# Oracle Business Continuity and Disaster Recovery on VMware Hybrid Multi-Clouds REFERENCE ARCHITECTURE

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# **Executive Summary**

### **Business Case**

Customers have successfully run their business-critical Oracle workloads with high-performance demands on VMware vSphere\* for many years. Virtualization of mission-critical databases adds layers of complexity to the infrastructure, however, making common operations like backup and recovery, cloning, disaster recovery and other day-to-day activities difficult. The most efficient storage operations for mission-critical databases are offloaded to the storage array.

Concerns that often delay virtualization of business-critical database workloads include:

- Rapid database growth and the need to reduce backup windows to meet performance and business SLAs
- The size of modern databases makes it harder to regularly clone and refresh data from production to QA and other environments
- · Correct choice of business continuity plan to ensure rapid recovery from significant disruption to the operations
- Correct choice of disaster recovery technology to ensure business needs of RTO and RPO are met

A business continuity plan is a detailed strategy and set of systems for ensuring an organization's ability to prevent or rapidly recover from a significant disruption to its operations. The plan is essentially a playbook for how any type of organization will continue its day-today business during a disaster scenario or otherwise abnormal conditions.

Disaster recovery (DR) is an organization's method of regaining access and functionality to its IT infrastructure after events like a natural disaster, cyber-attack, or even business disruptions related to the COVID-19 pandemic. DR is one aspect of business continuity. Disaster recovery relies upon the replication of data and computer processing in an off-premises location not affected by the disaster.

#### On-Premises with VMware vSphere

VMware vSphere provides many tools for customers to successfully ensure business continuity and disaster recovery for their businesscritical databases.

VMware snapshots preserve the state and data of a VM at the time the snapshot is taken. When a VM snapshot is captured, an image of the VM in a given state is copied and stored.

VMware Clone creates a VM that is a copy of the original VM. The new VM is configured with the same virtual hardware, installed software, and other properties that were configured for the original VM.

VMware Site Recovery Manager<sup>™</sup> is a business continuity and disaster recovery solution that helps you plan, test, and run the recovery of virtual machines between a protected VMware vCenter Server<sup>®</sup> site and a recovery vCenter Server site. One can use Site Recovery Manager to implement different types of recovery from the protected site to the recovery site.

VMware vSphere<sup>®</sup> Replication<sup>™</sup> is an extension to VMware vCenter Server that provides hypervisor-based virtual machine replication and recovery. vSphere Replication is an alternative to storage-based replication. It protects virtual machines from partial or complete site failures by replicating the virtual machines between sites.

Site Recovery Manager can also protect VMs in a datastore by using third-party disk replication mechanisms to configure array-based replication. Array-based replication surfaces replicated datastores to recover virtual machine workloads.

#### Migrating to VMware Cloud

Enterprise IT infrastructure and operations organizations are looking for ways to provide business continuity and disaster recovery for on-premises vSphere-based workloads to the public cloud, consolidate and extend data center capacities, and optimize, simplify and modernize their disaster recovery solutions.

VMware Cloud<sup>™</sup> on AWS is an on-demand service that enables customers to run applications across vSphere-based cloud environments with access to a broad range of AWS services.

VMware Site Recovery brings VMware enterprise-class SDDC disaster recovery-as-a-service to the AWS Cloud. VMware Site Recovery works in conjunction with VMware Site Recovery Manager 8.0 and VMware vSphere Replication 8.0 to automate the process of recovering, testing, re-protecting, and failing-back virtual machine workloads.



VMware Cloud Disaster Recovery is an on-demand disaster recovery service that provides an easy-to-use software-as-a-service (SaaS) solution and offers cloud economics to keep your disaster recovery costs under control. You can use VMware Cloud Disaster Recovery to protect your vSphere virtual machines by replicating them to the cloud and recovering them as needed to a target VMware Cloud SDDC. You can create the target SDDC immediately prior to performing a recovery, and it does not need to be provisioned to support replications in the steady state.

### Solution Overview

This paper describes the configuration and implementation of various business continuity and disaster recovery options across the application, VMware platform, and storage levels of Oracle single instance and Real Application Cluster (RAC) workloads on the VMware vSphere hybrid multi-cloud platform. This includes on-premises and VMware clouds, with an emphasis on VMware Cloud<sup>™</sup> on AWS.

#### **Key Results**

The following highlights validate the capability of the VMware vSphere hybrid multi-cloud platform, including on-premises and VMware clouds with a special emphasis on VMware Cloud on AWS, to provide business continuity and disaster recovery to business-critical Oracle single-instance and RAC workloads across application, VMware platform, and storage levels using native Oracle tools and VMware vSphere products.

# Introduction

#### Purpose

The following highlights validate the capability of the VMware vSphere hybrid multi-cloud platform, including on-premises and VMware clouds with a special emphasis on VMware Cloud on AWS, to provide business continuity and disaster recovery to business-critical Oracle single instance and RAC workloads across application, VMware platform, and storage levels using native Oracle tools and VMware vSphere products.

#### Audience

This reference architecture is intended for Oracle database administrators (DBAs) as well as virtualization and storage architects involved in planning, architecting, and administering business continuity and disaster recovery processes for business-critical Oracle environments on the VMware SDDC platform.

#### Terminology

The following terms are used throughout this paper:

| TERM  | DEFINITION   |
|---|--|
| Oracle Single Instance                              | An Oracle single-instance database consists of a set of memory structures, background processes, and physical database files, which serves the database users. |
| Oracle Clusterware                                  | Oracle Clusterware is a portable cluster software that allows clustering of independent servers so that they cooperate as a single system.                     |
| Oracle Automatic Storage Management<br>(Oracle ASM) | Oracle ASM is a volume manager and a file system for Oracle database files that support single-instance Oracle Database and RAC configurations.                |



| Oracle ASMLIB and Oracle ASMFD Oracle AS<br>device, so<br>helps prev | MLIB maintains permissions and disk labels that are persistent on the storage that the label is available even after an operating system upgrade. Oracle ASMFD ent corruption in Oracle ASM disks and files within the disk group. |
|--|--|
|--|--|

#### TABLE 1: Terminology

# Technology Overview

#### Overview

This section provides an overview of the technologies used in this solution:

- VMware vSphere<sup>®</sup>
- VMware Datastores
- VMware vSAN<sup>™</sup>
- VMware vSphere® Virtual Volumes™
- VMware Virtual Disks
- VMware Virtual Machine Snapshots
- VMware Virtual Machine Clones
- VMware Multi-Writer Attribute for Shared VMDKs
- VMware Site Recovery Manager<sup>™</sup>
- VMware vSphere<sup>®</sup> Replication<sup>™</sup>
- Hybrid and Multi-Cloud as the VMware Cloud
- VMware Cloud<sup>™</sup> on AWS
- VMware Cloud on Dell EMC
- Google Cloud VMware Engine
- Azure VMware Solution
- Oracle Cloud VMware Solution
- VMware Site Recovery
- VMware Cloud Disaster Recovery
- VMware Site Recovery Manager and vSphere Replication for other VMware Multi-Clouds
- Oracle Database Architecture
- Oracle ASM, ASMLIB and ASMFD
- Oracle Backup and Recovery
- Oracle User Managed Database Backup
- Oracle Crash-Consistent Backup
- Oracle RMAN
- Oracle Database Cloning
- Oracle Real Application Clusters on VMware vSphere
- Oracle Data Guard

### VMware vSphere

VMware vSphere<sup>\*</sup>, the industry-leading virtualization and cloud platform, is the efficient and secure platform for hybrid clouds, accelerating digital transformation by delivering simple and efficient management at scale, comprehensive built-in security, a universal application platform, and a seamless hybrid cloud experience. The result is a scalable, secure infrastructure that provides enhanced application performance and can be the foundation of any cloud.



As the next-generation infrastructure for next-generation applications, vSphere 7.0 has been rearchitected with native Kubernetes, enabling IT admins to use VMware vCenter Server\* to operate Kubernetes clusters through namespaces. VMware vSphere with Tanzu allows IT admins to leverage their existing skillset to deliver self-service infrastructure access to their DevOps teams, while providing observability and troubleshooting of Kubernetes workloads. vSphere 7 provides an enterprise platform for both traditional and modern applications, enabling customers and partners to deliver a developer-ready infrastructure, scale without compromise, and simplify operations.

Learn more about VMware vSphere 7.0.

#### VMware Datastores

VMware datastores are logical containers, analogous to file systems, that hide specifics of physical storage and provide a uniform model for storing virtual machine files. Datastores can also be used for storing ISO images, virtual machine templates, and floppy images.

To store virtual disks, VMware ESXi<sup>™</sup> uses datastores. The datastores are logical containers that hide specifics of physical storage from virtual machines (VM) and provide a uniform model for storing the VM files. The datastores that you deploy on block storage devices use the native vSphere virtual machine file system (VMFS) format. It is a special high-performance file system format that is optimized for storing VMs.

Depending on the storage you use, datastores can be of different types. VMware vCenter Server\* and ESXi support the following types of datastores:

- VMFS (version 5 and 6)
- NFS (version 3 and 4.1)
- vSAN
- vVols

Learn more about VMware Datastores.

### VMware vSAN

VMware vSAN<sup>™</sup> is VMware's software-defined storage solution, built from the ground up for vSphere virtual machines.

It abstracts and aggregates locally attached disks in a vSphere cluster to create a storage solution that can be provisioned and managed from vCenter and the vSphere client. vSAN is embedded within the hypervisor, hence storage and compute for VMs are delivered from the same x86 server platform running the hypervisor.

VMware vSAN-backed hyperconverged infrastructure (HCI) provides a wide array of deployment options, ranging from a two-node setup to a standard cluster with up to 64 hosts in a cluster. Also, vSAN accommodates a stretched cluster topology to serve as an active-active disaster recovery solution. vSAN incorporates HCI mesh, allowing customers to remotely mount a vSAN datastore to other vSAN clusters, disaggregating storage and compute. This allows greater flexibility to scale storage and compute independently.

Learn more about VMware vSAN.

### VMware vSphere Virtual Volumes

Historically, vSphere storage management used a datastore-centric approach. The datastore then is the lowest granularity level at which data management occurs from a storage perspective. However, a single datastore contains multiple virtual machines, all of which may have differing requirements. Using a traditional approach, it is difficult to meet the storage requirements of an individual VM.

With VMware vSphere<sup>®</sup> Virtual Volumes<sup>™</sup> (vVols), an individual VM, not the datastore, becomes a unit of storage management, while storage hardware gains complete control over virtual disk content, layout, and management.



vVols functionality helps to improve granularity. It helps to differentiate VM services on a per-application level by offering a new approach to storage management. Rather than arranging storage around features of a storage system, vVols arranges storage around the needs of individual virtual machines, making storage VM-centric.

More information on vVols datastores can be found on VMware Docs and Core.vmware.com/vVols.

### VMware Virtual Disks

It's possible to add large-capacity virtual disks to virtual machines and add more space to existing disks, even when the VM is running. Most virtual disk parameters can be set during VM creation or after the guest operating system is installed.

VM data can be stored in a new virtual disk, an existing virtual disk, or a mapped SAN LUN. A virtual disk appears as a single hard disk to the guest operating system. The virtual disk is composed of one or more files on the host file system. You can copy or move virtual disks on the same hosts or between hosts.

Virtual disks (VMDKs) can be provisioned on the above VMware datastores types. The concept of VMDK remains the same regardless of the underlying datastore types, the difference being in the way the underlying storage for the datastore is provisioned.

Learn more about VMware virtual disks.

#### VMware Virtual Machine Snapshots

Snapshots preserve the state and data of a VM at the time the snapshot is taken. When a VM snapshot is captured, an image of the VM in a given state is copied and stored. Snapshots are useful when frequently reverting to a particular VM state and creating multiple VMs is undesirable.

#### VMware snapshots are point-in-time (PIT) snapshots and therefore write-order fidelity is guaranteed for all VMDKs of the VM.

Snapshots for Oracle databases on VMware vSphere can be performed in three ways:

- Database using Oracle ACFS snapshots, for example, which is an online, read-only or read-write point-in-time copy of an Oracle ACFS file system. See *About Oracle ACFS Snapshots* for detailed information.
- vSphere VM using VMware snapshots.
- Storage using LUN-based snapshots available in a traditional storage array.

VMware vSphere, using VM snapshots, enables users to capture point-in-time state and data of a VM. This includes the VM's storage, memory, and other devices, such as virtual NICs.

Snapshots are useful for creating point-in-time state and data of a VM for backup or archival purposes and for creating test and rollback environments for applications.

For further information about using VM snapshots in a vSphere environment, see Using Snapshots To Manage Virtual Machines.

A VM snapshot can be taken through:

- Web Client GUI see Taking a Snapshot for detailed information.
- PowerCLI commands see PowerCLI Reference: New Snapshot for detailed information.

#### VMware Virtual Machine Clones

Cloning a VM creates a VM that is a copy of the original. The new VM is configured with the same virtual hardware, installed software, and other properties that were configured for the original VM.



Clones for Oracle databases on VMware vSphere can be performed in three ways:

- Database using Oracle Enterprise Manager Cloud Control, for example, or classic cloning using RMAN backups. See *Cloning Oracle Databases and Pluggable Databases* for more information.
- vSphere using VMware cloning technology.
- Storage using traditional storage-array-based cloning.

There are two types of cloning operations performed in this guide:

- Cloning of an entire VM containing all VMDKs, including the operating system, Oracle binaries, and Oracle data VMDKs.
- Cloning the database VMDKs of a VM alone.

For further information about VM cloning in a vSphere environment, see Clone a Virtual Machine.

### VMware Multi-Writer Attribute for Shared VMDKs

VMFS is a clustered file system that disables (by default) multiple VMs from opening and writing to the same virtual disk (.vmdk file). This prevents more than one VM from inadvertently accessing the same .vmdk file. The multi-writer option allows VMFS-backed disks to be shared by multiple VMs. An Oracle RAC cluster using shared storage is a common use case.

VMware vSphere on VMFS, VVols (beginning with ESXi 6.5), network files system (NFS) datastores and VMware vSAN prevents multiple VMs from opening the same virtual disk (VMDK) in read-write mode.

Current restrictions of the multi-writer attribute documented in KB 1034165 include:

- VMware vSphere® Storage vMotion® is disallowed.
- Snapshots are not supported (snapshots of VMs with independent-persistent disks are supported, however).
- Changed-block tracking (CBT) is not supported.
- Cloning, hot-extend virtual disk are not supported.

Independent-persistent mode is **NOT** required for enabling multi-writer attribute.

For further information about multi-writer attribute for shared VMDKs, see KB 1034165.

#### VMware Site Recovery Manager

VMware Site Recovery Manager<sup>™</sup> is a business continuity and disaster recovery solution that helps you plan, test, and run the recovery of virtual machines between a protected vCenter Server site and a recovery vCenter Server site.

You can use Site Recovery Manager to implement different types of recovery from the protected site to the recovery site.

Planned migration is the orderly migration of VMs from the protected site to the recovery site. Planned migration prevents data loss when migrating workloads in an orderly fashion. For planned migration to succeed, both sites must be running and fully functional.

Disaster recovery does not require that both sites be up and running, and it can be initiated in the event of the protected site going offline unexpectedly. During a disaster recovery operation, failure of operations on the protected site is reported, but otherwise ignored.

Site Recovery Manager orchestrates the recovery process with the replication mechanisms, to minimize data loss and system downtime.

See VMware Site Recovery Manager for more further details.

### VMware vSphere Replication

VMware vSphere<sup>\*</sup> Replication<sup>™</sup> is an extension to VMware vCenter Server that provides a hypervisor-based virtual machine replication and recovery.

vSphere Replication is an alternative to storage-based replication. It protects virtual machines from partial or complete site failures by replicating the VMs between the following sites:

- From a source site to a target site
- Within a single site from one cluster to another
- From multiple source sites to a shared remote target site

vSphere Replication provides several benefits as compared to storage-based replication:

- Data protection at a lower cost per VM.
- A replication solution that allows flexibility in the storage vendor selection at the source and target sites.
- Lower overall cost per replication.

With vSphere Replication, you can configure the replication of a virtual machine from a source site to a target site, monitor and manage the status of the replication, and recover the VM at the target site.

When you configure a VM for replication, the vSphere Replication agent sends changed blocks in the VM disks from the source site to the target site. The changed blocks are applied to the copy of the VM. This process occurs independently of the storage layer. vSphere Replication performs an initial full synchronization of the source VM and its replica copy. You can use replication seeds to reduce the network traffic that data transfer generates during the initial full synchronization.

During replication configuration, you can set a recovery point objective (RPO) and enable retention of instances from multiple points-intime (MPIT).

# Write-order fidelity is guaranteed with vSphere Replication on the disks or VMDKs that comprise a VM. However, consistency cannot be guaranteed across multiple VMs.

vSphere Replication supports replicating VMs on local, attached, vSAN, FC, iSCSI, or NFS storage. vSphere Replication cannot replicate VMs that are part of an MSCS cluster. vSphere Replication cannot replicate disks in multi-writer mode.

Learn more about Best Practices for Using and Configuring vSphere Replication.

For further information about VMware vSphere Replication, see VMware vSphere Replication and Array-Based Replication Versus vSphere Replication.

#### Hybrid and Multi-Cloud as the VMware Cloud

The term hybrid cloud describes the use of both private and public cloud platforms, working in conjunction. It can refer to any combination of cloud solutions that work together on-premises and off-site to provide cloud computing services to a company. A hybrid cloud environment allows organizations to benefit from the advantages of both types of cloud platforms and choose which cloud to use based on specific data needs.

A multi-cloud environment is as its name suggests, reflecting multiple and disparate cloud offerings and forms, all of which are part of the ubiquitous VMware cloud.

The VMware *hybrid cloud* portfolio offers a combination of solutions that enable organizations to easily extend, protect, or replace on-premises infrastructure. These hybrid cloud offerings are built on an SDDC architecture, leveraging VMware's industry-leading compute, networking, and storage virtualization technologies.

Any combination of clouds powered by VMware creates a common operating environment across VMware-based on-premises private clouds and VMware-based public clouds. Cloud solutions from VMware Cloud Provider<sup>™</sup> partners (VCPP) include IBM, Oracle, Microsoft, Google, Amazon Web Services (AWS) and others. Native public clouds such as AWS, Azure, Oracle and Google Cloud Platform using VMware technologies including VMware Cloud Foundation<sup>™</sup>, VMware vRealize<sup>\*</sup> and VMware Cloud<sup>™</sup> Services – along with on-premises managed cloud services such as VMware Cloud on DellEMC – form the core of VMware Cloud<sup>™</sup> offerings.



This approach enables a diverse set of use cases, including regional capacity expansion, disaster recovery, application migration, data center consolidation, new application development and burst capacity.

Learn more about VMware Hybrid Cloud.

#### VMware Cloud on AWS

VMware Cloud on AWS is an on-demand service that enables customers to run applications across vSphere-based cloud environments with access to a broad range of AWS services. Powered by VMware Cloud Foundation, this service integrates vSphere, vSAN and VMware NSX\* along with VMware vCenter management, and is optimized to run on dedicated, elastic, bare-metal AWS infrastructure.

With VMware Hybrid Cloud Extension<sup>™</sup>, customers can easily and rapidly perform large-scale bi-directional migrations between on-premises and VMware Cloud on AWS environments.

With the same architecture and operational experience on-premises and in the cloud, IT teams can now quickly derive instant business value from use of the AWS and VMware hybrid cloud experience. VMware Cloud on AWS is ideal for enterprise IT infrastructure and operations organizations looking to migrate on-premises vSphere-based workloads to the public cloud, consolidate and extend data center capacities, and optimize, simplify, and modernize their disaster recovery solutions.





Learn more about VMware Cloud on AWS.

#### VMware Cloud on Dell EMC

VMware Cloud on Dell EMC combines the simplicity and agility of the public cloud with the enhanced security and control of on-premises infrastructure, delivered as-a-service to data center and edge locations. This fully managed VMware Cloud service provides a simple, secure, and scalable infrastructure for customer's on-premises datacenter and edge locations. Industry-leading compute, storage, and networking software from VMware is integrated with enterprise-class Dell EMC VxRail hardware, empowering you to drive any enterprise workload. The unique approach of this service empowers customers to focus on business innovation and differentiation, while VMware operates the entire infrastructure end-to-end.



VMware Cloud on Dell EMC is a fully managed VMware Cloud Service which includes a physical Dell VxRail hyperconverged infrastructure built to a customer's capacity needs and is delivered onsite preloaded with vSphere, NSX, and vSAN software. Included with this service is full management of the hardware infrastructure, including monitoring, software patching and upgrades, security updates, lifecycle management and break-fix service in the event of a hard failure. This service is backed by an enterprise-grade service-level agreement (SLA).





Learn more about VMware Cloud on Dell EMC.

#### Google Cloud VMware Engine

Google Cloud VMware Engine (GCVE) allows organizations to seamlessly migrate and run their VMware workloads to the cloud. This solution offers flexible on-demand capacity and full operational consistency with your existing on-premises environments, allowing you to harness the power of the Google Cloud Platform to modernize your infrastructure, operations, and processes.

By integrating VMware flagship compute, storage, network virtualization, and management technologies with dedicated, elastic, baremetal infrastructure, Google Cloud VMware Engine allows customers to access the agility, scale, and innovative services of the cloud while maintaining operational consistency and leveraging existing tools and investments.



#### FIGURE 3. Google Cloud VMware Engine

Learn more about Google Cloud VMware Engine.

#### Azure VMware Solution

Azure VMware Solution (AVS) is a first-party Microsoft service that delivers the VMware SDDC stack as a managed service—sold, operated, and supported by Microsoft—running natively on bare-metal infrastructure in the Microsoft Azure Cloud. Azure VMware Solution is a VMware Cloud-verified platform that offers vSphere, vSAN, NSX-T, and more, while being seamlessly integrated into Microsoft Azure infrastructure and management tools.

With Azure VMware Solution, you can modernize your infrastructure by seamlessly moving vSphere-based workloads directly to Microsoft Azure without application changes. Because Azure VMware Solution uses the same VMware SDDC components you use on-premises, you can leverage the same skills and tools you use every day to build an elastic, hybrid, and scalable platform for your existing or new vSphere applications.



#### FIGURE 4. Azure VMware Solution

#### Learn more about Azure VMware Solution.

### **Oracle Cloud VMware Solution**

Oracle Cloud VMware Solution (OCVS) integrates VMware on-premises tools, skillsets, and processes with public Oracle Cloud services. The solution is a customer-managed, native VMware cloud environment based on VMware Validated Design<sup>™</sup> for use with the public Oracle Cloud. It allows enterprises to access the scale and agility of the Oracle Cloud while extending VMware-based workloads and applications across the Oracle Cloud. It also empowers enterprises to reduce operational costs and complexity, while mitigating operational risk.

Oracle Cloud VMware Solution leverages VMware Cloud Foundation compute, network virtualization, and storage functions deployed to Oracle bare-metal hosts in the Oracle Cloud. This consistent, unified cloud infrastructure and operations platform will enable your enterprise to migrate and modernize applications faster while seamlessly moving workloads between on-premises environments and Oracle Cloud at scale. Enterprises can now move or extend VMware-based workloads without rearchitecting applications or retooling operations. Your IT teams can also easily leverage Oracle services, such as Oracle Autonomous Database, Exadata Cloud, and Database Cloud, from the same cloud data centers, on the same networks, with consistent portal access and modernized APIs.





# 

Learn more about Oracle Cloud VMware Solution.

#### VMware Site Recovery

VMware Site Recovery brings VMware enterprise-class SDDC disaster recovery-as-a-service to the AWS Cloud. It enables customers to protect and recover applications without the requirement for a dedicated secondary site. It is delivered, sold, supported, maintained and managed by VMware as an on-demand service. IT teams manage their cloud-based resources with familiar VMware tools—without the difficulties of learning new abilities or utilizing new tools.

VMware Site Recovery is an add-on feature to VMware Cloud on AWS, powered by VMware Cloud Foundation. VMware Cloud on AWS integrates VMware flagship compute, storage, and network virtualization products—VMware vSphere, VMware vSAN, and VMware NSX—along with VMware vCenter Server management. It optimizes them to run on elastic, bare-metal AWS infrastructure. With the same architecture and operational experience on-premises and in the cloud, IT teams can now get instant business value via the AWS and VMware hybrid cloud experience.

VMware Site Recovery works in conjunction with VMware Site Recovery Manager and VMware vSphere Replication to automate the process of recovering, testing, re-protecting, and failing-back virtual machine workloads.

VMware Site Recovery utilizes VMware Site Recovery Manager servers to coordinate the operations of the VMware SDDC. This is so that as VMs at the protected site are shut down, copies of these VMs at the recovery site start up. By using the data replicated from the protected site, these VMs assume responsibility for providing the same services.

VMware Site Recovery can be used between a customer's datacenter and an SDDC deployed on VMware Cloud on AWS, or it can be used between two SDDCs deployed to different AWS availability zones or regions. The second option allows VMware Site Recovery to provide a fully VMware managed and maintained disaster recovery solution.

For further information about VMware Site Recovery, see VMware Site Recovery Technical Overview.

#### VMware Cloud Disaster Recovery

VMware Cloud Disaster Recovery is an on-demand disaster recovery service that provides an easy-to-use software-as-a-service (SaaS) solution and offers cloud economics to keep your disaster recovery costs under control.



FIGURE 6. VMware Cloud Disaster Recovery

You can use VMware Cloud Disaster Recovery to protect your vSphere VMs by replicating them to the cloud and recovering them as needed to a target VMware Cloud SDDC. You can create the target SDDC immediately prior to performing a recovery, and it does not need to be provisioned to support replications in the steady state.

You can protect VMs in vSphere environments running on any storage with the *DRaaS Connector*. With the DRaaS Connector in a vSphere environment (on-premises or cloud), you can back up VMs using *protection groups* which are replicated to the scale-out cloud file System (SCFS) using regularly scheduled snapshots. You can define which snapshots to use if there is a disaster or planned recovery using *DR plans*. VMs captured in snapshots are then restarted on the recovery SDDC in VMware Cloud on AWS.

VMware Cloud Disaster Recovery lets you *deploy a recovery SDDC* in VMware Cloud on AWS to use for recovery and testing of your DR plans. You can add hosts, new networks, request public IP addresses, configure NAT rules, and also delete the recovery SDDC. In the event of a disaster or planned recovery operation, you can recover VMs from your protected site to your recovery SDDC.

#### VMware Cloud Disaster Recovery uses regularly scheduled snapshots to replicate to the SCFS. VMware snapshots are point-intime (PIT) snapshots and are therefore crash-consistent.

VMware snapshots are not compatible with disks in multi-writer mode and VMware Cloud Disaster Recovery cannot replicate disks in multi-writer mode. Learn more about VMware Cloud DR and shared disks.

Both VMware Cloud Disaster Recovery and VMware Site Recovery are DRaaS solutions that can be used to protect mission-critical applications. Refer to VMware documentation for the RPO and RTO values for DRaaS solutions.

Learn more about *VMware Cloud DR Backup Considerations*. For further information about VMware Cloud Disaster Recovery, see VMware Cloud Disaster Recovery Documentation.

#### VMware Site Recovery Manager and vSphere Replication for other VMware Multi-Clouds

VMware Site Recovery Manager, along with VMware vSphere Replication, can be used to provide disaster recovery services from on-premises VMware environments to other VMware multi-clouds including VMware Cloud on Dell EMC, Google Cloud VMware Engine, Azure VMware Solutions, or Oracle Cloud VMware Solution.

Information on Site Recovery Manager and vSphere Replication for VMware Cloud on Dell EMC is the same as on-premises VMware environments.

Further information about Site Recovery Manager and vSphere Replication for Google Cloud VMware Engine (GCVE) can be found at *Configuring disaster recovery using VMware SRM*.

Further information about Site Recovery Manager and VMware vSphere Replication for Azure VMware Solution can be found at Set up Private Cloud as a disaster recovery target with VMware Site Recovery Manager.

Further information about Site Recovery Manager and vSphere Replication for Oracle Cloud VMware Solution can be found at Implement the VMware Site Recovery Manager.

#### **Oracle Database Architecture**

Oracle Database 19c, the latest generation of the world's most popular database, provides businesses of all sizes with access to the world's fastest, most scalable, and reliable database technology for secure and cost-effective deployment of transactional and analytical workloads in the cloud, on-premises and in hybrid cloud configurations.

An Oracle database server consists of a database and at least one database instance. In Oracle RAC, an Oracle database will have more than one instance accessing the database.

- A database is a set of files, located on disk, that store data. These files can exist independently of a database instance.
- An instance is a set of memory structures that manage database files. The instance consists of a shared memory area, called the system global area (SGA), and a set of background processes. An instance can exist independently of database files.



The physical database structures that comprise a database are:

- Data files Every Oracle database has one or more physical data files, which contain all database data. The data of logical database structures, such as tables and indexes, is physically stored in the data files.
- Control files Every Oracle database has a control file. A control file contains metadata specifying the physical structure of the database, including the database name, along with the names and locations of the database files.
- Online redo log files Every Oracle database has an online redo log, representing a set of two or more online redo log files. An online redo log is made up of redo entries (also called redo log records), which record all changes made to data.
- Many other files, including parameter files, archived redo files, backup files and networking files, are important to any oracle database operation.

Learn more about Oracle database architecture.

#### Oracle ASM, ASMLIB and ASMFD

#### ASM

Oracle Automatic Storage Management (ASM) is a volume manager and a file system for Oracle database files that supports singleinstance Oracle Database and Oracle RAC configurations.

Oracle ASM is Oracle's recommended storage-management solution that can be used for both Oracle RAC and single-instance Oracle databases and provides an alternative to conventional volume managers, file systems, and raw devices.

Oracle ASM uses disk groups to store data files. An Oracle ASM disk group is a collection of disks that Oracle ASM manages as a unit. Users can add or remove disks from a disk group while a database continues to access files from the disk group.

Learn more about Oracle Automatic Storage management (ASM).

#### ASMLIB

Oracle ASMLIB maintains permissions and disk labels that are persistent on the storage device, so that the label is available even after an operating system upgrade.

The Oracle ASMLIB driver simplifies the configuration and management of block disk devices by eliminating the need to rebind block disk devices used with Oracle ASM each time the system is restarted.

Learn more about Oracle ASMLIB.

#### ASMFD

Oracle ASMFD helps prevent corruption in Oracle ASM disks and files within the disk group. Oracle ASMFD simplifies the configuration and management of disk devices by eliminating the need to rebind disk devices used with Oracle ASM each time the system is restarted.

Learn more about Oracle ASMFD.

#### Oracle Backup and Recovery

The purpose of backup and recovery is to protect the database against data loss and reconstruct the database after data loss. Oracle provides different options for database backup and recovery.

Oracle Recovery Manager (RMAN) is the most popular and preferred backup solution for Oracle Database.



Common Oracle backup and recovery options include:

- User-managed database backup (hot and cold backup)
- Crash-consistent backup using storage-based snapshots
- Oracle RMAN
- Oracle Data Pump export/import

Learn more about Oracle Backup and Recovery Solutions.

#### Oracle User Managed Database Backup

The user-managed backup and recovery mechanism includes performing backup and recovery with a mixture of host operating system commands and SQL\*Plus recovery commands. This strategy does not depend on using Oracle RMAN.

A database-consistent backup is a whole database backup that can be opened with the RESETLOGS option without performing media recovery. It's not necessary to apply redo to this backup to make it consistent. Unless the redo generated is applied after the consistent backup is created, however, all transactions since the time of the consistent backup will be lost.

All datafiles in a consistent backup must:

- Have the same checkpoint system change number (SCN) in their headers, unless they are datafiles in tablespaces that are read-only or offline normal (in which case they will have a clean SCN that is earlier than the checkpoint SCN).
- Contain no changes past the checkpoint SCN (i.e., are not fuzzy).
- Match the data file checkpoint information stored in the control file.

See Oracle Backup and Recovery User Guide for more information.

Consistent backups can only be taken after a clean shutdown has been completed or by turning on hot backup mode of the database. This is the most trusted backup by DBAs but is also complex, as the admin will need to run scripts to put the database in hot-backup mode, take a snapshot, and then take the database out of the hot-backup mode.

Oracle data pump backups are logical database backups in that they extract logical definitions and data from the database to a file.

With a cold backup, it's possible to make a consistent whole database backup of all files in a database after the database is shut down with the **NORMAL**, **IMMEDIATE**, or **TRANSACTIONAL** options.

See Making User-Managed Backups of the Whole Database for more information.

With a hot backup, this would require:

- Putting the tablespace or database (depending on whether it is a tablespace level or database level backup) in a **BEGIN** backup mode by the **ALTER TABLESPACE/DATABASE BEGIN BACKUP** command.
- Taking an operating system-level backup of the tablespace or database data files.
- Taking the tablespace or database out of the backup mode with the ALTER TABLESPACE/ DATABASE END BACKUP command.

There is overhead involved in transitioning a database in and out of backup mode:

- Additional redo data is logged.
- Complete database checkpoint is required.
- More operational steps and complexity during the backup operation



#### Oracle Crash-Consistent Backup

A crash-consistent backup is the backup of a point-in-time image of an Oracle database that is equivalent to a database crash induced by a power outage, other failures, or a shutdown abort.

When the database is started up, instance recovery (i.e., the process of applying records in the online redo log to data files to reconstruct changes) is performed automatically to bring the database to a consistent state.

This is one of the most common backup methods used for storage-based backups and is fully supported by Oracle as long as the following conditions are met.

As noted in *Supported Backup, Restore and Recovery Operations using Third Party Snapshot Technologies* (Oracle Doc ID 604683.1), third-party vendor snapshots must conform to the following requirements:

- Integrated with Oracle's recommended restore and recovery operations above
- Database crash-consistent at the point of the snapshot
- Write-ordering is preserved for each file within a snapshot

See Making Backups with Third-Party Snapshot Technologies for more information.

### Oracle RMAN

Oracle RMAN is an Oracle Database client that performs backup and recovery tasks on databases and automates administration of backup strategies. It greatly simplifies backing up, restoring, and recovering database files.

The RMAN environment consists of the utilities and databases that play a role in backing up data. Minimally, the environment for RMAN must include the following components:

- A target database An Oracle database to which RMAN is connected with the **TARGET** keyword. A target database is a database on which RMAN is performing backup and recovery operations. RMAN always maintains metadata about its operations on a database in the control file of the database. The RMAN metadata is known as the RMAN repository.
- The RMAN client An Oracle database executable that interprets commands, directs server sessions to execute those commands, and records its activity in the target database control file. The RMAN executable is automatically installed with the database and is typically located in the same directory as the other database executables.

Advantages of Oracle RMAN-based backups include:

- Only used space in the database is backed up
- RMAN does not put tablespaces in backup mode, saving on redo-generation overhead. RMAN will re-read database blocks until it gets a consistent image of it.

Learn more about Oracle RMAN.

#### Oracle Database Cloning

Cloning of an Oracle database is the process of making an exact copy of another database for various reasons. The cloned database is both fully functional and separate in its own right.

Use cases for cloning include making copies of the production database to use it:

- As a development database for developing new applications or adding new features to existing applications.
- As a QA database for testing existing software for bugs or testing new software features or versions.
- As a test database for backup and recovery scenarios.
- To provision a copy of a database for different business units.
- To test database patching, upgrade, and migration strategies.
- To benchmark for performance.

# 

After cloning, the DBA may choose to mask sensitive data in the cloned database before releasing it for general consumption.

For example, a production database for a credit card company will have real customer data that cannot be revealed for security purposes, so Oracle data-masking is used to mask customer names and social security number.

Examples of database cloning include using Oracle Enterprise Manager Cloud Control or classic cloning using RMAN backups. See *Cloning Oracle Databases and Pluggable Databases* for more information.

The database cloning process may also occasionally include making copies of Oracle database home directories, along with a copy of the Oracle database, for those instances when testing database patching, upgrade, or migration strategies is needed.

#### Oracle Real Application Clusters on VMware vSphere

Oracle Clusterware is portable cluster software that provides comprehensive multi-tiered high availability and resource management for consolidated environments. It supports clustering of independent servers so that they cooperate as a single system.

Oracle Clusterware is the integrated foundation for Oracle Real Application Clusters (Oracle RAC), and the high-availability and resource management framework for all applications on any major platform.

Learn more about Oracle Clusterware 19c.

There are two key requirements for Oracle RAC:

- Shared storage
- Multicast Layer 2 networking

These requirements are fully addressed when running Oracle RAC on VMware vSphere, as both shared storage and Layer 2 networking are natively supported by vSphere.

vSphere high availability (HA) clusters enable a collection of ESXi hosts to work together so that, as a group, they provide higher levels of infrastructure-level availability for VMs than each ESXi host can provide individually.

vSphere HA provides high availability for VMs by pooling the VMs and the hosts they reside on into a cluster. Hosts in the cluster are monitored and, in the event of a failure, the VMs on a failed host are restarted on alternate hosts.

When creating a vSphere HA cluster, a single host is automatically elected as the master host. The master host communicates with vCenter Server and monitors the state of all protected VMs and of the slave hosts.

Learn more about VMware vSphere HA.

Oracle RAC and VMware HA solutions are completely complementary to each other. Running Oracle RAC on a VMware platform provides the application-level HA enabled by Oracle RAC, in addition to the infrastructure-level HA enabled by VMware vSphere.

Learn more about Oracle RAC on VMware vSphere.

# Oracle Data Guard

Oracle Data Guard provides a comprehensive set of services that create, maintain, manage, and monitor one or more standby databases to enable production Oracle databases to survive disasters and data corruptions. Oracle Data Guard maintains these standby databases as copies of the production database.

Then, if the production database becomes unavailable because of a planned or an unplanned outage, Oracle Data Guard can switch any standby database to the production role, minimizing the downtime associated with the outage. Oracle Data Guard can be used with traditional backup, restoration, and cluster techniques to provide a high level of data protection and data availability.

Learn more about Oracle Data Guard.



# Solution Configuration

This section introduces the resources and configurations for the solution, including:

- Architecture diagram
- Hardware resources
- Software resources
- Network configuration
- Storage configuration
- Pure Storage Plugin for VMware vSphere client
- VM and Oracle configuration
- VMware Site Recovery Manager with vSphere Replication
- VMware Site Recovery Manager with Array-Based Replication (LUN level and vVOL Level)
- VMware Site Recovery
- VMware Cloud Disaster Recovery

# Architecture Diagram

This solution architecture relies on a three-site scenario:

- On-premises vSphere cluster on Site A (Santa Clara)
- On-premises vSphere cluster on Site B (Wenatchee)
- VMware Cloud on AWS



FIGURE 7. Site Architecture Diagram

The on-premises setup features two separate and dedicated vSphere cluster configurations: Site A and Site B.

- Site A is hosting production RAC and single-instance workloads.
- Site B is hosting non-production RAC and non-RAC workloads, including disaster recovery (DR).
- Both sites are connected to VMware Cloud on AWS.

Site A infrastructure details are as follows:

- vCenter sc2wvc03.vslab.local version 7.0.2 Build 17694817
- vSphere cluster BCA-SiteC with 4-nodes running ESXi version 7.0.2 Build 17867351
- Each ESXi server is a Dell PowerEdge R640 Server with Intel<sup>®</sup> Xeon<sup>®</sup> Platinum 8168 CPU @ 2.70GHz with 2x24 cores, and 384GB RAM with hyperthreading
- Each ESXi server has access to a Pure Storage FlashArray//x50 (Purity/FA 6.1.6) for both block FC storage and vVols
- Each ESXi server features:
  - 2 x QLogic ISP2812-based 64/32G Fibre Channel to PCIe Controller for FC storage
  - -2 x Intel® Ethernet Controller X710 for 10GbE SFP+ for network connection

Site B infrastructure details are as follows:

- Virtual Center az2wvc01.vslab.local version 7.0.2 Build 17694817
- vSphere cluster AZ2-DC with 3-nodes running ESXi version 7.0.2 Build 17867351
- Each ESXi server is a Dell PowerEdge R740 Server with Intel<sup>®</sup> Xeon<sup>®</sup> Platinum 8168 CPU @ 2.70GHz with 2x24 cores, and 1TB RAM with hyperthreading
- Each ESXi server has access to a Pure Storage FlashArray//x50 (Purity/FA 6.1.6) for both block FC storage and vVols
- Each ESXi server features:
  - 2 x Emulex LightPulse LPe32000 Gen 6 16/32G PCIe Fibre Channel Adapter for FC storage
  - 2 x Intel® Ethernet Controller X710 for 10GbE SFP+ for network connection

The VMware Cloud on AWS setup has the following configuration:

- Virtual Center vcenter.sddc-44-232-220-144.vmwarevmc.com Version 7.0.2 Build 18231847
- A two-node cluster for VMware Cloud on AWS setup, each ESXI server version 7.0.2 Build 18226209
- Each ESXi server is an Amazon EC2 i3.metal with 2 sockets, 18 cores each with Intel Xeon processor E5-2686 v4 at 2.30GHz without HyperThreading and 512GB RAM memory
- Storage provided by the HCI vSAN instance

| (]) B, E Ø  | Cluster-1 Actions Y   |   |
|---|---|---|
| 🧹 🍘 vcenter.sddc-44-232-220-144.vmwarevmc.com   | Summary Monitor Configure Permissions Hosts VMs Datastores Networks Updates   |   |
| <ul> <li>➤ I) SDDC-Datacenter</li> <li>✓ [] Cluster-1</li> <li>[] 10.129.32.4</li> <li>[] 10.129.32.5</li> <li>&gt; ○ Compute-ResourcePool</li> <li>&gt; ⊘ Mgmt-ResourcePool</li> <li>&gt; I) 10.129.128.4</li> </ul> | Total Processors: 72<br>Total VMotion Migrations: 2<br>Fault Domains:<br>A UT |   |
|   | Related Objects   | ~ |
|   | vSphere HA  | ~ |
|   | Cluster Services  | ~ |
|   | Custom Attributes   | ~ |
|   | vSAN Overview   | ~ |

### FIGURE 8. VMware Cloud on AWS Setup

# Hardware Resources

Below are the hardware resources for the vSphere cluster on Site A:

| DESCRIPTION              | SPECIFICATION  |
|--------------------------|--|
| Server                   | 4 x ESXi server  |
| Server Model             | Dell PowerEdge R640  |
| CPU                      | 2 sockets with 24 cores each, Intel <sup>®</sup> Xeon <sup>®</sup> Platinum 8168 CPU @ 2.70GHz with hyperthreading enabled |
| RAM                      | 384GB RAM  |
| Storage controller       | 2 x QLogic ISP2812-based 64/32G Fibre Channel to PCIe Controller for FC storage  |
| Storage Array            | Pure x50 AFA (Purity/FA 6.1.6)   |
| Network                  | 2 x Intel* Ethernet Controller X710 for 10GbE SFP+ for network connection  |
| Internal Disk Controller | Dell HBA330 Mini   |
| Internal Disks           | Cache—1 x 372.61GB SSD ATA<br>Capacity—2 x 894.25GB SSD ATA  |
| vSAN Disk Group          | 1 vSAN Disk Group per ESXi server  |

TABLE 2. Site A Hardware Resources



The following summarizes the vCenter **sc2wvcO3.vslab.local**, vSphere cluster **BCA-SiteC** and one of the ESXi servers in the vSphere cluster on Site A:

| 🗗 sc2v  | wvc03.v  | slab.local    | ACTIONS V   |             |   |              |                             |                |                 |     |           |
|---------|----------|---------------|-------------|-------------|---|--------------|-----------------------------|----------------|-----------------|-----|-----------|
| Summary | Monitor  | Configure     | Permissions | Datacenters | Hosts & Clusters                                    | VMs          | Datastores                  | Networks       |                 |     |           |
| Hosts   | Clusters | Host Profiles |             |             |   |              |                             |                |                 |     |           |
| Name 🛧  |          |               |             |             | ~ A   | vailable CPU | ~ Ave                       | ailable Memory |                 |     |           |
| []] BCA | -SiteC   |               |             |             | 5   | 11.65 GHz    | 1,3                         | 40.05 GB       |                 |     |           |
|         |          |               |             | Hosts       | -SiteC Agrious<br>Monitor Configu<br>Resource Pools | ♥<br>re Perm | hissions Hosts              | VMs Data:      | stores Networks | Upd | ates      |
|         |          |               |             | Name ↑      |   |              | <ul> <li>✓ State</li> </ul> | ~              | Status          | ~   | Cluster   |
|         |          |               |             | sc2es       | sx09.vslab.local                                    |              | Connec                      | ted            | 🗸 Normal        |     | BCA-SiteC |
|         |          |               |             | sc2es       | sx10.vslab.local                                    |              | Connec                      | ted            | Vormal          |     | BCA-SiteC |
|         |          |               |             | . sc2es     | sx11.vslab.local                                    |              | Connec                      | ted            | Vormal          |     | BCA-SiteC |
|         |          |               |             | . sc2es     | sx12.vslab.local                                    |              | Connec                      | ted            | Vormal          |     | BCA-SiteC |

FIGURE 9. Site A vCenter and vSphere Cluster

| sc2es     | x09.vslab.lc  | cal  | ACTIONS Y   |                       |                   |               |         |  |  |
|-----------|---|--|---|-----------------------|-------------------|---------------|---------|--|--|
| Summary   | Monitor Con   | figure   | Permissions   | VMs                   | Datastores        | Networks      | Updates |  |  |
| 0         | Hypervisor:<br>Model:<br>Processor Type<br>Logical Process<br>NICs:<br>Virtual Machine<br>State:<br>Uptime: | VMv<br>Pow<br>e: Intel<br>ors: 96<br>6<br>s: 8<br>Coni<br>46 d | vare ESXi, 7.0.2,<br>erEdge R640<br>(R) Xeon(R) Plat<br>nected<br>ays | 17867351<br>inum 8168 | CPU @ 2.70GHz     |               |         |  |  |
| Hardware  |   |  |   |                       |                   |               |         |  |  |
| Manufa    | cturer  |  |   | ell Inc.              |                   |               |         |  |  |
| Model     |   |  | P   | PowerEdge R640        |                   |               |         |  |  |
| ✓ CPU     |   |  |   |                       |                   |               |         |  |  |
| CPU C     | ores  |  | [   | 48 CPUs               | s x 2.69 GHz      |               |         |  |  |
| Proces    | ssor Type   |  | I   | ntel(R) Xeo           | on(R) Platinum 81 | 68 CPU @ 2.70 | GHz     |  |  |
| Socke     | ts  |  | :   | 2                     |                   |               |         |  |  |
| Cores     | per Socket  |  | :   | 24                    |                   |               |         |  |  |
| Logica    | al Processors   |  | 9   | 96                    |                   |               |         |  |  |
| Hyper     | threading   |  | ,   | Active                |                   |               |         |  |  |
| Memor     | У   |  |   | 58.29 GE              | 3 / 383.44 GB     |               |         |  |  |
| Persiste  | ent Memory  |  |   | 1.28 GB /             | 95.98 GB          |               |         |  |  |
| > Virtual | Flash Resource  |  | 8   | .58 GB / 11           | 9.75 GB           |               |         |  |  |
| > Networ  | rking   |  | S   | c2esx09.v             | slab.local        |               |         |  |  |
| > Storage | 9   |  | 10  | 0 Datastor            | e(s)              |               |         |  |  |

FIGURE 10. Site A VMware ESXI Server Summary



Below are the hardware resources for the vSphere cluster on Site B:

| DESCRIPTION              | SPECIFICATION  |
|--------------------------|--|
| Server                   | 3 x ESXi server  |
| Server Model             | Dell PowerEdge R740  |
| CPU                      | 2 sockets with 24 cores each, Intel <sup>®</sup> Xeon <sup>®</sup> Platinum 8168 CPU @ 2.70GHz with Hyperthreading enabled |
| RAM                      | 1TB RAM  |
| Storage controller       | 2 x Emulex LightPulse LPe32000 Gen 6 16/32G PCIe Fibre Channel Adapter for FC storage                                      |
| Storage Array            | Pure x50 AFA (Purity/FA 5.3.10)  |
| Network                  | 2 x Intel* Ethernet Controller X710 for 10GbE SFP+ for network connection  |
| Internal Disk Controller | Dell HBA330 Mini   |
| Internal Disks           | Cache—1 x 372.61GB Samsung SSD ATA<br>Capacity—3 x 894.25GB SSD ATA  |
| vSAN Disk Group          | 1 vSAN Disk Group per ESXi server  |

#### TABLE 3. Site B Hardware Resources

The following summarizes the vCenter **az2wvcO1.vslab.local**, vSphere cluster **AZ2-DC** and one of the ESXi servers in the vSphere cluster on Site B:

| 🕝 az2wvc01.vslab.local 🛛 Actions 🗸    |   |                           |                  |                 |              |
|---------------------------------------|---|---------------------------|------------------|-----------------|--------------|
| Summary Monitor Configure Permissions | Datacenters Hosts & Clusters                        | VMs Datastores            | Networks I       |                 |              |
| Hosts Clusters Host Profiles          |   |                           |                  |                 |              |
|                                       |   |                           |                  |                 |              |
| Name ↑                                | ~   | Available CPU 🛛 🗸         | Available Memory |                 |              |
| []] AZ2BCA11                          |   | 387.52 GHz                | 3,412.97 GB      |                 |              |
| ÷.                                    | ■ AZ2-DC ACTIONS ✓<br>Summary Monitor Configure Per | missions Hosts & Clusters | VMs Datastores   | Networks Update | 5            |
|                                       | Hosts Clusters Resource Pools H                     | lost Folders              |                  |                 |              |
|                                       | Name ↑  | ~                         | State ~          | Status ~        | Cluster      |
|                                       | az2esx22.vslab.local                                |                           | Connected        | 🗸 Normal        | () AZ2BCA11  |
|                                       | az2esx23.vslab.local                                |                           | Connected        | V Normal        | []] AZ2BCA11 |
|                                       | az2esx24.vslab.local                                |                           | Connected        | V Normal        | []] AZ2BCA11 |

FIGURE 11. Site B vCenter and vSphere Cluster

| az2     | az2esx22.vslab.local Actions V  |  |   |                        |                  |              |         |  |  |  |
|---------|---|--|---|------------------------|------------------|--------------|---------|--|--|--|
| Summary | y Monitor   | Configure  | Permissions   | VMs                    | Datastores       | Networks     | Updates |  |  |  |
| 0       | Hypervisor<br>Model:<br>Processor 1<br>Logical Pro<br>NICs:<br>Virtual Mac<br>State:<br>Uptime: | :: VMv<br>Pow<br>Type: Intel<br>ccessors: 96<br>6<br>chines: 0<br>Con<br>41 di | vare ESXI, 7.0.2,<br>erEdge R740<br>(R) Xeon(R) Platii<br>nected<br>ays | 17867351<br>num 8168 ( | :PU @ 2.70GHz    |              |         |  |  |  |
| Hardwa  | ire   |  |   |                        |                  |              |         |  |  |  |
| Mar     | nufacturer  |  | Del   | Inc.                   |                  |              |         |  |  |  |
| Мо      | del   |  | Pov   | PowerEdge R740         |                  |              |         |  |  |  |
| V CPU   | U,  |  |   |                        |                  |              |         |  |  |  |
| CF      | PU Cores  |  |   | 48 CPUs x              | 2.69 GHz         |              |         |  |  |  |
| Pre     | ocessor Type  |  | Int   | el(R) Xeon(            | R) Platinum 8168 | CPU @ 2.70GH | z       |  |  |  |
| So      | ockets  |  | 2   |                        |                  |              |         |  |  |  |
| Co      | ores per Socket   |  |   | 24                     |                  |              |         |  |  |  |
| Lo      | gical Processors  |  | 96  |                        |                  |              |         |  |  |  |
| Hy      | perthreading  |  | Ac  | tive                   |                  |              |         |  |  |  |
| Mei     | mory  |  |   | 9.31 GB / 1.           | 12 TB            |              |         |  |  |  |
| > Virt  | tual Flash Resource   |  | 16.2  | 29 GB / 103            | .5 GB            |              |         |  |  |  |
| > Net   | tworking  |  | az2   | esx22.vsla             | b.local          |              |         |  |  |  |
| > Sto   | rage  |  | 2 D   | atastore(s)            |                  |              |         |  |  |  |

#### FIGURE 12. Site B Vmware Esxi Server Summary

The following hardware resources are utilized for VMware Cloud on AWS:

| DESCRIPTION      | SPECIFICATION   |
|------------------|---|
| Server           | 2 x ESXi servers  |
| Server model     | Amazon EC2 i3.metal   |
| CPU              | Two sockets, 18 cores each, Intel Xeon processor E5-2686 v4 at 2.30GHz without HyperThreading |
| RAM              | 512GB   |
| Disks            | (8) NVMe drives, each drive 1.73TB across two vSAN disk groups                                |
| vSAN disk groups | Two disk groups, each disk group with (1) NVMe for cache and (3) NVMe for capacity            |
| Network          | 25G Amazon Elastic Network Adapter (ENA)  |

#### TABLE 4. VMware Cloud on AWS Hardware Resources

# 

The following summarizes one of the ESXi servers in the VMware Cloud on AWS:

| 10.129    | 9.32.4  | ACTIONS                                      | ~   |                                     |                            |                 |               |         |
|-----------|---|--|---|-------------------------------------|----------------------------|-----------------|---------------|---------|
| Summary   | Monitor   | Configure                                    | e Permis  | sions                               | VMs                        | Datastores      | Networks      | Updates |
| 0         | Hypervi:<br>Model:<br>Process<br>Logical F<br>NICs:<br>Virtual N<br>State:<br>Uptime: | sor:<br>pr Type:<br>Processors:<br>fachines: | VMware ES><br>Amazon EC2<br>Intel(R) Xeor<br>36<br>1<br>6<br>Connected<br>19 days | KI, 7.0.2,<br>2 i3.meta<br>h(R) CPU | 18226209<br> <br>E5-2686 v | 4 @ 2.30GHz     |               |         |
| Hardware  |   |  |   |                                     |                            |                 |               |         |
| Manufa    | acturer   |  |   | Å                                   | Amazon EC                  | 2               |               |         |
| Model     |   |  |   | A                                   | Amazon EC                  | 2 i3.metal      |               |         |
| ✓ CPU     |   |  |   |                                     |                            |                 |               |         |
| CPU C     | Cores   |  |   |                                     | 36 CPU                     | s x 2.3 GHz     |               |         |
| Proce     | ssor Type   |  |   |                                     | Intel(R) Xe                | on(R) CPU E5-26 | 86 v4 @ 2.30G | Hz      |
| Socke     | ts  |  |   | :                                   | 2                          |                 |               |         |
| Cores     | per Socket  |  |   |                                     | 18                         |                 |               |         |
| Logica    | al Processors   |  |   |                                     | 36                         |                 |               |         |
| Hyper     | threading   |  |   |                                     | Inactive                   |                 |               |         |
| Memor     | У   |  |   |                                     | 129.7 GE                   | ) / 511.86 GB   |               |         |
| > Virtual | Flash Resour  | ce   |   | 7                                   | 7.49 GB / 5                | 5.75 GB         |               |         |
| > Netwo   | rking   |  |   | €                                   | esx-0.sddc                 | -44-232-220-144 | .vmwarevmc.co | om      |
| > Storage | e   |  |   | 2                                   | 2 Datastore                | e(s)            |               |         |

FIGURE 13. VMware Cloud on AWS ESXI Server Summary

### Software Resources

The following is a summary of the software resources used:

| SOFTWARE              | VERSION              | PURPOSE  |
|-----------------------|----------------------|--|
| VMware vCenter Server | 7.0.2 Build 17694817 | VMware vCenter Server provides a centralized platform for managing VMware vSphere environments |
| VMware ESXi Server    | 7.0.2 Build 17867351 | ESXi servers to host VMs   |
| ESXi Datastores       | Purity//FA 6.1.6     | Pure AFA provides both VMFS and vVol datastores  |
| Oracle Linux          | 8.3 UEK              | Oracle database server nodes   |
| Oracle Database 19c   | 19.12.0.0.0          | Grid Infrastructure and Oracle Database  |



#### **Network Configuration**

VMware vSphere<sup>\*</sup> Distributed Switch<sup>™</sup> acts as a single virtual switch across all associated hosts in the datacenter. This setup enables VMs to maintain a consistent network configuration as they migrate across multiple hosts.

A port group defines properties regarding security, traffic-shaping, and network adapter-teaming. Jumbo frames (MTU=9000 bytes) are enabled on the vSphere vMotion interface and the default port group setting is used.

For Site A, vSphere Distributed Switch **dVSwitch** uses 2x 10GbE adapter per host:

• 2 x 10GbE uplinks for VM traffic and VMkernel non-VM traffic

The following distributed switch-port groups were created for Oracle RAC and Oracle VM traffic to balance traffic across the available uplinks:

- Port group APPS-1614 with VLAN ID 1614 (Subnet 172.16.14.1/24) is for VM user traffic
- Port group **APPS-1605** with VLAN ID 1605 (Subnet 172.16.05.1/24) and **APPS-1606** with VLAN ID 1606 (Subnet 172.16.06.1/24) for Oracle RAC interconnect traffic with two active/active uplinks set to **Route based on originating virtual port**.
- Port group APPS-1631 with VLAN ID 1631 for management traffic
- Port group APPS-1632 with VLAN ID 1632 for vMotion traffic
- Port group APPS-1635 with VLAN ID 1635 for vSAN traffic

| 🖽 dVSwitch 📔 🗛          | TIONS V               |             |                     |         |                          |
|-------------------------|-----------------------|-------------|---------------------|---------|--------------------------|
| Summary Monitor C       | Configure Permissions | Ports Hosts | s VMs Networks      |         |                          |
| Distributed Port Groups | Uplink Port Groups    |             |                     |         |                          |
| Name ↑                  | VLAN ID               |             | V NSX Port Group ID | ~ VNI ~ | Port Binding             |
| ( APPS-1601             | VLAN access           | : 1601      |                     |         | Static binding (elastic) |
| APPS-1602               | VLAN access           | : 1602      |                     |         | Static binding (elastic) |
| APPS-1603               | VLAN access           | : 1603      |                     |         | Static binding (elastic) |
| 🔒 APPS-1604             | VLAN access           | : 1604      |                     |         | Static binding (elastic) |
| APPS-1605               | VLAN access           | : 1605      |                     |         | Static binding (elastic) |
| APPS-1606               | VLAN access           | : 1606      |                     |         | Static binding (elastic) |
| APPS-1607               | VLAN access           | : 1607      |                     |         | Static binding (elastic) |
| 🔮 APPS-1608             | VLAN access           | : 1608      |                     |         | Static binding (elastic) |
| APPS-1609               | VLAN access           | : 1609      |                     |         | Static binding (elastic) |
| (음) APPS-1610           | VLAN access           | : 1610      |                     |         | Static binding (elastic) |
| (음) APPS-1611           | VLAN access           | : 1611      |                     |         | Static binding (elastic) |
| (음) APPS-1612           | VLAN access           | : 1612      |                     |         | Static binding (elastic) |
| APPS-1613               | VLAN access           | : 1613      |                     |         | Static binding (elastic) |
| (음) APPS-1614           | VLAN access           | : 1614      |                     |         | Static binding (elastic) |

#### FIGURE 14. Site A vSphere Distributed Switch Port Group Configuration

For Site B, vSphere Distributed Switch az2-dvSwitch uses 2x 10GbE adapter per host:

• 2 x 10GbE uplinks for VM traffic and VMkernel non-VM traffic

The following distributed switch-port groups were created for Oracle RAC and Oracle VM traffic to balance traffic across the available uplinks:

- Port group APPS-1810 with VLAN ID 1810 (Subnet 172.18.10.1/24) is for VM user traffic
- Port group **APPS-1805** with VLAN ID 1805 (Subnet 172.18.05.1/24) and **APPS-1806** with VLAN ID 1806 (Subnet 172.18.06.1/24) for Oracle RAC interconnect traffic with two active/active uplinks set to **Route based on originating virtual port**.



- Port group APPS-1809 with VLAN ID 1809 (Subnet 172.18.09.1/24) is for Site Recovery Manager test network
- Port group AZ2-COMP-MGMT with VLAN ID 1631 for management traffic
- Port group AZ2-COMP-VMOTION with VLAN ID 1632 for vMotion traffic
- Port group AZ2-COMP-NFS with VLAN ID 1635 for NFS and vSAN traffic

| 📾 az2-dvSwitch 🛛 🔺         | CTIONS V               |                     |         |                          |
|----------------------------|------------------------|---------------------|---------|--------------------------|
| Summary Monitor Config     | gure Permissions Ports | Hosts VMs Networks  |         |                          |
| Distributed Port Groups Up | link Port Groups       |                     |         |                          |
| Name ↑                     | VLAN ID                | V NSX Port Group ID | ~ VNI ~ | Port Binding             |
| (P) APPS-1801              | VLAN access: 1801      |                     |         | Static binding (elastic) |
| (APPS-1802                 | VLAN access: 1802      |                     |         | Static binding (elastic) |
| (APPS-1803                 | VLAN access: 1803      |                     |         | Static binding (elastic) |
| ( <sup>©</sup> ) APPS-1804 | VLAN access: 1804      |                     |         | Static binding (elastic) |
| 😩 APPS-1805                | VLAN access: 1805      |                     |         | Static binding (elastic) |
| (APPS-1806                 | VLAN access: 1806      |                     |         | Static binding (elastic) |
| (APPS-1807                 | VLAN access: 1807      |                     |         | Static binding (elastic) |
| (APPS-1808                 | VLAN access: 1808      |                     |         | Static binding (elastic) |
| (≗) APPS-1809              | VLAN access: 1809      |                     |         | Static binding (elastic) |
| APPS-1810                  | VLAN access: 1810      |                     |         | Static binding (elastic) |
| AZ2-COMP-MGMT              | VLAN access: 1631      |                     |         | Static binding (elastic) |
| AZ2-COMP-NFS               | VLAN access: 1635      |                     |         | Static binding (elastic) |
| AZ2-COMP-VMOTION           | VLAN access: 1632      |                     |         | Static binding (elastic) |

#### FIGURE 15. Site B vSphere Distributed Switch Port Group Configuration

For VMware Cloud on AWS, each ESXi server has (1) 25GbE adapter per host.

|                                       | ∎ 10.129.32.4 AC         | ctions ¥  |
|---------------------------------------|--------------------------|---|
| ✓                                     | Summary Monitor Co       | anfigure Permissions VMs Datastores Networks Updates  |
| ✓ III SDDC-Datacenter ✓ III Cluster-1 | Storage >                | Physical adapters   |
| 10.129.32.4                           | Networking V             | 🔮 Add Networking. 🖉 Refresh 🛛 🖉 Edit.   |
| 10.129.32.5                           | Virtual switches         | Device         Y         Actual Speed         Y         Configured Speed         Y         Switch         Y         MAC Address         Y         Observed IP Renges         Y         Wake on LAN Supported         Y         SRIOV Status |
| > O Compute-ResourcePool              | VMkernel adapters        | 😑 vmnic0 25 Gbit/s 25 Gbit/s 🗋 vmc-hostswitch 0e-93.d7.ad.e4.d9 No networks No Not supported  |
| > @ Mgmt-ResourcePool                 | Physical adapters        |   |
| > [ 10.129.128.4                      | TCP/IP configuration     |   |
|                                       | Virtual Machines 🛛 🗸     |   |
|                                       | VM Startup/Shutdown      | Physical network adapter: vmnicO  |
|                                       | Agent VM Settings        | All Properties CDP LLDP   |
|                                       | Default VM Compatibility |   |
|                                       | Swap File Location       | Adapter Amazon, mc Listic Network Adapter (VF) Name vmnic0  |
|                                       | Suetam                   | Location PCI 0000:04:00.0   |
|                                       | System /                 | Driver ena  |
|                                       | Hardware >               | Status<br>Exercise Connected  |
|                                       | Virtual Flash            | actual speed, Duplex 25 Gb/t/s, Full Duplex   |
|                                       | Alarm Definitions        | Configured speed, Duplex 25 Obi/s, Full Duplex  |
|                                       | Scheduled Tasks          | ING INFORMATION   |
|                                       |                          | Network (/O Control Statue Allowed  |
|                                       |                          |   |
|                                       |                          | SR-IOV<br>Status Not supported  |
|                                       |                          |   |
|                                       |                          | Claco Discovery Protocol is not available on this physical network adapter  |
|                                       |                          | Link Laver Discovery Protocol   |
|                                       |                          | ① Link Layer Discovery Protocol is not available on this physical network adapter   |
|                                       |                          |   |



To create a logical segment, navigate to the VMware Cloud on AWS portal and click **Networking & Security**. Click **Segments**, then **Add Segments**. The illustration below is an example:

| < ALL SDDCs VSLAB-SDD Summary Networking 8 | CO<br>& Sec | 1  <br>:urity | VMC            | on AW | <b>rs 🖗 US West (Oregon)</b><br>Dns Maintenance Troubleshooting Settings Suppor | t            |                  | OPEN VCEN  | ACTIONS Y |
|--|-------------|---------------|----------------|-------|---|--------------|------------------|------------|-----------|
| Overview<br>Network                        | Se<br>se    | egn<br>Igmer  | nen<br>nt List | ts    | Segment Profiles  |              |                  |            |           |
| Segments<br>VPN<br>NAT                     | A           | DD SI         | EGMEI          | T     |   |              |                  | EXPAND ALL | Q Search  |
| Tier-1 Gateways                            |             |               |                |       | Segment Name  | Туре         | Subnets          |            | Status 🕦  |
| Transit Connect                            |             | 1             | >              | 6     | OraclePrivate   | Disconnected | 192.168.140.1/24 |            | Success C |
| Gateway Firewall                           |             | 1             | >              | 6     | L2E_OracleWorkloads-71687-878db786  | Disconnected | 192.168.6.1/24   |            | Success C |
| Distributed Firewall                       |             | ÷             | >              | 6     | L2E_SC2-COMP-ORACLE-1637-878db786   | Disconnected | 172.16.37.1/24   |            | Success C |

#### FIGURE 17. Logical Network details

Fill in the required details as shown above. Select the **Disconnected** option and specify the CIDR block of the segment in the **Gateway/Prefix Length** field. Click **Save** when done.

As mentioned before, a disconnected network segment has no uplink and provides an isolated network accessible only to VMs connected to it.

| < ALL SDDCs   | AB │ ∨MC on<br>a & Security | AWS 📀                   | US West (Oregon)<br>Ons Maintenance T | roubleshooting Sett | inas Support |              |            |           |                  | OPEN VC      | ENTER  | ACTIONS V        |
|---|-----------------------------|-------------------------|---------------------------------------|---------------------|--------------|--------------|------------|-----------|------------------|--------------|--------|------------------|
| Overview<br>Network   | Segment                     | ents<br><sub>List</sub> | Segment Profiles                      |                     |              |              |            |           |                  |              |        | G                |
| Segments<br>VPN<br>NAT  | ADD SEG                     | MENT                    |                                       |                     |              |              |            |           |                  | COLLAPSE ALL | Q Sear | ch               |
| Tier-1 Gateways   |                             |                         | Segment Name                          |                     |              | Туре         |            |           | Subnets          |              |        | Status į         |
| Transit Connect<br>Security   | 1 ~                         | B                       | Apps Team 01                          |                     |              | Routed       |            |           | 172.16.115.1/24  |              |        | Success C        |
| Gateway Firewall<br>Distributed Firewall                              |                             |                         | VPN Tunnel ID                         | Not Set             |              |              | Domain Nam | e Not Set |                  |              | ME     |                  |
| Inventory<br>Groups   |                             | >                       | SEGMENT PROFILES                      |                     |              |              | iays       | 0         |                  |              |        |                  |
| Services<br>Virtual Machines  |                             | >                       | DHCP STATIC BINDINGS                  |                     |              |              |            |           |                  |              |        |                  |
| Tools   | •                           |                         | Oracle Private                        |                     |              | Disconnected |            |           | 192.168.115.1/24 |              |        | Success C        |
| Port Mirroring  |                             |                         | VPN Tunnel ID                         | Not Set             |              |              | Domain Nam | e Not Set |                  |              |        | VIEW STATISTICS  |
| System  |                             |                         | Description                           | Not Set             |              |              | Tags       | 0         |                  |              | VIE    | W RELATED GROUPS |
| DHCP  |                             | >                       | SEGMENT PROFILES                      |                     |              |              |            |           |                  |              |        |                  |
| Global Configuration<br>Public IPs<br>Direct Connect<br>Connected VPC |                             | >                       | DHCP STATIC BINDINGS                  |                     |              |              |            |           |                  |              |        |                  |

#### FIGURE 18. Logical Segments for Public and Private network

Learn more about VMware Cloud on AWS logical networks.



The following are logical segments of Oracle VM traffic on VMware Cloud on AWS:

- Logical segment Apps Team 01 (Subnet 172.16.115.1/24) for VM user traffic
- Logical segment Oracle Private (Subnet 192.168.115.1/24) for VM private traffic

The following extended segments were created for Oracle VM traffic between on-premises Site A and VMware Cloud on AWS:

- Port group **BCA-L2VPN** for **L2VPN** for **VM user**: traffic enables VMs to keep the same subnet when migrating from on-premises data centers to the cloud and back.
- Port group **BCA-VPN-Network** for routed VM: traffic enables VMs to communicate—or ping each other—without being on the same subnet.

vSphere vMotion enables live migration of running (i.e., powered on) VMs from an on-premises host to a host in VMware Cloud on AWS, with zero downtime for the application (less than one second switchover time), continuous service availability, and complete transaction integrity. Furthermore, by enabling certain advanced configurations, vSphere vMotion migration between on-premises VMs and VMware Cloud on AWS can be enabled across various vSphere Distributed Switch versions.

VMware Cloud on AWS provides multiple ways to establish network connectivity from on-premises environments, including different types of VPNs and AWS Direct Connect (DX). AWS DX is a service provided by AWS that allows creation of a high-speed, low-latency connection between an on-premises data center and AWS services including VMware Cloud on AWS.

Learn more about AWS Direct Connect.

Learn more about live vSphere vMotion migration between on-premises data centers and VMware Cloud on AWS.

#### Storage Configuration

#### Storage Setup on Site A and Site B

Site A has access to a Pure Storage FlashArray//x50 all-flash storage (Purity/FA 6.1.6) for VMFS and vSphere Virtual Volumes named **Pure-X50-BCA**.

| Storag            | e                            |                                 |                                      |                             |         |             |                  |      |                       |  |           | <u> </u> | Search                    |                 |
|-------------------|------------------------------|---------------------------------|--------------------------------------|-----------------------------|---------|-------------|------------------|------|-----------------------|--|-----------|----------|---------------------------|-----------------|
| Array             | Hosts Volun                  | nes Pods                        | File Systems Polic                   | cles                        |         |             |                  |      |                       |  |           |          |                           |                 |
| 🕑 > Ar            | rray                         |                                 |                                      |                             |         |             |                  |      |                       |  |           |          |                           |                 |
| Size<br>234431540 | Data Reduction<br>M 4.8 to 1 | Unique Replicati<br>4.50 T 0.00 | on Snapshots Shared<br>4.70 M 1.31 T | System Total<br>0.00 5.81 T |         |             |                  |      |                       |  |           |          |                           |                 |
| Pure-X5           | io-BCA                       |                                 |                                      |                             |         |             |                  |      |                       |  |           |          | ID a841b405-a3a3-48ca-a63 | 37-bf3977355c9a |
|                   | Hosts                        | Host                            | Volumes                              | Volume                      | Volume  | Protection  | Protection Group | Pods | File                  | Directories  | Directory | Policies |                           |                 |
|                   | 41                           | 11                              | 128                                  | 6                           | 36      | 3           | 1<br>1           | 1    | 0                     | 0  | 0         | 2        |                           |                 |
| Array Co          | onnections                   |                                 |                                      |                             |         |             |                  |      |                       |  |           |          |                           | + :             |
| Name              | 0                            |                                 | Status                               | Туре                        | Version | Managem     | ent Address      |      | Replication Transport | Replication Address  |           |          | Throttled                 |                 |
| • wdc-t           | sa-pure-01                   |                                 | connected                            | async-replication           | 6.16    | 172.16.50.2 | 22               |      | Ethernet (IP)         | 172.16.51.14<br>172.16.51.15<br>172.16.51.16<br>172.16.51.17 |           |          | False                     | ⊗ ⊠ ×           |

FIGURE 19. Site A Pure Storage



Site B has access to a Pure Storage FlashArray//x50 all-flash storage (Purity/FA 6.1.6) for VMFS and vSphere Virtual Volumes named **wdc-tsa-pure-01**.

| Storage                                 |                                    |  |                     |         |         |             |           |                       |  |           | <u> </u> | X Q Search               |                    |
|---|------------------------------------|--|---------------------|---------|---------|-------------|-----------|-----------------------|--|-----------|----------|--------------------------|--------------------|
| Array Hosts                             | /olumes Pods                       | File Systems Policie                           | 3                   |         |         |             |           |                       |  |           |          |                          |                    |
| 😲 > Array                               |                                    |  |                     |         |         |             |           |                       |  |           |          |                          |                    |
| Size Data Reduction<br>51204 G 3.0 to 1 | Unique Replication<br>76.30 G 0.00 | Snapshots Shared System<br>2.94 G 78.11 G 0.00 | n Total<br>157.34 G |         |         |             |           |                       |  |           |          |                          |                    |
| wdc-tsa-pure-01                         |                                    |  |                     |         |         |             |           |                       |  |           |          | ID fabf667e-849b-44c5-br | d42-85c681eae44b   |
| PE                                      |                                    | 0  | o                   | ()))    | 0       | Ô           | ൪         | Ľ                     |  | Ċ         | ſò       |                          |                    |
| Hosts                                   | Host<br>Groups                     | Volumes  | Snapshots           | Groups  | Groups  | Snapshots   | Pods<br>1 | File<br>Systems       | Directories  | Snapshots | Policies |                          |                    |
| 5                                       |                                    | 5  | 000                 |         | 2       | 100         |           | v                     | Ū  | Ŭ         | 5        |                          |                    |
| Array Connections                       |                                    |  |                     |         |         |             |           |                       |  |           |          |                          | + :                |
| Name                                    |                                    | Status   | Туре                | Version | Managem | ent Address |           | Replication Transport | Replication Address  |           |          | Throttled                |                    |
| Pure-X50-BCA                            |                                    | connected                                      | async-replication   | 6.1.6   |         |             |           | Ethernet (IP)         | 172.16.51.10<br>172.16.51.11<br>172.16.51.12<br>172.16.51.13 |           |          | False                    | <mark>⊛</mark> ⊠ × |

FIGURE 20. Site B Pure Storage

### ESXi Storage Setup on Site A and Site B

On Site A, each of the 4 ESXi servers contains 2 x QLogic ISP2812-based 64/32G Fibre Channel to PCIe Controller for FC storage.

| sc2esx09.vsla            | ab.l     |   |                   |           |               |             |                       |                        |   |     |            |
|--------------------------|----------|---|-------------------|-----------|---------------|-------------|-----------------------|------------------------|---|-----|------------|
| Summary Monitor          | Co       | nfigure Permissions VMs Datasto                 | res Networks      | Upda      | ates          |             |                       |                        |   |     |            |
| Storage                  | ~        | Storage Adapters                                |                   |           |               |             |                       |                        |   |     |            |
| Storage Adapters         |          | + Add Software Adapter 🗧 Refresh 🛛 🗓 Resca      | n Storage 🛛 🗟 R   | escan Ada | pter × Remove |             |                       |                        |   |     |            |
| Storage Devices          |          | Adapter   | т Туре            |           | ⊤ Status      | ⊤ Identifie | 91                    |                        | ▼ Targets                                 | Τ   | Devices    |
| Host Cache Configuration | on       | Model: Dell BOSS-S1 Adapter                     |                   |           |               |             |                       |                        |   |     |            |
| Protocol Endpoints       |          | Model: Dell HBA330 Mini                         |                   |           |               |             |                       |                        |   |     |            |
| I/O Filters              |          | Model: ISP2812-based 64/32G Fibre Channel to    | PCle Controller   |           |               |             |                       |                        |   |     |            |
| Networking               | >        | 🗇 vmhba4  | Fibre Cl          | hannel    | Online        | 20:00       | :34:80:0d:70:36:c0 2  | 1:00:34:80:0d:70:36:c0 | 8   |     | 7          |
| Virtual Machinee         | 、        | √ vmhba5  | Fibre Cl          | hannel    | Online        | 20:00       | :34:80:0d:70:36:c1 21 | 1:00:34:80:0d:70:36:c1 | 7   |     | 7          |
| VIItual Machines         | <i>_</i> | 🗇 vmhba64                                       | Fibre Cl          | hannel    | Online        | 20:00       | :34:80:0d:70:36:c0 2  | 1:00:34:80:0d:70:36:c0 | 0   |     | 0          |
| System                   | >        | 🗇 vmhba65                                       | Fibre Cl          | hannel    | Online        | 20:00       | :34:80:0d:70:36:c1 21 | 1:00:34:80:0d:70:36:c1 | 0   |     | 0          |
| Hardware                 | >        | Model: Lewisburg SATA AHCI Controller           |                   |           |               |             |                       |                        |   |     |            |
|                          |          |   |                   |           |               |             |                       |                        |   |     |            |
| Virtual Flash            | >        |   |                   |           |               |             |                       |                        |   |     |            |
| Alarm Definitions        |          | Properties Devices Paths                        |                   |           |               |             |                       |                        |   |     |            |
| Scheduled Tasks          |          | 🗟 Refresh 🛛 🗟 Attach 🗟 Detach 🗹 Renam           | ie                |           |               |             |                       |                        |   |     |            |
| Pure Storage             | >        | Name ↑  | ~                 | LUN       | ~ Type ~      | Capacity ~  | Datastore ~           | Operational State      | <ul> <li>Hardware Acceleration</li> </ul> | ~ 0 | Drive Type |
| INFINIDAT                |          | NFINIDAT Fibre Channel Disk (naa.6742b0f000000  |                   | 11        | disk          | 45.47 TB    | Oralnfinidat          | Attached               | Supported                                 |     | HDD        |
|                          |          | NFINIDAT Fibre Channel RAID Ctlr (naa.6742b0f00 | 00006d000000      | 0         | array control |             | Not Consumed          | Attached               | Not supported                             |     | HDD        |
|                          |          | PURE Fibre Channel Disk (naa.624a9370a841b405   | a3a348ca000118ff) | 253       | disk          | 1.00 MB     | Not Consumed          | Attached               | Supported                                 |     | Flash      |
|                          |          | PURE Fibre Channel Disk (naa.624a9370a841b405   | a3a348ca000119    | 254       | disk          | 10.00 TB    | Not Consumed          | Attached               | Supported                                 |     | Flash      |
|                          |          | PURE Fibre Channel Disk (naa.624a9370a841b405   | a3a348ca00012     | 251       | disk          | 20.00 TB    |                       | Attached               | Supported                                 |     | Flash      |
|                          |          | PURE Fibre Channel Disk (naa.624a9370a841b405   | a3a348ca00012a    | 252       | disk          | 500.00 GB   | Not Consumed          | Attached               | Supported                                 |     | Flash      |
|                          |          | PURE Fibre Channel Disk (naa.624a9370a841b405   | a3a348ca000130    | 250       | disk          | 20.00 TB    | OraSC2                | Attached               | Supported                                 |     | Flash      |

FIGURE 21. Site A ESXi Server Storage Adapter



| sc2esx09.vs          | lab.l |  |               |                   |             |                       |                        |   |     |           |
|----------------------|-------|--|---------------|-------------------|-------------|-----------------------|------------------------|---|-----|-----------|
| Summary Monitor      | Co    | nfigure Permissions VMs Datastores Networks                                      | Updates       | 5                 |             |                       |                        |   |     |           |
| Storage              | ~     | Storage Adapters   |               |                   |             |                       |                        |   |     |           |
| Storage Adapters     |       | + Add Software Adapter 🗧 Refresh 🛛 🗟 Rescan Storage 🗎 😪 R                        | escan Adapter | imes Remove       |             |                       |                        |   |     |           |
| Storage Devices      |       | Adapter Type   |               | T Status          | T Identifie | er                    |                        | ▼ Targets                                 | т   | Devices   |
| Host Cache Configura | ation | Model: Dell BOSS-S1 Adapter  |               |                   |             |                       |                        |   |     |           |
| Protocol Endpoints   |       | Model: Dell HBA330 Mini  |               |                   |             |                       |                        |   |     |           |
| I/O Filters          |       | <ul> <li>Model: ISP2812-based 64/32G Fibre Channel to PCIe Controller</li> </ul> |               |                   |             |                       |                        |   |     |           |
| Networking           | >     | 🔆 vmhba4 Fibre C   | hannel        | Online            | 20:00       | 0:34:80:0d:70:36:c0 2 | 1:00:34:80:0d:70:36:c0 | 8   |     | 7         |
| Virtual Machines     | >     | 🗇 vmhba5 Fibre C   | hannel        | Online            | 20:00       | 0:34:80:0d:70:36:c1 2 | 1:00:34:80:0d:70:36:c1 | 7   |     | 7         |
| in the indefined     | ŕ     | 🗇 vmhba64 Fibre C  | hannel        | Online            | 20:00       | 0:34:80:0d:70:36:c0 2 | 1:00:34:80:0d:70:36:c0 | 0   |     | 0         |
| System               | >     |  | hannel        | Online            | 20:00       | 0:34:80:0d:70:36:c1 2 | 1:00:34:80:0d:70:36:c1 | 0   |     | 0         |
| Hardware             | >     | <ul> <li>Model: Lewisburg SATA AHCI Controller</li> </ul>                        |               |                   |             |                       |                        |   |     |           |
| Virtual Elach        |       |  |               |                   |             |                       |                        |   |     |           |
| Marrie De Californi  |       | Properties Devices Paths   |               |                   |             |                       |                        |   |     |           |
| Alarm Definitions    |       |  |               |                   |             |                       |                        |   |     |           |
| Scheduled Tasks      |       | 🗟 Refresh 🛛 🗟 Attach 🗟 Detach 🖉 Rename   |               |                   |             |                       |                        |   |     |           |
| Pure Storage         | >     | Name V   | LUN ~         | Type $\checkmark$ | Capacity 🗸  | Datastore ~           | Operational State      | <ul> <li>Hardware Acceleration</li> </ul> | ~ D | rive Type |
| INFINIDAT            |       | NFINIDAT Fibre Channel Disk (naa.6742b0f0000006d0000000000                       | 11            | disk              | 45.47 TB    | Oralnfinidat          | Attached               | Supported                                 |     | HDD       |
|                      |       | NFINIDAT Fibre Channel RAID Ctlr (naa.6742b0f0000006d000000                      | 0             | array control     |             | Not Consumed          | Attached               | Not supported                             |     | HDD       |
|                      |       | PURE Fibre Channel Disk (naa.624a9370a841b405a3a348ca000130                      | 250           | disk              | 20.00 TB    | OraSC2                | Attached               | Supported                                 |     | Flash     |
|                      |       | PURE Fibre Channel Disk (naa.624a9370a841b405a3a348ca00012                       | 251           | disk              | 20.00 TB    | OraPure               | Attached               | Supported                                 |     | Flash     |
|                      |       | PURE Fibre Channel Disk (naa.624a9370a841b405a3a348ca00012a                      | 252           | disk              | 500.00 GB   | Not Consumed          | Attached               | Supported                                 |     | Flash     |
|                      |       | PURE Fibre Channel Disk (naa.624a9370a841b405a3a348ca000118ff)                   | 253           | disk              | 1.00 MB     | Not Consumed          | Attached               | Supported                                 |     | Flash     |
|                      |       | PURE Fibre Channel Disk (naa.624a9370a841b405a3a348ca000119                      | 254           | disk              | 10.00 TB    | Not Consumed          | Attached               | Supported                                 |     | Flash     |

FIGURE 22. Site A ESXi Server FC Storage Connections

On Site A, on the four-node vSphere cluster, the following VMFS and vSphere Virtual Volumes datastores were created on the Pure x50 array.

OraSC2 VMFS6 datastore and OraVVOL vSphere Virtual Volumes datastore on Site A were used in this reference architecture.

| ■ SC2-DC ACTIONS ¥                                |              |            |             |            |             |
|---|--------------|------------|-------------|------------|-------------|
| Summary Monitor Configure Permissions Hosts & Clu | isters VMs   | Datastores | Networks    | Updates    |             |
| Datastores Datastore Clusters Datastore Folders   |              |            |             |            |             |
| Name  | Status 🔨 🗸 🗸 | Type V     | Datastore 🎽 | Capacity ~ | Free 🗸      |
| Oralnfinidat                                      | ✓ Normal     | VMFS 6     |             | 45.47 TB   | 44.92 TB    |
| C OraSC2  | 🗸 Normal     | VMFS 6     |             | 20 TB      | 19.59 TB    |
| ☐ OraPure   | 🗸 Normal     | VMFS 6     |             | 50 TB      | 38.7 TB     |
|   | 🗸 Normal     | vVol       |             | 8,192 TB   | 8,190.83 TB |
| CraTintri   | 🗸 Normal     | NFS 3      |             | 145.71 TB  | 77.93 TB    |

FIGURE 23. Site A Datastores

In addition, Site A four-node vSphere cluster has a vSAN datastore **BCA-SiteC-vSAN**.

| The DCA CiteC                       |  |                   |           |               |           |           |              |   |                         |   |                     |  |  |
|-------------------------------------|--|-------------------|-----------|---------------|-----------|-----------|--------------|---|-------------------------|---|---------------------|--|--|
| BCA-SiteC                           | ACTIONS V  |                   |           |               |           |           |              |   |                         |   |                     |  |  |
| Summary Monitor                     | Configure Permissions Hosts VMs Da               | tastores Networks | Updates   |               |           |           |              |   |                         |   |                     |  |  |
| Services 🗸 🗸                        | Disk Management                                  |                   |           |               |           |           |              |   |                         |   |                     |  |  |
| vSphere DRS<br>vSphere Availability | All 12 disks on version 14.0.                    |                   |           |               |           |           |              |   |                         |   |                     |  |  |
| Configuration 🗸                     | CLAIM UNUSED DISKS ADD DISKS GO TO PRE-CHECK *** |                   |           |               |           |           |              |   |                         |   |                     |  |  |
| Quickstart<br>General               | Disk Group                                       | Disks in Use 🛛 🔻  | State     | ▼ Health      | т Туре    | ٣         | Fault Domain | ٣ | Network Partition Group | ٣ | Disk Format Version |  |  |
| Key Provider                        | V sc2esx09.vslab.local                           | 3 of 3            | Connected | Healthy       |           |           |              |   | Group 1                 |   |                     |  |  |
| VMware EVC<br>VM/Host Groups        | ■ Disk group (52f28ab3-ab9a-3078-5c22-2246       | 3                 | Mounted   | Healthy       | All flash |           |              |   |                         |   | 14                  |  |  |
| VM/Host Rules                       | > . sc2esx10.vslab.local                         | 3 of 3            | Connected | Healthy       |           |           |              |   | Group 1                 |   |                     |  |  |
| VO Filters                          | > 🗍 sc2esx11.vslab.local                         | 3 of 3            | Connected | Healthy       |           |           |              |   | Group 1                 |   |                     |  |  |
| Host Options                        | > ac2esx12.vslab.local                           | 3 of 3            | Connected | Healthy       |           |           |              |   | Group 1                 |   |                     |  |  |
| Licensing V                         | ADD DISKS  |                   |           |               |           |           |              |   |                         |   |                     |  |  |
| vSAN Cluster                        | Name   | Drive Type        | т         | Claimed As    | т         | Capacity  |              | т | Health                  | ٣ | State               |  |  |
| Trust Authority                     | E Local ATA Disk (naa.500080d9111cb34f)          | Flash             |           | vSAN Cache    |           | 372.61 GB |              |   | Healthy                 |   | Mounted             |  |  |
| Alarm Definitions                   | E Local ATA Disk (naa.55cd2e414fedf85c)          | Flash             |           | vSAN Capacity |           | 894.25 GB |              |   | Healthy                 |   | Mounted             |  |  |
| Pure Storage V                      | E Local ATA Disk (naa.55cd2e414fedebbb)          | Flash             |           | vSAN Capacity |           | 894.25 GB |              |   | Healthy                 |   | Mounted             |  |  |
| Host Connections                    |  |                   |           |               |           |           |              |   |                         |   |                     |  |  |
| vSAN 🗸                              |  |                   |           |               |           |           |              |   |                         |   |                     |  |  |

#### FIGURE 24. Site A vSAN Datastore

On Site B, each of the four ESXi servers contains 2 x Emulex LightPulse LPe32000 Gen 6 16/32G PCIe Fibre Channel Adapter for FC storage.

| az2esx22.v         | slab.l  |   |                         |               |          |  |                         |              |  |  |  |  |  |  |  |
|--------------------|---------|---|-------------------------|---------------|----------|--|-------------------------|--------------|--|--|--|--|--|--|--|
| Summary Monito     | or Co   | nfigure Permissions VMs Datastore                 | s Networks Upda         | tes           |          |  |                         |              |  |  |  |  |  |  |  |
| Storage            | ~       | Storage Adapters                                  |                         |               |          |  |                         |              |  |  |  |  |  |  |  |
| Storage Adapters   |         | + Add Software Adapter 🗧 Refresh 🛛 🗒 Rescan       | Storage 👌 🗟 Rescan Adap | oter × Remove |          |  |                         |              |  |  |  |  |  |  |  |
| Storage Devices    |         | Adapter   | т Туре                  | ▼ Status      | ⊤ Ide    | ntifier  | ▼ Targets               | T Devices    |  |  |  |  |  |  |  |
| Host Cache Config  | uration | Model: Dell BOSS-S1 Adapter                       |                         |               |          |  |                         |              |  |  |  |  |  |  |  |
| Protocol Endpoints |         | Model: Dell HBA330 Adapter                        |                         |               |          |  |                         |              |  |  |  |  |  |  |  |
| I/O Filters        |         | Model: Emulex LightPulse LPe32000 PCIe Fibre      | Channel Adapter         |               |          |  |                         |              |  |  |  |  |  |  |  |
| Networking         | >       | 🗇 vmhba4  | Fibre Channel           | Online        | 2        | 0:00:00:10:9b:34:45:70 10:00:00:10:9b:34:45:70 | ) 8                     | 3            |  |  |  |  |  |  |  |
| Virtual Machines   | 、<br>、  | ↓ vmhba5  | Fibre Channel           | Online        | 2        | 0:00:00:10:9b:34:45:71 10:00:00:10:9b:34:45:71 | 7                       | 3            |  |  |  |  |  |  |  |
| virtual machines   |         | <⊳ vmhba64  | Fibre Channel           | Online        | 2        | 0:00:00:10:9b:34:45:70 10:00:00:10:9b:34:45:70 | 0                       | 0            |  |  |  |  |  |  |  |
| System             | >       | ↓ vmhba65   | Fibre Channel           | Online        | 2        | 0:00:00:10:9b:34:45:71 10:00:00:10:9b:34:45:71 | 0                       | 0            |  |  |  |  |  |  |  |
| Hardware           | >       | Model: Lewisburg SATA AHCI Controller             |                         |               |          |  |                         |              |  |  |  |  |  |  |  |
|                    |         | Model: Ultrastar SN100/SN150 NVMe SSD             |                         |               |          |  |                         |              |  |  |  |  |  |  |  |
| Virtual Flash      | >       |   |                         |               |          |  |                         |              |  |  |  |  |  |  |  |
| Alarm Definitions  |         | Properties Devices Paths                          |                         |               |          |  |                         |              |  |  |  |  |  |  |  |
| Scheduled Tasks    |         | Refrech Attach Repared Repared                    |                         |               |          |  |                         |              |  |  |  |  |  |  |  |
| Pure Storage       | >       | Name  | × 111N ×                | Type          | Capacity | V Datastore V Operational State                | V Hardware Acceleration | V Drive Type |  |  |  |  |  |  |  |
|                    |         | NEINIDAT Fibre Channel PAID Ctlr (naa 6742b0f000) | 0006400000 0            | array contro  | cupucity | Not Consumed Attached                          | Not supported           | HDD          |  |  |  |  |  |  |  |
|                    |         | PLIPE Fibre Channel Disk (nas 624a9370fab/667e84  | 9644c500011 253         | diek          | 100      | MB Not Consumed Attached                       | Supported               | Flach        |  |  |  |  |  |  |  |
|                    |         | PURE Fibre Channel Disk (naa 624a9370fab1667e84   | 9b44c50004 254          | disk          | 30.00    | TB AZ2-OraPu Attached                          | Supported               | Flash        |  |  |  |  |  |  |  |
|                    |         |   |                         |               |          | U Praticipa                                    |                         | 1 North      |  |  |  |  |  |  |  |

FIGURE 25. Site B ESXi Server Storage Adapter



Services Disk Management

| az2esx22.vslab.local Actions Y |              |      |  |                    |        |              |          |          |                      |                         |            |            |   |            |
|--------------------------------|--------------|------|--|--------------------|--------|--------------|----------|----------|----------------------|-------------------------|------------|------------|---|------------|
| Summary                        | Monitor      | Co   | nfigure Permissions VMs Datastore                                | s Networks U       | pdate  | 25           |          |          |                      |                         |            |            |   |            |
| Storage                        |              | ~    | Storage Adapters   |                    |        |              |          |          |                      |                         |            |            |   |            |
| Storage A                      | dapters      |      | + Add Software Adapter 🛛 🗟 Refresh 🖉 Rescan                      | Storage 🛛 🌀 Rescan | Adapte | er × Remove  |          |          |                      |                         |            |            |   |            |
| Storage D                      | evices       |      | Adapter  | т Туре             | Ŧ      | Status       | Ŧ        | Identifi | er                   |                         | Ŧ          | Targets    | T | Devices    |
| Host Cach                      | ne Configura | tion | Model: Dell BOSS-S1 Adapter                                      |                    |        |              |          |          |                      |                         |            |            |   |            |
| Protocol E                     | Endpoints    |      | Model: Dell HBA330 Adapter                                       |                    |        |              |          |          |                      |                         |            |            |   |            |
| I/O Filters                    |              |      | <ul> <li>Model: Emulex LightPulse LPe32000 PCIe Fibre</li> </ul> | Channel Adapter    |        |              |          |          |                      |                         |            |            |   |            |
| Networking                     |              | >    |  | Fibre Channel      |        | Online       |          | 20:00    | 0:00:10:9b:34:45:70  | 10:00:00:10:9b:34:45:70 |            | 8          |   | 3          |
| Virtual Mach                   | hines        | >    | 🔆 vmhba5   | Fibre Channel      |        | Online       |          | 20:00    | 0:00:10:9b:34:45:711 | 0:00:00:10:9b:34:45:71  |            | 7          |   | 3          |
|                                |              |      | ☆ vmhba64  | Fibre Channel      |        | Online       |          | 20:00    | 0:00:10:9b:34:45:70  | 10:00:00:10:9b:34:45:70 |            | 0          |   | 0          |
| System                         |              | >    |  | Fibre Channel      |        | Online       |          | 20:00    | 0:00:10:9b:34:45:711 | 0:00:00:10:9b:34:45:71  |            | 0          |   | 0          |
| Hardware                       |              | >    | <ul> <li>Model: Lewisburg SATA AHCI Controller</li> </ul>        |                    |        |              |          |          |                      |                         |            |            |   |            |
| Virtual Electr                 | _            |      | <ul> <li>Model: Ultrastar SN100/SN150 NVMe SSD</li> </ul>        |                    |        |              |          |          |                      |                         |            |            |   |            |
| VITUAI Flash                   | n            | ,    |  |                    |        |              |          |          |                      |                         |            |            |   |            |
| Alarm Defini                   | itions       |      | Properties Devices Paths   |                    |        |              |          |          |                      |                         |            |            |   |            |
| Scheduled T                    | Fasks        |      | Refresh  |                    |        |              |          |          |                      |                         |            |            |   |            |
| Pure Storage                   | le           | >    | Name   | ~ LUN              | $\sim$ | Type 🗸       | Capacity | ~        | Datastore ~          | Operational State       | Hardware A | celeration | ~ | Drive Type |
|                                |              |      | NFINIDAT Fibre Channel RAID Ctlr (naa.6742b0f0000                | 0006d00000 0       |        | array contro |          |          | Not Consumed         | Attached                | Not supp   | orted      |   | HDD        |
|                                |              |      | PURE Fibre Channel Disk (naa.624a9370fabf667e84                  | 9b44c500011 253    |        | disk         |          | 1.00 MB  | Not Consumed         | Attached                | Supporte   | d          |   | Flash      |
|                                |              |      | PURE Fibre Channel Disk (naa.624a9370fabf667e84                  | 9b44c50004 254     |        | disk         |          | 30.00 TB | AZ2-OraPu            | Attached                | Supporte   | d          |   | Flash      |

#### FIGURE 26. Site B ESXi Server FC Storage Connections

On Site B, on the three-node vSphere cluster, the following VMFS and vSphere Virtual Volumes datastores were created on the Pure x50 array.

AZ2OraPure VMFS6 datastore and AZ2OraVVOL vSphere Virtual Volumes datastore on Site B were used in this reference architecture.

| AZ2-DC ACTIONS V |         |             |                 |                  |     |            |          |         |         |   |        |   |             |          |   |          |
|------------------|---------|-------------|-----------------|------------------|-----|------------|----------|---------|---------|---|--------|---|-------------|----------|---|----------|
| Summary          | Monitor | Configure   | Permissions     | Hosts & Clusters | VMs | Datastores | Networks | Updates |         |   |        |   |             |          |   |          |
| Datastores       | Datasto | re Clusters | Datastore Folde | ers              |     |            |          |         |         |   |        |   |             |          |   |          |
| Name 🛧           |         |             |                 |                  |     |            |          | ~       | Status  | ~ | Туре   | ~ | Datastore 🗸 | Capacity | ~ | Free     |
| AZ2-0            | raPure  |             |                 |                  |     |            |          |         | 🗸 Norma | I | VMFS 6 |   |             | 30 TB    |   | 29.84 TB |
| AZ2Or            | aVVOL   |             |                 |                  |     |            |          |         | 🗸 Norma | I | vVol   |   |             | 8,192 TB |   | 8,192 TB |

FIGURE 27. Site B Datastores
In addition, Site B three-node vSphere cluster also has a vSAN datastore AZ2-vSAN.

| AZ2BCA11                             | ACTIONS Y  |                |               |               |           |                |   |                         |   |           |  |  |  |  |
|--------------------------------------|--|----------------|---------------|---------------|-----------|----------------|---|-------------------------|---|-----------|--|--|--|--|
| Summary Monitor                      | Configure Permissions Hosts VMs                        | Datastores Net | works Updates |               |           |                |   |                         |   |           |  |  |  |  |
| Services 🗸                           | Disk Management  |                |               |               |           |                |   |                         |   |           |  |  |  |  |
| vSphere DRS<br>vSphere Availability  |  |                |               |               |           |                |   |                         | ( | UPGRADE   |  |  |  |  |
| Configuration 🗸                      |  |                |               |               |           |                |   |                         |   |           |  |  |  |  |
| Quickstart                           | CLAIM UNUSED DISKS ADD DISKS GO TO PRE-CHECK ···· Show |                |               |               |           |                |   |                         |   |           |  |  |  |  |
| General<br>Key Provider              | Disk Group   | T Disks in Use | ▼ State       | T Health      | т Туре    | ▼ Fault Domain | τ | Network Partition Group | т | Disk Fori |  |  |  |  |
| VMware EVC                           | > az2esx22.vslab.local                                 | 9 of 9         | Connected     | Unhealthy     |           |                |   | Group 1                 |   |           |  |  |  |  |
| VM/Host Groups<br>VM/Host Rules      | > az2esx23.vsiab.local                                 | 4 of 5         | Connected     | Healthy       |           |                |   | Group 1                 |   |           |  |  |  |  |
| VM Overrides                         | ✓ 🖡 az2esx24.vslab.local                               | 4 of 5         | Connected     | Healthy       |           |                |   | Group 1                 |   |           |  |  |  |  |
| I/O Filters<br>Host Options          | ■ Disk group (524b0c5c-a7bf-c605-27b4-b0               | 941 4          | Mounted       | Healthy       | All flash |                |   |                         |   | 6         |  |  |  |  |
| Host Profile                         | ADD DISKS  |                |               |               |           |                |   |                         |   |           |  |  |  |  |
| vSAN Cluster ✓                       | Name   | T Drive Type   | т             | Claimed As    | т         | Capacity       | ٣ | Health                  | т | State     |  |  |  |  |
| Supervisor Cluster                   | C E Local SAMSUNG Disk (naa.5002538a4839               | 528 Flash      |               | vSAN Cache    |           | 372.61 GB      |   | Healthy                 |   | Mounted   |  |  |  |  |
| Trust Authority<br>Alarm Definitions | C E Local ATA Disk (naa.55cd2e414e37152f)              | Flash          |               | vSAN Capacity |           | 894.25 GB      |   | Healthy                 |   | Mounted   |  |  |  |  |
| Scheduled Tasks                      | C E Local ATA Disk (naa.55cd2e414e37154d)              | Flash          |               | vSAN Capacity |           | 894.25 GB      |   | Healthy                 |   | Mounted   |  |  |  |  |
| vSAN V                               | C E Local ATA Disk (naa.55cd2e414e371556)              | Flash          |               | vSAN Capacity |           | 894.25 GB      |   | Healthy                 |   | Mounted   |  |  |  |  |
| Disk Management                      |  |                |               |               |           |                |   |                         |   |           |  |  |  |  |

### FIGURE 28. Site B vSAN Datastore

### Pure Storage Plugin for VMware vSphere Client

The Pure Storage Plugin for the vSphere client enables VMware users to have insight into, and control of, their Pure Storage FlashArray environment while directly logged into the vSphere client.

The Pure Storage Plugin extends the vSphere client interface to include environmental statistics and objects that underpin the VMware objects in use and to provision new resources as needed.

#### Learn more about installing the Pure Storage Plugin for the vSphere client.

Pure Storage Plugin details are shown below:

| P        | PURESTORAGE" 4 | Settings   |  |           |  |  |  |  |
|----------|----------------|--|--|-----------|--|--|--|--|
| ٩        | Dashboard      | System Networ  | k Users Software   |           |  |  |  |  |
| (F)      |                | 🔆 > Software   |  |           |  |  |  |  |
| ~        |                | vSphere Plugin   |  |           |  |  |  |  |
| (ع)<br>ا |                | vCenter Host<br>Administrator User<br>Administrator Password<br>Version on vCenter | 10.128.138.123<br>administrator@vsphere.local<br>****<br>4.4.0 |           |  |  |  |  |
| €        |                | Available Version  | 4.3.1  | Uninstall |  |  |  |  |
| *        | Settings       |  |  |           |  |  |  |  |

FIGURE 29. Pure Storage Plugin Details

## 

VMware vCenter and Pure Storage Plugin:

| vm vSphere Client                | Menu V Q Search in all environments   |   |
|----------------------------------|---|---|
| 🚹 Home                           |   |   |
| Shortcuts                        |   |   |
| Hosts and Clusters               | + ADD 🖉 EDIT - REMOVE TREGISTER STORAGE PROVIDER 🕄 IMPORT PROTECTION GROUPS |   |
| VMs and Templates                |   |   |
| Storage                          | Array URL   |   |
|                                  | • wdc-tsa-pure-01 https://10.128.136.60                                     | ) |
| Content Libraries                |   |   |
| 🗞 Workload Management            |   |   |
| 🕞 Global Inventory Lists         |   |   |
| Policies and Profiles            |   |   |
| 🕗 Auto Deploy                    |   |   |
| lightarrow Hybrid Cloud Services |   |   |
| < > Developer Center             |   |   |
| 📸 Administration                 |   |   |
| 🗊 Tasks                          | Load Pure1 Tags Volume Groups   |   |
| Events                           |   |   |
| 🧭 Tags & Custom Attributes       |   |   |
| 🔷 Lifecycle Manager              |   |   |
|                                  | □ vvolvSphere-HA-4d3e9f32-vg  |   |
| 🖸 vRealize Operations            | 🗅 vvolvSphere-HA-a44c9013-vg  |   |
| PRaaS                            | <sup>6</sup> 7 yyol-yyolrac2-e8777402-yg                                    |   |
| 🚱 Site Recovery                  |   |   |
| 🚺 Pure Storage                   |   |   |

FIGURE 30. VMware vCenter and Pure Storage Plugin

Once the plugin is installed, from the VM **Oracle19c-OL8-VVOL** view and summary tab, there is a FlashArray widget box indicating whether or not the VM has undelete protection. Undelete protection means that there is currently a FlashArray snapshot of the VM's config-virtual volumes.

| Control Mapiter Continue Data   | 🔲 😴 🐎 🔯 🛛 ACTIONS 🗸  |                  |                       |                                    |
|---|--|------------------|-----------------------|------------------------------------|
| Guest OS:<br>Compatibili<br>VMware To<br>III Powered On DNS Name:<br>IP Addresse<br>Host:<br>LAUNCH REMOTE CONSOLE<br>LAUNCH REMOTE CONSOLE | Oracle Linux 8 (64-bit)<br>VE ESXI 7.0 and later (VM version 17)<br>VE Running, version:11296 (Guest Managed)<br>MORE INFO<br>oracel99-col8-vvol.corp.localdomain<br>VE 10.128,140.102<br>10.128,136,128 |                  |                       |                                    |
| VM Hardware   |  | ^                | Notes                 |                                    |
| > CPU   | 12 CPU(s)  |                  |                       |                                    |
| > Memory  | 128 GB, 1.28 GB memory active  |                  | Custom Attributes     |                                    |
| > Hard disk 1   | 80 GB  |                  | VM Storage Policies   |                                    |
| Total hard disks  | 5 hard disks   |                  |                       |                                    |
| > Network adapter 1   | TSA-WDC-70B-PG1403 (connected)   |                  | vSphere HA            |                                    |
| CD/DVD drive 1  | Disconnected   | 9 <sub>0</sub> ~ |                       |                                    |
| > Video card  | 8 MB   |                  | FlashArray            |                                    |
| VMCI device   | Device on the virtual machine PCI bus that provides support for the virtual mac<br>communication interface   | chine            | B-VIRTUAL VOLUMES     |                                    |
| > Other   | Additional Hardware  |                  | Undelete Protection ① | 😵 (No snapshot found) Snapshot now |
| Compatibility   | ESXi 7.0 and later (VM version 17)   |                  |                       |                                    |
| Edit Settings   |  |                  |                       |                                    |

#### FIGURE 31. Undelete Protection Widget

Navigate to VM Oracle19c-OL8-VVOL's Configure tab to see virtual volumes on Pure Storage.

| Summary Monitor  | 8-VVOL<br>Configure | ▶ ■ 🔮<br>Permissions  | Datastore   | ACTIONS      | ✓<br>vorks Snapshots | Updates          |     |                     |   |                 |   |   |
|--|---------------------|-----------------------|-------------|--------------|----------------------|------------------|-----|---------------------|---|-----------------|---|---|
| Settings V<br>VM SDRS Rules<br>vApp Options<br>Alarm Definitions | Virtual \<br>£IMPOR | Olume<br>r disk ≜ res | TORE DELETE | D DISK       | + CREATE SNAPSHOT    | G overwrite disk |     |                     |   |                 |   |   |
| Scheduled Tasks  | Na                  | ne                    | Ŧ           | Virtual Devi | ice T                | Size             | 1 τ | Datastore           | Ψ | Array           | т | Volume  |
| Policies<br>VMware EVC   | ОНа                 | d disk 1              |             | SCSI (0:0)   |                      | 80.0 GB          |     | TSA-Pure-VVOL-SC-DS |   | wdc-tsa-pure-01 |   | vvol-Oracle19c-OL8-VVOL-0b4146e3-vg/Data-20c34be7   |
| Guest User Mappings  | 🔿 На                | d disk 2              |             | SCSI (0:1)   |                      | 80.0 GB          |     | TSA-Pure-VVOL-SC-DS |   | wdc-tsa-pure-01 |   | vvol-Oracle19c-OL8-VVOL-0b4146e3-vg/Data-c552b187   |
| Pure Storage 🗸 🗸   | ОНа                 | d disk 3              |             | SCSI (1:0)   |                      | 100.0 GB         |     | TSA-Pure-VVOL-SC-DS |   | wdc-tsa-pure-01 |   | vvol-Oracle19c-OL8-VVOL-0b4146e3-vg/Data-57b48797   |
| Virtual Volumes  | O Ha                | d disk 4              |             | SCSI (2:0)   |                      | 1.0 TB           |     | TSA-Pure-VVOL-SC-DS |   | wdc-tsa-pure-01 |   | vvol-Oracle19c-OL8-VVOL-0b4146e3-vg/Data-03decfb2   |
|  | 🔿 На                | d disk 5              |             | SCSI (3:0)   |                      | 250.0 GB         |     | TSA-Pure-VVOL-SC-DS |   | wdc-tsa-pure-01 |   | vvol-Oracle19c-OL8-VVOL-0b4146e3-vg/Data-efe1c0b0   |
|  | O VN                | home                  |             | -            |                      | 4.0 GB           |     | TSA-Pure-VVOL-SC-DS |   | wdc-tsa-pure-01 |   | vvol-Oracle19c-OL8-VVOL-0b4146e3-vg/Config-950dc3ea |
|  |                     |                       |             |              |                      |                  |     |                     |   |                 |   |   |

FIGURE 32. Virtual Volumes on Pure Storage

The Pure Storage Plugin enables the following operations:

- Import disk to import a virtual disk (vVol)
- Restore deleted disk to restore a destroyed vVol
- Create snapshot to take a snapshot
- Overwrite disk to overwrite an existing vVol

Learn more about Pure Storage Plugin operations.

### Virtual Machine and Oracle Configuration

Two single-instance VMs were created on Site A as follows:

- VM Oracle19c-OL8
- VM Oracle19c-OL8-RMAN

Each VM was created with the following tools or characteristics:

- VM version 19 on ESXi 7.0 U2
- Guest operating system Oracle Enterprise Linux 8.3 UEK
- Oracle Grid and RDBMS binaries version 19.8
- ASM disk group for Oracle Grid Infrastructure Management Repository (GIMR) named MGMT\_DATA
- Different names for DATA and FRA ASM disks on VMs Oracle19c-OL8 and Oracle19c-OL8-RMAN
  - On VM Oracle19c-OL8, ASM diskgroup DATA\_DG contains a ASM disk DATA\_01 and ASM diskgroup FRA\_DG has a ASM disk FRA\_01
  - On VM Oracle19c-OL8-RMAN, ASM diskgroup RMAN\_DATA\_DG contains a ASM disk RMAN\_DATA\_01

Storage for both VMs **Oracle19c-OL8** and **Oracle19c-OL8-RMAN** was provisioned on the VMFS datastore OraSC2.for all use cases except for storage-based replication using vSphere Virtual Volumes, these two VMs were provisioned on the vSphere Virtual Volumes datastore OraVVOL.

The use cases for application-based replication and VMware-based replication (VMware Site Recovery Manager with VMware vSphere Replication) can be applied to virtual machines with storage on any VMware datastore (NFS, VMFS, vSAN, vSphere Virtual Volumes).

Details for VM Oracle19c-OL8 are as follows:

- 12 vCPUs with 128GB RAM
- Oracle SGA set to 96GB with traditional HugePages and PGA set to 6GB
- VM hosts both Oracle Grid and RDBMS 19.8 multi-tenant production database vvol19c with a pluggable database pdb1
- 3 ASM disks groups:
  - MGMT\_DATA for Oracle Grid Infrastructure Management Repository (GIMR) with ASM disk MGMT\_DATA01
  - DATA\_DG for data and redo log files with ASM disk DATA\_01
  - FRA\_DG for archive logs files with ASM disk FRA\_01
- VM network adapter is connected to port group APPS-1614 and assigned an IP address 172.16.14.45

All Oracle on VMware platform best practices were followed as per the VMware Hybrid Cloud Best Practices Guide for Oracle Workloads.



| 🕆 Oracle19c-OL8   | > 🗆 🗳 🖑   | ťĊ   | ACTIONS V  |  |                 |                    |              |
|---|---|--|--|--|-----------------|--------------------|--------------|
| Summary Monitor Conf                                      | igure Permis  | sions  | Datastores   | Networks   | Snapshots       | Updates            |              |
| Powered On<br>Launch web console<br>Launch remote console | Guest OS:<br>Compatibility:<br>VMware Tools:<br>DNS Name:<br>IP Addresses:<br>Host:<br>$\delta$ | Oracle<br>ESXi 7<br>Runnin<br>MORE<br>oracle<br>172.16.<br>sc2es | Linux 8 (64-bit)<br>.0 U2 and later (<br>ng, version:11296<br>INFO<br>19c-ol8-vvol.corp<br>.14.45<br>x12.vslab.local | 'VM version 19)<br>(Guest Manageo<br>b.localdomain | )               |                    |              |
| VM Hardware   |   |  |  |  |                 |                    | ^            |
| > CPU   |   | 1  | 2 CPU(s)   |  |                 |                    |              |
| > Memory  |   |  | 128 GB, 1.28 G   | B memory active                                    |                 |                    |              |
| > Hard disk 1   |   | ε  | 30 GB  |  |                 |                    |              |
| Total hard disks  |   | 5  | ó hard disks   |  |                 |                    |              |
| > Network adapter 1                                       |   | A  | APPS-1614 (conne   | ected)   |                 |                    |              |
| CD/DVD drive 1  |   | C  | Disconnected   |  |                 |                    | -q_<br>*D- ~ |
| > Video card  |   | 8  | 3 MB   |  |                 |                    |              |
| VMCI device   |   | C<br>r   | Device on the vir<br>nachine commur  | tual machine PCI<br>nication interface             | bus that provid | es support for the | virtual      |
| > Other   |   | A  | Additional Hardw   | are  |                 |                    |              |
| Compatibility   |   | E  | SXi 7.0 U2 and I   | ater (VM version                                   | 19)             |                    |              |

FIGURE 33. VM Oracle19c-OL8 Summary

VM Oracle19c-OL8 VMDKs are shown below. All SCSI controllers are set to VMware Paravirtual SCSI Controller type.

| $\vee$ Hard disks                      | 5 total   1.5 TB   |
|--|--------------------|
| > Hard 80 GB   SCSI(0:0)<br>disk 1 ×   |                    |
| > Hard 80 GB   SCSI(0:1)<br>disk 2 ×   |                    |
| > Hard 100 GB   SCSI(1:0)<br>disk 3 ×  |                    |
| > Hard 1024 GB   SCSI(2:0)<br>disk 4 × |                    |
| > Hard 250 GB   SCSI(3:0)<br>disk 5 ×  |                    |
| > SCSI controller 0                    | VMware Paravirtual |
| > SCSI controller 1                    | VMware Paravirtual |
| > SCSI controller 2                    | VMware Paravirtual |
| > SCSI controller 3                    | VMware Paravirtual |



VMKD details:

- Hard Disk 1 80GB for operating system
- Hard Disk 2 80GB for Oracle Grid and RDBMS binaries
- Hard Disk 3 100GB for Oracle Grid Infrastructure Management Repository (GIMR) (Management Database (MGMTDB)) (ASM Disk Group MGMT\_DATA)
- Hard Disk 4 1TB for database vvol19c data and redo log files (ASM Disk Group DATA\_DG)
- Hard Disk 5 250GB for database vvol19c archive logs files (ASM Disk Group FRA\_DG)

Oracle ASM disk group details:

| grid@ora | icle19c-c | ol8-vvol         | :+ASM:/h | iome/grid> asmc | nd lsdg |         |          |         |                 |                |               |              |            |
|----------|-----------|------------------|----------|-----------------|---------|---------|----------|---------|-----------------|----------------|---------------|--------------|------------|
| State    | Туре      | Rebal            |          | Logical_Secto   | : Block |         | Total_MB | Free_MB | Req_mir_free_MB | Usable_file_MB | Offline_disks | Voting_files | Name       |
| MOUNTED  | EXTERN    |                  | 512      |                 | 2 4096  | 1048576 | 1048575  | 1036823 |                 | 1036823        |               |              | DATA_DG/   |
| MOUNTED  | EXTERN    |                  | 512      |                 | 2 4096  | 1048576 |          | 253761  |                 | 253761         |               |              | FRA DG/    |
| MOUNTED  | EXTERN    |                  | 512      |                 | 2 4096  | 4194304 | 102396   | 102296  |                 | 102296         |               |              | MGMT DATA/ |
| aridaara |           | $18 - \pi \pi 0$ | ·+ASM·/h | omelarid        |         |         |          |         |                 |                |               |              |            |

FIGURE 35. Oracle ASM Disk Group

Hard Disk 4 (1TB) details are shown below:

| ✓ Hard disk 4       | <u>1                                    </u> |
|---------------------|--|
| Maximum Size        | 20.59 TB                                     |
| VM storage policy   | Datastore Default ~                          |
| Туре                | Thin Provision                               |
| Sharing             | No sharing 🗸                                 |
| Disk File           | [OraSC2] Oracle19c-OL8/Oracle19c-OL8_3.vmdk  |
| Shares              | Normal ~ 1000 ~                              |
| Limit - IOPs        | Unlimited ~                                  |
| Disk Mode           | Dependent ~                                  |
| Virtual Device Node | SCSI controller 2 💉 SCSI(2:0) Hard disk 4 🗸  |

FIGURE 36. Hard Disk 4 (1TB)



VM Oracle19c-OL8-RMAN details are as follows:

- 12 vCPUs with 128GB RAM
- Oracle SGA set to 96GB with traditional HugePages and PGA set to 6GB
- VM hosts both Oracle Grid and RDBMS 19.8 multi-tenant production database **rmandb** with a pluggable database **pdb1** for Oracle RMAN catalog purpose and an xfs file system **/rman** for holding Oracle RMAN backups
- 2 ASM disks groups
  - MGMT\_DATA for Oracle Grid Infrastructure Management Repository (GIMR) with ASM disk MGMT\_DATA01
  - RMAN\_DATA\_DG for data, redo log files and archive log files with ASM disk RMAN\_DATA\_01
- VM network adapter is connected to port group APPS-1614 and assigned an IP address 172.16.14.46

All Oracle on VMware platform best practices were followed as outlined in VMware Hybrid Cloud Best Practices Guide for Oracle Workloads.

| 🕆 Oracle19c-OL8       | -RMAN   D                                 | 🛃 🖗 🔯 🛛 ACTIONS 🗸   |
|-----------------------|---|---|
| Summary Monitor       | Configure Permissio                       | ons Datastores Networks Snapshots Updates   |
|                       |   |   |
|                       | Compatibility: E<br>VMware Tools: R       | JFACIE LINUX 8 (64-bit)<br>ISXI 7.0 U2 and later (VM version 19)<br>Junning, version:11296 (Guest Managed)  |
|                       | DNS Name: c<br>IP Addresses: 1<br>Host: s | 10RE INFO<br>sracle19c-ol8-vvol-rman.corp.localdomain<br>72.16.14.46<br>sc2esx12.vslab.local                |
| LAUNCH REMOTE CONSOLE | 1 👃 🗔 🗓                                   |   |
| VM Hardware           |   | ^   |
| > CPU                 |   | 12 CPU(s)   |
| > Memory              |   | 128 GB, 15.36 GB memory active  |
| > Hard disk 1         |   | 100 GB  |
| Total hard disks      |   | 5 hard disks  |
| > Network adapter 1   |   | APPS-1614 (connected)   |
| CD/DVD drive 1        |   | Disconnected $q_{\rm D}$ v  |
| > Video card          |   | 4 MB  |
| VMCI device           |   | Device on the virtual machine PCI bus that provides support for the virtual machine communication interface |
| > Other               |   | Additional Hardware   |
| Compatibility         |   | ESXi 7.0 U2 and later (VM version 19)   |

FIGURE 37. VM Oracle19c-OL8-RMAN Summary



VM Oracle19c-OL8-RMAN VMDKs are shown below. All SCSI controllers are set to VMware Paravirtual SCSI Controller type.

| ✓ Hard disks                           | 5 total   1.5 TB   |
|--|--------------------|
| > Hard 80 GB   SCSI(0:0)<br>disk 1 ×   |                    |
| > Hard 80 GB   SCSI(0:1)<br>disk 2 ×   |                    |
| > Hard 100 GB   SCSI(1:0)<br>disk 3 ×  |                    |
| > Hard 250 GB   SCSI(2:0)<br>disk 4 ×  |                    |
| > Hard 1024 GB   SCSI(3:0)<br>disk 5 × |                    |
| > SCSI controller 0                    | VMware Paravirtual |
| > SCSI controller 1                    | VMware Paravirtual |
| > SCSI controller 2                    | VMware Paravirtual |
| > SCSI controller 3                    | VMware Paravirtual |

#### FIGURE 38. VM Oracle19c-OL8-RMAN VMDKs

VMDK details:

- Hard Disk 1 80GB for operating system
- Hard Disk 2 80GB for Oracle Grid and RDBMS binaries
- Hard Disk 3 100GB for Oracle Grid Infrastructure Management Repository (GIMR) (Management Database (MGMTDB)) (ASM Disk Group MGMT\_DATA)
- Hard Disk 4 250GB for Oracle Database rmandb database, redo log and archive log files (ASM Disk Group DATA\_DG)
- Hard Disk 5 1TB for XFS filesystem /rman mount point for storing physical RMAN backups

Oracle ASM disk group details:

| grid@ora | rid@oracle19c-o18-vvol-rman:+ASM:/home/grid> asmcmd lsdg |                    |                           |                 |       |         |          |         |                 |                |               |              |            |
|----------|--|--------------------|---------------------------|-----------------|-------|---------|----------|---------|-----------------|----------------|---------------|--------------|------------|
| State    | Type   | Rebal              |                           | Logical_Sector  | Block |         | Total_MB | Free_MB | Req_mir_free_MB | Usable_file_MB | Offline_disks | Voting_files | Name       |
| MOUNTED  | EXTERN   |                    | 512                       | - 512           | 4096  | 1048576 | 255999   | 223816  |                 | 223816         |               |              | DATA_DG/   |
| MOUNTED  | EXTERN   |                    | 512                       | 512             | 4096  | 4194304 | 102396   | 102296  |                 | 102296         |               |              | MGMT DATA/ |
| aridlors |  | $18 - \pi \pi o 1$ | $-rman \cdot \pm \Lambda$ | SM. (home/arid) |       |         |          |         |                 |                |               |              |            |

#### FIGURE 39. Oracle ASM Disk Group

A two-node Oracle RAC was created on Site A as follows:

- VM prac19c1
- VM prac19c2

The basic steps for a RAC deployment on VMware can be found in Oracle VMware Hybrid Cloud High Availability Guide Reference Architecture.

For simplicity, and for sake of illustration, the RAC cluster was created with one shared VMDK.

Storage for the Oracle RAC **prac19c** VMs was provisioned on the VMFS datastore **OraSC2** for all use cases except storage-based replication using vSphere Virtual Volumes. Oracle RAC **prac19c** VMs were provisioned on the vSphere Virtual Volumes datastore **OraVVOL**.

The use cases for application-based replication and VMware-based replication (VMware Site Recovery Manager with VMware vSphere Replication) can be applied to virtual machines with storage on any VMware datastore (NFS, VMFS, vSAN, vSphere Virtual Volumes).

Details of Oracle RAC VMs prac19c1 and prac19c2 are as follows:

- 12 vCPUs with 128GB RAM
- Oracle SGA set to 96GB with traditional HugePages and PGA set to 6GB
- VM hosts both Oracle Grid and RDBMS 19.8 multi-tenant production database vvol19c with a pluggable database pdb1
- For purposes of simplicity and illustration, one ASM disk group was created (DATA\_DG) housing all data files, control files, redo log files, archive log files, CRS and vote disks.
- Separate ASM disk groups are recommended for the RAC and database components as a best practice. Refer to *Oracle VMware Hybrid Cloud High Availability Guide* for more information.
- VM prac19c1 public network adapter is connected to port group **APPS-1614** and assigned an IP address 172.16.14.191. The private network adapter is connected to port group **APPS-1605** and assigned an IP address 192.168.14.191
- VM prac19c2 public network adapter is connected to port group **APPS-1614** and assigned an IP address 172.16.14.192. The private network adapter is connected to port group **APPS-1605** and assigned an IP address 192.168.14.192

All Oracle on VMware platform best practices were followed as described in VMware Hybrid Cloud Best Practices Guide for Oracle Workloads.

Oracle RAC prac19c VM's VMDKs are shown below. All SCSI controllers are set to VMware Paravirtual SCSI Controller type:

- Two non-shared VMDKs
  - Hard Disk 1 80GB for Operating System with disk mode Dependent
- Hard Disk 1 80GB for Oracle Grid Infrastructure and RDBMS binaries with disk mode Dependent
- One shared VMDK (500 GB) with multi-writer attribute and disk mode Independent-Persistent for RAC cluster

Details of the shared VMDK with multi-writer flag and disk mode Independent-Persistent are shown below:



FIGURE 40. Oracle RAC prac19c Shared VMDK Details



| SERVER       | prac19c1                   | prac19c2                   | PORTGROUP |
|--------------|----------------------------|----------------------------|-----------|
| IP           | 172.16.14.191              | 172.16.14.192              |           |
|              |                            |                            |           |
| Public FDQN  | prac19c1.vslab.local       | prac19c2.vslab.local       | APPS-1614 |
| Public IP    | 172.16.14.191              | 172.16.14.192              |           |
|              |                            |                            |           |
| Private FDQN | prac19c1-priv1.vslab.local | prac19c2-priv1.vslab.local | APPS-1605 |
| Private IP   | 192.168.14.191             | 192.168.14.192             |           |
|              |                            | ·                          | ·         |
| VIP FDQN     | prac19c1-vip.vslab.local   | prac19c2-vip.vslab.local   | APPS-1605 |
| VIP IP       | 172.16.14.193              | 172.16.14.194              |           |
|              |                            |                            |           |
| SCAN         | prac19c-scan.vslab.local   |                            |           |
|              | 172.16.14.195              |                            |           |
|              | 172.16.14.196              |                            |           |
|              | 172.16.14.197              |                            |           |

Details of the RAC public network and private interconnect are shown below:

### TABLE 6. Oracle RAC Public and Private Network Details

| prac19c1      P      E                              | 了 命 磁   ACTIONS 〜<br>gure Permissions Datastores Networks Snaps   | hots Updates                     | Brac19c2 ▷ □     Summary Monitor Conf                       | 😴 की 🕼 🛛 🕶 ACTIONS 🗸   | inapshots Updates                       |
|---|---|----------------------------------|---|--|---|
| Powered Cn LAUNCH WEB CONSOLE LAUNCH REMOTE CONSOLE | Guest OS: Cracle Linux 7 (64-bit)<br>Compatibility: ESX 7.0 and later (VM version 17)<br>VM vers Tool: Running, version 11269 (Guest Managed)<br>More INFO<br>DNS Name: practPdL viseb Jocal<br>IP Addresses<br>Hot: sc2esrl0 vs8b Jocal<br>Kot Compatibility Compatibility (VER)<br>VEW ALL 6 IP ADDRESSES<br>Hot: sc2esrl0 vs8b Jocal |                                  | Povered On     LAUNCH WEB CONSOLE     LAUNCH REMOTE CONSOLE | Guest OS: Oracle Linux 7 (64-bit)<br>Compatibility: ESXI 7.0 and later (VM version 17)<br>VMware Tools: Running, version 11269 (Suest Managed)<br>Mode IMPO<br>DNS Name: proc19c2 vsiab.local<br>IP Addresses: 172.1614.192<br>VIEW ALL S IP ADDRESSES<br>Host: sc2esx11 vsiab.local |   |
| VM Hardware   |   | ^                                | VM Hardware   |  | ^                                       |
| > CPU   | 12 CPU(s)   |                                  | > CPU   | 12 CPU(s)  |   |
| > Memory  | 128 GB, 16.64 GB memory active  |                                  | > Memory  | 128 GB, 11.52 GB memory active   |   |
| > Hard disk 1                                       | 80 GB   |                                  | > Hard disk 1   | 80 GB  |   |
| Total hard disks                                    | 3 hard disks  | Public Interface 🔸               | Total hard disks  | 3 hard disks   |   |
| > Network adapter 1                                 | APPS-1614 (connected)   |                                  | > Network adapter 1   | CAPPS-1614 (connected)   |   |
| > Network adapter 2                                 | APPS-1605 (connected)   | Private Interconnect 🔫           | > Network adapter 2   | APPS-1605 (connected)  |   |
| CD/DVD drive 1                                      | Disconnected  | 9 <sub>0</sub> ~                 | CD/DVD drive 1  | Disconnected   | d <sup>D</sup> ^                        |
| > Video card  | 8 MB  |                                  | > Video card  | 8 MB   |   |
| VMCI device   | Device on the virtual machine PCI bus that<br>machine communication interface   | provides support for the virtual | VMCI device   | Device on the virtual machine PCI bu<br>machine communication interface  | s that provides support for the virtual |
| > Other   | Additional Hardware   |                                  | > Other   | Additional Hardware  |   |
| Compatibility                                       | ESXI 7.0 and later (VM version 17)  |                                  | Compatibility   | ESXI 7.0 and later (VM version 17)   |   |

FIGURE 41. Oracle RAC prac19c Public Network and Private Interconnect



Details of the RAC public network, private interconnect, VIP and HAIP IP address are shown below:





Details of the RAC cluster services are shown below:

| [root@prac19c1     | ~]# /u0  | 1/app/19.0.0/0 | grid/bin/crsctl status re: | s -t                  | [root@prac19c2     | ~]# /u0   | l/app/19.0.0/  | grid/bin/crsctl status re | s -t                 |
|--------------------|----------|----------------|----------------------------|-----------------------|--------------------|-----------|----------------|---------------------------|----------------------|
| Name               | Target   | State          | Server                     | State details         | Name               | Target    | State          | Server                    | State details        |
| Local Resources    |          |                |                            |                       | Local Resource     |           |                |                           |                      |
| ora.LISTENER.ls    |          |                |                            |                       | ora.LISTENER.1     |           |                |                           |                      |
|                    | ONLINE   | ONLINE         | prac19c1                   | STABLE                |                    |           |                | prac19c1                  | STABLE               |
|                    |          | ONLINE         | prac19c2                   | STABLE                |                    | ONLINE    | ONLINE         | prac19c2                  | STABLE               |
| ora.chad           |          |                |                            |                       | ora.chad           |           |                |                           |                      |
|                    | ONLINE   | ONLINE         |                            | STABLE                |                    | ONLINE    | ONLINE         | pracl9cl                  | STABLE               |
|                    | ONLINE   | ONLINE         | prac19c2                   | STABLE                |                    | ONLINE    | ONLINE         | prac19c2                  | STABLE               |
| ora.net1.netwom    |          |                |                            |                       | ora.net1.netWo     | ork       |                |                           | 0 <b>0</b> 7.07.0    |
|                    | ONLINE   | ONLINE         | prac19c1                   | STABLE                |                    | ONLINE    | ONLINE         | pracisci<br>presilez      | STABLE               |
|                    | ONLINE   | ONLINE         | prac19c2                   | STABLE                | oro one            |           |                | pracisez                  | STABLE               |
| ora.ons            |          | ANT 7317       |                            | 4 <b>773 D.</b> T. D. | ora.ons            | ONLINE    | ONLINE         | pred 9cl                  | CTARLE               |
|                    | ONLINE   | ONLINE         | pracisci                   | STABLE                |                    | ONLINE    | ONLINE         | pracisci<br>pracisci      | STABLE               |
|                    | ONTINE   | ONLINE         |                            | SIABLE                |                    |           |                |                           |                      |
|                    |          |                |                            |                       | Cluster Resour     |           |                |                           |                      |
| ono 3 CMUE/01- CMU |          |                |                            |                       | ora.ASMNETILSM     | R ASM. Le | or (ora asmgro | (au                       |                      |
| JLA.ASMNETILSNI    | ONLINE   | ONLINE         | .prod19d1                  | CTARLE                | 1                  | ONLINE    | ONLINE         | pracl9c1                  | STABLE               |
|                    | ONLINE   | ONLINE         | proclac2                   | STABLE                | 2                  | ONLINE    | ONLINE         | prac19c2                  | STABLE               |
|                    | ONLINE   | OFFLINE        |                            | STABLE                | 3                  | ONLINE    | OFFLINE        |                           | STABLE               |
| ora.DATA DG.dq     | ora.asm  | Troup)         |                            | JINDE                 | ora.DATA DG.do     | (ora.asm  | aroup)         |                           |                      |
| 1                  | ONLINE   | ONLINE         | pracl9c1                   | STABLE                | 1 -                | ONLINE    | ONLINE         | prac19c1                  | STABLE               |
|                    | ONLINE   | ONLINE         | prac19c2                   | STABLE                | 2                  | ONLINE    | ONLINE         | prac19c2                  | STABLE               |
|                    | OFFLINE  | OFFLINE        |                            | STABLE                | 3                  | OFFLINE   | OFFLINE        |                           | STABLE               |
| ora.LISTENER SC    | CAN1.lsn | r              |                            |                       | ora.LISTENER S     | CAN1.lsn  |                |                           |                      |
|                    | ONLINE   | ONLINE         | prac19c2                   | STABLE                | 1 -                | ONLINE    |                | prac19c2                  | STABLE               |
| ora.LISTENER SC    | CAN2.lsn |                |                            |                       | ora.LISTENER_S     | CAN2.lsn  |                |                           |                      |
|                    | ONLINE   | ONLINE         | prac19c1                   | STABLE                | 1 -                | ONLINE    | ONLINE         | prac19c1                  | STABLE               |
| ora.LISTENER_SC    | CAN3.lsn |                |                            |                       | ora.LISTENER_S     | CAN3.lsn  |                |                           |                      |
|                    |          | ONLINE         | prac19c1                   | STABLE                | 1                  | ONLINE    | ONLINE         | prac19c1                  | STABLE               |
| ora.MGMTLSNR       |          |                |                            |                       | ora MGMTLSNR       |           |                |                           |                      |
|                    | ONLINE   | ONLINE         | prac19c1                   | 169.254.16.7 192.168  | 1                  | ONLINE    | ONLINE         | pracl9cl                  | 169.254.16.7 192.168 |
|                    |          |                |                            | .14.191,STABLE        |                    |           |                |                           | .14.191,STABLE       |
| ora.asm(ora.asm    | (group)  |                |                            |                       | ora.asm(ora.as     | mgroup)   | ONLY THIN      |                           | at-st-d amanin       |
|                    | ONLINE   | ONLINE         | prac19c1                   | Started, STABLE       | 1                  | ONLINE    | ONLINE         | praci9ci                  | started, STABLE      |
|                    | ONLINE   | ONLINE         | praci9c2                   | Started, STABLE       | ~ ~                | ORDINE    | ORDINE         | pracisez                  | STALLED, SIABLE      |
| 3                  | OFFLINE  | OFFLINE        |                            | STABLE                | ora semnati se     | anid 110  | OFF LINE       |                           | STABLE               |
| ora.asmneti.asm    | ONTINE   | (ora.asmgroup  |                            | CMARIE                | ora.asililetr.as   | ONLINE    | ONLINE         | pradl9d1                  | CTARLE               |
|                    | ONLINE   | ONLINE         | prodlac2                   | CTABLE                | 2                  | ONLINE    | ONLINE         | pracisci<br>pracisci      | STABLE               |
|                    | OFFLINE  | OFFLINE        |                            | STABLE                | 3                  | OFFLINE   | OFFLINE        |                           | STABLE               |
| ora.cvu            |          | OLL DIND       |                            | 011000                | ora.cvu            |           |                |                           |                      |
|                    | ONLINE   | ONLINE         | pracl9c1                   | STABLE                | 1                  | ONLINE    | ONLINE         | prac19c1                  | STABLE               |
| ora.momtdb         |          |                |                            |                       | ora.mgmtdb         |           |                |                           |                      |
|                    | ONLINE   | ONLINE         | prac19c1                   | Open, STABLE          | 1                  | ONLINE    | ONLINE         | pracl9cl                  | Open,STABLE          |
| ora.prac19c.db     |          |                |                            |                       | ora.prac19c.db     |           |                |                           |                      |
|                    |          | ONLINE         | prac19c1                   | Open,HOME=/u01/app/o  | 1                  |           |                |                           | Open,HOME=/u01/app/o |
|                    |          |                |                            | racle/product/19.0.0  |                    |           |                |                           | racle/product/19.0.0 |
|                    |          |                |                            | /dbhome_1,STABLE      |                    |           |                |                           | /dbhome_1,STABLE     |
|                    | ONLINE   | ONLINE         | prac19c2                   | Open,HOME=/u01/app/o  | 2                  | ONLINE    | ONLINE         | prac19c2                  | Open,HOME=/u01/app/o |
|                    |          |                |                            | racle/product/19.0.0  |                    |           |                |                           | racle/product/19.0.0 |
|                    |          |                |                            | /dbhome_1,STABLE      |                    |           |                |                           | /dbhome_1,STABLE     |
| ora prac19c1 vi    |          |                |                            |                       | ora.prac19c1.v     | 'ip       |                |                           |                      |
|                    | ONLINE   | ONLINE         | pracl9cl                   | STABLE                | 1                  | ONLINE    | ONLINE         | praci9ci                  | STABLE               |
| ora.prac19c2.vi    | Lp       |                |                            |                       | ora.prac19c2.v     | 'ip       | AN             |                           | 003 D 7 D            |
|                    | ONLINE   | ONLINE         | prac19c2                   | STABLE                |                    | ONLINE    | ONLINE         | praci9cz                  | STABLE               |
| ora.qosmserver     | ONT THE  | ONLY THE       |                            | CHAD F                | ora.qosmserver     | ONLINE    | ONLINE         |                           | CHARLE               |
|                    | ONLINE   | ONLINE         | pracisci                   | STABLE                | L<br>one ecent win |           |                | pracisei                  | STABLE               |
| ora.scanr.vip      | ONLINE   | ONLINE         | pp2_10_22                  | CHARLE                | ora.scanr.vip      | ONLINE    | ONLINE         | prod19d3                  | CHARIE               |
| ora goan? win      | ONTINE   | ONLINE         | pracisez                   | SIADDE                | ora ecan2 min      | ONTINE    | OMPTAR         | placiscz                  | STADUE               |
| ora.scanz.vip      | ONLINE   | ONLINE         | prod19d1                   | CTARIE                | ora.scanz.vip      | ONLINE    | ONLINE         | prac19c1                  | CTARLE               |
| ora scan3 win      |          |                | practiver                  | STADUE                | ora scant win      |           | ONDINE         | practiver                 | STREEDS              |
| 1                  | ONLINE   | ONLINE         | pracl9c1                   | STABLE                | 1                  | ONLINE    | ONLINE         | prac19c1                  | STABLE               |
|                    |          |                |                            |                       |                    |           |                |                           |                      |
|                    |          |                |                            |                       |                    |           |                |                           |                      |

### FIGURE 43. Oracle RAC prac19c Cluster Services

For the Oracle Data Guard use case, two VMs were created with one VM on Site A and one VM on Site B as follows:

- VM Oracle19c-OL8-Primary on Site A with IP address 172.16.14.50
- VM Oracle19c-OL8-Standby on Site B with IP address 172.16.14.51

Each VM was created with the following tools or characteristics:

- VM version 19 on ESXi 7.0 U2
- Guest operating system Oracle Enterprise Linux 8.3 UEK
- Oracle Grid and RDBMS binaries version 19.12
- For sake of simplicity and illustration, one ASM disk group was created called DATA\_DG which houses all the data files, control files, redo log files and archive log files. Creating separate ASM disk groups for these components is recommended as a best practice.

Storage for VM Oracle19c-OL8-Primary was provisioned on the VMFS datastore OraPure. Storage for VM Oracle19c-OL8-Standby was provisioned on the NFS datastore AZ2-TINTRI-EC6090.

Details for VM Oracle19c-OL8-Primary are as follows:

- 8 vCPUs with 32 GB RAM
- ${\scriptstyle \bullet}$  Oracle SGA set to 16B with traditional HugePages and PGA set to 6GB
- VM hosts both Oracle Grid and RDBMS 19.12 multi-tenant production database ora19c with a pluggable database pdb1
- For the sake of simplicity and illustration, one ASM disk group was created called DATA\_DG which houses all the datafiles, control files, redo log files and archive log files. Creating separate ASM disk groups for these components is recommended as a best practice.
- VM network adapter is connected to port group APPS-1614 and assigned an IP address 172.16.14.50

All Oracle on VMware platform best practices were followed as described in VMware Hybrid Cloud Best Practices Guide for Oracle Workloads.

| Oracle19c-OL8-Pi                                    | rimary   ▷ 🗖 😅  | ACTIONS V  |                   |   |   |
|---|---|--|-------------------|---|---|
| Summary Monitor Con                                 | figure Permissions  | Datastores Networks  | Snapshots         | Updates                                 |   |
| Powered On LAUNCH WEB CONSOLE LAUNCH REMOTE CONSOLE | Guest OS: Oracle L<br>Compatibility: ESXI 7.<br>VMware Tools: Running<br>DNS Name: Oraclefs<br>IP Addresses 172.16.14<br>Host: Compatibility Sc2ess.d | Jnux 8 (64-bit)<br>) and later (VM version 17)<br>), version:11328 (Guest Manage<br>PFC<br>- col8-primaryvslab.loca<br>1,50<br>27งราชเวาbCal | d)                |   |   |
| VM Hardware   |   |  |                   |   |   |
| > CPU   |   | 8 CPU(s)   |                   |   |   |
| > Memory  |   | 32 GB, 0.64 GB memory  | active            |   |   |
| > Hard disk 1                                       |   | 80 GB  |                   |   |   |
| Total hard disks                                    |   | 3 hard disks   |                   |   |   |
| > Network adapter 1                                 |   | APPS-1614 (connected)  |                   |   |   |
| CD/DVD drive 1                                      |   | Disconnected   |                   | 9                                       | Þ |
| > Video card  |   | 8 MB   |                   |   |   |
| VMCI device   |   | Device on the virtual machin<br>communication interface  | ne PCI bus that p | rovides support for the virtual machine | e |
| > Other   |   | Additional Hardware  |                   |   |   |
| Compatibility                                       |   | ESXi 7.0 and later (VM versi   | ion 17)           |   |   |
| Edit Settings                                       |   |  |                   |   |   |
| Related Objects                                     |   |  |                   |   |   |
| Cluster   |   | []] BCA-SiteC  |                   |   |   |
| Host  |   | sc2esx12.vslab.local   |                   |   |   |
| Networks  |   | APPS-1614  |                   |   |   |
| Storage   |   | OraPure  |                   |   |   |

FIGURE 44. Primary Database VM Oracle19C-OL8-Primary

Details of VM Oracle19c-OL8-Standby are as follows:

- 8 vCPUs with 32 GB RAM
- Oracle SGA set to 16B with traditional HugePages and PGA set to 6GB
- VM hosts both Oracle Grid and RDBMS 19.12 multi-tenant standby production database ora19c with a pluggable database pdb1
- For sake of simplicity and illustration, one ASM disk group was created called DATA\_DG which houses all the datafiles, control files, redo log files and archive log files. Creating separate ASM disk groups for these components is recommended as a best practice.
- VM network adapter is connected to port group APPS-1810 and assigned an IP address 172.18.10.51

All Oracle on VMware platform best practices were followed as outlined in VMware Hybrid Cloud Best Practices Guide for Oracle Workloads.

| 🕼 Oracle19c-OL8-Standby   ▷ 🗖 🚅   | 🖗 🔞 ACTIONS Y  |
|---|--|
| Summary Monitor Configure Permissions [   | Datastores Networks Snapshots Updates  |
| Guest OS: Oracle Li Compatibility: ESX 7.0 V/Ware Tools: Running. Powered On IP Addresses: 72(8:10, 12(10, 12 | nux 8 (64-bit)<br>and later (VM version 17)<br>version:11328 (Guest Managed)<br>oo-<br>-ol8-standby.vslab.local<br>st<br>vslab.local |
| VM Hardware   |  |
| > CPU   | 8 CPU(s)   |
| > Memory  | 32 GB, 0.32 GB memory active   |
| > Hard disk 1   | 80 GB  |
| Total hard disks  | 3 hard disks   |
| > Network adapter 1   | APPS-1810 (connected)  |
| CD/DVD drive 1  | Disconnected q.  |
| > Video card  | 8 MB   |
| VMCI device   | Device on the virtual machine PCI bus that provides support for the virtual machine communication interface                          |
| > Other   | Additional Hardware  |
| Compatibility   | ESXi 7.0 and later (VM version 17)   |
| Edit Settings   |  |
| Related Objects   |  |
| Cluster   | C AZ2BCA11   |
| Host  | az2esx24.vslab.local   |
| Networks  | APPS-1810  |
| Storage   | AZ2-TINTRI-EC6090  |

FIGURE 45. Physical Standby VM Oracle19C-OL8-Standby

# VMware Site Recovery Manager with vSphere Replication and VMware Site Recovery Manager with Array Based Replication

The Site Recovery Manager and vSphere Replication Appliance information Site Pair Summary for Site A and Site B are as shown below:

| ij               | vCenter Server:<br>vCenter Version:<br>vCenter Host Name:<br>Platform Services Controller: | sc2wvc03.vslab.local<br>7.0.2, 17958471<br>sc2wvc03.vslab.local<br>sc2wvc03.vslab.local<br>3 | <ul> <li>az2wvc01.vslab.local</li> <li>7.0.2, 17920168</li> <li>az2wvc01.vslab.local:443</li> <li>az2wvc01.vslab.local:443</li> </ul> |    |                                    |
|------------------|--|--|---|----|------------------------------------|
| Site Peroven/ N  | lanager  |  |   |    |                                    |
| Protection Group | os:1 🗉 Recovery Plans:1  |  |   |    |                                    |
| ✓ Name           |  | C  | Primary_Site RENAME   | Č. | DR_SILE AENAME                     |
| Server           |  |  | SRMSC2DC01.vslab.local:443 ACTIONS ~  |    | srmaz201.vslab.local:443 ACTIONS - |
| Version          |  |  | 8.4.0, 17913191   |    | 8.4.0, 17913191                    |
| ID               |  |  | com.vmware.vcDr-onprem  |    | com.vmware.vcDr-onprem             |
| Logged in as     |  |  | VSPHERE.LOCAL\Administrator   |    | VSPHERE.LOCAL\Administrator        |
| Remote SRM cor   | nnection   |  | ✓ Connected   |    | ✓ Connected                        |
| vSphere Replica  | ation  | from DB. SiterO  |   |    |                                    |
| W Name           | rom Primary_site.o un Replicated VM:   | From DR_arte.0   | Trimony Cita  |    | DD Gite                            |
| - Name<br>Server |  |  | VPSC2DC01 vslab local:8043  |    | VPA7201 vslab local 8043           |
| Version          |  |  | 8.4.0.9813. 17913754  |    | 8.4.0.9813. 17913754               |
| Domain Name /    | / IP   |  | VRSC2DC01.vslab.local   |    | VRAZ201.vslab.local                |
| Remote VR conr   | nection  |  | ✓ Connected   |    | ✓ Connected                        |
|                  |  |  |   |    |                                    |

FIGURE 46. Site A and Site B Pairing Summary

The network mappings, folder mappings, resource mappings and placeholder datastore mappings must be setup for both use cases below:

- Site Recovery Manager with vSphere Replication
- Site Recovery Manager with array-based replication (LUN OR vVOL level)

The network-mapping port groups between Site A and Site B is as shown below:

| NETWORK                 | SOURCE SITE | PORT GROUP | DESTINATION<br>SITE | DESTINATION TEST<br>NETWORK | DESTINATION<br>RECOVERY NETWORK |
|-------------------------|-------------|------------|---------------------|-----------------------------|---------------------------------|
| Public Network          | Site A      | APPS-1614  | Site B              | APPS-1810                   | APPS-1810                       |
| Private<br>Interconnect | Site A      | APPS-1605  | Site B              | APPS-1809                   | APPS-1805                       |
|                         |             |            |                     |                             |                                 |
| Public Network          | Site B      | APPS-1810  | Site A              | APPS-1614                   | APPS-1614                       |
| Private<br>Interconnect | Site B      | APPS-1805  | Site A              | APPS-1605                   | APPS-1605                       |

TABLE 7. Network-Mapping Details between Site A and Site B



The network-mapping for protected site public network **APPS-1614** to recovery site recovery network **APPS-1810** is as shown below. The recovery site test network is also **APPS-1810**.

| Network Mappings                                   |                          |            |                  |     |                 |   |                      |
|--|--------------------------|------------|------------------|-----|-----------------|---|----------------------|
| sc2wvc03.vslab.local az2wvc01.vslab.local          |                          |            |                  |     |                 |   |                      |
| NEW EDIT DELETE CREATE REVERSE MAPPING             |                          |            |                  |     |                 |   |                      |
| sc2wvc03.vslab.local                               |                          | <b>↑ τ</b> | Recovery Network | T I | Reverse Mapping | T | Test Network         |
| 🗌   🙆 APPS-1605                                    |                          |            | 🛆 APPS-1805      |     | Yes             |   | 🛆 APPS-1809          |
| 🔽 🛛 🛆 APPS-1614                                    |                          |            | APPS-1810        |     | Yes             |   | APPS-1810            |
|  |                          |            |                  |     |                 |   |                      |
| 1 III EXPORT ~                                     |                          |            |                  |     |                 |   |                      |
| IP Customization                                   |                          |            |                  |     |                 |   |                      |
| Site   | sc2wvc03.vslab.local     |            |                  |     |                 |   | az2wvc01.vslab.local |
| Network  | APPS-1614                |            |                  |     |                 |   | APPS-1810            |
| Subnet   | 172.16.14.0              |            |                  |     |                 |   | 172.18.10.0          |
| Subnet mask  | 255.255.255.0            |            |                  |     |                 |   | 255.255.255.0        |
| Range start  | 172.16.14.0              |            |                  |     |                 |   | 172.18.10.0          |
| Range end  | 172.16.14.255            |            |                  |     |                 |   | 172.18.10.255        |
| Network settings to be applied to the recovery sit | e network                |            |                  |     |                 |   |                      |
| Gateway  | 172.18.10.1              |            |                  |     |                 |   |                      |
| DNS addresses                                      | 172.16.31.6; 172.16.31.7 |            |                  |     |                 |   |                      |
| DNS suffixes                                       | vslab.local              |            |                  |     |                 |   |                      |
| Primary WINS server                                |                          |            |                  |     |                 |   |                      |
| Secondary WINS server                              |                          |            |                  |     |                 |   |                      |

FIGURE 47. Network Mapping Between Site A and Site B for Planned Recovery Use Case

The network mapping for protected site private interconnect network **APPS-1605** to recovery site recovery network **APPS-1805** is as shown below. The recovery site test network is **APPS-1809**.

| Network Mappings                    |                          |            |                  |   |                 |   |                      |
|-------------------------------------|--------------------------|------------|------------------|---|-----------------|---|----------------------|
| sc2wvc03.vslab.local az2wvc01.vs    | slab.local               |            |                  |   |                 |   |                      |
| NEW   EDIT DELETE CREATE P          | REVERSE MAPPING          |            |                  |   |                 |   |                      |
| sc2wvc03.vslab.local                |                          | <u>↑</u> т | Recovery Network | т | Reverse Mapping | т | Test Network         |
| 🗹 🛆 APPS-1605                       |                          |            | 🛆 APPS-1805      |   | Yes             |   | 🛆 APPS-1809          |
| APPS-1614                           |                          |            | 🛆 APPS-1810      |   | Yes             |   | 🛆 APPS-1810          |
| 2 1 🛄 EXPORT 🛩                      |                          |            |                  |   |                 |   |                      |
| IP Customization                    |                          |            |                  |   |                 |   |                      |
| Site                                | sc2wvcO3.vslab.local     |            |                  |   |                 |   | az2wvc01.vslab.local |
| Network                             | APPS-1605                |            |                  |   |                 |   | APPS-1805            |
| Subnet                              | 192.168.14.0             |            |                  |   |                 |   | 192.168.14.0         |
| Subnet mask                         | 255.255.255.0            |            |                  |   |                 |   | 255.255.255.0        |
| Range start                         | 192.168.14.0             |            |                  |   |                 |   | 192.168.14.0         |
| Range end                           | 192.168.14.255           |            |                  |   |                 |   | 192.168.14.255       |
| Network settings to be applied to t | he recovery site network |            |                  |   |                 |   |                      |
| Gateway                             |                          |            |                  |   |                 |   |                      |
| DNS addresses                       | 172.16.31.6; 172.16.31.7 |            |                  |   |                 |   |                      |
| DNS suffixes                        | vslab.local              |            |                  |   |                 |   |                      |
| Primary WINS server                 |                          |            |                  |   |                 |   |                      |
| Secondary WINS server               |                          |            |                  |   |                 |   |                      |

FIGURE 48. Network Mapping Between Site A and Site B for Test Recovery Use Case



The network mapping for recovery site public network **APPS-1810** to protected site recovery network **APPS-1614** is as shown below. The recovery site test network is **APPS-1614**.

| Network Mappings                           |                          |                |                  |               |  |  |
|--|--------------------------|----------------|------------------|---------------|--|--|
| sc2wvc03.vslab.local az2wvc01.vslab.loca   |                          |                |                  |               |  |  |
| NEW   EDIT DELETE CREATE REVERSE N         | IAPPING                  |                |                  |               |  |  |
| az2wvc01.vslab.local 1 T Recovery Netw     | ork T Reverse Mapping    | Test Network T | IP Customization |               |  |  |
| 🔄 🛛 📥 APPS-1805 🖉 APPS-160                 | 5 Yes                    | 📥 APPS-1605    | Yes              |               |  |  |
| C APPS-1810 🗠 APPS-161                     | 4 Yes                    | 🛆 APPS-1614    | Yes              |               |  |  |
|  |                          |                |                  |               |  |  |
| ✓ 1 Ⅲ EXPORT ~                             |                          |                |                  |               |  |  |
| IP Customization                           |                          |                |                  |               |  |  |
|  |                          |                |                  |               |  |  |
| Network                                    | APPS-1810                |                |                  | APPS-1614     |  |  |
| Subnet                                     | 172.18.10.0              |                |                  | 172.16.14.0   |  |  |
| Subnet mask                                | 255.255.255.0            |                |                  | 255.255.255.0 |  |  |
| Range start                                | 172.18.10.0              |                |                  | 172.16.14.0   |  |  |
| Range end                                  | 172.18.10.255            |                |                  | 172.16.14.255 |  |  |
| Notwork actions to be applied to the rece  | uen celte network        |                |                  |               |  |  |
| Network settings to be applied to the reco | Tery site fletwork       |                |                  |               |  |  |
| Gateway                                    | 17.2.16.14.1             |                |                  |               |  |  |
| DNS addresses                              | 1/2.16.31.6; 1/2.16.31.7 |                |                  |               |  |  |
| DNS suffixes                               | DNS suffixes vslab.local |                |                  |               |  |  |
| Primary WINS server                        |                          |                |                  |               |  |  |
| Secondary WINS server                      |                          |                |                  |               |  |  |

FIGURE 49. Network Mapping Between Site B and Site A for Planned Recovery Use Case

The network mapping for recovery site private interconnect network **APPS-1805** to protected site recovery network **APPS-1605** is as shown below. The recovery site test network is **APPS-1605**.

| Network Mappings            |                           |                          |              |   |                  |                      |
|-----------------------------|---------------------------|--------------------------|--------------|---|------------------|----------------------|
| sc2wvc03.vslab.local az2    | wvc01.vslab.local         |                          |              |   |                  |                      |
| NEW EDIT DELETE             | CREATE REVERSE MAPPING    |                          |              |   |                  |                      |
| az2wvc01.vslab.local        | T Recovery Network        | T Reverse Mapping        | Test Network | т | IP Customization |                      |
| 🗹 🛛 🛆 APPS-1805             | 🛆 APPS-1605               | Yes                      | 🐣 APPS-1605  |   | Yes              |                      |
| 📄   🚔 APPS-1810             | 🛆 APPS-1614               | Yes                      | 🐣 APPS-1614  |   | Yes              |                      |
|                             |                           |                          |              |   |                  |                      |
|                             |                           |                          |              |   |                  |                      |
|                             |                           |                          |              |   |                  |                      |
| IP Customization            |                           |                          |              |   |                  |                      |
| Site                        |                           | az2wvc01.vslab.local     |              |   |                  | sc2wvc03.vslab.local |
| Network                     |                           | APPS-1805                |              |   |                  | APPS-1605            |
| Subnet                      |                           | 192.168.14.0             |              |   |                  | 192.168.14.0         |
| Subnet mask                 |                           | 255.255.255.0            |              |   |                  | 255.255.255.0        |
| Range start                 |                           | 192.168.14.0             |              |   |                  | 192.168.14.0         |
| Range end                   |                           | 192.168.14.255           |              |   |                  | 192.168.14.255       |
|                             |                           |                          |              |   |                  |                      |
| Network settings to be appl | lied to the recovery site | network                  |              |   |                  |                      |
| Gateway                     |                           |                          |              |   |                  |                      |
| DNS addresses               |                           | 172.16.31.6; 172.16.31.7 |              |   |                  |                      |
| DNS suffixes                |                           | vslab.local              |              |   |                  |                      |
| Primary WINS server         |                           |                          |              |   |                  |                      |
| Secondary WINS server       |                           |                          |              |   |                  |                      |

FIGURE 50. Network Mapping Between Site B and Site A for Test Recovery Use Case



The folder mapping from Site A to Site B is as shown below:

| Folder Mappings                                  |                          |                          |
|--|--------------------------|--------------------------|
| sc2wvc03.vslab.local az2wvc01.vslab.local<br>NEW |                          |                          |
| sc2wvc03.vslab.local                             | ↑ Ţ az2wvc01.vslab.local | T Reverse Mapping Exists |
| Oracle   | 🔁 🖸 Oracle-DR            | Yes                      |

### FIGURE 51. Folder Mappings from Site A to Site B

The folder mapping from Site B to Site A is as shown below:

| Folder Mappings      |                      |          |                      |    |                        |
|----------------------|----------------------|----------|----------------------|----|------------------------|
| sc2wvc03.vslab.local | az2wvc01.vslab.local |          |                      |    |                        |
| NEW                  |                      |          |                      |    |                        |
| az2wvc01.vslab.local |                      | Υ Τ      | sc2wvc03.vslab.local | ٣  | Reverse Mapping Exists |
| 🗌 ╞ 🗖 Oracle-DR      |                      | <u>ا</u> | 🗖 Oracle             | t= | Yes                    |

### FIGURE 52. Folder Mappings from Site B to Site A

The resource mapping from Site A to Site B is as shown below:

| R | esource Mappir       | ngs                  |     |                      |   |                 |
|---|----------------------|----------------------|-----|----------------------|---|-----------------|
| 5 | c2wvc03.vslab.local  | az2wvc01.vslab.local | )   |                      |   |                 |
| r | IEW                  |                      |     |                      |   |                 |
|   | sc2wvc03.vslab.local |                      | Υ τ | az2wvc01.vslab.local | τ | Reverse Mapping |
|   | BCA-SiteC            |                      |     | T AZ2BCA11           |   | Yes             |

### FIGURE 53. Resource Mappings from Site A to Site B

The resource mapping from Site B to Site A is as shown below:

| Resource Mappir      | ngs                  |                          |   |                 |
|----------------------|----------------------|--------------------------|---|-----------------|
| sc2wvc03.vslab.local | az2wvc01.vslab.local | l                        |   |                 |
| NEW                  |                      |                          |   |                 |
| az2wvc01.vslab.local |                      | ↑ ▼ sc2wvc03.vslab.local | Ŧ | Reverse Mapping |
| 🗌 🛛 🗍 AZ2BCA11       |                      | 📋 BCA-SiteC              |   | Yes             |

FIGURE 54. Resource Mappings from Site B to Site A



The placeholder datastore mapping between Site A and Site B is as shown below. The placeholder datastore on the recovery site is used by Site Recovery Manager to store placeholder VMs.

| Placeholder Datastores                    |               |  |        |             |
|---|---------------|--|--------|-------------|
| sc2wvc03.vslab.local az2wvc01.vslab.local |               |  |        |             |
| NEW                                       |               |  |        |             |
| Name                                      | 1 τ           | Host/Cluster   |        |             |
| □   |               | GPU4, HPC3, GPU2, BCA3, GPU1   |        |             |
| 🗌   🗟 OraTintri                           |               | BCA-SiteC, BCA-Intel (Reserved)  |        |             |
| SC2-TINTRI-EC6090                         |               | BCA-SiteC, BCA-Intel (Reserved), GPU2, GPU1, BCA3, GPU4, Legacy Management |        |             |
| SPARK01                                   |               | BCA3, GPU4   |        |             |
|   | Placeholde    | Datastores   |        |             |
|   | sc2wvc03.vsla | b.local az2wvc01.vslab.local   |        |             |
|   | NEW           |  |        |             |
|   | Name          |  | 1 т Но | ost/Cluster |
|   | 🗌   🗐 AZ2-Or  | raPure   | AZ     | Z2BCA11     |

FIGURE 55. Placeholder Datastore Mappings between Site A and Site B

### VMware Site Recovery Manager with vSphere Replication

The graphic below illustrates Site Recovery Manager and vSphere Replication setup between on-premises Site A and Site B:

| vCenter Server:<br>vCenter Version:<br>vCenter Host Name:<br>Platform Services Contro<br>Replica<br>sc2wvc0<br>REGISTER | sc2wvc03.vslab.local<br>7.02, 17694817<br>sc2wvc03.vslab.local:443<br>ler: sc2wvc03.vslab.local:443<br>tion Servers<br>3.vslab.local az2wvc01.vslab | az2wvc01.vslab.local []<br>7.b.2, 17920168<br>az2wvc01.vslab.local:443<br>az2wvc01.vslab.local:443 |             |
|---|---|--|-------------|
| Rep   | ication Server  | 1 T Domain Name / IP   | T Status    |
| $\bigcirc$   $\Box$   | /RSC2DC01 (embedded)  | VRSC2DC01.vslab.local  | 🌂 Connected |



| Replication Serve    | ers                       |             |              |
|----------------------|---------------------------|-------------|--------------|
| sc2wvc03.vslab.local | az2wvc01.vslab.local      |             |              |
| REGISTER             |                           |             |              |
| Replication Server   | 1P                        | ▼ Status    | Replications |
| 🚫   📋 VRAZ201 (embed | dded) VRAZ201.vslab.local | 💘 Connected | 2            |

FIGURE 57. Site B Replication Server Details



| COMPONENT                        | SOURCE<br>SITE | APPLIANCE              | DESTINATION SITE       | APPLIANCE                                 |
|----------------------------------|----------------|------------------------|------------------------|---|
| SRM Appliance                    | Site A         | SRMSC2DC01.vslab.local | Site B                 | SRMAZ01.vslab.local                       |
| IP Address                       |                | 172.16.31.145          |                        | 172.16.31.147                             |
|                                  |                |                        |                        |   |
| vSphere Replication<br>Appliance | Site A         | VRSC2DC01.vslab.local  | Site B                 | VRAZ01.vslab.local                        |
| IP Address                       |                | 172.16.31.144          |                        | 172.16.31.146                             |
|                                  |                | 1                      | 1                      | 1   |
| SRM Appliance                    | Site A         | SRMSC2DC03.vslab.local | VMware Cloud on<br>AWS | srm.sddc-44-232-220-144.<br>vmwarevmc.com |
| IP Address                       |                | 172.16.31.149          |                        | 10.129.224.24                             |
|                                  |                |                        | ·                      |   |
| vSphere Replication<br>Appliance | Site A         | VRSC2DC01.vslab.local  | VMware Cloud on<br>AWS | vr.sddc-44-232-220-144.<br>vmwarevmc.com  |
| IP Address                       |                | 172.16.31.144          |                        | 10.129.224.23                             |

Site Recovery Manager and vSphere Replication pairings and IP addresses for on-premises and VMware Cloud on AWS are shown below:

### TABLE 8. VSPHERE REPLICATION NETWORK PAIRING DETAILS

Setup of Site Recovery Manager and vSphere Replication is beyond the scope of this paper.

The steps to configure replication are as shown below:

| vmw Site Recovery sc2w    |                             |  |                                       |  |                 |             |
|---------------------------|-----------------------------|--|---------------------------------------|--|-----------------|-------------|
| iii Site Pair Replication | ns 💎 Protection Groups 🔲 Re | covery Plans                             |                                       |  |                 |             |
| Outgoing                  | er sc2wvcC                  | 3.vslab.local → @ az2wvc                 | 01.vslab.local                        |  |                 |             |
|                           |                             | Configure Replication                    | Target                                | site   |                 |             |
|                           |                             | 1 Target site                            | Status                                | Logged in  |                 |             |
|                           |                             | 2 Virtual machines<br>3 Target datastore | Select the vi<br>Auto-ass<br>Manually | Sphere Replication server that will handle th<br>ign vSphere Replication Server<br>select vSphere Replication Server | he replication. |             |
|                           |                             | 4 Replication settings                   | Nam                                   | e  | т               | Replication |
|                           |                             | 5 Protection group                       | <b>O</b>   <b>D</b>                   | /RAZ201 (embedded)   |                 | 1           |
|                           |                             | 6 Ready to complete                      |                                       |  |                 |             |





### Choose the VMs to protect.

1 Target site

2

6

### Virtual machines

Select the virtual machines that you want to protect. Already replicated VMs are not shown in this list.

All Selected (2)

| l machines |                                 |                  | SELECT ALL CLEAR SELECTION           |
|------------|---------------------------------|------------------|--------------------------------------|
|            | Name T                          | VM Folder        | ↑ T Compute Resource T               |
|            | VSLAB-DC35                      | 🗀 Infrastructure | Ø Microsoft Infrastructure           |
|            | 🔂 VSLAB-DC36                    | 🗀 Infrastructure | Ø Microsoft Infrastructure           |
|            | 🔂 VSLAB-DC37                    | 🗀 Infrastructure | Ø Microsoft Infrastructure           |
|            | 🗗 sc2jump03                     | JumpBoxes        | Jumpservers                          |
|            | sc2jump04                       | JumpBoxes        | Ø Jumpservers                        |
|            | 📑 sc2jump09                     | 🗖 JumpBoxes      | Jumpservers                          |
|            | 🔂 orac19c1                      | 🗖 Oracle         | BCA-SiteC                            |
|            | 🗊 orac19c2                      | 🗖 Oracle         | 📋 BCA-SiteC                          |
|            | 🗊 Oracle19c-BM                  | 🗖 Oracle         | BCA-SiteC                            |
| •          | 🚹 Oracle19c-OL8                 | 🗖 Oracle         | BCA-SiteC                            |
|            | 🚹 Oracle19c-OL8-RMAN            | 🗖 Oracle         | BCA-SiteC                            |
|            | 🗇 Oracle19c-OL8-VVOL            | 🗖 Oracle         | 🛅 BCA-SiteC                          |
|            | 🗍 🗇 Oracle19c-OL8-VVOL-RMAN     | 🗖 Oracle         | BCA-SiteC                            |
|            | 🗄 Oracle19c-PMEM                | 🗖 Oracle         | 📋 BCA-Intel (Reserved)               |
|            | 🗍 👘 Oracle19c-PMEM-RedoTest     | 🗖 Oracle         | 📋 BCA-Intel (Reserved)               |
|            | 🔄 🗄 Oracle19c-PMEM-RedoTest0601 | 🗖 Oracle         | 📋 BCA-Intel (Reserved)               |
|            | 🗇 prac19c1                      | Cracle           | BCA-SiteC                            |
|            | 🗇 prac19c2                      | Cracle Oracle    | BCA-SiteC                            |
|            | 📄 📅 rac19c1                     | 🗖 Oracle         | BCA-SiteC                            |
|            | 🗗 rac19c2                       | 🗖 Oracle         | BCA-SiteC                            |
|            | B-OL76-ORA19C                   | 🗖 Oracle         | 📋 BCA-SiteC                          |
|            | Template-OL8-OL19C              | 🗖 Oracle         | BCA-SiteC                            |
| C          | 2                               |                  | 45 - 66 of 199 VM(s)  < < 3 / 10 > > |
|            |                                 |                  | CANCEL BACK NEXT                     |

FIGURE 59. SITE A: Choose VMs to Protect

 $\times$ 

Choose the target datastore and RPO.





Create protection group SC2-AZ2-SRM-VR-PG and recovery plan SC2-AZ2-Oracle-RP.



### FIGURE 61. SITE A: Create Protection Group and Recovery Plan

The replication configuration summary is as shown below:

| Configure Replication - 2<br>VMs | Ready to complete<br>Review your selected settings. |                         |
|----------------------------------|---|-------------------------|
| 1 Target site                    | Target site   | az2wvc01.vslab.local    |
|                                  | Replication server                                  | VRAZ201 (embedded)      |
| 2 Virtual machines               | Auto-replicate new disks                            | Enabled                 |
| 3 Target datastore               | VMs to be replicated                                | 2                       |
| 4 Replication settings           | Quiescing   | Disabled                |
| 5 Protection group               | Network compression                                 | Disabled                |
| 5 Protection group               | Encryption  | Disabled                |
| 6 Recovery plan                  | Recovery point objective                            | 5 minutes               |
| 7 Ready to complete              | Points in time recovery                             | Disabled                |
|                                  | Protection group                                    | SC2-AZ2-SRM-VR-PG (new) |
|                                  | Recovery plan                                       | SC2-AZ2-Oracle-RP (new) |



After the setup completes, vSphere Replication will automatically seed the source data to target as baseline first OR we can force a sync.

| Incoming       Protection Groups       Recovery Plans         Incoming       Virtual Machine ↑ ▼ status ▼ RPO ▼ Target ▼ Replication Server ▼ Protection Groups         Incoming       Virtual Machine ↑ ▼ status ▼ RPO ▼ Target ▼ Replication Server ▼ Protection Groups         Incoming       Virtual Machine ↑ ▼ status ▼ RPO ▼ Target ♥ Replication Server ▼ Protection Groups         Incoming       Virtual Machine ↑ ▼ status ▼ RPO ▼ Target ♥ Replication Server ▼ Protection Groups         Incoming       Virtual Machine ↑ ▼ status ▼ RPO ▼ Target ♥ Replication Server ▼ Protection Groups         Incoming       Virtual Machine ↑ ▼ status ▼ Replications         Incoming       Virtual Machine ↑ ▼ Status ▼ Replications         Incoming       Incoming         Incoming       Incoming <t< th=""><th>Incoming</th><th>vmw Site Recovery sc2wvc03.vslab.local - a:</th><th>wvc01vsleblocal 🗸</th></t<>  | Incoming  | vmw Site Recovery sc2wvc03.vslab.local - a: | wvc01vsleblocal 🗸   |
|---|---|---|---|
| Outgoing       @ sc2wvc03.vslab.local → @ az2wvc01.vslab.local         incoming       NEW         Incoming       Virtual Machine ↑ ▼ Status ▼ RP0 ▼ Target ▼ Replication Server ▼ Protection Group         > ② oracletec OLB       > OK 5 minutes         > ③ oracletec OLB-RMAN ◇ OK 5 minutes       D R_Site ○ VRAZ201 SC2-AZ2 SRM-VR-PG         > ③ oracletec OLB-RMAN ◇ OK 5 minutes       D R_Site ○ VRAZ201 SC2-AZ2 SRM-VR-PG         > ③ oracletec OLB-RMAN ◇ OK 5 minutes       D R_Site ○ VRAZ201 SC2-AZ2 SRM-VR-PG         > ④ oracletec OLB-RMAN ◇ OK 5 minutes       D R_Site ○ VRAZ201 SC2-AZ2 SRM-VR-PG         > ④ oracletec OLB-RMAN ◇ OK 5 minutes       D R_Site ○ VRAZ201 SC2-AZ2 SRM-VR-PG         > ④ oracletec OLB-RMAN ◇ OK 5 minutes       D R_Site ○ VRAZ201 SC2-AZ2 SRM-VR-PG         > ④ oracletec OLB-RMAN ◇ OK 5 minutes       D R_Site ○ VRAZ201 SC2-AZ2 SRM-VR-PG         > ● ○ accentro       ● Oracletec OLB-RMAN ◇ OK 5 minutes       D R_Site ○ VRAZ201 SC2-AZ2 SRM-VR-PG         > ● ○ stepertor       ● Oracletec OLB - ORACLE ● ORACLE  | Outgoing  | Site Pair Replications Prote                | ion Groups 📃 Recovery Plans   |
| Incoming   Virtual Machine ↑ ▼ Status ▼ PPO ▼ Target ▼ Replication Server ▼ Protection Group  | Incoming  | Outgoing                                    | epi sc2wvc03.vslab.local →      pa az2wvc01.vslab.local   |
| Image: Step Pair       Image: Step Pair <t< td=""><td>Image: space of the space</td><td>Incoming</td><td>NEW     Virtual Machine     ↑     Y     Status     Y     RPO     Y     Target     Y     Replication Server     Y     Protection Group       &gt;     ⑦     ⑦ Oracle19c+OL8     ✓ OK     5 minutes     ۩     DR_Site     □     VRAZ201     SC2-AZ2-SRM-VR-PG       &gt;     ⑧     ⑦ Oracle19c+OL8     ✓ OK     5 minutes     ۩     DR_Site     □     VRAZ201     SC2-AZ2-SRM-VR-PG</td></t<> | Image: space of the space | Incoming                                    | NEW     Virtual Machine     ↑     Y     Status     Y     RPO     Y     Target     Y     Replication Server     Y     Protection Group       >     ⑦     ⑦ Oracle19c+OL8     ✓ OK     5 minutes     ۩     DR_Site     □     VRAZ201     SC2-AZ2-SRM-VR-PG       >     ⑧     ⑦ Oracle19c+OL8     ✓ OK     5 minutes     ۩     DR_Site     □     VRAZ201     SC2-AZ2-SRM-VR-PG |
| Wind Matching       Conversion         Wind Matching       ↑  | With Site Recovery       conversite basics - accovery Plans         Image: Site Pair       Replication         Outgoing       Recovery Plans         Incoming       Sc2WvcO3.vslab.local         With Machine 1 1       Basic         Vitual Machine 1 1       Soft         Configured data:       Soft         Last spre duration:       1 scond         Auto-replicate new disk       Enabled         Last spre duration:       1 scond         Manages by:       VR         Last spre duration:       1 scond         Manages by:       VR         Last spre duration:       1 scond   |   |   |
| Outgoing <sup>®</sup> sc2wvc03.vslab.local         → <sup>®</sup> az2wvc01.vslab.local        Incoming          New RECONFIGURE PAUSE FROME REMOVE SYNC NOW        Incoming          Vitual Machine         ↑            Xtabus           ×   | Outgoing       62 sc2WVcO3.vslab.local       + 10 az2WvcO1.vslab.local         Incoming       NEW       RECOVIDUES       PAUSE       REMOVE       SYNC NOW         Vitrain Machine       + 2       Statute       REMOVE       SYNC NOW         Vitrain Machine       + 2       Statute       * EMOVE       SYNC NOW         Vitrain Machine       + 2       Statute       * 0K       * 1000         Vitrain Machine       + 2       Statute       * 0K       5 minutes         Contigured disks:       5 of 5       Last sync duration:       1 second         Manages Up:       VR       Last sync duration:       1 second         Manages Up:       VR       Last sync duration:       5 59 MB   |   | Vitter Recovery     eccivered Repail code       Image: Site Pair     Image: Repair code       Image: Repair code     Image: Recovery Plans  |
|   | Configured diaxi: 5 of 5 Last instance sync point: Jun 18, 2021, 2:03.39 PM<br>Auto-register arew diaks: 5 of 5 Last instance sync point: Jun 18, 2021, 2:03.39 PM<br>Auto-register arew diaks: Enabled Last sync ataation: 1 Second<br>Managed by: VR Last sync state: 5:99 MB   |   | Outgoing          @ sc2wvc03.vslab.local         →        @ az2wvc01.vslab.local            Incoming          NEW RECONFIGURE PAUSE RESUME REMOVE SYNC NOW            Incoming          Visual Machine ↑ Y Status            Incoming          Visual Machine ↑ Y Status  |



The protection group is as shown below:



FIGURE 64. SITE A: Protection Group and Virtual Machines



The recovery plan is as shown below:

|      | Recovery Plans    |   |   |                                    |                |   |         |   |        |         |
|------|-------------------|---|---|------------------------------------|----------------|---|---------|---|--------|---------|
| Reco | overy Plans       |   |   |                                    |                |   |         |   |        |         |
|      | Name              | <b>↑ ▼</b>  | Status  | Ψ                                  | Protected Site | T | Recover | y Site  |        |         |
| 01   | SC2-AZ2-Oracle-RP |   | → Ready   |                                    | Primary_Site   |   | DR_Site | e   |        |         |
|      | Sur               | SC2-AZ2-Oracle-RI   | DEDIT NOVE DELE                                   | r <mark>e test</mark><br>sions Pro | CLEANUP RUN    |   |         |   |        | Learn r |
|      |                   | Recovery P<br>Protected Site<br>Recovery Site<br>Description: | Ian: SC2-AZ2-Oracle-RP<br>Primery_Site<br>DR_Site |                                    |                |   |         |   |        |         |
|      | ~                 | Plan Status   |   |                                    |                |   |         | ✓ VM Status   |        |         |
|      |                   | Plan Status:  | → Ready   |                                    |                |   |         | Ready for Recovery:   |        | 2 VMs   |
|      |                   |   | This plan is ready                                | for test or rec                    | owery          |   |         | In Progress:  |        | 0 VMs   |
|      |                   | Desent Listen:  |   |                                    |                |   |         | Success   |        | 0 VMs   |
|      |                   | - Harden Charlon y  |   |                                    |                |   |         | Warning   |        | O VMs   |
|      |                   |   |   |                                    |                |   |         | Error:  |        | o VMs   |
|      |                   |   |   |                                    |                |   |         | intering the construction of the construction | Tolai: | 2 VMs   |
|      |                   |   |   |                                    |                |   |         |   |        |         |

### FIGURE 65. SITE A: Recovery Plan

The recovery steps of the recovery plan are as shown below:

| SC2-AZ2-Oracle-RP EDIT MOVE DELETE TEST CLEANUP RUN                                  |  |        |              |  |  |  |
|--|--|--------|--------------|--|--|--|
| Summary Recovery Steps Issues History Permissions Protection Groups Virtual Machines |  |        |              |  |  |  |
| EXPORT STEPS TEST CLEANUP RUN REPROTECT CANCEL                                       |  |        |              |  |  |  |
| Plan status:   | → Ready  |        |              |  |  |  |
| Description:   | Description: This plan is ready for test or recovery |        |              |  |  |  |
|  |  |        |              |  |  |  |
| Recovery Step  |  | Status | Step Started |  |  |  |
| > 🔄 1. Synchronize storage   |  |        |              |  |  |  |
| $\fbox$ 2. Restore recovery site hosts from standby                                  |  |        |              |  |  |  |
| II 3. Suspend non-critical VMs at recovery site                                      |  |        |              |  |  |  |
| > 🔯 4. Create writable storage snapshot  |  |        |              |  |  |  |
| > 🔯 5. Configure test networks   |  |        |              |  |  |  |
| 1 6. Power on priority 1 VMs   |  |        |              |  |  |  |
| 2 7. Power on priority 2 VMs   |  |        |              |  |  |  |
| > 3 8. Power on priority 3 VMs   |  |        |              |  |  |  |
| 4 9. Power on priority 4 VMs   |  |        |              |  |  |  |
| 5 10. Power on priority 5 VMs  |  |        |              |  |  |  |

### FIGURE 66. SITE A: Recovery Plan Steps

Currently, VMware vSphere Replication 8.4 cannot replicate VMs that share VMDK files. This limitation can be found in *VMware vSphere Replication 8.4 Release Notes*.



Attempting to use vSphere Replication of Oracle RAC **prac19c** results in two shadow VMs created at the DR site, each with three standalone VMDKs (two 80GB VMDKs and one 500GB VMDK), which is inconsistent with the Oracle RAC VMDK layout. The 500GB VMDK is shared between the two Oracle RAC VMs.



FIGURE 67. Limitations with Clustered VMDKs

Keep in mind, both Oracle RAC VMs prac19c1 and prac19c2 contain three VMDKs:

- Two non-shared VMDKs
  - Hard Disk 1 80GB for operating system with disk mode Dependent
  - Hard Disk 1 80GB for Oracle Grid Infrastructure and RDBMS binaries with disk mode Dependent
- One shared VMDK (500GB) with multi-writer attribute and disk mode Independent-Persistent

### VMware Site Recovery Manager with Array-Based Replication (LUN Level)

The Site Recovery Manager and Pure Storage Array pairings between on-premises Site A and Site B are shown below:

| COMPONENT     | SOURCE<br>SITE | APPLIANCE              | DESTINATION SITE | APPLIANCE           |
|---------------|----------------|------------------------|------------------|---------------------|
| SRM Appliance | Site A         | SRMSC2DC01.vslab.local | Site B           | SRMAZ01.vslab.local |
| IP Address    |                | 172.16.31.145          |                  | 172.16.31.147       |
|               |                |                        |                  |                     |
| Pure Storage  | Site A         | Pure-X50-BCA           | Site B           | wdc-tsa-pure-01     |

#### TABLE 9. Site Recovery Manager Site A and B Network Pairing

### Site A Pure Storage **Pure-X50-BCA** and Site B Pure Storage **wdc-tsa-pure-01** are paired as indicated below:



#### FIGURE 68. SITE A: Pure Storage Pure-X50-BCA



FIGURE 69. SITE B: Pure Storage wdc-tsa-pure-01

## 

### Site A Pure Storage Pure-X50-BCA and Site B Pure Storage wdc-tsa-pure-01 Replication links are as shown below:

| Array Connections | Array Connections               |                    |                           |                       |          |                            |                         |            |      |
|-------------------|---------------------------------|--------------------|---------------------------|-----------------------|----------|----------------------------|-------------------------|------------|------|
| Array             |                                 | Status             |                           | Replication Transport |          |                            |                         |            |      |
| wdc-tsa-pure-01   |                                 | connected          |                           | Ethernet (IP)         |          |                            |                         |            |      |
| Remote Array      | Local Array                     | ETH2: 172.16.51.12 | CT1<br>ETH3: 172.16.51.13 |                       |          |                            |                         |            |      |
| сто               | ETH2: 172.16.51.14              |                    |                           |                       |          |                            |                         |            |      |
|                   | ETH3: 172.16.51.15              |                    |                           |                       |          |                            |                         |            |      |
|                   | ETH2: 172.16.51.16              |                    |                           |                       |          |                            |                         |            |      |
|                   | ETH3: 172.16.51.17              |                    |                           |                       |          |                            |                         |            |      |
| Array Ports ~     |                                 |                    |                           |                       |          |                            |                         |            |      |
| FC Port           | Name                            |                    |                           | Speed                 | Failover | FC Port                    | Name                    | Speed Fail | over |
| CT0.FC0           | 52:4A:93:7C:A6:64:FA:           | 00                 |                           | 16 Gb/s               |          | CT1.FC0                    | 52:4A:93:7C:A6:64:FA:10 | 0          |      |
| CT0.FC1           | 52:4A:93:7C:A6:64:FA:01         |                    | 0                         |                       | CT1.FC1  | 10 52:4A:93:7C:A6:64:FA:11 | 0                       |            |      |
| CT0.FC2           | 52:4A:93:7C:A6:64:FA:02         |                    | 16 Gb/s                   |                       | CT1.FC2  | w 52:4A:93:7C:A6:64:FA:12  | 16 Gb/s                 |            |      |
| CT0.FC3           | CT0.FC3 52:4A:93:7C:A6:54:FA:03 |                    | 0                         |                       | CT1.FC3  | 52:4A:93:7C:A6:64:FA:13    | 0                       |            |      |

### FIGURE 70. SITE A: Pure Storage Pure-X50-BCA Replication Links

| Array Connections | Array Connections            |                          |                         |                    |                         |                           |                         |         |
|-------------------|------------------------------|--------------------------|-------------------------|--------------------|-------------------------|---------------------------|-------------------------|---------|
| Array             |                              | Status                   | Status                  |                    |                         |                           |                         |         |
| Pure-X50-BCA      |                              | connected                |                         | Ethernet (IP)      |                         |                           |                         |         |
| Remote Array      | Local Array                  | CT<br>ETH2: 172.16.51.14 | 0<br>ETH3: 172.16.51.15 | ETH2: 172.16.51.16 | CT1<br>ETH3: 17216.5117 |                           |                         |         |
| 074               | ETH2: 172.16.51.12           |                          |                         |                    |                         |                           |                         |         |
| ch .              | ETH3: 172.16.51.13           | -                        |                         |                    |                         |                           |                         |         |
| Array Porte       |                              |                          |                         |                    |                         |                           |                         |         |
| Allay Polts ~     |                              |                          |                         |                    |                         |                           |                         |         |
| FC Port           | Name                         |                          |                         | Speed              | Fallover                | FC Port                   | Name                    | Speed   |
| CTO.FCO           | 52:4A:93:7A:50:46:BC         | 00                       |                         | 16 Gb/s            |                         | CT1.FC0                   | 52:4A:93:7A:50:46:BC:10 | 16 Gb/s |
| CT0.FC1           | 52:4A:93:7A:50:46:BC:01      |                          | 0                       |                    | CT1.FC1                 | 52:4A:93:7A:50:46:BC:11   | 0                       |         |
| CT0.FC2           | 52:4A:93:7A:50:46:BC:02      |                          | 0                       |                    | CT1.FC2                 | 52:4A:93:7A:50:46:BC:12   | 16 Gb/s                 |         |
| CTO.FC3           | C3 🔤 52:4A:93:7A:50:46:BC:03 |                          | 0                       |                    | CT1.FC3                 | 😇 52:4A:93:7A:50:46:BC:13 | 0                       |         |

### FIGURE 71. SITE B: Pure Storage wdc-tsa-pure-01 Replication Links

Follow steps in the *FlashRecover Replication Configuration and Best Practices Guide* to connect the two Pure Storage arrays for replication.

Site A Pure Storage **Pure-X50-BCA** has storage pod **SC2POD** and protection group **SC2PG**. Volume **OraSC2** (20TB) is part of the storage pod **SC2POD**.

| Array Hosts Volumes Pods File  | Systems Policies  |                                 |                   |                   |  |           |   |  |   |
|--|---|---------------------------------|-------------------|-------------------|--|-----------|---|--|---|
| () > Pods > @ SC2POD (promoted)  |   |                                 |                   |                   |  |           |   |  |   |
| Size         Data Reduction         Unique         Replication         Snapsho           20 T         18.3 to 1         8.12 G         0.00         0.00 | ots Shared System Total<br>65.70 M - 8.18                   | G                               |                   |                   |  |           |   |  |   |
| Arrays   |   |                                 |                   |                   |  |           |   |  |   |
| Name   |   |                                 |                   | Status            |  | Frozen At |   |  | Mediator Status                             |
| Pure-X50-BCA   |   |                                 |                   | • online          |  | -         |   |  | online                                      |
| Pod Replica Links 🔿  |   |                                 |                   |                   |  |           |   |  |   |
| Local Pod  | Direction Re  | emote Pod                       | Remote Array      |                   | Status   |           |   | Recovery Point   |   |
| P SC2POD (promoted)  |   | Z2POD                           | wdc-tsa-pure-01   |                   | • replicating  |           |   | 2021-06-18 19:53   |   |
| Volumes A  |   | Space Oos                       | Details 11or1 ± : | Protection Groups |  |           |   |  |   |
| Name   |   | Size Volumes Sna                | apphots Reduction | Name              |  |           |   | Snapshots  |   |
|  |   |                                 |                   |                   |  |           |   |  |   |
| SC2POD::OraSC2   |   | 20 T 8.12 G                     | 0.00 18.3 to 1    | SC2POD::SC2PG     |  |           |   | 0.00   |   |
|  | Snapshots Policies Protection Groups ActiveDR ActiveCluster |                                 |                   |                   |  |           |   |  |   |
|  | > Protectio   | on Groups > 💿 SC2POD :: SC2PG 🥌 |                   |                   |  |           |   |  |   |
|  | Snapshots<br>0.00   |                                 |                   |                   |  |           |   |  |   |
|  | Members o   |                                 |                   |                   |  | 11.011    |   | Snapshot Schedule  |   |
| Name A   |   |                                 |                   | ·                 | Enabled: False<br>Create a snapshot on source every 1 hours<br>Retain all snapshots on source for 1 days |           |   |  |   |
|  | SC2POD::OraS  | C2                              |                   |                   |  |           | × | then retain 4 snapshots  | per day for 7 more days                     |
|  | Targets ^   |                                 |                   |                   |  |           | ÷ | Replication Schedu   | lle   |
|  | Name  |                                 |                   |                   | Allo   | owed      |   | Enabled: False<br>Replicate a snapshot to<br>Retain all snapshots on | targets every 4 hours<br>targets for 1 days |
|  |   |                                 | No targets found. |                   |  |           |   | then retain 4 sna  | pshots per day for 7 more day               |

FIGURE 72. SITE A: Pure Storage POD, Protection Group and Protected Volume

Site B Pure Storage wdc-tsa-pure-01 has storage pod AZ2POD. Volume A2POD::OraSC2 is the corresponding recovery volume in the storage pod AZ2POD.

| Array Hosts Volumes Pods  | File Systems Policies  |                                   |                      |                   |                                 |   |   |                |
|---|--|-----------------------------------|----------------------|-------------------|---------------------------------|---|---|----------------|
| > Pods > of AZ2POD (demoted)  |  |                                   |                      |                   |                                 |   |   |                |
| ize Data Reduction Unique Replication<br>20 T 6.2 to 1 33.60 G 0.00 | Snapshots         Shared         System         Total           0.00         42.30 M         -         33.64 Q | G                                 |                      |                   |                                 |   |   |                |
| Arrays  |  |                                   |                      |                   |                                 |   |   |                |
| Name  |  |                                   |                      | Status            |                                 |   | Frozen At   | Mediator Statu |
| wdc-tsa-pure-01   |  |                                   |                      | • online          |                                 | 3   | 2021-06-17 10:18:56   | online         |
| Pod Replica Links   |  |                                   |                      |                   |                                 |   |   |                |
| Local Pod   | Direction Remo   | ote Pod                           | Remote Array         |                   | Status                          |   | Recovery Point  |                |
| ♂ AZ2POD (demoted)  | ← SC2P   | POD                               | Pure-X50-BCA         |                   | <ul> <li>replicating</li> </ul> |   | 2021-06-18 19:57  |                |
| Volumes A   |  | Space QoS                         | Detalls 1-1 of 1 + : | Protection Groups | ^                               |   |   |                |
| Name  |  | Size Volumes Sna                  | pshots Reduction     | Name              |                                 |   | Snapshots   |                |
|   |  |                                   |                      |                   |                                 |   |   |                |
|   | Snapshots Policies Protect   | ction Groups Active DR Active Clu | ster                 |                   |                                 |   |   |                |
|   | > Protection Groups > () A   | ZZPOD :: SCZPG                    |                      |                   |                                 |   |   |                |
|   | 0.00   |                                   |                      |                   |                                 |   |   |                |
|   | Members ~  |                                   |                      |                   | 1-1 of 1                        |   | Snapshot Schedule   |                |
|   | Name   |                                   |                      |                   |                                 |   | Enabled: False<br>Create a snapshot on source every 1 hours<br>Retain all snapshots on source for 1 days      |                |
|   | CAZZPOD::OraSC2  |                                   |                      |                   | ×                               | then retain 4 snapshots per day for 7 more days |   |                |
|   | Targets 🥎  |                                   |                      |                   |                                 | ÷   | Replication Schedule  |                |
|   | Name   |                                   |                      | A                 | llowed                          |   | Enabled: False<br>Replicate a snapshot to targets every 4 hours<br>Retain all snapshots on targets for 1 days |                |
|   |  | No targets for                    | und.                 |                   |                                 |   | then retain 4 snapshots per day for 7 more day:   | 5              |

FIGURE 73. SITE B: Pure Storage POD, Protection Group and Protected Volume

A replica link is created between Site A storage pod **SC2POD** and Site B storage pod **AZ2POD**.

| Create Replica Lir | ık                |        | ×      |
|--------------------|-------------------|--------|--------|
| Local Pod Name     | SC2POD            |        | •      |
| Remote Array       | wdc-tsa-pure-01   |        | •      |
|                    | Connect Array     |        |        |
| Remote Pod Name    | AZ2POD            |        | •      |
|                    | Create Remote Pod |        |        |
|                    |                   |        |        |
|                    |                   | Cancel | Create |



Information on configuring the replica link can be found in SRM User Guide: FlashArray Continuous Replication (ActiveDR) Workflows guide.

Site Recovery Manager includes two important features that allow discovery of the Pure Storage replication environment—the Pure Storage SRA and Array Managers.

#### Storage Replication Adapters Storage Replication Adapters sc2wvc03.vslab.local az2wvc01.vslab.local sc2wvc03.vslab.local az2wvc01.vslab.local RESCAN ADAPTERS RESCAN ADAPTERS Pure Storage FlashArray SRA Pure Storage FlashArray SRA Status 🗸 ок Status 🗸 ок Version 4.1.0 Version 4.1.0 Vendor Pure Storage Vendor Pure Storage Install Location puresra:latest Install Location puresra:latest Vendor URL http://support.purestorage.com Vendor URL http://support.purestorage.com Pure Storage, FA-400 series Pure Storage, FlashArray//m Supported Array Models Pure Storage, FA-400 series Pure Storage, FlashArray//m Supported Array Models MORE MORE Supported Software Purity Operating Environment 4.10.0 or higher Supported Software Purity Operating Environment 4.10.0 or higher Stretched Storage Stretched Storage Supported Supported

#### FIGURE 75. Site A and Site B Storage Replication Adapters

Details regarding configuration of Pure Storage SRA can be found in *SRM User Guide: Installing the FlashArray Storage Replication Adapter.* 

After the protected site and recovery site are paired up, the array managers are configured so that Site Recovery Manager can discover replicated devices, compute datastore groups, and initiate storage operations.

| Array Pairs<br>add   array pair × array manager pair ×                   |                        |                                 |         |                                     |                         |
|--|------------------------|---------------------------------|---------|-------------------------------------|-------------------------|
| Array Pair   | 1 T Array Manager Pair |                                 | ⊤ Last  | t Array Manager Ping                |                         |
| $\bigcirc$ > $\checkmark$ Pure-X50-BCA $\leftrightarrow$ wdc-tsa-pure-01 | PureProtectedSite ←    | → PureRecoverySite              | ✓ 5     | Success, 6/18/21, 12:50:05 PM -0700 |                         |
| O > ✓ SC2POD ↔ AZ2POD  | PureProtectedSite ←    | → PureRecoverySite              | ✓ 5     | Success, 6/18/21, 12:50:05 PM -0700 |                         |
|  |                        |                                 |         |                                     |                         |
| EXPORT ~   |                        |                                 |         |                                     |                         |
|  |                        |                                 |         |                                     |                         |
| Device (sc2wvc03.vslab.local) T Datastore                                | T Status               | T Device (az2wvc01.vslab.local) | T Prote | ection Group                        | Local Consistency Group |
| OraSC2 Local: [Or  | aSC2] → Forward        | Replica of SC2POD:OraSC2        |         |                                     | SC2POD                  |

Figure 76. Site A and Site B Array Managers



Additional array managers details are shown below:



### FIGURE 77. Site A and Site B Array Managers Details

Information regarding configuration of Pure Storage Array Manager can be found in *SRM User Guide: Configuring the FlashArray SRA Array Managers.* 

Installing Pure Storage SRA and Pure Storage Array Manager is beyond the scope of this paper.

Site A protection group **SC2-AZ2-SRM-SRA-PG** for array-based replication is created as shown below. The steps to create the protection group for array-based replication are as shown below:

| New Protection Group         | Name and dire           | ction  |  |
|------------------------------|-------------------------|--|--|
| 1 Name and direction         | Name:                   | SC2-AZ2-SRM-SRA-PG<br>62 characters remaining  |  |
| 2 Type<br>3 Datastore groups | Description:            | SC2-AZ2-SRM-SRA-PG   |  |
| 4 Recovery plan              |                         | 4078 characters remaining  |  |
| 5 Ready to complete          | Direction:<br>Location: | Primary_Site → DR_Site     DR_Site → Primary_Site     Q Search     Protection Groups                               |  |
|                              |                         | New Protection Group   | Туре   |
|                              |                         | 1 Name and direction         2 Type         3 Datastore groups         4 Recovery plan         5 Ready to complete | Select the type of protection group you want to create:  |
|                              |                         |  | Select array pair       ↑ ▼       Array Manager Pair         ▲ rray Pair       ↑ ▼       Array Manager Pair         ↓ ✓ Pure-X50-BCA ↔ wdc-tsa-pure-01       PureProtectedSite ↔ PureRecoverySite         ↓ ✓ SC2POD ↔ AZ2POD       PureProtectedSite ↔ PureRecoverySite |

FIGURE 78. SITE A: Array Based Replication Create Protection Group

Choose the protected datastore and create a new recovery plan SC2-AZ2-Oracle-SRA-RP.

| New Protection Group                      | Datastore groups   | >   |   |
|---|--|---|---|
| 1 Name and direction                      | Select the datastore groups to be part of this protection group. Datast together:                              | ore groups contain datastores which must be recovered   |   |
| 2 Type 3 Datastore groups 4 Recovery plan | Datastore Group     OraSC2   | SELECT ALL     CLEAR SELECTION       Y     Status     Y       Add to this protection group     X  |   |
| 5 Ready to complete                       |  | 1 datastore groups  |   |
|   | The following virtual machines are in the selected datastore groups:       Virtual Machine     T     Datastore | Y     Status     Y       Add to this protection group     Add to this protection group       Add to this protection group       Add to this protection group       Add to this protection group |   |
|   |  | 1       Name and direction         2       Type   | Recovery plan         You can optionally add this protection group to a recovery plan.         Add to existing recovery plan         Add to new recovery plan         Do not add to recovery plan now |
|   |  | 3 Datastore groups<br>4 Recovery plan<br>5 Ready to complete  | Recovery plan name: SC2-AZ2-Oracle-SRA-RP<br>59 characters remaining  |

### FIGURE 79. SITE A: Pick Protected Datastore and Create New recovery plan

The protection group summary and recovery plan details are as shown below:

| New Protection Group | Ready to complete<br>Review your selected settings. |  |  |  |  |
|----------------------|---|--|--|--|--|
| 1 Name and direction | Name  | SC2-AZ2-SRM-SRA-PG   |  |  |  |
| 2 Туре               | Description   | SC2-AZ2-SRM-SRA-PG   |  |  |  |
| 3 Datastore groups   | Protected site                                      | Primary_Site   |  |  |  |
|                      | Recovery site                                       | DR_Site  |  |  |  |
| 4 Recovery plan      | Location  | Protection Groups  |  |  |  |
| 5 Ready to complete  | Protection group type                               | Datastore groups (array-based replication)   |  |  |  |
|                      | Array paír  | $SC2POD \leftrightarrow AZ2POD \ (PureProtectedSite \leftrightarrow PureRecoverySite)$ |  |  |  |
|                      | Datastore groups                                    | OraSC2   |  |  |  |
|                      | Total virtual machines                              | 4  |  |  |  |
|                      | Recovery plan                                       | SC2-AZ2-Oracle-SRA-RP (new)  |  |  |  |
|                      |   |  |  |  |  |

FIGURE 80. Protection Group and Recovery Plan Details



The details of protection group SC2-AZ2-SRM-SRA-PG are as shown below:

| Protection Groups         |                          |                                      |                             |                   |                  |           |
|---------------------------|--------------------------|--------------------------------------|-----------------------------|-------------------|------------------|-----------|
| NEW EDIT MOVE DELETE      |                          |                                      |                             |                   |                  |           |
| Name 🔨 🝸 Protectio        | Status T Recovery Status | T Protec                             | tion Type                   | T Protected Site  | T Reco           | very Site |
| ● SC2-AZ2-SRM-SRA-PG ✓ OK | Ready                    | Datas                                | tore groups                 | Primary_Site      | DR_              | Site      |
|                           |                          |                                      |                             |                   |                  |           |
|                           | SC2 A72 S                |                                      |                             |                   |                  |           |
|                           |                          | RM-SRA-PG                            | EDIT MOVE D                 | DELETE ····       |                  |           |
|                           | Summary Issues           | Permissions                          | Datastores Device           | es Recovery Plans | Virtual Machines |           |
|                           |                          | Protection Group: SC2-AZ2-SRM-SRA-PG |                             |                   |                  |           |
|                           |                          | Protection Type:                     | Datastore groups (array-bas | sed replication)  |                  |           |
|                           |                          | Protected Site:                      | Primary_Site                |                   |                  |           |
|                           |                          | Recovery Site:                       | DR_Site                     |                   |                  |           |
|                           |                          | Array Pair:                          | SC2POD ↔ AZ2POD             |                   |                  |           |
|                           |                          | Array Managers:                      |                             |                   |                  |           |
|                           |                          | Description:                         | SC2-AZ2-SRM-SRA-PG          |                   |                  |           |
|                           | ✓ Protection Group       | Details                              |                             |                   |                  |           |
|                           | Status:                  |                                      | OK                          |                   |                  |           |
|                           | Datastores:              |                                      | 1                           |                   |                  |           |
|                           | > Virtual Machines       | 5.                                   | 4                           |                   |                  |           |

FIGURE 81. Protection Group Details

Protection group SC2-AZ2-SRM-SRA-PG for array-based replication is protecting both single-instance Oracle VMs Oracle19c-OL8 and Oracle19c-OL8-RMAN and Oracle RAC prac19c VMs.

| © SC2-AZ2-SRM-SRA-PG EDIT MOVE DELETE   |                   |                        |                      |                 |           |                       |  |  |  |  |
|---|-------------------|------------------------|----------------------|-----------------|-----------|-----------------------|--|--|--|--|
| Summary Issues Permissions Datastores Devices Recovery Plans Virtual Machines |                   |                        |                      |                 |           |                       |  |  |  |  |
| RESTORE ALL PLACEHOLDER VMS CO  | NFIGURE ALL VMS   |                        |                      |                 |           |                       |  |  |  |  |
| Virtual Machine 🔨 🔻   | Protection Status | Recovery Resource Pool | T Recovery Host T    | Recovery Folder | Ŧ         | Recovery Network      |  |  |  |  |
| Oracle19c-OL8   | 🕑 ОК              | AZ2BCA11               | az2esx23.vslab.local | 🗖 Oracle-DR     | <u>t=</u> | 🛆 APPS-1810           |  |  |  |  |
| Oracle19c-OL8-RMAN  | 🕑 ОК              | T AZ2BCA11             | az2esx22.vslab.local | 🗖 Oracle-DR     | te=       | 🛆 APPS-1810           |  |  |  |  |
| D prac19c1  | 🛇 ОК              | AZ2BCA11               | az2esx22.vslab.local | Cacle-DR        | La-       | 🚔 APPS-1810,APPS-1805 |  |  |  |  |
| D prac19c2  | 🛇 ОК              | AZ2BCA11               | az2esx24.vslab.local | C Oracle-DR     | 6         | 🚔 APPS-1810,APPS-1805 |  |  |  |  |

FIGURE 82. Protection Group Virtual Machine Details

The discovered devices are as shown below:

| ♥ SC2-AZ2-SRM-SRA-PG EDIT MOVE DELETE ··· |                 |         |          |                 |    |        |             |       |                          |   |                         |
|---|-----------------|---------|----------|-----------------|----|--------|-------------|-------|--------------------------|---|-------------------------|
| Summa                                     | ary Issues      | Perr    | nissions | Datastores      | De | vices  | Recovery Pl | ans   | Virtual Machines         |   |                         |
| Device                                    | (sc2wvc03.vslab | .local) | T        | Datastore       | T  | Status | T           | Devic | e (az2wvc01.vslab.local) | T | Local Consistency Group |
| OraSC                                     | 2               |         |          | Local: [OraSC2] |    | → Forv | ward        | Repli | ca of SC2POD:OraSC2      |   | SC2POD                  |

FIGURE 83. Site A Discovered Devices



Information regarding discovered devices can be found in SRM User Guide: Discovering Replicated Devices with the FlashArray SRA.

Recovery plan SC2-AZ2-Oracle-SRA-RP for array-based replication is as shown below:

| © SC2-AZ2-SRM-SRA-PG   | DIT MOVE DELETE ····                   |         |                     |        |       |
|--|--|---------|---------------------|--------|-------|
| Summary Issues Permissions Data  | stores Devices Recovery Plans          | nes     |                     |        |       |
|  |  |         |                     |        |       |
| Name 🔨 🝸 Sta   | itus 🕎 Protected Site                  | T Recov | very Site           |        |       |
| ○ SC2-AZ2-Oracle-SRA-RP →  | Ready Primary_Site                     | DR_S    | Site                |        |       |
| SC2-AZ2-Oracle-SRA-RP<br>Summary Recovery Steps Issues Hist<br>Recovery Plan: SC2-AZ2-<br>Protested Step: Prenz, Sta<br>Recovery Step: DB_Step<br>Description: | EDIT MOVE DELETE TEST CLIANOP RUN      |         |                     |        | Learn |
| ✓ Plan Status  |  |         | ✓ VM Status         |        |       |
| Plan Status:   | Ready                                  |         | Ready for Recovery: |        | 4 VMs |
| т  | nis plan is ready for test or recovery |         | In Progress:        |        | 0 VMs |
|  |  |         | Success:            |        | 0 VMs |
| > Recent History   |  |         | Warning:            |        | 0 VMs |
|  |  |         | Error:              |        | 0 VMs |
|  |  |         | Incomplete:         |        | 0 VM  |
|  |  |         |                     | Total: | 4 VMs |

### FIGURE 84. Array-Based Replication Recovery Plan Details

More information regarding testing a recovery plan can be found in *SRM User Guide: FlashArray Continuous Replication (ActiveDR) Workflows.* 

Further information regarding Site Recovery Manager with array-based replication can be found in Using Array-Based Replication with Site Recovery Manager.
### VMware Site Recovery Manager with Array-Based Replication (vVOL Level)

Details of Site A Pure Storage **Pure-X50-BCA** vVOL storage providers are as shown below:



FIGURE 85. SITE A: Storage Provider Details-ct0

| ADD 2 EDIT - REMOV                 | e REGIST  | ER STORAGE PRO  | VIDER                                | IMPORT PRO        | ECTION GROU            | PS                    |          |           |                              |           |                        |
|------------------------------------|---|---|--------------------------------------|-------------------|------------------------|-----------------------|----------|-----------|------------------------------|-----------|------------------------|
| Array Alias                        |   | <b>↑ τ</b>  | Array URL                            |                   |                        |                       |          |           |                              |           |                        |
| Pure-X50-BCA                       |   | 1   | https://17                           | 2.16.50.19        |                        |                       |          |           |                              |           |                        |
| SC2WV Summary Settings             | cO3.vslab.loca<br>Monitor Configu<br>~ Stora            | al ACTIONS V<br>re Permissions<br>ge Providers                                      | Datacen                              | ters Hosts & Clu  | isters VMs             | Datastores            | Networks | Linked vC | enter Server Systems         | Extensi   | ons Updates            |
| General<br>Litensing<br>Message of | + Add<br>storage  | C Synchronize Stora   | age Provide                          | rs 📄 🚊 Rescan 🛛 🛪 | Remove $\bigcirc$ Refi | resh certificate<br>T | Priority |           | URL                          | Ŧ         | Last Rescan Time       |
| Advanced S                         | ettings 5f  | 72821c-1d59-eb9e-499e-  |                                      |                   | Active                 |                       | 1        |           |                              |           |                        |
| Authentidet                        | ion Proxy FIOFIL  | TER Provider sc2esx64.v   | Offline                              |                   |                        |                       |          |           | https://sc2esx64.vslab.local | 9080/v    | 10/19/2020, 8:59:25 P  |
| vCenter HA                         | ) IOFIL   | TER Provider sc2esx65.v   | Offline                              |                   |                        |                       |          |           | https://sc2esx65.vslab.local | 9080/v    | 12/23/2020, 7:17:45 A  |
| Security                           | V FIOFIL  | TER Provider sc2esx66.v   | Offline                              |                   |                        |                       |          |           | https://sc2esx66.vslab.local | 9080/v    | 10/09/2020, 6:08:24    |
| Trust Autho                        | rity IOFIL  | TER Provider sc2vesx01  | . Online                             |                   |                        |                       | -        |           | https://sc2vesx01.vslab.loca | :9080/    | 05/04/2021, 12:05:36   |
| Key Provide                        | IOFIL   | TER Provider sc2vesx02.   | Online                               |                   |                        |                       |          |           | https://sc2vesx02.vslab.loca | 1:9080/   | 05/04/2021, 12:05:36   |
| Scheduled Ta                       | sks a Pure-   | -X50-BCA-ct0  | Online                               |                   |                        |                       |          |           | https://172.16.50.17:8084/ve | rsion.xml | 03/09/2021, 10:45:20   |
| Storage Prov                       | ders 🖌 Pu   | ire-X50-BCA (2/2 online)  |                                      |                   | Standby                |                       | 200      |           |                              |           |                        |
| vSAN                               | V Pure  | -X50-BCA-ct1  | Online                               |                   |                        |                       |          |           | https://172.16.50.18:8084/ve | rsion.xml | 05/24/2021, 1:14:41 PM |
| Update                             | Pu  | re-X50-BCA (2/2 online)   |                                      |                   | Active                 |                       | 200      |           |                              |           |                        |
| Internet Co                        | nectivity VMw   | are vSAN  | Online                               |                   |                        |                       |          |           | http://localhost:1080/vsanH  | ealth/vs  | 06/14/2021, 5:30:06 A  |
| INFINIDAT                          | General<br>Provide<br>Provide<br>Active/s<br>Activation | Supported Vende<br>rr name Pure-1<br>rr status Online<br>standby status<br>on Auton | or IDs (<br>X50-BCA-ct<br>a<br>natic | Certificate Info  |                        |                       |          |           |                              |           |                        |

FIGURE 86. SITE A: Storage Provider Details—ct1

Details of Site B Pure Storage **wdc-tsa-pure-01** vVOL storage providers are as shown below:

|  |  |                                   | CORAGE <sup>®</sup><br>- REMOVE ● REGISTI | ER STORAGE PROVID                                | DER 1 IMPORT PROT  | ECTION GROUPS  |                            |            |  |
|--|--|-----------------------------------|---|--|--|--|----------------------------|------------|--|
|  |  | Array Allas                       |   |  | . T  | Array ORL  |                            |            |  |
|  |  | <ul> <li>wdc-tsa-pure-</li> </ul> | 01  |  |  | https://172.16.50  | 0.22                       |            |  |
| Baz2wvcO1.vslab       Summary       Settings | D.IOCAI ACTIONS ><br>Configure Permissions Datacenters Hosts & Clu<br>Storage Providers  | usters VMs Datastores             | ietworks Linked vCenter Server Systems    | az2wvcO1.vsla     summary Monitor     Settings ~ | Configure         Permissions         Diagonal           Storage         Providers   | atacenters Hosts & Cluste  | ers VMs Datastore          | s Networks | Linked vCenter Server Systems            |
| General                                      | + Add Q Synchronize Storage Providers  | Remove 22 Retresh certificate     |   | General  | + Add 🖸 Synchronize Storage F  | roviders 📃 Rescan X Re   | move () Refresh certificat | te         |  |
| Message of the Day                           | Storage Provider/Storage Sys  ¥ Status  ¥  | Active/Standby Y Priority         | Uat                                       | Message of the Day                               | Storage Provider/Storage Sys_ T  | Status Y A   | Active/Standby T           | Priority   | URL                                      |
| Advanced Settings                            | 193 + IOFLITER Provider az2esx24.v Offline   |                                   |   | Advanced Settings                                | <ul> <li>IOFILTER Provider az2esx24.v</li> </ul>   | Offline -  |                            |            | https://az2esx24.vsiab.local:9080/versl. |
| Authentication Proxy                         | IOFILIER Provider ar2est22xx     Office  |                                   | http://ar2esv21.valab.local.9080.0veral   | Authentication Proxy                             | <ul> <li>IOFILTER Provider az2esx22.v.,</li> </ul>   | Offline -  |                            |            | https://az2esx22.vslab.local:9080/versl. |
| Voenter HA                                   | wide-tsa-pure-01-ct1 Online  |                                   | http://172.16.50.218084/version.xml       | vCenter HA                                       | <ul> <li>IOFILTER Provider az2esx23.v</li> </ul>   | Offline -  |                            |            | https://az2esx23.vslab.local:9080/versl. |
| To set Authority                             | wdc-tra-pure-01 (2/2 pnijne)   | Standby 200                       |   | Security V                                       | wdc-tsa-pure-01-ct1  | Online -   |                            |            | https://172.16.50.21.8084/version.xml    |
| Key Providers                                | wdc-tsa-pure-01-ct0 Online   |                                   | https://172.16.50.20.9084/version.xml     | Trust Authority                                  | wdc-tsa-pure-01 (2/2 online)   | s  | tandby                     | 200        |  |
| Alarm Definitions                            | wdc-tse-pure-01 (2/2 online)   | Active 200                        |   | Key Providers                                    | ⊿ wdc-tsa-pure-01-ct0  | Online -   |                            |            | https://172.16.50.20:8084/version.xml    |
| Scheduled Tasks<br>Storage Providers         | VMware vSAN Online   |                                   | http://localhost:1080/vsanHealth/vsanv    | Scheduled Tasks                                  | wdc-tsa-pure-01 (2/2 online)  VMware vSAN  | Online -   |                            |            | http://iocalhost:1080/vsanHealth/vsanv.  |
| vsan 🗸                                       |  |                                   |   | Storage Providers                                |  |  |                            |            |  |
| Update G                                     | Supported Vendor IDs         Certificate Info           Provider name         vdc-tas-pure-01-ct0           Provider status         Online           Active/standby status   |                                   |   | Update<br>Internet Connectivity                  | Innectivity Provide name wdc:lsa.pure-O1-ct1 Provide name wdc:lsa. |  |                            |            |  |
|  | Provider version         12.0           VS8A API version         3.0           Default namespace         com purestorrage           Provider ID         rab/1679-843b-4425-bd42-85c68texe           Supported profiles         Storrage Profile Based Management<br>ReplicationProfile | 44b-0                             |   |  | URL https://172<br>Provider version 1.2.0<br>VASA API version 3.0<br>Default namespace com.pures<br>Provider ID fab1667e-1<br>Supported profiles Storage Pr<br>Replication   | 16.50.21.8084/version.xml<br>torage<br>149b-44c5-bd42-85c691eae44t<br>offie Based Management<br>iProfile | 5-1                        |            |  |

FIGURE 87. SITE B: Storage Provider Details

# 

Site A Pure Storage vVOL datastore **OraVVOL** is as shown below:

| Summary Monitor Configure Permissions Files Hosts VMs              |      |                                 |                        |                          |  |  |  |  |
|--|------|---------------------------------|------------------------|--------------------------|--|--|--|--|
| Turner added   |      |                                 |                        | Storage                  |  |  |  |  |
| URL: ds:///vmfs/volumes/vvol:3209833ef6833000-9b879a832d2b5158/    |      |                                 |                        | Storage                  |  |  |  |  |
|  |      |                                 |                        | Used: 1.17 TB            |  |  |  |  |
|  |      |                                 |                        |                          |  |  |  |  |
| $\bigcirc$   |      |                                 |                        |                          |  |  |  |  |
|  |      |                                 |                        |                          |  |  |  |  |
| Details  | ^    | Related Objects                 |                        |                          |  |  |  |  |
|  |      |                                 |                        |                          |  |  |  |  |
| Location ds://vmfs/volumes/vvol:3209833ef6833000-9b8/9e832d2b5l58/ |      |                                 |                        |                          |  |  |  |  |
| Type vVoi  | vVol |                                 |                        |                          |  |  |  |  |
| Hosts 11   |      | Attribute Value                 |                        |                          |  |  |  |  |
|  |      | SRM-com.vmware.vcDr.::protected |                        |                          |  |  |  |  |
| Virtual machines 12  |      |                                 |                        |                          |  |  |  |  |
| VM templates 0   |      |                                 |                        |                          |  |  |  |  |
| Active storage provider Pure-X50-BCA-ct1                           |      |                                 |                        |                          |  |  |  |  |
|  |      |                                 |                        |                          |  |  |  |  |
|  |      |                                 |                        |                          |  |  |  |  |
| Taos   | ~    | Edit                            |                        |                          |  |  |  |  |
|  |      |                                 |                        |                          |  |  |  |  |
|  |      | FlashArray                      |                        |                          |  |  |  |  |
|  |      |                                 |                        |                          |  |  |  |  |
|  |      | Array                           | Pure-X50-BCA           |                          |  |  |  |  |
|  |      | Active Storage Provider         | Pure-X50-BCA-ct1       |                          |  |  |  |  |
|  |      | Protocol Endpoint               | pure-protocol-endpoint | A841B405A3A348CA000118FF |  |  |  |  |
|  |      | Volume Groups In Use            | 34                     |                          |  |  |  |  |
|  |      | Volumes In Use                  | 95                     |                          |  |  |  |  |
|  |      |                                 |                        |                          |  |  |  |  |



Site B Pure Storage vVOL datastore **AZ2OraVVOL** is as shown below:

| AZ2OraVVOL ACTIONS V  |   |                 |  |  |                          |  |  |  |  |  |  |
|---|---|-----------------|--|--|--------------------------|--|--|--|--|--|--|
| Summary Monitor Configure Permissions Files Hosts VMs   |   |                 |  |  |                          |  |  |  |  |  |  |
| Type:         vVol         Storage           URL:         ds:///vmfs/volumes/vvol:52cc3c9a587e399e-a20e901faf033899/         used: 5 MB |   |                 |  |  |                          |  |  |  |  |  |  |
| Details   | ^ | Related Objects |  |  |                          |  |  |  |  |  |  |
| Location         ds:///vmfs/volumes/vvol:52cc3c9a587e393e-a20e901faf033899/           Type         vVol                                 |   | Cus             | tom Attributes                         |  |                          |  |  |  |  |  |  |
| Hosts 3   |   | Flas            | hArray                                 |  |                          |  |  |  |  |  |  |
| Virtual machines     O       VM templates     O       Active storage provider     wdc-tea.pure-01_ct0                                   |   |                 | Array<br>Active Storage Provider       | wdc-tsa-pure-01<br>wdc-tsa-pure-01-ct0 |                          |  |  |  |  |  |  |
| Tags  |   |                 | Volume Groups In Use<br>Volumes In Use | pure-protocol-endpoint  1  1           | FABF667E849B44C500011018 |  |  |  |  |  |  |
| Storage Capability Profiles   | ~ |                 |  |  |                          |  |  |  |  |  |  |

FIGURE 89. SITE B: vVOL Datastore



Create a Pure Storage protection group **SC2vVOLPG** on Site A. We do not need to create a Pure Storage protection group on Site B.

| Protection  |           |                                       |
|---|-----------|---------------------------------------|
| Snapshots Policies Protection Groups ActiveDR ActiveCluster |           |                                       |
| Ø > Protection Groups                                       |           |                                       |
| Snapshots<br>109.64 M                                       |           |                                       |
| Source Protection Groups A                                  |           |                                       |
| Name  | Snapshots | Targets                               |
| ⊙ pure-vasa-default   | 0.00      |                                       |
| ⊗ sc2pdd:sc2pg  | 0.00      |                                       |
| () SC2WOLPG   | 109.64 M  | Allowed on 1 of 1 replication targets |



Create the VMware replication-based VM storage policy **vVOL Replication Policy** for Site A.

| Edit VM Storage Policy                    | Name and descrip     | otion                       |  |  |  |                         |
|---|----------------------|-----------------------------|--|--|--|-------------------------|
| 1 Name and description 2 Policy structure | Name:                |                             |  |  |  |                         |
| 3 com.purestorage.storage.policy ruk      | Description:         | vVOL Replication Policy     |  |  |  |                         |
| 4 Storage compatibility                   |                      | Edit VM S                   | Storage Policy                           | Policy structure   |  |                         |
| 5 Review and finish                       |                      | 1 Name a                    | nd description                           | Host based services  |  |                         |
|   |                      | 2 Policy s<br>3 comput      | tructure<br>restorage.storage.policy ruk | Create rules for data services provided by hosts. Available data se<br>Host based services will be applied in addition to any datastore sp<br>Enable host based rules            | rvices could include encryption, l/<br>ecific rules. | /O control, caching, et |
|   |                      | 4 Storage                   | compatibility                            | Datastore specific rules   |  |                         |
|   |                      | 5 Review                    | and finish                               | Create rules for a specific storage type to configure data services<br>when VMs are placed on the specific storage type.<br>Enable rules for "vSAN" storage                      | provided by the datastores. The r                    | rules will be applied   |
|   |                      |                             |  | Enable rules for "vSANDirect" storage     Enable rules for "com.purestorage.storage.policy" storage     Enable rules for "INFINIOX VVOL" storage     Enable rules for "INFINIOX" |  |                         |
| Edit VM Storag                            | no Dolicy            |                             | orage policy (                           |  | 、  |                         |
|   | Je Policy            | com.parestorage.st          | orage.policy i                           |  | ,  |                         |
| 1 Name and descr                          | iption               | Placement Replication       | Tags                                     |  |  |                         |
| 2 Policy structure                        |                      | Pure Storage FlashArray (1) | Yes                                      | 5  | REMOVE   |                         |
| 3 com.purestorag                          | e.storage.policy rul | ADD ROLE *                  |  |  |  |                         |
| 4 Storage compat                          | ibility              |                             |  |  |  |                         |
| 5 Review and finis                        | h                    |                             |  |  |  |                         |
|   |                      |                             |  |  |  |                         |





The following is a continuation of the steps needed to create VMware replication-based VM storage policy **vVOL Replication Policy** for Site A.



FIGURE 92. SITE A: vVOL Storage Replication Policy Continued

The vVOL storage replication policy is created as shown below:



FIGURE 93. SITE A: vVOL Storage Replication Policy Complete

Create the VMware replication-based VM storage policy **vVOL Replication Policy** for Site B in the same way.

| VM  | Stor  | age P          | olicies     | 5         |        |         |                 |            |              |  |
|---|---|----------------|-------------|-----------|--------|---------|-----------------|------------|--------------|--|
| CREA  | TE  | EDIT           | CLONE       | СНЕ       | ск     | REAPP   | νLΥ             | DELETI     | E            |  |
|   | Name  |                |             |           |        | 1       | /C              |            |              |  |
|   | 🔒 Ma  | nagemen        | t Storage   | Polícy -  | Large  |         | 🕑 az            | 2wvc01.v   | slab.local   |  |
|   | R VV  | 'ol No Rec     | luirement   | s Polícy  |        |         | 🕑 az            | 2wvc01.v   | slab.local   |  |
|   | 🔒 Ma  | nagemen        | t Storage   | Polícy -  | Streto | :h      | 🕑 az            | 2wvc01.v   | slab.local   |  |
|   | 🗌 🗟 VM Encryption Policy 📴 az2wvc01.vslab.local |                |             |           |        |         |                 |            |              |  |
|   | 🔒 Ma  | nagemen        | t Storage   | polícy -  | Encry  | pt      | 🕑 az            | 2wvc01.v   | slab.local   |  |
|   | 🔒 Ma  | nagemen        | t Storage   | Polícy -  | Single |         | 🕑 az            | 2wvc01.v   | slab.local   |  |
|   | 🔒 Ho  | st-local Pl    | vlem Defa   | ult Stora | age Po | )í      | 🕑 az            | 2wvc01.v   | slab.local   |  |
|   | ₽ vS/   | AN Defau       | t Storage   | Policy    |        |         | 🕑 az            | 2wvc01.v   | slab.local   |  |
|   | <u></u> 7√                                      | OL Replic      | ation Polic | y - AZ2   |        |         | 🕑 az            | 2wvc01.v   | slab.local   |  |
|   | 🔒 Ma  | nagemen        | t Storage   | Polícy -  | Regul  | ar      | 🗗 az            | 2wvc01.v   | slab.local   |  |
| 1   | П Ma  | <u>nocomon</u> | + Ctorogo   | naliau    | Thin   |         | <del>د</del> لک | 00000010   |              |  |
| lules                                       | ٧N  | 1 Complia      | nce         | VM Ter    | nplate | s St    | orage           | e Compa    | tibility     |  |
| Gener                                       | al  |                |             |           |        |         |                 |            |              |  |
| Nan   | ne  |                |             |           | vV     | OL Repl | licatio         | n Polícy - | AZ2          |  |
| Des   | criptior  | ı              |             |           | vV     | OL Repl | licatio         | n Policy - | AZ2          |  |
| Rule-s                                      | et 1: co  | m.puresto      | orage.stor  | age.pol   | icy    |         |                 |            |              |  |
| Placen                                      | nent  |                |             |           |        |         |                 |            |              |  |
| Storage Type com.purestorage.storage.policy |   |                |             |           |        |         |                 | e.policy   |              |  |
| Pure  | e Stora   | ge FlashA      | rray        |           | Yes    | S       |                 |            |              |  |
| Replica                                     | ation >   | Custom         |             |           |        |         |                 |            |              |  |
| Prov  | vider   |                |             |           | CO     | m.pures | torag           | e.storage  | ereplication |  |
| Targ  | get síte  | S              |             |           | Pu     | re-X50- | BCA             |            |              |  |

### FIGURE 94. SITE B: vVOL Storage Replication Policy Details

On Site A, we need to assign the VMware replication-based VM storage policy **vVOL Replication Policy** to both single-instance Oracle VMs **Oracle19c-OL8** and **Oracle19c-OL8-RMAN** and Oracle RAC **prac19c** VMs to be protected by FlashArray periodic replication.

Steps to assign the VMware replication-based VM storage policy **vVOL Replication Policy** to single-instance Oracle VM **Oracle19c-OL8** are shown below:

| vm vs  | phere Client   | Menu 🗸 🛛 🔍 Sea            | rch in all environments               |  | Ed     | it VM Sto  | orage Policies Oracle19c-OL                            | 8-VVOL             |    |                      | × |
|--|--|---------------------------|---------------------------------------|--|--------|--|--|--------------------|----|----------------------|---|
| () ð,  | 8  |                           | Oracle19c-O                           | L8-VVOL   Þ  | VM s   | torage policy:   | VVol No Requirements Policy 🗸                          | 1                  |    | Configure per disk 🔘 |   |
| <ul> <li>&gt; S az2wv</li> <li>&gt; S az2wv</li> <li>&gt; S az2wv</li> <li>&gt; S az2wv</li> <li>&gt; Flt SC2</li> </ul> | c01.vslab.local<br>c03.vslab.local<br>-DC  |                           | Summary Monitor<br>Settings V         | Configure Per<br>Policies                                      |        |  | Datastore Default                                      | -                  |    |                      |   |
| > () B   | CA-Intel (Reserved)  |                           | VM SDRS Rules                         | CHECK VM STORA   |        | Name   | Management Storage policy - Encryption                 | Datastor           | 0  | Datastore Type       |   |
| - LLI -  | sc2esx09.vslab.loci  | Power                     | irm Definitions                       | Name   | >      | D VM hor   | Management Storage Policy - Stretched                  | OraVVC             | DL | vVol                 |   |
|  | sc2esx10.vslab.local   | Guest OS                  | Icles                                 | O B Hard disk  | >      | Hard disk 1 Management Storage Policy - Stretched Lite | lard disk 1 Management Storage Policy - Stretched Lite | OraVVO             | DL | vVol                 |   |
| ы<br>С   | sc2esxl2.vsab.loca Snapshots were EVC C And disk oraclfel Console est User Mappings C And disk | >                         | Hard disk 2                           | Management Storage Policy - Large                              | OraVVC | DL   | vVol   |                    |    |                      |   |
| 60<br>60<br>60   | Oracie19c-BM<br>Oracie19c-OL8  | @1 Migrate                | re Storage V<br>/irtual Volumes       | Image: Bard disk       Image: Bard disk       Image: Bard disk | >      | Hard disk 3  | VVol No Requirements Policy                            | OraVVC             | DL | vVol                 |   |
| 6  | Oracle19c-OL8-RMJ<br>Oracle19c-OL8-VV  | Fault Tolerance           | FINIDAT                               |  | >      | Hard disk 4  | Management Storage policy - Thin                       | OraVVO             | DL | vVol                 |   |
| 5<br>6   | Oracle19c-OL8-VV(<br>prac19c1  | VM Policies               | Edit VM Storage                       | Policies   | >      | Hard disk 5  | performancenfs   | OraVVC             | DL | vVol                 |   |
| 69<br>69   | prac19c2<br>rac19c1  | Template<br>Compatibility | Gerek VM Stora     Gereapply VM Stora | ge Policy Compliance   |        |  | vVOL Replication Policy                                |                    |    |                      |   |
| 12   | 1861962  |                           | 1                                     |  |        |  | Management Storage Policy - Single Node                |                    |    |                      |   |
|  |  |                           |                                       |  |        |  | vSAN Default Storage Policy                            |                    |    |                      |   |
| Edi  | t VM Sto   | orage Polic               | ies Orac                              | Hell9c-OL8-V   | /OL    |  |  | ×                  |    |                      |   |
| VM st  | orage policy:  | vVOL Replication I        | Policy                                | ~  |        |  | Col  | nfigure per disk 🔵 |    |                      |   |
|  |  |                           |                                       |  |        |  | Replication groups: 🕕 Not co                           | CONFIGURE          |    |                      |   |
|  | Name   |                           | Disk Si                               | ze   | c      | Datastore  | Datastore Type   | •                  |    |                      |   |
| >  | 🗅 VM hor   | ne                        | -                                     |  | (      | DraVVOL  | vVoi   |                    |    |                      |   |
| >  | Hard disk 1  |                           | 80 GB                                 | 5  | (      | DraVVOL  | vVol   |                    |    |                      |   |
| >  | Hard disk 2  |                           | 80 GB                                 | 5  | (      | DraVVOL  | vVol   |                    |    |                      |   |
| >  | Hard disk 3  |                           | 100 G                                 | B  | (      | DraVVOL  | vVol   |                    |    |                      |   |
| >  | Hard disk 4  |                           | 1 TB                                  |  | (      | DraVVOL  | vVol   |                    |    |                      |   |
| >  | Hard disk 5  |                           | 250 G                                 | в  | (      | DraVVOL  | vVol   |                    |    |                      |   |

FIGURE 95. SITE A: Assign Storage Policy vVOL Replication Policy to VMs

| Configure VM Replication Groups   |   |  | × Ed      | X Edit VM Storage Policies Oracle19c-OL8-VVOL |                  |                              |                    |  |
|---|---|--|-----------|---|------------------|------------------------------|--------------------|--|
| The following storage objects are being replik<br>objects or select different ones for each stora | ated to a remote location. Sele<br>ge object. | ect a common replication group for all | VM :      | storage policy: VVOL Replication              | n Policy v       | Replicatio                   | Configure per disk |  |
| Replication group: Pure-X50-BCA:SC2vVOLPG   | ·   | Configure per disk 🔵                   |           | Name  | Disk Size        | Datastore                    | Datastore Type     |  |
| Name  | VM Storage Policy                             |  | >         | 🗅 VM home                                     |                  | OraVVOL                      | vVol               |  |
| P VM home   | vVOL Replication                              | Policy                                 | >         | Hard disk 1                                   | 80 GB            | OraVVOL                      | VVol               |  |
|   | Y OL REPROVIDIN FORCE                         |  | >         | Hard disk 2                                   | 80 GB            | OraVVOL                      | vVol               |  |
| Hard disk 1   | vVOL Replication                              | Policy                                 | >         | Hard disk 3                                   | 100 GB           | OraVVOL                      | vVol               |  |
| Hard disk 2   | vVOL Replication                              | Policy                                 | >         | Hard disk 4                                   | 1 TB             | OraVVOL                      | vVol               |  |
| Hard disk 3   | vVOL Replication                              | Policy                                 | >         | Hard disk 5                                   | 250 GB           | OraVVOL                      | vVol               |  |
| Hard disk 4   | vVOL Replication                              | Policy                                 |           |   |                  |                              |                    |  |
| Hard disk 5   | vVOL Replication                              | Policy                                 |           |   |                  |                              |                    |  |
|   |   |  |           |   |                  |                              | ( )                |  |
|   |   | 6 iter                                 | ms        |   |                  |                              | CANCEL             |  |
| ✓ Valid replication group configuration.  | B Oracle19c-OL<br>Summary Monitor             | _8-VVOL   ▷ □ ⊑ 🖗                      | 전   🗛     | Networks Snapsl                               | nots Updates     |                              |                    |  |
|   | Settings V<br>VM SDRS Rules<br>vApp Options   | Policies<br>CHECK VM STORAGE POLICY C  | OMPLIANCE | READELY VM STOR                               | AGE POLICY       |                              |                    |  |
|   | Alarm Definitions                             | Name                                   |           | Y VM Storage Poli                             | icy              | T Compliance Stat            | us                 |  |
|   | Scheduled Tasks                               | VM home                                |           | 🖳 vVOL Re                                     | plication Policy | ✓ Complian                   | it                 |  |
|   | Policies                                      | Hard disk 1                            |           | VVOL Re                                       | plication Policy | ✓ Compilar                   | it                 |  |
|   | Guest User Mappings                           | Hard disk 2                            |           | R VVOL Re                                     | plication Policy | ✓ Compilar                   | it                 |  |
|   | Pure Storage                                  | B Hard disk 3                          |           |   | plication Policy | ✓ Compilar                   | 11.<br>            |  |
|   | Virtual Volumes                               | By Hard disk 4                         |           |   |                  | ✓ Complian                   | n                  |  |
|   | ritus. volumes                                |  |           | R AAOL KE                                     | plication Policy | <ul> <li>Compilat</li> </ul> | 14                 |  |

FIGURE 96. SITE A: Assign Storage Policy vVOL Replication Policy to VMs Continued

Steps to assign the replication-based VM to single-instance Oracle VM **Oracle19c-OL8-RMAN** and Oracle RAC **prac19c** VMs are the same as shown above.

Single-instance Oracle VMs Oracle19c-OL8 and Oracle19c-OL8-RMAN now have storage policy vVOL Replication Policy applied.

| 🚯 Oracle19c-O                          | L8   Þ 🗆 🖬 🖓 🔞                    | ACTIONS Y                        |                               |                        |
|--|-----------------------------------|----------------------------------|-------------------------------|------------------------|
| Summary Monitor                        | Configure Permissions             | Datastores Networks Snapshots    | Updates                       |                        |
| Settings VM SDRS Rules                 | Policies<br>CHECK VM STORAGE POLI | CY COMPLIANCE REAPPLY VM STORAGE | POLICY                        |                        |
| Alarm Definitions                      | Name                              | VM Storage Policy                | Compliance Status             | T Last Checked         |
| Scheduled Tasks                        | O D VM home                       | 😥 vVOL Replication Policy        | <ul> <li>Compliant</li> </ul> | 06/23/2021, 8:26:26 PM |
| Policies                               | 🔿 🛛 🖉 Hard disk 1 🂙               | 🗟 vVOL Replication Policy        | <ul> <li>Compliant</li> </ul> | 06/23/2021, 8:26:26 PM |
| VMware EVC                             | O B Hard disk 2                   | 🗟 vVOL Replication Policy        | ✓ Compliant                   | 06/23/2021, 8:26:26 PM |
| Guest User Mappings                    | 이 욢 Hard disk 3                   | 🗟 vVOL Replication Policy        | ✓ Compliant                   | 06/23/2021, 8:26:26 PM |
| Pure Storage 🗸 🗸                       | 🔿 🛛 📇 Hard disk 4                 | 🗟 vVOL Replication Policy        | ✓ Compliant                   | 06/23/2021, 8:26:26 PM |
| Virtual Volumes                        | O B. Hard disk 5                  | R vVOL Replication Policy        | <ul> <li>Compliant</li> </ul> | 06/23/2021, 8:26:26 PM |
|  |                                   |                                  |                               |                        |
| Summary Monitor                        | L8-RMAN D Configure Permissions   | actions 🗸 🔞 🛔 🖓                  | s Updates                     |                        |
| Settings VM SDRS Rules<br>vApp Options | Policies<br>CHECK VM STORAGE POL  | ICY COMPLIANCE REAPPLY VM STORAG | E POLICY                      | Last Charked           |
| Alarm Definitions                      |                                   | P vVOI Penlication Policy        | Compliant                     | 06/23/2021 8:27:12 PM  |
| Scheduled Tasks                        |                                   |                                  | Compliant                     | 06/23/2021 8:27:12 PM  |
| VMware EVC                             |                                   |                                  | Compliant                     | 06/23/2021, 8:27:12 PM |
| Guest User Mappings                    | B Hard disk 2                     |                                  | Compliant                     | 06/23/2021, 8:27:12 PM |
| Pure Storage                           |                                   | B w/OL Replication Policy        | Compliant                     | 06/23/2021, 0.27.12 PM |
| Virtual Volumes                        | B Hard diak E                     | eg vvoc Replication Policy       | Compliant                     | 06/23/2021, 0.27.12 PM |
|  |                                   | eg avoir replication Policy      | Compliant                     | 00/20/2021, 0.27.12 PM |

FIGURE 97. SITE A: Single-Instance VM's Storage Policy vVOL Replication Policy



Oracle RAC prac19c VMs now have storage policy vVOL Replication Policy applied.

| 🔂 prac19c1 🕴 Þ         |                       | ; v                                    |                               |                        |  |  |  |  |  |  |
|------------------------|-----------------------|--|-------------------------------|------------------------|--|--|--|--|--|--|
| Summary Monitor        | Configure Permissions | Datastores Networks Snapshots          | Updates                       |                        |  |  |  |  |  |  |
| Settings VM SDRS Rules | Policies              |  |                               |                        |  |  |  |  |  |  |
| vApp Options           |                       |  |                               |                        |  |  |  |  |  |  |
| Alarm Definitions      | Name                  | YM Storage Policy                      | T Compliance Status           | T Last Checked         |  |  |  |  |  |  |
| Scheduled Tasks        | O D VM home           | 🔺 🌈 vVOL Replication Policy            | Compliant                     | 06/23/2021, 8:27:34 PM |  |  |  |  |  |  |
| Policies               | 🔿   📇 Hard disk 1     | 🗟 vVOL Replication Policy              | <ul> <li>Compliant</li> </ul> | 06/23/2021, 8:27:34 PM |  |  |  |  |  |  |
| VMware EVC             | 🔿 🛛 📇 Hard disk 2     | 🖁 vVOL Replication Policy 🧳            | <ul> <li>Compliant</li> </ul> | 06/23/2021, 8:27:34 PM |  |  |  |  |  |  |
| Guest User Mappings    | 🔿 🖉 Hard disk 3       | 😥 vVOL Replication Policy              | <ul> <li>Compliant</li> </ul> | 06/23/2021, 8:30:20 PM |  |  |  |  |  |  |
|                        |                       |  |                               |                        |  |  |  |  |  |  |
| Summary Monitor        | Configure Permissions | ions ✓<br>s Datastores Networks Snapsh | ots Updates                   |                        |  |  |  |  |  |  |
| Settings 🗸 🗸           | Policies              |  |                               |                        |  |  |  |  |  |  |
| VM SDRS Rules          | CHECK VM STORAGE POL  | ICY COMPLIANCE REAPPLY VM STORA        | GE POLICY                     |                        |  |  |  |  |  |  |
| vApp Options           |                       |  |                               | 1.1.1.1.1.1            |  |  |  |  |  |  |
| Alarm Definitions      | Name                  | VM storage Policy                      | Compliance Status             | T Last Checked         |  |  |  |  |  |  |
| Scheduled Tasks        | ○ D VM home           | VVOL Replication Policy                | Compliant                     | 06/23/2021, 8:27:49 PM |  |  |  |  |  |  |
| Policies               | 이 🚊 Hard disk 1       | 🖳 vVOL Replication Policy              | Compliant                     | 06/23/2021, 8:27:49 PM |  |  |  |  |  |  |
| VMware EVC             | 🔿 🛛 📇 Hard disk 2     | 👷 vVOL Replication Policy 🚽            | Compliant                     | 06/23/2021, 8:27:49 PM |  |  |  |  |  |  |
| Guest User Mappings    | O B. Hard disk 3      | a vVOL Replication Policy              | Compliant                     | 06/23/2021, 8:30:58 PM |  |  |  |  |  |  |
|                        |                       |  |                               |                        |  |  |  |  |  |  |



| VM        | Storage F   | Policies     |                |         |          |             |                        |  |  |  |  |
|-----------|---|--------------|----------------|---------|----------|-------------|------------------------|--|--|--|--|
| CREA      | TE EDIT   | CLONE        | СНЕСК          | REA     | PPLY     | DELETE      |                        |  |  |  |  |
|           |   | it storage j | Joney - Thirt  |         |          |             | VC                     |  |  |  |  |
| $\square$ | R Performanc  | eflash       |                |         |          |             | 🗗 sc2wvc03.vslab.local |  |  |  |  |
|           | 🗟 performanc  | enfs         |                |         |          |             | 🗗 sc2wvc03.vslab.local |  |  |  |  |
|           | ☐ R VM Encryption Policy                              |              |                |         |          |             |                        |  |  |  |  |
|           | <br>〕 │   |              |                |         |          |             |                        |  |  |  |  |
|           | <br>□   |              |                |         |          |             |                        |  |  |  |  |
|           | 🗟 vVOL Replic   | ation Policy | /              |         |          |             | 🗗 sc2wvc03.vslab.local |  |  |  |  |
|           | 🗟 Host-local P  | Mem Defau    | ult Storage P  | Policy  |          |             | 🕝 az2wvc01.vslab.local |  |  |  |  |
|           | 🗌 🛛 🗟 Management Storage policy - Encryption 🛛 🔂 az2v |              |                |         |          |             |                        |  |  |  |  |
|           | 🗟 Managemer   | nt Storage I | Policy - Larg  | е       |          |             | 🗗 az2wvc01.vslab.local |  |  |  |  |
|           | 🗟 Managemer   | nt Storage I | Polícy - Regu  | ular    |          |             | 🗗 az2wvc01.vslab.local |  |  |  |  |
|           | 🗟 Managemer   | nt Storage I | Polícy - Singl | le Node | 5        |             | 🗗 az2wvc01.vslab.local |  |  |  |  |
|           | 🗟 Managemer   | nt Storage I | Polícy - Stret | tched   |          |             | 🗗 az2wvc01.vslab.local |  |  |  |  |
| 1         |   |              |                |         |          |             |                        |  |  |  |  |
| ules      | VM Compli   | ance '       | VM Templat     | te      | Storag   | le Compat   | tibility               |  |  |  |  |
| Gener     | al  |              |                |         |          |             |                        |  |  |  |  |
| Nan       | ne  |              | V              | VOL Re  | plicatio | n Policy    |                        |  |  |  |  |
| Des       | cription  |              | V              | VOL Re  | plicatio | n Polícy    |                        |  |  |  |  |
| Rule-s    | et 1: com.purest                                      | orage.stora  | age.policy     |         |          |             |                        |  |  |  |  |
| Placen    | nent  |              |                |         |          |             |                        |  |  |  |  |
| Sto       | Storage Type com.purestorage.storage.policy           |              |                |         |          |             |                        |  |  |  |  |
| Pur       | Pure Storage FlashArray Yes                           |              |                |         |          |             |                        |  |  |  |  |
| Replic    | ation > Custom  |              |                |         |          |             |                        |  |  |  |  |
| Pro       | vider   |              | C              | om.pur  | estorag  | je.storage. | replication            |  |  |  |  |
| Targ      | Target sites wdc-tsa-pure-01                          |              |                |         |          |             |                        |  |  |  |  |

FIGURE 99. SITE B: Storage Policy vVOL Replication Policy

The single-instance Oracle VMs Oracle19c-OL8 and Oracle19c-OL8-RMAN VM and the Oracle RAC vvolrac VMs to be protected by FlashArray periodic replication are now part of the Site A Pure Storage protection group SC2vVOLPG.

| Protection   |  |                 |
|--|--|-----------------|
| Snapshots Policies Protection Groups Ac  | tiveDR ActiveCluster   |                 |
| Protection Groups<br>SC2vVOLPG   |  |                 |
| Snapshots<br>128.17 M  |  |                 |
| Members A  | 1-10 of 19 🔇 🔪 🚦   |                 |
| Name   |  |                 |
|  |  |                 |
| vvol-Oracle19C-OL8-5fce3a1d-vg/Config:950eaaf4   | x  |                 |
| = vvol Oracle19c-OL8-5fce3a1d-vg/Data-2192b301   | Protection   |                 |
| vvol-Oracle19c-OL8-5fce3a1d-vg/Data-257192b8   | Consolvato Dallalog Destantian Crauno Antico DD Antico Chustor |                 |
| vvol-Oracle19c-OL8-5fce3a1d-vg/Data-70f28497   | Shapshots Policies Protection Gloups ActiveDR ActiveCluster    |                 |
| C vvol-Oracle19c-OL8-5fce3a1d-vg/Data-d69aeef6   |  |                 |
| Cvvol-Oracle19c-OL8-5fce3a1d-vg/Data-e17b037b  | Snapshots  |                 |
| Cvvol-Oracle19c-OL8-RMAN-13dt9767-vg/Config-114072fc   |  |                 |
| vvol-Oracle19c-OL8-RMAN-13dt9767-vg/Data-06b7t7ct  | Members A  | 11-19 of 19 < > |
| vvol-Oracle19c-OL8-RMAN-13df9767-vg/Data-32832875  | Name   |                 |
| evvol-Oracle19c-OL8-RMAN-13df9767-vg/Data-930f14e4   |  |                 |
| and the second s | C wol-Orade19c-OL8-RMAN-/3df9767-vg/Data-d05a7191              | ×               |
|  | C vvol-Orade19c-OL8-RMAN-13d19767 vg/Data-d5284a14             | ×               |
| / ·  | vvol-pract9ct-90c766ce-vg/Config-btf22d05                      | ×               |
|  | C wol-pract9ct-90c766ce-vg/Data-04c634v5                       | ×               |
|  | woi-prac19c1-90c766ce-vg/Data-0caaa243                         | ×               |
| j.   | vvol-prac19c1-90c766ce-vg/Data-2d5b187d                        | ×               |
| N. N   | ⇒ vvol-prac19c2-41059974-vg/Config-99/1e844                    | ×               |
|  | 😄 vvol-prac19c2-41059974-vg/Data-Vob95d6b                      | ×               |
|  | ≥ wol-prac19c2-41059974-vg/Data-6cce596f                       | ×               |
|  |  |                 |

FIGURE 100. SITE B: Storage Protection Groups and vVOLs

Create vSphere Virtual Volumes replication storage policy mappings between Site A and Site B.



FIGURE 101. vVOL Replication Storage Policy Mapping Between Site A and B

Further steps to create vSphere Virtual Volumes replication storage policy mappings between Site A and Site B are as shown below:

| New Storage Policy<br>Mappings | Reverse mappings<br>Select configured mappings for which to automatically creat | te reverse mappings. This might overwrite ex                     | :isting mappings.               |                        |
|--------------------------------|---|--|---------------------------------|------------------------|
| 1 Creation mode                | az2wvc01.vslab.local     Im vVOL Replication Policy - AZ2                       | ↑  ▼ sc2wvc03.vslab.local      Get vVOL Replication Policy       | т                               |                        |
| 2 Recovery storage policies    |   |  |                                 |                        |
| 3 Reverse mappings             | New Storage Policy<br>Mappings  | Ready to complete<br>Review your settings before finishing the w | izard                           |                        |
| 4 Ready to complete            | 1. Creation mode  | sc2wvc03.vslab.local   | az2wvc01.vslab.local            | Reverse Mapping        |
|                                | T Creation mode   | 🕞 vVOL Replication Policy  | 🕞 vVOL Replication Policy - AZ2 | Yes                    |
|                                | 2 Recovery storage policies   |  |                                 |                        |
|                                | 3 Reverse mappings  |  |                                 |                        |
|                                | 4 Ready to complete   |  |                                 |                        |
| Storage Policy Mappings        | 5   |  |                                 |                        |
| sc2wyc03,yslab,local az2wyc01  | I.vslab.local   |  |                                 |                        |
| NEW                            |   |  |                                 |                        |
| sc2wvc03.vslab.local           | ↑ K az2wvc01.vslab.local  | T Reverse  | Mapping Exists                  |                        |
| VVOL Replication Policy        | vVOL Replication Policy   | y - AZ2 Yes  |                                 |                        |
|                                |   |  |                                 |                        |
|                                | Storage Policy Mappin   | igs  |                                 |                        |
|                                | sc2wvc03.vslab.local az2wv  | c01.vslab.local  |                                 |                        |
|                                | NEW   |  |                                 |                        |
|                                | az2wvc01.vslab.local  | ↑ ▼ sc2wvc   | :03.vslab.local                 | Reverse Mapping Exists |
|                                | VVOL Replication Policy -   | AZ2 🕞 vV   | OL Replication Policy           | Yes                    |

FIGURE 102. vVOL Replication Storage Policy Mapping Between Site A and B Continued

Create a new VMware Site Recovery Manager protection group SC2-AZ2-SRM-SRA-VVOL-PG on Site A for vVOL-based replication.

| New Protection Group | Name and direction        | 1  |                                  |   |
|----------------------|---------------------------|--|----------------------------------|---|
| 1 Name and direction | Name:                     | SC2-AZ2-SRM-SRA-VVOL-PG<br>57 characters remaining |                                  |   |
| 2 Type               | Description:              | SC2-AZ2-SRM-SRA-VVOL-PG                            |                                  |   |
| 3 Replication groups |                           |  |                                  |   |
| 4 Recovery plan      |                           | 4073 characters remaining                          |                                  |   |
| 5 Ready to complete  | Direction:                | Primary_Site → DR_Site     DR_Site → Primary_Site  | New Protection Group             | Туре  |
|                      | Location:                 | Q Search   | 1 Name and direction             | Select the type of protection group you want to create: Datastore groups (array-based replication)    |
|                      |                           | Protection Groups                                  | 2 Туре                           | Protect all virtual machines which are on specific datastores. O Individual VMs (vSphere Replication) |
|                      |                           |  | 3 Replication groups             | Protect specific virtual machines, regardless of the datastores.                                      |
|                      |                           |  | 4 Recovery plan                  | Virtual Volumes (vVol replication) Protect virtual machines which are on replicated vVol storage.     |
|                      |                           |  |                                  | Storage policies (array-based replication)  |
|                      |                           |  | 5 Ready to complete              | Protect virtual machines with specific storage policies.  |
|                      |                           |  |                                  | Select fault domain.  |
|                      |                           |  |                                  | Fault Domain 🕆 Y Description Y Status   |
|                      |                           |  |                                  | Pure-X50-BCA Pure Storage VASA Provider 1.2.0 Pure-X50-BCA      VK                                    |
|                      |                           |  |                                  |   |
| New Protection Group | Replication grou          | ps   |                                  | ×   |
| 1 Name and direction | Select replication groups | . Replication groups contain virtual mad           | hines which are recovered togeth | er.   |
| 2 Туре               | Replication Gro           | up y Virtual Machir                                | es Status                        | EAR SELECTION   |
| 3 Replication groups | Pure-X50-BC               | CA:SC2vVOLPG 2                                     | Add to                           | this protectio  |
| 4 Recovery plan      |                           |  |                                  |   |
| 5 Ready to complete  |                           |  |                                  |   |



Create a new VMware Site Recovery Manager recovery plan SC2-AZ2-Oracle-SRA-VV on Site A for vVOL-based replication.

| New Protection Group           | Recovery plan   |  |                                |                                    |  |  |
|--------------------------------|---|--|--------------------------------|------------------------------------|--|--|
| 1 Name and direction<br>2 Type | You can optionally add the Add to existing record Add to existing record Add to new recover Do not add to recover | his protection group to a recovery plan.<br>wery plan<br>y plan<br>very plan now |                                |                                    |  |  |
| 3 Replication groups           | Recovery plan name:   | SC2-AZ2-Oracle-SRA-VV  |                                |                                    |  |  |
| 4 Recovery plan                |   | 54 characters remaining  |                                |                                    |  |  |
| 5 Ready to complete            |   | New Protection Group   | Ready to complete              | 9                                  |  |  |
|                                |   |  | Review your selected settings. |                                    |  |  |
|                                |   | 1 Name and direction   | Name                           | SC2-AZ2-SRM-SRA-VVOL-PG            |  |  |
|                                |   | 2 Туре   | Description                    | SC2-AZ2-SRM-SRA-VVOL-PG            |  |  |
|                                |   | 3 Replication groups   | Protected site                 | Primary_Site                       |  |  |
|                                |   |  | Recovery site                  | DR_Site                            |  |  |
|                                |   | 4 Recovery plan  | Location                       | Protection Groups                  |  |  |
|                                |   | 5 Ready to complete  | Protection group type          | Virtual Volumes (vVol replication) |  |  |
|                                |   |  | Replication groups             | Pure-X50-BCA:SC2vVOLPG             |  |  |
|                                |   |  | Total virtual machines         | 4                                  |  |  |
|                                |   |  | Recovery plan                  | SC2-AZ2-Oracle-SRA-VVOL-RP (new)   |  |  |





The Site Recovery Manager protection group on Site A SC2-AZ2-SRM-SRA-VVOL-PG and the protected VMs are shown below:

| © SC2-AZ2-SRM-SRA-VVOL-PG  | DIT MOVE DELETE  |                  |                        |                    |                       |                         |
|--|--|------------------|------------------------|--------------------|-----------------------|-------------------------|
| Summary Issues Permissions Replication Gro<br>Protection Group: SC2-A22-SRM-<br>Virtual Volumes (VV<br>Protected SM: Primary-SMe | ups Recovery Plans Virtual Mar<br>•SRA-VVOL-PG<br>fol replication) | hines<br>Sun     | SC2-AZ2-SRM-SRA        | A-VVOL-PG          | DUPS Recovery Plans   | ···<br>Virtual Machines |
| Recovery Site: DR_Site<br>Description: SC2-AZ2-SRM-SRA   | -VVOL-PG   | Re               | plication Group        |                    |                       | ↑ ▼ Virtual Machines    |
| $\mathbf{V}$   |  | Pu               | ire-X50-BCA:SC2vVOLPG  |                    |                       | 2                       |
| ✓ Protection Group Details   |  |                  |                        |                    |                       |                         |
| Status: O  | к  |                  |                        |                    |                       |                         |
| > Virtual Machines: 2  |  | V SC2            | 2-AZ2-SRM-SRA-         | VVOL-PG            | EDIT MOVE DELETE      |                         |
|  |  | Summary          | y Issues Permissio     | ns Replication Gro | Pups Recovery Plans   | Virtual Machines        |
|  |  |                  |                        |                    |                       |                         |
|  |  | Na               | ame                    | ↑ ▼ Status         | T Protected Site      | Recovery Site           |
|  |  | 01               | SC2-AZ2-Oracle-SRA-VVO | RP → Ready         | Primary_Site          | DR_Site                 |
| SC2-AZ2-SRM-SRA-VVC     Summary Issues Permissions   | CL-PG EDIT MOVE<br>Replication Groups Recover                      | DELETE ···       | ual Machines           |                    |                       |                         |
| RESTORE ALL PLACEHOLDER VMS CONF   | IGURE ALL VMS  |                  |                        |                    |                       |                         |
| Virtual Machine  | Protection Status TRecovery I                                      | esource Pool 🛛 🔻 | Recovery Host          | Recovery Folder T  | Recovery Network      | vVol Replication Group  |
| Oracle19c-OL8  | OK 🗍 AZ2B  | CA11             | az2esx22.vslab.local   | Oracle-DR          | APPS-1810             | Pure-X50-BCA:SC2vVOLP   |
| Oracle19c-OL8-RMAN   | OK 🔲 AZ2B  | CA11             | az2esx22.vslab.local   | Oracle-DR          | APPS-1810             | Pure-X50-BCA:SC2vVOLP   |
| U   m prac19c1   | V OK   | CA11             | az2esx23.vslab.local   | Coracle-DR         | APPS-1810, APPS-1805  | Pure-X50-BCA:SC2vVOLP   |
| 🔄 📋 prac19c2   | V OK   | CA11             | az2esx24.vslab.local   | C Oracle-DR        | 🖄 APPS-1810,APPS-1805 | Pure-X50-BCA:SC2vVOLP   |

FIGURE 105. SITE A: Site Recovery Manager Protection Group and Protected VMs

The Site Recovery Manager recovery plan on Site A SC2-AZ2-Oracle-SRA-VVOL-RP is shown below:

| SC2-AZ2-Oracle-SRA-VVOL-RP EDIT MOVE DELETE TEST CLU   | EANUP RUN                                   |                                    |                             | Learn mc     |
|--|---|------------------------------------|-----------------------------|--------------|
| Summary Recovery Steps Issues History Permissions Protection Groups Vit  | rtual Machines                              |                                    |                             |              |
| Recovery Plan: Sc2_AZ2-Oracle-SRA-VVOL-RP<br>Protected Size Primary_Size<br>Encovery Size: OR_Size<br>Description: |   |                                    |                             |              |
| ∼ Plan Status  | SC2-AZ2-Oracle-SF                           | RA-VVOL-RP EDIT MOVE DELE          | ETE TEST CLEANUP RUN        |              |
| Plan Status: -> Ready  | Summary Recovery Steps                      | Issues History Permissions Protect | ion Groups Virtual Machines |              |
| This plan is ready for less or recovery  | EXPORT STEPS TEST CL                        | EANUP <b>RUN</b> REPROTECT CANCEL  |                             |              |
| > Recent History   | Plan status:                                | $\rightarrow$ Ready                |                             |              |
|  | Description:                                | This plan is ready fo              | or test or recovery         |              |
|  |   |                                    |                             |              |
|  | > \$1 Synchronize storage                   |                                    | Status                      | Step Started |
|  | 2. Restore recovery site hosts              | s from standby                     |                             |              |
|  | 3. Suspend non-critical VMs at              | it recovery site                   |                             |              |
|  | ✓ ∅ 4. Create writable storage sna          | apshot                             |                             |              |
|  | 4.1. Protection Group SC2-AZ2               | 2-SRM-SRA-VVOL-PG                  |                             |              |
|  | > 4.2. prac19c2                             |                                    |                             |              |
|  | > 4.3. Oracle19c-OL8                        |                                    |                             |              |
|  | > 4.4. Oracle19c-OL8-RMAN                   |                                    |                             |              |
|  | > 4.5. prac19c1                             |                                    |                             |              |
|  | √ @ 5. Configure test networks              |                                    |                             |              |
|  | 5.1. prac19c2                               |                                    |                             |              |
|  | 5.2. Oracle19c-OL8                          |                                    |                             |              |
|  | 5.3. Oracle19c-OL8-RMAN                     |                                    |                             |              |
|  | 5.4. prac19c1                               |                                    |                             |              |
|  | 1 6. Power on priority 1 VMs                |                                    |                             |              |
|  | <ol> <li>Power on priority 2 VMs</li> </ol> |                                    |                             |              |
|  | ✓ 3 8. Power on priority 3 VMs              |                                    |                             |              |
|  | > 8.1. prac19c2                             |                                    |                             |              |
|  | > 8.2. Oracle19c-OL8                        |                                    |                             |              |
|  | > 8.3. Oracle19c-OL8-RMAN                   |                                    |                             |              |
|  | > 8.4. prac19c1                             |                                    |                             |              |
|  | 4 9. Power on priority 4 VMs                |                                    |                             |              |
|  | 5 10. Power on priority 5 VMs               |                                    |                             |              |

FIGURE 106. SITE A: Site Recovery Manager Recovery Plan

### VMware Site Recovery

The Site Recovery Manager and vSphere Replication appliance information site pairing summary for Site A and VMware Cloud on AWS are as shown below:

| Summary         |  |   |  |   |
|-----------------|--|---|--|---|
|                 | vCenter Server:<br>vCenter Version:<br>vCenter Host Name:<br>Platform Services Controller: | sc2wvc03.vslab.local 2<br>7.0.2, 17958431<br>sc2wvc03.vslab.locat/443<br>sc2wvc03.vslab.locat/443 | vcenter.sddc-44-232-220-144.vmwarevmc.com [2]<br>7.0.2, 18231847<br>vcenter.sddc-44-232-220-144.vmwarevmc.com;443<br>vcenter.sddc-44-232-220-144.vmwarevmc.com;443 |   |
| Site Recovery N | Manager  |   |  |   |
| Protection Grou | ips:1 🔲 Recovery Plans:1   |   |  |   |
| ∨ Name          |  |   | Primary-Site RENAME  | VMC-DR-Site RENAME                                  |
| Server          |  |   | srmsc2dc03.vslab.local:443 ACTIONS ~   | srm.sddc-44-232-220-144.vmwarevmc.com:443 ACTIONS ~ |
| Version         |  |   | 8.4.0, 17913191  | 8.4.0, 18048862                                     |
| ID              |  |   | com.vmware.vcDr  | com.vmware.vcDr                                     |
| Logged in as    |  |   | VSPHERE.LOCAL\Administrator  | VMC.LOCAL\cloudadmin                                |
| Remote SRM co   | onnection  |   | ✓ Connected  | ✓ Connected   |
| vSphere Replic  | ation  |   |  |   |
| Replicated VMs  | from Primary_Site:2 🕞 R  | eplicated VMs from vce  | nter.sddc-44-232-220-144.vmwarevmc.com:0   |   |
| ∨ Name          |  |   | Primary_Site   | vcenter.sddc-44-232-220-144.vmwarevmc.com           |
| Server          |  |   | VRSC2DC01.vslab.local:8043 ACTIONS ~   | vr.sddc-44-232-220-144.vmwarevmc.com:8043 ACTIONS ~ |
| Version         |  |   | 8.4.0.9813, 17913754   | 8.4.0.9982, 18008606                                |
| Domain Name     | / IP   |   | VRSC2DC01.vslab.local  | vr.sddc-44-232-220-144.vmwarevmc.com                |
| Remote VR con   | nection  |   | ✓ Connected  | ✓ Connected   |
|                 |  |   |  |   |

#### FIGURE 107. Site A and VMware Cloud on AWS Pairing Summary

The network mappings, folder mappings, resource mappings and placeholder datastore mappings must be setup for Site Recovery Manager with vSphere Replication.

The network mapping port groups between Site A and VMware Cloud on AWS are as shown below:

| NETWORK                 | SOURCE SITE            | PORT GROUP     | DESTINATION SITE       | DESTINATION<br>TEST NETWORK | DESTINATION<br>RECOVERY NETWORK |
|-------------------------|------------------------|----------------|------------------------|-----------------------------|---------------------------------|
| Public Network          | Site A                 | APPS-1614      | VMware Cloud on<br>AWS | Apps Team 01                | Apps Team 01                    |
| Private<br>Interconnect | Site A                 | APPS-1605      | VMware Cloud on<br>AWS | Oracle Private              | Oracle Private                  |
|                         |                        |                |                        |                             |                                 |
| Public Network          | VMware Cloud<br>on AWS | Apps Team 01   | Site A                 | APPS-1614                   | APPS-1614                       |
| Private<br>Interconnect | VMware Cloud<br>on AWS | Oracle Private | Site A                 | APPS-1605                   | APPS-1605                       |

TABLE 10. Network Mapping Details between Site A and VMware Cloud on AWS



The network mapping for protected site public network **APPS-1614** to recovery site **Recovery Network Apps Team 01** is as shown below. The recovery site test network is also **Apps Team 01**.

| Network Mappings                        |                            |            |                  |       |                       |          |                  |
|---|----------------------------|------------|------------------|-------|-----------------------|----------|------------------|
| sc2wvc03.vslab.local vcenter.sddc-44    | -232-220-144.vmwarevmc.com |            |                  |       |                       |          |                  |
| NEW   EDIT DELETE CREATE REVE           | RSE MAPPING                |            |                  |       |                       |          |                  |
| sc2wvc03.vslab.local                    |                            | <u>↑</u> т | Recovery Network | τ     | Reverse Mapping       | Ŧ        | Test Network     |
| 🗌   🖀 APPS-1605                         |                            |            | ଌ Oracle Private |       | Yes                   |          | 🐣 Oracle Private |
| Z APPS-1614                             |                            |            | 😤 Apps Team 01   |       | Yes                   |          | 🐣 Apps Team 01   |
| ✓ 1 EXPORT ~                            |                            |            |                  |       |                       |          |                  |
| IP Customization                        |                            |            |                  |       |                       |          |                  |
| Site                                    | sc2wvc03.vslab.local       |            |                  | vcer  | nter.sddc-44-232-220- | 144.vmwa | revmc.com        |
| Network                                 | APPS-1614                  |            |                  | App   | s Team 01             |          |                  |
| Subnet                                  | 172.16.14.0                |            |                  | 172.1 | 16.115.0              |          |                  |
| Subnet mask                             | 255.255.255.0              |            |                  | 255.  | 255.255.0             |          |                  |
| Range start                             | 172.16.14.0                |            |                  | 172.1 | 6.115.0               |          |                  |
| Range end                               | 172.16.14.255              |            |                  | 172.1 | 16.115.255            |          |                  |
| Network settings to be applied to the r | ecovery site network       |            |                  |       |                       |          |                  |
| Gateway                                 | 172.16.115.1               |            |                  |       |                       |          |                  |
| DNS addresses                           | 172.16.31.6; 172.16.31.7   |            |                  |       |                       |          |                  |
| DNS suffixes                            | vslab.local                |            |                  |       |                       |          |                  |
| Primary WINS server                     |                            |            |                  |       |                       |          |                  |
| Secondary WINS server                   |                            |            |                  |       |                       |          |                  |

#### FIGURE 108. Network Mapping Between Site A and VMware Cloud on AWS for Planned Recovery Use Case

The network mapping for protected site private interconnect network **APPS-1605** to recovery site **Recovery Network Oracle Private** is as shown below. The recovery site test network is **Oracle Private**.

| Network Mappings                     |                               |                      |        |                      |          |                  |
|--------------------------------------|-------------------------------|----------------------|--------|----------------------|----------|------------------|
| sc2wvc03.vslab.local vcenter.sddc    | -44-232-220-144.vmwarevmc.com |                      |        |                      |          |                  |
| NEW EDIT DELETE CREATE RE            | EVERSE MAPPING                |                      |        |                      |          |                  |
| sc2wvc03.vslab.local                 |                               | ↑ ▼ Recovery Network | Ŧ      | Reverse Mapping      | Ŧ        | Test Network     |
| 🔽 🖉 APPS-1605                        |                               | 😕 Oracle Private     |        | Yes                  |          | 🐣 Oracle Private |
| 🗌 🛛 📥 APPS-1614                      |                               | 🐣 Apps Team 01       |        | Yes                  |          | ଌ Apps Team 01   |
| ✓ 1 []] EXPORT ~                     |                               |                      |        |                      |          |                  |
| IP Customization                     |                               |                      |        |                      |          |                  |
| Site                                 | sc2wvc03.vslab.local          |                      | vcen   | ler.sddc-44-232-220- | 144.vmwa | irevmc.com       |
| Network                              | APPS-1605                     |                      | Orac   | le Private           |          |                  |
| Subnet                               | 172.16.5.0                    |                      | 192.16 | 68.14.0              |          |                  |
| Subnet mask                          | 255.255.255.0                 |                      | 255.2  | 255.255.0            |          |                  |
| Range start                          | 172.16.5.0                    |                      | 192.16 | 68.14.0              |          |                  |
| Range end                            | 172.16.5.255                  |                      | 192.16 | 68.14.255            |          |                  |
| Network settings to be applied to th | e recovery site network       |                      |        |                      |          |                  |
| Gateway                              |                               |                      |        |                      |          |                  |
| DNS addresses                        | 172.16.31.6; 172.16.31.7      |                      |        |                      |          |                  |
| DNS suffixes                         | vslab.local                   |                      |        |                      |          |                  |
| Primary WINS server                  |                               |                      |        |                      |          |                  |
| Secondary WINS server                |                               |                      |        |                      |          |                  |

FIGURE 109. Network Mapping Between Site A and VMware Cloud on AWS For Test Recovery Use Case



The network mapping for recovery site **Public Network Apps Team 01** to protected site **Recovery Network APPS-1614** is as shown below. The recovery site test network is **APPS-1614**.

| Network Mappings                                   |                         |                               |                     |              |                        |
|--|-------------------------|-------------------------------|---------------------|--------------|------------------------|
| sc2wvc03.vslab.local vcenter.sddc-44-232-220-14    | 4.vmwarevmc.com         |                               |                     |              |                        |
| NEW EDIT DELETE CREATE REVERSE MAPPING             | ]                       |                               |                     |              |                        |
| vcenter.sddc-44-232-220-144.vmwarevmc.com          | 1 T Reco                | very Network T                | Reverse Mapping 🛛 🕆 | Test Network |                        |
| 🗹 🛛 🖉 Apps Team 01                                 | ۵ ا                     | APPS-1614                     | Yes                 | APPS-1614    |                        |
| 🗌   💩 Oracle Private                               | 😤 #                     | 4PPS-1605                     | Yes                 | APPS-1605    |                        |
|  |                         |                               |                     |              |                        |
| 2 1 EXPORT >                                       |                         |                               |                     |              |                        |
| IP Customization                                   |                         |                               |                     |              |                        |
| Cita   | vegenter oddo 44.02     | 2 220 144 vmwarovms.com       |                     |              | Iccol delay \$0aure?aa |
| Natwork  | Apps Team 01            | :-220-144.VIIIWareVIIIC.COIII |                     |              | ADDS-1614              |
| Subnet   | 172 16 115 0            |                               |                     |              | 172 16 14 0            |
| Subnet mask  | 255.255.255.0           |                               |                     |              | 255,255,255,0          |
| Range start  | 172.16.115.0            |                               |                     |              | 172.16.14.0            |
| Range end  | 172.16.115.255          |                               |                     |              | 172.16.14.255          |
|  |                         |                               |                     |              |                        |
| Network settings to be applied to the recovery sit | te network              |                               |                     |              |                        |
| Gateway  | 172.16.14.1             |                               |                     |              |                        |
| DNS addresses                                      | 172.16.31.6; 172.16.31. | 7                             |                     |              |                        |
| DNS suffixes                                       | vslab.local             |                               |                     |              |                        |
| Primary WINS server                                |                         |                               |                     |              |                        |
| Secondary WINS server                              |                         |                               |                     |              |                        |

#### FIGURE 110. Network Mapping Between VMware Cloud on AWS and Site A for Planned Recovery Use Case

The network mapping for recovery site private network **Oracle Private** to protected site **Recovery Network APPS-1605** is as shown below. The recovery site test network is **APPS-1605**.

| Network Mappings                                      |   |                     |                |                  |                      |
|---|---|---------------------|----------------|------------------|----------------------|
| sc2wvc03.vslab.local vcenter.sddc-44-232-220-144.v    | vmwarevmc.com                             |                     |                |                  |                      |
| NEW EDIT DELETE CREATE REVERSE MAPPING                |   |                     |                |                  |                      |
| vcenter.sddc-44-232-220-144.vmwarevmc.com             | ↑ y Recovery Network y                    | Reverse Mapping 🛛 👻 | Test Network T | IP Customization |                      |
| 🗌 🛛 🕭 Apps Team 01                                    | 🚔 APPS-1614                               | Yes                 | APPS-1614      | Yes              |                      |
| 🕑 🕹 Oracle Private                                    | APPS-1605                                 | Yes                 | APPS-1605      | Yes              |                      |
|   |   |                     |                |                  |                      |
| 2 1 1 EXPORT ~  |   |                     |                |                  |                      |
| IP Customization                                      |   |                     |                |                  |                      |
| Site  | vcenter.sddc-44-232-220-144.vmwarevmc.com |                     |                |                  | sc2wvc03.vslab.local |
| Network   | Oracle Private                            |                     |                |                  | APPS-1605            |
| Subnet  | 192.168.14.0                              |                     |                |                  | 172.16.5.0           |
| Subnet mask   | 255.255.255.0                             |                     |                |                  | 255.255.255.0        |
| Range start   | 192.168.14.0                              |                     |                |                  | 172.16.5.0           |
| Range end   | 192.168.14.255                            |                     |                |                  | 172.16.5.255         |
| Network settings to be applied to the recovery site r | network                                   |                     |                |                  |                      |
| Gateway   |   |                     |                |                  |                      |
| DNS addresses   | 172.16.31.6; 172.16.31.7                  |                     |                |                  |                      |
| DNS suffixes  | vslab.local                               |                     |                |                  |                      |
| Primary WINS server                                   |   |                     |                |                  |                      |
| Secondary WINS server                                 |   |                     |                |                  |                      |

FIGURE 111. Network Mapping Between VMware Cloud on AWS and Site A for Test Recovery Use Case



The folder mapping from Site A to VMware Cloud on AWS is as shown below:

| Folder Mappings      |                                |   |             |                        |
|----------------------|--------------------------------|---|-------------|------------------------|
| sc2wvc03.vslab.local | vcenter.sddc-44-232-220-144.vn | nwarevmc.com                              |             |                        |
| NEW                  |                                |   |             |                        |
| sc2wvc03.vslab.local | ↑ ▼                            | vcenter.sddc-44-232-220-144.vmwarevmc.com | т           | Reverse Mapping Exists |
| 🔲 🗖 Oracle           |                                | C Workloads                               | <b>b</b> == | Yes                    |

FIGURE 112. Folder Mappings from Site A to VMware Cloud on AWS

Folder mapping from VMware Cloud on AWS to Site A is as shown below:

| Folder Mappings                           |                          |                          |
|---|--------------------------|--------------------------|
| sc2wvc03.vslab.local vcenter.sddc-44-232- | 220-144.vmwarevmc.com    |                          |
| NEW                                       |                          |                          |
| vcenter.sddc-44-232-220-144.vmwarevmc.com | ↑ ▼ sc2wvc03.vslab.local | ▼ Reverse Mapping Exists |
| U Workloads                               | ि Oracle                 | Yes                      |

FIGURE 113. Folder Mappings from VMware Cloud on AWS to Site A

Resource mapping from Site A to VMware Cloud on AWS is as shown below:

| Resource Mappir      | ngs  |                        |
|----------------------|--|------------------------|
| sc2wvc03.vslab.local | vcenter.sddc-44-232-220-144.vmwarevmc.com    |                        |
| NEW                  |  |                        |
| sc2wvc03.vslab.local | ↑ ▼ vcenter.sddc-44-232-220-144.vmwarevmc.cd | om 🛛 🛉 Reverse Mapping |
| 🗌   🖉 Oracle-RP      | Compute-ResourcePool                         | Yes                    |

#### FIGURE 114. Resource Mappings from Site A to VMware Cloud on AWS

The Resource mapping from VMware Cloud on AWS to Site A is as shown below:

| Resource Mappir        | ngs                 |            |                      |   |                 |
|------------------------|---------------------|------------|----------------------|---|-----------------|
| sc2wvc03.vslab.local   | vcenter.sddc-44-23  | 2-220-144. | /mwarevmc.com        |   |                 |
| NEW                    |                     |            |                      |   |                 |
| vcenter.sddc-44-232-22 | 0-144.vmwarevmc.com | Υ Τ        | sc2wvc03.vslab.local | Ŧ | Reverse Mapping |
| 🗌   🖉 Compute-Resour   | cePool              |            | 🕖 Oracle-RP          |   | Yes             |





The placeholder datastore mapping between Site A and Site B is as shown below. The placeholder datastore on the recovery site is used by Site Recovery Manager to store placeholder VMs.

| Placeholder Data     | stores                               |  |
|----------------------|--------------------------------------|--|
| sc2wvc03.vslab.local | vcenter.sddc-44-232-220-144.vmwarevr | nc.com   |
| NEW                  |                                      |  |
| Name                 | ↑ <b>т</b>                           | Host/Cluster   |
| -   🗐 HPC02          |                                      | GPU4, BCA3, GPU2, GPU1, HPC3   |
| 🗌 🛛 🗐 OraTintri      |                                      | BCA-SiteC, BCA-Intel (Reserved)  |
| SC2-TINTRI-EC60      | 90                                   | BCA-SiteC, Legacy Management, GPU4, BCA-Intel (Reserved), GPU2, GPU1, BCA3 |
| 🗌   🗐 SPARKO1        |                                      | BCA3, GPU4   |

#### FIGURE 116. Placeholder Datastore Mappings from Site A to VMware Cloud on AWS

| Placeholder Datastores |   |  |  |  |  |  |
|------------------------|---|--|--|--|--|--|
| sc2wvc03.vslab.local   | vcenter.sddc-44-232-220-144.vmwarevmc.com |  |  |  |  |  |
| NEW                    |   |  |  |  |  |  |
| Name                   | ↑ ▼ Host/Cluster                          |  |  |  |  |  |
| 📃 🛛 🗐 vsanDatastore    | Cluster-1                                 |  |  |  |  |  |

FIGURE 117. Placeholder Datastore Mappings from VMware Cloud on AWS and Site B

The graphic below illustrates vSphere Replication setup between on-premises Site A and VMware Cloud on AWS.

| Replication Servers  |                |
|--|----------------|
| sc2wvc03.vslab.local     vcenter.sddc-44-232-220-144.vmwarevmc.com       REGISTER     UNREGISTER     RECONNECT     CONFIGURE |                |
| Replication Server 🔨 🝸 Domain Name / IP 🝸 Status   | ▼ Replications |
| ● 🗍 VRSC2DC01 (embedded) VRSC2DC01.vslab.local 🔍 Connected   | 0              |

FIGURE 118. SITE A: Replication Server Details

| Replication Servers    | 5                              |               |              |
|------------------------|--------------------------------|---------------|--------------|
| sc2wvc03.vslab.local v | center.sddc-44-232-220-144.vmw | arevmc.com    |              |
| REGISTER UNREGISTER    | RECONNECT CONFIGURE            |               |              |
| Replication Server     | 1P                             | ▼ Status      | Replications |
| 💿 🗌 vr (embedded)      | vr.sddc-44-232-220-144         | I 🔌 Connected | 2            |

FIGURE 119. VMware Cloud on AWS Replication Server Details

| COMPONENT                        | SOURCE SITE | APPLIANCE              | DESTINATION SITE    | APPLIANCE                                 |
|----------------------------------|-------------|------------------------|---------------------|---|
| SRM Appliance                    | Site A      | SRMSC2DC03.vslab.local | VMware Cloud on AWS | srm.sddc-44-232-220-144.<br>vmwarevmc.com |
| IP Address                       |             | 172.16.31.149          |                     | 10.129.224.24                             |
|                                  |             |                        |                     |   |
| vSphere Replication<br>Appliance | Site A      | VRSC2DC01.vslab.local  | VMware Cloud on AWS | vr.sddc-44-232-220-144.<br>vmwarevmc.com  |
| IP Address                       |             | 172.16.31.144          |                     | 10.129.224.23                             |

Site Recovery Manager and Sphere Replication pairings and IP addresses for Site A and VMware Cloud on AWS are as shown below:

#### TABLE 11. vSphere Replication Network Pairing Details

Setup of Site Recovery Manager and vSphere Replication is beyond the scope of this paper.

The steps to set up replication between Site A and VMware Cloud on AWS are the same as those required to set up replication between Site A and Site B.

To enable site recovery on VMware Cloud in an AWS SDDC environment that uses VMware NSX-T, firewall rules must be created between on-premises and VMware Cloud on AWS management gateway. After the initial firewall rules configuration, one can add, edit or delete any rules as needed. *Learn more about firewall rules*.

After setup is complete, vSphere Replication will automatically seed the source data to target as baseline first OR we can force a sync.

#### sc2wvc03.vslab.local → @ vcenter.sddc-44-232-220-144.vmwarevmc.com

| NEW |  |  |  |   |   |            |   |   |                     |                   |
|-----|--|--|--|---|---|------------|---|---|---------------------|-------------------|
|     | Virtual Machine 🔹 🕆 🔻  | Status   |  |   | т | RPO        | т | Target T                                    | Replication Serve y | Protection Group  |
|     | Dracle19c-OL8  | 🗸 ОК   |  |   |   | 10 minutes |   | n vcenter.sddc-44-232-220-144.vmwarevmc.com | Vr Vr               | SC2-VMC-SRM-VR-PG |
|     | Configured disks:<br>Auto-epilcate new disks<br>Managed by:<br>Ouliescing:<br>Network compression:<br>Encryption:<br>Datastore:<br>Storage policy: | 5 of 5<br>Enabled<br>SRM<br>Disabled<br>Disabled<br>Disabled<br>WorkloadDatastore<br>Datastore Default | Last instance sync point:<br>Last sync duration:<br>Last sync size:<br>Lag time:<br>RPO:<br>Points in time:<br>Replica disk usage: | Aug 3, 2021, 1:21:37 PM<br>2 seconds<br>2:38 MB<br>52 seconds<br>10 minutes<br>Disabled<br>II 141.22 GB |   |            |   |   |                     |                   |
| •   | Dracle19c-OL8-RMAN   | 🗸 ОК   |  |   |   | 10 minutes |   | vcenter.sddc-44-232-220-144.vmwarevmc.com   | Vr Vr               | SC2-VMC-SRM-VR-PG |
|     | Configured disks:<br>Auto-replicate new disks<br>Managed by:<br>Quiescing:<br>Network compression:<br>Encryption:<br>Datastore:<br>Storage policy: | 5 of 5<br>Enabled<br>SRM<br>Disabled<br>Disabled<br>WorkloadDatastore<br>Patastore Default             | Last instance sync point:<br>Last sync duration:<br>Last sync size:<br>Lag time:<br>RPO:<br>Points in time:<br>Replica disk usage: | Aug 3, 2021, 1:22:06 PM<br>2 seconds<br>8:19 MB<br>25 seconds<br>10 minutes<br>Disabled<br>170.34 GB    |   |            |   |   |                     |                   |

FIGURE 120. vSphere Replication Source Data Seeding

The protection group and VMs are as shown below:

| © SC2-VMC-SR  | M-VR-PG EDIT MOVE DELETE   |                              |                   |                                  |
|---|--|------------------------------|-------------------|----------------------------------|
| Summary Issues  | Permissions Recovery Plans Virtual Machines  |                              |                   |                                  |
| Pr<br>Pr<br>Pr<br>Pr<br>Pr<br>Pr<br>Pr<br>Pr<br>Pr<br>Pr<br>Pr<br>Pr<br>Pr<br>P | StateLion Group:         SC2-VMC-SRM-VR-PG           section Type:         lexhedual VMs (vSphere Replication)           sected Rise:         Primmy-SRe           corrupt Site:         VMC-DB-Site           corpliance:         VMC-DB-Site |                              |                   |                                  |
| ✓ Protection Group Det  | ails   |                              |                   |                                  |
| Status:   | ок   |                              |                   |                                  |
| ✓ Virtual Machines:   | 2  |                              |                   |                                  |
| Configured  | 2  |                              |                   |                                  |
| Not Configured  | 0  |                              |                   |                                  |
|   |  |                              |                   |                                  |
|   | SC2-VMC-SRM-VR-PG  | DIT MOVE DELETE              |                   |                                  |
|   | Summary Issues Permissions Rec   | overy Plans Virtual Machines |                   |                                  |
|   | RESTORE ALL PLACEHOLDER VMS CONFIGUR   | e all vms                    |                   |                                  |
|   | Virtual Machine 🔨 🔻 Protection St  | at 🝸 Recovery Resource Pool  | T Recovery Host T | Recovery Fold 🔻 Recovery Network |
|   | 🗌 🗄 Oracle19c-OL8 🔮 OK   | Ø Compute-ResourcePool       | 10.129.32.4       | 🗂 Workloads 🚡 父 Apps Team 01     |
|   | 🗌 🖹 Oracle19c-OL8-RMAN 🛛 🤡 OK  | Compute-ResourcePool         | 10.129.32.5       | 🗂 Workloads 🧱 🍚 Apps Team 01     |

FIGURE 121. Site A Protection Group and Virtual Machines

The recovery plan is as shown below:

| Recovery Plan     | S                           |                        |                |                          |
|-------------------|-----------------------------|------------------------|----------------|--------------------------|
| NEW EDIT M        | IOVE DELETE TES             | T CLEANUP RUN          |                |                          |
| Name              | ↑ 🔻 Status                  | T Protected Site       | т              | Recovery Site            |
| 💿 🗌 🗉 SC2-VMC-Ora | acle-RP $\rightarrow$ Ready | Primary-Site           |                | VMC-DR-Site              |
|                   |                             |                        |                |                          |
|                   |                             | SC2-VMC-Oracle-R       |                | DELETE TEST CLEAN        |
|                   |                             | Summary Recovery Steps | Issues History | Permissions Protection ( |

| EXPORT STEPS TEST CLEANUP R                  | UN REPROTECT CANCEL |                         |                |
|--|---------------------|-------------------------|----------------|
| Plan status:                                 | → Ready             |                         |                |
| Description:                                 | This plan is rea    | dy for test or recovery |                |
| Recovery Step                                | Status              | Step Started            | Step Completed |
| > 🔄 1. Synchronize storage                   |                     |                         |                |
| 🖪 2. Restore recovery site hosts from standb | y.                  |                         |                |
| 3. Suspend non-critical VMs at recovery sit  | e                   |                         |                |
| > 🚱 4. Create writable storage snapshot      |                     |                         |                |
| > 🚱 5. Configure test networks               |                     |                         |                |
| 1 6. Power on priority 1 VMs                 |                     |                         |                |
| 2 7. Power on priority 2 VMs                 |                     |                         |                |
| √ 3 8. Power on priority 3 VMs               |                     |                         |                |
| > 8.1. Oracle19c-OL8-RMAN                    |                     |                         |                |
| > 8.2. Oracle19c-OL8                         |                     |                         |                |
|  |                     |                         |                |



As mentioned before, vSphere Replication 8.4 cannot replicate VMs that share VMDK files. This limitation can be found in *VMware vSphere Replication 8.4 Release Notes*.

### VMware Cloud Disaster Recovery

The illustration below shows VMware Cloud Disaster Recovery setup between Site A and VMware Cloud on AWS.

The dashboard for VMware Cloud Disaster Recovery is as shown below. Using VMware Cloud Disaster Recovery with VMware Cloud on AWS, the recovery SDDC is already provisioned and configured.

Setting up the recovery SDDC is beyond the scope of this paper. Learn more about *Deploying a Recovery SDDC*.

| vmw VMware Cloud DR   | Dashboard   | Sites Protection                            | groups DR pla | ns Monitor         |                       |                      |  |  |
|---|---|---|---------------|--------------------|-----------------------|----------------------|--|--|
| Dashboard   |   |   |               |                    |                       |                      |  |  |
| Welcome to VMwa   | are Clou  | ud Disaster                                 | Recover       | У                  |                       | Hide ×               |  |  |
| VMware Cloud DR is VMware's easy-to-use, on-demand disaster recovery service,<br>delivered as SaaS, with cloud economics. |   |   |               |                    |                       |                      |  |  |
| System health Cloud back  | up<br>1.8 TiB<br>Calculated every 121   | Protected s                                 | ites<br>P 2   | Recovery SDDC      | Protected VMs         | DR plans             |  |  |
| Sites   |   |   | Topology      |                    |                       |                      |  |  |
| Cloud Backup (Oregon) (   | <ul> <li>         1.8 те      </li> <li>         1 v      </li> <li>         1 v      </li> </ul> | a backup size<br>rCenter<br>connector       |               | Data Center Site 1 | Cloud Backup (Gregon) | OF                   |  |  |
| Data Center Site 1     OR-SDDC ()   | 1     ν       2     c       2     c       2     c       2     c       20.7     πε                 | rCenter<br>connectors<br>nosts<br>8 storage |               |                    | s                     | ite A - SC2 - Oracle |  |  |

FIGURE 123. VMware Cloud Disaster Recovery Dashboard

Cloud backup (Oregon) is as shown below:

| vmw VMware Cloud DR   | Dashboard                     | Sites Protection groups  | DR plans   | Monitor |   |   |                       |                       |
|-----------------------|-------------------------------|--|------------|---------|---|---|-----------------------|-----------------------|
| Sites                 | Cloud file systems            | Protected sites Recovery Si  | DDC        |         |   |   | Deploy nev            | v cloud file systen   |
| Cloud Backup (Oregon) | Cloud  <br>Details            | Backup (Oregon)  |            |         | Protection  |   |                       | ≡⊷                    |
|                       | AWS<br>Availabili<br>Capacity | 3 region US West (Oregon)<br>ity zone usw2-az1                                     |            |         | Protected VMs                                       | Snapshots<br>Group snaps<br>403<br>(1983 total V  | shots<br>/M snapshots |                       |
|                       | Protect                       | ed capacity           1.8 TiB           Calculated every 12h           um capacity |            |         | 29%<br>291 vCenter VMs<br>27 in groups              |   |                       |                       |
|                       |                               | O.1%<br>Used   |            |         | Name -<br>Applications<br>Desktop                   | Site<br>Data Center Site 1<br>Data Center Site 1  | VMs<br>10<br>3        | Snaps<br>89<br>55     |
|                       | On-prem                       | d sites<br>1 vSphere VMware Cir<br>2 D   | oud on AWS |         | Script VMs<br>Test VMs<br>Users<br>VCDR - Oracle PG | Data Center Site 1<br>Data Center Site 1<br>Data Center Site 1<br>Site A - SC2 - Oracle | 2<br>10<br>3<br>e 2   | 49<br>31<br>162<br>17 |
|                       | Paired re                     | ecovery SDDC   |            |         |   |   | Create protect        | lion group            |

FIGURE 124. VMware Cloud Disaster Recovery Cloud Backup

On the recovery VMware Cloud on AWS SDDC, there are tree datastores. Datastore **ds01** is scale-out cloud file system (SCFS) storage mounted as an NFS datastore on the recovery VMware Cloud on AWS SDDC. This datastore should only be used by VMware Cloud DR.

| ()) & e e                                     | B SDDC-Datacenter ACTIONS ∨  |                                       |
|---|--|---------------------------------------|
| V @ vcenter.sddc-44-229-154-128.vmwarevmc.com | Summary Monitor Configure Permissions Hosts & Clusters VMs   | Datastores Networks                   |
| ✓ I SDDC-Datacenter ☐ ds01                    | Datastore Datastore Clusters Datastore Folders   |                                       |
| vsanDatastore                                 |  |                                       |
| WorkloadDatastore                             |  |                                       |
|   | Name V Status V Type V Datastore C   | ✓ Capacity ✓ Free                     |
|   | ds01 Vormal NFS 3  | 105.4 TB 105.03 TB                    |
|   | 🗟 vsanDatastore 🗸 Normal vSAN  | 20.74 TB 14.65 TB                     |
|   | B WorkloadDatastore V Normal VSAN  | 20.74 TB 14.65 TB                     |
|   | Image: Subscription     Image: Subscription       Image: Subscription     Summary       Monitor     Configure       Permissions  | Files Hosts VMs                       |
|   | SDDC-batacenter       Type:       NFS 3         Image: state store       URL:       ds:///vmfs/volumes/4b1e188e-f15t         Image: state store       Image: state store         Image: state store       Image: state store | b516f/                                |
|   | Details  |                                       |
|   | Location   | ds:///vmfs/volumes/4b1e188e-f15b516f/ |
|   | Туре   | NFS 3                                 |
|   | Hosts  | 2                                     |
|   | Virtual machines   | 2                                     |
|   | VM templates   | 0                                     |
|   | Server   | 10.2.127.254                          |
|   | Folder   | /ext_ds_01/ds01                       |

FIGURE 125. VMware Cloud Disaster Recovery SCFS Storage

The vsanDatastore and WorkloadDatastore are part of the basic VMware Cloud on AWS storage.

The protected site **Site A - SC2 – Oracle** is as shown below:

| vmw VMware Cloud DR   | Dashboard Si          | tes Protect   | tion groups | DR plans | Monitor |  |                                  |
|-----------------------|-----------------------|---------------|-------------|----------|---------|--|----------------------------------|
| Sites                 | Cloud file systems Pr | otected sites | Recovery S  | SDDC     |         |  | Deploy new cloud file systemetry |
| Site A - SC2 - Oracle | Site A - So           | 02 - Oracle   |             |          |         |  | ≡⊷                               |
| 오 Data Center Site 1  | Connectors            |               |             |          |         | Protection                               |                                  |
|                       | 🗸 DRC                 |               | 172.16.14   | 1.220    |         | Protected VMs                            | VM snapshots                     |
|                       |                       |               |             | De       | bloy    |  |                                  |
|                       | vCenters              |               |             |          |         | 1%                                       | 34                               |
|                       |                       |               |             |          |         |  |                                  |
|                       | <b>172.18.1</b>       | 1.76          |             |          |         | 2 VMs in groups<br>254 total vCenter VMs |                                  |
|                       |                       |               |             | Register | vCenter |  |                                  |
|                       | Cloud backu           | o target      |             |          |         | Protection groups                        |                                  |
|                       |                       |               |             |          |         | Protection group 🔺                       |                                  |
|                       | Cloud                 | Backup (Orego | on)         |          |         | VCDR - Oracle PG                         |                                  |
|                       |                       |               |             |          |         |  | Create protection group          |

FIGURE 126. VMware Cloud Disaster Recovery Protected Site

The DRaaS connector appliance is deployed on protected Site A with IP address 172.16.14.220 as shown below:

| 🗟 da-drc-Releas   | e     |   |                              | ۲¢  | ACTIONS   | ~  |  |                         |                |        |
|---|-------|---|------------------------------|---|---|--|--|-------------------------|----------------|--------|
| Summary Monitor   | Confi | gure P  | ermiss                       | ions  | Datastore   | es   | Networks                                     | Snapshot                | s Update       | s      |
| And a set of the second s | ١     | Guest OS:<br>Compatibi<br>VMware T<br>DNS Name<br>IP Address<br>Host: | lity:<br>ools:<br>e:<br>ses: | Other<br>ESXi 6<br>Runnir<br>MORE<br>vcdr_(<br>172.16<br>VIEW<br>sc2es) | 4.x or later Li<br>.5 and later ('<br>ng, version:21<br>INFO<br>20:50:56:80:8<br>14.220<br>ALL 2 IP ADDR<br>(10.vslab.loca) | inux (<br>VM ve<br>4748:<br>Ba:ab<br>Ba:ab | (64-bit)<br>ersion 13)<br>3647 (Guest M<br>S | anaged)                 |                |        |
| VM Hardware   |       |   |                              |   |   |  |  |                         |                | ^      |
| > CPU   |       |   |                              | 8   | CPU(s)  |  |  |                         |                |        |
| > Memory  |       |   |                              |   | 12 GB, 1.08 G   | B me                                       | emory active                                 |                         |                |        |
| > Hard disk 1   |       |   |                              | 10  | 0 GB  |  |  |                         |                |        |
| > Network adapter 1   |       |   |                              | AF  | PPS-1614 (con   | necte                                      | ed)  |                         |                |        |
| > CD/DVD drive 1  |       |   |                              | Co  | onnected  |  |  |                         |                | -@- ~  |
| > Video card  |       |   |                              | 4   | MB  |  |  |                         |                |        |
| VMCI device   |       |   |                              | De<br>vir   | evice on the v<br>tual machine  | rirtual<br>comr                            | I machine PCI<br>munication inte             | bus that prov<br>erface | ides support f | or the |
| > Other   |       |   |                              | Ad  | ditional Hard   | ware                                       |  |                         |                |        |
| Compatibility   |       |   |                              | ES  | Xi 6.5 and lat  | er (V                                      | M version 13)                                |                         |                |        |
|   |       |   |                              |   |   |  |  |                         |                |        |

FIGURE 127. Site A: DRaaS Connector Appliance

The protection group **VCDR - Oracle PG** is created as shown below:

| vmw VMware Cloud DR | Dashboard  | Sites            | Protection groups      | DR plans         | Monitor  |             |  |                                       |
|---------------------|--|------------------|------------------------|------------------|----------|-------------|--|---------------------------------------|
| Protection groups   |  |                  |                        |                  |          |             |  |                                       |
| Protection groups   |  |                  |                        |                  |          |             |  | Create protection group               |
| Protection group -  | Site name  | Site type        |                        | Replicates to    |          | Health      | Schedule                               |                                       |
| VCDR - Oracle PG    | Site A - SC2 - Oracle  | On-prem          | site                   | Cloud Backup (Or | egon)    | OK          | Active                                 |                                       |
|                     | www.VMware Cloud DR  | Da               | shboard Sites          | Protection group | s DR pla | ans Monitor |  |                                       |
| ×<br><'             | VCDR - Oracle PG   |                  |                        |                  |          |             |  |                                       |
|                     | Group details  |                  | Membership             |                  |          |             | Schedule                               |                                       |
|                     | Snapshots 17<br>Schedule Active<br>Health OK<br>Site Site A - SC2 - Oracle |                  | VM name pattern Or     | racle19c-OL8*    |          |             | Every 4 hours: snapshot every for week | ur hours starting at 12:00 AM. Retain |
|                     | Snapshots  |                  |                        |                  |          |             |  | Delete                                |
|                     | Name   |                  | Taken time             | stamp            | Includes |             | Total size                             | Expiration                            |
|                     | O VCDR - Oracle PG - Every 4 ho  | urs - 2021-07-19 | 0T03:00 UTC Jul-18-202 | 1 08:00 pm       | 2 VMs    |             | 147.2 GiB                              | Jul-25-2021 08:00 pm                  |
|                     | O VCDR - Oracle PG - Every 4 hor   | urs - 2021-07-18 | 3T23:00 UTC Jul-18-202 | 1 04:01 pm       | 2 VMs    |             | 147.1 GiB                              | Jul-25-2021 04:01 pm                  |
|                     | O VCDR - Oracle PG - Every 4 hor   | urs - 2021-07-18 | 3T19:00 UTC Jul-18-202 | 1 12:01 pm       | 2 VMs    |             | 147.1 GiB                              | Jul-25-2021 12:01 pm                  |
|                     | O VCDR - Oracle PG - Every 4 hor   | urs - 2021-07-18 | 3T15:00 UTC Jul-18-202 | 1 08:00 am       | 2 VMs    |             | 147 GiB                                | Jul-25-2021 08:00 am                  |
|                     | O VCDR - Oracle PG - Every 4 hor   | urs - 2021-07-18 | 3T11:00 UTC Jul-18-202 | 1 04:01 am       | 2 VMs    |             | 147 GiB                                | Jul-25-2021 04:01 am                  |
|                     | O VCDR - Oracle PG - Every 4 bo  | urs - 2021-07-18 | TO7:00 UTC Jul-18-202  | 1.12·01.am       | 2 VMs    |             | 147 GIB                                | Jul-25-202112:01 am                   |

FIGURE 128. Site A VMware Cloud DR Protection Group

The protection group VCDR - Oracle PG details with VMs Oracle19c-OL8 and Oracle19c-OL8-RMAN is as shown below:

| Edit site protection gro                 | up -                          |                          |                             |             | ×                         |           |             |                    |
|--|-------------------------------|--------------------------|-----------------------------|-------------|---------------------------|-----------|-------------|--------------------|
| → General                                | Protection group name         |                          |                             |             | Preview VMs               |           |             | ×                  |
| <ul> <li>Protection schedules</li> </ul> | VCDR - Oracle PG              |                          |                             |             | Previewing VMs matching a | any query |             |                    |
|  | Protected site                | vCenter                  | Cloud backup                |             | VM name •                 | Cluster   | Datastore   | State              |
| $\langle \rangle$                        | Site A - SC2 - Oracle         | 170 10 11 76             | Cloud Backup (              | (regon)     | 🗗 Oracle19c-OL8           | BCA-SiteC | OraSC2      | On                 |
|  | B SILE A - SC2 - Olacle       | 1/2.18.11.70             | elega paerap (              | , regen,    | Oracle19c-OL8-RMAN        | BCA-SiteC | OraSC2      | On                 |
|  | VM name pattern               |                          |                             |             |                           |           |             | 2 virtual machines |
|  | VM name pattern Orac          | le19c-OL8*               |                             |             |                           |           |             | 2 Virtual machines |
|  |                               |                          |                             |             |                           |           |             | ок                 |
|  | Excluding                     |                          |                             |             |                           |           |             |                    |
|  | Use *                         | as wildcard, comma to se | parate patterns. VM pattern | ips         |                           |           |             |                    |
|  |                               |                          |                             |             |                           |           |             |                    |
|  | Add vCenter query 🗸           | Preview VMs              |                             |             |                           |           |             |                    |
|  | The queries are evaluated wit | h vCenter whenever a ne  | w snapshot is taken.        |             |                           |           |             |                    |
|  |                               |                          |                             |             |                           |           |             |                    |
|  | Edit sit                      | e protection grou        | p -                         |             |                           |           |             | ×                  |
|  | ✓ General                     | al                       | Protection schedule         | es          |                           |           |             |                    |
|  | → Protec                      | tion schedules           | Every 4 hours               |             |                           |           |             |                    |
|  |                               |                          | Take snapshots              | Starting at |                           | Keep sna  | apshots for |                    |
|  |                               |                          | Every 4 hours               | 12 AM -     | - 00                      | 1         | weeks       | .) ×               |
|  |                               |                          |                             |             | .00 1                     | ·         | Weeks 4     |                    |
|  |                               |                          |                             |             |                           |           |             |                    |
|  |                               |                          | New schedule                |             |                           |           |             |                    |

FIGURE 129. SITE A: VMware Cloud DR Protection Group and Protected VMs

# 

Details of snapshot VCDR - Oracle PG - Every 4 hours - 2021-07-19T03:00 UTC are as shown below for VMs Oracle19c-OL8 and Oracle19c-OL8-RMAN:

### VCDR - Oracle PG - Every 4 hours - 2021-07-19T03:00 UTC

| Snapshot details   |  |       |     |
|--|--|-------|-----|
| Taken timestamp Jul-18-2021 08:00 pm (16h ago)<br>Expiration Jul-25-2021 08:00 pm (in 6d)<br>Origin Cloud Backup (Oregon)<br>Trigger Automatic<br>Sita Site A - SC2 - Oracle | Group VCDR - Oracle PG<br>Includes 2 VMs<br>Total size 147.2 сів |       |     |
| Virtual machines   |  |       |     |
| Name   | Origin vCenter   |       |     |
| 🗗 Oracle19c-OL8  | 172.18.11.76   | Resto | ore |
| Dracle19c-OL8-RMAN   | 172.18.11.76   | Resto | ore |

FIGURE 130. VMware Cloud DR Protection Group Snapshots Details

The snapshot can also be viewed on the protected site **Site A - SC2 – Oracle**. This snapshot is temporary during the protection group cycle and will be removed as soon as the changed block data has been successfully replicated to the SCFS.

The snapshot of VM **Oracle19c-OL8** is as shown below:

| ট Oracle19c-OL8 🛛 🖻 🗟 🕼 🔹 actions 🗸   |  |  |
|---|--|--|
| Summary Monitor Configure Permissions Datastores Networks Snapshots Updates |  |  |
| TAKE SNAPSHOT TREVERT EDIT DELETE DELETE ALL                                |  |  |
|   | Name                                     | vcdr-internal-snap-ad26ad24-d9ed-460e-9da1-03917a440c9<br>3  |
|   | Description                              | Temporary snapshot taken by VMware Cloud DR as part of a<br>backup operation. It will be automatically deleted when the<br>backup task finishes. Do NOT delete manually. |
|   | Timestamp                                | 7/20/21, 8:15 AM   |
|   | Size                                     | 66.49 GB   |
|   | Snapshot the virtual<br>machine's memory | No   |
|   | Quiesce guest file<br>system             | No   |
|   |  |  |

FIGURE 131. Site A: Protected VM Oracle19c-OL8 Snapshots Details

The snapshot of VM Oracle19c-OL8-RMAN is as shown below:

| Cracle19C-OL8-RMAN D  Configure Permissions Datastores Networks Snapshots Updates  TAKE SNAPSHOT  REVERT EDIT DELETE DELETE ALL |  |  |
|---|--|--|
| 🕼 vcdr-internal-snap-6889325f-4c64-4351-a205-cb80a9ba41ad   | Name                                     | vcdr-internal-snap-6889325f-4c64-4351-a2O5-cb80a9ba41ad  |
| You are here  | Description                              | Temporary snapshot taken by VMware Cloud DR as part of a<br>backup operation. It will be automatically deleted when the<br>backup task finishes. Do NOT delete manually. |
|   | Timestamp                                | 7/20/21, 8:17 AM   |
|   | Size                                     | 80.99 GB   |
|   | Snapshot the virtual<br>machine's memory | No   |
|   | Quiesce guest file<br>system             | No   |
|   |  |  |

FIGURE 132. Site A: Protected VM Oracle19c-OL8-RMAN Snapshots Details

The recovery SDDC **DR-SDDC** is as shown below:

The network mapping port groups between Site A and VMware Cloud DR on VMware Cloud on AWS is as shown below:

| NETWORK        | SOURCE SITE | PORT GROUP | DESTINATION SITE                                   | DESTINATION<br>TEST NETWORK | DESTINATION<br>RECOVERY NETWORK |
|----------------|-------------|------------|--|-----------------------------|---------------------------------|
| Public Network | Site A      | APPS-1614  | VMware Cloud DR<br>Recovery VMware<br>Cloud on AWS | Oracle Test                 | Oracle Failover                 |

### TABLE 12. Network Mappings between Site A and Recovery SDDC

Two networks have been created on the recovery SDDC **DR-SDDC**:

- Oracle Failover with network subnet 192.168.14.1 / 24 for all Failover testing
- Oracle Test with network subset 192.168.15.1 / 24 for all Test testing

| Sites Cloud fi | e systems Protected site  | es Recovery SD                        | DC                        |   |                  | Deploy new cloud file syst |
|----------------|---|---------------------------------------|---------------------------|---|------------------|----------------------------|
| DR-SDDC        | Details   |                                       | c                         | Capacity and usag   | e                |                            |
|                | SDDC name DR-SDDC<br>Type VMware C<br>Seller VMware<br>AWS region US_WEST<br>Zone ID us-west-21<br>Cloud backup Cloud Bac<br>Uptime 24d 13h | loud on AWS<br>2<br>b<br>kup (Oregon) |                           | Hosts 2<br>Physical capacity 20.7 TIB<br>Total CPU 165.6 GHz (72 cores)<br>Total memory 1099.5 GB |                  |                            |
|                | <ul> <li>Clusters</li> </ul>  |                                       |                           |   |                  | 1 cluster                  |
|                | Cluster Hosts   | Storage                               | Host type Status •        |   |                  |                            |
|                | Cluster-1 2   | 20.7 TIB                              | I3 Ready                  |   |                  | Add hosts                  |
|                | <ul> <li>Networks</li> <li>Name •</li> </ul>  | Gateway / bits                        | DHCP IP range             | DHCP DNS suffix   | DHCP DNS servers | 7 networks                 |
|                | AppPrivateNetwork   | 172.10.10.1 / 24                      | 172.10.10.100 - 172.10.1  | DHCP DNS suffix   | DHCP DNS servers | Rename ×                   |
|                | DR Network  | 192.168.20.1 / 24                     | 192.168.20.100 - 192.16   |   |                  | Rename ×                   |
|                | IsolatedTestNetwork   | 172.30.30.1 / 24                      | 172.30.30.100 - 172.30    |   |                  | Rename ×                   |
|                | Oracle Failover   | 192.168.14.1 / 24                     | ·                         |   |                  | Rename ×                   |
|                | Oracle Test   | 192.168.15.1 / 24                     |                           |   |                  | Rename                     |
|                | sddc-cgw-network-1  | 192.168.1.1 / 24                      | 192.168.1.2 - 192.168.1.2 |   |                  | Rename ×                   |
|                | sddc-cloud-dr-proxy   | 10.68.97.1/28                         |                           | vmc.local   |                  | (reserved)                 |
|                | Add network   |                                       |                           |   |                  |                            |
|                | Public IP addresses   |                                       |                           |   |                  | No public IPs              |
|                | NAT rules   |                                       |                           |   |                  | No NAT rules               |
|                | Firewall rules  |                                       |                           |   |                  | 4 firewall rules           |

#### FIGURE 133. VMware Cloud DR Failover and Test Network Details

The two networks on the recovery SDDC are as shown below:

| [] Þ. 🖹 💇                        | B SDDC-Datacenter ▲CTIONS ▼  |
|----------------------------------|--|
| ✓                                | Summary Monitor Configure Permissions Hosts & Clusters VMs Datastores Networks Updates                     |
| SDDC-Datacenter      MC Networks | Networks Distributed Switches Distributed Port Groups Uplink Port Groups Network Folders                   |
| Ø VM Network                     |  |
| AppPrivateNetwork                |  |
| DR Network                       | Name ↑         Y         Type         Y         Network P Y         VMs         Y         Hosts         VC |
| IsolatedTestNetwork              | 🗘 Oracle Failover NSX network 0 2 😰 vcenter.sddc-44-229-154-128.vmwarevmc.com                              |
| Oracle Failover                  | Coracle Test NSX network 2 2 2 2 vcentersddc-44-229-154-128vmwarevmc.com                                   |
|                                  |  |
|                                  |  |
|                                  |  |





The DR plan Oracle Recovery Plan is as shown below:

| vmw VMware Cloud DR               | Dashboard Sites Pr                       | otection groups | DR plans Monitor      |                         |                                   |                     |
|-----------------------------------|--|-----------------|-----------------------|-------------------------|-----------------------------------|---------------------|
| OR plans                          |  |                 |                       |                         |                                   |                     |
| Plans                             |  |                 |                       | Create plan Edi         | t Duplicate Delete                |                     |
| Plan 🔺                            | Status                                   |                 | Protected site        | Recovery site           | Groups Compliance                 |                     |
| O Failback - Oracle Recovery Plan | <ul> <li>Ready (not testable)</li> </ul> |                 | DR-SDDC               | → Site A - SC2 - Oracle | 1 🗸 10m ago                       |                     |
| Oracle Recovery Plan              | ⊘ Ready                                  |                 | Site A - SC2 - Oracle | → DR-SDDC               | 1 🗸 11m ago                       |                     |
| ~                                 | Oracle Recovery Plan                     | Summary         | Reports               | Protected aroups        | Continuous compliance             | C                   |
|                                   | Oracle Recovery Plan                     |                 |                       | VCDR - Oracle PG        |                                   |                     |
|                                   | Site A - SC2 - Oracle -> DR-SDDC         |                 |                       |                         | ✓                                 |                     |
|                                   | Oracle Recovery Plan                     |                 |                       |                         |                                   |                     |
|                                   |  |                 |                       |                         | 18 / 18 checks passed<br>< 1m ago | Show                |
|                                   |  |                 |                       |                         |                                   |                     |
|                                   | 🕑 Ready                                  |                 |                       |                         | Fallover                          | est plan Deactivate |

#### FIGURE 135. VMware Cloud DR Recovery Plan

Details of the DR plan Oracle Recovery Plan are as shown below:





Details of the VMware Cloud DR recovery plan protection group and vCenter mappings are as shown below:

| Edit plan - Oracle Recov   | ery Plan   |  |   |                   |  |                            |
|--|--|--|---|-------------------|--|----------------------------|
| <ul> <li>General</li> <li>Sites</li> <li>Groups</li> <li>vCenters</li> <li>vCenter folders</li> <li>Compute resources</li> <li>Virtual networks</li> <li>IP addresses</li> </ul> | Groups Choose the protection groups from the protection group VCDR - Oracle PG Only groups in site DR-SDDC are shown | orotected site included in this plan   | 1.  |                   |  |                            |
| <ul> <li>✓ Script VM</li> <li>✓ Recovery steps</li> <li>✓ Alerts</li> </ul>  |  | Edit plan - Oracle Recovery<br>General VC<br>Sites Ch<br>Groups<br>VCenters F  | y Plan<br>enters<br>∞ose the vCenter in D<br>≅allover mapping | R-SDDC for eac    | ch source vCenter                                    | Same for test and failover |
|  |  | VCenter folders     Compute resources     Virtual networks     IP addresses     Script VM     On     Recovery steps     Alerts | Durce vCenter   | → th VMs protecte | Target vCenter 10.2.224.4 It in this plan are shown. | •                          |

FIGURE 137. VMware Cloud DR Recovery Plan Protection Group and vCenter Mappings

Details of the VMware Cloud DR vCenter folders and compute mappings are as shown below:

| Edit plan - Oracle Re  | ecovery Plan   |  |  |   |
|--|--|--|--|---|
| <ul> <li>General</li> <li>Sites</li> <li>Groups</li> <li>vCenters</li> </ul>             | vCenter folders<br>Map each vCenter folder in Site A -<br>Failover mapping | SC2 - Oracle containing protected V  | Ms to a folder in DR-SDDC  |   |
| <ul> <li>VCenter folders</li> <li>Compute resources</li> <li>Virtual petworks</li> </ul> | Map folders  | <b>1</b> 0 2 224 4   |  |   |
| <ul> <li>IP addresses</li> <li>Script VM</li> </ul>                                      | SC2-DC/Oracle  | <ul> <li>SDDC-Datacent</li> </ul>  | er/Cloud DR/Oracle ×   |   |
| <ul> <li>Recovery steps</li> <li>Alerts</li> </ul>                                       |  | Edit plan - Oracle Re  | covery Plan  |   |
|  |  | <ul> <li>✓ General</li> <li>✓ Sites</li> <li>✓ Groups</li> <li>✓ vCentes;</li> </ul> | Compute resources<br>Map each vCenter compute resource in<br>resource in DR-SDDC | n Site A - SC2 - Oracle containing protected VMs to a compute |
|  |  | <ul><li>✓ vCenter folders</li><li>→ Compute resources</li></ul>                      | Failover mapping Map compute resources   | Same for test and failover                                    |
|  |  | <ul> <li>Virtual networks</li> <li>IP addresses</li> </ul>                           | 172.18.11.76   | 10.2.224.4      SDDC-Datacenter/Cluster-1/Compute-Re ×        |
|  |  | <ul> <li>✓ Script VM</li> <li>✓ Recovery steps</li> <li>✓ Alerts</li> </ul>          |  |   |





Details of the VMware Cloud DR failover and test network mappings are as shown below:



FIGURE 139. VMware Cloud DR Failover and Test Network Mappings

Details of the VMware Cloud DR failover network mappings are as shown below:

| Edit plan - Oracle Rec   | overy Plan  |       |   |   |
|--|---|-------|---|---|
| <ul> <li>General</li> <li>Sites</li> <li>Groups</li> <li>vCenters</li> <li>vCenter folders</li> </ul>  | IP addresses<br>Map source subnets to subnets in DR-SDDC<br>Failover mapping Test mapping   |       |   | Same for test and failover                    |
| <ul> <li>Compute resources</li> <li>Virtual networks</li> <li>IP addresses</li> <li>Script VM</li> <li>Recovery steps</li> <li>Alerts</li> </ul> | Add rule         Edit         Delete           Source         IP Address Mapping - Oracle19c-OL8         172.16.14.45           Subnet mask         255.255.255.0         Gateways           Gateways         172.16.14.1         DNS servers         172.16.31.6 | -<br> | Target<br>192.168.14.45<br>Subnet mask<br>Gateways<br>DNS servers | 255.255.255.0<br>192.168.14.1<br>192.168.14.2 |
|  | <ul> <li>IP Address Mapping - Oracle19c-OL8-RMAN</li> <li>172.16.14.46</li> <li>Subnet mask 255.255.255.0</li> <li>Gateways 172.16.14.1</li> <li>DNS servers 172.16.31.6 172.16.31.7</li> </ul>   | >     | <b>192.168.14.46</b><br>Subnet mask<br>Gateways<br>DNS servers    | 255.255.255.0<br>192.168.14.1<br>192.168.14.2 |

FIGURE 140. VMware Cloud DR Failover Network Mappings Details

#
Details of the VMware Cloud DR test network mappings are as shown below:

| 🗸 General                                     | IP addresses   |                            |       |               |                            |
|---|--|----------------------------|-------|---------------|----------------------------|
| <ul> <li>✓ Sites</li> <li>✓ Groups</li> </ul> | Map source subnets to su   | ubnets in Cloud Backup (Or | egon) |               |                            |
| <ul> <li>✓ vCenters</li> </ul>                | Failover mapping   | Test mapping               |       |               | Same for test and failover |
| ✓ vCenter folders                             | Add rule Edit  | Delete                     |       |               |                            |
| <ul> <li>Compute resources</li> </ul>         | Source   |                            |       | Target        |                            |
| <ul> <li>Virtual networks</li> </ul>          | ○ IP Address Test Map  | ning - Oracle19c-Ol 8      | _     |               |                            |
| → IP addresses                                | 172.16.14.45   |                            | -     | 192.168.15.45 |                            |
| <ul> <li>Script VM</li> </ul>                 | Subnet mask 255.2  | 255.255.0                  |       | Subnet mask   | 255.255.255.0              |
| <ul> <li>Recovery steps</li> </ul>            | Gateways 172.16  | 6.14.1                     |       | Gateways      | 192.168.15.1               |
| ✓ Alerts                                      | DNS servers 172.16   | 6.31.6 172.16.31.7         |       | DNS servers   | 192.168.15.2               |
|   | 🔘 IP Address Test Map  | oing - Oracle19c-OL8-RMAI  | V     |               |                            |
|   | IP addresses         Map source subnets to subnets in Cloud Backup (Oregon)         Failover mapping       Test mapping         Add rule       Edit       Delete         Source       Target         IP Address Test Mapping - Oracle19c-OL8       172.16.14.45         Subnet mask 255.255.255.0       Subnet mask 255.255.255.0         Gateways 172.16.14.1       DNS servers 172.16.31.6 172.16.31.7         IP Address Test Mapping - Oracle19c-OL8-RMAN       Subnet mask 255.255.255.0         Gateways 172.16.14.1       DNS servers 192.168.15.46         Subnet mask 255.255.255.0       Subnet mask 255.255.255.0         Gateways 172.16.31.6 172.16.31.7       P12.168.15.46         Subnet mask 255.255.255.0       Subnet mask 255.255.255.0         Gateways 172.16.14.1       DNS servers 192.168.15.1         DNS servers 172.16.31.6 172.16.31.7       DNS servers 192.168.15.1 |                            |       |               |                            |
|   | Subnet mask 255.2  | 255.255.0                  |       | Subnet mask   | 255.255.255.0              |
|   | Gateways 172.16  | 5.14.1                     |       | Gateways      | 192.168.15.1               |

FIGURE 141. VMware Cloud DR Test Network Mappings Details

Details of the VMware Cloud DR recovery plan optional script are as shown below:

| Edit plan - Oracle Reco  | overy Plan   |
|--|--|
| <ul> <li>General</li> <li>Sites</li> <li>Groups</li> <li>vCenters</li> <li>vCenter folders</li> <li>Compute resources</li> <li>Virtual networks</li> <li>ID addresses</li> </ul> | Script VM<br>The script VM is where the custom scripts specified in the recovery steps are run.<br>Both Windows and Linux are supported; the VM must have VMware Tools installed.<br>When running the plan, you will need to enter the credentials to run the scripts.<br>Learn more about using a script VM.<br>O Do not run custom scripts |
| <ul> <li>Fradulesses</li> <li>Script VM</li> <li>Recovery steps</li> <li>Alerts</li> </ul>   | Script VM name     VCenter     10.2.224.4     Use failover settings for test     Test script VM name     Test vCenter     10.2.224.4   |

FIGURE 142. VMware Cloud DR Recovery Plan Optional Script

# **vm**ware<sup>®</sup>

Steps for creating the VMware Cloud DR recovery plan are continued below:

| Edit plan - Oracle Red  | covery Plan  | Edit  |
|---|--|---|
| <ul> <li>General</li> <li>Sites</li> <li>Groups</li> <li>VCenters</li> </ul>                | Recovery steps       Choose the virtual machine recovery steps       Add step     Edit       Defiete   | Step type<br>O Recover protection groups<br>Recover individual VMs  |
| <ul> <li>vCenter folders</li> <li>Compute resources</li> <li>Virtual networks</li> </ul>    | 1 Recover protection group Oracle Test<br>Recover VMs: BOracle19c-OL8 and Cracle19c-OL8-RMAN<br>Power on all recovered VMs.  | Recover all remaining VMs, files, and groups     Other actions - wait, run script, and other actions     VMs to recover   |
| <ul> <li>TP addresses</li> <li>Script VM</li> <li>Recovery steps</li> <li>Alerts</li> </ul> | 2 Wait for user input: Do you wish to continue?<br>One or more standalone actions     3 Recover all remaining VMs, files, and groups<br>Recover remaining groups and VMs<br>Do not power on VMs. | VMs to be recovered in this step: 🗇 Oracle19c-OL8 and 🎒 Oracle19c-OL8-RMAN Select individual VMs Power action   |
|   |  | <ul> <li>Power on only VMs that were powered-on when snapshotted</li> <li>Power on all recovered VMs</li> <li>Do not power on any VMs</li> <li>Pre-recover actions for each VM</li> </ul> |
|   |  | Add action  |
|   |  | Add action  |
|   |  | Recover protection group Oracle Test Leave empty to use default description   |

### FIGURE 143. VMware Cloud DR Recovery Plan Steps

Complete the VMware Cloud DR recovery plan configuration.

| Edit plan - Oracle Rec  | overy Plan  |  |
|---|---|--|
| <ul> <li>General</li> <li>Sites</li> <li>Groups</li> <li>vCenters</li> <li>vCenter folders</li> <li>Compute resources</li> <li>Virtual networks</li> <li>IP addresses</li> <li>Script VM</li> <li>Recovery steps</li> <li>Alerts</li> </ul> | Alerts<br>Choose the email recipients and alert triggers<br>Email alert recipients<br>Go to Configure email alerts to add new<br>recipients.<br>administrator @vmware.com | Alert triggers Continuous compliance reports Every compliance check Compliance warning Compliance error Once per week When check results changed Plan runtime alerts Failover runtime status changed Waiting for user input Failover finished; waiting for user commit |

FIGURE 144. VMware Cloud DR Recovery Plan Configure Complete

# **vm**ware<sup>®</sup>

The DR plan Failback - Oracle Recovery Plan is as shown below:

| vmw VMware Cloud DR         | Dashboard   | Sites Pro         | tection groups            | DR plans                  | Monitor                              |         |                            |              |                |
|-----------------------------|---|-------------------|---------------------------|---------------------------|--------------------------------------|---------|----------------------------|--------------|----------------|
| DR plans                    |   |                   |                           |                           |                                      |         |                            |              |                |
| Plans                       |   |                   |                           |                           |                                      |         | Create plan                | Edit Du      | plicate Delete |
| Plan                        | Status  | stable)           |                           | Protec                    | ted site                             | R       | Recovery site              | Groups       | Compliance     |
| ง                           | VMware Cloud DR<br>back - Oracle Recovery   | Dashboa<br>/ Plan | rd Sites Pro<br>Summary F | tection groups<br>Reports | DR plans N                           | Monitor |                            |              |                |
| Plar<br>Fail<br>DR-<br>Fail | )<br>back - Oracle Recovery Plan<br>SDDC → Site A - SC2 - Oracle<br>Cloud file system Cloud Backup (<br>pack - Oracle Recovery Plan | (Oregon)          |                           |                           | Protected groups<br>/CDR - Oracle PG |         | Continuou<br>18 / 18 check | s compliance | 0              |
| $\odot$                     | Ready (not testable)  |                   |                           |                           |                                      |         | 2h ago                     | Fallow       | show           |

FIGURE 145. VMware Cloud DR Failback Plan Details

Details of DR plan Failback - Oracle Recovery Plan are as shown below.

The details of DR plan Failback - Oracle Recovery Plan is simply the reverse of those for DR plan Oracle Recovery Plan.



FIGURE 146. VMware Cloud DR Failback Plan Protected and Failback Site

Details of the VMware Cloud DR failback plan failover and datastore mappings are as shown below:

| General                      | Groups   |  | ✓ General   | ▶ vCenters  |                           |                               |
|------------------------------|--|--|---|---|---------------------------|-------------------------------|
| <ul> <li>Sites</li> </ul>    | The protection groups that were fa   | ailed over will be failed back.  | ✓ Sites   | Choose the vCenter in S                                       | ite A - SC2 - Or          | racle for each source vCenter |
| Groups                       |  |  | ✓ Groups  | Enilover manning  |                           |                               |
| <ul> <li>vCenters</li> </ul> | Protection group   |  | → vCenters  | Fallover mapping  |                           |                               |
| Failback datastores          | VCDR - Oracle PG   |  | <ul> <li>Failback datastores</li> </ul>   | Source vCenter  |                           | Target vCenter                |
| vCenter folders              |  |  | ✓ vCenter folders   | 10.2.224.4  | >                         | 172.18.11.76                  |
| Compute resources            |  |  | <ul> <li>Compute resources</li> </ul>   |   |                           |                               |
| Virtual networks             |  |  | <ul> <li>Virtual networks</li> </ul>  | Only source vCenters wi                                       | th VMs protect            | ed in this plan are shown     |
| IP addresses                 |  |  | ✓ IP addresses  | City source veenters wi                                       |                           | as the sho plan are shown.    |
| Script VM                    |  |  | ✓ Script VM   |   |                           |                               |
| Recovery steps               |  |  | <ul> <li>Recovery steps</li> </ul>  |   |                           |                               |
| Alerts                       |  |  | ✓ Alerts  |   |                           |                               |
|                              | <ul> <li>General</li> <li>Sites</li> <li>Groups</li> <li>vCenters</li> <li>Failback datastores</li> <li>vCenter folders</li> <li>Compute resources</li> <li>Virtual networks</li> <li>IP addresses</li> <li>Script VM</li> </ul> | Failback datastores<br>Choose the default target datas<br>Failover mapping<br>VMware Cloud DR will attempt<br>datastore with the same name i<br>will be placed in the datastore s<br>Default datastore<br>SC2-DC/datastore/BCA-SiteC | tore in Site A - SC2 - Oracle<br>to fail back VMs to their original<br>the failback site, or if the VM w<br>pecified below. | datacenter and datastore. If the accenter and the recovery SD | nere is no<br>DC, then it |                               |
|                              | <ul> <li>Recovery steps</li> </ul>   |  |   |   |                           |                               |
|                              | ✓ Alerts   |  |   |   |                           |                               |

FIGURE 147. VMware Cloud DR Failback Plan Failover and Datastore Mappings

Details of the VMware Cloud DR failback plan folder and compute mappings are as shown below:

| Edit plan - Failback -   | Oracle Recovery Plan   |   |        |   |
|--|--|---|--------|---|
| General Sites Groups vcenters Failback datastores  | vCenter folders<br>Map each vCenter folder in DR-SDDC co<br>Failover mapping<br>Map folders  | ontaining protected VMs to a folder in Site A - SC2 - Oracle  |        |   |
| <ul> <li>Compute resources</li> <li>Virtual networks</li> <li>IP addresses</li> <li>Script VM</li> <li>Recovery steps</li> </ul> | <ul> <li>☑ 10.2.224.4</li> <li>☑ SDDC-Datacenter/Cloud DR/Oracle</li> <li>Eriit plan - Eailback - Oracle</li> </ul>                                | <ul> <li>₽ 172.18.11.76</li> <li>&gt; □ SC2-DC/Oracle</li> </ul>  | -      |   |
| <ul> <li>✓ Alerts</li> </ul>   | General     Sites     Groups     VCenters     VCenters     VCenter folders     VCenter folders   | Compute resources Map each vCenter compute resource in DR-SDDC containin Failover mapping Map compute resources | ig pro | tected VMs to a compute resource in Site A - SC2 - Oracle |
|  | <ul> <li>Compute resolutions</li> <li>Virtual networks</li> <li>IP addresses</li> <li>Script VM</li> <li>Recovery steps</li> <li>Alerts</li> </ul> | SDDC-Datacenter/Cluster-1/Compute-ResourcePool  | >      | SC2-DC/BCA-SiteC  |

FIGURE 148. VMware Cloud DR Failback Plan Folder and Compute Mappings



Details of the VMware Cloud DR failback network mappings are as shown below:

| East plan - ranback - orac  | ie Recovery Flam   |  |   |   |   |
|---|--|--|---|---|---|
| <ul> <li>✓ General</li> <li>✓ Sites</li> <li>✓ Groups</li> <li>✓ Contern</li> </ul> | Virtual networks<br>Map each vCenter virtual n<br>Failover mapping | etwork in DR-SDDC containing pr  | otected VMs to a virtual network in Site A - SC2 - Oracle   |   |   |
| <ul> <li>Failback datastores</li> <li>vCenter folders</li> </ul>                    | Map virtual networks   |  |   |   |   |
| ✓ Compute resources   | 10.2.224.4   |  | 🔁 172.18.11.76  |   |   |
| Virtual networks  | SDDC-Datacenter/Ora  | icle Test  | → ▲ SC2-DC/APPS-1614  |   |   |
| IP addresses     Script VM     Recovery steps                                       |  | Edit plan - Failback - C   | Dracle Recovery Plan  |   |   |
| ✓ Alerts  |  | <ul> <li>General</li> <li>Sites</li> <li>Groups</li> <li>vCenters</li> <li>Fallback datastores</li> <li>vCenter folders</li> <li>Compute resources</li> <li>Virtual networks</li> <li>IP addresses</li> <li>Script VM</li> <li>Recovery steps</li> <li>Alerts</li> </ul> | IP addresses<br>Map source subnets to subnets in Site A - SC2 - Oracle<br>Failover mapping<br>Add rule Edit Delete<br>Source<br>O IP Address Foilback Mapping - Oracle19c-OL8<br>192.168.14.45<br>Subnet mask 255.255.255.0<br>Gateways 192.168.14.1<br>DNS servers 192.168.14.2<br>O IP Address Foilback Mapping - Oracle19c-OL8-RMAN<br>192.168.14.46 | + | Target<br>172.16.14.45<br>Subnet mask: 255.255.255.0<br>Gateways: 172.16.14.1<br>DNS servers: 172.16.31.6 172.16.31.7<br>172.16.14.46 |
|   |  |  | 192.168.14.46<br>Subnet mask 255.255.255.0<br>Gateways 192.168.14.1<br>DNS servers 192.166.14.2   | > | 172.16.14.46<br>Subnet mask 255.255.255.0<br>Gateways 172.16.14.1<br>DNS servers 172.16.31.6 172.16.31.7                              |

FIGURE 149. VMware Cloud DR Failback Network Mappings

Details of the VMware Cloud DR failback recovery plan optional script are as shown below:

| Edit plan - Failback - Orac  | le Recovery Plan  |  |  |
|--|---|--|--|
| General     Sites     Groups     VCenters     Failback datastores     VCenter folders     VCenter folders     Vorbute resources     Virtual networks     IP addresses     Script VM     Recovery steps | Script VM The script VM is where the custom scripts specifi Both Windows and Linux are supported, the VM When running the plan, you will need to enter th Learn more about using a script VM.  Do not run custom scripts O Run scripts on a VM Script VM name vCenter P172.18 | ed in the recovery steps are run.<br>must have VMware Tools installed.<br>e credentials to run the scripts.  |  |
| ✓ Alerts   |   | Edit plan - Failback - O<br>General<br>Sites<br>Groups<br>VCenters<br>Failback datastores<br>Victenter folders<br>Compute resources<br>Virtual networks<br>IP addresses<br>Script VM<br>Recovery steps<br>Alerts | Pracle Recovery Plan         Recovery steps         Choose the virtual machine recovery steps         Add step       Edit         Delete         1 Recover protection group Oracle Test<br>Recover VMs:         Power on all recovered VMs.         2 Wait for user input: Do you wish to continue?<br>One or more standalone actions         3 Recover all remaining VMs, files, and groups<br>Recover remaining groups and VMs<br>Do not power on VMs. |





Complete the VMware Cloud DR failback recovery plan configuration.

| Edit plan - Failback - Ora  | acle Recovery Plan   |  |
|---|--|--|
| <ul> <li>General</li> <li>Sites</li> <li>Groups</li> <li>vCenters</li> <li>Failback datastores</li> <li>vCenter folders</li> <li>vCenter folders</li> <li>Compute resources</li> <li>Virtual networks</li> <li>IP addresses</li> <li>Script VM</li> <li>Recovery steps</li> </ul> | Alerts<br>Choose the email recipients and alert triggers<br>Email alert recipients<br>Go to Configure email alerts to add new recipients.<br>☐ administrator ⊉vmware.com | Alert triggers Continuous compliance reports Every compliance check Compliance warning Compliance error Once per week When check results changed Plan runtime alerts |
| → Alerts  |  | <ul> <li>Failover runtime status changed</li> <li>Waiting for user input</li> <li>Failover finished; waiting for user commit</li> </ul>                              |

FIGURE 151. VMware Cloud DR Failback Recovery Plan Configuration Complete

As VMware Cloud DR uses regularly scheduled snapshots to replicate to the SCFS and VMware snapshots are not compatible with disks in multi-writer mode, VMware Cloud DR cannot replicate disks in multi-writer mode. VMware snapshots are a point-in-time (PIT) snapshot and therefore are crash-consistent.

More information regarding VMware Cloud DR components can be found in VMware Cloud Disaster Recovery Documentation.

# Solution Validation

This solution primarily validated the business continuity and disaster recovery functionality of Oracle single-instance and Oracle RAC deployments on VMFS and vSphere Virtual Volumes storage backed by Pure x50 Storage.

Site A was chosen for all business continuity validations. Site B was chosen for on-premises disaster recovery validation and VMware Cloud on AWS was chosen for cloud-based disaster recovery validation.

### Solution Test Overview

This solution validates the business continuity and disaster recovery functionality of Oracle single-instance and Oracle RAC deployments using Pure x50 Storage on-premises and in VMware clouds, at each of the three levels referenced below:

- Business Continuity
  - Application level
  - vSphere level
  - Storage level



- Disaster Recovery
  - Application level
  - vSphere level
  - Storage level

The choice of a business continuity or disaster recovery solution is dependent on application needs, SLAs, RTO, RPO and various other factors.

The focus of the solution was to ensure that for all business continuity and disaster recovery use cases, database data was always consistent.

Performance testing was not included as part of this reference architecture. Any performance data is a result of the combination of hardware configuration, software configuration, test methodology, test tool, and workload profile used in the testing.

Performance testing can be conducted by using the SLOB tool against Oracle single instance and RAC, and generating a load on the database. Oracle AWR and Linux SAR reports can be captured to compare the performance and validate the testing use cases.

## **Oracle Business Continuity**

This section validates Oracle business continuity using Oracle application-based tools, VMware-based tools and storage-based tools for an Oracle single instance and Oracle RAC using Pure x50 Storage.

On-premises and VMware clouds may have different choices of storage offerings but the type of underlying storage (VMFS, RDM, iSCSI, NFS, vSAN, vSphere Virtual Volumes) is transparent to the Oracle layer, whether its on-premises or on VMware clouds.

Once VM disks are carved from any of these storage technologies and added to a VM, the guest operating system sees them as a regular Linux block device (/dev/sdX). The remaining steps to create ASM disks or create filesystems are the same as one would execute on physical architecture.

## Application-Level Business Continuity

Recovery Manager (RMAN) is an Oracle Database client that performs backup and recovery tasks on the databases and automates administration of the backup strategies.

Other Oracle Database backup tools includes data pump, user managed backups (i.e., cold backup by shutting down the database OR hot backup by DB BEGIN/END backup commands), and database flashback.

All of these Oracle utilities operate at an Oracle application level and are therefore completely transparent to the underlying physical infrastructure.

#### **On-premises**

This use case focusses on leveraging the Oracle RMAN utility to back up single-instance VM **Oracle19c-OL8** and the two-node Oracle RAC **prac19c** using RMAN catalog database **rmandb**.

Two VMs are employed for this use case:

- Production VM Oracle19c-OL8-VVOL
- RMAN VM Oracle19c-OL8-VVOL-RMAN with RMAN catalog

RMAN utility is used to back up the database data to:

- Oracle FRA (i.e., fast recovery area), a disk location in which the database can store and manage files related to backup and recovery
- A filesystem (ext3 / ext4 / zfs / xfs) which can then be further backed up by third-party products to media
- Interact directly with media management software to write to sequential media devices such as tape libraries

Learn more about Oracle RMAN Backup.



| 🕆 Oracle19c-OL8                        | 8   Þ           | 🗆 🗳 🖗  | ACTIONS Y  |                                   |                        | 🔂 Oracl   | e19c-OL8-I | RMAN                        |                              | 1 🛱 🖗 🖾  |  |
|--|-----------------|--|--|-----------------------------------|------------------------|---|------------|-----------------------------|------------------------------|--|--|
| Summary Monitor                        | Configu         | ire Permis                                   | sions Datastores   | Networks                          |                        | Summary   | Monitor C  | onfigure                    | Permis                       | sions Datastor   | es Networks  |
| 10.70% disensation and<br>and disense. | G               | Guest OS:<br>Compatibility:<br>/Mware Tools: | Oracle Linux 8 (64-bit)<br>ESXI 7.0 U2 and later (1<br>Running, version:11296 -<br>MORE INFO | /M version 19)<br>(Guest Managed) |                        | ALTING A constant of the second |            | Guest C<br>Compai<br>VMware | 9S:<br>:ibility:<br>e Tools: | Oracle Linux 8 (64<br>ESXi 7.0 U2 and la<br>Running, version:11<br>MORE INFO | -bit)<br>ter (VM version 19)<br>1296 (Guest Managed) |
| ▷ Powered On                           | C<br>IF         | DNS Name:<br>P Addresses:<br>Host:           | oracle19c-ol8-vvol.corp<br>172.16.14.45<br>sc2esx12 vslab local                              | localdomain.                      |                        | ▷ Powered C   | Dn         | DNS Na<br>IP Addr           | me:<br>esses:                | oracle19c-ol8-vvol-<br>172.16.14.46  | -rman.corp.localdomair                               |
| LAUNCH WEB CONSOLE                     | 1               | o.<br>16 4.                                  | SELECKIL, SIGDIOCO   |                                   |                        | LAUNCH WEB  | ONSOLE     | Host:                       |                              | sczesx11.vsiab.ioca  | I  |
|  |                 |  |  |                                   |                        |   |            |                             |                              |  |  |
|  | Databa          | ase  |  |                                   |                        |   |            | rmar                        | ndb                          |  |  |
|  | $\setminus$     |  |  | Metadata<br>RMAN ca               | a written to<br>atalog |   |            |                             |                              |  |  |
| D                                      | )B bad<br>ystem | kup to fi<br>1 / tape                        | le   |                                   |                        |   |            |                             |                              |  |  |

FIGURE 152. Oracle RMAN Backup Using RMAN Catalog

Setting up RMAN backup and RMAN catalog is beyond the scope of this paper. Learn more about Oracle RMAN.

Using the Pure Storage Plugin and vSphere Virtual Volumes, the different use cases of Oracle RMAN utility with vSphere Virtual Volumes to back up a single instance VM and Oracle RAC cluster can be found in *Virtualizing Oracle Workloads with VMware vSphere Virtual Volumes on VMware Hybrid Cloud*.

Using the Oracle RMAN utility, the steps required to back up the two-node Oracle RAC **prac19c** using RMAN catalog database **rmandb** are the same as those employed for single-instance VM **Oracle19c-OL8-VVOL**.

More information regarding use of Oracle RMAN to backup an Oracle RAC can be found in *Real Application Clusters Administration and Deployment Guide Managing Backup and Recovery*.

### VMware Clouds

The above use case, using the Oracle RMAN utility to back up the single-instance VM **Oracle19c-OL8** and the two-node Oracle RAC **prac19c** with RMAN catalog database **rmandb**, employs the same steps for all VMware clouds as well as on-premises environments

All of these Oracle utilities operate at an Oracle application level and are therefore completely transparent to the underlying infrastructure, including storage.

#### vSphere Level Business Continuity

VMware snapshots can be used to take a VM level point-in-time snapshot. Snapshots preserve the state and data of a VM at the time the snapshot is taken.

A VMware clone of the VM can be created from this VM snapshot, or one can simply create a VM-level clone from an existing VM without taking a VM-level snapshot.



A VMware snapshot of an Oracle VM can be taken before any database operation. The state of the VM can then be reverted back to that VM-level snapshot in case there are issues with the database operation.

Both web client and PowerCLI can be leveraged for taking a VMware snapshot and clone.

VM operations like VMware snapshots and VMware clones constructs are the same across all underlying VMware storage layers, even though there may be subtle differences in the ways some of the VM components are represented on these various storage layers.

#### **On-premises**

This use case focusses on the use of VMware snapshot and VMware Clone utility to:

- Snapshot a single instance VM Oracle19c-OL8 for purpose of reverting to it in case of any application issue
- Clone a new single instance VM Oracle19c-OL8-Clone directly from VM Oracle19c-OL8 or from a point-in-time snapshot of the single instance VM Oracle19c-OL8

#### VMware Snapshot

The VM snapshot can be taken either as a:

- Crash-consistent database snapshot (without placing the database in a backup mode)
- Hot backup database snapshot by placing the database in a backup mode using **BEGIN/END Backup** commands.
- Cold backup database snapshot by shutting down the database

#### VMware Snapshot with Crash-Consistent Database Backup

The steps below illustrate the use of VMware Snapshot to take a crash-consistent snapshot of an Oracle single-instance database VM using the web client and reverting back to the snapshot.

| vm vSphere C  | Client Menu 🗸  | Q Search in all environments |         |  |  |  |                   |             |   |   |
|---|--|------------------------------|---------|--|--|--|-------------------|-------------|---|---|
|   | 0  | 🕼 Oracle19c-Ol               | 8   >   | • • •  |  |  |                   |             |   |   |
| (az2wvc01.vslab.).<br>(a) sc2wvc03.vslab.).<br>(b) sc2-DC<br>→ (1) BCA-Intel (f<br>→ (1) BCA-SiteC<br>(1) sc2esx(0)<br>(1) sc2esx(1)<br>(1) sc2esx(1) | local<br>local<br>Reserved)<br>Actions - Dradef9c-OL8<br>Power<br>Guest OS | Summary Monitor              | Configu | Suest OS:<br>Compatibility:<br>VMware Tools:<br>DNS Name:<br>P Addresses:<br>doct: | Oracle Linux 8 (64-bit<br>ESX/7.0.02 and later<br>Running, version129<br>oracle19c-ol8-vvol.cor<br>172.1614.45<br>concerts with long | Networks<br>(VM version 19)<br>(Guest Managed<br>p.localdomain | Snapshots         | Updates     |   |   |
| 및 sc2esx12<br>값 orac19c1<br>값 orac19c2  | Snapshots  | Manage Snapshots             | 0       | ost.<br>👌 🕼 🖫  | 5C265X12.Y518D.IOC81   |  |                   |             |   |   |
| Oracle19     Oracle19     Oracle19     Oracle19   | c 🗊 Migrate<br>c<br>Clone  | Consolidate                  | ~       |  |  |  |                   |             | ^                                       |   |
| Cracle19  | Fault Tolerance  | Delete All Snapshots         |         |  | 12 CPU(s)  |  |                   |             |   |   |
| 🔂 Oracle19  | VM Policies  | > Memory                     |         |  | 128 GB, 1.28 G   | B memory active  |                   |             |   |   |
| 🛱 prac19c1<br>🛱 prac19c1-   | Template   | Hard disk 1                  |         |  | 80 GB  |  |                   |             |   |   |
| prac19c2  | Compatibility  | Total hard disks             |         | -  | 5 hard disks   |  |                   |             |   |   |
| ලා prac19c2<br>බා rac19c1   | Export System Logs   | > Network adapter 1          |         | lá   | ake shapsi   | not  |                   |             |   |   |
| @ rac19c2   | 🖗 Edit Settings  | CD/DVD drive 1               |         |  |  |  |                   |             |   |   |
| SB-OL76  SRMSC21  | Move to folder   | > Video card                 |         | New  |  |  | Snapshot          | -Oracle19c- | OL8-6/18/2021                           |   |
| SRMSC2  | Rename   | VMCI device                  |         | Nar  | ne   |  |                   |             |   |   |
| D Template  | e Edit Notes   |                              |         | De   | evintion   |  | Country           |             | 010000000000000000000000000000000000000 |   |
| 行 VRSC2DI   | C<br>Tags & Custom Attribute   | S > Other                    |         | De   | scription  |  | Snapsno           | t-Oracle190 | -018-6/18/2021                          | 5 |
| D vvoirac2  | Add Permission   | Compatibility                |         |  |  |  |                   |             |   |   |
| > []] BCA3  | Alarms   | Edit Settings                |         |  |  |  |                   |             |   |   |
|   |  |                              |         |  | Include virtual ma<br>Quiesce guest file   | chine's memo<br>system(requ                                    | ry<br>ires VM too | ls)         |   |   |

FIGURE 153. Steps to take VMware Snapshot of Oracle VM Oracle19c-OL8



VMware snapshot Snapshot-Oracle19c-OL8-6/18/2021 of Oracle VM Oracle19c-OL8 is taken successfully.

| ট Oracle19c-OL8 🛛 Þ 🗖 🗳 🚳 🖍 Actions 🗸                                       |                                       |                                  |
|---|---------------------------------------|----------------------------------|
| Summary Monitor Configure Permissions Datastores Networks Snapshots Updates |                                       |                                  |
| TAKE SNAPSHOT REVERT EDIT DELETE DELETE ALL                                 |                                       |                                  |
| යි Snapshot-Oracle19c-OL8-6/18/2021   | Name                                  | Snapshot-Oracle19c-OL8-6/18/2021 |
| You are here  | Description                           | Snapshot-Oracle19c-OL8-6/18/2021 |
|   | Timestamp                             | 8/4/21, 10:04 AM                 |
|   | Size                                  | 69.79 GB                         |
|   | Snapshot the virtual machine's memory | No                               |
|   | Quiesce guest file system             | No                               |

FIGURE 154. VMware Snapshot Snapshot-Oracle19c-OL8-6/18/2021 of Oracle VM Oracle19c-OL8

The VM Oracle19c-OL8 contains a point-in-time snapshot to which to revert in the event of an application issue.

To revert to the point-in-time state and data of a VM taken as part of the VM snapshot, follow the steps below.

It's recommended to shut down the database as you would normally in the VM and power off the VM.



FIGURE 155. Steps to Revert to the VMware Snapshot Snapshot-Oracle19c-OL8-6/18/2021



The operation to revert to the snapshot is successful.

| Recent Tasks    | Alarms          |                 |           |   |                             |   |              |
|-----------------|-----------------|-----------------|-----------|---|-----------------------------|---|--------------|
| Task Name       | ▼ Target        | ▼ Status        | ▼ Details | T | Initiator                   | T | Queued F 🛛 🔻 |
|                 |                 | is inaccessible |           |   |                             |   |              |
| Revert snapshot | ြ Oracle19c-OL8 | ⊘ Completed     |           |   | VSPHERE.LOCAL\Administrator |   | 2 ms         |

FIGURE 156. Revert Back to VMware Snapshot Successful

The Oracle VM **Oracle19c-OL8** is up with IP address 172.16.14.45 and the database **vvol19c** is up. The alert log for the database **vvol19c** shows no errors. Oracle crash recovery is performed when the database **vvol19c** starts up, which is normal and expected.

| ALTER DATABASE OPEN   |  |
|---|--|
| Ping without log force is disabled:   |  |
| instance mounted in exclusive mode.   |  |
| Buffer Cache Full DB Caching mode changing from FULL CACHING DISABLED to FULL CACHING ENABLED |  |
| 2021-08-04T10:37:00.196998-07:00  |  |
| Crash Recovery excluding pdb 2 which was cleanly closed.                                      |  |
| 2021-08-04T10:37:00.210214-07:00  |  |
| Beginning crash recovery of 1 threads   |  |
| parallel recovery started with 11 processes   |  |
| Thread 1: Recovery starting at checkpoint rba (logsed 598 block 42), scn 0                    |  |
| 2021-08-04#10.37.00 326005-07.00  |  |
| Started redo scan   |  |
| 2021-08_04910-37-00_352445_07-00  |  |
| Completed reduces n   |  |
| completed fedo scan   |  |
| Tead 52 KB Teddy, 14 data brocks need recovery  |  |
| 2021-08-04110:37100.331529-07100  |  |
| Started redo application at   |  |
| Thread 1: logseq 598, block 42, offset 0  |  |
| 2021-08-04T10:37:00.360061-07:00  |  |
| Recovery of Online Redo Log: Thread 1 Group 4 Seq 598 Reading mem O                           |  |
| Mem# 0: +DATA_DG/vvol19c/group04_redo01.log   |  |
| Mem# 1: +DATA_DG/vvol19c/group04_redo02.log   |  |
| 2021-08-04T10:37:00.361248-07:00  |  |
| Completed redo application of 0.01MB  |  |
| 2021-08-04T10:37:00.385282-07:00  |  |
| Completed crash recovery at   |  |
| Thread 1: BBA 598.146.16, nab 146, scn 0x0000000005faa23                                      |  |
| 14 data blocks read. 14 data blocks written, 52 redo k-bytes read                             |  |
| Endian type of dictionary set to little   |  |
| 2021-08-04910-37-00 489580-07-00  |  |
|   |  |
| Starting hedre und process NCO  |  |
| scaling background process Acco   |  |
| 2021-08-04110:37:00.494/91-07:00  |  |
| Proto (PID:3027); Gap wanager starting  |  |
| 2021-08-04710:3/:00.506/38-07:00  |  |
| ARCU started with pid=94, US id=3030  |  |
|   |  |
| LGWR (PID:2914): ARCO: Archival started   |  |
| LGWR (PID:2914): STARTING ARCH PROCESSES COMPLETE   |  |
| 2021-08-04T10:37:00.516973-07:00  |  |
| ARCO (PID:3030): Becoming a 'no FAL' ARCH   |  |
| ARCO (PID:3030): Becoming the 'no SRL' ARCH   |  |
| 2021-08-04T10:37:00.520323-07:00  |  |
| TMON (PID:2965): STARTING ARCH PROCESSES  |  |
| Starting background process ARC1  |  |
| 2021-08-04T10:37:00.532277-07:00  |  |
| ARC1 started with pid=56, OS id=3036  |  |
| Starting background process ARC2  |  |
| 2021-08-04T10:37:00.544423-07:00  |  |
| ARC2 started with pid=57, OS id=3039  |  |
| Starting background process ARC3  |  |
| 2021-08-04T10:37:00.556753-07:00  |  |
| ARC3 started with pid=58, OS id=3042  |  |
| TMON (PID:2965): ARC1: Archival started   |  |
| TMON (PID:2965): ARC2: Archival started   |  |
| TMON (PID:2965): ARC3: Archival started   |  |
| TMON (PID:2965): STARTING ARCH PROCESSES COMPLETE   |  |
| 2021-08-04T10:37:00.650887-07:00  |  |
| Thread 1 advanced to log sequence 599 (thread open)   |  |
| Redo log for group 5, sequence 599 is not located on DAX storage                              |  |
| Fhread 1 opened at log sequence 599   |  |
| Current log# 5 seg# 599 mem# 0: +DATA DG/vvol19c/group05 redo01.log                           |  |
| Current log# 5 seg# 599 mem# 1: +DATA DG/vvol19c/droup05 redo02.log                           |  |
| Successful open of redo thread 1  |  |
| 2021-08-04910-37-00 880515-07-00  |  |
| WTTR advisory is disabled because FAST START MTTR TARGET is not set                           |  |
| stopping charactering   |  |
| 2001-0-04010-27-00-040002-07-00   |  |
| 2021-00-04110137100.348362-0/100  |  |
| NOTE: As the mountering group 2 (FAA DG)  |  |
| NOTE: Assigning humber (2, U) to disk (ORCL:FRA_UI)   |  |
| SUCCESS: Mounted group 2 (FRA DG)   |  |
| NOTS: GED 2 disk OF FRA OF PACH: FRA_UI   |  |
| 2021=05-04110137701.019970-07100  |  |
| ARCU (PIDISUSU): ArCHIVEG LOG ENTRY 535 added for T-1.S-596 ID UXaIDa6CIG LAD:1               |  |
| 20/1-00-04110-37101-033247-07100  |  |

FIGURE 157. Oracle VM Oracle19c-OL8 Alert Log details



Alternatively, the VM snapshot can also be taken using the VMware PowerCLI command.

New-Snapshot -VM Oracle19c-OL8 -Name 'Snapshot-Oracle19c-OL8-6/188/2021' -Memory \$false -description Oracle19c-OL8\_Snap

#### VMware Snapshot with Database BEGIN/END Backup Mode with Custom Quiescing Scripts

The steps below illustrate the use of VMware Snapshot of an Oracle single-instance database, by placing the database in a backup mode using **BEGIN/END Backup** commands and reverting back to the snapshot.

Putting the database in backup mode can be done either manually or automatically:

- Manual
  - Use Oracle native tools (e.g., sqlplus to place the database in a **BEGIN backup** mode).
  - Use web client or VMware PowerCLI to take a VM-level snapshot.
  - Use Oracle native tools (e.g., sqlplus to take the database out of the BEGIN backup mode).
- Automatic
  - Use custom quiescing scripts to run pre-freeze and post-thaw commands. VMware tools must be installed and running in the guest operating system for this feature to work correctly.

Prerequisites for custom quiescing scripts:

- The scripts have to be created in the /etc/vmware-tools/backupScripts.d directory on Linux VMs.
- The directory may contain one or multiple scripts that will be executed in sequence. The file names of the scripts affect the execution order (e.g., 10-application.sh, then 20-database.sh).
- Each script must be able to handle freeze, freezeFail and thaw arguments passed by the VMware tools during the different phases.
- Ensure that the scripts have correct execute permissions.

An example of a custom quiescing is shown below:

- The main script that invokes the freeze and thaw routines is created in the /etc/vmware-tools/backupScripts.d directory and has correct write permissions for the root user.
- The individual pre-freeze-script and post-thaw-script shell scripts are created under the Oracle user home directory and have correct write permissions.

Example scripts have been provided in the appendix of this document.

The steps below illustrate the use of VMware Snapshot of an Oracle single-instance database, by placing the database in a backup mode using **BEGIN/END Backup** commands and reverting to the snapshot, using Linux custom quiescing scripts.

| vm vSphere Client   | Menu 🗸 🛛 C   |  |   |  |   |                                    |                                  |                  |                    |    |
|---|--|--|---|--|---|------------------------------------|----------------------------------|------------------|--------------------|----|
| <u>()</u> Ø e §   | 2  | a  | Oracle19c-OL8   | > 🗆 😅 🗶 🤅  | ACTIONS Y   |                                    |                                  |                  |                    |    |
| > @ ez2wvc01.vsab.local           > @ sc2wvc01.vsab.local           > @ Sc2wvc01.vsab.local           > @ Sc2wvc01.vsab.local           > @ BCA.lstec           @ BCA.lstec           @ sc2esx00           @ sc2esx00           @ sc2esx10.           @ sc2esx10. | d)<br>dons - Oradeffic OLB<br>ower<br>uest OS<br>napshots<br>ipen Remote Console | <ul> <li>Su</li> <li>Su</li> <li>Su</li> <li>Su</li> <li>Take</li> <li>Co Men</li> </ul> | mmary Monitor Con<br>Provered On<br>registration<br>nege Snepphot | figure Permission<br>Guest OS: O<br>Compatibility: E<br>VMware Tools: R<br>DNS Name: o<br>IP Addresses: 17<br>Host: se<br>Most: se | ns Datastores Networks 5/<br>troce Linux 6 (64-b1)<br>SIX 70-102 and ster (VA version 10)<br>unning, version:1056 (Gluest Managed)<br>order Hero<br>ancette-out source sources<br>264-045<br>264-045<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047<br>264-047 | apphots Updates                    |                                  |                  |                    |    |
| Oracle19c (B, M)  Oracle19c   | ligrate  | ( Rev  | ert to Latest Sna shot  |  |   |                                    | ^                                |                  |                    |    |
| Conscience Fa   | auit Tolerance   | Dela   | ete All Snapshots   |  | 12 CPU(s)   |                                    |                                  |                  |                    |    |
| 값 Oracle19c vr<br>값 prac19c1  | M Policies   | •  | > Memory  |  | 128 GB, 1.28 GB memory active   |                                    | Take snapshot                    |                  |                    | ×  |
| D prac19c1-: Te   | emplate<br>ompatibility  | :  | Total hard disks  |  | 5 herd disks  |                                    |                                  |                  |                    |    |
| (i) pract9c2-<br>(i) ract9c1  | xport System Logs  |  | > Network adapter 1   |  | APPS-1614 (connected)   |                                    |                                  |                  |                    |    |
| @ rac19c2 @ E0  | idit Settings  |  | CD/DVD drive 1  |  | Deconnected   | ٩                                  |                                  | Spanshot-Oracle1 | 190-01 8-6/18/2021 |    |
| B SRMSC2D   | love to folder   |  | > Video card  |  | 8 MB  | that menodes a month for the solu- | Name                             | Shapshot-Oracler | 50-010-0/10/2021   |    |
| (d) SRMSC2D Re<br>(d) Template Ec   | dit Notes  |  | Vinci device  |  | machine communication interface   | thet provides support for the vist |                                  |                  |                    |    |
| D VRSC2DC   | egs & Custom Attributes  | •  | > Other   |  | Additional Hardware   |                                    | Description                      | Snapshot-Oracle  | e19c-OL8-6/18/2021 |    |
| D vvoirac2 Ac   | dd Permission  |  | Compatibility   |  | ESXI 7.0 U2 and later (VM version 19)   |                                    |                                  |                  |                    |    |
| S ITH OP IT   | larms  |  | dit Settings  |  |   |                                    |                                  |                  |                    |    |
|   |  |  |   |  |   |                                    |                                  |                  |                    | 11 |
|   |  |  |   |  |   |                                    | Include virtual machine's memory | ory              |                    |    |
|   |  |  |   |  |   |                                    | 🔽 Quiesce guest file system(requ | uires VM tools)  |                    |    |
|   |  |  |   |  |   |                                    |                                  |                  |                    |    |
|   |  |  |   |  |   |                                    |                                  |                  |                    |    |
|   |  |  |   |  |   |                                    |                                  |                  |                    | -  |
|   |  |  |   |  |   |                                    |                                  |                  | CANCEL             | 5  |
|   |  |  |   |  |   |                                    |                                  |                  |                    |    |

FIGURE 158. Steps to take VMware Snapshot of Oracle VM Oracle19c-OL8 with Quiescing

VMware snapshot Snapshot-Oracle19c-OL8-6/18/2021 of Oracle VM Oracle19c-OL8 with quiescing is taken successfully.

| 🔀 Oracle19c-OL8 🛛 🖂 🖓 🚳 🔹 Actions 🗸   |                                       |                                  |
|---|---------------------------------------|----------------------------------|
| Summary Monitor Configure Permissions Datastores Networks Snapshots Updates |                                       |                                  |
| TAKE SNAPSHOT         REVERT         EDIT         DELETE         DELETE ALL |                                       |                                  |
| 윦 Snapshot-Oracle19c-OL8-6/18/2021  | Name                                  | Snapshot-Oracle19c-OL8-6/18/2021 |
| You are here  | Description                           | Snapshot-Oracle19c-OL8-6/18/2021 |
|   | Timestamp                             | 8/4/21, 10:04 AM                 |
|   | Size                                  | 69.79 GB                         |
|   | Snapshot the virtual machine's memory | No                               |
|   | Quiesce guest file system             | No                               |
|   |                                       |                                  |

FIGURE 159. VMware Snapshot Snapshot-Oracle19c-OL8-6/18/2021 of Oracle VM Oracle19c-OL8



The backup steps include:

- The database is placed in a BEGIN backup mode as part of the invocation of pre-freeze-script.
- VMware snapshot Snapshot-Oracle19c-OL8-6/18/2021 of Oracle VM Oracle19c-OL8 is taken successfully.
- The database is taken out of the BEGIN backup mode (END mode) as part of the invocation of post-thaw-script.

| pracle@oracle19c-ol8:vvol19c:/u01/admin/vvol19c/diag/rdbms/vvol19c/vvol19c/trace> tail -10 alert_vvol19c.log |
|--|
| Current log# 8 seq# 602 mem# 0: +DATA_DG/vvol19c/group08_redo01.log  |
| Current log# 8 seq# 602 mem# 1: +DATA_DG/vvol19c/group08_redo02.log  |
| 2021-08-04T19:00:05.880575-07:00   |
| ARC1 (PID:30/9): Archived Log entry 538 added for T-1.S-601 ID 0xalba6ctd LAD:1                              |
| 2021-08-04119:16:19.238239-07:00   |
| arter database begin backup  |
| 2011_02_0/m10:16-02_56/410_07.00   |
| alter database end backup  |
|  |
| pracle@oracle19c-ol8:vvol19c:/u01/admin/vvol19c/diag/rdbms/vvol19c/vvol19c/trace>                            |
|  |

#### FIGURE 160. ALERT LOG OF DATABASE SHOWING BEGIN/END BACKUP MODES

#### VMware Snapshot with Cold Database Backup

The steps to take a VMware-level snapshot of an Oracle single-instance database cold by shutting down the database and then reverting back to the snapshot if needed are the same as those required for the two cases above except, in this case, the database is shutdown cold.

#### VMware Clone

A VMware clone of the Oracle VM can also be accomplished in one of two ways:

- Using PowerCLI command or web client to take a point-in-time VMware snapshot and cloning a VM from this snapshot using VMware PowerCLI.
  - The VMware snapshot can either use database crash-consistent method or database hot backup or database cold backup.
  - An example PowerCLI script using vSphere API that contains Clone\_VM task and includes the ability to specify a snapshot to clone from using the VirtualMachinecloneSpec can be found in the Oracle Database 12c on VMware vSAN—Day 2 Operations and Management guide.
- Clone directly using the web client from an existing Oracle VM
  - Clone either using database crash-consistent or database hot backup or database cold backup before performing the cloning operation.
  - Using the web client to perform the VM cloning operation implicitly takes a temporary snapshot and deletes the snapshot after the cloning operation is completed.

Once the VM clone is created, the database can then be backed up to media for offshore storage and can be restored from, if needed.

VMware **vmkfstools** command can also be used to clone VMDKs using either the snapshot of the Oracle VM or without the snapshot. The steps to clone Oracle VM VMDKs from a VM-level snapshot using VMware **vmkfstools** command can be found in the Oracle Database 12c on VMware vSAN—Day 2 Operations and Management guide.

Using VMware Snapshot, vSphere Virtual Volumes and Pure Storage Plugin, a VM-level or a VMDK-level snapshot can also be taken of the Oracle single-instance VM. The steps to achieve this can be found in the *Virtualizing Oracle Workloads with VMware vSphere Virtual Volumes on VMware Hybrid Cloud guide*.

The steps for taking a VMware snapshot and clone are the same as those employed for any underlying VMware storage.



In case of snapshot and clone of an Oracle VM using crash-consistent database snapshot, Oracle crash recovery is performed when the database starts up, which is normal and expected. If and when placing the database in backup mode, database recovery would need to be performed using archivelog, which is normal and expected.

The steps below illustrate the use of VMware Clone to clone a new Oracle VM directly from an existing Oracle VM, using database crash-consistent method from the web client.



FIGURE 161. VMware Clone of Oracle VM Oracle19c-OL8

Select the target compute cluster and datastore for Oracle VM Oracle19c-OL8-clone.



FIGURE 162. VMware Clone of Oracle VM Oracle19c-OL8 Pick Compute and Datastore

The Oracle VM Oracle19c-OL8-clone is up with IP address 172.16.14.55 and the copy of the database vvol19c is up.

| 🚯 Oracle19                                       | c-OL8-Clo        | one   Þ 🗖   | <b>4</b>  | 10 AC  | CTIONS Y                              |                           |                   |
|--|------------------|---|---|--|---------------------------------------|---------------------------|-------------------|
| Summary Moi                                      | nitor Confi      | gure Permis   | sions   | Datastores   | Networks                              | Snapshots                 | Updates           |
| Powered On<br>Launch web cons<br>Launch remote c | SOLE<br>ONSOLE ① | Guest OS:<br>Compatibility:<br>VMware Tools:<br>DNS Name:<br>IP Addresses:<br>Host:<br>$\bigwedge$ $\bigcirc$ $\square$ | Oracle Li<br>ESXI 7.0<br>Running,<br>MORE INI<br>oracle190<br>172.16.14<br>sc2esx01 | nux 8 (64-bit)<br>and later (VM<br>, version:11296<br>Fo<br>2-ol8.vslab.loca<br>.55<br>9.vslab.local | version 17)<br>(Guest Managed         | )                         |                   |
| VM Hardware                                      |                  |   |   |  |                                       |                           |                   |
| > CPU  |                  |   | 12 CF   | PU(s)  |                                       |                           |                   |
| > Memory   |                  |   | 12  | 8 GB, 71.68 GE   | B memory active                       |                           |                   |
| > Hard disk 1                                    |                  |   | 80 G  | В  |                                       |                           |                   |
| Total hard di                                    | sks              |   | 5 hai   | rd disks   |                                       |                           |                   |
| > Network ada                                    | pter 1           |   | APP   | S-1614 (connec   | ted)                                  |                           |                   |
| CD/DVD driv                                      | re 1             |   | Disco   | onnected   |                                       |                           |                   |
| > Video card                                     |                  |   | 8 ME  | 3  |                                       |                           |                   |
| VMCI device                                      |                  |   | Devi<br>virtu   | ce on the virtu<br>al machine cor  | ual machine PCI b<br>mmunication inte | us that provides<br>rface | s support for the |
| > Other  |                  |   | Addi  | tional Hardwa  | re                                    |                           |                   |
| Compatibility                                    | /                |   | ESXi  | 7.0 and later  | (VM version 17)                       |                           |                   |

FIGURE 163. Oracle VM Oracle19c-OL8-Clone Details

# 

The alert log for the database copy **vvol19c** shows no errors. Oracle crash recovery is performed when the database copy **vvol19c** starts up, which is normal and expected.

R DATABASE OPEN without log force is disabled: stance mounted in exclusive mode. er Cache Full DB Caching mode changing from FULL CACHING DISABLED to FULL CACHING ENABLED -08-04709:39:27.649201-07.00 h Recovery excluding pdb 2 which was cleanly closed. -08-04709:39:27.65470-07:00 erege-verver.99727.650730-07:00 ginning crash recovery of 1 threads arallel recovery started with 11 processes pread 1: Recovery starting at checkpoint rba (logseq 597 block 25841), scn 0 21-08-04709:39:27.777098-07:00 arted redo scan 21-08-04709:39:27.806595-07:00 D21-09-04 TOP: 39:27.80589-07:00 Fread 44 KB redo, 22 data blocks need recovery D21-06-04709:39:27.01516-07:00 Latted redo application at Thread 1: Logseq 597, block 25041, offset 0 D21-06-04709:39:27.01516-07:00 Mem5 0: +DATA\_D6/vv0119c/group03\_red001.log Mem5 1: +DATA\_D6/vv0119c/group03\_red002.log D21-08-04709:39:27.0196/group03\_red002.log D21-08-04709:39:27.037914-07:00 D01leted reash recovery at Thread 1: KBA 597.25930.16, nab 25930, scn 0x00000000005f9f26 Z data blocks read, 22 data blocks written, 44 redo k-bytes read ndian type of dictionary set to little D21-08-04709:39:27.94097-07:00 GWR (FD12950): STARTING ARCH FROCESSES tarting background process ARC0 D21-08-04709:39:27.95655-07:00 GWR (FD12950): STARTING ARCH FROCESSES Completed evelt pide55, 0S id=3073 D21-08-04709:39:27.95655-07:00 RWR (FD12950): STARTING ARCH FROCESSES COMPLETE D21-08-04709:39:27.976147-07:00 GWR (FD12950): STARTING ARCH PROCESSES COMPLETE D21-09-04709:39:27.976147-07:00 RWR (FD12950): STARTING ARCH PROCESSES COMPLETE D21-09-04709:39:27.97925-07:00 RMN (FD12050): STARTING ARCH PROCESSES COMPLETE D21-09-04709:39:27.97922-07:00 RNN (FD1:301): STARTING ARCH PROCESSES Latting background process ARC1 D21-09-04709:39:27.97925-07:00 RNN (FD1:302): Started with pid=57, 0S id=3073 D21-08-04709:39:27.97925-07:00 RNN (FD1:302): STARTING ARCH PROCESSES Latting background process ARC2 D21-09-04709:39:27.97925-07:00 RNN (FD1:302): STARTING ARCH PROCESSES Latting background process ARC2 D21-09-04709:39:28.00:171-07:100 RC2 started with pid=59, 0S id=3085 MNN (FD1:3001): ARC3: Archival started MNN (FD1:3001): AR 1-08-04103.341 Pleted redo scan ad 44 KB redo, 22 data blocks need recovery 1-08-04T09:39:27.811516-07:00 rest log# 4 seq# 598 mem# 11 HRVA\_DO, FIGHLO, BOALD essful open of redo thread 1 -08-04709:39:28.26203-07:00 . advisory is disabled because FAST\_START\_MTTR\_PARGET is not set pling change tracking i. ASVB mounting group 1 (FRA\_DG) :. Assigning number (1,0) to disk (ORCL:FRA\_01) FSS: mounted group 1 (FRA\_DG) :: grp 1 disk 0: FRA 01 path:ORCL:FRA\_01 -08-04709:39:28.474371-07:00 > initialization recovery: erris start: 514804 end: 514834 diff: 30 ms (0.0 seconds) -08-04709:39:28.474515-07:00 > (BD:3073): Archived Log entry 534 added for T-1.8-597 ID Oxalba6cfd LAD:1 -08-04709:39:28.54515-07:00 DR: failed to establish dependency between database vvol19c and diskgroup resource ora.FRA\_DG.dg -00-04709:39:28.54615-07:00 DR: failed to establish dependency is erris start: 514834 end: 514944 diff: 10 ms (0.1 seconds) initialization online undo segments: erri0 start: 514834 end: 514944 diff: 110 ms (0.1 seconds) initialization online do segments: erri0 start: 514834 end: 514944 diff: 10 ms (0.1 seconds) ffying minimum file header compatibility for tablespace encryption for pdb 1... ifying minimum file header compatibility for tablespace encryption for pdb 1 abase Characterset is AL32UTF8

FIGURE 164. Oracle VM Oracle19c-OL8-Clone Alert Log Details

# **vm**ware<sup>®</sup>

In case of Oracle RAC, a current restriction of the multi-writer attribute as documented in *KB 1034165* is VMware snapshots and cloning of multi-writer VMDKs are not supported. Currently, the VMware snapshot and cloning utility cannot be used with Oracle RAC to snapshot or clone RAC VMs with multi-writer VMDKs.

For an Oracle RAC cluster, independent-persistent disk mode is not required to enable multi-writer for shared VMDKs. However, default-dependent disk mode causes a *cannot snapshot shared disk* error when a VM-level snapshot is taken of an Oracle RAC VM. Use of independent-persistent disk mode allows taking a snapshot of the non-shared disk or disks (e.g., OS, Oracle binaries, standalone file system), while the shared disk(s) are backed up separately via a storage-level snapshot mechanism (e.g., vVOL-level backup of the shared VMDKs or LUN-level backup of shared VMDKs).

In the case of an Oracle RAC cluster, the snapshot process occurs in two steps:

- VM-level snapshot for non-shared VMDKs with disk mode set to Dependent for all RAC VMs
- Application-level (e.g., Oracle RMAN) for the RAC database OR storage-based snapshot for shared RAC VMDKs with disk mode set to **Independent-Persistent** from any RAC VM

More information on backing up Oracle RAC using VMware vVols Storage level can be found in the *Virtualizing Oracle Workloads with VMware vSphere Virtual Volumes on VMware Hybrid Cloud guide*.

#### VMware Clouds

The above use case of employs VMware Snapshot and Clone utilities to snapshot or clone the single-instance VM **Oracle19c-OL8** using the web client or VMware PowerCLI command, following the same steps for all VMware Cloud-supported storage as well as on-premises storage.

VMware **vmkfstools** command capability is not available on VMware clouds, as this command requires access to the ESXi hosts. VMware Cloud is a managed service and does not provide direct access to the ESXi hosts.

Native storage-based snapshot and cloning capability is not available on most VMware clouds as most VMware clouds are managed services and do not provide direct access to the storage layer.

Current restrictions of the multi-writer attribute, disallowing VMware snapshots or cloning as documented in *KB 1034165*, applies to VMware Cloud as well.

### Storage Level Business Continuity

Storage-based snapshots can be used to take a storage LUN-level point-in-time snapshot. A storage clone can then be provisioned from the LUN-level snapshot.

Storage-based snapshots and clones of a VMware datastore are at a storage LUN level, so the granularity of operation is at the storage LUN level and will not provide VM-level granularity.

A storage-based snapshot can be taken before any database operation and if the state of the database has to be reverted back to the snapshot, the state of the storage LUN will be reverted back to the snapshot time. This affects the state of all the VMs on that storage LUN.

Storage-based cloning can also be done by cloning a storage LUN from the storage-based snapshot. The steps to mount a clone of a VMFS datastore with resignaturing can be found in *Mount a VMFS Datastore Copy guide*.

On the other hand, storage-based snapshots and clones of a VM on vSphere Virtual Volumes is at a vVOL level, so the granularity of operation is likewise at the vVOL level.

As noted in *Supported Backup, Restore and Recovery Operations using Third Party Snapshot Technologies* (Oracle Doc ID 604683.1), third-party storage vendor snapshots must conform to the following requirements:

- Integrated with Oracle's recommended restore and recovery operations above
- Database crash-consistent at the point of the snapshot
- Write-ordering is preserved for each file within a snapshot



#### On-premises Using vSphere VMFS Storage

This use case focusses on employing storage-based snapshot and cloning to take a storage LUN-level point-in-time snapshot and clone a new storage LUN from the LUN-level snapshot. The storage LUN would then be resignatured before using that as a copy of the original ESXI datastore.

A copy of the original VM **Oracle19c-OL8** would be brought up as VM **Oracle19c-OL8-Copy** and database contents can be copied from VM **Oracle19c-OL8-Copy** to original VM **Oracle19c-OL8** in the event any database level restores are needed.

The VMFS datastore **OraSC2** houses two single-instance VMs and one Oracle RAC as shown below:

| Summary Monitor Configure Permissions Files Hosts VMs  |   |   |                     |
|--|---|---|---------------------|
| Virtual Machines VM Templates  |   |   |                     |
|  |   |   |                     |
| Name ↑   | State   | <ul> <li>✓ Status</li> </ul>              |                     |
| Name ↑ ~   | State<br>Powered On                             | <ul> <li>✓ Status</li> <li>✓ N</li> </ul> | i<br>Iorma          |
| Name ↑<br>Cracle19c-OL8 Cracle19c-OL8-RMAN   | State<br>Powered On<br>Powered On               | ✓ Status<br>✓ N<br>✓ N                    | i<br>Iorma          |
| Name ↑       ✓ <sup>1</sup> Oracle19c-OL8        ✓ <sup>1</sup> Oracle19c-OL8-RMAN        ✓ <sup>2</sup> prac19c1        ✓ | State<br>Powered On<br>Powered On<br>Powered On | ✓ Status<br>✓ N<br>✓ N<br>✓ N             | i<br>Iorma<br>Iorma |



Use the Pure Storage GUI to take a storage-based snapshot of the LUN **OraSC2** called **OraSC2-Snap**. A storage-based clone **ORASC2-Copy** is taken from the storage snapshot **OraSC2-Snap**. Delete the storage snapshot after the clone **ORASC2-Copy** is created.

| S Volumes > COr.<br>OraSC2                              |          |                             |                           |               |                  |
|---|----------|-----------------------------|---------------------------|---------------|------------------|
| Ize Data Reduction Unique snapshots Shared System Total |          |                             |                           |               |                  |
| 01 36101 - 52002.6 - 000                                |          |                             |                           |               |                  |
| Connected Hosts A                                       | 1        | Protection Groups ~         |                           |               | 1                |
| Namo  | LUN      | Namo                        |                           |               |                  |
|   |          |                             |                           |               |                  |
| No hosts found.   |          | No protection groups found. |                           |               |                  |
| Connected Host Groups A                                 | 1-2 of 2 | Volume Snapshots ~          |                           |               | General Transfer |
| Name  | LUN      | Name                        |                           | Crea          | ted Snapshots    |
|   |          |                             |                           | All           |                  |
| ECA-Intel   | 253 X    | No snapshots found.         |                           |               |                  |
|   |          |                             | Optional Suffix CrisC2 Sr | Ca            | neel Create      |
| Volume Snapshots 🔺                                      |          |                             | Gene                      | eral Transfer | 1-1 of 1 🕂 🚦     |
| Name  |          |                             | Created▼<br>All ∨         | Snapshots     |                  |
| SC2POD::OraSC2.OraSC2-Snap                              |          |                             | 2021-06-18 10:18:30       | 0.00          | :                |

FIGURE 166. Create Storage Level Snapshot



From the storage-based snapshot **OraSC2-Snap**, create storage clone **ORASC2-Copy**.

| Volume Snapshots 🔿         |   |                               | General                      | Transfer 1-1 of 1                     | + : |
|----------------------------|---|-------------------------------|------------------------------|---------------------------------------|-----|
| Name                       |   |                               | Created▼                     | Snapshots                             |     |
| SC2POD::OraSC2.OraSC2-Snap |   |                               | 2021-06-18 10:18:30          | 0.00                                  |     |
| Volume Snapshots ~         |   |                               | Ger<br>Created <del>▼</del>  | neral T Copy<br>Restore<br>Sna Rename |     |
| SC2POD::OraSC2.OraSC2-Snap |   |                               | All ~<br>2021-06-18 10:18 30 | Destroy<br>26.39 M                    | :   |
|                            | Destroved (                               | 0) 🗸                          |                              |                                       |     |
|                            | Copy Snapshot                             |                               |                              | ×                                     |     |
|                            | You are greating or even utiling a volume | by conving charactert /SC/POI | D:: Oraș C2 Oraș C2 Spapi    |                                       |     |
|                            | Pod or Volume Group SC2PO[                |                               | D. Orasez. Orasez-shap.      |                                       |     |
|                            | Name OraSC2                               | -Copy                         |                              |                                       |     |
|                            | Overwrite                                 |                               |                              |                                       |     |
|                            |   |                               | Cancel Copy                  |                                       |     |

FIGURE 167. Create Storage-Based Clone from Storage-Level Snapshot

The clone ORASC2-Copy is attached to the ESXi host which is currently hosting the Oracle VM Oracle19c-OL8.

| 🕃 > Volumes > 🕳 S                            | SC2POD :: OraS           | С2-Сору   |        |               |          |    |
|--|--------------------------|-----------|--------|---------------|----------|----|
| Size Data Reduction Uni<br>20 T 1.0 to 1 0.0 | ique Snapshots<br>0 0.00 | Shared    | System | Total<br>0.00 |          |    |
| Connected Hosts A                            |                          |           |        |               |          |    |
| Name   |                          |           |        |               | L        | UN |
|  |                          |           |        |               |          |    |
| No hosts found.                              |                          |           |        |               |          |    |
| Connected Heat Group                         | c .                      |           |        |               | 44.55    |    |
| Connected Host Group                         | 15 ^                     |           |        |               | 1-1 01 1 |    |
| Name   |                          |           |        |               | LUN      |    |
|  |                          |           |        |               |          |    |
| BCA-SiteC                                    |                          |           |        |               | 254      | ;  |
| Details                                      |                          |           |        |               |          |    |
| Source                                       | SC2POD::OraSC            | 2         |        |               |          |    |
| Created                                      | 2021-06-18 10:18         | 30        |        |               |          |    |
| Serial                                       | A841B405A3A34            | 8CA000135 | 38     |               |          |    |
| Host Encryption Key Status                   | none                     |           |        |               |          |    |
| # Hosts                                      | 4                        |           |        |               |          |    |
| # Connections                                | 1                        |           |        |               |          |    |
| QoS 🗹  |                          |           |        |               |          |    |
| Bandwidth Limit -                            |                          |           |        |               |          |    |
| IOPS Limit -                                 |                          |           |        |               |          |    |

FIGURE 168. Attach Storage-Based Clone to ESXi Host Group



Rescan the ESXi host's storage via the web client to see the new LUN.

| sc2esx09.vslab.                         |                              |  |              |            |                |                   |                    |
|---|------------------------------|--|--------------|------------|----------------|-------------------|--------------------|
| Summary Monitor C                       | onfigure Permissions         | VMs Datastores Networks Updates                              |              |            |                |                   |                    |
| Storage                                 | Storage Devices              |  |              |            |                |                   |                    |
| Storage Devices                         | REFRESH ATTACH DE            | TACH RENAME TURN ON LED TURN OFF LED ERASE PARTI             | TIONS MARK A | S HDD DISK | MARK AS LOCAL  | MARK AS PEREN     | NIALLY RESERVED    |
| Host Cache Configuration                | Name                         |  | Υ Υ          | LUN T      | Туре т         | Capacity <b>T</b> | Datastore <b>T</b> |
| Protocol Endpoints                      | Local Marvell Process        | sor (eui.005043000000000)                                    |              | 0          | scsi processor |                   | Not Consumed       |
| I/O Filters                             | NFINIDAT Fibre Char          | nel Disk (naa.6742b0f000006d000000000000033f5)               |              | 11         | disk           | 45.47 TB          | OraInfinidat       |
| Networking >                            | NFINIDAT Fibre Char          | nnel RAID Ctir (naa.6742b0f0000006d000000000000000000)       |              | 0          | array controll |                   | Not Consumed       |
| ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | PURE Fibre Channel           | Disk (naa.624a9370a841b405a3a348ca000118ff)                  |              | 253        | disk           | 1.00 MB           | Not Consumed       |
| Virtual Machines >                      | PURE Fibre Channel           | Disk (naa.624a9370a841b405a3a348ca00012592)                  |              | 251        | disk           | 20.00 TB          | OraPure            |
| System >                                | PURE Fibre Channel           | Disk (naa.624a9370a841b405a3a348ca00012ac0)                  |              | 252        | disk           | 500.00 GB         | Not Consumed       |
| Hardware >                              | PURE Fibre Channel           | Disk (naa.624a9370a841b405a3a348ca00013066)                  |              | 250        | disk           | 20.00 TB          | OraSC2             |
|   | 🔽   PURE Fibre Channel       | Disk (naa.624a9370a841b405a3a348ca00013538)                  |              | 254        | disk           | 20.00 TB          | Not Consumed       |
| Virtual Flash                           |                              |  |              |            |                |                   |                    |
| Alarm Definitions                       |                              |  |              |            |                |                   |                    |
| Scheduled Tasks                         | Properties Daths [           | Partition Datalla  |              |            |                |                   |                    |
| Pure Storage >                          | Properties Paths F           | Partition Details  |              |            |                |                   |                    |
| INFINIDAT                               | ✓ General                    |  |              |            |                |                   |                    |
|   | Name                         | PURE Fibre Channel Disk (naa.624a9370a841b405a3a348ca0001353 | 38)          |            |                |                   |                    |
|   | Identifier                   | naa.624a9370a841b405a3a348ca00013538                         |              |            |                |                   |                    |
|   | Туре                         | disk   |              |            |                |                   |                    |
|   | Location                     | /vmfs/devices/disks/naa.624a9370a841b405a3a348ca00013538     |              |            |                |                   |                    |
|   | Capacity                     | 20.00 TB   |              |            |                |                   |                    |
|   | Drive Type                   | Flash  |              |            |                |                   |                    |
|   | Hardware<br>Acceleration     | Supported  |              |            |                |                   |                    |
|   | Transport                    | Fibre Channel  |              |            |                |                   |                    |
|   | Owner                        | NMP  |              |            |                |                   |                    |
|   | Sector Format                | 512n   |              |            |                |                   |                    |
|   | ✓ Multipathing Policies AC   | TIONS Y  |              |            |                |                   |                    |
|   | Path Selection Policy        | Round Robin (VMware)   |              |            |                |                   |                    |
|   | Storage Array Type<br>Policy | VMW_SATP_ALUA  |              |            |                |                   |                    |

#### FIGURE 169. New Storage LUN on ESXi Server

The steps to create a new datastore **OraSC2-Copy** with resignaturing are as shown below:



FIGURE 170. New VMFS Datastore

# **m**ware<sup>®</sup>

Resignature the new datastore **OraSC2-Copy**.

| New Datastore                      | Mount option  |  |   | >   |  |  |  |
|------------------------------------|---|--|---|-----|--|--|--|
|                                    | Select VMFS mount option.   |  |   |     |  |  |  |
| 1 Type 2 Name and device selection | Specify whether you want to mo format the disk.   | unt the detected VMFS volu   | ne with the same signature or with a new signature, or  |     |  |  |  |
| Mount option     Ready to complete | <ul> <li>Assign a new signature<br/>Data on the disk will be retain<br/>from VM configuration files w</li> <li>Keep existing signature<br/>Data on the disk will be retain<br/>using the original name.</li> <li>Format the disk<br/>The current disk layout will be</li> </ul> | ed. A new signature will be a<br>ill be updated. Datastore will<br>ed. The datastore will be mo<br>e destroyed and all data will b | ssigned to the datastore and references to existing signat<br>be mounted using the original name.<br>unted using the same signature. Datastore will be mounte<br>be lost permanently. | ure |  |  |  |
| New                                | Datastore   | Ready to complete  |   |     |  |  |  |
|                                    |   | Review your settings selections before finishing the wizard.   |   |     |  |  |  |
| 1 T <sub>2</sub>                   | /pe   | Type:  | VMFS  |     |  |  |  |
| 2 N                                | ame and device selection  | Disk/LUN:<br>Mount Option:   | PURE Fibre Channel Disk (naa.624a9370a841b405a3a3480<br>Assign a new signature  |     |  |  |  |
| 3 M                                | ount option   |  |   |     |  |  |  |
| 4 R                                | eady to complete  |  |   |     |  |  |  |



The new datastore on cloned volumes is created with a cryptic name, not the one we provided to the wizard. Right-click on the name to rename it to a user-friendly name.

| Snap-3000a1ce-OraSC2                           |   |                             |        |
|--|---|-----------------------------|--------|
| Summary Monitor Configure Permissions Files    | Hosts VMs   |                             |        |
| Filter by a folder name                        | NEW FOLDER UPLOAD FILES UPLOAD FOLDER REGISTER  | VM DOWNLOAD COPY TO MOVE TO |        |
| ✓  | Name Size   | Modified                    |        |
| > 🗋 .dvsData                                   | □ □ dvsData   | 06/11/2021, 12:03:26 PM     |        |
| > 🗂 .sdd.sf                                    | State | 06/09/2021, 11:23:39 AM     |        |
| > Po vSphere-HA                                | VSphere-HA  | 06/16/2021, 7:57:10 PM      |        |
|  | Oracle19c-OL8   | 06/18/2021, 9:06:39 AM      |        |
|  | Oracle19c-OL8-RMAN  | 06/17/2021, 5:41:29 PM      |        |
| > Cracle19c-OL8-RMAN                           | D praci9ci  | 06/17/2021, 12:45:28 PM     |        |
| > 🗅 prac19c1                                   | D prac19c2  | 06/17/2021, 12:44:53 PM     |        |
| > 🗅 prac19c2                                   | SB-OL76-ORA19C  | 06/15/2021, 8:02:47 PM      |        |
| > E SB-0L76-ORA19C                             | Renam   | snap-3000a1ce-OraSC2        | ×      |
| B 0(25/2 0au)                                  | Enter the   | new name: OraSC2-Copy       |        |
|  | eriese Piece Marcha Mille   |                             |        |
| Filar by a folder name  Filar by a folder name | V         New Folder         UPLOAD FILES         UPLOAD FILES         UPLOAD FILES           Image: Image   |                             | CANCEL |
| > 🗈 .sdd.sf                                    | C sdd.sf  |                             |        |
| > E1 .vSphere-HA                               | VSphere-HA     Oracle19c-OL8  |                             |        |
| > Pi Oracle19c-OL8-RMAN                        | Oracle19c-OL8-RMAN  |                             |        |
| > D practifici                                 | D proct9c1  |                             |        |
| > in precibic2                                 | SB-0L76-ORA19C  |                             |        |
| > E SB-OL76-ORA19C                             |   |                             |        |

FIGURE 172. Rename VMFS Datastore



Register the Oracle VM Oracle19c-OL8 on the datastore copy OraSC2-Copy as Oracle19c-OL8-Copy.



FIGURE 173. Register VM Oracle19c-OL8-Copy

Select the target compute resources and datastore for Oracle VM Oracle19c-OL8-Copy.

| Register Virtual Machine  | Select a compute resource  |  |                    |  |  |
|---|----------------------------|--|--------------------|--|--|
|   | Select the destination con | pute resource for this operation                     |                    |  |  |
| <ol> <li>Select a name and folder</li> <li>Select a compute resource</li> </ol> |                            |  |                    |  |  |
|   |                            |  |                    |  |  |
| Regis   | ster Virtual Machine       | Ready to complete<br>Click Finish to start creation. |                    |  |  |
| 1 S   | elect a name and folder    | Virtual machine name                                 | Oracle19c-OL8-Copy |  |  |
| 2 S   | elect a compute resource   | Folder   | Oracle             |  |  |
| 3 R   | eady to complete           | Cluster  | BCA-SiteC          |  |  |

FIGURE 174. VM Oracle19c-OL8-Copy Compute Resource and Complete

# **vm**ware<sup>®</sup>

A copy of the original Oracle VM Oracle19c-OL8 is brought up as VM Oracle19c-OL8-Copy. Assign a new IP address to the VM Oracle19c-OL8-Copy. The VM Oracle19c-OL8-Copy database has the same name as in the original Oracle VM Oracle19c-OL8.

Oracle crash recovery is performed when the database starts up, which is normal and expected.

Perform database operations to restore the database contents as required.

| () BCA    | -SiteC      | ACTIONS V    |             |       |     |            |          |         |   |             |        |          |
|-----------|-------------|--------------|-------------|-------|-----|------------|----------|---------|---|-------------|--------|----------|
| Summary   | Monito      | or Configure | Permissions | Hosts | VMs | Datastores | Networks | Updates |   |             |        |          |
| Virtual M | achines     | VM Templates | VApps       |       |     |            |          |         |   |             |        |          |
| Name ↑    |             |              |             |       |     |            |          |         | ~ | State       | $\sim$ | Status   |
| 🔂 Orac    | le19c-OL8   |              |             |       |     |            |          |         |   | Powered On  |        | 🗸 Normal |
| 🗇 Orac    | le19c-OL8-C | Сору         |             |       |     |            |          |         |   | Powered Off |        | ✓ Normal |



When the database restore operation is completed, the VM copy **Oracle19c-OL8-Copy** can be shut down and unregistered from VM. The datastore copy **OraSC2-Copy** can be then unmounted using the web client. Using the Pure Storage GUI, the storage LUN **OraSC2-Copy** can then be deleted.

Similar steps can be followed in the case of Oracle VM Oracle19c-OL8-RMAN, bringing up a copy of the VM Oracle19c-OL8-RMAN-Copy.

The steps above for performing storage-based snapshots and cloning of Oracle VM **Oracle19c-OL8** can be used for Oracle RAC **prac19c** VMs as well. These can be found in the **Oracle Backup of RAC** section in *Virtualizing Oracle Workloads with VMware vSphere Virtual Volumes on VMware Hybrid Cloud guide*.

Similar steps for performing storage-based backup/restore of Oracle VM **Oracle19c-OL8** on a VMFS datastore can be found in *Cloning an Oracle Database on VMware VMFS guide*.

#### On-premises Using vSphere Virtual Volumes Storage

As mentioned, storage-based snapshots and clones of a VMFS datastore are at a storage LUN level, so the granularity of operation is also at the storage LUN level.

In case of vVOLs datastores, granularity of operation can occur at a VM or VMDK level using vSphere Virtual Volumes

- A traditional VM-level snapshot using the web client
- A VMDK-level snapshot using the Pure Storage Plugin

Details for use of vSphere Virtual Volumes and Pure Storage Plugin with Oracle VM backup and restores can be found in the *Virtualizing Oracle Workloads with VMware vSphere Virtual Volumes on VMware Hybrid Cloud guide*.

### VMware Clouds

Native storage-based snapshot and cloning capability is not available on most VMware clouds as most VMware clouds are managed services and do not provide direct access to the storage layer.

To enable additional storage capacity in VMware Cloud on AWS, the ability to attach external NFS cloud-managed storage to a VMware Cloud SDDC through a managed service provider is offered as well (e.g., Faction Cloud Control Volumes). Learn more about *Faction Managed VMware Cloud*.

This solution architecture does not focus on third-party provided storage solutions.

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#### **Oracle Disaster Recovery**

This section validates Oracle disaster recovery using Oracle application-based tools, VMware-based tools and storage-based tools for Oracle single-instance and Oracle RAC using Pure x50 Storage.

On-premises and VMware clouds may have different choices of storage offerings but the type of underlying storage (VMFS, RDM, iSCSI, NFS, vSAN, vSphere Virtual Volumes) is transparent to the Oracle layer, whether its on-premises or on VMware clouds.

Once VM disks are carved from any of these storage technologies and added to a VM, the guest operating system sees them as a regular Linux block device (/dev/sdX). The remaining steps to create ASM disks or filesystems are the same as those one would employ on physical architecture.

#### **Application-Level Disaster Recovery**

Oracle Data Guard is an Oracle Database tool that provides a comprehensive set of services that create, maintain, manage, and monitor one or more standby databases, enabling production Oracle databases to survive disasters and data corruptions.

Other Oracle Database DR tools include Oracle GoldenGate. Other third-party DR tools are also available.

All of these Oracle utilities operate at an Oracle application level and are therefore completely transparent to the underlying physical infrastructure.

#### **On-premises**

This use case focusses at a high level on the use of Oracle Data Guard to provide disaster recovery to the single-instance primary VM **Oracle19c-OL8** on Site A, using the physical standby VM **Oracle19c-OL8-DG** on **Site B**.

Two VMs are employed for this use case:

- Primary Database VM Oracle19c-OL8-Primary with IP address 172.16.14.50 on Site A
- Physical standby Database VM Oracle19c-OL8-Standby with IP address 172.16.14.51 on Site B

Setup of Oracle Data Guard and Oracle GoldenGate is beyond the scope of this paper. Learn more about Oracle Data Guard.

The primary and standby database status is as shown below. There is no archive log gap on the standby database.

| Primary Oracle Database VM Oracle19C-OL8-Primary   | Standby Oracle Database VM Oracle19C-OL8-Standby   |
|--|--|
| SQL> SELECT sequence#, first_time, next_time, applied<br>FROM v\$archived_log ORDER BY sequence#;<br>SEQUENCE# FIRST_TIM NEXT_TIME APPLIED<br> | SQL> SELECT ARCH.THREAD# "Thread", ARCH.SEQUENCE# "Last Sequence Applied", ARCH.SEQUENCE# - APPL.SEQUENCE# "Last Sequence Applied", ARCH.SEQUENCE# - APPL.SEQUENCE# "Difference"<br>FROM<br>(SELECT THREAD#,SEQUENCE# FROM V\$ARCHIVED_LOG WHERE (THREAD#,FIRST_TIME) IN (SELECT<br>THREAD#,MAX(FIRST_TIME) FROM V\$ARCHIVED_LOG GROUP BY THREAD#)) ARCH,<br>(SELECT THREAD#,SEQUENCE# FROM V\$LOG_HISTORY WHERE (THREAD#,FIRST_TIME) IN (SELECT<br>THREAD#,MAX(FIRST_TIME) FROM V\$LOG_HISTORY WHERE (THREAD#,FIRST_TIME) IN (SELECT<br>THREAD#,MAX(FIRST_TIME) FROM V\$LOG_HISTORY GROUP BY THREAD#)) APPL<br>WHERE ARCH.THREAD# = APPL.THREAD#<br>ORDER BY 1;<br>Thread Last Sequence Received Last Sequence Applied Difference<br>1 49 49 10<br>SQL><br>SQL> SELECT * FROM V\$ARCHIVE_GAP;<br>no rows selected<br>SQL> |

FIGURE 176. Primary and Standby Oracle Database Status



The standby Oracle VM **Oracle19c-OL8-Standby** alert log for the database **ora19c** shows no errors and shows the redo log application if and when it is generated on the primary database.

RC6 started with pid=50, OS id=3599 tarting background process ARC7 021-08-04712137159.207328-07100 RC7 started with pid=37, OS id=3603 tarting background process ARC8 021-08-04712137159.219953-07100 RC8 started with pid=51, OS id=3607 tarting background process APC9 RC8 started with pid=51, OS id=3607 tarting background process ARC9 021-08-04712137:59.233571-07:00 RC9 started with pid=53, OS id=3610 021-08-04712:37:59.233589-07:00 MON (PID:3546): ARC1: Archival started MON (PID:3546): ARC2: Archival started MON (PID:3546): ARC3: Archival started MON (PID:3546): ARC4: Archival started MON (PID:3546): ARC5: Archival started MON (PID:3546): ARC6: Archival started MON (PID:3546): ARC6: Archival started MON (PID:3546): ARC7: Archival started MON (PID:3546): ARC8: Archival started MON (PID:3546): ARC8: Archival started MON (PID:3546): ARC9: Archival started MON (PID:3546): ARC9: Archival started MON (PID:3546): STARTING ARCH PROCESSES COMPLETE NEW (PID:3340): STARTING ARCH PROCESSIS COMPLETE 021-08-04712:38:03.477307-07:00 rfs (PID:3628): krsr\_rfs\_atc: Identified database type as 'PHYSICAL STANDBY': Client is Foreground (PID:3584) 021-08-04712:38:03.477329-07:00 rfs (PID:3631): krsr\_rfs\_atc: Identified database type as 'PHYSICAL STANDBY': Client is ASYNC (PID:3632) rfs (PID:3631): Primary database is in MAXIMUM PERFORMANCE mode 021-08-04712:38:03.540775-07:00 (PID:3634): krsr rfs atc: Identified database type as 'PHYSICAL STANDBY': Client is FAL (PID:3599) -08-04T12:38:03.691470-07:00 ter database recover managed standby database disconnect from session nodelay 021-08-04T12:38:06.396206-07:00 arting background process MRE 221-08-04T12:38:06.409855-07:00 RPO started with pid=57, OS id=3643 221-08-04T12:38:06.411115-07:00 ackground Managed Standby Recovery process started (oral9csb) D21-08-04T12:38:11.432045-07:00 221-08-04T12:38:11.746157-07:00
800 (PID:3646): Media Recovery Log +DATA\_DG/ORA19CSB/ARCHIVELOG/2021\_08\_04/thread\_1\_seq\_49.318.1079699883
800 (PID:3646): Media Recovery Waiting for T-1.S-50 (in transit)
221-08-04T12:38:11.881635-07:00
scovery of Online Redo Log: Thread 1 Group 5 Seq 50 Reading mem 0
Mem# 0: +DATA\_DG/ORA19CSB/stdby\_group05\_redo01.log
Mem# 1: +DATA\_DG/ORA19CSB/stdby\_group05\_redo02.log
221-08-04T12:38:12.416178-07:00
221-08-04T12:38:12.416178-07:00
Scovery and the page descent menaged standby detabase disconnect from session modelay.

FIGURE 177. Alert log for Standby Oracle Database

The steps for setting up Oracle Data Guard for an Oracle RAC cluster **prac19c** are similar to a single instance with certain subtleties. More information can be found in the Oracle Data Guard and Oracle Real Application Clusters guide.

Oracle Data Guard role transitions switchover and failover are the same when applied to physical architecture. Learn more about *role transitions*.



#### Using VMware Site Recovery Manager Workflow for Oracle Data Guard Role Transition

Oracle Data Guard facilitates the redo transport in a physical Data Guard setup. A database operates in one of the following mutually exclusive roles: primary or standby.

Oracle Data Guard enables you to change these roles dynamically by using SQL statements, or by using either of the Oracle Data Guard broker's interfaces.

Oracle Data Guard supports the following role transitions:

- Switchover Allows the primary database to switch roles with one of its standby databases. There is no data loss during a switchover. After a switchover, each database continues to participate in the Oracle Data Guard configuration with its new role.
- Failover Changes a standby database to the primary role in response to a primary database failure. If the primary database was not operating in either maximum protection mode or maximum availability mode before the failure, some data loss may occur. If Flashback database is enabled on the primary database, it can be reinstated as a standby for the new primary database once the reason for the failure is corrected.

Learn more about role transitions.

VMware Site Recovery Manager is a business continuity and disaster recovery solution that helps you plan, test, and run the recovery of virtual machines between a protected vCenter Server site and a recovery vCenter Server site.

A use case could be to combine the workflow capability of VMware Site Recovery Manager to assist with the role transitioning of Oracle Data Guard environments in case of testing a DR scenario or in event of an actual DR.

For example, as part of configuring the recovery plan SC2-VMC-Oracle-RP

- One could configure the recovery of a control VM Oracle19c-Control-VM
- Control VM Oracle19c-Control-VM can have a power-on step with a shell script embedded which is executed once the control VM
   Oracle19c-Control-VM is fully powered up
- The post power-on shell script can run a command on the local control VM or any VM it can ssh to, for example, run a shell script residing locally on standby VM **Oracle19c-OL8-Standby** to perform the database role transition to failover to a standby database.

| CONFIGURE RECOVERY PRIORITY GROUP ~ | STARTUP ACTION Y   |   |                |  |                                 |  |   |                        |
|-------------------------------------|--------------------|---|----------------|--|---------------------------------|--|---|------------------------|
| Virtual Machine                     | T Recovery Status  | Y Status Modified By                      | Ŧ              | Protection Group   | т                               | Priority   |   |                        |
| >      Drack 9c-Control-VM          | Ready for recovery | SC2-VMC-Oracle-RP                         |                | SC2-VMC-SRM-VR-PG  |                                 | 3 (Medium)                                       |   |                        |
|                                     |                    | VM Recovery Properties                    | Oracle1        | 9c-Control-VM  |                                 |  |   | 1                      |
|                                     |                    | Changes to these properties will apply to | this VM in all | recovery plans.  |                                 |  |   |                        |
|                                     |                    | Recovery Properties IP Customiza          | ation          |  |                                 |  |   |                        |
|                                     | $\mathbf{i}$       |   |                | 3 (Medium) ~   |                                 |  |   |                        |
|                                     |                    | Priority Group                            |                | All virtual machines within a priorit<br>within a priority group may be spe<br>ordered by VM dependencies. | y group will t<br>cified by add | be started before proci<br>ling VM dependencies. | eeding to the next priority group. The startup order of virtual<br>The virtual machines within a priority group will start in paralli | nachines<br>al, unless |
|                                     |                    | > VM Dependencies                         |                | None   |                                 |  |   |                        |
|                                     | $\backslash$       | vMotion                                   |                | Disabled (The protection gro   | up of the V                     | M does not suppor                                | t vMotion)  |                        |
|                                     |                    | > Shutdown Action                         |                | Shutdown guest OS before<br>Shutdown actions are used to pow   | power off (<br>rer off VMs a    | requires VMware To<br>t the protected site dur   | ools) v   | anup.                  |
|                                     |                    | > Startup Action                          |                | Power on ~<br>Startup actions are used to power  | on VMs at th                    | e recovery site during                           | Test and Recovery.  |                        |
|                                     |                    | > Pre Power On Steps                      |                | None   |                                 |  |   |                        |
|                                     |                    | V Post Power On Steps                     |                |  |                                 |  |   |                        |
|                                     |                    | These steps run after the VM is power     | ed on.         |  |                                 |  |   |                        |
|                                     |                    | + NEW   🖉 EDIT 🛛 🗙 DELET                  | е ↑ моу        | EUP ↓ MOVE DOWN  |                                 |  |   |                        |
|                                     |                    | Name                                      |                | Туре   |                                 |  | Timeout   |                        |
|                                     |                    |   |                |  | 8                               |  |   |                        |
|                                     |                    |   |                |  | Y                               |  |   |                        |
|                                     |                    |   |                |  |                                 |  |   |                        |



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The steps to add the post power-on step to VM Oracle19c-Control-VM is as shown below.

The post power-on step contains a call out to a shell script, residing locally on standby VM **Oracle19c-OL8-Standby**. This shell script could then perform the database role transition to failover to a standby database.

| Add Post Power | On Step  | $\times$ |
|----------------|--|----------|
| Туре:          | Command on SRM Server Prompt (requires a user to acknowledge the prompt before the plan continues) Command on Recovered VM |          |
| Name:          | Fallover to DB Standby   |          |
|                | 58 characters remaining  |          |
| Content:       | ssh oracle19c-ol8-standby.vslab.local /home/oracle/scripts/odgfailover.sh  | 1.       |
| Timeout        | 4023 characters remaining  |          |
| Timeout.       | 5 minutes 0 seconds  |          |
|                | CANCEL   | D        |

FIGURE 179. Post Power-On Step with Embedded Shell Script

For example, the invocation command could be **ssh oracle19c-ol8-standby.vslab.local /home/oracle/scripts/odgfailover.sh**. Example of a shell script that could be invoked to perform database role transition to failover to a standby database is as shown below:

| ~ # cat odgfailover.sh   |
|--|
| <pre>#1 /bin/sh ####################################</pre>                                 |
| connect / as <u>sysdba</u>   |
| ALTER DATABASE RECOVER MANAGED STANDBY DATABASE CANCEL;                                    |
| SELECT name.open mode,database role FROM V\$DATBASE;                                       |
| ALTER DATABASE ACTIVATE PHYSICAL STANDBY DATABASE;   |
| ALTER DATABASE OPEN;   |
| exit<br>EOFarch1   |
| echo "Job ` <u>basename</u> \$0`: ended at `date`"<br>#################################### |

FIGURE 180. Example of a Post Power-On Shell Script



More details on post power-on steps are shown below:

| covery Properties IP Customization  |  |                          |  |  |  |
|---|--|--------------------------|--|--|--|
|   | 3 (Medium) 🗸   |                          |  |  |  |
| Priority Group All virtual machines within a priority group will be started before proceeding to the next priority group. The startup order of virtual within a priority group may be specified by adding VM dependencies. The virtual machines within a priority group will start in paral ordered by VM dependencies. |  |                          |  |  |  |
| > VM Dependencies   | None   |                          |  |  |  |
| vMotion   | Disabled (The protection group of the VM does not support vMotion) |                          |  |  |  |
| > Shutdown Action   | are Tools) $\vee$  |                          |  |  |  |
| Shutdown actions are used to power off VMs at the protected site during a Recovery. Shutdown actions are not used for Test or   |  |                          |  |  |  |
| > Startup Action  | ion Power on V   |                          |  |  |  |
|   | Startup actions are used to power on VMs at the recovery site d    | uring Test and Recovery. |  |  |  |
| > Pre Power On Steps  | None   |                          |  |  |  |
| <ul> <li>Post Power On Steps</li> </ul>   |  |                          |  |  |  |
| These steps run after the VM is powered on.   |  |                          |  |  |  |
| + NEW 🛛 🖉 EDIT 🛛 🗙 DELETE   | NOVE UP ↓ MOVE DOWN  |                          |  |  |  |
| Name  | Туре   | Timeout                  |  |  |  |
| • Failover to DB Standby  | Run on Recovered VM  | 5 min 0 sec              |  |  |  |



FIGURE 181. Post Power-On Process Configuration Details

The above use case is appropriate in the event there are a number of standby databases with role transitions to manage. One could combine the workflow capability of VMware Site Recovery Manager to assist with role transitioning of Oracle Data Guard environments in a testing DR scenario or in event of an actual DR.

The above use case is relevant for both on-premises and VMware clouds.

#### VMware Clouds

The above use case employing Oracle Data Guard to provide disaster recovery to the single-instance VM **Oracle19c-OL8-Primary** using the standby VM **Oracle19c-OL8-Standby** is accomplished with the same steps across all VMware clouds and on-premises environments.

On VMware Cloud on AWS, one could use two SDDC clusters deployed on two different availability zones (AZ), setting up the singleinstance VM **Oracle19c-OL8-Primary** on AZ1 and standby VM **Oracle19c-OL8-Standby** on AZ2, thereby providing Oracle Data Guard services between the two AZs.



#### vSphere Level Disaster Recovery

VMware Site Recovery Manager with VMware vSphere Replication can provide disaster recovery to Oracle VMs from on-premises Site A to Site B **OR** from on-premises Site A or Site B to any VMware Cloud.

In a typical Site Recovery Manager installation, the protected site provides business-critical datacenter services. The recovery site is an alternative infrastructure to which Site Recovery Manager can migrate these services.

vSphere Replication replicates at the VM level. This process occurs independently of the storage layer as mentioned earlier, whether the VMDK resides on a NFS, VMFS, vSAN or a vVOL datastore.

As mentioned earlier, Write-order fidelity is guaranteed with vSphere Replication on the disks or VMDKs that comprise a VM. However, consistency cannot be guaranteed across multiple VMs. vSphere Replication supports replicating VMs on local, attached, Virtual SAN, FC, iSCSI, or NFS storage. vSphere Replication cannot replicate VMs that are part of an MSCS cluster. vSphere Replication cannot replicate disks in multi-writer mode.

More information regarding VMware Site Recovery Manager and VMware vSphere Replication can be found in VMware Site Recovery Manager Installation and Configuration and VMware vSphere Replication.

#### **On-premises**

This use case focusses on the utilization of VMware Site Recovery Manager with VMware vSphere Replication to provide disaster recovery to Oracle single-instance VM **Oracle19c-OL8** and **Oracle19c-OL8-RMAN** across on-premises sites A and B.

The steps to configure vSphere Replication for Oracle VM **Oracle19c-OL8** are as shown below. These steps are the same for Oracle VM **Oracle19c-OL8-RMAN**.

This use cases provisions the Oracle VMs **Oracle19c-OL8** and **Oracle19c-OL8-RMAN** on a VMFS datastore and holds true for NFS, VMFS, vSAN or vVOL datastores. vSphere Replication operates at a VMDK level completely independent from the underlying datastore storage characteristics.

Oracle RAC uses the multi-writer attribute to share VMDKs as part of the RAC cluster. The multi-writer attribute is documented in *KB* 1034165. Currently, vSphere Replication 8.4 cannot replicate VMs that share VMDK files. This limitation is referenced in *VMware vSphere Replication* 8.4 *Release Notes*.

### **Test Recovery Plan**

The recovery plan can be tested before being used for planned migration or for disaster recovery. Testing a recovery plan will ensure the primary VM on the protected site is still replicating with the replica VM disk files on the recovery site. The vSphere Replication server creates redo logs on the VM disk files on the recovery site, so that synchronization can continue normally. During a recovery plan test, there is no impact or disruption to the protected VMs, replication or RPO.

The VMs on the recovery site are run on a test network and on a temporary snapshot of replicated data at the recovery site. No operations are disrupted at the protected site. A snapshot is created on the recovery site of all the disk files of the VMs in the recovery plan.

When running a recovery plan test, recent changes can be replicated to simulate a planned migration, or not replicated to simulate a disaster.

Steps to test the recovery plan SC2-AZ2-Oracle-RP are as shown below:

| SC2-AZ2-Oracle-RP                              | DIT MOVE DELETE TEST CLEANUP     | RUN ····                                  |   |
|--|----------------------------------|---|---|
| Summary Recovery Steps Issues                  | History Permissions Protection G | roups Virtual Machines                    |   |
| EXPORT STEPS   TEST CLEANUP                    | RUN REPROTECT CANCEL             |   |   |
| Plan status:                                   | → Ready                          |   |   |
| Description:                                   | This plan is ready for test      | or recovery                               |   |
|  | $\backslash$                     |   |   |
| Recovery Step                                  |                                  | Status                                    | Step Started  |
| > 🔄 1. Synchronize storage                     |                                  |   |   |
| 2. Restore recovery site hosts from stan       | dby T                            | est - SC2-A72-Oracle-PD                   | Confirmation options  |
| 3. Suspend non-critical VMs at recovery        | site                             | est - Sez-Azz-Ordele-RF                   |   |
| > 🛞 4. Create writable storage snapshot        |                                  |   |   |
| > 🔞 5. Configure test networks                 |                                  | 1 Confirmation options                    | Test confirmation   |
| <ol> <li>6. Power on priority 1 VMs</li> </ol> |                                  |   | Running this plan in test mode will recover the virtual machines in a test environment on the recovery site.        |
| 2 7. Power on priority 2 VMs                   |                                  | 🛠 Ready to complete                       |   |
| > 3 8. Power on priority 3 VMs                 |                                  |   | Protected site: Primary Site  |
| 9. Power on priority 4 VMs                     |                                  |   | Recovery site: DD Site  |
| 5 10. Power on priority 5 VMs                  |                                  |   |   |
|  |                                  |   | Server connection: CONNected  |
|  |                                  |   | Number of VMs: 2  |
|  |                                  |   | Storage options   |
|  |                                  |   | Specify whether to replicate recent changes to the recovery site. This process might take several minutes and is or |
| est - SC2-AZ2-Oracle-RP                        | Ready to complete                |   | available if the sites are connected.   |
|  | Review your selected settings    |   |   |
| 1 Confirmation options                         | iterien your sereeten settingsi  |   | Replicate recent changes to recovery site   |
| 2. Deartists consists                          | Name                             | SC2-AZ2-Oracle-RP                         |   |
| 2 Ready to complete                            | Protected site                   | Primary_Site                              |   |
|  | Recovery site                    | DR_Site                                   |   |
|  | Server connection                | Connected                                 |   |
|  | Number of VMs                    | 2   |   |
|  | Storage synchronization          | Replicate recent changes to recovery site | 0   |



The test of the recovery plan completes successfully.

| SC2-AZ2-Oracle-RP                            | DELETE TEST CLEANUP RUN                        |                                   |   |  |
|--|--|-----------------------------------|---|--|
| mmary Recovery Steps Issues History          | Permissions Protection Groups Virtual Machines |                                   |   |  |
| KPORT STEPS   TEST CLEANUP RUN REPR          | ROTECT CANCEL                                  |                                   |   |  |
| Plan status:                                 | Test in progress                               |                                   |   |  |
|  | 68%  |                                   |   |  |
| Description:                                 | A test of this plac is currently in progress.  |                                   |   |  |
|  |  |                                   |   |  |
| overy Step                                   | Status   | Step Started                      |   |  |
| 1. Synchronize storage                       |  |                                   |   |  |
| 2. Restore recovery site hosts from standby  | ✓ Success                                      | Monday, June 28, 2021 10:5        | 3:56 AM   |  |
| 3. Suspend non-critical VMs at recovery site |  |                                   |   |  |
| 4. Create writable storage snapshot          |  |                                   |   |  |
| 5. Configure test networks                   |  |                                   |   |  |
| . Power on priority 1 VMs                    |  |                                   |   |  |
| . Power on priority 2 VMs                    |  |                                   |   |  |
| 8. Power on priority 3 VMs                   | SC2-AZ2-Oracle-RP                              | NOVE DELETE TEST CLEANUP R        | JN  |  |
| 9. Power on priority 4 VMs                   |  |                                   |   |  |
| IO. Power on priority 5 VMs                  | Summary Recovery Steps Issues His              | ory Permissions Protection Groups | Virtual Machines                                    |  |
|  | EXPORT STEPS   TEST CLEANUP RUN                | REPROTECT CANCEL                  |   |  |
|  | Plan status:                                   | Complete                          |   |  |
|  | Description:                                   | The virtual machines have been    | recovered in a test environment at the recovery sit | e. Review the plan history to view any errors of |
|  | Recovery Step                                  | Status                            | Step Started  | Step Completed                                   |
|  | > S 1. Synchronize storage                     | ✓ Success                         | Monday, June 28, 2021 10:53:56 AM                   | Monday, June 28, 2021 10:53:56 AM                |
|  | 2. Restore recovery site hosts from standby    | ✓ Success                         | Monday, June 28, 202110:53:56 AM                    | Monday, June 28, 2021 10:53:56 AM                |
|  | 3. Suspend non-critical VMs at recovery site   |                                   |   |  |
|  | > @ 4. Create writable storage snapshot        | ✓ Success                         | Monday, June 28, 202110:53:57 AM                    | Monday, June 28, 2021 10:54:04 AM                |
|  | > 1 5. Configure test networks                 | ✓ Success                         | Monday, June 28, 202110:54:02 AM                    | Monday, June 28, 2021 10:54:04 AM                |
|  | 6. Power on priority 1 VMs                     |                                   |   |  |
|  | 2 7. Power on priority 2 VMs                   |                                   |   |  |
|  | > 3 8. Power on priority 3 VMs                 | ✓ Success                         | Monday, June 28, 2021 10:54:04 AM                   | Monday, June 28, 2021 10:57:25 AM                |
|  | 9. Power on priority 4 VMs                     |                                   |   |  |
|  |  |                                   |   |  |

FIGURE 183. Test Recovery Plan SC2-AZ2-Oracle-RP Completion



VMs on Protected Site A are still powered on.

| []] BCA-      | SiteC      | AC    | TIONS 🗸  |            |       |        |     |
|---------------|------------|-------|----------|------------|-------|--------|-----|
| Summary       | Monito     | or Co | onfigure | Permiss    | sions | Hosts  | VMs |
| Virtual Ma    | chines     | VM Te | mplates  | vApps      | ]     |        |     |
| Name <b>↑</b> |            |       | ~ :      | State      | ~     | Status | ~   |
| 🔂 Oracle      | e19c-OL8   |       | 1        | Powered On | ``    | 🗸 Nor  | mal |
| 🔂 Oracle      | e19c-OL8-R | MAN   | ×.       | Powered On | /     | 🗸 Nor  | mal |



Oracle VM **Oracle19c-OL8** and **Oracle19c-OL8-RMAN** on Recovery Site B are powered on with the IP addressing scheme set per network mappings to test network **APPS-1810**.

| Dracle19c-OL8   | ি 🖸 💭 🚳 🕺 🗚 Actions 🗸<br>ifigure Permissions Datastores Networks Snapshots Updates   | Oracle19c-OL8-RM     Summary Monitor Config                | AN   ▷ □ 閏 @ @   Actions ✓<br>ure Permissions Datastores Networks Snapshots Updates  |
|---|--|--|--|
| P Powered On<br>Launch web console<br>Launch remote console ① | Guest OS:     Oracle Linux 8 (64-bit)       Compatibility:     ESX 7.0 and later (VM version 17)       VMware Tocia:     Running, version:11296 (Guest Managed)       more two     oracle [Guest Monaged]       DNS Name:     oracle [Guest Monaged]       IP Addresser:     IP [B to 45]       Managed By:     description       DETAILS     IP | P Roward On<br>LAUNCH WEB CONSOLE<br>LAUNCH REMOTE CONSOLE | Guest OS:     Orecle Linux 8 (64-bit)       Compatibility:     ESXI 7.0 and later (VM version 17)       VMwere Tools:     Running, version.11296 (Guest Managed)       MORE INFO     Oracle 35-oils-man.corp.localdomain       IP Address     772.18.10.46       Managed By:     description       DETAILS |
| VM Hardware   |  | VM Hardware  |  |
| > CPU   | 12 CPU(s)  | > CPU  | 8 CPU(s)   |
| > Memory  | 128 GB, 1.28 GB memory active  | > Memory   | 96 GB, 0.96 GB memory active   |
| > Hard disk 1   | 80 GB  | > Hard disk 1  | 80 GB  |
| Total hard disks  | 5 hard disks   | Total hard disks   | 5 hard disks   |
| > Network adapter 1   | APPS-1810 (connected)  | > Network adapter 1  | APPS-1810 (connected)  |
| CD/DVD drive 1  | Disconnected   | CD/DVD drive 1   | Disconnected   |
| > Video card  | 8 MB   | > Video card   | 4 MB   |
| VMCI device   | Device on the virtual machine PCI bus that provides support for the<br>virtual machine communication interface   | VMCI device  | Device on the virtual machine PCI bus that provides support for the<br>virtual machine communication interface   |
| > Other   | Additional Hardware  | > Other  | Additional Hardware  |
| Compatibility   | ESXI 7.0 and later (VM version 17)   | Compatibility  | ESXi 7.0 and later (VM version 17)   |

FIGURE 185. Test Recovery Plan VM Networking Details



The Oracle VM Oracle19c-OL8 is up with IP address 172.18.10.45 and the database vvol19c is up.



FIGURE 186. VM Oracl19c-OL8 Networking and Database Details

The alert log for the database shows no errors. Oracle crash recovery is performed when the database starts up, which is normal and expected.



FIGURE 187. VM Oracl19c-OL8 Database Alert Log Details



The Oracle VM **Oracle19c-OL8-RMAN** is up with IP address 172.18.10.46 and the database **rmandb** is up. The alert log for the database **rmandb** shows no errors. Oracle crash recovery is performed when the database **rmandb** starts up, which is normal and expected.

As mentioned earlier, write-order fidelity is guaranteed with vSphere Replication on the disks or VMDKs that comprise a VM.

At the successful completion of the test recovery, perform the cleanup of the test recovery as shown below. As part of the cleanup after running a test, the vSphere Replication server removes the redo logs from the disks on the recovery site and discards the changes.

| SC2-AZ2-Oracle-RP                            | E TEST CLEANUP RUN  |  |  |
|--|---|--|--|
| Summary Recovery Steps Issues History Perm   | issions Protection Groups Virtual Machines                                  |  |  |
| EXPORT STEPS TEST CLEANUP RUN REPROTECT      |   |  |  |
| Plan status:                                 | Test complete   |  |  |
| Description: Th                              | e virtual machines have been recovered in a test environment at the recover | ery site. Review the plan history to view any errors or warnings. When you are rea | ly to remove the test environment, run cleanup on this plan.   |
|  |   |  | View T   |
| Recovery Step                                | Status  | Step Started   | Step Completed   |
| > 🖕 1. Synchronize storage                   | ✓ Success   | Friday, June 18, 2021 2:57:52 PM   | Frday, June 18, 2021 2:57:52 PM  |
| 2. Restore recovery site hosts from standby  | V Success   | Friday, June 18, 2021 2:57:52 PM   | Friday, June 10, 2021 2:57 52 PM   |
| 3. Suspend non-critical VMs at recovery site |   |  |  |
| > @ 4. Create writable storage snapshot      | ✓ Success   | Friday, June 18, 2021 2:57:52 PM   | Friday, June 18, 2021 2:58-02 PM   |
| > 🔞 S. Configure test networks               | A CORES   | Friday, June 18, 2021 2:58:02 PM   | Friday, June 18, 2021 2:58 02 PM   |
| 6. Power on priority 1 VMs                   |   |  |  |
| 7. Power on priority 2 VMs                   |   |  |  |
| > 3 8. Power on priority 3 VMs               | ✓ Success   | Friday, June 18, 2021 2:58:03 PM   | Friday, June 18, 2021 2:59 53 PM   |
| 0. Power on priority 4 VMs                   |   | Cleanup - SC2-A72-   | Confirmation options   |
| Cleanup - SC2-AZ2-<br>Oracle-RP              | Ready to complete<br>Review your selected settin                            | Confirmation options     Ready to complete   | Cleanup confirmation  Forming a deerap operation on this plan will remove the test environment and reset the plan to the Ready state.  Protected site: Primary_Site Recovery site: DR_Site Server connection: Connected Number of VMs: 2 |
| 1 Confirmation options                       | Name  | SC2-AZ2-Oracle-RP  | Cleanup options If you are experiencing errors during cleanup, you can choose the Force Cleanup option to ignore all errors and return the   |
| 2 Ready to complete                          | Protected site  | Primary_Site   | plan to the Ready state. If you use this option, you might need to clean up your storage manually, and you should run another<br>test as soon as possible.   |
|  | Recovery site   | DR_Site  | Force cleanup  |
|  | Server connection   | Connected  |  |
|  | Number of VMs   | 2  |  |
|  | Force cleanup   | Do not ignore cleanup warnings   |  |

#### FIGURE 188. Cleanup Test Recovery Plan SC2-AZ2-Oracle-RP

The cleanup of test recovery is successful.

| SC2-AZ2-Oracle               | E-RP EDIT MOVE DELETE TE             | ST CLEANUP RUN                |               |                |
|------------------------------|--------------------------------------|-------------------------------|---------------|----------------|
| Summary Recovery Ste         | <b>ps</b> issues History Permissions | Protection Groups Vir         | tual Machines |                |
| EXPORT STEPS TEST            | CLEANUP <b>RUN</b> REPROTECT CANCE   | EL                            |               |                |
| Plan status:                 | → Ready                              |                               |               |                |
| Description:                 | This plan                            | is ready for test or recovery |               |                |
|                              |                                      |                               |               |                |
| Recovery Step                |                                      | Status                        | Step Started  | Step Completed |
| > 🔄 1. Synchronize storage   |                                      |                               |               |                |
| 🛃 2. Restore recovery site   | hosts from standby                   |                               |               |                |
| 3. Suspend non-critical      | /Ms at recovery site                 |                               |               |                |
| > 💮 4. Create writable stora | ge snapshot                          |                               |               |                |
| > 💮 5. Configure test netwo  | rks                                  |                               |               |                |
| 1 6. Power on priority 1 Vi  | мs                                   |                               |               |                |
| 2 7. Power on priority 2 V   | Ms                                   |                               |               |                |
| > 3 8. Power on priority 3 V | /Ms                                  |                               |               |                |
| 9. Power on priority 4 V     | Ms                                   |                               |               |                |
| 5 10. Power on priority 5    | √Ms                                  |                               |               |                |

FIGURE 189. Steps to Cleanup Test Recovery Plan SC2-AZ2-Oracle-RP



VMs on Protected Site A are still powered on. We can see the placeholder VMs on recovery Site B are powered off.



FIGURE 190. Cleanup Test Recovery Plan SC2-AZ2-Oracle-RP Successful

More information regarding testing a recovery plan can be found in the VMware Site Recovery Manager guide.

#### Run Recovery Plan for Planned Migration

Performing a planned migration or disaster recovery by running a recovery plan will result in VM migration from the protected site to the recovery site. If the protected site suffers an unforeseen event that might result in data loss, the recovery plan can also be run under unplanned circumstances.

Planned migration – During a planned migration, Site Recovery Manager synchronizes the VM data on the recovery site with the VMs on the protected site. Site Recovery Manager attempts to shut down the protected VMs gracefully and performs a final synchronization to prevent data loss, then powers on the VMs on the recovery site. If errors occur during a planned migration, the plan stops so that the errors can be resolved, and the plan rerun.

Steps to run a planned migration of recovery plan SC2-AZ2-Oracle-RP are as shown below:





Planned migration of recovery plan SC2-AZ2-Oracle-RP completes successfully.

| B SCZ ALZ OTUCIC IN  | T NOVE DELETE TEST CLEANUP RUN  |   |  |   |
|--|---|---|--|---|
| Summary Recovery Steps Issues  | History Permissions Protection Groups Virtual Machines  |   |  |   |
| EXPORT STEPS   TEST CLEANUP R  | NUN REPROTECT CANCEL  |   |  |   |
| Plan status:   | Recovery in progress  |   |  |   |
| Description:   | Recovery in pregross  |   |  |   |
| Decovery Step  | Status  | Sten Startad  |  |   |
| S 1. Pre-synchronize storage   | Sunness   | Monday, June 28, 2021 12:02:52 PM   |  |   |
| Shut down VMs at protected site  | Running .   | Monriav, June 28, 2021 12:02:52 PM  |  |   |
| 3. Resume VMs suspended by previous re   | KOWEY .   |   |  |   |
| 4. Restore recovery site hosts from standb   | by l  |   |  |   |
| 5. Restore protected site hosts from stand   | toy   |   |  |   |
| > 🛱 6. Prepare protected site VMs for migratic   | on  |   |  |   |
| > 🔄 7. Synchronize storage   |   |   |  |   |
| 8. Suspend non-critical VMs at recovery sit  |   |   |  |   |
| > 1 9. Change recovery site storage to writable  | IN SC2-AZ2-Oracle-RP EDIT MOVE DILETE   | TEST CLEANUP RUN ····   |  |   |
| 10. Power on priority 1 VMs  | Summer Press Steers History Device  | Destantion Proving Vistual Manhloon   |  |   |
| 2 11. Power on priority 2 VMs  | sommary Recovery steps issues History Permission  | Protection groups wintual machines  |  |   |
|  |   |   |  |   |
| > 3 12. Power on priority 3 VMs  | EXPORT STEPS TEST CLEANUP RUN REPROTECT CA  | une -   |  |   |
| 12. Power on priority 3 VMs     13. Power on priority 4 VMs     14. Power on priority 5 VMs  | EXPORT STEPS TEST CLEANUP RUN REPROTECT CA  | ind :<br>covery complete  |  |   |
| <ul> <li>3 12. Power on priority 3 VMs</li> <li>3 . Power on priority 4 VMs</li> <li>4. Power on priority 5 VMs</li> </ul>   | EXPORT STEPS   1753 CLEANUP HUN REPROTECT CAN   | covery complete<br>covery has completed. Review the plan history to view any erre<br>plan in reprotect mode, then once protection is configured in  | ns or warnings. You can now press Reprotect to configure protection in the<br>revenue, you can run the plan in recovery mode to fathack the virtual mach   | reverse cirection. Note that if you plan to failback the virtual mach<br>set to the original site.  |
| <ul> <li>D. Power on priority 3 VMs</li> <li>D. Power on priority 4 VMs</li> <li>D. Power on priority 5 VMs</li> <li>V. Power on priority 5 VMs</li> </ul>         | EXPORT STEPS   YEST CLEANUP IN.H REPROTECT CAN  | covery somprete<br>covery has completed. Beview the plan history to view any em-<br>plan in reprotect mode, then once protection is configured in<br>Status   | ns or warnings. You can now press Reprotect to configure protection in the<br>reverse, you can run the plan in recovery mode to failback the virtual mach<br>Step Started  | reverse direction. Note that If you plan to failback the virtual mach<br>nes to the original alle.<br>Step Competed   |
| <ul> <li>D. Power on priority 3 VMs</li> <li>T. Power on priority 4 VMs</li> <li>T. Power on priority 5 VMs</li> <li>M. Power on priority 5 VMs</li> </ul>         | EXPORT STEPS TYES CLEANUP IN REPROTECT CAN<br>Plan status:   Plan status:  Description:  The re<br>run the  Recovery Step  S. Pre-synchronize storage   | covery templete<br>covery templete. Review the plan history to view any err<br>plan in reprotect mode, then once protection is configured in<br>Status<br>V Success   | ins or warnings. You can now press Reprotect to configure protection in the<br>reverse, you can run the plan in recovery mode to failback the virtual maching<br>the started<br>Monteg, June 38, 2021 12:02:52 PM  | reverse direction. Note that If you plan to failback the virtual mach<br>nes to the original site.<br><b>Step Competed</b><br>Monologi, June <b>28</b> , 2021 12:02:32 PM   |
| <ol> <li>D. D. Ower on pilotity 3 VMs.</li> <li>D. Tower on pilotity 4 Mds.</li> <li>I. Newer on pilotity 5 VMs.</li> </ol>  | EXPORT STEPS         TY ST         CLEANUP         INUM         REPROTECT         CAL           Plan status:         Image: Comparison of the s   | covery somprete<br>covery has concreteded. Beylees the plan Nstory to view any error<br>plan in reprotect mode, then once protection is configured in<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status   | ins or warnings. You can now press Reprotect to configure protection in the<br>reverse, you can not the plan in recovery mode to faitback the virtual mach<br><b>Step Started</b><br>Monings, June 38, 2021 32,252 PM<br>Monings, June 38, 2021 32,252 PM  | revenue direction. Note that if you plan to failback the virtual mach<br>nes to the original allo.  |
| B 2 Power on ploting 3 VMs     Stronger on ploting 4 VMs     Stronger on ploting 5 VMs   | EXPORT STEPS         TEST         CLEANUP         INIT         REMOTECT         CAL           Plan status:         Image: Clean status:         Imag   | covery tomprate<br>covery has comprated. Review the plan history to view any error<br>plan in reprotect mode, then once protection is configured in<br>status<br>Status<br>Status<br>Status<br>Status   | rs or warnings. You can now press Reprotect to configure protection in the<br>reverse, you can run the plan in recovery mode to failback the virtual inacti<br>Rep Started<br>Monday, June 28, 2021 12:02:52 PM<br>Monday, June 28, 2021 12:02:52 PM   | reverse cliection. Note that If you plan to failback the virtual mach<br>nes to the original alle.<br>Step Competent<br>Monday, June 38, 2021 12:20:52 PM<br>Monday, June 28, 2021 12:20:53 PM  |
| <ul> <li>III V. Power on ploady 3 VMs</li> <li>III Sever on ploady 4 VMs</li> <li>III Rever on ploady 3 VMs</li> </ul>   | EXPORT STEPS         TYEST         CLEARUP         INUM         REPROTECT         CAL           Plan status:         Image: The status         Image:   | covery Somprete<br>covery has consolited. Beylew the plan Nstory to slew any err<br>e plan in reprotect mode, then once protection is configured in<br>States<br>States<br>States<br>Success<br>Success   | ins or warnings. You can now press. Reprotect to configure production in the<br>revenue, you can run the para in recovery mode to failback the virtual maching<br>Step Starket<br>Monrieg, June 38, 2021 12:02:32 PM<br>Monrieg, June 38, 2021 12:02:32 PM   | revenue direction. Note that if you plan to failback the virtual mach<br>nees to the original alle.<br>Step Completed<br>Montegy, June 38, 2021 12:02:52 PM<br>Montegy, June 38, 2021 12:02:53 PM<br>Montegy, June 38, 2021 12:02:53 PM   |
| <ul> <li>B. 2. Power on priority 3 VMs</li> <li>I.3. Power on priority 4 VMs</li> <li>S. F. Power on priority 5 VMs</li> </ul>                                     | EXPORT STEPS YES CLEARUP IN IN REPORTED CAN Plan status:  Plan status: P | covery somplete<br>covery has completed. Beview the plan history to view any em-<br>plan in reprotect mode, then once protection is configured in<br>Status<br>Status<br>Status<br>Success<br>Success<br>Success  | ris or warnings. You can now press Reprotect to configure protection in the<br>reverse, you can run the plan in recovery mode to falback the virtual mach<br>generative stress of the plan in recovery mode to falback the virtual mach<br>Moning, June 38, 2021 320.252 PM<br>Moning, June 38, 2021 320.252 PM<br>Moning, June 38, 2021 320.252 PM  | revense direction. Note that If you plan to fallback the virtual mach<br>nes to the original site.<br><b>Step Competed</b><br>Money, June 28, 2021 12:02:32 PM<br>Money, June 28, 2021 12:02:33 PM<br>Money, June 28, 2021 12:02:33 PM  |
| <ul> <li>III 2: Power on plotty 3 VMs</li> <li>III 2: Power on plotty 3 VMs</li> <li>II 4: Power on plotty 3 VMs</li> </ul>  | EXPORT STEPS     115.3     CLEARUP     PLAN     REMOTECT     CLEARUP       Plan status:     Image:   | covery Somprete<br>covery has consistent. Beylew the plan Niskov to view any error<br>plan in reprotect mode, then once protection is configured in<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status | ins or warnings. You can now press. Reprotect to configure protection in the<br>reverse, you can run the plan in recovery mode to fallback the virtual mach<br>Mending. June 38, 2007 12:02:52 PM<br>Monding. June 38, 2007 12:02:52 PM<br>Monding. June 38, 2007 12:02:53 PM<br>Monding. June 38, 2007 12:02:03 PM<br>Monding. June 38, 2007 12:02:03 PM  | reverse citection. Note that if you plan to failback the virtual mach<br>ness to the original alle.<br>Step Competition<br>Monday, June 38, 3021 12:02:32 PM<br>Monday, June 38, 3021 12:02:33 PM<br>Monday, June 38, 3021 12:03:33 PM<br>Monday, June 38, 3021 12:03:33 PM   |
| <ul> <li>■ 0. Power on ploting 3 VMs</li> <li>■ 3. Power on ploting 4 VMs</li> <li>■ 0. Power on ploting 5 VMs</li> </ul>  | EXPORT STEPS         YEST         CLEARUP         INL         REPORTET         CLEARUP           Plan status:         Image: Clearup         I  | covery somprete<br>covery has completed. Review the plan Nidory to view any em-<br>plan in reproduct mode, then once protection is configured in<br>Status<br>Status<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success  | Ins or warnings. You can now press Reprotect to configure protection in the<br>revenue, you can run the plan in recovery mode to faitback the virtual mach<br>Monetage, June 38, 2001 12:02:52 PM<br>Monetage, June 38, 2001 12:02:52 PM<br>Monetage, June 38, 2001 12:02:53 PM<br>Monetage, June 38, 2001 12:03:53 PM<br>Monetage, June 38, 2001 12:03:53 PM  | reverse direction. Note that If you plan to fallback the virtual mach<br>nes to the original value.<br><b>Step Completed</b><br>Moning, June 38, 2021 12:02:02 PM<br>Moning, June 38, 2021 12:02:03 PM                                     |
| B 22 Power on ploting 3 VMs     Constraint on ploting 4 VMs     S. Power on ploting 5 VMs     S. Tower on ploting 5 VMs  | EXPORT STEPS         TEST         CLEARUP         INL         REPORTET         CLEARUP         INL         Reported         INL         INL <td>covery templete<br/>covery templeted. Review the plan history to view any error<br/>plan in reprotect mode, then once protection is configured in<br/>Status<br/>Status<br/>Success<br/>Success<br/>Success<br/>Success<br/>Success<br/>Success<br/>Success<br/>Success<br/>Success<br/>Success<br/>Success</td> <td>rs or warnings. You can now press Reprotect to configure protection in the<br/>reverse, you can run the plan in recovery mode to failback the virtual mach<br/>Rep Started<br/>Monday, June 38, 2021 12:02:52 PM<br/>Monday, June 38, 2021 12:02:52 PM<br/>Monday, June 38, 2021 12:02:53 PM<br/>Monday, June 38, 2021 12:03:03 PM<br/>Monday, June 38, 2021 12:03:03 PM</td> <td>reverse direction. Note that If you plan to failback the virtual mach<br/>nes to the original site.</td>  | covery templete<br>covery templeted. Review the plan history to view any error<br>plan in reprotect mode, then once protection is configured in<br>Status<br>Status<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success  | rs or warnings. You can now press Reprotect to configure protection in the<br>reverse, you can run the plan in recovery mode to failback the virtual mach<br>Rep Started<br>Monday, June 38, 2021 12:02:52 PM<br>Monday, June 38, 2021 12:02:52 PM<br>Monday, June 38, 2021 12:02:53 PM<br>Monday, June 38, 2021 12:03:03 PM<br>Monday, June 38, 2021 12:03:03 PM  | reverse direction. Note that If you plan to failback the virtual mach<br>nes to the original site.  |
| <ul> <li>B) 20 Power on plotty 3 VMs</li> <li>B) 31 Power on plotty 4 VMs</li> <li>B A Power on plotty 5 VMs</li> </ul>  | EXPORT STEPS         1753         CLEARUP         HUL         REMOTECT         CAL           Plan status:         Image: Comparison of the status         Image: Compariso  | Covery Somprete<br>covery has concretelled. Beylew the plan fishory to view any err<br>e plan in reprotect mode, then once protection is configured in<br>Statu<br>Status<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success   | ris or warnings. You can new press Reprotect to configure protection in the<br>reverse, you can not the plan in recovery mode to faitback the virtual mach<br>devices and the plan in recovery mode to faitback the virtual mach<br>Moning, June 38, 2021 12:02:52 PM<br>Moning, June 38, 2021 12:02:52 PM<br>Moning, June 38, 2021 12:02:53 PM<br>Moning, June 38, 2021 12:03:03 PM<br>Moning, June 38, 2021 12:03:03 PM<br>Moning, June 38, 2021 12:03:03 PM | revenue direction. Note that If you plan to failback the virtual mach<br>nes to the original allo.<br><b>Step Completed</b><br>Moning, June 38, 2001 12:02:32 PM<br>Moning, June 38, 2001 12:02:33 PM |
| <ul> <li>B. 2. Power on priority 3 VMs</li> <li>B. Power on priority 4 VMs</li> <li>S. Power os priority 5 VMs</li> </ul>  | EXPORT STEPS         YEST         CLEARUP         INL         REPORTET         INL         INL         REPORTET         INL   | covery somplete<br>covery has completed. Believ the plan fistory to view any em-<br>plan in reprotect mode, then once protection is configured in<br>Status<br>Status<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success  | rs or warnings. You can now press Reprotect to configure protection in the<br>reverse, you can run the plan in recovery mode to falback the virtual mach<br>set of the plan in recovery mode to falback the virtual mach<br>Monday, June 38, 2021 12:02:52 PM<br>Monday, June 38, 2021 12:02:52 PM<br>Monday, June 38, 2021 12:02:52 PM<br>Monday, June 38, 2021 12:03:03 PM<br>Monday, June 38, 2021 12:03:03 PM<br>Monday, June 38, 2021 12:03:22 PM         | revense direction. Note that If you plan to fallback the virtual mach<br>nes to the original site.<br><b>Step Competed</b><br>Monday, June 38, 2021 12:02:22 PM<br>Monday, June 38, 2021 12:03:03 PM  |
| <ol> <li>B. Y. Power on ploting 3 VMs</li> <li>Theorem ploting 4 VMs</li> <li>Theorem ploting 5 VMs</li> <li>M. Power on ploting 5 VMs</li> </ol>                  | EXPORT STEPS     115.3     CLEARUP     HUL     REMOTECT     CLEARUP       Plan status:     Image: Clearup     Image: Clearup     Image: Clearup     Image: Clearup       Description:     The model     The model     Image: Clearup     Image: Clearup       S     Image: Clearup     Image: Clearup     Image: Clearup     Image: Clearup       S     Image: Clearup     Image: Clearup     Image: Clearup     Image: Clearup       S     Image: Clearup     Image: Clearup     Image: Clearup     Image: Clearup       S     Image: Clearup     Image: Clearup     Image: Clearup     Image: Clearup       S     Image: Clearup     Image: Clearup     Image: Clearup     Image: Clearup       S     Image: Clearup     Image: Clearup     Image: Clearup     Image: Clearup       S     Image: Clearup     Image: Clearup     Image: Clearup     Image: Clearup       S     Image: Clearup     Image: Clearup     Image: Clearup     Image: Clearup       S     Image: Clearup     Image: Clearup     Image: Clearup     Image: Clearup       S     Image: Clearup     Image: Clearup     Image: Clearup     Image: Clearup       S     Image: Clearup     Image: Clearup     Image: Clearup     Image: Clearup       S     Image: Clearup<   | Convery Somprete<br>convery tax controlited. Beylew the plan Nstory to slew any err<br>a plan in reprotect mode, then once protection is configured in<br>State:<br>State:<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success   | ins or warnings. You can now press Reprotect to configure protection in the<br>revenue, you can run the pair in recovery mode to failback the virtual mach<br>Moning, June 38, 2021 12:02:32 PM<br>Moning, June 38, 2021 12:02:32 PM<br>Moning, June 38, 2021 12:02:32 PM<br>Moning, June 38, 2021 12:03:03 PM<br>Moning, June 38, 2021 12:03:03 PM<br>Moning, June 38, 2021 12:03:12 PM   | revenue direction. Note that if you plan to failback the virtual mach<br>new to the original alle.<br>Step Canadested<br>Monetag, June 38, 2021 12:02:32 PM<br>Monetag, June 38, 2021 12:02:33 PM<br>Monetag, June 38, 2021 12:02:33 PM<br>Monetag, June 38, 2021 12:02:32 PM<br>Monetag, June 38, 2021 12:02:32 PM                                       |
| <ul> <li>III 2: Dever on ploady 3 VMs</li> <li>III 2: Dever on ploady 4 VMs</li> <li>III 2: Dever on ploady 4 VMs</li> <li>III 4: Dever on ploady 5 VMs</li> </ul> | EXPORT STEPS     115.31     CLEARUP     RUL     RUPOTECT     CLEARUP       Plan status:     Image: Rule     Image: Rule     Image: Rule       Description:     The regression       Status:     Image: Rule       Status:     Rule       S  | covery somprete<br>covery has consistent. Beview the plan history to view any em-<br>plan in reprotect mode, then once protection is configured in<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status<br>Status  | ns or warnings. You can now press Reprotect to configure protection in the<br>reverse, you can run the plan in recovery mode to faitback the virtual mach<br><b>Step Started</b><br>Mondag, June 38, 2021 202232 PM<br>Mondag, June 38, 2021 202232 PM<br>Mondag, June 38, 2021 202303 PM<br>Mondag, June 38, 2021 202302 PM                          | revenue clinection, Note that II you plan to fallback the virtual mach<br>nes to the original value<br>Monetay, June 38, 2021 12/2023 22 PM<br>Monetay, June 38, 2021 12/2023 22 PM<br>Monetay, June 38, 2021 12/2023 20 PM<br>Monetay, June 38, 2021 12/2023 20 PM<br>Monetay, June 38, 2021 12/2023 29 PM<br>Monetay, June 38, 2021 12/2023 2PM         |
| <ol> <li>B. Y. Rover on ploting 3 VMs</li> <li>J. Rover on ploting 4 VMs</li> <li>J. Rover on ploting 5 VMs</li> </ol>   | EXPORT STEPS     1453     CLEARUP     PLAN     REMOTECT     CLEARUP       Plan status:     Image: Clearup     Image: Clearup     Image: Clearup     Image: Clearup       Description:     The model     Image: Clearup     Image: Clearup     Image: Clearup       No.     Status     Image: Clearup     Image: Clearup     Image: Clearup       No.     Status     Image: Clearup     Image: Clearup       No.     Status     Image: Clearup     Image: Clearup       No.     Status     Image: Clearup     Image: Clearup       Status     <  | covery somprete<br>covery somprete<br>a plan in reprotect mode, then once protection is configured in<br>status<br>Status<br>Status<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success  | ins or earthings. You can now press. Reported: to configure production in the<br>revenue, you can run the period of the second of the second model of failback the virtual mach<br>Moneting. June 38, 2001 12:02:32 PM<br>Moneting. June 38, 2001 12:02:32 PM<br>Moneting. June 38, 2001 12:02:33 PM<br>Moneting. June 38, 2001 12:03:33 PM<br>Moneting. June 38, 2001 12:03:33 PM<br>Moneting. June 38, 2001 12:03:32 PM                                      | revenue direction. Note that if you plan to failback the virtual mach<br>nees to the original alle.   |

FIGURE 192. Planned Migration of Recovery Plan SC2-AZ2-Oracle-RP in Process


Planned migration of recovery plan **SC2-AZ2-Oracle-RP** is successful. Protected Site A VMs are powered off and Recovery Site B VMs are powered on.

| DI BCA-SiteC ACTIONS         | ~             |          |     | []] AZ2BCA11       | ACTIONS     | ×             |          |        |
|------------------------------|---------------|----------|-----|--------------------|-------------|---------------|----------|--------|
| Summary Monitor Configur     | e Permissions | Hosts    | √Ms | Summary Monitor    | Configur    | e Permissions | Hosts    | VMs    |
| Virtual Machines VM Template | es vApps      |          |     | Virtual Machines   | VM Template | es vApps      |          |        |
|                              |               |          |     |                    |             |               |          |        |
| Name ↑ ~                     | State ~       | Status   | ~   | Name ↑             | ~           | State         | ✓ Status |        |
| Dracle19c-OL8                | Powered Off   | 🗸 Normal |     | 🔂 Oracle19c-OL8    | í           | Powered On    | N        | lormal |
| Dracle19c-OL8-RMAN           | Powered Off   | 🗸 Normal |     | 🔂 Oracle19c-OL8-RM | IAN         | Powered On    | ✓ N      | lormal |

FIGURE 193. Planned Migration of Recovery Plan SC2-AZ2-Oracle-RP VM Status

Recovery Site B Oracle VMs Oracle19c-OL8 and Oracle19c-OL8-RMAN are powered on with the IP addressing scheme defined per network mappings to recovery network APPS-1810.

As in the case of testing the recovery plan, the Oracle VM **Oracle19c-OL8** is up with IP address 172.18.10.45 and the database vvol19c is up. The alert log for the database shows no errors. Oracle crash recovery is performed when the database starts up, which is normal and expected. The Oracle VM **Oracle19c-OL8-RMAN** is up with IP address 172.18.10.46 and the database **rmandb** is up. The alert log for the database **rmandb** shows no errors. Oracle crash recovery is performed when the database **rmandb** starts up, which is normal and expected.

As mentioned earlier, write-order fidelity is guaranteed with vSphere Replication on the disks or VMDKs that comprise a VM.

| 🕸 Oracle19c-OL8   | D 🖸 🚰 🖑 🖄 🕴 ACTIONS 🗸  | 🕏 Oracle19c-OL8-RMAN   | D 🖸 🛱 🖓 🔞 🔺 ACTIONS 🗸   |
|---|--|--|---|
| Summary Monitor Conf                                      | ligure Permissions Datastores Networks Snapshots Updates   | Summary Monitor Configure F  | Permissions Datastores Networks Snapshots Updates   |
| Powered On<br>LAUNCH WEB CONSOLE<br>LAUNCH REMOTE CONSOLE | Guest OS:     Oracle Linux 8 (64-bit)       Compatibility:     ESX1 7.0 and later (VM version 177)       VMvare Tools:     Running, version11296 (Guest Managed)       MORE:     No resr (D=c)@corp.localdomain       Ph Addresses:     7.72.18.10.45       Host:     az2esx23.vsiab.local | Guest OS<br>Compatib<br>VMware 1<br>Powered On DNS Nam<br>IP Addres<br>LAUNCH WEB CONSOLE<br>LAUNCH REMOTE CONSOLE | S Oracle Linux 8 (64-bit)<br>SIIIty: ESXI 7.0 and later (VM version 17)<br>Tools: Running, version11296 (Guest Managed)<br>MORE INFO<br>oracje190-ol6-man.corp.localdomain<br>set 22.18.10.46<br>ar2esx22.vslab.local |
| VM Hardware   |  | VM Hardware  |   |
| N CPU   | 12 CDI //e1  | > CPU  | 8 CPU(s)  |
| > Mamony  | 128 GP 11 E2 GP memory active  | > Memory   | 96 GB, 16.32 GB memory active   |
| > Hand dials 4  |  | > Hard disk 1  | 80 GB   |
| 5 Hard disk i   | 80 68  | Total hard disks   | 5 hard disks  |
| Total hard disks  | 5 hard disks   | > Network adapter 1  | APPS-1810 (connected)   |
| > Network adapter 1                                       | APPS-1810 (connected)  | CD/DVD drive 1   | Disconnected  |
| CD/DVD drive 1  | Disconnected   |  | AND   |
| > Video card  | 8 MB   | > Video card   | 4 MB  |
| VMCI device   | Device on the virtual machine PCI bus that provides support for the<br>virtual machine communication interface   | VMCI device  | Device on the virtual machine PCI bus that provides support for the<br>virtual machine communication interface  |
| > Other   | Additional Hardware  | > Other  | Additional Hardware   |
| Compatibility   | ESXI 7.0 and later (VM version 17)   | Compatibility  | ESXi 7.0 and later (VM version 17)  |

FIGURE 194. After Planned Migration of Recovery Plan SC2-AZ2-Oracle-RP VM Networking



At the successful completion of the planned migration, run **Reprotect** to protect Site B, which is now the new protected site.



FIGURE 195. Reprotect VMs after Planned Migration of Recovery Plan SC2-AZ2-Oracle-RP

Reprotection of VMs after planned migration of recovery plan SC2-AZ2-Oracle-RP is as shown below:

| EXPORT STEPS TEST CLEANUP RUN REP              | PROTECT CANCEL                             |  |                    |              |
|--|--|--|--------------------|--------------|
| Plan status:                                   | Reprotect in progress                      |  |                    |              |
|  | 30%  |  |                    |              |
| Description:                                   | Reprotect in progress                      |  |                    |              |
|  |  |  |                    |              |
| Recovery Step                                  | Status                                     | Step Started                           |                    |              |
| 🗟 1. Restore protected site hosts from standby | ✓ Succes                                   | Monday, June 28, 2021 12:21:18 PM      |                    |              |
| > 🙆 2. Configure storage to reverse direction  | III Running                                | Monday, June 28, 2021 12:21:18 PM      |                    |              |
| 3. Configure protection to reverse direction   |  |  |                    |              |
| > 🎰 4. Clean up storage                        | SC2-AZ2-Ora                                | ACIERP EDIT MOVE DELETE TEST CLE       | ANUP RUN ····      |              |
| > 🔄 5. Synchronize storage                     |  |  |                    |              |
|  | Plan status:<br>Description:               | ightarrow Ready This plan is ready for | r lest or recovery |              |
|  |  |  |                    |              |
|  | Recovery Step                              |  | Status             | Step Started |
|  | > 😒 1. Synchronize stor                    | age                                    |                    |              |
|  | 🗟 2. Restore recovery                      | y site hosts from standby              |                    |              |
|  | 3. Suspend non-crit                        | tical VMs at recovery site             |                    |              |
|  | > 🚱 4. Create writable s                   | storage snapshot                       |                    |              |
|  | > 🛞 5. Configure test ne                   | etworks                                |                    |              |
|  | 6. Power on priority                       | y 1 VMs                                |                    |              |
|  |  |  |                    |              |
|  | 7. Power on priority                       | y 2 VMS                                |                    |              |
|  | <ul> <li>3 8. Power on priority</li> </ul> | y 2 VMs<br>ly 3 VMs                    |                    |              |

FIGURE 196. Reprotection of VMs after Planned Migration of Recovery Plan SC2-AZ2-Oracle-RP in Progress



The reprotect step to protect the Site B is successful. Now the new protected site is Site B and the DR site is Site A.

| SC2-AZ2-Oracle-RP EDIT MOVE DELETE TEST CLEANUP RUN   |                          |   |  |  |
|---|--------------------------|---|--|--|
| zmany Recovery Steps Issues History Permissions Protection Groups Virtual Machines                            |                          |   |  |  |
| Recovery Plan: SC2-AZ2-Oracle-RP<br>Protected State: DR_State<br>Recovery State: Primary_Site<br>Description: |                          |   |  |  |
| ✓ Plan Status   | ✓ VM Status              |   |  |  |
| Plan Status: → Roady  | Ready for Recovery: 2 VM | s |  |  |
| This plan is ready for test or recovery   | In Progress: 0 VM        | s |  |  |
|   | Success: 0 VM            | s |  |  |
| > Recent History  | Warning: 0 VM            | s |  |  |
|   | Error: 0 VM              | s |  |  |
|   | Incomplete: 0 VM         | 5 |  |  |
|   | Total: 2 VMs             | 5 |  |  |

FIGURE 197. Reprotection of VMs after Planned Migration of Recovery Plan SC2-AZ2-Oracle-RP Successful

Run another planned migration to switch the protected site from Site B back to Site A.

| Sensory     Story     Mark     Kithory     Mark       Recompt Res     SOA22-Oracle-RP<br>Romony Res     Name       Name     Recompt Res     SOA22-Oracle-RP<br>Romony Res       Name     Recompt Res     SOA22-Oracle-RP<br>Recompt Res       Name     Name     Name       Pain Status     -> Nady     Name       Table Status     -> Nady     Recompt Res       Table Status     -> Nady     2.V/A       Name     0.V/M   |                  |
|--|------------------|
| Romery File:         S2-32-Order BP<br>(0.5%)           Provide Size:         0.5%           Description:         0.5%           Description:         0.5%           V Plan Statut:         V V Statut:           Plan Statut:         - 3/body           This plan is reacy for fact or incomery         V V Statut:  |                  |
| V Plan Status     Plan Status     Plan Status     Plan Status     Plan Status     Tris gran is ready for test or recovery  |                  |
| Plas Stabuli:        -> Diskdy         Exectly for ferrovery         2 Vols        This grant is ready for less or recovery         is Pragress         0 Vols   |                  |
| This pair is ready for least or recovery 0 VMs   |                  |
|  |                  |
| Noncert Matters  |                  |
| 7 ministration (Constraints)   |                  |
| Increase Contraction Contracti |                  |
| Total 2 VMs  |                  |
| Confirmation options Construction Confirmation Confirmat  | the recovery sit |
| 2 Ready to complete Protected site: DR_Site  |                  |
| Recovery site: Primary_Site  |                  |
| Recovery - SC2-A22- Ready to complete Server connected   |                  |
| Review your selected settings.   |                  |
| I Confirmation options         Name         SC2-AZ2-Oracle-RP         Indextand that this process will permanently after the virtual machines and infrastructure of both the protected and recovery datacenters.   |                  |
| 2 Ready to complete Protected site DR_Site Recovery type   |                  |
| Recovery site Drimary Site Discovery circular  |                  |
| Server connection Connected Replicate recovery site and cancel recovery if errors are encountered. (Sites must be connected and sproge replication must be available).   |                  |
| Number of VMs 2 Disaster recovery  |                  |
| Recovery type Planned migration Planned migration Attempt to replicate recent changes to the recovery site, but otherwise use the most recent storage synchronization data.  |                  |

FIGURE 198. Planned Migration of Recovery Plan SC2-AZ2-Oracle-RP from Site B to Site A



The planned migration from Site B to Site A is successful.

| SC2-AZ2-Oracle-RP                               | E DELETE TEST CLEAN                               | UP RUN ····  |  |
|---|---|--|--|
| Summary Recovery Steps Issues History           | Permissions Protection                            | Groups Virtual Machines  |  |
| EXPORT STEPS   TEST CLEANUP RUN RE              | PROTECT CANCEL                                    |  |  |
| Plan status:                                    | Recovery complete                                 |  |  |
| Description:                                    | The recovery has comp<br>run the plan in reprotec | leted. Review the plan history to view any errors<br>it mode, then once protection is configured in re | s or warnings. You can now press Reprotect to config<br>everse, you can run the plan in recovery mode to faili |
| Recovery Step                                   | Status  | Step Started   | Step Completed   |
| > S 1. Pre-synchronize storage                  | ✓ Success   | Monday, June 28, 2021 12:27:38 PM  | Monday, June 28, 2021 12:27:38 PM  |
| > 📕 2. Shut down VMs at protected site          | ✓ Success   | Monday, June 28, 2021 12:27:38 PM  | Monday, June 28, 2021 12:29:16 PM  |
| 3. Resume VMs suspended by previous recovery    |   |  |  |
| 🛃 4. Restore recovery site hosts from standby   | V Success   | Monday, June 28, 2021 12:29:16 PM  | Monday, June 28, 2021 12:29:16 PM  |
| 🗟 5. Restore protected site hosts from standby  | ✓ Success   | Monday, June 28, 2021 12:29:16 PM  | Monday, June 28, 2021 12:29:16 PM  |
| > 🛱 6. Prepare protected site VMs for migration | ✓ Success   | Monday, June 28, 2021 12:29:16 PM  | Monday, June 28, 2021 12:29:16 PM  |
| > 🔄 7. Synchronize storage                      | ✓ Success   | Monday, June 28, 2021 12:29:23 PM  | Monday, June 28, 2021 12:29:23 PM  |
| 8. Suspend non-critical VMs at recovery site    |   |  |  |
| > 🔞 9. Change recovery site storage to writable | ✓ Success   | Monday, June 28, 2021 12:29:23 PM  | Monday, June 28, 2021 12:29:45 PM  |
| 10. Power on priority 1 VMs                     |   |  |  |
| 2 11. Power on priority 2 VMs                   |   |  |  |
| > 3 12. Power on priority 3 VMs                 | ✓ Success   | Monday, June 28, 2021 12:29:43 PM  | Monday, June 28, 2021 12:33:02 PM  |
| 13. Power on priority 4 VMs                     |   |  |  |
| 14. Power on priority 5 VMs                     |   |  |  |

FIGURE 199. Planned Migration of Recovery Plan SC2-AZ2-Oracle-RP from Site B to Site A steps

VMs on Protected Site A vVOL datastore **OraVVOL** are powered back on and we see the VMs on Recovery Site B are powered off.

| SC2-AZ2-Oracle-RP EDIT NOVE DELETE TEST CLEANUP RUN  |  | Learn more |
|--|--|------------|
| Summary Recovery Steps Issues History Permissions Protection Groups Virtual Machines   |  |            |
| Recovery Plan: SC2-AZ2-Oracle-RP<br>Protected Nam: Oc.,Sine<br>Concord Sine: Paramy_Sine<br>Decorption:  |  |            |
| Your workloads are not protected. Run reprotect.   |  |            |
| ✓ Plan Status  | ✓ VM Status  |            |
| Plan Status: O Recovery complete   | Ready for Recovery:  | 0 VMs      |
| The recovery has completed. Review the plan history to view any errors or warnings. You can now  | In Progress:   | 0 VMs      |
| press reprotect to consigure induction in the reverse direction. Note that it you plan to failoack the<br>virtual machines to the original site, you must first run the plan in reprotect mode, then once protection | Success:   | 2 VMs      |
| is configured in reverse, you can run the plan in recovery mode to failback the virtual machines to the<br>original site.  | Warning:   | 0 VMs      |
|  | Error:   | 0 VMs      |
| > Recent History   | Incomplete:  | 0 VMs      |
| BCA-SiteC Actions      Summary Monitor Configure Permissions Hosts VMs Summary     Virtual Machines VM Templates VApps     Virtual   | 2BCA11 ACTIONS V<br>Monitor Configure Permissions Hosts VMs<br>Machines VM Templates VApps |            |
| Name ↑ ✓ State – _ ✓ Status ✓  | State Status   |            |
| Dracle19c-OL8 Powered On Vormal  | acle19c-OL8   Powered Off   Normal   |            |
| 聞 Oracle19c-OLB-RMAN Powered On Vormal 語 Ora   | acle19c-OL8-RMAN Powered Off Vormal  |            |





Site A Oracle VM **Oracle19c-OL8** and **Oracle19c-OL8-RMAN** are powered on with the IP addressing scheme defined per network mappings to primary network **APPS-1614**.

As in the case of testing the recovery plan, the Oracle VM **Oracle19c-OL8** is up with IP address 172.16.14.45 and the database vvol19c is up. The alert log for the database shows no errors. Oracle crash recovery is performed when the database starts up, which is normal and expected.

The Oracle VM **Oracle19c-OL8-RMAN** is up with IP address 172.16.14.46 and the database **rmandb** is up. The alert log for the database **rmandb** shows no errors. Oracle crash recovery is performed when the database **rmandb** starts up, which is normal and expected.

| 🕈 Oracle19c-OL8   | D 🗖 🛱 🦣 🔞 🛛 Actions 🗸  |         | Cracle19c-OL8-RN  |   | ACTIONS V  | Snanehote Undat         | tar                |
|---|--|---------|---|---|--|-------------------------|--------------------|
| Aunmary Monitor Cont<br>* Powered On<br>.aunch web console<br>.aunch remote console | Igure Permissions Datastores Networks Snapsnots Updates Guest OS: Oracle Linux 8 (64-bit) Compatibility: ESXI 70 and later (VM version 17) VMware Tools: Running, version:11296 (Guest Managed) MoRE INFO DNS Name: Orace@Ecorp.localdomain IP Addresses 172.16.14.45 V3: sc2est1.vsab.local |         | Powered On<br>LAUNCH WEB CONSOLE<br>LAUNCH REMOTE CONSOLE | Guest OS: Ora<br>Compatibility: ES<br>VMware Tools: Rum<br>Moi<br>DNS Name: 010<br>IP Addresses 172<br>Host: 52 | icle Linux 8 (64-bit)<br>(7.0 and later (VM version 17)<br>nning, version 11296 (Guest Manageo<br>Re IMPO<br>call9Col8-man.corp.localdomain<br>16.14.46<br>esh22yseb.local | ))                      |                    |
| VM Hardware   |  | ^       | VM Hardware   |   |  |                         | D                  |
| > CPU   | 12 CPU(s)  |         | > CPU   |   | 8 CPU(s)   |                         |                    |
| > Memory  | 128 GB, 7.68 GB memory active  |         | > Memory  |   | 96 GB, 11.52 GB memory active  |                         |                    |
| > Hard disk 1   | 80 GB  |         | > Hard disk 1   |   | 80 GB  |                         |                    |
| Total hard disks  | 5 hard disks   |         | Total hard disks  |   | 5 hard disks   |                         |                    |
| > Network adapter 1   | APPS-1614 (connected)  |         | > Network adapter 1                                       | <   | APPS-1614 (connected)  |                         |                    |
| CD/DVD drive 1  | Disconnected   | °g⊳ ∨   | CD/DVD drive 1  |   | Disconnected   |                         | 9 <sub>10</sub> ~  |
| > Video card  | 8 MB   |         | > Video card  |   | 4 MB   |                         |                    |
| VMCI device   | Device on the virtual machine PCI bus that provides support for the<br>machine communication interface   | virtual | VMCI device   |   | Device on the virtual machine PCI<br>machine communication interface   | bus that provides suppo | rt for the virtual |
| > Other   | Additional Hardware  |         | > Other   |   | Additional Hardware  |                         |                    |
| Compatibility   | ESXi 7.0 and later (VM version 17)   |         | Compatibility   |   | ESXi 7.0 and later (VM version 17)   |                         |                    |

FIGURE 201. VM Networking Details after Planed Migration from Site B to Site A

Run Reprotect to reprotect the VMs on the Protected Site A.

| SC2-AZ2-Oracle-RP  | MOVE DELETE TEST CLEANUP                         | RUN                               | Learn more   |
|--|--|-----------------------------------|--|
| Summary Recovery Steps Issues H Recovery Issues H Recovery Steps Issues H Reco | Istory Permissions Protection Gro<br>2-Oracle-RP | uos Virtual Machines              |  |
| Your workloads are not protected. Run reprot   | lect.  |                                   | С переотест  |
|  |  | Reprotect - SC2-AZ2-<br>Oracle-RP | Confirmation options   |
|  |  | 1 Confirmation options            | Reprotect Contirmation Running reprotect on this plan will commit the results of the recovery, and configure protection in the reverse direction.  |
|  |  | 2 Ready to complete               | New protected site: Primary_Sile<br>New recovery site: DecSile<br>Server connected: Connected<br>Name of VMs: 2  |
| Reprotect - SC2-AZ2-<br>Oracle-RP  | Ready to complet<br>Review your selected se      | te<br>ettings.                    | I understand that this operation cannot be undone. Reprotect options   |
| 1 Confirmation options   | Name   | SC2-AZ2-Oracle-RP                 | Reprotect operations include steps to clean up the original datastores and devices. If you are experiencing errors during<br>cleanup steps, you may choose the force cleanup option to ignore all errors and return the plan to the Ready state. If you us |
| 2 Ready to complete  | New protected site                               | Primary_Site                      | this option, you may need to clean up your storage manually, and you should run a Test as soon as possible.  |
|  | New recovery site                                | DR_Site                           | Force cleanup  |
|  | Server connection                                | Connected                         |  |
|  | Number of VMs                                    | 2                                 |  |
|  | Force cleanup                                    | Do not ignore cleanup warnings    |  |

FIGURE 202. Reprotect Site A VMs After Failback



Reprotection of Protected Site A vVOL VMs successful.

| SC2-AZ2-Oracle-RP EDIT MOVE DELETE TEST CLEANUP RUN   | Le                      | iam m |
|---|-------------------------|-------|
| Summary Recovery Steps Issues History Permissions Protection Groups Virtual Machines Recovery Plan: SC2-AZ2-Oracle-RP Protected Ster: Primary_Ste |                         |       |
| Recovery Stat: DR_State<br>Description:   |                         |       |
| ✓ Plan Status   | ✓ VM Status             |       |
| Plan Status: → Ready  | Ready for Recovery: 2 \ | VMs   |
| This plan is ready for test or recovery   | In Progress: 01         | VMs   |
|   | Success: 01             | VMs   |
| > Recent History  | Warning: 01             | VMs   |
|   | Error: 01               | VMs   |
|   | Incomplete: 01          | VMs   |
|   | Total: 2 \              | VMs   |

#### FIGURE 203. Reprotect Site A VMs After Failback Successful

More information regarding running a planned migration can be found in the VMware Site Recovery Manager guide.

#### Run Recovery Plan for Disaster Recovery

Disaster Recovery – During a disaster recovery, Site Recovery Manager first attempts a storage synchronization. If it succeeds, Site Recovery Manager uses the synchronized storage state to recover VMs on the recovery site to their most recent available state, according to the recovery point objective (RPO) that you set when you configure replication.

When you run a recovery plan to perform a disaster recovery, Site Recovery Manager attempts to shut down the VMs on the protected site. If Site Recovery Manager cannot shut down the VMs, Site Recovery Manager still powers on the copies at the recovery site.

In case the protected site comes back online after disaster recovery, the recovery plan goes into an inconsistent state, where production VMs are running on both sites, known as a split-brain scenario. Site Recovery Manager detects this state, and you can run the plan again to power off the VMs on the protected site. The recovery plan then returns to a consistent state, and you can run reprotect.

If Site Recovery Manager detects that a datastore on the protected site is in all paths down (APD) state and is preventing a VM from shutting down, Site Recovery Manager waits for a period before attempting to shut down the VM again. The APD state is usually transient, so by waiting for a datastore in the APD state to come back online, Site Recovery Manager can gracefully shut down the protected VMs on that datastore.

| SC2-AZ2-Oracle-RP EDIT MOVE DELETE   | TEST CLEANUP RUN                                    |   | Learn mi   |
|--|---|---|--|
| Summary Recovery Steps Issues History Permissio  | ons Protection Groups Virtual Machines              |   |  |
| Recovery Plan: SC2-A22-Oracle-RP<br>Preticted the: Penner, Sie<br>Becory file: 08.5%<br>Deception: 08.5% |   |   |  |
| ✓ Plan Status  |   | V VM Status                                       |  |
| Plan Status: → Reacy   |   | Ready for Recoverys                               | 2 VMs  |
| This plan is ready fo  | rr test or recovery                                 | In Progress:                                      | 0 VMs  |
|  |   | Success   | 0 VMs  |
| > Recent History   |   | Warning:  | 0 VMs  |
|  |   | Errori  | 0 VMs  |
|  |   |   | Total: 2 VMs   |
| Recovery - SC2-AZ2-<br>Oracle-RP   | Ready to complete<br>Review your selected settings. | racte-RP 1 confirmation options 2 Ready to mplete | Recovery confirmation  Revealing this plan in recovery mode will attempt to shat down the VMs at the protected site and recover the VMs at the recovery site Protected site: Primary_Site Recovery site: DR_Site Server connection: Connected Number of VMs: 2 |
| 1 Confirmation options   | Name  | SC2-AZ2-Oracle-RP                                 | I understand that this process will permanently alter the virtual machines and infrastructure of both<br>the protected and recovery datacenters.   |
| 2 Ready to complete  | Protected site                                      | Primary_Site                                      | Recovery type  |
|  | Recovery site                                       | DR_Site   | Planned migration  |
|  | Server connection                                   | Connected   | Replicate recent changes to the recovery site and cancel recovery if errors are encountered. (Sites must be connected and  |
|  | Number of VMs                                       | 2   | scorage representation must be available.)   |
|  | Recovery type                                       | Disaster recovery                                 | Attempt to replicate recent changes to the recovery site, but otherwise use the most recent storage synchronization data.<br>Confinue recovery even if errors are encountered.   |
|  | Forced recovery                                     | Do not force recovery                             |  |

Steps to run a disaster recovery scenario of recovery plan SC2-AZ2-Oracle-RP are as shown below:

FIGURE 204. Disaster Recovery Use Case for Recovery Plan SC2-AZ2-Oracle-RP

Disaster recovery of recovery plan **SC2-AZ2-Oracle-RP** is successful. Protected Site A VMs are powered off and Recovery Site B VMs are powered on.

| SC2-AZ2-Oracle-RP EDIT NOVE DELETE TEST  | CLEANUP RUN   |                     |                     |             | Learn more   |
|--|---|---------------------|---------------------|-------------|--------------|
| Summary Recovery Steps Issues History Permissions Pro  | stection Groups Virtual Machines  |                     |                     |             |              |
| Recovery Plan: SC2-AC2-Oracle-RP<br>Protected Size: Pinnar, Six<br>Recovery Size: 06, Six<br>Decorption:   |   |                     |                     |             |              |
| A Your workloads are not protected. Run reprotect.   |   |                     |                     |             |              |
| ✓ Plan Status  |   | ✓ VM Status         |                     |             |              |
| Plan Status: O Recovery complete   |   | Ready for Recovery: |                     |             | 0 VMs        |
| The recovery tas completed. A<br>press Reprotect to checking press Reprotect to checking the pre | eview the plan history to view any errors or warnings. You can now<br>rotection in the reverse direction. Note that if you plan to failback the   | In Progress:        |                     |             | 0 VMs        |
| virtual machines to the original<br>is configured in reverse, you ca   | site, you must first run the plan in reprotect mode, then once protection<br>in the plan in recovery mode to fallback the virtual machines to the | Success:            |                     |             | 2 VMs        |
| original site.   |   | Error:              |                     |             | 0 VMs        |
| > Recent History   |   | Incomplete:         |                     |             | 0 VMs        |
|  |   |                     |                     |             | Total: 2 VMs |
| BCA-SiteC Actions ~  |   | (]) AZ2E            | 3CA11 Actions V     |             |              |
| Summary Monitor Configure  | Permissions Hosts VMs   | Summary             | Monitor Configure   | Permissions | Hosts VMs    |
| Virtual Machines VM Templates  | vApps   | Virtual Ma          | chines VM Templates | vApps       |              |
|  |   |                     |                     |             |              |
| Name ↑   | ✓ State ✓ Status  | Name ↑              | · ·                 | State ~     | Status       |
| ကြီး Oracle19c-OL8   | Powered Off V Normal  | 🔂 Oracle            | 19c-OL8             | Powered On  | 🗸 Normal     |
| Dracle19c-OL8-RMAN   | Powered Off   | 🔂 Oracle            | 19c-OL8-RMAN        | Powered On  | V Normal     |

FIGURE 205. VM's Status after Disaster Recovery Run of Recovery Plan SC2-AZ2-Oracle-RP



Recovery Site B Oracle VMs Oracle19c-OL8 and Oracle19c-OL8-RMAN are powered on with the IP addressing scheme defined per network mappings to recovery network APPS-1810.

As in the case of testing the recovery plan, the Oracle VM **Oracle19c-OL8** is up with IP address 172.18.10.45 and the database vvol19c is up. The alert log for the database shows no errors. Oracle crash recovery is performed when the database starts up, which is normal and expected.

The Oracle VM **Oracle19c-OL8-RMAN** is up with IP address 172.18.10.46 and the database **rmandb** is up. The alert log for the database **rmandb** shows no errors. Oracle crash recovery is performed when the database **rmandb** starts up, which is normal and expected.

As mentioned earlier, write-order fidelity is guaranteed with vSphere Replication on the disks or VMDKs that comprise a VM.

| 🕆 Oracle19c-OL8   | D 🖬 🖗 🚳 🛛 ACTIONS 🗸  | 🕏 Oracle19c-OL8-RMA                 | AN 🛛 🖻 🖬 🖓 🔞 🛛 actions 🗸  |
|---|--|-------------------------------------|---|
| Summary Monitor Config                                      | gure Permissions Datastores Networks Snapshots Updates   | Summary Monitor Configu             | ure Permissions Datastores Networks Snapshots Updates   |
| P Powered On<br>LAUNCH WEB CONSOLE<br>LAUNCH REMOTE CONSOLE | Guest OS: Oracle Linux 8 (64-bit)<br>Compatibility: ESX17.0 and later (VM version 17)<br>VMvware Tools: Running, version1236 (Guest Managed)<br>MORE INFO<br>DNS Name: oracle 18/col8/corp localdomain<br>PA Addresses 172, 18.10.45 ≥<br>Host: ez2esx23 vslab.local | Powered On<br>LAUNCH REMOTE CONSOLE | Suest OS: Oracle Linux 8 (64-bit)<br>Compatibility: ESX: 7.0 and later (VM version 17)<br>VM vers Tools: Running, version:11296 (Guest Managed)<br>MORE INFO<br>DNS Name: org.cg/sg/sc-oB-rman.corp.localdomain<br>P. Address / 172:18:10.46<br>ex2esx22. vslab.local<br>V Tools / 172:18:10.46<br>P. Address / 17 |
| VM Hardware   |  | VM Hardware                         |   |
| > CPU   | 12 CPU(5)  | > CPU                               | 8 CPU(s)  |
| > Memory  | 128 GB. 11.52 GB memory active   | > Memory                            | 96 GB, 16.32 GB memory active   |
| > Hard disk 1   | 80 GB  | > Hard disk 1                       | 80 GB   |
| Total hard disks  | 5 hard disks   | Total hard disks                    | 5 hard disks  |
| > Network adapter 1   | APPS-1810 (connected)  | > Network adapter 1                 | APPS-1810 (connected)   |
| CD/DVD drive 1  | Disconnected   | CD/DVD drive 1                      | Disconnected  |
| > Video card  | 8 MB   | > Video card                        | 4 MB  |
| VMCI device   | Device on the virtual machine PCI bus that provides support for t<br>virtual machine communication interface   | e VMCI device                       | Device on the virtual machine PCI bus that provides support for the<br>virtual machine communication interface  |
| > Other   | Additional Hardware  | > Other                             | Additional Hardware   |
| Compatibility   | ESXi 7.0 and later (VM version 17)   | Compatibility                       | ESXi 7.0 and later (VM version 17)  |

FIGURE 206. VM's Networking Status After Disaster Recovery Run of Recovery Plan SC2-AZ2-Oracle-RP

In event of real disaster, Site A may not be available. This use case is a DR exercise, so Site A is available in this instance.

After the successful completion of the disaster recovery exercise and ensuring that Site A is back operationally, run **Reprotect** to protect Site B, which is now the new protected site.



FIGURE 207. Reprotect Site B VMs

Run a planned migration to switch the protected site from Site B back to Site A.

| SC2-AZ2-Oracle-RP EDIT MOVE DELETE   | TEST CLEANUP IEM ***               |                       | Learn m  |
|--|------------------------------------|-----------------------|--|
| Summary Recovery Steps Issues History Permissions  | Protection Groups Virtual Machines |                       |  |
| Recovery Mare: 5C2-A22-Oracle-RP<br>Protocces State: 306-State<br>Encoury State: Foreway, State<br>Oracingations |                                    |                       |  |
| ✓ Plan Status  | ✓ VH St                            | atus                  |  |
| Plan Status:   | Ready fi                           | or Recovery:          | 2 VMs  |
| This plan is ready for te  | ist or recovery is Progr           | ***                   | 0 VMa  |
|  | Success                            |                       | 0 VMs  |
| > Recent History   | Warning                            |                       | O VMs  |
|  | Error                              |                       | 0 VMs  |
|  | Incernel                           | ete:                  | 0 \/\\s  |
|  |                                    |                       | Tota: 2 VMs  |
|  | Reco<br>Oracle<br>1 co<br>2 pe     | rery - SC2-AZ2-<br>RP | Confirmation options Recovery confirmation  Recovery confirmation  Reading the plan in recovery mode will attempt to shad down the VMs at the protected site and recover the VMs at the recovery site Protected site: DR_Site Recovery site: Printing_Site |
| Recovery - SC2-AZ2-  | Ready to complete                  | $\langle \rangle$     | Server connection: Connected   |
| Oracle-RP  | Review your selected settings.     |                       | Number of VMs: 2   |
|  | , ,                                |                       | I understand that this process will permanently alter the virtual machines and infrastructure of both  |
| 1 Confirmation options   | Name                               | SC2-AZ2-Oracle-RP     | the protected and recovery datacenters.  |
| 2 Ready to complete  | Protected site                     | DR_Site               | Recovery type  |
|  | Recovery site                      | Primary_Site          | Planned migration     Replicate recent changes to the recovery site and cancel recovery if errors are encountered. (Sites must be connected and  |
|  | Server connection                  | Connected             |  |
|  | Number of VMs                      | 2                     | Attempt to replicate recent changes to the recovery site, but otherwise use the most recent storage synchronization data. Continue recovery even if errors are encountered.  |
|  | Recovery type                      | Planned migration     |  |

FIGURE 208. Planned Migration from Site B to Site A

# 

Planned migration from Site B to Site A is successful. VMs on Protected Site A are powered back on and we see that VMs on Recovery Site B powered off.

| E SC2-AZ2-Oracle-RP EDIT MOVE DELETE  | TEST CLEANUP RUN   |                     |                |               |               | Learn more |
|---|--|---------------------|----------------|---------------|---------------|------------|
| Summary Recovery Steps Issues History Permissio   | ns Protection Groups Virtual Machines  |                     |                |               |               |            |
| Recovery Plan: SC2-AZ2-Oracle-RP<br>Protoctics Size: OR_Soa<br>Encovery Size: Prevery_Size<br>Desrgistor: |  |                     |                |               |               |            |
| Xour workloads are not protected. Run reprotect.  |  |                     |                |               |               |            |
| ✓ Plan Status   |  | VM Status           |                |               |               |            |
| Plan Status: 🚫 Recovery comple  | ste  | Ready for Recovery: |                |               |               | 0 VMs      |
| The roco on has co  | mpleted. Review the plan history to view any errors or warnings. You can no      | N In Progress:      |                |               |               | 0 VMs      |
| virtual machines to t   | the original site, you must first run the plan in reprotect mode, then once pro- | ection Success:     |                |               |               | 2 VMs      |
| is configureetin reve<br>original site.   | rse, you can the fine plan in recovery mode to failback the virtual machines to  | Warning:            |                |               |               | 0 VMs      |
|   |  | Error:              |                |               |               | O VMs      |
| > Recent History  |  |                     |                |               | Totz          | i: 2 VMs   |
|   |  |                     |                |               |               |            |
| BCA-SiteC         ACTIONS           Summary         Monitor         Configure                             | re Permissions Hosts VI  | []] AZ2             | BCA11 A        | CTIONS V      | issions Hosts | VMs        |
| Virtual Machines VM Templat   | es vApps   | Virtual M           | achines VM T   | emplates vApp | s             |            |
| Name 1  | ✓ State ✓ Status   | Name ↑              |                | State         |               | Status     |
| 🔂 Oracle19c-OL8   | Powered On 🗸 🗸 No  | rmal 🗊 Orac         | le19c-OL8      | Power         | red Off       | 🗸 Norma    |
| 🔂 Oracle19c-OL8-RMAN  | Powered On 🗸 🗸 No  | rmal 🗇 Orac         | le19c-OL8-RMAN | Powe          | red Off       | 🗸 Norma    |

FIGURE 209. Planned Migration from Site B to Site A Successful

Site A Oracle VMs **Oracle19c-OL8** and **Oracle19c-OL8-RMAN** are powered on with the IP addressing scheme defined per network mappings to primary network **APPS-1614**.

As in the case of testing the recovery plan, the Oracle VM **Oracle19c-OL8** is up with IP address 172.16.14.45 and the database vvol19c is up. The alert log for the database shows no errors. Oracle crash recovery is performed when the database starts up, which is normal and expected.

The Oracle VM **Oracle19c-OL8-RMAN** is up with IP address 172.16.14.46 and the database **rmandb** is up. The alert log for the database **rmandb** shows no errors. Oracle crash recovery is performed when the database **rmandb** starts up, which is normal and expected.

| Oracle19c-OL8     Summary Monitor Cont                      | ▷ 🗆 🛱 🤯 ሰ ACTIONS ∨<br>figure Permissions Datastores Networks Snapshots Upd  | ates                 | 🕼 Oracle19c-OL8-RMAN   D 🛛 🛱 🍈 🚺 астюнь 🗸<br>Summary Monitor Configure Permissions Datastores Networks Snapshots Updates |   |                           |
|---|--|----------------------|--|---|---------------------------|
| P Powered On<br>LAUNCH WEB CONSOLE<br>LAUNCH REMOTE CONSOLE | Guest OS: Oracle Linux 8 (64-bit)<br>Competibility: ESKI 70 and later (VM version 17)<br>VM vare Tocis: Running, version:11296 (Guest Managed)<br>More INFO<br>DNS Name: oracle Complexity (Subst Managed)<br>Ph Addresses 7 22 16 14 4 5<br>Host: 22 16 14 4 5<br>Host: sc2essil vseb local |                      | P Powered On<br>LAUNCH WEB CONSOLE<br>LAUNCH REMOTE CONSOLE ①  | Guest OS: Oracle Linux 8 (84-bit)<br>Compatibility: ESXI 7.0 and leter (VM version 17)<br>VMware Tools: Running, version11296 (Guest Managed)<br>MoRE IMPO<br>ONS Name: 172 16.14.46<br>Host: 3-22es712.7916b.local |                           |
| VM Hardware   |  | ^                    | VM Hardware  |   |                           |
| > CPU   | 12 CPU(s)  |                      | > CPU  | 8 CPU(s)  |                           |
| > Memory  | 128 GB, 7.68 GB memory active  |                      | > Memory   | 96 GB, 11.52 GB memory active   |                           |
| > Hard disk 1   | 80 GB  |                      | > Hard disk 1  | 80 GB   |                           |
| Total hard disks  | 5 hard disks   |                      | Total hard disks   | 5 hard disks  |                           |
| > Network adapter 1   | APPS-1614 (connected)  |                      | > Network adapter 1  | ( APPS-1614 (connected) )   |                           |
| CD/DVD drive 1  | Disconnected   | 9 <sub>0</sub> v     | CD/DVD drive 1   | Disconnected  | 9 <sub>6</sub> ~          |
| > Video card  | 8 MB   |                      | > Video card   | 4 MB  |                           |
| VMCI device   | Device on the virtual machine PCI bus that provides supp<br>machine communication interface  | port for the virtual | VMCI device  | Device on the virtual machine PCI bus that provides<br>machine communication interface  | s support for the virtual |
| > Other   | Additional Hardware  |                      | > Other  | Additional Hardware   |                           |
| Compatibility   | ESXI 7.0 and later (VM version 17)   |                      | Compatibility  | ESXI 7.0 and later (VM version 17)  |                           |

FIGURE 210. VM Networking Status after Planned Migration from Site B to Site A Successful

Run Reprotect to reprotect the VMs on the Protected Site A.



FIGURE 211. Reprotect VM on Site A



Reprotection of Protected Site A VMs is successful.

| SC2-AZ2-Oracle-RP EDIT MOVE DELETE TEST CLEANUP RUN   |                     |              |  |  |  |
|---|---------------------|--------------|--|--|--|
| Summary Recovery Steps Issues History Permissions Protection Groups Virtual Machines                        |                     |              |  |  |  |
| Recovery Plan: SC2-AZ2-Oracle-RP<br>Protected Stat: Primitry_Stat<br>Recovery Stat: DR_Stle<br>Descriptions |                     |              |  |  |  |
| ✓ Plan Status   | ✓ VM Status         |              |  |  |  |
| Plan Status: $\rightarrow$ Ready  | Ready for Recovery: | 2 VMs        |  |  |  |
| This plan is ready for test or recovery   | In Progress:        | 0 VMs        |  |  |  |
|   | Success:            | 0 VMs        |  |  |  |
| > Recent History  | Warning:            | 0 VMs        |  |  |  |
|   | Error:              | 0 VMs        |  |  |  |
|   | Incomplete:         | 0 VMs        |  |  |  |
|   |                     | Total: 2 VMs |  |  |  |

#### FIGURE 212. Reprotect VM on Site A Successful

More information regarding the disaster recovery steps of a recovery plan can be found in the VMware Site Recovery Manager guide.

#### VMware Clouds

Site Recovery Manager along with vSphere Replication can be used to provide disaster recovery services from on-premises VMware environment to all other VMware multi-clouds including VMware Cloud on Dell EMC, Google Cloud VMware Engine (GCVE), Azure VMware Solutions (AVS), and Oracle Cloud VMware Solution (OCVS).

VMware site recovery brings VMware enterprise-class SDDC disaster recovery-as-a-service to the AWS Cloud.

This use case focusses on utilizing VMware site recovery to provide disaster recovery to Oracle single-instance VMs **Oracle19c-OL8** and **Oracle19c-OL8-RMAN** from on-premises Site A to VMware Cloud on AWS.

For on-premises, this use cases provisions the Oracle VMs Oracle19c-OL8 and **Oracle19c-OL8-RMAN** on a VMFS datastore, and applies as well to NFS, VMFS, vSAN or vVOL datastores. vSphere Replication operates at a VMDK level, completely independent of underlying datastore storage characteristics.

The underlying storage in VMware Cloud on AWS and other VMware Cloud offerings is VMware hyperconverged storage (vSAN).

#### **Test Recovery Plan**

Steps to test the recovery plan SC2-VMC-Oracle-RP are as shown below:





Confirmation of test recovery plan **SC2-VMC-Oracle-RP** is as shown below:

| Test - SC2-VMC-Oracle-<br>RP<br>- | Ready to complete<br>Review your selected settings.               |                    |  |  |  |  |  |
|-----------------------------------|---|--------------------|--|--|--|--|--|
| 1 Confirmation options            | Name  | SC2-VMC-Oracle-RP  |  |  |  |  |  |
| 2 Ready to complete               | Protected site  | Primary-Site       |  |  |  |  |  |
|                                   | Recovery site   | VMC-DR-Site        |  |  |  |  |  |
|                                   | Server connection   | Connected          |  |  |  |  |  |
|                                   | Number of VMs   | 2                  |  |  |  |  |  |
|                                   | Storage synchronization Replicate recent changes to recovery site |                    |  |  |  |  |  |
|                                   |   | CANCEL BACK FINISH |  |  |  |  |  |

FIGURE 214. Test Recovery Plan SC2-VMC-Oracle-RP Confirmation



The test of the recovery plan completes successfully.

|                                     | D EDIT MOVE DELETE TEST   | CLEANUP RUN                                     | Virtual Machines  |   |   |  |   |
|-------------------------------------|---|---|---|---|---|--|---|
| EXPORT STEPS   TEST CLE             | ANUP RUN REPROTECT CANCEL   |   | The second se |   |   |  |   |
| Plan status:                        | III> Testi  | n progress                                      |   |   |   |  |   |
|                                     | 76%   |   |   |   |   |  |   |
| Description:                        | A test of   | this plan is currently i                        | n progress.   |   |   |  |   |
|                                     |   | $\langle \rangle$                               |   |   |   |  |   |
| Recovery Step                       | Statu   | Step S  | tarted  | Step Completed                            |   |  |   |
| > 🔄 1. Synchronize storage          | 🗸 Su  | iccess Tuesd                                    | lay, August 3, 2021 1:43:58   | PM Tuesday, August 3, 2021 1:43:          | 8 PM  |  |   |
| 🛃 2. Restore recovery site hosts fi | 'rom standby 🗸 Su   | iccess Tuesd                                    | lay, August 3, 2021 1:43:58   | PM Tuesday, August 3, 2021 1:43:          | 8 PM  |  |   |
| 3. Suspend non-critical VMs at r    | recovery site   |   |   |   |   |  |   |
| > 🙆 4. Create writable storage snap | oshot 🗸 Su  | ccess Tuesd                                     | lay, August 3, 2021 1:43:58   | PM Tuesday, August 3, 2021 1:44:6         | 7 PM  |  |   |
| > 🞯 5. Configure test networks      | 🗸 SL  | iccess uesd                                     | lay, August 3, 2021 1:44:06   | PM Tuesday, August 3, 2021 1:44:6         | 7 PM  |  |   |
| 1 6. Power on priority 1 VMs        |   |   |   |   |   |  |   |
| 2 7. Power on priority 2 VMs        |   | \   |   |   |   |  |   |
| > 3 8. Power on priority 3 VMs      | III> Ru   | unning Tuesd                                    | y, August 3, 2021 1:44:07   | PM  |   |  |   |
| 9. Power on priority 4 VMs          |   |   | 1   |   |   |  |   |
| 10. Power on priority 5 VMs         |   |   |   |   |   |  |   |
| L <b>o</b><br>Si                    | SC2-VMC-Oracle-RP     Immary Recovery Steps Issues     EXPORT STEPS TEST CLEANUP  | EDIT MOVE DEL<br>History Permi<br>RUN REPROTECT | ETE EST CLEANU  | P RUN                                     |   |  |   |
|                                     | Plan status:  |   | 🕑 Test complete   |   |   |  |   |
|                                     | Description:  |   | The virtual machines I  | nave been recovered in a test environment | at the recovery site. Review the plan history to view any errors or v | varnings. When you are ready to remove the | test environment, run cleanup on this plan. |
|                                     | Recovery Step   |   | Status  | Step Started                              | Step Completed  |  |   |
| 3                                   | > 🔄 1. Synchronize storage  |   | ✓ Success   | Tuesday, August 3, 2021 1:43:58 PM        | Tuesday, August 3, 2021 1:43:58 PM                                    |  |   |
|                                     | 🛃 2. Restore recovery site hosts from stan  | dby   | ✓ Success   | Tuesday, August 3, 2021 1:43:58 PM        | Tuesday, August 3, 2021 1:43:58 PM                                    |  |   |
|                                     | 3. Suspend non-critical VMs at recovery   | site  |   |   |   |  |   |
| 3                                   | > 🔞 4. Create writable storage snapshol ✓ Success Tuesday, August 3, 2021 1:43.58 PM Tuesday, August 3, 2021 1:44.07 PM |   |   |   |   |  |   |
| 3                                   | 🕽 🚳 5. Configure test networks  |   | ✓ Success   | Tuesday, August 3, 2021 1:44:06 PM        | Tuesday, August 3, 20211:44:07 PM                                     |  |   |
|                                     | 6. Power on priority 1 VMs  |   |   |   |   |  |   |
|                                     | 2 7. Power on priority 2 VMs  |   |   |   |   |  |   |
|                                     | 3 8. Power on priority 3 VMs  |   | ✓ Success   | Tuesday, August 3, 2021 1:44:07 PM        | Tuesday, August 3, 2021 1:46:25 PM                                    |  |   |
|                                     | 9. Power on priority 4 VMs  |   |   |   |   |  |   |
|                                     | 10. Power on priority 5 VMs   |   |   |   |   |  |   |

#### FIGURE 215. Test Recovery Plan SC2-VMC-Oracle-RP Successful

VMs on Protected Site A are still powered on.

| []] BCA-   | SiteC    | ACTIONS     | ~  |           |      |        |      |
|------------|----------|-------------|----|-----------|------|--------|------|
| Summary    | Monito   | or Configur | e  | Permiss   | ions | Hosts  | VMs  |
| Virtual Ma | chines   | VM Template | es | vApps     | ]    |        |      |
|            |          |             | _  |           |      | -      |      |
| Name ↑     |          | ~           | St | ate       | ~    | Status | ~    |
| 🔂 Oracle   | e19c-OL8 |             | Po | owered On | N    | V No   | rmal |
| 🔂 Oracle   | 90-018-R | MAN         | P  | owered On |      | V No   | rmal |

FIGURE 216. Site A VM Details



Oracle VMs **Oracle19c-OL8** and **Oracle19c-OL8-RMAN** on recovery VMware Cloud on AWS are powered on with the IP addressing scheme set per network mappings to test network **Apps Team 01**.

| Summary Monitor Confi   | ▷ 🗖 🐺 🖑 💧 ACTIONS ❤<br>gure Permissions Datastores Networks Snapshots   | Summary Monitor   | RMAN D E 🗳 🖗 🖄 Actions 🗸  |           |
|---|---|---|---|-----------|
| P Powered On<br>LAUNCH WEB CONSOLE<br>LAUNCH REMOTE CONSOLE ① | Guest OS: Oracle Linux 8 (64-bit)<br>Competibility: ESX 7.0 and later (VM version 17)<br>VMvere Tools: Running, version 1296 (Guest Managed)<br>MORE INFO<br>DNS Name: OracleDB-Od VytBh local<br>IP Addresses: IT2.5 IIS.45<br>Host: T0.129.52.4<br>Managed By: description<br>DETAILS | Powered On<br>LAUNCH WEB CONSOLE<br>LAUNCH REMOTE CONSOLE | Guest OS: Oracle Linux 8 (64-bit)<br>Compatibility: ESX 7.0 and later (VM version 17)<br>VMware Tools: Running, version:11296 (Guest Managed)<br>Model INFO<br>DNS Name: orace-Ille-culturgan visab.local<br>IP Addresser<br>Host: To 1729/2015<br>Managed By: description<br>DETAILS |           |
| VM Hardware   |   | VM Hardware   |   |           |
| > CPU   | 12 CPU(s)   | > CPU   | 8 CPU(s)  |           |
| > Memory  | 128 GB, 96 GB memory active   | > Memory  | 96 GB, 53.76 GB memory active   |           |
| > Hard disk 1   | 80 GB   | > Hard disk 1   | 80 GB   |           |
| Total hard disks  | 5 hard disks  | Total hard disks  | 5 hard disks  |           |
| > Network adapter 1   | Apps Team 01 (connected)  | > Network adapter 1                                       | Apps Team O1 (connected)  |           |
| CD/DVD drive 1  | Disconnected  | 9 <sub>D</sub> CD/DVD drive 1                             | Disconnected  | 9         |
| > Video card  | 8 MB  | > Video card  | 4 MB  |           |
| VMCI device   | Device on the virtual machine PCI bus that provides support for the virtu-<br>machine communication interface   | VMCI device   | Device on the virtual machine PCI bus that provides support for th<br>machine communication interface   | e virtual |
| > Other   | Additional Hardware   | > Other   | Additional Hardware   |           |
| Compatibility   | ESXI 7.0 and later (VM version 17)  | Compatibility   | ESXI 7.0 and later (VM version 17)  |           |

FIGURE 217. Test Recovery Plan VM Networking Details

The Oracle VM **Oracle19c-OL8** is up with IP address 172.16.115.45 and the database **vvol19c** is up. The alert log for the database shows no errors. Oracle crash recovery is performed when the database starts up, which is normal and expected.

The Oracle VM **Oracle19c-OL8-RMAN** is up with IP address 172.16.115.46 and the database **rmandb** is up. The alert log for the database **rmandb** shows no errors. Oracle crash recovery is performed when the database **rmandb** starts up, which is normal and expected.

As mentioned earlier, write-order fidelity is guaranteed with vSphere Replication on the disks or VMDKs that comprise a VM. At the successful completion of the test recovery, perform the cleanup of the test recovery as shown below. As part of the cleanup after running a test, the vSphere Replication server removes the redo logs from the disks on the recovery site and discards the changes.

| SC2-VMC-Oracle-RP                              | ELETE TEST CLEANUP      | RUN   |                        |  |   |
|--|-------------------------|---|------------------------|--|---|
| Summary Recovery Steps Issues History Per      | missions Protection Gro | pups Virtual Machines                       |                        |  |   |
| EXPORT STEPS TEST CLEANUP RUN REPROTEC         | T CANCEL                |   |                        |  |   |
| Plan status:                                   | 🕑 Test complete         |   |                        |  |   |
| Description:                                   | The virtual machines ha | ave been recovered in a test environment at | t the recovery site. F | eview the plan history to view any e   | errors or warnings. When you are ready to remove the test environment, run cleanup on this plan.  |
|  |                         |   |                        |  |   |
| Recovery Step                                  | Status                  | Step Started                                | Step Completed         |  |   |
| > 🔄 1. Synchronize storage                     | ✓ Success               | Tuesday, August 3, 2021 1:43:58 PM          | Tuesday, August        | 3, 2021 1:43:58 PM   |   |
| 2. Restore recovery site hosts from standby    | ✓ Success               | Tuesday, August 3, 2021 1:43:58 PM          | Tuesday, August        | 3, 2021 1:43:58 PM   |   |
| 3. Suspend non-critical VMs at recovery site   |                         |   |                        |  |   |
| > 🚱 4. Create writable storage snapshot        | ✓ Success               | Tuesday, August 3, 2021 1:43:58 PM          | Tuesday, August        | 3, 2021 1:44:07 PM   |   |
| > 🚳 5. Configure test networks                 | Success                 | Tuesday, August 3, 2021 1:44:06 PM          | Tuesday, August        | 3, 2021 1:44:07 PM   |   |
| <ol> <li>6. Power on priority 1 VMs</li> </ol> |                         |   |                        |  |   |
| 7. Power on priority 2 VMs                     |                         |   |                        |  |   |
| > 3 8. Power on priority 3 VMs                 | ✓ Success               | Tuesday, August 3, 2021 1:44:07 PM          | Tuesday, August        | 3, 2021 1:46:25 PM   |   |
| 4 9. Power on priority 4 VMs                   |                         |   |                        |  |   |
|  |                         | Cleanup - SC2-VMC<br>Oracle-RP              | -                      | Confirmation op  | n on one of the second s |
|  |                         | 1 Confirmation options                      |                        | Running a cleanup op   | peration on this plan will remove the test environment and reset the plan to the Ready state.   |
|  |                         | 2 Ready to complete                         |                        | Protected site:  | Primary-Site  |
|  |                         |   |                        | Recovery site:   | VMC-DR-Site   |
|  |                         |   |                        | Server connection:   | Connected   |
|  |                         |   |                        |  | -   |
|  |                         |   |                        | Number of VMs:   | 2   |
|  |                         |   |                        | Cleanup options  |   |
|  |                         |   |                        | If you are experiencing er<br>plan to the Ready state. If<br>test as soon as possible. | rrors during cleanup, you can choose the Force Cleanup option to ignore all errors and return th<br>f you use this option, you might need to clean up your storage manually, and you should run and   |
|  |                         |   |                        | Force cleanup  |   |



Confirmation of cleanup of test recovery plan **SC2-VMC-Oracle-RP** is as shown below:

| Cleanup - SC2-VMC-<br>Oracle-RP | Ready to complete<br>Review your selected settings. |                                |  |  |  |
|---------------------------------|---|--------------------------------|--|--|--|
| 1 Confirmation options          | Name  | SC2-VMC-Oracle-RP              |  |  |  |
| 2 Ready to complete             | Protected site                                      | Primary-Site                   |  |  |  |
|                                 | Recovery site                                       | VMC-DR-Site                    |  |  |  |
|                                 | Server connection                                   | Connected                      |  |  |  |
|                                 | Number of VMs                                       | 2                              |  |  |  |
|                                 | Force cleanup                                       | Do not ignore cleanup warnings |  |  |  |
|                                 |   |                                |  |  |  |

FIGURE 219. Cleanup Test Recovery Plan SC2-VMC-Oracle-RP Confirmation

The cleanup of the test recovery is successful.

| SC2-VMC-Oracle-RP EDIT MOVE DELETE TEST CLEANUP RUN                                  |                               |                     |                |  |  |  |  |
|--|-------------------------------|---------------------|----------------|--|--|--|--|
| Summary Recovery Steps Issues History Permissions Protection Groups Virtual Machines |                               |                     |                |  |  |  |  |
| EXPORT STEPS TEST CLEANUP RUN REPROTECT CANCEL                                       |                               |                     |                |  |  |  |  |
| Plan status:  → Ready  |                               |                     |                |  |  |  |  |
| Description:   | This plan is ready fo         | or test or recovery |                |  |  |  |  |
|  |                               |                     |                |  |  |  |  |
| Recovery Step  | Status                        | Step Started        | Step Completed |  |  |  |  |
| > 🔄 1. Synchronize storage   |                               |                     |                |  |  |  |  |
| 🛃 2. Restore recovery site hosts from standby  |                               |                     |                |  |  |  |  |
| 3. Suspend non-critical VMs at recovery site   |                               |                     |                |  |  |  |  |
| > 🔯 4. Create writable storage snapshot  |                               |                     |                |  |  |  |  |
| > 🔯 5. Configure test networks   |                               |                     |                |  |  |  |  |
| 1 6. Power on priority 1 VMs   |                               |                     |                |  |  |  |  |
| 2 7. Power on priority 2 VMs   |                               |                     |                |  |  |  |  |
| > 3 8. Power on priority 3 VMs   | 3 8. Power on priority 3 VMs  |                     |                |  |  |  |  |
| 4 9. Power on priority 4 VMs   |                               |                     |                |  |  |  |  |
| 5 10. Power on priority 5 VMs  | 5 10. Power on priority 5 VMs |                     |                |  |  |  |  |

#### FIGURE 220. Steps to Cleanup Test Recovery Plan SC2-AZ2-Oracle-RP

The VMs on Protected Site A are still powered on. We can see the placeholder VMs on recovery site VMware Cloud on AWS are powered off.

| SC2-VMC-Oracle-RP EXIT MOVE DELETE TEST CLEARUP REN   |                     | Learn   |
|---|---------------------|---|
| Recovery Plan: SC2 VM-C/rede-RP<br>Protected file: Promy file<br>Becomy Stat: VM-C/d-5/a<br>Descriptor: |                     |   |
| v Plan Status   | ✓ VM Status         |   |
| Plan Status:  | Ready for Recovery: | 2 VMs   |
| This plan is ready for test or recovery   | In Progress:        | 0 VMs   |
|   | Success:            | 0 VMs   |
| V Recent History  | Warning:            | 0 VMs   |
| Cleanup Tuesday, August 3, 2021 1:56:49 PM Success  | Error:              | 0 VMs   |
| Test Tuesday, August 3, 2021 1:43:48 PM 🗸 Success   | Incomplete:         | 0 VMs   |
|   |                     | Total: 2 VMs  |
|   |                     |   |
| Ø Oracle-RP Actions ▼   | ⊘ Comp              | ute-ResourcePool Actions Y  |
| Summary Monitor Configure Permissions Resource Pools VMs  | Summary             | Monitor Configure Permissions Resource Pools VMs                        |
| Virtual Machines VW Templates VApps   | Virtual Mact        | ines VM Templates VApps   |
| Name ↑  | Host Mem            | ✓ State ✓ Status ✓ Provisioned Space ✓ Used Space ✓ Host CPU ✓ Host Mem |
| Gracle19c-OL8 Powered On ✓ Normal 7,351,908.85 TB 197.63 GB 161 MHz                                     | 103.97 GB           | c-OLB Powered Off ✓ Normal 129.79 GB 220 MB 0 Hz 0 B                    |
| Cracle19c-OL8-RMAN Powered On V Normal 179.66 GB 179.66 GB 888 MHz                                      | 11.72 GB            | c-OL8-RMAN Powered Off ✓ Normal 97.79 GB 220 MB 0 Hz 0 B                |

FIGURE 221. Cleanup Test Recovery Plan SC2-VMC-Oracle-RP Successful



More information regarding the testing recovery plan can be found in the VMware Site Recovery Manager guide.

The steps to run the recovery plan for planned migration and the recovery plan for disaster recovery are the same as those employed in on-premises use cases.

#### VMware Cloud Disaster Recovery

VMware Cloud Disaster Recovery is a VMware on-demand disaster recovery service that is delivered as an easy-to-use SaaS solution, offering cloud economics to help keep disaster recovery costs under control.

VMware Cloud Disaster Recovery can provide disaster recovery to Oracle workloads from on-premises Site A to VMware Cloud on AWS.

VMware Cloud Disaster Recovery uses regularly scheduled snapshots to replicate to the SCFS. VMware snapshots are point-intime (PIT) snapshots and are therefore crash-consistent. Write-order fidelity is guaranteed for all VMDKs of the VM as a result.

VMware snapshots are not compatible with disks in multi-writer mode and VMware Cloud Disaster Recovery cannot replicate disks in multi-writer mode. Learn more about VMware Cloud DR and shared disks.

This use case focusses on the utilization of VMware Cloud Disaster Recovery to provide disaster recovery to two Oracle single-instance VMs **Oracle19c-OL8** and **Oracle19c-OL8-RMAN** from on-premises Site A to VMware Cloud on AWS.

As VMware Cloud DR uses regularly scheduled snapshots to replicate to the SCFS and VMware snapshots are not compatible with disks in multi-writer mode, VMware Cloud DR cannot replicate disks in multi-writer mode. VMware snapshots are a point-in-time snapshot and are therefore crash-consistent.

#### Failover DR Plan

A DR plan includes a set of recovery steps that capture ordering constraints and action-sequencing instructions for DR operations, which occur when you run the plan.

A failover DR plan can run after a real-life disaster event, or as a test failover before a real disaster occurs. You can run a failover plan in the following ways:

- Failover A failover operation is run following a disaster event when the source site is no longer available. The failover operation orchestrates on the destination site based on previously replicated snapshots. When failing over to a VMware Cloud on AWS SDDC, VMs that belong to the protection groups defined in your DR plan are recovered to the vCenter in a recovery SDDC.
- Test failover A test failover operation is similar to regular failover operation, but runs in the context of its own test execution environment. Another difference is that by default, a test failover stops on the first failure, whereas a regular failover continues to run, even after failures. You can override all default behaviors by custom options prior to starting the failover operation. With a test failover, you have the option to clean up the test plan.

Learn more about How a Failover DR Plan Runs.

#### Running a Test Failover of the DR Plan

Steps to test the failover DR plan Oracle Recovery Plan are as shown below:

| Plan  |                      |              | Protected groups                | Continuous compliance           | Ø                     |
|---|----------------------|--------------|---------------------------------|---------------------------------|-----------------------|
| Oracle Recovery Plan<br>Site A - SC2 - Oracle   DR-SDDC |                      |              | VCDR - Oracle PG                | ~                               |                       |
|   |                      |              |                                 | 18 / 18 checks passed<br>1h ago | Show                  |
| 🕑 Ready   |                      |              |                                 | Failover                        | Test plan Deactivate  |
|   |                      |              |                                 |                                 |                       |
|   | Test plan - Oracle R | ecovery Plan |                                 |                                 |                       |
|   | → Snapshots          | Choose the   | e snapshots to restore for each | group                           |                       |
|   | Runtime settings     | VCDR - C     | Dracle PG                       |                                 |                       |
|   |                      | VCDR - C     | oracle PG - Every 4 hours - 202 | I-07-19T19:00 UTC               | Use different snapsho |
|   | Confirmation         | Jul-19-202   | 1 12:01 pm (4h ago)             |                                 |                       |
|   |                      |              |                                 |                                 |                       |

FIGURE 222. Test Failover DR Plan

Test failover operations give you the option of performing a full storage vMotion from the staging datastore to the SDDC datastore to emulate a real failover—or to leave VMs on the staging datastore to cut down on the failover time (preview feature)—and to allow you to test and debug your failover faster.

We can select the storage to migrate VMs to during the failover:

- Full storage migration to SDDC. Select this option to migrate all VMs to vSAN storage on the SDDC. The failover operation requires more time, but this option is optimal for those VMs that need lower latency and higher I/O.
- Leave VMs and files on the cloud file system. Use the cloud backup SCFS as highly available storage and run recovered VMs directly from the cloud file system. If you select this, failover is faster and there is no dependency on SDDC hosts for storage capacity. With this option, the SDDC can be substantially smaller in size because VMs are kept on the cloud file system datastore, eliminating the vSAN storage capacity constraints. This configuration can be more cost-effective.

With this more cost-effective preview feature, the SDDC can be substantially smaller in size because VMs are kept on the cloud file system datastore, eliminating vSAN storage capacity constraints, which can incur costs.

| Test plan - Oracle Rec   | covery Plan  |
|--|--|
| <ul> <li>Snapshots</li> <li>Runtime settings</li> <li>Preview</li> <li>Confirmation</li> </ul> | <ul> <li>Runtime settings</li> <li>Error handling</li> <li>Ignore all errors <ul> <li>You can still retry all failed actions before committing.</li> </ul> </li> <li>Stop on every error <ul> <li>Manually choose to ignore or retry every failed action.</li> </ul> </li> </ul> |
|  | <ul> <li>Full storage migration to SDDC<br/>Will take more time to complete.</li> <li>Leave VMs and files in cloud backup<br/>Skip the migration step during this test.</li> </ul>   |

FIGURE 223. Test Failover DR Plan Options

Confirmation of the test failover DR plan is as shown below:

| Test plan - Oracle Recove                         | rery Plan   |
|---|---|
| ✓ Snapshots                                       | Preview   |
| <ul> <li>Runtime settings</li> </ul>              | * Step 1. Prepare cloud storage resources to run VMs for step Recover protection group Oracle Test                                      |
| <ul> <li>Preview</li> <li>Confirmation</li> </ul> | 1. Prepare cloud storage resources to run VMs   |
| Committee   | ▼ Step 2. Recover protection group Oracle Test  |
|   | 1. Retrieve VM snapshots for 2 VMs  |
|   | 2. Recover 2 VMs  |
|   | Step 3. Wait for user input: Do you wish to continue?   |
|   | 1. Wait for user confirmation: Do you wish to continue?   |
|   | • Step 4. Recover all remaining VMs, files, and groups  |
|   | 1. Duplicate protection group seapshot VCDR - Oracle PG - Every 4 hours - 2021-07-19T19:00 UTC into a snapshot with unlimited retention |
|   | - Step 5. Release cloud storage resources for step Recover all remaining VMs, files, and groups   |
|   | 1. Release cloud storage resources Test plan - Oracle Recovery Plan   |
|   | September Confirmation  |
|   | Runtime settings     Test will restore a copy of the protected VMs in the destination site.   |
|   | Confirmation     VMs with virtual hardware version 18 and 19 will be downgraded to version 17 during failover.                          |
|   | Type TEST PLAN to confirm   |
|   | TEST PLAN   |
|   |   |
|   |   |
|   |   |
|   |   |
|   |   |
|   |   |
|   |   |
|   |   |
|   | Cancel C Back Next > C Tout Cat   |

FIGURE 224. Confirm Test Failover DR Plan Run



The test failover is run when the **Run Test** button is clicked.

| Plan       Protected groups       Continuous compliance         VCDR - Oracle PG       VCDR - Oracle PG         WCDR - Oracle PG       No         18 / 18 chocke passed       Smago         Step       Trest finished with no errors         Success       Step         Step 1. Prepare cloud storage resources to run VMs       Log Jul-19 04.02 pm <tm finished<="" td="">         * Step 2. Recover protection group Oracle Test       Jul-19 04.02 pm <tm finished<="" td="">         * 1. Retrieve VM snapshots for 2 VMs       Log Jul-19 04.02 pm <tm finished<="" td="">         * 2. Recover 2VMs       Log Jul-19 04.02 pm <tm finished<="" td="">         * 1. Wait for user input: Do you wish to continue?       Jul-19 04.02 pm <tm finished<="" td="">         * 1. Netwise VMs magnitud to continue?       Jul-19 04.02 pm <tm finished<="" td="">         * 1. Retrieve VMs magnitud to continue?       Jul-19 04.02 pm <tm finished<="" td="">         * 1. Retrieve TMs       Log Jul-19 04.02 pm <tm finished<="" td="">         * 2. Recover 2VMs       Log Jul-19 04.02 pm <tm finished<="" td="">         * 3 Liep 3. Wait for user input: Do you wish to continue?       Jul-19 04.02 pm <tm finished<="" td="">         * 1. Wait for user continue?       Jul-19 04.02 pm <tm finished<="" td="">         * 1. Nation user input: Do you wish to continue?       Jul-19 04.02 pm <tm finished<="" td="">         * 1. Nation user input: Do you wish to continue?       Jul-19 04.02 pm <tm finished<="" td=""></tm></tm></tm></tm></tm></tm></tm></tm></tm></tm></tm></tm></tm>   | Dracle Recovery Plan Summary Reports                                      |   |                                      |                 |          |          |
|--|---|---|--------------------------------------|-----------------|----------|----------|
| Oracle Recovery Plan       Image: Start of S | Plan  | Protected groups  | Continuous co                        | mpliance        |          | C        |
| Success       Image       Image       Image         Success       Step       Timestamp       Duration       Progret         * ✓ Step 1. Prepare cloud storage resources to run VMs       Timestamp       Duration       Progret         * ✓ Step 1. Prepare cloud storage resources to run VMs       Timestamp       Duration       Progret         * ✓ Step 1. Prepare cloud storage resources to run VMs       Timestamp       Duration       Progret         * ✓ Step 2. Recover protection group Oracle Test       Jul-19 04.02 pm       Finishet         * 1. Retrieve VM snapshots for 2 VMs       Log       Jul-19 04.02 pm       Finishet         * J. Retrieve VM snapshots for 2 VMs       Log       Jul-19 04.02 pm       Finishet         * J. Retrieve VM snapshots for 2 VMs       Log       Jul-19 04.02 pm       Finishet         * J. Retrieve VM snapshots for 2 VMs       Log       Jul-19 04.02 pm       Atm       Finishet         * J. Retrieve VM snapshots for 2 VMs       Log       Jul-19 04.05 pm       Am       Finishet         * J. Retrieve VM snapshots for 2 VMs       Log       Jul-19 04.05 pm       Am       Finishet         * J. Retrieve VM snapshots tor 2 VMs       Log       Jul-19 04.05 pm       Am       Finishet         * J. Nait for user confirmation: Do you wish to con   | Oracle Recovery Plan Site A - SC2 - Oracle   DR-SDDC Oracle Recovery Plan |   |                                      | ~               |          |          |
| Test finished with no errors   Success   Step    Timestamp   Duration   Progree       Step 1. Prepare cloud storage resources to run VMs for step Recover protection group Oracle Test   Jul-19 04.02 pm   Ing   Jul-19 04.02 pm   Ing   Jul-19 04.02 pm   Ing   Jul-19 04.02 pm   V   Step 2. Recover protection group Oracle Test   Jul-19 04.02 pm   V   Ing   Jul-19 04.02 pm   Jul-19 04.02 pm   V   Ing   Jul-19 04.02 pm   Jul-19 04.02 pm   Jul-19 04.02 pm   V   Step 3. Wait for user input: Do you wish to continue?   Jul-19 04.05 pm   V   Step 4. Recover all remaining VMs, files, and groups   Jul-19 04.09 pm   V   Step 5. Release cloud storage resources for step Recover all remaining VMs, files, and groups   Jul-19 04.09 pm   V   Step 5. Release cloud storage resources for step Recover all remaining VMs, files, and groups   Jul-19 04.09 pm   V   Null 19 04.09 pm   V   Step 5. Release cloud storage resources for step Recover all remaining VMs, files, and groups   Jul-19 04.09 pm   V   Netesse cloud storage resources   V   Null 19 04.09 pm   V   Null 19 04.09 pm   V   Null 19 04.09 pm   V   | Gluic Relively Fluit  |   | <b>18</b> / 18 checks pas<br>37m ago | ssed            |          | Show     |
| Success       Timestamp       Duration       Progre         * < Step 1.       Prepare cloud storage resources to run VMs for step Recover protection group Oracle Test       Jul-19 04:02 pm <tm< td="">       Finishe         * 1.       Prepare cloud storage resources to run VMs       Iog       Jul-19 04:02 pm       <tm< td="">       Finishe         * Step 2.       Recover protection group Oracle Test       Jul-19 04:02 pm       <tm< td="">       Finishe         * Step 2.       Recover protection group Oracle Test       Jul-19 04:02 pm       <tm< td="">       Finishe         * 1.       Retrieve VM snapshots for 2 VMs       Iog       Jul-19 04:02 pm       <tm>Finishe         * 2.       Recover 2 VMs       Iog       Jul-19 04:02 pm       <tm>Finishe         * Step 3.       Wait for user input: Do you wish to continue?       Jul-19 04:05 pm       4m       Finishe         * Step 4.       Recover all remaining VMs, files, and groups       Jul-19 04:05 pm       4m       Finishe         * Step 5.       Release cloud storage resources for step Recover all remaining VMs, files, and groups       Jul-19 04:09 pm &lt; tm       Finishe         * 1.       Release cloud storage resources       Jul-19 04:09 pm &lt; tm       Finishe       Finishe</tm></tm></tm<></tm<></tm<></tm<>   | ✓ Test finished with no errors  |   |                                      |                 |          | Clean up |
| Step       Timestamp       Duration       Progre         * Step 1. Prepare cloud storage resources to run VMs for step Recover protection group Oracle Test       Jul-19 04.02 pm       <1m  | Success   |   |                                      |                 |          |          |
| * < Step 1. Prepare cloud storage resources to run VMs for step Recover protection group Oracle Test   | Step  |   |                                      | Timestamp       | Duration | Progress |
| Image: Non-Step 2.       Recover protection group Oracle Test       Jul-19 04:02 pm < 1m   | ▼ ✓ Step 1. Prepare cloud storage resources to run VMs for s              | tep Recover protection group Oracle Test                          |                                      | Jul-19 04:02 pm | < 1m     | Finished |
| • Step 2. Recover protection group Oracle Test       Jul-19 04:02 pm 3m       Finishe         • 1. Retrieve VM snapshots for 2 VMs       log Jul-19 04:02 pm <1m   | ✓ 1. Prepare cloud storage resources to run VMs                           |   | Log                                  | Jul-19 04:02 pm | < 1m     | Finished |
| • 1. Retrieve VM snapshots for 2 VMs       Log       Jul-19 04:02 pm       1m       Finishe         • 2. Recover 2 VMs       Log       Jul-19 04:02 pm       3m       Finishe         • • Step 3. Wait for user input: Do you wish to continue?       Jul-19 04:05 pm       4m       Finishe         • 1. Wait for user confirmation: Do you wish to continue?       Log       Jul-19 04:05 pm       4m       Finishe         • • Step 4. Recover all remaining VMs, files, and groups       Jul-19 04:05 pm       4m       Finishe         • • Step 5. Release cloud storage resources for step Recover all remaining VMs, files, and groups       Jul-19 04:09 pm       1m       Finishe         • 1. Release cloud storage resources       Log       Jul-19 04:09 pm       1m       Finishe   | <ul> <li>Step 2. Recover protection group Oracle Test</li> </ul>          |   |                                      | Jul-19 04:02 pm | Зm       | Finished |
| • 2. Recover 2 VMs       Log Jul-19 04:02 pm 3m       Finishe         • < Step 3. Wait for user input: Do you wish to continue?  | ✓ 1. Retrieve VM snapshots for 2 VMs                                      |   | Log                                  | Jul-19 04:02 pm | < 1m     | Finished |
| • Step 3. Wait for user input: Do you wish to continue?       Jul-19 04.05 pm 4m       Finisher         • 1. Wait for user confirmation: Do you wish to continue?       Log Jul-19 04.05 pm 4m       Finisher         • Step 4. Recover all remaining VMs, files, and groups       Jul-19 04.05 pm 4m       Finisher         • 1. Duplicate protection group snapshot VCDR - Oracle PG - Every 4 hours - 2021-07-19T19:00 UTC into a snapshot with unlimited retention       Log Jul-19 04:09 pm <1m   | ✓ 2. Recover 2 VMs  |   | Log                                  | Jul-19 04:02 pm | 3m       | Finished |
| ✓ 1. Wait for user confirmation: Do you wish to continue?       Log Jul-19 04.05 pm 4m       Finishe         ✓ Step 4. Recover all remaining VMs, files, and groups       Jul-19 04.09 pm <1m  | Step 3. Wait for user input: Do you wish to continue?                     |   |                                      | Jul-19 04:05 pm | 4m       | Finished |
| <ul> <li>Step 4. Recover all remaining VMs, files, and groups</li> <li>Jul-19 04.09 pm &lt;1m</li> <li>Finishe</li> <li>I. Duplicate protection group snapshot VCDR - Oracle PG - Every 4 hours - 2021-07-19T19:00 UTC into a snapshot with unlimited retention</li> <li>Step 5. Release cloud storage resources for step Recover all remaining VMs, files, and groups</li> <li>Jul-19 04:09 pm &lt;1m</li> <li>Finishe</li> <li>I. Release cloud storage resources</li> <li>Jul-19 04:09 pm &lt;1m</li> <li>Finishe</li> </ul>  | 1. Wait for user confirmation: Do you wish to continue?                   |   | Log                                  | Jul-19 04:05 pm | 4m       | Finished |
| <ul> <li>1. Duplicate protection group snapshot VCDR - Oracle PG - Every 4 hours - 2021-07-19T19:00 UTC into a snapshot with unlimited retention</li> <li>✓ Step 5. Release cloud storage resources for step Recover all remaining VMs, files, and groups</li> <li>Jul-19 04:09 pm &lt;1m</li> <li>Finishe</li> <li>✓ 1. Release cloud storage resources</li> <li>Log Jul-19 04:09 pm &lt;1m</li> <li>Finishe</li> </ul>   | ▼ ✓ Step 4. Recover all remaining VMs, files, and groups                  |   |                                      | Jul-19 04:09 pm | < 1m     | Finished |
| <ul> <li>Step 5. Release cloud storage resources for step Recover all remaining VMs, files, and groups</li> <li>Jul-19 04:09 pm &lt;1m</li> <li>Finishe</li> <li>Log Jul-19 04:09 pm &lt;1m</li> <li>Finishe</li> </ul>  | ✓ 1. Duplicate protection group snapshot VCDR - Oracle PG - Ev            | very 4 hours - 2021-07-19T19:00 UTC into a snapshot with unlimite | d retention                          | Jul-19 04:09 pm | < 1m     | Finished |
| ✓ 1. Release cloud storage resources Log Jul-19 04:09 pm < 1m Finisher   | ▼ ✓ Step 5. Release cloud storage resources for step Recover              | er all remaining VMs, files, and groups                           |                                      | Jul-19 04:09 pm | < 1m     | Finished |
|  | ✓ 1. Release cloud storage resources                                      |   | Log                                  | Jul-19 04:09 pm | < 1m     | Finished |

### FIGURE 225. Test Failover DR Plan Completed Successfully

The test completed with no errors.

| 🕼 Oracle19c-OL8 🛛 ⊵ 🗖 🕼 🖉 🖓 🔞 🖌 Actions M  |                  | 🕼 Oracle19c-OL8-RI                | MAN 🛛 🖻 🗳 🕼 🔹 actions 🗸   |                  |
|--|------------------|-----------------------------------|---|------------------|
| Summary Monitor Configure Permissions Datastores Networks Snapshots  |                  | Summary Monitor Con               | figure Permissions Datastores Networks Snapshots  |                  |
| Compatibility: ESX 7.0 and later (VM version 17) Compatibility: ESX 7.0 and later (VM version 17) VM vers Tools: Running, version:11296 (Guest Managed) More IIIPO ONS Name: GraceMaccele Visibility IAUNCH REMOTE CONSOLE LAUNCH REMOTE CONSOLE |                  | Powered Cn     Launch web console | Guest OS: Oracle Linux & (64-bit)<br>Compatibility: ESX 7.0 and later (VM version 17)<br>VM verse Tools: Running, version:11296 (Guest Managed)<br>HOR Name: Oracle18: 0:018-man.yilab.local<br>IP Addresses: 02.163.15.46<br>Host: 10.2.32.4<br>Not: 10.2.32.4 |                  |
| VM Hardware  | ^                | VM Hardware                       |   | ^                |
| > CPU 12 CPU(s)  |                  | > CPU                             | 8 CPU(s)  |                  |
| > Memory 📔 128 GB, 71.68 GB memory active  |                  | > Memory                          | 96 GB, 29.76 GB memory active   |                  |
| > Hard disk 1 80 GB  |                  | > Hard disk 1                     | 80 GB   |                  |
| Total hard disks 5 hard disks  |                  | Total hard disks                  | 5 hard disks  |                  |
| > Network adapter 1 Oracle Test (connected)  |                  | > Network adapter 1               | Oracle Test (connected)   |                  |
| CD/DVD drive 1 Disconnected  | q <sub>₽</sub> ~ | CD/DVD drive 1                    | Disconnected  | 9 <sub>0</sub> ~ |
| > Video card 8 MB  |                  | > Video card                      | 4 MB  |                  |
| VMCI device Device on the virtual machine PCI bus that provides su<br>virtual machine communication interface  | pport for the    | VMCI device                       | Device on the virtual machine PCI bus that provides so<br>virtual machine communication interface   | upport for the   |
| > Other Additional Hardware  |                  | > Other                           | Additional Hardware   |                  |
| Compatibility ESXI 7.0 and later (VM version 17)   |                  | Compatibility                     | ESXI 7.0 and later (VM version 17)  |                  |
| Edit Settings  |                  | Edit Settings                     |   |                  |

FIGURE 226. VM Networking Status After Test Failover DR Plan



The Oracle VM **Oracle19c-OL8** is up with IP address 192.168.15.45 and the database vvol19c is up. The alert log for the database shows no errors. Oracle crash recovery is performed when the database starts up, which is normal and expected.

The Oracle VM **Oracle19c-OL8-RMAN** is up with IP address 192.168.15.46 and the database **rmandb** is up. The alert log for the database **rmandb** shows no errors. Oracle crash recovery is performed when the database **rmandb** starts up, which is normal and expected.

VMware Cloud Disaster Recovery uses regularly scheduled snapshots to replicate to the SCFS. VMware snapshots are point-intime (PIT) snapshots and are therefore crash-consistent. Write-order fidelity is guaranteed for all VMDKs of the VM as a result.

Navigating the files folders on datastore ds1 shows VM Oracle19c-OL8 is present. The VM Oracle19c-OL8-RMAN is present on another folder on the same datastore.

| () Ø <u>e</u> §                               | ds01 Actions ~                                |  |                                   |                        |   |
|---|---|--|-----------------------------------|------------------------|---|
| v @ vcenter.sddc-44-229-154-128.vmwarevmc.com | Summary Monitor Configure Permissions Files   | Hosts VMs  |                                   |                        |   |
| V III SOD C.Desarranter                       | Filter by a folder name                       | NEW FOLDER UPLOAD FILES UPLOAD FOLDER REGISTER V     | M DOWNLOAD COPY TO MOVE TO        | RENAME TO DELETE       | Q Search in the entire datastore                            |
| WorkloadDatastore                             | ✓   | Name 4 T   | Size y Modified y                 | Туре т                 | Path  |
|   | > C .vSphere-HA                               | vmx-Oracle19c-OL8-fac4279c23246O1e6df86bcba8fOe      | 93,184 KB 07/19/2021, 4:05:40 P   | File                   | [ds01] 5000bad1-9778-5134-3646-239985dacb23_000000/vmx-Ori  |
|   | 5000bed1-9778-5134-3646-239985decb23_000000   | vmware.log   | 151.69 KB 07/19/2021, 4:11:27 PM  | VM Log File            | [ds01] 5000bad1-9778-5134-3646-239985dacb23_000000/vmware   |
|   | > 5000/672-c749-2207-3aa3-e17a726d1594_000000 | vmware-2.log   | 215.84 KB 07/19/2021, 4:05:11 PM  | VM Log File            | [ds01] 5000bad1-9778-5134-3646-239985dacb23_000000/vmware   |
|   |   | vmware-1log  | 181.54 KB 07/19/2021, 4:03:20 P   | VM Log File            | [ds01] 5000bad1-9778-5134-3646-239985dacb23_000000/vmware   |
|   | >staging                                      | Oracle19c-OL8.vmx.lck                                | 0 KB 07/19/2021, 4:05:40 P        | File                   | [ds01] 5000bad1-9778-5134-3646-239985dacb23_000000/Oracle19 |
|   |   | 🕐 🗇 Oracle19c-OL8.vmx                                | 7.42 KB 07/19/2021, 4:05:40 P     | Virtual Machine        | [ds01] 5000bad1-9778-5134-3646-239985dacb23_000000/Oracle15 |
|   | 1   | Oracle19c-OL8.vmsd                                   | 0.04 KB 07/19/2021, 4:05:37 P     | File                   | [ds01] 5000bad1-9778-5134-3646-239985dacb23_000000/Oracle19 |
|   |   | Oracie19c-OL8.nvram                                  | 264.49 KB 07/19/2021, 4:05:41 PM  | Non-volatile Memory Fi | [ds01] 5000bad1-9778-5134-3646-239985dacb23_000000/Oracle19 |
|   |   | Cracle19c-OL8-d03b3799.vswp                          | 134,217,728 07/19/2021, 4:05:40 P | File                   | [ds01] 5000bad1-9778-5134-3646-239985dacb23_000000/Oracle19 |
|   |   | hbr-persistene-state-RDID-dd89c493-c1ca-3b42-a258-1  | 3,201 KB 07/19/2021, 4:05:40 P    | File                   | [ds01] 5000bad1-9778-5134-3646-239985dacb23_000000/hbr-per: |
|   |   | hbr-persistent-state-RDID-a9149cf6-4b8d-3ae5-b091-6  | 2,561 KB 07/19/2021, 4:05:40 P    | File                   | [ds01] 5000bad1-9778-5134-3646-239985dacb23_000000/hbr-per: |
|   |   | hbr-persistent-state-RDID-9d3d1abc-9516-3109-a3f0-8f | 2,561 KB 07/19/2021, 4:05:40 P    | File                   | [ds01] 5000bad1-9778-5134-3646-239985dacb23_000000/hbr-per: |
|   |   | hbr-persistent-state-RDID-1333c100-fc89-3205-b3fe-b  | 32,769 KB 07/19/2021, 4:05:40 P   | File                   | [ds01] 5000bad1-9778-5134-3646-239985dacb23_000000/hbr-per: |
|   |   | hbr-persistent-state-RDID-0f766a6b-18ff-3594-a29a-e  | 8,001 KB 07/19/2021, 4:05:40 P    | File                   | [ds01] 5000bad1-9778-5134-3646-239985dacb23_000000/hbr-per: |
|   |   | vmcVm.info   | 1.2 KB 07/19/2021, 4:05:33 P      | File                   | [ds01] 5000bad1-9778-5134-3646-239985dacb23_000000/_vmcVn   |
|   |   | 6000c29f-ec41-809e-b4c4-18f02917c813.vmdk            | 10,708,036 07/19/2021, 4:08:11 PM | Virtual Disk           | [ds01] 5000bad1-9778-5134-3646-239985dacb23_000000/6000c2   |
|   |   | 6000c29f-ec41-809e-b4c4-18f02917c813-ctk.vmdk        | 32,768.5 KB 07/19/2021, 4:05:40 P | File                   | [ds01] 5000bad1-9778-5134-3646-239985dacb23_000000/6000c2   |

FIGURE 227. VM Oracle19c-OL8 VMDK Details

| Oracle Recovery Plan Summary Reports  |                                     |  |
|---|-------------------------------------|--|
| Plan  | Protected groups                    | Continuous compliance  |
| Oracle Recovery Plan  | VCDR - Oracle PG                    |  |
| Site A - SC2 - Oracle 🔿 DR-SDDC   |                                     | $\checkmark$   |
| Oracle Recovery Plan  |                                     |  |
|   |                                     | 19 / 18 checks passed Show   |
| ✓ Test finished with no errors  |                                     | Clean up   |
| Success   |                                     | Clean up - Oracle Recovery Plan  |
| Step  |                                     |  |
| Step 1. Prepare cloud storage resources to run VMs for step Re  | ecover protection group Oracle Test | Clean up will up do the test test, including upperiatering and detailing VA/a        |
| Step 2. Recover protection group Oracle Test  |                                     | created by failing over. Europarticity for this test, like retry errors, will not be |
| Step 3. Wait for user input: Do you wish to continue?   |                                     | available anymore  |
| Step 4. Recover all remaining VMs, files, and groups  |                                     |  |
| Step 5. Release cloud storage resources for step Recover all release resources for | emaining VMs, files, and groups     | Test results   |
|   |                                     | Test status Test finished with no Test errors None                                   |
|   |                                     | Time to 7 minutes, 11 seconds<br>recovery  |
|   |                                     | Confirmation   |
|   |                                     | Type CLEAN UP TEST to confirm.   |
|   |                                     | CLEAN UP TEST  |
|   |                                     | Cancel Clean up  |

Run a cleanup of the test failover run.

FIGURE 228. Cleanup of DR Plan

# 

Cleanup of the DR Plan completes successfully.

| Oracle Recovery Plan Summary Reports  |  |                                 |                     | _                                    |                      |                |
|---|--|---------------------------------|---------------------|--------------------------------------|----------------------|----------------|
| Plan<br>Oracle Recovery Plan<br>Sike A - SC2 - Oracle ⇒ DR-SDDC<br>Oracle Recovery Plan | Protected groups<br>VCDR - Oracle PG         | Continuous compliance           | 0                   | ]                                    |                      |                |
|   |  | 18 / 18 checks passed<br>1h ago | Show                |                                      |                      |                |
| ✓ Test cleaned up   |  |                                 | Acknowledge >       |                                      |                      |                |
| Success   |  |                                 |                     | - \                                  |                      |                |
| Step  |  | Timestam                        | p Duration Progress | _ \                                  |                      |                |
| ▶ ✓ Step 1. Prepare cloud storage resources to run VMs for step Recover                 | protection group Oracle Test                 | Jul-19 04:                      | 02 pm < 1m Finished |                                      |                      |                |
| Step 2. Recover protection group Oracle Test  |  | Jul-19 04:                      | 02 pm 3m Finished   |                                      |                      |                |
| Step 3. Wait for user input: Do you wish to continue?                                   |  | Jul-19 04:                      | 05 pm 4m Finished   |                                      |                      |                |
| Step 4. Recover all remaining VMs, files, and groups                                    |  | Jul-19 04:                      | 09 pm < 1m Finished |                                      |                      |                |
| ▶ ✓ Step 5. Release cloud storage resources for step Recover all remainin               | g VMs, files, and groups                     | Jul-19 04:                      | 09 pm < 1m Finished |                                      | \                    |                |
| Cleaned   |  |                                 | Acknowledge - 0     | )racle Recovery Pla                  | an                   | ×              |
| Step  |  | Timestam                        | Toot rogulto        |                                      | $\langle \rangle$    |                |
| ▶ ✓ Clean up step 5. Prepare cloud storage resources to run VMs for step                | Recover all remaining VMs, files, and groups | Jul-19 04:-                     | Test Tesuits        |                                      |                      |                |
| Clean up step 4. Undo Recover all remaining VMs, files, and groups                      |  | Jul-19 04:-                     | Test status T       | est cleaned up<br>minutes 11 seconds | Clean up errors None | 1              |
| Clean up step 3. Undo Wait for user input: Do you wish to continue?                     |  | Jul-19 04:                      | Test notes          |                                      | crear up crear       |                |
| Clean up step 2. Undo Recover protection group Oracle Test                              |  | Jul-19 04:                      |                     |                                      | \                    |                |
| ➤ ✓ Clean up step 1. Release cloud storage resources for step Recover pro               | otection group Oracle Test                   | Jul-19 04:                      |                     |                                      |                      | \              |
|   |  |                                 |                     |                                      |                      |                |
|   |  |                                 |                     |                                      |                      |                |
|   |  |                                 |                     |                                      | Cance                | el Acknowledge |

### FIGURE 229. Cleanup of DR Plan Completed Successfully

Learn more about *Running a Test Failover*.

#### Running a Failover of the DR Plan

A failover operation is run following a disaster event when the source site is no longer available.

Steps to run the failover DR plan **Oracle Recovery Plan** are as shown below. In this use case, we simulated an actual DR event, even though the protected site was available.

| Plan<br>Oracle Recovery Plan                            | Protected groups<br>VCDR - Oracle PG | Continuous compliance           | Failover - Oracle Re             | covery Plan   |
|---|--------------------------------------|---------------------------------|----------------------------------|---|
| site A - SC2 - Oracle 🚸 DR-SDDC<br>Dracle Recovery Plan |                                      | 18 / 18 checks passed<br>th ago | Show<br>Runtime settings         | <ul> <li>All 18 checks passed with no issues!</li> </ul>  |
| Ready   |                                      | filow Rettple D                 | activate Preview<br>Confirmation | Protected site  Connection to source site  Protected groups replication schedule Networks exist on source site  Resource pools exist on source site  Folders exist on source site  Recovery site  Connection to failover site Venter server registered in failover site Venter server registered in failover site Protection groups can be recovered in failover site Protection groups can be recovered in failover site Resource pools exist on failover site Recovery site Crchestration I P address mapping Recovery steps Script server recovered before script actions Other VMC refresh token validity VMC folder structure for file recovery is valid |

FIGURE 230. Start Failover of DR Plan

The failover plan options are as shown below:

| Failover - Oracle Reco   | very Plan  |   | ×                               |
|--|--|---|---------------------------------|
| <ul> <li>Compliance check</li> <li>Snapshots</li> <li>Runtime settings</li> <li>Preview</li> <li>Confirmation</li> </ul> | Snapshots<br>Choose the snapshots to restore for each grou<br>VCDR - Oracle PG<br>VCDR - Oracle PG - Every 4 hours - 2021-07-<br>Jul-19-2021 04:01 pm (1h ago)<br>✓ This snapshot is already in the recovery s | p<br>19T23:00 UTC<br>ite, No replication needed.  | Use different snapshot          |
|  | Failover - Oracle Rec<br>Compliance check<br>Snapshots<br>Runtime settings<br>Preview<br>Confirmation  | overy Plan<br>Runtime settings<br>Error handling<br>Ignore all errors<br>You can still retry all fa<br>O Stop on every error<br>Manually choose to ig | illed actions before committing |

FIGURE 231. Failover of DR Plan Options

The default is full storage migration to SDDC. This use case is a simulation of an actual DR event, even though this was a planned DR event.

| <ul> <li>Compliance check</li> </ul> | Preview   |
|--------------------------------------|---|
| <ul> <li>Snapshots</li> </ul>        | • Step 1. Prepare cloud storage resources to run VMs for step Recover protection group Oracle Test                                      |
| Runtime settings     Preview         | 1. Prepare cloud storage resources to run VMs   |
| Confirmation                         | ▼ Step 2. Recover protection group Oracle Test  |
|                                      | 1. Retrieve VM snapshots for 2 VMs  |
|                                      | 2. Recover 2 VMs  |
|                                      | Step 3. Wait for user input: Do you wish to continue?   |
|                                      | 1. Wait for user confirmation: Do you wish to continue?   |
|                                      | Step 4. Recover all remaining VMs, files, and groups  |
|                                      | 1. Duplicate protection group snapshot VCDR - Oracle PG - Every 4 hours - 2021-07-19T23:00 UTC into a snapshot with unlimited retention |
|                                      | 2. Disable protection group VCDR - Oracle PG schedule on archival site  |
|                                      | Step 5. Migrate to SDDC datastore VMs recovered in step Recover protection group Oracle Test  |
|                                      | 1. Migrate 2 VMs to SDDC datastore  |
|                                      | Step 6. Release cloud storage resources for step Recover all remaining VMs, files, and groups   |

FIGURE 232. Failover of DR Plan Steps



Confirmation of the failover DR plan is as shown below:

| Failover - Oracle Recove                                 | ery Plan ×  |
|--|---|
| <ul> <li>Compliance check</li> </ul>                     | Confirmation  |
| <ul><li>✓ Snapshots</li><li>✓ Runtime settings</li></ul> | IMPORTANTI Failover will restore the protected VMs in the destination site.                   |
| <ul> <li>✓ Preview</li> <li>→ Confirmation</li> </ul>    | VMs with virtual hardware version 18 and 19 will be downgraded to version 17 during failover. |
|  | Type FAILOVER to confirm.   |
|  |   |
|  |   |
|  |   |
|  | Cancel K Back Next > Start failover   |

FIGURE 233. Confirmation of Failover of DR Plan

We can see that VMs **Oracle19c-OL8** and **Oracle19c-OL8-=RMAN** have been successfully migrated via vSphere Storage vMotion to the vSAN workload datastore.



FIGURE 234. VM Oracle19c-OL8 VMDK Details

The failover of the DR plan completed successfully.

| Oracle Recovery Plan Summary Reports   |                           |                                |         |
|--|---------------------------|--------------------------------|---------|
| Plan   | Protected groups          | Continuous compliance          | Ø       |
| Oracle Recovery Plan   | VCDR - Oracle PG          |                                |         |
| Site A - SC2 - Oracle 🔶 DR-SDDC  |                           | ✓                              |         |
| Oracle Recovery Plan   |                           |                                |         |
|  |                           | 18 / 18 checks passed S 2h ago | how     |
|  |                           |                                |         |
| ✓ Failed over with no errors   |                           | Commit 👂 Ro                    | llback  |
| Success  |                           |                                |         |
| Step   |                           | Timestamp Duration Pr          | rogress |
| → ✓ Step 1. Prepare cloud storage resources to run VMs for step Recover prot | tection group Oracle Test | Jul-19 04:52 pm <1m Fi         | nished  |
| ▶ ✓ Step 2. Recover protection group Oracle Test                             |                           | Jul-19 04:52 pm 4m Fi          | nished  |
| ▶ ✓ Step 3. Wait for user input: Do you wish to continue?                    |                           | Jul-19 04:56 pm 1m Fi          | nished  |
| ▶ ✓ Step 4. Recover all remaining VMs, files, and groups                     |                           | Jul-19 04:57 pm < 1m Fi        | nished  |
| ▶ ✓ Step 5. Migrate to SDDC datastore VMs recovered in step Recover protect  | ction group Oracle Test   | Jul-19 04:57 pm 1h Fi          | nished  |
| ▶ ✓ Step 6. Release cloud storage resources for step Recover all remaining V | Ms, files, and groups     | Jul-19 05:44 pm < 1m Fi        | nished  |

#### FIGURE 235. Failover of DR Plan Completed Successfully

After a failover finishes, commit the plan to make the effects permanent. When you commit a completed failover plan, the plan transitions to the failover committed state. Commit a failover with extra caution. Until you explicitly commit the failover operation, it can still be rolled back (even following a successful completion). But after commit, there is no rollback.

| Commit - Oracle Recovery Plan  | ×   |                  |                                 |
|--|---|------------------|---------------------------------|
| Commit will finish the failover task. Further actions for this task, retry, will not be available anymore. | like rollback or  |                  |                                 |
| Failover results   | Oracle Recovery Plan Summary Reports                    |                  |                                 |
| Failover status Failed over with no Errors None errors   | Plan  | Protected groups | Continuous compliance 3         |
| Time to 4 minutes, 51 seconds<br>recovery<br>Failover notes  | Oracle Recovery Plan<br>Site A - SC2 - Oracle 🔅 DR-SDDC | VCDR - Oracle PG | ~                               |
|  | Oracle Recovery Plan                                    |                  | 18 / 18 checks passed Show Show |
| Failback plan  | Sailover committed                                      |                  | Create PDF report Activate      |
| Create a failback plan<br>The failback plan reverses source and destination, and the correspon             | nding mappings.   |                  |                                 |
| Confirmation   |   |                  |                                 |
| Type COMMIT FAILOVER to confirm.   |   |                  |                                 |
| Ca   | Commit  |                  |                                 |

FIGURE 236. Commit Failover of DR Plan



In event of a real DR, the plan should be deactivated so that any further compliance checks will not run and error out. In this case, the recovery plan was left activated as the failover DR was a simulated exercise.

| Oracle Recovery Plan Summary Report   | ts               |                                 |  |
|---|------------------|---------------------------------|--|
| Plan  | Protected groups | Continuous compliance 3         |  |
| Oracle Recovery Plan<br>Site A - SC2 - Oracle → DR-SDDC<br>Oracle Recovery Plan | VCDR - Oracle PG | ~                               |  |
|   |                  | 18 / 18 checks passed Show Show |  |
| ⊘ Ready   |                  | Fallover Test plan Deactivate   |  |



The Oracle VMs Oracle19c-OL8 and Oracle19c-OL8-RMAN are recovered on the DR site as show below:

| Oracle19c-OL8   D      Summary Monitor Configure  | ී මී 🙆 🖌 ACTIONS 🗸<br>Permissions Datastores Networks Snapshots   | Sur | Oracle19c-OL8-RM    | MAN   D 🛛 🛱  | ACTIONS V<br>S Datastores Networks Snapshots   |                      |
|---|---|-----|---------------------|--|--|----------------------|
| Guest Of<br>Competi-<br>VWware<br>Powered On<br>LAUNCH WEB CONSOLE<br>LAUNCH REMOTE CONSOLE ① | S: Oracle Linux 8 (64-bit)<br>bitty: ESXI 7.0 and later (VM version 17)<br>Tools: Running, version:11296 (Guest Managed)<br><u>VOOR WF0-</u><br>oraclef906.08 visb.locat<br>192168.14.45<br>10.2.32.4 | D F |                     | Guest OS: Ora<br>Compatibility: ESX<br>VMware Tools: Run<br>DNS Name:<br>IP Addresses: 192<br>Host: 10.2 | cie Linux 8 (64-bit)<br>17.7.0 and later (VM version 17)<br>Ining, version:11296 (Guest Managed)<br>15.1.1.2.1.2.1.2.1.2.1.2.1.1.1.1.1.1.1.1 |                      |
| VM Hardware   |   | V   | d Hardware          |  |  |                      |
| > CPU   | 12 CPU(s)   |     | > CPU               |  | 8 CPU(s)   |                      |
| > Memory  | 128 GB, 1.28 GB memory active   |     | > Memory            |  | 96 GB, 0.96 GB memory active   |                      |
| > Hard disk 1   | 80 GB   |     | > Hard disk 1       |  | 80 GB  |                      |
| Total hard disks  | 5 hard disks  |     | Total hard disks    |  | 5 hard disks   |                      |
| > Network adapter 1   | Oracle Fallover (connected)   |     | > Network adapter 1 |  | Oracle Fallover (connected)  |                      |
| CD/DVD drive 1  | Disconnected  | q   | CD/DVD drive 1      |  | Disconnected   | q.                   |
| > Video card  | 8 MB  |     | > Video card        |  | 4 MB   |                      |
| VMCI device   | Device on the virtual machine PCI bus that provides support for the virt<br>machine communication interface   | lal | VMCI device         |  | Device on the virtual machine PCI bus that provides sup<br>machine communication interface   | port for the virtual |
| > Other   | Additional Hardware   |     | > Other             |  | Additional Hardware  |                      |
| Compatibility   | ESXi 7.0 and later (VM version 17)  |     | Compatibility       |  | ESXI 7.0 and later (VM version 17)   |                      |

FIGURE 238. VM Oracle19c-OL8 and Oracle19c-OL8-RMAN Status

The Oracle VM **Oracle19c-OL8** is up with IP address 192.168.14.45 and the database **vvol19c** is up. The alert log for the database shows no errors. Oracle crash recovery is performed when the database starts up, which is normal and expected.

The Oracle VM **Oracle19c-OL8-RMAN** is up with IP address 192.168.14.46 and the database **rmandb** is up. The alert log for the database **rmandb** shows no errors. Oracle crash recovery is performed when the database **rmandb** starts up, which is normal and expected.

Learn more about Running a Failover DR Plan.



#### Failback DR Plan

Once the protected site is made available after a disaster event, the steps to run the failback DR plan **Failback-Oracle Recovery Plan** can be employed as shown below.

You can run a DR plan to failback from a VMware Cloud on AWS SDDC to a protected vSphere site. Failback from an SDDC returns only changed data. There is no rehydration, and the data remains in its native compressed and deduplicated form.

Learn more about Running a Failback DR Plan.

As mentioned in the previous section, the failover of the DR plan **Oracle Recovery Plan** was actually a simulated one, so Protected Site A was still available. In this case, power the Oracle VMs **Oracle19c-OL8** and **Oracle19c-OL8-RMAN** down before proceeding.

#### The failback DR plan is as shown below:

| Failback - Oracle Recovery Plan  | Summary Reports |                  |                                 |            |
|--|-----------------|------------------|---------------------------------|------------|
| Plan   |                 | Protected groups | Continuous compliance           | C          |
| Failback - Oracle Recovery Plan<br>DR-SDDC → Site A - SC2 - Oracle<br>Cloud file system Cloud Backup (Oregon)<br>Failback - Oracle Recovery Plan |                 | VCDR - Oracle PG | 18 / 18 checks passed<br>Im ago | Show       |
| 📀 Ready (not testable)   |                 |                  | Failover from VMC               | Deactivate |

FIGURE 239. Failback DR Plan

The failback DR plan steps pass all validation checks as shown below:

| <ul> <li>Compliance check<br/>Runtime settings<br/>Preview<br/>Confirmation</li> <li>Protected site</li> <li>Connection to source site</li> <li>Replication health</li> <li>Datastores exist on source site</li> <li>Networks exist on source site</li> <li>Resource pools exist on source site</li> <li>Folders exist on source site</li> <li>Folders exist on source site</li> <li>Resource pools exist on source site</li> <li>Recovery site</li> </ul> |   |
|---|---|
| Preview       2m ago         Confirmation       Protected site <ul> <li>Connection to source site</li> <li>Replication health</li> <li>Datastores exist on source site</li> <li>Networks exist on source site</li> <li>Resource pools exist on source site</li> <li>Folders exist on source site</li> <li>Folders exist on source site</li> </ul> Recovery site   | 5 |
| Confirmation  Protected site  Connection to source site  Replication health  Datastores exist on source site  Networks exist on source site  Resource pools exist on source site  Recovery site   | 2 |
| <ul> <li>Connection to source site</li> <li>Replication health</li> <li>Datastores exist on source site</li> <li>Networks exist on source site</li> <li>Resource pools exist on source site</li> <li>Folders exist on source site</li> </ul>  |   |
| <ul> <li>Replication health</li> <li>Datastores exist on source site</li> <li>Networks exist on source site</li> <li>Resource pools exist on source site</li> <li>Folders exist on source site</li> </ul>   |   |
| <ul> <li>Datastores exist on source site</li> <li>Networks exist on source site</li> <li>Resource pools exist on source site</li> <li>Folders exist on source site</li> <li>Recovery site</li> </ul>  |   |
| <ul> <li>Networks exist on source site</li> <li>Resource pools exist on source site</li> <li>Folders exist on source site</li> <li>Recovery site</li> </ul>   |   |
| <ul> <li>Resource pools exist on source site</li> <li>Folders exist on source site</li> <li>Recovery site</li> </ul>  |   |
| <ul> <li>Folders exist on source site</li> <li>Recovery site</li> </ul>   |   |
| Recovery site   |   |
|   |   |
| <ul> <li>Connection to failover site</li> </ul>   |   |
| ✓ vCenter server registered in failover site  |   |
| <ul> <li>Datastores exist on failover site</li> </ul>   |   |
| <ul> <li>Protection groups can be recovered in failover site</li> </ul>   |   |
| <ul> <li>Networks exist on failover site</li> </ul>   |   |
| <ul> <li>Resource pools exist on failover site</li> </ul>   |   |
| <ul> <li>Folders exist on recovery site</li> </ul>  |   |
| Orchestration   |   |
| ✓ IP address mapping  |   |
| ✓ Recovery steps  |   |
| <ul> <li>Script server recovered before script actions</li> </ul>   |   |
| Other   |   |
| <ul> <li>VMC proxy is running and reachable</li> </ul>  |   |
| ✓ VMC refresh token validity  |   |
| Cancel  |   |

FIGURE 240. Failback DR Plan Steps

Steps of the failback DR plan are continued below:

| Failover from VMC - F   | ailback - Oracle Recovery Pl                                    | an   |
|---|---|--|
| <ul> <li>Compliance check</li> <li>Runtime settings</li> <li>Preview</li> <li>Confirmation</li> </ul> | Runtime settings<br>Error handling<br>When failing over from VM | MC, all errors are ignored and cannot be retried.  |
|   | Fallover from VMC - Fall  | Preview         * Step 1.       Prepare cloud storage resources to run VMs for step Recover protection group Oracle Test         1.       Prepare cloud storage resources to run VMs         * Step 2.       Power off VMs on failover site required for step Recover protection group Oracle Test         1.       Power off VMs on failover site required for step Recover protection group Oracle Test         1.       Power off VMs on failover site         * Step 3.       Restore VMs to failover site via DRaaS Connect for step Recover protection group Oracle Test         1.       Restore 2 VMs on protected site via DRaaS Connect         * Step 4.       Power off VMs required for step Recover protection group Oracle Test         1.       Power off 2 VMs on protected site         * Step 5.       Synthesize VMC snapshots of VMs for step Recover protection group Oracle Test         1.       Power off 2 VMs engaphots of 2 VMs         * Step 6.       Snapshots of 2 VMs         * Step 6.       Snapshot VMs required for step Recover all remaining VMs, files, and groups         1.       Take snapshots of 1 protection groups         * Step 7.       Snapshot VMs required for step Recover all remaining VMs, files, and groups         1.       Take snapshots of 1 protection groups         * Step 8.       Applying VM changes from VMC SDDC via DRaaS Connect for step Recover protection group Oracle Test |

FIGURE 241. Failback DR Plan Steps Continued

The summary of the failback DR plan steps is shown below:

| <ul> <li>Compliance check</li> </ul> | Preview   |
|--------------------------------------|---|
| <ul> <li>Runtime settings</li> </ul> | Step 1. Prepare cloud storage resources to run VMs for step Recover all remaining VMs, files, and groups            |
| → Preview                            | • Step 2. Power off VMs on failover site required for step Recover all remaining VMs, files, and groups             |
|                                      | • Step 3. Restore VMs to failover state via DRaaS Connect for step Recover all remaining VMs, files, and groups     |
|                                      | Step 4. Power off VMs required for step Recover all remaining VMs, files, and groups                                |
|                                      | • Step 5. Synthesize VMC snapshots of VMs for step Recover all remaining VMs, files, and groups                     |
|                                      | Step 6. Snapshot VMs required for step Recover all remaining VMs, files, and groups                                 |
|                                      | Step 7. Snapshot VMs required for step Recover all remaining VMs, files, and groups                                 |
|                                      | • Step 8. Applying VM changes from VMC SDDC via DRaaS Connect for step Recover all remaining VMs, files, and groups |
|                                      | Step 9. Recover all remaining VMs, files, and groups  |
|                                      | Step 10. Delete from protected site VMs recovered in step Recover all remaining VMs, files, and groups              |
|                                      | Step 11. Release cloud storage resources for step Recover all remaining VMs, files, and groups                      |

FIGURE 242. Failback DR Plan Steps Summary

| Failover from VMC - Failback  | - Oracle Recovery Plan   |
|---|--|
| <ul> <li>Compliance check</li> <li>Runtime settings</li> <li>Preview</li> </ul> | Confirmation IMPORTANTI Planned failover will restore the protected VMs in the destination site. |
| → Confirmation  | Type PLANNED FAILOVER to confirm. PLANNED FAILOVER   |
|   | Cancel Cancel Next > Start failover  |



### The failback completes successfully.

| [failback] Oracle Recovery Plan Summary Reports                                 |  |                               |                 |          |          |
|---|--|-------------------------------|-----------------|----------|----------|
| Plan  | Protected groups                             | Continuous cor                | npliance        |          | Ø        |
| [failback] Oracle Recovery Plan   | VCDR - Oracle PG                             |                               |                 |          |          |
| DR-SDDC   Site A - SC2 - Oracle   |  |                               | $\sim$          |          |          |
| Cloud file system Cloud Backup (Oregon)   |  |                               |                 |          |          |
| Oracle Recovery Plan  |  | 18 / 18 checks pas<br>30m ago | sed             |          | Show     |
| ✓ Failed over with no errors  |  |                               |                 |          | Commit 🗲 |
| Success   |  |                               |                 |          |          |
| Step  |  |                               | Timestamp       | Duration | Progress |
| → ✓ Step 1. Prepare cloud storage resources to run VMs for step Recover all re  | emaining VMs, files, and groups              |                               | Jul-20 12:17 pm | < 1m     | Finished |
| → ✓ Step 2. Power off VMs on failover site required for step Recover all remain | ning VMs, files, and groups                  |                               | Jul-20 12:17 pm | < 1m     | Finished |
| ▶ ✓ Step 3. Restore VMs to failover state via DRaaS Connect for step Recover    | all remaining VMs, files, and groups         |                               | Jul-2012:18 pm  | 1m       | Finished |
| ▶ ✓ Step 4. Power off VMs required for step Recover all remaining VMs, files,   | and groups                                   |                               | Jul-20 12:19 pm | < 1m     | Finished |
| ▶ ✓ Step 5. Synthesize VMC snapshots of VMs for step Recover all remaining V    | VMs, files, and groups                       |                               | Jul-2012:19 pm  | Зm       | Finished |
| ► ✓ Step 6. Snapshot VMs required for step Recover all remaining VMs, files, a  | and groups                                   |                               | Jul-20 12:22 pm | < 1m     | Finished |
| ▶ ✓ Step 7. Snapshot VMs required for step Recover all remaining VMs, files, a  | and groups                                   |                               | Jul-20 12:22 pm | < 1m     | Finished |
| ▶ ✓ Step 8. Applying VM changes from VMC SDDC via DRaaS Connect for ste         | p Recover all remaining VMs, files, and grou | os                            | Jul-20 12:22 pm | < 1m     | Finished |
| ▶ ✓ Step 9. Recover all remaining VMs, files, and groups                        |  |                               | Jul-20 12:22 pm | 1m       | Finished |
| ► ✓ Step 10. Delete from protected site VMs recovered in step Recover all ren   | naining VMs, files, and groups               |                               | Jul-20 12:23 pm | < 1m     | Finished |
| → ✓ Step 11. Release cloud storage resources for step Recover all remaining V   | Ms, files, and groups                        |                               | Jul-20 12:24 pm | < 1m     | Finished |

FIGURE 244. Planned Failback Status



As in the case of a failover, after a failback finishes, commit the plan to make the effects permanent. When you commit a completed failback plan, the plan transitions to the committed state.

| Commit - [failback] Oracle Recovery Plan  |  |                  |                                 |
|---|--|------------------|---------------------------------|
| Commit will finish the failover task. Further actions for this task, like rollback or<br>retry, will not be available anymore.  |  |                  |                                 |
| Failover results  |  |                  |                                 |
| Failover status Failed over with no Errors None<br>errors   |  |                  |                                 |
| Time to 6 minutes, 13 seconds<br>recovery   |  |                  |                                 |
| Failover notes  | [failback] Oracle Recovery Plan Summary Reports  |                  |                                 |
|   | Pian   | Protected groups | Continuous compliance           |
|   | [failback] Oracle Recovery Plan<br>DR-SDDC → Site A - SC2 - Oracle<br>Cloud file system: Cloud Backup (Oregon) | VCDR - Oracle PG | ~                               |
| Failback plan   | Oracle Recovery Plan   |                  | 18 / 18 checks passed Show Show |
|   |  |                  |                                 |
| Create a fallback plan<br>The failback plan reverses source and destination, and the corresponding mappings.  | Failover committed   |                  | Create PDF report Activate      |
| Create a failback plan The failback plan reverses source and destination, and the corresponding mappings. Next steps  | Failover committed   |                  | Create PDF report Activate      |
| Create a failback plan The failback plan reverses source and destination, and the corresponding mappings. Next steps IMPORTANT! After committing, we strongly recommend the following steps: Delete DR-SDDC, if it is not in use anymore, to save costs.  | Failover committed   |                  | Create PDF report Activate      |
| Create a failback plan The failback plan reverses source and destination, and the corresponding mappings. Next steps IMPORTANT! After committing, we strongly recommend the following steps: Delete DR-SDDC, if it is not in use anymore, to save costs. Confirmation   | Failover committed   |                  | Create PDF report Activate      |
| Create a failback plan The failback plan reverses source and destination, and the corresponding mappings. Next steps IMPORTANT! After committing, we strongly recommend the following steps: Delete DR-SDDC, if it is not in use anymore, to save costs. Confirmation Type COMMIT FAILOVER to confirm.                                      | Failover committed   |                  | Create PDF report Activate      |
| Create a fallback plan The failback plan reverses source and destination, and the corresponding mappings. Next steps IMPORTANT! After committing, we strongly recommend the following steps: Delete DR-SDDC, if it is not in use anymore, to save costs. Confirmation Type COMMIT FAILOVER to confirm. COMMIT FAILOVER                      | Failover committed   |                  | Create PDF report Advante       |
| Create a failback plan The failback plan reverses source and destination, and the corresponding mappings. Next steps IMPORTANT! After committing, we strongly recommend the following steps: Delete DR-SDDC, if it is not in use anymore, to save costs. Confirmation Type COMMIT FAILOVER to confirm. COMMIT FAILOVER Cencel Concel Commit | Failover committed   |                  | Create PDF report Activate      |



The Oracle VM **Oracle19c-OL8** is up with IP address 172.16.14.45 and the database **vvol19c** is up. The alert log for the database shows no errors. Oracle crash recovery is performed when the database starts up, which is normal and expected.

The Oracle VM **Oracle19c-OL8-RMAN** is up with IP address 172.16.14.46 and the database **rmandb** is up. The alert log for the database **rmandb** shows no errors. Oracle crash recovery is performed when the database **rmandb** starts up, which is normal and expected.

VMware Cloud Disaster Recovery uses regularly scheduled snapshots to replicate to the SCFS. VMware snapshots are point-intime (PIT) snapshots and are therefore crash-consistent. Write-order fidelity is guaranteed for all VMDKs of the VM.

| 🍪 Oracle19c-OL8   ▷ 🗖 🛃   | ACTIONS Y  | 🔠 Orac                | cle19c-OL8-RI                       | MAN   🖻 🗖  | 1 🗳 🖗 🔞 🛛 ACTION   | s ¥                                      |              |                            |
|---|--|-----------------------|-------------------------------------|--|--|--|--------------|----------------------------|
| Summary Monitor Configure Per   | missions Datastores Networks Snapshots Updates   | Summary               | Monitor Con                         | figure Permiss   | sions Datastores Ne  | tworks Si                                | napshots     | Updates                    |
| Compatibility Compatibility VMware Too VMware Too DNS Name: IP Addresses LAUNCH WEB CONSOLE LAUNCH REMOTE CONSOLE | Oracle Linux 8 (64-bit)<br>(FST 70 U2 and later (VM version 19)<br>(Fs: Running, version11296 (Guest Managad)<br>MOBL INFO<br>oracle18-ci8 vslab.local<br>(T21.66.44<br>sc2esx09.vslab.local | P Powered<br>Launch w | I CN<br>EB CONSOLE<br>EMOTE CONSOLE | Guest OS:<br>Compatibility:<br>VMware Tools:<br>DNS Name:<br>IP Addresses:<br>Host:<br>& | Oracle Linux 8 (64-bit)<br>ESXI 7.0 U2 and later (VM ve<br>Running, version11296 (Gues<br>MoRE INPO<br>oracle19c-08-vvol-rman.corp<br>172.16.14.46<br>sc2esx12.vslab.local | rsion 19)<br>t Managed)<br>b.localdomain |              |                            |
| VM Hardware   |  | , VM Hardy            | ware                                |  |  |  |              |                            |
| > CPU   | 12 CPU(s)  | > CPU                 |                                     |  | 12 CPU(s)  |  |              |                            |
| > Memory  | 128 GB, 1.28 GB memory active  | > Mem                 | ory                                 |  | 128 GB, 1.28 GB men  | nory active                              |              |                            |
| > Hard disk 1   | 80 GB  | > Hard                | disk 1                              |  | .100 GB  |  |              |                            |
| Total hard disks  | 5 hard disks   | Total                 | hard disks                          |  | 5 hard disks   |  |              |                            |
| > Network adapter 1   | APPS-1614 (connected)  | > Netw                | ork adapter 1                       |  | APPS-1614 (connected)  | >  |              |                            |
| CD/DVD drive 1  | Disconnected 9   | _ CD/D                | VD drive 1                          |  | Disconnected   |  |              | 4 <sup>0</sup> ×           |
| > Video card  | 8 MB   | > Video               | o card                              |  | 4 MB   |  |              |                            |
| VMCI device   | Device on the virtual machine PCI bus that provides support for the virtua<br>machine communication interface  | VMC                   | I device                            |  | Device on the virtual m<br>machine communication   | achine PCI bus<br>n interface            | that provide | is support for the virtual |
| > Other   | Additional Hardware  | > Othe                | r                                   |  | Additional Hardware  |  |              |                            |
| Compatibility   | ESXI 7.0 U2 and later (VM version 19)  | Com                   | patibility                          |  | ESXi 7.0 U2 and later (\   | /M version 19)                           |              |                            |

#### FIGURE 246. Oracle VM Oracle19c-OL8 and Oracl19c-OL8-RMAN Status

Following a successful failback, you must clean up the failback source site in preparation for subsequent recovery operations.

Specifically, the stale VMs left behind on the datastores of the failback source site must be deleted to avoid conflicts for future recoveries from the protected site. Similarly, you must demote protection groups on the recovery source.

Learn more about Running a Failback DR Plan.

#### Storage-Level Disaster Recovery

Storage-level disaster recovery can be used to provide storage LUN-level OR vVOLs-level replication from on-premises Site A to Site B.

Using array-based replication with Site Recovery Manager ensures one or more storage arrays at the protected site to replicate data to peer arrays at the recovery site.

With storage replication adapters (SRAs), Site Recovery Manager can be integrated with a wide variety of arrays.

To use array-based replication with Site Recovery Manager, replication must be configured first before one can configure Site Recovery Manager to use it.

As noted in *Supported Backup, Restore and Recovery Operations using Third Party Snapshot Technologies* (Oracle Doc ID 604683.1), third-party storage vendor snapshots must conform to the following requirements:

- Integrated with Oracle's recommended restore and recovery operations above
- Database crash-consistent at the point of the snapshot
- Write-ordering is preserved for each file within a snapshot



#### On-premises using vSphere VMFS Storage

This use case focusses on the utilization of VMware Site Recovery Manager with storage-based replication using Pure Storage to provide disaster recovery on a storage LUN (VMFS) level, to both single-instance Oracle VMs Oracle19c-OL8 and Oracle19c-OL8 RMAN and Oracle RAC prac19c, from on-premises Site A to Site B and vice-versa.

#### **Test Recovery Plan**

The recovery plan can be tested before being used for planned migration or for disaster recovery.

With array-based replication, as part of testing a recovery plan, the VMs on the protected site are still replicated to the replica VM disk files on the recovery site. During a test recovery, the array creates a snapshot of the volumes hosting the VM disk files on the recovery site. Array replication continues normally while the test is in progress. When you perform cleanup after running a test, the array removes the snapshots that were created earlier as part of the test recovery workflow.

#### Steps to test the recovery plan SC2-AZ2-Oracle-SRA-RP are as shown below:

| SC2-AZ2-Oracle-SRA-RP EDIT NOVE D  | DELETE TEST CLEANUP RUN              |   | Learn mor  |
|--|--------------------------------------|---|--|
| Summary Recovery Steel Lauer Hatory Permission Recovery Plane: SC2 AZZ Oracle-SRA-RP Howards Size: Howards Size Recovery Size: Displaye Decaptors: | ns Protectio Groups Virtual Machines |   |  |
| ✓ Plan Status  |                                      | ✓ VM Status   |  |
| Plan Status: -> Ready  | $\sim$                               | Ready for Recovery:   | 4 VMs  |
| This plan is ready for   | test or recovery                     | In Progress:  | 0 VMs  |
|  |                                      | Success   | 0 VMs  |
| <ul> <li>Recent History</li> </ul>   |                                      | Warnings  | 0 VMs  |
| This   | : list is empty                      | Error:<br>Incomplete:   | 0 VMs  |
|  |                                      |   | Totač 4 VMs  |
| Test - SC2-AZ2-Oracle-   | Ready to complete                    | Nest - SC2-AZ2-Oracle-SRA-RP         1         Confirmation options         2       Beady to complete | Confirmation         Test confirmation         Image: Server connection:         Protected site:       Primary_Site         Recovery site:       DR_Site         Server connection:       Connected         Number of VMs:       4 |
| SRA-RP   | Review your selected settings.       |   | Storage options  |
| 1 Confirmation options   | Name                                 | SC2-AZ2-Oracle-SRA-RP   | Specify whether to replicate recent changes to the recovery site. This process might take several minutes and is or<br>available if the sites are connected.   |
| 2 Ready to complete  | Protected site                       | . Primary_Site  | Deplicate regent chapters to regulary site   |
|  | Recovery site                        | DR_Site   | Replicate recent changes to recovery site  |
|  | Server connection                    | Connected   |  |
|  | Number of VMs                        | 4   |  |
|  | Storage synchronization              | Replicate recent changes to recovery site   |  |

FIGURE 247. Test Recovery Plan SC2-AZ2-Oracle-SRA-RP

Testing of the recovery plan **SC2-AZ2-Oracle-SRA-RP** is successful.

| Bacovery Stars                     | THE EDIT MOVE DELETE TEST   | ion Groups Virtual Machines   |   |  | -   |
|------------------------------------|---|---|---|--|---|
| PORT STEPS TEST CLEAP              | NUP RUN REPROTECT CANCEL  | on aroups - virtual Machines  |   |  |   |
| Plan status:                       | III» Test in progress   |   |   |  |   |
| Description                        | A test of this Man is .   | currently in progress   |   |  |   |
| escription.                        | A rest of this pairs.   | currently in progress.  |   |  |   |
|                                    | \   |   |   |  | View: Test steps  |
| rry Step                           |   | Status  | Step Started  | Step Completed   |   |
| . Synchronize storage              |   | ✓ Success   | Friday, June 25, 2021 9:11:37 AM  | Friday, June 25, 2021 9:12:22 AM   |   |
| . Restore recovery site hosts from | om standby  | ✓ Success   | Friday, June 25, 2021 9:12:22 AM  | Friday, June 25, 2021 9:12:22 AM   |   |
| . Suspend non-critical VMs at rec  | covery site   |   |   |  |   |
| 5. Configure test networks         | not   | Success   | Eriday, June 25, 2021 9:12:22 AM  | Friday, June 25, 2021 512:57 AM  |   |
| 5 Power on priority 1 VMs          |   | * auccess   | chody, surie za, zozralizitata Am   | rhody, sone zo, zozi olizioo Am  |   |
| 7. Power on priority 2 VMs         |   | \<br>\  |   |  |   |
| 8. Power on priority 3 VMs         |   | Running   | Friday, June 25, 2021 9:12:56 AM  |  | 50%   |
| 9. Power on priority 4 VMs         |   |   |   |  |   |
| 10. Power on priority 5 VMs        |   | \<br>\  |   |  |   |
|                                    | SC2-AZ2-Oracle-SR   | A-RP EDIT MOVE DELE   | TE TEST CLEANUP RUN   |  |   |
|                                    | SUMMARY Recovery Steps  | A-RP EDIT MOVE DELE<br>Issues History Permissions<br>ANUP RUN REPROTECT ANCI  | TR TREST CLEANUP RUN  |  |   |
|                                    | SC2-AZ2-Oracle-SR Summary Recovery Steps CXPORT STEPS TEEPS TEET CLL Plan status:   | A-RP EDIT MOVE DELE<br>Issues History Permissions<br>ANUP RUN REPROTECT DISC<br>Control   | TE TEST CLEANUP RUN   |  |   |
|                                    | SC2-AZ2-Oracle-SR<br>Summary Recovery Steps<br>EXPORT STEPS T151 CLE<br>Plan status:<br>Description:  | A-RP EDT MOVE DELE<br>Issues History Permisions<br>ANUP RUN REPROTECT ONCO<br>Tost of<br>The virtue   | TRE TREST CLEANUP RUN   | ary site: Review the plan history to view any errors or warnings. When you   | are ready to remove the test environment, run clear   |
|                                    | SC2-AZ2-Oracle-SR Summary Recovery Steps EXPORT STEPS TEST CLE Plan status: Description: Recovery Step  | A-RP EDT MOVE DELE<br>Issues History Permisions<br>ANUP RUN REPROTECT CHICK<br>Concernent Chick<br>The virtue                                       | TE TEST CLEANUP BUN ····  Protection Groups Virtual Machines  EL  complete  al machines have been recovered in a test environment at the recove  Status  Status   | ery site. Review the plan history to view any errors or warnings. When you a<br>Step Startad   | are ready to remove the test environment, run clear<br>Step Completed   |
|                                    | SC2-AZ2-Oracle-SR           Summary         Recovery Steps           EXPORT STEPS         T.S.T. CLE.           Plan status:         Description:           Description:         Image: Clear Status           Recovery Step         > % it synchronize storage   | A-RP EDIT MOYE DELE<br>Issues History Permitions<br>ANUP RUN REPROTECT SUICI<br>Trev Virtue   | TE TEST CLEANUP BUN ···· Protection Groups Virtual Machines  CL  complete al machines have been recovered in a test environment at the recove  Status  Status  Status  Success  | cry site. Review the plan history to view any errors or warnings. When you a<br>Step Started<br>Friday, June 25, 2021 91137 AM   | are ready to remove the test environment, run clear<br>Step Completed<br>Friday, June 25, 2021 912:22 AM  |
|                                    | SC2-AZ2-Oracle-SR Summary Recovery Steps CXPORT STEPS TEST CLE. Plan status: Description: Recovery Step S 1 Synchronize storage L 2. Recovery ste hosts fi  | A-RP EDT MOVE DELE<br>Issues History Permissions<br>ANUP RUN REPROTECT DISC<br>The virtue<br>The virtue   | TE TEST CLEANUP BUN  Protection Groups Virtual Machines  CL  complete  al machines have been recovered in a test environment at the recove  Status  Status Status  Status  Status  Status  Status   | ary site; Review the plan history to view any errors or warnings. When you a<br>Step Started<br>Friday, June 25, 2021 91137 AM<br>Friday, June 25, 2021 91132 AM   | are ready to remove the test environment, run clear<br>Step Completed<br>Friday, June 25, 2021 91:2:22 AM<br>Friday, June 25, 2021 91:2:22 AM   |
|                                    | SUMMARY Recovery Steps  EXPORT STEP  EXPORT | A-RP EDT MOVE DELE<br>Issues History Permisions<br>ANUP RUN REPROTECT UNCL<br>The virtue<br>The virtue<br>Inform standby<br>recovery site           | TE TEST CLEANUP BUN ····<br>Protection Groups Virtual Machines<br>FL<br>complete<br>al machines have been recovered in a test environment at the recove<br>Status<br>Status<br>Status<br>Success<br>Success   | ery site. Review the plan history to view any errors or warnings. When you a<br>Step Started<br>Friday, June 25, 2021 81137 AM<br>Friday, June 25, 2021 91222 AM   | are ready to remove the test environment, run clear<br>Step Completed<br>Friday, June 25, 2021 912-22 AM<br>Friday, June 25, 2021 912-22 AM   |
|                                    | SC2-AZ2-Oracle-SR Summary Recovery Steps EXPORT STEPS TEST CLE. Plan status: Description: Recovery Step S 1 Synchronize storage S 2 Restore recovery site hosts fi S 3.supend non-clickal VAs at 1 O 4 4.ceae writible storage  | A-RP EDIT NOVE DELE<br>Issues History Permisions<br>ANUP RUN REPROTECT VICI<br>The Virtue<br>from slandby<br>recovery site<br>solot                 | TE TEST CLEANUP BUN  Protection Groups Virtual Machines  L  complete  al machines have been recovered in a test environment at the recove  fistatus  Status Success Success Success Success Success   | ery site. Review the plan history to view any errors or warnings. When you a<br>Step Started<br>Friday, June 25, 2021 91:37 AM<br>Friday, June 25, 2021 91:222 AM<br>Friday, June 25, 2021 91:222 AM                                   | are ready to remove the test environment, run clear<br>Step Completed<br>Friday, June 25, 2021 912-22 AM<br>Friday, June 25, 2021 912-23 AM<br>Friday, June 25, 2021 912-57 AM                                    |
|                                    | SC2-AZ2-Oracle-SR Summary Recovery Steps EXPORT STEPS TEST CLE. Plan status: Description:  Recovery Step S 1 synchronize storage C 2. Reciber recovery site hosts fi S 3. Suspend non-critical VMs at i S 4. Create writiblo storage some S 5.   | A-RP EDT NOVE DELE<br>Issues History Permissions<br>ANUP RUN REPROTECT DIVICI<br>The virtue<br>The virtue<br>from standby<br>recovery site<br>oshot | TE TEST CLEANUP BUN  Protection Groups Virtual Machines  CL  complete  al machines have been recovered in a test environment at the recove  Status  Status Status  Status  Status  Status  Status   | ary site: Review the plan history to view any errors or warnings. When you -<br>Step Started<br>Friday, June 25, 2021 91137 AM<br>Friday, June 25, 2021 91222 AM<br>Friday, June 25, 2021 91222 AM<br>Friday, June 25, 2021 91222 AM   | are ready to remove the test environment, run clear<br>Step Completed<br>Friday, June 25, 2021 912-22 AM<br>Friday, June 25, 2021 912-22 AM<br>Friday, June 25, 2021 912-53 AM<br>Friday, June 25, 2021 912-58 AM |
|                                    | SUBJECT STATES Summary Recovery Steps CXPORT STEPS TEST CLL Plan status: Description:  Recovery Step S 1 Synchronize storage L 2: Retore recovery site holds fi II 3. Superhonize storage L 3: G 6 Configure test networks G 6 Co | A-RP EDT MOVE DELE<br>Issues History Permisions<br>ANUP RUN REPROTECT CHICL<br>The virtue<br>The virtue<br>Inform standby<br>recovery site<br>oshot | TE TEST CLEANUP BUN ····<br>Protection Groups Virtual Machines<br>FL<br>complete<br>al machines have been recovered in a test environment at the recove<br>Status<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Success<br>Succes<br>Success<br>Success<br>Success | ery site: Review the plan history to view any errors or warnings. When you a<br>step Started<br>Friday, June 25, 2021 9132 AM<br>Friday, June 25, 2021 912-22 AM<br>Friday, June 25, 2021 912-22 AM<br>Friday, June 25, 2021 912-25 AM | are ready to remove the test environment, run clear<br>9tep Completed<br>Friday, June 25, 2021 912:22 AM<br>Friday, June 25, 2021 912:23 AM<br>Friday, June 25, 2021 912:57 AM<br>Friday, June 25, 2021 912:58 AM |
|                                    | SC2-AZ2-Oracle-SR Summary Recovery Steps      CXFORT STEPS TEST CLE.      Plan status:      Description:      Recovery Step      S 1 Synchronize storage      & 2. Bestore recovery site heads fi     3. Suspend non-critical VMs at 1  | A-RP EDIT NOVE DELE<br>Issues History Permisions<br>ANUP BUN REPROTECT MICL<br>The virtue<br>from standby<br>recovery site<br>ophot                 | TE TEST CLEANUP BUN  Protection Groups Virtual Machines  L  complete al machines have been recovered in a test environment at the recove  Status Success Succes  | ery site. Review the plan history to view any errors or warnings. When you i  step Startad  Fiday, June 25, 2021 91137 AM  Fiday, June 25, 2021 91222 AM  Fiday, June 25, 2021 91225 AM  | are ready to remove the test environment, run clear<br>Step Completed<br>Friday, June 25, 2021 91:222 AM<br>Friday, June 25, 2021 91:257 AM<br>Friday, June 25, 2021 91:258 AM                                    |
|                                    | SC2-AZ2-Oracle-SR Summary Recovery Steps EXPORT STEPS TEST CLE. Plan status: Description:  Recovery Step S 1 Synchronize storage S 2 Aspend non-critical VMs at 1 S 4 Create writabols storage periods G 6 Power on priority 1 VMs C 7.Power on priority 2 VM | A-RP EDT MOVE DELE<br>Issues History Permissions<br>ANUP RUN REPROTECT DIVICI<br>The virtue<br>The virtue<br>from standby<br>recovery site<br>pshot | TE TEST CLEANUP RUN  Protection Groups Virtual Machines  CL  complete  al machines have been recovered in a test environment at the recove  Status Stat   | ary site: Review the plan history to view any errors or warnings. When you -<br>Step Started<br>Friday, June 25, 2021 91137 AM<br>Friday, June 25, 2021 91222 AM<br>Friday, June 25, 2021 91255 AM<br>Friday, June 25, 2021 91255 AM   | are ready to remove the test environment, run clear<br>Step Completed<br>Friday, June 25, 2021 912-22 AM<br>Friday, June 25, 2021 912-57 AM<br>Friday, June 25, 2021 912-57 AM<br>Friday, June 25, 2021 912-93 AM |
|                                    | SC2-AZ2-Oracle-SR         Summary       Recovery Steps         ExPORT STEPS       T.S.7         Plan status:       Description:         Description:  | A-RP EDT MOVE DELE<br>Issues History Permisions<br>ANUP RUN REPROTECT CHICL<br>The virtue<br>from standby<br>recovery site<br>oshot                 | TE TEST CLEANUP BUN   | ery site: Review the plan history to view any errors or warnings. When you a Step Started Friday, June 25, 2021 9137 AM Friday, June 25, 2021 912-22 AM Friday, June 25, 2021 912-25 AM Friday, June 25, 2021 912-55 AM                | are ready to remove the test environment, run clear<br>9tep Completed<br>Friday, June 25, 2021 912-22 AM<br>Friday, June 25, 2021 912-57 AM<br>Friday, June 25, 2021 912-58 AM<br>Friday, June 25, 2021 912-58 AM |

#### FIGURE 248. Test Recovery Plan SC2-AZ2-Oracle-SRA-RP Successful

The protected VMs are still powered on and running on the protected site.

| C Oracle Actions V                                |            |
|---|------------|
| Summary Monitor Configure Permissions VMs Updates |            |
| Virtual Machines VM Templates vApps VM Folders    |            |
|   |            |
| Name ↑  | State      |
| 🔀 Oracle19c-OL8                                   | Powered On |
| Coracle19c-OL8-RMAN                               | Powered On |
| টি prac19c1                                       | Powered On |
| 🔁 prac19c2  | Powered On |

FIGURE 249. Protected VM Status


During a test recovery, the array creates a snapshot of the volumes hosting the VM's disk files on the recovery site and the datastore on that snapshot is brought up. The VMs on that snapshot's datastores are powered up as below for testing.

The target pod is promoted with the resignature process for VMFS, which includes a mandatory step adding a name prefix in the form of snap-XXXXXXX (e.g., **snap-076af255-OraSC2**).

| [] Þ. <u>e</u> Ø         | 🖹 snap-076af255-Or        | aSC2             | s 🗸         |                          |                         |              |          |
|--------------------------|---------------------------|------------------|-------------|--------------------------|-------------------------|--------------|----------|
| ✓                        | Summary Monitor Config    | gure Permissions | Files Hosts | VMs                      |                         |              |          |
| ✓ 由 AZ2-DC               |                           |                  |             |                          |                         |              |          |
| AZ2-OraPure              | Virtual Machines VM Templ | lates            |             |                          |                         |              |          |
| AZ2-TINTRI-EC6090        |                           |                  |             |                          |                         |              |          |
| AZ20raVVOL               |                           |                  |             |                          |                         |              |          |
| snap-076af255-OraSC2     | Name ↑                    | ✓ State ✓        | Status ~    | Provisioned Space $\lor$ | Used Space $\checkmark$ | Host CPU 🗸 🗸 | Host Mem |
| > 🛃 sc2wvc03.vslab.local | Dracle19c-OL8             | Powered On       | V Normal    | 1.62 TB                  | 191.27 GB               | 888 MHz      | 3.26 GB  |
| > 🕝 sc2wvc11.vslab.local | Dracle19c-OL8-RMAN        | Powered On       | ✓ Normal    | 906.09 GB                | 171.15 GB               | 888 MHz      | 2.69 GB  |
|                          | prac19c1                  | Powered On       | ✓ Normal    | 788.09 GB                | 752.41 GB               | 323 MHz      | 6.03 GB  |
|                          | prac19c2                  | Powered On       | 🗸 Normal    | 788.09 GB                | 708.55 GB               | 403 MHz      | 23.91 GB |

#### FIGURE 250. Test Recovery Plan Storage Snapshot on Site B

The contents of the Site B storage snapshot are as shown below:

| Array Hosts Volumes Pods File   | Systems Policies               |                  |                            |                                 |                                |                  |                 |                          |
|---|--------------------------------|------------------|----------------------------|---------------------------------|--------------------------------|------------------|-----------------|--------------------------|
| () > Pods > PAZ2POD (promoted)  |                                |                  |                            |                                 |                                |                  |                 |                          |
| Size         Data Reduction         Unique         Replication         Snapsh           20 T         4.3 to 1         75.15 G         0.00         0.00 | ots Shared System<br>42.30 M - | Total<br>75.19 G |                            |                                 |                                |                  |                 |                          |
| Arrays  |                                |                  |                            |                                 |                                |                  |                 |                          |
| Name  |                                |                  |                            | Status                          |                                | Frozen At        | Mediator Status |                          |
| wdc-tsa-pure-01   |                                |                  |                            | • online                        |                                |                  | online          |                          |
| Pod Replica Links A   |                                |                  |                            |                                 |                                |                  |                 | 1-1 of 1 +               |
| Local Pod   | Direction                      | Remote Pod       | Remote Array               |                                 | Status                         | Recovery Point   |                 | Lag                      |
| ල AZ2POD (promoted)   | <del>~</del>                   | SC2POD           | Pure-X50-BCA               |                                 | • replicating                  | 2021-06-20 10:43 |                 | 1s                       |
|   |                                |                  | ▶ snap-49b<br>summary Moni | 528bb-OraSC2<br>tor Configure R | ACTIONS V<br>Permissions Files | Hosts VMs        |                 |                          |
|   |                                |                  | Virtual Machines           | VM Templates                    |                                |                  |                 |                          |
|   |                                |                  | Name ↑                     |                                 |                                |                  | v               | State                    |
|   |                                |                  | Oracle19c-OL8              | RMAN                            |                                |                  |                 | Powered On<br>Powered On |
|   |                                |                  | prac19c1                   |                                 |                                |                  |                 | Powered On               |
|   |                                |                  | prac19c2                   |                                 |                                |                  |                 | Powered On               |

FIGURE 251. Site B Storage Snapshot Contents

Array replication continues normally while the test is in progress.

| Array Hosts Volumes Pods File   | e Systems Policies           |                 |  |  |                      |            |                  |                  |                 |             |
|---|------------------------------|-----------------|--|--|----------------------|------------|------------------|------------------|-----------------|-------------|
| (€) > Pods > ⊕ SC2POD (promoted)  |                              |                 |  |  |                      |            |                  |                  | i               |             |
| Size         Data Reduction         Unique         Replication         Snapsh           20 T         19.7 to 1         5.41 G         0.00         0.00 | oots Shared System<br>0.00 • | Total<br>5.41 G |  |  |                      |            |                  |                  |                 |             |
| Arrays  |                              |                 |  |  |                      |            |                  |                  | +               |             |
| Name  |                              |                 |  |  | Status               | Fn         | ozen At          | Mediator Status  |                 |             |
| Pure-X50-BCA  |                              |                 |  |  | • online             |            |                  | online           | 10              |             |
| Pod Replica Links <   |                              |                 |  |  |                      |            |                  | 1-1              | of1 + i         |             |
| Local Pod   | Direction                    | Remote Pod      |  | Remote Array                                   | Status               |            | Recovery Point   |                  | Lag             |             |
| @ SC2POD (promoted)   | $\rightarrow$                | AZ2POD          |  | wdc-ba-pure-01                                 | • repli              | cating     | 2021-06-19 14:08 |                  | 1s 🚦            |             |
|   |                              |                 | Array Hosts Volumes  | Pods File Systems Poll                         | cles                 |            |                  |                  |                 |             |
|   |                              |                 | Pods > gP AZ2POD (prom   | oted)  |                      |            |                  |                  |                 |             |
|   |                              |                 | Size Data Reduction Unique Repti<br>20 T 4.3 to 1 75.07 G 0.00 | cation Snapshots Shared Syst<br>0.00 42.30 M - | tem Total<br>75.11 G |            |                  |                  |                 |             |
|   |                              |                 | Arrays   |  |                      |            | $\mathbf{X}$     |                  |                 | +           |
|   |                              |                 | Name   |  |                      |            | atus             | Frozen At        | Mediator Status |             |
|   |                              |                 | wdc-ba-pure-01   |  |                      |            | e onizà          |                  | online          | 1           |
|   |                              |                 | Pod Replica Links <  |  |                      |            |                  |                  |                 | 14 of 1 + 1 |
|   |                              |                 | Local Pod  | Direction                                      | Remote Pod           | Remote An  | Status           | Recovery Point   |                 | Lag         |
|   |                              |                 | d <sup>P</sup> AZ2POD (promoted)                               | +  | SC2POD               | Pure-X50-E | OCA ereplicating | 2021-05-19 14:09 |                 | 15          |

FIGURE 252. Site A and Site B Array Replication in Progress

Both single-instance Oracle VMs **Oracle19c-OL8** and **Oracle19c-OL8-RMAN** are powered up and connected to the recovery site test network **APPS-1810**. The IP addressing scheme is followed as defined in the network mapping section.

Oracle VM **Oracle19c-OL8** is up with IP address 172.18.10.45 and the database **vvol19c** is up. The alert log for the database shows no errors. Oracle crash recovery is performed when the database starts up, which is normal and expected.

Oracle VM **Oracle19c-OL8-RMAN** is up with IP address 172.18.10.46 and the database **rmandb** is up. The alert log for the database **rmandb** shows no errors. Oracle crash recovery is performed when the database **rmandb** starts up, which is normal and expected.

The storage-based snapshot is crash-consistent and write-ordering is preserved for each file within a snapshot.

| 🔀 Oracle19c-OL8 📔 Þ 🗖 🗳 🚳   | tở Actions ₩   |                  | 🐉 Oracle19c-OL8-RMAN 🛛 Þ 🗖 🛱 🖗 🐯 🛛 actions 🗸              |  |   |       |  |
|---|--|------------------|---|--|---|-------|--|
| Summary Monitor Configure Permissi  | ions Datastores Networks Snapshots Updates   |                  | Summary Monitor Conf                                      | ligure Permis  | ssions Datastores Networks Snapshots Updates  |       |  |
| Compatibility: Compatibility: VMwere Tools: Powered On PAddresses: Hoxt: LAUNCH WEB CONSOLE LAUNCH REMOTE CONSOLE | Oracle Linux 8 (64-bit)<br>Esxi 7.0 U 2 and ater (VM version 19)<br>Running, version 11256 (Guest Managed)<br>MoBE INFO<br>oracle195-ol Svisb. Jocal<br>172,1610.45<br>az2 sx23 vslab. Jocal |                  | Powered On<br>LAUNCH WEB CONSOLE<br>LAUNCH REMOTE CONSOLE | Guest OS:<br>Compatibility:<br>VMware Tools:<br>DNS Name:<br>IP Addresses:<br>Host:<br>& | Oracle Linux 8 (64-bit)<br>ESX 7 O U2 and later (VM version 19)<br>Running, version 11296 (Guest Managed)<br>More INPO<br>oracle19c-08-woi-man.corp.localdomain<br>172,18,10,46<br>az2esz24 vstab.local |       |  |
| VM Hardware   |  | ^                | VM Hardware   |  |   |       |  |
| > CPU   | 12 CPU(s)  |                  | > CPU   |  | 12 CPU(s)   |       |  |
| > Memory  | 128 GB, 1.28 GB memory active  |                  | > Memory  |  | 128 GB, 1.28 GB memory active   |       |  |
| > Hard disk 1   | 80 GB  |                  | > Hard disk 1   |  | 100 GB  |       |  |
| Total hard disks  | 5 hard clsks   |                  | Total hard disks  |  | 5 hard disks  |       |  |
| > Network adapter 1   | APPS-1810 (connected)  |                  | > Network adapter 1                                       |  | APPS-1810 (connected)   |       |  |
| CD/DVD drive 1  | Disconnected   | 9 <sub>D</sub> ~ | CD/DVD drive 1  |  | Disconnected  |       |  |
| > Video card  | 8 MB   |                  | > Video card  |  | 4 MB  |       |  |
| VMCI device   | Device on the virtual machine PCI bus that provides support for the<br>virtual machine communication interface   |                  | VMCI device   |  | Device on the virtual machine PCI bus that provides support fo<br>virtual machine communication interface   | r the |  |
| > Other   | Additional Hardware  |                  | > Other   |  | Additional Hardware   |       |  |
| Compatibility   | ESXI 7.0 U2 and later (VM version 19)  |                  | Compatibility   |  | ESXI 7.0 U2 and later (VM version 19)   |       |  |

FIGURE 253. Oracle VMs Oracle19c-OL8 and Oracle19c-OL8-RMAN Networking Details



All ASM disk groups are online and the ASM and Oracle instance is up.

| [root@oracle19<br>   | c-o18-vv@   | 51 ~]# /u01/a]<br>                                      | pp/19.0.0/grid/bin/crsctl  | status re | es -t<br>  |
|--|---|---|--|-----------|--|
| Name   | Target  | State   | Server   |           | tails  |
| Local Resource   |   |   |  |           |  |
| ora.DATA_DG.dg   |   |   |  |           |  |
| oro FRA DC da  | ONLINE  | ONLINE  | oracle19c-ol8-vvol   | STABLE    |  |
| ora.rka_bG.dg  | ONLINE  | ONLINE  | oracle19c-ol8-vvol   | STABLE    |  |
| ora.LISTENER.1   | snr<br>ONLINE                                       | ONLINE  | oracle19c-ol8-vvol   | STABLE    |  |
| ora.MGMT_DATA.   | dg  | 0.000 7.000   | 1 10 10 1  |           |  |
| ora.REDO DG.dg   | ONLINE  | ONLINE  | oraciel9c-ol8-vvol   | STABLE    |  |
|  | OFFLINE   | OFFLINE   | oracle19c-ol8-vvol   | STABLE    |  |
| 014.4510   | ONLINE  | ONLINE  | oracle19c-ol8-vvol   | Started,  | STABLE   |
|  | OFFLINE   | OFFLINE   | oracle19c-ol8-vvol   | STABLE    |  |
| Cluster Resour   |   |   |  |           |  |
|  |   |   |  |           |  |
| 1<br>ora diskmon   | ONLINE  | ONLINE  | oracle19c-ol8-vvol   | STABLE    |  |
| 1  | OFFLINE   | OFFLINE   |  | STABLE    |  |
| ora.evmd<br>1  | ONLINE  | ONLINE  | oracle19c-ol8-vvol   | STABLE    |  |
| [root@oracle19<br>[root@oracle19<br>0 S grid<br>0 S oracle<br>[root@oracle19 | c-o18-vvo<br>c-o18-vvo<br>2778<br>2992<br>c-o18-vvo | ol ~]#<br>ol ~]# ps -ae<br>1 0 80<br>1 0 80<br>0 21 ~]# | fl   grep -i smon   grep<br>0 - 391131 do_sem 14:0<br>0 - 25284218 do_sem 14 |           | 00:00:00 asm_smon_+ASM<br>00:00:00 ora_smon_vvol |

FIGURE 254. Oracle VM Oracle19c-OL8 Services

The Oracle RAC cluster **prac19c** VMs are also powered up. The public interfaces are connected to the recovery site test network **APPS-1810** and private interconnects are connected to the recovery site test network **APPS-1809**. The IP addressing scheme is followed as defined in the network mapping section.

| 🟦 prac19c1 🛛 🖻 🗳 🚳 👘  | ACTIONS V   | 🗊 prac19c2 🛛 Þ 🗖 🛱 🛷 🖄  | ACTIONS Y   |
|---|---|---|---|
| Summary Monitor Configure Permiss   | sions Datastores Networks Snapshots Updates   | Summary Monitor Configure Permi   | ssions Datastores Networks Snapshots Updates  |
| Cuest OS:<br>Compatibility:<br>VMware Tools:<br>VMware Tools:<br>DNS Name:<br>IP Addresses:<br>LAUNCH REMOTE CONSOLE<br>LAUNCH REMOTE CONSOLE<br>LAUNCH REMOTE CONSOLE<br>LAUNCH REMOTE CONSOLE | Oracie Linux 7 (64-bit)<br>ESXI 7.0 end later (VM version 17)<br>Running, version:11269 (Guest Managed)<br>MORE INFO<br>practolevitab local<br>172.18.10.191<br>VIEW ALL 3 IP ADDRESSES<br>Zezex/23.93/bb.local<br>description<br>DETAILS | Compatibility: Compatibility: Compatibility: Dependent on DNS Name: IP Addresses: LAUNCH WEB CONSOLE LAUNCH REMOTE CONSOLE Undependent Un | Oracle Linux 7 (64-bit)<br>ESX 7.0 and ister (VM version 17)<br>Running, version 1299 (Guest Managed)<br>More INFO<br>practice2 vibib local<br>172.18.10.192<br>View ALL 3IP Abddesses:<br>172.18.10.192<br>View ALL 3IP Abddesses:<br>172.18.10.192<br>192.168.14.192<br>199.254.0.115 |
| VM Hardware   |   | VM Hardware   |   |
| > CPU   | 12 CPU(s)   | > CPU   | 12 CPU(s)   |
| > Memory  | 128 GB, 43.52 GB memory active  | > Memory  | 128 GB, 96 GB memory active   |
| > Hard disk 1   | 80 GB   | > Hard disk 1   | 80 GB   |
| Total hard disks  | 3 hard disks  | Total hard disks  | 3 hard disks  |
| > Network adapter 1   | APPS-1810 (connected)   | > Network adapter 1   | APPS-1810 (connected)   |
| > Network adapter 2   | APPS-1809 (connected)   | > Network adapter 2   | APPS-1809 (connected)   |
| CD/DVD drive 1  | Disconnected  | CD/DVD drive 1  | Disconnected  |
| > Video card  | 8 MB  | > Video card  | 8 MB  |
| VMCI device   | Device on the virtual machine PCI bus that provides support for the<br>virtual machine communication interface  | VMCI device   | Device on the virtual machine PCI bus that provides support for the<br>virtual machine communication interface  |
| > Other   | Additional Hardware   | > Other   | Additional Hardware   |
| Compatibility   | ESXI 7.0 and later (VM version 17)  | Compatibility   | ESXI 7.0 and later (VM version 17)  |

FIGURE 255. Oracle RAC VM prac19c Networking Details



As part of testing the recovery plan, the network interfaces of the Oracle RAC **prac19c** will be changed to the appropriate test network as defined in the network mappings.

- The VIP and the SCAN IPs have to be changed to the test/recovery network IP scheme in order for the RAC Clusterware to bring up the RAC services.
- The steps to change the RAC VIP IP address can be found in *Oracle 19c Clusterware Administration and Deployment Guide*. The steps to change the Oracle private interconnect IP address can be found in the *Changing Oracle Clusterware Private Network Configuration*.
- The steps to change the RAC SCAN IP addresses can be found in the *My Oracle Support Note How to Update the IP Address of the SCAN VIP Resources (ora.scan{n}.vip) (Doc ID 952903.1).*
- The steps to change the RAC VIP, scan and private interconnect IP addresses are beyond the scope of this paper.

The recovery plans can be configured and IP customization can be performed for VM networking, if needed.



FIGURE 256. Recovery Plan IP Customization

IP customization can be performed for VM NIC1 networking, if needed.

| VM Recovery Properties - prac19c1   |                | ×   |          |
|---|----------------|---|----------|
| Changes to these properties will apply to this VM in all recovery plans. Recovery Properties IP Customization |                |   |          |
| Select IP customization mode ①<br>Manual IP customization ~   |                |   |          |
| $\sim$ IP settings - NIC 1  |                |   |          |
| Protected Site: Primary_Site CONFIGURE<br>Recovery Site: DR_Site CONFIGURE                                    |                |   |          |
| Property Protected Site   | Recovery Site  |   |          |
| IPv4 Configuration Not configured   | Not configured |   |          |
| IPv6 Configuration Not configured   | Not configured | Configure Protected Site IP Settings - NIC 1  | $\times$ |
| DNS Configuration Not configured  | Not configured | 19v4 IPv6 DNS   |          |
| > IP settings - NIC 2   |                | IPv4 Address for Protected Site   |          |
| Configure Recovery Site IP Settings - NIC 1   |                | Une DHCP to obtain an IP address automatically  Use the following IPv4 address:  IPv4 Address:  |          |
| IPv4 IPv6 DNS   |                | Subnet Mask:  |          |
| IPv4 Address for Recovery Site  |                | Alternate Gateway:  |          |
| <ul> <li>Use DHCP to obtain an IP address automatically</li> <li>Use the following IPv4 address:</li> </ul>   |                |   |          |
| IPv4 Address:   |                |   |          |
| Subnet Mask:  |                |   |          |
| Default Gateway:  |                |   |          |
| Alternate Gateway:  |                | Retrieve the current IP settings from the protected VM (requires VMwere Tools and ESK 4.1 or higher). Some settings may need to be entered manually.     CANCEL 0 | эк       |

FIGURE 257. Recovery Plan IP Customization Details

When performing cleanup after running a test, the array removes the snapshots that were created earlier as part of the test recovery workflow.



FIGURE 258. Cleanup the Recovery Plan

As part of the cleanup, the VMs on the snapshot datastore are powered off and the placeholder VMs are then placed on the placeholder datastore **AZ2-OraPure**.

The snapshot datastore **snap-49b528bb-OraSC2** is then removed, and the pod will then be demoted, resetting the environment for another test or recovery.

| SC2-AZ2-Oracle-SRA-RP EDIT MOVE DELETE TEST CLEANUP RUN                              |  |
|--|--|
| Summary Recovery Steps Issues History Permissions Protection Groups Virtual Machines |  |
| EXPORT STEPS TEST CLEANUP RUN REPROTECT CANCEL                                       |  |
| Plan status: $\rightarrow$ Ready   |  |
| Description:   |  |
|  |  |
| Recovery Step  | Step Started Step Completed  |
| > S 1. Synchronize storage   |  |
| 2. Restore recovery site hosts from standby  |  |
| 3. Suspend non-critical VMs at recovery site   |  |
| > 🕲 4. Create writable storage snapshot  |  |
| > @ 5. Configure test networks   | ACTIONS Y  |
| 6. Power on priority 1 VMs   |  |
| 2 7. Power on priority 2 VMs   | Summary Monitor Configure Permissions Hosts & Clusters VMs Datastores Networks Undates |
| > 3 8. Power on priority 3 VMs   |  |
| 9. Power on priority 4 VMs   |  |
| I0. Power on priority 5 VMs  | Datastores Datastore Clusters Datastore Folders  |
|  |  |
|  |  |
|  |  |
|  | Norma di   |
|  | Name 1   |
|  | AZ2-OraPure  |
|  |  |
|  | AZZ-TINTRI-EC6090  |
|  | AZ20reVVOL   |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
| Summary Monitor Configure Permissions VMs Updates                                    |  |
|  |  |
|  |  |
| Virtual Machines VM Templates VApps VM Folders                                       |  |
|  |  |
|  |  |
| Name 1   | ✓ State  |
| Dracle19c-OL8  | Powered Off  |
| Dracle19c-OL8-RMAN   | Powered Off  |
| D prac19c1   | Powered Off  |
| ឆ្លាំ prac19c2   | Powered Off  |
|  |  |

FIGURE 259. Site B Storage and Compute Status



The placeholder datastore with the placeholder VMs are as shown below:



FIGURE 260. Site B Placeholder Datastore and Placeholder VMs

Site B VM status is as shown below:

| () AZ2E    | BCA11         | actions 🗸   |             |       |     |            |          |         |   |             |
|------------|---------------|-------------|-------------|-------|-----|------------|----------|---------|---|-------------|
| Summary    | Monitor       | Configure   | Permissions | Hosts | VMs | Datastores | Networks | Updates |   |             |
| Virtual Ma | nchines V     | M Templates | vApps       |       |     |            |          |         |   |             |
| Name ↑     |               |             |             |       |     |            |          |         | ~ | State       |
| 🗊 Oracle   | e19c-OL8      |             |             |       |     |            |          |         |   | Powered Off |
| 🗊 Oracle   | e19c-OL8-RMAI | Ν           |             |       |     |            |          |         |   | Powered Off |
| 🗊 prac19   | )c1           |             |             |       |     |            |          |         |   | Powered Off |
| 🗊 prac19   | e2            |             |             |       |     |            |          |         |   | Powered Off |

FIGURE 261. Site B VM Status

More information on testing a recovery plan with array-based replication can be found in *Testing a Recovery Plan* and *SRM User Guide: FlashArray Continuous Replication (ActiveDR) Workflows*.



#### Run Recovery Plan for Planned Migration

Performing a planned migration or disaster recovery by running a recovery plan will result in VM migration from the protected site to the recovery site. If the protected site suffers an unforeseen event that might result in data loss, the recovery plan can also be run under unplanned circumstances.

**Planned migration** – During a planned migration, Site Recovery Manager synchronizes the VM data on the recovery site with the VMs on the protected site. Site Recovery Manager attempts to shut down the protected VMs gracefully and performs a final synchronization to prevent data loss, then powers on the VMs on the recovery site. If errors occur during a planned migration, the plan stops so that the errors can be resolved, and the plan rerun.

Steps to run recovery plan SC2-AZ2-Oracle-SRA-RP in planned migration mode are as shown below:



FIGURE 262. Run Recovery Plan SC2-AZ2-Oracle-SRA-RP

A planned migration is very similar to a test recovery in process. Prior to a recovery, a source pod is in the promoted state and the target pod is in the demoted state.

After the planned migration, the datastore **OraSC2** is disconnected, the protected site pod volume **SC2POD::OraSC2** is disconnected from all protected site hosts, and protected site pod **SC2POD::OraSC2** is **demoted**. The recovery site pod volume **AZ2POD::OraSC2** is promoted and connected to the recovery site hosts.

| SC2-AZ2-Oracle-SRA-RP EDIT MOVE DELETE TEST CLEANUP RUN   |   |  |                    |                |                  |                 | U        | earn more     |                     |                  |
|---|---|--|--------------------|----------------|------------------|-----------------|----------|---------------|---------------------|------------------|
| Summary Recovery Steps Issues History Permissions Protection Groups Virtual Machine   | es  |  |                    |                |                  |                 |          |               |                     |                  |
| Recovery Plan: SC2-A22-Oraclo-SRA-RP<br>Protected Size: Peremy, Six<br>Encoury Size: Dis_Size<br>Decorption:                                      |   |  |                    |                |                  |                 |          |               |                     |                  |
| Your workloads are not protected. Run reprotect.  |   |  |                    |                |                  |                 | G RI     | PROTECT       |                     |                  |
| ∼ Plan Status   |   | ✓ VM State   | us                 |                |                  |                 |          |               |                     |                  |
| Plan Status: 🥥 Recovery complete  |   | Ready for  | Recovery:          |                |                  |                 | 0        | VMs           |                     |                  |
| The recovery has completed. Review the plan history to view any err<br>press Reprotect to configure protection in the reverse direction. Not      | ors or warnings. You can now<br>e that if you plan to failback the  | In Progres   | s:                 |                |                  |                 | 0        | VMs           |                     |                  |
| virtual machines to be original site, you must first run the plan in repr<br>is continued in reverse you can run the plan in recovery mode to fai | rotect mode, then once protection   | n Success:   |                    |                |                  |                 | 4        | VMs           |                     |                  |
| original site.  |   | Error:   |                    |                |                  |                 | 0        | VMs           |                     |                  |
| > Recent History  |   | Incomplete   |                    |                |                  |                 | 0        | VMs           |                     |                  |
|   |   |  |                    |                |                  |                 | Total: 4 | VMs           |                     |                  |
|   | Array         Pocks         volume           ②         > Pocks         > g <sup>0</sup> SC2POD           Size         Data Reduction         Unique           201         Nate for 1         6.516           Arrays         Name         Size | 25 POUS Fill<br>0 (demoted)<br>Replication Snapst<br>0.00 0.00 | hols Shared System | Total<br>6.51G |                  |                 | Status   |               | Frozen At           | Mediator Stat    |
|   | Pure-XSO-BCA  |  |                    |                |                  |                 | • online |               | 2021-06-09 10:48:31 | onine            |
|   | Pod Replica Links A   |  | Direction          | Remote Pod     |                  | Remote Array    |          | Status        |                     | Recovery Point   |
|   | SC2POD (demoted)  |  | <i>←</i>           | AZ2POD         |                  | wdc-bsa-pure-01 |          | • replicating |                     | 2021-06-20 22:18 |
| Array Hosts Volumes Pods File Systems Policies  |   |  |                    |                |                  |                 |          |               |                     |                  |
| Pods > of AZ2POD (promoted)   |   |  |                    |                |                  |                 |          |               |                     |                  |
| Size Data Reduction ywgee Replication Sinapuhotis Shared System Total<br>20 T 4.3 to 1 75.40 G 0.00 0.00 42.30 M - 75.44 G                        |   |  |                    |                |                  |                 |          |               |                     |                  |
| Arrays  |   |  |                    |                |                  |                 |          |               |                     |                  |
| Name  | Sta   | tus  |                    | Frozen At      | Mec              | slator Status   |          |               |                     |                  |
| wdobsgure-01  | • 0   | nline  |                    |                | onli             | 10              |          |               |                     |                  |
| Pod Replica Links A   |   |  |                    |                |                  |                 |          |               |                     |                  |
| Local Pod Direction Remote Pod  | Remote Array  |  | Status             |                | Recovery Point   |                 |          |               |                     |                  |
|   | Pure-X50-BCA  |  | replicating        |                | 2021-06-20 22:19 |                 |          |               |                     |                  |

#### FIGURE 263. Recovery Plan SC2-AZ2-Oracle-SRA-RP in Progress

Site A and Site B storage volumes are as shown below:

| Array Hosts Volumes Pods File Systems Policies  | Array Hosts Volumes Pods File Systems Policies  |
|---|---|
| () > Volumes > SC2POD :: OraSC2   | Volumes > Caracteria AZ2POD :: OraSC2   |
| Size         Data Reduction         Unique         Snapshots         Shared         System         Total           20 T         210 to 1         3.56 G         0.00         -         -         3.56 G | Size         Data Reduction         Unique         Snapshots         Shared         System         Total           20 T         9.5 to 1         6.44 G         0.00         -         -         6.44 G |
| Connected Hosts A   | Connected Hosts A   |
| Name  | Name  |
| No hosts found.   | No hosts found.   |
| Connected Host Groups A   | Connected Host Groups A   |
| Name  | Name  |
| No host groups found.   | 题 AZ2BCA11  |
| Details   | Details   |
| Source -  | Source -  |
| Created 2021-06-09 11:22:57   | Created 2021-06-09 11:22:57   |
| Serial A841B405A3A348CA00013066   | Serial FABF667E849B44C500042326   |
| Host Encryption Key Status none   | Host Encryption Key Status none   |
| # Hosts 0   | # Hosts 3   |
| // Connections 0  | # Connections 1   |
| QoS 🗹   | QoS IZ  |
| Bandwidth Limit -   | Bandwidth Limit -   |
| IOPS Limit -  | IOPS Limit -  |

### FIGURE 264. Site A and Site B Storage Volumes

As part of rescanning the ESXi hosts, the recovery site datastore is resignatured and mounted and the process of resignaturing adds the snap-XXXXXXX prefix to the datastore names. The VMs are then powered on in the resignature process.

| () B <u>=</u> Ø  | snap-46ea4261-OraSC           | 2 Actions V       |           |
|--|-------------------------------|-------------------|-----------|
| ✓ ⓓ az2wvc01.vslab.local   | Summary Monitor Configure     | Permissions Files | Hosts VMs |
| <ul> <li>✓ ■ AZ2-DC</li> <li>☑ AZ2-OraPure</li> <li>☑ AZ2-TINTRI-EC6090</li> <li>☑ AZ2OraVVOL</li> </ul> | Virtual Machines VM Templates |                   |           |
| snap-46ea4261-OraSC2   | Name ↑                        | ∽ State           | ✓ Status  |
| > 🗗 sc2wvc03.vslab.local   | 🔂 Oracle19c-OL8               | Powered On        | 🗸 Normal  |
| > 🗗 sc2wvc11.vslab.local   | 🔂 Oracle19c-OL8-RMAN          | Powered On        | 🗸 Normal  |
|  | 🔂 prac19c1                    | Powered On        | 🗸 Normal  |
|  | prac19c2                      | Powered On        | 🗸 Normal  |

FIGURE 265. Resignature of Recovery Site Datastore



Both single-instance Oracle VMs **Oracle19c-OL8** and **Oracle19c-OL8-RMAN** are powered up and connected to the recovery site recovery network **APPS-1810**. The IP addressing scheme is followed as defined in the network mapping section.

As in the case of testing the recovery plan, the Oracle VM **Oracle19c-OL8** is up with IP address 172.18.10.45 and the database **vvol19c** is up. The alert log for the database shows no errors. Oracle crash recovery is performed when the database starts up, which is normal and expected.

The Oracle VM **Oracle19c-OL8-RMAN** is up with IP address 172.18.10.46 and the database **rmandb** is up. The alert log for the database **rmandb** shows no errors. Oracle crash recovery is performed when the database **rmandb** starts up, which is normal and expected.

The storage-based snapshot is crash-consistent and write-ordering is preserved for each file within a snapshot.

Oracle VM Oracle19c-OL8 network details are as shown below:

| Snap-440f9f13-OraSC2                  | s 🗸  |   |                     |
|---------------------------------------|--|---|---------------------|
| Summary Monitor Configure Permissions | s Files Hosts VMs  |   |                     |
| Virtual Machines VM Templates         |  |   |                     |
| Name ↑                                |  | ~   | State               |
| 🔂 Oracle19c-OL8                       |  |   | Powered On          |
| Oracle19c-OL8-RMAN                    | 🔠 Oracle19c-OL8   🖻 🖬 🧔  | J 🔞 ACTIONS Y   | : On                |
| 🔂 prac19c1                            | Summary Monitor Configure Perm   | issions Datastores Networks Snapshots Updates   | :l On               |
| 🔀 prac19c2                            |  |   | :l On               |
|                                       | Compatibility:<br>VMware Tools<br>VMware Tools<br>DNS Name:<br>IP Addresses:<br>Host:<br>LAUNCH REMOTE CONSOLE | ESXi 7.0 U2 and later (VM version 19)<br>Running, version.11296 (Guest Managed)<br>MORE INFO<br>oracle19c-ol8.vslab.local<br>172.18.10.45<br>az2esx23.vslab.local |                     |
|                                       | VM Hardware  |   | ^                   |
|                                       | > CPU  | 12 CPU(s)   |                     |
|                                       | > Memory   | 128 GB, 1.28 GB memory active   |                     |
|                                       | > Hard disk 1  | 80 GB   |                     |
|                                       | Total hard disks   | 5 hard disks  |                     |
|                                       | > Network adapter 1  | APPS-1810 (connected)   |                     |
|                                       | CD/DVD drive 1   | Disconnected  | 9 <sub>10</sub> . ~ |
|                                       | > Video card   | 8 MB  |                     |
|                                       | VMCI device  | Device on the virtual machine PCI bus that provides support for<br>virtual machine communication interface  | the                 |
|                                       | > Other  | Additional Hardware   |                     |
|                                       | Compatibility  | ESXi 7.0 U2 and later (VM version 19)   |                     |

FIGURE 266. Oracle Oracle19c-OL8 Networking Status

Oracle VM Oracle19c-OL8-RMAN network details are as shown below:

| Isnap-440f9f13-OraSC2 ▲ ACTIONS ▼   |  |  |
|---|--|--|
| Summary Monitor Configure Permissions   | Files Hosts VMs                                  |  |
| Virtual Machines VM Templates   | Oracle19c-OL8-RMAN     Summary Monitor Configure | <ul> <li>Permissions</li> <li>Datastores</li> <li>Networks</li> <li>Snapshots</li> <li>Updates</li> </ul>  |
| Name ↑<br>Conciet9c-OL8<br>Conciet9c-OL8-RMAN<br>Pract9c1<br>Conciet9c-OL8-RMAN<br>Conciet9c-OL8-RMAN | Differences Gue                                  | at OS: Oracle Linux 8 (64-bit)<br>patibility: ESXI 7.0 and later (VM version 17)<br>vare Tools: Running, version:11296 (Guest Managed)<br>MORE INFO<br>Name: oracle19c-ol8-rman.corp.localdomain |
|   | LAUNCH WEB CONSOLE HOS<br>LAUNCH REMOTE CONSOLE  | Idresses: 172.18.10.46<br>: az2esx22.vslab.local   |
|   | VM Hardware                                      |  |
|   | > CPU  | 8 CPU(s)   |
|   | > Memory   | 96 GB, 8.64 GB memory active   |
|   | > Hard disk 1                                    | 100 GB   |
|   | Total hard disks                                 | 5 hard disks   |
|   | > Network adapter 1                              | APPS-1810 (connected)  |
|   | CD/DVD drive 1                                   | Disconnected   |
|   | > Video card                                     | 4 MB   |
|   | VMCI device                                      | Device on the virtual machine PCI bus that provides support for the<br>virtual machine communication interface   |
|   | > Other  | Additional Hardware  |
|   | · ······   |  |

FIGURE 267. Oracle Oracle19c-OL8-RMAN Networking Status

Oracle RAC cluster **prac19c** VMs are also powered up. The public interfaces are connected to the recovery site recovery network **APPS-1810** and private interconnects are connected to the recovery site recovery network **APPS-1805**. The IP addressing scheme is followed as defined in the network mapping section.



FIGURE 268. Oracle RAC prac19c Networking Status

As part of running a planned migration of the recovery plan, the network interfaces of the Oracle RAC **prac19c** will be changed to the appropriate recovery network as defined in the network mappings.

- The VIP and the SCAN IPs have to be changed to the test/recovery network IP scheme in order for the RAC Clusterware to bring up the RAC services.
- The steps to change the RAC VIP IP address can be found in *Oracle 19c Clusterware Administration and Deployment Guide*. The steps to change the Oracle private interconnect IP address can be found in the *Changing Oracle Clusterware Private Network Configuration*.
- The steps to change the RAC SCAN IP addresses can be found in the *My Oracle Support Note How to Update the IP Address of the SCAN VIP Resources (ora.scan{n}.vip) (Doc ID 952903.1).*
- The steps to change the RAC VIP, scan and private interconnect IP addresses are beyond the scope of this paper.

## 

At the end of the recovery process, the Target Site B is replicating to the Source Site A.

| Array             | Hosts                      | Volume            | s Pods                  | File Sy              | stems               | Policies         |                  |                 |         |                 |              |                 |                                 |             |
|-------------------|----------------------------|-------------------|-------------------------|----------------------|---------------------|------------------|------------------|-----------------|---------|-----------------|--------------|-----------------|---------------------------------|-------------|
| > 👀               | Pods > of                  | AZ2POD            | (promoted)              |                      |                     |                  |                  |                 |         |                 |              |                 |                                 |             |
| Size<br>20 T      | Data Reduction<br>4.3 to 1 | Unique<br>75.42 G | Replication 0.00        | Snapshots<br>0.00    | Shared<br>42.30 M   | System<br>-      | Total<br>75.46 G |                 |         |                 |              |                 |                                 |             |
| Arra              | vs                         |                   |                         |                      |                     |                  |                  |                 |         |                 |              |                 |                                 |             |
| Name              | · -                        |                   |                         |                      |                     |                  |                  |                 |         |                 |              | Status          |                                 | Frozen At   |
| wdest             | a-pure-01                  |                   |                         |                      |                     |                  |                  |                 |         |                 |              | • online        |                                 |             |
| macra             | a-pare-or                  |                   |                         |                      |                     |                  |                  |                 |         |                 |              | • on the        |                                 |             |
| Pod               | Replica Links              | ^                 |                         |                      |                     |                  |                  |                 |         |                 |              |                 |                                 |             |
| Local             | Pod                        |                   |                         |                      | Directi             | on               | Remote           | Pod             |         |                 | Remote Array |                 | Status                          |             |
| d <sup>₽</sup> AZ | 2POD (promoted)            |                   |                         |                      | $\rightarrow$       |                  | SC2POI           | >               |         |                 | Pure-X50-BCA |                 | <ul> <li>replicating</li> </ul> |             |
|                   |                            | Arr               | ay Hosts                | s Volur              | nes Po              | ds Fi            | e Systen         | ns Po           | blicies | 1               |              |                 |                                 |             |
|                   |                            | Size<br>20 T      | Data Reduc<br>18.6 to 1 | tion Uniqu<br>6.50 G | e Replicati<br>0.00 | on Snaps<br>0.00 | hots Sha         | ared Sys<br>0 - | tem     | Total<br>6.50 G |              |                 |                                 |             |
|                   |                            | A                 | rrays                   |                      |                     |                  |                  |                 |         |                 |              |                 |                                 |             |
|                   |                            | Na                | me                      |                      |                     |                  |                  |                 |         |                 |              |                 | Status                          |             |
|                   |                            | Pu                | re-X50-BCA              |                      |                     |                  |                  |                 |         |                 |              |                 | • online                        |             |
|                   |                            | R                 | od Replica Li           | nks ^                |                     |                  |                  |                 |         |                 |              |                 |                                 |             |
|                   |                            | Lo                | dal Pod                 |                      |                     |                  |                  | Direction       |         | Remote Pod      |              | Remote Array    |                                 | Status      |
|                   |                            | ୍                 | SC2POD (demo            | oted)                |                     |                  |                  |                 |         | AZ2POD          |              | wdc-tsa-pure-01 |                                 | replicating |

FIGURE 269. Storage Replication from Site B to Site A

A Reprotect needs to be run on the target Site B back to source Site A to protect the VMs in the reverse direction.

| Recovery Plans                         |                    |                       |  |   |                       |   |                                |                                 |          |
|--|--------------------|-----------------------|--|---|-----------------------|---|--------------------------------|---------------------------------|----------|
| NEW EDIT MOVE DELETE TEST CL           | LEANUP RUN ····    |                       |  |   |                       |   |                                |                                 |          |
| Name                                   | Description        | us                    |  | Ŧ   | Protected Site        |   | т                              | Recovery Site                   |          |
| SC2-AZ2-Oracle-SRA-RP Reprotect needed | Reprotect          | Recovery complete     |  |   | Primary_Site          |   |                                | DR_Site                         |          |
|  |                    |                       | Reprotect - SC2-AZ<br>Oracle-SRA-RP                                  | Z2- Con   | nfirmation op         | otions  |                                |                                 |          |
|  |                    |                       |  | Repr  | rotect confirmati     | on  |                                |                                 |          |
|  |                    |                       | 1 Confirmation options   | 1   | Running reprotect on  | this plan will commit the results of the record | very, and configure protection | in the reverse direction.       |          |
|  |                    |                       | 2 Ready to complete  |   | New protected site:   | DR_Site   |                                |                                 |          |
|  |                    | /                     |  |   | New recovery site:    | Primary_Site                                    |                                |                                 |          |
|  |                    |                       |  |   | Server connection:    | Connected                                       |                                |                                 |          |
|  |                    |                       |  |   | Number of VMs:        | 4   |                                |                                 |          |
| Reprotect - SC2-AZ2-                   | Ready to cor       | nplete                |  |   |                       |   |                                |                                 |          |
| Oracle-SRA-RP                          | Review your selec  | ted settings          |  | V Iu  | understand that this  | operation cannot be undone.                     |                                |                                 |          |
|  | ,,                 | iee eettiingei        |  |   |                       |   |                                |                                 |          |
|  |                    |                       |  | Repr  | rotect options        |   |                                |                                 |          |
| 1 Confirmation options                 | Name               |                       | SC2-AZ2-Oracle-SRA-RP  | Repro   | otect operations incl | ude steps to clean up the original da           | atastores and devices. If y    | you are experiencing errors dur | ing      |
| 2 Ready to complete                    | New protected site |                       | clean<br>use ti  | cleanup steps, you may choose the force cleanup option to ignore all errors and return the plan to the Ready state. If you<br>use this option, you may need to clean up your storage manually, and you should run a Test as soon as possible. |                       |   |                                |                                 |          |
|  | New recovery site  |                       | Primary_Site   | E FO  | orce cleanup          |   |                                |                                 |          |
|  | Server connection  |                       | Connected  |   |                       |   |                                |                                 |          |
|  | Number of VMs      |                       | 4  |   |                       |   |                                |                                 |          |
|  | Force cleanup      |                       | Do not ignore cleanup war  | nings   |                       |   |                                |                                 |          |
|  |                    | SC2-AZ2-Oracle        | -SRA-RP ton wort ettern test   | CLEANUP BON -   |                       |   |                                |                                 | Learn n  |
|  |                    | Summary Recovery Step | is issues History Permissions Protection                             | n Groups Virtual Machines   |                       |   |                                |                                 |          |
|  |                    | Recov                 | ny Plan: 5C2-AZ2-Oracle-SRA-8P<br>Chic: 04,5m<br>Soc: Pressy_50<br>P |   |                       |   |                                |                                 |          |
|  |                    | ✓ Plan Status         |  |   |                       | V VH Status                                     |                                |                                 |          |
|  |                    | Plan Status:          | -> Ready   |   |                       | Ready for Recovery                              |                                |                                 | 4 VMs    |
|  |                    |                       | This plan is ready for test or recover                               | ry.   |                       | In Progress:                                    |                                |                                 | 0 VMs    |
|  |                    |                       |  |   |                       | Decose .  |                                |                                 | 0 VMs    |
|  |                    | V Decent History      |  |   |                       | Wenny   |                                |                                 | 0 VMs    |
|  |                    | Reprotect             | Sunday, June 20, 2021 8:00:13 FM                                     | 🖌 Success   |                       | Drief   |                                |                                 | 0 VMs    |
|  |                    | Recovery              | Sunday, June 20, 20219(24:00 PM                                      | ✓ Success   |                       | Incomplete                                      |                                |                                 | 0 VMs    |
|  |                    | Test                  | Survey, June 20, 2021 Statement<br>Survey, June 20, 2021 853-05 FM   | Success   |                       |   |                                | Tot                             | 28 4 VMs |
|  |                    | Opena                 | Surviva June 20, 2022 2/2128 PM                                      | - Durines   |                       |   |                                |                                 |          |

FIGURE 270. Run Reprotect on Site B

In order to switch the protected site from Site B to Site A, we can run another planned migration which will switch the protected site from Site B to Site A. Replication will occur from Site A to Site B.

| Array Hosts Volumes Pods File S   | Systems Policies                                       |   |   |                           |          |              |          |                                 |
|---|--|---|---|---------------------------|----------|--------------|----------|---------------------------------|
| () > Pods > of SC2POD (promoted)  |  |   |   |                           |          |              |          |                                 |
| Size         Data Reduction         Unique         Replication         Snapshot           20 T         18.5 to 1         6.63 G         0.00         0.00 | is Shared System T<br>0.00 - 6                         | otal<br>.63 G   |   |                           |          |              |          |                                 |
| Arrays  |  |   |   |                           |          |              |          |                                 |
| Name  |  |   |   |                           | Status   |              |          |                                 |
| Pure-X50-BCA  |  |   |   |                           | • online |              |          |                                 |
| Pod Replica Links ~   |  |   |   |                           |          |              |          |                                 |
| Local Pod   | Direction  | Remote Pod  | R   | emote Array               |          | Status       |          |                                 |
| P SC2POD (promoted)   | $\rightarrow$  | AZ2POD  | w   | dc-tsa-pure-01            |          | replicating  |          |                                 |
|   | Array Hos<br>Pods ><br>Size Data Redu<br>20 T 4.3 to 1 | of AZ2POD (demoted)<br>Unique Replication Snaps<br>75.356 0.00 0.00 | e Systems Polic<br>hots Shared Syste<br>42.30 M - | Ies<br>m Total<br>75.39 G |          |              |          |                                 |
|   | Arrays   |   |   |                           |          |              |          |                                 |
|   | Name   |   |   |                           |          |              | Status   |                                 |
|   | wdc-tsa-pure-01  |   |   |                           |          |              | • online |                                 |
|   | Pod Replica I  | inks ^  |   |                           |          |              |          |                                 |
|   | Local Pod  |   | Direction   | Remote Pod                |          | Remote Array |          | Status                          |
|   | P AZ2POD (dem  | oted)   |   | SC2POD                    |          | Pure-X50-BCA |          | <ul> <li>replicating</li> </ul> |

FIGURE 271. Storage Replication from Site A to Site B

Planned migration from Site B to Site A is successful.

| ELETE TEST CLEANUP RUN   |   | Learn mo   |
|--|---|--|
| ons Protection Groups Virtual Machines   |   |  |
| N CEL  |   |  |
| S Recovery complete  |   |  |
| The recovery has completed. Review the plan history to view any error then once protection is configured in reverse, you can run the plan in r | s or warnings. You can now press Reprotect to configure protection in the re-<br>covery mode to failback the virtual machines to the original site.   | erse direction. Note that if you plan to failback the virtual machines to the original site, you must first run the plan in reprotect mode,  |
|  |   | View: Recovery Ster  |
| Status   | Step Started  | Step Completed   |
| ✓ Success  | Sunday, June 20, 2021 11:04:09 PM   | Sunday, June 20, 2021 11:04:53 PM  |
| ✓ Success  | Sunday, June 20, 2021 11:04:53 PM   | Sunday, June 20, 2021 11:08:46 PM  |
|  |   |  |
| ✓ Success  | Sunday, June 20, 2021 11:08:46 PM   | Sunday, June 20, 2021 11:08:46 PM  |
| ✓ Success  | Sunday, June 20, 2021 11:08:46 PM   | Sunday, June 20, 2021 11:08:47 PM  |
| ✓ Success  | Sunday, June 20, 2021 11:08:47 PM   | Sunday, June 20, 2021 11:09:19 PM  |
| ✓ Success  | Sunday, June 20, 2021 11:09:19 PM   | Sunday, June 20, 2021 11:09:59 PM  |
|  |   |  |
| ✓ Success  | Sunday, June 20, 2021 11:09:59 PM   | Sunday, June 20, 2021 11:10:48 PM  |
|  |   |  |
|  |   |  |
| ✓ Success  | Sunday, June 20, 2021 11:10:36 PM   | Sunday, June 20, 2021 11:15:07 PM  |
|  |   |  |
|  |   |  |
|  | terre TEST CLEANUP RUN      Protection Groups Virtual Machines      Success      Succes      Success      Success      Su | TEST CLARAGE RUN      TOTAL     Protection Groups      Virtual Machines      Protection groups      Protection groups      Protection groups      Virtual Machines      Protection groups      Protection groups      Virtual Machines      Protection groups      Virtual Machines      Protection groups      Protecting groups      Protecting groups |

FIGURE 272. Planned Migration from Site A to Site B Successful



Re-run the reprotect process to protect the VMs on the protected Site A.



FIGURE 273. Reprotect Site A

The recovery plan SC2-AZ2-Oracle-SRA-RP is ready as shown below:

| SC2-AZ2-Oracle-SRA-RP EDIT MOVE DEL              | ETE TEST CLEANUP RUN ····               |              |
|--|---|--------------|
| Summary Recovery Steps Issues History Permission | ns Protection Groups Virtual Machines   |              |
| EXPORT STEPS   TEST CLEANUP RUN REPROTECT CAN    | CEL                                     |              |
| Plan status:                                     | → Ready                                 |              |
| Description:                                     | This plan is ready for test or recovery |              |
|  |   |              |
| Recovery Step                                    | Status                                  | Step Started |
| > 🔄 1. Synchronize storage                       |   |              |
| 🗟 2. Restore recovery site hosts from standby    |   |              |
| 3. Suspend non-critical VMs at recovery site     |   |              |
| > 🔯 4. Create writable storage snapshot          |   |              |
| > 🔯 5. Configure test networks                   |   |              |
| 1 6. Power on priority 1 VMs                     |   |              |
| 2 7. Power on priority 2 VMs                     |   |              |
| > 3 8. Power on priority 3 VMs                   |   |              |
| 4 9. Power on priority 4 VMs                     |   |              |
|  |   |              |

FIGURE 274. Recovery Plan Steps



More information on running a planned recovery with array-based replication can be found in the *Run a Recovery Plan* and *SRM User Guide: FlashArray Continuous Replication (ActiveDR) Workflows.* 

#### Run Recovery Plan for Disaster Recovery

Disaster Recovery - During a disaster recovery, Site Recovery Manager first attempts a storage synchronization. If it succeeds, Site Recovery Manager uses the synchronized storage state to recover VMs on the recovery site to their most recent available state, according to the recovery point objective (RPO) that you set when you configure replication

The steps for running the recovery plan for disaster recovery are the same as those employed above with planned migration.

Steps to run the recovery plan SC2-AZ2-Oracle-SRA-RP in a disaster recovery mode are as shown below:

| EXPORT STEPS TEST CLEANUP RUN REPROTECT      | CANCEL                               |   |  |   |                      |
|--|--------------------------------------|---|--|---|----------------------|
| Plan status:                                 | $\rightarrow$ Ready                  |   |  |   |                      |
| Description:                                 | This plan is ready for test or reco  | very  |  |   |                      |
| Recovery Step                                | Recovery - SC2-AZ2-<br>Oracle-SRA-RP | Confirmation options  |  |   |                      |
| > S 1. Synchronize storage                   |                                      | Recovery confirmation   |  |   |                      |
| 2. Restore recovery site hosts from standby  | Confirmation options                 | Running this plan in recovery mode will at!   | errot to shut down the VMs at the protected site and recover the VMs   | the recovery site.                                  |                      |
| 3. Suspend non-critical VMs at recovery site | 2. De tiu le complete                | U   |  |   |                      |
| > 😳 4. Create writable storage snapshot      | 2 Ready to complete                  | Protected site: Primary_Site  |  |   |                      |
| 🛇 😳 5. Configure test networks               |                                      | Recovery site: DR_Site<br>Server connection: Connecteri   |  |   |                      |
| 1 6. Power on priority 1 VMs                 |                                      | Number of VMs: 4  |  |   |                      |
| 2 7. Power on priority 2 VMs                 |                                      | I unclarational that this process will para   | anonthy after the virtual mechines and infrastructure of both  |   |                      |
| 3 8. Power on priority 3 VMs                 |                                      | the protected and recovery datacenter   | is in the second s |   |                      |
| 9. Power on priority 4 VMs                   |                                      |   |  |   |                      |
| 5 10. Power on priority 5 VMs                |                                      | Recovery type   |  |   |                      |
|  |                                      | Planned migration   |  |   |                      |
|  |                                      | storage replication must be available.)   | cancel recovery if errors are encouncered, joites must be connected and  |   |                      |
|  |                                      | O Disaster recovery   |  |   |                      |
|  |                                      | Attends to replicate recent changes to the recover<br>Continue recovery even if errors are encountered. | y site, but otherwise use the most recent storage synchronization data.  |   |                      |
|  |                                      |   | Recovery - SC2-AZ2-<br>Oracle-SRA-RP   | Ready to complete<br>Review your selected settings. |                      |
|  |                                      |   | 1 Confirmation options   | Name  | SC2-AZ2-Oracle-SRA-F |
|  |                                      |   | 2 Ready to complete  | Protected site                                      | Primary_Site         |
|  |                                      |   |  | Recovery site                                       | DR_Site              |
|  |                                      |   |  | Server connection                                   | Connected            |
|  |                                      |   |  | Number of VMs                                       | 4                    |
|  |                                      |   |  | Recovery type                                       | Disaster recovery    |
|  |                                      |   |  | Formal second                                       | Do not force recommu |

FIGURE 275. Disaster Recovery Use Case for Recovery Plan SC2-AZ2-Oracle-SRA-RP

Recovery plan SC2-AZ2-Oracle-SRA-RP in a disaster recovery mode is successful.

| SC2-AZ2-Oracle-SRA-RI  | P EDIT MOVE DELETE TEST CLEANUP RUN ***   |                     |      | Learn more |
|--|---|---------------------|------|------------|
| Summary Recovery Steps Issues  | History Permissions Protection Groups Virtual Machines  |                     |      |            |
| Recovery Plan: St<br>Protected State: Per<br>Percovery State: 06<br>Description: | C2-AZ2-Oracle-\$RA-RP<br>man_5∞<br>≲Sa  |                     |      |            |
| A Your workloads are not protected. Run  | reprotect.  |                     |      |            |
| ✓ Plan Status  |   | ✓ VM Status         |      |            |
| Plan Status:   | O Recovery complete   | Ready for Recovery: |      | O VMs      |
|  | The recovery has completed. Review the plan history to view any errors or warnings. You can now   | In Progress:        |      | O VMs      |
|  | press Reprotect to configure protection in the reverse direction. Note that if you plan to failback the<br>virtual machines to the original site, you must first run the plan in reprotect mode, then once protection | Success:            |      | 4 VMs      |
|  | is configured in reverse, you can run the plan in recovery mode to failback the virtual machines to the   | Warning:            |      | O VMs      |
|  | cinginal sate.  | Erron               |      | 0 VMs      |
| > Recent History   |   | Incomplete:         |      | O VMs      |
|  |   |                     | Tota | 4 VMs      |

FIGURE 276. Disaster Recovery Use Case for Recovery Plan SC2-AZ2-Oracle-SRA-RP Successful



Site A **SC2POD** is demoted and Site B **AZ2POD** is promoted as shown below:

| Array Hosts Volumes Pods File  | Systems Policies                 |               |            |                 |            |                                 |                     |
|--|----------------------------------|---------------|------------|-----------------|------------|---------------------------------|---------------------|
| Pods > of SC2POD (demoted)   |                                  |               |            |                 |            |                                 |                     |
| Size         Data Reduction         Unique         Replication         Snapsh           20 T         18.4 to 1         6.78 G         0.00         0.00  | ots Shared System T<br>0.00 - 6  | otal<br>.78 G |            |                 |            |                                 |                     |
| Arrays   |                                  |               |            |                 |            |                                 |                     |
| Name   |                                  |               |            |                 | Status     |                                 | Frozen At           |
| Pure-X50-BCA   |                                  |               |            |                 | • online   |                                 | 2021-06-20 23:10:03 |
| Pod Replica Links A  |                                  |               |            |                 |            |                                 |                     |
| Local Pod  | Direction                        | Remote Poo    | d          | Remote Array    |            | Status                          |                     |
| P SC2POD (demoted)   | <i>←</i>                         | AZ2POD        |            | wdc-tsa-pure-01 |            | <ul> <li>replicating</li> </ul> |                     |
| Array     Hosts     Volumes     Pods       Image: Constraint of the state of the s | File Systems<br>Snapshots Shared | Policies      | Total      |                 |            |                                 |                     |
| 20 T 4.3 to 1 75.20 G 0.00   | 0.00 42.30 M                     |               | 75.24 G    |                 |            |                                 |                     |
| Arrays   |                                  |               |            |                 |            |                                 |                     |
| Name   |                                  |               |            |                 | st         | atus                            |                     |
| wdc-tsa-pure-01  |                                  |               |            |                 | •          | online                          |                     |
| Pod Replica Links ~  |                                  |               |            |                 |            |                                 |                     |
| Local Pod  | Directio                         | on            | Remote Pod | Ren             | note Array |                                 | Status              |
| AZ2POD (promoted)  | $\rightarrow$                    |               | SC2POD     | Pure            | e-X50-BCA  |                                 | replicating         |

FIGURE 277. Storage Array POD Status on Site A and Site B

Both single-instance Oracle VMs **Oracle19c-OL8** and **Oracle19c-OL8-RMAN** are powered up and connected to the recovery site recovery network APPS-1810. The IP addressing scheme is followed as defined in the network mapping section.

As in the case of testing the recovery plan, the Oracle VM **Oracle19c-OL8** is up with IP address 172.18.10.45 and the database **vvol19c** is up. The alert log for the database shows no errors. Oracle crash recovery is performed when the database starts up, which is normal and expected.

The Oracle VM **Oracle19c-OL8-RMAN** is up with IP address 172.18.10.46 and the database **rmandb** is up. The alert log for the database **rmandb** shows no errors. Oracle crash recovery is performed when the database **rmandb** starts up, which is normal and expected.

### The storage-based snapshot is crash-consistent and write-ordering is preserved for each file within a snapshot.

| snap-55addaa2-OraSC2          | ACTIONS V         |           |  |                          |  |
|-------------------------------|-------------------|-----------|--|--------------------------|--|
| Summary Monitor Configure     | Permissions Files | Hosts VMs |  |                          |  |
| Virtual Machines VM Templates |                   |           | 🕆 Oracle19c-OL8  | > 🗆 🗳 🧔                  | 资 Actions Y  |
| Name ↑                        | ✓ State           | ✓ Status  | Summary Monitor Cont   | figure Permissi          | ons Datastores Networks Snapshots Updates  |
| Coracle19c-OL8                | Powered On        | V Normal  |  |                          |  |
| Cracle19c-OL8-RMAN            | Powered On        | V Normal  |  |                          |  |
| 🔀 prac19c1                    | Powered On        | V Normal  | 4.4.1 (1973) K. Barradov, and a star for a first<br>star for the star for the star for the star for the star for the<br>star for the star. | Guest OS: Compatibility: | Oracle Linux 8 (64-bit)<br>ESVI 7 0 and later (VM version 17)  |
| apract9c2                     | Powered On        | V Normal  |  | VMware Tools: F          | Running, version:11296 (Guest Managed)   |
|                               |                   |           |  |                          | MORE INFO  |
|                               |                   |           | Powered On   | DNS Name: c              | oracle19c-ol8.corp.localdomain   |
|                               |                   |           |  | Host: a                  | az2esx24.vslab.local   |
|                               |                   |           | LAUNCH WEB CONSOLE   |                          |  |
|                               |                   |           | LAUNCH REMOTE CONSOLE  | 😳 t© 🖓                   |  |
|                               |                   |           | VM Hardware  |                          |  |
|                               |                   |           | > CPU  |                          | 12 CPU(s)  |
|                               |                   |           | > Memory   |                          | 128 GB, 21.76 GB memory active   |
|                               |                   |           | > Hard disk 1  |                          | 80 GB  |
|                               |                   |           | Total hard disks   |                          | 5 hard disks   |
|                               |                   |           | > Network adapter 1  | <                        | APPS-1810 (connected)  |
|                               |                   |           | CD/DVD drive 1   |                          | Disconnected   |
|                               |                   |           | > Video card   |                          | 8 MB   |
|                               |                   |           | VMCI device  |                          | Device on the virtual machine PCI bus that provides support for<br>virtual machine communication interface |
|                               |                   |           | > Other  |                          | Additional Hardware  |
|                               |                   |           | Compatibility  |                          | ESXi 7.0 and later (VM version 17)   |



| 🖹 snap-55addaa2-OraS0         | C2 ACTIONS ¥                               |                    |   |                                 |   |                |
|-------------------------------|--|--------------------|---|---------------------------------|---|----------------|
| Summary Monitor Configure     | Permissions Files                          | Hosts VMs          |   |                                 |   |                |
| Virtual Machines VM Templates | ]  |                    | _ Oracle19c-OL8-RI  |                                 | ] 🚰 @ @ Actions Y   |                |
| Name ↑                        | ✓ State                                    | ✓ Status           | Summary Monitor Con   | figure Permis                   | sions Datastores Networks Snapshots L   | Updates        |
| Cracle19c-OL8                 | Powered On                                 | V Normal           | dannary monitor con   | ngure renno.                    |   | spaares        |
| Dracle19c-OL8-RMAN            | Powered On                                 | ✓ Normal           |   |                                 |   |                |
| 🔀 prac19c1                    | Powered On                                 | V Normal           | $\sum_{i=1}^{n-1}   \widehat{\mathcal{T}}_{i}(X_{i}) - \widehat{\mathcal{T}}_{i}(X_{i})  \leq 1  \text{where } i = 1  \text$ | Guest OS:                       | Oracle Linux 8 (64-bit)   |                |
| 🛱 prac19c2                    | Powered On                                 | ✓ Normal           |   | Compatibility:<br>VMware Tools: | ESXI 7.0 and later (VM version 17)<br>Running, version:11296 (Guest Managed)                      |                |
|                               |  |                    | Powered On  | DNS Name:<br>IP Addresses:      | oracle19c-ol8-rman.corp.localdomain<br>172.18.10.46   |                |
|                               | LAUNCH WEB CONSOLE<br>LAUNCH REMOTE CONSOL | LAUNCH WEB CONSOLE | Host:<br>👌 🐻 🖫  | az2esx22.vslab.local            |   |                |
|                               |  |                    | VM Hardware   |                                 |   |                |
|                               |  |                    | > CPU   |                                 | 8 CPU(s)  |                |
|                               |  |                    | > Memory  |                                 | 96 GB, 8.64 GB memory active  |                |
|                               |  |                    | > Hard disk 1   |                                 | 100 GB  |                |
|                               |  |                    | Total hard disks  |                                 | 5 hard disks  |                |
|                               |  |                    | > Network adapter 1   |                                 | APPS-1810 (connected)   |                |
|                               |  |                    | CD/DVD drive 1  |                                 | Disconnected  |                |
|                               |  |                    | > Video card  |                                 | 4 MB  |                |
|                               |  |                    | VMCI device   |                                 | Device on the virtual machine PCI bus that provides su<br>virtual machine communication interface | upport for the |
|                               |  |                    | > Other   |                                 | Additional Hardware   |                |
|                               |  |                    | Compatibility   |                                 | ESXi 7.0 and later (VM version 17)  |                |

### FIGURE 279. Oracle VM Oracle19c-OL8-RMAN Networking Status



The Oracle RAC cluster **prac19c** VMs are also powered up. The public interfaces are connected to the recovery site recovery network **APPS-1810** and private interconnects are connected to the recovery site recovery network **APPS-1805**. The IP addressing scheme is followed as defined in the network mapping section.



FIGURE 280. Oracle RAC prac19c Networking Status

As part of running a disaster recovery exercise of the recovery plan, the network interfaces of the Oracle RAC **prac19c** will be changed to the appropriate recovery network as defined in the network mappings.

- The VIP and the SCAN IPs have to be changed to the test/recovery network IP scheme in order for the RAC Clusterware to bring up the RAC services.
- The steps to change the RAC VIP IP address can be found in *Oracle 19c Clusterware Administration and Deployment Guide*. The steps to change the Oracle private interconnect IP address can be found in the *Changing Oracle Clusterware Private Network Configuration*.
- The steps to change the RAC SCAN IP addresses can be found in the *My Oracle Support Note How to Update the IP Address of the SCAN VIP Resources (ora.scan{n}.vip) (Doc ID 952903.1).*
- The steps to change the RAC VIP, scan and private interconnect IP addresses are beyond the scope of this paper.

At the end of running the recovery plan in disaster recovery mode Target Site B is replicating to the Source Site A.

| Array Hosts Volumes Pods File System  | ns Policies            |                  |              |               |          |                                 |           |          |             |
|---|------------------------|------------------|--------------|---------------|----------|---------------------------------|-----------|----------|-------------|
| Yeds > 60 AZ2POD (promoted)   |                        |                  |              |               |          |                                 |           |          |             |
| Size         Data Reduction         Unique         Replication         Snapshots         Shapshots           20 T         4.3 to 1         75.42 G         0.00         0.00         42   | ared System<br>.30 M - | Total<br>75.46 G |              |               |          |                                 |           |          |             |
| Arrays  |                        |                  |              |               |          |                                 |           |          |             |
| Name  |                        |                  |              |               | Status   |                                 | Frozen At |          |             |
| wdc-tsa-pure-01   |                        |                  |              |               | • online |                                 |           |          |             |
| Pod Replica Links ~   |                        |                  |              |               |          |                                 |           |          |             |
| Local Pod   | Direction              | Remote Pod       | Remote Array |               |          | Status                          |           |          |             |
| P AZ2POD (promoted)   | $\rightarrow$          | SC2POD           | Pure-X50-BCA |               |          | <ul> <li>replicating</li> </ul> |           |          |             |
| Array     Hosts     Volumes     Pods     File Systems     Policies <ul> <li>&gt; Pods</li> <li>&gt; g<sup>2</sup> SC2POD (demoted)</li> <li>Ster</li> <li>Data Reduction</li> <li>Unique Replication</li> <li>Snaphrets</li> <li>Snaphrets</li> <li>Snaphrets</li> <li>Snaphrets</li> <li>Snaphrets</li> <li>Snaphrets</li> </ul> |                        |                  |              | otal<br>.50 G |          |                                 |           |          |             |
|   | Arrays                 |                  |              |               |          |                                 |           |          |             |
|   | Name                   |                  |              |               |          |                                 |           | Status   |             |
|   | Pure-X50               | D-BCA            |              |               |          |                                 |           | • online |             |
|   | Pod Re                 | eplica Links ~   |              |               |          |                                 |           |          |             |
|   | Local Po               | d                | Direction    | Remote Pod    |          | Remote Array                    |           |          | Status      |
|   | & SC2P                 | OD (demoted)     | ←            | AZ2POD        |          | wdc-tsa-pure-0                  | 1         |          | replicating |

FIGURE 281. Site B Replicating to Site A

The VMs are powered up on the protected Site B.

| SC2-AZ2-Oracle-SRA-RP                        | DELETE TEST CLEANUP RUN                     |              |                           |                      |            |
|--|---|--------------|---------------------------|----------------------|------------|
| Summary Decovery Steps Issues History Perr   | nissions Protection Groups Virtual Machines |              |                           |                      |            |
|  |   |              |                           |                      |            |
| EXPORT STEPS TEST CLEANUP RUN REPROTECT      |   |              |                           |                      |            |
| Plan status:                                 | → Ready                                     |              |                           |                      |            |
| Description:                                 | This plan is ready for test or recovery     |              |                           |                      |            |
|  |   |              |                           |                      |            |
| Recovery Step                                | Status                                      | Step Started |                           |                      |            |
| > 🔄 1. Synchronize storage                   |   |              |                           |                      |            |
| 2. Restore recovery site hosts from standby  |   |              |                           |                      |            |
| 3. Suspend non-critical VMs at recovery site |   |              |                           |                      |            |
| > @ 4. Create writable storage snapshot      |   |              |                           |                      |            |
| > @ 5. Configure test networks               |   |              |                           |                      |            |
| 1 6. Power on priority 1 VMs                 |   |              |                           |                      |            |
| 2 7. Power on priority 2 VMs                 |   |              |                           |                      |            |
| > 3 8. Power on priority 3 VMs               |   |              |                           |                      |            |
| 9. Power on priority 4 VMs                   |   |              |                           |                      |            |
| 10. Power on priority 5 VMs                  |   |              |                           |                      |            |
|  | () B = Ø                                    | E            | snap-5b032349-0ra         | SC2 Actions ¥        |            |
|  | ✓ @ az2wvc01.vslab.local                    | Su           | mmary Monitor Configu     | re Permissions Files | Hosts VMs  |
|  | ✓ 用 AZ2-DC                                  |              |                           |                      |            |
|  |   |              | irtual Machines VM Templa | tes                  |            |
|  | azz-orapute                                 |              |                           |                      |            |
|  | AZ2-TINTRI-EC6090                           |              |                           |                      |            |
|  | AZ2OraVVOL                                  |              |                           |                      |            |
|  | snap-5b032349-OraSC2                        |              | Name ↑                    |                      | ✓ State ✓  |
|  | > P sc2wvc03.vslab.local                    | •            | Dracle19c-OL8             |                      | Powered On |
|  |   |              | Dracle19c-OL8-RMAN        |                      | Powered On |
|  |   |              | 🔂 prac19c1                |                      | Powered On |
|  |   |              | prac19c2                  |                      | Powered On |

FIGURE 282. Site B VM Status



**Reprotect** needs to be run on Target Site B back to Source Site A to protect the VMs in the reverse direction.

| SC2-AZ2-Oracle-SRA-RP mer were enter                            |  |  |   | Search Inc.   |
|---|--|--|---|---|
| Surmary Recovery Steps Issues History Permissions P             | rolection Groups - Virtual Machines  |  |   |   |
|   |  |  |   |   |
| Plan statue:  | overy complete   |  |   |   |
| Description man   | overy has completed. Review the plan history to view any errors or warrier | pr. You can now press limprotect to configure protection in the rever<br>to to follow in the obtaining profiles on the obtained allow. | ron clirection. Note that if you plan to fullback the virtual machines to | to the original allow, you must that our the plan in represent much,  |
|   | there are a condition to the on the statistic for                          | an co subsector and various independents to the program have.  |   | New Deservoir   |
| Recovery Day  | Detail   | Rep Started  | Rep Completed   |   |
| > S 1 Pre-synchronize storage                                   | ✓ Success  | Monoisy, June 21, 2021/8/28:41 AM  | Monday, June 21, 2021 8:295   | OS AM   |
| 3 2. Shut elower VMs at protected site                          | ✓ Success  | Monoley, June 24, 2021 (2:29:25 AM   | Monolog, June 24, 2021 (k.24)   | IS2 AM  |
| <ul> <li>3. Resume VMs superced by previous recovery</li> </ul> |  |  |   |   |
| A. Restore recovery site hosts from standby                     | A Decoma   | Monday, June 21, 2021/02/24/2 AM   | Monday, June 21, 2021 0:29-   | 52.5M   |
| > C 6. Prepare protected site Vids for reignation               | - Garrense   | Marking June 21, 2021 9:29:42 AM   | Montage June 24, 2021 0-301   | 02.0M   |
| > 🕱 7. Syecteoniae storage                                      | V Success  | Manuary, June 21, 2021/8:30:20 AM  | Monday, June 29, 2021 8:30:   | 159 AM  |
| 1 8. Suspendinon-criticali VHs at recovery site                 |  |  |   |   |
| > 0 9. Charge recovery site storage to writable                 | ✓ Success  | Monolog, June 21, 2021/8:30:59 AM  | Monday, June 21, 2021 (k3)(3  | 24.64   |
| 10. Power on priority 1 VHs                                     |  |  |   |   |
| E. Power on priority 3 VMs                                      | ✓ faccess  | Marciev, Ares 21 20218-3120 AM   | Monday, June 21, 2021 Billio  | CHI AM  |
| 11. Power on priority 4 VMs                                     |  |  |   |   |
| C IV. Power on periody 3 VM                                     |  | Reprote<br>Oracle-   | ect - SC2-AZ2-<br>-SRA-RP   | Confirmation options  |
|   |  |  |   | Reprotect confirmation  |
|   |  | 1 Conf   | firmation options   | Running reprotect on this plan will commit the results of the recovery, and configure protection in the reverse direction.  |
|   |  | 2 Read   |   | New protected site: DR_Site   |
|   |  |  |   | New recovery site: Primary_Site   |
|   |  |  |   | Server connected  |
|   |  |  |   | Number of VMs: 4  |
|   |  |  |   | I understand that this operation cannot be undone.  |
|   |  |  |   | Reprotect options   |
|   | 5  |  |   | Pennotect operations include steps to clean up the original datastores and devices. If you are experiencing errors during   |
| Reprotect - SC2-AZ2-  | Ready to complete  |  |   | reprotect operations include steps to clean up and original autoscores and devices. It you are experiencing eners during  |
| Oracle-SRA-RP   | Daview your selected settin  | 205  |   | cleanup steps, you may choose the force cleanup option to ignore all errors and return the plan to the Ready state. If yo   |
|   | Review your selected settin  | 193.   |   | use this option, you may need to clean up your storage manually and you should run a Test as soon as possible   |
|   |  |  |   | use and option, you may need to clean up you storage menability, and you should run a rest to soon as possible.   |
| 1 Confirmation options  | Name   | SC2-A72-Oracle-SR  | A-RP  | Record and the second se |
|   |  | 002 M22 01006 - 5N   | DA TO   | Force cleanup   |
| 2 Ready to complete   | New protected site   | DR_Site  |   |   |
|   | New recovery site  | Primary_Site   |   |   |
|   | Server connection  | Connected  |   |   |
|   | Number of VMs  | 4  |   |   |
|   | Force cleanup  | Do not ignore clean  | up warnings   |   |
|   |  |  |   |   |

FIGURE 283. RUN REPROTECT ON SITE B

Once Source Site A is back online, re-run the workflow in planned migration mode, which will reverse the replication direction.

| SC2-AZ2-Oracle-SRA-RP                        | EDIT MOVE DELETE TEST CLEANUP         | RUN ····                          |   |   |
|--|---------------------------------------|-----------------------------------|---|---|
| Summary Recovery Steps Issues                | History Permissions Protection Groups | Virtual Machines                  |   |   |
| EXPORT STEPS TEST CLEANUP RU                 | N REPROTECT CANCEL                    |                                   |   |   |
| Plan status:                                 | → Ready                               |                                   |   |   |
| Description:                                 | This plan is ready for test or r      | ecovery                           |   |   |
|  |                                       | Recovery - SC2-A<br>Oracle-SRA-RP | Z2- Confirmatio                               | on options  |
| Recovery Step                                |                                       |                                   | Decovery cost                                 | livesstas   |
| > 🔄 1. Synchronize storage                   |                                       | 1 Confirmation option             | s Recovery com                                | imation   |
| 2. Restore recovery site hosts from standby  | /                                     |                                   | Running this                                  | splan in recovery mode will attempt to shut down the VMs at the protected site and recover the VMs at the recovery          |
| 3. Suspend non-critical VMs at recovery site | 8                                     | 2 Ready to complete               | Protected a                                   | te: DR Site   |
| > 🚱 4. Create writable storage snapshot      |                                       |                                   | Recovery si                                   | te: Primary Site  |
| > 🙆 5. Configure test networks               |                                       |                                   | Server conn                                   | ection: Connected   |
| 1 6. Power on priority 1 VMs                 |                                       |                                   | Number of                                     | VMs: 4  |
| 2 7. Power on priority 2 VMs                 |                                       |                                   |   |   |
| > 3 8. Power on priority 3 VMs               |                                       |                                   | the protected                                 | and this process will permanently after the virtual machines and intrastructure of both<br>and recovery datacenters.        |
| 9. Power on priority 4 VMs                   |                                       |                                   |   |   |
| 5 10. Power on priority 5 VMs                |                                       |                                   | Recovery type                                 |   |
|  |                                       |                                   | Planned migra                                 | tion  |
|  |                                       |                                   | Replicate recent cha<br>storage replication m | nges to the recovery site and cancel recovery if errors are encountered. (Sites must be connected and<br>ust be available.) |
|  | Deside the second state               |                                   | O Dieaster reco                               |   |
| Recovery - SC2-AZ2-                          | Ready to complete                     |                                   | Attempt to replicate                          | recent changes to the recovery site, but otherwise use the most recent storage synchronization data.                        |
| Oracle-SRA-RP                                | Review your selected settings.        |                                   | Continue recovery ev                          | en if errors are encountered.   |
| 1  |                                       |                                   |   |   |
| 1 Confirmation options                       | Name                                  | SC2-AZ2-Oracle-SRA-RP             |   |   |
| 2 Ready to complete                          | Protected site                        | DR_Site                           |   |   |
|  | Recovery site                         | Primary_Site                      |   |   |
|  | Server connection                     | Connected                         |   |   |
|  | Number of VMs                         | 4                                 |   |   |
|  | Recovery type                         | Planned migration                 |   |   |

FIGURE 284. Run Planned Migration from Site B to Site A



Site A and Site B storage POD status is as shown below:



FIGURE 285. Site A and Site B Storage POD Status

**Reprotect** needs to be run on Source Site A back to Target Site B to protect the VMs.



FIGURE 286. Run Reprotect on Site A



The recovery plan steps for Site A are as shown below:

| SC2-AZ2-Oracle-SRA-RP edit move delete test cleanup run                              |   |        |              |  |  |  |  |  |
|--|---|--------|--------------|--|--|--|--|--|
| Summary Recovery Steps Issues History Permissions Protection Groups Virtual Machines |   |        |              |  |  |  |  |  |
| EXPORT STEPS TEST CLEANUP RUN REPROTECT CANCEL                                       |   |        |              |  |  |  |  |  |
| Plan status:   | → Ready                                 |        |              |  |  |  |  |  |
| Description:   | This plan is ready for test or recovery |        |              |  |  |  |  |  |
|  |   |        |              |  |  |  |  |  |
| Recovery Step  |   | Status | Step Started |  |  |  |  |  |
| > 🔄 1. Synchronize storage   |   |        |              |  |  |  |  |  |
| 🛃 2. Restore recovery site hosts from standby  |   |        |              |  |  |  |  |  |
| 3. Suspend non-critical VMs at recovery site   |   |        |              |  |  |  |  |  |
| > 🔯 4. Create writable storage snapshot  |   |        |              |  |  |  |  |  |
| > 🚳 5. Configure test networks   |   |        |              |  |  |  |  |  |
| 1 6. Power on priority 1 VMs   |   |        |              |  |  |  |  |  |
| 2 7. Power on priority 2 VMs   | 2 7. Power on priority 2 VMs            |        |              |  |  |  |  |  |
| > 3 8. Power on priority 3 VMs   |   |        |              |  |  |  |  |  |
| 4 9. Power on priority 4 VMs   |   |        |              |  |  |  |  |  |
| 5 10. Power on priority 5 VMs  |   |        |              |  |  |  |  |  |

### FIGURE 287. Recovery Plan Steps on Site A

Single-instance Oracle VM Oracle19c-OL8 is powered up and connected to protected site network APPS-1614.

| ■ snap-797ecd77-OraSC2 ACTIONS ¥                 |   |   |
|--|---|---|
| Summary Monitor Configure Permissions Files Host | s VMs   |   |
| Virtual Machines VM Templates                    |   |   |
| Name ↑   | - 🕅 Oracle19c-Ol 8   🖂 🖬 🗟  | ACTIONS Y   |
| C D Oracle19c-OL8                                |   | - Datastara Naturalia Casadata Hadatas  |
| Cracle19c-OL8-RMAN                               | Summary Monitor Comigure Permission   | is Datastores Networks Shapshots Opdates  |
| 🔂 prac19c1                                       |   |   |
| ₿ prac19c2                                       | Guest OS: Or<br>Competibility: Es<br>VMware Tools: Ru<br>MONS Name: OR<br>IP Addresses: 17<br>Host: 17<br>Ho | acte Linux 8 (64-bit)<br>Min (57, O U 2and later (VM version 19)<br>mining, version:11296 (Guest Managed)<br>bate INPO<br>celef8c-ol8 visib.local<br>2.16.14.45<br>2esx09.vslab.local |
|  | VM Hardware   |   |
|  | > CPU   | 12 CPU(s)   |
|  | > Memory  | 128 GB, 1.28 GB memory active   |
|  | > Hard disk 1   | 80 GB   |
|  | Total hard disks  | 5 hard disks  |
|  | > Network adapter 1   | APPS-1614 (connected)   |
|  | CD/DVD drive 1  | Disconnected 4  |
|  | > Video card  | 8 MB  |
|  | VMCI device   | Device on the virtual machine PCI bus that provides support for the virtua<br>machine communication interface   |
|  | > Other   | Additional Hardware   |
|  | Compatibility   | ESXi 7.0 U2 and later (VM version 19)   |

### FIGURE 288. Oracle VM Oracle19c-OL8 Status

Single-instance Oracle VM Oracle19c-OL8-RMAN is powered up and connected to protected site network APPS-1614.



FIGURE 289. Oracle VM Oracle19c-OL8-RMAN Status

The Oracle RAC cluster **prac19c** VMs are also powered up. The public interfaces are connected to the protected site network **APPS-1614** and private interconnects are connected to the protected site network **APPS-1605**.

| 🕏 prac19c1   ▷ 🗖  | 🛱 🔯 🔞 Actions 🗸  | 🕼 prac19c2 🛛 Þ 🗖 ⊄ 🧔   | ACTIONS Y  |
|---|--|--|--|
| Summary Monitor Con   | flgure Permissions Datastores Networks Snapshots Updates   | Summary Monitor Configure Per  | missions Datastores Networks Snapshots Updates   |
| Provide Cn     Launch web console     Launch remote console | Guest OS:     Oracle Linux 7 (64-bit)       Compatibility:     ESXI 70 and later (VM version 17)       VMware Tools:     Running, version:11260 (Suest Managed)       MORE INFO     DNS Name:       practicLvisbl.ocal       IP Addresses:     172.16.1419       VEW ALL & IP ADDRESSES       Host:     sc2esx10.vsiab.local | Compatibility<br>Compatibility<br>Winare Tor<br>DNS Name:<br>IP Addresse<br>LAUNCH WEB CONSOLE<br>LAUNCH REMOTE CONSOLE<br>LAUNCH REMOTE CONSOLE | Oracle Linux 7 (64-bit)<br>y: ESX17.0 and later (VM vertion 17)<br>Is: Running, version11269 (Guest Managed)<br>MORE INFO<br>practic2.visb.iocal<br>x: T22.164.1492<br>VIEW ALL 51 P.ADDRESSES<br>sc2esx11.visib.iocal |
| VM Hardware   | ^  | VM Hardware  | ^  |
| > CPU   | 12 CPU(s)  | > CPU  | 12 CPU(s)  |
| > Memory  | 128 GB, 16.64 GB memory active   | > Memory   | 128 GB, 11.52 GB memory active   |
| > Hard disk 1   | 80 GB  | > Hard disk 1  | 80 GB  |
| Total hard disks  | 3 hard disks   | Total hard disks   | 3 hard disks   |
| > Network adapter 1   | (APPS-1614 (connected)   | > Network adapter 1  | APPS-1614 (connected)  |
| > Network adapter 2   | (APPS-1605 (connected)   | > Network adapter 2  | APPS-1605 (connected)  |
| CD/DVD drive 1  | Disconnected 96 ~  | CD/DVD drive 1   | Disconnected $q_{\rm D} \sim$  |
| > Video card  | 8 MB   | > Video card   | 8 MB   |
| VMCI device   | Device on the virtual machine PCI bus that provides support for the virtual<br>machine communication interface   | VMCI device  | Device on the virtual machine PCI bus that provides support for the virtual<br>machine communication interface   |
| > Other   | Additional Hardware  | > Other  | Additional Hardware  |
| Compatibility   | ESXI 7.0 and later (VM version 17)   | Compatibility  | ESXi 7.0 and later (VM version 17)   |

FIGURE 290. Oracle RAC VMs prac19c Status

More information on running a disaster recovery with array-based replication can be found in the *Performing a Planned Migration or Disaster Recovery By Running a Recovery Plan* and *SRM User Guide: FlashArray Continuous Replication (ActiveDR) Workflows*.

### On-premises Using vSphere Virtual Volumes Storage

This use case focusses on the utilization of Site Recovery Manager with storage-based replication using Pure Storage to provide disaster recovery on a **vVOL level**, to both single-instance Oracle VMs **Oracle19c-OL8** and **Oracle19c-OL8-RMAN** and Oracle RAC **prac19c**, from on-premises Site A to Site B and vice-versa.

### **Test Recovery Plan**

The steps to test a recovery plan, planned migration of a recovery plan, and actual disaster recovery of a recovery plan for vVOLs, are the same in the case of a storage LUN.

Steps to test the recovery plan SC2-AZ2-Oracle-SRA-VVOL-RP are as shown below:

| SC2-AZ2-Oracle-SRA-VVOL-RP   | OVE DELETE TEST CLEANUP RUN          |   | Learn mo  |   |
|--|--------------------------------------|---|---|---|
| Summary Recovery Steps Issues History Permission   | s Protection Groups Virtual Machines |   |   |   |
| Recovery Plan: SC2-AZ2-Oracle-SRA-VVOL-J<br>Postal dila: Paray_lila<br>Recovery yea: DR_SRE<br>Decoblos: | RP                                   |   |   |   |
| V Plan Status  |                                      | r VM Status   |   |   |
| Pian Status: → Ready   |                                      | Ready for Recovery:   | 2 VMs   |   |
| This plan is ready for test or   | r recovery                           | In Progress:  | 0 VMs   |   |
|  |                                      | Success   | 0 VMs   |   |
| > Recent History   |                                      | Warning:  | 0 VMs   |   |
|  |                                      | Error:  | 0 VMs   |   |
|  |                                      | incomplete:   | 0 VMs   |   |
|  |                                      |   | Total: 2 VMs  |   |
|  |                                      | Test - SC2-AZ2-Oracle-<br>SRA-VVOL-RP  1 Confirmation options 2 Ready to complete | Confirmation opt Test confirmation Test confirmation Test confirmation Protected site: Recovery site: | ions<br>mode will recover the virtual machines in a test environment on the recovery site.<br>Primary_Site<br>DR_Site |
| Test - SC2-AZ2-Oracle-   | Ready to complete                    |   | Server connection:  | Connected   |
| SRA-VVOL-RP  | Review your selected settings.       |   | Number of VMs:  | 4   |
|  |                                      |   | Storage options   |   |
| 1 Confirmation options   | Name                                 | SC2-AZ2-Oracle-SRA-VVOL-RP  | Specify whether to replicate  | e recent changes to the recovery site. This process might take several minutes and is only                            |
| 2 Ready to complete  | Protected site                       | Primary_Site  | available if the sites are con  | nected.   |
|  | Recovery site                        | DR_Site   | Replicate recent change   | s to recovery site  |
|  | Server connection                    | Connected   |   |   |
|  | Number of VMs                        | 4   |   |   |
|  | Storage synchronization              | Replicate recent changes to recovery site   |   |   |

FIGURE 291. Test Recovery Plan SC2-AZ2-Oracle-SRA-VVOL-RP for vVOL

The steps to test the recovery plan SC2-AZ2-Oracle-SRA-VVOL-RP continue as shown below. The test completes successfully.

| SC2-AZ2-Oracle-SRA-VVOL-RP  | TEST CLEANUP RUN ····                              |                     |   | Learn more        |                |                 |
|---|--|---------------------|---|-------------------|----------------|-----------------|
| Summary Recovery Steps Issues History Permissions Protecti  | on Groups Virtual Machines                         |                     |   |                   |                |                 |
| Recovery Plan: SC2-A22-Oracle-SRA-VVOL-RP<br>Protected Sate: Pranty_Site<br>Recovery Rec: OR_Me<br>Discreption: |  |                     |   |                   |                |                 |
| A Test complete   |  |                     |   | VIEW PLAN HISTORY |                |                 |
| ✓ Plan Status   |  | ✓ VM Status         |   |                   |                |                 |
| Plan Status: 🔮 Test complete  |  | Ready for Recovery: |   | 0 VMs             |                |                 |
| The virtual machines have been recovered  | I in a test environment at the recovery site.      | In Progress:        |   | 0 VMs             |                |                 |
| Review the plan history to view any errors<br>the test environment, run cleanup on this                         | or warnings. When you are ready to remove<br>plan. | Success:            |   | 2 VMs             |                |                 |
|   |  | Warning:            |   | 0 VMs             |                |                 |
| > Recent History  |  | Error:              |   | 0 VMs             |                |                 |
|   |  | Incomplete:         |   | 0 VMs             |                |                 |
|   | SC2-AZ2-Oracle-SR                                  | A-VVOL-RP           | T MOVE DELETE TEST CLEANUP RUN              |                   |                |                 |
|   | Summary Recovery Steps                             | Issues History Peri | missions Protection Groups Virtual Machines |                   |                |                 |
|   | Name 🕇 🕈 🔻   | Protection Status   | T Recovery Status                           | Y Protection Type | Protected Site | T Recovery Site |
|   | 🚫   🔞 SC2-AZ2-SRM-SRA-VV                           | Test complete       | Test complete                               | Virtual Volumes   | Primary_Site   | DR_Site         |

FIGURE 292. Test Recovery Plan SC2-AZ2-Oracle-SRA-VVOL-RP for vVOL Successful

VMs on Protected Site A vVOL datastore **OraVVOL** are still powered on.

| OraVVOL             | ACTIONS V    |             |       |       |     |   |            |   |          |
|---------------------|--------------|-------------|-------|-------|-----|---|------------|---|----------|
| Summary Monitor     | Configure    | Permissions | Files | Hosts | VMs |   |            |   |          |
| Virtual Machines V  | 'M Templates |             |       |       |     |   |            |   |          |
| Name ↑              |              |             |       |       |     | ~ | State      | ~ | Status   |
| 🔂 Oracle19c-OL8     |              |             |       |       |     |   | Powered On |   | 🗸 Normal |
| 🔂 Oracle19c-OL8-RMA | N            |             |       |       |     |   | Powered On |   | 🗸 Normal |
| 🔂 prac19c1          |              |             |       |       |     |   | Powered On |   | 🗸 Normal |
| 🔂 prac19c2          |              |             |       |       |     |   | Powered On |   | 🗸 Normal |



Both Oracle VM **Oracle19c-OL8** and **Oracle19c-OL8-RMAN** on Recovery Site B vVOL datastore **AZ2OraVVOL** are powered on with the IP addressing scheme set per network mappings to test network **APPS-1810**.

| AZ2OraVVOL ACTIONS V |               |             |             |       |       |     |            |        |          |
|----------------------|---------------|-------------|-------------|-------|-------|-----|------------|--------|----------|
| Summary              | Monitor       | Configure   | Permissions | Files | Hosts | VMs |            |        |          |
| Virtual Ma           | chines VI     | M Templates |             |       |       |     |            |        |          |
|                      |               |             |             |       |       |     |            |        |          |
| Name ↑               |               |             |             |       |       | ~   | State      | $\sim$ | Status   |
| 👔 Oracle             | e19c-OL8      |             |             |       |       |     | Powered On |        | 🗸 Normal |
| 🔂 Oracle             | e19c-OL8-RMAN | ٧           |             |       |       |     | Powered On |        | 🗸 Normal |
| 👔 prac19             | ∂c1           |             |             |       |       |     | Powered On |        | 🗸 Normal |
| 👔 prac19             | e2            |             |             |       |       |     | Powered On |        | 🗸 Normal |

FIGURE 294. Recovery Site B VMs Status



The Oracle VM **Oracle19c-OL8** is up with IP address 172.18.10.45 and the database **vvol19c** is up. The alert log for the database shows no errors. Oracle crash recovery is performed when the database starts up, which is normal and expected.

The Oracle VM **Oracle19c-OL8-RMAN** is up with IP address 172.18.10.46 and the database **rmandb** is up. The alert log for the database **rmandb** shows no errors. Oracle crash recovery is performed when the database **rmandb** starts up, which is normal and expected.

The storage vVOL-based snapshot is crash-consistent and write-ordering is preserved for each file within a snapshot.

| 🟦 Oracle19c-OL8   | å actions V  | Cracle19c-OL8-RMAN   | 1 😴 🖗 🔞 🛛 ACTIONS 🗸   |
|---|--|--|---|
| Summary Monitor Configure Permission  | ns Datastores Networks Snapshots Updates   | Summary Monitor Configure Permiss  | sions Datastores Networks Snapshots Updates   |
| Compatibility: Es Compatibili | rade Linux 8 (64-bit)<br>SXI 7.0 U2 and later (VM version 19)<br>anning, version:11296 (Guest Managed)<br>ORE INFO<br>ace192-ol8 vsiab.local<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45<br>2:8:0:45 | Guest OS:<br>Compatibility:<br>VMware Tools:<br>LAUNCH WEB CONSOLE<br>LAUNCH REMOTE CONSOLE<br>LAUNCH REMOTE CONSOLE | Oracle Linux 8 (64-bit)<br>ESXI 7.0 U2 and later (VM version 19)<br>Running, version:11296 (Guest Managed)<br>MORE INFO<br>oracle19c-ol8-vvol-rman.corp.localdomain<br>172.18.10.46<br>az2esc24 vstab.local<br>description<br>DETAILS |
| VM Hardware   |  | VM Hardware  |   |
| > CPU   | 12 CPU(s)  | > CPU  | 12 CPU(s)   |
| > Memory  | 128 GB, 39.68 GB memory active   | > Memory   | 128 GB, 53.76 GB memory active  |
| > Hard disk 1   | 80 GB  | > Hard disk 1  | 100 GB  |
| Total hard disks  | 5 hard disks   | Total hard disks   | 5 hard disks  |
| > Network adapter 1   | APPS-1810 (connected)  | > Network adapter 1  | APPS-1810 (connected)   |
| CD/DVD drive 1  | Disconnected   | CD/DVD drive 1   | Disconnected  |
| > Video card  | 8 MB   | > Video card   | 4 MB  |
| VMCI device   | Device on the virtual machine PCI bus that provides support for the<br>virtual machine communication interface   | VMCI device  | Device on the virtual machine PCI bus that provides support for the<br>virtual machine communication interface  |
| > Other   | Additional Hardware  | > Other  | Additional Hardware   |
| Compatibility   | ESXi 7.0 U2 and later (VM version 19)  | Compatibility  | ESXi 7.0 U2 and later (VM version 19)   |

FIGURE 295. Recovery Site B VMs Networking Details

Oracle RAC **prac19c** VMs on Recovery Site B vVOL datastore **AZ2OraVVOL** are powered on with the public IP addressing scheme set per network mappings to test network **APPS-1810** and the private IP addressing scheme set per network mappings to test network **APPS-1809**.

| Summary Monitor Cor                                 | 🖵 🖗 🐼  <br>nfigure Permiss   | ACTIONS V  | tworks Snapshots   | Updates           | Summary Monitor  | Config | ure Permis   | ACTIONS V<br>ssions Datastores N  | Networks Snapshots   | Updates             |
|---|--|--|--|-------------------|--|--------|--|---|--|---------------------|
| Powered On LAUNCH WEB CONSOLE LAUNCH REMOTE CONSOLE | Guest OS:<br>Compatibility:<br>VMware Tools:<br>DNS Name:<br>IP Addresses:<br>Host:<br>Managed By: | Oracle Linux 7 (64-bit)<br>ESXI 7.0 and later (VM version<br>Running, version:11269 (Guest<br>MORE INFO<br>pract9c1.vslab.local<br>172.18.10.191<br>VIEW ALL 31P ADDRESSES<br>az2esx24 vslab.local<br>description<br>DETAILS | n 17)<br>Menaged)<br>IP Addresses<br>172.18.10.191<br>192.188.14.191<br>169.254.16.7 | x                 | P Powered On<br>LAUNCH WEB CONSOLE<br>LAUNCH REMOTE CONSOL | LE ①   | Guest OS:<br>Compatibility:<br>VMware Tools:<br>DNS Name:<br>IP Addresses:<br>Host:<br>Managed By: | Oracle Linux 7 (64-bit)<br>ESXI 7.0 and later (VM vers<br>Running, version:11269 (Gu<br>MORE INFO<br>practi9c2.vsiab.local<br>172.18.10.192<br>VIEW ALL 31P ADDRESSES -<br>az2esx22.vsiab.local<br>description<br>DETAILS | ston 17)<br>est Managed)<br>prac19c2<br>IP Addresses:<br>172.18 to 192<br>192.184.192<br>169.254.9.115 | ×                   |
| VM Hardware   |  |  |  |                   | VM Hardware  |        |  |   |  |                     |
| > CPU   |  | 12 CPU(s)  |  |                   | > CPU  |        |  | 12 CPU(s)   |  |                     |
| > Memory  |  | 128 GB, 23.04 GB mem   | nory active  |                   | > Memory   |        |  | 128 GB, 12.8 GB men   | nory active  |                     |
| > Hard disk 1                                       |  | 80 GB  |  |                   | > Hard disk 1  |        |  | 80 GB   |  |                     |
| Total hard disks                                    |  | 3 hard disks   |  |                   | Total hard disks   |        |  | 3 hard disks  |  |                     |
| > Network adapter 1                                 |  | APPS-1810 (connected)  |  |                   | > Network adapter 1  |        |  | APPS-1810 (connected)   | in .   |                     |
| > Network adapter 2                                 |  | APPS-1809 (connected)  |  |                   | > Network adapter 2  | 2      |  | APPS-1809 (connected  | 0  |                     |
| CD/DVD drive 1                                      |  | Disconnected   |  | 4                 | CD/DVD drive 1   |        |  | Disconnected  |  |                     |
| > Video card  |  | 8 MB   |  |                   | > Video card   |        |  | 8 MB  |  |                     |
| VMCI device   |  | Device on the virtual mac<br>virtual machine communic  | hine PCI bus that provide<br>cation interface  | s support for the | VMCI device  |        |  | Device on the virtual m<br>virtual machine commu  | nachine PCI bus that provid<br>unication interface   | des support for the |
| > Other   |  | Additional Hardware  |  |                   | > Other  |        |  | Additional Hardware   |  |                     |
| Compatibility                                       |  | ESXi 7.0 and later (VM ve  | rsion 17)  |                   | Compatibility  |        |  | ESXI 7.0 and later (VM  | version 17)  |                     |
|   |  |  |  |                   |  |        |  |   |  |                     |

### FIGURE 296. Recovery Site B Oracle RAC VMs Networking Details

As part of testing the recovery plan, the network interfaces of the Oracle RAC **prac19c** will be changed to the appropriate test network as defined in the network mappings.

- The VIP and the SCAN IPs have to be changed to the test/recovery network IP scheme in order for the RAC Clusterware to bring up the RAC services.
- The steps to change the RAC VIP IP address can be found in *Oracle 19c Clusterware Administration and Deployment Guide*. The steps to change the Oracle private interconnect IP address can be found in the *Changing Oracle Clusterware Private Network Configuration*.
- The steps to change the RAC SCAN IP addresses can be found in the *My Oracle Support Note How to Update the IP Address of the SCAN VIP Resources (ora.scan{n}.vip) (Doc ID 952903.1).*
- The steps to change the RAC VIP, scan and private interconnect IP addresses are beyond the scope of this paper.

Site B has Pure Storage protection group **r-SC2vVOLPG-Robqn** created with the replicated VM vVOLs.

| Protection   |   |
|--|---|
| Snapshots Policies Protection Groups ActiveDR ActiveCluster  |   |
|  |   |
| Snapshots<br>0.00  |   |
| Members A  | 1-10 of 19 < >  |
| Name   |   |
| wol-Orade19c-OL8-5a159813-vg/Config-950eaa14   | Protection  |
| C vvol-Oracle19c-OL8-5a159813-vg/Data-2192b361   | Snapshots Policies Protection Groups ActiveDR ActiveCluster   |
| wol-Oracle19c-OL8-5a159813-vg/Data-257192b8  |   |
| C wol-Oracle19c-OL8-5a159813-vg/Data-70f28497  | Snapshots   |
| vvol-Orade19c-OL8-5a159813-vg/Data-d69aeet6  | 0.00  |
|  |   |
| wol-Oracle19c-OL8-5a159813-vg/Data-e17b037b  | Members A 11-19 of 19 < >   |
| wol-Orade19c-OL8-5a159813-vg/Data-e1750375 wol-Orade19c-OL8-RMAN-9384e0b1-vg/Conflg-f14072fc   | Members ^         11-19 of 19         C         I           Name_   |
| wol-Orade19c-OL8-5159813-vg/Data-e1750375      wol-Orade19c-OL8-RMAN-9884e0b1-vg/Config f14072fc      wol-Orade19c-OL8-RMAN-9884e0b1-vg/Data-06577cb   | Members A 11-19 of 19 < > 1<br>Name_  |
| wol-Orade19c-OL8-5nt59813-vg/Data-er7b037b     wol-Orade19c-OL8-RMAN-9584e0b1-vg/Contig/14072fc     wol-Orade19c-OL8-RMAN-9584e0b1-vg/Data-06b717cb     wol-Orade19c-OL8-RMAN-9584e0b1-vg/Data-28832875  | Members ^         11.19 of 19 <>         I           Name_  |
| wol-Orade19c-OL8-8n59813-vg/Data-e17b037b     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Config-114072tc     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-06577.db     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-32832875     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-32832875     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-32074e4 | Members ^         1149 of 19 < > ;           Name_         ;           wol-Oracle19c-OL8-RMAN-9384e0b1/vg/Data-d05a7191         x           = wol-Oracle19c-OL8-RMAN-9384e0b1/vg/Data-d05a7191         x  |
| wol-Orade19c-OL8-6159818-vg/Data-e17b037b     wol-Orade19c-OL8-RMAN-9884e0b1-vg/Config f14072fc     wol-Orade19c-OL8-RMAN-9884e0b1-vg/Data-06b77cb     wol-Orade19c-OL8-RMAN-9884e0b1-vg/Data-32832875     wol-Orade19c-OL8-RMAN-9884e0b1-vg/Data-32014e4  | Members         11.49 of 19         >         :           Name_   |
| wol-Orade19c-OL8-St159813-vg/Data-er7b037b     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Config:f14072tc     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-06577cb     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-32832875     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-920f4e4   | Members         11:49 of 19         >         I           Name_   |
| wol-Orade19c-OL8-8nt59813-vg/Data-er7b037b     wol-Orade19c-OL8-RMAN-9884e0b1-vg/Data-06b7f7cb     wol-Orade19c-OL8-RMAN-9884e0b1-vg/Data-32832875     wol-Orade19c-OL8-RMAN-9884e0b1-vg/Data-920f4e4  | Members ^         11149 of 19 < > #           Name_         11149 of 19 < > #           Name_         1           =         vol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-d05a7191         X           =         vol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-d05a7405         X           =         vol-oracl9c-OL64610d00-vg/Contig-b1127d05         X           =         vol-pract9c-I-04610d00-vg/Data-04c634b5         X           =         vol-pract9c-I-04610d00-vg/Data-04c634b5         X           =         vol-pract9c-I-04610d00-vg/Data-04c634b5         X |
| wol-Orade19c-OL8-8nt59813-vg/Data-er7b037b     wol-Orade19c-OL8-RMAN-9584e0b1-vg/Contig/14072tc     wol-Orade19c-OL8-RMAN-9584e0b1-vg/Data-966777cb     wol-Orade19c-OL8-RMAN-9584e0b1-vg/Data-32832875     wol-Orade19c-OL8-RMAN-9584e0b1-vg/Data-32074e4   | Members ^         1149 of 19          >         ;           Name_   |
| wol-Orade19c-OL8-5459813-vg/Data-er/b037b     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Config:f14072tc     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-06577cb     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-32832875     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-920f4e4  | Members ^         1149 of 19 < > ;           Name_         :           > wol-Orade18c-OL8-RMAN-9384e0b1vg/Data-d05a7191         ×           = wol-Orade18c-OL8-RMAN-9384e0b1vg/Data-d5284a14         ×           = wol-orade18c-OL4610dad0vg/Contig-b1t27d05         ×           = wol-pract8c1-04610dad0vg/Data-04c634b5         ×           = wol-pract8c1-04610dad0vg/Data-04c634b187d         ×           = wol-pract8c1-04610dad0vg/Data-04c634b187d         ×  |
| wol-Orade19c-OL8-8n59813-vg/Data-er7b037b     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Contig-114072fc     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-92877cb     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-92812875     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-920114e4   | Members ^       11:49 of 19 < > ;         Name_   |

FIGURE 297. Recovery Site B Protection Group with Replicated VMs

At the successful completion of the test recovery, perform the cleanup of the test recovery as shown below:

| SC2-AZ2-Oracle-SRA-VVOL-RP   | WE DELETE TEST CLEANUP RUN   |   | Learn mor   |
|--|--|---|---|
| Summary Recovery Steps Issues History Permission   | s Protection Groups Vinual Machines  |   |   |
| Recovery Plan: SC2-AZ2-Oracle-SRA-VVOL-5<br>Protected Ster Pranz, Ster<br>Decovery Ster DIL Ster<br>Overvition | 5P   |   |   |
| A Test complete  |  |   | VIEW PLAN HISTORY   |
| ✓ Plan Status  |  | VM Status   |   |
| Plan Status: 📀 Test complete   |  | Ready for Recovery:   | O VMs   |
| The virtual machines have b<br>Review the plan history to v<br>the test environment, run ci                    | een recovered in a test environment at the recovery site.<br>lew any errors or warnings. When you are ready to remove<br>eenup on this plan. | success<br>Success<br>Oracle-SRA-VVOL-RP  | Confirmation options  |
| > Breed Hildory<br>Cleanup - SC2-AZ2-<br>Oracle-SRA-VVOL-RP  | Ready to complete<br>Review your selected settings.  | mereix     monophil     mereix     monophil     mereix     me | Cleanup confirmation  Protected site: Primary_Site  Reverse primary or develop operation on the plen will remove the test environment and rest the plen to the Ready state.  Protected site: Primary_Site  Reverse remeting the DR_Site  Reverse connected connected  Reverse remeting the Connected  Reverse remeting the Connected  Reverse remeting the Connected  Reverse remeting the Reverse |
| 1 Confirmation options   | Name   | SC2-AZ2-Oracle-SRA-VVOL-RP  |   |
| 2 Ready to complete  | Protected site   | Primary_Site  |   |
|  | Recovery site  | DR_Site   |   |
|  | Server connection  | Connected   |   |
|  | Number of VMs  | 4   |   |
|  | Force cleanup  | Do not ignore cleanup warnings  |   |

FIGURE 298. Cleanup of Recovery Plan

The cleanup of test recovery is successful.

VMs on Protected Site A vVOL datastore **OraVVOL** are still powered on. We can see placeholder VMs on recovery Site B powered off.

| SC2-AZ2-Oracle-SRA-VVOL-RP EDIT MOVE DELETE TEST CLEANUP RUN   |  | Learn n    |
|--|--|------------|
| Summary Recovery Steps Issues History Permissions Protection Groups Virtual Machines                                       |  |            |
| Recovery Plan: SCP.AZ2-Oracle-SRA-VVOL-RP<br>Pressested Bitter: Prenury, Sat<br>Pressested Bitter: Bitt, Sat<br>Decreptor: |  |            |
| ✓ Plan Status  | ✓ VM Status  |            |
| Plan Status: → Ready   | Ready for Recovery:  | 4 VMs      |
| This plan is ready for test or recovery  | In Progress:   | 0 VMs      |
|  | Success:   | 0 VMs      |
| > Recent History   | Warning:   | 0 VMs      |
|  | Elres  | 0 VMs      |
|  | Incomplete:  | o vMs      |
|  |  |            |
| BCA-SiteC Actions V  |  |            |
| Summary Monitor Configure Permissions Hosts VMs Datastores Netwo   | Summary Monitor Configure Permissions  | Hosts VMs  |
| Virtual Machines VM Templates VApps  | Virtual Machines VM Templates VApps  |            |
|  | virtual machines vie remplates viepps  |            |
|  |  |            |
| Name V State V Status  | Name 🔨 🗸 State   | - Status - |
| G Oracle19c-OL8-RMAN Powered On V Vormal   | 귀 Oracle19c-OL8 Powered Off  | Normal     |
| tip Oracle19c-OL8 Powered On ✓ Normal  | Oracle19c-OL8-RMAN Powered Off   | V Normal   |
| Powered On / V Normal  | Powered Off  | / V Normal |
| D practect Powered On Vormal   | practige2  | ✓ Normal   |
|  | and protocol of the second sec |            |

FIGURE 299. Status of VMs on Protected and Recovery Site



All replicated VM vVOLs have been deleted from the Pure Storage protection group r-SC2vVOLPG-Robqn.

| Protection  |  | Protection        | ı           |                    |          |                   |
|---|--|-------------------|-------------|--------------------|----------|-------------------|
| Snapshots Policies Protection Groups A              | ActiveDR ActiveCluster                             |                   |             |                    |          |                   |
| > Protection Groups > () SC2vVOLPG                  |  | Snapshots         | Policies    | Protection Groups  | ActiveDR | ActiveCluster     |
| Snapshots<br>160.05 M                               |  |                   | tion Groups | > 💿 r-SC2vVOLPG-Ro | bqn      |                   |
| Members A   |  | Snapshots<br>0.00 |             |                    |          |                   |
| Name  |  | Members ~         |             |                    |          |                   |
| = vvol-Oracle19c-OL8-5fce3a1d-vg/Config-950eaaf4    |  | Name              |             |                    |          |                   |
| = vvol-Oracle19c-OL8-5fce3a1d-vg/Data-2192b361      |  |                   |             |                    |          |                   |
| wol-Oracle19c-OL8-5fce3a1d-vg/Data-257192b8         |  |                   |             |                    |          | No mombors found  |
| C wol-Oracle19c-OL8-5fce3a1d-vg/Data-70f28497       | *  |                   |             |                    |          | No members found. |
| C vvol-Oracle19c-OL8-5fce3a1d-vg/Data-d69aeef6      | Members ~  |                   |             |                    |          |                   |
| C vvol-Oracle19c-OL8-5fce3a1d-vg/Data-e17b037b      | Name   |                   |             |                    |          |                   |
| vvol-Oracle19c-OL8-RMAN-f3df9767-vg/Config-f14072fc |  |                   |             |                    |          |                   |
| wol-Oracle19c-OL8-RMAN-f3df9767-vg/Data-06b7f7cb    | Svvol-Oracle19c-OL8-RMAN-f3df9767-vg/Data-d05a7191 |                   |             |                    |          |                   |
| Cvvol-Oracle19c-OL8-RMAN-f3df9767-vg/Data-32832875  | vvol-Oracle19c-OL8-RMAN-f3df9767-vg/Data-d5284af4  |                   |             |                    |          |                   |
| C vvol-Oracle19c-OL8-RMAN-r3df9767-vg/Data-920f14e4 | vvol-prac19c1-90c766ce-vg/Config-b1t27d05          |                   |             |                    |          |                   |
|   | vvol-prac19c1-90c766ce-vg/Data-04c634b5            |                   |             |                    |          |                   |
|   | Swol-prac19c1-90c766ce-vg/Data-0caaa243            |                   |             |                    |          |                   |
|   | vvol-prac19c1-90c766ce-vg/Data-2d5b187d            |                   |             |                    |          |                   |
|   | vvol-prac19c2-41059974-vg/Config-99b1e844          |                   |             |                    |          |                   |
|   | Svvol-prac19c2-41059974-vg/Data-0bb95d6b           |                   |             |                    |          |                   |
|   | Swol-prac19c2-41059974-vg/Data-6cce596f            |                   |             |                    |          |                   |

### FIGURE 300. Recovery Site vVOLs Status

More information regarding testing a recovery plan with vSphere Virtual Volumes can be found in the *Testing a Recovery Plan* and *SRM User Guide: Configuring Site Recovery Manager vVol-Based Storage Policy Discovery*.



### Run Recovery Plan for Planned Migration

The steps to run a planned migration of a recovery plan for vVOLs are the same in the case of a storage LUN.

Steps to run a planned migration of recovery plan SC2-AZ2-Oracle-SRA-VVOL-RP are as shown below:

| SC2-AZ2-Oracle-SRA-VVOL-RP EDIT NOVE DELETE TEST CLEANUP RUN  |                                     |                     |  |  | Learn moi   |
|---|-------------------------------------|---------------------|--|--|---|
| Summary Recovery Steps Issues History Permissions Protection Groups Virtual Machines                              |                                     |                     |  |  |   |
| Recovery Plan: SC2-AZ3-Oracle-SRA-VVOL-RP<br>Protected Bite: Primar_Site<br>Recovery Bite: DB_Ste<br>Description: |                                     |                     |  |  |   |
| ✓ Plan Status   |                                     | ✓ VM Status         |  |  |   |
| Plan Status: → Ready  |                                     | Ready for Recovery: |  |  | 4 VMs   |
| This plan is ready for test or recovery   |                                     | In Progress:        |  |  | O VMS   |
|   |                                     | Success:            |  |  | 0 VMs   |
| > Recent History  |                                     | Warning:            |  |  | O VMS   |
|   | $\langle \rangle$                   | Erron               |  |  | O VMs   |
|   |                                     | Incomplete:         |  |  | O VMs   |
|   | 1 Confirmation c<br>2 Ready to comp | Diete               | Recovery confirmation of<br>Renning this plan in re<br>Protected site:<br>Recovery site:<br>Server connection:<br>Number of VMs:<br>I understand that this plan the protected and rec<br>Recovery type<br>Planned migration<br>Replicate recent changes to the<br>Storegor replication must be ev<br>Disaster recovery<br>Attempt to replicate record of every | Primary_Site Primary_Site DR_Site Connected 4 process will permanently alter the virtual mach svery datacenters. erecovery site and cancel recovery if errors are encountered. | protected site and recover the VMs at the recovery<br>inois and infrastructure of both<br>intered. (Sites must be connected and<br>recent storage synchronization data. |

### FIGURE 301. Planned Recovery Use Case

The summary of the planned recovery is as shown below:

| Recovery - SC2-AZ2-<br>Oracle-SRA-VVOL-RP<br>- | Ready to complete<br>Review your selected settings. |                            |  |  |  |
|--|---|----------------------------|--|--|--|
| 1 Confirmation options                         | Name  | SC2-AZ2-Oracle-SRA-VVOL-RP |  |  |  |
| 2 Ready to complete                            | Protected site                                      | Primary_Site               |  |  |  |
|  | Recovery site                                       | DR_Site                    |  |  |  |
|  | Server connection                                   | Connected                  |  |  |  |
|  | Number of VMs                                       | 4                          |  |  |  |
|  | Recovery type                                       | Planned migration          |  |  |  |

### FIGURE 302. Planned Recovery Summary

## **vm**ware<sup>®</sup>

site.

Planned migration of recovery plan SC2-AZ2-Oracle-SRA-VVOL-RP is successful.

Protected Site A vVOL VMs are powered off and Recovery Site B vVOL VMs are powered on.



FIGURE 303. Planned Recovery Successful

Recovery Site B vVOL Oracle VM **Oracle19c-OL8** and **Oracle19c-OL8-RMAN** are powered on with the IP addressing scheme defined per network mappings to recovery network **APPS-1810**.

As in the case of testing the recovery plan, the Oracle VM **Oracle19c-OL8** is up with IP address 172.18.10.45 and the database **vvol19c** is up. The alert log for the database shows no errors. Oracle crash recovery is performed when the database starts up, which is normal and expected.

The Oracle VM **Oracle19c-OL8-RMAN** is up with IP address 172.18.10.46 and the database **rmandb** is up. The alert log for the database **rmandb** shows no errors. Oracle crash recovery is performed when the database **rmandb** starts up, which is normal and expected.
The storage vVOL-based snapshot is crash-consistent and write-ordering is preserved for each file within a snapshot.

| 🕆 Oracle19c-OL8   | D 🖸 🛱 🖓 🔞 🔺 ACTIONS 🗸  | 🕆 Oracle19c-OL8-RM               | 1AN 🗁 🗖 🛱 🐼 🛛 actions 🗸   |
|---|--|----------------------------------|---|
| Summary Monitor Cor   | figure Permissions Datastores Networks Snapshots Updates   | Summary Monitor Confi            | igure Permissions Datastores Networks Snapshots Updates   |
| Powered On<br>Launch web console<br>Launch remote console ① | Guest OS:     Oracle Linux 8 (64-bit)       Compatibility:     ESX 7.0 U2 and later (VM version 19)       VMwere Tools:     Running, version:11296 (Guest Managed)       MORE INFO     DNS Name:       Oracle19c-08.vsiab.local       IP Addresses:     172.18.10.45       Host:     azzesx23.vsiab.local       Vol     Image: Compatibility (Compatibility) | Powered On<br>LAUNCH WEB CONSOLE | Guest OS: Oracle Linux 8 (64-bit)<br>Compatibility: ESXI 7.0 U2 and later (VM version 19)<br>VMvare Tools: Running, version:11296 (Guest Managed)<br>MORE INPO<br>DNS Name: oracle19c-ol8-vvol-rman.corp.localdomain<br>IP Addresses: 172.18.10.46<br>esz2esx24.vsleb.local |
| VM Hardware   |  | VM Hardware                      |   |
| > CPU   | 12 CPU(s)  | > CPU                            | 12 CPU(s)   |
| > Memory  | 128 GB, 3.84 GB memory active  | > Memory                         | 128 GB, 3.84 GB memory active   |
| > Hard disk 1   | 80 GB  | > Hard disk 1                    | 100 GB  |
| Total hard disks  | 5 hard disks   | Total hard disks                 | 5 hard disks  |
| > Network adapter 1   | APPS-1810 (connected)  | > Network adapter 1              | APPS-1810 (connected)   |
| CD/DVD drive 1  | Disconnected   | CD/DVD drive 1                   | Disconnected  |
| > Video card  | 8 MB   | > Video card                     | 4 MB  |
| VMCI device   | Device on the virtual machine PCI bus that provides support for the<br>virtual machine communication interface   | VMCI device                      | Device on the virtual machine PCI bus that provides support for the<br>virtual machine communication interface  |
| > Other   | Additional Hardware  | > Other                          | Additional Hardware   |
| Compatibility   | ESXi 7.0 U2 and later (VM version 19)  | Compatibility                    | ESXI 7.0 U2 and later (VM version 19)   |

FIGURE 304. Planned Recovery Site VM Status

Recovery Site B vVOL Oracle RAC prac19c is powered on with the public IP addressing scheme set per network mappings to recovery network **APPS-1810**. The private IP addressing scheme is set per network mappings to recovery network **APPS-1805**.

| 🚯 prac19c1   🖂 🗖 🖉   🗛  | ctions V  | 🔠 prac19c2 📔 🖻 🗳 🚳 👘   | ACTIONS Y   |
|---|---|--|---|
| Summary Monitor Configure Permissio   | ns Datastores Networks Snapshots Updates  | Summary Monitor Configure Permissio  | ons Datastores Networks Snapshots Updates   |
| Guest OS: O<br>Compatibility: E<br>VMware Tools: R<br>M M<br>DNS Name: p<br>IP Addresses: 17<br>LAUNCH WEB CONSOLE<br>LAUNCH REMOTE CONSOLE<br>AUNCH REMOTE CONSOLE | racle Linux 7 (64-bi;)<br>SXI 7.0 and later (VM version 17)<br>uning, version 1129 (Guest Managed)<br>otes INFO<br>rac19cl,visb.local<br>2,1810.191<br>IP Addresses:<br>IP21810.191<br>192.168.14.191<br>169.254.16.7 | Compatibility: Compatibility: Compatibility: Compatibility: Discovered On LAUNCH WEB CONSOLE LAUNCH REMOTE CONSOLE | Dracle Linux 7 (64-bit)<br>SXI 7.0 and later (VM version 17)<br>turning, version 1293 (Guest Managed)<br>vracl9c2, vslab.local<br>Z285x23 vslab.local<br>vz2esx23 vslab.local<br>Vz2.18.10.192<br>192.188.14.192<br>199.254.9.115 |
| VM Hardware   |   | VM Hardware  |   |
| > CPU   | 12 CPU(s)   | > CPU  | 12 CPU(s)   |
| > Memory  | 128 GB, 8.96 GB memory active   | > Memory   | 128 GB, 7.68 GB memory active   |
| > Hard disk 1   | 80 GB   | > Hard disk 1  | 80 GB   |
| Total hard disks  | 3 hard disks  | Total hard disks   | 3 hard disks  |
| > Network adapter 1   | APPS-1810 (connected)   | > Network adapter 1  | APPS-1810 (connected)   |
| > Network adapter 2   | APPS-1805 (connected)   | > Network adapter 2  | APPS-1805 (connected)   |
| CD/DVD drive 1  | Disconnected  | CD/DVD drive 1   | Disconnected  |
| > Video card  | 8 MB  | > Video card   | 8 MB  |
| VMCI device   | Device on the virtual machine PCI bus that provides support for the<br>virtual machine communication interface  | VMCI device  | Device on the virtual machine PCI bus that provides support for the<br>virtual machine communication interface  |
| > Other   | Additional Hardware   | > Other  | Additional Hardware   |
| Compatibility   | ESXI 7.0 and later (VM version 17)  | Compatibility  | ESXi 7.0 and later (VM version 17)  |

FIGURE 305. Planned Recovery Site Oracle RAC VM Status



As part of running a planned migration of the recovery plan, the network interfaces of Oracle RAC prac19c will be changed to the appropriate recovery network as defined in the network mappings.

- The VIP and the SCAN IPs have to be changed to the test/recovery network IP scheme in order for the RAC Clusterware to bring up the RAC services.
- The steps to change the RAC VIP IP address can be found in *Oracle 19c Clusterware Administration and Deployment Guide*. The steps to change the Oracle private interconnect IP address can be found in the *Changing Oracle Clusterware Private Network Configuration*.
- The steps to change the RAC SCAN IP addresses can be found in the *My Oracle Support Note How to Update the IP Address of the SCAN VIP Resources (ora.scan{n}.vip) (Doc ID 952903.1).*
- The steps to change the RAC VIP, scan and private interconnect IP addresses are beyond the scope of this paper.

Site A has Pure Storage protection group **SC2vVOLPG** with the original VM vVOLs.

| Protection  |                |   |  | 4                   |
|---|----------------|---|--|---------------------|
| Snapshots Policies Protection Groups ActiveDR ActiveCluster   |                |   |  |                     |
| > Protection Groups & SC2vVOLPG   |                |   |  |                     |
| Snapshots<br>29.97 M  |                |   |  |                     |
| Members A   | 1-10 of 12 < > | ÷ | Snapshot Schedule  |                     |
| Name  |                |   | Enabled: False<br>Create a snapshot on source every 1 hours                                    |                     |
| wol-Orade19c-0L84V0L-07dfa932vg Config-a8bdc8f  |                | × | Retain all snapshots on source for 1 days<br>then retain 4 snapshots per day for 7 more days   |                     |
| C vvol-Orade19c-OL8-VVOL-07dfa932-vg Data-0bb928b1  |                | × | Papilestian Schodula   |                     |
| = wol-Orade19c-OL8-VVOL-07dfa932-ve/Data-18347cb4   |                | × | Enabled: False   |                     |
| C vvol-Oracle19c-OL8-VVOL-07dfa932-g/Data-4eade15f  |                | × | Replicate a snapshot to targets every 15 minutes<br>Retain all snapshots on targets for 1 days |                     |
| = vvol-Orade19c-OL8-VVOL-07dfa932-g/Data-6057107c   |                | × | then retain 4 snapshots per day for 7 more days  |                     |
| C wol-Orade19c-OL8-/VOL-07dfa932/vg/Data-843bbd3d   |                | × |  |                     |
| wol-Oracle19c-OL8-/VOL-RMAN-8cc012d9-wg/Config-a6c809fe   |                | × |  |                     |
| Wol-Oradete-OL8-VVOL-RMAN-Scottzde-vig/Data-8/58114     Well-Oradete-OL8-VVOL-RMAN-Scottzde-vig/Data-8/58114     Well-Oradete-OL8-VVOL-RMAN-Scottzde-vig/Data-8/58114 |                | × |  |                     |
| Wol-Oracle190-OLS-VVOL-RMAN/Scool2d9-vg/Data-900805300  |                | Ŷ |  |                     |
|   |                |   |  |                     |
| largets ^   | 1-1 of 1       | : |  |                     |
|   | Alloned        |   |  |                     |
| wdc-tsa-pure-01   | True           | 亩 |  |                     |
| Protection Group Snapshots A  |                |   |  |                     |
| Name  |                |   |  | Created             |
|   |                |   |  | All                 |
| U SULVVULHS VASASYICKS 03508/67   |                |   |  | 2021-06-22 09:44:59 |
|   |                |   |  | 202100-22 05.44.08  |

FIGURE 306. Site A Protection Group



Site B has Pure Storage protection group **r-SC2vVOLPG-Robqn** created with the replicated VM vVols.

| Protection   |   |                            |
|--|---|----------------------------|
| Snapshots Policies Protection Groups ActiveDR ActiveCluster  |   |                            |
|  |   |                            |
| Snapshots<br>000   |   |                            |
| Members A  | 140 of 19 🧹 🕨 🚦   |                            |
| Name   |   |                            |
| Contig-950eaat4  | Protection  |                            |
| vvol-Oracle19c-OL8-5a159813-vg/Data-2192b361   | Snapshots Policies Protection Groups ActiveDR ActiveCluster   |                            |
| vvol-Oracle19c-OL8-5a159813-vg/Data-257192b8   |   |                            |
| C wol-Orade19c-OL8-5a159813-vg/Data-70128497   | Snapshots   |                            |
| vvol-Oracle19c-OL8-5a159813-vg/Data-d69aeef6   | 0.00  |                            |
|  |   |                            |
| wvol-Orade19c-OL8-5a159813-vg/Data-e17b037b  | Members ^ 11-19 of 19 < >   | :                          |
| wol-Oradet9c-OL8-5a159813-vg/Data-e17b037b wol-Oradet9c-OL8-RMAN-9384e0b1-vg/Config f14072fc   | Members ^         11.19 of 19         <         >           Name_  <  | :                          |
| Wol-Orade19c-OL8-58159813-vg/Data-er/b037b     Wol-Orade19c-OL8-RMAN-9384e0b1-vg/Config-f14072fc     Wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-06b77rcb   | Members A 11.49 of 19 < >   | :                          |
| wol-Orade19c-OL8-5it59813-vg/Data-e17b037b     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Conflg-114072fc     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-06b717cb     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-28832875   | Members ^         11.49 of 19 < >           Name_            wwol-Orade19c-OLB-RMAN-9384e001-vg/Data-d05a7191   | :                          |
| wol-Oradet9c-OL8-5in59813-vg/Data-e17b037b     wol-Oradet9c-OL8-RMAN-9884e0b1vg/Data-06b717cb     wol-Oradet9c-OL8-RMAN-9884e0b1vg/Data-06b717cb     wol-Oradet9c-OL8-RMAN-9884e0b1vg/Data-2882875     wol-Oradet9c-OL8-RMAN-9884e0b1vg/Data-92014e4                             | Members ^         11.49 of 19 < >           Name_   | : *                        |
| wol-Orade19c-OL8-8nt59813-vg/Data-e17b037b           wol-Orade19c-OL8-RMAN-9384e0b1vg/Config f14072fc           wol-Orade19c-OL8-RMAN-9384e0b1vg/Data-66b77/cb           wol-Orade19c-OL8-RMAN-9384e0b1vg/Data-82832875           wol-Orade19c-OL8-RMAN-9384e0b1vg/Data-920f14e4 | Members         11.49 of 19         >           Name  | :<br>×<br>×<br>×           |
| Wol-Orade19c-OL8-8459813-vg/Data-er/b037b     Wol-Orade19c-OL8-RMAN-9384e0b1vg/Data-06b7r/cb     Wol-Orade19c-OL8-RMAN-9384e0b1vg/Data-920714e     Wol-Orade19c-OL8-RMAN-9384e0b1vg/Data-920714e4  | Members ^         11.49 of 19 < >           Name _  | :<br>×<br>×<br>×           |
| Wol-Orade19c-OL8-5af59813-vg/Data-e17b037b     Wol-Orade19c-OL8-RMAN-9384e0b1-vg/Config f14072fc     Wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-92b77cb     Wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-92b74e4     Wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-92b74e4                        | Members ^         11.49 of 19 < >           Name _  | :<br>×<br>×<br>×<br>×      |
| wol-Orade19c-OL8-8nt59813-vg/Data-e17b037b     wol-Orade19c-OL8-RMAN-9384e0b1vg/Data-96b717cb     wol-Orade19c-OL8-RMAN-9384e0b1vg/Data-92b717cb     wol-Orade19c-OL8-RMAN-9384e0b1vg/Data-92b714e4     wol-Orade19c-OL8-RMAN-9384e0b1vg/Data-92b714e4                           | Members         11.49 of 19 《           Name         ()           wol-Oracle15c-OL8-RMAN-9384e001-vg/Data-d05a7191         ()           wol-Oracle15c-OL8-RMAN-9384e001-vg/Data-d05a7191         ()           wol-Oracle19c-OL8-RMAN-9384e001-vg/Data-d05a7191         ()           wol-Oracle19c-OL8-RMAN-9384e001-vg/Data-d05a7491         ()           wol-pract9c1-04610dd0-vg/Conflg-b1t27d05         ()           wol-pract9c1-04610dd0-vg/Data-04c634b5         ()           wol-pract9c1-04610dd0-vg/Data-04c634b5         ()           wol-pract9c1-04610dd0-vg/Data-04c634b5         ()           wol-pract9c1-04610dd0-vg/Data-04c634b5         ()   | :<br>×<br>×<br>×<br>×<br>× |
| wol-Orade19c-OL8-8n59813-vg/Data-e17b037b     wol-Orade19c-OL8-RMAN-9384e0b1vg/Data-06b717cb     wol-Orade19c-OL8-RMAN-9384e0b1vg/Data-06b717cb     wol-Orade19c-OL8-RMAN-9384e0b1vg/Data-92014e4     wol-Orade19c-OL8-RMAN-9384e0b1vg/Data-92014e4                              | Members         11.49 of 19 (>)           Name         (>)           wool-OracletSc-OLS-RMAN-9384e0b1-vg/Data-d05a7191         (>)           wool-OracletSc-OLS-RMAN-9384e0b1-vg/Data-d05a7191         (>)           wool-OracletSc-OLS-RMAN-9384e0b1-vg/Data-d05a7191         (>)           wool-OracletSc-OLS-RMAN-9384e0b1-vg/Data-d05a7491         (>)           wool-practSc-OLS-RMAN-9384e0b1-vg/Data-d05a7491         (>)           wool-practSc-L04610dd0-vg/Data-d05284a14         (>)           wool-practSc-L04610dd0-vg/Data-04c684b5         (>) |                            |
| Wol-Orade19c-OL8-8459813-vg/Data-er7b037b     Wol-Orade19c-OL8-RMAN-9384e0b1-vg/Config f14072fc     Wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-96b77cb     Wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-920f14e4     Wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-920f14e4                       | Members ^         11.49 of 19 < >           Name _  |                            |

FIGURE 307. Site B Protection Group with Replicated VMs

At the successful completion of the planned migration, run **Reprotect** to protect Site B, which is now the new protected site.



#### FIGURE 308. Reprotect Site B

The reprotect step to protect Site B is successful.

| SC2-AZ2-Oracle-SRA-VVOL-RP EDIT MOVE DELETE TEST CLEANUP BUN  |                     | Learn moi |
|---|---------------------|-----------|
| Summary Recovery Steps Issues History Permissions Protection Groups Virtual Machines  Recovery Plan: SC2-AZ2-Oracle-SRA-VVOL-RP  Protected Bite: DR.See Recovery Step: Prenary_Ste Description: |                     |           |
| ✓ Plan Status   | → VM Status         |           |
| Plan Status:  → Ready   | Ready for Recovery: | 4 VMs     |
| This plan is ready for test or recovery   | In Progress:        | 0 VMs     |
|   | Success:            | 0 VMs     |
| > Recent History  | Warning: (          | 0 VMs     |
|   | Erron               | 0 VMs     |
|   | Incomplete:         | 0 VMs     |
|   | Total: 4            | 4 VMs     |

FIGURE 309. Reprotect Site B Successful



Run another planned migration to switch the protected site from Site B back to Site A.

| SC2-AZ2-Oracle-SRA-VVOL-RP  | MOVE DELETE TEST CLEANUP RUN   |   | Learn m   |
|---|--|---|---|
| Summary Recovery Steps Issues History Permission  | s Protection Groups Virtual Machines   |   |   |
| Recovery Plan: SC2-A22-Orade-SRA-VVOL<br>Prestances Nac. (DL.No<br>Bacoury Nac. Penny, Sta<br>Decoplan: | RP   |   |   |
| V Plan Status   |  | ✓ VM Status   |   |
| Plan Status: → Ready  |  | Ready for Recovery:   | 4 VMs   |
| This plan is ready for  | test or recovery   | In Progress   | 0 VMs   |
|   |  | Successi  | 0 VMs   |
| > Recent History  | , and the second s | Warning:  | 0 VMs   |
|   |  | Errori  | 0 VMs   |
|   |  | Incomplete:   | 0 VM8   |
|   | Or   | acle-SRA-VVOL-RP 1 Confirmation options 2 Ready to complete | Recovery confirmation  Fourning this plan in recovery mode will attempt to shut down the VMs at the protected site and recover the VMs at the recovery site  Protected site: DR_Site  Recovery site: Primary_Site |
| Recovery - SC2-AZ2-   | Ready to complete  |   | Server connection: Connected  |
| Dracle-SRA-VVOL-RP  | Review your selected settings.   |   | <ul> <li>understand that this process will permanently alter the virtual machines and infrastructure of both<br/>the protected and recovery datacenters.</li> </ul>   |
| 1 Confirmation options  | Name   | SC2-AZ2-Oracle-SRA-VVOL-RP                                  | Descurrenterer  |
| 2 Ready to complete   | Protected site   | DR_Site   | Planned migration   |
|   | Recovery site  | Primary_Site  | Replicate recent changes to the recovery site and cancel recovery if errors are encountered. (Sites must be connected and<br>storage replication must be available.)  |
|   | Server connection  | Connected   | Disaster recovery  Atternot to replicate recent changes to the recovery site, but otherwise use the most recent storage synchronization data.   |
|   | Number of VMs  | 4   | Continue recovery even if errors are encountered.   |
|   | Recovery type  | Planned migration   |   |

FIGURE 310. Run Planned Migration from Site B to Site A

Planned migration from Site B to Site A is successful. VMs on Protected Site A vVOL datastore **OraVVOL** are powered back on and we see the VMs on Recovery Site B are powered off.

| SC2-AZ2-Oracle-SF   | RA-VVOL-RP EDIT MO   | OVE DELETE TEST CLEANUP                       | RUN ····                                |                     |                              |                    | Learn mr                     |
|---|--|---|---|---------------------|------------------------------|--------------------|------------------------------|
| Summary Recovery Steps                                      | Issues History Permissions                                 | Protection Groups Virtual Me                  | ichines                                 |                     |                              |                    |                              |
| Recovery P<br>Protected Ske<br>Recovery Ske<br>Description: | Plan: SC2-AZ2-Oracle-SRA-VVOL-R<br>= CR_Sto<br>Frimary_Sto | P   |   |                     |                              |                    |                              |
| A Your workloads are not protect                            | cled. Run reprotect.                                       |   |   |                     |                              |                    |                              |
| ✓ Plan Status   |  |   |   | ✓ VM Status         |                              |                    |                              |
| Plan Status:  | Recovery complete  |   |   | Ready for Recovery: |                              |                    | 0 VMs                        |
|   | The recovery has been                                      | leted. Review the plan history to view an     | y errors or warnings. You can now       | In Progress:        |                              |                    | 0 VMs                        |
|   | virtual machines to the o                                  | original site, you must first run the plan in | reprotect mode, then once protection    | Success:            |                              |                    | 4 VMs                        |
|   | is configured in reverse,<br>original site.                | you can run the plan in recovery mode         | to failback the virtual machines to the | Warning:            |                              |                    | 0 VMs                        |
|   |  |   | <u></u>                                 | Error:              |                              |                    | 0 VMs                        |
| > Recent History  | \  | \   |   |                     |                              |                    | Total: 4 VMs                 |
| []] BCA-S   | SiteC Actions<br>Monitor Configu                           | re Permissions                                | Hosts VMs                               | () AZ2<br>Summary   | 2BCA11 ACTION<br>Monitor Con | figure Permissions | Hosts VMs                    |
| Virtual Mac   | chines VM Templat  | es vApps                                      |   | Virtual             | Machines VM Tem              | plates vApps       |                              |
| Name ↑  |  | ✓ State                                       | ∽ Status                                | Name ↑              |                              | V State            | <ul> <li>✓ Status</li> </ul> |
| 🕃 Oracle1   | 19c-OL8  | Powered On                                    | V Normal                                | 🗊 Ore               | cle19c-OL8                   | Powered Off        | 🗸 Normal                     |
| 🔂 Oracle1   | 19c-OL8-RMAN   | Powered On                                    | V Normal                                | 🗊 Ore               | cle19c-OL8-RMAN              | Powered Off        | 🗸 Normal                     |
| 🔂 prac19c   | c1   | Powered On                                    | V Normal                                | 🗊 pra               | c19c1                        | Powered Off        | Vormal                       |
| 🔂 prac19c   | c2   | Powered On                                    | Vormal                                  | 🗊 pra               | c19c2                        | Powered Off        | V Normal                     |

FIGURE 311. Planned Migration from Site B to Site A Successful



Protected Site A protection group **SC2vVOLPG**:

| Protection   |   |
|--|---|
| Snapshots Policies Protection Groups ActiveDR Ac     | tiveCluster   |
| > Protection Groups > ( SC2vVOLPG )                  |   |
| Snapshots<br>765.94 M                                |   |
| Members A  | Protection  |
| Name   | Snapshots Policies Protection Groups ActiveDR ActiveCluster |
| Svol-Oracle19c-OL8-5fce3a1d-vg/Config-950eaaf4       |   |
| C vvol-Oracle19c-OL8-5fce3a1d-vg/Data-2192b361       | Snapshots   |
| C vvol-Oracle19c-OL8-5fce3a1d-vg/Data-257192b8       | 765,94 M  |
| Svvol-Oracle19c-OL8-5fce3a1d-vg/Data-70f28497        | Members A   |
| Svvol-Oracle19c-OL8-5fce3a1d-vg/Data-d69aeef6        | Name  |
| vvol-Oracle19c-OL8-5fce3a1d-vg/Data-e17b037b         |   |
| Cvvol-Oracle19c-OL8-RMAN-f3df9767-vg/Config-f14072fc | C vvol-Oracle19c-OL8-RMAN-f3df9767-vg/Data-d05a7191         |
| wol-Oracle19c-OL8-RMAN-f3df9767-vg/Data-06b7f7cb     | vvol-Oracle19c-OL8-RMAN-f3df9767-vg/Data-d5284af4           |
| vvol-Oracle19c-OL8-RMAN-f3df9767-vg/Data-32832875    | vvol-prac19c1-90c766ce-vg/Config-b1f27d05                   |
| C wol-Oracle19c-OL8-RMAN-13df9767-vg/Data-920f14e4   | vvol-prac19c1-90c766ce-vg/Data-04c634b5                     |
|  | vvol-pract9c1-90c766ce-vg/Data-0caaa243                     |
|  | vvol-pract9ct-90c766ce-vg/Data-2d5b187d                     |
|  | vvol-prac19c2-41059974-vg/Config-99b1e844                   |
|  | vvol-prac19c2-41059974-vg/Data-0bb95d6b                     |
|  | C vvol-prac19c2-41059974-vg/Data-6cce596f                   |

FIGURE 312. Protected Site A Protection Group

Recovery Site B protection group **r-SC2vVOLPG-Robqn**:

| Protection  |   |
|---|---|
| Snapshots Policies Protection Groups ActiveDR ActiveClu | istei   |
| > Protection Groups > 10 r-SC2vVOLPG-Robqn )            |   |
| Snapshots<br>10.55 M                                    |   |
| Members   | Protection  |
| Name  | Snapshots Policies Protection Groups ActiveDR ActiveCluster |
| wol-Orade19c-OL8-edea6t41-vg/Contlg-950eaat4            | > Protection Groups > 💿 r-SC2vVOLPG-Robqn                   |
| Swol-Orade19c-OL8-edea6f41-vg/Data-2192b361             | Snapshots   |
| vvol-Orade19c-OL8-edea6t41-vg/Data-257192b8             |   |
| S vvol-Orade19c-OL8-edea6t41-vg/Data-70t28497           | Members A   |
| Svvol-Orade19c-OL8-edea6f41-vg/Data-d69aeef6            | Name  |
| Swol-Oracle19c-OL8-edea6f41-vg/Data-e17b037b            |   |
| Svvol-Oracle19c-OL8-RMAN-77ea0724-vg/Contig-114072tc    | wol-Oracle19c-OL8-RMAN-77ea0724-vg/Data-d05a7191            |
| Svvol-Oracle19c-OL8-RMAN-77ea0724-vg/Data-06b7f7cb      | C vvol-Oracle19c-OL8-RMAN-77ea0724-vg/Data-d5284af4         |
| Svvol-Oracle19c-OL8-RMAN-77ea0724-vg/Data-32832875      | Svvol-prac19c1-2cdc9379-vg/Config-b1127d05                  |
| C vvol-Orade19c-OL8-RMAN-77ea0724-vg/Data-920f14e4      | C vvol-prac19c1-2cdc9379-vg/Data-04c634b5                   |
|   | vvol-prac19c1-2cdc9379-vg/Data-0caaa243                     |
|   | Svvol-prac19c1-2cdc9379-vg/Data-2d5b187d                    |
|   | vvol-pract9c2-aeefc253-vg/Config-99b1e844                   |
|   | vvol-pracl9c2-aeefc253-vg/Data-0bb95d6b                     |
|   | Svvol-prac19c2-aeefc253-vg/Data-6cce596f                    |

FIGURE 313. Recovery Site B Protection Group

Site A vVOL Oracle VMs **Oracle19c-OL8** and **Oracle19c-OL8-RMAN** are powered on with the IP addressing scheme defined as per network mappings to the primary network **APPS-1614**.

|                                    |   | & Oracle19r   |   |  |
|------------------------------------|---|---|---|--|
|                                    |   |   |   |  |
| Summary Monitor Config             | gure Permissions Datastores Networks Snapshots  | Updates Summary Mon                                 | iltor Configure Permissions Datastores  | Networks Snapshots Updates   |
| P Powered On<br>Launch web console | Guest OS: Oracle Linux 8 (64-bit)<br>Compatibility: ESXI 7.0 U2 and later (VM version 19)<br>VMware Tools: Running, version:11296 (Guest Managed)<br>More: IMPO<br>DNS Neme: orace195-cols visibiliocal<br>IP Addresses: 172.16.14.45<br>Host: sc2esx09.vsibiliocal<br>▲ Col UT | P Powered On<br>LAUNCH WEB CONS<br>LAUNCH REMOTE CO | Guest OS: Oracle Linux 8 (64-bit)<br>Compatibility: ESX 7.0 U2 and later (V<br>VMware Tools: Running, version:1296 (r<br>MORE INFO<br>DNS Name: oracle19c-08-vvol-man<br>IP Addresse: T72.16.14.46<br>Host: sc2esx12.vstab.local<br>ONSOLE () & C C | M version 19)<br>Guest Managed)<br>.corp.localdomain                         |
| VM Hardware                        |   | , VM Hardware                                       |   | ~  |
| > CPU                              | 12 CPU(s)   | > CPU   | 12 CPU(s)   |  |
| > Memory                           | 128 GB, 1.28 GB memory active   | > Memory  | 128 GB, 1.28 GB   | memory active  |
| > Hard disk 1                      | 80 GB   | > Hard disk 1                                       | 100 GB  |  |
| Total hard disks                   | 5 hard disks  | Total hard dis                                      | sks 5 hard disks  |  |
| > Network adapter 1                | APPS-1614 (connected)   | > Network adap                                      | pter 1 APPS-1614 (connec  | ted)   |
| CD/DVD drive 1                     | Disconnected  | g <sub>b</sub> → CD/DVD drive                       | e 1 Disconnected  |  |
| > Video card                       | 8 MB  | > Video card  | 4 MB  |  |
| VMCI device                        | Device on the virtual machine PCI bus that provide<br>machine communication interface   | es support for the virtual VMCI device              | Device on the virtu<br>machine communic   | al machine PCI bus that provides support for the virtual<br>cation interface |
| > Other                            | Additional Hardware   | > Other   | Additional Hardwar  | re   |
| Compatibility                      | ESXi 7.0 U2 and later (VM version 19)   | Compatibility                                       | ESXI 7.0 U2 and lat   | (er (VM version 19)  |

FIGURE 314. Site A VMs Status

Site A vVOL Oracle RAC **prac19c** is powered on with the Public IP addressing scheme set as per the network mappings to the primary network **APPS-1614** and private IP addressing scheme set as per the network mappings to the primary network **APPS-1605**.

|   |  | CTIONS Y  |   |                      | 遼 prac19c2 📔 Þ 🗖                 | C 🖗 🚳  | ACTIONS Y  |   |                        |
|---|--|---|---|----------------------|----------------------------------|--|--|---|------------------------|
| Summary Monitor Cont  | figure Permissio   | ons Datastores Net  | works Snapshots Upc   | dates                | Summary Monitor Con              | figure Permis  | sions Datastores Ne  | tworks Snapshots U  | pdates                 |
| Powered Cn<br>LAUNCH WER CONSOLE<br>LAUNCH REMOTE CONSOLE ① | Guest OS: O<br>Compatibility: E<br>VMware Tools: R<br>DNS Name: p<br>IP Addresses: I<br>Host: sc | SY 7.0 And later (VM version<br>SX 7.0 And later (VM version<br>unning, version/289 (Gue<br>vope: InPO<br>restRet Visiblo local<br>72.16.14.191<br>REW ALL & IP ADDRESSES<br>«CassIO, vsiab.local | T72.1514.191<br>172.1514.191<br>172.1514.191<br>172.1514.193<br>172.1514.193<br>172.1514.193<br>172.1514.193<br>172.1514.197<br>192.21814.191<br>169.254.16.7 |                      | Powered On<br>LAUNCH WEB CONSOLE | Guest OS:<br>Compatibility:<br>VMware Tools:<br>DNS Name:<br>IP Addresses:<br>Host:<br>Most: | Oracle Linux 7 (64-bit)<br>ESX 7.0 and later (VM versio-<br>Running, version11269 (Guef<br>MORE INFO<br>pract922 valab local<br>172.16 14.192<br>VIEW ALL 5 IP ADDRESSES<br>sc2esx11.vslab.local | n 17)<br>prac19c2<br>IP Addresses:<br>172 16 14 192<br>172 16 14 195<br>192 183 14 192<br>169 254 9 115 | ×                      |
| VM Hardware   |  |   |   | ļ                    | VM Hardware                      |  | L  |   |                        |
| > CPU   |  | 12 CPU(s)   |   |                      | > CPU                            |  | 12 CPU(s)  |   |                        |
| > Memory  |  | 128 GB, 11.52 GB mem  | ory active  |                      | > Memory                         |  | 128 GB, 14.08 GB mer   | mory active   |                        |
| > Hard disk 1   |  | 80 GB   |   |                      | > Hard disk 1                    |  | 80 GB  |   |                        |
| Total hard disks  |  | 3 hard disks  |   |                      | Total hard disks                 |  | 3 hard disks   |   |                        |
| > Network adapter 1   | 1  | APPS-1614 (connected)   | ×   |                      | > Network adapter 1              |  | APPS-1614 (connected)  | <b>N</b>  |                        |
| > Network adapter 2   | Ň,   | APPS-1605 (connected)   | 1   |                      | > Network adapter 2              |  | APPS-1605 (connected)  | 1   |                        |
| CD/DVD drive 1  |  | Disconnected  |   | 9 <sub>0</sub> . v   | CD/DVD drive 1                   |  | Disconnected   |   | 9 <sub>D</sub> . ~     |
| > Video card  |  | 8 MB  |   |                      | > Video card                     |  | 8 MB   |   |                        |
| VMCI device   |  | Device on the virtual ma<br>machine communication   | chine PCI bus that provides supp<br>interface   | port for the virtual | VMCI device                      |  | Device on the virtual ma<br>machine communication  | achine PCI bus that provides su<br>interface  | upport for the virtual |
| > Other   |  | Additional Hardware   |   |                      | > Other                          |  | Additional Hardware  |   |                        |
| Compatibility   |  | ESXI 7.0 and later (VM ve   | ersion 17)  |                      | Compatibility                    |  | ESXi 7.0 and later (VM v   | version 17)   |                        |

FIGURE 315. Site A Oracle RAC VMs Status



All Oracle RAC **prac19c** cluster services are up.

| Jame<br>Jocal Resources<br>pra.LISTENER.ls | Target<br> | State         | Server   | State details        |
|--|------------|---------------|----------|----------------------|
| ocal Resources                             | <br>5      |               |          |                      |
| ra.LISTENER.l:                             |            |               |          |                      |
| ra.Lisienek.l                              |            |               |          |                      |
| ra chad                                    | ONLINE     | ONLINE        | prod19d1 | CTADIE               |
| ra chad                                    | ONTIME     | ONLINE        | praci9c2 | STABLE               |
|  |            |               | pracisez | STABLE               |
| na. chau                                   | ONLINE     | ONLINE        | prac19c1 | STABLE               |
|  | ONLINE     | ONLINE        | prac19c2 | STABLE               |
| ra.net1.netwo                              | ck         |               |          |                      |
|  | ONLINE     | ONLINE        | prac19c1 | STABLE               |
|  | ONLINE     | ONLINE        | prac19c2 | STABLE               |
| ra.ons                                     |            |               |          |                      |
|  | ONLINE     | ONLINE        | prac19c1 | STABLE               |
|  | ONLINE     | ONLINE        | prac19c2 | STABLE               |
|  |            |               |          |                      |
|  |            |               |          |                      |
|  |            |               |          |                      |
| ra.ASMNET1LSN                              | R_ASM.ls:  | nr(ora.asmgro | up)      |                      |
|  | ONLINE     |               |          |                      |
|  | ONLINE     | ONLINE        | prac19c2 |                      |
|  | ONLINE     |               |          |                      |
| ra.DATA_DG.dg                              |            | group)        |          |                      |
|  | ONLINE     | ONLINE        | prac19c1 |                      |
|  | ONLINE     |               |          |                      |
|  |            | OFFLINE       |          | STABLE               |
| ra.LISTENER_SC                             | CAN1.lsn   |               |          |                      |
|  | ONLINE     | ONLINE        |          | STABLE               |
| ra.LISTENER_SC                             | CAN2.lsn   |               |          |                      |
|  | ONLINE     | ONLINE        |          | STABLE               |
| ra.LISTENER_SC                             | CAN3.lsn:  |               |          |                      |
|  | ONLINE     | ONLINE        |          | STABLE               |
| ra.MGMTLSNR                                |            |               |          |                      |
|  | ONLINE     | ONLINE        | prac19c1 | 169.254.16.7 192.168 |
|  |            |               |          | .14.191,STABLE       |
| ra.asm(ora.asm                             | ngroup)    |               |          |                      |
|  | ONLINE     | ONLINE        | pracl9c1 | Started, STABLE      |
|  | ONLINE     | ONLINE        | prac19c2 | Started,STABLE       |
|  | OFFLINE    | OFFLINE       |          | STABLE               |
| ra.asmnet1.asr                             | nnetwork   | (ora.asmgroup |          |                      |
|  | ONLINE     | ONLINE        | pracl9c1 | STABLE               |
|  | ONLINE     | ONLINE        | pracl9c2 | STABLE               |
|  | OFFLINE    | OFFLINE       |          | STABLE               |
| ra.cvu                                     |            |               |          |                      |
|  | ONLINE     | ONLINE        | prac19cl | STABLE               |
| ra.mgmtdb                                  |            |               |          |                      |
|  | ONLINE     | ONLINE        | pracl9c1 | Open,STABLE          |
| ra.prac19c.db                              |            |               |          |                      |
|  | ONLINE     | ONLINE        | pracl9c1 | Open,HOME=/u01/app/o |
|  |            |               |          | racle/product/19.0.0 |
|  |            |               |          | /dbhome_1,STABLE     |
|  | ONLINE     | ONLINE        | pracl9c2 | Open,HOME=/u01/app/o |
|  |            |               |          | racle/product/19.0.0 |
|  |            |               |          | /dbhome_1,STABLE     |
| ra.prac19c1.v                              | ıp         |               |          |                      |
|  | ONLINE     | ONLINE        | pracl9cl | STABLE               |
| ra.prac19c2.v:                             | ip         |               |          |                      |
|  | ONLINE     | ONLINE        | prac19c2 | STABLE               |
|  |            |               |          |                      |
|  | ONLINE     | ONLINE        |          | STABLE               |
|  |            |               |          |                      |
|  | ONLINE     |               |          | STABLE               |
| ra.scan2.vip                               |            |               |          |                      |
|  | ONLINE     | ONLINE        |          | STABLE               |
|  |            |               |          |                      |
| 1<br>ra.scan3.vip                          |            |               |          |                      |
| 1<br>ra.scan3.vip<br>1                     | ONLINE     |               |          | STABLE               |

| <b>.</b>                        |           |               |                      |                      |
|---------------------------------|-----------|---------------|----------------------|----------------------|
| Jame                            |           |               |                      | State details        |
| Local Resource:                 | s         |               |                      |                      |
| bra.LISTENER.l:                 | snr       |               |                      |                      |
| JEG. DISIBNDR. I                | ONLINE    | ONLINE        | prac19c1             | STABLE               |
|                                 | ONLINE    | ONLINE        | prac19c2             | STABLE               |
| ora.chad                        |           |               |                      |                      |
|                                 | ONLINE    | ONLINE        | prac19c1             | STABLE               |
|                                 | ONLINE    | ONLINE        | prac19c2             | STABLE               |
| bra.net1.netwo:                 | rk        | ONLY THE      |                      | 0777 D 7 D           |
|                                 | ONLINE    | ONLINE        | praciyci<br>prociaci | STABLE               |
| bra ons                         |           | ONTINE        | pracisez             | STABLE               |
| JEG. 0115                       | ONLINE    | ONLINE        | prac19c1             | STABLE               |
|                                 | ONLINE    | ONLINE        | prac19c2             | STABLE               |
|                                 |           |               |                      |                      |
| Cluster Resour                  | ces<br>   |               |                      |                      |
| ora.ASMNET1LSN                  | R_ASM.ls: | nr(ora.asmgro | up)                  |                      |
| 1                               | ONLINE    | ONLINE        | prac19c1             | STABLE               |
| 2                               | ONLINE    | ONLINE        | pracl9c2             | STABLE               |
| 3                               | ONLINE    | OFFLINE       |                      | STABLE               |
| JEA. DATA_DG.dg                 | (ora.asm  | group)        | prod19d1             | CHARLE               |
| 2                               | ONLINE    | ONLINE        | praci9ci             | STABLE               |
| 3                               | OFFLINE   | OFFLINE       | processes            | STABLE               |
| ora.LISTENER S                  | CAN1.lsn  | r             |                      | 0.1110.000           |
| 1                               | ONLINE    | ONLINE        | prac19c2             | STABLE               |
| ora.LISTENER S                  | CAN2.lsn  |               |                      |                      |
| 1 -                             | ONLINE    |               |                      |                      |
| bra.LISTENER_S                  |           |               |                      |                      |
| 1                               | ONLINE    | ONLINE        | prac19c1             | STABLE               |
| bra MGMTLSNR                    |           | 0117 THE      |                      |                      |
| 1                               | ONLINE    | ONLINE        | pracifici            | 169.254.16./ 192.168 |
| vra agmiora ag                  | manound   |               |                      | .14.191,STABLE       |
| 1                               | ONLINE    | ONLINE        | prac19c1             | Started STABLE       |
| 2                               | ONLINE    | ONLINE        | prac19c2             | Started, STABLE      |
| 3                               | OFFLINE   | OFFLINE       |                      | STABLE               |
| bra.asmnet1.as                  | mnetwork  | (ora.asmgroup |                      |                      |
| 1                               |           |               |                      |                      |
| 2                               |           |               |                      |                      |
| 3                               | OFFLINE   | OFFLINE       |                      | STABLE               |
| bra.cvu                         |           |               |                      |                      |
| 1                               | ONLINE    | ONLINE        | praci9cl             | STABLE               |
| ra.mgmcab<br>1                  | ONLINE    | ONLINE        | prod18d1             | OPOD STARIE          |
| ra.pracl9c db                   | ONDINE    | OMPTINE       | praciser             | open, STABLE         |
| 1                               | ONLINE    | ONLINE        | prac19c1             | Open,HOME=/u01/app/c |
|                                 |           |               |                      | racle/product/19.0.0 |
|                                 |           |               |                      | /dbhome 1,STABLE     |
| 2                               | ONLINE    | ONLINE        | prac19c2             | Open,HOME=/u01/app/c |
|                                 |           |               |                      | racle/product/19.0.0 |
|                                 |           |               |                      | /dbhome_1,STABLE     |
| ora.prac19c1.v                  |           |               |                      |                      |
| 1                               | ONLINE    | ONLINE        | pracl9cl             | STABLE               |
| bra.prac19c2.v                  | 1p        |               |                      | 0033377              |
| T<br>T                          | ONLINE    | ONPINE        | praci9c2             | STABLE               |
| 1                               | ONLINE    | ONLINE        | prac19c1             | STABLE               |
| pra.scan1.vin                   | OWNER     | OWDINE        | practice             | STADLE               |
| 1                               | ONLINE    | ONLINE        | prac19c2             | STABLE               |
| ora.scan2.vip                   |           |               |                      |                      |
| 1                               | ONLINE    | ONLINE        | prac19c1             | STABLE               |
| ora.scan3.vip                   |           |               |                      |                      |
| 1                               | ONLINE    | ONLINE        |                      | STABLE               |
|                                 |           |               |                      |                      |
| C o O 1 o o o o o o o o o o o o |           |               |                      |                      |

FIGURE 316. Site A Oracle RAC Cluster Services

Run **Reprotect** to reprotect the VMs on Protected Site A.

| SC2-AZ2-Oracle-SRA-VV  | OL-RP EDIT MOVE DELETE TEST CL  | EANUP RUN  |   | Learn more   |
|--|---|--|---|--|
| Recovery Plan: SC2<br>Protected Site: DR.S<br>Recovery Site: Premo<br>Description: | AZ2-Oracle-SRA-VVOL-RP<br>66<br>ry_S86                                      |  |   |  |
| A Your workloads are not protected. Run re   | protect.  |  |   |  |
| ✓ Plan Status  |   |  | ✓ VM Status                               |  |
| Plan Status:   | Secovery complete   |  | Ready for Recovery:                       | 0 VMs  |
|  | The recovery has completed. Review the plan history to                      | o view any errors or warnings. You can now         | In Progress:                              | 0 VMs  |
|  | virtual machines to the original site, you must first run ti                | he plan in reprotect mode, then once protection    | Success:                                  | 4 VMs  |
|  | is configured in reverse, you can run the plan in recover<br>original site. | ry mode to failback the virtual machines to the    | Warning:                                  | 0 VMs  |
|  |   |  | Error:                                    | 0 VMs  |
| > Recent History   |   |  | Incomplete:                               | 0 VMs  |
| Depretect SC2 A72  | Peadu to complete   | Reprotect<br>Oracle-SR<br>1 contirma<br>2 Ready to | : - SC2-AZ2-<br>A-VVOL-RP<br>tion options | Confirmation options  Reprotect confirmation  Reprotect confirmation  New protected site: Primary_Site New protected site: Primary_Site Server convergiste: DR_Site Server connection: Connected |
| Reprotect - SC2-AZ2-<br>Oracle-SRA-VVOL-RP   | Ready to complete<br>Review your selected setting                           | 35.  |   | Number of VMs: 4   |
| 1 Confirmation options   | Name  | SC2-AZ2-Oracle-SRA-VVOL-                           | -RP                                       | Papratact actions  |
| 2 Ready to complete  | New protected site  | Primary_Site                                       |   | Reprotect operations include steps to clean up the original datastores and devices. If you are experiencing (  |
|  | New recovery site   | DR_Site  |   | cleanup steps, you may choose the force cleanup option to ignore all errors and return the plan to the Read  |
|  | Server connection   | Connected  |   | Enviro specific you may need to crean up you avonge manuary, and you anound rull diffet do sould as possible   |
|  | Number of VMs   | 4  |   | Loice cleanup  |
|  | Force cleanup   | Do not ignore cleanup warn                         | inas                                      |  |

#### FIGURE 317. Run Reprotect on Site A

Reprotection of Protected Site A vVOL VMs successful.

| Summary     Recovery Steps     Issues     History     Permissions     Protection Groups     Virtual Machines   | Learn m  |  |  |  |
|--|----------|--|--|--|
| Recovery Plan: SC2-AZ2-Oracle-SRA-VVOL-RP Protected State: Primary_State Recovery State: DR_Stile Description: |          |  |  |  |
| ✓ Plan Status ✓ VM Status  |          |  |  |  |
| Plan Status:     → Ready for Recovery:   | 4 VMs    |  |  |  |
| This plan is ready for test or recovery In Progress:   | 0 VMs    |  |  |  |
| Success:   | 0 VMs    |  |  |  |
| > Recent History Warning:  | 0 VMs    |  |  |  |
| Errori   | 0 VMs    |  |  |  |
| Incomplete:  | 0 VMs    |  |  |  |
| To   | l: 4 VMs |  |  |  |

FIGURE 318. Reprotect on Site A Successful



As mentioned above, the steps to run a planned migration of a recovery plan for vVOLs are the same in the case of a storage LUN.

More information on running a planned migration of a recovery plan with vVOL can be found in the *Performing a Planned Migration* or *Disaster Recovery By Running a Recovery Plan* and SRM User Guide: Configuring Site Recovery Manager vVol-Based Storage Policy Discovery.

#### Run Recovery Plan for Disaster Recovery

The steps to run a disaster recovery of a recovery plan for vVOL are the same in the case of a storage LUN.

The steps to run a disaster recovery scenario of recovery plan SC2-AZ2-Oracle-SRA-VVOL-RP are as shown below:



FIGURE 319. Disaster Recovery of Recovery Plan SC2-AZ2-Oracle-SRA-VVOL-RP

Disaster recovery of recovery **plan SC2-AZ2-Oracle-SRA-VVOL-RP** is successful. Protected Site A vVOL VMs are powered off and Recovery Site B vVOL VMs are powered on.

| LEARN LARN COLOR FOR NOVE DELETE TEST CLEARING BOIL  |   |  |  |  |
|--|---|--|--|--|
| Summary Recovery Steps Issues History Permissions Protection Groups Virtual Machines   |   |  |  |  |
| Recovery Plan: SC2.AZ2-Orade SRA-VVOL-RP<br>Pratacted Bits: Prevry, Site<br>Provery State: (SE_State<br>Decorption:  |   |  |  |  |
| ▲ Your workloads are not protected. Run reprotect.   | 🕞 REPROTEC                                  |  |  |  |
| ✓ Plan Status  | ✓ VM Status                                 |  |  |  |
| Plan Status: Ø Recovery complete   | Ready for Recovery: 0 VMs                   |  |  |  |
| The recovery tas completed. Review the plan history to view any errors or warnings. You can now  | In Progress: O VMs                          |  |  |  |
| press Reprotect to contigure protection in the reverse direction. Note that if you plan to failback the<br>virtual machines to the original site, you must first run the plan in reprotect mode, then once protection  | on Success: 4VMs                            |  |  |  |
| is configured in reverse, you can run the plan in recovery mode to failback the virtual machines to the<br>original site.  | 0 Warning: 0 VMs                            |  |  |  |
|  | Erren 0 VMs                                 |  |  |  |
| > Recent History   | Incomplete: 0 VMs                           |  |  |  |
|  | Tota: 4 VMs                                 |  |  |  |
| Image: Construction of the second | Virtual Machines     VM Templates     vApps |  |  |  |
| Name 🔶 🗸 Status  |   |  |  |  |
| Diracle19c-OL8 / Powered Off / Normal  | Name  |  |  |  |
| Doracle19c-OL8-RMAN Powered Off  | Oracle19-OL8     Powered On     Normal      |  |  |  |
| ∰ prac19c1 Powered Off / ✓ Normal  | Powered On Viormal                          |  |  |  |
| prac19c2 Powered Off Normal  | Powered On Vormal                           |  |  |  |
|  | La processa Powered On Contrain             |  |  |  |

FIGURE 320. Disaster Recovery of Recovery Plan SC2-AZ2-Oracle-SRA-VVOL-RP Successful

Recovery Site B vVOL Oracle VM **Oracle19c-OL8** and **Oracle19c-OL8-RMAN** are powered on with the IP addressing scheme defined per network mappings to recovery network **APPS-1810**.

As with testing the recovery plan, the Oracle VM **Oracle19c-OL8** is up with IP address 172.18.10.45 and the database **vvol19c** is up. The alert log for the database shows no errors. Oracle crash recovery is performed when the database starts up, which is normal and expected.

The Oracle VM **Oracle19c-OL8-RMAN** is up with IP address 172.18.10.46 and the database **rmandb** is up. The alert log for the database **rmandb** shows no errors. Oracle crash recovery is performed when the database **rmandb** starts up, which is normal and expected.

The storage vVOL-based snapshot is crash-consistent and write-ordering is preserved for each file within a snapshot.

| 🕏 Oracle19c-OL8   | D 🖸 🚭 🚳 🕺 Actions Y   | 🕈 Oracle19c-OL8-RMAN                                 | > 🗆 🛒 🏶 🐼 🛛 ACTIONS 🗸   |
|---|---|--|---|
| Summary Monitor Con   | figure Permissions Datastores Networks Snapshots Updates  | Summary Monitor Configure Pe                         | ermissions Datastores Networks Snapshots Updates  |
| P Powered On<br>LAUNCH WEB CONSOLE<br>LAUNCH REMOTE CONSOLE | Guest OS: Oracle Linux 8 (64-bit)<br>Compatibility: ESXI 7.0 U2 and later (VM version 19)<br>VMware Tools: Running, version:11296 (Guest Managed)<br>MORE INFO<br>ONS Name: oracle196-oils valab.local<br>IP Addresses: 172.18.10.45<br>Host: az2esx23.vslab.local<br>♪ | Ouest OS     On     ONSOLE     LAUNCH REMOTE CONSOLE | Oracle Linux 8 (64-bit)<br>ity: ESXi 7.0 U2 and later (VM version 19)<br>MoRet INFO<br>oracle19c-08-wol-rman.corp.localdomain<br>est 172.18.10.46<br>az2esx24.vslab.local |
| VM Hardware   |   | VM Hardware  |   |
| > CPU   | 12 CPU(s)   | > CPU  | 12 CPU(s)   |
| > Memory  | 128 GB, 11.52 GB memory active  | > Memory   | 128 GB, 11.52 GB memory active  |
| > Hard disk 1   | 80 GB   | > Hard disk 1  | 100 GB  |
| Total hard disks  | 5 hard disks  | Total hard disks                                     | 5 hard disks  |
| > Network adapter 1   | APPS-1810 (connected)   | > Network adapter 1                                  | APPS-1810 (connected)   |
| CD/DVD drive 1  | Disconnected  | CD/DVD drive 1                                       | Disconnected  |
| > Video card  | 8 MB  | > Video card   | 4 MB  |
| VMCI device   | Device on the virtual machine PCI bus that provides support for the<br>virtual machine communication interface  | VMCI device  | Device on the virtual machine PCI bus that provides support for the<br>virtual machine communication interface  |
| > Other   | Additional Hardware   | > Other  | Additional Hardware   |
| Compatibility   | ESXi 7.0 U2 and later (VM version 19)   | Compatibility  | ESXi 7.0 U2 and later (VM version 19)   |

FIGURE 321. Recovery Site Oracle VMs Oracle19c-OL8 and Oracle19c-OL8-RMAN Status

Recovery Site B vVOL Oracle RAC **prac19c** is powered on with the public IP addressing scheme set per the network mappings to recovery network **APPS-1810**, and the private IP addressing scheme set per the network mappings to recovery network **APPS-1805**.

| 🔀 prac19c1   🖻 🗖 🐺 🕼   🔺  | ICTIONS Y   | 🔠 prac19c2   🖻 🗖 🖉 🕼   🧳   | ACTIONS Y   |
|---|---|--|---|
| Summary Monitor Configure Permissio   | ons Datastores Networks Snapshots Updates   | Summary Monitor Configure Permissio  | ons Datastores Networks Snapshots Updates   |
| Guest OS:<br>Compatibility:<br>VMwere Tools:<br>DNS Name:<br>IP Addresses:<br>LAUNCH WEB CONSOLE<br>LAUNCH REMOTE CONSOLE<br>CANCH REMOTE CONSOLE | Dracle Linux 7 (64-bit)<br>SXI 7.0 and later (VM version 17)<br>Anning, version:11269 (Guest Managed)<br>more INF00<br>pract/Sci.visab.local<br>VEW ALL 3 IP ADDRESSES<br>sz2esx22.visab.local<br>122.18.10.191<br>192.168.14.191<br>169.254.16.7 | Compatibility:<br>Powered On<br>LAUNCH WEB CONSOLE<br>LAUNCH REMOTE CONSOLE<br>Compatibility:<br>UNWere Tools:<br>PAddresses:<br>Host:<br>Compatibility:<br>UNNS Name:<br>IPAddresses:<br>Host:<br>Compatibility:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPAddresses:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES:<br>IPADDRESSES | Dracle Linux 7 (64-bit)<br>SXI 7.0 and later (VM version 17)<br>Anning, version.11269 (Guest Managed)<br>MORE INFO<br>pracl922, Viab.local<br>VEW ALL 3 IP ADDRESSES<br>siz3esx23.vsibb.local<br>VEW ALL 3 IP ADDRESSES<br>172.18 10.192<br>192.168.14.192<br>169.254.9.115 |
| VM Hardware   |   | VM Hardware  |   |
| > CPU   | 12 CPU(s)   | > CPU  | 12 CPU(s)   |
| > Memory  | 128 GB, 8.96 GB memory active   | > Memory   | 128 GB, 7.68 GB memory active   |
| > Hard disk 1   | 80 GB   | > Hard disk 1  | 80 GB   |
| Total hard disks  | 3 hard disks  | Total hard disks   | 3 hard disks  |
| > Network adapter 1   | APPS-1810 (connected)   | > Network adapter 1  | APPS-1810 (connected)   |
| > Network adapter 2   | APPS-1805 (connected)   | > Network adapter 2  | APPS-1805 (connected)   |
| CD/DVD drive 1  | Disconnected  | CD/DVD drive 1   | Disconnected  |
| > Video card  | 8 MB  | > Video card   | 8 MB  |
| VMCI device   | Device on the virtual machine PCI bus that provides support for the<br>virtual machine communication interface  | VMCI device  | Device on the virtual machine PCI bus that provides support for the<br>virtual machine communication interface  |
| > Other   | Additional Hardware   | > Other  | Additional Hardware   |
| Compatibility   | ESXI 7.0 and later (VM version 17)  | Compatibility  | ESXi 7.0 and later (VM version 17)  |

FIGURE 322. Recovery Site Oracle RAC prac19c VMs Status



As part of running a disaster recovery of the recovery plan, the network Interfaces of the Oracle RAC **prac19c** will be changed to the appropriate recovery network as defined in the network mappings.

- The VIP and the SCAN IPs have to be changed to the test /recovery network IP scheme in order for the RAC Clusterware to bring up the RAC services.
- The steps to change the RAC VIP IP address can be found in *Oracle 19c Clusterware Administration and Deployment Guide*. The steps to change the Oracle private interconnect IP address can be found in the *Changing Oracle Clusterware Private Network Configuration*.
- The steps to change the RAC SCAN IP addresses can be found in the *My Oracle Support Note How to Update the IP Address of the SCAN VIP Resources (ora.scan{n}.vip) (Doc ID 952903.1).*
- The steps to change the RAC VIP, scan and private interconnect IP addresses are beyond the scope of this paper.

In event of real disaster, Site A may not be available. As this use case is a DR exercise, Site A is available in this case. Site A has Pure Storage protection group **SC2vVOLPG** with the original VM vVOLs.

| Protection   |                |   |  | 4                   |  |  |
|--|----------------|---|--|---------------------|--|--|
| Snapshots Policies Protection Groups ActiveDR ActiveCluster  |                |   |  |                     |  |  |
| > Protection Groups & SC2vVOLPG  |                |   |  |                     |  |  |
| Snapshots<br>28 87 M   |                |   |  |                     |  |  |
| Members A  | 1-10 of 12 < > | ÷ | Snapshot Schedule  |                     |  |  |
| Name 🔺   |                |   | Enabled: False<br>Create a snapshot on source every 1 hours<br>Retain all snapshots on source for 1 days |                     |  |  |
| Contig-asbctc8f  |                | × | then retain 4 snapshots per day for 7 more days  |                     |  |  |
| = wol-Orade19c-OL8-VVOL-07dfa932-vg Data-Obb928b1  |                | × | Replication Schedule   |                     |  |  |
| = vvol-Oracle19c-OL8-VVOL-07dfa932-vtp/Data-18347cb4   |                | × | Enabled: False   |                     |  |  |
| wol-Orade19c-OL8-VVOL-07dfa932-\g/Data-4eade15f  |                | × | Replicate a snapshot to targets every 15 minutes<br>Retain all snapshots on targets for 1 days           |                     |  |  |
| C wol-Orade19c-OL8-VVOL-07d1a932-rg/Data-6057107c  |                | × | then retain 4 snapshots per day for 7 more days  |                     |  |  |
| e wol-Orade19c-OL8-VVOL-07dfa932/vg/Data-843bbd3d  |                | × |  |                     |  |  |
| wol-Orade19c-OL8-VVOL-RMAN-8c012d9-vg/Config-a6c8091e  |                | × |  |                     |  |  |
| C wol-Orade19c-OL8-VVOL-RMAN-8cc012d9-vg/Data-8758114  |                | × |  |                     |  |  |
| Control Contro |                | × |  |                     |  |  |
| C vvol-Orade19c-OL8-VVOL-RMAN8cc012d9-vg/Data-d7/0b6e42  |                | × |  |                     |  |  |
| Targets ^  | 1-1 of 1       | ÷ |  |                     |  |  |
| Name   | Allowed        |   |  |                     |  |  |
| wdc-tsa-pure-01  | True           | 面 |  |                     |  |  |
| Protection Group Snapshots   |                |   |  |                     |  |  |
| Name   |                |   |  | Created             |  |  |
|  |                |   |  | All                 |  |  |
| O SC2/VOLPG.VasaSyncRGd39ba767   |                |   |  | 2021-06-22 09:44:59 |  |  |
| @ SC2VVOLPG.460  |                |   |  | 2021-06-22 09:44:58 |  |  |

FIGURE 323. Site A Protection Group with VMs



Site B has Pure Storage protection group **r-SC2vVOLPG-Robqn** with the failed-over VM vVOLs.

| Protection  |  |   |
|---|--|---|
| Snapshots Policies Protection Groups ActiveDR ActiveCluster   | r  |   |
| > Protection Groups >   r-SC2vVOLPG-Robqn   |  |   |
| Snapshots<br>000  |  |   |
| Members A   | 140 of 19 < >  |   |
| Name  |  |   |
| Svol-Oracle19c-OL8-5a159813-vg/Contig-950eaa14  | Protection   |   |
| C vvol-Orade19c-OL8-5a159813-vg/Data-2192b361   | Snapshots Policies Protection Groups ActiveDR ActiveCluster  |   |
| vvol-Oracle19c-OL8-5a159813-vg/Data-257192b8  |  |   |
| C vvol-Oracle19c-OL8-5a159813-vg/Data-70f28497  | Snapshots  |   |
| 😄 vvol-Oracle19c-OL8-5a159813-vg/Data-d69aeef6  | 0.00   |   |
|   |  |   |
| C wol-Oracle19c-OL8-5a159813-vg/Data-e17b037b   | Members A  | 11-19 of 19 < >   |
| wol-Oradet9c-OL8-8a159813-vg/Data-e17b037b wol-Oradet9c-OL8-RMAN-9384e0b1vg/Contlg-fM072fc  | Members A  | 11-19 of 19 < >   |
| wol-Orade19c-OL8-5159813-vg/Data-e17b037b     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Config f14072fc     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-06b7f7cb   | Members  Name  | 11-19 of 19 < > 🚦   |
| wol-Orade19c-OL8-6nt59813-vg/Data-er7b037b     wol-Orade19c-OL8-RMAN-9584e0b1-vg/Conf1g/14072tc     wol-Orade19c-OL8-RMAN-9584e0b1-vg/Data-06b777cb     wol-Orade19c-OL8-RMAN-9584e0b1-vg/Data-28832875   | Members  Mame  Mame  Mame  Mame  Mane  Man | 11-19 of 19 < > :   |
| wol-Orade19c-OL8-8nt59813-vg/Dath-e7b037b     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Config-114072tc     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-06577cb     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-32832875     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-32832875     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-32074e4 | Members ^         Name_  | 11-19 of 19 < > :   |
| wol-Orade19c-OL8-8159813-vg/Data-e17b037b     wol-Orade19c-OL8-RMAN-9884e0b1-vg/Config f14072fc     wol-Orade19c-OL8-RMAN-9884e0b1-vg/Data-06b7f7cb     wol-Orade19c-OL8-RMAN-9884e0b1-vg/Data-32832875     wol-Orade19c-OL8-RMAN-9884e0b1-vg/Data-32014e4  | Members ^         Name_  | 11-19 of 10 et 10 et 10 et 10 et 11 |
| wol-Orade19c-OL8-8nt598t3-vg/Data-er7b037b     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Config-f14072fc     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-06577cb     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-32832875     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-920f4e4  | Members ^         Name_  | 11-19 of 19 ( ) [<br>   |
| wol-Orade19c-OL8-8nt59813-vg/Data-er7b037b     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Contig (14072fc     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-06b7f7cb     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-28832875     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-92014e4   | Members ^         Name_  | 11-19 of 19         \$ <td< td=""></td<>  |
| wol-Orade19c-OL8-8nt59813-vg/Data-er7b037b     wol-Orade19c-OL8-RMAN-9584e0b1-vg/Config/14072tc     wol-Orade19c-OL8-RMAN-9584e0b1-vg/Data-96b777cb     wol-Orade19c-OL8-RMAN-9584e0b1-vg/Data-92074e4     wol-Orade19c-OL8-RMAN-9584e0b1-vg/Data-92074e4   | Members ^         Name_         Swol-Orade19c-OLB-RMAN-9384e001-vg/Data-d05a7191         Swol-Orade19c-OLB-RMAN-9384e001-vg/Data-d05a7191         wol-Orade19c-OLB-RMAN-9384e001-vg/Data-d05a7191         wol-Orac19c1-O4610dd0-vg/Data-04c634b5         wol-Orac19c1-O4610dd0-vg/Data-2d5b187d  | 11-19 of 19     \$     >     I       X     X     X     X       X     X     X     X       X     X     X     X       X     X     X     X       X     X     X     X       X     X     X     X       X     X     X     X       X     X     X     X       X     X     X     X  |
| wol-Orade19c-OL8-8nt59813-vg/Data-er7b037b     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-06b7f7cb     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-32832875     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-32014e4   | Members ^         Name_         Swol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-d05a7191         Swol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-d05a7191         Swol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-d05a7191         Swol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-d05a7191         Swol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-d05a7191         Swol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-d05a7191         Swol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-d05a7191         Swol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-d05a7191         Swol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-d05a7191         Swol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-d05a740         Swol-Pract9ct-O4610dd0-vg/Data-2d5b187d         Swol-Pract9ct-O4610dd0-vg/Data-2d5b187d         Swol-Pract9ct-O4610dd0-vg/Data-2d5b187d   | 11-19 of 19         1         1           X         X         X           X         X         X           X         X         X           X         X         X           X         X         X           X         X         X           X         X         X           X         X         X           X         X         X           X         X         X           X         X         X   |
| wol-Orade19c-OL8-8nt59813-vg/Data-er7b037b     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Config-f14072tc     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-96577cb     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-9207He4     wol-Orade19c-OL8-RMAN-9384e0b1-vg/Data-9207He4   | Members ^         Name_  | 11-19 of 19     <   |

FIGURE 324. Site B Protection Group with Failed Over VMs

After the successful completion of the disaster recovery exercise, and ensuring that Site A is back operationally, run **Reprotect** to protect Site B, which is now the new protected site.



#### FIGURE 325. Reprotect Site B VMs

The reprotect step to protect the Site B is successful.

| SC2-AZ2-Oracle-SRA-VVOL-RP EDIT MOVE DELETE TEST CLEANUP RUN  | Learn m                   |  |  |  |
|---|---------------------------|--|--|--|
| Summary       Recovery Steps       Issues       History       Permissions       Protection Groups       Virtual Machines         Recovery Steps       S2:-AZ2-Oracle-SRA-VVOL-RP       Protected Steps       DR. Steps       DR. Steps       DR. Steps         Recovery Steps       Vermary_Steps       Vermary_Steps       Vermary_Steps       Vermary_Steps       Vermary_Steps |                           |  |  |  |
| ✓ Plan Status   | ✓ VM Status               |  |  |  |
| Plan Status: $\rightarrow$ Ready  | Ready for Recovery: 4 VMs |  |  |  |
| This plan is ready for test or recovery   | In Progress: 0 VMs        |  |  |  |
|   | Success: 0 VMs            |  |  |  |
| > Recent History  | Warning: 0 VMs            |  |  |  |
|   | Error: 0 VMs              |  |  |  |
|   | Incomplete: 0 VMs         |  |  |  |
|   | Total: 4 VMs              |  |  |  |





Run a planned migration to switch the protected site from Site B back to Site A.

| SC2-AZ2-Oracle-SRA-VVOL-RP   | E DELETE TEST CLEANUP RUN                           |  | Learn m  |
|--|---|--|--|
| Summary Recovery Steps Issues History Permissions  | Protection Groups Virtual Machines                  |  |  |
| Recovery Plan: SC2-AZ2-Oracle-SRA-VVOL-RP<br>Protected Stat: Dr.,Sta<br>Excernity Stat: Dr.,Sta<br>Disorption: |   |  |  |
| ✓ Plan Status  |   | ✓ VM Status                            |  |
| Plan Status: $\rightarrow$ Ready   |   | Ready for Recovery:                    | 4 VMs  |
| This plan is ready for test  | or recovery   | In Progress:                           | 0 VMs  |
| > Recent History   |   | Success:                               | 0 VMs  |
|  |   | Error:                                 | 0 VMs  |
|  |   | Incomplete:                            | 0 VMs  |
| 200.470  | Ora   | Confirmation options Ready to complete | Recovery confirmation     Pawing the plan in recovery mode will attempt to shut down the VMs at the protected site and recover the VMs at the recovery site     Protected site: DR_Site     Recovery site: Primary_Site     Server connected |
| Recovery - SC2-AZ2-<br>Dracle-SRA-VVOL-RP  | Ready to complete<br>Review your selected settings. |  | Number of VMs: 4   |
| 1 Confirmation options   | Name  | SC2-AZ2-Oracle-SRA-VVOL-RP             | the protected and recovery datacenters.  |
| 2 Ready to complete  | Protected site                                      | DR_Site                                | Planned migration  |
|  | Recovery site                                       | Primary_Site                           | Replicate recent changes to the recovery site and cancel recovery if errors are encountered. (Sites must be connected and storage replication must be available.)  |
|  | Server connection                                   | Connected                              | Disaster recovery<br>Attempt to realisate recent channes to the recovery site, but otherwise use the most recent storage suppriorization data  |
|  | Number of VMs                                       | 4                                      | Continue recovery even if errors are encountered.  |
|  | Recovery type                                       | Planned migration                      |  |

FIGURE 327. Planned Migration from Site B to Site A

Planned migration from Site B to Site A is successful. VMs on Protected Site A vVOL datastore **OraVVOL** are powered back on and we see the VMs on Recovery Site B are powered off.

| IS SC2-AZ2-Oracle-SRA-VVOL-RP EXIT MOVE BELETE TEST CLEANUP RUN I ···  |  |   |                                    |                     | Learn m                    |                        |                      |       |                            |
|--|--|---|------------------------------------|---------------------|----------------------------|------------------------|----------------------|-------|----------------------------|
| Recovery Steps Recovery Steps Recovery Steps Recovery Steps Recovery Stec Recovery Ste | ISSUES HISTORY Permissions an: SC2-AZ2-Oracle-SRA-VVOL-RP DR_SRe Primary_SRe | Protection Groups Virtual Machine               | 63                                 |                     |                            |                        |                      |       |                            |
| Your workloads are not protect   | ed. Run reprotect.   |   |                                    |                     |                            |                        |                      |       |                            |
| ✓ Plan Status  |  |   |                                    | ✓ VM Status         |                            |                        |                      |       |                            |
| Plan Status:   | Recovery complete  |   |                                    | Ready for Recovery: |                            |                        |                      |       | 0 VMs                      |
|  | The recovery has complet   | ted. Review the plan history to view any error  | ors or warnings. You can now       | In Progress:        |                            |                        |                      |       | 0 VMs                      |
|  | virtual machines to the ori  | iginal site, you must first run the plan in rep | rotect mode, then once protection  | Successi            |                            |                        |                      |       | 4 VMs                      |
|  | is configured in reverse, y<br>original site.                                | you can run the phot in recovery mode to fai    | liback the virtual machines to the | Warning:            |                            |                        |                      |       | 0 VMs                      |
|  |  |   |                                    | Erron               |                            |                        |                      |       | 0 VMs                      |
| > Recent History   |  |   |                                    |                     |                            |                        |                      |       | Total: 4 VMs               |
| () BCA-S<br>Summary<br>Virtual Mac   | SiteC ACTIONS<br>Monitor Configur-<br>hines VM Template                      | e Permissions H                                 | iosts VMs                          | C /<br>Sumo         | AZ2BCA11  <br>hary Monitor | ACTIONS V<br>Configure | Permissions<br>vApps | Hosts | VMs                        |
|  |  |   |                                    |                     |                            |                        |                      |       |                            |
| Name ↑   |  | ✓ State ✓                                       | Status                             | Nar                 | ne ↑                       | ~                      | State                | ~ S   | tatus                      |
| Cracle1  | 9c-OL8   | Powered On                                      | V Normal                           | 24                  | Oracle19c-OL8              | (                      | Powered Off          |       | Vormal                     |
| Cracle1  | 9c-OL8-RMAN  | Powered On                                      | V Normal                           | 5 <sup>1</sup>      | Oracle19c-OL8-RMA          | N I                    | Powered Off          | ì     | ✓ Normal                   |
| 🔂 prac19c  | Ē.   | Powered On                                      | Vormal                             | 2                   | prac19c1                   |                        | Powered Off          |       | <ul> <li>Normal</li> </ul> |
| 🔀 prac19c  | 2  | Powered On                                      | Vormal                             | 1                   | prac19c2                   | `.                     | Powered Off          |       | Vormal                     |

FIGURE 328. Site A and Site B VM Status



Protected Site A protection group **SC2vVOLPG**:

| Protection   |   |  |  |  |  |  |  |
|--|---|--|--|--|--|--|--|
| Snapshots Policies Protection Groups ActiveDR Act    | IveCluster  |  |  |  |  |  |  |
| > Protection Groups > @ SC2vVOLPG                    |   |  |  |  |  |  |  |
| Snapshots<br>765.94 M                                |   |  |  |  |  |  |  |
| Members A  | Protection  |  |  |  |  |  |  |
| Name   | Snapshots Policies Protection Groups ActiveDR ActiveCluster |  |  |  |  |  |  |
| C vvol-Oracle19c-OL8-5fce3a1d-vg/Config-950eaaf4     |   |  |  |  |  |  |  |
| C vvol-Oracle19c-OL8-5fce3a1d-vg/Data-2192b361       | Snapshots   |  |  |  |  |  |  |
| 🗢 vvol-Orade19c-OL8-5fce3a1d-vg/Data-257192b8        | 765,94 M  |  |  |  |  |  |  |
| S wol-Orade19c-OL8-5fce3a1d-vg/Data-70f28497         | Members A   |  |  |  |  |  |  |
| Svvol-Orade19c-OL8-5fce3a1d-vg/Data-d69aeef6         | Name  |  |  |  |  |  |  |
| Svvol-Oracle19c-OL8-5fce3a1d-vg/Data-e17b037b        |   |  |  |  |  |  |  |
| Svvol-Oracle19c-OL8-RMAN-f3df9767-vg/Config-f14072fc | Svol-Oracle19c-OL8-RMAN-f3df9767-vg/Data-d05a7191           |  |  |  |  |  |  |
| vvol-Oracle19c-OL8-RMAN-f3df9767-vg/Data-06b7f7cb    | C vvol-Oracle19c-OL8-RMAN-f3df9767-vg/Data-d5284af4         |  |  |  |  |  |  |
| vvol-Oracle19c-OL8-RMAN-f3df9767-vg/Data-32832875    | wol-prac19c1-90c766ce-vg/Config-b1f27d05                    |  |  |  |  |  |  |
| vvol-Oracle19c-OL8-RMAN-f3df9767-vg/Data-920f14e4    | vvol-prac19c1-90c766ce-vg/Data-04c634b5                     |  |  |  |  |  |  |
|  | Swol-prac19c1-90c766ce-vg/Data-0caaa243                     |  |  |  |  |  |  |
|  | vvol-prac19c1-90c766ce-vg/Data-2d5b187d                     |  |  |  |  |  |  |
|  | vvol-prac19c2-41059974-vg/Config-99b1e844                   |  |  |  |  |  |  |
|  | vvol-prac19c2-41059974-vg/Data-0bb95d6b                     |  |  |  |  |  |  |
|  | vvol-prac19c2-41059974-vg/Data-6cce596f                     |  |  |  |  |  |  |

FIGURE 329. Site A Protection Group

Recovery Site B protection group **r-SC2vVOLPG-Robqn**:

| Protection  |   |  |  |  |  |  |  |  |
|---|---|--|--|--|--|--|--|--|
| Snapshots Policies Protection Groups ActiveDR ActiveClu | uster   |  |  |  |  |  |  |  |
| > Protection Groups > 10 r-SC2vVOLPG-Robon              |   |  |  |  |  |  |  |  |
| Snapshots<br>10.55 M                                    |   |  |  |  |  |  |  |  |
| Members   | Protection  |  |  |  |  |  |  |  |
| Name  | Snapshots Policies Protection Groups ActiveDR ActiveCluster |  |  |  |  |  |  |  |
| wol-Oracle19c-OL8-edea6f41-vg/Config-950eaaf4           | > Protection Groups > (i) r-SC2vVOLPG-Robqn                 |  |  |  |  |  |  |  |
| C vvol-Orade19c-OL8-edea6f41-vg/Data-2192b361           | Snapshots   |  |  |  |  |  |  |  |
| Svvol-Oracle19c-OL8-edea6f41-vg/Data-257192b8           |   |  |  |  |  |  |  |  |
| C vvol-Oracle19c-OL8-edea6f41-vg/Data-70f28497          | Members A   |  |  |  |  |  |  |  |
| Svvol-Oracle19c-OL8-edea6f41-vg/Data-d69aeef6           | Name  |  |  |  |  |  |  |  |
| Swol-Oracle19c-OL8-edea6f41-vg/Data-e17b037b            |   |  |  |  |  |  |  |  |
| vvol-Oracle19c-OL8-RMAN-77ea0724-vg/Config-f14072fc     | vvol-Oracle19c-OL8-RMAN-77ea0724-vg/Data-d05a7191           |  |  |  |  |  |  |  |
| Cvvol-Oracle19c-OL8-RMAN-77ea0724-vg/Data-06b7f7cb      | vvol-Oracle19c-OL8-RMAN-77ea0724-vg/Data-d5284af4           |  |  |  |  |  |  |  |
| Cvvol-Oracle19c-OL8-RMAN-77ea0724-vg/Data-32832875      | vvol-prac19c1-2cdc9379-vg/Config-b1f27d05                   |  |  |  |  |  |  |  |
| Cvvol-Oracle19c-OL8-RMAN-77ea0724-vg/Data-920f14e4      | wol-prac19c1-2cdc9379-vg/Data-04c634b5                      |  |  |  |  |  |  |  |
|   | Swol-prac19c1-2cdc9379-vg/Data-0caaa243                     |  |  |  |  |  |  |  |
|   | vvol-prac19c1-2cdc9379-vg/Data-2d5b187d                     |  |  |  |  |  |  |  |
|   | vvol-prac19c2-aeefc253-vg/Config-99b1e844                   |  |  |  |  |  |  |  |
|   | vvol-prac19c2-aeefc253-vg/Data-0bb95d6b                     |  |  |  |  |  |  |  |
|   | vvol-prac19c2-aeefc253-vg/Data-6cce596f                     |  |  |  |  |  |  |  |

FIGURE 330. Site B Protection Group

Site A vVOL Oracle VMs **Oracle19c-OL8** and **Oracle19c-OL8-RMAN** are powered on with the IP addressing scheme defined per network mappings to primary network **APPS-1614**.

|  | 🛱 Oracle19c-OL8-RMAN 🛛 🖻 🗳 🚳 🛛 actions 🗸   |                                  |  |         |  |   |  |  |                      |             |               |                    |
|--|--|----------------------------------|--|---------|--|---|--|--|----------------------|-------------|---------------|--------------------|
| Summary Monitor Configure Permission   | ns Datastores Networks Snapshots Updates   | Summary                          | Monitor                                | Configu | ure Permis   | sions [   | Datastores   | Network                                      | s Sna                | apshots     | Updates       |                    |
| Guest OS: O<br>Compatibility: ES<br>VMware Tools: R.<br>M<br>Powered On<br>PAddresse: 77<br>Host: sc<br>LAUNCH REMOTE CONSOLE<br>LAUNCH REMOTE CONSOLE | racie Linux 8 (64-bit)<br>SX 7.0 U2 and leter (VM version 19)<br>uning, version:1126 (Guest Managed)<br>ORE INFO<br>acie136-ol8 vstab.local<br>2.2.16.4.45<br>2esx09.vstab.local | P Powere<br>LAUNCH V<br>LAUNCH F | ed On<br>Web Console<br>REMOTE CONSOLE |         | Guest OS:<br>Compatibility:<br>/Mware Tools:<br>DNS Name:<br>P Addresses:<br>Host:<br> | Oracle Lin<br>ESXI 7.0 U<br>Running, 1<br>MORE INF<br>oracle19c-<br>172.16.14.4<br>sc2esx12.1 | ux 8 (64-bit)<br>J2 and later (<br>version:11296<br>o<br>ol8-vvol-rma<br>l6<br>vslab.local | VM version 1<br>(Guest Mana<br>n.corp.locald | 9)<br>iged)<br>omain |             |               |                    |
| VM Hardware  | ,  | VM Hard                          | dware                                  |         |  |   |  |  |                      |             |               | 1                  |
| > CPU  | 12 CPU(s)  | > CPU                            | J                                      |         |  | 12 CI   | PU(s)  |  |                      |             |               |                    |
| > Memory   | 128 GB, 1.28 GB memory active  | > Mer                            | nory                                   |         |  | 12  | 28 GB, 1.28 G  | B memory ac                                  | tive                 |             |               |                    |
| > Hard disk 1  | 80 GB  | > Har                            | d disk 1                               |         |  | 100   | GB   |  |                      |             |               |                    |
| Total hard disks   | 5 hard disks   | Tot                              | al hard disks                          |         |  | 5 ha  | rd disks   | -  |                      |             |               |                    |
| > Network adapter 1  | APPS-1614 (connected)  | > Net                            | work adapter 1                         |         |  | APP   | S-1614 (conne  | ected)                                       |                      |             |               |                    |
| CD/DVD drive 1   | Disconnected 9   | CD/                              | DVD drive 1                            |         |  | Disc  | onnected   |  |                      |             |               | 9 <sub>0</sub> , ~ |
| > Video card   | 8 MB   | > Vid                            | eo card                                |         |  | 4 ME  | 3  |  |                      |             |               |                    |
| VMCI device  | Device on the virtual machine PCI bus that provides support for the virtual<br>machine communication interface   | VM                               | CI device                              |         |  | Devi<br>maci  | ce on the viri<br>hine commun  | tual machine<br>lication interf              | PCI bus t<br>ace     | hat provide | es support fo | r the virtual      |
| > Other  | Additional Hardware  | > Oth                            | er                                     |         |  | Add   | tional Hardw   | are  |                      |             |               |                    |
| Compatibility  | ESXi 7.0 U2 and later (VM version 19)  | Con                              | npatibility                            |         |  | ESX   | 7.0 U2 and la  | ater (VM ver:                                | sion 19)             |             |               |                    |

FIGURE 331. Site A Oracle VMs Oracle19c-OL8 and Oracle19c-OL8-RMAN

Site A vVOL Oracle RAC **prac19c** is powered on with the public IP addressing scheme set per network mappings to primary network **APPS-1614** and the private IP addressing scheme set per network mappings to primary network **APPS-1605**.

| Image: summary   Monitor   Conf  | 🗊 🖗 🐻 🛛 🗚 AC   | ns Datastores Net  | works Snapshots Up  | dates                 |   | onfigure Permis  | ACTIONS ♥   | tworks Snapshots   | Updates                   |
|----------------------------------|--|--|---|-----------------------|---|--|---|--|---------------------------|
| Powered On Launch Remote Console | Guest OS: O<br>Compatibility: ES<br>VMware Tools: R<br>M<br>DNS Name: pr<br>IP Addresses: 17.<br>V<br>Host: sc | racie Linux 7 (54-bit)<br>SXI 7:0 and later (VM version<br>unning, version:11269 (Gue:<br>ore INFO<br>act9cl:vylab.local<br>2:16:14:191<br>EW ALL 6 IP ADDRESSES<br>2/2esx10.vslab.local | X 171<br>X prac19c1<br>IP Addresses:<br>172 16 14 196<br>172 16 14 193<br>172 16 14 197<br>192 168 14 197<br>192 168 14 197<br>192 168 14 197<br>192 168 14 197 |                       | Powered On<br>Launch web console<br>Launch Remote console | Guest OS:<br>Compatibility:<br>VMware Tools:<br>DNS Name:<br>IP Addresses:<br>Host:<br>Most: | Oracle Linux 7 (64-bit)<br>ESXI 7.0 and later (VM versio<br>Running, version:11269 (Gue<br>MORE INFO<br>Prec1962, visiab.local<br>72:1614192<br>VIEW ALL 5 IP ADDRESSES<br>sc2esx11.vsiab.local | n 17)<br>Prac19c2<br>IP Addresses:<br>172.16.14.192<br>172.16.14.192<br>172.16.14.195<br>192.168.14.192<br>169.254.9.115 | ×                         |
| VM Hardware                      |  |  |   | ,                     | VM Hardware   |  | l   |  |                           |
| > CPU                            |  | 12 CPU(s)  |   |                       | > CPU   |  | 12 CPU(s)   |  |                           |
| > Memory                         |  | 📗 128 GB, 11.52 GB mem   | nory active   |                       | > Memory  |  | 📗 128 GB, 14.08 GB me   | mory active  |                           |
| > Hard disk 1                    |  | 80 GB  |   |                       | > Hard disk 1   |  | 80 GB   |  |                           |
| Total hard disks                 |  | 3 hard disks   |   |                       | Total hard disks  |  | 3 hard disks  |  |                           |
| > Network adapter 1              | 1  | APPS-1614 (connected)  | ×   |                       | > Network adapter 1                                       |  | APPS-1614 (connected)   | · · · · · · · · · · · · · · · · · · ·  |                           |
| > Network adapter 2              | ×.   | APPS-1605 (connected)  |   |                       | > Network adapter 2                                       |  | APPS-1605 (connected)   | 1  |                           |
| CD/DVD drive 1                   |  | Disconnected   |   | 9 <sub>0</sub> . ~    | CD/DVD drive 1  |  | Disconnected  |  | 9 <sub>D</sub> ~          |
| > Video card                     |  | 8 MB   |   |                       | > Video card  |  | 8 MB  |  |                           |
| VMCI device                      |  | Device on the virtual ma<br>machine communication  | chine PCI bus that provides sup<br>interface  | oport for the virtual | VMCI device   |  | Device on the virtual machine communication   | achine PCI bus that provide<br>n interface   | s support for the virtual |
| > Other                          |  | Additional Hardware  |   |                       | > Other   |  | Additional Hardware   |  |                           |
| Compatibility                    |  | ESXi 7.0 and later (VM v   | ersion 17)  |                       | Compatibility   |  | ESXI 7.0 and later (VM  | version 17)  |                           |

FIGURE 332. Site A Oracle RAC prac19c VMs

### FIGURE 333. Site A Oracle RAC prac19c Cluster Services

| oot@prac190      | :1 ~]# /u0          | 1/app/19.0. | 0/grid/bin/crsctl s                     | tatus res -t         | [root@prac190      | cz ∼]# /uu<br>   |             | U/grid/bin/crsctl s  | tatus res -t<br>   |
|------------------|---------------------|-------------|---|----------------------|--------------------|------------------|-------------|----------------------|--------------------|
| me               |                     |             |   | State details        | Jame               | Target           | State       | Server               | State details      |
| cal Resourd      | <br>es              |             |   |                      | Local Resourc      |                  |             |                      |                    |
| a.LISTENER.      |                     |             |   |                      | ora.LISTENER.      |                  |             |                      |                    |
|                  | ONLINE              | ONLINE      | prac19c1                                | STABLE               |                    | ONLINE           | ONLINE      | prac19c1<br>prac19c2 | STABLE             |
| a.chad           | ONDINE              | ONDINE      | pracisez                                | SIADUE               | ora.chad           |                  |             |                      |                    |
|                  | ONLINE              | ONLINE      | prac19c1                                | STABLE               |                    | ONLINE<br>ONLINE | ONLINE      | prac19c1<br>prac19c2 | STABLE             |
|                  | ork                 | ONDINE      | practice                                | STABBE               | pra.net1.netw      |                  |             |                      |                    |
|                  | ONLINE              | ONLINE      | prac19c1                                | STABLE               |                    | ONLINE           | ONLINE      | prac19c1<br>prac19c2 | STABLE             |
| a.ons            | ONTINE              | ONTINE      | praciscz                                | SIABLE               | ora.ons            |                  |             |                      |                    |
|                  | ONLINE              | ONLINE      | prac19c1                                | STABLE               |                    | ONLINE           | ONLINE      | prac19c1             | STABLE             |
|                  | ONLINE              | ONLINE      | prac19c2                                | STABLE               |                    |                  |             |                      |                    |
| uster Resou      | rces                |             |   |                      | Cluster Resou      | urces            |             |                      |                    |
| a.ASMNET1LS      | NR_ASM.ls           | nr(ora.asmç | roup)                                   |                      | ora.ASMNET1LS      | SNR_ASM.ls       | nr(ora.asmg |                      |                    |
|                  | ONLINE              | ONLINE      | prac19c1                                | STABLE               | 1                  | ONLINE           | ONLINE      | prac19c1<br>prac19c2 | STABLE             |
|                  | ONLINE              | ONLINE      | prac19c2                                | STABLE               | 3                  | ONLINE           | OFFLINE     | pracisez             | STABLE             |
| a.DATA_DG.o      | g(ora.asm           | group)      |   | 0 TABBE              | ora.DATA_DG.o      | dg(ora.asm       | group)      |                      |                    |
|                  | ONLINE              | ONLINE      | prac19c1                                | STABLE               | 1                  | ONLINE           | ONLINE      | prac19c1             | STABLE             |
|                  | ORLINE              | ONLINE      | prac19c2                                | STABLE               | 3                  | OFFLINE          | OFFLINE     | pracisez             | STABLE             |
| a.LISTENER       | SCAN1.1sn           | r           |   | 016000               | bra.LISTENER       |                  |             |                      |                    |
| 1                | ONLINE              | ONLINE      |   | STABLE               | 1<br>DES LISTENER  | ONLINE           | ONLINE      | prac19c2             | STABLE             |
| a.LISTENER_<br>1 | SCANZ.1Sh<br>ONLINE | r<br>ONLINE | prac19c1                                | STABLE               | 1                  | ONLINE           | ONLINE      | prac19c1             | STABLE             |
| a.LISTENER_      | scan3.lsn           |             |   |                      | ora.LISTENER       | SCAN3.1sr        | r           |                      |                    |
| 1<br>D MCMTLOND  | ONLINE              | ONLINE      | prac19c1                                | STABLE               | J<br>Dra.MGMTLSNR  | ONLINE           | ONLINE      | pracivei             | STABLE             |
| 1                | ONLINE              | ONLINE      | prac19c1                                | 169.254.16.7 192.168 | 1                  | ONLINE           | ONLINE      |                      |                    |
|                  |                     |             |   | .14.191,STABLE       | ora asmiora a      | smaroup)         |             |                      | .14.191,STABLE     |
| 1.asm(ora.a      | ONLINE              | ONLINE      | prac19c1                                | Started STABLE       | 1                  | ONLINE           | ONLINE      | prac19c1             | Started, STABLE    |
|                  | ONLINE              | ONLINE      | prac19c2                                | Started, STABLE      | 2                  | ONLINE           | ONLINE      |                      | Started, STABLE    |
|                  | OFFLINE             | OFFLINE     |   | STABLE               | 3<br>Dra agmnati s | OFFLINE          | OFFLINE     |                      | STABLE             |
| a.asmnetl.a      | ONLINE              | (ora.asmgrc | up)<br>prac19c1                         | STABLE               | 1                  | ONLINE           | ONLINE      | prac19c1             | STABLE             |
|                  | ONLINE              | ONLINE      | prac19c2                                | STABLE               | 2                  | ONLINE           | ONLINE      |                      |                    |
|                  | OFFLINE             | OFFLINE     |   | STABLE               | 3                  | OFFLINE          | OFFLINE     |                      | STABLE             |
| a.cvu<br>1       | ONLINE              | ONLINE      | prac19c1                                | STABLE               | 1                  | ONLINE           | ONLINE      | prac19c1             | STABLE             |
| a.mgmtdb         | ONDIND              | ONDIND      | practoci                                | 0 INDDA              | ora.mgmtdb         |                  |             |                      |                    |
|                  | ONLINE              | ONLINE      |   | Open, STABLE         | 1<br>pra praci9c d | ONLINE           | ONLINE      | prac19c1             | Open,STABLE        |
| a.praci9c.c      | ONLINE              | ONLINE      | prac19c1                                | Open,HOME=/u01/app/o | 1                  | ONLINE           | ONLINE      |                      | Open,HOME=/u01/app |
|                  |                     |             |   | racle/product/19.0.0 |                    |                  |             |                      | racle/product/19.0 |
|                  | ONTIME              | ONLINE      | nna19a2                                 | /dbhome_1,STABLE     | 2                  | ONLINE           | ONLINE      | prac19c2             | Open.HOME=/u01/app |
|                  | ONDINE              | ONDINE      |   | racle/product/19.0.0 |                    |                  |             |                      | racle/product/19.0 |
|                  |                     |             |   | /dbhome_1,STABLE     | are prediat        | min              |             |                      | /dbhome_1,STABLE   |
| a.prac19c1.      | V1p<br>ONLINE       | ONLINE      | pred 9c1                                | STABLE               | 1                  | ONLINE           | ONLINE      | prac19c1             | STABLE             |
| a.prac19c2.      | vip                 |             |   | STREES               | pra.prac19c2.      |                  |             |                      |                    |
| 1                | ONLINE              | ONLINE      |   | STABLE               | l<br>Dra.dosmserve | ONLINE           | ONLINE      | prac19c2             | STABLE             |
| a.qosmserve<br>1 | ONLINE              | ONLINE      | prac19c1                                | STABLE               | 1                  | ONLINE           | ONLINE      |                      |                    |
| a.scan1.vip      |                     |             | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, |                      | bra.scanl.vip      | 0                |             |                      | 0777777            |
| 1                | ONLINE              | ONLINE      | prac19c2                                | STABLE               | l<br>pra.scan2.vir | ONLINE           | ONTINE      | praciscz             | STABLE             |
| 1                | ONLINE              | ONLINE      | prac19c1                                | STABLE               | 1                  | ONLINE           | ONLINE      |                      | STABLE             |
| .scan3.vip       |                     |             |   |                      | bra.scan3.vi       |                  | ONLY THE    | n no s10 s1          | (03.D.I.)?         |
|                  | ONLINE              | ONLINE      | prac19c1                                | STABLE               | Ţ                  | ONLINE           | ONLINE      | pracisci             | STABLE             |

All Oracle RAC prac19c cluster services are up.

Run Reprotect to reprotect the VMs on Protected Site A.



#### FIGURE 334. Reprotect Site A VMs

Reprotection of Protected Site A vVOL VMs successful.

| SC2-AZ2-Oracle-SRA-VVOL-RP EDIT MOVE DELETE TEST CLEANUP RUN  |                           |  |  |  |  |  |
|---|---------------------------|--|--|--|--|--|
| Summary Recovery Steps Issues History Permissions Protection Groups Virtual Machines                                    |                           |  |  |  |  |  |
| Recovery Plan: SC2-AZ2-Oracle-SRA-VVOL-RP<br>Protected State: Primery_State<br>Recovery State: DR_State<br>Description: |                           |  |  |  |  |  |
| ✓ Plan Status   | ✓ VM Status               |  |  |  |  |  |
| Plan Status: → Ready  | Ready for Recovery: 4 VMs |  |  |  |  |  |
| This plan is ready for test or recovery   | In Progress: 0 VMs        |  |  |  |  |  |
|   | Success: 0 VMs            |  |  |  |  |  |
| > Recent History  | Warning: 0 VMs            |  |  |  |  |  |
|   | Erron: 0 VMs              |  |  |  |  |  |
|   | Incomplete: 0 VMs         |  |  |  |  |  |
|   | Total: 4 VMs              |  |  |  |  |  |

FIGURE 335. Reprotect Site A VMs Successful



More information regarding running a disaster recovery of a recovery plan with vVOL can be found in the Performing a Planned Migration or Disaster Recovery By Running a Recovery Plan and *SRM User Guide: Configuring Site Recovery Manager vVol-Based Storage Policy Discovery*.

### Conclusion

Customers have successfully run their business-critical Oracle workloads with high performance demands on VMware vSphere for many years. Virtualization of mission-critical databases adds layers of complexity to the infrastructure, however, making common operations like backup and recovery, cloning, disaster recovery and other day-to-day activities difficult. The most efficient storage operations for mission-critical databases are offloaded to the storage array.

Concerns that often delay virtualization of business-critical database workloads include:

- Rapid database growth and the need to reduce backup windows to meet performance and business SLAs.
- The size of modern databases makes it harder to regularly clone and refresh data from production to QA and other environments.
- · Correct choice of business continuity plan to ensure rapid recovery from significant disruption to the operations
- Correct choice of disaster recovery technology to ensure business needs of RTO and RPO are met

A business continuity plan is a detailed strategy and set of systems for ensuring an organization's ability to prevent or rapidly recover from a significant disruption to its operations.

Disaster recovery is an organization's method of regaining access and functionality to its IT infrastructure after events like a natural disaster, cyber-attack, or even business disruptions related to the COVID-19 pandemic.

The VMware vSphere platform provides many tools for customers to successfully ensure business continuity and disaster recovery for their business-critical databases.

VMware Snapshot and VMware Clone are tools that help achieve point-in-time recovery.

VMware Site Recovery Manager, along with VMware vSphere Replication or array-based replication help protect VMs or entire LUN(s) from partial or complete site failures by replicating the VMs or entire LUN(s) between sites.

VMware Cloud on AWS is an on-demand service that enables customers to run applications across vSphere-based cloud environments with access to a broad range of AWS services.

VMware Site Recovery brings VMware enterprise-class SDDC disaster recovery-as-a-service to the AWS Cloud.

VMware Cloud Disaster Recovery is an on-demand disaster recovery service that provides an easy-to-use software-as-a-service (SaaS) solution and offers cloud economics to keep your disaster recovery costs under control.

This solution validates the business continuity and disaster recovery functionality of Oracle Single-Instance and Oracle RAC deployments using Pure x50 Storage (VMFS & vVOL) at all three below levels at on-premises and/or VMware clouds:

- Business Continuity
  - Application level
  - vSphere level
  - Storage level
- Disaster Recovery
  - Application level
  - vSphere level
  - Storage level



The choice of the business continuity or disaster recovery solution to adopt depends on application needs, SLAs, RTO, RPO and various other factors.

The above business continuity and disaster recovery methods can be summarized in the illustration below:





### Appendix A Oracle Initialization Parameter Configuration

#### Oracle Initialization Parameters (Oracle19c-OL8)

- \*.audit\_file\_dest='/u01/admin/vvol19c/adump'
- \*.audit\_trail='db'
- \*.audit\_sys\_operations=TRUE
- \*.compatible=12.1.0.0.0
- \*.control\_files='+DATA\_DG/vvol19c/control01.ctl','+DATA\_DG/vvol19c/control02.ctl','+DATA\_DG/vvol19c/control03.ctl'
- \*.db\_block\_size=8192
- \*.db\_domain="
- \*.db\_name='vvol19c'
- \*.db\_create\_file\_dest='+DATA\_DG'
- \*.db\_recovery\_file\_dest='+FRA\_DG'
- \*.db\_recovery\_file\_dest\_size=100G
- \*.diagnostic\_dest='/u01/admin/vvol19c'
- \*.enable\_pluggable\_database=true
- \*.instance\_number=1
- \*.instance\_name='vvol19c'
- \*.log\_archive\_format='%t\_%s\_%r.dbf'
- \*.open\_cursors=1000
- \*.processes=2000
- \*.parallel\_instance\_group='vvol19c'
- \*.parallel\_max\_servers=100
- \*.pga\_aggregate\_target=256M
- \*.pga\_aggregate\_limit=6G
- \*.remote\_login\_passwordfile='exclusive'
- \*.resource\_manager\_plan=''
- \*.result\_cache\_max\_size=4M
- \*.sga\_max\_size=96G
- \*.sga\_target=96G
- \*.thread=1
- \*.undo\_tablespace='UNDOTBS01'
- \*.use\_large\_pages='only'



#### Oracle Initialization Parameters (Oracle19c-OL8-RMAN)

- \*.audit\_file\_dest='/u01/admin/rmandb/adump'
- \*.audit\_trail='db'
- \*.audit\_sys\_operations=TRUE
- \*.compatible=12.1.0.0.0

\*.control\_files='+RMAN\_DATA\_DG/rmandb/control01.ctl','+RMAN\_DATA\_DG/rmandb/control02.ctl','+RMAN\_DATA\_ DG/rmandb/control03.ctl'

- \*.db\_block\_size=8192
- \*.db\_domain=''
- \*.db\_name='rmandb'
- \*.db\_create\_file\_dest='+DATA\_DG'
- \*.db\_recovery\_file\_dest='+DATA\_DG'
- \*.db\_recovery\_file\_dest\_size=100G
- \*.diagnostic\_dest='/u01/admin/rmandb'
- \*.enable\_pluggable\_database=true
- \*.instance\_number=1
- \*.instance\_name='rmandb'
- \*.log\_archive\_format='%t\_%s\_%r.dbf'
- \*.open\_cursors=1000
- \*.processes=2000
- \*.parallel\_instance\_group='rmandb'
- \*.parallel\_max\_servers=100
- \*.pga\_aggregate\_target=256M
- \*.pga\_aggregate\_limit=6G
- \*.remote\_login\_passwordfile='exclusive'
- \*.resource\_manager\_plan=''
- \*.result\_cache\_max\_size=4M
- \*.sga\_max\_size=16G
- \*.sga\_target=16G
- \*.thread=1
- \*.undo\_tablespace='UNDOTBS01'



#### Oracle RAC Initialization Parameters (prac19c)

\*.AWR\_PDB\_AUTOFLUSH\_ENABLED=true \*.audit trail='db' \*.audit\_sys\_operations=TRUE prac19c1.audit\_file\_dest='/u01/admin/prac19c1/adump' prac19c2.audit\_file\_dest='/u01/admin/prac19c2/adump' \*.cluster\_database=true \*.compatible=12.1.0.0.0 \*.control\_files='+DATA\_DG/prac19c/control01.ctl','+DATA\_DG/prac19c/control02.ctl','+DATA\_DG/prac19c/control03. ctl' \*.db\_block\_size=8192 \*.db domain=" \*.db\_name='prac19c' \*.db\_recovery\_file\_dest='+DATA\_DG' \*.db\_recovery\_file\_dest\_size=50G prac19c1.diagnostic\_dest='/u01/admin/prac19c1' prac19c2.diagnostic\_dest='/u01/admin/prac19c2' \*.enable\_pluggable\_database=true prac19c1.instance\_number=1 prac19c2.instance number=2 \*.log\_archive\_format='%t\_%s\_%r.dbf' \*.sga\_max\_size=16G \*.sga\_target=16G \*.open\_cursors=1000 \*.processes=1000 \*.parallel\_max\_servers=100 \*.pga aggregate target=2G \*.remote\_login\_passwordfile='exclusive' prac19c1.thread=1 prac19c2.thread=2prac19c1.undo\_tablespace='UNDOTBS01' prac19c2.undo\_tablespace='UNDOTBS02' \*.use\_large\_pages='only'



#### Oracle Initialization Parameters (Oracle19c-OL8-Primary)

- \*.audit\_file\_dest='/u01/admin/ORA19C/adump'
- \*.audit\_sys\_operations=TRUE
- \*.audit\_trail='db'
- \*.compatible='12.1.0.0.0'
- \*.control\_files='+DATA\_DG/control01.ctl','+DATA\_DG/control02.ctl','+DATA\_DG/control03.ctl'
- \*.db\_block\_size=8192
- \*.db\_create\_file\_dest='+DATA\_DG'
- \*.db\_domain="
- \*.db\_file\_name\_convert='+DATA\_DG/ORA19CSB','+DATA\_DG/ORA19C'
- \*.log\_file\_name\_convert='+DATA\_DG/ORA19CSB','+DATA\_DG/ORA19C'
- \*.db\_name='ORA19C'
- \*.db\_unique\_name='ora19c'
- \*.db\_recovery\_file\_dest='+DATA\_DG'
- \*.db\_recovery\_file\_dest\_size=10G
- \*.diagnostic\_dest='/u01/admin/ORA19C'
- \*.enable\_pluggable\_database=true
- \*.fal\_client='ORA19C'
- \*.fal\_server='ORA19CSB'
- \*.instance\_name='ora19c'
- \*.instance\_number=1
- \*.log\_archive\_config='dg\_config=(ora19c,ora19csb)'

\*.log\_archive\_dest\_1='location=use\_db\_recovery\_file\_dest valid\_for=(all\_logfiles,all\_roles) db\_unique\_ name=ora19c'

- \*.log\_archive\_dest\_2='service=ora19csb async valid\_for=(online\_logfiles,primary\_role) db\_unique\_name=ora19csb'
- \*.log\_archive\_dest\_state\_2='ENABLE'
- \*.log\_archive\_format='%t\_%s\_%r.dbf'
- \*.log\_archive\_max\_processes=10
- \*.job\_queue\_processes=0
- \*.open\_cursors=1000
- \*.parallel\_instance\_group='ORA19C'
- \*.parallel\_max\_servers=100
- \*.pga\_aggregate\_limit=6G
- \*.pga\_aggregate\_target=256M
- \*.processes=2000



- \*.remote\_login\_passwordfile='exclusive'
- \*.resource\_manager\_plan=''
- \*.result\_cache\_max\_size=4M
- \*.sga\_max\_size=16G
- \*.sga\_target=16G
- \*.standby\_file\_management='AUTO'
- \*.thread=1
- \*.undo\_tablespace='UNDOTBS01'

#### Oracle Initialization Parameters (Oracle19c-OL8-Standby)

- \*.audit\_file\_dest='/u01/admin/ORA19CSB/adump'
- \*.audit\_sys\_operations=TRUE
- \*.audit\_trail='db'
- \*.compatible='12.1.0.0.0'
- \*.control\_files='+DATA\_DG/stdby\_control01.ctl','+DATA\_DG/stdby\_control02.ctl','+DATA\_DG/stdby\_control03.ctl'
- \*.db\_block\_size=8192
- \*.db\_create\_file\_dest='+DATA\_DG'
- \*.db\_domain=''
- \*.db\_file\_name\_convert='+DATA\_DG/ORA19C','+DATA\_DG/ORA19CSB'
- \*.log\_file\_name\_convert='+DATA\_DG/ORA19C','+DATA\_DG/ORA19CSB'
- \*.db\_name='ORA19C'
- \*.db\_unique\_name='ora19csb'
- \*.db\_recovery\_file\_dest='+DATA\_DG'
- \*.db\_recovery\_file\_dest\_size=10G
- \*.diagnostic\_dest='/u01/admin/ORA19CSB'
- \*.enable\_pluggable\_database=true
- \*.fal\_client='ORA19CSB'
- \*.fal\_server='ORA19C'
- \*.instance\_name='ora19csb'
- \*.instance\_number=1
- \*.log\_archive\_config='dg\_config=(ora19c,ora19csb)'
- \*.log\_archive\_dest\_1='location=use\_db\_recovery\_file\_dest valid\_for=(all\_logfiles,all\_roles) db\_unique\_ name=ora19csb'
- \*.log\_archive\_dest\_2='service=ora19c async valid\_for=(online\_logfiles,primary\_role) db\_unique\_name=ora19c'
- \*.log\_archive\_dest\_state\_2='ENABLE'



- \*.log\_archive\_format='%t\_%s\_%r.dbf'
- \*.log\_archive\_max\_processes=10
- \*.job\_queue\_processes=0
- \*.open\_cursors=1000
- \*.parallel\_instance\_group='ORA19C'
- \*.parallel\_max\_servers=100
- \*.pga\_aggregate\_limit=6G
- \*.pga\_aggregate\_target=256M
- \*.processes=2000
- \*.remote\_login\_passwordfile='exclusive'
- \*.resource\_manager\_plan=''
- \*.result\_cache\_max\_size=4M
- \*.sga\_max\_size=16G
- \*.sga\_target=16G
- \*.standby\_file\_management='AUTO'
- \*.thread=1
- \*.undo\_tablespace='UNDOTBS01'

#### Custom Quiescing Scripts (Pre-Freeze and Post-Thaw)

Example of main script '10-freeze-thaw-databasse-vm-snapshot' that invokes the freeze and thaw routines:

[root@oracle19c-ol8 ~]# cat /etc/vmware-tools/backupScripts.d/10-freeze-thaw-databasse-vm-snapshot #!/bin/sh

if [[ \$1 == "freeze" ]] then

```
echo "This section is executed before the Snapshot is created"
su - oracle -c /home/oracle/pre-freeze-script
```

```
elif [[ $1 == "freezeFail" ]]
then
```

echo "This section is executed when a problem occurs during snapshot creation and cleanup is needed since thaw is not executed"

su - oracle -c "echo "Error in Freeze Operation" > /home/oracle/error.txt"

```
elif [[ $1 == "thaw" ]]
then
```

echo "This section is executed when the Snapshot is removed"

```
su - oracle -c /home/oracle/post-thaw-script
```

#### else

```
echo "Usage: `/bin/basename $0` [ freeze | freezeFail | thaw ]" exit 1
```

#### fi

```
[root@oracle19c-ol8 ~]#
```



Database Pre-Freeze scripts:

oracle@oracle19c-ol8:vvol19c:/home/oracle> cat pre-freeze-script #!/bin/bash export ORACLE\_HOME=/u01/app/oracle/product/19.0.0/dbhome\_1

sqlplus /nolog <<EOF conn / as sysdba alter database begin backup; exit; EOF oracle@oracle19c-ol8:vvol19c:/home/oracle>

Database Post-Thaw scripts:

oracle@oracle19c-ol8:vvol19c:/home/oracle> cat post-thaw-script #!/bin/bash export ORACLE\_HOME=/u01/app/oracle/product/19.0.0/dbhome\_1

sqlplus /nolog <<EOF conn / as sysdba alter database end backup; exit; EOF oracle@oracle19c-ol8:vvol19c:/home/oracle>

#### Reference

#### White Papers

For additional information, see the following white papers:

- VMware Hybrid Cloud Best Practices Guide for Oracle Workloads
- Oracle VMware Hybrid Cloud High Availability Guide
- Virtualizing Oracle Workloads with VMware vSphere Virtual Volumes on VMware Hybrid Cloud
- Oracle Database 12c on VMware vSAN Day 2 Operations and Management
- Enabling or disabling simultaneous write protection provided by VMFS using the multi-writer flag (1034165)

#### **Product Documentation**

For additional information, see the following product documentation:

- VMware vSphere Documentation
- Oracle 19c Database Online Documentation

#### Other Documentation

For additional information, see the following document:

VMware Solutions Lab

#### Author Info and Acknowledgements

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