

SnapCenter for Databases

NetApp Solutions

NetApp May 17, 2024

This PDF was generated from https://docs.netapp.com/us-en/netappsolutions/databases/automation_ora_clone_lifecycle.html on May 17, 2024. Always check docs.netapp.com for the latest.

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SnapCenter for Databases

SnapCenter Oracle Clone Lifecycle Automation

Allen Cao, Niyaz Mohamed, NetApp

This solution provides an Ansible based automation toolkit for configuring Oracle database High Availability and Disaster Recovery (HA/DR) with AWS FSx ONTAP as Oracle database storage and EC2 instances as the compute instances in AWS.

Purpose

Customers love the FlexClone feature of NetApp ONTAP storage for databases with significant storage cost savings. This Ansible based toolkit automates the setup, cloning, and refreshing of cloned Oracle databases on schedule using the NetApp SnapCenter command line utilities for streamlined lifecycle management. The toolkit is applicable to Oracle databases deployed to ONTAP storage either on-premisses or public cloud and managed by NetApp SnapCenter UI tool.

This solution addresses the following use cases:

- Setup Oracle database clone-specification configuration file.
- Create and refresh clone Oracle database on user defined schedule.

Audience

This solution is intended for the following people:

- A DBA who manages Oracle databases with SnapCenter.
- A storage administrator who manages ONTAP storage with SnapCenter.
- · An application owner who has access to SnapCenter UI.

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Solution deployment

Prerequisites for deployment

Deployment requires the following prerequisites.

```
Ansible controller:
Ansible v.2.10 and higher
ONTAP collection 21.19.1
Python 3
Python libraries:
netapp-lib
xmltodict
jmespath
```

SnapCenter server: version 5.0 backup policy configured Source database protected with a backup policy

Oracle servers: Source server managed by SnapCenter Target server managed by SnapCenter Target server with identical Oracle software stack as source server installed and configured

Download the toolkit

```
git clone https://bitbucket.ngage.netapp.com/scm/ns-
bb/na_oracle_clone_lifecycle.git
```

Ansible target hosts file configuration

The toolkit includes a hosts file which define the targets that an Ansible playbook running against. Usually, it is the target Oracle clone hosts. Following is an example file. A host entry includes target host IP address as well as ssh key for an admin user access to the host to execute clone or refresh command.

#Oracle clone hosts

```
[clone_1]
ora_04.cie.netapp.com ansible_host=10.61.180.29
ansible_ssh_private_key_file=ora_04.pem
```

[clone_2]

[clone 3]

Global variables configuration

The Ansible playbooks take variable inputs from several variable files. Below is an example global variable file vars.yml.

ONTAP specific config variables

SnapCtr specific config variables

```
snapctr_usr: xxxxxxxx
snapctr_pwd: 'xxxxxxx'
```

backup_policy: 'Oracle Full offline Backup'

Linux specific config variables

Oracle specific config variables

Host variables configuration

Host variables are defined in host_vars directory named as {{ host_name }}.yml. Below is an example of target Oracle host variable file ora_04.cie.netapp.com.yml that shows typical configuration.

User configurable Oracle clone db host specific parameters

Source database to clone from source_db_sid: NTAP1 source db host: ora 03.cie.netapp.com

Clone database
clone db sid: NTAP1DEV

snapctr obj id: '{{ source db host }}\{{ source db sid }}'

Additional clone target Oracle server configuration

Clone target Oracle server should have the same Oracle software stack as source Oracle server installed and patched. Oracle user .bash_profile has \$ORACLE_BASE, and \$ORACLE_HOME configured. Also, \$ORACLE_HOME variable should match with source Oracle server setting. Following is an example.

```
# .bash profile
```

```
# User specific environment and startup programs
export ORACLE_BASE=/u01/app/oracle
export ORACLE HOME=/u01/app/oracle/product/19.0.0/NTAP1
```

Playbook execution

There are total of three playbooks to execute Oracle database clone lifecycle with SnapCenter CLI utilities.

1. Install Ansible controller prerequisites - one time only.

ansible-playbook -i hosts ansible requirements.yml

2. Setup clone specification file - one time only.

```
ansible-playbook -i hosts clone_1_setup.yml -u admin -e
@vars/vars.yml
```

3. Create and refresh clone database regularly from crontab with a shell script to call a refresh playbook.

```
0 */4 * * * /home/admin/na oracle clone lifecycle/clone 1 refresh.sh
```

For an additional clone database, create a separate clone_n_setup.yml and clone_n_refresh.yml, and clone_n_refresh.sh. Configure the Ansible target hosts and hostname.yml file in host_vars directory accordingly.

Where to find additional information

To learn more about the NetApp solution automation, review the following website NetApp Solution Automation

TR-4988: Oracle Database Backup, Recovery, and Clone on ANF with SnapCenter

Allen Cao, Niyaz Mohamed, NetApp

This solution provides overview and details for automated Oracle deployment in Microsoft Azure NetApp Files as primary database storage with NFS protocol and Oracle database is deployed as container database with dNFS enabled. Database deployed in Azure is protected using SnapCenter UI tool for simplified database management.

Purpose

NetApp SnapCenter software is an easy-to-use enterprise platform to securely coordinate and manage data protection across applications, databases, and file systems. It simplifies backup, restore, and clone lifecycle management by offloading these tasks to application owners without sacrificing the ability to oversee and regulate activity on the storage systems. By leveraging storage-based data management, it enables increased performance and availability, as well as reduced testing and development times.

In TR-4987, Simplified, Automated Oracle Deployment on Azure NetApp Files with NFS, we demonstrate automated Oracle deployment on Azure NetApp Files (ANF)in Azure cloud. In this documentation, we

showcase Oracle database protection and management on ANF in Azure cloud with a very user-friendly SnapCenter UI tool.

This solution addresses the following use cases:

- Backup and recovery of Oracle database deployed on ANF in Azure cloud with SnapCenter.
- Manage database snapshots and clone copies to accelerate application development and improve data lifecycle management.

Audience

This solution is intended for the following people:

- A DBA who would like to deploy Oracle databases on Azure NetApp Files.
- A database solution architect who would like to test Oracle workloads on Azure NetApp Files.
- A storage administrator who would like to deploy and manage Oracle databases on Azure NetApp Files.
- An application owner who would like to stand up an Oracle database on Azure NetApp Files.

Solution test and validation environment

The testing and validation of this solution were performed in a lab setting that might not match the final deployment environment. See the section Key factors for deployment consideration for more information.

Architecture



Hardware and software components

Hardware

| Azure NetApp Files | Current offering in Azure by Microsoft | A capacity pool with Premium service level |
|-------------------------|--|---|
| Azure VM for DB server | Standard_B4ms - 4 vCPUs, 16GiB | Two Linux virtual machine instances |
| Azure VM for SnapCenter | Standard_B4ms - 4 vCPUs, 16GiB | One Windows virtual machine instance |
| | Software | |
| RedHat Linux | RHEL Linux 8.6 (LVM) - x64 Gen2 | Deployed RedHat subscription for testing |
| Windows Server | 2022 DataCenter; AE Hotpatch - x64 Gen2 | Hosting SnapCenter server |
| Oracle Database | Version 19.18 | Patch p34765931_190000_Linux- x86-64.zip |
| Oracle OPatch | Version 12.2.0.1.36 | Patch p6880880_190000_Linux- x86-64.zip |
| SnapCenter Server | Version 5.0 | Workgroup deployment |
| Open JDK | Version java-11-openjdk | SnapCenter plugin requirement on DB VMs |
| NFS | Version 3.0 | Oracle dNFS enabled |
| Ansible | core 2.16.2 | Python 3.6.8 |

Oracle database configuration in the lab environment

| Server | Database | DB Storage |
|--------|---|---|
| ora-01 | NTAP1(NTAP1_PDB1,NTAP1_PD B2,NTAP1_PDB3) | /u01, /u02, /u03 NFS mounts on ANF capacity pool |
| ora-02 | NTAP2(NTAP2_PDB1,NTAP2_PD B2,NTAP2_PDB3) | /u01, /u02, /u03 NFS mounts on ANF capacity pool |

Key factors for deployment consideration

- **SnapCenter deployment.** SnapCenter can deploy in a Windows domain or Workgroup environment. For domain-based deployment, the domain user account should be a domain administrator account, or the domain user belongs to the local administrator's group on the SnapCenter hosting server.
- **Name resolution.** SnapCenter server needs to resolve the name to the IP address for each managed target database server host. Each target database server host must resolve the SnapCenter server name to the IP address. If a DNS server is unavailable, add naming to local host files for resolution.
- **Resource group configuration.** Resource group in SnapCenter is a logical grouping of similar resources that can be backed up together. Thus, it simplifies and reduces the number of backup jobs in a large database environment.
- Separate full database and archive log backup. Full database backup includes data volumes and log volumes consistent group snapshots. A frequent full database snapshot incurs higher storage consumption but improves RTO. An alternative is less frequent full database snapshots and more frequent archive logs

backup, which consumes less storage and improves RPO but may extend RTO. Consider your RTO and RPO objectives when setting up the backup scheme. There is also a limit (1023) of the number of snapshot backups on a volume.

• **Privileges delegation.** Leverage role based access control that is built-in within SnapCenter UI to delegate privileges to application and database teams if desired.

Solution deployment

The following sections provide step-by-step procedures for SnapCenter deployment, configuration, and Oracle database backup, recovery, and clone on Azure NetApp Files in the Azure cloud.

Prerequisites for deployment

Deployment requires existing Oracle databases running on ANF in Azure. If not, follow the steps below to create two Oracle databases for solution validation. For details of Oracle database deployment on ANF in Azure cloud with automation, referred to TR-4987: Simplified, Automated Oracle Deployment on Azure NetApp Files with NFS

- 1. An Azure account has been set up, and the necessary VNet and network segments have been created within your Azure account.
- 2. From the Azure cloud portal, deploy Azure Linux VMs as Oracle DB servers. Create an Azure NetApp Files capacity pool and database volumes for Oracle database. Enable VM SSH private/public key authentication for azureuser to DB servers. See the architecture diagram in the previous section for details about the environment setup. Also referred to Step-by-Step Oracle deployment procedures on Azure VM and Azure NetApp Files for detailed information.



For Azure VMs deployed with local disk redundancy, ensure that you have allocated at least 128G in the VM root disk to have sufficient space to stage Oracle installation files and add OS swap file. Expand /tmplv and /rootlv OS partition accordingly. Ensure the database volume naming follows the VMname-u01, VMname-u02, and VMname-u03 convention.

sudo lvresize -r -L +20G /dev/mapper/rootvg-rootlv

sudo lvresize -r -L +10G /dev/mapper/rootvg-tmplv

- 3. From the Azure cloud portal, provision a Windows server to run the NetApp SnapCenter UI tool with the latest version. Refer to the following link for details: Install the SnapCenter Server.
- Provision a Linux VM as the Ansible controller node with the latest version of Ansible and Git installed. Refer to the following link for details: Getting Started with NetApp solution automation in section -

```
Setup the Ansible Control Node for CLI deployments on RHEL / CentOS or
Setup the Ansible Control Node for CLI deployments on Ubuntu / Debian.
```



The Ansible controller node can locate either on-premisses or in Azure cloud as far as it can reach Azure DB VMs via ssh port.

 Clone a copy of the NetApp Oracle deployment automation toolkit for NFS. Follow instructions in TR-4887 to execute the playbooks.

```
git clone https://bitbucket.ngage.netapp.com/scm/ns-
bb/na_oracle_deploy_nfs.git
```

6. Stage following Oracle 19c installation files on Azure DB VM /tmp/archive directory with 777 permission.

```
installer_archives:
```

- "LINUX.X64_193000_db_home.zip"
- "p34765931_190000_Linux-x86-64.zip"
- "p6880880_190000_Linux-x86-64.zip"
- 7. Watch the following video:

Oracle Database Backup, Recovery, and Clone on ANF with SnapCenter

8. Review the Get Started online menu.

SnapCenter installation and setup

We recommend to go through online SnapCenter Software documentation before proceeding to SnapCenter installation and configuration: . Following provides a high level summary of steps for installation and setup of SnapCenter software for Oracle on Azure ANF.

- 1. From SnapCenter Windows server, download and install latest java JDK from Get Java for desktop applications.
- 2. From SnapCenter Windows server, download and install latest version (currently 5.0) of SnapCenter installation executable from NetApp support site: NetApp | Support.
- 3. After SnapCenter server installation, launch browser to login to SnapCenter with Windows local admin user or domain user credential via port 8146.



4. Review Get Started online menu.

| п | NetApp Snap(| enter® | • = | i 01 | 👤 azur | reuser | SnapCenterAdmin | Sign Out |
|-------------|-----------------|--|-------------|------------|---------------|-------------|-----------------|----------|
| < | | Status Get Started | Get Sta | arted | | | | > × |
| | Dashboard | | - Ad | id storag | e connectio | ins and lic | censing | ~ |
| | Resources | | 1 Co | onfigure | user creden | tials | | ~ |
| | Monitor | | Ad Ad | dd a host | & install plu | ug-ins | | ~ |
| <i>i</i> ii | Reports | | 🗞 Cri | reate poli | cies | | | ~ |
| ٨ | Hosts | | V Pri | otect res | ources | | | ~ |
| 20 | Storage Systems | | Ва | ack up no | w | | | ~ |
| ÷ | Settings | Unable to connect to YouTube. You can use the playlist | Re | estore a f | Jackup | | | |
| A | Alerts | (https://www.youtube.com/playlist? | | lone a ha | ckup | | | |
| | | list=PLdXI3b2JEW/nofM6IN44eOe4aOSoryckg) to view the videos. | | one a ba | Kup | | | ~ |
| | | | CA 🗋 | Certifica | ite Settings | | | ~ |
| | | | Bac | ckup to C | /bject Store | | | ~ |
| | | | | | | Learn m | nore | |

5. In Settings-Global Settings, check Hypervisor Settings and click on Update.

| NetApp Snap | Center@ | • | 8 - | 👤 azureuser | SnapCenterAdmin | 🖡 Sign Ou |
|-----------------|--|---|------------|-------------|-----------------|-----------|
| | Clobal Settings Policies Users and Access Roles Credential Software | | | | | |
| Dashboard | | | | | | |
| Resources | Global Settings | | | | | |
| D Monitor | | | | | | |
| iii Reports | Hypervisor Settings 0 | | | | | |
| 🐴 Hosts | VWs have ISCSI direct attached disks or NFS for all the hosts Update | | | | | |
| Storage Systems | Notification Server Settings | | | | | |
| Settings | Configuration Settings 0 | | | | | |
| Alerts | Purge Jobs Settings 0 | | | | | |
| | Domain Settings 0 | | | | | |
| | CA Certificate Settings 0 | | | | | |
| | Disaster Recovery 0 | | | | | |
| | Audit log Settings 0 | | | | | |
| | Multi Factor Authentication (MFA) Settings 0 | | | | | |

6. If needed, adjust Session Timeout for SnapCenter UI to the desired interval.

| ΠN | etApp Snap(| enter® | • | 2 | 0. | 👤 azureuser | SnapCenterAdmin | 🖡 Sign Out |
|------------|-----------------|---|---|---|----|-------------|-----------------|------------|
| < | | Global Settings Policies Users and Access Roles Credential Software | | | | | | |
| | Dashboard | | | | | | | |
| V | Resources | Global Settings | | | | | | |
| | Monitor | | | | | | | |
| ail | Reports | Hypervisor Settings 0 | | | | | | ~ |
| A | Hosts | Notification Server Settings 0 | | | | | | ~ |
| } 4 | Storage Systems | Configuration Settings | | | | | | ~ |
| | Settings | | | | | | | |
| A | Alerts | Session nervou (in minutes) 20 Save | | | | | | |
| | | Purge Jobs Settings 0 | | | | | | ~ |
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| | | CA Certificate Settings 0 | | | | | | ~ |
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| | | Audit log Settings 0 | | | | | | ~ |
| | | Multi Factor Authentication (MFA) Settings 0 | | | | | | ~ |
| | | | | | | | | |

7. Add additional users to SnapCenter if needed.

| П | NetApp Snap(| [enter® | | | | | | • | 8 - | 👤 azureuser | SnapCenterAdmin | 🗊 Sign Out |
|-----|-----------------|-----------------|-----------|------------------|-----|----------|-----------------|---|------------|-------------|-----------------|------------|
| < | | Global Settings | | Users and Access | | Software | | | | | | |
| | Dashboard | Search by Nam | e | \supset | | | Type All | | | | + | |
| 9 | Resources | | Name | | IL. | Type | Roles | | I | Domain | Add | Rettore |
| ✤ | Monitor | | azureuser | | | User | SnapCenterAdmin | | | ocalhost | | |
| âîÎ | Reports | | | | | | | | | | | |
| A | Hosts | | | | | | | | | | | |
| ł | Storage Systems | | | | | | | | | | | |
| | Settings | | | | | | | | | | | |
| ▲ | Alerts | | | | | | | | | | | |
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8. The Roles tab list the built-in roles that can be assigned to different SnapCenter users. Custom roles also can be created by admin user with desired privileges.

| ΠN | letApp Snapi | Center® |) | | | | | | • = • | azureu | iser SnapCo | enterAdmin | 🚺 Sign Out |
|-------------|-----------------|---------|-----------|--------------|-----------|-----|-------|----|--|------------|-------------|------------|------------|
| | | | Settings | | | ess | Roles | | | | | | |
| | Dashboard | Searc | h by Name | | | | | | | | + | | |
| 0 | Resources | | Name | | | | | 18 | Details | Members | Add | Сору | Rettore |
| • | Monitor | | SnapO | enterAdmin | | | | •= | Overall administrator of SnapCenter system | 1 User, No | Groups | | |
| a il | Reports | | App B | ackup and Cl | one Admin | | | | App Backup and Clone Admin | No Membe | rs | | |
| A | Hosts | | Backu | p and Clone | /iewer | | | | Backup and Clone Viewer | No Membe | rs | | |
| ÷. | Storage Systems | | Infras | ructure Adm | lū. | | | | Infrastructure Admin | No Membe | rs | | |
| | Settings | | | | | | | | | | | | |
| A | Alerts | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
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| _ | | 1 | | | | | | | | | | | |

9. From Settings-Credential, create credentials for SnapCenter management targets. In this demo use case, they are linux user for login to Azure VM and ANF credential for capacity pool access.

| NetApp SnapC | Center® | | | | • | ≅ @- ⊥ | Lazureuser SnapC | enterAdmin | 🗊 Sign Out |
|-------------------|--|----------------------|----------------------------------|-------------|------------------|--------|------------------|------------|------------|
| < | Global Settings Policies Users and Acc | ess Roles Credential | Software | | | | | | |
| Dashboard | Search by Credential Name | | | | | | + | | |
| Resources | Credential Name | | Authentication Mode | | Details | | 9709K | | Li wate |
| | azure_anf | | AzureCredential | | | | | | |
| 渝 Reports | azureuser | | Linux | | Userld:azureuser | | | | |
| Hosts | | | | | | | | | |
| - Storage Systems | | | | | | | | | |
| Settings | | | | | | | | | |
| A Alerts | | | | | | | | | |
| Cred | lential | | | | | 2 | ~ | | |
| c | Credential Name | azureuse | ir | | | | | | |
| Auth | entication Mode | Linux | | | • | | | | |
| Aut | nentication Type | O Passwor | rd <mark>Based) ⑧</mark> SSH Ke | ey Based 🚺 | | | | | |
| | Username | azureuse | r | | | 0 | | | |
| | | VDI-KIOC- | C011a== | | | | | | |
| | SS <mark>H</mark> Private Key | END RS | SA PRIVATE KEY | | | 0 | | | |
| 🗹 Us | se sudo privileges | 0 | | | | | | | |
| | | | | Cancel | | ок | | | |

| Credential Name | | | |
|---------------------|-------------------------|---|--|
| | azure_anf | | |
| Authentication Mode | Azure Credential | • | |
| zure Details 🚯 | | | |
| Tenant ID | Enter Tenant Id | | |
| Client ID | Enter Client Id | | |
| Client Secret Key | Enter client secret key | | |

10. From Storage Systems tab, add Azure NetApp Files with credential created above.

| Codertial Beckond Beckond <th>NetApp SnapCe</th> <th>nter®</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>- 1 azurei</th> <th>user SnapCenter/</th> <th>Admin 🔋</th> <th>Sign</th> | NetApp SnapCe | nter® | | | | | | | | | - 1 azurei | user SnapCenter/ | Admin 🔋 | Sign |
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11. From Hosts tab, add Azure DB VMs, which installs SnapCenter plugin for Oracle on Linux.

| Monitor ora-01.br2220bmbnoutstever | IL: | Type | System Stand-alone | Plug-in UNIX, Oracle Database | | Version 5.0 | Overall St |
|--------------------------------------|--|-------|-----------------------|----------------------------------|-----|----------------|------------|
| Reports ora-02.hr222nbmhnoutdsxgsc | tuxizd.jx.internal.cloudaop.net | Linux | Stand-alone | UNIX, Oracle Database | | 5.0 | Runn |
| Storge Systems Settings Alerts | | | | | | | |
| Host Type | Linux | | | • | 1 | | |
| Host Name | ora-01 | | | | 1 | | |
| Credentials | azureuser | | | • | + 0 | | |
| | Oracle Database SAP HANA | | | | | | |
| More Options : Po | Oracle Database SAP HANA Unix File Systems | g-Ins | ****) | | | | |
| More Options : Po | Oracle Database SAP HANA Unix File Systems rt, Install Path, Custom Plug | g-Ins | | | | | |
| More Options : Po | Oracle Database SAP HANA Unix File Systems rt, Install Path, Custom Plug | g-Ins | 1000 (| | | | |
| More Options : Po Submit Cancel | Oracle Database SAP HANA Unix File Systems rt, Install Path, Custom Plug | g-Ins | *** | | | | |
| More Options : Po Submit Cancel | Oracle Database SAP HANA Unix File Systems rt, Install Path, Custom Plug | g-Ins | | | | | |
| More Options : Po Submit Cancel | Oracle Database SAP HANA Unix File Systems rt, Install Path, Custom Plug | g-Ins | | | | | |
| More Options : Po Submit Cancel | Oracle Database SAP HANA Unix File Systems rt, Install Path, Custom Plug | g-Ins | •••• | | | | |

| Port | 8145 | (|
|-------------------|---------------------------------|---|
| Installation Path | /opt/NetApp/snapcenter | |
| | Skip optional preinstall checks | |
| | Add all hosts in the oracle RAC | |
| Custom Plug-ins | Choose a File | |
| | Browse | |
| | No plug-ins found. | |

12. Once host plugin is installed on DB server VM, databases on the host are auto discovered and visible in Resources tab. Back to Settings-Polices, create backup policies for full Oracle database online backup and archive logs only backup. Refer to this document Create backup policies for Oracle databases for detailed step by step procedures.

| | | Global Settings Policies Users ar | | Roles Credential Software | | | | |
|---------|--------------------|-----------------------------------|----|---------------------------|---------------|-------------|--------------|--|
| | Dashboard | Oracle Database | | | | | | |
| 0 | Resources | Search by Name | | | | New | | |
| • | Monitor | Name | 15 | Backup Type | Schedule Type | Replication | Verification | |
| ~1 | Deporte | Oracle archivelogs backup | | LOG, ONLINE | Hourly | | | |
| * | Hosts | Oracle full online backup | | FULL, ONLINE | Hourly | | | |
| ÷. | Storage Systems | | | | | | | |
| | | | | | | | | |
| *** | Settings | | | | | | | |
| ## A | Settings Alerts | | | | | | | |
| ## A | Settings Alerts | | | | | | | |

Database backup

A NetApp snapshot backup creates a point-in-time image of the database volumes that you can use to restore in case of a system failure or data loss. Snapshot backups take very little time, usually less than a minute. The backup image consumes minimal storage space and incurs negligible performance overhead because it records only changes to files since the last snapshot copy was made. Following section demonstrates the implementation of snapshots for Oracle database backup in SnapCenter.

1. Navigating to Resources tab, which lists the databases discovered once SnapCenter plugin installed on database VM. Initially, the Overall Status of database shows as Not protected.

| п | NetApp Snap | Center | ® | | | | | ۰ | 2 | 0 - | 1 azureuser | SnapCenterAdmin | 🖡 Sign Out |
|-----|-----------------|--------|--------------|-------------------------------|--|----------------|----------|---|---|------------|-------------|------------------------------------|-----------------|
| < | | | e Database 🕞 | | | | | | | | | | |
| | Dashboard | | Database | Search databases | T | | | | | | | \$ | + |
| 0 | Resources | lin . | Name | Oracle Database Type | Host/Cluster | Resource Group | Policies | | | | Last Bac | Refresh Resource kup Overall St | s Add - atus |
| Ð | Monitor | | NTAP1 | Single Instance (Multitenant) | ora-01.hr2z2nbmhnqutdsxgscjtuxizd.jx.interna | | | | | | | Not prote | cted |
| ail | Reports | | NTAP2 | Single Instance (Multitenant) | ora-02.hr2z2nbmhnqutdsxgscjtuxizd.jx.interna | | | | | | | Not prote | cted |
| ٨ | Hosts | | | | l.cloudapp.net | | | | | | | | |
| 20 | Storage Systems | | | | | | | | | | | | |
| 華 | Settings | | | | | | | | | | | | |
| A | Alerts | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

2. Click on View drop-down to change to Resource Group. Click on Add sign on the right to add a Resource Group.

| ī | NetApp Snap | Center® | | | | • = | 0. Laz | ireuser SnapCente | rAdmin 🛛 🛱 Sign Out | | | |
|-------|-----------------|---|---------------------------------|------|----------|-----|-------------|-------------------|-----------------------------|--|--|--|
| < | | Oracle Database 👻 | | | | | | | | | | |
| = | Dashboard | View Resource Group Search resource group | | | | | | | | | | |
| V | Resources | Name | Resources | Tags | Policies | | Last Backup | Overall Status | Add • Application Volume | | | |
| - | Monitor | There is no match for your s | earch or data is not available. | | | | | | Resource Group | | | |
| í í í | Reports | | | | | | | | | | | |
| å | Hosts | | | | | | | | | | | |
| ÷ | Storage Systems | | | | | | | | | | | |
| - | Settings | | | | | | | | | | | |
| A | Alerts | | | | | | | | | | | |
| | | | | | | | | | | | | |

3. Name your resource group, tags, and any custom naming.

| Provide a nam | e and tags for the resource group | | | | |
|---|-----------------------------------|---|-------|---|---------|
| Name | full_online_bkup | | | 0 | |
| Tags | oradata | | | 0 | |
| Use custom n. \$HostName | me format for Snapshot copy | | | | |
| Backup setting Exclude archive lo destinations from backup | S B | × | • • • | | |
| | | | | | Previou |

| New Resource Group | |
|---|----------------------------|
| 1 2 3 4 5 6 Name Resources Policies Venfication Notification Summary | |
| Add resources to Resource Group | |
| Host | |
| Available Resources Selected Resources | |
| search available resources | |
| NTAP1 (ora-01.hr222nbmhnqutdsxgsqtuxizd.jx.internal.cloudapp. NTAP2 (ora-02.hr222nbmhnqutdsxgsqtuxizd.jx.internal.cloudapp. * | |
| | |
| | Previous Next |
| Select the backup policy and set a schedule by click on '+' sign | under Configure Schedules. |
| | |
| | |
| | |
| | |

| Name Resources Policie | les Verification Notification Summary | |
|---|--|----------|
| Select one or more policies and confi | figure schedules | |
| Oracle full online backup | · + 0 | |
| Configure schedules for selected poli Policy | licies Applied Schedules Configure Schedules | |
| Oracle full online backup | None + | |
| | | |
| Total 1 | | |
| | | |
| | | |
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| | | |
| | | |
| | | |
| | | Previous |
| | | |
| Add schedules f | for policy Oracle full online backup X | |
| | | |
| Deceder | | |
| Hourly | | |
| Charles James | 02/05/2024 05/55 pm | |
| Start date | 02/06/2024 05:55 pm | |
| | 03/06/2024 05:51 pm | |
| L'UNES ON | 03/00/2024 03:37 pm | |
| | | |
| Repeat every | 2 ≜ hours o mins | |
| Repeat every | 2 ¢ hours 0 mins | |
| Repeat every | 2 ¢ hours 0 mins | |
| Repeat every | 2 ¢ hours ₀ mins | |
| Repeat every | 2 🌲 hours ₀ mins | |
| Repeat every | 2 ¢ hours 0 mins | |
| Repeat every | 2 ‡ hours ₀ mins | |
| Repeat every | 2 ‡ hours 0 mins | |
| Repeat every | 2 ‡ hours 0 mins | |
| Repeat every | edules are triggered in the SnapCenter Server time | |
| Repeat every <i>i</i> The sche zone. | edules are triggered in the SnapCenter Server time | |
| Repeat every The sche zone. | edules are triggered in the SnapCenter Server time | |
| Repeat every i The sche zone. | edules are triggered in the SnapCenter Server time | |

6. If backup verification is not configured in policy, leave verification page as is.

| 0 | 6 | | | • | | | | | |
|--------------|----------------|---------------|------------------|------------------|--------------|---------------------|--|--|--|
| Name | Resour | es | Policies | Verification | Notification | Summary | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| Configur | e verification | n schedules | | | | | | | |
| Policy | 15 Sche | ule lype | ta ia mataviaila | Applied Schedule | s | Configure Schedules | | | |
| i nere is no | match for you | search or dat | ta is not availa | ole. | | | | | |
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| Total 0 | | | | | | | | | |
| Total 0 | | | | | | | | | |
| Total 0 | | | | | | | | | |
| Total 0 | | | | | | | | | |

7. In order to email a backup report and notification, a SMTP mail server is needed in the environment. Or leave it black if a mail server is not setup.

| | New Resource Group | | | | | | | | × |
|----|----------------------|--------------------|----------------------|-----------------------|--------------|---------|--|--|---------------|
| | 0 | 0 | | | | 6 | | | |
| | Name | Resources | Policies | Verification | Notification | Summary | | | |
| | Provide email s | settings 🚯 | | | | | | | |
| | Select the service a | accounts or people | e to notify regardir | ng protection issues. | | | | | |
| | Email preference | Never | | • | | | | | |
| | From | From email | | | | | | | |
| | То | Email to | | | | | | | |
| | Subject | Notification | | | | | | | |
| | 📃 Attach job repo | rt | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | Previous Next |
| 8. | Summary of | f new re | source | group. | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

| Name | Resources | Policies | Verification | Notification | Summary | | |
|----------------|-------------------|------------|-------------------------|--------------|---------|--|--|
| Resource gro | up name | full_onlir | ne_bkup | | | | |
| Tags | | oradata | | | | | |
| Policy | | Oracle fu | ull online backup: Hou | irly | | | |
| Plug-in | | SnapCer | iter Plug-in for Oracle | Database | | | |
| Verification e | habled for policy | None | | | | | |
| Send email | | No | | | | | |
| | | | | | | | |
| | | | | | | | |

9. Repeat the above procedures to create a database archive log only backup with corresponding backup policy.

| п | NetApp Snap | Center® | | | | ۰ | | 0· 1 | L azureuser | SnapCenterAdmin | 🛿 Sign Out |
|-------------|-----------------|---------------------|--------------------|---------|---------------------------|----|-----------|-------------|-------------|-----------------|------------|
| < | | Oracle Database 🔹 | | | | | | | | | |
| | Dashboard | View Resource Group | Search resource gr | roup V | | | | | | | + |
| 0 | Resources | Name | Resources | Tags | Policies | | | Last F | Backup | Overall Status | Add * |
| • | Monitor | full_online_bkup | 2 | oradata | Oracle full online backup | | 02/06/202 | 4 6:00:44 | PM 🛱 | Completed | |
| a ii | Reports | archivelog_bkup | 2 | oralog | Oracle archivelogs backup | l. | 02/06/202 | 4 5:59:25 1 | PM 🛱 | Completed | |
| Å | Hosts | | | | | | | | | | |
| 20 | Storage Systems | | | | | | | | | | |
| = | Settings | | | | | | | | | | |
| A | Alerts | | | | | | | | | | |
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10. Click on a resource group to reveal the resources it includes. Besides the scheduled backup job, an one-off backup can be triggered by clicking on Backup Now.

| | etApp SnapCenter® | | | | • = | 0• 1az | ureuser SnapC | enterAdmin | 🖡 Sign Out |
|-----|------------------------|--------------------------|-----------------|--|-----|---------------------|----------------|-------------|------------|
| > | Oracle Database 🕞 | full_online_bkup Details | | | | | | | × |
| | Search resource groups | search | | | | Modify Resource Gro | ap Back up Now | Maintenance | Deleto |
| 0 | News | Resource Name | Туре | Host | | | | | |
| - | Name | NTAP1 | Oracle Database | ora-01.hr2z2nbmhnqutdsxgscjtuxizd.jx.internal.cloudapp.net | | | | | |
| ~ | ful_online_bkup | NTAP2 | Oracle Database | ora-02.hr2z2nbmhnqutdsxgscjtuxizd.jx.internal.cloudapp.net | | | | | |
| and | archivelog_okop | | | | | | | | |
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| Resource Group | full_online_bkup | 5 10. | |
|---------------------|---------------------------|-------|--|
| Policy | Oracle full online backup | - | |
| 🗌 Verify after back | up | | |
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11. Click on the running job to open a monitoring window, which allows the operator to track the job progress in real-time.

Job Details

Backup of Resource Group 'full_online_bkup' with policy 'Oracle full online backup'

Backup of Resource Group 'full_online_bkup' with policy 'Oracle full online backup'

- Internal.cloudapp.net
- ora-01.hr2z2nbmhnqutdsxgscjtuxizd.jx.internal.cloudapp.net

 Task Name: Backup of Resource Group 'full_online_bkup' with policy 'Oracle full online backup' Start Time: 02/06/2024 6:00:05 PM End Time: 02/06/2024 6:00:44 PM

View Logs

12. A snapshot backup set appears under database topology once a successful backup job finishes. A full database backup set includes a snapshot of the database data volumes and a snapshot of the database log volumes. A log-only backup contains only a snapshot of the database log volumes.

Close

| Search resource groups: Search Name NTAP1 Name NTAP2 archwelog_blup NTAP2 A A Primary Backup(s) Primary Backup(s) Search Primary Backup(s) Search Search Name NTAP2 Manage Copies Summary Card 3 Backups 1 Data Backup 2 Log Backups 0 Clones 0 Clones 1 Data Backup 2 Log Backups 0 Clones 1 Data Backup 2 Log Backups 0 Clones 0 Clones <t< th=""><th>N</th><th>Oracle Database 🔹</th><th>full_online_bkup Details</th><th>NTAP1 Topology</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></t<> | N | Oracle Database 🔹 | full_online_bkup Details | NTAP1 Topology | | | | | | | | |
|--|----------|------------------------|--------------------------|---------------------------------------|--------------------------|-------|--------|-------------------------|-------------------|-----------|----------------------|-----|
| Name Resource Name | | Search resource groups | search | | | | | | | (NC) | | |
| Name NTAP1 Other Subp NTAP2 Autorine_Stup NTAP2 Autorine_Stup NTAP2 Autorine_Stup NTAP2 Autorine_Stup Summary Card 3 Backups 1 Data Backups Local copies 1 Data Backups Coll of Cones 0 Clones D Staphots Locked 0 Clones D Staphot Lock Expiration Count Typelf End Date MANA Cataloged 0 Revenue Staphot Lock Expiration Count Typelf End Date MANA Cataloged 0 Revenue Staphot Lock Expiration Count Typelf End Date Managed optication 0 Revenue Staphot Lock Expiration Count Typelf End Date Managed optication 0 Revenue Staphot Lock Expiration Count Typelf End Date< | 0 | | Resource Name | | | | | | | Backup to | Object Store Protect | Rei |
| Mill contine_blap MIAP2 All contine_blap Mill contine_blap Summary Card 3 Backup: 1 Data Backup: 1 Data Backup: 2 Log Backup: 2 Log Backup: 0 Cones 0 Cones 0 Cones 0 Cones 0 Cones 0 Cones 0 Snaphots Locked 0 Cones 0 Snaphots Locked 0 Snaphots Locked 0 Cones 0 Snaphots Locke Expiration Cont Typelf End Date Monted MANA cataloged 0 re-01 (20-06-2024,11,50,0) 0 1 Data 0 2006/2024 60:004 PM Monted False Not Cataloged 0 re-01 (20-06-2024,11,50,0) 0 1 Data 0 2006/2024 60:004 PM Not False Not 0 re-01 (20-06-2024,11,50,0) 1 Log 0 2006/2024 60:004 PM Not False Not 0 re-01 (20-06-2024,11,50,0) 1 Log 0 2006/2024 60:004 PM Not False Not 0 re-01 (20-06-2024,11,50,0) 1 Log 0 2006/2024 60:004 PM Not False Not | • | Name | NTAP1 | Manage Copies | | | | | | | | |
| atomice@_baip | ~ | full_online_bkup | NTAP2 | 3 Backups | | | | | | Summa | irv Card | |
| Local copies 1 Data Backup 2 Log Backups 2 Log Backups ○ Closes 0 Snapshots Locked 0 Primary Backup(s) 0 Backup Name Snapshot Lock Expiration Count Typelf End Date Mounted MANN cataloged 0 rg-01/20-06-2024.18.00_ 0 0.01 Typelf End Date Verified Mounted RMAN cataloged 0 rg-01/20-06-2024.18.00_ 0 1 Log 02/06/2024.68:00.11 PM Applicable Cataloged 0 rg-01/20-06-2024.17.59 1 Log 02/06/2024.68:00.41 PM Applicable Cataloged 0 rg-01/20-06-2024.17.59 1 Log 02/06/2024.59:01.81 PM Not False Not 0 rg-01/20-06-2024.17.59 1 Log 02/06/2024.59:01.81 PM Not False Not | âŭl | archivelog_bkup | | 0 Clones | | | | | | 3 Backur | 35 | |
| Image: Control Contecontrol Control Control Control Control Co | A | | | Local copies | | | | | | 1 Dat | a Backup | |
| ▲ 0 Clones 0 Clones 0 Shapshot Locked ● Primary Backup(s) • | ֥ | | | | | | | | | 2 Log | Backups | |
| Backup Name Snapshot Lock Expiration Count Typelf End Date Verified MAAN Cataloged 06,0582,1 02,065/2024 600,41 PM 02,006/2024 600,41 PM Not False Not 0re-01,02:06-2024,18,00, 0re-01,02:06-2024,18,00, 0re-01,02:06-2024,17,59, 01 Log 02/06/2024 600,41 PM Not False Not 0re-01,02:06-2024,17,59, 01 Log 02/06/2024 50:01.8 PM Not False Not | # | | | | | | | | | 0 Clones | ots Locked | |
| Backup (s) Backup Name Snapshot Lock Expiration Count Typelif End Date Verified Mounted RMAN Cataloged 060,0582,1 00:00-00-2024,18,00, 01 Log 02/06/2024.600.41 PM Not False Not Cataloged 0re-01,0206-2024,18,00, 01 Log 02/06/2024.600.25 PM Univerified False Not Cataloged 0re-01,0206-2024,17,59, 01 Log 02/06/2024.500.25 PM Univerified False Not Cataloged | • | | | | | | | | | 0 shapsi | IOLS LOCKED | |
| Search Sapshot Lock Expiration Count Typelf End Date Monted MANA Cataloged 060,0582,1 02:06:2024.00:0.01 PMI 1 Log 02:06:2024.60:0.01 PMI Not. Applicable Not. Cataloged 06:,0582,1 00:00.00:00:00:00:00:00:00:00:00:00:00:0 | | | | Primary Backup(s) | | | | | | | | |
| Backup Name Snapshot Lock Expiration Count Type/F End Date Verified Mounted RMAN Cataloged ors-01_02-06-2024_18_00_ 06;0882_1 choose | | | | search | 7 | | | | | • t | Tie 19 4 | A. |
| ora-01_02-06-2024_18_00_ 06_0582_1 1 Log 02/05/2024 6:00.41 PM Not Applicable False Not Cataloged ora-01_02-06-2024_18_00_ 06_0582_2 0 1 Data 02/05/2024 6:00.24 PM Image: Cataloged Cataloged ora-01_02-06-2024_17_59_ 1 Log 02/05/2024 6:00.24 PM Not False Not | | | | Backup Name | Snapshot Lock Expiration | Count | Typel; | End Date | Verified | Mounted | RMAN Cataloged | SC |
| or-01_02-05-0202_11_00_ 00_0382_0 1 Data 02/05/2024 6:00.25 PM Universited False Not Catalogue or-01_02-05-2024_17_59_ 1 Log 02/05/2024 5:5918 PM Not False Not | | | | ora-01_02-06-2024_18_00_ 06_0582_1 | | 1 | Log | 02/06/2024 6:00:41 PM 🛱 | Not Applicable | False | Not Cataloged | 337 |
| ors-01_020-06-2024_17.59_ 1 Log 02/06/2024_559:18 PM D Not False Not | | | | ora-01_02-06-2024_18_00_ 06_0582_0 | | 1 | Data | 02/06/2024 6:00:26 PM 🛱 | Unverified | False | Not Cataloged | 337 |
| 01_115s_1 Applicable Cataloged | | | | ora-01_02-06-2024_17_59_ 01_1158_1 | | 1 | Log | 02/06/2024 5:59:18 PM 🛱 | Not Applicable | False | Not Cataloged | 337 |
| | | | | | | | | | | | | |

Database recovery

Database recovery via SnapCenter restores a snapshot copy of the database volume image point-in-time. The database is then rolled forward to a desired point by SCN/timestamp or a point as allowed by available archive logs in the backup set. The following section demonstrates the workflow of database recovery with SnapCenter UI.

1. From Resources tab, open the database Primary Backup(s) page. Choose the snapshot of database data volume, then click on Restore button to launch database recovery workflow. Note the SCN number or timestamp in the backup sets if you like to run the recovery by Oracle SCN or timestamp.

| NTAP1 Topology | | | | | | | | × |
|---------------------------------------|--------------------------|-------|--------|-------------------------|-------------------|--------------|------------------------|----------------------|
| | | | | | | Backup to | Cibiject Store Protect | Refresh |
| Manage Copies | | | | | | | | |
| 3 Backups | | | | | | Summa | ary Card | |
| 0 Clones | | | | | | 3 Backup | os | |
| Local copies | | | | | | 1 Dat | a Backup | |
| | | | | | | 2 Log | g Backups | |
| | | | | | | 0 Clones | | |
| | | | | | | 0 Snapsi | hots Locked | |
| Primary Backup(s) | | | | | | | | |
| search | ∇ | | | | Ca | talog Rename | Clone Restore Mount | 스 합 Unmount Delet |
| Backup Name | Snapshot Lock Expiration | Count | Typel: | End Date | Verified | Mounted | RMAN Cataloged | SCN |
| ora-01_02-06-2024_18_00_ 06_0582_1 | | 1 | Log | 02/06/2024 6:00:41 PM 📋 | Not Applicable | False | Not Cataloged | 3374950 |
| ora-01_02-06-2024_18_00_ 06_0582_0 | | 1 | Data | 02/06/2024 6:00:26 PM 📋 | Unverified | False | Not Cataloged | 3374903 |
| ora-01_02-06-2024_17_59_ 01_1158_1 | | 1 | Log | 02/06/2024 5:59:18 PM 📋 | Not Applicable | False | Not Cataloged | 3374762 |

2. Select Restore Scope. For a container database, SnapCenter is flexible to perform a full container database (All Datafiles), pluggable databases, or tablespaces level restore.

| Restore NTAP1 | | > |
|------------------|---|---|
| 1 Restore Scope | Restore Scope 🚯 | |
| 2 Recovery Scope | All Datafiles | |
| 3 PreOps | O Pluggable databases (PDBs) | |
| 4 PostOps | O Pluggable database (PDB) tablespaces | |
| 5 Notification | Control files | |
| 6 Summary | Database State Change database state if needed for restore and recovery | |
| | Restore Mode () | |
| | Force in place restore | |
| | If this check box is not selected and if any of the in place restore criteria is not met, restore will be performed using the connect and copy method. The connect and copy restored, | |
| | | |
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3. Select Recovery Scope. All logs means to apply all available archive logs in the backup set. Point-in-time recovery by SCN or timestamp are also available.

| Restore NTAP1 | | × |
|------------------|--|---|
| 1 Restore Scope | Choose Recovery Scope | |
| 2 Recovery Scope | All Logs | |
| 3 PreOps | Until SCN (System Change Number) O Date and Time No recovery | |
| 4 PostOps | | |
| 5 Notification | Specify external archive log files locations | 1 |
| 6 Summary | | 8 |
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| | | |
| | Previous Next | |

 $\mbox{4. The $\tt PreOps$ allows execution of scripts against database before restore/recovery operation. } \label{eq:preops}$

| | Restore NTAP1 | | × |
|----|------------------|--|------|
| | 1 Restore Scope | Specify optional scripts to run before performing a restore job () | |
| | 2 Recovery Scope | Prescript full path /var/opt/snapcenter/spl/scripts/ Enter Prescript path | |
| | 3 PreOps | Arguments | |
| | 4 PostOps | Script timeout 60 secs | |
| | 5 Notification | | |
| | 6 Summary | | |
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| | | Previous | Next |
| _ | | | |
| 5. | The PostOps al | lows execution of scripts against database after restore/recovery operation. | |
| | | | |
| | | | |

| | Restore NTAP1 | | | | | × |
|----|--------------------|----------------------|-----------------------------------|--------------------------|----------|------|
| | 1 Restore Scope | Specify optional scr | ipts to run after performing a | restore job 🚯 | | |
| | 2 Recovery Scope | Postscript full path | /var/opt/snapcenter/spl/scripts/ | Enter Postscript path | | |
| | 3 PreOps | Arguments | | | | |
| | 4 PostOps | Open the database | e or container database in READ-W | RITE mode after recovery | | |
| | 5 Notification | | | | | |
| | 6 Summary | | | | | |
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| 6. | Notification via e | mail if desired. | | | Previous | Next |
| 6. | Notification via e | mail if desired. | | | Previous | Next |
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| 6. | Notification via e | mail if desired. | | | Previous | Next |

| Restore MIAPT | | | |
|-------------------------------|---|--|-------------|
| 1 Restore Scope | Provide email set | tings 🚯 | |
| 2 Recovery Scope | Email preference | Never * | |
| 3 PreOps | From | From email | |
| 4 PostOps | То | Email to | |
| 5 Notification | Subject | Notification | |
| 6 Summary | 🗌 Attach job report | | |
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| If you want to information, a | send notifications for R nd then go to Settings> | estore Jobs, an SMTP server must be configured. Continue to the Summary page t Slobal Settings>Notification Server Settings to configure the SMTP server. | o save your |
| | | | Denvious |
| | | | Previous Ne |

7. Restore job summary

| Restore NTAP1 | | | > |
|------------------|----------------------|--|---|
| 1 Restore Scope | Summary | | |
| 2 Recovery Scope | Backup name | ora-01_02-06-2024_18_00_06_0582_0 | |
| ProOne | Backup date | 02/06/2024 6:00:26 PM | |
| o neops | Restore scope | All DataFiles | |
| 4 PostOps | Recovery scope | All Logs | |
| 5 Notification | Options | Change database state if necessary , Open the database or container database in READ-WRITE mode after recovery | |
| 5 Summany | Prescript full path | None | |
| o cumury | Prescript arguments | | |
| | Postscript full path | None | |
| | Postscript arguments | | |
| | Send email | No | |
| | | | |
| | | | |
| | | | |
| | | | |

8. Click on running job to open Job Details window. The job status can also be opened and viewed from the Monitor tab.

| Resto | re 'ora-01.hr2z2nbmhnqutdsxgscjtuxizd | .jx.internal.cloudapp.net\NTAP1' | |
|------------------|--|--|----|
| v v | Restore 'ora-01.hr2z2nbmhnqutdsxgscjtuxizd.jx. | internal.cloudapp.net\NTAP1' | |
| 4 | ora-01.hr2z2nbmhnqutdsxgscjtuxizd.jx.interr | ial.cloudapp.net | |
| ~ | Prescripts | | |
| ~ | Mount log backups | | |
| ~ | Pre Restore | | |
| ~ | ► Restore | | |
| ~ | Post Restore | | |
| ~ | Unmount log backups | | |
| ~ | Postscripts | | |
| ~ | Post Restore Cleanup | | |
| ~ | Data Collection | | |
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| D Task me: 02 | Name: ora-01.hr2z2nbmhnqutdsxgscjtuxizd.jx.ir /06/2024 4:08:42 PM | iternal.cloudapp.net Start Time: 02/06/2024 4:04:55 PM E | nd |
| | | | |

Database clone

Database clone via SnapCenter is accomplished by creating a new volume from a snapshot of a volume. The system uses the snapshot information to clone a new volume using the data on the volume when the snapshot was taken. More importantly, it is quick (a few minutes) and efficient compared with other methods to make a cloned copy of the production database to support development or testing. Thus, dramatically improve your database application lifecycle management. The following section demonstrates the workflow of database clone with SnapCenter UI.

1. From Resources tab, open the database Primary Backup(s) page. Choose the snapshot of database data volume, then click on clone button to launch database clone workflow.

| NTAP1 Topology | | | | | | | | × |
|---------------------------------------|--------------------------|-------|--------|-------------------------|-------------------|---------------------|-----------------------|----------|
| | | | | | | Backup to | Cloject Store Protect | Refresh |
| Manage Copies | | | | | | | | |
| 3 Backups | | | | | | Summa | ry Card | |
| 0 Clones | | | | | | 3 Backup | 05 | |
| Local copies | | | | | | 1 Dat | a Backup | |
| | | | | | | 2 Log | Backups | |
| | | | | | | 0 Clones | | |
| | | | | | | 0 Snapsh | nots Locked | |
| Primary Backup(s) | <u>م</u> | | | | G | • t talog Rename | Cone Restore Mount | A Delete |
| Backup Name | Snapshot Lock Expiration | Count | Typel₹ | End Date | Verified | Mounted | RMAN Cataloged | SCN |
| ora-01_02-06-2024_18_00_ 06_0582_1 | | 1 | Log | 02/06/2024 6:00:41 PM 🛱 | Not Applicable | False | Not Cataloged | 3374950 |
| ora-01_02-06-2024_18_00_ 06_0582_0 | | 1 | Data | 02/06/2024 6:00:26 PM 🛱 | Unverified | False | Not Cataloged | 3374903 |
| ora-01_02-06-2024_17_59_ 01_1158_1 | | 1 | Log | 02/06/2024 5:59:18 PM 🛱 | Not Applicable | False | Not Cataloged | 3374762 |

2. Name the clone database SID. Optionally, for a container database, clone can be done at PDB level as well.

| 1 Name | Capacity Pool Max. Throughput (MiB/s) | | 0 |
|----------------|--|-------------------|----------|
| 2 Locations | O Complete Datab | ase Clone | |
| 3 Credentials | Clone SID | ntap1dev | |
| 4 PreOps | Exclude PDBs | Type to find PDBs | |
| 5 PostOps | O PDB Clone | | |
| 6 Notification | | | |
| 7 Summary | | | |
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3. Select the DB server where you want to place your cloned database copy. Keep the default file locations unless you want to name them differently.
| | Select the host to create | e a clone | | | | | | |
|--------------|---|---|---------------------------|------------------------|--|-----------------------|-------------|------------|
| Locations | Clone host ora | Clone host ora-02.hr2z2nbmhnqutdsxgscjtuxizd.jx.inter • | | | | | | |
| Credentials | ⊙ Datafile locations ① | | | | | | | |
| PreOps | /u02_ntap1dev | | | | | ÷ | | Reset |
| PostOps | | | | | | | | <u>.</u> |
| Notification | ⊙ Control files () | | | | | | | |
| Summary | /u02_ntap1dev/ntap1dev/ | /control/control | 101.ctl | | | $\left[\times\right]$ | * | + |
| | /u02_ntap1dev/ntap1dev | /control/control | 102.ctl | | | × | - | Reset |
| | 🕞 Redo logs 🚯 | | | | | | | |
| | Redo logs Group | | Size | Unit | Number of files | | | |
| | Redo logs ① Group RedoGroup 1 | × | Size | Unit | Number of files | | + | * + |
| | Redo logs ① Group RedoGroup 1 RedoGroup 2 | × | Size 200 200 | Unit MB MB | Number of files | | + | + Reset |
| | Redo logs Group RedoGroup 1 RedoGroup 2 RedoGroup 3 | ××××× | Size 200 200 200 | Unit MB MB MB | Number of files | | + + + | + Reset |
| | Redo logs Group RedoGroup 1 RedoGroup 2 RedoGroup 3 | × × × | Size 200 200 200 | Unit MB MB MB | Number of files 1 1 1 1 1 1 1 1 1 1 1 1 1 | | * | + Reset |
| | Redo logs Group RedoGroup 1 RedoGroup 2 RedoGroup 3 | | Size 200 200 200 | Unit MB MB MB | Number of files 1 1 1 | | * * * | + Reset |
| | Redo logs Group RedoGroup 1 RedoGroup 2 RedoGroup 3 | | Size 200 200 200 | Unit MB MB MB | Number of files 1 1 1 | | * | + Reset |

4. Identical Oracle software stack as in source database should have been installed and configured on clone DB host. Keep the default credential but change Oracle Home Settings to match with settings on clone DB host.

| Clone from NT | TAP1 | | × |
|----------------|---------------------------------|--------------------------------------|------|
| 1 Name | Database Credentials fo | or the clone | |
| 2 Locations | Credential name for sys user | None • • | |
| 3 Credentials | Database port | 1521 | |
| 4 PreOps | | | |
| 5 PostOps | Oracle Home Settings | 0 | |
| 6 Notification | Oracle Home | /u01/app/oracle/product/19.0.0/NTAP2 | |
| 7 Summary | Oracle OS User | oracle | |
| | Oracle OS Group | oinstall | |
| | | | |
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5. The PreOps allows execution of scripts before clone operation. Database parameters can be adjusted to meet a clone DB needs as versus a production database, such as reduced SGA target.

| | Specify scripts to r | run before clone op | eration 🕕 | | | |
|--------------|----------------------|---------------------|----------------------------|-----------|----------|-------|
| Locations | Prescript full path | /var/opt/snapcente | r/spl/scripts/ Enter Presc | ript path | | |
| Credentials | Arguments | | | | | |
| PreOps | Script timeout | 60 secs | | | | |
| PostOps | 🕑 Database Parame | ter settings | | | | |
| Notification | processes | | 320 | | × | * |
| Houncadon | remote_login_pass | wordfile | EXCLUSIVE | | × | + |
| Summary | sga_target | | 3G | | × | Reset |
| | undo_tablespace | | UNDOTBS1 | | \times | v |
| | | | | | | |
| | | | | | | |

6. The PostOps allows execution of scripts against database after clone operation. Clone database recovery can be SCN, timestamp based, or Until cancel (rolling forward database to last archived log in the backup set).

| 1 Name | Recover Database |
|------------------------------|--|
| 2 Locations 3 Credentials | Until Cancel |
| 4 PreOps | Date-time format: MM/DD/YYYY hh:mm:ss |
| 5 PostOps | O Until SCN (System Change Number) |
| 6 Notification | Specify external archive log locations 💽 💿 🚯 |
| 7 Summary | |
| | |
| | Create new DBID () Create tempfile for temporary tablespace () Enter SQL queries to apply when clone is created Enter scripts to run after clone operation () |

7. Notification via email if desired.

| 1 Name | Provide email set | tings 🕕 | |
|----------------|--|--|--|
| 2 Locations | Email preference | Never • | |
| 3 Credentials | From | From email | |
| 4 PreOps | То | Email to | |
| 5 PostOps | Subject | Notification | |
| 6 Notification | 🗌 Attach job report | | |
| 7 Summary | 2 | | |
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| informatic | nt to send notifications fo on, and then go to Settin | or Clone Jobs, an SMTP server must be configured. Continue to the Summary page to save your gs>Global Settings>Notification Server Settings to configure the SMTP server. | |

8. Clone job summary.

| 2 Locations | | |
|--------------|---------------------------------------|--|
| | Clone from backup | ora-01_02-06-2024_18_00_06_0582_0 |
| Candenkala | Clone SID | ntap1dev |
| Credentials | Capacity Pool Max. Throughput (MiB/s) | none |
| PreOps | Clone server | ora-02.hr2z2nbmhnqutdsxgscjtuxizd.jx.internal.cloudapp.net |
| | Exclude PDBs | none |
| PostOps | Oracle home | /u01/app/oracle/product/19.0.0/NTAP2 |
| Notification | Oracle OS user | oracle |
| | Oracle OS group | oinstall |
| Summary | Datafile mountpaths | /u02_ntap1dev |
| | Control files | /u02_ntap1dev/control/control01.ctl |
| | | /u02_ntap1dev/ntap1dev/control/control02.ctl |
| | Redo groups | RedoGroup =1 TotalSize =200 Path =/u02_ntap1dev/ntap1dev/redolog/redo01_01.log |
| | | RedoGroup =2 TotalSize =200 Path =/u02_ntap1dev/ntap1dev/redolog/redo02_01.log |
| | Recovery scope | |
| | Prescript full path | none |
| | Prescript arguments | |
| | Postscript full path | none |
| | Postscript arguments | |
| | Send email | No |
| | | |
| | | |

9. Click on running job to open Job Details window. The job status can also be opened and viewed from the Monitor tab.

Job Details

Clone from backup 'ora-01_02-06-2024_18_00_06_0582_0'

- ✓ ▼ Clone from backup 'ora-01_02-06-2024_18_00_06_0582_0'
- ora-02.hr2z2nbmhnqutdsxgscjtuxizd.jx.internal.cloudapp.net
- Prescripts
- Query Host Information
- Prepare for Cloning
- Cloning Resources
- FileSystem Clone
- Application Clone
- Postscripts
- Register Clone
- Unmount Clone
- Data Collection

| Task Name: ora-02.hr2z2nbmhnqutdsxgscjtuxizd.jx.internal.clouda | app.net Start Time: 02/06/2024 6:21:5 | 9 PM End |
|---|---------------------------------------|----------|
| Time: 02/06/2024 6:28:10 PM | | |
| | | |
| | View Logs Cancel Job | Close |

10. Cloned database registers with SnapCenter immediately.

| ī. | NetApp Snap | Center® | | | | | | ۰ | 8 - | 1 azureuser | SnapCenterAdmi | n 🛛 🗍 Sign Out |
|---------|-------------|------------|----------|-------------------------------|--|------------------|--|---|------------|-------------------|----------------------------|----------------|
| < | | Oracle Dat | abase 🔹 | | | | | | | | | |
| = | Dashboard | View Da | atabase | Search databases | V | | | | | | \$ | + |
| V | Resources | 15 km | Name | Oracle Database Type | Host/Cluster | Resource Group | Policies | | | Last I | Befresh Reso Backup Ove | rall Status |
| 4 | Monitor | | NTAP1 | Single Instance (Multitenant) | ora-01.hr2z2nbmhnqutdsxgscjtuxizd.jx.i | archivelog_bkup | Oracle archivelogs backup Oracle full online backup | | 02 | 2/06/2024 7:29:18 | PM 🛱 Bac | up succeeded |
| â | Reports | - | ntap1dev | Single Instance (Multitenant) | ora-02.hr2z2nbmhnqutdsxgscjtuxizd.jx.l | tai_onine_okup | oracle for online backup. | | | | Not | protected |
| 6 1. | Hosts | | NTAP2 | Single Instance (Multitenant) | ora-02.hr2z2nbmhnqutdsxgscjtuxizd.jx.i | archivelog_bkup | Oracle archivelogs backup | | 02 | 2/06/2024 7:29:19 | PM 🛱 Bac | up succeeded |
| : | E Settings | | | | nternal.cloudapp.net | full_online_bkup | Oracle full online backup | | | | | |
| 4 | Alerts | | | | | | | | | | | |
| | | | | | | | | | | | | |

11. Validate clone database on DB server host. For a cloned development database, database archive mode should be turned off.

[azureuser@ora-02 ~]\$ sudo su [root@ora-02 azureuser]# su - oracle Last login: Tue Feb 6 16:26:28 UTC 2024 on pts/0 [oracle@ora-02 ~]\$ uname -a Linux ora-02 4.18.0-372.9.1.el8.x86 64 #1 SMP Fri Apr 15 22:12:19 EDT 2022 x86 64 x86 64 x86 64 GNU/Linux [oracle@ora-02 ~]\$ df -h Filesystem Size Used Avail Use% Mounted on devtmpfs 7.7G 0 7.7G 0% /dev tmpfs 7.8G 0 7.8G 0% /dev/shm tmpfs 7.8G 49M 7.7G 1% /run 7.8G 0 7.8G tmpfs 0% /sys/fs/cgroup /dev/mapper/rootvg-rootlv 22G 17G 5.6G 75% / /dev/mapper/rootvg-usrlv 10G 2.0G 8.1G 20% /usr /dev/mapper/rootvg-homelv 1014M 40M 975M 4% /home /dev/sda1 496M 106M 390M 22% /boot /dev/mapper/rootvg-varlv 8.0G 958M 7.1G 12% /var /dev/sda15 495M 5.9M 489M 2% /boot/efi /dev/mapper/rootvg-tmplv 12G 8.4G 3.7G 70% /tmp tmpfs 1.6G 0 1.6G 0% /run/user/54321 172.30.136.68:/ora-02-u03 250G 2.1G 248G 1% /u03 172.30.136.68:/ora-02-u01 100G 10G 91G 10% /u01 172.30.136.68:/ora-02-u02 250G 7.5G 243G 3% /u02 tmpfs 1.6G 0 1.6G 0% /run/user/1000 1.6G 0 1.6G tmpfs 0% /run/user/0 172.30.136.68:/ora-01-u02-Clone-020624161543077 250G 8.2G 242G

```
4% /u02 ntap1dev
[oracle@ora-02 ~]$ cat /etc/oratab
# This file is used by ORACLE utilities. It is created by root.sh
# and updated by either Database Configuration Assistant while
creating
# a database or ASM Configuration Assistant while creating ASM
instance.
# A colon, ':', is used as the field terminator. A new line
terminates
# the entry. Lines beginning with a pound sign, '#', are comments.
#
# Entries are of the form:
  $ORACLE SID:$ORACLE HOME:<N|Y>:
#
#
# The first and second fields are the system identifier and home
# directory of the database respectively. The third field indicates
# to the dbstart utility that the database should , "Y", or should
not,
# "N", be brought up at system boot time.
# Multiple entries with the same $ORACLE SID are not allowed.
#
#
NTAP2:/u01/app/oracle/product/19.0.0/NTAP2:Y
# SnapCenter Plug-in for Oracle Database generated entry (DO NOT
REMOVE THIS LINE)
ntap1dev:/u01/app/oracle/product/19.0.0/NTAP2:N
[oracle@ora-02 ~]$ export ORACLE SID=ntap1dev
[oracle@ora-02 ~]$ sqlplus / as sysdba
SQL*Plus: Release 19.0.0.0.0 - Production on Tue Feb 6 16:29:02 2024
Version 19.18.0.0.0
Copyright (c) 1982, 2022, Oracle. All rights reserved.
Connected to:
Oracle Database 19c Enterprise Edition Release 19.0.0.0 -
Production
Version 19.18.0.0.0
```

SQL> select name, open_mode, log_mode from v\$database; NAME OPEN_MODE LOG_MODE _____ ARCHIVELOG NTAP1DEV READ WRITE SQL> shutdown immediate; Database closed. Database dismounted. ORACLE instance shut down. SQL> startup mount; ORACLE instance started. Total System Global Area 3221223168 bytes Fixed Size 9168640 bytes Fixed Size9100040 bytesVariable Size654311424 bytesDatabase Buffers2550136832 bytes Redo Buffers 7606272 bytes Database mounted. SQL> alter database noarchivelog; Database altered. SQL> alter database open; Database altered. SQL> select name, open mode, log mode from v\$database; NAME OPEN_MODE LOG_MODE _____ ____ NTAP1DEV READ WRITE NOARCHIVELOG SQL> show pdbs OPEN MODE RESTRICTED CON ID CON NAME _____ ____ READ ONLY NO 2 PDB\$SEED 3 NTAP1 PDB1 MOUNTED 4 NTAP1 PDB2 MOUNTED 5 NTAP1 PDB3 MOUNTED SQL> alter pluggable database all open;

Where to find additional information

To learn more about the information described in this document, review the following documents and/or websites:

Azure NetApp Files

https://azure.microsoft.com/en-us/products/netapp

SnapCenter Software documentation

https://docs.netapp.com/us-en/snapcenter/index.html

• TR-4987: Simplified, Automated Oracle Deployment on Azure NetApp Files with NFS

Deployment Procedure

TR-4977: Oracle Database backup, restore and clone with SnapCenter Services - Azure

Allen Cao, Niyaz Mohamed, NetApp

This solution provides overview and details for Oracle database backup, restore, clone using NetApp SnapCenter SaaS using BlueXP console.

Purpose

SnapCenter Services is the SaaS version of the classic SnapCenter database management UI tool that is available through the NetApp BlueXP cloud management console. It is an integral part of the NetApp cloud-backup, data-protection offering for databases such as Oracle and HANA running on Azure NetApp Files. This SaaS-based service simplifies traditional SnapCenter standalone server deployment that generally requires a Windows server operating in a Windows domain environment.

In this documentation, we demonstrate how you can set up SnapCenter Services to backup, restore, and clone Oracle databases deployed on Azure NetApp Files volumes and Azure compute instances. It is very easy to setup data protection for Oracle database deployed on Azure NetApp Files with web based BlueXP user interface.

This solution addresses the following use cases:

- Database backup with snapshots for Oracle databases hosted in Azure NetApp Files and Azure VMs
- · Oracle database recovery in the case of a failure
- · Fast cloning of primary databases for dev, test environments or other use cases

Audience

This solution is intended for the following audiences:

- The DBA who manages Oracle databases running on Azure NetApp Files storage
- The solution architect who is interested in testing Oracle database backup, restore, and clone in Azure
- The storage administrator who supports and manages the Azure NetApp Files storage

The application owner who owns applications that are deployed to Azure NetApp Files storage and Azure VMs

Solution test and validation environment

The testing and validation of this solution was performed in a lab environment that might not match the final deployment environment. For more information, see the section Key factors for deployment consideration.

Architecture



This image provides a detailed picture of BlueXP backup and recovery for applications within the BlueXP console, including the UI, the connector, and the resources it manages.

Hardware and software components

Hardware

| Azure NetApp Files storage | Premium Service level | Auto QoS type, and 4TB in storage capacity in testing |
|----------------------------|--|---|
| Azure instance for compute | Standard B4ms (4 vcpus, 16 GiB memory) | Two instances deployed, one as primary DB server and the other as clone DB server |
| Software | | |
| RedHat Linux | Red Hat Enterprise Linux 8.7 (LVM) - x64 Gen2 | Deployed RedHat subscription for testing |
| Oracle Database | Version 19.18 | Applied RU patch p34765931_190000_Linux-x86-64.zip |

| Oracle OPatch | Version 12.2.0.1.36 | Latest patch p6880880_190000_Linux- x86-64.zip |
|--------------------|---------------------|---|
| SnapCenter Service | Version v2.5.0-2822 | Agent Version v2.5.0-2822 |

Key factors for deployment consideration

- Connector to be deployed in the same virtual network / subnet as databases and Azure NetApp Files. When possible, the connector should be deployed in the same Azure virtual networks and resource groups, which enables connectivity to the Azure NetApp Files storage and the Azure compute instances.
- An Azure user account or Active Directory service principle created at Azure portal for SnapCenter connector. Deploying a BlueXP Connector requires specific permissions to create and configure a virtual machine and other compute resources, to configure networking, and to get access to the Azure subscription. It also requires permissions to later create roles and permissions for the Connector to operate. Create a custom role in Azure with permissions and assign to the user account or service principle. Review the following link for details:Set up Azure permissions.
- A ssh key pair created in the Azure resource group. The ssh key pair is assigned to the Azure VM user for logging into the connector host and also the database VM host for deploying and executing a plug-in. BlueXP console UI uses the ssh key to deploy SnapCenter service plugin to database host for one-step plugin installation and application host database discovery.
- A credential added to the BlueXP console setting. To add Azure NetApp Files storage to the BlueXP working environment, a credential that grants permissions to access Azure NetApp Files from the BlueXP console needs to be set up in the BlueXP console setting.
- **java-11-openjdk installed on the Azure VM database instance host.** SnapCenter service installation requires java version 11. It needs to be installed on application host before plugin deployment attempt.

Solution deployment

There is extensive NetApp documentation with a broader scope to help you protect your cloud-native application data. The goal of this documentation is to provide step-by-step procedures that cover SnapCenter Service deployment with the BlueXP console to protect your Oracle database deployed on an Azure NetApp Files storage and an Azure compute instance.

To get started, complete the following steps:

- Read the general instructions Protect your cloud native applications data and the sections related to Oracle and Azure NetApp Files.
- · Watch the following video walkthrough

Video of deployment of Oracle and ANF

Prerequisites for SnapCenter service deployment

Deployment requires the following prerequisites.

- 1. A primary Oracle database server on an Azure VM instance with an Oracle database fully deployed and running.
- 2. An Azure NetApp Files storage service capacity pool deployed in Azure that has capacity to meet the database storage needs listed in hardware component section.
- 3. A secondary database server on an Azure VM instance that can be used for testing the cloning of an Oracle database to an alternate host for the purpose of supporting a dev/test workload or any use cases that requires a full data set of production Oracle database.
- 4. For additional information for Oracle database deployment on Azure NetApp Files and Azure compute instance, see Oracle Database Deployment and Protection on Azure NetApp Files.

Onboarding to BlueXP preparation

- 1. Use the link NetApp BlueXP to sign up for BlueXP console access.
- 2. Create an Azure user account or an Active Directory service principle and grant permissions with role in Azure portal for Azure connector deployment.
- To set up BlueXP to manage Azure resources, add a BlueXP credential with details of an Active Directory service principal that BlueXP can use to authenticate with Azure Active Directory (App client ID), a client secret for the service principal application (Client Secret), and the Active Directory ID for your organization (Tenant ID).
- 4. You also need the Azure virtual network, resources group, security group, an SSH key for VM access, etc. ready for connector provisioning and database plugin installation.

Deploy a connector for SnapCenter services

1. Login to the BlueXP console.

| NetApp BlueXP | | | Q BlueXP Search | Account V Workspace Automation-te Azure-DB | Connector → ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ |
|------------------|-------------------------|-----------------------------------|-------------------------------|---|---|
| Canvas | My working environments | My estate | | | 🖽 Go to Tabular View |
| + Add Working Er | vironment 20 5e | ure Blob Storage rage Accounts | Amazon 53 0 Buckets aws | C Enable Services | Working Environments Image: State of the sta |
| | | | | - • | |

2. Click on **Connector** drop down arrow and **Add Connector** to launch the connector provisioning workflow.

| | Q BlueXP Search Account V Workspan | ce 🖌 Connector ^ 🛛 🏚 🌣 ? 🕒 |
|--|------------------------------------|---|
| Canvas My working environments My estate | | Connectors Add Connector Manage Connectors |
| + Add Working Environment | C Enable Services 0 | Q Search BlueXP Connectors acao-aws-connector Go to Local UI AWS us-east-1 ■ Inactive |
| * | | AzureConnector Go to Local UI A Azure southcentralus • inactive |
| Azure Blob Storage 20 Storage Accounts | Amazon 53 0 Buckets | |
| | | |
| | | |
| | (- +) | Switch Cancel |

3. Choose your cloud provider (in this case, **Microsoft Azure**).

| Add BlueXP Conne | ector | | | |
|------------------|-----------------|---|-----------------------|--|
| | | Provider | | |
| | Choose the clo | oud provider where you want to run the Bl | JeXP Connector: | |
| | | aws | ٥ | |
| | Microsoft Azure | Amazon Web Services | Google Cloud Platform | |
| | | Deploy the Connector on your premises [| 3 | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | Continue | | |

4. Skip the **Permission**, **Authentication**, and **Networking** steps if you already have them set up in your Azure account. If not, you must configure these before proceeding. From here, you could also retrieve the permissions for the Azure policy that is referenced in the previous section "Onboarding to BlueXP preparation."



 Click on Skip to Deployment to configure your connector Virtual Machine Authentication. Add the SSH key pair you have created in Azure resource group during onboarding to BlueXP preparation for connector OS authentication.

| Virtual Machine Authentication You are logged in with Azure user: acao@netapp.com Tenant: Hybrid Cloud TME ~ Subscription | |
|---|----------|
| You are logged in with Azure user: acao@netapp.com 🖉 Tenant: Hybrid Cloud TME 🗸 | |
| Subscription Hybrid Cloud TME Onprem Authentication Method | |
| Hybrid Cloud TME Onprem Authentication Method | |
| | |
| Location | |
| South Central US | |
| Resource Group azureuser | |
| Create New O Use Existing Enter SSH Public Key | 0 |
| Resource Group | . |
| ANFAVSRG | |

6. Provide a name for the connector instance, select **Create** and accept default **Role Name** under **Details**, and choose the subscription for the Azure account.

| | Add BlueXP C | Connector - Azure | | More Information X |
|---|--------------|--|--|--------------------|
| | | VM Authentication 2 Detail | s (3) Network (4) Security Group (5) Review | |
| | | | Details | |
| | | Connector Instanco Namo | A | |
| | | AzureConnector | Connector Role | |
| • Ard Bjus Connector • Aure • Configure networking with the proper VNet, Subnet, and disable Public IP but ensure that the connector has the internet access in your Azure environment. • Add Blus XP Connector • Aure • Our o | | | Create Attach existing Manual | |
| Intervention of the set of the | | Add Tags to Connector Instance | Role Name | |
| Subtractional type with the proper VNet, Subnet, and disable Public IP but ensure that the connector has the internet access in your Azure environment. Add BlueXP Connector - Azure Network Image: Control or and a state internet access in your Azure environment. Network Image: Control or and the internet access in your Azure environment. Image: Control or and the internet access in your Azure environment. Image: Control or and the internet access in your Azure environment. Image: Control or and the internet access in your Azure environment. Image: Control or and the internet access in your Azure environment. Image: Control or and the internet access in your Azure environment. Image: Control or and the internet access in your Azure environment. Image: Control or and the internet access in your Azure environment. Image: Control or and the internet access in your Azure environment. Image: Control or and the internet access in your Azure environment. Image: Control or and the internet access in your Azure environment. Image: Control or and the internet access in your Azure environment. Image: Control or and the internet access in your Azure environment. Image: Control or advector - Azure Ima | | | BlueXP Operator-5519248 | |
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| Configure networking with the proper VNet, Subnet, and disable Public IP but ensure that the connector has the internet access in your Azure environment. Add BlueXP Connector - Azure Image: | | | - , , | |
| Configure networking with the proper VNet, Subnet, and disable Public IP but ensure that the connector has the internet access in your Azure environment. Add BlueXP Connector - Azure vero vero ment. Add BlueXP Connector - Azure vero vero ment. Network Vero vero dustrated on the proper vero dustrated on | | | | |
| Configure networking with the proper VNet, Subnet, and disable Public IP but ensure that the connector has the internet access in your Azure environment. Add BlueXP Connector - Azure ver very very configuration (Optioned) Ver very very configuration (Optioned) Very very very very very very very very v | | | | |
| Proteon Not Configure networking with the proper VNet, Subnet, and disable Public IP but ensure that the connector has the internet access in your Azure environment. Add BlueXP Connector - Azure Not information Image: Connective Image: Connective Azure Not information Image: Connective Image | | | | |
| Pretors Configure networking with the proper VNet, Subnet, and disable Public IP but ensure that the connector has the internet access in your Azure environment. Add BlueXP Connector - Azure Image: Connective - Azure Image: C | | | | |
| Preces Configure networking with the proper VNet, Subnet, and disable Public IP but ensure that the connector has the internet access in your Azure environment. Add BlueXP Connector - Azure Image: Connectivity Image: Connectivity Image: Connectivity Prov Configuration (Optioned) Image: Connectivity Image: Connectivity Image: Connectivity Prov Configuration (Optioned) Image: Connectivity Image: Connectivity Image: Connectivity Prov Configuration (Optioned) Image: Connectivity Image: Connectivity Im | | | | |
| Protos Not Configure networking with the proper VNet, Subnet, and disable Public IP but ensure that the connector has the internet access in your Azure environment. Add BlueXP Connector - Azure Network Image: NEtwork Image: Network Image: Network | | | | |
| Protein Vert | | | | |
| • Configure networking with the proper VNet, Subnet, and disable Public IP but ensure that the connector has the internet access in your Azure environment. Add BlueXP Connector - Azure Were Internation Image: Connector - Azure Were Internation Image: Connector - Azure Were Internation Image: Connector - Azure Image: Connector - Azure | | Previous | Next | |
| | Add BlueXP C | Connector - Azure | | More Information X |
| NetworkConnectivityProxy Configuration (Optional)VieeHTTP ProxyANFAVSValExample: http://172.16.254.1.8080SubnetDefine Credentials for this Proxy ~VM_SubUpload a root certificate ~Public IPVoload a root certificate ~Disableor provy servers on that the ConnectorityNotice: Ensure that the subnet has internet connectivityHTTP ProxyANFICE: Ensure that the subnet has internet connectivityVoload a root certificate ~ | | ⊘ VM Authentication | 3 Network (4) Security Group (5) Review | |
| ConnectivityProxy Configuration (Optional)VNetHTTP ProxyANFAVSValExample: http://172.16.254.1.8080SubnetDefine Credentials for this Proxy >VM_SubUpload a root certificate >Public IPSableDisableSubnet through a NAT device or proxy server so that the Connector can communicate with Azure services. | | | Network | |
| VNet HTTP Proxy ANFAVSVal Example: http://172.16.254.15000 Subnet Define Credentials for this Proxy ~ VM_Sub Upload a root certificate ~ Public IP Disable Disable Notice: Ensure that the subnet has internet connectivity through a NAT device or proy server so that the Connector can communicate with Azure services. | | Connectivity | Proxy Configuration (Optional) | |
| ANFAVSVal ANFAVSVal Subnet VM_Sub Public IP Disable Notice: Ensure that the subnet has internet connectivity through a NATI device or proxy server so that the Connector can communicate with Azure services. | | VNet | HTTP Proxy | |
| Subnet VM_Sub Define Credentials for this Proxy ~ Public IP Upload a root certificate ~ Notice: Ensure that the subnet has internet connectivity through a NAT device or proxy server so that the Connector can communicate with Azure services. Notice: Submet the Connector can communicate with Azure services. | | ANFAVSVal | Example: http://172.16.254.1:8080 | |
| VM_Sub Define Credentials for this Proxy ~ Public IP Upload a root certificate ~ Notice: Ensure that the subnet has internet connectivity through a NAT device or proxy server so that the Connector can communicate with Azure services. Volume | | Subnet | | |
| Public IP Disable Notice: Ensure that the subnet has internet connectivity through a NAT device or proxy server so that the Connector can communicate with Azure services. | | VM_Sub | Define Credentials for this Proxy \checkmark | |
| Disable Notice: Ensure that the subnet has internet connectivity through a NAT device or proxy server so that the Connector can communicate with Azure services. | | Public IP | Upload a root certificate 🗸 🗸 | |
| Notice: Ensure that the subnet has internet connectivity through a NAT device or proxy server so that the Connector can communicate with Azure services. | | Disable | - | |
| through a NAT device or proxy server so that the Connector can communicate with Azure services. | | Notice: Ensure that the subnet has internet connection | vity | |
| | | through a NAT device or proxy server so that the Cor can communicate with Azure services. | nector | |
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| Provinue Next | | | | |

8. Configure the **Security Group** for the connector that allows HTTP, HTTPS, and SSH access.

| VM Authentication | Details O Network Sec | curity Group 5 Review | |
|----------------------------------|--|-----------------------|--|
| | Security Group | | |
| The securit | y group must allow inbound HTTP, HTTPS and | SSH access. | |
| Assign a security group: 💿 Creat | e a new security group O Select an exist | ting security group | |
| | | | |
| HTTP (Port 80) | HTTPS (Port 443) | SSH (Port 22) | |
| Source Type | Source Type | Source Type | |
| Anywhere | Anywhere 🗸 | Anywhere 🗸 | |
| Source (CIDR) | Source (CIDR) | Source (CIDR) | |
| 0.0.0.0/0 | 0.0.0/0 | 0.0.0/0 | |
| | | | |
| | | | |
| | | | |

9. Review the summary page and click **Add** to start connector creation. It generally takes about 10 mins to complete deployment. Once completed, the connector instance VM appears in the Azure portal.

| Image: We durbed location Image: We durbed location <th></th> | |
|---|--|
| Review BlueXP Connector Nam AzureConnector Subscription Hybrid Cloud TME Onprem Location South Central US Resource Group Existing - ANFAVSRG Role New - BlueXP Operator-5519248 Authentication Method Password (user: azureuser) VNet ANFAVSVal Subnet VM_Sub Existing Fashe | |
| Code for Terraform Automation BlueXP Connector Name AzureConnector Subscription Hybrid Cloud TME Onprem Location South Central US Resource Group Existing - ANFAVSRG Role New - BlueXP Operator-5519248 Authentication Method Password (user: azureuser) VNet ANFAVSVal Subnet VM_Sub | |
| SubscriptionHybrid Cloud TME OnpremLocationSouth Central USResource GroupExisting - ANFAVSRGRoleNew - BlueXP Operator-5519248Authentication MethodPassword (user: azureuser)VNetANFAVSValSubnetVM_SubRublic IPEnable | |
| LocationSouth Central USResource GroupExisting - ANFAVSRGRoleNew - BlueXP Operator-5519248Authentication MethodPassword (user: azureuser)VNetANFAVSValSubnetVM_SubRubic IPEnable | |
| Resource Group Existing - ANFAVSRG Role New - BlueXP Operator-5519248 Authentication Method Password (user: azureuser) VNet ANFAVSVal Subnet VM_Sub Rublic IP Enable | |
| Role New - BlueXP Operator-5519248 Authentication Method Password (user: azureuser) VNet ANFAVSVal Subnet VM_Sub Rublic IP Enable | |
| Authentication Method Password (user: azureuser) VNet ANFAVSVal Subnet VM_Sub Rublic IP Enable | |
| VNet ANFAVSVal | |
| Subnet VM_Sub | |
| Public IP Enable | |
| rubicir Litable | |
| Proxy None | |
| Security Group HTTP: 0.0.0.0/0, HTTPS: 0.0.0.0/0, SSH: 0.0.0.0/0 | |
| | |

10. After the connector is deployed, the newly created connector appears under **Connector** drop-down.

| • | Canvas | My working environments My esta | | | | | Go to Tabular Vie |
|---|----------------------|---------------------------------|--------------|---------|------------|---|-------------------|
| 9 | + Add Working Enviro | onment | | C Enabl | e Services | Working Environments | |
| , | | | | | | | |
| | | | | | | Amazon S3 O Buckets | |
| | | | | | | Azure Blob Storage 20 Storage Accounts | 1 |
| | | | | | | | |
| | | Azure Blob Storage | Amazon S3 | | | | |
| | | 20 Storage Accounts | 0 Buckets | aws | | | |
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Define a credential in BlueXP for Azure resources access

1. Click on setting icon on top right corner of BlueXP console to open **Account credentials** page, click **Add credentials** to start credential configuration workflow.

| Net/ | App BlueXP | | | Q BlueXP Search Automation-team | Workspace Azure-D8 | e Connector AzureConnector | 0 0 0 |
|------|-------------|---------------------|---|---|-----------------------|-----------------------------------|-------|
| 8 | Credentials | Account credentials | User credentials | | | 🐼 Settings | |
| 9 | | | | BlueXP and the Connector use account-level credentials to deploy and manage resources in your cloud environment. | | Connector Settings | |
| 5 | | 3 с | redentials | | Ac | Timeline | |
| 9 | | | BemoFSxNCMCredentials Type: Assume Role BlueXP | | | Credentials | |
| | | | 982589175402 | DhruvCloudManagerRole | | Software Update | |
| | | | | Assume Kole | | HTTPS Setup | |
| | | | aws shantanucreds Type: Assume Role BlueXP | | | Alerts and Notifications Settings | |
| | | | 210811600188 AWS Account ID | nkarthik, kafka_nfs_role_FSxN Assume Role | | | |
| | | | Managed Service Identity | (Country) | | | |
| | | | 1 View Subscriptions | 0 Working Environments | | | |
| | | | | | | | - |

2. Choose credential location as - Microsoft Azure - BlueXP.

| 🗖 Në | etApp BlueXP | | Q BlueXP Search | Account 🛩 Automation-team | Workspace Y Azure-D8 | Connector Y AzureConnector | 4 0 🌣 | ? | 8 |
|------|-----------------|-----------------------|----------------------|------------------------------|-------------------------|-------------------------------|--------------|---|---|
| 8 | Add Credentials | | | | | | | × | |
| Q | | Choose Creder | itials Location | | | | | | |
| Ψ | | | aws | | | | | | |
| Ģ | | Microsoft Azure | Amazon Web Services | | | | | | |
| ۲ | | Choose how to associa | te the credentials 🕚 | | | | | | |
| •• | | Connector | BlueXP | ⊘ | | | | | |
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3. Define Azure credentials with proper **Client Secret**, **Client ID**, and **Tenant ID**, which should have been gathered during previous BlueXP onboarding process.

| III N | etApp BlueXP | Q Blue09 Search Account V Workspace V Connector V Automation- team Acure-D8 Acure-D8 | le 9 🕈 🥵 |
|-------|-----------------|--|----------|
| | Add Credentials | Credentials Type 2 Define Credentials 3 Marketplace Subscription | × |
| 9 | | Define Mirrosoft Azure Credentials | |
| | | Learn more about Azure application credentials | |
| ¢ | | Credentials Name 0 Client Secret | |
| ۲ | | Azure,Hybrid,TME | |
| ** | | Application (client) ID Directory (tenant) ID 2tbc3be5-a259-4539-bb57-036b176f5c 9bb0aab6-5c38-419b-9ctd-7a38bd496 | |
| | | I have verified that the Azure role assigned to the Active Directory service principal matches BlueXP policy requirements. | |
| | | Previous Next | 0 |

4. Review and **Add**.

| n Ne | tApp BlueXP | | Q BlueXP Search Account Automation-te | workspace Azure-D8 | Connector AzureConnector | la 🕸 😨 🤤 |
|------|-----------------|-------------------------|---------------------------------------|-----------------------|------------------------------|----------|
| | Add Credentials | ⊘ Credentials | ype 🕢 Define Credentials 3 Review | | | × |
| 9 | | | Review | | | |
| ٠ | | | | | | |
| 5 | | Credentials Type | Azure | | | |
| Ð | | Credentials Name | Azure_Hybrid_TME | | | |
| • | | Credential Storage | Cloud Manager | | | |
| | | Application (client) ID | 2fbc9be5-a259-4539-bb57-036b176f5cc7 | | | |
| | | Directory (tenant) ID | 9bb0aab6-5c98-419b-9cfd-7a38bd496e1f | | | |
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| | | Previous | Add | | | |

5. You may also need to associate a **Marketplace Subscription** with the credential.

| Net | tApp BlueXP | Q BlueVP Search Account V Workspace V Connector Automation-Iteam Azure-D8 Azure-Connector Q |
|-----|--------------------------------------|---|
| | Associate Subscription | × |
| 9 | Credentials > Associate Subscription | |
| • | | Associate a Marketplace Subscription |
| ç | | Choose an Azure subscription to associate with the Azure Marketplace subscription. |
| ۲ | | Azure Subscription |
| • | | Hybrid Cloud TME Onprem (default) |
| | | Marketplace Subscription |
| | | dhruv-cvo-subscription |
| | | Add Subscription |
| | | |
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SnapCenter services setup

With the Azure credential configured, SnapCenter services can now be set up with the following procedures:

1. Back to Canvas page, from My Working Environment click Add working Environment to discover Azure NetApp Files deployed in Azure.

| III N | tApp BlueXP | Q BlueXP Search | Account V Workspace Automation-te Azure-DB | Connector AzureConnector |
|-------|--|---------------------------|---|---|
| - | Canvas My working environments My estate | | | 🗄 Go to Tabular View |
| 9 | + Add Working Environment | | C Enable Services () | Working Environments |
| ି | | | | Amazon S3 O Buckets |
| • | | | | Azure Blob Storage 20 Storage Accounts |
| | Azure Blob Storage 20 Storage Accounts | Amazon 53 O Buckets | | |
| | | | - + | 0 |

2. Choose Microsoft Azure as the location and click on Discover.

| n Ne | tApp BlueXP | Q BluckP Search Account V Workspace V Connector Automation-train Acur-DB Acur-Conn | _{ector} 🔪 🎝 🎝 🕹 |
|------|-------------------------|---|--------------------------|
| | Add Working Environment | Choose a Location | × |
| 9 | | | |
| • | | Image: Second state Image: Second state | |
| 2 | | Select Type | |
| (| | | |
| | | Cloud Volumes ONTAP Discover Existing Add new | |
| | | Cloud Volumes ONTAP HA Discover Existing Add new | |
| | | Azure NetApp Files Discover | |
| | | Kubernetes Cluster Discover V | |
| | | | |
| | | | |
| | | | |
| | | | Ç |
| la | me Working Environ | nent and choose Credential Name created in previous sec | tion, and click |

3 Continue.

| NetA | op BlueXP | Q Bluet/P Search Account V Workspace V Automation-Iteam Acure-D8 | tonnector ¥ | 8 |
|---|--|--|--------------|---|
| ₽ ₽ ₽ ₽ Φ Φ | Add Azure NetApp Files Wizard The sector of | Quarter Net App Files Credentials More Net Net App Files Credentials More Net Net App Files Credentials More Net Net Net Net Net Net Net Net Net Ne | aveConvector | × |
| | | Continue | | C |

4. BlueXP console returns to **My working environments** and discovered Azure NetApp Files from Azure now appears on **Canvas**.

| NetApp BlueXP | Q. BlueXP Search Account V Workspace Automation-te Azure-D8 | Connector AzureConnector AzureConnector |
|--|--|--|
| Canvas My working environments My estate | | 🗄 Go to Tabular View |
| + Add Working Environment | Enable Services 🕕 | Working Environments Instruction 1 Azure NetApp Files 7.08 TiB Provisioned Capacity Image: Amazon S3 0 Buckets |
| Volumes Capacity | Amazon 53 0 Buckets aws | Azure Blob Storage 20 Storage Accounts |
| Azure Blob Storage 20 Storage Accounts | | |
| | - + | |

5. Click on **Azure NetApp Files** icon, then **Enter Working Environment** to view Oracle database volumes deployed in Azure NetApp Files storage.

| NetApp BlueXP | | Q BlueXP Search Automation-team Azure-D8 | Connector AzureConnector |
|---------------|--|--|--------------------------|
| 9 | Azure NetApp Files AzureNfile | | (i) |
| , | | | |
| , | ora01-u01 AVAILABLE | ••• ora01-u02 | AVAILABLE |
| • | INFO CAPACITY Service Level Premium Location South Central US (100.0 GiB Provisioned) | thro CAPACITY Service Level Premium Lostion South Central US Providenced Providenced | O GiB Used Capacity |
| j. | Protocolis NFSv3 | Protocols NFSv3 | |
| | | | |
| | ora01-u03 | LE test | AVAILABLE |
| | INTO CAPACITY Service Level Premium Location South Central US Protocols NFSv3 | INFO CAPACITY Service Leviel Standard Location Germany West Central Protocols NFS-3 | Git Used Capacity |
| | | | |
| | | | |

6. From the left-hand sidebar of the console, hover your mouse over the protection icon, and then click **Protection > Applications** to open the Applications launch page. Click **Discover Applications**.

| Backup and recovery | Volumes Restors Applications Virtual Ma | chines Ruberneties 3cb Monitoring | Reports | |
|---------------------|---|--|---|--|
| | | | | |
| | BlueXP backup and red | covery for | | |
| | Enterprise Application | s 🔳 | 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | |
| | Integrated Data protection & Copy | y management | | |
| | service for on-premises and cloud | workloads | A Press of the Control of States of | |
| | IllueXP backup and recovery delivers quick, effective backup, restore, and copy manage enterprise databases booted on both on-pri cloud (Cloud velumes ONTAP) Abore NetApp for NetApp ONTAP) atorage. | seamless, and cost ment capabilities for emises and in the p files and Amazon FSx | | |
| | Ger started with Cloud Backup for Applications. | ns by discovering | | |
| | 0 | (\$,) | 8 | |
| | Streamlined data management | Save time & resources | Protect data in minutes | |

7. Select **Cloud Native** as the application source type.

| | Q Blue09 Search Account V Workpan Automation-team Account | ce 🗸 Connector 🎽 🏚 🌣 😯 🤂 |
|---------|---|--------------------------|
| | Select Application Source Type | |
| • | Select the application source type that you want to manage. | |
| \$ | | |
| ⊕ -* | Hybrid Cloud Native Applications hosted within your Applications that are hosted and run in | |
| *6 | organization's infrastructure. the cloud using AWS. Azure, GCP, etc., | |
| | | |
| | | |
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| | Canrel Next | |
| | KUNCH | Q |

8. Choose **Oracle** for the application type, click on **Next** to open host details page.

| NetApp BlueXP | Q. Bluck? Search Account V Workspace Automation Item Account | Connector AzureConnector | ko 🌣 🥹 🖉 |
|-----------------------|---|------------------------------|----------|
| Discover Applications | | | |
| 9 | | | |
| • | Select Application Type | | |
| ବ | Q | | |
| 0 | ORACLE | | |
| 0 ⁰ 0 | Oracle SAP HANA | | |
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| | Next | | |

9. Select **Using SSH** and provide the Oracle Azure VM details such as **IP address**, **Connector**, Azure VM management **Username** such as azureuser. Click on **Add SSH Private Key** to paste in the SSH key pair that you used to deploy the Oracle Azure VM. You will also be prompted to confirm the fingerprint.

| Discover Applications | 1 Host Details 2 Configuration 3 Review | |
|-----------------------|--|--|
| | | |
| | Select host type | |
| | Provide the following defails to add host and discover applications | |
| | Host Installation Type O Manual 🕕 🖲 Using SSH 🕥 | |
| | | |
| | Host FQDN or IP Connector | |
| | 172.30.137.142 AzureConnector 💌 | |
| | Username 0 | |
| | azureuser 🕒 Add SSH Private Key Optional 🕥 | |
| | SSH Port Plug-In Port | |
| | 22 8145 | |
| | | |
| | | |
| iscover Applications | Host Details (2) Configuration (3) Review | |
| iscover Applications | Host Details (2) Configuration (3) Review | |
| iscover Applications | Host Details (2) Configuration (3) Review Select host type | |
| iscover Applications | Host Details 2 Configuration 3 Review Select host type Provide the following details to add host and discover applications | |
| iscover Applications | Host Installation Type Manual Manual Mexical Manual Mexical Manual Mexical Manual | |
| scover Applications | Host Details 2 Configuration 3 Review Select host type Provide the following details to add host and discover applications Host installation Type Manual Eulor SSH Validate fingerprint | |
| scover Applications | Host Details 2 Configuration 3 Review Select host type Provide the following details to add host and discover applications Host Installation Type Manual | |
| iscover Applications | | |
| iscover Applications | Front Decision Provide the following details to add host and discover applications: Host Installation Type Host Installation Type Using SSH Validate fingerprint Algorithm Ssh-rsa Fingerprint: AdAAE2Vj2HNhLXNoYTitbmizdHAyNTYAAAAIbmizdHAyNTYAAAAB Proceed | |
| iscover Applications | Finds the following details to add host and discover applications Most installation Type Manual Most installation Type Manual Validate fingerprint Algorithm ssh-rsa Fingerprint: AAAAE2VJ2HNhLXNovTitbmizdHAyNTYAAAAIbmizdHAyNTYAAAB Procceding further, I confirm that the above fingerprint for host is valid. Procced Cancel | |
| Jiscover Applications | First Details Configuration Select host type The stand discover applications Host installation Type Manual Using SSH Validate fingerprint Algorithm ssh-rsa Fingerprint: AAAAE2V/2HNhLXNoYTItbmizdHAyNTYAAABbmizdHAyNTYAABB I by proceeding further; I confirm that the above fingerprint for host is valid. Frocced Cancel | |

10. Move on to next **Configuration** page to setup sudoer access on Oracle Azure VM.

| | rtApp BlueXP | Q Bluex9 Search Account V Workspace V Connector V Automation-team Azure-Dil AzureConnector Account | 9 8 |
|---|-----------------------|--|------------|
| • | Discover Applications | Host Details (2) Configuration (3) Review | |
| 9 | | | |
| • | | Connguration Follow the steps to make sure all the configuration expectations are met | |
| o | | | |
| ۲ | | 1. Configure sudoer access for "azureuser". | |
| 4 | | Log into the application host. Create following file /etc/sudgers.d/snapcenter with the following content, | |
| | | # | |
| | | I have configured sudo access for "azureuser" as per the above steps. | |
| | | | |
| | | | |
| | | | |
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| | | Previous Next | |

11. Review and click on **Discover Applications** to install a plugin on the Oracle Azure VM and discover Oracle database on the VM in one step.

| letApp BlueXP | | Q BlueXP Search Account Vo Automation-team Azu | ire-D8 Connector | 4 2 ♀ ♀ ♀ |
|-----------------------|------------------------|--|------------------|------------------|
| Discover Applications | Host Deta | ils 🕜 Configuration 3 Review | | |
| | | Review | | |
| | Follow the steps to ma | ake sure all the configuration expectations are met. | | |
| | Host Details | Configurations | | |
| | Host Installation Type | SSH | | |
| | Host FQDN or IP | 172.30.137.142 | | |
| | Connector | AzureConnector | | |
| | User name (Sudo) | azureuser | | |
| | Plug-In Port | 8145 | | |
| | SSH Port | 22 | | |
| | Fingerprint | AAAAE2VJZHNhLXNoYTItbmlzdHAyNTYAAAAIbmlzdH | | |
| | Кеу Туре | ecdsa-sha2-nistp256 | | |
| | | | | |
| | Previo | Us Discover Applications | | C |

12. Discovered Oracle databases on Azure VM are added to **Applications**, and the **Applications** page lists the number of hosts and Oracle databases within the environment. The database **Protection Status** initially shows as **Unprotected**.

| n Ne | etApp BlueXP | | | Q BlueXP Search Ac | ccount V Workspac utomation-te Azure-DB | ce Connector AzureConnector | 4 2 🌣 😗 |
|------|---------------------|-----------------|--|------------------------|--|-----------------------------|----------------|
| | Backup and recovery | Volumes Restore | Applications Virtual Machines Kubernetes | Job Monitoring Reports | | | |
| 9 | | | | | | | |
| • | | Claud Mathia | and the second s | | | | |
| ô | | Cloud Native | * Orace | | | | |
| Θ | | | | | Application Protect | tion | |
| • | | Hosts | GRACLE | Clone | O Protected | 9 3 Unprotected | |
| | | | | | | | |
| | | 3 Databases | | | | | |
| | | Filter By + | | Q | Manage Databases 🛛 🔻 | Settings 🔻 | |
| | | Name | A Host Name | Policy Name | Protection Status | o 1 | |
| | | NTAP | 172.30.137.142 | | Unprotected | | |
| | | db1 | 172.30.15.99 | | Unprotected | | |
| | | db1tst | 172.30.15.124 | | Unprotected | | |
| | | | | | 1 - 3 | of 3 «< < 1 > >> | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| : 00 | ompletes the ini | itial setup of | SnapCenter services | for Oracle. Th | ne next three | e sections o | f this |
| , 00 | | - | | | | | |

Oracle database backup

1. Our test Oracle database in Azure VM is configured with three volumes with an aggregate total storage about 1.6 TiB. This gives context about the timing for the snapshot backup, restore, and clone of a database of this size.

| [oracle@acao-ora01 ~]\$ df | -h | | | | |
|----------------------------|-------|------|-------|------|----------------|
| Filesystem | Size | Used | Avail | Use∛ | Mounted on |
| devtmpfs | 7.9G | 0 | 7.9G | 0% | /dev |
| tmpfs | 7.9G | 0 | 7.9G | 0% | /dev/shm |
| tmpfs | 7.9G | 17M | 7.9G | 1% | /run |
| tmpfs | 7.9G | 0 | 7.9G | 0% | /sys/fs/cgroup |
| /dev/mapper/rootvg-rootlv | 40G | 23G | 15G | 62% | / |
| /dev/mapper/rootvg-usrlv | 9.8G | 1.6G | 7.7G | 18% | /usr |
| /dev/sda2 | 496M | 115M | 381M | 24% | /boot |
| /dev/mapper/rootvg-varlv | 7.9G | 787M | 6.7G | 11% | /var |
| /dev/mapper/rootvg-homelv | 976M | 323M | 586M | 36% | /home |
| /dev/mapper/rootvg-optlv | 2.0G | 9.6M | 1.8G | 1% | /opt |
| /dev/mapper/rootvg-tmplv | 2.0G | 22M | 1.8G | 2% | /tmp |
| /dev/sda1 | 500M | 6.8M | 493M | 2% | /boot/efi |
| 172.30.136.68:/ora01-u01 | 100G | 23G | 78G | 23% | /u01 |
| 172.30.136.68:/ora01-u03 | 500G | 117G | 384G | 24% | /u03 |
| 172.30.136.68:/ora01-u02 | 1000G | 804G | 197G | 81% | /u02 |
| tmpfs | 1.6G | 0 | 1.6G | 0% | /run/user/1000 |
| [oracle@acao-ora01 ~]\$ | | | | | |

 To protect database, click the three dots next to the database Protection Status, and then click Assign Policy to view the default preloaded or user defined database protection policies that can be applied to your Oracle databases. Under Settings - Policies, you have option to create your own policy with a customized backup frequency and backup data-retention window.

| NetApp | BlueXP | | Q BlueXP Search | Account ~ Automation-te | Workspace 💙 Azure-DB | Connector ✓ AzureConnector | lo 🌣 | ? |
|--------|---------------------|------------------------------|-----------------------------|-------------------------|-------------------------|-------------------------------|-------------|---|
| | Backup and recovery | Volumes Restore Applications | Virtual Machines Kubernetes | Job Monitoring | Reports | | | |
| 2 | | | | | | | | |
| | Cloud Native | Oracle | * | | | | | |
| | | | | | | | | |
| | _ | | | | Application Pro | otection | | |
| | 4 Hosts | BB 3 ORACI | E | Clone | O Protected | 9 3 Unprotected | | |
| | | | | | | | | |
| | 3 Databases | | | | | | | |
| | Filter By + | | | Q | Manage Databases | ▼ Settings | • | |
| | Name | A Host Name | Policy Name | | Protection Status | ÷ 1 | | |
| | NTAP | 172.30.137.142 | | | Unprotected | ••• | | |
| | db1 | 172.30.15.99 | | | 🤨 Unprotected | View Details | | |
| | db1tst | 172.30.15.124 | | | 0 Unprotected | | | |
| | | | | | | 1-3 of 3 << < 1 | > >> | |
| | | | | | | | | |

2. When you are happy with the policy configuration, you can then **Assign** your policy of choice to protect the database.

| ■ Net/ | App BlueXP | | | Q. Elucity Search Account Workspace Connector Automation-te Azure-DB AzureConnector |
|--------|--------------------------|-------------------------------|---------------------------------|---|
| | Backup and recovery | Volumes Restore Applications | Virtual Machines Kubernetes | Job Monitoring Reports |
| ø | Applications > Assign Pr | alicy | | |
| • | | | Assig | n Policy |
| Ô | | | Assign a policy to start taking | backups of the database "NTAP" |
| Θ | | 4 Policies | | |
| • | | Policy Name | 🔨 📔 Backup Type | 0 Schedules |
| | | Oracle Full Backup for Bronze | FullBackup | Daily: Repeats Every 1 Day, Keeps 14 copies Weekly: Repeats Every Fri, Keeps 4 copies Monthly: Repeats Every 1st Day of Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, C |
| | | Oracle Full Backup for Gold | FullBackup | Hourly: Repeats Every 6 Hrs., Keeps 16 copies Daily: Repeats Every 1 Day, Keeps 30 copies Weekly: Repeats Every Fri, Keeps 4 copies Monthly: Repeats Every 1st Day of Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, C |
| | | Oracle Full Backup for Silver | FullBackup | Hourly: Repeats Every 12 Hrs, Keeps 6 copies Daily: Repeats Every 1 Day, Keeps 14 copies Weekly: Repeats Every Fri, Keeps 4 copies Monthly: Repeats Every 1st Day of Jan, Feb. Mar, Apr, May, Jun, Jul, Aug, Sep, C |
| | | my_full_bkup | FullBackup | Hourly: Repeats Every 6 Hrs, Keeps 3 Days |
| | | | | 1-4of4 << < 1 > >> |
| | | | Cancel | Assign |

 After the policy is applied, the database protection status changed to Protected with a green check mark. BlueXP executes the snapshot backup according to the schedule defined. In addition, ON-Demand Backup is available from the three-dot drop down menu as shown below.

| - 110 | тарр | BlueXP | | | | | | Q BlueXP S | earch | Automation-te | Azure-DB | | AzureConnecto |
|-------|------|-----------------------|---|--------------|--|-----------------|------------|-------------------------------|---------|--|--|---|---------------|
| | G |) Backup and recovery | Volumes | Restore Appl | lications Vi | irtual Machines | Kubernetes | Job Monitoring | Reports | | | | |
| | | | | | | | | | | | | | |
| | | | Cloud Nativo | | | Oracla | | | | | | | |
| | | | Cloud Native | | | UIACIE | | | | | | | |
| | | | | | | | | | | Applicatio | on Protection | | |
| | | | A Hosts | | 8 | ORACLE | | | llone | 1 Protected | | 0 2 Unprotecte | d |
| | | | | | | | | | | | | | |
| | | | 3 Databases | | | | | | | | | | |
| | | | 3 Databases Filter By + | | | | | | ۹ | Manage Database | es 🔻 | Settir | ngs |
| | | | 3 Databases Filter By + Name | <u>^ </u> | Host Name | | | Policy Name | ۹ | Manage Database | es ▼ | Settir | ngs ' |
| | | | 3 Databases Filter By + Name NTAP | ~] | Host Name | 2 | | Policy Name ≅ my_full_bkup | Q | Manage Database Protection State Protected | es ▼ | Settir | ngs 1 |
| | | | 3 Databases Filter By + Name NTAP db1 | ^] | Host Name 172.30.137.142 172.30.15.99 | 2 | | Policy Name | Q | Manage Database Protection State Protected Unprotected | es I▼ | Settir | ngs 1 |
| | | | 3 Databases Filter By + NTAP db1 db1tst | × | Host Name 172.30.137.142 172.30.15.99 172.30.15.124 | 2 | | Policy Name | ٩ | Manage Database Protection State Protected Unprotecte Unprotecte | es I View Detail: On-Deman Assign Polic | Settir | ngs 1 |
| | | | 3 Databases Filter By + NTAP db1 db1tst | <u>^</u>] | Host Name 172:30:137:142 172:30:15:124 | 2 | | Policy Name ≩ my_full_bkup | Q | Manage Database Protection State Protected Unprotected Unprotected | es ▼ Us View Detail On-Demann Assign Polic Un-assign F | Settin S d Backup Cy Policy | ngs 1 |

4. From **Job Monitoring** tab, backup job details can be viewed. Our test results showed that it took about 4 minutes to backup an Oracle database about 1.6 TiB.

| n Ne | tApp BlueXP | | | | | | Q BlueXP Se | aarch | Account ~ Automation-te | Workspac Azure-DB | • • | Connector ✓ AzureConnector |
|------|-----------------------------------|-----------------------|-----------------------|------------------|--------------------------------|---------------|----------------------------|------------|----------------------------|----------------------|-------|-------------------------------|
| | Backup and recovery | Volumes | Restore Ap | plications | Virtual Machines | Kubernetes | Job Monitoring | Reports | | | | |
| 9 | Job Monitoring > Job Name: Backup | of NTAP oracle databa | se on host 172.30.137 | 7.142 with polic | y my_full_bkup and sc | hedule Hourly | | | | | | |
| • | | 1. | Job Name: Bac | kup of NT | AP oracle datab | ase on host | 172.30.137.142 w | ith policy | my_full_bkup | and schedu | lle H | |
| ¢ | | | | | | | | 0050 | | | | |
| ۲ | | | 0 | | 0 | | | | | | | |
| -: | | | Other Job Type | | Jul 11 2023, 2:1 Start Time | 17:53 pm | Jul 11 2023, 2 End Time | :21:38 pm | Job | Success Status | | |
| | | Sub-Jobs(17) | | | | | | | | | | Collapse All |
| | | Job Name | | ; | t Job ID | \$ | Start Time | ‡ End | l Time | Duratic | 'n | ≎∣ 🖨 |
| | | Backup of NT | AP oracle database o | n host 172.30 | 🗇 61a12139-33 | 0e-4390-bc | Jul 11 2023, 2:17:53 pm | Jul | 11 2023, 2:21:38 pm | 4 Minu | tes | |
| | | Apply | ing Retention | | 27ff9d5f-68f0 |)-4880-a48 | Jul 11 2023, 2:21:38 pm | Jul | 11 2023, 2:21:38 pm | 0 Secor | nd | |
| | | Perfor | rming cleanup after b | backup | 074c0689-09 | 7e-41aa-ac | Jul 11 2023, 2:21:36 pm | Jul | 11 2023, 2:21:38 pm | 2 Secor | nds | |
| | | Finali | zing Oracle database | log backup | 348189d3-90 | b5-4cce-97 | Jul 11 2023, 2:21:36 pm | Jul | 11 2023, 2:21:36 pm | 0 Secor | nd | |
| | | 1 | | | | | | | | | | |
| | | | | | | | | | | | | |

5. From three-dot drop down menu **View Details**, you can view the backup sets created from snapshot backup.

| INC | tApp | BlueXP | | | | | Q BlueXP Search | Account Automat | ion-te | Workspace Azure-DB | | Connector AzureConnecto |
|-----|------|---------------------|---|--|---------------------------------------|------------|-------------------------------|----------------------|---|--|-------------------------------|----------------------------|
| | G | Backup and recovery | Volumes | Restore Applications | Virtual Machines | Kubernetes | Job Monitoring Re | ports | | | | |
| | | | | | | | | | | | | |
| | | | Cloud Nativa | | - | | | | | | | |
| | | | Cloud Native | | • Oracle | | • | | | | | |
| | | | - | | | | | | Applicatio | n Protectio | n | |
| | | | 4 Hosts | | ORACLE | | Clone | | 2 Protected | | 0 1 Unprote | ected |
| | | | | | | | | | | | | |
| | | | 3 Databases | | | | | | | | | |
| | | | 3 Databases Filter By + | | | | | Q Ma | inage Database | 25 ▼ | Se | ettings 🕻 |
| | | | 3 Databases Filter By + Name | ∧ Host N | lame | | Policy Name | Q Ma | inage Database rotection Stat | es ▼ | Se 0 | ettings 🔻 |
| | | | 3 Databases Filter By + Name | Host N 172.30 | Jame ,137.142 | | Policy Name | Q Ma | nage Database rotection Stat Protected | 25 ▼ US | Se 0 • | ettings v |
| | | | 3 Databases Filter By + Name NTAP db1 | ▲ Host Most Most Most A 172.30 172.30 | tame ,137,142 ,15,99 | | Policy Name S my_full_bkup | Q Ma | nage Database rotection Stat Protected Protected | 25 ▼ US View Deta | Se C IIS | ettings 1 |
| | | | 3 Databases Filter By + NTAP db1 db1tst | Host 1 172.30 172.30 172.30 | lame .137.142 .15.99 .15.124 | | Policy Name | Q Ma P | nage Database rotection Stat Protected Protected Unprotecte | es View Deta On-Demai | Se Se Ils Ils icy | ettings 1 |
| | | | 3 Databases Filter By + Name NTAP db1 db1tst | Host Model 172.30 172.30 | tame ,137,142 ,15,99 ,15,124 | | Policy Name S my_full_bkup | Q Ma P | nage Database rotection Stat Protected Protected Protected | us View Deta On-Demai Assign Pol Un-assign | Se ils icy Policy | ettings V |

6. Database backup details include the Backup Name, Backup Type, SCN, RMAN Catalog, and Backup Time. A backup set contains application-consistent snapshots for data volume and log volume respectively. A log volume snapshot takes place right after a database data volume snapshot. You could apply a filter if you are looking for a particular backup in the backup list.

| 2 | Backup and recovery | Volumes Restore App | lications Virtual Machines | Kubernetes Job Monitoring | g Reports | |
|---|--|------------------------------|----------------------------|---------------------------------|---------------------------------------|--------------------|
| | Applications > Database Details | | | | | |
| | | | Datab | ase Details | | |
| • | NTAP Database Na | Ime Protection | ected on | my_full_bkup Policy Names | Database Type | |
| : | 172.30.137.142 ANF Host Name Host Storage | | rage | Unreachable Database Version | zEHlu7vkdyaBnujcxllbk Connector Id | KELkVXToyNlclients |
| | - Clones | - Parent D | Vatabase | Disabled RMAN Catalog | - RMAN catalog repositor | y G |
| | 14 Backups | | | | | |
| | Filter By + | | | | Q | Select Timeframe 🔻 |
| | Backup Name | ¢ | Backup Type 🔅 SCM | N 🗘 🕴 RMAN Catalog | Backup Time 🗸 🗸 | 1 |
| | my_full_bkup_Hourly_NT | FAP_2023_07_13_12_04_28_8376 | Log 291 | 92187 Not Cataloged | Jul 13, 2023, 8:06:22 am | Delete |
| | my_full_bkup_Hourly_NT | TAP_2023_07_13_12_03_07_4363 | Data 291 | 92136 Not Cataloged | Jul 13, 2023, 8:03:40 am | Delete |
| | my_full_bkup_Hourly_N1 | TAP_2023_07_13_06_04_28_5618 | Log 291 | 78022 Not Cataloged | Jul 13, 2023, 2:05:50 am | Delete |
| | | | | | | |

Oracle database restore and recovery
1. For a database restore, click the three-dot drop down menu for the particular database to be restored in **Applications**, then click **Restore** to initiate database restore and recovery workflow.

| NetApp | BlueXP | | | | (| Q BlueXP Search | Accoun Automa | t ¥ tion-te | Workspace Azure-DB | | Connector AzureConnecto |
|--------------------------------|---------------------|---|--------------------------------------|---|--------------------------|---|------------------|--|---|--|----------------------------|
| Storage | Backup and recovery | Volumes | Restore Applica | tions Virtual Machines | Kubernetes Job M | Monitoring R | eports | | | | |
| 9 Health | | | | | | | | | | | |
| Protection | | | | | | | | | | | |
| Backup and re | ico - | Cloud Native | | Oracle | | • | | | | | |
| | | | | | | | | Application | Protection | ı | |
| Governance | | △ 4 | | | | | | 2 Protected | | 9 1 Unprotect | ted |
| | | Hosts | | ORACLE | | CIOILE | | Trotected | | and the second | |
| Mobility | | Hosts | | ORACLE | | cione | | Trotected | | | |
| Mobility Extensions | | 3 Databases | | ORACLE | | cione | | Trotected | | And a second | |
| Mobility Extensions | | 3 Databases Filter By | | ORACLE | | CIUTE | Q M | anage Databases | 6 I T | Sett | tings V |
| Mobility Extensions | | Hosts 3 Databases Filter By + Name | ∧ H | ORACLE | Polic | cyName | Q _ M | anage Databases | s ▼ | Sett | tings V |
| Mobility Estensions | | Hosts Hosts Hosts Hosts Hosts Hosts | ∧ H 11 | ost Name 72.30.137.142 | Polic E n | cy Name ny_full_bkup | Q _ M | anage Databases Protection Statu | i ₹ S | Sett | tings ¥ |
| | | Hosts A Databases Filter By Name NTAP db1 | л н П Т | ost Name 72.30.137.142 72.30.15.99 | Polic S n S n | cy Name ny_full_bkup ny_full_bkup | Q | anage Databases Protection Statu | s View Detail | Sett | tings ¥ |
| | | Hosts 3 Databases Filter By + Name NTAP db1 db1tst | <mark>л н</mark> 1: 1: 1: | ost Name 72.30.137.142 72.30.15.99 72.30.15.124 |) Polic S n S n | cy Name my_full_bkup my_full_bkup | Q M | Protected Protection Statu Protected Protected Unprotected | s View Detai On-Demar Assign Poli | Sett | tings V |
| Mobility | | Hosts | <mark>л н</mark> 17 17 17 | ost Name 72.30.137.142 72.30.15.199 72.30.15.124 | ୁ Polic କୁମ କୁମ | cy Name ny_full_bkup ny_full_bkup | Q | rotected anage Databases votection Statu Orotected Protected Unprotecter | s View Detai On-Demar Assign Poli Un-assign | Sett Sett Is Id Backup Cy Policy | tings ¥ |

2. Choose your **Restore Point** by time stamp. Each time stamp in the list represents an available database backup set.

| | Automation-te Azure-D8 AzureC | onnector 40 🌣 🥐 🦉 |
|----------------|--|-------------------|
| Restore "NTAP" | Restore Point and Location (2) Configuration (3) Review | |
| | | |
| | Restore Point and Location | |
| | Specify the restore point to which the database should to be restored. | |
| | Dertore Delet | |
| | Jul 13, 2023. 8:03:40 am | |
| | Jul 13, 2023. 8:03:40 am | |
| | Jul 13, 2023, 2:03:43 am | |
| | Jul 12, 2023, 8:03:41 pm | |
| | Jul 12, 2023, 2:03:32 pm | |
| | Jul 12, 2023, 2:03:31 am | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | Previous Next | |

3. Choose your **Restore Location** to **original location** for an Oracle database in place restore and recovery.

| n Net | tApp BlueXP | Q Blueby Search Account Workspace Connector Azure-D8 Azure-D8 | 40 🌣 | ? | 8 |
|-------|----------------|--|------|---|---|
| 8 | Restore "NTAP" | Restore Point and Location ② Configuration ③ Review | | | |
| 9 | | | | | |
| • | | Restore Point and Location | | | |
| o | | Specify the restore point to which the database should to be restored. | | | |
| ۲ | | Restore Point. | | | |
| | | jul 13, 2023, 8:03:40 am 👻 | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | Restore to original Restore to alternate location location | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | _ | C |
| | | Previous Next | | | |

4. Define your **Restore Scope**, and **Recovery Scope**. All Logs mean a full recovery up to date including current logs.

| | etApp BlueXP | Q Bluesto Search Account 🖌 Workspace 🎽 Connector 🎽 🎝 Aure-Connector 🎝 😥 🔅 | 99 |
|-------------|----------------|---|----|
| 8 | Restore "NTAP" | Restore Point and Location 2 Configuration 3 Review | × |
| 2 6 0 | Restore | icope III Data Files Data Files Restore Control Files Control Files Control Files O Database state will be changed if needed for restore and recovery. introl Files O Database state will be changed if needed for restore and recovery. | |
| | | Concernence of the container database in READ-WRITE mode after recovery. | |
| | | Previous Next | Q |

5. Review and **Restore** to start database restore and recovery.

| n Net | tApp BlueXP | | Q Blueorp Search Account V Workspace V Connector Azure-D6 Azure-Connector | 98 |
|-------|----------------|---|---|----|
| | Restore "NTAP" | \odot | Restore Point and Location 🕜 Configuration 3 Review | > |
| 9 | | | | |
| • | | | Review | |
| ¢ | | Backup Name | my_full_bkup_Hourly_NTAP_2023_07_13_12_03_07_43633_0 | |
| ۲ | | Restore Scope | All Data Files | |
| • | | Recovery Scope | All Logs | |
| | | Force in Place Restore | No | |
| | | Open Database or Contail Database in READ-WRITE Mode After Recovery | iner Yes | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Previous Restore | Q |

6. From the **Job Monitoring** tab, we observed that it took 2 minutes to run a full database restore and recovery up to date.

| ÷ | (3) Backup and recove | volu | imes Restore | Applications | Virtual Machir | nes Kubernete | s Job Monit | toring Rej | ports | | | | |
|---|-------------------------------|-----------------------|------------------------|--------------------|------------------------|------------------------|------------------|---------------------------|--------------|-----------------|--------------|--------------|--|
| , | Job Monitoring > Job Name: Re | store for Oracle Data | abase NTAP using bac | kup name my_full_b | okup_Hourly_NTAF | P_2023_07_13_12_03_ | 07_43633_0 | | | | | | |
| | | | Job Name | : Restore for (| Dracle Datab | ase NTAP usin | g backup na | me my_full | _bkup_Hou | irly_NTAP_ | 2023_07_13_1 | 2 | |
| 5 | | | | | | JUD 10: 00082740 | -9520-44C0-0000- | -912791030230 | | | | | |
| 0 | | | 0 | | | | | | | ~ | | | |
| • | | | Other Job Type | | Jul 13 20 Start Tim | 023, 10:37:42 am 1e | Jul 1 End | 13 2023, 10:39:15 Time | 5 am | ✓ Su Job Sta | ccess tus | | |
| | | Sub-Jobs(6) | | | | | | | | | | Collapse All | |
| | | Job Name | | | Job ID | ¢ | Start Time | ¢ | End Time | | Duration | ≎∣ 🔂 | |
| | | Resto | re for Oracle Database | NTAP using backu | 1 808827 | '40-952d-4acd-b | Jul 13 2023, 10 | 0:37:42 am | Jul 13 2023, | 10:39:15 am | 2 Minutes |] | |
| | | | Post Restore Cleanu | p | 🗇 0533d5 | 8b-7750-40c1-a | Jul 13 2023, 10 | 0:39:14 am | Jul 13 2023, | 10:39:15 am | 1 Second | | |
| | | | Post Restore | | 642624 | 31-041c-4c21-8d | Jul 13 2023, 10 |):38:48 am | Jul 13 2023, | 10:39:14 am | 26 Seconds | | |
| | | | Restore | | 918ad6 | i69-af04-417e-89 | Jul 13 2023, 10 | 0:38:24 am | Jul 13 2023, | 10:38:48 am | 24 Seconds | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

Oracle database clone

Database clone procedures are similar to restore but to an alternate Azure VM with identical Oracle software stack pre-installed and configured.



Ensure that your Azure NetApp File storage has sufficient capacity for a cloned database the same size as the primary database to be cloned. The alternate Azure VM has been added to **Applications**.

1. Click the three-dot drop down menu for the particular database to be cloned in **Applications**, then click **Restore** to initiate clone workflow.

| NetApp | BlueXP | | | | | | Q BlueXP Search | Autom | ation-te | Workspace Azure-DB | | AzureConnector |
|------------------------|---------------------|--|---------|--|-----------------------------|------------|---|--------|--|--|---|----------------|
| Storage | Backup and recovery | Volumes | Restore | Applications | Virtual Machines | Kubernetes | Job Monitoring R | eports | | | | |
| 9 Health | | | | | | | | | | | | |
| Protection | | Cloud Native | | | Orada | | - | | | | | |
| Backup and re | | Cloud Native | | | Unacle | | | | | | | |
| | | | | | _ | | | | Applicatio | on Protectio | n | |
| Governance | | \sim 4 | | | 88 3 | | 88 0 | | 2 | | 0 1 | |
| | | | | | | | Clone | | Protected | | Unprote | ecteri |
| Mobility | | Hosts | | | ORACLE | | | | | | 1.00 | |
| Mobility Extensions | | Hosts | | | ORACLE | | | | | | 1000 | |
| Mobility | | 3 Databases | | | ORACLE | | | | | | | |
| Mobility | | 3 Databases Filter By + | | | ORACLE | | | ۹ 🗖 | Manage Databas | es ∣▼ | S | ettings 🔻 |
| Mobility Extensions | | 3 Databases Filter By + | ^ | Host Nam | te | | Policy Name | ۹ . | Manage Databas | es ▼ | 5 | ettings 🔻 |
| Mobility | | 3 Databases Filter By + Name NTAP | ~ | Host Nam 172.30.137 | Te 7.142 | | Policy Name | ۹ . | Manage Databas | es ▼ | Si | ettings V |
| Mobility Extensions | | A Databases Filter By Hosts Name NTAP db1 | ~ | Host Nam 172.30.137 172.30.15.1 | 10 OKALLE 12.7.142 99 | | Policy Name my_full_bkup my_full_bkup | ۹ . | Vanage Database Protection State Protected | tus View Deta Op-Dema | Si • • | ettings ¥ |
| Mobility Extensions | | A Databases Filter By + Name NTAP db1 db1tst | ^ | Host Nam 172.30.137 172.30.15. 172.30.15. | e 7,142 99 | | Policy Name S my_full_bkup my_full_bkup | Q , | Manage Databas Protection Stat Protected Protected Unprotected | es ↓▼ tus View Deta On-Dema ²t Assign Po | sills nd Backup | ettings V |
| Mobility Detensions | | A Databases Filter By + Name NTAP db1 db1tst | ^ | Host Nam 172.30.137 172.30.15.1 172.30.15.1 | e 7,142 99 124 | | Policy Name Smy_full_bkup my_full_bkup | Q | Aanage Database Protection Stat Protected Protected | es IV tus View Deta On-Dema ²⁴ Assign Po Un-assign | si sils nd Backup licy Policy | ettings V |

2. Select the **Restore Point** and check the **Restore to alternate location**.

| Restore "NTAP" | Restore Point and Location Restore Point Specify the restore point to which t Restore Point Jul 13, 2023, 8:03:40 am | Configuration 3 Review t and Location the database should to be restored. | | > |
|-----------------------------------|---|---|--|---|
| • • • • • | Restore Point Specify the restore point to which t Restore Point Jul 13, 2023, 8:03:40 am | t and Location the database should to be restored. | | |
| • • • | Restore Point Specify the restore point to which t Restore Point Jul 13, 2023, 8:03:40 am | t and Location the database should to be restored. | | |
| ♠ ♦ | Specify the restore point to which t Restore Point Jul 13. 2023. 8:03:40 am | The database should to be restored. | | |
| © ** | Restore Point Jul 13, 2023. 8:03:40 am | • | | |
| 4 | Jul 13, 2023. 8:03:40 am | v | | |
| | | | | |
| | | | | |
| | Restore to original | Restore to alternate | | |
| | location | location | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | Previous | Next | | C |
| | | | | |

3. In the next **Configuration** page, set alternate **Host**, new database **SID**, and **Oracle Home** as configured at alternate Azure VM.

| n Net | App BlueXP | Q BlueXP Search Account V Workspace Connector V 🎝 🔅 🌻 | θ |
|---|---------------------------|---|--------|
| ■ ♥ ● ● • | App BlueXP Restore "NTAP" | | 8 × |
| | | Previous | 0 |

4. Review **General** page shows the details of cloned database such as SID, alternate host, data file locations, recovery scope etc.

| n Ne | tApp BlueXP | | | Q BlueXP Search | Account ~ Automation-te | Workspace Y Azure-D8 | Connector Y AzureConnector | 1 0 🌣 | 00 |
|------|----------------|--------------------|---|---|---|-------------------------|-------------------------------|--------------|----|
| | Restore "NTAP" | \odot | Restore Point and Location | Configuration 3 | Review | | | | × |
| 9 | | | | | | | | | |
| ٠ | | | Re | view | | | | | |
| ¢ | | Ge | neral | Database | parameters | | | | |
| ۲ | | Backup Name | my_full_bkup_Hourly_NTAF | P_2023_07_13_12_03_07_43633_ | 0 | | | | |
| * | | SID | NTAP1 | | | | | | |
| | | Host | 172.30.137.147 | | | | | | |
| | | Datafile locations | /u02_NTAP1 | | | | | | |
| | | Control files | /u02_NTAP1/NTAP1/contro | l/control01.ctl | | | | | |
| | | Redo logs | RedoGroup = 1 TotalSize = RedoGroup = 2 TotalSize = RedoGroup = 3 TotalSize = | 1024 Path = /u02_NTAP1/NTAF 1024 Path = /u02_NTAP1/NTAF 1024 Path = /u02_NTAP1/NTAF | P1/redolog/redo01_01.lo P1/redolog/redo02_01.lo P1/redolog/redo03_01.lo | | | | |
| | | Recovery scope | Until cancel using selected | backup's archive logs | | | | | |
| | | Recovery Point | Jul 13, 2023, 8:03:40 am | | | | | | |
| | | Location | Alternate Location | | | | | | |
| | | | Previous | Restore | | | | | Q |

5. Review **Database parameters** page shows the details of cloned database configuration as well as some database parameters setting.

| n Ne | tApp BlueXP | | | Q BlueXP Search Account V Automation-te | Workspace ✓ Azure-DB | Connector ✓ AzureConnector | 40 🌣 | ? | 8 |
|------|----------------|----------------------|---|---|-------------------------|-------------------------------|------|---|---|
| P | Restore "NTAP" | \odot | Restore Point and Location | Configuration 3 Review | | | | | |
| , | | | | | | | | | |
| | | | Re | eview | | | | | |
| | | Ger | eral | Database parameters | | | | | |
| | | Database Credentials | None | | | | | | |
| | | Oracle home | /u01/app/oracle/product/ | 19.0.0/clone | | | | | |
| | | Oracle OS user | oracle | | | | | | |
| | | Oracle group | oinstall | | | | | | |
| | | DB parameters | audit, file_dest = /u01/app audit_trail = DB open_cursors = 300 pga_aggregate_target_in_ processes = 320 remote_login_passwordfil sga_target_in_mb = 9216 undo_tablespace = UNDO | /oracle/admin/NTAP/adump_NTAP1 mb = 512 e = EXCLUSIVE TB51 | | | | | |
| | | | Previous | Restore | | | | | (|

6. Monitor the cloning job status from the **Job Monitoring** tab, we observed that it took 8 minutes to clone a 1.6 TiB Oracle database.

| Backup and recovery | Volumes Restore | Applications | March March Street | | | | | | | |
|------------------------------------|---|--|---|--|--|---|--|---|--|--|
| Job Monitoring > Job Name: Restore | | | virtual Machines | Kubernetes | Job Monit | oring Rep | orts | | | |
| | Oracle Database NTAP as NTAP1 on | host 172.30.137.147 us | ing backup my_full_l | okup_Hourly_NTAP | _2023_07_13_12 | _03_07_43633_0 | | | | |
| | Job Name: Restore Ora | acle Database N | TAP as NTAP1 | on host 172.30 7e-461a-83b3-48e3 | 0.137.147 u 87fbf890f | sing backu | p my_full | _bkup_Hourl | | |
| | 0 | 0 | | 0 | | | ~ | | | |
| | Other Job Type | Jul 13 2023, Start Time | 1:05:02 pm | Jul 13 20 End Time | 23, 1:13:15 pm e | | Succe Job Status | \$\$ | | |
| Sub-Jobs(6) | | | | | | | | | Collapse All | |
| Job Name | | \$ Job ID | \$ | Start Time | \$ I | nd Time | \$ | Duration | ≎∣ 🔂 | |
| Restore C | Dracle Database NTAP as NTAP1 on he | o 🗇 7a187d5a- | -7f7e-461a-83 | Jul 13 2023, 1:05:02 | 2 pm J | ul 13 2023, 1:13 | 15 pm | 8 Minutes | | |
| c | ollect the restore database job logs o | f 🗇 abc9342a- | 5777-4262-b | Jul 13 2023, 1:13:14 | lpm J | ul 13 2023, 1:13 | 14 pm | 0 Second | | |
| R | egister the restored database metada | ita 🗇 15aefb90- | b21b-418f-b0 | Jul 13 2023. <mark>1</mark> :12:30 |) pm 🦳 J | ul 13 2023. 1:12 | 30 pm | 0 Second | | |
| R | emove the temporary storage of the | I 🗇 cc106fb9- | 7555-46c8-9c | Jul 13 2023, 1:12:30 |) pm J | ul 13 2023, 1:13 | 14 pm | 44 Seconds | | |
| | Sub-Jobs(6) Job Name Restore C R R R | Sub-Jobs(6) Job Name Collect the restore database NTAP as NTAP1 on ho Collect the restore database job logs of Register the restored database metada Remove the temporary storage of the | Other Jul 13 2023, Start Time Job Type Jul 13 2023, Start Time Sub-Jobs(6) Image: Sub-Jobs (6) Image: Job Name Image: Job Name Collect the restore database NTAP as NTAP1 on ho Image: Tailor Tailor Tailor Collect the restore database job logs of Image: Babelogs Register the restored database metadata Image: Tailor Tailor Remove the temporary storage of the l Image: Collector Tailor | Other Job Type Jul 13 2023, 1:05:02 pm Start Time Sub-Jobs(6) Job Name Job Name Image: Im | Other Job Type Jul 13 2023, 105:02 pm Start Time Jul 13 2023, 105:02 pm Start Time Sub-Jobs(6) Job Name | Other Job Type Jul 13 2023, 195:02 pm Start Time Jul 13 2023, 1:33:5 pm End Time Sub-Jobs(6) Sub-Jobs(6) Start Time Image: S | Other Job Type Jul 13 2023, 1:05:02 pm Start Time Jul 13 2023, 1:13:15 pm End Time Sub-Jobs(6) Job D \$ Start Time \$ End Time Job Name \$ Job ID \$ \$ Start Time \$ End Time Image: Sub-Jobs(6) Job D \$ \$ \$ \$ \$ Image: Sub-Jobs(2) Image: Sub-Jobs(6) Collect Database NTAP as NTAP1 on ho 10 7 7 7 7 7 7 7 10 <th< td=""><td>Jul 13 2023, 135:02 pm Job Type Jul 13 2023, 135:02 pm Start Time Jul 13 2023, 1:13:15 pm End Time Image: Comparison of the comparison</td><td>Sub-Jobs(6) Image: Sub-Jobs(2) Image: Sub-Jobs(</td><td>Sub-Jobs(6) College All > Sub-Jobs(6) College All > College three restore databases pib logs of Babc3942a=5777-4262+b Jul 13 2023, 1:13:14 pm Jul 13 2023, 1:13:14 pm Sub-Jobs(6) College three restore databases pib logs of Babc3942a=5777-4262+b Jul 13 2023, 1:13:14 pm Jul 13 2023, 1:13:14 pm Obleam College three restore databases metadata Babc3942a=5777-4262+b Jul 13 2023, 1:13:14 pm Jul 13 2023, 1:13:14 pm Jul 13 2023, 1:13:14 pm College three restore databases pib logs of Babc3942a=5777-4262+b Jul 13 2023, 1:13:14 pm State Three restore databases pib logs of Babc3942a=5777-4262+b Jul 13 2023, 1:13:14 pm State restore database pib logs of Babc3942a=5777-4262+b Jul 13 2023, 1:13:14 pm Jul 13 2023, 1:13:14 pm</td></th<> | Jul 13 2023, 135:02 pm Job Type Jul 13 2023, 135:02 pm Start Time Jul 13 2023, 1:13:15 pm End Time Image: Comparison of the comparison | Sub-Jobs(6) Image: Sub-Jobs(2) Image: Sub-Jobs(| Sub-Jobs(6) College All > Sub-Jobs(6) College All > College three restore databases pib logs of Babc3942a=5777-4262+b Jul 13 2023, 1:13:14 pm Jul 13 2023, 1:13:14 pm Sub-Jobs(6) College three restore databases pib logs of Babc3942a=5777-4262+b Jul 13 2023, 1:13:14 pm Jul 13 2023, 1:13:14 pm Obleam College three restore databases metadata Babc3942a=5777-4262+b Jul 13 2023, 1:13:14 pm Jul 13 2023, 1:13:14 pm Jul 13 2023, 1:13:14 pm College three restore databases pib logs of Babc3942a=5777-4262+b Jul 13 2023, 1:13:14 pm State Three restore databases pib logs of Babc3942a=5777-4262+b Jul 13 2023, 1:13:14 pm State restore database pib logs of Babc3942a=5777-4262+b Jul 13 2023, 1:13:14 pm Jul 13 2023, 1:13:14 pm |

7. Validate the cloned database in BlueXP **Applications** page that showed the cloned database was immediately registered with BlueXP.

| G Bac | kup and recovery Volu | mes Restore Applications Virtu | al Machines Kubernetes Job Mor | itoring Reports | |
|-------|--|---|---|---|--|
| | | | | | |
| | | | | | |
| | Cloud Native | • Oracle | * | | |
| | | | | Application Pro | tection |
| | <u> </u> | | 88 0 | 2 | 9 2 |
| | PH/ No. 1 St | | Cione | PIDPUPU | DEDDED POPPO |
| | nosis | ONACLE | Cione | Protected | Unprotected |
| | nosis | OMALL | Cione | Protected | onprotected |
| | 4 Databases | , OALL | Cione | Protected | Onprotected |
| | 4 Databases Filter By + | , OALL | Clone | Q Manage Databases | ▼ Settings ▼ |
| | 4 Databases Filter By + | Host Name | Clone Clone | Q Manage Databases Protection Status | Settings ▼ |
| | 4 Databases Filter By + Name NTAP | Host Name 172.30.137.142 | Policy Name | Q Manage Databases Protection Status Protection Status | ✓ Settings ▼ |
| | 4 Databases Filter By + Name NTAP | Host Name 172.30.137.142 172.30.137.147 | Policy Name | Q Manage Databases Protection Status Image Protected Image Outprotected | Settings ▼ Settings ▼ |
| | A Databases Filter By + Name NTAP (NTAP1) db1 | Host Name 172.30.137.142 172.30.137.147 172.30.15.99 | Policy Name @ my_full_bkup @ my_full_bkup | Q Manage Databases Protection Status Protected Unprotected Protected | ✓ Settings ▼ C ··· ··· ··· |

8. Validate the cloned database on the Oracle Azure VM that showed the cloned database was running as expected.

```
[oracle@acao-ora02 admin]$ cat /etc/oratab
# This file is used by ORACLE utilities. It is created by root.sh
# and updated by either Database Configuration Assistant while creating
# a database or ASM Configuration Assistant while creating ASM instance.
# A colon, ':', is used as the field terminator. A new line terminates
 the entry. Lines beginning with a pound sign, '#', are comments.
# Entries are of the form:
    SORACLE SID: SORACLE HOME: <N | Y>:
# The first and second fields are the system identifier and home
# directory of the database respectively. The third field indicates
# to the dbstart utility that the database should , "Y", or should not,
# "N", be brought up at system boot time.
# Multiple entries with the same $ORACLE SID are not allowed.
# SnapCenter Plug-in for Oracle Database generated entry (DO NOT REMOVE THIS LINE)
NTAP1:/u01/app/oracle/product/19.0.0/clone:N
[oracle@acao-ora02 admin]$ export ORACLE_SID=NTAP1
[oracle@acao-ora02 admin]$ export ORACLE_HOME=/u01/app/oracle/product/19.0.0/clone
[oracle@acao-ora02 admin]$ export PATH=$PATH:$ORACLE HOME/bin
[oracle@acao-ora02 admin]$ sqlplus / as sysdba
SQL*Plus: Release 19.0.0.0.0 - Production on Thu Jul 13 17:16:31 2023
Version 19.18.0.0.0
Copyright (c) 1982, 2022, Oracle. All rights reserved.
Connected to:
Oracle Database 19c Enterprise Edition Release 19.0.0.0.0 - Production
Version 19.18.0.0.0
SQL> select name, open_mode, log_mode from v$database;
NAME
          OPEN MODE
                                LOG MODE
NTAP1
          READ WRITE
                                NOARCHIVELOG
```

This completes the demonstration of an Oracle database backup, restore, and clone in Azure with NetApp BlueXP console using SnapCenter Service.

Additional information

To learn more about the information that is described in this document, review the following documents and/or websites:

· Set up and administer BlueXP

https://docs.netapp.com/us-en/cloud-manager-setup-admin/index.html

· BlueXP backup and recovery documentation

https://docs.netapp.com/us-en/cloud-manager-backup-restore/index.html

Azure NetApp Files

https://azure.microsoft.com/en-us/products/netapp

· Get started with Azure

https://azure.microsoft.com/en-us/get-started/

TR-4964: Oracle Database backup, restore and clone with SnapCenter Services - AWS

This solution provides overview and details for Oracle database backup, restore, clone using NetApp SnapCenter SaaS using BlueXP console in Azure cloud.

Allen Cao, Niyaz Mohamed, NetApp

Purpose

SnapCenter Services is the SaaS version of the classic SnapCenter database management UI tool that is available through the NetApp BlueXP cloud management console. It is an integral part of the NetApp cloudbackup, data-protection offering for databases such as Oracle and HANA running on NetApp cloud storage. This SaaS-based service simplifies traditional SnapCenter standalone server deployment that generally requires a Windows server operating in a Windows domain environment.

In this documentation, we demonstrate how you can set up SnapCenter Services to backup, restore, and clone Oracle databases deployed to Amazon FSx for ONTAP storage and EC2 compute instances. Although it is much easier to set up and use, SnapCenter Services deliver key functionalities that are available in the legacy SnapCenter UI tool.

This solution addresses the following use cases:

- Database backup with snapshots for Oracle databases hosted in Amazon FSx for ONTAP
- · Oracle database recovery in the case of a failure
- Fast and storage-efficient cloning of primary databases for a dev/test environment or other use cases

Audience

This solution is intended for the following audiences:

- The DBA who manages Oracle databases running on Amazon FSx for ONTAP storage
- The solution architect who is interested in testing Oracle database backup, restore, and clone in the public AWS cloud
- The storage administrator who supports and manages the Amazon FSx for ONTAP storage
- The application owner who owns applications that are deployed to Amazon FSx for ONTAP storage

Solution test and validation environment

The testing and validation of this solution was performed in an AWS FSx and EC2 environment that might not match the final deployment environment. For more information, see the section Key factors for deployment consideration.



This image provides a detailed picture of BlueXP backup and recovery for applications within the BlueXP console, including the UI, the connector, and the resources it manages.

Hardware and software components

Hardware

| FSx ONTAP storage | Current version offered by AWS | One FSx HA cluster in the same VPC and availability zone |
|----------------------------|--|--|
| EC2 instance for compute | t2.xlarge/4vCPU/16G | Two EC2 T2 xlarge EC2 instances, one as primary DB server and the other as clone DB server |
| Software | | |
| RedHat Linux | RHEL-8.6.0_HVM-20220503- x86_64-2-Hourly2-GP2 | Deployed RedHat subscription for testing |
| Oracle Grid Infrastructure | Version 19.18 | Applied RU patch p34762026_190000_Linux-x86- 64.zip |
| Oracle Database | Version 19.18 | Applied RU patch p34765931_190000_Linux-x86- 64.zip |
| Oracle OPatch | Version 12.2.0.1.36 | Latest patch p6880880_190000_Linux-x86- 64.zip |

Key factors for deployment consideration

- Connector to be deployed in the same VPC as database and FSx. When possible, the connector should be deployed in the same AWS VPC, which enables connectivity to the FSx storage and the EC2 compute instance.
- An AWS IAM policy created for SnapCenter connector. The policy in JSON format is available in the detailed SnapCenter service documentation. When you launch connector deployment with the BlueXP console, you are also prompted to set up the prerequisites with details of required permission in JSON format. The policy should be assigned to the AWS user account that owns the connector.
- The AWS account access key and the SSH key pair created in the AWS account. The SSH key pair is assigned to the ec2-user for logging into the connector host and then deploying a database plug-in to the EC2 DB server host. The access key grants permission for provisioning the required connector with IAM policy above.
- A credential added to the BlueXP console setting. To add Amazon FSx for ONTAP to the BlueXP working environment, a credential that grants BlueXP permissions to access Amazon FSx for ONTAP is set up in the BlueXP console setting.
- java-11-openjdk installed on the EC2 database instance host. SnapCenter service installation requires java version 11. It needs to be installed on application host before plugin deployment attempt.

Solution deployment

There is extensive NetApp documentation with a broader scope to help you protect your cloud-native application data. The goal of this documentation is to provide step-by-step procedures that cover SnapCenter Service deployment with the BlueXP console to protect your Oracle database deployed to Amazon FSx for ONTAP and an EC2 compute instance. This document fills in certain details that might be missing from more general instructions.

To get started, complete the following steps:

- Read the general instructions Protect your cloud native applications data and the sections related to Oracle and Amazon FSx for ONTAP.
- Watch the following video walkthrough.

Solution Deployment

Prerequisites for SnapCenter service deployment

Deployment requires the following prerequisites.

- 1. A primary Oracle database server on an EC2 instance with an Oracle database fully deployed and running.
- 2. An Amazon FSx for ONTAP cluster deployed in AWS that is hosting the database volumes above.
- 3. An optional database server on an EC2 instance that can be used for testing the cloning of an Oracle database to an alternate host for the purpose of supporting a dev/test workload or any use cases that requires a full data set of a production Oracle database.
- 4. If you need help to meet the above prerequisites for Oracle database deployment on Amazon FSx for ONTAP and EC2 compute instance, see Oracle Database Deployment and Protection in AWS FSx/EC2 with iSCSI/ASM or white paper Oracle Database Deployment on EC2 and FSx Best Practices

Onboarding to BlueXP preparation

- 1. Use the link NetApp BlueXP to sign up for BlueXP console access.
- 2. Login to your AWS account to create an IAM policy with proper permissions and assign the policy to the AWS account that will be used for BlueXP connector deployment.

| Services Q Search | | | | [Alt+S] | | 🗘 🕐 Globa |
|---|-----------------|--------------------|------------|---------------------------------------|------------------------------|----------------------------------|
| 🖉 Resource Groups & Tag Editor 🛛 🧱 FSx | | | | · · · · · · · · · · · · · · · · · · · | | |
| Identity and Access Management (IAM) | Policies > snap | center y | | | | |
| Dashboard | | | Policy AR | N arn:aws:iam | ::541696183547:policy/snape | center 🖉 |
| Access management | | | Descriptio | on Policy to gra | nt snapcenter service permis | sion to create connector in AWS. |
| User groups | Denstaalises | Della | | D. Il | | |
| Users | Permissions | Policy usage | lags | Policy versions | Access Advisor | |
| Roles | Policy sum | mary {}JSON | Edit p | olicy | | |
| Policies | 1.0 | | | | | |
| Identity providers | 2 | "Version": "20 | 012-10-17 | 7", | | |
| | 3- | "Statement": | [| | | |
| Account settings | 4.* | { "Effo | +0, 4A77 | Low " | | |
| Access reports | 6* | "Actio | on": [| LOW , | | |
| Access analyzer | | | Lam:Creat | teRole", | | |
| Access unaryzer | | | iam:Delet | teRole", | | |
| Archive rules | | 1.5 | Lam:PutRo | plePolicy", | | |
| Analyzers | | 10 | Lam:Creat | teInstanceProf | ile", | |
| | | 10 | lam:Delet | leKolePolicy , | and la" | |
| Settings | | | am: Remov | veRoleEnomInst | anceProfile" | |
| Or a death of a second | | 0.2 | iam:Delet | teInstanceProf | ile". | |
| Credential report | | 10 | Lam:PassF | Role", | | |
| Organization activity | | | iam:ListF | Roles", | | |
| Convises control policies (SODs) | | ". | ec2:Descr | ribeInstanceSt | atus", | |
| Service control policies (SCPS) | | 11 E | ec2:RunIr | nstances", | | |
| | | | ec2:Modit | fyInstanceAttr | ibute", | |
| O Search IAM | | | ec2:Creat | teSecurityGrou | Р", | |
| Sector State and | | | ecz:Delet | iboCocupityGrou | P > | |
| | | | ac2:Desci | -ibesecurityGr | oups , | |
| WS account ID: | | n, | ac2: Autho | anizeSecurityGP00 | rounEgress" | |
| 41606192547 | | 11. | ec2:Autho | prizeSecurityG | roupIngress". | |
| H1030109341 | | | ec2:Revol | keSecuritvGrou | pIngress", | |
| | | 11 | ec2:Creat | teNetworkInter | face", | |
| | 99 | 95 | -2.Docca | aihoNotworkInt | opfaces" | |

The policy should be configured with a JSON string that is available in NetApp documentation. The JSON string can also be retrieved from the page when connector provisioning is launched and you are prompted for the prerequisites permissions assignment.

3. You also need the AWS VPC, subnet, security group, an AWS user account access key and secrets, an SSH key for ec2-user, and so on ready for connector provisioning.

Deploy a connector for SnapCenter services

1. Login to the BlueXP console. For a shared account, it is a best practice to create an individual workspace by clicking **Account** > **Manage Account** > **Workspace** to add a new workspace.

| Manage | Account: Automation-team | Overview | Members | Workspaces | BlueXP Connector | × |
|-------------------|--|--|-----------------|---|--|---------------------------|
| | Managa di a Divi | VD connector Worker | | | | |
| | Manage the blue | exp connector workspace | | | | |
| | Database | + Ad | d New Workspace | | | |
| | Database | | | | | |
| | Database-2 | | • • | | | |
| | sufians-k8 | | | | | |
| | Workspace-1 | | 1 | | | |
| | | | | | | C |
| Click Add a Conr | nector to launch the connector | provisioning wo | orkflow. | | | |
| App Cloud Manager | | Account Automation-team | Workspace | Connector N/A | ~ 4 🔅 (| ? (|
| Backup & Restore | Volumes Restore Applications Virtual Machines | Kubernetes Job Monitoring | | | | |
| | | | | | | |
| | Backup & Restore | | | | Probability Manager Process | |
| | Fully integrated data protection for Ol | NTAP anywhere | | 12 2,011 Manual Parameter | 112.25 m B Trict Anices Tee | Contraction of the second |
| | Cloud Backup dramatically reduces the complexity of backi and unstructured data across your ONTAP hybrid cloud em | ng up critical structured vironments to cost- | 2,011 aar | Intel (1) 1 Second Standard 1 Second (2004) Second Standard 1 | Canacity 1 actually 1 angular 1 in Second 2 angular 1 angular 1 in Second 2 angular 100 interest 200 years 0 in Second 2 angular 100 years 0 in S | Landard Telling |
| | effective object storage. All you need to do is select the sou | irce, the target and the | | a la | anariant) antistictication () a | - setter |

| | Backup & Restore Fully integrated data protection for ONTAP anywhere Cloud Backup dramatically reduces the complexity of backing up critical structured and unstrucutred data across your ONTAP hybrid cloud environments to cost- effective object storage. All you need to do is select the source, the target and the protection policy and you're protected To start your Backup & Restore experience, please deploy our connector Add a Connector | |
|---|---|--|
| 8 | | \$. |
| € | Simple & intuitive Hybrid Multicloud No backup or cloud expertise required. Simply click Backup from On-premises or Cloud Volur the button above and follow the instructions ONTAP to AWS, Azure, GCP or StorageGF | Unmatched Efficiency mes Combines incremental, block-level operation RID storage efficiencies to reduce time and c |



1. Skip the **Permission**, **Authentication**, and **Networking** steps if you already have them set up in your AWS account. If not, you must configure these before proceeding. From here, you could also retrieve the permissions for the AWS policy that is referenced in the previous section "Onboarding to BlueXP preparation."

| Add Con | nector - AWS | | × |
|-----------------------|--|------------------|---|
| | Deploying a Connector The Connector is a crucial component for the day-to-day use of Cloud Manager. It's used to connect Cloud Manager's services to your hybrid-cloud environments. The Connector can then manage the resources and processes within your public cloud environment. Before you begin the deployment process, ensure that you have completed the required preparations. This guide will enable you to focus on the minimum requirements for Connector installation. | | |
| | Permissions Authentication Networking Set up an IAM role with the Choose between two AWS Obtain details about the VPC and required permissions authentication methods: AWS keys subnet in which the Connector will or assuming an IAM role reside | | |
| | | | |
| | Skip to Deployment | | |
| | | | |
| . Enter your A | WS account authentication with Access Key and Secret Key . | | C |
| . Enter your A Add | Previous Continue WS account authentication with Access Key and Secret Key. Connector - AWS | More Information | × |
| Enter your A | Previous Continue AWS account authentication with Access Key and Secret Key. Connector - AWS • AWS Credentials (2) Details (3) Network (4) Security Group (5) Review | More Information | × |
| . Enter your A | Previous Continue WS account authentication with Access Key and Secret Key. Connector - AWS • AWS Credentials (2) Details (3) Network (4) Security Group (5) Review AWS Authentication Region | More Information | × |
| . Enter your A | Previous Continue AWS account authentication with Access Key and Secret Key. Connector - AWS • AWS Credentials (2) Details (3) Network (4) Security Group (5) Review AWS Credentials (2) Details (3) Network (4) Security Group (5) Review AWS Credentials (2) Details (3) Network (4) Security Group (5) Review AWS Credentials (2) Details (3) Network (4) Security Group (5) Review AWS Credentials (2) Details (3) Network (4) Security Group (5) Review | More Information | × |
| . Enter your A | Previous Continue WS account authentication with Access Key and Secret Key. Connector - AWS AWS Credentials Details Network Security Group Review AWS Authentication Region us-east-1 US East (N. Virginia) Select the Authentication Method: Assume Role AWS Keys | More Information | × |
| Enter your A | Previous Continue WS account authentication with Access Key and Secret Key. Connector - AWS AWS Credentials Details Network Security Group Region Us-east-1 US East (N. Virginia) Select the Authentication Method: Assume Role AWS Secret Key AWS Access Key AWS Secret Key AWS Secret Key | More Information | × |
| . Enter your A | Previous Continue WS account authentication with Access Key and Secret Key. Connector - AWS AWS Credentials Details Network Security Group Region us-east-1 US East (N. Virginia) Select the Authentication Method: AWS Access Key < | More Information | × |
| . Enter your A | Previous Continue Connector - AWS • AWS Credentials (2) Details (2) Details (3) Network (4) Security Group (5) Review • AWS Credentials (2) Details (3) Network (4) Security Group (5) Review • AWS Credentials (2) Details (3) Network (4) Security Group (5) Review • AWS Credentials (2) Details (3) Network (4) Security Group (5) Review • AWS Credentials (2) Details (3) Network (4) Security Group (5) Review • AWS Credentials (2) Details (3) Network (4) Security Group (5) Review • AWS Credentials (2) Details (3) Network (4) Security Group (5) Review • AWS Access Key (AtlaßEjRXA62/VGVFSHM03 (5) Review | More Information | × |
| . Enter your A | Previous Continue Connector - AWS • AWS Credentials ③ Details ③ Network ④ Security Group ③ Review AWS Authentication Region us-east-1 US East (N. Virginia) Select the Authentication Method: · Assume Role · AWS Secret Key · AWS Access Key · AWS Access Key · AWS Access Key · AWS Secret Key · MWS Access Key Went to launch an instance without AWS Credentials? ~ | More Information | × |
| . Enter your A | Previous Connector - AWS Connector - AWS AVS Credentials O Letails | More Information | × |
| . Enter your A | Previous Continue Connector - AWS • AWS Credentials • Details • Details | More Information | × |

- Add Connector AWS More Information × AWS Credentials 2 Details (3) Network (4) Security Group (5) Review Details Connector Instance Name 0 0 Connector Role SnapCenterSvs Oreate Role O Select an existing Role Role Name Cloud-Manager-Operator-VZzSSP9-SnapCenter Add Tags to Connector Instance Om AWS Managed Encryption 0 Master Key: aws/ebs (default) Change Key Previous Next 1. Configure networking with the proper VPC, Subnet, and SSH Key Pair for connector access.
- 2. Name the connector instance and select Create Role under Details.

| Add BlueXP Co | onnector - AWS | | | More Information | |
|--|---|--|------------------------------|------------------|---|
| | AWS Credentials 🕢 Detai | ls <u>3</u> Network <u>4</u> Security Group | p 5 Review | | |
| | | Network | | | |
| | | | | | |
| | Connectivity | Proxy Configuration (Option | nal) | | |
| | vpc-0b522d5e982a50ceb - 172.30.15.0/25 | Example: http://172.16.254.1: | | | |
| | | | | | |
| | Subnet | Define Credentials for this Proxy | у ~ | | |
| | 172.30.15.0/25 priv-subnet-01 | Upload a root certificate 🗸 | | | |
| | Key Pair | 0 | | | |
| | sufi_new | ~ | | | |
| | Public IP | | | | |
| | Use subnet settings (Disable) | ~ | | | |
| | Notice: Ensure that the subnet has internet conne through a NAT device or proxy server so that the | ctivity Connector | | | |
| | can communicate with AWS services. | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| Set the Security Gr | Previo | Next | | | (|
| Set the Security Gr Add BlueXP C | Previo Toup for the connector. | Next | | More Information | |
| Set the Security Gr Add BlueXP C | Previous for the connector. | Is 🕜 Network 4 Security Grou | up (š) Review | More Information | |
| Set the Security Gr Add BlueXP C | Previo Proup for the connector. onnector - AWS @ AWS Credentials @ Detail | Is Vetwork Security Group | up (š) Review | More Information | |
| Set the Security Gr Add BlueXP C | Previo roup for the connector. onnector - AWS @ AWS Credentials @ Detai | IIS Vetwork Security Group | up (3) Review | More Information | |
| Set the Security Gr Add BlueXP C | Previo roup for the connector. onnector - AWS @ AWS Credentials @ Detail The security group of | Is Network Security Group nust allow inbound HTTP, HTTPS and SSH access | up (5) Review | More Information | |
| Set the Security Gr Add BlueXP C | Previo Proup for the connector. onnector - AWS @ AWS Credentials @ Detail The security group of Assign a security group: @ Create a new security group of the security grou | IIS IN Next IIS IN Next IIS IN Network IIS IN Network IIS IN Next | up (5) Review | More Information | |
| Set the Security Gr Add BlueXP C | Previo Proup for the connector. onnector - AWS AWS Credentials | Is Network Security Group nust allow inbound HTTP, HTTPS and SSH access curity group | up (5) Review s. group | More Information | |
| Set the Security Gr Add BlueXP C | Previo Coup for the connector. Connector - AWS @ AWS Credentials @ Detail The security group i Assign a security group i Create a new security group i 1 Security Group | IIS Network Security Group nust allow inbound HTTP, HTTPS and SSH access curity group Select an existing security g | up (5) Review | More Information | |
| Set the Security Gr Add BlueXP C | Previo Coup for the connector. Connector - AWS AWS Credentials O Detail The security group of Assign a security group: O Create a new security group of Security Group Name | IIS Wetwork Security Group The security Group The security group Select an existing security g Description | up (3) Review | More Information | |
| Set the Security Gr Add BlueXP C | Previo COUP for the connector. CONNECTOR - AWS CONNECTOR - AWS CONNECT | Is Security Group The sec | up (s) Review | More Information | |
| Set the Security Gr Add BlueXP C | Previo Coup for the connector. Connector - AWS AWS Credentials O Detail The security group I Assign a security group: O Create a new security group I 1 Security Group Name County Group Name County Group Name County Group Name | IIS Next IS Network Security Group nust allow inbound HTTP, HTTPS and SSH access curity group Select an existing security g t Description default VPC security group | up (3) Review | More Information | |
| Set the Security Gr Add BlueXP C | Previo Coup for the connector. Connector - AWS AWS Credentials O Detail The security group of Assign a security group: O Create a new security group of Security Group Name Center of the security of t | Is Network Security Group nust allow inbound HTTP, HTTPS and SSH access curity group i Description default VPC security group | up (s) Review | More Information | |
| Set the Security Gr Add BlueXP C | Previo Coup for the connector. Connector - AWS AWS Credentials | INS Next Next Is Network Security Group nust allow inbound HTTP, HTTPS and SSH access curity group Select an existing security g curity group C C C C C C C C C C C C C | up (s) Review | More Information | |
| Set the Security Gr Add BlueXP C | Previo Coup for the connector. Connector - AWS AWS Credential | IS Network Security Group Tust allow inbound HTTP, HTTPS and SSH access curity group () Select an existing security g t Description default VPC security group | up (s) Review | More Information | |
| Set the Security Gr Add BlueXP C | Previo Coup for the connector. Connector - AWS AWS Credentials | Is Security Group The sec | up (5) Review | More Information | |
| Set the Security Gr Add BlueXP C | Previo Coup for the connector. Connector - AWS AWS Credential Control Coup Create a new set Coup Create a new set Coup Coup Create a new set Coup Create a new set Create a new set Cre | IS Network 3 Security Group Is Security Group nust allow inbound HTTP, HTTPS and SSH access curity group Select an existing security group clip Description default VPC security group | up (3) Review | More Information | |

3. Review the summary page and click **Add** to start connector creation. It generally takes about 10 mins to complete deployment. Once completed, the connector instance appears in the AWS EC2 dashboard.

| Add BlueXP Conne | ctor - AWS | | | | | More Information | × |
|------------------|-----------------------|--------------------|----------------------|-----------------|----------------|------------------|---|
| | AWS Credentials | Oetails | Network | Security Group | 5 Review | | |
| | | | Review | | | | |
| | | | | Code for Terraf | orm Automation | | |
| | BlueXP Connector Name | aws-snapctr-us-e | east | | | | |
| | AWS Access Key | AKIAX4H43ZT56I | IWWR3TI | | | | |
| | Region | us-east-1 | | | | | |
| | VPC | vpc-0b522d5e98 | 2a50ceb - 172.30.15. | 0/25 | | | |
| | Subnet | 172.30.15.0/25 p | priv-subnet-01 | | | | |
| | Key Pair | sufi_new | | | | | |
| | Public IP | Use subnet settin | ngs (Disable) | | | | |
| | Ргоху | None | | | | | |
| | Security Group | default | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | Г | Provious | | Add | | | |

Define a credential in BlueXP for AWS resources access

1. First, from AWS EC2 console, create a role in **Identity and Access Management (IAM)** menu **Roles**, **Create role** to start role creation workflow.

| identity and Access 🛛 🗙 Management (IAM) | KAM > | Rolay | | | | |
|---|-------------------------|--|------------|---|----------------------------|-----------------|
| Q Search LAM | Role an UM met yt | $s\left(106\right)$ and $s_{\rm eff}$ density you can include that then specific premionions with critical bart. | destatu () | at are solid for short durations. Notes can be assumed by entries | C Definie | Create role |
| Dathboard | Q | Sharift | | | | 5 5 > @ |
| Access management | | Role name | | Trusted entities | | Last activity 🗢 |
| their groups | 2 | Amazand Californi aura failured | | AWS Server, no2 | | |
| Users | | Amazan55MRolef orimitancesQuickSetup | | AWS Service et2 | | 156 days ago |
| Policies | | aws controllower Administrativity securice Role | | Amount 982617961887 | | |
| identity providers | | aws-controllower-ConfigReconterRole | | AWS Service config | | |
| Account settings | | ave controllower ForwardInstactificationficie | | AWS Service: tambda | | 2 days ago |
| Access reports | | awa controllower RepORT reputier Pole | | Autoort: 962817961887 | | |
| Authine rules | | AWG QuickSetup StackSet Local AdministrationRule | | AWS Service: doutformation | | 354 days ago |
| Avalyvers | | AWG QueckSetup OtackSet Local (Lensition/Role | | Amount 541090183547 | | 354 days ago |
| Settings Credential report | | AantoControl ForwerExecution | | Account 292306980405 | | 207 days ago |
| Organization activity | | AWGReamwedTSD_AWGAdministratorAccess_30beb05ad/008031a | | Identity Provider: am awasam: 541690183547 sami-provider/AWSSSO_91b222 | 138525/441,00_NOT,0ELETE | 26 days ago |
| Service control policies (SCPs) | | Awards an webbar. Awards grad attorned addresses, Specific (1966 Feets) | | Identity Provider, am awai am: 541696183547 sami provider/AW3850_91b222 | 2738525/441,00,NOT,DELETE | |
| | | AWGReamvedEGO_AWGPowerDiseAccess_50900sadf6a40ed1 | | Identity Provider, am aws.lam.541696183547.sami-provider/AWSSS0_91b222 | 136535/441,00,NOT,DELETE | |
| IAM Identity Canter Pt | | AWGROUP VERSIO, AWGROAD VALUES, 234340/07/e780114 | | identity Privider: amaws iam: 541690183547.nami-privider/AW\$8550_91b222 | PSINDSM441_DO_NOT_DELETE | |
| AWS Organizations | | AWGRESS VERSES, SAA Dev ReadOnly, Iden 140403491567 | | Identity Provider: am aws.iam: 541696183547 sami-provider/AW\$3500,91b225 | HINB26441, DO. NOT. DELETE | |

2. In **Select trusted entity** page, choose **AWS account**, **Another AWS account**, and paste in the BlueXP account ID, which can be retrieved from BlueXP console.

| ect trusted entity | Select trusted entity Info | | | |
|-------------------------------------|--|--|--|--|
| | Trusted entity type | | | |
| ermissions e, review, and create | AWS service Allow AWS services like EC2, Lambda, or others to perform actions in this account. | AWS account Allow entities in other AWS accounts belonging to you or a 3rd party to perform actions in this account. | Web identity Allows users federated by the specified external web identity provider to assume this role to perform actions in this account. | |
| | SAML 2.0 federation Allow users federated with SAML 2.0 from a corporate directory to perform actions in this account. | Custom trust policy Create a custom trust policy to enable others to perform actions in this account. | | |
| | An AWS account Allow entities in other AWS accounts belonging to you or a 3rd party to | perform actions in this account. | | |
| | This account (\$41595183547) Another AWS account Account ID Identifier of the account that can use this role 952013314444 | | | |
| | Account ID is a 12-digit number. | | | |

3. Filter permission policies by fsx and add **Permissions policies** to the role.

| Q. Filter policies by property or policy name and press enter | ur. | 4 matches | < 1 > |
|---|---|--|--|
| *fsx* X Clear filters | | | |
| ■ Policy name □ ⁿ マ | Туре 🗢 | Description | |
| E AmazonFSxReadOnlyAccess | AWS ma | Provides read only access to Amazon FSx. | |
| MazonFSxFullAccess | AWS ma | Provides full access to Amazon FSx and access to related AWS services. | |
| The AmazonFSxConsoleReadOnlyAccess | AWS ma | Provides read only access to Amazon FSx and access to related AWS services via the AWS Management Console. | |
| AmazonFSxConsoleFullAccess | AWS ma | Provides full access to Amazon FSx and access to related AWS services via the AWS Management Console. | |
| | Q. Filter policies by property or policy name and press enter "fsx" X Clear filters Policy name [2" Image: Clear filters Image: Clear filters < | Q. Filter policies by property or policy name and press enter. "fsx" X Clear filters ■ Policy name (2) ▼ ■ Policy name (2) ▼ ■ Image: AmazonFSxReadOnlyAccess AWS ma ■ Image: AmazonFSxForsoleReadOnlyAccess AWS ma ■ Image: AmazonFSxConsoleReadOnlyAccess AWS ma Image: Image: AmazonFSxConsoleFullAccess AWS ma | Q. Filter policies by property or policy name and press enter. 4 matches "fsx" × Clear filters ■ Policy name (2) ▼ Type ▼ Description ■ # AmazonFSxReadOnlyAccess AWS ma Provides read only access to Amazon FSx. ■ # AmazonFSxCensoleReadOnlyAccess AWS ma Provides full access to related AWS services. ■ # AmazonFSxConsoleFulAccess AWS ma Provides read only access to Amazon FSx and access to related AWS services via the AWS Management Console. ■ # AmazonFSxConsoleFulAccess AWS ma Provides full access to Amazon FSx and access to related AWS services via the AWS Management Console. |

4. In **Role details** page, name the role, add a description, then click **Create role**.

| Step 1 Select trusted entity | Name, review, and create | |
|---------------------------------|--|------|
| Step 2 Add permissions | Role details | |
| Step 3 | Role name Enter a meaningful name to identify this role. | |
| Name, review, and create | fsm_bluexp | |
| | Maximum 64 characters: Use alphanumeric and ++-, @' characters: | |
| | Description Add a short explanation for this role. | |
| | Grant permission for BlueXP access to FSxN in AWS. | |
| | Maximum 1000 characters. Use alphanumeric and ++, @' characters. | |
| | Step 1: Select trusted entities | Edit |
| | <pre>1 - [() "Version": "2012-10-17", 3 - "Statement": [4 - { 7 - { 8 - "officet": "Allow", 7 - "official": { 8 - "AuS": "052013314444" 9 - }, 10 - { 11 - } 12] 13])</pre> | |

5. Back to BlueXP console, click on setting icon on top right corner of the console to open **Account credentials** page, click **Add credentials** to start credential configuration workflow.

| n Ne | tApp BlueXP | | | | Q BlueXP Search | Account ✓ Automation-te | Workspace 💙 Database-2 | Connector 🗸 | 4 0 🌣 | 0 O |
|------|-------------|---------------------|--|--|---|----------------------------|---------------------------|-------------|--------------|-----|
| | Credentials | Account credentials | User credentials | | | | | | | |
| e | | | | | | | | | | |
| | | (a) | | BlueXP and the Connector use and manage resources | e account-level credentials to de s in your cloud environment. | eploy | | | | |
| ¢ | | 5 cr | edentials | | | | Add credentials | | | |
| ۲ | | | aws shantanucreds Type: Assume Role | BlueXP | | | | | | |
| •• | | | 210811600188 | nkarthik_kafka_nfs_role_FSxN | | | | | | |
| | | | AWS Account ID | Assume Role | | | | | | |
| | | | | | | | | | | |

6. Choose credential location as - Amazon Web Services - BlueXP.

| 🗖 NetApp | D BlueXP | | Q BlueXP Search | Account ~ Automation-te | Workspace Y Database-2 | Connector 🛩 acao-aws-conn | l e 🌣 | 00 |
|----------|-----------------|---------------------|----------------------|----------------------------|---------------------------|------------------------------|--------------|----|
| | Add Credentials | | | | | | | × |
| • | | Choose Crede | entials Location | | | | | |
| @ • | | Choose how to assoc | iate the credentials | | | | | |
| | | Connector | BlueXP | 0 | | | | |
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| | | | | | | | | |
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| | | | | | | | | |
| | | N | ext | | | | | 0 |

7. Define AWS credentials with proper **Role ARN**, which can be retrieved from AWS IAM role created in step one above. BlueXP **account ID**, which is used for creating AWS IAM role in step one.

| n Net | App BlueXP | Q. Blue&P Search Account Workspace Connector Connector | l 🔹 🕸 🔞 😫 |
|--------|-----------------|--|-----------|
| | Add Credentials | Credentials Type 2 Define Credentials 3 Review | × |
| 9 | | Define Amazon Web Services Credentials | |
| ٠ | | Learn more about AWS authentication methods | |
| ¢ © | | When creating the IAM role. select Another AWS account and enter the account ID for BlueXP: 952013314444 d | |
| -3 | | Credentials Name | |
| | | Previous Next | 0 |

8. Review and Add.

| n Net | App BlueXP | | Q BlueXP Search Account ~ Automation-te | Workspace Connector Database-2 acao-aws-conn. | č 🖡 🎝 🎝 |
|-------|-----------------|--------------------|--|---|---------|
| | Add Credentials | ⊘ Creder | ttials Type 🕢 Define Credentials 3 Review | | × |
| 9 | | | Review | | |
| ٠ | | | | | |
| ¢ | | Credentials Type | AWS | | |
| ۲ | | Credentials Name | fsxn_bluexp | | |
| • | | Credential Storage | Cloud Manager | | |
| | | Role ARN | arn:aws:iam::541696183547:role/fsxn_bluexp | | |
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SnapCenter services setup

With the connector deployed and the credential added, SnapCenter services can now be set up with the following procedure:

1. From **My Working Environment** click **Add working Environment** to discover FSx deployed in AWS.

| | | Q BlueXP Search | Account Vorkspace Automation-team Database-2 | Connector aws-snapctr-us | 🍓 🌣 🥹 🖯 |
|--------------------------------|--------------------------|-----------------|---|------------------------------|--------------------|
| Canvas My Working Environments | My Opportunities | | | | Go to Tabular View |
| + Add Working Environment | | | C Enable Services 🚯 | Working Environments | |
| Ŷ | | | | | |
| ۲ | | | | | |
| * | | | | | |
| | Amazon S3 Buchets aws | | | | |
| | | | - + | | 0 |

1. Choose Amazon Web Services as the location.



| 🗖 NetAp | pp BlueXP | | | | Q BlueXP Search | Account 🛩 Automation-team | Workspace 🛩 Database-2 | Connector 🗸 | 6 | ¢ | ? | 0 |
|------------------|-------------------------|------------------------------|----------------------------|---------------------|-----------------------|------------------------------|---------------------------|-------------|---|---|---|---|
| | Add Working Environment | | | Choose a | Location | | | | | | | × |
| Ø | | | | | | | | | | | | |
| * | | | Microsoft Azure | Amazon Web Services | Google Cloud Platform | On-Premises | | | | | | |
| 6 | | | | Select | Туре | | | | | | | |
| ۲ | | Cloud Volu | imes ONTAP | | | | | | | | | |
| 0 ⁰ 0 | | Single Not | de) | | Disc | cover existing A | aa new | | | | | |
| | | Cloud Volu (High Avail | imes ONTAP HA lability) | | Disc | cover Existing | udd new | | | | | |
| | | FSX Amazon FS (High Avail | ix for ONTAP | | Disc | cover Existing | udd new 💛 | | | | | |
| | | Kubernetes Any | s Cluster | | | | Discover | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | 0 |

1. Select the **Credentials Name** that you have created in previous section to grant BlueXP with the permissions that it needs to manage FSx for ONTAP. If you have not added credentials, you can add it from the **Settings** menu at the top right corner of the BlueXP console.

| n Net | App BlueXP | Q. Bluex#P Search Account Workspace Commettor Commettor ans-snapctrus | 6 🔅 | 9 8 |
|-------|-------------------------------|---|------------|------------|
| 2 | Add an Existing FSx for ONTAP | FSx for ONTAP Authentication | | × |
| Q | | | | |
| ٠ | | Select the credentials that provides BlueXP with the permissions that it needs to manage FSx for ONTAP. | | |
| ¢ | | Credentials Name | | |
| ۲ | | DemoFSxNCMCredentials ~ | | |
| •• | | To add a new set of credential. go to the Credentials Page. | | |
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| | | Previous Next | | Q |

2. Choose the AWS region where Amazon FSx for ONTAP is deployed, select the FSx cluster that is hosting the Oracle database and click Add.

| 🗖 NetA | App BlueXP | | | | | xeXP Search Autom | int 💙 | Workspace 💙 Database-2 | Connector values aws-snapctr-us- | ٠ | 9 8 |
|--------|--------------------|--------------------------|--------------------------|----------------------------|--------------------------|---|----------|---------------------------|----------------------------------|---|------------|
| | Add an Existing FS | x for ONTAP | | Sele | ect FSx for ONT/ | AP | | | | | × |
| 9 | | | | | | | | | | | |
| • | | | Choose an A | WS region and then s | select the working env | vironment that you wan | t to add | | | | |
| Ģ | | | | Region us-east-1 US E | ast (N. Virginia) | ~ | | | | | |
| ۲ | | 1 FSx for ONTAP instance | | | | | | | Q | | |
| • | | Name | + File System ID + | VPC ID + | Subnet ID + | Management Address | ÷ | Deployment modal | ÷ Tags ÷ | | |
| | | O fsx_01 | fs- 02ad7bf3476b741df | vpc- 0b522d5e982a | subnet- 04f5fe7073ff5 | management.fs- 02ad7bf3476b741df.fsx.u | us-east | Single Availability Zone | ٩ | | |
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| | | | | Previou | | 44 | | | | | Q |
| | | | | Previou | ıs Ac | dd | | | | | |

1. The discovered Amazon FSx for ONTAP instance now appears in the working environment.



1. You can log into the FSx cluster with your fsxadmin account credentials.

| | etApp BlueXP | | | Q BlueXP Search | Account ~ Automation-team | Workspace V Database-2 | Connector 🗸 | la 🌣 | ? | 8 |
|----|--------------|------------------|------------------------|------------------|------------------------------|---------------------------|-------------|-------------|---|-----|
| 2 | Isx_01 | Overview Volumes | | | | | [| Timeline | C | (i) |
| ø | | | • | | | | | | | |
| | | | Je | \ \ | | | | | | |
| 6 | | | | 5 | | | | | | |
| ۲ | | | One last step and you | are ready to sta | rt | | | | | |
| •• | | | Provide ONTAP Clus | ster Password | | | | | | |
| | | | User Name | | | | | | | |
| | | | fsxadmin | | | | | | | |
| | | | ONTAP Cluster Password | | | | | | | |
| | | | | | | | | | | |
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| | | | | | | | | | | |
| | | | Save | Back to Canvas | | | | | | Q |

1. After you log into Amazon FSx for ONTAP, review your database storage information (such as database volumes).

| n Ne | tApp BlueXP | | | | | | Q BlueXP Searc | h Account Automation-team | Workspace | Connector aws-snapctr-us- | č 40 + | ¢ 0 | θ |
|-------|-------------|----------|---|---------------------------------|--|---------------------------------|---|---------------------------------|--|---|----------|-----|----|
| | isx_01 | Overview | Volumes | | | | | | | | Timeline | C | () |
| 9 e G | | | Volumes Sumn | nary | 3 Volumes | 250 GiB Provisioned Capacity | 26 SSD | 5.03 GiB | O GiB Capacity Pool | Used | | | |
| ۲ | | 3 | Volumes | | | | | | Q 🔚 | Add Volume | I | | |
| 4 | | | ora_01_ | data | ON | LINE Manage Volume | ora_01 | logs | ONI | .INE Manage Volume | | | |
| | | | INFO Disk Type SVM Name Tiering Policy | SSD svm_ora Snapshot Only | CAPACITY Provisioned SSD Used Capacity Pool Used | 100 GIB 5.79 GIB 0 GIB | INFO Disk Type SVM Name Tiering Policy | SSD svm_ora Snapshot Only | CAPACITY Provisioned SSD Used Capacity Pool Used | 100 GiB 1.14 GiB 0 GiB | | | |
| | | | ora_01_ | biny | | LINE Manage Volume | | | | | | | |
| | | | Disk Type SVM Name Tiering Policy | SSD svm_ora Snapshot Only | Provisioned SSD Used Capacity Pool Used | 50 GiB 19.1 GiB 0 GiB | | | | | | | 0 |

1. From the left-hand sidebar of the console, hover your mouse over the protection icon, and then click **Protection** > **Applications** to open the Applications launch page. Click **Discover Applications**.



| | Cancel | Next | Q |
|--|--------|------|---|
| | | | |
| | | | |
| | | | |
| | | | |

1. Choose Oracle for the application type.

| 🗖 Ne | tApp BlueXP | | Q BlueXP Search Account Automation-te | ✓ Workspace ✓ eam Database-2 | Connector 🗸 | lo 3 | ¢ ? | θ |
|--------|-----------------------|-------------|---------------------------------------|------------------------------|-------------|-------------|-----|---|
| | Discover Applications | | | | | | | × |
| • | | Select Appl | ication Type | | | | | |
| @ @ | | ORACLE | SAPHANA | | | | | |
| •: | | Oracle | SAP HANA | | | | | |
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| | | N | ext | | | | | 0 |

1. Fill in the AWS EC2 Oracle application host details. Choose **Using SSH** as **Host Installation Type** for one step plugin installation and database discovery. Then, click on **Add SSH Private Key**.

| n NetAp | p BlueXP | | | | Q BlueXP Search | Account ~ Automation-team | Workspace Database-2 | ~ Co ave | nnector 🗸 | 6 | ۵ | ? | 8 |
|------------|---------------------|-----------------|------------------------|--------------------------------|--------------------------------|------------------------------|-------------------------|-------------|-----------|---|---|---|---|
| e (| Backup and recovery | Volumes Restore | Applications Virtual | Machines Kubernetes | Job Monitoring | | | | | | | | |
| Ø | | | | | | | | | | | | | |
| • | | | | Add Ho | st | | | | | | | | |
| ¢ | | | Provide | the following details to add I | nost and discover applications | | | | | | | | |
| ۲ | | | Host Installation Type | 🔿 Manual 🕕 | Using SSH (1) | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | Host FQDN or IP | | Connector 🚯 | | | | | | | | |
| | | | 172.30.15.58 | | aws-snapctr-us-east | v | | | | | | | |
| | | | Username(Sudo) 🚯 | | | | | | | | | | |
| | | | ec2-user | | Add SSH Private Key Op | tional 🕕 | | | | | | | |
| | | | SSH Port | | Plug-in Port | | | | | | | | |
| | | | . 22 | | 8145 | | | | | | | | |
| | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | 0 |
| | | | | Cancel | Next | | | | | | | | U |

2. Paste in your ec2-user SSH key for the database EC2 host and click on **Validate** to proceed.

| n Ne | etApp BlueXP | Q. Bluesh Search Account 💙 Workspace 🎽 Connector 🎽 🏚 🌣 🤣 € |
|------|-----------------------|---|
| - | Discover Applications | Host Details (2) Configuration (3) Review |
| 9 | | |
| • | | Select host type |
| ŝ | | Provide the following details to add host and discover applications |
| • | | Host Installation Type O Manual 🕕 🛞 Using SSH 🕦 |
| •: | | Add SSH Private Key |
| | | Validate SSH connectivity to host |
| | | SSH Private Key |
| | | Validate |
| | | Proceed Cancel |
| | | |
| | | |
| | | |
| | | |
| | | Previous Next |

3. You will be prompted for **Validating fingerprint** to proceed.

| n Ne | tApp BlueXP | | | | | Q BlueXP Search | Account ~ Automation-team | Workspace Database-2 | ~ | Connector 🛩 aws-snapctr-us | 6 | ٠ | ? | θ |
|------|---------------------|-----------------|--------------|-----------------------|-----------------------|-------------------------------------|------------------------------|-------------------------|-----|-------------------------------|---|---|---|---|
| | Backup and recovery | Volumes Restore | Applications | Virtual Machines | Kubernetes | Job Monitoring | | | | | | | | |
| ø | | | | | | | | | | | | | | |
| | | | | Provide the followi | Add Hos | t | | | | | | | | |
| 6 | | | | Provide the following | ng detana to add in | stand discover applications | | | | | | | | |
| ۲ | | | Host Insta | lation Type 🛛 🔿 | Manual 🚯 | Using SSH () | | | | | | | | |
| • | | | | | | | | | | | | | | |
| | | | Host | Validating fingerpri | int | | | | - 1 | | | | | |
| | | | Usen | Algorithm | | ssh-rsa | | | | | | | | |
| | | | ec2 | Fingerprint | | AAAAE2VjZHNhLXNoYT | ItbmlzdHAyNTYAAAAlb | ml | | | | | | |
| | | | SSH I | By proceeding further | r, I confirm that the | above fingerprint for host is valid | d. | | | | | | | |
| | | | 22 | | | | | | | | | | | |
| | | | _ | | | | Procced | Cancel | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | Cancel | Next | | | | | | | | 0 |

4. Click on **Next** to install an Oracle database plugin and discover the Oracle databases on the EC2 host. Discovered databases are added to **Applications**. The database **Protection Status** shows as **Unprotected** when initially discovered.

| n Net | tApp BlueXP | | | Q BlueXP Search A | Account V Workspace Automation-team Database-2 | Connector aws-snapctr-us | 0 | ¢ () | • |
|-------|---------------------|-----------------|--|-------------------|---|--------------------------|---------|------|---|
| | Backup and recovery | Volumes Restore | Applications Virtual Machines Kubernetes | s Job Monitoring | | | | | |
| 9 | | | | | | | | | |
| • | | Cloud Native | Oracle | • | | | | | |
| ô | | Codd Name | | | | | | | |
| 0 | | 1 | | | Application Protectio | in | | | |
| • | | Hosts | ORACLE | Clone | Protected | Unprotected | | | |
| | | | | | | | | | |
| | | 1 Databases | | | | | | | |
| | | Filter By | | ٩ | Manage Databases 🛛 🔻 | Settings 🔻 | | | |
| | | Name | Host Name | 🗧 📔 Policy Name | Protection Status | ¢ (] | | | |
| | | db1 | 172.30.15.58 | | 0 Unprotected | | | | |
| | | | | | 1 - 1 of | 1 << < 1 > >> | | | |
| | | | | | | | | | |
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| | | | | | | | | | |
| : | mpletes the ini | tial setup of S | SnanCenter services | s for Oracle Th | ne next three | sections o | of this | : | |
| 00 | | | | | -tione | | | - | |
| Ime | ent describe UI | racie databas | e packup restore a | and clone oper | allons | | | | |

Oracle database backup

1. Click the three dots next to the database **Protection Status**, and then click **Polices** to view the default preloaded database protection policies that can be applied to protect your Oracle databases.

| Backup and recovery Volumes Restore Applications Virtual Machines Kubernetes Job Monitoring Cloud Native Oracle Image: Cloud Native Oracle Image: Cloud Native Application Protection Image: Cloud Native Image: Cl | tApp BlueXP | | | Q BlueXP Search | Account V Workspace Automation-team Database-2 | Connector aws-snapctr-us | ~ @ | ¢ (| | |
|---|---------------------|-----------------|-------------------------------|---------------------------|---|--------------------------|------------------------|--------------|--|--|
| Cloud Native Image: Cloud Native I | Backup and recovery | Volumes Restore | Applications Virtual Machines | Kubernetes Job Monitoring | | | | | | |
| Cloud Native Oracle Image: Database Image: Database Im | | | | | | | | | | |
| Image Databases Image Database | | Cloud Native | ▼ Oracle | - | | | | | | |
| 1 0 1 0 0 1 0 0 1 0 0 1 0 0 0 1 0 0 0 1 0 0 0 1 0 0 0 1 0 | | | | | Application Protection | 'n | | | | |
| 1 Databases Q Manage Databases ▼ Filter By + Q Manage Databases ▼ Name ^ Host Name ○ Policy Name Policies db1 172:30:15:58 ① Unprotected Hosts 1-10f1 ≪ 4 3 ∞ | | 1 Hosts | BB 1 ORACLE | | O Protected | 0 1 | | | | |
| 1 Databases Filter By + Q Manage Databases V Settings V Name A Host Name C Policy Name Protection Status db1 172:30.15.58 V Unprotected Hosts 11-10f (< 1 > >> | | | | | | | | | | |
| Riter By A Host Name Policy Name Protection Status About db1 172:30.15.58 172:30.15.58 1100000000000000000000000000000000000 | | 1 Databases | | | | | | | | |
| Name A Host Name Policy Name Protection Status Policies db1 172.30.15.58 ① Unprotected About 1-1oft << <td><<<td><</td> >></td> <td></td> <td>Filter By +</td> <td></td> <td>3</td> <td>Q Manage Databases ▼</td> <td>Settings 🔻</td> <td></td> <td></td> | << <td><</td> >> | < | | Filter By + | | 3 | Q Manage Databases ▼ | Settings 🔻 | | |
| db1 172.30.15.58 ① Unprotected Hosts 11-10f1 <<<<1>>>> >>> | | Name | A Host Name | O Policy Name | Protection Status | Policies About | | | | |
| 1-1of1 « < 1 > » | | db1 | 172.30.15.58 | | 0 Unprotected | Hosts | | | | |
| | | | | | 1 - 1 of | < < 1 > >> | | | | |
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| | | | | | | | | | | |

1. You can also create your own policy with a customized backup frequency and backup data-retention window.

| n Net/ | App BlueXP | | | Q BlueXP Search Account Workspace Y Automation-team Database-2 Da | Connector ~ aws-snapctr-us | 6 | ¢ (| 8 |
|--------|-------------------------|-------------------------------|-------------------------------|--|-------------------------------|---|-----|---|
| | Backup and recovery | Volumes Restore | Applications Virtual Machines | Kubernetes Job Monitoring | | | | |
| 9 | | | | | | | | |
| • | Applications > Policies | | | | | | | |
| ô | | Cloud Native | - Oracle | · | | | | |
| ۲ | | 4 Policies | | ۹ 🗖 | Create Policy | | | |
| 4 | | Policy Name | A Backup Type | 0 Schedules and Retention | 1 | | | |
| | | Oracle Full Backup for Bronze | FullBackup | Daily: Repeats Every 1 Day. Keeps 14 copies Weekly: Repeats Every Fril. Keeps 4 copies Monthly: Repeats Every 1st Day of Jan. Feb. Mar. Apr. May. Jun. Jul. Aug. Sep. Oct. No | · · · · | | | |
| | | Oracle Full Backup for Gold | FullBackup | Hourly: Repeats Every 6 Hrs. Keeps 16 copies Daily: Repeats Every 1 Day, Keeps 30 copies Weekly: Repeats Every 11 Keeps 4 copies Monthly: Repeats Every 1st Day of Jan, Feb. Mar, Apr. May, Jun. Jul. Aug. Sep. Oct. No | ••• | | | |
| | | Oracle Full Backup for Silver | FullBackup | Hourly: Repeats Every 12 Hrs. Keeps 6 copies Daily: Repeats Every 1 Day, Keeps 14 copies Weekly: Repeats Every 14 Keeps 4 copies Monthy: Repeats Every 15 Day of Jan, Feb. Mar, Apr, May, Jun, Jul, Aug, Sep. Oct. No | ••• | | | |
| | | my_full_bkup | FullBackup | Hourly: Repeats Every 1 Hr, Keeps 3 Days | | | | |
| | | | | 1-4 of 4 << | < 1 > >> | | | |
| | | | | | | | | 0 |
| | | | | | | | | |

1. When you are happy with the policy configuration, you can then assign your policy of choice to protect the database.

| Nocapp Bluexp | | | Q BlueXP Search | Account Workspace Connector Automation-team Database-2 aws-snapctr-us | la 🌣 😗 (|
|-------------------|---------------------|---------------------------------------|--------------------|---|----------|
| Backup and recove | ery Volumes Restore | Applications Virtual Machines Kuberne | tes Job Monitoring | | |
| | | | | | |
| | Claud Matter | | | | |
| | cloud Native | Uracie | | | |
| | | | | Application Protection | |
| | Hosts | ORACLE | | 0 1 Protected Unprotected | |
| | | | | | |
| | 1 Databases | | | | |
| | Filter By + | | c. | Q Manage Databases V Settings V | |
| | Name | A Host Name | 0 Policy Name | Protection Status 🗘 | |
| | | | | | |
| | db1 | 172.30.15.58 | | Unprotected •••• | |
| | db1 | 172.30.15.58 | | Unprotected | |
| | db1 | 172.30.15.58 | | Unprotected View Details Assign Policy | |
| | db1 | 172.30.15.58 | | Unprotected View Details Assign Policy | |
| | db1 | 172.30.15.58 | | Unprotected View Details Assign Policy | |

1. Choose the policy to assign to the database.

| | pp BlueXP | | | | | | | Q BlueX | IP Search | Account ~ Automation-team | Wo Data | rkspace 1base-2 | | Connector aws-snapctr-u | | 0 | ۵ | ? | 8 |
|----|--------------------------|------------|-------------|---------------|--------------|------------------|----------------------|---------------------|--|---|---|------------------------|------------------------|---------------------------------|----|---|---|---|---|
| | Backup and recovery | Vo | olumes | Restore | Applications | Virtual Machines | Kubernetes | Job Monitoring | U | | | | | | | | | | |
| 8 | Applications > Assign Po | icv | | | | | | | | | | | | | | | | | |
| • | | | | | | | Assig | gn Policy | | | | | | | | | | | |
| \$ | | | | | | Assign a | policy to start taki | ng backups of the c | database "db1 | | | | | | | | | | |
| 0 | | 4 Policies | | | | | | | | | | | | | | | | | |
| 4 | | 1 | Poli | icy Name | | ∧ Bac | :kup Type | 01 | Schedules | | | | | | | | | | |
| | | | Oracle Full | ll Backup for | Bronze | FullBa | ackup | | Daily: Repe Weekly: Re Monthly: R | eats Every 1 Day, Kee speats Every Fri, Keep sepeats Every 1st Day | eps 14 copies os 4 copies y of Jan, Feb, | Mar, Apr. I | May, Jun | n, <mark>J</mark> ul, Aug, Sep, | с | | | | |
| | | | Oracle Full | ll Backup for | Gold | FuliBa | ackup | | Hourly: Rep Daily: Repe Weekly: Re Monthly: R | peats Every 6 Hrs, Ke eats Every 1 Day, Kee epeats Every Fri, Keep repeats Every 1st Day | eeps 16 copie eps 30 copies os 4 copies y of Jan, Feb, | es ; Mar, Apr, I | May, <mark>Ju</mark> n | n, Jul. Aug. Sep. | с | | | | |
| | | | Oracle Full | ll Backup for | Silver | FullBa | ackup | | Hourly: Rep Daily: Repe Weekly: Re Monthly: R | peats Every 12 Hrs, K eats Every 1 Day, Kee epeats Every Fri, Keep repeats Every 1st Day | Keeps 6 copie ps 14 copies ps 4 copies y of Jan, Feb, | es 5 Mar, Apr, I | May, Jun | n, Jul, Aug, Sep, | c | | | | |
| | | \bigcirc | my_full_bk | kup | | FullBa | ackup | | Hourly: Rep | peats Every 1 Hr, Kee | eps 3 Days | | | | | | | | |
| | | | | | | | | | | | | 1 - 4 of 4 | ~~ | < 1 > | >> | | | | |
| | | | | | | | Cancel | Assig | n | | | | | | | | | | Q |

1. After the policy is applied, the database protection status changed to **Protected** with a green check mark.

| 🗖 Ne | tApp BlueXP | | | | | | Q BlueXP Search | Accou Autom | int 🗸 | Workspace Database-2 | | Connector aws-snapctr-us- | | 6 | ٥ | ? | 8 |
|------|---------------------|--------------|---------|--------------|------------------|------------|-----------------|------------------------|----------------|-------------------------|---------|------------------------------|---|---|---|---|---|
| | Backup and recovery | Volumes | Restore | Applications | Virtual Machines | Kubernetes | Job Monitoring | | | | | | | | | | |
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| • | | Cloud Native | | | Oracle | | | | | | | | | | | | |
| ê | | | | | | | | | | | | | | | | | |
| ۲ | | <u> </u> | | | 00 1 | | | | Applicati | on Protectio | | | | | | | |
| • | | Hosts | | | ORACLE | | Clone | | Protected | | Unprote | ected | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | 1 Databases | | | | | | _ | | | | | _ | | | | |
| | | Filter By 🕂 | | | | | | ۹ 🗖 | Manage Databas | ses 🔻 | S | ettings 🔻 | | | | | |
| | | Name | | ∧ Host Nam | ie i | 0 | Policy Name | $\langle \psi \rangle$ | Protection Sta | tus | ¢ | | | | | | |
| | | db1 | | 172.30.15. | 58 | | Smy_full_bkup | | Protected | | | | | | | | |
| | | | | | | | | | | 1 - 1 of | 1 << | < 1 > >> | • | | | | |
| | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | C |
| | | | | | | | | | | | | | | | | | - |

1. The database backup runs on a predefined schedule. You can also run a one-off on-demand backup as shown below.

| n Net | App BlueX | P | | | Q BlueXP Sea | rch Account ~ | / W | Vorkspace 🛩 🛛 | Connecto aws-snapc | r 🗸 | 6 | ٠ | ? | 8 |
|--------|-----------|-----------------|---------|----------------------|-----------------|-------------------------|-----------|------------------|-----------------------|-----------------|------|----|---|---|
| | G Back | up and recovery | Volumes | Restore Applications | Virtual Machine | es Kubernetes Job | Monitorir | ng | | | | | | |
| 9 | | | | | | | | | | | | | | |
| • | | Cloud Native | | ▼ Oracle | | | | | | | | | | |
| @ @ | | | | | | | | Application | Protectio | n | | | | |
| • | | Hosts | | ORACLE | | Clone | | 1 Protected | | 0 Unprotect | ed | | | |
| | | 1 Databases | | | | | | | | | | | | |
| | | Filter By + | | | | | ۹ 🛛 | Manage Databases | 🔻 | Setti | ings | • | | |
| | | Name | ^ | Host Name | 0 | Policy Name | | Protection Statu | 5 | e | | | | |
| | | db1 | | 172.30.15.58 | | Soracle Full Backup for | r Gold | Sector Protected | | | | | | |
| | | | | | | | | | On-Demar | ls id Backup | 1 > | >> | | |
| | | | | | | | | | Assign Poli | cy Policy | | | | |
| | | | | | | | | | -11 035501 | | | | | 0 |
| | | | | | | | | | | | | | | U |

The database backups details can be viewed by clicking View Details from the menu list. This
includes the backup name, backup type, SCN, and backup date. A backup set covers a snapshot for
both data volume and log volume. A log volume snapshot takes place right after a database volume
snapshot. You can apply a filter if you are looking for a particular backup in a long list.

| NetApp | BlueXP | | Q BlueXP Search | Account ✓ Automation-team | Workspace V Database-2 | Connector 🛩 aws-snapctr-us | la 🔅 |
|--------|--|--------------------------------|------------------|---------------------------------------|---------------------------|--------------------------------|-------------|
| G | Backup and recovery Volumes | Restore Applications | Virtual Machines | Kubernetes Job Mo | onitoring | | |
| | Applications > Database Details | | | | | | |
| | | | Database | Details | | | |
| | db1 Database Name | Protected Protection | | Oracle Full Backup fo Policy Names | or Gold | Database Type | |
| | 172.30.15.58 Host Name | FSx Host Storage | | Unreachable Database Version | | bKed8yv2T19BJ0V5Qy Agent Id | qvA |
| | - Clones | - Parent Database | | | | | |
| | 8 Backups | | | | | | |
| | Filter By + | | | | | Q Selec | Timeframe 🔻 |
| | Backup Name | \$ | Backup Type | ⊖ SCN ⇒ | Backup Date | ~ [| |
| | Oracle_Full_Backup_for_Gold_Weekly_db1 | 1_2023_03_24_19_12_18_60900_1 | Log | 2589354 | Mar 24, 2023, 3:12:34 p | om Delete | |
| | Oracle_Full_Backup_for_Gold_Weekly_db1 | 1_2023_03_24_19_11_51_51476_0 | Data | 2589306 | Mar 24, 2023, 3:12:18 p | om ••• | |
| | Oracle_Full_Backup_for_Gold_Hourly_db1 | _2023_03_24_18_10_31_71953_1 | Log | 2586621 | Mar 24, 2023, 2:10:45 p | om Delete | |
| | Oracle Full Backup for Gold Hourly db1 | 2023 03 24 18 10 03 20535 0 | Data | 2586557 | Mar 24 2023 2:10:31 r | | |

Oracle database restore and recovery

1. For a database restore, choose the right backup, either by the SCN or backup time. Click the three dots from the database data backup, and then click **Restore** to initiate database restore and recovery.

| NetApp BlueXP | | Q BlueKP Search Account V Workspace V Connector V Automation-team Database-2 avs-snapstr us |
|---------------|---|---|
| 🕝 Backup and | recovery Volumes Restore Applications Virtual Machines Ku | ernetes Job Monitoring |
| Applications | > Database Details | |
| | Da | abase Details |
| | db1 Protected Database Name Protection | Oracle Full Backup for Gold Database Type Policy Names |
| | 172.30.15.58 FSx Host Name Host Storage | Unreachable bKed9yv2T19BJ0V5QyqvA Database Version Agent id |
| | - Clones Parent Database | |
| | 6 Backups | |
| | Filter By + | Q Select Timeframe V |
| | Backup Name 0 Backup | Type ⊖ SCN ⊖ Backup Date -> |
| | Oracle_Full_Backup_for_Gold_Hourly_db1_2023_03_24_18_10_31_71953_1 Log | 2586621 Mar 24, 2023, 2:10:45 pm Delete |
| | Oracle_Full_Backup_for_Gold_Hourfy_db1_2023_03_24_18_10_03_70535_0 Data | 2586557 Mar 24, 2023, 2:10:31 pm ••• |
| | Oracle_Full_Backup_for_Gold_Hourly_db1_2023_03_24_15_37_04_98851_1 Log | 2580577 Mar 24, 2023, 11:37: Restore e |
| | Oracla Full Packup for Cold Houdy doi: 2022.02.24.15.26.22.27005.0 | 2500524 May 24 2022 44/27/0 |

 Choose your restore setting. If you are sure that nothing has changed in the physical database structure after the backup (such as the addition of a data file or a disk group), you can use the Force in place restore option, which is generally faster. Otherwise, do not check this box.

| | letApp BlueXP | Q. BlueXP-Search Account Workspace Connector Automation-team Database-2 ave-snaptr-vs | .ĭ ♠ ♦ @ 8 |
|--------------|-------------------------|--|--------------|
| | Restore "db1" | Restore Settings 2 Review | × |
| | | Restore Settings | |
| ବ * 1. | R | store Scope All Data Files Data Files Restore Control Files Control Files Restore Force in place restore In place restore will skip the foreign files/files which are not part of the database) validation check. The Oracle database and the ASM disk group will be restored to the point when the backup was created. Database state will be changed if needed for restore and recovery. tecovery Scope All Logs Until System Change Number Date and Time No Recovery Archive Log Files Locations [mnt/log_location001 Open the database or the container database in READ-WRITE mode after recovery. | |
| | Review and start databa | Previous Next | 0 |
| III Ne | etApp BlueXP | | Q BlueXP Search | Account 🛩 Automation-team | Workspace V Database-2 | Connector 🛩 aws-snapctr-us | 6 | ¢ 6 | 8 | | | | |
|--------|---------------|---|-------------------------------|------------------------------|---------------------------|-------------------------------|---|-----|---|--|--|--|--|
| - | Restore "db1" | Restore "db1" Restore Settings Review | | | | | | | | | | | |
| Q | | | | | | | | | | | | | |
| ٠ | | F | Review | | | | | | | | | | |
| 6 | | Rackup Name | Oracle Full Packup for G | old Weekl | | | | | | | | | |
| ۲ | | васкор манте | y_db1_2023_03_24_19_11_5 0 | 51_51476_ | | | | | | | | | |
| •: | | Restore Scope | All Data Files | | | | | | | | | | |
| | | Recovery Scope | All Logs | | | | | | | | | | |
| | | Force In Place Restore | Yes | | | | | | | | | | |
| | | Open Database or Container Database in READ-WRITE Mode After Recovery | Yes | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | Previous | Restore | | | | | | Q | | | | |

1. From the **Job Monitoring** tab, you can view the status of the restore job as well as any details while it is running.

| - Advanced Searc | h & Filtering | Timeframe: Last 24 Hours | | | | Walch 24 2025, 152253 | |
|----------------------|---------------|--------------------------|------------|---------------------------------|-----|-------------------------|---|
| Jobs(30) | • | | | | | - | 7 |
| Job ID 🗘 | Туре | Resource Name | 🗘 Status | Job Name | \$ | Start Time | Ð |
| 1fdca0bd-a9c8-45aa | | - | ⊘ Success | Restore for Oracle Database dl | b1 | Mar 24 2023, 3:16:28 pr | |
| D f6f4fe2d-3040-497f | - | | ⊘ Success | Backup of db1 oracle database | 9 0 | Mar 24 2023, 3:11:51 pr | |
| 5e3299f5-29db-4dcc | | | ⊘ Success | Backup of db1 oracle database | 2 0 | Mar 24 2023, 2:10:03 pr | |
| 🗇 6da5e51e-1a79-4e7e | | | Success | Initialize FullBackup backup of | ро | Mar 24 2023, 2:10:01 pr | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
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| n Net/ | Арр | BlueXP | | | | | Q BlueXP | Search Account Automat | on-team | Workspace V Database-2 | | Connector 🗸 | 6 | \$ | 0 | 8 |
|--------|-----|--------|------------------------|-----------------------|--------------|--------------|--|---------------------------|---------|---------------------------|----|-------------|----|----|---|---|
| | G | Backup | and recovery | Volumes | Restore | Applications | Virtual Mach | ines Kubernetes | Job I | Monitoring | | | | | | |
| 9 | | Job Mo | nitoring > Job Id: 1fc | lca0bd-a9c8-45aa-9d | 7a-05a07cb29 | 1f4 | | | | | | | | | | |
| • | | | | | | | Jc | b Details | | | | | | | | |
| 2 | | | | | | ; | Job ld: 11dca0bd-a9c8-45aa-9d7a-05a07cb29114 | | | | | | | | | |
| 0 | | Sul | o-Jobs(6) lob Name | | \$ | Job ID | ¢ | Start Time | \$ | End Time | \$ | Duration | \$ | 0 | | |
| • | | | Restore for Orac | le Database db1 using | backup | 1fdca0bd-a | 9c8-45aa-9d | Mar 24 2023, 3:16:28 p | m | Mar 24 2023, 3:23:33 pm | | 7 Minutes | | | | |
| | | | Post Res | tore Cleanup | | 🗇 2096a8e4- | 889d-4b2a-9 | Mar 24 2023, 3:23:18 p | m | Mar 24 2023, 3:23:32 pm | | 14 Seconds | | | | |
| | | | Post Res | tore | | 🗇 fb7b1171-9 | 9f6f-4228-9e | Mar 24 2023, 3:20:06 p | m | Mar 24 2023, 3:23:19 pm | | 3 Minutes | | | | |
| | | | Restore | | | 🗇 0f4580d0-6 | 5598-458b-a7 | Mar 24 2023, 3:17:49 p | m | Mar 24 2023, 3:20:07 pm | | 2 Minutes | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | C |
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Oracle database clone

To clone a database, launch the clone workflow from the same database backup details page.

1. Select the right database backup copy, click the three dots to view the menu, and choose the **Clone** option.

| NetAp | p BlueXP | | | | Q BlueXP Search | Account ~ Automation-team | Workspace Y Co Database-2 av | onnector 👻 | 0 | 1 |
|-------|------------------------|--------------------------------|--------------------------------------|-------------|--------------------|------------------------------|---------------------------------|------------|---|---|
| 1 | Backup and recovery | y Volumes Restore | Applications Virtual Machines | Kubernetes | Job Monitoring | | | | | |
| | Applications > Databas | se Details | | | | | | | | |
| | | | | Databa | ase Details | | | | | |
| | | db1 | Protected Protection | | Oracle Full Backup | for Gold | Database Type | | | |
| | | 172.30.15.58 | F5x | | Unreachable | | bKed8vv2T19BI0V5Ovgv/ | A | | |
| | | Host Name | Host Storage | | Database Version | | Agent Id | | | |
| | | - Clones | - Parent Database | | | | | | | |
| | | 2 Backups | | | | | | | | |
| | | Filter By 🕂 | | | | | Q Select Tir | meframe 🔻 | | |
| | | Backup Name | ¢ | Backup Type | 0 SCN 0 | 0 Backup Date | | | | |
| | | Oracle_Full_Backup_for_Gold_Ho | urly_db1_2023_03_24_13_34_41_30491_1 | Log | 2575607 | Mar 24, 2023, 9:34 | :55 am Delete | | | |
| | | Oracle_Full_Backup_for_Gold_Ho | urly_db1_2023_03_24_13_34_07_26748_0 | Data | 2575555 | Mar 24, 2023, 9:34 | :41 am •••• | | | |
| | | | | | | | Delete < | 1 > >> | | |
| | | | | | | | Clone | | | |

1. Select the **Basic** option if you don't need to change any cloned database parameters.

| Clone Database of "db1" | Clone Details | |
|-------------------------|---|--|
| Crone Database of up1 | Unune Declarito 🕑 Reenew | |
| | Create Clone Provide following details to create a clone from the database backup "Oracle_Full_Backup_for_Gold_Hourly_db1_2023_03_24_13 | |
| | Select Clone Options Basic Specification file Specification | |
| | Clone Host Clone SID | |
| | dbtclone Clone Naming Scheme Oracle Home | |
| | Auto-generated //u01/app/orade/product/19.0.0/db1 Database Credentials Optional ASM Credentials Optional | |
| | Add Credential | |
| | | |
| | | |
| | Cancel Next | |

1. Alternatively, select **Specification file**, which gives you the option of downloading the current init file, making changes, and then uploading it back to the job.

| Clone Databas | of "db1" | 1 Clone Details 2 Review | |
|---------------------|--------------|---|---|
| | | Create Clone | |
| | | Provide following details to create a clone from the database backup "Oracle_Full_Backup_for_Gold_Weekly_db1_2023_03_24_19 | |
| | | Select Clone Options O Basic Basic Specification file | |
| | | (j) Generate specification file to modify input parameters and use for clone. | |
| | | Specification File | |
| | | Clone Host Clone SID | |
| | | 172.30.15.58 v db1clone | |
| | | Database Credentials Optional ASM Credentials Optional | |
| | | Cancel Next | |
| Review ar | d launch the | job. | |
| .pp BlueXP | | Q. BlueXP/9 Search Account Workspace Connector Q Automation-team Detabase-2 aws snapstr usr Image: Connector usr Image: Connector usr | ? |
| Clone Database of " | lb1" | Clone Details 2 Review | |
| | | | |
| | | Review | |
| | | General Database parameters | |
| | | | |
| | | Backup Name Oracle Full Backup for Gold Hourly_db1_2023_03_24_13_34_07_26748_0 | |

1. Monitor the cloning job status from the **Job Monitoring** tab.

Clone Host

Datafile locations

Control files

Redo logs

Recovery scope

172.30.15.58

DATA_db1clone

+DATA_db1clone/db1clone/control/control01.ctl

RedoGroup = 1 TotalSize = 1024 Path = +DATA, db tclone/db tclone/redolog/redo01_01.log RedoGroup = 2 TotalSize = 1024 Path = +DATA, db tclone/db tclone/redolog/redo02_01.log RedoGroup = 3 TotalSize = 1024 Path = +DATA, db tclone/db tclone/redolog/redo03_01.log

Until cancel using selected backup's archive logs

Clone

0

Previous

| 🗖 Net/ | App BlueXP | | | | Q BlueXP Search | Account ~ Automation-team | Workspace V Database-2 | Connector ~ aws-snapctr-us | 6 | ¢ () | θ |
|--------|----------------------|----------------------------|--------------------------------|-----------------------|-------------------------------|------------------------------|---------------------------|-------------------------------|---|------|---|
| | Backup and recove | ery Volumes | Restore Application | is Virtual Machines I | Kubernetes Job Monitorin | 9 | | | | | |
| 9 | Job Monitoring > Jol | b ld: cd30abaf-fbe2-4052-a | 6db-4bf965a8d29b | | | | | | | | |
| • | | | | | | | | | | | |
| 6 | | Sub-Jobs(2) | | Job ld: cd3 | 0abaf-fbe2-4052-a6db-4bf965a8 | d29b | | Expand All 🗸 | | | |
| ۲ | | Job Name | | ≎ Job ID | Start Time | ≎ End Time | ≎ Duration | ≎∣ 🔂 | | | |
| •• | | Cloning Oracle D | latabase db1 as db1clone on h. | 🗇 cd30abaf-fbe2-4052- | a6 Mar 24 2023, 1:30:36 pr | 1 | | | | | |
| | | Running | pre scripts | 51f152c1-853a-4ec6- | a4f Mar 24 2023, 1:30:41 pn | Mar 24 2023, 1:30 | :41 pm 0 Second | | | | |
| | | Validatin | g clone request | f93a6c44-2eb2-4c5e- | 9f Mar 24 2023, 1:30:35 pn | Mar 24 2023, 1:30 | :42 pm 7 Seconds | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

1. Validate the cloned database on the EC2 instance host.

Multiple entries with the same \$ORACLE_SID are not allowed.

+ASM:/u01/app/oracle/product/19.0.0/grid:N db1:/u01/app/oracle/product/19.0.0/db1:N # SnapCenter Plug-in for Oracle Database generated entry (DO NOT REMOVE THIS LINE) db1clone:/u01/app/oracle/product/19.0.0/db1:N [oracle@ip-172-30-15-58 ~]\$ crsctl stat res -t

| | Target | State | Server | State details |
|---|---|---------------------------------------|--|--|
| Local Resou | irces | | | |
| ora.DATA.do | i | | | |
| ana na minina matangan pangana m | ONLINE | ONLINE | ip-172-30-15-58 | STABLE |
| ora.DATA DE | SICLONE, dg | | | |
| | ONLINE | ONLINE | ip-172-30-15-58 | STABLE |
| ora.LISTENE | R.lsnr | | | |
| | ONLINE | ONLINE | ip-172-30-15-58 | STABLE |
| ora.LOGS.dg | Ĩ | | | |
| | ONLINE | ONLINE | ip-172-30-15-58 | STABLE |
| ora.LOGS SC | 0 2748138658 | 8.dg | | |
| | ONLINE | ONLINE | ip-172-30-15-58 | STABLE |
| ora.asm | | | | |
| | ONLINE | ONLINE | ip-172-30-15-58 | Started, STABLE |
| ora.ons | | | | |
| | OFFLINE | OFFLINE | ip-172-30-15-58 | STABLE |
| | | | | |
| Cluster Res | ources | | | |
| Cluster Res | ources | | | |
| Cluster Res ora.cssd 1 | ources ONLINE | ONLINE | ip-172-30-15-58 | STABLE |
| Cluster Res ora.cssd 1 ora.db1.db | ONLINE | ONLINE | ip-172-30-15-58 | STABLE |
| Cluster Res ora.cssd 1 ora.db1.db 1 | ONLINE ONLINE | ONLINE | ip-172-30-15-58 ip-172-30-15-58 | STABLE Open,HOME=/u01/app/o racle/product/19.0.0 /db1,STABLE |
| Cluster Res ora.cssd 1 ora.db1.db 1 ora.db1clor | ONLINE ONLINE ONLINE | ONLINE | ip-172-30-15-58 ip-172-30-15-58 | STABLE Open,HOME=/u01/app/o racle/product/19.0.0 /db1,STABLE |
| Cluster Res ora.cssd 1 ora.db1.db 1 ora.db1clor 1 | ONLINE ONLINE De.db ONLINE | ONLINE ONLINE ONLINE | ip-172-30-15-58 ip-172-30-15-58 ip-172-30-15-58 | STABLE Open,HOME=/u01/app/d racle/product/19.0.0 /db1,STABLE Open,HOME=/u01/app/d racle/product/19.0.0 /db1,STABLE |
| Cluster Res ora.cssd 1 ora.dbl.db 1 ora.dblclor 1 ora.diskmor | ONLINE ONLINE Ne.db ONLINE | ONLINE ONLINE ONLINE | ip-172-30-15-58 ip-172-30-15-58 ip-172-30-15-58 | STABLE Open,HOME=/u01/app/d racle/product/19.0.0 /db1,STABLE Open,HOME=/u01/app/d racle/product/19.0.0 /db1,STABLE |
| Cluster Res ora.cssd 1 ora.dbl.db 1 ora.dblclon 1 ora.diskmon 1 | ONLINE ONLINE Ne.db ONLINE ONLINE | ONLINE ONLINE ONLINE OFFLINE | ip-172-30-15-58 ip-172-30-15-58 ip-172-30-15-58 | STABLE Open,HOME=/u01/app/d racle/product/19.0.0 /db1,STABLE Open,HOME=/u01/app/d racle/product/19.0.0 /db1,STABLE STABLE |
| Cluster Res ora.cssd 1 ora.dbl.db 1 ora.dblclon 1 ora.diskmon 1 ora.diskmon | ONLINE ONLINE Ae.db ONLINE OFFLINE afd | ONLINE ONLINE ONLINE OFFLINE | ip-172-30-15-58 ip-172-30-15-58 ip-172-30-15-58 | STABLE Open,HOME=/u01/app/d racle/product/19.0.0 /db1,STABLE Open,HOME=/u01/app/d racle/product/19.0.0 /db1,STABLE STABLE |
| Cluster Res ora.cssd 1 ora.dbl.db 1 ora.dblclon 1 ora.diskmon 1 ora.diskmon 1 | ONLINE ONLINE Ae.db ONLINE OFFLINE afd ONLINE | ONLINE ONLINE OFFLINE ONLINE | ip-172-30-15-58 ip-172-30-15-58 ip-172-30-15-58 | STABLE Open,HOME=/u01/app/d racle/product/19.0.0 /db1,STABLE Open,HOME=/u01/app/d racle/product/19.0.0 /db1,STABLE STABLE STABLE |
| Cluster Res ora.cssd 1 ora.db1.db 1 ora.db1clon 1 ora.diskmon 1 ora.diskmor 1 ora.driver. 1 ora.evmd | ONLINE ONLINE Ae.db ONLINE OFFLINE afd ONLINE | ONLINE ONLINE OFFLINE ONLINE | ip-172-30-15-58 ip-172-30-15-58 ip-172-30-15-58 ip-172-30-15-58 | STABLE Open,HOME=/u01/app/d racle/product/19.0.0 /db1,STABLE Open,HOME=/u01/app/d racle/product/19.0.0 /db1,STABLE STABLE STABLE |

Additional information

To learn more about the information that is described in this document, review the following documents and/or websites:

• Set up and administer BlueXP

https://docs.netapp.com/us-en/cloud-manager-setup-admin/index.html

• BlueXP backup and recovery documentation

https://docs.netapp.com/us-en/cloud-manager-backup-restore/index.html

Amazon FSx for NetApp ONTAP

https://aws.amazon.com/fsx/netapp-ontap/

Amazon EC2

https://aws.amazon.com/pm/ec2/?trk=36c6da98-7b20-48fa-8225-4784bced9843&sc_channel=ps&s_kwcid=AL!4422!3!467723097970!e!!g!!aws%20ec2&ef_id=Cj0KCQiA54KfB hCKARIsAJzSrdqwQrghn6I71jiWzSeaT9Uh1-vY-VfhJixFxnv5rWwn2S7RqZOTQ0aAh7eEALw_wcB:G:s&s_kwcid=AL!4422!3!467723097970!e!!g!!aws%20ec2

Hybrid Cloud Database Solutions with SnapCenter

TR-4908: Hybrid Cloud Database Solutions with SnapCenter Overview

Alan Cao, Felix Melligan, NetApp

This solution provides NetApp field and customers with instructions and guidance for configuring, operating, and migrating databases to a hybrid cloud environment using the NetApp SnapCenter GUI-based tool and the NetApp storage service CVO in public clouds for the following use cases:

- Database dev/test operations in the hybrid cloud
- · Database disaster recovery in the hybrid cloud

Today, many enterprise databases still reside in private corporate data centers for performance, security, and/or other reasons. This hybrid cloud database solution enables enterprises to operate their primary databases on site while using a public cloud for dev/test database operations as well as for disaster recovery to reduce licensing and operational costs.

Many enterprise databases, such as Oracle, SQL Server, SAP HANA, and so on, carry high licensing and operational costs. Many customers pay a one-time license fee as well as annual support costs based on the number of compute cores in their database environment, whether the cores are used for development, testing, production, or disaster recovery. Many of those environments might not be fully utilized throughout the application lifecycle.

The solutions provide an option for customers to potentially reduce their licensable cores count by moving their database environments devoted to development, testing, or disaster recovery to the cloud. By using publiccloud scale, redundancy, high availability, and a consumption-based billing model, the cost saving for licensing and operation can be substantial, while not sacrificing any application usability or availability. Beyond potential database license-cost savings, the NetApp capacity-based CVO license model allows customers to save storage costs on a per-GB basis while empowering them with high level of database manageability that is not available from competing storage services. The following chart shows a storage cost comparison of popular storage services available in the public cloud.



This solution demonstrates that, by using the SnapCenter GUI-based software tool and NetApp SnapMirror technology, hybrid cloud database operations can be easily setup, implemented, and operated.

The following videos demonstrate SnapCenter in action:

- Backup of an Oracle database across a Hybrid Cloud using SnapCenter
- SnapCenter- Clone DEV/TEST to AWS Cloud for an Oracle database

Notably, although the illustrations throughout this document show CVO as a target storage instance in the public cloud, the solution is also fully validated for the new release of the FSx ONTAP storage engine for AWS.

To test drive the solution and use cases for yourself, a NetApp Lab-on-Demand SL10680 can be requested at following xref:./databases/ TL_AWS_004 HCoD: AWS - NW,SnapCenter(OnPrem).

Solution Architecture

The following architecture diagram illustrates a typical implementation of enterprise database operation in a hybrid cloud for dev/test and disaster recovery operations.



In normal business operations, synchronized database volumes in the cloud can be cloned and mounted to dev/test database instances for applications development or testing. In the event of a failure, the synchronized database volumes in the cloud can then be activated for disaster recovery.

SnapCenter Requirements

This solution is designed in a hybrid cloud setting to support on-premises production databases that can burst to all of the popular public clouds for dev/test and disaster recovery operations.

This solution supports all databases that are currently supported by SnapCenter, although only Oracle and SQL Server databases are demonstrated here. This solution is validated with virtualized database workloads, although bare-metal workloads are also supported.

We assume that production database servers are hosted on-premises with DB volumes presented to DB hosts from a ONTAP storage cluster. SnapCenter software is installed on-premises for database backup and data replication to the cloud. An Ansible controller is recommended but not required for database deployment automation or OS kernel and DB configuration syncing with a standby DR instance or dev/test instances in the public cloud.

Requirements

| Environment | Requirements | | | | | | | | |
|---------------|---|--|--|--|--|--|--|--|--|
| On-premises | Any databases and versions supported by SnapCenter | | | | | | | | |
| | SnapCenter v4.4 or higher | | | | | | | | |
| | Ansible v2.09 or higher | | | | | | | | |
| | ONTAP cluster 9.x | | | | | | | | |
| | Intercluster LIFs configured | | | | | | | | |
| | Connectivity from on-premises to a cloud VPC (VPN, interconnect, and so on) | | | | | | | | |
| | Networking ports open - ssh 22 - tcp 8145, 8146, 10000, 11104, 11105 | | | | | | | | |
| Cloud - AWS | Cloud Manager Connector | | | | | | | | |
| | Cloud Volumes ONTAP | | | | | | | | |
| | Matching DB OS EC2 instances to On-prem | | | | | | | | |
| Cloud - Azure | Cloud Manager Connector | | | | | | | | |
| | Cloud Volumes ONTAP | | | | | | | | |
| | Matching DB OS Azure Virtual Machines to On-prem | | | | | | | | |
| Cloud - GCP | Cloud Manager Connector | | | | | | | | |
| | Cloud Volumes ONTAP | | | | | | | | |
| | Matching DB OS Google Compute Engine instances to on-premises | | | | | | | | |

Prerequisites configuration

Certain prerequisites must be configured both on-premises and in the cloud before the execution of hybrid cloud database workloads. The following section provides a high-level summary of this process, and the following links provide further information about necessary system configuration.

On premises

- SnapCenter installation and configuration
- On-premises database server storage configuration
- Licensing requirements
- Networking and security
- Automation

Public cloud

- A NetApp Cloud Central login
- · Network access from a web browser to several endpoints
- A network location for a connector

- Cloud provider permissions
- Networking for individual services

Important considerations:

- 1. Where to deploy the Cloud Manager Connector?
- 2. Cloud Volume ONTAP sizing and architecture
- 3. Single node or high availability?

The following links provide further details:

On Premises

Public Cloud

Prerequisites on-premises

The following tasks must be completed on-premises to prepare the SnapCenter hybridcloud database workload environment.

SnapCenter installation and configuration

The NetApp SnapCenter tool is a Windows-based application that typically runs in a Windows domain environment, although workgroup deployment is also possible. It is based on a multitiered architecture that includes a centralized management server (the SnapCenter server) and a SnapCenter plug-in on the database server hosts for database workloads. Here are a few key considerations for hybrid-cloud deployment.

- **Single instance or HA deployment.** HA deployment provides redundancy in the case of a single SnapCenter instance server failure.
- Name resolution. DNS must be configured on the SnapCenter server to resolve all database hosts as well as on the storage SVM for forward and reverse lookup. DNS must also be configured on database servers to resolve the SnapCenter server and the storage SVM for both forward and reverse lookup.
- **Role-based access control (RBAC) configuration.** For mixed database workloads, you might want to use RBAC to segregate management responsibility for different DB platform such as an admin for Oracle database or an admin for SQL Server. Necessary permissions must be granted for the DB admin user.
- Enable policy-based backup strategy. To enforce backup consistency and reliability.
- **Open necessary network ports on the firewall.** For the on-premises SnapCenter server to communicate with agents installed in the cloud DB host.
- Ports must be open to allow SnapMirror traffic between on-prem and public cloud. The SnapCenter server relies on ONTAP SnapMirror to replicate onsite Snapshot backups to cloud CVO storage SVMs.

After careful pre-installation planning and consideration, click this SnapCenter installation workflow for details of SnapCenter installation and configuration.

On-premises database server storage configuration

Storage performance plays an important role in the overall performance of databases and applications. A welldesigned storage layout can not only improve DB performance but also make it easy to manage database backup and recovery. Several factors should be considered when defining your storage layout, including the size of the database, the rate of expected data change for the database, and the frequency with which you perform backups. Directly attaching storage LUNs to the guest VM by either NFS or iSCSI for virtualized database workloads generally provides better performance than storage allocated via VMDK. NetApp recommends the storage layout for a large SQL Server database on LUNs depicted in the following figure.



The following figure shows the NetApp recommended storage layout for small or medium SQL Server database on LUNs.



The Log directory is dedicated to SnapCenter to perform transaction log rollup for database recovery. For an extra large database, multiple LUNs can be allocated to a volume for better performance.

For Oracle database workloads, SnapCenter supports database environments backed by ONTAP storage that are mounted to the host as either physical or virtual devices. You can host the entire database on a single or multiple storage devices based on the criticality of the environment. Typically, customers isolate data files on dedicated storage from all other files such as control files, redo files, and archive log files. This helps administrators to quickly restore (ONTAP single-file SnapRestore) or clone a large critical database (petabyte scale) using Snapshot technology within few seconds to minutes.



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For mission critical workloads that are sensitive to latency, a dedicated storage volume should be deployed to different types of Oracle files to achieve the best latency possible. For a large database, multiple LUNs (NetApp recommends up to eight) per volume should be allocated to data files.



For smaller Oracle databases, SnapCenter supports shared storage layouts in which you can host multiple databases or part of a database on the same storage volume or LUN. As an example of this layout, you can host data files for all the databases on a +DATA ASM disk group or a volume group. The remainder of the files (redo, archive log, and control files) can be hosted on another dedicated disk group or volume group (LVM). Such a deployment scenario is illustrated below.



To facilitate the relocation of Oracle databases, the Oracle binary should be installed on a separate LUN that is included in the regular backup policy. This ensures that in the case of database relocation to a new server host, the Oracle stack can be started for recovery without any potential issues due to an out-of-sync Oracle binary.

Licensing requirements

SnapCenter is licensed software from NetApp. It is generally included in an on-premises ONTAP license. However, for hybrid cloud deployment, a cloud license for SnapCenter is also required to add CVO to SnapCenter as a target data replication destination. Please review following links for SnapCenter standard capacity-based license for details:

SnapCenter standard capacity-based licenses

Networking and security

In a hybrid database operation that requires an on-premises production database that is burstable to cloud for dev/test and disaster recovery, networking and security is important factor to consider when setting up the environment and connecting to the public cloud from an on-premises data center.

Public clouds typically use a virtual private cloud (VPC) to isolate different users within a public-cloud platform. Within an individual VPC, security is controlled using measures such as security groups that are configurable based on user needs for the lockdown of a VPC.

The connectivity from the on-premises data center to the VPC can be secured through a VPN tunnel. On the VPN gateway, security can be hardened using NAT and firewall rules that block attempts to establish network

connections from hosts on the internet to hosts inside the corporate data center.

For networking and security considerations, review the relevant inbound and outbound CVO rules for your public cloud of choice:

- Security group rules for CVO AWS
- Security group rules for CVO Azure
- Firewall rules for CVO GCP

Using Ansible automation to sync DB instances between on-premises and the cloud - optional

To simplify management of a hybrid-cloud database environment, NetApp highly recommends but does not require that you deploy an Ansible controller to automate some management tasks, such as keeping compute instances on-premises and in the cloud in sync. This is particular important because an out-of-sync compute instance in the cloud might render the recovered database in the cloud error prone because of missing kernel packages and other issues.

The automation capability of an Ansible controller can also be used to augment SnapCenter for certain tasks, such as breaking up the SnapMirror instance to activate the DR data copy for production.

Follow these instruction to set up your Ansible control node for RedHat or CentOS machines: RedHat/CentOS Ansible Controller Setup.

Follow these instruction to set up your Ansible control node for Ubuntu or Debian machines: Ubuntu/Debian Ansible Controller Setup.

Prerequisites for the public cloud

Before we install the Cloud Manager connector and Cloud Volumes ONTAP and configure SnapMirror, we must perform some preparation for our cloud environment. This page describes the work that needs to be done as well as the considerations when deploying Cloud Volumes ONTAP.

Cloud Manager and Cloud Volumes ONTAP deployment prerequisites checklist

- □ A NetApp Cloud Central login
- $\hfill\square$ Network access from a web browser to several endpoints
- □ A network location for a Connector
- □ Cloud provider permissions
- Networking for individual services

For more information about what you need to get started, visit our cloud documentation.

Considerations

1. What is a Cloud Manager connector?

In most cases, a Cloud Central account admin must deploy a connector in your cloud or on-premises network. The connector enables Cloud Manager to manage resources and processes within your public cloud environment.

For more information about Connectors, visit our cloud documentation.

2. Cloud Volumes ONTAP sizing and architecture

When deploying Cloud Volumes ONTAP, you are given the choice of either a predefined package or the creation of your own configuration. Although many of these values can be changed later on nondisruptively, there are some key decisions that need to be made before deployment based on the workloads to be deployed in the cloud.

Each cloud provider has different options for deployment and almost every workload has its own unique properties. NetApp has a CVO sizing tool that can help size deployments correctly based on capacity and performance, but it has been built around some basic concepts which are worth considering:

- · Capacity required
- Network capability of the cloud virtual machine
- Performance characteristics of cloud storage

The key is to plan for a configuration that not only satisfies the current capacity and performance requirements, but also looks at future growth. This is generally known as capacity headroom and performance headroom.

If you would like further information, read the documentation about planning correctly for AWS, Azure, and GCP.

3. Single node or high availability?

In all clouds, there is the option to deploy CVO in either a single node or in a clustered high availability pair with two nodes. Depending on the use case, you might wish to deploy a single node to save costs or an HA pair to provide further availability and redundancy.

For a DR use case or spinning up temporary storage for development and testing, single nodes are common since the impact of a sudden zonal or infrastructure outage is lower. However, for any production use case, when the data is in only a single location, or when the dataset must have more redundancy and availability, high availability is recommended.

For further information about the architecture of each cloud's version of high availability, visit the documentation for AWS, Azure and GCP.

Getting started overview

This section provides a summary of the tasks that must be completed to meet the prerequisite requirements as outlined in previous section. The following section provide a high level tasks list for both on-premises and public cloud operations. The detailed processes and procedures can be accessed by clicking on the relevant links.

On-premises

- Setup database admin user in SnapCenter
- · SnapCenter plugin installation prerequisites
- SnapCenter host plugin installation
- DB resource discovery
- Setup storage cluster peering and DB volume replication
- · Add CVO database storage SVM to SnapCenter

- Setup database backup policy in SnapCenter
- · Implement backup policy to protect database
- Validate backup

AWS public cloud

- Pre-flight check
- Steps to deploy Cloud Manager and Cloud Volumes ONTAP in AWS
- Deploy EC2 compute instance for database workload

Click the following links for details:

On Premises, Public Cloud - AWS

Getting started on premises

The NetApp SnapCenter tool uses role based access control (RBAC) to manage user resources access and permission grants, and SnapCenter installation creates prepopulated roles. You can also create custom roles based on your needs or applications.

On Premises

1. Setup database admin user in SnapCenter

It makes sense to have a dedicated admin user ID for each database platform supported by SnapCenter for database backup, restoration, and/or disaster recovery. You can also use a single ID to manage all databases. In our test cases and demonstration, we created a dedicated admin user for both Oracle and SQL Server, respectively.

Certain SnapCenter resources can only be provisioned with the SnapCenterAdmin role. Resources can then be assigned to other user IDs for access.

In a pre-installed and configured on-premises SnapCenter environment, the following tasks might have already have been completed. If not, the following steps create a database admin user:

- 1. Add the admin user to Windows Active Directory.
- 2. Log into SnapCenter using an ID granted with the SnapCenterAdmin role.
- 3. Navigate to the Access tab under Settings and Users, and click Add to add a new user. The new user ID is linked to the admin user created in Windows Active Directory in step 1. Assign the proper role to the user as needed. Assign resources to the admin user as applicable.

| | NetApp SnapCenter® • 🗷 😔 ± demo\administrator S | | | | | | | | | | | | SnapCenterAdmin | 🖡 Sign Out | | |
|---|---|----------------|---------------|--------|------------------|--------|----|-----------|----------|---------------|----------------|---|-----------------|------------|-----------|--|
| < | | Global Setti | ings Poli | cies _ | Users and Access | s Role | | redential | Software | | | | | | | |
| | Dashboard | Search by Name | | | | | | | | Туре А | 11 | • | | | ++ Add | |
| | Resources | | Name | | | | 45 | Туре | | Roles | | | | | Domain | |
| | Monitor | | administra | ator | | | | User | | SnapCenterAdr | min | | | | demo | |
| | | | oradba | | | | | User | | App Backup an | id Clone Admin | | | | demo | |
| â | Reports | | <u>sqldba</u> | | | | | User | | App Backup an | id Clone Admin | | | | demo | |
| Å | Hosts | | | | | | | | | | | | | | | |
| h | Storage Systems | | | | | | | | | | | | | | | |
| | Settings | | | | | | | | | | | | | | | |
| | Alerts | | | | | | | | | | | | | | | |

2. SnapCenter plugin installation prerequisites

SnapCenter performs backup, restore, clone, and other functions by using a plugin agent running on the DB hosts. It connects to the database host and database via credentials configured under the Setting and Credentials tab for plugin installation and other management functions. There are specific privilege requirements based on the target host type, such as Linux or Windows, as well as the type of database.

DB hosts credentials must be configured before SnapCenter plugin installation. Generally, you want to use an administrator user accounts on the DB host as your host connection credentials for plugin installation. You can also grant the same user ID for database access using OS-based authentication. On the other hand, you can also employ database authentication with different database user IDs for DB management access. If you decide to use OS-based authentication, the OS admin user ID must be granted DB access. For Windows domain-based SQL Server installation, a domain admin account can be used to manage all SQL Servers within the domain.

Windows host for SQL server:

- 1. If you are using Windows credentials for authentication, you must set up your credential before installing plugins.
- 2. If you are using a SQL Server instance for authentication, you must add the credentials after installing plugins.
- 3. If you have enabled SQL authentication while setting up the credentials, the discovered instance or database is shown with a red lock icon. If the lock icon appears, you must specify the instance or database credentials to successfully add the instance or database to a resource group.
- 4. You must assign the credential to a RBAC user without sysadmin access when the following conditions are met:
 - The credential is assigned to a SQL instance.
 - The SQL instance or host is assigned to an RBAC user.
 - \circ The RBAC DB admin user must have both the resource group and backup privileges.

Unix host for Oracle:

- 1. You must have enabled the password-based SSH connection for the root or non-root user by editing sshd.conf and restarting the sshd service. Password-based SSH authentication on AWS instance is turned off by default.
- 2. Configure the sudo privileges for the non-root user to install and start the plugin process. After installing the plugin, the processes run as an effective root user.
- 3. Create credentials with the Linux authentication mode for the install user.

- 4. You must install Java 1.8.x (64-bit) on your Linux host.
- 5. Installation of the Oracle database plugin also installs the SnapCenter plugin for Unix.

3. SnapCenter host plugin installation



Before attempting to install SnapCenter plugins on cloud DB server instances, make sure that all configuration steps have been completed as listed in the relevant cloud section for compute instance deployment.

The following steps illustrate how a database host is added to SnapCenter while a SnapCenter plugin is installed on the host. The procedure applies to adding both on-premises hosts and cloud hosts. The following demonstration adds a Windows or a Linux host residing in AWS.

Configure SnapCenter VMware global settings

Navigate to Settings > Global Settings. Select "VMs have iSCSI direct attached disks or NFS for all the hosts" under Hypervisor Settings and click Update.

| п | NetApp Snap(| enter® | ٠ | | | L demo\administrator | SnapCenterAdmin | 🖡 Sign Out | | | | | | | | |
|------------|-----------------|--|--------------------------------|--|--|----------------------|-----------------|------------|--|--|--|--|--|--|--|--|
| < | | Global Settings Policies Users and Access Roles Credential Software | | | | | | | | | | | | | | |
| | Dashboard | | | | | | | | | | | | | | | |
| V | Resources | Slobal Settings | | | | | | | | | | | | | | |
| ٩ | Monitor | | | | | | | | | | | | | | | |
| ííí | Reports | Hypervisor Settings 🚺 | | | | | | | | | | | | | | |
| М | Hosts | VMs have ISCSI direct attached disks or NFS for all the hosts Update | | | | | | | | | | | | | | |
| ł | Storage Systems | Notification Server Settings | Notification Server Settings 1 | | | | | | | | | | | | | |
| | Settings | Configuration Settings 0 | | | | | | ~ | | | | | | | | |
| ▲ | Alerts | Purge Jobs Settings 🚯 | | | | | | ~ | | | | | | | | |
| | | Domain Settings 0 | | | | | | ~ | | | | | | | | |
| | | CA Certificate Settings 🟮 | | | | | | | | | | | | | | |

Add Windows host and installation of plugin on the host

- 1. Log into SnapCenter with a user ID with SnapCenterAdmin privileges.
- 2. Click the Hosts tab from the left-hand menu, and then click Add to open the Add Host workflow.
- 3. Choose Windows for Host Type; the Host Name can be either a host name or an IP address. The host name must be resolved to the correct host IP address from the SnapCenter host. Choose the host credentials created in step 2. Choose Microsoft Windows and Microsoft SQL Server as the plugin packages to be installed.

| II N | etApp | p SnapCenter® | | | | | | • | 0- | L demo\administrator | SnapCenterAdmin | 🖡 Sign Out |
|----------|----------------|-----------------------|----------|-------------------------|--|---|---|---|----|----------------------|-----------------|------------|
| > | Man | naged Hosts | | | | | | | | | | × |
| | Search by Name | | Add Host | | | | | | | | | |
| | | Name | IL. | Host Type | Windows | • | | | | | | |
| | | rhel2.demo.netapp.com | | Host Name | sql-standby | | | | | | | |
| a | | sql1.demo.netapp.com | | Credentials | Domain Admin | • | + | | | | | |
| A. | | | | Select Plug-ins to Inst | tall SnapCenter Plug-ins Package 4.5 for Windows | | | | | | | |
| }• ** | | | | | Microsoft Windows Microsoft SQL Server Microsoft Exchange Server | | | | | | | |
| A | - | | | More Options : Po | SAP HANA ort, gMSA, Install Path, Custom Plug-Ins | | | | | | | |
| | | | | Submit Cancel | | | | | | | | |

4. After the plugin is installed on a Windows host, its Overall Status is shown as "Configure log directory."

| | NetApp Snap | Center | 8 | | | | | ٠ | | 0. | . demo\administr | ator | SnapCenterAdmin | 🖡 Sign Out |
|-----|-----------------|--------|--|----|---------|-------------|--|---|----|--------|------------------|-----------|-----------------|------------|
| < | | Manag | ed Hosts Disks Shares Initiator Groups i | | | | | | | | | | | |
| | Dashboard | Sear | ch by Name 🛛 🖓 | | | | | | | | + | Rett | | More |
| | Resources | | Name | 11 | Туре | System | Plug-in | | V | ersion | Overall Statu | s | | |
| • | Monitor | | rhel2.demo.netapp.com | | Linux | Stand-alone | UNIX, Oracle Database | | 4. | 5 | Running | | | |
| | | | sgl1.demo.netapp.com | | Windows | Stand-alone | Microsoft Windows Server, Microsoft SQL Server | | 4. | 5 | Running | | | |
| âîÎ | Reports | | sql-standby.demo.netapp.com | | Windows | Stand-alone | Microsoft Windows Server, Microsoft SQL Server | | 4. | 5 | 😑 Configur | e log din | rectory | |
| A | Hosts | | | | | | | | | | | | | |
| ł. | Storage Systems | | | | | | | | | | | | | |
| 譕 | Settings | | | | | | | | | | | | | |
| | Alerts | | | | | | | | | | | | | |

5. Click the Host Name to open the SQL Server log directory configuration.

| n Ne | tApp | SnapCenter® | | | | | • = | 0 - | ▲ demo\administrator | SnapCenterAdmin | 🗊 Sign O | but |
|----------|------|---|----|---------------------------|---|-----------|-----|------------|----------------------|-----------------|----------|-----|
| > | Mana | ged Hosts | | | | | | | | | | × |
| | Sea | rch by Name | | Host Details | | | | | | | | |
| v | | Name | 11 | Host Name | sql-standby.demo.netapp.com | Alerts | | | | | | |
| @ | | rhel2.demo.netapp.com sgl1.demo.netapp.com | | Host IP Overall Status | Configure log directory | No Alerts | | | | | | |
| â | | sql-standby.demo.netapp.com | | Host Type | Windows | | | | | | | |
| A. | | | | System | Stand-alone | | | | | | | |
| ֥ | | | | Credentials | Domain Admin 🕜 | | | | | | | |
| ÷= | | | | Plug-ins | SnapCenter Plug-ins package 4.5.0.6123 for Windows | | | | | | | |
| ▲ | | | | | Microsoft Windows Microsoft SQL Server <u>Remove</u> <u>Configure log directory</u> | | | | | | | |
| | | | | More Options ; Po | rt, gMSA, Install Path, Add Plug-Ins | | | | | | | |
| | | | | Submit Cancel | Reset | | | | | | | |

6. Click "Configure log directory" to open "Configure Plug-in for SQL Server."

| Configure Plug | in for SQL Server | | × |
|--------------------|--|--------|-----|
| Configure the log | backup directory for sql-standby.demo.netapp.com | | |
| Configure host log | ; directory | | |
| Host log directory | dedicated disk directory path | Browse | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | Save | ose |

7. Click Browse to discover NetApp storage so that a log directory can be set; SnapCenter uses this log directory to roll up the SQL server transaction log files. Then click Save.

| Configure Plug-in for SQL Server | | × |
|---|--------|-------|
| Configure the log backup directory for sql-standby.demo.netapp.com | | |
| Configure host log directory | | |
| Host log directory G:\ | Browse | |
| Choose directory on NetApp Storage | | |
| sql-standby.demo.netapp.com G:\ System Volume Information | | |
| | Save | Close |



For NetApp storage provisioned to a DB host to be discovered, the storage (on-prem or CVO) must be added to SnapCenter, as illustrated in step 6 for CVO as an example.

8. After the log directory is configured, the Windows host plugin Overall Status is changed to Running.

| n | NetApp Snap | Center® | | • = | 0- | L demo\administrator | SnapCenterAdmin | 🖡 Sign Out | | |
|---|-----------------|---|-----------|------------|--|----------------------|-----------------|------------|----------------|------|
| < | | Managed Hosts Disks Shares Initiator Groups iSCSI Session | | | | | | - | | |
| | Dashboard | Search by Name | | | | | | Add 1 | lanove Adrech | More |
| | Resources | Name 11 | Type S | ystem | Plug-in | | | Version | Overall Status | |
| | Monitor | rhel2.demo.netapp.com | Linux S | tand-alone | UNIX, Oracle Database | | | 4.5 | Running | |
| | | sql1.demo.netapp.com | Windows S | tand-alone | Microsoft Windows Server, Microsoft SQL Server | | | 4.5 | Running | |
| â | Reports | sql-standby.demo.netapp.com | Windows S | tand-alone | Microsoft Windows Server, Microsoft SQL Server | | | 4.5 | Running | |
| A | Hosts | | | | | | | | | |
| ÷ | Storage Systems | | | | | | | | | |
| - | Settings | | | | | | | | | |
| A | Alerts | | | | | | | | | |

9. To assign the host to the database management user ID, navigate to the Access tab under Settings and Users, click the database management user ID (in our case the sqldba that the host needs to be assigned to), and click Save to complete host resource assignment.

| | NetApp Snap | App SnapCenter® Global Settings Policies Users and Access Roles Credential Software Aboard Search by Name Type All Surves Image: Search by Name Image: Search by Name Surves Image: Search by Name Image: Search by Name Image: Search by Name Image: Search by Name Type All Surves Image: Search by Name Image: Search by Name Image: Search by Name Image: Search by Name Search by Name Image: Search by Name Image: Search by Name Type All Image: Search by Name Image: Search by Name Search by Name Image: Search by Name Image: Search by Name Type All Image: Search by Name Image: Search by Name Search by Name Image: Search by Name Image: Search by Name Search by Name | | | | | | | | | • | a 0- | 1 demo\administrator | SnapCenterAdmin | 🖡 Sign Out |
|---|-------------------|--|---------------|------------------|-------|------------|----------|--|----------------------------|---|---|------|----------------------|-----------------|------------|
| | | Global Settings | s Policies | Users and Access | Roles | Credential | Software | | | | | | | | |
| 1 | Dashboard | Search by Na | ame | | | | | | Type All | - | | | | + | Remove |
| | Resources | | Name | | | 1E | Туре | | Roles | | | | Do | main | |
| 4 | Monitor | | administrator | | | | User | | SnapCenterAdmin | | | | de | mo | |
| | | | oradba | | | | User | | App Backup and Clone Admin | | | | de | mo | |
| 1 | Reports | | <u>sqldba</u> | | | | User | | App Backup and Clone Admin | | | | de | mo | |
| 1 | 📥 Hosts | | | | | | | | | | | | | | |
| 1 | - Storage Systems | | | | | | | | | | | | | | |
| | Settings | | | | | | | | | | | | | | |
| 2 | Alerts | | | | | | | | | | | | | | |

| Assi | Assign Assets × | | | | | | | | | | | |
|-------|-----------------------------|--------|--|--|--|--|--|--|--|--|--|--|
| Asset | Type Host 💌 | search | | | | | | | | | | |
| | Asset Name | 15 | | | | | | | | | | |
| | rhel2.demo.netapp.com | | | | | | | | | | | |
| | sql1.demo.netapp.com | | | | | | | | | | | |
| | sql-standby.demo.netapp.com | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | Save | | | | | | | | | | |

Add Unix host and installation of plugin on the host

- 1. Log into SnapCenter with a user ID with SnapCenterAdmin privileges.
- 2. Click the Hosts tab from left-hand menu, and click Add to open the Add Host workflow.
- 3. Choose Linux as the Host Type. The Host Name can be either the host name or an IP address. However, the host name must be resolved to correct host IP address from SnapCenter host. Choose host credentials created in step 2. The host credentials require sudo privileges. Check Oracle Database as the plug-in to be installed, which installs both Oracle and Linux host plugins.

| | | | | | ٠ | ₿- | ▲ demo\administrator | SnapCenterAdmin | 🖡 Sign Out |
|-------------------------|--|-----|--|--|---|----|----------------------|-----------------|------------|
| | | | | | | | | | × |
| Add Host | | | | | | | | | |
| Host Type | Linux |] | | | | | | | |
| Host Name | ora-standby | | | | | | | | |
| Credentials | admin 💌 | + 0 | | | | | | | |
| Select Plug-ins to Inst | all SnapCenter Plug-ins Package 4.5 for Linux Gracle Database SAP HANA | | | | | | | | |
| More Options : Po | rt, Install Path, Custom Plug-Ins | | | | | | | | |
| Submit Cancel |] | | | | | | | | |

4. Click More Options and select "Skip preinstall checks." You are prompted to confirm the skipping of the preinstall check. Click Yes and then Save.

| More Options | | × |
|---------------------------|---|-------|
| Port Installation Path | 8145 /opt/NetApp/snapcenter | 0 |
| | Skip preinstall checks Add all hosts in the oracle RAC | - |
| Custom Plug-ins — | Choose a File Browse Upload | |
| | No plug-ins found. | * |
| | Save | incel |

5. Click Submit to start the plugin installation. You are prompted to Confirm Fingerprint as shown below.

| Confirm Fingerprint | | | | | | | | | | |
|--|--|-------|--|--|--|--|--|--|--|--|
| Authenticity of the host cannot be determined () | | | | | | | | | | |
| Host name 🕴 | Fingerprint | Valid | | | | | | | | |
| ora-standby.demo.netapp.com | ssh-rsa 3072 5C:02:EF:6B:63:54:59:10:84:DF:4D:6B:AB:FB:61:67 | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | Confirm and Submit | Close | | | | | | | | |

6. SnapCenter performs host validation and registration, and then the plugin is installed on the Linux host. The status is changed from Installing Plugin to Running.

| п | NetApp Snap | enter® | | | ٠ | ⊠ 6 | 👻 👤 demo\administrator | SnapCenterAdmin | 🖡 Sign Out |
|---|-----------------|---|---------|-------------|--|-----|------------------------|-----------------|------------|
| < | | Managed Hosts Disks Shares Initiator Groups ISCSI Session | | | | | | | |
| | Dashboard | Search by Name V | | | | | ÷ | | More |
| | Resources | Name IE | Туре | System | Plug-in | | Version | Overall Status | |
| - | Monitor | ora-standby.demo.netapp.com | Linux | Stand-alone | UNIX, Oracle Database | | 4.5 | Running | |
| | | rhel2.demo.netapp.com | Linux | Stand-alone | UNIX, Oracle Database | | 4.5 | Running | |
| â | Reports | sgl1.demo.netapp.com | Windows | Stand-alone | Microsoft Windows Server, Microsoft SQL Server | | 4.5 | Running | |
| 4 | Hosts | sgl-standby.demo.netapp.com | Windows | Stand-alone | Microsoft Windows Server, Microsoft SQL Server | | 4.5 | Running | |
| ÷ | Storage Systems | | | | | | | | |
| | Settings | | | | | | | | |
| A | Alerts | | | | | | | | |

7. Assign the newly added host to the proper database management user ID (in our case, oradba).

| II Ne | etApp SnapCenter® | | | | | • | 9- | L demo\administrator | SnapCenterAdmin | 🕼 Sign C | Dut |
|----------|-------------------|--------------|------------------------------------|----|----------|-------|----|---|-----------------|----------|-----|
| > | Users and Access | Users/Group: | Details | | | | | | | | × |
| | Search by Name | | User Name oradba | | | | | | | | |
| V | Name IL | | Domain demo | | | | | | | | |
| | administrator | | Roles App Backup and Clone Admin × | | | | | | | | |
| | oradba | | | | | | | | | | |
| â | <u>soldba</u> | Assign A | ssets | | | | | | | | |
| Å | | | | | | | | | + Assign 📋 | Unassign | |
| н., | | | Asset Name IL | Ту | e | | | Asset Type | | | |
| ## | | | 10.0.0.1 | Da | aOntapCl | uster | | Storage Connect | ion | ^ | |
| Δ | | | 192.168.0.101 | Da | aOntapCl | uster | | Storage Connect | ion | | |
| - | | | admin | | | | | Credentials | | | |
| | | | Linux Admin | | | | | Credentials | | | |
| | | | Oracle Archive Log Backup | | | | | Policy | | | |
| | | | Oracle Full Online Backup | | | | | Policy | | | |
| | | | | | | | | terrary and the second s | | * | |

| Assi | gn Assets | x |
|-------|-----------------------------|-----|
| Asset | t Type Host • search | |
| | Asset Name | ΠĘ. |
| | ora-standby.demo.netapp.com | |
| | rhel2.demo.netapp.com | |
| | sql1.demo.netapp.com | |
| | sql-standby.demo.netapp.com | |
| | | |
| | | |
| | | |
| | Save | e |

4. Database resource discovery

With successful plugin installation, the database resources on the host can be immediately discovered. Click the Resources tab in the left-hand menu. Depending on the type of database platform, a number of views are available, such as the database, resources group, and so on. You might need to click the Refresh Resources tab if the resources on the host are not discovered and displayed.

| п | NetApp Snap | letApp SnapCenter® | | | | | | | | | App Backup and Clo | one Admin | 🖡 Sign Out |
|-----------|-----------------|--------------------|------------|-------------------------------|-----------------------|----------------|--------|----|--|--|--------------------|--------------|--------------------|
| < | | Oracle | Database 🕞 | | | | | | | | | | |
| | Dashboard | View | Database | - Search databa | ases V | | | | | | Refre | sh Resources | New Resource Group |
| U | Resources | 199 | Name | Oracle Database Type | Host/Cluster | Resource Group | Polici | es | | | Last Backup | Overall | Status |
| • | Monitor | | cdb2 | Single Instance (Multitenant) | rhel2.demo.netapp.com | | | | | | | Not pro | tected |
| 11 | Reports | | | | | | | | | | | | |
| A | Hosts | | | | | | | | | | | | |
| ł | Storage Systems | | | | | | | | | | | | |
| # | Settings | | | | | | | | | | | | |
| | Alerts | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

When the database is initially discovered, the Overall Status is shown as "Not protected." The previous screenshot shows an Oracle database not protected yet by a backup policy.

When a backup configuration or policy is set up and a backup has been executed, the Overall Status for the database shows the backup status as "Backup succeeded" and the timestamp of the last backup. The following screenshot shows the backup status of a SQL Server user database.

| Π | NetApp Snap(| Center® | | ٠ | | 0 - | 👤 demo\sqldba | App Backup and Clone | Admin | 🗊 Sign Out | | | |
|-----|-----------------|---------|--------------------------|----------|----------------------|-------------------------|--------------------------|--------------------------|-----------|------------|-----------------|-----------|--------------------|
| < | | | SQL Server 👻 | | | | | | | | | | |
| | Dashboard | View Da | atabase • search by name | T | | | | | | | Refresh F | lesources | New Resource Group |
| 0 | Resources | Til lan | Name | Instance | Host | Last Backup | On | verall Sta | atus | | Туре | | |
| - | Monitor | | master | sql1 | sql1.demo.netapp.com | | N | ot availa | ble for b | ackup | System database | | |
| | | | model | sql1 | sql1.demo.netapp.com | | N | Not available for backup | | | System database | | |
| âil | Reports | | msdb | sql1 | sql1.demo.netapp.com | | Not available for backup | | | ackup | System database | | |
| A | Hosts | | tempdb | sql1 | sql1.demo.netapp.com | | N | ot availa | ble for b | ackup | System database | | |
| ÷. | Storage Systems | | tpcc | sql1 | sql1.demo.netapp.com | 09/14/2021 2:35:07 PM 🛱 | Ba | ickup su | cceeded | | User database | | |
| - | Settings | | | | | | | | | | | | |
| A | Alerts | | | | | | | | | | | | |

If database access credentials are not properly set up, a red lock button indicates that the database is not accessible. For example, if Windows credentials do not have sysadmin access to a database instance, then database credentials must be reconfigured to unlock the red lock.



| II Ne | etApp SnapCenter® | 2 | | ٠ | | 0- | 👤 demo\sqldba | App Backup and Clone Admin | 🖡 Sign Out |
|-------|----------------------|--|---|-----------|----------|-------|---------------|----------------------------|----------------|
| > | Microsoft SQL Server | Instance - Credentials | | | | | | | × |
| | search by name | | | | | | | | Add Credential |
| 0 | Name | i The Microsoft SQL server or Windows credentials are neccessary to unlock t | he selected instance. Click Refresh Resources to run a discovery with the associate | d Auth. | | | | | × |
| - | sql-standby | Name | sql-standby | | | | | | |
| 1 | sql1 | Resource Group | None | | | | | | |
| 400 | | Policy | None | | | | | | |
| A | | Selectable | 🖑 Not available for backup. DB is not on NetApp storage, auto-close is enable | d or in r | recovery | mode. | | | |
| ֥ | | | | | | | | | |
| 莘 | | | | | | | | | |
| A | | | | | | | | | |
| | | | | | | | | | |

After the appropriate credentials are configured either at the Windows level or the database level, the red lock disappears and SQL Server Type information is gathered and reviewed.

| | letApp Snap(| SnapCenter® 🖉 😝 - 1 demokrajdina App Ba | | | | | | | | | | | 🖡 Sign Out |
|-----|-----------------|---|-------------------------|-----------------------------|-----------------|----------|-----|-------|--|--|---------|-------------------|--------------------|
| < | | Microsoft S | 5QL Server 👻 | | | | | | | | | | |
| | Dashboard | View Ins | stance • search by name | | | | | | | | | Refresh Resources | New Resource Group |
| ۵ | Resources | 15 lm | Name | Host | Resource Groups | Policies | Sta | ite | | | Туре | | |
| ۲ | Monitor | | sql1 | sql1.demo.netapp.com | | | Ru | nning | | | Standal | lone (15.0.2000) | |
| ~ | | | sql-standby | sql-standby.demo.netapp.com | | | Ru | nning | | | Standal | lone (15.0.2000) | |
| and | keports | | | | | | | | | | | | |
| Δ | Hosts | | | | | | | | | | | | |
| ÷. | Storage Systems | | | | | | | | | | | | |
| 韢 | Settings | | | | | | | | | | | | |
| ▲ | Alerts | | | | | | | | | | | | |

5. Setup storage cluster peering and DB volumes replication

To protect your on-premises database data using a public cloud as the target destination, on-premises ONTAP cluster database volumes are replicated to the cloud CVO using NetApp SnapMirror technology. The replicated target volumes can then be cloned for DEV/OPS or disaster recovery. The following high-level steps enable you to set up cluster peering and DB volumes replication.

 Configure intercluster LIFs for cluster peering on both the on-premises cluster and the CVO cluster instance. This step can be performed with ONTAP System Manger. A default CVO deployment has intercluster LIFs configured automatically.

On-premises cluster:

| | P Sys | stem Manag | er (Return to cla | ssic version) | | | Search actions, objects, and p | ages Q | | | 0 | \diamond | ± : |
|---------------------------|-------|------------|-------------------|---------------------------------|------------|---------|--------------------------------|--------------|--|---------------------------|----------------|------------|-------|
| DASHBOARD | | Overviev | V | | | | | | | | | | |
| STORAGE V | | IPspaces | 5 | | | + | Broadcast Domains | | | | | | + |
| NETWORK ^ | | Cluster | | Broadcast Domains | | | Cluster | 9000 MTU | Pspace: Cluster | | | | |
| Ethernet Ports | | 246-14 | | Cluster | | | Default | 1500 MTU | Pspace: Default onPrem-01_e0a_e0b_e0c_e0d | e0e e0f e0g e0h e0g-100 e | 0e-200 e0f-201 | | |
| EVENTS & JOBS | | Delaut | | svm_onPrem Broadcast Domains | | | | | | | | | |
| PROTECTION ^ | | | | Default | | | | | | | | | |
| Overview Relationships | | Network | Interfaces | | | | | | | | + | T F | ilter |
| HOSTS ^ | | Name | | Status 🌲 | Storage VM | IPspace | Address | Current Node | Current Port | Protocols | Туре | | |
| NVMe Subsystem | | onPrem-0 | 1_IC | 0 | | Default | 192.168.0.113 | onPrem-01 | e0b | | Intercluster | | |
| CLUSTER ^ | | onPrem-0 | 1_mgmt1 | 0 | | Default | 192.168.0.111 | onPrem-01 | e0c | | Cluster/Node M | Igmt | |
| Overview | | cluster_m | gmt | 0 | | Default | 192.168.0.101 | onPrem-01 | e0a | | Cluster/Node M | Igmt | |

Target CVO cluster:

| ■ ONTAP Sy | ystem Manager | | | Se | arch actions, objects, a | nd pages Q | | | t, | ? ↔ | ± : |
|----------------------------|--------------------|------------------------------------|---------------|---------|--------------------------|--------------|---|------------|--------------------------------|---------------|--------|
| DASHBOARD | Overview | | | | | | | | | | ч |
| STORAGE V | - | | | | | | | | | | |
| NETWORK ^ | IPspaces | | | + | Broadcast | Domains | | | | | |
| Overview Ethernet Ports | Cluster | Broadcast Domains Cluster | | | Cluster | 9000 | MTU IPspace: Cluster hybridevo-01_e0 | 0 | | | |
| EVENTS & JOBS 💙 | Default | Storage VMs | | | Default | 9001 | MTU IPenace: Default | | | | |
| PROTECTION V | | svm_hybridevo Broadcast Domains | | | Delaut | 5001 | hybridcvo-01 e0 hybridcvo-02 e0 | 3 | | | |
| HOSTS 🗸 | | Default | | | | | 0.4.0018-311-07-28 | | | | |
| CLUSTER Y | Network Interfaces | 5 | | | | | | + Q Search | 🛓 Download 🗦 Filter 🚳 S | ihow / Hide 🗸 | |
| | Name ≑ | Status | Storage VM | IPspace | Address | Current Node | Current Port | Protocols | Туре | Through | put (I |
| | hybridcvo-02_mgmt1 | 0 | | Default | 10.221.2.104 | hybridcvo-02 | e0a | | Cluster/Node Mgmt | - | 0 |
| | inter_1 | 0 | | Default | 10.221.1.180 | hybridcvo-01 | e0a | | Intercluster,Cluster/Node Mgmt | | 0.02 |
| | inter_2 | 0 | | Default | 10.221.2.250 | hybridcvo-02 | e0a | | Intercluster,Cluster/Node Mgmt | | 0.03 |
| | iscsi_1 | 0 | svm_hybridcvo | Default | 10.221.1.5 | hybridcvo-01 | e0a | ISCSI | Data | | 0 |
| | iscsi_2 | 0 | svm_hybridcvo | Default | 10.221.2.168 | hybridcvo-02 | e0a | ISCSI | Data | | 0 |

2. With the intercluster LIFs configured, cluster peering and volume replication can be set up by using dragand-drop in NetApp Cloud Manager. See "Getting Started - AWS Public Cloud" for details.

Alternatively, cluster peering and DB volume replication can be performed by using ONTAP System Manager as follows:

Log into ONTAP System Manager. Navigate to Cluster > Settings and click Peer Cluster to set up cluster peering with the CVO instance in the cloud.



4. Go to the Volumes tab. Select the database volume to be replicated and click Protect.

| ■ ONTAP S | ystem Manager (Return to classic version) | | Search actions, objects, and pages |
|----------------------------|---|---------------------------------|--|
| DASHBOARD | Volumes | | |
| STORAGE ^ | + Add Telete Protect : | More | |
| Overview Applications | Name | rhel2_u03 All Volumes | |
| Volumes | onPrem_data rhel2_u01 | Overview Snapshot Copies | Clone Hierarchy SnapMirror (Local or Remote) |
| NVMe Namespaces | rhel2_u02 | | |
| Qtrees | rhel2_u03 | status Online | Capacity |
| Storage VMs | 8 | style FlexVol | |
| NETWORK ^ | sql1_log | /rhel2_u03 | SNAPSHOT CAPACITY |
| Overview Ethernet Ports | sql1_snapctr | storage vm svm_onPrem | 0 Bytes Available 2.36 GB Used 2.36 GB Overnow |
| FC Ports | svm_onPrem_root | LOCAL TIER ONPrem_01_SSD_1 | |
| PROTECTION V | | SNAPSHOT POLICY default | Performance Hour Day Week |
| HOSTS ~ | | QUOTA Off | Latency |
| CLUSTER V | | Read Write space reservation | 1.5 |

5. Set the protection policy to Asynchronous. Select the destination cluster and storage SVM.

| ≡ ONTAP Sy | rstem Manager (Return to classic version) | | Search actions, objects, and pages Q |
|-------------------------|---|--------------------------|---------------------------------------|
| DASHBOARD | | Protect Volumes | |
| STORAGE ^ | | PROTECTION POLICY | |
| Overview | | Asynchronous | ~ |
| Applications | | Source | Destinatio |
| Volumes | | 0110770 | CLISTER |
| LUNS NVMe Namespaces | | onPrem | hybridcvo |
| Shares | | storage vm svm_onPrem | STORAGE VM |
| Qtrees | | SELECTED VOLUMES | svm_hybridcvo 🗸 |
| Quotas Storage VMs | | rhel2_u03 | ▲ Destination Settings |
| Tiers | | | 2 matching labels |
| NETWORK ^ | | | VOLUME NAME |
| Overview | | | |
| Ethernet Ports | | | |
| | | | Override default storage service name |
| | | | Configuration Details |
| | | | 🗹 Initialize relationship 🛛 🕜 |
| | | | Enable FabricPool |
| CLOSTER | | Save Cancel | |
| | | Cancer | |

6. Validate that the volume is synced between the source and target and that the replication relationship is healthy.

| | Volum | les | | | | | | | | | | | | |
|-------------------------------|--------------------------------|-------------|-----------------------|----------------------------|------------------------------|---------------------|---------------------|------------|--|--|--|--|--|--|
| + Add i Delete Protect : More | | | | | | | | | | | | | | |
| | • | Name | rhel2_u03 All Volumes | rhel2_u03 All Volumes | | | | | | | | | | |
| | | onPrem_data | | | | | | | | | | | | |
| | | rhel2_u01 | Overview Snapsh | ot Copies Clone Hierarchy | SnapMirror (Local or Remote) | | | | | | | | | |
| | | rhel2 u02 | | | | | | | | | | | | |
| | | - | Source Destination | | Protection Policy | Relationship Health | Relationship Status | Lag | | | | | | |
| | | metz_003 | svm_onPrem:rhel2_u03 | svm_hybridcvo:rhel2_u03_dr | MirrorAllSnapshots | Healthy | Mirrored | 12 seconds | | | | | | |
| | rhel2_u030923211942120311 8 | | | | | | | | | | | | | |

6. Add CVO database storage SVM to SnapCenter

- 1. Log into SnapCenter with a user ID with SnapCenterAdmin privileges.
- Click the Storage System tab from the menu, and then click New to add a CVO storage SVM that hosts replicated target database volumes to SnapCenter. Enter the cluster management IP in the Storage System field, and enter the appropriate username and password.



3. Click More Options to open additional storage configuration options. In the Platform field, select Cloud Volumes ONTAP, check Secondary, and then click Save.

| More Options | | × |
|--------------|---------------------------------|---|
| Platform | Cloud Volumes ON' 👻 Secondary 🚺 | |
| Protocol | HTTPS 🔻 | |
| Port | 443 | |
| Timeout | 60 seconds () | |
| Preferred IP | 0 | |
| Save Cance | 2 | |

4. Assign the storage systems to SnapCenter database management user IDs as shown in 3. SnapCenter host plugin installation.

| | NetApp Snap | Center@ |) | | | | ۰ | 0 - | 1 demo\administrator | SnapCenterAdmin | 🖡 Sign Out |
|---|-----------------|---------|-----------------------|----|---------------|-----------|---|------------|----------------------|-----------------|------------|
| < | | ONTAP | Storage | | | | | | | | |
| = | Dashboard | Туре | ONTAP SVMs | | | | | | | + New | |
| V | Resources | ONTA | P Storage Connections | | | | | | | | |
| - | Monitor | | Name IE | IP | Cluster Name | User Name | | Platform | Control | ler License | |
| | Reports | | svm hybridevo | | 10.0.0.1 | | | CVO | 0 | | |
| 4 | Hosts | | svm_onPrem_ | | 192.168.0.101 | | | CVO | ~ | | |
| ÷ | Storage Systems | | | | | | | | | | |
| = | E Settings | | | | | | | | | | |
| 4 | Alerts | | | | | | | | | | |

7. Setup database backup policy in SnapCenter

The following procedures demonstrates how to create a full database or log file backup policy. The policy can then be implemented to protect databases resources. The recovery point objective (RPO) or recovery time objective (RTO) dictates the frequency of database and/or log backups.

Create a full database backup policy for Oracle

1. Log into SnapCenter as a database management user ID, click Settings, and then click Polices.

| | 🖬 NetApp SnapCenter® 🔹 😔 1 demolorada App Backup and Clone Admin | | | | | | | | | 🖡 Sign Out | |
|----|--|---------------------------|--------------|---------------|-------------|--|-----|--------------|------|------------|--------|
| < | | Policies Credential | | | | | | | | | |
| | Dashboard | Oracle Database | | | | | | | | | |
| | Resources | Search by Name | | | P. | | Now | Mostly | Copy | Details | Defena |
| - | Monitor | Name IE | Backup Type | Schedule Type | Replication | | | Verification | n | | |
| ~ | Banorte | Oracle Archive Log Backup | LOG, ONLINE | Hourly | SnapMirror | | | | | | |
| di | r Reports | Oracle Full Online Backup | FULL, ONLINE | Daily | SnapMirror | | | | | | |
| 4 | Hosts | | | | | | | | | | |
| Þ | Storage Systems | | | | | | | | | | |
| | E Settings | | | | | | | | | | |
| A | Alerts | | | | | | | | | | |

2. Click New to launch a new backup policy creation workflow or choose an existing policy for modification.

| Modify Oracle Database Backup Policy | | | | | |
|--------------------------------------|------------------------------------|-------------------------------|------|--|--|
| 1 Name | Name Provide a policy name | | | | |
| 2 Backup Type | Policy name | Oracle Full Online Backup | 0 | | |
| 3 Retention | Details | Backup all data and log files |] | | |
| 4 Replication | | | | | |
| 5 Script | | | | | |
| 6 Verification | | | | | |
| 7 Summary | | | | | |
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| | | Previous | Next | | |

3. Select the backup type and schedule frequency.

| Modify Oracle | Database Backup Policy | × |
|----------------|---|---|
| 1 Name | Select Oracle database backup options | - |
| 2 Backup Type | Choose backup type | |
| 3 Retention | Online backup | 1 |
| 4 Replication | Otatafiles, control files, and archive logs | |
| 5 Script | O Datafiles and control files | |
| 6 Verification | ○ Archive logs | |
| Summary | O Offline backup 🚯 | |
| | ◯ Shutdown | |
| | Save state of PDBs () | |
| | Choose schedule frequency | |
| | Select how often you want the schedules to occur in the policy. The specific times are set at backup job creation enabling you to stagger your start times. | |
| | 🔿 On demand | |
| | O Hourly | |
| | Daily | * |
| | Previous Next | |

4. Set the backup retention setting. This defines how many full database backup copies to keep.

| Modify Oracle | Database Backup Policy | | | × |
|----------------|---|----|------|---------------|
| 1 Name | Retention settings 🚯 | | | |
| 2 Backup Type | Daily retention settings | | | |
| 3 Retention | Total Snapshot copies to keep | 7 | | |
| 4 Replication | Keep Snapshot copies for | 14 | days | |
| 5 Script | Archive Log backup retention settings | 7 | | |
| 6 Verification | Keep Snapshot copies for | 14 | days | |
| 2 Summary | | | | |
| | | | | Previous Next |

5. Select the secondary replication options to push local primary snapshots backups to be replicated to a secondary location in cloud.

| Modify Oracle [| Modify Oracle Database Backup Policy | | | | |
|------------------------|---|------|--|--|--|
| 1 Name | Select secondary replication options 0 | | | | |
| 2 Backup Type | ✓ Update SnapMirror after creating a local Snapshot copy. | | | | |
| 3 Retention | Update SnapVault after creating a local Snapshot copy. | | | | |
| 4 Replication 5 Script | Secondary policy label Daily Error retry count 3 | | | | |
| 6 Verification | | | | | |
| 7 Summary | | | | | |
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| | Previous | Next | | | |

6. Specify any optional script to run before and after a backup run.

| Modify Oracle [| Modify Oracle Database Backup Policy | | | | | |
|---|--------------------------------------|----------------------------------|-----------------------|---------------|--|--|
| Name Specify optional scripts to run before and after performing a backup job | | | | | | |
| 2 Backup Type | | | | | | |
| 3 Retention Prescript arguments | | | | | | |
| 4 Replication | Postscript full path Postscript | /var/opt/snapcenter/spl/scripts/ | Enter Postscript path | | | |
| 5 Script | arguments | 60 5805 | | | | |
| 6 Verification | Script anieout | 00 200 | | | | |
| 7 Summary | | | | | | |
| | | | | | | |
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| | | | | Previous Next | | |

7. Run backup verification if desired.

| Modify Oracle I | Database Backup | Policy | | | × | | |
|--|---|---------------------------|----------------------|-----------------------|-----|--|--|
| Name Select the options to run backup verification | | | | | | | |
| 2 Backup Type | Type Run Verifications for following backup schedules Select how often you want the schedules to occur in the policy. The specific verification times are set at backup job creation enabling you to stagger your verification start times. | | | | | | |
| 3 Retention | | | | | | | |
| A Replication | Daily | | | | | | |
| 5 Script | Verification script | commands | | | | | |
| 6 Verification | Script timeout | 60 | secs | | | | |
| | Summary Prescript full path Prescript arguments Postscript full path Postscript arguments | /var/opt/sna | pcenter/spl/scripts/ | Enter Prescript path | | | |
| 3 Summary | | Choose optio | nal arguments | | | | |
| | | /var/opt/sna | pcenter/spl/scripts/ | Enter Postscript path | | | |
| | | Choose optional arguments | | | | | |
| | - | | | | | | |
| | | | | Previous | ext | | |

8. Summary.

| Modify Oracle I | Database Backup Policy | | (3 |
|-----------------|---------------------------------------|---|---------------|
| 1 Name | Summary | | |
| 2 Backup Type | Policy name | Oracle Full Online Backup | |
| | Details | Backup all data and log files | |
| Retention | Backup type | Online backup | etry count: 3 |
| Replication | Schedule type | Daily | |
| | RMAN catalog backup | Disabled | |
| Script | Archive log pruning | None | |
| Verification | On demand data backup retention | None | |
| | On demand archive log backup retentio | n None | |
| Summary | Hourly data backup retention | None | |
| | Hourly archive log backup retention | None | |
| | Daily data backup retention | Delete Snapshot copies older than : 14 days | |
| | Daily archive log backup retention | Delete Snapshot copies older than : 14 days | |
| | Weekly data backup retention | None | |
| | Weekly archive log backup retention | None | |
| | Monthly data backup retention | None | |
| | Monthly archive log backup retention | None | |
| | Replication | SnapMirror enabled , Secondary policy label: Daily , Error retry count: 3 | |

Create a database log backup policy for Oracle

- 1. Log into SnapCenter with a database management user ID, click Settings, and then click Polices.
- 2. Click New to launch a new backup policy creation workflow, or choose an existing policy for modification.

| New Oracle Database Backup Policy | | | | | |
|-----------------------------------|------------------------------------|----------------------------|------|--|--|
| 1 Name | Name Provide a policy name | | | | |
| 2 Backup Type | Policy name | Oracle Archive Log Backup | 1 | | |
| 3 Retention | Details | Backup Oracle archive logs | | | |
| 4 Replication | | | | | |
| 5 Script | | | | | |
| 6 Verification | | | | | |
| 7 Summary | | | | | |
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| | | | | | |
| | | Previous | Next | | |

3. Select the backup type and schedule frequency.
| New Oracle Da | atabase Backup Policy | × |
|----------------|---|---|
| 1 Name | Select Oracle database backup options | - |
| 2 Backup Type | Choose backup type | 1 |
| 3 Retention | Online backup | |
| 4 Replication | O Datafiles, control files, and archive logs | |
| 5 Script | O Datafiles and control files | |
| 6 Verification | Archive logs | |
| 7 Summary | O Offline backup Mount | |
| | ◯ Shutdown | |
| | Save state of PDBs 0 | |
| | Choose schedule frequency | |
| | Select how often you want the schedules to occur in the policy. The specific times are set at backup job creation enabling you to stagger your start times. | |
| | 🔿 On demand | |
| | Hourly | |
| | O Daily | * |
| | Previous Next | |

4. Set the log retention period.

| New Oracle Da | tabase Backup Policy | | | × |
|---|--|---------------------|--------------|----------------|
| 1 Name | Retention settings () | | | |
| Backup Type Retention Replication Script Verification | Hourly retention settings Data backup retention settings ① ③ Total Snapshot copies to keep 〇 Keep Snapshot copies for Archive Log backup retention settings 〇 Total Snapshot copies to keep ④ Keep Snapshot copies for | 7 14 7 7 ≑ | days days | |
| 7 Summary | | | | Previous: Next |

5. Enable replication to a secondary location in the public cloud.

| New Oracle Dat | tabase Backup Policy | × |
|----------------|---|------|
| 1 Name | Select secondary replication options 🚯 | |
| 2 Backup Type | 🗹 Update SnapMirror after creating a local Snapshot copy. | |
| 3 Retention | Update SnapVault after creating a local Snapshot copy. | |
| 4 Replication | Secondary policy label Hourly Error retry count | |
| 6 Verification | | |
| 7 Summary | | |
| | | |
| | | |
| | | |
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| | | |
| | Previous | Next |

6. Specify any optional scripts to run before and after log backup.

| New Oracle Dat | New Oracle Database Backup Policy | | | | | |
|----------------|---|----------------------------------|-----------------------|---------------|--|--|
| 1 Name | Name Specify optional scripts to run before and after performing a backup job | | | | | |
| 2 Backup Type | Prescript full path | /var/opt/snapcenter/spl/scripts/ | Enter Prescript path | | | |
| 3 Retention | Prescript arguments | | | | | |
| 4 Replication | Postscript full path Postscript | /var/opt/snapcenter/spl/scripts/ | Enter Postscript path | | | |
| 5 Script | arguments | | | | | |
| 6 Verification | Script timeout | 60 secs | | | | |
| 7 Summary | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | Previous Next | | |

7. Specify any backup verification scripts.

| New Oracle Dat | abase Backup Po | licy | | × | | | |
|----------------|---|--|---|-----|--|--|--|
| 1 Name | Select the options | Select the options to run backup verification | | | | | |
| 2 Backup Type | Run Verifications f | for following backup schedules | | | | | |
| 3 Retention | Select how often you enabling you to stag | want the schedules to occur in the policy. The generation start times. | he specific verification times are set at backup job creation | | | | |
| 4 Replication | Verification script | commands | | | | | |
| 5 Script | Script timeout | 60 secs | | | | | |
| 6 Verification | Prescript full path | /var/opt/snapcenter/spl/scripts/ | | | | | |
| 7 Summary | Prescript arguments Choose optional arguments | | | | | | |
| | Postscript full path | /var/opt/snapcenter/spl/scripts/ | Enter Postscript path | | | | |
| | Postscript | Choose optional arguments | | | | | |
| | | | | | | | |
| | | | Previous | ext | | | |

8. Summary.

| Name | Summary | |
|--------------|---------------------------------------|--|
| Backup Type | Policy name | Oracle Archive Log Backup |
| | Details | Backup Oracle archive logs |
| Retention | Backup type | Online backup |
| Replication | Schedule type | Hourly |
| | RMAN catalog backup | Disabled |
| Script | Archive log pruning | None |
| Verification | On demand data backup retention | None |
| | On demand archive log backup retentio | n None |
| 7 Summary | Hourly data backup retention | None |
| | Hourly archive log backup retention | Delete Snapshot copies older than : 7 days |
| | Daily data backup retention | None |
| | Daily archive log backup retention | None |
| | Weekly data backup retention | None |
| | Weekly archive log backup retention | None |
| | Monthly data backup retention | None |
| | Monthly archive log backup retention | None |
| | Replication | SnapMirror enabled , Secondary policy label: Hourly , Error retry count: 3 |

Create a full database backup policy for SQL

1. Log into SnapCenter with a database management user ID, click Settings, and then click Polices.

| n | NetApp Snap | Center® | | | | | ٠ | 9- | L demo\s | qldba <i>i</i> | App Backup an | d Clone Admin | 🖡 Sign Out |
|----------|-----------------|--|-----------|-------------|---------------|-------------|---|----|----------|----------------|---------------|---------------|------------|
| < | | Policies Credential | | | | | | | | | | | |
| | Dashboard | Microsoft SQL Server | | | | | | | | | | | |
| | Resources | Search by Name | | | | | | | New | Modity | Copy | Details | Deterat |
| - | Monitor | Name | 15 | Backup Type | Schedule Type | Replication | | | | Verifica | ation | | |
| . | Reports | There is no match for your search or data is not a | available | 8 s | | | | | | | | | |
| ٨ | Hosts | | | | | | | | | | | | |
| 54 | Storage Systems | | | | | | | | | | | | |
| | Settings | | | | | | | | | | | | |
| • | Alarte | | | | | | | | | | | | |
| - | ALLIS | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

2. Click New to launch a new backup policy creation workflow, or choose an existing policy for modification.

| New SQL Serve | r Backup Policy | | × |
|----------------|---------------------|-------------------------------|------|
| 1 Name | Provide a policy na | ame | |
| 2 Backup Type | Policy name | SQL Server Full Backup | 1 |
| 3 Retention | Details | Backup all data and log files | |
| 4 Replication | | | |
| 5 Script | | | |
| 6 Verification | | | |
| 7 Summary | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | Previous | Next |

3. Define the backup option and schedule frequency. For SQL Server configured with an availability group, a preferred backup replica can be set.

| New SQL Serve | r Backup Policy × |
|----------------|---|
| 1 Name | Select SQL server backup options |
| 2 Backup Type | Choose backup type |
| 3 Retention | Full backup and log backup |
| 4 Replication | ○ Full backup |
| 5 Script | Copy only backup |
| 6 Verification | Maximum databases backed up per Snapshot copy: 100 |
| 7 Summary | Availability Group Settings |
| | |
| | Schedule frequency |
| | Select how often you want the schedules to occur in the policy. The specific times are set at backup job creation enabling you to stagger your start times. |
| | ○ On demand |
| | ⊖ Hourly |
| | Daily |
| | ⊖ Weekly |
| | ○ Monthly |
| | Previous Next |

4. Set the backup retention period.

| New SQL Serve | er Backup Policy | × |
|-----------------|--|------|
| 1 Name | Retention settings | |
| 2 Backup Type | Retention settings for up-to-the-minute restore operation 🚯 | |
| 3 Retention | Keep log backups applicable to last 7 full backups | |
| (4) Replication | O Keep log backups applicable to last 14 days | |
| 5 Script | | |
| 6 Verification | Daily | |
| 7 Summary | Total Snapshot copies to keep Keep Snapshot copies for 14 days | |
| | Previous | Next |

5. Enable backup copy replication to a secondary location in cloud.

| New SQL Serve | r Backup Policy | × |
|---|---|---|
| 1 Name | Select secondary replication options 1 | |
| 2 Backup Type | ✓ Update SnapMirror after creating a local Snapshot copy. | |
| 3 Retention | Update SnapVault after creating a local Snapshot copy. | |
| Replication S Script 6 Verification 7 Summary | Secondary policy label Daily Error retry count 3 | |
| | | |
| | Previous Next | |

6. Specify any optional scripts to run before or after a backup job.

| New SQL Serve | r Backup Policy | | × |
|----------------|-------------------------|---|------|
| 1 Name | Specify optional so | ripts to run before performing a backup job | |
| 2 Backup Type | Prescript full path | | |
| 3 Retention | Prescript arguments | Choose optional arguments | |
| 4 Replication | Specify optional se | ripts to run after performing a backup job | |
| 0 | Postscript full path | | |
| 5 Script | Postscript arguments | Choose optional arguments | |
| 6 Verification | Script timeout | 60 secs | |
| 7 Summary | | | |
| | | | |
| | | | |
| | | | |
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| | | | |
| | | | |
| | | Previous | Next |

7. Specify the options to run backup verification.

| New SQL Serve | r Backup Policy | × |
|----------------|---|---|
| 1 Name | Select the options to run backup verification | Â |
| 2 Backup Type | Run verifications for the following backup schedules | |
| 3 Retention | Select how often you want the schedules to occur in the policy. The specific verification times are set at backup job creation enabling you to stagger your verification start times. | 1 |
| 4 Replication | Daily | 1 |
| 5 Script | Database consistency checks options | 1 |
| 6 Verification | Limit the integrity structure to physical structure of the database (PHYSICAL_ONLY) Suppress all information message (NO_INFOMSGS) | 1 |
| 7 Summary | Display all reported error messages per object (ALL_ERRORMSGS) | |
| | Do not check non-clustered indexes (NOINDEX) Limit the checks and obtain the locks instead of using an internal database Snapshot copy (TABLOCK) | 1 |
| | Log backup | 1 |
| | 🗌 Verify log backup. 🚯 | 1 |
| | Verification script settings | |
| | Script timeout 60 secs | |
| | Previous Next | |

8. Summary.

| New SQL Serve | r Backup Policy | | × | | | | | | |
|----------------|---|---|---|--|--|--|--|--|--|
| 1 Name | Summary | | | | | | | | |
| 2 Backup Type | Policy name | SQL Server Full Backup | | | | | | | |
| Detection | Details | Backup all data and log files | | | | | | | |
| 3 Retention | Backup type | Full backup and log backup | | | | | | | |
| 4 Replication | Availability group settings Backup only on preferred backup replica | | | | | | | | |
| | Schedule Type | Daily | | | | | | | |
| 5 Script | UTM retention | Total backup copies to retain : 7 | | | | | | | |
| 6 Verification | Daily Full backup retention | Total backup copies to retain : 7 | | | | | | | |
| | Replication | SnapMirror enabled , Secondary policy label: Daily , Error retry count: 3 | | | | | | | |
| 7 Summary | Backup prescript settings | undefined Prescript arguments: | | | | | | | |
| | Backup postscript settings | undefined Postscript arguments: | | | | | | | |
| | Verification for backup schedule type | none | | | | | | | |
| | Verification prescript settings | undefined Prescript arguments: | | | | | | | |
| | Verification postscript settings | undefined Postscript arguments: | | | | | | | |
| | | | | | | | | | |
| | | Previous Finis | h | | | | | | |

Create a database log backup policy for SQL.

1. Log into SnapCenter with a database management user ID, click Settings > Polices, and then New to launch a new policy creation workflow.

| New SQL Server Backup Policy | | | | | | | |
|------------------------------|---------------------|-----------------------|------|--|--|--|--|
| 1 Name | Provide a policy na | ame | | | | | |
| 2 Backup Type | Policy name | SQL Server Log Backup | 0 | | | | |
| 3 Retention | Details | Backup SQL server log |] | | | | |
| 4 Replication | | | | | | | |
| 5 Script | | | | | | | |
| 6 Verification | | | | | | | |
| 7 Summary | | | | | | | |
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| | | Previous | Next | | | | |

2. Define the log backup option and schedule frequency. For SQL Server configured with a availability group, a preferred backup replica can be set.

| New SQL Serve | er Backup Policy × |
|----------------|---|
| 1 Name | Select SQL server backup options |
| 2 Backup Type | Choose backup type |
| 3 Retention | Full backup and log backup |
| 4 Replication | Full backup Log backup |
| 5 Script | Copy only backup |
| 6 Verification | Maximum databases backed up per Snapshot copy: 100 |
| 7 Summary | Availability Group Settings |
| | Schedule frequency |
| | Select how often you want the schedules to occur in the policy. The specific times are set at backup job creation enabling you to stagger your start times. |
| | ○ On demand |
| | Hourly |
| | O Daily |
| | ○ Monthly |
| | Previous Next |

3. SQL server data backup policy defines the log backup retention; accept the defaults here.

| New SQL Serve | r Backup Policy × | | | | | | | | | |
|-----------------|--|--|--|--|--|--|--|--|--|--|
| 1 Name | Log backup retention settings | | | | | | | | | |
| 2 Backup Type | Up-to-the-minute (UTM) retention settings retains log backups created as part of full backup and full and log backup operations. | | | | | | | | | |
| 3 Retention | settings is configured to retain log backups of the last 5 full backups, then the log backups of the last 5 full backups are retain the rest are deleted. | | | | | | | | | |
| (4) Replication | | | | | | | | | | |
| 5 Script | | | | | | | | | | |
| 6 Verification | | | | | | | | | | |
| 7 Summary | | | | | | | | | | |
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| | Previous | | | | | | | | | |

4. Enable log backup replication to secondary in the cloud.

| New SQL Serve | r Backup Policy | | × |
|----------------|---|----------|---|
| 1 Name | Select secondary replication options 🚯 | | |
| 2 Backup Type | 🗹 Update SnapMirror after creating a local Snapshot copy. | | |
| 3 Retention | Update SnapVault after creating a local Snapshot copy. | | |
| 4 Replication | Secondary policy label Hourly Error retry count | 0 | |
| 6 Verification | | | |
| 7 Summary | | | |
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| | | Previous | |

5. Specify any optional scripts to run before or after a backup job.

| New SQL Server Backup Policy | | | | | | | | | | |
|------------------------------|-------------------------|--|------|--|--|--|--|--|--|--|
| 1 Name | Specify optional se | cripts to run before performing a backup job | | | | | | | | |
| 2 Backup Type | Prescript full path | | | | | | | | | |
| 3 Retention | Prescript arguments | Choose optional arguments | | | | | | | | |
| A Replication | Specify optional se | cripts to run after performing a backup job | | | | | | | | |
| | Postscript full path | | | | | | | | | |
| 5 Script | Postscript arguments | Choose optional arguments | | | | | | | | |
| 6 Verification | Script timeout | 60 secs | | | | | | | | |
| 7 Summary | | | | | | | | | | |
| | | | | | | | | | | |
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| | | | | | | | | | | |
| | | Previous | Next | | | | | | | |

6. Summary.

| New SQL Serve | r Backup Policy | | × |
|----------------|---------------------------------------|--|---|
| 1 Name | Summary | | |
| 2 Backup Type | Policy name | SQL Server Log Backup | |
| O Patrotica | Details | Backup SQL server log | |
| 3 Retention | Backup type | Log transaction backup | |
| 4 Replication | Availability group settings | Backup only on preferred backup replica | |
| | Schedule Type | Hourly | |
| 5 Script | Replication | SnapMirror enabled , Secondary policy label: Hourly , Error retry count: 3 | |
| 6 Verification | Backup prescript settings | undefined Prescript arguments: | |
| 7 Summary | Backup postscript settings | undefined Postscript arguments: | |
| | Verification for backup schedule type | none | |
| | Verification prescript settings | undefined Prescript arguments: | |
| | Verification postscript settings | undefined Postscript arguments: | |
| | | | |
| | | Previous Finis | h |

8. Implement backup policy to protect database

SnapCenter uses a resource group to backup a database in a logical grouping of database resources, such as multiple databases hosted on a server, a database sharing the same storage volumes, multiple databases supporting a business application, and so on. Protecting a single database creates a resource group of its own. The following procedures demonstrate how to implement a backup policy created in section 7 to protect Oracle and SQL Server databases.

Create a resource group for full backup of Oracle

1. Log into SnapCenter with a database management user ID, and navigate to the Resources tab. In the View drop-down list, choose either Database or Resource Group to launch the resource group creation workflow.

| | NetApp Snap | Center | B | | | | ٠ | E 0 | demo\oradb | a App Backup an | d Clone Admin | 🖡 Sign Out |
|---|-----------------|--------|------------|-------------------------------|-----------------------|----------------|----------|------------|------------|-----------------|-------------------|--------------------|
| | < | | Database 🝷 | | | | | | | | | |
| | Dashboard | | Database | • Search databases | V | | | | | | Refresh Resources | New Resource Group |
| | Resources | 19 | Name | Oracle Database Type | Host/Cluster | Resource Group | Policies | | | Last Backup | Overall Sta | tus |
| | Monitor | | cdb2 | Single Instance (Multitenant) | rhel2.demo.netapp.com | | | | | | Not protec | ted |
| | Reports | | | | | | | | | | | |
| | Hosts | | | | | | | | | | | |
| 1 | Storage Systems | | | | | | | | | | | |
| | E Settings | | | | | | | | | | | |
| | Alerts | | | | | | | | | | | |
| | | | | | | | | | | | | |

2. Provide a name and tags for the resource group. You can define a naming format for the Snapshot copy and bypass the redundant archive log destination if configured.

| | etApp Sna | apCenter® | | | | | | | | ٠ | 2 | 9- 1 | demo\oradba | App Backup and Clone Admin | 🖡 Sign Out |
|------------------|-----------------|-----------|--|---------------------|----------------|-------------|--------------|----------|-------|---|---|------|-------------|----------------------------|------------|
| > | Oracle Database | | New Resource Group | | | | | | | | | | | | × |
| Search databases | | | | | | | | | | | | | | | |
| U | 17 PF | Name | 0 | 2 | 3 | 4 | 5 | 6 | | | | | | | |
| • | | cdb2 | Name R | Resources | Policies | vernication | Notification | Summary | | | | | | | |
| <i></i> | | | Provide a name | e and tags for th | ne resource gi | roup | | | | | | | | | |
| ٨ | | | Name | rhel2_cdb2 | | | | | 0 | | | | | | |
| ÷۹ | | | Tags | orafullbkup | | | | | 0 | | | | | | |
| ÷ | | | Use custom nam | ne format for Snap: | shot copy | | | | | | | | | | |
| ▲ | | | \$CustomText × rhel2_cdb2 | ¢ | | | | | _ | | | | | | |
| | | | Backup settings | 5 | | | | | | | | | | | |
| | | | Exclude archive log destinations from backup | | | | | < ÷ + () | | | | | | | |
| | | | | | | | | | | | | | | | |

3. Add database resources to the resource group.

| | etApp Sn | apCenter® | | • | •• | demo\oradba | App Backup and Clone Admin | 🖡 Sign Out |
|---------|------------|-----------|--|---|----|-------------|----------------------------|------------|
| > | Oracle Dat | tabase 👻 | New Resource Group | | | | | × |
| | Search o | latabases | | | | | | |
| U | ar M | Name | | | | | | |
| ٩ | | cdb2 | Name Resources Policies Vernication Notification Summary | | | | | |
| <i></i> | | | Add resources to Resource Group | | | | | |
| Å | | | Host | | | | | |
| ł۹. | | | All Available Resources Selected Resources | | | | | |
| 橆 | | | (search available resources Q | | | | | |
| A | | | cdb2 (rhel2.demo.netapp.com) | | | | | |
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4. Select a full backup policy created in section 7 from the drop-down list.

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|---|-------------|-------------------|---------------------------------------|------------------------------|---------------------|---|-----|----------------|-----------------------|--|--|---|
| | > | Oracle Database 👻 | New Resource Group | | | | | | | | | |
| | | Search databases | | | | | | | | | | |
| Ī | 9 | lF ⊨ Name | | 4 5 | 6 | | | | | | | |
| 1 | ۵ | cdb2 | Name Resources Polici | es verification Notification | summary | | | | | | | |
| 1 | ñĩ | | Select one or more policies and confi | igure schedules | | | | | | | | |
| | A | | Oracle Full Online Backup | · + 0 | | | | | | | | |
| | - | | Configure schedules for selected poli | icies | | | | | | | | |
| 1 | E | | Policy IL | Applied Schedules | Configure Schedules | | | | | | | |
| | A | | Oracle Full Online Backup | None | + | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | Total 1 | | | | | | | | | |
| | | | | | | | | | | | | |

5. Click the (+) sign to configure the desired backup schedule.

| Daily | | | | | | | | | |
|---------------------|----------------|-----------------|----------|----|------|------|------|----|---|
| Start date | 09/10/2 | 021 2:32 PM | # |) | | | | | |
| Expires on | 12/31/2 | 021 2:32 PM | | | | | | | |
| Papart quart | 1 | davs | < | | Dece | mber | 2021 | | , |
| Repeat every | | | Su | Mo | Tu | We | Th | Fr | S |
| | | | 28 | 29 | 30 | 1 | 2 | З | 4 |
| | | | 5 | б | 7 | 8 | 9 | 10 | 1 |
| | | | 12 | 13 | 14 | 15 | 16 | 17 | 1 |
| | | | 19 | 20 | 21 | 22 | 23 | 24 | 2 |
| | | | 26 | 27 | 28 | 29 | 30 | 31 | 1 |
| | | | 2 | З | 4 | 5 | 6 | 7 | 8 |
| 2 The sche zone. | dules are trig | gered in the S | nap | | | Ø | | | |
| i The sche zone. | dules are trig | ggered in the S | nar | 3 | 4 | O | 6 | 7 | 2 |

6. Click Load Locators to load the source and destination volume.

| п | NetA | pp Snap | Center® | | | | | ٠ | 9 - | 👤 demo\oradba | App Backup and Clone Admin | 🖡 Sign Out |
|------------|------|----------------|---------|---------------------------------------|---|---------------------------|---------------------|---|------------|---------------|----------------------------|------------|
| > | | oracle Databi | ase 👻 | New Resource Group | | | | | | | | × |
| | | Search data | bases | | | | | | | | | |
| | 13 | 2 IN | Name | | -0 | | 6 | | | | | |
| • | | | cdb2 | Name | Resources Policies | Verification Notification | Summary | | | | | |
| a i | | | | Load secondary l verify backups or | ocators to | | | | | | | i |
| * | | | | Secondary stor | rage location: SnanVault or Snar | Mirror | | | | | | |
| ÷. | | | | Source Volume | age location. Shapvault of Shap | Destination Volume | | | | | | |
| = | | | | svm_onPrem:rh | el2_u02 | svm_hybridcvo:rhel2_ | u02_dr • | | | | | |
| A | | | | Configure ver | ification schedules | | | | | | | |
| | | | | Policy 11 | Schedule Type | Applied Schedules | Configure Schedules | | | | | |
| | | | | There is no matcl | h for your search or data is not availa | ible. | | | | | | |
| | | | | | | | | | | | | |

7. Configure the SMTP server for email notification if desired.

| ΠN | etApp Si | napCenter® | | | | | | | | | ٠ | | 0 - | 👤 demo\oradba | App Backup and Clone Admin | 🖡 Sign Out |
|-------------|----------|------------|----------------|-------------------------|-------------------------|----------------------|----------------------|----------------------|----------------------|---------------------|---------------------|-----------|------------|----------------------|------------------------------------|-------------------|
| • | | atabase 👻 | New Reso | ource Group | | | | | | | | | | | | × |
| | Search | databases | A If you serve | u want to send i er. | notifications for schee | duled or on deman | d jobs, an SMTP serv | er must be configure | d. Continue to the S | ummary page to save | our information, an | d then go | to Settir | ngs>Global Settings> | Notification Server Settings to co | infigure the SMTP |
| U | 17.19 | Name | | _ | _ | | _ | | | | | | | | | |
| 2 | | cdb2 | | 0— | | | | 6 | 6 | | | | | | | |
| a il | | | | Name | Resources | Policies | Verification | Notification | Summary | | | | | | | |
| Å | | | | Provide em | ail settings 🚯 | | | | | | | | | | | |
| ÷٩. | | | | Select the serv | vice accounts or peopl | e to notify regardin | g protection issues. | | | | | | | | | |
| 橆 | | | | Email preferen | nce Never | | - | | | | | | | | | |
| • | | | | From | From email | | | | | | | | | | | |
| - | | | | То | Email to | | | | | | | | | | | |
| | | | | Subject | Notification | | | | | | | | | | | |
| | | | | 🗌 Attach job r | report | | | | | | | | | | | |
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8. Summary.

| n Ne | etApp Sn | apCenter® | | | 🌲 📓 🤣 🕈 👤 demo\oradba App Backup and Clone Admin 🛛 🖉 Sign Ou | rt |
|----------|----------|-----------|---------------------|--|--|----|
| > | | abase 👻 | New Resource Group | | | x |
| | Search d | latabases | | | | |
| U | IF P | Name | | | | |
| ٠ | | cdb2 | Name Resources | Policies Verification Notification Summary | | |
| . | | | Resource group name | rhel2_cdb2 | | |
| * | | | Tags | orafullbkup | | |
| 34 | | | Policy | Oracle Full Online Backup: Daily | | |
| - | | | Plug-in | SnapCenter Plug-in for Oracle Database | | |
| | | | Send email | No | | |
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| | Total 1 | | | | Previous Fine | h |

Create a resource group for log backup of Oracle

1. Log into SnapCenter with a database management user ID, and navigate to the Resources tab. In the View drop-down list, choose either Database or Resource Group to launch the resource group creation workflow.

| | c | | | | _ | | | |
|-----------------|---------------------|-------------------|-------------|---------------------------|-----|---------------------------------|----------------------------|--------------------|
| NetApp Snap | Center® | | | | - e | demo\oradba | App Backup and Clone Admin | Sign Out |
| | Oracle Database 👻 | | | | | | | |
| N | | | | | | | | - |
| Dashboard | View Resource Group | Search resource g | tront A | | | | | New Resource Group |
| Resources | Name | Resources | Tags | Policies | | Last Backup | Overall Status | |
| | rhel2_cdb2 | 1 | orafullbkup | Oracle Full Online Backup | | | | |
| | | | | | | | | |
| Reports | | | | | | | | |
| 🐴 Hosts | | | | | | | | |
| Storage Systems | | | | | | | | |
| 🖶 Settings | | | | | | | | |
| Alerts | | | | | | | | |
| | | | | | | | | |

2. Provide a name and tags for the resource group. You can define a naming format for the Snapshot copy and bypass the redundant archive log destination if configured.

| E N | etApp SnapCenter® | | ٠ | 0 - | 👤 demo\oradba | App Backup and Clone Admin | 🖡 Sign Out |
|----------|------------------------|---|---|------------|---------------|----------------------------|------------|
| > | Oracle Database 👻 | New Resource Group | | | | | × |
| | Search resource groups | | | | | | |
| • | Name | | | | | | |
| • | rhel2_cdb2 | Name Resources Poicles Vernication Notification Summary | | | | | |
| . | | Provide a name and tags for the resource group | | | | | |
| A | | Name rhel2_cdb2_log 0 | | | | | |
| 80 L | | Tags Oralogbkup 0 | | | | | |
| 霊 | | Use custom name format for Snapshot copy | | | | | |
| A | | ScustomText × | | | | | |
| | | Backup settings | | | | | |
| | | Exclude archive log destinations from X C + 0 | | | | | |
| | | | | | | | |
| | | | | | | | |

3. Add database resources to the resource group.

| ΠN | etApp SnapCenter® | | ٠ | 8 . | 👤 demo\oradba | App Backup and Clone Admin | 🖡 Sign Out |
|-------------|------------------------|---|---|------------|---------------|----------------------------|------------|
| > | Oracle Database 👻 | New Resource Group | | | | | × |
| | Search resource groups | | | | | | |
| 0 | Name | | | | | | |
| • | rhel2_cdb2 | Name Resources Policies Verification Notification Summary | | | | | |
| a il | | Add resources to Resource Group | | | | | |
| * | | Host | | | | | |
| 34 | | All - | | | | | |
| = | | Available Resources Selected Resources | | | | | |
| A | | cdb2 (rhel2.demo.netapp.com) | | | | | |
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| | Total 1 | | | | | Pre | vious Next |

4. Select a log backup policy created in section 7 from the drop-down list.

| ΠN | etApp SnapCenter® | | | 0 • | 👤 demo\oradba | App Backup and Clone Admin | 🖡 Sign Out |
|----|------------------------|---|--|------------|---------------|----------------------------|------------|
| > | Oracle Database 👻 | New Resource Group | | | | | × |
| | Search resource groups | | | | | | |
| • | Name | | | | | | |
| ۲ | rhel2_cdb2 | Name Resources Policies Ventication Notification Summary | | | | | |
| ай | | Select one or more policies and configure schedules | | | | | |
| A | | Oracle Archive Log Backup | | | | | |
| ÷۹ | | Oracle Full Online Backup Voracle Archive Log Backup S | | | | | |
| ÷ | | Policy IE Applied Schedules Configure Schedules | | | | | |
| ▲ | | Oracle Archive Log Backup None + | | | | | |
| | | Total 1 | | | | | |
| | | | | | | | |
| | Total 1 | | | | | Pre | vious Next |

5. Click on the (+) sign to configure the desired backup schedule.

| Add schedules for | r policy Oracle Archive Log Backup | × |
|-----------------------|--|-----|
| Hourly | | |
| Start date | 09/10/2021 3:00 PM | |
| Z Expires on | 12/31/2021 3:00 PM | |
| Repeat every | 1 hours 0 mins | |
| | | |
| | | |
| | | |
| i The schedu zone. | ules are triggered in the SnapCenter Server time | |
| | Cancel OK | |
| | | ~ I |

6. If backup verification is configured, it displays here.

| | letApp SnapCenter® | | ٠ | 8 - | 👤 demo\oradba | App Backup and Clone Admin | 🖡 Sign Out |
|-------------|------------------------|---|---|------------|---------------|----------------------------|------------|
| > | Oracle Database 👻 | New Resource Group | | | | | × |
| | Search resource groups | | | | | | |
| 0 | Name | | | | | | |
| • | rhel2_cdb2 | Name Resources Policies Verification Notification Summary | | | | | |
| a il | | | | | | | |
| * | | Configure verification schedules | | | | | |
| 34 | | Policy Li Schedule Type Applied Schedules Configure Schedules | | | | | |
| - | | There is no match for your search or data is not available. | | | | | |
| • | | | | | | | |
| - | | | | | | | |
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| | | Total 0 | | | | | |
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| | Total 1 | | | | | Pre | vious Next |

7. Configure an SMTP server for email notification if desired.

| II N | etApp SnapCenter® | 🌒 🗷 🕹 - 1 demoloradba App Backup and Clone Admin 🕼 | Sign Out |
|---------|------------------------|--|-------------|
| > | Oracle Database 👻 | New Resource Group | × |
| | Search resource groups | If you want to send notifications for scheduled or on demand jobs, an SMTP server must be configured. Continue to the Summary page to save your information, and then go to Settings-Global Settings-Notification Server Settings to configured. | ure the SMT |
| 0 | Name | | |
| • | rhel2_cdb2 | | |
| <i></i> | | Name Resources Policies Venfication Notification Summary | |
| ٨ | | Provide email settings 0 | |
| 24 | | Select the service accounts or people to notify regarding protection issues. | |
| ÷ | | Email preference Never * | |
| A | | From From enal | |
| | | To Email to | |
| | | Subject Notification | |
| | | attach joo report | |
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| | Total 1 | Previous | Next |

8. Summary.

| | etApp SnapCenter® | | | | | • = | 🕑 🔹 👤 demo\oradba | App Backup and Clone Admin | 🖡 Sign Out |
|----|------------------------|---------------------------------|-------------------------------|--------------|---------|-----|-------------------|----------------------------|-------------|
| > | Oracle Database 👻 | New Resource Group | | | | | | | > |
| | Search resource groups | | | - | | | | | |
| • | Name | 0-2 | | 5 | | | | | |
| 2 | rhel2_cdb2 | Name Resources | Policies Verification | Notification | Summary | | | | |
| | | Resource group name | rhel2 cdb2 log | | | | | | |
| A | | Tags | oralogbkup | | | | | | |
| 34 | | Policy | Oracle Archive Log Backup: Ho | ourly | | | | | |
| • | | Plug-in | SnapCenter Plug-in for Oracle | e Database | | | | | |
| | | Verification enabled for policy | None | | | | | | |
| | | | | | | | | | |
| | Total 1 | | | | | | | Prev | ious Finish |

Create a resource group for full backup of SQL Server

1. Log into SnapCenter with a database management user ID, and navigate to the Resources tab. In the View drop-down list, choose either a Database or Resource Group to launch the resource group creation workflow. Provide a name and tags for the resource group. You can define a naming format for the Snapshot copy.

| n Ne | tApp SnapCenter® | | | | | | | ٠ | 8- | 👤 demo\sqldba | App Backup and Clone Admin | 🖡 Sign Out |
|----------|----------------------|---|-----------------------------|--------------|--------------|---------|---|---|-----------|---------------|----------------------------|------------|
| > | Microsoft SQL Server | New Resource Group | | | | | | | | | | × |
| | search by name | | | | | | | | | | | |
| 0 | Name | • | 2 3 | 4 | 5 | 6 | | | | | | |
| | master | Name F | Resources Policies | Verification | Notification | Summary | | | | | | |
| ~ | model | | | | | | | | | | | |
| - | msdb | Provide a name | e and tags for the resource | group | | | | | | | | |
| <u>.</u> | tempab | Name | sql1_tpcc | | | | 0 | | | | | |
| 24 | daea | Tags | sqlfullbkup | | | | 0 | | | | | |
| ≕ | | Use custom nar | me format for Snapshot copy | | | | | | | | | |
| A | | sql1_tpcc | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
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| | | | | | | | | | | | | |
| | Total 5 | | | | | | | | | | Prev | vious Next |

2. Select the database resources to be backed up.

| n | NetApp SnapCenter® | | ♦ 🛎 🚱 - L demo\sqldba App Backup and Clone Admin 🖡 Sign Out |
|----|----------------------|--|---|
| > | Microsoft SQL Server | New Resource Group | |
| | search by name | | |
| | Name | | |
| 9 | master | Name Resources Policies Verification Notification Summary | |
| | model | Add recourses to Descurse Croup | |
| in | msdb | Add resources to Resource Group | |
| 2 | tempdb | Host Resource Type SQL Server Instance | |
| 5 | tpcc | All • Databases • Sql1 • | |
| - | | Available Resources Selected Resources | |
| # | ≖ | search available resources | |
| 4 | 2 | Auto select all the resources from the same storage volume 0 | |
| | | tpcc (sql1) | |
| | | | |
| | | | |
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| | | | |
| | Total 5 | | Previous Next |

3. Select a full SQL backup policy created in section 7.

| п | NetApp SnapCenter® | | ● 🜌 😔 🛨 demo\sqldba App Backup and Clone Admin I Sign Out |
|----------|----------------------|---|---|
| > | Microsoft SQL Server | New Resource Group | |
| | search by name | | |
| | Name | | |
| ♠ | master | Name Resources Policies Verification Notification Summary | |
| ~ | model | Celect one or more policies and configure schedules | |
| and - | msdb | | |
| ^ | tempdb | | |
| 24 | tpcc | SQL Server Full Backup SQL Server Log Backup S | |
| 橆 | | Policy IL Applied Schedules Configure Schedules | |
| A | | SQL Server Full Backup None 🕇 | |
| | | Total 1 | |
| | Total 5 | | Previous Next |

4. Add exact timing for backups as well as the frequency.

| Add schedules for policy SQL Server Full Backup × | | | | | | | |
|---|---|---|--|--|--|--|--|
| Daily | | | | | | | |
| Start date | 09/10/2021 6:20 PM | | | | | | |
| Expires on | 12/31/2021 6:20 PM | | | | | | |
| Repeat every | 1 days | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| i The schedu zone. | les are triggered in the SnapCenter Server time | | | | | | |
| | Cancel OK | I | | | | | |

5. Choose the verification server for the backup on secondary if backup verification is to be performed. Click Load Locator to populate the secondary storage location.

| n Ne | etApp SnapCenter® | | ٠ | 0 - | 👤 demo\sqldba | App Backup and Clone Admin | 🖡 Sign Out |
|--------|------------------------|--|---|------------|---------------|----------------------------|------------|
| > | Microsoft SQL Server 🚽 | New Resource Group | | | | | × |
| | search by name | | | | | | |
| | Name | | | | | | |
| • | master | Name Resources Policies Vernication Notification Summary | | | | | |
| ~ | model | | | | | | |
| and | msdb | Select the verification servers | | | | | |
| * | tempdb | Verification server Select one or more servers | | | | | |
| 34 | tpcc | Load secondary locators to | | | | | |
| ₩ ₩ | | Verify backups on secondary Load locators Secondary storage location: SnapVault or SnapMirror Destination Volume Source Volume mm_onPremsql1_data | | | | | |
| | Total 5 | | | | | Prev | vious Next |

6. Configure the SMTP server for email notification if desired.

| | etApp SnapCenter® | 🌢 🗷 😯 - 主 demoisspidba App Backup and Clone Admin 🖉 Sign Ou | t |
|----|------------------------|--|-----|
| ~ | Microsoft SQL Server 👻 | New Resource Group | x |
| | search by name | If you want to send notifications for scheduled or on demand jobs, an SMTP server must be configured. Continue to the Summary page to save your information, and then go to Settings-Global Settings-Notification Server Settings to configure the server. | SMT |
| 0 | Name | | |
| æ | master | | |
| | model | Name Resources Policies Verification Notification Summary | |
| â | msdb | | |
| Δ. | tempdb | Provide email settings 👩 | |
| 34 | tpcc | Select the service accounts or people to notify regarding protection issues. | |
| | | Email preference Never - | |
| | | From From email | |
| | | To Email to | |
| | | Subject Notification | |
| | | Attach job report | |
| | | | |
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| | | | |
| | | | |
| | Total 5 | Previous Net | đ |

7. Summary.

| II N | etApp SnapCenter® | | | | | ٠ | 8 | 8 - | 👤 demo\sqldba | App Backup and Clone Admin | 🖡 Sign Out |
|------|--|---------------------|-------------------------------|------------------|---------|---|---|------------|---------------|----------------------------|-------------|
| > | Microsoft SQL Server | New Resource Group | | | | | | | | | 2 |
| | search by name | | | | | | | | | | |
| • | Name | | -0 | 5 | | | | | | | |
| ۲ | There is no match for your search or data is not available. | Name Resources | Policies Verification | Notification | Summary | | | | | | |
| ай | | Resource group name | sql1_tpcc | | | | | | | | |
| A. | | Tags | sqlfullbkup | | | | | | | | |
| 34 | | Policy | SQL Server Full Backup: Daily | У | | | | | | | |
| - | | Plug-in | SnapCenter Plug-in for Micro | osoft SQL Server | | | | | | | |
| | | Verification Server | None | | | | | | | | |
| A | | Send email | None | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
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| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | Resources are not found. Click Refresh Resources to discover databases in the database view or create new resource group | | | | | | | | | | |
| | on the discovered databases from the resource view. | | | | | | | | | Prev | ious Finish |

Create a resource group for log backup of SQL Server

1. Log into SnapCenter with a database management user ID, and navigate to the Resources tab. In the View drop-down list, choose either a Database or Resource Group to launch the resource group creation workflow. Provide the name and tags for the resource group. You can define a naming format for the Snapshot copy.

| II Ne | tApp SnapCenter® | | | • | - L demo\sqldb | a App Backup and Clone Admin | 🕼 Sign Out |
|-------------|----------------------|--|---|---|--------------------|------------------------------|------------|
| > | Microsoft SQL Server | New Resource Group | | | | | × |
| | search by name | | | | | | |
| U | Name | | | | | | |
| | sql1_tpcc | Name nesources Policies Vermication Notification Summary | | | | | |
| a i | | Provide a name and tags for the resource group | | | | | |
| A | | Name sql1_tpcc_log | 0 | | | | |
| 89 - | | Tags sqllogbkup | 0 | | | | |
| 1 25 | | Use custom name format for Snapshot copy ScustomText . | | | | | |
| | | sql1_tpcc_log | | | | | |
| | | | | | | | |
| | | | | | | | |
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| | | | | | | | |
| | Total 1 | | | | | Pre | vious Next |

2. Select the database resources to be backed up.

| п | NetApp SnapCenter® | | 🌲 📓 🚱 👻 🗘 demo\sqldba App Backup and Clone Admin 🛛 🖉 Sign Out |
|---|------------------------|--|---|
| > | Microsoft SQL Server 👻 | New Resource Group | × |
| | search by name | | |
| 0 | Name | | |
| | sql1_tpcc | Name Resources Policies Vernication Notification Summary | |
| 1 | | Add resources to Resource Group | |
| A | | Host Resource Type SQL Server Instance | |
| | | All • Databases • sql1 • | |
| | | Available Resources Selected Resources | |
| # | | (search available resources Q | |
| ▲ | | Auto select all the resources from the same storage volume 0 | |
| | | tpcc (sql1) | |
| | | | |
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| | | | |
| | | | |
| | Total 1 | | Previous Next |

3. Select a SQL log backup policy created in section 7.

| n Ne | tApp SnapCenter® | | 🌲 📓 🚱 - 👤 demo\sqldba App Backup and Clone Admin 🗍 Sign Out |
|-------------|----------------------|---|---|
| > | Microsoft SQL Server | New Resource Group | |
| | search by name | | |
| 0 | Name | | |
| ٠ | sql1_tpcc | Name Resources Policies Verification Notification Summary | |
| a il | | Select one or more policies and configure schedules | |
| ٨ | | SQL Server Log Backup 🔹 🕂 🕕 | |
| } 4 | | SQL Server Full Backup SQL Server Log Backup S | |
| 韢 | | Policy IL Applied Schedules Configure Schedules | |
| ▲ | | SQL Server Log Backup None + | |
| | | Total 1 Use Microsoft SQL Server scheduler | |
| | Total 1 | | Previous Next |

4. Add exact timing for the backup as well as the frequency.

| III Ne | tApp SnapCenter® | | ٠ | 8 | 0 - | L demo\sqldba | App Backup and Clone Admin | 🗊 Sign (| Dut |
|--------|------------------------|--|---|---|------------|---------------|----------------------------|----------|------|
| > | Microsoft SQL Server 🚽 | New Resource Group | | | | | | | × |
| | search by name | | | | | | | | |
| Ø | Name | | | | | | | | |
| | sql1_tpcc | Name Resources Policies Verification Notification Summary | | | | | | | |
| | | Select one or more policies and configure schedules SQL Server Log Backup | | | | | | | |
| | Total 1 | | | | | | Pre | vious N | lext |

5. Choose the verification server for the backup on secondary if backup verification is to be performed. Click the Load Locator to populate the secondary storage location.

| 1 | INetApp SnapCenter® | | 🌲 📓 🥹 🎍 demo\sqldba App Backup and Clone Admin 🖡 Sign Out |
|---|----------------------|--|---|
| > | Microsoft SQL Server | New Resource Group | × |
| | search by name | | |
| C | Name | | |
| - | sql1_tpcc | Name Resources Policies Verification Notification Summary | |
| | | Select the verification servers Verification server Select one or more servers verification server verify backups on secondary Secondary storage location: SnapVault or SnapMirror Source Volume Destination Volume svm_onPremsql1_data svm_hybrid svm_onPremsql1_log svm_hybrid Configure verification schedules Applied Schedules Policy Ls Shedule Type Applied Schedules Configure Schedules | |
| | Total 1 | | Previous Next |

6. Configure the SMTP server for email notification if desired.

| | letApp SnapCenter® | 🌲 😆 🥹 - 1 demoisqidba App Backup and Clone Admin 🕅 | gn Out |
|------------|------------------------|--|------------|
| | Microsoft SQL Server 🚽 | New Resource Group | × |
| - | search by name | if you want to send notifications for scheduled or on demand jobs, an SMTP server must be configured. Continue to the Summary page to save your information, and then go to Settings-Global Settings-Notification Server Settings to configured. | e the SMTF |
| U | Name | | |
| | sql1_tpcc | | |
| a i | | Name Resources Policies Verification Notification Summary | |
| ٨ | | Provide email settings 0 | |
| ł۰ | | Select the service accounts or people to notify regarding protection issues. | |
| 橆 | | Email preference Never • | |
| A | | From From email | |
| | | To Email to | |
| | | Subject Notification | |
| | | Attach job report | |
| | | | |
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| | | | |
| | | | |
| | | | |
| | Total 1 | Previous | Next |

7. Summary.

| • | letApp SnapCenter® | | | | • = | ₽ ▼ L demo\sqldba | App Backup and Clone Admin | 🖡 Sign Out |
|----------|----------------------|---------------------------------|---------------------------------------|-------|-----|-------------------|----------------------------|------------|
| > | Microsoft SQL Server | New Resource Group | | | | | | > |
| | search by name | | | | | | | |
| | Name | 0-0- | -0-0-0 | 6 | | | | |
| | sql1_tpcc | Name Resources | Policies Verification Notification Su | mmary | | | | |
| ~ | | | | | | | | |
| 101 | | Resource group name | sql1_tpcc_log | | | | | |
| <u>^</u> | | Tags | sqllogbkup | | | | | |
| 20 | | Policy | SQL Server Log Backup: Houriy | | | | | |
| = | | Verification Server | None | | | | | |
| • | | Verification enabled for policy | None | | | | | |
| - | | Send email | No | | | | | |
| | | | | | | | | |
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| | | | | | | | | |
| | | | | | | | | |
| | Total 1 | | | | | | Previ | ous Finish |

9. Validate backup

After database backup resource groups are created to protect database resources, the backup jobs runs according to the predefined schedule. Check the job execution status under the Monitor tab.

| п | NetApp SnapCenter® • 🖉 🗣 🕯 demoksqleba App Baduup | | | | | | | | | | 🖡 Sign Out |
|----------|---|---------------|-----------|--|-------------------------|--|--------------------|---------|---------|-------|------------|
| < | | Jobs | Schedules | | | | | | | | |
| | Dashboard | searc | h by name | | | | () Detai | | | | |
| V | Resources | Jobs - Filter | | | | | | | | | |
| 3 | Monitor | ID | Status | Name | Start date | | E | nd date | Owner | | |
| <i>.</i> | Reports | 532 | ~ | Backup of Resource Group 'sql1_tpcc_log' with policy 'SQL Server Log Backup' | 09/14/2021 8:35:01 PM 🛱 | | 09/14/2021 8:37:10 | PM 🛱 | demo\s- | qldba | |
| | Hosts | 528 | ~ | Backup of Resource Group 'sql1_tpcc_log' with policy 'SQL Server Log Backup' | 09/14/2021 7:35:01 PM 🛱 | | 09/14/2021 7:37:09 | PM 🛱 | demo\s | qldba | |
| | | 524 | ~ | Backup of Resource Group 'sql1_tpcc_log' with policy 'SQL Server Log Backup' | 09/14/2021 6:35:01 PM 🛱 | | 09/14/2021 6:37:08 | PM 🛱 | demo\si | qldba | |
| 14 | Storage Systems | 521 | ~ | Backup of Resource Group 'sql1_tpcc' with policy 'SQL Server Full Backup' | 09/14/2021 6:25:01 PM 🛱 | | 09/14/2021 6:27:14 | PM 🛱 | demo\si | qldba | |
| - | E Settings | 517 | ~ | Backup of Resource Group 'sql1_tpcc_log' with policy 'SQL Server Log Backup' | 09/14/2021 5:35:01 PM 🛱 | | 09/14/2021 5:37:09 | PM 🛱 | demo\si | qldba | |
| | Alerte | 513 | 4 | Backup of Resource Group 'sql1_tpcc_log' with policy 'SQL Server Log Backup' | 09/14/2021 4:35:01 PM 🗂 | | 09/14/2021 4:37:08 | PM 🛱 | demo\s | qldba | |
| 40 | | 509 | ~ | Backup of Resource Group 'sql1_tpcc_log' with policy 'SQL Server Log Backup' | 09/14/2021 3:35:01 PM 🛱 | | 09/14/2021 3:37:10 | PM 🛱 | demo\se | qldba | |
| | | 503 | ~ | Backup of Resource Group 'sql1_tpcc_log' with policy 'SQL Server Log Backup' | 09/14/2021 2:35:01 PM 🛱 | | 09/14/2021 2:37:09 | PM 🛱 | demo\s- | qldba | |

Go to the Resources tab, click the database name to view details of database backup, and toggle between Local copies and mirror copies to verify that Snapshot backups are replicated to a secondary location in the

public cloud.

| n Ne | tApp SnapC | enter® | | | | 1 | ∎ 0- | ⊥ demo\oradba | App Backup and Clone A | imin 🛛 🗍 Sign Out |
|----------|-----------------|----------|---------------------------------------|-------|------|-------------------------|-------------------|----------------------|------------------------|-------------------|
| > | Oracle Database | - | cdb2 Topology | | | | | | | × |
| | Search databa | ises | | | | | | | Database Settings Pr | ✓ |
| U | IF IM | Name | Manage Copies | | | | | | | |
| ♠ | | cdb2 | 197 Backups | | | | | | | |
| | 層 | cdb2dev | 3 Clones | | | | | Summ | hary Card | |
| M | | cdb2dr | O Clones Mirror copies | | | | | 394 Backu | ips | |
| A | 1 | cdb2dr2 | Local copies | | | | | 28 Da | ita Backups | _ |
| 14 | 6 | cdb2test | | | | | | 366 L0 3 Clone | g Backups s | |
| ₩ # | | | Primary Backup(s) | | | | | • 1 | ī≞ •ι ē | ≜ ≣ |
| | | | Backup Name | Count | Туре | 17 End Date | Verified | Mounted | RMAN Cataloged | SCN |
| | | | rhel2_cdb2_09-23-2021_14.35.03.3242_1 | 1 | Log | 09/23/2021 2:35:45 PM 🛱 | Not Applicable | False | Not Cataloged | 6872761 |
| | | | rhel2_cdb2_09-23-2021_14.35.03.3242_0 | 1 | Data | 09/23/2021 2:35:30 PM 🛱 | Unverified | False | Not Cataloged | 6872715 |
| | | | rhel2_cdb2_09-22-2021_14.35.02.0014_1 | 1 | Log | 09/22/2021 2:35:24 PM 🛱 | Not Applicable | False | Not Cataloged | 6737479 |
| | | | rhel2_cdb2_09-22-2021_14.35.02.0014_0 | 1 | Data | 09/22/2021 2:35:14 PM 🛱 | Unverified | False | Not Cataloged | 6737395 |
| | | | rhel2_cdb2_09-21-2021_14.35.02.1884_1 | 1 | Log | 09/21/2021 2:35:35 PM | Not | False | Not Cataloged | 6598735 |

At this point, database backup copies in the cloud are ready to clone to run dev/test processes or for disaster recovery in the event of a primary failure.

Getting Started with AWS public cloud

This section describes the process of deploying Cloud Manager and Cloud Volumes ONTAP in AWS.

AWS public cloud



To make things easier to follow, we have created this document based on a deployment in AWS. However, the process is very similar for Azure and GCP.

1. Pre-flight check

Before deployment, make sure that the infrastructure is in place to allow for the deployment in the next stage. This includes the following:

- ☐ AWS account
- □ VPC in your region of choice
- □ Subnet with access to the public internet
- Permissions to add IAM roles into your AWS account
- □ A secret key and access key for your AWS user

2. Steps to deploy Cloud Manager and Cloud Volumes ONTAP in AWS



There are many methods for deploying Cloud Manager and Cloud Volumes ONTAP; this method is the simplest but requires the most permissions. If this method is not appropriate for your AWS environment, please consult the NetApp Cloud Documentation.

Deploy the Cloud Manager connector

1. Navigate to NetApp Cloud Central and log in or sign up.

| Log In to NetApp Cloud Central | |
|------------------------------------|--|
| Don't have an account yet? Sign Up | |
| rt1600680@demo.netapp.com | |
| | |
| LOGIN | |

2. After you log in, you should be taken to the Canvas.



3. Click "Add Working Environment" and choose Cloud Volumes ONTAP in AWS. Here, you also choose whether you want to deploy a single node system or a high availability pair. I have chosen to deploy a high availability pair.

| Cloud Ma | nager | | | | | | | Account ~ | Works | pace ~ | Connector | • | 9 ® |
|--------------|----------------|------------------|-------------|------------|------------------|--------------|----------|-------------------|-------|--------|-----------|---|-----|
| Canvas | Replication | Backup & Restore | KBs | Data Sense | File Cache | Compute | Sync | All Services | +6) ~ | | | | |
| Add New | Working Enviro | onment | | | | | | | | | | | × |
| | | | | | | | | | | | | | |
| | | | | | aws | 0 | | - | | | | | |
| | | | Microsft An | And And | zon Web Services | Google Cloud | Radoum | On Premis | 9 | | | | |
| | | Cho | oose Type | | | | | | | | | | |
| | | | 0 | 2 | 6 | 2 | 1 | 0 | | | | | |
| | | | Cloud Volu | mes ONTAP | Cloud Valum | HIS ONTAP HA | ci | oud Volumes Sen | ice : | | | | |
| | | | 1.00 | Node | High A | velationsy. | | High Availability | | | | | |
| | | | | | | | <u> </u> | | | | | | |
| | | | | | 10 | Next/ | | | | | | | |

4. If no connector has been created, a pop-up appears asking you to create a connector.



5. Click Lets Start, and then choose AWS.

| - | Cloud Manager | Add Connector | | | | Need Help? | × |
|---|----------------------|---------------|-----------------|---|-----------------------|------------|---|
| | Canvas Replication | | | | | | |
| | Add New Working Envi | | | | | | |
| | | | | Provider | | | |
| | | | Choose the | cloud provider where you want to run th | e Connector: | | |
| | | | | 0 | | | |
| | | | | aws | 0 | | |
| | | | Microsoft Azure | Amazon Web Services | Google Cloud Platform | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | Continue | | | |

6. Enter your secret key and access key. Make sure that your user has the correct permissions outlined on the NetApp policies page.

| | Cloud Manager | Add Connector | Need Help? X |
|---|----------------------|---|--------------|
| | Canvas Replication | 🕗 Get Ready 👩 AWS Credentials 🔘 Details 🕢 Network 🔇 Security Group 🚳 Review | |
| _ | Add New Working Envi | AWS Credentials | |
| | | AWS Access Key AWS Access Key Is required: AWS Secret Key Region us-exist-1 US East (M. Virginia) | |
| | | Previous Next; | |

7. Give the connector a name and either use a predefined role as described on the NetApp policies page or ask Cloud Manager to create the role for you.

| Cloud Manager | Add Connector | Need Help7 X |
|----------------------|---|--------------|
| Canvas Replication | ⊘ Get Ready 🖉 AWS Credentials 🌖 Details 🕣 Network 🌀 Security Group 🌀 Review | |
| Add New Working Envi | Details | |
| | Connector Instance Name O Connector Role O | |
| | avesciousdmanager | |
| | Role Name | |
| | Add Tags to Connector Instance Choud-Manager-Operator-IBNt2Aj | |
| | | |
| | | |
| | | |
| | Previous Next | |

- 8. Give the networking information needed to deploy the connector. Verify that outbound internet access is enabled by:
 - a. Giving the connector a public IP address
 - b. Giving the connector a proxy to work through
 - c. Giving the connector a route to the public internet through an Internet Gateway
| - | Cloud Manager | Add Connector | Need Help? X |
|---|---------------------|--|--------------|
| | Canves Replication | 🧭 Get Ready 🔗 AWS Credentials 🔗 Details 💽 Network 🔇 Security Group 🚯 Review | |
| | Add New Working Env | Connectivity Proxy Configuration (Optional) VPC MTTP Proxy vpc:083fcd/9975dfb6e-10.221.0.0/16 Energiest impuft 22.16.264 f mmth Subnet Define Credemials for this Proxy ~ 10.221.4.0/24 publicSN_usi-ebst-1a_rt1600 Upload a root certificate ~ Key Pair Image: I | |
| | | Previous Next | |

9. Provide communication with the connector via SSH, HTTP, and HTTPs by either providing a security group or creating a new security group. I have enabled access to the connector from my IP address only.

| Cloud Manager | Add Connector | Need Help? X |
|----------------------|---|--------------|
| Canvas Replication | 🧭 Get Ready 🕑 AWS Credentials 🕑 Details 🕑 Network 🚳 Security Group 🚯 Review | |
| Add New Working Envi | The security group must allow inbound HTTP. HTTPS and SSH access. | |
| | Assign a security group: Create a new security group Select an existing security group | |
| | HTTP (Port 80) HTTPS (Port 44); SSH (Port 22) | |
| | Source Type Source Type Source Type | |
| | _ Mχ.Φ → | |
| | Source (CIDPI) Source (CIDPI) Source (CIDPI) | |
| | 216.240.31.345.02 216.240.31.545.02 216.240.31.545.02 | |
| | | |
| | Previous Next | |

10. Review the information on the summary page and click Add to deploy the connector.

| - | Cloud Manager | Add Connector | | Need Help? X |
|---|----------------------|---------------------|---|--------------|
| | Canvas Replication | 🕑 Get Ready 🛛 🖉 AWS | Credentials ⊘ Details ⊘ Network 🥝 Security Group 👩 Review | |
| | Add New Working Envi | | Code for Terraform Automation | |
| | | Connector Name | awscloudmanager | |
| | | Region | us-east-1 | |
| | | VPC | vpc-083fcbd79f75dfb6e - 10.221.0.0/16 | |
| | | Subnet | 10.221.4.0/24 publicSN_us-cast.1a_rt1600680 | |
| | | say Pair | n1600680 | |
| | | Public IP | Enable | |
| | | Prosy | None | |
| | | Security Group | HTTP: 216.240.31.145/32, HTTP5: 216.240.31,145/32, 35H: 216.240.31.145/32 | |
| | | | Previous Add | |

11. The connector now deploys using a cloud formation stack. You can monitor its progress from Cloud Manager or through AWS.



12. When the deployment is complete, a success page appears.

| Cloud Manager | × |
|---------------------|--------------------------------|
| Carrvas Replication | Connector Successfully Created |
| | Continue |
| | |

Deploy Cloud Volumes ONTAP

1. Select AWS and the type of deployment based on your requirements.

| Cloud Ma | nager | | | | | | A0 11 | ount costa | | Workspace Workspace 1 | Connector modeutment | @ @ | |
|--------------|----------------|------------------|--------------|------------|------------------|-----------------|----------|-----------------|----------|--------------------------|-------------------------|-----|---|
| Canvas | Replication | Backup & Restore | Kās | Data Sense | File Cache | Compute | Sync | All Service | s (+8) 🛩 | | | | |
| Add New | Working Enviro | onment | | | | | | | | | | | × |
| | | | | | | | | | | | | | |
| | | | | | aws | 0 | | | 1 | | | | |
| | | | Microsh Atur | e Ana | nın Web Services | Google Clouif I | Platform | 0ePre | nites | | | | |
| | | Cho | ose Type | | | | | | | | | | |
| | | | G | 8 | 0 | 2 | | 6 | | | | | |
| | | | Cloud Volum | Ses ONTAP | Cloud Volum | HIS ONTAP HA | Cloud | Volumes 54 | ervice | | | | |
| | | | Share | Node | High A | effetility | | igh Availabilit | 20 | | | | |
| | | | | | | | | | | | | | |
| | | | | | 0 | lext | | | | | | | |

2. If no subscription has been assigned and you wish to purchase with PAYGO, choose Edit Credentials.

| | Cloud Ma | nager | | | | | | | Account r1500880 | | Workspace Workspace | | Connecto | ina." | ۲ | 0 | ۲ |
|--------|------------------|-----------------------|----------------------------------|------------|----------------------------|------------|--|---------------------|---------------------|--------------|------------------------|---|----------|-------|---|---|---|
| | Canvas | Replication | Backup & Restore | K8s | Data Sense | File Cache | Compute | Sync | All Sen | vices (+8) 🗸 | | | | | | | |
| | Create a No | ew Working Environ | nment | | | Details an | d Credentia | Is | | | | | | | | | |
| | Previous | Step . | Instance Profi Credential Nat | le Ne | 322944748816 Account ID | | Are subscription tarketplace Subscr | n annulated | | fd | t Credentials |] | | | | | |
| | | | Details Working Envir | onment Nam | e (Chutter Manue) | | Cred | oritials | | | | | | | | | |
| | | | Up to 40 ch | racters. | | | adr | nin | | | | | | | | | |
| | | | 3 Add Tag | оро | onal Field Up to f | iur tags | Confi | rord rm Password | | | | | | | | | |
| | | | | | | 6 | monue | | | | | | | | | | |
| Coud M | anger3.9.9 Built | 5 Aug 18, 2021 04,130 | 5 eri luta | | | | | | | | | | | | | | |

3. Choose Add Subscription.

| | Cloud Mar | nager | | | | | | | Account | | Workspace Workspace 1 | Connector avrichadman | ٢ | 0 | 8 |
|---|-------------------------------|--------------------|-------------------------------------|--------|--------------------------------------|-------------------|------------------------------------|-----------|---------|--------------|--------------------------|--------------------------|---|---|---|
| | Canvas | Replication | Backup & Restore K | 08s | Data Sense | File Cache | Compute | Sync | All Se | envices (+8) | | | | | |
| | Create a Ne | w Working Enviror | ument | | | Details and | d Credentia | | | | | | | | |
| | Priseolas | Step . | Instance Profile Credential Name | | Edit Cre | dentials & Ad | ld Subscriptic | on . | _ | | R Credenzals | | | | |
| | | | Details Working Environm | nd Nam | Associate Credentials Instance | Subscription to | Credentials (*) 0: 322944748816 | | * | | | | | | |
| | | | Add Tags | Opt | Macketg • Arr | lace Subscription | a latest with the st | ndectast. | | | | | | | |
| - | | Aug 16,707, 8418.0 | | | | Apply | Cat | icel | | | | | | | |

4. Choose the type of contract that you wish to subscribe to. I chose Pay-as-you-go.

| | Cloud Ma | nager | | | | | | | Account +1600580 | • • | Vorkspace Vorkspace-1 | | Connector anodoudmen | @ (| 9 0 |
|---------|------------------|--------------------------|------------------|-----|---|--|--|-----------------------------|--|--------------------------|--------------------------|----|-------------------------|-----|-----|
| | Canvas | Replication | Backup & Restore | Kās | Data Sense | File Cache Cablantibilis Sc A | Compute and Subsempt | Sync | All Service | s (+8) 🗸 | | | | | |
| | Create a No | w Working Enviror | WINNE: | | Select a s details an Pay Pay wit | ubstription option of thes substribe. g-Per-THE - Annual y for Cloud Volum th an annual, upfri | and click Continue Contract es ONTAP ont payment. | The AWS M | arketplace ena fay-as-you go lay for Cloud V m hourly rate. | bles you to Volumes O | view pricing | | | | |
| . 65.00 | langer 163 Julié | 1 - Aug 18, 201 (4415) # | Len dK | | The next (1) AW Sub (2) Coo Sav | t steps: IS Maningslace bscribe and then dis wid Manager we your subscription | is Set Up Your Act and associate the | ount to conf Marketplace | igure your acco subscription w | sunt. http://www.ak | WS credents Gancel | μ. | | | |

5. You are redirected to AWS; choose Continue to Subscribe.

| 💭 aws marketplace | | | | | ٩ | Halla, rt1600680 - |
|-----------------------------------|---|--|---|---|--|--------------------------------------|
| Addot - Categorian - Dervery Addo | ■ NetApp | Cloud Manager - Deplo Data Services loid by: NetKop.Inc. Eart here to drafoy and manage Gloud Idoud Backup and Cloud Volumes Servic Show more | y & Manage Ne Volumes ONTAP, Cloud Tir e. Accelerate critical busin | tApp Cloud ering, Cloud Data Sense, ess apps with speed, | Continuer to Solution be | Anna and an and an and an and an and |
| | Product Over | Pricing | Usage | Support | Reviews | |
| | NetApp Cloud Manager is th and operating NetApp's Clain - Cloud Volumes ONTAP - Fi - Cloud Backup - Increment arthiving CVD and On-Prem - Cloud Testing - Terring infr - Cloud Tasting - Terring infr - Cloud Tasting - Terring infr - Cloud Manager also manager Cloud Manager also manager Cloud Manager also manager | e management and automation platfor all Data Services including: lie and block storage for enterprise work to block-level Bakkop & Restore capabilities over ONTAP data to 53 equently-uned data to object storage for adda privacy controls and reporting per Clocel Volumes Service on AWS y-to-day requirements of operating yo guring, provisioning, and monitoring et- | m use for deploying cloads fines for protecting and er AFF er Lloud storage ich of your active | Highlights Streamline the deploys Cloud Volumes ONTAP Centrally manage your replicate across availab your data center Enable your If adminis your cloud storage res | ment of all your NetApp environments NetApp based storage and ality zones or to and from trators to audit and track surce spend | |

6. Subscribe and you are redirected back to NetApp Cloud Central. If you have already subscribed and don't get redirected, choose the "Click here" link.



7. You are redirected to Cloud Central where you must name your subscription and assign it to your Cloud Central account.

| T NetApp | | Falstic View | Fill - | 22 |
|--------------------------|---|--------------|--------|----|
| EE Experientee | Subscription Assignment × | | | |
| NGE Feature Spotlight | Your subscription to Cloud Manager / Cloud Volumes ONTAP from AWS Marketplace was created successfully! | | | |
| 197 Praticity (| Name your subscription demo.netapp.com-cloud-volumes-ontap-386953e5 | | | |
| ×. | NetApp Cloud Central Account 0 | | | |
| ena An | We've assigned your subtractiption to all of your NetApp Cloud Central accounts. You can choose to unassign specific accounts. | | | |
| territori Itatus (1 | Sive | | | |
| Command Us | | | | |

8. When successful, a check mark page appears. Navigate back to your Cloud Manager tab.

| IT NetApp | | Fataric View | Full - | |
|--------------------------|---|--------------|--------|--|
| THE LARGE VIEW | | | | |
| NCE Pearses Spotlight | | | | |
| B Pullen i | | | | |
| X tum : | | | | |
| eta Ari | | | | |
| Services Batue (3 | Your subscription demo.netapp.com-cloud-volumes-ontap-386953e5 saved successfully. | | | |
| Contact Un | | | | |

9. The subscription now appears in Cloud Central. Click Apply to continue.

| Create a New Working Environment | Edit Credentials & Add Subscription | | |
|--|--|-----|--|
| | Associate Subscription to Credentials | | |
| | You subscribed successfully? | _ | |
| | Credentals | | |
| | Instance Profile Account ID: 322944748816 | | |
| | Subscription | | |
| | demo.netapp.com-cloud-volumes-ontap-386953e5 | • | |
| | Add Subscription | | |
| | 77 11 | | |
| | Apply Cancel | h i | |
| | | | |
| 2 Charl Hengel 54.8 (Sell 8 - Aug 18, 2017 541, 500 are 177) | | | |

- 10. Enter the working environment details such as:
 - a. Cluster name
 - b. Cluster password
 - c. AWS tags (Optional)

| Cloud Ma | nager | | | | | | Account ~ Workspace ~ Co r1600880 Workspace a | onsector 🖌 🕲 G | |
|--------------|--------------------|-----------------------------------|-----------------------------|--------------|---------------------------------------|---------------------|--|------------------|--|
| Canvas | Replication | Backup & Restore | K8s Data Sense | File Cache | Compute | Sync | All Services (+8) ~ | | |
| Create a N | ew Working Enviror | nment | | Details an | nd Credentia | IS | | | |
| † Previou | s Step | Instance Profil Credential Nat | e 32294474 le Account I | 8816 | demo.netapp.com Marketplace Subscr | cloud-vol lption | Edit Credentials | | |
| | | Defails | | | Crede | mbals | | | |
| | | hybridawseve | nment Name (Guster Nar) | 201 | Juser | ume un | | | |
| | | | | | Pasaw | ord | | | |
| | | Add Tags | Opponal Field (1) | to four tags | | | | | |
| | | | | | Confir | m Password | | | |
| | | | | c | ontinue | | | | |

11. Choose which additional services you would like to deploy. To discover more about these services, visit the NetApp Cloud Homepage.

| | | | | | | | | | Account ~ | Workspo Workspo | en ~ | Connector avectesdmena. | @ (| 9 | 8 |
|---|-------------|--------------------|------------------|-----------|------------|------------|---------|------|------------------|--------------------|------|----------------------------|------------|---|---|
| - | Canvas | Replication | Backup & Restore | K8s | Data Sense | File Cache | Compute | Sync | All Services (+) | n~ | | | | | |
| | Create a No | ew Working Environ | ament | | | Ser | vices | | | | | | | | |
| | ↑ Previous | :Step | | | | | | | | | | | | | |
| | | | 💿 Da | a Sense & | Compliance | | | | | -0 | ~ | | | | |
| | | | Ва | kup to Ck | Rid | | | | | - | | | | | |
| | | | (ilid) Mo | nitoring | | | | | | -0 | | | | | |

12. Choose whether to deploy in multiple availability zones (reguires three subnets, each in a different AZ), or a single availability zone. I chose multiple AZs.

| - | Cloud Ma | nager | | | | | 1 | Account ~ | Works | pate ace-1 | Connector avadoudment. | © © | |
|---|-------------|-------------------|-------------------|---|--|----------|--|---|--|---------------------|---------------------------|-----|--|
| | Canvas | Replication | Backup & Restore | K8s Data S | iense File Cache | Compute | Sync | All Services (+ | 8) V | | | | |
| | Create a No | ew Working Enviro | nment | | HA Deploy | ment Mod | els | | | | | | |
| | 1 Previous | Step | Multiple Availabi | lity Zones aximum protection 4 ection of 3 availabilit e serves data if its pa | gairot AZ failures. γ zones. rtner goes offline. | Single A | vailability Zo rotects agains ingle availabi0 roup, spread i n HA node sei Linfis | ane It failures within ity zone. HA nod across distinct u rves data if its pr | a single AZ es are in a p nderlying hi | lacement rdware. | | | |

13. Choose the region, VPC, and security group for the cluster to be deployed into. In this section, you also assign the availability zones per node (and mediator) as well as the subnets that they occupy.

| # | Cloud Ma | nager | | | | | | | Account ~ | Workspace Workspace1 | | Connector ~ avodoutmena. | 0 | 0 | |
|-------|-------------------|----------------------|---------------------|-----|------------|------------------------------------|---------|------|-------------------------|-------------------------|----|-----------------------------|---|---|--|
| | Canvas | Replication | Backup & Restore | K8s | Data Sense | Ele Cache | Compute | Sync | All Services (+8) 🗸 | : | | | | | |
| | Create a No | w Working Environ | iment | | | Regio | n & VPC | | | | | | | | |
| | 1 Previous | Step | AWS Region | | | /PC | | | Security group | | | | | | |
| | | | US East N. Virgin | à | × | vpc-063fcbd79f75d 10.221.0.0/16 | ito6e+ | × | Use a generated securit | y group | ¥. | | | | |
| | | | Node 1: | | | Node 2: | | | Mediator: | | | | | | |
| | | | Availability Zone | | | Availability Zone | | | Availability Zone | | | | | | |
| | | | us-east-1a | | | us-east-1b | | • | us-east-1c | • | | | | | |
| | | | Subnet | | | Subnet | | | Subnet | | | | | | |
| | | | 10.221.1.0/24 | | * | 10.221.2.0/24 | | * | 10.221.3.0/24 | + | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | Cor | ntinue | | | | | | | | |
| | | | | | | | | | | | | | | | |
| CoutM | langer3.9.9 Suite | 0 Aug 18,2021 04,133 | s ani luta | | | | | | | | | | | | |

14. Choose the connection methods for the nodes as well as the mediator.

| | Cloud Ma | nager | | | | | | | Account | | Workspace Workspace | • | Connec | tor dmana* | ۲ | 0 | 8 |
|-------|----------------|-------------------------|------------------|---------------|------------|--------------|-------------|--------------|------------|------------|------------------------|---|--------|---------------|---|---|---|
| | Canvas | Replication | Backup & Restore | K8s | Data Sense | File Cache | Compute | Sync | All Ser | vices (+8) | ~ | | | | | | |
| | Create a N | ew Working Enviro | ament | | Conr | ectivity & S | SH Authen | tication | | | | | | | | | |
| | t Previou | : Step | No. | des . | | | <u>.</u> | Mediator | | | | | | | | | |
| | | | SSH Authe | ntication Met | thod | | Security Gr | ត់ប្តេ | | | | | | | | | |
| | | | Passwor | đ | | • | Use a ger | verated secu | uth Ruants | | • | | | | | | |
| | | | | | | | Key Pair Na | me | | | | | | | | | |
| | | | | | | | /1160068 | 0 | | | | | | | | | |
| | | | | | | | Internet Co | nnection Me | thod | | | | | | | | |
| | | | | | | | Plublic (P | address | | | - | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | Cor | tinue | | | | | | | | | | |
| CoutM | lange 359 Suit | a Aug 10, 2021 (ALT) (A | s em lata | | | | | | | | | | | | | | |



The mediator requires communication with the AWS APIs. A public IP address is not required so long as the APIs are reachable after the mediator EC2 instance has been deployed.

 Floating IP addresses are used to allow access to the various IP addresses that Cloud Volumes ONTAP uses, including cluster management and data serving IPs. These must be addresses that are not already routable within your network and are added to route tables in your AWS environment. These are required to enable consistent IP addresses for an HA pair during failover. More information about floating IP addresses can be found in the NetApp Cloud Documenation.

| Cloud Mar | ager | | | | | | | | Account rt1618549 | | Workspace Workspace-1 | Connector 🗸 | Ĺ, | ? | |
|---------------|-------------------|------------------|-------------|---|---|--|--------------------------------|---|-------------------------------------|-------------------|--------------------------|-------------|----|---|--|
| Canvas | Replication | Backup & Restore | K8s | Data Sense | File Cache | Compute | Sync | All Services (+8) 🗸 | | | | | | | |
| Create a Nev | w Working Environ | ment | | | | Floa | ting IPs | | | | | | | | |
| ↑ Previous 9 | Step | | Floating IP | addresses are requ HA nodes if failu | iired for cluster an ires occur. To acce | nd SVM access and ess the data from nat are outside of i | d for NFS and outside the V | CIFS data access. These f PC, you can set up an AW | loating IPs can IS transit gatew | migrate be ay. | etween | | | | |
| | | | | iou muse spee | Floating IP add | Iress for cluster m | ianagement | | cica nuo regio | | | | | | |
| | | | | | Floating IP add 10.222.0.201 | lress 1 for NFS and | d CIFS data | | | | | | | | |
| | | | | | Floating IP add 10.222.0.202 | lress 2 for NFS and | d CIFS data | | | | | | | | |
| | | | | | Floating IP add | lress for SVM man g IP Address | nagement (Op | tional) | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | Ca | ontinue | | | | | | | | |

2. Select which route tables the floating IP addresses are added to. These route tables are used by clients to communicate with Cloud Volumes ONTAP.

| # | Cloud Ma | nager | | | | | | Å | ecount ~ | Workspace ~ Workspace1 | Connector ~ | - | 0 0 |
|---|------------|--------------------|------------------------|-------------------------------------|--|-------------------------------|---|----------------------------------|---|-----------------------------|-------------|---|-----|
| | Canvas | Replication | Backup & Restore | ×85 | Data Sense | Ble G | che Compute | Sync | All Services (+8) | ·~ | | | |
| | Create a N | ew Working Environ | iment | | | R | oute Tables | | | | | | |
| | 1 Previou | s Step | Select the rou pair | e tables that s . If you leave a | hould include route route table unselec | s to the flou ted. clients | iting IP addresses. This enu that are associated with th | ibles client a ne route tabli | ccess to the Cloud V e cannot access the | olumes ONTAP HA HA pair. | | | |
| | | | | | | Add | ibonal information 🕀 | | | | | | |
| | | | Name | | | Main | ID | Asso | ciate with Subnet | Tags | | | |
| | | | [2] private | _rt_rt1600680 | | No | rtb-08b4cb88f65cR26a5 | 3 Sub | boets | 1 Tags | | | |
| | | | 2 public | rt_rt1600680 | | Ves | rtb-0e46720d0da10c59 | 3 (150) | briets | 1 Tags | | | |
| | | | 2 Route Tables |) The main is | ute table is the defa | ult for the | VPC | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | 1 | Continue | | | | | | |
| | | | | | | | A CONTRACTOR OF A | | | | | | |

Choose whether to enable AWS managed encryption or AWS KMS to encrypt the ONTAP root, boot, and data disks.

| - | Cloud Ma | nager | | | | | | | Account m600680 | | Workspace Workspace 1 | Connector ~ | 0 | 0 (| 9 |
|---|------------|-------------------|------------------|----------|--|--|-------------------|---------------|--------------------|--------------|--------------------------|-------------|---|-----|---|
| | Canvas | Replication | Backup & Restore | K8s | Data Sense | File Cache | Compute | Sync | All Ser | vices (+8) • | × | | | | |
| | Create a N | ew Working Enviro | oment | | | Data E | ncryption | | | | | | | | |
| | 1 Previous | s Step | | AM B1 | 5 Is responsible for andled by AWS key fault Master Key: a | data encryption data encryption a management sen ws/ebs | nd decryption opi | eraboris. Key | nianageme | nt | | | | | |
| | | | | | | Co | ntinue | | | | | | | | |

4. Choose your licensing model. If you don't know which to choose, contact your NetApp representative.

| - | Cloud Ma | nager | | | | | | | Account r1500580 | | Workspace Workspace1 | Connector evolvedme | na.~ | ٢ | 0 | |
|-------|-----------------|-----------------------|---|--|----------------|-----------|--|--|---|--|---|------------------------|------|---|---|--|
| | Canvas | Replication | Backup & Restore | K8s | Data Sense | Ble Cache | Compute | Sync | All Sen | vices (+8) 🗸 | <i>.</i> | | | | | |
| | Create a N | ew Working Enviro | onment | Clou | d Volumes (| ONTAP Cha | rging Meth | ods & N | ISS Acco | ount | | | | | | |
| | 1 Previout | i Step | Cloud Volumes ONTAP Learn more about our cha O Pay-As-You Bring your o | Charging rging meth Go by the h wwn license | Methods ods | | Net Lean Ta m shou Dom finist Supp | App Suppor n more abou sgister this C ild add NetA t have a Net n deploying t sort Registral | rt Site Acco It NetApp Su loud Volume op Support 5 App Support his system.A tion option b | unt <i>(Clotio</i> pport Site (is ONTA9" to lite Account Site account site account ther its create an | nal) NSS) accounts s support.you t. nt?Select go to sted.use the NSS account. | | | | | |
| | | | Freemium (| Up to 500G | 8) | | | Add Netapp | Support Site | Account | | | | | | |
| | | | | | | co | ntinue | | | | | | | | | |
| Charf | large 153 files | 0 Aug 18, 2021 04 13: | 25 mm 10715 | | | | | | | | | | | | | |

5. Select which configuration best suits your use case. This is related to the sizing considerations covered in the prerequisites page.

| | Cloud Ma | nager | | | | | | | Account ~ | Workspace 1 | | Connector exocloudment. | | \$ | 9 ® |
|--------|----------------|-------------------------|---------------------------------|------------|---|--------------------------------------|--------------------------------------|-----------------------------|----------------------|----------------|-------------------------------------|-----------------------------------|--------|-------------|-------|
| | Canvas | Replication | Backup & Restore | K8s | Data Sense | Ble Cache | Compute | Sync | All Services (+8) | | | | | | |
| | Create a Ne | w Working Enviro | oment | | | Preconfigu | red Packag | 95 | | | | | | | |
| | 1 Previous | Step | Select a proc | configured | Cloud Volumes O Preconfi | NTAP system the guind settings ca | at best matches in be modified at | your needs, a later time | or create your own o | configuration. | | | Change | e Configura | ation |
| | | POC and t | mail workloads Its of xorage | t | batabase and applik production wor Up to 10TR of at | cation data kloads torage | | Cost effectiv | ve DR storage | Highest | performar workdo p to 36815 c | ce production ids fittorage | | | |
| Coud M | looge 153 Said | 0 Aug 10, 2021 (04, 13) | S err L/TC | | | Co | otinue | | | | | | | | |

6. Optionally, create a volume. This is not required, because the next steps use SnapMirror, which creates the volumes for us.

| ** | Cloud Ma | inager | | | | | | | Account | • | Workspace Workspace 1 | | Consector ~ | 0 | 0 | 0 |
|---------|------------|-----------------------|-------------------|---------|------------|-------------|------------|---------------|-----------|------------|--------------------------|---|-------------|---|---|---|
| | Canvas | Replication | Backup & Restore | KBs | Data Sense | File Cache | Compute | Sync | All Servi | ces (+8) 🛩 | e | | | | | |
| | Create a N | ew Working Environ | iment | | | Create | Volume | | | | | | | | | |
| | 1 Previou | s Step | Details & Pro | tection | | | Protoco | d | | | | | | | | |
| | | | Volume Name: | | Sue | :G81 @ | 145 | 5 | CIFS | | (505) | | | | | |
| | | | 1 | | W | dume size | Access Con | anal . | | | | | | | | |
| | | | Snapshot Policy; | | | | Custom e | export policy | 2 | | | - | | | | |
| | | | default | | | | | | | | | | | | | |
| | | | ID Default Policy | | | | Custom ex | port policy | | | | 0 | | | | |
| | | | | | | | 10.221.0 | 0/16 | | | | | | | | |
| | | | | | | | Advanced | options | | | | ~ | | | | |
| | | | | | | < Continue? | Sk | ip | 1 | | | | | | | |
| 1.45.44 | | - Aug 18 1012 AA 5 10 | Control Control | | | | | | -1 | | | | | | | |

7. Review the selections made and tick the boxes to verify that you understand that Cloud Manager deploys resources into your AWS environment. When ready, click Go.

| # | Cloud Mana | ıger | | | | | | | Account S | | Workspace Workspace 1 | | Connector evodoutmen | | ۲ | 0 | |
|---|---------------|--------------------------|-----------------------------|--------------------|----------------------|-------------------|---------------------|----------------|------------------|------------|--------------------------|---|-------------------------|---|---|---|--|
| | Canvas | Replication | Backup & Restore | Kās | Data Sense | File Cache | Compute | Sync | All Service | i (+8) 🛩 | | | | | | | |
| | Create a New | Working Environr | ment | | | Review (| & Approve | | | | | | | | | | |
| | 1 Previous St | ^{ep} hybridawsc | VO ast-1 HA | | | | | | | | | 5 | iow API reque | d | | | |
| | | I understan | d that in order to activate | e support. I mu | rst first register G | Toud Volumes ONT | AP with NetApp: M | ore informatic | 00 F | | | | | | | | |
| | | V Lunderstan | d that Cloud Manager wi | It allocate the a | appropriate AW5 | resources to comp | ly with my above re | equinoments | . More informati | ie? | | | | | | | |
| | | Overview | v Networking | 51 | torage | | | | | | | | | - | | | |
| | | Storage System: | Cloud | Volumes ONTA7 | HA. | | HA Deploym | nent Model: | Mul | tple Avail | ibility čones | | | | | | |
| | | | 1 March 1 | NUMBER POTAT | Grandaut | | Encryption | | 4564 | Mariana | e. | | | | | | |
| | | License Type: | Cibud | Fundament Services | - (4140 H140 H2 | | | | 1000 | 1000000 | 6.7 | | | | | | |

8. Cloud Volumes ONTAP now starts its deployment process. Cloud Manager uses AWS APIs and cloud formation stacks to deploy Cloud Volumes ONTAP. It then configures the system to your specifications, giving you a ready-to-go system that can be instantly utilized. The timing for this process varies depending on the selections made.



9. You can monitor the progress by navigating to the Timeline.

| | Cloud M | anager | | | | | A. | ccount ~ | Workspace ~ Workspace-1 | Connector ~ | © © | 8 |
|------------------|------------------|---------------------------------|-------------------------------------|-----|------------|---|-------|------------------|---------------------------------------|-------------|-----|---|
| | Canvas | Replication | Backup & Restore | Kās | Data Sense | File Cache Compute 5 | Sync: | All Services (+) | n~ | | | |
| | | Resources Canvas Review | 6 Cirol, CirS, ANF & On-Premises | * | 6 | Digital Wallet View & Manage Digital Wallet | 1 | * | Timeline View Activity & Events | | | |
| | | Services Replice Data lie | tion plication | * | 6 | Backup & Restore Data Protection for CPO and On-Premis | - | ۲ | KBs Cloud Native Development | | | |
| | | Data S | ense overnance & Compiliance | * | 0 | Compliance Privacy & Compliance Controls | 4 | | Tiering Lift and DON'T shift | <i>\$</i> | | |
| | | (ht) Monito | eing 6. Optimize and Secure | 2 | (1) | File Cache Convolidate your Data into the Cloud | 1 | \bigcirc | Compute Optimize your clinic spend | | | |
| Margin /// South | arage retapp con | Sync Automo | ned Data Synchronization | × | | SnapCenter Application Data Management | 1 | * | Active IQ Digital Advisor | 1 | | |

10. The Timeline acts as an audit of all actions performed in Cloud Manager. You can view all of the API calls that are made by Cloud Manager during setup to both AWS as well as the ONTAP cluster. This can also be effectively used to troubleshoot any issues that you face.

| Cloud Man | iger | | | Acce | ount ~ | Norkspace ~ Norkspace 1 | Comm | etor ~ | ۲ | 0 (| 8 |
|---------------|---|-----------------------------------|----------------|-------------|---------------------|----------------------------|-----------------------------|------------|---|-----|---|
| Canvas | Replication Backup & Rest | ore KBs Data Sense File | e Cache Comput | e Sync | All Services (+8) ~ | | | | | | |
| (+) Timeli | ne | | | | | | | | | | |
| | ₩ Filters: | | | | | | | | | | |
| | Time (1) Service | Action Apont (1) Resource | e Uier [| Status Peo | et. | | ¢ | 2 <u>+</u> | | | |
| | Time . | Action : | Service : | 🕒 Agent ± | • Resource : | User : | Status : | ٠ | | | |
| | Aug 18 2021, 9:42:32 pm | Check Connectivity | Coud Manager | auscloudman | hybridavacio | Full Name | Success | | | | |
| | Aug 16 2021, 9:42:00 pm | Create Awa Ha Working Environment | Cloud Manager | awychoudma | hybridawscvo | full Name |) Pending | • | | | |
| | Aug 19 2021, 10:09:39 pm | Describe Operation Status | | | | | Success | | | | |
| | | December December Parties | | | | | . Lena | | | | |

11. After deployment is complete, the CVO cluster appears on the Canvas, which the current capacity. The ONTAP cluster in its current state is fully configured to allow a true, out-of-the-box experience.



Configure SnapMirror from on-premises to cloud

Now that you have a source ONTAP system and a destination ONTAP system deployed, you can replicate volumes containing database data into the cloud.

For a guide on compatible ONTAP versions for SnapMirror, see the SnapMirror Compatibility Matrix.

1. Click the source ONTAP system (on-premises) and either drag and drop it to the destination, select Replication > Menu > Replicate.



Select Enable.

| o Livie | | | |
|---------|-------------|--------|-------|
| 6 | Replication | Enable |] (;) |

Or Options.

| onPrem • On | | |
|-------------------|-------------------------|----|
| DETAILS | | |
| On-Premises ONTAP | | |
| SERVICES | | |
| Replication | 1 Replication Target | (1 |

Replicate.

| onPrem • On | (1) (1) (* |
|---|-------------------------|
| DETAILS | |
| On-Premises ONTAP | |
| | |
| SERVICES | |
| SERVICES Replication On | 1 Replication Target |
| SERVICES Replication On Backup & Compliance | 1 Replication Target |

2. If you did not drag and drop, choose the destination cluster to replicate to.

| Replicate Data | |
|--|---------------------------|
| From: onPrem | |
| To: select the Working Environment to which ye | ou want to replicate data |
| Replication Target | |
| hybridcvo (Cloud Volumes ONTAP) | `` |
| | |
| Start Replication Wizard | Cancel |

3. Choose the volume that you'd like to replicate. We replicated the data and all log volumes.

| Replication Setup | | Source Vi | olume Selection | | |
|--|-------------------------------|---|--------------------------------------|--|---|
| rhel2_u03 | ONLINE | erhel2_u030923211942120 | 03118 Online | sql1_data | ONLINE |
| IFO CAPACI | Ŷ | INFO | CAPACITY | INFO | CAPACITY |
| torage VM Name svm_onPrem Tering Policy None 10 /olume Type RW | T.29 GB DISk Used cated | Storage VM Name svm_onPrem Tiering Policy None Volume Type RW | a 35.83 MB Disk Used Allocated | Storage VM Name SVM Tiering Policy No Volume Type RW | n_onPrem ne // 53.37 GB // Disk Used |
| sql1_log | ONLINE | sql1_snapctr | ONLINE | | |
| IFO CAPACI torage VM Name svm_onPrem | Y | INFO Storage VM Name svm_onPrem | CAPACITY | | |
| Tiering Policy None 21. | S GB Disk Used | Tiering Policy None | 24.87 GB Allocated | | |

4. Choose the destination disk type and tiering policy. For disaster recovery, we recommend an SSD as the disk type and to maintain data tiering. Data tiering tiers the mirrored data into low-cost object storage and saves you money on local disks. When you break the relationship or clone the volume, the data uses the fast, local storage.

| Replication Setup | Des | stination Disk Type and Tie | ering | |
|-------------------|---|--|--|--|
| ↑ Previous Step | Destination Disk Type | General Purpose SSD - Dynamic Performance | Throughput Optimized HDD | |
| | S3 Tiering C Enabled Disabled Note: If you enable S3 tiering, thin provis | ioning must be enabled on volumes created i | What are storage tiers? n this aggregate. | |
| | | Continue | | |

- Cloud Manager 3.9.10 Build: 2 Sep 12, 2021 06:47:41 am UTC
- 5. Select the destination volume name: we chose [source_volume_name]_dr.

Destination Volume Name

| Destination \ | /olume Nan | ne |
|---------------|------------|----|
|---------------|------------|----|

sql1_data_dr

Destination Aggregate

Automatically select the best aggregate

6. Select the maximum transfer rate for the replication. This enables you to save bandwidth if you have a low bandwidth connection to the cloud such as a VPN.

Max Transfer Rate

You should limit the transfer rate. An unlimited rate might negatively impact the performance of other applications and it might impact your Internet performance.

| | 1 | the second s |
|---------------------------------|-----|--|
| Limited to: | 100 | MB/s |

Unlimited (recommended for DR only machines)

7. Define the replication policy. We chose a Mirror, which takes the most recent dataset and replicates that into the destination volume. You could also choose a different policy based on your requirements.

| | Replicati | on Policy |
|---|------------------|--|
| | Default Policies | Additional Policies |
| Mirror Typically used for disaster recovery | | Mirror and Backup (1 month retention) Configures disaster recovery and long-term retention of backups on the same destination volume |
| More info | | More info |

8. Choose the schedule for triggering replication. NetApp recommends setting a "daily" schedule of for the data volume and an "hourly" schedule for the log volumes, although this can be changed based on requirements.

| One-time copy | 10min | 12-hourly | 5min | 6-hourly |
|---------------|---|---|--|---|
| No schedule | Every hour Minutes: 0th, 10th, 20th, 3 | Every day Hours: 12 AM and 12 PM Minutes: 15th minute | Every hour Minutes: 0th, 5th, 10th, 15t | Every day Hours: 12 AM, 6 AM, 12 PM Minutes: 15th minute |
| | 8hour | daily | hourly | monthly |
| | Every day Hours: 2 AM, 10 AM and 6 Minutes: 15th minute | Every day Hours: 12 AM Minutes: 10th minute | Every hour Minutes: 5th minute | Every month Days: 2nd Hours: 12 AM Minutes: 20th minute |
| | | ī | | |
| | pg-15-minutely | pg-6-hourly | pg-daily | pg-daily-set2 |
| | O Eveny hour | C Evenuday | O Even day | O Evenuday |

9. Review the information entered, click Go to trigger the cluster peer and SVM peer (if this is your first time replicating between the two clusters), and then implement and initialize the SnapMirror relationship.

| Replication Setup | | Review & Approve | | | | | | | | | |
|-------------------|------------------------------------|---|---|---|--|--|--|--|--|--|--|
| ↑ Previous Step | Source OnPrem I Sql1_data | Destination (in) hybridcvo - sql1_data_copy | Review your selection and start I understand that Cloud Mane More information > Source Volume Allocated Size: Source Volume Used Size: Source Thin Provisioning: Destination Volume Allocated Siz Destination Volume Disk Type: Capacity Tiering: | the replication process ager will allocate the appropri 53.37 GB 45.09 GB Yes e: 53.37 GB General Purpose SSD (53 | AWS resources to comply with m Destination Thin Provisioning: Destination Aggregate: Destination Storage VM: Max Transfer Rate: SnapMirror Policy: Replication Schedule: | y above requirements. Yes aggr1 (Automatically s svm_hybridcvo 100 MB/s Mirror daily | | | | | |
| | | | Go | | | | | | | | |

- 10. Continue this process for data volumes and log volumes.
- 11. To check all of your relationships, navigate to the Replication tab inside Cloud Manager. Here you can manage your relationships and check on their status.

| lication | | | | | | | | |
|----------|------------------------|---------------------|-----------------------------|-----------------------|-----------------------------|------------------|--|-----|
| | 7 Volume R | elationships | P 153.32 Replicated Capa | GiB city | O Currently Transferring | ✓ 7 Healthy | ⊗ 0 Failed | |
| | 7 Volume Relationships | | | | | | | Q C |
| | Health Status 💠 | Source Volume | + Target Volume | ‡ Total Tran | nsfer Time 🕴 Status | ≂ Mirror State | + Last Successful Transfer | Đ |
| | \odot | rhel2_u01 onPrem | rhel2_u01_dr hybridcvo | 43 minute seconds | idle | snapmirrored | Sep 30. 2021, 12:12:50 AI 19.73 MiB | |
| | \odot | rhel2_u02 onPrem | rhel2_u02_dr hybridcvo | 1 hour 37 seconds | minutes 59 idle | snapmirrored | Sep 30, 2021, 2:37:08 PM 239.78 MiB | |
| | \odot | rhel2_u03 onPrem | rhel2_u03_dr hybridcvo | 16 hours 1 seconds | 1 minute 9 idle | snapmirrored | Sep 30, 2021, 4:07:14 PM 225.37 KIB | |
| | \odot | sql1_data onPrem | sql1_data_dr hybridcvo | 1 hour 6 m seconds | ninutes 50 idle | snapmirrored | Sep 30, 2021, 12:12:28 AI 24.56 KiB | |
| | | | | | | | | |

12. After all the volumes have been replicated, you are in a steady state and ready to move on to the disaster recovery and dev/test workflows.

3. Deploy EC2 compute instance for database workload

AWS has preconfigured EC2 compute instances for various workloads. The choice of instance type determines the number of CPU cores, memory capacity, storage type and capacity, and network performance. For the use cases, with the exception of the OS partition, the main storage to run database workload is allocated from CVO or the FSx ONTAP storage engine. Therefore, the main factors to consider are the choice of CPU cores, memory, and network performance level. Typical AWS EC2 instance types can be found here: EC2 Instance Type.

Sizing the compute instance

- 1. Select the right instance type based on the required workload. Factors to consider include the number of business transactions to be supported, the number of concurrent users, data set sizing, and so on.
- 2. EC2 instance deployment can be launched through the EC2 Dashboard. The exact deployment procedures are beyond the scope of this solution. See Amazon EC2 for details.

Linux instance configuration for Oracle workload

This section contain additional configuration steps after an EC2 Linux instance is deployed.

- 1. Add an Oracle standby instance to the DNS server for name resolution within the SnapCenter management domain.
- 2. Add a Linux management user ID as the SnapCenter OS credentials with sudo permissions without a password. Enable the ID with SSH password authentication on the EC2 instance. (By default, SSH password authentication and passwordless sudo is turned off on EC2 instances.)
- 3. Configure Oracle installation to match with on-premises Oracle installation such as OS patches, Oracle versions and patches, and so on.
- 4. NetApp Ansible DB automation roles can be leveraged to configure EC2 instances for database dev/test and disaster recovery use cases. The automation code can be download from the NetApp public GitHub site: Oracle 19c Automated Deployment. The goal is to install and configure a database software stack on an EC2 instance to match on-premises OS and database configurations.

Windows instance configuration for SQL Server workload

This section lists additional configuration steps after an EC2 Windows instance is initially deployed.

- 1. Retrieve the Windows administrator password to log in to an instance via RDP.
- 2. Disable the Windows firewall, join the host to Windows SnapCenter domain, and add the instance to the DNS server for name resolution.
- 3. Provision a SnapCenter log volume to store SQL Server log files.
- 4. Configure iSCSI on the Windows host to mount the volume and format the disk drive.
- 5. Again, many of the previous tasks can be automated with the NetApp automation solution for SQL Server. Check the NetApp automation public GitHub site for newly published roles and solutions: NetApp Automation.

Workflow for dev/test bursting to cloud

The agility of the public cloud, the time to value, and the cost savings are all meaningful value propositions for enterprises adopting the public cloud for database application development and testing effort. There is no better tool than SnapCenter to make this a

reality. SnapCenter can not only protect your production database on-premises, but can also it quickly clone a copy for application development or code testing in the public cloud while consuming very little extra storage. Following are details of the step-by-step processes for using this tool.

Clone an Oracle Database for dev/test from a replicated snapshot backup

1. Log into SnapCenter with a database management user ID for Oracle. Navigate to the Resources tab, which shows the Oracle databases being protected by SnapCenter.

| | NetApp Snap | Center | B | | | | • | 0. | 👤 demo\oradba | App Backup and Clo | ine Admin 🛛 🖡 Sign Out |
|---|-----------------|--------|------------|-------------------------------|-----------------------|------------------------------|--|----|---------------|--------------------|---------------------------------|
| | ٢ | | Database 👻 | | | | | | | | |
| : | Dashboard | | Database | Search databa | ases V | | | | | Refre | sh Resources New Resource Group |
| Ę | Resources | lin | Name | Oracle Database Type | Host/Cluster | Resource Group | Policies | | | Last Backup | Overall Status |
| 4 | Monitor | | cdb2 | Single Instance (Multitenant) | rhel2.demo.netapp.com | rhel2_cdb2 rhel2_cdb2_log | Oracle Archive Log Backup Oracle Full Online Backup | | 09/17/20 | 21 3:00:09 PM 🛱 | Backup succeeded |
| á | Reports | | | | | | | | | | |
| 4 | Hosts | | | | | | | | | | |
| 3 | Storage Systems | | | | | | | | | | |
| = | E Settings | | | | | | | | | | |
| 4 | Alerts | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

2. Click the intended on-premises database name for the backup topology and the detailed view. If a secondary replicated location is enabled, it shows linked mirror backups.

| II Ne | tApp Sna | apCenter® | | | | | | - L demo\oradba | App Backup and Clone Ac | min 🛛 🗊 Sign Out |
|---------------------|----------|-----------|---|-----------|------|--------------------------|-------------------|--|--|------------------|
| > | | abase 👻 | cdb2 Topology | | | | | | | > |
| | Search d | latabases | | | | | | | Database Settings Pr | atect Refresh |
| U | 15.16 | Name | Manage Copies | | | | | | | |
| | | cdb2 | 184 Backups 0 Clones Local copies | | | | | Sum 368 Back 16 C 352 L 0 Clor | mary Card iups Jata Backups og Backups ies | |
| # | | | Primary Backup(s) | Backup(s) | | | | | | |
| A | | | (search Y) | | | | | Catalog Av | t Till 1 de Name Cone Resource Mount | A B |
| | | | Backup Name | Count | Туре | 1₹ End Date | Verified | Mounted | RMAN Cataloged | SCN |
| | | | rhel2_cdb2_log_09-17-2021_15.00.01.1317_1 | 1 | Log | 09/17/2021 3:00:10 PM 🛱 | Not Applicable | False | Not Cataloged | 5982003 |
| | | | rhel2_cdb2_09-17-2021_14.35.01.4997_1 | 1 | Log | 09/17/2021 2:35:21 PM 🛱 | Not Applicable | False | Not Cataloged | 5980629 |
| | | | rhel2_cdb2_09-17-2021_14.35.01.4997_0 | 1 | Data | 09/17/2021 2:35:12 PM 🛱 | Unverifie | d False | Not Cataloged | 5980588 |
| | | | rhel2_cdb2_log_09-17-2021_14.00.01.1042_1 | 1 | Log | 09/17/2021 2:00:10 PM 🛱 | Not Applicable | False | Not Cataloged | 5978388 |
| | | | rhel2_cdb2_log_09-17-2021_13.00.01.7389_1 | ĩ | Log | 09/17/2021 1:00:11 PM 🛱 | Not Applicable | False | Not Cataloged | 5975135 |
| | | | rhel2_cdb2_log_09-17-2021_12.00.01.1142_1 | 1 | Log | 09/17/2021 12:00:10 PM 🛱 | Not Applicable | False | Not Cataloged | 5971773 |
| | Total 1 | | rhel2_cdb2_log_09-17-2021_11.00.01.0895_1 | 1 | Log | 09/17/2021 11:00:10 AM 🛱 | Not | False | Not Cataloged | 5968474 |

3. Toggled to the mirrored backups view by clicking mirrored backups. The secondary mirror backup(s) is then displayed.

| | e tApp Sn | napCenter® | | | | | - L demo\oradba | App Backup and Clone | \dmin 🖡 Si | ign Out | |
|-------------|------------------|------------|---|-------|------|--------------------------|-------------------|----------------------|------------------------|--------------|---------|
| > | | itabase 👻 | cdb2 Topology | | | | | | | | × |
| | Search | databases | | | | | | | 🗮 Database Settings | Protect | Refresh |
| U | 17.19 | Name | Manage Copies | | | | | | | | Â |
| | | cdb2 | 184 Backups | | | | | Sum | mary Card | | |
| a ii | | | 0 Clones Mirror copies | | | | | 368 Bac | kups | | |
| A | | | Local copies | | | | | 161 | Data Backups | | |
| 5-0 | | | | | | | | 0 Clor | ies | | |
| = | | | | | | | | | | | - 1 |
| A | | | Secondary Mirror Backup(s) | | | | | | | | _ |
| | | | search V | | | | | | e Ti + S | ant Somount- | |
| | | | Backup Name | Count | Туре | 17 End Date | Verified | Mounted | RMAN Cataloged | SCN | |
| | | | rhel2_cdb2_log_09-17-2021_15.00.01.1317_1 | 1 | Log | 09/17/2021 3:00:10 PM 🛱 | Not Applicable | False | Not Cataloged | 5982003 | 8 |
| | | | rhel2_cdb2_09-17-2021_14.35.01.4997_1 | 1 | Log | 09/17/2021 2:35:21 PM 🛱 | Not Applicable | False | Not Cataloged | 5980629 | • |
| | | | rhel2_cdb2_09-17-2021_14.35.01.4997_0 | 1 | Data | 09/17/2021 2:35:12 PM 🛱 | Unveri | fied False | Not Cataloged | 5980588 | 3 |
| | | | rhel2_cdb2_log_09-17-2021_14.00.01.1042_1 | 1 | Log | 09/17/2021 2:00:10 PM 🛱 | Not Applicable | False | Not Cataloged | 5978388 | 3 |
| | | | rhel2_cdb2_log_09-17-2021_13.00.01.7389_1 | 1 | Log | 09/17/2021 1:00:11 PM 🛱 | Not Applicable | False | Not Cataloged | 5975135 | 5 |
| | | | rhel2_cdb2_log_09-17-2021_12.00.01.1142_1 | 1 | Log | 09/17/2021 12:00:10 PM 🛱 | Not Applicable | False | Not Cataloged | 5971773 | 3 |
| | Total 1 | | rhel2_cdb2_log_09-17-2021_11.00.01.0895_1 | 1 | Log | 09/17/2021 11:00:10 AM 🛱 | Not Applicable | False | Not Cataloged | 5968474 | 1 |

4. Choose a mirrored secondary database backup copy to be cloned and determine a recovery point either by time and system change number or by SCN. Generally, the recovery point should be trailing the full database backup time or SCN to be cloned. After a recovery point is decided, the required log file backup must be mounted for recovery. The log file backup should be mounted to target DB server where the clone database is to be hosted.

| Mount backup | S | | | × |
|--|--|-----------------------------|-------|--------|
| Choose the host to mount the backup | ora-standby.demo.netapp.com | | | |
| Mount path : | /var/opt/snapcenter/sco/backup_mount/rhel2_cdb2_09-1 | 7-2021_14.35.01.4997_1/cdb2 | | |
| | | | | |
| | | | | |
| Secondary storag | e location : Snap Vault / Snap Mirror | | | |
| Source Volume | | Destination Volume | | |
| svm_onPrem:rhel2 | 2_u03 | svm_hybridcvo:rhel2_u03_dr | | |
| | | | | |
| | | | | |
| | | | | |
| | | | Mount | Cancel |

| II Ne | tApp SnapC | Center® | Celto Topology Manage Copies 184 Badups 1 Cione Mirror copies 1 Cione Mirror copies Secondary Mirror Backup(s) Secondary Mirror Backup(s) Secondary Mirror Backup(s) search | | | | | | 👤 demo\oradba | App Backup and Clone | Admin 🔋 | Sign Out |
|-----------------------|----------------|-------------------------|--|--|------|-------------------------|---------------|-----------|---------------|--|---------|----------|
| > | Oracle Databas | e 🔽 | cdb2 Topology | | | | | | | | - | × |
| === | Search datab | ases | | | | | | | | Database Settings | Protect | Refrests |
| ♥ ☆ ▲ ↓ ▲ | 17 M | Name cdb2 cdb2dev | Manage Copies 184 Backups 1 Clone Ucal copies Secondary Mirror Backup(s) | ge Copies 144 Backups 1 Cone 1 Cone Mirror copies dary Mirror Backup(s) | | | | | | mary Card ups ata Backups og Backups e | | |
| | | | Backup Name | Count | Type | IF End Date | Verifier | 4 | Mounted | RMAN Cataloged | SCN | |
| | | | rhel2_cdb2_log_09-17-2021_16.00.01.2156_1 | 1 | Log | 09/17/2021 4:00:10 PM | No | t ible | False | Not Cataloged | 598527 | 72 * |
| | | | rhel2_cdb2_log_09-17-2021_15.00.01.1317_1 | 1 | Log | 09/17/2021 3:00:10 PM 🛱 | No Applica | t ible | False | Not Cataloged | 598200 | 03 |
| | | | rhel2_cdb2_09-17-2021_14.35.01.4997_1 | 1 | Log | 09/17/2021 2:35:21 PM 🗎 | No Applica | t ible | True | Not Cataloged | 598062 | 29 |
| | | | rhel2_cdb2_09-17-2021_14.35.01.4997_0 | 1 | Data | 09/17/2021 2:35:12 PM 🛱 | Un | verified | False | Not Cataloged | 598058 | 38 |
| | | | rhel2_cdb2_log_09-17-2021_14.00.01.1042_1 | 1 | Log | 09/17/2021 2:00:10 PM 🛱 | No Applica | t ible | False | Not Cataloged | 597838 | 38 |



If log pruning is enabled and the recovery point is extended beyond the last log pruning, multiple archive log backups might need to be mounted.

5. Highlight the full database backup copy to be cloned, and then click the clone button to start the DB clone Workflow.

| cdb2 Topology | | | | | | | |
|---|-------|------|-------------------------|-------------------|----------------------|-----------------------|-------------------|
| | | | | | | Database Settings P | ♥ ₹ |
| (search) | | | | | • I Catalog Renar | Tie Clone Restore Mou | nt Unmount Delete |
| Backup Name | Count | Туре | l₹ End Date | Verified | Mounted | RMAN Cataloged | SCN |
| rhel2_cdb2_log_09-17-2021_16.00.01.2156_1 | 1 | Log | 09/17/2021 4:00:10 PM 🛱 | Not Applicable | False | Not Cataloged | 5985272 |
| rhel2_cdb2_log_09-17-2021_15.00.01.1317_1 | 1 | Log | 09/17/2021 3:00:10 PM 🛱 | Not Applicable | False | Not Cataloged | 5982003 |
| rhel2_cdb2_09-17-2021_14.35.01.4997_1 | 1 | Log | 09/17/2021 2:35:21 PM 🛱 | Not Applicable | True | Not Cataloged | 5980629 |
| rhel2_cdb2_09-17-2021_14.35.01.4997_0 | 1 | Data | 09/17/2021 2:35:12 PM 🛱 | Unverified | False | Not Cataloged | 5980588 |
| rhel2_cdb2_log_09-17-2021_14.00.01.1042_1 | 1 | Log | 09/17/2021 2:00:10 PM 📋 | Not Applicable | False | Not Cataloged | 5978388 |

6. Choose a proper clone DB SID for a complete container database or CDB clone.

| Clone from cdb | 02 | | | | × |
|----------------|--------------------------|-------------------------------|----------------------------|----------|------|
| 1 Name | Complete Database (| Clone | | | |
| 2 Locations | Clone SID | cdb2test | | | |
| 3 Credentials | Exclude PDBs | Type to find PDBs | | | |
| 4 PreOps | O PDB Clone | | | | |
| 5 PostOps | Secondary storage locati | on : Snap Vault / Snap Mirror | | | |
| 6 Notification | ⊙ Data | | | | |
| 7 Summary | Source Volume | | Destination Volume | | |
| Juninary | svm_onPrem:rhel2_u02 | | svm_hybridcvo:rhel2_u02_dr | • | |
| | ⊙ Logs | | | | |
| | Source Volume | | Destination Volume | | |
| | svm_onPrem:rhel2_u03 | | svm_hybridcvo:rhel2_u03_dr | • | |
| | | | | | |
| | | | | Previous | Next |

7. Select the target clone host in the cloud, and datafile, control file, and redo log directories are created by the clone workflow.

| Clone from cdb | 02 | | | | | × |
|----------------|--|--|------------|-----------|-----------------|---------------|
| 1 Name | Select the host to o | reate a clone | | | | |
| 2 Locations | Clone host | ora-standby.demo.r | netapp.com | 1 | • | |
| 3 Credentials | ☉ Datafile locations | 0 | | | | |
| 4 PreOps | /u02_cdb2test | | | | | Reset |
| 5 PostOps | | | | | | |
| 6 Notification | ⊙ Control files () | | | | | |
| 7 Summary | /u02_cdb2test/cdb2 /u02_cdb2test/cdb2 | test/control/control01 test/control/control02 | | × + Reset | | |
| | ⊙ Redo logs 🚯 | | | | | |
| | Group | | Size | Unit | Number of files | |
| | RedoGroup 1 | × | 200 | MB | 1 | + + + |
| | /u02_cdb2tes | /cdb2test/redolog/re | do03.log | | | X Reset |
| | RedoGroup 2 | × | 200 | MB | 1 | + |
| | | | | | | |
| | | | | | | Previous Next |

8. The None credential name is used for OS-based authentication, which renders the database port irrelevant. Fill in the proper Oracle Home, Oracle OS User, and Oracle OS Group as configured in the target clone DB server.

| Clone from cdb | 02 | | × |
|----------------|---------------------------------|------------------------------------|---|
| 1 Name | Database Credentials for | the clone | |
| 2 Locations | Credential name for sys user | None 🔹 🕇 🚺 | |
| 3 Credentials | Database port | 1521 | |
| 4 PreOps | Oracle Home Settings 🧃 | | |
| 5 PostOps | Oracle Home | /u01/app/oracle/product/19800/cdb2 | |
| 6 Notification | Oracle OS User | oracle | |
| 7 Summary | Oracle OS Group | oinstall | |
| | | | |
| | | | |
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| | | Previous Next | |

9. Specify the scripts to run before clone operation. More importantly, the database instance parameter can be adjusted or defined here.

| Clone from cdb | 02 | | | | | × |
|----------------|----------------------|--------------------|------------|----------------------------|----------|----|
| 1 Name | Specify scripts to r | un before clone op | eration | 0 | | |
| 2 Locations | Prescript full path | /var/opt/snapcente | er/spl/scr | ipts/ Enter Prescript path | | |
| 3 Credentials | Arguments | | | | | |
| 4 PreOps | Script timeout | 60 secs | | | | |
| | O Database Paramet | ter settings | | | | |
| 5 PostOps | processes | | | 320 | × • | |
| 6 Notification | remote_login_passv | vordfile | | EXCLUSIVE | × + | |
| | sga_target | | | 4311744512 | × Reset | |
| 7 Summary | undo_tablespace | | | UNDOTBS1 | × | |
| | | | | | | |
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10. Specify the recovery point either by the date and time or SCN. Until Cancel recovers the database up to the available archive logs. Specify the external archive log location from the target host where the archive log volume is mounted. If target server Oracle owner is different from the on-premises production server, verify that the archive log directory is readable by the target server Oracle owner.

| Nume Clocations | Clone from cd | b2 | × |
|--|---|---|---|
| <pre> Locations (Until Cancel Date and Time Date and Time Date time format: MM/DD/VVV hh:mm:ss Until SCN (System Change Number) S980629 SpectOps O Notification Vurtil SCN (System Change Number) S980629 Spectops Spectops Vurtil SCN (System Change Number) S980629 Spectops Spectop</pre> | 1 Name | Recover Database | |
| Credentials Credentials Create and Time Date-time format: MM/DD/YYY hh:mm:ss Until SCN (System Change Number) S980629 Specify external archive log locations Specify external archive log locations Create and Time Create new DBD Create new DBD Create new DBD Create tempfile for temporary tablespace Create tempfile to temporary tables | 2 Locations | O Until Cancel | |
| Dete-time format: MM/DD/YYYY hh:mm:ss Until SCN (System Change Number) 5980629 Specify external archive log locations () () Specify external archive log locations () () Var/opt/snapcenter/sco/backup_mount/thel2_cdb2_09-17-2021_14.35.01.4997_11/cdb2/1/orarecc/CDB2/archivelog/ Var/opt/snapcenter/sco/backup_mount/thel2_cdb2_09-17-2021_14.35.01.4997_11/cdb2/1/orarecc/CDB2/archivelog/ Var/opt/snapcenter/sco/backup_mount/thel2_cdb2_09-17-2021_14.35.01.4997_11/cdb2/1/orarecc/CDB2/archivelog/ Create new DBID () Create new DBID () Create tempfile for temporary tablespace () Deter SQL queries to apply when clone is created Deter scripts to run after clone operation () Previous Next | 3 Credentials | 🔿 Date and Time 🛛 🗎 | |
| Outling SCN (System Change Number) <u>5980629</u> Specify external archive log locations ① ① Specify external archive log locations ② ③ ① /var/opt/ <u>snapcenter/sco/backup_mount/rhel2_cdb2_09-17-2021_14.35.01.4997_1/cdb2/1/orareco/CDB2/archivelog/ /var/opt/snapcenter/sco/backup_mount/rhel2_cdb2_09-17-2021_14.35.01.4997_1/cdb2/1/orareco/CDB2/archivelog/ /var/opt/snapcenter/sco/backup_mount/rhel2_cdb1_09-17-2021_14.35.01.4997_1/cdb2/1/orareco/CDB2/archivelog/ /var/opt/snapcenter/sco/backup_mount/rhel2_cdb1_09-17-2021_14.35.01.4997_1/cdb2/1/orareco/CDB2/archivelog/ /var/opt/snapcenter/sco/backup_mount/rhel2_cdb1_09-17-2021_14.35.01.4997_1/cdb2/1/orareco/CDB2/archivelog/ /var/opt/snapcenter/sco/backup_mount/rhel2_cdb1_09-17-2021_14.35.01.4997_1/cdb2/1/orareco/CDB2/archivelog/ /var</u> | A PreOps | Date-time format: MM/DD/YYYY hh:mm:ss | |
| S PostOps Specify external archive log locations Sectory and the sectory and the sectory of the sect | U | Until SCN (System Change Number) 5980629 | |
| Image: Create new DBID I | 5 PostOps | Specify external archive log locations 🖸 💿 🕚 | |
| Image: Summary Image: | 6 Notification | /var/opt/snapcenter/sco/backup_mount/rhel2_cdb2_09-17-2021_14.35.01.4997_1/cdb2/1/orareco/CDB2/archivelog/ | |
| Create new DBID Create tempfile for temporary tablespace Previous Previous Previous Next Create tempfile for temporary tablespace Create tempfile to run after clone operation Create tempfile to run | Cummani | | |
| Create new DBID Create tempfile for temporary tablespace Create tempfile for | Journmary | | |
| I create new DBID Create tempfile for temporary tablespace E create tempfile fo | | | |
| Create new DBID Create tempfile for temporary tablespace tempfile for temporary tablespace Create tempfile for temporary tablespace Create tempfile for temporary tablespace tempfile for temporary tablespace tempfile for temporary tablespace tempfile for temporary tablespace temp fi | | | |
| Create them DBiD Create tempfile for temporary tablespace Enter SQL queries to apply when clone is created Enter scripts to run after clone operation Previous Previous Next recelebra-standby:tmp] createGora-standby:tmp] createGora-standby:tmp] createGora-standby:tmp] createGora-standby:tmp] createGora-standby:tmp] createGora-standby:tmp] createGora-standby:tmp] createGora-standby:tmp] createGora-standby:tmp] createGora-standby:tmp] createGora-standby:tmp] createGora-standby:tmp] c | | | |
| | | Create tempfile for temporary tablespace | |
| Enter scripts to run after clone operation Previous Next Setemption of a standby/tmp for the formation of a standby tmp formation of a standby tmp formation of a standby tmp for the formation of a standby tmp formation o | | • Enter SQL queries to apply when clone is created | |
| Previous Previous | | Enter scripts to run after clone operation | |
| Previous Next oracle@ora-standby/tmp | | | |
| <pre>@ oracle@ora-standby/tmp]</pre> | | Previous | |
| | | | |
| | | | |
| 1021_08_26 2021_08_28 2021_08_30 2021_09_01 2021_09_03 2021_09_05 2021_09_07 2021_09_09 2021_09_11 2021_09_13 2021_09_15 2021_09_17 0021_08_27 2021_08_29 2021_08_91 2021_09_02 2021_09_04 2021_09_06 2021_09_08 2021_09_10 2021_09_12 2021_09_14 2021_09_16 oracle@ora-standby tmp]\$ | 😼 oracle@ora-standby:/tmp oracle@ora-standby tmg | | × |
| | 021_08_26 2021_08_28 021_08_27 2021_08_29 | 2021_08_30_2021_09_01_2021_09_03_2021_09_05_2021_09_07_2021_09_09_2021_09_11_2021_09_13_2021_09_15_2021_09_17 2021_08_31_2021_09_02_2021_09_04_2021_09_06_2021_09_08_2021_09_10_2021_09_12_2021_09_14_2021_09_16 | |
| | Draciegora-standby tmp | | |
| | | | |

11. Configure the SMTP server for email notification if desired.

| Clone from cdb | 02 | | × |
|-------------------------|---|---|------|
| 1 Name | Provide email sett | ings 🕕 | |
| 2 Locations | Email preference | Never 👻 | |
| 3 Credentials | From | From email | |
| 4 PreOps | То | Email to | |
| | Subject | Notification | |
| 5 PostOps | Attach job report | | |
| 6 Notification | | | |
| 7 Summary | | | |
| If you want information | to send notifications fo h, and then go to Setting | r Clone jobs, an SMTP server must be configured. Continue to the Summary page to save your is>Global Settings>Notification Server Settings to configure the SMTP server. | × |
| | | Previous | Next |

12. Clone summary.

| Clone from cdb | 52 | | × |
|----------------|----------------------|---|----------|
| 1 Name | Summary | | ^ |
| 2 Locations | Clone from backup | rhel2_cdb2_09-17-2021_14.35.01.4997_0 | |
| Cradaatiala | Clone SID | cdb2test | |
| 3 Credentials | Clone server | ora-standby.demo.netapp.com | |
| 4 PreOps | Exclude PDBs | none | |
| • | Oracle home | /u01/app/oracle/product/19800/cdb2 | |
| 5 PostOps | Oracle OS user | oracle | |
| 6 Notification | Oracle OS group | oinstall | |
| | Datafile mountpaths | /u02_cdb2test | |
| 7 Summary | Control files | /u02_cdb2test/cdb2test/control/control01.ctl /u02_cdb2test/cdb2test/control/control02.ctl | |
| | Redo groups | RedoGroup =1 TotalSize =200 Path =/u02_cdb2test/cdb2test/redolog/redo03.log RedoGroup =2 TotalSize =200 Path =/u02_cdb2test/cdb2test/redolog/redo02.log RedoGroup =3 TotalSize =200 Path =/u02_cdb2test/cdb2test/redolog/redo01.log | l |
| | Recovery scope | Until SCN 5980629 | |
| | Prescript full path | none | |
| | Prescript arguments | | |
| | Postscript full path | none | |
| | Postscript arguments | | * |
| | | Previous Finish | |

13. You should validate after cloning to make sure that the cloned database is operational. Some additional tasks, such as starting up the listener or turning off the DB log archive mode, can be performed on the dev/test database.

| B oracle@ora-standby:/tmp | | | | - 🗆 × |
|--|--|--------------|--|-------|
| [oracle@ora-standby tmp]\$ export ORACLE SI] [oracle@ora-standby tmp]\$ export ORACLE MO [oracle@ora-standby tmp]\$ export PATH=\$PAT] [oracle@ora-standby tmp]\$ sqlplus / as syst | D=cdb2test HE=/u01/app/oracle/product H:\$ORACLE_HOME/bin Aba | :/19800/cdb2 | | |
| SQL*Plus: Release 19.0.0.0.0 - Production (Version 19.3.0.0.0 | on Fri Sep 17 17:49:29 202 | 21 | | |
| Copyright (c) 1982, 2019, Oracle. All right | nts reserved. | | | |
| Connected to: Oracle Database 19c Enterprise Edition Rel Version 19.3.0.0.0 | ease 19.0.0.0.0 - Producti | | | |
| SQL> select name, log_mode from v\$database | | | | |
| NAME LOG_MODE | | | | |
| CDB2TEST ARCHIVELOG | | | | |
| SQL> select instance_name, host_name from ` | v\$instance; | | | |
| INSTANCE_NAME | | | | |
| HOST_NAME | | | | |
| cdb2test ora-standby.demo.netapp.com | | | | |
| SQL> show pdbs | | | | |
| CON_ID CON_NAME | OPEN MODE RESTRICTED | | | |
| 2 PDB\$SEED 3 3 CDB2_PDB1 1 4 CDB2_PDB2 5 5 CDB2_PDB3 | READ ONLY NO READ WRITE NO READ WRITE NO READ WRITE NO | | | |
| SQL> | | | | |

Clone a SQL database for dev/test from a replicated Snapshot backup

1. Log into SnapCenter with a database management user ID for SQL Server. Navigate to the Resources tab, which shows the SQL Sever user databases being protected by SnapCenter and a target standby SQL instance in the public cloud.

| | letApp Snap(| Center® | 1000 | | | | 🌲 🛛 😨 🕈 💄 demo\sqldba | App Backup and Clone Admin Sign Out |
|----|-----------------|---------|--------------------------|-------------|-----------------------------|-------------------------|--------------------------|--------------------------------------|
| < | | | SQL Server 👻 | | | | | |
| | Dashboard | View Da | atabase 🔹 search by name | Y | | | | Refresh Resources New Resource Group |
| 0 | Resources | 15.94 | Name | Instance | Host | Last Backup | Overall Status | Туре |
| | Monitor | | master | sql1 | sql1.demo.netapp.com | | Not available for backup | System database |
| | | | model | sql1 | sql1.demo.netapp.com | | Not available for backup | System database |
| â | Reports | | msdb | sql1 | sql1.demo.netapp.com | | Not available for backup | System database |
| * | Hosts | | tempdb | sql1 | sql1.demo.netapp.com | | Not available for backup | System database |
| 54 | Storage Systems | | tpcc | sql1 | sql1.demo.netapp.com | 09/16/2021 7:35:05 PM 🛱 | Backup succeeded | User database |
| | Storage Systems | | master | sql-standby | sql-standby.demo.netapp.com | | Not available for backup | System database |
| 華 | Settings | | model | sql-standby | sql-standby.demo.netapp.com | | Not available for backup | System database |
| A | Alerts | | msdb | sql-standby | sql-standby.demo.netapp.com | | Not available for backup | System database |
| | | | tempdb | sql-standby | sql-standby.demo.netapp.com | | Not available for backup | System database |
| | | | | | | | | |
| | | | | | | | | |

2. Click on the intended on-premises SQL Server user database name for the backups topology and detailed view. If a secondary replicated location is enabled, it shows linked mirror backups.

| II Ne | tApp SnapCenter® | | | | • | s () - | 👤 demo\sqldba | App Backup ar | nd Clone Admin | 🖡 Sign Out |
|------------|------------------------|------------------------------------|-------|-------------|----|--------|---------------|---------------|----------------|---------------|
| N | Microsoft SQL Server 🚽 | tpcc (sql1) Topology | | | | | | | | × |
| | search by name | | | | | | Cione Life | cycle Protect | i Details | Refresh |
| • | Name | Manage Copies | | | | | | | | |
| 2 | master | 7 Backups | | | | | C | cond | | |
| ~2 | model | 0 Clones | | | | | Sur | nmary Card | | |
| *** | msdb | Mirror copies | | | | | 14 Ba | ickups | | |
| A | tempdb | Local copies | | | | | U Ch | JUES | | |
| 54 | tpcc | | | | | | | | | |
| ₩ # | | Primary Backup(s) | | | | | | | I Tanana Gana | entere Gelere |
| | | Backup Name | Count | Туре | 17 | | | End Date | Verified | |
| | | sql1_tpcc_09-16-2021_18.25.01.4024 | 1 | Full backup | | | 09/16/2021 6 | 25:05 PM 🛱 | Unverifi | ed |
| | | sql1_tpcc_09-15-2021_18.25.01.4604 | 1 | Full backup | | | 09/15/2021 6 | 5:25:06 PM 🛱 | Unverifi | ed |
| | | sql1_tpcc_09-14-2021_18.25.01.5233 | 1 | Full backup | | | 09/14/2021 6 | :25:05 PM 🛱 | Unverifi | ed |
| | | sql1_tpcc_09-13-2021_18.25.01.4500 | 1 | Full backup | | | 09/13/2021 6 | 5:25:05 PM 🛱 | Unverifi | ed |
| | | sql1_tpcc_09-12-2021_18.25.01.4016 | 1 | Full backup | | | 09/12/2021 6 | 6:25:05 PM 🛱 | Unverifi | ed |
| | | sql1_tpcc_09-11-2021_18.25.01.3753 | 1 | Full backup | | | 09/11/2021 6 | :25:05 PM 🛱 | Unverifi | ed |
| | | sql1_tpcc_09-10-2021_18.36.25.5430 | 1 | Full backup | | | 09/10/2021 6 | 5:36:29 PM 🛱 | Unverifi | ed |

3. Toggle to the Mirrored Backups view by clicking Mirrored Backups. Secondary Mirror Backup(s) are then displayed. Because SnapCenter backs up the SQL Server transaction log to a dedicated drive for recovery, only full database backups are displayed here.

| II Ne | etApp SnapCenter® | | | | • | ≅ 0 ∙ | L demo\sqldba App Backup and | d Clone Admin | 🖡 Sign Out |
|-------|------------------------|--|-------|-------------|----|--------------|------------------------------|----------------------|-----------------------|
| \$ | Microsoft SQL Server 👻 | tpcc (sql1) Topology | | | | | | | × |
| | search by name | | | | | | Cione Lifecycle Protect | i Details | Refresh |
| 0 | Name | Manage Copies | | | | | | | |
| - | master | 7 Backups | | | | | Summary Card | | |
| | model | 0 Clones | | | | | Summary Caru | | |
| iii | msdb | Mirror copies | | | | | 14 Backups | | |
| Α. | tempdb | Local copies. | | | | | 0 clones | | |
| 34 | tpcc | | | | | | | | |
| | | Secondary Mirror Backup(s) (search IV) | | | | | | r ii Conie | ← ¶ Restore |
| | | Backup Name | Count | Туре | 13 | -2 | End Date | Verified | |
| | | sql1_tpcc_09-16-2021_18.25.01.4024 | 1 | Full backup | | | 09/16/2021 6:25:05 PM 🛱 | Unverified | í. |
| | | sql1_tpcc_09-15-2021_18.25.01.4604 | 1 | Full backup | | | 09/15/2021 6:25:06 PM 🛱 | Unverified | i i |
| | | sql1_tpcc_09-14-2021_18.25.01.5233 | 1 | Full backup | | | 09/14/2021 6:25:05 PM 🛱 | Unverified | E. |
| | | sql1_tpcc_09-13-2021_18.25.01.4500 | 1 | Full backup | | | 09/13/2021 6:25:05 PM 🛱 | Unverified | ł |
| | | sql1_tpcc_09-12-2021_18.25.01.4016 | 1 | Full backup | | | 09/12/2021 6:25:05 PM 🛱 | Unverified | í. |
| | | sql1_tpcc_09-11-2021_18.25.01.3753 | 1 | Full backup | | | 09/11/2021 6:25:05 PM 🛱 | Unverified | l. |
| | | sql1_tpcc_09-10-2021_18.36.25.5430 | 1 | Full backup | | | 09/10/2021 6:36:29 PM 🛱 | Unverified | 0 |

4. Choose a backup copy, and then click the Clone button to launch the Clone from Backup workflow.

| | atApp SnapCenter® | | | | | | • ≅ 0· . | 👤 demo\sqldba 🛛 App E | lackup and | l Clone Admin | 🖡 Sign Out |
|----------|------------------------|--------------------------------------|--|----------------|----------|-------------|----------|-----------------------|------------|---------------|------------|
| | Microsoft SQL Server 🔫 | tpcc (sql1) Topology | | | | | | | | | × |
| | search by name | | | | | | | | V | i | = |
| | Name | Managa Capita | | | | | | Come chocycle | Plotett | Details | Refresh |
| <u>_</u> | master | Manage copies | 7 Backups | | | | | ~ | | | |
| ~ | model | 7 Backups | 1 Clone | | | | | Summary | / Card | | |
| | msdb | Local copies | Mirror copies | | | | | 14 Backups 1 Clone | | | |
| <u>^</u> | tempdb | | | | | | | | | | |
| 84 | master | | | | | | | | | | |
| 華 | model | Secondary Mirror Backup(s) | | | | | | | | | |
| ▲ | msdb | (search) | | | | | | | | re i | 41 |
| | tempdb | Parlan Harri | | | 6 | | | | 10.00 | Clone | Restore |
| | doct clone | sol1 torc 09-19-2021 18.25.01.413 | 1 | | Count | Full backup | 45 | 09/19/2021 6:25:05 | | Unverifie | d |
| | | sql1_tpcc_09-18-2021_18.25.01.396 | 3 | | 1 | Full backup | | 09/18/2021 6:25:05 | PM 🛱 | Unverifie | d |
| | | sql1_tpcc_09-17-2021_18-25-01-4214 | 3 | | 1 | Full backup | | 09/17/2021 6:25:05 | PM 🛱 | Unverifie | d |
| | | sql1_tpcc_09-16-2021_18.25.01.402- | 4 | | 1 | Full backup | | 09/16/2021 6:25:05 | PM 🛱 | Unverifie | d |
| | | sql1_tpcc_09-15-2021_18.25.01.460- | 9 | | 1 | Full backup | | 09/15/2021 6:25:06 | PM 🗖 | Unverifie | d |
| | | sql1_tpcc_09-13-2021_18.25.01.450 | | | 1 | Full backup | | 09/13/2021 6:25:05 | PM 🛱 | Unverifie | d |
| | | | | | | | | | | | |
| 0 | lone from back | up | | | | | | | | | x |
| | | | | | | | | | | | _ |
| • | Clone Options | Clone settings | | | | | | | | | |
| | | cione settings | | | | | | | | | |
| 6 | lar | | | | | • | | | | | |
| 19 | LOgs | Clone server | Choose | | - | 1 | | | | | |
| | | | | | | | | | | | |
| | 3 Script | Clone instance | Nothing selected | | - (| 1 | | | | | |
| | | | | | | | | | | | |
| G | Notification | Clone name | tpcc | | | | | | | | |
| 19 | Woundation | | | | | | | | | | |
| ~ | | | | | | | | | | | |
| (3 | 5 Summary | Chaosa may inter | tion | | | | | | | | |
| | | Choose mount op | lion | | | | | | | | |
| | | Auto assign mou | Int point 🜖 | | | | | | | | |
| | | | | | | | | | | | |
| | | Auto assign volu | me mount point under path | full file path | | 0 | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | Secondary storage | location · Snap Vault / Si | nan Mirror | | | | | | | |
| | | Secondary Storage | location shap taaley si | | | | | | | | |
| | | Source Volume | | Destination V | olume | | | | | | |
| | | Source volume | | Destination | olume | | | | | | |
| | | sym onPremisal1 a | lata | | | | | | | | |
| | | SVIII_OIII I CIIII.SqIII_C | and a second sec | svm_hybrid | cvo:sql1 | 1_data_dr | | • | | | |
| | | | | | | | | | | | |
| | | svm_onPrem:sql1_l | og | sym hybrid | cvo;sal1 | 1 log dr | | • | | | |
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| | | | | | | | | Previ | | Ne | xt |
| | | | | | | | | | | | |

5. Select a cloud server as the target clone server, clone instance name, and clone database name. Choose either an auto-assign mount point or a user-defined mount point path.

| Clone from back | up | | | | × |
|-----------------|--|--|-----------------|------------------|---------------|
| 1 Clone Options | Clone settings | | | | |
| 2 Logs | Clone server | sql-standby.demo.netapp. | com • | • • | |
| 3 Script | Clone instance | sql-standby | - | | |
| 4 Notification | Clone name | tpcc_clone | | | |
| 5 Summary | Choose mount op Auto assign mou Auto assign volu | tion Int point 1 Ime mount point under path | full file path | • | |
| | Source Volume | e location : Shap vault 7 Si | Destination Vol | ume | |
| | svm_onPrem:sql1_u | data | svm_hybridcv | o:sql1_data_dr 🔹 | |
| | svm_onPrem:sql1_l | og | svm_hybridcv | o:sql1_log_dr • | |
| | | | | | |
| | | | | F | Previous Next |

6. Determine a recovery point either by a log backup time or by a specific date and time.

| Clone from back | kup | 1 | ¢ |
|-----------------|---|----------|---|
| 1 Clone Options | Choose logs | | |
| 2 Logs | ○ All log backups | | |
| 3 Script | By log backups until 9/17/2021 6:25:10 PM | | |
| 4 Notification | O None | | |
| 5 Summary | | | |
| | | | |
| | | | |
| | | | |
| | | | |
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| | | | |
| | | Previous | |

7. Specify optional scripts to run before and after the cloning operation.

| Clone from back | up | | × |
|-----------------|-------------------------|---|----|
| 1 Clone Options | Specify optional se | cripts to run before and after performing a clone from backup job | |
| 2 Logs | Prescript full path | | |
| 3 Script | Prescript arguments | Choose optional arguments | |
| 4 Notification | Postscript full path | | |
| | Postscript arguments | Choose optional arguments | |
| 5 Summary | Script timeout | 60 secs | |
| | | | |
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| | | | |
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| | | | |
| | | | _ |
| | | Previous | xt |

8. Configure an SMTP server if email notification is desired.

| Clone from back | up | | × |
|-----------------|--|--|------|
| 1 Clone Options | Provide email setti | ngs 🕦 | |
| 2 Logs | Email preference | Never • | |
| 3 Script | From | From email | |
| | То | Email to | |
| 4 Notification | Subject | Notification | |
| 5 Summary | 🗌 Attach Job Report | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
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| | | | |
| | | | |
| information, | o send notifications for Cl and then go to Settings>(| one Jobs, an SMTP server must be configured. Continue to the Summary page to save your Slobal Settings>Notification Server Settings to configure the SMTP server. | |
| | | Previous | Next |

9. Clone Summary.
| Clone from back | up | | × |
|-----------------|----------------------|--|--------|
| 1 Clone Options | Summary | | |
| 2 Logs | Clone server | sql-standby.demo.netapp.com | |
| Covint. | Clone instance | sql-standby | |
| 3 Schpt | Clone name | tpcc_dev | |
| 4 Notification | Mount option | Auto assign volume mount point under custom path | |
| 0 | Prescript full path | None | |
| 5 Summary | Prescript arguments | | |
| | Postscript full path | None | |
| | Postscript arguments | | |
| | Send email | No | |
| | | | |
| | | | |
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| | | | |
| | | Previous | Finish |

10. Monitor the job status and validate that the intended user database has been attached to a target SQL instance in the cloud clone server.

| п | NetApp Snap | Center@ | > | | • | ≅ 0 - | L demo\sqldba | App Backı | ıp and Clone Admin | 🖡 Sign Out |
|----|-----------------|---------------|------------------------|--|-------------------------|--------------|-----------------------|-----------|--------------------|------------|
| < | Dashboard | Jobs searc | Schedules h by name | Events Logs | | | | | | |
| | Resources | lobs - | Filter | | | | Lincans | | epore powersio cog | Linterjoo |
| 0 | Monitor | ID | Status | Name | Start date | | End | date | Owner | |
| | Penorte | 766 | ~ | Clone from backup 'sql1_tpcc_09-16-2021_18.25.01.4024' | 09/16/2021 8:05:25 PM 🛱 | | 09/16/2021 8:06:17 PM | 10 | demo\sqldba | |
| | nepores | 763 | ~ | Discover resources for all hosts | 09/16/2021 7:56:49 PM 🛱 | | 09/16/2021 7:56:54 PN | 1 🛱 | demo\sqldba | |
| ĥ | Hosts | 761 | 4 | Backup of Resource Group 'sql1_tpcc_log' with policy 'SQL Server Log Backup' | 09/16/2021 7:35:00 PM 🛱 | | 09/16/2021 7:37:08 PN | 1 🛱 | demo\sqldba | |
| ÷. | Storage Systems | 760 | A | Discover resources for all hosts | 09/16/2021 7:19:05 PM 🛱 | | 09/16/2021 7:19:09 PN | 10 | demo\sqldba | |
| - | Settinge | 759 | A | Discover resources for all hosts | 09/16/2021 7:18:43 PM 🛱 | | 09/16/2021 7:18:48 PN | 1 🛱 | demo\sqldba | |
| | . serungs | 756 | A | Discover resources for all hosts | 09/16/2021 6:59:51 PM 🛱 | | 09/16/2021 6:59:56 PN | 10 | demo\sqldba | |
| A | Alerts | 753 | ~ | Backup of Resource Group 'sql1_tpcc_log' with policy 'SQL Server Log Backup' | 09/16/2021 6:35:00 PM 🛱 | | 09/16/2021 6:37:07 PN | 1 🛱 | demo\sqldba | |
| | | 750 | ~ | Backup of Resource Group 'sql1_tpcc' with policy 'SQL Server Full Backup' | 09/16/2021 6:25:01 PM 🛱 | | 09/16/2021 6:27:14 PN | 10 | demo\sqldba | |
| | | 749 | ~ | Discover resources for host 'sql-standby.demo.netapp.com' | 09/16/2021 6:19:00 PM 🛱 | | 09/16/2021 6:19:05 PN | 10 | Demo\administrato | c |
| | | 745 | ~ | Backup of Resource Group 'sql1_tpcc_log' with policy 'SQL Server Log Backup' | 09/16/2021 5:35:00 PM 🛱 | | 09/16/2021 5:37:08 PM | 10 | demo\sqldba | |

Post-clone configuration

- 1. An Oracle production database on-premises is usually running in log archive mode. This mode is not necessary for a development or test database. To turn off log archive mode, log into the Oracle DB as sysdba, execute a log mode change command, and start the database for access.
- 2. Configure an Oracle listener, or register the newly cloned DB with an existing listener for user access.
- 3. For SQL Server, change the log mode from Full to Easy so that the SQL Server dev/test log file can be readily shrunk when it is filling up the log volume.

Refresh clone database

- 1. Drop cloned databases and clean up the cloud DB server environment. Then follow the previous procedures to clone a new DB with fresh data. It only takes few minutes to clone a new database.
- 2. Shutdown the clone database, run a clone refresh command by using the CLI. See the following SnapCenter documentation for details: Refresh a clone.

Where to go for help?

If you need help with this solution and use cases, join the NetApp Solution Automation community support Slack channel and look for the solution-automation channel to post your questions or inquires.

Disaster recovery workflow

Enterprises have embraced the public cloud as a viable resource and destination for disaster recovery. SnapCenter makes this process as seamless as possible. This disaster recovery workflow is very similar to the clone workflow, but database recovery runs through the last available log that was replicated to cloud to recover all the business transactions possible. However, there are additional pre-configuration and post-configuration steps specific to disaster recovery.

Clone an on-premises Oracle production DB to cloud for DR

1. To validate that the clone recovery runs through last available log, we created a small test table and inserted a row. The test data would be recovered after a full recovery to last available log.

| · · · · · · · · · · · · · · · · · · · | | |
|---|---|----------|
| ∰ oracle@rhel2-~ | - | \times |
| <pre>SQL> create table dr_test(2 id integer, 3 event varchar(200), 4 dt timestamp);</pre> | | ^ |
| Table created. | | |
| SQL> insert into dr_test values(1, 'testing DB clone for DR and roll forward DB to last available log', sysdate); | | |
| l rov created. | | |
| SQL> select * from dr_test; | | |
| ID | | |
| EVENT | | |
| DT | | |
| l testing DB clone for DR and roll forward DB to last available log 17-SEP-21 02.12.13.000000 PM | | |
| SQL> commit; | | |
| Commit complete. | | |
| SQL> | | ~ |

2. Log into SnapCenter as a database management user ID for Oracle. Navigate to the Resources tab, which shows the Oracle databases being protected by SnapCenter.

| п | NetApp Snap | Center® | | | | ٠ | 8 • | _ demo\oradba | Арр В | Backup and Clone Admin | 🖡 Sign Out |
|----|-----------------|---------------------|-------------------|-------------|---------------------------|---|------------|---------------------|-------|------------------------|--------------------|
| < | | Oracle Database 👻 | | | | | | | | | |
| | Dashboard | View Resource Group | Search resource g | roup V | | | | | | | New Resource Group |
| V | Resources | Name | Resources | Tags | Policies | | | Last Ba | ckup | Overall Status | |
| 2 | Monitor | rhel2_cdb2 | 1 | orafullbkup | Oracle Full Online Backup | | 0 | 0/17/2021 2:38:16 P | мВ | Completed | |
| | | rhel2_cdb2_log | 1 | oralogbkup | Oracle Archive Log Backup | | 0 | 9/17/2021 6:02:13 P | м 🗂 | Completed | |
| âŭ | Reports | | | | | | | | | | |
| A | Hosts | | | | | | | | | | |
| Þ | Storage Systems | | | | | | | | | | |
| = | Settings | | | | | | | | | | |
| ▲ | Alerts | | | | | | | | | | |
| | | | | | | | | | | | |

3. Select the Oracle log resource group and click Backup Now to manually run an Oracle log backup to flush the latest transaction to the destination in the cloud. In a real DR scenario, the last transaction recoverable depends on the database log volume replication frequency to the cloud, which in turn depends on the RTO or RPO policy of the company.

| n Ne | tApp SnapCenter® | | | | | | | | | 8 - | 👤 demo\oradba | App Backup and C | lone Admin | 🖡 Sign Ou |
|----------|------------------------|-----------|----------------|-----------------|-----------|-------------|-------|----|------|------------|-----------------|-------------------|-------------|-----------|
| > | Oracle Database 👻 | rhel2_cdb | 02_log Details | | | | | | | | | | | |
| | Search resource groups | search | | | | | | | | | Modify Resource | Group Back up Now | Maintenance | Delete |
| 0 | Name | Resource | Name | Туре | Host | | | | | | | | | |
| ♠ | rhel2_cdb2 | cdb2 | | Oracle Database | rhel2.den | no.netapp.c | om | | | | | | | |
| ~ | rhel2_cdb2_log | | | | | | | | | | | | | |
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| <u>.</u> | | | | | | | | | | | | | | |
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| | Backup | | | | | | | | | | × | | | |
| | Bachap | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | Create a backi | JD f | or the select | ted resource a | roup |) | | | | | | | | |
| | ereate a bacit | чр i | or the belief | curesource a | - o ap | | | | | | _ | | | |
| | Resource Group | | rhol2 cdb2 l | 0.7 | | | | | | | | | | |
| L ' | resource droup | | THEIZ_CODZ_I | og | | | | | | | | | | |
| | | [| | | | | | | | | | | | |
| | Policy | | Oracle Archiv | e Log Backup | | - | 0 | | | | | | | |
| 1 | oney | l | | - · | | | | | | | | | | |
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Asynchronous SnapMirror loses data that has not made it to the cloud destination in the database log backup interval in a disaster recovery scenario. To minimize data loss, more frequent log backup can be scheduled. However there is a limit to the log backup frequency that is technically achievable.

4. Select the last log backup on the Secondary Mirror Backup(s), and mount the log backup.

i

| NetApp | SnapCenter® | | | | | | ٠ | ≅ 0 • . | 👤 demo\oradba | App Backup and Clone Ad | min 🖡 Sign (| Out |
|----------|---------------------|----------|--|---------|---------|--------------------|-----------|--------------------|-------------------|-------------------------|--------------|-----|
| Oracle I | Database 👻 | | cdb2 Topology | | | | | | | | | × |
| Searc | h databases | | | | | | | | | Database Settings | | |
| 0 . | Name | 11 | Manage Copies | | | | | | | | | |
| ا ال | cdb2 | | 185 Backups | | | | | | Summ | harv Card | | |
| M | cdb2de | ev | 0 Clones Mirror copies | | | | | | 370 Backu | ips | | |
| * | cubzte | 51 | Local copies | | | | | | 16 Da | ta Backups | | |
| 54 | | | | | | | | | 354 Lo 2 Clone | g Backups s | | |
| | | | | | | | | | | | | - |
| | | | Secondary Mirror Backup(s) | | | | | | | | | _ |
| 44 | | | search 7 | | | | | | Cat | log Cone Resore Mount | A Unmount | |
| | | | Backup Name | Count | Туре | 47 E | nd Date V | /erified | Mounted | RMAN Cataloged | SCN | |
| | | | rhel2_cdb2_log_09-17-2021_18:20:04.1177_1 | 1 | Log | 09/17/2021 6:20:13 | PM 🗇 | Not | False | Not Cataloged | 5994710 | - |
| | | | rhel2_cdb2_log_09-17-2021_18.00.01.2424_1 | 1 | Log | 09/17/2021 6:00:09 | PM 🛱 | Not Applicable | False | Not Cataloged | 5992079 | |
| | | | rhel2_cdb2_log_09-17-2021_17.00.01.1566_1 | 1 | Log | 09/17/2021 5:00:20 | PM 🛱 | Not | False | Not Cataloged | 5988842 | |
| | | | | | | | | | | | | |
| Mount | path : dary stor | /var/o | pt/snapcenter/sco/backup_mount/rhel2_cdb2_log_09- tion : Snap Vault / Snap Mirror | 17-202 | 1_18.2 | 0.04.1177_1/cc | ib2 | | | | | |
| Sourc | e Volume | - | | Destina | tion Vo | olume | | | | | | |
| svm_0 | onPrem:rh | nel2_u03 | [| svm_h | ybrido | vo:rhel2_u03_ | dr | | • | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | N | Aount C | ancel | |

5. Select the last full database backup and click Clone to initiate the clone workflow.

| NetApp SnapCe | enter® | | | | | n ⊠ 0- | 👤 demo\oradba | App Backup and Clone A | dmin 🛛 🖡 Sign O |
|-----------------|---------------------------------------|---|------------|-------------|---|-------------------------------|---|---|-----------------|
| Oracle Database | - | cdb2 Topology | | | | | | | |
| Search databa | ses | | | | | | | Database Settings Pi | votect Refer |
| 14 16 | Name I cdb2 cdb2dev cdb2test | Manage Copies 185 Backups 0 Clones Local copies Mirror copies | | | | | Summ 370 Backu 16 Da 354 Lo 2 Clone | nary Card ps ta Backups g Backups s | - |
| | | Secondary Mirror Backup(s) | | | | | Cat | fog Cone Restore Mour | nt Dimesses |
| | | Backup Name rhel2_cdb2_log_09-17-2021_18.20.04.1177_1 | Count 1 | Type Log | UF End Date 09/17/2021 6:20:13 PM 	☐ | Verified Not Applicable | Mounted | RMAN Cataloged | SCN 5994710 |
| | | rhel2_cdb2_log_09-17-2021_18.00.01.2424_1 | 1 | Log | 09/17/2021 6:00:09 PM 🛱 | Not Applicable | False | Not Cataloged | 5992079 |
| | | rhel2_cdb2_log_09-17-2021_17.00.01.1566_1 | 1 | Log | 09/17/2021 5:00:20 PM 🛱 | Not Applicable | False | Not Cataloged | 5988842 |
| | | rhel2_cdb2_log_09-17-2021_16.00.01.2156_1 | t | Log | 09/17/2021 4:00:10 PM 🛱 | Not Applicable | False | Not Cataloged | 5985272 |
| | | rhel2_cdb2_log_09-17-2021_15.00.01.1317_1 | 1 | Log | 09/17/2021 3:00:10 PM 🛱 | Not Applicable | False | Not Cataloged | 5982003 |
| | | rhel2_cdb2_09-17-2021_14.35.01.4997_1 | 1 | Log | 09/17/2021 2:35:21 PM 🛱 | Not Applicable | False | Not Cataloged | 5980629 |
| Total 3 | | rhel2_cdb2_09-17-2021_14.35.01.4997_0 | 1 | Data | 09/17/2021 2:35:12 PM 🛱 | Unverified | False | Not Cataloged | 5980588 |

6. Select a unique clone DB ID on the host.

| Clone from cdb | 52 | | | | × |
|----------------|----------------------------|-------------------------------|----------------------------|----------|------|
| 1 Name | Complete Database (| Clone | | | |
| 2 Locations | Clone SID | <u>cdb2dr</u> | | | |
| 3 Credentials | Exclude PDBs | Type to find PDBs | | | |
| 4 PreOps | O PDB Clone | | | | |
| 5 PostOps | Secondary storage location | on : Snap Vault / Snap Mirror | | | |
| 6 Notification | ⊙ Data | | | | |
| 7 Summary | Source Volume | | Destination Volume | | |
| | svm_onPrem:rhel2_u02 | | svm_hybridcvo:rhel2_u02_dr | • | |
| | \odot Logs | | | | |
| | Source Volume | | Destination Volume | | |
| | svm_onPrem:rhel2_u03 | | svm_hybridcvo:rhel2_u03_dr | • | |
| | | | | | |
| | | | | Previous | Next |

7. Provision a log volume and mount it to the target DR server for the Oracle flash recovery area and online logs.

| | AP Sy | stem Man | lager | | | Search actions, objects, and pages | ۹ |
|---------------|-------|----------|----------------------------|---------------|-------------------|------------------------------------|---|
| DASHBOARD | | Volum | les | | | | |
| STORAGE | | + Add | • More | | | | |
| Overview | | | Name | Storage VM | Status Capaci | ity | |
| Applications | | ~ | ora_standby_u01 | svm_hybridcvo | Online | 31,6 GB | |
| LUNs | | ~ | rhel2 u01 dr | sym hybridcyo | Q Add Volum | | ~ |
| Shares | | | incl_dol_di | Sin_nysindero | Add volume | e | ^ |
| Qtrees | | ~ | rhel2_u02_dr | svm_hybridcvo | O NAME | | |
| Quotas | | ~ | rhel2_u02_dr09172116081193 | svm_hybridcvo | ora_standby_u | 03 | |
| Storage VMs | | | 60 | | CAPACITY | | |
| Tiers | | ~ | rhel2_u02_dr09172117035348 | svm_hybridcvo | ⊘ ° 20 G | в 🗸 | |
| NETWORK | | | 03 | | | | |
| EVENTS & JOBS | | ~ | rhel2_u03_dr | svm_hybridcvo | ⊘ 0 More Ontio | ne Cancel Save | |
| PROTECTION | | ~ | rhel2_u03_dr09172118245747 | svm_hybridcvo | | Save Save | |
| HOSTS | | | 75 | | | | |

| P ec2-user@ora-standby:/tmp | | | | | | <u></u> | \times |
|---|-------------------------------|-------------------------|---------------|------|---|---------|----------|
| <pre>[ec2-user@ora-standby tmp]\$ sudo mkdir /u0\$_cdb2dr [ec2-user@ora-standby tmp]\$ chown oracle:oinstall chown: changing ownership of '/u03_cdb2dr': Operat: [ec2-user@ora-standby tmp]\$ sudo chown oracle:oinst</pre> | (u03_cd lon_not call_/u | b2dr permi 03_cdb | itted o2dr | | | | ^ |
| [ec2-user@ora-standby tmp]\$ sudo mount -t nfs 10.22 | | /ora_s | standby | u03 | /u03_cdb2dr | | |
| [ec2-user@ora-standby tmp]\$ df -h | | | | | | | |
| Filesystem | Size | Used | Avail | Use% | Mounted on | | |
| devtmpfs | 7.6G | | 7.6G | 0% | /dev | | |
| tmpfs | 7.6G | | 7.6G | 0% | /dev/shm | | |
| tmpfs | 7.6G | 17M | 7.6G | 1% | /run | | |
| tmpfs | 7.6G | | 7.6G | 0% | /sys/fs/cgroup | | |
| /dev/nvme0n1p2 | 10G | 9.0G | | 90% | | | |
| 10.221.1.6:/ora standby u01 | | 13G | 18G | 42% | /u01 | | |
| tmpfs | 1.6G | | 1.6G | 0% | /run/user/1000 | | |
| 10.221.1.6:/Sc28182452-3fa8-448c-9e4a-c5a9e465f353 | 100G | 3.1G | 97G | 4% | /u02_cdb2dev | | |
| tmpfs | 1.6G | | 1.6G | 0.% | /run/user/54321 | | |
| 10.221.1.6:/Sc39c05df8-4b00-4b3a-853c-9d6d338e5df7 | 100G | | 97G | 4% | /u02_cdb2test | | |
| 10.221.1.6:/Sccf886a5c-3273-475e-ad97-472b2a8dccee | 100G | 3.8G | | | /var/opt/snapcenter/sco/backup mount/rhe12 cdb2 log 09-17-2021 18.20.04.1177 1/co | lb2/1 | |
| 10.221.1.6:/ora standby u03 | | 320K | 20G | 1% | /u03_cdb2dr | | |
| [ec2-user@ora-standby tmp]\$ | | | | | | | |



The Oracle clone procedure does not create a log volume, which needs to be provisioned on the DR server before cloning.

8. Select the target clone host and location to place the data files, control files, and redo logs.

| Clone from cd | lb2 |
|----------------|--|
| 1 Name | Select the host to create a clone |
| 2 Locations | Clone host ora-standby.demo.netapp.com |
| 3 Credentials | ⊙ Datafile locations ① |
| (4) PreOps | /u02_cdb2dr Reset |
| 5 PostOps | |
| 6 Notification | Control files |
| (7) Summary | /u03_cdb2dr/cdb2dr/control/control02.ctl × Reset |
| | ⊙ Redo logs () |
| | Group Size Unit Number of files |
| | ▲ RedoGroup 1 × 200 MB 1 + + |
| | /u03_cdb2dr/cdb2dr/redolog/redo03.log |
| | RedoGroup 2 X 200 MB 1 + |
| | Previous Next |

9. Select the credentials for the clone. Fill in the details of the Oracle home configuration on the target server.

| Clone from cdb | o2 | | | x |
|----------------|---------------------------------|------------------------------------|----------|----|
| 1 Name | Database Credentials for | the clone | | |
| 2 Locations | Credential name for sys user | None | + 0 | |
| 3 Credentials | Database port | 1521 |] | |
| 4 PreOps | Oracle Home Settings |) | | |
| 5 PostOps | Oracle Home | /u01/app/oracle/product/19800/cdb2 | | |
| 6 Notification | Oracle OS User | oracle | | |
| 7 Summary | Oracle OS Group | oinstall | | |
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10. Specify the scripts to run before cloning. Database parameters can be adjusted if needed.

| Clone from cdb | 02 | | | | | | | | × |
|----------------|----------------------|--------------|---------|-------------|------------------------------------|---|----------|-------|-----|
| 1 Name | Specify scripts to r | un before d | clone o | peration | 0 | | | | |
| 2 Locations | Prescript full path | /var/opt/s | napcen | ter/spl/scr | ipts/ Enter Prescript path | | | |] |
| 3 Credentials | Arguments | | | | | | | | |
| 4 PreOps | Script timeout | 60 | secs | | | | | | |
| | 🖸 Database Paramet | ter settings | | | | | | | |
| 5 PostOps | audit_file_dest | | | | /u01/app/oracle/admin/cdb2dr/adump | × | ^ | | |
| 6 Notification | audit_trail | | | | DB | × | | + | |
| | open_cursors | | | | 300 | × | | Reset | |
| 7 Summary | pga_aggregate_target | | | | 1432354816 | × | • | | |
| | | | | | | | | | |
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| | | | | | | | Previo | us N | ext |

11. Select Until Cancel as the recovery option so that the recovery runs through all available archive logs to recoup the last transaction replicated to the secondary cloud location.

| Clone from cd | b2 | × |
|----------------|---|------|
| 1 Name | Recover Database | |
| 2 Locations | Until Cancel | |
| 3 Credentials | 🔿 Date and Time 🗎 🗎 | |
| 4 PreOps | Date-time format: MM/DD/YYYY hh:mm:ss | |
| 5 PostOps | Specify external archive log locations 🖸 🧿 🚯 | |
| 6 Notification | /var/opt/snapcenter/sco/backup_mount/rhel2_cdb2_log_09-17-2021_18.20.04.1177_1/cdb2/1/orareco/CDB2/archivelog | 1 |
| 7 Summary | | |
| | Create new DBID 🚯 | |
| | Create tempfile for temporary tablespace 🚯 | |
| | Enter SQL queries to apply when clone is created O Enter scripts to run after clone operation | |
| | Previous | lext |

12. Configure the SMTP server for email notification if needed.

| Clone from cdb | o2 | | × |
|-------------------------|--|--|------|
| 1 Name | Provide email sett | ings 🕕 | |
| 2 Locations | Email preference | Never 👻 | |
| 3 Credentials | From | From email | |
| A PreOps | То | Email to | |
| | Subject | Notification | |
| 5 PostOps | 📋 Attach job report | | |
| 6 Notification | | | |
| 7 Summary | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| If you want information | to send notifications for n, and then go to Setting | r Clone jobs, an SMTP server must be configured. Continue to the Summary page to save your s>Global Settings>Notification Server Settings to configure the SMTP server. | × |
| | | Previous | Next |

13. DR clone summary.

| Clone from cdb | 52 | | × | | | | |
|----------------|---------------------------------|---|---|--|--|--|--|
| 1 Name | Summary | | | | | | |
| 2 Locations | Clone from backup | rhel2_cdb2_09-17-2021_14.35.01.4997_0 | | | | | |
| Cradantials | Clone SID | cdb2dr | | | | | |
| 3 Credentials | Clone server | ora-standby.demo.netapp.com | | | | | |
| 4 PreOps | Exclude PDBs | none | | | | | |
| • | Oracle home | /u01/app/oracle/product/19800/cdb2 | | | | | |
| 5 PostOps | Oracle OS user | oracle | | | | | |
| 6 Notification | Oracle OS group oinstall | | | | | | |
| | Datafile mountpaths /u02_cdb2dr | | | | | | |
| 7 Summary | Control files | /u02_cdb2dr/cdb2dr/control/control01.ctl /u03_cdb2dr/cdb2dr/control/control02.ctl | | | | | |
| | Redo groups | RedoGroup =1 TotalSize =200 Path =/u03_cdb2dr/cdb2dr/redolog/redo03.log RedoGroup =2 TotalSize =200 Path =/u03_cdb2dr/cdb2dr/redolog/redo02.log RedoGroup =3 TotalSize =200 Path =/u03_cdb2dr/cdb2dr/redolog/redo01.log | | | | | |
| | Recovery scope | Until Cancel | | | | | |
| | Prescript full path | none | | | | | |
| | Prescript arguments | | | | | | |
| | Postscript full path | none | | | | | |
| | Postscript arguments | | - | | | | |
| | | Previous Finis | h | | | | |

14. Cloned DBs are registered with SnapCenter immediately after clone completion and are then available for backup protection.

| NetApp Snap | Center® | | | | | ♦ ≅ Q· | L demo\oradba App Backup and Clo | one Admin 🛛 🗊 Sign Out |
|-------------------|------------|----------|-------------------------------|-----------------------------|------------------------------|--|----------------------------------|---------------------------------|
| < | Oracle Dat | tabase 星 | | | | | | |
| Dashboard | View D | atabase | Search databases | 8 | | | | sh Resources New Resource Group |
| Resources | Til lan | Name | Oracle Database Type | Host/Cluster | Resource Group | Policies | Last Backup | Overall Status |
| 🛞 Monitor | | cdb2 | Single Instance (Multitenant) | rhel2.demo.netapp.com | rhel2_cdb2 rhel2_cdb2_log | Oracle Archive Log Backup Oracle Full Online Backup | 09/17/2021 7:00:10 PM 🛱 | Backup succeeded |
| Reports | a | cdb2dev | Single Instance (Multitenant) | ora-standby.demo.netapp.com | | | | Not protected |
| A Hosts | | cdb2dr | Single Instance (Multitenant) | ora-standby.demo.netapp.com | | | | Not protected |
| - Storage Systems | - | cdb2test | Single Instance (Multitenant) | ora-standby.demo.netapp.com | | | | Not protected |
| 🚎 Settings | | | | | | | | |
| Alerts | | | | | | | | |

Post DR clone validation and configuration for Oracle

1. Validate the last test transaction that has been flushed, replicated, and recovered at the DR location in the cloud.

| Protele@ora-standby:/u01/app/oracle/product/19800/c8b2/dbs | - | □ × |
|--|---|-----------|
| Oracle Database 19c Enterprise Edition Release 19.0.0.0.0 - Production Version 19.3.0.0.0 | | · · · · · |
| SQL> set lin 200 SQL> select instance_name, host_name from v\$instance; | | |
| INSTANCE_NAME HOST_NAME | | |
| cdb2dr ora-standby.demo.netapp.com | | |
| SQL> alter pluggable database cdb2_pdb1 open; | | |
| Pluggable database altered. | | |
| SQL> alter session set container=cdb2_pdbl; | | |
| Session altered. | | |
| SQL> select * from pdbadmin.dr_test; | | |
| ID | | |
| EVENT | | |
| DT | | |
| 1 testing DB clone for DR and roll forward DB to last available log 17-SEP-21 02.12.13.000000 PM | | |
| SQL> | | |

2. Configure the flash recovery area.



- 3. Configure the Oracle listener for user access.
- 4. Split the cloned volume off of the replicated source volume.
- 5. Reverse replication from the cloud to on-premises and rebuild the failed on-premises database server.



Clone split may incur temporary storage space utilization that is much higher than normal operation. However, after the on-premises DB server is rebuilt, extra space can be released.

Clone an on-premises SQL production DB to cloud for DR

1. Similarly, to validate that the SQL clone recovery ran through last available log, we created a small test table and inserted a row. The test data would be recovered after a full recovery to the last available log.

| Administrator: Command Prompt - sqlcmd - SQLCMD | - | - 🗆 | \times |
|---|------------------------|-----|----------|
| C:\Users\administrator.DEMO>sqlcmd 1> select host_name() 2> go | | | î |
| SQL1 | | | |
| (1 rows affected) 1> use tpcc 2> go Changed database context to 'tpcc'. 1> insert into snap_sync values ('test snap mirror D 2> go | R for SQL', getdate()) | | |
| (1 rows affected) 1> select * from snap_sync 2> go event d ² | ŧ | | |
| test snap mirror DR for SQL 20 | 021-09-20 14:23:04.533 | | |
| (1 rows affected) 1> _ | | | |

2. Log into SnapCenter with a database management user ID for SQL Server. Navigate to the Resources tab, which shows the SQL Server protection resources group.

| | tApp SnapCenter® | | | | ٠ | | 8 - | 👤 demo | \sqldba Ap | p Backup and C | Clone Admin | 🖡 Sign Out |
|---------|------------------------|----------------------|--------------|----------------------|--------|--------------|------------|------------|----------------|----------------|------------------------|------------|
| 5 | Microsoft SQL Server 🚽 | sql1_tpcc_logDetails | | | | | | | | | | × |
| | search by name | search | | | Modify | Desource Gro | | uck up Now | Cone Lifecycle | Maintenance | i Edit/View Details | Deleta |
| • | Name | Resource Name | Туре | Host | | | | | | | | |
| 2 | sql1_tpcc | tpcc (sql1) | SQL Database | sql1.demo.netapp.com | | | | | | | | |
| ай 2 | sql1_tpcc_log | | | | | | | | | | | |
| 자 24 | | | | | | | | | | | | |

3. Manually run a log backup to flush the last transaction to be replicated to secondary storage in the public cloud.

| Backup | | × | | | | |
|---|---------------------------|---|--|--|--|--|
| Create a backup for the selected resource group | | | | | | |
| Resource Group | sql1_tpcc_log | | | | | |
| Policy | SQL Server Log Backup 🔹 🚺 | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | _ | | | | |
| | Cancel Backup | | | | | |
| | | | | | | |

4. Select the last full SQL Server backup for the clone.

| I Ne | tApp SnapCenter® | | | | | • = | 0 - | 👤 demo\sqldba | App Backup and | d Clone Admin | 🖡 Sign Out |
|------|------------------------|------------------------------------|---------------|-------|-------------|-----|------------|---------------|----------------|---------------|------------|
| > | Microsoft SQL Server 👻 | tpcc (sql1) Topology | | | | | | | | | × |
| | search by name | | | | | | | Clone Lifecy | tle Protect | 1 Details | Refresh |
| U | Name | Manage Copies | | | | | | | | | |
| | master | | 7 Backups | | | | | Cum | man Card | | |
| | model | | 2 Clones | | | | | Sum | mary card | | |
| â | msdb | Local capies M | Airror copies | | | | | 14 Bac | kups | | |
| A | tempdb | Local copies | | | | | | 2 Clor | 162 | | |
| 54 | tpcc | | | | | | | | | | |
| | master | | | | | | | | | | |
| # | model | Secondary Mirror Backup(s) | | | | | | | | | |
| A | msdb | | | | | | | | | - | - |
| | tempdb | Search | | | | | | | | Clone | Restore |
| | tpcc_clone | Backup Name | | Count | Туре | 47 | | | End Date | Verified | |
| | tpcc_dev 🗊 | sql1_tpcc_09-19-2021_18.25.01.4134 | | 1 | Full backup | | | 09/19/2021 6: | 25:05 PM 🛱 | Unverifi | ed |
| | | sql1_tpcc_09-18-2021_18.25.01.3963 | | 1 | Full backup | | | 09/18/2021 6: | 25:05 PM 🛱 | Unverifi | ed |
| | | sql1_tpcc_09-17-2021_18.25.01.4218 | | 1 | Full backup | | | 09/17/2021 6: | 25:05 PM 🛱 | Unverifi | ed |

5. Set the clone setting such as the Clone Server, Clone Instance, Clone Name, and mount option. The secondary storage location where cloning is performed is auto-populated.

| Clone from back | up | | | | × | | |
|-----------------|--------------------------------------|----------------------------|----------------------------|------------------|---------------|--|--|
| 1 Clone Options | Clone settings | | | | | | |
| 2 Logs | Clone server | sql-standby.demo.netapp.co | om • | • | | | |
| 3 Script | Clone instance | sql-standby | - | · () | | | |
| 4 Notification | Clone name | tpcc_dr | | | | | |
| 5 Summary | Choose mount op | tion | | | | | |
| | Auto assign mount point 1 | | | | | | |
| | Auto assign volu | me mount point under path | full file path | 0 | | | |
| | Secondary storage | location : Snap Vault / Sn | ap Mirror | | _ | | |
| | Source Volume | | Destination Vol | ume | | | |
| | svm_onPrem:sql1_o | lata | svm_hybridcvo:sql1_data_dr | | | | |
| | svm_onPrem:sql1_l | og | svm_hybridcv | o:sql1_log_dr 	▼ | | | |
| | | | | | | | |
| | | | | | Previous Next | | |

6. Select all log backups to be applied.

| Clone from back | up | | > | ¢ |
|---|--|---|---------------|---|
| 1 Clone Options | Choose logs | | | |
| 2 Logs | All log backups | | | |
| 3 Script 4 Notification 5 Summary | By log backups until By specific date until None | 9/19/2021 6:25:10 PM 09/19/2021 6:25:05 PM | | |
| | | | | |
| | | | Previous Next | |

7. Specify any optional scripts to run before or after cloning.

| Clone from back | up | | x | | | |
|---|--|---|------|--|--|--|
| 1 Clone Options Specify optional scripts to run before and after performing a clone from backup job | | | | | | |
| 2 Logs 3 Script 4 Notification 5 Summary | Prescript full path Prescript arguments Postscript full path Postscript arguments Script timeout | Choose optional arguments Choose optional arguments 60 secs | | | | |
| | | | | | | |
| | | Previous | Next | | | |

8. Specify an SMTP server if email notification is desired.

| Clone from back | up | | × | |
|-----------------------------|--|--|------|--|
| 1 Clone Options | Provide email settings 1 | | | |
| 2 Logs | Email preference | Never 👻 | | |
| 3 Script | From | From email | | |
| | То | Email to | | |
| 4 Notification | Subject | Notification | | |
| 5 Summary | 🗌 Attach Job Report | | | |
| | | | | |
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| | | | | |
| | | | | |
| | | | | |
| If you want to information, | o send notifications for C and then go to Settings> | one jobs, an SMTP server must be configured. Continue to the Summary page to save your Global Settings>Notification Server Settings to configure the SMTP server. | × | |
| | | Previous | Next | |

9. DR clone summary. Cloned databases are immediately registered with SnapCenter and available for backup protection.

| Clone from backup × | | | | | | |
|---------------------|----------------------|-----------------------------|-----------------|--|--|--|
| 1 Clone Options | Summary | | | | | |
| 2 Logs | Clone server | sql-standby.demo.netapp.com | | | | |
| 2 Coviet | Clone instance | sql-standby | | | | |
| 3 Script | Clone name | tpcc_dr | | | | |
| 4 Notification | Mount option | Auto Mount | | | | |
| 0 | Prescript full path | None | | | | |
| 5 Summary | Prescript arguments | | | | | |
| | Postscript full path | None | | | | |
| | Postscript arguments | | | | | |
| | Send email | No | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
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| | | | | | | |
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| | | | | | | |
| | | | Previous Finish | | | |

| 🗖 NetApp SnapCenter® 🔹 😔 🛨 demoksqldba . | | | | | | | | | |
|--|-----------------|-----------|---------------------------|-------------|-----------------------------|-------------------------|----------------------------------|------------------------------------|--|
| e | | Microsoft | t SQL Server 🔽 | | | | | | |
| | Dashboard | View | Database • search by name | | | | | Refresh Resources New Resource Gro | |
| 0 | Resources | 15.00 | Name | Instance | Host | Last Backup | Overall Status | Туре | |
| | Monitor | | master | sql1 | sql1.demo.netapp.com | | Not available for backup | System database | |
| | | | model | sql1 | sql1.demo.netapp.com | | Not available for backup | System database | |
| â | Reports | | msdb | sql1 | sql1.demo.netapp.com | | Not available for backup | System database | |
| A | Hosts | | tempdb | sql1 | sql1.demo.netapp.com | | Not available for backup | System database | |
| 5-0 | Storage Sustems | | tpcc | sql1 | sql1.demo.netapp.com | 09/22/2021 5:35:08 PM 🛱 | Backup failed, Schedules on hold | User database | |
| | Storage Systems | | master | sql-standby | sql-standby.demo.netapp.com | | Not available for backup | System database | |
| 華 | Settings | | model | sql-standby | sql-standby.demo.netapp.com | | Not available for backup | System database | |
| | Alerts | | msdb | sql-standby | sql-standby.demo.netapp.com | | Not available for backup | System database | |
| | | | tempdb | sql-standby | sql-standby.demo.netapp.com | | Not available for backup | System database | |
| | | - | tpcc_clone | sql-standby | sql-standby.demo.netapp.com | | Not protected | User database | |
| | | 1 | tpcc_dev | sql-standby | sql-standby.demo.netapp.com | | Not protected | User database | |
| | | | tpcc_dr | sql-standby | sql-standby.demo.netapp.com | | Not protected | User database | |

Post DR clone validation and configuration for SQL

1. Monitor clone job status.

| п | 🖬 NetApp SnapCenter® 🔹 🗧 | | | | | | 👤 demo\sqldba | App Backu | Backup and Clone Admin 🛛 🖡 Sig | | |
|----|--------------------------|----------|-----------|--|--------------------------|--|-----------------------|-----------|--------------------------------|--|--|
| < | | Jobs | Schedules | | | | | | | | |
| | Dashboard | search | by name | <u>-</u> 7 9 | | | | | | | |
| | Resources | Jobs - F | ilter | | | | | | | and the second sec | |
| • | Monitor | ID | Status | Name | Start date | | En | d date | Owner | | |
| ~ | Reports | 1052 | ~ | Clone from backup 'sql1_tpcc_09-19-2021_18.25.01.4134' | 09/20/2021 2:36:17 PM 🛱 | | 09/20/2021 2:37:06 F | PM 🛱 | demo\sqldba | | |
| - | nepore | 1047 | ~ | Backup of Resource Group 'sql1_tpcc_log' with policy 'SQL Server Log Backup' | 09/20/2021 2:35:01 PM 🛱 | | 09/20/2021 2:37:08 F | PM 🛱 | demo\sqldba | | |
| • | Hosts | 1045 | ~ | Backup of Resource Group 'sql1_tpcc_log' with policy 'SQL Server Log Backup' | 09/20/2021 2:28:17 PM 🛱 | | 09/20/2021 2:30:25 F | PM 🛱 | demo\sqldba | | |
| 20 | Storage Systems | 1044 | ~ | Clone from backup 'sql1_tpcc_09-17-2021_18.25.01.4218' | 09/20/2021 1:39:24 PM 🛱 | | 09/20/2021 1:40:09 F | PM 🛱 | demo\sqldba | | |
| | Settings | 1042 | ~ | Backup of Resource Group 'sql1_tpcc_log' with policy 'SQL Server Log Backup' | 09/20/2021 1:35:01 PM 🛱 | | 09/20/2021 1:37:08 F | PM 🛱 | demo\sqldba | | |
| | ocrango | 1040 | ~ | Backup of Resource Group 'sql1_tpcc_log' with policy 'SQL Server Log Backup' | 09/20/2021 12:35:01 PM 🛱 | | 09/20/2021 12:37:08 F | м 🛱 | demo\sqldba | | |

2. Validate that last transaction has been replicated and recovered with all log file clones and recovery.

| Administrator: Command Prompt - sqlcmd - SQLCMD | | - | × |
|---|-------------------------|---|---|
| C:\Users\administrator.DEMO>sqlcmd 1> select host_name() 2> go | | | Î |
| SQL-STANDBY (1 rows affected) 1> use tpcc_dr 2> go Changed database context to 'tpcc_dr'. 1> select * from snap_sync 2> go event | | | |
| test snap mirror DR for SQL (1 rows affected) 1 select getdate() 2> go | 2021-09-20 14:23:04.533 | | |
| 2021-09-20 14:39:19.037 (1 rows affected) 1> _ | | | |

- 3. Configure a new SnapCenter log directory on the DR server for SQL Server log backup.
- 4. Split the cloned volume off of the replicated source volume.
- 5. Reverse replication from the cloud to on-premises and rebuild the failed on-premises database server.

Where to go for help?

If you need help with this solution and use cases, please join the NetApp Solution Automation community support Slack channel and look for the solution-automation channel to post your questions or inquires.

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