

## **Deployment procedures**

**NetApp Solutions** 

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# Step-by-Step Oracle deployment procedures on Azure VM and Azure NetApp Files

Previous: Factors to consider.

# Deploy an Azure VM with ANF for Oracle via Azure portal console

If you are new to Azure, you first need to set up an Azure account environment. This includes signing up your organization to use Azure Active Directory. The following section is a summary of these steps. For details, see the linked Azure-specific documentation.

#### **Create and consume Azure resources**

After your Azure environment is set up and an account is created and associated with a subscription, you can log into Azure portal with the account to create the necessary resources to run Oracle.

#### 1. Create a virtual network or VNet

Azure Virtual Network (VNet) is the fundamental building block for your private network in Azure. VNet enables many types of Azure resources, such as Azure Virtual Machines (VMs), to securely communicate with each other, the internet, and on-premises networks. Before provisioning an Azure VM, a VNet (where a VM is deployed) must first be configured.

See Create a virtual network using the Azure portal to create a VNet.

#### 2. Create a NetApp storage account and capacity pool for ANF

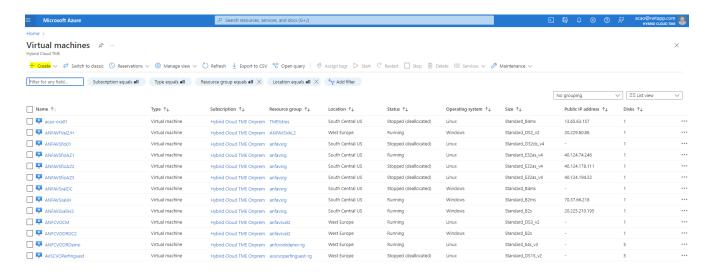
In this deployment scenario, an Azure VM OS is provisioned using regular Azure storage, but ANF volumes are provisioned to run Oracle database via NFS. First, you need to create a NetApp storage account and a capacity pool to host the storage volumes.

See Set up Azure NetApp Files and create an NFS volume to set up an ANF capacity pool.

#### 3. Provision Azure VM for Oracle

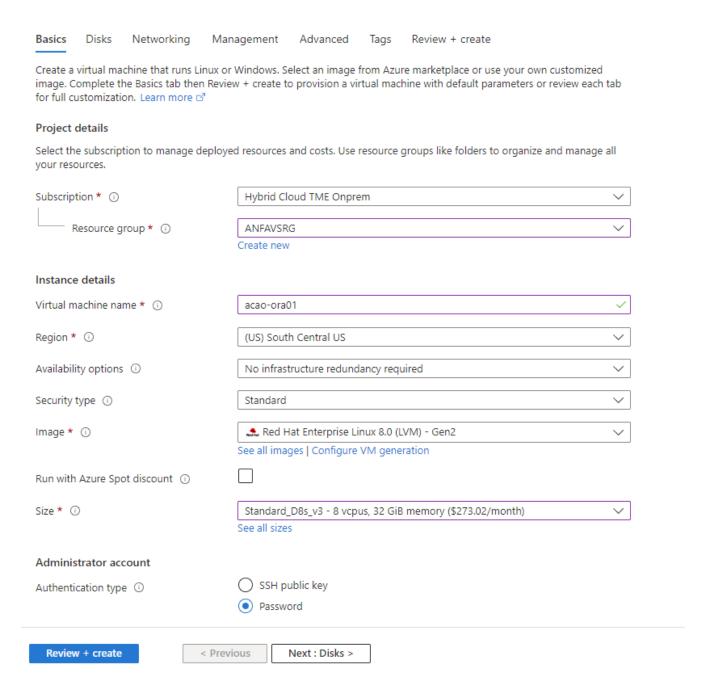
Based on your workload, determine what type of Azure VM you need and the size of the VM vCPU and RAM to deploy for Oracle. Then, from the Azure console, click the VM icon to launch the VM deployment workflow.

1. From the Azure VM page, click Create and then choose Azure virtual machine.

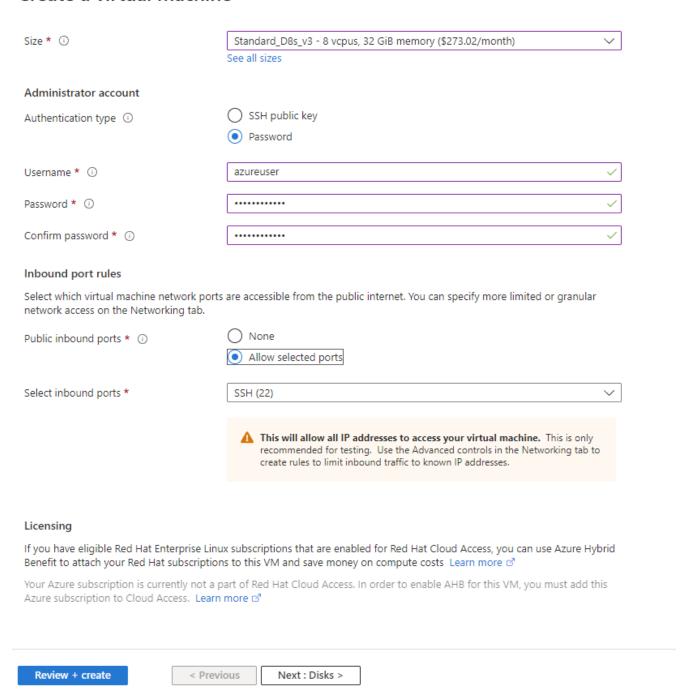


2. Choose the subscription ID for the deployment, and then choose the resource group, region, host name, VM image, size, and authentication method. Go to the Disk page.

#### Create a virtual machine

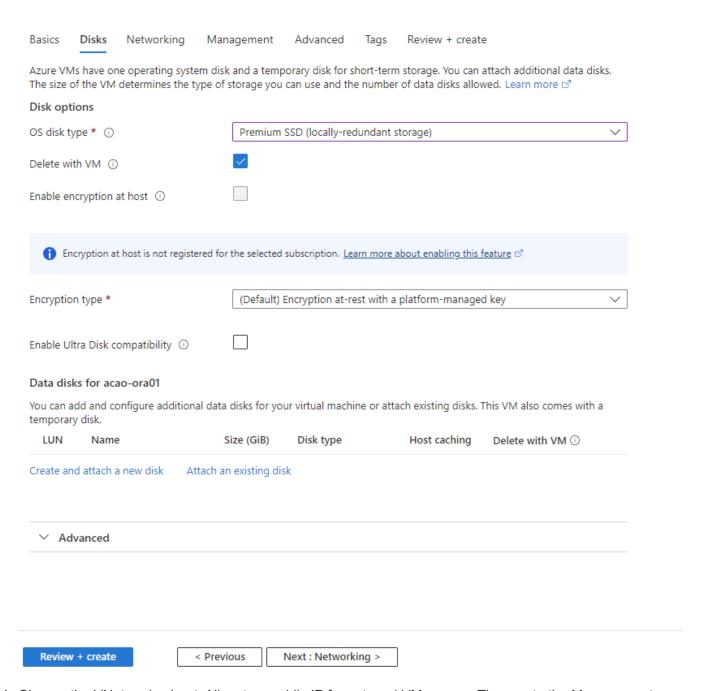


#### Create a virtual machine



Choose premium SSD for OS local redundancy and leave the data disk blank because the data disks are mounted from ANF storage. Go to the Networking page.

#### Create a virtual machine



4. Choose the VNet and subnet. Allocate a public IP for external VM access. Then go to the Management page.

### Create a virtual machine

Network interface	
When creating a virtual machine,	a network interface will be created for you.
Virtual network * ①	ANFAVSVal
	Create new
Subnet * (i)	VM_Sub (172.30.137.128/25)
	Manage subnet configuration
Public IP ①	(new) acao-ora01-ip
	Create new
NIC network security group ①	None
	Basic
	Advanced
Public inbound ports * (i)	None
	Allow selected ports
Select inbound ports *	SSH (22)
	⚠ This will allow all IP addresses to access your virtual machine. This is only recommended for testing. Use the Advanced controls in the Networking tab to create rules to limit inbound traffic to known IP addresses.
Delete public IP and NIC when VN deleted ①	Λ is ✓
Enable accelerated networking	
Load balancing	
You can place this virtual machine	in the backend pool of an existing Azure load balancing solution. Learn more
Place this virtual machine behind existing load balancing solution?	an
Parismon and a	
Review + create	< Previous   Next : Management >

5. Keep all defaults for Management and move to the Advanced page.

Review + create

Home > Virtual machines >							
Create a virtual ma	chine ···						
Basics Disks Networking	Management Advanced Tags Review + create						
Configure monitoring and manage	ment options for your VM.						
Microsoft Defender for Cloud	Microsoft Defender for Cloud						
Microsoft Defender for Cloud prov workloads. Learn more 🗗	ides unified security management and advanced threat protection across hybrid cloud						
Your subscription is protected	by Microsoft Defender for Cloud basic plan.						
Monitoring							
Boot diagnostics ①	<ul> <li>Enable with managed storage account (recommended)</li> <li>Enable with custom storage account</li> <li>Disable</li> </ul>						
Enable OS guest diagnostics ①							
Identity							
Enable system assigned managed identity ①							
Azure AD							
Login with Azure AD ①							
	RBAC role assignment of Virtual Machine Administrator Login or Virtual Machine User Login is required when using Azure AD login. <u>Learn more</u>						
	rtificate-based authentication. You will need to use an SSH client that supports OpenSSH .l or Cloud Shell from the Azure Portal. <u>Learn more</u> ♂						
Auto-shutdown							
Enable auto-shutdown ①							
Rackup							

6. Keep all defaults for the Advanced page unless you need to customize a VM after deployment with custom scripts. Then go to Tags page.

Next : Advanced >

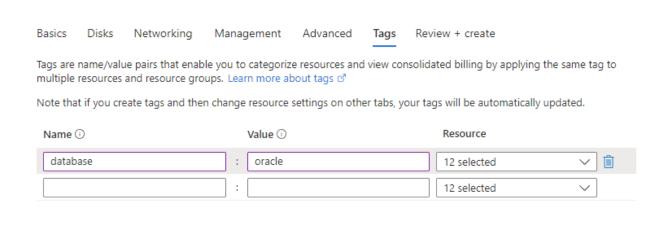
< Previous

_			
Croato	a virtual	machine	

Basics	Disks	Networkin	g Manageme	nt Advanced	Tags	Review +	- create	
Add additional configuration, agents, scripts or applications via virtual machine extensions or cloud-init.								
Extension	ns							
Extension	Extensions provide post-deployment configuration and automation.							
Extension	xtensions ① Select an extension to install							
VM appl	ications							
VM applications contain application files that are securely and reliably downloaded on your VM after deployment. In addition to the application files, an install and uninstall script are included in the application. You can easily add or remove applications on your VM after create. Learn more Select a VM application to install								
Custom	data							
				the virtual machine votom data for VMs o		being pro	visioned. The data will be sav	/ed on
Custom d	ata							
	i Your image must have a code to support consumption of custom data. If your image supports cloud-init, custom-data will be processed by cloud-init. Learn more about custom data for VMs ♂							
User data	a							
				will be accessible to rets or passwords. Le			roughout the lifetime of the r data for VMs ♂	virtual
Fnahle us	Enable user data							
Review	+ create		< Previous	Next : Tags >				

7. Add a tag for the VM if desired. Then, go to the Review + create page.

#### Create a virtual machine



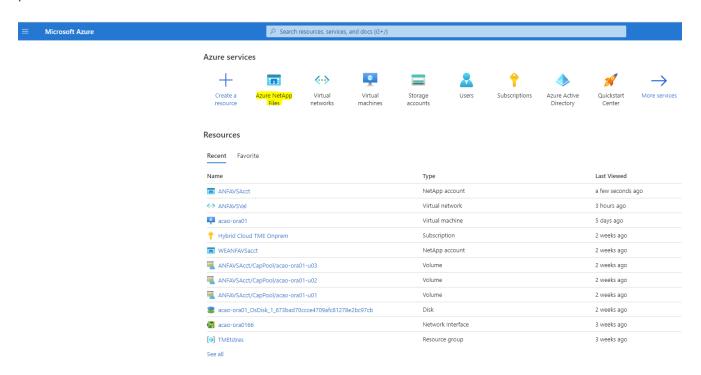


8. The deployment workflow runs a validation on the configuration, and, if the validation passes, click **Create** to create the VM.

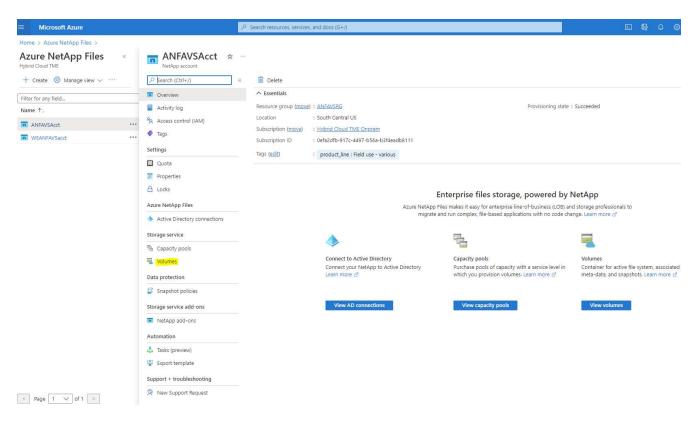
#### 4. Provision ANF database volumes for Oracle

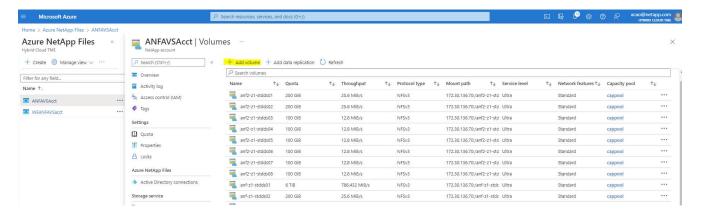
You must create three NFS volumes for an ANF capacity pool for the Oracle binary, data, and log volumes respectively.

1. From the Azure console, under the list of Azure services, click Azure NetApp Files to open a volume creation workflow. If you have more than one ANF storage account, click the account that you would like to provision volumes from.



2. Under your NetApp storage account, click **Volumes**, and then **Add volume** to create new Oracle volumes.





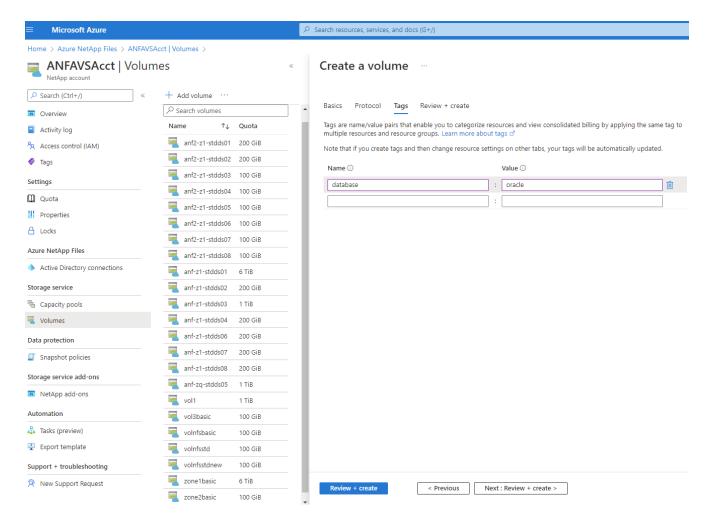
3. As a good practice, identify Oracle volumes with the VM hostname as a prefix and then followed by the mount point on the host, such as u01 for Oracle binary, u02 for Oracle data, and u03 for Oracle log. Choose the same VNet for the volume as for the VM. Click Next: Protocol>.



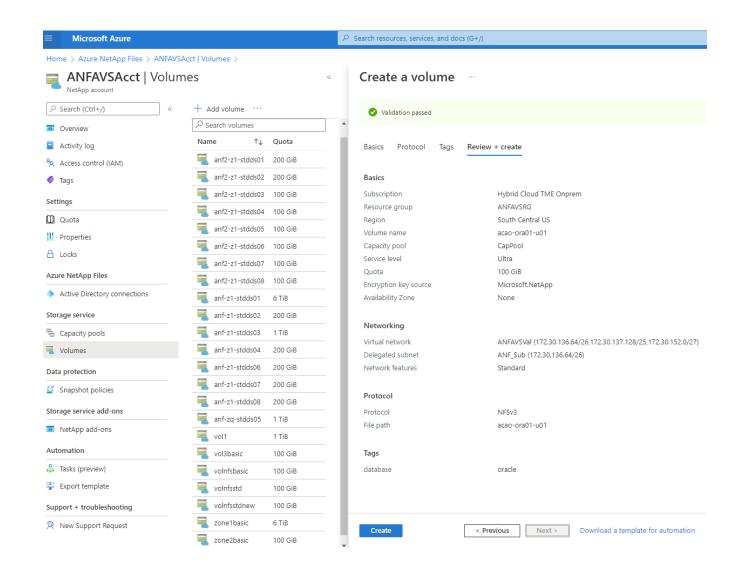
4. Choose the NFS protocol, add the Oracle host IP address to the allowed client, and remove the default policy that allows all IP addresses 0.0.0.0/0. Then click **Next: Tags>**.



5. Add a volume tag if desired. Then click Review + Create>.



6. If the validation passes, click **Create** to create the volume.



### Install and configure Oracle on Azure VM with ANF

The NetApp solutions team has created many Ansible-based automation toolkits to help you deploy Oracle in Azure smoothly. Follow these steps to deploy Oracle on an Azure VM.

#### Set up an Ansible controller

If you have not set up an Ansible controller, see NetApp Solution Automation, which has detailed instructions on how to setup an Ansible controller.

#### **Obtain Oracle deployment automation toolkit**

Clone a copy of the Oracle deployment toolkit in your home directory under the user ID that you use to log into the Ansible controller.

git clone https://github.com/NetApp-Automation/na\_oracle19c\_deploy.git

#### **Execute the toolkit with your configuration**

See the CLI deployment Oracle 19c Database to execute the playbook with the CLI. You can ignore the ONTAP portion of the variables configuration in the global VARS file when you create database volumes from the Azure console rather than the CLI.



The toolkit default deploys Oracle 19c with RU 19.8. It can be easily adapted for any other patch level with minor default configuration changes. Also default seed-database active log files are deployed into the data volume. If you need active log files on the log volume, it should be relocated after initial deployment. Reach out to the NetApp Solution team for help if needed.

# Set up AzAcSnap backup tool for app-consistent snapshots for Oracle

The Azure Application-Consistent Snapshot tool (AzAcSnap) is a command-line tool that enables data protection for third-party databases by handling all the orchestration required to put them into an application-consistent state before taking a storage snapshot. It then returns these databases to an operational state. NetApp recommends installing the tool on the database server host. See the following installation and configuration procedures.

#### Install AzAcSnap tool

- 1. Get the most recent version of the the AzArcSnap Installer.
- 2. Copy the downloaded self-installer to the target system.
- 3. Execute the self-installer as the root user with the default installation option. If necessary, make the file executable using the chmod +x \*.run command.

```
./azacsnap_installer_v5.0.run -I
```

#### **Configure Oracle connectivity**

The snapshot tools communicate with the Oracle database and need a database user with appropriate permissions to enable or disable backup mode.

#### 1. Set up AzAcSnap database user

The following examples show the setup of the Oracle database user and the use of sqlplus for communication to the Oracle database. The example commands set up a user (AZACSNAP) in the Oracle database and change the IP address, usernames, and passwords as appropriate.

1. From the Oracle database installation, launch sqlplus to log into the database.

```
su - oracle
sqlplus / AS SYSDBA
```

2. Create the user.

```
CREATE USER azacsnap IDENTIFIED BY password;
```

3. Grant the user permissions. This example sets the permission for the AZACSNAP user to enable putting the database into backup mode.

```
GRANT CREATE SESSION TO azacsnap;
GRANT SYSBACKUP TO azacsnap;
```

4. Change the default user's password expiration to unlimited.

```
ALTER PROFILE default LIMIT PASSWORD_LIFE_TIME unlimited;
```

5. Validate azacsnap connectivity for the database.

```
connect azacsnap/password
quit;
```

#### 2. Configure Linux-user azacsnap for DB access with Oracle wallet

The AzAcSnap default installation creates an azacsnap OS user. It's Bash shell environment must be configured for Oracle database access with the password stored in an Oracle wallet.

1. As root user, run the cat /etc/oratab command to identify the ORACLE\_HOME and ORACLE\_SID variables on the host.

```
cat /etc/oratab
```

2. Add ORACLE\_HOME, ORACLE\_SID, TNS\_ADMIN, and PATH variables to the azacsnap user bash profile. Change the variables as needed.

```
echo "export ORACLE_SID=ORATEST" >> /home/azacsnap/.bash_profile
echo "export ORACLE_HOME=/u01/app/oracle/product/19800/ORATST" >>
/home/azacsnap/.bash_profile
echo "export TNS_ADMIN=/home/azacsnap" >> /home/azacsnap/.bash_profile
echo "export PATH=\$PATH:\$ORACLE_HOME/bin" >>
/home/azacsnap/.bash_profile
```

3. As the Linux user azacsnap, create the wallet. You are prompted for the wallet password.

```
sudo su - azacsnap
mkstore -wrl $TNS_ADMIN/.oracle_wallet/ -create
```

4. Add the connect string credentials to the Oracle Wallet. In the following example command, AZACSNAP is the ConnectString to be used by AzAcSnap, azacsnap is the Oracle Database User, and AzPasswd1 is the Oracle User's database password. You are again prompted for the wallet password.

```
mkstore -wrl $TNS_ADMIN/.oracle_wallet/ -createCredential AZACSNAP
azacsnap AzPasswd1
```

5. Create the tnsnames-ora file. In the following example command, HOST should be set to the IP address of the Oracle Database and the Server SID should be set to the Oracle Database SID.

```
echo "# Connection string
AZACSNAP=\"(DESCRIPTION=(ADDRESS=(PROTOCOL=TCP) (HOST=172.30.137.142) (POR
T=1521)) (CONNECT_DATA=(SID=ORATST)))\"
" > $TNS_ADMIN/tnsnames.ora
```

6. Create the sqlnet.ora file.

```
echo "SQLNET.WALLET_OVERRIDE = TRUE
WALLET_LOCATION=(
         SOURCE=(METHOD=FILE)
          (METHOD_DATA=(DIRECTORY=\$TNS_ADMIN/.oracle_wallet))
) " > $TNS_ADMIN/sqlnet.ora
```

7. Test Oracle access using the wallet.

```
sqlplus /@AZACSNAP as SYSBACKUP
```

The expected output from the command:

```
[azacsnap@acao-ora01 ~]$ sqlplus /@AZACSNAP as SYSBACKUP

SQL*Plus: Release 19.0.0.0.0 - Production on Thu Sep 8 18:02:07 2022
Version 19.8.0.0.0

Copyright (c) 1982, 2019, Oracle. All rights reserved.

Connected to:
Oracle Database 19c Enterprise Edition Release 19.0.0.0.0 - Production
Version 19.8.0.0.0
SQL>
```

#### **Configure ANF connectivity**

This section explains how to enable communication with Azure NetApp Files (with a VM).

1. Within an Azure Cloud Shell session, make sure that you are logged into the subscription that you want to be associated with the service principal by default.

```
az account show
```

2. If the subscription isn't correct, use the following command:

```
az account set -s <subscription name or id>
```

3. Create a service principal using the Azure CLI as in the following example:

```
az ad sp create-for-rbac --name "AzAcSnap" --role Contributor --scopes
/subscriptions/{subscription-id} --sdk-auth
```

The expected output:

```
"clientId": "00aa000a-aaaa-0000-00a0-00aa000aaa0a",
   "clientSecret": "00aa000a-aaaa-0000-00a0-00aa000aaa0a",
   "subscriptionId": "00aa000a-aaaa-0000-00a0-00aa000aaa0a",
   "tenantId": "00aa000a-aaaa-0000-00a0-00aa000aaa0a",
   "activeDirectoryEndpointUrl": "https://login.microsoftonline.com",
   "resourceManagerEndpointUrl": "https://management.azure.com/",
   "activeDirectoryGraphResourceId": "https://graph.windows.net/",
   "sqlManagementEndpointUrl":
"https://management.core.windows.net:8443/",
   "galleryEndpointUrl": "https://gallery.azure.com/",
   "managementEndpointUrl": "https://management.core.windows.net/"
}
```

4. Cut and paste the output content into a file called oracle.json stored in the Linux user azacsnap user bin directory and secure the file with the appropriate system permissions.



Make sure the format of the JSON file is exactly as described above, especially with the URLs enclosed in double quotes (").

#### Complete the setup of AzAcSnap tool

Follow these steps to configure and test the snapshot tools. After successful testing, you can perform the first database-consistent storage snapshot.

1. Change into the snapshot user account.

```
su - azacsnap
```

2. Change the location of commands.

```
cd /home/azacsnap/bin/
```

3. Configure a storage backup detail file. This creates an azacsnap. json configuration file.

```
azacsnap -c configure --configuration new
```

The expected output with three Oracle volumes:

```
[azacsnap@acao-ora01 bin]$ azacsnap -c configure --configuration new Building new config file
Add comment to config file (blank entry to exit adding comments): Oracle snapshot bkup
```

```
Add comment to config file (blank entry to exit adding comments):
Enter the database type to add, 'hana', 'oracle', or 'exit' (for no
database): oracle
=== Add Oracle Database details ===
Oracle Database SID (e.g. CDB1): ORATST
Database Server's Address (hostname or IP address): 172.30.137.142
Oracle connect string (e.g. /@AZACSNAP): /@AZACSNAP
=== Azure NetApp Files Storage details ===
Are you using Azure NetApp Files for the database? (y/n) [n]: y
--- DATA Volumes have the Application put into a consistent state before
they are snapshot ---
Add Azure NetApp Files resource to DATA Volume section of Database
configuration? (y/n) [n]: y
Full Azure NetApp Files Storage Volume Resource ID (e.g.
/subscriptions/.../resourceGroups/.../providers/Microsoft.NetApp/netAppA
ccounts/.../capacityPools/Premium/volumes/...): /subscriptions/Oefa2dfb-
917c-4497-b56a-
b3f4eadb8111/resourceGroups/ANFAVSRG/providers/Microsoft.NetApp/netAppAc
counts/ANFAVSAcct/capacityPools/CapPool/volumes/acao-ora01-u01
Service Principal Authentication filename or Azure Key Vault Resource ID
(e.g. auth-file.json or https://...): oracle.json
Add Azure NetApp Files resource to DATA Volume section of Database
configuration? (y/n) [n]: y
Full Azure NetApp Files Storage Volume Resource ID (e.g.
/subscriptions/.../resourceGroups/.../providers/Microsoft.NetApp/netAppA
ccounts/.../capacityPools/Premium/volumes/...): /subscriptions/0efa2dfb-
917c-4497-b56a-
b3f4eadb8111/resourceGroups/ANFAVSRG/providers/Microsoft.NetApp/netAppAc
counts/ANFAVSAcct/capacityPools/CapPool/volumes/acao-ora01-u02
Service Principal Authentication filename or Azure Key Vault Resource ID
(e.g. auth-file.json or https://...): oracle.json
Add Azure NetApp Files resource to DATA Volume section of Database
configuration? (y/n) [n]: n
--- OTHER Volumes are snapshot immediately without preparing any
application for snapshot ---
Add Azure NetApp Files resource to OTHER Volume section of Database
configuration? (y/n) [n]: y
Full Azure NetApp Files Storage Volume Resource ID (e.g.
/subscriptions/.../resourceGroups/.../providers/Microsoft.NetApp/netAppA
ccounts/.../capacityPools/Premium/volumes/...): /subscriptions/0efa2dfb-
917c-4497-b56a-
b3f4eadb8111/resourceGroups/ANFAVSRG/providers/Microsoft.NetApp/netAppAc
counts/ANFAVSAcct/capacityPools/CapPool/volumes/acao-ora01-u03
Service Principal Authentication filename or Azure Key Vault Resource ID
```

```
(e.g. auth-file.json or https://...): oracle.json
Add Azure NetApp Files resource to OTHER Volume section of Database
configuration? (y/n) [n]: n

=== Azure Managed Disk details ===
Are you using Azure Managed Disks for the database? (y/n) [n]: n

=== Azure Large Instance (Bare Metal) Storage details ===
Are you using Azure Large Instance (Bare Metal) for the database? (y/n)
[n]: n

Enter the database type to add, 'hana', 'oracle', or 'exit' (for no database): exit

Editing configuration complete, writing output to 'azacsnap.json'.
```

4. As the azacsnap Linux user, run the azacsnap test command for an Oracle backup.

```
cd ~/bin azacsnap -c test --test oracle --configfile azacsnap.json
```

#### The expected output:

```
[azacsnap@acao-ora01 bin]$ azacsnap -c test --test oracle --configfile
azacsnap.json
BEGIN : Test process started for 'oracle'
BEGIN : Oracle DB tests
PASSED: Successful connectivity to Oracle DB version 1908000000
END : Test process complete for 'oracle'
[azacsnap@acao-ora01 bin]$
```

5. Run your first snapshot backup.

```
azacsnap -c backup --volume data --prefix ora_test --retention=1
```

Next: Database protection.

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