



## Installation And Configuration Of Oracle 19c RAC With ASM Over Oracle ZFS Storage

### ABSTRACT

In this article, we are going to demonstrate installation and configuration of Oracle 19c RAC with ASMLib over Oracle ZFS Storage Simulator.

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## Environment Setup

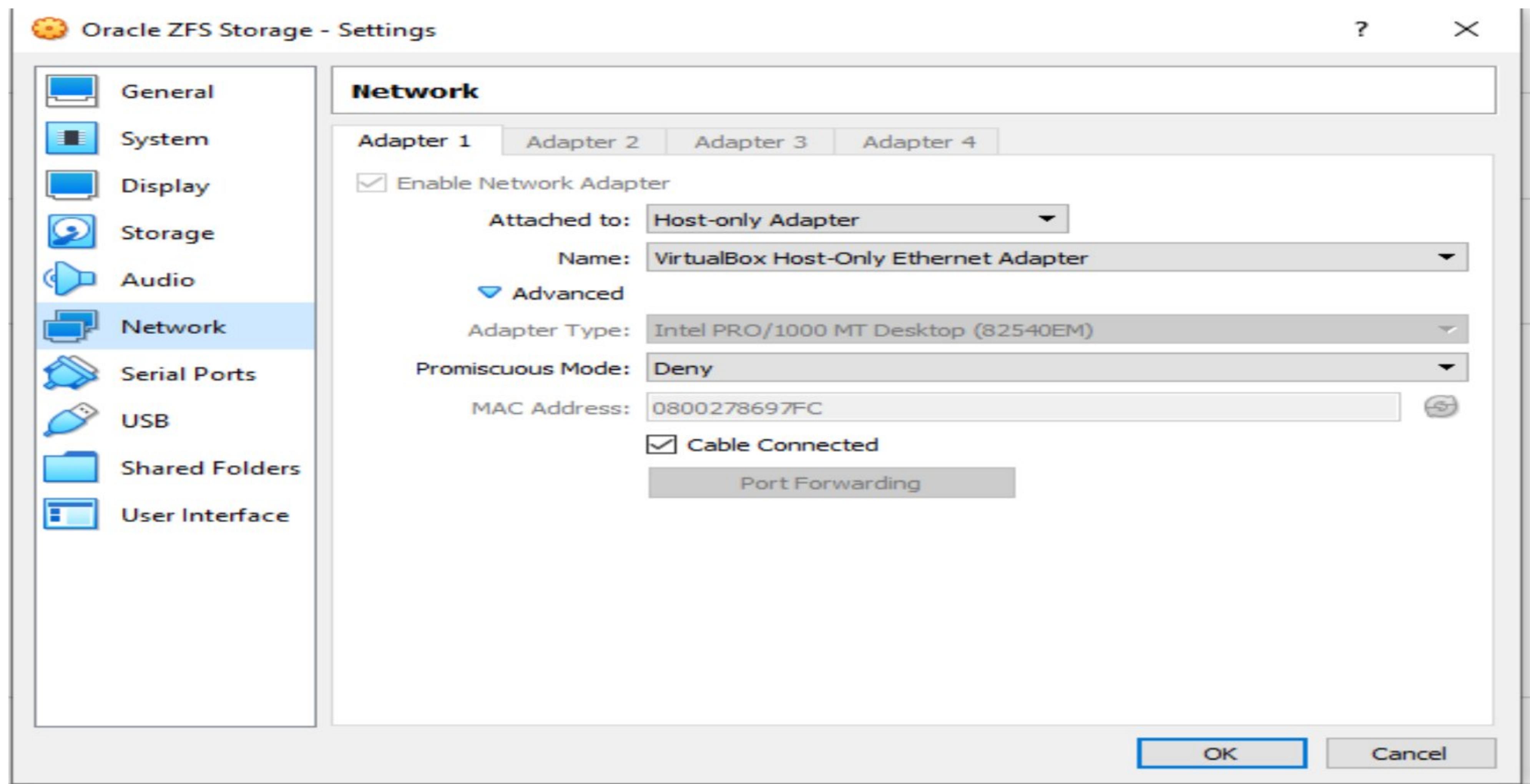
Hostname	Operating System	Public IP	Private IP	Virtual IP	SCAN Ips
rac1.localdomain	OEL 7.2 x86-64	192.168.2.100	10.1.4.10	192.168.2.110	192.168.2.10
rac2.localdomain	OEL 7.2 x86-64	192.168.2.200	10.1.4.20	192.168.2.210	192.168.2.20
					192.168.2.30
Oracle ZFS Storage	OS8.8	192.168.2.150			

GI and RDBMS locations	
ORACLE_BASE	/u01/app/oracle
ORACLE_HOME	/u01/app/oracle/product/19.3.0/db_1
GRID_HOME	/u01/app/19.3.0/grid

July 2020 RU versions	
Oracle 19c GI (19.8)	p31305339_190000_Linux-x86-64.zip
Oracle 19c RDBMS (19.8)	p31281355_190000_Linux-x86-64.zip
Opatch version	p6880880_190000_Linux-x86-64.zip

## Installing Oracle ZFS Storage

File that was downloaded with the ZFS appliance, we must import it through the Import Appliance in the VirtualBox menu.



After importing, we must start the basic Oracle ZFS configuration, click on the “START” button to start the ZFS virtual machine.

On this screen we will perform the Oracle ZFS configuration, fill in the information on our screen to simulate the environment.

Oracle ZFS Storage [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

The Virtual Machine reports that the guest OS supports **mouse pointer integration**. This means that you do not

```
WARNING: cpu0: failed to update microcode from version 0x0 to 0x96
SunOS Release 5.11 Version 11.4.0.34.0 64-bit
Copyright (c) 1983, 2018, Oracle and/or its affiliates. All rights reserved.
0 blocks
Starting primordial svc.configd
SMF online in 1 seconds
Loading smf(7) service descriptions: 225/225
svccfg: Loaded 225 smf(7) service descriptions
Migrating existing sysconfig profiles to new layers
Loading smf(7) service descriptions: 29/29
Applying profile install/akinstall.xml ... done.
Applying service layer generic ... done.
Applying service layer nas ... done.
Applying service layer SUNW,ankimo ... done.
Applying service profile generic ... done.
Enabling auditing of Solaris commands ... done.
Adding stencil /etc/boot-config.conf ... done.
Adding stencil /etc/crypto/ucrypto.conf ... done.
Adding stencil /etc/system.d/system:core-os,sxadm,kadi ... done.
Shutting down svc.configd ... done.
Generating DH parameters ... done.
Configuring devices.

Oracle ZFS Storage VirtualBox Version ak/SUNW,ankimo@2013.06.05.8.0,1-1.34
Copyright (c) 2008, 2020, Oracle and/or its affiliates. All rights reserved.

Configuring network devices.
Checking hardware configuration ... done.
Starting appliance configuration ..... done.
Press any key to begin configuring appliance: [*] ■
```

Oracle ZFS Storage [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

```
Oracle ZFS Storage VirtualBox Configuration
Copyright (c) 2008, 2020, Oracle and/or its affiliates. All rights reserved.

NET-0 <=>
Host Name: zfs
DNS Domain: localdomain
IP Address: 192.168.2.150
IP Netmask: 255.255.255.0
Default Router: 192.168.2.1
DNS Server: 192.168.2.1
Password: 000000
Re-enter Password: 000000

Please complete the remaining mandatory (*) items
ESC-1: Done ESC-2: Help ESC-3: Halt ESC-4: Reboot ESC-5: Info
For help, see http://www.oracle.com/zfsstorage/
```

Right Ctrl

Password used was oracle. Please enter | ESC-1 Done.

Oracle ZFS Storage [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

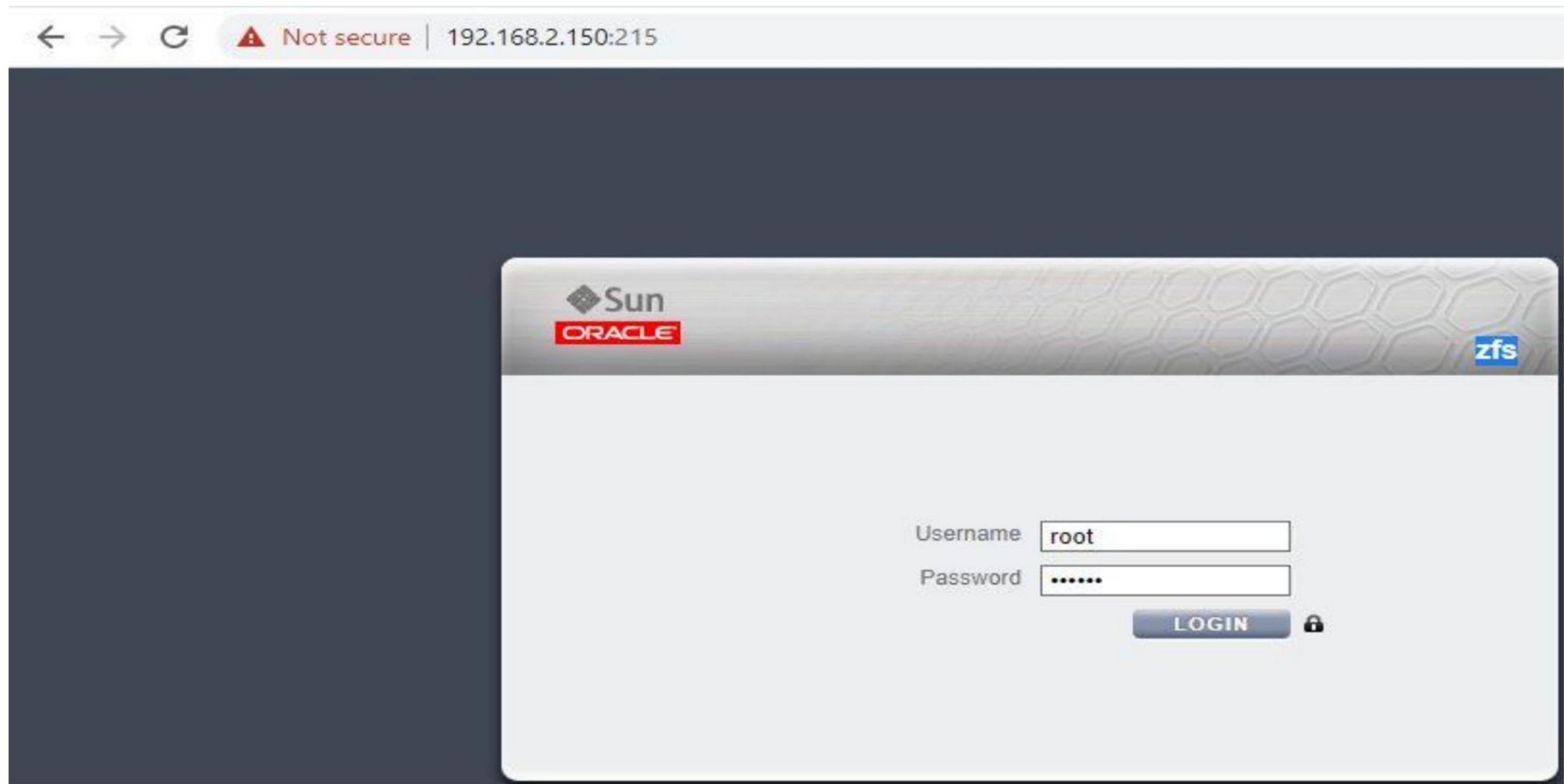
```
WARNING: cpu0: failed to update microcode from version 0x0 to 0x96
SunOS Release 5.11 Version 11.4.0.34.0 64-bit
Copyright (c) 1983, 2018, Oracle and/or its affiliates. All rights reserved.
Configuring devices.

Oracle ZFS Storage VirtualBox Version ak/SUNW,ankimo@2013.06.05.8.0.1-1.34
Copyright (c) 2008, 2020, Oracle and/or its affiliates. All rights reserved.

Configuring network devices.
Aug 16 00:34:00 svc-auditset[13589]: getaddrinfo(zfs) failed[temporary name resolution failure].
zfs console login: 
```

After the configuration is finished, we will access the console via browser <http://192.168.2.150:215>

The User we use is "root" and the password "oracle".



## Oracle ZFS configuration - Startup Storage.

Now let's start the initial configuration of ZFS and prepare the same with the disks.

Configure the appliance once it has been unpacked from the box and powered on for the first time.

**Welcome**

Begin the appliance configuration task. These steps are required before you can begin using your new appliance.

**Oracle ZFS Storage VirtualBox**  
Oracle

**START**

**Welcome to the Oracle ZFS Storage Virtual Machine.**

This virtual appliance contains the full set of software features available on the Oracle ZFS Storage series of appliances. It is intended for **demonstration purposes only**, and is not suitable for production use or benchmarking.

Before using the appliance, you will need to provide some basic information about your system environment. During this process you will configure network, time, directory and support services, and then initialize your storage pool to provide space for data shares.

Once the initial setup process is complete, you will be able to create shares and configure more advanced settings specific to your environment and workload. If you need to revisit this process, select Maintenance: System from the main navigation. To begin, click the start button above.

Some information about ZFS is presented on this screen, click on "START".

← → C Not secure | 192.168.2.150:215/#utask/id=15c3968b-c0d3-41a5-8f7d-e6cf19e73851

**Sun** ORACLE ORACLE ZFS STORAGE VM Super-User@zfs LOGOUT HELP

Initial configuration of appliance settings. **COMMIT**

**Configure Networking** Step 1 of 6

Configure the appliance network interfaces. The first network interface has been configured for you using the settings you provided at the serial console.

**Network** Configuration Addresses Routing

To configure networking, build Datalinks on Devices, and Interfaces on Datalinks. Click on a pencil icon to edit object properties. Select an object to view its relationship to other objects. Drag objects to extend Aggregations or IP Multipathing Groups.

**Devices** Total: 1 **Datalinks** Total: 1 **Interfaces** Total: 1

Motherboard	Total: 1	Untitled Datalink	Total: 1	Untitled Interface	Total: 1
e1000g0	1Gb (full)	via e1000g0		IPv4 static, 192.168.2.150/24, via e1000g0	

**REVERT** **APPLY**

On this screen we have the ZFS network configuration, it is not necessary to make any changes, click on the "COMMIT" button to save these settings and go to the next step.

← → C Not secure | 192.168.2.150:215/#utask/id=15c3968b-c0d3-41a5-8f7d-e6cf19e73851

**Sun** ORACLE ORACLE ZFS STORAGE VM Super-User@zfs LOGOUT HELP

Initial configuration of appliance settings. **REVERT** **COMMIT**

**Configure DNS** Step 2 of 6

Configure the Domain Name Service.

Online

**Domain Name Service**  
DNS is used to map host names such as oracle.com to their corresponding IP addresses. DNS is always enabled on your appliance, and can be configured manually or based on your current DHCP settings. In addition, you may elect to attempt hostname resolution using other directory services (if configured).

**General Settings**

DNS Domain	localdomain
DNS Search Domain(s)	+ (empty)
Allow IPv4 non-DNS resolution	<input type="checkbox"/>
Allow IPv6 non-DNS resolution	<input type="checkbox"/>

**DNS Servers** Total: 1

SERVER	RTT
192.168.2.1	

**See Also**  
Help: DNS  
Wikipedia: DNS  
**RESTART**  
**DISABLE**

In this screen we have the DNS configuration of ZFS, it is not necessary to make any changes, click on the "COMMIT" button to save these settings and go to the next step. Please make sure DNS Domain is "localdomain".

Not secure | 192.168.2.150:215/#utask/id=15c3968b-c0d3-41a5-8f7d-e6cf19e73851

**Sun** | ORACLE ZFS STORAGE VM Super-User@zfs LOGOUT HELP

Initial configuration of appliance settings.

**REVERT** **COMMIT**

**Configure Time** **Step 3 of 6**

Configure the Network Time Protocol.

Disabled

**Network Time Protocol**  
Configure the network time protocol. If you choose to leave the NTP service disabled, you may manually set the time and date to match your time according to your web browser.

**NTP Settings**

Discover NTP server via multicast address:  
224.0.1.1

Manually specify NTP server(s):

**Clock**

Server Time: 2020-8-11 11:19:12  
Client Time: 2020-8-11 11:19:14

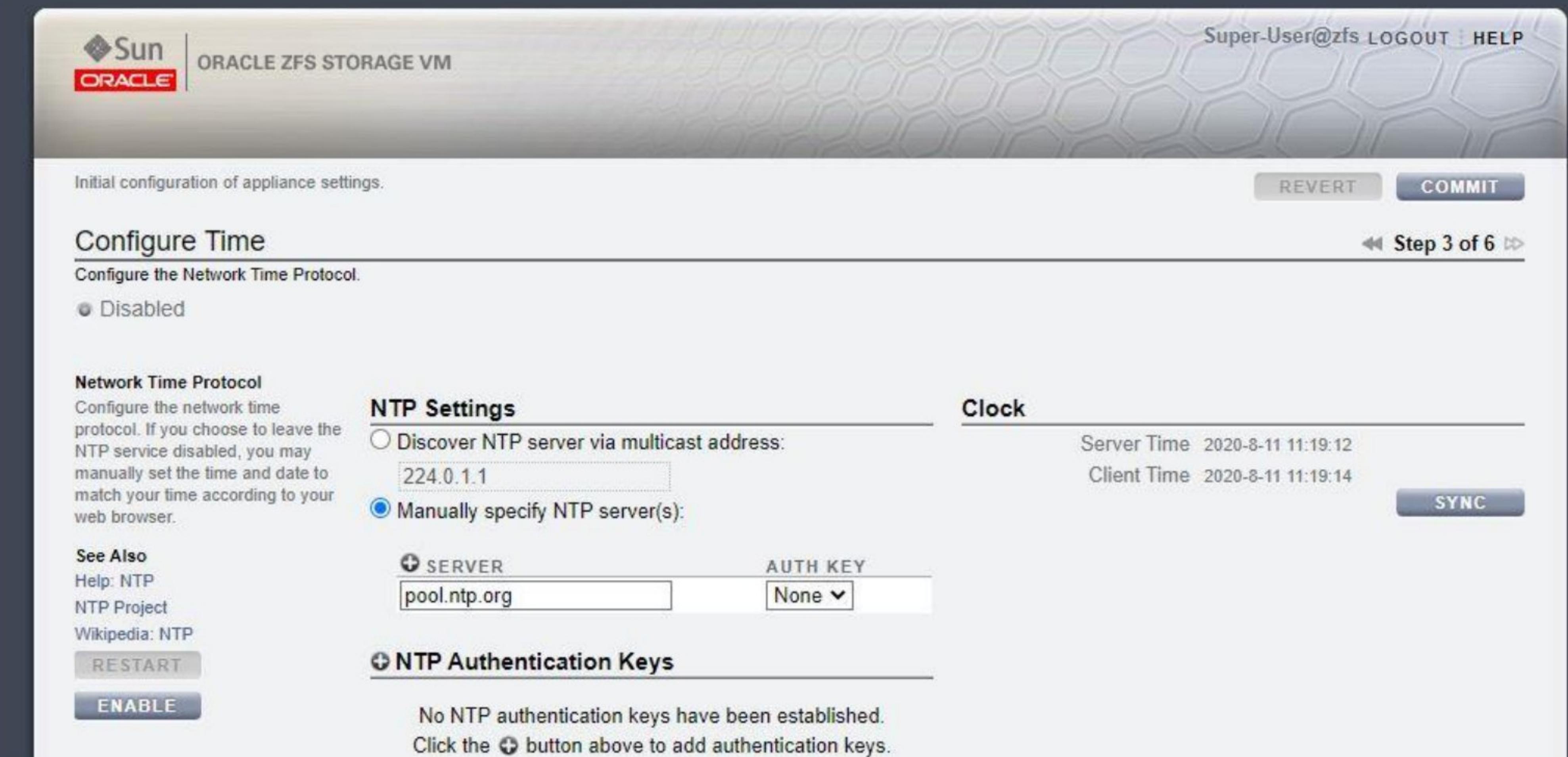
**SYNC**

**See Also**  
Help: NTP  
NTP Project  
Wikipedia: NTP

**RESTART** **ENABLE**

**NTP Authentication Keys**

No NTP authentication keys have been established.  
Click the **+** button above to add authentication keys.



On this screen we have the NTP configuration of ZFS, it is not necessary to make any changes, click on the "COMMIT" button to save these settings and go to the next step.

Not secure | 192.168.2.150:215/#utask/id=15c3968b-c0d3-41a5-8f7d-e6cf19e73851

**Sun** | ORACLE ZFS STORAGE VM Super-User@zfs LOGOUT HELP

Initial configuration of appliance settings.

**COMMIT**

**Configure Name Services** **Step 4 of 6**

Configure directory services for users and groups. You can configure and enable each directory service independently, and you can configure more than one directory service.

**NIS** **CONFIGURE**

Recognize users and groups defined in a NIS directory. Once the NIS service is configured, go to Configuration/Users to give users permission to log into the administrative interface.

This service is not yet configured. Click the configure button to configure and enable the service.

**LDAP** **CONFIGURE**

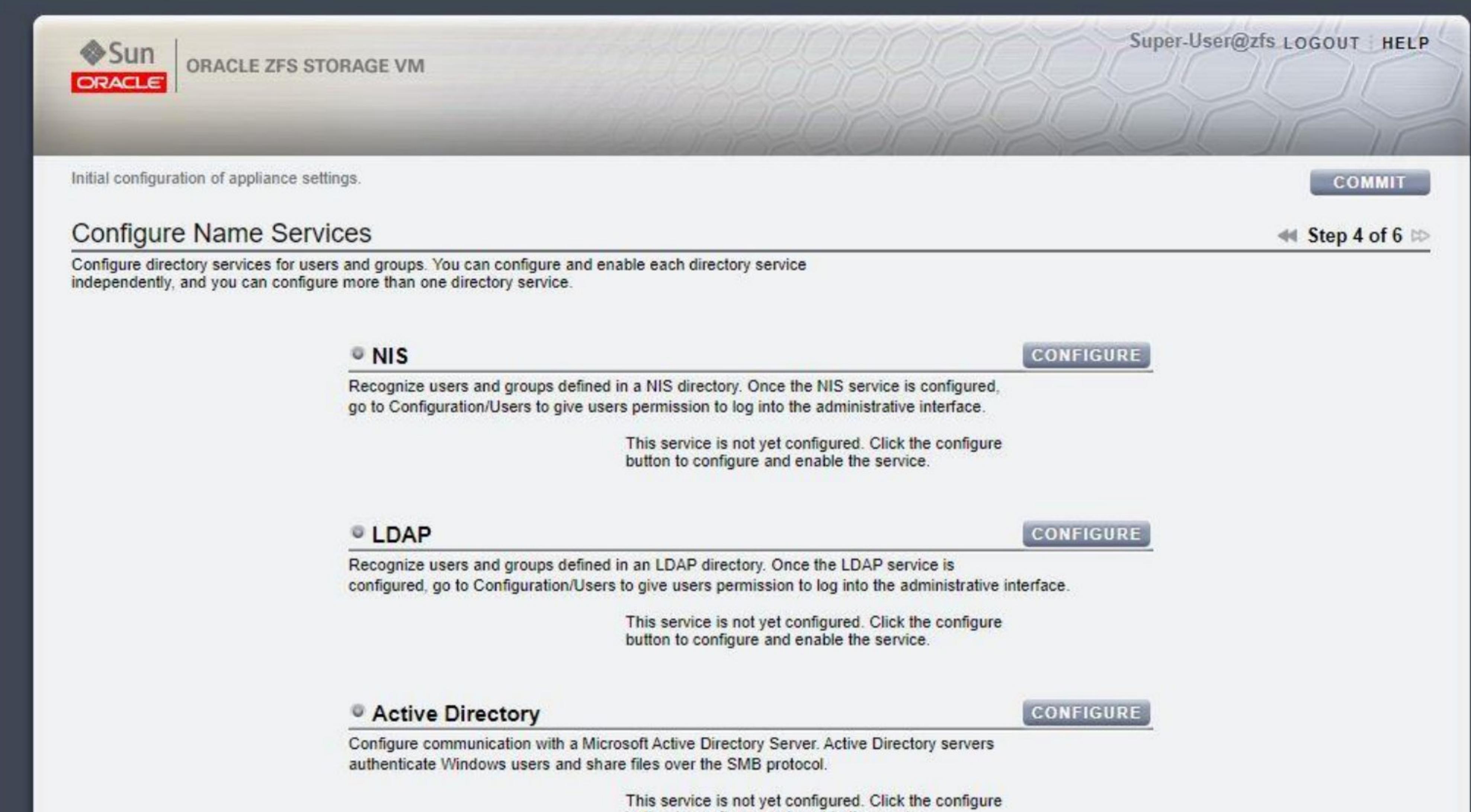
Recognize users and groups defined in an LDAP directory. Once the LDAP service is configured, go to Configuration/Users to give users permission to log into the administrative interface.

This service is not yet configured. Click the configure button to configure and enable the service.

**Active Directory** **CONFIGURE**

Configure communication with a Microsoft Active Directory Server. Active Directory servers authenticate Windows users and share files over the SMB protocol.

This service is not yet configured. Click the configure button to configure and enable the service.



On this screen we have the NFS configuration of ZFS, it is not necessary to make any changes, click on the "COMMIT" button to save these settings and go to the next step.

← → C Not secure | 192.168.2.150:215/#utask/id=15c3968b-c0d3-41a5-8f7d-e6cf19e73851

Sun ORACLE ZFS STORAGE VM Super-User@zfs LOGOUT HELP

Initial configuration of appliance settings.

Configure Storage Step 5 of 6

Configure Storage Pools.

About Storage Configuration

Storage is configured in pools that are characterized by their underlying data redundancy, and provide space that is shared across all filesystems and LUNs.

During the configuration process, you will select which devices to allocate to a storage pool and the redundancy profile most appropriate to your workload, balancing performance, availability, and capacity.

Importing storage will search all devices attached to the system for existing pool configurations, from which you can select one as the system pool. This option is used to migrate pools between systems, and in some cases can recover pools that were destroyed inadvertently.

No pools are configured. Click the button to configure a new pool. Click the import button to search for previously configured pools.

Available Pools IMPORT

Commit

On this screen we have the configuration of STORAGE of ZFS, it is not necessary to make any changes, click on the "COMMIT" button to save these settings and go to the next step, on the last step click on "LATER" and then confirm.

← → C Not secure | 192.168.2.150:215/#utask/id=15c3968b-c0d3-41a5-8f7d-e6cf19e73851

Sun ORACLE ZFS STORAGE VM Super-User@zfs LOGOUT HELP

Initial configuration of appliance settings.

Registration & Support Step 5 of 6

Register your appliance and configure remote support.

About Support Services

Oracle provides automated service response to system faults and connectivity issues as part of customer support. To enable this Phone Home service, you must register your appliance under a My Oracle Support account and your web connection should be properly configured if it requires a proxy. If you don't wish to register at this time, click the Later button.

See Also

Help: Phone Home  
My Oracle Support  
Privacy Statement



Register your appliance with My Oracle Support to receive immediate notification of system updates, on-demand access to software downloads, and automated service call generation and fault response for your appliance. All registered customers are supported.

My Oracle Support Username  New account?

Password

Use web proxy  If your system communicates to the web through a proxy, check this box and enter the configuration information below.

Host : port  :   
Username   
Password

LATER REGISTER

Sun ORACLE ORACLE ZFS STORAGE VM Super-User@zfs LOGOUT HELP

Configuration Maintenance Shares Status Analytics

Oracle ZFS Storage VirtualBox Oracle

The system has been successfully configured.

You are now ready to customize the system to your workload. We recommend familiarizing yourself briefly with the interface, then moving on to these tasks:

- ▶ Configure filesystems or LUNs
- ▶ Configure additional services
- ▶ Add users and control access
- ▶ Monitor the status of system components
- ▶ Perform detailed investigations using analytics
- ▶ View and maintain hardware components
- ▶ Set up alerts for problem notification

For more detailed information, consult the documentation.

## Configuring Luns on ZFS

A project can be defined in Oracle ZFS Storage Appliance for related group volumes. A project allows property inheritance for file systems and LUNs presented from the project and also allows quotas and reservations to be applied. Click on “SHARES”, then click on “PROJECTS”, select the option “+” next to the word Projects. Before that click on “Configuration” and “Storage” and specify size of the POOL size and import and click on “Commit”.

PS Note: By default, 74.5 GB size of the complete volume and based on data pool. You can use the options striped, mirrored etc.

Super-User@zfs LOGOUT HELP

ABORT COMMIT Step 2 of 2

Choose pool

Pick a pool to import based on discovered storage.

About importing pools

The pools that were found are displayed. Once you have determined the pool you wish to import (and have selected it, if more than one pool was found), click on the 'commit' button to complete the process. Note that pools that are faulted cannot be imported, and are provided here only as information.

Available Pools

PREVIOUS NAME	DATA PROFILE	LOG PROFILE	STATUS	ERRORS
storage	Striped	-	Online	0

storage

Allocation

Pool Name: storage  
Data Profile: Striped  
Log Profile: -  
Pool Status: Online  
Data Errors: No known persistent errors

Device Status

No device faults have been detected in the storage pool.

0 errors

Data Reserve 74.5G 480M

Data + Reserve 15 disks  
Spare 0 disks  
Log 0 disks  
Cache 0 disks  
Meta 0 disks

**Sun** | ORACLE ZFS STORAGE VM Super-User@zfs LOGOUT HELP

**Configuration** Maintenance Shares Status Analytics

SERVICES STORAGE NETWORK SAN CLUSTER USERS PREFERENCES SETTINGS ALERTS

**About Storage Configuration**  
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During the configuration process, you will select which devices to allocate to a storage pool and the redundancy profile most appropriate to your workload, balancing performance, availability, and capacity.

Importing storage will search all devices attached to the system for existing pool configurations, from which you can select one as the system pool. This option is used to migrate pools between systems, and in some cases can recover pools that were destroyed inadvertently.

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**Available Pools**

NAME	DATA PROFILE	LOG PROFILE	STATUS	ERRORS	ENCRYPTED
storage	Striped	-	Online	0	

**storage** ADD REMOVE UNCONFIG REVERT APPLY Allocation

Pool Name: storage  
Data Profile: Striped  
Log Profile: -  
Pool Status: Online  
Data Errors: No known persistent errors  
Scrub Schedule: Off  
Scrub Status: Never scrubbed SCRUB

Data 73.4G  
Reserve 1.63G

0 errors

No device faults have been detected in the storage pool.

Data + Reserve 15 disks  
Spare 0 disks  
Log 0 disks  
Cache 0 disks  
Meta 0 disks

**Sun** | ORACLE ZFS STORAGE VM Super-User@zfs LOGOUT HELP

**Configuration** Maintenance Shares Status Analytics

SHARES PROJECTS ENCRYPTION SCHEMA

**Projects** All Projects

**Usage** 0.0% of 73.4G

Referenced data	31K
Total space	31K

**Projects** Total: 1

SHOW ALL : LOCAL : REPLICA

NAME	SIZE	CREATION	ENCRYPTED
default	31K	2020-8-12 12:28:05	

**Sun** | ORACLE ZFS STORAGE VM Super-User@zfs LOGOUT HELP

**Configuration** Maintenance Shares Status Analytics

SHARES PROJECTS ENCRYPTION SCHEMA

**Projects** All Projects

**Projects** Total: 1

SHOW ALL : LOCAL : REPLICA

NAME	SIZE	CREATION	ENCRYPTED
default	31K	2020-8-12 12:28:05	

**Create Project** CANCEL APPLY

Name: RAC  
Encryption: Off  
Inherit key:   
Key:  Local  OKM

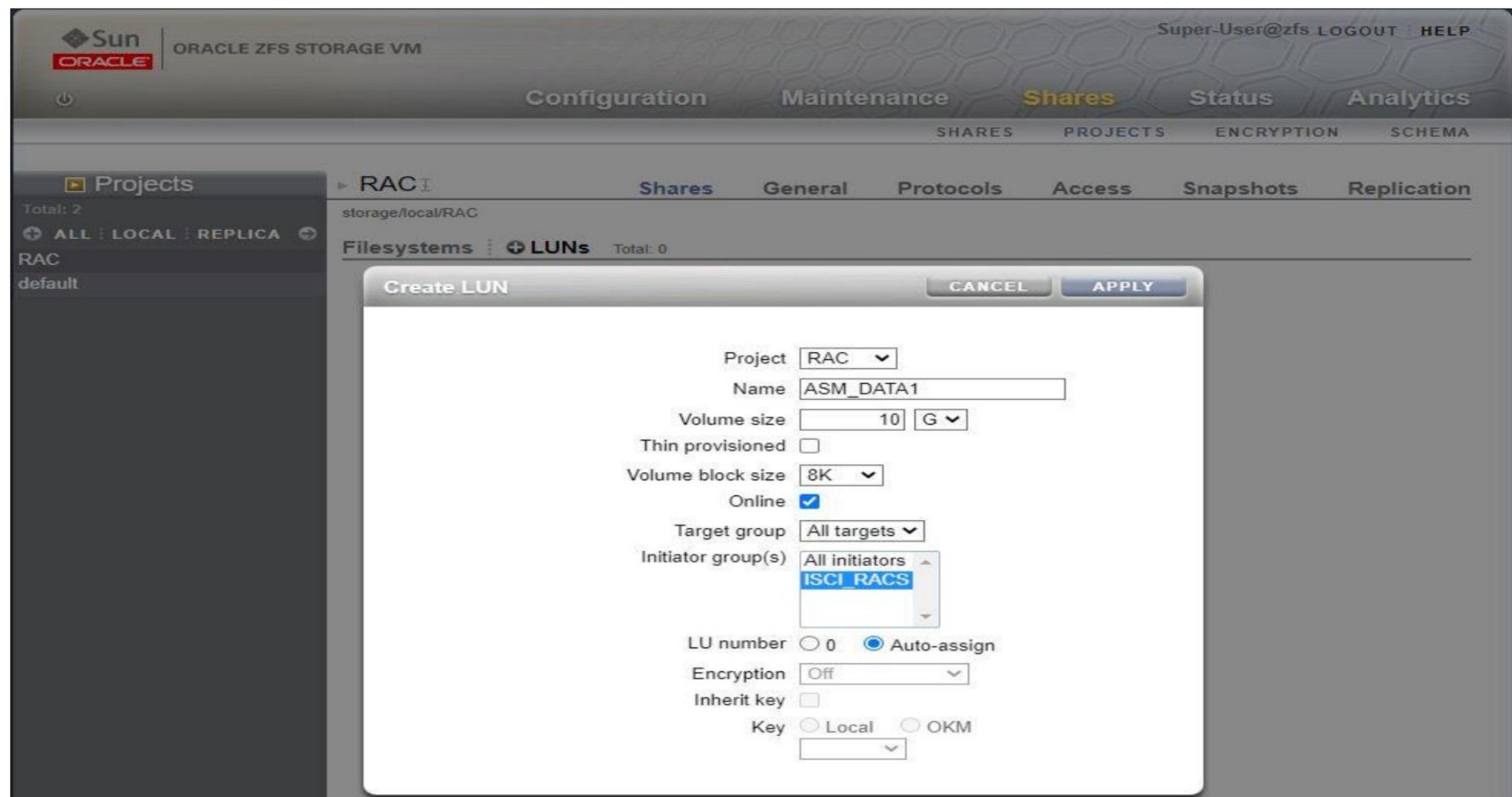
Now edit the project name for RAC and then click on APPLY.

The screenshot shows the Oracle ZFS Storage VM interface. The top navigation bar includes the Sun logo, ORACLE ZFS STORAGE VM, Super-User@zfs, LOGOUT, and HELP. Below the bar, there are tabs for Configuration, Maintenance, Shares (highlighted in yellow), Status, and Analytics. Under the Shares tab, sub-tabs include SHARES, PROJECTS, ENCRYPTION, and SCHEMA. On the left, a sidebar titled 'Projects' shows two entries: 'RAC' (selected) and 'default'. The main content area is titled 'All Projects' and shows a table with columns NAME, SIZE, CREATION, and ENCRYPTED. Two rows are listed: 'RAC' (31K, 2020-8-15 22:45:19) and 'default' (31K, 2020-8-12 12:28:05). The 'NAME' column header is highlighted with a red box.

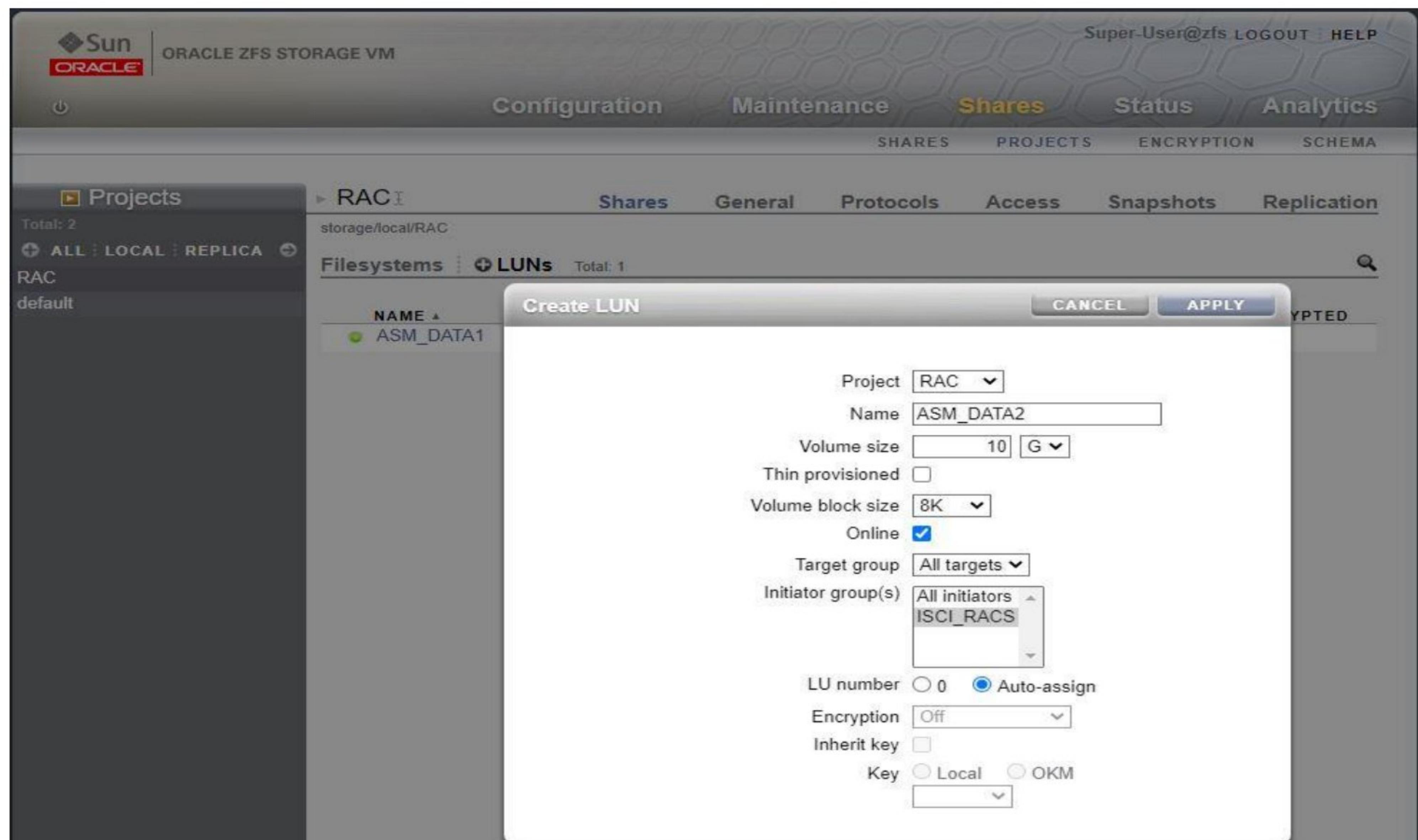
This screenshot shows the Oracle ZFS Storage VM interface with the 'RAC' project selected. The top navigation bar and tabs are identical to the previous screenshot. The main content area shows the 'RAC' project details under the 'Shares' tab. It includes tabs for Shares, General, Protocols, Access, Snapshots, and Replication. Below these tabs, there are sections for 'storage/local/RAC' and 'Filesystems'. A sub-section titled '+ LUNs' is highlighted with a red box. A message below states 'No LUNs defined. Click the + button above to add a LUN.'

Ready now that we have the project ready click on the word “LUNs” and then on the “+” next to the word Luns, so that we can create the disk volumes.

Now let's start the creation of the first volume, **ASM\_DATA1**, first select the name of the project “RAC”. After selecting the project, put the name of the volume in this case we will put it as “ASM\_DATA1”, we will set the volume size to “ 10 GB ”, the size of the block size to “ 8k ” and we will select the group “ISCI\_RACS”, after done this click on “APPLY”.

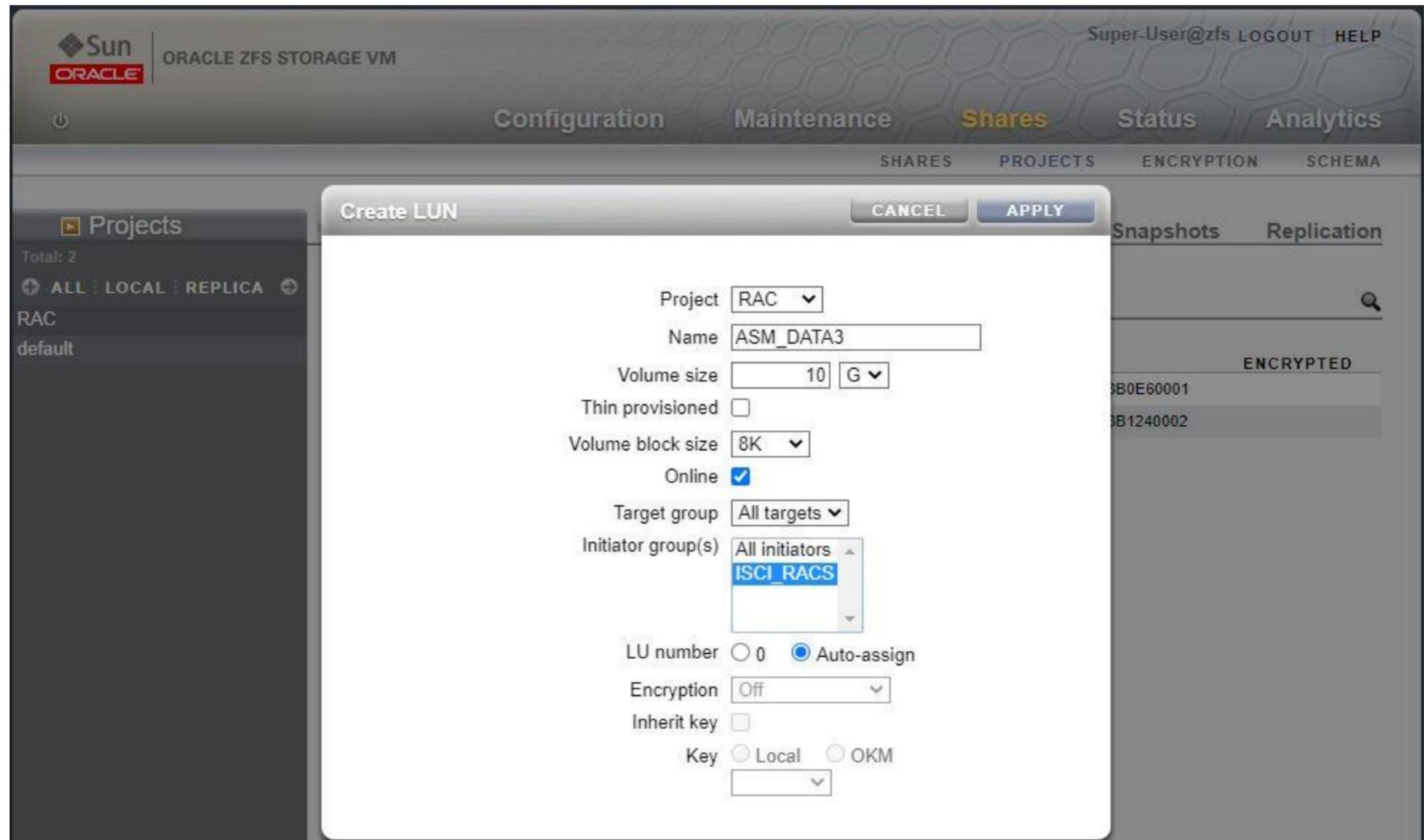


We will now repeat the steps to create the second volume, click on the word “LUNs” and then on the “+” next to the word Luns. After selecting the project, put the name of the volume in this case we will put it as “**ASM\_DATA2**”, we will set the volume size to “ 10 GB ”, the size of the block size to “ 8k ” and we will select the group “**ISCI\_RACS**”, after done this click on “APPLY”.

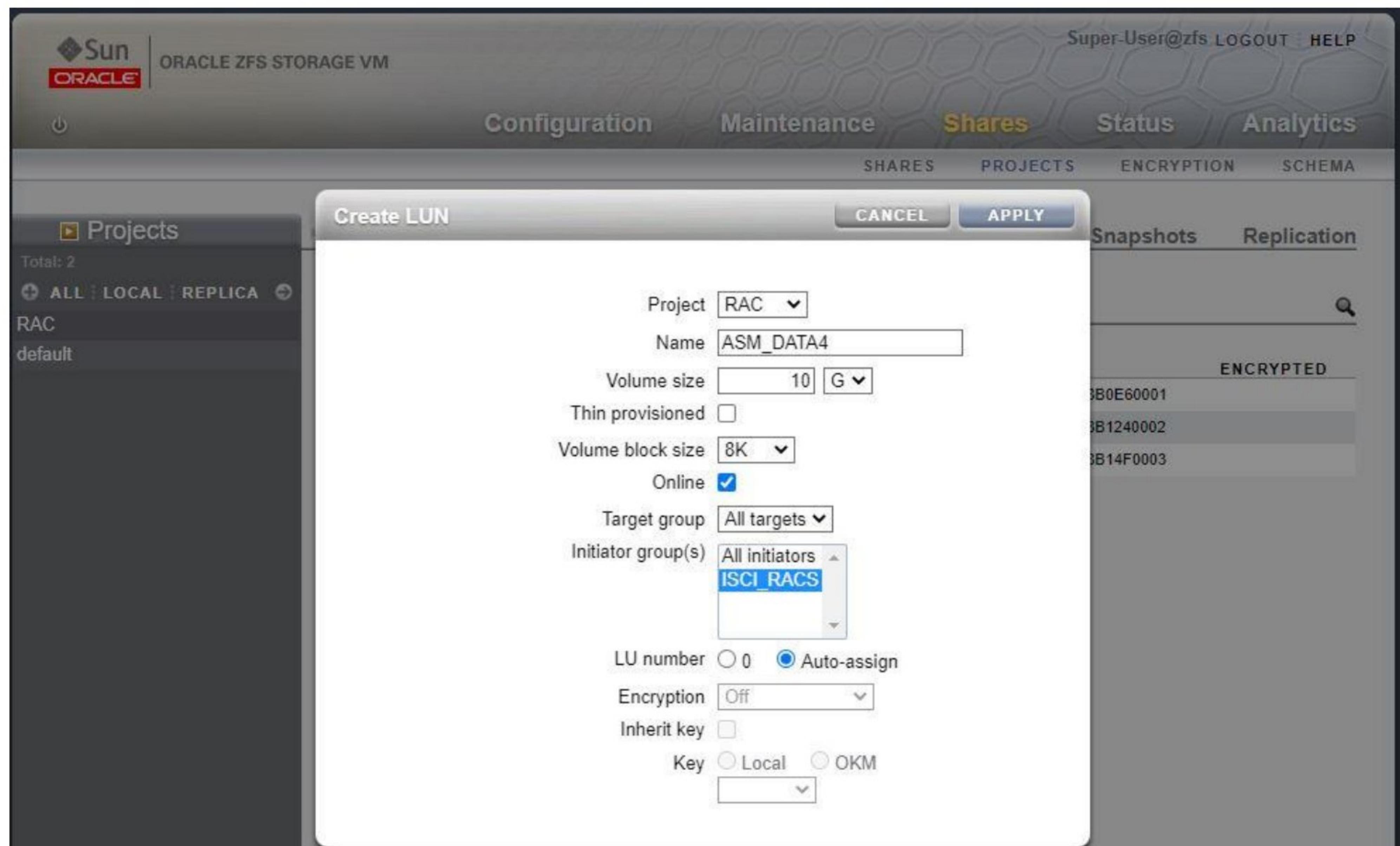


We will now repeat the steps to create the third volume, click on the word “LUNs” and then on the “+” next to the word Luns. After selecting the project, put the name of the volume in this case we will put it

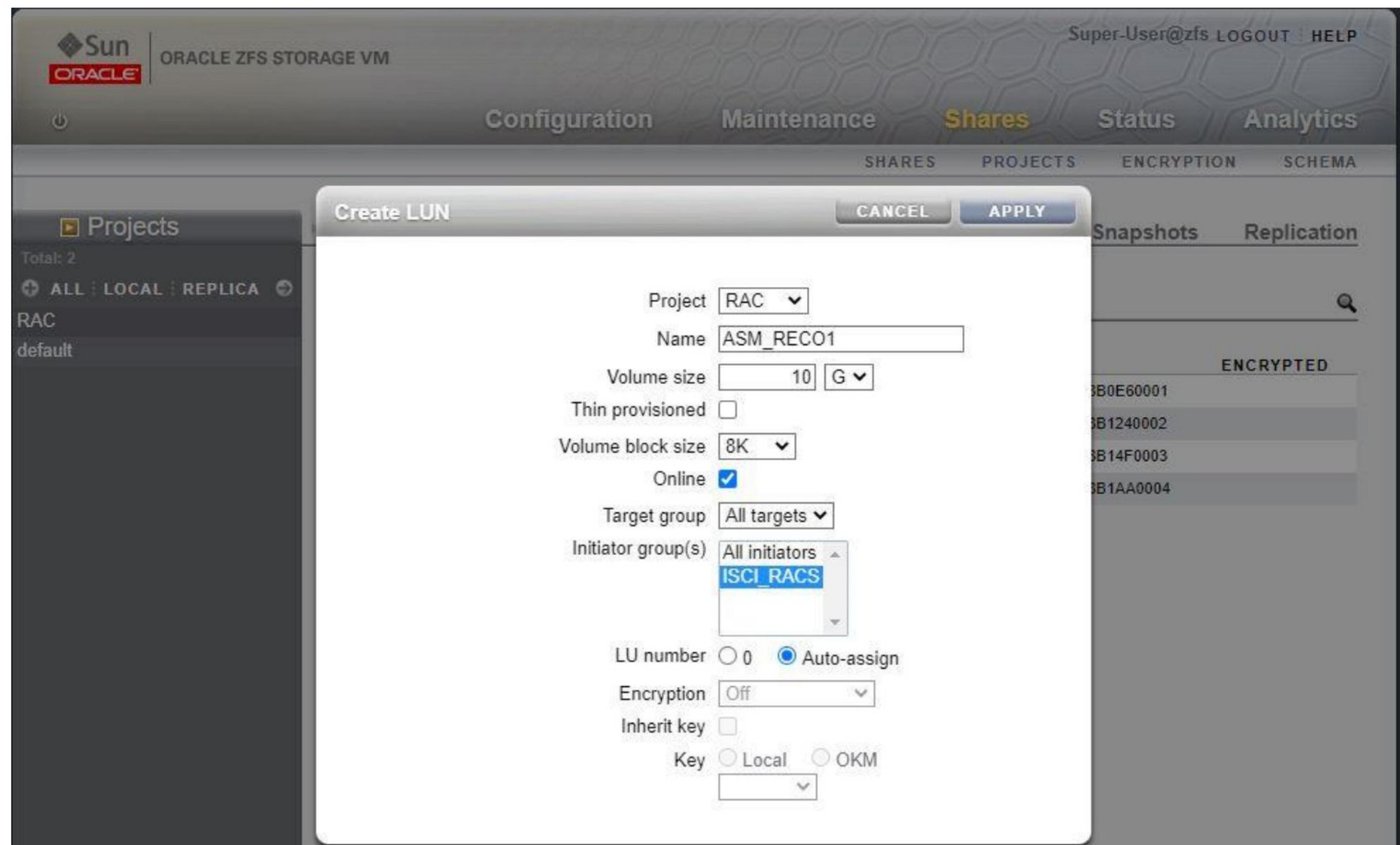
as "**ASM\_DATA3**", we will set the volume size to " 10 GB ", the size of the block size to " 8k " and we will select the group "ISCI\_RACS", after done this click on "APPLY".



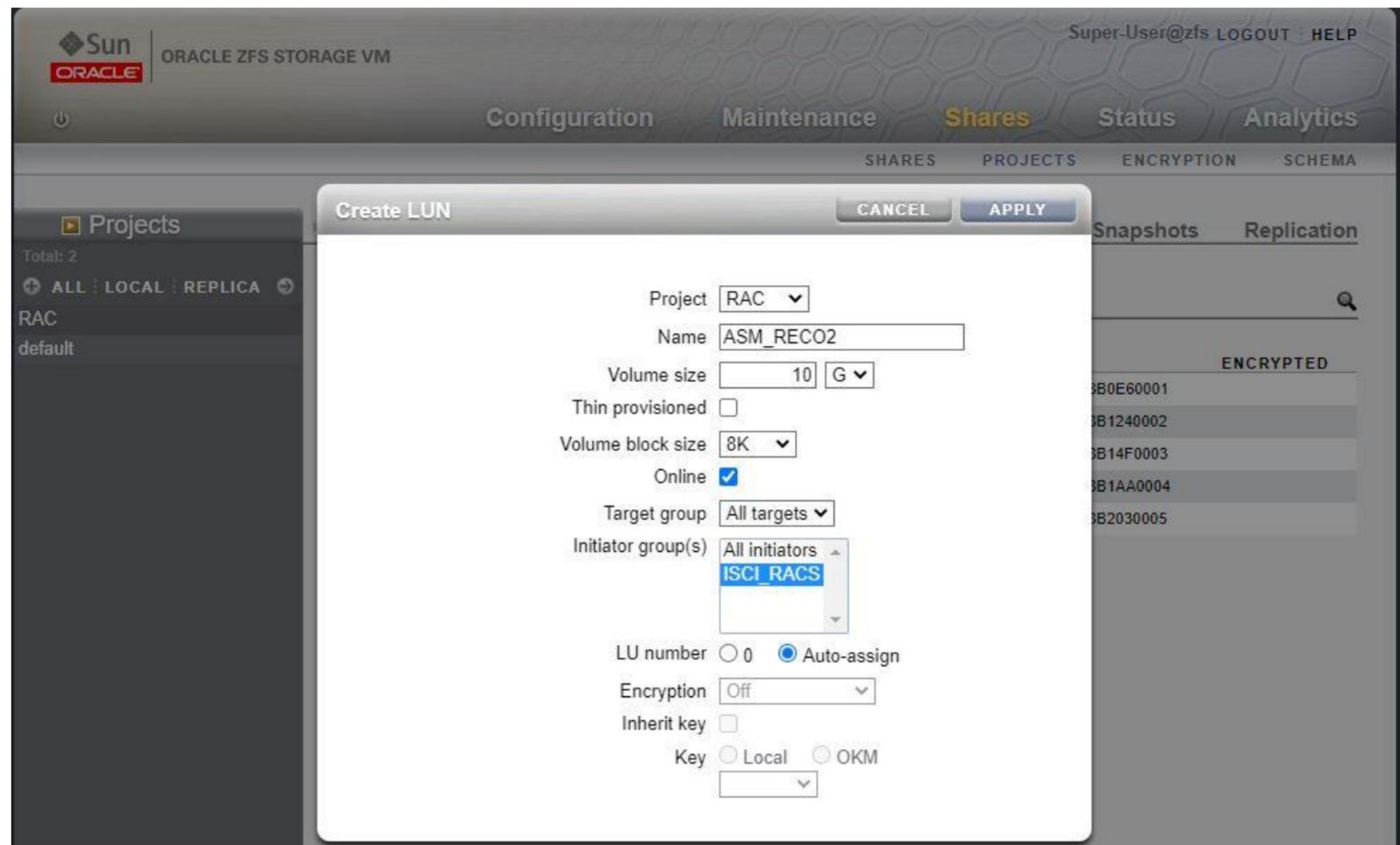
We will now repeat the steps to create the fourth volume, click on the word "LUNs" and then on the "+" next to the word Luns. After selecting the project, put the name of the volume in this case we will put it as "**ASM\_DATA4**", we will set the volume size to " 10 GB ", the block size to " 8k " and we will select the group "ISCI\_RACS", after done this click on "APPLY".



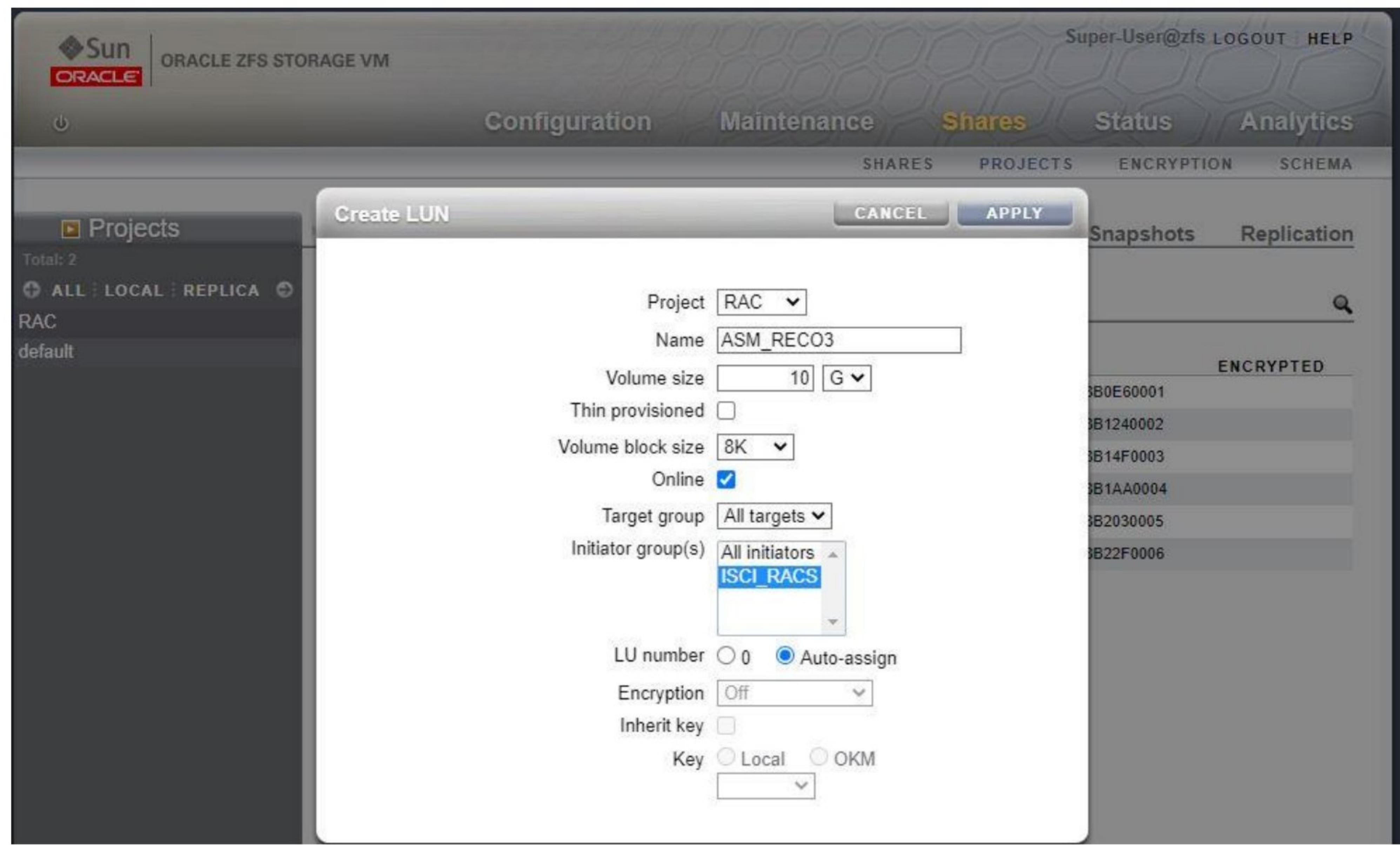
We will now repeat the steps to create the fifth volume, click on the word “LUNs” and then on the “+” next to the word Luns. After selecting the project, put the name of the volume in this case we will put it as “**ASM\_RECO1**”, we will set the volume size to “ 10 GB ”, the block size to “ 8k ” and we will select the group “ISCI\_RACS”, after done this click on “APPLY”.



We will now repeat the steps to create the sixth volume, click on the word “LUNs” and then on the “+” next to the word Luns. After selecting the project, put the name of the volume in this case we will put it as “**ASM\_RECO2**”, we will set the volume size to “ 10 GB ”, the block size to “ 8k ” and we will select the group “ISCI\_RACS”, after done this click on “APPLY”.



We will now repeat the steps to create the seventh volume, click on the word “LUNs” and then on the “+” next to the word Luns. After selecting the project, put the name of the volume in this case we will put it as “**ASM\_RECO3**”, we will set the volume size to “ 10 GB ”, the block size to “ 8k ” and we will select the group “ISCI\_RACS”, after done this click on “APPLY”.



Ready now we already have all the volumes created for us to use in Oracle RAC.

NAME	VOLSIZE	GUID	ENCRYPTED
ASM_DATA1	10G	600144F0EDC1B00B00005F38B0E60001	Encrypted
ASM_DATA2	10G	600144F0EDC1B00B00005F38B1240002	Encrypted
ASM_DATA3	10G	600144F0EDC1B00B00005F38B14F0003	Encrypted
ASM_DATA4	10G	600144F0EDC1B00B00005F38B1AA0004	Encrypted
ASM_REC01	10G	600144F0EDC1B00B00005F38B2030005	Encrypted
ASM_REC02	10G	600144F0EDC1B00B00005F38B22F0006	Encrypted
ASM_REC03	10G	600144F0EDC1B00B00005F38B2590007	Encrypted

## Installing the Oracle Linux iSCSI Initiator in cluster nodes (rac1 and rac2)

The Oracle Linux iSCSI initiator package is not installed by default so must be installed manually. The package can be installed using one of these options. Use the yum command as root to execute a text-based installation as shown:

Execute the following commands on both the nodes: rac1 and rac2

```
[root@rac1 ~]# yum install iscsi-initiator-utils
Loaded plugins: langpacks, ulninfo
ol7_UEKR3           2.5 kB 00:00:00
(1/5): ol7_UEKR3/x86_64/updateinfo   116 kB 00:00:00
ol7_latest          2.7 kB 00:00:00
(2/5): ol7_latest/x86_64/group     660 kB 00:00:00
(3/5): ol7_latest/x86_64/updateinfo 2.9 MB 00:00:02
(4/5): ol7_latest/x86_64/primary_db 35 MB 00:00:06
(5/5): ol7_UEKR3/x86_64/primary_db 66 MB 00:00:16
Resolving Dependencies
--> Running transaction check
--> Package iscsi-initiator-utils.x86_64 0:6.2.0.873-32.0.1.el7 will be updated
--> Processing Dependency: iscsi-initiator-utils = 6.2.0.873-32.0.1.el7 for package: iscsi-initiator-utils-iscsiui
ol7_UEKR3-6.2.0.873-32.0.1.el7.x86_64
--> Package iscsi-initiator-utils.x86_64 0:6.2.0.874-17.0.3.el7 will be an update
--> Running transaction check
--> Package iscsi-initiator-utils-iscsiui.x86_64 0:6.2.0.873-32.0.1.el7 will be updated
--> Package iscsi-initiator-utils-iscsiui.x86_64 0:6.2.0.874-17.0.3.el7 will be an update
--> Finished Dependency Resolution

Dependencies Resolved

=====
Package          Arch Version      Repository Size
=====
Updating:
iscsi-initiator-utils    x86_64 6.2.0.874-17.0.3.el7 ol7_latest 429 k
Updating for dependencies:
iscsi-initiator-utils-iscsiui x86_64 6.2.0.874-17.0.3.el7 ol7_latest 95 k

Transaction Summary
=====
Upgrade 1 Package (+1 Dependent package)

Total download size: 524 k
Is this ok [y/d/N]: y
Downloading packages:
No Presto metadata available for ol7_latest
warning: /var/cache/yum/x86_64/7Server/ol7_latest/packages/iscsi-initiator-utils-iscsiui-6.2.0.874-17.0.3.el7.x86_64.rpm: Header V3 RSA/SHA256 Signature, key ID ec551f03: NOKEY
Public key for iscsi-initiator-utils-iscsiui-6.2.0.874-17.0.3.el7.x86_64.rpm is not installed
(1/2): iscsi-initiator-utils-iscsiui-6.2.0.874-17.0.3.el7.x86_64.rpm | 95 kB 00:00:00
```

```
(2/2): iscsi-initiator-utils-6.2.0.874-17.0.3.el7.x86_64.rpm | 429 kB 00:00:00
```

```
-----  
Total 892 kB/s | 524 kB 00:00:00  
Retrieving key from file:///etc/pki/rpm-gpg/RPM-GPG-KEY-oracle  
Importing GPG key 0xEC551F03:  
Userid : "Oracle OSS group (Open Source Software group) <build@oss.oracle.com>"  
Fingerprint: 4214 4123 fecf c55b 9086 313d 72f9 7b74 ec55 1f03  
Package : 7:oraclelinux-release-7.2-1.0.5.el7.x86_64 (@anaconda/7.2)  
From : /etc/pki/rpm-gpg/RPM-GPG-KEY-oracle
```

**Is this ok [y/N]: y**

Running transaction check

Running transaction test

Transaction test succeeded

Running transaction

```
Updating : iscsi-initiator-utils-6.2.0.874-17.0.3.el7.x86_64 1/4  
Updating : iscsi-initiator-utils-iscsiuiio-6.2.0.874-17.0.3.el7.x86_64 2/4  
Cleanup : iscsi-initiator-utils-6.2.0.873-32.0.1.el7.x86_64 3/4  
Cleanup : iscsi-initiator-utils-iscsiuiio-6.2.0.873-32.0.1.el7.x86_64 4/4  
Verifying : iscsi-initiator-utils-iscsiuiio-6.2.0.874-17.0.3.el7.x86_64 1/4  
Verifying : iscsi-initiator-utils-6.2.0.874-17.0.3.el7.x86_64 2/4  
Verifying : iscsi-initiator-utils-iscsiuiio-6.2.0.873-32.0.1.el7.x86_64 3/4  
Verifying : iscsi-initiator-utils-6.2.0.873-32.0.1.el7.x86_64 4/4
```

Updated:

iscsi-initiator-utils.x86\_64 0:6.2.0.874-17.0.3.el7

Dependency Updated:

iscsi-initiator-utils-iscsiuiio.x86\_64 0:6.2.0.874-17.0.3.el7

Complete!

[root@rac1 ~]#

```
[root@rac1 ~]# chkconfig iscsi on  
Note: Forwarding request to 'systemctl enable iscsi.service'.  
Created symlink from /etc/systemd/system/remote-fs.target.wants/iscsi.service to  
/usr/lib/systemd/system/iscsi.service.  
[root@rac1 ~]#
```

```
[root@rac1 ~]# chkconfig iscsid on  
Note: Forwarding request to 'systemctl enable iscsid.service'.  
Created symlink from /etc/systemd/system/multi-user.target.wants/iscsid.service to  
/usr/lib/systemd/system/iscsid.service.
```

```
[root@rac1 ~]# systemctl list-dependencies iscsi  
iscsi.service  
● └─iscsi-shutdown.service  
● └─iscsid.service  
● └─system.slice  
● └─remote-fs-pre.target  
[root@rac1 ~]#
```

```
[root@rac1 ~]# systemctl list-dependencies iscsid
iscsid.service
● └─system.slice
[root@rac1 ~]#
[root@rac1 ~]# service iscsi start
Redirecting to /bin/systemctl start iscsi.service
[root@rac1 ~]# service iscsid start
Redirecting to /bin/systemctl start iscsid.service
```

**Note: Repeat the same commands in another cluster node (rac2)**

### Identifying the Host IQN for cluster nodes

Now we are going to identify the HOST IQN, so that we can inform Oracle ZFS which machines will identify the LUNS of the environment.

```
[root@rac1 ~]# cat /etc/iscsi/initiatorname.iscsi
InitiatorName=iqn.1988-12.com.oracle:e7a57ff151db
[root@rac1 ~]#
```

```
[root@rac2 ~]# cat /etc/iscsi/initiatorname.iscsi
InitiatorName=iqn.1988-12.com.oracle:e7a57ff151db
[root@rac2 ~]#
```

**Note: If HOST IQN then use the following method to change**

```
[root@rac2 ~]# mv /etc/iscsi/initiatorname.iscsi /var/tmp/initiatorname.iscsi.backup
[root@rac2 ~]#
[root@rac2 ~]# echo "InitiatorName=`/sbin/iscsi-iname`" > /etc/iscsi/initiatorname.iscsi
[root@rac2 ~]#
[root@rac2 ~]# cat /etc/iscsi/initiatorname.iscsi
InitiatorName=iqn.1988-12.com.oracle:aaea2b108131
[root@rac2 ~]#
[root@rac2 ~]# service iscsi start
Redirecting to /bin/systemctl start iscsi.service
[root@rac2 ~]#
[root@rac2 ~]# service iscsid start
Redirecting to /bin/systemctl start iscsid.service
[root@rac2 ~]#
[root@rac2 ~]# cat /etc/iscsi/initiatorname.iscsi
InitiatorName=iqn.1988-12.com.oracle:aaea2b108131
[root@rac2 ~]#
```

As information on the installation that you will perform the InitiatorName will be different than this documentation, as it generates this identifier during the installation of iscsi-initiator.

Make a note of these identifiers, as they will be necessary for our use.

## Setting up CHAP Authentication

These settings must be made on both servers.

To configure CHAP authentication, edit the /etc/iscsi/iscsid.conf file to make the following changes:

To enable CHAP authentication, remove the # character at the beginning of the following line:

**node.session.auth.authmethod = CHAP**

To set the CHAP username and password, complete the following steps:

Edit the lines that define the CHAP username and password to remove the # character from the beginning of these lines:

**node.session.auth.username = username**

**node.session.auth.password = password**

Change username to the IQN we found. For this example, the username is:

iqn.1988-12.com.oracle:e7a57ff151db - RAC1

iqn.1988-12.com.oracle:aaea2b108131 - RAC2

The configuration should look like this on RAC1.

**node.session.auth.username = iqn.1988-12.com.oracle:e7a57ff151db**

**node.session.auth.password = CHAPsecret14**

The configuration should look like this on RAC2.

**node.session.auth.username = iqn.1988-12.com.oracle:aaea2b108131**

**node.session.auth.password = CHAPsecret14**

After that we must change the username and password so that we can start the transaction with Oracle ZFS.

Removing the # character in front of the following lines:

**node.session.auth.username\_in = username**

**node.session.auth.password\_in = password**

Define the username and password that will be used.

**node.session.auth.username\_in = chapuser**

**node.session.auth.password\_in = CHAPsecret22**

After making these changes on both servers, save the files.

## Configuring the Oracle ZFS Storage Appliance Using the Browser User Interface

As a unified storage platform, the Oracle ZFS Storage Appliance supports access to block protocol LUNs using iSCSI and Fibre Channel protocols. This section describes how to use the Oracle ZFS Storage Appliance BUI to configure the Oracle ZFS Storage Appliance to recognize the Oracle Linux host and present iSCSI LUNs to it.

A “Target Group” is created on the Oracle ZFS Storage Appliance to define the ports and the protocol by which the LUN will be presented to the Oracle Linux server.

Login to Oracle ZFS Storage using administrator user (root) through web browser using the following URL (The following URL we have got through after installation of Oracle ZFS Storage).

<https://192.168.2.150:215>

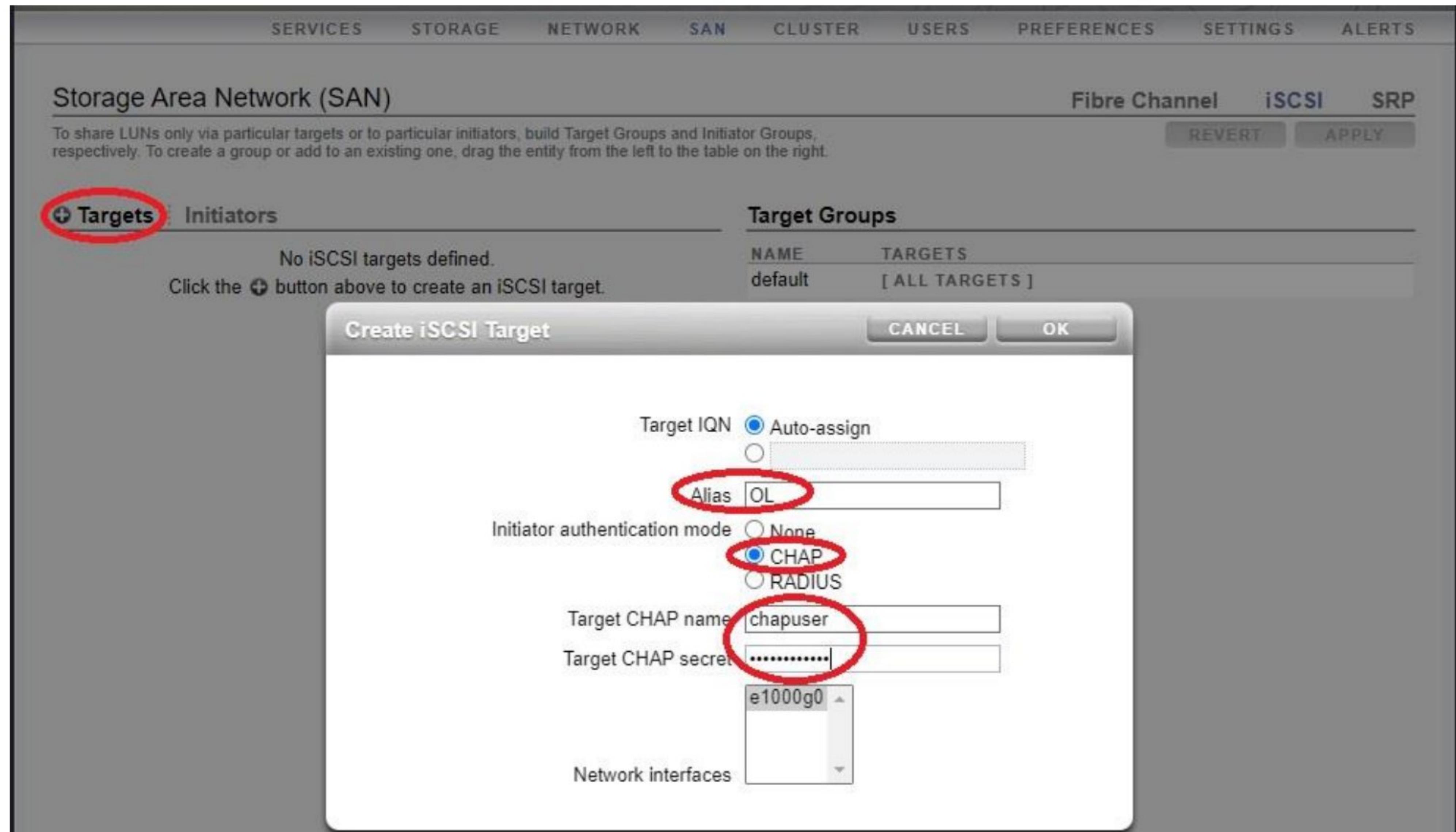


Enter the root user and oracle password and click on “LOGIN”

After logging in, click on “CONFIGURATION”, then click on “SAN”, select the option “iSCSI” and finally click on “TARGET”.



After doing this, click on the “+” sign next to the word target to add the settings below.



In the ALIAS field, define an alias for this TARGET, as shown in the image above, I defined it as “OL”. Then define the authentication method, which is the CHAP type.

In the item Target CHAP name and CHAP secret, the information must be the same as that configured in ISCSID.CONF

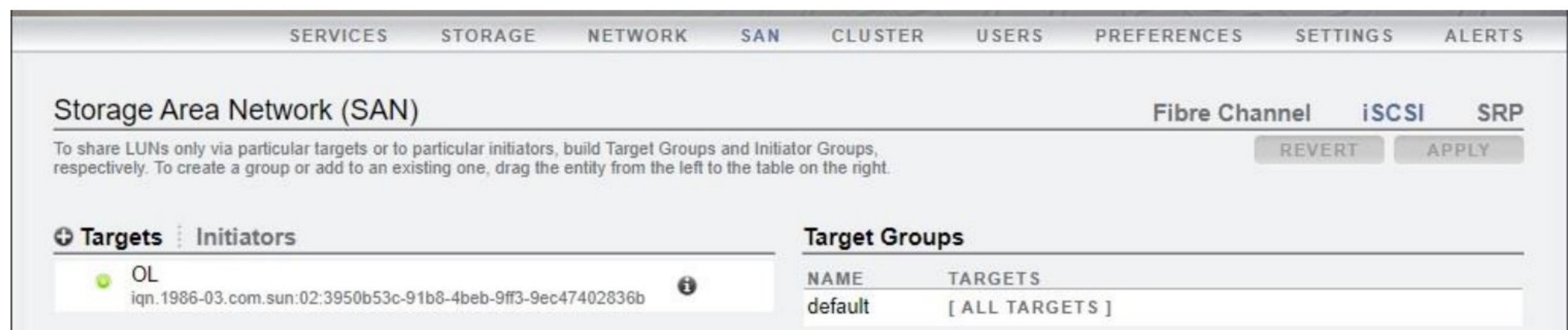
Target CHAP NAME = **chapuser**

Target CHAP SECRET = **CHAPsecret22**

After completing the configuration, click OK.

Well let's move the target created to the Targets Group, place the cursor on the entry that was created for the iSCSI Targets.

The movement icon appears to the left of the entrance, as shown in the image below.



Move to the Target Group, the Target created as shown below

NAME	TARGETS
default	[ ALL TARGETS ]
targets-0	iqn.1986-03.com.sun:02:3950b53c-91b8-4beb-9ff3-9ec47402836b

After making the move, click on a pencil button to edit the Target name to change the identification. Now edit the iSCSI initiator name for ZFS and click OK.

NAME	TARGETS
default	[ ALL TARGETS ]
ZFS	iqn.1986-03.com.sun:02:3950b53c-91b8-4beb-9ff3-9ec47402836b

Ready now we already have our Target, configured so that the servers have access to Oracle ZFS storage. To save this configuration, click on “APPLY”.

### Configuring Initiators on Oracle ZFS

An “iSCSI initiator” is defined to restrict which servers have access to a given volume. If more than one host can write to a given volume simultaneously, inconsistency in the file system cache between hosts can cause disk image corruption.

To identify the Oracle Linux server for Oracle ZFS Storage Appliance, the iSCSI initiator must be registered, as we will now do.

Click on “CONFIGURATION”, then click on “SAN”, select the option “iSCSI” and finally click on “INITIATORS”.

After doing this click on the “+” sign next to the word Initiators to add the settings below.

The configuration should look like this on RAC1.

**Initiator CHAP name = iqn.1988-12.com.oracle:e7a57ff151db**

**Initiator CHAP secret = CHAPsecret14**

After completing the configuration, click OK.

After doing this, click again on the “+” sign next to the word Initiators to add the second node with the settings below

The configuration should look like this on RAC2.

Initiator CHAP name = **iqn.1988-12.com.oracle:aaea2b108131**

Initiator CHAP secret = **CHAPsecret14**

After completing the configuration, click OK.

Ready we already have the initiators of the servers that will be part of Oracle RAC and will access the storage volumes.

Well let's move the initiators created for the Initiators Group, place the cursor over the entry that was created for the Initiators.

The movement icon appears to the left of the entrance, as shown in the image below.

Move to Initiators RAC1 and then RAC2 to Group the Initiators as shown below. You can under initiator Groups (Initiators-0 and Initiators-1).

SERVICES STORAGE NETWORK SAN CLUSTER USERS PREFERENCES SETTINGS ALERTS

### Storage Area Network (SAN)

To share LUNs only via particular targets or to particular initiators, build Target Groups and Initiator Groups, respectively. To create a group or add to an existing one, drag the entity from the left to the table on the right.

**Targets**  **Initiators**

RAC1 iqn.1988-12.com.oracle:e7a57ff151db
RAC2 iqn.1988-12.com.oracle:aaea2b108131

**Initiator Groups**

NAME	INITIATORS
default	[ ALL INITIATORS ]
initiators-0	iqn.1988-12.com.oracle:e7a57ff151db
initiators-1	iqn.1988-12.com.oracle:aaea2b108131

Fibre Channel iSCSI SRP REVERT APPLY

Ready should look like the image below, now let's edit the group and give it a name. After making the move, click on a pencil button to edit the Target name to change the identification.

SERVICES STORAGE NETWORK SAN CLUSTER USERS PREFERENCES SETTINGS ALERTS

### Storage Area Network (SAN)

To share LUNs only via particular targets or to particular initiators, build Target Groups and Initiator Groups, respectively. To create a group or add to an existing one, drag the entity from the left to the table on the right.

**Targets**  **Initiators**

RAC1 iqn.1988-12.com.oracle:e7a57ff151db
RAC2 iqn.1988-12.com.oracle:aaea2b108131

**Initiator Groups**

NAME	INITIATORS
default	[ ALL INITIATORS ]
initiators-0	iqn.1988-12.com.oracle:e7a57ff151db
initiators-1	iqn.1988-12.com.oracle:aaea2b108131

Name

**Initiators**

iqn.1988-12.com.oracle:aaea2b108131  
 iqn.1988-12.com.oracle:e7a57ff151db

CANCEL OK

REVERT APPLY

SERVICES STORAGE NETWORK SAN CLUSTER USERS PREFERENCES SETTINGS ALERTS

### Storage Area Network (SAN)

To share LUNs only via particular targets or to particular initiators, build Target Groups and Initiator Groups, respectively. To create a group or add to an existing one, drag the entity from the left to the table on the right.

**Targets**  **Initiators**

RAC1 iqn.1988-12.com.oracle:e7a57ff151db
RAC2 iqn.1988-12.com.oracle:aaea2b108131

**Initiator Groups**

NAME	INITIATORS
default	[ ALL INITIATORS ]
ISCI_RACS	iqn.1988-12.com.oracle:aaea2b108131 iqn.1988-12.com.oracle:e7a57ff151db
initiators-1	iqn.1988-12.com.oracle:aaea2b108131

Fibre Channel iSCSI SRP REVERT APPLY

Note: Please remove "Initiators-1" after making the group "ISCI\_RACS".

SERVICES STORAGE NETWORK SAN CLUSTER USERS PREFERENCES SETTINGS ALERTS

### Storage Area Network (SAN)

To share LUNs only via particular targets or to particular initiators, build Target Groups and Initiator Groups, respectively. To create a group or add to an existing one, drag the entity from the left to the table on the right.

Targets		Initiators	
RAC1 iqn.1988-12.com.oracle:e7a57ff151db		NAME	INITIATORS
RAC2 iqn.1988-12.com.oracle:aaea2b108131		default	[ ALL INITIATORS ]
		ISCI_RACS	iqn.1988-12.com.oracle:aaea2b108131 iqn.1988-12.com.oracle:e7a57ff151db

**Fibre Channel iSCSI SRP**

REVERT APPLY

Ready now we already have our Initiators configured, so that the servers have access to the same volume of disks. To save this configuration, click on “APPLY”.

SERVICES STORAGE NETWORK SAN CLUSTER USERS PREFERENCES SETTINGS ALERTS

### Available Pools

About Storage Configuration  
Storage is configured in pools that are characterized by their underlying data redundancy, and provide space that is shared across all filesystems and LUNs.

During the configuration process, you will select which devices to allocate to a storage pool and the redundancy profile most appropriate to your workload, balancing performance, availability, and capacity.

Importing storage will search all devices attached to the system for existing pool configurations, from which you can select one as the system pool. This option is used to migrate pools between systems, and in some cases can recover pools that were destroyed inadvertently.

DATA PROFILE LOG PROFILE STATUS ERRORS ENCRYPTED

storage	Striped	-	Online	0
---------	---------	---	--------	---

**Allocation**

Pool Name: storage  
Data Profile: Striped  
Log Profile: -  
Pool Status: Online  
Data Errors: No known persistent errors  
Scrub Schedule: Off  
Scrub Status: Never scrubbed

**Device Status**

No device faults have been detected in the storage pool.

**Pool name:** ZFS-pool

**CANCEL** **APPLY**

Each storage pool is identified by a unique name. Please enter the name that will be used to identify this storage pool.

Data + Reserve: 15 disks  
Spare: 0 disks  
Log: 0 disks  
Cache: 0 disks  
Meta: 0 disks

Data: 73.4G  
Reserve: 1.63G

## Configuring volumes on servers

Now that the LUNs are prepared and available for iSCSI, the LUN must be configured for use by the Oracle Linux server, by performing the following steps:

We must perform these steps on the two Oracle RAC servers. First, we must create an entry in /etc/hosts to not need DNS. Edit the /etc/hosts file and include the following entry on both servers.

**192.168.2.150 zfs.localdomain zfs**

```
[root@rac1 ~]# cat /etc/hosts
127.0.0.1      localhost localhost.localdomain localhost4 localhost4.localdomain4
::1            localhost localhost.localdomain localhost6 localhost6.localdomain6

#rac1 - Public, Private and VIP
192.168.2.100    rac1.localdomain        rac1
10.1.4.10        rac1-priv.localdomain   rac1-priv
192.168.2.110    rac1-vip.localdomain    rac1-vip

#rac2 - Public, Private and VIP
192.168.2.200    rac2.localdomain        rac2
10.1.4.20        rac2-priv.localdomain   rac2-priv
192.168.2.210    rac2-vip.localdomain    rac2-vip

#SCAN IPs
192.168.2.10     racp-scan.localdomain   racp-scan
192.168.2.20     racp-scan.localdomain   racp-scan
192.168.2.30     racp-scan.localdomain   racp-scan

#Oracle ZFS Storage
192.168.2.150      zfs.localdomain      zfs
[root@rac1 ~]#
```

```
[root@rac2 ~]# cat /etc/hosts
127.0.0.1      localhost localhost.localdomain localhost4 localhost4.localdomain4
::1            localhost localhost.localdomain localhost6 localhost6.localdomain6

#rac1 - Public, Private and VIP
192.168.2.100    rac1.localdomain        rac1
10.1.4.10        rac1-priv.localdomain   rac1-priv
192.168.2.110    rac1-vip.localdomain    rac1-vip

#rac2 - Public, Private and VIP
192.168.2.200    rac2.localdomain        rac2
10.1.4.20        rac2-priv.localdomain   rac2-priv
192.168.2.210    rac2-vip.localdomain    rac2-vip

#SCAN IPs
```

```
192.168.2.10      racp-scan.localdomain      racp-scan
192.168.2.20      racp-scan.localdomain      racp-scan
192.168.2.30      racp-scan.localdomain      racp-scan
```

```
#Oracle ZFS Storage
192.168.2.150      zfs.localdomain      zfs
[root@rac2 ~]#
```

After the inclusion in the hosts file of the two servers, save the files and execute the commands below in red.

### Formatting the LUNs - RAC1

```
[root@rac1 ~]# service iscsi start
Redirecting to /bin/systemctl start iscsi.service
[root@rac1 ~]#
```

```
[root@rac1 ~]# iscsadm -m discovery -t sendtargets -p zfs
192.168.2.150:3260,2 iqn.1986-03.com.sun:02:c8fe1586-0fb9-42e3-a603-fc5323a59181
[root@rac1 ~]#
```

```
[root@rac1 ~]# iscsadm -m node -p zfs -l
Logging in to [iface: default, target: iqn.1986-03.com.sun:02:c8fe1586-0fb9-42e3-a603-fc5323a59181,
portal: 192.168.2.150,3260] (multiple)
Login to [iface: default, target: iqn.1986-03.com.sun:02:c8fe1586-0fb9-42e3-a603-fc5323a59181, portal:
192.168.2.150,3260] successful.
[root@rac1 ~]#
```

```
[root@rac1 ~]# ls -l /dev/sd?
brw-rw----. 1 root disk 8,  0 Aug 15 20:45 /dev/sda
brw-rw----. 1 root disk 8, 16 Aug 15 23:57 /dev/sdb
brw-rw----. 1 root disk 8, 32 Aug 15 23:57 /dev/sdc
brw-rw----. 1 root disk 8, 48 Aug 15 23:57 /dev/sdd
brw-rw----. 1 root disk 8, 64 Aug 15 23:57 /dev/sde
brw-rw----. 1 root disk 8, 80 Aug 15 23:57 /dev/sdf
brw-rw----. 1 root disk 8, 96 Aug 15 23:57 /dev/sdg
brw-rw----. 1 root disk 8, 112 Aug 15 23:57 /dev/sdh
[root@rac1 ~]#
```

```
[root@rac1 ~]# fdisk -l
```

```
Disk /dev/sda: 107.4 GB, 107374182400 bytes, 209715200 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk label type: dos
Disk identifier: 0x0002661e
```

Device	Boot	Start	End	Blocks	Id	System
/dev/sda1	*	2048	1026047	512000	83	Linux
/dev/sda2		1026048	209715199	104344576	8e	Linux LVM

Disk /dev/mapper/ol\_oel72-root: 53.7 GB, 53687091200 bytes, 104857600 sectors  
Units = sectors of 1 \* 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 512 bytes / 512 bytes

Disk /dev/mapper/ol\_oel72-swap: 5301 MB, 5301600256 bytes, 10354688 sectors  
Units = sectors of 1 \* 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 512 bytes / 512 bytes

Disk /dev/mapper/ol\_oel72-home: 47.8 GB, 47789899776 bytes, 93339648 sectors  
Units = sectors of 1 \* 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 512 bytes / 512 bytes

Disk /dev/sdb: 10.7 GB, 10737418240 bytes, 20971520 sectors  
Units = sectors of 1 \* 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 8192 bytes / 8192 bytes

Disk /dev/sdc: 10.7 GB, 10737418240 bytes, 20971520 sectors  
Units = sectors of 1 \* 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 8192 bytes / 8192 bytes

Disk /dev/sdd: 10.7 GB, 10737418240 bytes, 20971520 sectors  
Units = sectors of 1 \* 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 8192 bytes / 8192 bytes

Disk /dev/sde: 10.7 GB, 10737418240 bytes, 20971520 sectors  
Units = sectors of 1 \* 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 8192 bytes / 8192 bytes

Disk /dev/sdf: 10.7 GB, 10737418240 bytes, 20971520 sectors  
Units = sectors of 1 \* 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 8192 bytes / 8192 bytes

Disk /dev/sdg: 10.7 GB, 10737418240 bytes, 20971520 sectors  
Units = sectors of 1 \* 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes

```
I/O size (minimum/optimal): 8192 bytes / 8192 bytes
Disk /dev/sdh: 10.7 GB, 10737418240 bytes, 20971520 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 8192 bytes / 8192 bytes
```

```
[root@rac1 ~]#
[root@rac1 ~]# fdisk /dev/sdb
Welcome to fdisk (util-linux 2.23.2).
```

Changes will remain in memory only, until you decide to write them.  
Be careful before using the write command.

Device does not contain a recognized partition table  
Building a new DOS disklabel with disk identifier 0xd28413a5.

```
Command (m for help): n
Partition type:
 p primary (0 primary, 0 extended, 4 free)
 e extended
Select (default p): p
Partition number (1-4, default 1): 1
First sector (2048-20971519, default 2048):
Using default value 2048
Last sector, +sectors or +size{K,M,G} (2048-20971519, default 20971519):
Using default value 20971519
Partition 1 of type Linux and of size 10 GiB is set
```

```
Command (m for help): w
The partition table has been altered!
```

```
Calling ioctl() to re-read partition table.
Syncing disks.
[root@rac1 ~]#
[root@rac1 ~]# fdisk /dev/sdc
Welcome to fdisk (util-linux 2.23.2).
```

Changes will remain in memory only, until you decide to write them.  
Be careful before using the write command.

Device does not contain a recognized partition table  
Building a new DOS disklabel with disk identifier 0x6e30eb70.

```
Command (m for help): n
Partition type:
 p primary (0 primary, 0 extended, 4 free)
 e extended
Select (default p): p
```

```
Partition number (1-4, default 1): 1
First sector (2048-20971519, default 2048):
Using default value 2048
Last sector, +sectors or +size{K,M,G} (2048-20971519, default 20971519):
Using default value 20971519
Partition 1 of type Linux and of size 10 GiB is set
```

```
Command (m for help): w
The partition table has been altered!
```

```
Calling ioctl() to re-read partition table.
Syncing disks.
[root@rac1 ~]#
[root@rac1 ~]# fdisk /dev/sdd
Welcome to fdisk (util-linux 2.23.2).
```

```
Changes will remain in memory only, until you decide to write them.
Be careful before using the write command.
```

```
Device does not contain a recognized partition table
Building a new DOS disklabel with disk identifier 0x36e02eeb.
```

```
Command (m for help): n
Partition type:
 p primary (0 primary, 0 extended, 4 free)
 e extended
Select (default p): p
Partition number (1-4, default 1): 1
First sector (2048-20971519, default 2048):
Using default value 2048
Last sector, +sectors or +size{K,M,G} (2048-20971519, default 20971519):
Using default value 20971519
Partition 1 of type Linux and of size 10 GiB is set
```

```
Command (m for help): w
The partition table has been altered!
```

```
Calling ioctl() to re-read partition table.
Syncing disks.
[root@rac1 ~]#
[root@rac1 ~]# fdisk /dev/sde
Welcome to fdisk (util-linux 2.23.2).
```

```
Changes will remain in memory only, until you decide to write them.
Be careful before using the write command.
```

```
Device does not contain a recognized partition table
Building a new DOS disklabel with disk identifier 0x7cc1c380.
```

```
Command (m for help): n
Partition type:
  p  primary (0 primary, 0 extended, 4 free)
  e  extended
Select (default p): p
Partition number (1-4, default 1): 1
First sector (2048-20971519, default 2048):
Using default value 2048
Last sector, +sectors or +size{K,M,G} (2048-20971519, default 20971519):
Using default value 20971519
Partition 1 of type Linux and of size 10 GiB is set
```

```
Command (m for help): w
The partition table has been altered!
```

```
Calling ioctl() to re-read partition table.
Syncing disks.
[root@rac1 ~]#
[root@rac1 ~]# fdisk /dev/sdf
Welcome to fdisk (util-linux 2.23.2).
```

```
Changes will remain in memory only, until you decide to write them.
Be careful before using the write command.
```

```
Device does not contain a recognized partition table
Building a new DOS disklabel with disk identifier 0x754bc898.
```

```
Command (m for help): n
Partition type:
  p  primary (0 primary, 0 extended, 4 free)
  e  extended
Select (default p): p
Partition number (1-4, default 1): 1
First sector (2048-20971519, default 2048):
Using default value 2048
Last sector, +sectors or +size{K,M,G} (2048-20971519, default 20971519):
Using default value 20971519
Partition 1 of type Linux and of size 10 GiB is set
```

```
Command (m for help): w
The partition table has been altered!
```

```
Calling ioctl() to re-read partition table.
Syncing disks.
[root@rac1 ~]#
[root@rac1 ~]# fdisk /dev/sdg
Welcome to fdisk (util-linux 2.23.2).
```

Changes will remain in memory only, until you decide to write them.  
Be careful before using the write command.

Device does not contain a recognized partition table  
Building a new DOS disklabel with disk identifier 0x5e696479.

Command (m for help): n  
Partition type:  
p primary (0 primary, 0 extended, 4 free)  
e extended  
Select (default p): p  
Partition number (1-4, default 1): 1  
First sector (2048-20971519, default 2048):  
Using default value 2048  
Last sector, +sectors or +size{K,M,G} (2048-20971519, default 20971519):  
Using default value 20971519  
Partition 1 of type Linux and of size 10 GiB is set

Command (m for help): w  
The partition table has been altered!

Calling ioctl() to re-read partition table.  
Syncing disks.  
[root@rac1 ~]#  
[root@rac1 ~]# fdisk /dev/sdh  
Welcome to fdisk (util-linux 2.23.2).

Changes will remain in memory only, until you decide to write them.  
Be careful before using the write command.

Device does not contain a recognized partition table  
Building a new DOS disklabel with disk identifier 0x12f5cf35.

Command (m for help): n  
Partition type:  
p primary (0 primary, 0 extended, 4 free)  
e extended  
Select (default p): p  
Partition number (1-4, default 1): 1  
First sector (2048-20971519, default 2048):  
Using default value 2048  
Last sector, +sectors or +size{K,M,G} (2048-20971519, default 20971519):  
Using default value 20971519  
Partition 1 of type Linux and of size 10 GiB is set

Command (m for help): w  
The partition table has been altered!

Calling ioctl() to re-read partition table.

Syncing disks.

[root@rac1 ~]#

[root@rac1 ~]# partprobe

[root@rac1 ~]#

```
[root@rac1 ~]# yum install oracleasm-support oracleasmlib oracleasm
```

Loaded plugins: langpacks, ulninfo

No package oracleasmlib available.

Resolving Dependencies

--> Running transaction check

--> Package kernel-uek.x86\_64 0:3.8.13-118.48.1.el7uek will be installed

--> Processing Dependency: kernel-firmware = 3.8.13-118.48.1.el7uek for package: kernel-uek-3.8.13-118.48.1.el7uek.x86\_64

--> Package oracleasm-support.x86\_64 0:2.1.11-2.el7 will be installed

--> Running transaction check

--> Package kernel-uek-firmware.noarch 0:3.8.13-118.48.1.el7uek will be installed

--> Finished Dependency Resolution

Dependencies Resolved

```
=====
Package      Arch   Version       Repository  Size
=====
Installing:
kernel-uek      x86_64  3.8.13-118.48.1.el7uek  ol7_UEKR3   33 M
kernel-uek-firmware noarch  3.8.13-118.48.1.el7uek  ol7_UEKR3   2.2 M
oracleasm-support x86_64  2.1.11-2.el7      ol7_latest   85 k
```

Transaction Summary

```
=====
Install 3 Packages
```

Total download size: 36 M

Installed size: 117 M

Is this ok [y/d/N]: y

Downloading packages:

No Presto metadata available for ol7\_UEKR3

```
(1/3): oracleasm-support-2.1.11-2.el7.x86_64.rpm           | 85 kB 00:00:01
(2/3): kernel-uek-firmware-3.8.13-118.48.1.el7uek.noarch.rpm | 2.2 MB 00:00:01
(3/3): kernel-uek-3.8.13-118.48.1.el7uek.x86_64.rpm        | 33 MB 00:00:08
```

```
=====
Total                           4.3 MB/s | 36 MB 00:00:08
```

Running transaction check

Running transaction test

Transaction test succeeded

```
Running transaction
  Installing : kernel-uek-firmware-3.8.13-118.48.1.el7uek.noarch      1/3
  Installing : kernel-uek-3.8.13-118.48.1.el7uek.x86_64                2/3
  Installing : oracleasm-support-2.1.11-2.el7.x86_64                  3/3
Note: Forwarding request to 'systemctl enable oracleasm.service'.
Created symlink from /etc/systemd/system/
multi-user.target.wants/oracleasm.service to
/usr/lib/systemd/system/oracleasm.service.
  Verifying : kernel-uek-3.8.13-118.48.1.el7uek.x86_64                1/3
  Verifying : oracleasm-support-2.1.11-2.el7.x86_64                  2/3
  Verifying : kernel-uek-firmware-3.8.13-118.48.1.el7uek.noarch      3/3

Installed:
  kernel-uek.x86_64 0:3.8.13-118.48.1.el7uek
  kernel-uek-firmware.noarch 0:3.8.13-118.48.1.el7uek
  oracleasm-support.x86_64 0:2.1.11-2.el7
Complete!
[root@rac1 ~]#
```

## Configuring oracleasm

```
[root@rac1 ~]# oracleasm configure -i
Configuring the Oracle ASM library driver.
```

This will configure the on-boot properties of the Oracle ASM library driver. The following questions will determine whether the driver is loaded on boot and what permissions it will have. The current values will be shown in brackets ('[]'). Hitting <ENTER> without typing an answer will keep that current value. Ctrl-C will abort.

```
Default user to own the driver interface []: oracle
Default group to own the driver interface []: dba
Start Oracle ASM library driver on boot (y/n) [n]: y
Scan for Oracle ASM disks on boot (y/n) [y]: y
Writing Oracle ASM library driver configuration: done
[root@rac1 ~]#
```

```
[root@rac1 ~]# /usr/sbin/oracleasm init
Creating /dev/oracleasm mount point: /dev/oracleasm
Loading module "oracleasm": oracleasm
Configuring "oracleasm" to use device physical block size
Mounting ASMLib driver filesystem: /dev/oracleasm
[root@rac1 ~]#
```

**Note: Repeat the same commands in another cluster node (rac2)**

```
[root@rac1 ~]# rpm -qa | grep asm
oracleasm-support-2.1.11-2.el7.x86_64
objectweb-asm-3.3.1-9.el7.noarch
kde-plasma-networkmanagement-0.9.0.9-7.el7.x86_64
kde-plasma-networkmanagement-libs-0.9.0.9-7.el7.x86_64
kdeplasma-addons-libs-4.10.5-5.el7.x86_64
kdeplasma-addons-4.10.5-5.el7.x86_64
plasma-scriptengine-python-4.11.19-7.el7.x86_64
kde-settings-plasma-19-23.5.0.1.el7.noarch
libatasmart-0.19-6.el7.x86_64
[root@rac1 ~]#
```

```
[root@rac1 ~]# oracleasm status
Checking if ASM is loaded: yes
Checking if /dev/oracleasm is mounted: yes
[root@rac1 ~]#
```

```
[root@rac1 ~]# /usr/sbin/oracleasm createdisk ASM_DATA1 /dev/sdb1
Writing disk header: done
Instantiating disk: done
[root@rac1 ~]#
```

```
[root@rac1 ~]# /usr/sbin/oracleasm createdisk ASM_DATA2 /dev/sdc1
Writing disk header: done
Instantiating disk: done
[root@rac1 ~]#
```

```
[root@rac1 ~]# /usr/sbin/oracleasm createdisk ASM_DATA3 /dev/sdd1
Writing disk header: done
Instantiating disk: done
[root@rac1 ~]#
```

```
[root@rac1 ~]# /usr/sbin/oracleasm createdisk ASM_DATA4 /dev/sde1
Writing disk header: done
Instantiating disk: done
[root@rac1 ~]#
```

```
[root@rac1 ~]# /usr/sbin/oracleasm createdisk ASM_RECO1 /dev/sdf1
Writing disk header: done
Instantiating disk: done
[root@rac1 ~]#
```

```
[root@rac1 ~]# /usr/sbin/oracleasm createdisk ASM_RECO2 /dev/sdg1
Writing disk header: done
Instantiating disk: done
[root@rac1 ~]#
```

```
[root@rac1 ~]# /usr/sbin/oracleasm createdisk ASM_RECO3 /dev/sdh1
```

```
Writing disk header: done  
Instantiating disk: done  
[root@rac1 ~]#
```

```
[root@rac1 ~]# /usr/sbin/oracleasm scandisks  
Reloading disk partitions: done  
Cleaning any stale ASM disks...  
Scanning system for ASM disks...  
[root@rac1 ~]#
```

```
[root@rac1 ~]# /usr/sbin/oracleasm listdisks  
ASM_DATA1  
ASM_DATA2  
ASM_DATA3  
ASM_DATA4  
ASM_RECO1  
ASM_RECO2  
ASM_RECO3  
[root@rac1 ~]#
```

**Note:** Formatting LUNs and creating disks using oracleasm if required do it in cluster node (rac2) also. We have formatted LUNs in rac1 and created all the disks using oracleasm command.

### Login into RAC2 and scan the disks

```
[root@rac2 ~]# iscsiadadm -m discovery -t sendtargets -p zfs  
192.168.2.150:3260,2 iqn.1986-03.com.sun:02:c8fe1586-0fb9-42e3-a603-fc5323a59181  
[root@rac2 ~]#
```

```
[root@rac2 ~]# iscsiadadm -m node -p zfs -l  
Logging in to [iface: default, target: iqn.1986-03.com.sun:02:c8fe1586-0fb9-42e3-a603-fc5323a59181,  
portal: 192.168.2.150,3260] (multiple)  
iscsiadm: Could not login to [iface: default, target: iqn.1986-03.com.sun:02:c8fe1586-0fb9-42e3-a603-  
fc5323a59181, portal: 192.168.2.150,3260].  
iscsiadm: initiator reported error (24 - iSCSI login failed due to authorization failure)  
iscsiadm: Could not log into all portals  
[root@rac2 ~]#
```

```
[root@rac2 etc]# systemctl restart iscsid  
[root@rac2 etc]#
```

```
[root@rac2 etc]# systemctl restart iscsi  
[root@rac2 etc]#
```

```
[root@rac2 etc]# iscsiadadm -m discovery -t sendtargets -p zfs  
192.168.2.150:3260,2 iqn.1986-03.com.sun:02:c8fe1586-0fb9-42e3-a603-fc5323a59181
```

```
[root@rac2 etc]#
```

```
[root@rac2 etc]# iscsiadm -m node -p zfs -l  
[root@rac2 etc]#
```

```
[root@rac2 etc]# ls -l /dev/sd?  
brw-rw----. 1 root disk 8, 0 Aug 15 20:44 /dev/sda1  
brw-rw----. 1 root disk 8, 16 Aug 16 00:38 /dev/sdb1  
brw-rw----. 1 root disk 8, 32 Aug 16 00:38 /dev/sdc1  
brw-rw----. 1 root disk 8, 48 Aug 16 00:38 /dev/sdd1  
brw-rw----. 1 root disk 8, 64 Aug 16 00:38 /dev/sde1  
brw-rw----. 1 root disk 8, 80 Aug 16 00:38 /dev/sdf1  
brw-rw----. 1 root disk 8, 96 Aug 16 00:38 /dev/sdg1  
brw-rw----. 1 root disk 8, 112 Aug 16 00:38 /dev/sdh1  
[root@rac2 etc]#
```

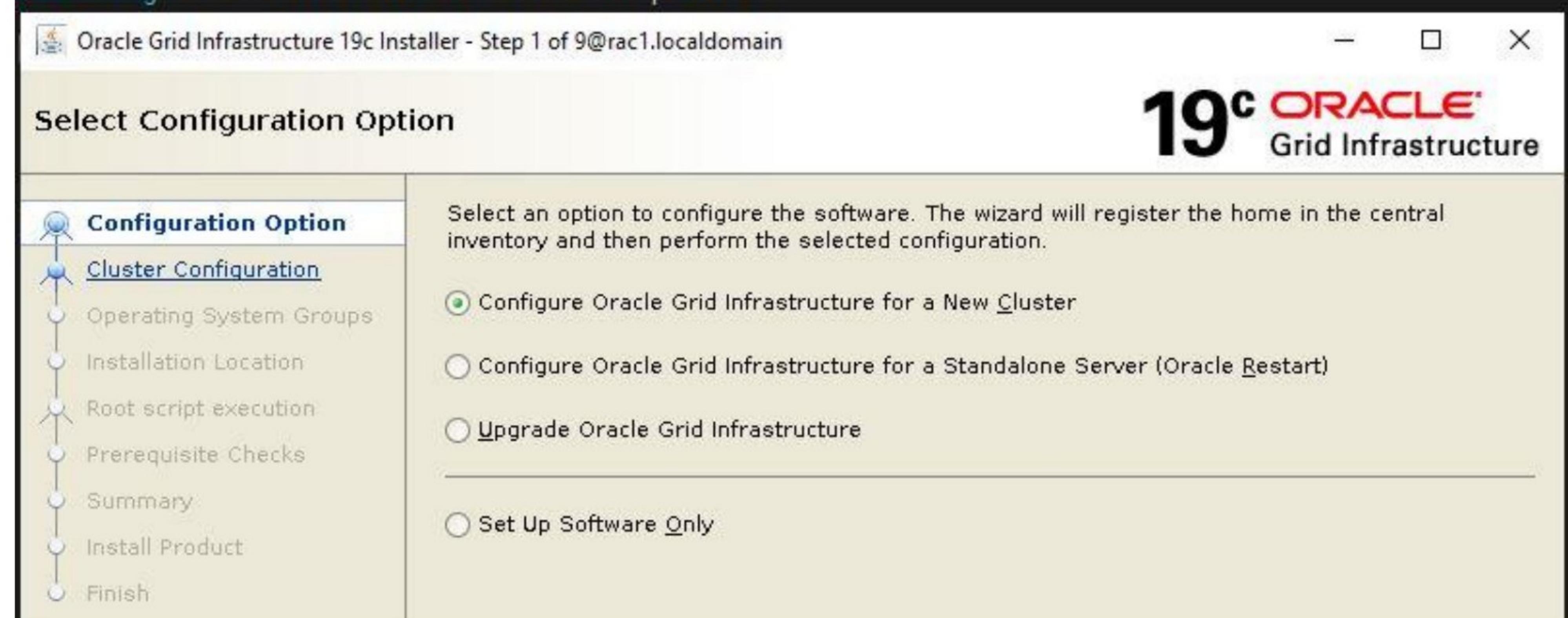
```
[root@rac2 etc]# oracleasm status  
Checking if ASM is loaded: yes  
Checking if /dev/oracleasm is mounted: yes  
[root@rac2 etc]#
```

```
[root@rac2 etc]# /usr/sbin/oracleasm scandisks  
Reloading disk partitions: done  
Cleaning any stale ASM disks...  
Scanning system for ASM disks...  
Instantiating disk "ASM_DATA1"  
Instantiating disk "ASM_DATA3"  
Instantiating disk "ASM_DATA2"  
Instantiating disk "ASM_DATA4"  
Instantiating disk "ASM_RECO1"  
Instantiating disk "ASM_RECO2"  
Instantiating disk "ASM_RECO3"  
[root@rac2 etc]#
```

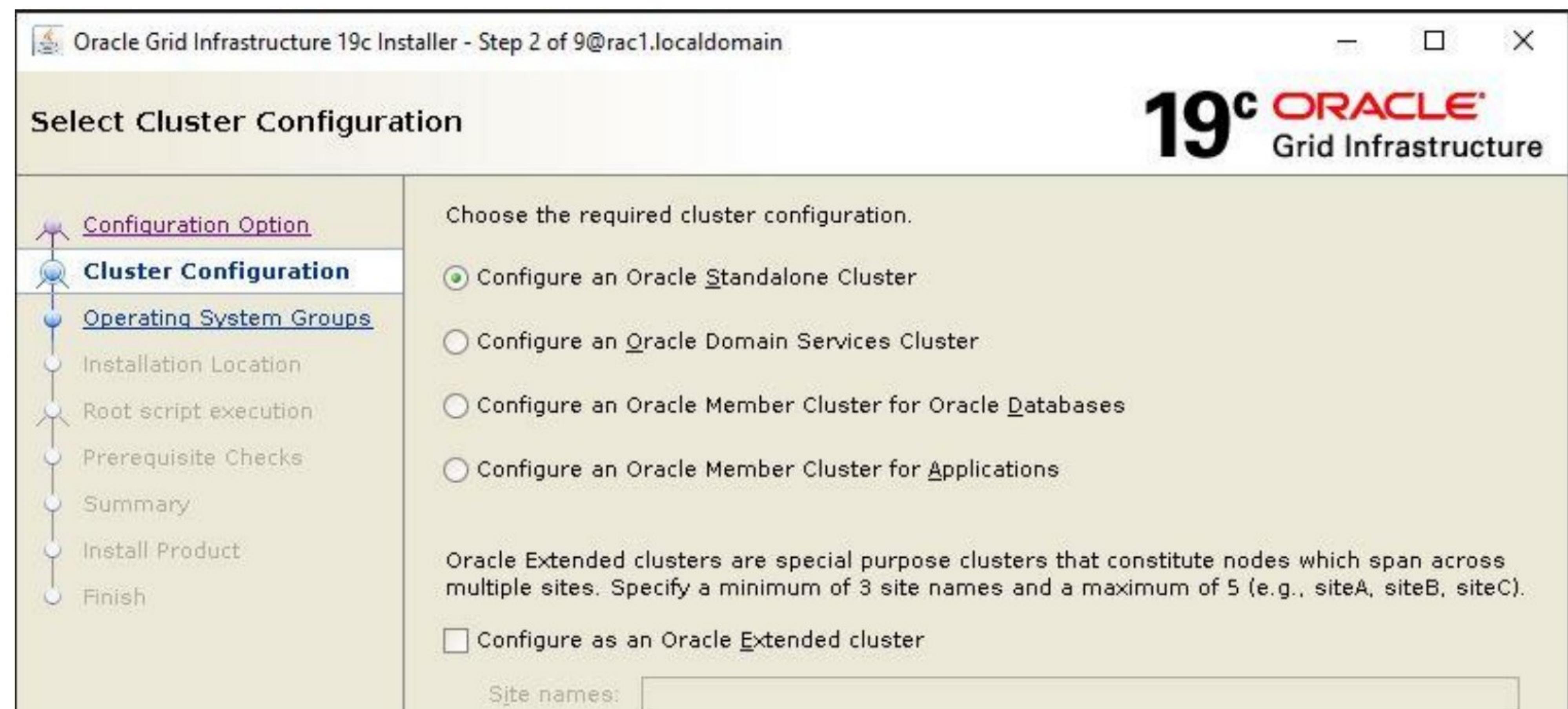
```
[root@rac2 etc]# /usr/sbin/oracleasm listdisks  
ASM_DATA1  
ASM_DATA2  
ASM_DATA3  
ASM_DATA4  
ASM_RECO1  
ASM_RECO2  
ASM_RECO3  
[root@rac2 etc]#
```

## Oracle 19c GRID Installation (Applying July 2020 Patch):

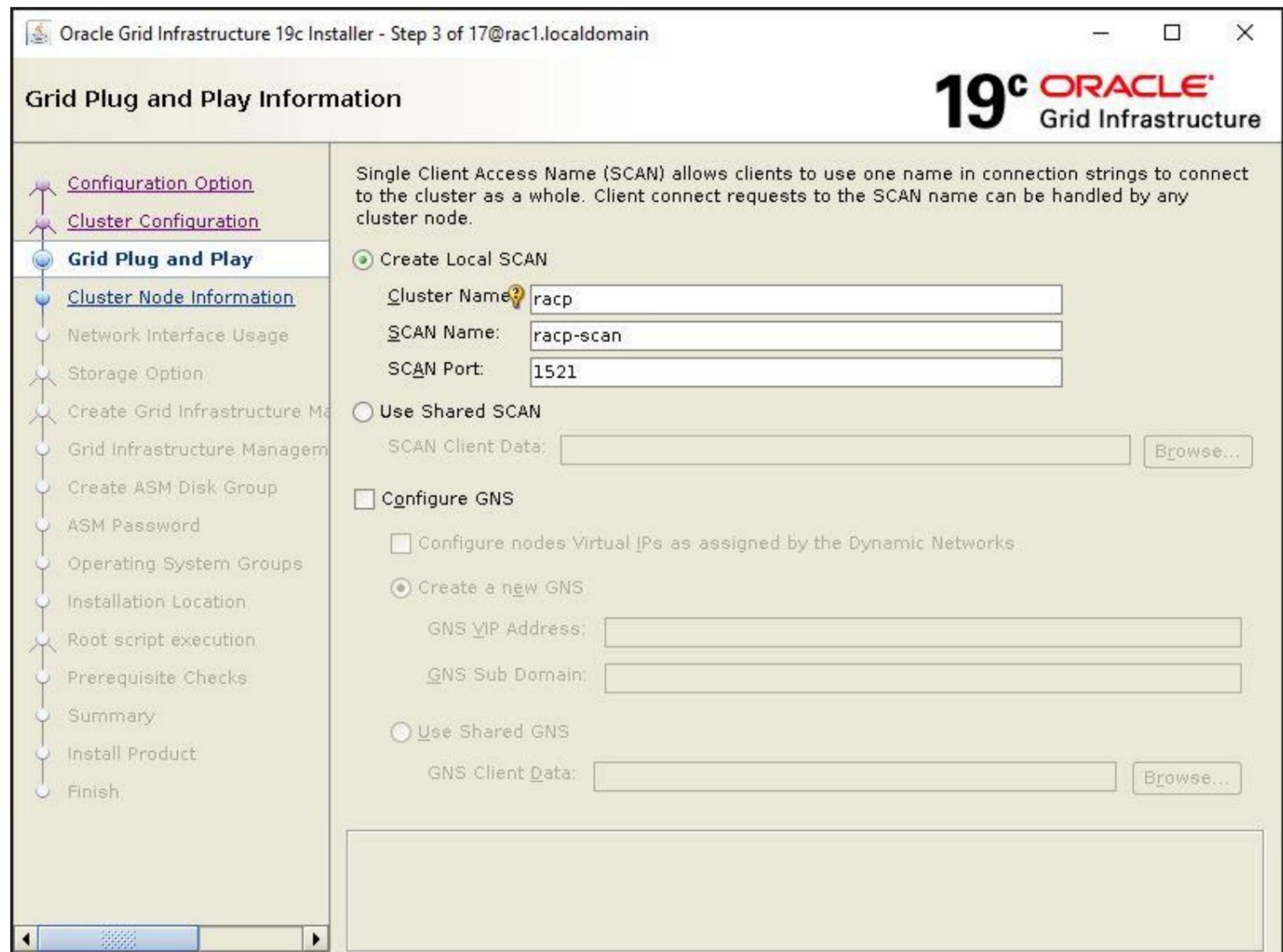
```
[oracle@rac1 grid]$ ./gridSetup.sh -applyPSU /home/oracle/31305339/
Preparing the home to patch...
Applying the patch /home/oracle/31305339/...
Successfully applied the patch.
The log can be found at: /tmp/GridSetupActions2020-08-16_01-36-05PM/installerPatchActions_2020-08-16
Launching Oracle Grid Infrastructure Setup Wizard...
```



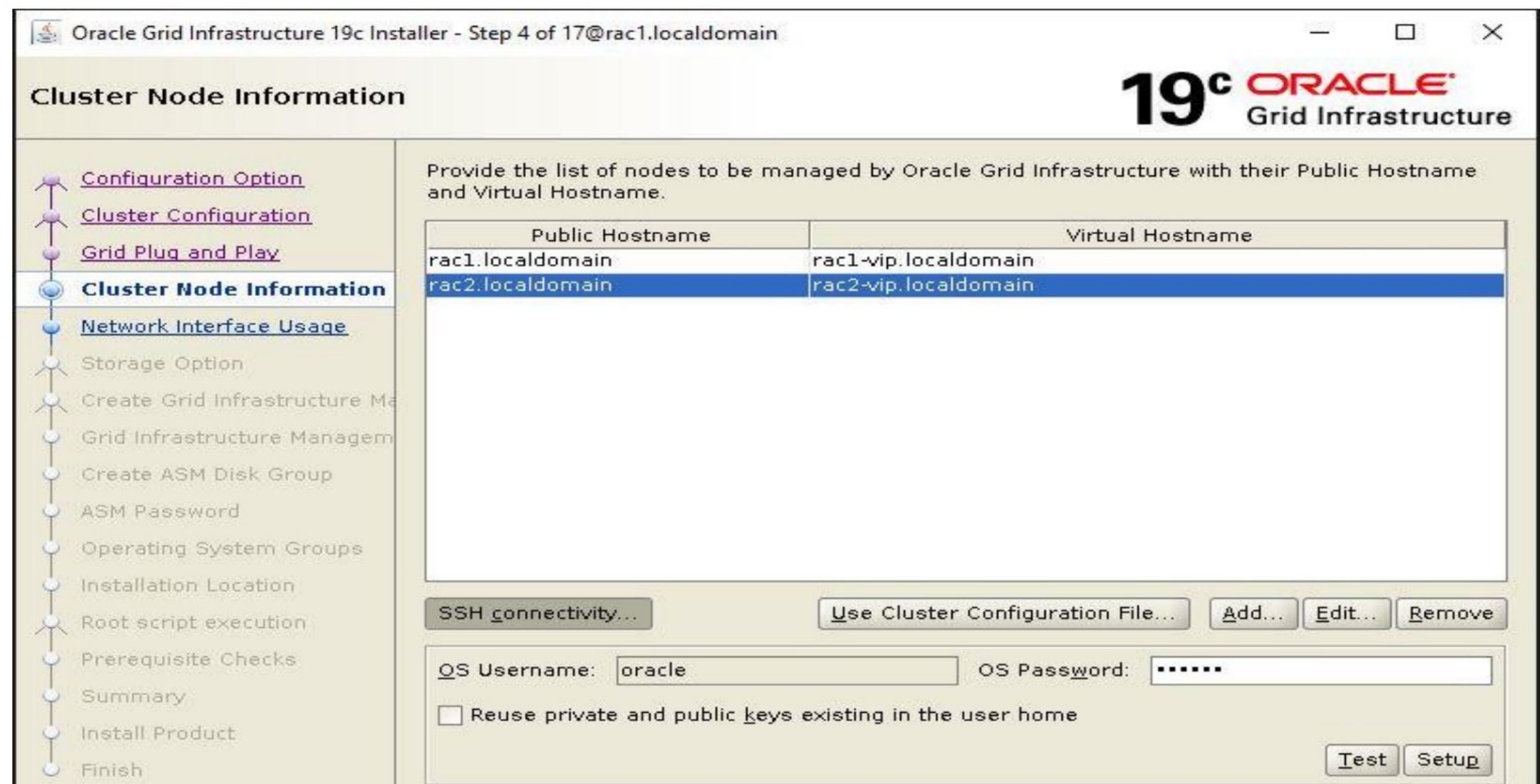
Select the option – Set up Software Only



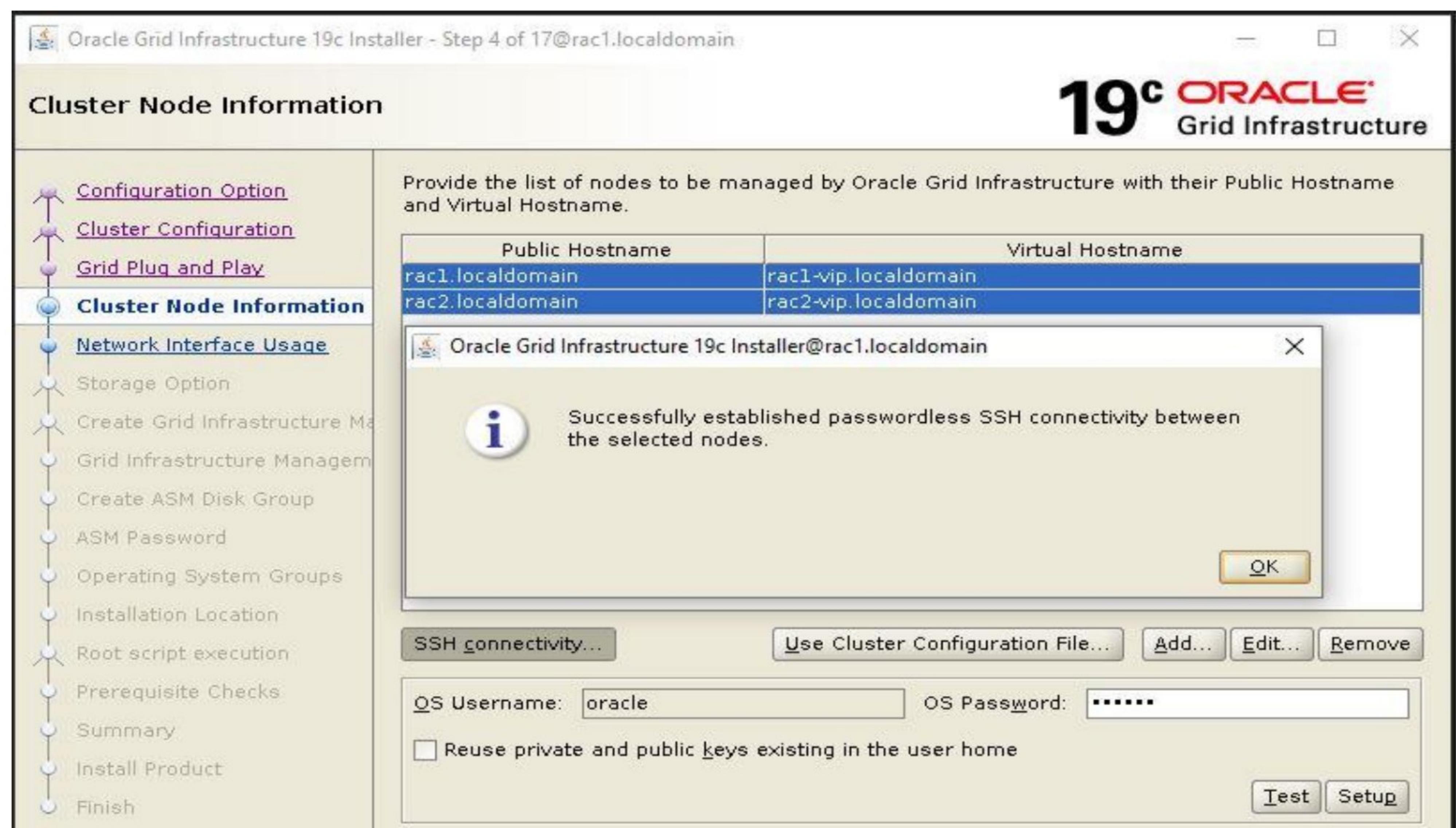
Select the option – Configure an Oracle Standalone Cluster



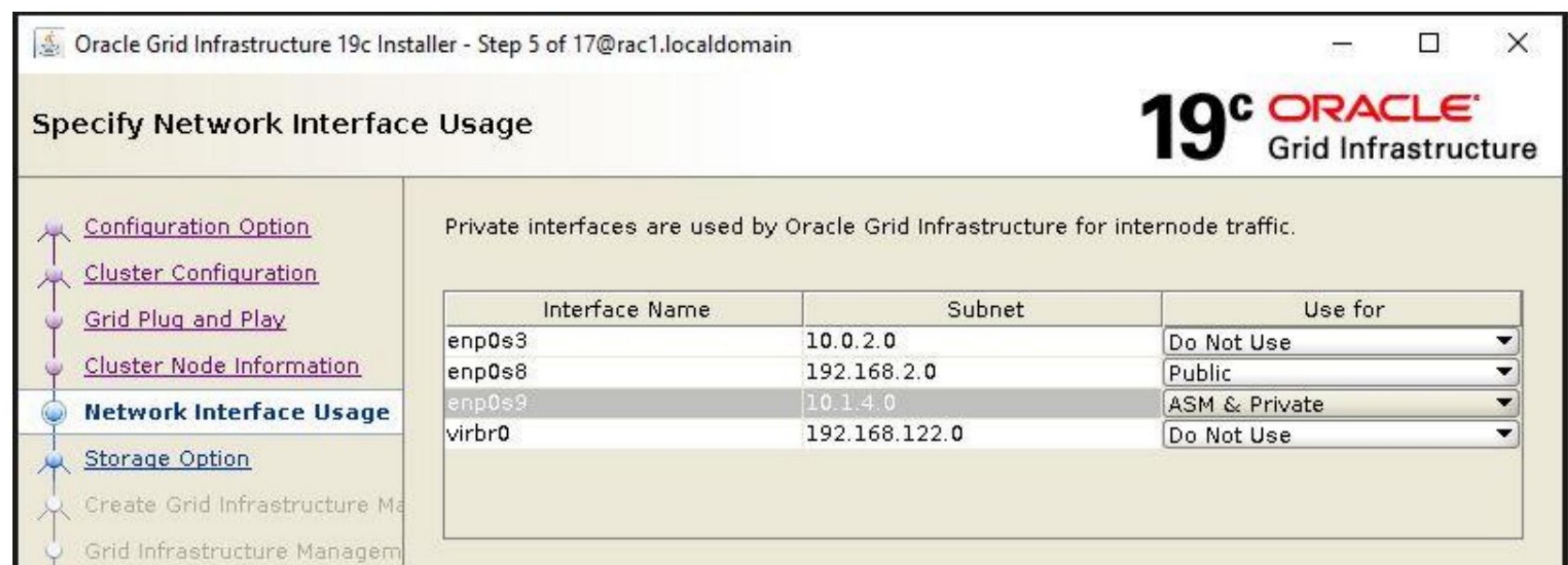
Select the option – Create Local SCAN



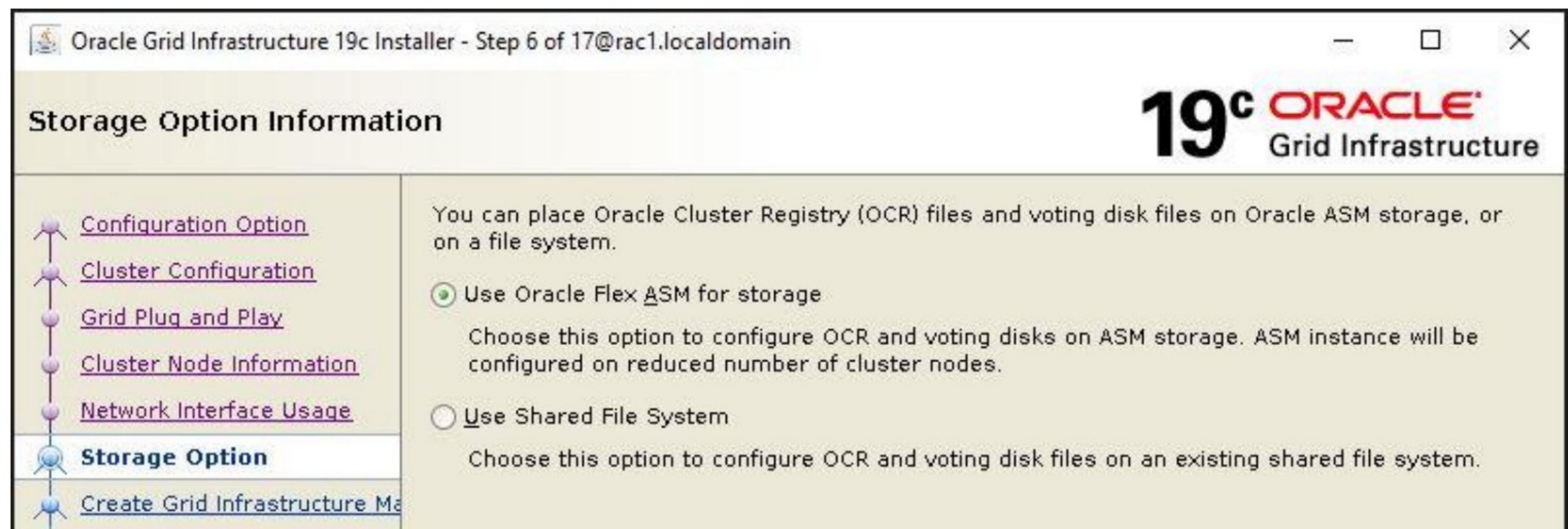
Specify the cluster nodes



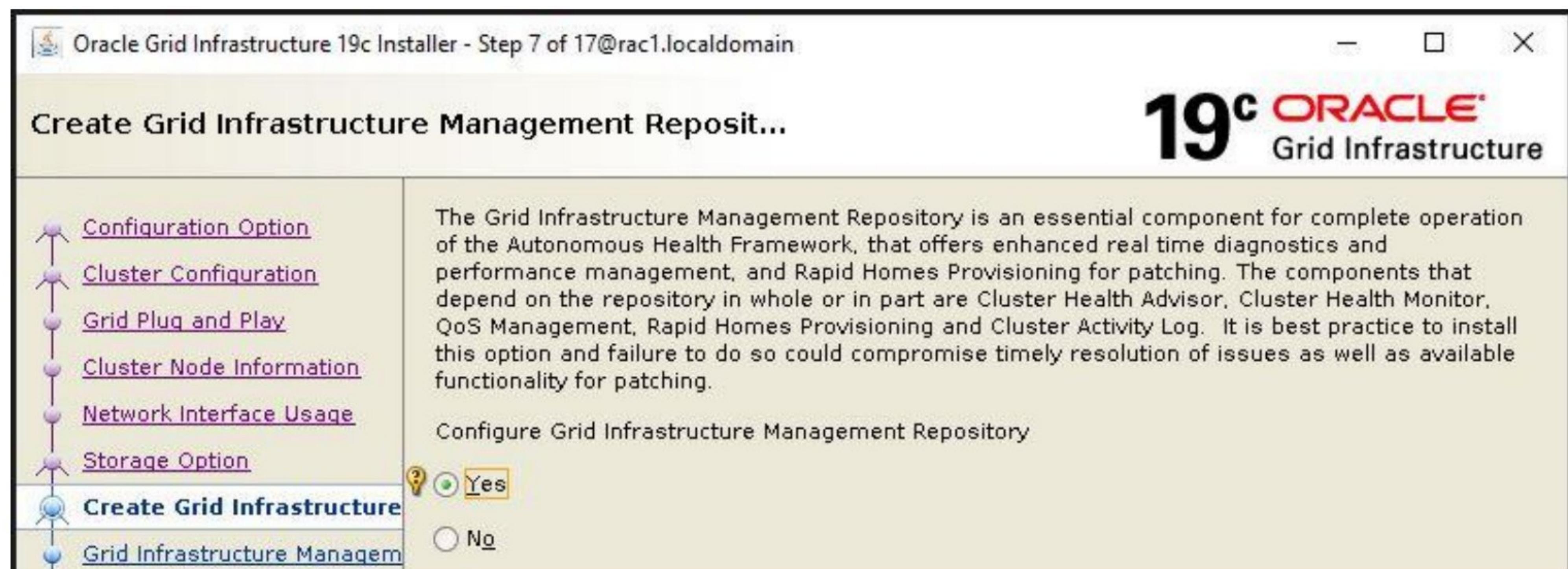
### Configure SSH Set up



Select Public and ASM & Private interfaces.



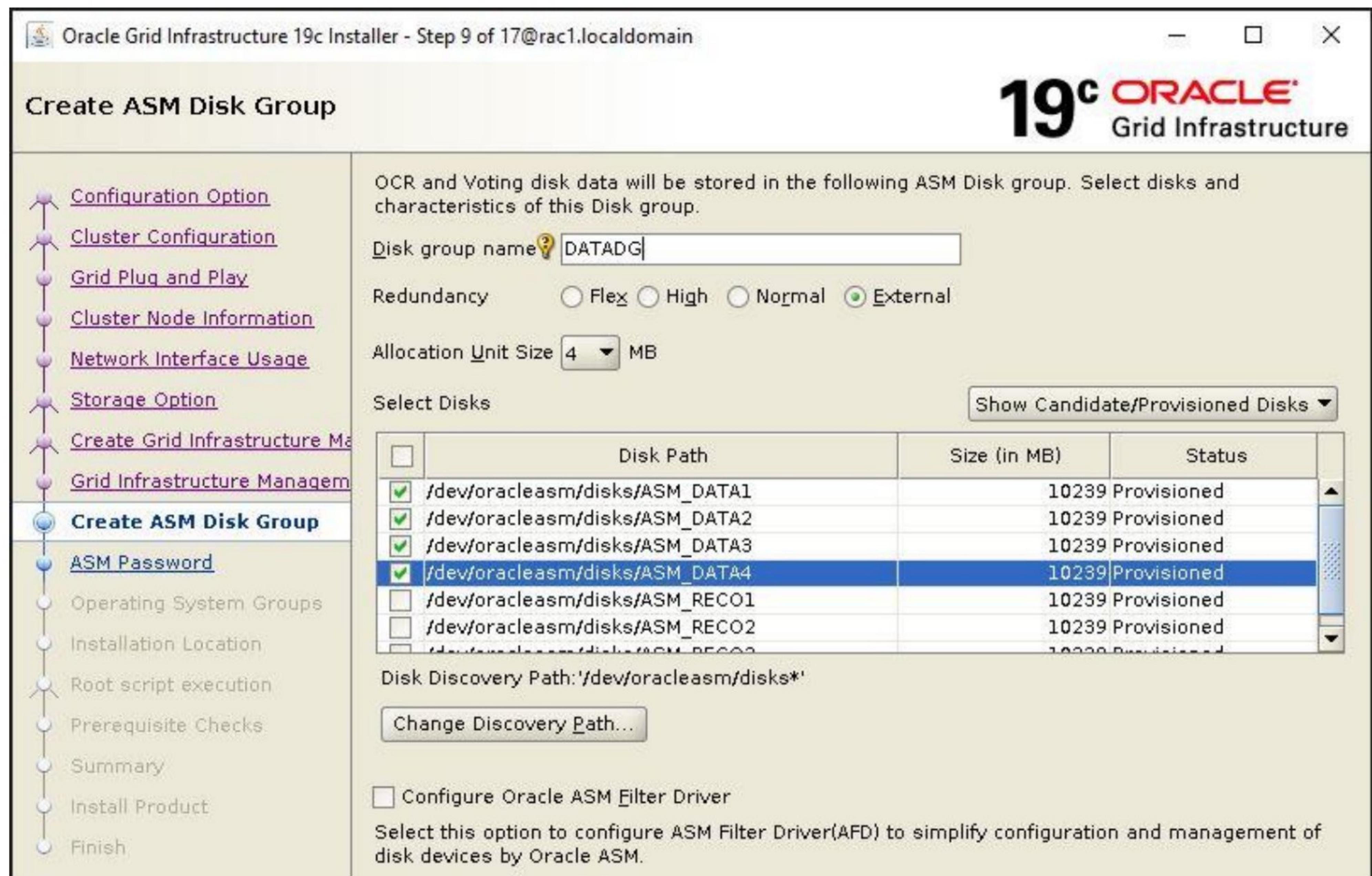
Select the option – Use Oracle Flex ASM for Storage



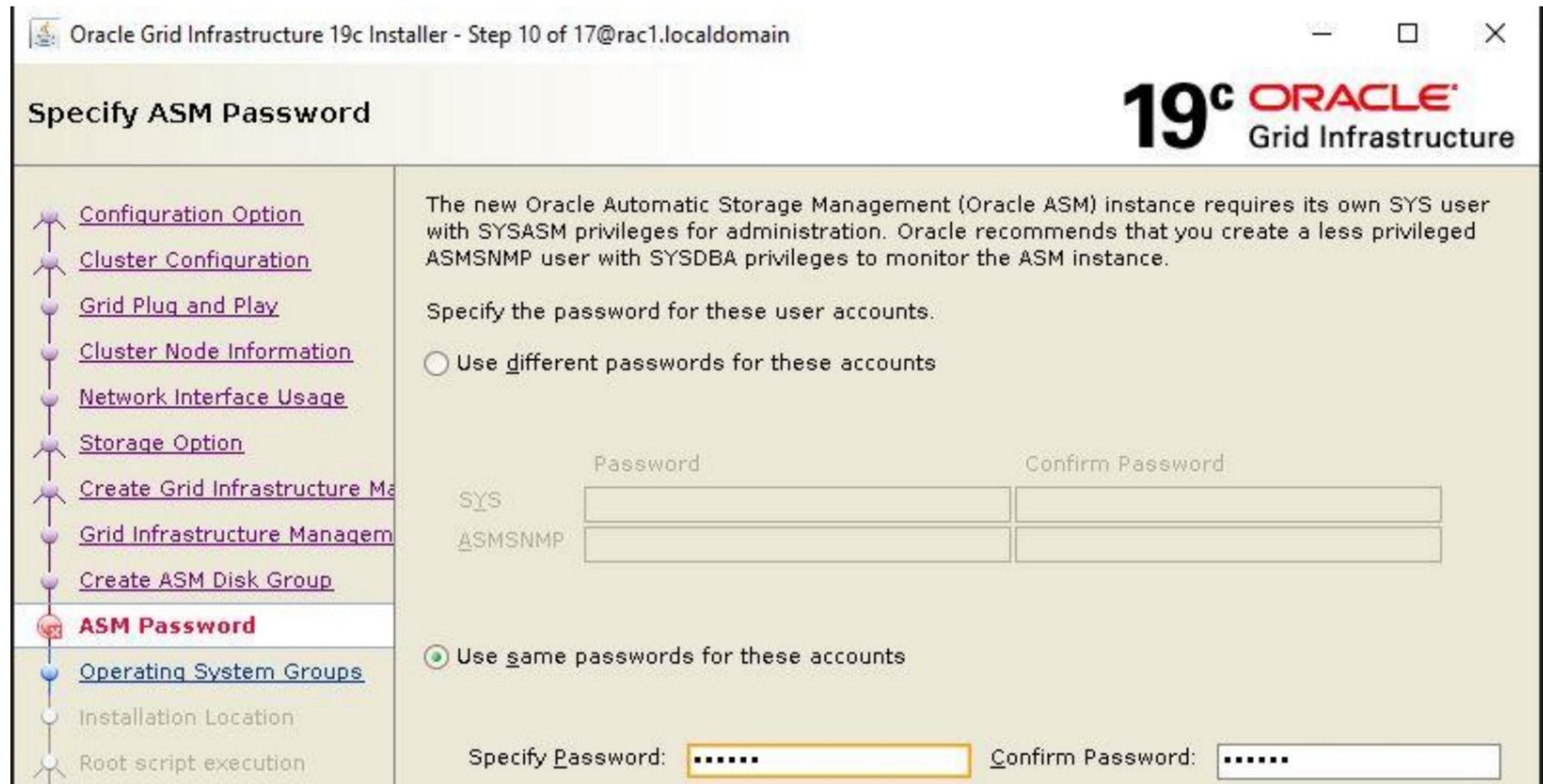
Select the option – Yes to configure GIMR

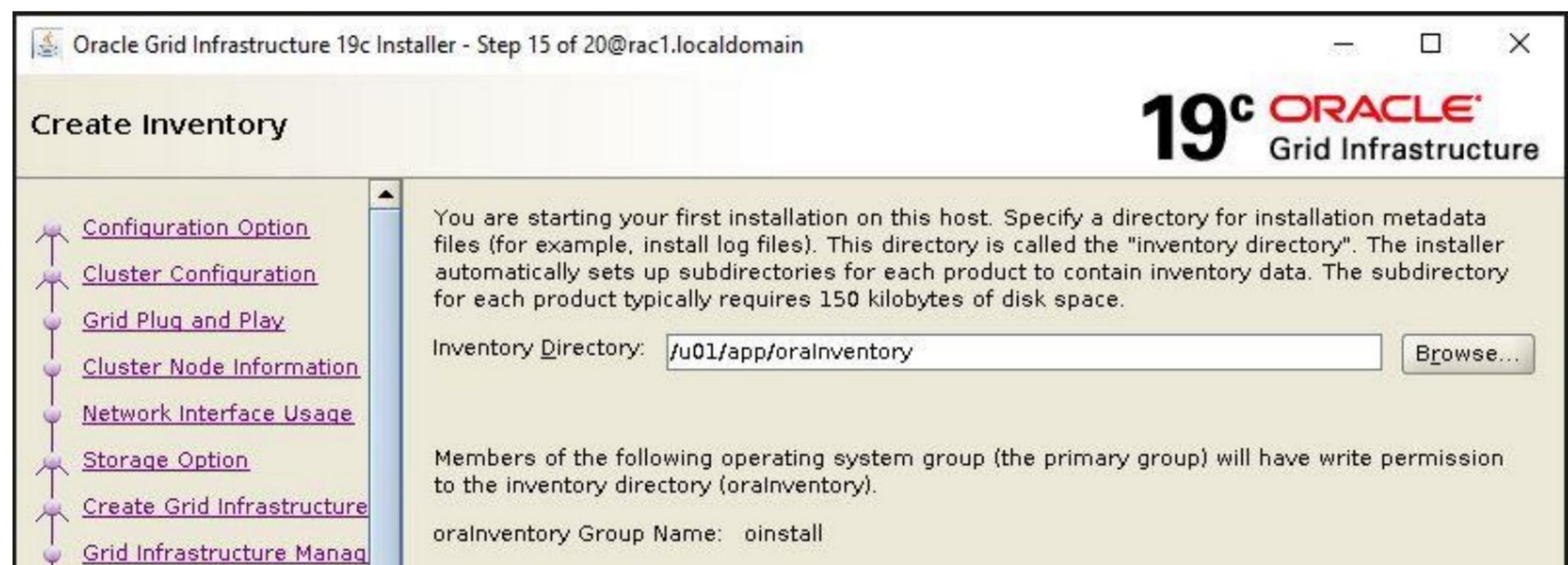
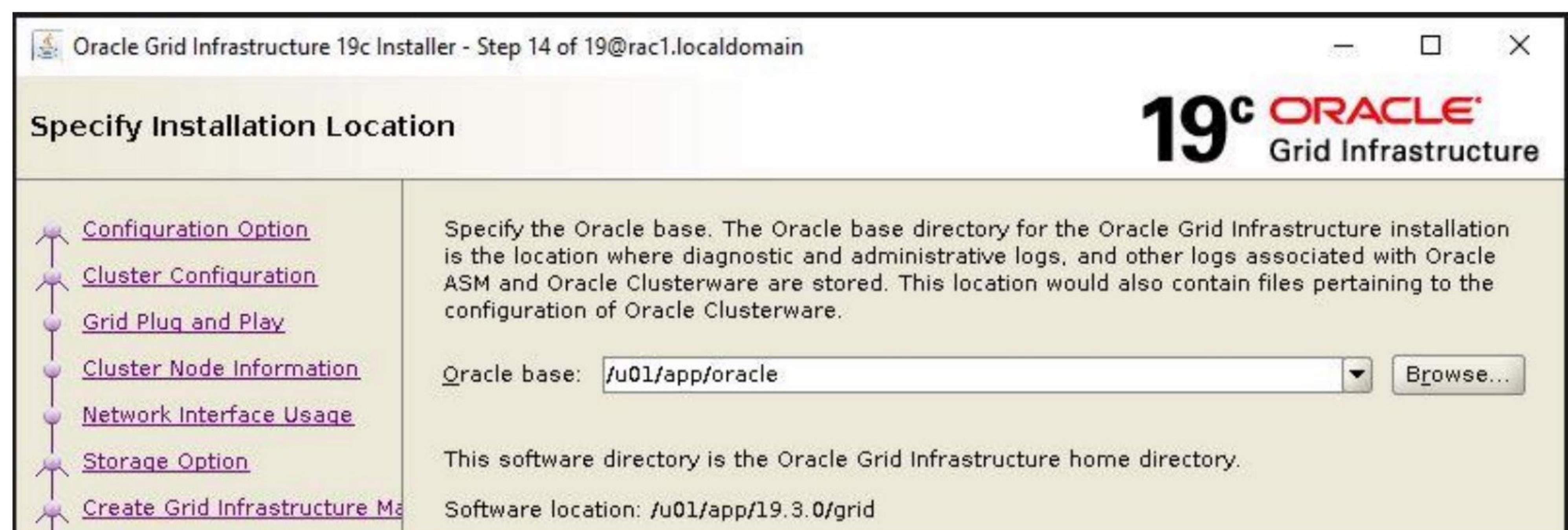
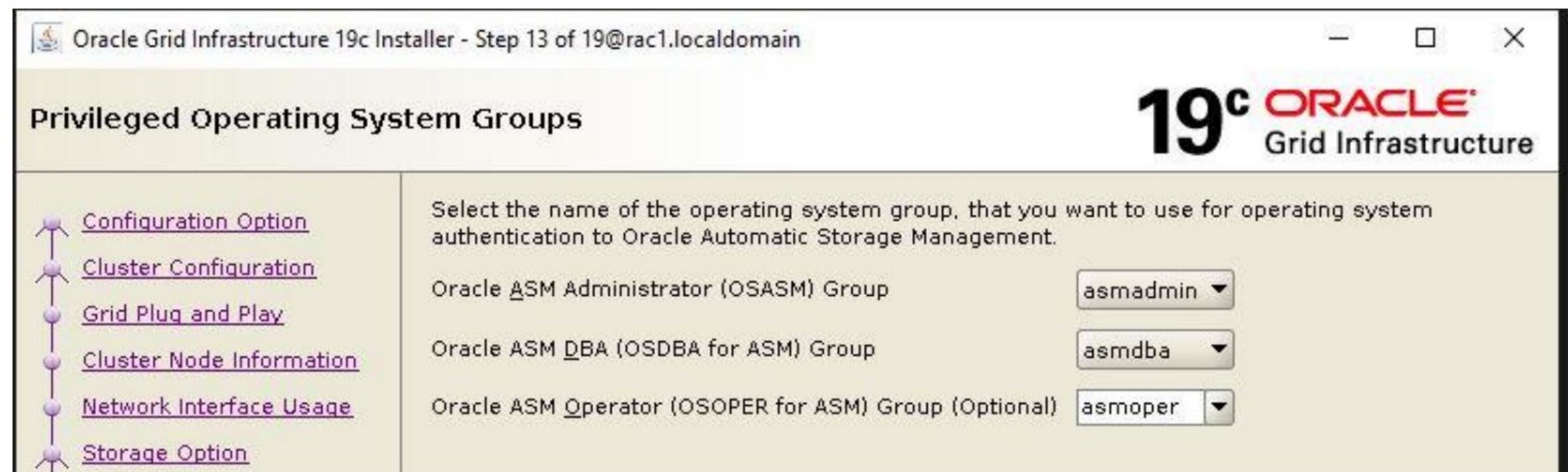


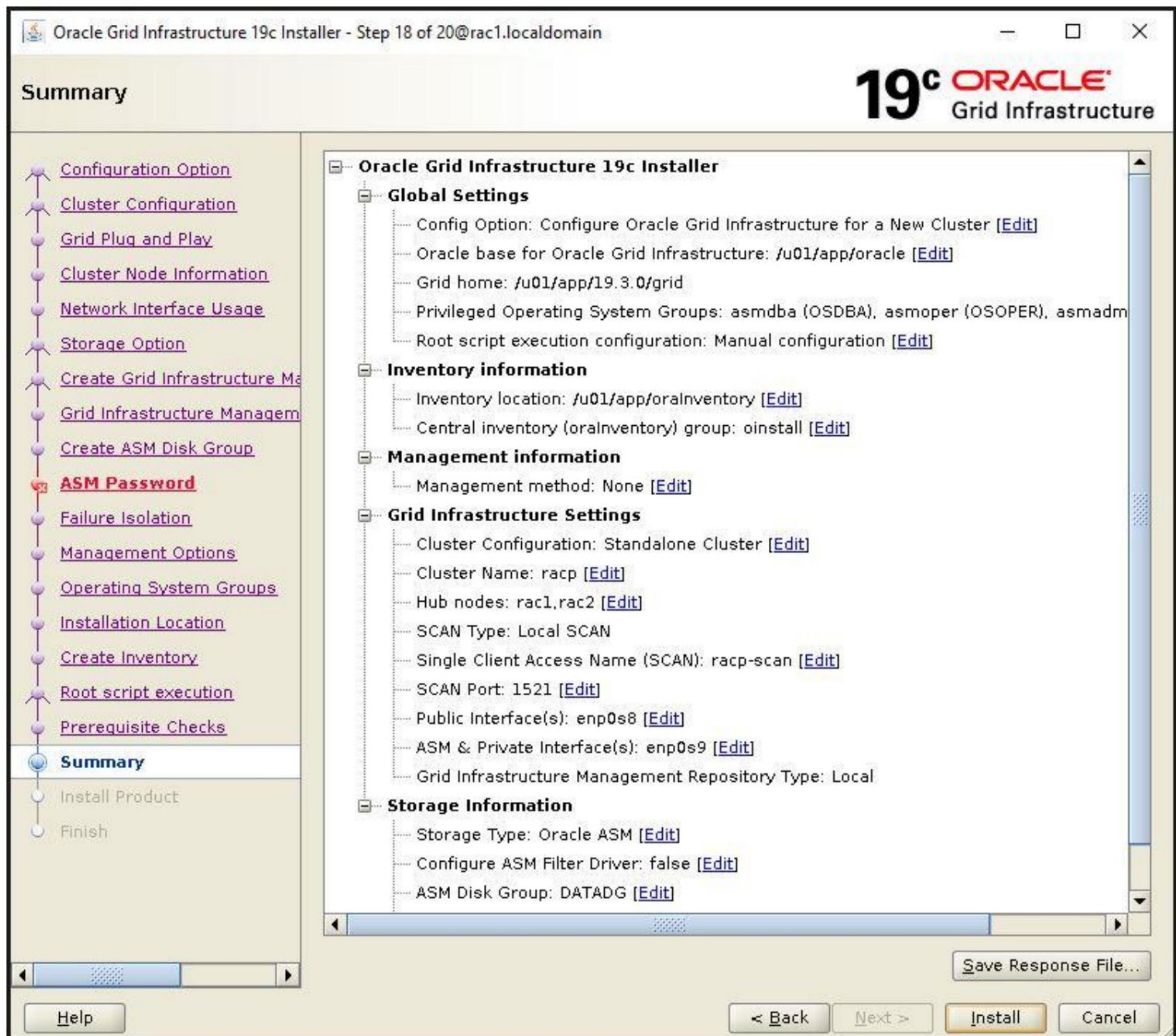
Select the option – No (you can decide based on storage size and chosen type)

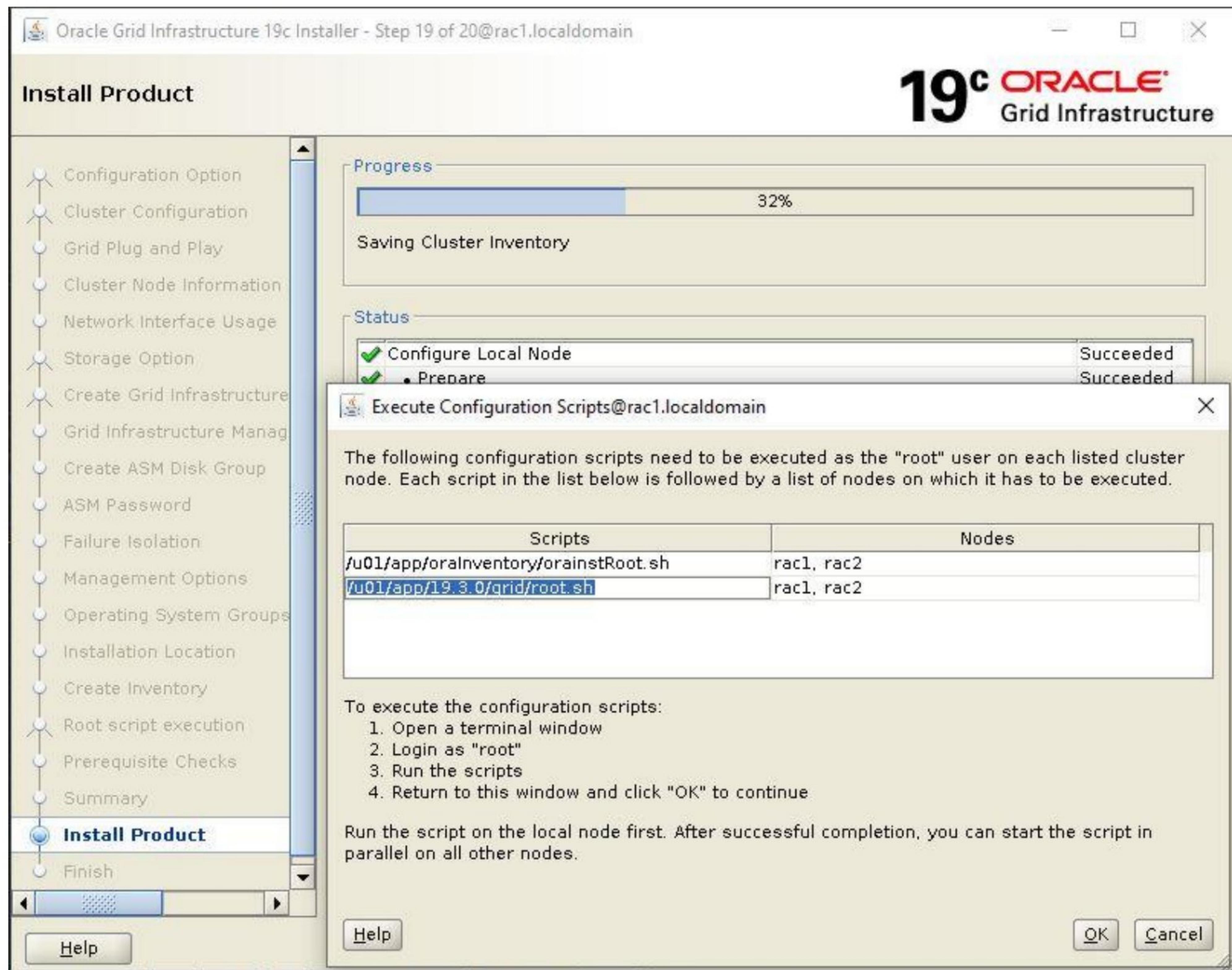


Select the Disk Path – ASM\_DATA1, ASM\_DATA2, ASM\_DATA3 and ASM\_DATA4 for DATADG.









### Execute the following scripts as a 'root' user in cluster nodes

[root@rac1 ~]# /u01/app/oralInventory/orainstRoot.sh

Changing permissions of /u01/app/oralInventory.

Adding read,write permissions for group.

Removing read,write,execute permissions for world.

Changing groupname of /u01/app/oralInventory to oinstall.

The execution of the script is complete.

[root@rac1 ~]#

[root@rac2 ~]# /u01/app/oralInventory/orainstRoot.sh

Changing permissions of /u01/app/oralInventory.

Adding read,write permissions for group.

Removing read,write,execute permissions for world.

Changing groupname of /u01/app/oralInventory to oinstall.

The execution of the script is complete.

[root@rac2 ~]#

[root@rac1 ~]# /u01/app/19.3.0/grid/root.sh

Performing root user operation.

The following environment variables are set as:

```
ORACLE_OWNER= oracle  
ORACLE_HOME= /u01/app/19.3.0/grid
```

Enter the full pathname of the local bin directory: [/usr/local/bin]:

```
Copying dbhome to /usr/local/bin ...  
Copying oraenv to /usr/local/bin ...  
Copying coraenv to /usr/local/bin ...
```

Creating /etc/oratab file...

Entries will be added to the /etc/oratab file as needed by  
Database Configuration Assistant when a database is created  
Finished running generic part of root script.

Now product-specific root actions will be performed.

Relinking oracle with rac\_on option

Using configuration parameter file: /u01/app/19.3.0/grid/crs/install/crsconfig\_params

The log of current session can be found at:

```
/u01/app/oracle/crsdata/rac1/crsconfig/rootcrs_rac1_2020-08-16_02-23-52PM.log  
2020/08/16 14:24:08 CLSRSC-594: Executing installation step 1 of 19: 'SetupTFA'.  
2020/08/16 14:24:08 CLSRSC-594: Executing installation step 2 of 19: 'ValidateEnv'.  
2020/08/16 14:24:08 CLSRSC-363: User ignored prerequisites during installation  
2020/08/16 14:24:08 CLSRSC-594: Executing installation step 3 of 19: 'CheckFirstNode'.  
2020/08/16 14:24:11 CLSRSC-594: Executing installation step 4 of 19: 'GenSiteGUIDs'.  
2020/08/16 14:24:12 CLSRSC-594: Executing installation step 5 of 19: 'SetupOSD'.  
2020/08/16 14:24:12 CLSRSC-594: Executing installation step 6 of 19: 'CheckCRSConfig'.  
2020/08/16 14:24:12 CLSRSC-594: Executing installation step 7 of 19: 'SetupLocalGPNP'.  
2020/08/16 14:24:27 CLSRSC-594: Executing installation step 8 of 19: 'CreateRootCert'.  
2020/08/16 14:24:34 CLSRSC-594: Executing installation step 9 of 19: 'ConfigOLR'.  
2020/08/16 14:24:58 CLSRSC-594: Executing installation step 10 of 19: 'ConfigCHMOS'.  
2020/08/16 14:24:58 CLSRSC-594: Executing installation step 11 of 19: 'CreateOHASD'.  
2020/08/16 14:25:05 CLSRSC-594: Executing installation step 12 of 19: 'ConfigOHASD'.  
2020/08/16 14:25:05 CLSRSC-330: Adding Clusterware entries to file 'oracle-ohasd.service'  
2020/08/16 14:25:27 CLSRSC-4002: Successfully installed Oracle Trace File Analyzer (TFA) Collector.  
2020/08/16 14:25:29 CLSRSC-594: Executing installation step 13 of 19: 'InstallAFD'.  
2020/08/16 14:25:29 CLSRSC-594: Executing installation step 14 of 19: 'InstallACFS'.  
2020/08/16 14:25:35 CLSRSC-594: Executing installation step 15 of 19: 'InstallKA'.  
2020/08/16 14:25:41 CLSRSC-594: Executing installation step 16 of 19: 'InitConfig'.  
Redirecting to /bin/systemctl restart rsyslog.service
```

ASM has been created and started successfully.

[DBT-30001] Disk groups created successfully. Check /u01/app/oracle/cfgtoollogs/asmca/asmca-200816PM022613.log for details.

2020/08/16 14:27:51 CLSRSC-482: Running command: '/u01/app/19.3.0/grid/bin/ocrconfig -upgrade oracle oinstall'

CRS-4256: Updating the profile

Successful addition of voting disk 2f9ebef3841f4f3abf13bd7f07d3fe68.  
Successfully replaced voting disk group with +DATADG.  
CRS-4256: Updating the profile  
CRS-4266: Voting file(s) successfully replaced

## STATE	File Universal Id	File Name	Disk group
1. ONLINE	2f9ebef3841f4f3abf13bd7f07d3fe68	(/dev/oracleasm/disks/ASM_DATA1)	[DATADG]

Located 1 voting disk(s).

2020/08/16 14:30:10 CLSRSC-594: Executing installation step 17 of 19: 'StartCluster'.  
2020/08/16 14:31:59 CLSRSC-343: Successfully started Oracle Clusterware stack  
2020/08/16 14:31:59 CLSRSC-594: Executing installation step 18 of 19: 'ConfigNode'.  
2020/08/16 14:35:02 CLSRSC-594: Executing installation step 19 of 19: 'PostConfig'.  
2020/08/16 14:36:04 CLSRSC-325: Configure Oracle Grid Infrastructure for a Cluster ... succeeded  
[root@rac1 ~]#

**[root@rac2 ~]# /u01/app/oralInventory/orainstRoot.sh**

Changing permissions of /u01/app/oralInventory.

Adding read,write permissions for group.

Removing read,write,execute permissions for world.

Changing groupname of /u01/app/oralInventory to oinstall.

The execution of the script is complete.

**[root@rac2 ~]# /u01/app/19.3.0/grid/root.sh**

Performing root user operation.

The following environment variables are set as:

ORACLE\_OWNER= oracle

ORACLE\_HOME= /u01/app/19.3.0/grid

Enter the full pathname of the local bin directory: [/usr/local/bin]:

Copying dbhome to /usr/local/bin ...

Copying oraenv to /usr/local/bin ...

Copying coraenv to /usr/local/bin ...

Creating /etc/oratab file...

Entries will be added to the /etc/oratab file as needed by

Database Configuration Assistant when a database is created

Finished running generic part of root script.

Now product-specific root actions will be performed.

Relinking oracle with rac\_on option

Using configuration parameter file: /u01/app/19.3.0/grid/crs/install/crsconfig\_params

The log of current session can be found at:

/u01/app/oracle/crsdata/rac2/crsconfig/rootcrs\_rac2\_2020-08-16\_02-36-48PM.log

2020/08/16 14:37:06 CLSRSC-594: Executing installation step 1 of 19: 'SetupTFA'.

2020/08/16 14:37:06 CLSRSC-594: Executing installation step 2 of 19: 'ValidateEnv'.

2020/08/16 14:37:06 CLSRSC-363: User ignored prerequisites during installation

2020/08/16 14:37:06 CLSRSC-594: Executing installation step 3 of 19: 'CheckFirstNode'.

2020/08/16 14:37:07 CLSRSC-594: Executing installation step 4 of 19: 'GenSiteGUIDs'.

```
2020/08/16 14:37:07 CLSRSC-594: Executing installation step 5 of 19: 'SetupOSD'.
2020/08/16 14:37:07 CLSRSC-594: Executing installation step 6 of 19: 'CheckCRSConfig'.
2020/08/16 14:37:08 CLSRSC-594: Executing installation step 7 of 19: 'SetupLocalGPNP'.
2020/08/16 14:37:10 CLSRSC-594: Executing installation step 8 of 19: 'CreateRootCert'.
2020/08/16 14:37:10 CLSRSC-594: Executing installation step 9 of 19: 'ConfigOLR'.
2020/08/16 14:37:30 CLSRSC-594: Executing installation step 10 of 19: 'ConfigCHMOS'.
2020/08/16 14:37:30 CLSRSC-594: Executing installation step 11 of 19: 'CreateOHASD'.
2020/08/16 14:37:32 CLSRSC-594: Executing installation step 12 of 19: 'ConfigOHASD'.
2020/08/16 14:37:32 CLSRSC-330: Adding Clusterware entries to file 'oracle-ohasd.service'
2020/08/16 14:37:55 CLSRSC-594: Executing installation step 13 of 19: 'InstallAFD'.
2020/08/16 14:37:55 CLSRSC-594: Executing installation step 14 of 19: 'InstallACFS'.
2020/08/16 14:37:57 CLSRSC-594: Executing installation step 15 of 19: 'InstallKA'.
2020/08/16 14:37:59 CLSRSC-594: Executing installation step 16 of 19: 'InitConfig'.
Redirecting to /bin/systemctl restart rsyslog.service
2020/08/16 14:38:16 CLSRSC-594: Executing installation step 17 of 19: 'StartCluster'.
2020/08/16 14:38:34 CLSRSC-4002: Successfully installed Oracle Trace File Analyzer (TFA) Collector.
2020/08/16 14:40:58 CLSRSC-343: Successfully started Oracle Clusterware stack
2020/08/16 14:40:58 CLSRSC-594: Executing installation step 18 of 19: 'ConfigNode'.
2020/08/16 14:42:24 CLSRSC-594: Executing installation step 19 of 19: 'PostConfig'.
2020/08/16 14:45:20 CLSRSC-325: Configure Oracle Grid Infrastructure for a Cluster ... succeeded
[root@rac2 ~]#
```

```
[oracle@rac1 grid]$ ./gridSetup.sh -applyPSU /home/oracle/31305339/
Preparing the home to patch...
Applying the patch /home/oracle/31305339/...
Successfully applied the patch.
The log can be found at: /tmp/GridSetupActions2020-08-16_07-40-54PM/installerPatchActions_2020-08-16_07-40-54PM.log
Launching Oracle Grid Infrastructure Setup Wizard...
```

The response file for this session can be found at:  
/u01/app/19.3.0/grid/install/response/grid\_2020-08-16\_07-40-54PM.rsp

You can find the log of this install session at:  
/tmp/GridSetupActions2020-08-16\_07-40-54PM/gridSetupActions2020-08-16\_07-40-54PM.log  
Moved the install session logs to:  
/u01/app/oralInventory/logs/GridSetupActions2020-08-16\_07-40-54PM  
[oracle@rac1 grid]\$

### **Check the cluster status using the following command**

```
[oracle@rac1 ~]$ grid_env
[oracle@rac1 ~]$ crsctl stat res -t
-----
Name      Target State    Server          State details
-----
Local Resources
-----
```

ora.LISTENER.lsnr			
	ONLINE ONLINE	rac1	STABLE
	ONLINE ONLINE	rac2	STABLE
ora.chad			
	ONLINE ONLINE	rac1	STABLE
	ONLINE ONLINE	rac2	STABLE
ora.net1.network			
	ONLINE ONLINE	rac1	STABLE
	ONLINE ONLINE	rac2	STABLE
ora.ons			
	ONLINE ONLINE	rac1	STABLE
	ONLINE ONLINE	rac2	STABLE

---

#### Cluster Resources

---

ora.ASMNET1LSNR_ASM.lsnr(ora.asmgroup)			
	1 ONLINE ONLINE	rac1	STABLE
	2 ONLINE ONLINE	rac2	STABLE
ora.DATADG.dg(ora.asmgroup)			
	1 ONLINE ONLINE	rac1	STABLE
	2 ONLINE ONLINE	rac2	STABLE
ora.LISTENER_SCAN1.lsnr			
	1 ONLINE ONLINE	rac2	STABLE
ora.LISTENER_SCAN2.lsnr			
	1 ONLINE ONLINE	rac1	STABLE
ora.LISTENER_SCAN3.lsnr			
	1 ONLINE ONLINE	rac1	STABLE
ora.MGMTLSNR			
	1 ONLINE ONLINE	rac1	169.254.7.133 10.1.4
			.10,STABLE
ora.asm(ora.asmgroup)			
	1 ONLINE ONLINE	rac1	Started,STABLE
	2 ONLINE ONLINE	rac2	Started,STABLE
ora.asmnet1.asmnetwork(ora.asmgroup)			
	1 ONLINE ONLINE	rac1	STABLE
	2 ONLINE ONLINE	rac2	STABLE
ora.cvu			
	1 ONLINE ONLINE	rac1	STABLE
ora.mgmtdb			
	1 ONLINE ONLINE	rac1	Open,STABLE
ora.qosmserver			
	1 ONLINE ONLINE	rac1	STABLE
ora.rac1.vip			
	1 ONLINE ONLINE	rac1	STABLE
ora.rac2.vip			
	1 ONLINE ONLINE	rac2	STABLE
ora.scan1.vip			
	1 ONLINE ONLINE	rac2	STABLE

---

```
ora.scan2.vip
 1 ONLINE ONLINE rac1      STABLE
ora.scan3.vip
 1 ONLINE ONLINE rac1      STABLE
-----
[oracle@rac1 ~]$
```

```
[oracle@rac1 ~]$ sqlplus / as sysasm
```

```
SQL*Plus: Release 19.0.0.0.0 - Production on Sun Aug 16 21:12:42 2020
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> select instance_name,instance_number from gv$instance;
```

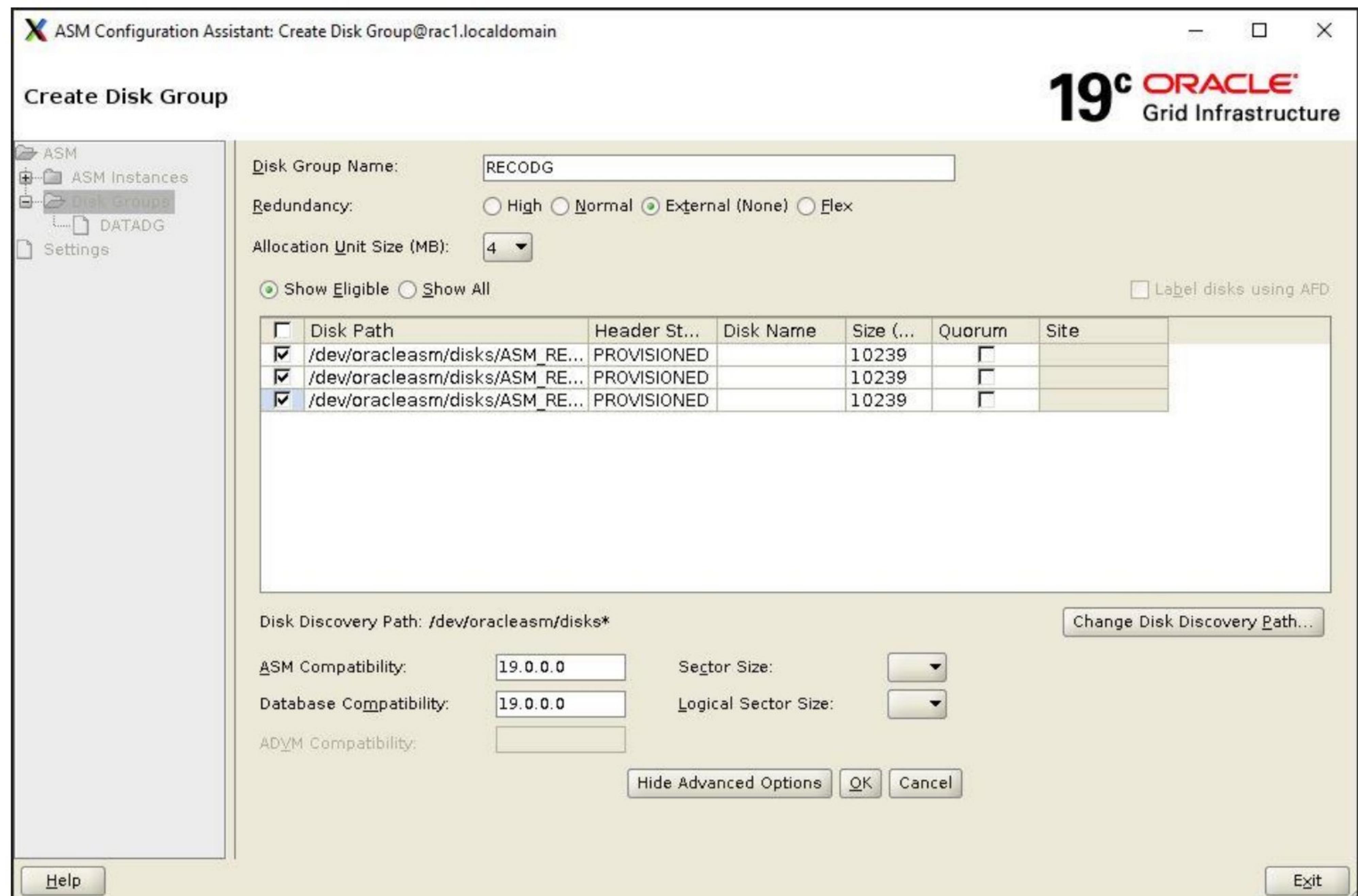
INSTANCE_NAME	INSTANCE_NUMBER
+ASM1	1
+ASM2	2

```
SQL>
```

```
[oracle@rac1 ~]$ ps -ef | grep pmon
oracle  2001  1 0 20:17 ?    00:00:00 asm_pmon_+ASM1
oracle  7455 3018 0 21:14 pts/0  00:00:00 grep --color=auto pmon
oracle 14843  1 0 20:54 ?    00:00:00 mdb_pmon_-MGMTDB
[oracle@rac1 ~]$
```

```
[oracle@rac2 ~]$ ps -ef | grep pmon
oracle 17758 3025 0 21:14 pts/0  00:00:00 grep --color=auto pmon
oracle 24658  1 0 20:27 ?    00:00:00 asm_pmon_+ASM2
[oracle@rac2 ~]$
```

### Using ASMCA – creating diskgroup for Flash Recovery Area (RECODG)



ASM Configuration Assistant: Disk Groups@rac1.localdomain

**Disk Groups**

**19c ORACLE Grid Infrastructure**

Disk Group Name	Size (GB)	Free (GB)	Usable (GB)	Redundancy	State
RECODG	29.99	29.83	29.83	EXTERN	MOUNTED(2 of 2)
DATADG	39.98	16.57	16.57	EXTERN	MOUNTED(2 of 2)

Disk Group Name: RECODG

Size (GB): 29.99

Free (GB): 29.83

Usable (GB): 29.83

Redundancy: EXTERN

State: MOUNTED(2 of 2)

Disk Group Name: DATADG

Size (GB): 39.98

Free (GB): 16.57

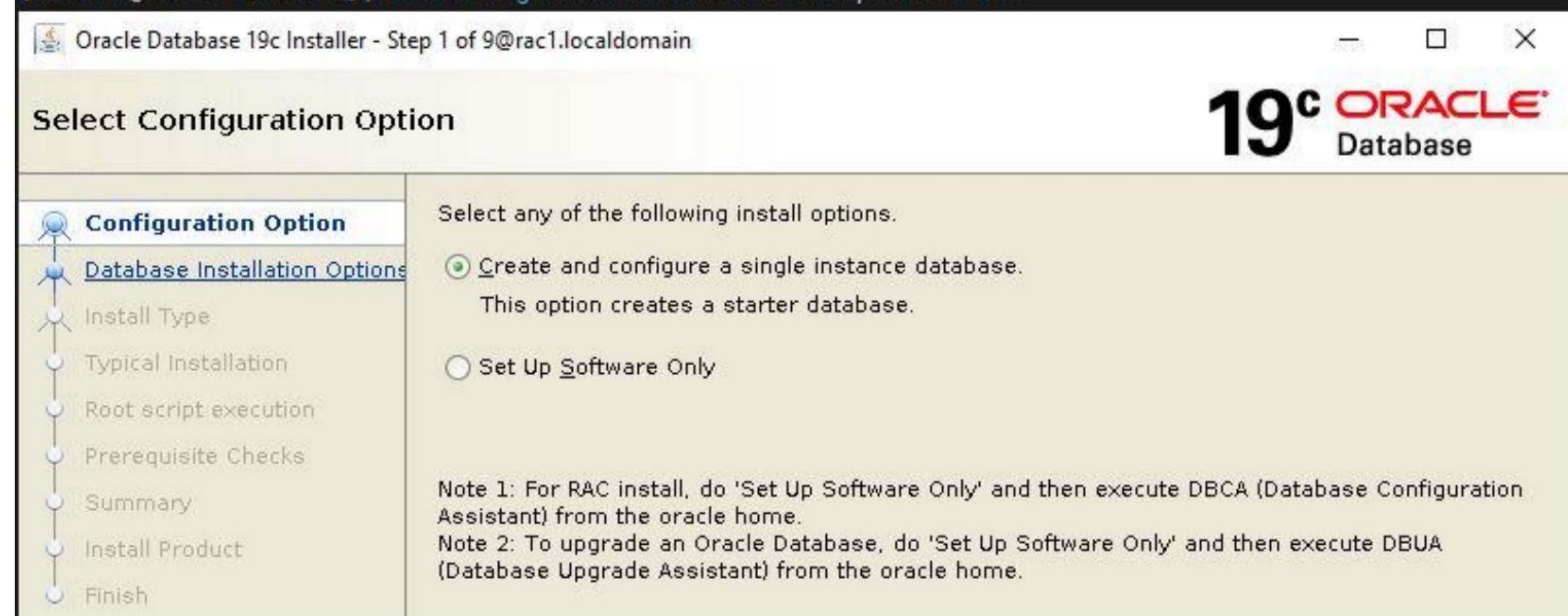
Usable (GB): 16.57

Redundancy: EXTERN

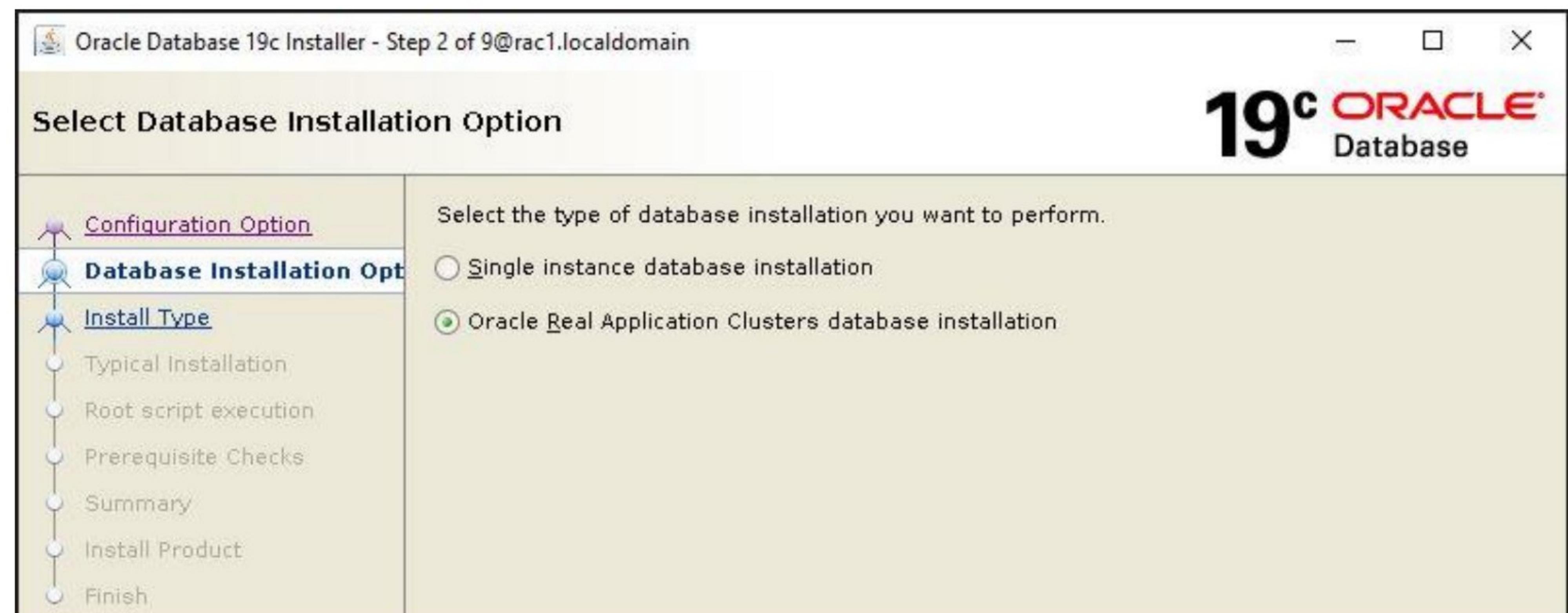
State: MOUNTED(2 of 2)

## Installation of Oracle 19c (19.3.0) RDBMS binaries

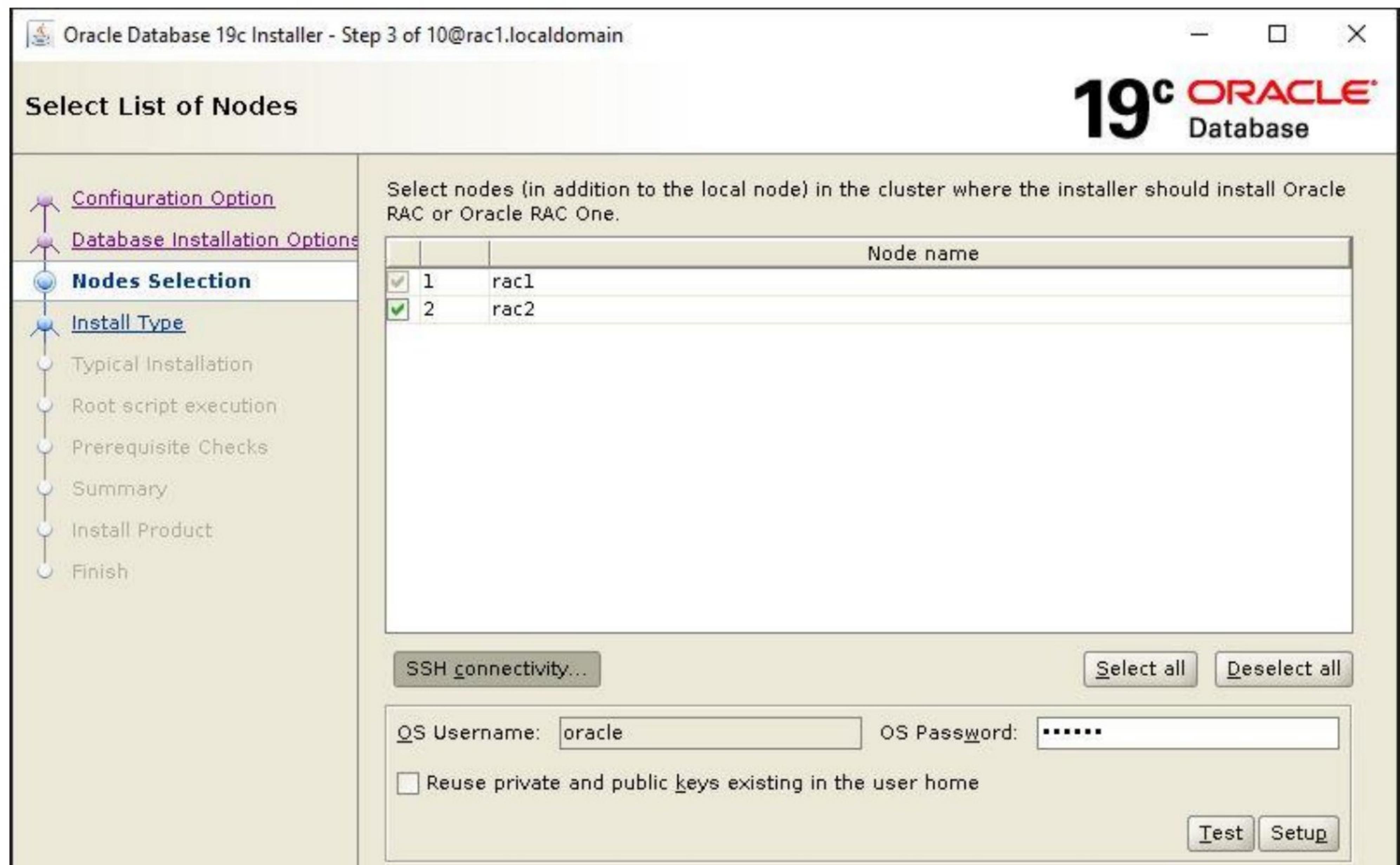
```
[oracle@rac1 ~]$ cd database/  
[oracle@rac1 database]$ ./runInstaller &  
[1] 10343  
[oracle@rac1 database]$ Launching Oracle Database Setup Wizard...
```



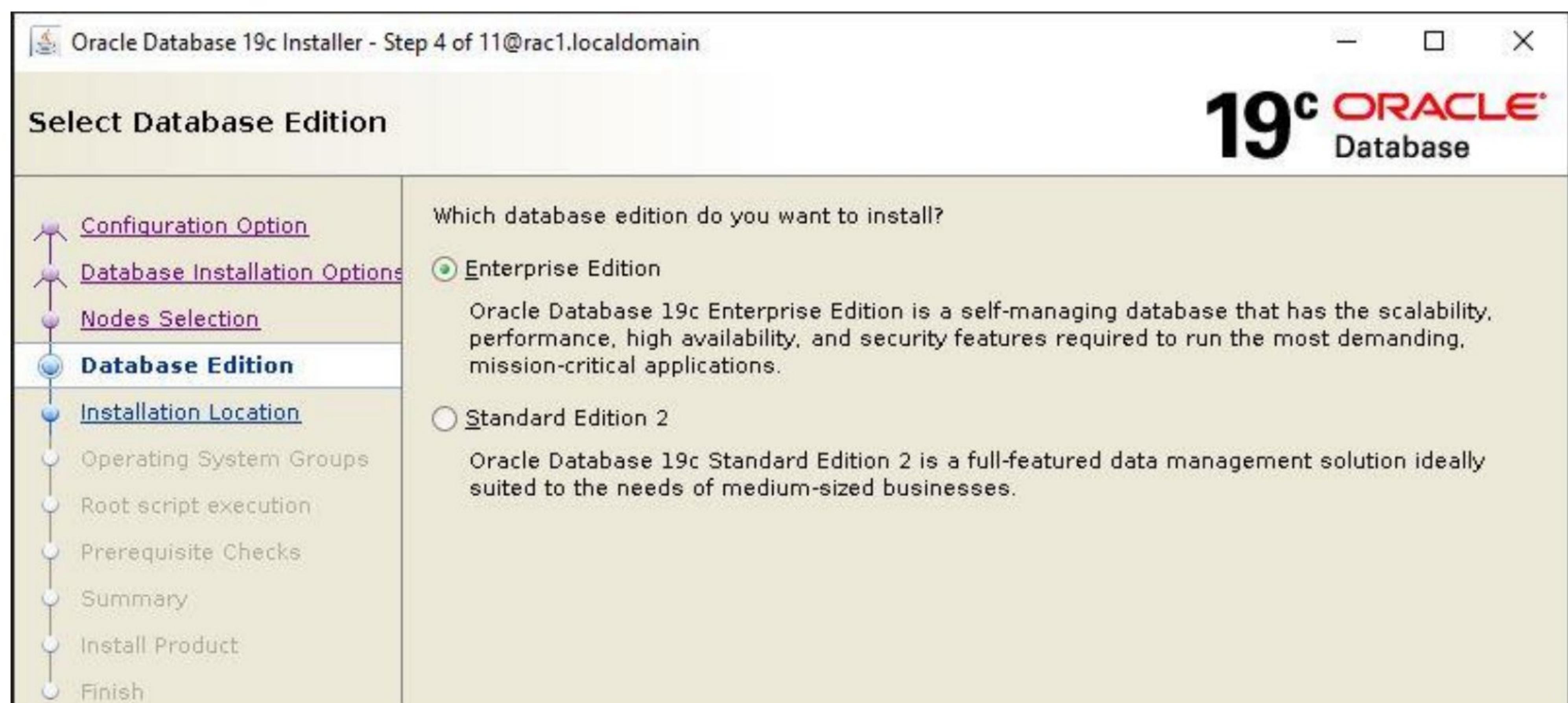
Select the option – Set Up Software Only



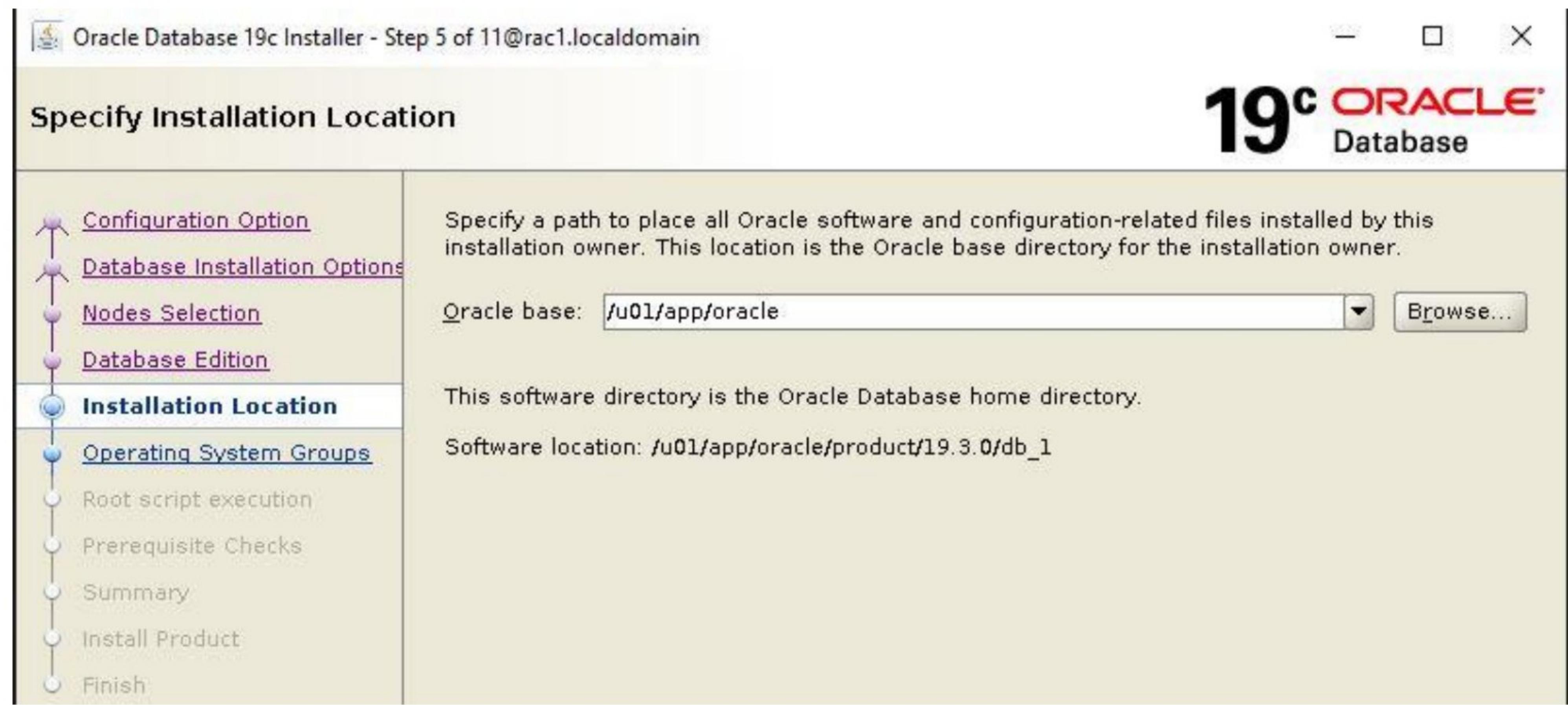
Select the option – “Oracle Real Application Clusters database installation” and click “NEXT”.



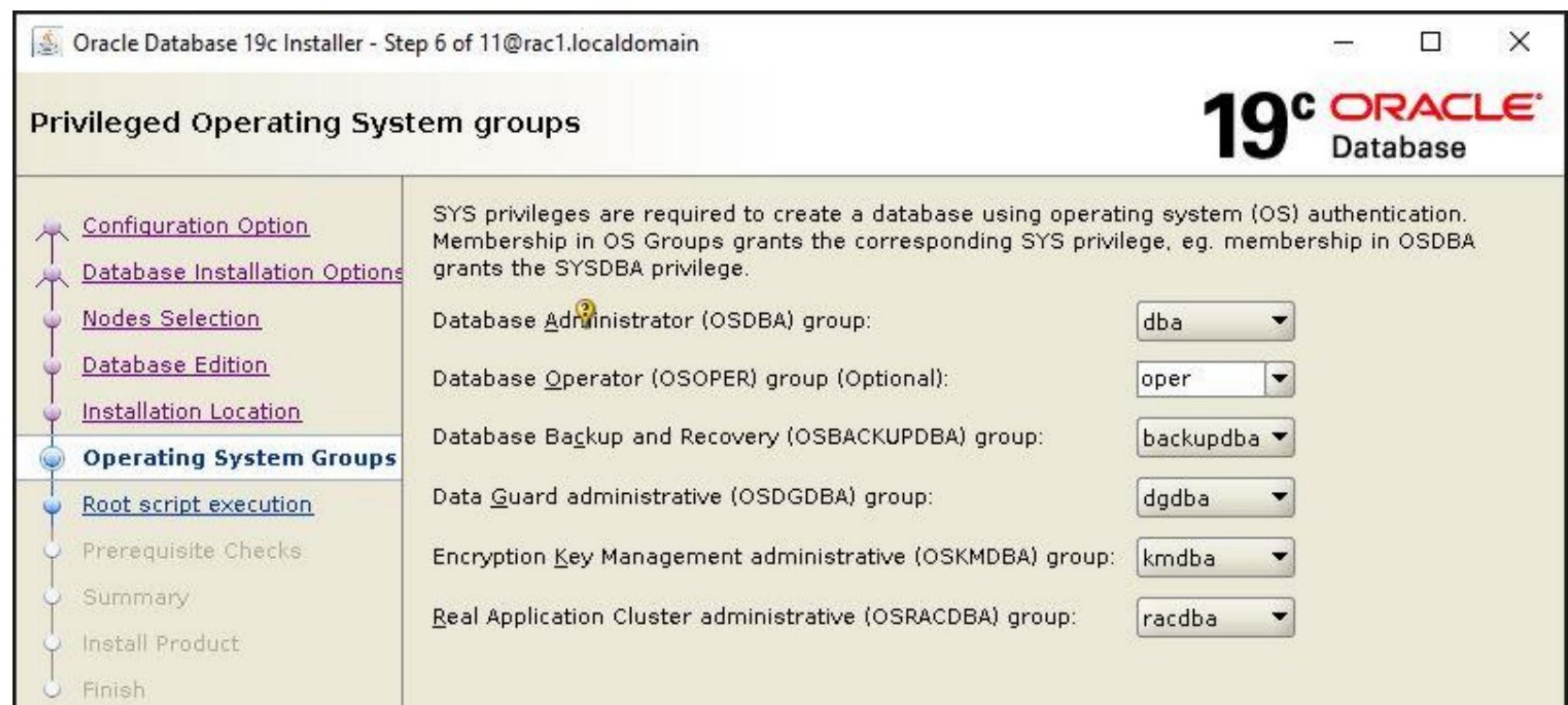
Check that the 2 nodes are selected, click on the "SSH Connectivity" button and enter the password for the user "oracle". Click the "Setup" button to configure SSH connectivity, and the "Test" button to test it, then press "Next".



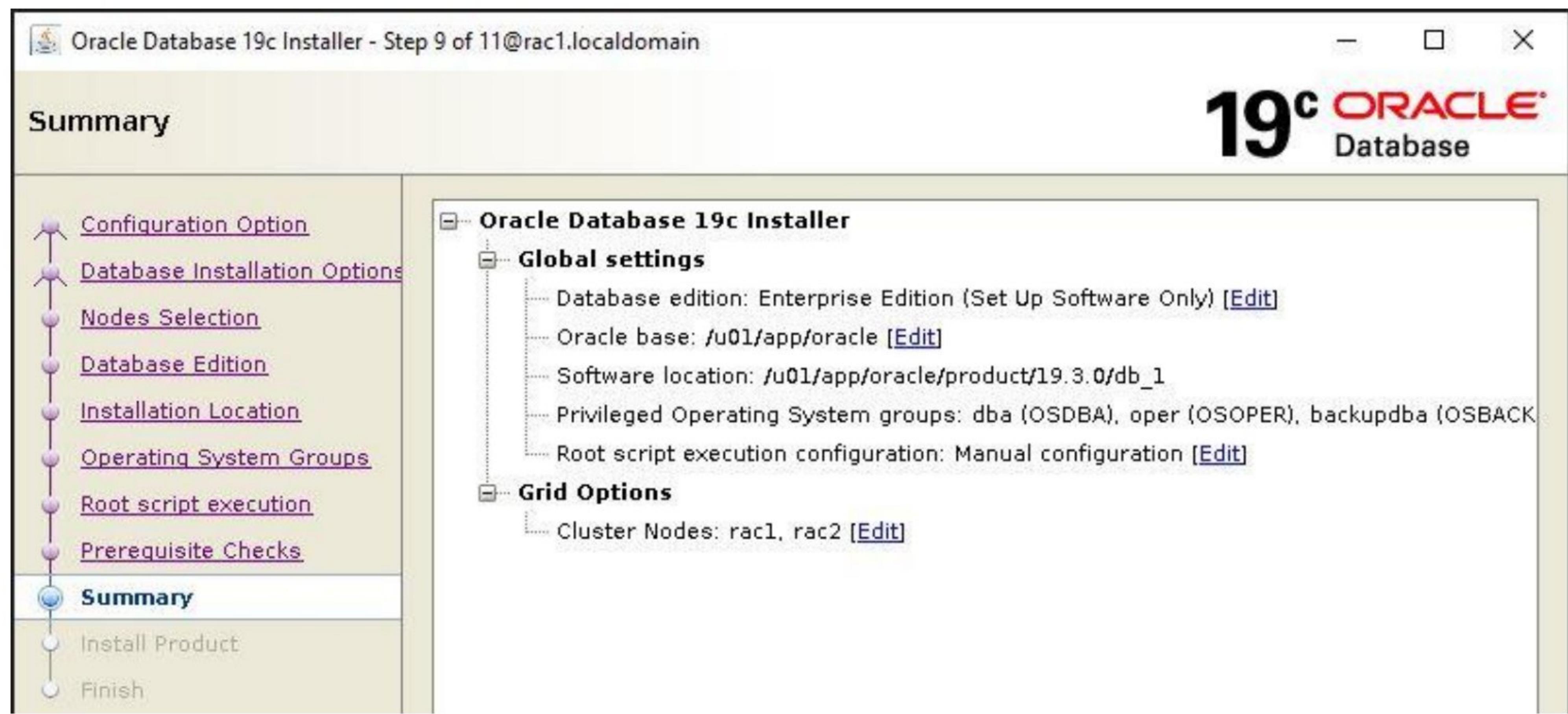
At the “Database Edition” screen, select the Enterprise Edition option and click “NEXT”.



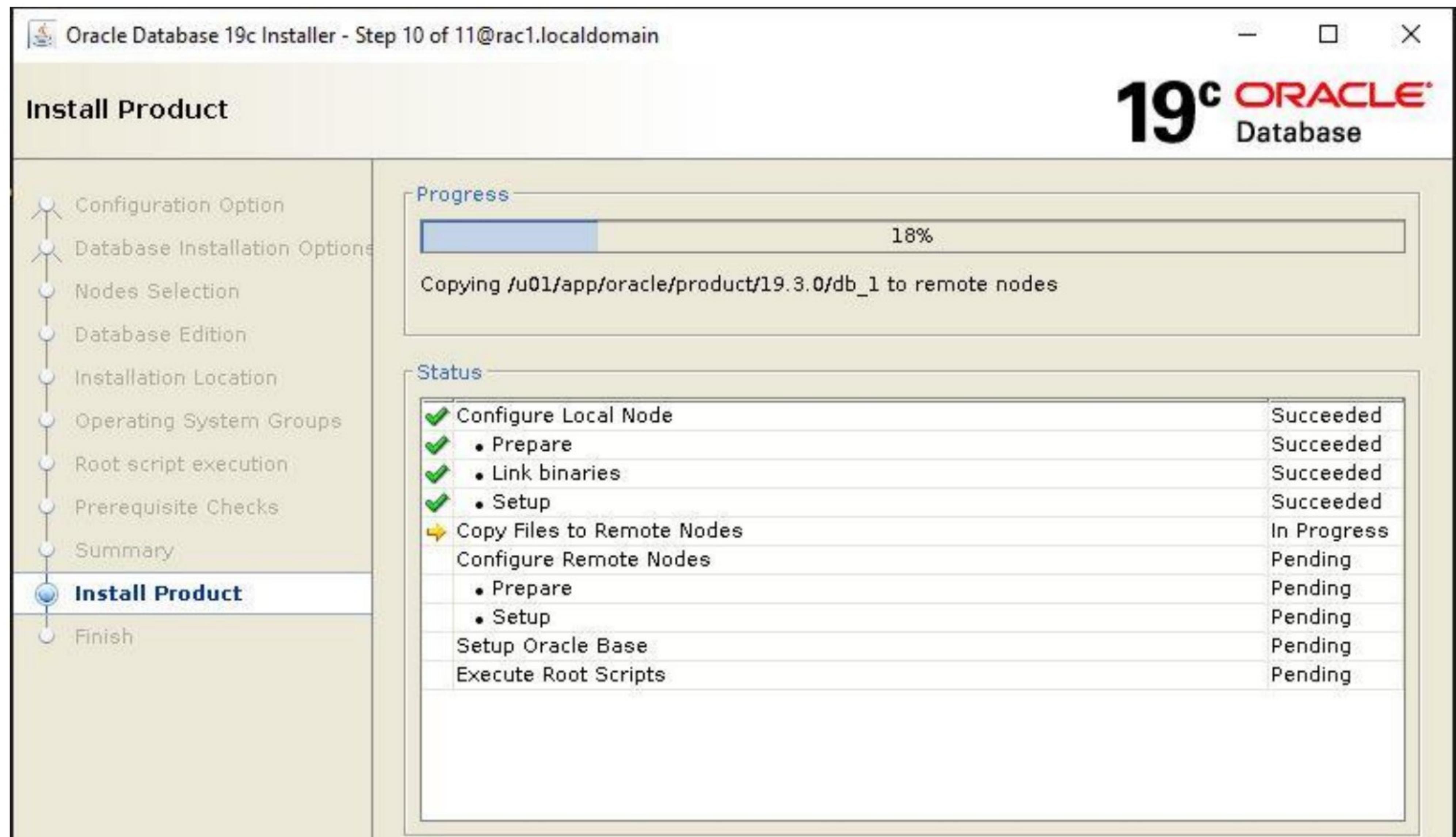
On the “Installation Location” screen, we recommend following the standard suggestion, if necessary, change the path, and after that click on “NEXT”.

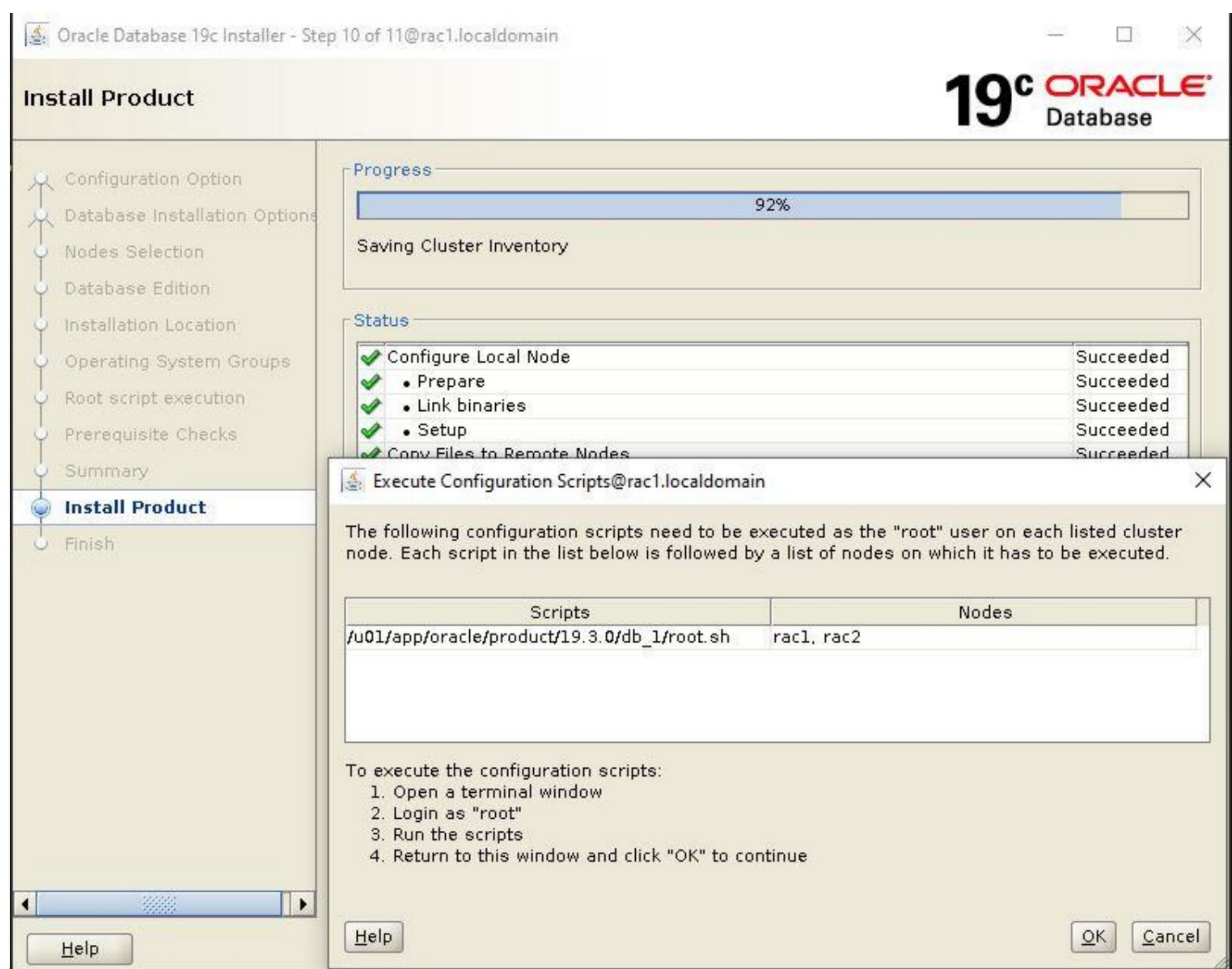


Keep the defaults in "Operating Systems Groups" and press "Next". Ignore warning on the next screen.



In the item Prerequisite Checks, in my installation it passed without major problems, if I present something to you, check the alerts, solve the problems before installation.  
After everything is OK click on Install.





### Execute the following scripts as a 'root' user in cluster nodes

```
[root@rac1 ~]# /u01/app/oracle/product/19.3.0/db_1/root.sh
```

Performing root user operation.

The following environment variables are set as:

ORACLE\_OWNER= oracle

ORACLE\_HOME= /u01/app/oracle/product/19.3.0/db\_1

Enter the full pathname of the local bin directory: [/usr/local/bin]:

The contents of "dbhome" have not changed. No need to overwrite.

The contents of "oraenv" have not changed. No need to overwrite.

The contents of "coraenv" have not changed. No need to overwrite.

Entries will be added to the /etc/oratab file as needed by

Database Configuration Assistant when a database is created

Finished running generic part of root script.

Now product-specific root actions will be performed.

```
[root@rac1 ~]#
```

```
[root@rac2 ~]# /u01/app/oracle/product/19.3.0/db_1/root.sh
```

Performing root user operation.

The following environment variables are set as:

```
ORACLE_OWNER= oracle  
ORACLE_HOME= /u01/app/oracle/product/19.3.0/db_1
```

Enter the full pathname of the local bin directory: [/usr/local/bin]:

The contents of "dbhome" have not changed. No need to overwrite.

The contents of "oraenv" have not changed. No need to overwrite.

The contents of "coraenv" have not changed. No need to overwrite.

Entries will be added to the /etc/oratab file as needed by

Database Configuration Assistant when a database is created

Finished running generic part of root script.

Now product-specific root actions will be performed.

```
[root@rac2 ~]#
```

```
[oracle@rac1 db_1]$ export ORACLE_BASE=/u01/app/oracle
```

```
[oracle@rac1 db_1]$ export ORACLE_HOME=/u01/app/oracle/product/19.3.0/db_1
```

```
[oracle@rac1 db_1]$ ./runInstaller &
```

```
[1] 15836
```

```
[oracle@rac1 db_1]$ Launching Oracle Database Setup Wizard...
```

The response file for this session can be found at:

```
/u01/app/oracle/product/19.3.0/db_1/install/response/db_2020-08-16_09-26-27PM.rsp
```

You can find the log of this install session at:

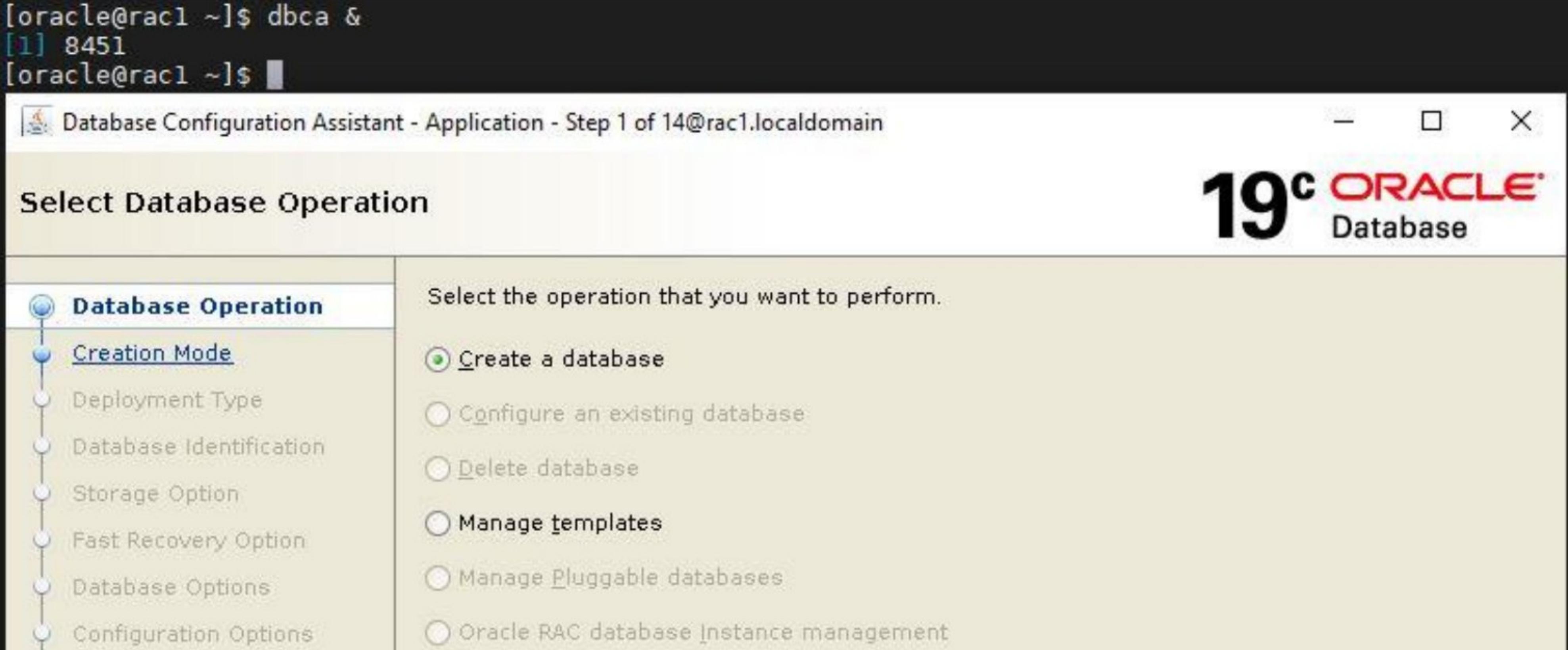
```
/u01/app/oralInventory/logs/InstallActions2020-08-16_09-26-27PM/installActions2020-08-16_09-26-27PM.log
```

```
[1]+ Exit 6          ./runInstaller
```

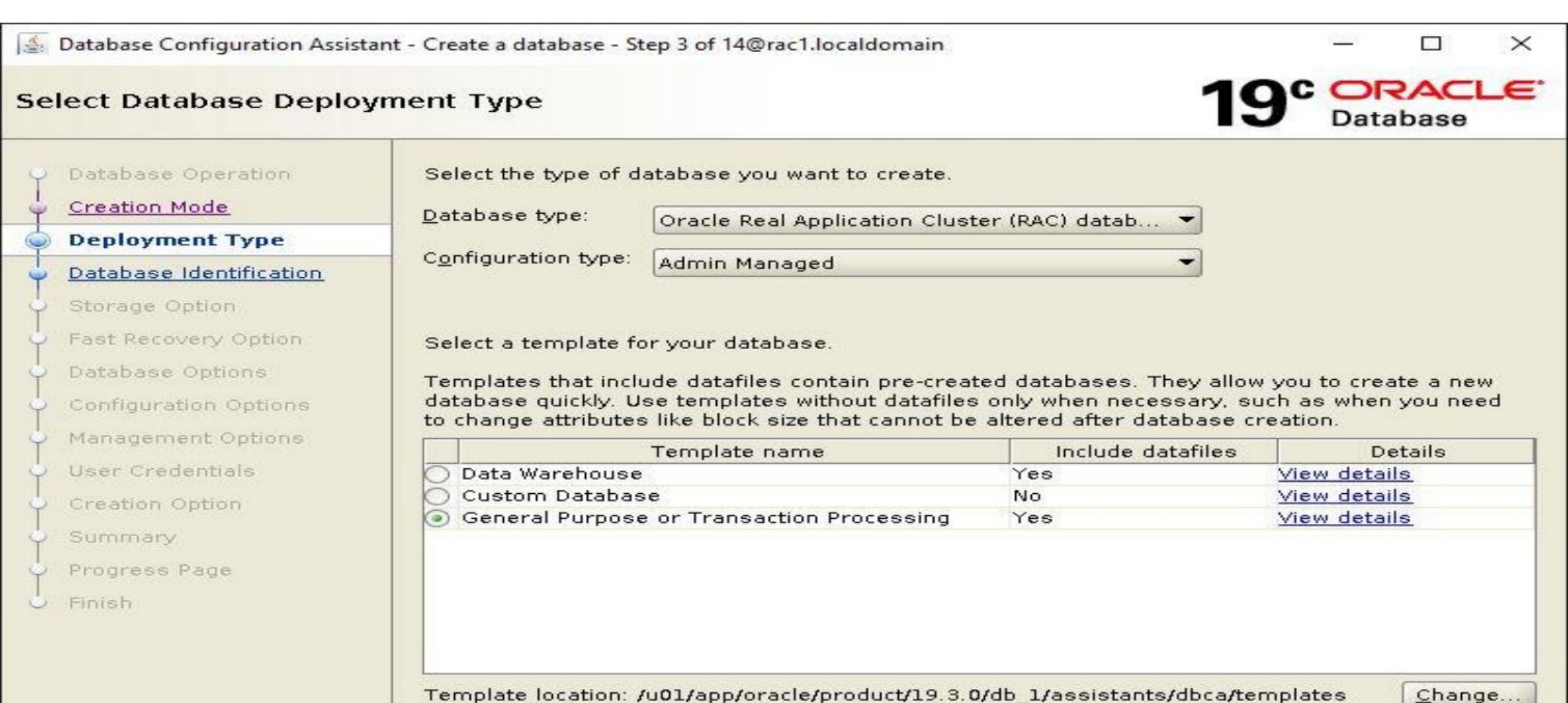
```
[oracle@rac1 db_1]$
```

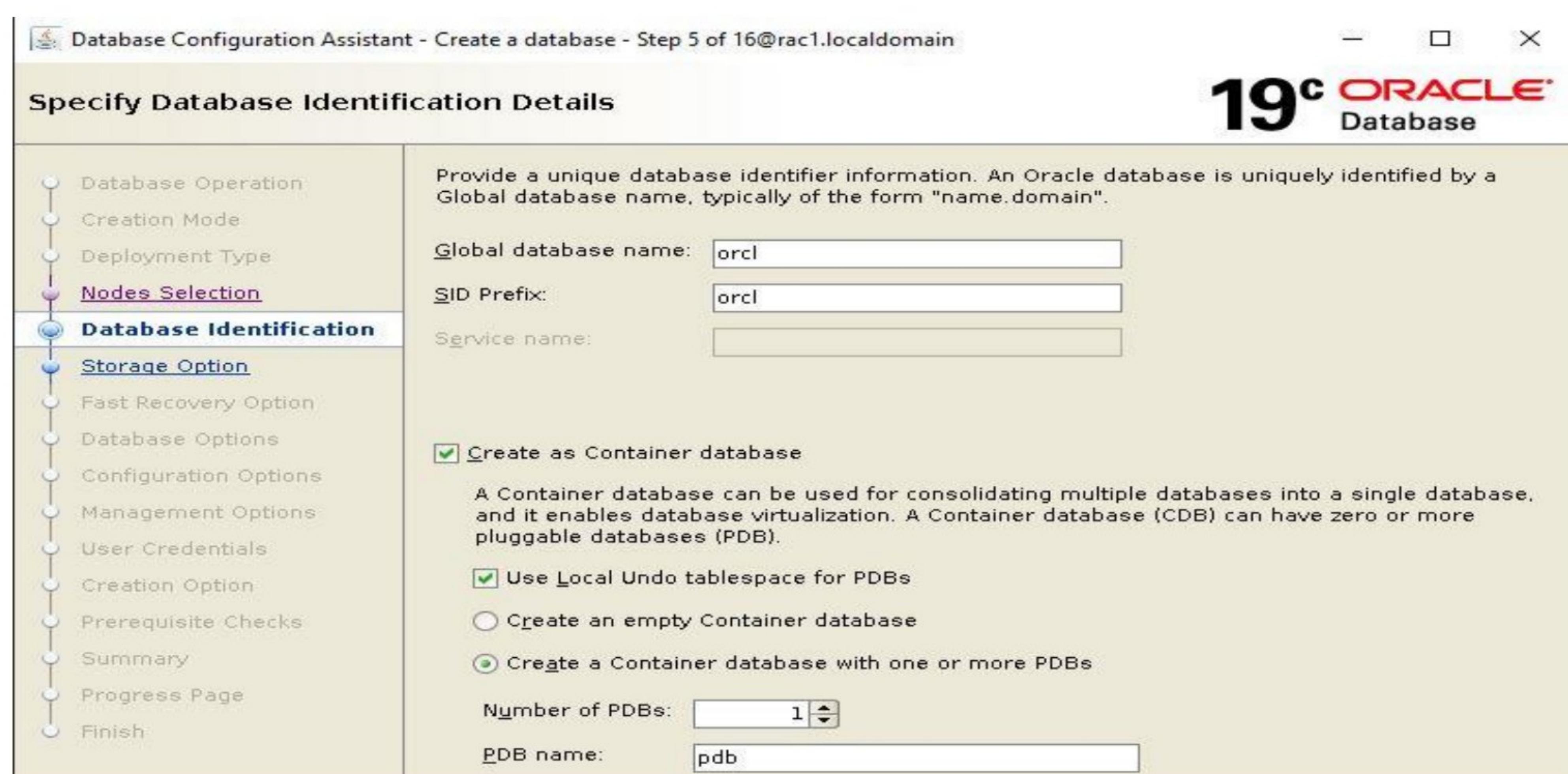
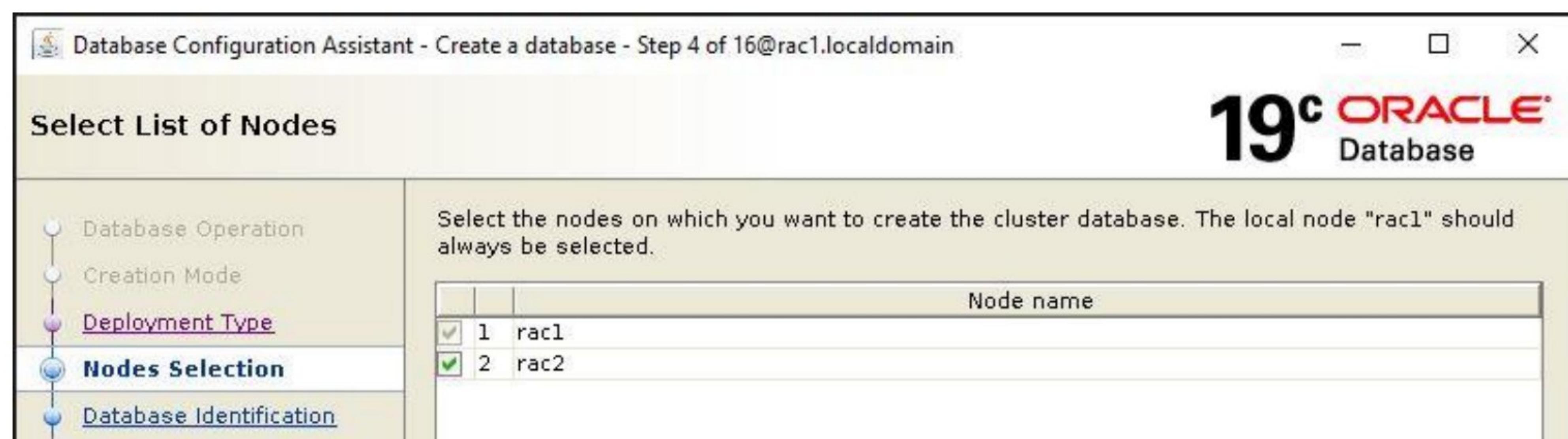
## Creation and Configuration of Oracle 19c (19.3.0) RAC Database

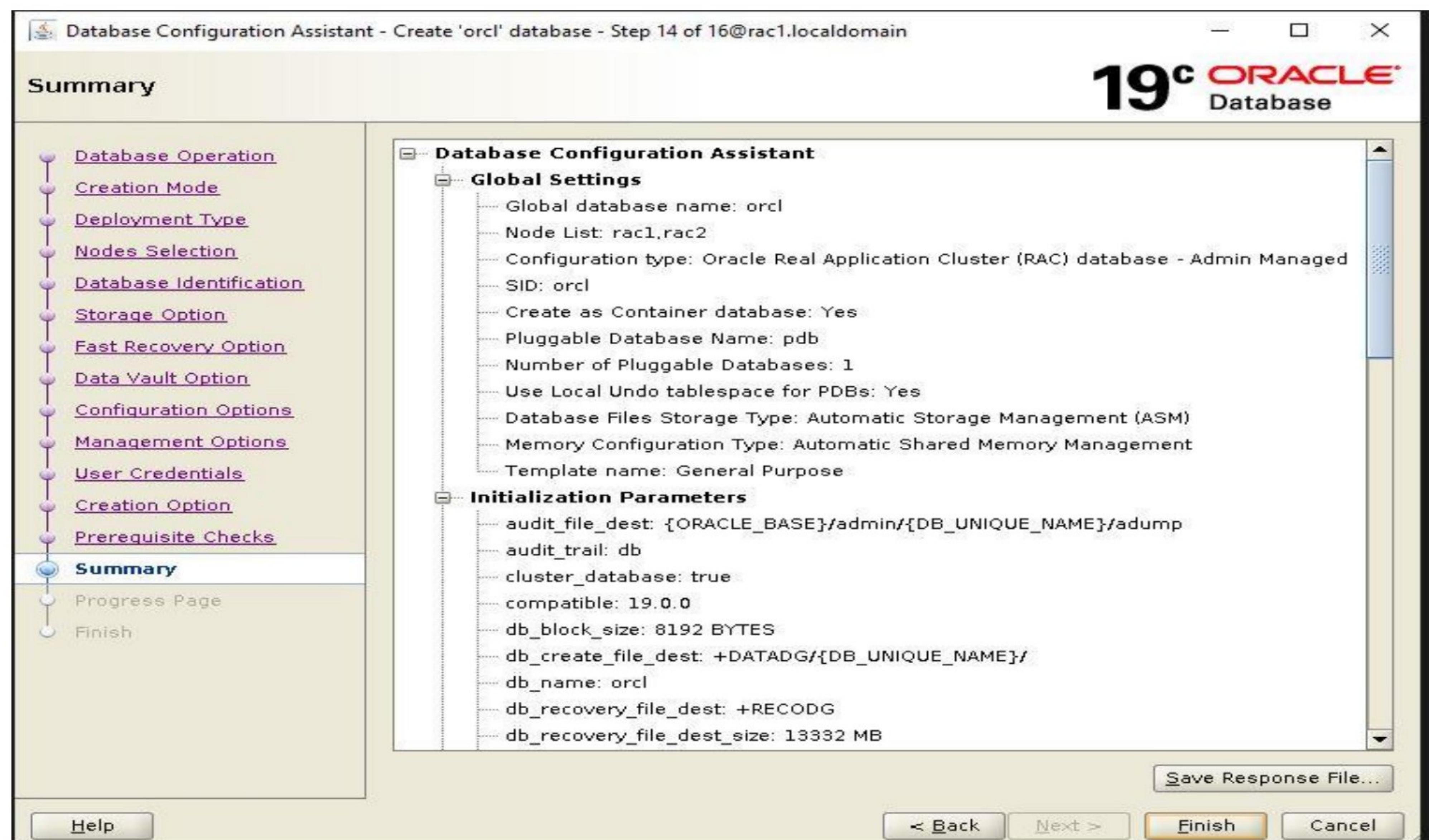
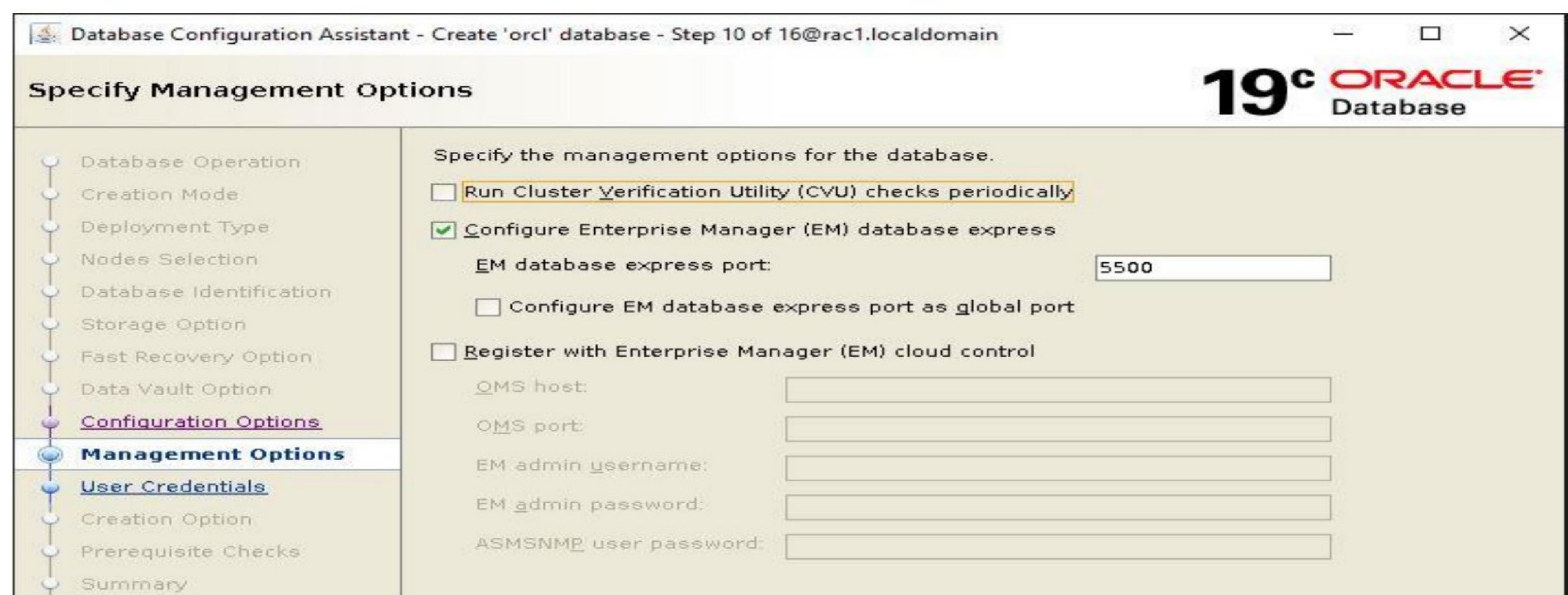
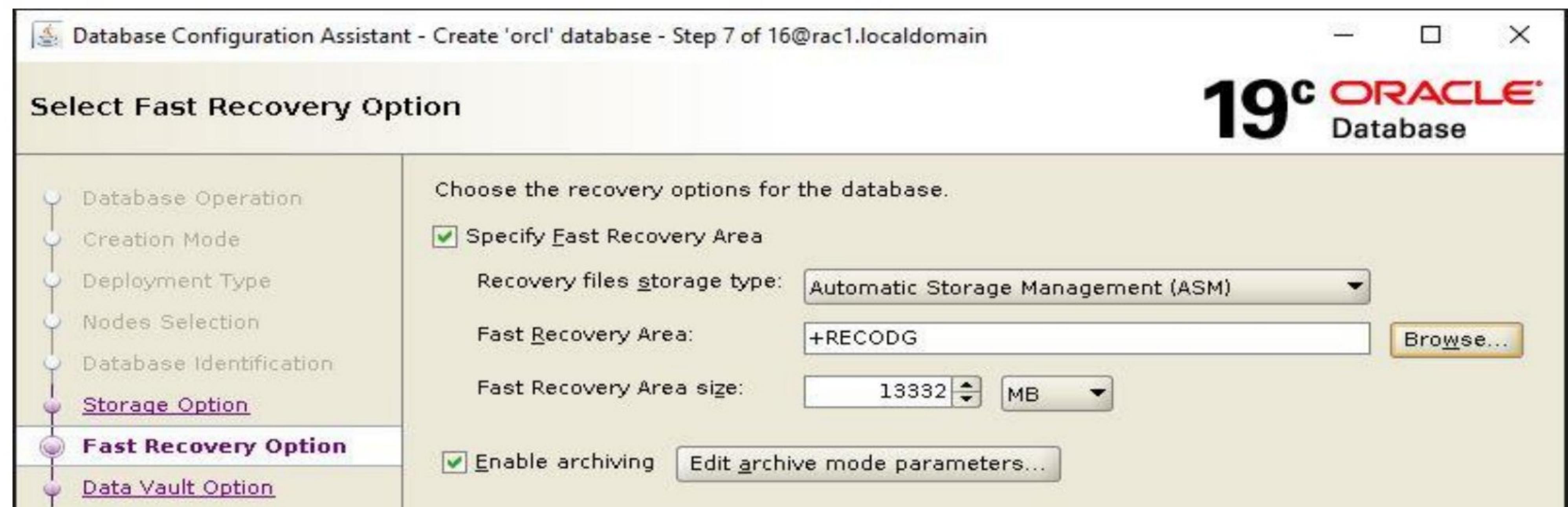
```
[oracle@rac1 ~]$ dbca &
[1] 8451
[oracle@rac1 ~]$
```

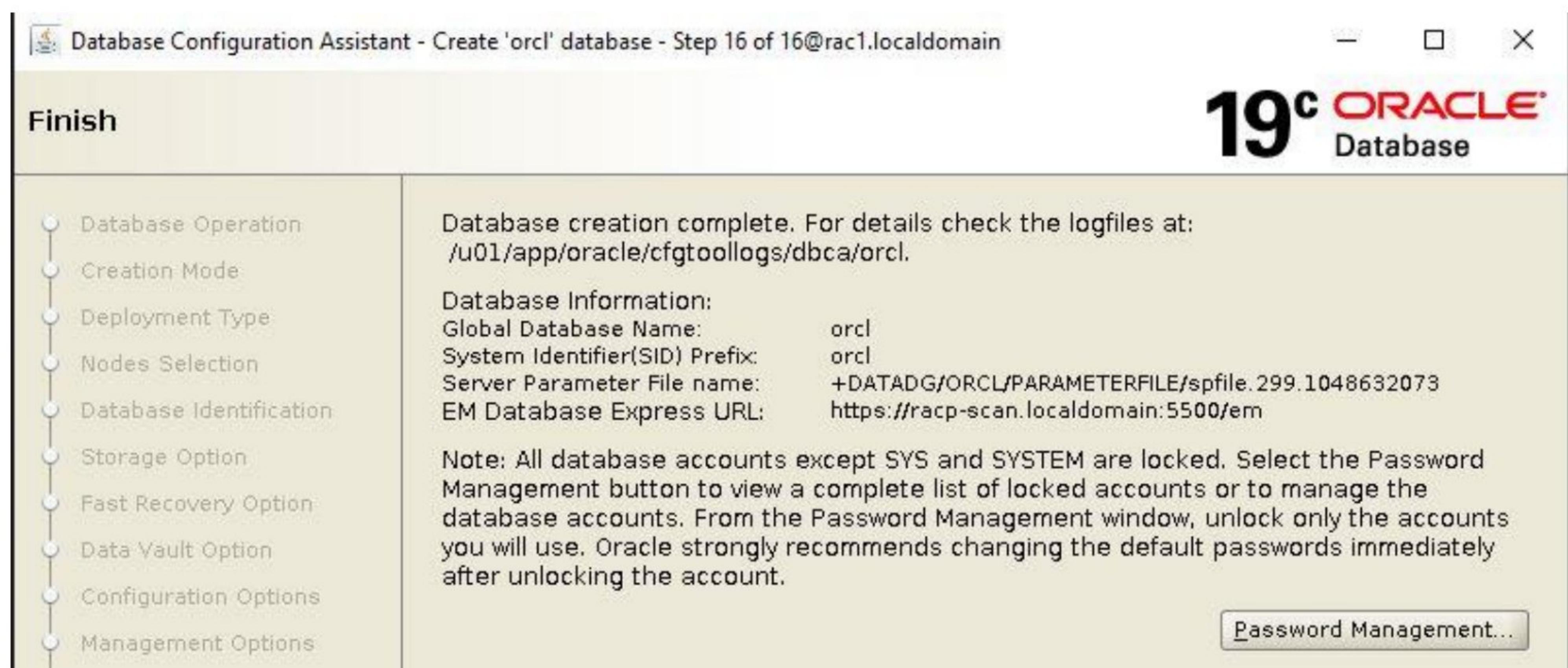












```
[oracle@rac1 ~]$ srvctl config database -d orcl
Database unique name: orcl
Database name: orcl
Oracle home: /u01/app/oracle/product/19.3.0/db_1
Oracle user: oracle
Spfile: +DATADG/ORCL/PARAMETERFILE/spfile.299.1048632073
Password file: +DATADG/ORCL/PASSWORD/pwdorcl.283.1048630197
Domain:
Start options: open
Stop options: immediate
Database role: PRIMARY
Management policy: AUTOMATIC
Server pools:
Disk Groups: RECODG,DATADG
Mount point paths:
Services:
Type: RAC
Start concurrency:
Stop concurrency:
OSDBA group: dba
OSOPER group: oper
Database instances: orcl1,orcl2
Configured nodes: rac1, rac2
CSS critical: no
CPU count: 0
Memory target: 0
Maximum memory: 0
Default network number for database services:
Database is administrator managed
```

```
[oracle@rac1 ~]$
```

```
[oracle@rac1 ~]$ srvctl status database -d orcl
Instance orcl1 is running on node rac1
Instance orcl2 is running on node rac2
[oracle@rac1 ~]$
```

```
[oracle@rac1 ~]$ sqlplus sys/oracle@orcl as sysdba
```

```
SQL*Plus: Release 19.0.0.0.0 - Production on Sun Aug 16 22:54:17 2020
Version 19.3.0.0.0
Copyright (c) 1982, 2019, Oracle. All rights reserved.
Connected to:
Oracle Database 19c Enterprise Edition Release 19.0.0.0.0 - Production
Version 19.3.0.0.0
```

```
SQL> select instance_name, instance_number from gv$instance;
```

INSTANCE_NAME	INSTANCE_NUMBER
orcl2	2
orcl1	1

```
SQL>
```

```
SQL> show pdbs
```

CON_ID	CON_NAME	OPEN MODE	RESTRICTED
2	PDB\$SEED	READ ONLY	NO
3	PDB	READ WRITE	NO

```
SQL>
```

### **Restarting complete stack:**

Just start Oracle ZFS Storage first and start both the cluster nodes (rac1 and rac2). The sequence of steps is below.

Login as 'root' user and stop cluster using the following command.

```
[root@rac2 ~]# crsctl stop cluster -all
CRS-2673: Attempting to stop 'ora.crsd' on 'rac2'
CRS-2673: Attempting to stop 'ora.crsd' on 'rac1'
CRS-2790: Starting shutdown of Cluster Ready Services-managed resources on server 'rac2'
CRS-2673: Attempting to stop 'ora.chad' on 'rac2'
CRS-2673: Attempting to stop 'ora.orcl.db' on 'rac2'
CRS-2673: Attempting to stop 'ora.qosmserver' on 'rac2'
```

```
CRS-2790: Starting shutdown of Cluster Ready Services-managed resources on server 'rac1'
CRS-2673: Attempting to stop 'ora.orcl.db' on 'rac1'
CRS-2677: Stop of 'ora.orcl.db' on 'rac2' succeeded
CRS-33673: Attempting to stop resource group 'ora.asmgroup' on server 'rac2'
CRS-2673: Attempting to stop 'ora.RECODG.dg' on 'rac2'
CRS-2673: Attempting to stop 'ora.DATADG.dg' on 'rac2'
CRS-2673: Attempting to stop 'ora.LISTENER.lsnr' on 'rac2'
CRS-2673: Attempting to stop 'ora.LISTENER_SCAN2.lsnr' on 'rac2'
CRS-2673: Attempting to stop 'ora.LISTENER_SCAN3.lsnr' on 'rac2'
CRS-2673: Attempting to stop 'ora.cvu' on 'rac2'
CRS-2677: Stop of 'ora.RECODG.dg' on 'rac2' succeeded
CRS-2677: Stop of 'ora.orcl.db' on 'rac1' succeeded
CRS-2673: Attempting to stop 'ora.LISTENER.lsnr' on 'rac1'
CRS-2673: Attempting to stop 'ora.LISTENER_SCAN1.lsnr' on 'rac1'
CRS-2677: Stop of 'ora.DATADG.dg' on 'rac2' succeeded
CRS-2673: Attempting to stop 'ora.asm' on 'rac2'
CRS-2677: Stop of 'ora.LISTENER.lsnr' on 'rac2' succeeded
CRS-2673: Attempting to stop 'ora.rac2.vip' on 'rac2'
CRS-2677: Stop of 'ora.LISTENER_SCAN2.lsnr' on 'rac2' succeeded
CRS-2677: Stop of 'ora.LISTENER_SCAN3.lsnr' on 'rac2' succeeded
CRS-2673: Attempting to stop 'ora.scan2.vip' on 'rac2'
CRS-2673: Attempting to stop 'ora.scan3.vip' on 'rac2'
CRS-2677: Stop of 'ora.LISTENER.lsnr' on 'rac1' succeeded
CRS-2677: Stop of 'ora.cvu' on 'rac2' succeeded
CRS-2677: Stop of 'ora.LISTENER_SCAN1.lsnr' on 'rac1' succeeded
CRS-2673: Attempting to stop 'ora.scan1.vip' on 'rac1'
CRS-2677: Stop of 'ora.rac2.vip' on 'rac2' succeeded
CRS-2677: Stop of 'ora.scan1.vip' on 'rac1' succeeded
CRS-2677: Stop of 'ora.scan2.vip' on 'rac2' succeeded
CRS-2677: Stop of 'ora.scan3.vip' on 'rac2' succeeded
CRS-2677: Stop of 'ora.qosmserver' on 'rac2' succeeded
CRS-2677: Stop of 'ora.chad' on 'rac2' succeeded
CRS-2673: Attempting to stop 'ora.chad' on 'rac1'
CRS-2677: Stop of 'ora.chad' on 'rac1' succeeded
CRS-2673: Attempting to stop 'ora.mgmtdb' on 'rac1'
CRS-2677: Stop of 'ora.mgmtdb' on 'rac1' succeeded
CRS-2673: Attempting to stop 'ora.MGMTLSNR' on 'rac1'
CRS-2677: Stop of 'ora.MGMTLSNR' on 'rac1' succeeded
CRS-2673: Attempting to stop 'ora.rac1.vip' on 'rac1'
CRS-2677: Stop of 'ora.rac1.vip' on 'rac1' succeeded
[root@rac2 ~]#
```

#### **Cluster Node (rac1):**

```
[root@rac1 ~]# systemctl restart iscsid
[root@rac1 ~]# systemctl restart iscsi
[root@rac1 ~]# iscsiadm -m discovery -t sendtargets -p zfs
192.168.2.150:3260,2 iqn.1986-03.com.sun:02:c8fe1586-0fb9-42e3-a603-fc5323a59181
```

```
[root@rac1 ~]# iscsiadm -m node -p zfs -l

[root@rac1 ~]# /usr/sbin/oracleasm scandisks
Reloading disk partitions: done
Cleaning any stale ASM disks...
Scanning system for ASM disks...
Instantiating disk "ASM_DATA1"
Instantiating disk "ASM_DATA3"
Instantiating disk "ASM_DATA2"
Instantiating disk "ASM_DATA4"
Instantiating disk "ASM_RECO1"
Instantiating disk "ASM_RECO2"
Instantiating disk "ASM_RECO3"

[root@rac1 ~]# /usr/sbin/oracleasm listdisks
ASM_DATA1
ASM_DATA2
ASM_DATA3
ASM_DATA4
ASM_RECO1
ASM_RECO2
ASM_RECO3
[root@rac1 ~]#
```

#### **Cluster Node (rac2):**

```
[root@rac2 ~]# systemctl restart iscsid
[root@rac2 ~]# systemctl restart iscsi
[root@rac2 ~]# iscsiadm -m discovery -t sendtargets -p zfs
192.168.2.150:3260,2 iqn.1986-03.com.sun:02:c8fe1586-0fb9-42e3-a603-fc5323a59181
[root@rac2 ~]# iscsiadm -m node -p zfs -l
[root@rac2 ~]# /usr/sbin/oracleasm scandisks
Reloading disk partitions: done
Cleaning any stale ASM disks...
Scanning system for ASM disks...
Instantiating disk "ASM_DATA1"
Instantiating disk "ASM_DATA2"
Instantiating disk "ASM_DATA3"
Instantiating disk "ASM_DATA4"
Instantiating disk "ASM_RECO1"
Instantiating disk "ASM_RECO2"
Instantiating disk "ASM_RECO3"
[root@rac2 ~]# /usr/sbin/oracleasm listdisks
ASM_DATA1
ASM_DATA2
ASM_DATA3
ASM_DATA4
ASM_RECO1
```

```
ASM_RECO2  
ASM_RECO3  
[root@rac2 ~]#
```

#### Starting the cluster stack and Oracle database:

```
[oracle@rac1 ~]$ su - root  
Password:  
Last login: Mon Aug 17 09:23:50 CDT 2020 on pts/0
```

```
[root@rac1 ~]# . oraenv  
ORACLE_SID = [root] ? +ASM1  
ORACLE_HOME = [/home/oracle] ? /u01/app/19.3.0/grid  
The Oracle base has been set to /u01/app/oracle
```

```
[root@rac1 ~]# crsctl start cluster -all  
CRS-2672: Attempting to start 'ora.cssd' on 'rac1'  
CRS-2672: Attempting to start 'ora.diskmon' on 'rac1'  
CRS-2672: Attempting to start 'ora.cssd' on 'rac2'  
CRS-2676: Start of 'ora.diskmon' on 'rac1' succeeded  
CRS-2672: Attempting to start 'ora.diskmon' on 'rac2'  
CRS-2676: Start of 'ora.diskmon' on 'rac2' succeeded  
CRS-2676: Start of 'ora.cssd' on 'rac1' succeeded  
CRS-2672: Attempting to start 'ora.cluster_interconnect.haip' on 'rac1'  
CRS-2672: Attempting to start 'ora.ctssd' on 'rac1'  
CRS-2676: Start of 'ora.cssd' on 'rac2' succeeded  
CRS-2672: Attempting to start 'ora.cluster_interconnect.haip' on 'rac2'  
CRS-2672: Attempting to start 'ora.ctssd' on 'rac2'  
CRS-2676: Start of 'ora.ctssd' on 'rac1' succeeded  
CRS-2676: Start of 'ora.ctssd' on 'rac2' succeeded  
CRS-2676: Start of 'ora.cluster_interconnect.haip' on 'rac2' succeeded  
CRS-2672: Attempting to start 'ora.asm' on 'rac2'  
CRS-2676: Start of 'ora.cluster_interconnect.haip' on 'rac1' succeeded  
CRS-2672: Attempting to start 'ora.asm' on 'rac1'  
CRS-2676: Start of 'ora.asm' on 'rac1' succeeded  
CRS-2672: Attempting to start 'ora.storage' on 'rac1'  
CRS-2676: Start of 'ora.asm' on 'rac2' succeeded  
CRS-2672: Attempting to start 'ora.storage' on 'rac2'  
CRS-2676: Start of 'ora.storage' on 'rac2' succeeded  
CRS-2672: Attempting to start 'ora.crsd' on 'rac2'  
CRS-2676: Start of 'ora.crsd' on 'rac2' succeeded  
CRS-2676: Start of 'ora.storage' on 'rac1' succeeded  
CRS-2672: Attempting to start 'ora.crsd' on 'rac1'  
CRS-2676: Start of 'ora.crsd' on 'rac1' succeeded  
[root@rac1 ~]# exit  
logout
```

```
[oracle@rac1 ~]$ . oraenv
```

```
ORACLE_SID = [+ASM1] ? orcl
ORACLE_HOME = [/home/oracle] ? /u01/app/oracle/product/19.3.0/db_1
The Oracle base remains unchanged with value /u01/app/oracle
[oracle@rac1 ~]$
```

```
[oracle@rac1 ~]$ srvctl start database -d orcl
```

```
[oracle@rac1 ~]$ srvctl status database -d orcl
Instance orcl1 is running on node rac1
Instance orcl2 is running on node rac2
[oracle@rac1 ~]$
```

Summary: Finally, Oracle 19c (19.8.0) GI and Oracle (19.3.0) Database on Oracle ZFS Storage (OS8.8). We hope we have posted all the steps to configure Oracle ZFS Storage for Cluster Nodes. Good luck. Thanks for referring the article.