

Oracle RAC 21c(21.3.0.0.0) on SUSE Linux Enterprise Server 15 (SP3) for x86-64

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Introduction

This document provides details on installing Oracle Grid/Database 21c on SUSE Linux Enterprise Server 15 SP3. It covers x86_64 version but installation steps are same for other supported platforms. (x86, ia64, System z, etc.).

Official Oracle product documentation is available at: <http://docs.oracle.com/en/>

System Requirements and Specifications

Hardware Requirements

Requirement	Minimum
RAM	32 GB
Swap space	Approx. twice the size of RAM
Disk space in /tmp	8 GB
Disk space for software files	8 GB
Disk space for database files	8 GB

Software Requirements

SUSE

- *SUSE Linux Enterprise Server 15 SP3(x86_64)*
(<https://www.suse.com/products/server/download>)

Oracle

- *Oracle Grid Infrastructure 21c (21.3) (x86_64)*
- *Oracle Database 21c (21.3) (x86_64)*
(<https://www.oracle.com/database/technologies/oracle21c-linux-downloads.html>)

Cluster(4-node) Information

HP DL360 Gen9 Server (Intel Xeon 2x12 core ~ 48 CPU), 64GB RAM

4 NIC per server (two bonded as active/passive) + Static IP Address

Local HDD (500GB)

Three shared SAN Partition (ASM: 30GB & NFS:400GB, OAST:600GB)

OS: SUSE Linux Enterprise Server 15 SP3(x86_64)

Kernel version: 5.3.18-59.34-default

Network configuration:

Public

10.156.215.31 c2n1.olab.prv.suse.com c2n1

10.156.215.32 c2n2.olab.prv.suse.com c2n2

10.156.215.33 c2n3.olab.prv.suse.com c2n3

10.156.215.34 c2n4.olab.prv.suse.com c2n4

Private

10.1.1.1 c2n1-priv

10.1.1.2 c2n2-priv

10.1.1.3 c2n3-priv

10.1.1.4 c2n4-priv

Virtual

10.156.215.35 c2n1-vip c2n1-vip.olab.prv.suse.com

10.156.215.36 c2n2-vip c2n2-vip.olab.prv.suse.com

10.156.215.37 c2n3-vip c2n3-vip.olab.prv.suse.com

10.156.215.38 c2n4-vip c2n4-vip.olab.prv.suse.com

SCAN

c2-scan. olab.prv.suse.com (10.156.215.39, 10.156.215.53, 10.156.215.54)

Prerequisites

1. Installing SUSE Linux Enterprise Server 15 SP3 on each cluster node

1-1. Install SUSE Linux Enterprise Server 15 SP3 with “Enhanced Base System, Software Management, X Window System, Oracle Server Base” pattern. You can follow official Oracle Grid/Database Installation manual for selective SLES OS required rpms, however “Oracle Server Base” pattern from SUSE will fulfil minimum setup required for Oracle RAC Installation.

Figure 1-1 Software Installed as shown below

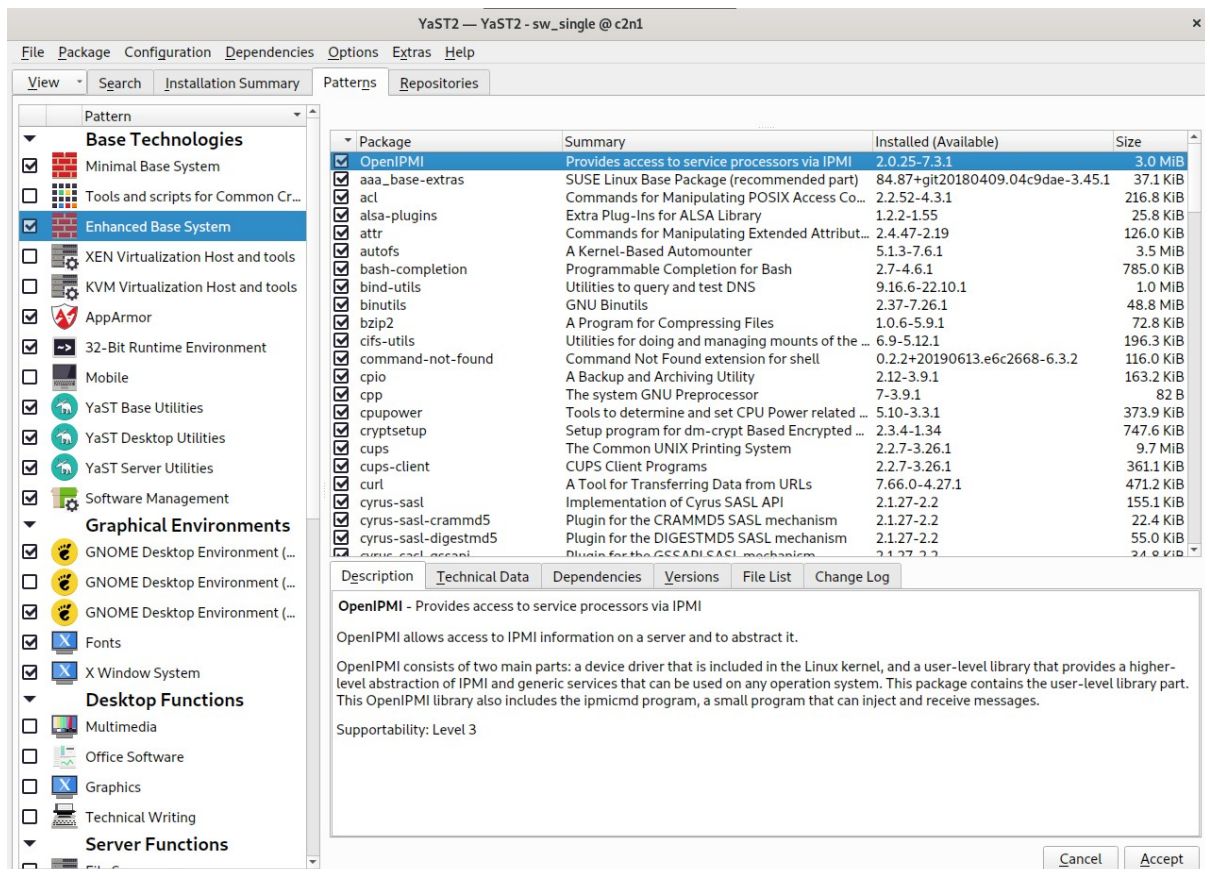
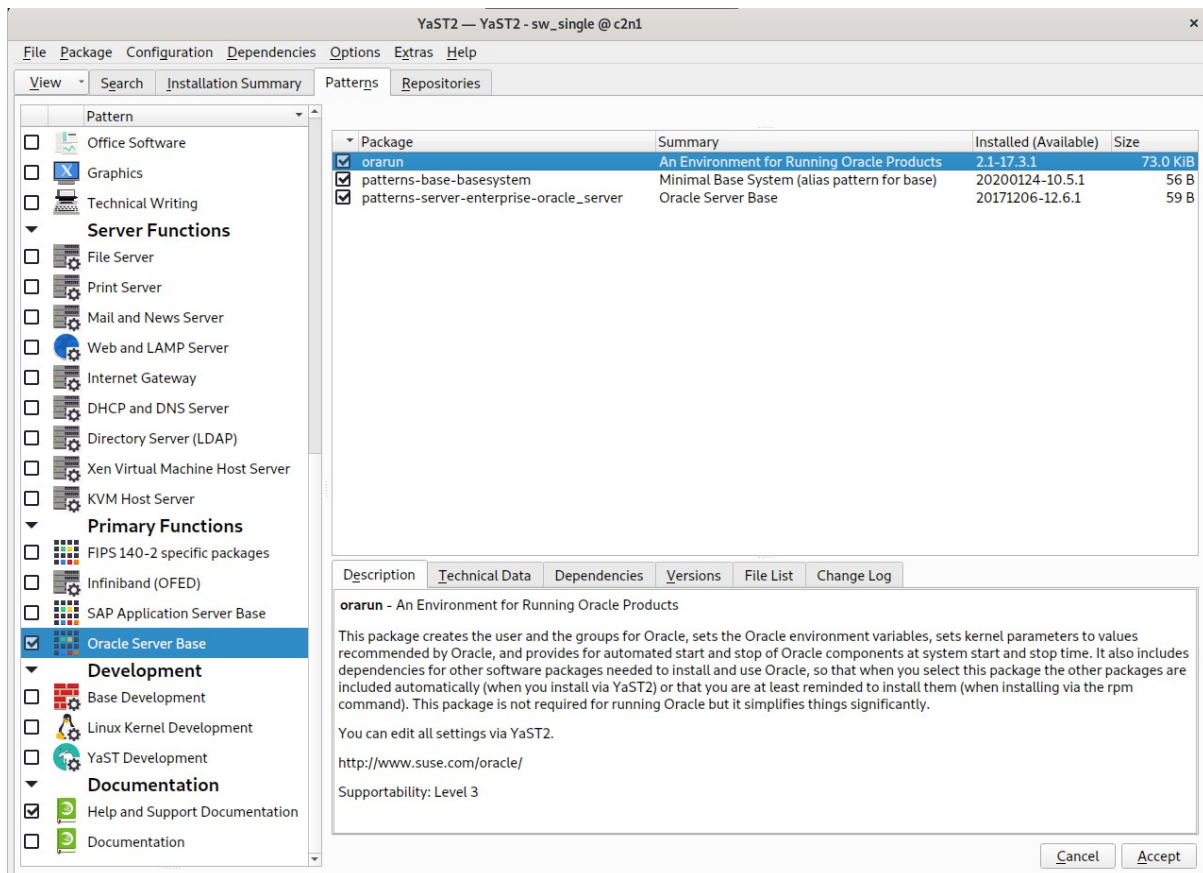


Figure 1-2 Software Installed as shown below**Figure 1-3 OS release information and kernel version**

```
oracle@c2n1:~> more /etc/os-release
NAME="SLES"
VERSION="15-SP3"
VERSION_ID="15.3"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP3"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp3"
DOCUMENTATION_URL="https://documentation.suse.com/"
oracle@c2n1:~> uname -a
Linux c2n1 5.3.18-59.34-default #1 SMP Thu Nov 11 12:18:45 UTC 2021 (a2a53aa) x86_64 x86_64 x86_64 GNU/Linux
oracle@c2n1:~> █
```

2. Oracle software pre-install verify

2-1. Login to the SLES 15 SP3 64-bit OS as a non-admin user. Download Oracle Database 21c Grid Infrastructure (21.3) for Linux x86-64 from:

<https://www.oracle.com/database/technologies/oracle21c-linux-downloads.html>.

2-2. Extract LINUX.X64_213000_grid_home.zip and run Oracle 'runcluvfy.sh' tool to verify cluster setup is ready for install. Resolve any issues you encounter, before proceeding. Please refer official Oracle Install Guide for help.

```
oracle@rac2n1:~/Oracle_SW/grid_21c> ls
acfsccn  acfsrm  bin      clone  cv      diagnostics  gppp      instantclient  jlib  mdns  OPatch  ords  perl  opatch  rhp      runcluvfy.sh  srvm  utl
acfsccreg  addnode  cdata  crf    cvu      env.ora      gridSetup.sh  inventory  ldap  network  opmn  oss  plsql  qos      root.sh      sdk      suptools  welcome.html
acfsca  admvcb  cdp    crs    dba      emv          has        javavm  lib  nls      oracore  osysmond  precomp  racg      root.sh.old  slas      toncat  win
acfslob  assistants  cftoollogs  css  deinstall  gipc      hs        jdbc      log  ohasd  oraInst.loc  oui  pylib  rdms      root.sh.old.1  sqlpatch  ucp  xag
acfsrd  gnsd    cha    ctss  demo      gnsd      install    jdk      md  ologqrd  ord  ovm  python  relnotes  rootstage.sh  sqlplus  usm  xdk
oracle@rac2n1:~/Oracle_SW/grid_21c> ./runcluvfy.sh stage -pre crsinst -n c2n1,c2n2,c2n3,c2n4 -r 21 -verbose
```

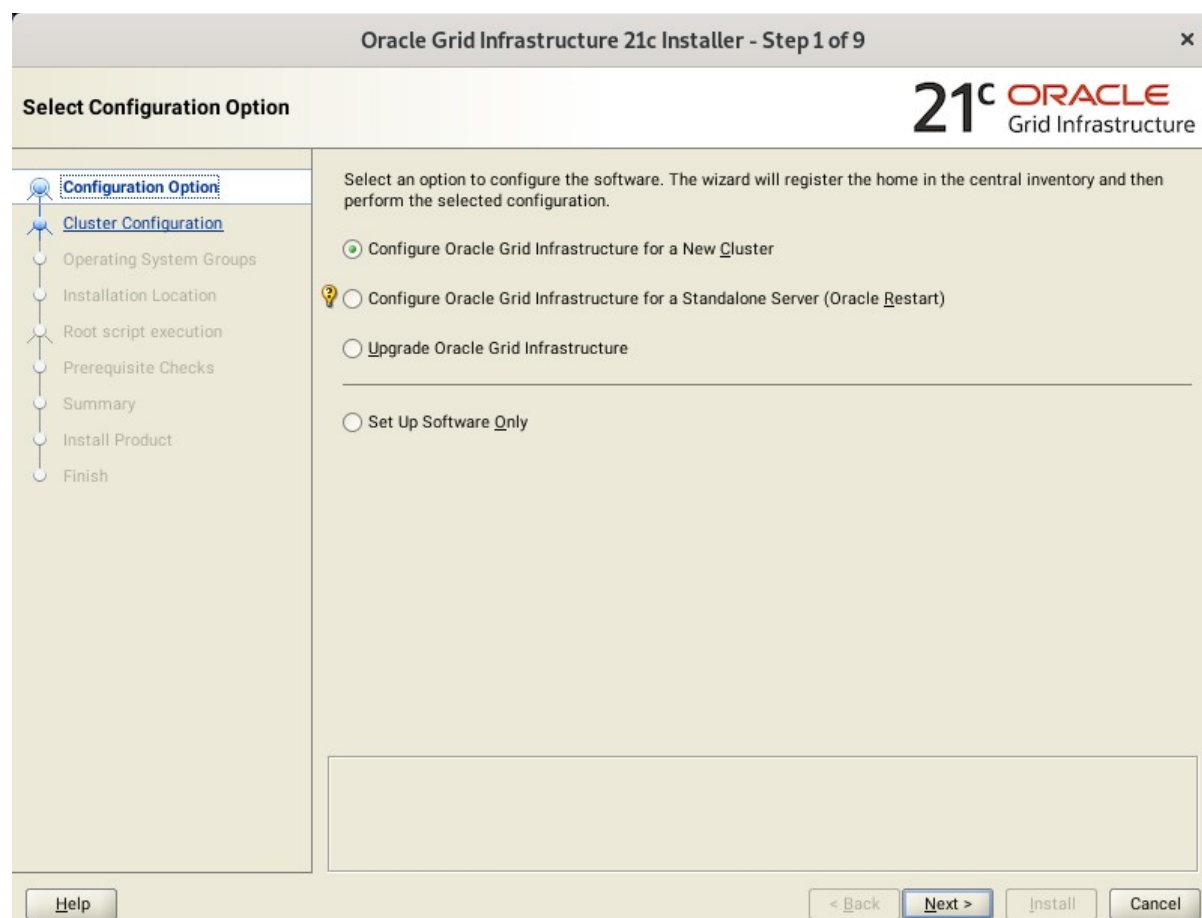
Oracle RAC Installation

1. Installing Oracle Grid Infrastructure.

1-1. Run Oracle Grid installer './gridSetup.sh' from Grid ShipHome.

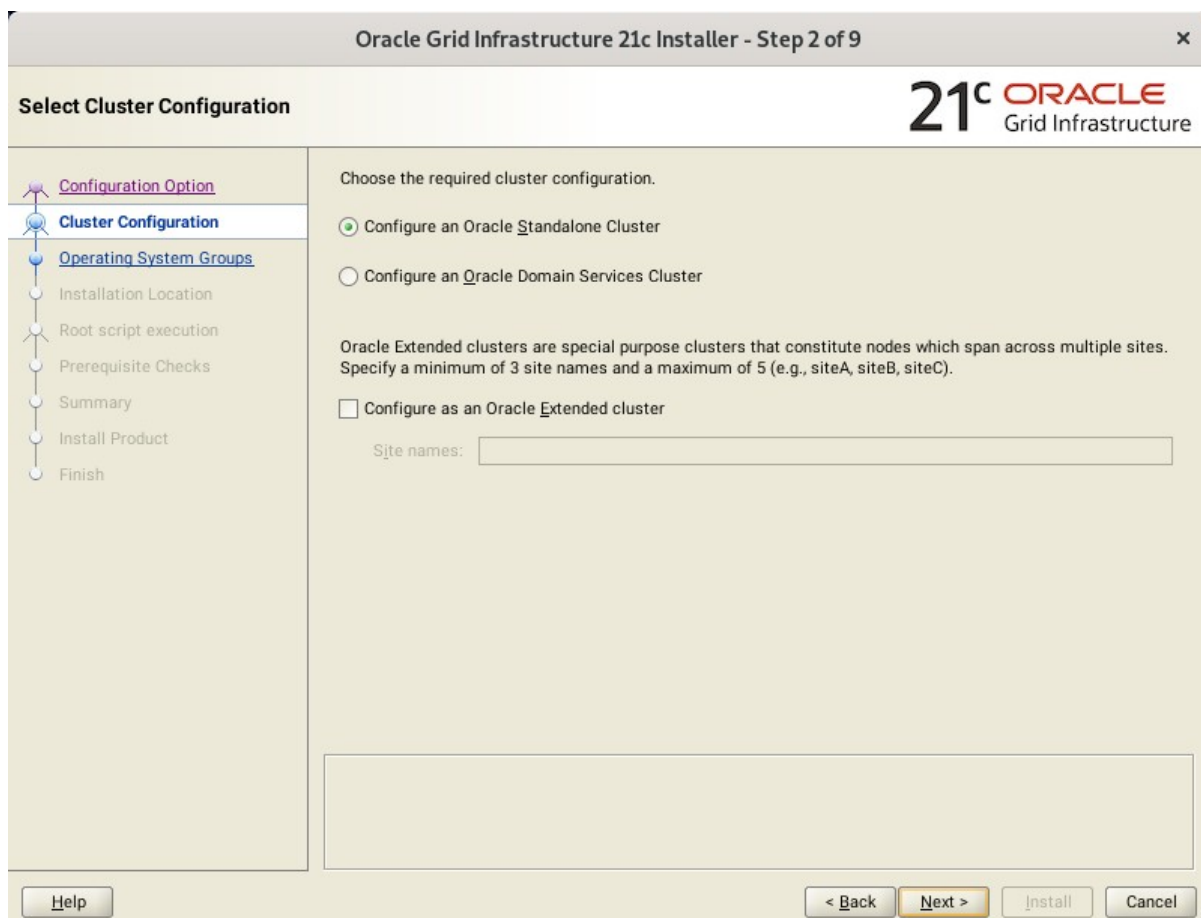
Install Flow:

1). Select Configuration Option.



Choose option "Configure Oracle Grid Infrastructure for a New Cluster", then click **Next** to continue.

2). Select Cluster Configuration.



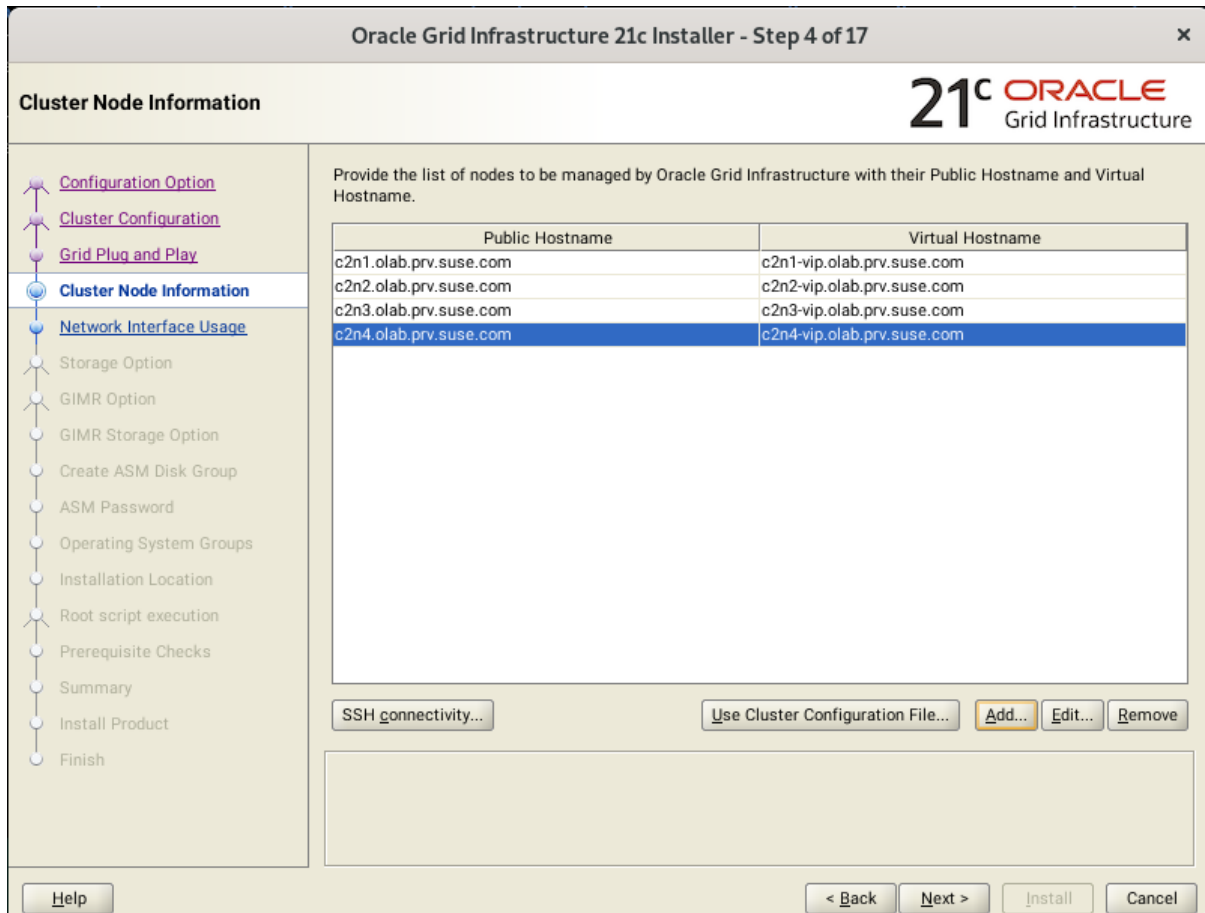
Choose option "**Configure an Oracle Standalone Cluster**", then click **Next** to continue.

3). Grid Plug and Play Information.

In the **Cluster Name** and **SCAN Name** fields, enter the names for your cluster and cluster scan that are unique throughout your entire enterprise network, then click **Next** to continue.

(More details for GNS configuration please see Oracle official document.)

4). The 'Cluster Node Information' screen appears.



In the Public Hostname column of the table of cluster nodes, you should see your local node. Click **Add** to add another node to the cluster. Enter the second node's public name (node2), and virtual IP name (node2-vip), then click OK. Make sure all nodes are selected, then click the SSH Connectivity button at the bottom of the window. After a short period, another message window appears indicating that passwordless SSH connectivity has been established between the cluster nodes. Click **OK** to continue. When returned to the Cluster Node Information window, click **Next** to continue.

5). Specify Network Interface Usage.

Oracle Grid Infrastructure 21c Installer - Step 5 of 17

Specify Network Interface Usage

Private interfaces are used by Oracle Grid Infrastructure for internode traffic.

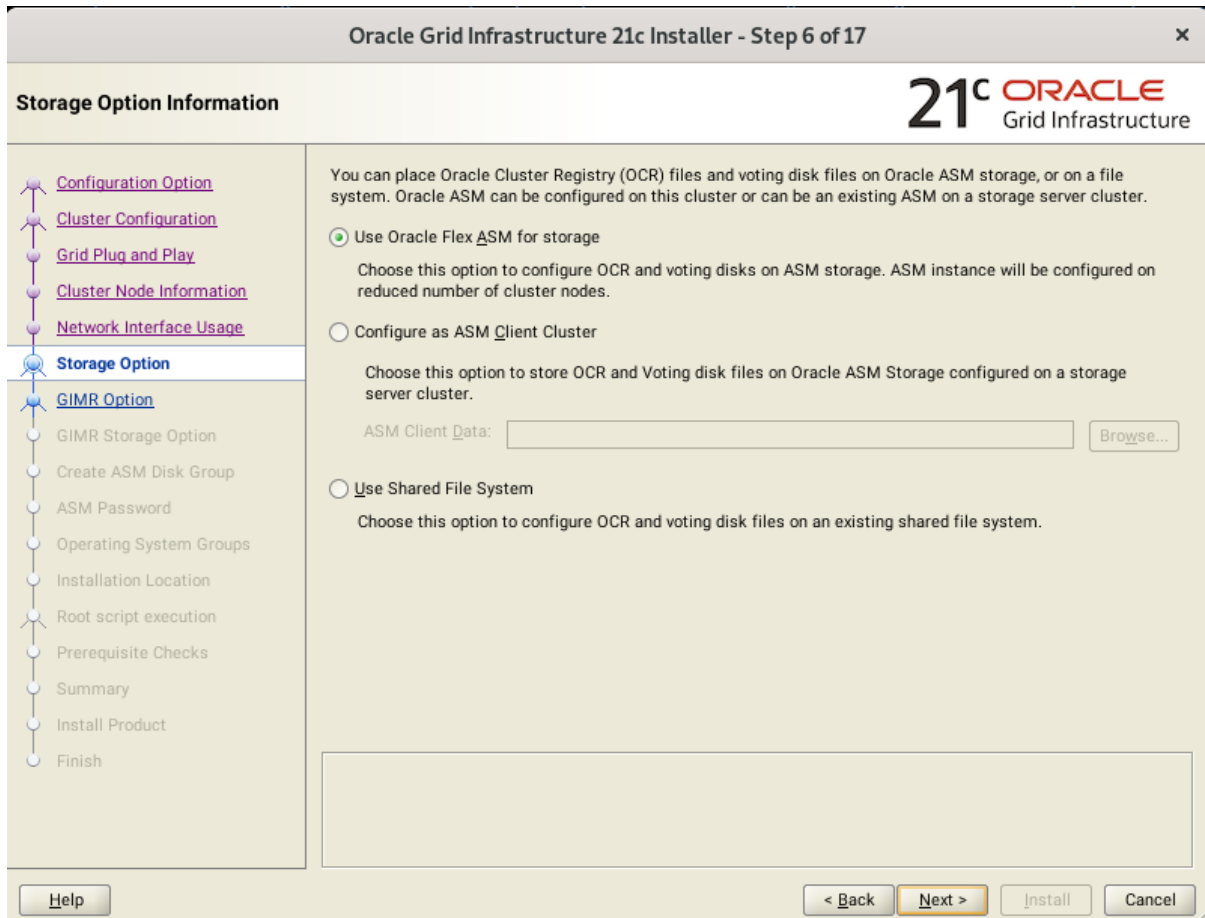
Interface Name	Subnet	Use for
bond0	10.1.1.0	ASM & Private
bond1	10.156.215.0	Public

Note: While configuring an Oracle Member Cluster for Databases using the Grid Naming Service (GNS), only networks that have dynamic host configuration protocol (DHCP) assigned addresses can be designated as 'Public'.

Help < Back Next > Install Cancel

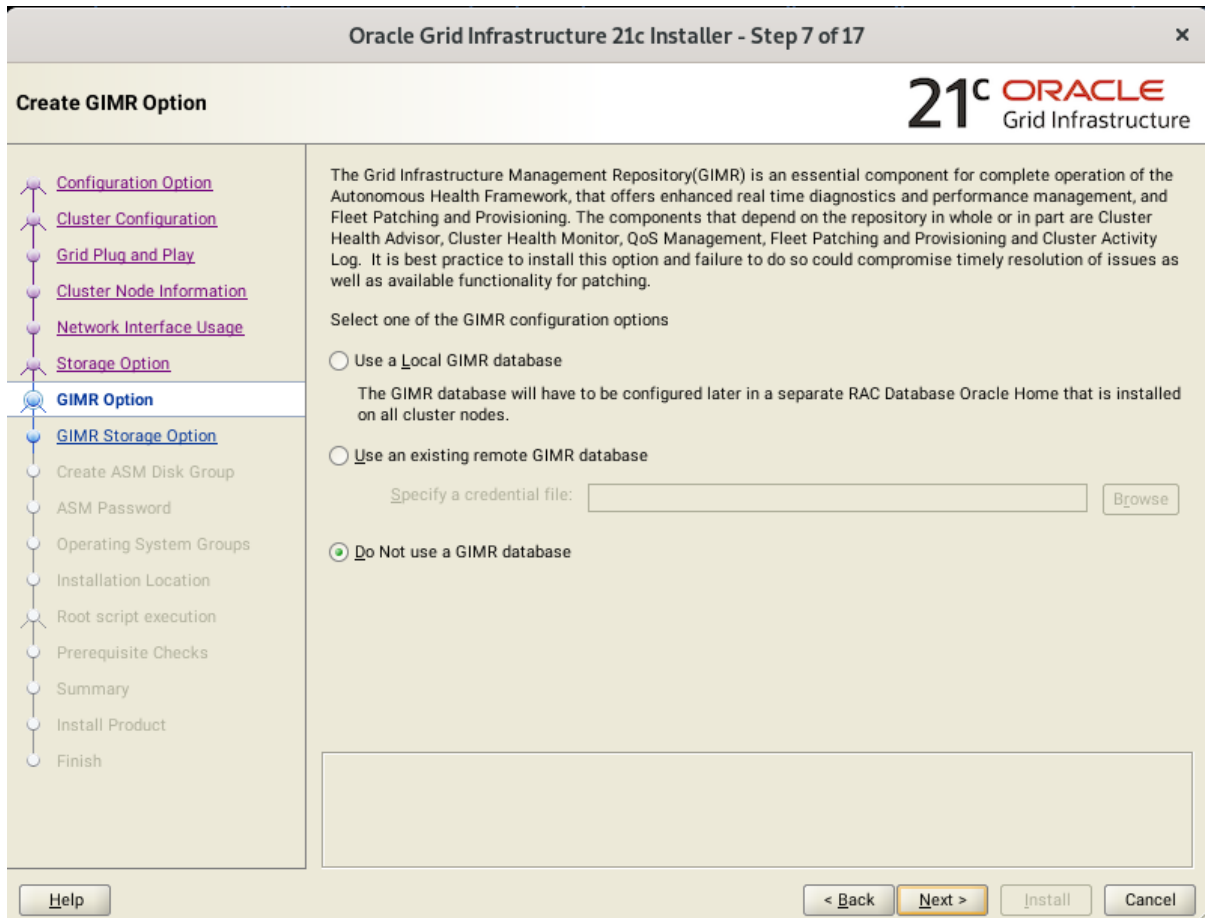
Verify that each interface has the correct interface type associated with it. If you have network interfaces that should not be used by Oracle Clusterware, then set the network interface type to **Do Not Use**. For example, if you have only two network interfaces, then set the public interface to have a Use For value of **Public** and set the private network interface to have a Use For value of **ASM & Private**, then click **Next** to continue.

6). Storage Option Information.



Choose option "Use Oracle Flex ASM for storage", then click **Next** to continue.

7). Grid Infrastructure Management Repository Option.



Choose whether you want to store the Grid Infrastructure Management Repository in a separate Oracle ASM disk group, then click **Next** to continue.

8). Create ASM Disk Group.

Oracle Grid Infrastructure 21c Installer - Step 8 of 16

Create ASM Disk Group

OCR and Voting disk data will be stored in the following ASM Disk group. Select disks and characteristics of this Disk group.

Disk group name:

Redundancy: Flex High Normal External

Allocation Unit Size: MB

Select Disks:

<input type="checkbox"/>	Disk Path	Size (in MB)	Status	Failure Group
<input checked="" type="checkbox"/>	/dev/oradata/disk1	7629	Candidate	
<input checked="" type="checkbox"/>	/dev/oradata/disk2	7629	Candidate	
<input checked="" type="checkbox"/>	/dev/oradata/disk3	7629	Candidate	
<input type="checkbox"/>	/dev/oradata/disk5	266240	Candidate	
<input type="checkbox"/>	/dev/oradata/disk6	266240	Candidate	

Disk Discovery Path: /dev/oradata/*

Configure Oracle ASM Filter Driver

Select this option to configure ASM Filter Driver(AFD) to simplify configuration and management of disk devices by Oracle ASM.

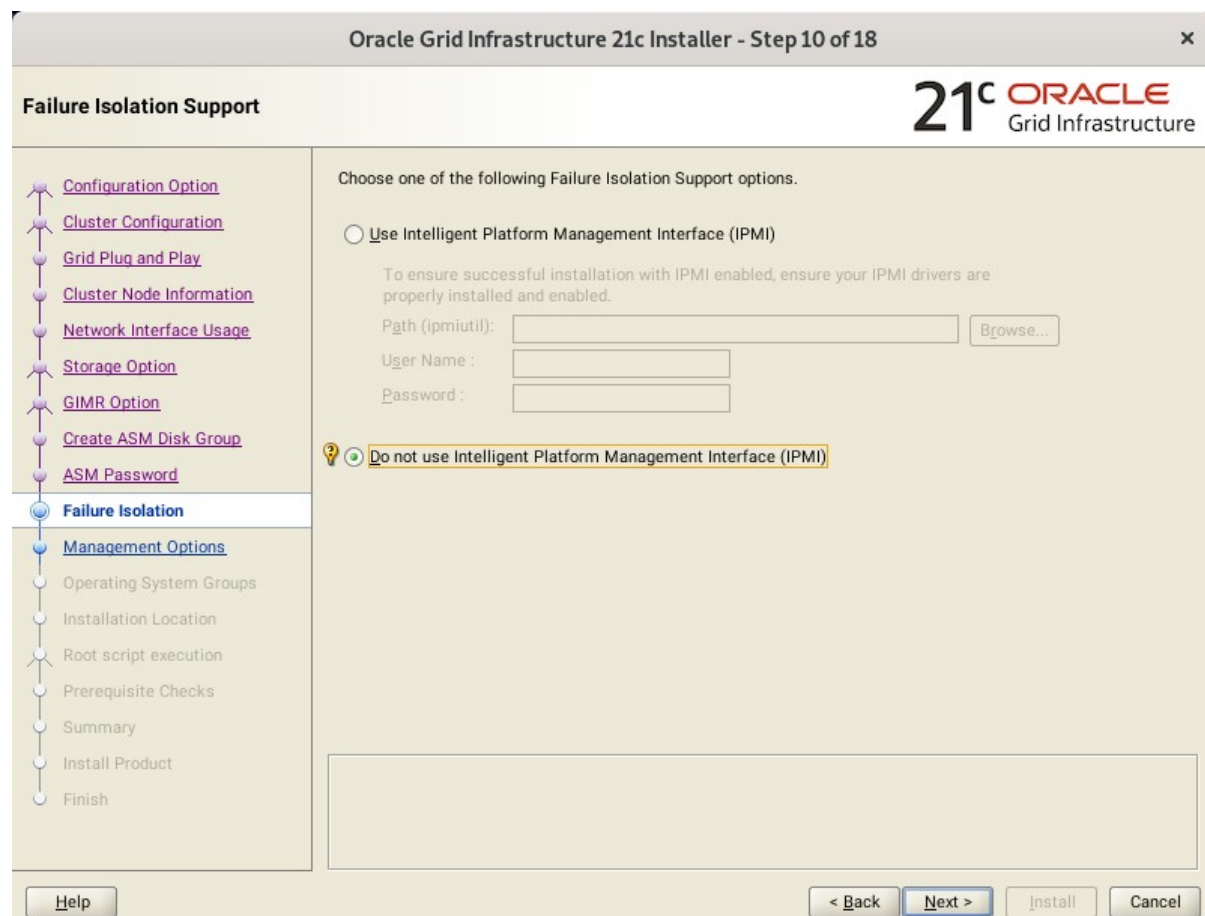
Depending on your needs to creat ASM Disk Group, then click **Next** to continue.

9). Specify ASM Password.

The screenshot shows the 'Specify ASM Password' window in the Oracle Grid Infrastructure 21c Installer. The window title is 'Oracle Grid Infrastructure 21c Installer - Step 9 of 16'. The Oracle logo and '21c ORACLE Grid Infrastructure' are in the top right. A navigation pane on the left lists steps: Configuration Option, Cluster Configuration, Grid Plug and Play, Cluster Node Information, Network Interface Usage, Storage Option, GIMR Option, Create ASM Disk Group, **ASM Password** (selected), Operating System Groups, Installation Location, Root script execution, Prerequisite Checks, Summary, Install Product, and Finish. The main area contains the following text: 'The new Oracle Automatic Storage Management (Oracle ASM) instance requires its own SYS user with SYSASM privileges for administration. Oracle recommends that you create a less privileged ASMSNMP user with SYSDBA privileges to monitor the ASM instance.' Below this, it says 'Specify the password for these user accounts.' There are two radio buttons: 'Use different passwords for these accounts' (unselected) and 'Use same passwords for these accounts' (selected). Under the first option, there are two columns: 'Password' and 'Confirm Password'. The 'SYS' user has two empty input fields, and the 'ASMSNMP' user has two empty input fields. Under the second option, there are two input fields: 'Specify Password:' and 'Confirm Password:'. At the bottom, there are buttons for 'Help', '< Back', 'Next >', 'Install', and 'Cancel'.

Choose the same password for the Oracle ASM SYS and ASMSNMP account, or specify different passwords for each account, then click **Next** to continue.

10). Failure Isolation Support.



The screenshot shows the Oracle Grid Infrastructure 21c Installer window at Step 10 of 18. The title bar reads "Oracle Grid Infrastructure 21c Installer - Step 10 of 18". The main window has a header with "Failure Isolation Support" on the left and the "21c ORACLE Grid Infrastructure" logo on the right. A vertical navigation pane on the left lists various configuration steps, with "Failure Isolation" selected and highlighted in blue. Below "Failure Isolation" are sub-items: "Management Options", "Operating System Groups", "Installation Location", "Root script execution", "Prerequisite Checks", "Summary", "Install Product", and "Finish".

The main content area is titled "Failure Isolation Support" and contains the following text and controls:

Choose one of the following Failure Isolation Support options.

Use Intelligent Platform Management Interface (IPMI)

To ensure successful installation with IPMI enabled, ensure your IPMI drivers are properly installed and enabled.

Path (ipmiutil):

User Name:

Password:

Do not use Intelligent Platform Management Interface (IPMI)

At the bottom of the window, there are four buttons: "Help", "< Back", "Next >", "Install", and "Cancel". The "Next >" button is highlighted with a blue border.

Select the option "**Do not use Intelligent Platform Management Interface (IPMI)**", then click **Next** to continue.

11). Specify Management Options.

Oracle Grid Infrastructure 21c Installer - Step 11 of 18

Specify Management Options

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Grid Infrastructure

You can configure to have this instance of Oracle Grid Infrastructure and Oracle Automatic Storage Management to be managed by Enterprise Manager Cloud Control. Specify the details of the Cloud Control configuration to perform the registration.

Register with Enterprise Manager (EM) Cloud Control

OMS host:

OMS port:

EM Admin User Name:

EM Admin Password:

- Configuration Option
- Cluster Configuration
- Grid Plug and Play
- Cluster Node Information
- Network Interface Usage
- Storage Option
- GIMR Option
- Create ASM Disk Group
- ASM Password
- Failure Isolation
- Management Options**
- Operating System Groups
- Installation Location
- Root script execution
- Prerequisite Checks
- Summary
- Install Product
- Finish

Help < Back Next > Install Cancel

Selected/Delected the option "Register with EM...", then click **Next** to continue.

12). Privileged Operating System Groups.

Oracle Grid Infrastructure 21c Installer - Step 12 of 18

Privileged Operating System Groups

Select the name of the operating system group, that you want to use for operating system authentication to Oracle Automatic Storage Management.

Oracle ASM Administrator (OSASM) Group:

Oracle ASM DBA (OSDBA for ASM) Group:

Oracle ASM Operator (OSOPER for ASM) Group (Optional):

Operating System Groups

Installation Location

Root script execution

Prerequisite Checks

Summary

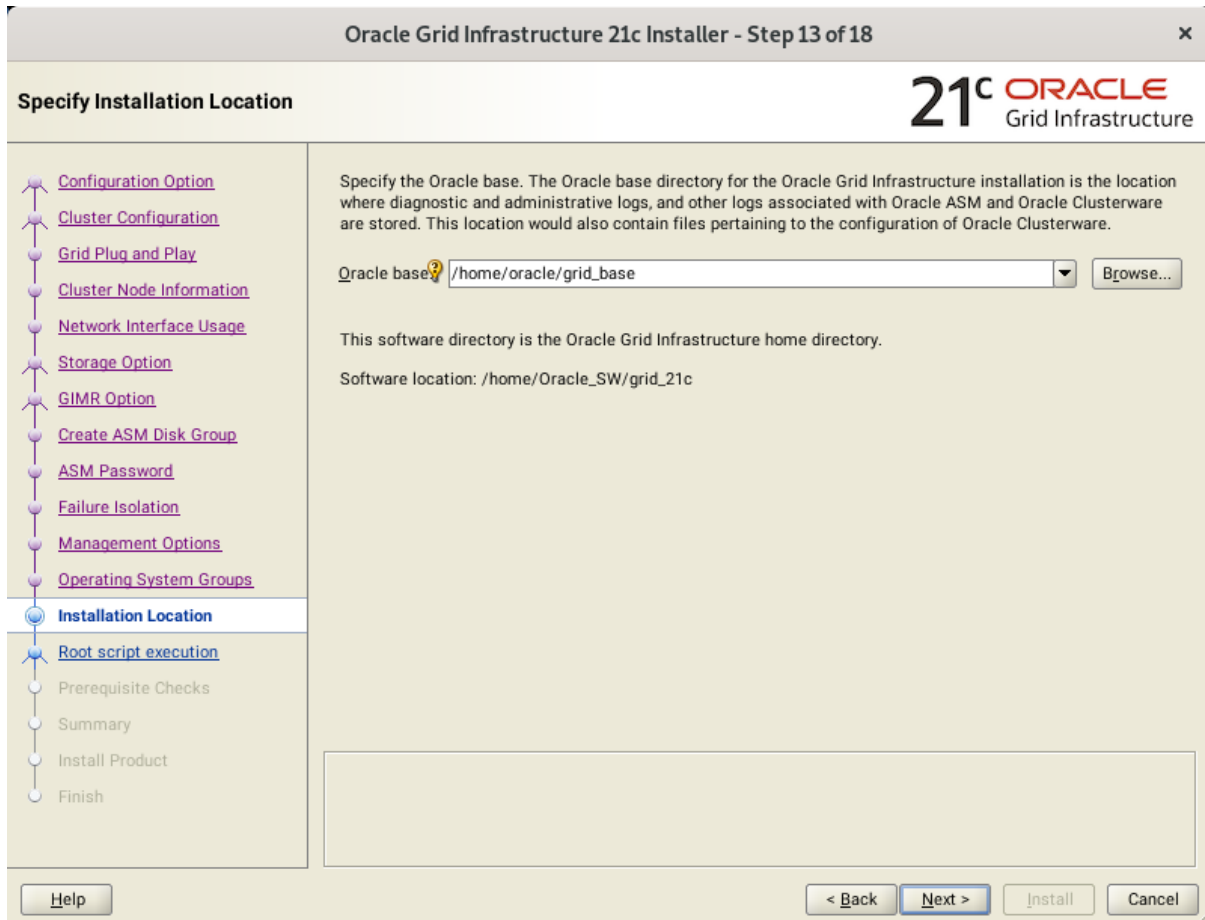
Install Product

Finish

Help < Back Next > Install Cancel

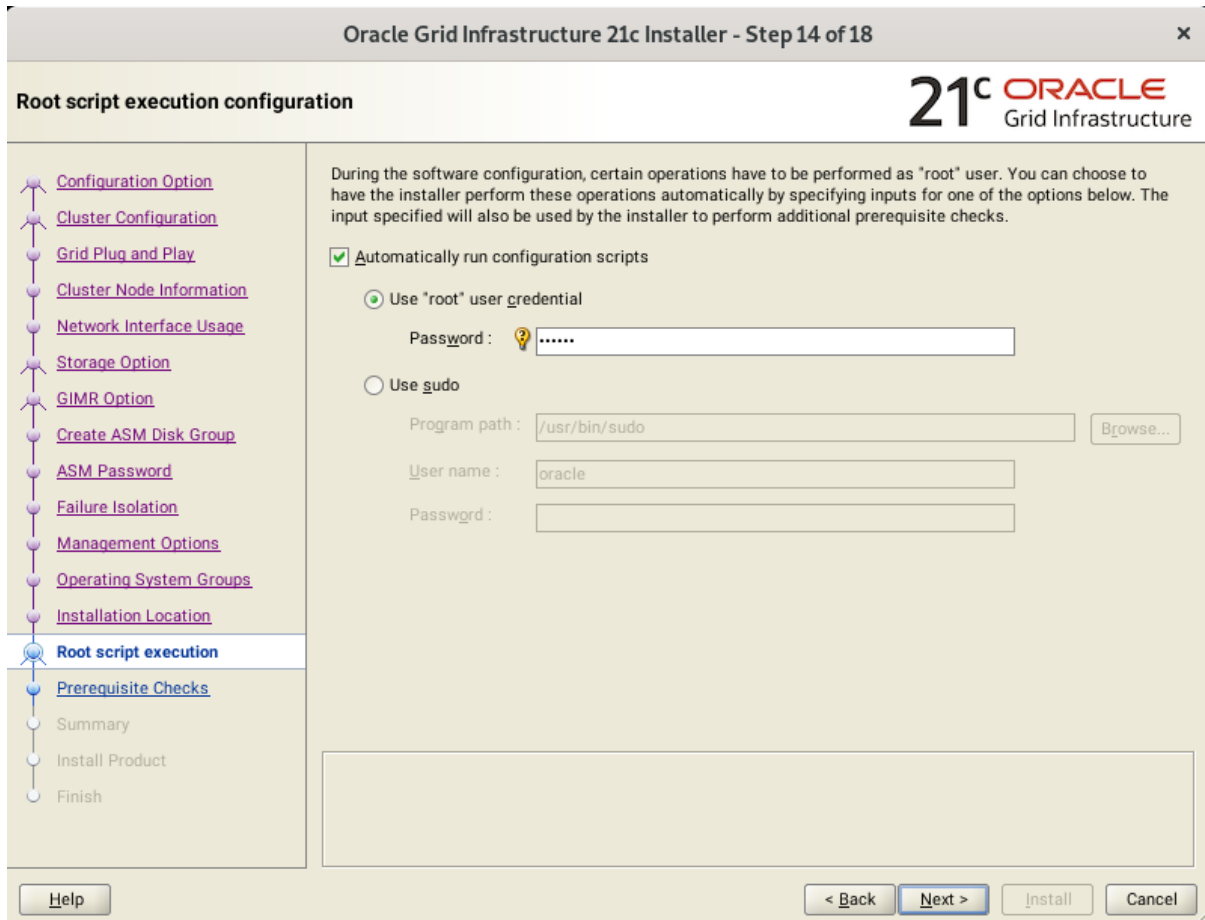
Accept the default operating system group names for Oracle ASM administration, then click **Next** to continue.

13). Specify Installation Location.



Specify the directory to use for the Oracle base for the Oracle Grid Infrastructure installation, then click **Next** to continue. The Oracle base directory must be different from the Oracle home directory.

14). Root script execution configuration.



Select the option to **Automatically run configuration scripts**. Enter the credentials for the root user or a sudo account, then click **Next** to continue.

Alternatively, you can Run the scripts manually as the root user at the end of the installation process when prompted by the installer.

15). Perform Prerequisite Checks.

Oracle Grid Infrastructure 21c Installer - Step 15 of 18

Perform Prerequisite Checks

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Grid Infrastructure

Verification Result

Some of the minimum requirements for installation are not completed. Review and fix the issues listed in the following table, and recheck the system.

Ignore All

Checks	Status	Fixable
zeroconf check	Warning	No

Checks that OS network parameter NOZEROCONF is set to yes or the parameter LINKLOCAL_INTERFACES is not set in case of SUSE Linux. ([more details](#))

Resolve all the errors and warnings on all nodes in the cluster & run “**Fix & Check Again**”. If the “**Fix & check again**” button is not available, try to fix manually.

Once verified, select option "Ignore All", then click **Next** to continue.

Oracle Grid Infrastructure 21c Installer - Step 15 of 18

Perform Prerequisite Checks

21^c ORACLE
Grid Infrastructure

Verification Result

Some of the minimum requirements for installation are not completed. Review and fix the issues listed in the following table, and recheck the system.

Checks	Status	Fixable
zeroconf check	Ignored	No

Checks that OS network parameter NOZEROCONF is set to yes or the parameter LINKLOCAL_INTERFACES is not set in case of SUSE Linux. ([more details](#))

16). Summary.

Oracle Grid Infrastructure 21c Installer - Step 16 of 18

Summary

21^c ORACLE
Grid Infrastructure

- Configuration Option
- Cluster Configuration
- Grid Plug and Play
- Cluster Node Information
- Network Interface Usage
- Storage Option
- GIMR Option
- Create ASM Disk Group
- ASM Password
- Failure Isolation
- Management Options
- Operating System Groups
- Installation Location
- Root script execution
- Prerequisite Checks
- Summary**
- Install Product
- Finish

Oracle Grid Infrastructure 21c Installer

- Global Settings**
 - Config Option: Configure Oracle Grid Infrastructure for a New Cluster [\[Edit\]](#)
 - Oracle base for Oracle Grid Infrastructure: /home/oracle/grid_base [\[Edit\]](#)
 - Grid home: /home/Oracle_SW/grid_21c
 - Privileged Operating System Groups: asmdba (OSDBA), asmadmin (OSASM) [\[Edit\]](#)
 - Root script execution configuration: Root user credential [\[Edit\]](#)
- Management information**
 - Management method: None [\[Edit\]](#)
- Grid Infrastructure Settings**
 - Cluster Configuration: Standalone Cluster [\[Edit\]](#)
 - Cluster Name: c2-cluster [\[Edit\]](#)
 - Hub nodes: c2n1,c2n2,c2n3,c2n4 [\[Edit\]](#)
 - SCAN Type: Local SCAN
 - Single Client Access Name (SCAN): c2-scan.olab.prv.suse.com [\[Edit\]](#)
 - SCAN Port: 1521 [\[Edit\]](#)
 - Public Interface(s): bond1 [\[Edit\]](#)
 - ASM & Private Interface(s): bond0 [\[Edit\]](#)
- Storage Information**
 - Storage Type: Oracle ASM [\[Edit\]](#)
 - Configure ASM Filter Driver: false [\[Edit\]](#)
 - ASM Disk Group: SUSEOCR [\[Edit\]](#)
 - Storage Redundancy: NORMAL [\[Edit\]](#)
 - Disks Selected: /dev/oradata/disk1,/dev/oradata/disk2,/dev/oradata/disk3 [\[Edit\]](#)

[Save Response File...](#)

[Help](#) [< Back](#) [Next >](#) [Install](#) [Cancel](#)

Installation Summary as shown above, click **Install** to continue.

17). Install Product.

Oracle Grid Infrastructure 21c Installer - Step 17 of 18

21^c ORACLE
Grid Infrastructure

Install Product

Progress
5%

Starting Installations

Status

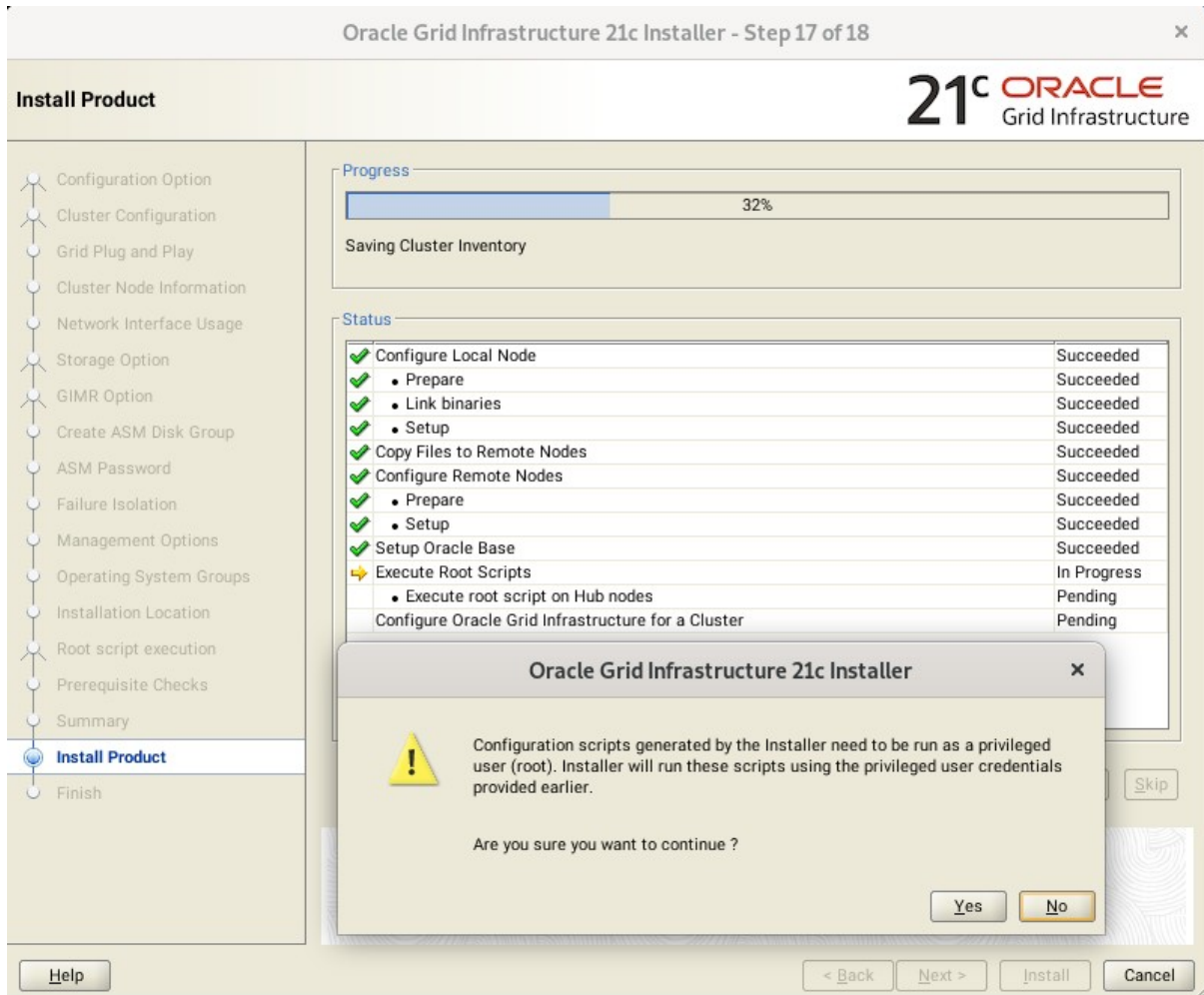
Configure Local Node	Pending
• Prepare	Pending
• Link binaries	Pending
• Setup	Pending
Copy Files to Remote Nodes	Pending
Configure Remote Nodes	Pending
• Prepare	Pending
• Setup	Pending
Setup Oracle Base	Pending
Execute Root Scripts	Pending
Configure Oracle Grid Infrastructure for a Cluster	Pending

Details Revert All Revert Retry Skip

21^c ORACLE
Grid Infrastructure

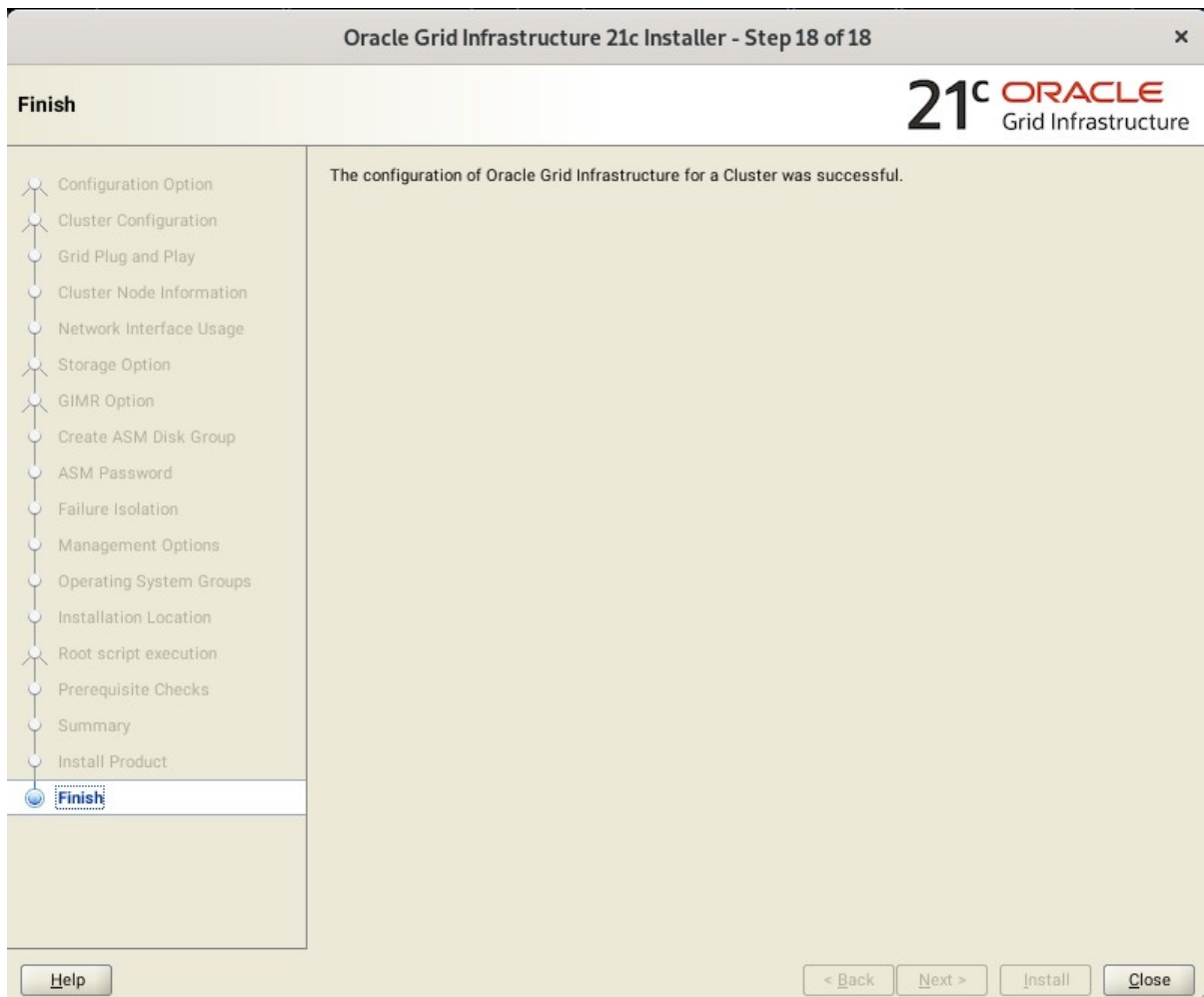
Help < Back Next > Install Cancel

Installer prompted you to run the orainstRoot.sh and root.sh scripts. Click **Yes**.



Continue monitoring the installation until the Finish window appears.

18). Finish.



Click **Close** to complete the installation process and exit the installer.

1-2. Oracle Database 21c(21.3) Grid Infrastructure Post-Install Checks.

1). Check Oracle Clusterware health and resources.

```

oracle@c2n1:~> /home/Oracle_SW/grid_21c/bin/crsctl check cluster -all
*****
c2n1:
CRS-4537: Cluster Ready Services is online
CRS-4529: Cluster Synchronization Services is online
CRS-4533: Event Manager is online
*****
c2n2:
CRS-4537: Cluster Ready Services is online
CRS-4529: Cluster Synchronization Services is online
CRS-4533: Event Manager is online
*****
c2n3:
CRS-4537: Cluster Ready Services is online
CRS-4529: Cluster Synchronization Services is online
CRS-4533: Event Manager is online
*****
c2n4:
CRS-4537: Cluster Ready Services is online
CRS-4529: Cluster Synchronization Services is online
CRS-4533: Event Manager is online
*****
oracle@c2n1:~> /home/Oracle_SW/grid_21c/bin/srvctl status nodeapps
VIP 10.156.215.35 is enabled
VIP 10.156.215.35 is running on node: c2n1
VIP 10.156.215.36 is enabled
VIP 10.156.215.36 is running on node: c2n2
VIP 10.156.215.37 is enabled
VIP 10.156.215.37 is running on node: c2n3
VIP 10.156.215.38 is enabled
VIP 10.156.215.38 is running on node: c2n4
Network is enabled
Network is running on node: c2n1
Network is running on node: c2n2
Network is running on node: c2n3
Network is running on node: c2n4
ONS is enabled
ONS daemon is running on node: c2n1
ONS daemon is running on node: c2n2
ONS daemon is running on node: c2n3
ONS daemon is running on node: c2n4
oracle@c2n1:~> █

```

2). Check status of designated resources.

```
oracle@c2n1:~> /home/Oracle_SW/grid_21c/bin/crsctl stat res -t
-----
Name                Target  State        Server        State details
-----
Local Resources
-----
ora.LISTENER.lsnr
    ONLINE  ONLINE      c2n1          STABLE
    ONLINE  ONLINE      c2n2          STABLE
    ONLINE  ONLINE      c2n3          STABLE
    ONLINE  ONLINE      c2n4          STABLE
ora.chad
    ONLINE  ONLINE      c2n1          STABLE
    ONLINE  ONLINE      c2n2          STABLE
    ONLINE  ONLINE      c2n3          STABLE
    ONLINE  ONLINE      c2n4          STABLE
ora.net1.network
    ONLINE  ONLINE      c2n1          STABLE
    ONLINE  ONLINE      c2n2          STABLE
    ONLINE  ONLINE      c2n3          STABLE
    ONLINE  ONLINE      c2n4          STABLE
ora.ons
    ONLINE  ONLINE      c2n1          STABLE
    ONLINE  ONLINE      c2n2          STABLE
    ONLINE  ONLINE      c2n3          STABLE
    ONLINE  ONLINE      c2n4          STABLE
-----
```

```

Cluster Resources
-----
ora.ASMNET1LSNR_ASM.lsnr(ora.asmgroup)
  1      ONLINE  ONLINE  c2n1      STABLE
  2      ONLINE  ONLINE  c2n2      STABLE
  3      ONLINE  ONLINE  c2n4      STABLE
ora.LISTENER_SCAN1.lsnr
  1      ONLINE  ONLINE  c2n1      STABLE
ora.LISTENER_SCAN2.lsnr
  1      ONLINE  ONLINE  c2n4      STABLE
ora.LISTENER_SCAN3.lsnr
  1      ONLINE  ONLINE  c2n2      STABLE
ora.SUSEOCR.dg(ora.asmgroup)
  1      ONLINE  ONLINE  c2n1      STABLE
  2      ONLINE  ONLINE  c2n2      STABLE
  3      ONLINE  ONLINE  c2n4      STABLE
ora.asm(ora.asmgroup)
  1      ONLINE  ONLINE  c2n1      Started,STABLE
  2      ONLINE  ONLINE  c2n2      Started,STABLE
  3      ONLINE  ONLINE  c2n4      Started,STABLE
ora.asmnet1.asmnetwork(ora.asmgroup)
  1      ONLINE  ONLINE  c2n1      STABLE
  2      ONLINE  ONLINE  c2n2      STABLE
  3      ONLINE  ONLINE  c2n4      STABLE
ora.c2n1.vip
  1      ONLINE  ONLINE  c2n1      STABLE
ora.c2n2.vip
  1      ONLINE  ONLINE  c2n2      STABLE
ora.c2n3.vip
  1      ONLINE  ONLINE  c2n3      STABLE
ora.c2n4.vip
  1      ONLINE  ONLINE  c2n4      STABLE
ora.cdp1.cdp
  1      ONLINE  ONLINE  c2n1      STABLE
ora.cdp2.cdp
  1      ONLINE  ONLINE  c2n4      STABLE
ora.cdp3.cdp
  1      ONLINE  ONLINE  c2n2      STABLE
ora.cvu
  1      ONLINE  ONLINE  c2n1      STABLE
ora.qosmserver
  1      ONLINE  ONLINE  c2n1      STABLE
ora.scan1.vip
  1      ONLINE  ONLINE  c2n1      STABLE
ora.scan2.vip
  1      ONLINE  ONLINE  c2n4      STABLE
ora.scan3.vip
  1      ONLINE  ONLINE  c2n2      STABLE
-----
oracle@c2n1:~> █

```

3). Check OCR and Voting disk files.

```
oracle@c2n1:~> /home/Oracle_SW/grid_21c/bin/ocrcheck
Status of Oracle Cluster Registry is as follows :
  Version                : 4
  Total space (kbytes)   : 901284
  Used space (kbytes)    : 84928
  Available space (kbytes) : 816356
  ID                     : 66291585
  Device/File Name       : +SUSEOCR
                        Device/File integrity check succeeded
                        Device/File not configured
                        Device/File not configured
                        Device/File not configured
                        Device/File not configured

Cluster registry integrity check succeeded

Logical corruption check bypassed due to non-privileged user

oracle@c2n1:~> /home/Oracle_SW/grid_21c/bin/crsctl query css votedisk
## STATE      File Universal Id      File Name Disk group
--  -
  1. ONLINE   abdea0d60e554faebf0d74854a70a59e (/dev/oradata/disk1) [SUSEOCR]
  2. ONLINE   ebf38c6517a74faabfc53611b3f31f05 (/dev/oradata/disk2) [SUSEOCR]
  3. ONLINE   a54d56af23714f69bf94e18eed252a6c (/dev/oradata/disk3) [SUSEOCR]
Located 3 voting disk(s).
oracle@c2n1:~> █
```

2. Installing Oracle Database.

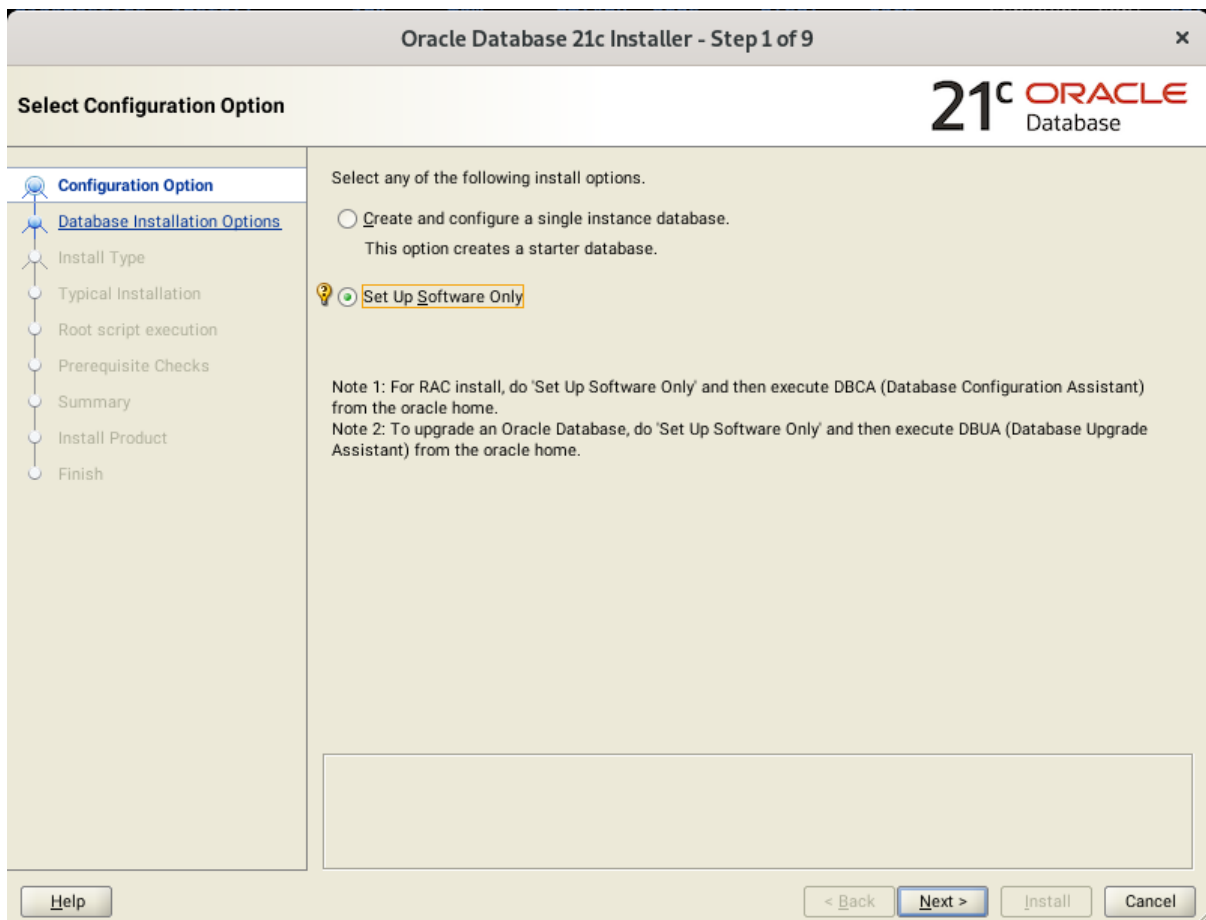
2-1. Login to the SLES 15 SP3 64-bit OS as a non-admin user. Download Oracle Database 21c (21.3) for Linux x86-64 from:

<https://www.oracle.com/database/technologies/oracle21c-linux-downloads.html>.

2-2. Extract LINUX.X64_213000_db_home.zip and run Oracle DB installer 'runInstaller' from Database ShipHome.

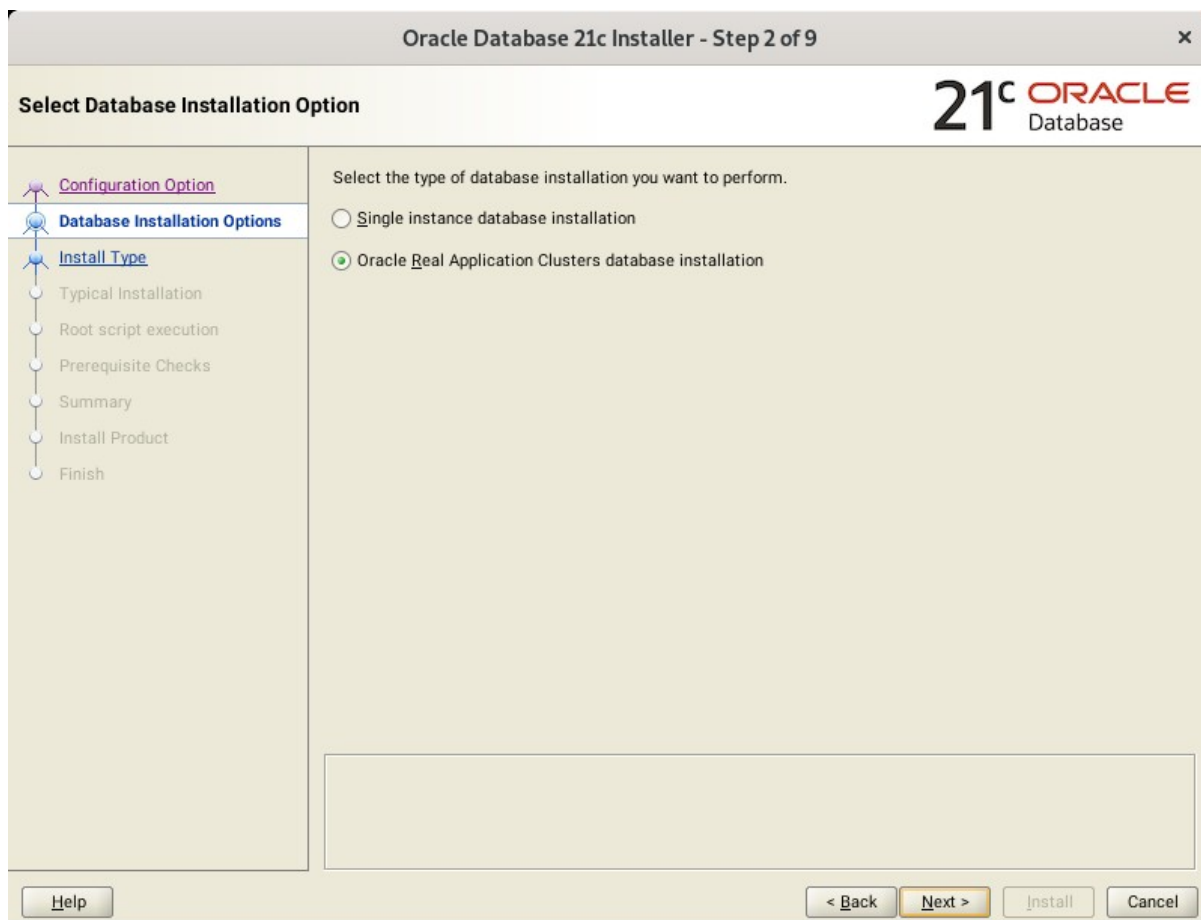
Install Flow:

1). Select Configuration Option.



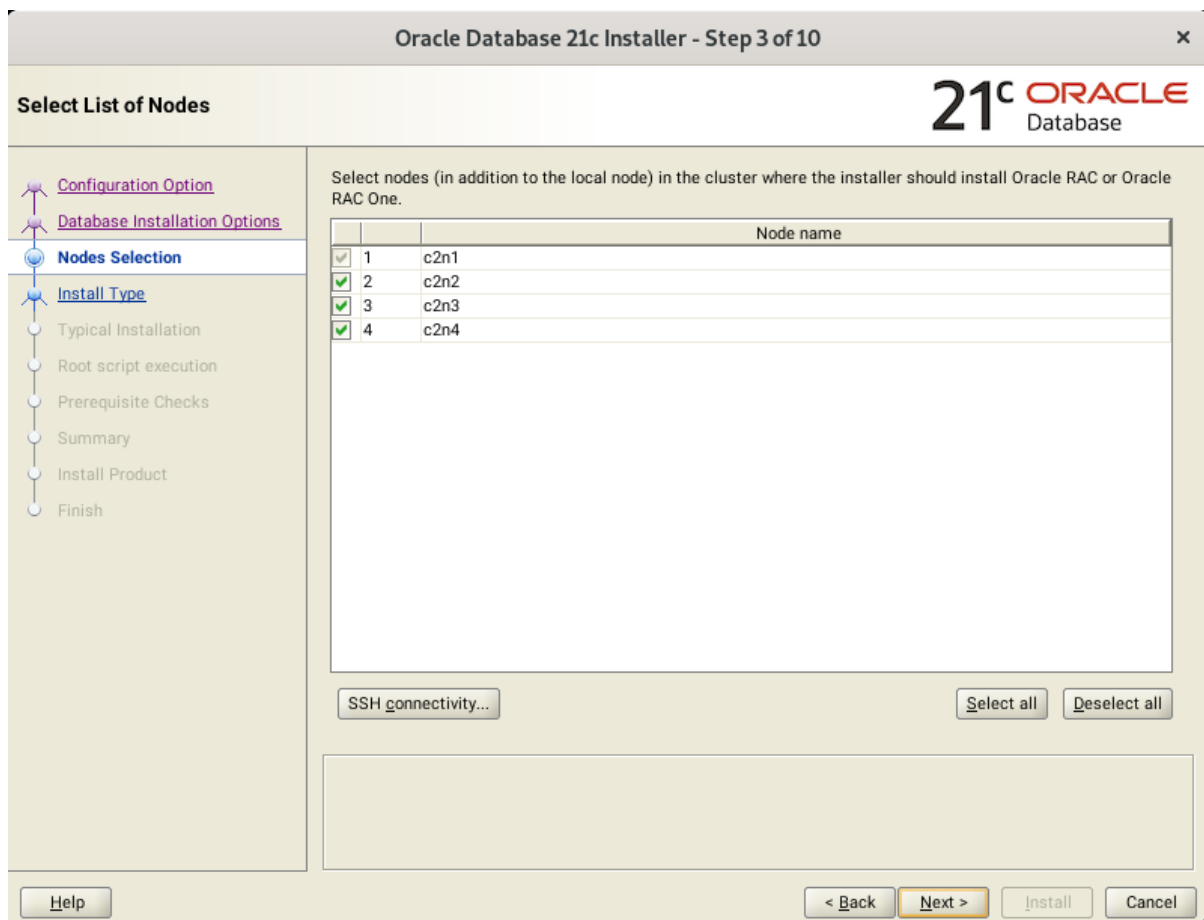
Select option "**Set Up Software Only**", then click **Next** to continue.

2). Select Database Installation Option.



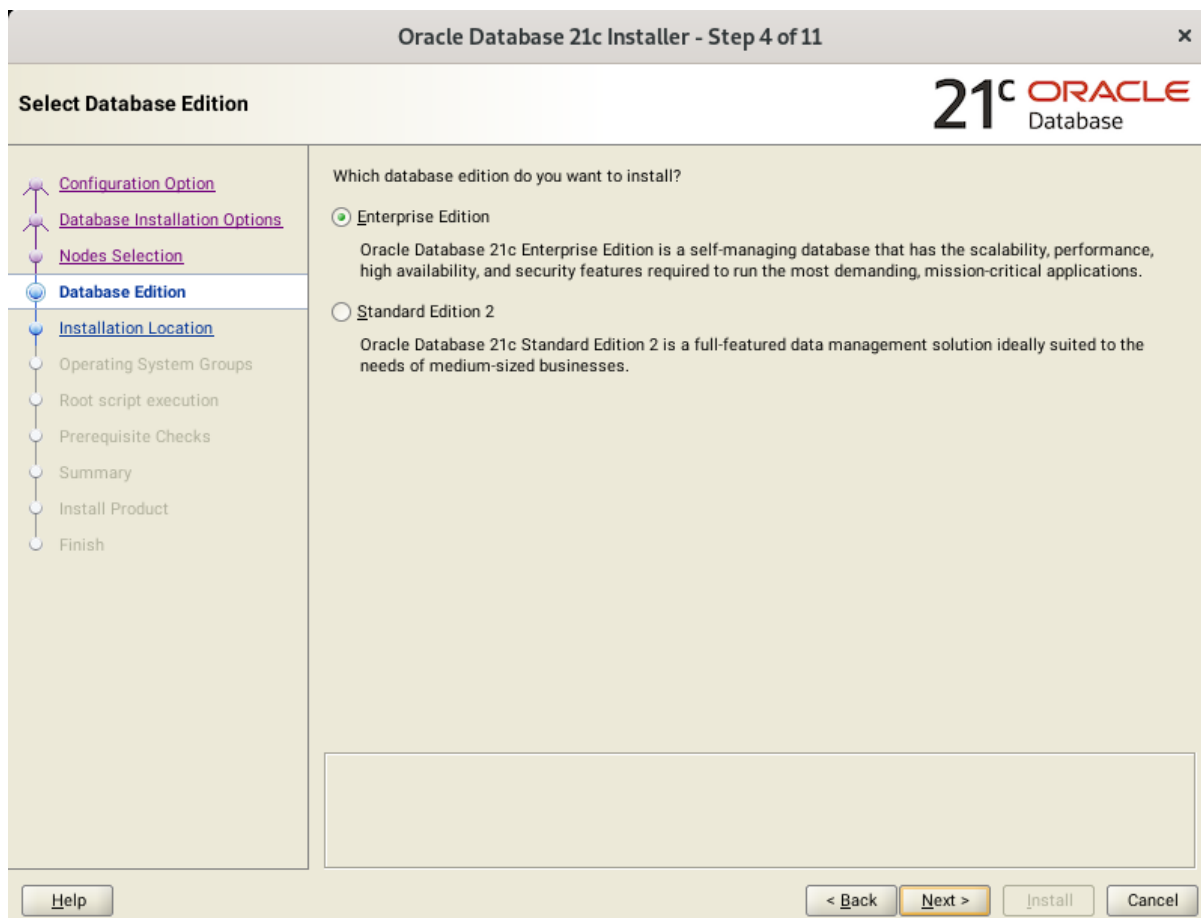
Choose option "Oracle Real Application Clusters database installation", then click **Next** to continue.

3). Select List of Nodes.



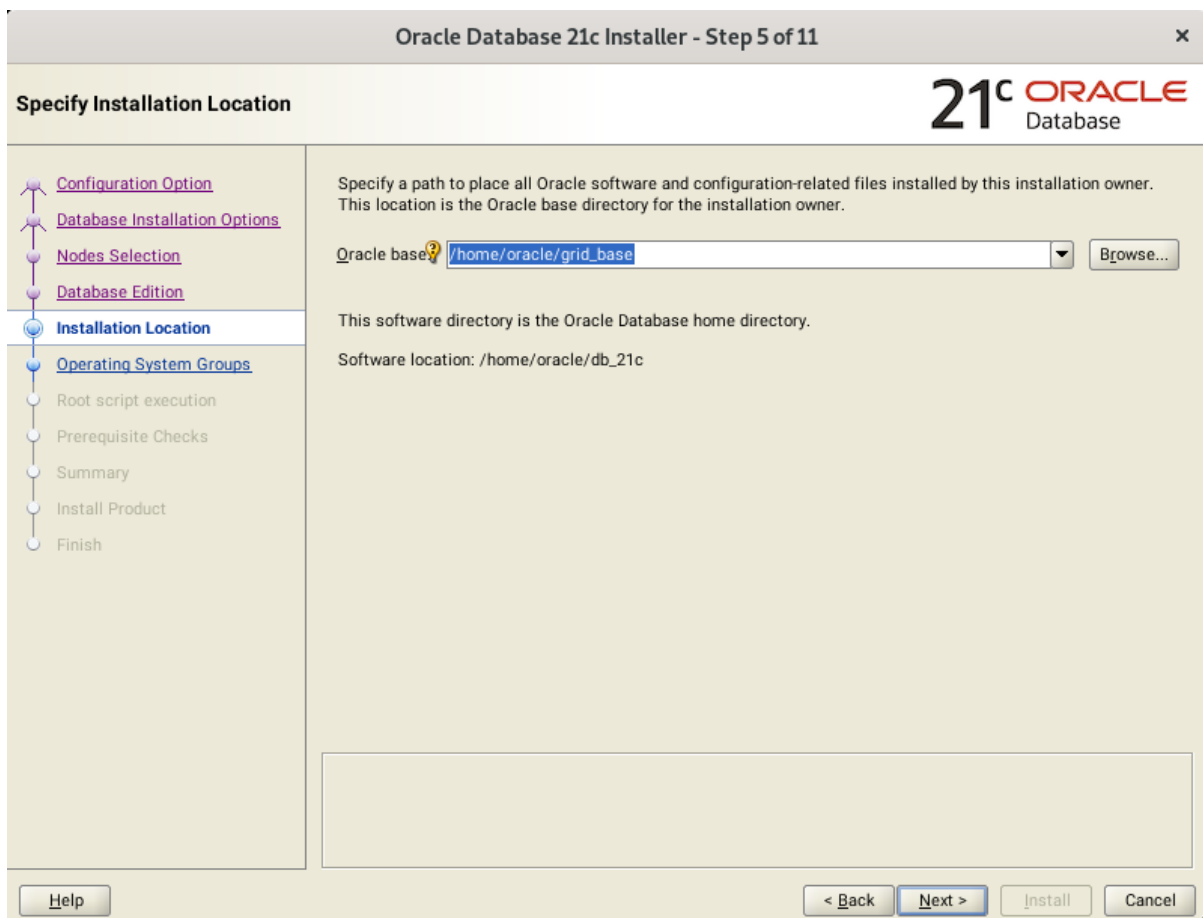
Select all nodes in the cluster, then click **Next** to continue.

4). Select Database Edition.



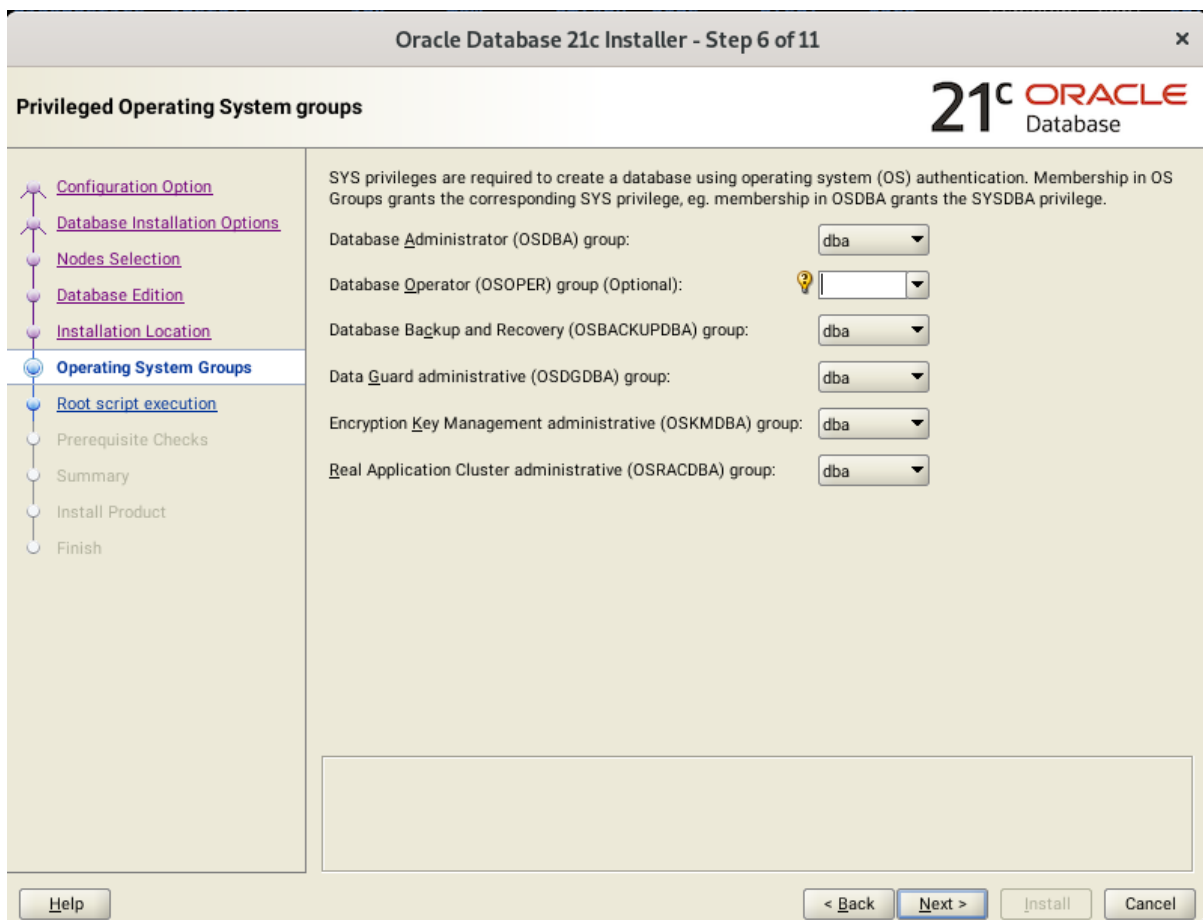
Choose option "**Enterprise Edition**", then click **Next** to continue.

5). Specify Installation Location.



Fill in **Oracle base** as shown above, then click **Next** to continue.

6). Privileged Operating System groups.



The screenshot shows the Oracle Database 21c Installer window at Step 6 of 11, titled "Privileged Operating System groups". The window features a navigation pane on the left with the following steps: Configuration Option, Database Installation Options, Nodes Selection, Database Edition, Installation Location, Operating System Groups (selected), Root script execution, Prerequisite Checks, Summary, Install Product, and Finish. The main area contains the following text and controls:

SYS privileges are required to create a database using operating system (OS) authentication. Membership in OS Groups grants the corresponding SYS privilege, eg. membership in OSDBA grants the SYSDBA privilege.

Database Administrator (OSDBA) group: dba

Database Operator (OSOPER) group (Optional): ?

Database Backup and Recovery (OSBACKUPDBA) group: dba

Data Guard administrative (OSDGDBA) group: dba

Encryption Key Management administrative (OSKMDBA) group: dba

Real Application Cluster administrative (OSRACDBA) group: dba

At the bottom of the window, there are buttons for Help, < Back, Next >, Install, and Cancel.

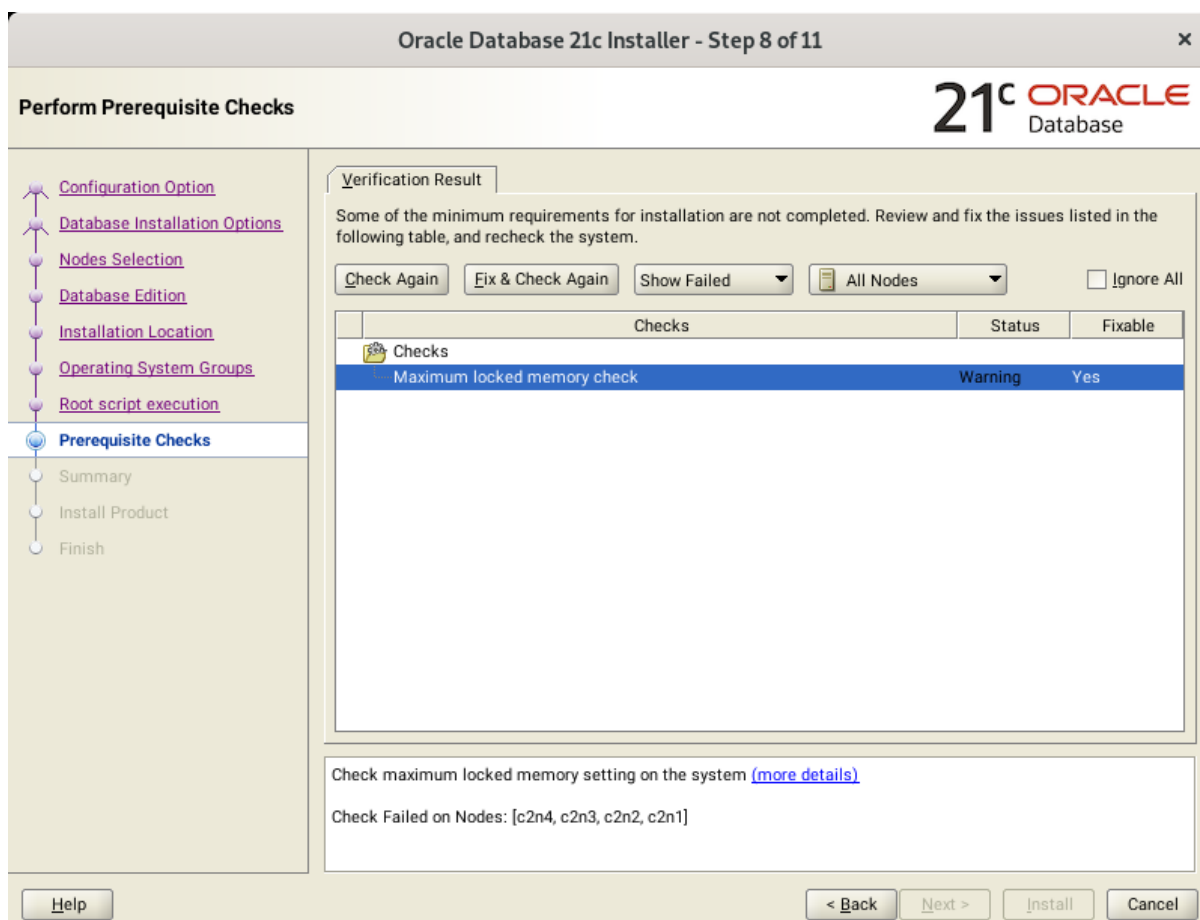
Selected by default, then click **Next** to continue.

7). Root script execution configuration.

The screenshot shows the Oracle Database 21c Installer window at Step 7 of 11. The title bar reads "Oracle Database 21c Installer - Step 7 of 11". The main window has a header with "21c ORACLE Database". The left sidebar contains a navigation menu with the following items: Configuration Option, Database Installation Options, Nodes Selection, Database Edition, Installation Location, Operating System Groups, **Root script execution** (highlighted), Prerequisite Checks, Summary, Install Product, and Finish. The main content area is titled "Root script execution configuration" and contains the following text: "During the software configuration, certain operations have to be performed as 'root' user. You can choose to have the installer perform these operations automatically by specifying inputs for one of the options below. The input specified will also be used by the installer to perform additional prerequisite checks." Below this text are two radio button options: Automatically run configuration scripts and Use "root" user credential. The "Use 'root' user credential" option is selected and has a "Password:" field with a masked password "*****" and a help icon. The "Use sudo" option is unselected and has a "Program path:" field with the value "/usr/bin/sudo" and a "Browse..." button, a "User name:" field with the value "oracle", and a "Password:" field. At the bottom of the window are buttons for "Help", "< Back", "Next >", "Install", and "Cancel".

Select the option to **Automatically run configuration scripts**. Enter the credentials for the root user or a sudo account, then click **Next** to continue. Alternatively, you can Run the scripts manually as the root user at the end of the installation process when prompted by the installer.

8). Perform Prerequisite Checks.



Perform Pre-Check as shown above. Resolve all the errors and warnings on all nodes in the cluster & run **“Fix & Check Again”**.

Follow the prompts, click **OK** to proceed.

Oracle Database 21c Installer - Step 8 of 11

Perform Prerequisite Checks **21^c ORACLE Database**

Verification Result

Some of the minimum requirements for installation are not completed. Review and fix the issues listed in the following table, and recheck the system.

Check Again Fix & Check Again Show Failed All Nodes Ignore All

Fixup Script

Some of the prerequisites have failed on the following nodes. Installer has generated a fixup script that needs to be run as a privileged user (root). Installer will run the fixup script (/var/lib/oracle/cvu/CVU_21.0.0.0.0_oracle/runfixup.sh) on the listed nodes using the privileged user credentials provided earlier. Click "OK" to proceed.

Nodes:

- c2n4
- c2n3
- c2n2
- c2n1

OK Cancel

Fixable

Yes

Check maximum locked memory setting on the system ([more details](#))

Check Failed on Nodes: [c2n4, c2n3, c2n2, c2n1]

Help < Back Next > Install Cancel

Once verified, click **Next** to continue.

Oracle Database 21c Installer - Step 8 of 11

Perform Prerequisite Checks

21^c ORACLE Database

Configuration Option
Database Installation Options
Nodes Selection
Database Edition
Installation Location
Operating System Groups
Root script execution
Prerequisite Checks
Summary
Install Product
Finish

Verification Result **Fixup Result**

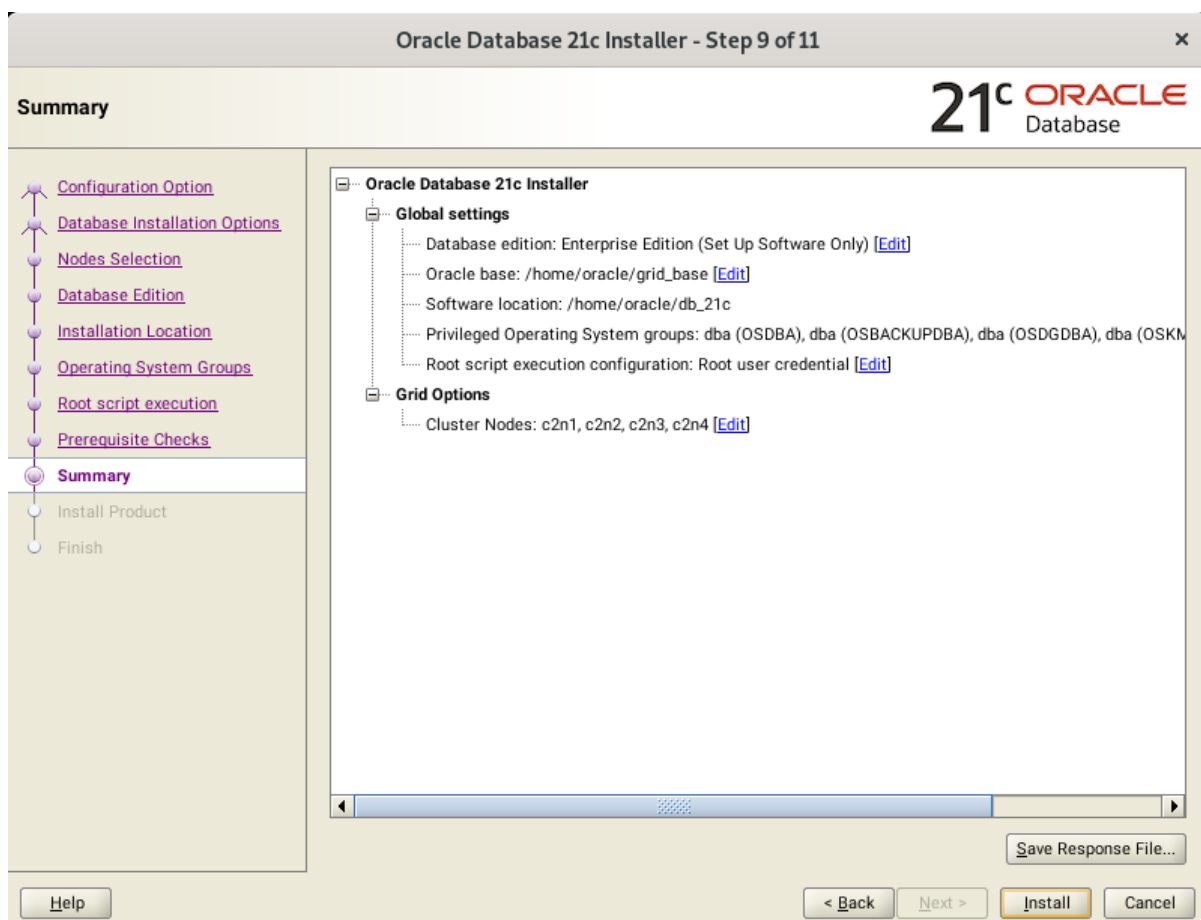
All minimum requirements are satisfied. You may proceed with the installation.

Show All Ignore All

Checks	Status	Fixable
Checks		
Physical Memory	Succeeded	
Available Physical Memory	Succeeded	
Swap Size	Succeeded	
[Free Space]	Succeeded	
[User Existence]	Succeeded	
[Group Existence]	Succeeded	
[Group Membership]	Succeeded	
Run Level	Succeeded	
Hard Limit: maximum open file descriptors	Succeeded	
Soft Limit: maximum open file descriptors	Succeeded	
Hard Limit: maximum user processes	Succeeded	
Soft Limit: maximum user processes	Succeeded	
Soft Limit: maximum stack size	Succeeded	
Architecture	Succeeded	
OS Kernel Version	Succeeded	

This task verifies the free space and writability of the Oracle base `/home/oracle/grid_base` [\(more details\)](#)

9). Summary.



Installation Summary as shown above, click **Install** to continue.

10). Install Product.

Oracle Database 21c Installer - Step 10 of 11

Install Product

21^c ORACLE Database

Progress

10%

instantiating '/home/oracle/db_21c/bin/chopt.ini'.

Status

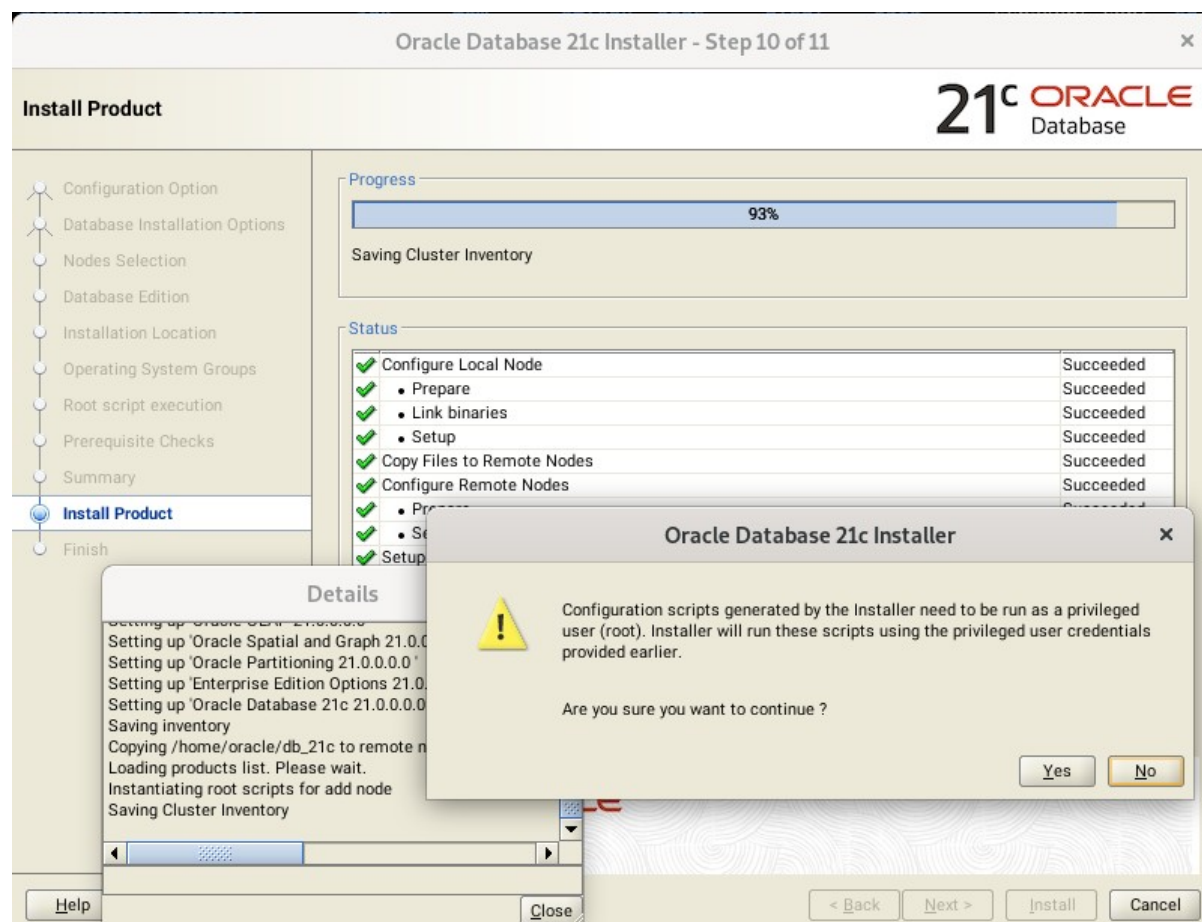
➤ Configure Local Node	In Progress
➤	
• Prepare	In Progress
• Link binaries	Pending
• Setup	Pending
Copy Files to Remote Nodes	Pending
Configure Remote Nodes	Pending
• Prepare	Pending
• Setup	Pending
Setup Oracle Base	Pending
Setup Read-Only Oracle Home	Pending
Execute Root Scripts	Pending

Details Revert All Revert Retry Skip

21^c ORACLE Database

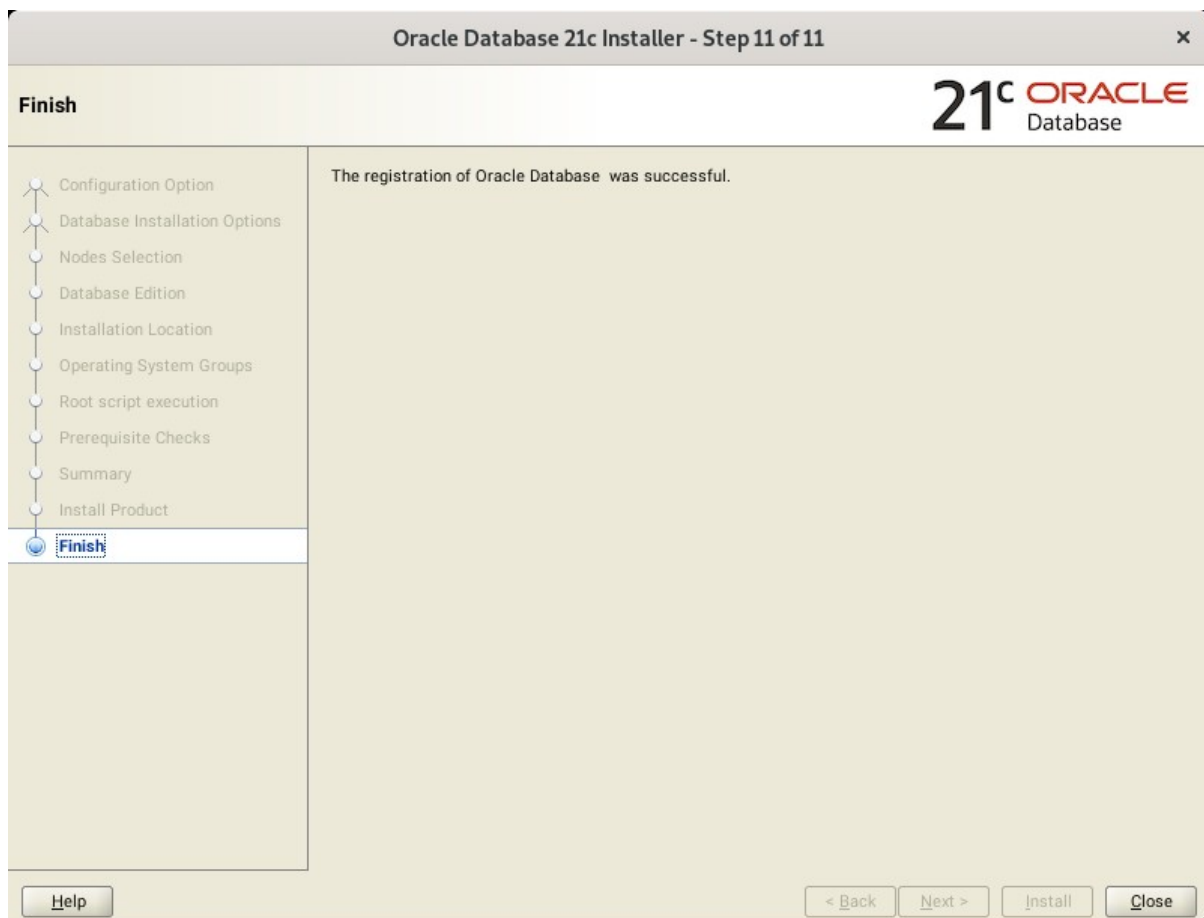
Help < Back Next > Install Cancel

Installer prompted you to run the orainstRoot.sh and root.sh scripts. Click **Yes**.



Continue monitoring the installation until the Finish window appears.

11). Finish



The installation of Oracle Database is finished, click **Close** to dismiss the screen.

2-3. Using ASM Configuration Assistant to create ASM Disk Group for Database files.

ASM Configuration Assistant: Disk Groups

21c ORACLE Grid Infrastructure

Disk Groups

Disk Group Name	Size (GB)	Free (GB)	Usable (GB)	Redundancy	State
SUSEOCR	22.35	21.25	6.90	NORMAL	MOUNTED(3 of 4)
SUSEDATA	520.00	519.58	259.79	NORMAL	MOUNTED(3 of 4)

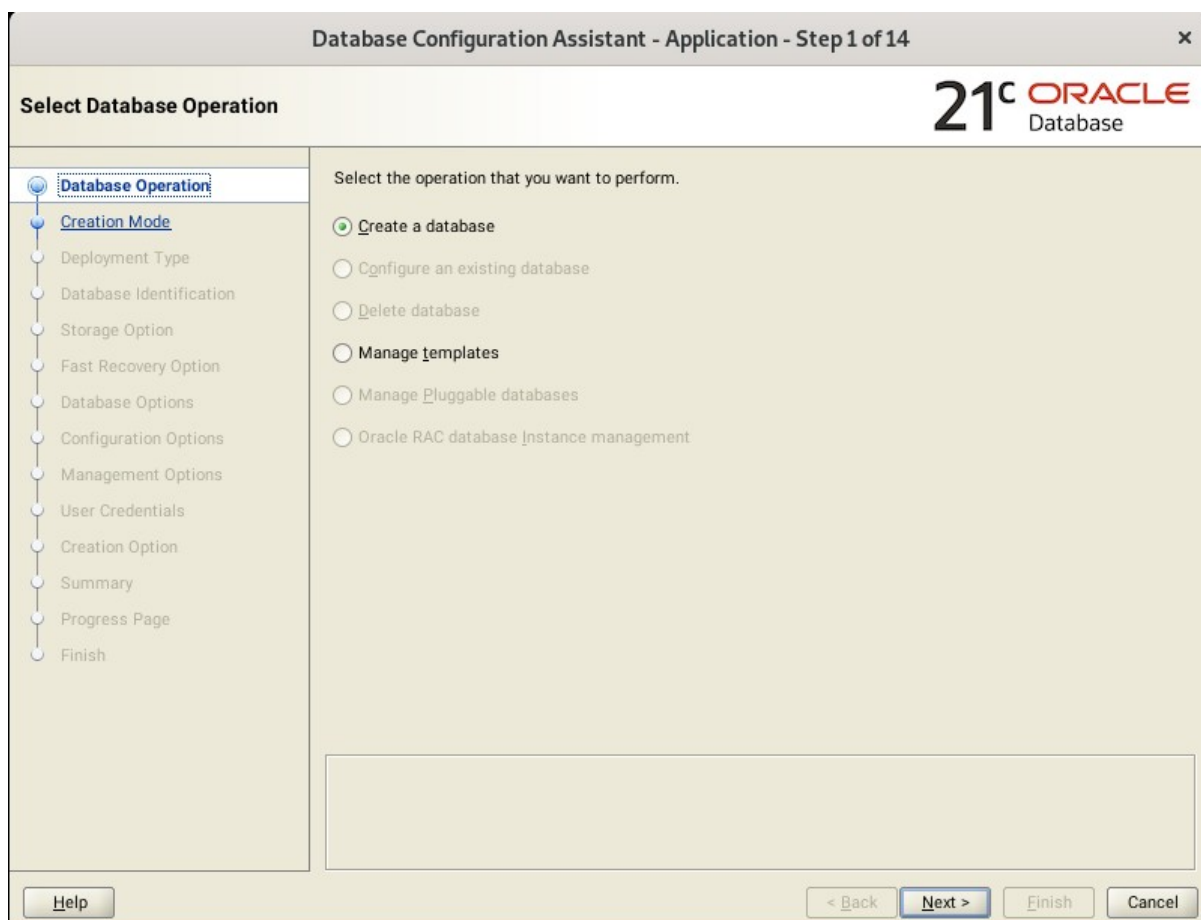
Note: Use right click to see more options.

Create... Mount All Dismount All Refresh

Help Exit

2-4. Using DBCA to create Oracle RAC DataBase.

1). Select Database Operation.



Select option "**Create a database**", then click **Next** to continue.

2). Select Database Creation Mode.

Database Configuration Assistant - Create a database - Step 2 of 14

Select Database Creation Mode

21^c ORACLE Database

- Database Operation
- Creation Mode**
- Deployment Type
- Database Identification
- Storage Option
- Fast Recovery Option
- Database Options
- Configuration Options
- Management Options
- User Credentials
- Creation Option
- Summary
- Progress Page
- Finish

Typical configuration

Global database name:

Storage type:

Database files location:

Fast Recovery Area (FRA):

Database character set:

Administrative password:

Confirm password:

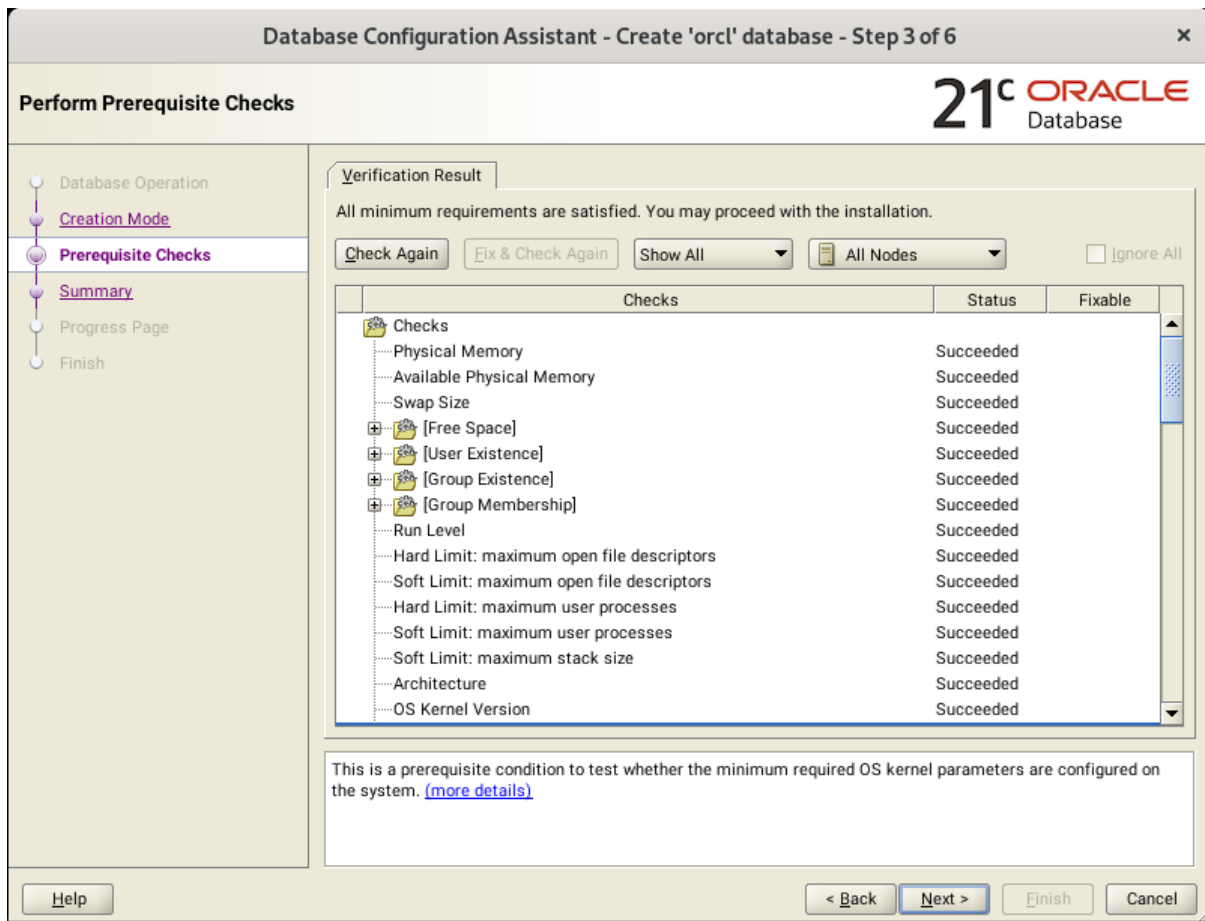
Create as Container database

Pluggable database name:

Advanced configuration

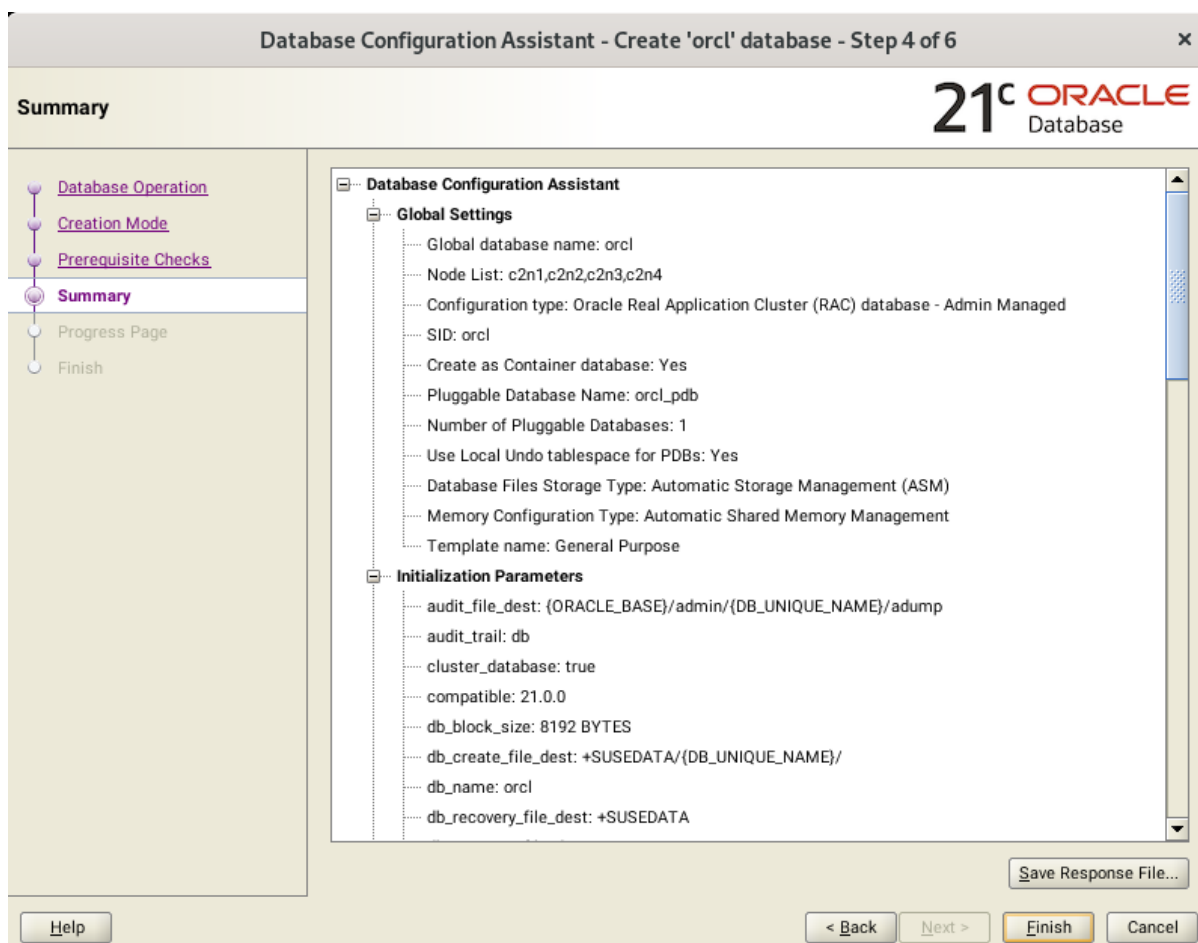
Select option "Typical configuration" and fill in administrator password. Then, click **Next** to continue.

3). Perform Prerequisite Checks.



Perform Pre-Check as shown above. Resolve all the errors and warnings on all nodes in the cluster, then click **Next** to continue.

4). Summary.



Database Configuration Summary as shown above, review the information, then click **Finish** to continue.

5). Progress Page.

The screenshot shows the 'Progress Page' of the Database Configuration Assistant (DBCA) for creating an Oracle database. The window title is 'Database Configuration Assistant - Create 'orcl' database - Step 5 of 6'. The Oracle logo is visible in the top right corner.

The progress bar indicates that the overall progress is 7%. The current step is 'Copying database files : In Progress'.

The 'Status' section shows a list of tasks and their completion status:

Task	Status
DB Creation	In Progress
• Prepare for db operation	Succeeded
• Copying database files	In Progress
• Creating and starting Oracle instance	Pending
• Creating cluster database views	Pending
• Completing Database Creation	Pending
• Creating Pluggable Databases	Pending
• Executing Post Configuration Actions	Pending

Buttons at the bottom include: Details, Revert All, Revert, Retry, Skip, Help, < Back, Next >, Finish, and Cancel.

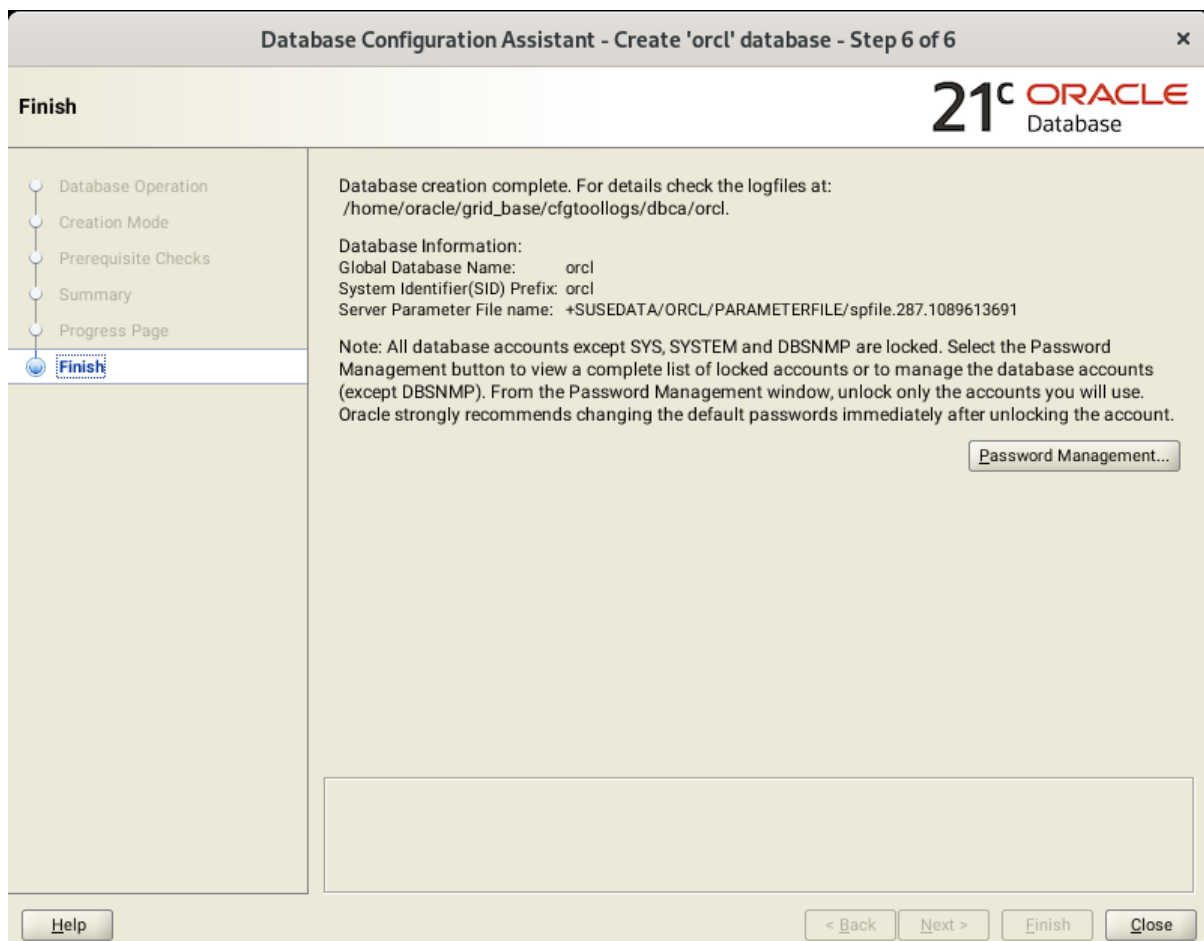
Log locations are displayed:

DBCA Log Location:
/home/oracle/grid_base/cfgtoollogs/dbca/orcl/trace.log_2021-11-26_06-01-21AM

Database Alert Log Location:
/home/oracle/grid_base/diag/rdbms/orcl/orcl1/trace/alert_orcl1.log

Database creating progress as shown above, waiting until the creation is complete.

6). Finish.



Database creation complete, some details as shown above. Click **Close** to dismiss the screen.

2-5. Oracle Database 21c(21.3) Post-Install Checks.

1). *Checking database status and configuration.*

```
oracle@c2n1:~> export ORACLE_HOME=/home/oracle/db_21c/
oracle@c2n1:~> /home/oracle/db_21c/bin/srvctl status database -d orcl -a
Instance orcl1 is running on node c2n1
Instance orcl1 is connected to ASM instance +ASM1
Instance orcl2 is running on node c2n2
Instance orcl2 is connected to ASM instance +ASM2
Instance orcl3 is running on node c2n3
Instance orcl3 is connected to ASM instance +ASM2
Instance orcl4 is running on node c2n4
Instance orcl4 is connected to ASM instance +ASM4
oracle@c2n1:~> █
```

```
oracle@c2n1:~> /home/oracle/db_21c/bin/srvctl config database -d orcl -a
Database unique name: orcl
Database name: orcl
Oracle home: /home/oracle/db_21c
Oracle user: oracle
Spfile: +SUSEDATA/ORCL/PARAMETERFILE/spfile.287.1089613691
Password file: +SUSEDATA/ORCL/PASSWORD/pwdorcl.256.1089612439
Domain:
Start options: open
Stop options: immediate
Database role: PRIMARY
Management policy: AUTOMATIC
Server pools:
Disk Groups: SUSEDATA
Mount point paths:
Services:
Type: RAC
Start concurrency:
Stop concurrency:
Database is enabled
Database is individually enabled on nodes:
Database is individually disabled on nodes:
OSDBA group: dba
OSOPER group:
Database instances: orcl1,orcl2,orcl3,orcl4
Configured nodes: c2n1,c2n2,c2n3,c2n4
CSS critical: no
CPU count: 0
Memory target: 0
Maximum memory: 0
Default network number for database services:
Database is administrator managed
oracle@c2n1:~> █
```

2-6. Oracle RAC 21c(21.3) Post-Install Checks.

1). *Checking Oracle RAC status and resources.*

```
oracle@c2n1:~> /home/Oracle_SW/grid_21c/bin/crsctl check cluster -all
*****
c2n1:
CRS-4537: Cluster Ready Services is online
CRS-4529: Cluster Synchronization Services is online
CRS-4533: Event Manager is online
*****
c2n2:
CRS-4537: Cluster Ready Services is online
CRS-4529: Cluster Synchronization Services is online
CRS-4533: Event Manager is online
*****
c2n3:
CRS-4537: Cluster Ready Services is online
CRS-4529: Cluster Synchronization Services is online
CRS-4533: Event Manager is online
*****
c2n4:
CRS-4537: Cluster Ready Services is online
CRS-4529: Cluster Synchronization Services is online
CRS-4533: Event Manager is online
*****
oracle@c2n1:~> /home/Oracle_SW/grid_21c/bin/srvctl status nodeapps
VIP 10.156.215.35 is enabled
VIP 10.156.215.35 is running on node: c2n1
VIP 10.156.215.36 is enabled
VIP 10.156.215.36 is running on node: c2n2
VIP 10.156.215.37 is enabled
VIP 10.156.215.37 is running on node: c2n3
VIP 10.156.215.38 is enabled
VIP 10.156.215.38 is running on node: c2n4
Network is enabled
Network is running on node: c2n1
Network is running on node: c2n2
Network is running on node: c2n3
Network is running on node: c2n4
ONS is enabled
ONS daemon is running on node: c2n1
ONS daemon is running on node: c2n2
ONS daemon is running on node: c2n3
ONS daemon is running on node: c2n4
oracle@c2n1:~> █
```

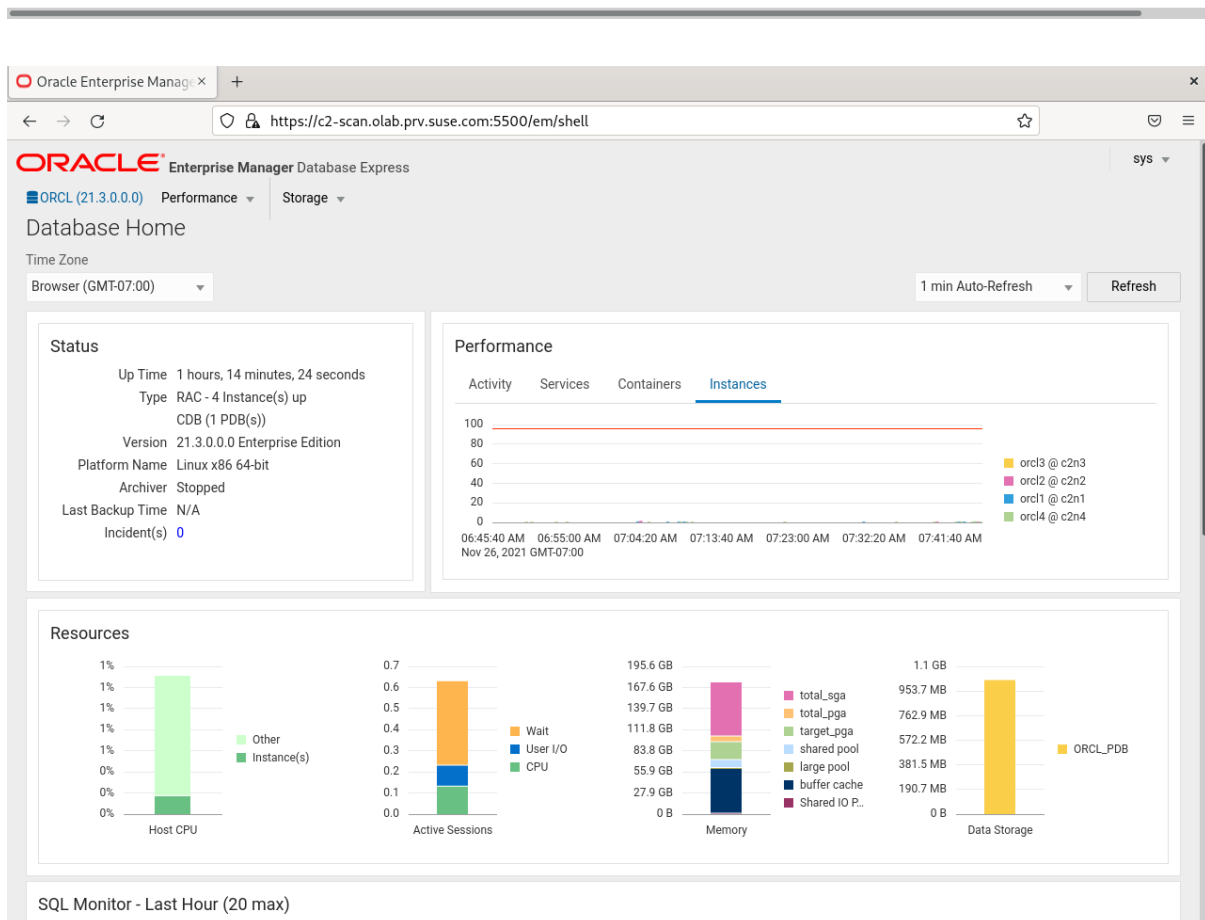
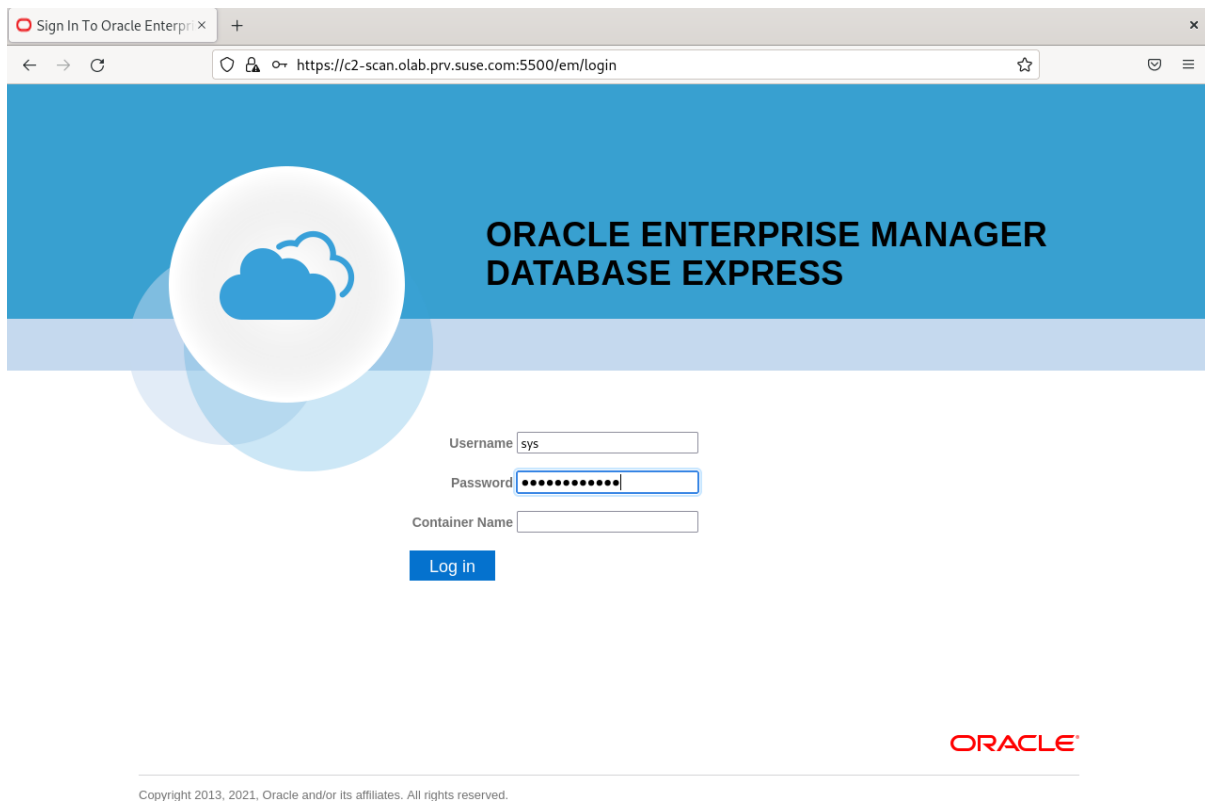
```
oracle@c2n1:~> /home/Oracle_SW/grid_21c/bin/crsctl stat res -t
-----
Name                Target  State        Server                State details
-----
Local Resources
-----
ora.LISTENER.lsnr
    ONLINE  ONLINE      c2n1                 STABLE
    ONLINE  ONLINE      c2n2                 STABLE
    ONLINE  ONLINE      c2n3                 STABLE
    ONLINE  ONLINE      c2n4                 STABLE
ora.chad
    ONLINE  OFFLINE     c2n1                 STABLE
    ONLINE  ONLINE      c2n2                 STABLE
    ONLINE  ONLINE      c2n3                 STABLE
    ONLINE  ONLINE      c2n4                 STABLE
ora.net1.network
    ONLINE  ONLINE      c2n1                 STABLE
    ONLINE  ONLINE      c2n2                 STABLE
    ONLINE  ONLINE      c2n3                 STABLE
    ONLINE  ONLINE      c2n4                 STABLE
ora.ons
    ONLINE  ONLINE      c2n1                 STABLE
    ONLINE  ONLINE      c2n2                 STABLE
    ONLINE  ONLINE      c2n3                 STABLE
    ONLINE  ONLINE      c2n4                 STABLE
-----
```

```

Cluster Resources
-----
ora.ASMNET1LSNR_ASM.lsnr(ora.asmgroup)
  1      ONLINE  ONLINE  c2n1      STABLE
  2      ONLINE  ONLINE  c2n2      STABLE
  3      ONLINE  ONLINE  c2n4      STABLE
ora.LISTENER_SCAN1.lsnr
  1      ONLINE  ONLINE  c2n1      STABLE
ora.LISTENER_SCAN2.lsnr
  1      ONLINE  ONLINE  c2n4      STABLE
ora.LISTENER_SCAN3.lsnr
  1      ONLINE  ONLINE  c2n2      STABLE
ora.SUSEDATA.dg(ora.asmgroup)
  1      ONLINE  ONLINE  c2n1      STABLE
  2      ONLINE  ONLINE  c2n2      STABLE
  3      ONLINE  ONLINE  c2n4      STABLE
ora.SUSEOCR.dg(ora.asmgroup)
  1      ONLINE  ONLINE  c2n1      STABLE
  2      ONLINE  ONLINE  c2n2      STABLE
  3      ONLINE  ONLINE  c2n4      STABLE
ora.asm(ora.asmgroup)
  1      ONLINE  ONLINE  c2n1      Started,STABLE
  2      ONLINE  ONLINE  c2n2      Started,STABLE
  3      ONLINE  ONLINE  c2n4      Started,STABLE
ora.asmnet1.asmnetwork(ora.asmgroup)
  1      ONLINE  ONLINE  c2n1      STABLE
  2      ONLINE  ONLINE  c2n2      STABLE
  3      ONLINE  ONLINE  c2n4      STABLE
ora.c2n1.vip
  1      ONLINE  ONLINE  c2n1      STABLE
ora.c2n2.vip
  1      ONLINE  ONLINE  c2n2      STABLE
ora.c2n3.vip
  1      ONLINE  ONLINE  c2n3      STABLE
ora.c2n4.vip
  1      ONLINE  ONLINE  c2n4      STABLE
ora.cdp1.cdp
  1      ONLINE  ONLINE  c2n1      STABLE
ora.cdp2.cdp
  1      ONLINE  ONLINE  c2n4      STABLE
ora.cdp3.cdp
  1      ONLINE  ONLINE  c2n2      STABLE
ora.cvu
  1      ONLINE  ONLINE  c2n1      STABLE
ora.orcl.db
  1      ONLINE  ONLINE  c2n1      Open,HOME=/home/oracle/db_21c,STABLE
  2      ONLINE  ONLINE  c2n2      Open,HOME=/home/oracle/db_21c,STABLE
  3      ONLINE  ONLINE  c2n3      Open,HOME=/home/oracle/db_21c,STABLE
  4      ONLINE  ONLINE  c2n4      Open,HOME=/home/oracle/db_21c,STABLE
ora.orcl.orcl_pdb.pdb
  1      ONLINE  ONLINE  c2n1      STABLE
  2      ONLINE  ONLINE  c2n2      STABLE
  3      ONLINE  ONLINE  c2n3      STABLE
  4      ONLINE  ONLINE  c2n4      STABLE
ora.qosmsserver
  1      ONLINE  ONLINE  c2n1      STABLE
ora.scan1.vip
  1      ONLINE  ONLINE  c2n1      STABLE
ora.scan2.vip
  1      ONLINE  ONLINE  c2n4      STABLE
ora.scan3.vip
  1      ONLINE  ONLINE  c2n2      STABLE
-----
oracle@c2n1:~> █

```


2). Access to Oracle Enterprise Manager.



Additional Comments

This document provides a brief instruction to install Oracle RAC Database 21c on SLES 15 SP3. You can extend this topology to make it highly available and secure so it is suitable for a production system.

*Thanks for selecting **SUSE Linux Enterprise Server** as your Linux platform of choice!*