



Technical report:
**OracleRAC10g Release 2 on
POWER Linux (SUSE9) with
IBM System Storage N series**

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Abstract

OracleRAC10g on Linux offers database speed and data protection via clustering. Placing the Oracle system on an IBM System Storage N series system delivers additional efficiencies and data protection options. This paper presents best practice installation of OracleRAC10g Release 2 on POWER Linux (SUSE9) on an IBM System Storage N series.

Introduction

This technical report covers the installation of IBM® System Storage™ N series in an NFS environment for IBM POWER™ processor-based Linux® on IBM pSeries servers. The servers are running SUSE9 (POWER Linux) operating system. The database is Oracle Real Application Clusters 10g Release 2 (hereafter referred to as OracleRAC10gR2) with Oracle Cluster Ready Services (hereafter referred to as Oracle CRS). This is now a certified configuration and, as such, the components presented in this paper have to be used in the same combination to gain support from all parties involved. The only exception to this is the application of certain patches (as defined and required by all the vendors in this configuration). This document will also cover the patches and recommendations for running OracleRAC10gR2 on IBM N series storage in NFS environment.

Assumptions

We assume that readers are familiar with OracleRAC10gR2 and the operation of IBM N series storage systems. We also assume that readers are familiar with the operation of the POWER Linux environment and installation of Oracle patches and any relevant POWER Linux rpms. It is also important to be familiar with all networking terminology and implementations.

The server/system environment

The configuration presented in this document is based on the OracleRAC10gR2 certification environment specified by Oracle and IBM N series.

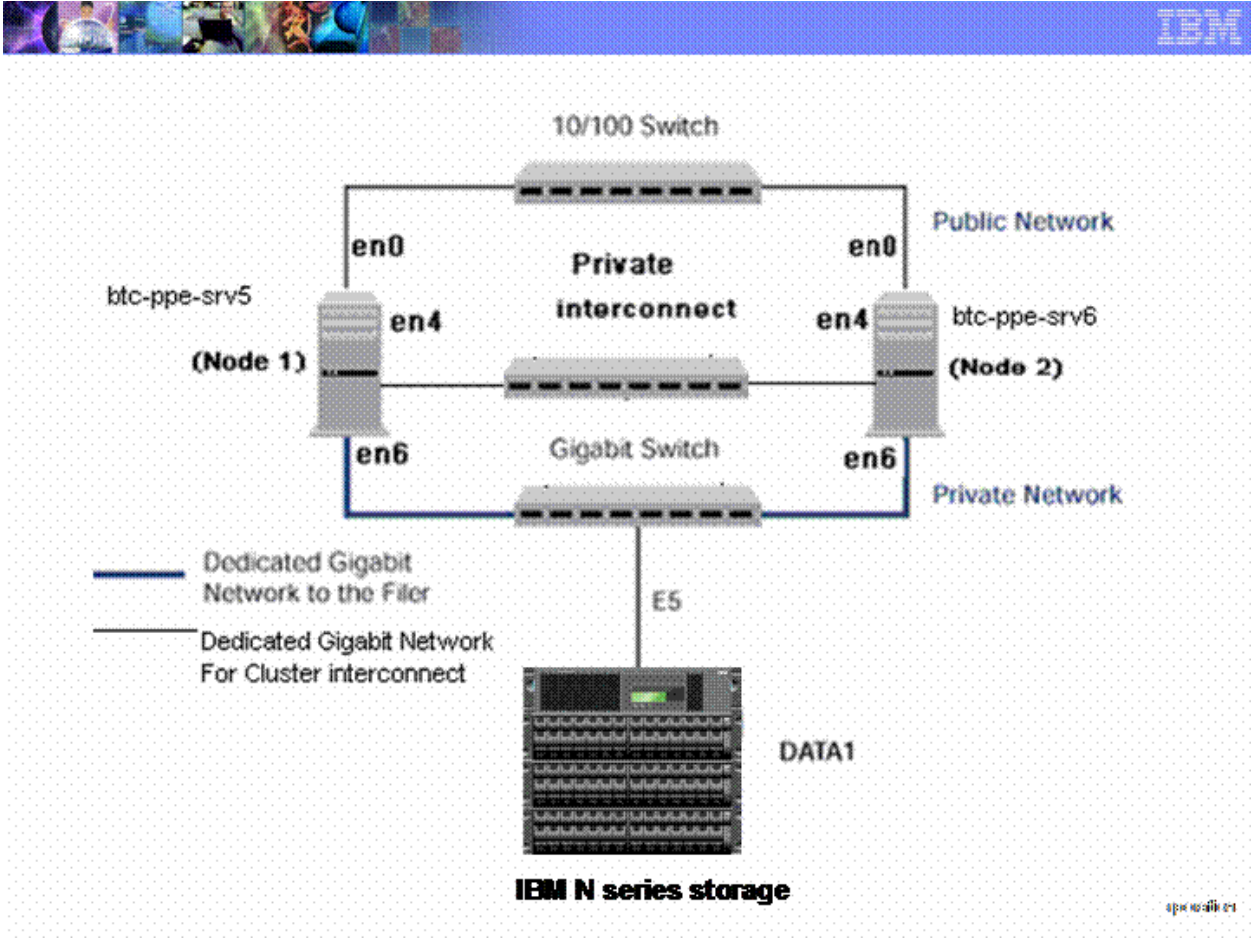


Figure 1) OracleRAC10gR2 on IBM pSeries® PowerPC™ servers with IBM N series storage.

Figure 1 illustrates a typical configuration of OracleRAC10gR2 with IBM N series storage and IBM pSeries PowerPC servers running SUSE9. This is a scalable configuration and allows users to scale horizontally and internally in terms of processor, memory, and storage.

As shown in the network diagram, we recommend that you dedicate a private network connection between the OracleRAC10gR2 servers and the IBM N series storage. This is accomplished using a dedicated gigabit network (with a gigabit switch) to the IBM N series storage. A dedicated network connection is beneficial for the following reasons:

- In an OracleRAC10gR2 environment, it is important to eliminate any contentions and latencies.
- Providing a separate network ensures security.

The cluster interconnect is an essential part for Oracle database clusters. Along with cache fusion, it is also used to monitor the heartbeat of the servers in the existing cluster group. This is a typical configuration that can be deployed in a customer's environment.



Requirements

Hardware used for tests

Cluster nodes

- Two IBM pSeries 520—Model 9111-520 64-bit PowerPC Servers
- One 4-Port 10/100 Base-TX Ethernet PCI Adapter
- One 10/100/1000 Base-T Ethernet PCI Adapter (for private interconnect)
- One 10/100/1000 Base-T Ethernet PCI Adapter (connected to IBM N series storage)

Storage infrastructure

- One N series system with IBM System Storage N series with Data ONTAP® 7.2 or later
- One gigabit switch with at least four ports
- One gigabit NIC in the system
- One or more disk shelves, based on the disk space requirements

Software used

For both nodes in the participating cluster unless specified otherwise:

- SUSE9 POWER Linux
- Oracle10g Release 2 (10.2.0.1), with RAC license



Setup for IBM N series storage

1. Configure a IBM N series storage system running IBM N series Data ONTAP 7.2 or later and with NFS and IBM System Storage N series with SnapRestore[®] license keys.
2. Create and export volumes for storing Oracle database files on the storage:

- a. Create three volumes on the storage (Data1) as listed below.

```
orahome Shared Oracle and CRS Home(Binaries)
oradata Oracle datafiles and control files
ora10g CRS files
oralogs database logs, a copy of control file and archive logs.
```

To create volumes, use the following command at the IBM N series storage console:

```
Data1> vol create oradata 14
```

Note: We created volume oradata with 14 disks and volumes oralogs and orahome with 8 disks each. You can create your volumes based on your workload needs.

Edit the `/etc/exports` file on IBM N series storage (Data1) and add the following entries to that file:

```
/vol/orahome -anon=0
/vol/oradata -anon=0
/vol/oralogs -anon=0
/vol/ora10g -anon=0
```

- b. Execute the following command at the storage system console:

```
Data1> exportfs -a
```

Note: It is recommended that you use flexible volumes in your database environment. IBM System Storage N series with FlexVol[™] technology pools storage resources automatically and enables you to create multiple flexible volumes on a large pool of disks. This flexibility means you can simplify operations, gain maximum spindle utilization and efficiency, and make changes quickly and seamlessly.

The database volume layout discussed in this document was defined for certification purposes and your setup may vary depending upon requirements.

Patches, environment and operating-system settings

Patches

Before your OracleRAC10gR2 install, the following rpms need to be applied on IBM servers. Some of these rpms may already be applied to your system. To determine whether the required rpms are already installed and committed, enter a command similar to the following:

- `# rpm -qa | grep compat`

If a patch is not installed and committed, then install it. Here is a list of required patches.

- `binutils-2.15.90.0.1.1-32.10`
- `binutils-64bit-9-200505240008`
- `compat-libstdc++-33-3.2.3-47.3 (ppc64)`
- `make-3.80-184.1 (Not Gmake-3.80-184.1)`
- `gcc-3.3.3-43.34`
- `gcc-64bit-9-200505240008`
- `gcc-c++-3.3.3-43.34`
- `glib-1.2.10-586.1`
- `glib-64bit-9-200407011606`
- `glibc-2.3.3-98.47`
- `glibc-64bit-9-200506062240`
- `glibc-devel-2.3.3-98.28`
- `glibc-devel-64bit-9-200407011606`
- `libaio-0.3.102-1.2`
- `libaio-64bit-9-200502241152`
- `libaio-devel-0.3.98-18.3`
- `libaio-devel-64bit-9-200407011606`
- `libgcc-3.3.3-43.34`
- `libgcc (64-bit) 9-200505240008`
- `libgcj-3.3.3-43.24`
- `libgcj-64bit-9-200407011606`
- `libgcj-devel-3.3.3-43.24`
- `libgcj-devel-64bit-9-200407011606`
- `libobjc-3.3.3-43.24`
- `libobjc-64bit-9-200407011606`
- `libstdc++-3.3.3-43.34`
- `libstdc++-64bit-9-200407011606`
- `libstdc++-devel-3.3.3-43.34`
- `libstdc++-devel-64bit-9-200407011606`
- `perl-5.8.5-12.1`
- `tcl-8.4.7-2`
- `unzip-5.51-7`
- `zip-2.3-27`
- `tar-1.14-4`



IBM XL C/C++ Advanced Edition V7.0.1 for Linux Runtime Environment component

If the IBM XL C/C++ Advanced Edition V7.0.1 for Linux on POWER compiler is installed, then the IBM XL C/C++ Advanced Edition V7.0.1 for Linux Runtime Environment Component will be automatically installed with the compiler. If the IBM XL C/C++ Advanced Edition V7.0 for Linux on POWER compiler is not installed, then the IBM XL C/C++ Advanced Edition V7.0.1 (or higher) for Linux Runtime Environment Component must be installed and can be downloaded for free without any license requirement.

Follow the instructions on the Web page to identify the correct files for SLES 9 “sles9”. Both files must be downloaded for Oracle:

- The RTE component: `vacpp.rte.70.sles9.jan2006.update.tar.gz`
- The XL Optimization Libraries: `vac.lib.70.sles9.tar`

Java for Oracle JDBC/OCI drivers

IBM Java 1.4.2 64-bit (SR1a) or higher:

- `IBMJava2-142-ppc64-SDK-1.4.2-1.0`

IBM Java 1.4.2 32-bit (SR1a) or higher:

- `IBMJava2-142-ppc32-SDK-1.4.2-1.0`

IBM Java 1.3.1 32-bit (SR8) or higher:

- `IBMJava2-SDK-1.3.1-8.0`

Note: IBM Java 1.4.2 32-bit is installed with Oracle.

Operating-system settings

On SUSE systems, the default ulimits for individual users are set in `/etc/security/limits.conf`. As a root user, add the following entries using root users:

```
# Oracle specific settings
oracle soft nofile 4096
oracle hard nofile 65536
oracle soft nproc 2047
oracle hard nproc 16384
oracle soft memlock 3145728
oracle hard memlock 3145728
```

This needs to be done on all nodes of the cluster. A server reboot might be necessary to activate updated limits. After you modify the settings, “`ulimit -a`” command should display the following:

```
# ulimit -a

core file size          (blocks, -c) 0
data seg size           (kbytes, -d) unlimited
file size               (blocks, -f) unlimited
max locked memory       (kbytes, -l) unlimited
max memory size         (kbytes, -m) unlimited
open files              (-n) 1024
pipe size                (512 bytes, -p) 8
stack size              (kbytes, -s) unlimited
cpu time                (seconds, -t) unlimited
max user processes      (-u) 15168
virtual memory          (kbytes, -v) unlimited
```

Verify the same for the Oracle user.

Kernel settings

Add the following parameters for the shared memory and semaphores to the “`/etc/sysctl.conf`” file using root user.

```
kernel.shmall = 2097152
kernel.shmmax = 2147483648
kernel.shmmni = 4096
kernel.sem = 250 32000 100 141
fs.file-max = 65536
net.ipv4.ip_local_port_range = 1024 65000
net.core.rmem_default = 1048576
net.core.wmem_default = 262144
net.core.rmem_max = 1048576
net.core.wmem_max = 262144
```



Preinstall setup tasks (cluster nodes)

This information is intended for both nodes in the participating cluster unless specified otherwise.

1. Please have two IBM pSeries PowerPC servers ready with the latest recommended patches and operating-system settings as discussed in Section 6.
2. Install/configure NI in the cluster nodes (three per node).
 - a. Public IP: As indicated by name.
 - b. Private interconnects: Connect one gigabit NIC back to back to the other node for cluster interconnects.
 - c. Server connection to the IBM N series storage: Connect one gigabit NIC to the gigabit switch, which will connect to the gigabit NIC on the IBM N series storage.
3. Configure the network interfaces on each node.
 - a. Configure the three network interfaces as indicated below.

```
# btc-ppe-srv5 (Host 1)
en0 - ip: 10.73.68.155, netmask 255.255.254.0
en6 - ip: 10.73.69.155, netmask: 255.255.255.0
en4 - ip: 192.168.73.1, netmask: 255.255.255.0
# btc-ppe-srv6 (Host 2)
en0 - ip: 10.73.68.156, netmask: 255.255.254.0
en6 - ip: 10.73.69.156, netmask: 255.255.255.0
en4 - ip: 192.168.73.2, netmask: 255.255.255.0
```

Where:

- Interface en0 is the public ip for each node.
 - Interface en6 on both cluster nodes is connected to the gigabit switch for storage I/O.
 - Interface en4 on both cluster nodes is connected back to back for cluster private interconnects.
- b. Update the /etc/hosts file on the cluster nodes and add entries for public, private and VIP addresses. Note that in addition to the preconfigured public and private network, Oracle Database 10g requires additional IP addresses that will be mapped to the public address as virtual IPs (VIPs). If a node fails when an application or user makes a connection using a VIP, the Oracle clusterware will transfer the VIP address to another surviving instance. Add the VIP to the /etc/hosts file on all nodes in the cluster and all nodes accessing the database.

A sample for /etc/hosts entries

# Internet Address	Hostname #	Comments
10.73.68.155	btc-ppe-srv5	btc-ppe-srv5.btcppe.ibm.com
10.73.69.155	btc-ppe-srv5-en6	
192.168.73.1	btc-ppe-srv5-i	btc-ppe-srv5-i.btcppe.ibm.com
10.73.68.195	btc-ppe-srv5-v	btc-ppe-srv5-v.btcppe.ibm.com
10.73.68.156	btc-ppe-srv6	btc-ppe-srv6.btcppe.ibm.com
10.73.69.156	btc-ppe-srv6-en6	
192.168.73.2	btc-ppe-srv6-i	btc-ppe-srv6-i.btcppe.ibm.com
10.73.68.196	btc-ppe-srv6-v	btc-ppe-srv6-v.btcppe.ibm.com
10.73.69.105	data1	

4. Check each interface connection via the ping command (interconnects, public IPs and storage).

5. Create NFS mount points and mount the volumes with the following mount options on all cluster nodes. As a root user, update the `/etc/fstab` file on all server nodes and add the following entries:
- ```
Data1:/vol/oradata /oradata nfs
hard,intr,tcp,rw,bg,rsize=32768,wsiz=32768,actimeo=0,timeo=600

Data1:/vol/orahome /orahome nfs
hard,intr,tcp,rw,bg,rsize=32768,wsiz=32768,noac,timeo=600

Data1:/vol/oralogs /oralogs nfs hard,intr,
tcp,rw,bg,rsize=32768,wsiz=32768,actimeo=0,timeo=600

Data1:/vol/ora10g /ora10g nfs
hard,tcp,intr,rw,bg,rsize=32768,wsiz=32768,noac,timeo=600/
```

**Where:**

- Data1 is the name of the IBM N series storage system.
- oradata, oralogs, orahome, and ora10g are the mount points on the cluster nodes.
- ora10g is just a separate mount point for CRS files. CRS files (cluster registry file and voting disk file) can reside in the same `/ora10g` volume but must be mounted with “noac” mount option. “intr” mount option is required in failure scenarios in which CRS has to evict a node.
- During the Oracle CRS install, please make sure to indicate a path starting with `/ora10g` directory when prompted for the Oracle Cluster Registry (OCR) file and voting disk Oracle Cluster Synchronization Services (CSS) file location.

**Note:** Oracle install fails if you dynamically mount NFS volumes without adding entries in `/etc/fstab`.

6. Create the following mount points on all cluster nodes:

```
#mkdir /oradata
#mkdir /oralogs
#mkdir /orahome
#mkdir /ora10g
```

Mount exported volumes on the mount points created above on all the cluster nodes. It is always a good idea to verify mount options by `mount` command on each node. After the NFS volumes are mounted, change the ownership of these mounted volumes to Oracle user.



## Installation procedure

---

For an OracleRAC10gR2 install SUSE POWER Linux, refer to the Oracle install documentation (part # B14203-05). The link below provides instructions for OracleRAC10gR2 install on SUSE POWER Linux:

1. Preparing to install the OracleRAC10g on cluster nodes:
  - a. This document assumes the Oracle user account and the group to be oracle and dba, respectively, on both cluster nodes. The user ID and group name for the oracle account should be the same on both cluster nodes. A sample oracle user .bash\_profile file is provided in the appendix. Make sure the user profile file exports at least ORACLE\_BASE, ORACLE\_PRODUCT, ORACLE\_HOME, ORACLE\_SID, and PATH entries.
  - b. Grant appropriate permissions to the oracle user on all shared mounted volumes, /oradata, /orahome, and /orlogs as indicated below:

```
#chown -R oracle:dba /oradata
#chmod -R 755 /oradata
```

Repeat the same for orahome and oralogs volumes.
  - c. Set up account equivalence between the cluster nodes for the oracle user account. Add the following entries to the /etc/hosts.equiv file on all cluster nodes:

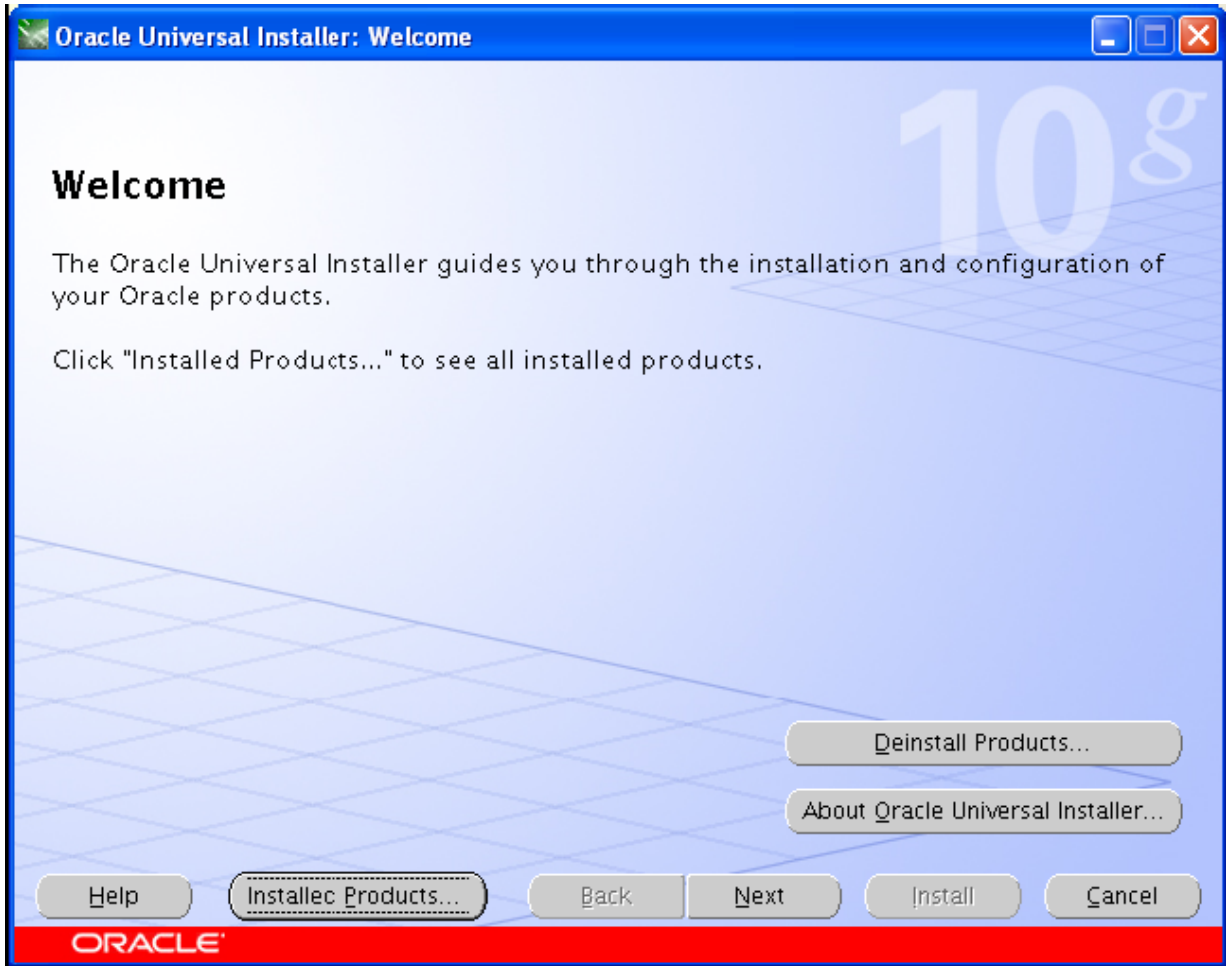
```
btc-ppe-srv5 oracle
btc-ppe-srv6 oracle
btc-ppe-srv5-i oracle
btc-ppe-srv6-i oracle
```
  - d. Test the oracle account equivalence using a remote shell utility. such as rsh. after logging in as the Oracle user from both cluster nodes.

```
btc-ppe-srv5:

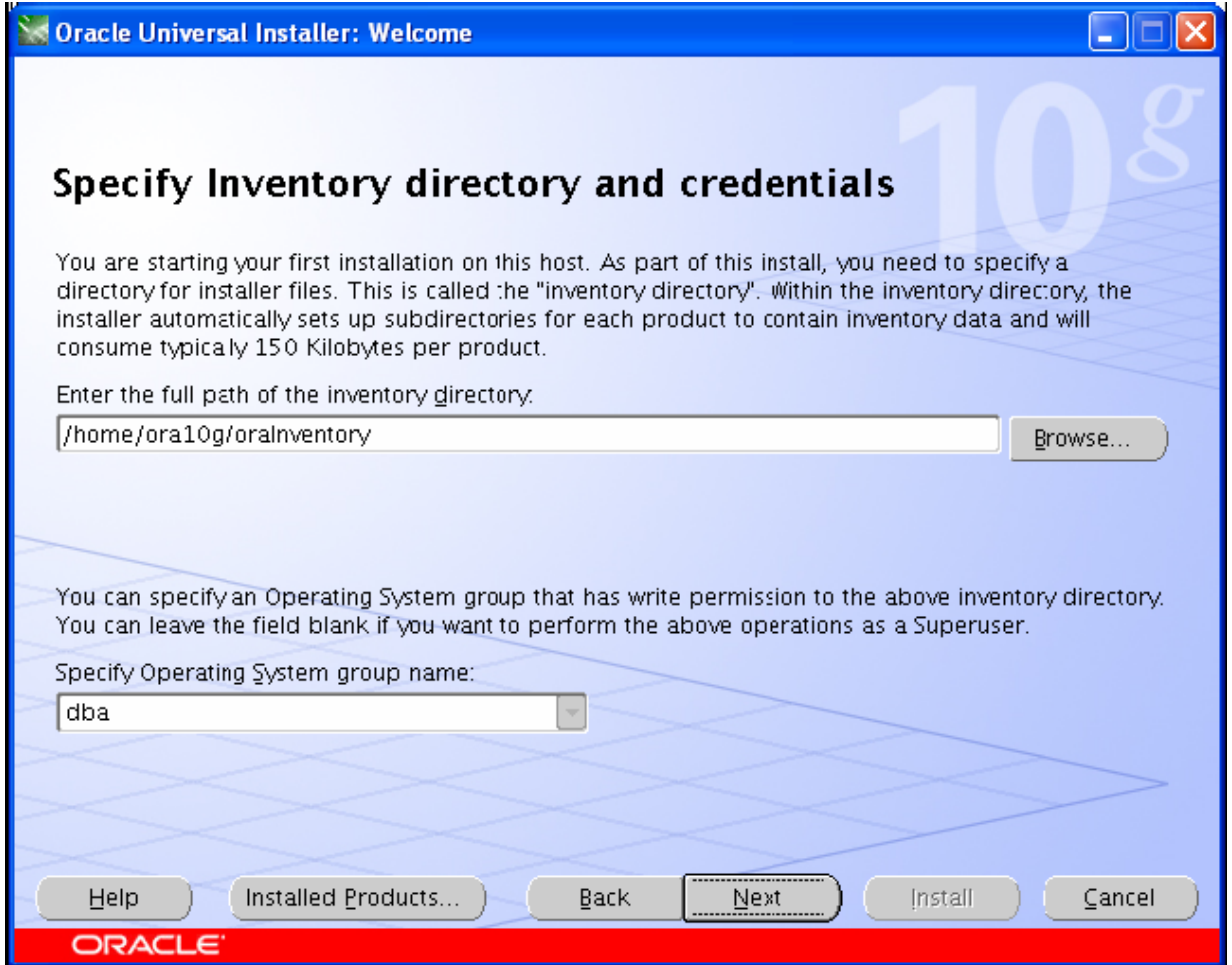
#su - oracle
$rsh btc-ppe-srv5 pwd
$rsh btc-ppe-srv6 pwd
$rsh btc-ppe-srv5-i pwd
$rsh btc-ppe-srv6-i pwd

btc-ppe-srv6:

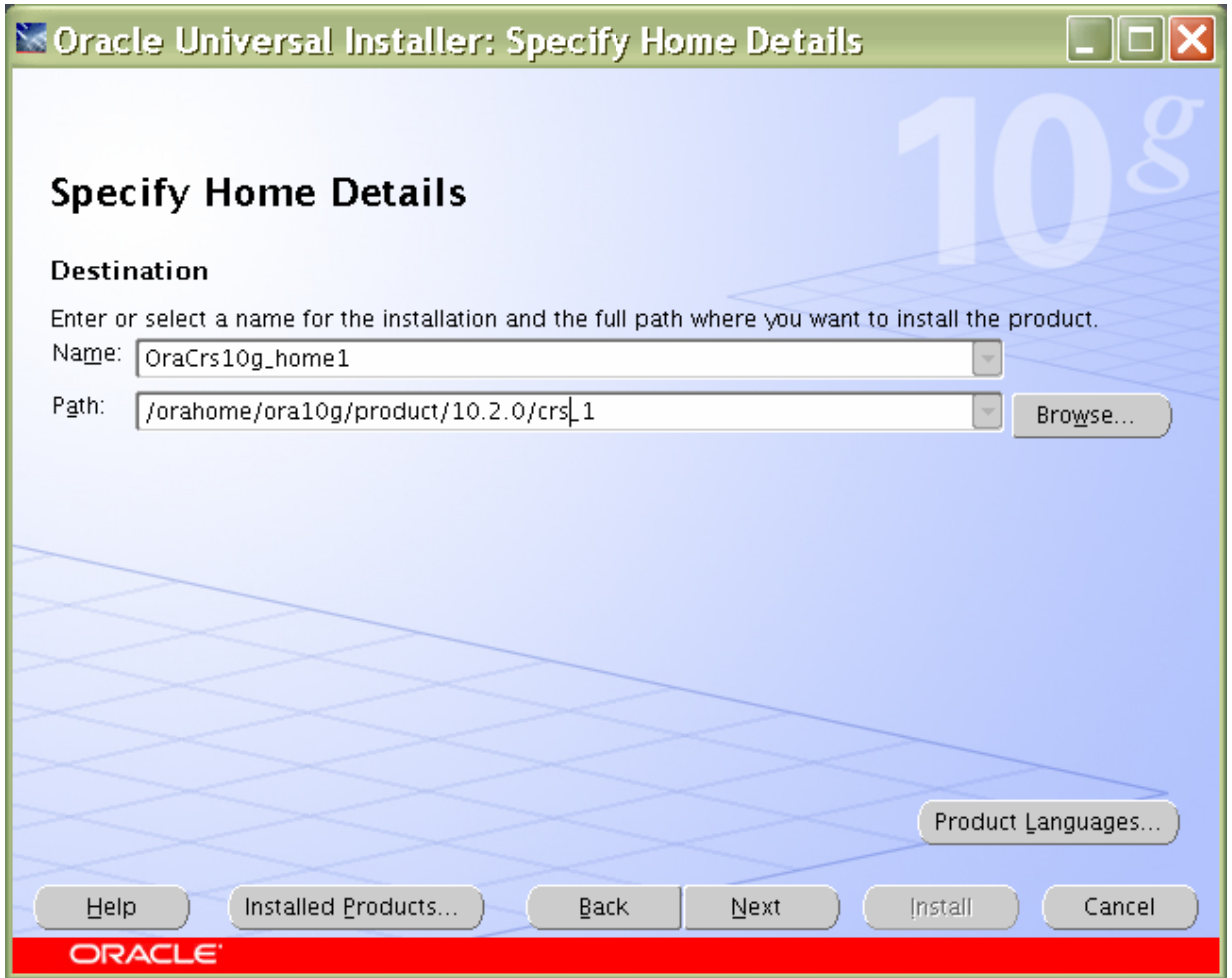
#su - oracle
$rsh btc-ppe-srv5 pwd
$rsh btc-ppe-srv6 pwd
$rsh btc-ppe-srv5-i pwd
$rsh btc-ppe-srv6-i pwd
```
2. Installing OracleRAC10g CRS (Cluster Ready Services): Prior to installing the Oracle10g, Oracle CRS must be installed, configured and started. Refer to Oracle Real Application Clusters Installation and Configuration Guide 10g Release 2 (10.2.0.1) for UNIX® Systems for details on installing Oracle CRS on Linux. This section describes the procedures for using Oracle Universal Installer (OUI) to install CRS. Note that the CRS home that you identify in this installation phase is only for CRS software; this home cannot be the same home as the one for the OracleRAC10g database. In short, ORACLE\_HOME and CRS HOME must be different locations.
  - a. Run the runInstaller command from the /crs subdirectory on the Oracle CRS Release 21 (10.2.0.1) CD-ROM. This is a separate CD that contains the Oracle CRS software. This document assumes you start the OUI from node 1 (btc-ppe-srv5). When the OUI displays the Welcome page, click Next.

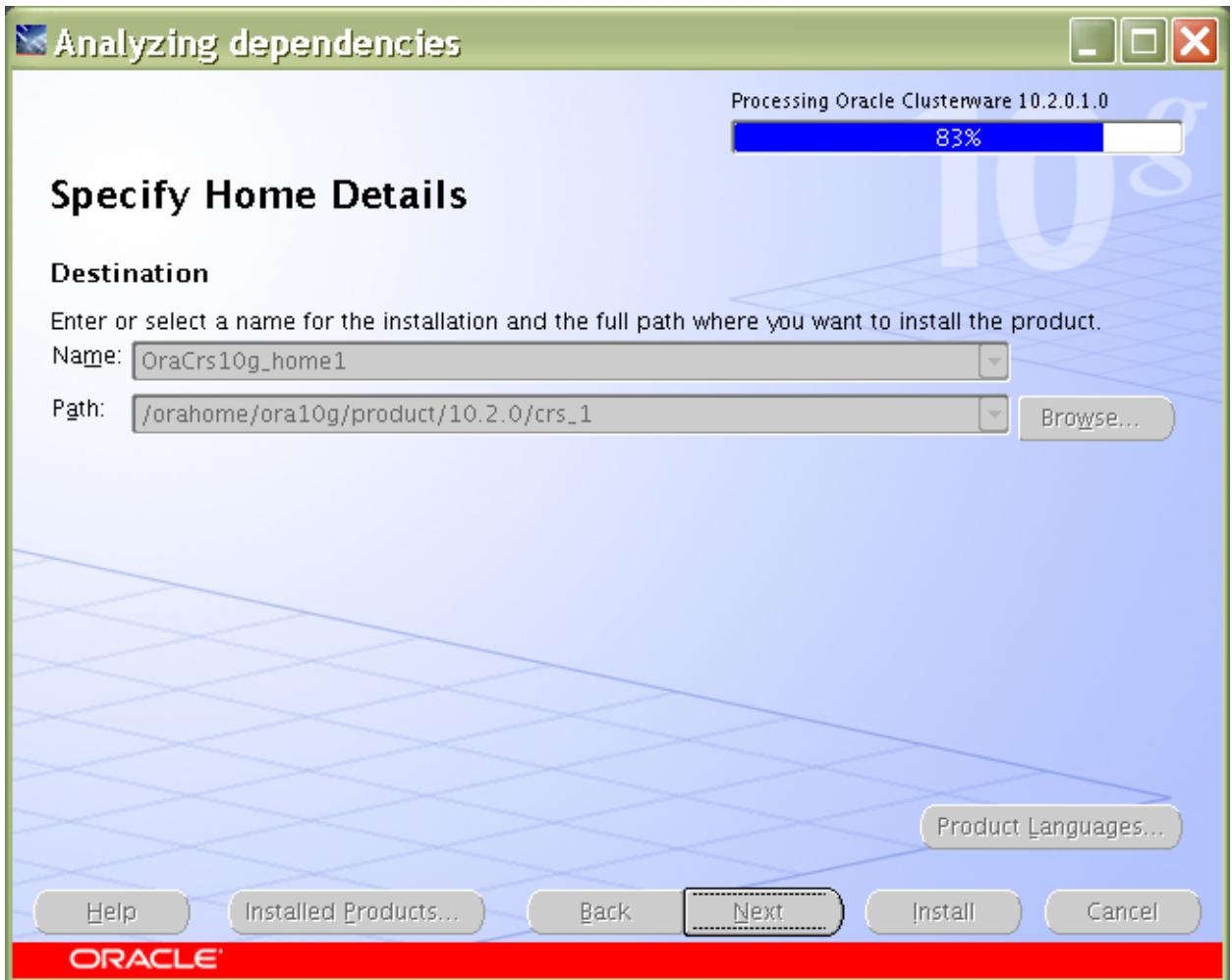


- b. On the “Specify Inventory...” page, enter a nonshared location for Oracle Inventory. This is the only part of Oracle10g that should not be shared. For this test, we used /home/oracle/oralInventory for the Oracle Inventory information. Click Next.



- c. The Specify File Locations page contains predetermined information for the source of the installation files and the target destination information. Specify the destination path for the shared CRS home. The path should be on a shared file system and different from \$ORACLE\_HOME. In this exercise, the shared CRS home was /orahome/ora10g/product/10.2.0/crs\_1.





- d. On the next screen, specify the cluster name, public names (hostnames), private names and virtual hostnames to be used for the cluster interconnect. In our case, the public names are btc-ppe-srv5 and btc-ppe-srv6, the private names are btc-ppe-srv5-i and btc-ppe-srv6-i and the Virtual hostnames are btc-ppe-srv5-v and btc-ppe-srv6-v. click next after adding all the nodes name.



**Oracle Universal Installer: Specify Cluster Configuration**

## Specify Cluster Configuration

Enter a name for the cluster and select the nodes to be managed by the Oracle Clusterware. For each node, specify the name for the public IP address, the name for the private interconnect, and the name for the virtual IP address on the node.

You can use a cluster configuration file to configure your cluster by clicking Use Cluster Configuration File instead of completing the Cluster Nodes box. The Use Cluster Configuration File option is helpful if you have many nodes.

Cluster Name:

Cluster Nodes

| Public Node Name | Private Node Name | Virtual Host Name |
|------------------|-------------------|-------------------|
| btc-ppe-srv5     | btc-ppe-srv5-i    | btc-ppe-srv5-v    |
| btc-ppe-srv6     | btc-ppe-srv6-i    | btc-ppe-srv6-v    |

**ORACLE**

**Modify a node in the existing cluster** [-] [x]

You can modify the following attributes of the selected node in the cluster. Ensure that the modified entries are unique; they must be different from the entries for the same attributes on the other nodes in this cluster.

Public Node Name:

Private Node Name:

Virtual Host Name:

- e. On the Network Interface Usage page, specify the private network to be used for the cluster interconnect. This is a very important step. Do not leave it set to the default, which is Do Not Use. In this case, eth1(btc-ppe-srv5-i) was used as the private interconnect and eth0(btc-ppe-srv5) was used as public interface. Select the interface and click the edit button to modify it. Click Next.

**Oracle Universal Installer: Specify Network Interface Usage**

## Specify Network Interface Usage

Identify the planned use for each global interface shown in the box below: Public, Private, or Do Not Use. Private interfaces are used by Oracle Clusterware for inter-node traffic.

If there is more than one subnet associated with an interface, then click Edit and change the interface's attributes to associate the interface name with the additional subnets.

| Interface Name | Subnet       | Interface Type |
|----------------|--------------|----------------|
| bond0          | 10.73.69.0   | Do Not Use     |
| eth0           | 10.73.68.0   | Public         |
| eth1           | 192.168.73.0 | Private        |

**ORACLE**

**Edit private interconnect type**

Select a global network interface type of Public, Private, or Do Not Use.

Interface Name:

Subnet:

Interface Type

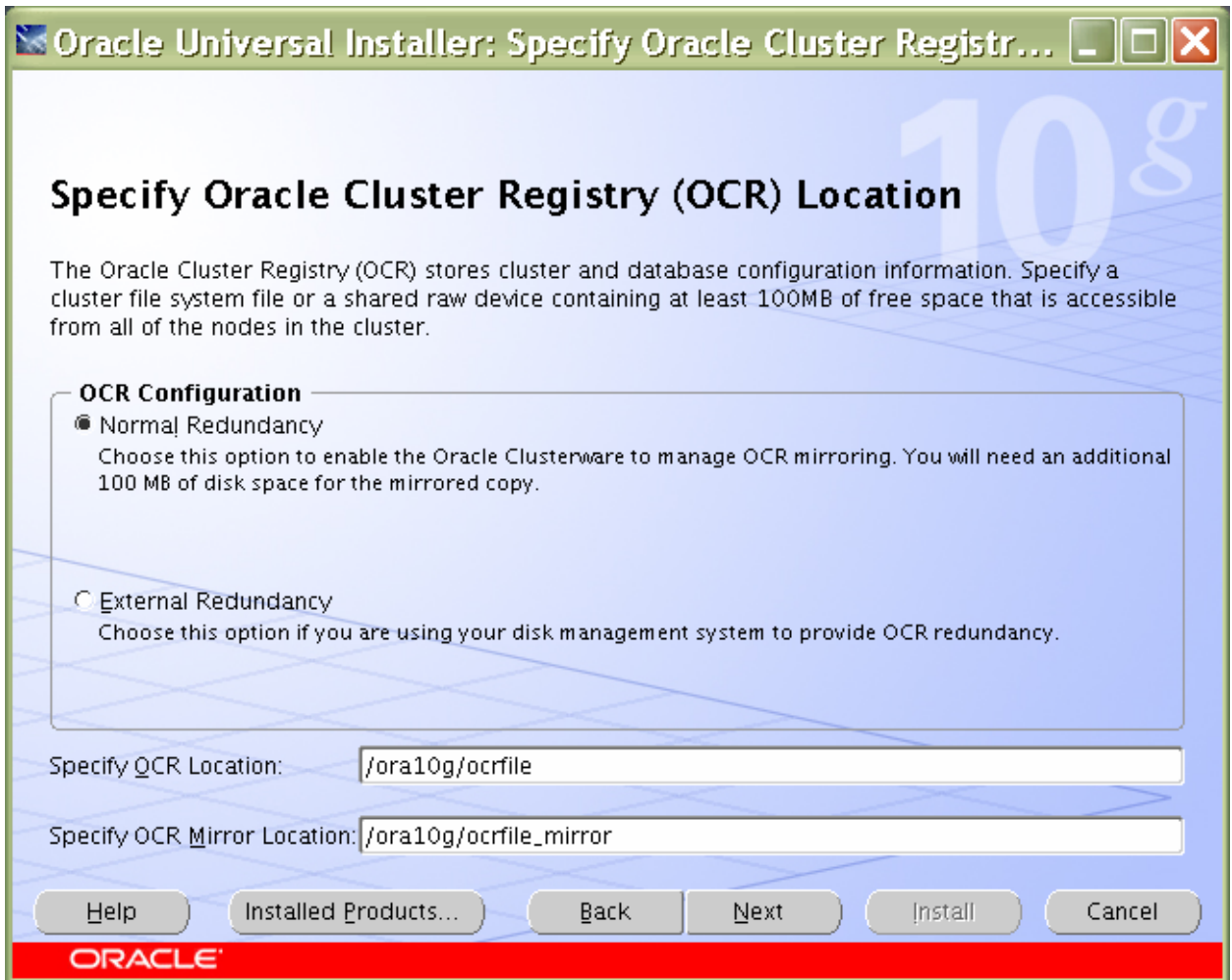
Public

Private

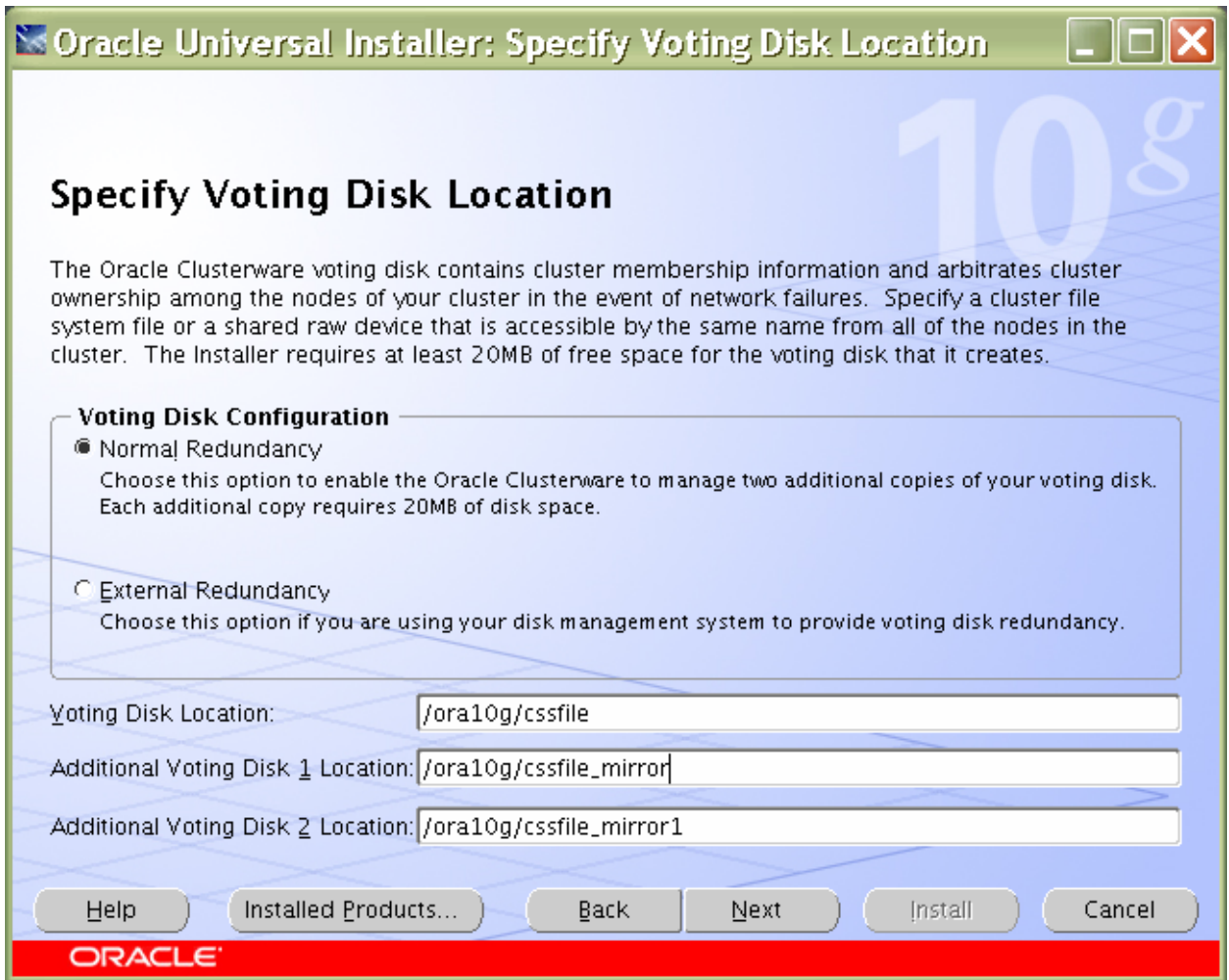
Do Not Use

OK Cancel

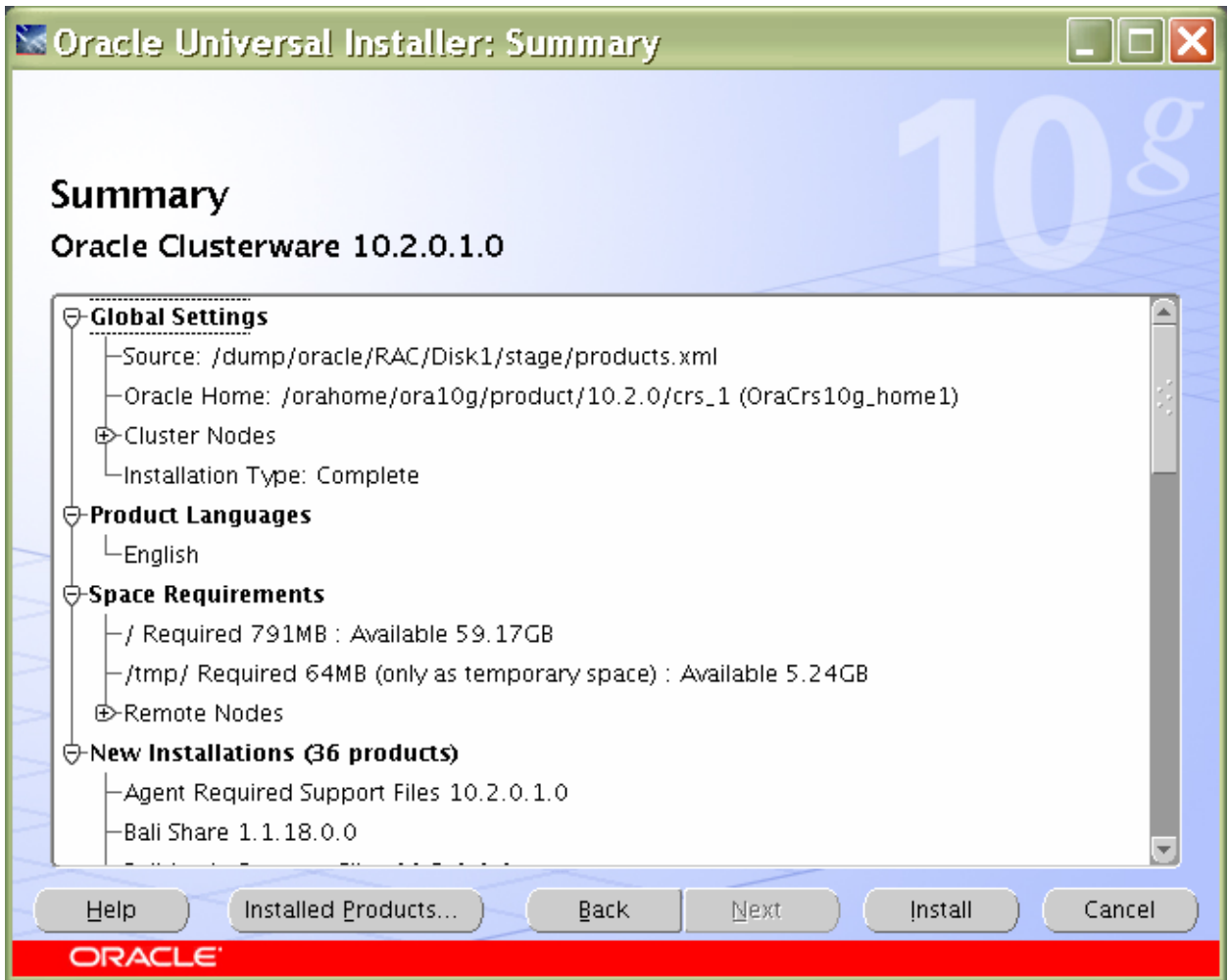
- f. On the OCR (Oracle Cluster Registry) page, specify the OCR file. Make sure to specify the full path to a shared location along with the name of the file. Do same for mirror file if you want normal redundancy. In our case, we used `/ora10g/ocrfile` and `/ora10g/ocrfile_mirror`. Click Next.

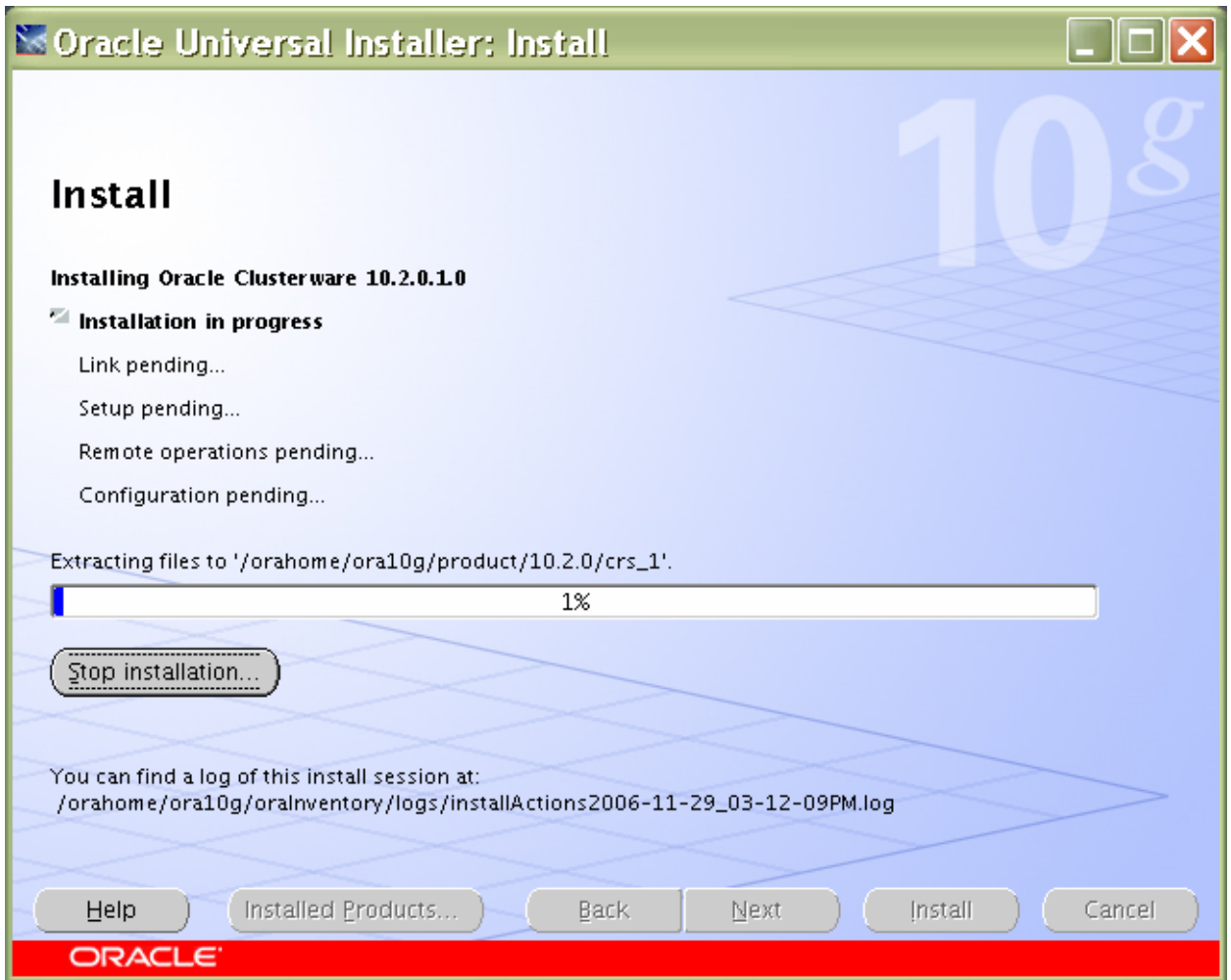


- g. On the Voting Disk page, specify the CSS voting disk file location. We used /ora10g/cssfile for CSS services. In case of normal redundancy specify the path along with name. Click Next.

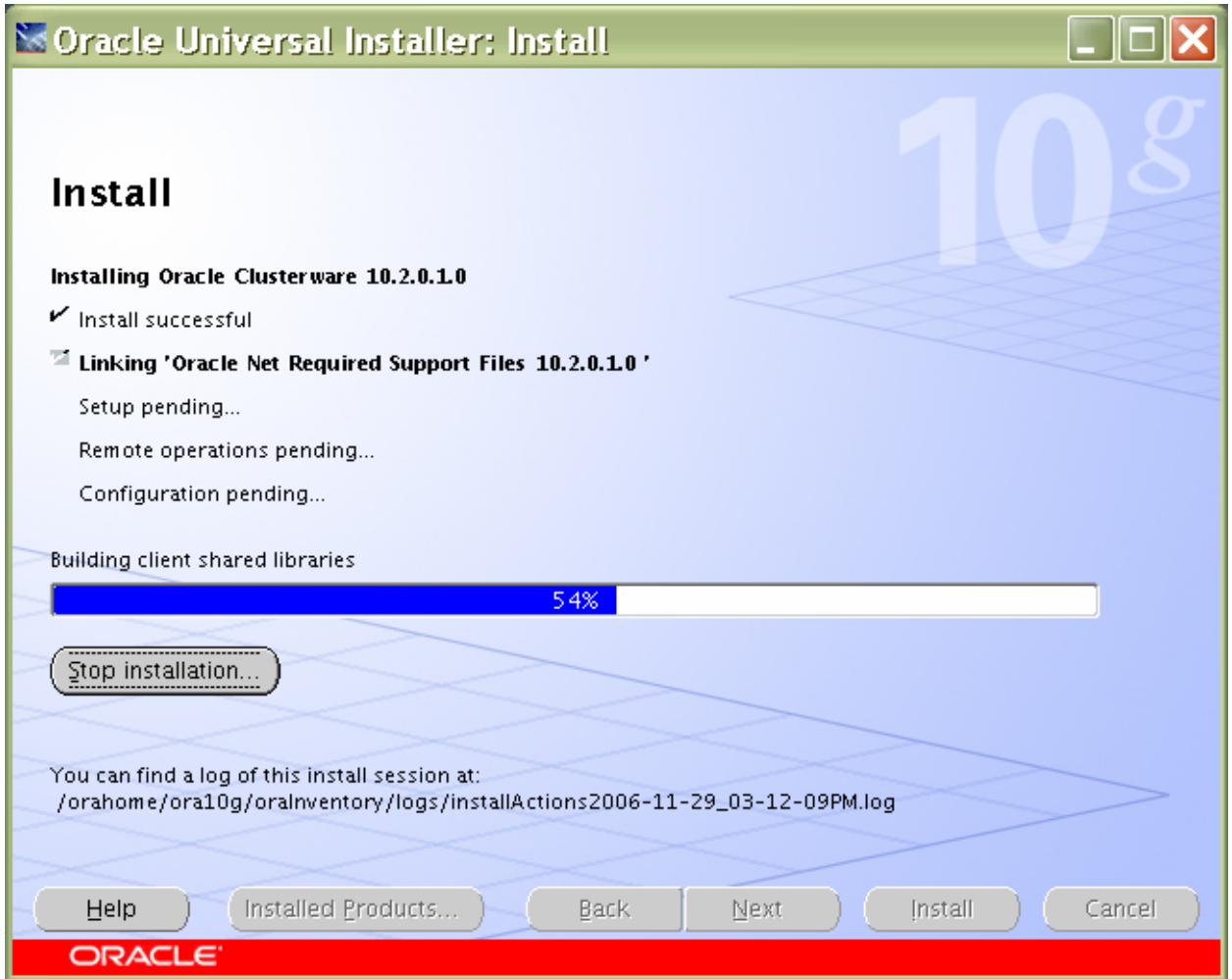


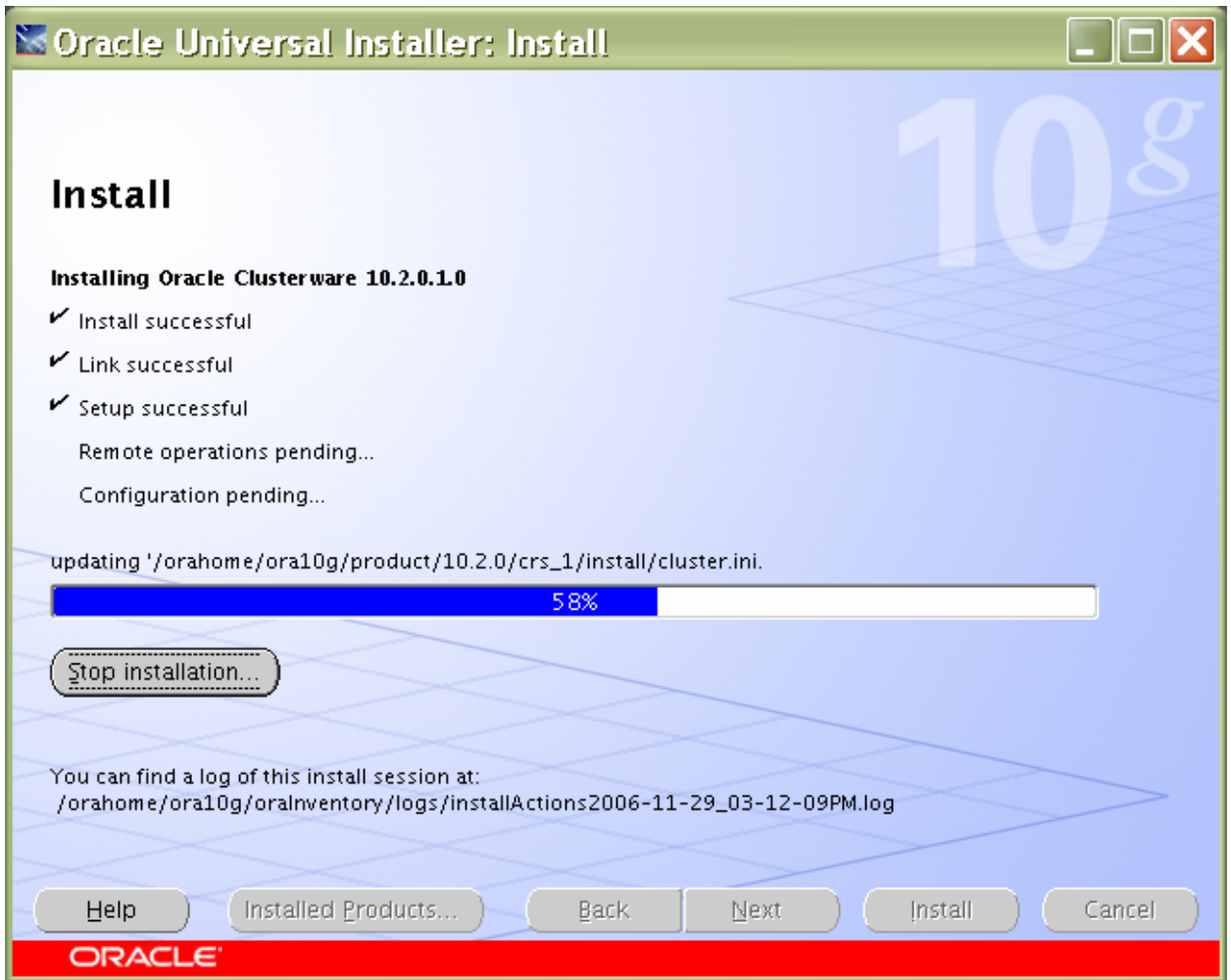
- h. Click Install to continue CRS Installation.

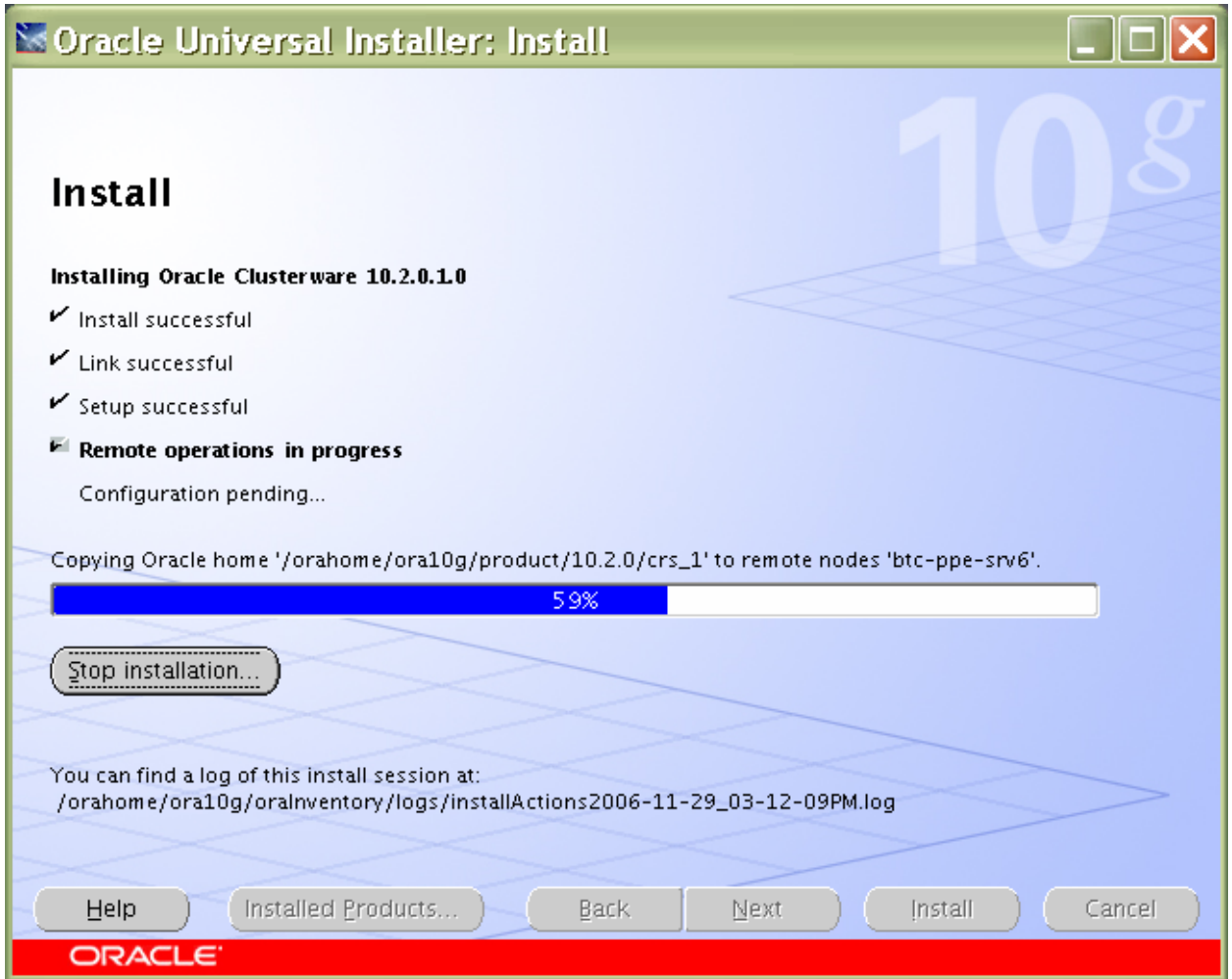


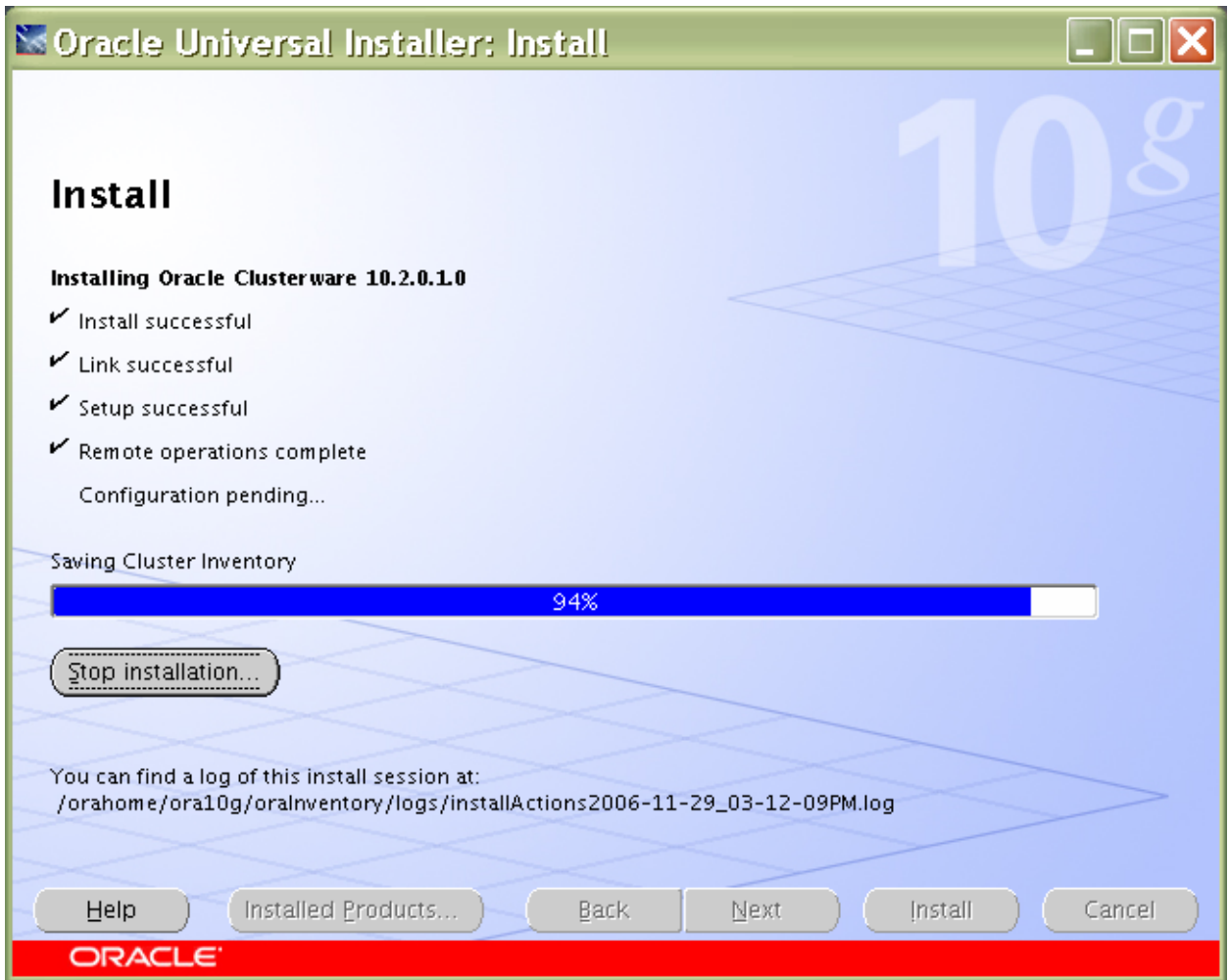




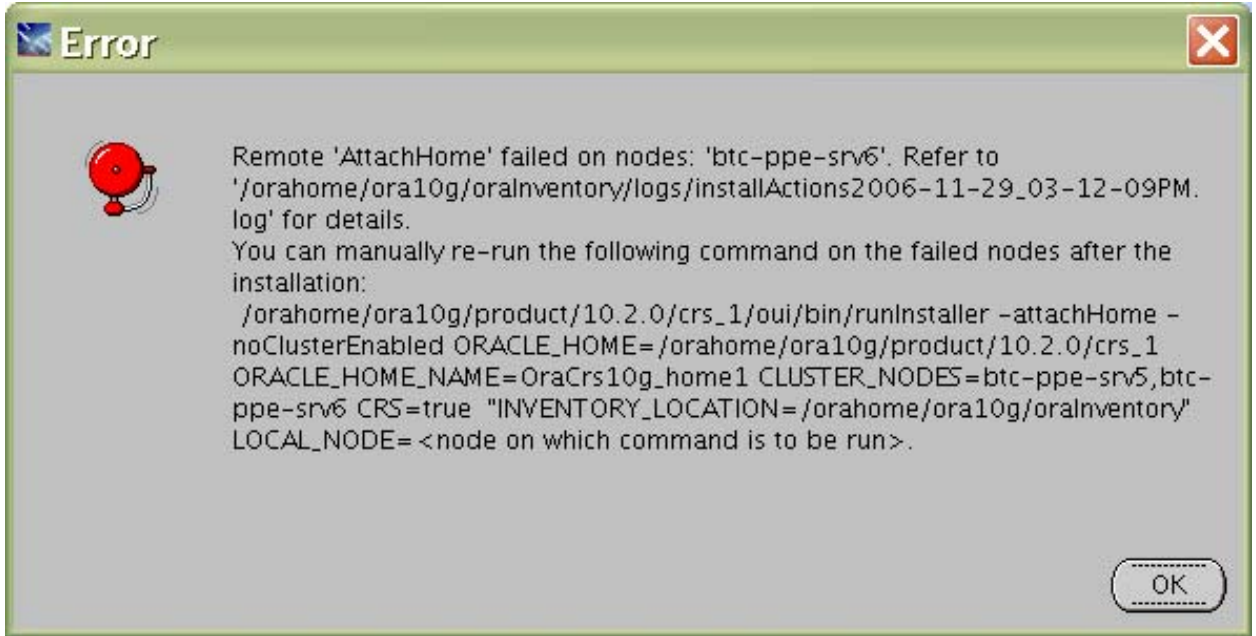








- i. During configuration you may get following error. Click OK to continue.



- j. Run the following script as root user starting from primary node.

Execute Configuration scripts

The following configuration scripts need to be executed as the "root" user in each cluster node.

Scripts to be executed:

| Number | Script Location                              | Nodes                     |
|--------|----------------------------------------------|---------------------------|
| 1      | /orahome/ora10g/orainventory/orainstRoot.sh  | btc-ppe-srv5,btc-ppe-srv6 |
| 2      | /orahome/ora10g/product/10.2.0/crs_1/root.sh | btc-ppe-srv5,btc-ppe-srv6 |

To execute the configuration scripts:

1. Open a terminal window
2. Log in as "root"
3. Run the scripts in each cluster node
4. Return to this window and click "OK" to continue

Note: Do not run the scripts simultaneously on the listed nodes.

Help
OK

- k. In the configuration assistant window you may get some warnings. Click OK to continue.

**Oracle Universal Installer: Configuration Assistants**

## Configuration Assistants

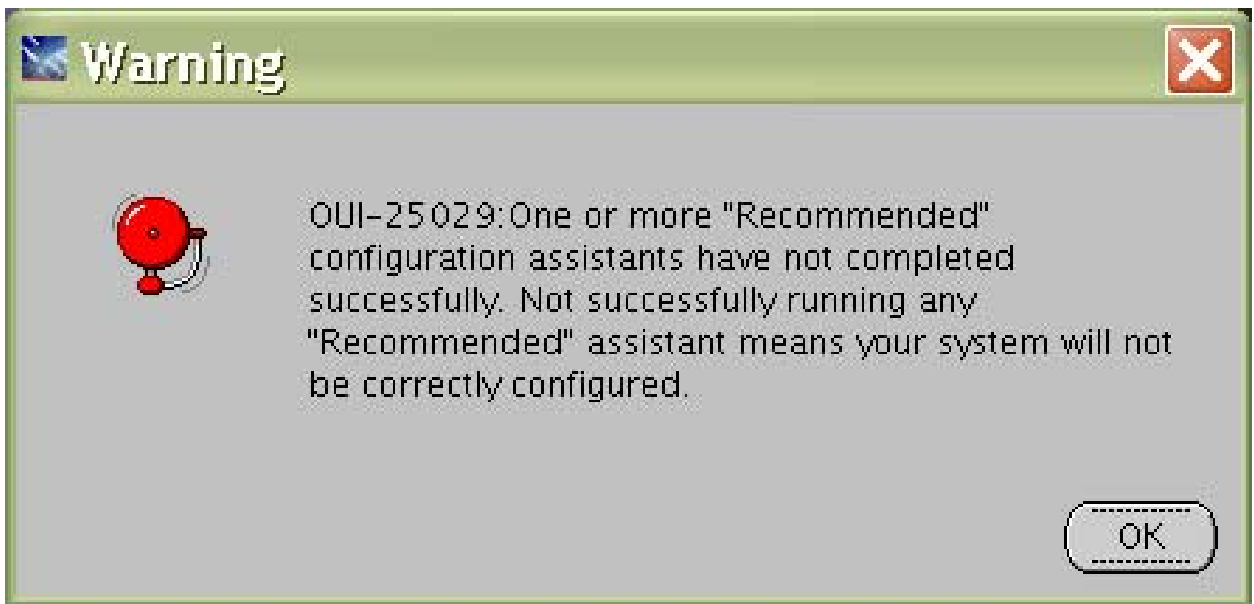
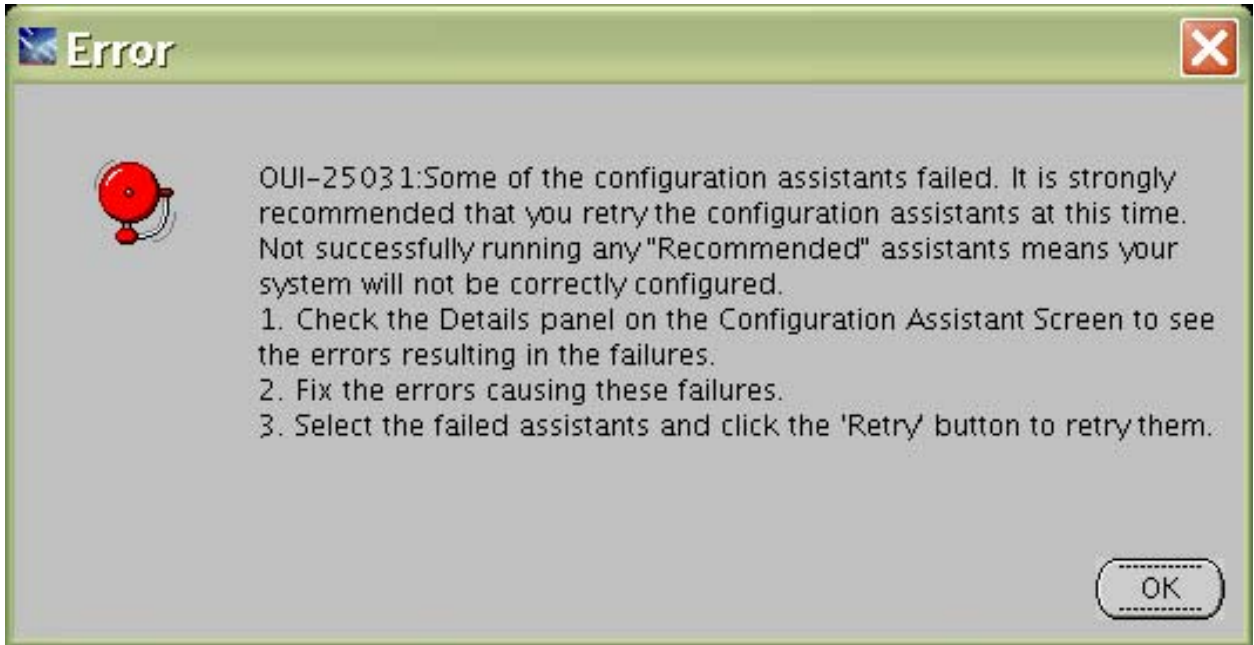
The following configuration assistants will configure and start the components you selected earlier.

| Tool Name                                                                    | Status                  | Type        |
|------------------------------------------------------------------------------|-------------------------|-------------|
| <input type="checkbox"/> Oracle Clusterware                                  |                         |             |
| <input type="checkbox"/> Oracle Notification Server Configuration Assistant  | Succeeded               | Recommended |
| <input type="checkbox"/> Oracle Private Interconnect Configuration Assistant | Succeeded               | Recommended |
| <input checked="" type="checkbox"/> Oracle Cluster Verification Utility      | Failed (see details...) | Recommended |

Details (see full log at /ora10g/orainventory/logs/installActions2006-11-29\_03-12-09PM.log)

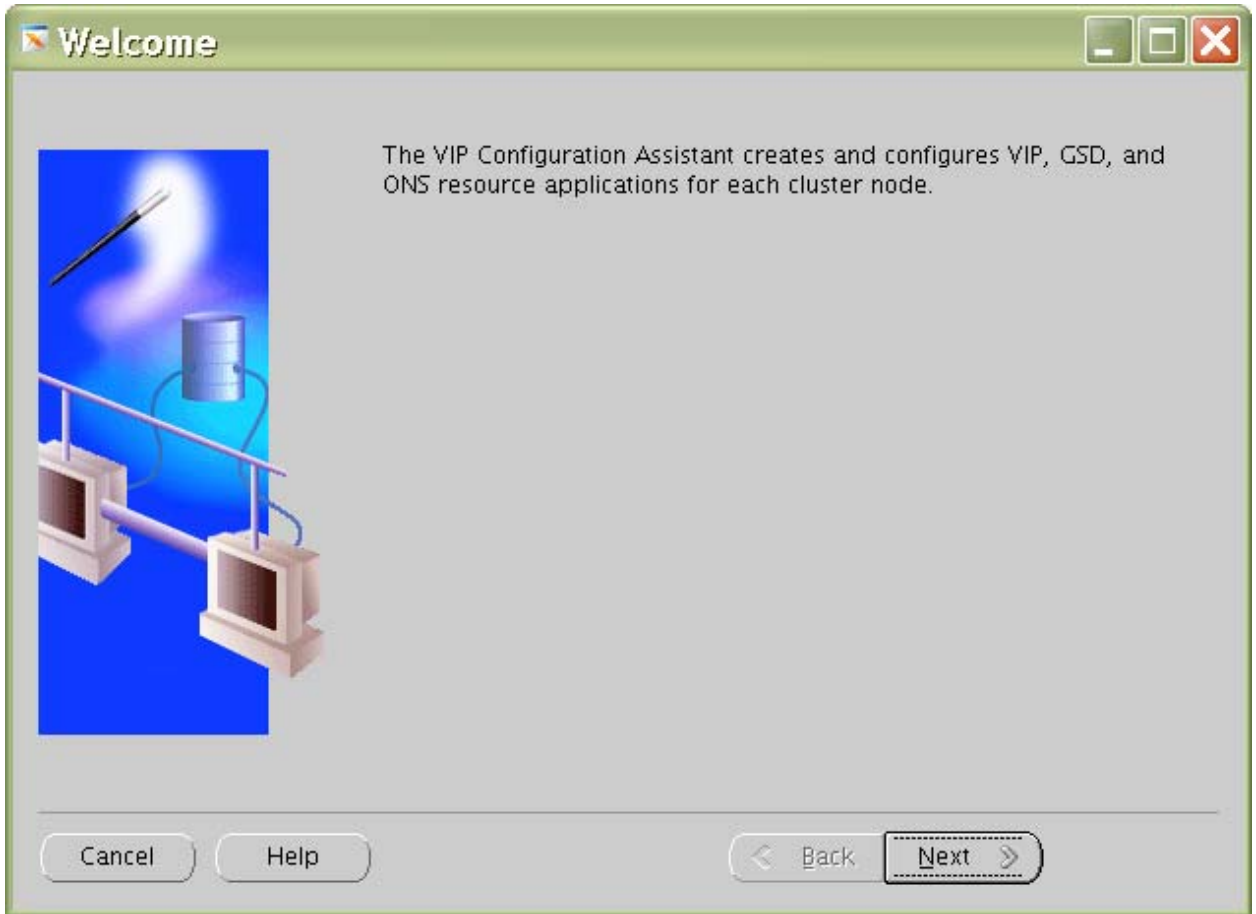
The "/ora10g/product/10.2.0/crs\_1/cfgtoollogs/configToolFailedCommands" script contains all commands that failed, were skipped or were cancelled. This file may be used to run these configuration assistants outside of OUI. Note that you may have to update this script with passwords (if any) before executing the same.

**ORACLE**

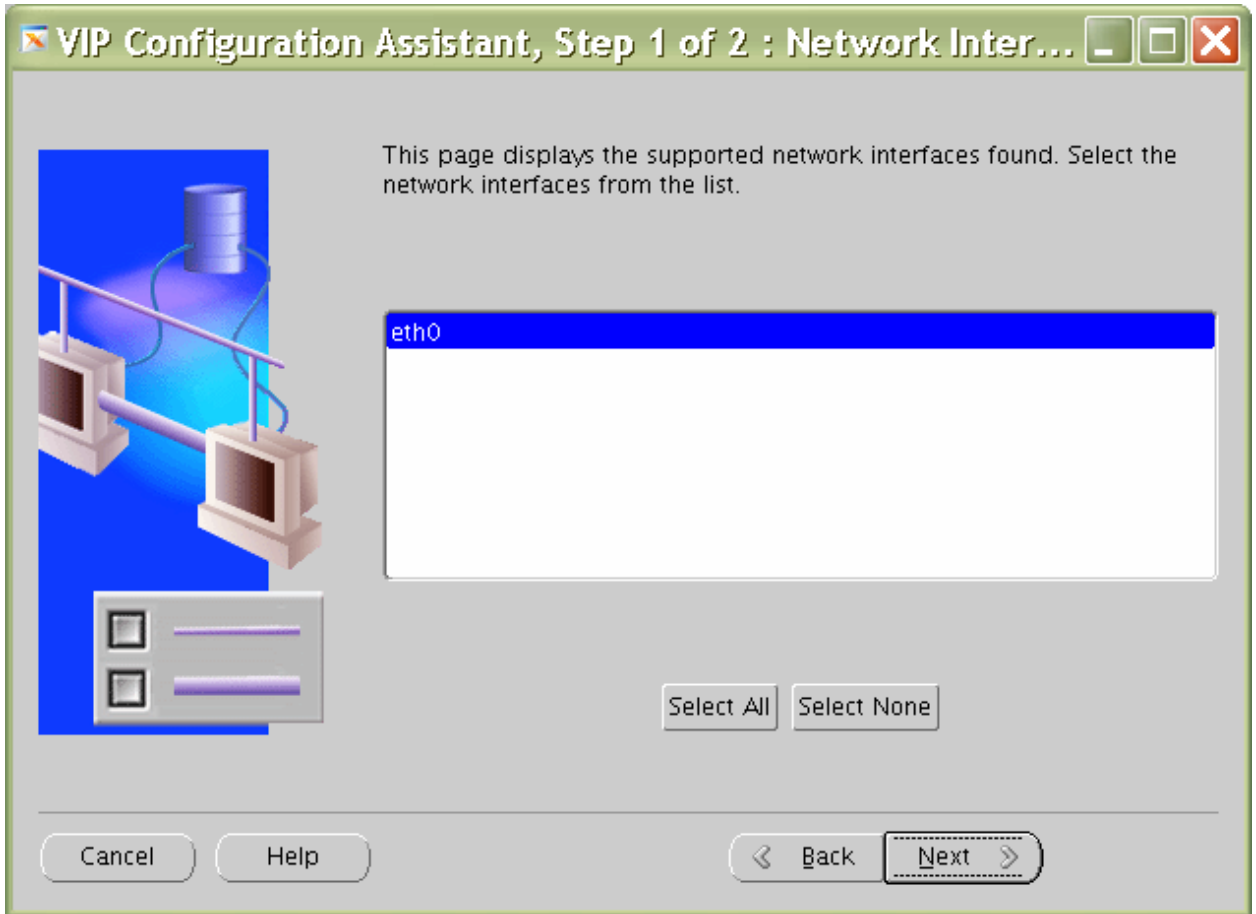


- I. Run vipca utility from \$ORA\_CRS\_HOME/bin directory as root user on Master Node (btc-ppe-srv5). Click next.  
# ./vipca





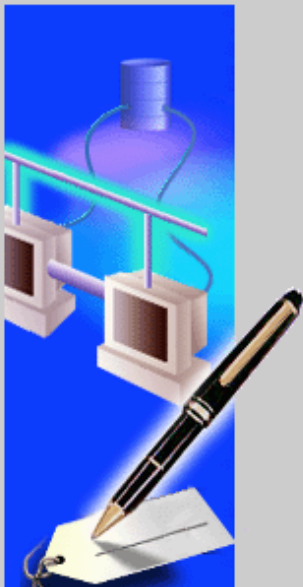
- m. Select the Public Interface. Click Next.



- n. Specify Virtual IP address and Subnet mask of each node. Click Next.

**VIP Configuration Assistant, Step 2 of 2 : Virtual IPs for...**

IP addresses are required for defining virtual IP resource application for each cluster node.



| Node name    | IP Alias Name | IP address | Subnet Mask   |
|--------------|---------------|------------|---------------|
| btc-ppe-srv5 |               |            | 255.255.255.0 |
| btc-ppe-srv6 |               |            | 255.255.255.0 |

Clear Clear all

Cancel Help < Back Next >

**VIP Configuration Assistant, Step 2 of 2 : Virtual IPs for...**

IP addresses are required for defining virtual IP resource application for each cluster node.

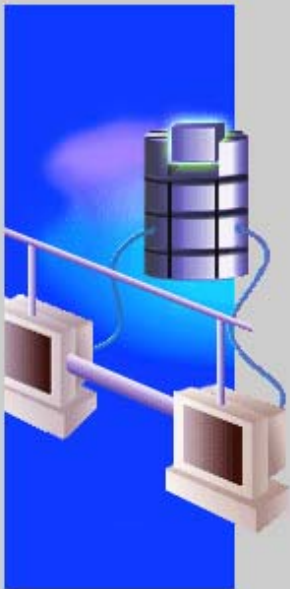
| Node name    | IP Alias Name  | IP address   | Subnet Mask   |
|--------------|----------------|--------------|---------------|
| btc-ppe-srv5 | btc-ppe-srv5-v | 10.73.68.195 | 255.255.254.0 |
| btc-ppe-srv6 | btc-ppe-srv6-v | 10.73.68.196 | 255.255.254.0 |

Clear Clear all

Cancel Help < Back Next >

- o. Click Finish to continue vipca.

Summary
\_ □ ×



## Summary

The VIP Configuration Assistant will now create application resources for each selected node.

**Nodes:** btc-ppe-srv5,btc-ppe-srv6


**Network Interfaces:** eth0

**Mapping of nodes and virtual IP addresses:**

| Node name    | IP Alias Name  | IP address   | Subnet Mask   |
|--------------|----------------|--------------|---------------|
| btc-ppe-srv5 | btc-ppe-srv5-v | 10.73.68.195 | 255.255.254.0 |
| btc-ppe-srv6 | btc-ppe-srv6-v | 10.73.68.196 | 255.255.254.0 |

Cancel
Help
← Back
Next →
Finish

### Configuration Assistant Progress Dialog

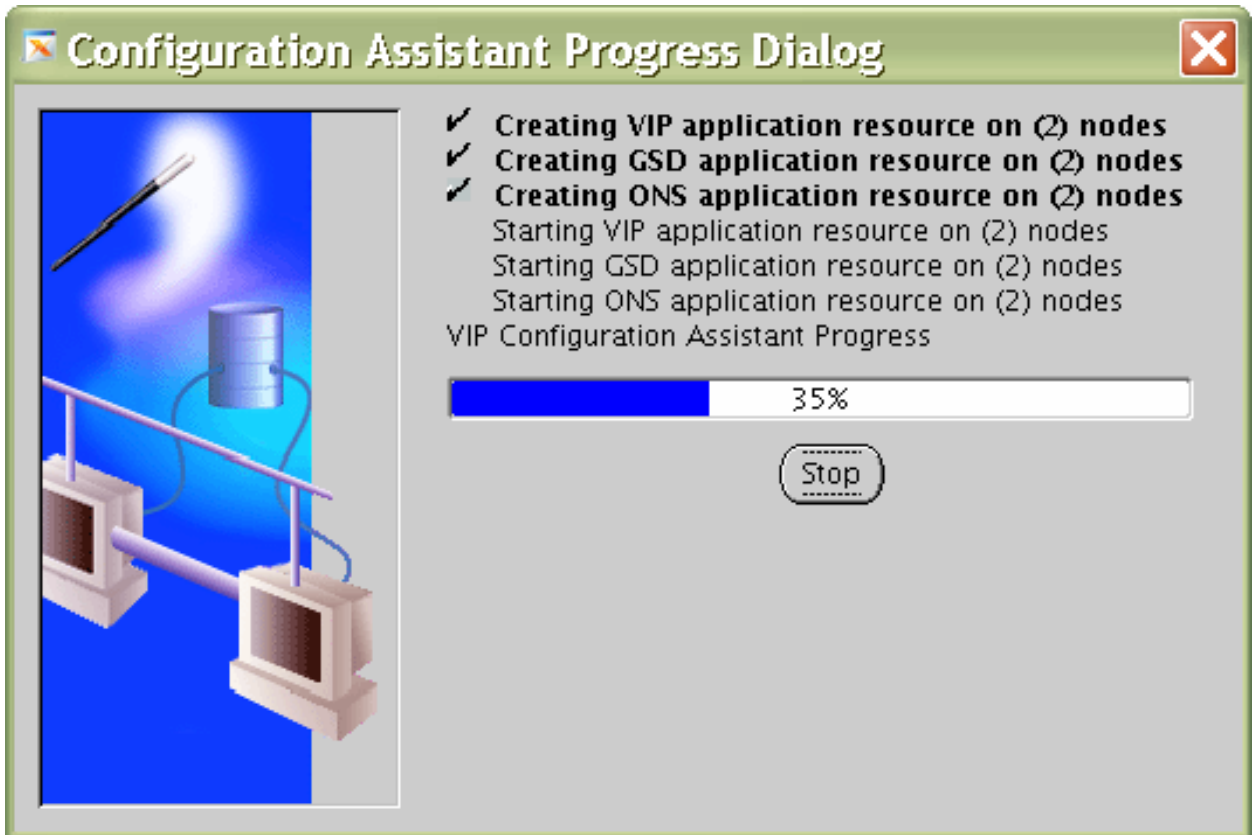


- ✓ **Creating VIP application resource on (2) nodes**
  - Creating GSD application resource on (2) nodes
  - Creating ONS application resource on (2) nodes
  - Starting VIP application resource on (2) nodes
  - Starting GSD application resource on (2) nodes
  - Starting ONS application resource on (2) nodes

VIP Configuration Assistant Progress

0%

Stop



p. Click OK and then exit to finish VIPCA.

## Configuration Assistant Progress Dialog



- ✓ Creating VIP application resource on (2) nodes
- ✓ Creating GSD application resource on (2) nodes
- ✓ Creating ONS application resource on (2) nodes
- ✓ Starting VIP application resource on (2) nodes
- ✓ Starting GSD application resource on (2) nodes
- ✓ Starting ONS application resource on (2) nodes

100%

Configuration complete. Click "OK" to see results.

OK



✖ Configuration Results
✖

## Configuration Results

The VIP Configuration Assistant has successfully created resource applications for each cluster node.

**Nodes:** btc-ppe-srv5,btc-ppe-srv6

**Network Interfaces:** eth0

**Mapping of nodes and virtual IP addresses:**

| Node name    | IP Alias Name  | IP address   | Subnet Mask   |
|--------------|----------------|--------------|---------------|
| btc-ppe-srv5 | btc-ppe-srv5-v | 10.73.68.195 | 255.255.254.0 |
| btc-ppe-srv6 | btc-ppe-srv6-v | 10.73.68.196 | 255.255.254.0 |

Exit
Help

- q. You can verify your CRS installation by executing the olsnodes command from the CRS Home/bin directory. The olsnodes command syntax is:

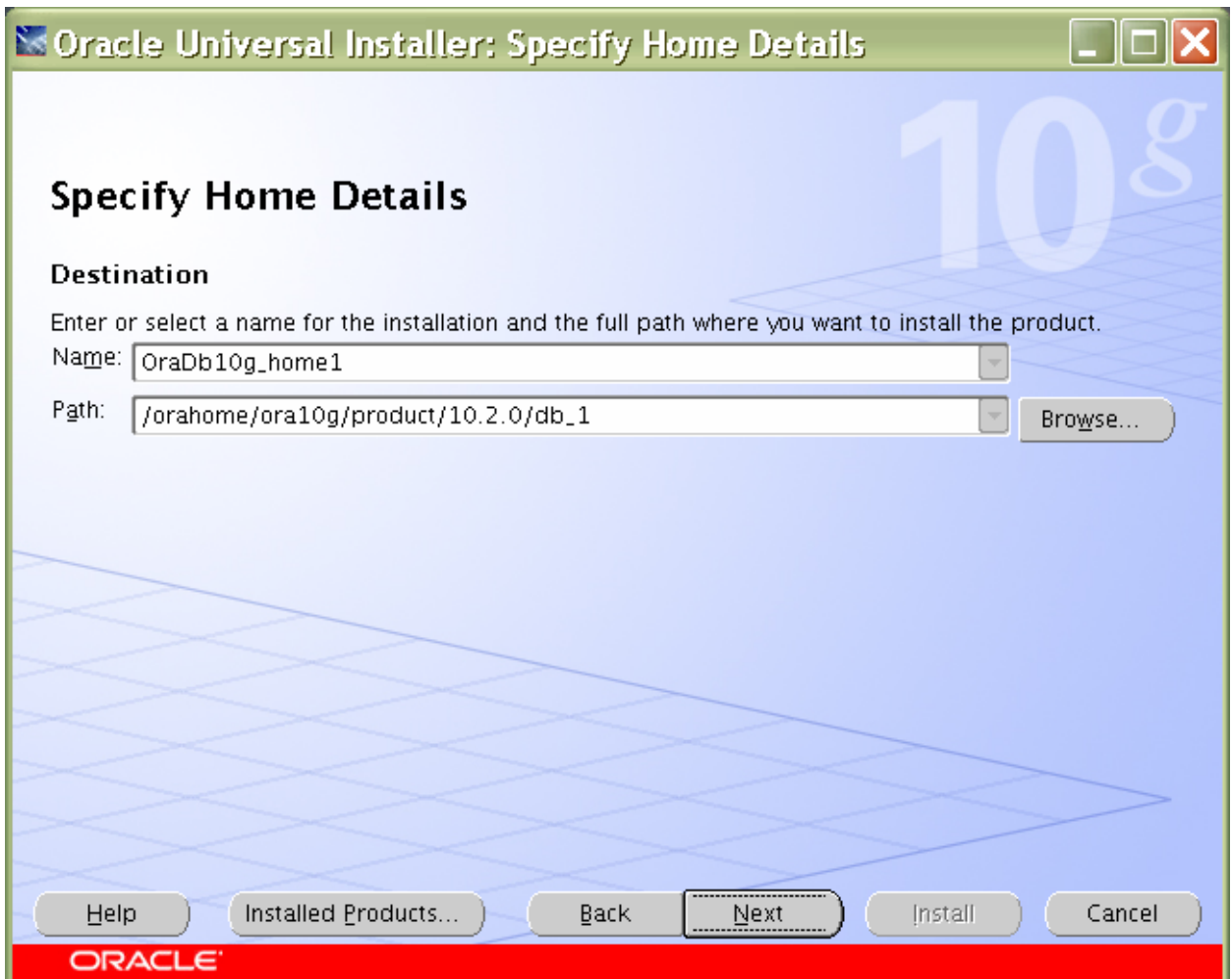
```
olsnodes [-n] [-l] [-v] [-g]
```

Where:

- n displays the member number with the member name
- l displays the local node name
- v activates verbose mode
- g activates logging

The output from this command should be a listing of the nodes on which CRS was installed.

3. Installing OracleRAC10g software:
  - a. 1. After making sure that Oracle CRS have started on the cluster nodes, start runInstaller from Disk1 of the Oracle10g Release 2 CDs.
  - b. 2. On the Specify File Locations screen, enter the destination path for the shared ORACLE\_HOME. This should be a different location than the shared CRS Home. For this exercise, the shared ORACLE\_HOME was /orahome/ora10g/product/10.2.0/db\_1.

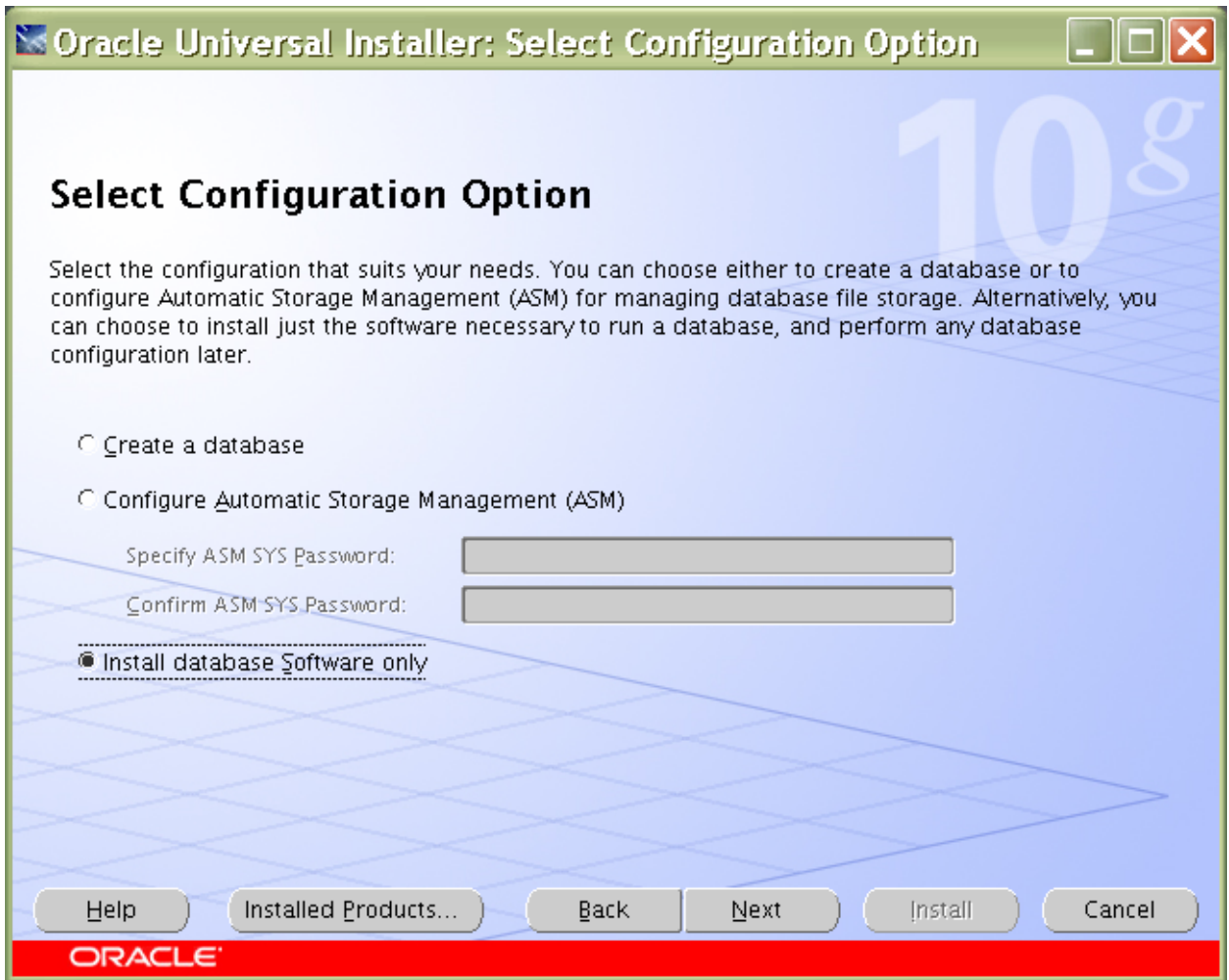


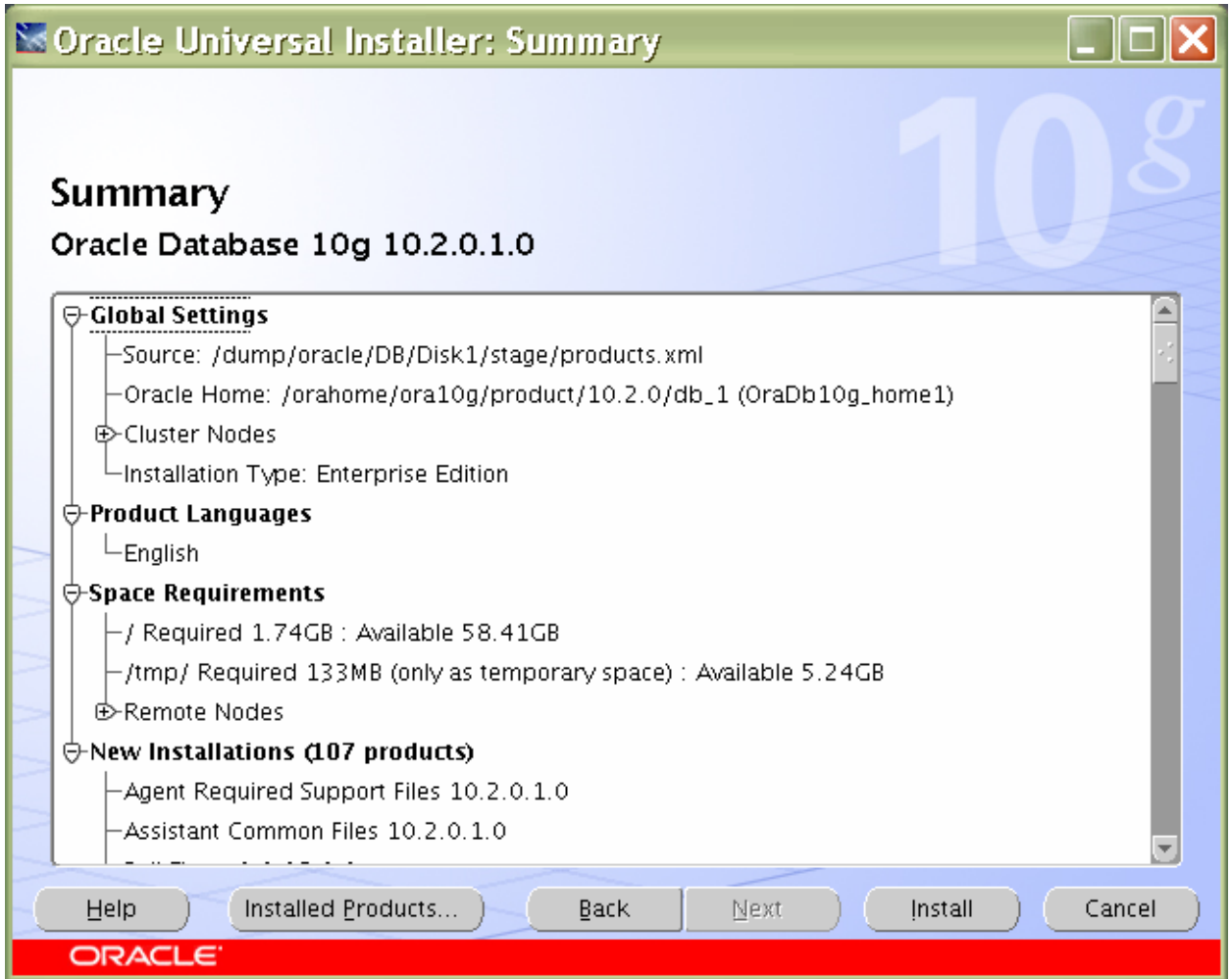
- c. On the next screen, select Cluster Installation and choose all the nodes in the cluster. For our exercise, the two cluster nodes were btc-ppe-srv5 and btc-ppe-srv6. Click Next.
 

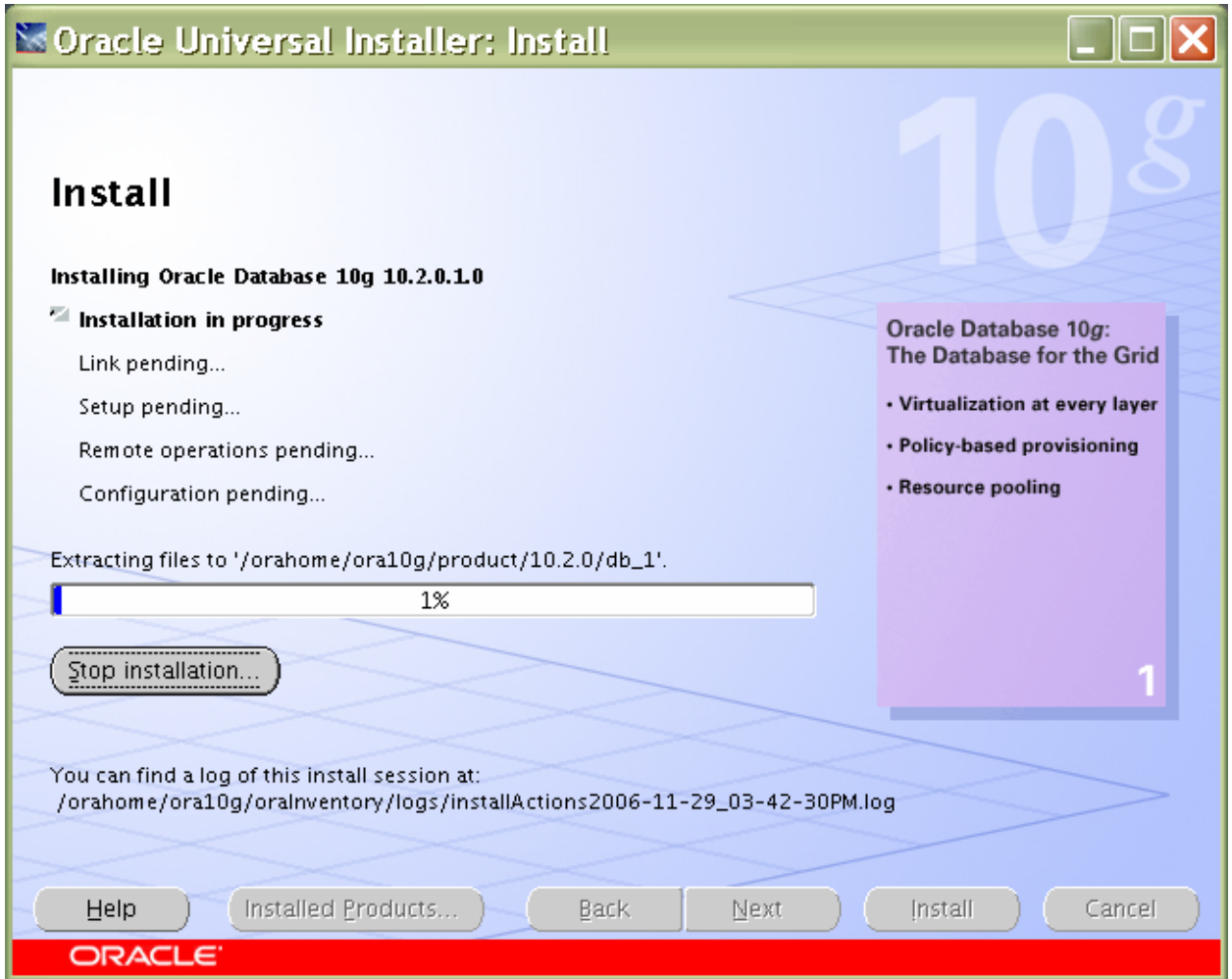
(**Note:** If the nodes are not displayed in the cluster node selection, then Oracle CRS are not configured or started on those cluster nodes.)

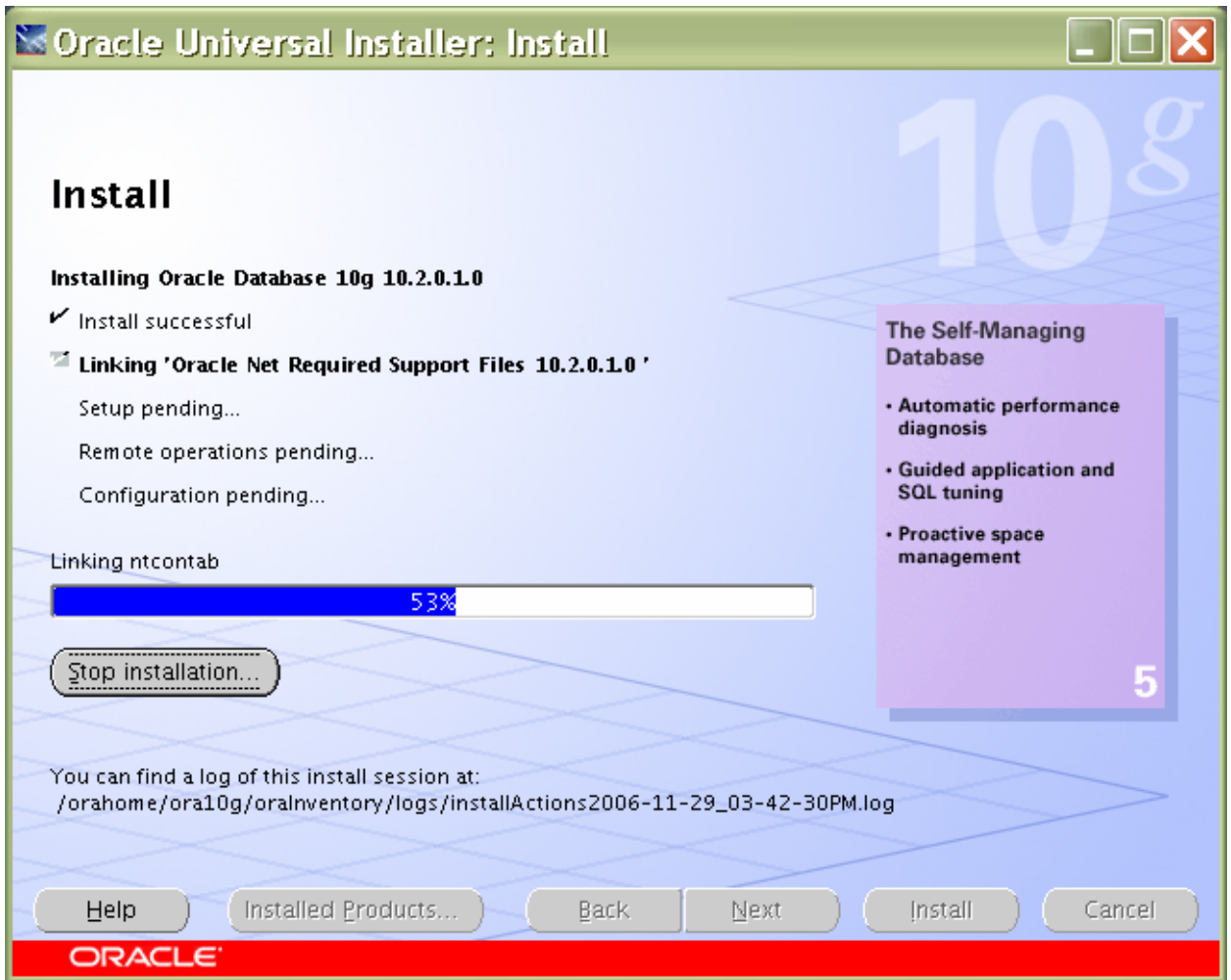


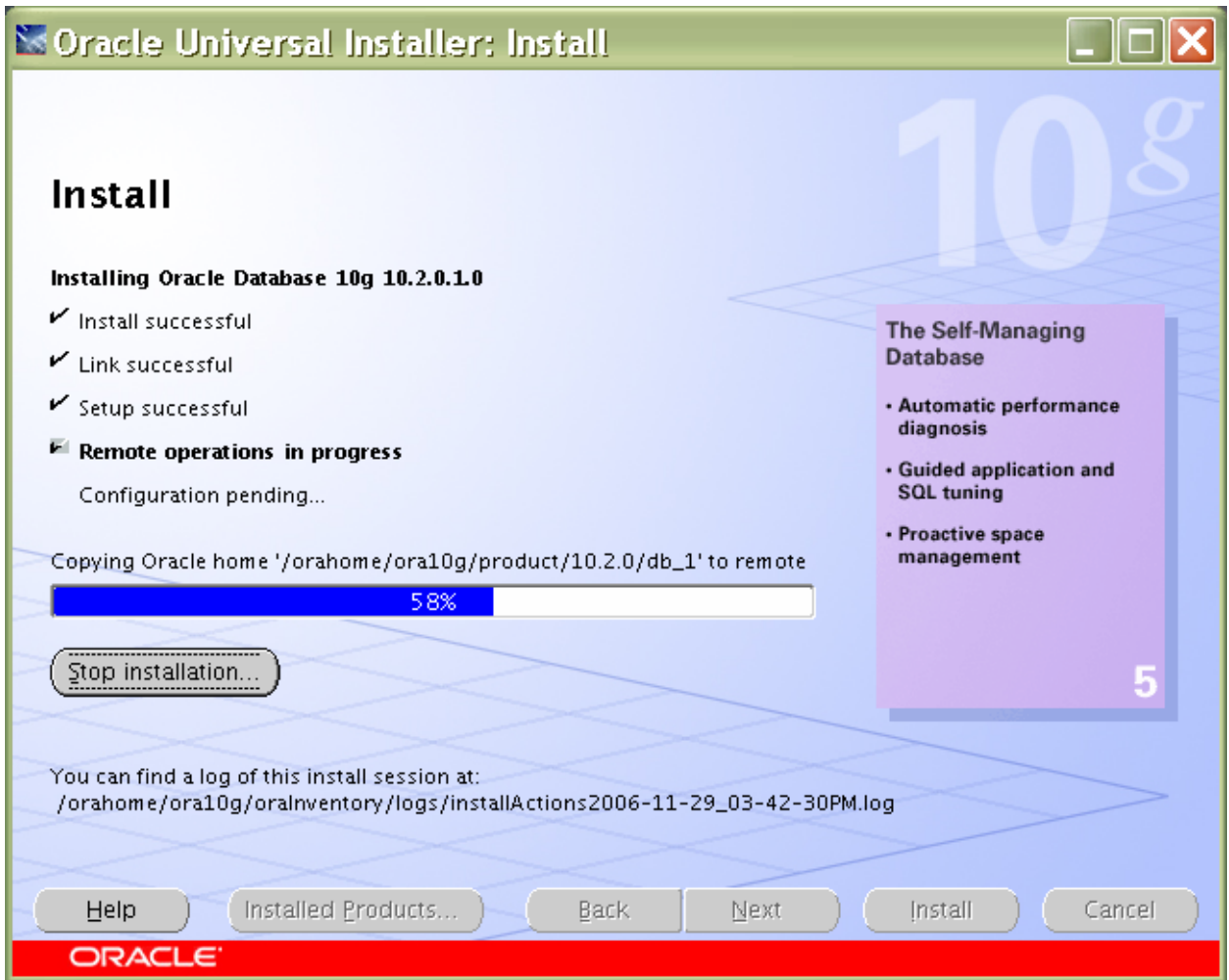
- d. For installation type, select Enterprise Edition and click Next.
- e. On the Select Database Configuration page, choose the “Do not create a starter database” option. We used dbca to create a database later. Click Next to continue further.





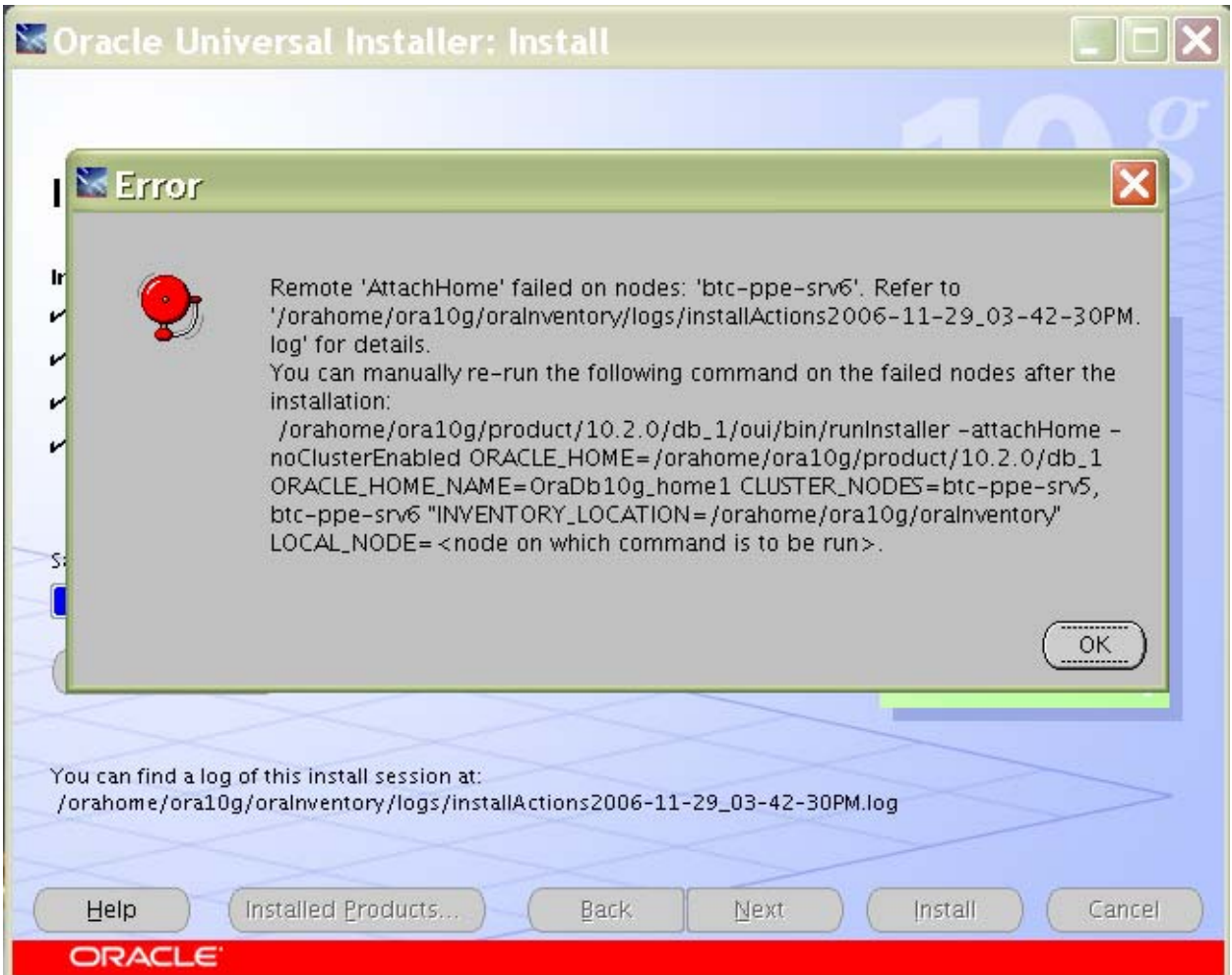




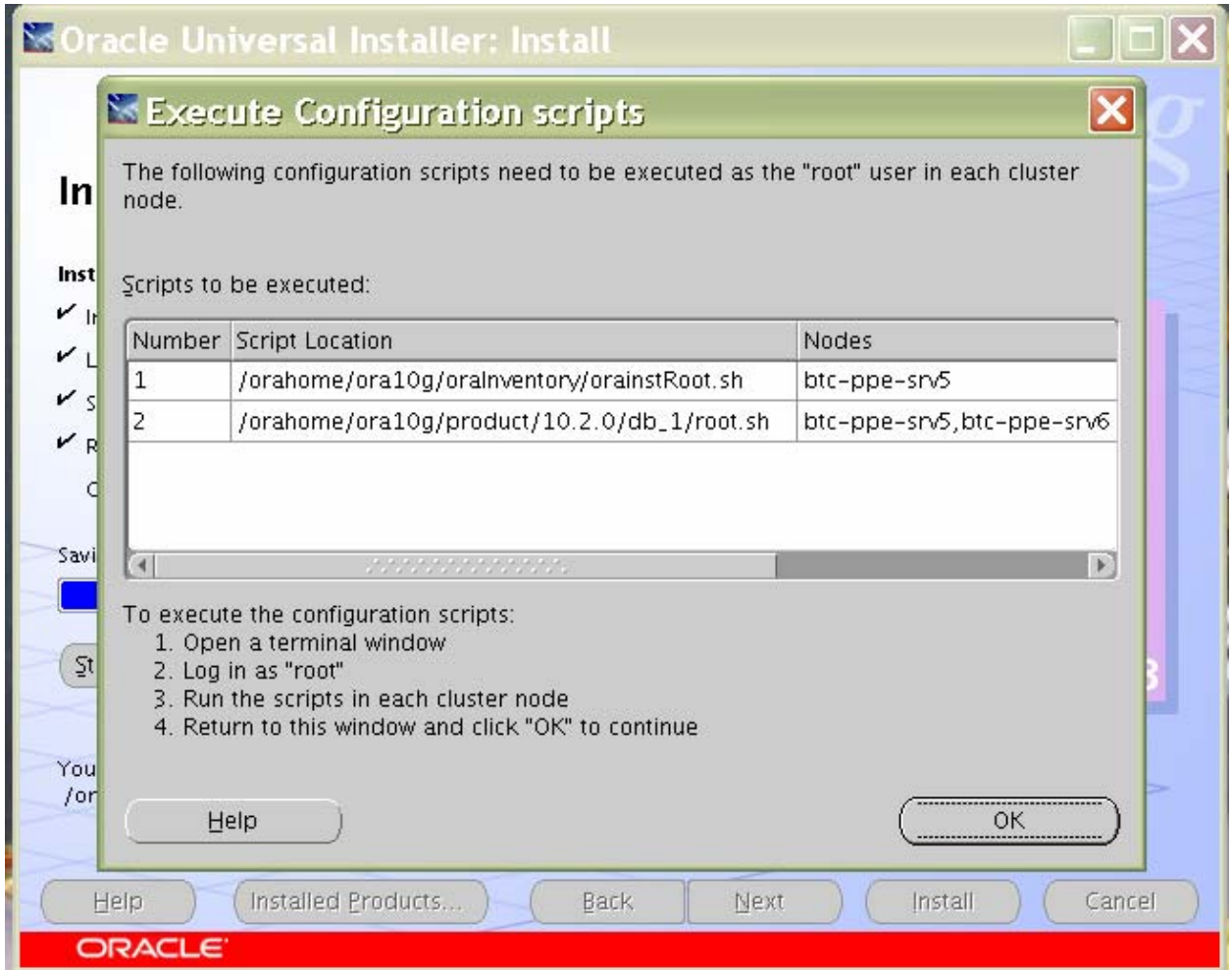


f. Click OK to continue.

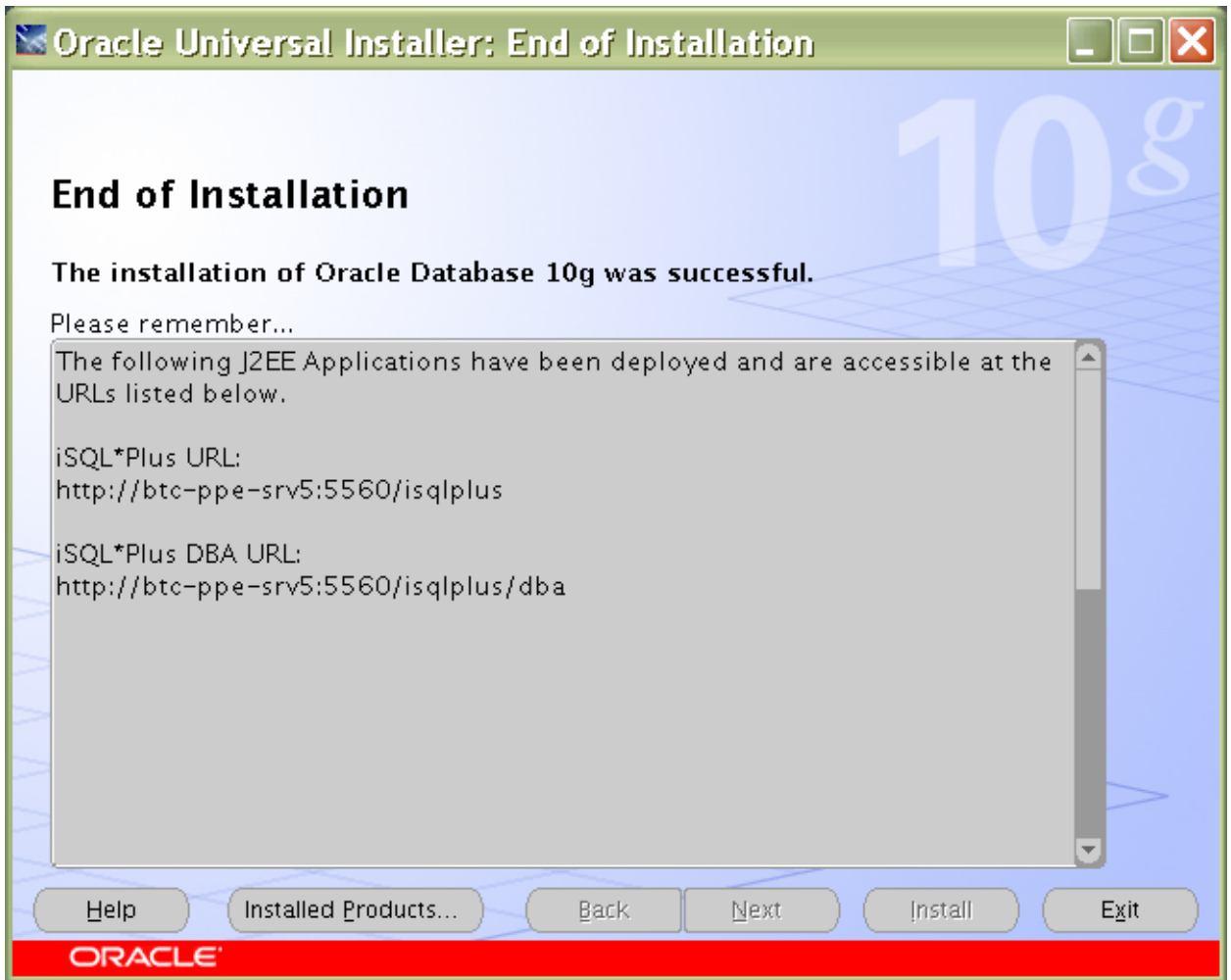




- g. Run the following scripts as root user starting from master node when prompted.



h. Click exit to finish the Database Installation.



## Appendix

---

Sample `.bash_profile` file for the Oracle user:

```
export ORACLE_BASE=/orahome/ora10g;
export ORACLE_PRODUCT=$ORACLE_BASE/product;
export ORACLE_HOME=$ORACLE_PRODUCT/10.2.0/db_1;
export ORACLE_CRS=$ORACLE_PRODUCT/10.2.0/crs_1;
export ORACLE_SID=oce;
export
LD_LIBRARY_PATH=$ORACLE_HOME/lib:$ORACLE_CRS/lib:$ORACLE_HOME/lib32:$LD_LIBRARY_PATH;
export LIBPATH=$ORACLE_HOME/lib:$ORACLE_CRS/lib:$ORACLE_HOME/lib32:$LIBPATH
export PATH=$PATH:$ORACLE_HOME/bin:$ORACLE_HOME:$ORACLE_CRS/bin:/usr/java14/bin;
```



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