Oracle RAC Install
Oracle Database 10g Release 2
(patchset 10.2.0.3) with
Microsoft Windows 2000/2003
32bit / 64bit
Using RAW for Oracle Clusterware files
and ASM for Oracle Database files

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Software: Windows 2000/2003 32bit / 64bit
Oracle Database 10gR2 (10.2.0.1) Enterprise Edition
Oracle Database 10gR2 patchset 10.2.0.3

This is a draft document.

It is complete although it is under constant change. Please check back from time to time to get the most recent version.

I welcome feedback to help improve this document. If you have used this document to install an Oracle Database 10g RAC on Windows cluster and you think the paper can be improved. Please let me know. You can email me at philip.newlan@oracle.com

Please note I cannot offer support for installation of Oracle RAC on Windows. Please log a support TAR if you need support.

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Change Control

Change Date

Author	Date	Version	Change Reason	Distribution List
philip.newlan	30-SEP-05	Draft 0.1	Initial Review	
philip.newlan	15-NOV-05	Draft 0.2	After Support feedback	
philip.newlan	18-NOV-05	Draft 0.3	BDE Feedback	
philip.newlan	13-MAR-06	Draft 0.4	RAC.US Feedback	
philip.newlan	01-MAY-06	Draft 0.5	Support Feedback	
Philip.newlan	14-NOV-06	Draft 0.6	Better Schematics	

Change Detail

Release	Change
Draft 0.5	Added information on issues when using non-routable IP Addresses
Draft 1.0	Added Appendix on how to add more OCR & vote devices
Draft 1.4	Added patch to 10.2.0.3
Draft 1.5	Added cleanup after a failed install (Appendix I)
Draft 1.53	Added info about HBA caching & fixed typo

Items to be added to this paper

The following topics will be added over the coming months

Coping with Firewalls

0. Introduction

What you need to know…

For those of you starting a RAC install for the first time. All this will be new. For those of you with 9i RAC on Windows experience there are some new concepts & features that make the RAC install easy.

- Cluster Verification Utility: aka cvu or cluvfy, this utility checks the state of your cluster at various stages of the install, from pre-Oracle software install all the way through to post cluster database setup. It should catch Operating System setup issues prior to the install that would have otherwise caused an unnecessary install failure. See Appendix I for more details on cluvfy.

- Automatic Storage Management: ASM is used in this document as the method of storage for the database files (not the Oracle Home). It can provide Automatic striping mirroring, Volume Management. The other two previous methods of data-file storage still exist; OCFS & RAW although this document does not cover these.

- Virtual IP (VIP): VIPs are used to provide a secondary IP for the main network adapter for the node, this is the adapter that clients connect to gain access to the database. They exist to improve the performance of detection of node failure by clients.

Software required for install:

- Base Oracle 10gR2 (10.2.0.1) DVD

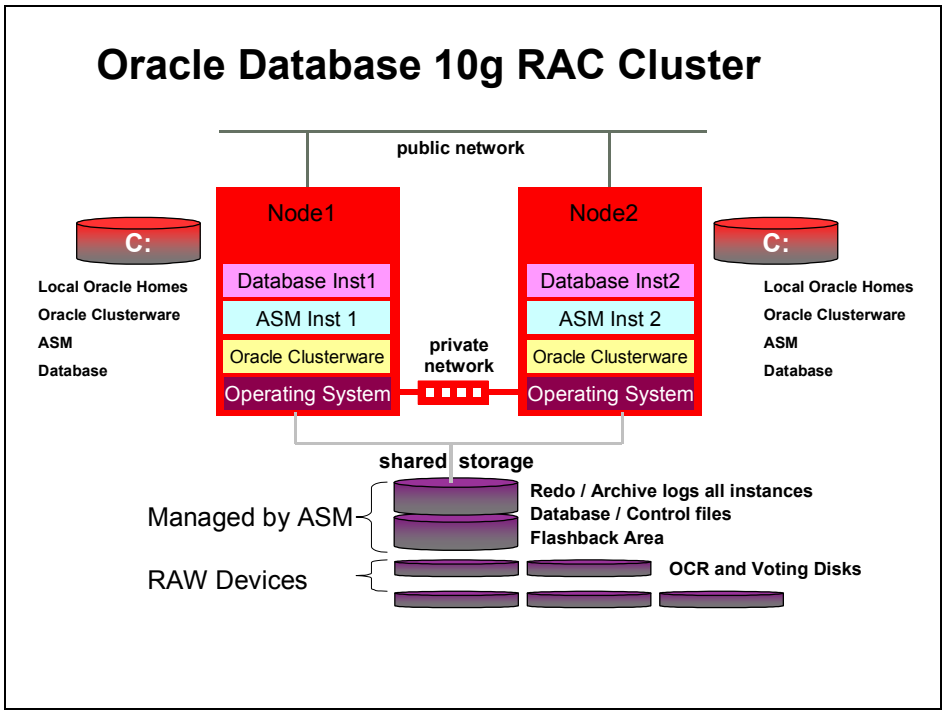
- 10.2.0.3 patchset

Install steps

To summarise the install steps are:

- Pre-reqs. to make sure the cluster is setup OK.
- Stage all the software on one node, typically Node1
- Prepare the Shared Disk
- Install the Oracle Clusterware (using the push mechanism to install on the other nodes in the cluster)
- Patch the Oracle Clusterware layer to 10.2.0.3
- Install Oracle ASM Software only Home
- Patch the Oracle ASM Software Home to 10.2.0.3
- Create Node Specific Network Listeners
- Create ASM Instances and initial ASM disk group
- Install Oracle RAC Database Software only Home
- Patch the Oracle RAC Database Software Home to 10.2.0.3
- Create RAC database

The following is a schematic of the software & hardware layout of a 2node RAC cluster when completed



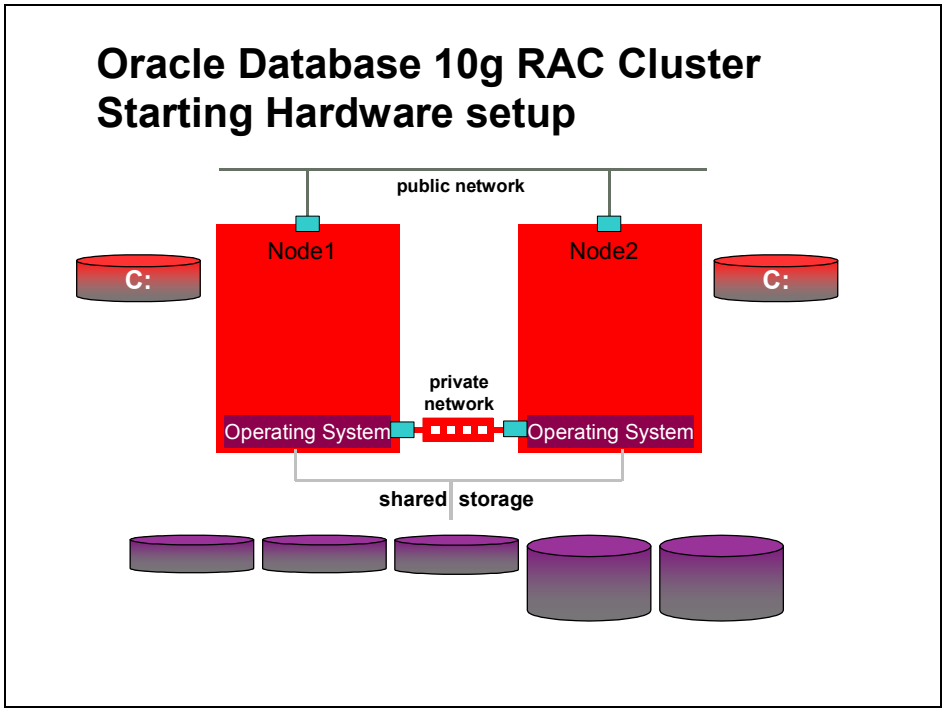
This document details one method of installing a 2 node Oracle 10gR2 RAC cluster on Windows.

NTFS_RAW_ASM: The Oracle Cluster, ASM & Oracle Database Homes are established on the local disk of each of the RAC nodes. The files required by Oracle Clusterware are on RAW file-systems. The database data-files are on ASM.

It should be noted that there are 3 other popular installation configurations. This document does not cover these methods:

- **NTFS_RAW_RAW:** The Oracle Cluster, ASM & Oracle Database Homes are established on the local disk of each of the RAC nodes. The files required by Oracle Clusterware are on RAW file-systems. The database data-files are also on RAW.
- **NTFS_OCFS_OCFS:** The Oracle Cluster, ASM & Oracle Database Homes are established on the local disk of each of the RAC nodes. The files required by Oracle Clusterware are on OCFS. The database data-files are also on OCFS.
- **OCFS_OCFS_OCFS:** The Oracle Cluster, ASM & Oracle Database Homes are established in a shared Oracle Home on the Oracle Cluster File System. The files required by Oracle Clusterware are on OCFS. The database data-files are also on OCFS.

There are other possible combinations although Oracle recommends one of the above methods



1. Prepare the cluster

This installation routine presumes that you have a 2 node Windows cluster. There are a number of items, which require checking before the install commences.

- User Accounts
    - `cluvfy stage -post hwos` will check this
- Installing using Remote desktop client.
- Environment Variables
- Networking
    - `cluvfy stage -post hwos` will check this
- Remote Registry Connect
- Disk Layout
    - `cluvfy stage -post hwos` will check this
- Stopping Services that might impact the installation process
- Enable Automounting of disks on Windows 2003
    - `cluvfy stage -post hwos` will check this
- Time sync
- Run CVU

It is essential that these items are checked and are configured correctly before the install commences.

User Accounts

The install will be done using the local Administrator account. The local admin username and password must be the same on both nodes. If you must use a domain account then you must ensure that the domain user is explicitly declared as a member of the local Administrators on each node in the cluster

Installing Using Windows Remote Desktop Client

If you must use the MS Terminal Services Client it is essential that you invoke the mstsc.exe application with the **`/console`** parameter which connects to the console session of the specified Windows Server.

Environment Variables

Make sure that both the TEMP and TMP environment variables for both the Logged in user & the LocalSystem account are set to point at sensible directories. e.g.

TEMP=C:\TEMP TMP=C:\TEMP. Also you should ensure that you do not have an ORACLE_HOME environment variable set.

Networking

Networking for the Oracle Database with RAC changed slightly with the first release of Oracle Database 10g RAC.

Network Assumptions

The network IP address for the Virtual IPs used by Oracle Clusterware must be in the same subnet as the public Adapter IP address.

There is a class of network address that is known as non-routable. The following table indicates the addresses that are known as non-routable.

Address Class Range	Network Address Range
A	10.0.0.0 - 10.255.255.255
B	172.16.0.0 -172.31.255.255
C	192.168.0.0 - 192.168.255.255

The Oracle installer assumes that the **public** IP address ranges **will not** be in range of what is sometimes known as non-routable addresses.

The Oracle installer assumes that the **private** interconnect IP addresses **will** be in what is sometimes known as non-routable address range.

If your public address must be from the non-routable range then you must ensure that the subnets used for the Public and Private Networks are different. Even after selecting different subnets the installer will have issues when using non-routable addresses for the public/vip interface. These issues can be worked around and will be discussed in this document.

Oracle RAC still requires a minimum of 2 networks cards per node, 1 for the public interface and one for the cluster interconnect.

The 2 nodes are visible to the 'outside world' via network cards. These cards are known as the public interface. Each of these cards will have a public IP address, which must be static IP addresses which will typically be resolved via DNS. This is the address that should be returned when you ping either of the nodes. The 2 nodes should also be connected to each other (via a private switch not a crossover cable). These cards are known as the private interface cards. Each of these cards will have a private IP address, which is also a static address. Normally IP resolution for the private interconnect is handled via an entry in the %SystemRoot%\system32\drivers\etc\hosts file.

Oracle RAC 10g introduces the concept of Virtual IP's (VIPs). There should be one additional IP address allocated per node. This additional VIP should not be bound physically to the public adapter or registered in DNS or the hosts file as an IP for the local hostname. Instead a new node name should be created, typically this is nodename-vip, and this value registered in DNS if available or the local hosts files. These Virtual IPs are the addresses clients will use to connect to the Oracle RAC instances when the install completes and one of the final steps is that vipca is run . Note the new Virtual IP should be in the same network subnet as the public IP.

Confirming the Network is configured correctly

It is important to confirm that networking is configured correctly before commencing install. There are a series of 'ping' tests that should be completed, and then the network adapter binding order should be checked.

Network Ping tests

You should ensure that the public IP addresses are static and resolve correctly and that the private addresses are of the form 'nodename-priv' and resolve on both nodes via the hosts file.

- Public Ping test

Pinging Node1 from Node1 should return Node1's public IP address
Pinging Node2 from Node1 should return Node2's public IP address
Pinging Node1 from Node2 should return Node1's public IP address
Pinging Node2 from Node2 should return Node2's public IP address

- Private Ping test

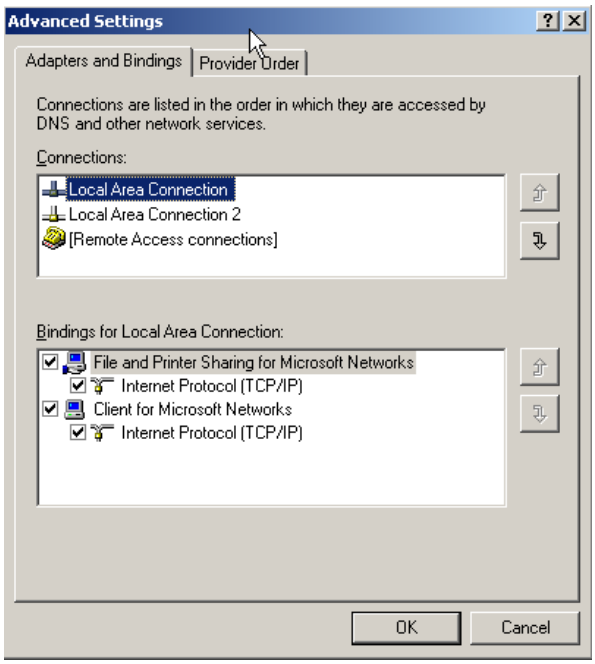
Pinging Node1 private from Node1 should return Node1's private IP address
Pinging Node2 private from Node1 should return Node2's private IP address
Pinging Node1 private from Node2 should return Node1's private IP address
Pinging Node2 private from Node2 should return Node2's private IP address

If any of the above tests fail you should fix name/address resolution by updating the DNS or local hosts files on each node before continuing.

Network Adapter naming and binding order

You must check the network adapter binding order. In the Control Panel double click on the Network (or Network & Dialup) Connections icon.

The list of adapters is displayed, you can use this dialog to rename the adapters if required. You rename the adapter by right clicking on it and selecting rename from the popup list. Remember that the public adapter should have exactly the same name on all nodes in the cluster and that the adapter used for the interconnect should have the same name on all the nodes in the cluster. You should avoid overly long adapter names and not use any special characters (spaces, periods, dashes etc) in the adapter name . Some customers choose to name the adapters PublicLAN and PrivateLan to avoid confusion



You must confirm the network adapter binding order on all the nodes in the cluster. Select the menu item 'Advanced->Advanced settings…' this will load a dialog box with 2 tabs. On the 'Adapters & Bindings TAB' you must ensure that the public adapter is listed first and the private adapter is listed second. If they are not in this order: select the public adapter and use the up arrow button to the right of the 'Connections' list box to move the public adapter to the top of the list.

It is very important to confirm this on all nodes in the cluster.

Net Use Test

Software gets distributed between the nodes via copying to the remote nodes from the local node. You should ensure that this procedure would be successful by testing the net use command

On node1 issue the following command:

```
net use * \\<node2name>\c$
```

This should return success

On node2 issue the following command:

```
net use * \\<node1name>\c$
```

(where <node1name> and <node2name> are the actual node names)Disable Media Sense

You should disable DHCP media sense. See Appendix J

Remote Registry Connect

There is sometimes an issue during the install when Oracle attempts to update the registry on a remote node. You should check that this is possible. From the node you are installing from

- Start the registry editor : regedit.exe
- Click File->Connect Network Registry…
- In the 'Enter the object name…' edit box enter the name of the other node in the cluster (e.g. node2) and click OK
- Wait for the node to appear in the registry tree. If this works then Remote registry connect is working and you can continue. If this fails then you probably have a policy set to disallow this. You need to change this policy.
- When done you can right click on the node in the regedit tree and select disconnect.

Disk Layout

It is assumed that the two nodes have local disk primarily for the operating system and the local Oracle Homes. The Oracle Clusterware software also resides on the local disks on each node. The 2 nodes must also share some central disks.

At least 2 empty partitions are required for the Oracle Clusterware install.

If the disk system used to provide the shared physical disk does not provide some form of RAID protection then Oracle recommends that you use the built in mirroring capabilities provided by Oracle Clusterware for the required Clusterware RAW partitions

Required partitions	Size (min)	No. required using external mirroring	No. required using Oracle mirroring
Oracle Cluster Registry	100Mb *	1	2
Oracle Voting Disk	20Mb *	1	3

* see text

* The above disk sizes are the minimum. It is suggested to add at least 20% to the sizes (24Mb & 120Mb) to allow for 'rounding issues' when creating the partitions.

If you choose to use Oracle mirroring you should ensure that the partitions created for the mirrors are on separate physical devices.

You should use either DISKPART (only available on Windows 2003) or DiskManager (available on Windows 2000 & 2003) to create the partitions.

The following example assumes that you are using external redundancy so you will need to create only 1 of each type of partition to be used by Oracle Clusterware. It also assumes you are using Diskmanager.

If at a later date you wish to add more OCR or vote devices please see Appendix M in this document.

Enable Automounting of disks when running Windows 2003

Windows 2003 does not automatically mount RAW disks and make them visible

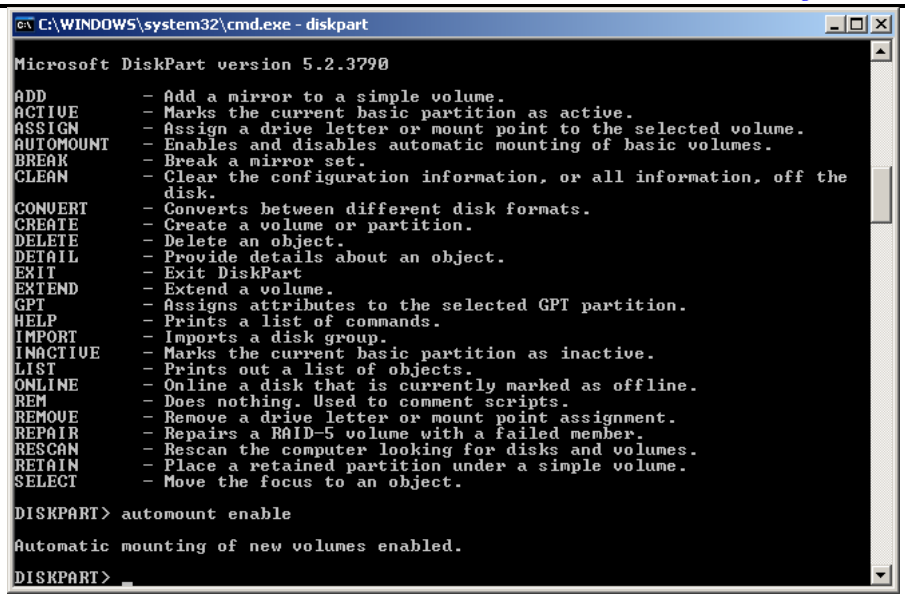
You must enable automounting.

On both nodes

From a command prompt run the `diskpart` utility

At the diskpart prompt type:

```
AUTOMOUNT ENABLE
```



After running DISKPART it is recommended that you reboot both nodes. You should only need to run diskpart again should you reinstall the Windows OS from scratch.

Disable Host Bus Adapter Node Local Caching

Caching for the shared disk subsystem can be problematic for RAC. RAC assumes that when a write request from the Oracle code to the OS returns with 'success' then the block written will be available to be read from another node if required.

Some Host Bus Adapter (HBA) cards have disk I/O cache on the card local to the node. If this is enabled then this can cause RAC database failures. If your 'node-local' HBAs support this feature then you must disable it. This is typically managed through either the device manager for Windows 2003 or a proprietary software module from the HBA vendor.

Some storage subsystems also have cache at the SAN 'end' – as long as this cache is shared then it is OK (with a few provisos) for this cache to be enabled for both read and write.

This SAN cache should be shared and visible to all nodes in the cluster

There must be some form of battery back up to guarantee that a write will not be lost should the SAN suffer an abrupt power failure.

On Node1 logged in as someone with Adminstrator privileges Click `START->RUN` and type `diskmgmt.msc`

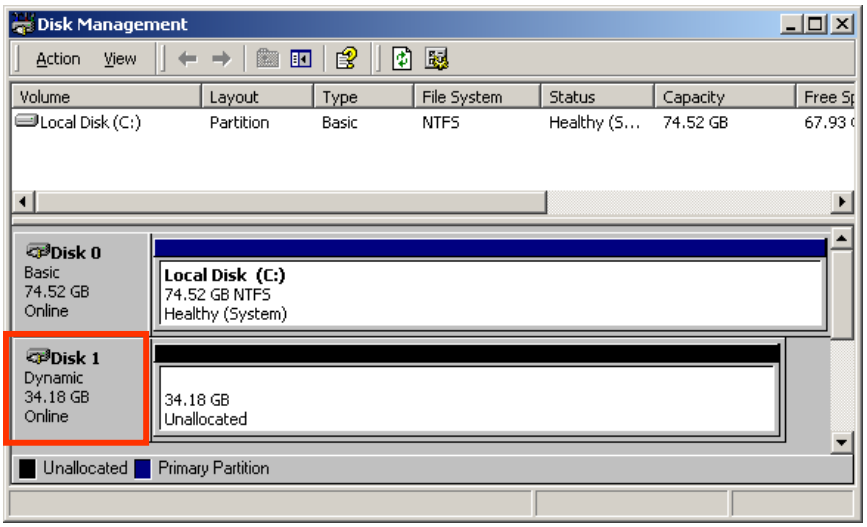


Figure 1

In this case there are 2 disks visible to the node. Disk 0 is a local attached disk and contains the Operating System. Disk 1 is located on a highly available shared storage array and is visible to all nodes in the cluster.

The Disk1 above is currently in Dynamic Mode, Oracle Clusterware requires that the disk be in Basic Mode. So right click on the Disk 1 logo and select Convert to Basic. You should check this on both nodes in the cluster

The DiskManagement console should now look like this:

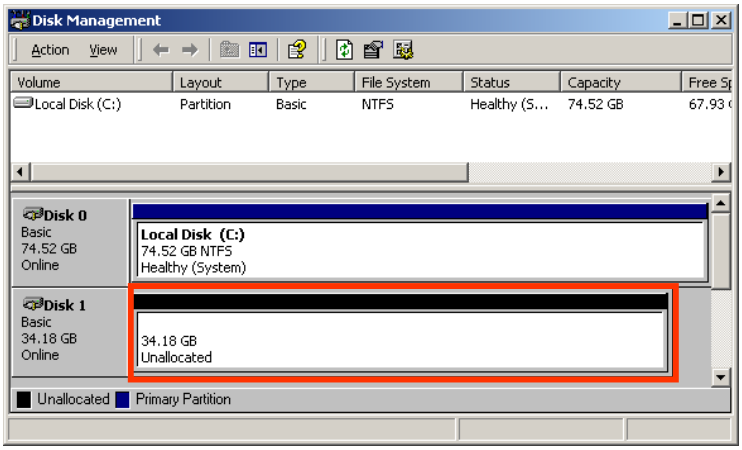
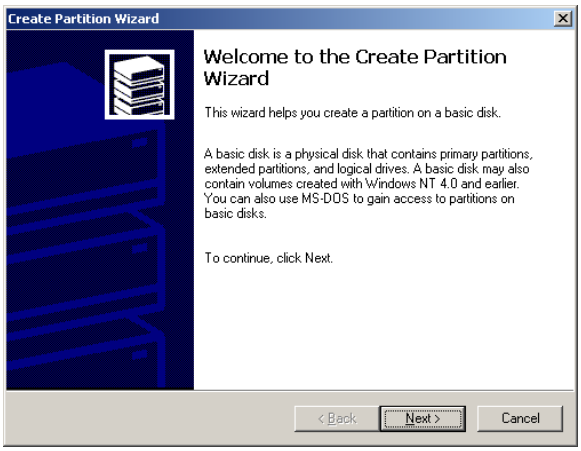


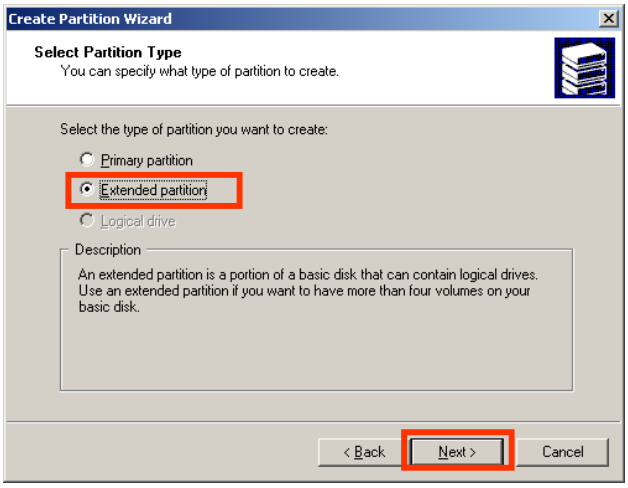
Figure 2

Right click in the Disk area on Disk1 and choose to create a new partition.

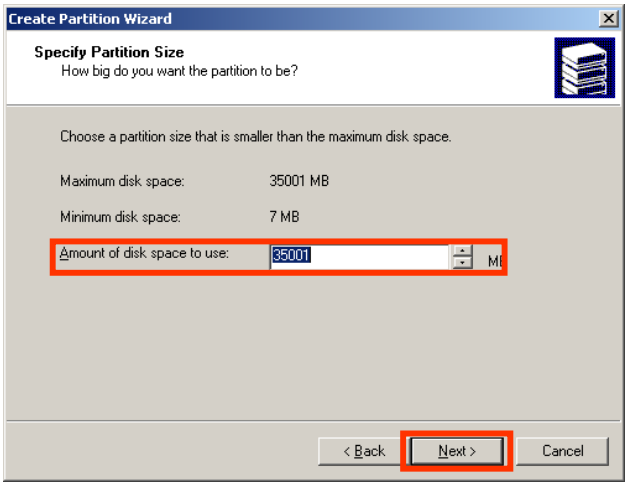
The New Partition Wizard launches



Click Next

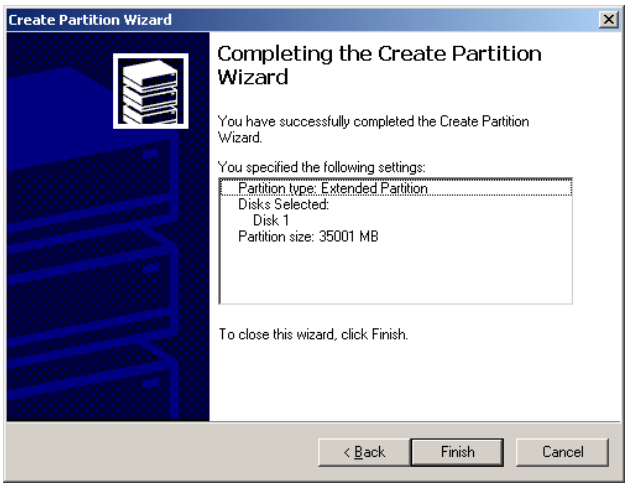


Select the Extended partition radio button and click Next



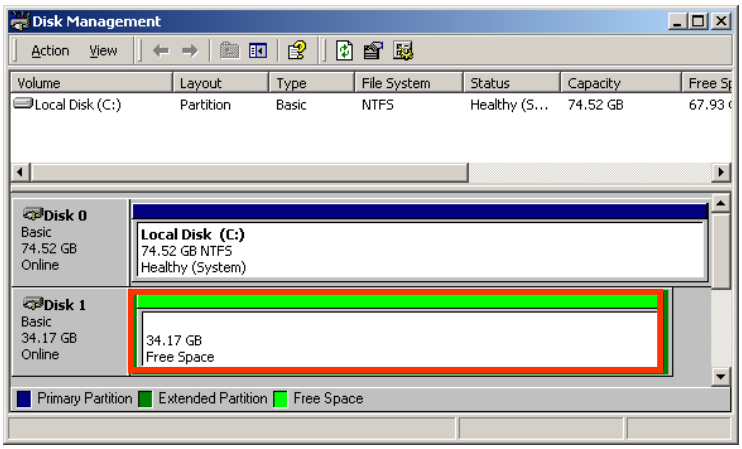
Select the partition size to fill the disk

Click Next



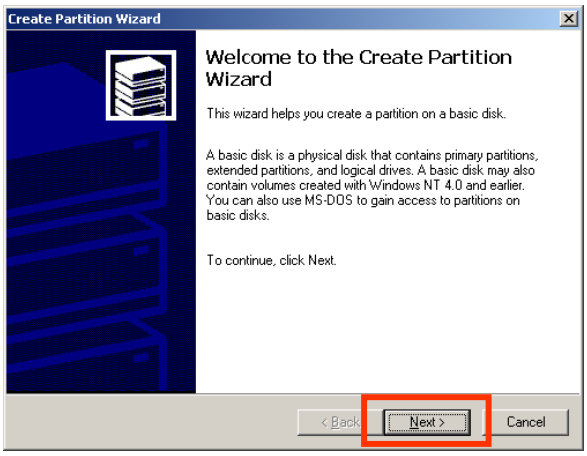
The wizard will create the extended partition

Click Finish

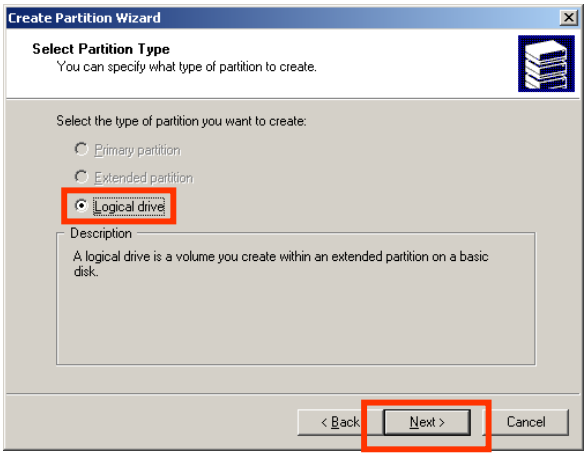


We need to create 2 logical drives for Oracle Clusterware so right click in the extended partition and click create partition. The first partition will be used by Oracle Clusterware as the voting disk.

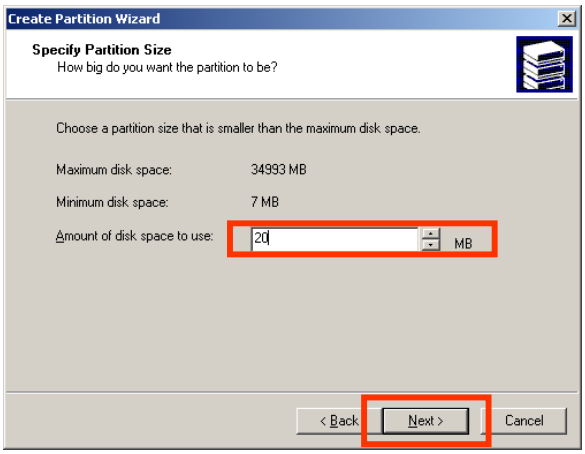
The New Partition Wizard launches



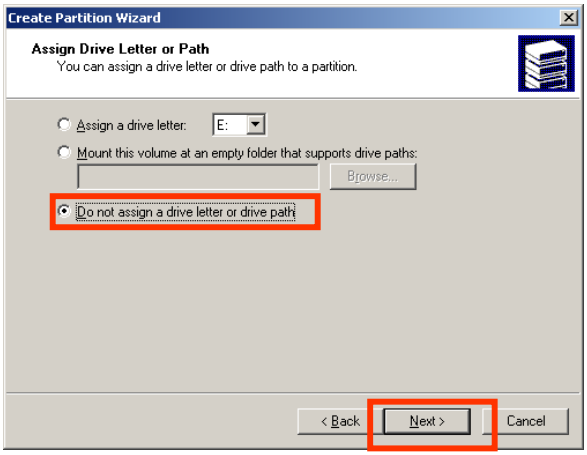
Click Next



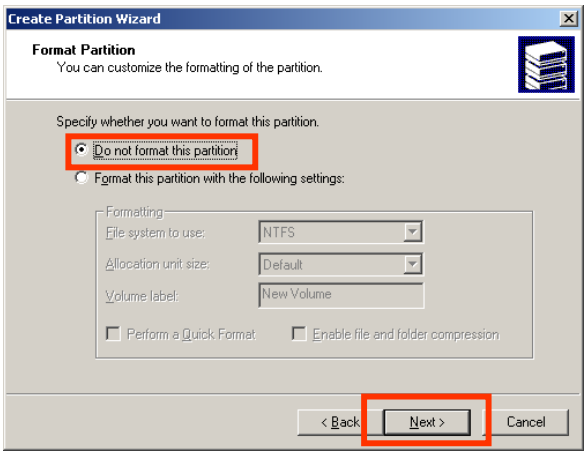
Select the radio button to create a logical drive and click Next



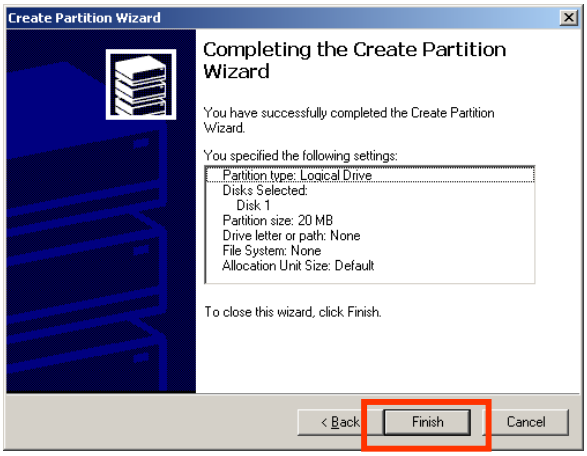
Enter 24 for the amount of disk space to be used by this partition and click Next



Select the Do not assign... radio button and click Next

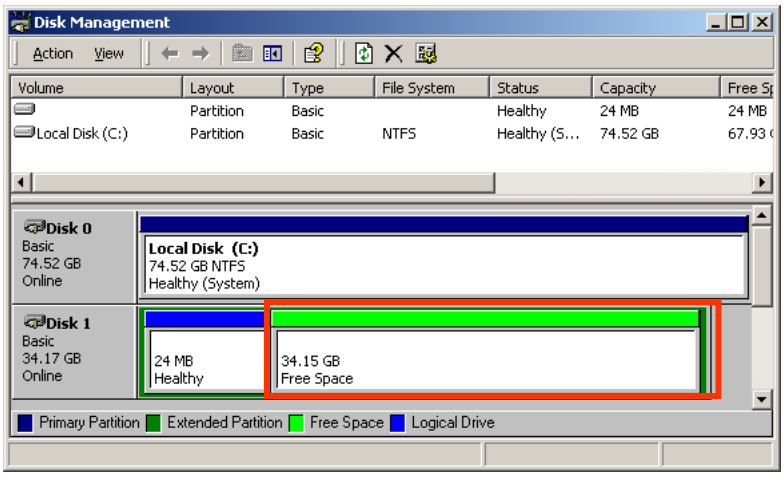


Select the Do not format... radio button and click Next

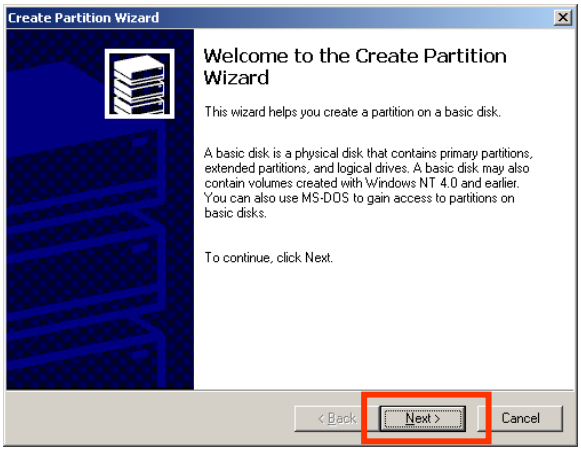


Click Finish to Create the first partition.

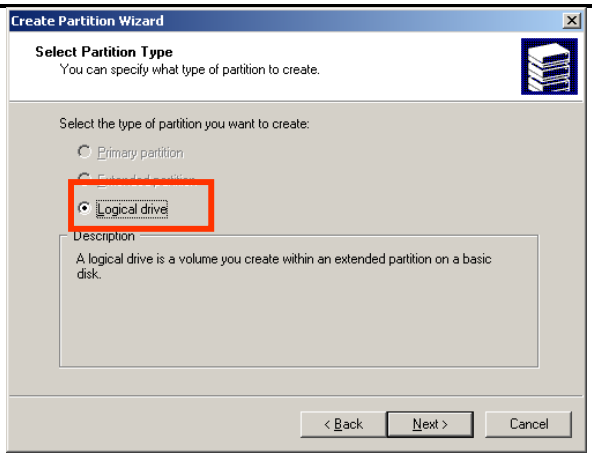
We now need to create an additional partition for the Oracle Clusterware – Oracle Cluster Registry



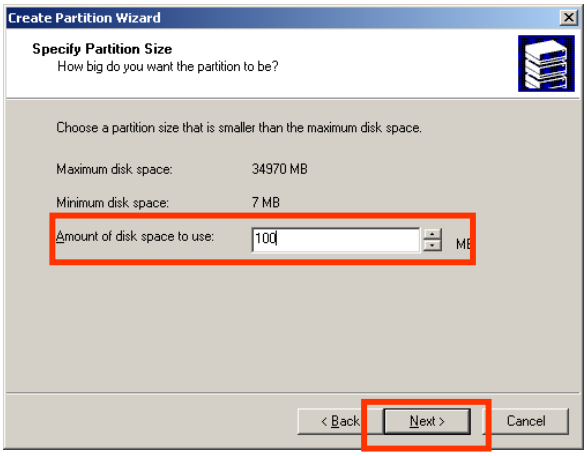
Right click in the Free Space section of Disk1 and select Create Partition.



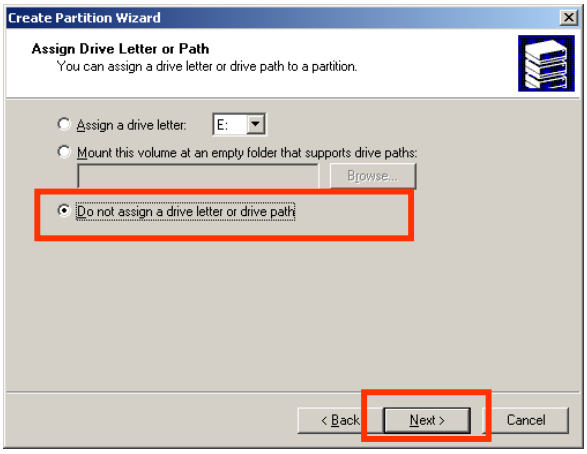
Click Next



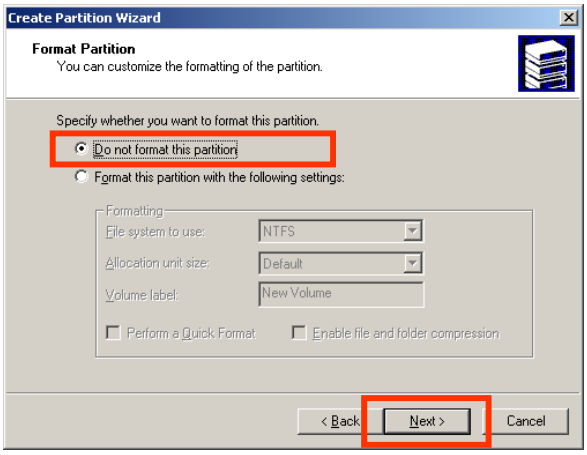
Select the radio button to create a logical drive and click Next



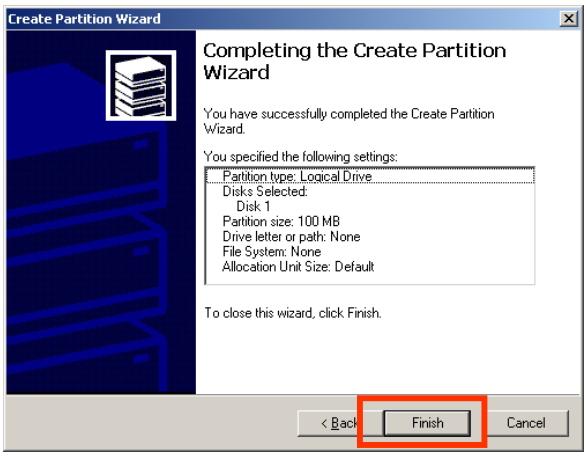
Enter 120 for the size of the partition and click Next.



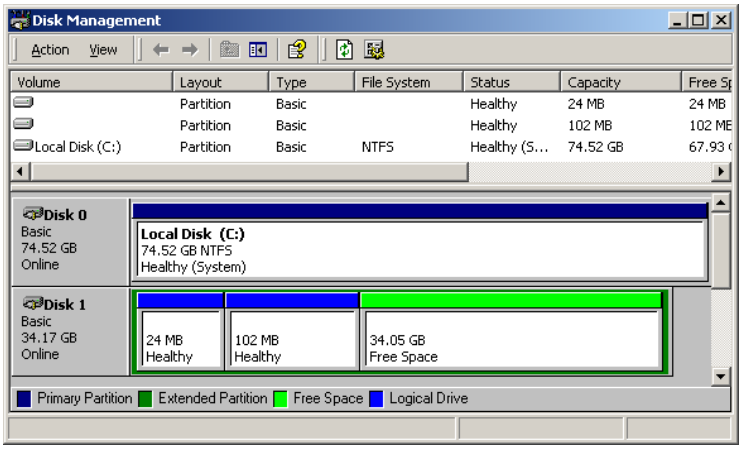
Select the Do not assign... radio button and click Next



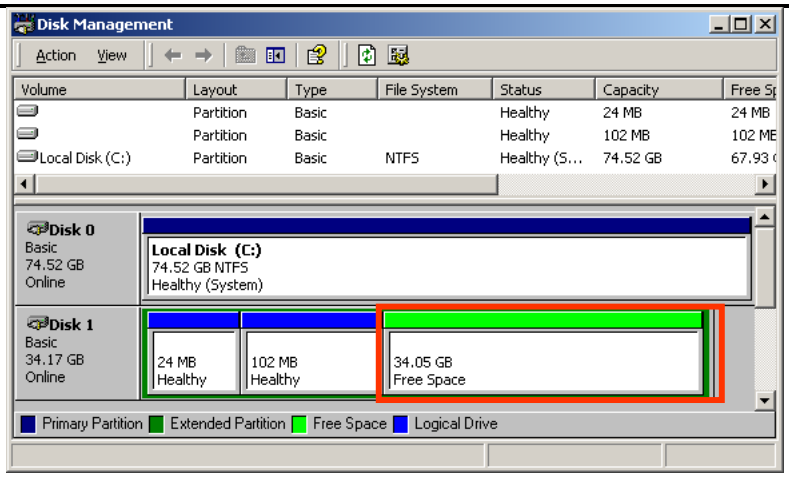
Select the Do not format... radio button and click Next



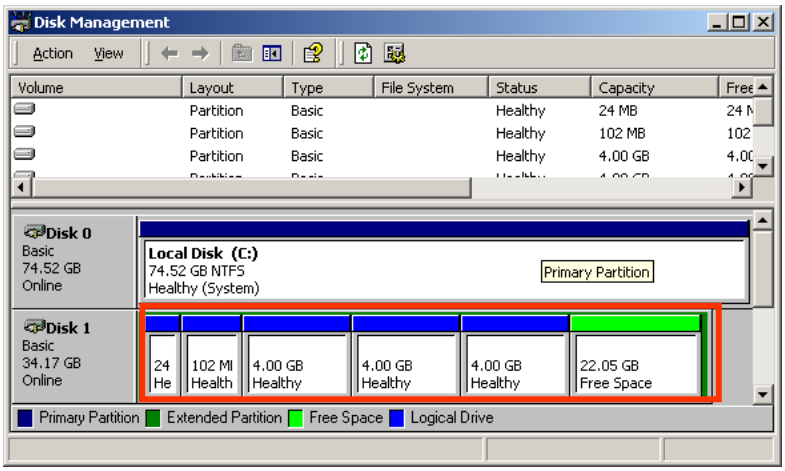
Click Finish to Create the first partition



As we are going to use ASM for our database files now is a good time to create the additional partitions required by ASM



Right click in the free space area on Disk 1 and create 3 more partitions each of size 4096Mb. When complete the disk manager layout for disk one should look like this:



There are now 5 partitions

Required partitions	Size (min)	No. required using external mirroring	No. required using Oracle mirroring
Oracle Cluster Registry	20Mb	1	2
Oracle Voting Disk	100Mb	1	3
Oracle ASM Disk0	4096Mb	n/a	n/a
Oracle ASM Disk1	4096Mb	n/a	n/a
Oracle Flashback Disk0	4096Mb	n/a	n/a

You must check that the partitions can be seen on the other node and that they do not have a drive letter assigned on either node. If the partitions do have letters assigned used diskmgmt.msc to remove the letters. On Windows 2003 a reboot of the 'other' node will be required for this new partition to become visible. Or you can use an

Oracle provided tool to rescan the partitions. You should run this tool on the 'other' nodes in the cluster.

Stopping Services

There can be issues with some of the services which may already be running on the cluster nodes. Typically a Microsoft Service: Distributed Transaction Coordinator (MSDTC) can interact with Oracle software during install. It is recommended that this service is stopped and set to 'manual' start using 'services.msc' on both nodes.

If, after completing the install, the MS DTC service is required it can be restarted and set to auto start.

This is particularly important when, in the future, you patch the Oracle software.

Time Sync

There is a general requirement for Oracle RAC that the time all the nodes is the same. Typically this can be achieved using Network Time Server protocol. At the very least you should ensure that the system clocks on all nodes are as close as possible.

Run the CVU stage check

Now you can run the CVU to check the state of the cluster prior to the install of the Oracle Software. CVU can be run from the installation media. It can be found in \clusterware\cluvfy directory of the installation DVD.

Note when running the CVU you may see a message '**`The system cannot find the file specified`**.' This can be ignored.

If you are using non-routable IP addresses for the public IP's then cluvfy will fail with an error **`Could not find a suitable set of interfaces for VIPs`**. You can ignore this error only if your public IP address is in the non-routable range.

```
D:\>cd clusterware\cluvfy
D:\clusterware\cluvfy>runcluvfy stage -post hwos -n iwinrca01,iwinrca02
The system cannot find the file specified.

Performing post-checks for hardware and operating system setup

Checking node reachability...
Node reachability check passed from node "iwinrca01".

Checking user equivalence...
User equivalence check passed for user "Administrator".

Checking node connectivity...

Node connectivity check passed for subnet "139.185.150.0" with node(s)
iwinrca02,iwinrca01.
Node connectivity check passed for subnet "10.10.10.0" with node(s)
iwinrca02,iwinrca01.

Suitable interfaces for VIP on subnet "139.185.150.0":
iwinrca02 Local Area Connection:139.185.150.55
iwinrca01 Local Area Connection:139.185.150.54

Suitable interfaces for the private interconnect on subnet "10.10.10.0":
iwinrca02 Local Area Connection 2:10.10.10.3
iwinrca01 Local Area Connection 2:10.10.10.2

Node connectivity check passed.

Checking shared storage accessibility...

  Disk Partition                         Sharing Nodes (2 in count)
  -------------------------------------  ------------------------
  \Device\Harddisk1\Partition1           iwinrca02 iwinrca01

  Disk Partition                         Sharing Nodes (2 in count)
  -------------------------------------  ------------------------
  \Device\Harddisk1\Partition2           iwinrca02 iwinrca01

  Disk Partition                         Sharing Nodes (2 in count)
  -------------------------------------  ------------------------
  \Device\Harddisk1\Partition3           iwinrca02 iwinrca01

  Disk Partition                         Sharing Nodes (2 in count)
  -------------------------------------  ------------------------
  \Device\Harddisk1\Partition4           iwinrca02 iwinrca01

  Disk Partition                         Sharing Nodes (2 in count)

 -------------------------------------  ------------------------
  \Device\Harddisk1\Partition5           iwinrca02 iwinrca01

Shared storage check was successful on nodes "iwinrca02,iwinrca01".

Post-check for hardware and operating system setup was successful.
```

2. Staging the Software

It is recommended that you stage the required software onto a local drive on Node 1 of your cluster.

Important. Ensure that you use only 32 bit versions of the Oracle Software on a 32bit OS and 64 bit versions of the Oracle Software on a 64bit OS

A suggested stage is as follows

- Oracle 10g Release 2 EE (10.2.0.1) (1 DVD or 2 CD's)

C:\stage\10gR2\clusterware
C:\stage\10gR2\database

- Patch sofware

C:\stage\10203\Disk1

3. Installing the Oracle Clusterware Layer

In this section you will install the Oracle Clusterware Layer. The Oracle Clusterware Layer is the layer used by Oracle to create a RAC cluster database.

Run the CVU stage check

CVU can be used to check the readiness of the cluster pre and post each stage.

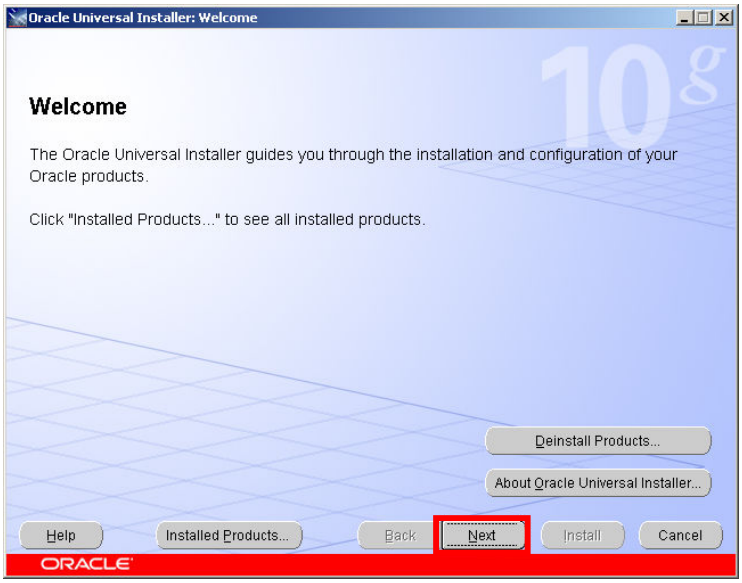
```
C:\>cd C:\stage\10gR2\clusterware
C:\stage\10gR2\clusterware\cluvfy>runcluvfy stage -pre crsinst  -n
iwinrca01,iwinrca02
The system cannot find the file specified.

Performing pre-checks for cluster services setup

Checking node reachability...
Node reachability check passed from node "iwinrca01".


Checking user equivalence...
User equivalence check passed for user "Administrator".
Checking administrative privileges...

Checking node connectivity...

Node connectivity check passed for subnet "139.185.150.0" with node(s)
iwinrca02,iwinrca01.
Node connectivity check passed for subnet "10.10.10.0" with node(s)
iwinrca02,iwinrca01.

Suitable interfaces for VIP on subnet "139.185.150.0":
iwinrca02 Local Area Connection:139.185.150.55
iwinrca01 Local Area Connection:139.185.150.54

Suitable interfaces for the private interconnect on subnet "10.10.10.0":
iwinrca02 Local Area Connection 2:10.10.10.3
iwinrca01 Local Area Connection 2:10.10.10.2

Node connectivity check passed.


Checking system requirements for 'crs'...
Operating system version check passed.
Operating system patch check passed for "1".
Total memory check passed.
Swap space check passed.
System architecture check passed.
Free disk space check passed.

System requirement passed for 'crs'

Pre-check for cluster services setup was successful.
```

Install the Oracle Clusterware Layer

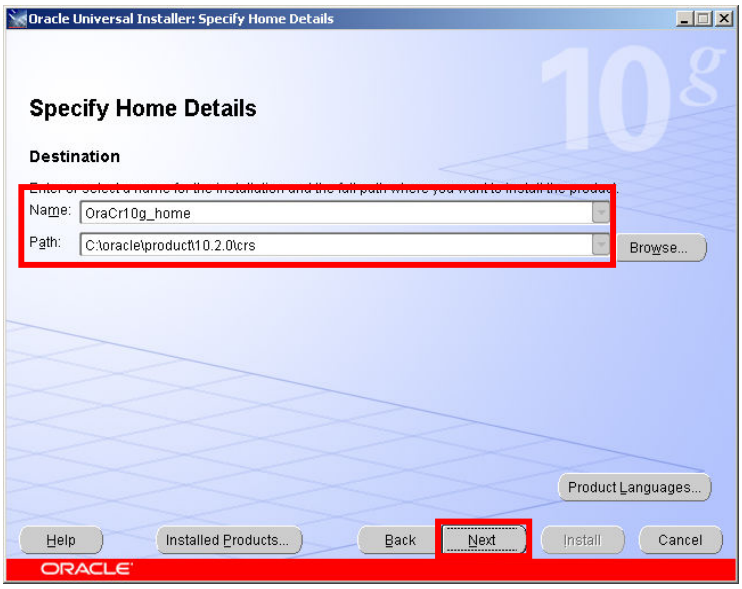
The installer is invoked by running:

```
C:\stage\10gR2\clusterware\setup.exe
```

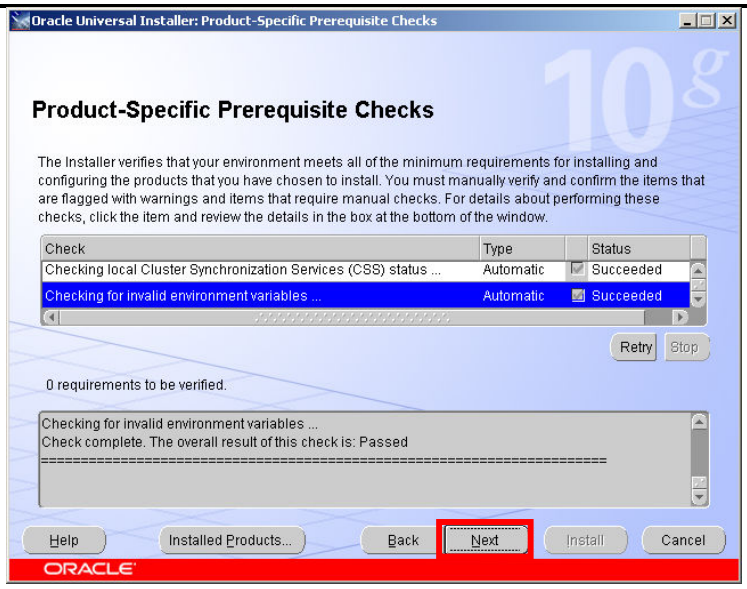
You will be presented with a welcome screen



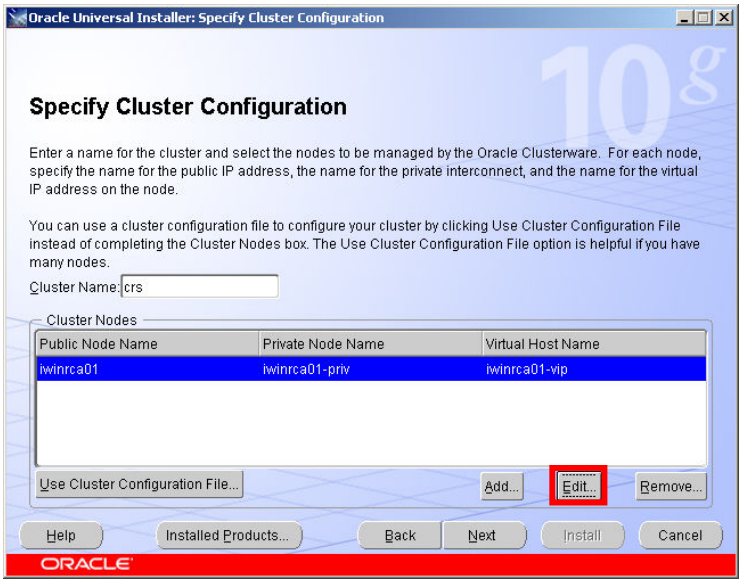
Click Next



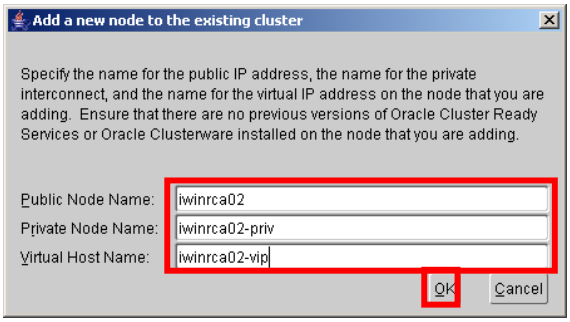
Enter the name and location of the Oracle Home
Click Next



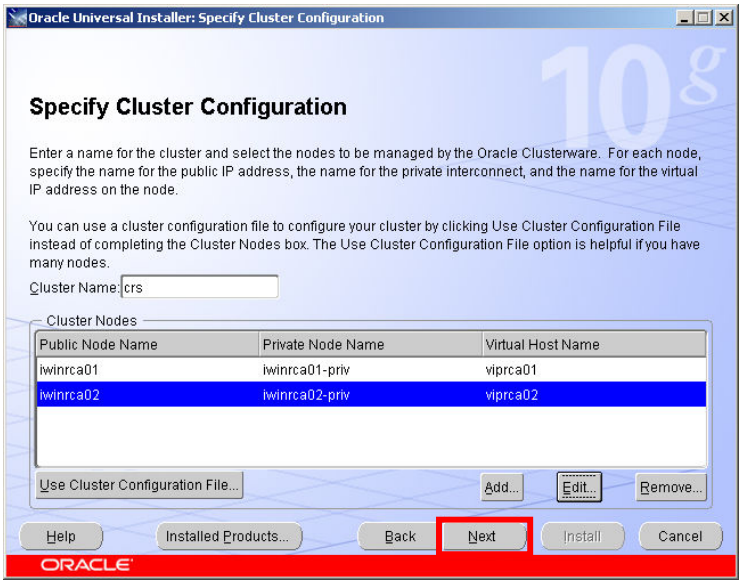
The installer then runs some Prerequisite Checks. If you have already run the CVU command then this should pass with no warning. If warnings are displayed you should correct those before continuing
Click Next



Now we specify the names of the Nodes and the networks to be used by RAC
Highlighted should be the first node in the cluster, the node you are running the installer from.
Oracle defaults the Public node name to the node name for the current node. It adds a '-priv' suffix to the interconnect address and a '-vip' suffix to the virtual IP address name. At this point in time you should be able to ping both the public & private node names as displayed in this box (from all nodes in the proposed cluster). Trying to ping the vip should fail at this point in time
Click Edit to add additional Nodes to the cluster

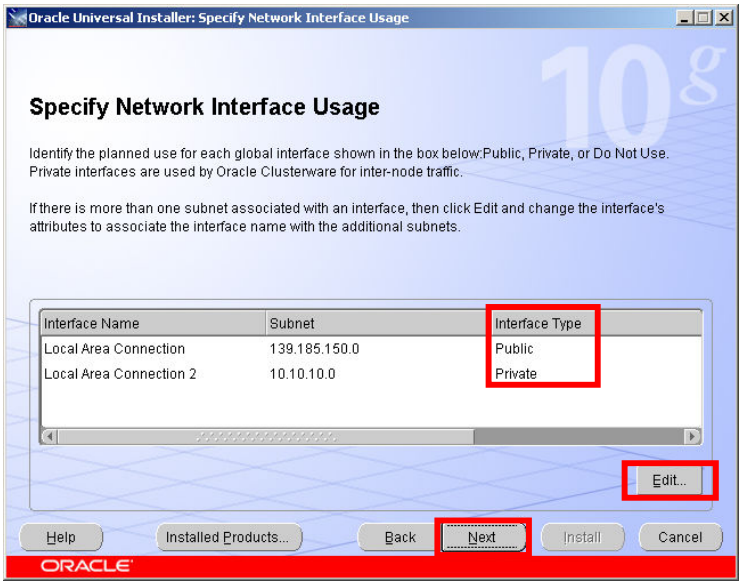


Enter the public, private and VIP names for the other node
Click OK



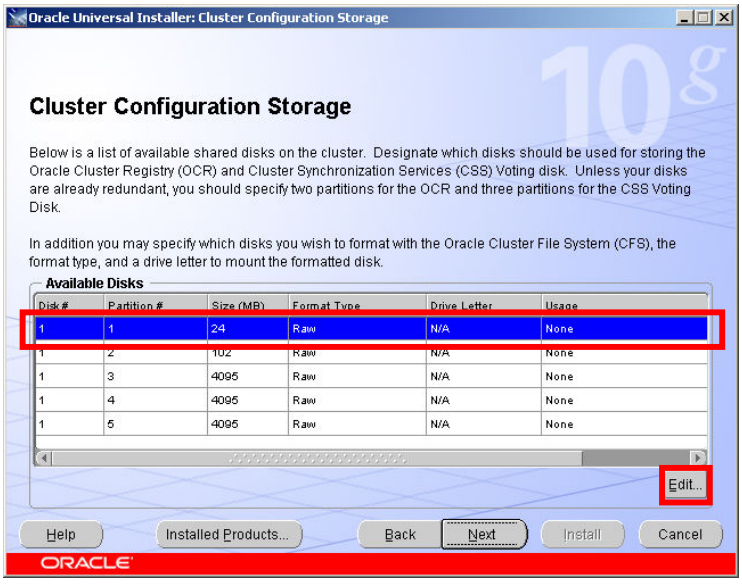
The list shows all the network names that will be configured for the Oracle Clusterware
Click Next

If you get an error indicating '**`Nodes are not clusterable`**' This is probably caused by the network being set up incorrectly. Review the network setup details in Section2 of this document.

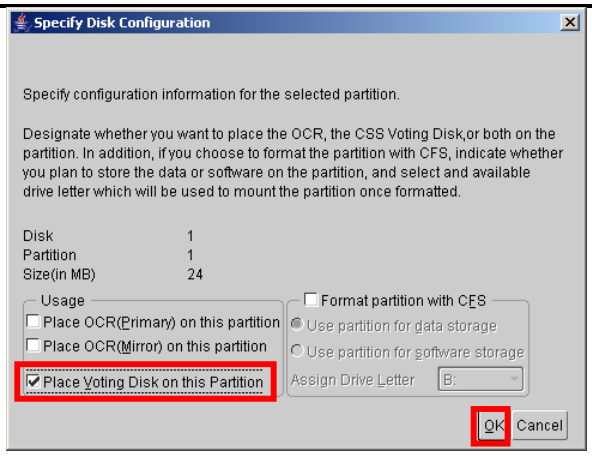


Using the network names provided the installer determines which sub-nets will be used for the public and private network connections. The information displayed here is usually correct. If incorrect, click the Edit button to select the correct Interface type. If both adapters are identified as Private then you should select the public adapter from the list and then click the edit button and change it's type to 'Public' Do not continue past this screen until you have at least 1 public and 1 private adapter.

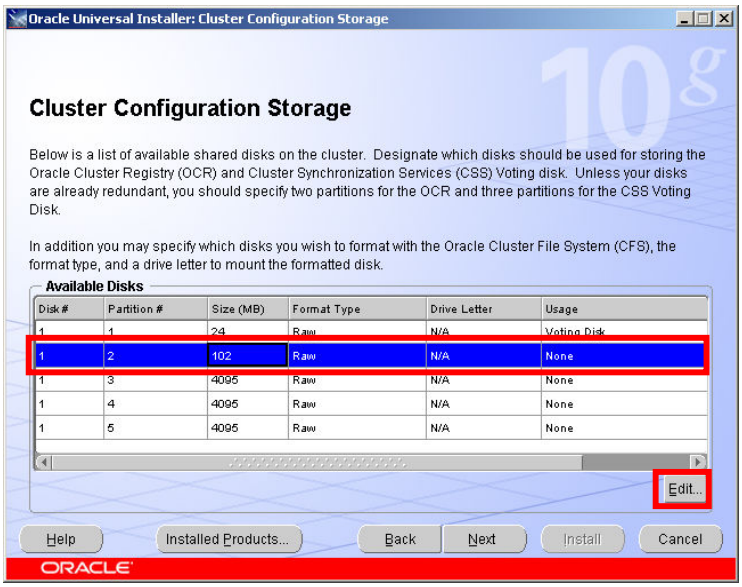
Click Next



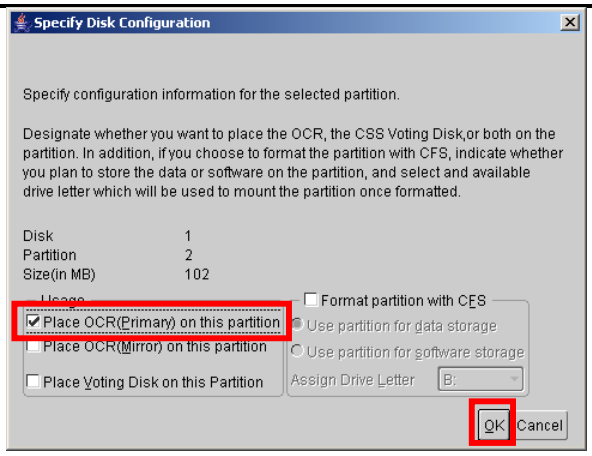
Next we need to select the storage that will be used by Oracle Clusterware.
The first storage item in this list is the 24Mb partition we created at the beginning.
Highlight it
Click Edit



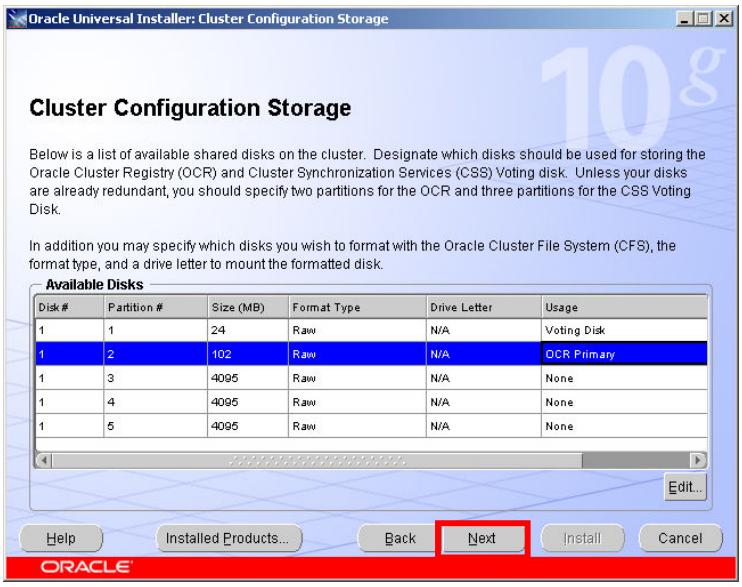
Now we tell the installer the type of the partition. Check the 'Place the Voting Disk on this Partition' checkbox
Click OK



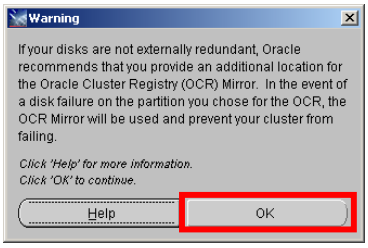
The first partition now has a usage type 'Voting Disk'
Select the second partition, the 102Mb partition
Click Edit



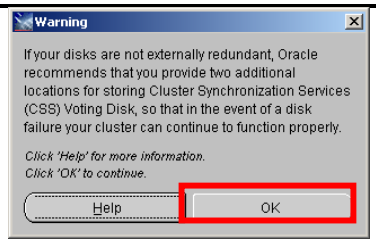
Now we tell the installer the type of the second partition. Check the 'Place the OCR (Primary) on this Partition' checkbox
Click OK



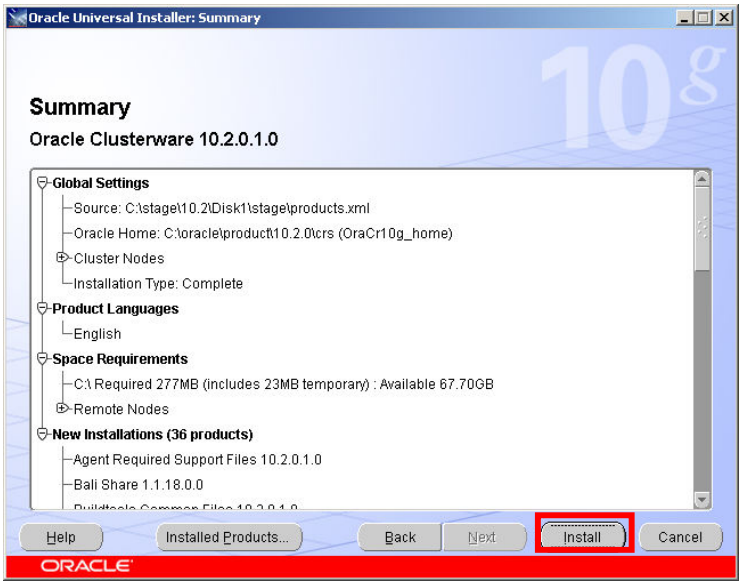
The usage type for the second partition has changed to OCR primary
The other partitions will be used later during the ASM and database install
Click Next



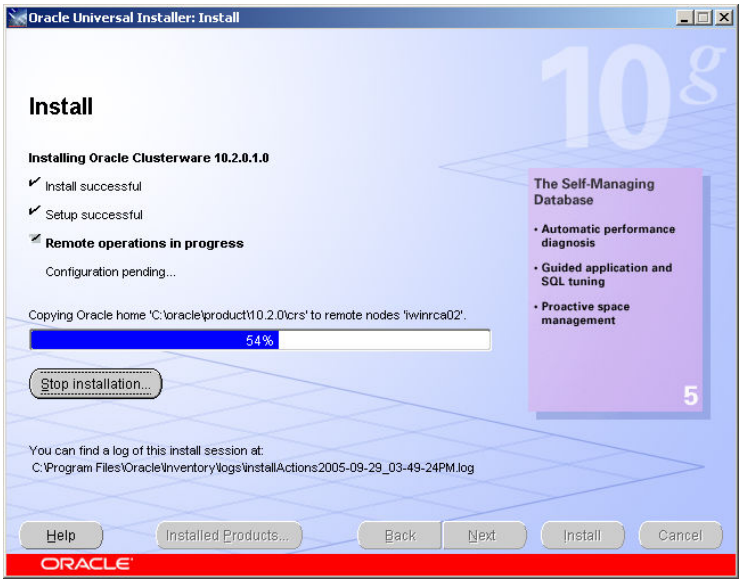
The installer warns that you should create more than 1 OCR partition. In our case the partition has been created on highly available disk so we can ignore this warning
Click OK



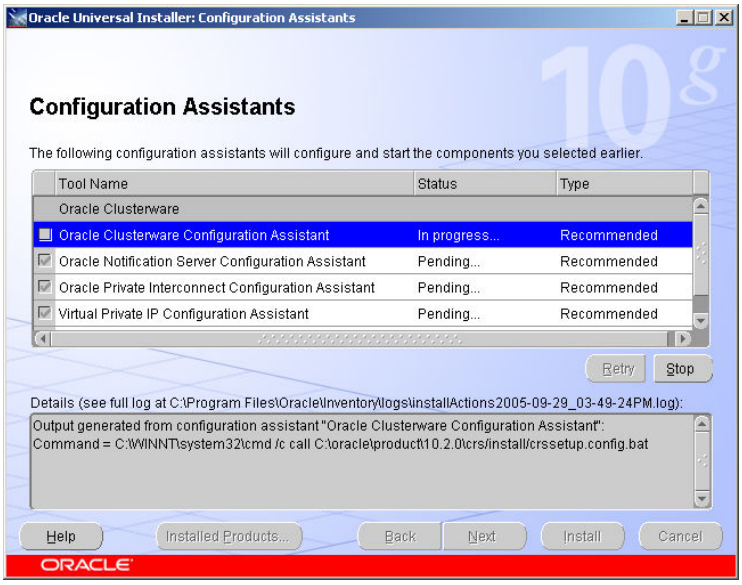
The installer warns that you should create more than 1 Voting partition. In our case the partition has been created on highly available disk so we can ignore this warning
Click OK



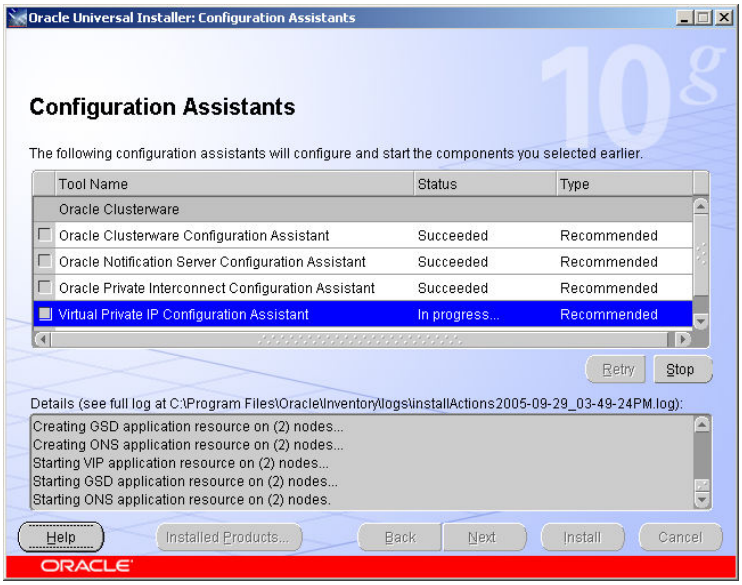
A summary screen appears
Click Install



The Oracle Custerware software is installed onto both nodes in the cluster

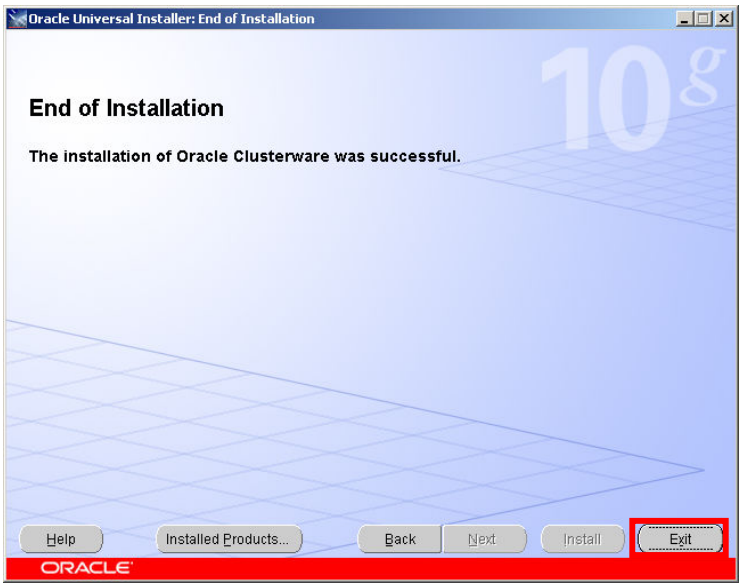


At the end of the Oracle Clusterware software install a number of Configuration assistants are run automatically. Some of these, especially the first one 'Oracle Clusterware Configuration Assistant', will take some time…

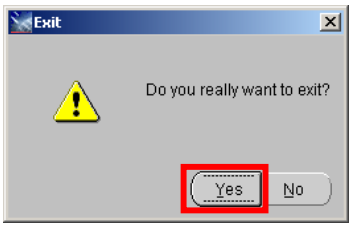


Finally the Configuration assistants create a number of Oracle Clusterware managed resources, including the VIPs

If you are using non-routable addresses for the public adapter then the Virtual IP configuration assistant will fail at this stage. If this happens ignore the error and continue to the end of the clusterware install. After the Oracle Clusterware install completes you can rerun the vipca command to reconfigure this.
To re run vipca run the vipca.bat file from the Oracle clusterware bin directory. Follow the prompts for VIPCA to select the appropriate interface for the public network, and assign the VIPs for each node when prompted. Manually running VIPCA with the same IPs should complete successfully.



At the end of the install click Exit



In the confirmation screen click Yes

Congratulations The base 10.2.0.1 Oracle Clusterware has been installed successfully

Patching of the Oracle Clusterware Home

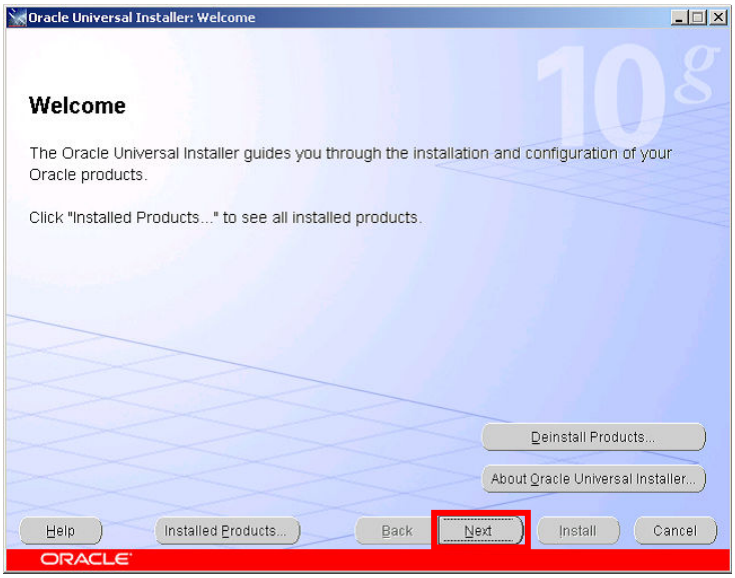
You should now patch the Clusterware home to the latest release levels

At this point in time the Oracle Clusterware should be up on both nodes in the cluster. Oracle Clusterware support rolling upgrades. The software is installed from the patch into a staging area in the Clusterware home on each node and then, in turn a script is run to patch that node to the latest version.

Install the Latest patch

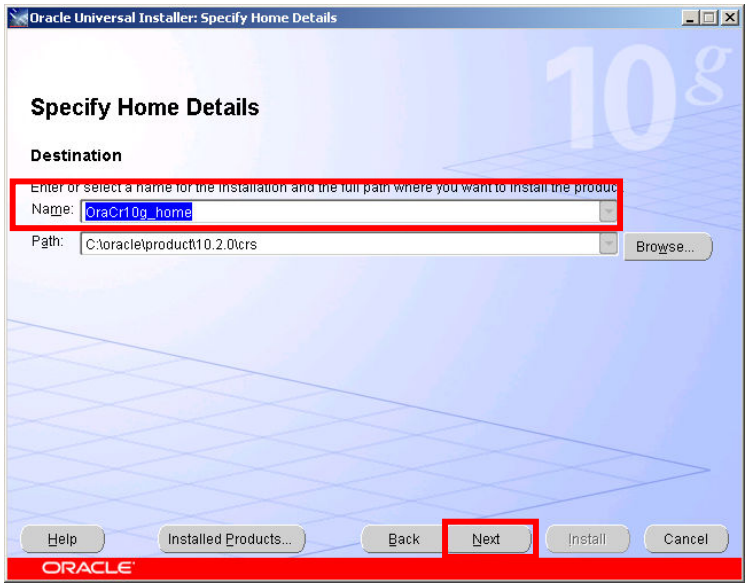
At the time of this document the latest patch for Oracle on Windows was 10.2.0.3, you should download that patch from Metalink and stage on node1, Notice, at this point that you have not stopped any Oracle Services

The installer is invoked by running: `C:\stage\10203\Disk1\setup.exe`



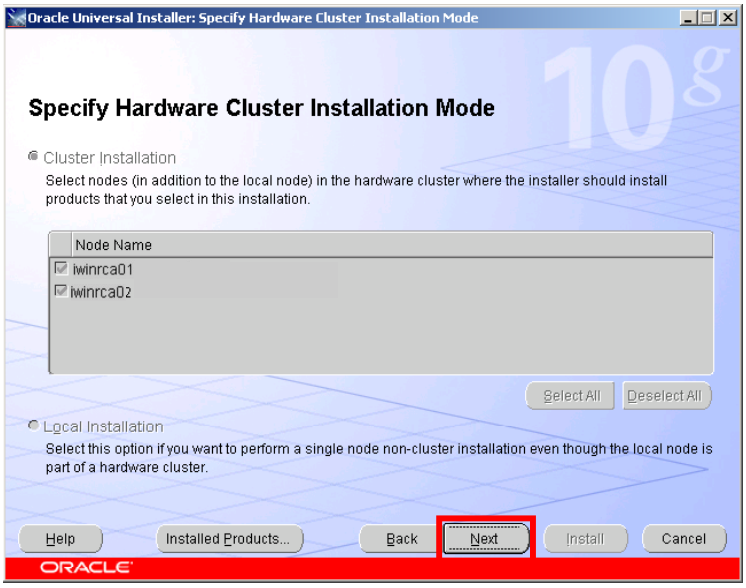
You will be presented with a welcome screen

Click Next



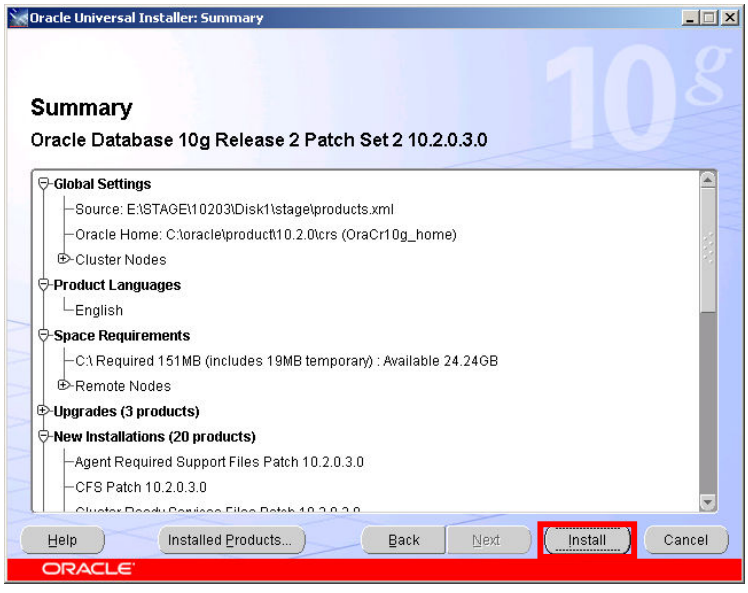
In the name Drop Down Listbox – ensure that the Clusterware home is selected. The Path should then show the directory for the Clusterware home

Click Next

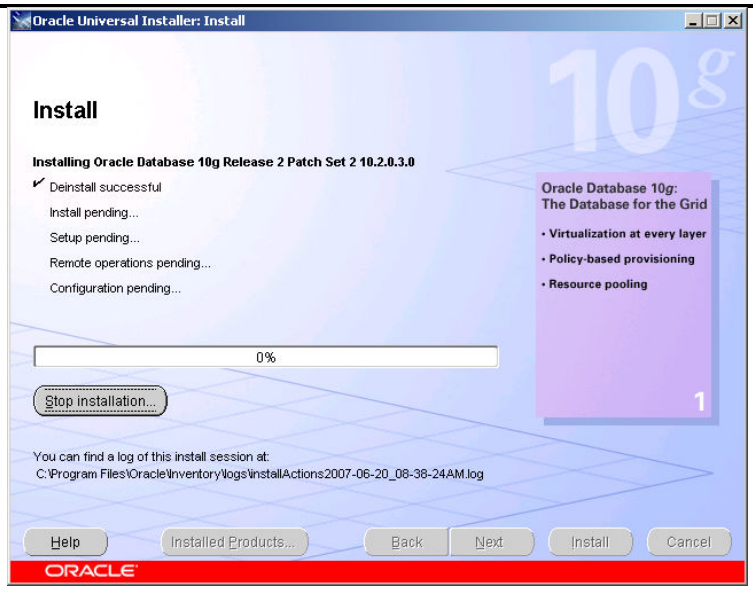


This screen lists the nodes in the cluster

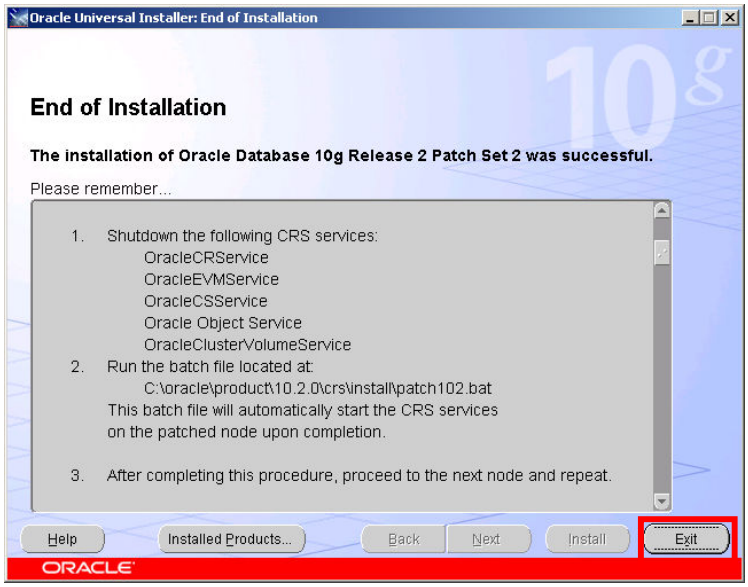
Click Next



Click Install

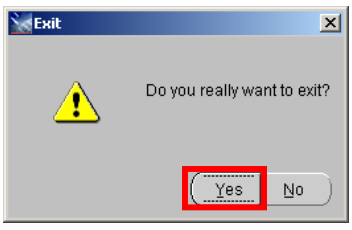


The installer will stage the patch into a directory on each of the nodes in the cluster



At the end there is a process that moves the replacement binaries to the correct locations

Click Exit



Click Yes

As the patch is applied in a rolling basis you do this on each node in turn

On node1

First we can see the Oracle Services currently running

```
C:\oracle\product\10.2.0\crs\BIN>net start | findstr Oracle
   Oracle Object Service
   OracleClusterVolumeService
   OracleCRService
   OracleCSService
   OracleEVMService
```

Next we must stop all of the services – which must be done in the following order

```
C:\oracle\product\10.2.0\crs\BIN>net stop OracleCRService
The OracleCRService service was stopped successfully.

C:\oracle\product\10.2.0\crs\BIN>net stop OracleEVMService
The OracleEVMService service was stopped successfully.

C:\oracle\product\10.2.0\crs\BIN>net stop OracleCSService
The OracleCSService service is stopping.
The OracleCSService service was stopped successfully.

C:\oracle\product\10.2.0\crs\BIN>net stop  "Oracle Object Service"
The Oracle Object Service service was stopped successfully.

C:\oracle\product\10.2.0\crs\BIN>net stop OracleClusterVolumeService
The OracleClusterVolumeService service is stopping.
The OracleClusterVolumeService service was stopped successfully.
```

I also check to make sure the MSDTC Service is stopped

```
C:\oracle\product\10.2.0\crs\BIN>net stop  MSDTC
The Distributed Transaction Coordinator service is stopping.
The Distributed Transaction Coordinator service was stopped successfully.
```

Now you can run the script to move the patch files to the correct location

```
C:\oracle\product\10.2.0\crs\install>patch102.bat
Successful validation check of Oracle CRS services status
Failed to patch all the files in the ORA_CRS_HOME C:\oracle\product\10.2.0\crs
Please ensure that all processes running from the home have been
stopped.
```

You can see that the patch failed as not all Oracle Processes were stopped. You can use a tool like listdlls.exe[1] to see which DLLs are still in use. If you look in task manager you will probably see 2 ons.exe processes still running. You can kill these from within task manager and try again. Note, on the first node this patch could take at least 3 minutes to run, specifically the EVM startup may appear slow.

```
C:\oracle\product\10.2.0\crs\install>patch102.bat
Successful validation check of Oracle CRS services status
Successful binary patch of the C:\oracle\product\10.2.0\crs
Successful cleanup of patch subdirectory
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\BIN\cluvfy.b
at
 -> C:\oracle\product\10.2.0\crs\inventory\Templates\BIN\cluvfy.bat
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\BIN\gsd.bat
->
 C:\oracle\product\10.2.0\crs\inventory\Templates\BIN\gsd.bat
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\BIN\gsdctl.b
at
 -> C:\oracle\product\10.2.0\crs\inventory\Templates\BIN\gsdctl.bat
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\BIN\gsdstop.
ba
```

[1] ListDLLs is available from the http://www.sysinternals.com website

```
t -> C:\oracle\product\10.2.0\crs\inventory\Templates\BIN\gsdstop.bat
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\BIN\instOrac
le
.key -> C:\oracle\product\10.2.0\crs\inventory\Templates\BIN\instOracle.key
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\BIN\localcon
fi
g.bat -> C:\oracle\product\10.2.0\crs\inventory\Templates\BIN\localconfig.bat
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\BIN\racgwrap
.b
at.sbs ->
C:\oracle\product\10.2.0\crs\inventory\Templates\BIN\racgwrap.bat.sbs
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\BIN\srvctl.b
at
 -> C:\oracle\product\10.2.0\crs\inventory\Templates\BIN\srvctl.bat
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\BIN\usrvip.b
at
 -> C:\oracle\product\10.2.0\crs\inventory\Templates\BIN\usrvip.bat
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\BIN\vipca.ba
t
-> C:\oracle\product\10.2.0\crs\inventory\Templates\BIN\vipca.bat
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\cv\remenv\ex
ec
task.bat ->
C:\oracle\product\10.2.0\crs\inventory\Templates\cv\remenv\exectask.
bat
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\evm\admin\co
nf
\evm.auth ->
C:\oracle\product\10.2.0\crs\inventory\Templates\evm\admin\conf\evm
.auth
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\evm\admin\co
nf
\evmdaemon.conf ->
C:\oracle\product\10.2.0\crs\inventory\Templates\evm\admin\co
nf\evmdaemon.conf
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\evm\admin\co
nf
\evmlogger.conf ->
C:\oracle\product\10.2.0\crs\inventory\Templates\evm\admin\co
nf\evmlogger.conf
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\install\preu
pd
ate.bat ->
C:\oracle\product\10.2.0\crs\inventory\Templates\install\preupdate.ba
t
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\opmn\conf\on
s.
config ->
C:\oracle\product\10.2.0\crs\inventory\Templates\opmn\conf\ons.config
16 File(s) copied
Successful startup of OracleCSService
Successful startup of OracleEvmService
Successful startup of OracleCRService
clscfg: EXISTING configuration version 3 detected.
clscfg: version 3 is 10G Release 2.
Successfully accumulated necessary OCR keys.
Using ports: CSS=49895 CRS=49896 EVMC=49898 and EVMR=49897.
node <nodenumber>: <nodename> <private interconnect name> <hostname>
node 1: iwinrca01 iwinrca01-priv iwinrca01
Creating OCR keys for user 'administrator', privgrp ''..
Operation successful.
clscfg -upgrade completed succssfully
Successful upgrade of this node to Oracle Cluster Ready Services 10203
```

The patch has been applied successfully; you can see that the Oracle Clusterware has been restarted on node1. At this point in time Node1 is running 10.2.0.3 Oracle Clusterware and node2 is running 10.2.0.1 Oracle Clusterware.

Yu must repeat the patching exercise on node2

On node2

First we can see the Oracle Services currently running

```
C:\oracle\product\10.2.0\crs\BIN>net start | findstr Oracle
   Oracle Object Service
   OracleClusterVolumeService
   OracleCRService
   OracleCSService
   OracleEVMService
```

Next we must stop all of the services – which must be done in the following order

```
C:\oracle\product\10.2.0\crs\BIN>net stop OracleCRService
The OracleCRService service was stopped successfully.

C:\oracle\product\10.2.0\crs\BIN>net stop OracleEVMService
The OracleEVMService service was stopped successfully.

C:\oracle\product\10.2.0\crs\BIN>net stop OracleCSService
The OracleCSService service is stopping.
The OracleCSService service was stopped successfully.

C:\oracle\product\10.2.0\crs\BIN>net stop  "Oracle Object Service"
The Oracle Object Service service was stopped successfully.

C:\oracle\product\10.2.0\crs\BIN>net stop OracleClusterVolumeService
The OracleClusterVolumeService service is stopping.
The OracleClusterVolumeService service was stopped successfully.
```

I also check to make sure the MSDTC Service is stopped

```
C:\oracle\product\10.2.0\crs\BIN>net stop  MSDTC
The Distributed Transaction Coordinator service is stopping.
The Distributed Transaction Coordinator service was stopped successfully.
```

Once again use taskmgr to ensure that the ons.exe processes are not running.

Now you can run the script to move the patch files to the correct location

```
C:\oracle\product\10.2.0\crs\install>patch102.bat
Successful validation check of Oracle CRS services status
Successful binary patch of the C:\oracle\product\10.2.0\crs
Successful cleanup of patch subdirectory
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\BIN\cluvfy.b
at
 -> C:\oracle\product\10.2.0\crs\inventory\Templates\BIN\cluvfy.bat
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\BIN\gsd.bat
->
 C:\oracle\product\10.2.0\crs\inventory\Templates\BIN\gsd.bat
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\BIN\gsdctl.b
at
 -> C:\oracle\product\10.2.0\crs\inventory\Templates\BIN\gsdctl.bat
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\BIN\gsdstop.
ba
t -> C:\oracle\product\10.2.0\crs\inventory\Templates\BIN\gsdstop.bat
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\BIN\instOrac
le
.key -> C:\oracle\product\10.2.0\crs\inventory\Templates\BIN\instOracle.key
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\BIN\localcon
fi
g.bat -> C:\oracle\product\10.2.0\crs\inventory\Templates\BIN\localconfig.bat
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\BIN\racgwrap
.b
at.sbs ->
C:\oracle\product\10.2.0\crs\inventory\Templates\BIN\racgwrap.bat.sbs
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\BIN\srvctl.b
at
 -> C:\oracle\product\10.2.0\crs\inventory\Templates\BIN\srvctl.bat
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\BIN\usrvip.b
at
 -> C:\oracle\product\10.2.0\crs\inventory\Templates\BIN\usrvip.bat
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\BIN\vipca.ba
t
-> C:\oracle\product\10.2.0\crs\inventory\Templates\BIN\vipca.bat
```

```
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\cv\remenv\ex
ec
task.bat ->
C:\oracle\product\10.2.0\crs\inventory\Templates\cv\remenv\exectask.
bat
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\evm\admin\co
nf
\evm.auth ->
C:\oracle\product\10.2.0\crs\inventory\Templates\evm\admin\conf\evm
.auth
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\evm\admin\co
nf
\evmdaemon.conf ->
C:\oracle\product\10.2.0\crs\inventory\Templates\evm\admin\co
nf\evmdaemon.conf
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\evm\admin\co
nf
\evmlogger.conf ->
C:\oracle\product\10.2.0\crs\inventory\Templates\evm\admin\co
nf\evmlogger.conf
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\install\preu
pd
ate.bat ->
C:\oracle\product\10.2.0\crs\inventory\Templates\install\preupdate.ba
t
C:\oracle\product\10.2.0\crs\inventory\Templates\install\patch102\opmn\conf\on
s.
config ->
C:\oracle\product\10.2.0\crs\inventory\Templates\opmn\conf\ons.config
16 File(s) copied
Successful startup of OracleCSService
Successful startup of OracleEvmService
Successful startup of OracleCRService
clscfg: EXISTING configuration version 3 detected.
clscfg: version 3 is 10G Release 2.
Successfully accumulated necessary OCR keys.
Using ports: CSS=49895 CRS=49896 EVMC=49898 and EVMR=49897.
node <nodenumber>: <nodename> <private interconnect name> <hostname>
node 2: iwinrac02 iwinrca02-priv iwinrca02
Creating OCR keys for user 'administrator', privgrp ''..
Operation successful.
clscfg -upgrade completed succssfully
Successful upgrade of this node to Oracle Cluster Ready Services 10203
```

Latest Bundle Patch

You can optionally now apply the latest bundle patch on top of 10.2.0.3

Installation of OPMD

Note : this utility is not normally required, only install if you experience startup issues of the Oracle Clusterware layer on reboot of a node.

On some systems where either the shared disk subsystem or network drivers are 'slow' to load, The Oracle Clusterware processes can be started by the OS before the required storage or network devices are fully initialized. This causes the Clusterware layer to fail on startup.

To get around this issue Oracle provides a utlity OPMD.exe which can be found in recent patchsets[2]

[2] Note the X86_64 10.2.0.3 patchset had an incorrect version of this utility. If you are running on this platform obtain the OPMD.exe uility from a previous patchset.

To install you must run the opmd utility from the Clusterware Home\bin directory

```
c:\oracle\product\10.2.0\crs\BIN>opmd -install
OpmdInstall:  OPM service successfully installed
OpmdFixupService:  Oracle Object Service set to manual startup and added to
list
OpmdFixupService:  OracleCSService set to manual startup and added to list
OpmdFixupService:  OracleEVMService set to manual startup and added to list
OpmdFixupService:  OracleCRService set to manual startup and added to list
```

This will set the following Windows services to manual start

- Oracle Object Service
- OracleCRService
- OracleCSService
- OracleEVMService

It then becomes the job of the new service: "Oracle Process Manager" to start the Clusterware services

Remember to install this utility on all nodes in the cluster

Run the CVU stage check to confirm the clusterware install

The Oracle Installer runs CVU on completion of the Oracle Clusterware Install, you can optionally choose to run the CVU stage check manually from a command line.

```
C:\>cd C:\stage\10gR2\clusterware\cluvfy
C:\>runcluvfy stage -post crsinst  -n iwinrca01,iwinrca02
The system cannot find the file specified.

Performing post-checks for cluster services setup

Checking node reachability...
Node reachability check passed from node "iwinrca01".


Checking user equivalence...
User equivalence check passed for user "Administrator".

Checking Cluster manager integrity...


Checking CSS daemon...
Daemon status check passed for "CSS daemon".

Cluster manager integrity check passed.

Checking cluster integrity...
Cluster integrity check passed


Checking OCR integrity...

Checking the absence of a non-clustered configuration...
All nodes free of non-clustered, local-only configurations.

Uniqueness check for OCR device passed.

Checking the version of OCR...
OCR of correct Version "2" exists.

Checking data integrity of OCR...
Data integrity check for OCR passed.

OCR integrity check passed.

Checking CRS integrity...

Checking daemon liveness...
Liveness check passed for "CRS daemon".

Checking daemon liveness...
Liveness check passed for "CSS daemon".

Checking daemon liveness...
Liveness check passed for "EVM daemon".

Checking CRS health...
CRS health check passed.

CRS integrity check passed.

Checking node application existence...


Checking existence of VIP node application (required)
Check passed.

Checking existence of ONS node application (optional)
Check passed.

Checking existence of GSD node application (optional)
Check passed.


Post-check for cluster services setup was successful.
```

4. Install ASM Software Home an patch to the latest release level

In this step we will establish the 10.2.0.1 Homes to be used by ASM as Software only homes

We will then patch to 10.2.0.3

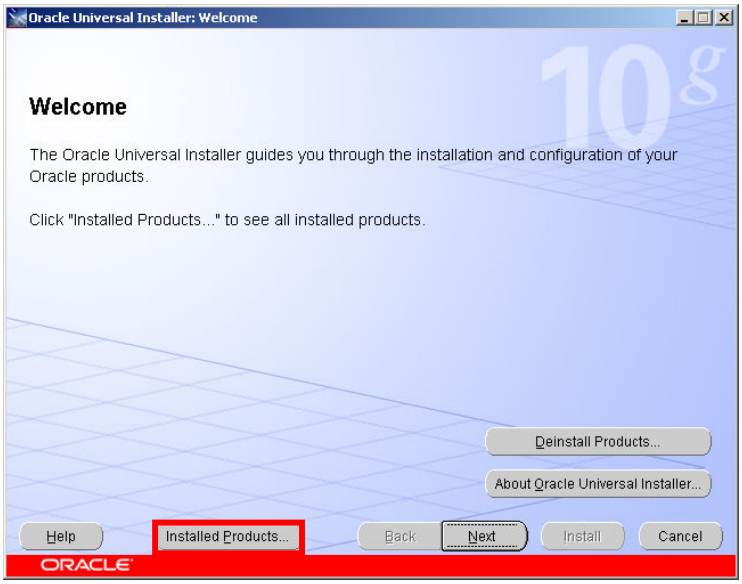
```
C:>cd C:\stage\10.2\clusterware\cluvfy
C:>runcluvfy stage -pre dbinst -n iwinrca01,iwinrca02 -r 10gR2
The system cannot find the file specified.

Performing pre-checks for database installation

Checking node reachability...
Node reachability check passed from node "iwinrca01".


Checking user equivalence...
User equivalence check passed for user "Administrator".
Checking administrative privileges...

Checking node connectivity...

Node connectivity check passed for subnet "139.185.150.0" with node(s)
iwinrca02,iwinrca02.
Node connectivity check passed for subnet "10.10.10.0" with node(s)
iwinrca02,iwinrca01.

Suitable interfaces for VIP on subnet "139.185.150.0":
iwinrca02 Local Area Connection:139.185.150.202 Local Area
Connection:139.185.150.55
iwinrca01 Local Area Connection:139.185.150.201 Local Area
Connection:139.185.150.54

Suitable interfaces for the private interconnect on subnet "10.10.10.0":
iwinrca02 Local Area Connection 2:10.10.10.3
iwinrca01 Local Area Connection 2:10.10.10.2

Node connectivity check passed.


Checking system requirements for 'database'...
Operating system version check passed.
Operating system patch check passed for "1".
Total memory check passed.
Swap space check passed.
System architecture check passed.
Free disk space check passed.

System requirement passed for 'database'

Checking CRS integrity...

Checking daemon liveness...
Liveness check passed for "CRS daemon".

Checking daemon liveness...
Liveness check passed for "CSS daemon".

Checking daemon liveness...
Liveness check passed for "EVM daemon".

Checking CRS health...
CRS health check passed.

CRS integrity check passed.

Checking node application existence...

Checking existence of VIP node application (required)
Check passed.

Checking existence of ONS node application (optional)
Check passed.

Checking existence of GSD node application (optional)
Check passed.


Pre-check for database installation was successful.
```

Install the Oracle Database Software Home for ASM

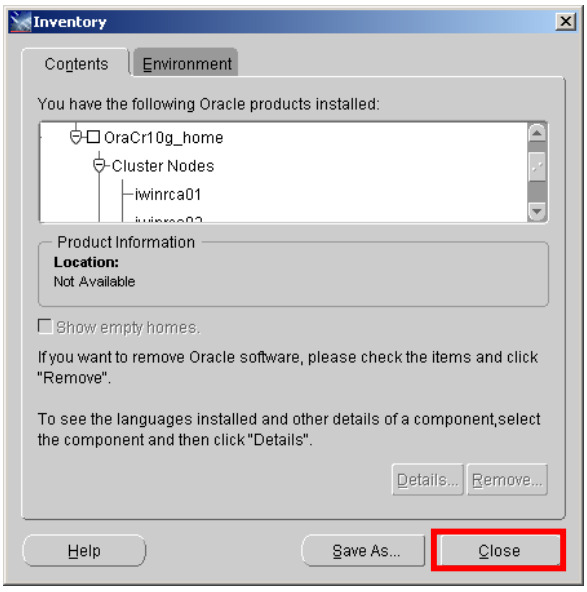
The installer is invoked by running:

```
C:\stage\10gR2\database\setup.exe
```

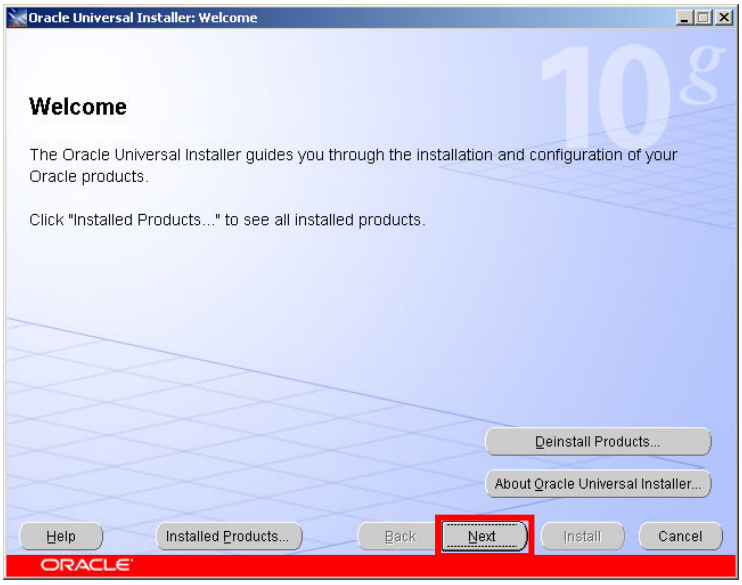
You will be presented with a welcome screen



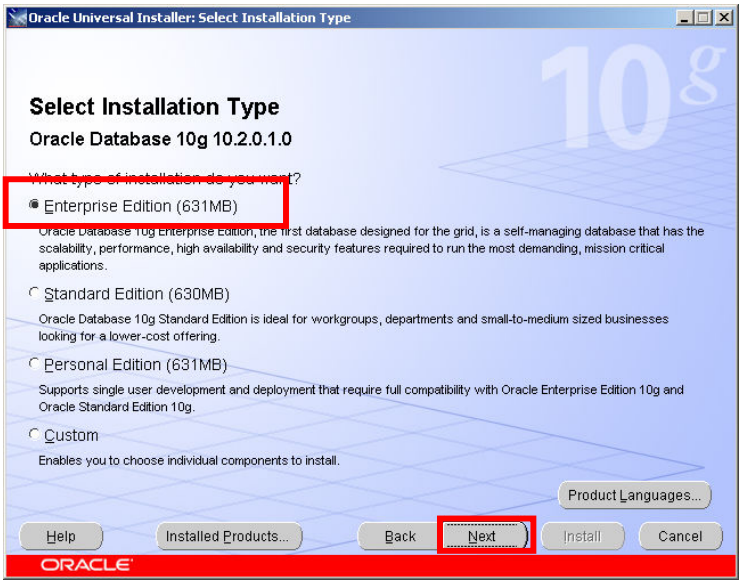
If you click on the Installed Products button you will see that the Oracle Clusterware software has been registered in the Oracle Software Inventory



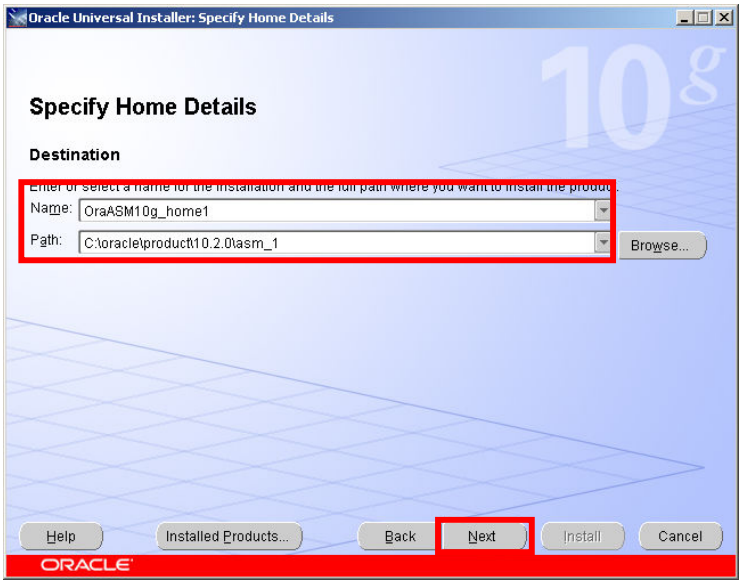
Click Close to return to the Welcome screen



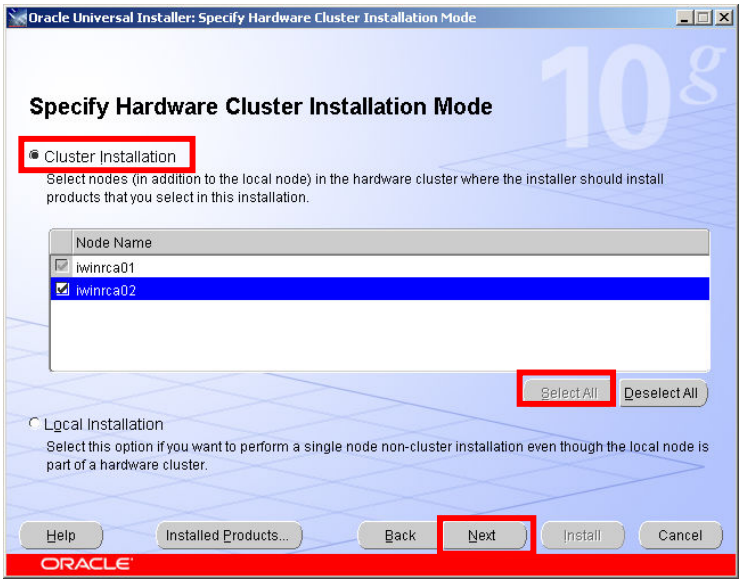
Click Next



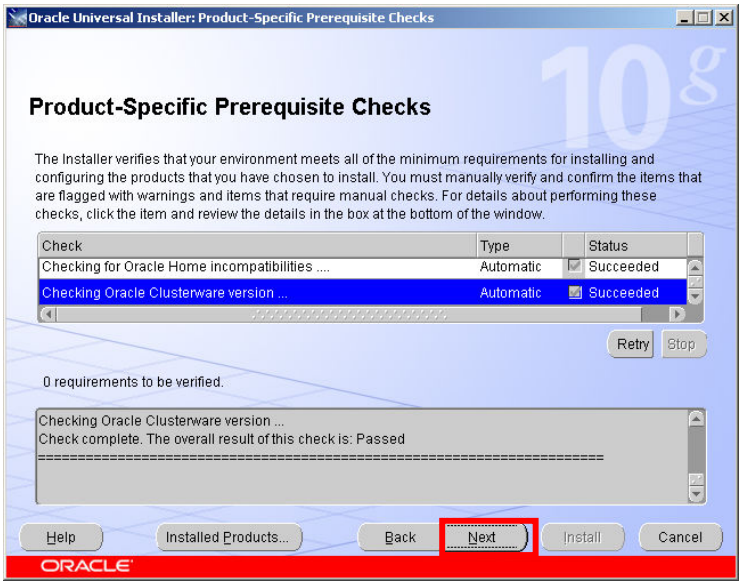
We are going to install an Oracle Home to host the ASM instances.
Select the Enterprise Edition radio button
Click Next



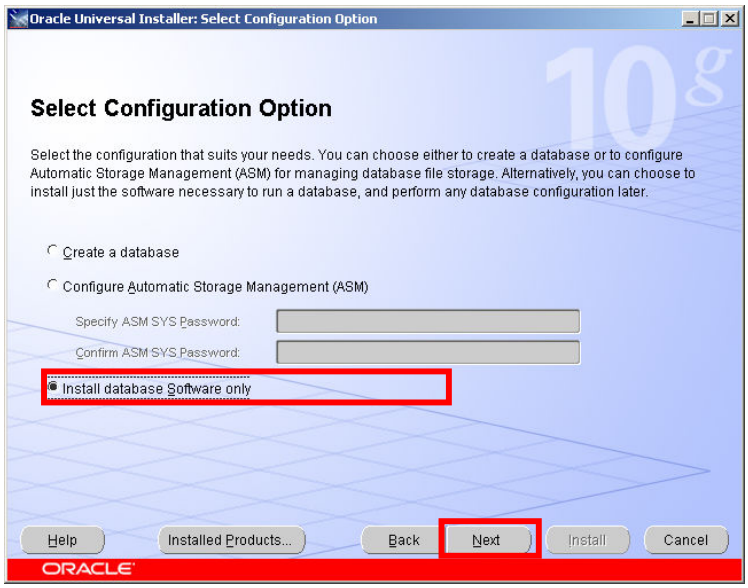
The ASM home must be a different home than the Oracle Clusterware Home
Enter a name for the home
Enter a location for the home
Click Next



The Oracle Installer determines that the Oracle Clusterware layer is installed. It presents a list of all the nodes in the Oracle Cluster
Ensure the Cluster Installation radio button is selected
Click the Select All button
Click Next

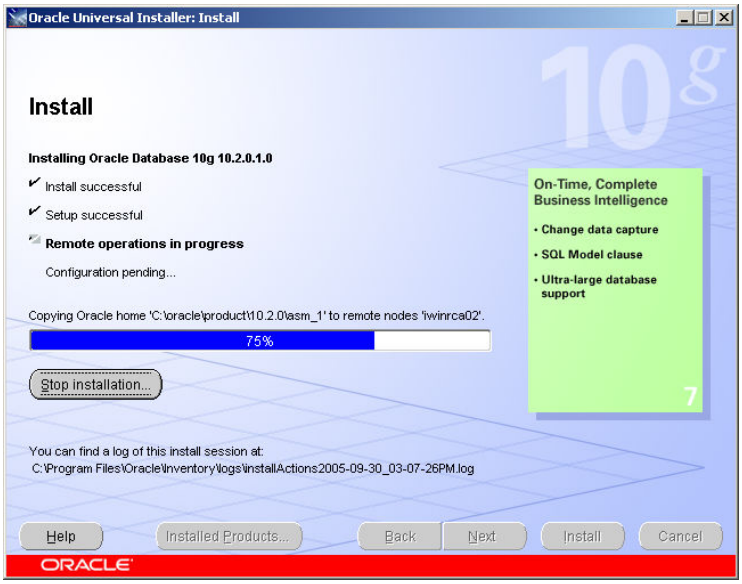


The installer runs a series of checks on the environment. If you have successfully run the CVU at the beginning of this stage then this should be OK
Click Next

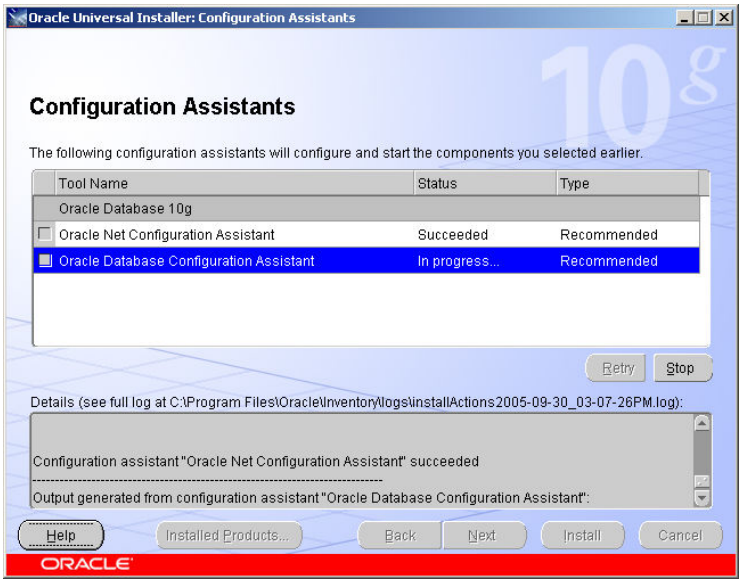


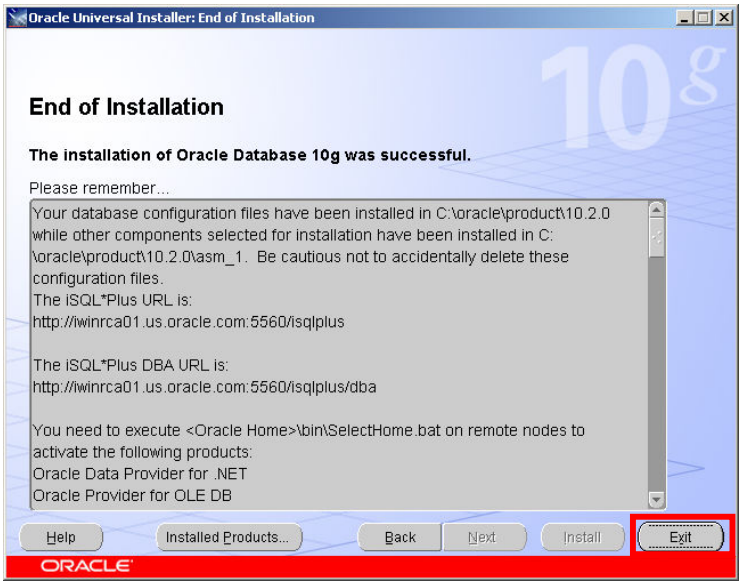
We will install the software first and then patch to the latest release before configuring ASM in this new home
Select the Install database Software only button
Click Next

At the summary screen
Click Install

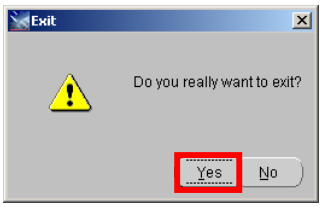


The Oracle ASM Home software for the ASM home is installed onto both nodes





At the end of the install a report screen is displayed
Click Exit



Click Yes

Congratulations The base 10.2.0.1 Oracle ASM Home has been installed successfully

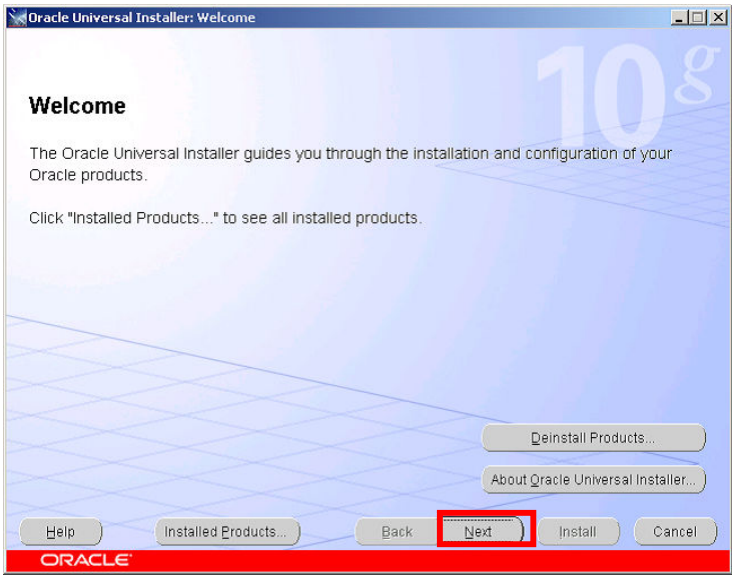
Patching of the ASM Home

You should now patch the ASM home to the latest release levels

Install the Latest patch

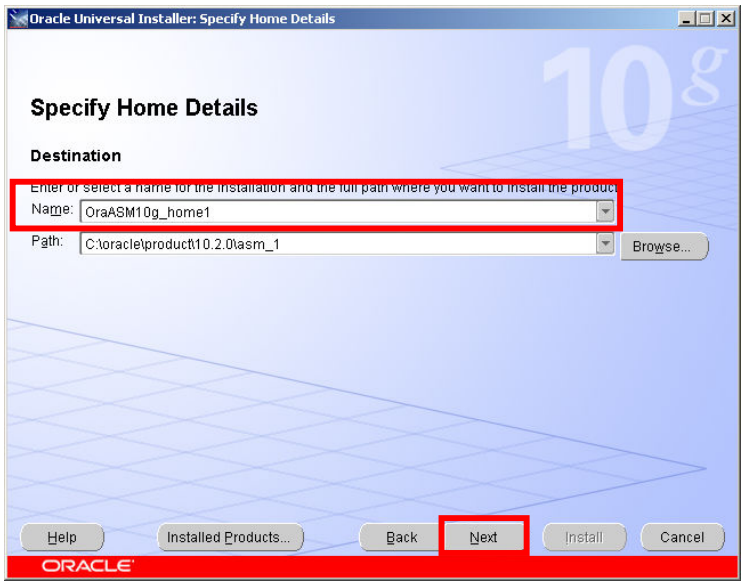
At the time of this document the latest patch for Oracle on Windows was 10.2.0.3, you should download that patch from Metalink and stage on node1The installer is invoked by running:

```
C:\stage\10203\Disk1\setup.exe
```



You will be presented with a welcome screen

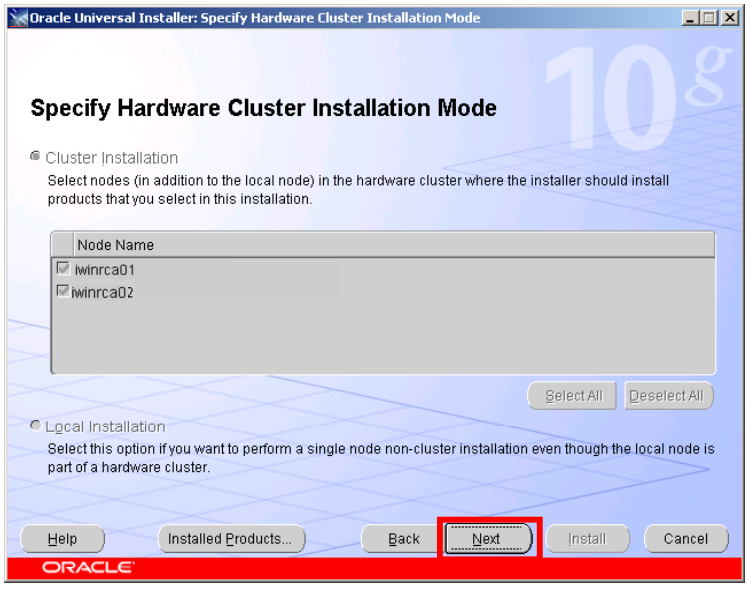
Click Next



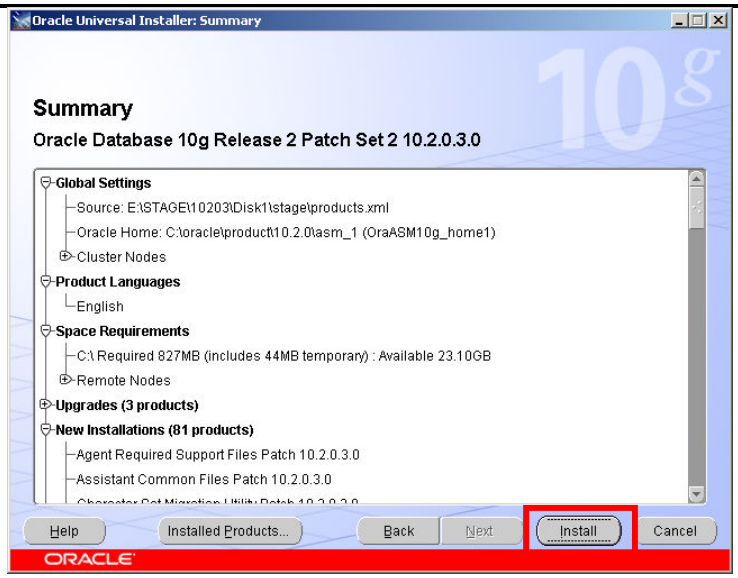
In the name Drop Down Listbox – ensure that the ASM home you just installed is selected. The Path should then show the directory for the ASM home

Click Next

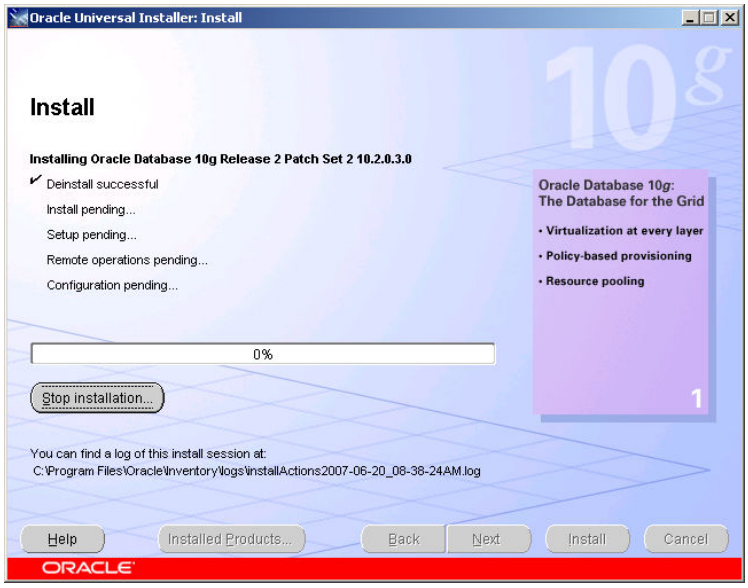
This screen lists the nodes in the cluster

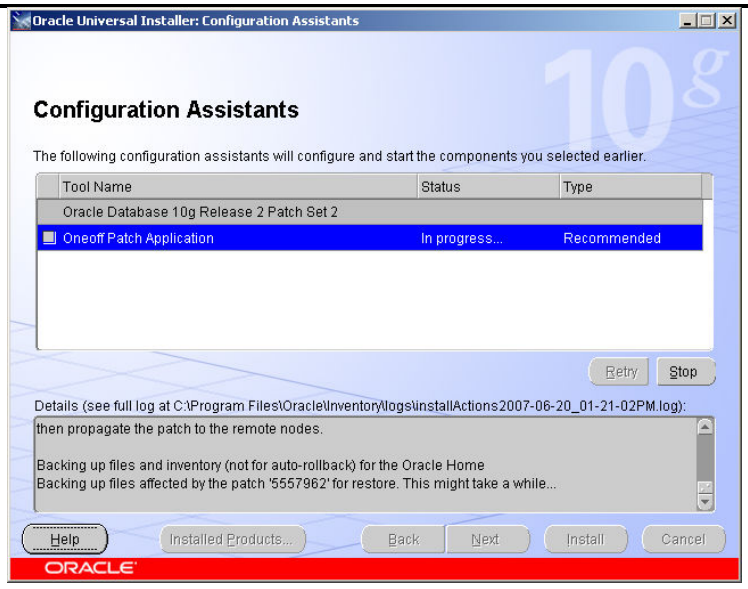


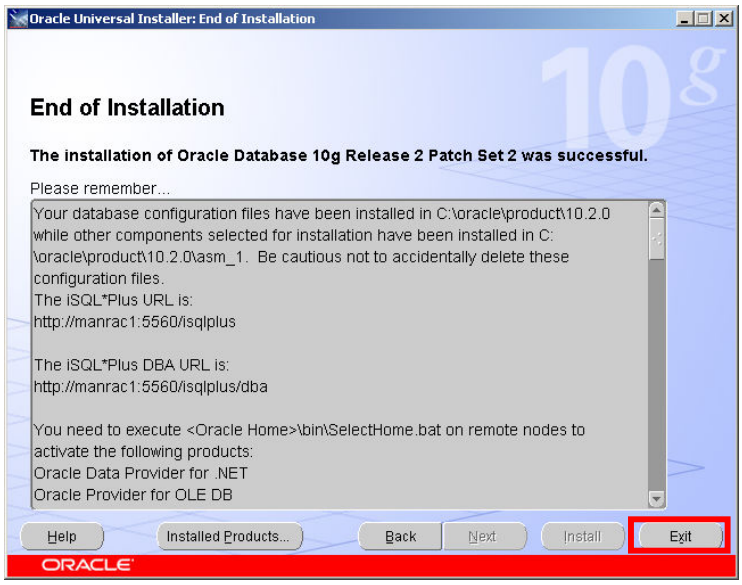
Click Next



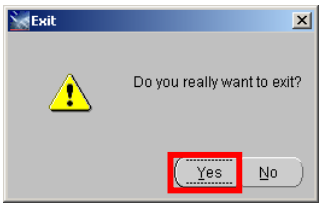
Click Install







At the end of the install a report screen is displayed
Click Exit



Click Yes

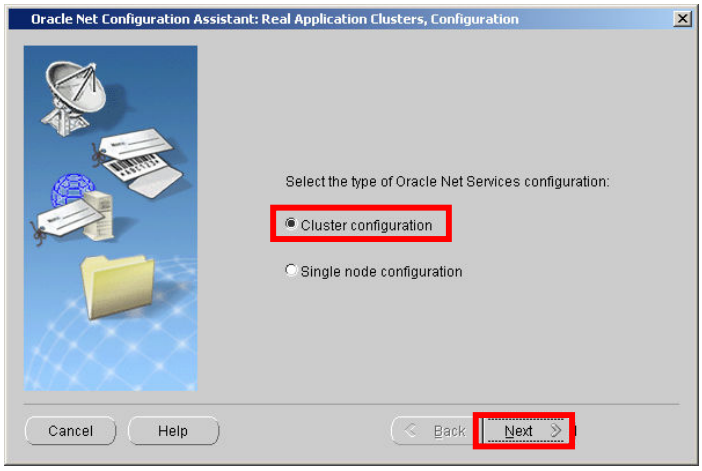
You can optionally now apply the latest bundle patch on top of 10.2.0.3

5. Create the RAC Database Listeners and the ASM Instances

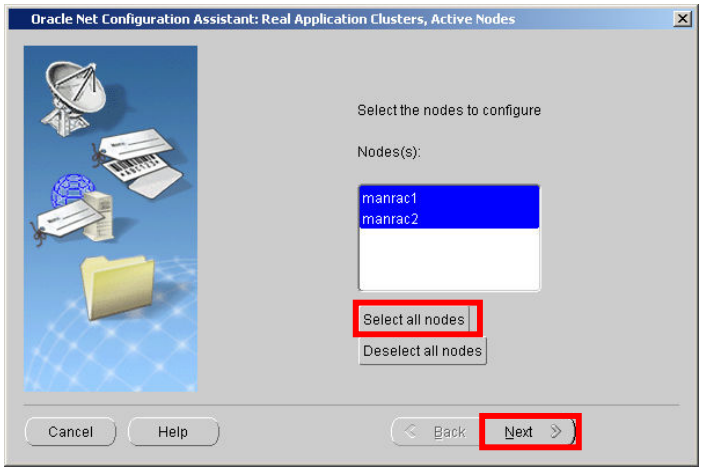
Create the listeners

From the ASM_HOME/bin directory run the netca.bat command

C:\oracle\product\10.2.0\asm_1\bin>**netca**

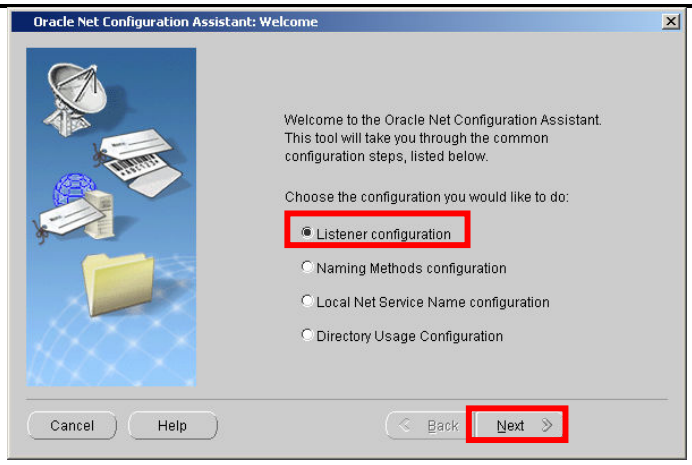


Make sure Cluster configuration is selected
Click Next

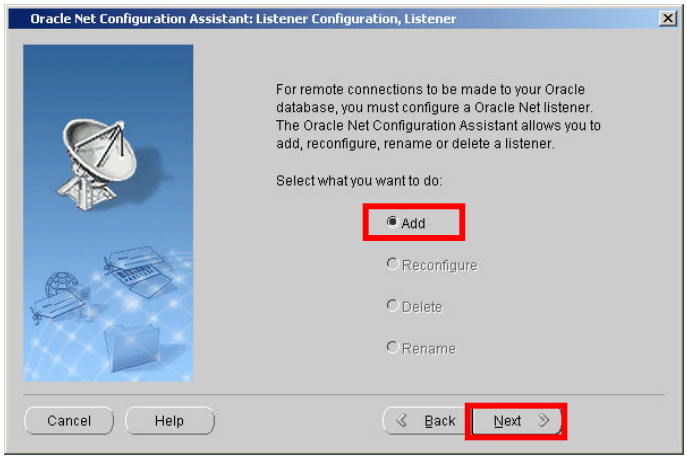


Make sure all the nodes are selected

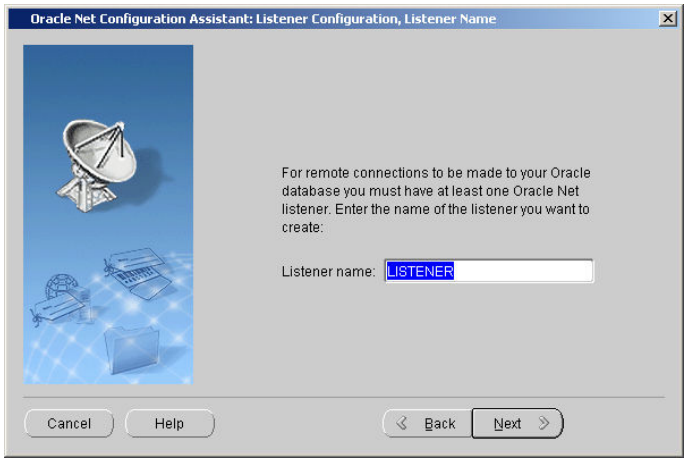
Click Next



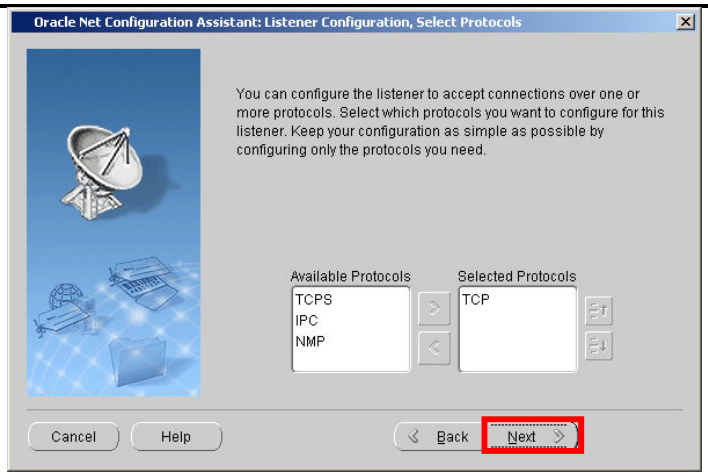
Select Listener configuration
Click Next



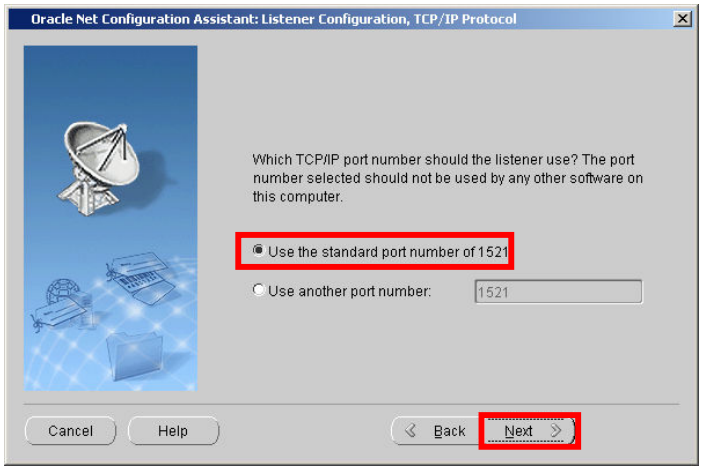
Select Add
Click Next



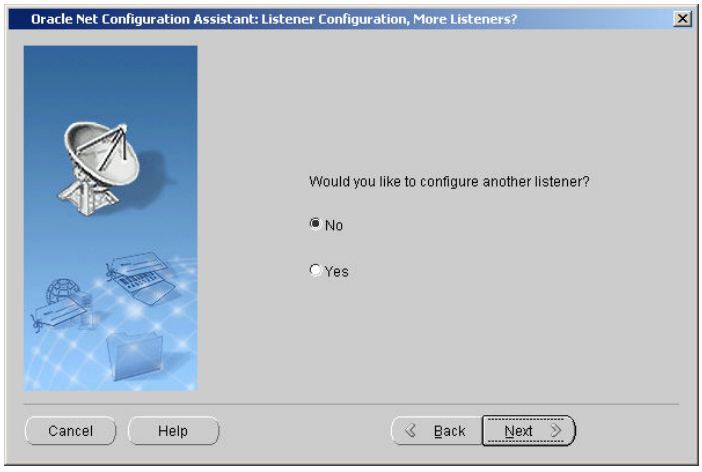
Make sure the Listener name is "LISTENER"
Click Next



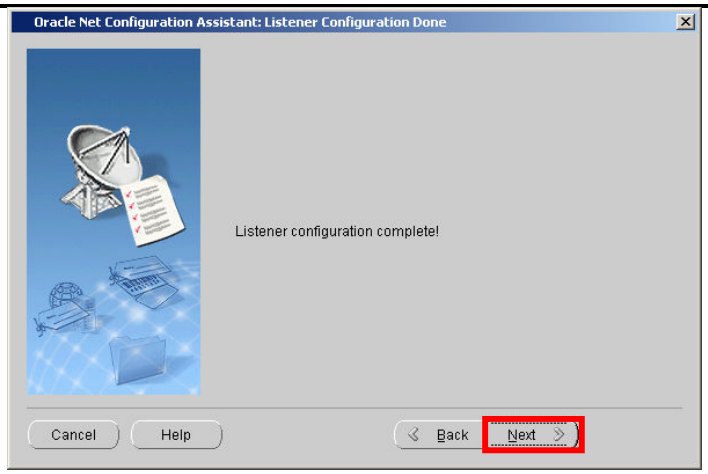
Select the appropriate Network Protocol
Click Next



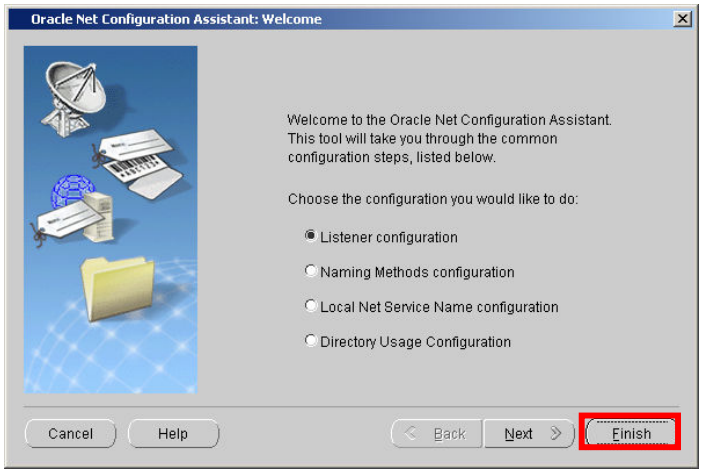
Use the default port 1521
Click Next



Select No
Click Next



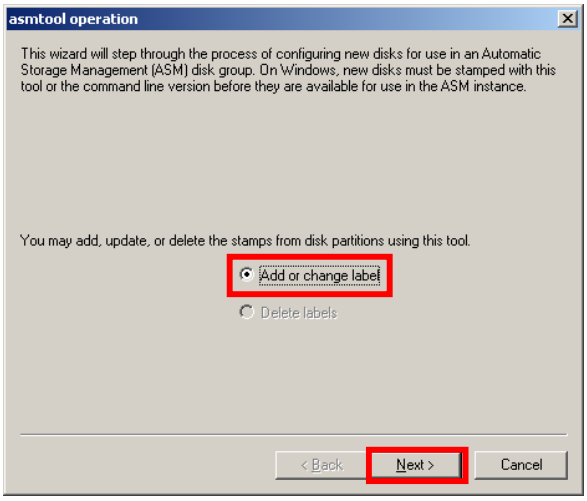
Click Next



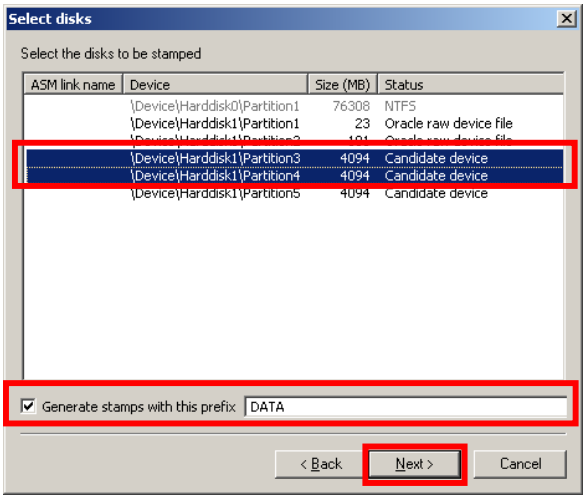
Click Finish

Stamp the disks for ASM

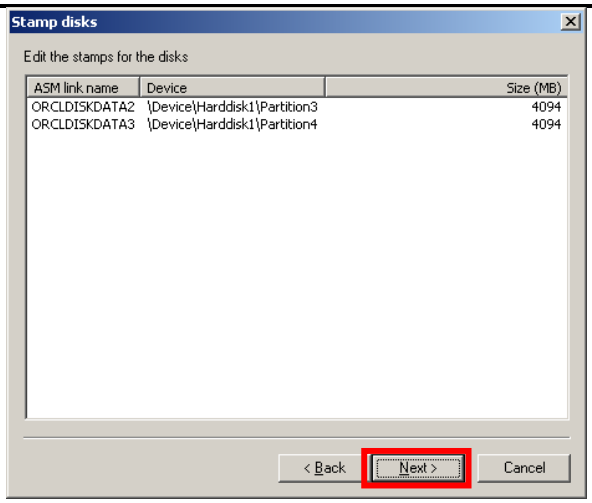
We use a tool called asmtoolg to stamp the disks that ASM will use
`C:\oracle\product\10.2.0\asm_1\BIN>`**`asmtoolg.exe`**



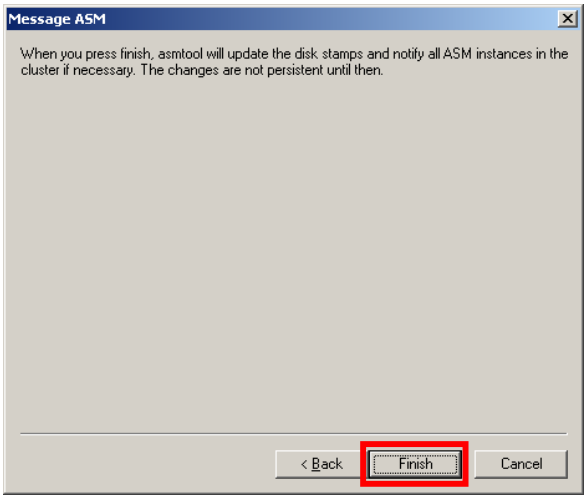
The asmtool launches
As there are no disks currently labeled the tool only offers the option to Add or Change a label
Click Next



asmtool lists all the visible partitions
In this case the first partition \Device\Harddisk0 is the local C drive
The next 2 partitions are the partitions used by the Oracle Clusterware
The next 3 are available 'Candidate devices'
Select the first 2 candidate devices
Ensure the Generate stamps with this prefix checkbox is set
And the prefix is set to the value DATA
Click Next



The asmtool then lists the partitions and the changes it is about to make
Click Next

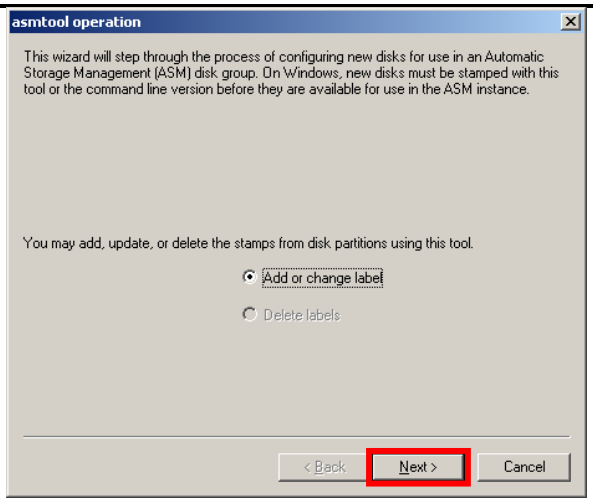


Click Finish

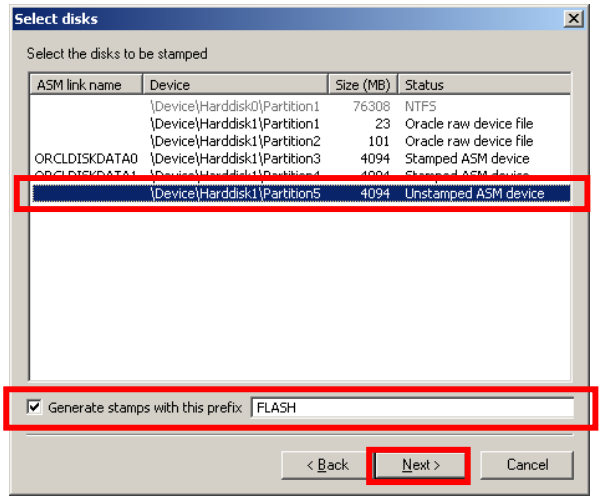
Run the asmtoolg again to stamp the FLASH disks

```
C:\oracle\product\10.2.0\asm_1\BIN>asmtoolg.exe
```

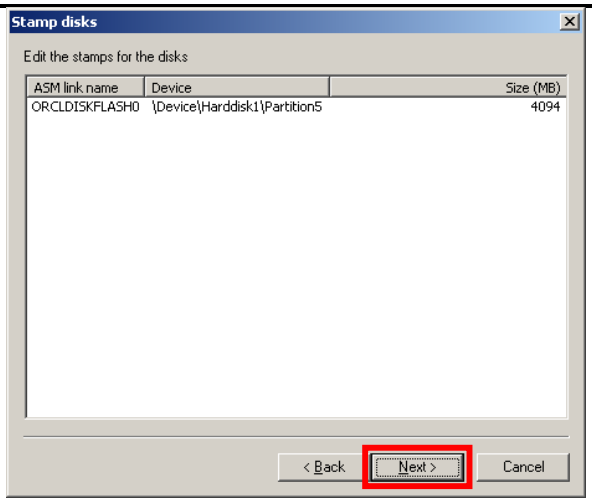
Click the Stamp Disks button again



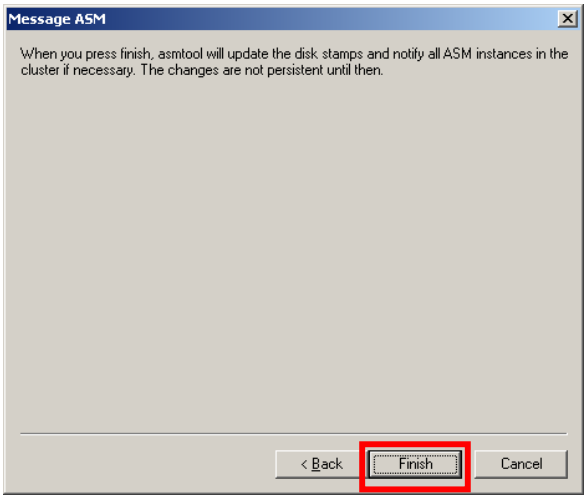
Click Next



Select the final disk device
Ensure the Generate stamps with this prefix checkbox is set
And the prefix is set to the value FLASH
Click Next



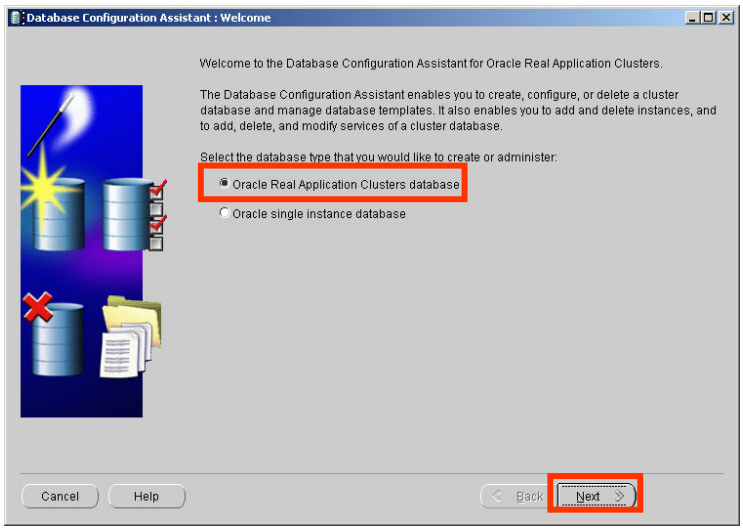
Click Next



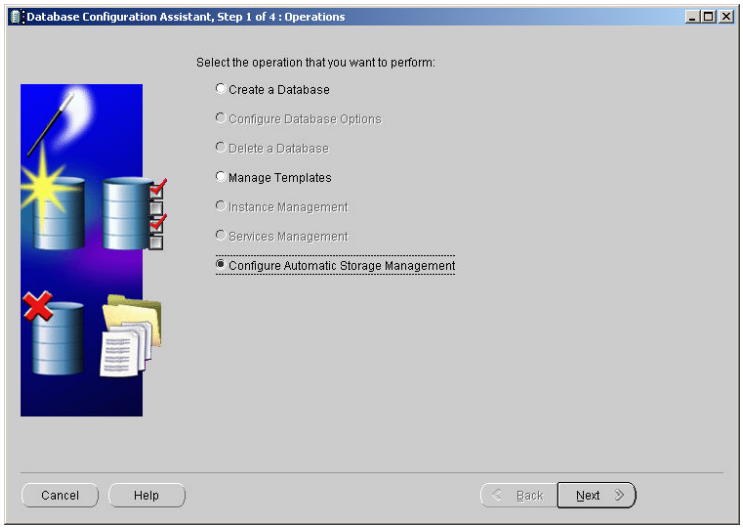
Click Next

Run dbca to create the ASM instances

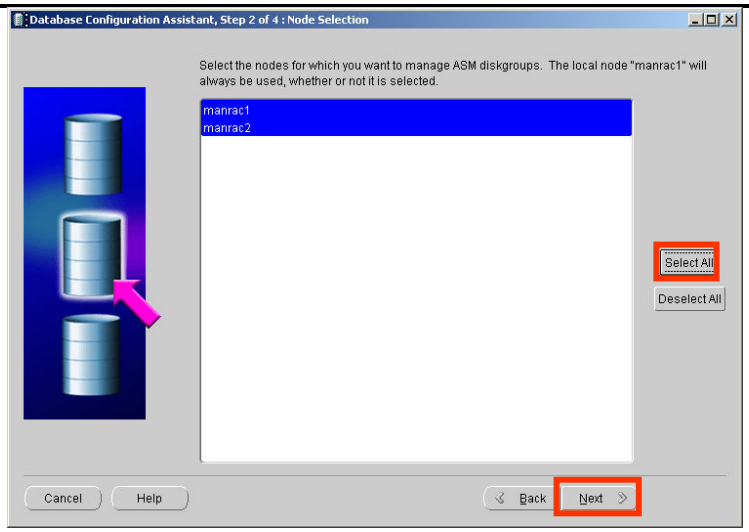
```
C:\oracle\product\10.2.0\asm_1\BIN>dbca
```



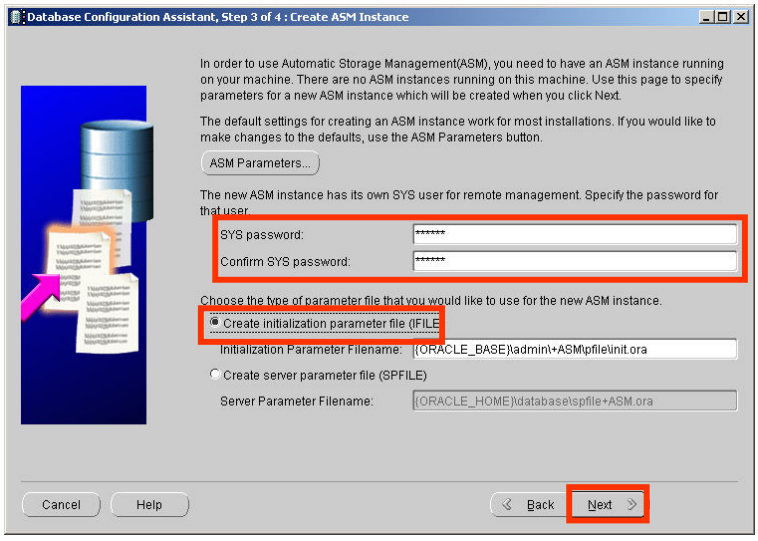
Select Oracle RAC database
Click Next



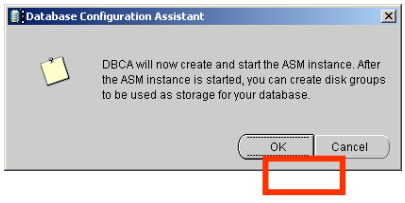
Select the configure ASM radio button
Click Next



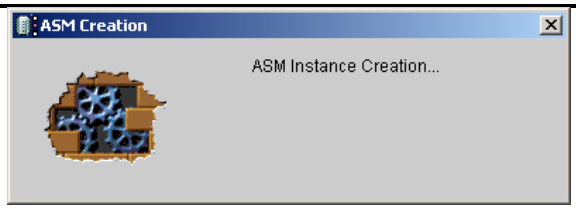
Click Select All
Click Next



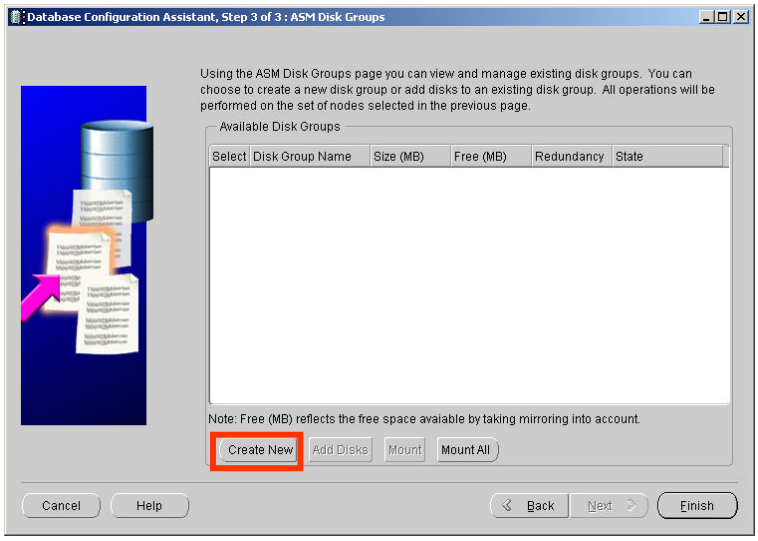
Enter 'oracle' for the sys password and confirm sys password fields
Select the IFILE radio button
Click Next



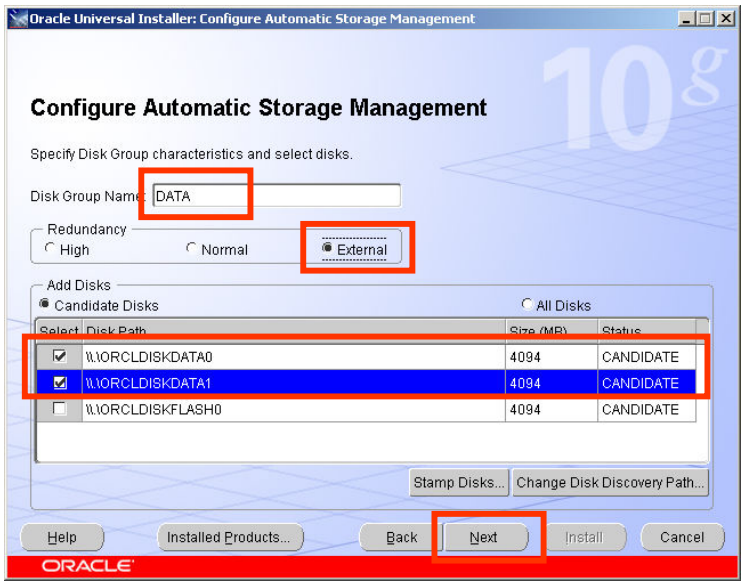
Click OK



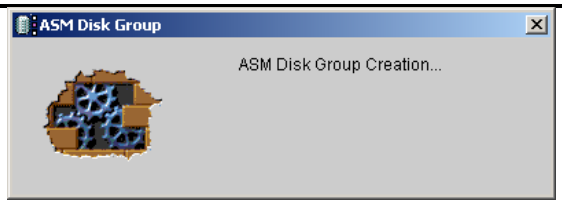
ASM creation will take a short while



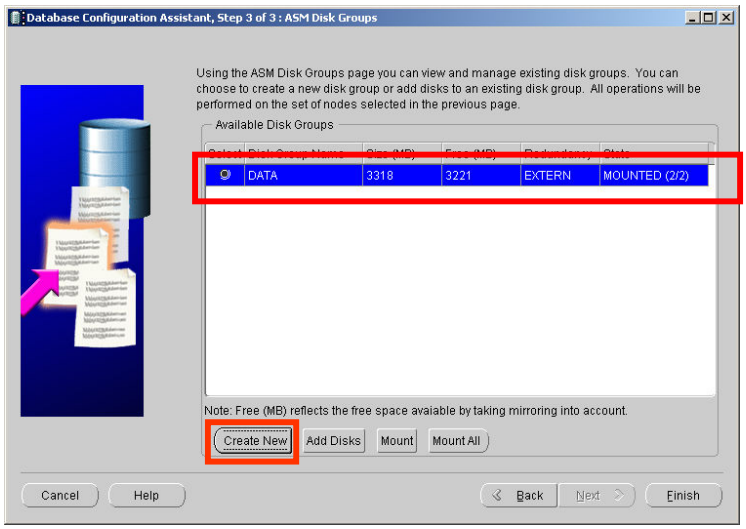
Now we get to create the ASM diskgroups
Click Create New



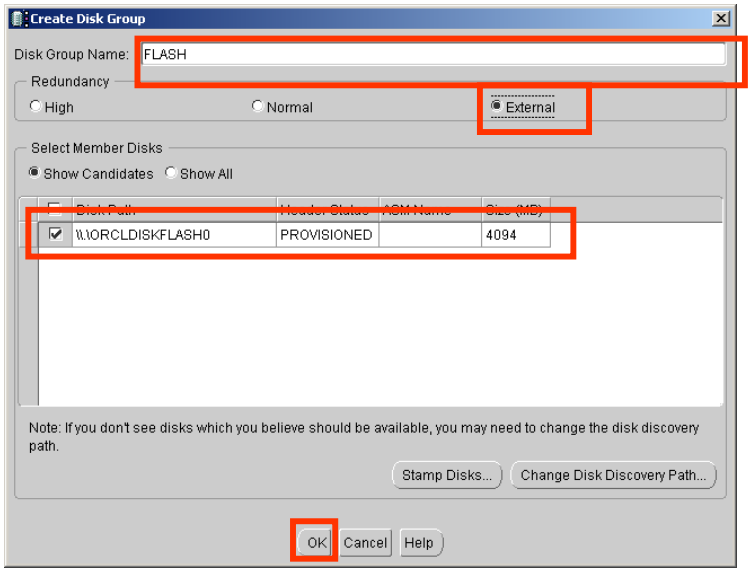
Enter 'DATA' for the Disk Group name
Select External Redundancy
Select the first 2 disks
Click Next



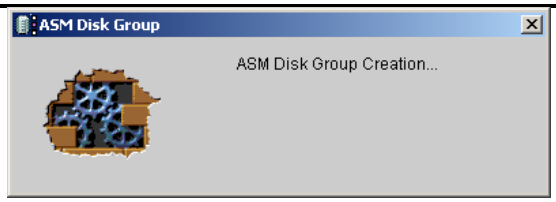
Creating the disk group takes a short while
DBCA then displays a list of the currently existing ASM diskgroups. Before we continue we need to create an additional disk group for the Flashback Area.



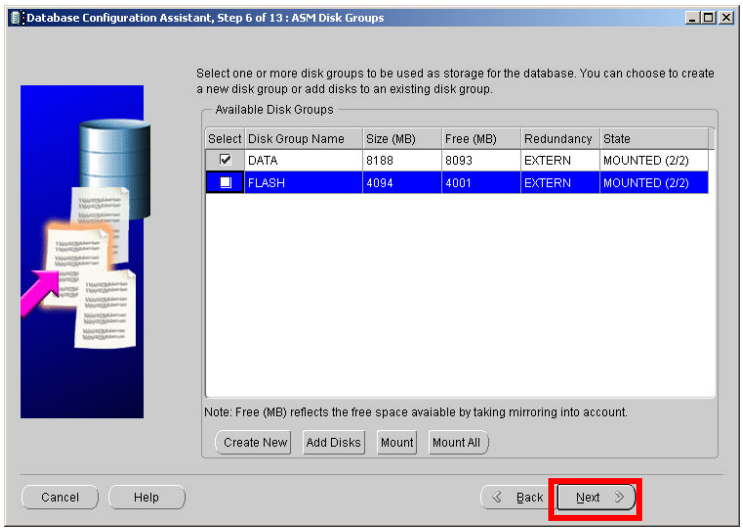
Click Create New



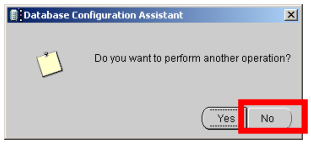
in the Disk group name field type FLASH
Select the Redundancy -> external radio button
check the box next to the name of the disk you wish to add to this diskgroup
Click OK



DBCA will now create the FLASH diskgroup



Click Next



Click No

We have now installed ASM and created the required ASM diskgroups

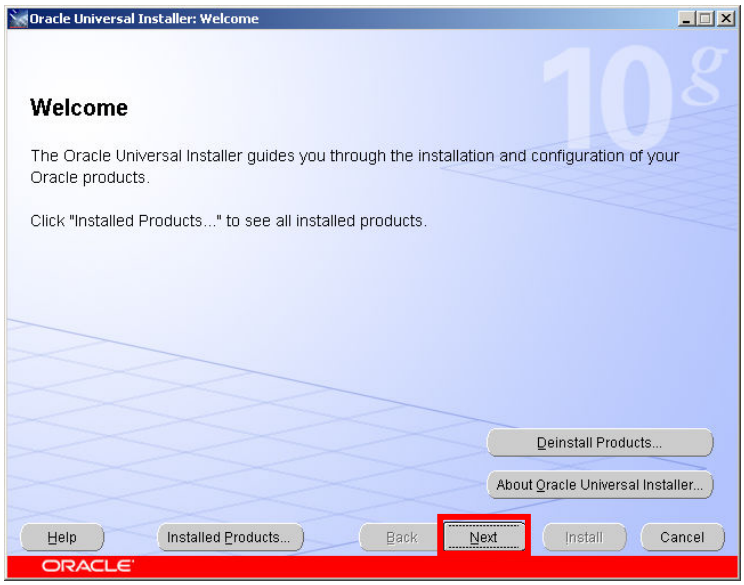
6. Install Oracle Database Home & Patch to the latest version

Next we will create the Oracle Home for the RAC database.

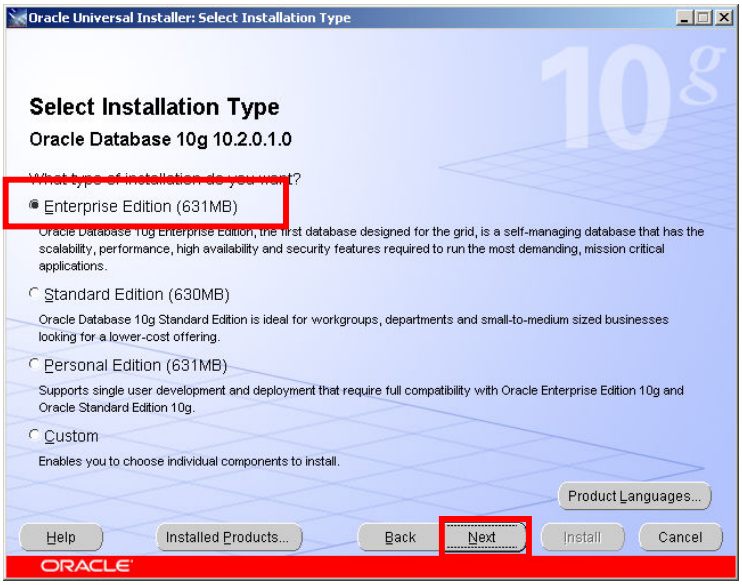
Install base 10.2.0.1 Release

The installer is invoked by running:

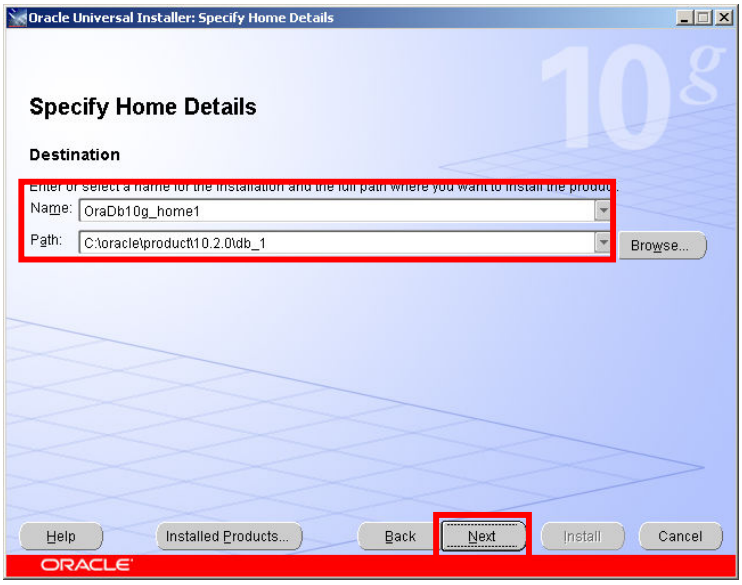
```
C:\stage\10gR2\database\setup.exe
```



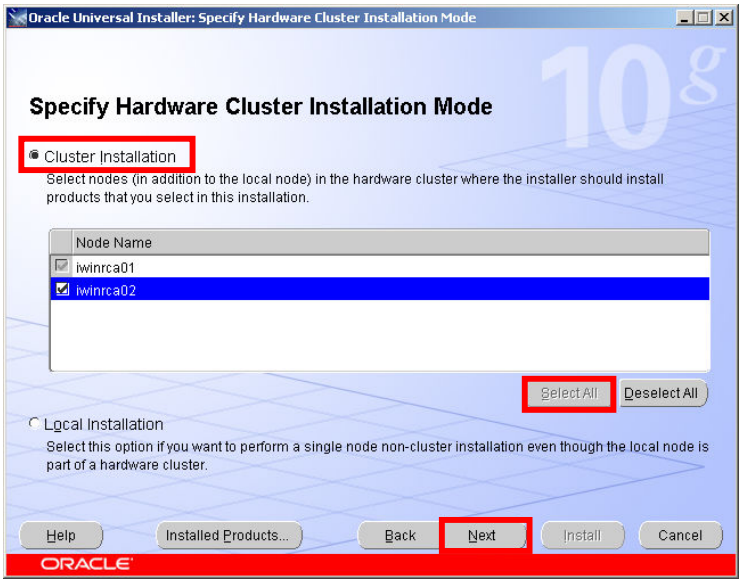
Click Next



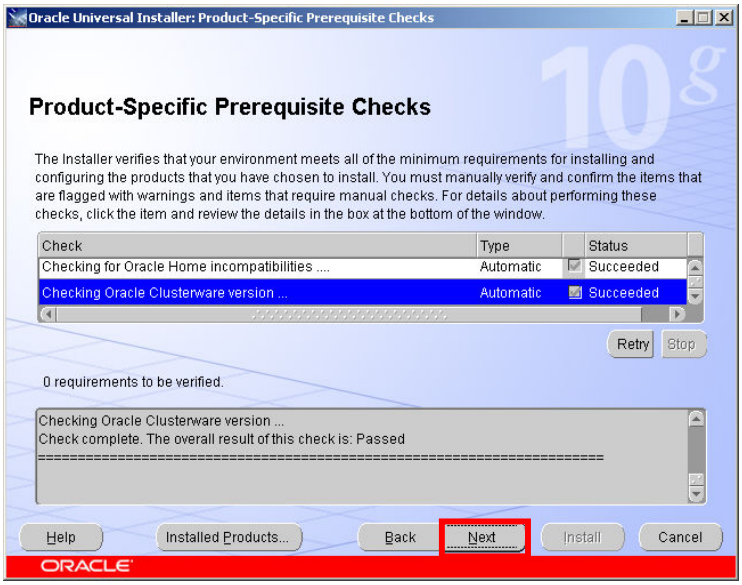
We are going to install an Oracle Home to host the RAC instances.
Select the Enterprise Edition radio button
Click Next



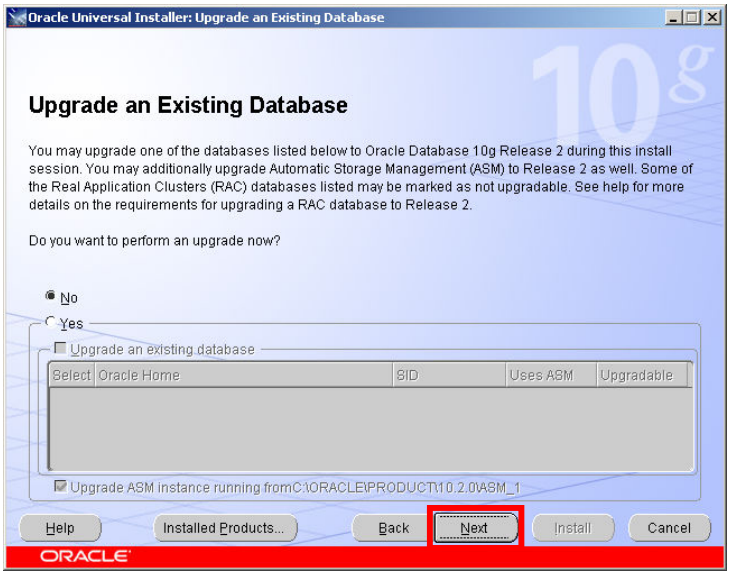
The DB home must be a different home than the Oracle Clusterware Home and, as installed here as separate homes for ASM and database, should be different to the ASM home
Enter a name for the home
Enter a location for the home
Click Next



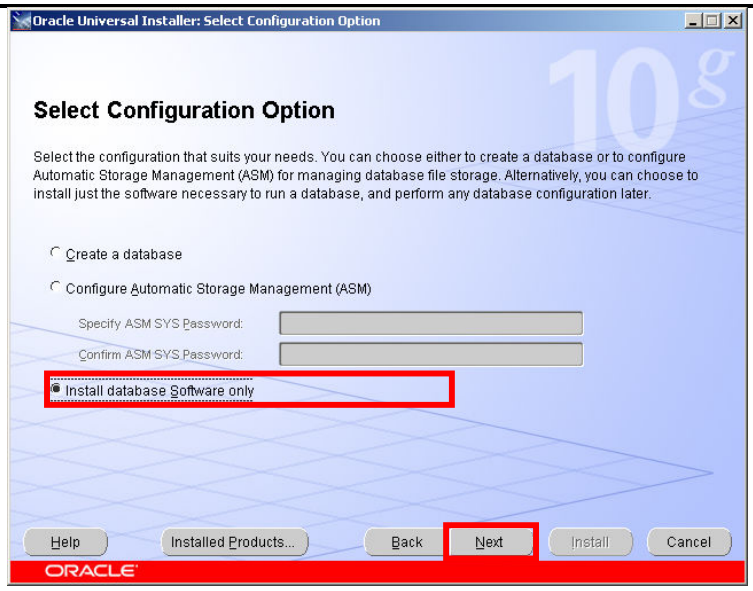
The Oracle Installer determines that the Oracle Clusterware layer is installed. It presents a list of all the nodes in the Oracle Cluster
Ensure the Cluster Installation radio button is selected
Click the Select All button
Click Next



The installer runs a series of checks on the environment. If you have successfully run the CVU at the beginning of this stage then this should be OK
Click Next

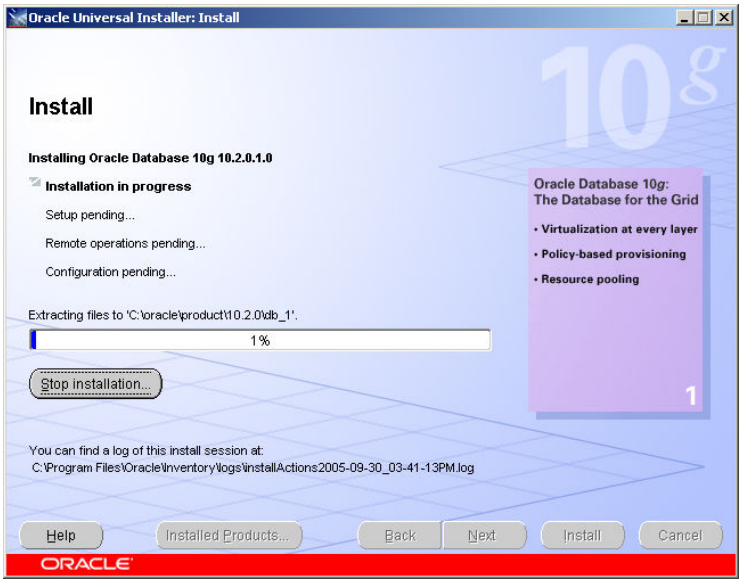


Click Next

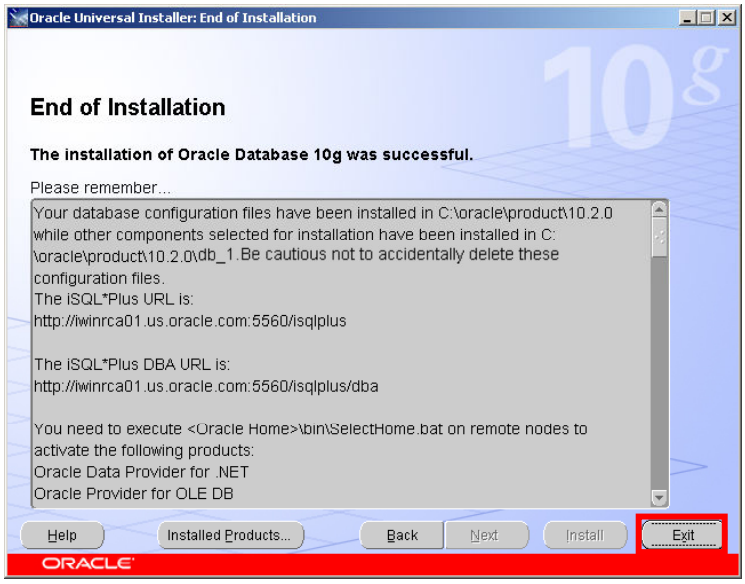


We will install the software first and then patch to the latest release before configuring the RAC Database in this new home
Select the Install database Software only button
Click Next

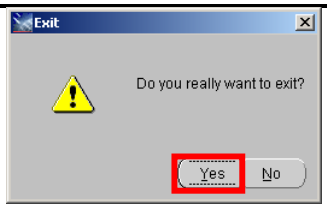
At the summary screen
Click Install



The Oracle RAC Database software for the RAC Database home is installed onto both nodes



At the end of the install a report screen is displayed
Click Exit



Click Yes

Congratulations The base 10.2.0.1 Oracle RAC Database Home has been installed successfully

Patching of the RAC Database Home

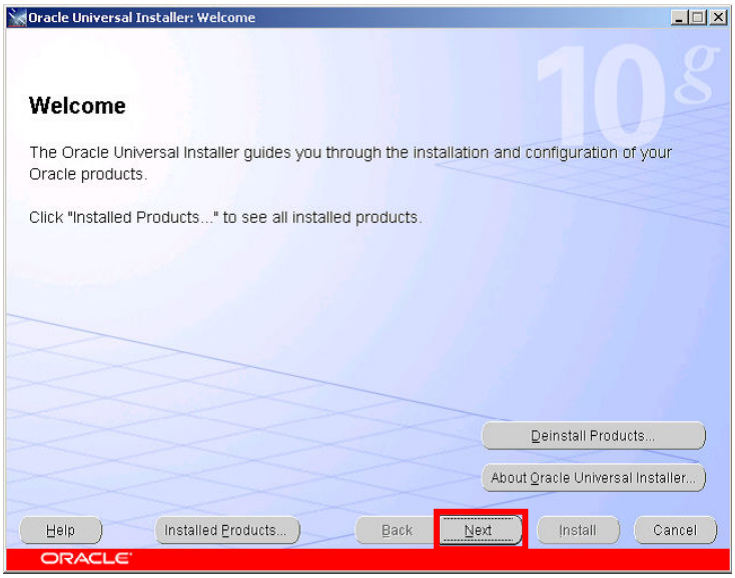
You should now patch the RAC Database home to the latest release levels

Install the Latest patch

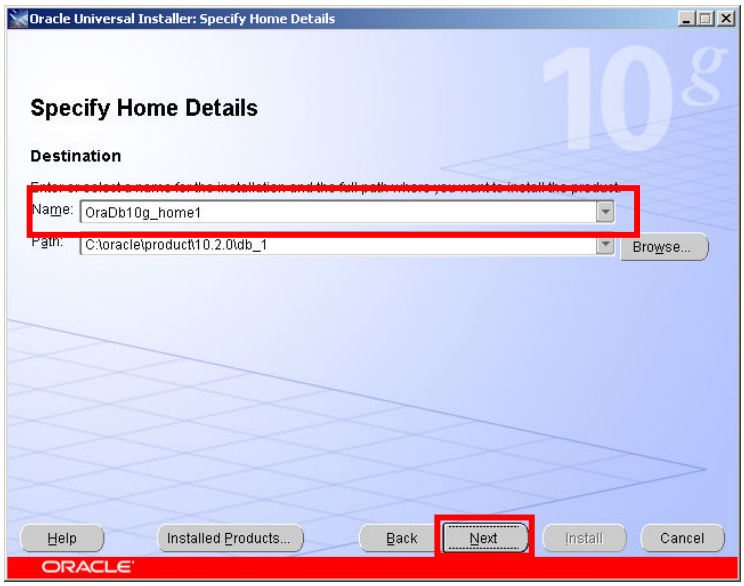
At the time of this document the latest patch for Oracle on Windows was 10.2.0.3, you should download that patch from Metalink and stage on node1The installer is invoked by running:

```
C:\stage\10203\Disk1\setup.exe
```

You will be presented with a welcome screen

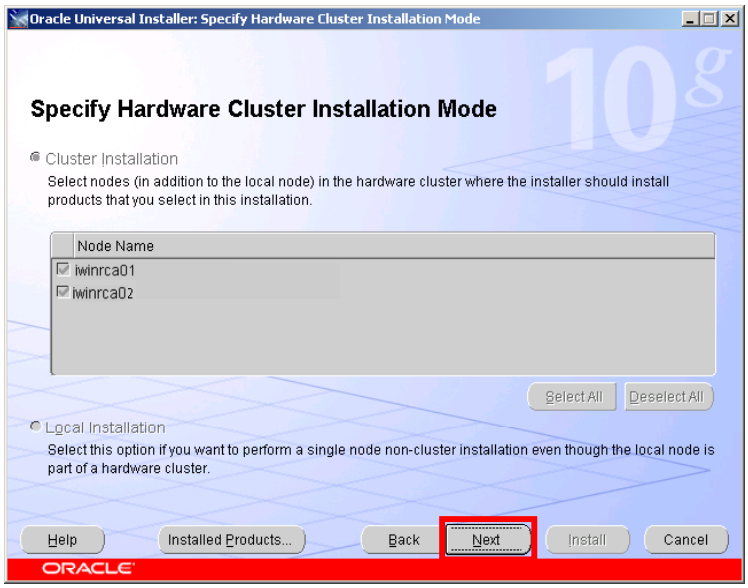


Click Next



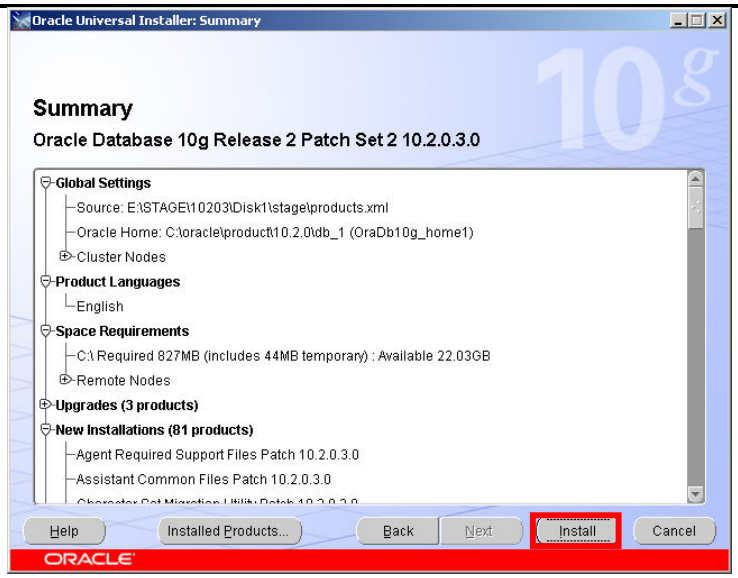
In the name Drop Down Listbox – ensure that the RAC Database home you just installed is selected. The Path should then show the directory for the RAC home

Click Next

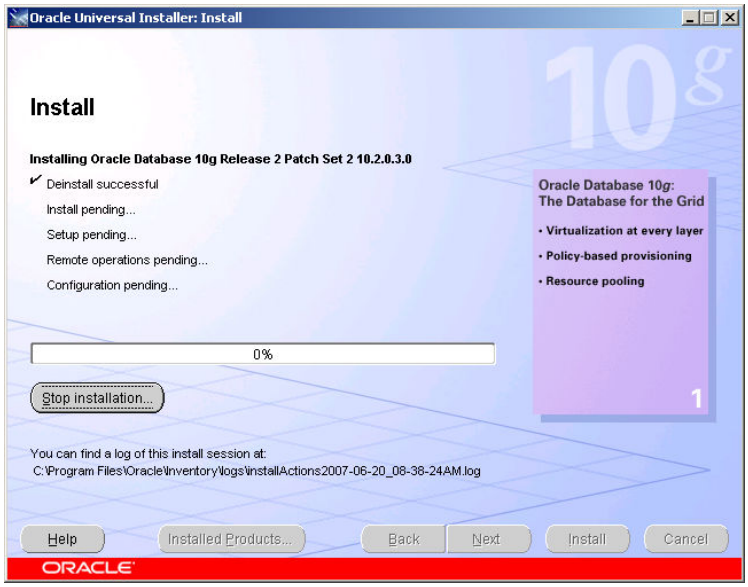


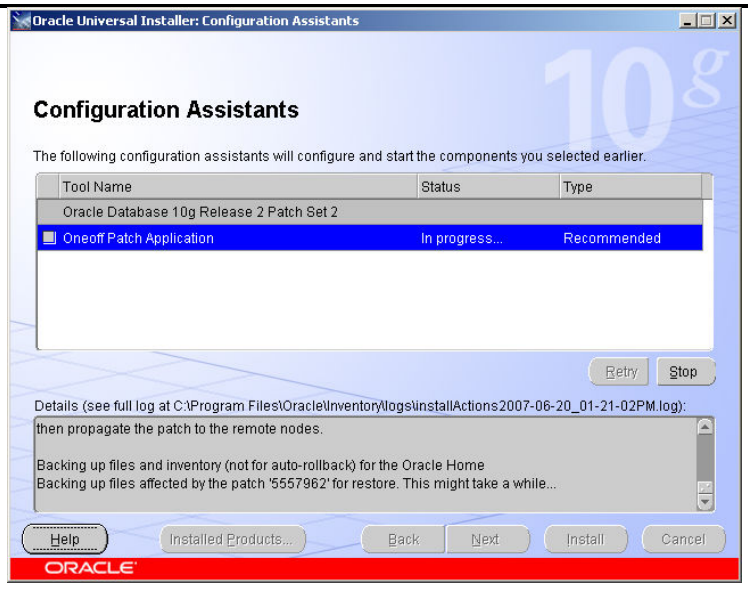
This screen lists the nodes in the cluster

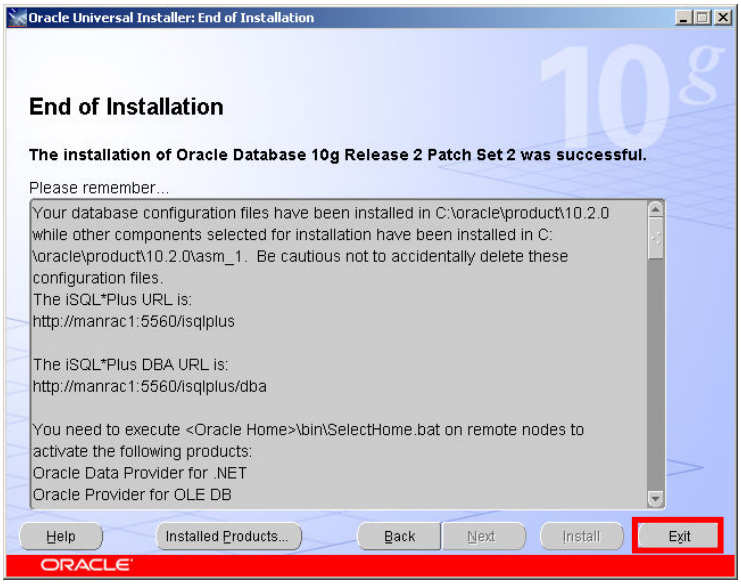
Click Next



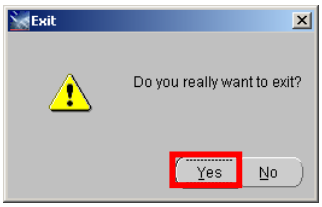
Click Install







At the end of the install a report screen is displayed
Click Exit



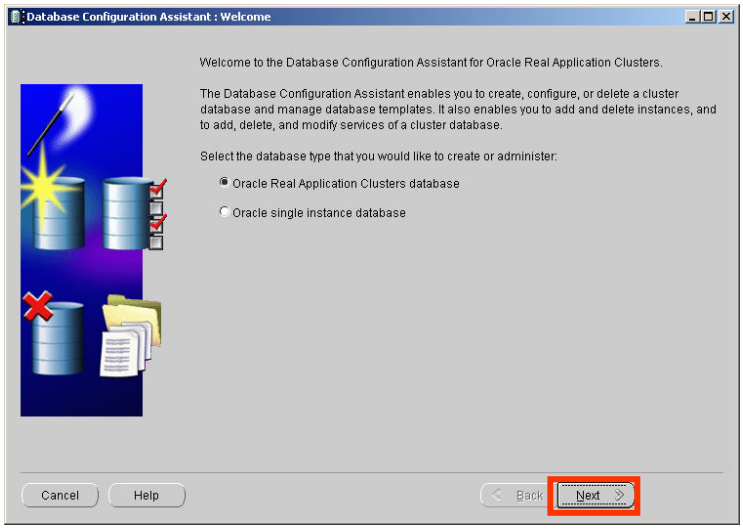
Click Yes

You can optionally now apply the latest bundle patch on top of 10.2.0.3

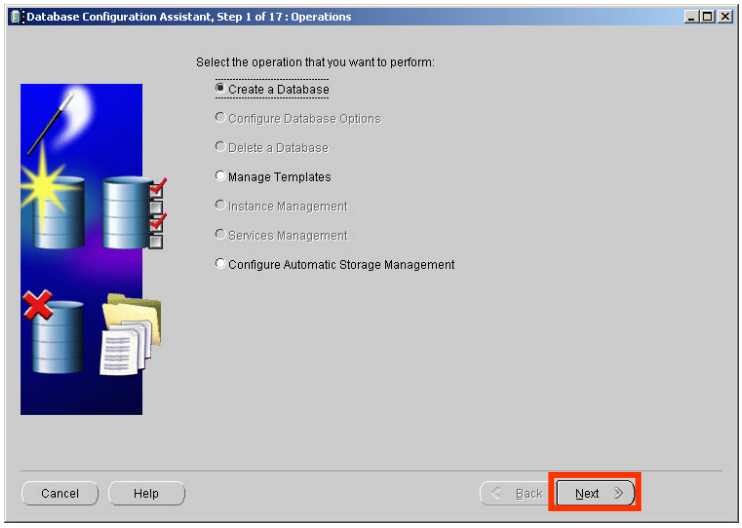
7. Create RAC Database using dbca

Run dbca to create the RAC Database instances

```
C:\oracle\product\10.2.0\db_1\BIN>dbca
```

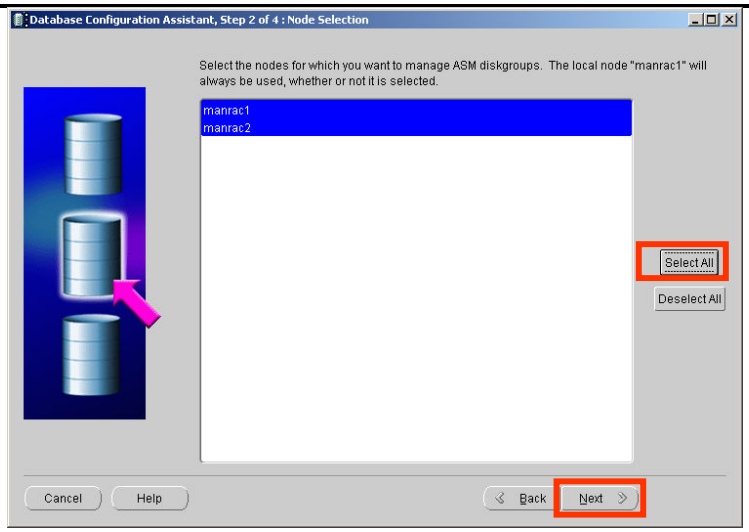


Click Next



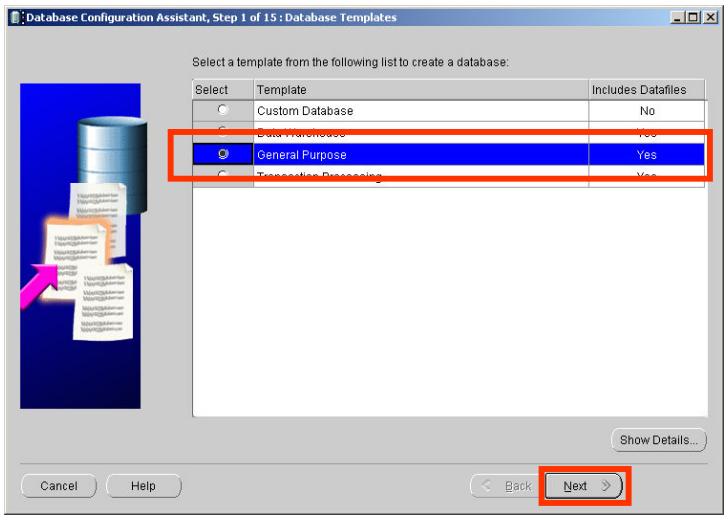
Select the Create a Database Radio Button

Click Next

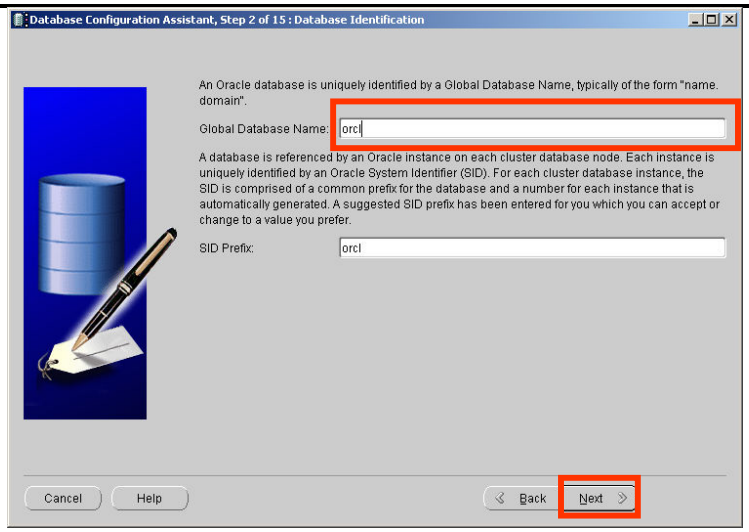


Click Select All

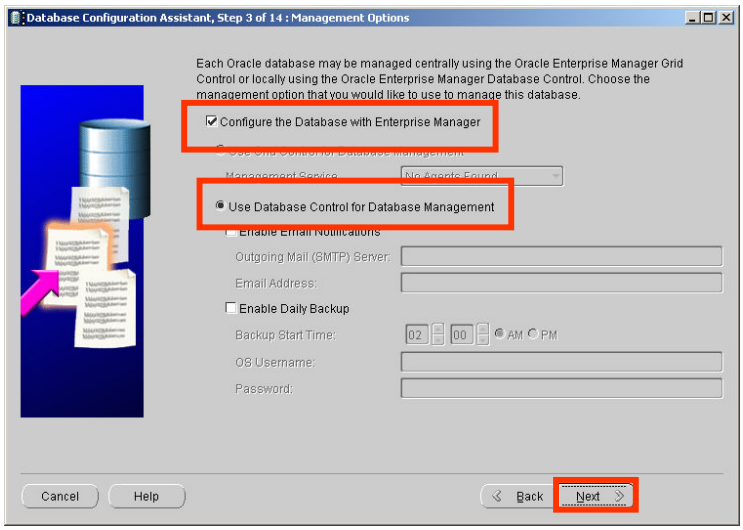
Click Next



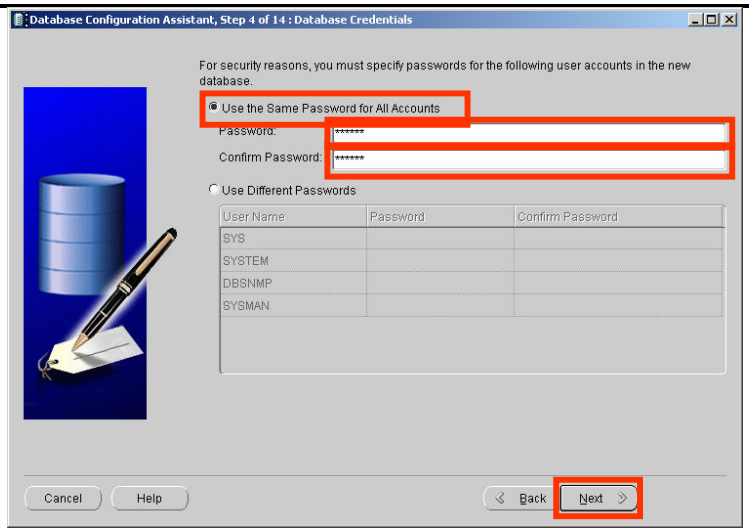
The assistant then asks which type of database you require
Select the General Purpose radio button
Click Next



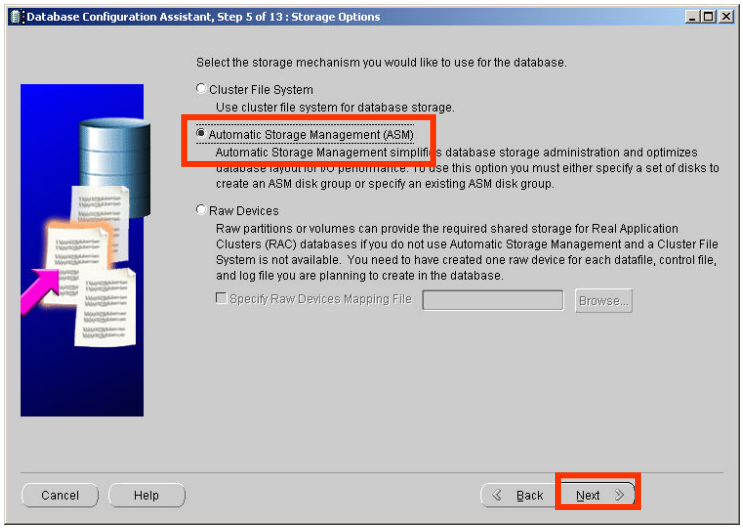
The database requires a global name and a SID prefix
In the Global Database name field type orcl
The dbca will auto fill the SID prefix field with the same value
Click Next



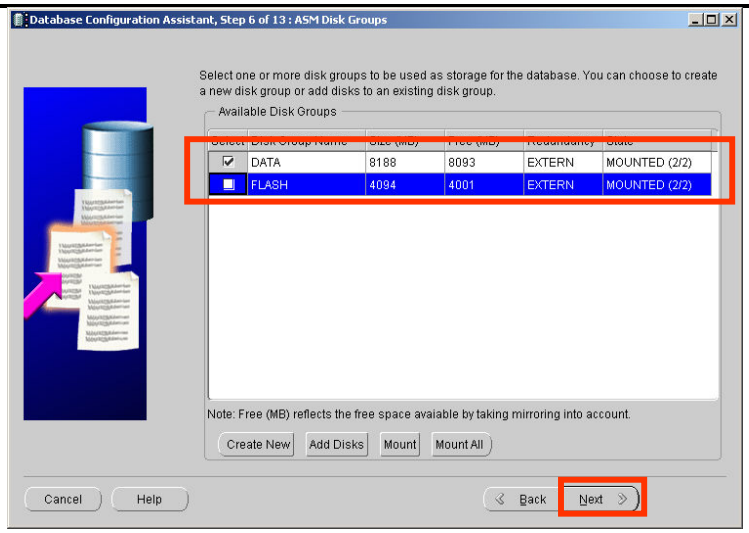
DBCA now needs to know how you will manage the database
Check the Configure the Database with Enterprise Manager checkbox
And
Select the Use Database Control for Database Management radio button
Click Next



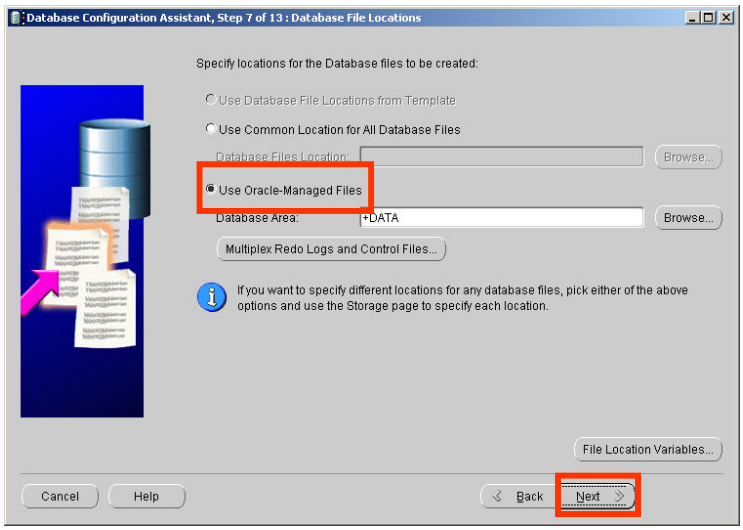
Select the Use the same password for all accounts radio button
In the password field type 'oracle'
In the confirm password field type 'oracle'
Click Next



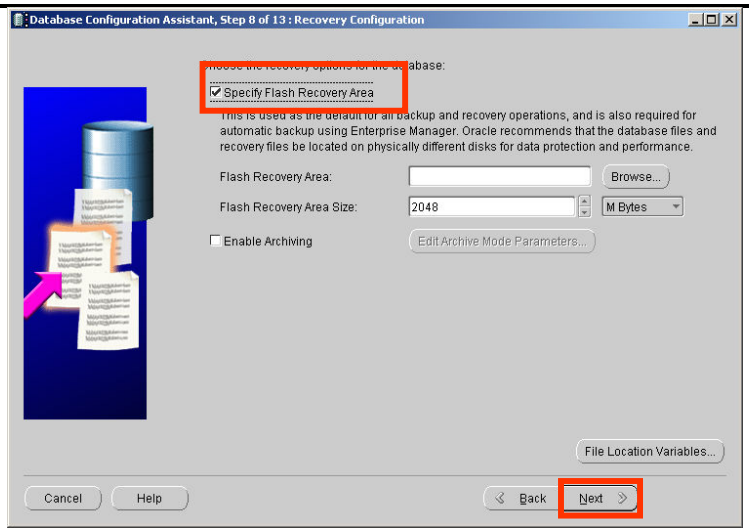
We are going to use ASM to store the datafiles for this RAC database
Select the Automatic Storage Management radio button
Click Next



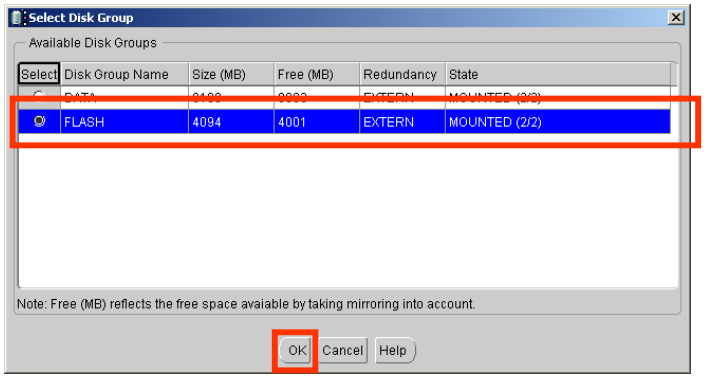
IMPORTANT make sure you check the DATA diskgroup and uncheck the FLASH diskgroup
Click Next



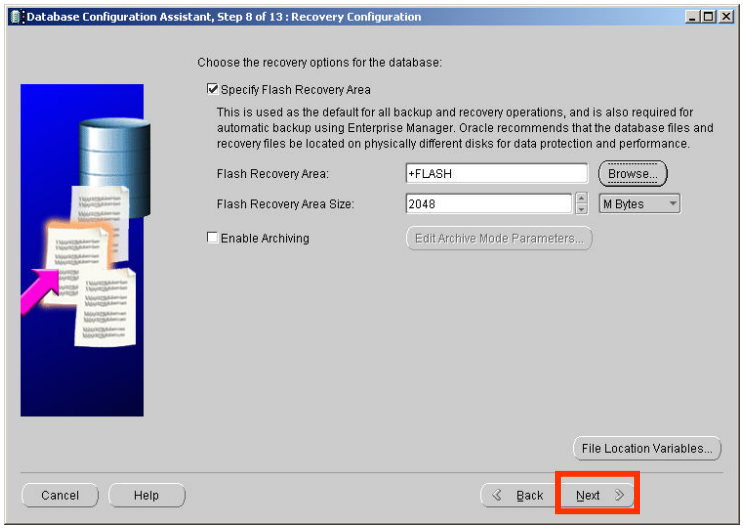
We will use Oracle Managed files for the filenames in this database
Select the Use Oracle managed Files radio button
Click Next



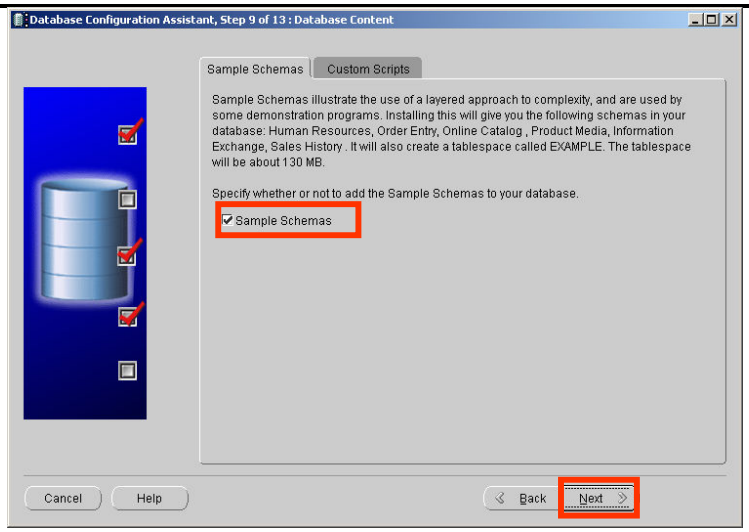
We are going to set up a flash recovery area for this RAC database
Check the Specify Flash Recovery Area check box
Click the Browse button next to the Flash Recovery Area edit box



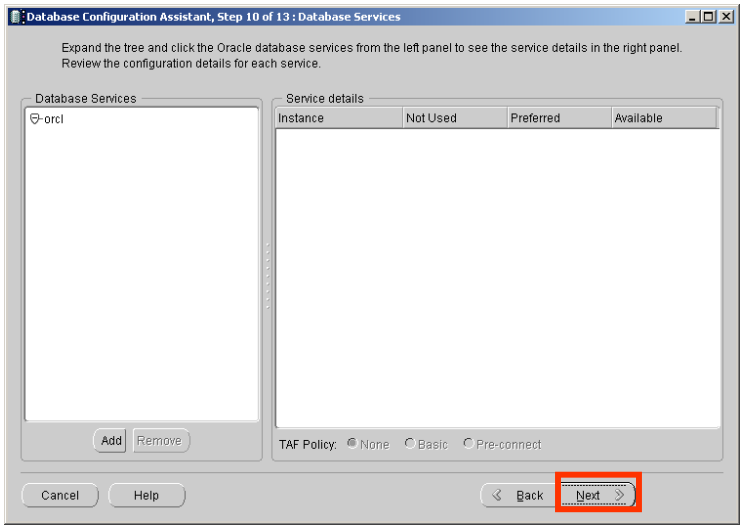
Select the radio button next to the FLASH diskgroup
Click OK



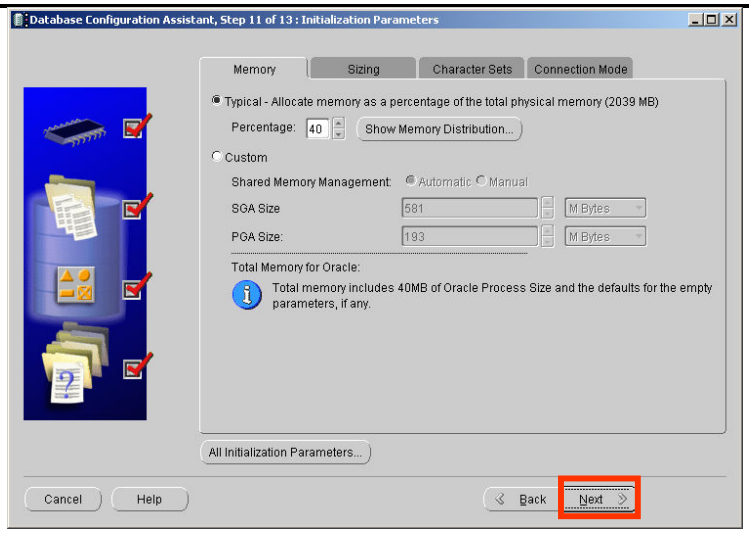
Click Next



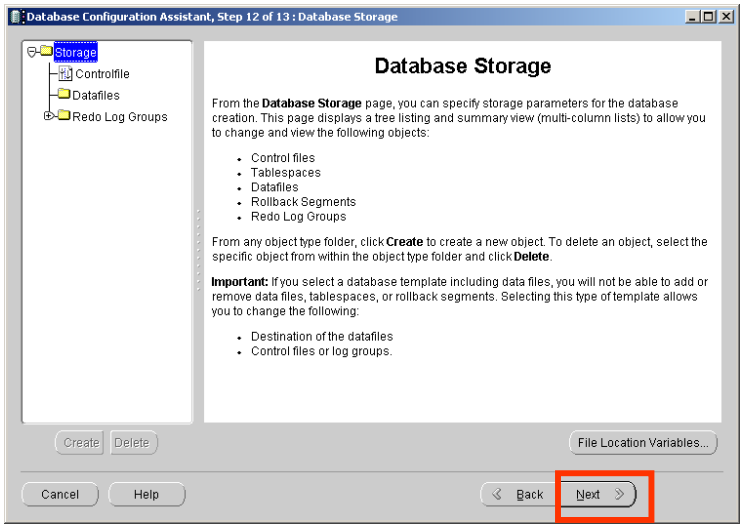
We will add the Sample Schemas to this database
Check the Sample Schemas checkbox
Click Next



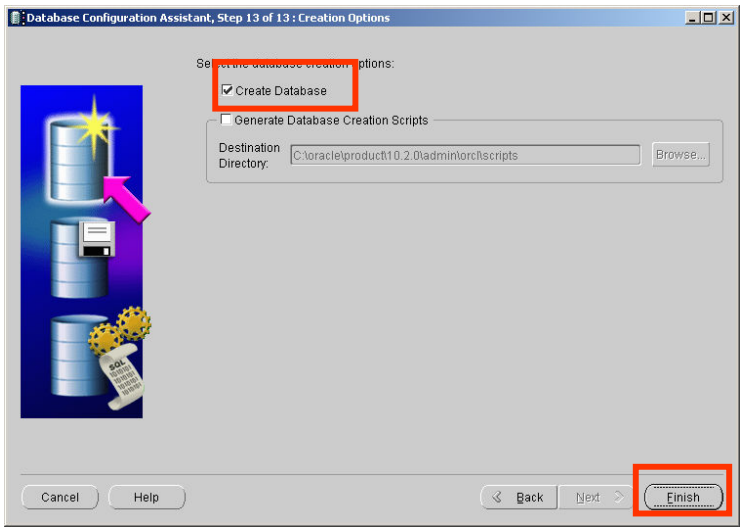
We will not create any additional services at this point in time
Click Next



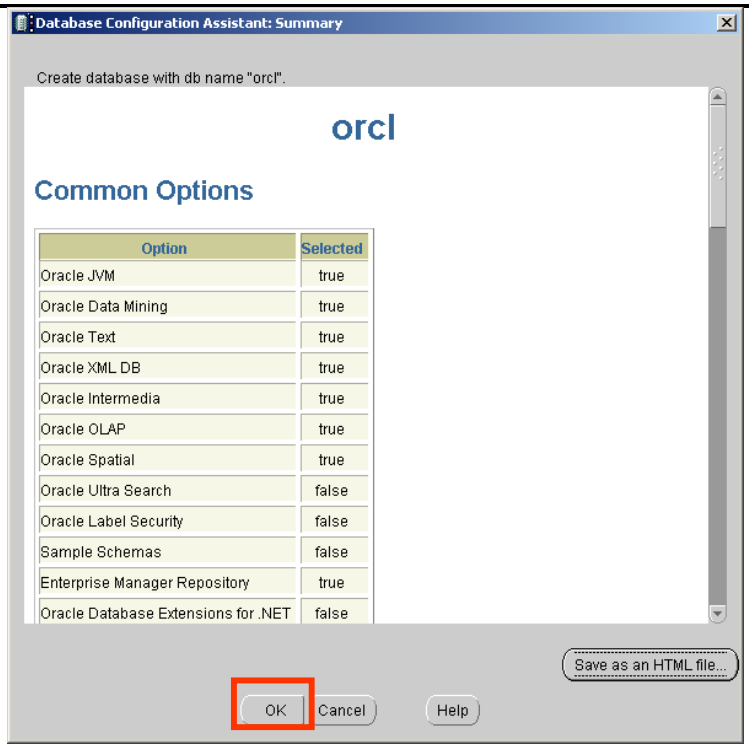
We will accept the defaults for the database memory
Click Next



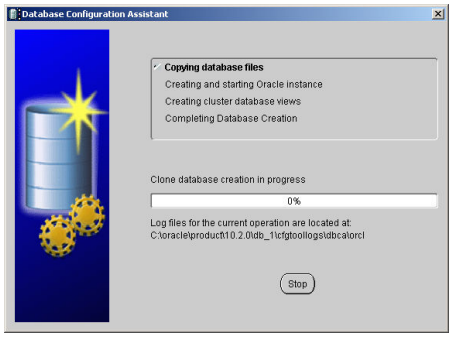
We will accept the defaults for the datafile locations
Click Next



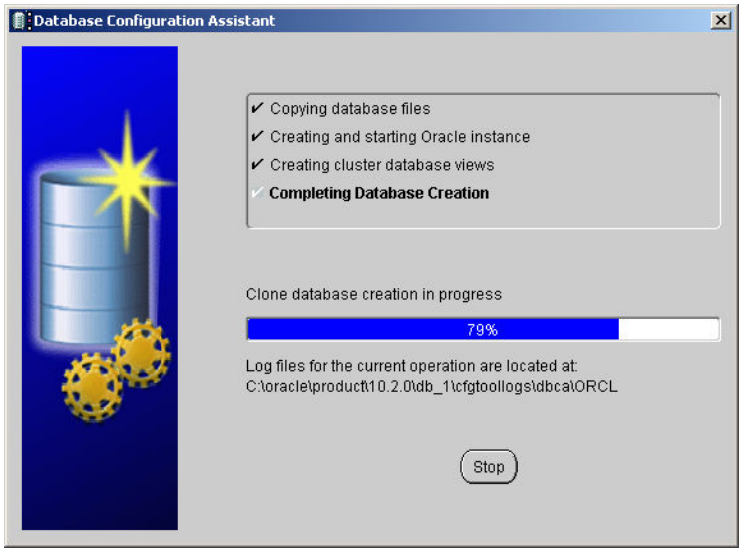
Ensure the Create Database checkbox is selected
Click Finish



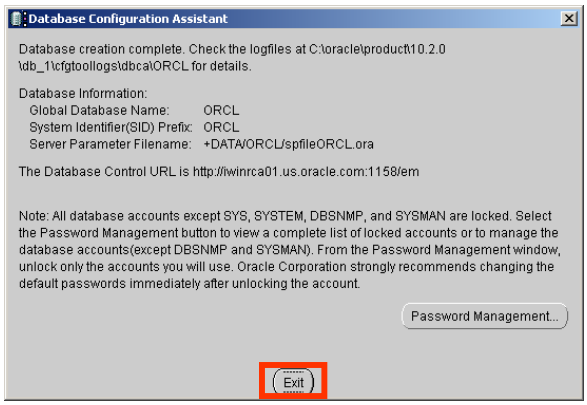
A screen confirming the options is displayed
Click OK



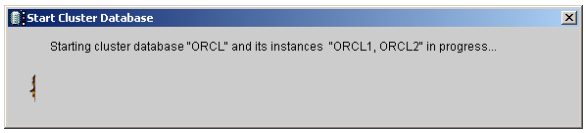
DBCA will now create the RAC database



A progress screen is displayed

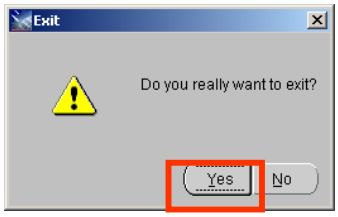


After the database is created a confirmation screen is displayed
Click Exit



DBCA then starts both of the instances on the cluster

On completion a summary screen is displayed
Click Exit



At the confirmation Dialog click Yes

Your RAC database install is complete

8. Appendix A Troubleshooting Setup

If you have run the CVU and it has returned an error in the post hwos stage

Re-run the cluvfy command in verbose mode

```
C:>runcluvfy stage -post hwos -n iwinrca01,iwinrca02 -verbose
The system cannot find the file specified.

Performing post-checks for hardware and operating system setup

Checking node reachability...
Check: Node reachability from node "iwinrca01"
  Destination Node                      Reachable?
  ------------------------------------  ------------------------
  iwinrca01                             yes
  iwinrca02                             yes
Result: Node reachability check passed from node "iwinrca01".


Checking user equivalence...
Check: User equivalence for user "Administrator"
  Node Name                             Comment
  ------------------------------------  ------------------------
  iwinrca02                             passed
  iwinrca01                             passed
Result: User equivalence check passed for user "Administrator".

Checking node connectivity...

Interface information for node "iwinrca02"
  Interface Name                  IP Address                      Subnet
  ------------------------------  ------------------------------  ----------
  Local Area Connection           139.185.150.55                  139.185.150.0
  Local Area Connection 2         10.10.10.3                      10.10.10.0


Interface information for node "iwinrca01"
  Interface Name                  IP Address                      Subnet
  ------------------------------  ------------------------------  ----------
  Local Area Connection           139.185.150.54                  139.185.150.0
  Local Area Connection 2         10.10.10.2                      10.10.10.0


Check: Node connectivity of subnet "139.185.150.0"
  Source                          Destination                     Connected?
  ------------------------------  ------------------------------  ----------
  iwinrca02:Local Area Connection  iwinrca02:Local Area Connection  yes
  iwinrca02:Local Area Connection  iwinrca01:Local Area Connection  yes
  iwinrca02:Local Area Connection  iwinrca01:Local Area Connection  yes
  iwinrca02:Local Area Connection  iwinrca01:Local Area Connection  yes
  iwinrca02:Local Area Connection  iwinrca01:Local Area Connection  yes
  iwinrca01:Local Area Connection  iwinrca01:Local Area Connection  yes
Result: Node connectivity check passed for subnet "139.185.150.0" with node(s)
iwinrca02,iwinrca01.

Check: Node connectivity of subnet "10.10.10.0"
  Source                          Destination                     Connected?
  ------------------------------  ------------------------------  ----------
  iwinrca02:Local Area Connection 2  iwinrca01:Local Area Connection 2  yes
Result: Node connectivity check passed for subnet "10.10.10.0" with node(s)
iwinrca02,iwinrca01.

Suitable interfaces for VIP on subnet "139.185.150.0":
iwinrca02 Local Area Connection:139.185.150.202 Local Area
Connection:139.185.150.55
iwinrca01 Local Area Connection:139.185.150.201 Local Area
Connection:139.185.150.54

Suitable interfaces for the private interconnect on subnet "10.10.10.0":
iwinrca02 Local Area Connection 2:10.10.10.3
```

Check 1

Check 2

Check 3

```
iwinrca01 Local Area Connection 2:10.10.10.2

Result: Node connectivity check passed.
```

Check 4

```
Checking shared storage accessibility...

  Disk Partition                       Sharing Nodes (2 in count)
  -----------------------------------  ------------------------
  \Device\Harddisk1\Partition1         iwinrca02 iwinrca01

  Disk Partition                       Sharing Nodes (2 in count)
  -----------------------------------  ------------------------
  \Device\Harddisk1\Partition2         iwinrca02 iwinrca01

  Disk Partition                       Sharing Nodes (2 in count)
  -----------------------------------  ------------------------
  \Device\Harddisk1\Partition3         iwinrca02 iwinrca01

  Disk Partition                       Sharing Nodes (2 in count)
  -----------------------------------  ------------------------
  \Device\Harddisk1\Partition4         iwinrca02 iwinrca01

  Disk Partition                       Sharing Nodes (2 in count)
  -----------------------------------  ------------------------
  \Device\Harddisk1\Partition5         iwinrca02 iwinrca01


Shared storage check was successful on nodes "iwinrca02,iwinrca01".

Post-check for hardware and operating system setup was successful.
```

If you have access to Oracle Metalink http://metalink.oracle.com then the following notes might assist in networking issue : 338924.1 and Note# 316583.1

9. Appendix B Post Oracle Clusterware Install: Oracle Cluster Registry Information

After the Oracle Clusterware has been installed the following resources will have been configured to be managed by Oracle Clusterware. If you have access to Oracle Metalink http://metalink.oracle.com then a new crs_stat script is available: 436067.1

```
C:\oracle\product\10.2.0\crs\BIN>crs_stat -t -v
Name           Type           R/RA   F/FT   Target    State     Host
----------------------------------------------------------------------
ora....a01.gsd application    0/5    0/0    ONLINE    ONLINE    iwinrca01
ora....a01.ons application    0/3    0/0    ONLINE    ONLINE    iwinrca01
ora....a01.vip application    0/0    0/0    ONLINE    ONLINE    iwinrca01
ora....a02.gsd application    0/5    0/0    ONLINE    ONLINE    iwinrca02
ora....a02.ons application    0/3    0/0    ONLINE    ONLINE    iwinrca02
ora....a02.vip application    0/0    0/0    ONLINE    ONLINE    iwinrca02
```

The Oracle Clusterware definition of the 6 resources added as part of the Oracle Clusterware install is as follows:

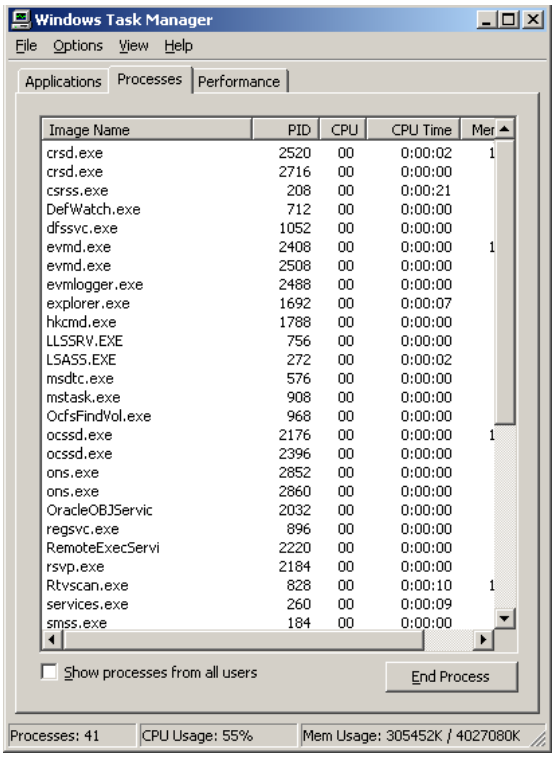
```
NAME=ora.iwinrca01.gsd
TYPE=application
ACTION_SCRIPT=C:\oracle\product\10.2.0\crs\bin\racgwrap.bat
ACTIVE_PLACEMENT=0
AUTO_START=1
CHECK_INTERVAL=600
DESCRIPTION=CRS application for GSD on node
FAILOVER_DELAY=0
FAILURE_INTERVAL=0
FAILURE_THRESHOLD=0
HOSTING_MEMBERS=iwinrca01
OPTIONAL_RESOURCES=
PLACEMENT=restricted
REQUIRED_RESOURCES=
RESTART_ATTEMPTS=5
SCRIPT_TIMEOUT=600
START_TIMEOUT=0
STOP_TIMEOUT=0
UPTIME_THRESHOLD=7d
USR_ORA_ALERT_NAME=
USR_ORA_CHECK_TIMEOUT=0
USR_ORA_CONNECT_STR=/ as sysdba
USR_ORA_DEBUG=0
USR_ORA_DISCONNECT=false
USR_ORA_FLAGS=
USR_ORA_IF=
USR_ORA_INST_NOT_SHUTDOWN=
USR_ORA_LANG=
USR_ORA_NETMASK=
USR_ORA_OPEN_MODE=
USR_ORA_OPI=false
USR_ORA_PFILE=
USR_ORA_PRECONNECT=none
USR_ORA_SRV=
USR_ORA_START_TIMEOUT=0
USR_ORA_STOP_MODE=immediate
USR_ORA_STOP_TIMEOUT=0
USR_ORA_VIP=

NAME=ora.iwinrca01.ons
TYPE=application
ACTION_SCRIPT=C:\oracle\product\10.2.0\crs\bin\racgwrap.bat
ACTIVE_PLACEMENT=0
AUTO_START=1
CHECK_INTERVAL=600
DESCRIPTION=CRS application for ONS on node
FAILOVER_DELAY=0
FAILURE_INTERVAL=0
FAILURE_THRESHOLD=0
HOSTING_MEMBERS=iwinrca01
OPTIONAL_RESOURCES=
PLACEMENT=restricted
REQUIRED_RESOURCES=
RESTART_ATTEMPTS=3
```

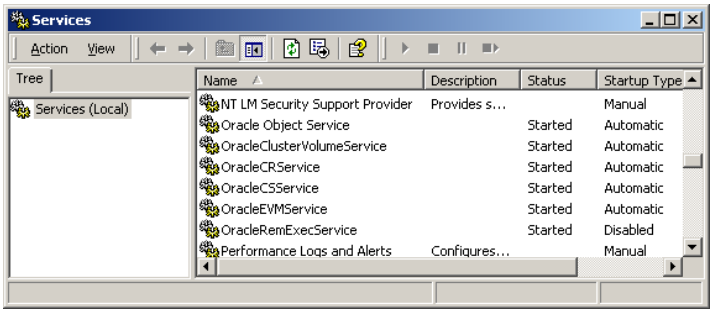
```
SCRIPT_TIMEOUT=600
START_TIMEOUT=0
STOP_TIMEOUT=0
UPTIME_THRESHOLD=7d
USR_ORA_ALERT_NAME=
USR_ORA_CHECK_TIMEOUT=0
USR_ORA_CONNECT_STR=/ as sysdba
USR_ORA_DEBUG=0
USR_ORA_DISCONNECT=false
USR_ORA_FLAGS=
USR_ORA_IF=
USR_ORA_INST_NOT_SHUTDOWN=
USR_ORA_LANG=
USR_ORA_NETMASK=
USR_ORA_OPEN_MODE=
USR_ORA_OPI=false
USR_ORA_PFILE=
USR_ORA_PRECONNECT=none
USR_ORA_SRV=
USR_ORA_START_TIMEOUT=0
USR_ORA_STOP_MODE=immediate
USR_ORA_STOP_TIMEOUT=0
USR_ORA_VIP=

NAME=ora.iwinrca01.vip
TYPE=application
ACTION_SCRIPT=C:\oracle\product\10.2.0\crs\bin\racgwrap.bat
ACTIVE_PLACEMENT=1
AUTO_START=1
CHECK_INTERVAL=60
DESCRIPTION=CRS application for VIP on a node
FAILOVER_DELAY=0
FAILURE_INTERVAL=0
FAILURE_THRESHOLD=0
HOSTING_MEMBERS=iwinrca01
OPTIONAL_RESOURCES=
PLACEMENT=favored
REQUIRED_RESOURCES=
RESTART_ATTEMPTS=0
SCRIPT_TIMEOUT=60
START_TIMEOUT=0
STOP_TIMEOUT=0
UPTIME_THRESHOLD=7d
USR_ORA_ALERT_NAME=
USR_ORA_CHECK_TIMEOUT=0
USR_ORA_CONNECT_STR=/ as sysdba
USR_ORA_DEBUG=0
USR_ORA_DISCONNECT=false
USR_ORA_FLAGS=
USR_ORA_IF=Local Area Connection
USR_ORA_INST_NOT_SHUTDOWN=
USR_ORA_LANG=
USR_ORA_NETMASK=255.255.255.0
USR_ORA_OPEN_MODE=
USR_ORA_OPI=false
USR_ORA_PFILE=
USR_ORA_PRECONNECT=none
USR_ORA_SRV=
USR_ORA_START_TIMEOUT=0
USR_ORA_STOP_MODE=immediate
USR_ORA_STOP_TIMEOUT=0
USR_ORA_VIP=139.185.150.201

NAME=ora.iwinrca02.gsd
TYPE=application
ACTION_SCRIPT=C:\oracle\product\10.2.0\crs\bin\racgwrap.bat
ACTIVE_PLACEMENT=0
AUTO_START=1
CHECK_INTERVAL=600
DESCRIPTION=CRS application for GSD on node
FAILOVER_DELAY=0
FAILURE_INTERVAL=0
FAILURE_THRESHOLD=0
HOSTING_MEMBERS=iwinrca02
OPTIONAL_RESOURCES=
PLACEMENT=restricted
REQUIRED_RESOURCES=
RESTART_ATTEMPTS=5
SCRIPT_TIMEOUT=600
START_TIMEOUT=0
STOP_TIMEOUT=0
```

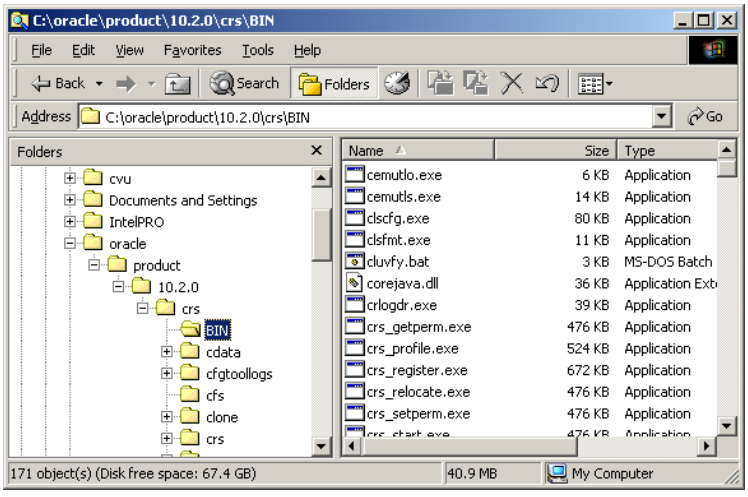
```
UPTIME_THRESHOLD=7d
USR_ORA_ALERT_NAME=
USR_ORA_CHECK_TIMEOUT=0
USR_ORA_CONNECT_STR=/ as sysdba
USR_ORA_DEBUG=0
USR_ORA_DISCONNECT=false
USR_ORA_FLAGS=
USR_ORA_IF=
USR_ORA_INST_NOT_SHUTDOWN=
USR_ORA_LANG=
USR_ORA_NETMASK=
USR_ORA_OPEN_MODE=
USR_ORA_OPI=false
USR_ORA_PFILE=
USR_ORA_PRECONNECT=none
USR_ORA_SRV=
USR_ORA_START_TIMEOUT=0
USR_ORA_STOP_MODE=immediate
USR_ORA_STOP_TIMEOUT=0
USR_ORA_VIP=

NAME=ora.iwinrca02.ons
TYPE=application
ACTION_SCRIPT=C:\oracle\product\10.2.0\crs\bin\racgwrap.bat
ACTIVE_PLACEMENT=0
AUTO_START=1
CHECK_INTERVAL=600
DESCRIPTION=CRS application for ONS on node
FAILOVER_DELAY=0
FAILURE_INTERVAL=0
FAILURE_THRESHOLD=0
HOSTING_MEMBERS=iwinrca02
OPTIONAL_RESOURCES=
PLACEMENT=restricted
REQUIRED_RESOURCES=
RESTART_ATTEMPTS=3
SCRIPT_TIMEOUT=600
START_TIMEOUT=0
STOP_TIMEOUT=0
UPTIME_THRESHOLD=7d
USR_ORA_ALERT_NAME=
USR_ORA_CHECK_TIMEOUT=0
USR_ORA_CONNECT_STR=/ as sysdba
USR_ORA_DEBUG=0
USR_ORA_DISCONNECT=false
USR_ORA_FLAGS=
USR_ORA_IF=
USR_ORA_INST_NOT_SHUTDOWN=
USR_ORA_LANG=
USR_ORA_NETMASK=
USR_ORA_OPEN_MODE=
USR_ORA_OPI=false
USR_ORA_PFILE=
USR_ORA_PRECONNECT=none
USR_ORA_SRV=
USR_ORA_START_TIMEOUT=0
USR_ORA_STOP_MODE=immediate
USR_ORA_STOP_TIMEOUT=0
USR_ORA_VIP=

NAME=ora.iwinrca02.vip
TYPE=application
ACTION_SCRIPT=C:\oracle\product\10.2.0\crs\bin\racgwrap.bat
ACTIVE_PLACEMENT=1
AUTO_START=1
CHECK_INTERVAL=60
DESCRIPTION=CRS application for VIP on a node
FAILOVER_DELAY=0
FAILURE_INTERVAL=0
FAILURE_THRESHOLD=0
HOSTING_MEMBERS=iwinrca02
OPTIONAL_RESOURCES=
PLACEMENT=favored
REQUIRED_RESOURCES=
RESTART_ATTEMPTS=0
SCRIPT_TIMEOUT=60
START_TIMEOUT=0
STOP_TIMEOUT=0
UPTIME_THRESHOLD=7d
USR_ORA_ALERT_NAME=
USR_ORA_CHECK_TIMEOUT=0
```

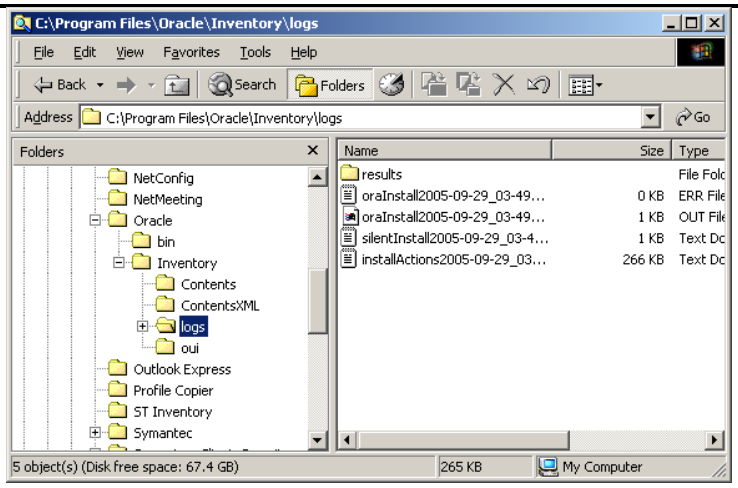
```
USR_ORA_CONNECT_STR=/ as sysdba
USR_ORA_DEBUG=0
USR_ORA_DISCONNECT=false
USR_ORA_FLAGS=
USR_ORA_IF=Local Area Connection
USR_ORA_INST_NOT_SHUTDOWN=
USR_ORA_LANG=
USR_ORA_NETMASK=255.255.255.0
USR_ORA_OPEN_MODE=
USR_ORA_OPI=false
USR_ORA_PFILE=
USR_ORA_PRECONNECT=none
USR_ORA_SRV=
USR_ORA_START_TIMEOUT=0
USR_ORA_STOP_MODE=immediate
USR_ORA_STOP_TIMEOUT=0
USR_ORA_VIP=139.185.150.202
```

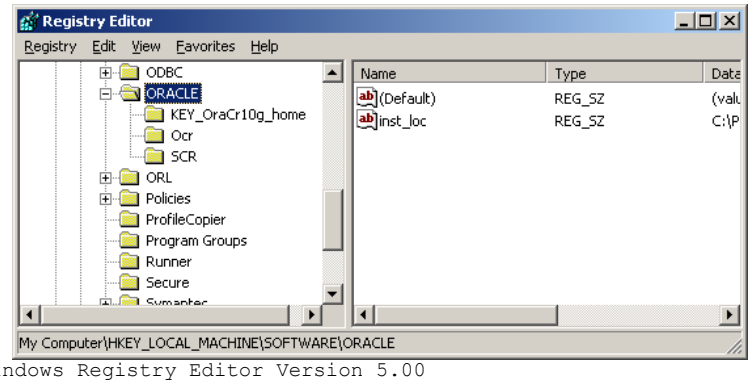
10. Appendix C Post Oracle Clusterware Install: Windows Filesystem, Registry & Services



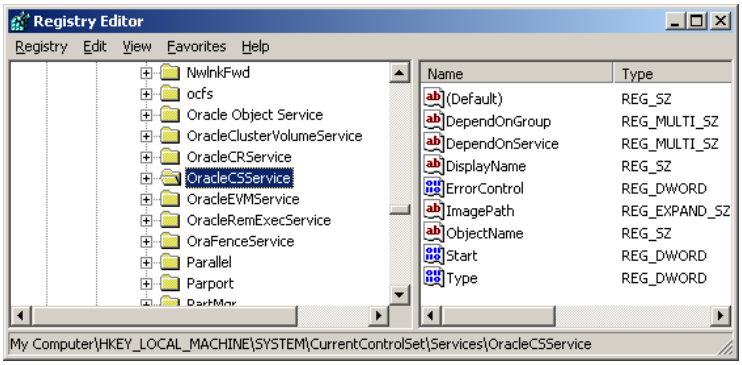









```
Windows Registry Editor Version 5.00

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE]
"inst_loc"="C:\\Program Files\\Oracle\\Inventory"

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\KEY_OraCr10g_home]
"ORACLE_HOME"="C:\\oracle\\product\\10.2.0\\crs"
"ORACLE_HOME_NAME"="OraCr10g_home"
"ORACLE_GROUP_NAME"="Oracle - OraCr10g_home"
"ORACLE_BUNDLE_NAME"="Enterprise"
"NLS_LANG"="AMERICAN_AMERICA.WE8MSWIN1252"
"ORA_CRS_HOME"="C:\\oracle\\product\\10.2.0\\crs"

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\Ocr]
"ocrconfig_loc"="\\\\.\\ocrcfg"
"Local_Only"="FALSE"

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\SCR]
"cssfatal"="enable"
"crsstart"="enable"
```



11. Appendix D Post ASM Install: Oracle Cluster Registry Information

After the ASM Software has been installed and the ASM instances created the following resources will have been configured to be managed by Oracle Clusterware.

```
C:\oracle\product\10.2.0\crs\BIN>crs_stat -t -v
Name           Type           R/RA   F/FT   Target    State     Host
----------------------------------------------------------------------
ora....SM1.asm application    0/5    0/0    ONLINE    ONLINE    iwinrca01
ora....01.lsnr application    0/5    0/0    ONLINE    ONLINE    iwinrca01
ora....a01.gsd application    0/5    0/0    ONLINE    ONLINE    iwinrca01
ora....a01.ons application    0/3    0/0    ONLINE    ONLINE    iwinrca01
ora....a01.vip application    0/0    0/0    ONLINE    ONLINE    iwinrca01
ora....SM2.asm application    0/5    0/0    ONLINE    ONLINE    iwinrca02
ora....02.lsnr application    0/5    0/0    ONLINE    ONLINE    iwinrca02
ora....a02.gsd application    0/5    0/0    ONLINE    ONLINE    iwinrca02
ora....a02.ons application    0/3    0/0    ONLINE    ONLINE    iwinrca02
ora....a02.vip application    0/0    0/0    ONLINE    ONLINE    iwinrca02
```

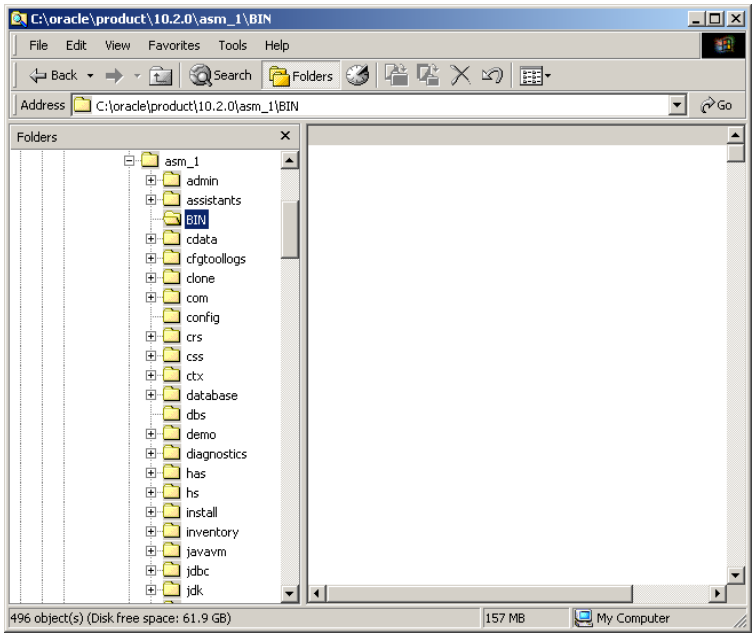
The Oracle Clusterware definition of the 4 new resources added as part of the ASM install is as follows :

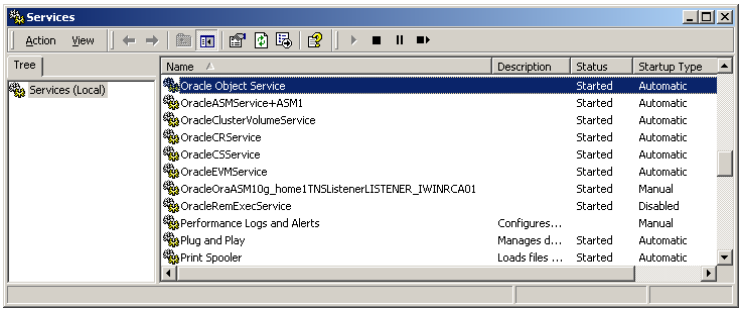
```
NAME=ora.iwinrca01.ASM1.asm
TYPE=application
ACTION_SCRIPT=C:\oracle\product\10.2.0\asm_1\bin\racgwrap.bat
ACTIVE_PLACEMENT=0
AUTO_START=1
CHECK_INTERVAL=600
DESCRIPTION=CRS application for ASM instance
FAILOVER_DELAY=0
FAILURE_INTERVAL=0
FAILURE_THRESHOLD=0
HOSTING_MEMBERS=iwinrca01
OPTIONAL_RESOURCES=
PLACEMENT=restricted
REQUIRED_RESOURCES=ora.iwinrca01.vip
RESTART_ATTEMPTS=5
SCRIPT_TIMEOUT=600
START_TIMEOUT=0
STOP_TIMEOUT=0
UPTIME_THRESHOLD=7d
USR_ORA_ALERT_NAME=
USR_ORA_CHECK_TIMEOUT=0
USR_ORA_CONNECT_STR=/ as sysdba
USR_ORA_DEBUG=0
USR_ORA_DISCONNECT=false
USR_ORA_FLAGS=
USR_ORA_IF=
USR_ORA_INST_NOT_SHUTDOWN=
USR_ORA_LANG=
USR_ORA_NETMASK=
USR_ORA_OPEN_MODE=mount
USR_ORA_OPI=false
USR_ORA_PFILE=
USR_ORA_PRECONNECT=none
USR_ORA_SRV=
USR_ORA_START_TIMEOUT=0
USR_ORA_STOP_MODE=immediate
USR_ORA_STOP_TIMEOUT=0
USR_ORA_VIP=

NAME=ora.iwinrca01.LISTENER_IWINRCA01.lsnr
TYPE=application
ACTION_SCRIPT=C:\oracle\product\10.2.0\asm_1\bin\racgwrap.bat
ACTIVE_PLACEMENT=0
AUTO_START=1
CHECK_INTERVAL=600
DESCRIPTION=CRS application for listener on node
FAILOVER_DELAY=0
FAILURE_INTERVAL=0
FAILURE_THRESHOLD=0
HOSTING_MEMBERS=iwinrca01
```

```
OPTIONAL_RESOURCES=
PLACEMENT=restricted
REQUIRED_RESOURCES=ora.iwinrca01.vip
RESTART_ATTEMPTS=5
SCRIPT_TIMEOUT=600
START_TIMEOUT=0
STOP_TIMEOUT=0
UPTIME_THRESHOLD=7d
USR_ORA_ALERT_NAME=
USR_ORA_CHECK_TIMEOUT=0
USR_ORA_CONNECT_STR=/ as sysdba
USR_ORA_DEBUG=0
USR_ORA_DISCONNECT=false
USR_ORA_FLAGS=
USR_ORA_IF=
USR_ORA_INST_NOT_SHUTDOWN=
USR_ORA_LANG=
USR_ORA_NETMASK=
USR_ORA_OPEN_MODE=
USR_ORA_OPI=false
USR_ORA_PFILE=
USR_ORA_PRECONNECT=none
USR_ORA_SRV=
USR_ORA_START_TIMEOUT=0
USR_ORA_STOP_MODE=immediate
USR_ORA_STOP_TIMEOUT=0
USR_ORA_VIP=

NAME=ora.iwinrca02.ASM2.asm
TYPE=application
ACTION_SCRIPT=C:\oracle\product\10.2.0\asm_1\bin\racgwrap.bat
ACTIVE_PLACEMENT=0
AUTO_START=1
CHECK_INTERVAL=600
DESCRIPTION=CRS application for ASM instance
FAILOVER_DELAY=0
FAILURE_INTERVAL=0
FAILURE_THRESHOLD=0
HOSTING_MEMBERS=iwinrca02
OPTIONAL_RESOURCES=
PLACEMENT=restricted
REQUIRED_RESOURCES=ora.iwinrca02.vip
RESTART_ATTEMPTS=5
SCRIPT_TIMEOUT=600
START_TIMEOUT=0
STOP_TIMEOUT=0
UPTIME_THRESHOLD=7d
USR_ORA_ALERT_NAME=
USR_ORA_CHECK_TIMEOUT=0
USR_ORA_CONNECT_STR=/ as sysdba
USR_ORA_DEBUG=0
USR_ORA_DISCONNECT=false
USR_ORA_FLAGS=
USR_ORA_IF=
USR_ORA_INST_NOT_SHUTDOWN=
USR_ORA_LANG=
USR_ORA_NETMASK=
USR_ORA_OPEN_MODE=mount
USR_ORA_OPI=false
USR_ORA_PFILE=
USR_ORA_PRECONNECT=none
USR_ORA_SRV=
USR_ORA_START_TIMEOUT=0
USR_ORA_STOP_MODE=immediate
USR_ORA_STOP_TIMEOUT=0
USR_ORA_VIP=

NAME=ora.iwinrca02.LISTENER_IWINRCA02.lsnr
TYPE=application
ACTION_SCRIPT=C:\oracle\product\10.2.0\asm_1\bin\racgwrap.bat
ACTIVE_PLACEMENT=0
AUTO_START=1
CHECK_INTERVAL=600
DESCRIPTION=CRS application for listener on node
FAILOVER_DELAY=0
FAILURE_INTERVAL=0
FAILURE_THRESHOLD=0
HOSTING_MEMBERS=iwinrca02
OPTIONAL_RESOURCES=
PLACEMENT=restricted
REQUIRED_RESOURCES=ora.iwinrca02.vip
```

```
RESTART_ATTEMPTS=5
SCRIPT_TIMEOUT=600
START_TIMEOUT=0
STOP_TIMEOUT=0
UPTIME_THRESHOLD=7d
USR_ORA_ALERT_NAME=
USR_ORA_CHECK_TIMEOUT=0
USR_ORA_CONNECT_STR=/ as sysdba
USR_ORA_DEBUG=0
USR_ORA_DISCONNECT=false
USR_ORA_FLAGS=
USR_ORA_IF=
USR_ORA_INST_NOT_SHUTDOWN=
USR_ORA_LANG=
USR_ORA_NETMASK=
USR_ORA_OPEN_MODE=
USR_ORA_OPI=false
USR_ORA_PFILE=
USR_ORA_PRECONNECT=none
USR_ORA_SRV=
USR_ORA_START_TIMEOUT=0
USR_ORA_STOP_MODE=immediate
USR_ORA_STOP_TIMEOUT=0
USR_ORA_VIP=
```

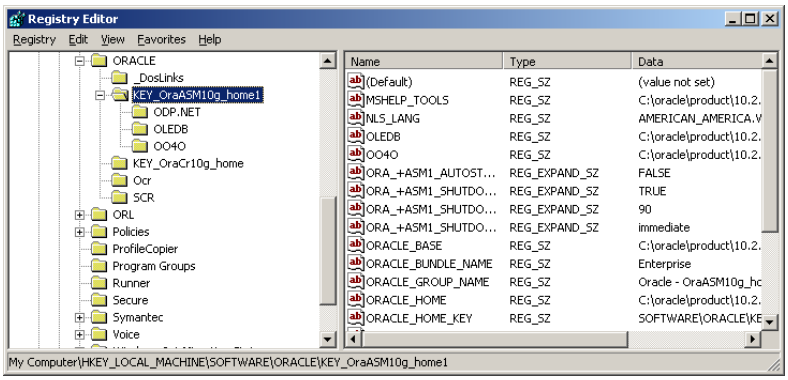
12. Appendix E Post ASM Install: Windows Filesystem, Services & Registry






```
Windows Registry Editor Version 5.00

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE]
"inst_loc"="C:\\Program Files\\Oracle\\Inventory"

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\KEY_OraASM10g_home1]
"ORACLE_HOME"="C:\\oracle\\product\\10.2.0\\asm_1"
"ORACLE_HOME_NAME"="OraASM10g_home1"
"ORACLE_GROUP_NAME"="Oracle - OraASM10g_home1"
"NLS_LANG"="AMERICAN_AMERICA.WE8MSWIN1252"
"ORACLE_BUNDLE_NAME"="Enterprise"
"OLEDB"="C:\\oracle\\product\\10.2.0\\asm_1\\oledb\\mesg"
"StmtCacheSize"="0"
"StatementCacheSize"="0"
"ORACLE_SID"="NO"
"OO4O"="C:\\oracle\\product\\10.2.0\\asm_1\\oo4o\\mesg"
"SQLPATH"="C:\\oracle\\product\\10.2.0\\asm_1\\dbs"
"ORACLE_HOME_KEY"="SOFTWARE\\ORACLE\\KEY_OraASM10g_home1"
"MSHELP_TOOLS"="C:\\oracle\\product\\10.2.0\\asm_1\\MSHELP"
"ORACLE_BASE"="C:\\oracle\\product\\10.2.0"
"RDBMS_CONTROL"="C:\\oracle\\product\\10.2.0\\asm_1\\DATABASE"
"RDBMS_ARCHIVE"="C:\\oracle\\product\\10.2.0\\asm_1\\DATABASE\\ARCHIVE"
"ORA_+ASM1_AUTOSTART"=hex(2):46,00,41,00,4c,00,53,00,45,00,00,00
"ORA_+ASM1_SHUTDOWN"=hex(2):54,00,52,00,55,00,45,00,00,00
"ORA_+ASM1_SHUTDOWNTYPE"=hex(2):69,00,6d,00,6d,00,65,00,64,00,69,00,61,00,74,\
  00,65,00,00,00
```

```
"ORA_+ASM1_SHUTDOWN_TIMEOUT"=hex(2):39,00,30,00,00,00

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\KEY_OraASM10g_home1\ODP.NET]
"TraceFileName"="C:\\ODPNET.trc"
"TraceLevel"="0"
"TraceOption"="0"
"StatementCacheSize"="0"

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\KEY_OraASM10g_home1\OLEDB]
"CacheType"="Memory"
"ChunkSize"="100"
"DistribTX"="1"
"FetchSize"="100"
"OSAuthent"="0"
"PLSQLRset"="0"
"PwdChgDlg"="1"
"SchRstLng"="10000"
"UserDefFn"="0"
"DisableRetClause"="1"
"VCharNull"="1"
"TraceCategory"="0"
"TraceFileName"="c:\\OraOLEDB.trc"
"TraceLevel"="0"
"TraceOption"="0"
"SPPrmDefVal"="0"
"StmtCacheSize"="0"

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\KEY_OraASM10g_home1\OO4O]
"CacheBlocks"="20"
"FetchLimit"="100"
"FetchSize"="4096"
"HelpFile"="C:\\oracle\\product\\10.2.0\\asm_1\\oo4o\\doc\\oracleo.hlp"
"PerBlock"="16"
"SliceSize"="256"
"TempFileDirectory"="c:\\temp"
"OO4O_HOME"="C:\\oracle\\product\\10.2.0\\asm_1\\oo4o"

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\KEY_OraCr10g_home]
"ORACLE_HOME"="C:\\oracle\\product\\10.2.0\\crs"
"ORACLE_HOME_NAME"="OraCr10g_home"
"ORACLE_GROUP_NAME"="Oracle - OraCr10g_home"
"ORACLE_BUNDLE_NAME"="Enterprise"
"NLS_LANG"="AMERICAN_AMERICA.WE8MSWIN1252"
"ORA_CRS_HOME"="C:\\oracle\\product\\10.2.0\\crs"

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\Ocr]
"ocrconfig_loc"="\\\\.\\ocrcfg"
"Local_Only"="FALSE"

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\SCR]
"cssfatal"="enable"
"crsstart"="enable"

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\_DosLinks]
"Scan"=hex(2):30,00,00,00
```



13. Appendix F Post Database Create: Oracle Cluster Registry Information

After the database has been installed the following resources will have been configured to be managed by Oracle Clusterware.

```
C:\oracle\product\10.2.0\crs\BIN>crs_stat -t -v
Name           Type           R/RA   F/FT   Target    State     Host
----------------------------------------------------------------------
ora....L1.inst application    0/5    0/0    ONLINE    ONLINE    iwinrca01
ora....L2.inst application    0/5    0/0    ONLINE    ONLINE    iwinrca02
ora.ORCL.db    application    0/1    0/1    ONLINE    ONLINE    iwinrca01
ora....SM1.asm application    0/5    0/0    ONLINE    ONLINE    iwinrca01
ora....01.lsnr application    0/5    0/0    ONLINE    ONLINE    iwinrca01
ora....a01.gsd application    0/5    0/0    ONLINE    ONLINE    iwinrca01
ora....a01.ons application    0/3    0/0    ONLINE    ONLINE    iwinrca01
ora....a01.vip application    0/0    0/0    ONLINE    ONLINE    iwinrca01
ora....SM2.asm application    0/5    0/0    ONLINE    ONLINE    iwinrca02
ora....02.lsnr application    0/5    0/0    ONLINE    ONLINE    iwinrca02
ora....a02.gsd application    0/5    0/0    ONLINE    ONLINE    iwinrca02
ora....a02.ons application    0/3    0/0    ONLINE    ONLINE    iwinrca02
ora....a02.vip application    0/0    0/0    ONLINE    ONLINE    iwinrca02
```

The Oracle Clusterware definition of the 3 new resources added as part of the database create is as follows :

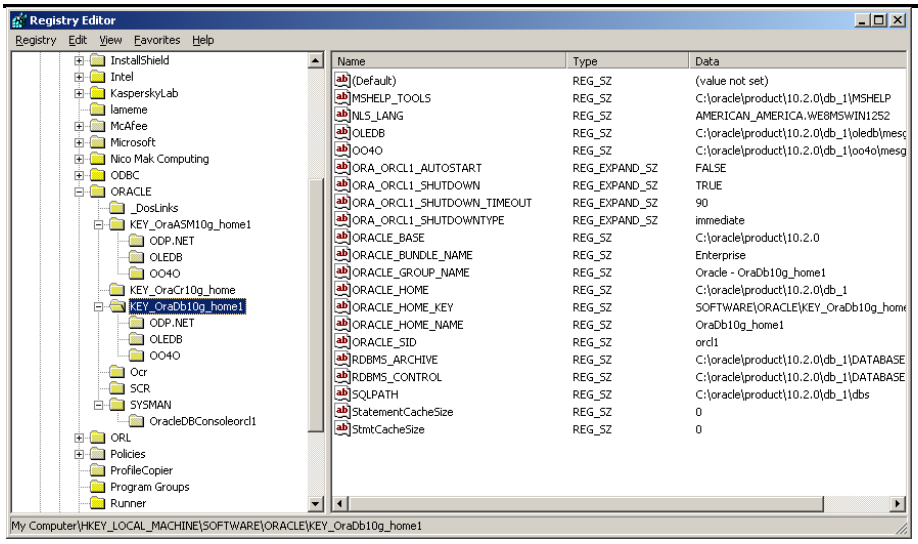
```
NAME=ora.ORCL.ORCL1.inst
TYPE=application
ACTION_SCRIPT=C:\oracle\product\10.2.0\db_1\bin\racgwrap.bat
ACTIVE_PLACEMENT=0
AUTO_START=1
CHECK_INTERVAL=600
DESCRIPTION=CRS application for Instance
FAILOVER_DELAY=0
FAILURE_INTERVAL=0
FAILURE_THRESHOLD=0
HOSTING_MEMBERS=iwinrca01
OPTIONAL_RESOURCES=
PLACEMENT=restricted
REQUIRED_RESOURCES=ora.iwinrca01.vip ora.iwinrca01.ASM1.asm
RESTART_ATTEMPTS=5
SCRIPT_TIMEOUT=600
START_TIMEOUT=0
STOP_TIMEOUT=0
UPTIME_THRESHOLD=7d
USR_ORA_ALERT_NAME=
USR_ORA_CHECK_TIMEOUT=0
USR_ORA_CONNECT_STR=/ as sysdba
USR_ORA_DEBUG=0
USR_ORA_DISCONNECT=false
USR_ORA_FLAGS=
USR_ORA_IF=
USR_ORA_INST_NOT_SHUTDOWN=
USR_ORA_LANG=
USR_ORA_NETMASK=
USR_ORA_OPEN_MODE=
USR_ORA_OPI=false
USR_ORA_PFILE=
USR_ORA_PRECONNECT=none
USR_ORA_SRV=
USR_ORA_START_TIMEOUT=0
USR_ORA_STOP_MODE=immediate
USR_ORA_STOP_TIMEOUT=0
USR_ORA_VIP=

NAME=ora.ORCL.ORCL2.inst
TYPE=application
ACTION_SCRIPT=C:\oracle\product\10.2.0\db_1\bin\racgwrap.bat
ACTIVE_PLACEMENT=0
AUTO_START=1
CHECK_INTERVAL=600
DESCRIPTION=CRS application for Instance
FAILOVER_DELAY=0
```

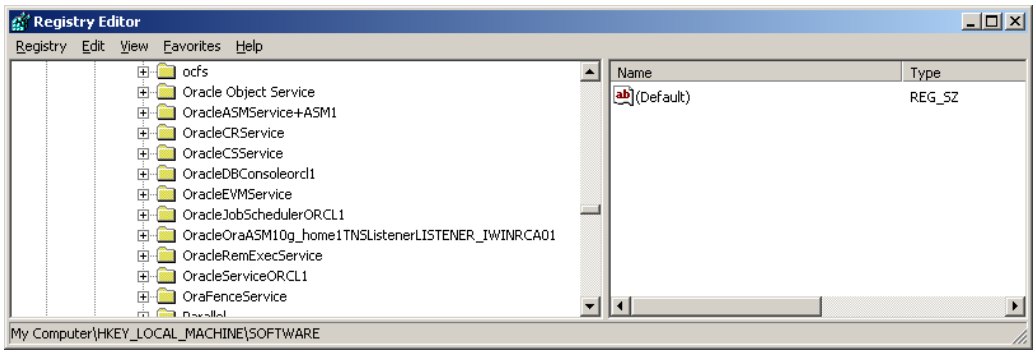
```
FAILURE_INTERVAL=0
FAILURE_THRESHOLD=0
HOSTING_MEMBERS=iwinrca02
OPTIONAL_RESOURCES=
PLACEMENT=restricted
REQUIRED_RESOURCES=ora.iwinrca02.vip ora.iwinrca02.ASM2.asm
RESTART_ATTEMPTS=5
SCRIPT_TIMEOUT=600
START_TIMEOUT=0
STOP_TIMEOUT=0
UPTIME_THRESHOLD=7d
USR_ORA_ALERT_NAME=
USR_ORA_CHECK_TIMEOUT=0
USR_ORA_CONNECT_STR=/ as sysdba
USR_ORA_DEBUG=0
USR_ORA_DISCONNECT=false
USR_ORA_FLAGS=
USR_ORA_IF=
USR_ORA_INST_NOT_SHUTDOWN=
USR_ORA_LANG=
USR_ORA_NETMASK=
USR_ORA_OPEN_MODE=
USR_ORA_OPI=false
USR_ORA_PFILE=
USR_ORA_PRECONNECT=none
USR_ORA_SRV=
USR_ORA_START_TIMEOUT=0
USR_ORA_STOP_MODE=immediate
USR_ORA_STOP_TIMEOUT=0
USR_ORA_VIP=

NAME=ora.ORCL.db
TYPE=application
ACTION_SCRIPT=C:\oracle\product\10.2.0\crs\bin\racgwrap.bat
ACTIVE_PLACEMENT=0
AUTO_START=1
CHECK_INTERVAL=600
DESCRIPTION=CRS application for the Database
FAILOVER_DELAY=0
FAILURE_INTERVAL=60
FAILURE_THRESHOLD=1
HOSTING_MEMBERS=
OPTIONAL_RESOURCES=
PLACEMENT=balanced
REQUIRED_RESOURCES=
RESTART_ATTEMPTS=1
SCRIPT_TIMEOUT=600
START_TIMEOUT=0
STOP_TIMEOUT=0
UPTIME_THRESHOLD=7d
USR_ORA_ALERT_NAME=
USR_ORA_CHECK_TIMEOUT=0
USR_ORA_CONNECT_STR=/ as sysdba
USR_ORA_DEBUG=0
USR_ORA_DISCONNECT=false
USR_ORA_FLAGS=
USR_ORA_IF=
USR_ORA_INST_NOT_SHUTDOWN=
USR_ORA_LANG=
USR_ORA_NETMASK=
USR_ORA_OPEN_MODE=
USR_ORA_OPI=false
USR_ORA_PFILE=
USR_ORA_PRECONNECT=none
USR_ORA_SRV=
USR_ORA_START_TIMEOUT=0
USR_ORA_STOP_MODE=immediate
USR_ORA_STOP_TIMEOUT=0
USR_ORA_VIP=
```

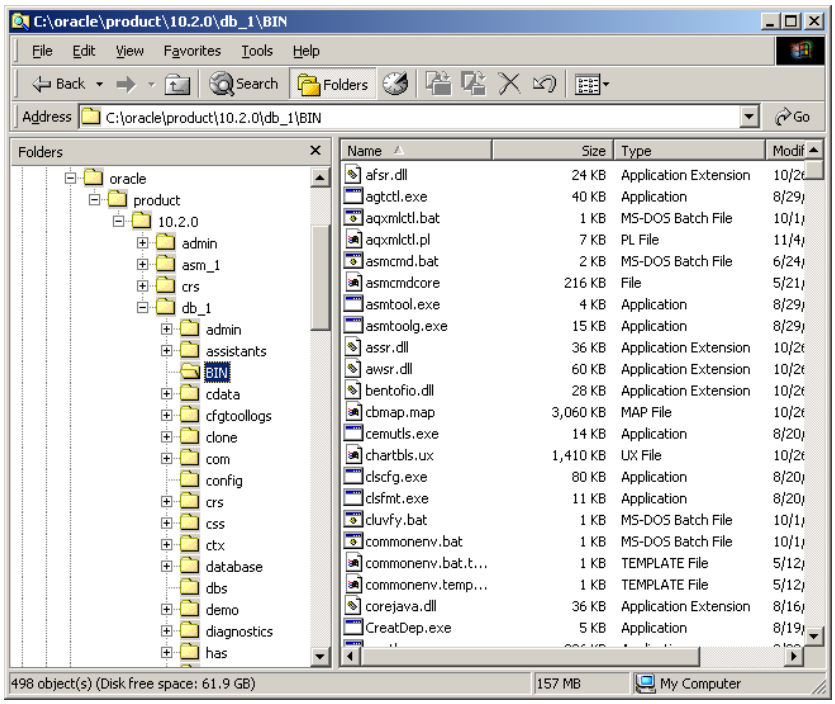
14. Appendix G Post Database Create: Windows Filesystem, Services & Registry Information

```
Windows Registry Editor Version 5.00

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE]
"inst_loc"="C:\\Program Files\\Oracle\\Inventory"

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\KEY_OraASM10g_home1]
"ORACLE_HOME"="C:\\oracle\\product\\10.2.0\\asm_1"
"ORACLE_HOME_NAME"="OraASM10g_home1"
"ORACLE_GROUP_NAME"="Oracle - OraASM10g_home1"
"NLS_LANG"="AMERICAN_AMERICA.WE8MSWIN1252"
"ORACLE_BUNDLE_NAME"="Enterprise"
"OLEDB"="C:\\oracle\\product\\10.2.0\\asm_1\\oledb\\mesg"
"StmtCacheSize"="0"
"StatementCacheSize"="0"
"ORACLE_SID"="NO"
"OO4O"="C:\\oracle\\product\\10.2.0\\asm_1\\oo4o\\mesg"
"SQLPATH"="C:\\oracle\\product\\10.2.0\\asm_1\\dbs"
"ORACLE_HOME_KEY"="SOFTWARE\\ORACLE\\KEY_OraASM10g_home1"
"MSHELP_TOOLS"="C:\\oracle\\product\\10.2.0\\asm_1\\MSHELP"
"ORACLE_BASE"="C:\\oracle\\product\\10.2.0"
"RDBMS_CONTROL"="C:\\oracle\\product\\10.2.0\\asm_1\\DATABASE"
"RDBMS_ARCHIVE"="C:\\oracle\\product\\10.2.0\\asm_1\\DATABASE\\ARCHIVE"
"ORA_+ASM1_AUTOSTART"=hex(2):46,00,41,00,4c,00,53,00,45,00,00,00
"ORA_+ASM1_SHUTDOWN"=hex(2):54,00,52,00,55,00,45,00,00,00
"ORA_+ASM1_SHUTDOWNTYPE"=hex(2):69,00,6d,00,6d,00,65,00,64,00,69,00,61,00,74,\
  00,65,00,00,00
"ORA_+ASM1_SHUTDOWN_TIMEOUT"=hex(2):39,00,30,00,00,00

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\KEY_OraASM10g_home1\ODP.NET]
"TraceFileName"="C:\\ODPNET.trc"
"TraceLevel"="0"
"TraceOption"="0"
"StatementCacheSize"="0"

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\KEY_OraASM10g_home1\OLEDB]
"CacheType"="Memory"
"ChunkSize"="100"
"DistribTX"="1"
"FetchSize"="100"
"OSAuthent"="0"
"PLSQLRset"="0"
"PwdChgDlg"="1"
"SchRstLng"="10000"
"UserDefFn"="0"
"DisableRetClause"="1"
"VCharNull"="1"
"TraceCategory"="0"
"TraceFileName"="c:\\OraOLEDB.trc"
"TraceLevel"="0"
"TraceOption"="0"
"SPPrmDefVal"="0"
"StmtCacheSize"="0"

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\KEY_OraASM10g_home1\OO4O]
"CacheBlocks"="20"
"FetchLimit"="100"
"FetchSize"="4096"
"HelpFile"="C:\\oracle\\product\\10.2.0\\asm_1\\oo4o\\doc\\oracleo.hlp"
"PerBlock"="16"
"SliceSize"="256"
"TempFileDirectory"="c:\\temp"
"OO4O_HOME"="C:\\oracle\\product\\10.2.0\\asm_1\\oo4o"

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\KEY_OraCr10g_home]
"ORACLE_HOME"="C:\\oracle\\product\\10.2.0\\crs"
"ORACLE_HOME_NAME"="OraCr10g_home"
"ORACLE_GROUP_NAME"="Oracle - OraCr10g_home"
"ORACLE_BUNDLE_NAME"="Enterprise"
"NLS_LANG"="AMERICAN_AMERICA.WE8MSWIN1252"
"ORA_CRS_HOME"="C:\\oracle\\product\\10.2.0\\crs"

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\KEY_OraDb10g_home1]
```

```
"ORACLE_HOME"="C:\\oracle\\product\\10.2.0\\db_1"
"ORACLE_HOME_NAME"="OraDb10g_home1"
"ORACLE_GROUP_NAME"="Oracle - OraDb10g_home1"
"NLS_LANG"="AMERICAN_AMERICA.WE8MSWIN1252"
"ORACLE_BUNDLE_NAME"="Enterprise"
"OLEDB"="C:\\oracle\\product\\10.2.0\\db_1\\oledb\\mesg"
"StmtCacheSize"="0"
"StatementCacheSize"="0"
"ORACLE_SID"="orcl1"
"OO4O"="C:\\oracle\\product\\10.2.0\\db_1\\oo4o\\mesg"
"SQLPATH"="C:\\oracle\\product\\10.2.0\\db_1\\dbs"
"ORACLE_HOME_KEY"="SOFTWARE\\ORACLE\\KEY_OraDb10g_home1"
"MSHELP_TOOLS"="C:\\oracle\\product\\10.2.0\\db_1\\MSHELP"
"ORACLE_BASE"="C:\\oracle\\product\\10.2.0"
"RDBMS_CONTROL"="C:\\oracle\\product\\10.2.0\\db_1\\DATABASE"
"RDBMS_ARCHIVE"="C:\\oracle\\product\\10.2.0\\db_1\\DATABASE\\ARCHIVE"
"ORA_ORCL1_AUTOSTART"=hex(2):46,00,41,00,4c,00,53,00,45,00,00,00
"ORA_ORCL1_SHUTDOWN"=hex(2):54,00,52,00,55,00,45,00,00,00
"ORA_ORCL1_SHUTDOWNTYPE"=hex(2):69,00,6d,00,6d,00,65,00,64,00,69,00,61,00,74,\
  00,65,00,00,00
"ORA_ORCL1_SHUTDOWN_TIMEOUT"=hex(2):39,00,30,00,00,00

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\KEY_OraDb10g_home1\ODP.NET]
"TraceFileName"="C:\\ODPNET.trc"
"TraceLevel"="0"
"TraceOption"="0"
"StatementCacheSize"="0"

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\KEY_OraDb10g_home1\OLEDB]
"CacheType"="Memory"
"ChunkSize"="100"
"DistribTX"="1"
"FetchSize"="100"
"OSAuthent"="0"
"PLSQLRset"="0"
"PwdChgDlg"="1"
"SchRstLng"="10000"
"UserDefFn"="0"
"DisableRetClause"="1"
"VCharNull"="1"
"TraceCategory"="0"
"TraceFileName"="c:\\OraOLEDB.trc"
"TraceLevel"="0"
"TraceOption"="0"
"SPPrmDefVal"="0"
"StmtCacheSize"="0"

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\KEY_OraDb10g_home1\OO4O]
"CacheBlocks"="20"
"FetchLimit"="100"
"FetchSize"="4096"
"HelpFile"="C:\\oracle\\product\\10.2.0\\db_1\\oo4o\\doc\\oracleo.hlp"
"PerBlock"="16"
"SliceSize"="256"
"TempFileDirectory"="c:\\temp"
"OO4O_HOME"="C:\\oracle\\product\\10.2.0\\db_1\\oo4o"

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\Ocr]
"ocrconfig_loc"="\\\\.\\ocrcfg"
"Local_Only"="FALSE"

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\SCR]
"cssfatal"="enable"
"crsstart"="enable"

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\SYSMAN]

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\SYSMAN\OracleDBConsoleorcl1]
"EMDROOT"="C:\\oracle\\product\\10.2.0\\db_1"
"ORACLE_HOME"="C:\\oracle\\product\\10.2.0\\db_1"
"EMSTATE"="C:\\oracle\\product\\10.2.0\\db_1\\iwinrca01_orcl1"
"CONSOLE_CFG"="dbconsole"
"ORACLE_SID"="orcl1"
"TIMEOUT"="15"
"TRACE_LEVEL"="16"

[HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\_DosLinks]
"Scan"=hex(2):30,00,00,00
```


Registry Editor
Registry Edit View Favorites Help
InstallShield
Intel
KasperskyLab
lameme
McAfee
Microsoft
Nico Mak Computing
ODBC
ORACLE
_DosLinks
KEY_OraASM10g_home1
ODP.NET
OLEDB
OO4O
KEY_OraCr10g_home
KEY_OraDb10g_home1
ODP.NET
OLEDB
OO4O
Ocr
SCR
SYSMAN
OracleDBConsoleorcl1
ORL
Policies
ProfileCopier
Program Groups
Runner
Name Type Data
(Default) REG_SZ (value not set)
MSHELP_TOOLS REG_SZ C:\oracle\product\10.2.0\db_1\MSHELP
NLS_LANG REG_SZ AMERICAN_AMERICA.WE8MSWIN1252
OLEDB REG_SZ C:\oracle\product\10.2.0\db_1\oledb\mesg
OO4O REG_SZ C:\oracle\product\10.2.0\db_1\oo4o\mesg
ORA_ORCL1_AUTOSTART REG_EXPAND_SZ FALSE
ORA_ORCL1_SHUTDOWN REG_EXPAND_SZ TRUE
ORA_ORCL1_SHUTDOWN_TIMEOUT REG_EXPAND_SZ 90
ORA_ORCL1_SHUTDOWNTYPE REG_EXPAND_SZ immediate
ORACLE_BASE REG_SZ C:\oracle\product\10.2.0
ORACLE_BUNDLE_NAME REG_SZ Enterprise
ORACLE_GROUP_NAME REG_SZ Oracle - OraDb10g_home1
ORACLE_HOME REG_SZ C:\oracle\product\10.2.0\db_1
ORACLE_HOME_KEY REG_SZ SOFTWARE\ORACLE\KEY_OraDb10g_home
ORACLE_HOME_NAME REG_SZ OraDb10g_home1
ORACLE_SID REG_SZ orcl1
RDBMS_ARCHIVE REG_SZ C:\oracle\product\10.2.0\db_1\DATABASE
RDBMS_CONTROL REG_SZ C:\oracle\product\10.2.0\db_1\DATABASE
SQLPATH REG_SZ C:\oracle\product\10.2.0\db_1\dbs
StatementCacheSize REG_SZ 0
StmtCacheSize REG_SZ 0
My Computer\HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE\KEY_OraDb10g_home1


Registry Editor
Registry Edit View Favorites Help
ocfs
Oracle Object Service
OracleASMService+ASM1
OracleCRService
OracleCSService
OracleDBConsoleorcl1
OracleEVMService
OracleJobSchedulerORCL1
OracleOraASM10g_home1TNSListenerLISTENER_IWINRCA01
OracleRemExecService
OracleServiceORCL1
OraFenceService
Name Type
(Default) REG_SZ
My Computer\HKEY_LOCAL_MACHINE\SOFTWARE


C:\oracle\product\10.2.0\db_1\BIN
File Edit View Favorites Tools Help
Back Search Folders
Address C:\oracle\product\10.2.0\db_1\BIN
Go
Folders
oracle
product
10.2.0
admin
asm_1
crs
db_1
admin
assistants
BIN
cdata
cfgtoollogs
clone
com
config
crs
css
ctx
database
dbs
demo
diagnostics
has
Name Size Type Modif
afsr.dll 24 KB Application Extension 10/2
agtctl.exe 40 KB Application 8/29/
aqxmlctl.bat 1 KB MS-DOS Batch File 10/1/
aqxmlctl.pl 7 KB PL File 11/4/
asmcmd.bat 2 KB MS-DOS Batch File 6/24/
asmcmdcore 216 KB File 5/21/
asmtool.exe 4 KB Application 8/29/
asmtoolg.exe 15 KB Application 8/29/
assr.dll 36 KB Application Extension 10/2
awsr.dll 60 KB Application Extension 10/2
bentofio.dll 28 KB Application Extension 10/2
cbmap.map 3,060 KB MAP File 10/2
cemutls.exe 14 KB Application 8/20/
chartbls.ux 1,410 KB UX File 10/2
clscfg.exe 80 KB Application 8/20/
clsfmt.exe 11 KB Application 8/20/
cluvfy.bat 1 KB MS-DOS Batch File 10/1/
commonenv.bat 1 KB MS-DOS Batch File 10/1/
commonenv.bat.t... 1 KB TEMPLATE File 5/12/
commonenv.temp... 1 KB TEMPLATE File 5/12/
corejava.dll 36 KB Application Extension 8/16/
CreatDep.exe 5 KB Application 8/19/
498 object(s) (Disk free space: 61.9 GB)
157 MB
My Computer

15. Appendix H Process List of Oracle RAC Node

```
PsList 1.26 - Process Information Lister
Copyright (C) 1999-2004 Mark Russinovich
Sysinternals - www.sysinternals.com

Process information for IWINRCA01:
```

Name	Pid	Pri	Thd	Hnd	VM	WS	Priv
Idle	0	0	2	0	0	16	0
System	8	8	53	325	1676	212	24
smss	184	11	6	36	5256	384	1076
csrss	208	13	13	791	20608	2264	1560
WINLOGON	232	13	19	459	54672	6324	7320
services	260	9	41	774	52172	13456	10080
termsrv	368	10	14	118	50868	4320	2168
svchost	488	8	9	263	23648	4192	1524
SPOOLSV	520	8	11	139	26344	4372	2516
msdtc	576	8	26	209	33816	5920	1960
DefWatch	712	8	4	45	20448	2436	552
svchost	732	8	19	354	34888	7152	2116
LLSSRV	756	9	9	79	17244	2380	748
svchost	820	8	14	184	23172	3660	1628
Rtvscan	828	8	39	632	91312	17360	13948
regsvc	896	8	3	58	9952	1124	324
mstask	908	8	6	121	29896	3620	1260
winmgmt	964	8	6	277	40680	848	3308
OcfsFindVol	**968**	**8**	**5**	**96**	**23788**	**2996**	**1040**
WinVNC	1000	8	8	161	50440	15044	11692
svchost	1024	8	8	434	47660	14552	9420
wuauclt	1988	8	3	165	36080	5344	4560
dfssvc	1052	8	3	44	10104	1732	476
OracleOBJServic	**2032**	**8**	**3**	**66**	**44476**	**4348**	**2920**
ocssd	**2176**	**13**	**16**	**607**	**74564**	**12300**	**15028**
ocssd	**2396**	**8**	**2**	**84**	**46588**	**4996**	**4320**
rsvp	2184	8	6	125	23880	1048	1256
RemoteExecServi	**2220**	**8**	**2**	**35**	**28992**	**1648**	**380**
evmd	**2408**	**8**	**18**	**571**	**79516**	**11316**	**16192**
evmlogger	**2488**	**8**	**1**	**124**	**47540**	**7220**	**7008**
evmd	**2508**	**8**	**2**	**87**	**48396**	**5668**	**4552**
crsd	**2520**	**8**	**45**	**929**	**130420**	**22912**	**36432**
crsd	**2716**	**8**	**2**	**85**	**50004**	**6388**	**4796**
nmesrvc	**3000**	**8**	**2**	**36**	**7404**	**1032**	**232**
CMD	**3584**	**8**	**1**	**21**	**8744**	**1228**	**324**
perl	**3604**	**8**	**1**	**24**	**31908**	**7904**	**6364**
TNSLSNR	**3200**	**8**	**4**	**120**	**52512**	**8804**	**6304**
oracle	**3268**	**8**	**49**	**2204**	**925164**	**373676**	**766264**
oracle	**3304**	**8**	**25**	**801**	**293612**	**130748**	**162884**
LSASS	272	9	21	368	33428	6496	2928
explorer	1692	8	14	402	59868	5340	5020
hkcmd	1788	8	3	94	28980	3800	1476
VPTray	1820	8	3	118	32356	3556	1992
CMD	2724	8	1	22	11308	1300	348
pslist	380	13	2	79	15552	1584	784
racgimon	**3248**	**8**	**6**	**215**	**59580**	**9256**	**12316**
racgimon	**3424**	**8**	**20**	**450**	**82000**	**15196**	**19588**
ons	**3568**	**8**	**1**	**17**	**7136**	**916**	**320**
ons	**3452**	**8**	**9**	**109**	**29492**	**3636**	**1424**
java	**3640**	**8**	**29**	**1003**	**461168**	**46948**	**43180**
emagent	**3760**	**8**	**10**	**4762**	**89512**	**21492**	**14008**

16. Appendix I Completely cleaning a failed install

You will have to reboot each node after completing this cleanup – This is to free the 2 device drivers that were loaded as part of the RAC install and to completely remove the registry deletes that were done in memory.

Services on each node in the cluster

Stop all the oracle services using the control panel applet: services.msc

Stop the "Distributed Transaction Coordinator" service

Registry on each node in the cluster

Remove HKLM/Software/oracle

Remove HKLM/System/CurrentControlSet/Services/Oracle* *(one at a time)*

Remove HKLM/System/CurrentControlSet/Services/ocfs

Remove HKLM/System/CurrentControlSet/Services/OraFenceService

Menu items on each node in the cluster

Remove c:\Documents and Settings\All Users\Start Menu\Programs\Oracle * folders

System Environment variables on each node in the cluster

PERL5LIB= (remove)

PATH= (modify to remove oracle\bin directories)

Shared disk cleanup: From one node only after stopping all above services on both nodes

You must clean the shared disks – Removing and recreating the partitions won't work – as the data will still be there.

Use the Oracle Clusterware command line utility: logpartformat.exe. You must add a drive letter using diskmgmt.msc to each partition you wish to format, remember to remove the drive letters after format has completed and check the drive letters have not returned following the subsequent reboot. Be very careful; this utility, as designed, will wipe all data from a partition.

Symbolic link cleanup on each node in the cluster

You must also remove the symbolic links, run the Oracle Clusterware utility GuiOracleObjManager.exe, for each device that has a name next to it select the checkbox then click Options->commit

File System cleanup on each node in the cluster

Remove C:\program Files\Oracle

Remove C:\oracle\product\ *(Or wherever the Oracle binaries are installed)*

Remove C:\WINDOWS\system32\drivers\orafencedrv.sys

Remove C:\WINDOWS\system32\drivers\orafenceservice.sys

Remove C:\WINDOWS\system32\drivers\ocfs.sys

Reboot each Node

This is required to remove the 2 device drivers

17. Networking Sample Files

Sample Networking files from the install

Server

A typical LISTENER.ORA file from Node1 in the cluster

```
LISTENER_IWINRCA01 =
  (DESCRIPTION_LIST =
    (DESCRIPTION =
      (ADDRESS = (PROTOCOL = IPC)(KEY = EXTPROC1))
      (ADDRESS = (PROTOCOL = TCP)(HOST = IWINRCA01-VIP)(PORT = 1521)(IP =
FIRST))
      (ADDRESS = (PROTOCOL = TCP)(HOST = 139.185.150.54)(PORT = 1521)(IP =
FIRST))
    )
  )

SID_LIST_LISTENER_IWINRCA01 =
  (SID_LIST =
    (SID_DESC =
      (SID_NAME = PLSExtProc)
      (ORACLE_HOME = C:\oracle\product\10.2.0\asm_1)
      (PROGRAM = extproc)
    )
  )
```

A Typical TNSNAMES.ORA from the Server

```
# tnsnames.ora Network Configuration File:
C:\oracle\product\10.2.0\db_1\network\admin\tnsnames.ora
# Generated by Oracle configuration tools.

LISTENERS_ORCL =
  (ADDRESS_LIST =
    (ADDRESS = (PROTOCOL = TCP)(HOST = IWINRCA01-VIP)(PORT = 1521))
    (ADDRESS = (PROTOCOL = TCP)(HOST = IWINRCA02-VIP)(PORT = 1521))
  )

ORCL2 =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = IWINRCA02-VIP)(PORT = 1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = orcl)
      (INSTANCE_NAME = orcl2)
    )
  )

ORCL1 =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = IWINRCA01-VIP)(PORT = 1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = orcl)
      (INSTANCE_NAME = orcl1)
    )
  )

ORCL =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST = IWINRCA01-VIP)(PORT = 1521))
    (ADDRESS = (PROTOCOL = TCP)(HOST = IWINRCA02-VIP)(PORT = 1521))
    (LOAD_BALANCE = yes)
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = orcl)
    )
  )

EXTPROC_CONNECTION_DATA =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = IPC)(KEY = EXTPROC0))
    )
```

```
    (CONNECT_DATA =
      (SID = PLSExtProc)
      (PRESENTATION = RO)
    )
  )
```

Client

A Typical client side TNSNAMES.ORA file :

```
orcl =
  (DESCRIPTION =
      (FAILOVER=ON)
      (ADDRESS_LIST =
        (ADDRESS = (PROTOCOL = TCP)(Host = IWINRCA01-VIP)(Port = 1521)
        )
        (ADDRESS = (PROTOCOL = TCP)(Host = IWINRCA02-VIP)(Port = 1521)
        )
       )
      (CONNECT_DATA =
            (SERVICE_NAME=ORCL)
           )
  )
```

Disable Media Sense

http://support.microsoft.com/default.aspx?scid=kb;EN-US;239924

Windows contains the "Media Sensing" feature. You may use this feature on a Windows-based computer using Transmission Control Protocol/Internet Protocol (TCP/IP) to detect whether or not your network media is in a "link state". A "link state" is defined as the physical media connecting or inserting itself on the network. For example, assuming a 10bt or 100bt physical media, Ethernet network adapters and hubs typically have a "link" light to indicate the current connection status. This is the same condition in which Windows can detect a link. Whenever Windows detects a "down" state on the media, it removes the bound protocols from that adapter until it is detected as "up" again. There may be situations where you may not want your network adapter to detect this state, and you can configure this by editing the registry.

To prevent your network adapter from detecting the link state:

Use Registry Editor (Regedt32.exe) to view the following key in the registry:

HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\Tcpip\Parameters

Add the following registry value:

Value Name: DisableDHCPMediaSense
Data Type: REG_DWORD -Boolean
Value Data Range: 0, 1 (False, True) Default: 0 (False)

This parameter controls DHCP Media Sense behaviour. If you set this value data to 1, DHCP, and even non-DHCP, clients ignore Media Sense events from the interface. By default, Media Sense events trigger the DHCP client to take an action, such as attempting to obtain a lease (when a connect event occurs), or invalidating the interface and routes (when a disconnect event occurs).

Restart your computer.

18. Appendix K Sample 'hosts' file

```
127.0.0.1       localhost

# Node 1

139.185.150.54  IWINRCA01
139.185.150.201 IWINRCA01-VIP
10.10.10.2      IWINRCA01-PRIV

# Node 2

139.185.150.55  IWINRCA02
139.185.150.202 IWINRCA02-VIP
10.10.10.3      IWINRCA02-PRIV
```

If you have a DNS server you should register the following addresses in DNS

IWINRCA01
IWINRCA02
IWINRCA01-VIP
IWINRCA02-VIP

The IWINRCA01-PRIV & IWINRCA02-PRIV do not benefit from being registered in DNS as clients do not need to contact these addresses.

19. Appendix L Sample SPFILE

```
orcl2.__db_cache_size=377487360
orcl1.__db_cache_size=469762048
orcl2.__java_pool_size=4194304
orcl1.__java_pool_size=4194304
orcl2.__large_pool_size=4194304
orcl1.__large_pool_size=4194304
orcl2.__shared_pool_size=218103808
orcl1.__shared_pool_size=125829120
orcl2.__streams_pool_size=0
orcl1.__streams_pool_size=0
*.audit_file_dest='C:\oracle\product\10.2.0/admin/orcl/adump'
*.background_dump_dest='C:\oracle\product\10.2.0/admin/orcl/bdump'
*.cluster_database_instances=2
*.cluster_database=true
*.compatible='10.2.0.1.0'
*.control_files='+DATA/orcl/controlfile/current.260.570585267','+FLASH/orcl/con
trolfile/current.256.570585269'
*.core_dump_dest='C:\oracle\product\10.2.0/admin/orcl/cdump'
*.db_block_size=8192
*.db_create_file_dest='+DATA'
*.db_domain=''
*.db_file_multiblock_read_count=16
*.db_name='orcl'
*.db_recovery_file_dest='+FLASH'
*.db_recovery_file_dest_size=2147483648
*.dispatchers='(PROTOCOL=TCP) (SERVICE=orclXDB)'
orcl2.instance_number=2
orcl1.instance_number=1
*.job_queue_processes=10
*.open_cursors=300
*.pga_aggregate_target=202375168
*.processes=150
*.remote_listener='LISTENERS_ORCL'
*.remote_login_passwordfile='exclusive'
*.sga_target=609222656
orcl2.thread=2
orcl1.thread=1
*.undo_management='AUTO'
orcl2.undo_tablespace='UNDOTBS2'
orcl1.undo_tablespace='UNDOTBS1'
*.user_dump_dest='C:\oracle\product\10.2.0/admin/orcl/udump'
```

20. Appendix M Adding additional OCR & Vote devices

The best practice for the disk-based components of Oracle Clusterware is to provide redundant protection by the Oracle Software. Starting with Version 10.2 of the Oracle Clusterware the installer offers the option of either 1 or 2 OCR devices and either 1 or 3 vote devices. This apendix describes how to add a second OCR device and a second and third vote device post Oracle Clusterware install.

- It is possible to add the second Clusterware OCR device with the Oracle Clusterware software layer running.
- It is not currently possible to add new vote devices whilst the Oracle Clusterware software layer running.

Steps to prepare the disk subsystem and Operating System for addition

Create the additional disk partitions

You must add 1 more partition (inside an extended partition) of size at least 120MB. This will be used as the second OCR device.

You must add 2 more partitions (inside extended partitions) of size at least 20MB. These will be used as the additional vote devices.

- Best practices is that the OCR devices are on separate disks
- Best practices is that the vote devices are on separate disks

You can share an OCR and a vote partition on the same disk in separate partitions.

Use diskmgmt.msc to create the devices. They must be visible to all the nodes in the cluster. Due to a feature in Windows 2003 you may have to reboot the nodes in the cluster which you did not use to run the disk management applet on (This restriction does not exist in Windows 2000) to make them visible.

After creating the partitions ensure that they do not have drive letters assigned. Windows has a habit of assigning drive letters even though the partitions are not formatted with a Windows file system.

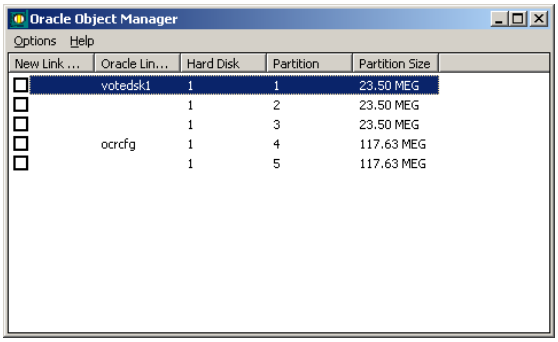
Label the partitions

The disks must be labelled using an Oracle utility called: GuiOracleObjManager.

Run this utility on the first node

```
C:\oracle\product\10.2.0\crs\BIN>guioracleobjmanager
```

A windows application will appear



The original installation of the Oracle Clusterware will have labelled 2 of the disks already

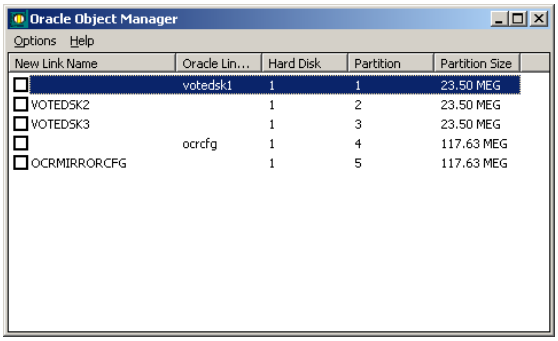
You need to label the 3 new ones you added. Make sure you select the correct partitions.

To label a disk you click just to the right of the checkbox (but still in the New Link column) you should then get the opportunity to enter the label of the partition.

Add the following labels

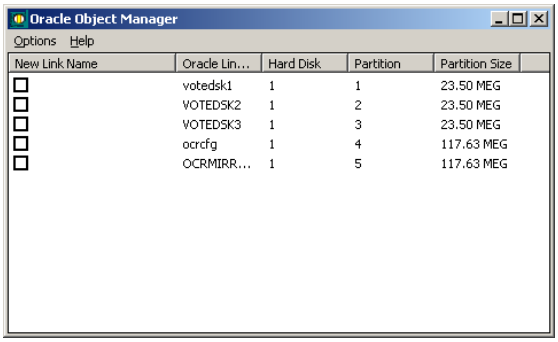
Device	Label
Second vote device	votedsk2
Third vote device	votedsk3
Second OCR device	ocrmirrorcfg

Be careful not to change or remove the existing labels. These are currently in use by the Oracle Clusterware.



Remember to hit enter after typing each link name

When done select the Options->Commit menu item to write these changes away.



Then you should select Options->Sync Nodes

Finally start the guiOracleObjManager on the other node(s) in the cluster to confirm the labels are available on all nodes.

Adding a second Oracle Cluster Registry

As previously mentioned this procedure can be completed whilst the Oracle Clusterware is active

Add the new device

Issue the ocrconfig command

```
C:\oracle\product\10.2.0\crs\BIN>ocrconfig -replace ocrmirror \\.\ocrmirrorcfg

C:\oracle\product\10.2.0\crs\BIN>
```

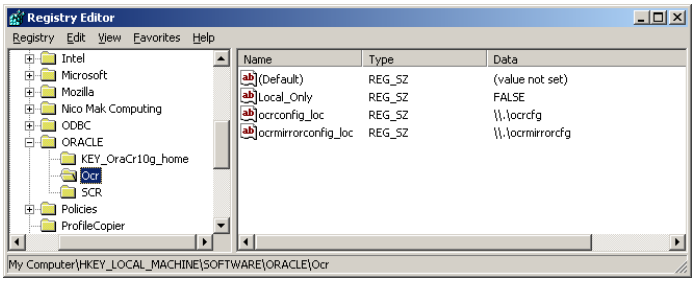
Confirm the new OCR device is added OK

You can then issue the following to make sure that 2 OCR devices are visible

```
C:\oracle\product\10.2.0\crs\BIN>ocrcheck
Status of Oracle Cluster Registry is as follows :
         Version                  :          2
         Total space (kbytes)     :     120244
         Used space (kbytes)      :       2004
         Available space (kbytes) :     118240
         ID                       : 1975880839
         Device/File Name         : \\.\ocrcfg
                                    Device/File integrity check succeeded
         Device/File Name         : \\.\ocrmirrorcfg
                                    Device/File integrity check succeeded

         Cluster registry integrity check succeeded
```

Here you can see that 2 OCR devices are being used.

On each node, using the regedit command, check that the ocrmirror device has been add to the registry



Oracle stores the key in the HKEY_LOCAL_MACHINE\SOFTWARE\Oracle\Ocr tree.

Do not change any values here, if the installation has been completed correctly then these values will be set.

Adding a second and Third vote device

As previously mentioned this process must only be carried out after stopping Oracle Clusterware on all the nodes in the cluster.

Confirm the existing configuration

You can use the crsctl command to query the state and number of vote disks

```
C:\oracle\product\10.2.0\crs\BIN>crsctl query css votedisk
 0.     0    \\.\votedsk1

located 1 votedisk(s).
```

Stop Database and Listener

You should stop any running database & listener on each node before proceeding.

Stop the Oracle Clusterware Layer on each node

Using the Windows services applet (services.msc) stop the 'OracleCSService'. This should stop both the OracleCRService and OracleEVM Service as well as they are dependent services

Repeat on all the other node(s)

Add the new vote devices

Then on node1 only: issue the crsctl command to add the additional vote disks

Each command may take a few minutes to complete

```
C:\oracle\product\10.2.0\crs\BIN>crsctl add css votedisk \\.\votedsk2 -force
Now formatting voting disk: \\.\votedsk2
successful addition of votedisk \\.\votedsk2.

C:\oracle\product\10.2.0\crs\BIN>crsctl add css votedisk \\.\votedsk3 -force
Now formatting voting disk: \\.\votedsk3
successful addition of votedisk \\.\votedsk3.

C:\oracle\product\10.2.0\crs\BIN>
```

Restart the Oracle Clusterware services on each node

Next on each node in turn start the Oracle Clusterware on all node(s)

Use the services applet (services.msc) to start the 'OracleCRService' this should start both the OracleCSService and OracleEVM Service as well as they are dependent services.

Confirm the new vote devices are added OK

Finally use the crsctl command to query the state and number of vote devices

```
C:\oracle\product\10.2.0\crs\BIN>crsctl query css votedisk
 0.     0    \\.\votedsk1
 1.     0    \\.\votedsk2
 2.     0    \\.\votedsk3
```