

NETAPP TECHNICAL REPORT

# **ORACLE10G<sup>™</sup> REAL APPLICATION CLUSTERS RELEASE 2 INSTALL WITH POWER LINUX (SUSE9)** AND NETAPP STORAGE

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## **1 INTRODUCTION**

This technical report covers the installation of NetApp storage in NFS environment for Power Linux on IBM pSeries servers. The servers are running SUSE9 (Power Linux) operating system. The database is Oracle10g Real Application Clusters release 2 (hereafter referred to as Oracle10gR2 RAC) with Oracle Cluster Ready Services (hereafter referred to as Oracle CRS). This is now a certified configuration and, as such, the components presented in this paper have to be used in the same combination to gain support from all parties involved. The only exception to this is the application of certain patches (as defined and required by all the vendors in this configuration). This document will also cover the patches and recommendations for running Oracle10gR2 RAC on NetApp Storage in NFS environment.

## 2 ASSUMPTIONS

We assume that readers are familiar with Oracle10*g* release 2 RAC and the operation of Network Appliance<sup>™</sup> storage systems. We also assume that readers are familiar with the operation of the Power Linux environment and installation of Oracle<sup>®</sup> patches and any relevant Power Linux rpms. It is also important to be familiar with all networking terminology and implementations.

## **3 THE SERVER/SYSTEM ENVIRONMENT**

The configuration presented in this document is based on the Oracle10gR2 RAC certification environment specified by Oracle and Network Appliance.



Figure 1) Oracle10gR2 RAC on IBM pSeries PowerPC servers with Network Appliance storage.

Figure 1 illustrates a typical configuration of Oracle10gR2 RAC with NetApp storage and IBM pSeries PowerPC servers running SUSE9. This is a scalable configuration and allows users to scale horizontally and internally in terms of processor, memory, and storage.

As shown in the network diagram, we recommend that you dedicate a private network connection between the Oracle10*g*R2 RAC servers and the NetApp storage. This is accomplished using a dedicated gigabit

network (with a gigabit switch) to the NetApp storage. A dedicated network connection is beneficial for the following reasons:

- In an Oracle10g R2 RAC environment, it is important to eliminate any contentions and latencies.
- Providing a separate network ensures security.

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

## 4 REQUIREMENTS HARDWARE USED FOR TESTS

#### **CLUSTER NODES**

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

#### STORAGE INFRASTRUCTURE

- One Network Appliance FAS2xx/F7xx/F8xx/FASF9x/FAS30xx system with Data ONTAP® 7.2 or later
- One gigabit switch with at least four ports.
- One gigabit NIC in the system
- One or more disk shelves, based on the disk space requirements

#### 4.1 SOFTWARE USED

For both nodes in the participating cluster unless specified of envise:

- SUSE9 Power Linux
- Oracle10g release 2 (10.2.0.1), with Real Application Clusters license

## 5 SETUP FOR NETAPP STORAGE

For more information, refer to the Network Appliance installation and setup guides at http://now.netapp.com.

- 1. Please configure a N+4pp storate system running Data ONTAP 7.2 and with NFS and SnapRestore<sup>®</sup> license keys.
- 2. Create and export volumes for storing Oracle database files on the storage:
  - A. Create three volumes on the storage (Data1) as listed below:

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

To create volumes, use the following command at the NetApp storage console:

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

Edit the /etc/exports file on NetApp storage (Data1) and add the following entries to that file:

```
/vol/orahome -anon=0
/vol/oradata -anon=0
/vol/oralogs -anon=0
/vol/oral0g -anon=0
```

B. Execute the following command at the storage system console:

Data1> exportfs -a

Note: NetApp recommends using flexible volumes in your database environment. NetApp FlexVol<sup>™</sup> technology pools storage resources automatically and enables you to create multiple flexible volumes on a large pool of disks. This flexibility means you can simplify operations, gain maximum spindle utilization and efficiency, and make changes quickly and seamlessly.

The database volume layout discussed in this document was defined for certification purposes and your setup may vary depending upon requirements. For database layout best practices on NetApp storage, please refer to NetApp Technical Report 3411 at http://www.netapp.com/library/tr/3411.pdf.

#### PATCHES, ENVIRONMENT, AND OS SETTINGS 6

## 6.1 PATCHES

Before your Oracle10gR2 RAC install, the following rpms need to be applied on IBM servers. Some of these rpms may already be applied to your system. Please verify if they already exist before a bying them.

To determine whether the required rpms are already installed and committed, energy and similar to the following:

# rpm -qa | grep compat

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

- •
- Compat-libstdc++-33-3.2.3-47.3 (ppc64) make-3.80-184.1 (Not Gmake-3.80-184.1) gcc-3.3.3-43.34 gcc-64bit-9-200505240008 gcc-c++-3.3.3-43.34 glib-1.2.10-586.1 glib-64bit-9-2004070 1606 libc-64bit-9-20050505

- glibc-devel-2.3.3-98.28
- glibc-devel-64bit-9-200407011606
- libaio-0.3.102-1.2
- libaio-64bit-9-200502241152
- libaio-devel-0.3.98-18.3
- libaio-devel-64bit-9-200407011606
- libgcc-3.3.3-43.34
- libgcc (64-bit) 9-200505240008
- libgcj-3.3.3-43.24
- libgcj-64bit-9-200407011606
- libgcj-devel-3.3.3-43.24
- libgcj-devel-64bit-9-200407011606
- libobjc-3.3.3-43.24
- libobjc-64bit-9-200407011606
- libstdc++-3.3.3-43.34
- libstdc++-64bit-9-200407011606

- libstdc++-devel-3.3.3-43.34 ٠
- libstdc++-devel-64bit-9-200407011606
- perl-5.8.5-12.1
- tcl-8.4.7-2
- unzip-5.51-7
- zip-2.3-27
- tar-1.14-4

#### THE IBM XL C/C++ ADVANCED EDITION V7.0.1 FOR LINUX RUNTIME ENVIRONMENT COMPONENT

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

www-1.ibm.com/support/docview.wss?uid=swg24007906

t-ot-da Follow the instructions on the web page to identify the correct files for SLES 9 "sles9" Kit files must be downloaded for Oracle:

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

### JAVA FOR ORACLE JDBC/OCI DRIVERS

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

IBMJava2-142-ppc64-SDK-1.4.2-1.0 ٠

From: www-128.ibm.com/developerworks/java older download.html

IBM Java 1.4.2 32-bit (SR1a) or higher

IBMJava2-142-ppc32-SDK-

From: www-128.ibm.com/deve inux140/older download.html

IBM Java 1.3.1 32-bit (SR hianer

IBMJava2-SDK-

From: www-128.ibm s/java/jdk/linux140/download.html n/develo

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

## 6.2 OS SETTINGS

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

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

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

```
# ulimit -a
core file size
                         (blocks, -c) 0
data seg size
                         (kbytes, -d) unlimited
file size
                         (blocks, -f) unlimited
max locked memory (kbytes, -1) unlimited (kbytes, -1) unlimited (kbytes, -m) unlimited (kbytes, -m) unlimited (-n) 1024
pipe size (512 bytes, -p) 8
stack size (kbytes, -s) un
stack size(kbytes, -s) unlimitedcpu time(seconds, -t) unlimited
max user processes (-u) 15168
virtual memory (kbytes, -v) unlimited
```

Verify the same for the Oracle user.

#### KERNEL SETTINGS

KERNEL SETTINGS
Add the following parameters for the shared memory and semaphores to the "/etc/systet.conf " file using root
user.
 kernel.shmall = 2097152
 kernel.shmmax = 2147483648
 kernel.shmmni = 4096
 kernel.sem = 250 32000 100 141
 fs.file-max = 65536
 net.ipv4.ip\_local\_port\_range = 1024 65000
 net.core.rmem\_default = 1048576
 net.core.rmem\_default = 262144
 net.core.wmem\_max = 1048576
 net.core.wmem\_max = 262144

#### PREINSTALC SETUR TASKS (CLUSTER NODES) 7

This information is interact for both foles in the participating cluster unless specified otherwise.

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

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

```
en6 - ip: 10.73.69.156, netmask: 255.255.255.0
en4 - ip: 192.168.73.2, netmask: 255.255.255.0
```

Where:

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

```
A sample for /etc/hosts entries
# Internet Address Hostname # Comments
10.73.68.155
                btc-ppe-srv5 btc-ppe-srv5.btcppe.netarp.com
10.73.69.155
                 btc-ppe-srv5-en6
                 btc-ppe-srv5-i
                                      btc-ppe-srv5-i.btcppe.netapp.com
192.168.73.1
10.73.68.195 btc-ppe-srv5-v btc-ppe-srv5-v.btcppe.netapp.com
10.73.68.156 btc-ppe-srv6 btc-ppe-srv6.btc/pe.netapp.com
10.73.69.156
                  btc-ppe-srv6-en6
192.168.73.2
                  btc-ppe-srv6-i btc-ppe-srv6/i.btcppe.netapp.com
                                     btc-ppe-srv6-v.btcppe.netapp.com
10.73.68.196
                  btc-ppe-srv6-
10.73.69.105 data1
```

- C Ensure the connectivity of each interface via the pir a command. (interconnects, public IPs, and storage)
- D Create NFS mount points and mount the volumes with the following mount options on all the cluster nodes. As a root user update the /ctc/fstab file on all server nodes and add the following entries:

Data1:/vol/oradace Coradata nfs rw,bg,hard,rsize=32768,vsize=32768,vers=3,proto=tcp,actimeo=0, nointr,suid,timeo=600

```
Data1:/vclorahone /orahome nfs
rw,bg,hard,rsize=32768,wsize=32768,vers=3,proto=tcp,actimeo=0,
nointr,suid,timeo=600
```

Data1:/vol/oralogs /oralogs nfs rw,bg,hard,rsize=32768,wsize=32768,vers=3,proto=tcp,actimeo=0, nointr,suid,timeo=600

```
Data1:/vol/ora10g /ora10g nfs
hard,proto=tcp,vers=3,suid,nointr,rw,bg,rsize=32768,wsize=32768,noac,
timeo=600
```

#### Where:

- Data1 is the name of the NetApp storage system.
- oradata, oralogs, orahome, and oralog are the mount points on the cluster nodes.
- oral0g is just a separate mount point for CRS files. CRS files (cluster registry file and voting disk file) can reside in the same /ora10g volume but must be mounted with "noac" mount option. "intr" mount option is required in failure scenarios in which CRS has to evict a node.

During the Oracle CRS install, please make sure to indicate a path starting with /ora10g directory when prompted for the Cluster registry file(ocr) and voting disk(css) file location.

**Note:** Oracle install will fail if you dynamically mount the NFS volumes without adding entries in /etc/fstab file.

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

```
#mkdir /oradata
#mkdir /oralogs
#mkdir /orahome
#mkdir /oralog
```

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

## 8 INSTALLATION PROCEDURE

For an Oracle10gR2 RAC install SUSE Power Linux, please refer to Oracle install documentation (part # B14203-05). The link below provides instructions for Oracle10gR2 RAC install on SUSE Power Linux:

## 8.1 PREPARING TO INSTALL THE ORACLE RAC 106 ON CLUSTER NODES

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

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

Repeat the same for orahome and oralcos volumes.

3. Set up account equivalence between the cluster nodes for the oracle user account. Add the following entries to the /etc/hosis.equiv file on all cluster nodes:

btc-ppe-srv5 oracle btc-ppe-srv6 oracle btc-ppe-srv5-i oracle btc-ppe-srv6-i oracle

4. Test the oracle account equivalence using a remote shell utility such as rsh after logging in as the oracle user from both cluster nodes.

btc-ppe-srv5:

```
#su – oracle

$rsh btc-ppe-srv5 pwd

$rsh btc-ppe-srv6 pwd

$rsh btc-ppe-srv5-i pwd

$rsh btc-ppe-srv6-i pwd
```

btc-ppe-srv6:

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

# 8.2 INSTALLING THE ORACLE RAC 10G CLUSTER READY SERVICES (CRS)

Prior to installing the Oracle10*g* database, Oracle Cluster Ready Services (CRS) must be installed, configured, and started. Refer to Oracle Real Application Clusters Installation and Configuration Guide 10g release 2 (10.2.0.1) for UNIX<sup>®</sup> Systems at <u>http://otn.oracle.com/docs/content.html</u> for more information on installing Oracle Cluster Ready Services on Linux. This section briefly describes the procedures for using the Oracle Universal Installer (OUI) to install CRS. Note that the CRS home that you identify in this phase of the installation is only for CRS software; this home cannot be the same home as the Oracle10*g* RAC database home. In short, ORACLE\_HOME and CRS HOME must be different locations.

 Run the runInstaller command from the /crs subdirectory on the Oracle Cluster Ready Services release 21 (10.2.0.1) CD-ROM. This is a separate CD that contains the Cluster Ready Services software. This document assumes that the OUI is started from node 1 (btc-ppe-srv5). When the OUI displays the Welcome page, click Next



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

Specify Inventory directory and cred	entials
You are starting your first installation on this host. As part of this is directory for installer files. This is called the "inventory directory", installer automatically sets up subdirectories for each product to consume typically 150 Kilobytes per product.	estall, you need to specify a within the inventory directory, the contain inventory data and will
Enter the full path of the inventory directory.	
(home local Onlocalmenton)	Browse
province of a solution of a	
You can specify an Operating System group that has write permis You can leave the field blank if you want to perform the above op	sion to the above inventory directory, erations as a Superuser.
You can specify an Operating System group that has write permis You can leave the field blank if you want to perform the above op Specify Operating System group name:	sion to the above inventory directory. erations as a Superuser.
You can specify an Operating System group that has write permis You can leave the field blank if you want to perform the above op Specify Operating System group name: dba	sion to the above inventory directory, erations as a Superuser.
You can specify an Operating System group that has write permiss You can leave the field blank if you want to perform the above op Specify Operating System group name: dba	sion to the above inventory directory, erations as a Superuser.

3. The Specify File Locations page contains predetermined information for the source of the installation files and the target destination information. Specify the destination path for the shared CRS home. The path should be on a shared file system and different from SORACLE\_HOME. In this exercise, the shared CRS home was /orahome/ora10g/product10.2.0/crs\_f

Oracle Universal Installer: Specify Home Details	
Specify Home Details	
Destination	e product
Name: OraCrs10g,home1	e prover.
Path: /orahome/ora10g/product/10.2.0/crs/_1	Browse_ )
Frad	uct Languages
Help I Installed Products ) Back Next I Install	Cancel



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

7

pecify Cluster	Configuration		
inter a name follow obster ode, specify the name for t or the virtual IP address on ou can use a cluster config	r and release to be mana the public IP address, the name fo the node. Invation file to configure your cluste the Caster Nodes box. The Use Clu	ged by the Oracle Clusterware. For e in the private interconnect, and the ni the private interconnect, and the ni the private interconnect in the private option is helpfill ster Configuration File option is helpfill	ame m
le instead of completing th ou have many nodes. Juster Name: Crs			-
le instead of completing th ou have many nodes. Juster Name Crs Cluster Nodes Public Node Name	Private Node Name	Virtual Host Name	
le instead of completing th ou have many nodes. Juster Name, Crs Cluster Nodes Public Node Name btc-ppe-srv5	Private Node Name btc-ppe-srv5-i	Virtual Host Name btc-ppe-srv5-v	
le instead of completing th ou have many nodes. Juster Name Crs Cluster Nodes Public Node Name btc-ppe-srv5 Clicerpe-srv5	Private Node Name btc-ppe-srv5-i btc-spe-srv5-i	Virtual Host Name btc-ppe-srv5-v btc-poe-srv6-v	

this cluster.		 noues in
Eublic Node Name:	btc-ppe-srv5	 _
Private Node Name:	btc-ppe-srv5-i	
Private Node Name: Virtual Host Name:	btc-ppe-srv5-i btc-ppe-srv5-v	 

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

	0
h global interface shown in the	a son nerow. Public, Private, or Do Not
by Oracle Clusterware for int	er-hose traffic.
associated with an interface.	then click Edit and change the interface's
ace normalishin the additional"	rubnets.
$\mathcal{O}$ $\mathcal{O}$	
N'G	
Subnet	Interface Type
X1073.69.0	Do Not Use
10.71.68.0	Public
192.168.73.0	Private
	by Oracle Clusterware for im associated with an interface, ace normal with the additionan Submit 103.69.0 1071.68.0 192.168.73.0

Select a global	network interface type of Public, Private	t, or Do Not Use
Interface Name	: 0170	
Subnet:	10.73.68.0	-
Public Private	Type	

6. On the Oracle Cluster Registry page, specify the OCR (Oracle Cluster Registry) fite. Valke sure to specify the full path to a shared location along with the name of the file. Do same or mirror file if you want normal redundancy. In our case, we used /ora10g/ocrfile and /ora10g/ocrfile\_mirror. Click Next.

	niversal Ins	italler: Spa	cify Oracle	(Cluster	Regitt	
Consilie -	Ownedla Ch					
specify	Oracle Cit	uster keg	istiv (DC	R) Local	lion	
The Oracle Clu cluster file sys from all of the	uster Registry (OC tem file or a shar nodes in the clus	(R) stores cluster red raw device c ster.	and satabase on ontaining at least	outiouration I 100MB of fre	nformation. Spe le space that is	cify a accessible
			.0.			
Normal R Choose th 100 M5 of	edundancy is option to enable disk space familie	microred copy	overe to manage	OCR mirroring	You will need a	n additional
C External f	tereschercy is officer if you see	bying your disk	nanagement syste	m to provide C	CR redundancy	ł
Choose th						
Choose th	0					
Choose th Specify QCR L	scation: 1/0	ra10g/ocrfile			-	
Choose th Specify QCR L Specify OCR M	pcation: //o	ra10g/ocrfile ra10g/ocrfile_m	irror			>

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

Specify Voting	Disk Location	
The Oracle Clusterware vo ownership among the nod system file or a shared ran cluster. The installer requ	ting disk contains cluster membership information and arbitr es of your cluster in the event of network failures. Specify a w device that is accessible by the same name from all of the lines at least 20M8 of free space for the voting disk that it cre	ates cluster cluster file nodes in the sates.
- Voting Disk Configura	ation	-
<ul> <li>Normal Redundancy Choose this option to e Each additional copy re</li> </ul>	nable the Oracle Clusterware to manage two additional copies of y quires 20MB of disk space.	our voting di
Choose this option if yo	ou are using your disk management system to provide voting disk	redundancy.
Yoting Disk Location:	/ora10g/cssfile	×
Additional Voting Disk 1 L	ocation: //ora10g/cssfile_mirror	20
Additional Voting Disk 2 L	acation: //ora10g/cssfile_mirror1	-0-
The second		and the second schedule
ORACLE		
CRACLE	CRS Installation	
CRACLE ck Install to continue ( Oracle Universal	CRS Installation	
CRACLE ck Install to continue ( Oracle Universal Summary Oracle Queternal	CRS Installation	0
CRACLE ck Install to continue ( Oracle Universal Summary Oracle Clusterman	CRS Installation	
Cracle Universal	CRS Installation	0
Cracle Universal Coracle Universal Summary Oracle Clusterway Global Setting Source /Omp/ora Oracle Home: /rai Cluster Nodes	CRS Installation	
CRACLE ck Install to continue ( Coracle Universal Summary Oracle Clusterman Global Settler Global Settler Coracle Home / Ca Coracle Home / Ca Chuster Nodes Installation Type: C Product Languages English O Space Requirements	CRS Installation	0
CRACLE ck Install to continue of Coracle Universal Summary Oracle Clusterman Global Settler -Source: /dymp/ora -Oracle Home: /rai @ Cluster Nodes -Installation Type: C @ Product Languages -English @ Space Requirements -/ Required 791MB	CRS Installation	0
CRACLE Ck Install to continue ( Coracle Universal Summary Oracle Clusterman Global Settler - Source / domp/ora - Oracle Home / rai - Oracle Home / r	CRS Installation	0
CRACLE Ck Install to continue ( Coracle Universal Summary Oracle Clusterman Global Setting -Source /dymp/ora -Oracle Home: /rai Cluster Nodes -Installation Type: C Product Languages -English Space Requirements -/ Required 791MB -/tmp/ Required 64 B-Remote Nodes P New Installations (B)	CRS Installation	0
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Install	
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a Installation in progress	
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Remote operations pending	
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Extracting files to '/orphome/orp10g/groduct/10.2.0/ors_1!	
15	
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54%	
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Installing Oracle Clusterware 10.7.0.1.0	
Install successful	
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updating '/orshome/ors10g/product/10 2 0/crs_1/install/cluster.ini.	
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Install successful	
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Remove operations in glog ev	
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Copying Oracle home "/orahome/ora10g/product/10.2.0/crs_1' to remote no	odes 'bic-ppe-srv6'.
5.9N	
Stop Installation	
You can find a log of this install session at:	
/orshome/ors10g/ors/nvemory/logs/installActions2006-11-29_03-12-096	M.log
Help   Installed Products.   Back Nest	Install Cancel



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

The follo node.	awing configuration scripts need to be exe	cuted as the	"root" user in each	cluster
Şcripts t	o be executed:			
Numbe	r Script Location		Nodes	
1	/orahome/ora10g/orainventory/orainst	Root sh	btc-ppe-srv5,btc	-ppe-s
2	/orahome/ora10g/product/10.2.0/crs	_1/root.sh	btc-ppe-srv5,btc	-ppe-s
	523773474641122	_		_
<b>L</b> 41				_
2. Lo 3. Ru 4. Re Note: D	g in as "root" in the scripts in each cluster node turn to this window and click "OK" to conti o not run the scripts simultaneously on the	nue listed nodes	t.of.	Sal
$\square$	Help	<u>?`</u>	00	K
Ond	e Universal Installers Configure	Gon Assis	iants	
Conf	iguration Assistants		10	J.s
The follo	Wing configuration assistants will configure and s	Status	nents you selected ea Type	rtier.
Ora	cie Clusterwari			
□ Ora	cle Notification Server Configuration Assistant	Succeeded	Recommend	ed
E Ora	cle Private Interconnect Configuration Assistant	Succeeded	Recommend	ed
I Ora	cle Cluster Verification Utility	Page day 1	Recommend	ed
-			Betry	Stop
Details (	see full log at /orahome/ora10g/oralmentory/lo	gs/installAction	2006-11-29.03-12	-09PM.1
	and the second state of the se	and the second sec		

Next

3

Install Cancel

Installed Broductr. ) Back

Help

ORACLE





12. Run vipca utility from \$ORA\_CRS\_HOME/bin directory as root user on Master Node (btc-ppe-srv5). Click next. Click next. 20





13. Select the Public Interface. Click Next.

VIP Configuration A	ssistant, Stop	l of 2 a N	stwork Int	97 💶 🗖 🔀
	his page displays the etwork interfaces from	supported net the list	work interfaces fi	ound. Select the
Cancel Help		Select All S	elect None	f.date
		0		1999
14. Specify Virtual IP address ar	nd Subnet mask of	each node	Click Next.	
VIP Configuration A	ssistent, Step	2 05 1 : 1	Irtual IPs fe	97 🔳 🗆 🔀
	ch cluster node	an ini nemini	i viriali ir resoar	ce appocation for
	Node tank IP A	ias Name	IP address	Subnet Mask
	btc page srv5			255.255.255.0
	ette ope-srv6			255.255.255.0
		Clear C	tear al	
Cancel Help		(4.1	ack Next	»)





16. Click OK and then exit to finish VIPCA.



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

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

Where:

-n displays the member number with the member name

-I displays the local node name

-v activates verbose mode

-g activates logging

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

### 8.3 INSTALLING ORACLE RAC 10G SOFTWARE

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

Oracle Universal Installer: Specify Home Details Specify Home Details	
Destination	
Enter or select a name for the installation and the full path where you want to in	nstall the product.
Name OraDb10g,home1	
Path: /orshome/ors10p/product/1902 0/db 1	Browse
AROntern	

3. On the next screen, select Cluster Installation and choose all the nodes in the cluster. For our exercise, the two cluster nodes were btc-ppe-srv5 and btc-ppe-srv6. Click Next. (Note: If the nodes are not displayed in the cluster node selection, then Oracle Cluster Ready Services are not configured or started on those cluster nodes.)

	Univer	sal Instal	len 5	pecify I	lardwa	ire Clu	ster Inst	
Speci	fy Hard	dware C	luste	r Insta	llatio	n Mod	le	
Cluste Select n produc	r (nstallati odes (in ad is that you r	on dition to the k select in this in	ocal node istallation	a) in the har 1.	dware clu	ner where	the installer	should install
No	de Name							
IP bto	-ppe-sn5							
St bit	- non- court							12
the second se	-bbe-auto							
	-hbe-sive							
	-the-sixe							
							Select All	Deselect Al-
Clocall	astallation		8		-	-	Şelett All	Deselect Al
Lgcal I Select t	nstallation if	1 You want to p	perform a	single nod	e non-clus	ter installi	Select All	
Local I Select t node is	nstallation his option if part of a h	1 Vou want to p ardware cluste	perform a er.	single nod	e non-clus	ter installi	Select All	Deselect As
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Local I Select t node is Help	nstallation his option if part of a h	n You want to p ardware clusti alled Products	serform a er.	single nod Back	e non-clus	ter installi	Select All	Deselect Au ough the Jojal

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

Select Configuration	Unreeds	ion You can cho IM) for mana	ose either t ping databa	o create a data se file storage nd perform en	abase or to Alternatively, you database
Configuration later.	anageme	ent (ASM)			
Confirm A3M S15 Pastword					





#### 7. Click OK to continue.



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

The foli node.	owing configuration scripts need to be executed as th	e "root" user in each cluster
Numbe	r Scriptificocation	Nodes
1	/orahome/ora10g/orainventory/orainstRoot.sh	btc-ppe-srv5
2	/orahome/ora10g/product/10.2.0/db_1/root.sh	bic-ppe-sn/5,btc-ppe-sn/6
To exec	ute the configuration scripts:	
1.00 2.10 3.Ri 4.Ri	ig in as "root" ig in as "root" in the scripts in each cluster node sturn to this window and click "OK" to continue	
		(

9. Click exit to finish the Database Installation.



#### **APPENDIX** 9

Sample .bash profile file for the Oracle user:

```
export ORACLE BASE=/orahome/oral0g;
export ORACLE PRODUCT=$ORACLE BASE/product;
export ORACLE HOME=$ORACLE PRODUCT/10.2.0/db 1;
export ORACLE CRS=$ORACLE PRODUCT/10.2.0/crs 1;
export ORACLE SID=oce;
export
LD LIBRARY PATH=$ORACLE HOME/lib:$ORACLE CRS/lib:$ORACLE HOME/lib32:$LD LIBRARY
PATH;
export LIBPATH=$ORACLE_HOME/lib:$ORACLE CRS/lib:$ORACLE HOME/lib32:$LIBPATH
export
PATH=$PATH:$ORACLE HOME/bin:$ORACLE HOME:$ORACLE CRS/bin:/usr/java14/bin;
```

## **10 ACKNOWLEDGEMENTS**

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Daniel Morgan, Shanthi Adloori, Uday Shet, Vasu Subbiah

## **11 DISCLAIMER**

Each environment has its own specific set of requirements and o guarantees can be given that the results presented in this report will work as expected on other platforms. This paper should assist in the research and troubleshooting that may be required in a particular case and serve as a checklist of items to be aware and troubleshooting that may be required in a particular rase and serve as a checklist of items to be aware of. Please forward any errors, omissions dimerences new discoveries, and comments about this paper to niranjan.mohapatra@netapp.com



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