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# Purpose and Scope

The purpose of this document is to describe step by step instructions that must be followed to consistently perform the installation and configuration of Oracle 12.1.0.2 clusterware on an LINUX host. This document also describes the tests that must be performed in order to verify that the Infrastructure Component has been installed and configured correctly. These verification tests constitute the Infrastructure Component Installation and Operation Qualification.

This document applies to all AstraZeneca® personnel who install Oracle 12.1.0.2 clusterware on an LINUX Server for use on the AZ Account.

It is a contractual requirement to follow this Installation Instruction precisely. If this is not possible you must report this fact to your Line Manager immediately so that the Installation Instruction can be corrected.

Any deviations from the instructional steps contained within this document must be recorded in the Global Component Qualification Record that is used to record the outcome of the post installation verification tests.

# References

|  |  |
| --- | --- |
| **Document Number** | **Document Title** |
| AZ-Regional-XXXXX | Regional Component Qualification |
| Oracle Doc: XXXXXX | Oracle Clusterware and Oracle Real Application Clusters  Administration and Deployment Guide 12c for LINUX |
| Oracle/AZ Joint Solutions Centre cookbook | Quick Installation Guide  Oracle 12c Real Application Cluster Instillation on LINUX environment with ASM. |

# Definitions

|  |  |
| --- | --- |
| **Term** | **Definition** |
| **Installation Instruction (II)** | Approved and controlled documents that describe how an Infrastructure Component is installed (currently referred to as Cookbooks, Installation Checklists, and Work Instructions). The installation instructions also define the verification tests that are required to confirm that the installation has occurred successfully and that the Infrastructure Component functions as anticipated. |
| **Regional Component Qualification Templates** | Required information in a template format that are managed by the Infrastructure Standards group and are available in the SharePoint under the Templates category. |
| **Role** | Roles and responsibilities identified in this document are defined in general terms (objectives), which should not be interpreted as all inclusive (tasks), and are meant as logical groupings of tasks. Several roles might be performed by the same individual or multiple individuals. A role may be split among several individuals. |
| **Template** | Fixed layout document with blanks for the insertion of information into required fields. Fields cannot be added or deleted, but existing fields/tables can be expanded. |
| AZ SharePoint | AZ SharePoint – A document management system to manage, store and provide access to compliance-related procedure and project documents for AZ staff on the AstraZeneca Account. |
| <> | Used in syntax and command examples to show generic text; these should be replaced by user supplied values e.g. <$ORACLE\_BASE>/product/12.1.0.2 would be entered as /u001/app/oracle/product/12.1.0.2/db\_1 |
| **$ORACLE\_GRID** | The directory where the Oracle cluster software will be installed (e.g. /u001/app/oracle/12.1.0.2/grid/). |
| **Oracle RAC** | Oracle Real Application Cluster - Oracles clustered database offering. |
| **Node** | A server in a cluster |

# Instructions Roles Overview

Roles and responsibilities identified in this document are defined in general terms (objectives), which should not be interpreted as all inclusive (tasks), and are meant as logical groupings of tasks. Several roles might be performed by the same individual or multiple individuals. A role may be split among several individuals.

The following roles are identified within this document:

## Oracle DBA

Overall responsibilities for developing Installation Instructions and Regional Component Qualification records.

# Instructions

This section lists the basic steps executed to install and configure the Infrastructure component. The installation procedure is divided into the following parts to allow the checks and configurations to be performed incrementally with each step building upon the previous.

Pre-requisites

* + 1. Confirm the Clusterware installation specification has been received:

Network Layout.

|  |  |  |  |
| --- | --- | --- | --- |
| Network Interface cards, IP addresses and names.  Required for /etc/hosts and specifying interface usage | | | |
|  | Public | | |
| Node name | Network card name | Alias | IP |
| Node-1 |  |  |  |
| Node-2 |  |  |  |
|  | SCAN | | |
| Node name | Network card name | Alias | IP |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  | VIP | | |
| Node name | Network card name | Alias | IP |
| Node-1 |  |  |  |
| Node-2 |  |  |  |
|  | RAC Interconnect (private) | | |
| Node name | Network card name | Alias | IP |
| Node-1 |  |  |  |
| Node-2 |  |  |  |

* + 1. Confirm that the operating system has been patched as per the patch requirements. Refer to the installation guide on how the values can be set or checked.
    2. Confirm that the **oracle** and **root** account has been set up with unlimited resources the Unix sysadmin. This can be checked by running ‘ulimit –a’ for both oracle and root.

The oracle LINUX server specification states:

core file size (blocks, -c) 0

data seg size (kbytes, -d) unlimited

scheduling priority (-e) 0

file size (blocks, -f) unlimited

pending signals (-i) 514397

max locked memory (kbytes, -l) 64

max memory size (kbytes, -m) unlimited

open files (-n) 1024

pipe size (512 bytes, -p) 8

POSIX message queues (bytes, -q) 819200

real-time priority (-r) 0

stack size (kbytes, -s) 8192

cpu time (seconds, -t) unlimited

max user processes (-u) 2047

virtual memory (kbytes, -v) unlimited

file locks (-x) unlimited

* + 1. Confirm that the maximum number of processes that are allowed for each user has been configured by the Unix sysadmin to be greater than 2048. This can be checked logging in as root and running ‘smit chgsys’

Confirm all IP addresses and Interface names have been set up, for a CRS to function, each node requires 3 addresses as shown below. Ensure that the subnets for the public and vip addresses are the same. Note that on AstraZeneca there is a separate management lan address for each server. This address is on its own interface (NIC) and must not be used. Ensure all addresses and names from all the public, private VIP and SCAN are in /etc/hosts.

|  |  |  |  |
| --- | --- | --- | --- |
| Type | Interface name | Registered in | Example |
| Public | node.fully qualified, node | DNS servers | 10.15.56.201 |
| Virtual | node\_vip , node\_vip.fully qualified | DNS servers | 10.15.56.207 |
| Private | node\_priv, node\_priv.fully qualified | Only registered in hosts file | 10.15.137.64 |
| SCAN | node\_scan, node\_scan, & node\_scan.fully qualified | DNS servers | 10.15.56.203 |

E.g.

# Public

10.15.56.201 usgblocpoc01 usgblocpoc01.medimmune.com

10.15.56.202 usgblocpoc02 usgblocpoc02.medimmune.com

# Private

10.15.137.64 usgblocpoc01-priv.medimmune.com usgblocpoc01-priv

10.15.137.65 usgblocpoc02-priv.medimmune.com usgblocpoc02-priv

# Virtual

10.15.56.207 usgblocpoc01-vip.medimmune.com usgblocpoc01-vip

10.15.56.208 usgblocpoc02-vip.medimmune.com usgblocpoc02-vip

# Scan IP’s and SCAN Name - usgblocpoc01-scan.medimmune.com

10.15.56.203

10.15.56.204

10.15.56.205

Ping each interface in the cluster from each node, i.e. ping everything from everywhere and ensure that the correct IP address is returned

Note: Because CRS is not installed yet, the ‘vip’ addresses will not ping as its CRS that assigns the vip address to the interface card.

Confirm from the sys admin that the network adapter names on which the private IP network is configured is the same on all the nodes. Determine the name of the adapter by determining the public IP address for the node from /etc/hosts, running the ifconfig –a command and seeing which adapter its assigned to.

For the Oracle team to be able to use cloning of Clusterware kernels, we need a consistent setup of the Network Interfaces.

The Public, Virtual & Private Interfaces should be defined using ether channeling from the Virtual I/O server and the Oracle related interfaces defined thus:

en0 Public & VIP Adapter

en2 Private Interconnect Adapter

en1 will be reserved for the Unix Management connection

Confirm that the followings users exist

* grid
* oracle

Confirm that the clustered filesystem has been setup and visible from all nodes.

**5.1.8 Public – Requires one interface or network Adapter/card:**

|  |  |
| --- | --- |
| Oracle Team | * Static IP address. * Configured before installation for each node, and resolvable to that node   before installation.   * It should be on the same subnet as all other public IP addresses, VIP   addresses, and SCAN addresses.   * A public IP is registered on DNS. * Assign One IP address with an associated host name (or network name)   registered in the DNS for the public interface.   * Each node needs a public IP address this can be an interface bonded   using IPMP. |

**5.1.9 Private – Requires one interface or network Adapter/card:**

|  |  |
| --- | --- |
| Oracle Team | * Static IP address. * This private hostname does not need to be resolvable through DNS and should be entered in the /etc/hosts file. * The private IP should NOT be accessible to servers not participating in   the local cluster. (Only RAC Nodes should ping each other using Priv IP)   * The private network should be on standalone dedicated switch(es). * The private network should be deployed on Gigabit Ethernet or better * Configured before installation, but on a separate, private network, with   its own subnet, that is not resolvable except by other cluster member nodes.   * A private IP only known to the servers in the RAC configuration, to be   used by the interconnect.   * Configure the private interconnect network interface cards to have a   private node name and a private IP address.   * This can be an interface bonded using IPMP. * Choose a private IP address that is in the address range   10.\*.\*. \* or 192.168.\*.\*  Private 10.0.0.1 Hosts file  Private 10.0.0.2 Hosts file   * The private IP address should be on a separate subnet than the public   IP address.   * Oracle strongly recommends using a physically separate, private   network (You can use a VLAN on a shared switch if you must).   * You should ensure that the private IP addresses are reachable only by   the cluster member nodes.   * Use Non-Routable network addresses for private interconnect:  Class A: 10.0.0.0 to 10.255.255.255  Class B: 172.16.0.0 to 172.31.255.255  Class C: 192.168.0.0 to 192.168.255.255 |

**5.1.10 VIP – NOT required separate Network adapter/card, it uses existing public interface:**

|  |  |
| --- | --- |
| Oracle Team | * Static IP address. * The virtual IP address and the network name must not be currently in use, (But should not be accessible by a ping command or NOT Pingable). * Configured before installation for each node, The IP address and host name are currently unused (it can be registered in a DNS, but should not be accessible by a ping command). * It should On the same subnet as all other public IP addresses, VIP addresses, and SCAN addresses. * A virtual IP is registered on DNS, but NOT defined in the servers. It will be defined later during Oracle Clusterware Install * Assign One virtual IP (VIP) address with an associated host name registered in a DNS. |

**5.1.11 SCAN– VIP – Define in corporate DNS (Domain Name Service), this again uses existing public Interface:**

|  |  |
| --- | --- |
| Network Team | * Determine your cluster name. The cluster name should satisfy the following conditions. * The cluster name is globally unique throughout your host domain. * The cluster name is at least 1 character long and less than 15 characters long. * The cluster name must consist of the same character set used for host names: single-byte alphanumeric characters (a to z, A to Z, and 0 to 9) and hyphens (-). * Define the SCAN in your corporate DNS (Domain Name Service) |

SCAN Name creation:

|  |  |
| --- | --- |
| DNS Service Team | 5.2 When Networks team has shared the IP’s address below, Oracle DBA/Unix   team requesting to DNS service team to register the IP’s address and create a   SCAN Name.  # Scan IP’s and SCAN Name - **usgblocpoc01-scan.medimmune.com**  10.15.56.203  10.15.56.204  10.15.56.205  SCAN Name standards as below,  <Server Name-scan. (Medimmune.com/asiapc.astrazeneca.net, etc.> |

## Oracle User creation by IAM Permission team:

|  |  |
| --- | --- |
| IAM Permission Team | 5.3 We will request to IAM Permission team to create an Oracle group and   account and other OS users.  groupadd -g 54321 oinstall  groupadd -g 54322 dba  groupadd -g 54323 oper  #groupadd -g 54324 backupdba  #groupadd -g 54325 dgdba  #groupadd -g 54327 asmdba  #groupadd -g 54328 asmoper  #groupadd -g 54329 asmadmin  useradd -u 54321 -g oinstall -G dba,oper oracle |

Oracle account setup:

| **Role** | **Step** |
| --- | --- |
| Oracle DBA | Ensure the following before commencing:  Form contained in appendix C is completed, to ensure that the information required for the installation is available  the root password Is known  /etc/hosts contains all the nodes, private, vip, scan entries  use ‘ifconfig –a’ to confirm that the interface names and IP addresses are as expected and documented in the Build Form. |
| Oracle DBA | Log onto each node in the cluster using your own ID and su to the “oracle” user |
| Oracle DBA | Update the Oracle profile  edit the .profile and add the following at the bottom of the file changing the ORACLE\_GRID and CV\_NODE\_ALL as appropriate  #######################################################################  # Set up for RAC  #######################################################################  export AIXTHREAD\_SCOPE=S  export ORA\_CRS\_HOME=/u001/app/12.1.0.2/grid  export PATH=$ORACLE\_GRID/bin:$PATH  export CV\_NODE\_ALL=<node\_1>,<node\_2>,…  umask 022 |
| Oracle DBA | Logout of the oracle account and log back in (to test new .profile) |
| Oracle DBA | Confirm that the oracle user is configured identically on each node. The ‘id’ command must return identical values on each node. Note that that the oracle account primary group is oinstall and secondary group is dba. E.g.  uid=10000(oracle) gid=301(oinstall) groups=300(dba)  there is a directory ~oracle/.ssh with permissions 700.  Set the umask for the oracle user to be 022 in the .profile  edit any .kshrc or .profile files such that all stty commands or anything scripts called that may have stty commands or commands that echos to the terminal are wrappered with an if statement which checks for whether the session has a terminal attached to it.  See example below:  # --------------------------------------------------------------------------  # all stty commands have to be wrappered to prevent ssh installation errors  # --------------------------------------------------------------------------  if [ -t 0 ] ; then  stty erase ^H  fi |
| Oracle DBA | Configure keys for oracle user equivalence on each node  Login as the oracle user  Confirm ssh daemon is running ( ps –ef | grep sshd ), if not contact unix team.  Generate the rsa and dsa keys in the location ~oracle/.ssh, and empty password, i.e. when prompted for a password, hit the enter key.  $ mkdir ~/.ssh  $ chmod 700 ~/.ssh  $ cd ~/.ssh  ssh-keygen –t rsa  ssh-keygen –t das |
| Oracle DBA | On A NODE: Compile and distribute a ‘master’ authorized keys file for oracle user equivalence If prompted to continue connecting then reply ‘yes’. Provide password if requested.  Login as the oracle user  Create a ‘master’ keys file  cd ~oracle/.ssh  ssh <node\_1> cat ~oracle/.ssh/\*.pub >> authorized\_keys  ssh <node\_2> cat ~oracle/.ssh/\*.pub >> authorized\_keys  …  ssh <node\_n> cat ~oracle /.ssh/\*.pub >> authorized\_keys  chmod 600 authorized\_keys  Copy the master authorized\_keys file to all the nodes in the cluster and restrict permissions. If prompted to continue connecting then reply ‘yes’. Provide password if requested.  cd ~oracle/.ssh  scp ssh authorized\_keys <node\_2>:~oracle/.ssh/  ssh <node\_2> chmod 600 ~oracle/.ssh/authorized\_keys  …  scp ~oracle/.ssh/authorized\_keys <node\_n>:~oracle/.ssh  ssh <node\_n> chmod 600 ~oracle/.ssh/authorized\_keys |
| Oracle DBA | To prevent X11 forwarding causing installation errors  Create a file ~oracle/.ssh/config, if it doesn’t exist  vi ~oracle/.ssh/config and add the following line, note the case is important:  Host \*  ForwardX11 no  Copy the file to the other nodes. If prompted to continue connecting then reply ‘yes’. Provide password if requested.  cd ~/.ssh  scp ~oracle/.ssh/config <node\_2>:~/.ssh  …  scp ssh ~oracle/.ssh/config <node\_n>:/home/oracle/.ssh |
| Oracle DBA | Test ssh by logging onto each node in the cluster and executing the following date command. If prompted to continue connecting then reply ‘yes’. Provide password if requested.  ssh <node\_1> date  …  ssh <node\_n> date  exit |
| Oracle DBA | Retest ssh by logging onto each node in the cluster and re-executing the date command as above. Confirm that the command will work without any prompts |

Unix OS Database Server Delivery Specifications:

The below details define the standard handover configuration of Oracle database servers from the Unix team.

The delivery specification information should be provided to the Unix area to ensure that consistent server builds occur & can be used as a DBA checklist against which the server setups can be verified.

**5.5.1 Hardware Details:**

The following are the hardware requirements to properly install Oracle RAC Database 12c on a x86\_64 system:

• Minimum of 4 GB of RAM for the installation of both Oracle Grid Infrastructure   
 and Oracle Database2   
 • The minimum of three Network Interface Cards (NIC) with the usage of direct   
 attach storage or fibre channel storage; however, four NICs are recommended.   
 • Red Hat Enterprise Linux 7.x Server x86\_64 with kernel 3.10.0-123 or higher   
 • Console access that supports 1024 x 768 resolution to ensure correct display of   
 Oracle's Universal Installer (OUI).   
 • All nodes within the Oracle RAC Database environment require the same chip   
 architecture. This reference architecture uses 64-bit processors on all nodes within   
 the cluster.

**5.5.2 Server Details:** The hardware for the server used within this reference environment. This hardware meets the minimum requirements for properly installing Oracle Database 12c Release 1 (12.1) on a x86\_64 system.

|  |  |
| --- | --- |
| **Server Hardware** | **Specifications** |
| Oracle 12c RAC Release 1 server  (db-oracle-node1, db-oracle-node2) | Red Hat Enterprise Linux 7 kernel 3.10.0-123.el7.x86\_64 |

**5.5.3 Disk Space Details:** The following is the disk space requirements for properly installing Oracle Database 12c Release 1 (12.1) software for this reference environment.

|  |  |
| --- | --- |
| **Software** | **Disk Space** |
| Oracle Grid Infrastructure Home  (includes software files) | 70 GB |
| Oracle Database Home Enterprise Edition  (includes software files and data files) | 70 GB |
| /tmp | 10 GB |

**5.5.4 File System Layout:** File System Layout specifies the file system layout for the server used in this reference environment. The layout ensures the disk space requirements to properly install the Oracle Grid Infrastructure and Oracle Database software for Oracle RAC Database 12c Release 1 (12.1).

|  |  |
| --- | --- |
| **File System Layout** | **Disk Space Size** |
| / | 15 GB |
| /dev/shm | 24 GB |
| /boot | 248 MB |
| /home | 8 GB |
| /tmp | 4 GB |
| /u001 | 50 GB |
| /usr | 5 GB |
| /var | 8 GB |

Oracle RAC Database 12c Release 1 (12.1) recommends three volumes each of at least 4 GB in size to store the Oracle Cluster Registry (OCR), voting disks, and the Oracle Grid Infrastructure Management Repository (GIMR) within an Oracle ASM disk group with the use of normal redundancy. The OCR manages the Oracle Clusterware and Oracle RAC Database 12c Release 1 configuration information. The voting disk manages any information pertaining to the node membership. GIMR is a mandatory installation with the release of Oracle Grid Infrastructure 12c Release 1 (12.1.0.2).

**5.5.5 RAM and Swap Space:**

Swap space is determined by the amount of RAM found within the system. The following table displays the swap space recommendation. This reference environment allocates 16 GB of RAM for swap space.

|  |  |
| --- | --- |
| **RAM** | **SWAP Space** |
| 2 GB up to 16 GB | Equal to the size of RAM |
| Greater than 16 GB | 16 GB of RAM |

**5.5.6 Oracle Database 12c Release 1 (12.1) Package Requirements:**

A specific set of packages is required to properly deploy Oracle RAC Database 12c Release 1 (12.1) on Red Hat Enterprise Linux 7 (x86\_64). The number of installed packages required varies depending on whether a default or minimal installation of Red Hat Enterprise Linux 7 (x86\_64) is performed.  
  
Oracle Grid Infrastructure 12.1 and Oracle Database 12.1 required x86\_64 RPM packages13:

|  |  |
| --- | --- |
| **Required Packages** | |
| Binutils | libX11 |
| compat-libcap1 | libXau |
| compat-libstdc++-33 | libaio |
| Gcc | libaio-devel |
| gcc-c++ | libdmx |
| glibc-devel | glibc |
| Ksh | make |
| Libgcc | sysstat |
| libstdc++ | xorg-x11-utils |
| libstdc++-devel | xorg-x11-xauth |
| libXext | libXv |
| libXtst | libXi |
| Libxcb | libXt |
| libXmu | libXxf86misc |
| libXxf86dga | LibXxf86vm |
| nfs-utils |  |

CRS Software install:

|  |  |
| --- | --- |
| Oracle DBA | 5.6 Log onto the node with your own ID and su to the “oracle” user  Download relevant Clusterware installation software 12.1.0.2 and patches   LINUX 64 Bit from Oracle Metalink.   Unpack the install packages linuxamd64\_12102\_grid\_1of2.zip  linuxamd64\_12102\_grid\_2of2.zip  guzip <>  cpio -idcmv <<disk\_image>>  5.6.1 Once unpacked the install packages Gird directory will be created under   present location.  5.6.2 Create the $ORACLE\_BASE and $ORACLE\_GRID directories or ensure   that the permissions will allow the oracle user to be able create them at   installation time |

## Archive cluvfy reports:

|  |  |
| --- | --- |
| Oracle DBA | 5.7 We needs to run the cluvfy reports either Node-1 or Node-2 server under software location. Once we collected the logs fix both warning/failures of respective teams Network, Storage and Unix teams.  5.7.2 ./runcluvfy.sh stage -pre crsinst -n <Node 1>, <Node 2> -verbose  5.7.3 To make sure the cluvfy issues fixed then only we need to proceed the Gird installation until fix the any issues we can’t proceed to further; this may cause of Grid installation fails. |
| Oracle DBA | 5.7.4 Attached the reference of Cluvfy report logs. |

## CRS Gird Software Installation

|  |  |
| --- | --- |
| Oracle DBA | 5.8.0 We should use Response file to install CRS Grid software installation on  node-1 server under grid software location.  To use the below script to install the CRS installation  ./runInstaller -silent -responseFile /home/oracle/oradiag\_oracle/diag/grid\_new.rsp -showProgress -ignorePrereq  5.8.1 Attached the response file details to use installation.  5.8.2 After completing the CRS installation though silent method, we needs to run root.sh scripts on both nodes as root user and make sure it should be complete without any errors or warning.  5.8.3 Attached the logs for CRS installation.    5.8.4 After CRS installation to check whether the cluster related process is started and up and running fine on both nodes.  5.8.5 Attached the Cluster status logs. |

## To Create ASM disks:

|  |  |
| --- | --- |
| Oracle DBA | 5.9.0 Based on the customer demand and database growth we can raise a request   to Storage team to get RAW disks on respective of WWPN’s provided by   UNIX team.  5.9.1 Storage team can give us RAW disks from 2 MB to 4 TB.  5.9.2 We will request storage to get 5\*100 GB LUN and 3\*10 GB LUN.  5.9.3 We should request UNIX team to create ASM Disks name as below,  ASM\_DISK1 – 100 GB  ASM\_DISK2 – 100 GB  ASM\_DISK3 – 100 GB  ASM\_DISK4 – 100 GB  ASM\_DISK5 – 100 GB  ASM\_OCRVOTE1 – 10 GB  ASM\_OCRVOTE2 – 10 GB  ASM\_OCRVOTE3 – 10 GB  Once they have created the disks, then we need to create ASM Disks group name using ORACLEASM lib.  The disks group name like below,  DATA01 - 200 GB  DATA02 – 200 GB  FRA01 – 100 GB  OCR\_VOTE01 – 30 GB  5.9.4 The below screenshot for the reference of Disks group details.    5.9.5 Oracle ASM Disks creations steps and logs. |

## MGMTDP database creation:

|  |  |
| --- | --- |
| Oracle DBA | 5.10.0 After completing the both Gird software installation and ASM disks  creations, then proceed to create MGMTDP database using the below   scripts.  5.10.1 export GI\_HOME=/u001/app/12.1.0.2/grid  ./dbca -silent -createDatabase -sid -MGMTDB -createAsContainerDatabase true -templateName MGMTSeed\_Database.dbc -gdbName \_mgmtdb -storageType ASM -diskGroupName DATA01 -datafileJarLocation $GI\_HOME/assistants/dbca/templates -characterset AL32UTF8 -autoGeneratePasswords -skipUserTemplateCheck  5.10.2 Attached the below logs for MGMTDB database creation. |

## Database software installation:

|  |  |
| --- | --- |
| Oracle DBA | 5.11.0 Before starting the database software installation, we need to make sure   Oracle Home and Oracle Base location needs to be created on both servers.  Unpack the install packages,    unzip linuxamd64\_12102\_database\_1of2.zip  unzip linuxamd64\_12102\_database\_2of2.zip  guzip <>   cpio -idcmv <<disk\_image>>  5.11.1 Needs to review the response file and make if any changes required.  ./runInstaller -ignoreSysPrereqs -showProgress -silent -responseFile  /home/oracle/rac\_db.rsp  5.11.2 Attached the Oracle software installation logs. |

## Oracle Database Creation:

|  |  |
| --- | --- |
| Oracle DBA | 5.12.0 Before starting the database creation needs to choose Database name with   below 8 character and Character set name and other mandatory keywords.  5.12.1 Needs to review the DBCA commands for noninteractive (Silent)  configuration for RAC.   ./dbca -silent -createDatabase \  -templateName General\_Purpose.dbc \  -gdbname <DBName> \  -sid <DBName> \  -responseFile <NO\_VALUE> \  -characterSet <AL32UTF8> \  -sysPassword <Astra123> \  -systemPassword <Astra123> \  -createAsContainerDatabase <false> \  -databaseType <MULTIPURPOSE> \  -automaticMemoryManagement <false> \  -totalMemory <1536> \  -storageType <ASM> \  -datafileDestination <"DATA01"> \  -redoLogFileSize <50> \  -emConfiguration <NONE> \  -nodeinfo <Node1>,<Node2> \  -ignorePreReqs  5.12.2 Attached the Oracle software installation logs. |

## Database service status:

|  |  |
| --- | --- |
| Oracle DBA | 5.13.0 To check the cluster services status and database status using the below   commands.    ./crsctl check crs  ./crsctl stat res -t   ./srvctl status database -d <database name>   sqlplus “/ as sysdba”  select name, open\_mode, log\_mode from gv$database;  select inst\_id,inst\_name,host\_name,status from gv$instance;  select \* from v$recover\_file;  And make sure the all the services should be up and running if any issues. |

## Fail Over Test:

|  |  |
| --- | --- |
| Oracle DBA | 5.14.0 When we brought down the Instance2 “<InstanceName2>” the node2   connection/jobs are failover it to Node1 “<InstanceName1>” service   without any issues.    ./srvctl status database -d <database name>  ./srvctl stop instance -d <database name> -i <instance name1>  ./srvctl start instance -d <database name> -i <instance name1>  ./crsctl check crs  ./crsctl stop crs <Node1 server>  ./crsctl start crs   ./srvctl status database -d <database name>  ./srvctl stop instance -d <database name> -i <instance name2>  ./srvctl start instance -d <database name> -i <instance name2>  ./crsctl check crs  ./crsctl stop crs <Node2 server>  ./crsctl start crs    ./crsctl stat res -t ( to check all the cluster services are ok)  When we brought down the services to check respective of log files and   make sure there were no ORA- errors. |

Post Installation Verification:

These post installation verification tests constitute the Infrastructure Component Installation and Operation Qualification tests for the Infrastructure Component.

| **Role** | **Step** |
| --- | --- |
| Oracle DBA | 5.15.0 Obtain the appropriate Global Component Qualification   Template from GRD if you are using an existing Oracle home   otherwise continue to use the template created when installing   the Oracle home for this database. Save template with the   following file name structure: -  Server Identifier\_Infrastructure Component type  <AZRFS#>\_<dbname>.doc  E.g: AZRFS1234\_XPROD.doc  *Note. This saved template is the Component Qualification record referred to in the subsequent steps* |
| Oracle DBA | 5.15.1 Check & verify the CRS kernel installation logs. |
| Oracle DBA | 5.15.2 Generate an Oracle Inventory listing for the CRS kernel   installation. Run:  <ORACLE\_GRID>/OPatch/opatch lsinventory–oh <ORACLE\_GRID> |

Archive cluvfy reports:

| **Role** | **Step** |
| --- | --- |
| Oracle DBA | 5.16.0 Create directories on Share Point under Project folder <……>  <Share Point X:\projects\<node\_1>\_RAC\_cluster\_with\_<node\_2>\CRS  e.g. X:\projects\ usgblocpoc01\_RAC\_cluster\_with\_ usgblocpoc02\CRS  X:\projects\<node\_2>\_RAC\_cluster\_with\_<node\_1> \CRS  e.g. X:\projects\ usgblocpoc02\_RAC\_cluster\_with\_usgblocpoc01\CRS |
| Oracle DBA | 5.16.1 Copy all the reports generated by cluvfy to the  “X:\projects\<node\_1> RAC cluster with <node\_2>\cluvfy” directory  e.g. X:\projects\ usgblocpoc01\_RAC\_cluster\_with\_ usgblocpoc02\cluvfy   Example of Cluvfy reports: |

**5.17 Post Installation checks:**

|  |  |
| --- | --- |
| Oracle DBA | 5.17.0 Confirm cluster configuration  Run: crs\_stat –t  Expect output similar to: |
| UNIX Team | 5.17.1 Request Unix team to setup sudo for:  $ORALE\_GRID/bin/crsctl password protected  $ORALE\_GRID/bin/ocrdump no password  $ORALE\_GRID/bin/ocrconfig password protected  /etc/init.crs password protected  $ORALE\_GRID/bin/srvctl no password |

# 6 Un-Install steps:

| **Role** | **Step** |
| --- | --- |
| Oracle DBA | 6.1.0 If a database(s) has been installed, then delete the database(s)   using DBCA and the associated Oracle Home(s) using OUI |
| Oracle DBA | 6.1.1 Log onto each node disable Oracle Clusterware applications.  $ORA\_CRS\_HOME/insall/rootdelete.sh local nosharedvar   nosharedhome  Assuming:   * The delete is for the local node * There is a /etc/oracle/orc.loc on the server * The cluster software is not shared |
| Oracle DBA | 6.1.2 On the last node: $ORACLE\_GRID/install/rootdeinstall.sh |
| Oracle DBA | 6.1.3 Using OUI – delete the clusterware home.  See Metalink Note: #1570554.1“12c How to Clean up after a Failed   CRS Install” (or)  https://oracle-base.com/articles/rac/clean-up-a-failed-grid-infrastructure-installation  6.1.4 Attached the De-install logs. |

# Appendices

## Appendix A - Terminal Server Connection

1. Start a ReflectionX Client (on Terminal Server for stability if available):

1.1. Install the ReflectionX client tool from Appzone and install in your   
 machine. : Start | Terminal Services Client | Terminal   
 Services Client.

1.2. For BCC based target servers enter "<Server Name >” in "Server:" textbox and press "Connect" button.

1.3. Log onto the terminal server with your unprivileged EMEA logon.

1.4. Click: Start | Programs | Reflection | Reflection X.

1.5. If prompted: Don't run "Performance Tuner".

If prompted: Press "Cancel" button on the "Select XDMCP Host" dialog.

If prompted: Press "No" at the "Reflection X" dialog.

1.6. Minimise the "X Client Manager (untitled)" window.

2. Find the ReflectionX Client's IP Address:

2.1. Open a command window on the Client (Terminal Server).

2.2. run ipconfig and record the IP Address displayed.

3. Set up and test X Windows connectivity:

3.1. From a UNIX command line session logged on as oracle to the target server.

3.2. export DISPLAY=156.71.8.136:0 (Substitute the IP Address of your X Client here).

3.3. /usr/X/bin/xclock (Solaris).

3.4. If the X Client is working correctly the clock window should appear in the Client (Terminal Server) window. If the display does not appear then another instance of X Server is probably running on the Terminal Server. Increment the port number and retry from step 3.2 above (E.g. export DISPLAY=156.71.8.136:1).

3.5. Stop the clock test by Ctrl C at the UNIX command line session.

## Appendix B - XTERM Connection from AZ-Lite

1. From the desktop, select :

START => Programs => Reflection => Reflection X

1. In the left hand menu, select the Type of Unix host to reflect the target server OS ( or use Generic Unix host if not displayed ) e.g. aix.rxc – Generic LINUX xterm
2. In the right hand menu, complete the Host Name, User Name and Password fields with details of the target server & the login account / password to be used.
3. Click Connect
4. This will open a XTERM session.
5. If you have connected with your personal login, enter : echo $DISPLAY and note the value of the variable
6. If you have connected to your personal login, for Oracle installation tasks you must switch user to oracle : enter su – oracle and respond with the password when prompted
7. If you originally connected with your personal login and have switched user to oracle, enter echo $DISPLAY this will not reflect the setting for your personal account
8. If you originally connected with your personal login and have switched user to oracle, enter export DISPLAY=<values from personal login session>
9. You can now run OUI & DBCA / netca commands within this xterm session

## Appendix C - Sample .profile entries for the oracle user

PATH=/usr/bin:/etc:/usr/sbin:/usr/ucb:$HOME/bin:/usr/bin/X11:/sbin:.

export PATH

if [ -t 0 ]; then

if [ -s "$MAIL" ] # This is at Shell startup. In normal

then echo "$MAILMSG" # operation, the Shell checks

fi # periodically.

fi

#######################################################################

# Set up for RAC

#######################################################################

export AIXTHREAD\_SCOPE=S

export ORACLE\_GIRD=/u001/app/oracle/12.1.0.2/grid/

export PATH=$ORACLE\_GIRD/bin:$PATH

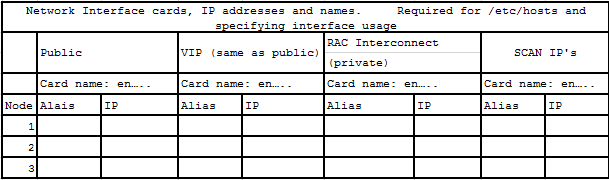
export CV\_NODE\_ALL= usgblocpoc01, usgblocpoc02

umask 022

## Appendix D – Build Information

|  |  |  |
| --- | --- | --- |
| Information | Example values | This installation |
| Nodes | usgblocpoc01, usgblocpoc01 |  |
| CRS Version | 12.1.0.2 |  |
| MLR Patch to be applied.[[1]](#footnote-1) | Latest PSU patch # |  |
| ORACLE\_BASE | /u001/app/oracle |  |
| Oracle Inventory location | <ORACLE\_BASE>/oraInventory |  |
| ORACLE\_GRID [[2]](#footnote-2) | /u001/app/oracle/12.1.0.2/grid/ |  |
| Voting disk location+name | +OCR\_VOTE01/oracle\_crsdata/votedisk |  |
| OCR disk location+name | +OCR\_VOTE01/oracle\_crsdata/ocrdisk |  |

Network Layout. The Interf.ace card usage is required. If the server is already built ‘ifconfig –a’ will list all available cards and the addresses that are allocated to them. Confirm with Unix team that allocation of the card and its usage are correct.



## Appendix F – Check CRS Installation

Execute health check report and confirm the following checks are successful.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Check | Expected output | Node #1 | Node #2 |
| 1 | Check output from cluvfy | Correct nodes are reported.  No errors or ‘unknown’ outcomes.  Note only errors relating to the operating system installation packages and patch sets maybe ignored |  |  |
| 2 | Check Clusterware software version by running the following on all nodes | Correct version installed |  |  |
| 3 | Check daemons are running | Following processes exist:  crsd.bin, evmd.bin and ocssd.bin |  |  |
| 4 | Check status of CRS | Reports ‘healthy’ |  |  |
| 5 | Check status of Clusterware daemons | Reports ‘healthy’ |  |  |
| 6 | Check status of Clusterware resources by running the following on all nodes | The gsd, ons and vip resourcres are ‘online’, one on each node. |  |  |
| 7 | Check OCR ( cluster registry) file. | Reports status of the OCR and ‘check succeeded’ |  |  |
| 8 | Check OCS auto backups | List of backup times and locations |  |  |
| 9 | Check Voting disks | Reports all configured voting disks |  |  |
| 10 | Check CRS stop | No CRS daemons |  |  |
| 11 | Check CRS start | All CRS Daemons running and daemon status ‘healthy’ |  |  |
| 12 | Failover of VIP if a node is down | The VIP from the failed node will failover to the still running node. |  |  |

## 

## Appendix H – Oracle Filesystem, Database File & Directory name Standards

|  |  |  |
| --- | --- | --- |
| RAC Filesystem setup | /u001 | Local Oracle kernels, local Oracle Admin directories and Oracle & Cluster Home directories.  Instance alert logs & trace files on specific node details. |
| OCR\_VOTE01 | CRS components (OCR & Voting disk |
| DATA01 | ctl file1 + "standard" tablespaces - SYSTEM / SYSAUX / TEMP / UNDO / USERS etc. & Block change tracking file and 1 redo groups in directory  /DATA01/<ORACLE\_SID>/ |
| DATA02 | ctl file2 + Application specific tablespaces + 2 redo groups in directory  /DATA02/<ORACLE\_SID>/ |
| FRA01 | ctl file3 + 3 redo group member in directory and archive logs in directory  /FRA01/<ORACLE\_SID>/archive/ |
| /u001-Backup | d2d backup area, export area, Flash recovery Area, OCR & Votedisk backup for RAC in directories  /u001-Backup/<ORACLE\_SID>/oradata/d2dbackup  /u001-Backup/<ORACLE\_SID>/export /  /u001-Backup/ <ORACLE\_SID>/flash\_recovery\_area |

|  |  |  |
| --- | --- | --- |
| Redo Logs | There should be a minimum of 3 redo log groups per instance.  Each redo log group should have two members  Redo log group members should reside on different filesystems.  (See the server delivery specification for details)  Redo log files should have the suffix of \*.rdo | redo<nn><a|b><thread#>.rdo (RAC)  e.g.  RAC  redo01a1.rdo redo01b1.rdo Thread 1  redo02a1.rdo redo02b1.rdo Thread 1  redo03a1.rdo redo03b1.rdo Thread 1  redo04a2.rdo redo04b2.rdo Thread 2  redo05a2.rdo redo05b2.rdo Thread 2  redo05a2.rdo redo05b2.rdo Thread 2 |
| Control Files | There should be three controlfiles.  Each controlfile should reside on a different filesystem .  (See the server delivery specification for details)  Control files should have the suffix of \*.ctl | control01.ctl  control02.ctl  control03.ctl |
| Database Files | Database files should be located according to the server delivery specification document.  Database files should have a suffix of \*.dbf  Tablespace datafile names are of the form :  <ts\_name><nn>.dbf  where <nn> is a two digit integer incrementing from 01 for each file associated with the same tablespace | Standard “System” tablespace datafiles are :  sysaux01.dbf  system01.dbf  temp01.dbf  undotbs01.dbf  undotbs02.dbf  users01.dbf |
| Archive Logs | Archive log files should be located according to the server delivery specification document. | The archive log name format is <DB\_NAME>\_%t\_%s\_%r.arc |

**For the Oracle GRID HOME, ORACLE RDBMS HOME & Oracle Admin areas, a standard OFA compliant directory definition will be created.**

i.e.

ORACLE\_BASE=/u001/app/oracle

ORACLE\_GIRD=/u001/app/oracle/12.1.0.2/grid/

ORACLE\_HOME=/u001/app/oracle/product/12.1.0.2/db\_<n>

where <n> would normally be 1, but where multiple Oracle kernels exist this could be 2,3,4 etc.

$ORACLE\_BASE/admin/diag/

adump

bdump

cdump

dpdump

pfile

scripts

udump

etc ….

In a RAC configuration, so that the Db logs and trace files are accessible from any server in the cluster, create a soft link from $ORACLE\_BASE/admin/ to a shared filesystem mount point:

/U001/app/oracle/admin

so, the directories would be:

/U001/app/oracle/admin/<INSTANCE\_NAME>/

adump

bdump

cdump

dpdump

pfile

scripts

udump

# Document Control

| **DOCUMENT HISTORY** | | |
| --- | --- | --- |
| **Revision Number** | **Revision Date** | **Nature of Change** |
| 1.00 | 21-Apr-2017 | Initial release. |
| 2.00 |  | Rework of post installation verification section. |

**Document Review Plans**

This document will be reviewed and updated if necessary as defined below:

* As required to correct or enhance information content

**End of Document**

1. One off patches to be applied to correct CRS problems [↑](#footnote-ref-1)
2. Must **not** be a subdirectory of ORACLE\_BASE as permissions on the $ORA\_CRS\_HOME will get changed to allow root only access [↑](#footnote-ref-2)