



Deployment of Oracle Real Application Clusters on Oracle Private Cloud Appliance X9-2

Oracle Private Cloud Appliance

March 23, 2023 | Version 2.01
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PURPOSE STATEMENT

The document summarizes the steps you can follow to deploy an Oracle Real Application Clusters (Oracle RAC) database on Oracle Private Cloud Appliance (PCA).

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INTRODUCTION

Oracle Private Cloud Appliance (PCA) is uniquely compatible with OCI providing fast and efficient infrastructure for modern software and business applications. Oracle Private Cloud Appliance has the same infrastructure constructs (including APIs and SDKs) as OCI. This enables customers to adopt a “develop once and deploy anywhere—on-premises or on OCI” approach to rapidly design and develop high-performance applications and middleware.

SCOPE AND CONTENT

This paper describes the end-to-end process to deploy an Oracle Real Application Clusters (Oracle RAC) 19c and 21c in a few hours using Oracle Grid Infrastructure and database software on Oracle Private Cloud Appliance (PCA). This document will take you through a 2-node Oracle RAC installation. This paper assumes that user already has working knowledge of deploying Oracle Grid Infrastructure and database software in an On-premises environment.

ADVANTAGES OF ORACLE PRIVATE CLOUD APPLIANCE

Oracle Private Cloud Appliance (PCA) is an Oracle Engineered System designed for implementing the application and middleware tiers. PCA is an integrated hardware and software system that reduces infrastructure complexity and deployment time for virtualized workloads in private clouds. It is a complete platform that provides optimal performance for a wide range of application types and workloads, with built-in management, compute, storage, and networking resources.

Oracle Private Cloud Appliance is the latest member of the Oracle Private Cloud Appliance product family. PCA provides cloud and administrative services for modernized cloud native applications. It makes use of a modern microservices architecture, Kubernetes, and related technologies, for a future-proofed software stack.

Oracle Private Cloud Appliance delivers private cloud infrastructure and architecture consistent with Oracle Cloud Infrastructure (OCI). PCA brings APIs and SDKs compatible with Oracle Cloud Infrastructure (OCI) to an on-premises implementation at rack scale, making workloads, user experience, tool sets, and skills portable between private and public clouds. PCA can be directly connected to Oracle Exadata to create an ideal infrastructure for scalable, multitier applications. Customers preferring or requiring an on-premises solution can realize the operational benefits of public cloud deployments using Oracle Private Cloud Appliance.

ARCHITECTURE

Oracle Clusterware is a portable cluster management solution that is integrated with Oracle Database. Oracle Clusterware is a required component for using Oracle RAC and provides the infrastructure necessary to run Oracle RAC. Oracle RAC is an option to the award-winning Oracle Database Enterprise Edition. Oracle Clusterware also manages resources, such as Virtual Internet Protocol (VIP) addresses, databases, listeners, services. Oracle Clusterware along with Oracle Automatic Storage Management (Oracle ASM) comprise the Oracle Grid Infrastructure, which enables you to create a clustered pool of storage to be used by Oracle RAC databases.

The versions of major software components used in this setup are:

- Oracle PCA software: 302-b799577 or above (Refer [Doc ID 2906831.1](#))
- Oracle Grid Infrastructure and Database Software: 19c or above
- Operating System: Oracle Linux 7.9

Oracle PCA provides the ability to allocate compute, network, and storage resources into tenancies/compartments for easy manageability and isolation. The tenancy offers a means to isolate compute, network, and storage resources per customer. This paper covers the steps needed to set up a 2-node Oracle RAC database. The architecture diagram for the setup is described in Fig 1.

In this configuration example, we setup a 2-node Oracle RAC database with:

- 2 VM instances (cluster nodes) in the same Public Subnet in a VCN
- VCN has 1 Public and 1 Private subnet
- Each node has 1 VNIC in each subnet and a Virtual IP
- Additional IPs: 3 Virtual IPs for SCAN Name

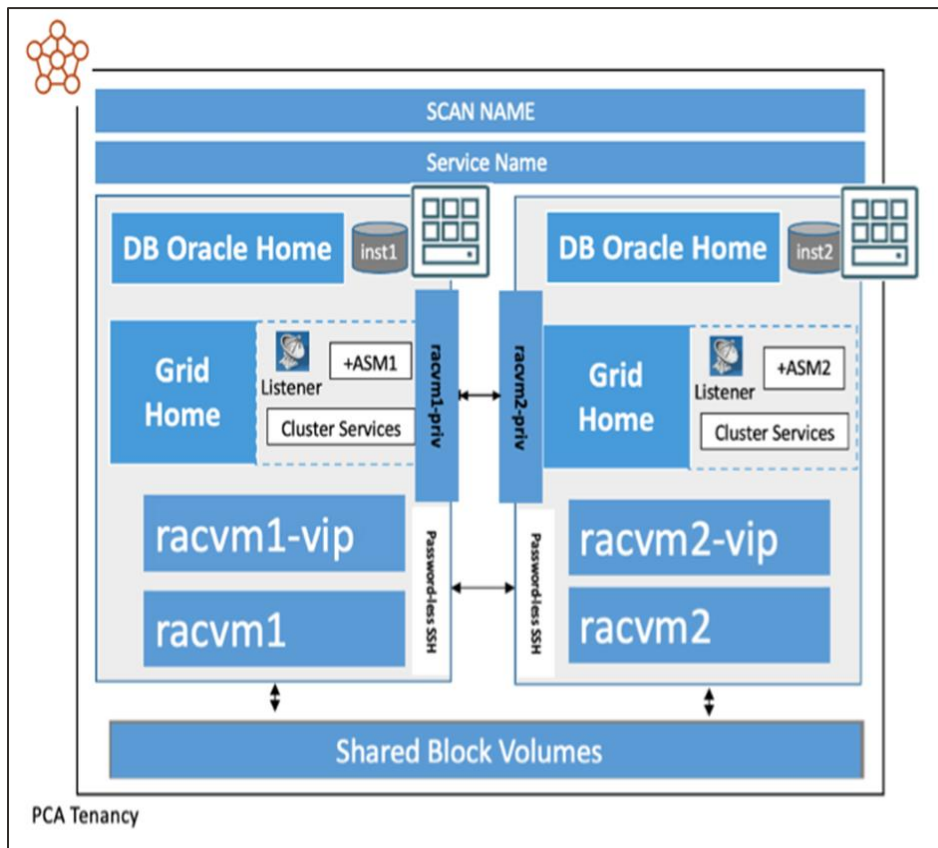


Figure 1. Oracle RAC architecture diagram

DEPLOYMENT OF A 2-NODE ORACLE RAC DATABASE

Oracle RAC is a cluster database with a shared cache architecture that overcomes the limitations of traditional shared-nothing and shared-disk approaches to provide highly scalable and available database solutions for business applications. Oracle RAC is a key component of the Oracle Grid Infrastructure architecture.

1. Access the Customer/Compute Enclave console

Point your web browser to the “Console.<System Name>.<Domain name>” on your system and log in to the PCA Dashboard CEUI (Compute Enclave User Interface).

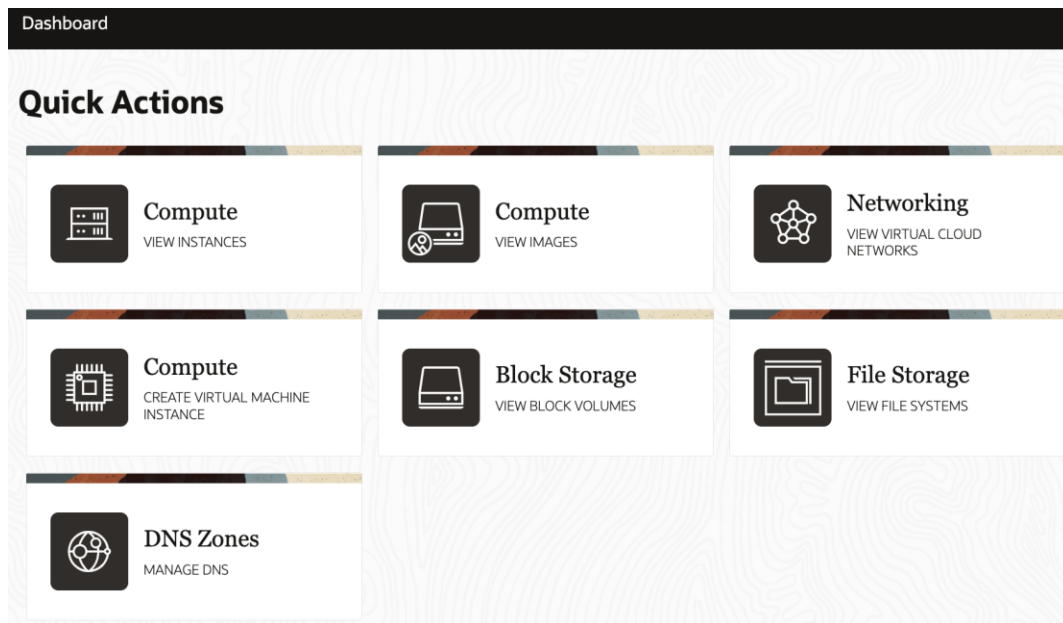


Figure 1.A. Compute Enclave Console User Interface

2. Prerequisites - Create IaaS for RAC DB on PCA

- All nodes (VMs) in an Oracle RAC environment must connect to at least one public network to enable users and applications to access the database.
- In addition to the public network, Oracle RAC requires private network connectivity used exclusively for communication between the nodes and database instances running on those nodes.
- When using PCA, only one private network interconnect can be configured. This network is commonly referred to as the interconnect. The interconnect network is a private network that connects all the servers in the cluster.
- To create compute, network, and storage constructs on a PCA System, you must follow the below prerequisites.
- In addition to accessing CEUI, the user also needs to configure oci cli on a Bastion VM to run the commands using oci instead of relying on CEUI.

2.1. IaaS on PCA

To prepare the Oracle Grid Infrastructure and Oracle RAC Database installation, complete the tasks below in order. Please refer to the Fig. 2 for the reference architecture diagram.

1. Network Configuration
2. Compute Configuration
3. Storage Configuration
4. Operating System Configuration
5. Grid Infrastructure & Oracle RAC Database Software

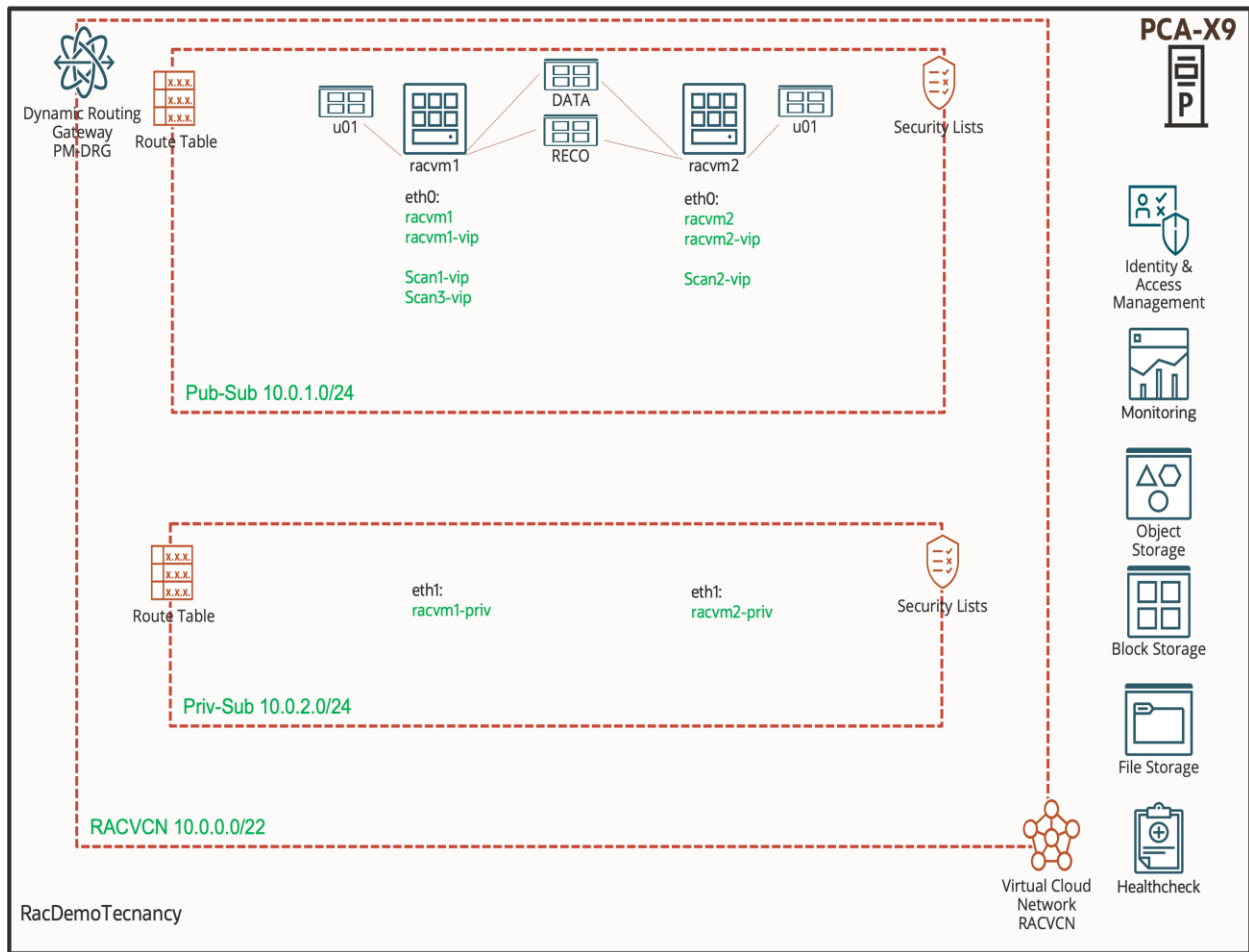


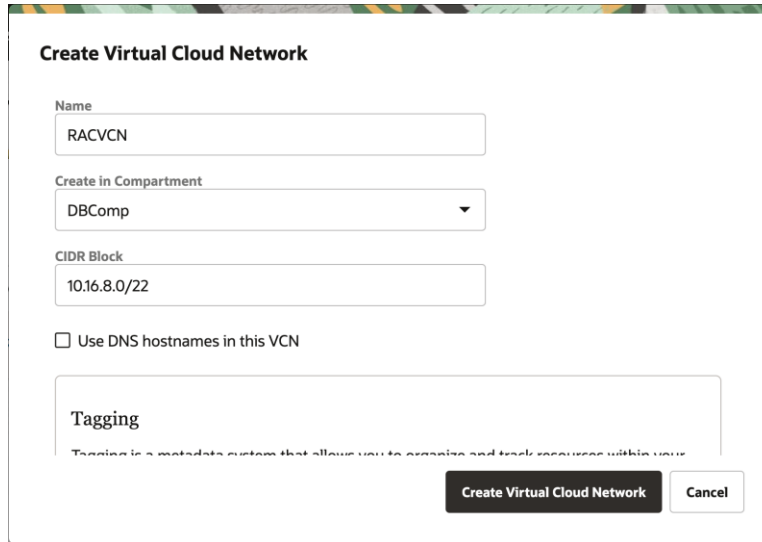
Figure 2. IaaS reference architecture diagram on PCA X9-2

2.1.1. Network Configuration

Create required Network Constructs:

1. Create VCN and define a valid CIDR range.

Steps: You can either use CEUI to create VCN or use oci cli to create VCN



Create Virtual Cloud Network

Name
RACVCN

Create in Compartment
DBComp

CIDR Block
10.16.8.0/22

Use DNS hostnames in this VCN

Tagging
Tagging is a metadata system that allows you to organize and track resources within your

Create Virtual Cloud Network Cancel

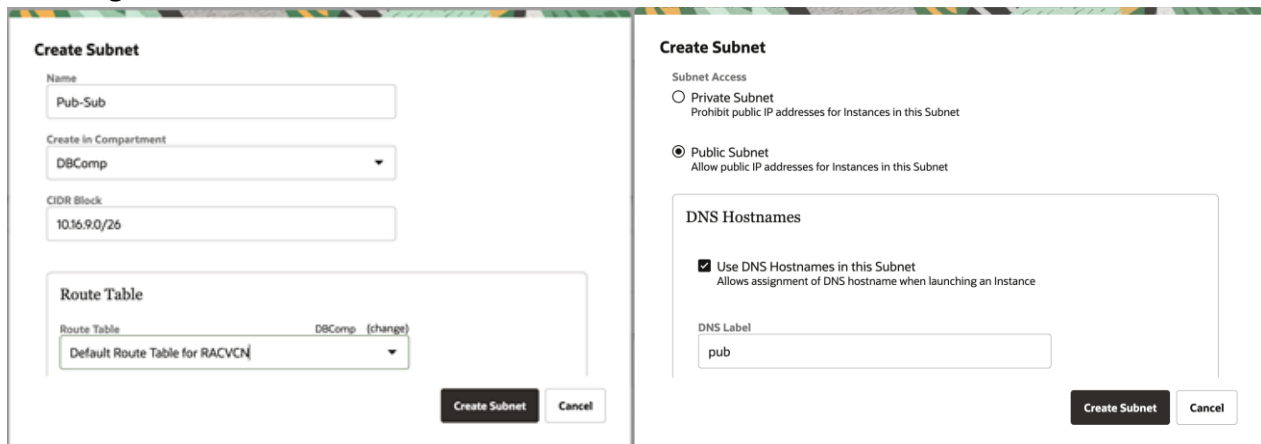
Figure 3. VCN Creation on PCA X9-2

2. Create a Public and a Private Subnet

Steps:

- Create Public and Private Subnet using CEUI, or one can also create these subnets using oci cli.
- In addition to Subnets, define Gateways such as DRG/IGW along with Security Rules, DHCP Options and Routing tables.

Creating Public Subnet



Create Subnet

Name
Pub-Sub

Create in Compartment
DBComp

CIDR Block
10.16.9.0/26

Route Table
Route Table DBComp (change)
Default Route Table for RACVCN

Create Subnet Cancel

Create Subnet

Subnet Access
 Private Subnet
Prohibit public IP addresses for Instances in this Subnet

Public Subnet
Allow public IP addresses for Instances in this Subnet

DNS Hostnames
 Use DNS Hostnames in this Subnet
Allows assignment of DNS hostname when launching an Instance

DNS Label
pub

Create Subnet Cancel

Figure 4. Public Subnet Creation on PCA X9-2

Creating Private Subnet

The image displays two side-by-side screenshots of the 'Create Subnet' form in the Oracle Cloud console. The left screenshot shows the initial configuration fields: 'Name' (Priv-Sub), 'Create in Compartment' (DBComp), 'CIDR Block' (10.16.10.0/26), and 'Route Table' (RAC_Internal). The right screenshot shows the 'Subnet Access' section with 'Private Subnet' selected, the 'DNS Hostnames' section with 'Use DNS Hostnames in this Subnet' checked, and the 'DNS Label' field set to 'priv'.

Figure 5. Private Subnet Creation on PCA X9-2

3. Creating Primary DNS Zone and DNS Zone Record

Steps:

Create new Zone

The image shows the 'Create Zone' form. The 'Name' field contains 'racdns-zone', 'Create in Compartment' is set to 'DBComp', and 'Zone Type' is set to 'Primary'. Below these fields is a 'Tagging' section with a descriptive text: 'Tagging is a metadata system that allows you to organize and track resources within your tenancy. Tags are composed of keys and values that can be attached to resources.'

Figure 6. Zone creation on PCA X9-2

Create DNS Zone Record

Create DNS Zone Record

Record Type
A - IPv4 Address ▼
Host record, used to point a hostname to an IPv4 address.

Domain (Optional)
Scanrac .oracle-rac-dns-zone

TTL
 Specify TTL value

Edit RDATA

Address
10.16.9.6

Add another record **Create Record** Cancel

Figure 7. DNS Zone record creation on PCA X9-2

4. Register the SCAN Name, VIPs in the DNS Zone records

Steps:

- User will have to register the Scan name resolving to 3 different IP addresses in the DNS Zone using Customer Enclave or using oci cli.
- User will have to register the Vip name with IP address in the DNS Zone using Customer Enclave or using oci cli for each node in the Oracle RAC cluster.

```

[root@vmrac1 ~]#nslookup <node1_name>-vip.<domain name>

Server: X.X.X.X

Address: X.X.X.X

Name: <node1-vip.Domain name>

Address: X.X.X.<Y4>

[root@vmrac2 ~]#nslookup <node2_name>-vip.<domain name>

Server: X.X.X.X

Address: X.X.X.X

Name: <node2-vip.Domain name>

Address: X.X.X.<Y5>

```

- **Create Steering Policy and add Answers as three IP addresses to it, resolving to same Scan name as shown below:**

The figure shows two side-by-side screenshots of the 'Create Steering Policy' configuration interface.

Left Screenshot: Policy Configuration

- Policy Type:**
 - Load Balancer** (Distributes traffic over several servers to optimize performance.)
 - IP Prefix Steering** (Dynamically routes traffic requests based on originating IP prefix (e.g. 172.16.1.0/24).)
- Name:** Scanrac-steer
- Policy TTL:** 60 (The Time To Live (TTL) for responses from the steering policy, in seconds. Maximum: 604800)
- Buttons:** Create Steering Policy, Cancel

Right Screenshot: Answer(s) Configuration

- Answer(s) Section:**
 - Entry 1:** Name: scanrac, Type: A, Disabled: (toggle), RData: 10.16.9.6, Weight: 10,
 - Entry 2:** Name: scanrac, Type: A, Disabled: (toggle)
- Buttons:** Create Steering Policy, Cancel

Figure 8. Steering Policy Creation on PCA X9-2

- **Add steering policy and attach the DNS zone to steering policy**

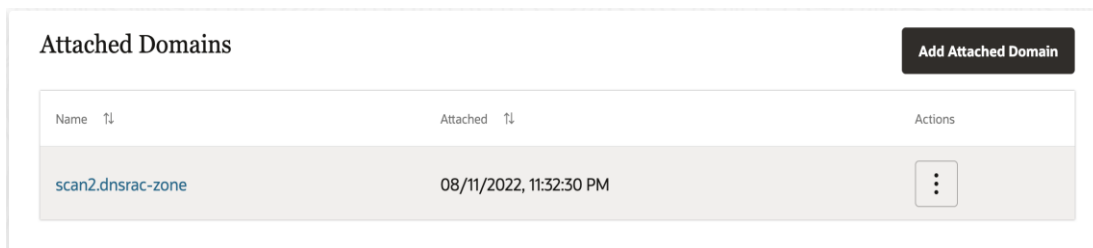


Figure 9. Attaching DNS Zones to Steering Policy on PCA X9-2

- **Expected Scan name Results**

```
[root@vmrac1 ~]# nslookup <Scan Name.Domain name>
Server: X.X.X.X
Address: X.X.X.X
Name: <SCAN Name>
Address: X.X.X.<Y1>
Name: <SCAN Name>
Address: X.X.X.<Y2>
Name: <SCAN Name>
Address: X.X.X.<Y3>
```

2.1.2. Compute Configuration

For creating compute VM's, the user must first define a VCN in their Tenancy/Compartment and then define a Public and a Private Subnet as instructed in previous step.

Steps:

2.1.2.1 Launch two VM's in the same Public Subnet

High Level Steps:

- Create PCA compute instances.
 - In the desired VCN & Public Subnet with OL7.9 Platform Image
 - VM Shape VM.PCAStandard1.x where x should be large enough to provide CPUs for the cluster nodes and at least 2 VNICs. So, each cluster node should have at least 2 OCPUs.
 - Please select **“Skip Source/Destination Check”** option for the Primary (Default) VNIC on both the nodes. Please refer to [VNIC](#) Documentation for more details

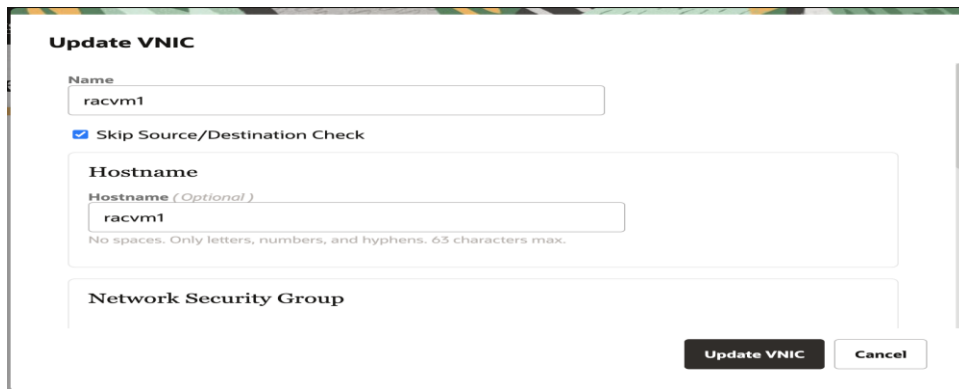


Figure 9a. Select “Skip Source/Destination Check” option for primary VNIC on PCA X9-2

2.1.2.2 Configure Secondary IPs on both nodes

- For each compute instance, one primary VNIC is already created per cluster node:
 - In the same VCN subnet as the primary VNIC of the compute instance
 - Its primary IP address is assigned a host name which is the intended cluster host name
 - Assign a secondary IP address to this VNIC with assigned host name <cluster-node-name>-vip

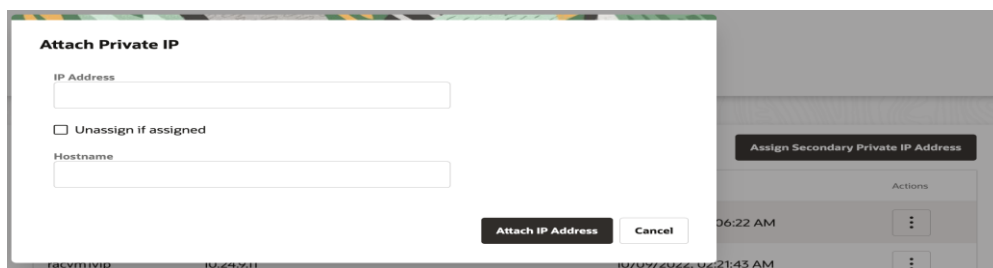


Figure 9b. Attaching Private IP on PCA X9-2

2.1.2.3 Configure Private IPs on both nodes in the same Private Subnet

- For each compute instance, create one [Secondary VNIC](#) per cluster node.

Steps

- Add the second VNIC in the private Subnet on both nodes after the instances are launched as shown below:

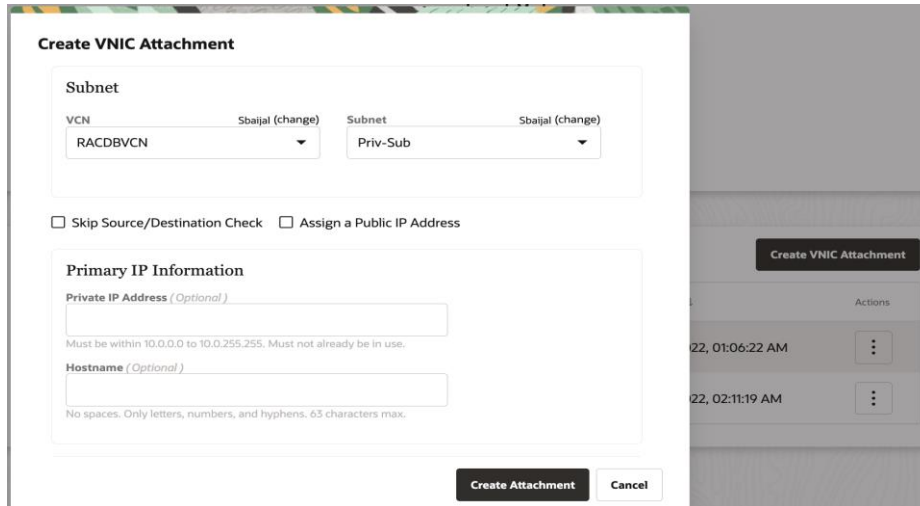


Figure 10. Attaching VNIC on PCA X9-2

- You have an option of entering an IP address or let system assign an IP address from the Private Subnet CIDR Range.
- Follow the [Secondary VNIC](#) documentation to enable the second VNIC. You may have to download and run Oracle script “secondary_vnic_all_configure.sh” and may have to edit /etc/sysconfig/network-scripts/ifcfg* files to enable second VNIC.
- Make sure all firewalls are disabled to allow private interconnect traffic to go through without issues.
- Update entry for private IP’s in /etc/hosts file

```
Cat /etc/hosts
127.0.0.1 localhost localhost.localdomain localhost4 localhost4.localdomain4
::1 localhost localhost.localdomain localhost6 localhost6.localdomain6
X.X.X.A1 <node1> <node1>.<domain name>
X.X.X.A2 <node2> <node2>.<domain name>
X.X.X.A3 <node1>-vip <node1>-vip.<domain name>
X.X.X.A4 <node2>-vip <node2>-vip.<domain name>
X.X.Y.B1 <node1>-priv <node1>-priv.<domain name>
X.X.Y.B2 <node2>-priv <node2>-priv.<domain name>
```

Note: The file /etc/hosts on both nodes should have entries of Public IPs, Virtual IPs, and Private IPs of both the nodes as shown above.

2.1.2.4 Attach a local BV to each node

- For each compute instance, create one new block volume per cluster node, then attach it to the compute instance in Read/Write mode. This volume will be used for the Grid Infrastructure Home and Oracle Database Home.

2.1.3. Storage Configuration

Oracle RAC utilizes Oracle Automatic Storage Management (ASM) for efficient shared storage access. ASM acts as the underlying, clustered volume manager. It provides the database administrator with a simple storage management interface that is consistent across all server and storage platforms. As a vertically integrated file system and volume manager, purpose-built for Oracle Database files, ASM provides the performance of raw I/O with the easy management of a file system.

2.1.3.1 Create Shared Storage Disk Groups

- Create at least one Block Volume, which will be used for ASM Disk Group.
- The User must attach the above created Block Volumes in Shared mode to both the VMs and configure AFD for ASM Disks and create AFD_label using asmcmd command. These Block Volumes will be used for the cluster shared disks under ASM.

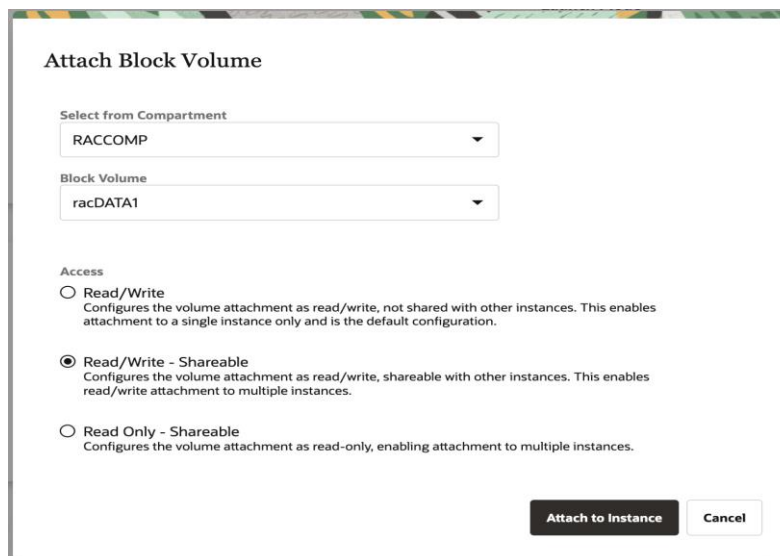


Figure 11. Attaching Block Volume on PCA X9-2

- Make sure the permissions of the disks are as below:

```
chown grid:asmadmin /dev/sdc
```

- Make the disks permissions persistent across reboots, create the following file and update disk permissions in it:

```
/etc/udev/rules.d
```

2.1.3.1 Create local Storage mount point

- Create two Block Volume, which will be used for local mount point for each node.
- For each VM, 1 newly created BV in Read/Write mode must be attached.
- Create a new local mount point on each VM as /u01 on each node.
- Create the Filesystem on top of this Block Volume and then create a /u01 Directory on each node.
- Mount the Filesystem on /u01 on each node.
- Make sure to add an entry in /etc/fstab, so that it remains persistent across reboots. This mount point will be used for the Grid Infrastructure Home and Oracle Database Home on each node. Please review the [Documentation](#) for details.

Attach Block Volume

Select from Compartment
RACCOMP

Block Volume
rac1u01

Access

Read/Write
Configures the volume attachment as read/write, not shared with other instances. This enables attachment to a single instance only and is the default configuration.

Read/Write - Shareable
Configures the volume attachment as read/write, shareable with other instances. This enables read/write attachment to multiple instances.

Read Only - Shareable
Configures the volume attachment as read-only, enabling attachment to multiple instances.

Attach to Instance Cancel

Figure 12. Attaching Block Volume on PCA X9-2

2.1.4. Operating System Configuration

2.1.4.1. Configuring users, groups, and environments for Oracle Grid Infrastructure and Oracle RAC

- i. Create the grid and oracle users with a primary and secondary group and check the user ids on both nodes:

```
[root@vmrac1 ~]#groupadd -g 201 oinstall
groupadd -g 200 dba
groupadd -g 202 asmadmin
groupadd -g 203 asmdba
[root@vmrac1 ~]#useradd -u 200 -g oinstall -G dba,asmdba oracle
useradd -u 123 -g oinstall -G dba,asmdba,asmadmin grid
id oracle
id grid
root@vmrac2 ~]#groupadd -g 201 oinstall
groupadd -g 200 dba
groupadd -g 202 asmadmin
groupadd -g 203 asmdba
[root@vmrac2 ~]#useradd -u 200 -g oinstall -G dba,asmdba oracle
useradd -u 123 -g oinstall -G dba,asmdba,asmadmin grid
id oracle
id grid
```

2.1.4.2. Creating Software Installation Directories

- i. Create Software Directory Structure:

Run these commands on both nodes as the Root user to create the software installation directories:

Create Directory Structure: -

```
[root@vmrac1 ~]#mkdir -p /u01/app/21.0.0/grid
chown grid:oinstall /u01/app/21.0.0/grid
mkdir -p /u01/app/grid
mkdir -p /u01/app/oracle
chown -R grid:oinstall /u01
chown oracle:oinstall /u01/app/oracle
chmod -R 775 /u01/
mkdir /etc/oraInventory
```

```
chown grid:oinstall /etc/oraInventory
chmod 770 /etc/oraInventory
```

- ii. Configure passwordless SSH configuration:
Configure passwordless SSH for all three users: Root, grid, and oracle.

Note: if you don't have Role Separation, then you just need one "oracle" user for both Grid Infrastructure and Oracle RAC database software.

2.1.5. Grid Infrastructure and Oracle RAC Database Software

- Stage both GI and RAC database software
- Create a Staging Directory e.g., /u01/app/stage

2.1.5.1. Download Grid Infrastructure and Oracle RAC Database Software

- Download the Oracle Grid Infrastructure and database binaries for Oracle RAC from edelivery.oracle.com
- Stage the GI Software in a Staging directory (/u01/app/stage) and then Unzip the GI software under the Directory structure created in the previous step i.e., /u01/app/21.0.0/grid

2.1.5.2. Grid Install Prerequisites Verification

- Run Cluster verification utility to verify it meets the Install pre-requisites:
<GI_HOME>/bin/runcluvfy.sh stage -pre crsinst -n <node1,node2> -fixup -verbose

```
/u01/app/21.0.0/grid/bin/runcluvfy.sh stage -pre crsinst -n racvm1,racvm2 -fixup -verbose
```

Note => If there are any errors in the cluster Verification output, then try to fix those before moving ahead with the installation. The fixup script generated by Cluvfy command can also be used.

3. Procedure

To install the Oracle Grid Infrastructure and Oracle RAC database, complete following steps:

- I. ASM Disk Configuration
- II. Grid Infrastructure Installation in Silent/GUI mode
- III. Clusterware Reboot
- IV. Oracle RAC Database Software Installation
- V. RAC Database Creation
- VI. Verification

3.1. ASM Disk Configuration

Use `asmcmd` to label the disk or use `asmlib`. Refer to the Oracle Grid Infrastructure Installation Guide for more details.

```
<GI_Home>/bin/asmcmd afd_label <Diskgroup name> <Disk with full path> --init
```

For e.g.,

```
/u01/app/21.0.0/grid/bin/asmcmd afd_label OCR /dev/sdc --init
```

3.2. Grid Infrastructure installation in Silent (or GUI) mode

- i. Create a Response file. You can use the Sample Response File available under `<GI_HOME>/install/response` and add the appropriate values for the variables.
- ii. Please run the following command to install in Silent mode:
`<GI_Home>/gridSetup.sh -silent -responseFile <responsefile name with full path>`

For e.g.,

```
/u01/app/21.0.0/grid/gridSetup.sh -silent -responseFile /home/oracle/gridsetup.rsp
```

Note: Please refer to the below MOS note before proceeding with running Root.sh on either node:

Steps to configure Grid Infrastructure in a PCA X9-2 RACK (Doc ID 2901750.1)

3.3. Clusterware Verification Post installation

- i. Cluster Verification utility “Cluvfy” can be used for post install verification. Run the command as below:

```
<GI_HOME>/bin/cluvfy -post crsinst -n <node1, node2>
```

For e.g.,

```
/u01/app/21.0.0/grid/bin/cluvfy -post crsinst -n racvm1,racvm2
```

- ii. Check the Clusterware resources by running below crsctl command

```
[oracle@racvm1 ~]$ crsctl stat res -t
-----
Name          Target  State        Server          State details
-----
Local Resources
-----
ora.LISTENER.lsnr
      ONLINE  ONLINE      racvm1          STABLE
      ONLINE  ONLINE      racvm2          STABLE
ora.chad
      ONLINE  ONLINE      racvm1          STABLE
      ONLINE  ONLINE      racvm2          STABLE
ora.net1.network
      ONLINE  ONLINE      racvm1          STABLE
      ONLINE  ONLINE      racvm2          STABLE
ora.ons
      ONLINE  ONLINE      racvm1          STABLE
      ONLINE  ONLINE      racvm2          STABLE
-----
Cluster Resources
-----
ora.ASMNET1LSNR_ASM.lsnr(ora.asmgrou
  1          ONLINE  ONLINE      racvm1          STABLE
  2          ONLINE  ONLINE      racvm2          STABLE
ora.DATA.dg(ora.asmgrou
  1          ONLINE  ONLINE      racvm1          STABLE
  2          ONLINE  ONLINE      racvm2          STABLE
ora.LISTENER_SCAN1.lsnr
  1          ONLINE  ONLINE      racvm2          STABLE
ora.LISTENER_SCAN2.lsnr
  1          ONLINE  ONLINE      racvm2          STABLE
ora.LISTENER_SCAN3.lsnr
  1          ONLINE  ONLINE      racvm1          STABLE
ora.asm(ora.asmgrou
  1          ONLINE  ONLINE      racvm1          STABLE
  2          ONLINE  ONLINE      racvm2          Started,STABLE
ora.asmnet1.asmnetwork(ora.asmgrou
  1          ONLINE  ONLINE      racvm1          STABLE
  2          ONLINE  ONLINE      racvm2          STABLE
ora.cdp1.cdp
  1          ONLINE  ONLINE      racvm2          STABLE
ora.cdp2.cdp
  1          ONLINE  ONLINE      racvm2          STABLE
ora.cdp3.cdp
  1          ONLINE  ONLINE      racvm1          STABLE
ora.cvu
  1          ONLINE  ONLINE      racvm2          STABLE
ora.qosmsserver
  1          ONLINE  ONLINE      racvm2          STABLE
ora.racvm1.vip
  1          ONLINE  ONLINE      racvm1          STABLE
ora.racvm2.vip
  1          ONLINE  ONLINE      racvm2          STABLE
ora.scan1.vip
  1          ONLINE  ONLINE      racvm2          STABLE
ora.scan2.vip
  1          ONLINE  ONLINE      racvm2          STABLE
```

```
ora.scan3.vip
  1          ONLINE  ONLINE          racvm1          STABLE
-----
[oracle@racvm1 ~]$
```

3.4. Oracle RAC Database Software Installation

Use RunInstaller as RDBMS user to install the Oracle RAC Database Software. Please refer to the Oracle Real Application Clusters Installation Guide for more details. You can install in Silent mode as shown below or in a GUI mode:

```
<RDBMS_HOME>/runInstaller -silent -responseFile <Response file name with full path>
```

For e.g.,

```
/u01/app/oracle/product/21.0.0/dbhome_1/runInstaller -silent -responseFile
/u01/app/oracle/product/21.0.0/dbhome_1/install/response/db_install.rsp
```

3.5. Oracle RAC Database Creation

- i. Use DBCA to create Oracle RAC database in Silent mode as shown below or use GUI mode.

```
<RDBMS_HOME>/bin/dbca -silent -createDatabase -responseFile <Response file name with full path>
```

For e.g.,

```
[oracle@racvm1 ~]$ /u01/app/oracle/product/21.0.0/dbhome_1/bin/dbca -silent -
createDatabase -responseFile
/u01/app/oracle/product/21.0.0/dbhome_1/assistants/dbca/dbca.rsp
```

- ii. Verify that Oracle RAC is created successfully by executing following commands:

For e.g.,

```
[oracle@racvm1 ~]$ /u01/app/oracle/product/21.0.0/dbhome_1/bin/srvctl status db -d
PCARACDB
Instance PCARACDB1 is running on node racvm1
Instance PCARACDB2 is running on node racvm2

oracle@racvm1 ~]$ crsctl stat res -t|grep -i db
ora.pcaracdb.db
  1          ONLINE  ONLINE          racvm1          Open,HOME=/u01/app/o
racle/product/21.0.0
/dbhome_1,STABLE
  2          ONLINE  ONLINE          racvm2          Open,HOME=/u01/app/o
racle/product/21.0.0
/dbhome_1,STABLE
```

3.6. Final Verification

- Connect to the database using sqlplus and see if the connection goes thru fine to validate database connectivity.
- Check the Scan and Vip names are online
- Check “crsctl stat res -t” command to verify all the resources are online.
- Create a new Database Service for this newly created RAC Database to check for the database connections.
- For making sure the connections can come in from other applications or non sys users, check and correct the entry in tnsnames.ora under <RDBMS Home>/network/admin.
- Run cluvfy post install to validate the configurations
<GI_HOME>/bin/cluvfy -post crsinst -n <node1, node2>
- Run “oracheck” can be run and validate the score.
- If you are trying to connect the database from another server in another Subnet, then make sure to copy the tnsnames entry in your client server.

CONCLUSION

Following the above steps, customers can now deploy an Oracle RAC database on Oracle Private Cloud Appliance.

RESOURCES

See these reference documents for additional information:

- Steps for Compute Instance Deployments:
<https://docs.oracle.com/en/engineered-systems/private-cloud-appliance/3.0/user-3.0.2/user-usr-compute.html#usr-compute>
- Installing OCI CLI (Using the OCI CLI):
<https://docs.oracle.com/en/engineered-systems/private-cloud-appliance/3.0/user-3.0.2/user-usr-comp-enclave.html#usr-ce-cli>
- To learn more about Oracle Grid Infrastructure:
<https://docs.oracle.com/en/database/oracle/oracle-database/21/cwlin/index.html>
- To learn more about Oracle Real Application Clusters:
<https://docs.oracle.com/en/database/oracle/oracle-database/21/rilin/index.html>
- To learn more about Oracle Private Cloud Appliance:
<https://docs.oracle.com/en/engineered-systems/private-cloud-appliance/3.0/user-3.0.2/index.html>
- To learn more about VNIC update:
<https://docs.oracle.com/en/engineered-systems/private-cloud-appliance/3.0/user-3.0.2/user-usr-networking.html#net-vnic-update>
- To learn more about Configuring Block Volumes to automatically mount (Linux) after reboot:
<https://docs.oracle.com/en/engineered-systems/private-cloud-appliance/3.0/user-3.0.2/user-usr-blockstorage.html#usr-blk-volume-mount>
- To learn more about latest PCA Software Updates:
<https://support.oracle.com/epmos/faces/DocumentDisplay?parent=DOCUMENT&id=2906831.1>

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Deployment of Oracle Real Application Clusters on Oracle Private Cloud Appliance X9-2
March 2023

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