Oracle Private Cloud Appliance

How to Manage Oracle Private Cloud Appliance with Enterprise Manager 13c Cloud Control

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Introduction

The purpose of this document is to define the end-to-end process to deploy an Oracle Enterprise Manager 13c agent to the highly available management nodes within the Oracle Private Cloud Appliance (PCA), deploy the Oracle PCA Plug-in and discover the Oracle VM Manager within the Oracle PCA.

Features

Oracle Enterprise Manager 13c, introduced the Oracle PCA Plug-in which enables users to discover multiple Oracle PCAs and manage them from a single instance of Oracle Enterprise Manager 13c. Users can also leverage the Oracle Enterprise Manager console to manage hybrid (private and public) cloud environments, through a single pane of glass. The Oracle PCA Plug-in also provides photorealistic views of the rack and its components, to facilitate hardware level monitoring.

Oracle Enterprise Manager also provides an Oracle Virtualization (VT) Plug-in which enables users to discover and manage multiple Oracle VM Manager instances. The VT Plug-in provides the ability to monitor all Oracle VM components such as Oracle VM guests, Oracle VM Servers (hypervisors), resource pools, storage and networking. The VT Plug-in also provides the foundation for infrastructure cloud services, providing secure multi-tenancy with self-service, elasticity and accountability.
Prerequisites
An Oracle Enterprise Manager 13c environment needs to exist outside of any Oracle PCA rack. The Oracle Enterprise Manager 13c environment should ideally be the latest version, which at the time of writing is Release 13.2. The following needs to exist and be available via the Oracle Enterprise Manager extensibility framework:

- Linux x86-64 agent software
- Oracle Enterprise Manager VT Plug-in

Additionally, in order to support the Oracle PCA Plug-in for hardware monitoring, Oracle PCA should be at version 2.1.1 or above.

High Level Steps
- Install the Oracle Enterprise Manager 13c agent on the Oracle PCA management nodes
- Install the Oracle Enterprise Manager VT Plug-in
- Discover Oracle PCA
- Register Oracle PCA’s Oracle VM Manager with Oracle Enterprise Manager 13c

Installing the Oracle Enterprise Manager 13c Agent
For this section, it is recommended to reference this document: Installing the Management Agent on Oracle PCA.

- As the root user, change the "oracle" user password to a known password.
  `passwd oracle`
- Verify the Oracle PCA Virtual IP address (VIP) and public Oracle Enterprise Manager IP address are in the /etc/hosts file.
  `YOUR.VIP pca1-vip.us.oracle.com pca1-vip-vip
  YOUR.IP em01.us.oracle.com em01`
- On the Oracle PCA active management node, and as the root user, create an agent directory within the shared nfs directory. The shared nfs directory is required for both availability and failover purposes.
  `mkdir /nfs/shared_storage/oemagent
  chown oracle:dba /nfs/shared_storage/oemagent`
- Oracle PCA software contains a pre-configured firewall entry for the default agent port of 3872 on both management nodes. If this port needs to be changed, the
Oracle PCA firewall needs to be configured as the root user on both the active and passive management nodes.

```
iptables -A INPUT -m state --state NEW -m tcp -p tcp --dport <agent_port> -j ACCEPT
service iptables save
service iptables restart
```

- Using the Oracle Enterprise Manager UI, add a named credential for the Oracle Enterprise Manager agent install user to install the agent.

- From the Oracle Enterprise Manager UI, deploy the agent to Oracle PCA:
  1. **Setup**=> **Add Target**=> **Add Targets Manually**
  2. **Install Agent on Host**=> **Add Manually**
  3. Enter the fully qualified hostname (FQDN) for the Oracle PCA management nodes’ VIP (Virtual IP Address)
  4. Enter **Linux x86-64** as the **Platform**
  5. **Next=>**
  6. Enter the following information:
     a. **Installation Base Directory**: /nfs/shared_storage/oemagent
     b. **Instance Directory**: This field will be automatically populated based upon the Installation Base Directory input
     c. **Named Credential**: This is a drop down menu. Select the agent install user named credential created earlier
     d. **Privileged Delegation Setting**: Leave the default. By default, this field is populated with /usr/bin/sudo -u %RUNAS% %COMMAND%
     e. **Port**: By default, this field is populated with 3872
     f. **Preinstallation Script**: Leave this field blank.
     g. **Postinstallation Script**: Leave this field blank.
     h. **Additional Parameters**: Leave this field blank.
     i. **Next =>**
    j. **Deploy Agent =>**

**Note:** During the agent install, the sudo command will display a warning and state that privilege scripts need to be run manually as the root user. Select to “Continue All Hosts” and once the agent install has completed, run the following privileged scripts as the root user on the Oracle PCA active management node:

```
/nfs/shared_storage/oemagent/agent_13.2.0.0.0/root.sh
/u01/app/oraInventory/orainstRoot.sh
```
On the Oracle PCA active management node, set the following property as the Enterprise Manager agent user, which for Oracle PCA is the "oracle" user.

```
/nfs/shared_storage/oemagent/agent_13.2.0.0.0/bin/emctl setproperty agent –name “AgentListenOnAllNICs” –value “false”
```

This setting by default instructs the agent to listen on all configured Network Interfaces. This is set to false and only listens on the Network Interface which is associated with the Oracle PCA VIP (Virtual IP address).

As the root user, and on the Oracle PCA active management node, copy the agent installation files to the passive management node (ovcamn06r1 is passive in this example):

```
scp /etc/init.d/gcstartup root@ovcamn06r1:/etc/init.d/
rsync -og /etc/oragchomelist root@ovcamn06r1:/etc/oragchomelist
rsync -og /u01/app/oraInventory/ root@ovcamn06r1:/u01/app/oraInventory/
```

As the root user, and on the Oracle PCA active management node, remove all the operating system startup files (gcstart) within the rc.d directories. For availability and failover reasons, it is required that the start and stop of the agent to be under the control of the Oracle PCA software.

```
for x in `find /etc/rc.*/rc* | grep gcstart`; do rm $x; done
```

Restart the Oracle Enterprise Manager agent on the Oracle PCA active management node either as the root user from the startup script OR as the agent user ("oracle") using the agent’s emctl command:

- As the root user
  ```
  /etc/init.d/gcstartup stop
  /etc/init.d/gcstartup start
  ```
- Or as the "oracle" user
  ```
  /nfs/shared_storage/oemagent/agent_13.2.0.0.0/bin/emctl stop agent
  /nfs/shared_storage/oemagent/agent_13.2.0.0.0/bin/emctl start agent
  ```

### Installing the Oracle Enterprise Manager VT Plug-in

For this section, we recommended referencing the Oracle Enterprise Manager 13.2 document: Downloading, Deploying, and Upgrading Plug-ins. In summary, the VT Plug-in is required to be installed on the Oracle Enterprise Manager 13c Management Server as well as the agent that is installed on the Oracle PCA active management node. Use of the latest version of the VT Plug-in on both the management server and agent is recommended.

**Note:** For the Oracle PCA version 2.3.1, the 13.2.3 version of the VT plug-in is required.

A prerequisite for the 13.2.3 VT Plug-in is the 13.2.2 version of the SI (Systems Infrastructure) and CFW (Cloud Framework) plug-in.
The VT Plug-in is required for both discovering the Oracle PCA and for registering Oracle PCA’s Oracle VM Manager.

**Plug-ins**

This page lists the plug-ins available, downloaded, and deployed to the Enterprise Manager system. Use this page to deploy or undeploy plug-ins.

<table>
<thead>
<tr>
<th>Name</th>
<th>Version</th>
<th>Management Agent with Plug-in</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

Discovering the Oracle Private Cloud Appliance

Once the Oracle Enterprise Manager 13c agent is installed and running on the Oracle PCA active management node, it is possible to discover Oracle PCA using the Oracle Enterprise Manager 13c PCA Plug-in. For this section, it is recommended that you reference Oracle Enterprise Manager 13.2 document: Discovering the Oracle PCA in Enterprise Manager.

1. From the Oracle Enterprise Manager 13c UI go to the Setup menu, then Add Target, then Add Targets Manually.
2. Then select **Add Non-Host Targets Using Guided Process**.

![Add Targets Manually](image)

3. Click on **Add Using Guided Process**. A pop-up window will appear. Select **Oracle Private Cloud Appliance** then click **Add**. This will then start the discovery wizard process.

4. On the **Discovery Input** page you will need to select the **Monitoring Agent** host location. Click the **Search** or Radio button and select the Oracle Enterprise Manager agent you installed in the first section on the Oracle PCA active management node. This agent will perform the discovery of the entire Oracle PCA. The Oracle PCA management nodes are connected to the private management network, which is required to access the internal components for the discovery process.

![Private Cloud Appliance Discovery Wizard: Discovery Input](image)
5. Next is the **Discovery Prerequisites** page where a series of checks are automatically performed. Any errors here should be investigated and resolved before continuing. Once resolved, the checks can be re-run by clicking on the **Reload** button.

6. A pop-up confirmation window will now appear to show how many targets have been discovered. Click the **Close** button to continue.

7. The **Discovered Targets** page displays the discovered targets. By default all targets are pre-selected.
8. The **Monitoring Credentials** page is next and shows a status flag which, when red, indicates that monitoring credentials are not set. For each target type, click the **Edit** button and insert the username and password. Note the top tick box which will allow you to use the same credentials for targets. Using this tick box will eliminate the need to enter the same credentials information multiple times. Note, for the InfiniBand switch enter “public” in the **Community String** mandatory field. Following the input of the required credentials, the status flag should now change from red to green.
9. The **System Review Page** is next and prompts you to click the **Promote Targets** button.
10. Once the discovery process is complete and all Oracle PCA targets are promoted, Oracle Enterprise Manager will then bring all Oracle PCA components into a rack view, including the option to access and view individual target home pages. To access this view go to **Targets**=>**Private Cloud Appliance**.
From here, click on the recently discovered Oracle PCA which will take you to the Oracle PCA home page. Here you can select to see the photorealistic rack view (as shown below).
Oracle Private Cloud Appliance Expansion Rack Monitoring

The Oracle Private Cloud Appliance supports expansion racks from software release 2.2.1 onward. It is recommended to install the latest bundle patches related to the version of the VT plugin being used. For the Oracle PCA 2.3.1 the latest version of the VT plugin (13.2.3) is required.

As there are more targets to discover with Oracle PCA and expansion racks it is recommended to tune the Oracle Enterprise Manager agent present on the Oracle PCA management nodes to expedite the discovery process time.

As the agent install user (oracle in the case of Oracle PCA) edit the following file:

```
/nfs/shared_storage/oemagent/agent_inst/sysman/config/emd.properties
```

Search for the line "agentJavaDefines"

The default for this entry is as follows:

```
agentJavaDefines=-Xmx128M -XX:MaxPermSize=96M
```

Edit this entry and add a line for the "propComputeParallelization" value as below:

```
agentJavaDefines=-Xmx5120M propComputeParallelization=100 -XX:MaxPermSize=96M
```

Finally, stop and start the agent to have the new tuning parameters take effect. This is achieved either as the oracle or root user:

As the oracle user:

```
/nfs/shared_storage/oemagent/agent_13.2.0.0.0/bin/emctl stop agent
/nfs/shared_storage/oemagent/agent_13.2.0.0.0/bin/emctl start agent
```

Or the root user:

```
/etc/init.d/gcstartup stop
/etc/init.d/gcstartup start
```

Depicted in the screen shot below, the enhanced view provides separate rack icons, on the left of the page, highlighted by a red box. Note the number in green within each expansion rack icon. This number is representative of the number of targets in the "Up" state. This view is of the main Oracle PCA rack:
Each rack is depicted as an icon which can be selected and can change the view of that rack. The screenshot below depicts expansion rack 2:
The view can either be a schematic or photo-realistic view. The following screenshot is of expansion rack 3 using the schematic view and exposing the IP address, rather than target name. It also shows empty slots and the temperature:

The Target Navigation view for Oracle PCA with multiple racks shows the main rack, then expansion racks 2 and 3. This is shown in the following screenshot:
The next screenshot shows that each rack can be expanded to show its individual component areas:

**Target Navigation**

- **Private Cloud Appliance**
  - PCA Rack
    - Compute Nodes
    - Ethernet Switches
    - Fabric Interconnects
    - InfiniBand Switches
    - Management Nodes
    - ZFS Storage Servers
  - PCA Rack
    - Compute Nodes
    - Ethernet Switches
    - InfiniBand Switches
  - PCA Rack
    - Compute Nodes
    - Ethernet Switches
    - InfiniBand Switches

With respect to the discovery process for Oracle PCA expansion racks, the overall process remains the same as with the PCA base rack. The difference lies with the amount of targets found and additional compute and fabric components that need to be registered. The following screenshots show these additional targets from the discovery process of an Oracle PCA with expansion racks:
If the Oracle VM Manager within the Oracle PCA is registered (see next section), the additional compute nodes will be visible from the Oracle VM Infrastructure cloud views within Oracle Enterprise Manager. The following screenshot depicts an Oracle PCA with expansion racks and therefore additional compute nodes:
Registering Oracle VM Manager with Oracle Enterprise Manager 13c (Oracle Private Cloud Appliance Software Version 2.3.1 and above)

As the Oracle PCA version 2.3.1 has Oracle VM Server 3.4.2, a tcps certificate is not required for registration with Oracle Enterprise Manager. Oracle VM Manager version 3.4 contains an internal Certificate Authority (CA) that is used to perform certificate-based authentication and to sign the SSL certificate that is used for the web-based user interface. Certificates are generated automatically upon the install of the Oracle PCA 2.3.1 software. The export and import of the Oracle VM Manager Weblogic certificate is required and detailed below.

For a new install of Oracle PCA software 2.3.1 and above, follow this procedure:

- As the root user, and on the Oracle PCA active management node, export the Oracle VM Manager certificate
  ```sh
  /u01/app/oracle/ovm-manager-3/ovm_upgrade/bin/ovmkeytool.sh exportca > /u01/app/oracle/ovm-manager-3/ws
  ```

- As the agent user, and on the Oracle PCA active management node, import the Oracle VM Manager certificate using password “welcome”
  ```sh
  /nfs/shared_storage/oemagent/agent_13.2.0.0.0/bin/emctl secure add_trust_cert_to_jks -trust_certs_loc /u01/app/oracle/ovm-manager-3/ws -alias ovmm
  ```

- From the Oracle Enterprise Manager UI, register Oracle PCA’s Oracle VM Manager

  **Enterprise**=>**Cloud**=>**Oracle VM Infrastructure Home**

  **Infrastructure Cloud**=>**Register OVM Manager**

  **Name**: Enter the target name for the Oracle VM Manager, for example “PCA-OVMM”

  **Monitoring Agent**: Select the agent running on the management nodes

  **Oracle VM Manager URL**: tcps://


  **Username**: admin

  **Password**: < pca oracle vm manager admin password >

  **Enable Automatic Synchronization with Oracle VM Manager**

  **Submit**

  The Oracle VM Manager within Oracle PCA will now be visible within the Oracle VM Infrastructure Home page.
Registering Oracle VM Manager with Oracle Enterprise Manager 13c (Oracle Private Cloud Appliance Software Versions 2.1.1 to 2.2.2)

With Oracle PCA software version 2.1.1 to 2.2.2, a tcps certificate is deployed in the shared nfs filesystem available to the Oracle PCA management nodes. For versions 2.1.1 to 2.2.2, this certificate should be used in the registration process for Oracle PCA's Oracle VM Manager using Oracle Enterprise Manager in all new installs. This deployed certificate will not change during any updates to the Oracle PCA software and therefore tcps does not need to be configured at each software upgrade.

For a new install of Oracle PCA software 2.1.1 to 2.2.2, follow this procedure:

- As the root user, and on the Oracle PCA active management node, export the Oracle VM Manager certificate using password “Welcome1”
  ```
  /u01/app/oracle/java/bin/keytool -keystore /nfs/shared_storage/certs/ovmm.ks -exportcert -alias ovmm -file /tmp/ovmm.cert
  ```
- As the agent user, and on the Oracle PCA active management node, import the Oracle VM Manager certificate using password “welcome”
  ```
  /nfs/shared_storage/oemagent/agent_13.2.0.0.0/bin/emctl secure add_trust_cert_to_jks -trust_certs_loc /tmp/ovmm.cert –alias ovmm
  ```
- From the Oracle Enterprise Manager UI, register Oracle PCA’s Oracle VM Manager
  
  Enterprise=> Cloud=> Oracle VM Infrastructure Home
  Infrastructure Cloud=> Register OVM Manager
  
  **Name**: Enter the target name for the Oracle VM Manager, for example “PCA-OVMM”
  
  **Monitoring Agent**: Select the agent running on the management nodes
  
  **Oracle VM Manager URL**: tcps://<pca-oracle-vm-manager-FQDN>:54322
  
  
  **Username**: admin
  
  **Password**: < pca oracle vm manager admin password>

  **Enable Automatic Synchronization with Oracle VM Manager**

  **Submit**

  The Oracle VM Manager within Oracle PCA will now be visible within the Oracle VM Infrastructure Home page.
Registering Oracle VM Manager with Oracle Enterprise Manager 13c (Oracle Private Cloud Appliance Software Version 2.0.5 and below)

For Oracle PCA software version 2.0.5, and below, the tcps certificate is stored locally and not within the shared nfs filesystem. Therefore tcps must be configured on each node using the following procedure referencing document: Oracle VM Installation and Upgrade Guide for 3.2

- As the root user, and on the Oracle PCA active management node, run the following script to setup tcps

```
/u01/app/oracle/ovm-manager-3/bin/secureOvmmTcpGenKeyStore.sh
/u01/app/oracle/ovm-manager-3/bin/secureOvmmTcp.sh
```

After the two scripts have run, the Oracle VM Manager service will need to be restarted. As the root user, and on the Oracle PCA active management node, run the following:

```
service ovmm stop
service ovmm start
```

Once the Oracle VM Manager service has been restarted, check that tcps is enabled and is listening on port 54322 by running the following as the root user on the Oracle PCA active management node:

```
netstat -a|grep 54322
```

```
tcp 0 0 *:54322 *:* LISTEN
```

The newly created tcps certificate needs to be copied from the Oracle PCA active management node to the passive management node (ovcamn06r1 is passive in this example), to enable tcps to start in the event of failover.

- As the root user, and on the Oracle PCA active management node, run the following:

```
scp -p /u01/app/oracle/ovm-manager-3/ovmmCoreTcps.ks ovcamn06r1:/u01/app/oracle/ovm-manager-3/ovmmCoreTcps.ks
```

- As the root user, and on the Oracle PCA active management node, export the Oracle VM Manager certificate using the KeyStore password used when running the secureOvmmTcpGenKeyStore.sh & secureOvmmTcp.sh scripts.

```
/u01/app/oracle/java/bin/keytool -keystore /u01/app/oracle/ovm-manager-3/ovmmCoreTcps.ks -exportcert -alias ovmm -file /tmp/ovmm.cert
```

- As the agent user, and on the Oracle PCA active management node, import the Oracle VM Manager certificate using password “welcome”.

```
/nfs/shared_storage/oemagent/agent_13.2.0.0.0/bin/emctl secure add_trust_cert_to_jks -trust_certs_loc /tmp/ovmm.cert -alias ovmm
```
From the Oracle Enterprise Manager UI, register Oracle PCA’s Oracle VM Manager:

**Enterprise**=>**Cloud**=>**Oracle VM Infrastructure Home**

**Infrastructure Cloud**=>**Register OVM Manager**

**Name**: Enter the target name for the Oracle VM Manager, for example “PCA-OVMM”

**Monitoring Agent**: Select the agent running on the management nodes

**Oracle VM Manager URL**: tcps://<pca-oracle-vm-manager-FQDN>:54322


**Username**: admin

**Password**: <pca oracle vm manager admin password>

**Enable Automatic Synchronization with Oracle VM Manager**

Submit

The Oracle VM Manager within Oracle PCA will now be visible within the Oracle VM Infrastructure Home page

**For more information**

Visit the Web resources listed in Table 1.

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<thead>
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<th>TABLE 1. WEB RESOURCES FOR FURTHER INFORMATION</th>
</tr>
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<tr>
<td>WEB RESOURCE DESCRIPTION</td>
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<td>---------------------------</td>
</tr>
<tr>
<td>Oracle Private Cloud Appliance</td>
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<tr>
<td>Oracle Virtualization</td>
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<td>Oracle Solaris</td>
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