

Deploying Database Systems and Application VMs on Oracle Database Appliance

This document in the Solution-in-a-Box series provides a step-by-step guide to utilize the KVM technology on Oracle Database Appliance bare metal system release 19.10.0.0.0 and later. It provides guidelines how to create the Application tier together with the database tier on the same Oracle Database Appliance hardware.

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About Oracle Database Appliance

Oracle Database Appliance is a pre-built, ready to deploy platform for Oracle Database.

Oracle Database Appliance is an engineered system, an integrated, full-stack solution developed for Oracle Database. Oracle hardware and software are designed to work perfectly together and are able to run crucial customer workloads faster, at lower costs, and with greater security than multivendor, on-premises 'build your own' solutions. Each Oracle Database Appliance system consists of server nodes, networking, and redundant storage. Oracle Database Appliance can be a single node model (S for small, M for Medium and in the case of X6-2L, for Large), or a two node HA model (HA models support high-availability). With the High-Availability models, you get two clustered nodes and you are able to create highly-available Oracle RAC databases easily and quickly using either the browser user interface (BUI) or the command-line interface (CLI).

Why Use Virtualization and How does Oracle Database Appliance provide a Virtualization Solution

Understand how Oracle Database Appliance can address your virtualization requirements.

Why use Virtualization?

There are several reasons why virtualization might be considered. Virtual Machines (VMs) can be used to consolidate and to utilize resources more effectively. Rather than disable cores that are not licensed, you can utilize them for other workloads. This can reduce the number of physical servers, resulting in space, power maintenance reductions, and cost savings. Virtualization is a great technology that provides application and database isolation and enables bundling of applications, middleware, and databases on the same hardware.

How does Oracle Database Appliance provide a Virtualization Solution?

Oracle Database Appliance has provided virtualization since Oracle Database Appliance release 2.5. To use virtualization on Oracle Database Appliance earlier, it had to be deployed with a special image. Users had to decide before deploying Oracle Database Appliance to go with either the bare metal (BM) image or the virtualized platform image (VP). To change from one layout to the other, the appliance had to be reimaged from scratch. Oracle Database Appliance VP was only available for Oracle Database Appliance High Availability (2 node appliance) and not for single node appliance. Virtualization on Oracle Database Appliance was introduced to allow the utilization of cores not licensed for Oracle Database. To avoid leaving these cores unused, virtualization allowed to utilize them for virtual machines hosting applications, web servers, and others. To host not only the database tier, but also the application and web tier on the same Oracle Database Appliance is also known as Solution-in-a-Box. This concept is widely adopted and not only used for Oracle Applications like EBS, WLS, Peoplesoft, Oracle Hospitality to name a few, but as well for many customer and third party software vendor developed applications.

In the past virtualization on Oracle Database Appliance was implemented with Oracle Virtual Machine (OVM) which is a type 1 bare metal hypervisor based on xen technology. Virtualization on Oracle Database Appliance is now available with KVM. KVM stands for Kernel-based Virtual Machine and is a type 2 host OS-based hypervisor. KVM provides modules that enable the Linux kernel to be used as a hypervisor. It is available on all Oracle Database Appliance hardware models (single node and HA). KVM is a mature technology that has been around since 2007 and offers several advantages. To name one, Oracle Database Appliance does not need separate bare metal system and virtualized platform images anymore. Starting with Oracle Database Appliance 19.9, Oracle Database Appliance integrated KVM support for applications. A user can use the built-in BUI or the command line to manage the Application VM life cycle on Oracle Database Appliance. The user is responsible for managing the application inside the KVM, for the Oracle Database Appliance software

tooling it is a 'black box'. Starting with Oracle Database Appliance 19.10, Oracle Database Appliance integrates KVM support for Oracle databases. A user can use Oracle Database Appliance's built-in BUI or the command line to manage both DB System (database KVM system on Oracle Database Appliance) life cycle and databases inside DB Systems. DB Systems allow Oracle hard partitioning licensing, thus a user only needs to have Oracle Database licenses for the CPU cores assigned to the DB System.

Oracle Database Appliance Virtualization Terminology

Understand the terminology used in this document.

- **Virtual Machine (VM):** Image and virtual resources that behave like an actual server within the host server.
- **KVM guest machine:** The software on an application VM with an independent operating system instance.
- **DB System (KVM Database System):** A database VM which runs an Oracle Database on Oracle Database Appliance. The DB System is created and managed by Oracle Database Appliance tooling.
- **VM Storage:** Central location for storing resources needed to create virtual machines.
- **Virtual Network:** Separate virtual network for the VM.
- **Virtual Disk:** Additional storage option for VMs to add additional block storage.
- **KVM Database System Networks:** Default networks created on Oracle Database Appliance, which are the public network (vnetwork pubnet) and the internal managed cluster interconnect and Oracle ASM network.

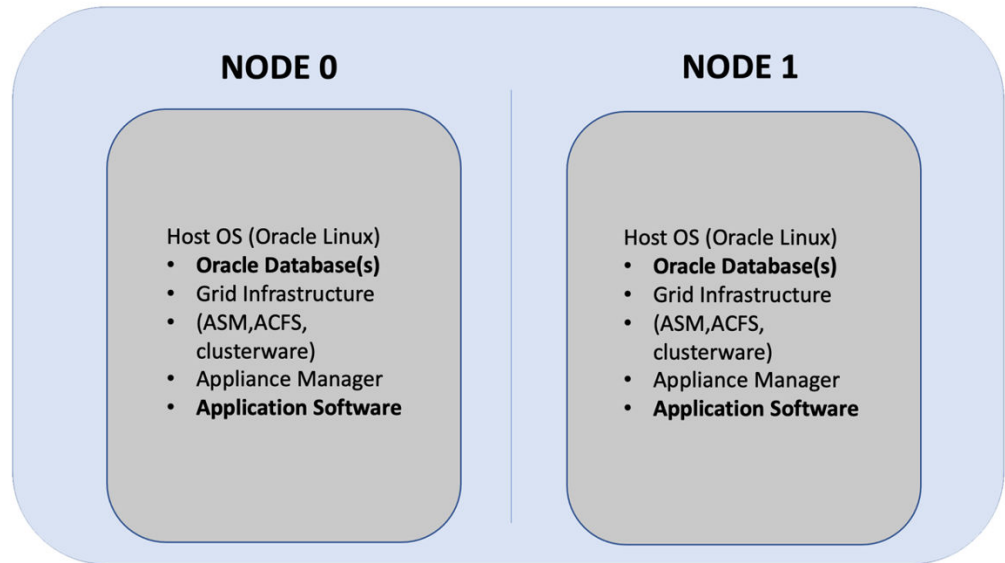
Solution-in-a-Box Designs

There are three basic scenarios on how to install the application along with the database on an Oracle Database Appliance. For an Oracle Database Appliance High-Availability hardware model, there are additional designs since your database can be a Oracle RAC or a single instance database on one node only and depending on your application, you may be able to run it on one or both nodes.

The basic scenarios are:

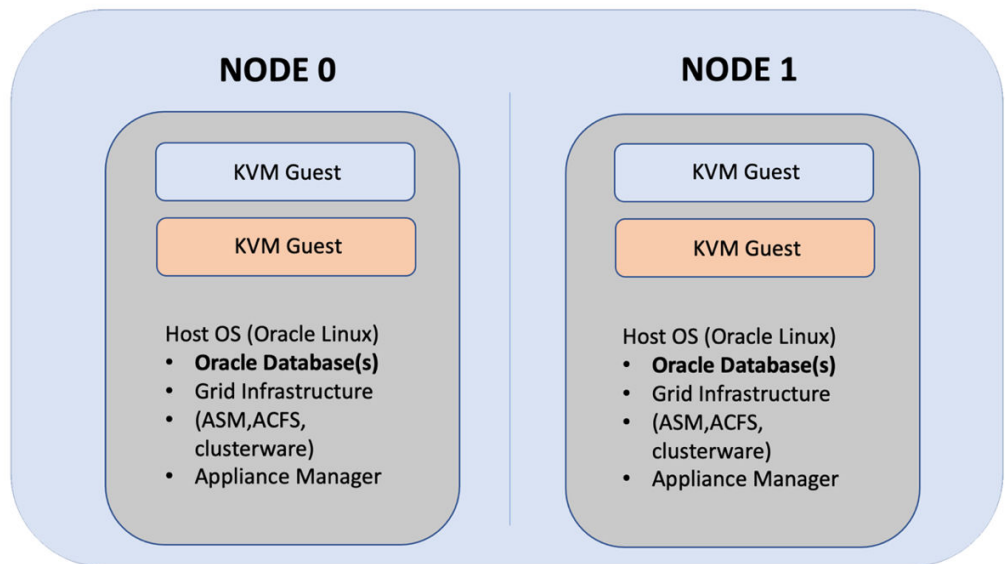
Application and Database installed in bare metal system

This option is only applicable for a few applications which do not interfere with the database software and operating system installation. One supported example is the Oracle Enterprise Manager software.



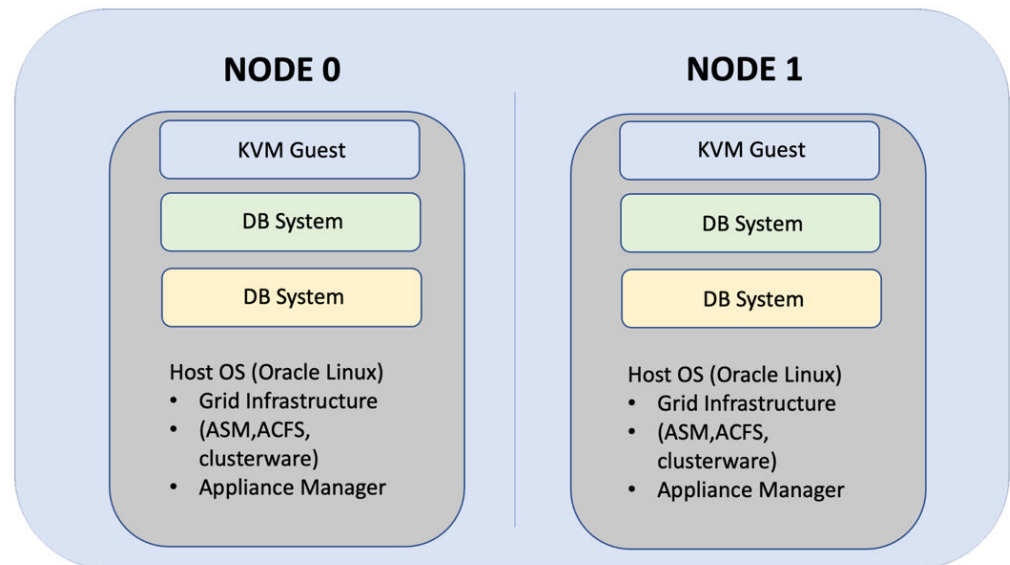
Database installed in bare metal system, Application installed in KVM guest machine

This option does not allow hard partitioning, that is, separation of cores for database and application is not possible.



Database and Application in separate KVM guest machines

This third option is ideal to separate resources for databases and applications and license them independently. This step-by-step guide covers an example of the third case since this is the best solution for most use cases.



High-Availability and Networking Considerations

Understand the high-availability and networking options when deploying your Solution-in-a-Box.

High-Availability Considerations

With Oracle Database Appliance, the best High Availability option is to use an Oracle RAC database. An Oracle RAC One Node design may be sufficient for your availability requirements as well. These options are only available with an Oracle Database Enterprise Edition (EE) licence. Oracle Database Standard Edition (SE) Oracle databases have Standard Edition High Availability (SEHA) feature enabled. The KVM guest machines you create for your applications are set up by default to auto-restart and auto-failover. You can confirm the setting by running the command `odacli describe-vm`. The output displays: `Auto start: YES - Fail over: YES`

Networking Considerations

Oracle Database Appliance KVM virtual network supports two type of networks, bridged and bridged-vlan. For bridged network, a bridge is created and a NIC or a bond is attached to it. On the public network, selected during appliance deployment, a bridge with the name `pubnet` is attached. If a VM needs access to `pubnet`, it can be attached to this network. This `pubnet` vnetwork cannot be modified or deleted. If additional bridged virtual networks are required, then they can be created on other interfaces that are not used for the `pubnet`. For DB Systems on Oracle Database Appliance release 19.10, you cannot use a virtual network other than the `pubnet`. With

later releases of Oracle Database Appliance, VLANs can be created on all available public interfaces, including the interface on which the public network is already configured. When planning to run one or more DB Systems, be aware that every DB System requires its own set of VIPs and SCAN IPs.

Solution: Create an Application VM with Linux Operating System

Following is an example of how to set up an application VM or a Compute Instance with Linux operating system.

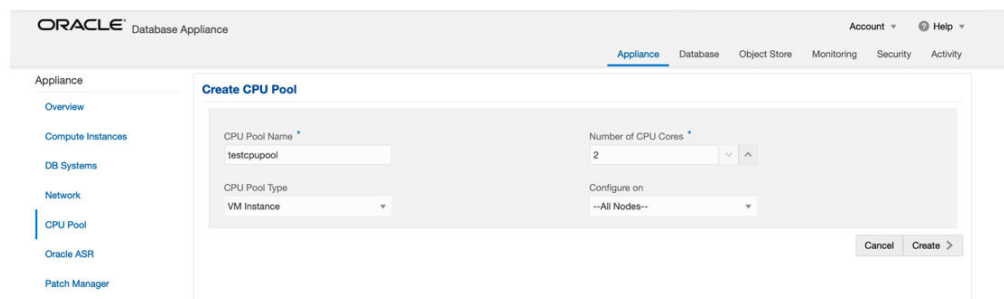
Tip:

Some of the following steps are mandatory as indicated, and other steps are optional. Decide to run the optional steps based on how you designed your Solution-in-a-Box. For example, if your application VM must only use a defined number of CPUs, then, you must create a VM CPU Pool as part of the process. Creation of VM storage is mandatory as several application VMs can share a single VM storage. If you have specific network requirements, you can create additional virtual networks for these purposes. Another optional step is the creation of virtual disks. One VM disk is created for each application guest KVM as part of the VM instance creation. You can create additional virtual disks for your application VM and these virtual disks can be shared between different application VMs, if required.

Step 1: Create a VM CPU Pool (Optional)

Create a CPU pool to specify how many CPU cores your KVM should use. This CPU pool is later assigned to the KVM guest machine.

In the Browser User Interface (BUI), in the **Appliance** tab, navigate to the **Create CPU Pool** page and specify the **CPU Pool Name**, **Number of CPU Cores**, and select the **CPU Pool Type** as **VM Instance**.

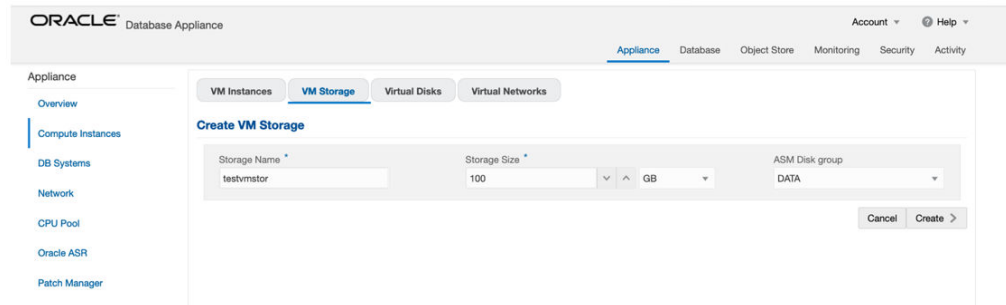


ODA CLI command for creating a CPU pool:

```
# odacli create-cpupool -n testcpupool -c 2 -vm
```

Step 2: Create VM Storage

In the **Appliance** tab, select **Compute Instances**, and then navigate to the **Create VM Storage** page and specify **Storage Name**, **Storage Size**, and **ASM Disk group**. Click **Create**.



The screenshot shows the Oracle Database Appliance interface. The 'Appliance' tab is selected, and the 'VM Storage' sub-tab is active. The 'Create VM Storage' form contains the following fields: 'Storage Name' with the value 'testvmstor', 'Storage Size' set to '100' GB, and 'ASM Disk group' set to 'DATA'. 'Cancel' and 'Create >' buttons are visible at the bottom right of the form.

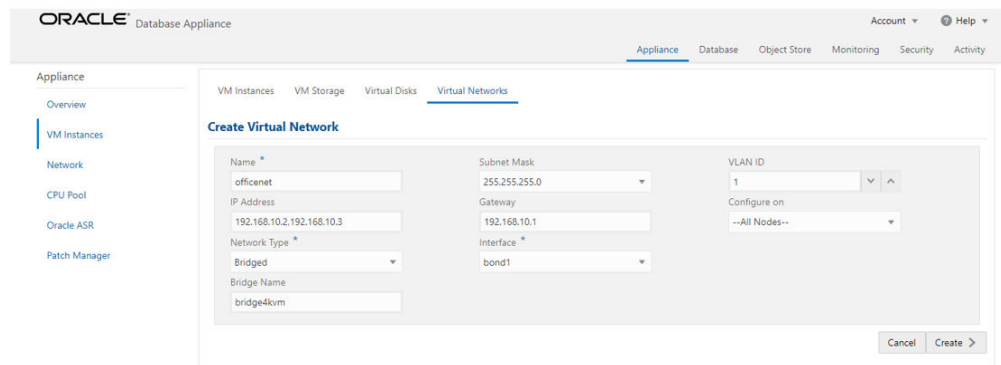
ODACLI command for creating VM storage:

```
# odacli create-vmstorage -n testvmstor -s 100G -dg DATA
```

Note that the default value of `-dg` is `DATA`.

Step 3: Create a Virtual Network (if required)

Any VM that needs to access the public network must be attached to the `pubnet` virtualnetwork. No bridged network other than the default `pubnet` bridge is allowed to be created on the public network interface. Additional bridged vnetwork (public network without tagged VLAN configuration) can be created on other interfaces that are not used for the public network. It is not mandatory to assign IP addresses to the bridge. IP addresses are only required if communication between the bare metal system host and the KVM guest is desired. When two IP addresses are assigned to a high-availability machine, the first will be assigned to the bridge on `node0` and the second IP address to `node1`.



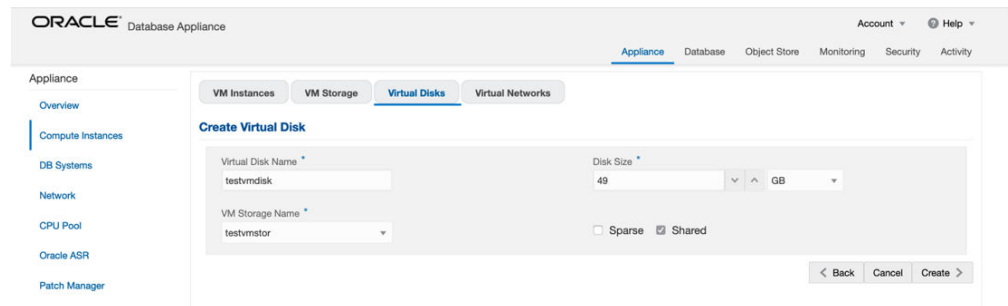
The screenshot shows the Oracle Database Appliance interface. The 'Appliance' tab is selected, and the 'Virtual Networks' sub-tab is active. The 'Create Virtual Network' form contains the following fields: 'Name' with the value 'officenet', 'Subnet Mask' set to '255.255.255.0', 'VLAN ID' set to '1', 'IP Address' with values '192.168.10.2, 192.168.10.3', 'Gateway' set to '192.168.10.1', 'Network Type' set to 'Bridged', 'Interface' set to 'bond1', and 'Bridge Name' set to 'bridge4kvm'. 'Cancel' and 'Create >' buttons are visible at the bottom right of the form.

ODACLI command for creating a virtual network:

```
# odacli create-vnetwork -name officenet -bridge bridge4kvm -type  
bridged -interface bond1 -ip xx.xx.xx.xx -gateway xx.xx.xx.xx -netmask  
xx.xx.xx.xx
```

Step 4: Create Virtual Disk (if required)

During the VM creation, a VM disk is created to host the operating system. If additional disks are required, you must create them in advance. Using virtual disks provides better control over the storage layout of your VM.



The screenshot shows the Oracle Database Appliance web interface. The top navigation bar includes 'Appliance', 'Database', 'Object Store', 'Monitoring', 'Security', and 'Activity'. The left sidebar lists various management options like 'Overview', 'Compute Instances', 'DB Systems', 'Network', 'CPU Pool', 'Oracle ASR', and 'Patch Manager'. The main content area is titled 'Create Virtual Disk' and contains the following fields:

- Virtual Disk Name ***: A text input field containing 'testvmdisk'.
- Disk Size ***: A dropdown menu showing '49' and a unit selector set to 'GB'.
- VM Storage Name ***: A dropdown menu showing 'testvmstor'.
- Options**: Two checkboxes, 'Sparse' (unchecked) and 'Shared' (checked).

At the bottom right of the form are three buttons: '< Back', 'Cancel', and 'Create >'.

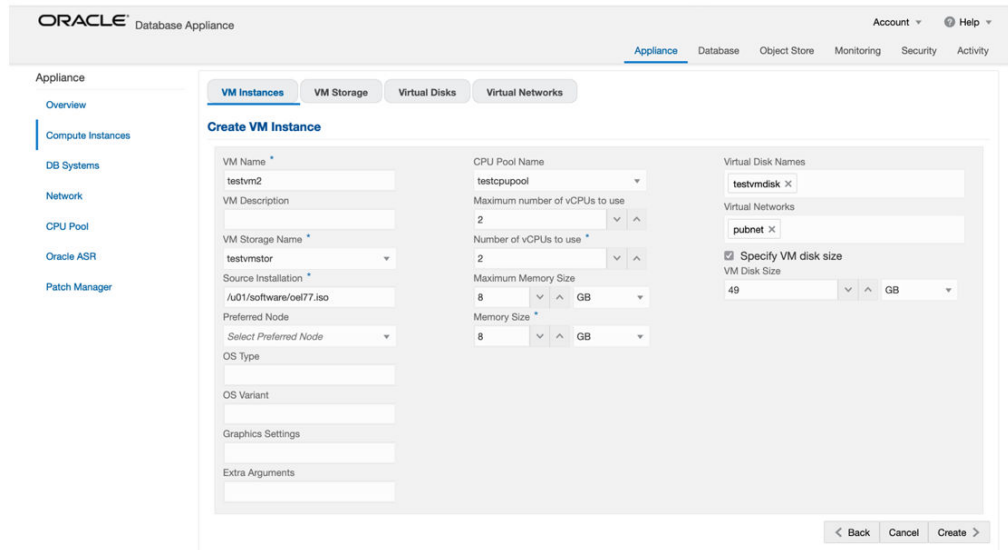
ODACLI command for creating a virtual disk:

```
# odacli create-vdisk -n testvmdisk -vms testvmstor -s 49G -sh
```

Step 5: Create the VM Instance

To create the VM go to 'VM Instances' and 'Create VM'. Type in the mandatory information for your VM plus the additional configuration you would like to use for your VM guest. Mandatory information is the 'VM name', 'VM Storage Name', the path to the application to install, under 'Source installation'. You have as well to define how many CPUs and how much memory to use for the VM. If you have created a CPU Pool a Virtual Disk or a Virtual Network, select them into the respective fields. Specify the size of the OS disk to be created for your VM guest in "VM Disk Size". If you need your VM to access the DB System via the pubnet, make sure 'pubnet' is selected in the 'Virtual Networks'.

In the **Appliance** tab, select Compute Instances, and then navigate to the **Create VM Instance** page and specify **VM Name** and **VM Storage Name**. Specify the path for the installation of application in the **Source Installation** field. Define the **Number of vCPUS** to use and the **Maximum Memory Size** for the VM. If you have created a CPU pool, virtual disk, or virtual network, then specify their names. Specify the operating system disk size to be created for your guest VM in the **VM Disk Size** field. To ensure that your VM can access the DB system through the pubnet, select `pubnet` in the **Virtual Networks** field. Click **Create**.



ODACLI command for creating a VM instance:

```
# odacli create-vm -n testvm2 -vc 2 -m 8G -vms testvmstor -vd
testvmdisk -s 49G -cp testcpupool -vn pubnet -src /u01/software/
oel77.iso
```

Step 6: Complete the operating system installation

If the creation of the VM was successful, use the `odacli describe-vm` command to check the VNC port.

```
# odacli describe-vm -n testvm2
VM
details
```

```

                                ID: 4956584d-7409-4d38-8a22-60653a6c2ae1
                                Name: testvm2
                                Created: 2021-05-10 02:24:01 HDT
                                Updated: 2021-05-10 02:24:01 HDT
                                VM Storage: testvmstor
                                Description: NONE
                                VM size: 49.00 GB
                                Source: oel77.iso
                                OS Type: NONE
                                OS Variant: NONE
                                Graphics settings: vnc,listen=127.0.0.1
                                Display Port: 127.0.0.1:2    <-VNC port
```

Status

```
Current node: node1
Current state: ONLINE
Target state: ONLINE
```

Parameters

```
-----
Preferred node: NONE
Boot option: NONE
Auto start: YES
Fail over: YES
```

Config

Live

```
-----
Memory: 8.00 GB 8.00
GB
Max Memory: 8.00 GB 8.00
GB
vCPU count: 2
2
Max vCPU count: 2
2
CPU Pool: testcpupool
testcpupool
Effective CPU set: 2-3,38-39
2-3,38-39
vCPUs: 0:2-3,38-39
0:2-3,38-39
1:2-3,38-39
1:2-3,38-39
vDisks: testvmdisk:vdb
testvmdisk:vdb
vNetworks: pubnet:52:54:00:7d:7b:6b
pubnet:52:54:00:7d:7b:6b
```

Step 7: Connect to the Oracle Database Appliance bare metal system node using VNC

To find out the VNC port that the bare metal system (not the KVM guest machine) uses, run the `vncserver` command.

```
# vncserver
perl: warning: Setting locale failed.
perl: warning: Please check that your locale settings:
    LANGUAGE = (unset),
    LC_ALL = (unset),
    LC_CTYPE = "UTF-8",
    LANG = "en_US.UTF-8"
are supported and installed on your system.
```

```
perl: warning: Falling back to the standard locale ("C").
```

```
You will require a password to access your desktops.
```

```
Password:
```

```
Verify:
```

```
Would you like to enter a view-only password (y/n)? n
```

```
A view-only password is not used
```

```
xauth: file /root/.Xauthority does not exist
```

```
New 'node1:1 (root)' desktop is node1:1  VNC port
```

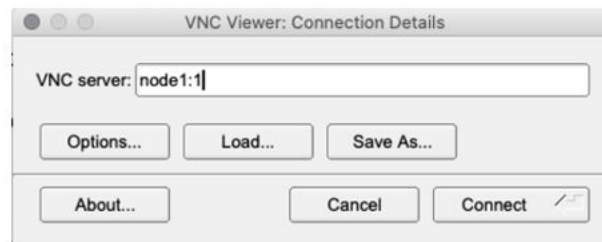
```
Creating default startup script /root/.vnc/xstartup
```

```
Creating default config /root/.vnc/config
```

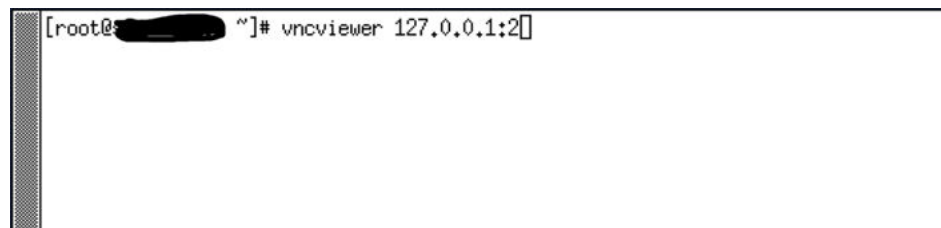
```
Starting applications specified in /root/.vnc/xstartup
```

```
Log file is /root/.vnc/node1:1.log
```

Use a VNC client of your choice and connect to `host:vncport` (the host is your Oracle Database Appliance bare metal system, the VNC port is from the `vncserver` command).

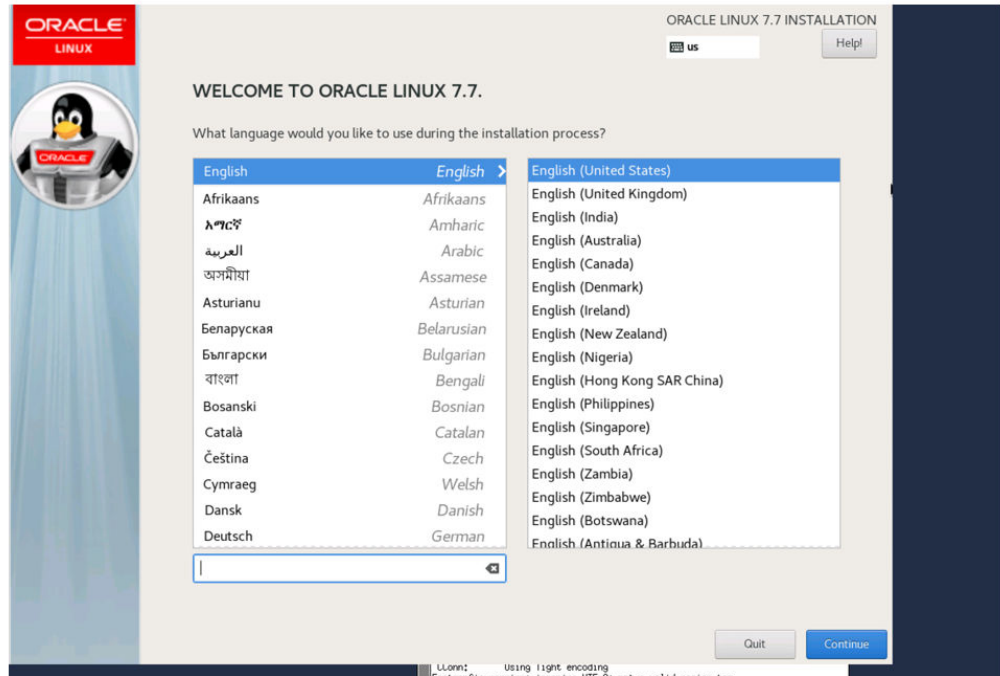


The command prompt in the VNC viewer of type `vncviewer 127.0.0.1:2` is displayed. Note that this Display Port: `127.0.0.1:2` is the same as displayed in the `odacli describe-vm` output.

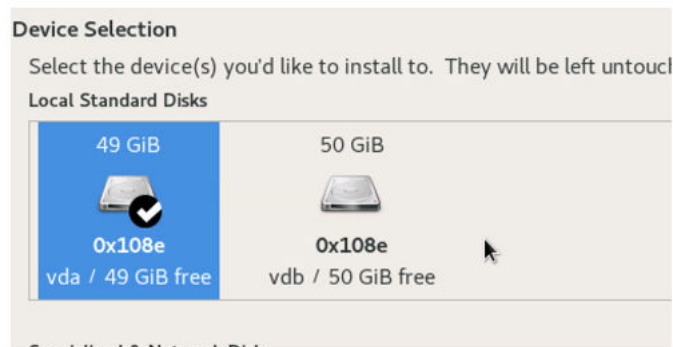


Step 8: Complete the installation process

Select the language:



In the Device Selection screen, the disks that were created when you ran the `odacli create-vm` and `odacli create-vdisk` commands are displayed. Ensure that you select the appropriate disk for the operating system install.



Accept the message to restart, and then run the VNC to complete the setup, such as accepting the license agreement.

Step 9: Configure the Application VM network

After the Linux operating system installation for the application VM is completed, the VM may have several interfaces. The following example describes how to assign the IP address to the `pubnet` and locate the MAC address for this interface.

```
# odacli describe-vm -n testvm2 | grep vNetworks
vNetworks: pubnet:52:54:00:7d:7b:6b
pubnet:52:54:00:7d:7b:6b
```

Login to the application VM through the VNC client and run the command `ip link show` to identify the interface with the MAC address described in the command above.

```
# ip link show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN
mode DEFAULT group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast
state UP mode DEFAULT group default qlen 1000
    link/ether 52:54:00:7d:7b:6b brd ff:ff:ff:ff:ff:ff
3: virbr0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc noqueue
state DOWN mode DEFAULT group default qlen 1000
    link/ether 52:54:00:42:63:d7 brd ff:ff:ff:ff:ff:ff
4: virbr0-nic: <BROADCAST,MULTICAST> mtu 1500 qdisc pfifo_fast master
virbr0 state DOWN mode DEFAULT group default qlen 1000
    link/ether 52:54:00:42:63:d7 brd ff:ff:ff:ff:ff:ff
```

Edit the `/etc/sysconfig/network-scripts/ifcfg-eth0` and `/etc/resolv.conf` file to find the DNS inside the VM. Refer to your operating system specific document to configure the network interface. The following is an example:

```
# cat /etc/sysconfig/network-scripts/ifcfg-eth0
TYPE=Ethernet
BOOTPROTO=none
DEFROUTE=yes
NAME=eth0
DEVICE=eth0
NM_CONTROLLED=no
ONBOOT=yes
IPADDR=your IP address
PREFIX=your subnet prefix
GATEWAY=your gateway
```

```
# cat /etc/resolv.conf
search domain
nameserver your first DNS server
nameserver your second DNS server
```

Step 10: Test for the required connectivity to the VM guest machine

Test that you are able to connect to all guest machines and clients (database, external machines, and others). To connect as root through SSH, you may need to change SELINUX to permissive mode in the `/etc/selinux/config` file. If required, test this

connectivity as well after you migrate the VM guest machine to the other node. To migrate the node, run the following commands:

```
# odacli describe-vm -n testvm2 | grep 'Current node'
Current node: node1

# odacli migrate-vm -n testvm2 -to node2

# odacli describe-vm -n testvm2 | grep 'Current node'
Current node: node2
```

Solution: Create an Application VM with Windows OS

Following is an example of how to set up an application VM or Compute Instance with Microsoft Windows operating system.

The following procedure is applicable for Oracle Database Appliance release 19.12 or later. If your Oracle Database Appliance is on an earlier release, then follow the instructions in My Oracle Support Note 2748946.1 at the location <https://support.oracle.com/rs?type=doc&id=2748946.1>.

Before you start, download the **Oracle VirtIO Drivers Version** for Microsoft Windows software either from Oracle Software Delivery Cloud or from My Oracle Support. For details, refer to the *Oracle Linux KVM User's Guide* . With BUI of Oracle Database Appliance release 19.12 or 19.11, the option to define an external source is not available. Use ODACLI commands to create the VM with the option `-esrc`.

Step 1: Create a VM CPU Pool (Optional step, required only for cases when you need dedicated CPU resources for the Windows VM)

```
# odacli create-cpupool -n winvmcpupool -c 2 -vm
```

Step 2: Create VM Storage

```
# odacli create-vmstorage -n winvmstor -s 100G -dg DATA
```

Step 3: Create Virtual Disk (Optional, required only if you need additional disks for the Windows VM)

```
# odacli create-vdisk -n winvmdisk -vms winvmstor -s 49G -sh
```

Step 4: Create the VM Instance

```
# odacli create-vm -n winvm -vc 2 -m 8G -vms winvmstor -s 49G -vd
winvmdisk -cp winvmpool -vn pubnet -src /tmp/win19.iso -esrc /tmp/
winvirtio.iso -ost windows
```

Step 5: Identify the VNC port

```
# odacli describe-vm -n winvm
```

VM

details

```

                                ID: 7b741c6a-7073-4d39-9270-24698b887135
                                Name: winvm
                                Created: 2021-08-03 02:59:42 HDT
                                Updated: 2021-08-03 02:59:42 HDT
                                VM Storage: winvmstor
                                Description: NONE
                                VM size: 49.00 GB
                                Source: win19.iso
                                OS Type: windows
                                OS Variant: NONE
                                Graphics settings: vnc,listen=127.0.0.1
                                Display Port: 127.0.0.1:0
```

Status

```
Current node: node1
Current state: ONLINE
Target state: ONLINE
```

Parameters

```
Preferred node: NONE
Boot option: NONE
Auto start: YES
Fail over: YES
```

Config

Live

```

                                Memory: 8.00 GB          8.00
GB
                                Max Memory: 8.00 GB      8.00
GB
                                vCPU count: 2
```



```

2
          Max vCPU count: 2
2
          CPU Pool: winvmpool
winvmpool
          Effective CPU set: 0-1,32-33
0-1,32-33
          vCPUs: 0:0-1,32-33
0:0-1,32-33
          1:0-1,32-33
1:0-1,32-33
          vDisks: winvmdisk:vdb
winvmdisk:vdb
          vNetworks: pubnet:52:54:00:84:8f:cd
pubnet:52:54:00:84:8f:cd

```

Step 6: Connect to the Oracle Database Appliance bare metal system node using VNC

To find out the VNC port that the bare metal system (not the KVM guest machine) uses, run the `vncserver` command.

```

# vncserver
perl: warning: Setting locale failed.
perl: warning: Please check that your locale settings:
    LANGUAGE = (unset),
    LC_ALL = (unset),
    LC_CTYPE = "UTF-8",
    LANG = "en_US.UTF-8"
    are supported and installed on your system.
perl: warning: Falling back to the standard locale ("C").

You will require a password to access your desktops.

Password:
Verify:
Would you like to enter a view-only password (y/n)? n
A view-only password is not used
xauth:  file /root/.Xauthority does not exist

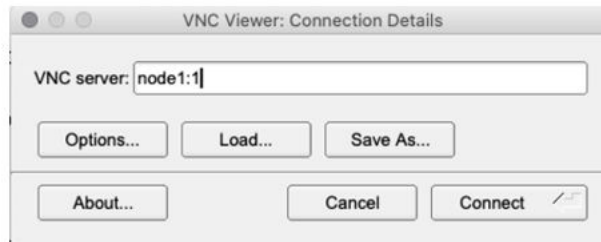
New 'node1:1 (root)' desktop is node1:1   VNC port

Creating default startup script /root/.vnc/xstartup
Creating default config /root/.vnc/config
Starting applications specified in /root/.vnc/xstartup
Log file is /root/.vnc/node1:1.log

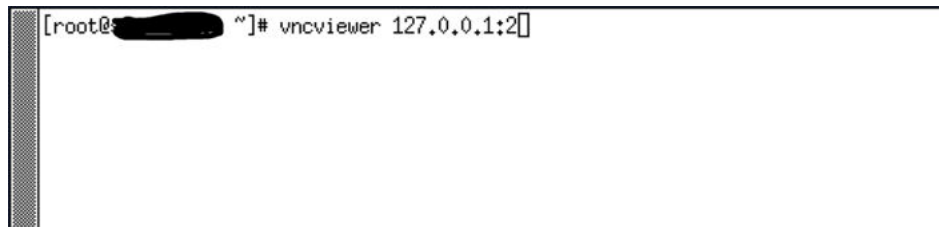
```

Step 7: Connect to the VM guest machine using VNC

Use a VNC client of your choice and connect to `host:vnport` (the host is your Oracle Database Appliance bare metal system, the VNC port is from the `vncserver` command).



The command prompt in the VNC viewer of type `vncviewer 127.0.0.1:2` is displayed. Note that this Display Port: 127.0.0.1:2 is the same as displayed in the `odacli describe-vm` output.

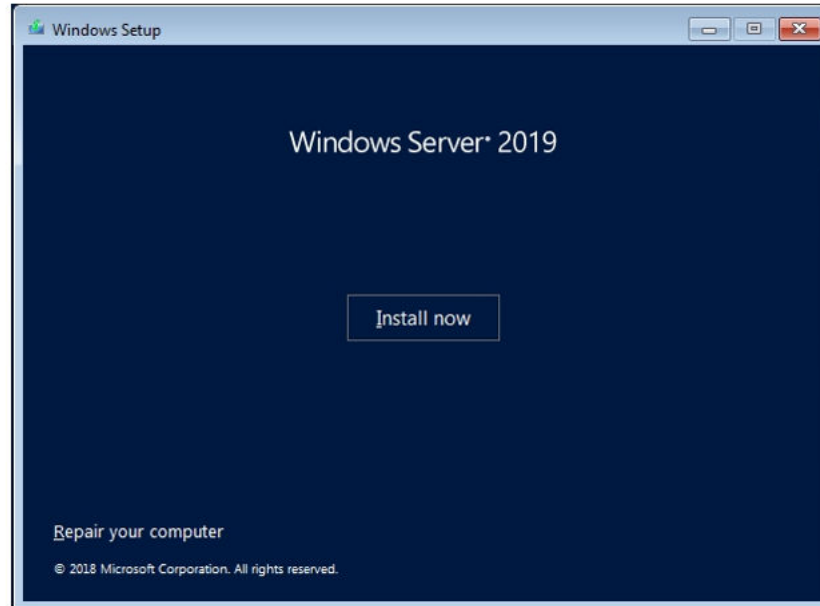


Step 8: Complete the Windows operating system installation

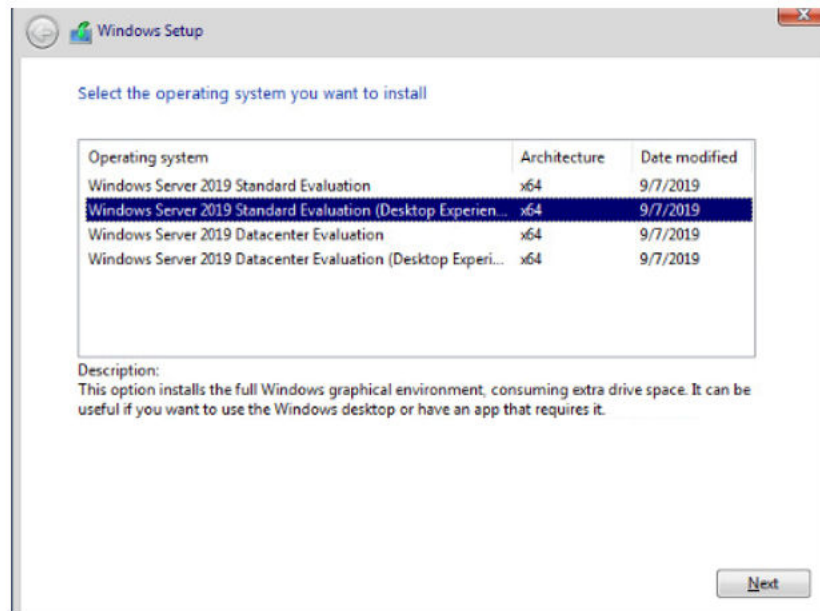
Select the configuration details.



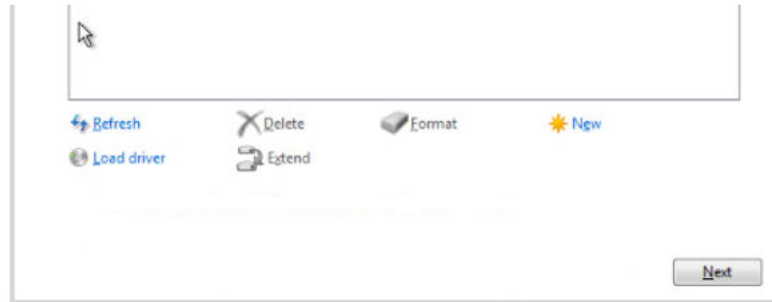
Provide the required values and navigate through the installation setup.



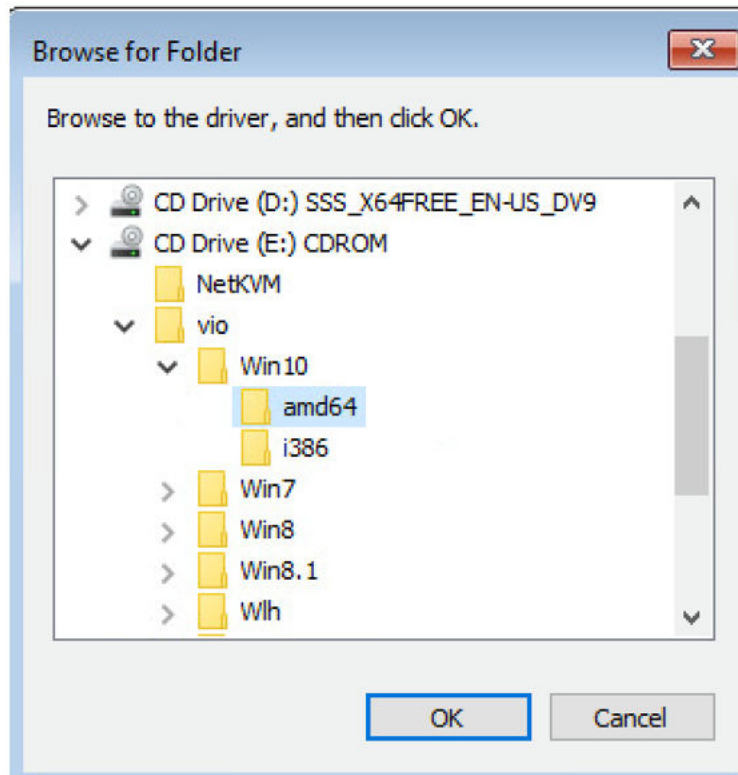
Select the configuration details.



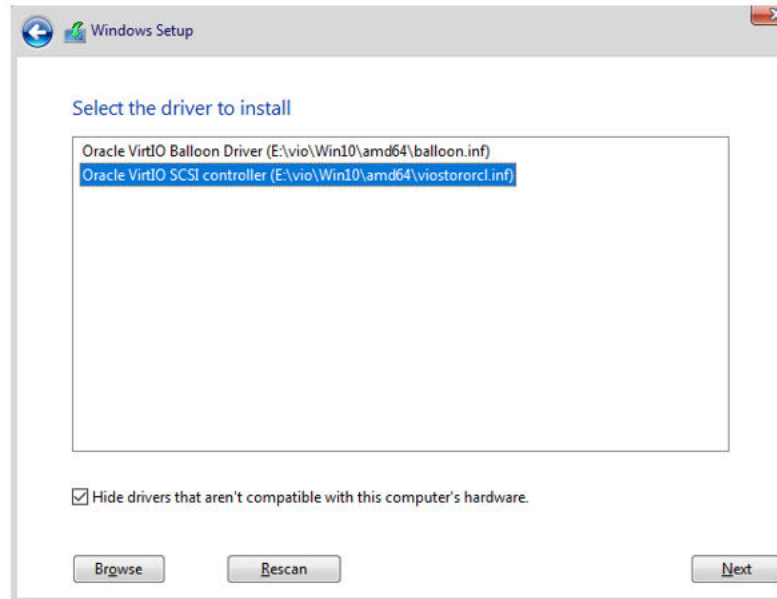
When prompted **Where do you want to install Windows?**, select **Load driver**.



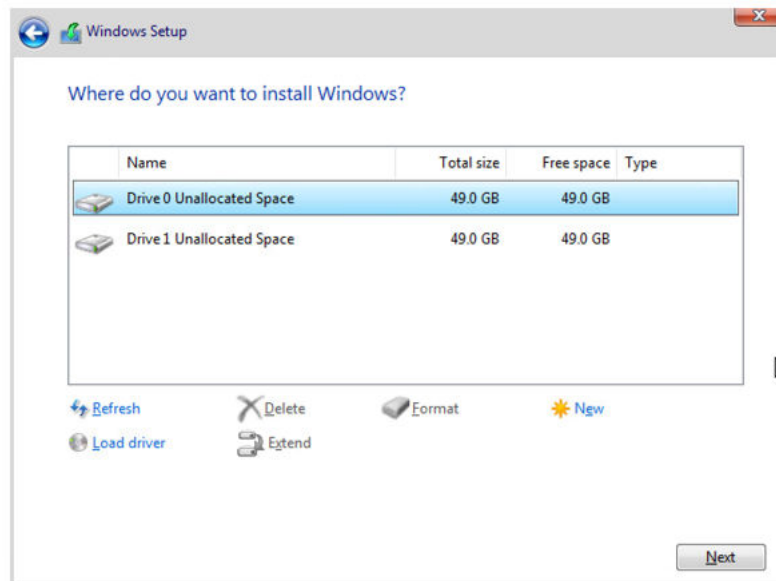
Navigate to the VirtIO driver on E: CDROM drive.



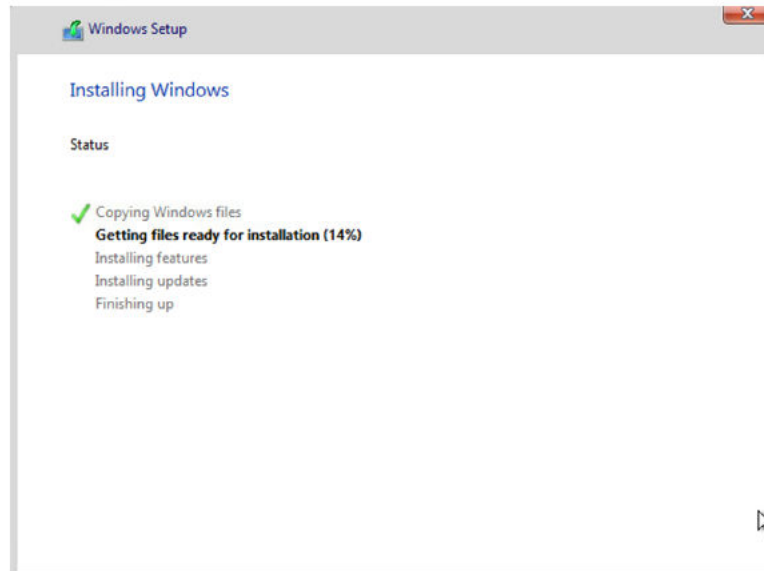
In the `vio/Win10/amd64` directory, select `viostororcl.inf` from the list.



After loading the driver, the pre-created virtual disk and the extra virtual disk (`winvmdisk`) is displayed. Select the pre-created virtual disk and continue with the installation.



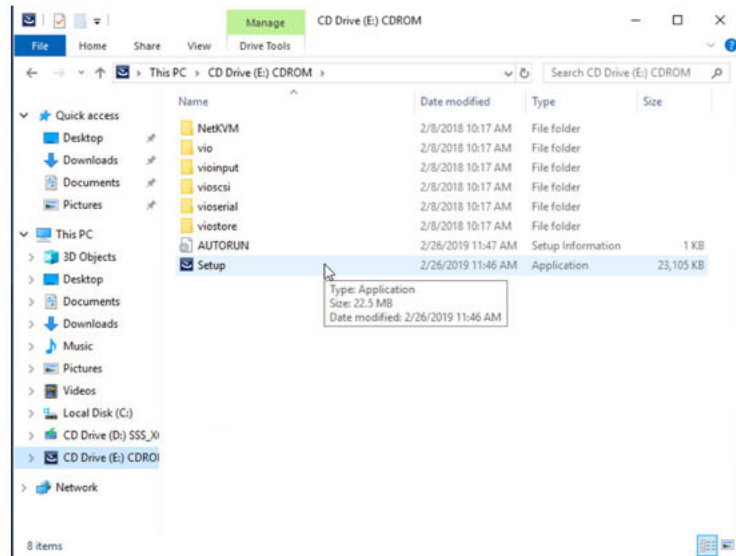
Review the progress of the installation.



To run **Ctrl+Alt+Delete** in the Windows operating system, click inside the Windows screen and press the **F8** key. On a Mac, press **Fn+F8**.



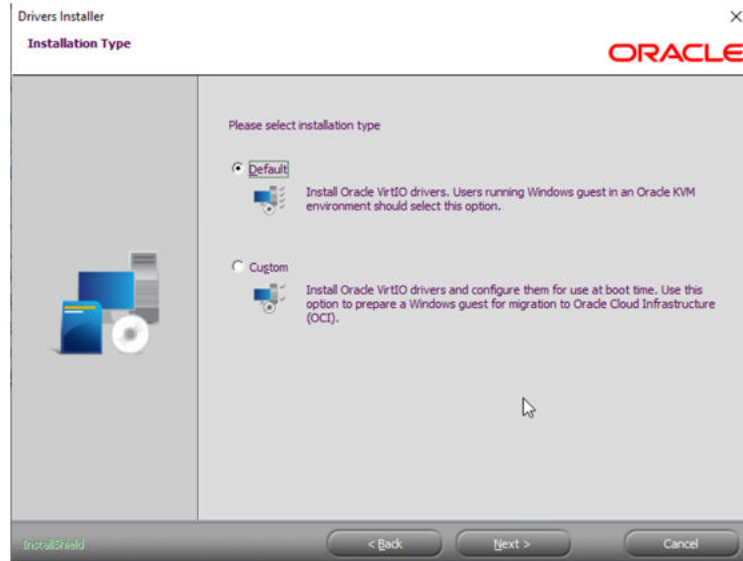
Step 9: Install the VirtIO drivers by running Setup from the CDROM drive E:



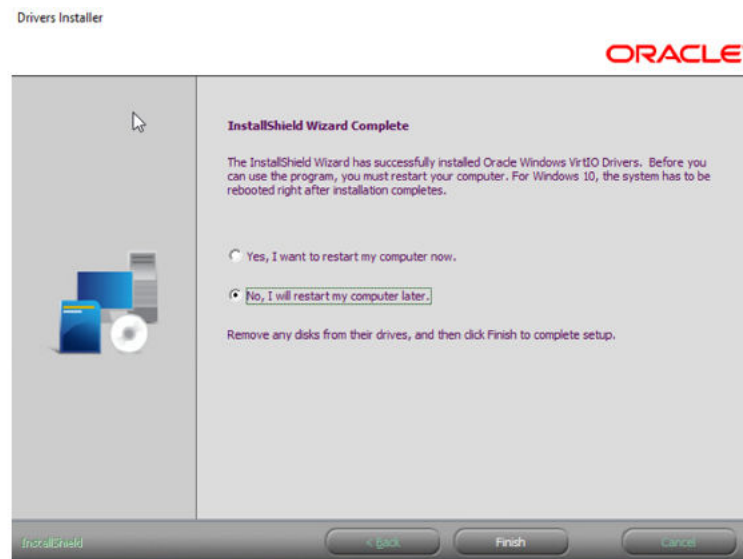
Navigate through the installation setup.



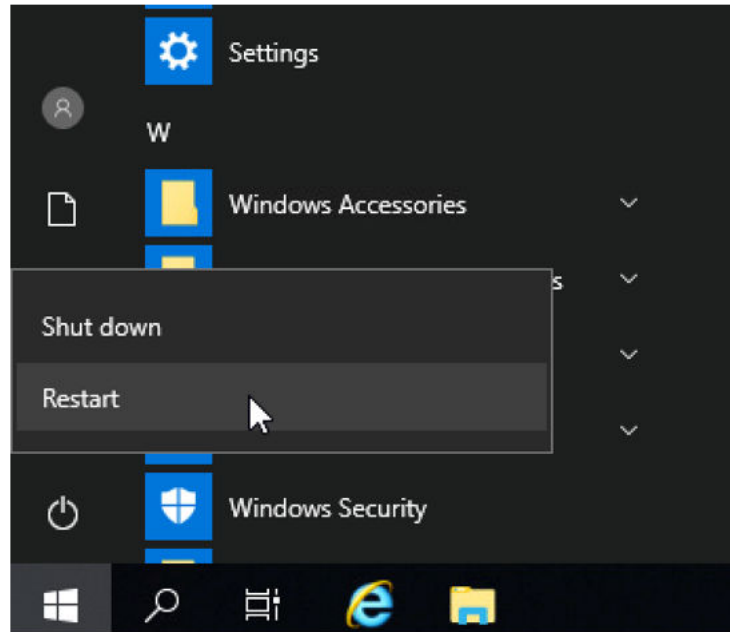
Select the default option.



When prompted, do not select to restart the computer.

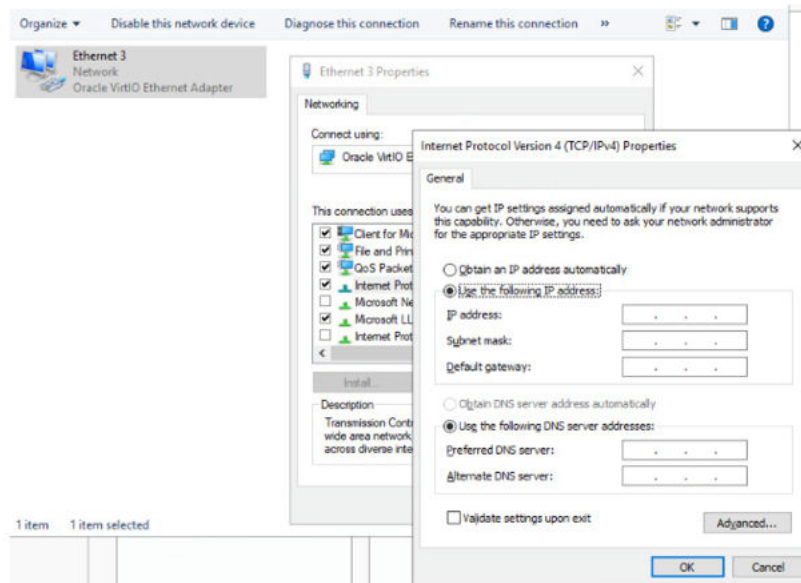


Restart the computer from the Windows **Start** menu.

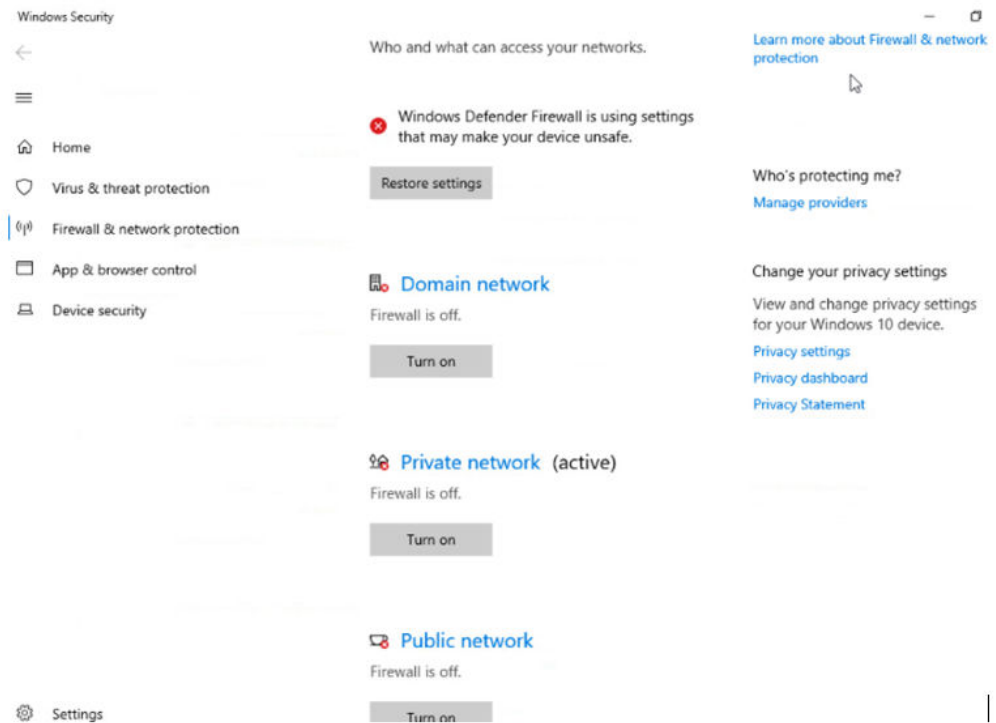


Step 10: Complete the configuration

Connect to your guest VM using VNC and configure it according to your needs. For example, you can assign a fixed IP address.



After disabling the Windows firewall, you can ping the bare metal system host IP from the KVM guest machine and vice versa.



Step 11: Remove the ISO image files

To delete the ISO files from the `/tmp` directory, you must remove the files from the KVM configuration as follows:

1. Stop the VM:

```
odacli stop-vm -n winvm
```

2. View the list of configured disks:

```
virsh domblklist winvm
-----
-----
vda /u05/app/sharedrepo/winvmstor/.ACFS/snaps/vm_winvm/winvm
vdb /u05/app/sharedrepo/winvmstor/.ACFS/snaps/vdisk_winvmdisk/
winvmdisk
hda /tmp/win19.iso
hdb /tmp/winvirtio.iso
```

3. Detach disks:

```
virsh detach-disk winvm hda -config (to detach the install media)
```

4. Detach the driver disk:

```
virsh detach-disk winvm hdb --config (to detach the virtio driver disk)
```

5. Replace the KVM XML file in `/u05/app/sharedrepo/your_kvm_storage` with the XML file at `/etc/libvirt/qemu`:

```
cp /etc/libvirt/qemu/winvm.xml /u05/app/sharedrepo/winvmstor/.ACFS/snaps/vm_winvm/winvm.xml
```

6. Rename or remove the `.iso` files from `/tmp`.

7. Start the VM:

```
odacli start-vm -n winvm
```

8. Test the KVM migration to the other node:

```
#odacli migrate-vm -n winvm --to second_node_name
```

Creating a DB System

Understand how you can create a KVM DB system on Oracle Database Appliance.

You can deploy KVM DB systems on Oracle Database Appliance release 19.10, but it is recommended that you deploy KVM DB systems on Oracle Database Appliance release 19.12 since it offers a more comprehensive support of DB systems. It is always advisable to update to the latest Oracle Database Appliance release.

Always review the latest Oracle Database Appliance documentation library for the features and configuration details for each release since these procedures may change with each release.

Oracle Database Appliance documentation library is available at:

<https://docs.oracle.com/en/engineered-systems/oracle-database-appliance/index.html>

The space reserved on Oracle ACFS storage for a DB system node is fixed at 200 GB. This is the space assigned for the operation system, Oracle Grid Infrastructure home and the database home of the DB system. The database files are stored on Oracle ASM disk groups of the Oracle Database Appliance bare metal system to which the Oracle Grid Infrastructure of the DB System connects as a client.

Follow these steps to create a DB system on your appliance:

Check the Oracle Database Appliance release

Confirm that you have installed Oracle Database Appliance release 19.12 or later.

```
# /opt/oracle/dcs/bin/odacli describe-component -v
System Version
-----
19.12.0.0.0
```

Download the DB System image

Download Patch 32451228 for the DB System image to a temporary directory on your appliance and unzip the file.

```
# cd /tmp
#unzip p32451228_1912000_Linux-x86-64.zip
odacli-dcs-19.12.0.0.0-210827-ODAVM-19.12.0.0.zip
```

Update the Oracle Database Appliance repository

```
# /opt/oracle/dcs/bin/odacli update-repository -f /tmp/odacli-
dcs-19.12.0.0.0-210827-ODAVM-19.12.0.0.zip
{
  "jobId" : "2e392dad-587b-4ed1-87b6-995f3131cab6",
  "status" : "Created",
  "message" : "/tmp/odacli-dcs-19.12.0.0.0-210827-ODAVM-19.12.0.0.zip",
  "reports" : [ ],
  "createTimestamp" : "October 27, 2021 00:26:39 AM HDT",
  "resourceList" : [ ],
  "description" : "Repository Update",
  "updatedAtTime" : "October 27, 2021 00:26:39 AM HDT"
```

Confirm the DB System image is correctly registered

```
# /opt/oracle/dcs/bin/odacli describe-dbsystem-image
DB System Image
details
```

```
-----
```

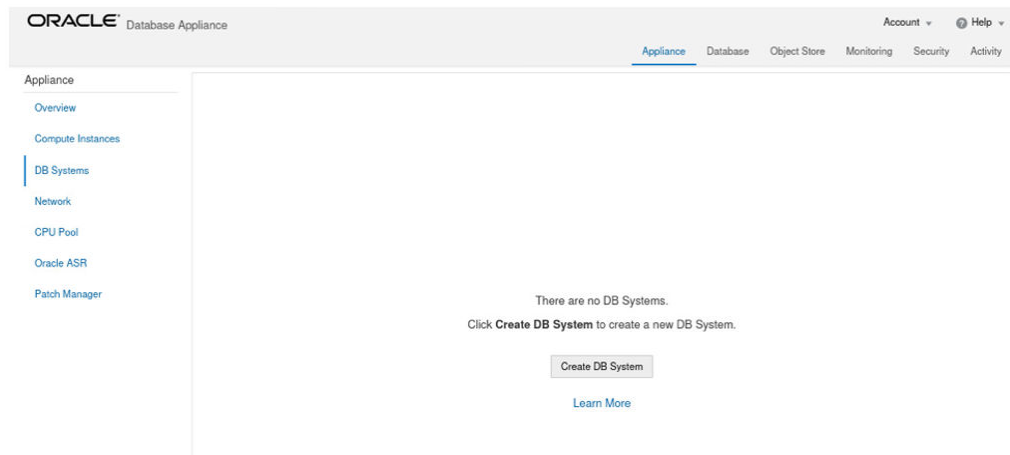
Component Name	Supported Versions	Available Versions
DBVM	19.12.0.0.0	19.12.0.0.0
GI	19.12.0.0.210720 21.3.0.0.210720	19.12.0.0.210720 not-available

DB	19.12.0.0.210720	19.12.0.0.210720
	21.3.0.0.210720	not-available

Create the DB System Using BUI

Decide on the database shape according to your Database Class (OLTP, DSS or IMDB) resource requirements and available licenses. The database shape determines the number of cores you assign to the DB system. For a complete list of DB shapes, review the Oracle Database Appliance documentation. You can use the BUI to create a DB system or you can use a JSON file to create the DB system using ODA CLI commands.

Log into the BUI. In the Appliance tab, click on DB Systems and then click **Create DB System**. If you need to assign more cores later, then you can change the configuration after creation.



Create the DB System: System Information

Provide the system information.

Create the DB System: Network Information

Provide the network information.

Create the DB System: Users and Groups and Database Information

Customize users and groups and decide if you want to use operating system role separation. You must specify the same configuration details for the DB system users and groups as the configuration details for the Oracle Grid Infrastructure installation on the bare metal system. If your bare metal system has a user `grid` and a user `oracle`, then you are using role separation. You can also provide information about the database you want to create.

The screenshot shows the Oracle Database Appliance configuration page. At the top, there's a navigation bar with 'Appliance', 'Database', 'Object Store', 'Monitoring', 'Security', and 'Activity'. Below this, the 'User and Group Selection' section has two radio buttons: 'Customize Users & Groups' (set to 'No') and 'Allow OS Role Separation' (set to 'Yes'). The main 'Database Information' section contains several fields and dropdown menus:

- DB Name: (empty text field)
- DB Unique Name: (empty text field)
- DB Version: 19.10.0.210119 (dropdown)
- CDB: Yes (selected) / No
- PDB Name: (empty text field)
- PDB Admin User: (empty text field)
- Database Edition: Enterprise Edition (dropdown)
- Deployment: RAC (dropdown)
- Shape: odb1(1 Core, 8GB Memory) (dropdown)
- Database Class: OLTP (dropdown)
- SYS and PDB Admin User Password: (password field)
- Confirm Password: (password field)
- Character Set: AL32UTF8 (dropdown)
- National Character Set: AL16UTF16 (dropdown)
- Language: AMERICAN (dropdown)
- Territory: AMERICA (dropdown)
- Configure EM Express: Yes (selected) / No
- Enable TDE: Yes (selected) / No
- TDE Wallet Password: (password field)
- Confirm TDE Wallet Password: (password field)

 At the bottom right, there are buttons for 'Save Configuration', 'Cancel', and 'Create >'.

Create DB System Using ODACLI Commands

You can also create a DB System using a JSON file. Check the latest Oracle Database Appliance documentation for sample JSON file to deploy a high-availability DB system.

```
# odacli create-dbsystem -p /tmp/prov.json
```

```
Job details
```

```
-----
ID: b8dc3738-e542-44fd-bdb2-fd06456d0e17
Description: DB System mydbsystem creation
Status: Created
Created: October 13, 2021 11:19:44 PM HST
Message:
```

Confirm the DB System creation

Confirm that the DB System was created successfully.

```
# odacli describe-dbsystem -n mydbsystem
```

```
DB System
details
```

```
-----
-----
ID: 69e49676-3400-49aa-a2a2-bcee062065e5
Name: mydbsystem
Image: 19.12.0.0.0
Shape: odb2
Cluster name: dbs6cd795483
```

Memory: 16.00 GB
Status: CONFIGURED
Created: 2021-10-13 04:56:17 HDT
Updated: 2021-10-13 06:01:32 HDT

CPU Pool

Name: c6cd795483
Number of cores: 2

Host: node1
Effective CPU set: 0-1,32-33
Online CPUs: 0, 1, 32, 33
Offline CPUs: NONE

Host: node2
Effective CPU set: 0-1,32-33
Online CPUs: 0, 1, 32, 33
Offline CPUs: NONE

VM Storage

Disk group: DATA
Volume name: S6CD795483
Volume device: /dev/asm/s6cd795483-433
Size: 400.00 GB
Mount Point: /u05/app/sharedrepo/ mydbsystem
Acc Volume name: AS6CD795483
Acc Volume device: /dev/asm/as6cd795483-433
Acc Volume size: 1.60 GB

VMs

Host: node1
VM Name: x6cd795483
VM Host Name: node1n1
Target State: ONLINE
Current State: ONLINE

Host: node2
VM Name: y6cd795483
VM Host Name: node2n2
Target State: ONLINE
Current State: ONLINE

VNetworks

Host: node1
VM Name: x6cd795483
Public: xx.xx.xx.xx / 255.255.248.0 / ens3 /
BRIDGE (pubnet)
ASM: 192.168.17.4 / 255.255.255.128 / ens4 /


```

BRIDGE(privasm) VLAN(icbond0.100)
    Interconnect: 192.168.17.129 / 255.255.255.252 / ens5 /
BRIDGE(privnet1) VLAN(icbond0.101)
    Host: node2
    VM Name: y6cd795483
    Public: xx.xx.xx.xx / 255.255.248.0 / ens3 /
BRIDGE(pubnet)
    ASM: 192.168.17.5 / 255.255.255.128 / ens4 /
BRIDGE(privasm) VLAN(icbond0.100)
    Interconnect: 192.168.17.130 / 255.255.255.252 / ens5 /
BRIDGE(privnet1) VLAN(icbond0.101)

```

Databases

```

-----
Name: my19db
Resource ID: e2978cc2-3ae0-4083-aea6-3f4cd7f38073
Unique name: mydb19
Database ID: 2242777418
Domain name: test_domain
DB Home ID: bc1f64a9-7782-4997-8c31-918e8c92a444
Shape: odb2
Version: 19.12.0.0.210720
Edition: EE
Type: RAC
Role: PRIMARY
Class: OLTP
Storage: ASM
Redundancy:
Target node name:
Character set: AL32UTF8
NLS character set:
Language: AMERICAN
Territory: AMERICA
Console enabled: false
SEHA enabled: false
Associated networks: Public-network
Backup config ID:
Level 0 Backup Day: sunday
Autobackup enabled: true
TDE enabled: false
CDB type: false
PDB name:
PDB admin user:

```

Test the database connection

Test connectivity to your DB System. During creation of the DB system you specified the SCAN name and database name. With this information you should be able to build your TNS connect string using the default service name which is the same as the database name. It is a best practice to create your own database services based on

your high-availability requirements. For an initial connection test, the default service is sufficient.

The screenshot shows the 'New / Select Database Connection' dialog box. The 'Connection Name' is 'my19db', 'Username' is 'system', and 'Password' is masked with dots. There are checkboxes for 'Save Password' and 'Connection Color'. Under the 'Oracle' tab, 'Connection Type' is 'Basic' and 'Role' is 'default'. The 'Hostname' is 'mysbssystem-scan.com', 'Port' is '1521', and 'Service name' is 'my19db.com'. There are also checkboxes for 'OS Authentication' and 'Kerberos Authentication', and an 'Advanced...' button. At the bottom are buttons for 'Save', 'Clear', 'Test', 'Connect', and 'Cancel'.

Connect to the KVM guest machine nodes with SSH also, and verify that you can connect to the database instances locally.

```
# ssh root@node1n1
# su - oracle
$ export ORACLE_HOME=/u01/app/oracle/product/19.0.0.0/dbhome_1
$ export ORACLE_SID=my19db1 (the '1' after the DB name is for
instance 1 on the first RAC node)
$ /u01/app/oracle/product/19.0.0.0/dbhome_1/bin/sqlplus / as sysdba

SQL*Plus: Release 19.0.0.0.0 - Production on Mon Mar 15 08:32:37 2021
Version 19.10.0.0.0

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Connected to:
Oracle Database 19c Enterprise Edition Release 19.0.0.0.0 - Production
Version 19.10.0.0.0

SQL>
```

Deploying JD Edwards EnterpriseOne on Oracle Database Appliance KVM

Understand how you can deploy JD Edwards EnterpriseOne on Oracle Database Appliance KVM.

 **Note:**

JD Edwards EnterpriseOne provides an Xen Virtualization VM Template. You cannot use this template for KVM virtualization deployment.

To install JD Edwards EnterpriseOne in KVM on Oracle Database Appliance, follow these steps:

1. On Oracle Database Appliance, create the application KVM for Windows guest machines as described in this document.
2. Create a DB system on Oracle Database Appliance and deploy Oracle Database.
3. Follow the JD Edwards EnterpriseOne documentation steps to install JD Edwards EnterpriseOne:
https://docs.oracle.com/cd/E84502_01/learnjde/installation.html#one-click-provisioning

Deploying Oracle E-Business Suite on Oracle Database Appliance KVM

Understand how you can deploy Oracle E-Business Suite on Oracle Database Appliance KVM.

Considerations for E-Business Suite 12.2 on Oracle Database Appliance:

- The Rapid Install tool is not supported on Oracle Database Appliance DB System. You cannot directly install new Oracle E-Business Suite environment on Oracle Database Appliance DB System.
- Existing Oracle E-Business Suite databases can be migrated to Oracle Database Appliance DB System. Use the following procedure to migrate Oracle E-Business Suite databases to Oracle Database Appliance DB System:
 1. Create a DB System.
 2. Refer to either of the following My Oracle Support Notes to migrate the database from source system to Oracle Database Appliance:
Export/Import Process for Oracle E-Business Suite Release 12.2 Database Instances Using Oracle Database 19c (Doc ID 2554156.1)

Using Transportable Tablespaces to Migrate Oracle E-Business Suite Release 12.2 Using Oracle Database 19c Enterprise Edition On a Multitenant Environment (Doc ID 2674405.1)
 3. If Oracle Database Appliance DB System Oracle RAC Database, then run Autoconfig on the remaining nodes following the instructions in Step 8.2 of My

Oracle Support Note: Using Oracle 19c RAC Multitenant (Single PDB) with Oracle E-Business Suite Release 12.2 (Doc ID 2530665.1)

- E-Business Suite requires one-off patches to be installed. This would conflict that future upgrades using Oracle Database Appliance tooling. Typically, these one-off patches must be rolled back, the database home patched and the equivalent E-Business Suite patches applied again.
- This process was tested with E-Business Suite 12.2 with Oracle Database Appliance releases 12.2 and 19.11.

E-Business Suite References

Interoperability Notes: Oracle E-Business Suite Release 12.2 with Oracle Database 19c (Doc ID 2552181.1)

Oracle E-Business Suite Release 12.2: Consolidated List of Patches and Technology Bug Fixes (Doc ID 1594274.1)

Export/Import Process for Oracle E-Business Suite Release 12.2 Database Instances Using Oracle Database 19c (Doc ID 2554156.1)

Using Transportable Tablespaces to Migrate Oracle E-Business Suite Release 12.2 Using Oracle Database 19c Enterprise Edition On a Multitenant Environment (Doc ID 2674405.1)

Using Oracle 19c RAC Multitenant (Single PDB) with Oracle E-Business Suite Release 12.2 (Doc ID 2530665.1)

Deploying Oracle FLEXCUBE on Oracle Database Appliance KVM

Understand how you can deploy Oracle FLEXCUBE on Oracle Database Appliance KVM.

Note:

Oracle FLEXCUBE does not provide a Virtualization Template.

To install Oracle FLEXCUBE in KVM on Oracle Database Appliance, follow these steps:

1. On Oracle Database Appliance, create the application KVM for your specific deployment, as described in this document.
2. Follow the Oracle FLEXCUBE documentation steps to install Oracle FLEXCUBE: https://docs.oracle.com/cd/F18207_01/install.htm

Deploying Oracle Enterprise Manager Cloud Control on Oracle Database Appliance KVM

Understand how you can deploy Oracle Enterprise Manager Cloud Control on Oracle Database Appliance KVM.

You can install Oracle Enterprise Manager Cloud Control directly on the Oracle Database Appliance bare metal system. It is recommended that you install Oracle Enterprise Manager Cloud Control on the KVM guest VM.

Prerequisites

- Create one application KVM guest machine with Oracle Linux.
- Create a DB System to host Oracle Enterprise Manager Cloud Control repository database.

Procedure

Follow the Oracle Enterprise Manager Cloud Control 13.5 documentation to install and configure the software:

<https://docs.oracle.com/en/enterprise-manager/cloud-control/enterprise-manager-cloud-control/13.5/index.html>

There are no additional configuration requirements specific to Oracle Database Appliance. The deployment of Oracle Linux 8.2 on the application KVM guest machine with Oracle Database Appliance release 19.12 DB System and Oracle RAC database release 19.12 are supported.

Install the Oracle Database Appliance plug-in on the bare metal system nodes so that Oracle Enterprise Manager agent can monitor the hardware and other specific metrics for Oracle Database Appliance.

The latest Oracle Enterprise Manager Cloud Control plug-in is available for download at:

<https://www.oracle.com/enterprise-manager/downloads/oem-v135-update-plugins-downloads.html>

Oracle Database Appliance Plug-in documentation is available at:

<https://docs.oracle.com/en/engineered-systems/oracle-database-appliance/plugin.html>

Deploying PeopleSoft on Oracle Database Appliance KVM

Understand how you can deploy PeopleSoft PeopleTools on Oracle Database Appliance KVM.

You can install PeopleSoft PeopleTools directly on the Oracle Database Appliance bare metal system. It is recommended that you install PeopleTools on the KVM guest VM. For each release of Oracle Database Appliance and PeopleSoft, you must ensure

that additional RPMs installed do not replace or conflict with the Oracle Database Appliance binaries.

Prerequisites

- Create one application KVM guest machine with Oracle Linux.
- Create a DB System to host PeopleSoft repository database.

Procedure

Follow the PeopleSoft PeopleTools 8.59 or later documentation to install and configure the software. The documentation and software can be obtained from Oracle Software Delivery Cloud by searching for **PeopleSoft PeopleTools** and downloading the software.

There are no additional configuration requirements specific to Oracle Database Appliance. The deployment of Oracle Linux 8.2 on the application KVM guest machine with Oracle Database Appliance release 19.12 DB System and Oracle RAC database release 19.12 are supported.

Oracle Software Delivery Cloud is available at:

<https://edelivery.oracle.com>

Migrating Oracle VM Guest Machines to KVM on Oracle Database Appliance

Understand how you can migrate Oracle VM guest machines from Virtualized Platform to Oracle KVM guest machines on Oracle Database Appliance KVM.

Creating a Solution-in-a-Box does not necessitate creation of a new virtual machine. You may have an existing Oracle Database Appliance running Oracle Virtual Machine (OVM) and you would may want to migrate the OVM from this machine to a KVM guest.

For the procedure, refer to *My Oracle Support Note 2773840.1: Migrating OVM guests from ODA VP to KVM on ODA BM* at:

<https://support.oracle.com/rs?type=doc&id=2773840.1>

Backing up Oracle Database Appliance KVM Guest Machines

Understand how you can back up KVM guest machines on Oracle Database Appliance.

Backup and Recovery procedures for the DB Systems are similar to Oracle Database database backup procedures.

For backup of application VMs, refer to My Oracle Support Note 2779329.1: Backup of KVM guests on ODA 19.9 BM and later.

<https://support.oracle.com/rs?type=doc&id=2779329.1>

For backup of DB Systems, refer to My Oracle Support Note 2784991.1: Database System backup on Oracle Database Appliance Release 19.10 and later.<https://support.oracle.com/rs?type=doc&id=2784991.1>

Oracle Database Appliance References

Links and references to the concepts, commands, and examples used in this document.

Oracle Database Appliance documentation library is available at:

<https://docs.oracle.com/en/engineered-systems/oracle-database-appliance/index.html>

Oracle Database Appliance KVM and DB Systems Command Line Reference:

Oracle Database Appliance Command-Line Interface for KVM

Sample JSON file for creating a DB System on Oracle Database Appliance KVM:

Example JSON File to Create a High-Availability DB System

Supported Database Shapes on Oracle Database Appliance KVM:

Database Shapes for Oracle Database Appliance

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc>.

Access to Oracle Support

Oracle customers that have purchased support have access to electronic support through My Oracle Support. For information, visit <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info> or visit <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs> if you are hearing impaired.

Oracle Database Appliance Solution-in-a-Box: Deploying Database Systems and Application VMs on Oracle Database Appliance
F75448-01

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