Oracle® Communications

Software Installation

Diameter Signal Routing User Data Repository Cloud Installation and Configuration Guide for Release 12.7.0.2.0

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ORACLE

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Diamter Signal Routing User Data Repository (DB Only) Cloud Installation and Configuration Guide for Release 12.7.0.2.0

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Chapter 1. Introduction

1.1 Purpose and Scope

This document describes the application-related installation procedures for an VMware User Data Repository system for Diameter Signal Router 8.4.

This document assumes that platform-related configuration has been completed.

The audience for this document includes Oracle customers as well as these groups: Software System, Product Verification, Documentation, and Customer Service including Software Operations and First Office Application.

1.2 References

[1] Oracle Communications User Data Repository Cloud Resource Porfile, E67495, latest revision
[2] Oracle Communications User Data Repository Installation and Configuration Guide, E72453, latest revision
[3] Oracle Communications User Data Repository Cloud Disaster Recovery Guide, E72458, latest revision

1.3 Acronyms

An alphabetized list of acronyms used in this document.

Table 1. Acronyms

Acronym	Definition
BIOS	Basic Input Output System
CD	Compact Disk
UDR	User Data Repository
ESXi	Elastic Sky X Integrated
FABR	Full Address Based Resolution
iDIH	Integrated Diameter Intelligence Hub
IPFE	IP Front End
IPM	Initial Product Manufacture—the process of installing TPD
IWF	Inter Working Function
NAPD	Network Architecture Planning Diagram
OS	Operating System (for example, TPD)
OVA	Open Virtualization Appliance
PDRA	Policy Diameter Routing Agent
PCA	Policy and Charging Application
RBAR	Range Based Address Resolution
SAN	Storage Area Network
SFTP	Secure File Transfer Protocol
SNMP	Simple Network Management Protocol

Acronym	Definition
TPD	Tekelec Platform Distribution
VM	Virtual Machine

1.4 Terminology

Multiple server types may be involved with the procedures in this manual. Therefore, most steps in the written procedures begin with the name or type of server to which the step applies.

Each step has a checkbox for every command within the step that the technician should check to keep track of the progress of the procedure.

The title box describes the operations to be performed during that step.

Each command that the technician is to enter is in **`10 point bold Courier`** *font.*

1. ☐	**ServerX:** Connect to the console of the server	Establish a connection to the server using cu on the terminal server/console. `$ cu -l /dev/ttyS7`

Figure 1. Example of an instruction that indicates the server to which it applies

1.5 Assumptions

This procedure assumes that:

- You have the assigned values from the network and used the values to compile XML files (see Appendix C) for each NOAMP NE site before performing this procedure.
- You have at least an intermediate skill set with command prompt activities on an Open Systems computing environment such as Linux or TPD.

1.6 XML Files (for installing NE)

The XML files compiled for the installation of each NOAMP NE site must be maintained and accessible for use in Disaster Recovery procedures. The Professional Services Engineer (PSE) gives a copy of the XML files used for installation to the designated Customer Operations POC. You are ultimately responsible for maintaining and providing the XML files to My Oracle Support if needed for use in Disaster Recovery operations. For more details on Disaster Recovery refer to Oracle Communications User Data Repository Cloud Disaster Recovery Guide.

1.7 How to use this Document

Although this document is primarily to be used as an initial installation guide, its secondary purpose is to be used as a reference for Disaster Recovery procedures Oracle Communications User Data Repository Cloud Disaster Recovery Guide. When using this document for either purpose, there are a few points which help to ensure that you understand the intent of the author. These points are as follows;

1. Before beginning a procedure, completely read the instructional text (immediately after the Section heading for each procedure) and all associated procedural warnings or notes.
2. Before performing a step in a procedure, completely read the left and right columns including any step specific warnings or notes.

If a procedural step fails to complete successfully, stop and contact My Oracle Support for assistance before attempting to continue.

Chapter 2. General Description

This document defines the steps to perform the initial installation of the Oracle Communications User Data Repository application on a VMware hypervisor.

Figure 2 show the Oracle Communications User Data Repository installation paths. The general timeline for all processes to perform a software installation/configuration and upgrade is also included below.

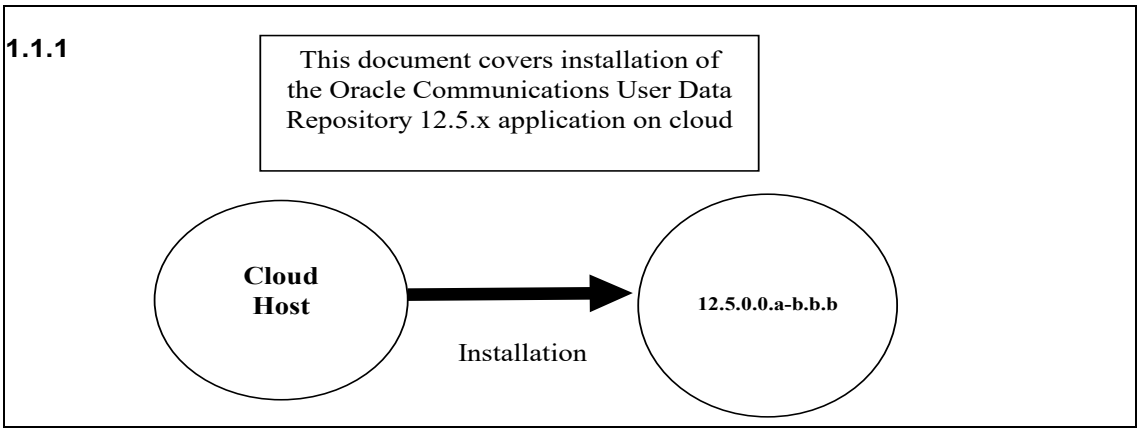


Figure 2. Example of Initial Application Installation Path

2.1 Required Materials

The following materials are required to complete Oracle Communications User Data Repository installation:

1. Target release Oracle Communications User Data Repository OVA Media
2. Target release Oracle Communications User Data Repository ISO Media only for ISO installs
3. Target release TPD Media only for ISO installs

The software media referenced here may be acquired online from the Oracle e-Delivery service at edelivery.oracle.com.

This document and others referenced here can be acquired online from the Oracle Document Repository at the http://docs.oracle.com/en/industries/communications/user-data-repository/index.html

2.2 Installation Overview

This section describes the overal strategy to be used for a single or multi-site installation. It also lists the procedures required for installation with estimated times. Section Section 3.2.3 lists the steps required to install a Oracle Communications User Data Repository system. These sections expand on the information from the matrix and give a general timeline for the installation.

2.3 Installation List of Procedures

The following table illustrates the progression of the installation process by procedure with estimated times. The estimated times and the phases that must be completed may vary due to differences in typing ability and system configuration. The phases outlined are to be performed in the order listed.

Table 2. Installation Overview

Procedure	Phase	Elapsed Time (Minutes)	
		This Step	Cum.
Procedure 1	Verify Deployment Options and Cloud Resources	5	5
Procedure 2	Deploy Oracle Communications User Data Repository Virtual Machines on VMware	20	25
Procedure 3	Deploy Oracle User Data Repository Virtual Machines on OpenStack (Only for OpenStack deployments)	20	25
Procedure 4	Deploy Oracle User Data Repository Virtual Machines on Oracle Linux/KVM	20	25
Procedure 5	Configure UDR-A Server (1st NOAMP only)	25	50
Procedure 6	Create Configuration for Remaining Servers	15	65
Procedure 7	Apply Configuration To Remaining Servers	15	80
Procedure 8	Configure XSI Networks	10	90
Procedure 9	OAM Pairing for Primary UDR Servers (1st NOAMP site only)	10	100
Procedure 10	OAM Pairing for DR Sites	15	115
Procedure 11	Configure UDR Signaling Routes **(All NOAM Sites)**	10	145
Procedure 12	Configure Services on Signaling Network	5	150
Procedure 13	Accept Installation	5	155

Chapter 3. Pre-Installation Procedure

3.1 Verify Deployment Options and Cloud Resources

This procedure determines appropriate HA Configurations and VM profiles for the deployment, as well as verifies the environment.

Procedure 1: Verify Deployment Options and Cloud Resources

Step	Procedure	Result
1. ☐	Decide which profile to deploy	The first step in deploying Oracle Communications User Data Repository for cloud is to review the resource profiles stated in Oracle Communications User Data Repository Cloud resource profile. A choice of HA configuration and resrouce profile must be driven by the available resources and expected use of the Oracle Communications User Data Repository deployment. • For demo purposes a OVA lab profile is the best option. • For support of larger datasets, ISO installation may be required.
2. ☐	Ensure availability of cloud resources	If you are using vCloud Director or vSphere as a non-priviliged user, contact your cloud administrator to esnure the availability of sufficient process, memory, storage and network resources to meet the requirements of your chosen configuration and profile in Step 1 **NOTE:** If you are a privileged user with VMWare vSphere, you can leverage procedures in 0 to configure storage and host networking for hosting Oracle Communications User Data Repository.
THIS PROCEDURE HAS BEEN COMPLETED		

Chapter 4. Cloud Creation

4.1 Deploy Oracle Communications User Data Repository Virtual Machines on VMware

This procedure creates Oracle Communications User Data Repository virtual machines (guests) on Vmware infrastructure.

Requirements:

- 3.1 Verify Deployment Options and Cloud Resources has been completed.

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure 2: Deploy Oracle Communications User Data Repository Virtual Machines on VMware

Step	Procedure	Result
1. ☐	Ready Installation media	• If using vSphere client, place installation media (OVA, or ISO) onto your local machine. • If using vCloud Director, upload installation media using Appendix C.1: vCloud Director Oracle Communications User Data Repository Media Upload
2. ☐	Create vApp	• If using vCloud Director, follow: Appendix C.2: Create vApp • If using vSphere client procede to the next step.
3. ☐	Create Oracle Communications User Data Repository guests	• If using vSphere client, follow: Appendix Appendix B: Create Guests from OVA • If using vCloud Director, follow: Appendix C.5: Create Guests from ISO or Appendix C.3: Create Guests from OVA Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B
4. ☐	Configure guest resources ***Only OVA installs***	• If using vSphere client to install by OVA, follow: Appendix B.2: Configure Guest Resources • If using vCloud Director to install by OVA, follow: Appendix C.4: Configure Guest Resources • If installing by ISO proceed to the next step. Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B
5. ☐	Install guest OS ***Only ISO installs***	Only for ISO installs using vCloud Director, follow Appendix C.6: Install Guests from ISO Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B

Step	Procedure	Result
6. ☐	Configure guest OAM network	If using vSphere client, follow: • Appendix B.3: Configure Guest Network If using vCloud Director, follow: • Appendix C.7: Configure Guests Network Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B
THIS PROCEDURE HAS BEEN COMPLETED		

4.2 Deploy Oracle User Data Repository Virtual Machines on OpenStack

This procedure creates User Data Repository virtual machines (guests) on OpenStack.

Requirements:

- Section 3.1 has been completed

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure 3: Deploy User Data Repository Virtual Machines on OpenStack

Step	Procedure	Result
1. ☐	Ready Installation media	Create and import OVA image file to OpenStack using Appendix D.1: OpenStack Image Creation from OVA
2. ☐	Create Resource Profile	Create Resource Profile (Flavor) on OpenStack following: Appendix D.2: Create Resource Profiles (Flavors)
3. ☐	Create Key Pair	Create Key Pair on OpenStack following: Appendix D.3: Create Key Pair
4. ☐	Update the Yaml File	Update the UDR Stack Yaml file following: Appendix D.4: Update UDR Stack Yaml File
5. ☐	Create VM Instances	On OpenStack, follow this to create VM instances: Appendix D.5: Create VM Instances Using Yaml File
6. ☐	Configure guest OAM network	Follow this step to configure OAM network for VM instances: Appendix D.7: VM Instance Network Configuration Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B
7. ☐	Associate Floating IP	Associate Floating IPs to the VM Instances if Floating IPs are available in cloud following: Appendix D.12: Associating Floating IPs Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B **NOTE:** This step is only needed if none of the networks assigned to VM Instances is a Public Network.

Step	Procedure	Result
8. ☐	Create Virtual IPs	Assigning floating IP address to VIP, see Appendix D.8 Virtual IP Address Assignment **NOTE:** This step is only needed if none of the networks assigned to VM Instances is a Public Network.
THIS PROCEDURE HAS BEEN COMPLETED		

4.3 Deploy Oracle User Data Repository Virtual Machines on Oracle Linux/KVM

This procedure creates User Data Repository virtual machines (guests) on Oracle Linux/KVM.

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure 4: Deploy User Data Repository Virtual Machines on Oracle Linux/KVM

Step	Procedure	Result
9. ☐	Install Oracle Linux/KVM and create VMs	Install Oracle Linux/KVM on the host and create VMs using Virtual Machine Manager by following the below procedure: Appendix J Install UDR on Oracle Linux OS via KVM
THIS PROCEDURE HAS BEEN COMPLETED		

Chapter 5. Oracle Communications User Data Repository Server Configuration

5.1 Configure UDR-A Server (1st NOAMP only)

This procedure does all steps that are necessary for configuring the first UDR server. This includes creating the NOAMP Network Element, configuring Services and creating/configuring the first UDR-A server.

Requirements:

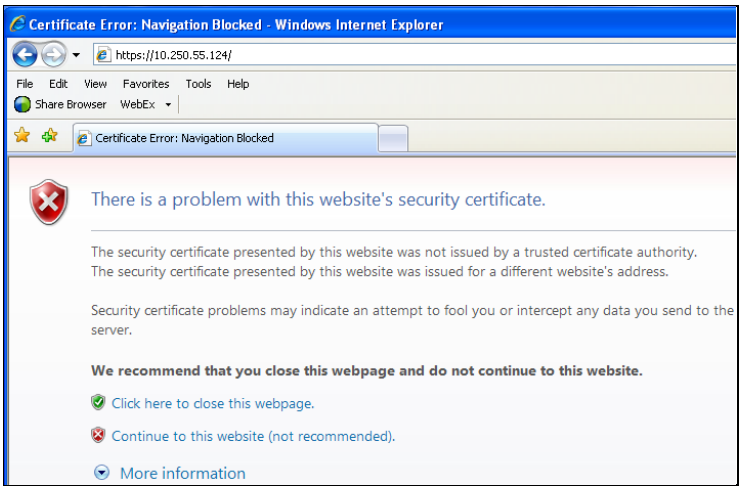
- Chapter 4 Cloud Creation has been completed

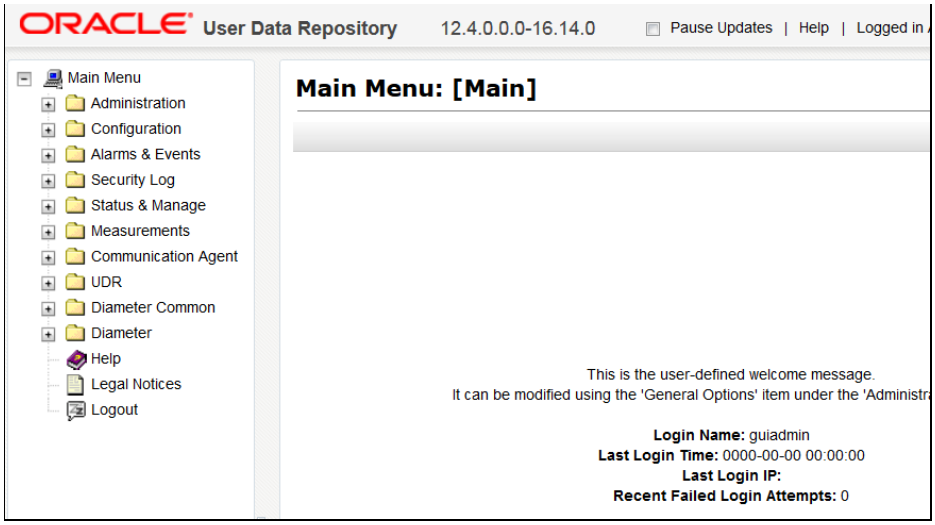
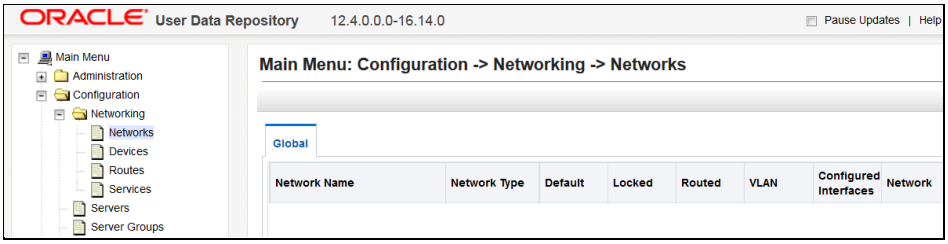
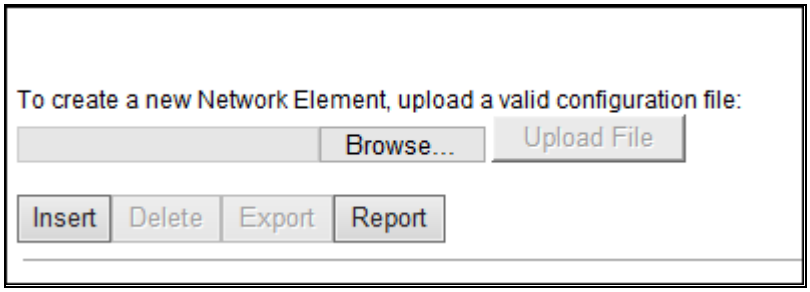
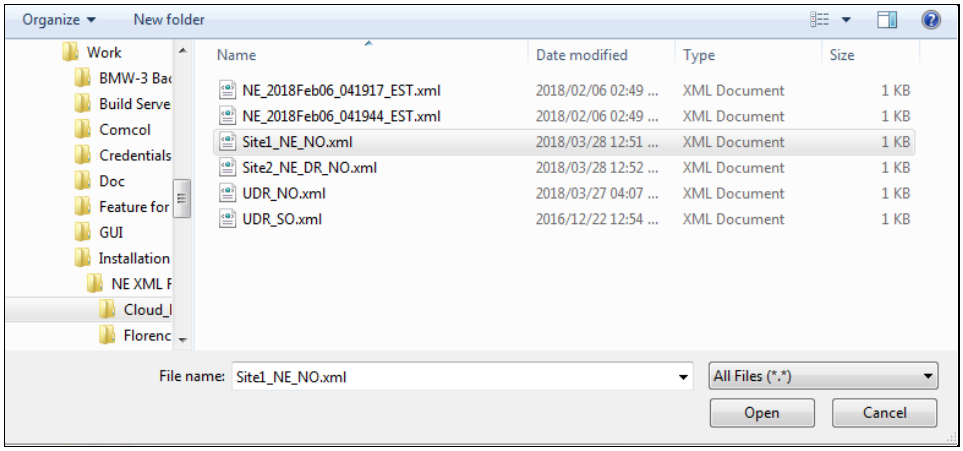
Assumptions:

- This procedure assumes that the Oracle Communications User Data Repository Network Element XML file for the Primary Provisioning NOAMP site has previously been created, as described in Appendix E.
- This procedure assumes that the Network Element XML files are either on a USB flash drive or the hard drive of the laptop. The steps are written as if the XML files are on a USB flash drive, but the files can exist on any accessible drive.

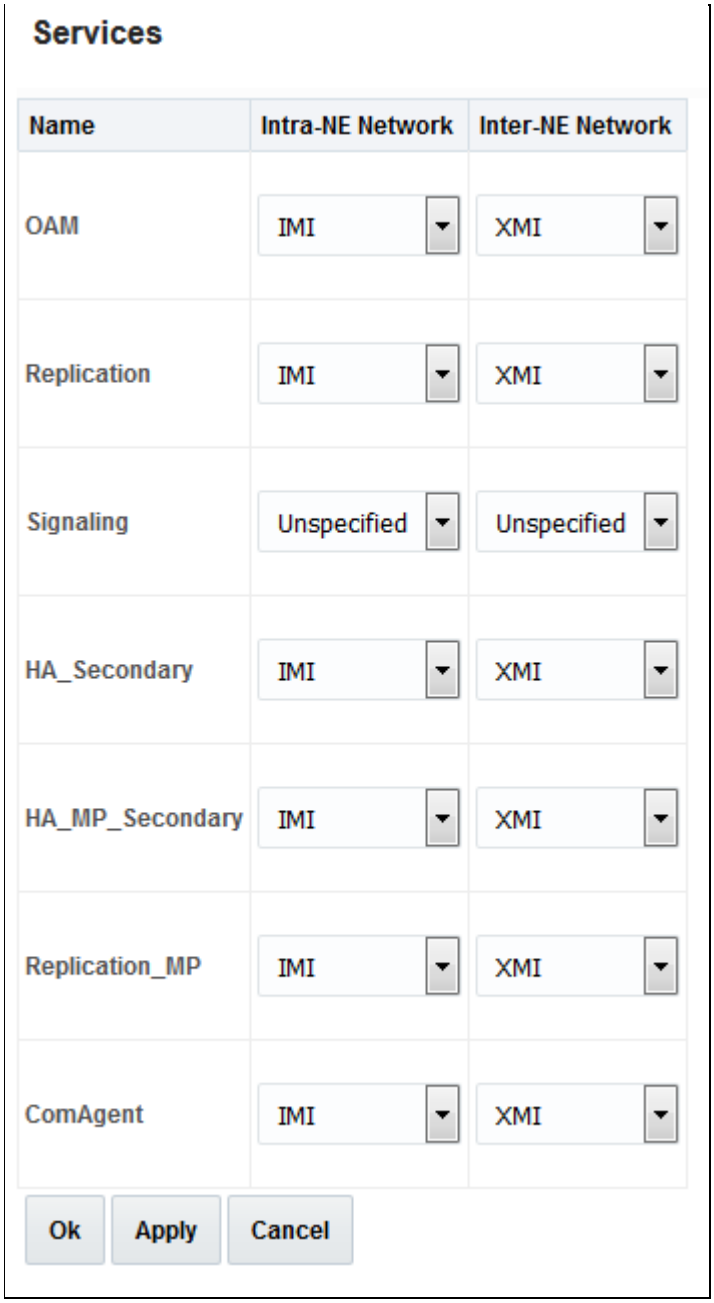
Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure 5: Configure UDR-A Server (1st NOAMP only)

Step	Procedure	Result
1. ☐	**UDR Server A:** Launch an approved web browser and connect to the UDR Server A IP address **NOTE:** Click **Continue to this website (not recommended)** if the security certificate warning displays.	
2. ☐	**UDR Server A:** The login screen opens. Login to the GUI using the default user and password.	

Step	Procedure	Result
3. ☐	**UDR Server A:** The Oracle Communications User Data Repository Main Menu displays.	
4. ☐	**UDR Server A:** ***Configuring Network Element*** Navigate to **Main Menu → Configuration → Networking → Networks**	
5. ☐	**UDR Server A:** Go to the **Configuration → Networking → Networks** screen. Click **Browse**.	
6. ☐	**UDR Server A:** **NOTE:** This step assumes that the XML files were previously prepared, as described in Appendix C. 1. Select the location containing the site XML file. 2. Select the XML file and click the **Open**.	

Step	Procedure	Result
7. ☐	**UDR Server A:** Click **Upload File** (bottom left corner of screen).	To create a new Network Element, upload a valid configuration file: Browse... Site1_NE_NO.xml Upload File Copyright © 2010, 2018, Oracle and/or its affiliates. All rights reserved.
8. ☐	**UDR Server A:** If the values in the XML file pass validation rules, a banner message displays showing that the data has been successfully committed to the DB. **NOTE** You may have to left mouse click the **Info** banner option to see the message.	Info • Network Element insert successful from /tmp/Site1_NE_NO.xml. **Main Menu: Configuration -> Networking -> Networks** Global Site1_NE_NO Network Name | Network Type | Default | Locked | Routed | VLAN | Configured Interfaces | Network xmi | OAM | Yes | Yes | Yes | 3 | 0 | 10.10.1.0/24 imi | OAM | No | Yes | Yes | 2 | 0 | 10.10.2.0/24
9. ☐	Navigate to **Main Menu → Configuration → Networking → Services**	Main Menu Administration Configuration Networking Networks Devices Routes Services Servers Server Groups Resource Domains Places Place Associations DSCP Alarms & Events Security Log **Main Menu: Configuration -> Networking -> Services** Name | Intra-NE Network | Inter-NE Network OAM | imi | xmi Replication | imi | xmi Signaling | Unspecified | Unspecified HA_Secondary | imi | xmi HA_MP_Secondary | imi | xmi Replication_MP | imi | xmi ComAgent | imi | xmi
10. ☐	**UDR Server A:** Click **Edit** (located at the bottom left corner of the page).	**Main Menu: Configuration -> Networking -> Services** Wed Feb 07 Name | Intra-NE Network | Inter-NE Network OAM | imi | xmi Replication | imi | xmi Signaling | Unspecified | Unspecified HA_Secondary | imi | xmi HA_MP_Secondary | imi | xmi Replication_MP | imi | xmi ComAgent | imi | xmi Edit Report

Step	Procedure	Result
11. ☐	**UDR Server A:** 1. Set the services values (see Note section). 2. Click **Apply**. 3. Click **OK**.	 **NOTE:** Servers do not need to be restarted if this is a fresh installation.

Services

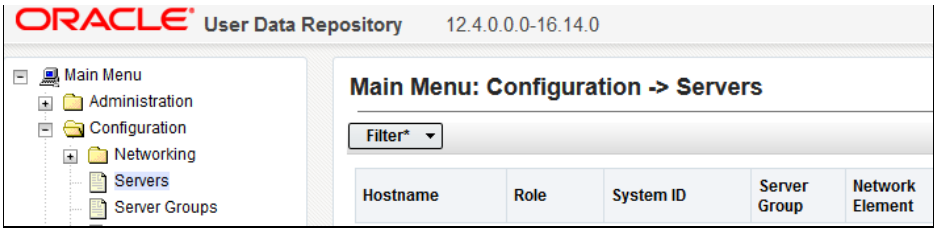
Name	Intra-NE Network	Inter-NE Network
OAM	IMI	XMI
Replication	IMI	XMI
Signaling	Unspecified	Unspecified
HA_Secondary	IMI	XMI
HA_MP_Secondary	IMI	XMI
Replication_MP	IMI	XMI
ComAgent	IMI	XMI

Ok Apply Cancel

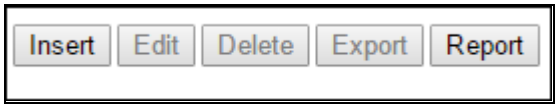
Step	Procedure	Result
12. ☐	**UDR Server A:** The Services configuration screen opens.	

Name	Intra-NE Network	Inter-NE Network
OAM	IMI	XMI
Replication	IMI	XMI
Signaling	Unspecified	Unspecified
HA_Secondary	IMI	XMI
HA_MP_Secondary	IMI	XMI
Replication_MP	IMI	XMI
ComAgent	IMI	XMI

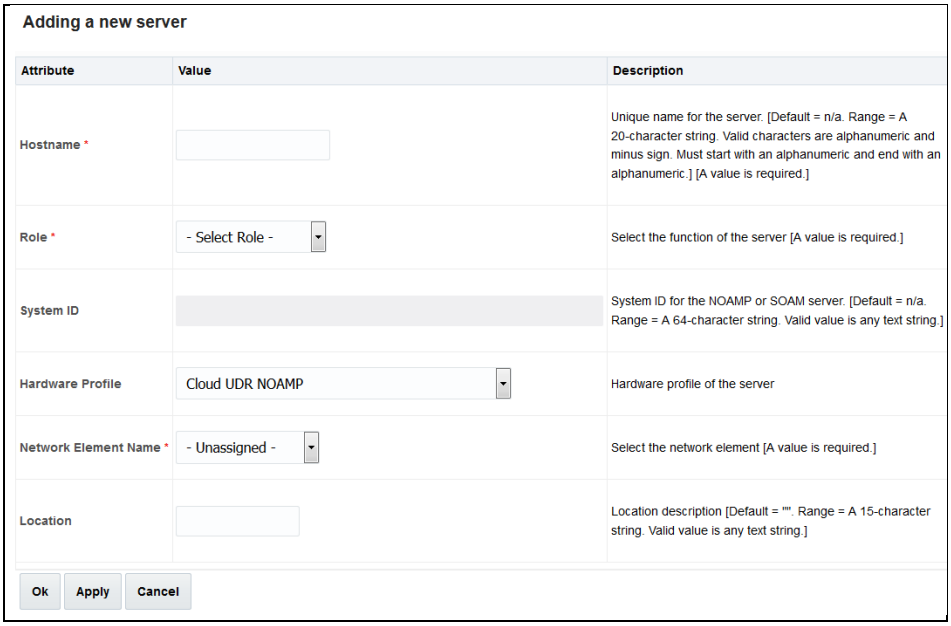
Step	Procedure	Result
13. ☐	**UDR Server A:** ***Configuring Oracle Communications User Data Repository Server*** Navigate to **Main Menu → Configuration → Servers**	



Step	Procedure	Result
14. ☐	**UDR Server A:** Click **Insert** at the bottom left.	

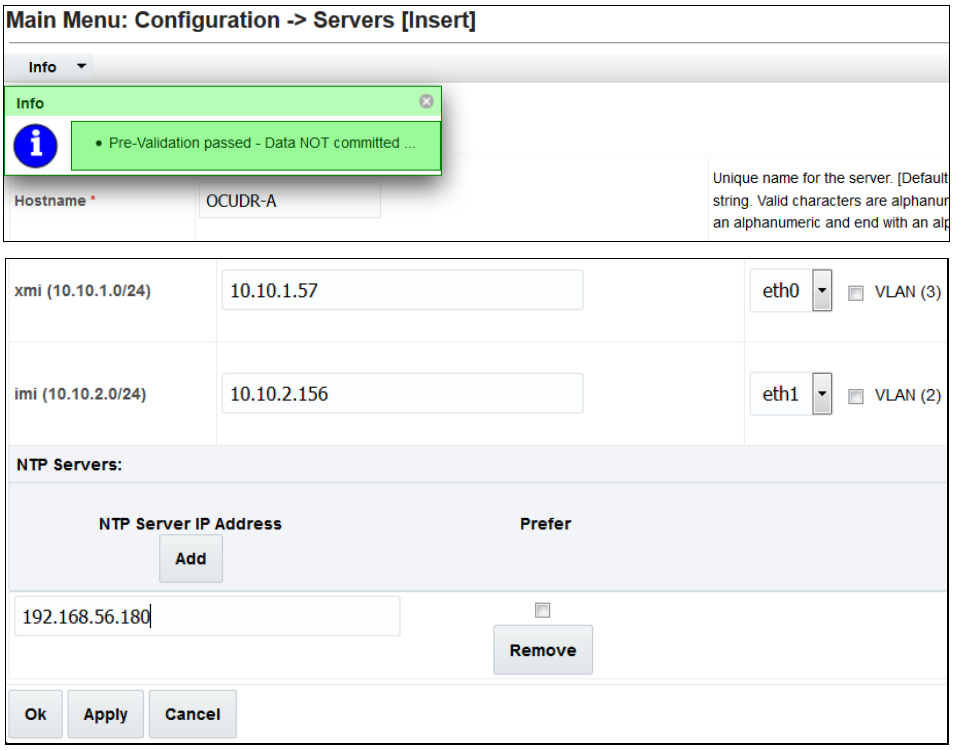
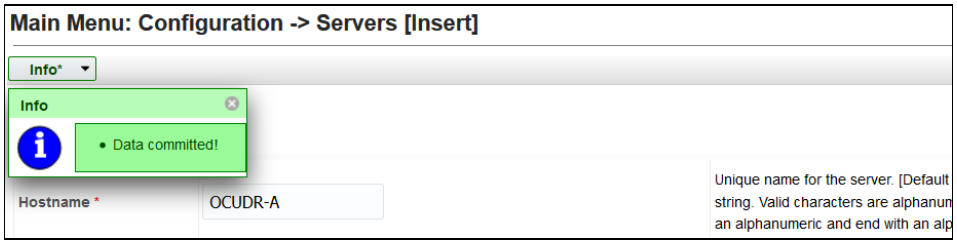
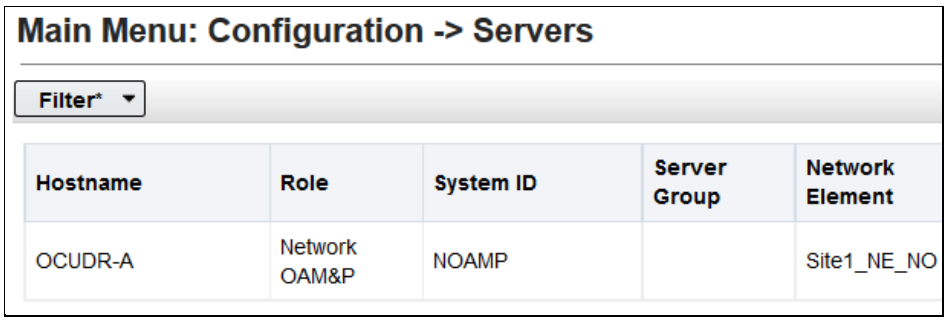
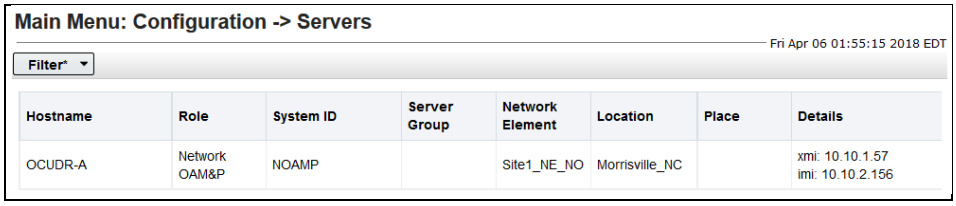


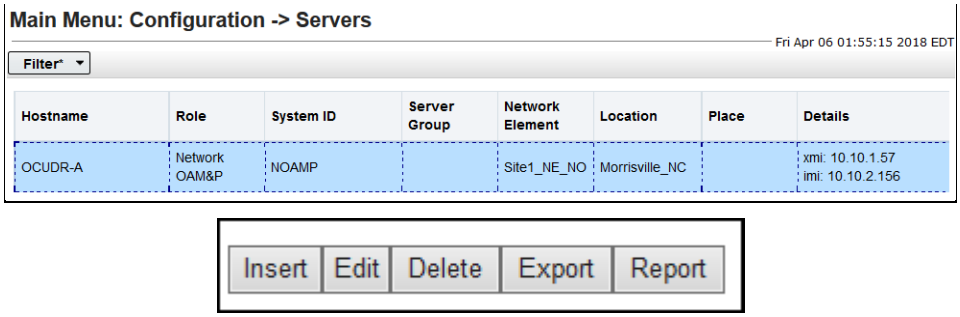
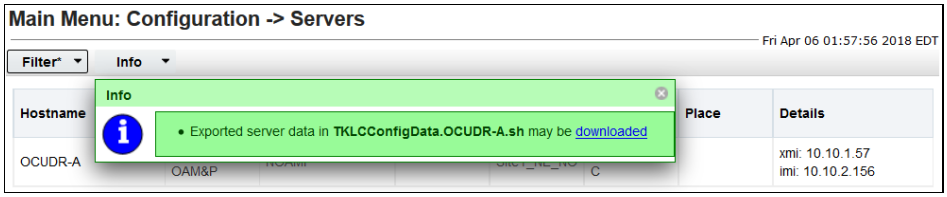
Step	Procedure	Result
15. ☐	**UDR Server A:** The Adding a new server configuration screen opens.	



Step	Procedure	Result
16. ☐	**UDR Server A:** Enter the assigned hostname for the UDR-A Server.	Attribute: Hostname * — Value: OCUDR-A — Description: Unique name for the server. string. Valid characters are a an alphanumeric and end wi
17. ☐	**UDR Server A:** Select **NETWORK OAM&P** for the server Role from the menu.	Role * — NETWORK OAM&P - Select Role - NETWORK OAM&P SYSTEM OAM MP QUERY SERVER System ID Hardware Profile — Cloud UDR NOAMP
18. ☐	**UDR Server A:** Enter the System ID for the NOAMP Server.	System ID — NOAMP — System ID for the NOAMP or SOAM server. [Default = n/a. Range = A 64-character string. Valid value is any text string.]
19. ☐	**UDR Server A:** Select the hardware profile from the menu.	Select the hardware profile: **Cloud UDR NOAMP** Hardware Profile — Cloud UDR NOAMP — Hardware profile of the server
20. ☐	**UDR Server A:** Select the Network Element Name from the menu. **NOTE:** After the Network Element Name is selected, the Interfaces fields are displayed.	Network Element Name * — Site1_NE_NO — Select the network element [A value is required.]
21. ☐	**UDR Server A:** Enter the site location. **NOTE:** Location is an optional field.	Location — Morrisville_NC — Location description [Default = "". Range = A 15-character string. Valid value is any text string.]

Step	Procedure	Result
22. ☐	**UDR Server A:** 1. Enter the IP Addresses for the Server. 2. Set the Interface parameters according to to deployment type.	OAM Interfaces [At least one interface is required.]: Network: xmi (10.10.1.0/24) — IP Address: 10.10.1.57 — Interface: eth0 ☐ VLAN (3) Network: imi (10.10.2.0/24) — IP Address: 10.10.2.156 — Interface: eth1 ☐ VLAN (2) 1. Enter the IP Addresses for XMI and IMI networks. 2. Set the Interface device for XMI and IMI networks according to the network adapter assigment for the VM guest as viewable in B.3 Step 3 or C.7 Step 5. 3. Leave the VLANs unselected
23. ☐	**UDR Server A:** Click **Add** under NTP Servers and enter the address of the supplied NTP server.	NTP Server IP Address — Prefer — Add 10.240.15.7 ☐ Remove 10.240.15.8 ☐ Remove 10.240.15.9 ☐ Remove 10.240.15.11 ☐ Remove Set one ore more NTP Server IP Addresses to the supplied NTP servers. It is recommended to have minimum of 3 and up to 4 external NTP servers for reliable functioning of NTP service. NTP Servers: NTP Server IP Address — Prefer Add ☐ Remove

Step	Procedure	Result
24. ☐	**UDR Server A:** Click **Info** to see a banner message stating Pre-Validation passed. Click **Apply**.	
25. ☐	**UDR Server A:** If the values match the network ranges assigned to the NOAMP NE,the banner message shows that the data has been validated and committed to the DB.	
26. ☐	**UDR Server A:** Applying the Server Configuration File Navigate to **Main Menu → Configuration → Servers**	
27. ☐	**UDR Server A:** The Configuration → Servers screen lists the added Server.	

Step	Procedure	Result
28. ☐	**UDR Server A:** 1. Use the cursor to select the added Server. 2. The row containing the Server is highlighted in SKY BLUE. 3. Click **Export**.	
29. ☐	**UDR Server A:** A banner information message showing a download link for the Server configuration data.	 The configuration file was created and stored in the `/var/TKLC/db/filemgmt` directory. The configuration file has a file name similar to `TKLCConfigData.<hostname>.sh`.

30. ☐	**UDR Server A:**
	1. Access the command prompt.
	2. Log into the UDR-A server as the admusr user.
		`login as: admusr`
		`admusr@10.250.xx.yy's password: <admusr_password>`
		`Last login: Wed Mar 28 05:03:47 2018 from 10.178.25.81 [root@NO-A ~]#`

31. ☐	**UDR Server A:** Switch to root user.	`[admusr@ UDR-A ~]$ su -` `password: <root_password>`
32. ☐	**UDR Server A:** Copy the server configuration file to the `/var/tmp` directory on the server, making sure to rename the file by omitting the server hostname from the file name.	**Example:** TKLCConfigData<.*server_hostname*>.sh translates to TKLCConfigData.sh `# cp -p /var/TKLC/db/filemgmt/TKLCConfigData.UDR-A.sh /var/tmp/TKLCConfigData.sh` **NOTE:** The server polls the `/var/tmp` directory for the presence of the configuration file and automatically runs the file when it is found.

Step	Procedure	Result

33. ☐	**UDR Server A:**
	After the script completes, a broadcast message is sent to the terminal.
	Ignore the output and press **ENTER** to return to the command prompt.
	NOTE: The time to complete this step varies by server and may take from 3 to 20 minutes to complete.
		****** NO OUTPUT FOR approximately 3 to 20 MINUTES ******
		`Broadcast message from root (Fri Mar 30 01:47:58 2018):`
		`Server configuration completed successfully!`
		`See /var/TKLC/appw/logs/Process/install.log for details.`
		`Please remove the USB flash drive if connected and reboot the server.`
		`<ENTER>`

34. ☐	**UDR Server A:**
	Configure the time zone.
		`# set_ini_tz.pl <time zone>`
		NOTE: The following command example uses America/New_York time zone. Replace, as appropriate, with the time zone you have selected for this installation. For UTC, use `Etc/UTC`.
		`# set_ini_tz.pl "America/New_York"`

35. ☐	**UDR Server A:** Initiate a reboot of the UDR Server.	`# reboot`

36. ☐	**UDR Server A:**
	Wait until server reboot is complete. Then, SSH into the UDR-A server.
		Wait approximately 9 minutes until the server reboot is complete.
		Using an SSH client such as putty, ssh to the UDR-A server.
		`login as: admusr`
		`admusr@10.250.xx.yy's password: <admusr_password>`
		`Last login: Wed Mar 28 05:03:47 2018 from 10.178.25.81`
		NOTE: If the server is not up, wait a few minutes and re-enter the `ssh` command. You can also try running the `ping` command to see if the server is up.

37. ☐	**UDR Server A:**
	Verify that the XMI and IMI IP addresses entered in Step 22 have been applied
		`$ ifconfig |grep in |grep -v inet6`
		Example:
		`eth0 Link encap:Ethernet HWaddr FA:16:3E:3C:8D:DE`
		`inet addr:10.10.1.57 Bcast:10.10.1.255 Mask:255.255.255.0`
		`eth1 Link encap:Ethernet HWaddr FA:16:3E:EF:4D:EF`
		`inet addr:10.10.2.156 Bcast:10.10.2.255 Mask:255.255.255.0`
		NOTE: The XMI and IMI addresses for the server are verified by reviewing the server configuration using the Oracle Communications User Data Repository GUI.
		1. Navigate to **Main Menu → Configuration → Servers**
		2. Scroll to line entry containing the hostname for the servers.

Step	Procedure	Result

38. ☐	**UDR Server A:**
	Use the `ntpq` command to verify that the server has connectivity to the assigned Primary (and Secondary if one was provided) NTP servers.
		`$ ntpq -np`
		`remote  refid  st t when poll reach  delay  offset  jitter`
		`==========`
		`*192.168.56.180  192.168.56.247  4 u 37  64  177  0.574  1.165  21.346`

	IF CONNECTIVITY TO THE NTP SERVERS CANNOT BE ESTABLISHED, STOP AND PERFROM THE FOLLOWING STEPS:	
Have the IT group provide a network path from the OAM server IP to the assigned NTP IP addresses. ***AFTER NETWORK CONNECTIVITY IS ESTABLISHED TO THE ASSIGNED NTP IP ADDRESSES, THEN RESTART THIS PROCEDURE BEGINNING WITH STEP 35.***		
39. ☐	**UDR Server A:** Run the `alarmMgr` to verify the health of the server	`$ alarmMgr --alarmStatus` **NOTE:** This command should not return output on a healthy system.
40. ☐	**UDR Server A:** Exit the SSH session for the UDR-A server	`$ exit`
THIS PROCEDURE HAS BEEN COMPLETED		

5.2 Create Configuration for Remaining Servers

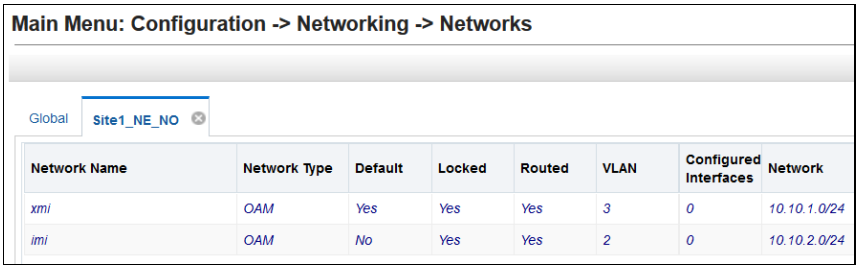
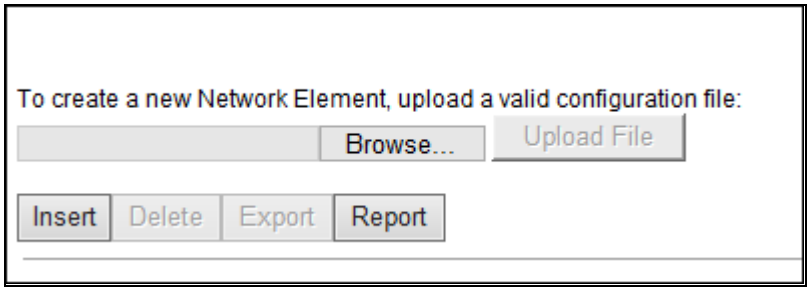
This procedure is used to create and configure all Oracle Communications User Data Repository Servers (Primary and DR Servers) except the first UDR-A server.

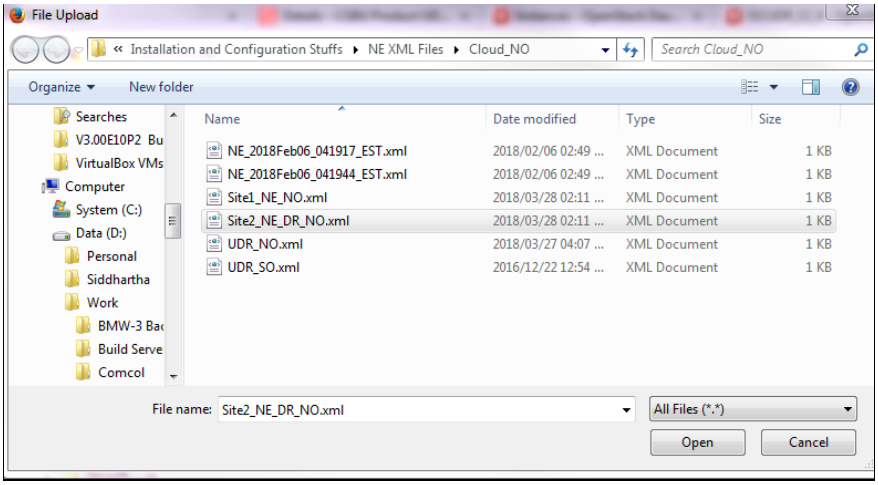
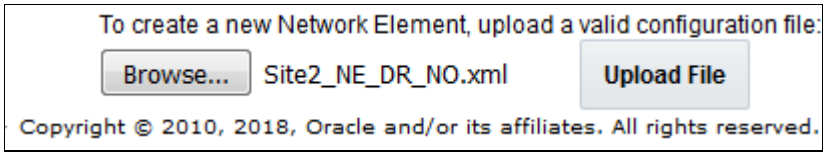
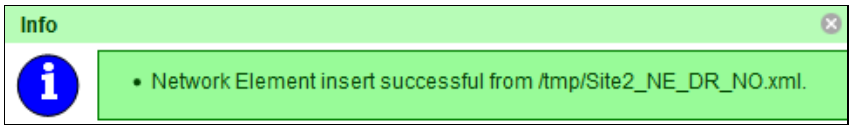
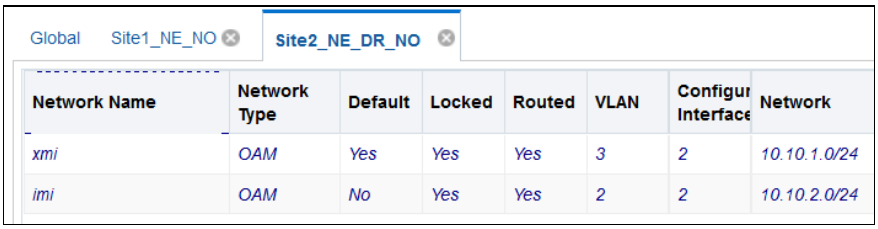
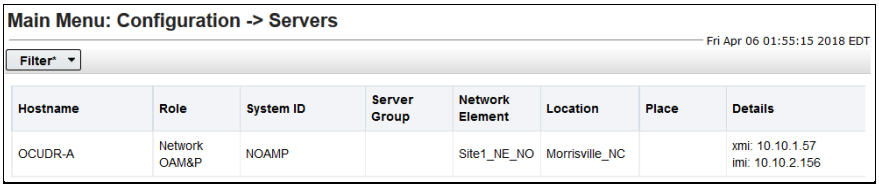
Requirements:

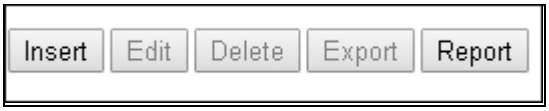
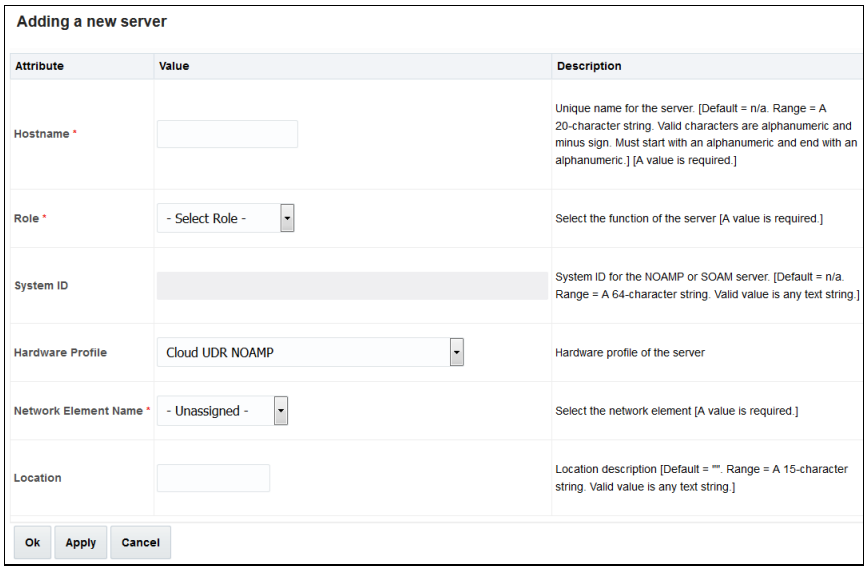
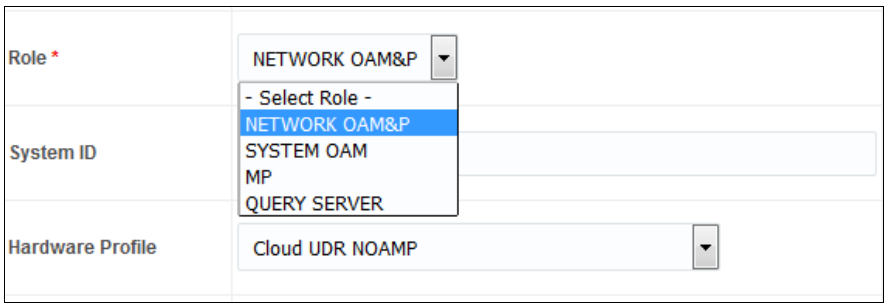
- Section 5.1 Configure UDR-A Server (1st NOAMP only) has been completed

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

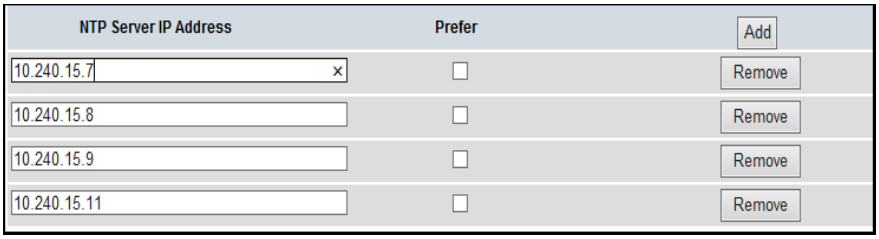
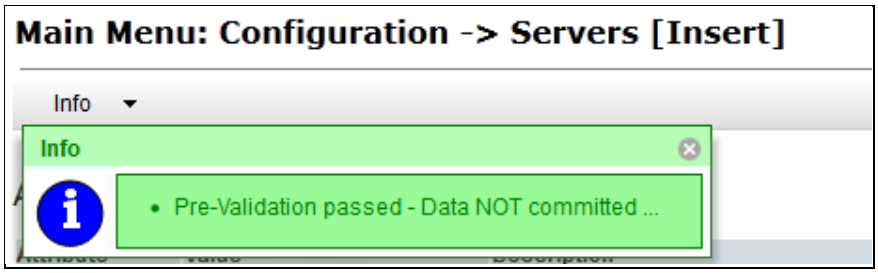
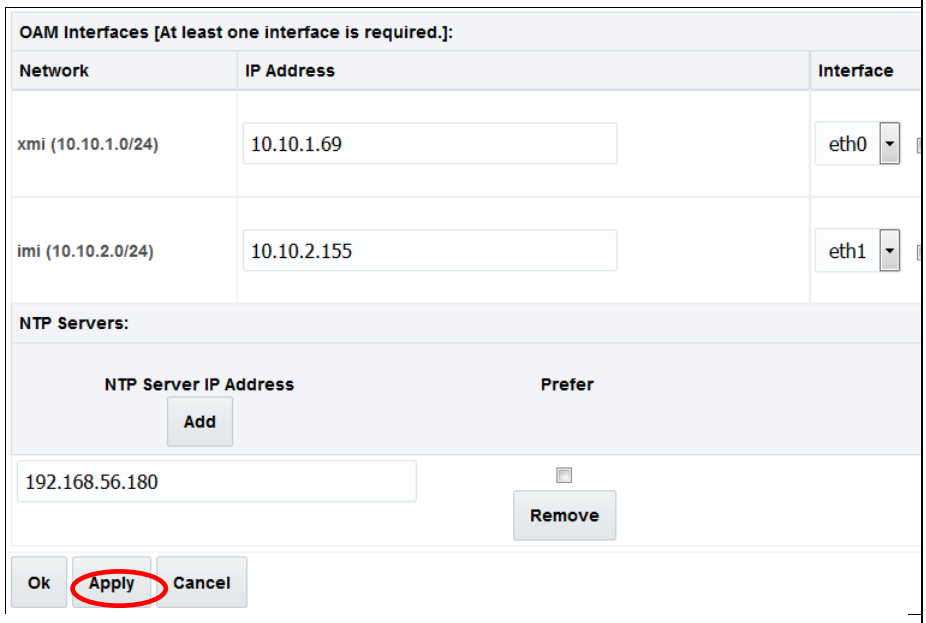
Procedure 6: Create Configuration for Remaining Servers

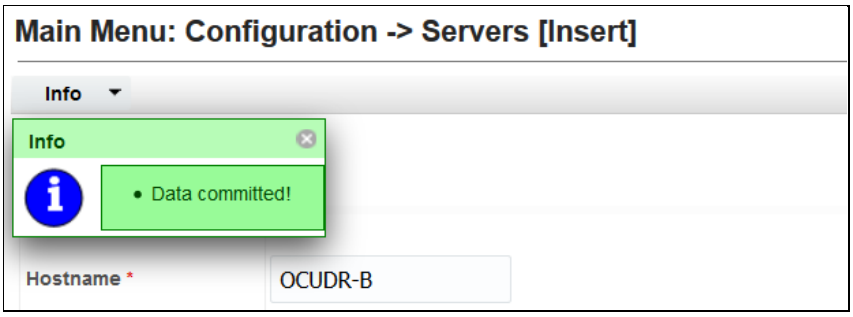
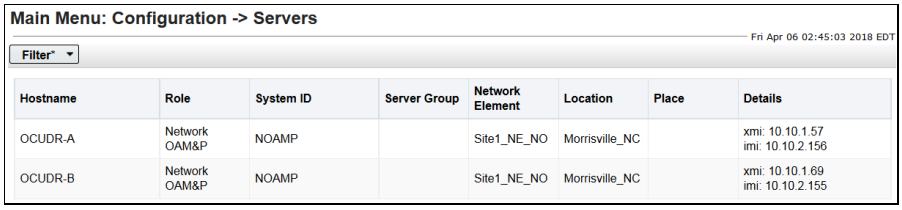
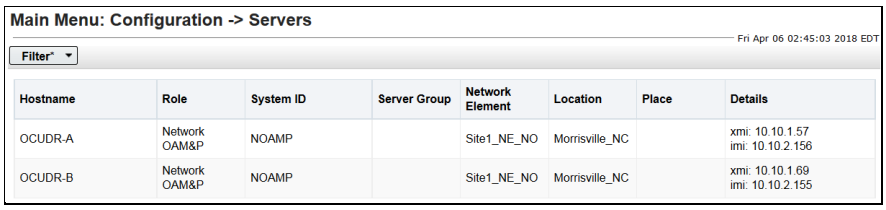
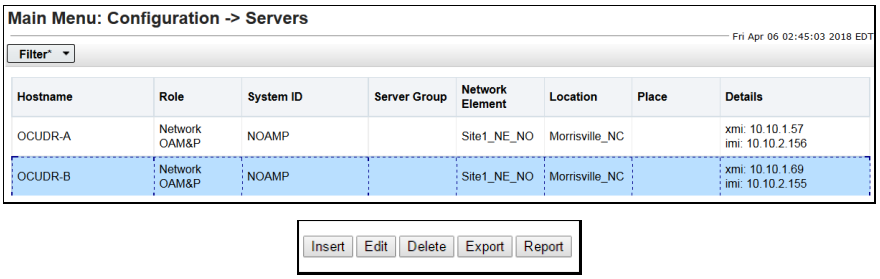
Step	Procedure	Result
1. ☐	**UDR Server A:** Launch an approved web browser and connect to the UDR Server A IP address **NOTE:** Click **Continue to this website (not recommended)** if the security certificate warning displays. Login to the GUI using the default user and password.	
For steps 4 through 8 add the remaing Network Elements one at a time. This includes the NO network Element for the DR elements (NO) if present. (DR elements can be uploaded during DR install)		
2. ☐	**UDR Server A:** ***Configuring Network Element*** Navigate to **Main Menu → Configuration → Network Elements**	
3. ☐	**UDR Server A:** On the **Configuration → Network Elements** screen, click **Browse**.	

Step	Procedure	Result
4. ☐	**UDR Server A:** **NOTE**: This step assumes that the xml files were previously prepared, as described inAppendix C. 1. Select the location containing the site .xml file. 2. Select the .xml file and click the **Open**.	
5. ☐	**UDR Server A:** Click **Upload File** (bottom left corner of screen).	
6. ☐	**UDR Server A:** If the values in the XML file pass validation rules, a banner message displays showing that the data has been successfully committed to the DB. **NOTE**: You may have to left mouse click the **Info** banner option to see the banner message.	 
NOTE: The following must be run for all servers except the first UDR-A server. These steps include a check box for UDR-A server. That check box refers to UDR-A servers that are not at the primary provisioning site, such as the UDR-A server at the disaster recovery (DR) site.		
7. ☐	**UDR Server A:** Navigate to **Main Menu → Configuration → Servers**	 Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B

Step	Procedure	Result
8. ☐	**UDR Server A:** Click **Insert** at the bottom left.	 Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B
9. ☐	**UDR Server A:** The Adding a new server configuration screen opens.	 Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B
10. ☐	**UDR Server A:** Enter the assigned Hostname for the server.	 Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B
11. ☐	**UDR Server A:** Select the appropriate server Role from the menu.	 Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B

Step	Procedure	Result
12. ☐	**UDR Server A:** Enter the System ID for the server. **NOTE:** System ID is not required for MP.	System ID: NOAMP — System ID for the NOAMP or SOAM server. [Default = n/a. Range = A 64-character string. Valid value is any text string.] Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B
13. ☐	**UDR Server A:** Select the hardware profile from the list.	NOAM select hardware profile: Cloud UDR NOAM Hardware Profile: Cloud UDR NOAMP — Hardware profile of the server Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B
14. ☐	**UDR Server A:** Select the Network Element Name from the menu. **NOTE:** After the Network Element Name is selected, the Interfaces fields are displayed.	Network Element Name *: Site1_NE_NO — Select the network element [A value is required.] **NOTE:** NO and DR pairs have their own Network element. Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B
15. ☐	**UDR Server A:** Enter the site location. **NOTE:** Location is an optional field.	Location: Morrisville_NC — Location description [Default = "". Range = A 15-character string. Valid value is any text string.] Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B
16. ☐	**UDR Server A:** 1. Enter the IP Addresses for the Server. 2. Set the Interface parameters according to to deployment type.	OAM Interfaces [At least one interface is required.]: Network: xmi (10.10.1.0/24) — IP Address: 10.10.1.69 — Interface: eth0 ☐ VLAN (3) Network: imi (10.10.2.0/24) — IP Address: 10.10.2.155 — Interface: eth1 ☐ VLAN (2) 1. Enter the IP Addresses for XMI and IMI networks. 2. Set the Interface device for XMI and IMI networks according to network adapter assigment for the VM guest as viewable in B.3 Step 3 or C.7 Step 5. 3. Leave the VLANs unselected. Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B

Step	Procedure	Result
17. ☐	**UDR Server A:** Click **Add** under NTP Servers and enter the addresses of the NTP servers.	 Set one ore more NTP Server IP Addresses to the supplied NTP servers. It is recommended to have minimum of 3 and up to 4 external NTP servers for reliable functioning of NTP service. Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B
18. ☐	**UDR Server A:** Click **Info** to see a banner with a message stating Pre-Validation passed. Click **Apply**.	  Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B

Step	Procedure	Result
19. ☐	**UDR Server A:** If the values match the network ranges assigned to the NE, click **Info** to see a banner message stating that the data has been validated and committed to the DB.	 Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B
20. ☐	**UDR Server A:** Applying the Server Configuration File Select **Main Menu → Configuration → Servers**	 Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B
21. ☐	**UDR Server A:** The Configuration → Servers screen shows the added Server in the list.	 Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B
22. ☐	**UDR Server A:** 1. Use the cursor to select the added Server. 2. The row containing the Server is be highlighted in SKY BLUE. 3. Click **Export**.	 Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B
23. ☐	**VMware client:** Repeat this procedure to create configuration	Repeat this procedure to create configuration for each remaining server: ☐ UDR-A ☐ UDR-B
THIS PROCEDURE HAS BEEN COMPLETED		

5.3 Apply Configuration To Remaining Servers

This procedure is used to apply configuration to all Oracle Communications User Data Repository Servers (Primary and DR Servers) except the first UDR-A server.

Requirements:

- Section 5.2 Create Configuration for Remaining Servers has been completed

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure 7: Apply Configuration to Remaining Servers

Step	Procedure	Result
1. ☐	**UDR Server A:** Connect to the UDR-A Server terminal at the Primary UDR site	SSH to the Primary UDR-A XMI IP_address. Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B

2. ☐	**UDR Server A:**
	1. Access the command prompt.
	2. Log into the Primary UDR-A server as the admusr user.
		`login as: admusr`
		`admusr@10.250.xx.yy's password: <admusr_password>`
		`Last login: Mon Jul 30 10:33:19 2012 from 10.25.80.199`
		`$`
		Mark the check box as addition is completed for each server.
		☐ UDR-A ☐ UDR-B

3. ☐	**UDR Server A:** Change directory into the file management space	`[admusr@pc9040833-no-a ~]$ cd /var/TKLC/db/filemgmt` Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B

4. ☐	**UDR Server A:**
	Get a directory listing and find the configuration files for the servers.
		`[admusr@pc9040833-no-a ~]$ ls -ltr TKLCConfigData*.sh`
		****** TRUNCATED OUTPUT ******
		`-rw-rw-rw- 1 root root 1257 Aug 17 14:01 TKLCConfigData.UDR-A .sh`
		`-rw-rw-rw- 1 root root 1311 Aug 17 14:30 TKLCConfigData.NO-B.sh`
		Mark the check box as addition is completed for each server.
		☐ UDR-A ☐ UDR-B

5. ☐	**UDR Server A:**
	Copy the configuration files found in the previous step to the target server based on the server name of the configuration file.
		`[admusr@pc9040833-no-a ~]$ scp -p <configuration_file-a> <Associated_Server_XMI_IP>:/tmp`
		`admusr@10.240.39.4's password: <admusr_password>`
		`TKLCConfigData.so-carync-a.sh 100% 1741 1.7KB/s 00:00`
		`[root@no-mrsvnc-a filemgmt]$`
		Mark the check box as addition is completed for each server.
		☐ UDR-A ☐ UDR-B

Step	Procedure	Result

6. ☐	**UDR Server A:**
	Connect to the target server which has received a configuration file copy in the previous step
		`[admusr@pc9040833-no-a ~]$ ssh <Associated_Server_XMI_IP >`
		`admusr@192.168.1.10's password: <admusr_password>`
		Mark the check box as addition is completed for each server.
		☐ UDR-A ☐ UDR-B

7. ☐	**Target Server:**
	Copy the configuration file to the tmp directory.
		Copy the server configuration file to the `/var/tmp` directory on the server, making sure to rename the file by omitting the server hostname from the file name.
		Example:
		`TKLCConfigData<.server_hostname>.sh` translates to `TKLCConfigData.sh`
		`[admusr@hostname1326744539 ~]$ sudo cp -p /tmp/TKLCConfigData.NO-B.sh /var/tmp/TKLCConfigData.sh`
		`[admusr@hostname1326744539 ~]$`
		NOTE: The server polls the `/var/tmp` directory for the presence of the configuration file and automatically runs the file when it is found.
		Mark the check box as addition is completed for each server.
		☐ UDR-A ☐ UDR-B

8. ☐	**Target Server:**
	After the script completes, a broadcast message is sent to the terminal.
	Ignore the output and press **ENTER** to return to the command prompt.
	NOTE: The time to complete this step varies by server and may take from approximately 3 to 20 minutes to complete.
		****** THERE IS NO OUTPUT FOR APPROXIMATELY 20 MINUTES ******
		`Broadcast message from root (Thu Dec 1 09:41:24 2011):`
		`Server configuration completed successfully!`
		`See /var/TKLC/appw/logs/Process/install.log for details.`
		`Please remove the USB flash drive if connected and reboot the server.`
		`<ENTER>`
		`[admusr@hostname1326744539 ~]$`
		Mark the check box as addition is completed for each server.
		☐ UDR-A ☐ UDR-B

9. ☐	**Target Server:** Initiate a reboot of the Server.	`[admusr@hostname1326744539 ~]$ sudo reboot` Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B

Step	Procedure	Result

10. ☐	**UDR Server A:**
	The SSH session for the target server was terminated by previous step.
		The previous step causes the ssh session for the server to close and you are returned to the UDR server console prompt.
		`Connection to 192.168.1.16 closed by remote host.`
		`Connection to 192.168.1.16 closed.`
		`$`
		Mark the check box as addition is completed for each server.
		☐ UDR-A ☐ UDR-B

11. ☐	**UDR Server A:**
	Wait until server reboot is complete. Then, SSH into the target server using its XMI address.
		Wait approximately 10 minutes until the server reboot is complete.
		Using an SSH client such as putty, ssh to the target server using admusr credentials and the <XMI IP Address>.
		`[admusr@pc9040833-no-a ~]$ ssh 192.168.1.xx`
		`admusr@192.168.1.20's password: <admusr_password>`
		NOTE: If the server is not up, wait a few minutes and re-enter the `ssh` command. You can also run the `ping` command to see if the server is up.
		Mark the check box as addition is completed for each server.
		☐ UDR-A ☐ UDR-B

12. ☐	**Target Server:**
	Verify that the XMI and IMI IP addresses entered in Section 5.2 Step 16 have been applied
		`$ ifconfig |grep in |grep -v inet6`
		`eth0 Link encap:Ethernet HWaddr FA:16:3E:BB:3D:AC`
		`inet addr:10.10.1.57 Bcast:10.10.1.255 Mask:255.255.255.0`
		`eth1 Link encap:Ethernet HWaddr FA:16:3E:56:C1:F9`
		`inet addr:10.10.2.156 Bcast:10.10.2.255 Mask:255.255.255.0`
		`eth2 Link encap:Ethernet HWaddr FA:16:3E:B4:BD:0A`
		`lo Link encap:Local Loopback`
		`inet addr:127.0.0.1 Mask:255.0.0.0`
		NOTE: The XMI and IMI addresses for the server can be verified by reviewing the server configuration through the Oracle Communications User Data Repository GUI.
		Navigate to **Main Menu → Configuration → Servers.**
		Scroll to line containing the hostname for the server.
		Mark the check box as addition is completed for each server.
		☐ UDR-A ☐ UDR-B

Step	Procedure	Result

13. ☐	**Target Server:**
	Use the `ntpq` command to verify that the server has connectivity to the assigned Primary and Secondary NTP servers.
		`$ ntpq -np`
		`remote refid st t when poll reach delay offset jitter`
		`==========`
		`*192.168.56.180 192.168.56.247 4 u 62 64 377 0.641 37.694 18.375`
		`[root@pc9040725-no-a ~]$`
		If offset value is in excess of five seconds, run the commands below to sync time manually:
		`$ sudo service ntpd stop`
		`Shutting down ntpd: [ OK ]`
		`$ sudo ntpdate <Remote_NTP_Server_IP>`
		`$ sudo service ntpd start`
		`Starting ntpd: [ OK ]`
		Mark the check box as addition is completed for each server.
		☐ UDR-A ☐ UDR-B

		IF CONNECTIVITY TO THE NTP SERVERS CANNOT BE ESTABLISHED, STOP AND PERFORM THE FOLLOWING STEPS:
14. ☐	**Target Server:** Run the `alarmMgr` command to verify the health of the server	`$ alarmMgr --alarmStatus` **NOTE:** This command should not return output on a healthy system Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B

15. ☐	**Target Server:**
	Exit the SSH session for the target server
		`$ exit`
		`logout`
		`Connection to 192.168.1.16 closed.`
		`#`
		Mark the check box as addition is completed for each server.
		☐ UDR-A ☐ UDR-B

16. ☐	**UDR Server A:**
	Exit terminal session
		`# exit`
		`logout`
		`Connection to 192.168.1.4 closed.`
		`#`

THIS PROCEDURE HAS BEEN COMPLETED		

5.4 Configure XSI Networks

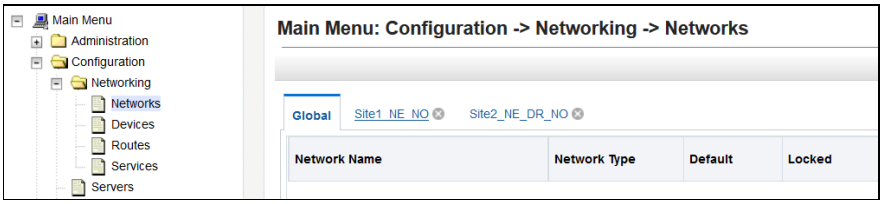
This procedure cofnigures the XSI networks used on UDR to support signaling traffic.

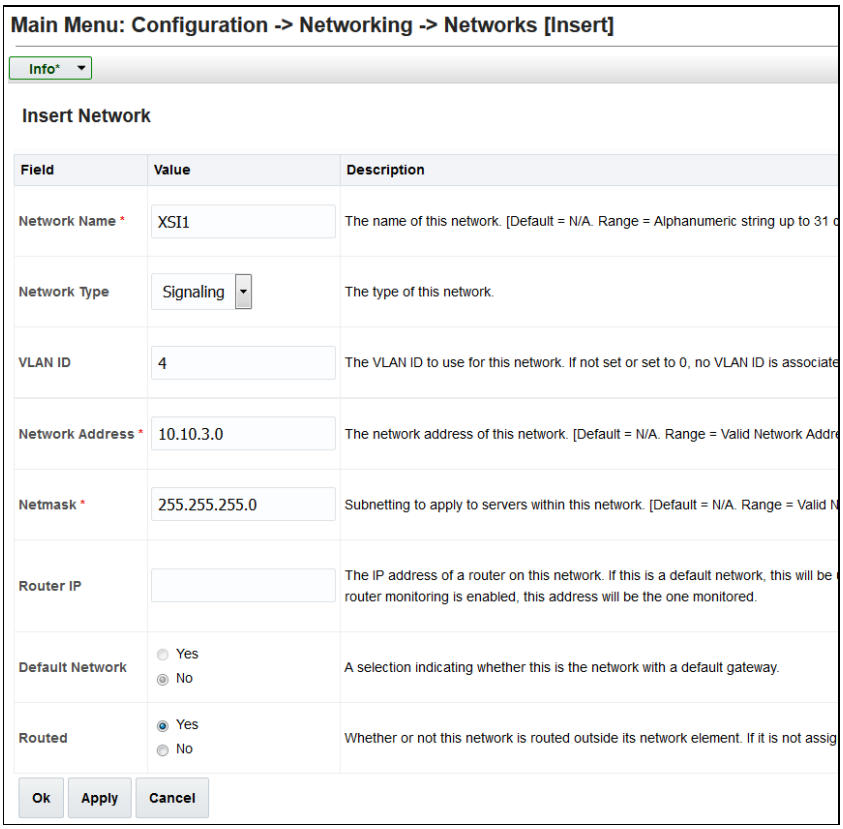
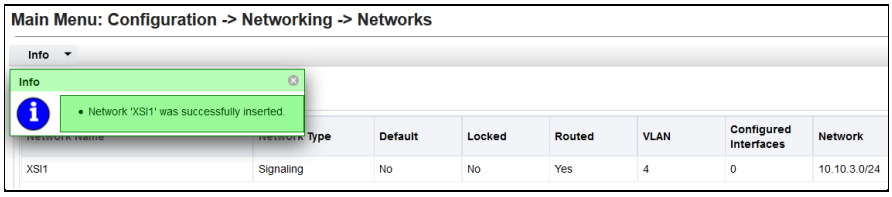
Requirements:

- Section 5.3 Apply Configuration To Remaining Servers has been completed
- Section 5.1 Configure UDR-A Server (1st NOAMP only) has been completed

NOTE: If deploying two sites use the same name for both XSI networks.

Procedure 8: Configure XSI Networks

Step	Procedure	Result
1. ☐	**UDR Server A:** Launch an approved web browser and connect to the UDR Server A IP address **NOTE:** Click **Continue to this website (not recommended)** if the security certificate warning displays. Login to the GUI using the default user and password.	
2. ☐	UDR Server A Navigate to **Main Menu → Configuration → Networking → Networks**	

Step	Procedure	Result
3. ☐	**UDR Server A** Add the XSI1 network	Click **Insert**.  Enter all of the fields for the XSI1 network according to the network parameters. Retain the default values for Network Element (Signalling), Default Network (No) and Routable (Yes). ComAgent Service may be configured to run on XSI1. In this case, the XSI1 network is used for MP to NOAMP ComAgent Traffic. **NOTE**: Network names can be overloaded to support multiple subnets. When defining network for ComAgent Service, use same network name for Primary and DR Site. **NOTE:** VLANs are not used in the context of this document, though VLAN ID is a required field on this screen. Enter any number in the valid range.
4. ☐	**UDR Server A** Repeat as required	Repeat Step 3 of this procedure to Insertadditional signaling networks(XSI2, etc) if applicable.
5. ☐	**UDR Server A** XSI network is displayed along with a success message.	
THIS PROCEDURE HAS BEEN COMPLETED		

Chapter 6. OAM Pairing

6.1 OAM Pairing for Primary UDR Servers (1st NOAMP site only)

During the OAM Pairing procedure, various errors may be seen at different stages of the procedure. While performing a step, ignore errors related to values other than the ones referenced by that step.

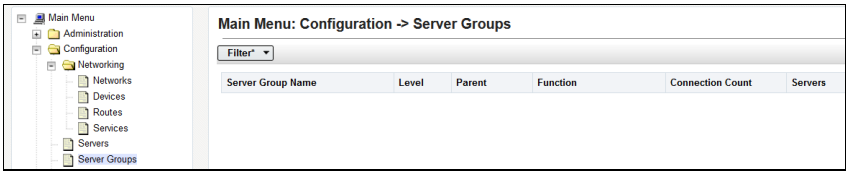
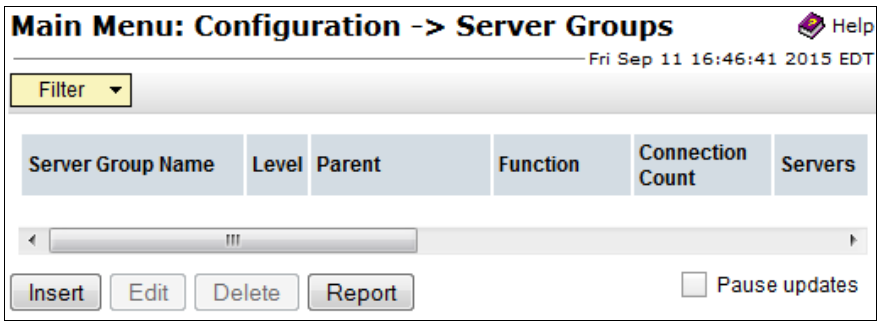
This procedure creates an active, standby pair for the UDR servers at the Primary Provisioning Site.

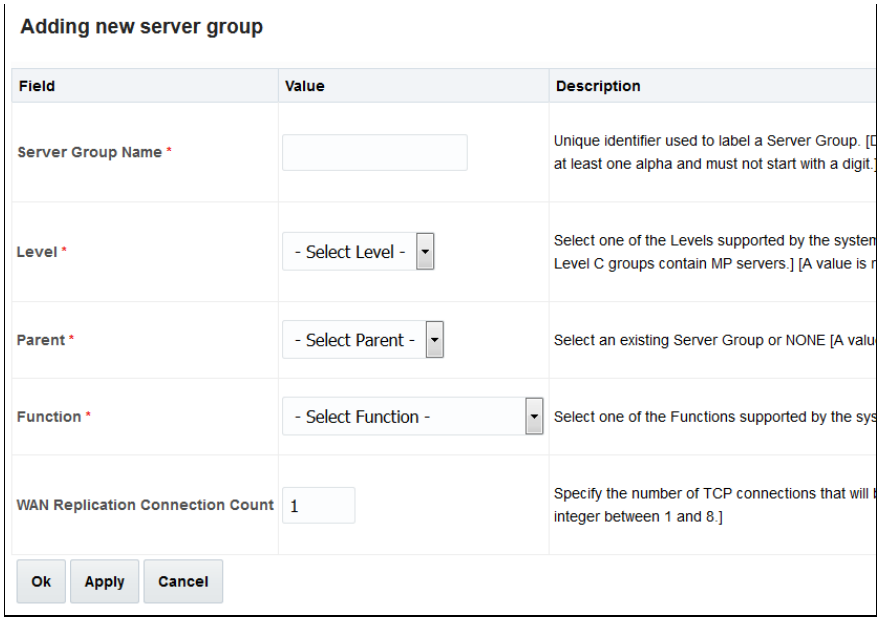
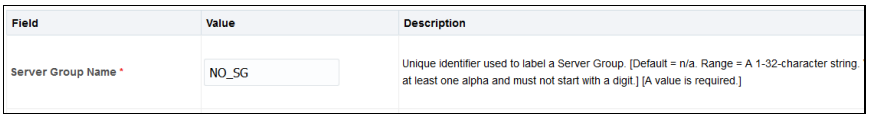
Requirements:

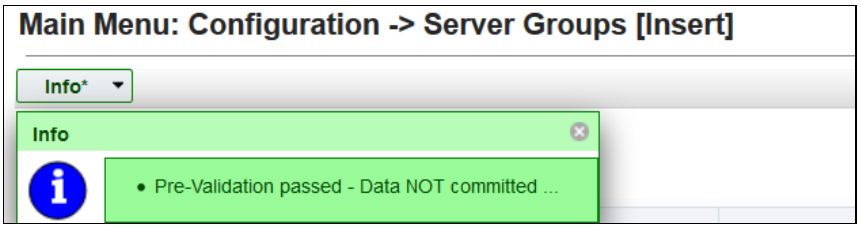
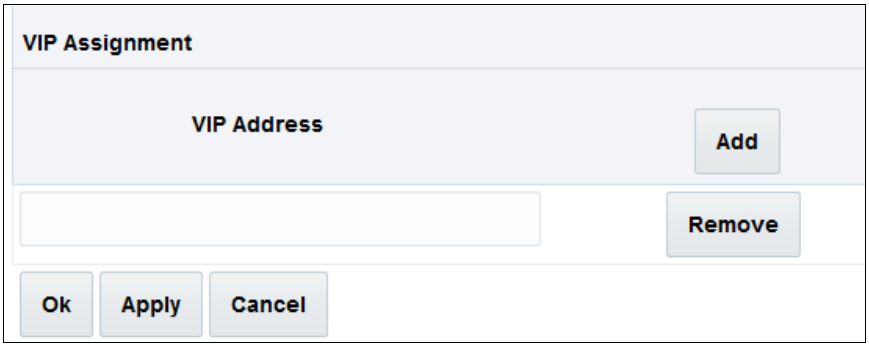
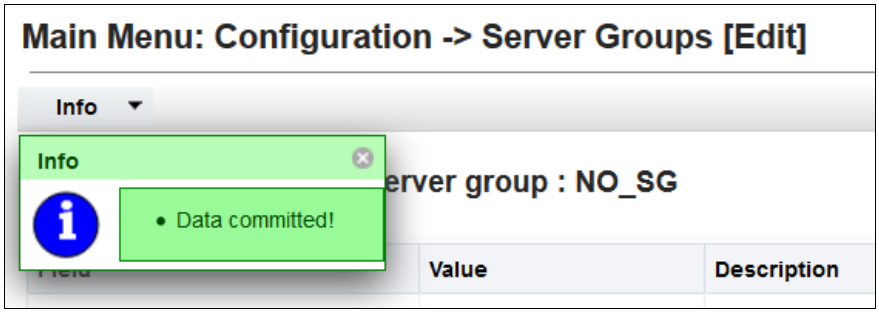
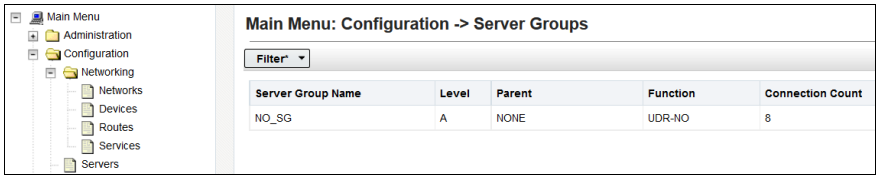
- Section 5.3 Apply Configuration To Remaining Servers has been completed

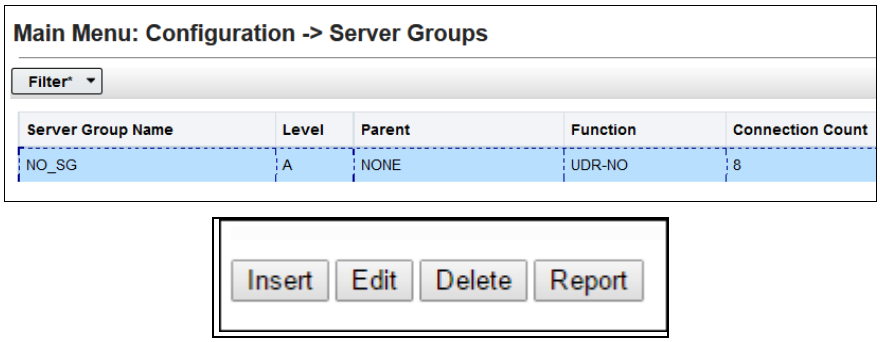
Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure 9: OAM Pairing for Primary UDR Servers (1st NOAMP site only)

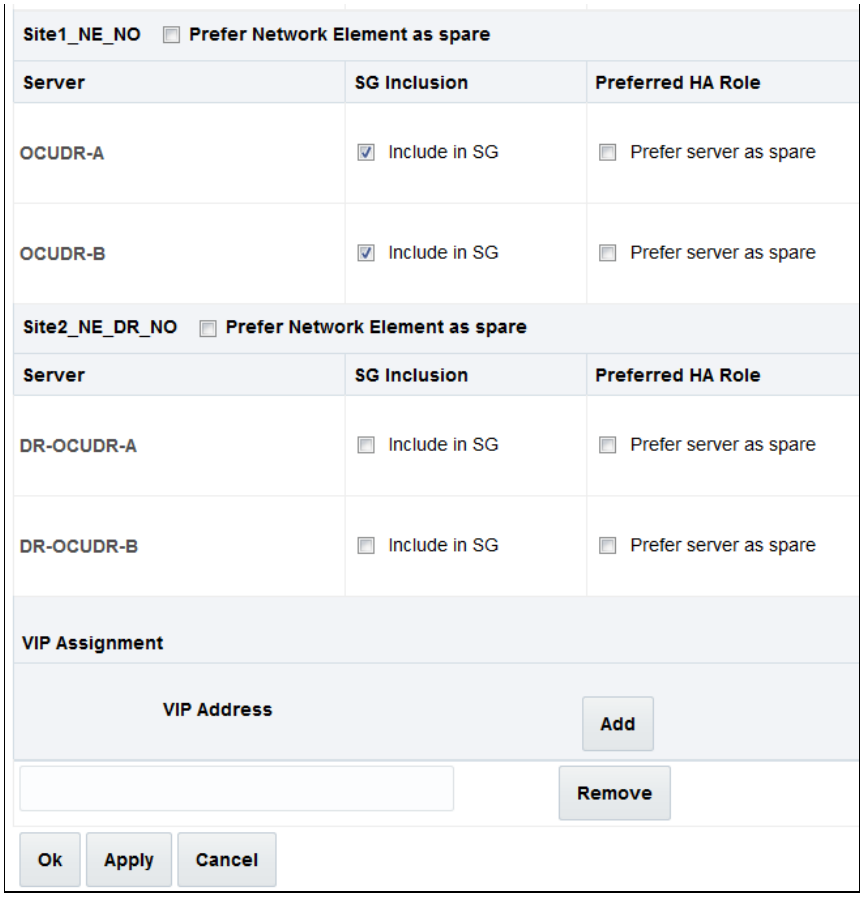
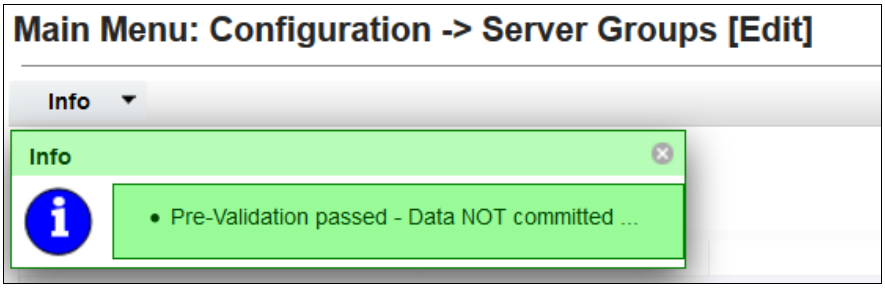
Step	Procedure	Result
1. ☐	**UDR Server A:** Launch an approved web browser and connect to the UDR Server A IP address	**NOTE:** Click **Continue to this website (not recommended)** if the security certificate warning displays. Login to the GUI using the default user and password.
2. ☐	**UDR Server A:** Configuring Server Group	Navigate to **Main Menu → Configuration → Server Groups** 
3. ☐	**UDR Server A:** Click **Insert** located at the bottom left corner of the page. **NOTE:** Use the vertical scroll-bar to see the **Insert** button.	

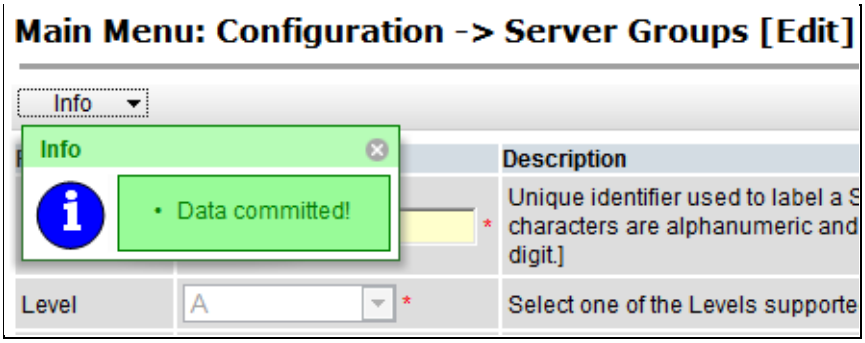
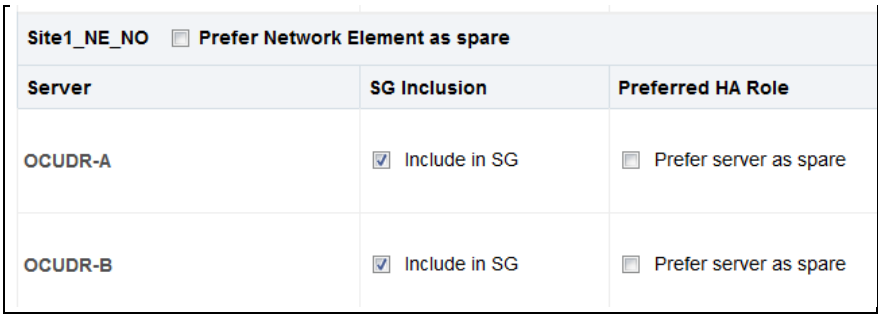
Step	Procedure	Result
4. ☐	**UDR Server A:** The Server Groups [Insert] screen opens.	
5. ☐	**UDR Server A:** Enter the Server Group Name.	
6. ☐	**UDR Server A:** Select **A** on the Level menu.	
7. ☐	**UDR Server A:** Select **None** on the Parent menu.	
8. ☐	**UDR Server A:** Select UDR-NO on the Function menu.	
9. ☐	**UDR Server A:** Enter 8 for WAN Replication Connection Count.	

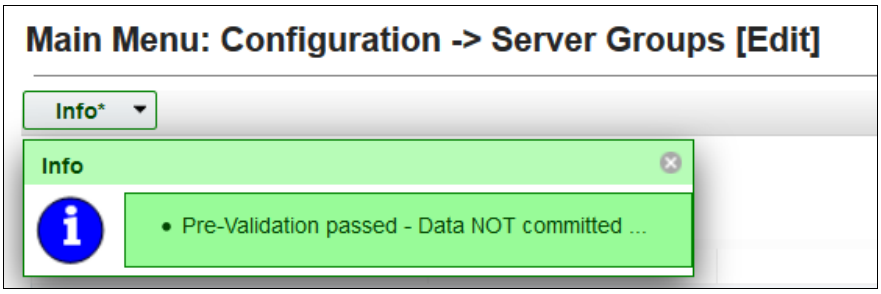
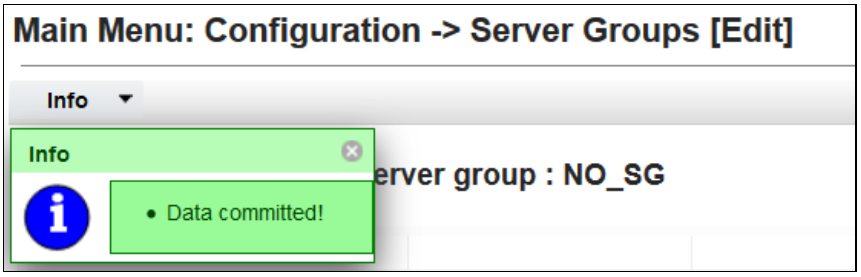
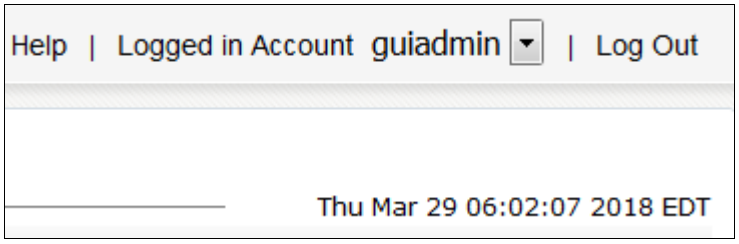
Step	Procedure	Result
10. ☐	**UDR Server A:** Click **Info** to see a banner message stating Pre-Validation passed. Click **Apply**.	 
11. ☐	**UDR Server A:** Click **Info** to see a banner message stating Data committed.	
12. ☐	**UDR Server A:** Navigate to **Main Menu → Configuration → Server Groups**	

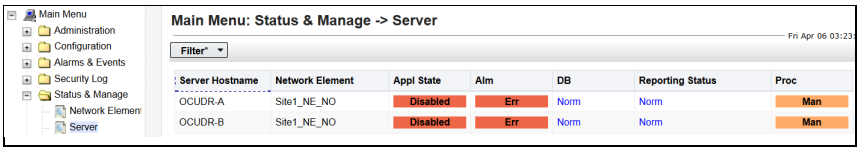
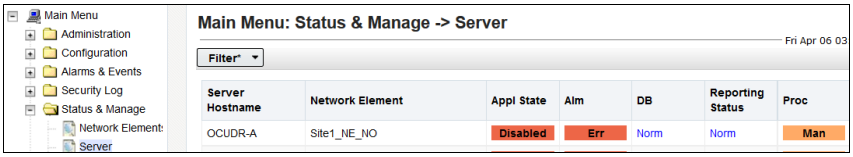
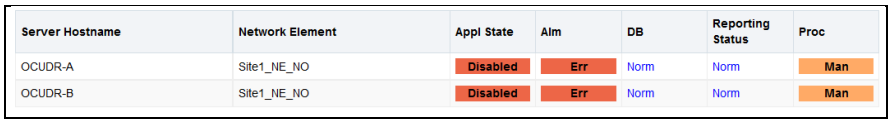
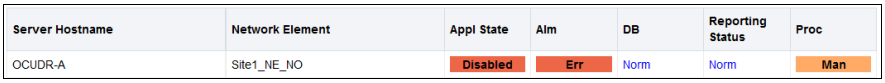
Step	Procedure	Result
13. ☐	**UDR Server A:** 1. Select the Server Group entry just added. The line entry is highlighted in sky blue. 2. Click **Edit** (located at the bottom left corner of the page). **NOTE:** You may need to use the vertical scroll-bar to see the **Edit**.	

Step	Procedure	Result
14. ☐	**UDR Server A:** The Server Groups [Edit] screen opens.	**Main Menu: Configuration -> Server Groups [Edit]** **Modifying attributes of server group : NO_SG** Field / Value / Description Server Group Name * — NO_SG — Unique identifier used to label a Server Group. [Default = n/a. Level * — A — Select one of the Levels supported by the system [A value is Parent * — NONE — Select an existing Server Group [A value is required.] Function * — UDR-NO — Select one of the Functions supported by the system [A valu WAN Replication Connection Count — 8 — Specify the number of TCP connections that will be used by Site1_NE_NO ☐ Prefer Network Element as spare Server / SG Inclusion / Preferred HA Role OCUDR-A — Include in SG — Prefer server as spare OCUDR-B — Include in SG — Prefer server as spare Site2_NE_DR_NO ☐ Prefer Network Element as spare Server / SG Inclusion / Preferred HA Role DR-OCUDR-A — Include in SG — Prefer server as spare DR-OCUDR-B — Include in SG — Prefer server as spare VIP Assignment VIP Address — Add Ok Apply Cancel

Step	Procedure	Result
15. ☐	**UDR Server A:** Select the options to include the A server and the B server in the UDR server group. **NOTE:** For single server installation, only NO-A is displayed; therefore only one option is selected. If this is a primary site (single site), then the DR site is not listed.	
16. ☐	**UDR Server A:** Click **Info** to see a banner message stating Pre-Validation passed. **Click** Apply**.**	

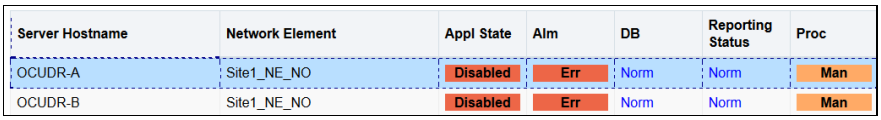
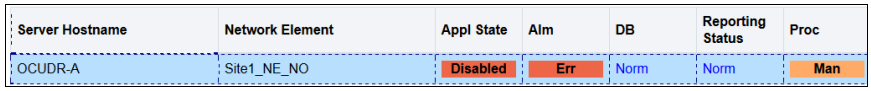
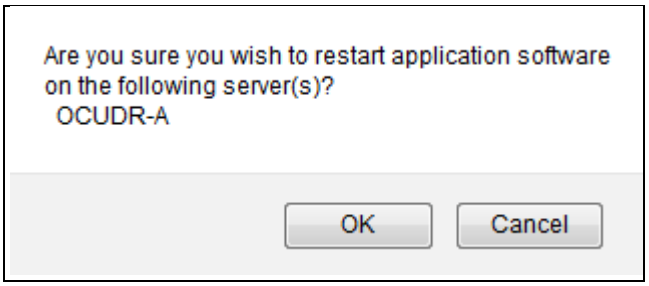
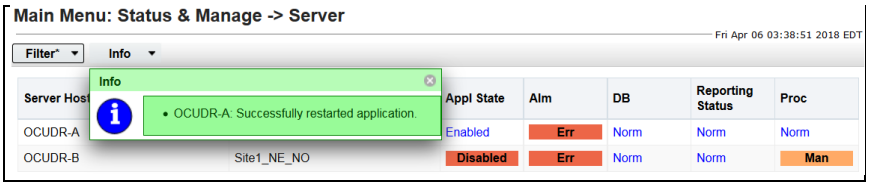
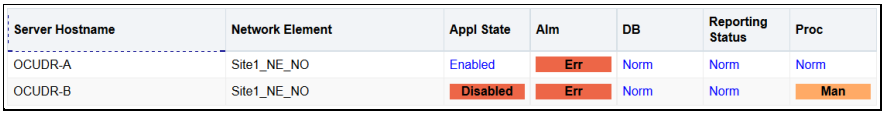
Step	Procedure	Result
17. ☐	**UDR Server A:** Click **Info** to see a banner message stating Data committed.	
18. ☐	**UDR Server A:** Click **Add** for the VIP Address. **NOTE:** VIP Address optional for Single Server Configuration.	
19. ☐	**UDR Server A:** Enter the VIP Address	

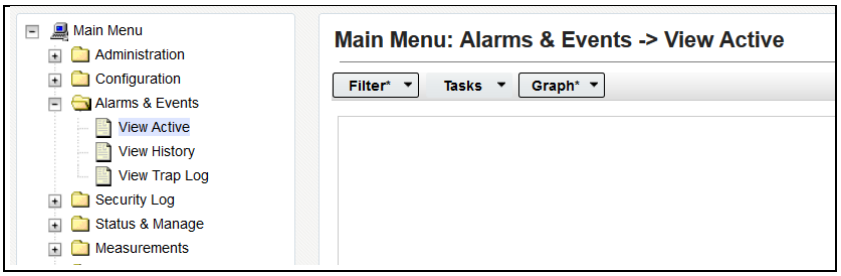
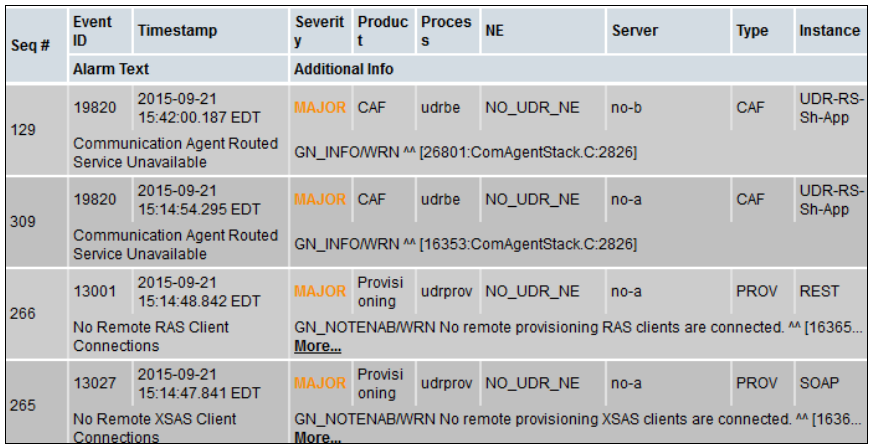
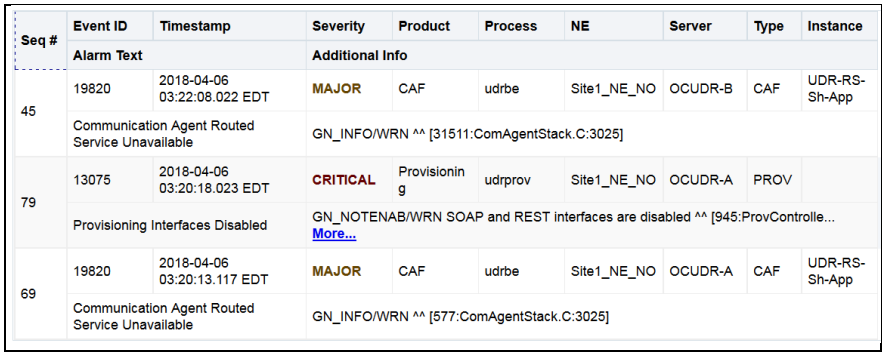
Step	Procedure	Result
20. ☐	**UDR Server A:** Click **Info** to see a banner message stating Pre-Validation passed. **Click** Apply**.**	
21. ☐	**UDR Server A:** Click **Info** to see a banner message stating Data committed.	
22. ☐	**UDR Server A:** Click **Logout** on the OAM A server GUI.	
23. ☐	***IMPORTANT: Wait at least 5 minutes before proceeding on to the next step.***	Now that the servers have been paired in a Server Group they must establish a master/slave relationship for High Availability (HA). It may take several minutes for this process to be completed. **NOTE:** Single server configuration is not needed to establish the master/slave relationship for High Availability (HA). Allow a minimum of 5 minutes before continuing to the next Step.

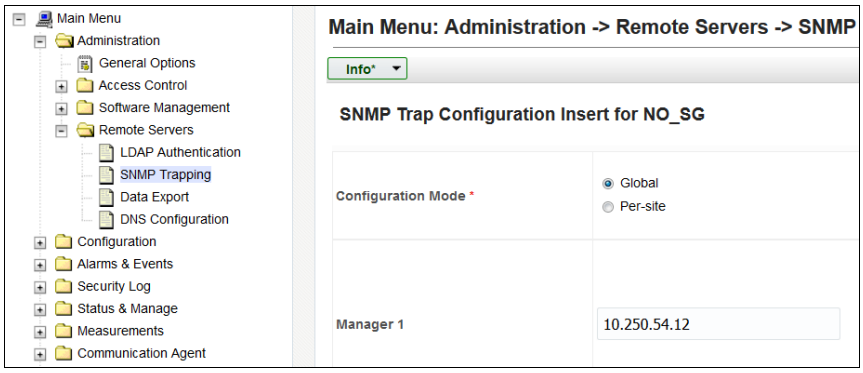
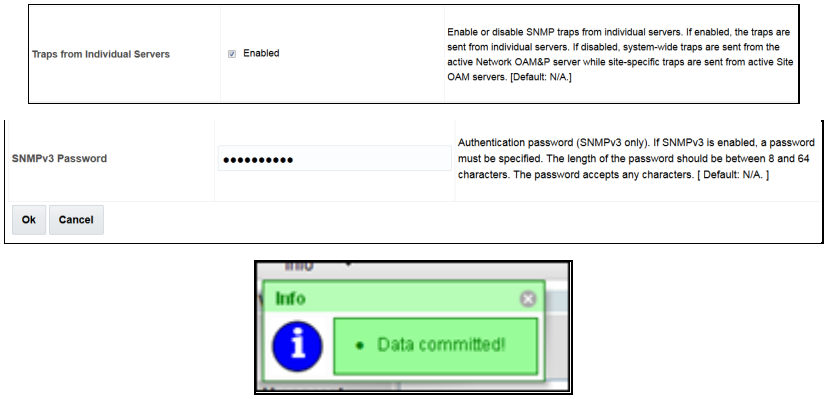
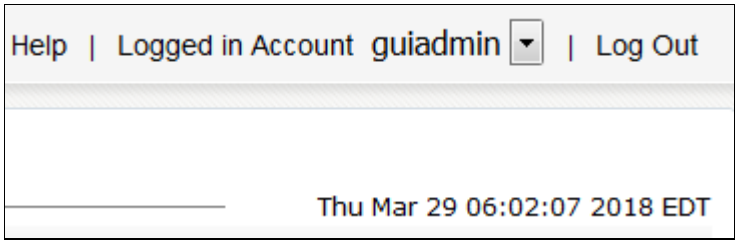
Step	Procedure	Result
24. ☐	**Active UDR VIP:** Launch an approved web browser and connect to the UDR Server A IP address **NOTE:** Click **Continue to this website (not recommended)** if the security certificate warning displays. Login to the GUI using the default user and password.	
25. ☐	**UDR VIP:** Restarting the UDR Server Application Navigate to **Main Menu → Status & Manage → Server**	Normal or Low Capacity Configuration:  Single Server Configuration: 
26. ☐	**UDR VIP:** 1. The A and B servers are listed in the right panel. **NOTE:** For single server, only the A server islisted. 2. Verify that the DB status shows Norm and the Proc status shows Man for one or both servers before proceeding to the next Step.	Normal or Low Capacity Configuration:  Single Server Configuration: 

Server Hostname	Network Element	Appl State	Alm	DB	Reporting Status	Proc
OCUDR-A	Site1_NE_NO	Disabled	Err	Norm	Norm	Man
OCUDR-B	Site1_NE_NO	Disabled	Err	Norm	Norm	Man

Server Hostname	Network Element	Appl State	Alm	DB	Reporting Status	Proc
OCUDR-A	Site1_NE_NO	Disabled	Err	Norm	Norm	Man

Step	Procedure	Result
27. ☐	**UDR VIP:** 1. Using the mouse, select UDR Server A. The line entry is highlighted in sky blue. 2. Click **Restart** (located at the bottom of the page). 3. Click **OK**. A confirmation message (in the banner area) for UDR Server A displays stating: `Successfully restarted application.` **NOTE:** Use the vertical scroll-bar to see the **Restart** button.	Normal Configuration:  Single Server Configuration:   
28. ☐	**UDR VIP:** Verify that the Appl State shows Enabled and that the DB, Reporting Status and Proc status columns all show Norm for UDR Server A before proceeding to the next Step.	 **NOTE:** If you want to refresh the Server status screen before the default setting (15 to 30 seconds), this can be done by reselecting the **Status & Manage → Server** option from the Main menu.
29. ☐	**UDR VIP:** Restart UDR Server B.	**NOTE:** Do not perform this step for single server installations. Repeat steps 27 and 28 to restart UDR Server B.

Step	Procedure	Result
30. ☐	**UDR VIP:** Verifying the UDR server alarm status	Navigate to **Main Menu → Alarms & Events → View Active** 
31. ☐	**UDR VIP:** Verify that the Event IDs are the only alarms present on the system.	 Seq # | Event ID | Timestamp | Severity | Product | Process | NE | Server | Type | Instance Alarm Text | Additional Info 129 | 19820 | 2015-09-21 15:42:00.187 EDT | MAJOR | CAF | udrbe | NO_UDR_NE | no-b | CAF | UDR-RS-Sh-App Communication Agent Routed Service Unavailable | GN_INFO/WRN ^^ [26801:ComAgentStack.C:2826] 309 | 19820 | 2015-09-21 15:14:54.295 EDT | MAJOR | CAF | udrbe | NO_UDR_NE | no-a | CAF | UDR-RS-Sh-App Communication Agent Routed Service Unavailable | GN_INFO/WRN ^^ [16353:ComAgentStack.C:2826] 266 | 13001 | 2015-09-21 15:14:48.842 EDT | MAJOR | Provisioning | udrprov | NO_UDR_NE | no-a | PROV | REST No Remote RAS Client Connections | GN_NOTENAB/WRN No remote provisioning RAS clients are connected. ^^ [16365... More... 265 | 13027 | 2015-09-21 15:14:47.841 EDT | MAJOR | Provisioning | udrprov | NO_UDR_NE | no-a | PROV | SOAP No Remote XSAS Client Connections | GN_NOTENAB/WRN No remote provisioning XSAS clients are connected. ^^ [1636... More...  Seq # | Event ID | Timestamp | Severity | Product | Process | NE | Server | Type | Instance Alarm Text | Additional Info 45 | 19820 | 2018-04-06 03:22:08.022 EDT | MAJOR | CAF | udrbe | Site1_NE_NO | OCUDR-B | CAF | UDR-RS-Sh-App Communication Agent Routed Service Unavailable | GN_INFO/WRN ^^ [31511:ComAgentStack.C:3025] 79 | 13075 | 2018-04-06 03:20:18.023 EDT | CRITICAL | Provisioning | udrprov | Site1_NE_NO | OCUDR-A | PROV Provisioning Interfaces Disabled | GN_NOTENAB/WRN SOAP and REST interfaces are disabled ^^ [945:ProvControlle... More... 69 | 19820 | 2018-04-06 03:20:13.117 EDT | MAJOR | CAF | udrbe | Site1_NE_NO | OCUDR-A | CAF | UDR-RS-Sh-App Communication Agent Routed Service Unavailable | GN_INFO/WRN ^^ [577:ComAgentStack.C:3025] Verify that only the following Event IDs are the only alarms present: 13075 Provisioning Interfaces Disabled 19820 Communicaton Agent Routed Service Unavailable **NOTE:** It may take a few minutes for residual process alarms to clear.

Step	Procedure	Result
32. ☐	**UDR VIP:** Configuring SNMP for Traps from Individual Servers	Navigate to **Main Menu → Administration → Remote Servers → SNMP Trapping** 
33. ☐	**UDR VIP:** 1. Select **Traps from Individual Servers**. 2. Click **OK** located at thebottom in the center of the screen. 3. Verify that a banner message stating Data committed is received.	
34. ☐	**UDR VIP:** Click **Logout** on the server GUI.	
THIS PROCEDURE HAS BEEN COMPLETED		

6.2 OAM Pairing for DR Sites

During the OAM Pairing procedure, various errors may be seen at different stages of the procedure. While performing a step, ignore errors related to values other than the ones referenced by that step.

The steps in this procedure are for all the DR UDR servers.

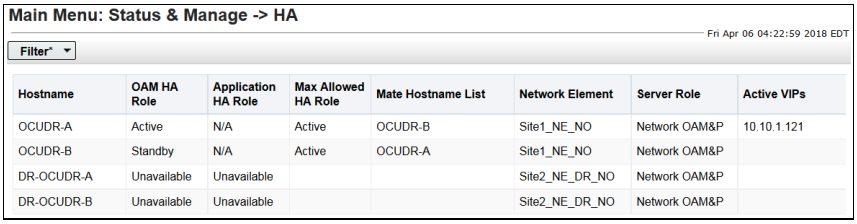
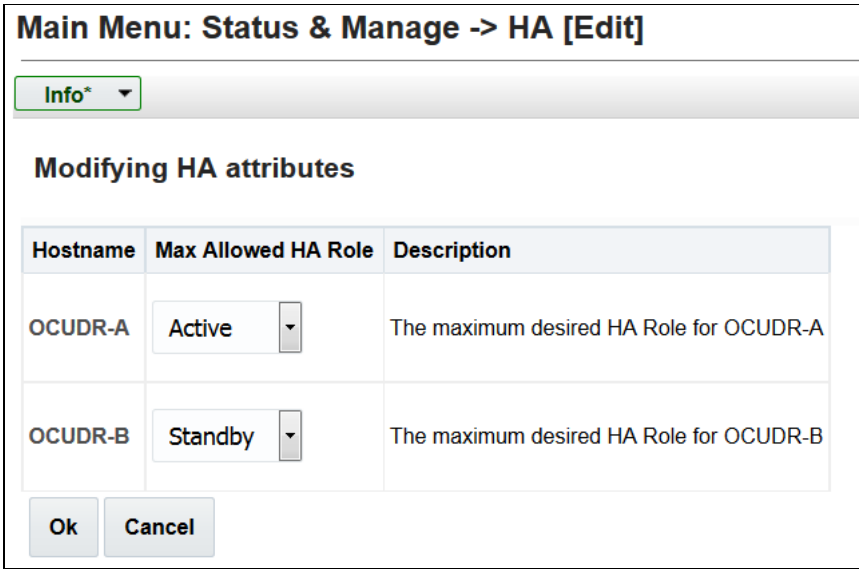
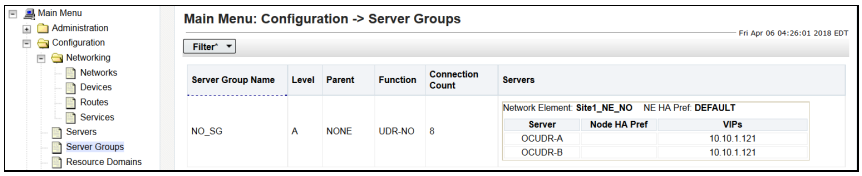
This procedure creates an active, standby pair for the DR UDR Servers.

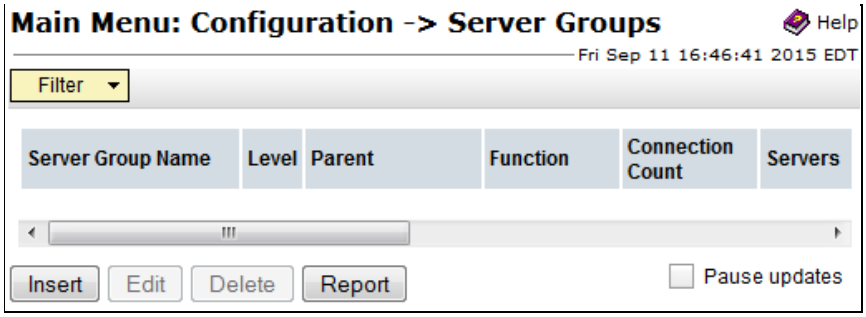
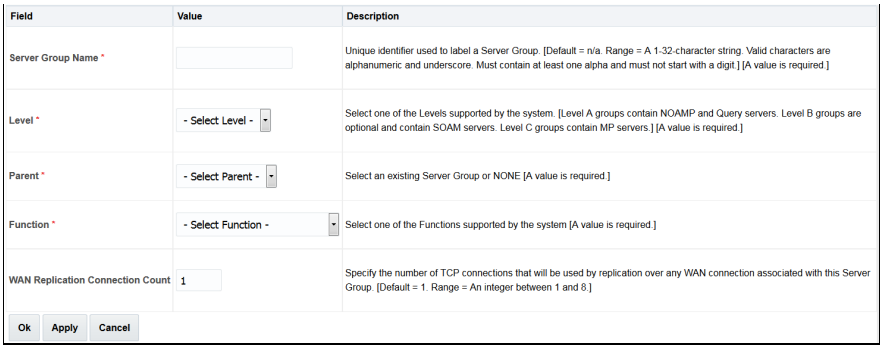
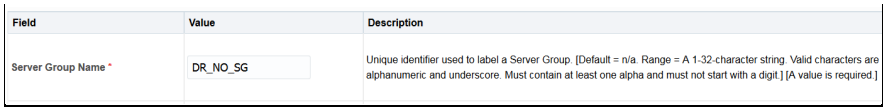
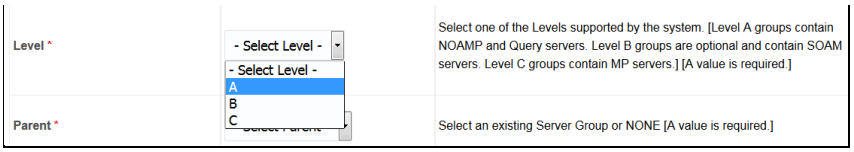
Requirements:

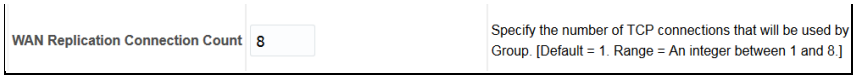
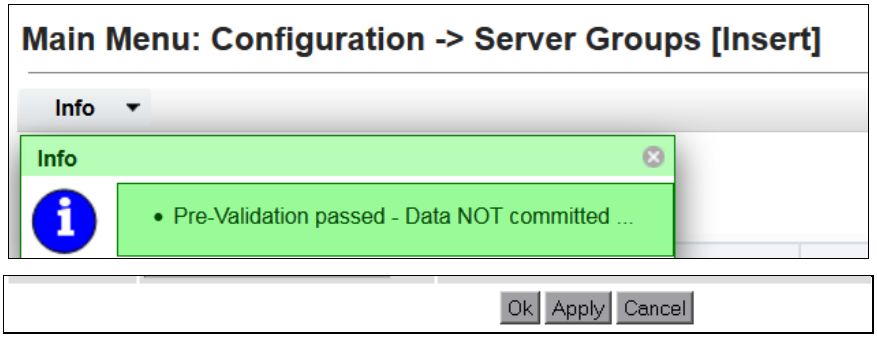
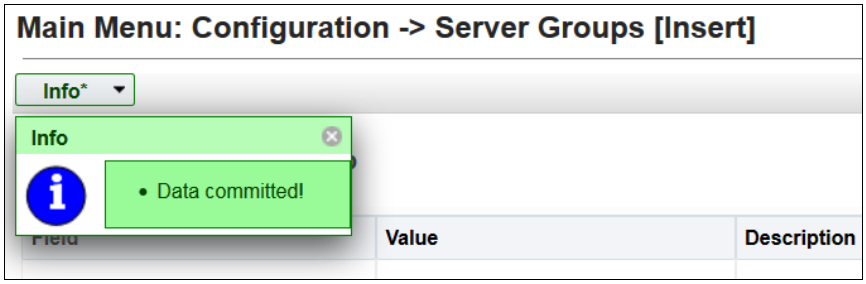
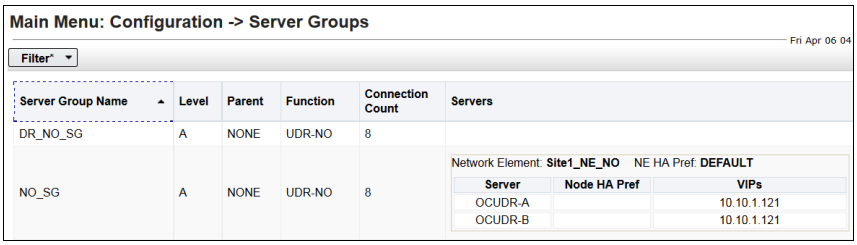
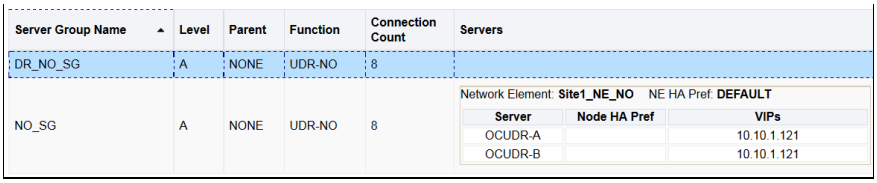
- Chapter 5 Oracle Communications User Data Repository Server Configuration has been completed
- Section 6.1 OAM Pairing for Primary UDR Servers (1st NOAMP site only) has been completed

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

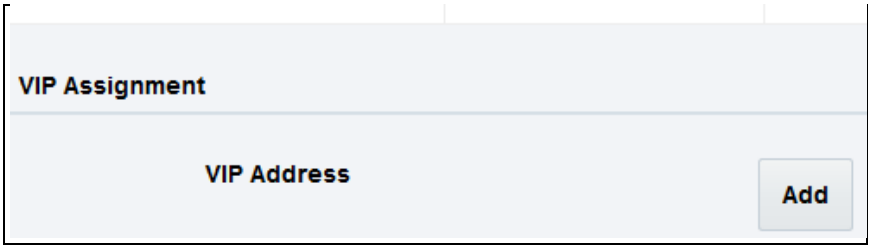
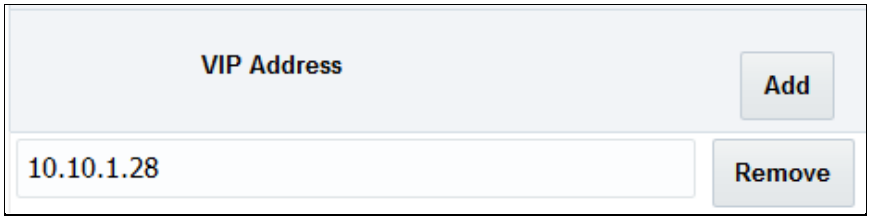
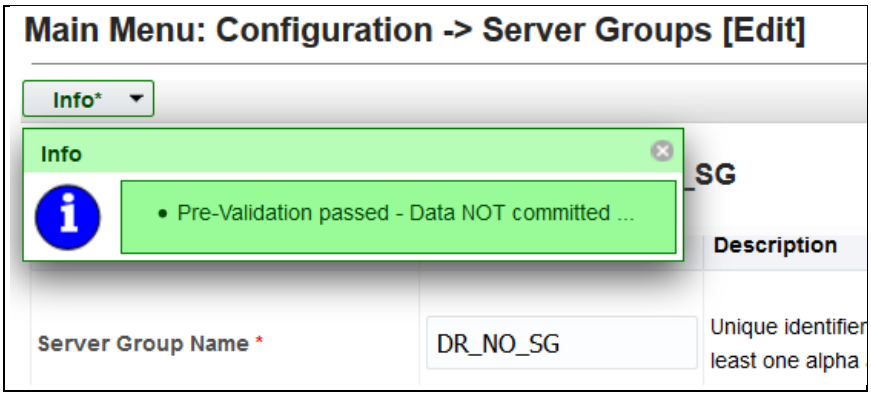
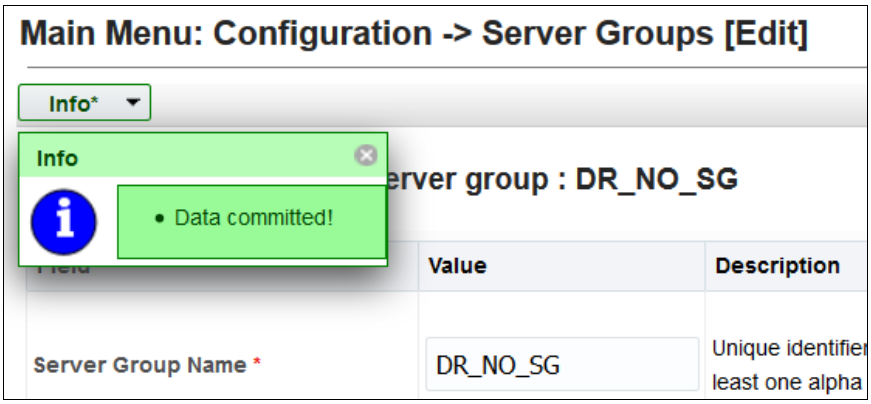
Procedure 10: OAM Pairing for DR Sites

Step	Procedure	Result
1. ☐	**Active UDR VIP:** Launch an approved web browser and connect to the UDR Server A IP address **NOTE:** Click **Continue to this website (not recommended)** if the security certificate warning displays. Login to the GUI using the default user and password.	
2. ☐	**Active UDR VIP:** ***For primary UDR standby server only:*** Change the HA role to forced standby for the server. 1. Navigate to **Main Menu → Status & Manage → HA** 2. Click **Edit** on bottom left 3. Find the row for the primary UDR standby server and change Max Allowed HA Role to Standby.	**NOTE:** Do not perform this step for single server installations.  
3. ☐	**Active UDR VIP:** Navigate to **Main Menu → Configuration → Server Groups**	

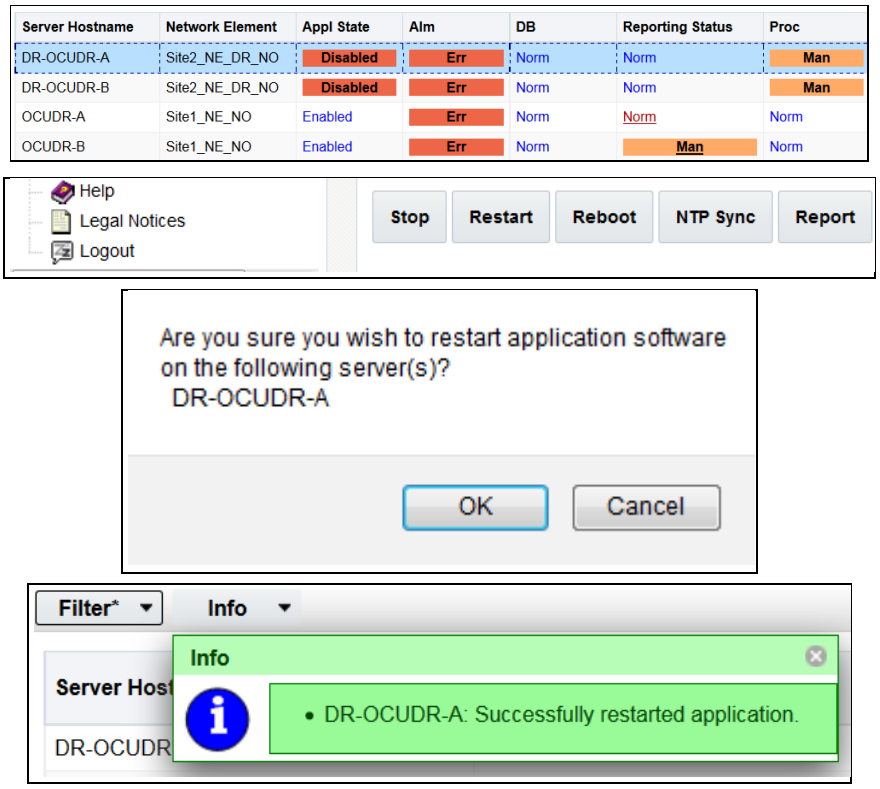
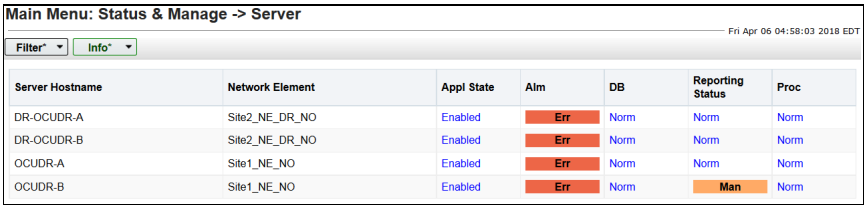
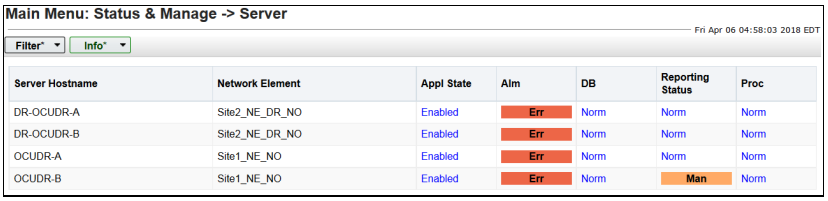
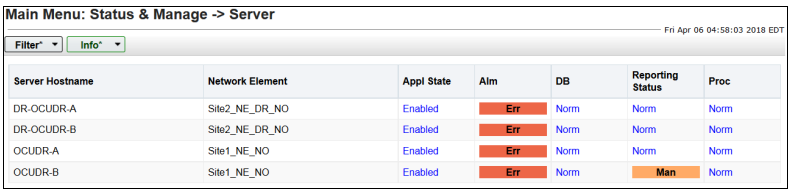
Step	Procedure	Result
4. ☐	**Active UDR VIP:** Click **Insert** located at the bottom left corner of the page. **NOTE:** Use the vertical scroll-bar to see the **Insert** button.	
5. ☐	**Active UDR VIP:** Configuring the DR UDR Server Group The Server Groups [Insert] page opens.	
6. ☐	**Active UDR VIP:** Enter the Server Group Name.	
7. ☐	**Active UDR VIP:** Assign the group Level.	 Use this setting for group level: • For DR UDR server group: select **A** on the Level menu.
8. ☐	**Active UDR VIP:** Assign the Parent.	 • Use this setting for parent: For DR UDR server group: select **NONE** on the Parent menu.
9. ☐	**Active UDR VIP:** Assign the Function.	 • Use this setting for function: For DR UDR server group: select **UDR-NO** on the Function menu.

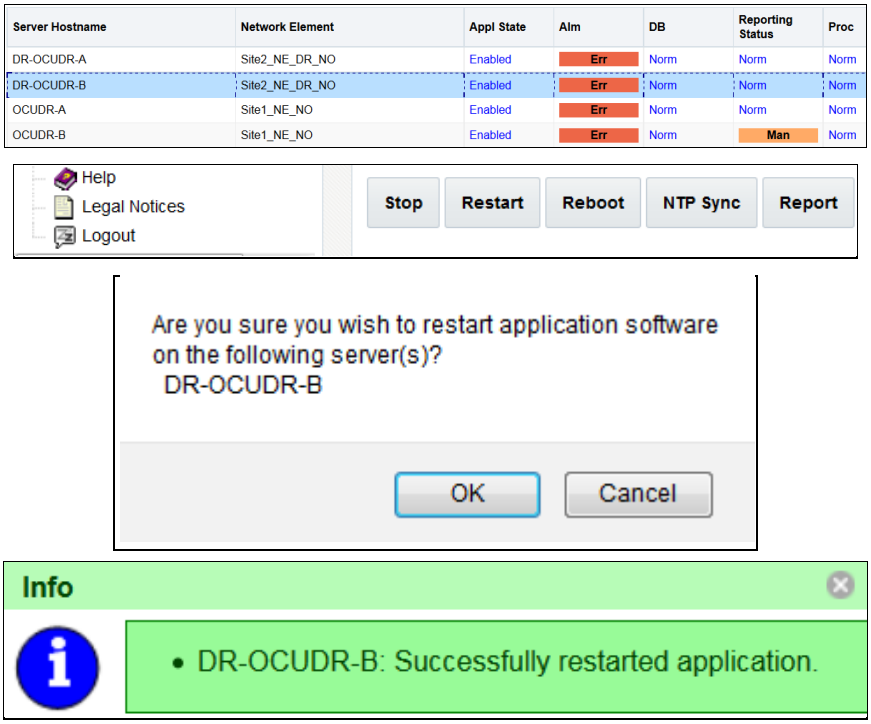
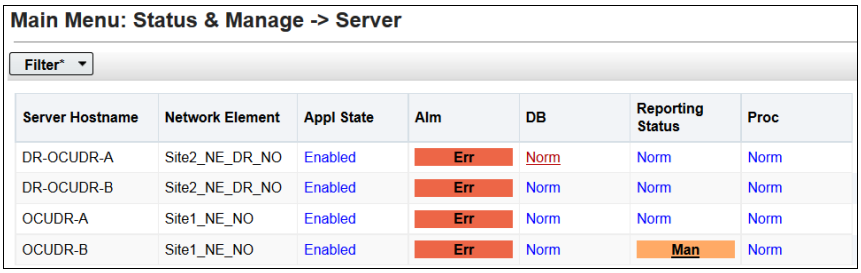
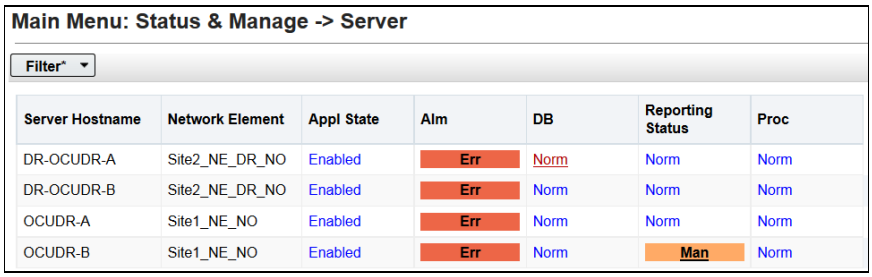
Step	Procedure	Result
10. ☐	**Active UDR VIP:** ***For DR UDR only:*** Enter 8 for the WAN Replication Connection Count.	
11. ☐	**Active UDR VIP:** Click **Info** to see a banner with a message stating that Pre-Validation passed. Click **Apply**	
12. ☐	**Active UDR VIP:** You see a banner with a message stating Data committed.	
13. ☐	**Active UDR VIP:** Navigate to **Main Menu → Configuration → Server Groups** **NOTE:** Server group entry is listed on the Server Groups configuration screen.	
14. ☐	**Active UDR VIP:** 1. Select the Server Group entry applied in Step 7. The line entry is highlighted in sky blue. 2. Click **Edit** (located at the bottom left corner of the page). **NOTE:** Use the vertical scroll-bar to see the Edit button.	

Step	Procedure	Result
15. ☐	**Active UDR VIP:** Select the A server and the B server from the list of servers.	Normal or Low Capacity Configuration: **Site2_NE_DR_NO** ☐ **Prefer Network Element as spare** **Server** / **SG Inclusion** / **Preferred HA Role** DR-OCUDR-A / ☑ Include in SG / ☑ Prefer server as spare DR-OCUDR-B / ☑ Include in SG / ☑ Prefer server as spare
16. ☐	**Active UDR VIP:** ***For DR UDR servers only*** Select the preferred spare options.	**Site2_NE_DR_NO** ☐ **Prefer Network Element as spare** **Server** / **SG Inclusion** / **Preferred HA Role** DR-OCUDR-A / ☑ Include in SG / ☑ Prefer server as spare DR-OCUDR-B / ☑ Include in SG / ☑ Prefer server as spare **NOTE:** DR UDR is not accessible via their VIP unless they become the active UDR. Individual servers in the DR UDR server group are always accessible by their XMI addresses.
17. ☐	**Active UDR VIP:** Click **Info** to see a banner message stating Pre-Validation passed. **Click** Apply**.**	**Main Menu: Configuration -> Server Groups [Edit]** Info Info • Pre-Validation passed - Data NOT committed ... Server Group Name * DR_NO_SG Unique identifier least one alpha Ok Apply Cancel
18. ☐	**Active UDR VIP:** Click **Info** to see a banner message stating Data committed.	**Main Menu: Configuration -> Server Groups [Edit]** Info* Info • Data committed! erver group : DR_NO_SG Value / Description Server Group Name * DR_NO_SG Unique identifier least one alpha

Step	Procedure	Result
19. ☐	**Active UDR VIP:** Click **Add** for the VIP Address.	
20. ☐	**Active UDR VIP:** Enter the VIP Address	
21. ☐	**Active UDR VIP:** Click **Info** to see a banner message stating Pre-Validation passed. **Click** Apply**.**	
22. ☐	**Active UDR VIP:** Click **Info** to see a banner message stating Data committed.	

Step	Procedure	Result
23. ☐	***IMPORTANT:Wait at least 5 minutes before proceeding on to the next Step.***	Now that the servers are paired in a Server Group, they must establish a master/slave relationship for High Availability (HA). It may take several minutes for this process to be completed. **NOTE:** Single Server Configurations do not establish master/slave relationship for High Availability (HA). **Allow a minimum of 5 minutes before continuing to the next Step.**
24. ☐	**Active UDR VIP:** Navigate to **Main Menu → Status & Manage → HA**	**Main Menu: Status & Manage -> HA** Filter* Hostname / OAM HA Role / Application HA Role / Max Allowed HA Role / Mate Hostname List / Network Element / Server Role / Active VIPs OCUDR-A / Active / N/A / Active / OCUDR-B / Site1_NE_NO / Network OAM&P / 10.10.1.121 OCUDR-B / Standby / N/A / Standby / OCUDR-A / Site1_NE_NO / Network OAM&P DR-OCUDR-A / Spare / N/A / Active / DR-OCUDR-B / Site2_NE_DR_NO / Network OAM&P / 10.10.1.28 DR-OCUDR-B / Spare / N/A / Standby / DR-OCUDR-A / Site2_NE_DR_NO / Network OAM&P
25. ☐	**Active UDR VIP:** **NOTE:** DR UDR servers have an OAM MAX HA Role of Spare and no active VIPs	Normal or Low Capacity Configuration: **Main Menu: Status & Manage -> HA** Filter* Hostname / OAM HA Role / Application HA Role / Max Allowed HA Role / Mate Hostname List / Network Element / Server Role / Active VIPs OCUDR-A / Active / N/A / Active / OCUDR-B / Site1_NE_NO / Network OAM&P / 10.10.1.121 OCUDR-B / Standby / N/A / Standby / OCUDR-A / Site1_NE_NO / Network OAM&P DR-OCUDR-A / Spare / N/A / Active / DR-OCUDR-B / Site2_NE_DR_NO / Network OAM&P / 10.10.1.28 DR-OCUDR-B / Spare / N/A / Standby / DR-OCUDR-A / Site2_NE_DR_NO / Network OAM&P
26. ☐	**Active UDR VIP:** Restarting the OAM Server Application Navigate to **Main Menu → Status & Manage → Server**	**Main Menu: Status & Manage -> Server** Filter* Server Hostname / Network Element / Appl State / Alm / DB / Reporting Status / Proc DR-OCUDR-A / Site2_NE_DR_NO / Disabled / Err / Norm / Norm / Man DR-OCUDR-B / Site2_NE_DR_NO / Disabled / Err / Norm / Norm / Man OCUDR-A / Site1_NE_NO / Enabled / Err / Norm / Norm / Norm OCUDR-B / Site1_NE_NO / Enabled / Err / Norm / Man / Norm
27. ☐	**Active UDR VIP:** 1. The A and B servers are listed in the right panel. (Only A for single server installs) 2. Verify that the DB status shows Norm and the Proc status shows Man for both servers before proceeding to the next Step. (Only A server for single server configuration)	Normal or Low Capacity Configuration: Server Hostname / Network Element / Appl State / Alm / DB / Reporting Status / Proc DR-OCUDR-A / Site2_NE_DR_NO / Disabled / Err / Norm / Norm / Man DR-OCUDR-B / Site2_NE_DR_NO / Disabled / Err / Norm / Norm / Man Single Server Configuration:

Step	Procedure	Result
28. ☐	**Active UDR VIP:** 3. UsinXSg the mouse, select Server A. The line entry is highlighted in sky blue. 4. Click **Restart** (located at the bottom of the page). 5. Click **OK**. A confirmation message (in the banner area) for Server A stating: Successfully restarted application. **NOTE:** Use the vertical scroll-bar to see the **Restart** button.	Normal or Low Capacity Configuration: 
29. ☐	**Active UDR VIP:** Navigate to **Main Menu → Status & Manage → Server**	
30. ☐	**Active UDR VIP:** Verify that the Appl State shows Enabled and that the Alm, DB, Reporting Status and Proc columns all show Norm for OAM Server A before proceeding to the next Step.	 **NOTE:** To refresh the server status screen before the default setting (15 to 30 seconds). Select the **Status & Manage → Server** option from the Main menu on the left.
31. ☐	**Active UDR VIP:** Navigate to **Main Menu → Status & Manage → Server**	

Step	Procedure	Result
Perform steps 32 to 35 for multiple server configurations only (not single server).		
32. ☐	**Active UDR VIP:** 1. Using the mouse, select Server B. The line entry is highlighted in sky blue. 2. Click **Restart** (located at the bottom of the page). 3. Click **OK**. A confirmation message displays in the banner area for server B stating: `Successfully restarted application.` **NOTE:** Use the vertical scroll-bar to see the **Restart** button.	
33. ☐	**Active UDR VIP:** Navigate to **Main Menu → Status & Manage → Server**	
34. ☐	**Active UDR VIP:** Verify that the Appl State shows Enabled and that the Alm, DB, Reporting Status and Proc columns all show Norm for Server B before proceeding to the next Step.	 **NOTE:** If you want to refresh the server status screen before the default setting (15 to 30 seconds). Select the **Status & Manage → Server** option from the Main menu on the left.
Repeat all steps for each DR UDR site being installed.		

Step	Procedure	Result
35. ☐	**Active UDR VIP:** ***For primary UDR standby server only:*** Move the server back to Active Navigate to **Main Menu → Status & Manage → HA[Edit]** Find the row for the primary UDR standby server and change Max Allowed HA Role back to Active.	**Modifying HA attributes** Hostname / Max Allowed HA Role / Description OCUDR-A / Active / The maximum desired HA Role for OCUDR-A OCUDR-B / Active / The maximum desired HA Role for OCUDR-B DR-OCUDR-A / Active / The maximum desired HA Role for DR-OCUDR-A DR-OCUDR-B / Active / The maximum desired HA Role for DR-OCUDR-B Ok Cancel
36. ☐	**Active UDR VIP:** Click **Logout** on the server GUI.	Help | Logged in Account guiadmin | Log Out Thu Mar 29 06:02:07 2018 EDT
THIS PROCEDURE HAS BEEN COMPLETED		

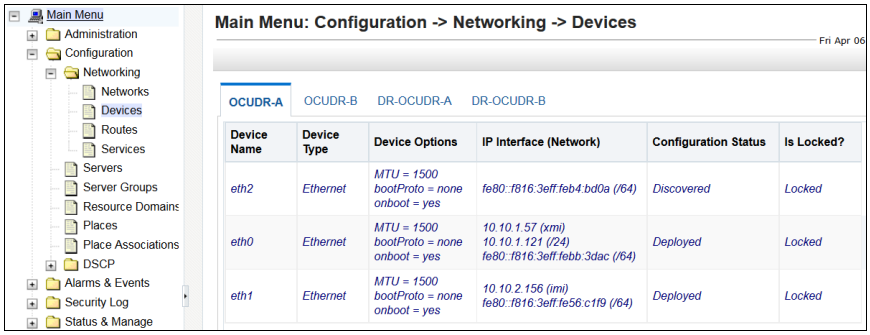
Chapter 7. Application Configuration

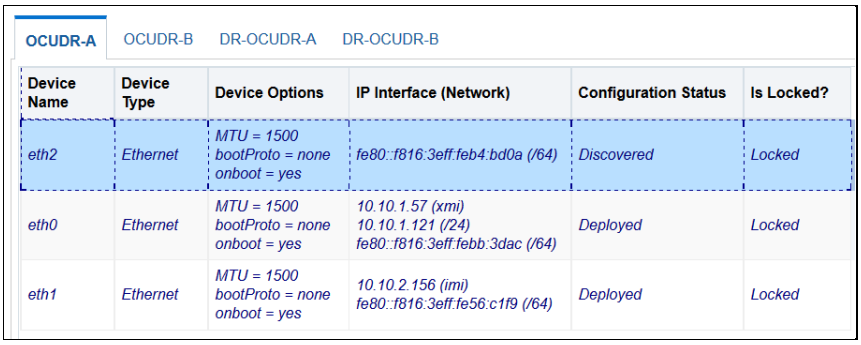
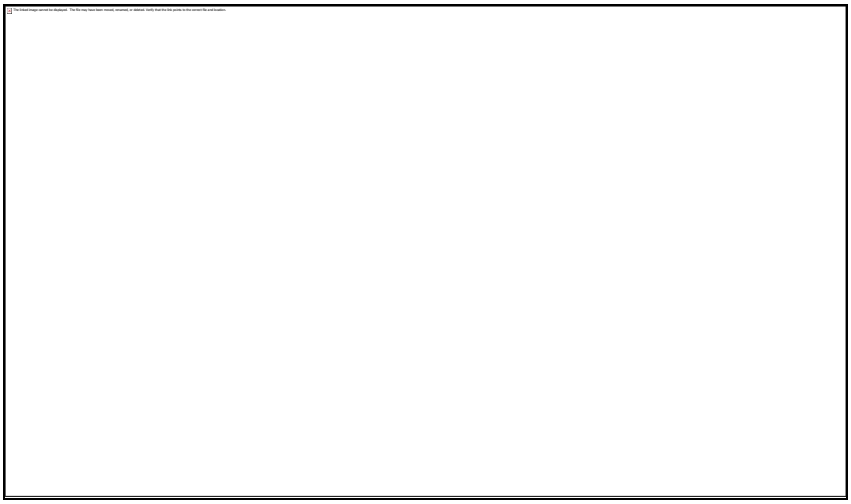
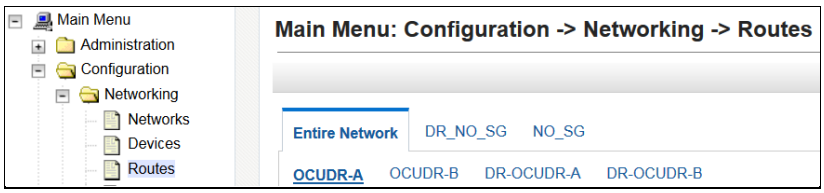
7.1 Configure UDR Signaling Routes (All NOAM Sites)

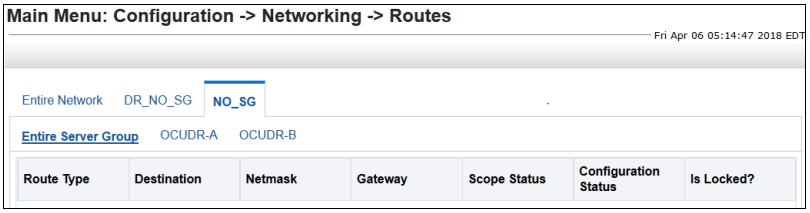
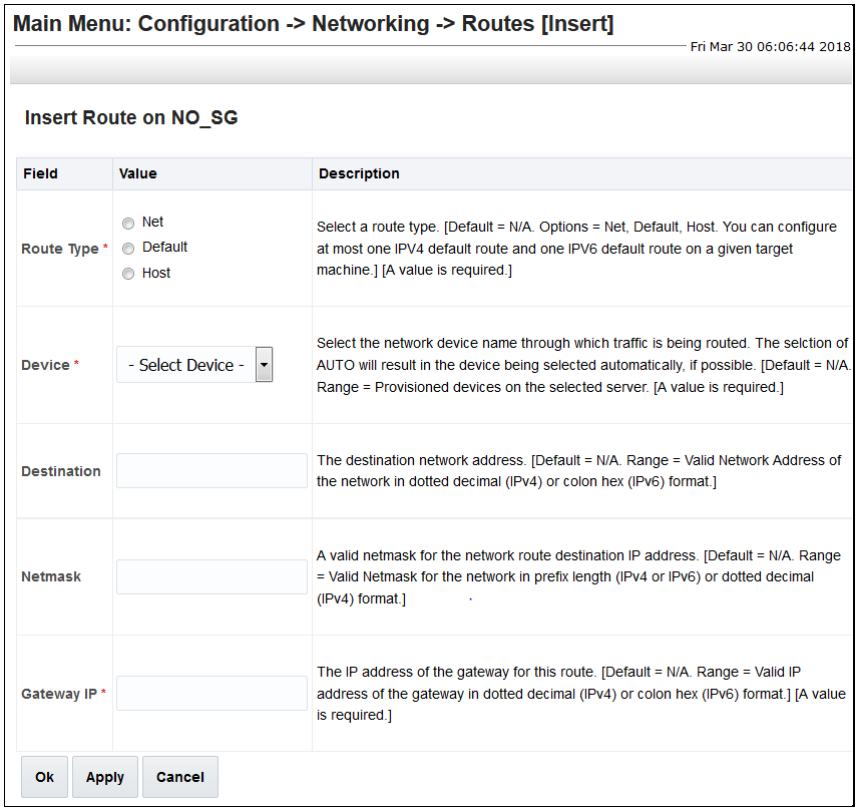
This procedure configures the XSI signaling route for the UDR and DR UDR Server Groups.

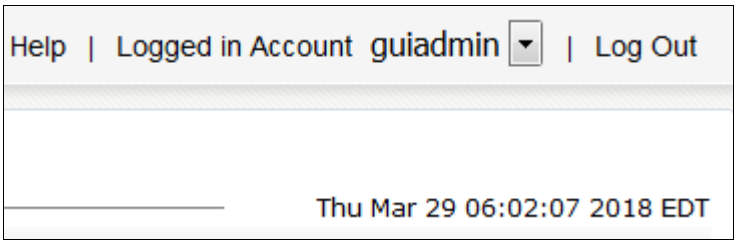
Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure 11: Configure UDR Signaling Routes

Step	Procedure	Result
1. ☐	Active UDR VIP:Launch an approved web browser and connect to the UDR Server A IP address **NOTE:** Click **Continue to this website (not recommended)** if the security certificate warning displays. Login to the GUI using the default user and password.	
2. ☐	**Active UDR VIP** Navigate to **Main Menu → Configuration → Networking → Devices**	 Mark the check box as addition is completed for each server. ☐ UDR-A (XSI-1) ☐ UDR-B (XSI-1)

Step	Procedure	Result
3. ☐	**Active UDR VIP:** Select the xsi device for the UDR	Select the **UDR** tab. Select the XSI-1 device (recorded in B.3 Step 3 or C.7 Step 5).  OCUDR-A OCUDR-B DR-OCUDR-A DR-OCUDR-B Device Name / Device Type / Device Options / IP Interface (Network) / Configuration Status / Is Locked? eth2 / Ethernet / MTU = 1500 bootProto = none onboot = yes / fe80::f816:3eff:feb4:bd0a (/64) / Discovered / Locked eth0 / Ethernet / MTU = 1500 bootProto = none onboot = yes / 10.10.1.57 (xmi) 10.10.1.121 (/24) fe80::f816:3eff:febb:3dac (/64) / Deployed / Locked eth1 / Ethernet / MTU = 1500 bootProto = none onboot = yes / 10.10.2.156 (imi) fe80::f816:3eff:fe56:c1f9 (/64) / Deployed / Locked Mark the check box as addition is completed for each server. ☐ UDR-A (XSI-1) ☐ UDR-B (XSI-1)
4. ☐	**Active UDR VIP** Edit the xsi device for the UDR	Click **Take Ownership**. Take Ownership Mark the check box as addition is completed for each server. ☐ UDR-A (XSI-1) ☐ UDR-B (XSI-1)
5. ☐	**Active UDR VIP** 1. Add the xsi device for the UDR 2. For Start On Boot, select **Enable** 3. Click **OK** to apply changes.	
6. ☐	**Active UDR VIP:** Repeat as required.	Repeat Steps 3 throuhg 5 for each UDR and its Signaling networks. **NOTE:** Steps 7 throiugh 9 are only needed for geo-redundant systems.
7. ☐	**Active UDR VIP:** Navigate to **Main Menu → Configuration → Networking → Routes**	 Main Menu Administration Configuration Networking Networks Devices Routes Main Menu: Configuration -> Networking -> Routes Entire Network DR_NO_SG NO_SG OCUDR-A OCUDR-B DR-OCUDR-A DR-OCUDR-B

Step	Procedure	Result
8. ☐	**Active UDR VIP:** Insert a route for the UDR or DR UDR Server group.	1. Select the **Server Group** tab on the top line. 2. Click **Entire Server Group** on the line below Server Group line.  3. Click **Insert**
9. ☐	**Active UDR VIP:** Add signaling route	 1. Set Route Type to Net 2. Set Device to XSI-1 device (recorded in B.3 Step 3 or C.7 Step 5). 3. Enter Destination: This is the network address of the remote MP server group that connects to Oracle Communications User Data Repository UDR for ComAgent service. 4. Enter Netmask for the remote network. 5. Enter Gateway IP: This is the signaling network gateway for Oracle Communications User Data Repository. 6. Click **Apply.**

Step	Procedure	Result
10. ☐	**NOTES**: Destination would be DR Site XSI1 Address if configuring Primary Site and vice-versa. Netmask would be DR Site XSI1 Address if configuring Primary Site and vice-versa. Gateway IP would be Primary Site XSI1 Gateway if configuring Primary Site and vice-versa.	
11. ☐	**Active UDR VIP:** Click **Logout** on the server GUI.	
THIS PROCEDURE HAS BEEN COMPLETED		

7.2 Configure Services on Signaling Network

This procedure configures ComAgent communication between NOAMP and MP to use Signaling Network. This procedure also configures dual path HA heartbeat to use the XSI network.

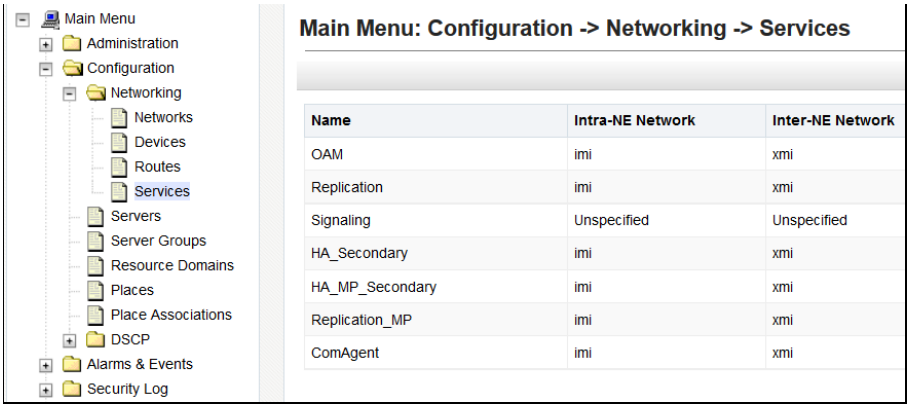
Requirements:

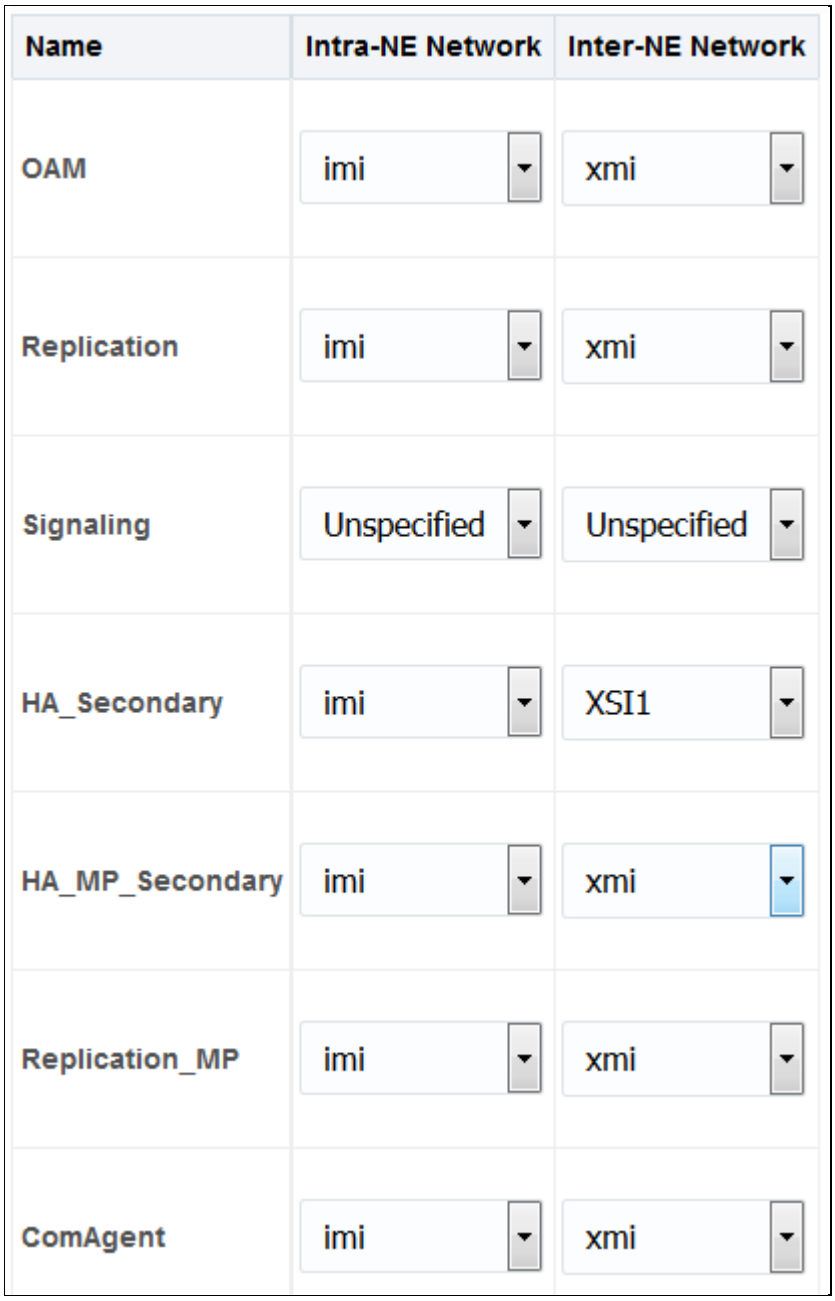
- Section 7.1 Configure UDR Signaling Routes (All NOAM Sites) has been completed

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure 12: Configure Services on Signaling Network

Step	Procedure	Result
1. ☐	**Active UDR VIP:** Launch an approved web browser and connect to the UDR Server A IP address **NOTE:** Click **Continue to this website (not recommended)** if the security certificate warning displays. Login to the GUI using the default user and password.	

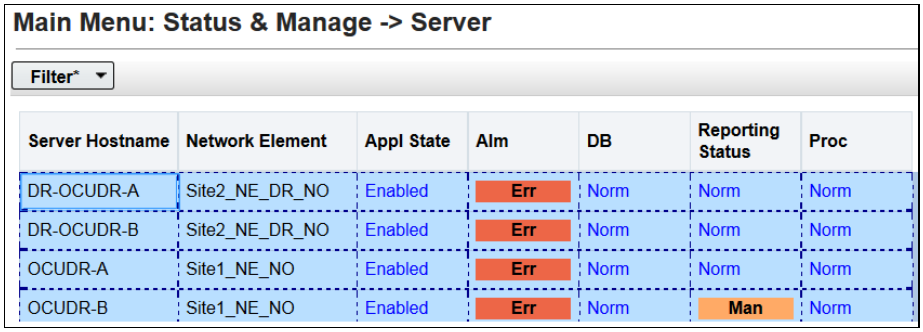
Step	Procedure	Result
2. ☐	**Active UDR VIP:** Navigate to **Main Menu → Configuration → Services**	 Name | Intra-NE Network | Inter-NE Network OAM | imi | xmi Replication | imi | xmi Signaling | Unspecified | Unspecified HA_Secondary | imi | xmi HA_MP_Secondary | imi | xmi Replication_MP | imi | xmi ComAgent | imi | xmi

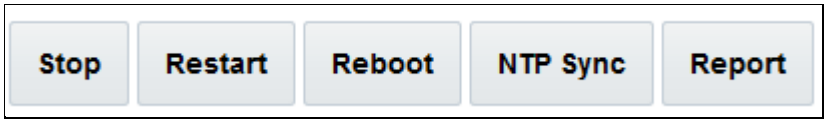
Step	Procedure	Result
3. ☐	**Active UDR VIP:** 1. Set two services values: **Inter-NE HA_Secondary → XSI1** **Inter-NE ComAgent → XSI1** 2. Click **Apply**. 3. Click **OK**.	 UDR Servers must be restarted.

Name	Intra-NE Network	Inter-NE Network
OAM	imi	xmi
Replication	imi	xmi
Signaling	Unspecified	Unspecified
HA_Secondary	imi	XSI1
HA_MP_Secondary	imi	xmi
Replication_MP	imi	xmi
ComAgent	imi	xmi

<table>
<tr><th>Step</th><th>Procedure</th><th>Result</th></tr>
<tr><td>4. ☐</td><td>Active UDR VIP:
The Services configuration screen opens.</td><td>
<table>
<tr><th>Name</th><th>Intra-NE Network</th><th>Inter-NE Network</th></tr>
<tr><td>OAM</td><td>imi</td><td>xmi</td></tr>
<tr><td>Replication</td><td>imi</td><td>xmi</td></tr>
<tr><td>Signaling</td><td>Unspecified</td><td>Unspecified</td></tr>
<tr><td>HA_Secondary</td><td>imi</td><td>XSI1</td></tr>
<tr><td>HA_MP_Secondary</td><td>imi</td><td>xmi</td></tr>
<tr><td>Replication_MP</td><td>imi</td><td>xmi</td></tr>
<tr><td>ComAgent</td><td>imi</td><td>xmi</td></tr>
</table>
</td></tr>
<tr><td>5. ☐</td><td>Reboot all UDR Servers</td><td>
Reboot all UDR servers either by

On the GUI for the active UDR, go to Status & Manage → Server screen and click Reboot.





On the terminal of each server with the reboot command:

<pre>$ sudo reboot</pre>
NOTE: Perform this on all UDRs.
</td></tr>
<tr><td colspan="3">THIS PROCEDURE HAS BEEN COMPLETED</td></tr>
</table>

7.3 Accept Installation

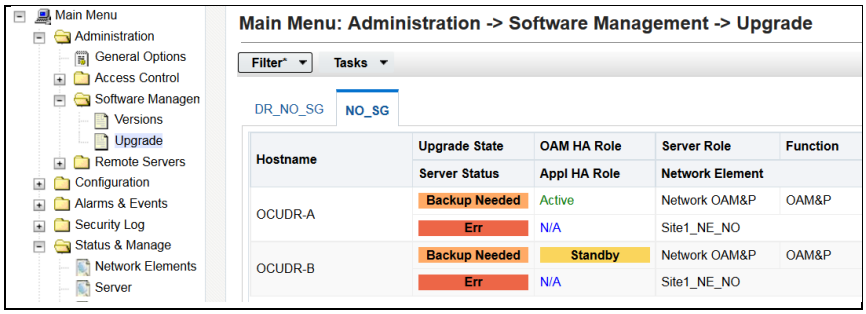
This procedure accepts the installation/upgrade on any servers that have not been accepted. Depending on the manner of installtion, there may not be any servers that require acceptance at this point in installation.

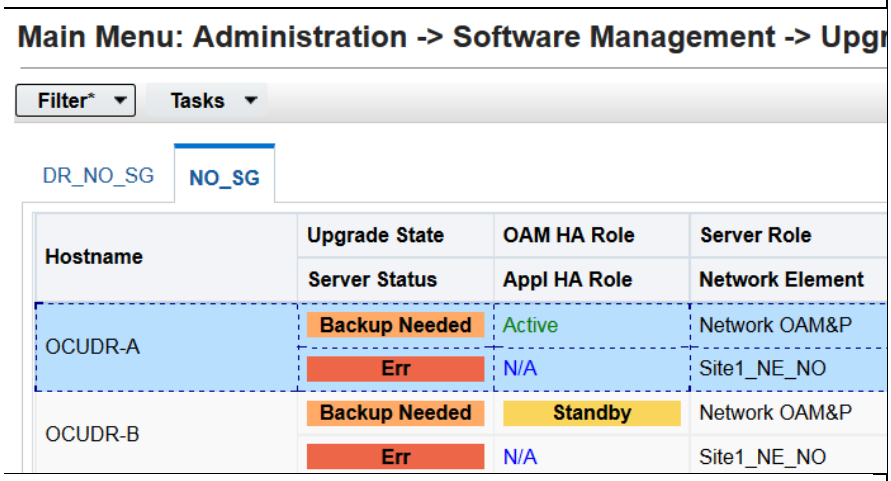
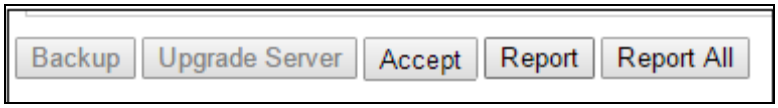
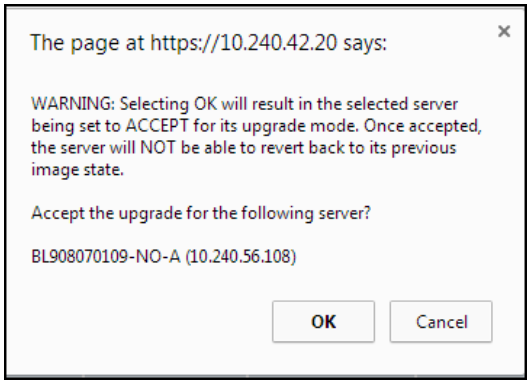
The upgrade needs either to be accepted or rejected before any subsequent upgrades are performed.

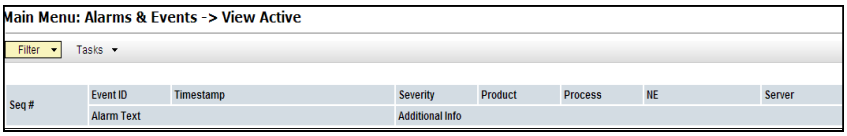
Alarm 32532 (Server Upgrade Pending Accept/Reject) displays for each server until one of these two actions (accept or reject) is performed.

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure 13: Accept Installation

Step	Procedure	Result
1. ☐	**Active UDR VIP:** Launch an approved web browser and connect to the UDR Server A IP address **NOTE:** Click **Continue to this website (not recommended)** if the security certificate warning displays. Login to the GUI using the default user and password.	
2. ☐	**Active UDR VIP:** Navigate to **Main Menu → Administration → Software Management → Upgrade**	

Step	Procedure	Result
3. ☐	**Active UDR VIP (GUI):** Accept upgrade for selected servers.	Accept upgrade of selected servers: 1. Select the server where the upgrade has not been accepted. 2. Click **Accept.**   A confirmation dialog warns that after the upgrade is accepted, the servers are not able to revert back to their previous image states.  3. Click **OK** The Upgrade Administration screen re-displays. An Informational message indicates the servers where the upgrade was accepted.
4. ☐	**Active UDR VIP:** Accept upgrade of the rest of the system	1. Accept upgrade on all remaining servers in the system: 2. Repeat all sub-steps of step 3 of this procedure on remaining servers until the upgrade of all servers in the User Data Repository system has been accepted. Note: As the upgrade is accepted on each server the corresponding Alarm ID 32532 (Server Upgrade Pending Accept/Reject) is removed.

Step	Procedure	Result
5. ☐	**Active UDR VIP:** Verify accept	Check that alarms are removed: 1. Navigate to **Alarms & Events > View Active**  2. Verify that Alarm ID 32532 (Server Upgrade Pending Accept/Reject) is not displayed under active alarms on User Data Repository system
THIS PROCEDURE HAS BEEN COMPLETED		

Configuration of UDR for EIR, FABR, MNP and SFAPP features

After finishing installation and configuration of UDR, we need to configure the UDR for below feature by executing the loader at Active NOAMP server.

Feature	Loader Path	Enabling the feature
EIR	/usr/TKLC/udr/prod/maint/loaders/upgrade/enableEIRSec	Execute the loader to enable the EIR feature.
FABR	/usr/TKLC/udr/prod/maint/loaders/upgrade/enableFABRSec	Execute the loader to enable the FABR feature.
MNP	/usr/TKLC/udr/prod/maint/loaders/upgrade/enablevMNPSec	Execute the loader to enable the MNP feature.
SFAPP	/usr/TKLC/udr/prod/maint/loaders/upgrade/enableSecurityApp	Execute the loader to enable the SFAPP feature.

Appendix A. VMWare vSphere Environment setup

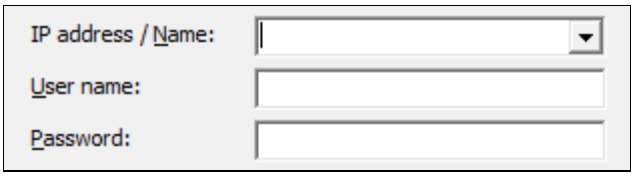
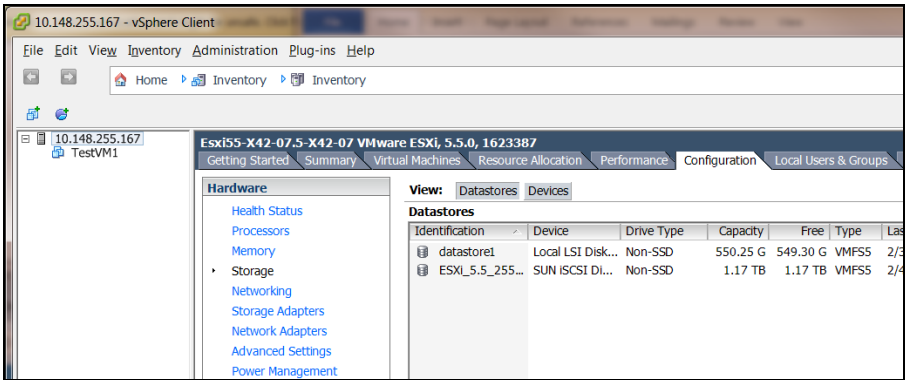
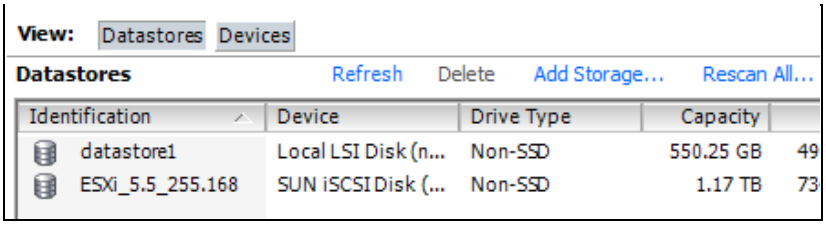
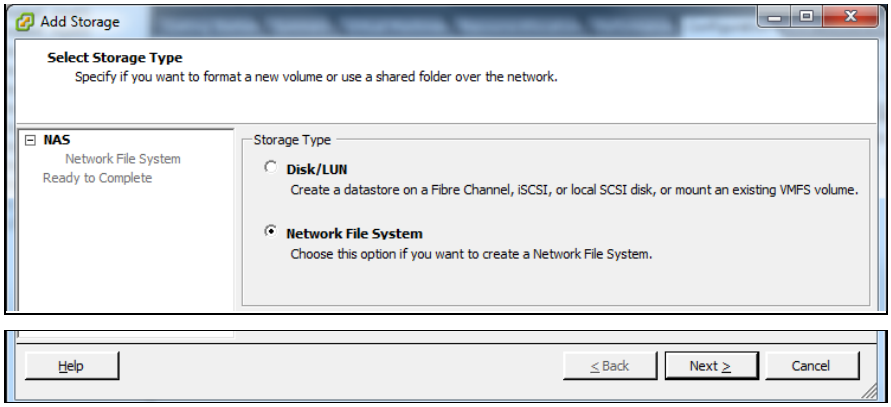
A.1 HOST DATASTORE CONFIGURATION USING VSPHERE

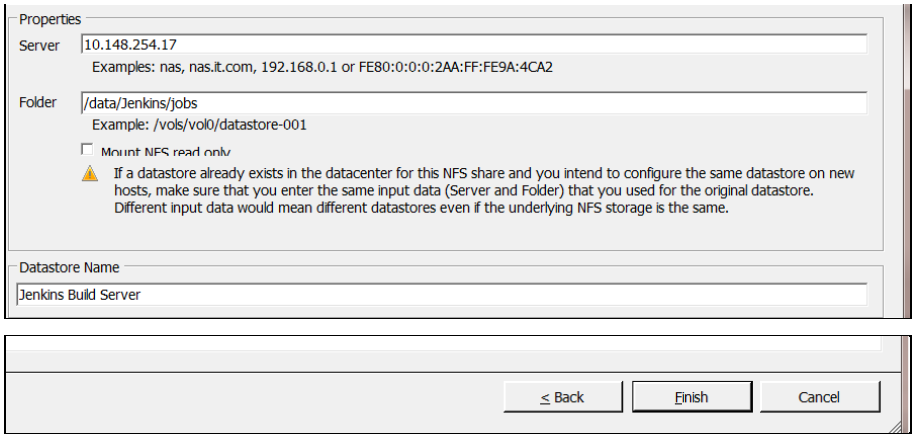
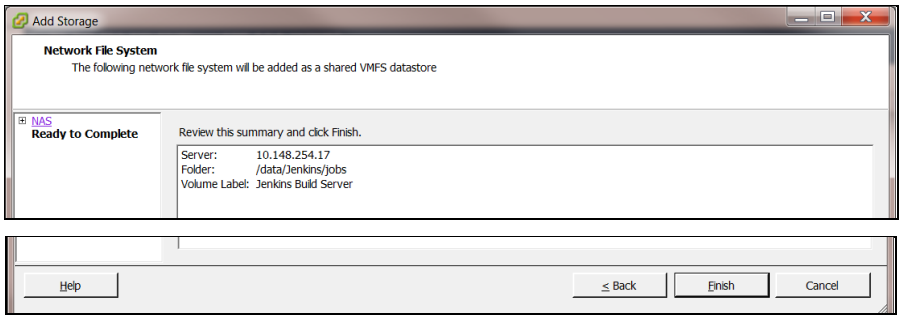
This procedure is performed to configure a datastore on the Host so that the appropriate storage is available for Oracle Communications User Data Repository component VMs. Steps and screenshots are taken from vSphere Client.

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

If this procedure fails, contact My Oracle Support, and ask for assistance.

Procedure14: Host Datastore Configuration with vSphere

Step	Procedure	Details
1. ☐	Log into the Vmware client	
2. ☐	**VMware client:** 1. Select the Host on the left tree menu 2. Click the **Configuration** tab on right **3.** Click **Storage** under Hardware menu	
3. ☐	**VMware client:** Click **Add Storage**	
4. ☐	**VMware client:** 1. Select Network File System storage type 2. Click **Next**	

Step	Procedure	Details
5. ☐	**VMware client:** 1. Enter a Server IP, Folder, and Datastore Name in the fields according to the resource availability in your VMware host environment 2. Click **Next**	
6. ☐	**VMware client:** 1. Review the Datastore summary **2.** Click **Finish**	
THIS PROCEDURE HAS BEEN COMPLETED		

A.2 HOST NETWORKING CONFIGURATION USING VSPHERE

The following procedure is performed to configure the recommended Networking on the Host so that the appropriate vNICs are available for Oracle Communications User Data Repository component VMs. Steps and screenshots are taken from vSphere Client.

To view the available Networks on the Host, select the **Summary** tab. In the example below several OAM and Signaling Networks have been configured. Each of these is associated with vSwitch on the Host and physical ethernet.

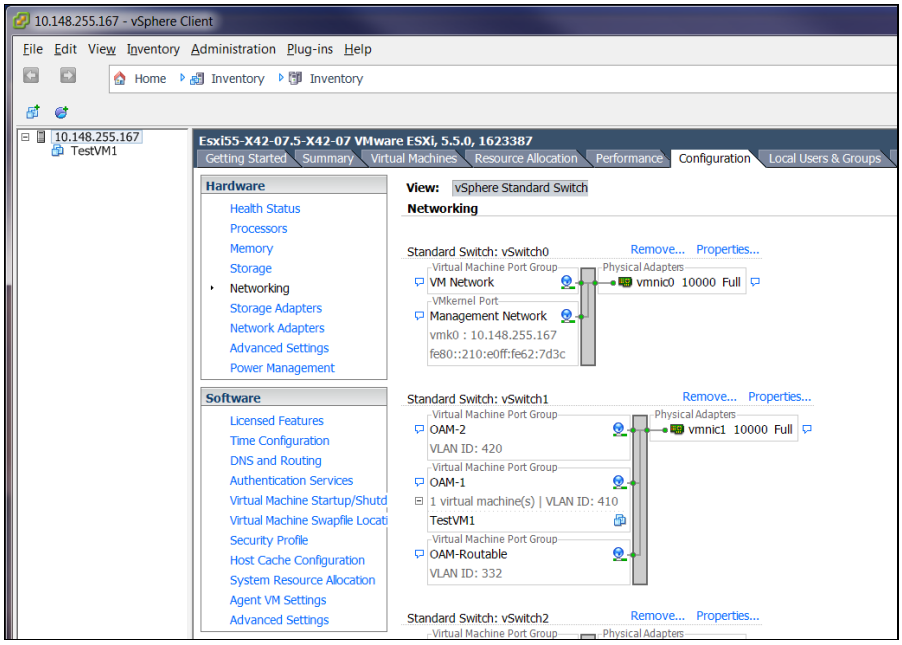
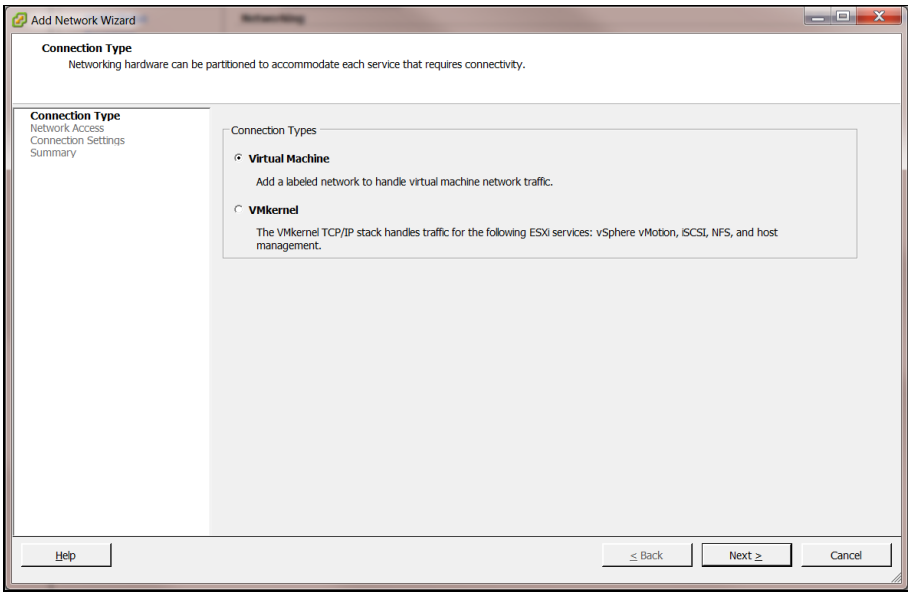
Oracle Communications User Data Repository VMs can be associated with up to 5 vLAN Networks. All 5 vNICs must be created and configured in order to be available for the Guest. The expected vNICs correspond the the following dedicated interfaces of the Oracle Communications User Data Repository and so the recommendation is the label them similarly:

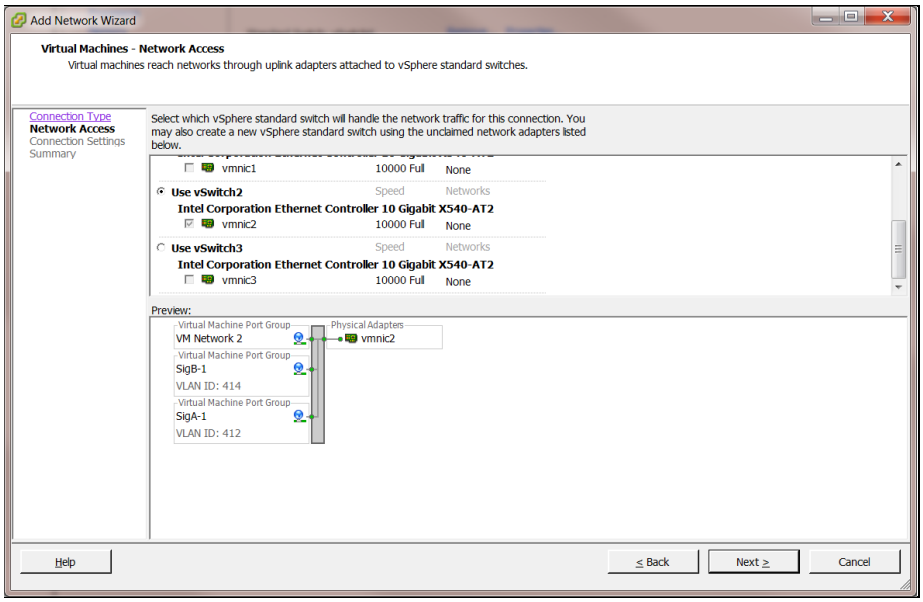
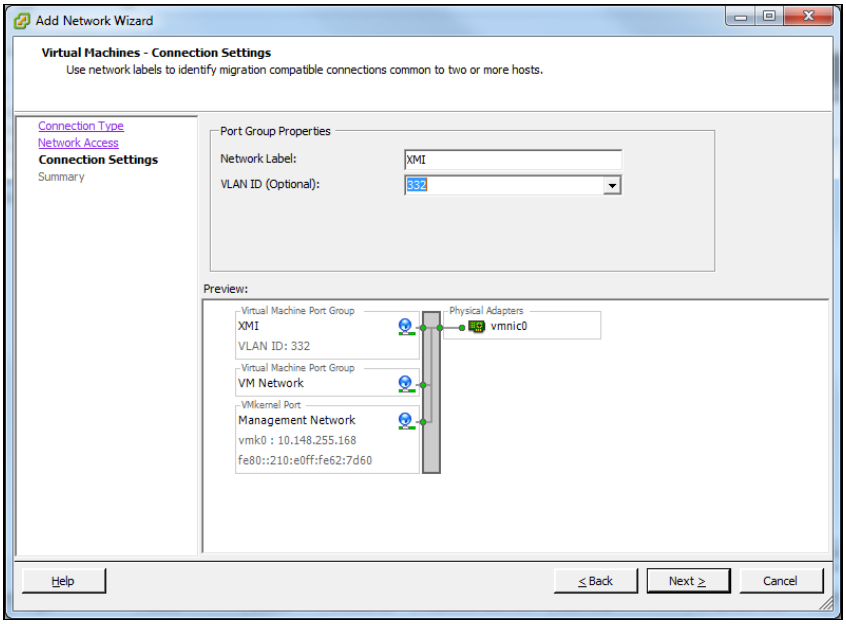
- XMI
  OAM Management Interface for the application
- XSI1
  Signaling Interface
- XSI2
  Signaling Interface
- IMI
  Replication Interface
- Guest Management
  Reserved for Guest management activities.

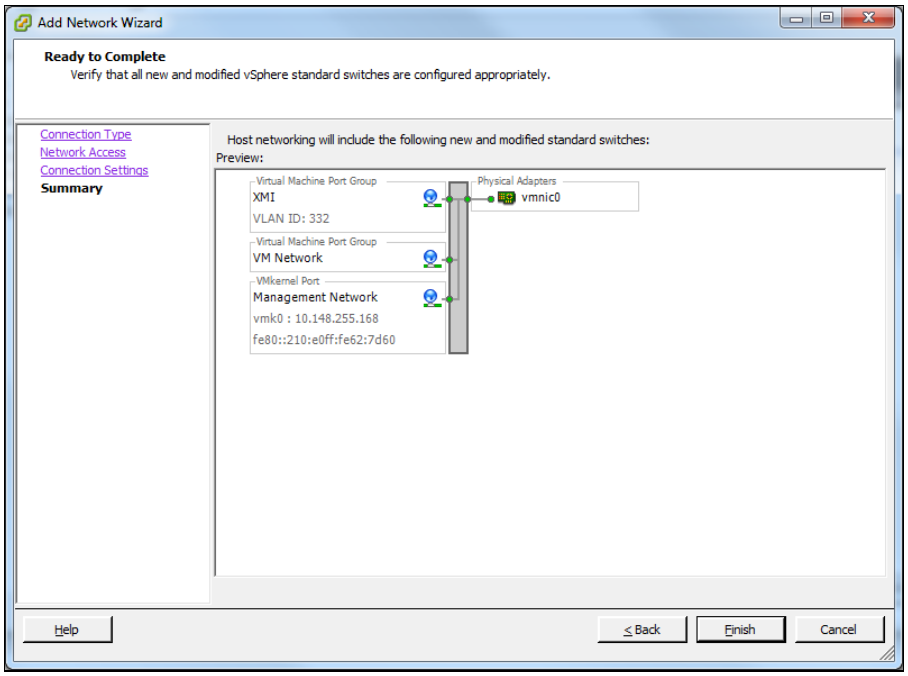
Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

If this procedure fails, contact My Oracle Support, and ask for assistance.

Procedure15: Host Networking Configuration with vSphere

Step	Procedure	Details
7. ☐	Log into the Vmware client	
8. ☐	**VMware client:** 1. Select the **Host** on the left tree menu 2. Click **Configuration** tab on right 3. Click **Networking** under Hardware menu	
9. ☐	**VMware client:** 1. Select **Add Networking** from top 2. Select connection type **Virtual Machine** and click **Next**	

Step	Procedure	Details
10. ☐	**VMware client:** Select appropriate vSwitch type based on the Host hardware and click **Next**	
11. ☐	**VMware client:** Label the Network, enter its VLAN ID, click **Next**	 **NOTE:** It is recommended that the name reflect how the Network is used or referenced from in the Guest, ie XMI, IMI, XSI1, and so on.

Step	Procedure	Details
12. ☐	**VMware client:** Review values and click **Finish**	
13. ☐	Repeat this procedure for each network	Repeat this procedure for each network type that is supported by this VMWare host: ☐ XMI ☐ IMI ☐ XSI-1 ☐ XSI-2 (optional)
THIS PROCEDURE HAS BEEN COMPLETED		

Appendix B. VMware vSphere Oracle Communications User Data Repository Deployment

B.1 CREATE GUESTS FROM OVA

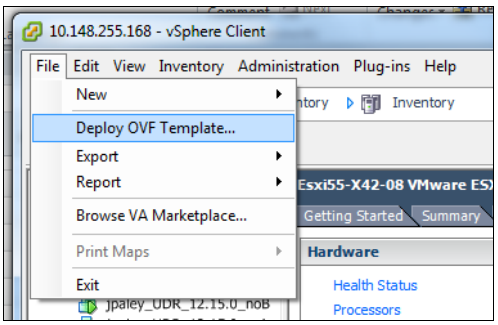
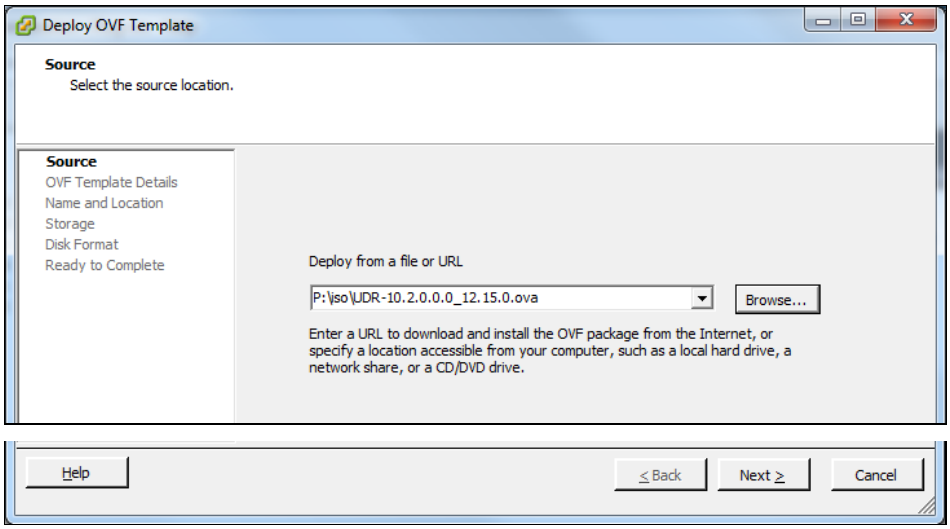
This procedure creates Oracle Communications User Data Repository virtual machines (guests) from OVA.

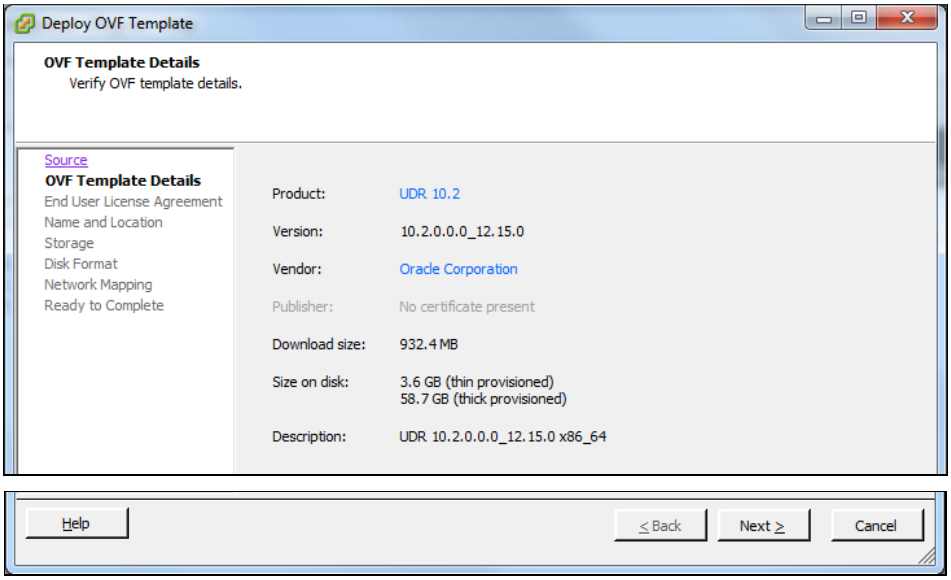
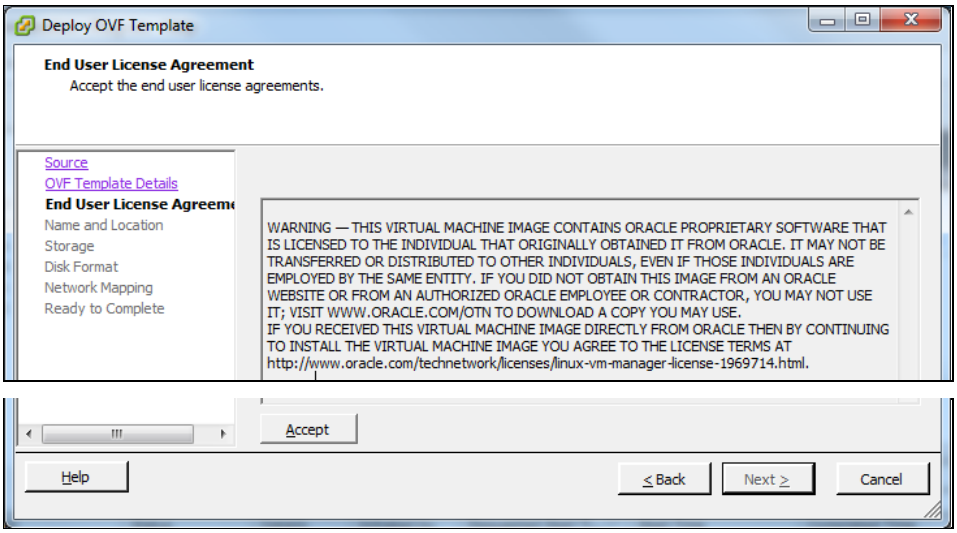
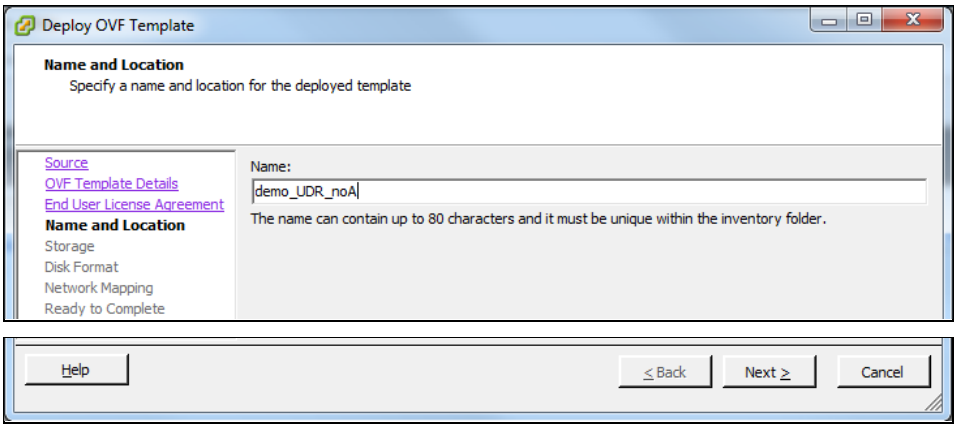
Needed material:

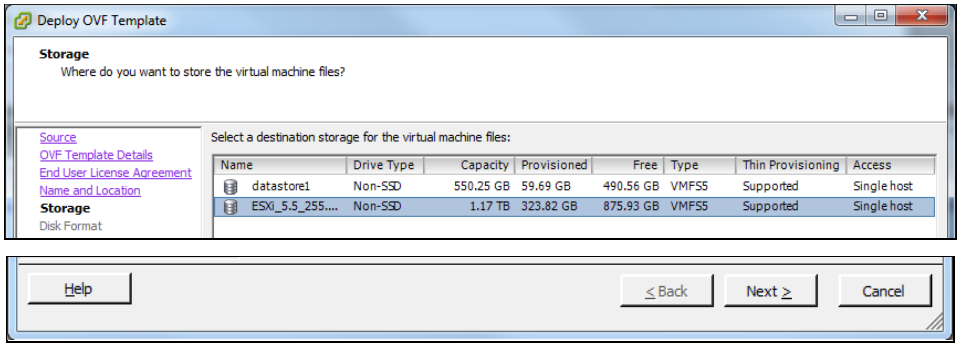
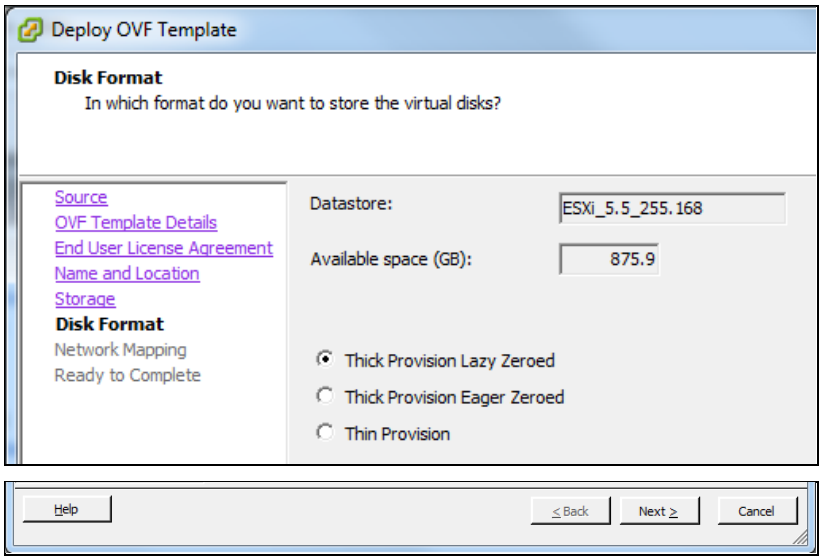
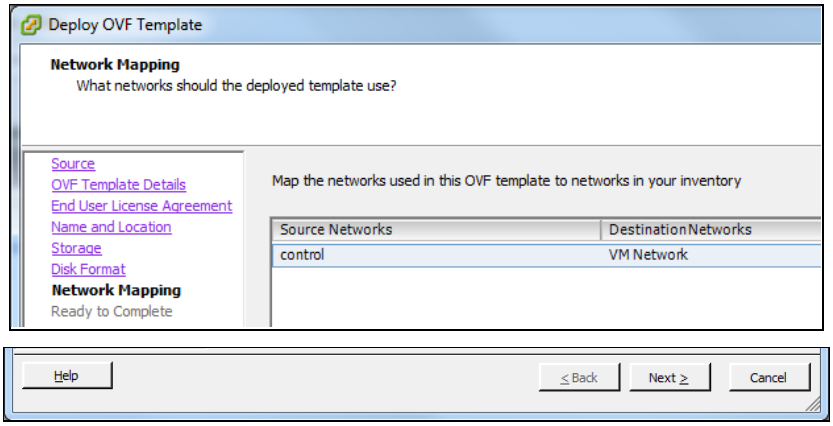
- Oracle Communications User Data Repository OVA

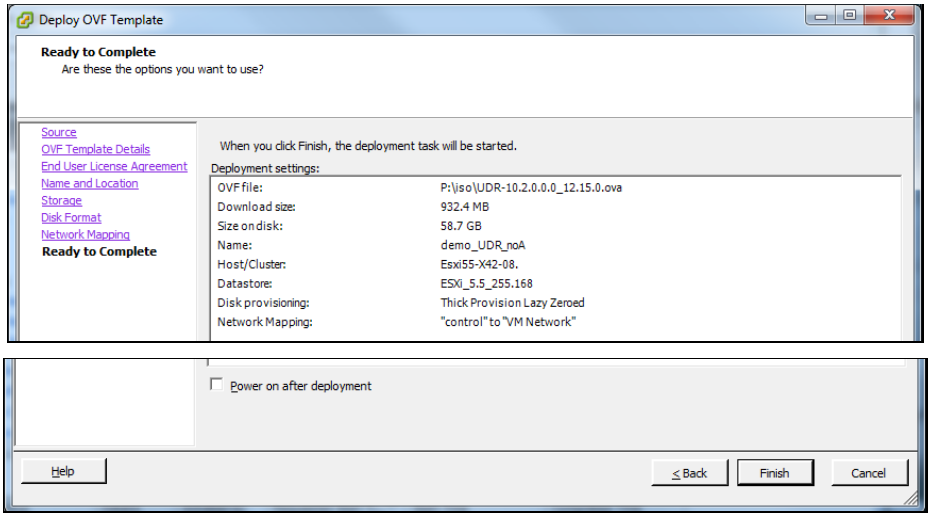
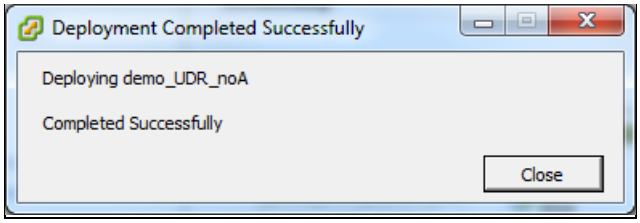
Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure16: Deploy Oracle Communications User Data Repository OVA

Step	Procedure	Result
1. ☐	Log into the VMware client	
2. ☐	**VMware client:** Navigate to **File → Deploy OVF Template**	
3. ☐	**VMware client:** 1. Click **Browse** and select the OVA file **2.** Click **Next**.	

Step	Procedure	Result
4. ☐	**VMware client:** Details screen displays, click **Next**	
5. ☐	**VMware client:** Accept End User License Agreement by clicking **Accept** then **Next**	
6. ☐	**VMware client:** Name the virtual machine and click **Next**	

Step	Procedure	Result
7. ☐	**VMware client:** Select **destination storage** for the virtual machine from the list of available data stores then click **Next**.	 **NOTE:** For an upgradeable deployment, ensure the data store has enough free capacity to support the type of VM according to the profile selected from Oracle Communications User Data Repository Installation and Configuration Guide, E72453, latest revision.
8. ☐	**VMware client:** Select **Thick Provision Lazy Zeroed** and click **Next**	
9. ☐	VMware client: Click **Next**	

Step	Procedure	Result
10. ☐	**VMware client:** Review deployment settings and click **Finish**	
11. ☐	**VMware client:** After a wait a deployment status message is displayed. Click **Close**.	
THIS PROCEDURE HAS BEEN COMPLETED		

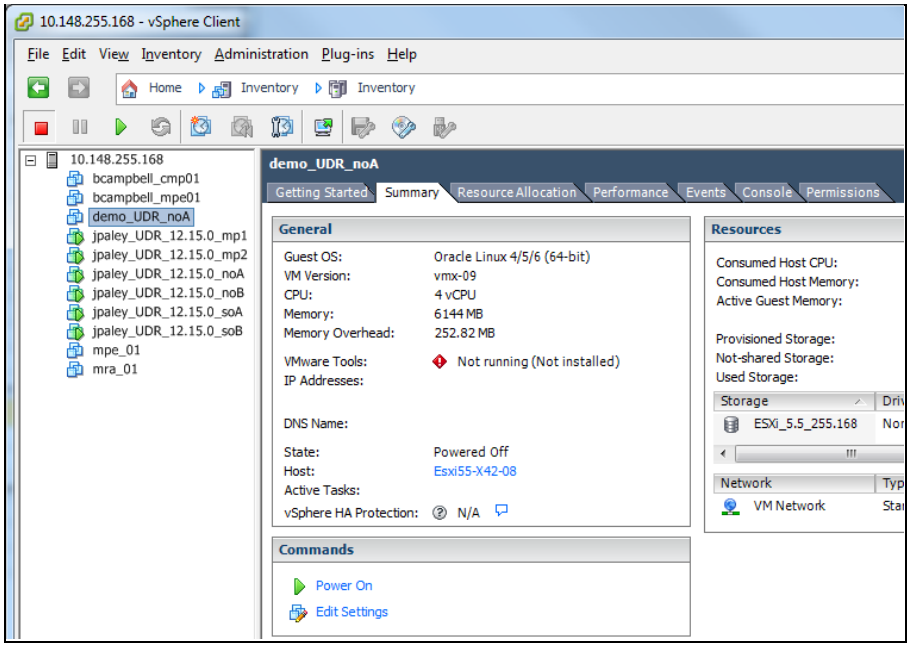
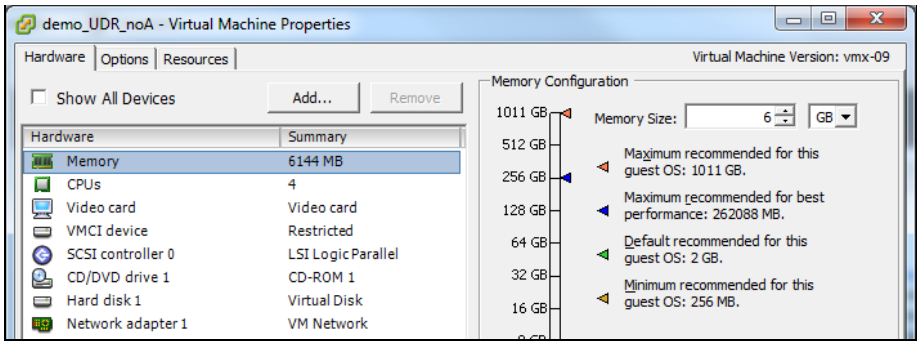
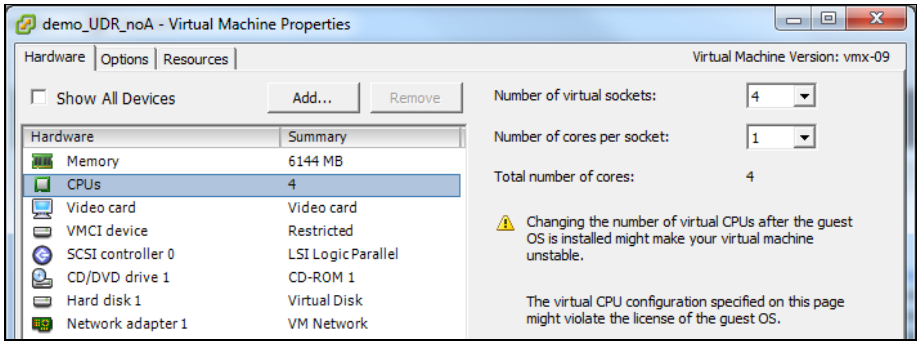
B.2 CONFIGURE GUEST RESOURCES

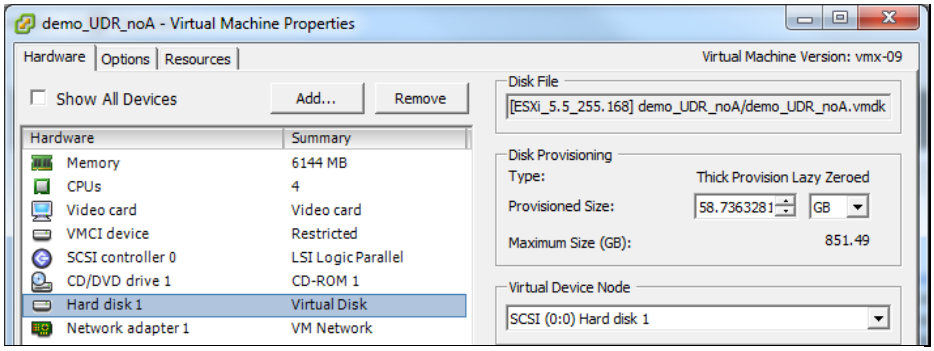
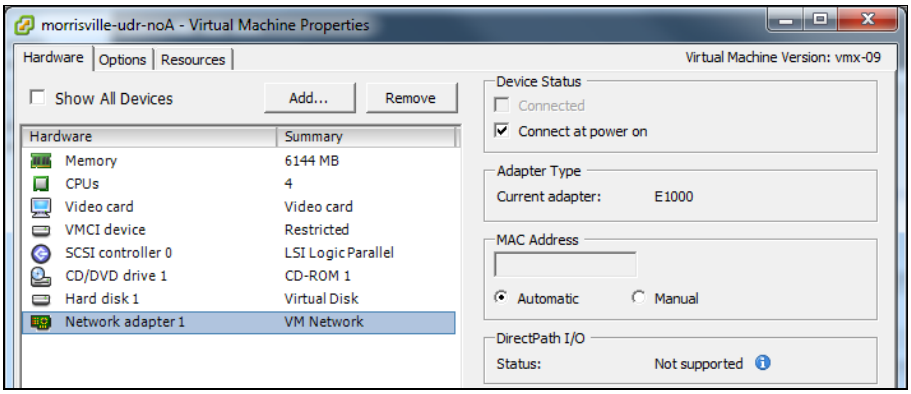
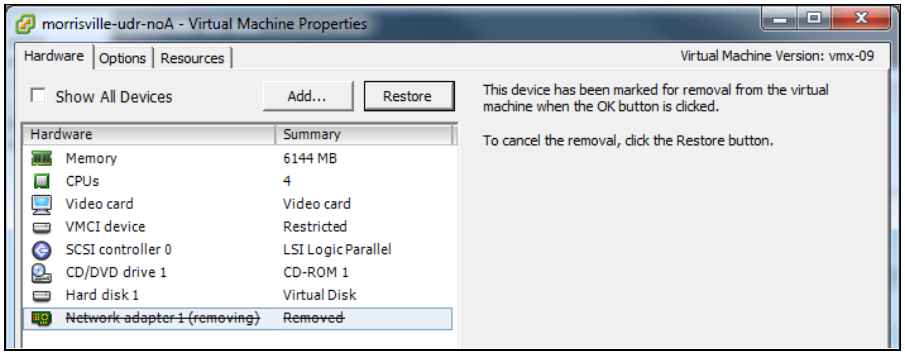
This procedure configures the required resource allocations and associations for Oracle Communications User Data Repository virtual machines (guests) and power them on.

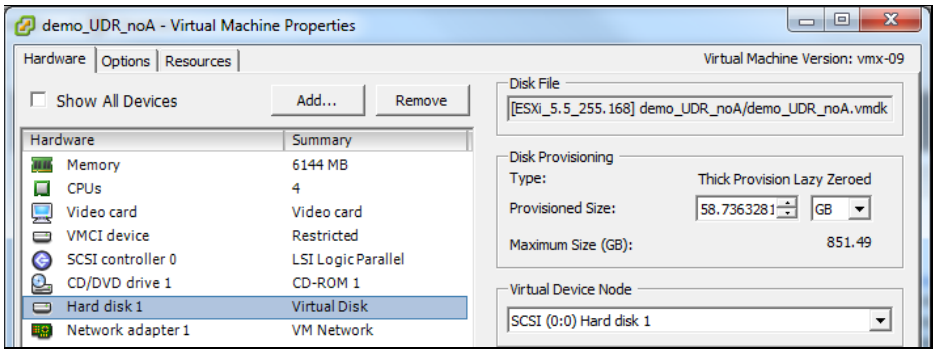
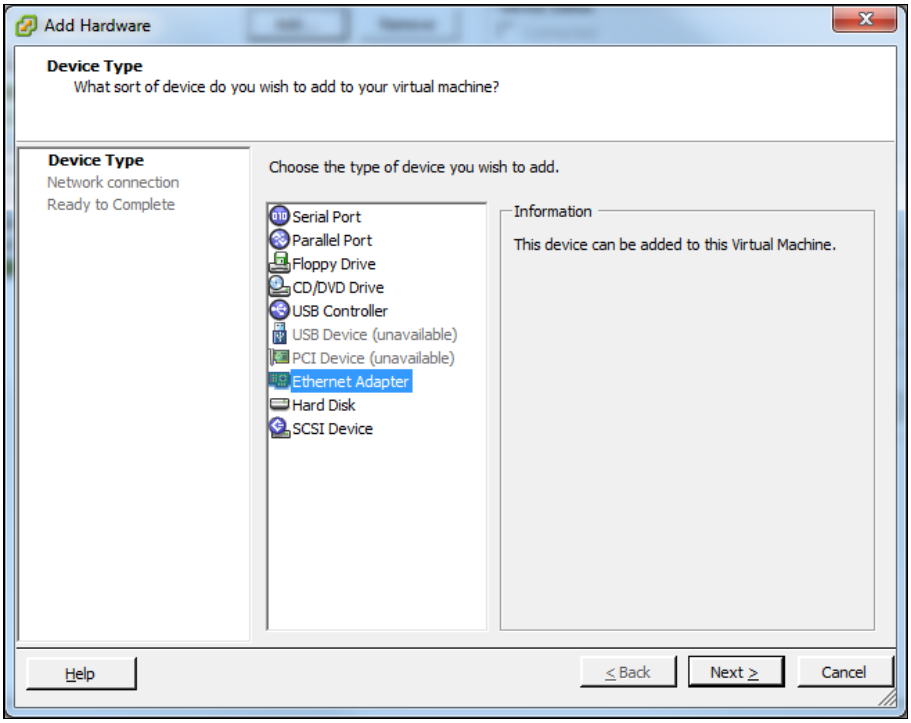
Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

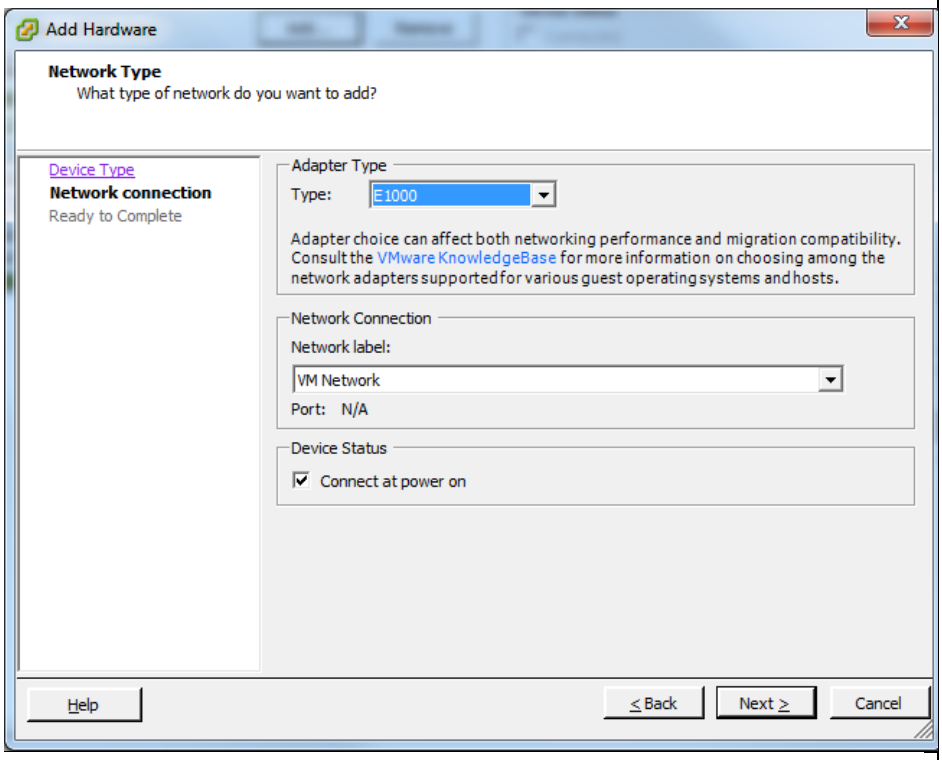
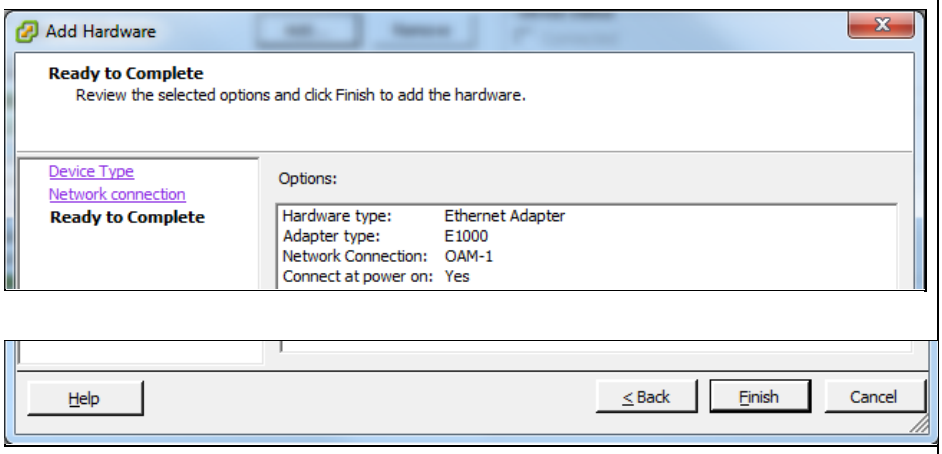
Procedure17: Configure Guest Resources

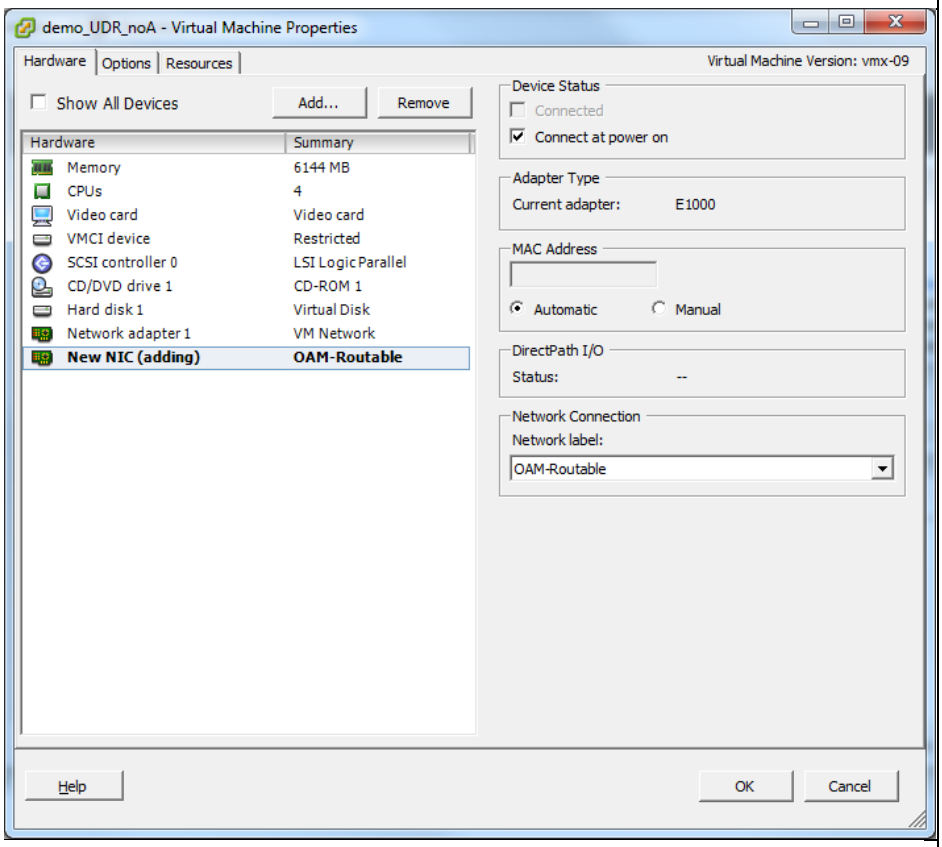
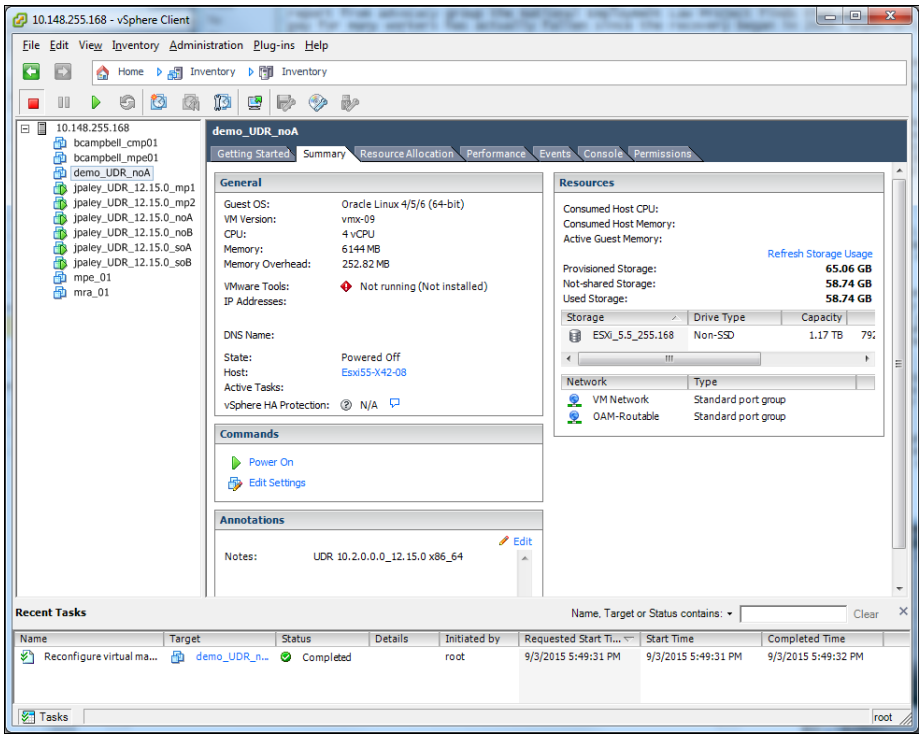
Step	Procedure	Result
1. ☐	**VMware client:** Log into the Vmware client	

Step	Procedure	Result
2. ☐	**VMware client:** 1. Select the Oracle Communications User Data Repository virtual machine from the left tree menu 2. Click **Summary** tab 3. Click **Edit Settings** under Commands	
3. ☐	**VMware client:** Select **Memory** from the Hardware menu and adjust Memory Size for the role of the server. UDR: 48 GB	
4. ☐	**VMware client:** Select **CPUs** from the Hardware menu and adjust the Number of virtual sockets according to [1].	

Step	Procedure	Result
5. ☐	**VMware client:** Select **Hard disk 1** from the Hardware menu and adjust the Provisioned Size according to [1].	
6. ☐	**VMware client:** 1. Select any Network adapter that may exist by default 2. Click **Remove** tab	
7. ☐	**VMware client:** The network adapter is crossed out and a removal message displayed	
8. ☐	**VMware client:** Take note of the order in which networks are added.	**NOTE:** The order in which networks are added by the following steps affects their device order in the virtual machine. Add them in the order they appear for each server: **UDR** 1. ☐ XMI 2. ☐ IMI 3. ☐ XSI-1 (optional)

Step	Procedure	Result
9. ☐	**VMware client:** Click **Add** on the Hardware tab.	
10. ☐	**VMware client:** Select **Ethernet Adapter** from the list of devices and click **Next**	

Step	Procedure	Result
11. ☐	**VMware client:** 1. Select Adapter Type to conform to your virtual host 2. Select the Network Label to match the network type 3. Click **Next**	
12. ☐	**VMware client:** Confirm Option settings and click **Finish**	
13. ☐	**VMware client:** Repeat as required	Repeat Steps 9 through 12 to add every network required for the role of the server.

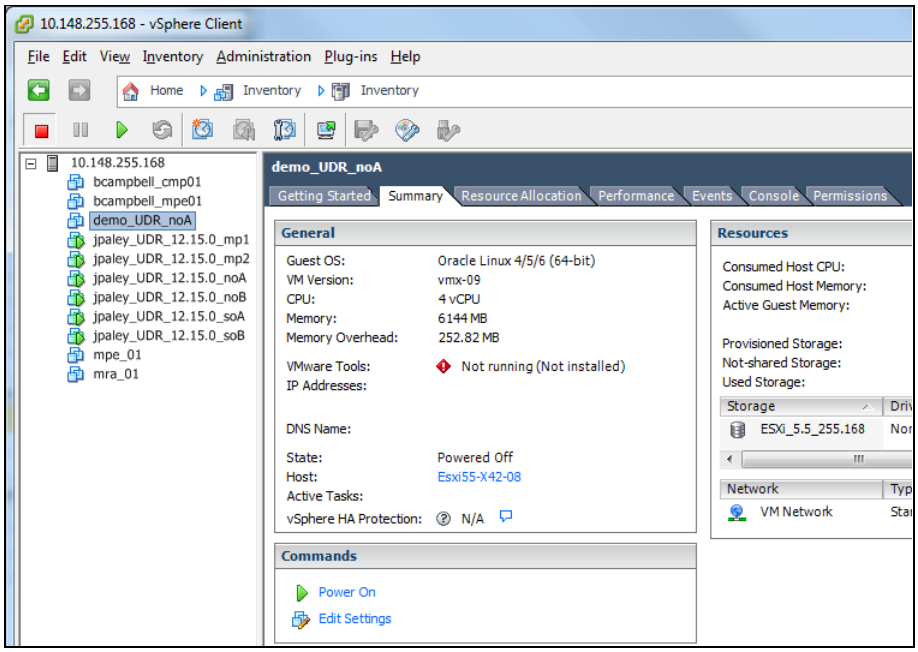
Step	Procedure	Result
14. ☐	**VMware client:** After all networks are added, confirm their entry in the Hardware menu then click **OK**.	
15. ☐	**VMware client:** New devices and networks are listed on the Summary tab and Reconfigure task shows status Completed under Recent Tasks. Click **Power On** under Commands.	
THIS PROCEDURE HAS BEEN COMPLETED		

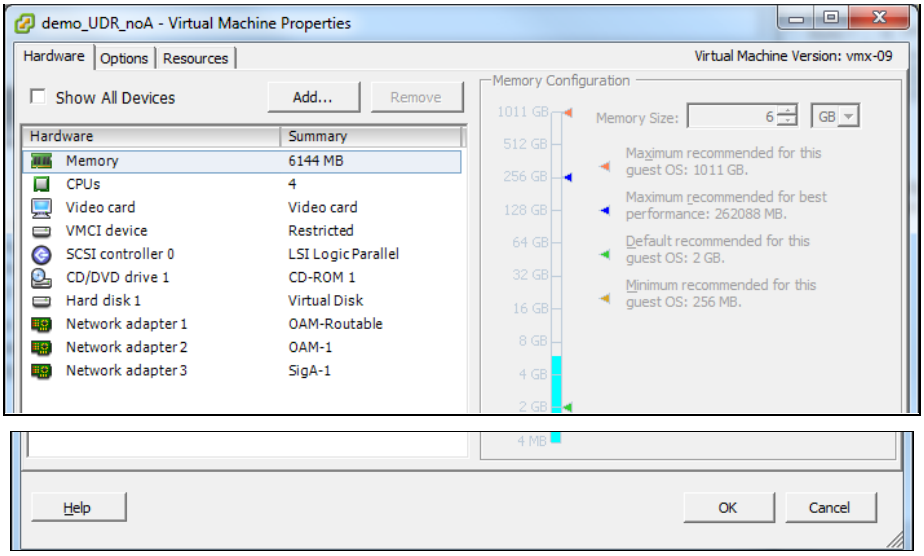
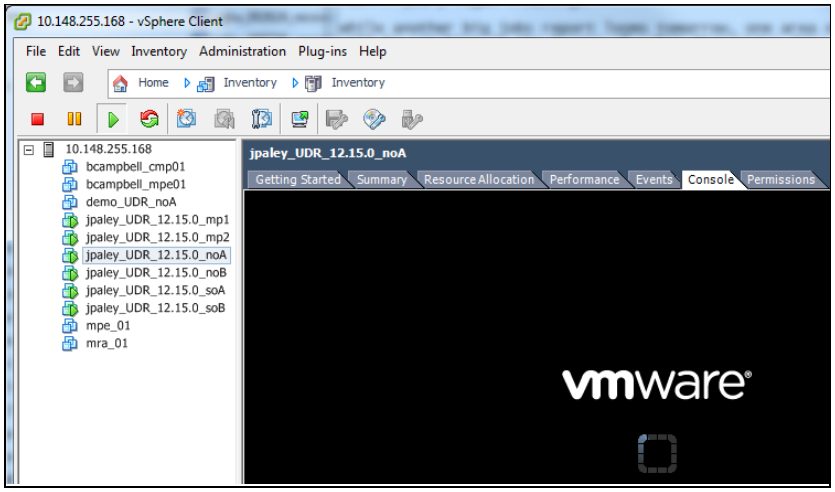
B.3 CONFIGURE GUEST NETWORK

This procedure configures the OAM network on Oracle Communications User Data Repository virtual machines (guests).

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure18: Configure Guest OAM Network

Step	Procedure	Result
1. ☐	Log into the Vmware client	
2. ☐	**VMware client:** 1. Select the Oracle Communications User Data Repository virtual machine from the left tree menu 2. Click the **Summary** tab 3. Click **Edit Settings** under Commands	

Step	Procedure	Result
3. ☐	**VMware client:** 1. Take note of the Network adapter assigment under Hardware tab for each application network. 2. Click **Cancel**	 Network adapters are enumerated under the Hardware tab. Their adapter number in the Hardware column corresponds to their zero-based device name assignment in a running guest. For instance, in the example capture above: • OAM (XMI) is on eth0 device • OAM-1 (IMI) is on eth1 device • Sig-A (XSI-1) is on eth2 device Record the NIC device number assigment of these networks: XMI: _____ IMI: _____ XSI-1: _____ XSI-2: _____ (optional)
4. ☐	**VMware client:** 1. Click the **Console** tab 2. Click inside the console window to bring focus there **NOTE:** Press **Ctrl-Alt** to escape from console.	
5. ☐	**VM Console:** Login to console as admusr	`login as: admusr` `Password:`

Step	Procedure	Result

6. ☐	**VM Console:**
	Configure XMI network
		1. Set the XMI device for routable OAM access:
		NOTE: Where ethX is the interface associated with the XMI network
		`$ sudo netAdm add --device=eth0 --address=<Guest_XMI_IP_Address> --netmask=<XMI_Netmask> --onboot=yes --bootproto=none`
		2. Add the default route for XMI:
		`$ sudo netAdm add --route=default --gateway=<Gateway_XMI_IP_Address> --device=eth0`
		NOTE: The network device may be different than shown here (eth0) if the order of network adapter insertion was other than shown. Refer to Step 3 for this assignment.

7. ☐	**VM Console:** Configure XSI network	Set the XSI device for routable signaling network access (Only for NO and MP Servers): **NOTE:** Where ethX is the interface associated with the XSI network `$ sudo netAdm add --device=eth2 --address=<Guest_XSI_IP_Address> --netmask=<XSI_Netmask> --onboot=yes --bootproto=none` **NOTE:** The network device may be different than shown here (eth2) if the order of network adapter insertion was other than shown. Refer to Step 3 for this assignment.
8. ☐	**VM Console:** Repeat as required	Repeat Step 7 to add XS1-2 (eth3) if a second signaling network. Adjust parameter values as required.
9. ☐	**VM Console:** Exit console	`$ exit` **NOTE:** Press **Ctrl-Alt** to escape from console.
THIS PROCEDURE HAS BEEN COMPLETED		

Appendix C. VMWare vCloud Director Oracle Communications User Data Repository Deployment

C.1 VCLOUD DIRECTOR ORACLE COMMUNICATIONS USER DATA REPOSITORY MEDIA UPLOAD

This procedure uploads Oracle Communications User Data Repository media (ISO or OVA) into vCloud Director Catalogs.

Needed material:

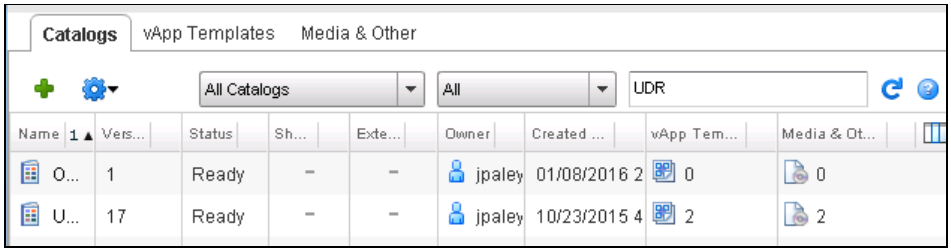
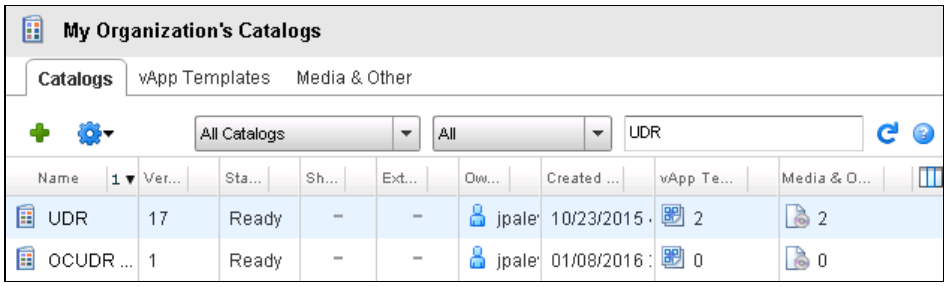
- Oracle Communications User Data Repository OVA

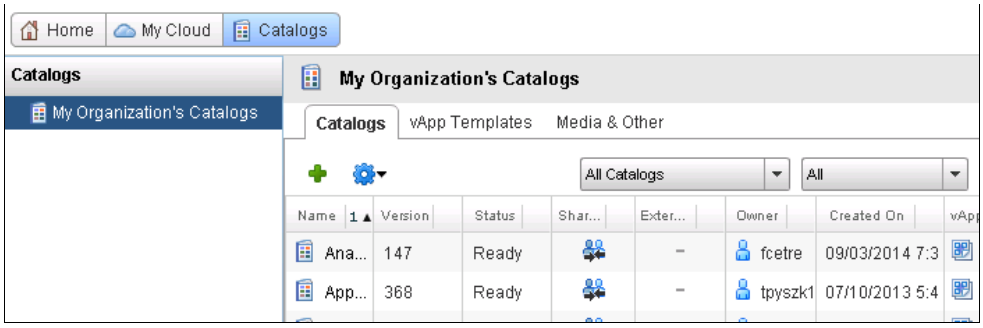
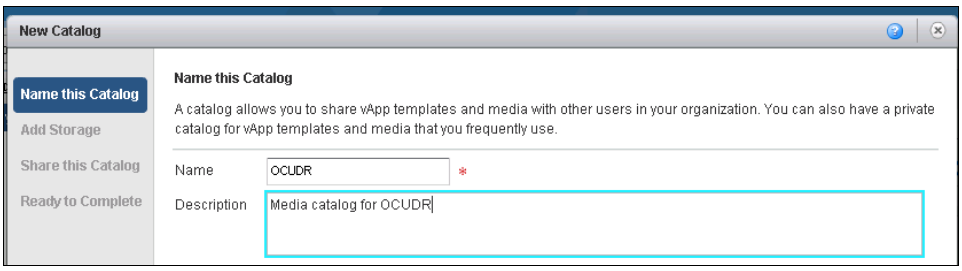
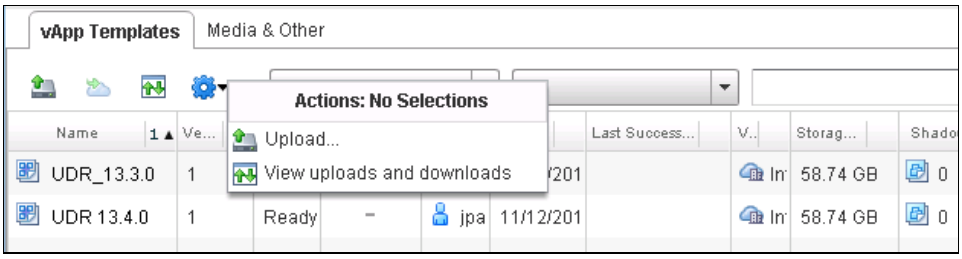
Optional material (required for ISO install only):

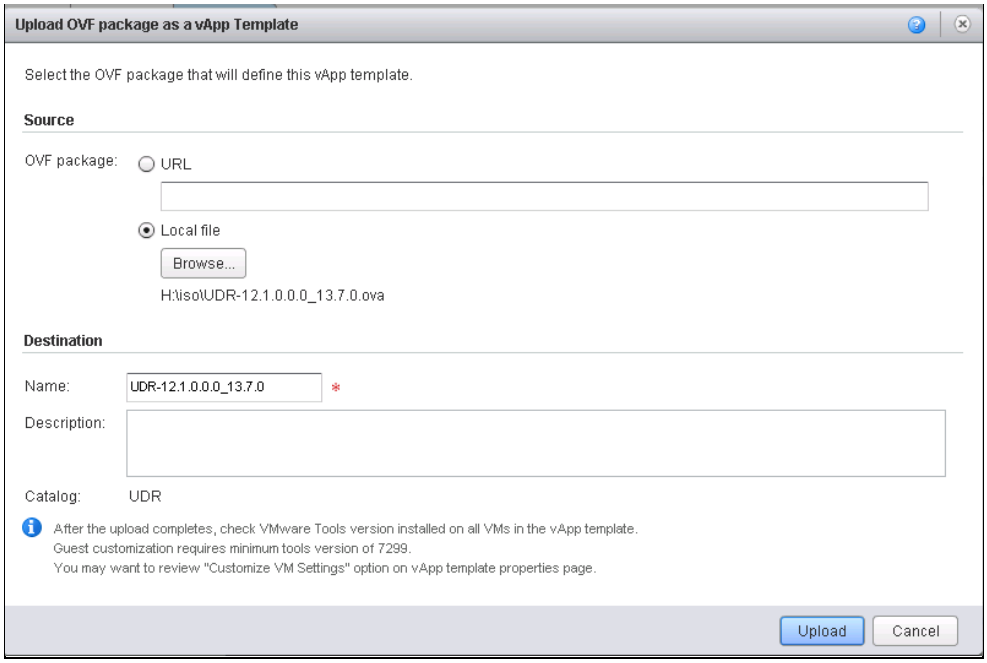
- Oracle Communications User Data Repository ISO
- TPD Platform ISO

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure19: vCloud Director Oracle Communications User Data Repository Media Upload

Step	Procedure	Result
1. ☐	Log into the VMware vCloud Director	
2. ☐	**vCloud Director:** Enter Oracle Communications User Data Repository catalog name in the search field and hit Enter.	
3. ☐	**vCloud Director:** Click the name for the appropriate catalog and proceed to Step 6	 **NOTE:** If a catalog for Oracle Communications User Data Repository does not exist, create one using steps 4 and 5.

Step	Procedure	Result
4. ☐	**vCloud Director:** Click Catalogs tab. Click the green plus sign.	
5. ☐	**vCloud Director:** 1. Enter the catalog name and description. 2. Unless this catalog requires special storage or sharing, click **Finish**.	 **NOTE:** After clicking Finish, return to Step 2 of this procedure to access the catalog.
6. ☐	**vCloud Director:** • Select. **vApp Templates** for OVA upload • Select **Media & Other** for ISO upload	
7. ☐	**vCloud Director:** Click the Blue Gear Symbol and then select **Upload**	

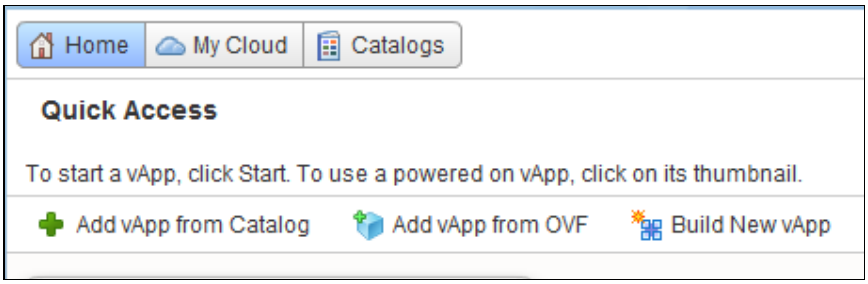
Step	Procedure	Result
8. ☐	**vCloud Director:** Select Source as either URL or local file then enter a Name. Click **Upload**.	
THIS PROCEDURE HAS BEEN COMPLETED		

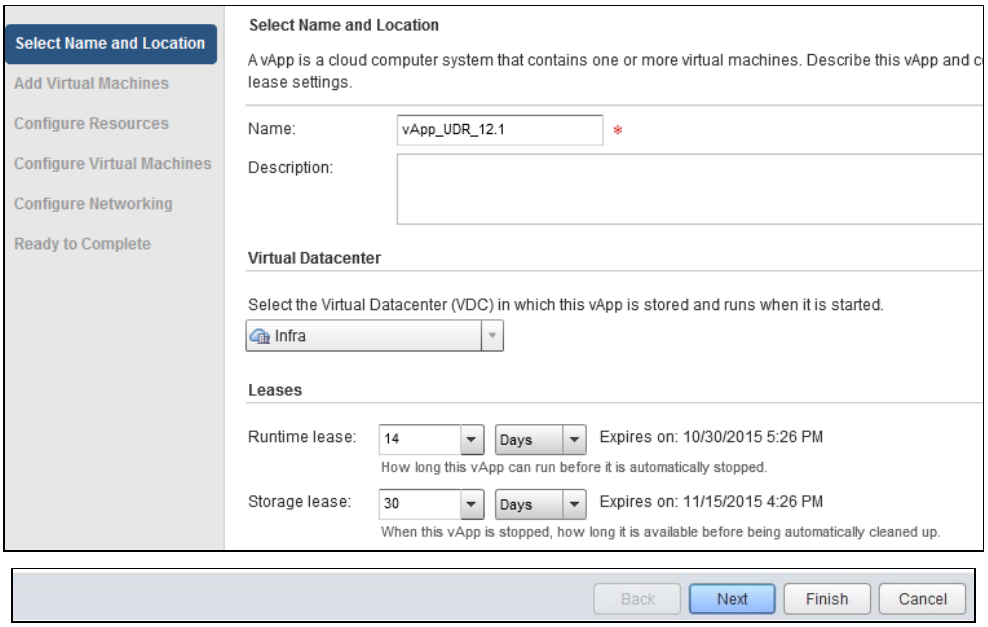
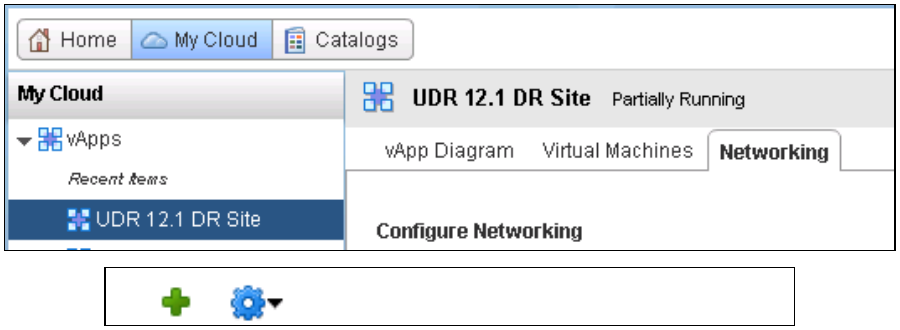
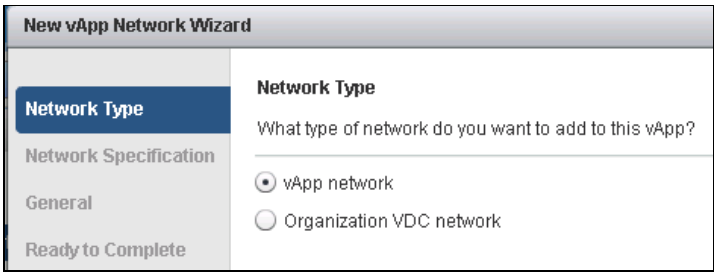
C.2 CREATE VAPP

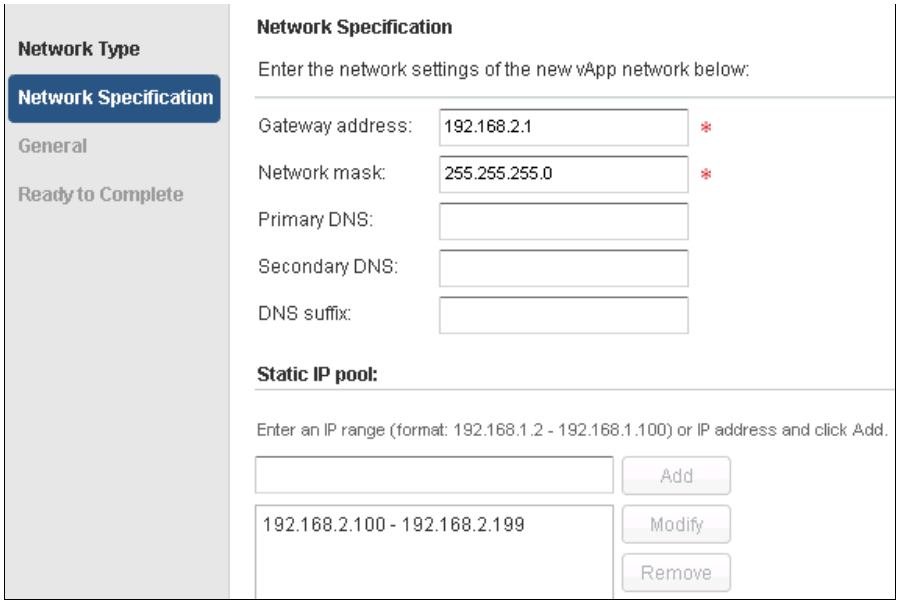
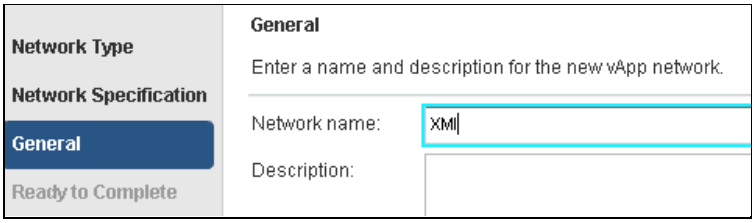
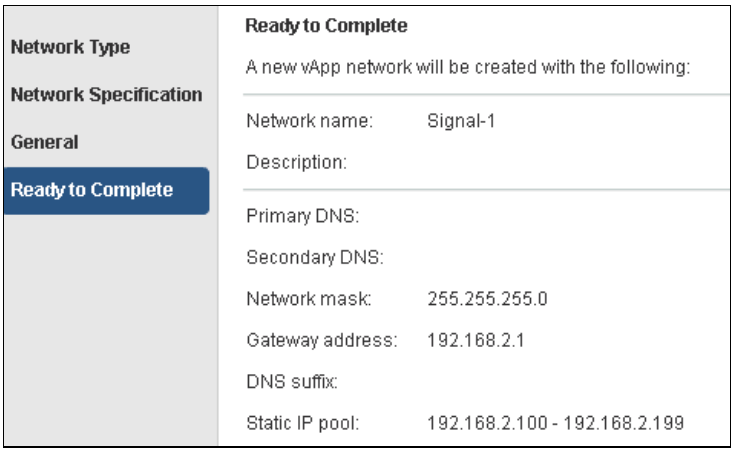
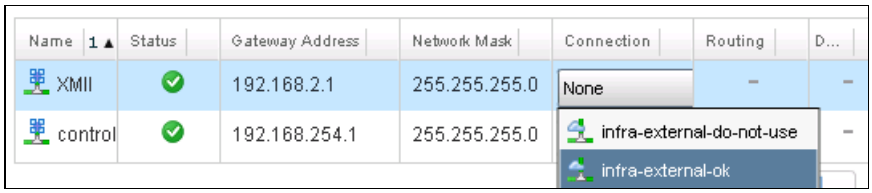
This procedure creates and configure a vApp virtual appliance.

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure20: Create vApp

Step	Procedure	Result
1. ☐	Log into the VMware vCloud Director	
2. ☐	**vCloud Director:** Select **Home** tab, then click **Build New vApp**	

Step	Procedure	Result
3. ☐	**vCloud Director:** 1.. Enter the name for the vApp and other parameters as required. 2. Click **Finish**.	
4. ☐	**vCloud Director:** Navigate to **My Cloud → <vApp Name> → Networking** Then click the green plus icon to add a network.	
5. ☐	**vCloud Director:** Select **vApp network**. Click **Next**.	

Step	Procedure	Result
6. ☐	**vCloud Director:** Enter parameters for your internal network. Be sure to have sufficient address space for the number of servers you expect to deploy. Click **Next**.	
7. ☐	**vCloud Director:** Enter a Name for your network using [1] as a guide. Click **Next**.	
8. ☐	**vCloud Director:** Review the network data Click **Finish**.	
9. ☐	**vCloud Director:** Back on the Networking tab.	 If the network is addressable outside the Cloud (such as XMI for administration), select an external network from the Connection list. Otherwise, leave Connection setting as None.

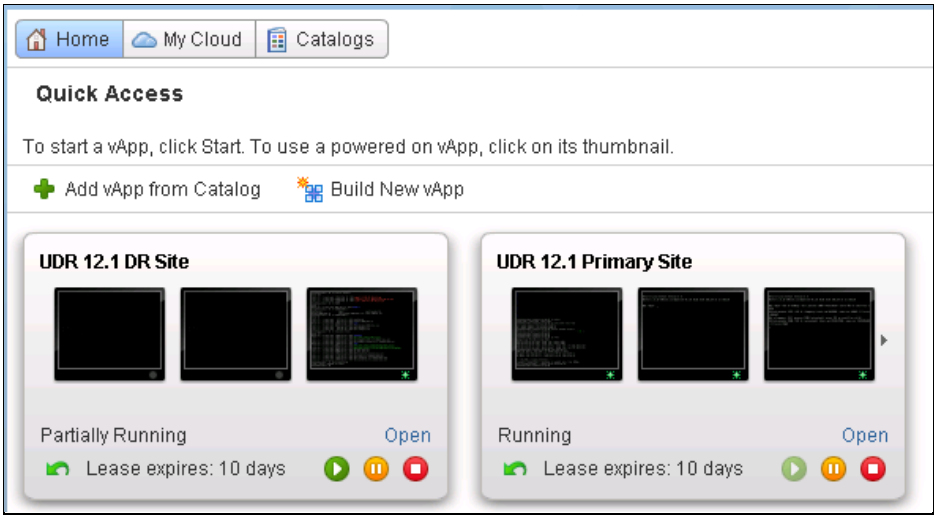
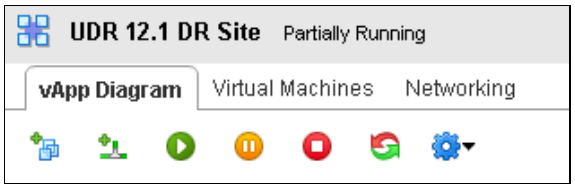
Step	Procedure	Result
10. ☐	**vCloud Director:** Click **Apply**.	
THIS PROCEDURE HAS BEEN COMPLETED		

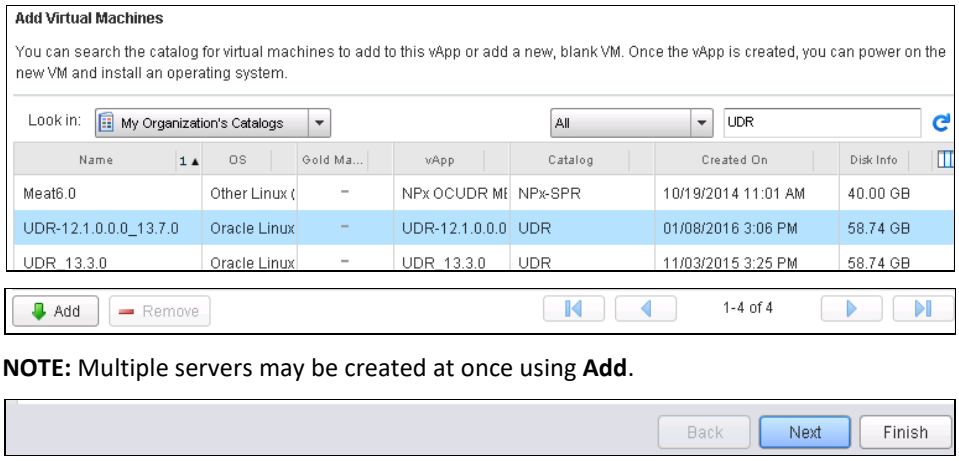
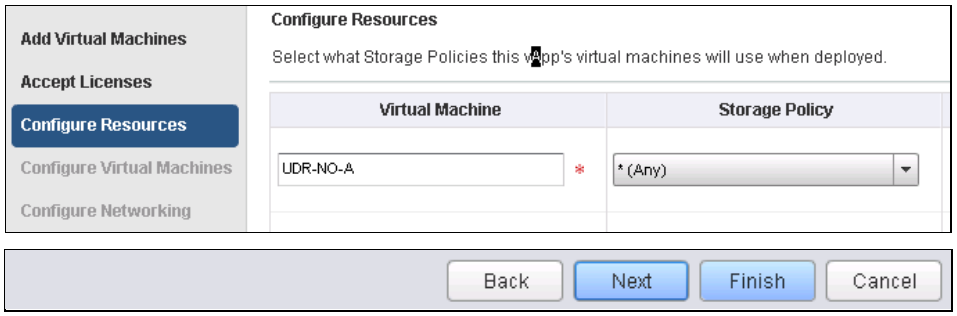
C.3 CREATE GUESTS FROM OVA

This procedure creates Oracle Communications User Data Repository virtual machines (guests) from OVA.

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure21: Create Guests from OVA with vCloud Director

Step	Procedure	Result
1. ☐	Log into the VMware vCloud Director	
2. ☐	**vCloud Director:** Click **Open** for the Oracle Communications User Data Repository vApp	 **NOTE:** Current vApps are listed on the Home Page. If a new vApp is required continue with the next step.
3. ☐	**vCloud Director:** Select icon on left to Add VM	

Step	Procedure	Result
4. ☐	**vCloud Director:** 1. Enter name in the search field and press **Enter** 2. Select Oracle Communications User Data Repository media name 3. Click **Add**. 4. Click **Next**.	 **NOTE:** Multiple servers may be created at once using **Add**.
5. ☐	**vCloud Director:** 1. Select the license agreement 2. Click **Next**	
6. ☐	**vCloud Director:** 1. Rename virtual machines to reflect its location and role 2. Click **Finish**.	
THIS PROCEDURE HAS BEEN COMPLETED		

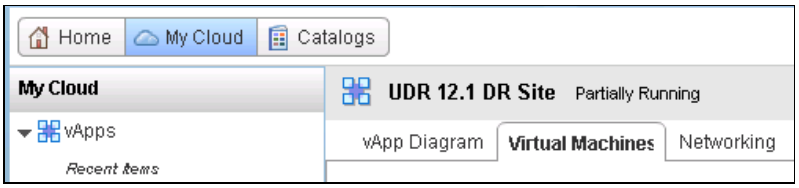
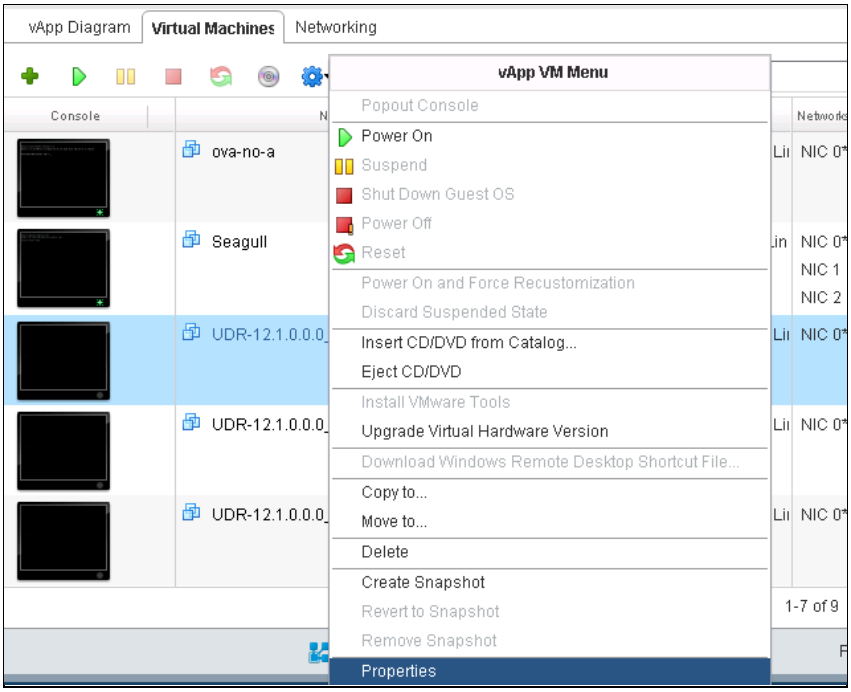
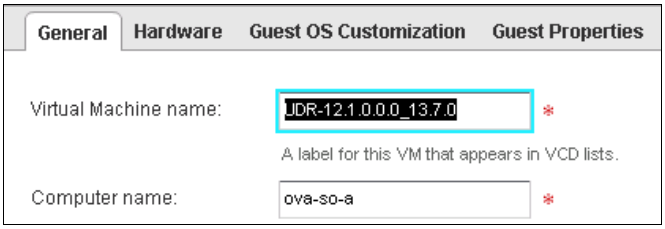
C.4 CONFIGURE GUEST RESOURCES

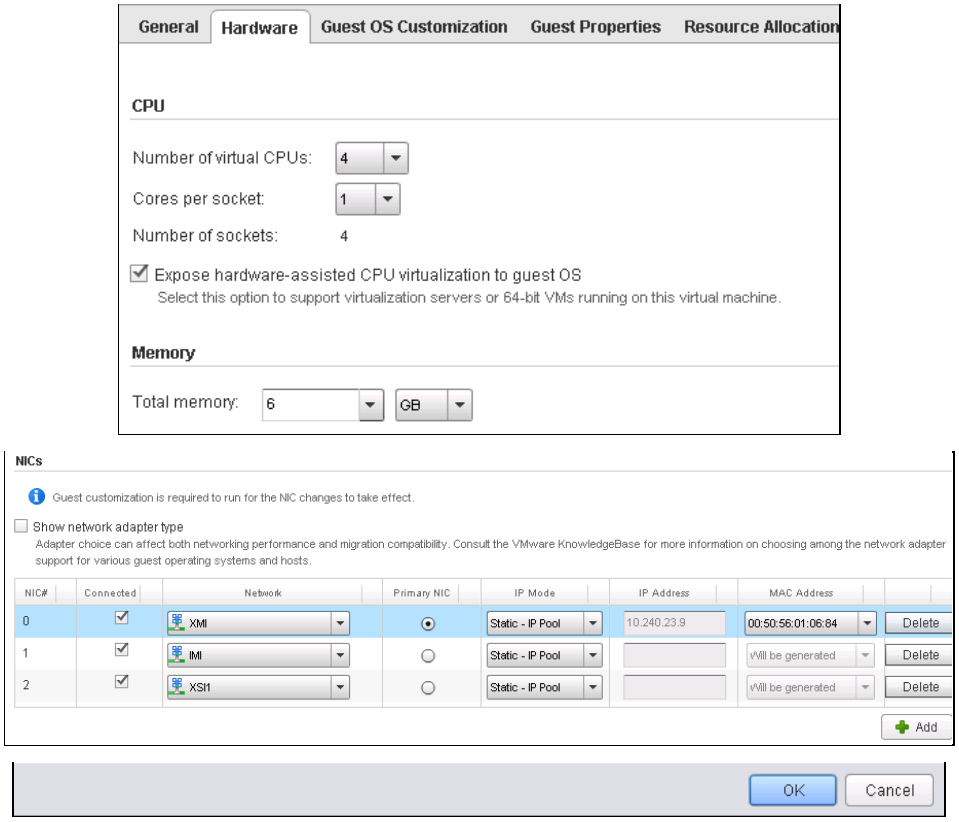
This procedure configures Oracle Communications User Data Repository virtual machines (guests) which have been created from OVA.

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure22: Configure Guests from OVA with vCloud Director

Step	Procedure	Result
1. ☐	Log into the VMware vCloud Director	

Step	Procedure	Result
2. ☐	**vCloud Director:** Navigate to **My Cloud → Virtual Machines**	
3. ☐	**vCloud Director:** 1. Select the VM. 2. Click the Blue Gear icon. 3. Select **Properties**.	
4. ☐	**vCloud Director:** Under the General tab, adjust Virtual Machine and Computer names.	

Step	Procedure	Result
5. ☐	**vCloud Director:** 1. Go to the **Hardware** tab. 2. Adjust the number of Virtual CPUs and Total Memory to match the role of the servers in [1]. 3. Select **Expose hardware-assisted CPU virtualization to guest OS**. 4. Adjust NICs to match the role of the server role in [1]. 5. Click **OK**.	
THIS PROCEDURE HAS BEEN COMPLETED		

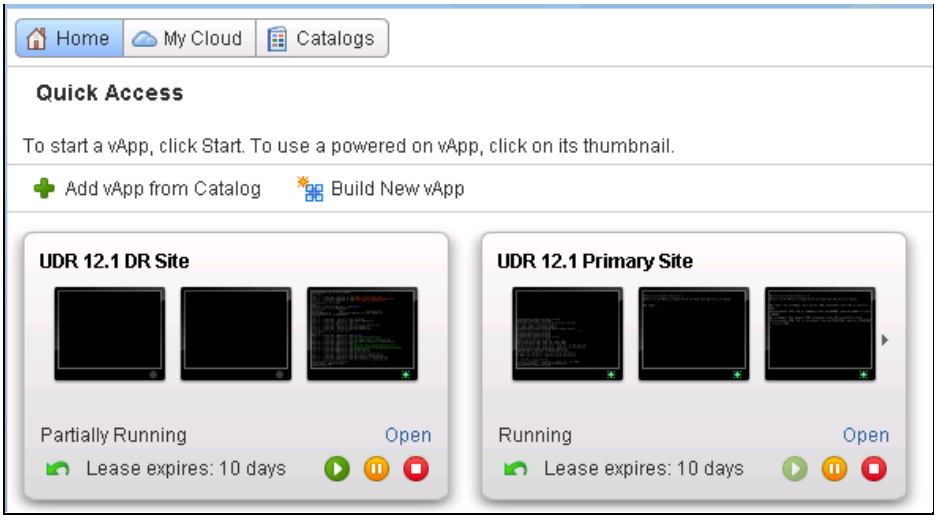
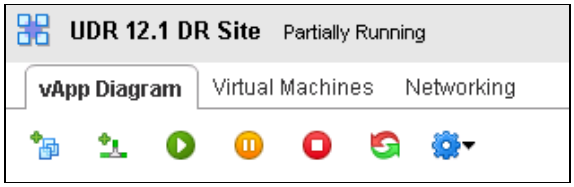
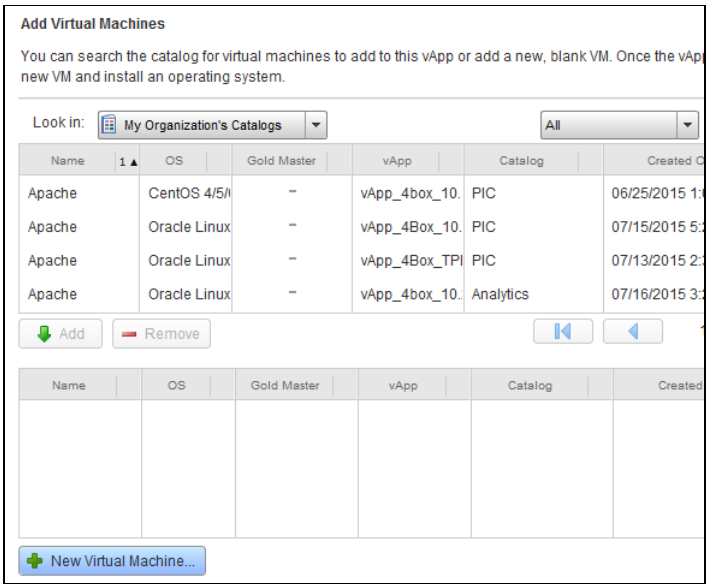
C.5 CREATE GUESTS FROM ISO

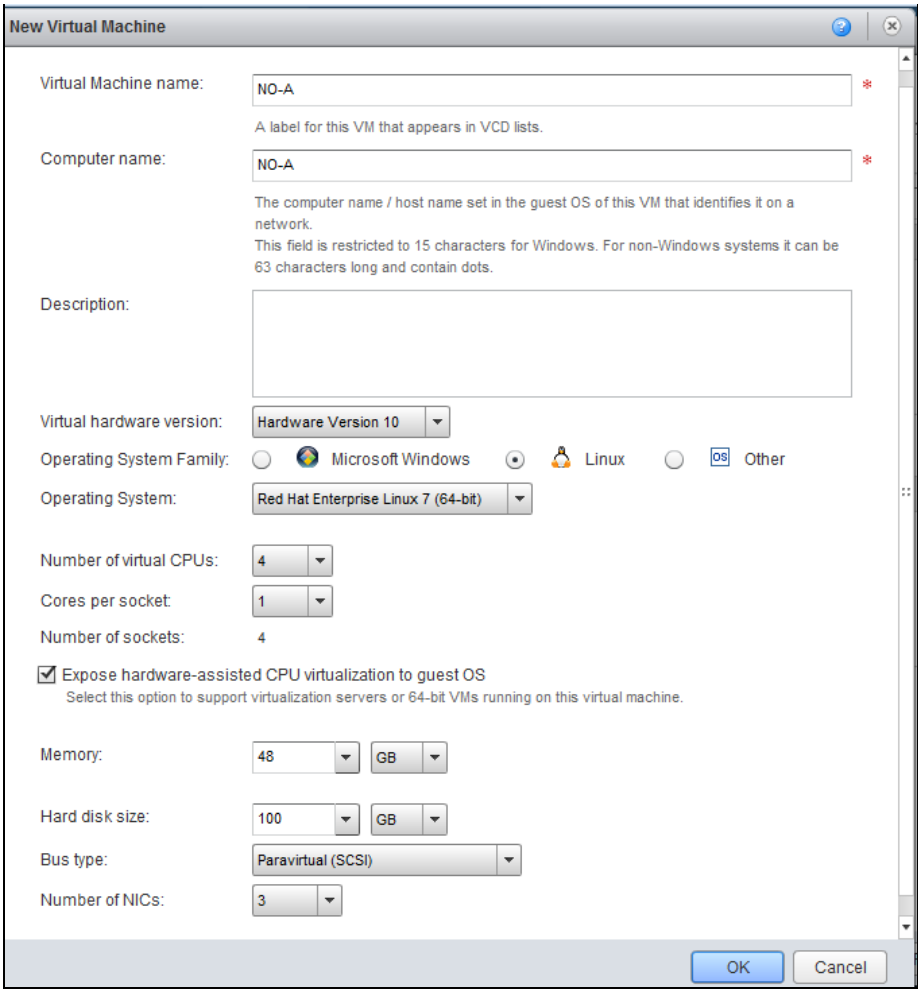
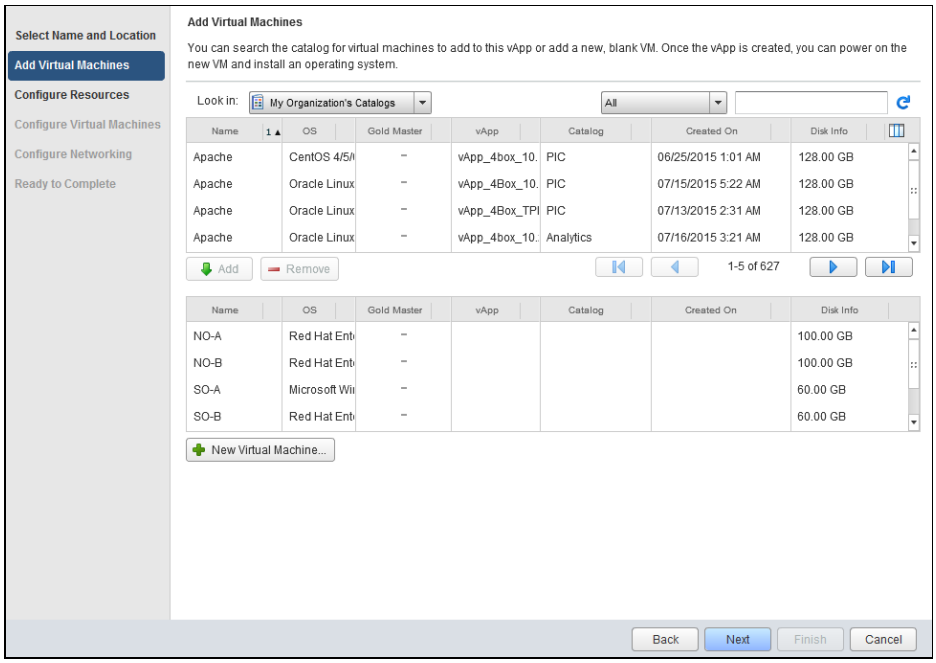
This procedure creates Oracle Communications User Data Repository virtual machines (guests) from ISO.

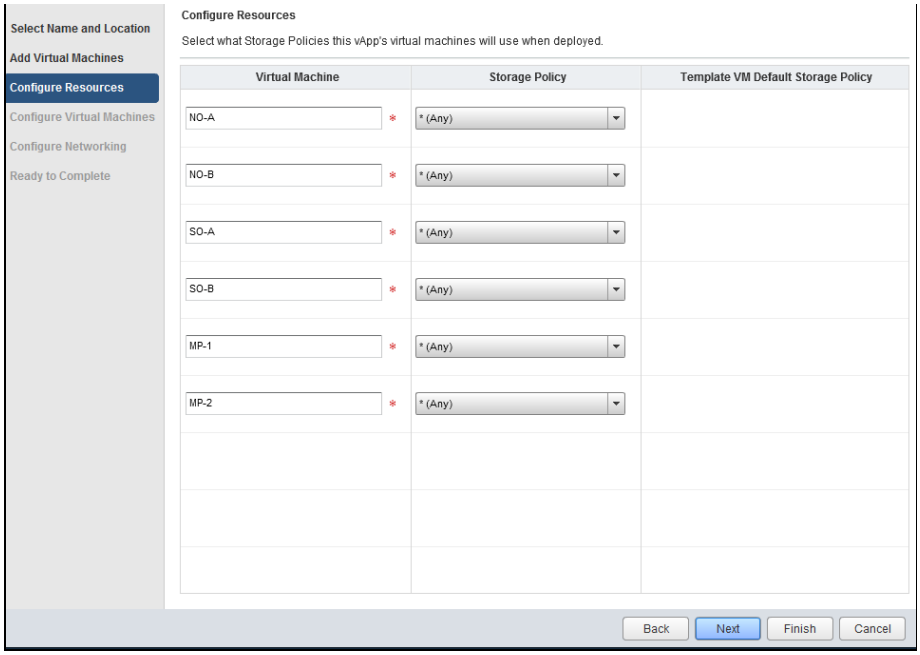
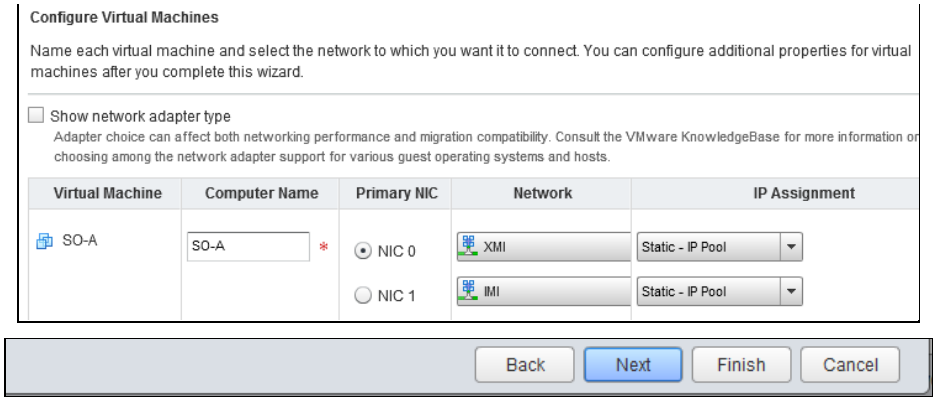
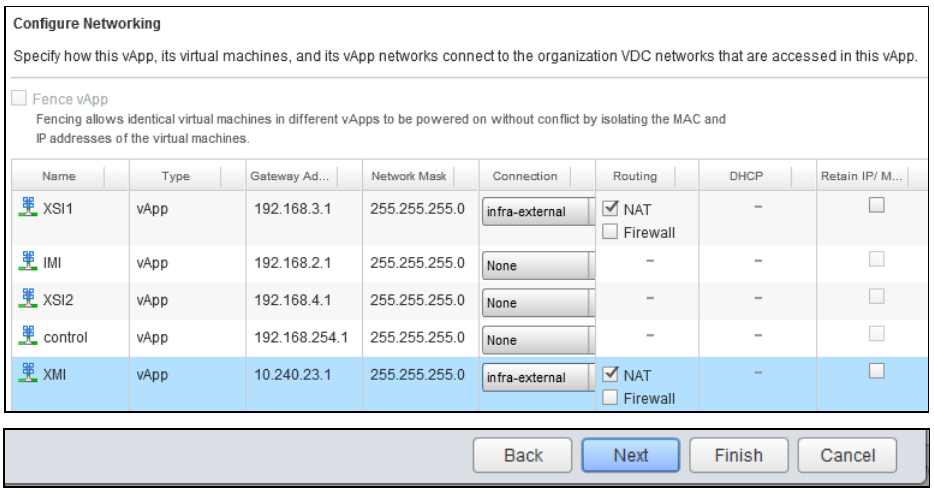
Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

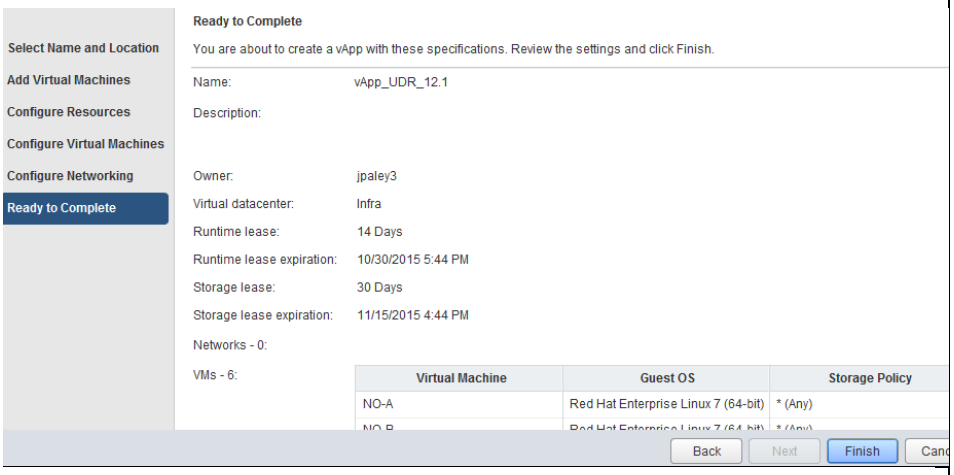
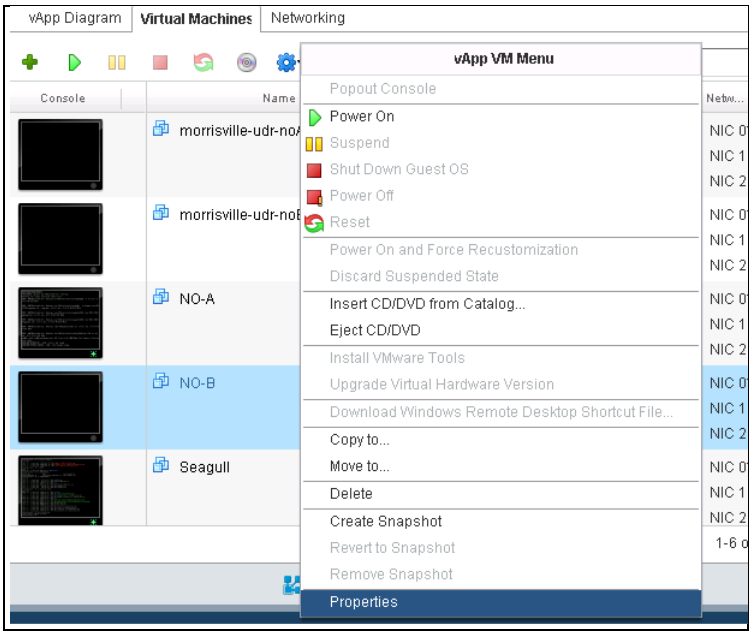
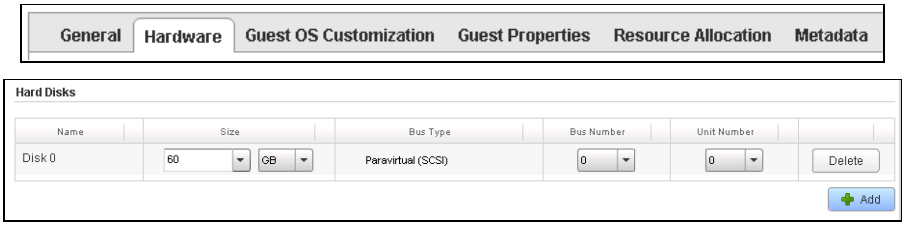
Procedure23: Create Guests from ISO with vCloud Director

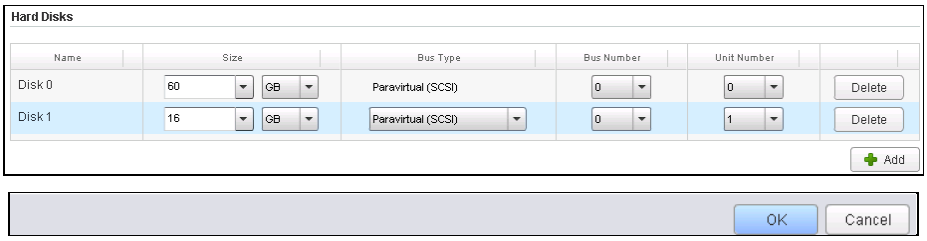
Step	Procedure	Result
1. ☐	Log into the VMware vCloud Director	

Step	Procedure	Result
2. ☐	**vCloud Director:** Click **Open** for the Oracle Communications User Data Repository vApp	 **NOTE:** Current vApps are listed on the Home Page. If a new vApp is required continue with the next step.
3. ☐	**vCloud Director:** Select icon on left to Add VM	
4. ☐	**vCloud Director:** Click **New Virtual Machine**.	

Step	Procedure	Result
5. ☐	**vCloud Director:** 1. Enter Name and Computer Name for VM. 2. Set Operating System Family to **Linux**. 3. Select **Expose hardware-assisted CPU…**. 4. Enter all resource parameters according to the role given in resource profile[1]. 5. Click **OK**.	
6. ☐	**vCloud Director:** Click **Next**.	

Step	Procedure	Result
7. ☐	**vCloud Director:** Click **Next**.	
8. ☐	**vCloud Director:** 1. Select **Networks and IP Assignments** for VM according to the role given in resource profile [1]. 2. Click **Next**.	
9. ☐	**vCloud Director:** 1. For each external network (XMI, XSI): Set Connection to the network a cloud administer has granted for external communication. 2. For each external network (XMI, XSI): Check NAT and Uncheck Firewall. 3. Click **Next**.	

Step	Procedure	Result
10. ☐	**vCloud Director:** 1. Review the settings. 2. Click **Finish**.	
11. ☐	**vCloud Director:** 1. Select the VM. 2. Click the Blue Gear icon. 3. Select **Properties**.	
12. ☐	**vCloud Director:** 1. Select the **Hardware** tab. 2. Adjust the size of Disk 0 to match VM profile [1]	

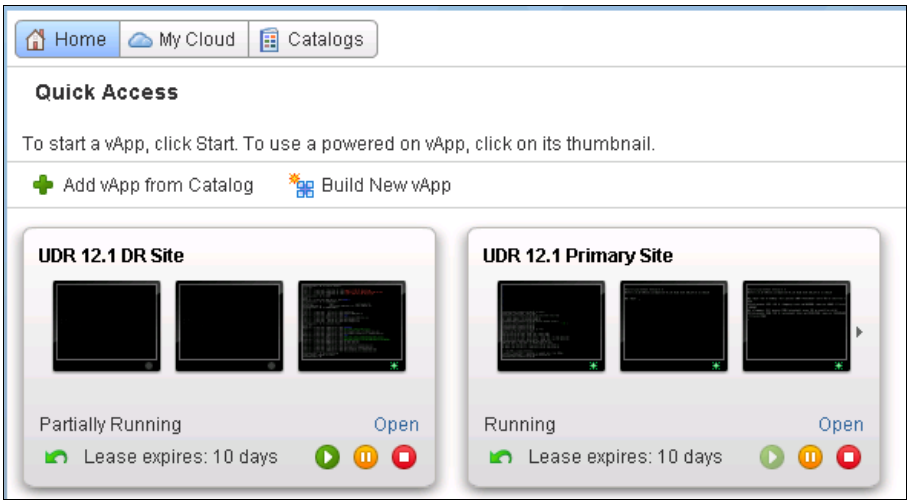
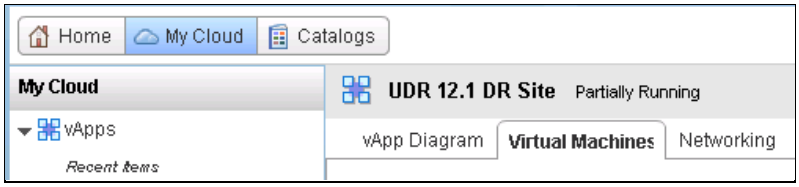
Step	Procedure	Result
13. ☐	**vCloud Director:** Only If the VM uses a second disk by [1]: 1. Click **Add** 2. Adjust size of Disk 1 to match VM profile [1]. 3. Click **OK**	
THIS PROCEDURE HAS BEEN COMPLETED		

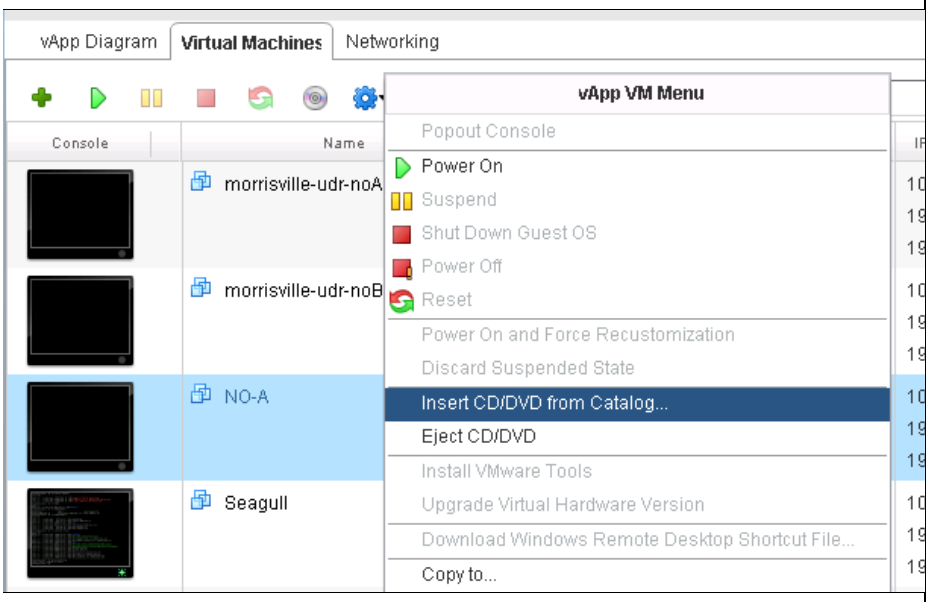
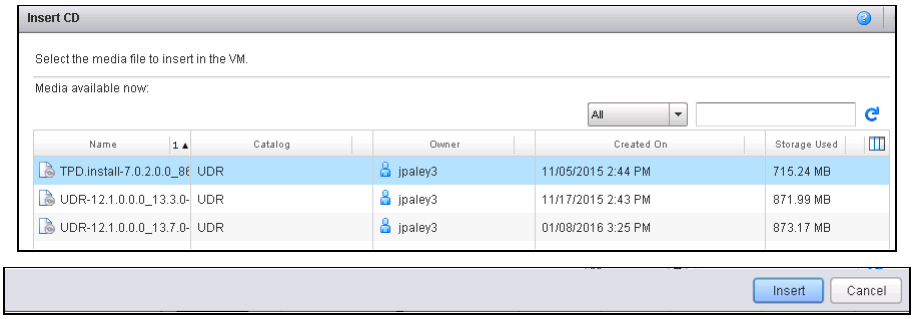
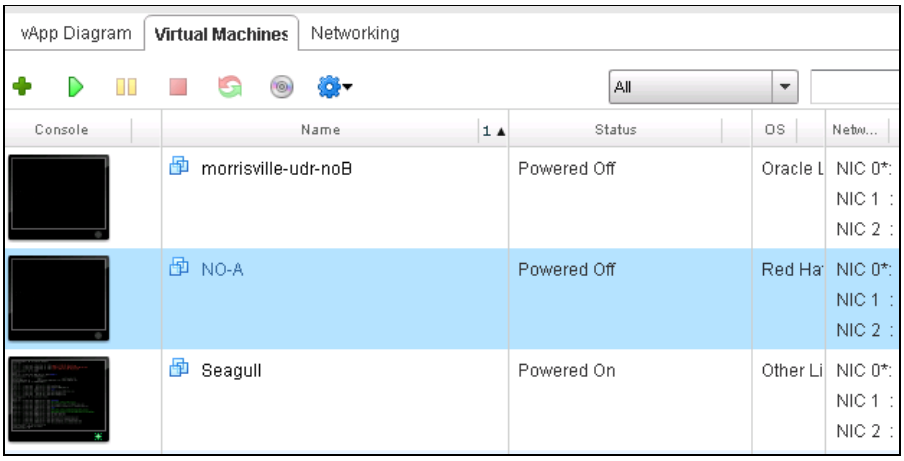
C.6 INSTALL GUESTS FROM ISO

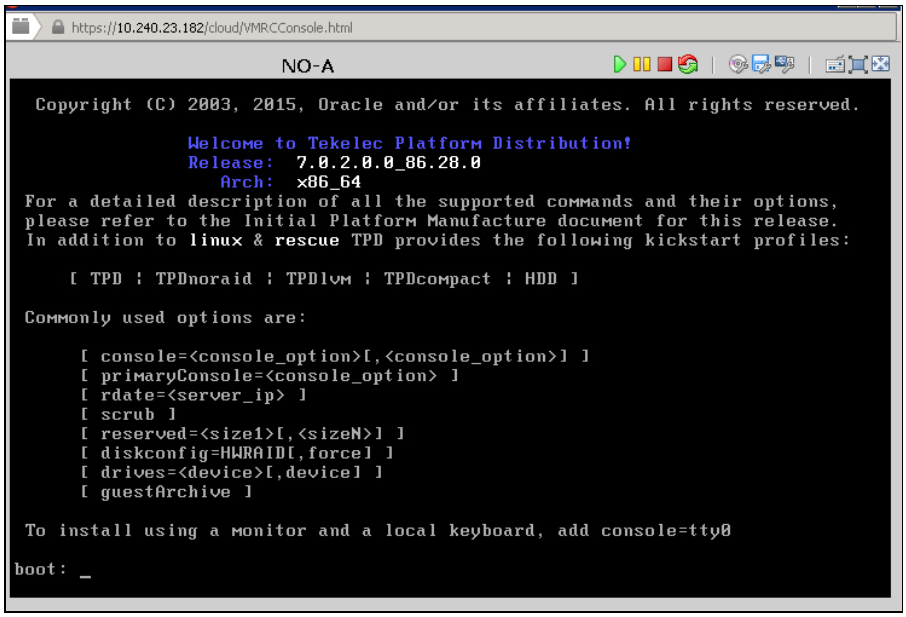
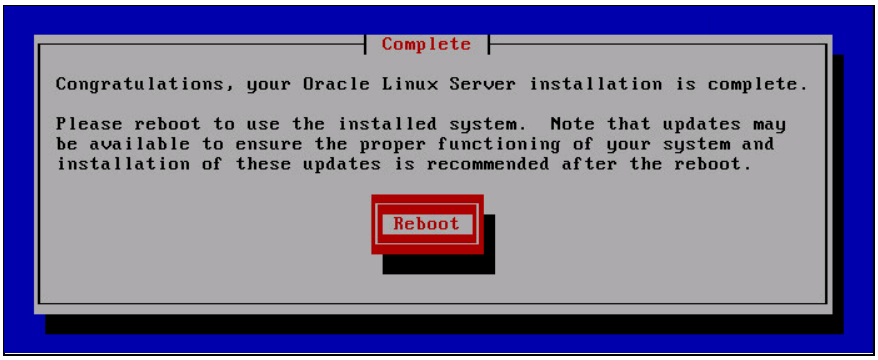
This procedure creates Oracle Communications User Data Repository virtual machines (guests) from ISO.

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure24: Install Guests from ISO with vCloud Director

Step	Procedure	Result
1. ☐	Log into the VMware vCloud Director	
2. ☐	**vCloud Director:** Click **Open** for the Oracle Communications User Data Repository vApp then procede to Step 5.	 **NOTE:** Current vApps are listed on the Home Page. If a new vApp is required continue with the next step.
3. ☐	**vCloud Director:** Navigate to → **My Cloud** → **Virtual Machines**	

Step	Procedure	Result
4. ☐	**vCloud Director:** 1. Select the VM. 2. Click the Blue Gear icon. 3. Select **Insert CD/DVD from Catalog**.	
5. ☐	**vCloud Director:** 1. Select TPD ISO. 2. Click **Insert**	
6. ☐	**vCloud Director:** 1. Click the sky blue Play icon to start the VM 2. Click the Console to open the console window	

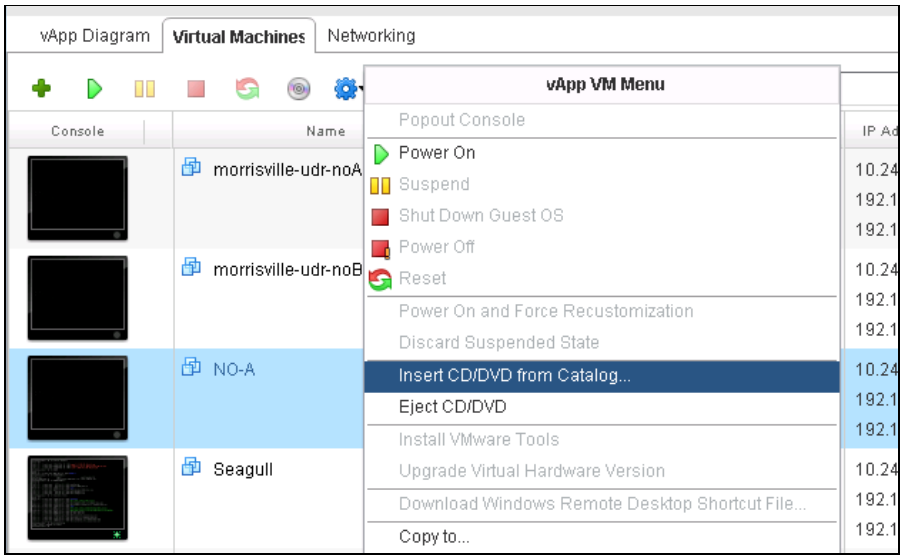
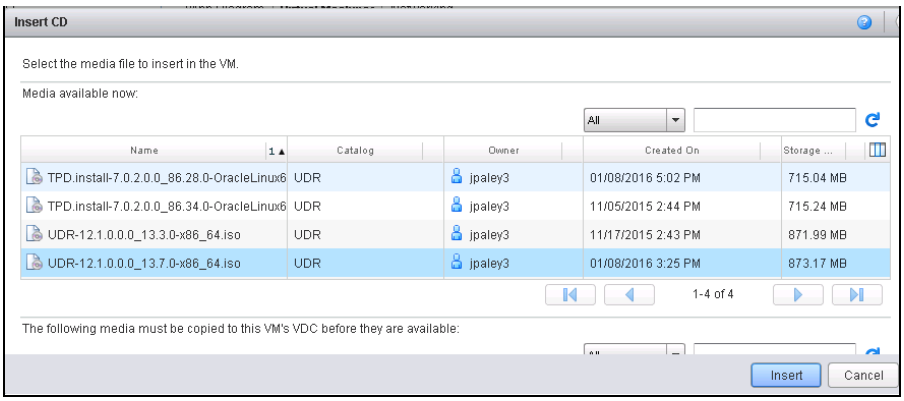
Step	Procedure	Result
7. ☐	**vCloud Director:** Initiate operating system install by entering the given text into console boot prompt	 `boot: TPDnoraid console=tty0`
8. ☐	When installation completes, press **Enter** to reboot	 **NOTE:** Escape the console session by pressing **Ctrl- Alt**
9. ☐	After reboot, log into console	`Hostnameb6092a316785 login: root` `password:`
10. ☐	Verify that the TPD release is 7.6.1.x	`# getPlatRev` `7.6.1.0.0-88.55.0`
11. ☐	Run the `alarmMgr` command to verify health of the server before Application install.	`# alarmMgr --alarmStatus` **NOTE**: This command should not return output on a healthy system.
12. ☐	Run the `verifyIPM` as a secondary way to verify health of the server before Application install.	`# verifyIPM` **NOTE**: This command should not return output on a healthy system.
13. ☐	Create physical volume sdb	`# pvcreate /dev/sdb` `Physical volume "/dev/sdb" successfully created`

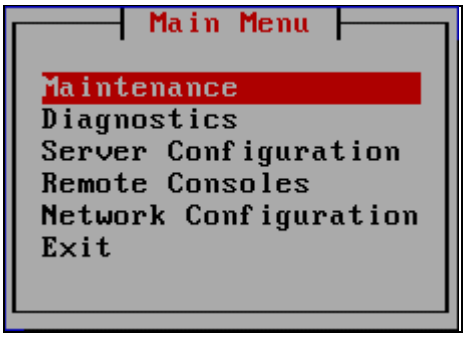
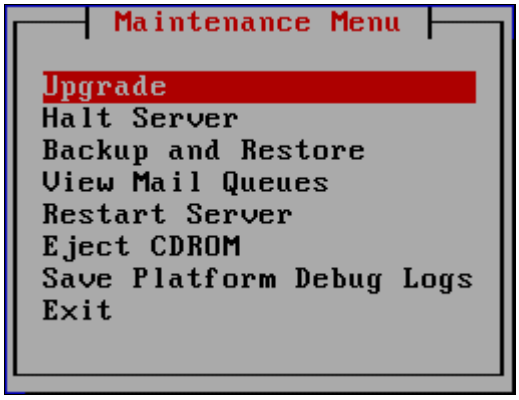
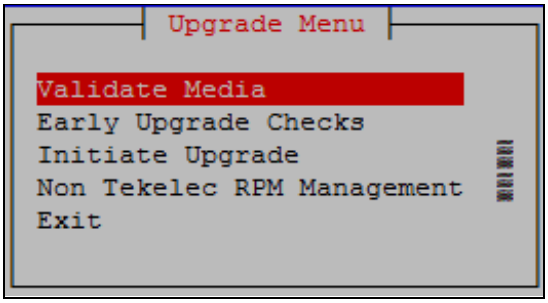
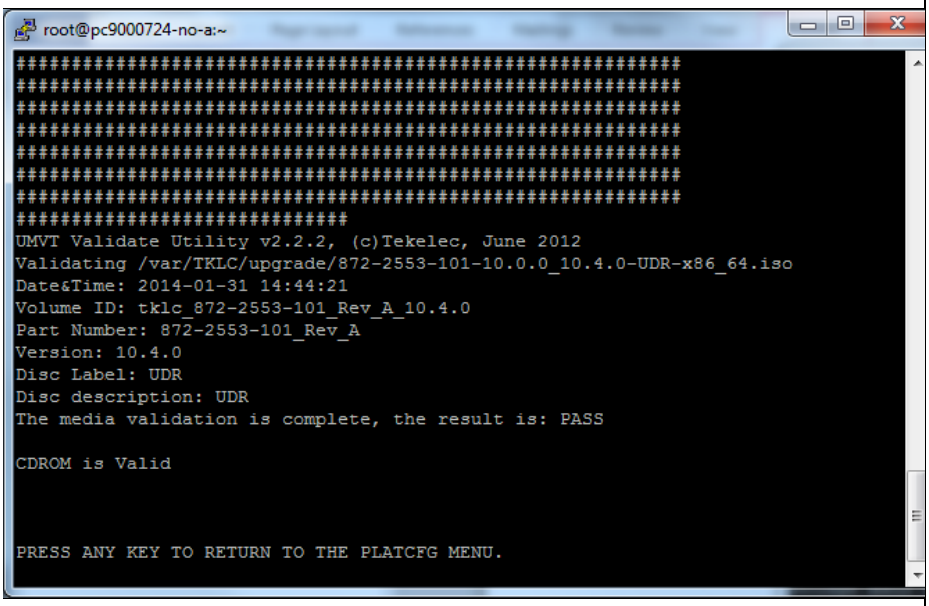
Step	Procedure	Result
14. ☐	Create volume group stripe_vg	`# vgcreate stripe_vg /dev/sdb` `Volume group "stripe_vg" successfully created`

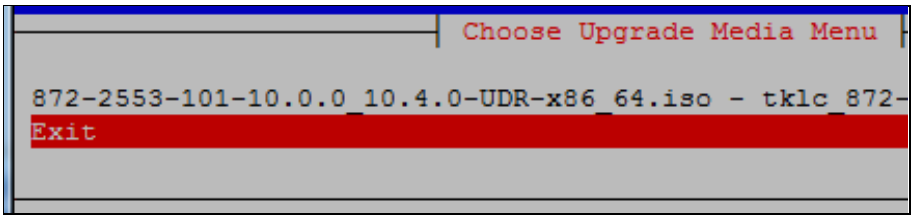
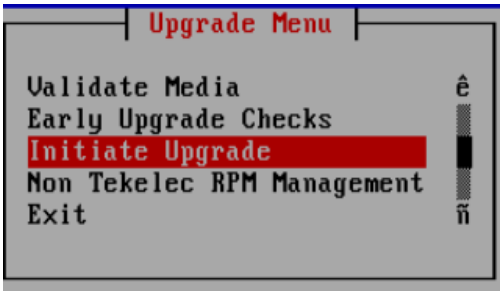
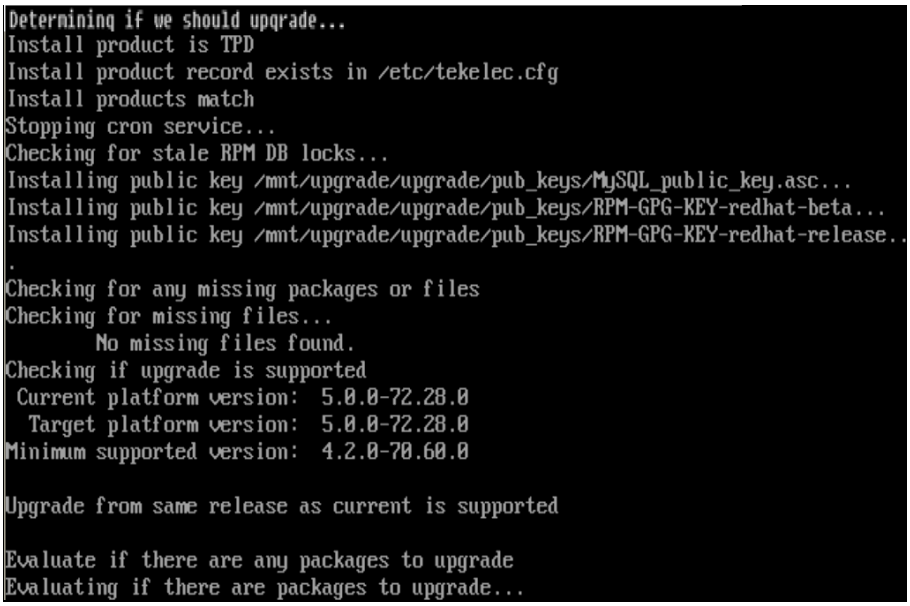
15. ☐	Create logical volume rundb	`# lvcreate -L <SIZE>G --alloc anywhere --name rundb stripe_vg`
		Replace <SIZE> size tag with a number in gigabytes half the size of the second disk according to [1].
		`ISO lab second disk is 120: <SIZE> = 60`
		`ISO production second disk is 720: <SIZE> = 360`

16. ☐	Make filesystem on rundb	`# mkfs -t ext4 /dev/stripe_vg/rundb`
		`mke2fs 1.43-WIP (20-Jun-2013)`
		`Filesystem label=`
		`OS type: Linux`
		`Block size=4096 (log=2)`
		`Fragment size=4096 (log=2)`
		`Stride=0 blocks, Stripe width=0 blocks`
		`25231360 inodes, 100925440 blocks`
		`5046272 blocks (5.00%) reserved for the super user`
		`First data block=0`
		`Maximum filesystem blocks=4294967296`
		`3080 block groups`
		`32768 blocks per group, 32768 fragments per group`
		`8192 inodes per group`
		`Superblock backups stored on blocks:`
		`32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208,`
		`4096000, 7962624, 11239424, 20480000, 23887872, 71663616, 78675968`
		
		`Allocating group tables: done`
		`Writing inode tables: done`
		`Creating journal (32768 blocks): done`
		`Writing superblocks and filesystem accounting information: done`
		
		`This filesystem will be automatically checked every 22 mounts or`
		`180 days, whichever comes first. Use tune2fs -c or -i to override.`

17. ☐	Run the syscheck/restart steps in order	`# syscheck --reconfig disk`
18. ☐	Escape console	Escape the console session by pressing **Ctrl-Alt**

Step	Procedure	Result
19. ☐	**vCloud Director:** 1. Select the **VM**. 2. Click the Blue Gear icon. **3.** Select **Insert CD/DVD from Catalog.**	
20. ☐	**vCloud Director:** 1. Select Oracle Communications User Data Repository ISO. 2. Click **Insert**	
21. ☐	**VM Console:** 1. Re-enter the console window **2.** Login to the platcfg utility.	`[root@hostname1260476221 ~]# su - platcfg`

Step	Procedure	Result
22. ☐	**VM Console:** From the platcfg Main Menu, select each option, pressing **Enter** after each selection.	  
23. ☐	**VM Console:** 1. From the platcfg Main Menu, verify that the CDROM is Valid. 2. Press any key to return to platcfg menu.	

Step	Procedure	Result
24. ☐	**VM Console:** From the platcfg Main Menu, select each option, pressing the **Enter** after each selection.	 
25. ☐	**VM Console:** Verify that the Application release level matches the target release. Press **Enter**.	
26. ☐	**VM Console:** Output similar to that shown on the right may be observed as the Application install progresses.	

Step	Procedure	Result

27. ☐	**VM Console:**
	Output similar to that shown on the right may be observed as the server initiates a post-install reboot.
		`scsi7 : SCSI emulation for USB Mass Storage devices`
		`scsi8 : SCSI emulation for USB Mass Storage devices`
		`input: Intel(R) Multidevice as /class/input/input3`
		`input: USB HID v1.01 Mouse [Intel(R) Multidevice] on usb-0000:00:1d.3-1`
		`input: Intel(R) Multidevice as /class/input/input4`
		`input: USB HID v1.01 Keyboard [Intel(R) Multidevice] on usb-0000:00:1d.3-1`
		`Restarting system.`
		`.`
		`machine restart`

28. ☐	**VM Console:**
	After the server has completed reboot, log into the server as admusr.
		`CentOS release 5.6 (Final)`
		`Kernel 2.6.18-238.19.1.el5prerel5.0.0_72.22.0 on an x86_64`
		
		`hostname1260476221 login:admusr`
		`Password: <admusr_password>`

29. ☐	**VM Console:**
	Output similar to that shown on the right appears as the server returns to a command prompt.
		****** TRUNCATED OUTPUT ******
		`|==========|`
		`| This system has been upgraded but the upgrade has not yet |`
		`| been accepted or rejected. Please accept or reject the |`
		`| upgrade soon. |`
		`|==========|`
		`VPATH=/opt/TKLCcomcol/runcm5.16:/opt/TKLCcomcol/cm5.16`
		`PRODPATH=`
		`RELEASE=5.16`
		`RUNID=00`
		`VPATH=/var/TKLC/rundb:/usr/TKLC/appworks:/usr/TKLC/awpcommon:/usr/TKLC/comagent-gui:/usr/TKLC/comagent:/usr/TKLC/udr`
		`PRODPATH=/opt/comcol/prod`
		`RUNID=00`
		`[admusr@hostname1260476221 ~]$`

30. ☐	**VM Console:** Verify successful upgrade.	`$ verifyUpgrade` **NOTE**: This command should not return output on a healthy system.

31. ☐	**VM Console:**
	Verify that the Application release level matches the target release.
		`[admusr@ pc9000724-no-a ~]$ appRev`
		`Install Time: Fri Feb 9 04:48:18 2019`
		`Product Name: UDR`
		`Product Release: 12.5.1.0.0_17.7.0`
		`Base Distro Product: TPD`
		`Base Distro Release: 7.6.1.0.0-88.55.0`
		`Base Distro ISO: TPD.install-7.6.1.0.0_88.55.0-OracleLinux6.9-x86_64.iso`
		`ISO name: UDR-12.5.1.0.0_17.7.0-x86_64.iso`
		`OS: OracleLinux 6.9`

32. ☐	Change directory	`$ cd /var/TKLC/backout`
33. ☐	Perform upgrade acceptance.	`$ sudo ./accept`

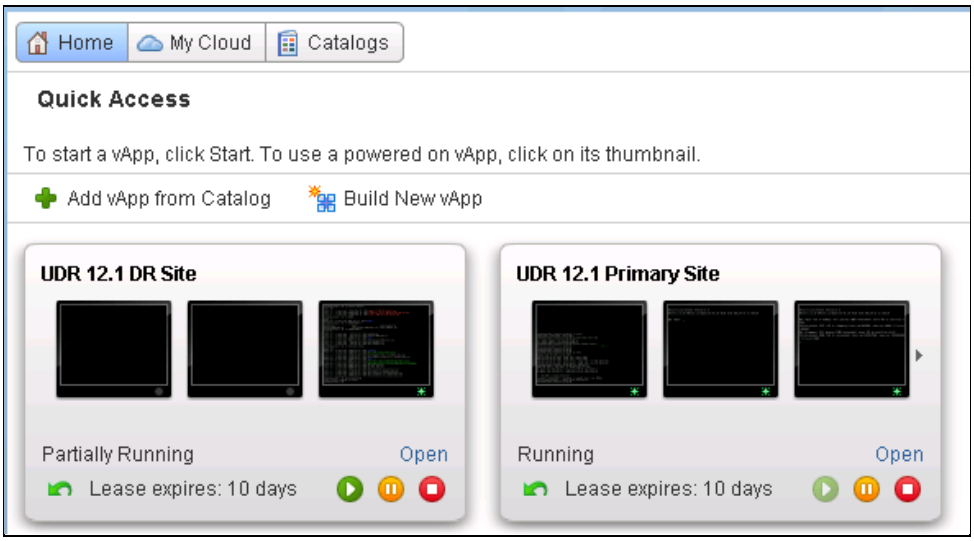
Step	Procedure	Result
34. ☐	**VM Console:** Reboot the server	Reboot the server: `$ sudo reboot` Wait until the reboot completes and re-login with admusr credentials.
35. ☐	**VM Console:** Verify server health	Verify server health: `$ alarmMgr --alarmStatus` **NOTE**: This command should return only one alarm related to pending upgrade acceptance.
THIS PROCEDURE HAS BEEN COMPLETED		

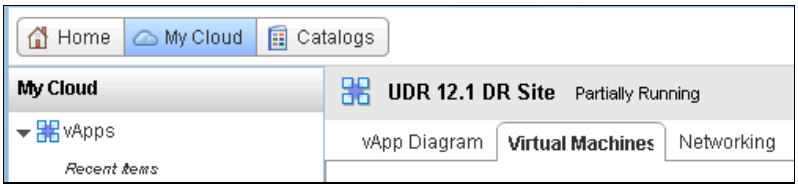
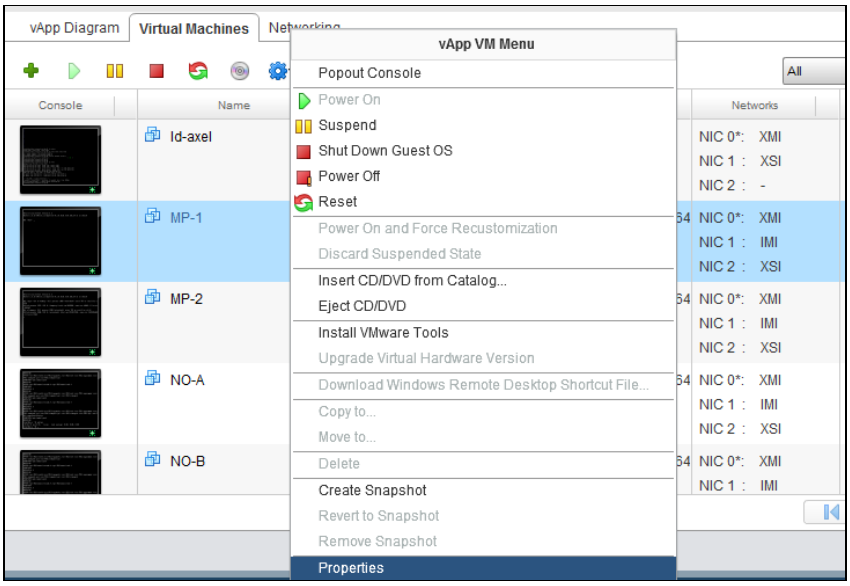
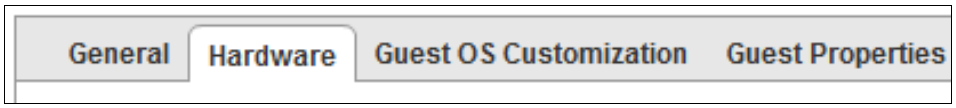
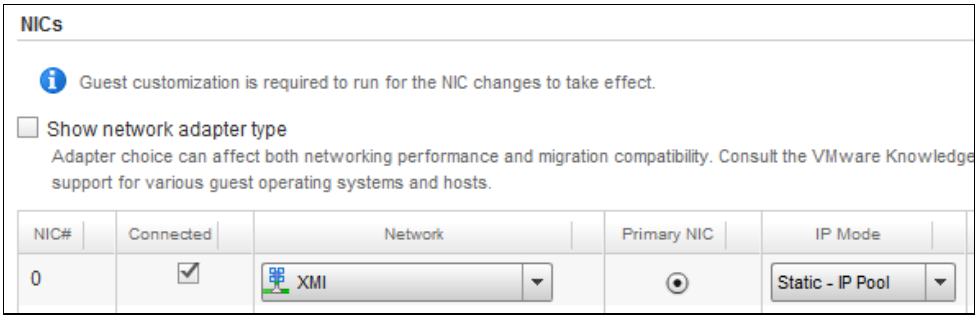
C.7 CONFIGURE GUESTS NETWORK

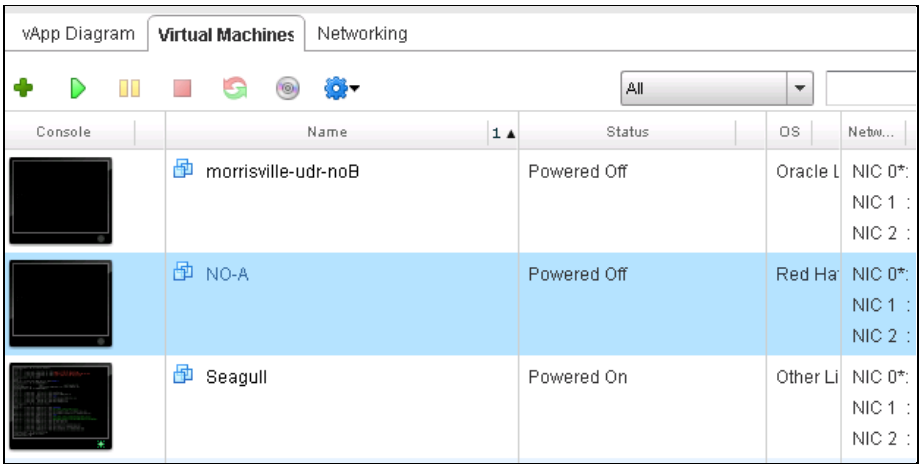
This procedure creates Oracle Communications User Data Repository virtual machines (guests) from ISO.

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure25: Configure Guest OAM Network

Step	Procedure	Result
1. ☐	Log into the VMware vCloud Director	
2. ☐	**vCloud Director:** Select **Open** hyperlink for the Oracle Communications User Data Repository vApp then procede to Step 5.	 **NOTE:** Current vApps are listed on the Home Page. If a new vApp is required continue with the next step.

Step	Procedure	Result
3. ☐	**vCloud Director:** Navigate to **My Cloud → Virtual Machines**	
4. ☐	**vCloud Director:** 1. Select the VM. 2. Click the Blue Gear icon. 3. Select **Properties**	
5. ☐	**vCloud Director:** 1. Select **Hardware** tab. 2. Recored the NIC number assigment of application networks 3. Click **Cancel**	  Record the NIC device number assigment for these networks: XMI: _____ IMI: _____ XSI-1: _____ XSI-2: _____ (optional)

Step	Procedure	Result
6. ☐	**vCloud Director:** Click the console to raise console window	
7. ☐	**VM Console:** Login to console as admusr	`login as: admusr` `Password:`

8. ☐	**VM Console:**
	Configure XMI network
		1. View a list of netAdm devices
		`$ sudo netAdm show`
		2. Set the XMI device for routable OAM access:
		NOTE: Use add if the show command did not list device eth0. Use set otherwise.
		`$ sudo netAdm add --device=eth0 --address=<Guest_XMI_IP_Address> --netmask=<XMI_Netmask> --onboot=yes --bootproto=none`
		3. Add the default route for XMI:
		`$ sudo netAdm add --route=default --gateway=<Gateway_XMI_IP_Address> --device=eth0`
		NOTE: The network device may be different than shown here (eth0) if the order of network adapter insertion was other than shown. Refer to Step 5 for this assignment.

9. ☐	**VM Console:** Configure XSI network	Set the XSI device for routable signaling network access (Only for NO and MP Servers): **NOTE:** Where ethX is the interface associated with the signaling network `$ sudo netAdm add --device=eth2 --address=<Guest_XSI_IP_Address> --netmask=<XSI_Netmask> --onboot=yes --bootproto=none` **NOTE:** The network device may be different than shown here (eth2) if the order of network adapter insertion was other than shown. Refer to Step 5 for this assignment.
10. ☐	**VM Console:** Repeat as required	Repeat Step 7 to add XS1-2 (eth3) if a second signaling network is in use. Adjust parameter values as required
11. ☐	**VM Console:** Exit console	`$ exit` **NOTE:** Press **Ctrl-Alt** to escape from console.
THIS PROCEDURE HAS BEEN COMPLETED		

Appendix D. OpenStack Cloud Oracle Communications User Data Repository

This appendix contains procedures for deploying Oracle Communications User Data Repository on the Openstack platform. The steps here contain references to third party interfaces, the accuracy of which cannot be guaranteed. Appearance and function may differ between versions of Openstack software and deployments of Openstack cloud computing.

IMPORTANT NOTE: The content of this appendix is for informational purposes only. Consult the latest documents from the vendor of your OpenStack distrobution.

D.1 OPENSTACK IMAGE CREATION FROM OVA

This procedure converts application media (OVA) to qcow2 format and upload it into OpenStack.

Needed material:

- Oracle Communications User Data Repository OVAs

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure26: OpenStack Image Creation from OVA

Step	Procedure	Result

1. ☐	1. Login to OpenStack Controller Node using root user
	2. Create /home/ova dir
		`login as: root`
		`root@100.65.218.136's password: <root_password>`
		`Last login: Thu Feb 9 21:10:59 2016 from 10.182.167.73`
		`[root@pc12107008 ~]# mkdir -p /home/ova`
		`[root@pc12107008 ~]# cd /home/ova`

2. ☐	Transfer OVA file this dir using sftp tool	`[root@pc12107008 ova]# ll` `-rw-r--r-- 1 root root 1519329280 Feb 2 03:40 UDR-12.5.1.0.0_17.7.0.ova`

3. ☐	Untar this ova file	`[root@pc12107008 ova]# tar xvf UDR-12.5.1.0.0_17.7.0.ova`
		`UDR-17_7_0.ovf`
		`UDR-17_7_0.mf`
		`UDR-17_7_0.vmdk`

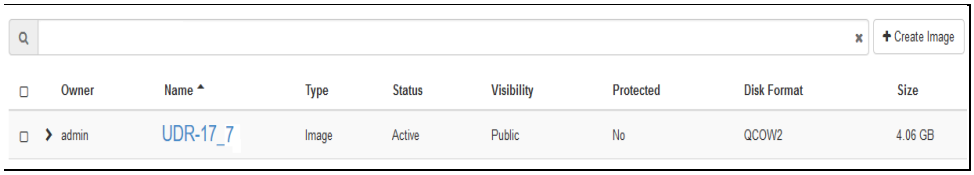
4. ☐	Convert this vmdk file to qcow2 file	`[root@pc12107008 ova]# qemu-img convert -O qcow2 UDR-17_17_0.vmdk UDR-17_7_0.qcow2`

Step	Procedure	Result
5. ☐	Import converted qcow2 file into OpenStack	

```
[root@pc12107008 ova]# source /root/keystonerc_admin
[root@pc12107008 ova(keystone_admin)]# time glance image-create --name
UDR-17_7_0 --disk-format=qcow2 --container-format=bare --
visibility=public--          file= UDR-17_7_0.qcow2
+------------------+--------------------------------------+
| Property         | Value                                |
+------------------+--------------------------------------+
| checksum         | 81e7f682231b108e29053e9516ff91ac     |
| container_format | bare                                 |
| created_at       | 2019-02-9T06:56:51                  |
| deleted          | False                                |
| deleted_at       | None                                 |
| disk_format      | qcow2                                |
| id               | ee0ffa59-356b-4b32-aea2-b0cdf9063653 |
| is_public        | True                                 |
| min_disk         | 0                                    |
| min_ram          | 0                                    |
| name             | UDR-17_7_0                           |
| owner            | 63efbafd70864562aa6440abfca60ca5     |
| protected        | False                                |
| size             | 3615227904                           |
| status           | active                               |
| updated_at       | 2016-03-29T06:57:16                  |
| virtual_size     | None                                 |
+------------------+--------------------------------------+

real    0m26.267s
user    0m2.435s
sys     0m2.691s
```

Step	Procedure	Result
6. ☐	After image-create, this image could be seen from OpenStack GUI under **Project → Images**	



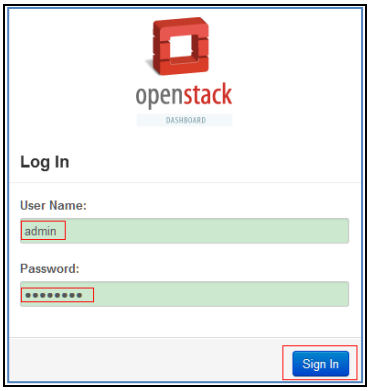
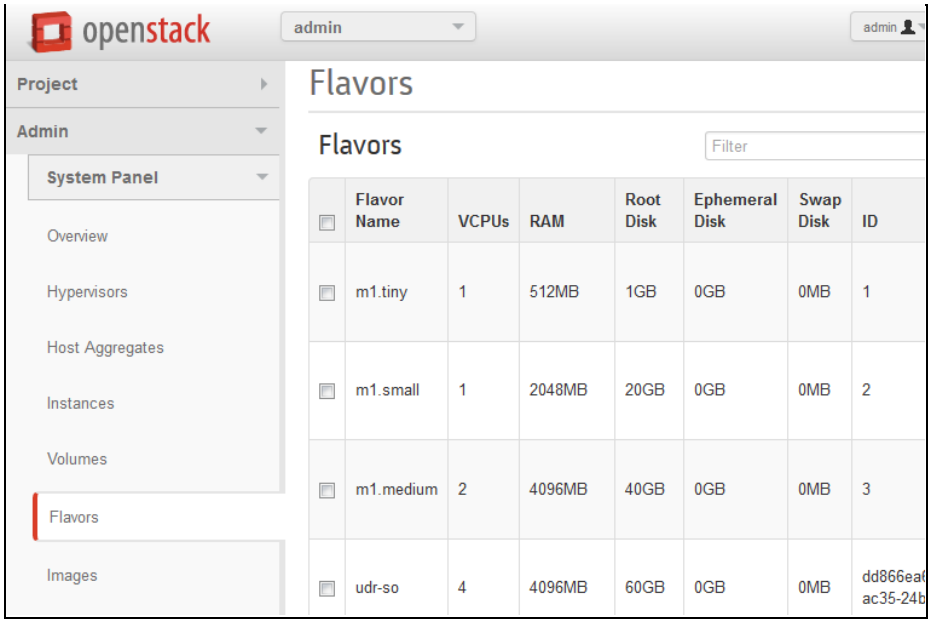
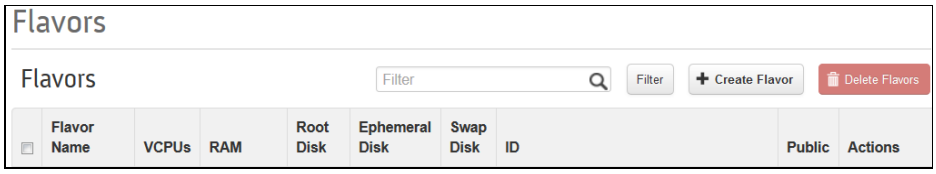
THIS PROCEDURE HAS BEEN COMPLETED

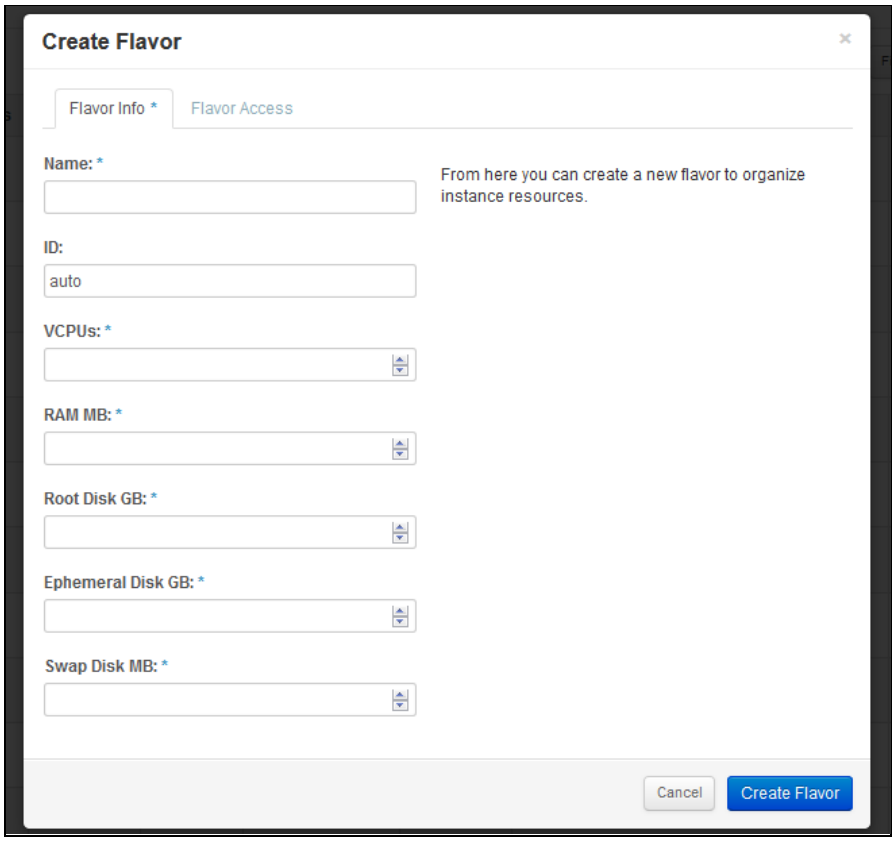
D.2 CREATE RESOURCE PROFILES (FLAVORS)

This procedure creates resource profiles called flavors to aid in VM creation.

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure27: Create Resource Profiles (Flavors)

Step	Procedure	Result
1. ☐	Login to the OpenStack GUI **NOTE:** Flavor profile creation may require administrative privilige.	
2. ☐	Select **Main Menu → Admin → System Panel → Flavors**	
3. ☐	Click **Create Flavor**	

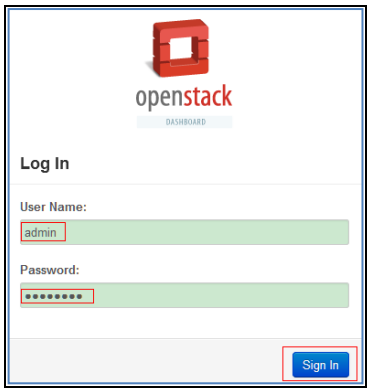
Step	Procedure	Result
4. ☐	Enter Flavor Details using Appendix G as a guide * Name: udr-no ID: auto VCPUs: vCPUs* RAM: RAM* Root Disk: Storage* Ephemeral Disk: 0 Swap Disk: 0 **NOTE:** UDR does not require Ephemeral or Swap Disk. Then click **Create Flavor**.	
THIS PROCEDURE HAS BEEN COMPLETED		

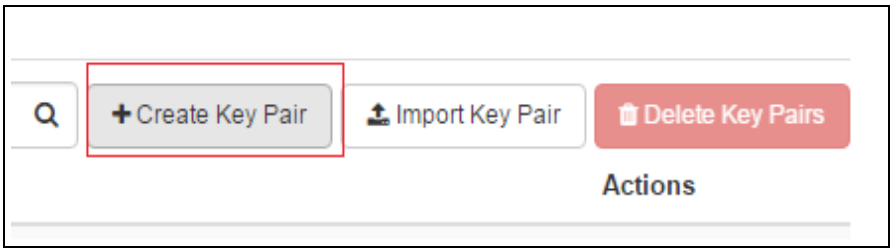
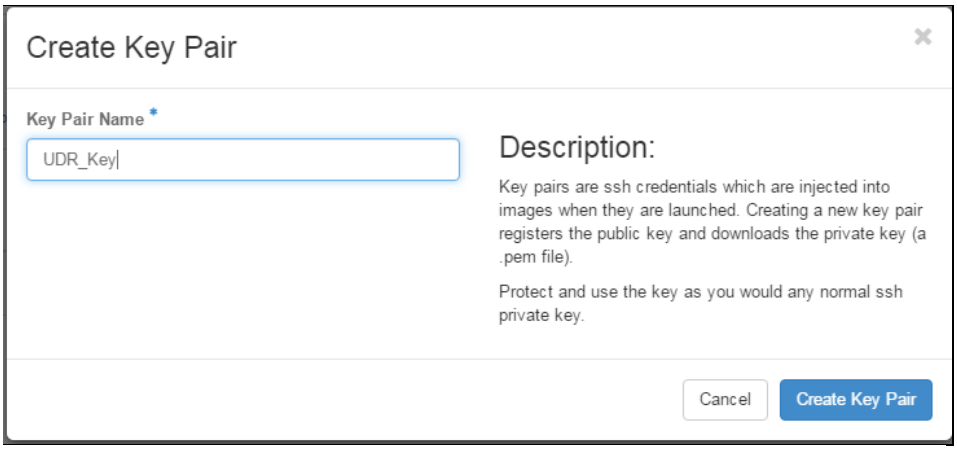
D.3 CREATE KEY PAIR

This procedure creates Key Pair to be used in VM creation.

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure28: Create Key Pair

Step	Procedure	Result
1. ☐	Login to the OpenStack GUI **NOTE:** Flavor profile creation may require administrative privilige.	

Step	Procedure	Result
2. ☐	Select: **Main Menu→ Compute → Access & Security → Key Pairs**	
3. ☐	Click **Create Key Pair.**	
4. ☐	Enter Key Pair Name Then click **Create Key Pair**.	
5. ☐	The Key pair automatically get downloaded to your computer.	The generated Key Pair gets downloaded automatically on creation. This is used for SSH Access to VM Instances.
THIS PROCEDURE HAS BEEN COMPLETED		

D.4 UPDATE UDR STACK YAML FILE

This procedure updates UDR Stack Yaml File to be used in VM creation.

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure29: Create Key Pair

Step	Procedure	Result
1. ☐	Download the yaml file	Go to the Oracle Help Center and download the zip file containing the [UDR Heat Templates]().

2. ☐	Update Image name or ID with the name of the UDR Qcow2 to be used	Change the deafult value.
		`label: Image name or ID`
		`description: UDR Image to be used for launching UDR VM`
		`default: UDR-12.5.1.0.0_17.7.0`

Step	Procedure	Result

3. ☐	Update the NTP Server IP	Change the default value.
		`label: NTP server`
		`description: IP address of the NTP server used for UDR VM syncing time`
		`default: 192.168.56.180`

4. ☐	Update the UDR flavor name if different	Change the default value.
		`label: Flavor for UDR`
		`description: Type of instance (flavor) to be used for launching UDR VM`
		`default: UDR`

5. ☐	Update the XMI Network name if different	Change the default value.
		`label: UDR XMI network`
		`description: Network name or ID to attach UDR XMI network to.`
		`default: xmi`

6. ☐	Update the IMI Network name if different	Change the default value.
		`label: UDR IMI network`
		`description: Private network name or ID to attach UDR IMI network to.`
		`default: imi`

7. ☐	Update the XSI1 Network name if different	Change the default value.
		`label: UDR XSI1 network`
		`description: Network name or ID to attach UDR XSI1 network to.`
		`default: xsi1`

8. ☐	Update the XSI2 Network name if different	Change the default value.
		`label: UDR XSI2 network`
		`description: Network name or ID to attach UDR XSI2 network to.`
		`default: xsi2`

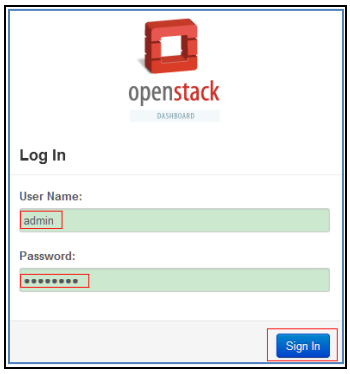
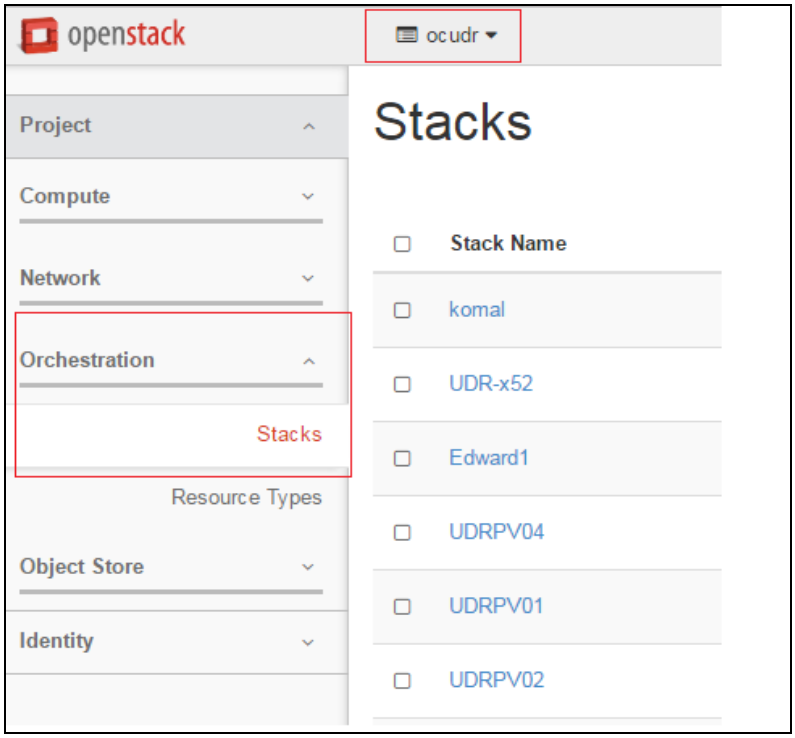
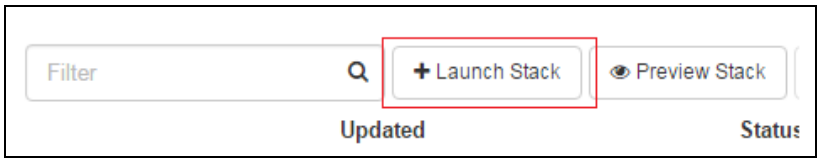
9. ☐	Uncomment UDROB configuration from line 147 to 234 if configuring active, standby UDRs	Uncomment UDRB configuration from line 147 to 234 if configuring active, standby UDRs
THIS PROCEDURE HAS BEEN COMPLETED		

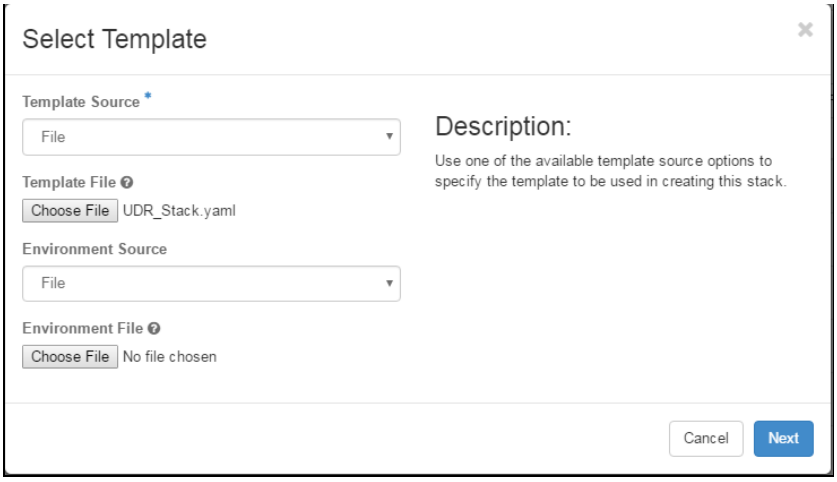
D.5 CREATE VM INSTANCES USING YAML FILE

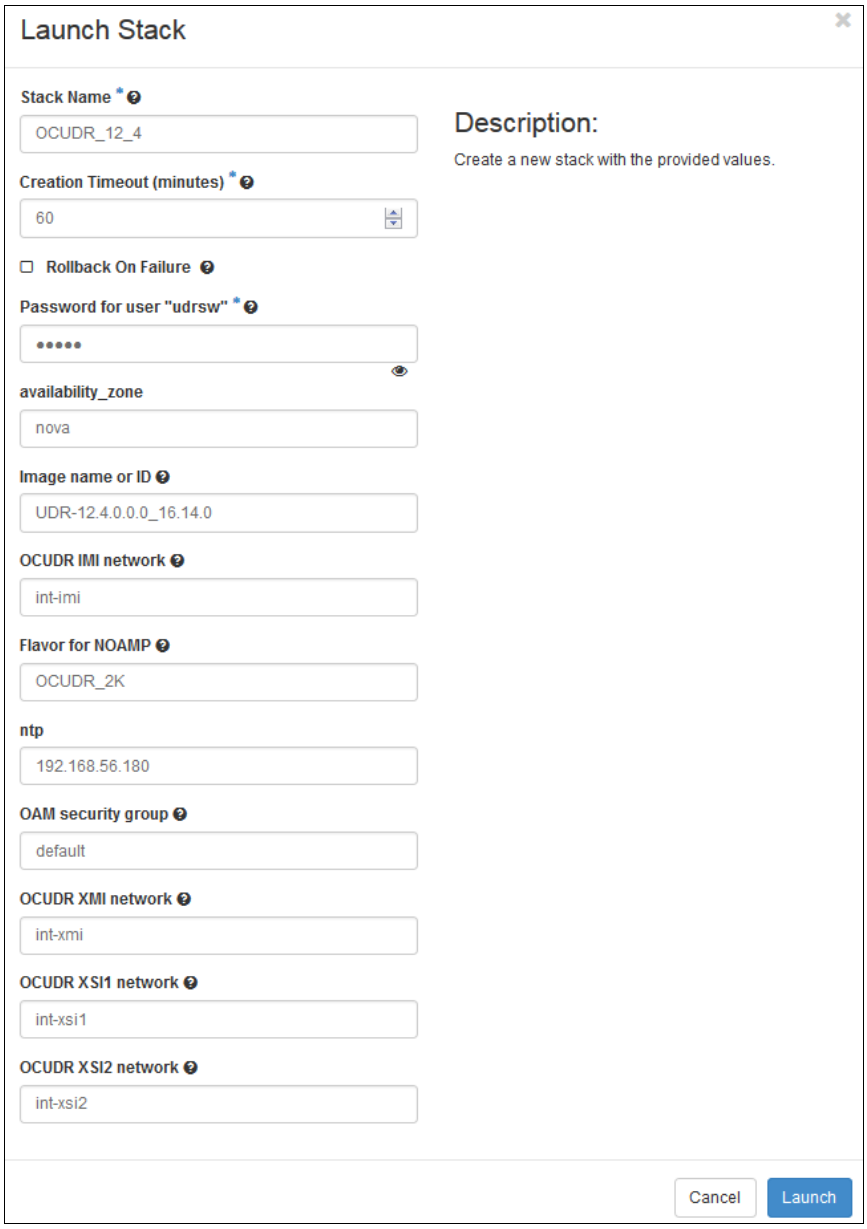
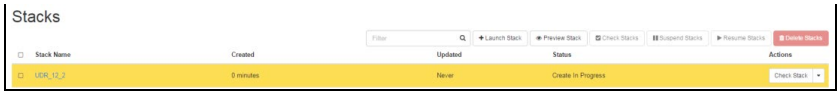
This procedure creates and configure all VM instances needed for UDR configuration.

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure30: Create VM Instances Using Yaml File

Step	Procedure	Result
1. ☐	Login to the OpenStack GUI	
2. ☐	1. Select project, (for example, UDR). 2. Navigate to **Project** → **Orchestration** → **Stacks** to show all Stacks created under this project.	
3. ☐	Click **Launch Stack**	

Step	Procedure	Result
4. ☐	Select the Template File and Click **Next**	

Step	Procedure	Result
5. ☐	1. Enter the Stack Name 2. Enter the password for Openstack user 3. Click Launch to create UDR Stack	
6. ☐	Wait for stack creation to finish.	
THIS PROCEDURE HAS BEEN COMPLETED		

D.6 EXTEND VM INSTANCE VOLUME SIZE

This procedure extends the storage capacity of a VM instance using filesystem utilities.

Important: The steps in this procedure only apply to servers where storage demands exceed the default size of 60GB. The numbers here vary depending on the unique needs of each deployment and the specific hardware resource availability. This is to be taken as an example only. The suitability of these steps cannot be guarenteed across all deployment scenarios.

This procedure must be performed only under these conditions:

- UDR Instance with resource profile other than lab profile

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure31: Extend VM Instance Volume Size

Step	Procedure	Result
1. ☐	Login to the VM Instance as per D.10 Accessing VM Instance using SSH	`hostnamea0c2d9aa8bce login: admusr`
2. ☐	Switch to root user	`# su - root` `password: <root_password>`

3. ☐	Use fdisk to create a partition on `/dev/vda`
	NOTE: First cylinder of `/dev/vda3` is calculated from end cylinder of `/dev/vda2`, say 124810 is the next of the end cylinder of `/dev/vda2`
		`[root@hostnameb267a6968148 ~]#fdisk /dev/vda`
		`Command (m for help): p`
		`Disk /dev/vda: 171.8 GB, 171798691840 bytes`
		`16 heads, 63 sectors/track, 332881 cylinders`
		`Units = cylinders of 1008 * 512 = 516096 bytes`
		`Sector size (logical/physical): 512 bytes / 512 bytes`
		`I/O size (minimum/optimal): 512 bytes / 512 bytes`
		`Disk identifier: 0x0008a531`
		`  Device Boot  Start  End  Blocks  Id  System`
		`/dev/vda1  *  3  523  262144  83  Linux`
		`Partition 1 does not end on cylinder boundary.`
		`/dev/vda2  523  124809  62640128  8e  Linux LVM`
		`Partition 2 does not end on cylinder boundary.`
		
		`Command (m for help): n`
		`Command action`
		`  e  extended`
		`  p  primary partition (1-4)`
		`p`
		`Partition number (1-4): 3`
		`First cylinder (1-332881, default 1): 124810`
		`Last cylinder, +cylinders or +size{K,M,G} (124810-332881, default 332881):`
		`Using default value 332881`
		`Command (m for help): w`
		`The partition table has been altered!`
		`Calling ioctl() to re-read partition table.`
		`WARNING: Re-reading the partition table failed with error 16: Device or resource busy.`
		`The kernel still uses the old table. The new table will be used at the next reboot or after you run partprobe(8) or kpartx(8)`
		`Syncing disks.`

4. ☐	Reboot instance	`[root@hostnameb267a6968148 ~]# init 6`

Step	Procedure	Result

5. ☐	After reboot, Login to the VM with admusr user and switch to root user D.10 Accessing VM Instance using SSH	`hostnameb267a6968148 login: admusr`
		`# su - root`
		`password: <root_password>`

6. ☐	Create pv /dev/vda3	`[root@hostnameb267a6968148 ~]# pvcreate /dev/vda3` ` Physical volume "/dev/vda3" successfully created`
7. ☐	Extend vg vgroot on /dev/vda3	`[root@hostnameb267a6968148 ~]# vgextend vgroot /dev/vda3` ` Volume group "vgroot" successfully extended`

8. ☐	Extend logical volumes for 2K profile	`# lvextend -L +52428800K /dev/vgroot/run_db`
		`# lvextend -L +52428800K /dev/vgroot/filemgmt`
		`# lvextend -L +6291456K /dev/vgroot/logs_process`
		`# lvextend -L +5242880K /dev/mapper/vgroot-plat_usr`
		
		`# resize2fs /dev/mapper/vgroot-filemgmt`
		`# resize2fs /dev/mapper/vgroot-run_db`
		`# resize2fs /dev/mapper/vgroot-logs_process`
		`# resize2fs /dev/mapper/vgroot-plat_usr`
		
		`# lvsdf -ha`
		
		`  LV  VG  Attr  LSize  Pool Origin Data%  Meta%`
		`Move Log Cpy%Sync Convert`
		`  apw_tmp  vgroot -wi-ao----  9.09g`
		`  filemgmt  vgroot -wi-ao---- 68.19g`
		`  logs_process  vgroot -wi-ao----  9.66g`
		`  logs_security vgroot -wi-ao----  3.66g`
		`  netbackup_lv  vgroot -wi-ao----  2.00g`
		`  plat_root  vgroot -wi-ao----  1.00g`
		`  plat_tmp  vgroot -wi-ao----  1.00g`
		`  plat_usr  vgroot -wi-ao----  8.80g`
		`  plat_var  vgroot -wi-ao----  1.00g`
		`  plat_var_tklc vgroot -wi-ao----  4.00g`
		`  run_db  vgroot -wi-ao---- 59.09g`
		
		`# vgs`
		`  VG  #PV #LV #SN Attr  VSize  VFree`
		`  vgroot  2  11  0 wz--n- 219.72g 52.62g`

Step	Procedure	Result

9. ☐	Extend logical volumes for 7K or 12.5K profile	`# lvextend -L +115343360K /dev/vgroot/run_db`
		`# lvextend -L +104857600K /dev/vgroot/filemgmt`
		`# lvextend -L +6291456K /dev/vgroot/logs_process`
		`# lvextend -L +10485760K /dev/vgroot/apw_tmp`
		`# lvextend -L +5242880K /dev/mapper/vgroot-plat_usr`
		
		`# resize2fs /dev/mapper/vgroot-filemgmt`
		`# resize2fs /dev/mapper/vgroot-run_db`
		`# resize2fs /dev/mapper/vgroot-logs_process`
		`# resize2fs /dev/mapper/vgroot-apw_tmp`
		`# resize2fs /dev/mapper/vgroot-plat_usr`
		`# lvs`
		`  LV  VG  Attr  LSize  Pool Origin Data%  Meta%`
		`Move Log Cpy%Sync Convert`
		`  apw_tmp  vgroot -wi-ao----  29.09g`
		`  filemgmt  vgroot -wi-ao---- 118.19g`
		`  logs_process  vgroot -wi-ao----  9.66g`
		`  logs_security vgroot -wi-ao----  3.66g`
		`  netbackup_lv  vgroot -wi-ao----  2.00g`
		`  plat_root  vgroot -wi-ao----  1.00g`
		`  plat_tmp  vgroot -wi-ao----  1.00g`
		`  plat_usr  vgroot -wi-ao----  8.80g`
		`  plat_var  vgroot -wi-ao----  1.00g`
		`  plat_var_tklc vgroot -wi-ao----  4.00g`
		`  run_db  vgroot -wi-ao---- 109.09g`
		
		`# vgs`
		`  VG  #PV #LV #SN Attr  VSize  VFree`
		`  vgroot  2  11  0 wz--n- 282.69g 117.31g`

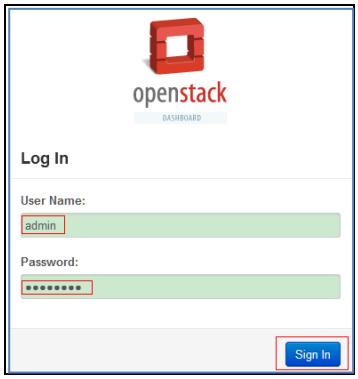
10. ☐	Reboot instance	`[root@hostnameb267a6968148 ~]# init 6`
THIS PROCEDURE HAS BEEN COMPLETED		

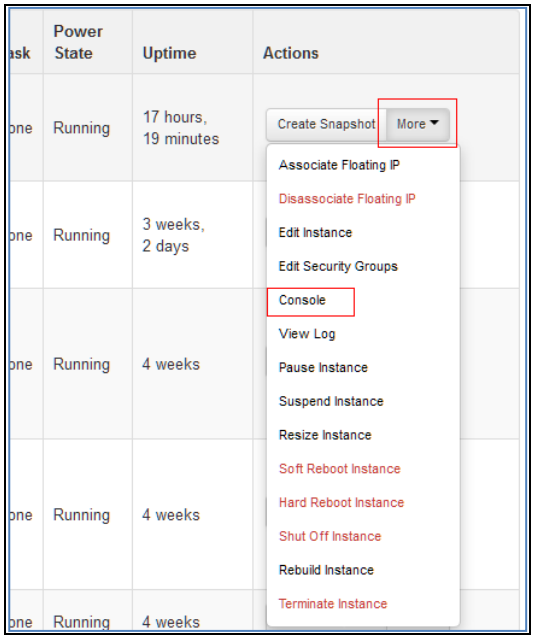
D.7 VM INSTANCE NETWORK CONFIGURATION

This procedure configures network interfaces for VM instance.

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure32: VM Instance Network Configuration

Step	Procedure	Result
1. ☐	Login to the OpenStack GUI	

Step	Procedure	Result
2. ☐	Login VM instance from **Project → Compute → Instances → More → Console**	
3. ☐	Login to the VM with root user	`hostnamea0c2d9aa8bce login: root` `password: <root_password>`

4. ☐	Use netAdm to add device and set ip address
	(ISO installs only)
		NOTE: This step is required only for ISO installs.
		`[root@ hostnamea0c2d9aa8bce ~]# netAdm add --device=eth0`
		`Interface eth0 added`

5. ☐	Set ip address for this interface	`[root@ hostnamea0c2d9aa8bce ~]# netAdm set --device=eth0 --onboot=yes \`
		`  --netmask=<netmask> --address=<ip_address>`
		`Interface eth0 updated`

6. ☐	Add default router	`[root@ hostnamea0c2d9aa8bce ~]# netAdm add --route=default --device=eth0 \`
		`  --gateway=10.240.174.1`
		`Route to eth0 added`

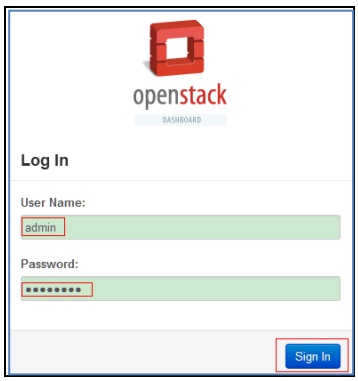
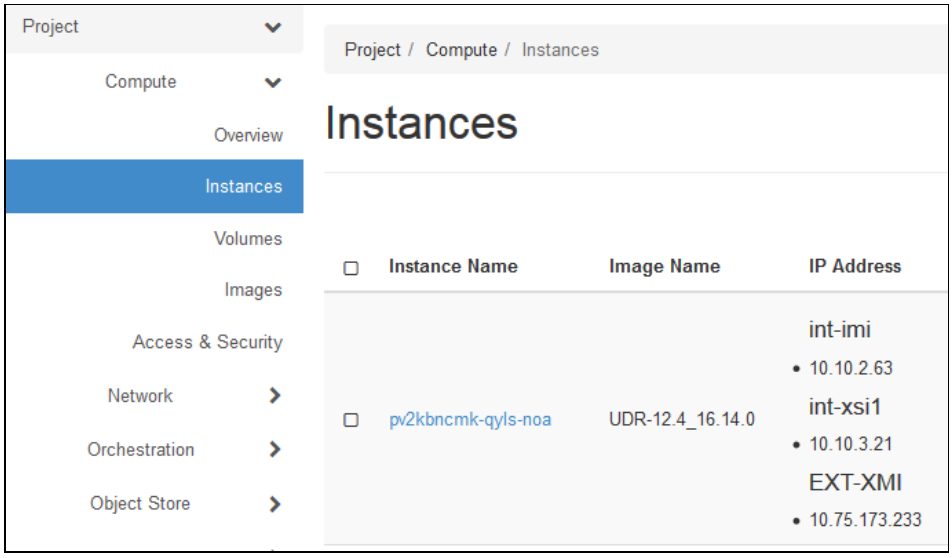
7. ☐	Add eth1 interface	`[root@ hostnamea0c2d9aa8bce ~]# netAdm add --device=eth1` `Interface eth1 added`
8. ☐	Add eth2 interface	`[root@hostnameb6092a316785 ~]# netAdm add --device=eth2` `Interface eth2 added`
THIS PROCEDURE HAS BEEN COMPLETED		

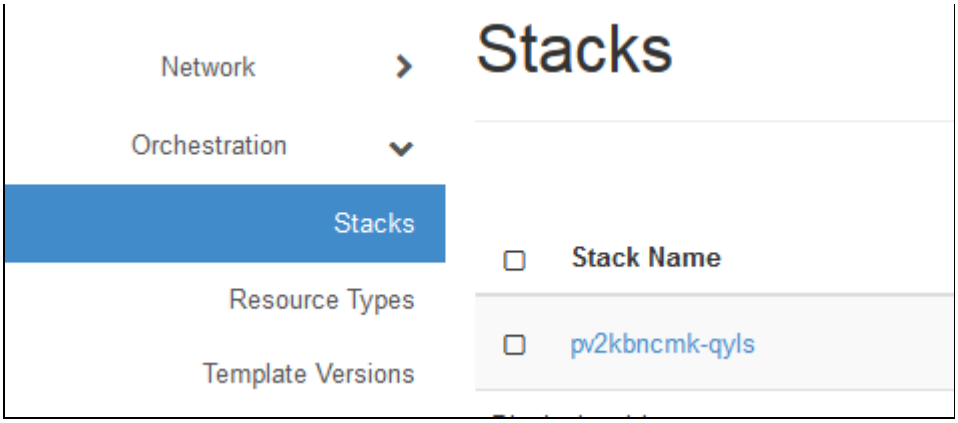
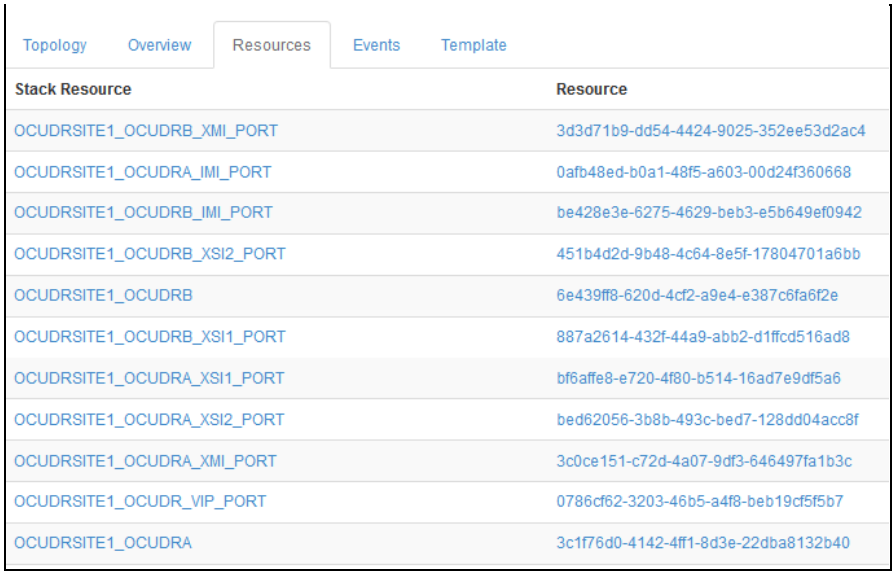
D.8 VIRTUAL IP ADDRESS ASSIGNMENT

This procedure configures a VIP for a virtual machine. Administrative access to the OpenStack controller node is required.

Mark (Ö) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure33: Virtual IP Address Assignment

Step	Procedure	Result
1. ☐	Login to the OpenStack GUI	
2. ☐	1. Select project, (for example: UDR). 2. Select **Project → Compute → Instances** to show all Instances created under this project:	
3. ☐	Find the UDR instances	Record the IP addresses of the UDR instances primary XMI network. UDR A: _____ UDR B: _____

Step	Procedure	Result
4. ☐	1. Navigate to **Project → Orchestration → Stacks** 2. Select the Stack Name to see more detail	
5. ☐	Select the **Resource** tab, find the VIP PORT for UDR servers.	

Stack Resource	Resource
OCUDRSITE1_OCUDRB_XMI_PORT	3d3d71b9-dd54-4424-9025-352ee53d2ac4
OCUDRSITE1_OCUDRA_IMI_PORT	0afb48ed-b0a1-48f5-a603-00d24f360668
OCUDRSITE1_OCUDRB_IMI_PORT	be428e3e-6275-4629-beb3-e5b649ef0942
OCUDRSITE1_OCUDRB_XSI2_PORT	451b4d2d-9b48-4c64-8e5f-17804701a6bb
OCUDRSITE1_OCUDRB	6e439ff8-620d-4cf2-a9e4-e387c6fa6f2e
OCUDRSITE1_OCUDRB_XSI1_PORT	887a2614-432f-44a9-abb2-d1ffcd516ad8
OCUDRSITE1_OCUDRA_XSI1_PORT	bf6affe8-e720-4f80-b514-16ad7e9df5a6
OCUDRSITE1_OCUDRA_XSI2_PORT	bed62056-3b8b-493c-bed7-128dd04acc8f
OCUDRSITE1_OCUDRA_XMI_PORT	3c0ce151-c72d-4a07-9df3-646497fa1b3c
OCUDRSITE1_OCUDR_VIP_PORT	0786cf62-3203-46b5-a4f8-beb19cf5f5b7
OCUDRSITE1_OCUDRA	3c1f76d0-4142-4ff1-8d3e-22dba8132b40

Step	Procedure	Result
6. ☐	Copy or record the Port ID for UDR	Topology Overview Resources Events Template Stack Resource / Resource OCUDRSITE1_OCUDRB_XMI_PORT — 3d3d71b9-dd54-4424-9025-352ee53d2ac4 OCUDRSITE1_OCUDRA_IMI_PORT — 0afb48ed-b0a1-48f5-a603-00d24f360668 OCUDRSITE1_OCUDRB_IMI_PORT — be428e3e-6275-4629-beb3-e5b649ef0942 OCUDRSITE1_OCUDRB_XSI2_PORT — 451b4d2d-9b48-4c64-8e5f-17804701a6bb OCUDRSITE1_OCUDRB — 6e439ff8-620d-4cf2-a9e4-e387c6fa6f2e OCUDRSITE1_OCUDRB_XSI1_PORT — 887a2614-432f-44a9-abb2-d1ffcd516ad8 OCUDRSITE1_OCUDRA_XSI1_PORT — bf6affe8-e720-4f80-b514-16ad7e9df5a6 OCUDRSITE1_OCUDRA_XSI2_PORT — bed62056-3b8b-493c-bed7-128dd04acc8f OCUDRSITE1_OCUDRA_XMI_PORT — 3c0ce151-c72d-4a07-9df3-646497fa1b3c OCUDRSITE1_OCUDR_VIP_PORT — 0786cf62-3203-46b5-a4f8-beb19cf5f5b7 OCUDRSITE1_OCUDRA — 3c1f76d0-4142-4ff1-8d3e-22dba8132b40
7. ☐	Copy or record all required Port IDs for DR Site.	Repeat Step 5 and Step 6 to copy or record the Port ID of both servers: DR-UDR-A and DR-UDR-B. DR-UDR-A: _____ DR-UDR-B _____

8. ☐	**OpenStack Controller node:**
	1. Access the command prompt.
	2. Log into the controller node as a privilidged user.
		`login as: <usr_name>`
		`root@10.250.xx.yy's password: <usr_password>`
		`Last login: Mon Jul 30 10:33:19 2012 from 10.25.80.199`
		`[root@control01]#`

9. ☐	**OpenStack Controller node:** Initialize environment variables	`controller ~]# source keystonerc_udrsw`

Step	Procedure	Result

10. ☐	**OpenStack Controller node:**
	Assign VIP by Port IDs
		Assign the VIP address to both A and B servers sharing the VIP:
		`[root@control01 ~(keystone_udrsw)]# openstack floating ip create --port <UDR_VIP_Port_ID> EXT-XMI`
		For example:
		`openstack floating ip create --port fc7b8473-b39d-477f-8b2b-7e0a3b45ce5b EXT-XMI`

11. ☐	**OpenStack Controller node:** Repeat if needed	Repeat Step 10 as required for any other server pairs requiring a VIP.
12. ☐	**OpenStack Controller node:** Confirm VIP association	VIP associations may be confirmed with the following command by Port ID: `[root@control01 ~(keystone_udrsw)]# neutron port-show <port_id>` See Figure 3 for an example of the output.
THIS PROCEDURE HAS BEEN COMPLETED		

Figure 3 Example port-show output.

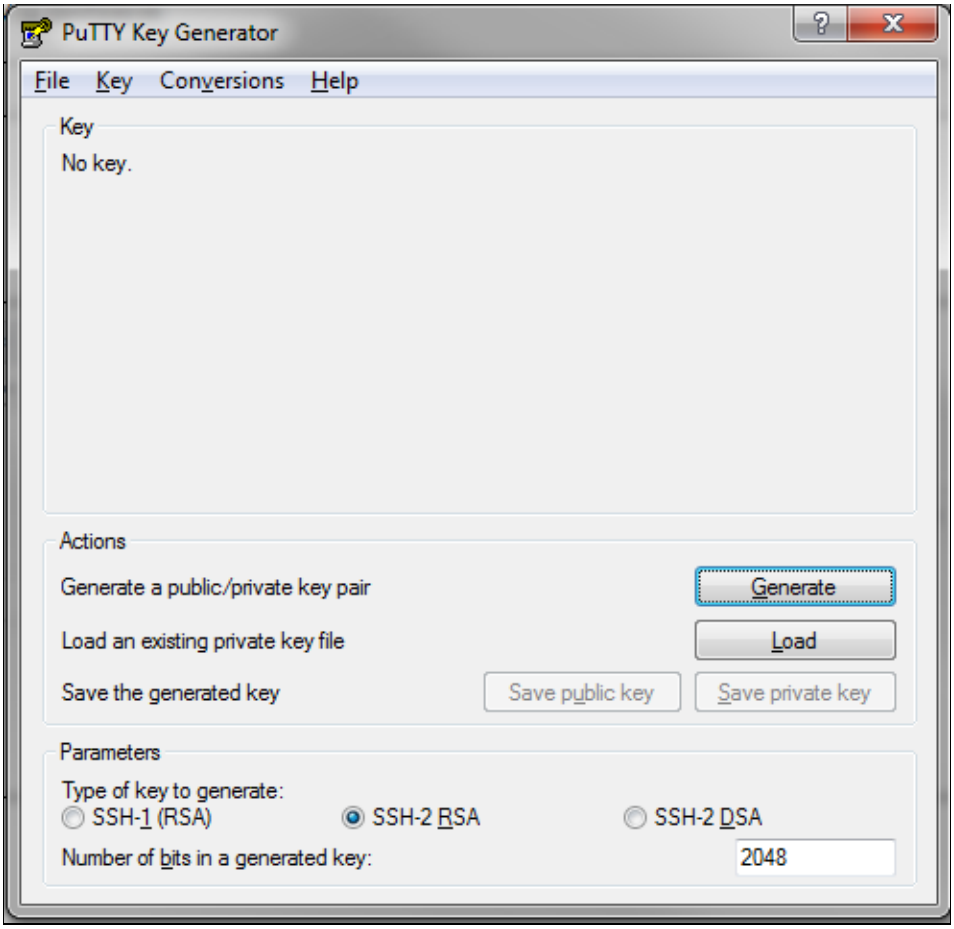
```
+-----------------------+-------------------------------------------------------------------------------------+
| Field                 | Value                                                                               |
+-----------------------+-------------------------------------------------------------------------------------+
| admin_state_up        | True                                                                                |
| allowed_address_pairs | {"ip_address": "10.240.221.36", "mac_address": "fa:16:3e:ce:18:2a"}                 |
| binding:host_id       | compute05.labafrica                                                                 |
| binding:profile       | {}                                                                                  |
| binding:vif_details   | {"port_filter": true, "ovs_hybrid_plug": true}                                      |
| binding:vif_type      | ovs                                                                                 |
| binding:vnic_type     | normal                                                                              |
| device_id             | 947457b4-46e8-43e7-8f14-79c816388e3d                                                |
| device_owner          | compute:Odds                                                                        |
| extra_dhcp_opts       |                                                                                     |
| fixed_ips             | {"subnet_id": "23f28095-bdb6-4fab-b13e-281d726ef3eb", "ip_address": "10.240.221.38"} |
| id                    | aa14b554-d0a6-413d-b77c-63e11a3c9895                                                |
| mac_address           | fa:16:3e:ce:18:2a                                                                   |
| name                  |                                                                                     |
| network_id            | 62027e77-7556-42b2-8070-ffbd61933877                                                |
| port_security_enabled | True                                                                                |
| security_groups       | 1e4bd44c-9ac2-4cd0-a56b-c094a52830c2                                                |
| status                | ACTIVE                                                                              |
| tenant_id             | d2fda814485247f795c23b9af2bc2e1c                                                    |
+-----------------------+-------------------------------------------------------------------------------------+
```

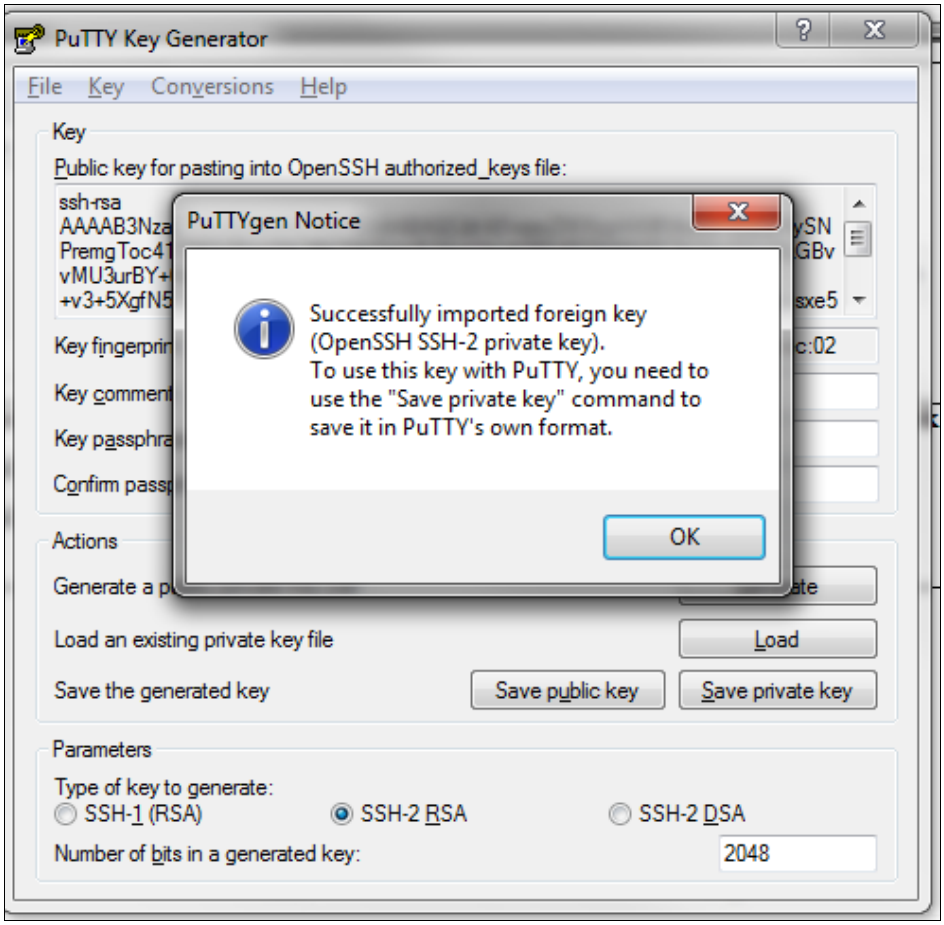
D.9 GENERATE PRIVATE KEY FOR SSH ACCESS

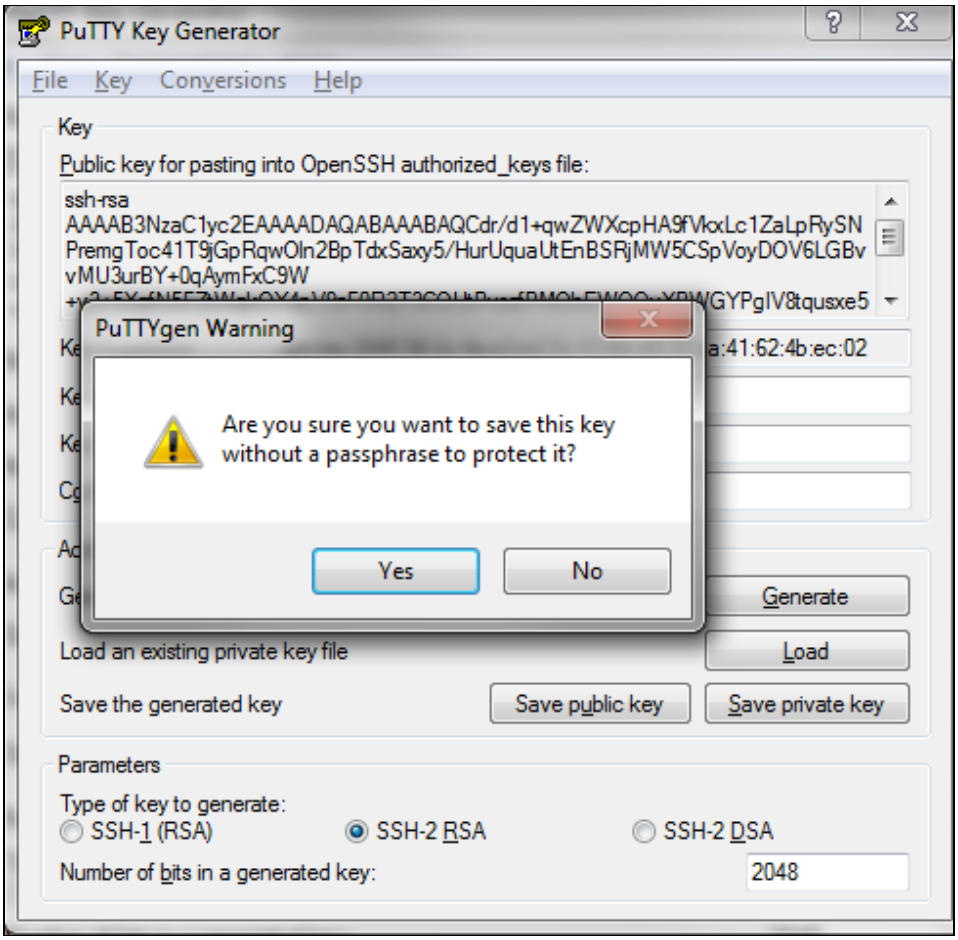
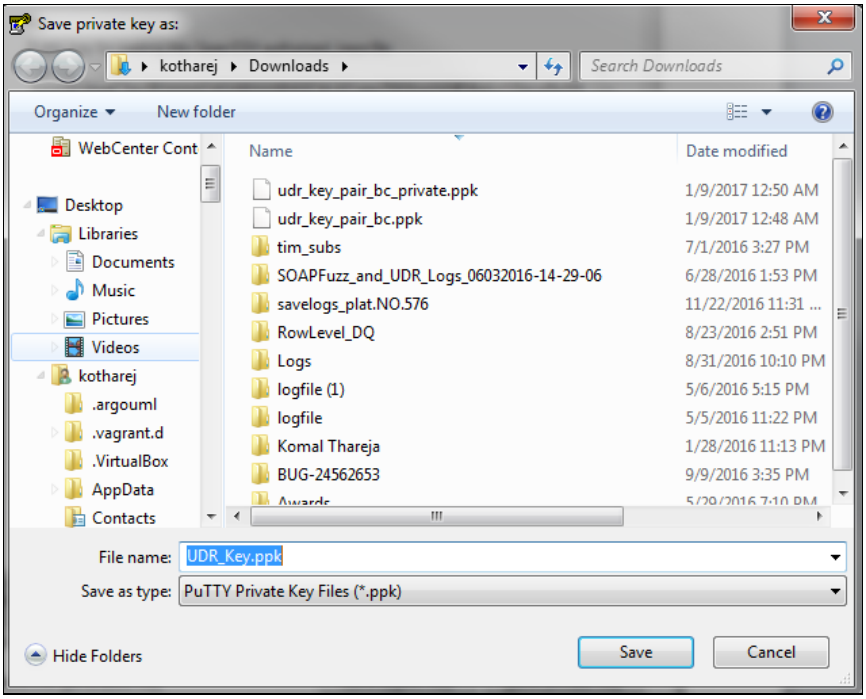
This procedure is used to generate Private Key to be used for accessing VM instance via SSH.

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure34: Generate Private Key for SSH Access

Step	Procedure	Result
1. ☐	Launch PuTTyGen	

Step	Procedure	Result
2. ☐	Load the key file i.e *.pem generated in D.3 Create Key Pair Click **OK**	

Step	Procedure	Result
3. ☐	Save the Private Key by clicking **Save Private Key** Click **Yes** Click **Save**	 
THIS PROCEDURE HAS BEEN COMPLETED		

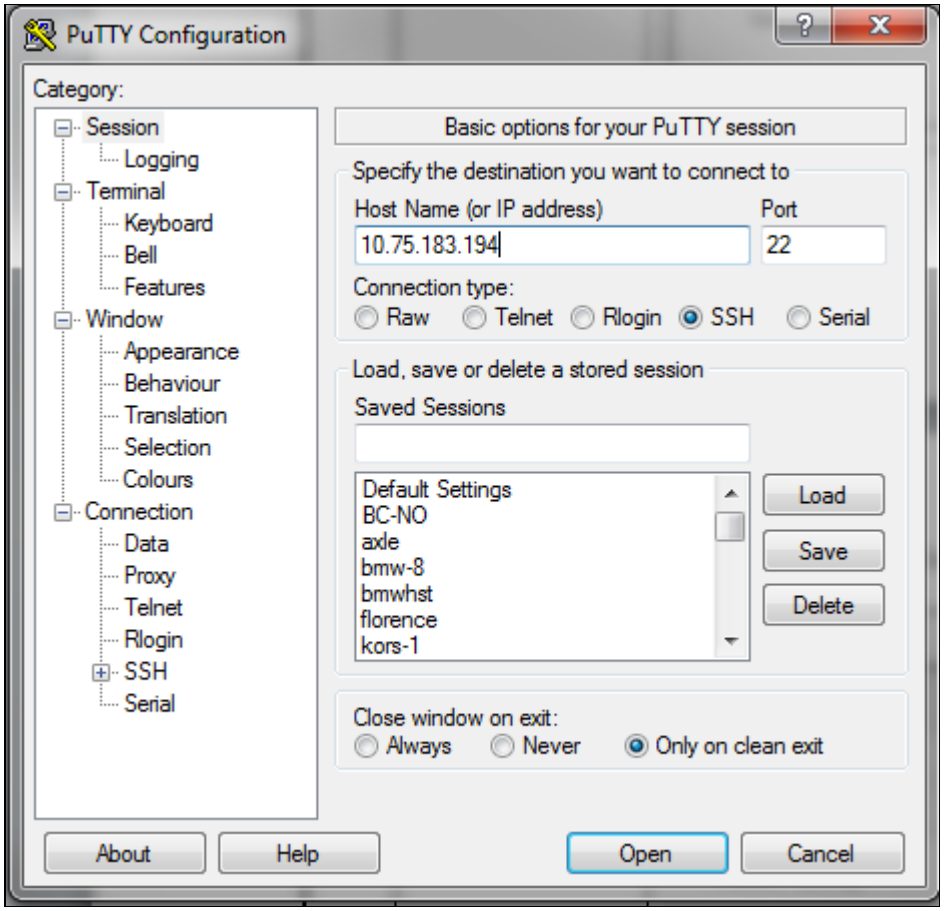
D.10 ACCESSING VM INSTANCE USING SSH

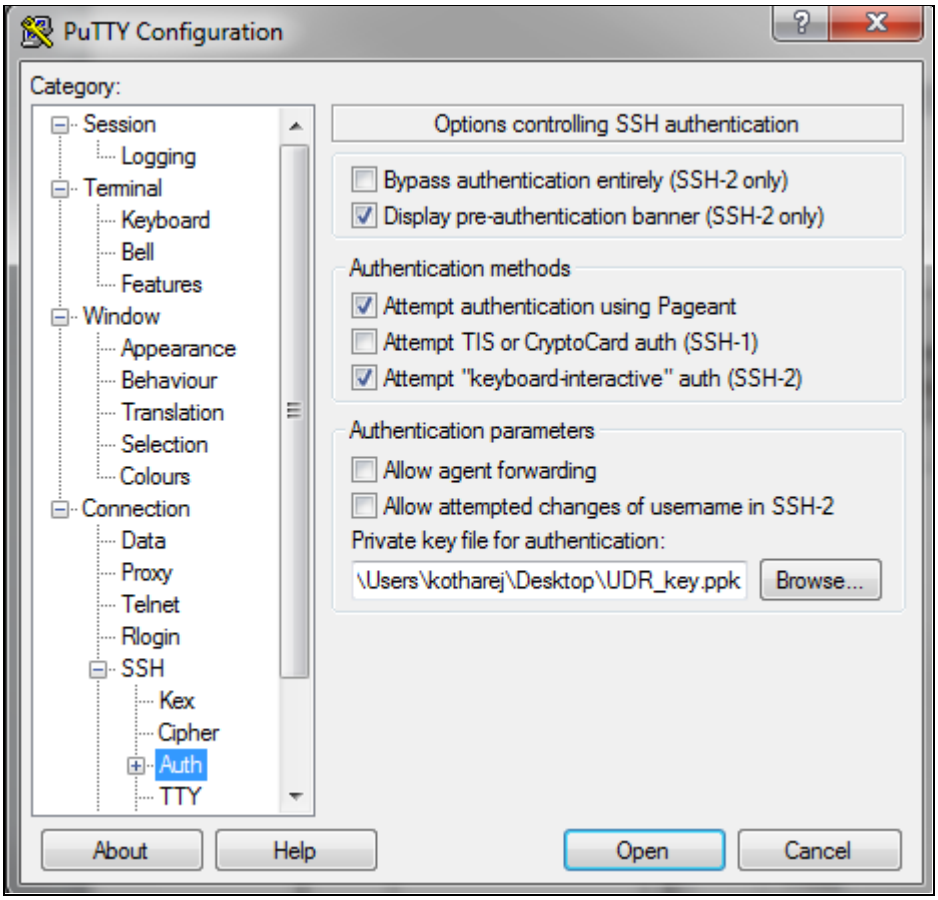
This procedure is used to access VM instance via SSH. This procedure assumes following:

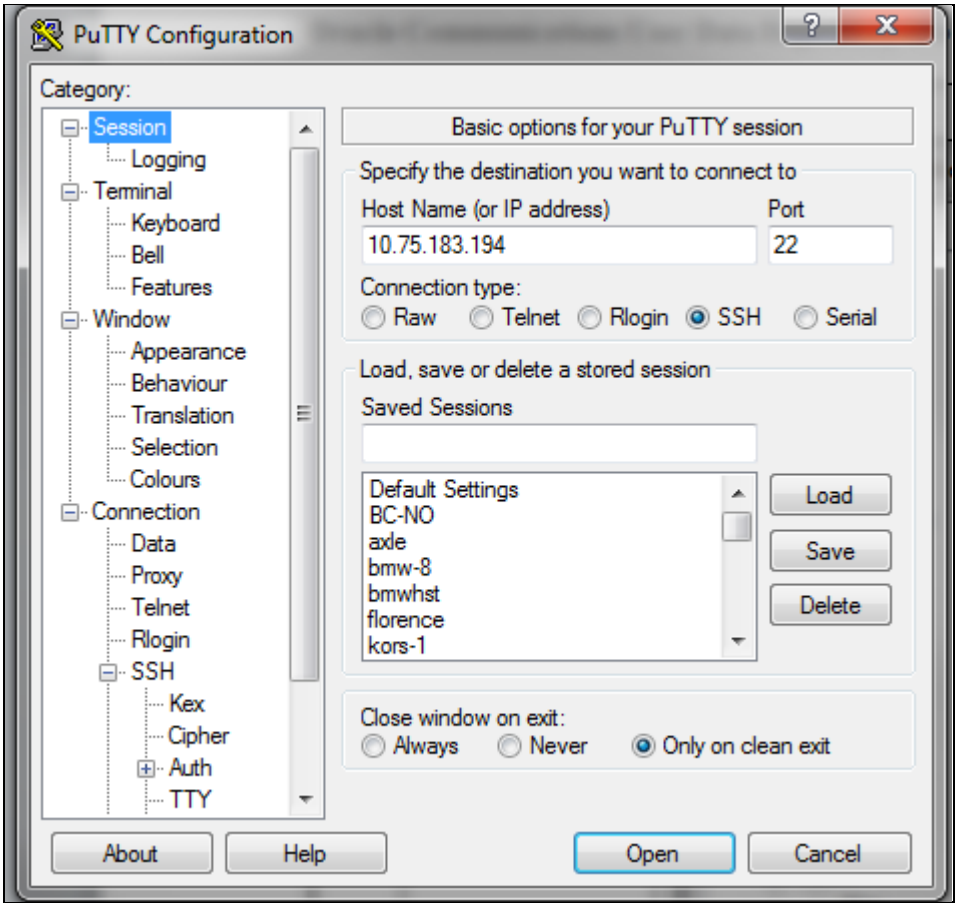
- Network configuration on VM insatance is complete or floating IPs have been associated with VM instance
- Private Key has been generated as per D.9 Generate Private Key for SSH Access

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure35: SSH Access to VM Instance

Step	Procedure	Result
1. ☐	Launch Putty Specify IP Address of the VM Instance	

Step	Procedure	Result
2. ☐	Navigate to **SSH → Auth** Select the *.ppk file generated by D.9 Generate Private Key for SSH Access	

Step	Procedure	Result
3. ☐	From Session Category, click Open to launch the SSH connection Specify username admusr when prompted	
THIS PROCEDURE HAS BEEN COMPLETED		

D.11 CLOBBER THE DATABASE ON VM INSTANCE

This procedure clobbers the database on VM instance.

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure36: Clobber Database on VM Instance

Step	Procedure	Result
1. ☐	Login to the VM with admusr via SSH as per D.10 Accessing VM Instance using SSH	`hostnamea0c2d9aa8bce login: admusr`
2. ☐	Switch to root user	`# su - root` `password: <root_password>`

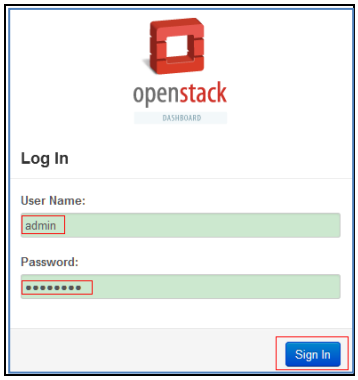
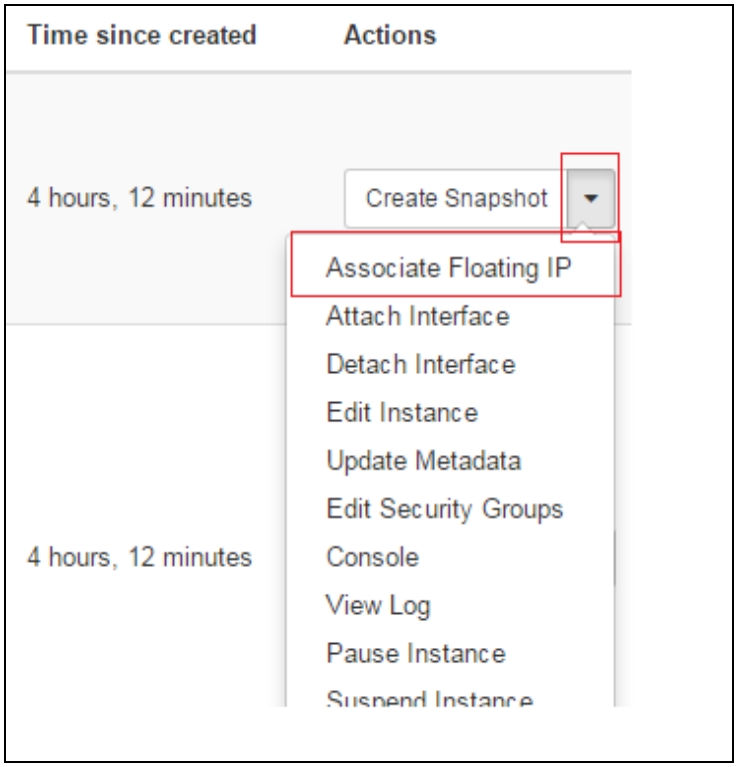
Step	Procedure	Result
3. ☐	Run prod.clobber on the created instances	[root@hostname2c6772f9819e ~]# prod.clobber ...prod.clobber (RUNID=00)... ...getting current state... Current state: X (product under procmgr) WARNING: ABOUT TO DESTROY ALL PRODUCT DISK FILES !!!! Are you sure? [enter Y or N] y ...setting state 0... ...waiting for state 0... Current state is 0 ...taking down processes... processes down ...removing existing IPC resources... + md_ipcrm ... 852 resources ...clobbering runenv files... + rm -rf /var/TKLC/rundb/run
4. ☐	Run prod.start on instance After start, use pl to check process status, after first start, only a few processes start	[root@hostname2c6772f9819e ~]# prod.start_ + iqt -IiddToXML -DataDictPart > /var/TKLC/rundb/run/db/DataDictPart/20160527.055813.5460.DataDictPart.tmp + edd.op --install --must-eq-current /var/TKLC/rundb/run/db/DataDictPart/20160527.055813.5460.DataDictPart.tmp created: 20160527.055813.5460.DataDictPart.xml ...starting procmgr ... [root@hostname2c6772f9819e ~]# pl S pid procTag $1 stat spawnTime N cmd Z 29470 cmha Up 05/27 01:59:29 1 cmha Z 29471 cmsoapa Up 05/27 01:59:29 1 cmsoapa Z 29473 idbsvc Up 05/27 01:59:29 1 idbsvc -M10 -ME204 -D40 -DE820 -V1 -S2 -L1 Z 29475 inetmerge Up 05/27 01:59:29 1 inetmerge Z 29477 raclerk Up 05/27 01:59:29 1 raclerk -r 3000 Z 29478 re.portmap Up 05/27 01:59:29 1 re.portmap -c100
5. ☐	Run prod.start -i again on instance, this time, all processes started	[root@hostname2c6772f9819e ~]# prod.start ...prod.start (RUNID=00)... ...getting current state... Current state: Z (product under procmgr) ...setting state X... ...waiting for state [X0A]... Current state is X [root@hostname2c6772f9819e ~]# pl S pid procTag $1 stat spawnTime N cmd X 29586 Imysqld Up 05/27 02:00:25 1 Imysqld.start -force X 29587 ProcWatch Up 05/27 02:00:25 1 ProcWatch -L X 29589 apwSoapServer Up 05/27 02:00:25 1 !CMNOSIGCHK=1 apwSoapServer X 29470 cmha Up 05/27 01:59:29 1 cmha X 29591 cmplatalarm Up 05/27 02:00:25 1 cmplatalarm X 29593 cmsnmpsa Up 05/27 02:00:25 1 cmsnmpsa -R 1.3.6.1.4.1.323.5.3.32.1 X 29471 cmsoapa Up 05/27 01:59:29 1 cmsoapa X 29608 eclipseHelp Up 05/27 02:00:25 1 eclipseHelp X 29594 guiReqMapLoad Up 05/27 02:00:25 1 guiReqMapLoad X 29473 idbsvc Up 05/27 01:59:29 1 idbsvc -M10 -ME204 -D40 -DE820 -V1 -S2 -L1 X 29475 inetmerge Up 05/27 01:59:29 1 inetmerge X 29596 inetrep Up 05/27 02:00:25 1 inetrep X 29598 mkdbhooks Up 05/27 02:00:25 1 mkdbhooks X 29601 oampAgent Up 05/27 02:00:25 1 oampAgent X 29603 pm.watchdog Up 05/27 02:00:25 1 pm.watchdog X 29477 raclerk Up 05/27 01:59:29 1 raclerk -r 3000 X 29478 re.portmap Up 05/27 01:59:29 1 re.portmap -c100 X 29605 statclerk Up 05/27 02:00:25 1 statclerk -s -0 X 29607 vipmgr Up 05/27 02:00:25 1 vipmgr
THIS PROCEDURE HAS BEEN COMPLETED		

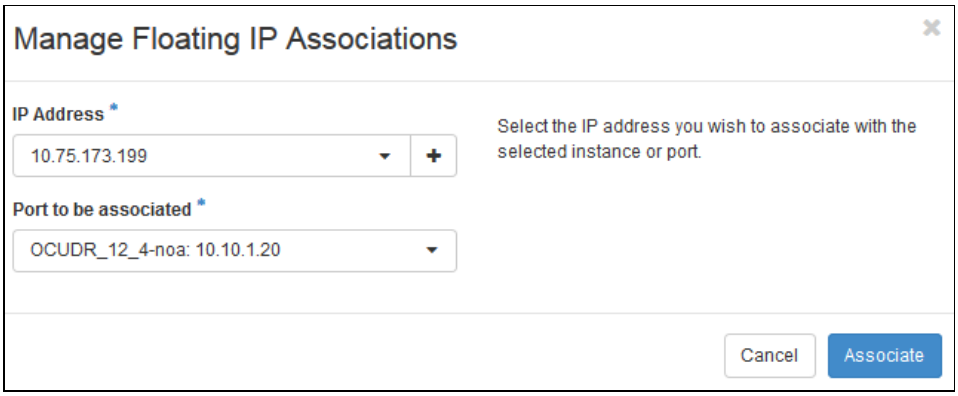
D.12 ASSOCIATING FLOATING IPS

This procedure associates Floating IP to VM instance.

Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

Procedure37: Associate Floating IP

Step	Procedure	Result
1. ☐	Login to the OpenStack GUI	
2. ☐	Login to the VM instance by navigating to **Project → Instances → More → Associate Floating IP**	

Step	Procedure	Result
3. ☐	Select the IP Addresss and Port to be associated Click **Associate**	
THIS PROCEDURE HAS BEEN COMPLETED		

Appendix E. Same Network Element and Hardware Profiles

In order to enter all the network information for a network element into an Appworks-based system, a specially formatted XML file needs to be updated with the required network information. The network information is needed to configure both the NOAMP and any SOAM Network Elements.

It is expected that the maintainer/creator of this file has networking knowledge of this product and the site at which it is being installed. The following is an example of a Network Element XML file.

The SOAM Network Element XML file needs to have same network names for the networks as the NOAMP Network Element XML file has. It is easy to accidentally create different network names for NOAMP and SOAM Network Element, and then the mapping of services to networks is not possible.

Example Network Element XML file:

Example NOAMP Network Element XML	Example SOAM Network Element XML

`<?xml version="1.0"?>`
`<networkelement>`
`  <name>NO_UDR_NE</name>`
`  <networks>`
`  <network>`
`  <name>XMI</name>`
`  <vlanId>3</vlanId>`
`  <ip>10.2.0.0</ip>`
`  <mask>255.255.255.0</mask>`
`  <gateway>10.2.0.1</gateway>`
`  <isDefault>true</isDefault>`
`  </network>`
`  <network>`
`  <name>IMI</name>`
`  <vlanId>4</vlanId>`
`  <ip>10.3.0.0</ip>`
`  <mask>255.255.255.0</mask>`
`  <nonRoutable>true</nonRoutable>`
`  </network>`
`  </networks>`
`</networkelement>`
	`<?xml version="1.0"?>`
	`<networkelement>`
	`  <name>SO_UDR_NE</name>`
	`  <networks>`
	`  <network>`
	`  <name>XMI</name>`
	`  <vlanId>3</vlanId>`
	`  <ip>10.2.0.0</ip>`
	`  <mask>255.255.255.0</mask>`
	`  <gateway>10.2.0.1</gateway>`
	`  <isDefault>true</isDefault>`
	`  </network>`
	`  <network>`
	`  <name>IMI</name>`
	`  <vlanId>4</vlanId>`
	`  <ip>10.3.0.0</ip>`
	`  <mask>255.255.255.0</mask>`
	`  <nonRoutable>true</nonRoutable>`
	`  </network>`
	`  </networks>`
	`</networkelement>`

NOTE: Do not include the XSI networks in a Network Element XML file.

The server hardware information is needed to configure the Ethernet interfaces on the servers. This server hardware profile data XML file is used for Appworks deployments. It is supplied to the NOAMP server so that the information can be pulled in by Appworks and presented in the GUI during server configuration. Figure 4 is an example of a server hardware profile XML file stored in the `/var/TKLC/appworks/profiles` directory.

Figure 4: Example Server Hardware Profile XML—Virtual Guest

```
<profile>
    <serverType>Cloud UDR</serverType>
    <available>
        <device>eth0</device>
        <device>eth1</device>
        <device>eth2</device>
        <device>eth3</device>
    </available>
    <devices>
        <device>
            <name>eth0</name>
            <type>ETHERNET</type>
        </device>
        <device>
            <name>eth1</name>
            <type>ETHERNET</type>
        </device>
        <device>
            <name>eth2</name>
            <type>ETHERNET</type>
        </device>
        <device>
            <name>eth3</name>
            <type>ETHERNET</type>
        </device>
    </devices>
</profile>
```

Appendix F. High Availability Configurations

	Non HA		HA			
VM Name	**Min number of VMs**	**Max number of VMs**	**Min number of VMs**	**Max number of VMs**	**HA config**	**Affinity**
UDR	1	2	2	2	Active-Standby	Anti-affinity. UDRs must be hosted on different servers

NOTES:

Non-HA configuration is for labs and demonstrations only.

The UDR VMs raise HA alarms when deployed as singletons. For this reason, standby VMs are often deployed even in non-HA labs.

The HA Max number of VMs was used for performance testing

For Geo-Diverse configurations, DR site VMs must be hosted at a geo-diverse location from the first site

Appendix G. Resource Profile

		vCPUs						RAM(GB)						Storage(GB)					
VM Name	VM Purpose	Lab	Small	Medium	vEIR	vMNP	vFABR-Large	Lab	Small	Medium	vEIR	vMNP	vFABR-Large	Lab	Small	Medium	vEIR	vMNP	vFABR-Large
UDR	Network Operation, Administration, Maintenance, and Provisioning	4	4	8	14	28	56	6	16	32	64	128	256	60	220	400	400	800	800

NOTES:

- Lab numbers are for demonstration of functionality only and can only support 100/s SOAP provisioning with 2k/s traffic.
- 1:1vCPU to CPU ratio based on Intel(R) Xeon(R) CPU E5-2699 v3 @ 2.30GHz
- vMNP flavor must be used for Signaling Security Application(For vSTP and DSA).

Appendix H. Network Device Assignments

		Interface Assignment						
Product	**Role**	**Control**	**Platform Management**	**OAMP (XMI)**	**Local (IMI)**	**Signaling A (XSI1)**	**Signaling B (XSI2)**	**NetBackup**
Platform	**TVOE**							
	PMAC							
UDR	**NOAMP**			eth0	eth1	eth2		

Legend				
Mandatory	Not Applicable	Unsupported	Optional	Suggested

Appendix I. Network and Port Information

Network	Description	Also Known As	Optional/ Mandatory	Type	IPv6	VMs using	Services	Notes
OAMP	Routable operations, administration, maintenance and provisioning flows	External Management Interface (XMI)	Mandatory	External	No	All	AppWorks SOAP Server (TCP/18081) AppWorks GUI (TCP/443, TCP/80) AppWorks File Transfer (TCP/22) AppWorks Online Help (TCP/8081) DNS (TCP/53, UDP/53) NTP (UDP/123) SNMP gets (UDP/161) SSH (TCP/22) X11 Forwarding (TCP/6010) RPC Bind (TCP/111) Prov REST (TCP/8787) Prov SOAP (TCP/62001) Prov GUI (TCP/16530) Prov Import (TCP/16531) Prov OnDemand (TCP/16532) Prov Notifications (TCP/16535)	Local services may also run on OAM network when the target is outside the Network Element. ComAgent Services may run over OAMP Network between Network Elements unless configured to run on Signaling A.

Local	Application internal communications	Internal Management Interface (IMI)	Mandatory	Internal	No	All	COMCOL SOAP Server (TCP/15360) COMCOL Merging (TCP/16878) COMCOL Replication (TCP/17398,17399, TCP/17400) COMCOL HA (TCP/17401,17402,17406 UDP/17401) ComAgent EventTransfer (TCP/16529) ComAgent EventTransfer Alert (TCP/16541) Imysql (TCP 15616)	OAM services may be configured to run on the Local network when the destination is inside the Network Element.
Signaling A	Application external communications	External Signaling Interface 1 (XSI1)	Mandatory	External	Yes	MP, Optional:NOAMP	Diameter (TCP/3868, SCTP/3868)	Signal A network may also be configured to host ComAgent services when the target is outside the Network Element.
Signaling B	Application external communications	External Signaling Interface 2 (XSI2)	Optional	External	Yes	MP	Diameter (TCP/3868, SCTP/3868)	
Port values are configurable (default values a listed)								

Appendix J. Install UDR on Oracle Linux OS via KVM

Important: The content of this appendix is for informational purposes only.

This procedure installs UDR configuration on Oracle Linux OS with direct KVM as hypervisor.

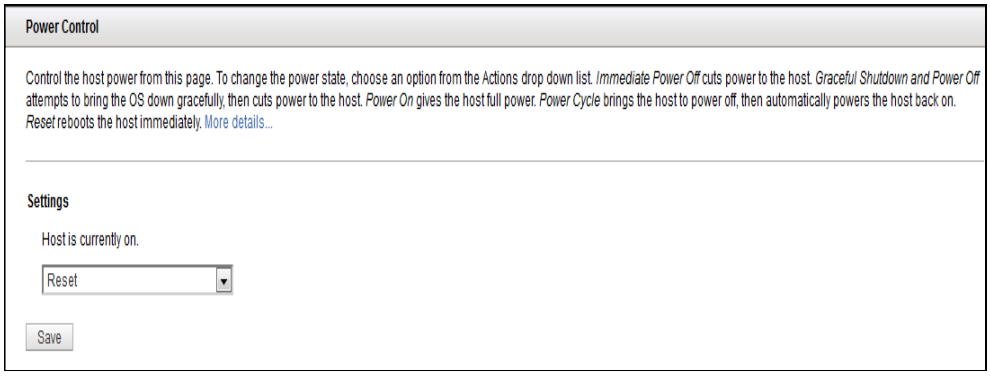
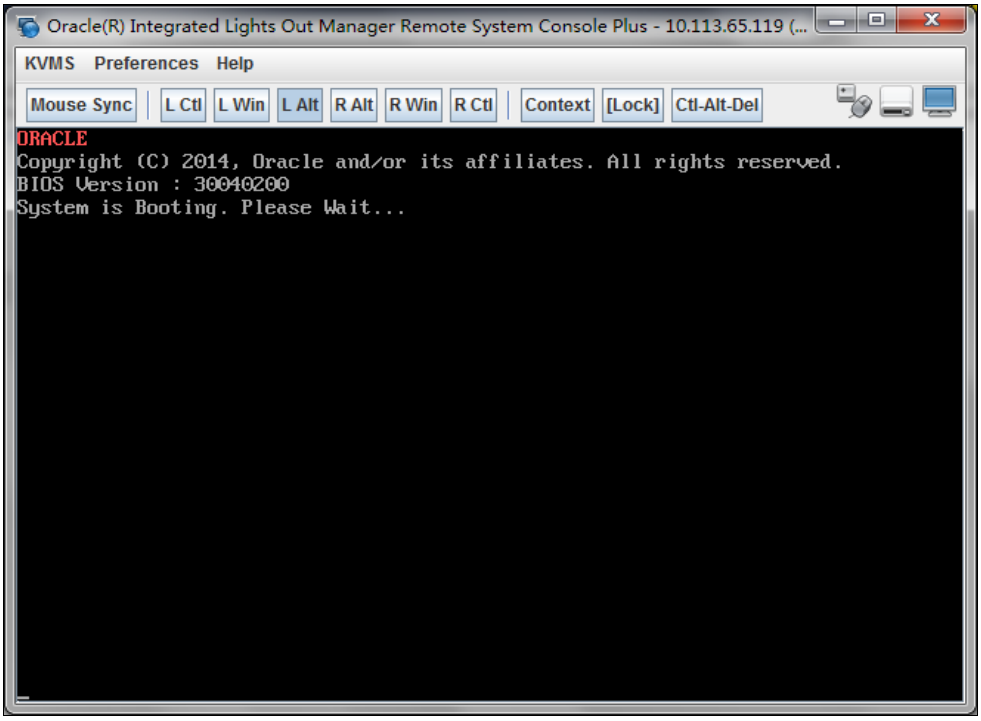
NOTE:

- This installation procedure only applies when installing UDR on Oracle Linux OS via direct KVM
- For the Oracle Linux OS, Oracle Linux 7.2 GA release is used and verified OK.

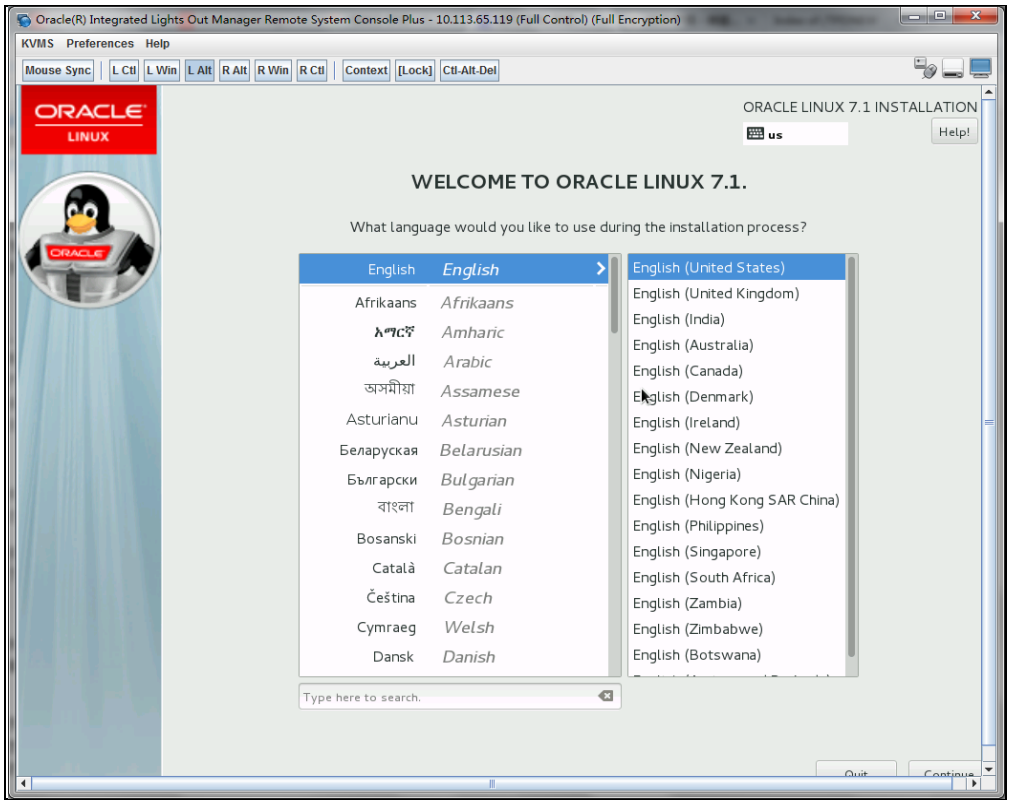
Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

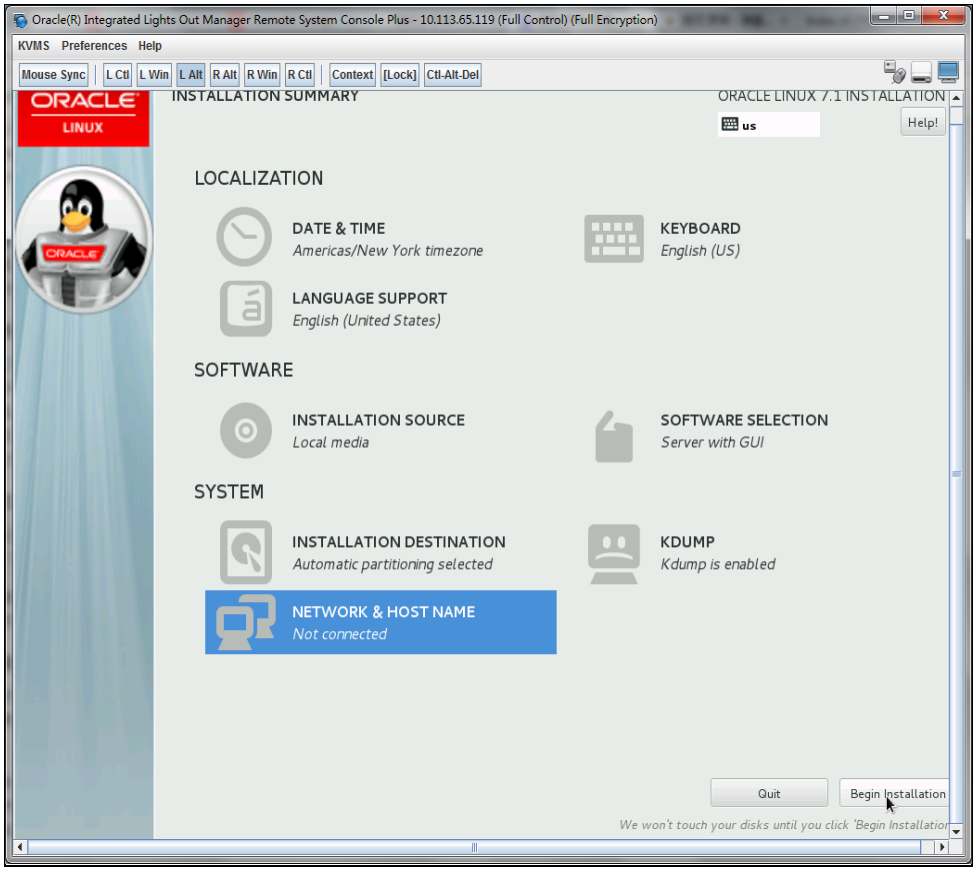
Procedure38: Install UDR on Oracle Linux/KVM

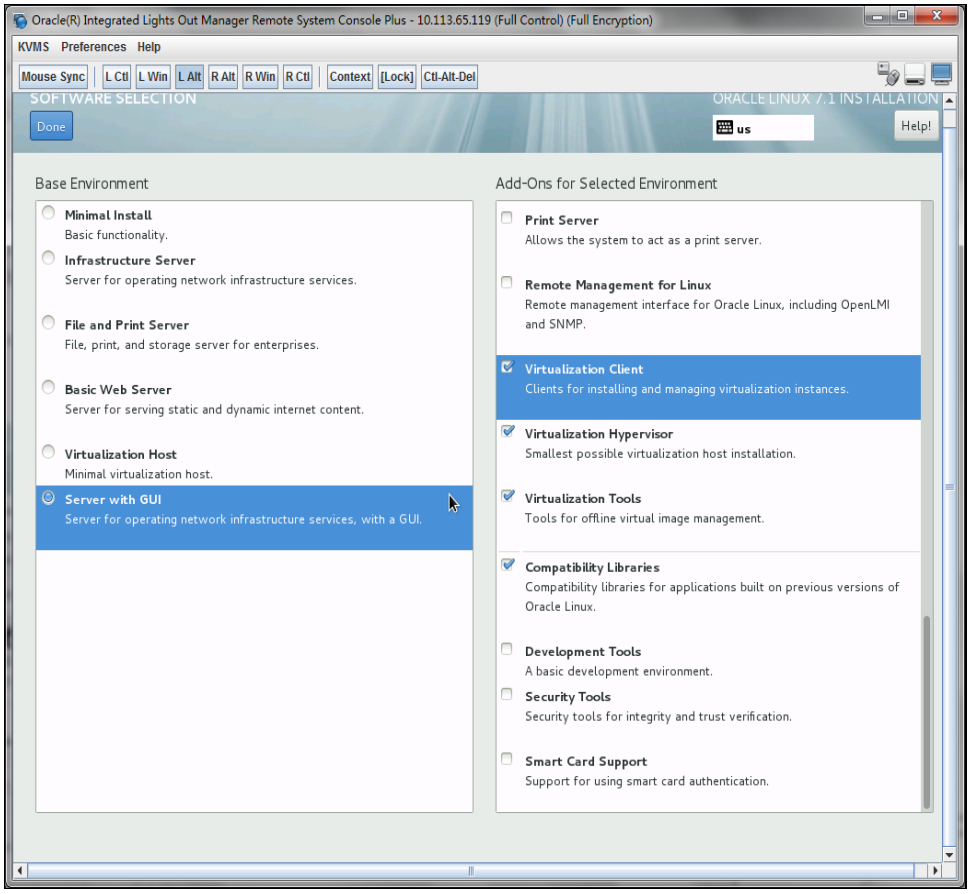
Step	Procedure	Result
1. ☐	For each Oracle X5-2 RMS, mount virtual media contains Oracle Linux OS software	Follow steps defined in Appendix C.3 Mounting Virtual Media on Oracle RMS Server of **Error! Reference source not found.**. to mount the Oracle Linux OS software ISO.

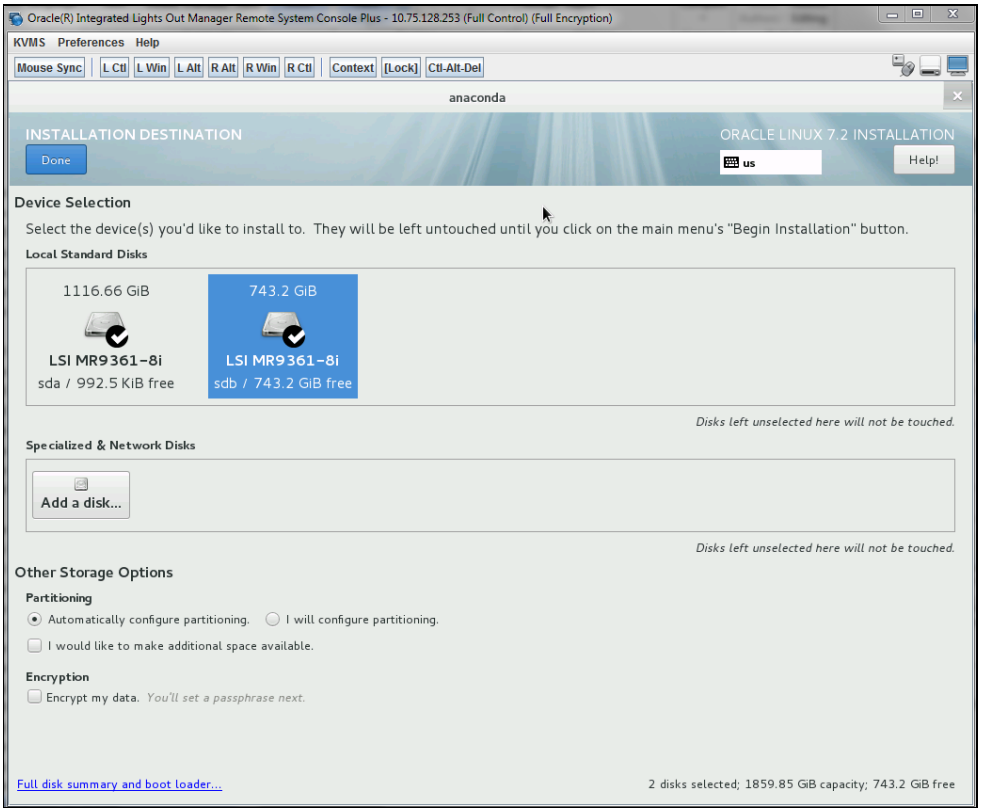
Step	Procedure	Result
2. ☐	For each Oracle X5-2 RMS, reboot the host.	1. Login to the X5-2 iLo GUI browser page and launch remote console 2. In ILO GUI, navigate to **Host Management → Power Control** 3. Select **Reset** 4. Click **Save** to reboot host. In remote console window, you see that the host is rebooting. Wait for the reboot to complete.  

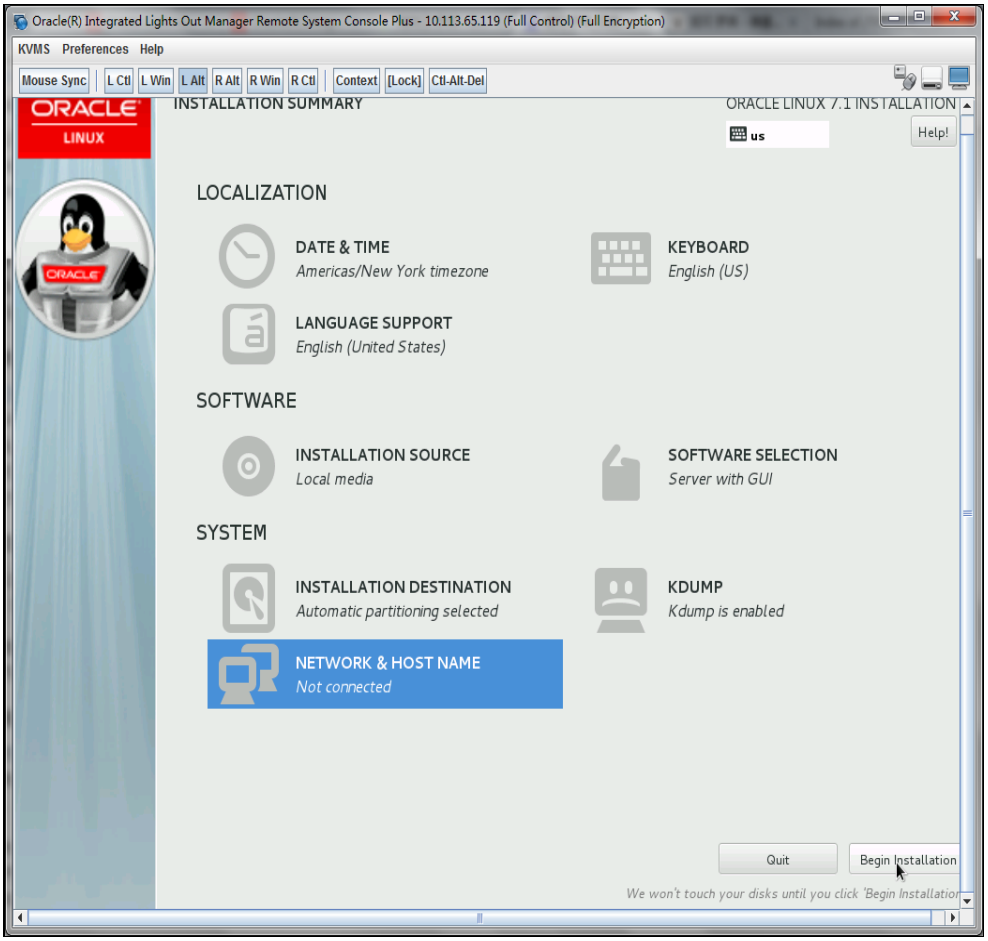
Step	Procedure	Result
3. ☐	For each Oracle X5-2 RMS, initiate Oracle Linux Platform installation	After the reboot is complete, the host boots with Oracle Linux installation ISO and the Oracle Linux GUI with the installation option opens. Select **Install Oracle Linux 7.x**.

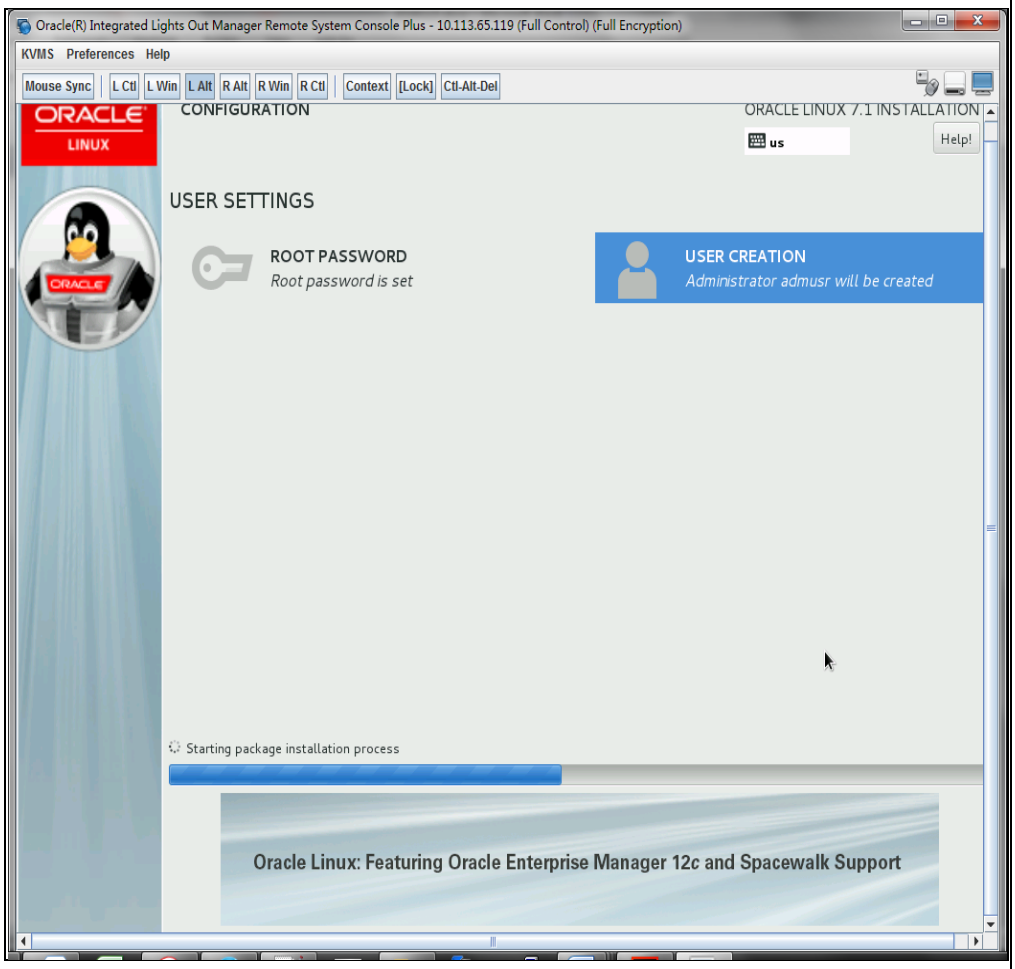
Step	Procedure	Result
4. ☐	For each Oracle X5-2 RMS, select Oracle Linux OS language	1. When prompted, select **English** as Oracle Linux OS language:  2. Click **Continue**.

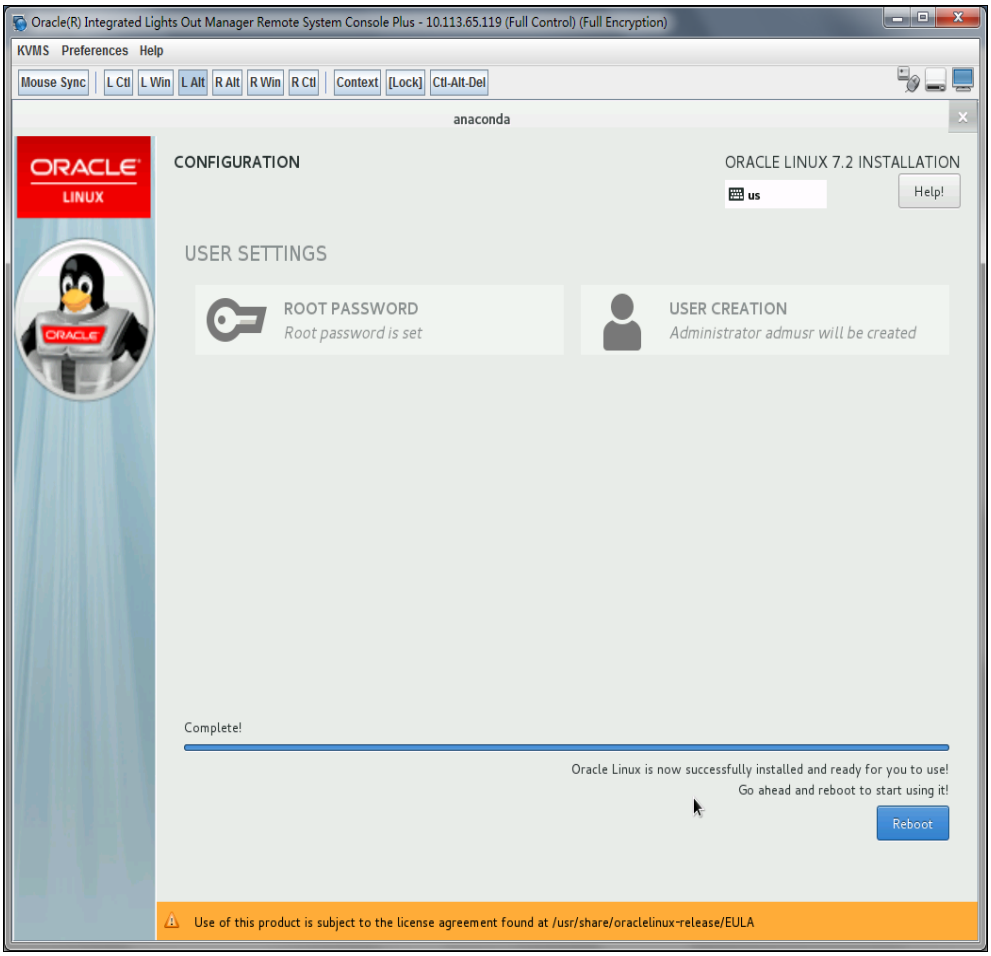
Step	Procedure	Result
5. ☐	For each Oracle X5-2 RMS, setup time zone	The next page prompts you for Oracle Linux OS installation required information to start installation.  1. Navigate to **LOCALIZATION → DATE & TIME**. 2. Set time zone as Americas/New York. 3. Click **Done** to save the changes and return to the main configuration page.

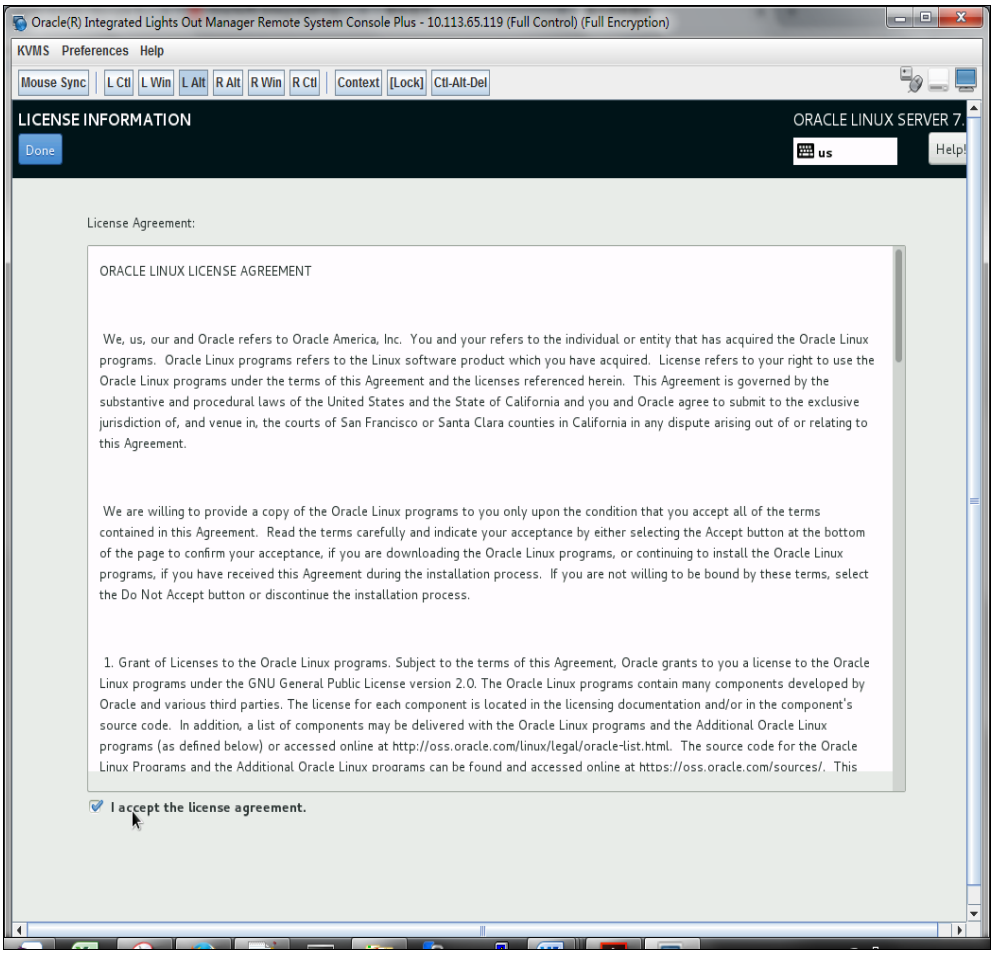
Step	Procedure	Result
6. ☐	**For each Oracle X5-2 RMS:** Setup installation base environment	1. Navigate to **SOFTWARE → SOFTWARE SELECTION** menu. 2. Select **Server with GUI**, and verify that these add-ons are selected: - Virtualization Client - Virtualization Hypervisor - Virtualization Tools - Compatibility Libraries  Click **Done** to save the changes and go back to the main configuration page.

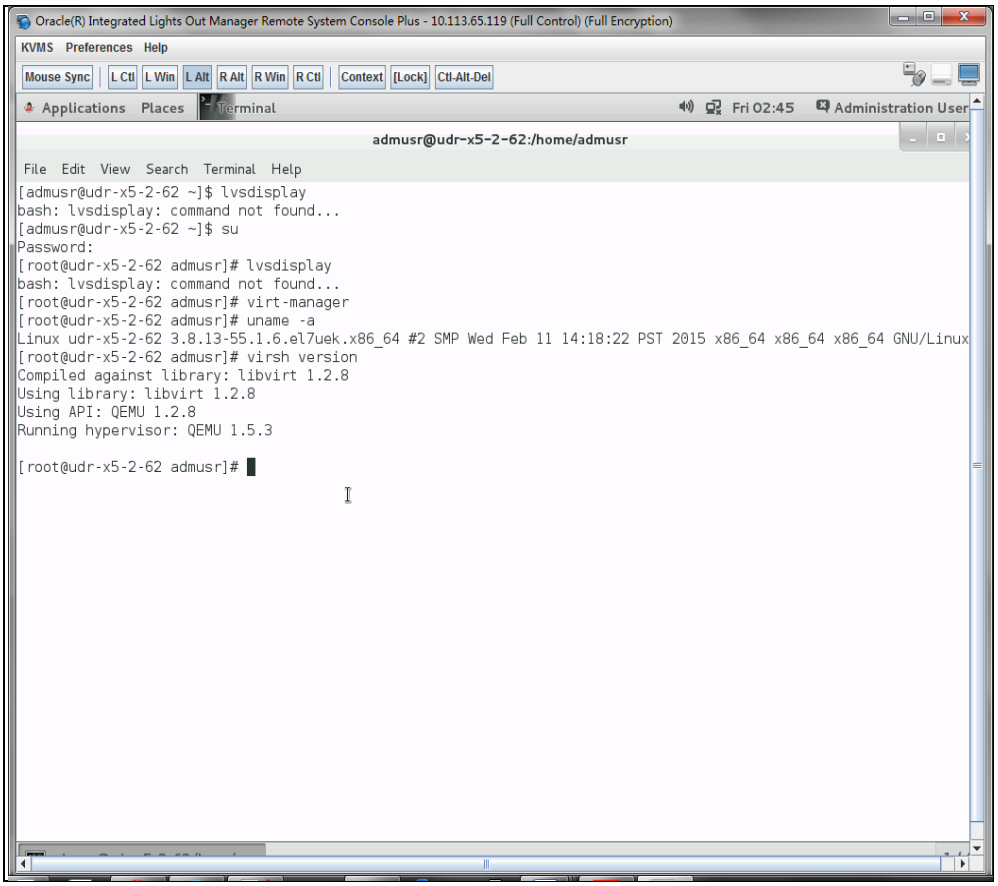
Step	Procedure	Result
7. ☐	For each Oracle X5-2 RMS, setup installation destination	1. Navigate to **SYSTEM → INSTALLATION DESTINATION** menu. 2. Select **sda and sdb**. 3. Select **Automatically configure partitioning.** 4. Click **Done**. 

Step	Procedure	Result
8. ☐	For each Oracle X5-2 RMS, review configuration and start to install	Review all information before clicking **Begin Installation**. (You do not need to configure the network at this time, network configuration is performed after the Oracle Linux OS is installed.) 

Step	Procedure	Result
9. ☐	For each Oracle X5-2 RMS, create login credential	At the same time Oracle Linux installation software is putting files onto the Oracle X5-2 local hard disk, you can configure the root credentials or any other login credentials required. 

Step	Procedure	Result
10. ☐	For each Oracle X5-2 RMS, reboot host after installation completed	Wait for the installation to complete.  Click **Reboot**.

Step	Procedure	Result
11. ☐	For each Oracle X5-2 RMS, read and accept the license agreement	After reboot is complete, the license agreement page opens.  1. Select **I accept the license agreement**. 2. Click **Finish Configuration**. If you are prompted for ULN setting, skip that step.

Step	Procedure	Result
12. ☐	For each Oracle X5-2 RMS, verify kernel version and KVM version	Open SSH console window and check following: 

13. ☐	For each Oracle X5-2 RMS, change network interface name pattern to `ethx`	1. Edit `/etc/default/grub` to append net.ifnames=0 to option GRUB_CMDLINE_LINUX:
		`[root@udr-x5-2-62-ol7 admusr]# cat /etc/default/grub`
		`GRUB_TIMEOUT=5`
		`GRUB_DISTRIBUTOR="$(sed 's, release .*$,,g' /etc/system-release)"`
		`GRUB_DEFAULT=saved`
		`GRUB_DISABLE_SUBMENU=true`
		`GRUB_TERMINAL_OUTPUT="console"`
		`GRUB_CMDLINE_LINUX="crashkernel=auto rd.lvm.lv=ol00/root rd.lvm.lv=ol00/swap rhgb quiet net.ifnames=0"`
		`GRUB_DISABLE_RECOVERY="true"`
		2. Recreate the grub2 config file with following command:
		`# grub2-mkconfig -o /boot/grub2/grub.cfg`
		3. Restart host using `shutdown -r` command and verify that network interface have the ethx name pattern.

Step	Procedure	Result

14. ☐	For each Oracle X5-2 RMS, Create bond0 device	1. Create device bond0 configuration file:
		`# vim /etc/sysconfig/network-scripts/ifcfg-bond0`
		`DEVICE=bond0`
		`TYPE=Bonding`
		`BOND_INTERFACES=<nic1>,<nic2>`
		`ONBOOT=yes`
		`NM_CONTROLLED=no`
		`BOOTPROTO=none`
		`BONDING_OPTS="mode=active-backup primary=<nic1> miimon=100"`
		2. Save the file and exit.
		3. Create device eth0 configuration file:
		`# vim /etc/sysconfig/network-scripts/ifcfg-<nic1>`
		`DEVICE=<nic1>`
		`TYPE=Ethernet`
		`ONBOOT=yes`
		`NM_CONTROLLED=no`
		`BOOTPROTO=none`
		`MASTER=bond0`
		`SLAVE=yes`
		4. Save the file and exit.
		5. Create device eth1 configuration file:
		`# vim /etc/sysconfig/network-scripts/ifcfg-<nic2>`
		`DEVICE=<nic2>`
		`TYPE=Ethernet`
		`ONBOOT=yes`
		`NM_CONTROLLED=no`
		`BOOTPROTO=none`
		`MASTER=bond0`
		`SLAVE=yes`
		6. Save the file and exit.
		7. Bring the devices into service:
		`# ifup <nic1>`
		`# ifup <nic2>`
		`# ifup bond0`

15. ☐	For each Oracle X5-2 RMS, create IMI bridge	1. Create bond0.<imi_vlan> configuration file:
		`# vim /etc/sysconfig/network-scripts/ifcfg-bond0.<imi_vlan>`
		`DEVICE=bond0.<imi_vlan>`
		`TYPE=Ethernet`
		`BOOTPROTO=none`
		`ONBOOT=yes`
		`NM_CONTROLLED=no`
		`BRIDGE=imi`
		`VLAN=yes`
		2. Create imi device configuration file:
		`# vim /etc/sysconfig/network-scripts/ifcfg-imi`
		`DEVICE=imi`
		`TYPE=Bridge`
		`BOOTPROTO=none`
		`ONBOOT=yes`
		`NM_CONTROLLED=no`
		`BRIDGE_INTERFACES=bond0.<imi_vlan>`
		3. Bring the devices into service:
		`# ifup bond0.<imi_vlan>`
		`# ifup imi`

Step	Procedure	Result

16. ☐	For each Oracle X5-2 RMS, create XMI bridge	1. Create bond0.<xmi_vlan> configuration file:
		`# vim /etc/sysconfig/network-scripts/ifcfg-bond0.<xmi_vlan>`
		`DEVICE=bond0.<xmi_vlan>`
		`TYPE=Ethernet`
		`BOOTPROTO=none`
		`ONBOOT=yes`
		`NM_CONTROLLED=no`
		`BRIDGE=xmi`
		`VLAN=yes`
		2. Create xmi device configuration file:
		`# vim /etc/sysconfig/network-scripts/ifcfg-xmi:`
		`DEVICE=xmi`
		`TYPE=Bridge`
		`BOOTPROTO=none`
		`ONBOOT=yes`
		`NM_CONTROLLED=no`
		`IPADDR=<xmi_ip_addr>`
		`NETMASK=<xmi_netmask>`
		`NETWORK=<xmi_network>`
		`BRIDGE_INTERFACES=bond0.<xmi_vlan>`
		3. Set default route for xmi network:
		`# vim /etc/sysconfig/network-scripts/route-xmi`
		`default via <xmi_gateway> table main`
		4. Bring the devices into service:
		`# ifup bond0.<xmi_vlan>`
		`# ifup xmi`

Step	Procedure	Result

17. ☐	For each Oracle X5-2 RMS, Create bond1 device	Create device bond1 configuration file:
		`# vim /etc/sysconfig/network-scripts/ifcfg-bond1`
		`DEVICE=bond1`
		`TYPE=Bonding`
		`BOND_INTERFACES=<nic3>,<nic4>`
		`ONBOOT=yes`
		`NM_CONTROLLED=no`
		`BOOTPROTO=none`
		`BONDING_OPTS="mode=active-backup primary=<nic3> miimon=100"`
		Create device eth4 configuration file:
		`# vim /etc/sysconfig/network-scripts/ifcfg-<nic3>`
		`DEVICE=<nic3>`
		`TYPE=Ethernet`
		`ONBOOT=yes`
		`NM_CONTROLLED=no`
		`BOOTPROTO=none`
		`MASTER=bond1`
		`SLAVE=yes`
		Create device eth5 configuration file:
		`# vim /etc/sysconfig/network-scripts/ifcfg-<nic4>`
		`DEVICE=<nic4>`
		`TYPE=Ethernet`
		`ONBOOT=yes`
		`NM_CONTROLLED=no`
		`BOOTPROTO=none`
		`MASTER=bond1`
		`SLAVE=yes`
		Bring the devices into service:
		`# ifup <nic3>`
		`# ifup <nic4>`
		`# ifup bond1`

Step	Procedure	Result

18. ☐	For each Oracle X5-2 RMS, Create xsi1/xsi2 bridge	Create device bond1.<xsi1_vlan> configuration file:
		`# vim /etc/sysconfig/network-scripts/ifcfg-bond1.<xsi1_vlan>`
		`BOOTPROTO=none`
		`VLAN=yes`
		`ONBOOT=yes`
		`TYPE=Ethernet`
		`DEVICE=bond1.<xsi1_vlan>`
		`BRIDGE=xsi1`
		`NM_CONTROLLED=no`
		Create device xsi1 configuration file:
		`# vim /etc/sysconfig/network-scripts/ifcfg-xsi1`
		`DEVICE=xsi1`
		`TYPE=Bridge`
		`BOOTPROTO=none`
		`ONBOOT=yes`
		`NM_CONTROLLED=no`
		`BRIDGE_INTERFACES=bond1.<xsi1_vlan>`
		Bring the devices into service:
		`# ifup xsi1`
		`# ifup bond1.<xsi1_vlan>`
		Perform similar operations to create network devices for xsi2.

19. ☐	For each Oracle X5-2 RMS, set the host name	Rename host by modifying /etc/hostname file:
		`[root@localhost network-scripts]# cat /etc/hostname`
		`udr-x5-2-62-ol7`
		Review host name change with following command:
		`[root@localhost network-scripts]# hostnamectl status`
		`Static hostname: udr-x5-2-62-ol7`
		`Icon name: computer-server`
		`Chassis: server`
		`Machine ID: 17980a78ef7d440ca5a6900768903795`
		`Boot ID: a2a5a649eea14d8ab7534aec962c6782`
		`Operating System: Oracle Linux Server 7.2`
		`CPE OS Name: cpe:/o:oracle:linux:7:2:server`
		`Kernel: Linux 3.8.13-98.7.1.el7uek.x86_64`
		`Architecture: x86-64`

Step	Procedure	Result

20. ☐	For each Oracle X5-2 RMS, set the NTP service	Modify `/etc/chrony.conf`, comment out all server * entries and append your NTP server IP to the list with prepending server text:
		`# Use public servers from the pool.ntp.org project.`
		`# Please consider joining the pool (http://www.pool.ntp.org/join.html).`
		`#server 0.rhel.pool.ntp.org iburst`
		`#server 1.rhel.pool.ntp.org iburst`
		`#server 2.rhel.pool.ntp.org iburst`
		`#server 3.rhel.pool.ntp.org iburst`
		`server 144.25.255.140`
		Force ntp to sync with the added server:
		`# ntpdate 144.25.255.140`
		`# timedatectl`
		Verify time synced:
		`[root@udr-x5-2-62 log]# chronyc tracking`
		`Reference ID : 144.25.255.140 (144.25.255.140)`
		`Stratum : 3`
		`Ref time (UTC) : Mon Feb 29 06:06:44 2016`
		`System time : 1.692247748 seconds slow of NTP time`
		`Last offset : -3.862722397 seconds`
		`RMS offset : 3.862722397 seconds`
		`Frequency : 0.000 ppm fast`
		`Residual freq : -93.109 ppm`
		`Skew : 1000000.000 ppm`
		`Root delay : 0.178002 seconds`
		`Root dispersion : 30.041723 seconds`
		`Update interval : 0.0 seconds`
		`Leap status : Normal`

21. ☐	For each Oracle X5-2 RMS: Create /home/ova dir	`[root@pc9112020 ~]# mkdir -p /home/ova` `[root@pc9112020 ~]# cd /home/ova`

22. ☐	Transfer OVA file this dir using sftp tool	`[root@pc12107008 ova]# ll`
		`total 12322888`
		`-rw-r--r--. 1 root root 1047767040 May 2 00:51 UDR-12.5.1.0.0_17.7.0.ova`

23. ☐	Untar this ova file	`[root@pc9112020 ova]# tar xvf UDR-12.5.1.0.0_17.7.0.ova`
		`UDR-17_7_0.ovf`
		`UDR-17_7_0.mf`
		`UDR-17_7_0.vmdk`

24. ☐	Convert this vmdk	`[root@pc9112020 ova]# qemu-img convert -O qcow2 DR- UDR-12.5.1.0.0_17.7.0.ova.vmdk UDRNO-17_7_0.qcow2`

Step	Procedure	Result
	file to qcow2 file	
25. ☐	Copy the qcow2 files for SO and MP	`[root@pc9112020 ova]# cp UDRNO-17_7_0.qcow2 UDRSO-17_7_0.qcow2` `[root@pc9112020 ova]# cp UDRNO-17_7_0.qcow2 UDRMP-17_7_0.qcow2`

26. ☐	Configure storage for corresponding qcow2 files	Configure storage qcow2 files as per corresponding VMs. Refer Appendix G to get the required storage.
		Run the following command for each VM to set the storage:
		`qemu-img resize <NO_qcow2_filename>.qcow2 <storage_in_gigabytes>G`
		Run the command for a VM if storage required is greater than 60G. You do not have to run this command if the storage required is 60G or less.
		For example, if resource profile is EIR and VM is UDR, the storage required is 400G. The command in that case is:
		`qemu-img resize UDRNO-17_7_0.qcow2 400G`

27. ☐	Create UDR VMs. Repeat this sep for each VM.	Create UDR VMs: NO, SO and MP using appendix below. Repeat the below procedure for each VM **Appendix J Install UDR on Oracle Linux OS via KVM** Mark the check box as addition is completed for each server. ☐ UDR

28. ☐	For each UDR VMs:
	Add the network device
		Login to each VM created and add the network devices:
		UDR:
		`# netAdm add -device=eth0`
		`# netAdm add -device=eth1`
		`# netAdm add -device=eth2`
		NOTE: eth0 is XMI, eth1 is IMI and eth2 is XSI1 and eth3 is XSI2 (create eth3 if XSI2 is required).

29. ☐	**For each UDR VMs:**
	Configure XMI network address
		Set XMI network address for each UDR VM:
		`# netAdm set --device=eth0 --onboot=yes --netmask=<XMI_netmask> --address=<XMI_network_address>`
		`# netAdm add --device=eth0 --route=default --gateway=<XMI_gateway>`

30. ☐	**For each UDR VMs:** Configure NTP service	Use Step 5 to 6 of Appendix L.6 Configure TVOE Server (Hostname, Time Zone, SNMP, NTP, etc) in [2] to configure NTP service for each VM.
31. ☐	Extend VM Instance volume	Extend volumes for various VM Instances depending on flavor following: Appendix D.6 Extend VM Instance Volume Size Mark the check box as addition is completed for each server. ☐ UDR-A ☐ UDR-B
THIS PROCEDURE HAS BEEN COMPLETED		

Appendix K. My Oracle Support

My Oracle Support (*https://support.oracle.com*) is your initial point of contact for all product support and training needs. A representative at Customer Access Support (CAS) can assist you with My Oracle Support registration.

Call the CAS main number at 1-800-223-1711 (toll-free in the US), or call the Oracle Support hotline for your local country from the list at *http://www.oracle.com/us/support/contact/index.html*. When calling, make the selections in sequence on the Support telephone menu:

1. Select **2** for New Service Request.
2. Select **3** for Hardware, Networking and Solaris Operating System Support.
3. Select one of the following options:
   - For Technical issues such as creating a Service Request (SR), Select **1.**
   - For Non-technical issues such as registration or assistance with My Oracle Support, Select **2.**

You are connected to a live agent who can assist you with My Oracle Support registration and opening a support ticket.

My Oracle Support is available 24 hours a day, 7 days a week, 365 days a year.

Appendix L. Locate Product Documentation on the Oracle Help Center Site

Oracle Communications customer documentation is available on the web at the Oracle Help Center (OHC) site, *http://docs.oracle.com*. You do not have to register to access these documents. Viewing these files requires Adobe Acrobat Reader, which can be downloaded at *http://www.adobe.com*.

1. Access the Oracle Help Center site at *http://docs.oracle.com*
2. Click **Industries**.
3. Under the Oracle Communications subheading, click the **Oracle Communications documentation** link.
4. The Communications Documentation page displays. Most products covered by these documentation sets appear under the headings Network Session Delivery and Control Infrastructure or Platforms.
5. Click your Product and then the Release Number.
6. A list of the documentation set for the selected product and release displays.
7. To download a file to your location, right-click the **PDF** link, select **Save target as** (or similar command based on your browser), and save to a local folder.

Appendix M. Create and install UDR VM via KVM GUI

IMPORTANT: The content of this appendix is for informational purposes only.

This procedure installs UDR VMs NO, SO and MP using KVM GUI.

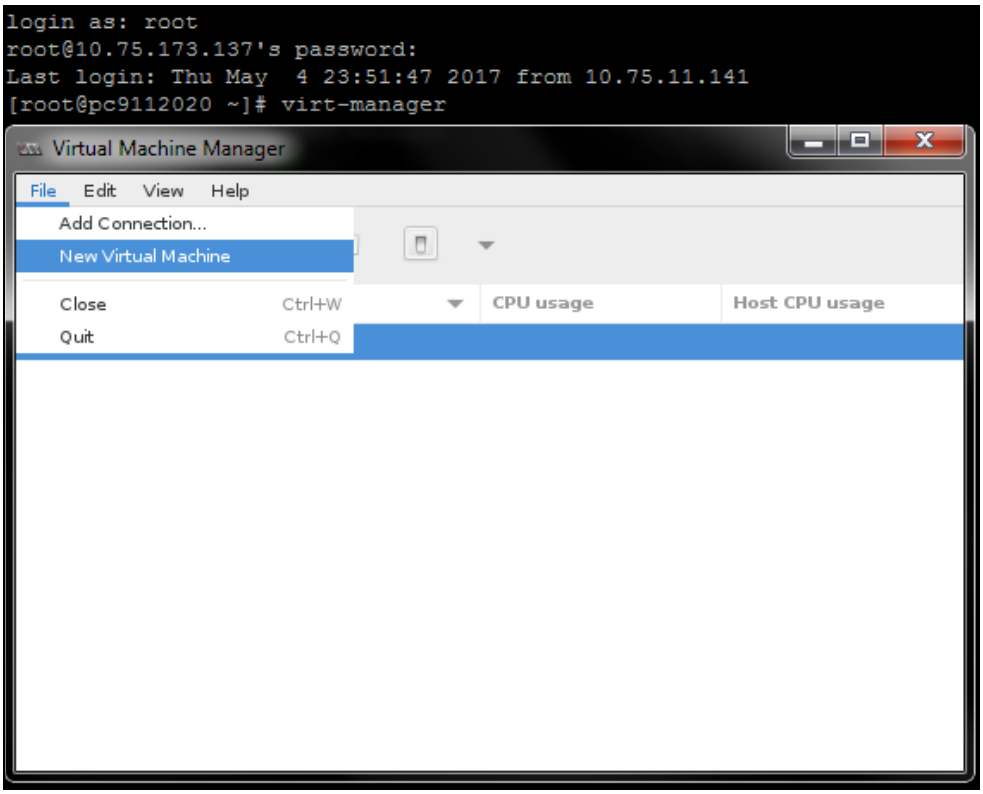
NOTE: This procedure needs to be done for each VM: NO, SO and MP

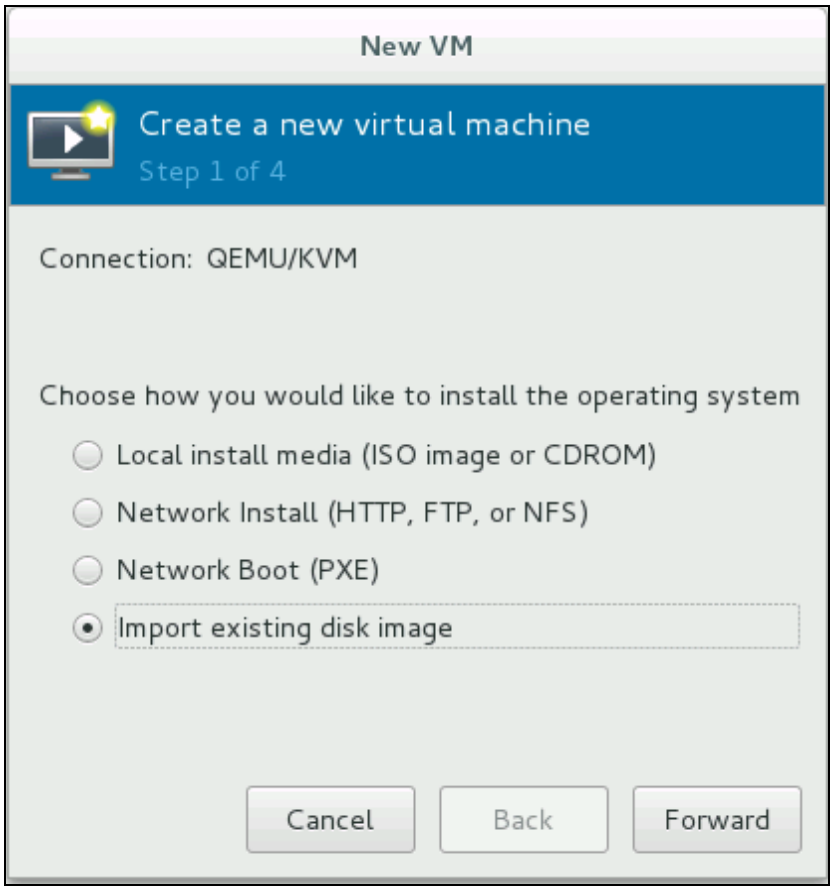
Requirements:

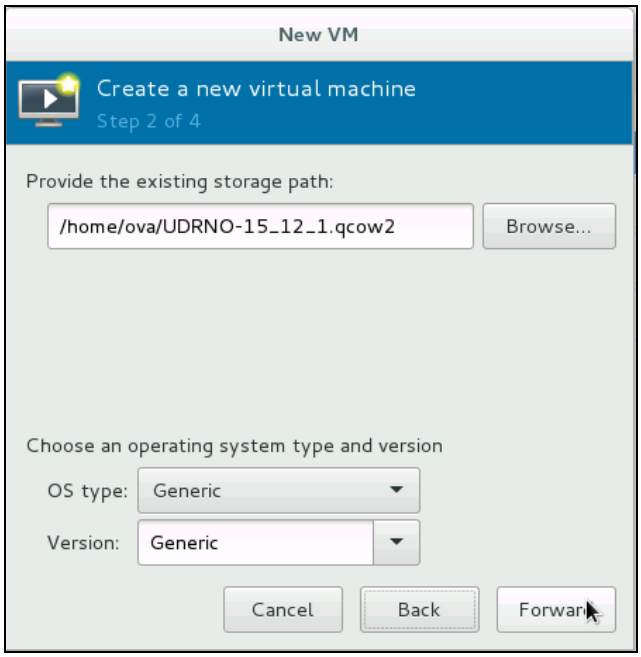
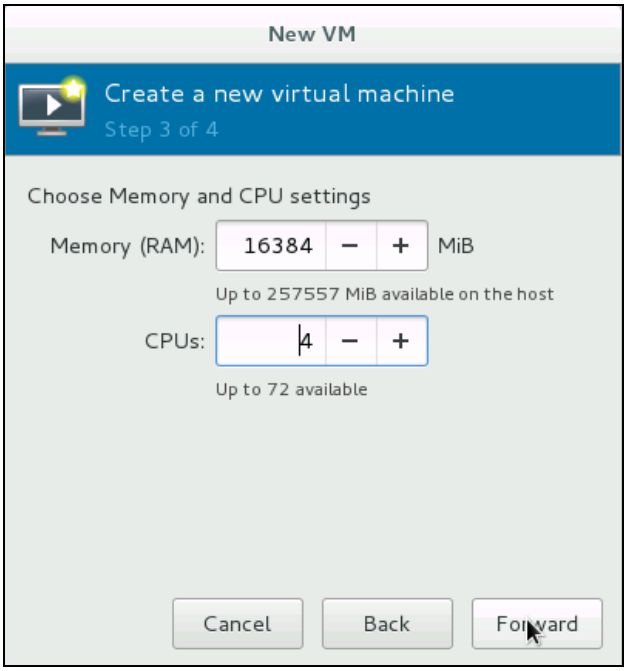
- [Appendix J Install UDR on Oracle Linux OS via KVM](#) Steps: 1 to 25 must be complete.

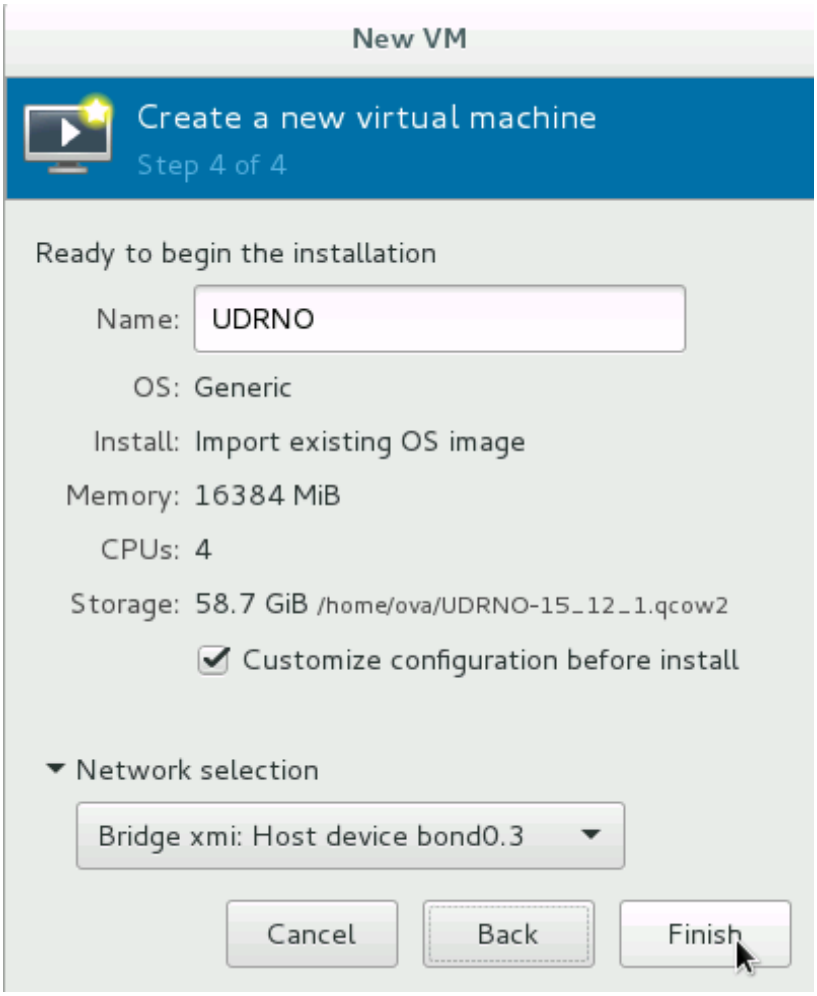
Mark (✓) each step as it is completed. Boxes have been provided for this purpose by each step number.

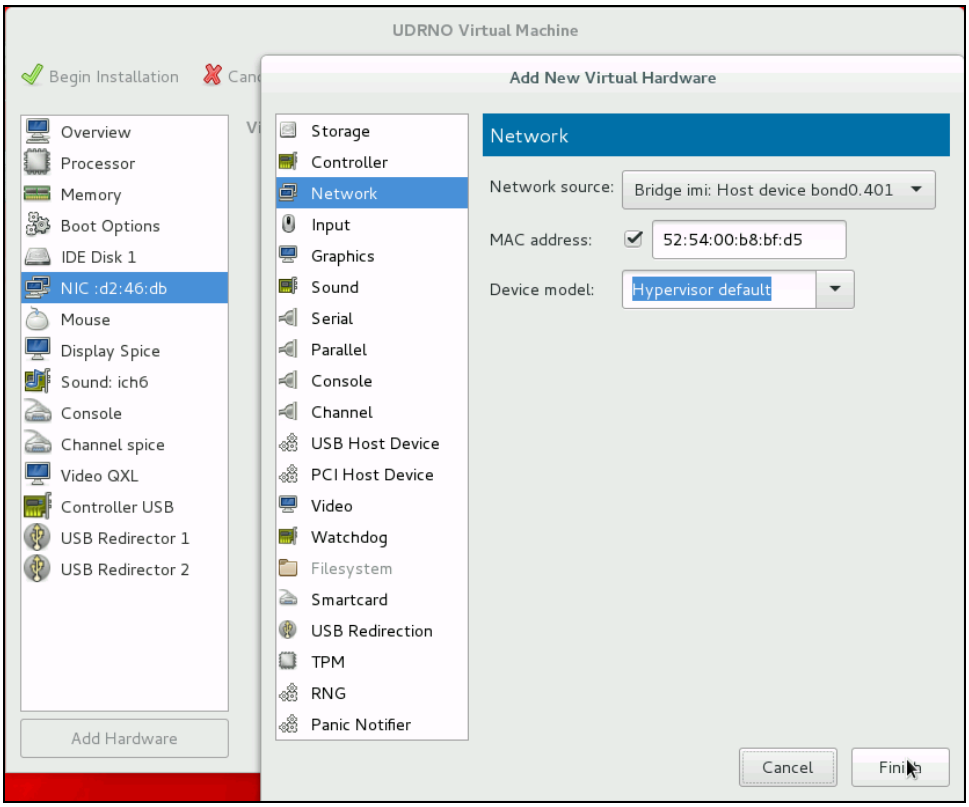
Procedure39: Create and Install UDR VMs via KVM GUI

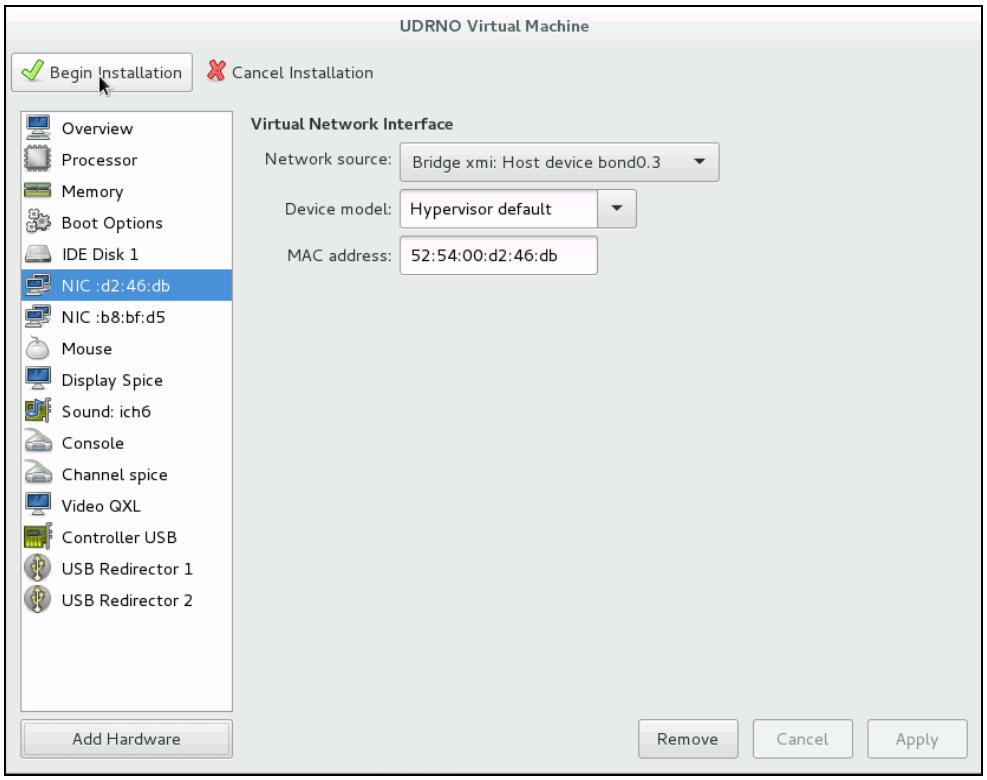
Step	Procedure	Result
1. ☐	Login to the host machine and open the Virual Machine Manager	Login to the host machine which has Oracle Linux installed and open the Virtual Machine Manager via command-line using `virt-manager` command. **NOTE:** Verify that X11 forwarding is enabled before running the `virt-manager` command. 

Step	Procedure	Result
2. ☐	Create a Virtual Machine using the Virtual Manager GUI	On Virtual Manager GUI, 1. Navigate to **File → New Virtual Machine.** 2. Select **Import existing disk image**. 

Step	Procedure	Result
3. ☐	Select the image file	Select the qcow2 from the location: `/home/ova` (as done Steps 24 and 25 in Appendix J) by browsing the location and clicking **Forward** 
4. ☐	Select RAM and vCPUs for VM	For each VM, select the RAM and vCPUs as per the required resource profile. Refer to Appendix G. Click **Forward**. 

Step	Procedure	Result
5. ☐	Verify and customize VM	Update the VM name and select **Customize configuration before install**. In Network selection, select XMI bridge and click **Finish**: 

Step	Procedure	Result
6. ☐	Customize the network configuration	On the next screen, click **Add Hardware**. Under Network, select the IMI bridge. • For NO and SO, select IMI bridge only. • For MP, add XSI1 along with IMI by repeating this step. Click **Finsh**. 

Step	Procedure	Result
7. ☐	Verify and begin installation	After adding all bridges, verify and begin the VM installation: 
THIS PROCEDURE HAS BEEN COMPLETED		

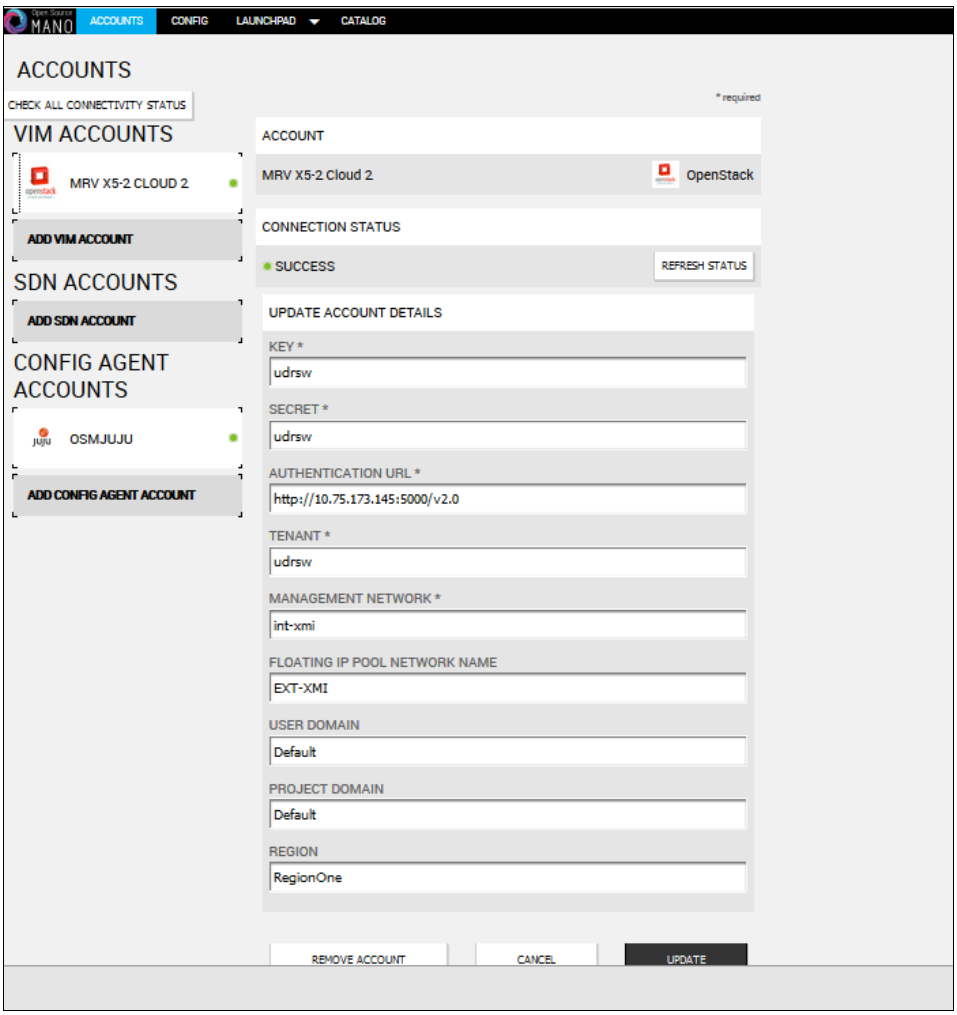
Appendix N. Orchestrating UDR Via OSM

Pre-requisites:

- OSM Relase Two must be successfully installed.
- A standalone Juju server must be successfully bootstrapped .

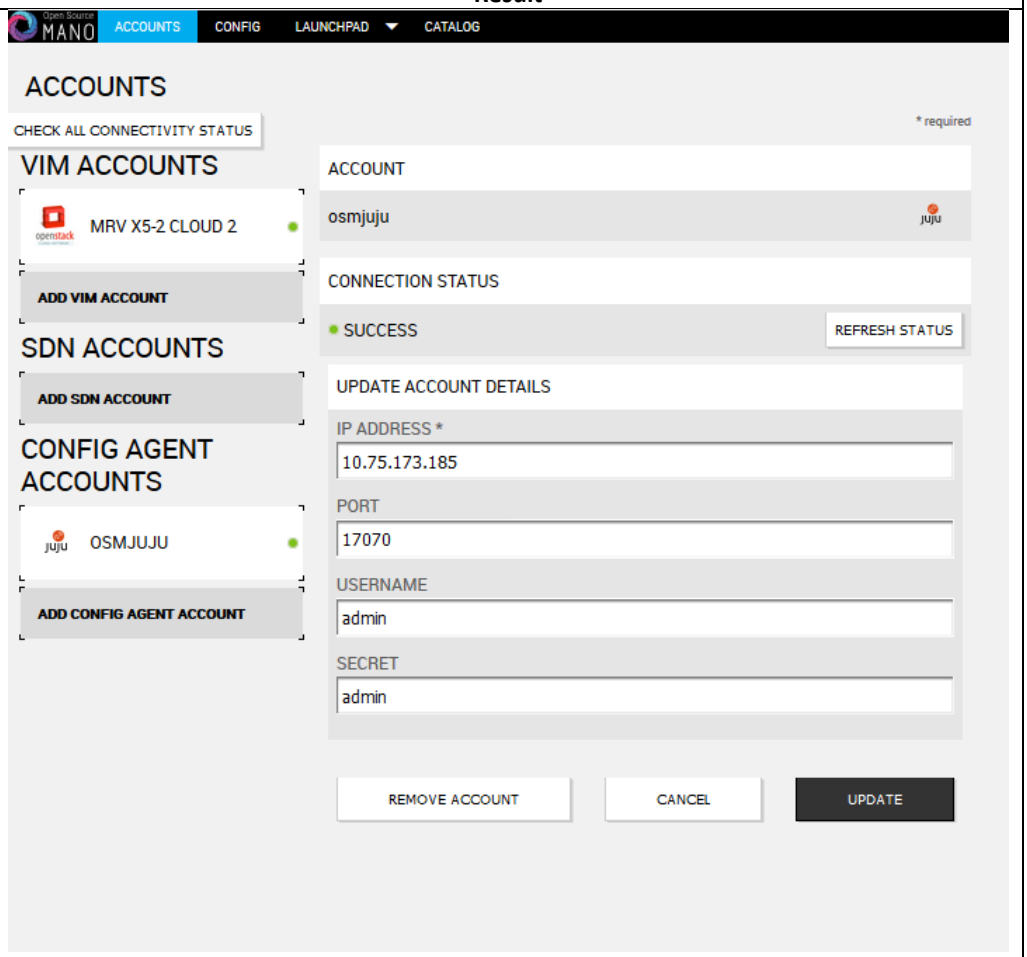
N.1 CONFIGURE OPENSTACK VIM TO RUN WITH OSM

On the OSM GUI, navigate to the Accounts tab and click **Add VIM Account**. Enter the OpenStack VIM details and add the VIM account.

Procedure	Result
Add the VIM details on the **Account → VIM ACCOUNTS** on OSM GUI.	

N.2 CONFIGURE CONFIG AGENT ACCOUNT (JUJU SERVER)

Add the details of standalone Juju server as a Config Agent account in order to enable OSM to communicate with Juju Server. On the OSM GUI, navigate to Accounts tab and **Add Config Agent Account**. A screen like the one below displays. Enter in the Juju Server details and add the account.

Procedure	Result
Add the CONFIG AGENT (Juju) account details in the **Account → CONFIG AGENT ACCOUNTS** on OSM GUI.	

N.3 BUILD AND DEPLOY UDR NSD/VNFD PACKAGE

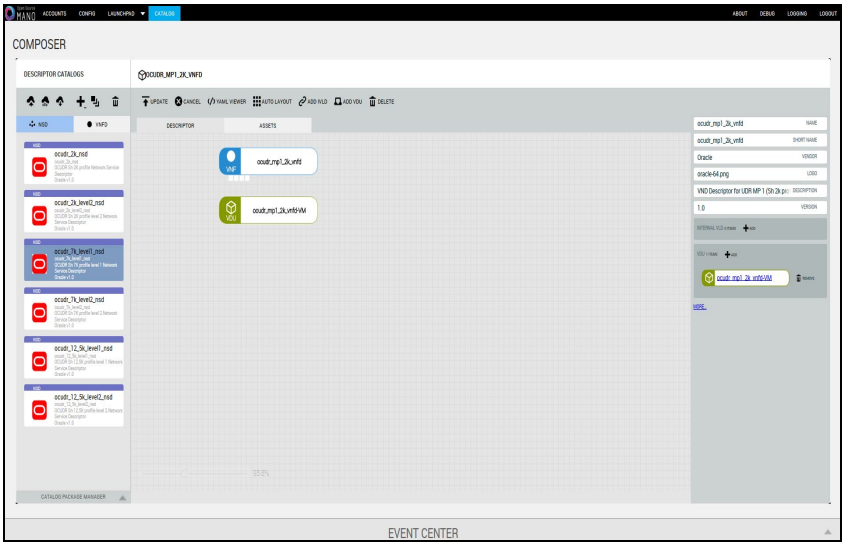
Build and deploy scripts must be run in order to upload UDR NSDs and VNFDs to OSM.

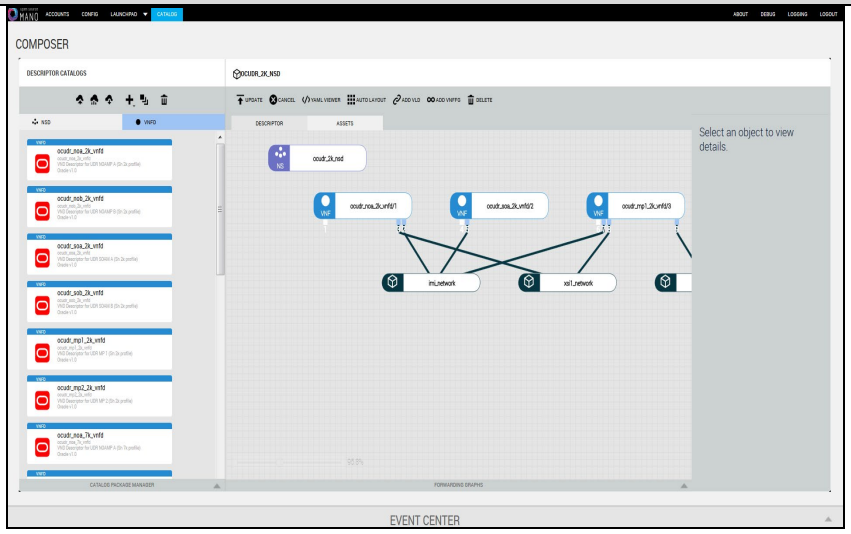
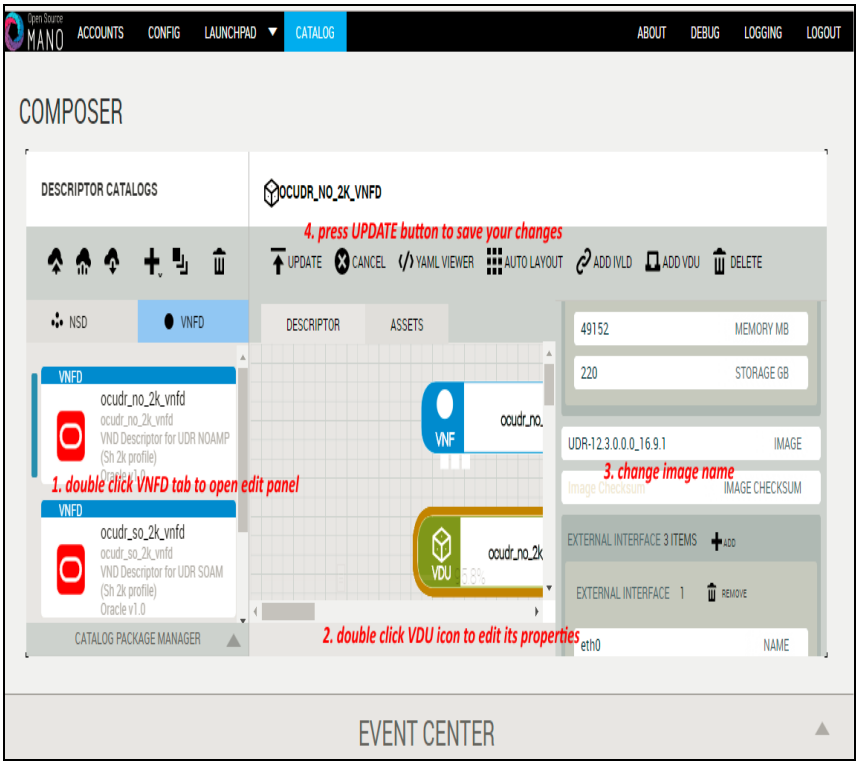
Procedure 11 SSH Logon to Juju Server and fetch build and deploy source scripts

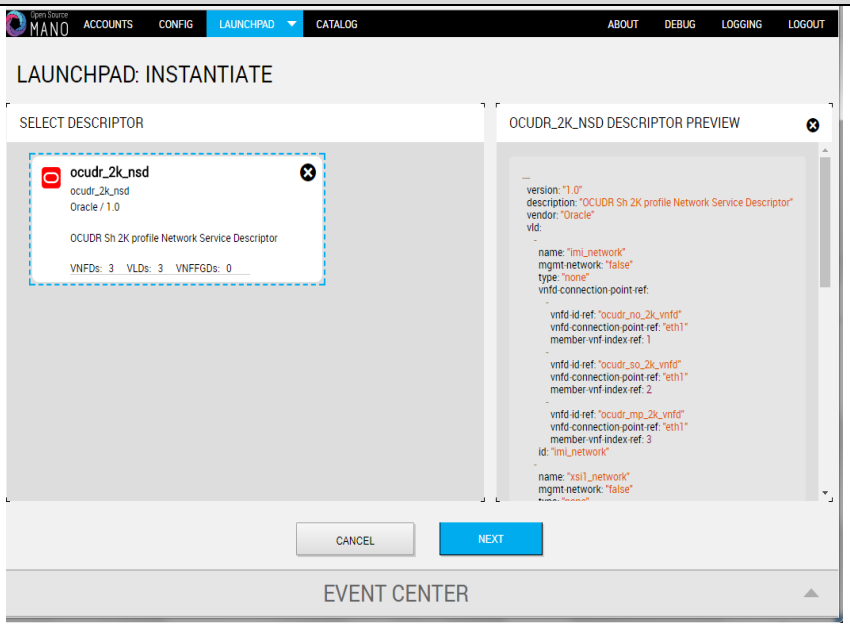
Step	Procedure	Result

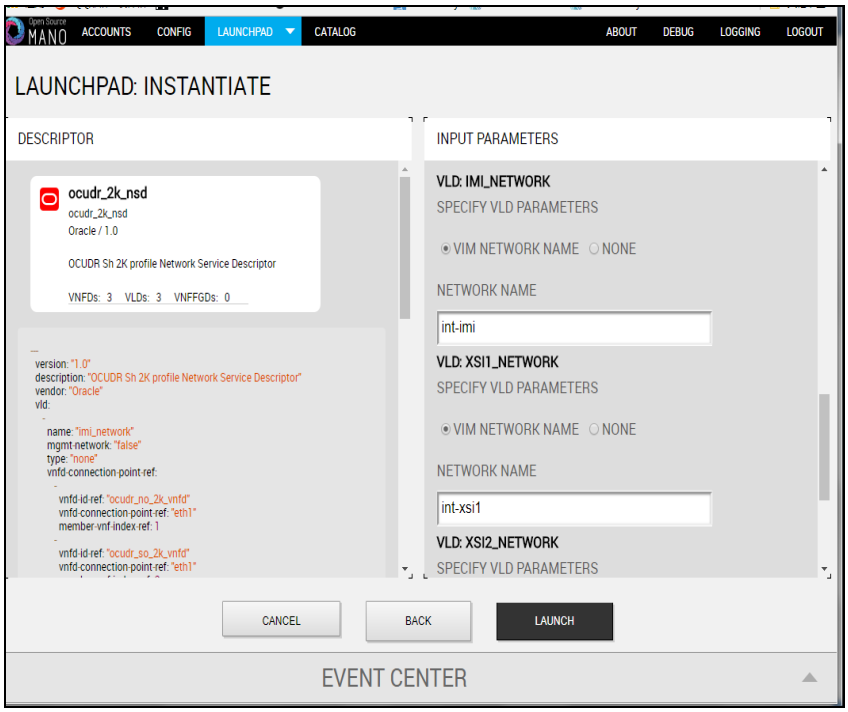
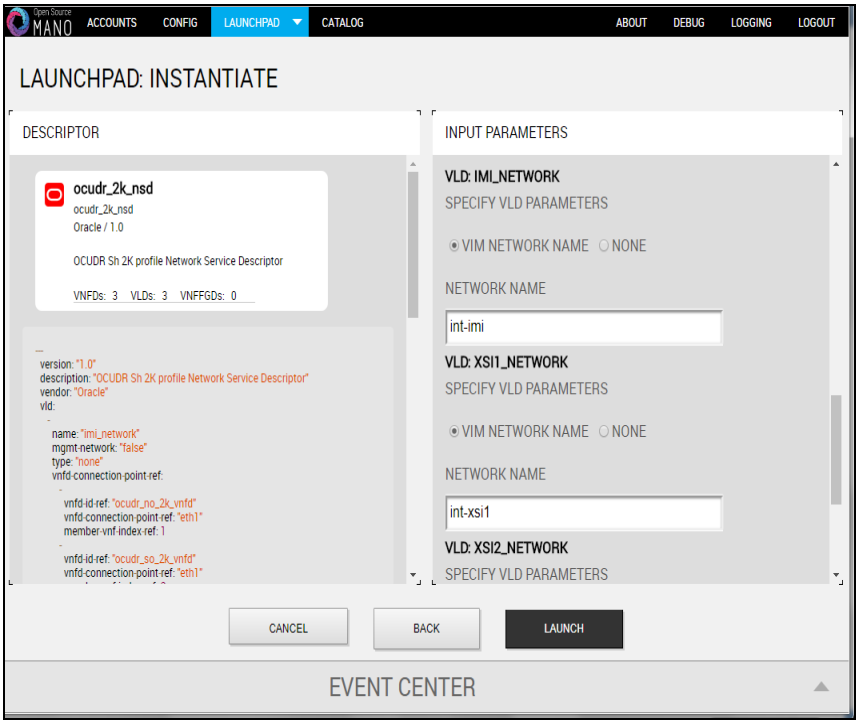
1. ☐	SSH Logon to Juju server and fetch the build and deploy source scripts	1. Copy the qcow2 file made from the ova file of UDR image to the Juju server.
		2. Run the following commands:
		`$ sudo guestmount -a UDR-12.5.1.0.0_17.7.0.qcow2 -m /dev/mapper/vgroot-plat_usr /mnt`
		`$ sudo cp /mnt/TKLC/udr/cloud/OSM-support.tar.gz ./`
		`$ sudo guestunmount /mnt`
		3. These commands extract osm-supprt.tar.gz file from qcow2 image
		4. Untar the file to osm-support directory
		Copied Image on Juju Server:
		`ubuntu@edward-juju-server:~$ ls -l UDR-12.4.0.0.0_16.13.0.qcow2`
		`-rw-r--r-- 1 ubuntu ubuntu 4345757696 Jan 23 09:57 UDR-12.4.0.0.0_16.13.0.qcow2`
		`ubuntu@edward-juju-server:~$`
		Extracted osm-support directory from qcow2 Image
		`ubuntu@edward-juju-server:~$ cd osm-support/`
		`ubuntu@edward-juju-server:~/osm-support$ ls`
		`build build.sh charms deploy.sh doc nsd vnfd`
		`ubuntu@edward-juju-server:~/osm-support$`

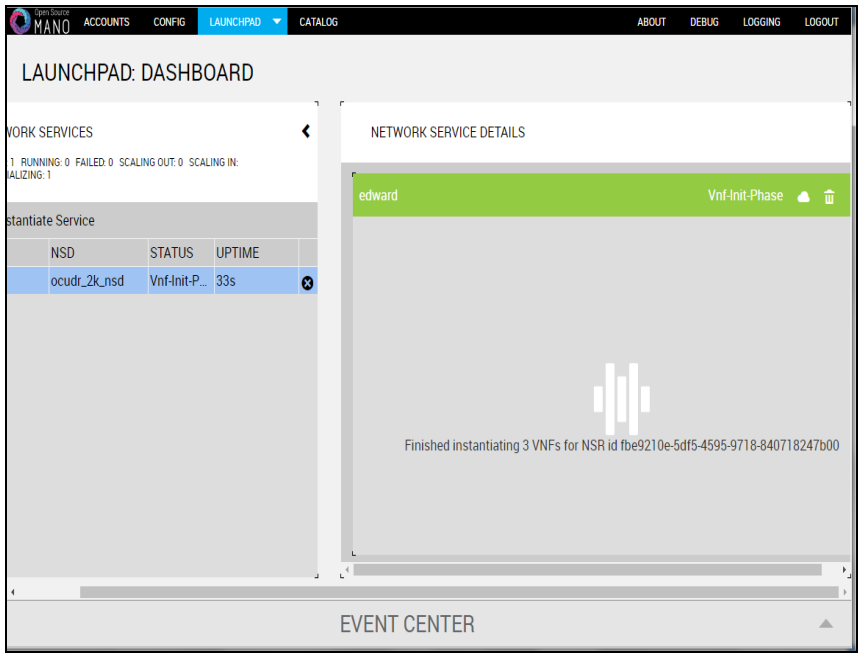
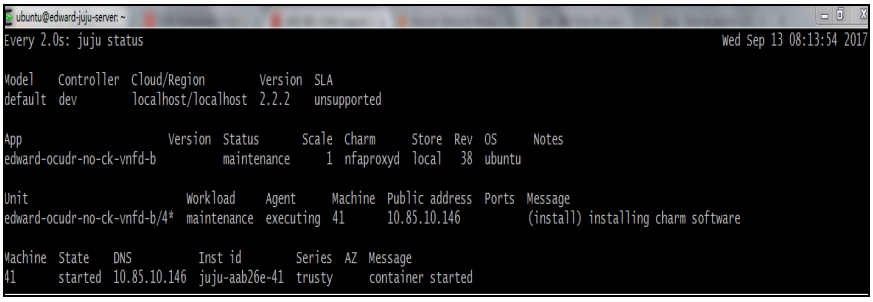
2. ☐	Navigate to OSM-Support directory and Run the build script
	`$ ./build.sh`
	NOTE: Monitor the console output to verify that the build script completed successfully
		`ubuntu@edward-juju-server:~/osm-support$ ./build.sh`
		`ocudr_soa_2k_vnf/`
		`ocudr_soa_2k_vnf/ocudr_soa_2k_vnfd.yaml`
		`ocudr_soa_2k_vnf/README`
		`ocudr_soa_2k_vnf/icons/`
		`ocudr_soa_2k_vnf/icons/oracle-64.png`
		`ocudr_soa_2k_vnf/checksums.txt`
		`ocudr_soa_2k_vnf/cloud_init/`
		`ocudr_soa_2k_vnf/cloud_init/ocudr_soa_2k_vnfd-VM.init`
		`ocudr_sob_2k_vnf/`
		`ocudr_nob_12_5k_vnf/cloud_init/ocudr_nob_12_5k_vnfd-VM.in`
		`build: Composing into /home/ubuntu/osm-support/charms`
		`build: Destination charm directory: /home/ubuntu/osm-supp`
		`nfaproxyd`
		`build: Processing layer: layer:basic`
		`build: Processing layer: layer:sshproxy`
		`build: Processing layer: layer:vnfproxy`
		`build: Processing layer: nfaproxyd (from charms/nfaproxyd`
		`proof: I: Includes template icon.svg file.`
		`proof: W: Includes template README.ex file`
		`proof: W: README.ex includes boilerplate: Step by step in`
		`g the charm:`
		`proof: W: README.ex includes boilerplate: You can then br`
		`address to configure the service.`
		`proof: W: README.ex includes boilerplate: - Upstream mail`
		`t information`
		`proof: W: README.ex includes boilerplate: - Feel free to`
		` useful for users`
		`proof: I: all charms should provide at least one thing`

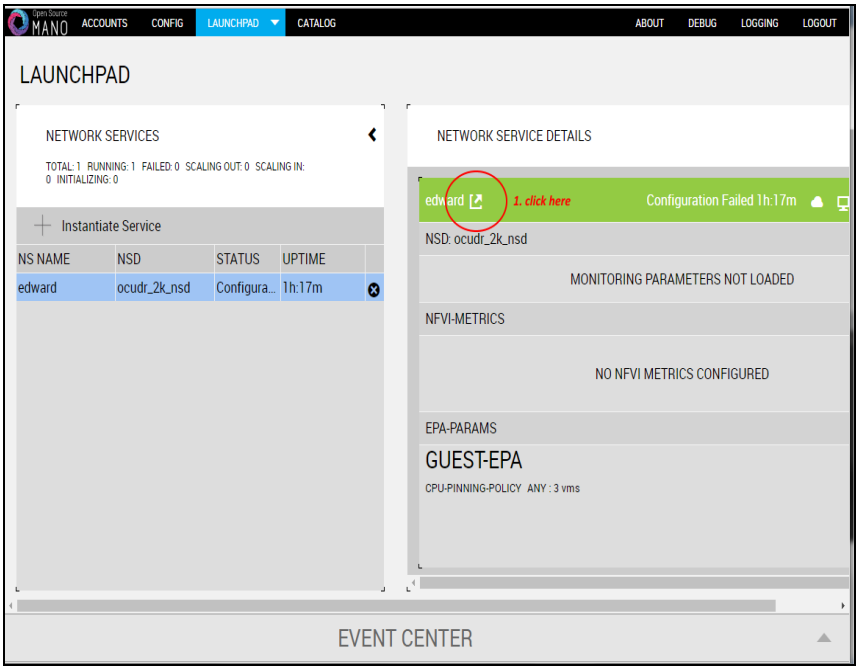
Step	Procedure	Result
		```ocudr_12_5k_level1_ns/ ocudr_12_5k_level1_ns/README ocudr_12_5k_level1_ns/icons/ ocudr_12_5k_level1_ns/icons/oracle-64.png ocudr_12_5k_level1_ns/ocudr_12_5k_level1_nsd.yaml ocudr_12_5k_level1_ns/checksums.txt ocudr_12_5k_level2_ns/ ocudr_12_5k_level2_ns/README ocudr_12_5k_level2_ns/icons/ ocudr_12_5k_level2_ns/icons/oracle-64.png ocudr_12_5k_level2_ns/checksums.txt ocudr_12_5k_level2_ns/ocudr_12_5k_level2_nsd.yaml ubuntu@edward-juju-server:~/osm-support$ ```
3. ☐	After the build script completes, run the deploy script inside OSM-support directory **Pre-requisite:** OSM host IP is required to run `deploy.sh`, Open the deploy script with an editor and change the env variable of `OSM_HOSTNAME` to your OSM host IP before running `deploy.sh`. `$./deploy.sh`	```ubuntu@edward-juju-server:~/osm-support$ ./deploy.sh failed to delete vnfd ocudr_noa_2k_vnfd failed to delete vnfd ocudr_nob_2k_vnfd failed to delete vnfd ocudr_soa_2k_vnfd failed to delete vnfd ocudr_sob_2k_vnfd failed to delete vnfd ocudr_mp1_2k_vnfd failed to delete vnfd ocudr_mp2_2k_vnfd ```
4. ☐	Logon to OSM GUI, verify that UDR NSD/VNFD has been uploaded successfully:	

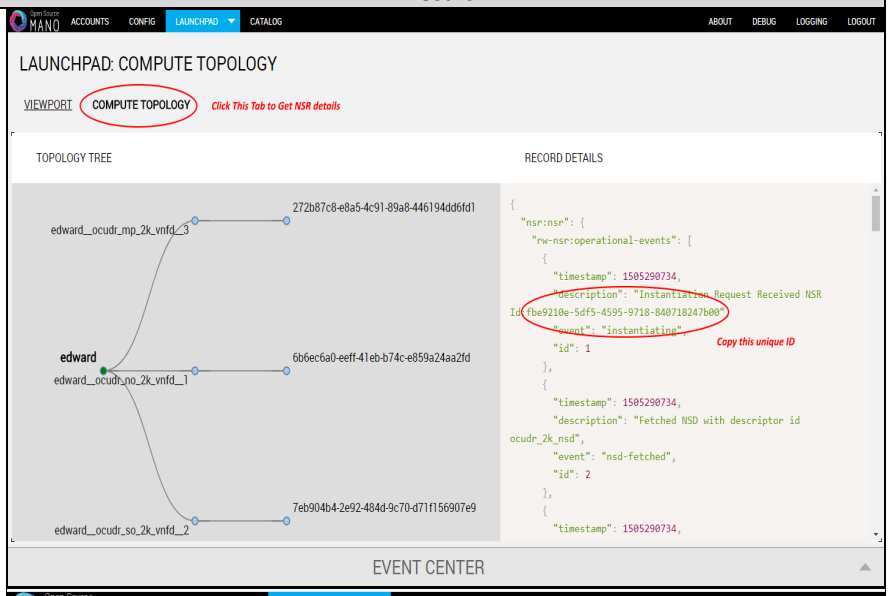
Step	Procedure	Result
		
5. ☐	**Optional Step: Change UDR image name** 1. Open The OSM GUI and select **CATALOG**. Follow the steps in the image to change UDR Image Name: 2. Double click **VNFD** to open edit pane 3. Double click VDU to edit its properties 4. Change the image name 5. Click **Update** to save changes **NOTE:** UDR image name must match the one you intend to use and an image with the same name is available on openstack	

Step	Procedure	Result
6. ☐	1. Open the OSM GUI. 2. Click **LAUNCHPAD** 3. Click **Instantiate Service** 4. Select **UDR_2k_nsd**. 5. Click **Next.**	

Step	Procedure	Result
7. ☐	Enter the required information and click **Launch**, enter the instance name.	**NOTE:** Enter the VLD:*_network: VLD:IMI_NETWORK → int-imi, VLD:XSI1_NETWORK → int-xsi1, VLD:XSI2_NETWORK -→ int-xsi2  

Step	Procedure	Result
8. ☐	Wait for the instantiation operation to complete	**NOTE:** In OSM Release 2, UDR NSR information may be incorrectly shown on GUI. To verify the status, logon to the Juju server and issue the command `$watch juju status` The screen displays a message. Wait for the cleanup of the message. The cleanup of message indicates success. (Refer to the second figure in this step)  

Step	Procedure	Result
9. ☐	After instantiation is complete, query UDR NSR ID from OSM GUI and configure the parameter of udr-nsr-id in NO charm. Follow the steps in the image to Add UDR NSR ID in NO charm	

Step	Procedure	Result
		

N.4 PERFORM ORCHESTRATION OPERATIONS VIA OSM

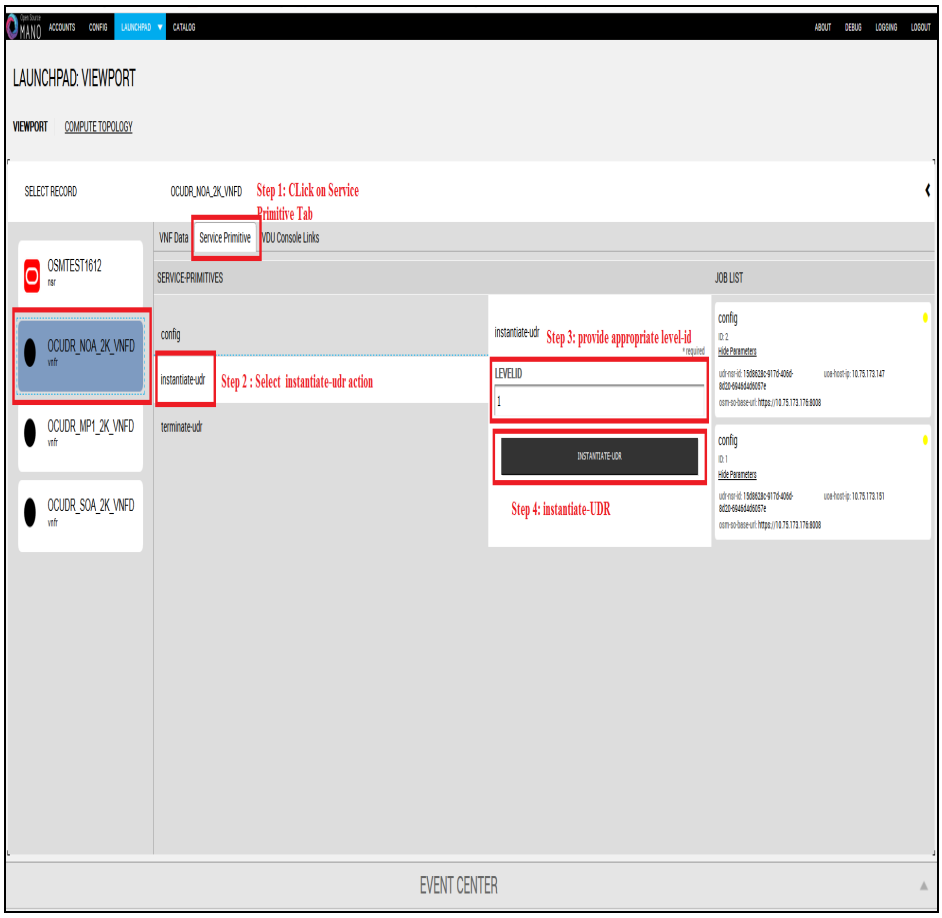
After the UDR NSR ID is added in the NO charm, UDR Orchestration operations can be performed. OSM supports two operations:

1. Instantiation
2. Termination

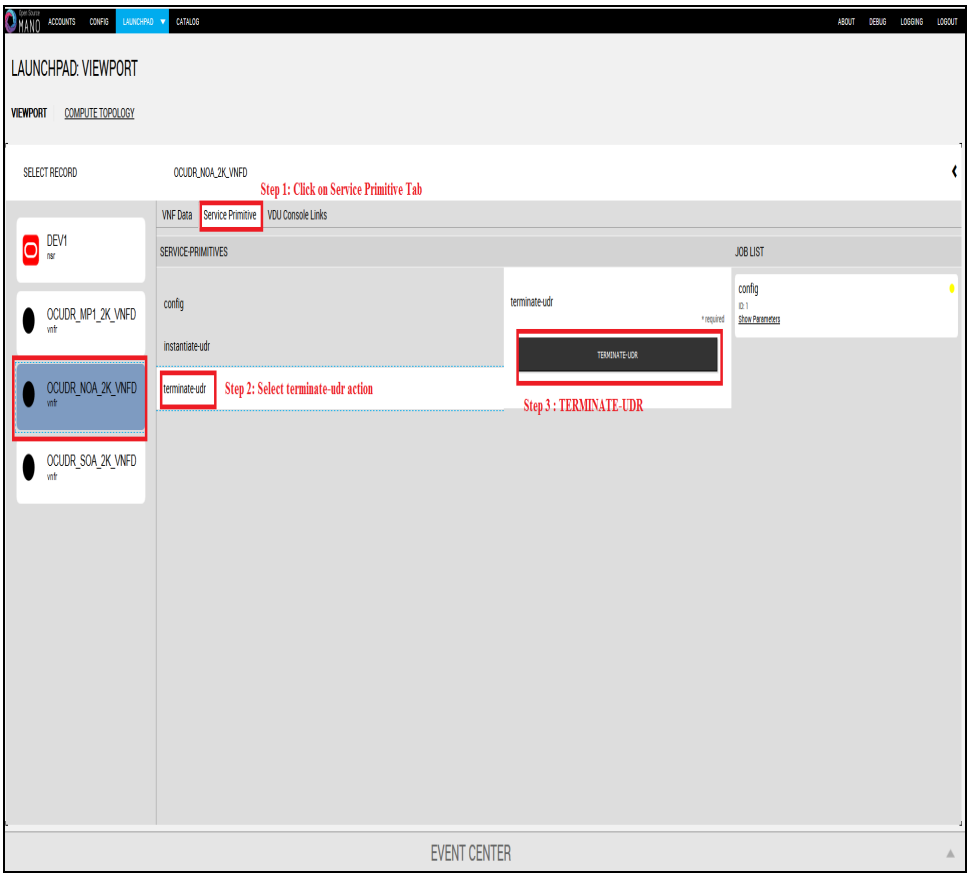
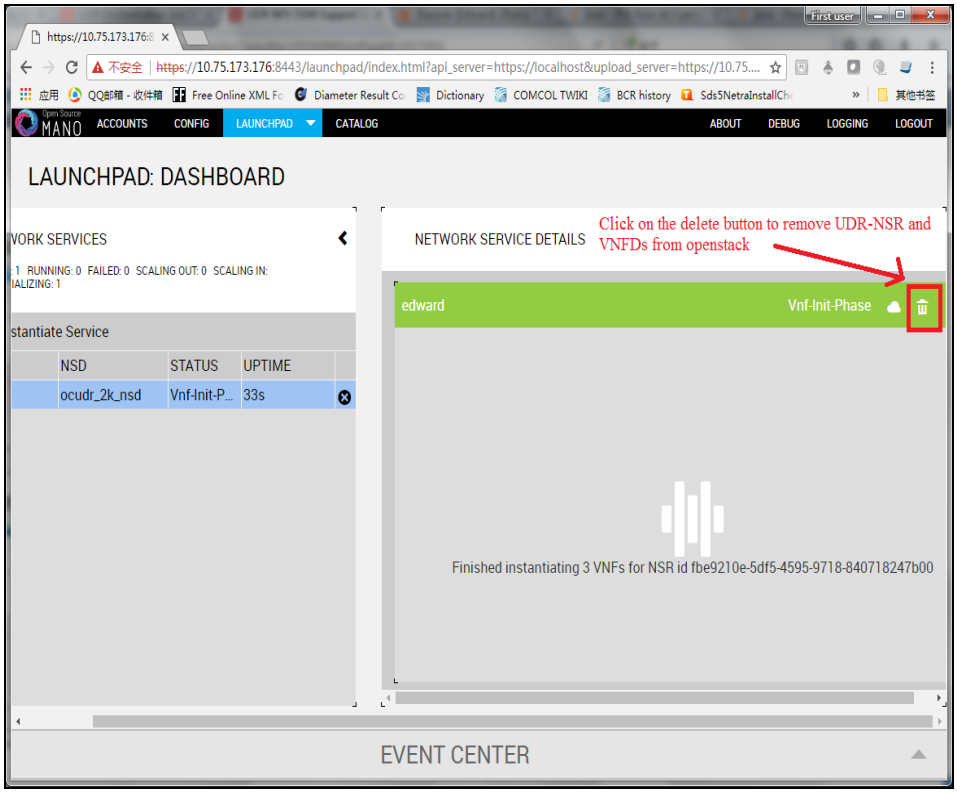
N.5 INSTANTIATE UDR

Afer the steps in Appendix N-3 are completed successfully, a UDR instance can be instantiated either to level1 or level 2.

1. Navigate to **Launchpad → Viewport → UDR_NO_VM**
2. Click the **Service Primitive** tab
3. Select **instantiate-udr** action
4. Enter the levelId to instantiate UDR
5. Click **instantiate-UDR**



N.6 TERMINATE UDR

1. Navigate to **Launchpad → Viewport → UDR_NO_VM** 2. Click the **Service Primitive** ab 3. Select **terminate-udr** action 4. Click **terminate-UDR**	
Manually remove the UDR NSR to remove the deployed VNFDs from openstack Naviagte to **LAUNCHPAD → DASHBOARD** on OSM GUI and click the delete icon for the corresponding UDR-NSR	

Appendix O. Orchestrating UDR via Tacker

Pre-requisites:

1. Openstack Pike with Tacker service must be installed
2. UDR is successfully instantiated and NFAgent service is up and running. Also a public IP is available to access the NFAgent service.

O.1 TACKER CONFIGURATION

Edit the tacker.conf file location, `/usr/local/etc/tacker/tacker.conf`, and add the following configuration options to it:

```
[udr]

#
# From tacker.vnfm.mgmt_drivers.udr.udr
#

# IP address on which host NFAgent service is deployed (string value)
nfagent_ip = 10.113.79.112

# user name to login NFAgent (string value)
#user = admusr

# password to login NFAgent (string value)
#password =

# time to wait for UDR VMs to be ready for application configuration (seconds)
#udr_init_wait_sec = 600
udr_init_wait_sec = 900
```

Configuration Options

- nfagent_ip: The public IP Address of the NFAgent service deployed as a pre-requisite before this step
- user: user name to login NFAgent (string value)
- password: password to login NFAgent (string value)
- udr_init_wait_sec: time to wait for UDR VMs to be ready for application configuration (seconds)

O.2 INSTALL UDR TACKER SUPPORT SCRIPTS

Step	Procedure	Result

1. ☐	SSH Logon to Tacker server
	
	1. Copy the qcow2 file made from the ova file of UDR image to the tacker server (controller Node).
	2. Run the following commands:
	
	`$ sudo guestmount -a UDR-12.5.1.0.0_17.7.0.qcow2 -m /dev/mapper/vgroot-plat_usr /mnt`
	`$ sudo cp /mnt/TKLC/udr/cloud/Tacker-support.tar.gz ./`
	`$ sudo guestunmount /mnt`
	
	These commands extract Tacker-supprt.tar.gz file from qcow2 image
	
	3. Untar the file to tacker-support directory
		Copied Image on Tacker server:
		
		`[root@nj-x52-61 image]# ls -l UDR-12.4.0.0.0_16.13.0.qcow2`
		`-rwxrwxrwx 1 root root 4345757696 Jan 24 18:05 UDR-12.4.0.0.0_16.13.0.qcow2`
		`[root@nj-x52-61 image]#`
		
		Extracted tacker-support directory from qcow2 image
		
		`[root@nj-x52-61 tacker-support]# ls`
		`bin  mgmt_driver  requirements.txt  vnfd`

Step	Procedure	Result

2. ☐	Browse to the directory where the tacker scripts are copied on the controller Node.	Run the following commands:
		1. `sudo mkdir -p /usr/lib/python2.7/site-packages/tacker/vnfm/mgmt_drivers/udr`
		2. `edit mgmt_driver/udr/udr.py` to navigate to line 102:
		3. `level = str(self.cluster_info['options']['LEVEL'])`
		4. `sudo cp mgmt_driver/udr/*.py /usr/lib/python2.7/site-packages/tacker/vnfm/mgmt_drivers/udr/`
		5. `sudo service openstack-tacker-server restart`
		NOTE: Substitute `/usr/lib/python2.7/site-packages/tacker` with the tacker script installation directory for your local tacker installation path.
		Inspect `tacker.log` to verify that UDR management driver installed successfully.
		`[root@nj-x52-61 tacker-support]# mkdir -p /usr/lib/python2.7/site-packages/tacker/vnfm/mgmt_drivers/udr/`
		`[root@nj-x52-61 tacker-support]# /bin/cp -rf mgmt_driver/udr/*.py /usr/lib/python2.7/site-packages/tacker/vnfm/mgmt_drivers/udr/`
		`[root@nj-x52-61 tacker-support]# service openstack-tacker-server restart`
		`Redirecting to /bin/systemctl restart openstack-tacker-server.service`
		`[root@nj-x52-61 tacker-support]#`

3. ☐	Deploy VNFD for UDR 2k level 2 VNF	1. Edit `vnfd/udr-2k-vnfd.yaml` and find occurrences of init 6 (there are 6 occurrences in total), prepend line with:
		`echo 'ifconfig eth0 mtu 1450' >> /etc/rc.d/rc.local`
		`before each occurrence of 'init 6', like following:`
		`echo 'ifconfig eth0 mtu 1450' >> /etc/rc.d/rc.local`
		`init 6`
		2. Source keystone rc file of openstack:
		`source ~/keystonerc_admin`
		3. Deploy the updated VNFD file with following command:
		`tacker vnfd-create --vnfd-file vnfd/udr-2k-vnfd.yaml udrvnfd`
		4. Verify that VNFD is deployed successfully.
		`[root@nj-x52-61 tacker-support]# vim vnfd/udr-2k-vnfd.yaml`
		`[root@nj-x52-61 tacker-support]# tacker vnfd-create --vnfd-file vnfd/udr-2k-vnfd.yaml udr-2k-vnfd`
		`You must provide a username or user ID via --os-username, env[OS_USERNAME] or --os-user-id, env[OS_USER_ID]`
		`[root@nj-x52-61 tacker-support]# source ~/keystonerc_admin`
		`[root@nj-x52-61 tacker-support(keystone_admin)]# tacker vnfd-create --vnfd-file vnfd/udr-2k-vnfd.yaml udr-2k-vnfd`
		`Created a new vnfd:`
		`+----------+----------+`
		`| Field | Value |`
		`+----------+----------+`
		`| created_at | 2018-02-05 03:47:24.167240 |`
		`| description | Demo with udr cluster |`
		`| id | 0874def4-0ac5-4352-bc7a-cff6139d6df4 |`
		`| name | udr-2k-vnfd |`
		`| service_types | vnfd |`
		`| template_source | onboarded |`
		`| tenant_id | 45a69279f4be47d89556b5299bdec769 |`
		`| updated_at | |`
		`+----------+----------+`
		`[root@nj-x52-61 tacker-support(keystone_admin)]#`

O.3 PERFORM ORCHESTRATION OPERATIONS VIA TACKER

After the succesfull completion of Appendix O-2, you can proceed with the orchestration of UDR. Tacker supports two orchestration operations:

1. Instantiation (CREATE UDR VNF)
2. Termination (DELETE UDR VNF)

O.4 CREATE UDR VNF (INSTANTIATION)

Issue the following command to create UDR VNF (assumes to have sourced the keystone rc file for openstack):

```
tacker vnf-create --vnfd-name udrvnfd <udr_vnf_name> --param-file udrvnf-param.yaml
```

Where:

- udr_vnf_name is replaced with the name you specify for udr vnf.
- udrvnf-param.yaml is the configuration file used for customizing parameters in UDR VNFD template. Change the file parameters to specify the configuration.

Figure 5 Example of udrvnf-param.yaml

```
xmi_network: int-xmi
imi_network: int-imi
xsi1_network: int-xsi1
xsi2_network: int-xsi2image: UDR-12.5.1.0.0_17.7.0.0
```

```
[root@nj-x52-61 tacker-support]# source ~/keystonerc_admin
[root@nj-x52-61 tacker-support(keystone_admin)]# tacker vnf-create --vnfd-n
ame udr-2k-vnfd udrpv1
Created a new vnf:
+----------------+--------------------------------------+
| Field          | Value                                |
+----------------+--------------------------------------+
| created_at     | 2018-02-05 04:52:52.342068           |
| description    | Demo with udr cluster                |
| error_reason   |                                      |
| id             | e60483c1-94a2-4af6-b415-1a740de59c64 |
| instance_id    | 204ad65b-8835-4052-ae57-79d3859a53d7 |
| mgmt_url       |                                      |
| name           | udrpv1                               |
| placement_attr | {"vim_name": "tacker"}               |
| status         | PENDING_CREATE                       |
| tenant_id      | 45a69279f4be47d89556b5299bdec769     |
| updated_at     |                                      |
| vim_id         | 7ae4f37b-056b-45de-a131-62463bdfce6d |
| vnfd_id        | 0874def4-0ac5-4352-bc7a-cff6139d6df4 |
+----------------+--------------------------------------+
[root@nj-x52-61 tacker-support(keystone_admin)]#
```

To inspect the detailed log for creating UDR VNF, refer to tacker log use following command:

```
$ sudo tail -f /var/log/tacker/tacker.log
```

O.5 DELETE UDR VNF (TERMINATION)

Issue the following command to delete UDR VNF:

```
tacker vnf-delete <udr_vnf_name>
```

Where:

- udr_vnf_name is replaced with the name of udr vnf you want to terminate.

```
[root@nj-x52-61 tacker-support]# source ~/keystonerc_admin
[root@nj-x52-61 tacker-support(keystone_admin)]# tacker vnf-delete udrpv1
All specified vnf(s) delete initiated successfully
[root@nj-x52-61 tacker-support(keystone_admin)]#
```