



INSTALLATION RUNBOOK FOR Openwave Mobility + vUDR

Application Type: **[Infrastructure (User data repository)]**
Application Version: **[1.0]**
MOS Version: **9.0**
OpenStack version: **Mitaka**

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Document History

Version	Revision Date	Description
0.1	01-08-2016	Initial Version

1 Introduction

This document is to serve as a detailed Deployment Guide for Openwave Mobility vUDR. This document describes the reference architecture, installation steps for Openwave Mobility vUDR, limitations and testing procedures.

1.1 Target Audience

This guide is designed for operators interested in evaluating the benefits of the OWM vUDR solution.

1.2 Why SDM?

Subscriber data management (SDM) is a mission critical system. Before any voice connection can be established, any data service accessed, or any message sent or received, internal systems need to authenticate a subscriber and their device to authorize the action the subscriber requests. For a communications network, SDM system is literally the life-giving oxygen. Services simply cannot be offered without authenticating the subscriber. SDM system serves as a foundation for other network applications like HSS, PCRF, Billing systems. As service providers move towards network function virtualization (NFV), it is imperative that this foundational block, i.e. SDM, is the first application that is deployed in the cloud. Also, the SDM system should be able to realize the benefits of virtualization like scale, elasticity, low OPEX, etc. without compromising on telco grade requirements of data integrity, high availability, reliability and performance.

2 Application overview

Today, service providers operate in multiple domains like mobility, triple play services (fixed line, broadband and cable TV), IOT, etc. Each of these domains has its own data stores, which are not accessible to applications from other domains. Even within the same domain, there is no unified data repository. Subscriber profile is fragmented across multiple silo'ed repositories. For instance, HSS has its own repository, Result – data fragmentation, data duplication, data consistency issues, sub-optimal capacity utilization, high costs.

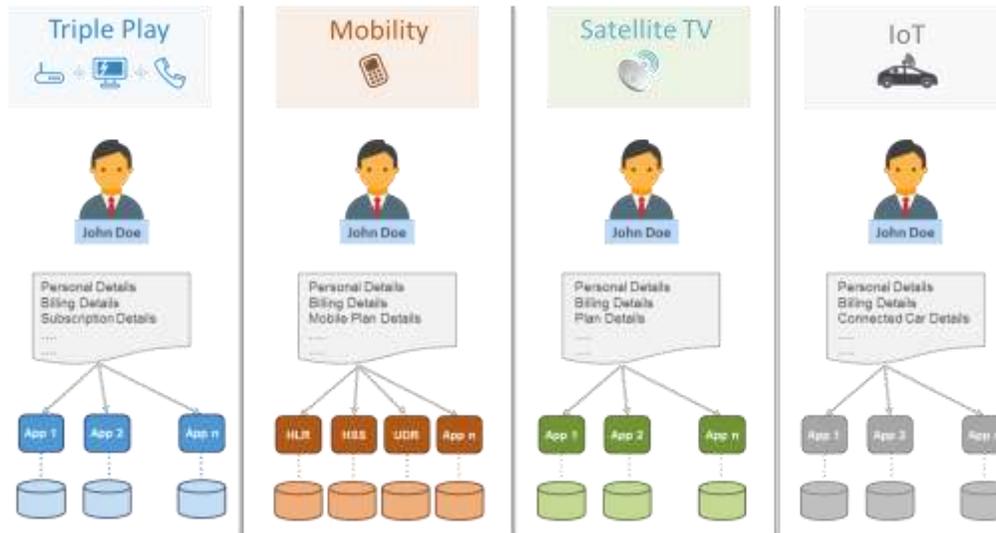


Figure 1 - One subscriber, many silos

vUDR addresses these issues by introducing a 3-tier architecture that provides a unified view of subscriber data, not only across multiple databases within a domain, but also across multiple domains. It is the industry's first, telco grade NFV based Subscriber Data Management (SDM) solution. It is a 3GPP standards compliant virtualized User Data Repository (vUDR) deployable in NFV environments which enables service providers to efficiently manage their capacities through dynamic scaling capabilities, reduce TCO and lessen time-to-market for new services by decoupling subscriber data from the application front end logic.

The consistency and availability of data can be configured on a per application level. vUDR was designed with the cloud in mind and is horizontally scalable to facilitate capacity expansion on demand. vUDR makes any data available, anywhere at any time. You provision once and it is both federated and distributed to provide optimal cost, performance and resiliency.

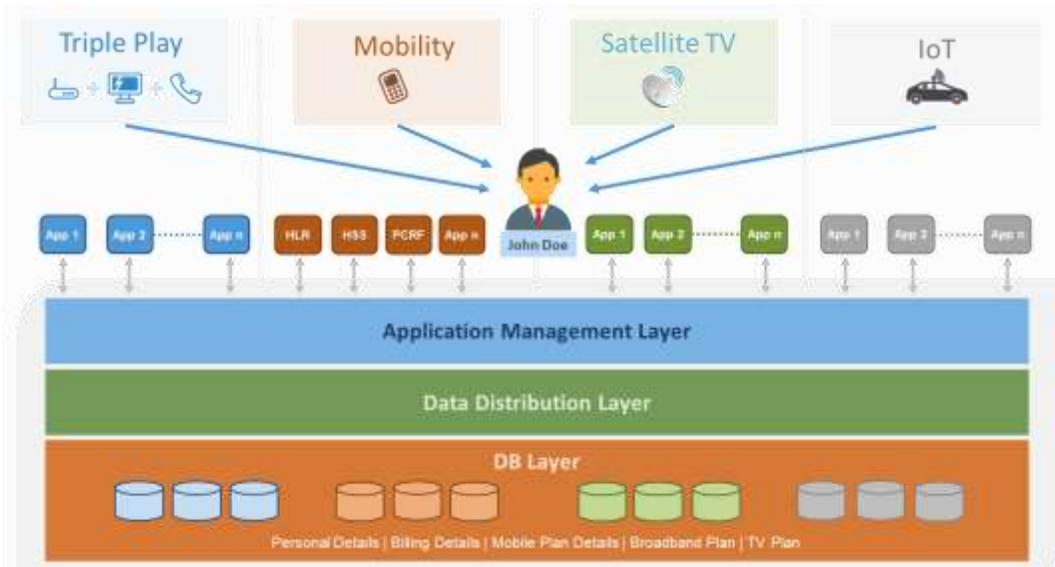


Figure 2 - Unified Profile Using Openwave Mobility vUDR

The Openwave Mobility vUDR solution provides:

Reduced OPEX

- Multiple data stores reduced to one
- COTS hardware
- Deployed in weeks

Extreme Agility

- Cloud-based elasticity
- No vendor lock-in – operator owned schema
- Decoupling of application management logic from storage logic

Telco Grade Availability

- Provides 5 nines of availability on commodity grade hardware based clouds.

3 Joint Reference Architecture

The vUDR is deployed as a cluster of VMs. It's optimized to run as a virtual solution, tested on Mirantis OpenStack 9.0.



Figure 3 - vUDR Deployment on Mirantis OpenStack

4 Installation & Configuration

4.1 Environment preparation

The solution requires a standard installation of MOS 9.0. For optimal performance, it is recommended that you enable CPU pinning.

The solutions assume the use of bare-metal hypervisors configured with highly available network interfaces.

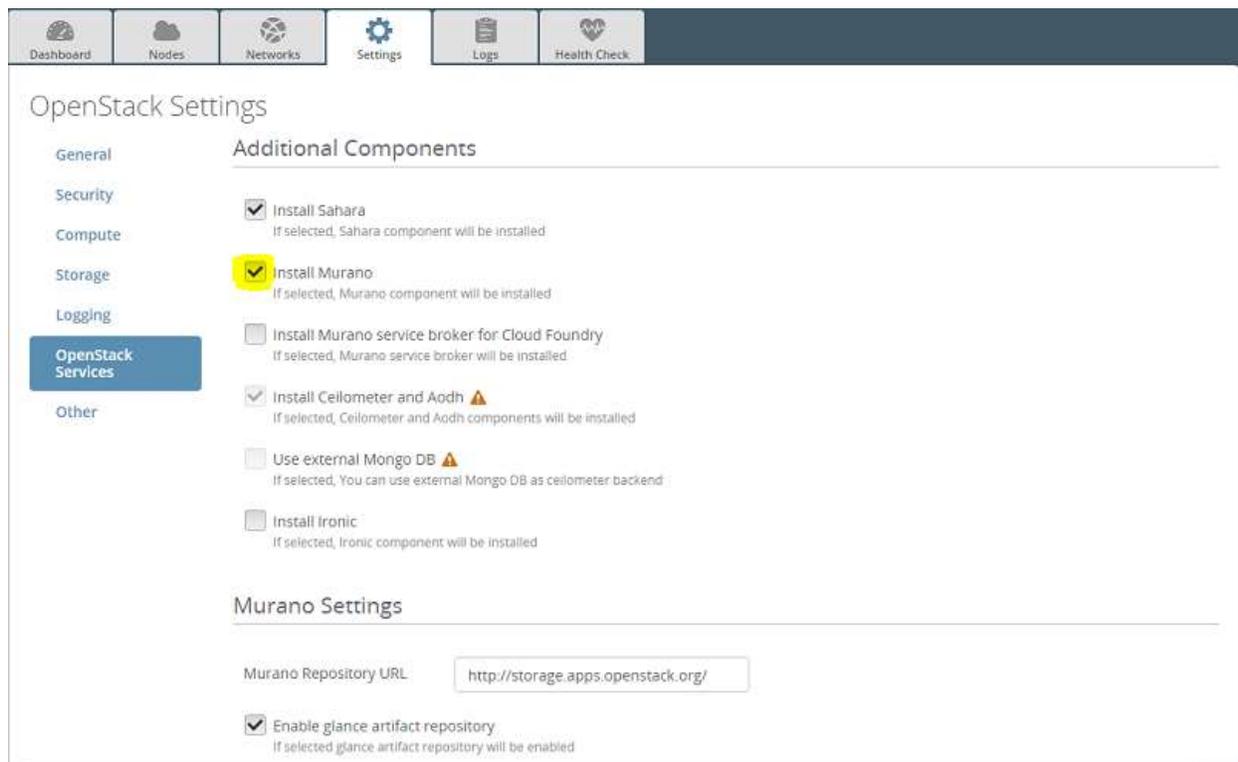
It is recommended to have multiple availability zones, in order to guarantee the high availability of your data.

4.2 MOS installation

Install MOS per the Mirantis guidelines

<https://docs.mirantis.com/openstack/fuel/fuel-9.0/quickstart-guide.html#introduction>

While installing, please make sure that Murano is enabled in the Fuel settings as shown in the below screenshot.



4.2.1 Health Check Results

Run the health checks to verify the deployment is completed and running successfully.

OpenStack Health Check			
<input type="checkbox"/> Select All		<input type="button" value="Provide credentials"/>	<input type="button" value="Run Tests"/>
<input type="checkbox"/> Sanity tests. Duration 30 sec - 2 min	Expected Duration	Actual Duration	Status
<input type="checkbox"/> Cellometer test to list meters, alarms, resources and events	180 s.	3.9	✓
<input type="checkbox"/> Request flavor list	20 s.	0.2	✓
<input type="checkbox"/> Request image list using Nova	20 s.	0.4	✓
<input type="checkbox"/> Request instance list	20 s.	0.3	✓
<input type="checkbox"/> Request absolute limits list	20 s.	0.1	✓
<input type="checkbox"/> Request snapshot list	20 s.	0.2	✓
<input type="checkbox"/> Request volume list	20 s.	0.2	✓
<input type="checkbox"/> Request image list using Glance v1	10 s.	0.0	✓
<input type="checkbox"/> Request image list using Glance v2	10 s.	0.0	✓
<input type="checkbox"/> Request stack list	20 s.	0.0	✓
<input type="checkbox"/> Request active console list	20 s.	0.0	✓

Once everything looks ok OpenStack system health-wise, it is time to install vUDR.

4.3 vUDR installation steps

The vUDR solution has been packaged for Murano. This provides a wizard driven deployment that instantiates a running vUDR ready to use. The following section describes the steps and options. As pre-requisite the deployment requires a RHEL 6.X with the pre-existing software dependencies. Contact your [OWM representative](#) to obtain the necessary images.

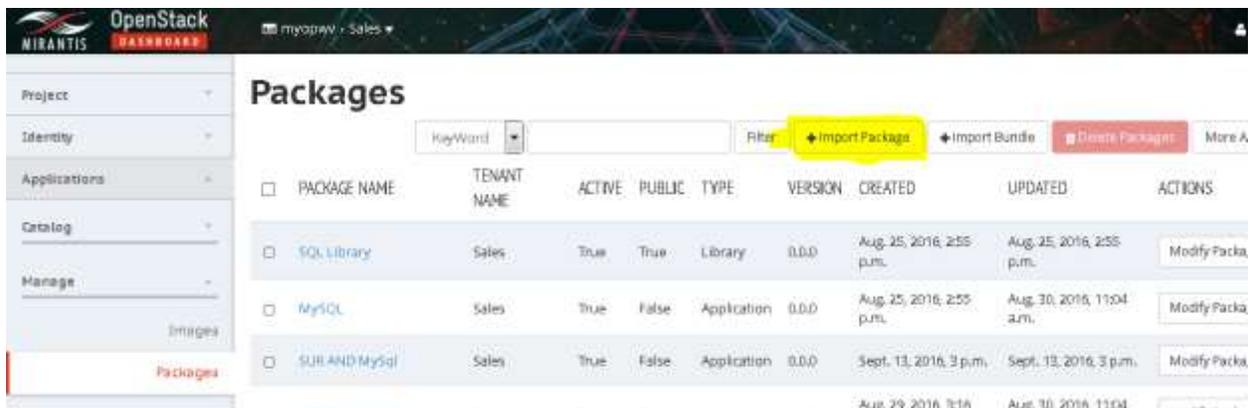
4.3.1 Steps for getting and importing vUDR Murano package

1. Get the Murano package for vUDR application by sending email to info@owmobility.com

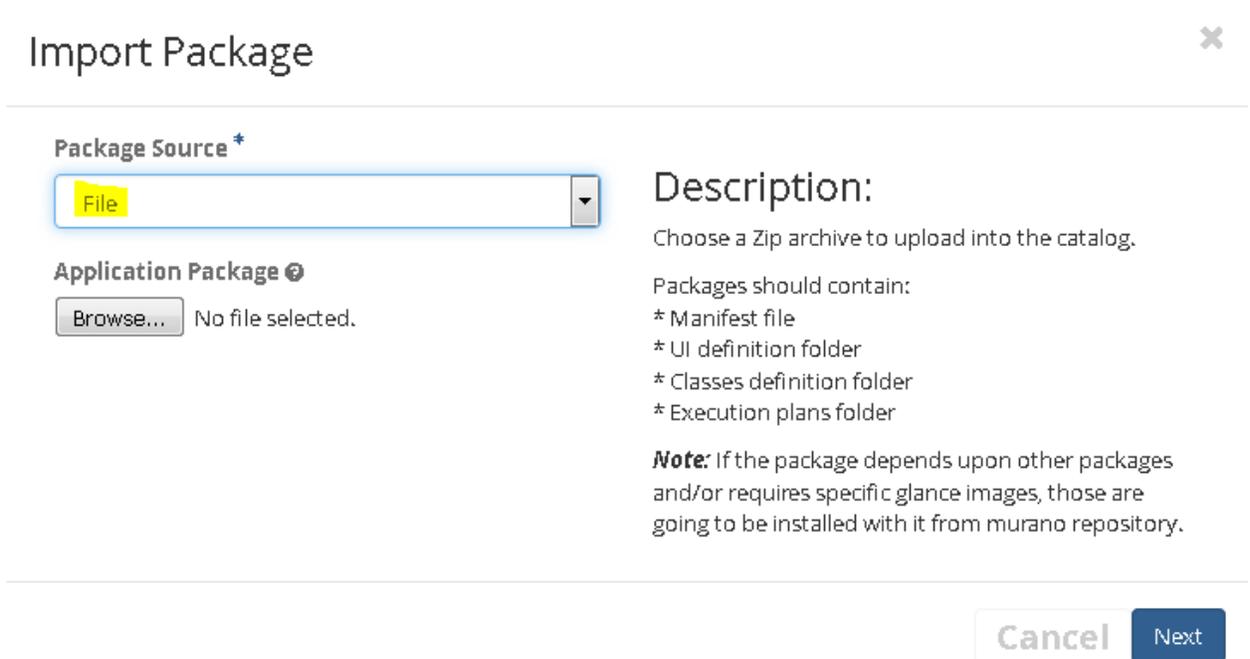
2. Once you get the virtual-user-data-repository.zip file, upload it in Horizon.

Below are the detailed steps for this:

(a) In Horizon, navigate to Manage -> Packages and click on “Import Package” button shown highlighted in below screenshot.



(b) In the new window that pops up, select Package Source as “File” and then click Browse.



(c) Browse for the Zip file and select it. Click on Next button.

Import Package



Package Source *

Application Package ⓘ

 virtual-user-data-repository.zip

Description:

Choose a Zip archive to upload into the catalog.

Packages should contain:

- * Manifest file
- * UI definition folder
- * Classes definition folder
- * Execution plans folder

Note: If the package depends upon other packages and/or requires specific glance images, those are going to be installed with it from murano repository.

(d) Give the name to the package that you want to appear in the packages page, then click the “Next” button.

Import Package



Name * ⓘ

Tags ⓘ

Public

Active

Description

Smart User Repository is a highly scalable, distributed LDAP directory. It scales to millions of subscribers and provides a carrier grade solution. The virtual edition is designed to run on the cloud and scale horizontally to provide carriers with the reliability of the traditional SUR platform, while offering the flexibility and agility provided by cloud platforms.

Description:

Name: Set up for identifying a package.

Tags: Used for identifying and filtering packages.

Public: Defines whether or not a package can be used by other tenants. (Applies to package dependencies)

Active: Allows to hide a package from the catalog. (Applies to package dependencies)

Description: Allows adding additional information about a package.

(e) Select the appropriate Application Category as shown below and click “Create”.

Import Package



Application Category

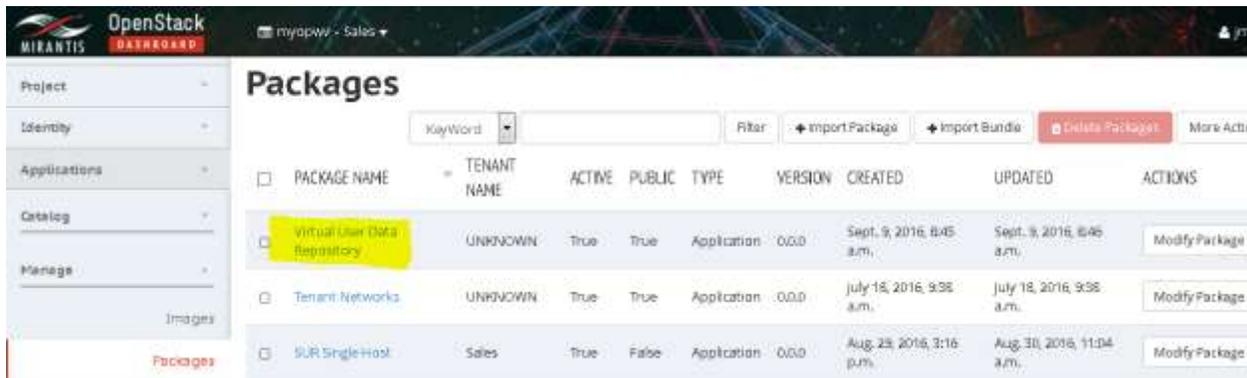
- Application Servers
- Big Data
- Databases**
- Development

Description:

Categories Select one or more categories for a package.

Specifying a category helps to filter applications in the catalog

(f) Verify that the Package of Virtual User Data Repository gets added and is displayed in Packages page of Horizon.



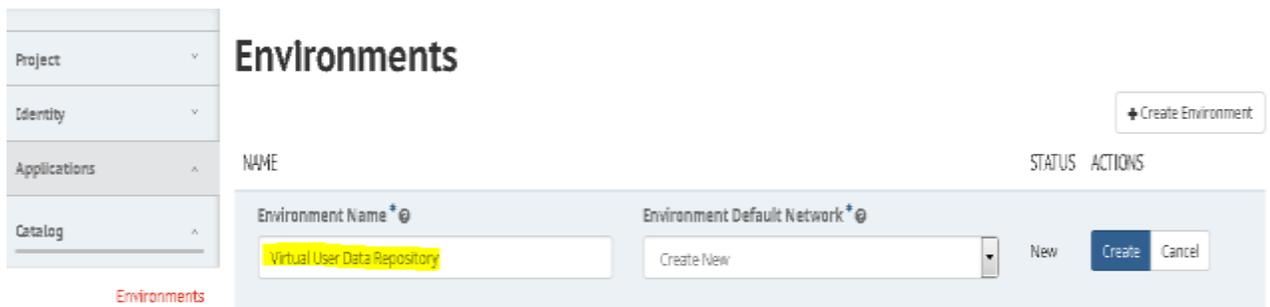
4.3.2 Steps for creating the Environment with vUDR Murano package

Once you have the package in the Horizon, you need to create an Environment and add the above package in it. Below are the detailed steps for this.

(a) Navigate to "Catalog" -> "Environments" page and Click "Create Environment" button.



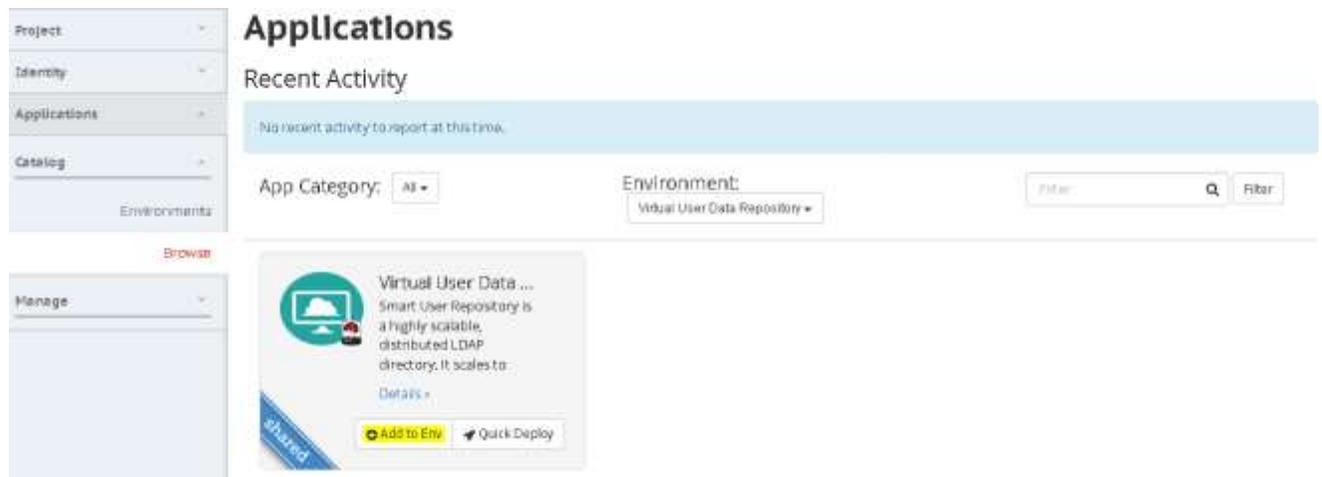
(b) Give proper name to the Environment. Select the network you want this Environment to use or select “Create New” network. Then click “Create” button.



(c) Once you are in above created Environment, now you need to add vUDR component in it. For this click the “Add Component” button.



(d) Select the component (package) for vUDR and click “Add to Env” button.



(e) Complete details for the cluster. It is recommended to use at least 3 seed nodes, to support the replication factor of 3. Below is an example:

Name: SUR Cluster

Count of Seed Nodes: 3

Count of Regular Nodes: 3

Assign floating IP to nodes should be "Selected".

Give appropriate "Cluster Name" and "Cassandra node hostname pattern" and then click "Next" button.

Configure Application: Virtual User Data Repository
✕

Cluster Name *

Count of seed nodes *

Count of regular nodes *

Assign floating IP to nodes

Cassandra node hostname pattern

Virtual User Data Repository

Apache License, Version 2.0

Cluster Name:
Enter a desired name for the application. Just A-Z, a-z, 0-9, dash and underline are allowed

Count of seed nodes:
Select the number of seed nodes. Seed nodes are used to bootstrap other nodes(which is the process of a new node joining an existing cluste...
[Show more](#)

Count of regular nodes:
Select the number of Cassandra nodes (except seed nodes)

Assign floating IP to nodes:
Check to assign floating IP to nodes

Cassandra node hostname pattern:
For your convenience instance hostname can be specified. Enter a name or leave blank for random name generation.

- (f) Select the size of your vUDR VMs, the Red Hat image, and optionally a Key Pair. Once ready you can click on “Next” button.

Configure Application: Virtual User Data Repository ✕

Instance flavor *

own.dev.medium ▾

Instance image *

RedHat Enterprise Linux 6.4 ▾

Key Pair

jmulay ▾ +

Availability zone

Belfast-1a ▾

Virtual User Data Repository

Specify some instance parameters on which application would be created.

Instance flavor:

Select one of the existing flavors. Consider that application performance depends on this parameter.

Instance image:

Select a valid image for the application. Image should already be prepared and registered in glance.

Key Pair:

Select the Key Pair to control access to instances. You can login to instances using this KeyPair after the deployment.

Availability zone:

Select an availability zone where the application would be installed.

Back

Next

- (g) Finally click the “Create” button to Create the Environment.

Configure Application: Virtual User Data Repository ✕

Continue application adding

Virtual User Data Repository

Continue application adding:

If checked, you will be returned to the Application Catalog page. If not - to the Environment page, where you can deploy the application. ...

[Show more](#)

Back

Create

(h) Verify that the Environment gets created and is in “Ready to Deploy” State.

The screenshot shows the OpenStack dashboard interface for managing environments. The page title is "Environments / Virtual User Data Repository". The left sidebar contains navigation options: Project, Identity, Applications, Catalog, Environments (selected), Browse, and Manage. The main content area has tabs for Components, Topology, and Deployment History. Under "Application Components", there is a search bar and a list of component icons: MySQL, MySQL SUR AND MySQL, MySQL SUR Single Host, Tenant Network, Content Server, and Load Driver. Below the icons is a "Drop Components here" area. At the bottom, a table lists the environment details:

NAME	TYPE	STATUS	LAST OPERATION	TIME UPDATED	ACTIONS
SURCluster	Virtual User Data Repository	Ready to deploy	Component draft created		Delete Component

Buttons for "Add Component" and "Deploy This Environment" are visible above the table.

4.3.3 Steps for creating the Environment with vUDR Murano package

Once you have created the Environment as explained above, you need to Deploy the Environment. Below are the detailed steps for deploying the environment.

(a) Navigate to “Catalog” -> “Environments” page and Click the above created Environment (in our example case it is named as “Virtual User Data Repository”. Then click “Deploy This Environment” button.

This screenshot is similar to the previous one but highlights the "Deploy This Environment" button in yellow. The table below the components shows the environment "SURCluster" with a status of "Ready to deploy".

NAME	TYPE	STATUS	LAST OPERATION	TIME UPDATED	ACTIONS
SURCluster	Virtual User Data Repository	Ready to deploy	Component draft created		Delete Component

(b) This will start the deployment on the “Virtual User Data Environment”. If there are any errors, then they will be displayed in “Latest Deployment Log” as shown below.

The screenshot shows the Nirantis dashboard for the 'Virtual User Data Repository' environment. The 'Latest Deployment Log' tab is active, showing a single deployment entry for 'SURCluster' with a status of 'Deploying'. The table below details the deployment:

NAME	TYPE	STATUS	LAST OPERATION	TIME UPDATED	ACTIONS
SURCluster	Virtual User Data Repository	Deploying	Creating a VM for vUDR node "aml-1"	Sept. 15, 2016, 10:27 a.m.	

Displaying 1 item

In case of errors check the details in “Latest Deployment Log” and remove the errors and the “Deploy” the Environment again repeating above step (i.e. 4.3.3 (a))

(c) Once the deployment is complete its Status will be shown as “Ready”.

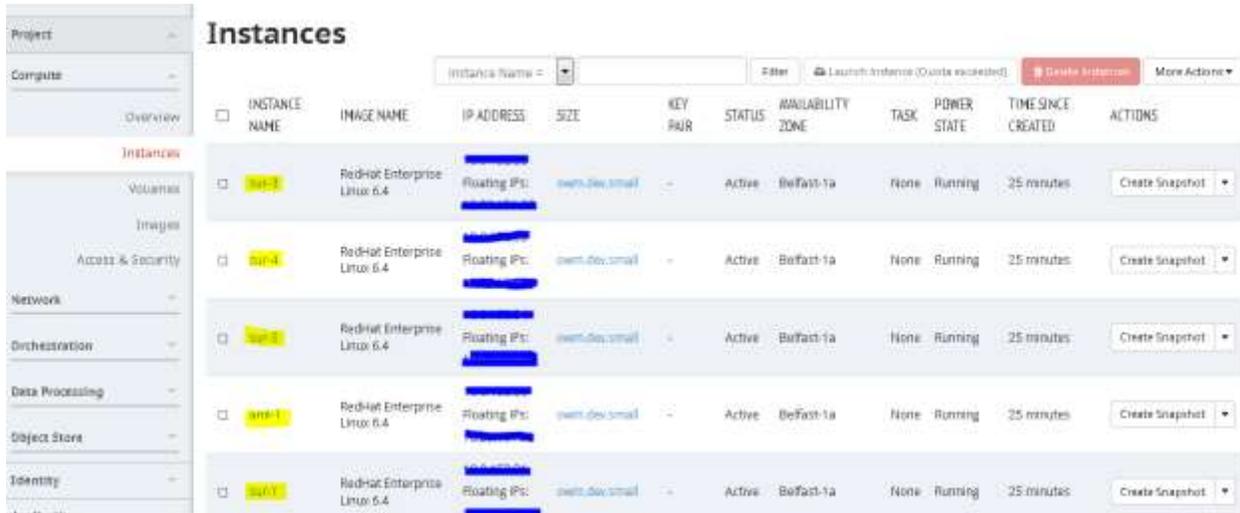
The screenshot shows the Nirantis dashboard for the 'Virtual User Data Repository' environment. The 'Latest Deployment Log' tab is active, showing a single deployment entry for 'SURCluster' with a status of 'Ready'. The table below details the deployment:

NAME	TYPE	STATUS	LAST OPERATION	TIME UPDATED	ACTIONS
SURCluster	Virtual User Data Repository	Ready	Log in to any instance to check	Sept. 15, 2016, 12:26 p.m.	Delete Component

Displaying 1 item

4.4 Accessing the app after the installation

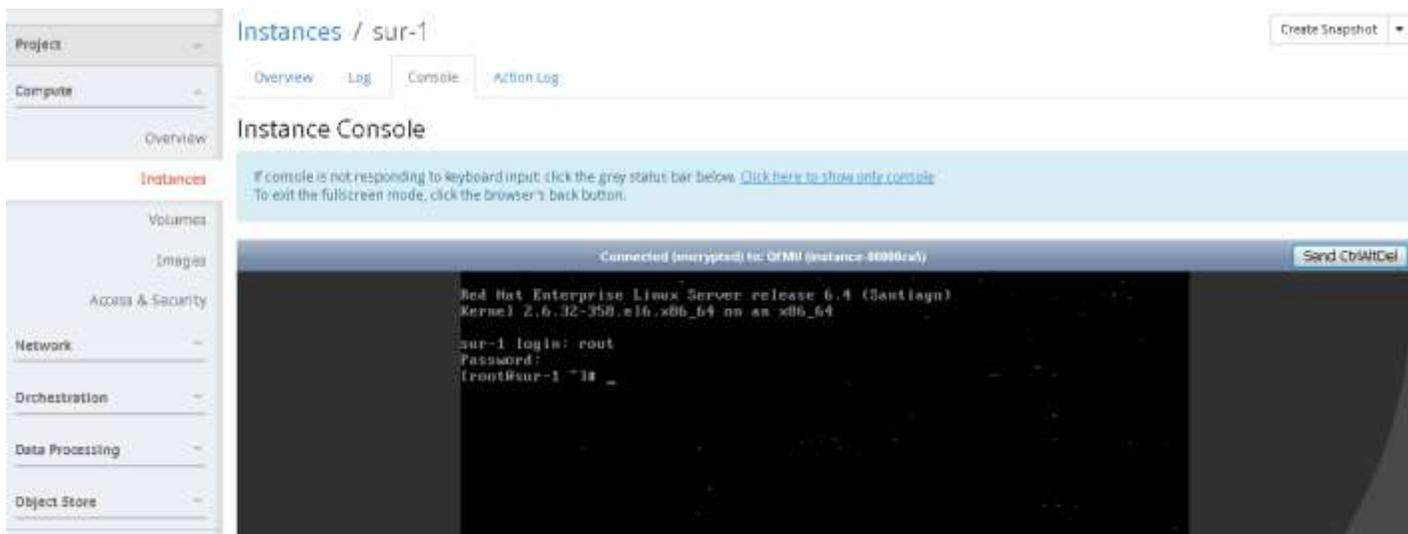
- (a) Once the Application is deployed you can see that the instances corresponding to vUDR environment are displayed in the list of Instances. To check this navigate to “Project” -> “Compute” -> “Instances” page of Horizon.



INSTANCE NAME	IMAGE NAME	IP ADDRESS	SIZE	KEY PAIR	STATUS	AVAILABILITY ZONE	TASK	POWER STATE	TIME SINCE CREATED	ACTIONS
sur-1	Red-Hat Enterprise Linux 6.4	Floating IP: [redacted]	over100.small	-	Active	Belfast-1a	None	Running	25 minutes	Create Snapshot
sur-1	Red-Hat Enterprise Linux 6.4	Floating IP: [redacted]	over100.small	-	Active	Belfast-1a	None	Running	25 minutes	Create Snapshot
sur-1	Red-Hat Enterprise Linux 6.4	Floating IP: [redacted]	over100.small	-	Active	Belfast-1a	None	Running	25 minutes	Create Snapshot
sur-1	Red-Hat Enterprise Linux 6.4	Floating IP: [redacted]	over100.small	-	Active	Belfast-1a	None	Running	25 minutes	Create Snapshot
sur-1	Red-Hat Enterprise Linux 6.4	Floating IP: [redacted]	over100.small	-	Active	Belfast-1a	None	Running	25 minutes	Create Snapshot

- (b) Note the Floating IP address of any one host say “sur-1”.

- (c) Login to this machine using either ssh or using console page provided by Horizon.
- For accessing through the “Console” from Horizon
- First navigate to any one specific instance page by clicking on “Project” -> Compute -> Instances -> Actual instance name (in our case it is sur-1)
 - Navigate to “Console” tab.



Instances / sur-1

Overview Log Console Action Log

Instance Console

If console is not responding to keyboard input, click the gray status bar below. [Click here to show unfile console](#). To exit the fullscreen mode, click the browser's back button.

```
Connected (unencrypted) to: CFMU (instance-00040ca)
Red Hat Enterprise Linux Server release 6.4 (Santiago)
Kernel 2.6.32-358.el6.x86_64 on an x86_64

sur-1 login: root
Password:
[root@sur-1 ~]#
```

- (d) Login as imail user as shown below and switch to the bash shell. After this run “.profile” as shown below to set the environment. Run the server ping command (imservping) to check that the servers are up and running on this host.

```
Red Hat Enterprise Linux Server release 6.4 (Santiago)
Kernel 2.6.32-358.el6.x86_64 on an x86_64

sur-1 login: root
Password:
Last login: Thu Sep 15 13:55:17 on tty1
[root@sur-1 ~]# su - imail
sur-1:imail:opwv$ bash
sur-1:imail:opwv$ . .profile
sur-1:imail:opwv$ imservping
```

```
sur-1:imail:opwv$ imservping
Thu Sep 15 13:57:34 2016. imservping: (Info) immgrserv responded
Thu Sep 15 13:57:34 2016. imservping: (Info) imdirserv responded
sur-1:imail:opwv$
```

- (e) If the servers are not running, you can start/restart the servers using below command:

```
[root@sur-1 ~]# su - imail
sur-1:imail:opwv$ bash
sur-1:imail:opwv$ . .profile
sur-1:imail:opwv$ ~/lib/imservctrl start
```

- (f) Ignore below Notifications that come during start of the servers. These come because in Demo version we have not enabled SNMP and some other features:

```
imservctrl: Notice: imautoswitchover not configured to run on this host
imservctrl: Notice: imswitchoverlistener not configured to run on this host
imservctrl: Notice: imlatextract and impmsextract will not start as SNMP is not
enabled.
imservctrl: Notice: imlatextract and impmsextract will not start as SNMP is not
enabled.
```

- (g) Similarly, you can ping servers on any of the sur-# hosts either from current host which is sur-1 in our example. This is shown below. Or you can also login to those hosts and locally ping the servers as explained above.

```

sur-1:imail:opwv$ imservping -h sur-2
Thu Sep 15 14:07:04 2016. imservping: (Info) imconfserv responded
Thu Sep 15 14:07:04 2016. imservping: (Info) immgrserv responded
Thu Sep 15 14:07:04 2016. imservping: (Info) imdirserv responded
sur-1:imail:opwv$
sur-1:imail:opwv$
sur-1:imail:opwv$ imservping -h sur-3
Thu Sep 15 14:07:08 2016. imservping: (Info) immgrserv responded
Thu Sep 15 14:07:08 2016. imservping: (Info) imdirserv responded
sur-1:imail:opwv$
sur-1:imail:opwv$
sur-1:imail:opwv$ imservping -h sur-4
Thu Sep 15 14:07:12 2016. imservping: (Info) immgrserv responded
Thu Sep 15 14:07:12 2016. imservping: (Info) imdirserv responded
sur-1:imail:opwv$
sur-1:imail:opwv$
sur-1:imail:opwv$ imservping -h sur-5
Thu Sep 15 14:07:16 2016. imservping: (Info) imdirserv responded
Thu Sep 15 14:07:16 2016. imservping: (Info) immgrserv responded
sur-1:imail:opwv$

```

- (h) Similarly, you can execute your own LDAP commands as per your test needs. Some examples of the commands are given in “Section 4.6 Testing”.

4.5 Limitations

The demo version of the solution deploys in a single availability zone. This means replication is restricted to within that zone.

4.6 Testing

4.6.1 Test cases

1. Check that all the LDAP servers are up on each host of the system and running on correct configured ports.

Steps : SSH into server with key, and switch to imail user on any sur-# LDAP host and run below commands:

```

# . .profile
# $INTERMAIL\chk_servers_port.sh

```

2. Check that the data (entry) can be added to a vUDR through its LDAP port and verify that this newly added entry can be searched from other vUDR servers in the system. Repeat the same for all the hosts.

Steps : SSH into server with key, and switch to imail user on any sur-# host and run below commands:

```

# . .profile
# $INTERMAIL\chk_addition.sh

```

3. Check that the data (entry) can be modified through a vUDR server through its LDAP port and verify that this modified entry can be searched from other vUDR servers in the system. Repeat the same for all the hosts.

Steps : : SSH into server with key and switch to imail user on any sur-# LDAP host and run below commands:

```
# . .profile  
# $INTERMAIL\chk_modification.sh
```

4. Check that the data (entry) can be deleted from a vUDR server through its LDAP port and verify that this entry is deleted from other vUDR servers in the system. Repeat the same for all the hosts.

Steps : : SSH into server with key and switch to imail user on any sur-# LDAP host and run below commands:

```
# . .profile  
# $INTERMAIL\chk_deletion.sh
```