RHV 4.3 Open Lab

Lab Guide

Contributions by:

Roberto Calva , Vagner Farias, Mike Savage, Mike Watkins, Arief Winata

Creation date: 06/21/2019

Welcome to the Red Hat Virtualization (RHV) Open Lab. Your instructor will assign each attendee a workshop “GUID”, which uniquely identifies your individual lab environment. Once you have been assigned a workshop GUID, make sure to record it, as it will be used throughout the workshop to access your RHV lab environment.

Utilize the following URLs during the lab exercises, substituting your assigned GUID where indicated:

RHV Manager Administration Portal: https://rhvm-GUID.rhpds.opentlc.com

Wordpress: https://wordpress-GUID.rhpds.opentlc.com

Windows Server (IIS): https://windows-GUID.rhpds.opentlc.com

Noisy Neighbor (IIS): https://noisy-GUID.rhpds.opentlc.com

Scale UP: https://scaleup-GUID.rhpds.opentlc.com

In addition, you can use the following URLs to access the “Cockpit” for each individual RHV hypervisor. Cockpit is a web-based interface that can be used to manage individual installations of the Red Hat Enterprise Linux 7 and later family of operating systems:

https://rhvh01-GUID.rhpds.opentlc.com:9090

https://rhvh02-GUID.rhpds.opentlc.com:9090

And for those exercises where SSH will be utilized within a terminal session, connect to the main workstation system via the following commands:

```
# export GUID=xxxx

# ssh -i <path_to_your_rhpds_private_key_file> \

   <your_rhpds_id>@workstation-$GUID.rhpds.opentlc.com
```

Table of Contents

Intro: Red Hat Virtualization Essentials

This section provides an overview of the Red Hat Virtualization Workshop. You will:

- Be provided an overview of the Red Hat Virtualization Workshop environment
- Learn how to access the RHV Administration Portal
- Start virtual machines
- Access the consoles of virtual machines

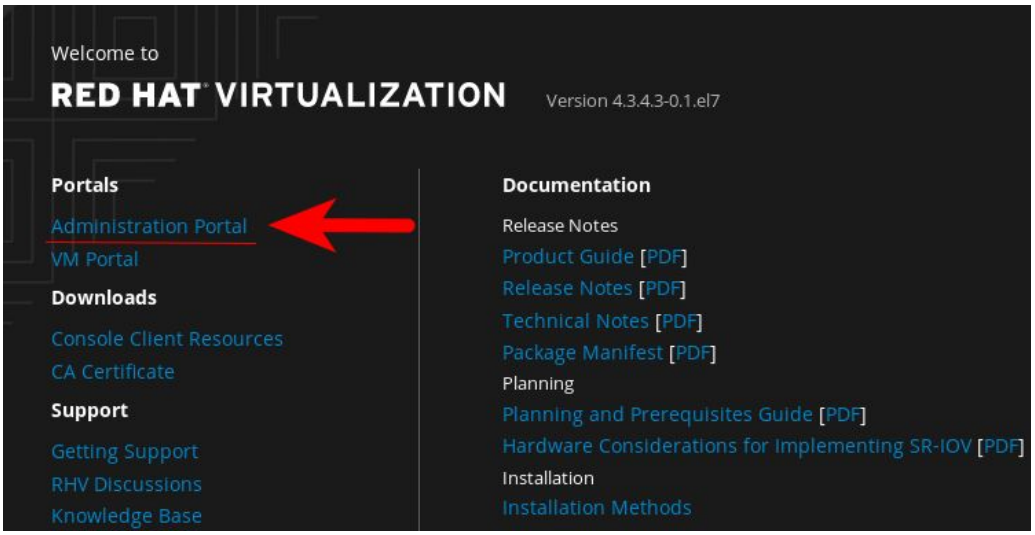
Red Hat Virtualization Workshop Environment

Your individual Red Hat Virtualization workshop environment is comprised of the following systems:

System	Hostname	Description
Workstation	workstation.example.com	workshop management and jump system
RHV Manager	rhvm.example.com	RHV management system
RHV Hypervisor 1	rhvh01.example.com	RHV hypervisor
RHV Hypervisor 2	rhvh02.example.com	RHV hypervisor
Storage	rhv-storage.example.com	Virtual machine storage

Red Hat Virtualization Administration Portal

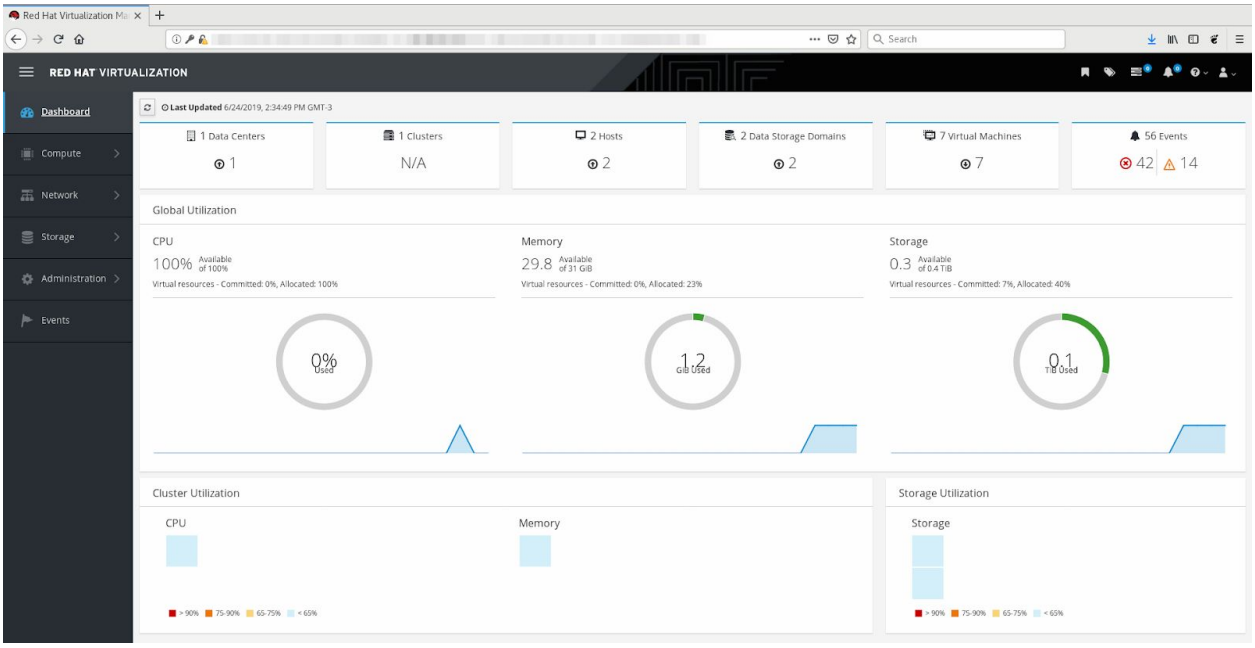
To access the Red Hat Virtualization Administration Portal, use the URL provided to you (eg. *https://rhvm-<GUID>.rhpds.opentlc.com*) and click on the link ***Administration Portal***.



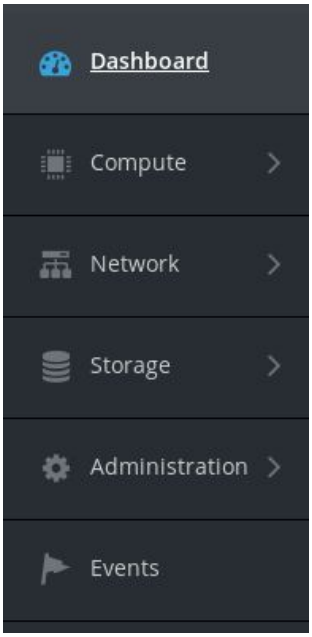
When accessing the Administration Portal login page, use the following credentials:

Login	admin
Password	r3dh4t1!
Profile	internal

First screen you will see is the main dashboard, which provides an overview of the environment, including information on Data Centers, Clusters, Hosts, Data Storage Domains and Virtual Machines.



On the left side of the screen you may access operations related to compute, network and storage.

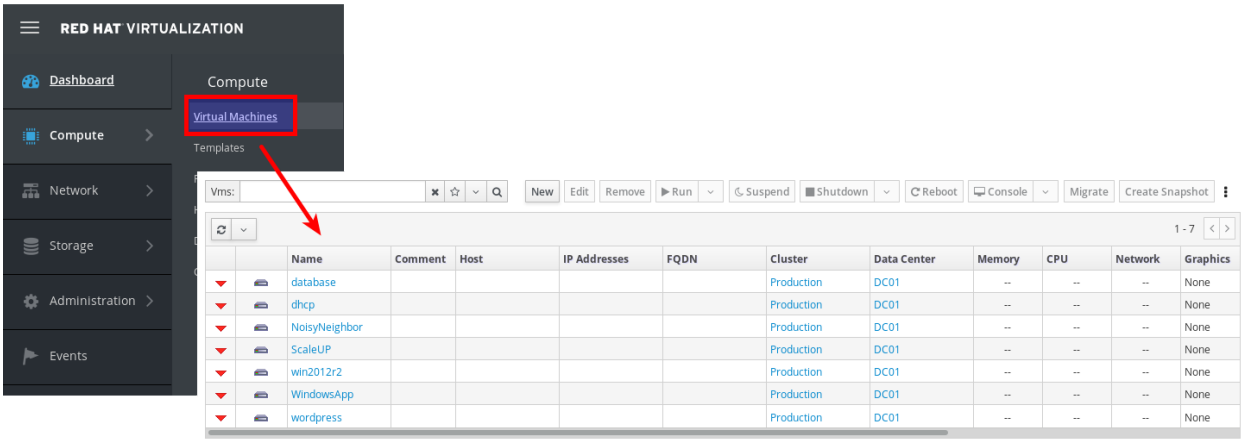


Intro 1.1 - Explore the Administration Portal

1. Explore the Administration Portal, but don't change configurations nor create virtual machines yet.

Virtual Machines View and Essential Operations

This environment already has some existing virtual machines, as you can notice when accessing Compute → Virtual Machines.



In order to execute some of the tasks in this Lab, the virtual machine named "*dhcp*" must be running and it will be started in the next step.

*** IMPORTANT ***

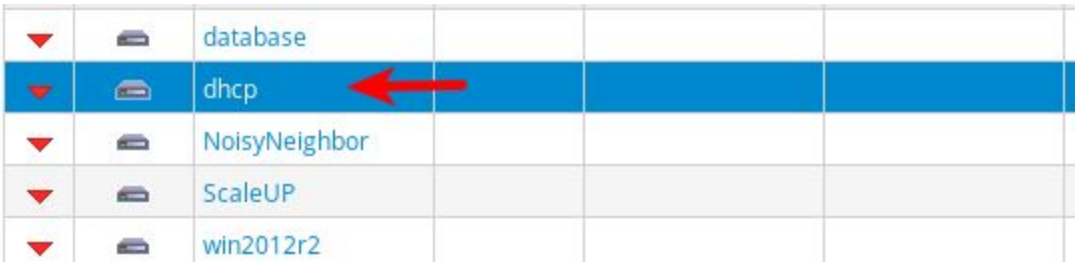
Before starting the dhcp VM, Activate the hosts by going to Compute → Hosts

- Select rhvh01.example.com, then click [Management], then Activate
- Go to back to Compute → Hosts, then repeat for rhvh02.example.com

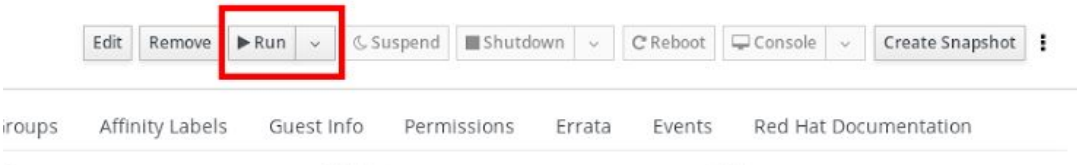
This will move the hosts from Maintenance mode to Up, and will result in the Datacenter itself coming Up. This step is needed since the lab is built to start with the hosts in Maintenance mode.

Intro 1.2 - Start Virtual Machines

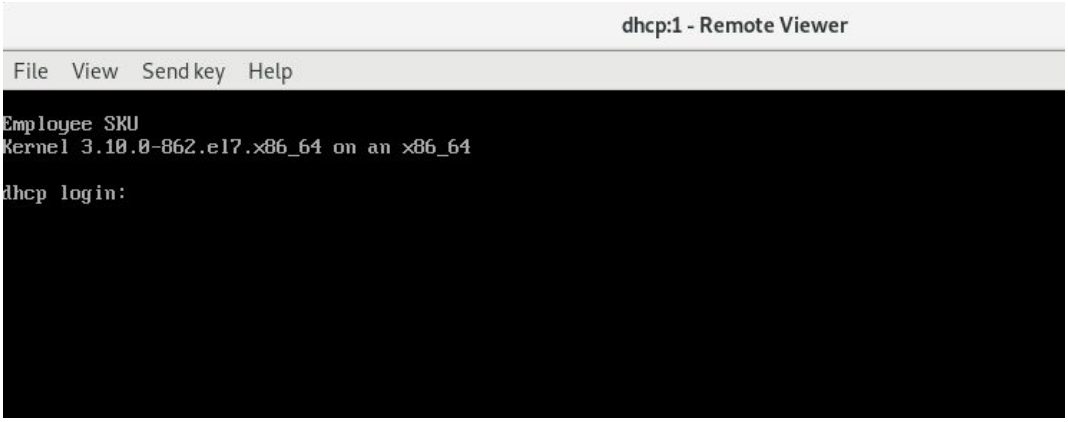
1. Using the vertical menu on the left, go to Compute → Virtual Machines.
2. Click on "*dhcp*" virtual machine name to view its information.



3. Click on "*Run*" button to start "*dhcp*" virtual machine.



4. Click on “Console” to access virtual machine console, to verify it started properly. Note that you won’t be logging into this virtual machine.



If you aren’t setup to access the SPICE-based remote viewer in your Web Browser, configuration steps for Linux & Windows are in the RHV 4.3 Documentation

Virtual Machine Management Guide - 2.2.2. Opening a Console to a Virtual Machine

Additional Resources:

- How to manually associate console.vv files with Remote Viewer in Windows
- For Mac OSX (tested on 10.14)
  - Install Homebrew -- https://brew.sh
  - $ brew tap jeffreywildman/homebrew-virt-manager
  - $ brew install virt-viewer
  - $ remote-viewer /path/to/console.vv
- Internal Note: Had to be connect to console and reboot VM to see it/access console
- You can login with admin / r3dh4t1!

5. Close the console window when you confirm the dhcp virtual machine started.
6. Start all of the remaining virtual machines in the same manner in which you started the *“dhcp”* virtual machine. Or, right-click each VM and select: Run.

Lab 1: Create Virtual Machines

This lab provides an overview of how to create virtual machines. You will learn to:

- Create virtual machines (commonly called virtual instances in cloud environments) connected to an existing network.
- Access the console of a virtual instance.

Lab 1.1 - Create basic virtual machine

Virtual machines can be created from templates or can have the operating system installed from installation media, such as an ISO image. For the purpose of this lab, you will be creating a virtual machine from a template.

Considering this scenario, you will be creating a virtual machine with the following information:

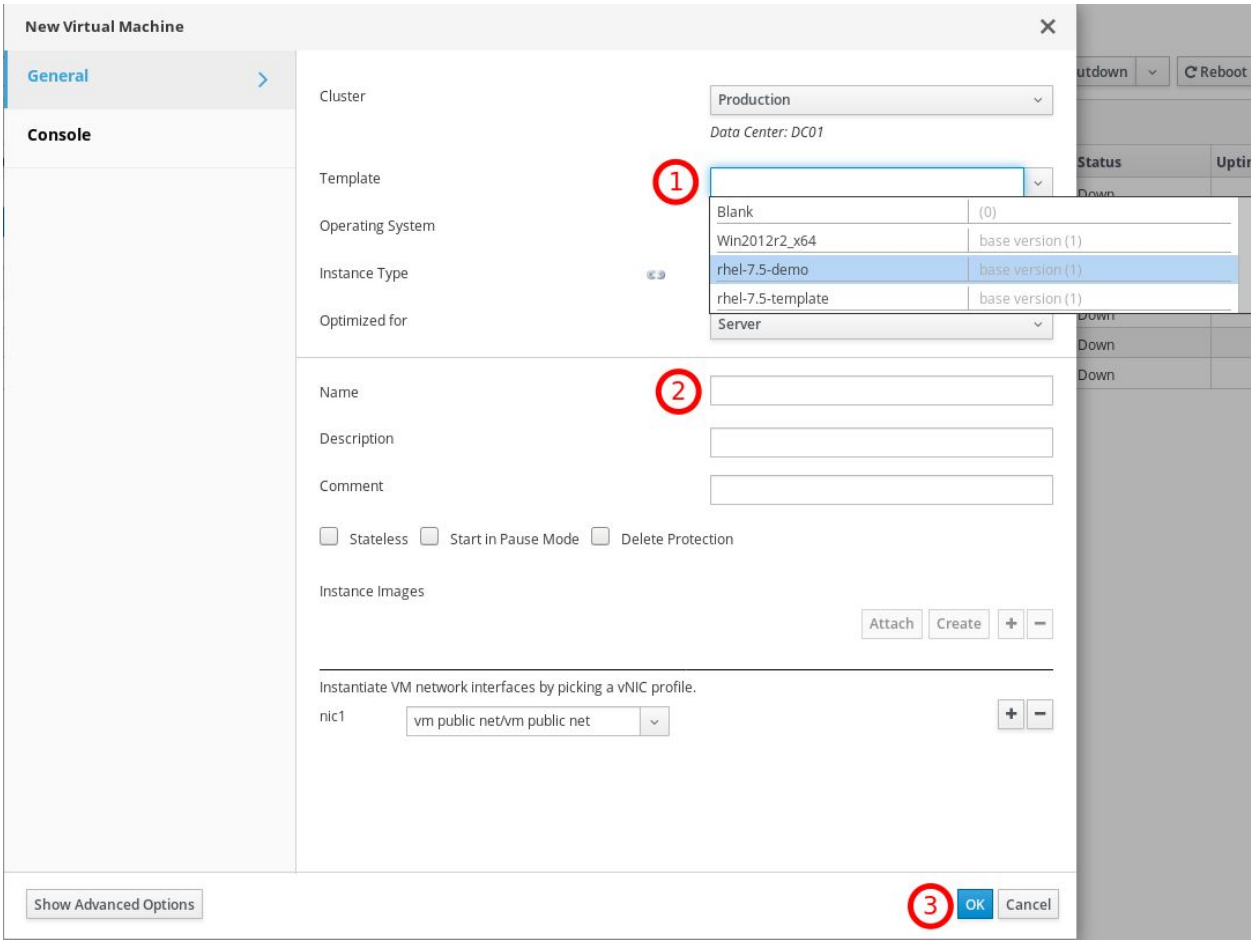
Cluster	Production
Template	Rhel-7.5-demo | base version(1)
Operating system	Red Hat Enterprise Linux 7.x x64
Instance Type	Custom
Optimized for	Server
Name	vm-1
Description	
Comment	
Stateless	

Start in Pause Mode	
Delete Protection	
nic1	vm public net/vm public net

1. Using the vertical menu on the left, go to Compute → Virtual Machines.
2. Click New to open the New Virtual Machine window.

3. Select "**rhel-7.5-demo**" Template.
4. Enter "**vm-1**" as Name for the virtual machine.

5. Keep defaults for everything else.



6. Click OK.
7. When the virtual machine creation finishes, select, then Run.
8. To access virtual machine console, click on Console button.

> For more details on all fields in the New Virtual Machine window, see Red Hat Virtualization documentation.

If you would like to log into the virtual machine operating system, use the following credentials.

Login	admin
Password	r3dh4t1!

Lab 1.2 - Create virtual machine that utilizes cloud-init script

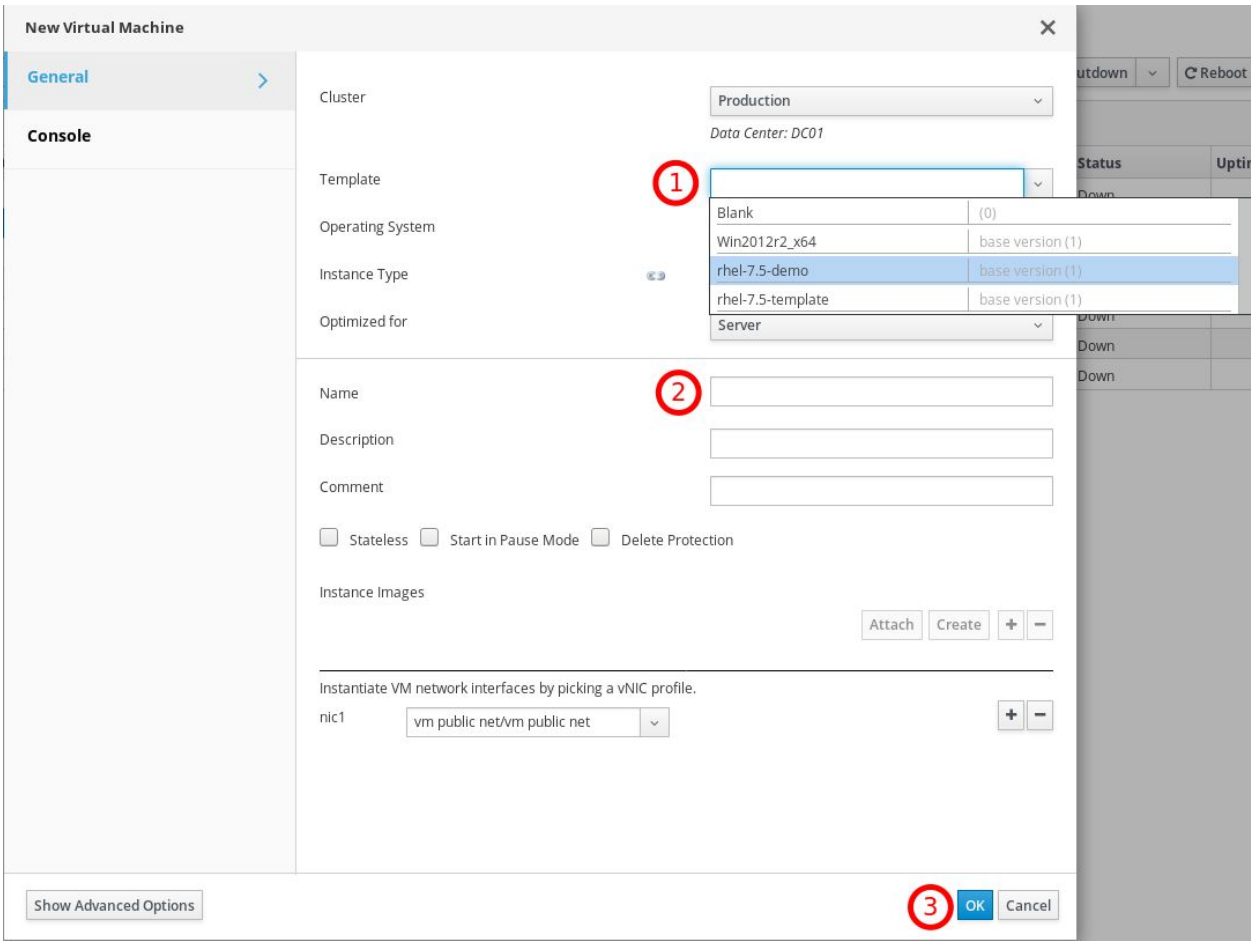
For the purpose of this lab, you will again be creating a virtual machine from a template, however, in this case you will customize the virtual machine via cloud-init, a tool that applies scripting (aka 'user-data') during virtual machine start up.

Considering this scenario, you will be creating a virtual machine with the following information:

Cluster	Production
Template	Rhel-7.5-demo | base version(1)
Operating system	Red Hat Enterprise Linux 7.x x64
Instance Type	Custom
Optimized for	Server
Name	vm-2
Description	
Comment	
Stateless	
Start in Pause Mode	
Delete Protection	
nic1	vm public net/vm public net

9. Using the vertical menu on the left, go to Compute → Virtual Machines.
10. Click New to open the New Virtual Machine window.

11. Select "**rhel-7.5-demo**" Template.
12. Enter "**vm-2**" as Name for the virtual machine.
13. Click [Show Advanced Options]



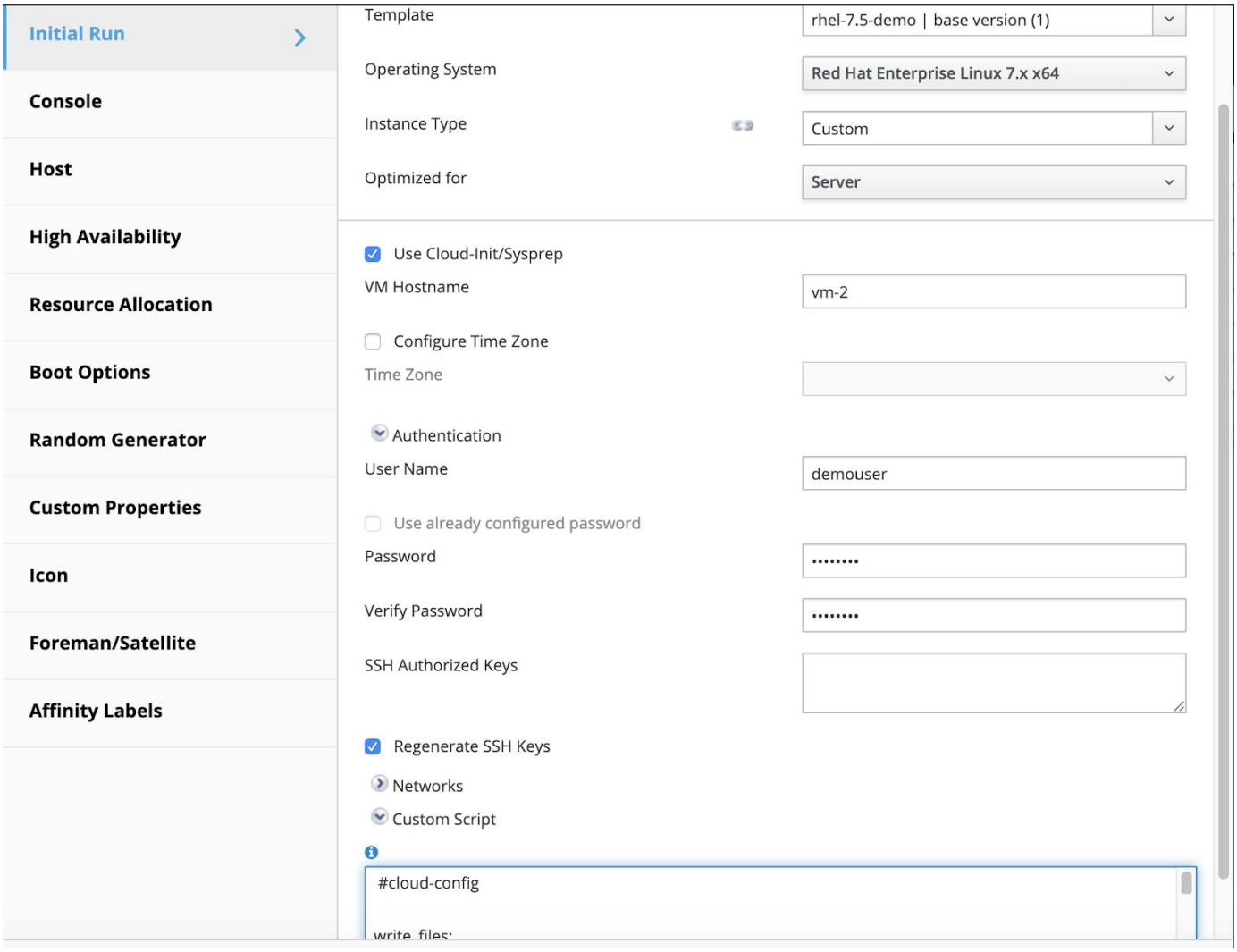
14. Click the Initial Run menu item, them check the "Use Cloud-Init/Sysprep" box
15. Expand "Authentication" and add user ***demouser*** and set password to ***demouser***. Check Regenerate SSH Keys. Cut and paste the following Cloud-Init script in the textbox.

```
#cloud-config

write_files:

 - path: /usr/CA.pem
```

```
permissions: 0644
content: |
  -----BEGIN CERTIFICATE-----
MIIFNDCCAx6gAwIBAgIBATALBgkqhkiG9w0BAQUwLTEMMAoGA1UEBhMDVVNBMRAw
  ...snip...
  EtHaxYQRy72yZrte6Ypw57xPRB8sw1DIYjr821Lw05DrLuBYcbyclg==
  -----END CERTIFICATE-----
```



16. Click OK.
17. When the virtual machine creation finishes, click on Run button.
18. To access virtual machine console, click on Console button.
19. Log into the virtual machine operating system as ***demouser*** and run: cat /usr/CA.pem

For more information on Cloud-Init, check out the RHV 4.3 Virtual Machine Management Guide - Section 7.8. USING CLOUD-INIT TO AUTOMATE THE CONFIGURATION OF VIRTUAL MACHINES

Lab 2: Virtual Machine Live Migration

This lab provides an overview of how to live migrate virtual machines and you will learn to:

- Migrate virtual machines while “live”, continuing to operate and providing services.
- Verify live services during migration operations.

Lab 2.1 - Live migrate virtual machine

Preparation:

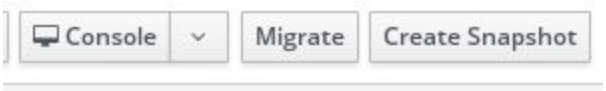
- Open an additional web browser window and resize both RHV manager window and this new one so that both can be shown while the VM is migrated.
- Open a terminal window and ssh to workstation-GUID.rhpds.opentlc.com. Prepare to ping the wordpress VM at 10.10.90.50.
- The goal is to be able to show the video available in the wordpress app as well as the wordpress vm migrating and the ping running.

Lab instructions:

1. Organize / resize windows as explained above.
2. On the Virtual Machines listing, select the “wordpress” line.

3. Open the second browser at https://wordpress-GUID.rhpds.opentlc.com
4. Go down until the video is shown

5. We will now migrate a “live” virtual machine from one host to another
6. Type on terminal: sudo ping -i 0.1 10.10.90.50
7. Select “wordpress” vm and click on migrate - DON’T Click on OK



8. Play the video and immediately start the migration.
9. Migration process should take approximately 30 seconds.
10. Observe the virtual machine migrated from one host to another without interruption.
11. Cancel ping and observe no packets were lost.

Lab 3: Migrating VMs across Storage Domains without disruption

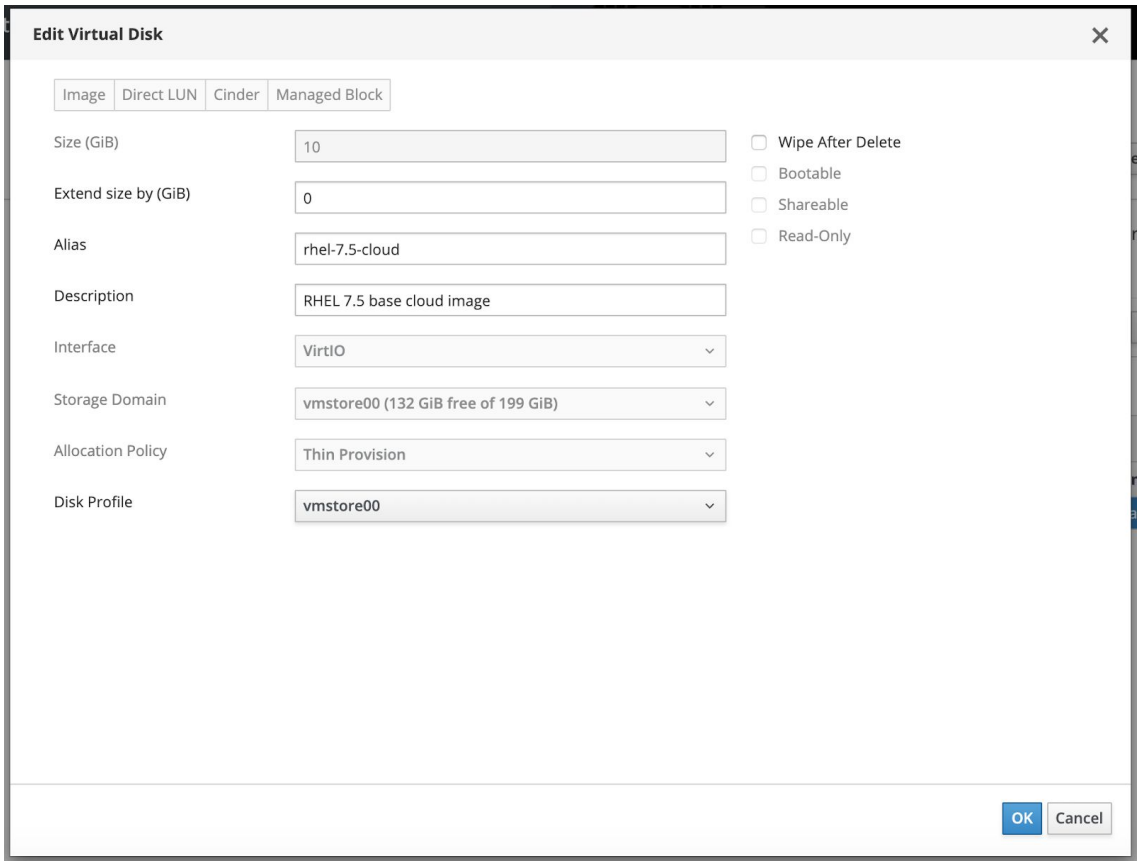
The third lab provides an overview of how to migrate a virtual machine across RHV Storage Domains while the virtual machine continues to operate. You will learn to:

- Migrate virtual machines while "live" across RHV Storage Domains, while the virtual machines continuing to operate and provide services.
- Verify live services during migration operations.

Lab Preparation

- Open additional web browser windows or tabs and resize both RHV Manager window and new ones so that each can be shown while the VM is migrated.
    - **RHV-M**
        - https://rhvm-<GUID>.rhpds.opentlc.com
    - **Wordpress-based web server**
        - https://wordpress-GUID.rhpds.opentlc.com
        - Login: shadowman / r3dh4t!RHV418
    - **RED HAT VIRTUALIZATION HOST remote administration (aka Cockpit)**
        - https://rhvh01-GUID.rhpds.opentlc.com:9090
        - Login: root / r3dh4t1!

1. Using the vertical menu on the left, go to Compute → Virtual Machines
2. Click on "**wordpress**" VM and go to "**Disks**" tab
3. Ensure that the disk named rhel-7.5-cloud is selected and click the **[Edit]** button
    - Take note of the Storage Domain (vmstore00)

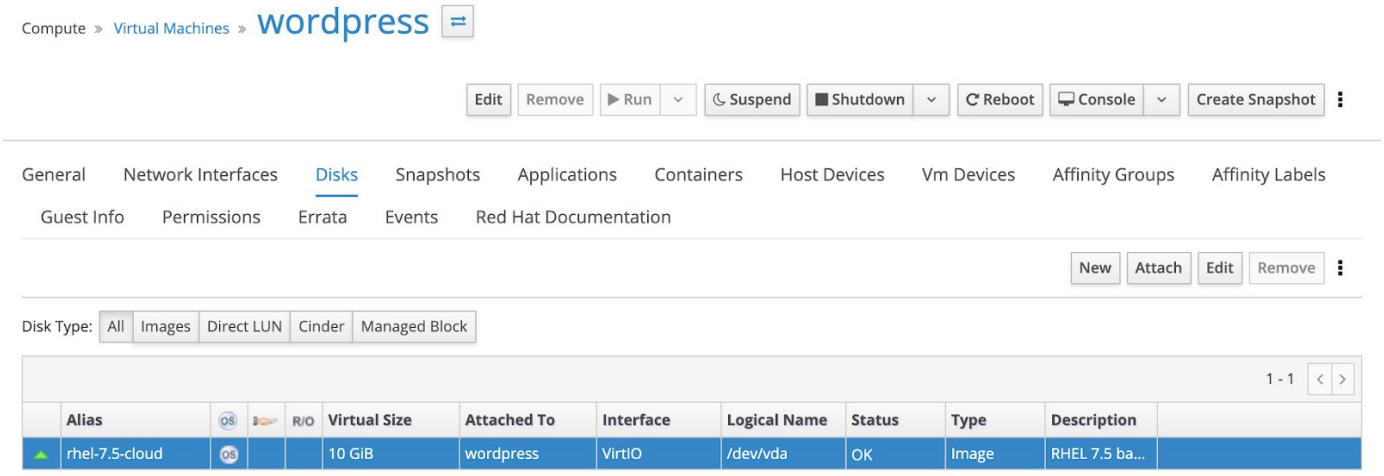


4. Click [Cancel] to close the Edit Virtual Disk dialog box

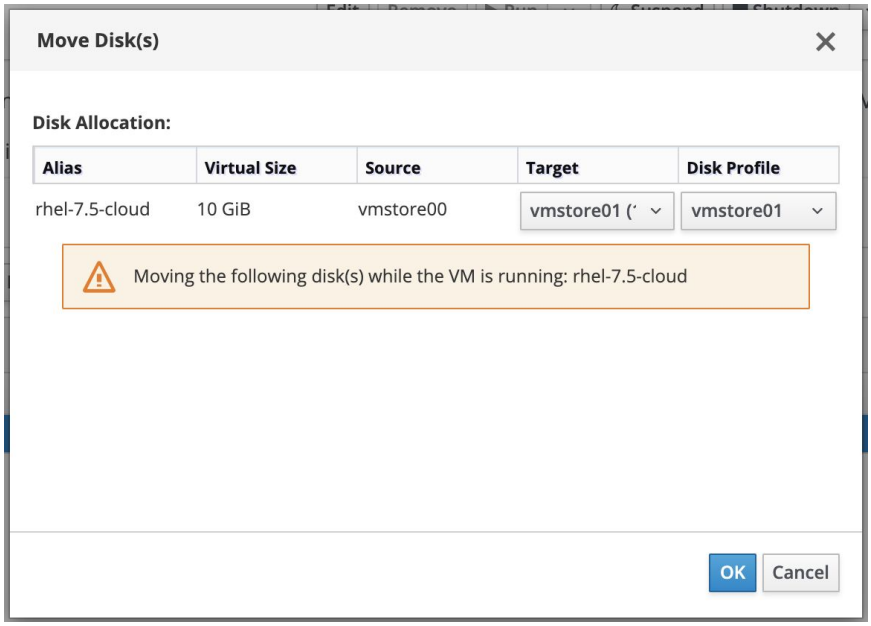
5. Open the RED HAT VIRTUALIZATION HOST remote administration (aka Cockpit) web browser or tab. Cockpit is an interactive Linux server admin interface.
6. From the left-side menu, click “localhost”, then select the Terminal sub-menu item
    - Note: You should be logged in as root
7. Ping the IP address of the “wordpress” VM. You can find the IP address from the RHV-M
    - ie. # ping 10.10.90.50

8. From the WordPress web page (in a different web browser or tab), play the video.

9. Then, from the RHV-M admin web browser or tab, Select the disk, click on the 3 dots icon at the right of the [Remove] button and select [Move]



10. The “Move Disk(s)” dialog box shows Source (vmstore00) and Target (vmstore01) Storage Domains. Click on **OK** to move the wordpress VM disk.



11. Click the Tasks icon at the top of the RHV Manager UI  to view progress. Additionally you can switch back to the RED HAT VIRTUALIZATION HOST remote administration (aka Cockpit) web browser or tab to ensure the VM is still pinging/alive.

12. Now during the migration we will write a quick blog post to show that we can write data to the wordpress VM disk during migration. Quickly complete these steps
    - Login to https://wordpress-GUID.rhpds.opentlc.com/wp-admin
        - Login info: shadowman / r3dh4t!RHV418
    - In the menu on the left-side of the page, mouse-over **Posts**, then click **Add New**
    - Enter the following:
        - *Title: RHV Supports Storage Live Migration*
        - *Disks is moving from one Storage Domain to another.*
    - Click [Publish]
    - Mouse-over the user icon in the top right of the page, then click **Log Out**
    - Check you new blog post by going back to:
        - https://wordpress-GUID.rhpds.opentlc.com
13. The migration process takes approx 2-3 min. Once the migration is completed, close the Tasks window in RHV Manager

RED HAT VIRTUALIZATION 4.3 - ADMINISTRATION GUIDE

[10.6.3. Overview of Live Storage Migration]

Lab 4: Utilizing VM snapshots to revert system changes

The fourth lab provides an overview of how to use virtual machine snapshots to revert system changes and restore a virtual machine to its previous state. You will learn to:

- Create a snapshot of a virtual machine
- Revert a virtual machine to an earlier state using a snapshot
- Delete a snapshot

Lab 4.1 - Utilizing VM snapshots to revert system changes

Lab Preparation

- You will work on the “wordpress” virtual machine on this lab.
- Go to the RHV manager and select the virtual machine.

- Click the Console button to have a console access on the virtual machine.

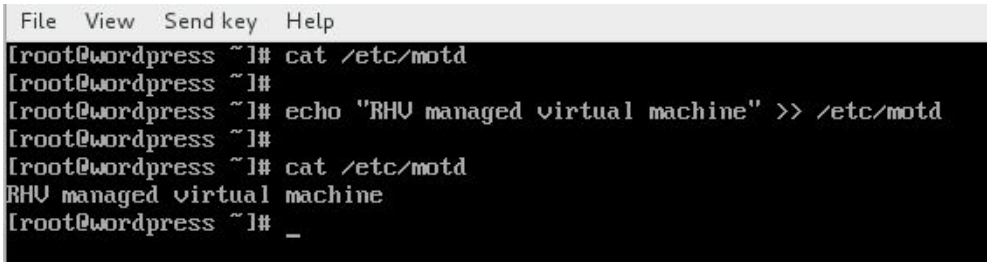
- If your browser does not automatically pop-up the console, click on the “console.vv” file which just has been downloaded.
- Login to the virtual machine via the console with username “admin” and password “r3dh4t1!”.
- Once you’re in issue a “sudo su -” to gain root access.
- Keep this console window open for the rest of this lab.

Lab instructions:

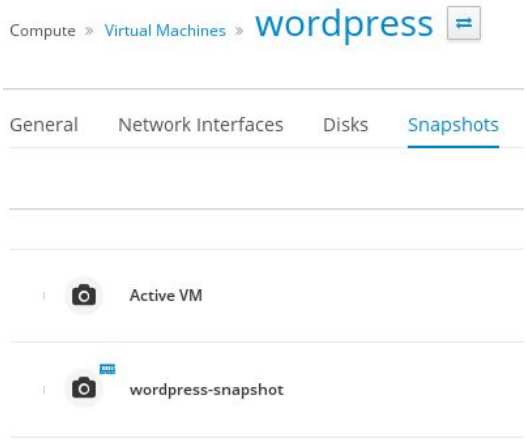
1. Create a snapshot of the “wordpress” virtual machine.
    a. Log into the RHV manager.
    b. In the left navigation pane, click System and select the Virtual Machines tab.
    c. Right-click the row for the “wordpress” virtual machine, and click Create Snapshot. The Create Snapshot window appears.

d. Enter wordpress-snapshot as a description for the snapshot in the Description field. Verify that the “rhel-7.5-cloud” disk is selected in the Disks to include section. Verify that the Save Memory check box is selected. Click OK to create the snapshot

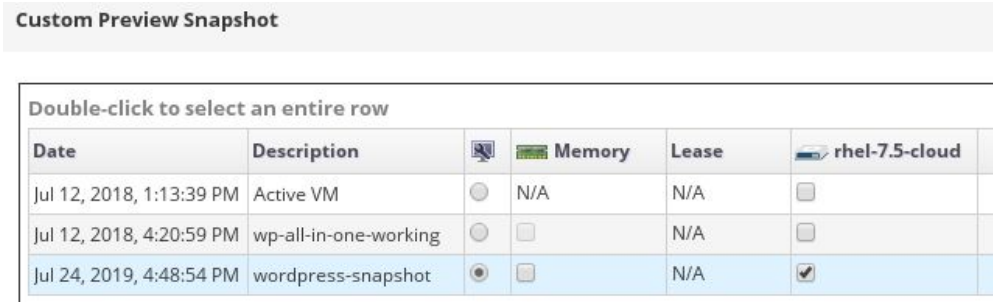
2. Modify the Message of the Day (MOTD) on the “wordpress” virtual machine.
   a. Via the “wordpress” console window, verify that the MOTD file is empty.
   b. Modify /etc/motd to contain the string “RHV managed virtual machine”.



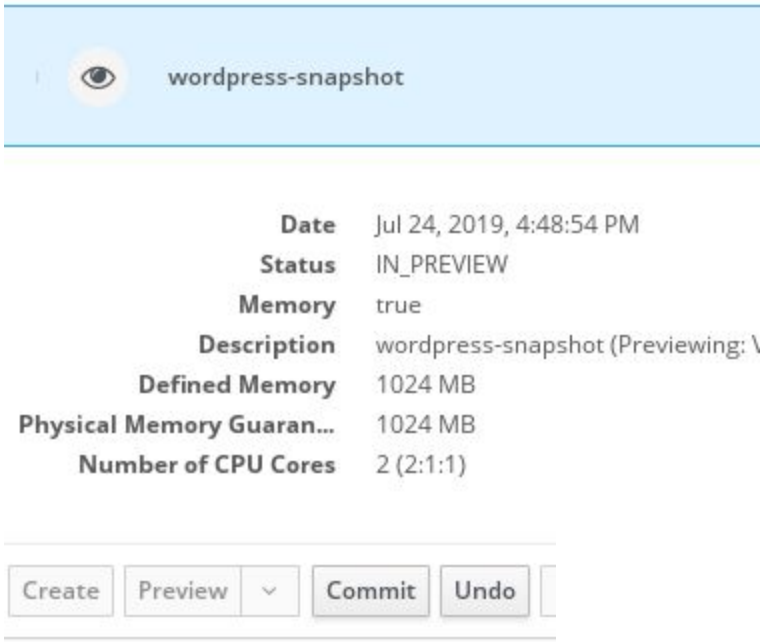
3. Revert “wordpress” back to the wordpress-snapshot snapshot.
   a. In the left navigation pane, click System, and select the Virtual Machines tab.
   b. Right-click the row for the “wordpress” virtual machine, and select Power Off. A window, titled Power Off Virtual Machine(s), appears. Click OK to power off “wordpress” virtual machine.
   c. Verify that the value of the Status field for the “wordpress” virtual machine is Down. You may need to scroll the virtual machine list window to the right. It may take a few seconds for RHVM to mark the “wordpress” virtual machine as Down.
   d. Select the row for the “wordpress” virtual machine. A new section with the virtual machine configuration appears at the bottom.
   e. In the bottom section, click on the Snapshots tab.



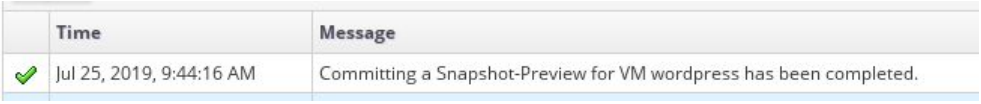
f. In the left section, select the snapshot with the description wordpress-snapshot. Click the Preview drop-down menu and select Custom.... The Custom Preview Snapshot window appears.



g. Select the radio button for the snapshot with the description wordpress-snapshot. Verify that the check box for the “rhel-7.5-cloud” disk is enabled. Click OK to revert rhel-7.5-cloud to the wordpress-snapshot snapshot.
h. In the row for the “wordpress”, verify that the value of the Status field transitions from Image Locked to Down.
i. In the Snapshots tab of the bottom section, verify that the value of the Status field for the wordpress-snapshot snapshot is In Preview. Click Commit.



j. In the left navigation pane, click System, and select the Events tab. Verify that the message VM "wordpress" restoring from Snapshot has been completed appears. This confirms that RHVM successfully restores the rhel-vm-snapshot snapshot in the "wordpress" virtual machine



4. Verify that "wordpress" virtual machine properly rolled back to the state in the wordpress-snapshot snapshot.
    a. In the left navigation pane, click System. Select the Virtual Machines tab.
    b. Right-click the row for the "wordpress" virtual machine, and select Run. Verify that the value of the Status field for the "wordpress" virtual machine is Up. It may take up to a minute for the "wordpress" virtual machine to start.
    c. Open the console window for the "wordpress" virtual machine and log in to the virtual machine.
    d. Verify that the MOTD for the "wordpress" virtual machine is empty.

5. Delete the wordpress-snapshot snapshot.
    a. In the Virtual Machines tab, select the row for the "wordpress" virtual machine.

b. In the bottom section, go to the Snapshots tab. Select the wordpress-snapshot snapshot. Click Delete. The Delete Snapshot window appears. Click OK.
c. Confirm that RHVM removes the wordpress-snapshot snapshot from the snapshot listing. It may take up to a minute.

Lab 5: Scaling up VMs, adding CPU and RAM without service disruption

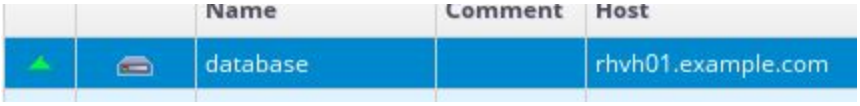
The fifth lab provides an overview of how to make changes to the configuration of an existing Red Hat Enterprise Linux based virtual machine. You will learn to:

- Change the amount of RAM and the number of CPUs in one of your virtual machines

Lab 5.1 - Scaling up VMs, adding CPU and RAM without service disruption

Lab Preparation

- You will work on the “database” virtual machine on this lab.
- Go to the RHV manager and select the virtual machine.

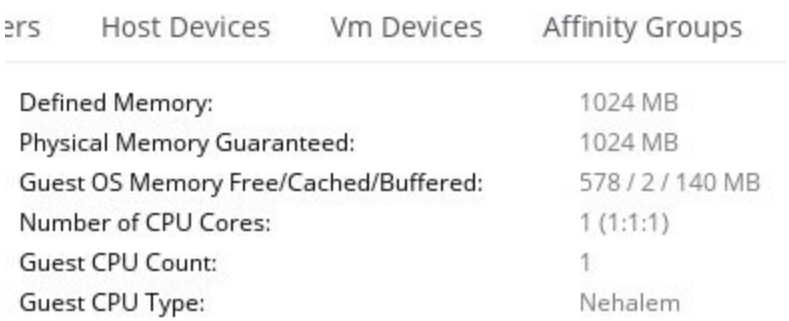


- Click the Console button to have a console access on the virtual machine.

- If your browser does not automatically pop-up the console, click on the “console.vv” file which just has been downloaded.
- Login to the virtual machine via the console with username “admin” and password “r3dh4t1!”.
- Keep this console window open for the rest of this lab.

Lab instructions:

1. Open a web browser window or tab with RHV Manager on.
2. Navigate to Virtual Machines by clicking on the Virtual Machines tab.
3. Highlight the “database” virtual machine by clicking its name. In the lower part of the screen, in the General tab, observe the amount of RAM and number of CPUs the machine has.

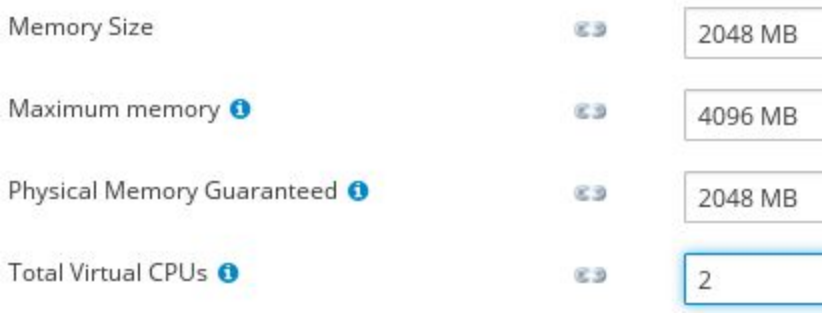


4. Login to the virtual machine via console.
5. Issue the free command to see that the amount of RAM is 1024 MB.
6. Issue the lscpu command to see that the number of CPUs is 1.
7. On RHV Manager, With the virtual machine still selected, click the Edit button to edit the properties of the virtual machine.

8. In the Edit Virtual Machine dialog window, ensure that the Show Advanced Options button was clicked and that you can access the advanced options. Click the System tab.

9. Change the amount of RAM available to the machine by modifying the Memory Size text field to a value of 2048 MB.

10. Change the number of CPUs available to the machine by modifying the Total Virtual CPUs text field to a value of 2.



11. Accept the changes by clicking OK.
12. Observe the changed values you have specified in the General tab.
13. Access the rhel-vm virtual machine console.
14. Log in to the virtual machine using the root user account with a password of redhat.
15. Issue the free command to see that the amount of RAM has changed to 2048 MB.
16. Issue the lscpu command to see that the number of CPUs has changed to 2.
17. Close the virtual machines console and log out from the Administration Portal. This completes the guided exercise.

Lab 6: Experiment with Networking Quality of Service (QoS)

The sixth lab provides an overview of RHV's Quality of Service (QoS) feature set which limits resource usage by VMs, preventing a VM from consuming all of the resources of a virtualization host - aka "the noisy neighbor". You will learn to set limits for:

- CPU
- Storage throughput and IOPs
- Network bandwidth

Lab 6.1 - Configure QoS for CPU utilization

Lab 6.2 - Configure QoS for Storage throughput and IOPs

Lab 6.3 - Configure QoS for Network bandwidth

RHV provides QoS features to limit resource usage by VMs, avoiding one VM to consume all resources of a virtualization host - also known as the the noisy neighbor. The administrators can set limits for CPU, Storage throughput and IOPs and network bandwidth.

We have 2 Windows 2012R2 server VMs with a web application that can be used to measure network connection bandwidth.

Open one browser window at https://windows.example.comhttps://windows-GUID.rhpds.opentlc.com

Mention that RHV is certified to run several Windows client and server releases, including versions as Windows 10 and Windows Server 2016.

(This demo is using Windows Server 2012 as the nested virtualization hosts have Skylake CPUs and it wasn't possible to run Windows Server 2016 with it - mention if needed)

On this same browser, change URL to https://windows-GUID.rhpds.opentlc.com/speedtest.

Open another browser window and resize the 2 windows so that both are visible at the same time.

On the second browser, access https://noisy-GUID.rhpds.opentlc.com/speedtest.

Explain that the first browser (https://windows-GUID.rhpds.opentlc.com/speedtest) has no QoS configured, while the second (https://noisy-GUID.rhpds.opentlc.com/speedtest) had a QoS rule applied (1 Mbps avg, 2 Mbps peak, 3 Mbps burst - mention if needed)

Start speed test on the first browser (no QoS) and explain you won't start both at the same time to avoid one test interfering in the other.

When the first test finishes, start on the second browser and highlight the differences at the end.

Switch to the RHV Administration interface (resize browser to use whole screen)

Show the QoS rules configuration going to Compute -> Data Center -> DC01 -> QoS

VM network, as configured, limiting how much bandwidth the VM can use

Host network - allows configuring how much bandwidth each host network can use if using the same network interface (eg. same link with VLANs for storage, service, cluster network etc)

CPU - allows configuring how much CPU a VM can use.

Storage - allows configuring how much throughput or IOPs a VM can use.

If required to show the QoS rule applied to the VM, go to Compute -> Virtual Machines -> NoisyNeighbor -> Network Interfaces: configured by vNIC profiles.

Lab 7: Import and export virtual machines via OVA package without Export storage domain

This lab provides an overview of how to import and export virtual machines via the OVA standard unit of packaging. You will learn to:

- Understand the OVF and OVA file formats for virtual machines.
- Export a virtual machine via OVA without employing a RHV Export Storage Domain.
- Import a virtual machine via OVA without employing a RHV Export Storage Domain.

Lab 7.intro - OVF/OVA File Formats for Virtual Machines explained

Open Virtualization Format (OVF)

The OVF Specification furnishes a means for describing the properties of a virtual machine. It is XML based and most commonly used to describe a single virtual machine or virtual appliance. It can contain information about the format of a virtual disk image file as well as describing the virtual hardware that should be emulated to run the OS or application contained within the image.

Open Virtual Appliance (OVA)

An OVA is virtual machine packaging specification which includes an OVF file that provides the properties of the virtual machine while also bundling the supporting files (disk images, etc.), all contained together in a single package file. Typically, when people refer to an “OVF”, they are most likely referring to an “OVA”.

Lab 7.1 - Export virtual machine to OVA, Export Storage Domain unused

Lab 7.2 - Import virtual machine to OVA, Export Storage Domain unused

Lab 8: Complete RHV administrative functions via Ansible automation

This lab provides an overview of how to perform administrative tasks through the execution of Ansible playbooks. You will learn to:

- Automate.
- Automate more.

Starting with RHV 4.1, Ansible is automatically installed with RHVM 4.1. Ansible can also be installed on a separate machine using the RHV repositories. Additionally, Ansible Roles are available to help configure and manage various parts of the RHV infrastructure (# yum install ovirt-ansible-roles)

Red Hat provides multiple roles in the ovirt-ansible-roles package that can be used to manage various parts of the RHV infrastructure, which makes using Ansible even easier.

For more information, check out

https://www.redhat.com/en/blog/automate-your-rhv-configuration-ansible

https://access.redhat.com/documentation/en-us/red_hat_virtualization/4.3/html/administration_guide/chap-automating_rhv_configuration_using_ansible

Resources/Links

Why are Export Domains deprecated in RHV?

How to achieve export storage domain functionality with a data storage domain?