



Demo : SUSE Enterprise Storage

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This document outlines the process to install SUSE Enterprise Storage 6 on a set of available virtual machines as a solution cluster in the Hewlett Packard Enterprise Customer Innovation Center. While citing steps, values or inputs which need to be changed from the default, documented process in this environment, you can refer to respective [SUSE Enterprise Storage 6 Deployment Guide](https://documentation.suse.com/ses/6/single-html/ses-deployment/) (<https://documentation.suse.com/ses/6/single-html/ses-deployment/>) ↗ for more complete solution overview and details.

**Tip**

Supplementary Videos - A condensed video version of this end-to-end process is available, within the Hewlett Packard Enterprise Customer Innovation Center at video::FixMe (<https://www.youtube.com/watch?v=4Vrhlylgo3M>) ↗. Likewise, there are full-length videos of the important process sections referenced throughout this document.

1 Hewlett Packard Enterprise Customer Innovation Center

1.1 Virtual Private Network (VPN)

1.2 Environment Core Functionality

Through a corporate sponsorship between SUSE and Hewlett Packard Enterprise, the resources provided for this solution demo are located in the [Customer Innovation Center \(https://www.hpe.com/us/en/about/executive-briefing-centers/geneva.html\)](https://www.hpe.com/us/en/about/executive-briefing-centers/geneva.html) ↗ facility. Joint sales teams and customers are encouraged to interact and engage in this environment to understand the joint value proposition.

Environment Access

This section outlines how to access the Hewlett Packard Enterprise Customer Innovation Center environment and what core functionality is present to leverage.

1.1 Virtual Private Network (VPN)

The following preparatory actions are required

1. Request a set of VPN user credentials
2. Request a copy of the Hewlett Packard Enterprise Customer Innovation Center Remote Access document to learn how to
 - Download and Install OpenVPN client
 - Configure the client
 - Start the VPN tunnel, connecting via your VPN user credentials

1.2 Environment Core Functionality

Next, request a copy of the environment service's login credentials. Once connected via the VPN, you can now access the following infrastructure

- The following table lists the various network parameters and services:

TABLE 1.1: ENVIRONMENT ACCESS - GENERAL NETWORKING / SERVICES

Role	Description	Value	Notes
Demo Subnet	IPRange/CIDR	10.6.64.0/24	Class C
	Router	10.6.64.1	
DNS	Primary	10.3.61.31	
	Secondary	10.11.0.13	
NTP	Primary	10.11.0.10	

- The following table lists the relevant infrastructure hosts to interact with:

TABLE 1.2: ENVIRONMENT ACCESS - INFRASTRUCTURE HOSTS

Function	Role	IPAddress	Notes
Desktop Environment	JumpHost	10.6.64.2	Windows
Virtualization Host	VMware	10.3.61.10	vSphere

-

The following additional command line interfaces, accessible from the JumpHost, may be relevant to interact with a Kubernetes infrastructure, like SUSE CaaS Platform:

- kubectl
 - An example invocation via *Start → Command Prompt → Downloads\kubectl.exe version*

**Tip**

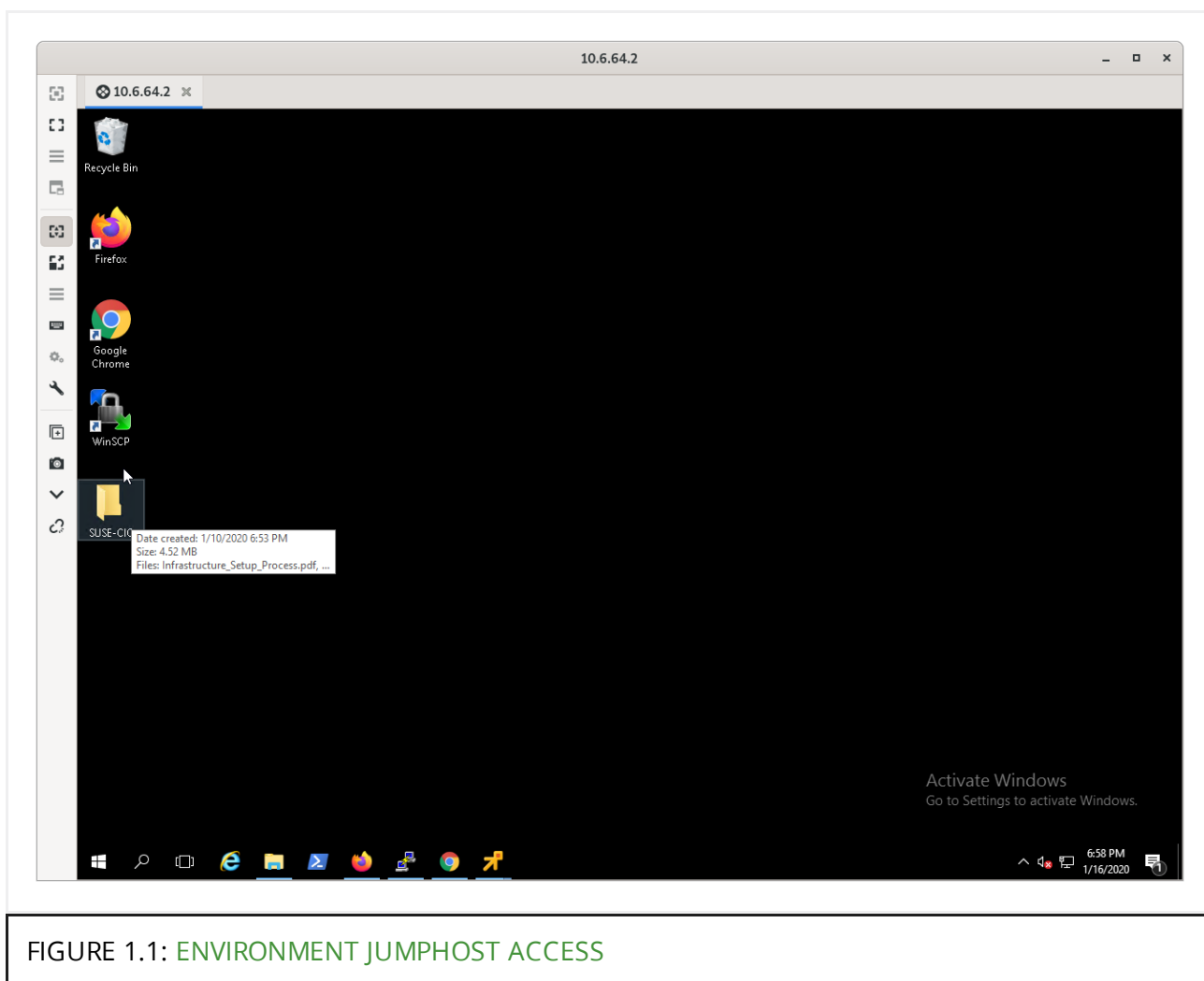
If this is not available, refer to [Install kubectl on Windows \(https://kubernetes.io/docs/tasks/tools/install-kubectl/#install-kubectl-on-windows\)](https://kubernetes.io/docs/tasks/tools/install-kubectl/#install-kubectl-on-windows) ↗.

- helm FixME
 - An example invocation via *Start → Command Prompt → Downloads\helm.exe version*

**Tip**

If this is not available, refer to [Installing Helm \(https://helm.sh/docs/intro/install/\)](https://helm.sh/docs/intro/install/) ↗.

Via the Remote Desktop Protocol (RDP), login to the provided JumpHost to utilize as desktop environment.



You should be able to

1. Access copies of this and other demonstration documents from the *SUSE-CIC* Desktop Folder
2. Use a web browser to access
 - the Internet (via any of the browsers types, Chrome, Edge, Firefox)
 - vSphere HTML client for VMware® host (recommend using Chrome, using HTML5 access)

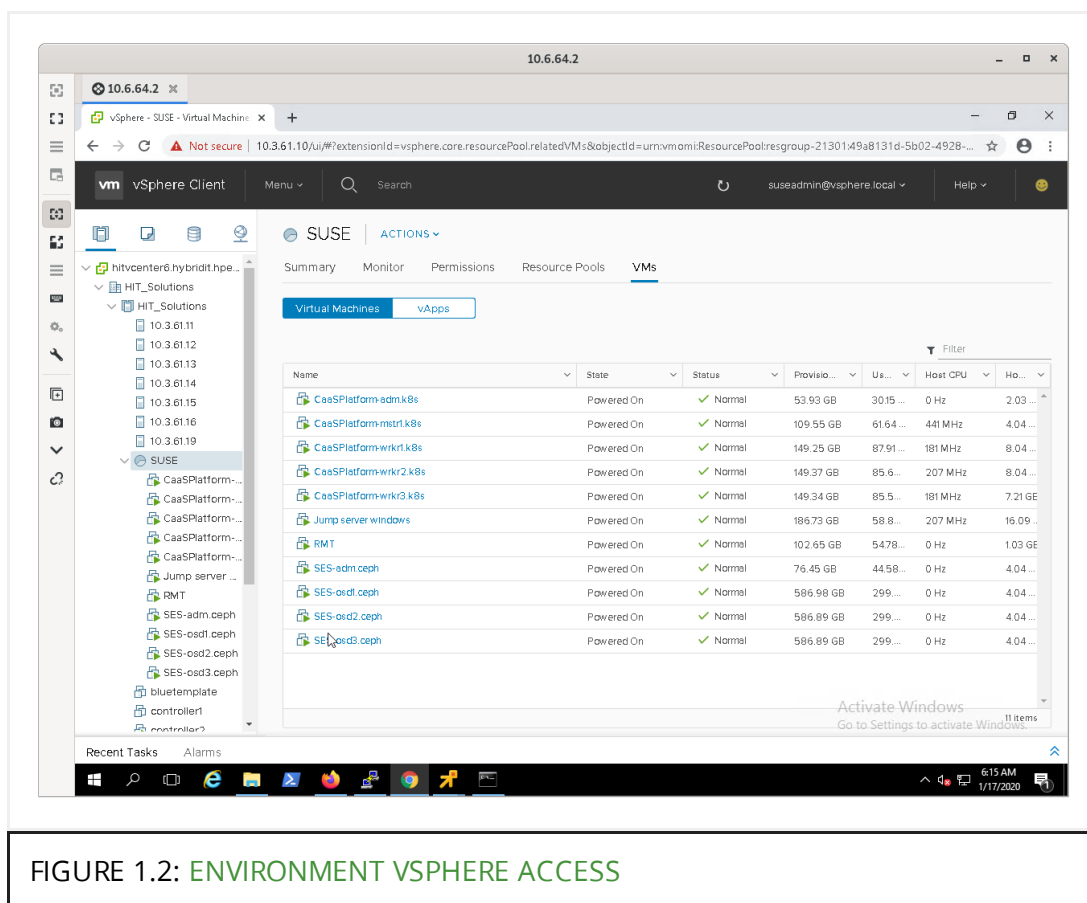


FIGURE 1.2: ENVIRONMENT VSPHERE ACCESS

2 Required Demo Infrastructure

- 2.1 Internet Access
- 2.2 Repository Mirroring Tool [RMT] Service
- 2.3 Domain Name Service [DNS]

These necessary infrastructure service components have been previously setup and should be operational. Most all of these services should remain running at all times and configuration values should remain static so as not to impact the deployments or operational aspects.

Prerequisite Services

This section outlines required background services for this document's SUSE solution within the Hewlett Packard Enterprise Customer Innovation Center environment. It also provides rudimentary checks to verify the services and some simple troubleshooting examples.

2.1 Internet Access

In order to access components and downloads from outside the Hewlett Packard Enterprise Customer Innovation Center environment, it is assumed that outbound Internet access is available, likely through the Demo Subnet Router.

2.2 Repository Mirroring Tool [RMT] Service

In order to have a local, synchronized repository of the required [SUSE Customer Center](https://scc.suse.com/) (<https://scc.suse.com/>) ↗ [SCC] content (for quick/easy access), the best practice is to have a local RMT server running in the demo environment.



Important

This node (virtual machine) and service should be up and running at all times, to provide the repository contents for both installs and updates of all the other solution nodes and services. By default, it automatically mirrors the content each night to stay current.

Verify Functionality

Once connected to the Hewlett Packard Enterprise Customer Innovation Center environment via the VPN, RDP and logged into the JumpHost

1. Launch a web browser and visit the RMT URL:

http://10.6.64.15/repo/SUSE

or

http://rmt.suse.cic/repo/SUSE

Browsing the underlying *Products* and *Updates* links will show what content is available.

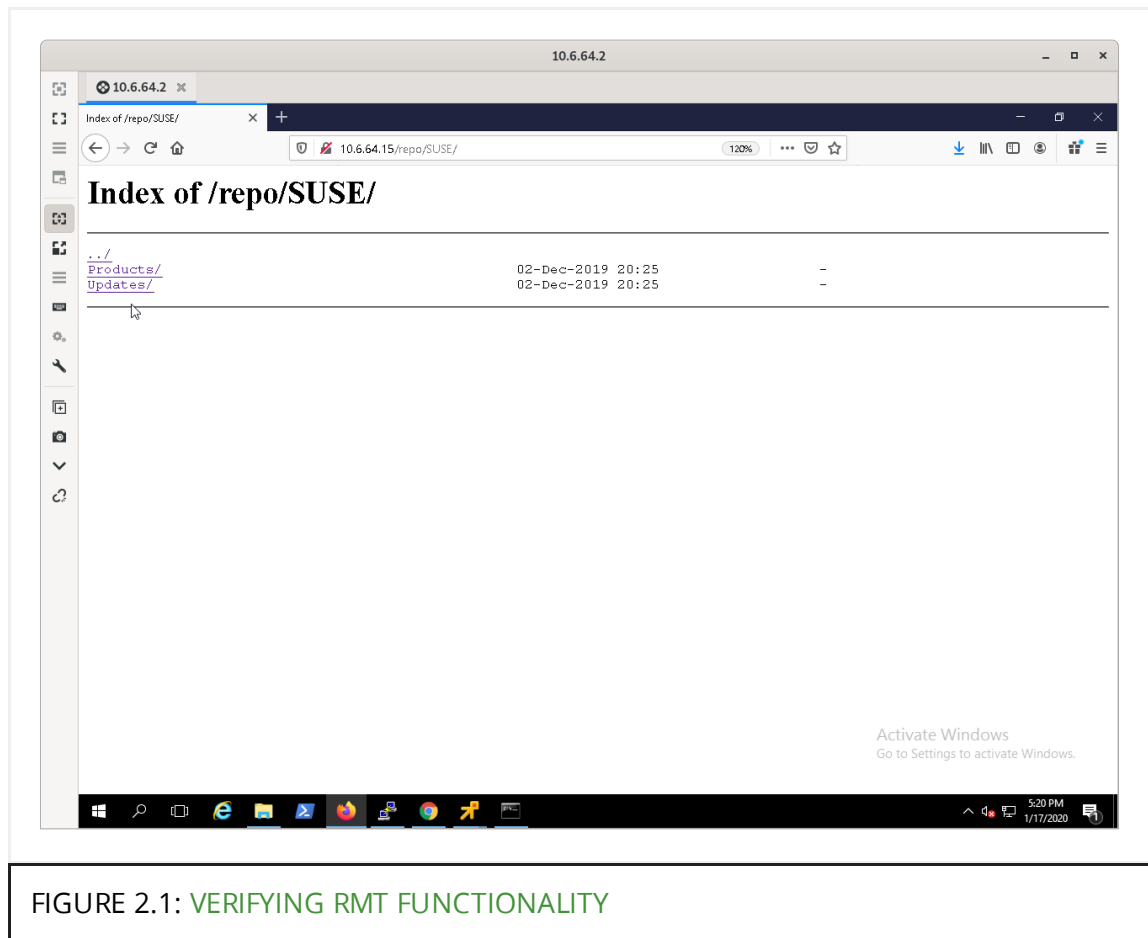


Note

The IP-based URL is based upon the designated, reserved IP address of the respective RMT server. By default the JumpHost does not utilize the local demo environment’s DNS service but can have this hostname entry added to it’s local host file.

TABLE 2.1: DEMONSTRATION ENVIRONMENT SUGGESTED REPOSITORY CONTENT

Function	Product	Version	Architecture	Notes
Infrastructure	Basesystem Module	15 SP1	x86_64	
	Desktop Applications Module	15 SP1	x86_64	
	Server Applications Module	15 SP1	x86_64	
	SLES	15 SP1	x86_64	
SUSE Enterprise Storage	Storage	6	x86_64	



If this appears to be functioning, skip to the next section.

Troubleshooting

If the previous access does not work, try the following additional checks:

- Launch a command prompt from the JumpHost *Start* menu and type

```
ping 10.6.64.15
```

- Launch the putty SSH client from the JumpHost *Start* menu and try connecting, logging in to the RMT IP address 10.6.64.15, then

```
systemctl status rmt-server
```

- Using the Google Chrome web browser, connect to the vSphere HTML5 client interface, log in and make sure the RMT virtual machine is powered on. The virtual remote console can also be launched to assess the state and potentially remedy any operational issues on the node. Refer to the

**Tip**

Review the [SUSE Linux Enterprise Server RMT Guide](https://documentation.suse.com/sles/15-SP1/single-html/SLES-rmt/)
(<https://documentation.suse.com/sles/15-SP1/single-html/SLES-rmt/>) ↗

If any of the above attempts fails, an RMT virtual machine can be recreated per the process mentioned in the [Chapter 5, Appendices](#).

2.3 Domain Name Service [DNS]

To have a coherent, self-contained name service for elements of the SUSE solution in the local environment, mapping IP addresses to hostnames, this service is co-located on the RMT server virtual machine.

**Important**

This service should be left running at all times, to provide the name to IP resolution installs, updates, and runtime operation of all the other nodes.

Verify Functionality

Once connected to the Hewlett Packard Enterprise Customer Innovation Center environment via the VPN, RDP and logged into the JumpHost

1. Launch a Command Prompt from the JumpHost *Start* menu and type

```
nslookup rmt.suse.cic 10.6.64.15
```

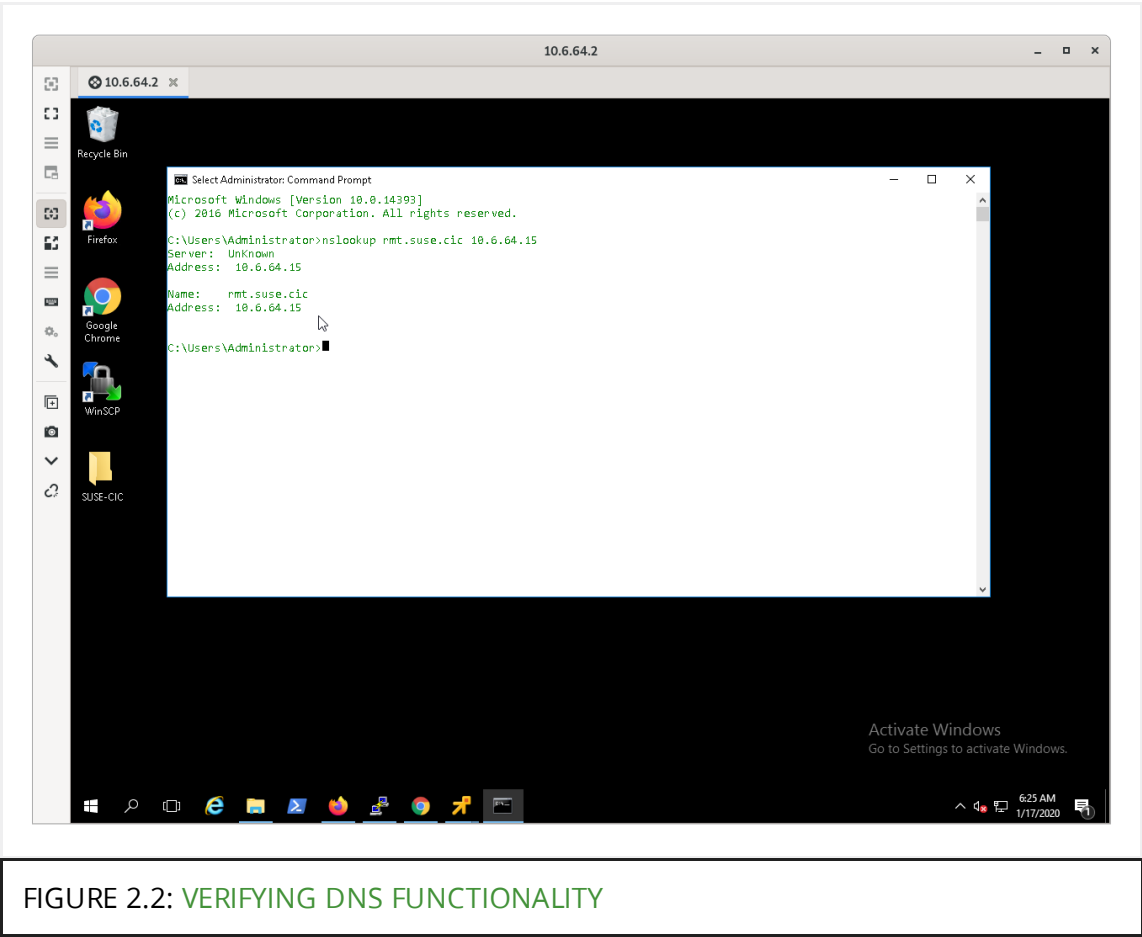


FIGURE 2.2: VERIFYING DNS FUNCTIONALITY

If this appears to be functioning, also ensure the other relevant solution’s Hostname to IPAddress mappings are configured and available:

TABLE 2.2: DEMONSTRATION ENVIRONMENT SUBNET MAPPING

Function	Role	Hostname	IPAddress	Notes
Infrastructure	RMT	rmt.suse.cic	10.6.64.15	local solution DNS, also referenced in JumpHost <i>hosts</i> file
SUSE Enterprise Storage	Admin	adm.ceph.suse.cic	10.6.64.32	also referenced in JumpHost <i>hosts</i> file
	OSD	osd1.ceph.suse.cic	10.6.64.36	co-located MON functionality
		osd2.ceph.suse.cic	10.6.64.37	co-located MON functionality
		osd3.ceph.suse.cic	10.6.64.38	co-located MON functionality
SUSE CaaS Platform	Admin/Mgmt	adm.k8s.suse.cic	10.6.64.64	also referenced in JumpHost <i>hosts</i> file
spares		n/a	10.6.64.201	
		n/a	10.6.64.202	
		n/a	10.6.64.203	
		n/a	10.6.64.204	
		n/a	10.6.64.205	
		n/a	10.6.64.206	
		n/a	10.6.64.207	
		n/a	10.6.64.208	

**Note**

The entries denoted as "spares" do not have specific hostname mappings and are just intended as available addresses for initial operating system installations on the virtual machines.

Troubleshooting

If the previous access does not work, try the following additional checks:

- Launch a Command Prompt from the JumpHost *Start* menu and type

```
ping 10.6.64.15
```

- Launch the putty SSH client from the JumpHost *Start* menu and try connect to the RMT IP address 10.6.64.15. Once logged in as root, try:

```
systemctl status named
```

- Using the Google Chrome web browser, connect to the vSphere HTML5 client interface, log in and make sure the RMT virtual machine is powered on. The virtual remote console can also be launched to assess the state and potentially remedy any operational issues on the node.

**Tip**

Review the [DNS Chapter \(https://documentation.suse.com/sles/15-SP1/single-html/SLES-admin/#cha-dns/\)](https://documentation.suse.com/sles/15-SP1/single-html/SLES-admin/#cha-dns/) of the SUSE Linux Enterprise Server Administration Guide.

If any of the above attempts fails, a DNS function can be recreated per the process mentioned in the [Chapter 5, Appendices](#).

3 Solution Cluster Deployment

3.1 Allocation of Target Virtual Machines

3.2 Node Operating System Install

3.3 Deploying the Solution

Overview

The following process encompasses an end-to-end deployment on Virtual Machines (VM), installation of the operating system and then creation of the cluster to provide the SUSE Enterprise Storage solution cluster. While many alternatives exist to create such a working solution cluster, the process outlined below is closely parallel to accomplishing the same thing on a set of baremetal nodes.

Important: Given the Hewlett Packard Enterprise Customer Innovation Center is potentially a shared demo environment, ensure these nodes are not in active use before recreating the solution from scratch!

3.1 Allocation of Target Virtual Machines

Purpose

This section outlines how to allocate, prepare and setup the virtual machines to run the various roles of the SUSE solution in the Hewlett Packard Enterprise Customer Innovation Center.



Note

If the required Virtual Machines already exist, review their settings and modify as needed to make sure they match the configurations below.

3.1.1 Create and prepare virtual machine settings

From the JumpHost, launch the Google Chrome browser to connect to the vSphere HTML5 Web Client, then follow the steps below:

1. Via *Hosts and Clusters* context

- Expand *hitvcenter6.hybritit_hpecic.net* > *HIT_Solutions* > *SUSE* and select *New Virtual Machine*

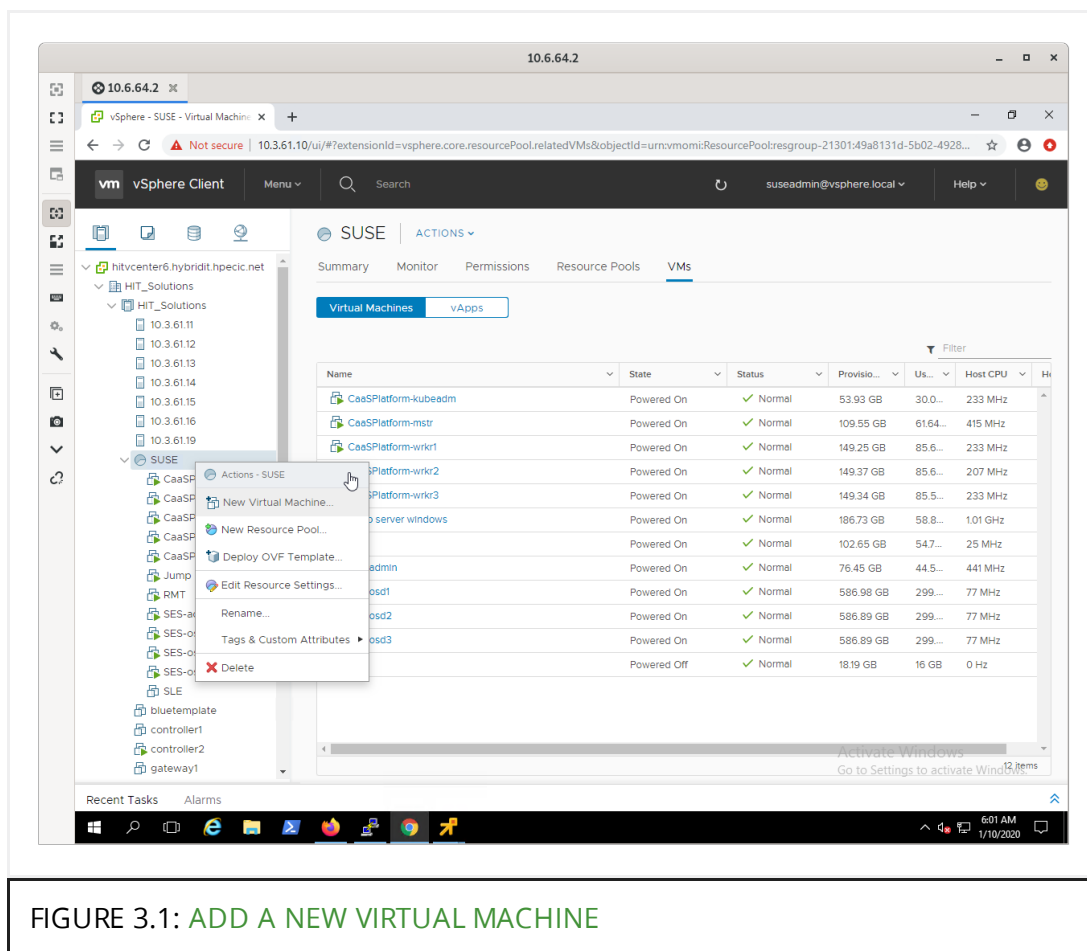


FIGURE 3.1: ADD A NEW VIRTUAL MACHINE

2. Using *New Virtual Machine* dialog

- Select *Create a new virtual machine* then **NEXT**

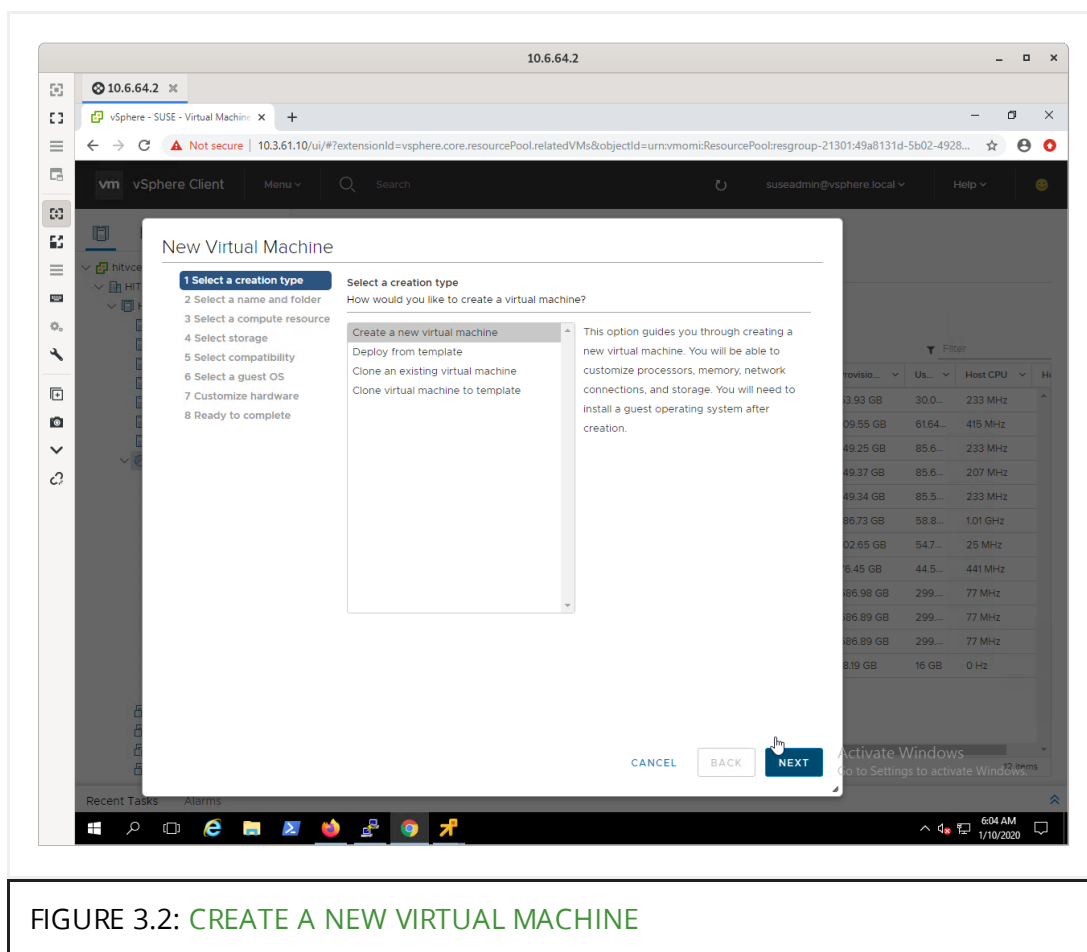


FIGURE 3.2: CREATE A NEW VIRTUAL MACHINE

- Provide an appropriate, distinct Virtual machine name in the text field. A suggested naming scheme is "<solution>-<role>"
 - For example - Enterprise Storage-<role>.ceph
- Expand folder location *hitvcenter6.hybritit_hpecic.net* > *HIT_Solutions* select *SUSE* then **NEXT**

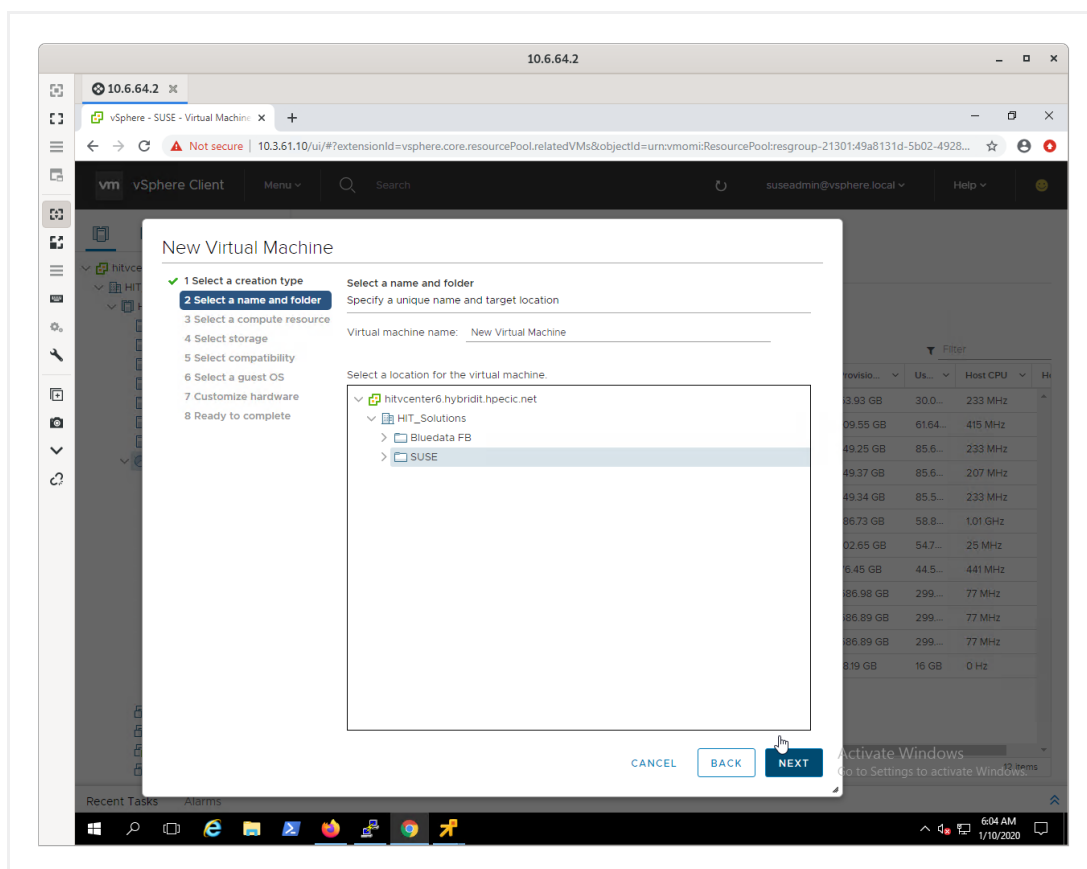


FIGURE 3.3: VIRTUAL MACHINE NAME AND LOCATION

- For destination compute resource, expand *hitvcenter6.hybridit_hpecic.net* > *HIT_Solutions* select *SUSE* then **NEXT**

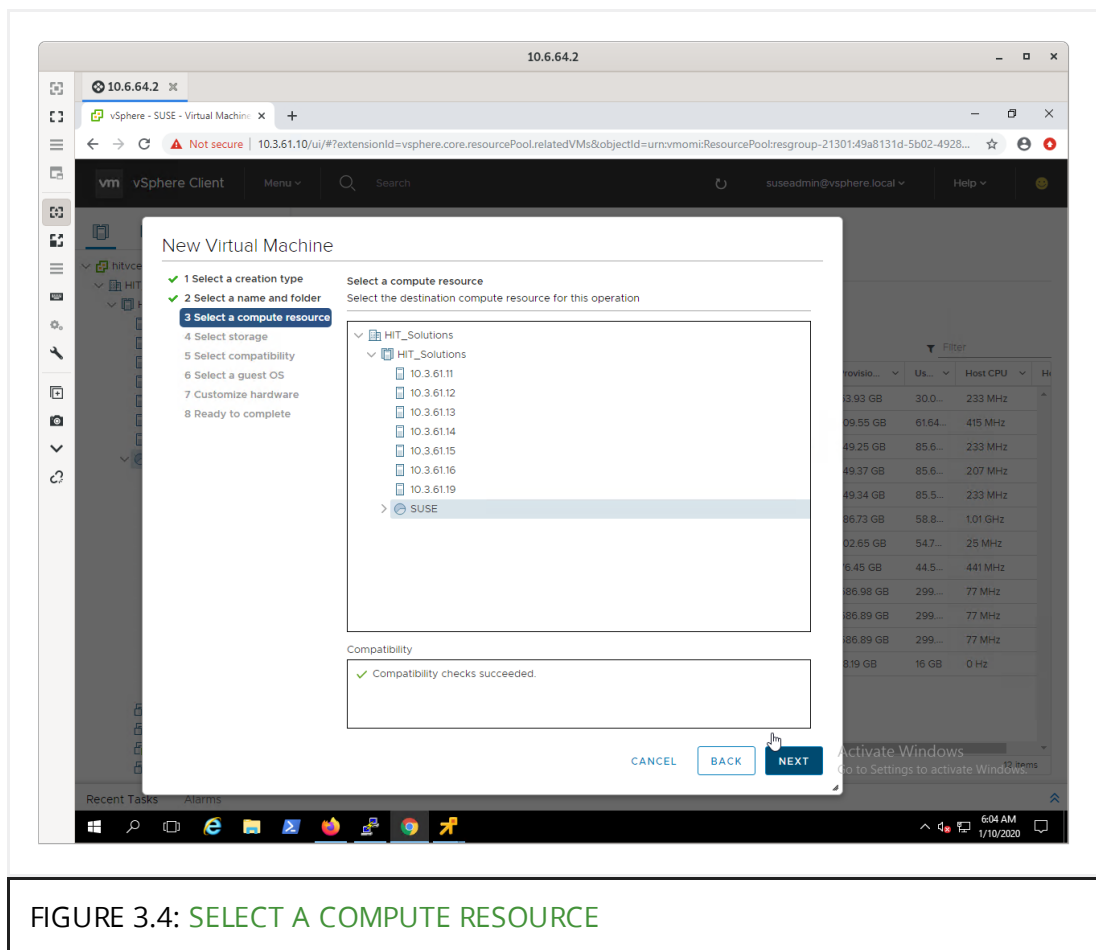


FIGURE 3.4: SELECT A COMPUTE RESOURCE

- For datastore, validate default value of *P20800-HIT-SUSE1064-D* then NEXT

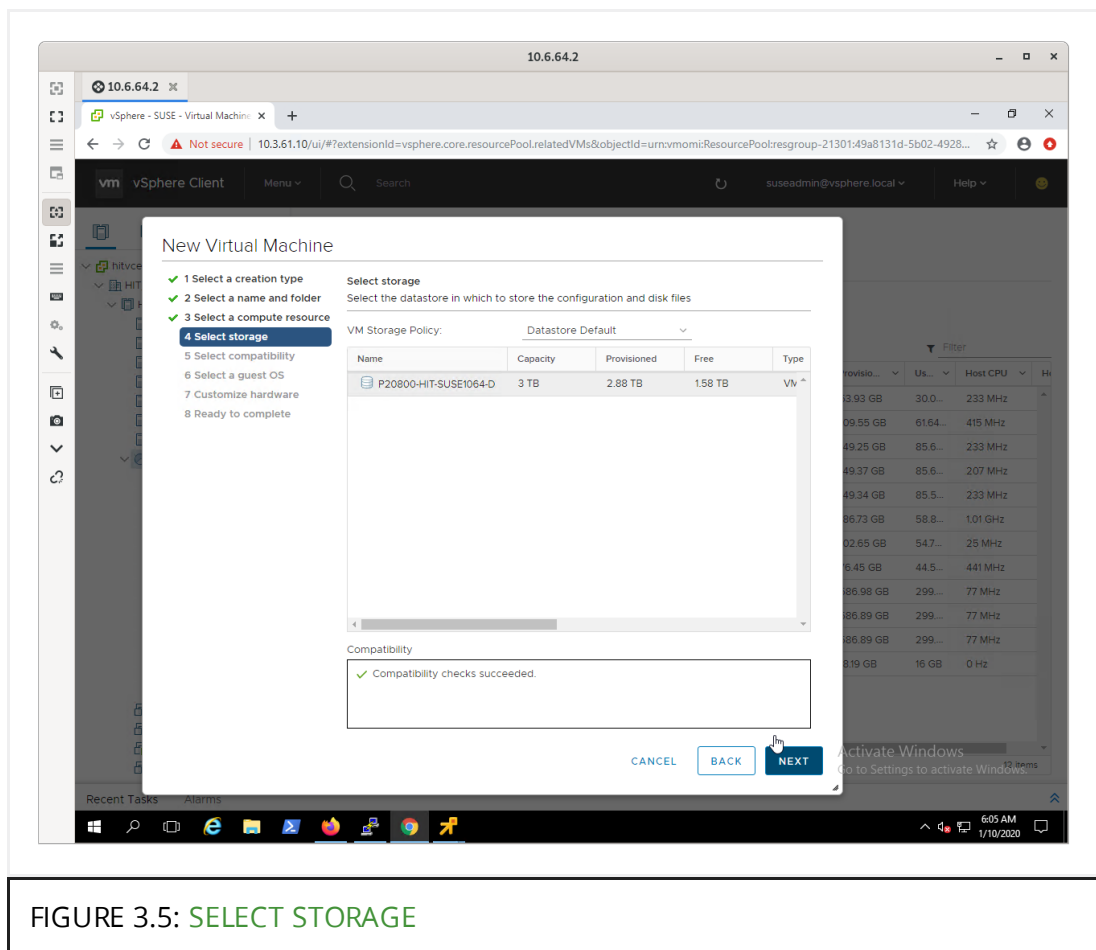
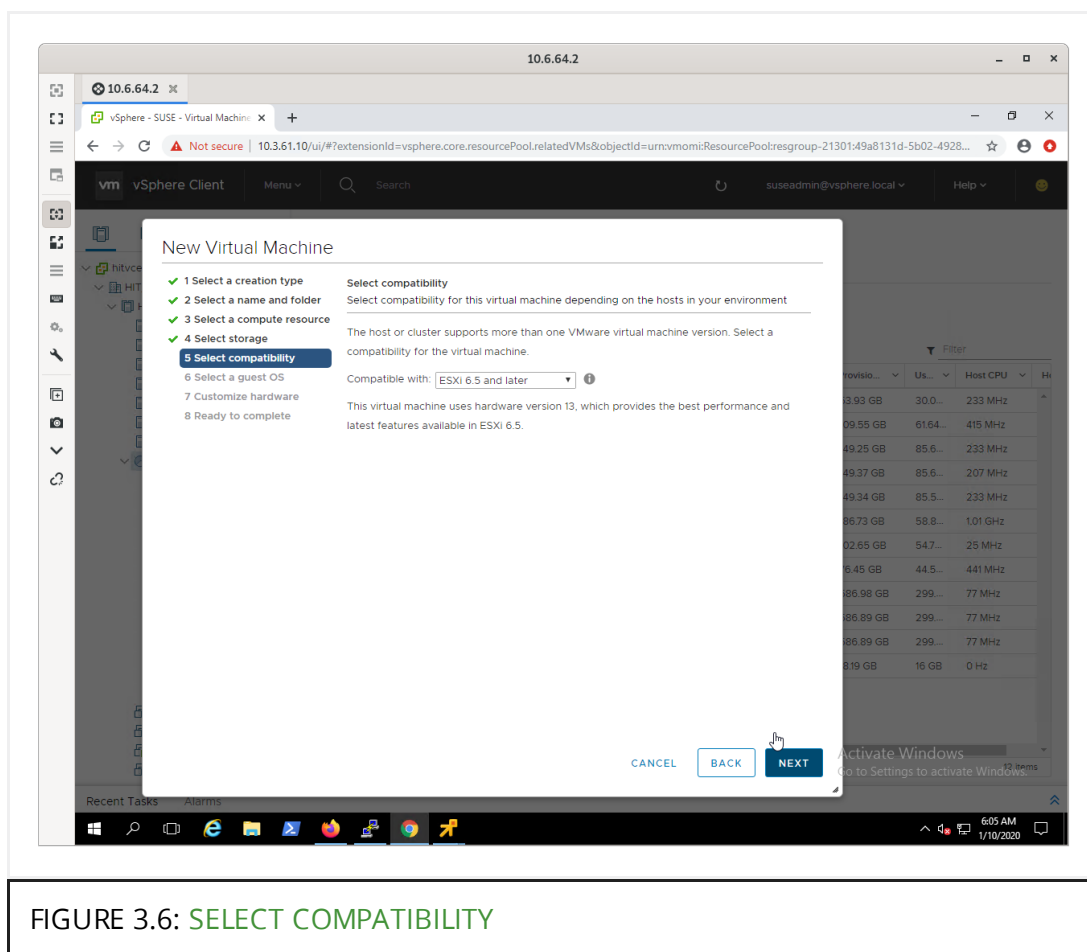


FIGURE 3.5: SELECT STORAGE

- For compatibility, leave default value of *ESXi 6.5 and later* then **NEXT**



- For guest OS
 - Change *Guest OS Family* to *Linux*
 - Change *Guest OS Version* to *SUSE openSUSE (64 bit)* then **NEXT**

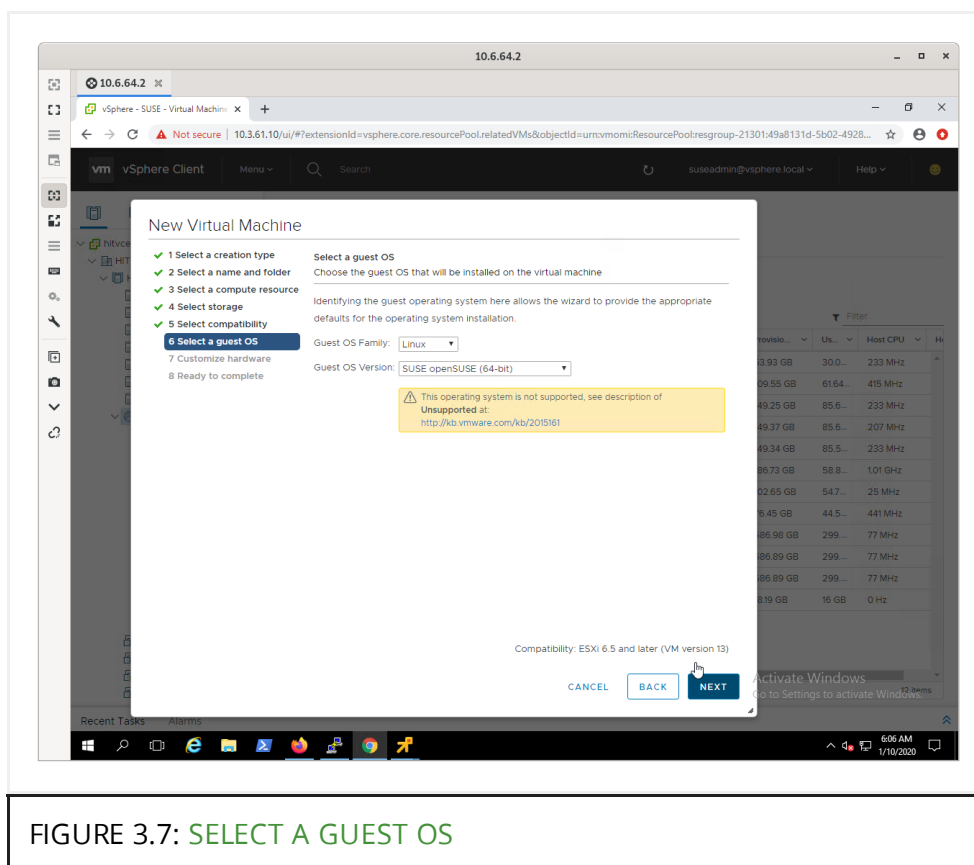


FIGURE 3.7: SELECT A GUEST OS

- Customize the virtual hardware resources, adjusting the quantity and capacity of *CPU*, *Memory*, *New Hard Disk Size* values to match at least the minimum requirement quantity/sizes of the target solution role.

TABLE 3.1: SOLUTION VM RESOURCE SETTINGS (MINIMUMS)

Solution	Quantity	Role	vCPU	Memory (GB)	Disk (GB)	Network
SUSE Enterprise Storage	1	JumpHost	8	16	128	1
	1	adm.ceph	2	4	32	1
	>=3	osd.ceph	4	4	32,4x64	2

**Note**

Refer to respective [SUSE product documentation](https://documentation.suse.com/) (<https://documentation.suse.com/>) ↗ for more details on the node resource requirements.

- Adjust *New Network* via *Browse* to *DPortGroup_PR_1064_HIT*, providing the recommended quantity of network interfaces then **OK**

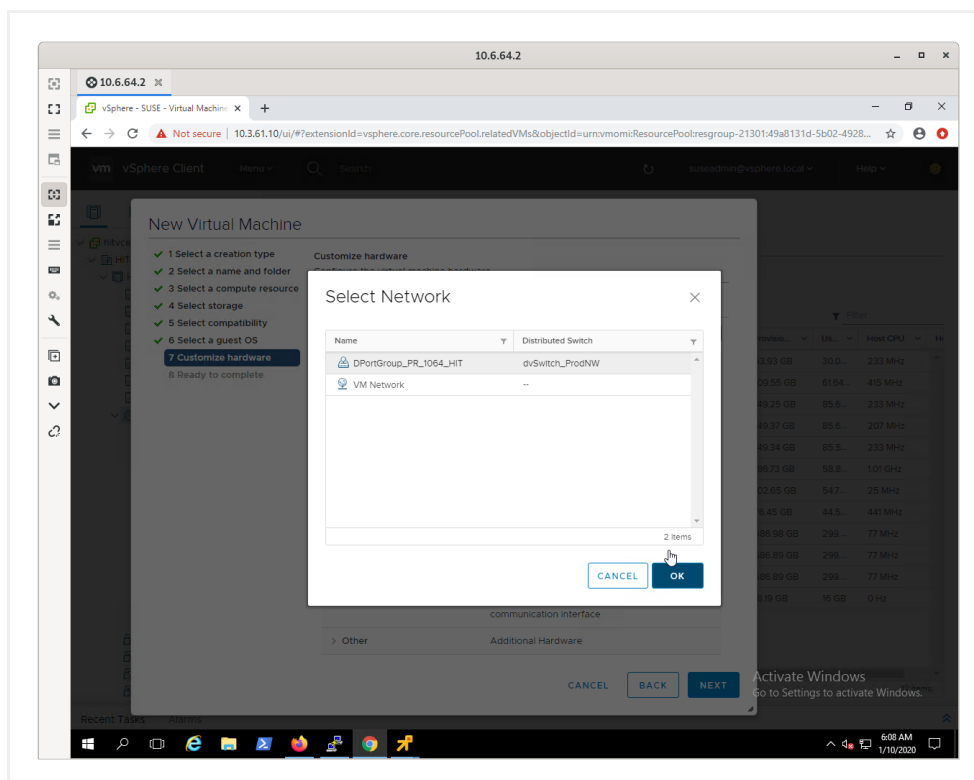


FIGURE 3.8: **SELECT NETWORK**

- Then **NEXT** and **FINISH**

3. Right click on the newly created "Virtual Machine Name", then *Edit Settings*

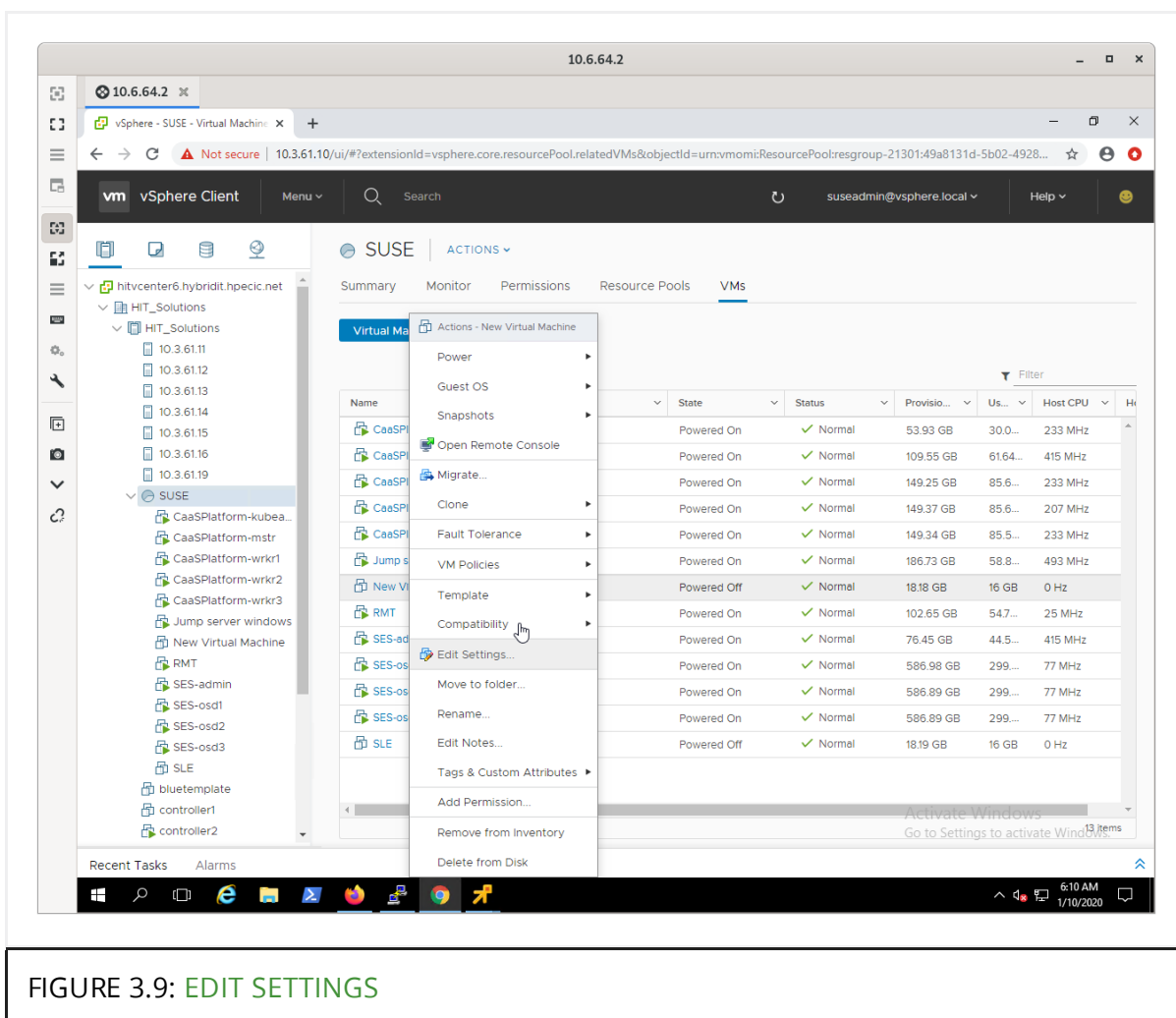


FIGURE 3.9: EDIT SETTINGS

- On *Virtual Hardware* tab, expand *CD/DVD Drive 1* and adjust settings
 - To *Datastore ISO File*
 - Select *Datastores* item *P20800-HIT-SUSE1064-D*
 - Select *Contents* item *SLE-15-SP1-Installer-DVD-x86_64-GM-DVD1.iso* then **OK**
 - Check *Connect At Power On*

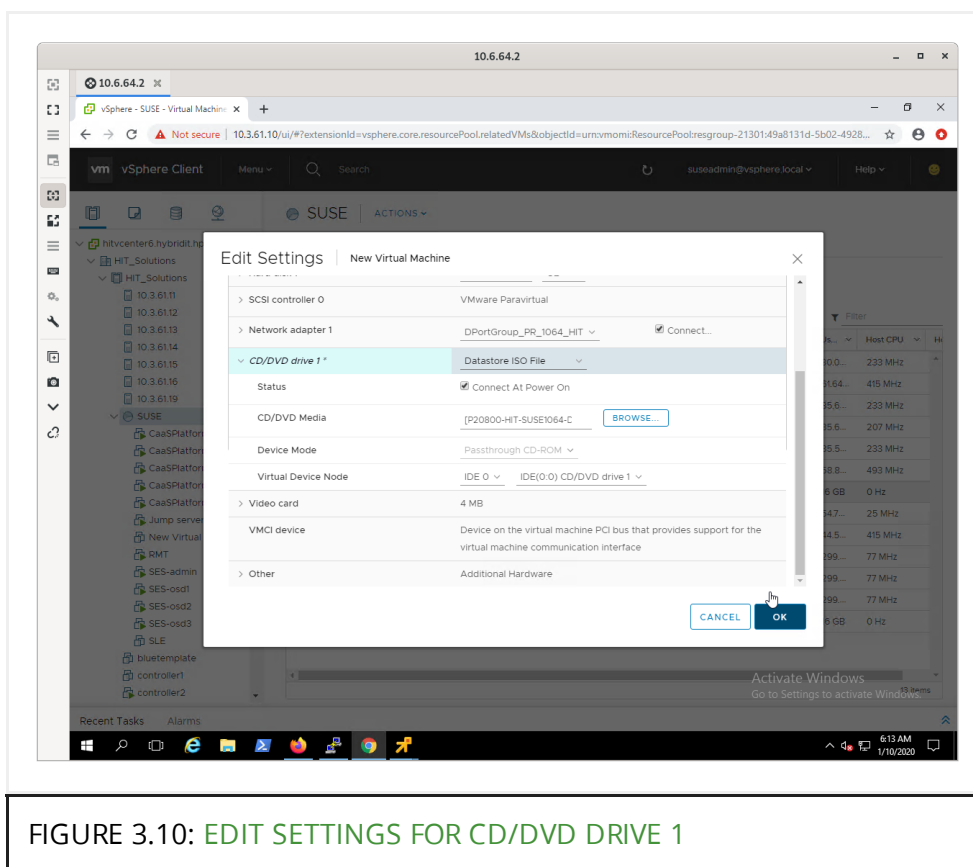


FIGURE 3.10: EDIT SETTINGS FOR CD/DVD DRIVE 1

- On *VM Options* tab, expand *Boot Options* and adjust *Boot Delay* to at least **2000** milliseconds then **OK**

**Tip**

This adjustment is to allow the ability to interrupt the boot process, with the **ESC** key to select the *CD/DVD drive* media for re-installs.

At this point you are ready to *Launch Remote Console* to power on and install the operating system on the virtual machine.

3.2 Node Operating System Install

Purpose

This section outlines how to install the base SUSE Linux Enterprise Server 15 SP1 on an available virtual machine node in a fairly automated fashion for the various roles of the SUSE solutions in the Hewlett Packard Enterprise Customer Innovation Center.

**Note**

For cluster-based solutions, each node can be done sequentially, yet all of the cluster nodes can be installed in parallel as well.

**Tip**

For a recorded, example video representative of this section's process, view video::[SUSE Enterprise Storage Node Operating System Install](https://drive.google.com/open?id=1xg-FQsdJAGYXpXW-x2buxRilJywLun_v) (https://drive.google.com/open?id=1xg-FQsdJAGYXpXW-x2buxRilJywLun_v) ↗.

3.2.1 Install the base operating system

From the JumpHost, launch the Google Chrome browser to connect to the vSphere HT ML5 Web Client, then follow the steps below:

**Note**

This document only cites values or inputs which need to be changed from the defaults. Refer to the node roles of SUSE solutions, as that respective document calls out further exceptions to this process.

**Tip**

Refer to the respective [SUSE Linux Enterprise Server 15 SP1 Deployment Guide](https://documentation.suse.com/sles/15-SP1/single-html/SLES-deployment/#book-sle-deployment) (<https://documentation.suse.com/sles/15-SP1/single-html/SLES-deployment/#book-sle-deployment>) ↗ for further details.

1. Right click on the respective virtual machine and *Open Remote Console*

2. Power On the virtual machine



Tip

If this is a re-install of the given virtual machine, you likely need to hit **ESC** during the boot startup to ensure you can boot from *CD-ROM Drive* media.

- On the install boot screen, use the arrow key to select *Installation* on the boot screen



Note

Refer to specific DNS IP Subnet networking settings from the [Section 2.3, "Domain Name Service \[DNS\]"](#)

- In the *Boot Options* input field, create a temporary network configuration to access the unattended installation (autoYaST) file



Note

Within the Hewlett Packard Enterprise Customer Innovation Center you can view the contents of the respective solution node role's autoYaST file via a web browser to review what configuration is being setup and installed by accessing the URL - <http://rmt.suse.cic/repo/autoYaST/> (<http://rmt.suse.cic/repo/autoYaST/>) ↗.

- ifcfg=INTERFACE=IP_LIST,GATEWAY_LIST,NAMESERVER_LIST,DOMAIN
autoyast=URL/PathToFile.xml
- As an example, for this solution, use a IP for the node and enter

```
ifcfg=eth=10.6.64.208/24,10.6.64.1/10.6.64.15,suse.cic auto
```

At this point, the operating system will install has finished, the node will reboot and the automated post-install configuration will be applied.

3.2.2 Verify the operating system installation

From the JumpHost, launch the Google Chrome browser to connect to the vSphere HT ML5 Web Client, then follow the steps below:

1. Right click on the respective virtual machine and *Open Remote Console*

- Login, via root, to the node and perform these few verifications and adjustments:

- Check the output of

```
ip a
```

- To ensure a match with the expected network interface IPAddress



Note

For the "osd" role nodes, a pair of network interfaces were made available from the virtual machine allocations and the corresponding autoYaST file configures these as a bonded pair with the designated IP address.

```
ip r
```

- To ensure a matching setup for the network routing

```
host rmt.suse.cic
```

- To access to the local DNS mapping service

```
hostname -f
```

- To ensure a matching setup for the fully-qualified domain name of this host

**Note**

This can be remedied by check the contents of the file(s): /etc/hostname to make sure it matches the intended fully-qualified node's Hostname and /etc/hosts which can have an entry added for the fully-qualified node's hostname

- Run

```
yast2
```

- Selecting *Software*

- Then *Product Registration*

- Select *Register System via local SMT Server*
 - Input the appropriate *Local Registration Server URL* to the RMT server (e.g. <http://rmt.suse.cic/> (<http://rmt.suse.cic/>) ↗) then **Next**
 - Add the respective *Extensions and Modules* for the desired role - may need to uncheck the *Hide Development Versions*

selecting *SUSE Enterprise Storage Enterprise Storage x86_64*

then **Next**

**Note**

Refer to the respective [SUSE Solution Deployment Guides](https://documentation.suse.com) (<https://documentation.suse.com>) ↗ for the required extensions/modules.

- Read and *Accept* any additional license agreements, then **Next**



Accept, Ok and Finish any recommended package installations

+ * **Then Online Update** ** Peruse all available updates then *Accept* and *OK* and *Finish* and *Close* and *OK* and *Quit*

At this point, the node should be manually rebooted to ensure application of all the updates. After that the node should be ready for operational usage and inclusion into the solution cluster.

3.3 Deploying the Solution

After connecting via the VPN and logging into the jump host, visit the vSphere Web Client, then follow the steps below:



Tip

For a recorded example video representative of this section's process, view video::SUSE Enterprise Storage Cluster Deployment (<https://drive.google.com/open?id=1AfpCwpbQnEL2IWlIGcKQW1ogqk7EnIHv>) ↗.

1. Right click on the respective virtual machine *Enterprise Storage-adm.ceph* and *Open Remote Console*
2. Login to the node as the "root" user
 - Per the [Cluster Deployment \(https://documentation.suse.com/ses/6/single-html/ses-deployment/#ceph-install-stack\)](https://documentation.suse.com/ses/6/single-html/ses-deployment/#ceph-install-stack) ↗ from the SUSE Enterprise Storage Deployment Guide:
 - Setup Salt configuration - master on "adm" node, minions on all solution cluster nodes

**Note**

Before accepting the minion keys, ensure the fully-qualified host names are represented by the values provided by each of the the salt-minions.

- On each of the "osd" nodes, zap all the non-operating system disk drives.

**Tip**

An example script to perform this action is available at: [diskzap.sh \(http://rmt.suse.cic/repo/EnterpriseStorage-deploy/\)](http://rmt.suse.cic/repo/EnterpriseStorage-deploy/).

- On the "adm" node, install "DeepSea"
- On each of the cluster nodes, create the Btrfs sub-volumes for /var/lib/ceph, since each of the "osd" nodes also have the "mon" functionality co-located on them.
- On the "adm" node, modify the *DriveGroups* file to use all available drives on the "osd" nodes.
- Begin the cluster deployment, invoking the "preparation" and "discovery" stages:

```
deepsea stage run ceph.stage.0
deepsea stage run ceph.stage.1
```

- Given the rather minimal cluster node setup, adjust the following configurations:
 - Allow a cluster with only 3 "osd" nodes, by modifying a line on the "adm" node in the /srv/modules/runners/validate.py to:

```
if (not self.in_dev_env and len(storage) < 3) or (se
```

- Create a "/srv/pillar/ceph/proposals/policy.cfg" file to deploy the minimal functions.

**Tip**

An example configuration file is available at: [policy.cfg \(http://rmt.suse.cic/repo/EnterpriseStorage-deploy/\)](http://rmt.suse.cic/repo/EnterpriseStorage-deploy/) ↗.

- Finish the remaining stages of solution cluster deployment with:

```
deepsea stage run ceph.stage.2  
deepsea stage run ceph.stage.3  
deepsea stage run ceph.stage.4
```

- Then verify the cluster, via

```
ceph status
```

4 Summary

At this point, the SUSE Enterprise Storage solution cluster should be up, running and functional.

TBD - Only included base solution deployment so far, so may add additional sections over time. NOTE: In the interim, refer to [SUSE Enterprise Storage Administration Guide \(https://documentation.suse.com/ses/6/single-html/ses-admin\)](https://documentation.suse.com/ses/6/single-html/ses-admin) ↗ for operational aspects and guidance.

5 Appendices

TBD - Will link to other content over time