FortiManager - VMware ESXi Cookbook

Version 6.4

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November 18th, 2022
FortiManager 6.4 VMware ESXi Cookbook
02-640-620526-20221118

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Change log

Date	Change description
2020-04-09	Initial release.
2020-06-22	Added Security Fabric connector integration with VMware vCenter on page 19.
2021-03-09	Updated Minimum system requirements on page 7.
2021-05-13	Updated About FortiManager on VMware ESXi on page 5.
2021-05-28	Updated information about trial licenses and add-on licenses.
2021-06-02	Updated "Deployment package for VMware ESXi" on page 8
2021-07-15	Updated "Deployment package for VMware ESXi" on page 8.
2021-11-24	Updated "Deploying FortiManager on VMware vSphere" on page 10
2022-09-09	Added "Compatibility for VM hardware versions" on page 9. Updated "Deploying the OVF file" on page 11.
2022-11-18	Updated "Minimum system requirements" on page 7.

About FortiManager on VMware ESXi

This document provides information about deploying a FortiManager virtual appliance in VMware vSphere Hypervisor (ESX/ESCi) and VMware vSphere Client environments.

This includes how to configure the virtual appliance's virtual hardware settings. This guide presumes that the reader has a thorough understanding of virtualization servers.

This document does not cover configuring and operating the virtual appliance after successfully installing and starting it. For that information, see the *FortiManager Administration Guide*.

Licensing

Fortinet offers the FortiManager-VM with a limited, free trial license. Stackable licenses can be purchased, letting you expand your VM solution as your environment expands. You can purchase perpetual or subscription-based licenses. Perpetual licenses never expire.

For information on purchasing a FortiManager-VM license, contact your Fortinet-authorized reseller, or visit How To Buy.

When configuring your FortiManager-VM, ensure that you configure hardware settings as the following table outlines and consider future expansion. Contact your Fortinet-authorized reseller for more information.

License	Devices/VDOMs	GB/day of logs with FortiAnalyzer enabled (not stackable)
Trial License	3	0 FortiAnalyzer features not supported
VM-10-UG	+10	2
VM-100-UG	+100	5
VM-1000-UG	+1000	10
VM-5000-UG	+5000	25
VM-10K-UG	+10000	50

See Minimum system requirements on page 7.

See also the FortiManager product datasheet.

Trial license

With a FortiCare account and FortiManager 6.4.1 or later, FortiManager-VM includes a free limited non-expiring trial license.

The free trial license includes support for to add 3 devices/VDOMS and use 3 ADOMs.

The free trial license does not include services or support.

You can activate the trial license when you connect to the GUI for the FortiManager-VM. Full-feature products and services are available for purchase with an add-on license. See Connecting to the GUI and enabling a trial license on page 17.

Add-on license

You must activate a trial license before you can upgrade FortiManager-VM to a purchased add-on license.

See also FortiManager 6.4 Trial License Guide.

Preparing for deployment

You can prepare for deployment by reviewing the following information:

- Minimum system requirements
- Deployment package for VMware ESXi
- Downloading a deployment package

Minimum system requirements

FortiManager-VM has a minimum requirement of 4 CPU, 8 GB of RAM, and 500 GB of disk storage.

The following table lists the minimum system requirements for your VM hardware, based on the number of devices, VDOMs, or ADOMs that your VM manages.

Maximum devices/ VDOMs	VM hardware requirements	
	RAM (GB)	CPU cores
100	8	4
300	16	6
1200	32	6
4000	64	16
10000	128	24

This table does not take into account other hardware specifications, such as bus speed, CPU model, or storage type.

Enabling FortiAnalyzer features requires more resources.

Deployment package for VMware ESXi

Firmware images on the Customer Service & Support site include FortiManager-VM deployment packages. The following table lists the available VM deployment package:

VM platform	Deployment file

VMware ESXi	ESX/ESXi server:
	`FMG_VM64-vX-buildxxxx-FORTINET.out.ovf.zip`
	VMware Player:
	`FMG_VM64-vX-buildxxxx-FORTINET.out.vmware.zip`

For the latest information on virtualization software support, see the corresponding FortiManager Release Notes on the Fortinet Docs Library.

The `.out.ovf.zip` file contains:

File	Description
`DATADRIVE.vmdk`	The FortiManager-VM log disk in VMDK format.
`FMG.vmdk`	The FortiManager system hard disk in Virtual Machine Disk (VMDK) format.
`FortiManager-VM64.hw14.ovf`	OVF template file for VMware ESXi 6.7 and later versions. Only available in 6.4.2 and later.
`FortiManager-VM64.hw14.vapp.ovf`	OVF template file for VMware vSphere, vCenter, and vCloud (ESXi 6.7 and later). Only available in 6.4.2 and later.
`FortiManager-VM64.ovf`	OVF template based on Intel e1000 NIC driver.
`FortiManager-VM64.vapp.ovf`	OVF template file for VMware vSphere, vCenter, and vCloud (earlier than ESXi 6.7).

The `.out.vmware.zip` file, for use with VMware Player, contains:

- `FMG.vmdk`: The FortiManager system hard disk in VMDK format.
- `FortiManager-VM64.ovf`: The VMware virtual hardware configuration file.
- `DATADRIVE.vmdk`: The FortiManager log disk in VMDK format.
- `DATADRIVE-S0XX.vmdk`: 41 VMDK files used during deployment.

For more information about FortiManager, see the FortiManager datasheet.

Downloading a deployment package

Firmware image FTP directories are organized by firmware version, major release, and patch release. The firmware images in the directories follow a specific naming convention. Each firmware image is specific to the device model. For example, the `FMG_VM64_HV-vX-buildxxxx-FORTINET.out.hyperv.zip` image, found in the 5.6.0 directory, is specific to the 64-bit Microsoft Hyper-V Server virtualization environment.

You can download the *FortiManager Release Notes* and MIB file from this directory. The Fortinet Core MIB file is located in the *FortiManager* > *Download* tab.

Download the `.out` file to upgrade your existing FortiManager installation.

To download deployment packages:

1. Log in to the Fortinet Customer Service & Support portal then, from the toolbar select *Download* > *Firmware Images*. The *Firmware Images* page opens.
2. Select *FortiManager* from the *Select Product* dropdown list, then select *Download*.
3. Browse to the appropriate directory for the version that you would like to download.
4. Download the appropriate firmware image and release notes to your management computer.
5. Extract the contents of the package to a new folder on your management computer.

Compatibility for VM hardware versions

FortiManager-VM supports ESXi 6.5 and later versions. Using corresponding hardware versions 13 and later is highly recommended, as mentioned in Virtual machine hardware versions.

It is recommended to upgrade hardware versions incrementally with only one delta at a time. For example, upgrading from 10 to 11, 11 to 12, 12 to 13, then 13 to 14 is recommended, although directly upgrading from 10 to 14 generally has no issues.

To upgrade hardware versions:

1. Log in to vSphere Client web console.
2. In the left pane tree-menu, right-click the FortiManager-VM.
3. From the shortcut menu, select *Compatibility* > *Schedule VM Compatibility Upgrade*.
4. Click *YES*.
5. From the *Compatible with* dropdown, select the desired compatibility.
6. Click *OK*.
7. Reboot the FortiManager-VM.

Deployment

Prior to deploying the FortiManager, the VM platform must be installed and configured so that it is ready to create virtual machines. The installation instructions for FortiManager presume that you are familiar with the management software and terminology of your VM platform.

You might also need to refer to the documentation provided with your VM server. The deployment information in this guide is provided as an example because, for any particular VM server, there are multiple ways of creating a virtual machine - command line tools, APIs, alternative graphical user interface tools.

Before you start your FortiManager appliance for the first time, you might need to adjust virtual disk sizes and networking settings. The first time you start FortiManager, you will have access only through the console window of your VM server environment. After you configure one network interface with an IP address and administrative access, you can access the FortiManager GUI (see Enabling GUI access on page 17).

Deploying FortiManager on VMware vSphere

After you download the `FMG_VM64-v5-buildxxxx-FORTINET.out.ovf.zip` file and extract the package contents to a folder on your management computer, you can deploy the OVF package to your VMware environment.

Prior to deploying the FortiManager-VM, ensure that you configure the following and they are functioning properly:

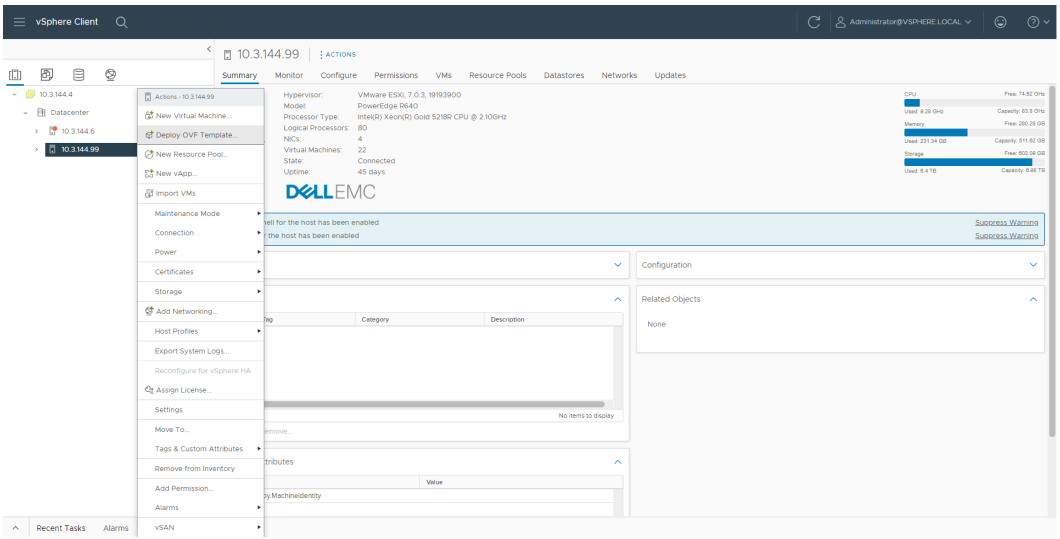
- You must install VMware vSphere Hypervisor™ (ESX/ESXi) software on a server and update it to the latest patch release prior to installing FortiManager. Go to What is a vSphere Hypervisor? for installation details.
- You must install VMware vSphere Client™ on the computer that you will use for managing the FortiManager-VM.

This section includes the following topics:

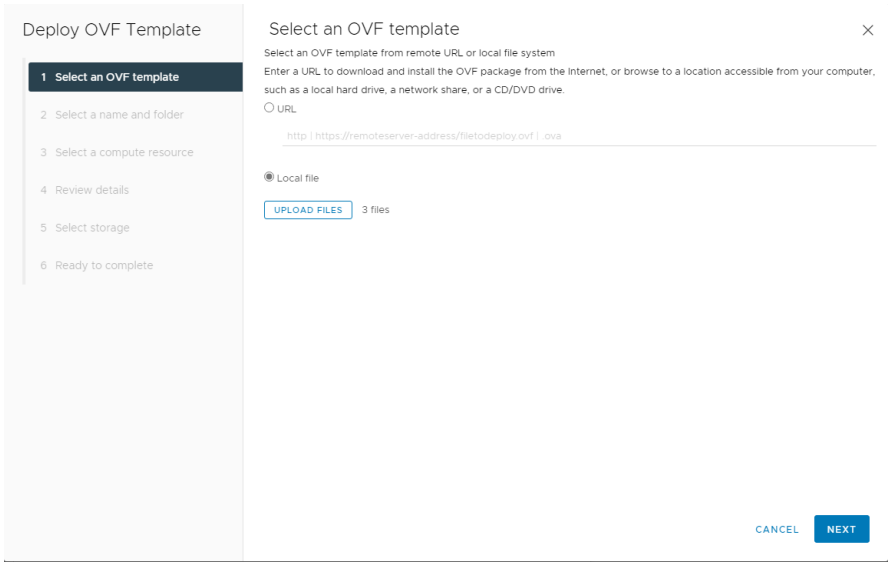
Deploying the OVF file

To deploy the OVF file template:

1. Log in to vSphere Client web console.
2. In the sidebar tree, right-click the intended physical host.



3. From the shortcut menu, select *Deploy OVF Template...*.
   The *Deploy OVF Template* wizard displays.
4. Using the *Deploy OVF Template* wizard, configure the FortiManager-VM:
   a. Select an OVF Template.



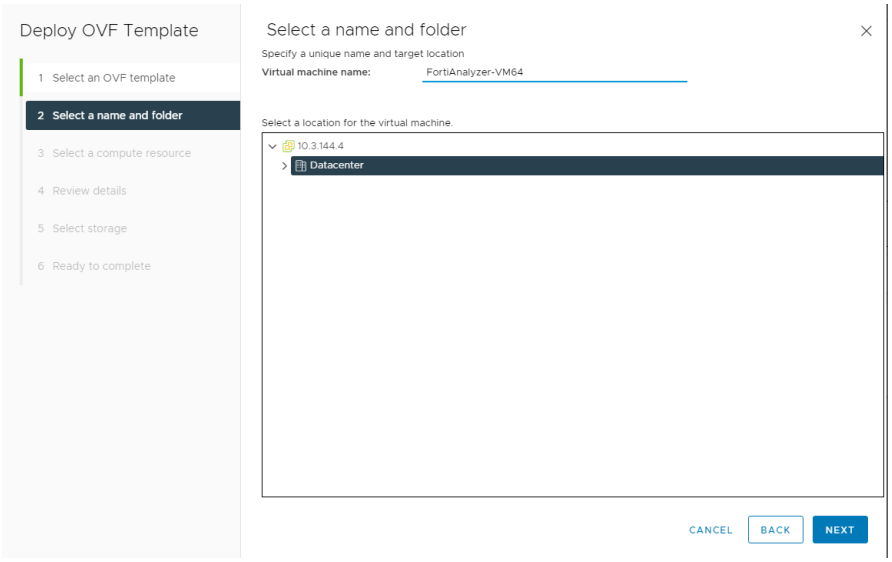
   i. Select the *Local file* radio button.
   ii. Click *Browse* and select all OVF related files.

iii. Click *NEXT*.

Alternatively, you can upload the OVF from a remote server. In this case, select the *URL* radio button and enter the URL of the OVF file.

Make sure all necessary files from the deployment package are in the same path. See "Deployment package for VMware ESXi" on page 8.

b. Select a name and folder.

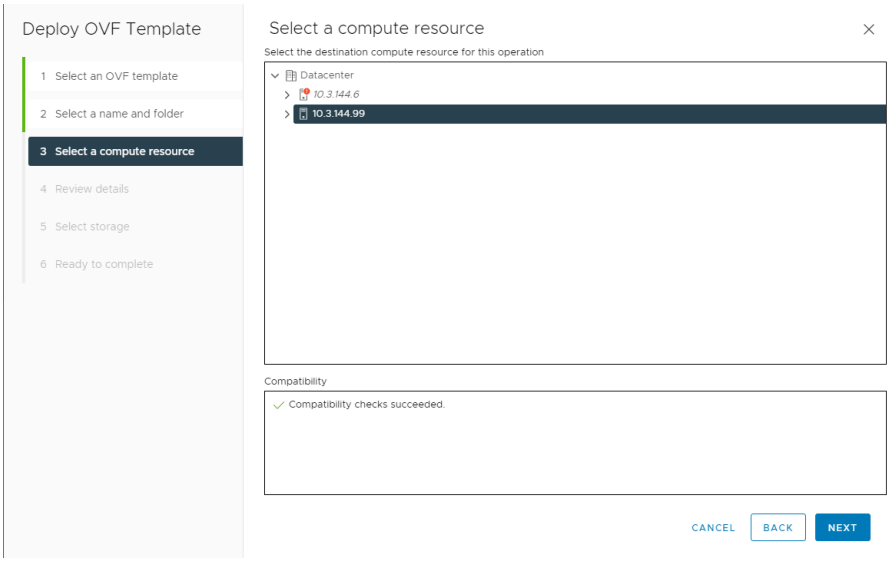


i. In the *Virtual machine name* field, enter a name for the VM.
The name can contain up to 80 characters and must be unique within the inventory folder.

ii. From the tree menu, select the location for the VM.

iii. Click *NEXT*.

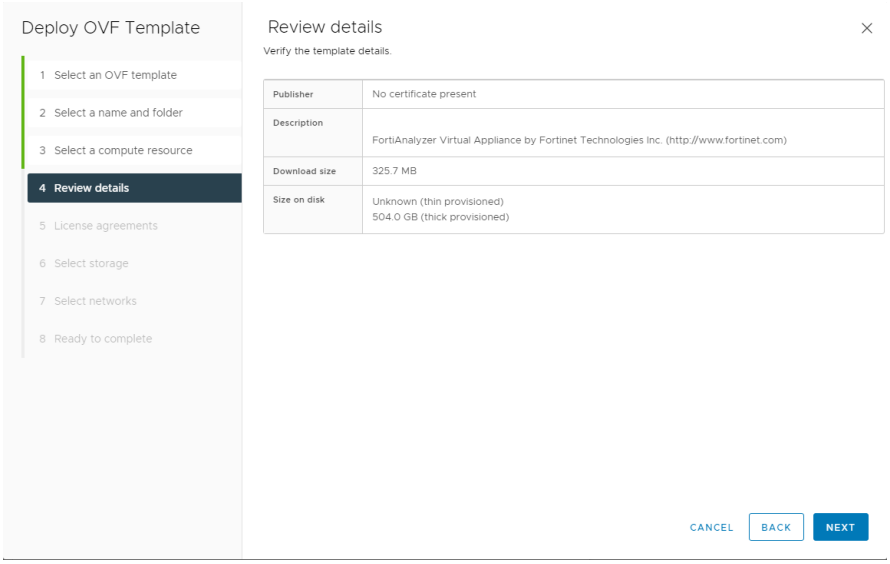
c. Select a compute resource.



i. From the tree menu, select the physical machine.

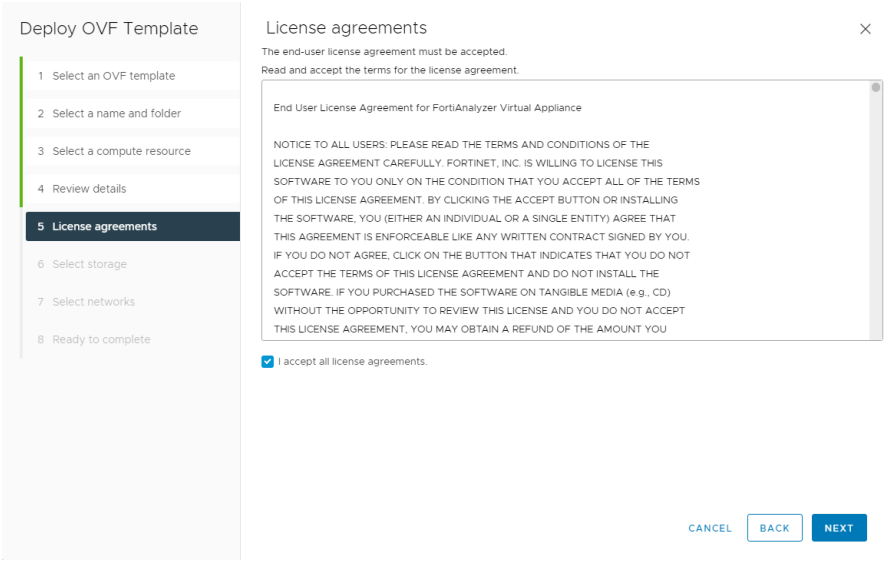
ii. Click *NEXT*.

d. Review details.



i. After reviewing the OVF details, click *NEXT*.

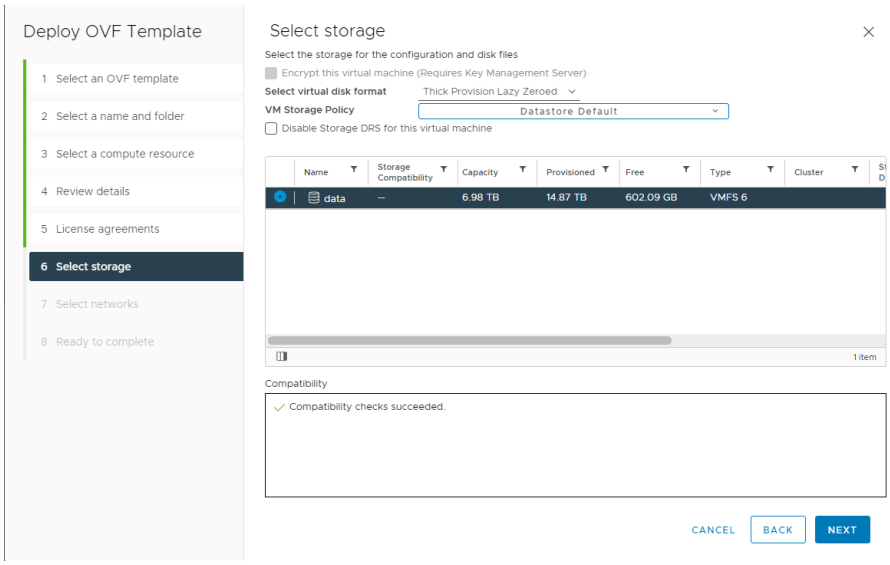
e. License agreements.



i. After reviewing the license agreements, select the checkbox for *I accept all license agreements*.

ii. Click *NEXT*.

f. Select storage.



i. From the *Select virtual disk format* dropdown, select one of the following:

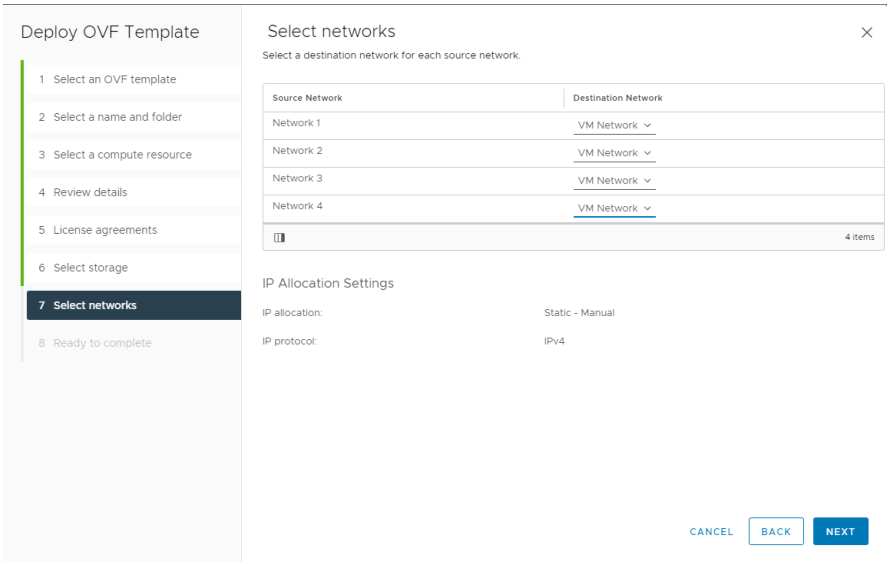
- *Thick Provision Lazy Zeroed*: Allocates the disk space statically (no other volumes can take the space), but does not write zeros to the blocks until the first write takes place to that block during runtime (which includes a full disk format).
- *Thick Provision Eager Zeroed*: Allocates the disk space statically (no other volumes can take the space), and writes zeros to all the blocks.
- *Thin Provision*: Allocates the disk space only when a write occurs to a block, but the Virtual Machine File System (VMFS) reports the total volume size to the OS. Other volumes can take the remaining space. This allows you to float space between your servers, and expand your storage when your size monitoring indicates there is a problem. Once a Thin Provisioned block is allocated, it remains in the volume regardless of whether you have deleted data.

If you know your environment will expand in the future, adding hard disks larger than the FortiManager base license requirement and utilizing Thin Provision when setting the OVF Template disk format is recommended. This allows your environment to expand as required while not taking up more space in the SAN than needed.

ii. From the menu, select the data storage location.

iii. Click *NEXT*.

g. Select networks.

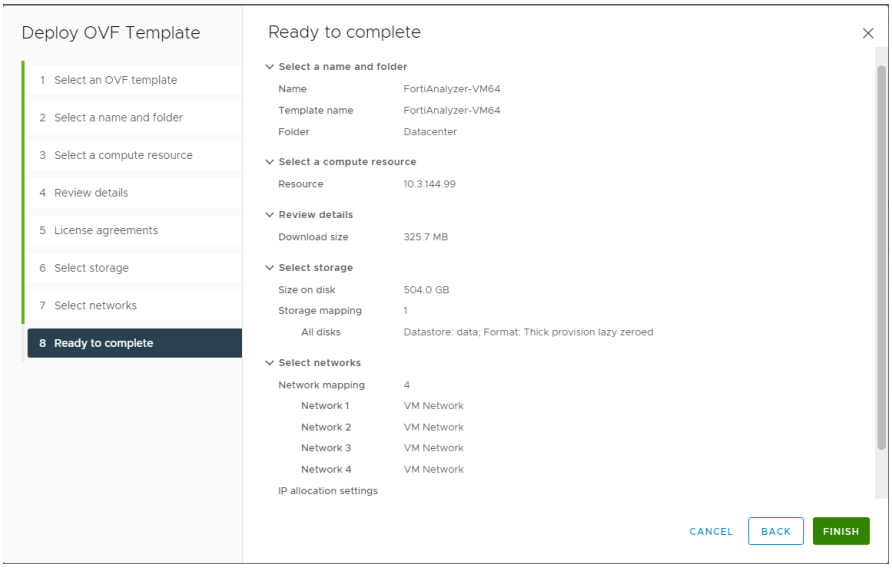


i. Map the networks used in this OVF template to networks in your inventory.

Network 1 maps to port1 of the FortiManager. You must set the destination network for this entry to access the device console.

ii. Click *NEXT*.

h. Ready to complete.



i. After verifying the information, click *FINISH* to start the deployment.

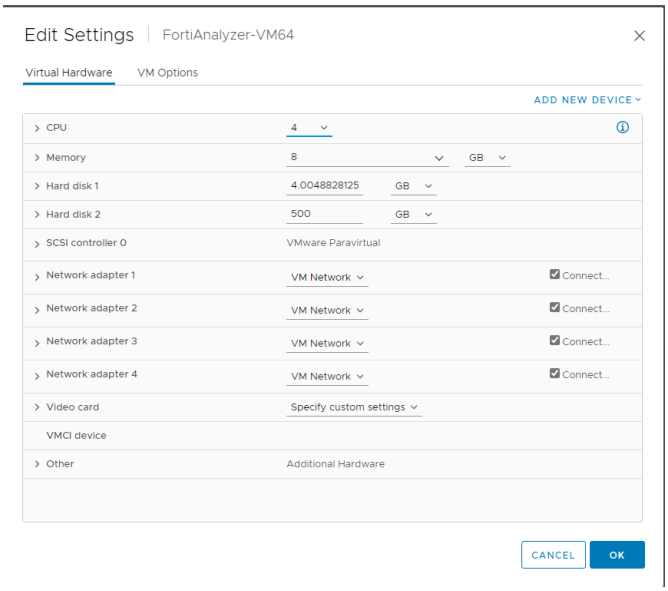
You may need to configure the FortiManager hardware settings before powering on the VM. See "Configuring hardware settings" below.

Configuring hardware settings

Before powering on your FortiManager-VM, you must configure the virtual memory, virtual CPU, and virtual disk.

To configure hardware settings:

1. In the vSphere Client, select the VM from the tree menu in the left pane.
2. In the VM Hardware pane, click *Edit Settings...*.
   The *Edit Settings* dialog displays.



3. In the *CPU* field, adjust the number of CPU cores as required.
4. In the *Memory* field, adjust the memory size as required. See "Minimum system requirements" on page 7 to determine your required memory.
5. In the *Hard disk 2* field (the log disk), adjust the size required. You should not edit *Hard disk 1*.

The FortiManager-VM allows you to add twelve virtual log disks to a deployed instance. When adding additional hard disks, use the following CLI command to extend the LVM logical volume:

```
execute lvm start
execute lvm extend <arg ..>
```

6. Click *OK* to apply your changes.

Powering on the VM

You can now proceed to power on your FortiManager.

- Select the FortiManager in the left pane, then click *Power on the virtual machine* in the *Getting Started* tab.
- Select the VM in the left pane, then click *Power On* in the toolbar.
- Right-click the VM in the left pane, then select *Power* > *Power On* from the right-click menu.

Once the VM starts, proceed with the initial configuration. See Configuring initial settings on page 17.

Configuring initial settings

Before you can connect to the FortiManager-VM, you must configure basic network settings via the CLI console. Once configured, you can connect to the FortiManager GUI.

Enabling GUI access

To enable GUI access to the FortiManager, you must configure the IP address and network mask of the appropriate port on the FortiManager. The following instructions use port 1.

You can determine the appropriate by matching the network adapter's MAC address and the `HWaddr` that the CLI command `diagnose fmnetwork interface list` provides.

To configure the port1 IP address and netmask:

1. In your hypervisor manager, start the FortiManager and access the console window. You might need to press *Enter* to see the login prompt.
2. At the FortiManager login prompt, enter the username *admin*, then press *Enter*. By default, there is no password.
3. Using CLI commands, configure the port1 IP address and netmask.

```
config system interface
   edit port1
      set ip <IP address> <netmask>
end
```

The port management interface should match the first network adapter and virtual switch that you have configured in the hypervisor VM settings.

4. To configure the default gateway, enter the following commands:

```
config system route
   edit 1
      set device port1
      set gateway <gateway_ipv4_address>
end
```

The Customer Service & Support portal does not currently support IPv6 for FortiManager license validation. You must specify an IPv4 address in the support portal and the port management interface.

Connecting to the GUI and enabling a trial license

Once you have configured a port's IP address and network mask, you can connect to the GUI by using a web browser.

To connect to the GUI and enable a trial license:

1. Launch a web browser, and enter the IP address you configured for the port management interface.
2. At the login page, click the *Login with FortiCloud* button to start the process of activating your free trial license.

See also FortiManager 6.4 Trial License Guide.

Upgrading to an add-on license

You must activate a trial license before you can upgrade FortiManager-VM to a purchased add-on license.

See also FortiManager 6.4 Trial License Guide.

Configuring your FortiManager

Once the FortiManager license has been validated, you can configure your device.

If the amount of memory or number of CPUs is too small for the VM, or if the allocated hard drive space is less than the licensed VM storage volume, warning messages show in the GUI in the *System Resources* widget on the dashboard and in the *Notification* list.

For more information on configuring your FortiManager, see the *FortiManager Administration Guide*.

Security Fabric connector integration with VMware vCenter

You can create SDN connectors for VMware vCentre to allow FortiGate to retrieve dynamic addresses from VMware vCenter via FortiManager.

Following is an overview of how to configure an SDN connector for VMware vCenter:

1. Create an SDN connector for VMware vCenter. See To create SDN connectors for VMware vCenter: on page 19.
2. Create a dynamic address object that references the SDN connector for VMware vCenter. See To create dynamic addresses: on page 20.
3. Create a firewall policy. See To create firewall policies: on page 21.
4. Install the changes to FortiGate. See To install changes to FortiGate: on page 22.

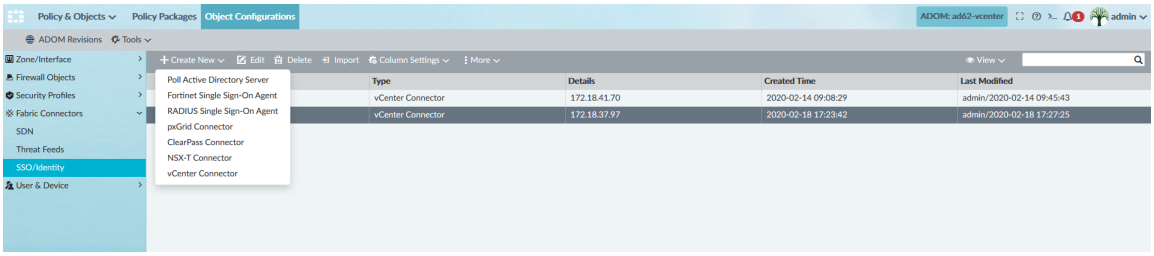
   FortiGate can retrieve dynamic addresses from VMware vCenter via FortiManager.

   This example assumes that VMware vCenter is already set up.

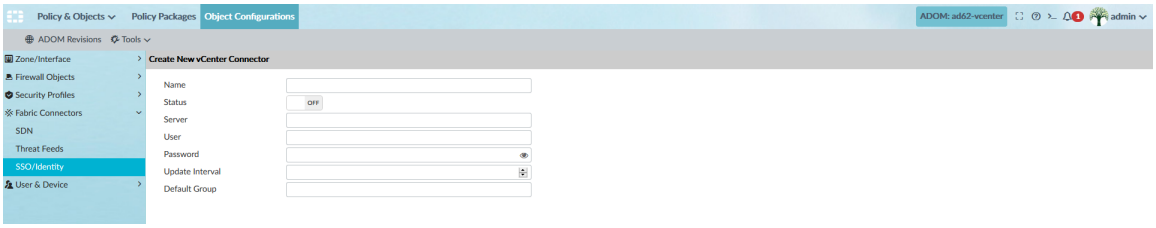
To create SDN connectors for VMware vCenter:

1. Go to *Policy & Objects* > *Object Configurations* > *Fabric Connectors* > *SSO/Identity*.
2. Click *Create New* > *vCenter Connector*.

   The pane opens.

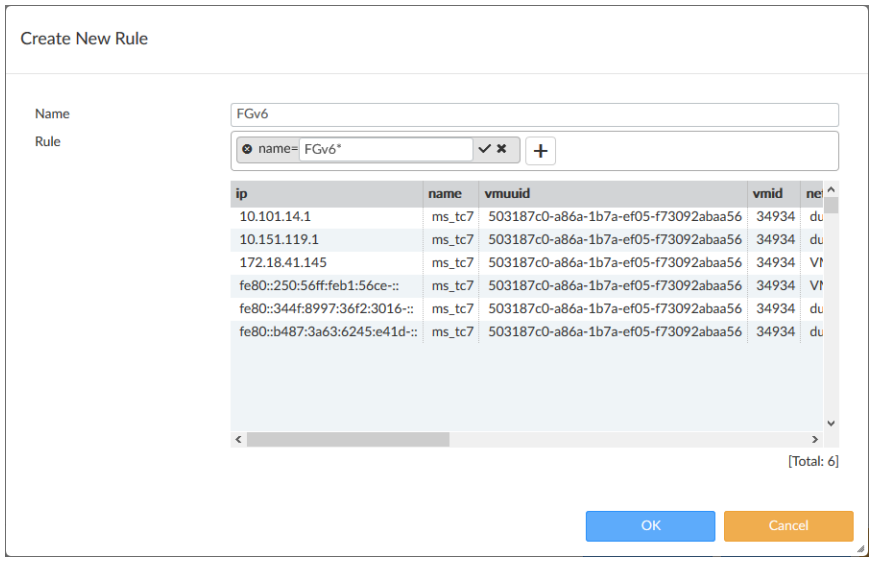


3. Complete the following options, and click *Apply & Refresh*:

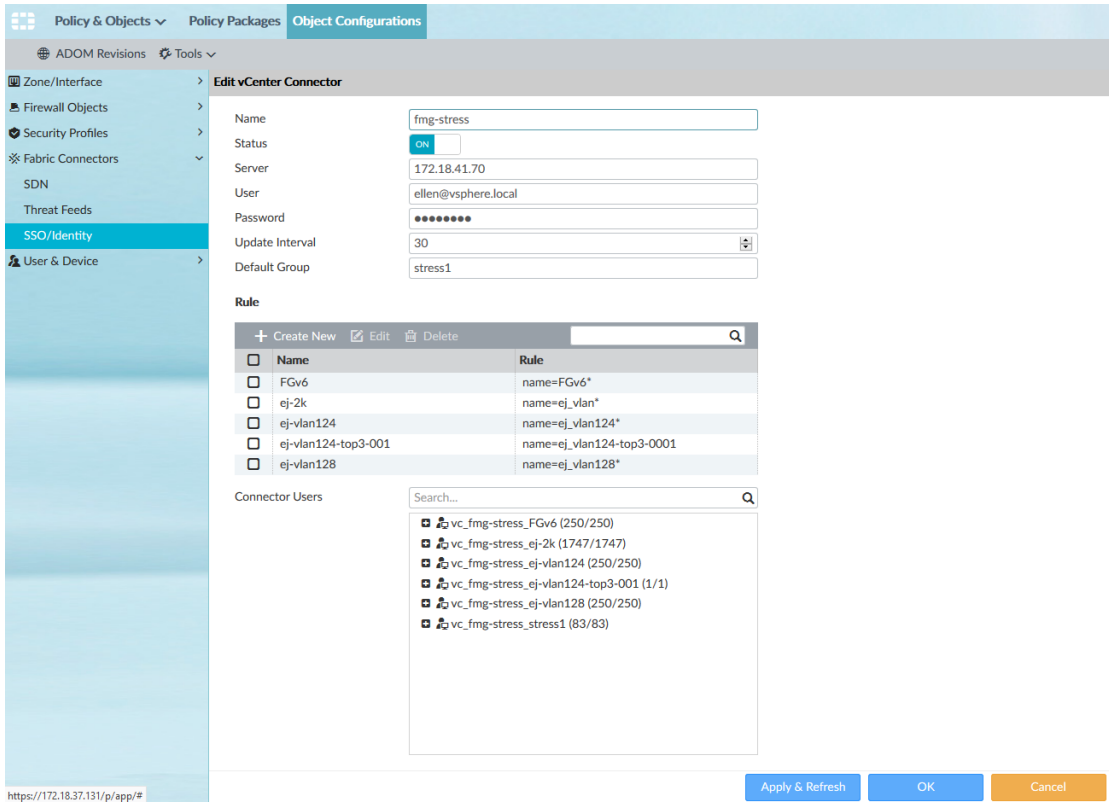


   The *Rule* section displays.
4. Under *Rule*, click *Create New*.

5. Complete the following options, and click *OK*.



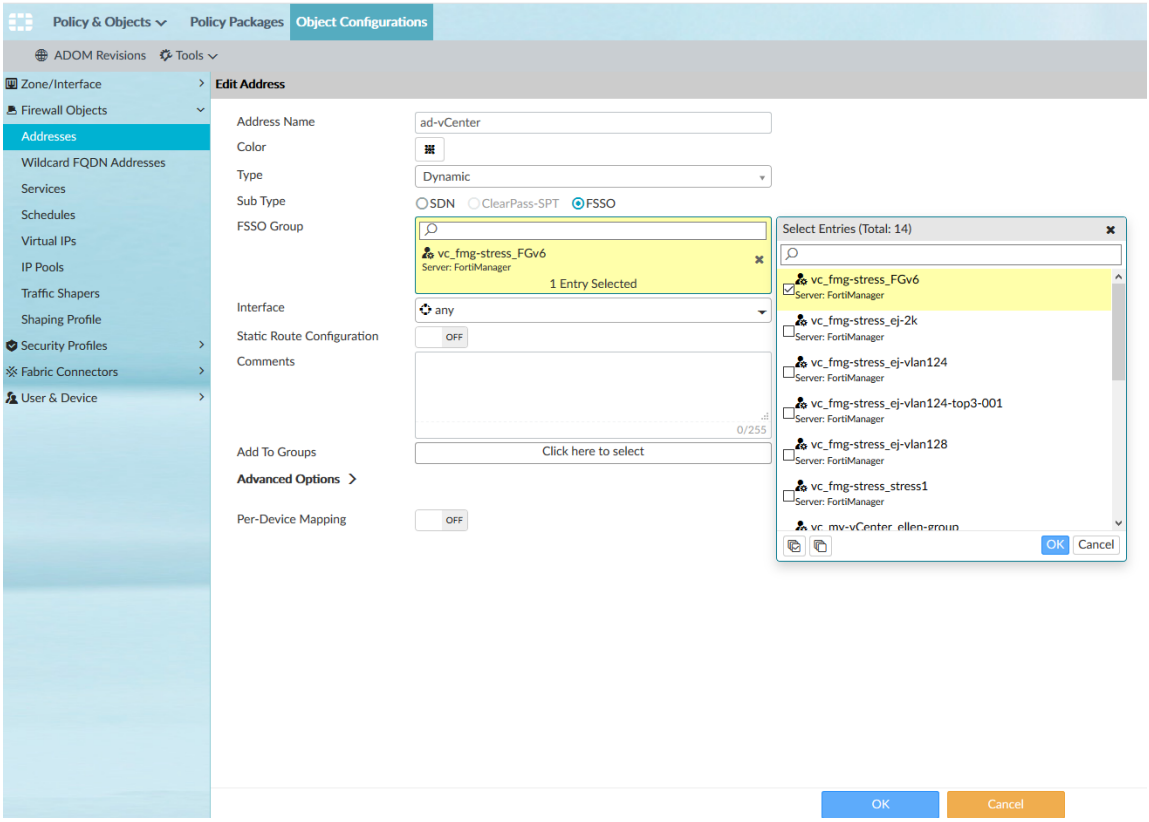
FortiManager retrieves IP addresses from the VMware vCenter server.



To create dynamic addresses:

1. Go to *Policy & Objects* > *Object Configurations* > *Firewall Objects* > *Addresses*.
2. Click *Create New* > *Address*, or double-click an existing address object to open it for editing.

3. Complete the following options, and click *OK*.
   a. In the *Address Name* field, enter a name.
   b. In the *Type* field, select *Dynamic*.
   c. For *Sub Type*, select *FSSO*.
   d. In the *FSSO Group* box, select the SDN connector that you created.
   e. Set the remaining objects as desired.

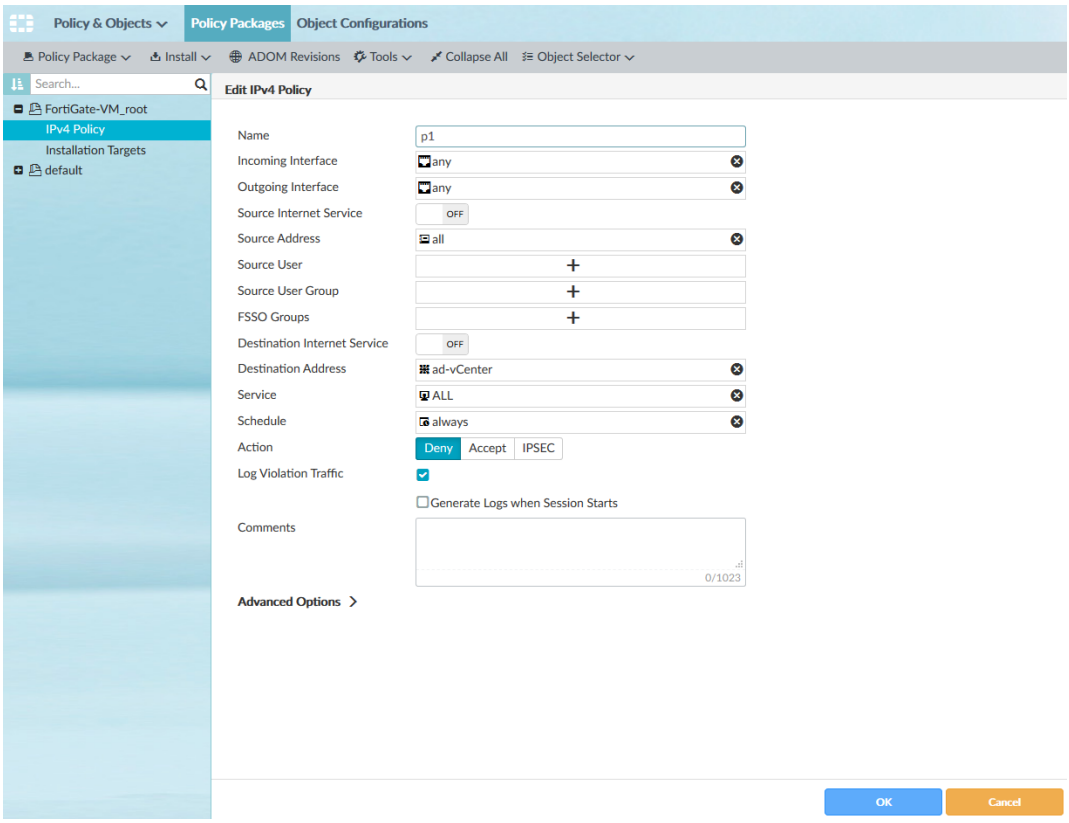


The dynamic address is created.

To create firewall policies:

1. Go to *Policy & Objects* > *Policy Packages*.
2. In the tree menu, click IPv4 Policy under the target FortiGate.

3. Click *Create New* , or double-click an existing policy to open it for editing.

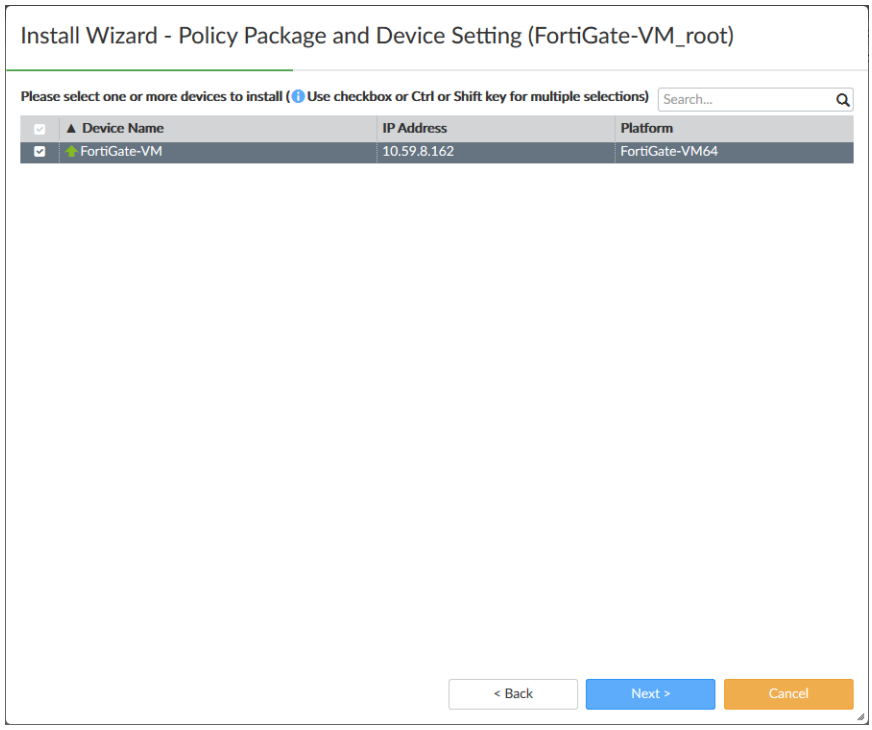


4. Complete the options, and click *OK*.
   The policy package is created.

To install changes to FortiGate:

1. Go to *Policy & Objects* > *Policy Packages*.
2. In the tree menu, right-click *Installation Targets* under the target FortiGate, and select *Install Wizard*.
   The *Install Wizard* dialog box opens.
3. Select *Install Policy Package & Device Settings*.

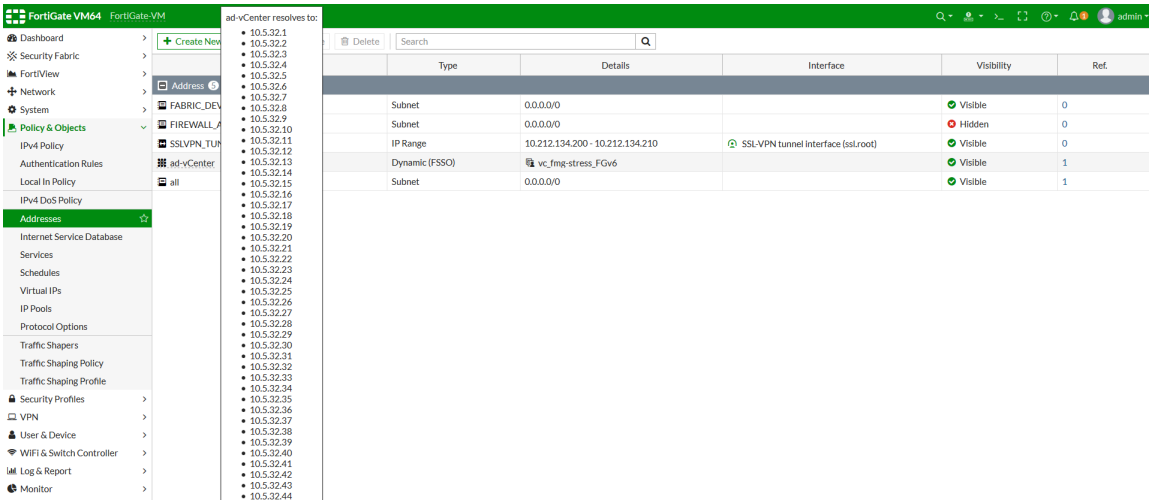
4. In the *Policy Package* list, select the policy package, and click *Next*.



5. Complete the options, and click *Next*.

   The policy package is installed.

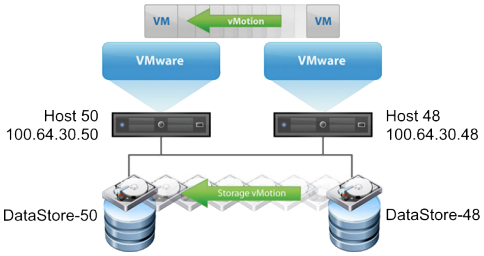
   FortiGate can retrieve dynamic addresses from VMware vCenter via FortiManager.



vMotion in a VMware environment

This guide provides sample configuration of a vMotion FortiManager-VM in a VMware environment. VMware vMotion enables the live migration of a running FortiManager-VM from one physical server to another with zero downtime, continuous service availability, and complete transaction integrity. It also provides transparency to users.

The following depicts the network topology for this sample deployment. In this sample deployment, there are two hosts, Host 48 (100.64.30.48) and Host 50 (100.64.30.50), that are members of Cluster 1 in the DataCenter 1. The vCenter server (vcenter67.fmg.lab) manages DataCenter 1.

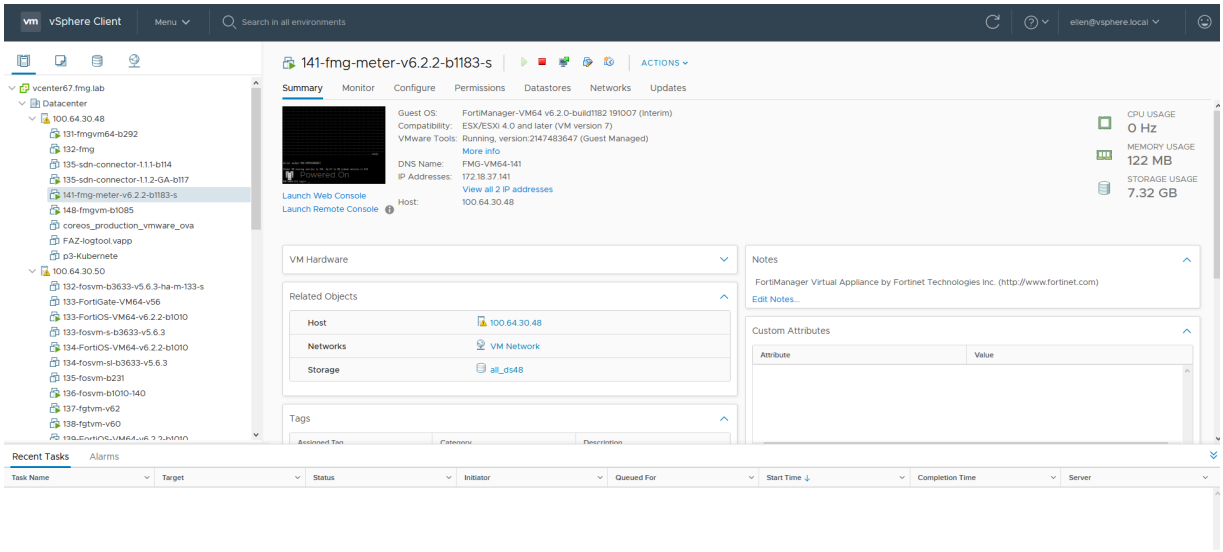


This configuration requires the following prerequisites:

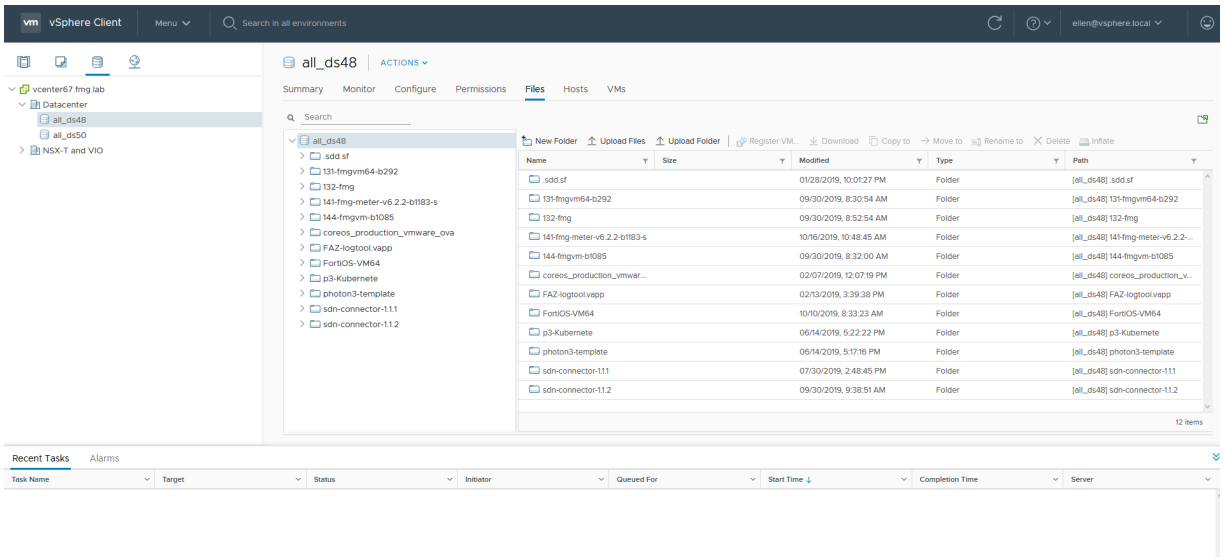
- You have set up the vCenter server and created the data center and cluster.
- Host 48 and Host 50 are members of the cluster.
- A Gigabit Ethernet network interface card with a VMkernel port enabled for vMotion exists on both ESXi hosts.
- A FortiManager-VM that is set up and able to handle traffic.

To migrate the FortiManager-VM on the vCenter web portal:

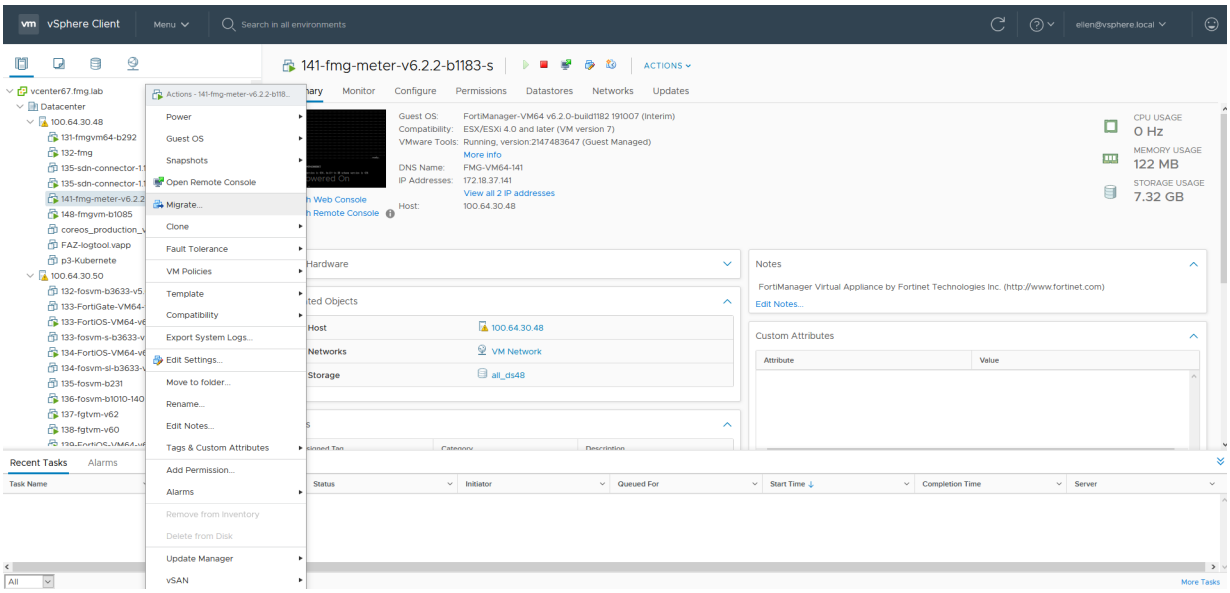
1. Log in to the vCenter web portal.
2. Verify the current location of the FortiManager-VM:
   a. Go to the FortiManager-VM.
   b. On the *Summary* tab, check the *Host*. In this example, the host is currently Host 48 (100.64.30.48).



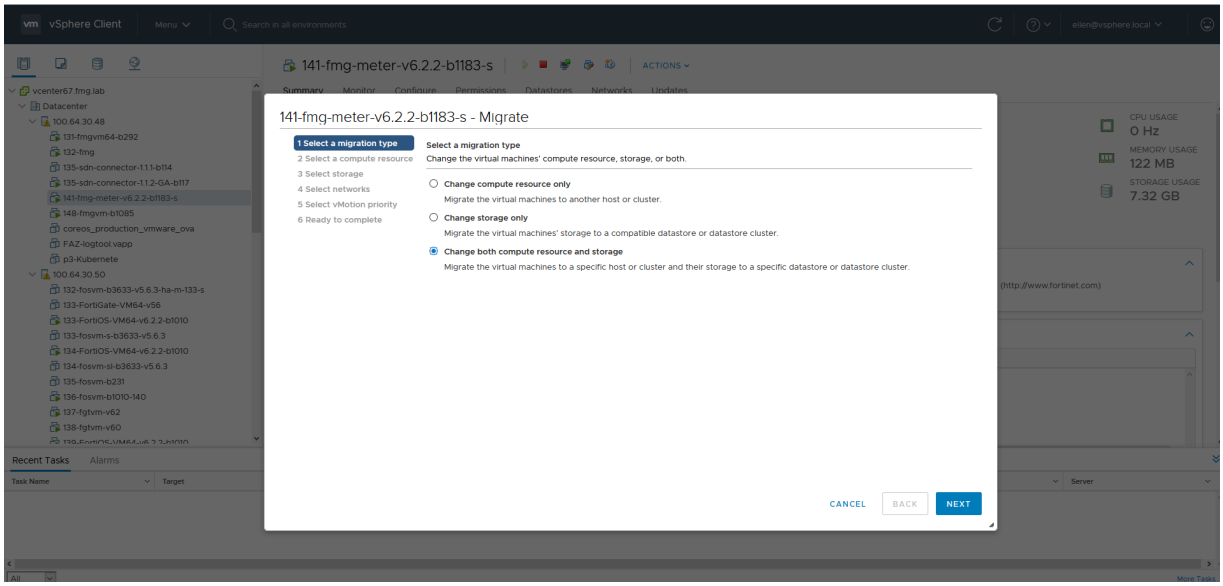
c. Go to *Storage* > *Files*. Check that the FortiManager-VM is located in the correct datastore. In this example, the datastore is currently Datastore 48, in Host 48.



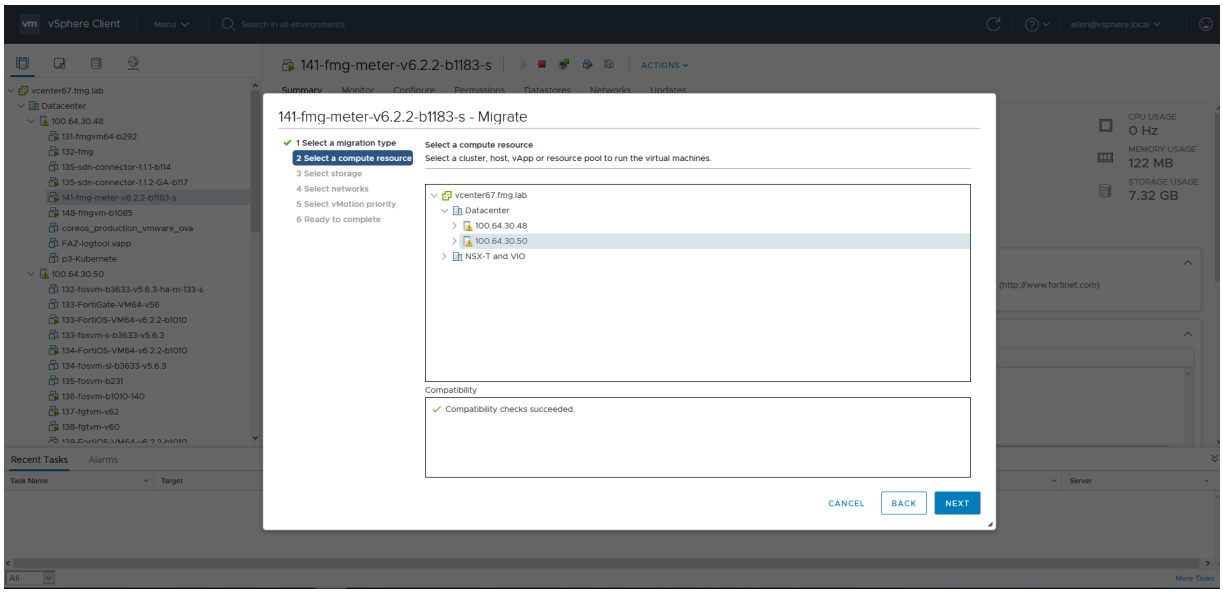
3. Right-click the FortiManager-VM and select *Migrate*.



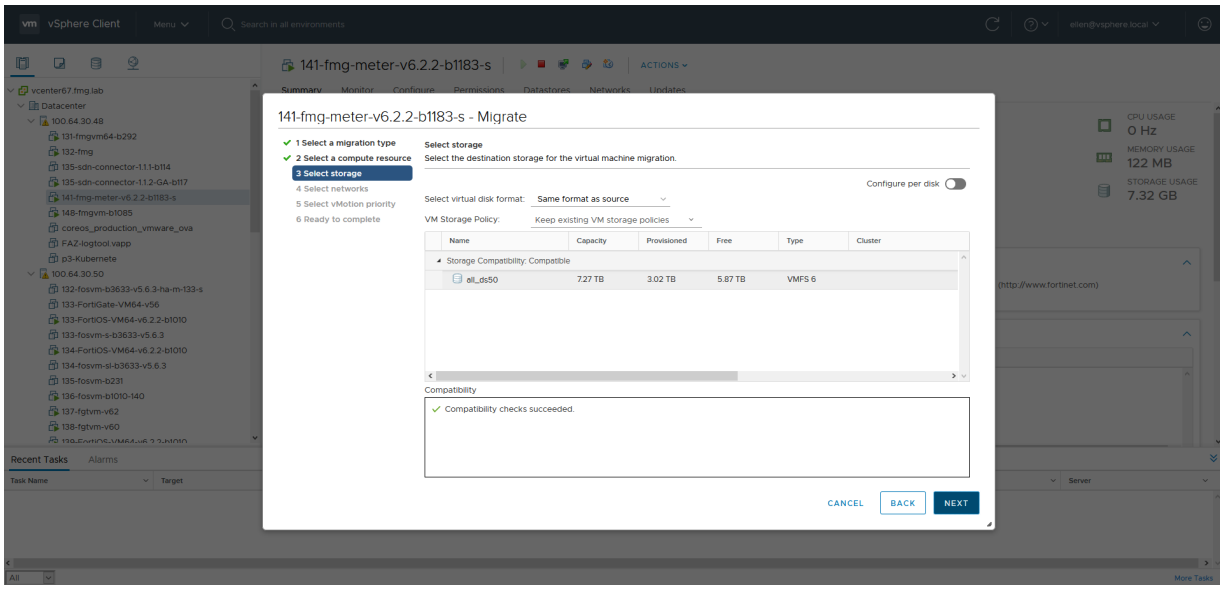
4. Configure the migration options:
   a. For *Select a migration type*, select *Change both compute resource and storage*. Click *NEXT*.



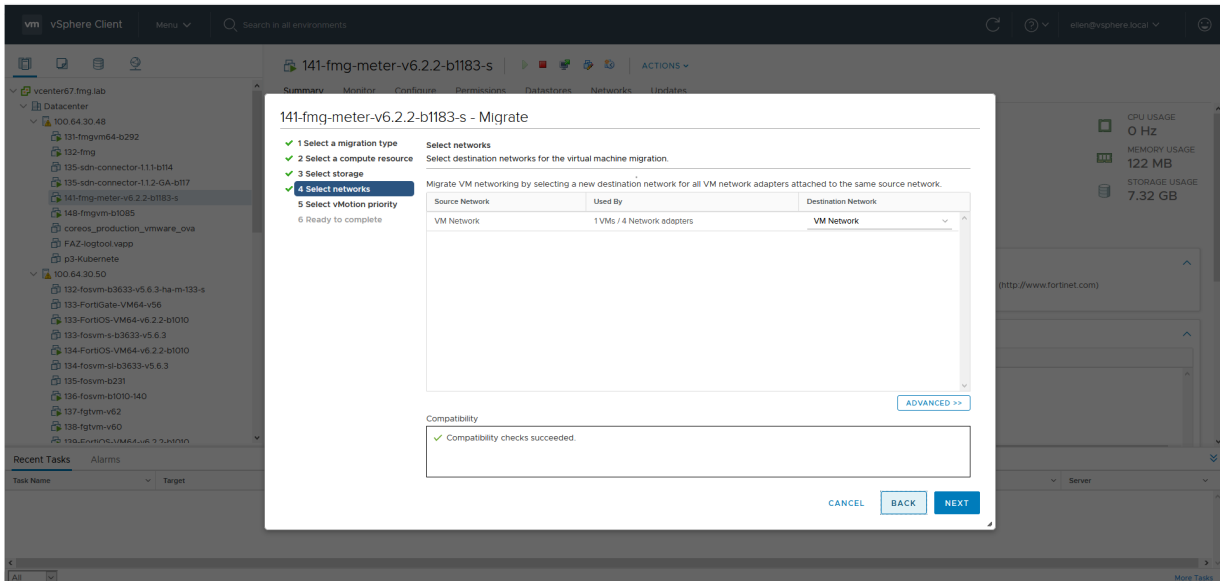
   b. For *Select a compute resource*, select the desired new compute resource. In this example, Host 50 (100.64.30.50) is selected. Click *NEXT*.



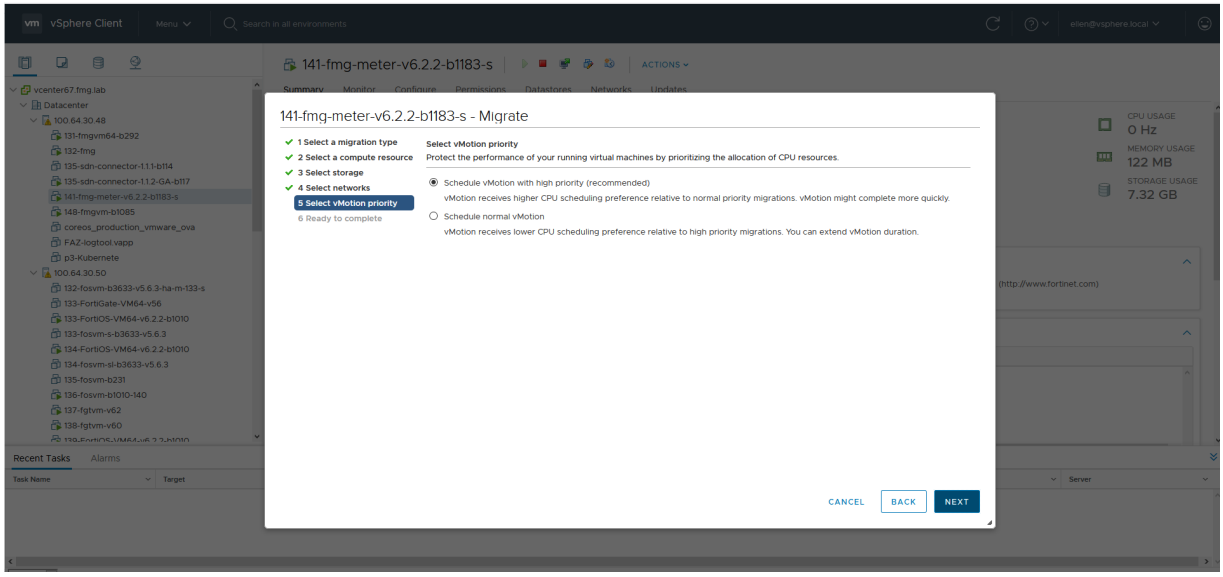
   c. For *Select storage*, select the storage associated with the selected compute resource. In this example, Datastore 50 (as corresponds to Host 50) is selected. Click *NEXT*.



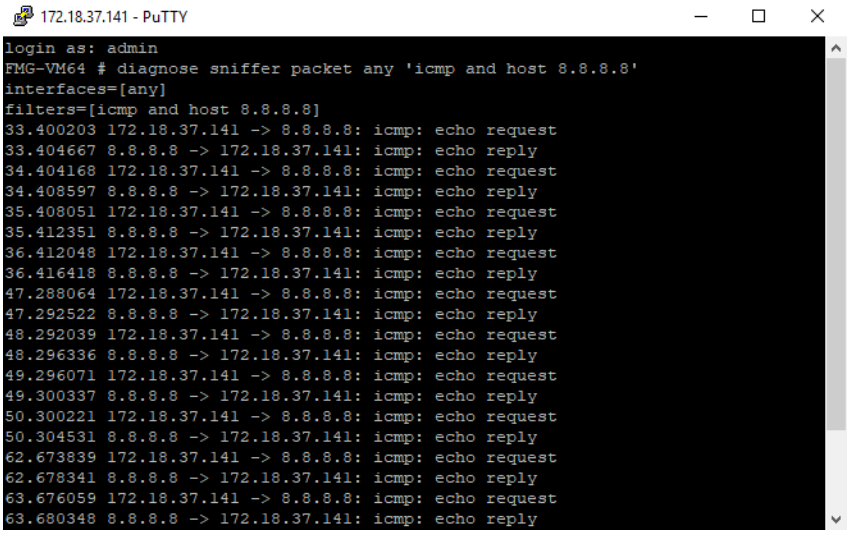
d. For *Select networks*, select the desired destination network at the selected compute resource. In this example, the source network is at Host 48, and the destination network is at Host 50. Click *NEXT*.



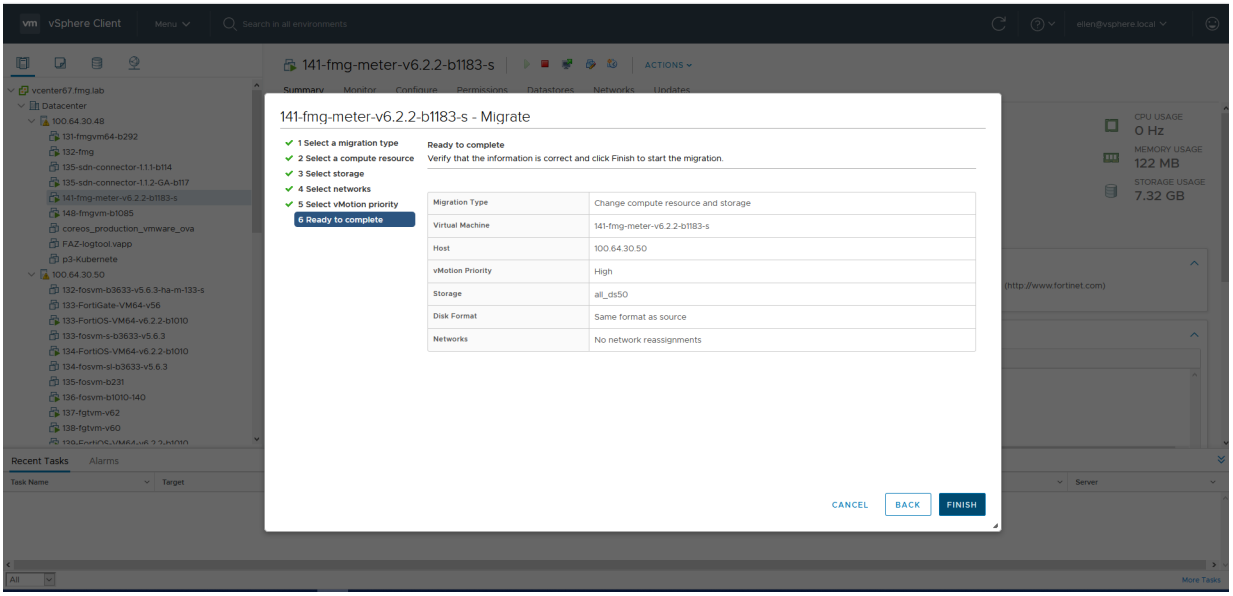
e. For *Select vMotion priority*, select *Schedule vMotion with high priority (recommended)*. Click *NEXT*.



5. Before initiating the migration, open the CLI for the FortiManager-VM to check on traffic during the migration. Enter `diagnose sniffer packet any 'icmp and host 8.8.8.8'` to check if traffic is stable. If no traffic is lost during migration and the FortiManager-VM SSH session does not break, the output resembles the following:

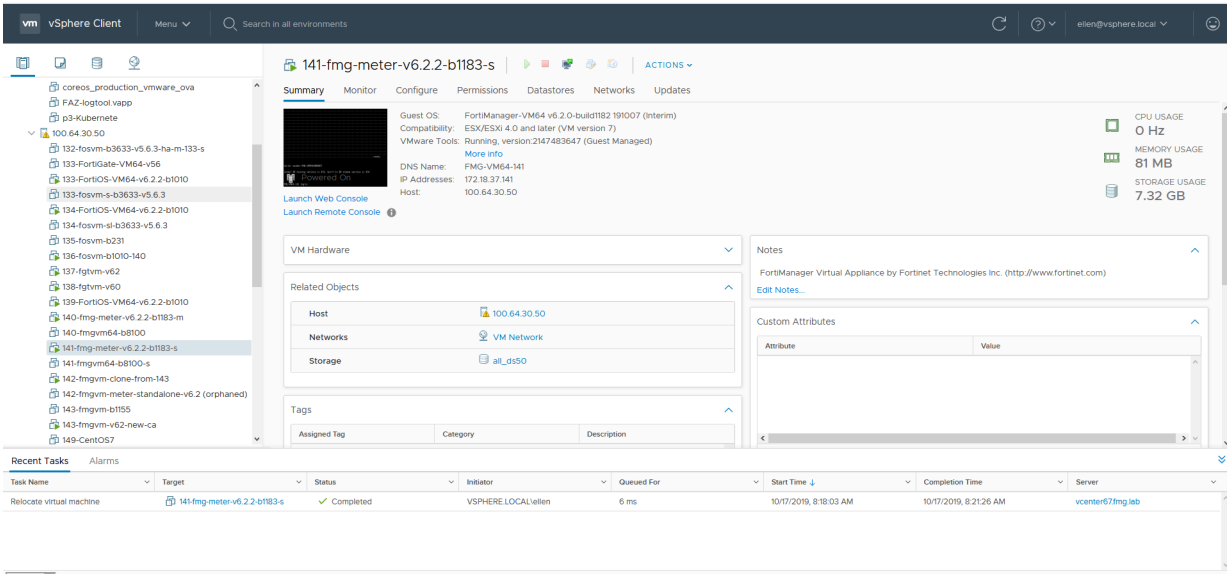


6. Click *FINISH*.



After a few seconds, the FortiManager-VM is migrated to the new compute resources, in this case Host 50.

7. Log into the vCenter web portal. Go to the FortiManager-VM. On the *Summary* tab, the *Host* is now the new compute resources, in this case Host 50 (100.64.30.50).



8. Go to *Storage* > *Files*. It shows that the FortiManager-VM is now located in a new datastore, in this example Datastore 50.