



# HOW TO BUILD A NETAPP ONTAP 9 LAB



FOR  
FREE!

NEIL ANDERSON

## Table of Contents

Introduction .....	3
About the Author .....	3
Lab Topology Diagram.....	4
Lab Topology Notes.....	5
IP Addressing Tables.....	6
Lab Notes.....	7
VMware Workstation Player Install .....	8
VyOS Router Build.....	14
ONTAP Simulator Build .....	25
Windows Server Build.....	62
Linux Build .....	94
SuperPutty Install.....	109

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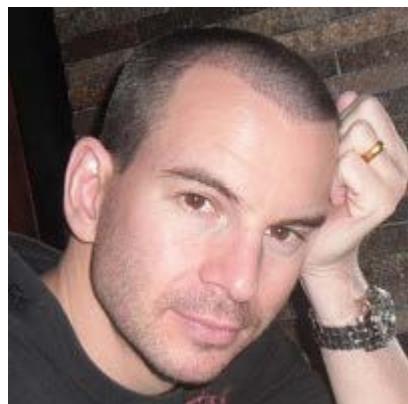
## Introduction

Thanks very much for taking the time to download this free eBook. In it I outline the step-by-step process to build an entire NetApp lab from scratch, for free. All you need is a PC to run the lab on. I hope you can make use of it to expand your storage knowledge and further your career.

The lab build outlined here is the same one I use for the hands-on demonstrations in my tutorials at [www.flackbox.com](http://www.flackbox.com). By building this lab, you'll be able to follow along and gain the hands-on skills you need to configure, manage and maintain NetApp storage systems.

If you find any errors in the book, please let me know so I can correct them. You can email me at [neil@flackbox.com](mailto:neil@flackbox.com)

## About the Author



I'm Neil Anderson, you can visit my blog at [www.flackbox.com](http://www.flackbox.com) to learn about Cloud and Data Center technologies.

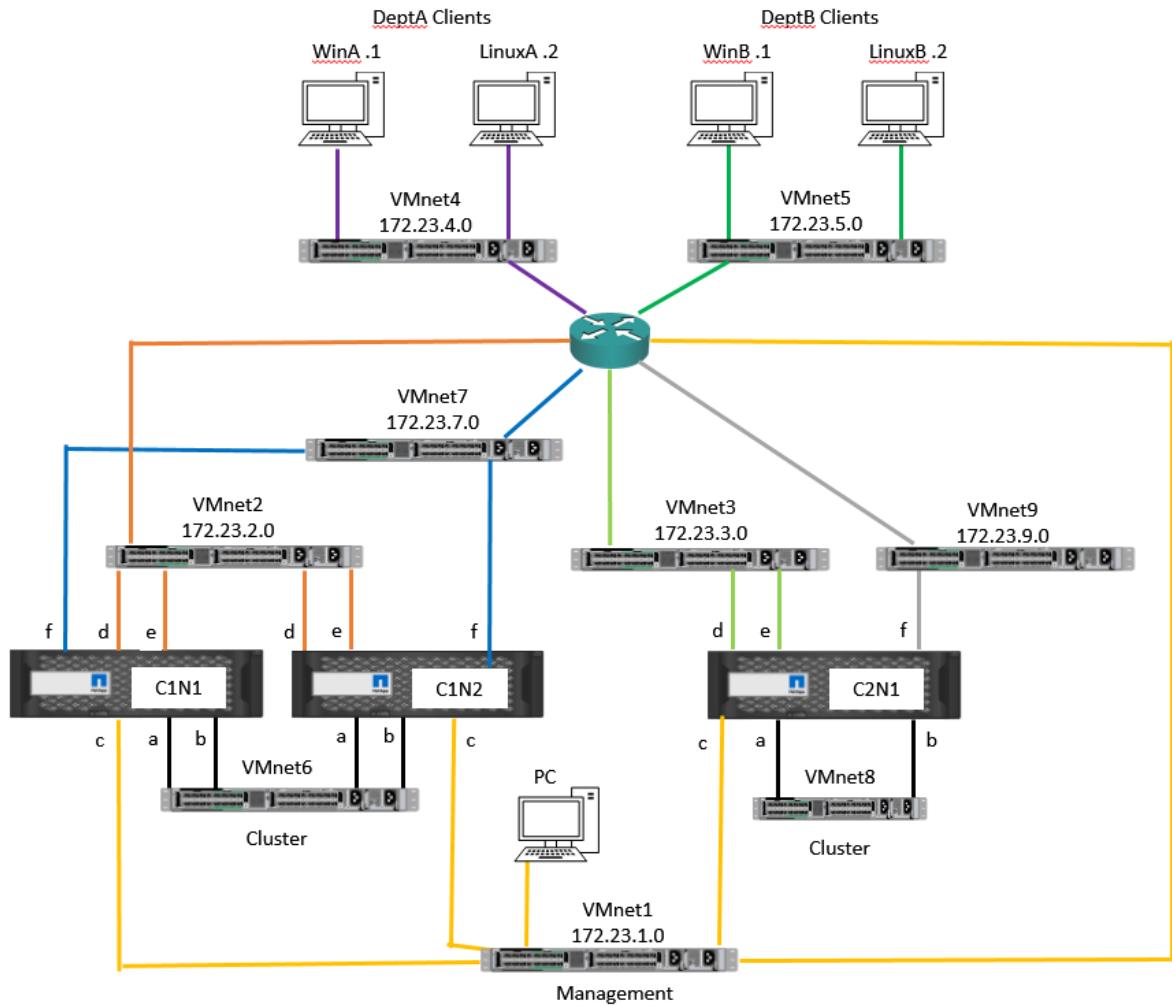
The main focus of my current role is delivery of technical training and development of course content for large enterprise and service provider customers such as NetApp, Cisco, Verizon and IBM.

Prior to focusing on training I was working in the field in a variety of systems and network engineering roles. I've always embraced change and I've worked in consultancy roles for dozens of companies, big and small, and enjoyed soaking up knowledge across all areas of information technology.

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## Lab Topology Diagram



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## Lab Topology Notes

The lab contains two NetApp ONTAP clusters.

Cluster1 contains two nodes, C1N1 and C1N2.

Cluster2 is a single node cluster with node C2N1.

Cluster1 represents the main production site, Cluster2 represents a Disaster Recovery and Backup site.

SnapMirror is used for the Disaster Recovery, SnapVault for long-term disk-to-disk backups.

There are two departments, DeptA and DeptB. You can configure dedicated SVMs for both DeptA and DeptB on the Cluster1 production cluster.

The DeptA clients are on the 172.23.4.0/24 subnet. The Windows host WinA has IP address 172.23.4.1, the Linux host LinuxA has IP address 172.23.4.2. WinA is the Active Directory Domain Controller and DNS server for the DeptA domain, flackboxA.lab

The DeptB clients are on the 172.23.5.0/24 subnet. The Windows host WinB has IP address 172.23.5.1, the Linux host LinuxB has IP address 172.23.5.2. WinB is the Active Directory Domain Controller and DNS server for the DeptB domain, flackboxB.lab

The Cluster1 NetApp system is connected to the 172.23.2.0/24 and 172.23.7.0/24 subnets which can be used for client data access or intercluster replication traffic. It is also connected to the 172.23.1.0/24 subnet for management access.

The Cluster2 NetApp system is connected to the 172.23.3.0/24 and 172.23.9.0/24 subnets which can be used for client data access or intercluster replication traffic. It is also connected to the 172.23.1.0/24 subnet for management access. Both Cluster1 and Cluster2 use the 172.23.1.0/24 subnet for management.

A VyOS virtual router provides connectivity between all the IP subnets. It has an IP address ending in .254 for each subnet, and it should be used as the default gateway for each subnet.

The PC which you run the lab on is configured with an additional virtual network card for connectivity to the lab. It has IP address 172.23.1.10 in the management network and a static route for all lab subnets pointing at the VyOS router. Your PC will still have connectivity to all other networks including the Internet via its main network card.



## IP Addressing Tables

Host IP Addresses	
Host	IP Address
Cluster1 cluster management	172.23.1.11
Cluster2 cluster management	172.23.1.21
WinA	172.23.4.1
LinuxA	172.23.4.2
WinB	172.23.5.1
LinuxB	172.23.5.2

VyOS Router			
Int.	VMnet	Network	IP Address
eth0	1	Mgmt	172.23.1.254
eth1	2	Data/Intercluster-2	172.23.2.254
eth2	3	Data/Intercluster-3	172.23.3.254
eth3	4	Dept-A Clients	172.23.4.254
eth4	5	Dept-B Clients	172.23.5.254
eth5	7	Data/Intercluster-7	172.23.7.254
eth6	9	Data/Intercluster-9	172.23.9.054

Cluster1 Node1			
Int.	VMnet	Network	IP Address
e0a	6	Cluster	169.054.x.x
e0b	6	Cluster	169.054.x.x
e0c	1	Node Mgmt	172.23.1.12
e0d	2	Data/Intercluster-2	172.23.2.x
e0e	2	Data/Intercluster-2	172.23.2.x
e0f	7	Data/Intercluster-7	172.23.7.x

Cluster1 Node2			
Int.	VMnet	Network	IP Address
e0a	6	Cluster	169.054.x.x
e0b	6	Cluster	169.054.x.x
e0c	1	Node Mgmt	172.23.1.13
e0d	2	Data/Intercluster-2	172.23.2.x
e0e	2	Data/Intercluster-2	172.23.2.x
e0f	7	Data/Intercluster-7	172.23.7.x

Cluster2 Node1			
Int.	VMnet	Network	IP Address
e0a	8	Cluster	169.054.x.x
e0b	8	Cluster	169.054.x.x
e0c	1	Node Mgmt	172.23.1.22
e0d	3	Data/Intercluster-3	172.23.3.x
e0e	3	Data/Intercluster-3	172.23.3.x
e0f	9	Data/Intercluster-9	172.23.9.x

# Lab Notes

## **The VMware Hypervisor**

The virtualization software I use in the lab guide is VMware Workstation Player because I wanted to show you how you can build the entire lab for free. You may also want to consider using the paid version of VMware Workstation as this will give you the benefit of being able to take snapshots. Snapshots allow you to save the state of the lab at any point in time and easily revert back to that state later. This can save you time and make your lab experience more convenient and reliable.

## **ONTAP Version**

Each instance of the Clustered ONTAP v9 simulator needs 5GB RAM to power on, so you'll need a PC with at least 16GB RAM to run all 3 nodes. The v8.3 simulator also requires 5GB RAM per node. The v8.2 simulator can be run with less than 2GB RAM per instance however, so you can run that version of the lab on an 8GB RAM PC. The features are very similar so you're not missing out on much if you want to run the 8.2 version. All versions of the simulator can be downloaded from the same page on the NetApp website.

## **Powering on Virtual Machines**

To maximise performance, only power on the virtual machines which are required for the individual task you want to practice (for example, do not power on Windows when you're practicing NFS).

Powering on both NetApp v9 clusters will require 15GB RAM, so only do this when you are practicing SnapMirror or SnapVault, and do not run any other unnecessary applications or services on your PC. If you need to free up memory you can run the VyOS router with only 128MB RAM instead of the usual 512MB.

Normally you will only need to power on Cluster1 (not Cluster2), and normally you will only need to power on the DeptA Windows or Linux host (not DeptB).

## **Downloading the Software**

All software referenced here can be downloaded for free from the vendor's websites. Download of the NetApp ONTAP simulator requires you to log in to the NetApp website with a user account which is associated with a NetApp partner with a valid support contract.

## VMware Workstation Player Install

In this section you will install VMware Workstation Player and configure connectivity through the lab management network.

1. Ensure Virtualization Technology VT is enabled in your laptop's BIOS. The method for doing this varies slightly between different laptop manufacturers. Power on your laptop and then press the manufacturer dependent function key to enter the BIOS settings. In the BIOS settings, ensure that Virtualization Technology VT is turned on. It may also be called Vanderpool Technology or Virtual Machine Extensions. Save the settings, power off, then power back on again.
2. Open the VMware downloads page at <https://my.vmware.com/web/vmware/downloads> in your browser
3. Click on the link to **Download Product** for VMware Workstation Player

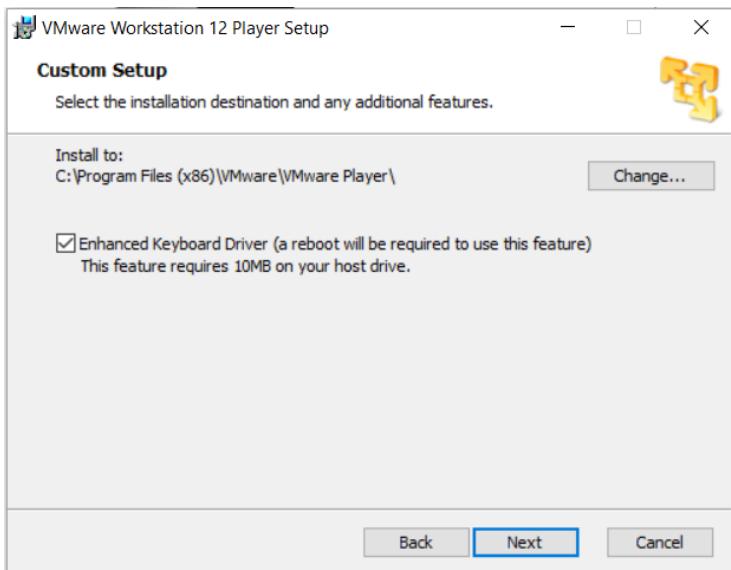


4. Download VMware Workstation Player and run the installer

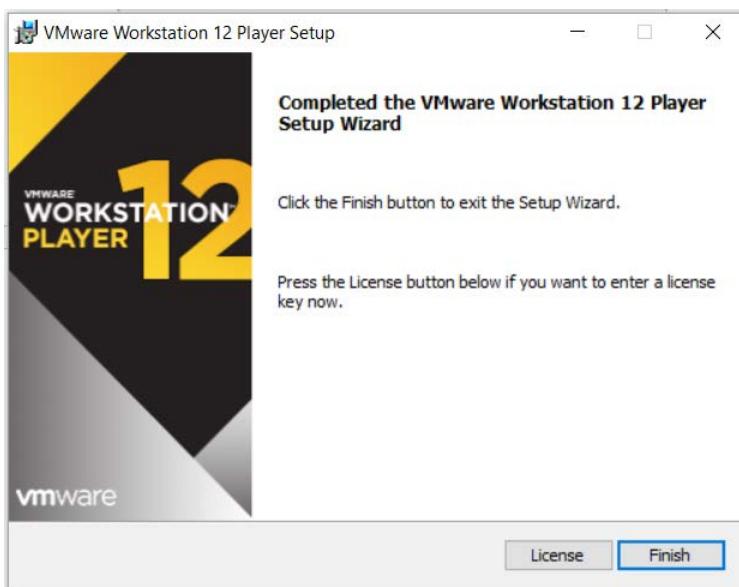


5. Accept the license agreement and click Next

6. Tick the checkbox to install the Enhanced Keyboard Driver



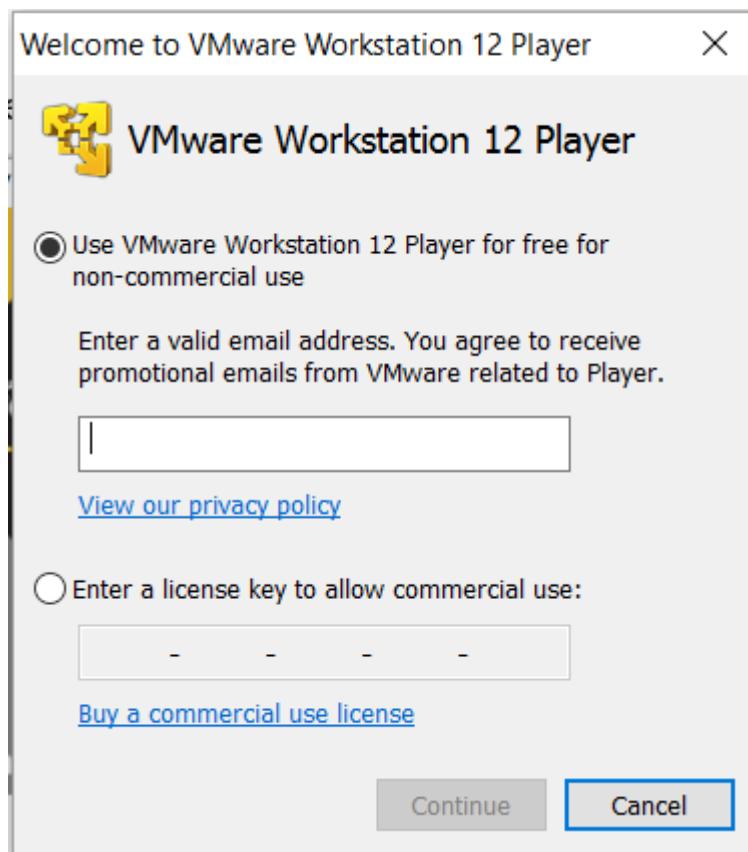
7. Accept the defaults and click **Next** on the remaining pages in the installation wizard, then click **Install**
8. When the installation has completed click **Finish**. There is no need to enter a license.



9. Open VMware Workstation Player from the Start menu or the shortcut on your desktop

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10. Enter your email address on the Welcome to VMware Workstation Player page and click **Continue** and then **Finish**



11. Click **Skip This Version** when prompted to download VMware Workstation Pro. The Pro version requires a paid license.

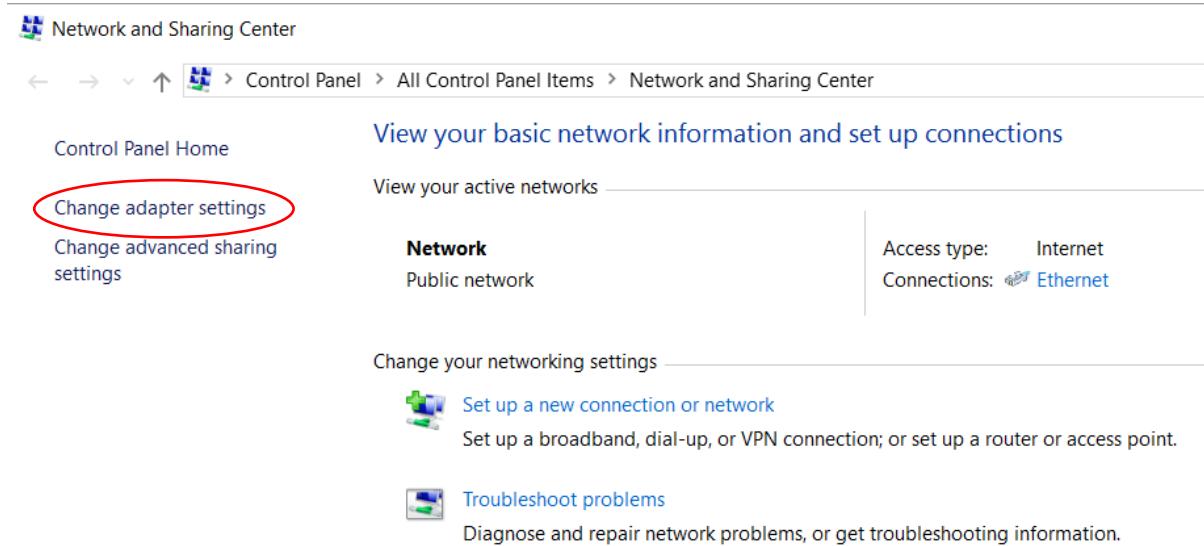


12. VMware Workstation Player installation is now completed.

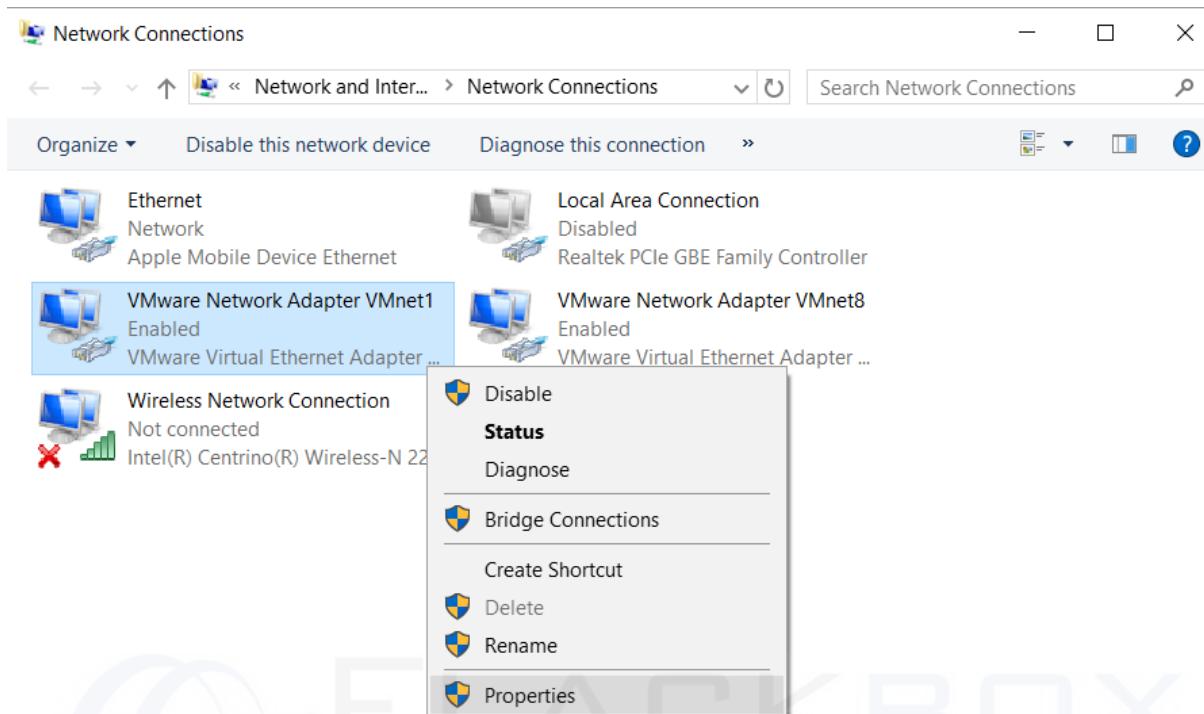
13. Next we need to configure an IP address on our laptop for connectivity to the lab.

14. In Windows, open **Control Panel > Network and Sharing Center**

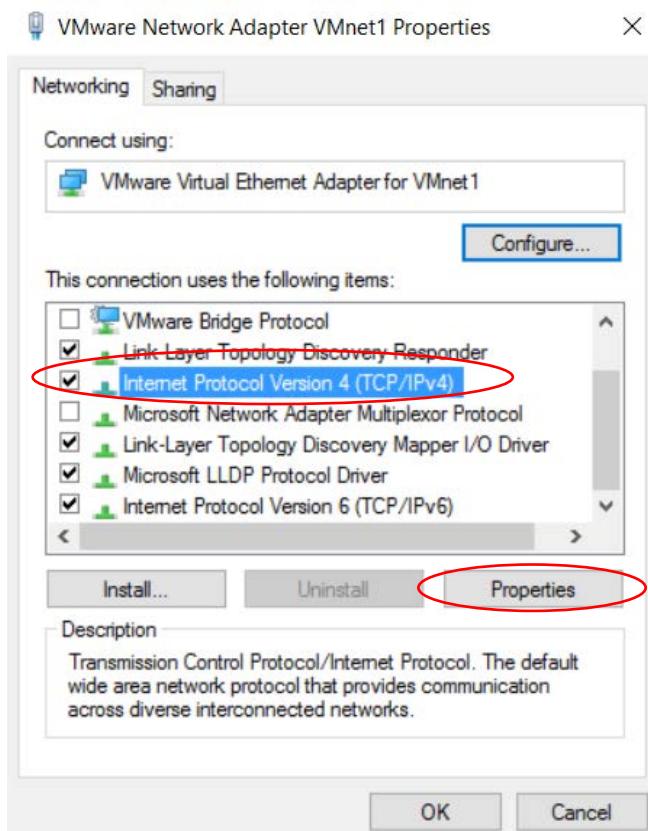
15. Click on **Change adapter settings**



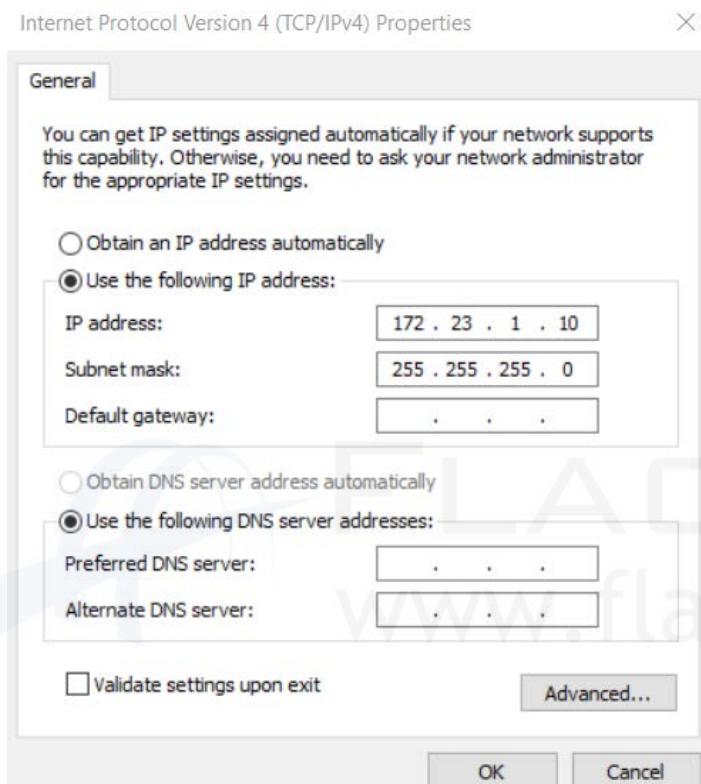
16. Right-click **VMware Network Adapter VMnet1** and select **Properties**



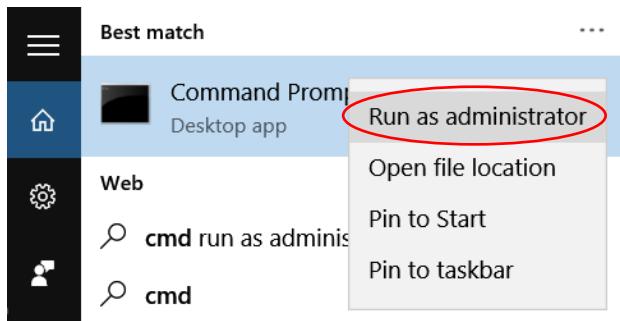
17. Click **Internet Protocol Version 4 (TCP/IPv4)** and select **Properties**



18. Configure the **IP address 172.23.1.10** and **Subnet mask 255.255.255.0**. Leave the rest of the settings blank and click **OK**



19. Next we need to configure a static route to the lab's IP subnets.
20. Open a command prompt on your laptop by clicking the Windows button and then **cmd** in the search box. Right-click and choose the option to **run as administrator**.



21. Enter the command **route add 172.23.0.0 mask 255.255.0.0 172.23.1.254 -p**

```
C:\WINDOWS\system32>route add 172.23.0.0 mask 255.255.0.0 172.23.1.254 -p  
OK!
```

22. VMware Workstation Player setup is now complete.

# VyOS Router Build

In this section you will install the VyOS router.

1. Open the VyOS webpage at [http://vyos.net/wiki/Main\\_Page](http://vyos.net/wiki/Main_Page) in your browser
2. In the **Get the Software** section, click on the link to download the **Physical and virtual 64-bit** version

## Get the Software

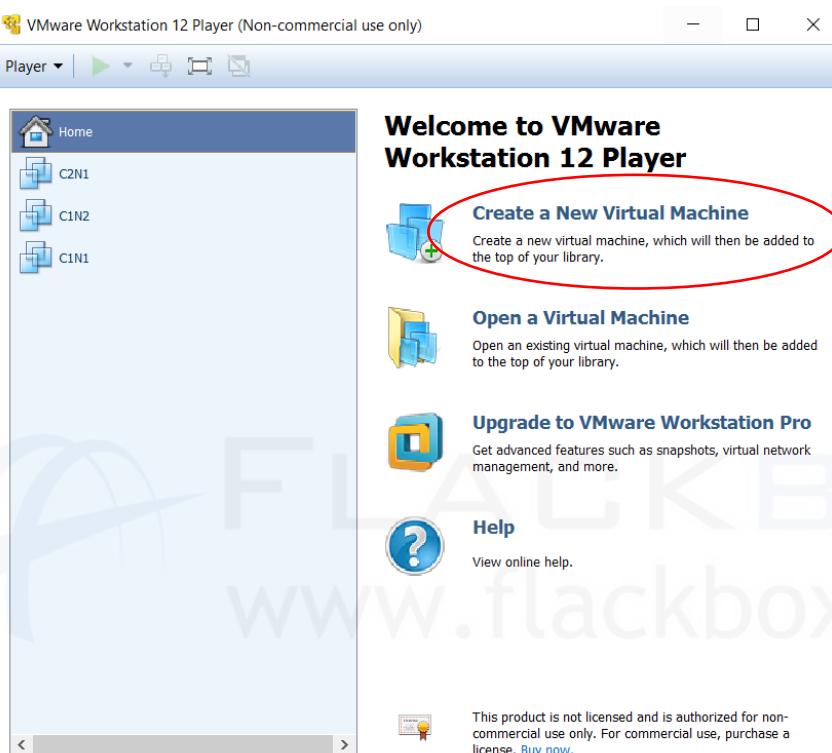
Current stable release: VyOS 1.1.7 (Helium)

Read about the [versioning scheme](#).

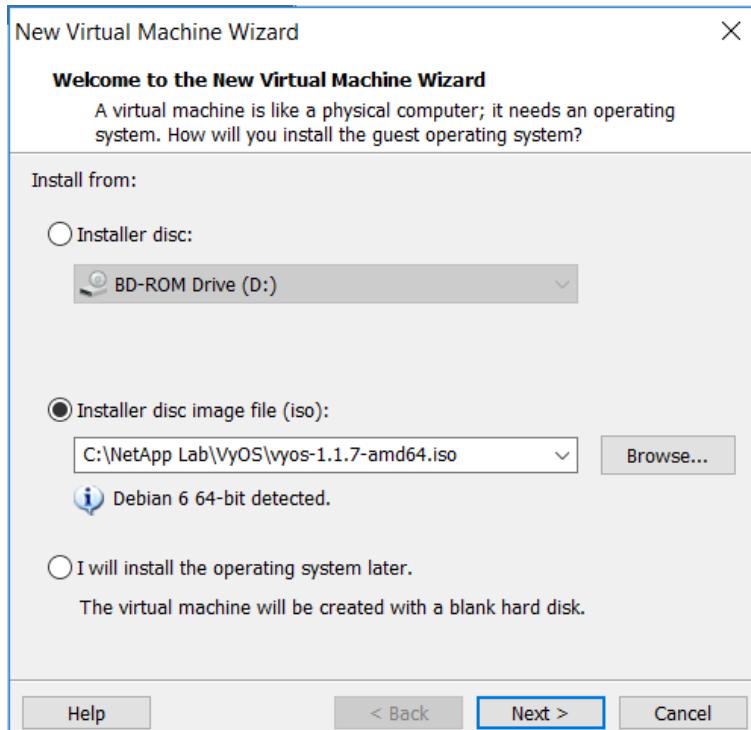
**Downloads:** <http://mirror.vyos.net/iso/release/1.1.7>.

- Physical and virtual 64-bit: [2]
- Legacy hardware 32-bit: [3]
- VMWare OVA: [4]
- Virtual 32-bit: [5] (DEPRECATED)

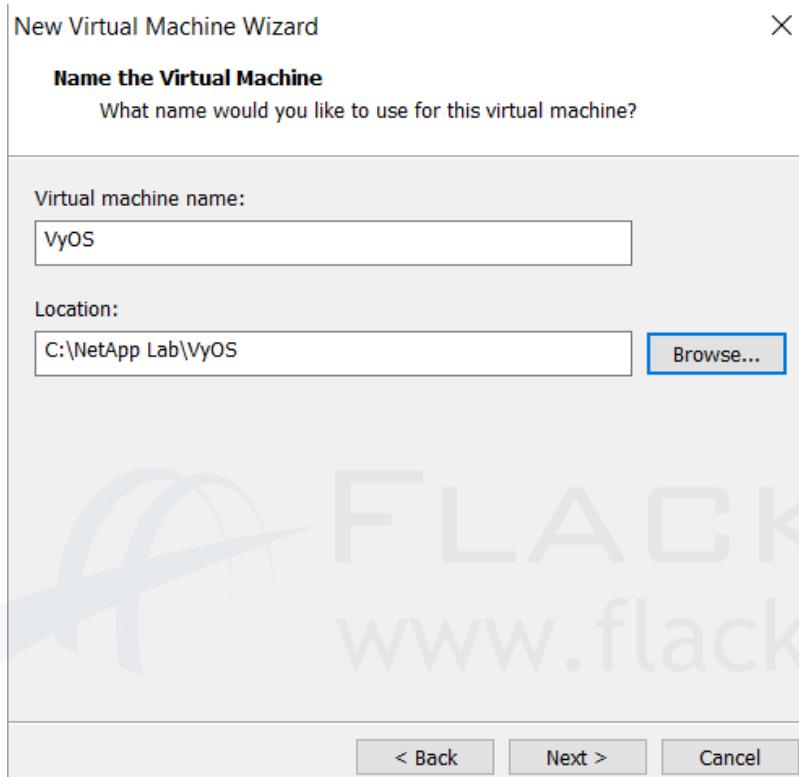
3. After the file has completed downloading, open Windows Explorer and browse to the folder you created earlier on your laptop named **NetApp Lab**.
4. In the NetApp Lab folder, make a subfolder named **VyOS**. We will create the VyOS Router in here.
5. Find the VyOS Router ISO file you downloaded and move it into the **VyOS** folder. It will have a name similar to **vyos-1.1.7-amd64.iso**
6. Open VMware Player
7. Click **Create a New Virtual Machine**



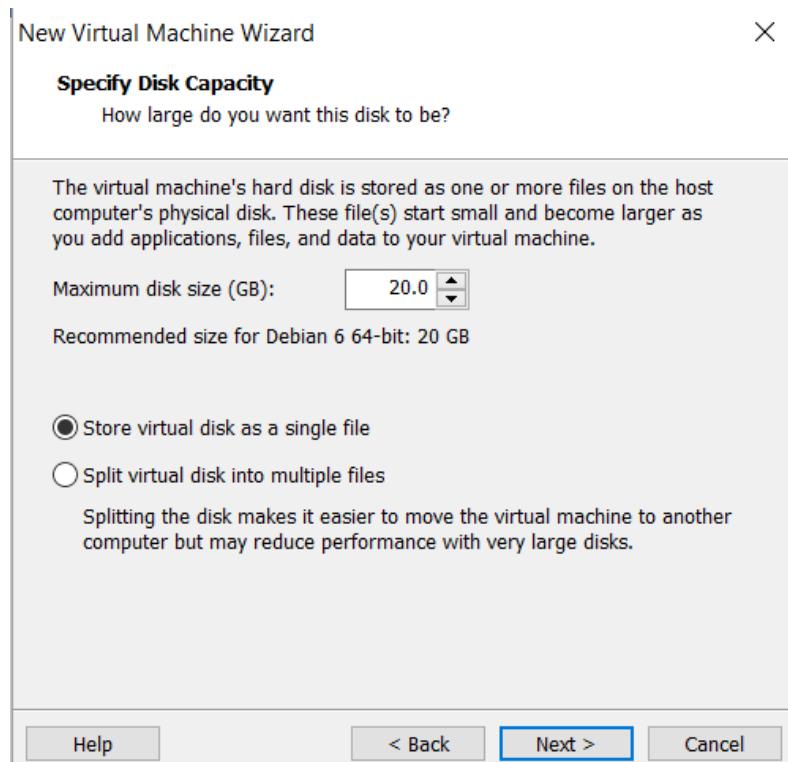
8. Select **Installer disc image file (iso)**: and **Browse** to the VyOS router ISO file in the VyOS folder.



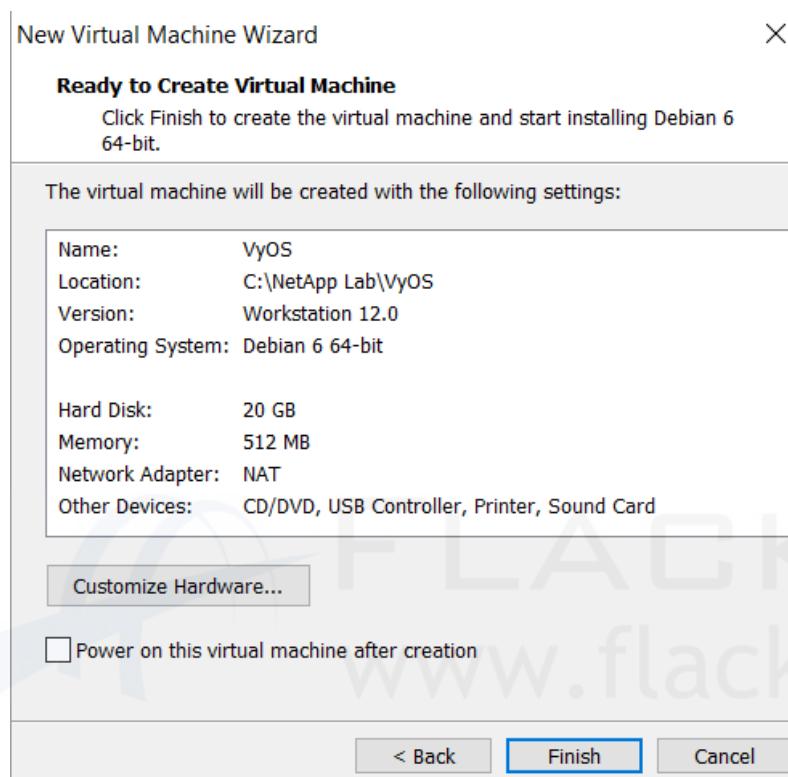
9. Name the virtual machine **VyOS** and save it in the **NetApp Lab\VyOS** folder



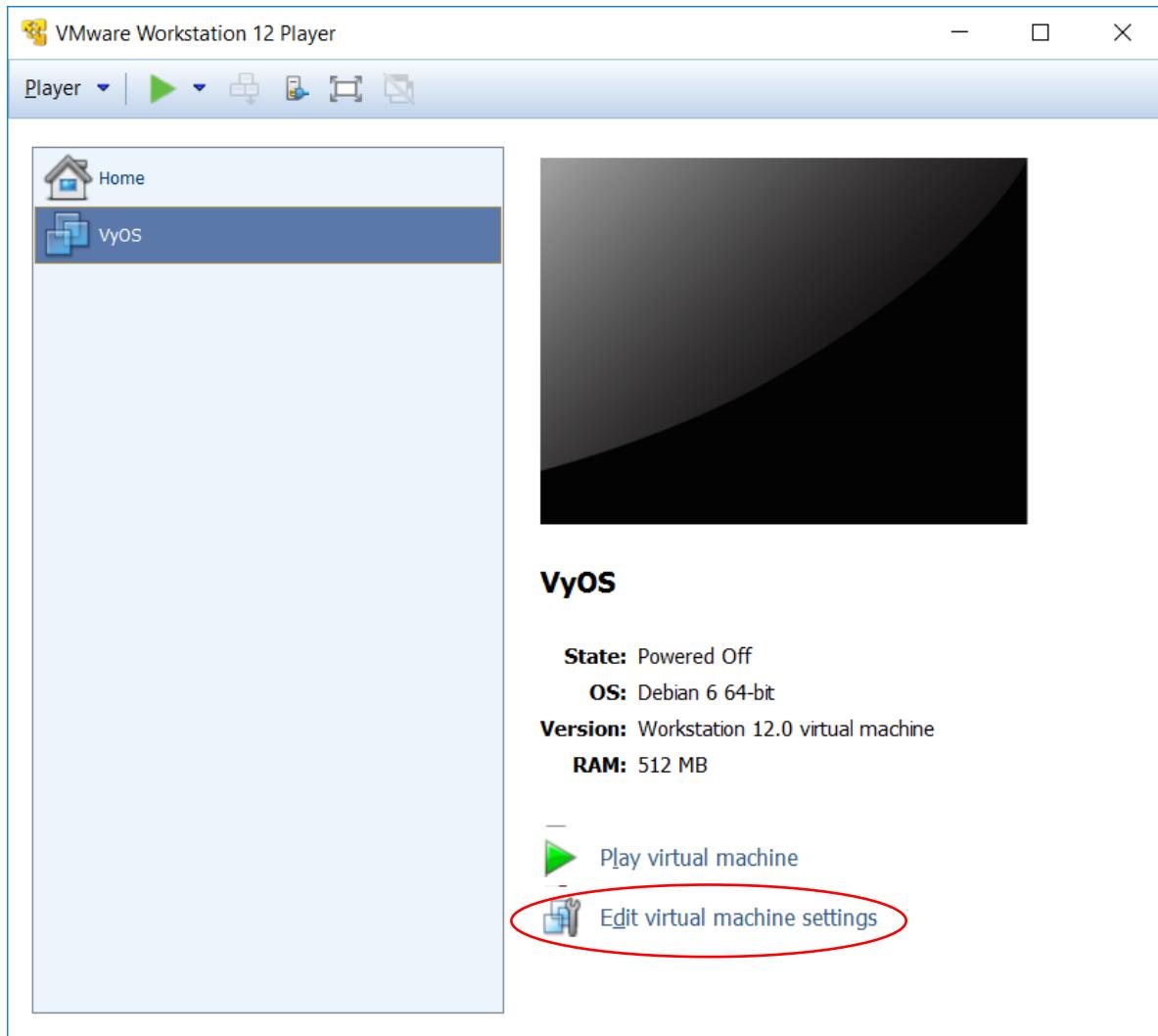
10. Select the option to **Store Virtual Disk as a single file** and click **Next**.



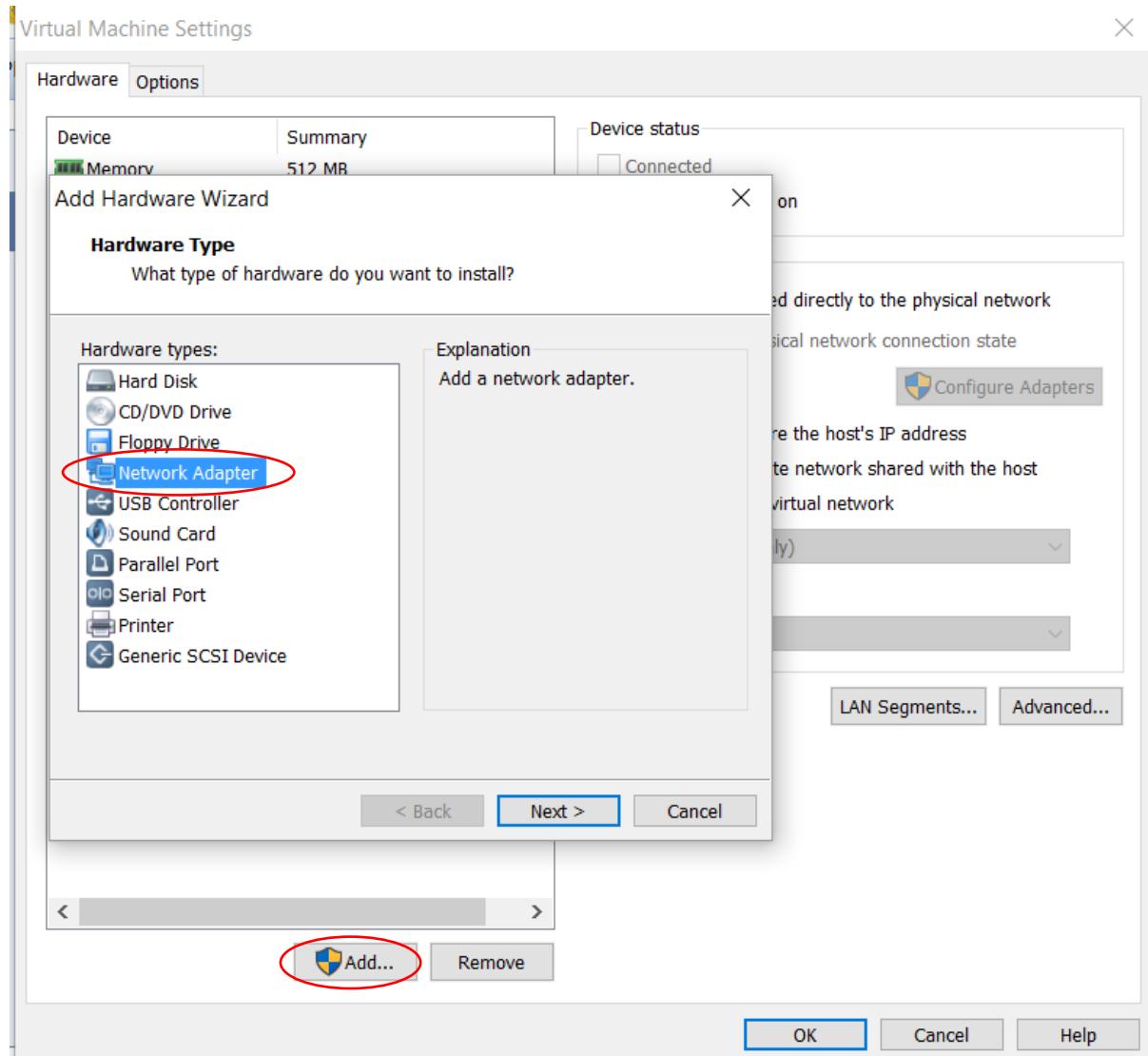
11. **Uncheck** the option to **Power on this virtual machine after creation** and click **Finish**



**12. Click **Edit Virtual Machine Settings****

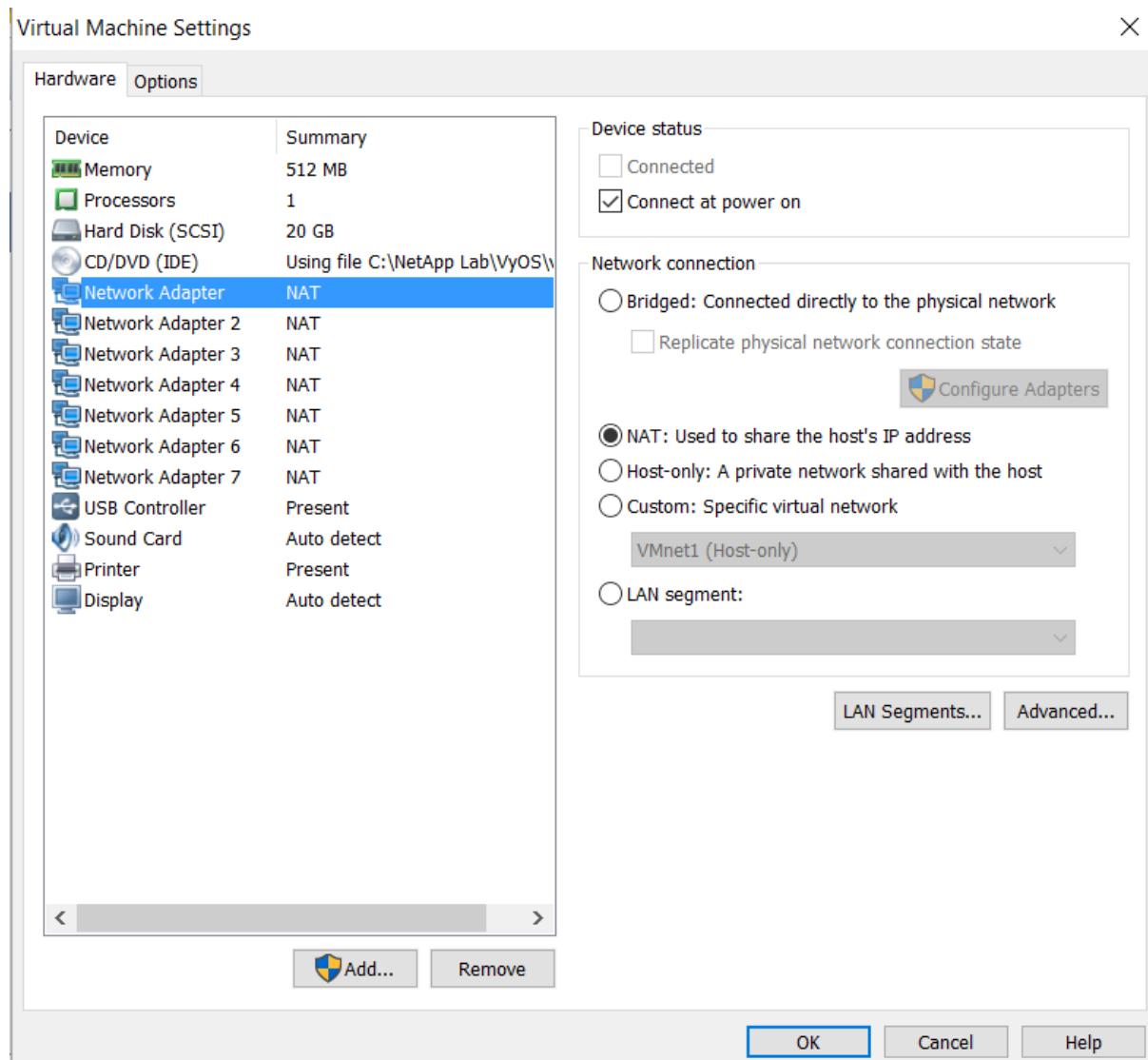


13. We need to add Network Adapters for the lab IP networks. Click on the **Add** button and choose **Network Adapter** then click **Next** and **Finish**



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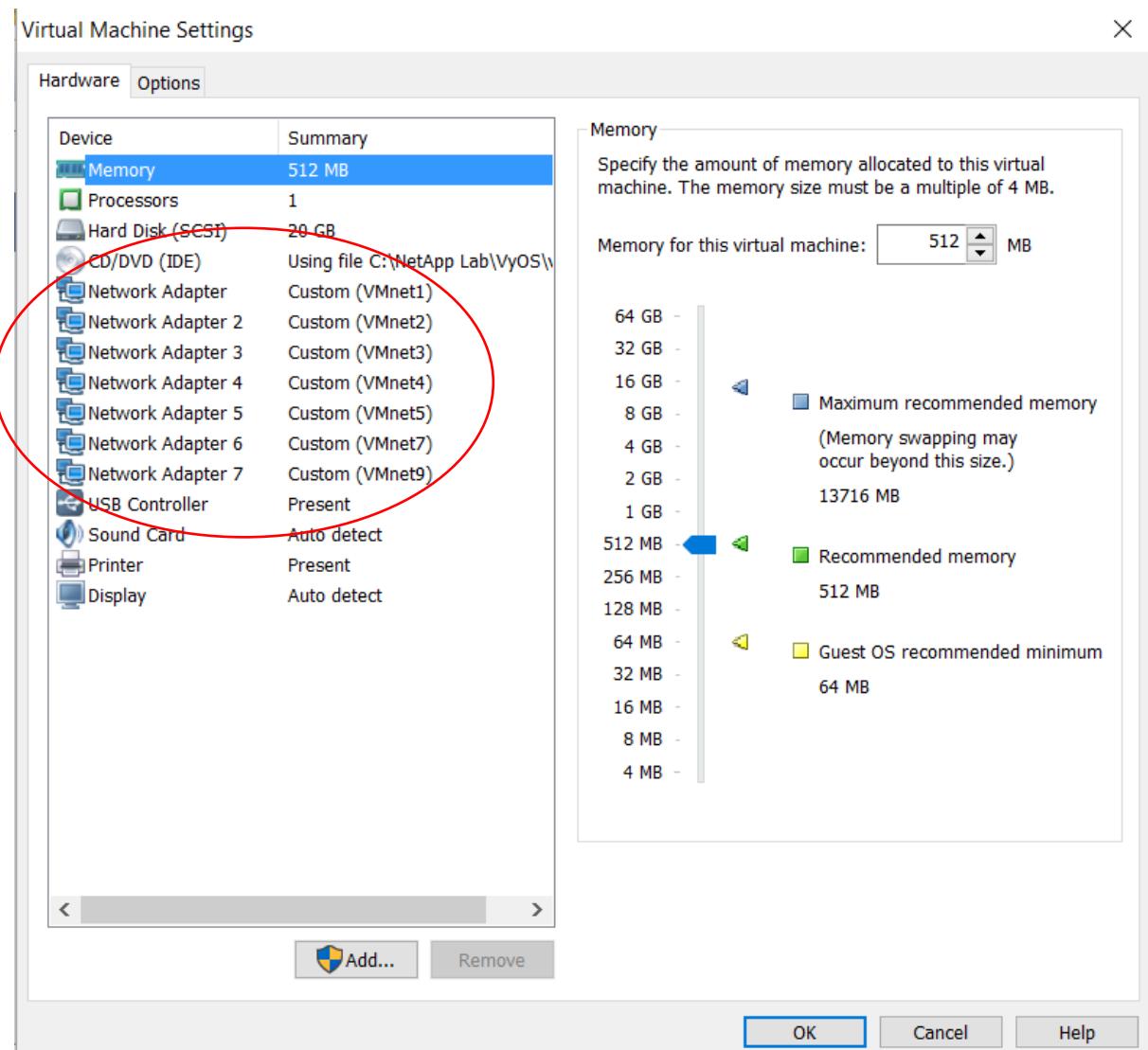
14. This will add **Network Adapter 2**. Repeat 5 more times to add Network Adapters 3 to 7.



15. Configure the network adapters according to the table below.

Adapter	Custom: Specific virtual network
1	VMnet1
2	VMnet2
3	VMnet3
4	VMnet4
5	VMnet5
6	VMnet7
7	VMnet9

16. Click **Player > Manage > Virtual Machine Settings...** again to verify your settings are the same as shown below. Make sure each adapter has the correct VMnet setting. Click **OK** to close the Settings window.



17. Click **Play Virtual Machine** to power on the router  
18. When the router boots up, click inside the virtual machine window with your mouse to make your keyboard active for the virtual machine. (Note that you need to press the **Ctrl and Alt** keys simultaneously to release the mouse when you want to return to your desktop.)

19. Log in with username **vyos** and password **vyos**
20. The router is currently booting from the CD image, we need to install onto the virtual hard drive. Enter the command **install image**
21. Type **Yes** when prompted to continue
22. Hit the **Enter** key to accept the default **Auto** partition

```
vyos@vyos:~$ install image
Welcome to the VyOS install program. This script
will walk you through the process of installing the
VyOS image to a local hard drive.
Would you like to continue? (Yes/No) [Yes]: yes
Probing drives: OK
Looking for pre-existing RAID groups...none found.
The VyOS image will require a minimum 1000MB root.
Would you like me to try to partition a drive automatically
or would you rather partition it manually with parted? If
you have already setup your partitions, you may skip this step

Partition (Auto/Parted/Skip) [Auto]: _
```

23. Hit the **Enter** key again to accept the default and install on **sda**
24. Type **Yes** to continue

```
I found the following drives on your system:
sda    21474MB

Install the image on? [sda]:
This will destroy all data on /dev/sda.
Continue? (Yes/No) [No]: Yes_
```

25. Hit the **Enter** key again to accept the default and create the maximum root partition size
26. Hit the **Enter** key again to accept the default image name

```
How big of a root partition should I create? (1000MB - 21474MB) [21474]MB:
Creating filesystem on /dev/sda1: OK
Done!
Mounting /dev/sda1...
What would you like to name this image? [1.1.7]:
OK. This image will be named: 1.1.7
```

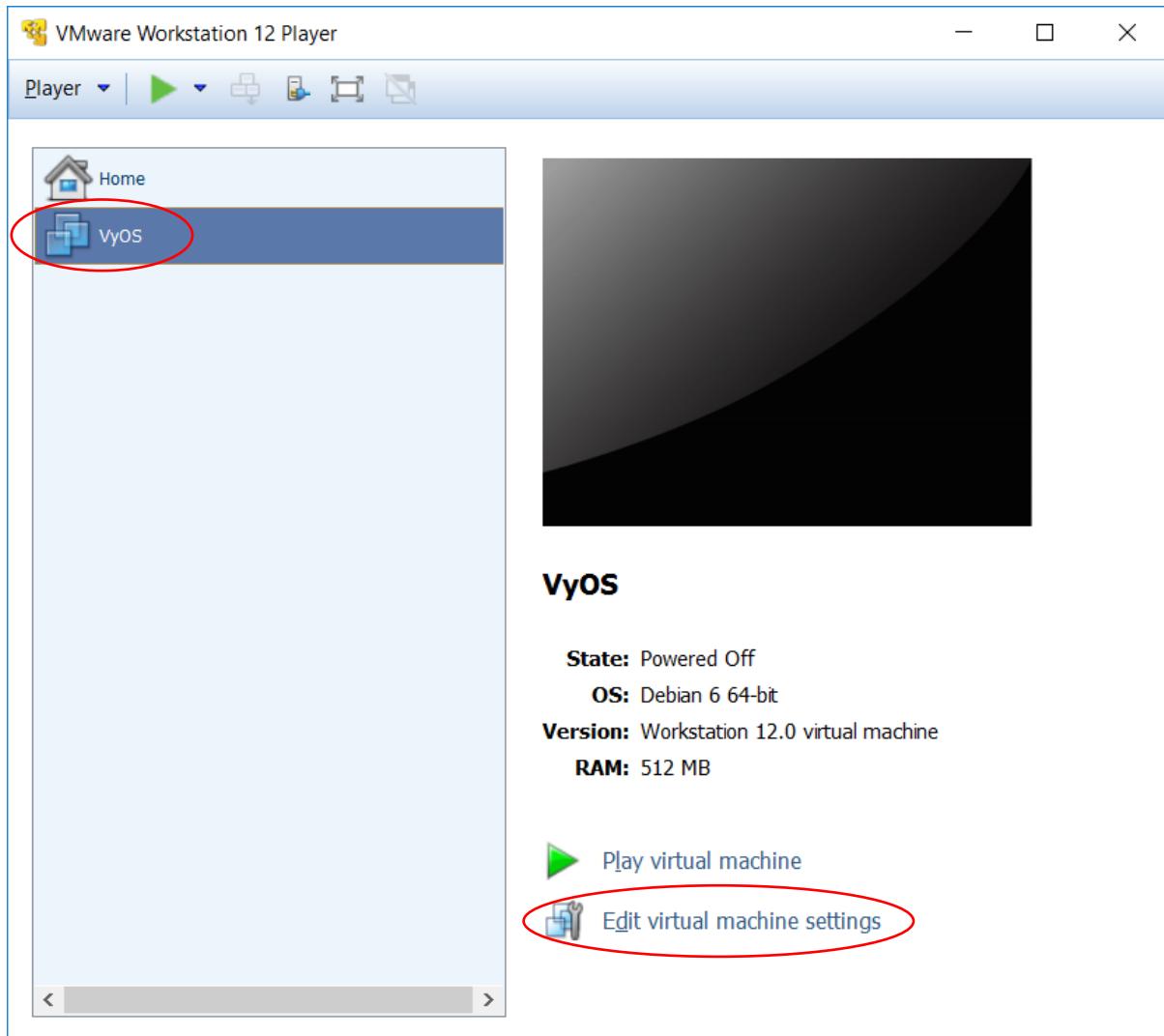
27. Hit the **Enter** key again to accept the default and copy the **/config/config.boot** configuration file
28. Enter and confirm the password **Flackbox1** for the **vyos** admin user

```
I found the following configuration files:
  /config/config.boot
  /opt/vyatta/etc/config.boot.default
Which one should I copy to sda? [/config/config.boot]:
Copying /config/config.boot to sda.
Enter password for administrator account
Enter password for user 'vyos':
Retype password for user 'vyos':
```

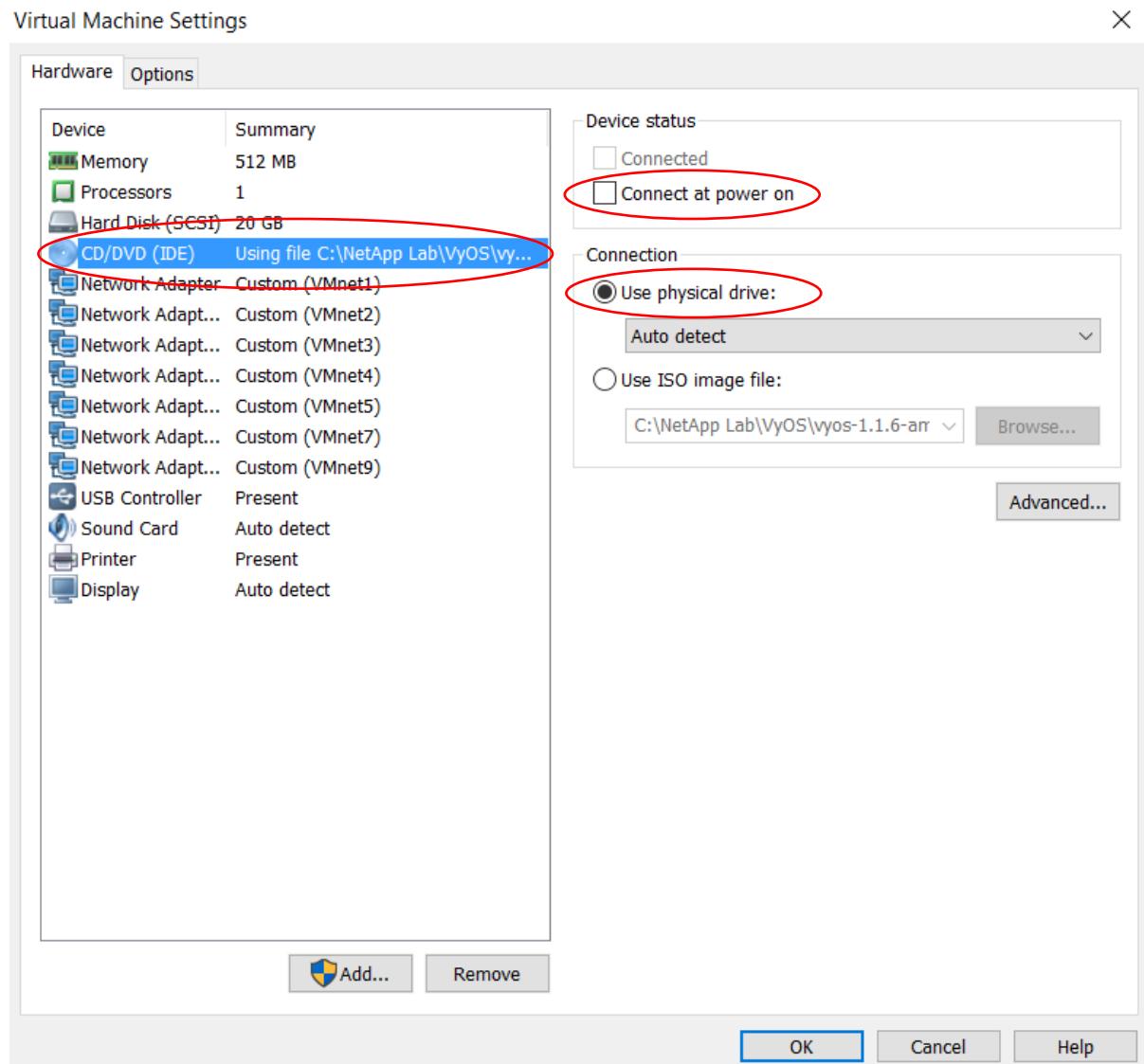
29. Hit the **Enter** key to accept the default and modify the boot partition on **sda**
30. Type **poweroff** to shut down the system and **yes** when prompted to confirm

```
Which drive should GRUB modify the boot partition on? [sda]:  
Setting up grub: OK  
Done!  
vyos@vyos:~$ poweroff_
```

31. When the virtual machine has completed its shutdown, reopen VMware Workstation Player, select the **VyOS** image and click **Edit Virtual Machine Settings**



32. We now need to configure the router to boot from its hard disk rather than the CD. This will allow us to make a permanent configuration which will survive reboots.  
 33. Click on **CD/DVD (IDE)**, uncheck **Connect at power on** and select **Use physical drive**



34. Click **OK** and then **Play virtual machine**  
 35. When the router boots up, login with the username **vyos** and password **Flackbox1**  
 36. Enter the command **configure** to enter configuration mode  
 37. Configure the eth0 network interface with the command **set interfaces ethernet eth0 address 172.23.1.254/24**  
 38. Repeat for the other interfaces according to the table below.

Interface	IP Address
eth1	172.23.2.254/24
eth2	172.23.3.254/24
eth3	172.23.4.254/24
eth4	172.23.5.254/24
eth5	172.23.7.254/24
eth6	172.23.9.054/24

```
vyos@vyos:~$ configure
[edit]
vyos@vyos# set interfaces ethernet eth0 address 172.23.1.254/24
[edit]
vyos@vyos# set interfaces ethernet eth1 address 172.23.2.254/24
[edit]
vyos@vyos# set interfaces ethernet eth2 address 172.23.3.254/24
[edit]
vyos@vyos# set interfaces ethernet eth3 address 172.23.4.254/24
[edit]
vyos@vyos# set interfaces ethernet eth4 address 172.23.5.254/24
[edit]
vyos@vyos# set interfaces ethernet eth5 address 172.23.7.254/24
[edit]
vyos@vyos# set interfaces ethernet eth6 address 172.23.9.254/24
[edit]
```

39. Enter the commands **set service ssh** and **set service ssh allow-root** to enable SSH access.

```
vyos@vyos# set service ssh
[edit]
vyos@vyos# set service ssh allow-root
[edit]
vyos@vyos# _
```

40. Enter the command **commit** to activate your changes.
41. Enter the command **save** to make your changes persistent over a reboot.

```
vyos@vyos# commit
[ service ssh ]
Restarting OpenBSD Secure Shell server: sshd.

[edit]
vyos@vyos# save
Saving configuration to '/config/config.boot'...
Done
[edit]
vyos@vyos# _
```

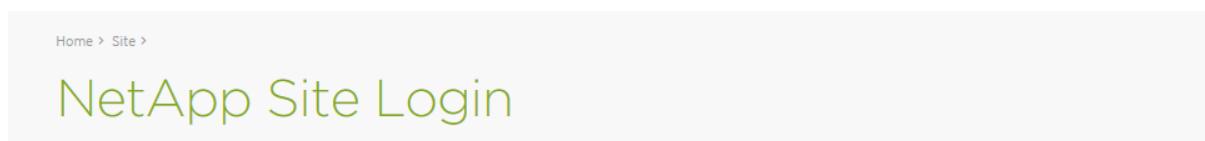
42. Installation of the VyOS router is now complete.



## ONTAP Simulator Build

In this section you will build the Cluster 1 and Cluster 2 NetApp storage systems.

1. Open [www.netapp.com](http://www.netapp.com) in your browser
2. Click on the **Sign In** button
3. Click on the **Support** link near the middle of the page to log in to the Support site.



4. Enter your username and password (Click on '**Sign Up Now**' if you don't have an existing account.)
5. Click on the **Downloads** tab and select **Product Evaluation**



6. Click the **ONTAP Simulator** link
7. Click the **Simulator 8.x and 9.x** link

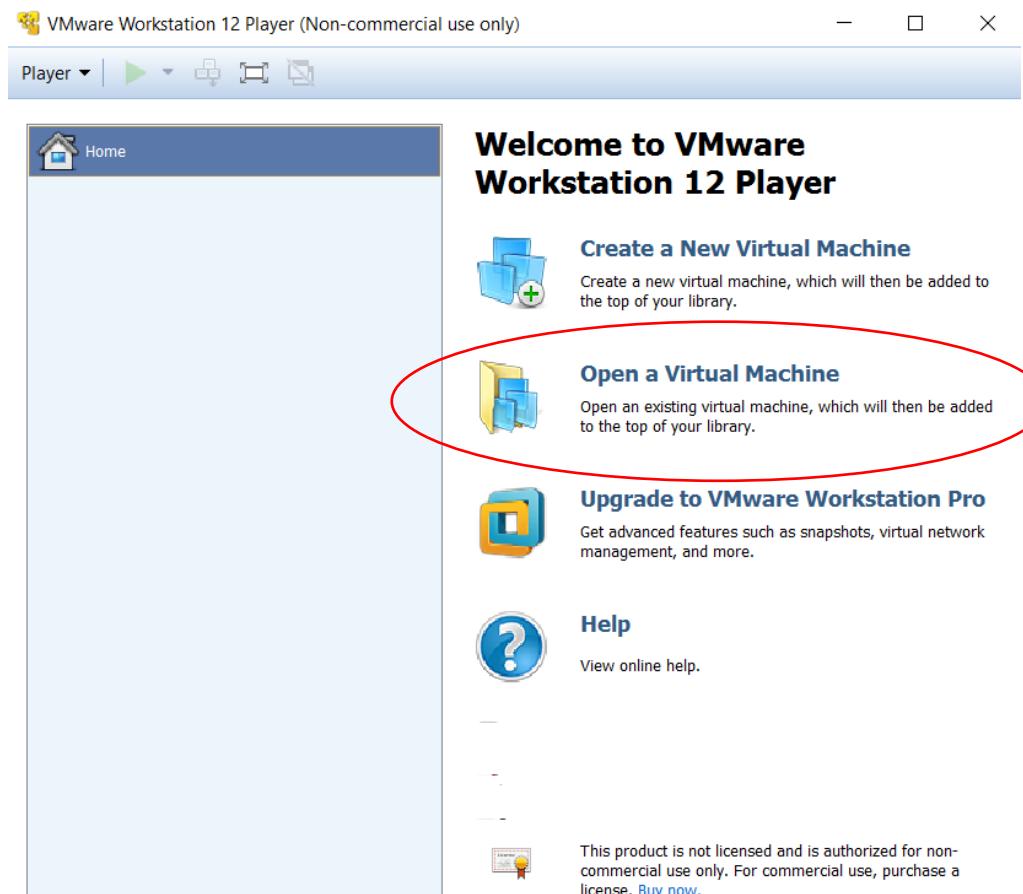
Data ONTAP Simulator	Download .tgz - compressed tar file for Linux .iso - CD-ROM image file for use with CD-ROM burning software	Documentation
8.x and 9.x	<a href="#">Simulator 8.x and 9.x</a>	All versions of the Data ONTAP 8.x Simulator and documentation can be found at this <a href="#">link</a> . Please note that Data ONTAP 8 simulators have different hardware.

8. Tick the checkbox to indicate **I have read and agree to License Terms & Conditions** and click **Continue**
9. Your laptop needs 16GB RAM minimum to use ONTAP 9 as explained in this PDF guide. If your laptop has 8GB RAM then use version 8.2.3 which can also be downloaded from the webpage.
10. Download the latest **Simulate ONTAP 9.x** OVA image for VMware Player. Also download the matching **CMode Licenses** text file and the **Simulate ONTAP Installation and Setup Guide** PDF. You can refer to the guide for help if you have issues installing the simulator.

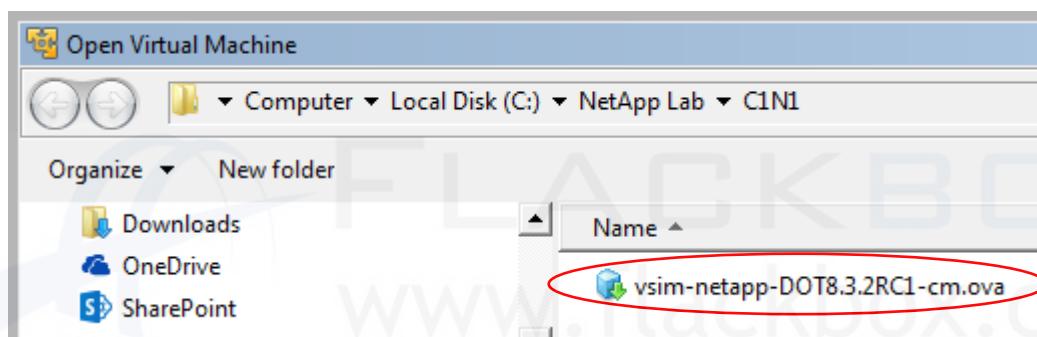
**Platform: VMware**

Task	Type	Description	Download
Administration	Client Tool	Simulate ONTAP 9.0 Installation and Setup Guide	<a href="#">Simulate_ONTAP_9.0_Installation_and_Setup_Guide.pdf</a> (1.14 MB)
Administration	Client Tool	Simulate ONTAP 9.0 - MD5Checksums	<a href="#">MD5Checksums_9.0.txt</a> (0.17 KB)
Administration	Client Tool	VSIM Licenses: 9.0 licenses Clustered-ONTAP	<a href="#">CMode_licenses_9.0.txt</a> (4.83 KB)
Administration	Client Tool	Simulate ONTAP 9.0 for VMware ESX	<a href="#">vsim-esx-DOT9.0-cm.ova</a> (585.39 MB)
Administration	Client Tool	Simulate ONTAP 9.0 for VMware Workstation, VMware Player, and VMware Fusion	<a href="#">vsim-netapp-DOT9.0-cm.ova</a> (585.39 MB)
Administration	Client Tool	Simulate ONTAP 8.2 Installation and Setup Guide	<a href="#">Simulate_ONTAP_8.2.1_Installation_and_Setup_Guide.pdf</a> (832.84 KB)
Administration	Client Tool	Simulate ONTAP 8.2.2 - MD5Checksums	<a href="#">MD5Checksums_8.2.2.txt</a> (0.26 KB)
Administration	Client Tool	VSIM Licenses: 8.2.2 licenses 7-Mode	<a href="#">7Mode_licenses_8.2.2.txt</a> (3.03 KB)
Administration	Client Tool	VSIM Licenses: 8.2.2 licenses Clustered-ONTAP	<a href="#">CMode_licenses_8.2.2.txt</a> (4.83 KB)
Administration	Client Tool	Simulate ONTAP 8.2.2P1 for VMware ESX - 7-mode	<a href="#">vsim_esx-7m.tgz</a> (423.23 MB)
Administration	Client Tool	Simulate ONTAP 8.2.2P1 for VMware ESX - Clustered-ONTAP	<a href="#">vsim_esx-cm.tgz</a> (423.23 MB)
Administration	Client Tool	Simulate ONTAP 8.2.2P1 for VMware Workstation, VMware Player, and VMware Fusion - 7-mode	<a href="#">vsim_netapp-7m.tgz</a> (423.23 MB)
Administration	Client Tool	Simulate ONTAP 8.2.2P1 for VMware Workstation, VMware Player, and VMware Fusion - Clustered-ONTAP	<a href="#">vsim_netapp-cm.tgz</a> (423.23 MB)
Administration	Client Tool	Simulate ONTAP 8.2.3 - MD5Checksums	<a href="#">MD5Checksums_8.2.3.txt</a> (0.25 KB)

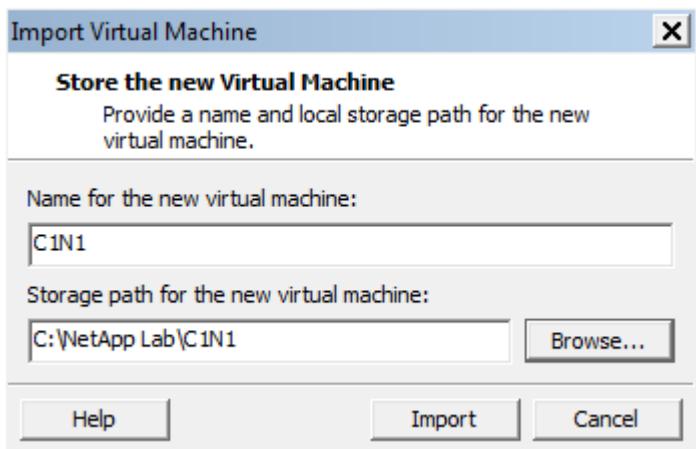
11. In your **NetApp Lab** folder, make a subfolder named **C1N1**. We will create Cluster 1 Node 1 in here.
12. Find the simulator VMware image OVA file you downloaded from the NetApp website and copy it into the **C1N1** folder. It will have a name similar to **vsim-netapp-DOT9.0-cm.ova**.
13. Open a new instance of VMware Workstation Player
14. Click **Open a Virtual Machine**



15. Browse to the C1N1 folder and double-click on the VMware image OVA file

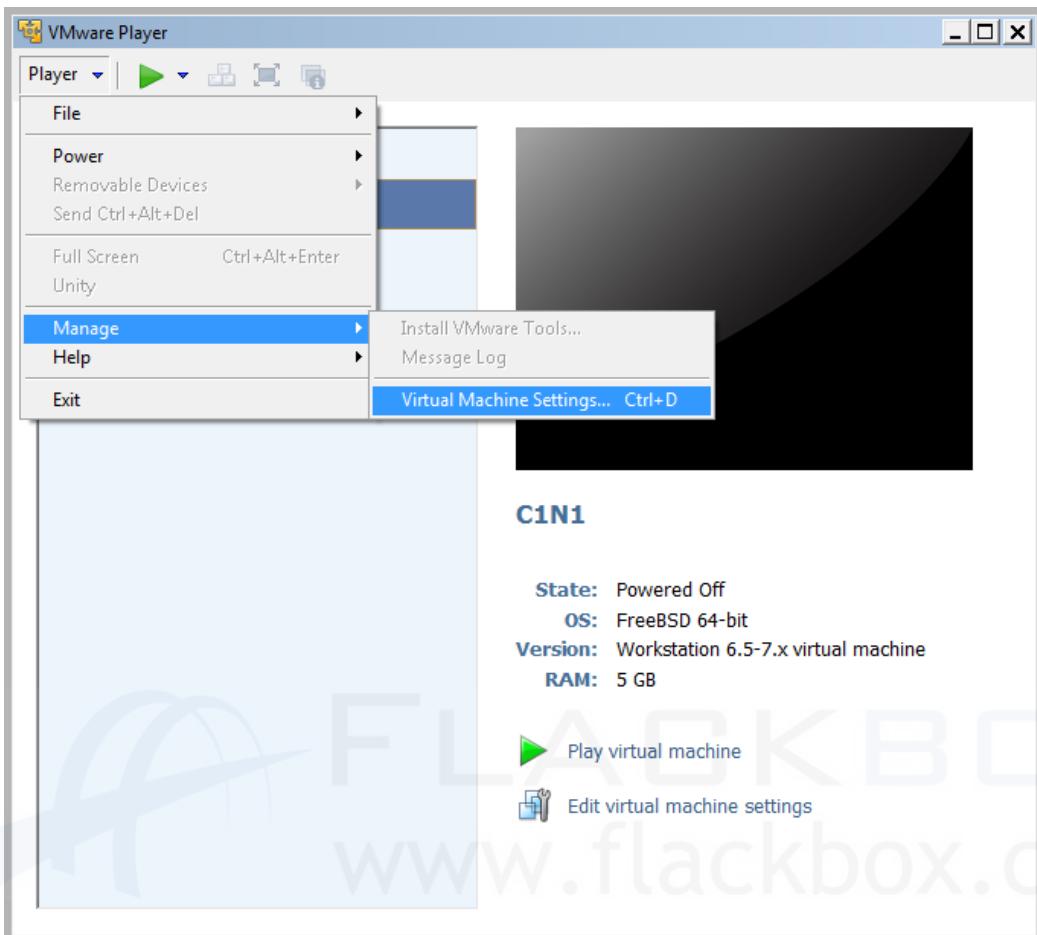


16. Name the virtual machine **C1N1** and save it in the **NetApp Lab\C1N1** folder

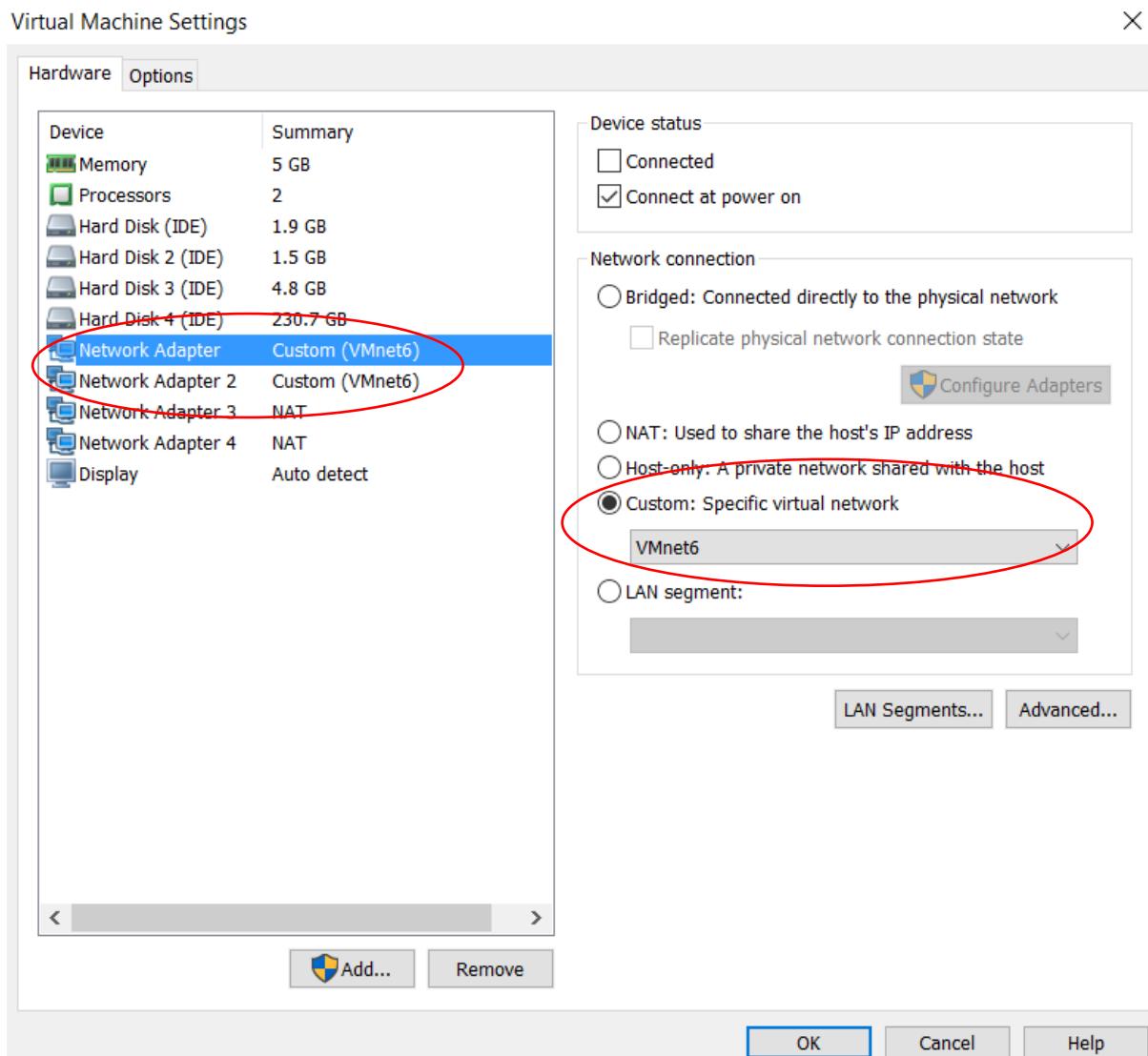


17. Click the **Import** button to create your first node.

18. After the image has completed importing, click **Player > Manage > Virtual Machine Settings...**

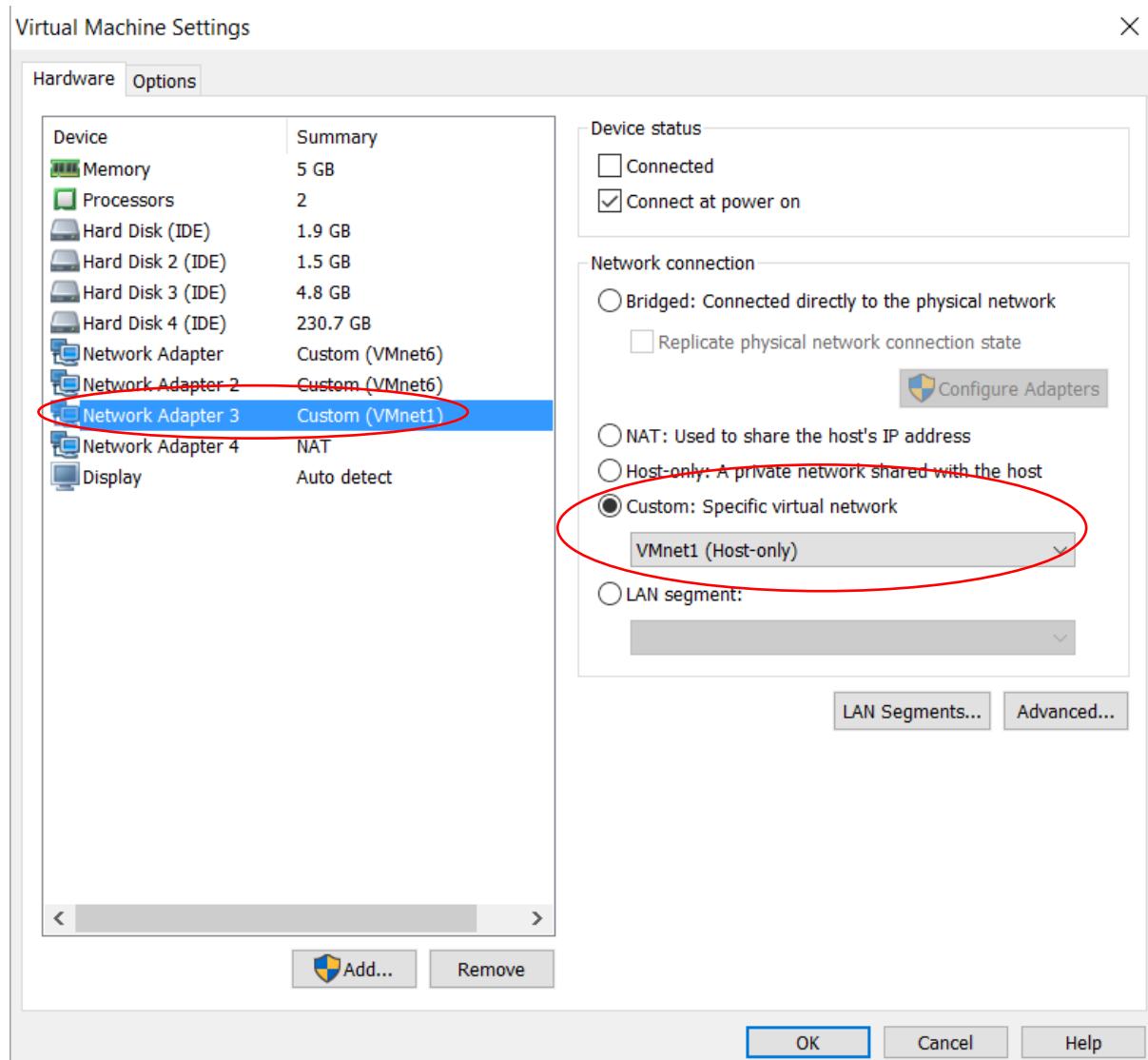


19. The first two network adapters are the Cluster Interconnect adapters. We will put them in their own private network. Click on the first **Network Adapter** and select Custom: Specific virtual network **VMnet6**. Repeat to set **Network Adapter 2** also to Custom: Specific virtual network **VMnet6**.

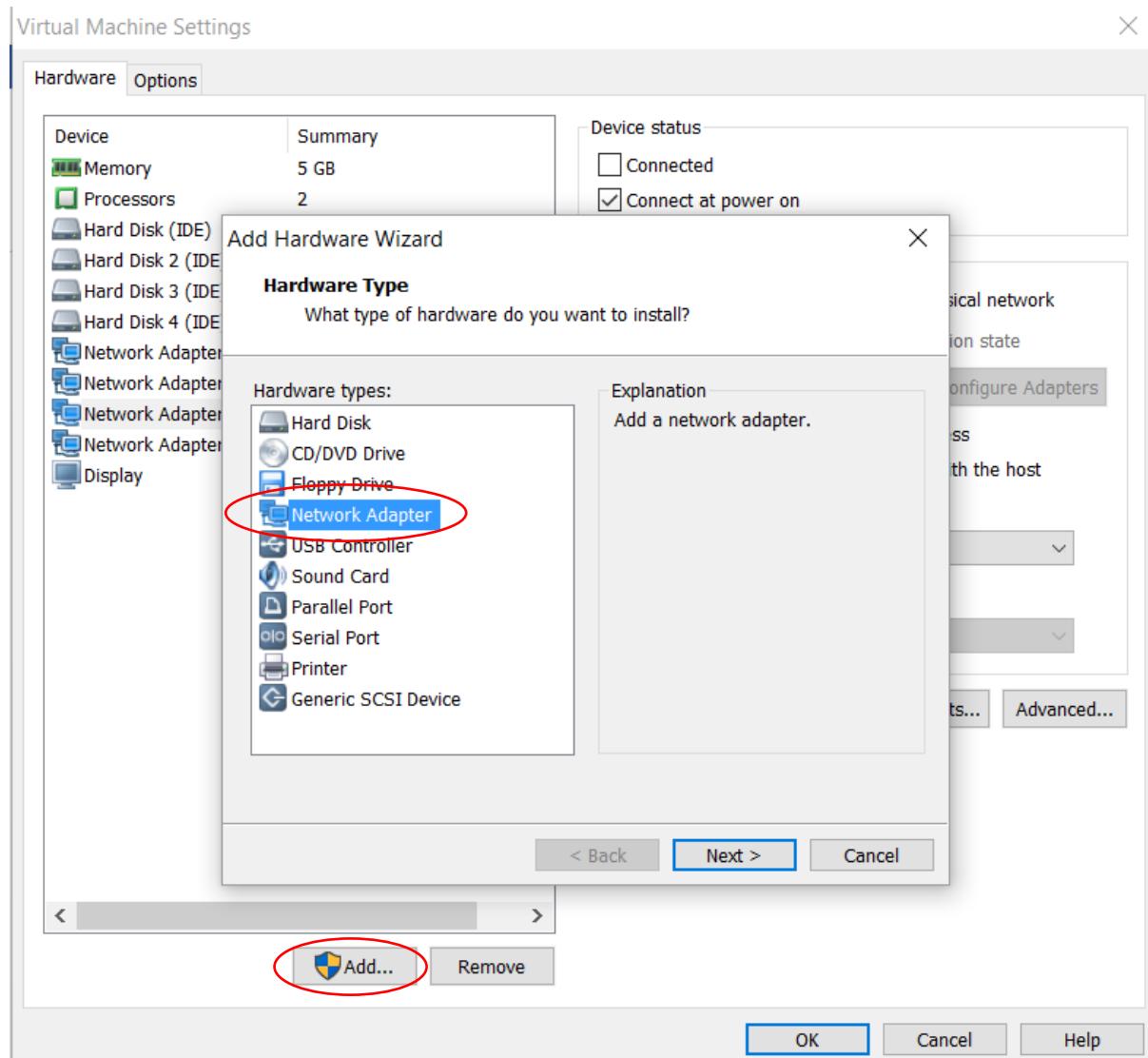


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20. Click on **Network Adapter 3** and select Custom: Specific virtual network **VMnet1 (Host-only)**. This will be our management network.

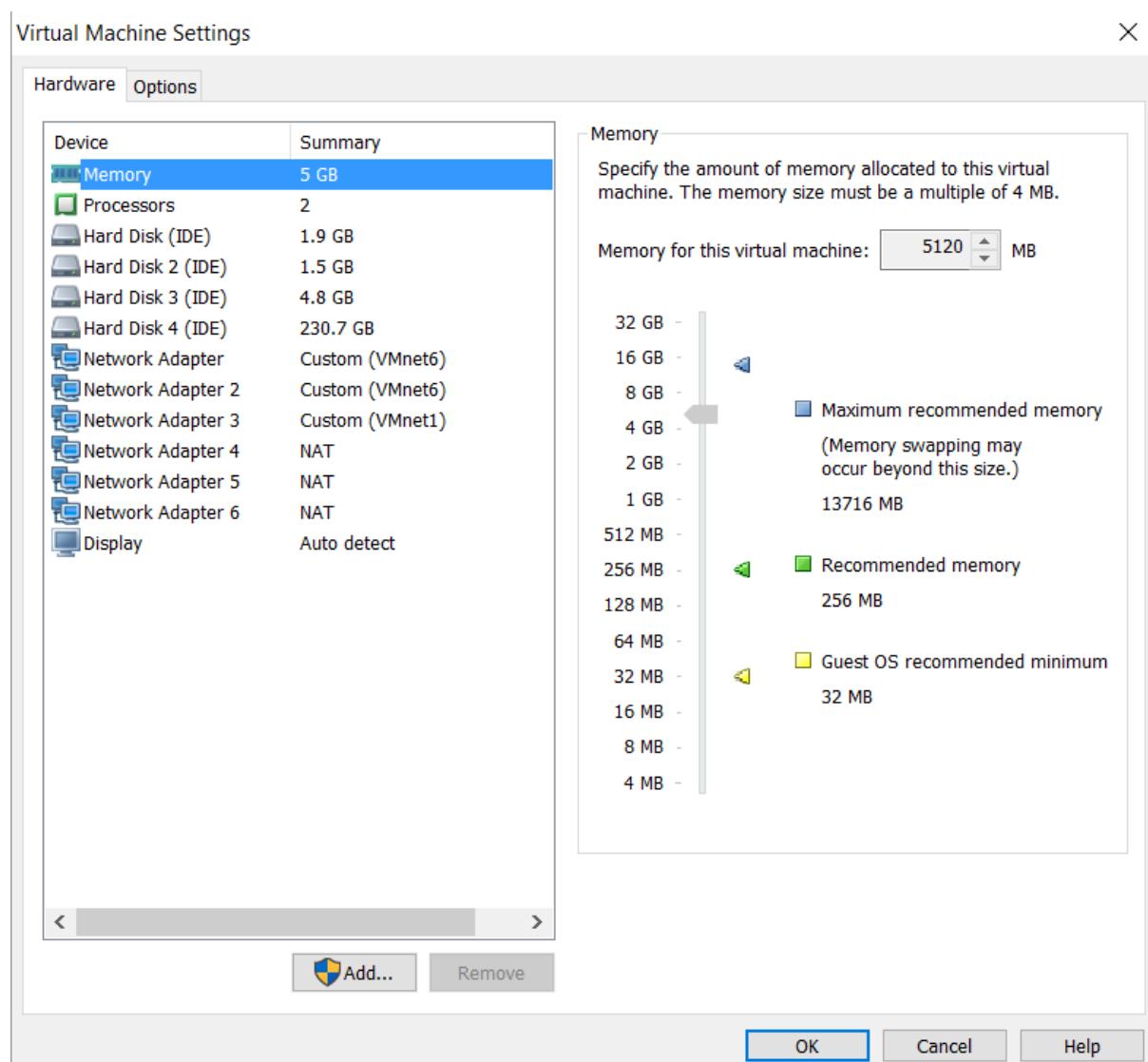


21. Add additional adapters for our data networks. Click on the **Add** button and choose **Network Adapter** then click **Next** and **Finish**.

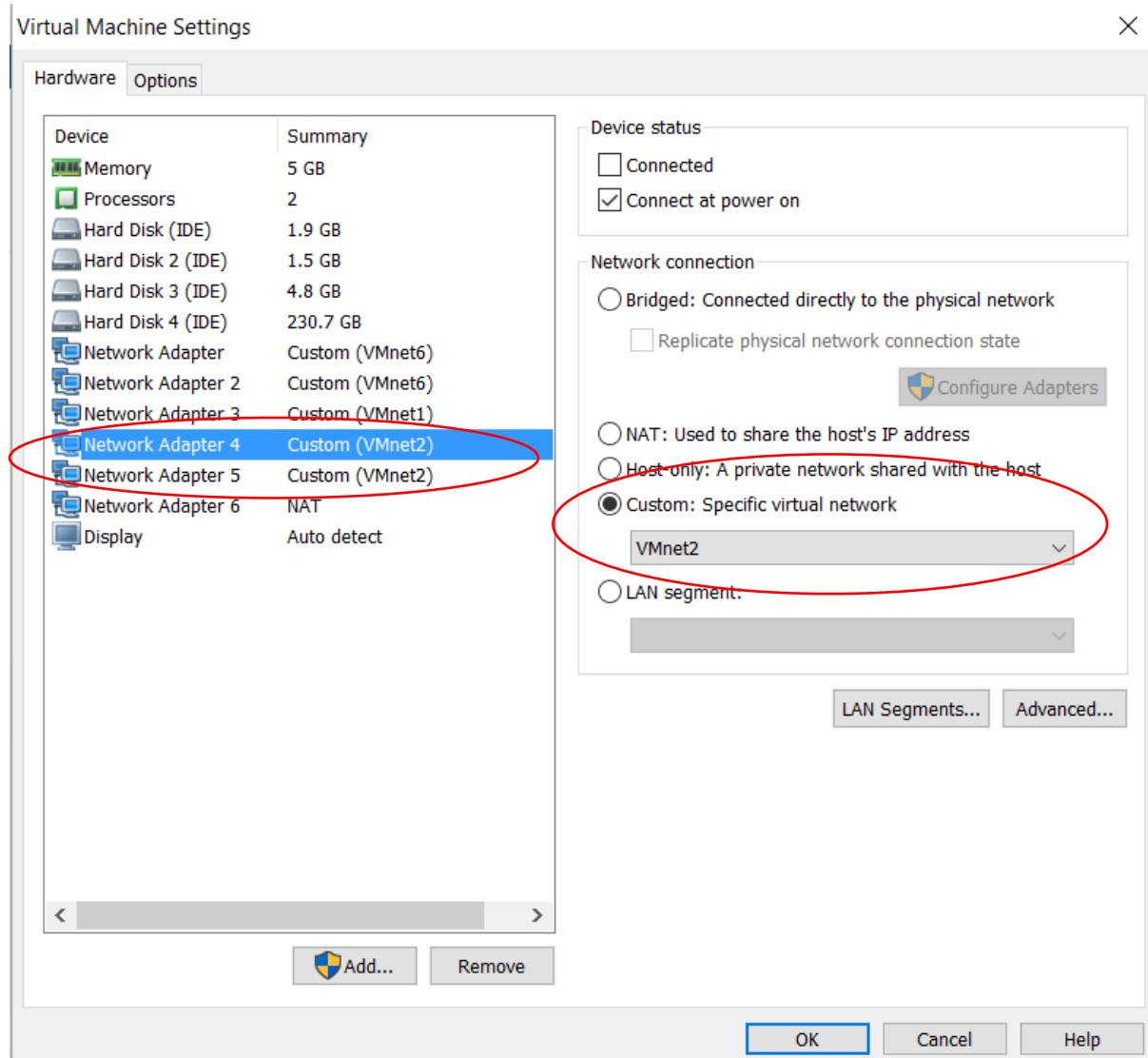


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22. This will add **Network Adapter 5**. Repeat to add **Network Adapter 6**.

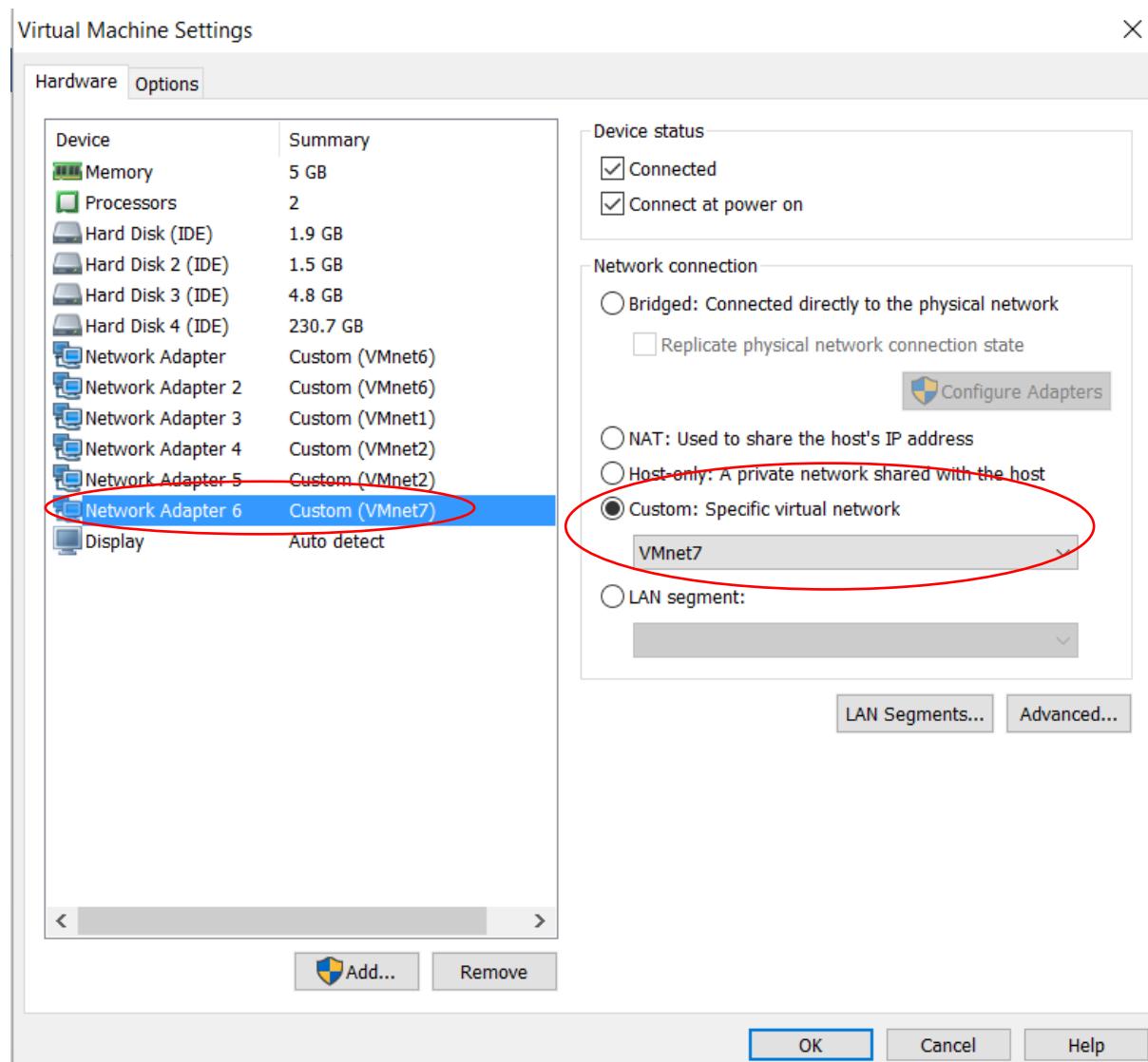


23. Click on **Network Adapter 4** and then select Custom: Specific virtual network **VMnet2**.  
Repeat to set **Network Adapter 5** also to Custom: Specific virtual network **VMnet2**.

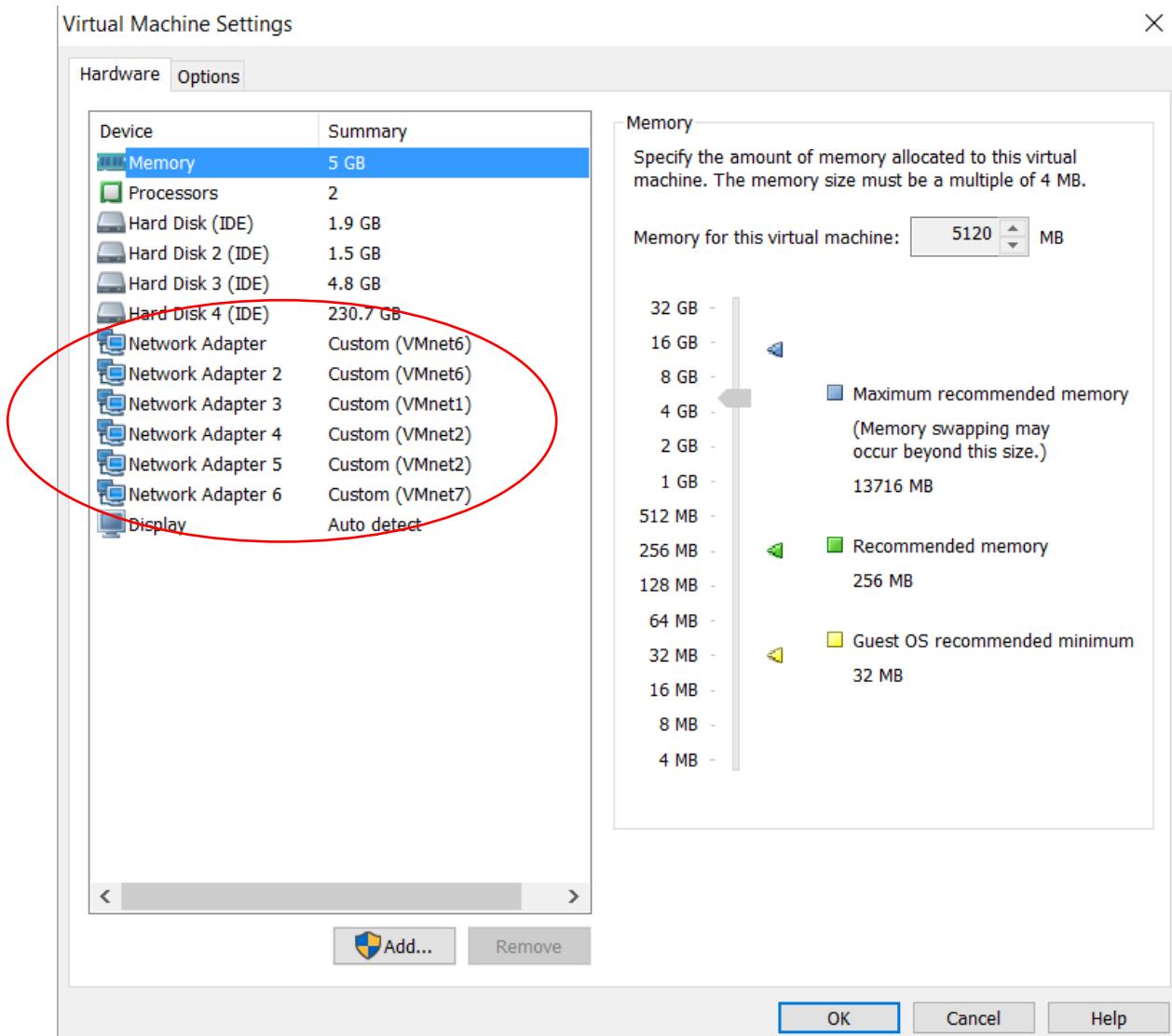


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24. Click on **Network Adapter 6** and then select Custom: Specific virtual network **VMnet7**.



25. Click **Player > Manage > Virtual Machine Settings...** again to verify your settings are the same as shown below. Make sure each adapter has the correct VMnet setting. Click **OK** to close the Settings window.



26. Click **Play Virtual Machine** to power it on



27. Observe the bootup process. Press the **Ctrl and C** keys on your keyboard simultaneously when the **Press Ctrl-C for Boot Menu** prompt appears. (It may take several minutes for the prompt to appear).

```
FreeBSD/x86 bootstrap loader, Revision 1.1
(rroot@bldr6sv165.eng.netapp.com, Fri Aug 19 00:09:32 PDT 2016)
Loading /boot/defaults/loader.conf
!
Hit [Enter] to boot immediately, or any other key for command prompt.
Booting...
x86_64/freebsd/image1/kernel data=0x9dcae0+0x58bba8 syms=[0x8+0x5a540+0x8+0x408e
8]
x86_64/freebsd/image1/platform.ko text=0x229518 data=0x55868+0x41cd0 syms=[0x8+0
x25980+0x8+0x19c6d]
NetApp Data ONTAP 9.0
Trying to mount root from msdosfs:/dev/ad0s2 [root]...
md0 attached to /x86_64/freebsd/image1/rootfs.img
Trying to mount root from ufs:/env/md0.uzip [...]
mountroot: waiting for device /env/md0.uzip ...
Copyright (C) 1992-2016 NetApp.
All rights reserved.
*****
*
* Press Ctrl-C for Boot Menu. *
*
*****
```

28. When the boot menu appears, select option **(4) Clean Configuration and Initialize All Disks** to factory reset the node. (It may take several minutes for the boot menu to appear).

```
*****
*
* Press Ctrl-C for Boot Menu. *
*
*****
Firewall rules loaded.
^CBoot Menu will be available.

Please choose one of the following:

(1) Normal Boot.
(2) Boot without /etc/rc.
(3) Change password.
(4) Clean configuration and initialize all disks.
(5) Maintenance Mode boot.
(6) Update flash from backup config.
(7) Install new software first.
(8) Reboot node.
Selection (1-8)?
```

29. Type **yes** and hit **Enter** when the **Zero disks, reset config and install a new file system?:** prompt appears.
30. Type **yes** and hit **Enter** when the **This will erase all data on the disks, are you sure?:** prompt appears.

```
All rights reserved.  
*****  
* Press Ctrl-C for Boot Menu. *  
*  
*****  
^CBoot Menu will be available.  
  
Please choose one of the following:  
  
(1) Normal Boot.  
(2) Boot without /etc/rc.  
(3) Change password.  
(4) Clean configuration and initialize all disks.  
(5) Maintenance Mode boot.  
(6) Update flash from backup config.  
(7) Install new software first.  
(8) Reboot node.  
Selection (1-8)? 4  
WAFL CPLEDGER is enabled. Checklist = 0x7ff841ff  
add host 127.0.10.1: gateway 127.0.20.1  
  
Zero disks, reset config and install a new file system?: yes  
  
This will erase all the data on the disks, are you sure?: yes
```

31. You will receive a message that System Initialization has completed successfully. (It may take several minutes for the prompt to appear.)

```
Oct 05 20:01:37 [localhost:kern.syslog.msg:notice]: Registry is being upgraded to improve storing of local changes.  
Oct 05 20:01:37 [localhost:kern.syslog.msg:notice]: Registry upgrade successful.  
  
Oct 05 20:01:37 [localhost:kern.syslog.msg:notice]: domain xing mode: off, domain xing interrupt: false  
System initialization has completed successfully.
```



32. The Cluster Setup Wizard will start. Type **create** when prompted **Do you want to create or join an existing cluster?**

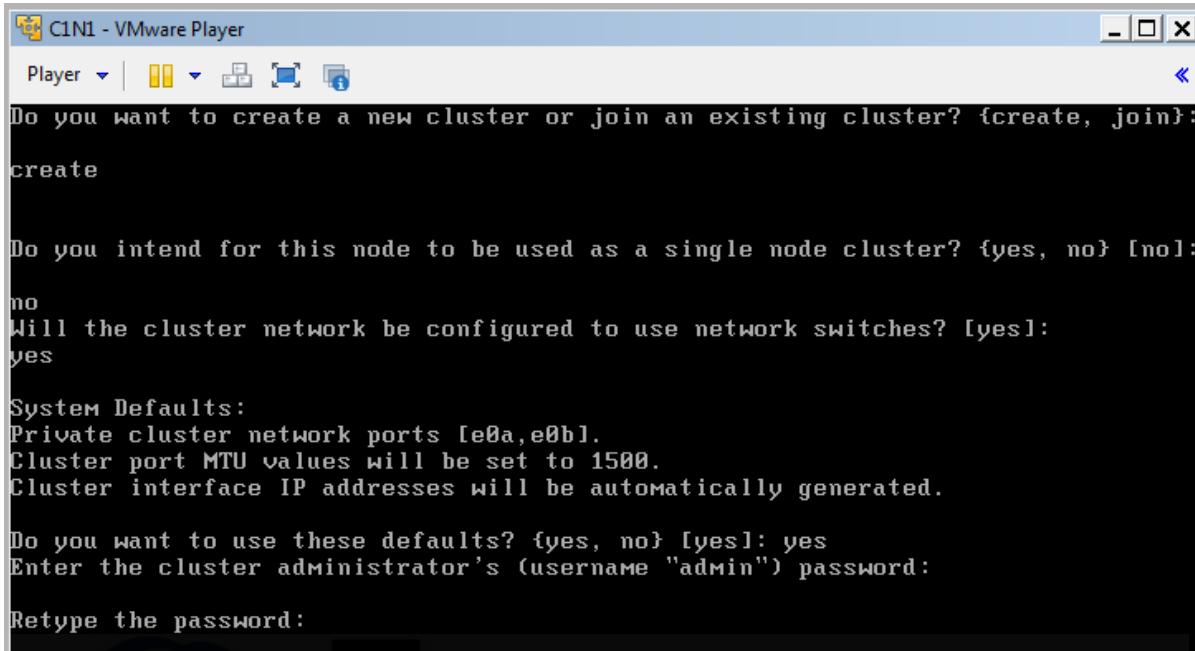
```
Welcome to the cluster setup wizard.

You can enter the following commands at any time:
  "help" or "?" - if you want to have a question clarified,
  "back" - if you want to change previously answered questions, and
  "exit" or "quit" - if you want to quit the cluster setup wizard.
  Any changes you made before quitting will be saved.

You can return to cluster setup at any time by typing "cluster setup".
To accept a default or omit a question, do not enter a value.

Do you want to create a new cluster or join an existing cluster? {create, join}:
create
```

33. Type **no** when prompted **Do you intend for this node to be used as a single node cluster?**  
34. Type **yes** when prompted **Will the cluster network be configured to use network switches?**  
35. Type **yes** when prompted **Do you want to use these defaults?**  
36. Enter **Flackbox1** for the administrator's password, and retype it when prompted.



C1N1 - VMware Player

Player | < >

```
Do you want to create a new cluster or join an existing cluster? {create, join}:
create

Do you intend for this node to be used as a single node cluster? {yes, no} [no]:
no
Will the cluster network be configured to use network switches? [yes]:
yes

System Defaults:
Private cluster network ports [e0a,e0b].
Cluster port MTU values will be set to 1500.
Cluster interface IP addresses will be automatically generated.

Do you want to use these defaults? {yes, no} [yes]: yes
Enter the cluster administrator's (username "admin") password:
Retype the password:
```

37. Enter the cluster name **cluster1**  
38. Leave the VMware window open. Open the **CMode\_licenses\_9.0.txt** file you downloaded from the NetApp website and locate the **Cluster Base License**.

```
Cluster Base License (Serial Number 1-80-000008)
=====
```

You use the cluster base license when setting up the first simulator in a cluster.

```
Cluster Base license = SMKQROWJNQYQSDAAAAAAAAAAAAAA
```

39. Back in the VMware window, enter the Cluster Base License. You will have to type this in manually as the VMware console does not support copy and paste. We will configure a management IP address later that you can SSH into using Putty which **does** support copy and paste.

```
C1N1 - VMware Player
Player | ■ | □ | X | < >

System Defaults:
Private cluster network ports [e0a,e0b].
Cluster port MTU values will be set to 1500.
Cluster interface IP addresses will be automatically generated.

Do you want to use these defaults? {yes, no} [yes]: yes
Enter the cluster administrator's (username "admin") password:
Retype the password:
It can take several minutes to create cluster interfaces...
Jan 28 04:29:10 [4294967293@localhost:callhome.netinet.dup.clustIP:EMERGENCY]: Call home for DUPLICATE CLUSTER IP.

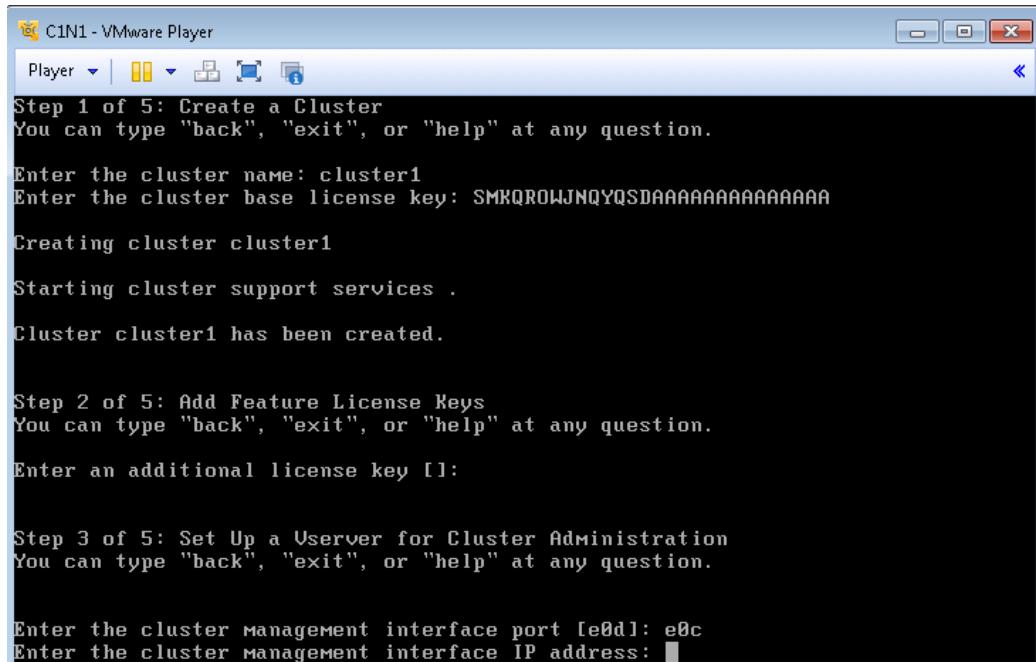
Step 1 of 5: Create a Cluster
You can type "back", "exit", or "help" at any question.

Enter the cluster name: Jan 28 04:30:16 [4294967293@localhost:netinet.ethr.dup.clustIP:EMERGENCY]: Duplicate IP address 169.254.248.167 (Ethernet MAC: 12:21:4b:71:b4:05) configured on the cluster network.

Enter the cluster name: cluster1
Enter the cluster base license key: SMKQROWJNQYQSDAAAAAAAAAAAAAA
```

40. Press **Enter** when you are prompted to **Enter an additional license key**. We will copy and paste the additional license keys later using Putty which is much quicker than manually typing them.

41. Enter **e0c** (in all lower case, it is case sensitive) as the **cluster management interface port**.  
Note that this is different from the default.



```
Step 1 of 5: Create a Cluster
You can type "back", "exit", or "help" at any question.

Enter the cluster name: cluster1
Enter the cluster base license key: SMKQROWJNQYQSDAAAAAAAAAAAAAA

Creating cluster cluster1
Starting cluster support services .
Cluster cluster1 has been created.

Step 2 of 5: Add Feature License Keys
You can type "back", "exit", or "help" at any question.

Enter an additional license key [1]: 

Step 3 of 5: Set Up a Userver for Cluster Administration
You can type "back", "exit", or "help" at any question.

Enter the cluster management interface port [e0d]: e0c
Enter the cluster management interface IP address: █
```

42. Enter the cluster management interface IP address **172.23.1.11**  
43. Enter the cluster management interface netmask **255.255.255.0**  
44. Enter the cluster management interface default gateway **172.23.1.254**  
45. Enter the DNS domain name: **flackboxA.lab**  
46. Enter the name server IP address: **172.23.4.1**. This is the Windows Active Directory server for Department A.

```
Enter the cluster management interface port [e0d]: e0c
Enter the cluster management interface IP address: 172.23.1.11
Enter the cluster management interface netmask: 255.255.255.0
Enter the cluster management interface default gateway: 172.23.1.254

A cluster management interface on port e0c with IP address 172.23.1.11 has been
created. You can use this address to connect to and manage the cluster.

Enter the DNS domain names: flackboxA.lab
Enter the name server IP addresses: 172.23.4.1
DNS lookup for the admin Userver will use the flackboxA.lab domain.
```



47. Enter Where is the controller located: **Flackbox-lab**. This is informational only.
48. Enter **e0c** as the node management interface port. Note this is a shared physical port with the cluster management interface.
49. Enter the node management interface IP address: **172.23.1.12**
50. Enter the node management interface netmask: **255.255.255.0**
51. Enter the node management default gateway: **172.23.1.254**

```
Step 5 of 5: Set Up the Node
You can type "back", "exit", or "help" at any question.

Where is the controller located []: Flackbox-lab
Enter the node management interface port [e0c]: e0c
Enter the node management interface IP address: 172.23.1.12
Enter the node management interface netMask: 255.255.255.0
Enter the node management interface default gateway [172.23.1.254]: 

A node management interface on port e0c with IP address 172.23.1.12 has been created.
```

52. Press **Enter** to enable AutoSupport and continue. NetApp systems automatically send logs and error messages to NetApp when AutoSupport is enabled.

```
This system will send event messages and weekly reports to NetApp Technical Support.
To disable this feature, enter "autosupport modify -support disable" within 24 hours.
Enabling AutoSupport can significantly speed problem determination and resolution should a problem occur on your system.
For further information on AutoSupport, please see: http://support.netapp.com/autosupport/
Press enter to continue: ■
```

53. The cluster setup wizard has completed and Cluster 1 Node 1 is available.

```
Cluster "cluster1" has been created.

To complete cluster setup, you must join each additional node to the cluster by running "cluster setup" on each node.

To complete system configuration, you can use either OnCommand System Manager or the Data ONTAP command-line interface.

To access OnCommand System Manager, point your web browser to the cluster management IP address (https://172.23.1.11).

To access the command-line interface, connect to the cluster management IP address (for example, ssh admin@172.23.1.11).
```

Wed Oct 5 20:22:01 UTC 2016  
login: ■

54. Log in with the username **admin** and the password **Flackbox1**

```
Wed Oct  5 20:22:01 UTC 2016
login: admin
Password:
cluster1::> █
```

55. Next we will add additional disks to the simulator. We need to be in the systemshell mode to do this which requires the use of the diag account. Unlock the diag user with the command **security login unlock –username diag**
56. Assign the diag user a password with the command **security login password -username diag**. You will be prompted to enter and then confirm the password. Use the password **Flackbox1**

```
cluster1::> security login unlock -username diag
cluster1::> security login password -username diag
Enter a new password:
Enter it again:
cluster1::> █
```

57. Enter the diag privilege level with the **set –privilege diag** command. Type **yes** to confirm. Notice the command prompt changes to cluster1::\*>

```
cluster1::> set -privilege diag
Warning: These diagnostic commands are for use by NetApp personnel only.
Do you want to continue? {y\!n}: yes
cluster1::*> █
```

58. Enter the systemshell on Node 1 with the **systemshell local** command. Login with the password **Flackbox1**. Notice the command prompt changes to cluster1-01%

```
cluster1::*> systemshell local
(system node systemshell)
diag@127.0.0.1's password:

Warning: The system shell provides access to low-level
diagnostic tools that can cause irreparable damage to
the system if not used properly. Use this environment
only when directed to do so by support personnel.

cluster1-01% █
```

59. Add the disk tools directory to the command path with the command **setenv PATH "\${PATH}:/usr/sbin"**

```
cluster1-01% setenv PATH "${PATH}:/usr/sbin"
cluster1-01% █
```

60. Change to the correct directory with the **cd /sim/dev** command

```
cluster1-01% cd /sim/dev
cluster1-01% █
```

61. Add 14 additional 1GB (type 23) disks on adapter 2 with the command  
**sudo vsim\_makedisks -n 14 -t 23 -a 2**

```
cluster1-01% sudo vsim_makedisks -n 14 -t 23 -a 2
Creating ,disks/v2.16:NETAPP__:VD-1000MB-FZ-520:22814800:2104448
Creating ,disks/v2.17:NETAPP__:VD-1000MB-FZ-520:22814801:2104448
Creating ,disks/v2.18:NETAPP__:VD-1000MB-FZ-520:22814802:2104448
Creating ,disks/v2.19:NETAPP__:VD-1000MB-FZ-520:22814803:2104448
Creating ,disks/v2.20:NETAPP__:VD-1000MB-FZ-520:22814804:2104448
Creating ,disks/v2.21:NETAPP__:VD-1000MB-FZ-520:22814805:2104448
Creating ,disks/v2.22:NETAPP__:VD-1000MB-FZ-520:22814906:2104448
Creating ,disks/v2.24:NETAPP__:VD-1000MB-FZ-520:22814907:2104448
Creating ,disks/v2.25:NETAPP__:VD-1000MB-FZ-520:22814908:2104448
Creating ,disks/v2.26:NETAPP__:VD-1000MB-FZ-520:22814909:2104448
Creating ,disks/v2.27:NETAPP__:VD-1000MB-FZ-520:22814910:2104448
Creating ,disks/v2.28:NETAPP__:VD-1000MB-FZ-520:22814911:2104448
Creating ,disks/v2.29:NETAPP__:VD-1000MB-FZ-520:22814912:2104448
Creating ,disks/v2.32:NETAPP__:VD-1000MB-FZ-520:22814913:2104448
Shelf file Shelf:DiskShelf14 updated
```

62. Add 14 additional 500MB SSD (type 35) disks on adapter 3 with the command **sudo vsim\_makedisks -n 14 -t 35 -a 3**

```
cluster1-01% sudo vsim_makedisks -n 14 -t 35 -a 3
Creating ,disks/v3.16:NETAPP__:VD-500MB-SS-520_:25852600:1080448
Creating ,disks/v3.17:NETAPP__:VD-500MB-SS-520_:25852601:1080448
Creating ,disks/v3.18:NETAPP__:VD-500MB-SS-520_:25852602:1080448
Creating ,disks/v3.19:NETAPP__:VD-500MB-SS-520_:25852603:1080448
Creating ,disks/v3.20:NETAPP__:VD-500MB-SS-520_:25852604:1080448
Creating ,disks/v3.21:NETAPP__:VD-500MB-SS-520_:25852605:1080448
Creating ,disks/v3.22:NETAPP__:VD-500MB-SS-520_:25852606:1080448
Creating ,disks/v3.24:NETAPP__:VD-500MB-SS-520_:25852607:1080448
Creating ,disks/v3.25:NETAPP__:VD-500MB-SS-520_:25852608:1080448
Creating ,disks/v3.26:NETAPP__:VD-500MB-SS-520_:25852609:1080448
Creating ,disks/v3.27:NETAPP__:VD-500MB-SS-520_:25852610:1080448
Creating ,disks/v3.28:NETAPP__:VD-500MB-SS-520_:25852611:1080448
Creating ,disks/v3.29:NETAPP__:VD-500MB-SS-520_:25852612:1080448
Creating ,disks/v3.32:NETAPP__:VD-500MB-SS-520_:25852613:1080448
Shelf file Shelf:DiskShelf14 updated
```

63. Enter the command **exit** to revert back to the clustershell command prompt  
64. Reboot the node so that the new disks can be detected. Use the command **system node reboot cluster1-01 --ignore-quorum-warnings** and type **y** when prompted to confirm

```
cluster1::*> system node reboot cluster1-01 --ignore-quorum-warnings
Warning: Are you sure you want to reboot node "cluster1-01"?
{y\!n}: y
```

login:

65. When the system has rebooted, log in with username **admin** and password **Flackbox1**. Please be patient as it can take a long time to reboot.  
66. Add all existing disks to Cluster 1 Node 1 with the command **storage disk assign -all true -node cluster1-01**

```
cluster1::> storage disk assign -all true -node cluster1-01
```

67. There is a limited amount of disk space so we will delete snapshots on the root volume vol0.
68. Enter the command **run local** to enter the local node shell. Notice that the command prompt changes.
69. Enter the command **snap delete -a -f vol0** to force the deletion of any existing snapshots.
70. Enter the command **snap sched vol0 0 0 0** to disable automatic snapshots on the root volume.
71. Enter the command **exit** to return to the cluster shell. The command prompt changes back to the cluster shell prompt.

```
cluster1::> run local
Type 'exit' or 'Ctrl-D' to return to the CLI
cluster1-01> snap delete -a -f vol0
Deleted vol0 snapshot hourly.0.
cluster1-01> snap sched vol0 0 0 0
cluster1-01> █
```

72. Add a disk to the root aggregate aggr0 with the command **node run cluster1-01 aggr add aggr0 1**

```
cluster1::> node run cluster1-01 aggr add aggr0 1
Addition of 1 disk to the aggregate has completed.
```

73. Attempt to add the capacity of the additional 1GB disk to vol0 with the command **node run cluster1-01 vol size vol0 +1g**  
The command will fail with an error message indicating the maximum volume size (1658052k in the example screenshot below).

```
cluster1::> node run cluster1-01 vol size vol0 +1g
vol size: Cannot grow root volume to more than 95% of the available aggregate size which is currently 1658052k.
An attempt was made to set the root volume size to 1875232k.
```

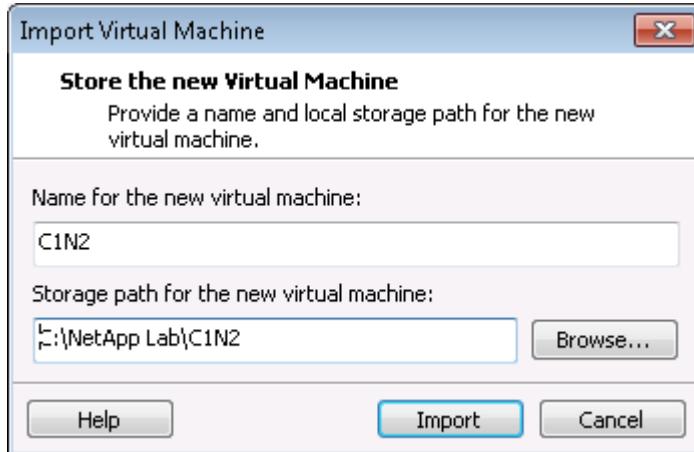
Enter the command **node run cluster1-01 vol size vol0 1658052k** to increase the volume size. (You may have a different maximum volume size).

```
cluster1::> node run cluster1-01 vol size vol0 1658052k
vol size: Flexible volume 'vol0' size set to 1658052k.
```

74. Set up of the first cluster and node 1 is now complete.



75. We are now ready to set up Cluster 1 Node 2. Leave Cluster 1 Node 1 running while you set up Cluster 1 Node 2.
76. Open Windows Explorer and browse to your NetApp Lab folder. Make a subfolder named **C1N2**.
77. Open a second instance of VMware Player from the Windows Start menu.
78. Repeat steps 14 to 25. Name the virtual machine **C1N2** and save it in the **C1N2** folder.



79. We need to change the serial number on Node 2 to prevent a conflict with Node 1. Follow the next step exactly as described and be ready to click in the virtual machine window and press the spacebar quickly.
80. Click **Play Virtual Machine** to power it on. Click inside the virtual machine window with your mouse to make your keyboard active for the virtual machine. Press the spacebar key immediately when you see the message **Hit [Enter] to boot immediately, or any other key for command prompt.**
81. At the VLOADER prompt, enter **setenv SYS\_SERIAL\_NUM 4034389-06-2**
82. Enter **setenv bootarg.nvram.sysid 4034389062**
83. This will change the serial number and system ID to different values from Node 1, which will allow us to join Node 2 to the cluster without error messages.

```

BTX loader 1.00 BTX version is 1.02
Consoles: internal video/keyboard
BIOS drive A: is disk0
BIOS drive C: is disk1
BIOS drive D: is disk2
BIOS drive E: is disk3
BIOS drive F: is disk4
BIOS 638kB/3143616kB available memory

FreeBSD/i386 bootstrap loader, Revision 1.1
(croot@bldrhh6svl06.eng.netapp.com, Thu Nov 5 01:45:20 PST 2015)
Loading /boot/defaults/loader.conf
:
Hit [Enter] to boot immediately, or any other key for command prompt.
Booting in 8 seconds...

Type '?' for a list of commands, 'help' for more detailed help.
VLOADER> setenv SYS_SERIAL_NUM 4034389-06-2
VLOADER> setenv bootarg.nvram.sysid 4034389062
VLOADER> _

```

84. Type **boot** and press **Enter** to boot the node.

85. Repeat steps 27 to 31 to factory reset the node.  
 86. The Cluster Setup Wizard will start. Type **join** when prompted **Do you want to create or join an existing cluster?**

```
Welcome to the cluster setup wizard.

You can enter the following commands at any time:
  "help" or "?" - if you want to have a question clarified,
  "back" - if you want to change previously answered questions, and
  "exit" or "quit" - if you want to quit the cluster setup wizard.
  Any changes you made before quitting will be saved.

You can return to cluster setup at any time by typing "cluster setup".
To accept a default or omit a question, do not enter a value.

Do you want to create a new cluster or join an existing cluster? {create, join}: join
```

87. Type **yes** and press **Enter** to accept the system default values.

```
System Defaults:
Private cluster network ports [e0a,e0b].
Cluster port MTU values will be set to 1500.
Cluster interface IP addresses will be automatically generated.

Do you want to use these defaults? {yes, no} [yes]: yes
```

88. If you receive no error message then continue to the next step. If you receive the error message 'No clusters were discovered' then enter the command **network interface show** on the first node C1N1, and note the IP address on interface cluster1-01\_clus1.

```
cluster1::> network interface show
      Logical      Status      Network          Current      Current   Is
Userver    Interface  Admin/Oper Address/Mask    Node        Port     Home
-----  -----  -----  -----  -----  -----
Cluster
      cluster1-01_clus1
            up/up    169.254.142.33/16  cluster1-01  e0a      true
      cluster1-01_clus2
            up/up    169.254.210.198/16  cluster1-01  e0b      true
cluster1
      cluster1-01_Mgmt1
            up/up    172.23.1.12/24    cluster1-01  e0c      true
      cluster_mgmt
            up/up    172.23.1.11/24    cluster1-01  e0c      true
4 entries were displayed.
```

Back on the second node C1N2, enter the IP address you noted of interface cluster1-01\_clus1.

```
No clusters were discovered. Enter the IP address of an interface on the
private cluster network from the cluster you want to join: 169.254.143.33
Enter the name of the cluster you would like to join [cluster1]:
```

89. Press **Enter** to join **cluster1**.

```
Enter the name of the cluster you would like to join [cluster1]:
```

```
Joining cluster cluster1
```

90. Enter **e0c** as the node management interface port.

91. Enter the node management interface IP address: **172.23.1.13**

92. Enter the node management interface netmask: **255.255.255.0**

93. Enter the node management default gateway: **172.23.1.254**

```
Step 3 of 3: Set Up the Node
You can type "back", "exit", or "help" at any question.
```

```
Enter the node management interface port [e0c]:
```

```
Enter the node management interface IP address: 172.23.1.13
```

```
Enter the node management interface netmask [255.255.255.0]:
```

```
Enter the node management interface default gateway [172.23.1.254]:
```

94. Press **Enter** to enable AutoSupport and continue.

```
This system will send event messages and weekly reports to NetApp Technical Support.
To disable this feature, enter "autosupport modify -support disable" within 24 hours.
Enabling AutoSupport can significantly speed problem determination and resolution should a problem occur on your system.
For further information on AutoSupport, please see: http://support.netapp.com/autosupport/
Press enter to continue: ■
```

95. The cluster setup wizard has completed and Cluster 1 Node 2 is available.

```
This node has been joined to cluster "cluster1".
```

```
To complete cluster setup, you must join each additional node to the cluster by running "cluster setup" on each node.
```

```
To complete system configuration, you can use either OnCommand System Manager or the Data ONTAP command-line interface.
```

```
To access OnCommand System Manager, point your web browser to the cluster management IP address (https://172.23.1.11).
```

```
To access the command-line interface, connect to the cluster management IP address (for example, ssh admin@172.23.1.11).
```

96. Log in with the username **admin** and password **Flackbox1**

97. Add all remaining disks to Cluster 1 Node 2 with the command **storage disk assign -all true -node cluster1-02**

```
cluster1::> storage disk assign -all true -node cluster1-02
```

98. There is a limited amount of disk space so we will delete snapshots on the root volume vol0.
99. Enter the command **run local** to enter the local node shell. Notice that the command prompt changes.
100. Enter the command **snap delete -a -f vol0** to force the deletion of any existing snapshots.
101. Enter the command **snap sched vol0 0 0 0** to disable automatic snapshots on the root volume.
102. Enter the command **exit** to return to the cluster shell. The command prompt changes back to the cluster shell prompt.

```
cluster1::> run local
Type 'exit' or 'Ctrl-D' to return to the CLI
cluster1-01> snap delete -a -f vol0
Deleted vol0 snapshot hourly.0.
cluster1-01> snap sched vol0 0 0 0
cluster1-01> █
```

103. Set up of Cluster 1 Node 2 is now complete.
104. A common problem at this point is that the cluster management IP address may be homed on the wrong port. Enter the **network interface show** command to check. (This is the first thing to check anytime you cannot connect to the management interface.)

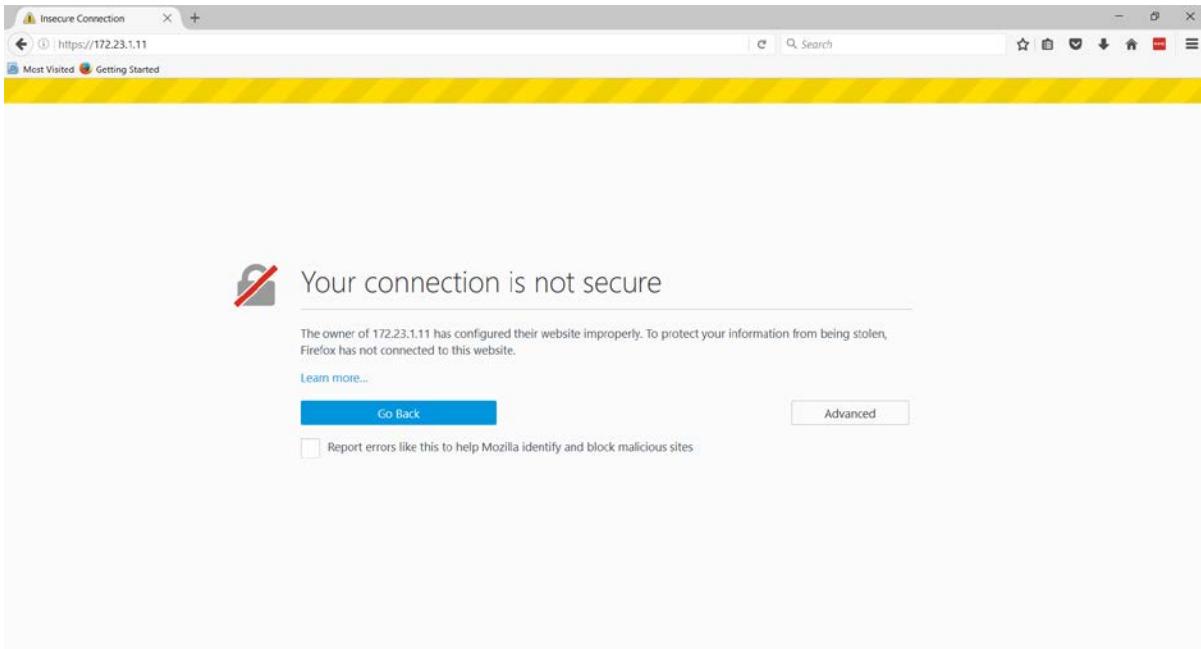
User/Server	Logical Interface	Status	Network Address/Mask	Current Node	Current Port	Is Home
Cluster	cluster1-01_clus1	up/up	169.254.105.151/16	cluster1-01	e0a	true
	cluster1-01_clus2	up/up	169.254.105.161/16	cluster1-01	e0b	true
	cluster1-02_clus1	up/up	169.254.213.179/16	cluster1-02	e0a	true
	cluster1-02_clus2	up/up	169.254.213.189/16	cluster1-02	e0b	true
cluster1	cluster1-01_mgmt1	up/up	172.23.1.12/24	cluster1-01	e0c	true
	cluster1-02_mgmt1	up/up	172.23.1.13/24	cluster1-02	e0c	true
	cluster_mgmt	up/up	172.23.1.11/24	cluster1-01	e0d	false
7 entries were displayed.						

105. If the **cluster\_mgmt** interface 172.23.1.11/24 reports **false** in the **Is Home** column, then revert it back to its home port with the command **network interface revert \***

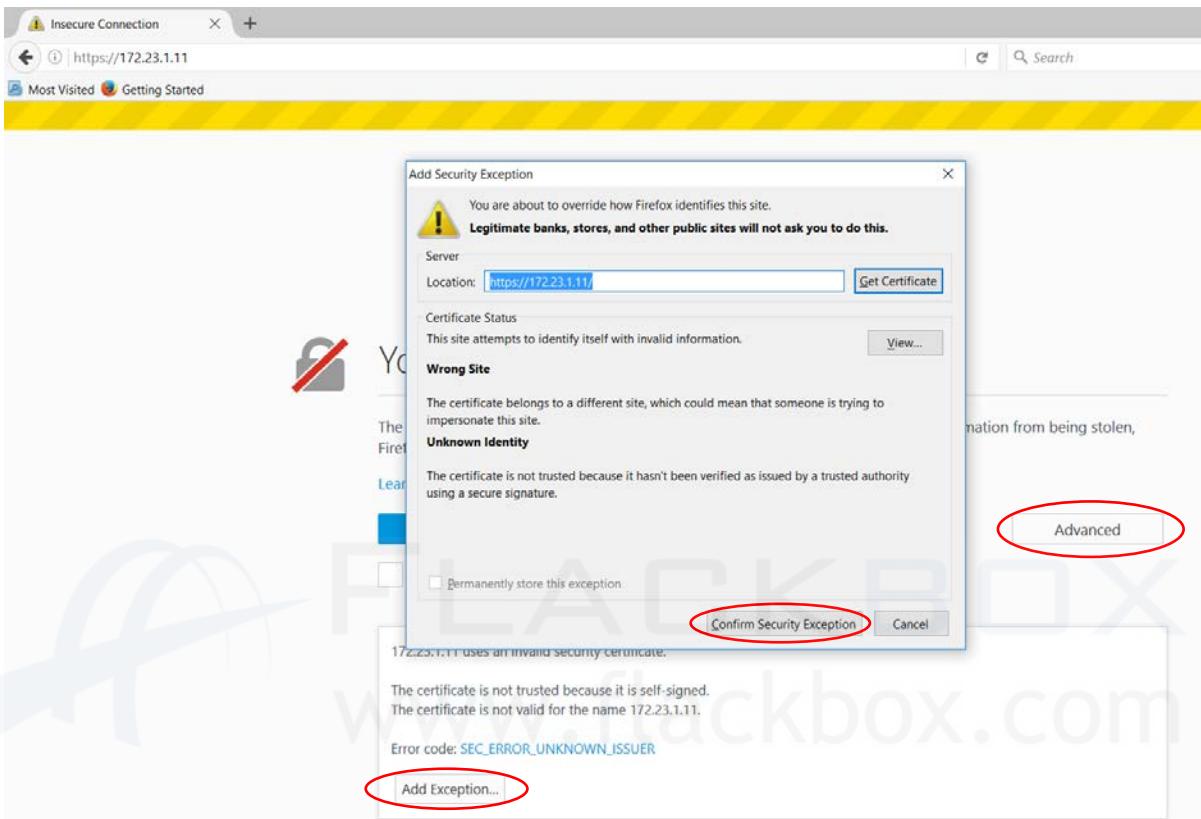
```
cluster1::> network interface revert *
1 entry was acted on.
```



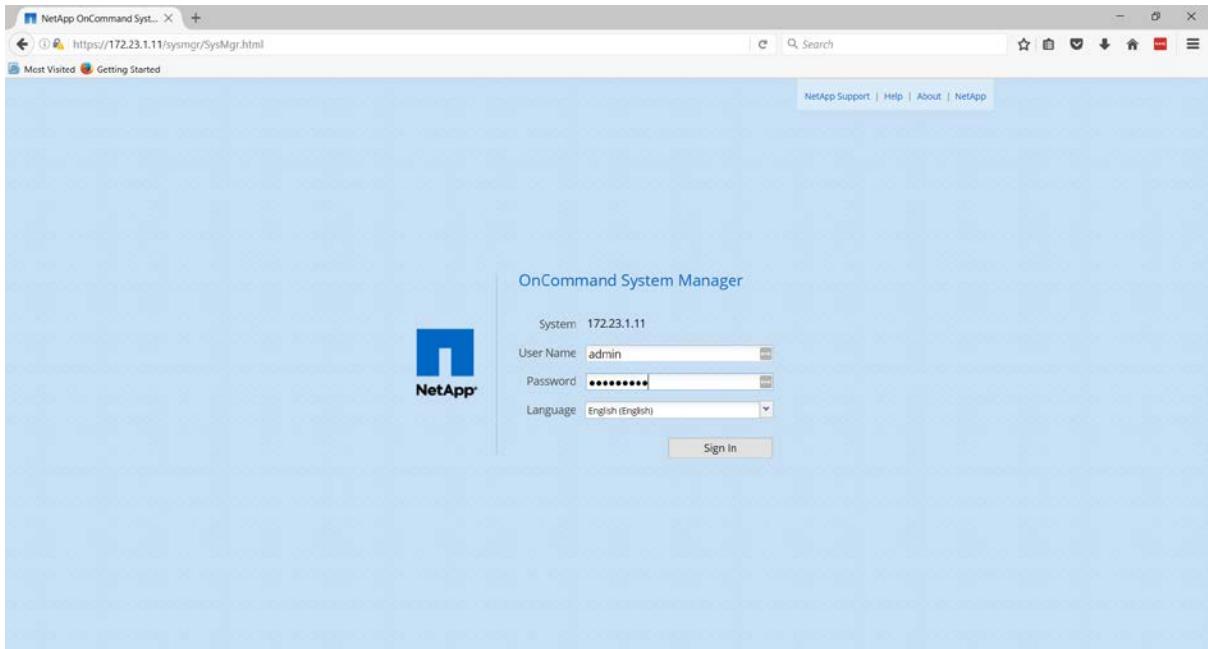
106. Open a web browser on your laptop and connect to the cluster management address at <https://172.23.1.11>



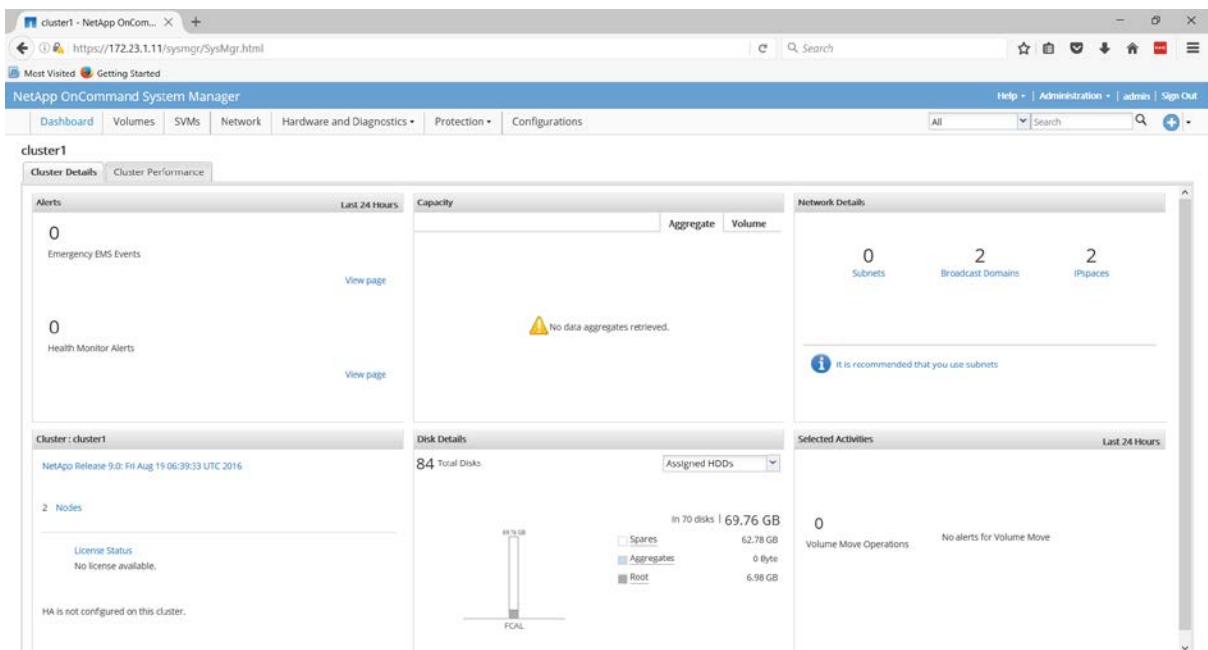
107. You will receive a certificate warning because the cluster uses a Self Signed Certificate which is not trusted by your browser  
108. Bypass the certificate warning in your browser. If you're using Firefox, click **Advanced** then **Add Exception...** then **Confirm Security Exception**



109. Log in to System Manager with the username **admin** and the password **Flackbox1**



110. The System Manager dashboard will open and you are ready to configure the first cluster



111. If you have any issues with how System Manager displays pages then try a different web browser or Java version on your laptop

112. We will power off both nodes of Cluster 1 to save resources while we configure Cluster 2.

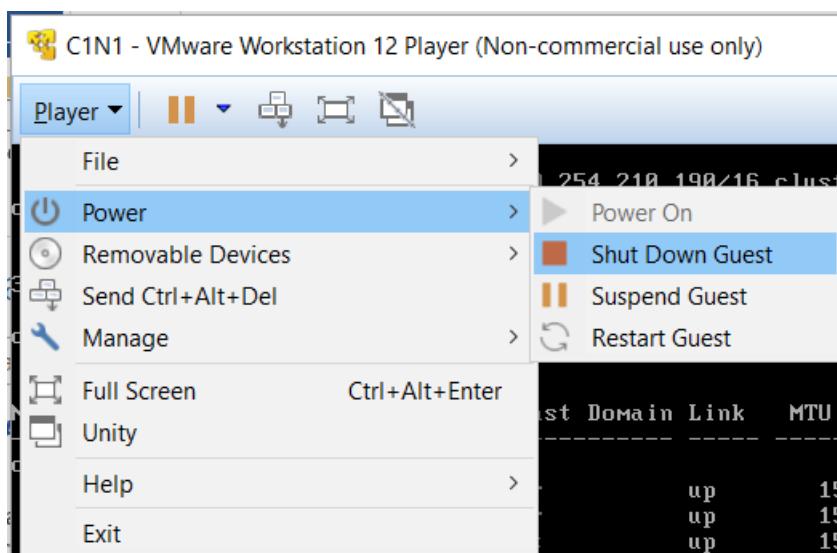
113. Gracefully shut down both Cluster 1 Node 1 and Node 2 with the command **system node halt local –ignore-quorum warnings**. When you see the **operating system has halted** message then click **Player > Power > Shut Down Guest** in VMware Player.

```
cluster1::> system node halt local -ignore-quorum-warnings
Warning: Are you sure you want to halt node "cluster1-01"? {y\!n}: y

login:
Waiting for PIDS: /usr/sbin/rpcbind 691.

Uptime: 5h30m39s

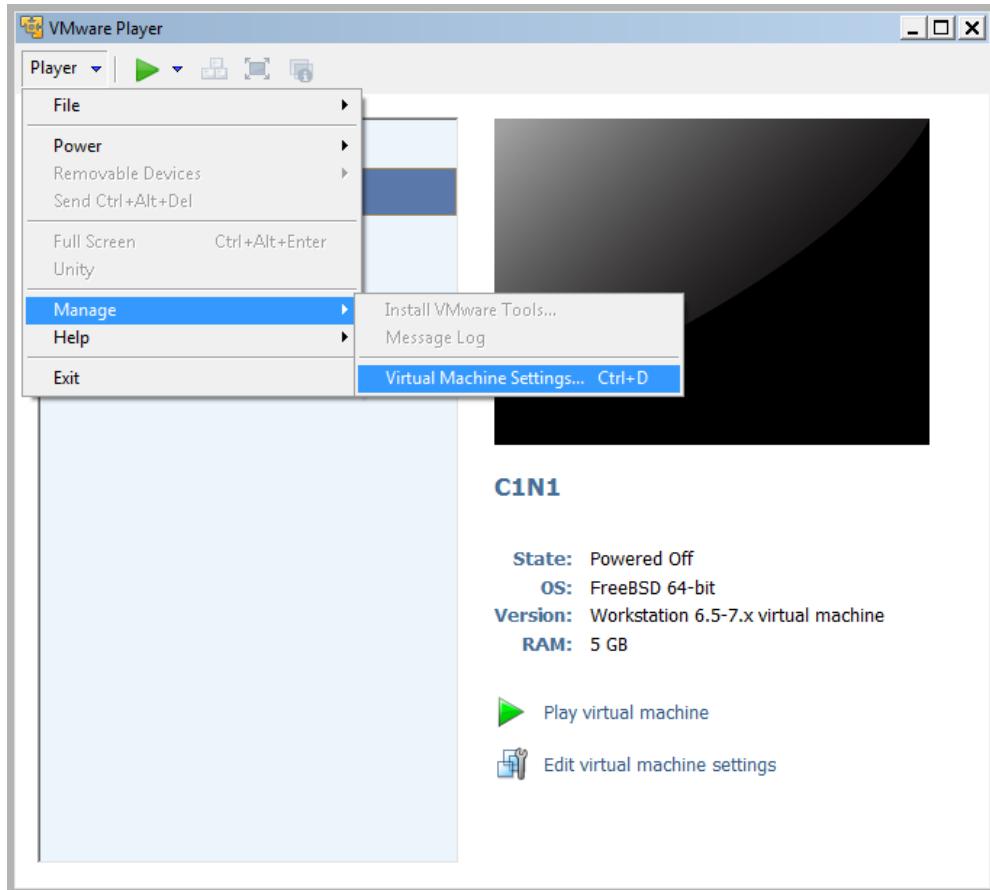
The operating system has halted.
Please press any key to reboot.
```



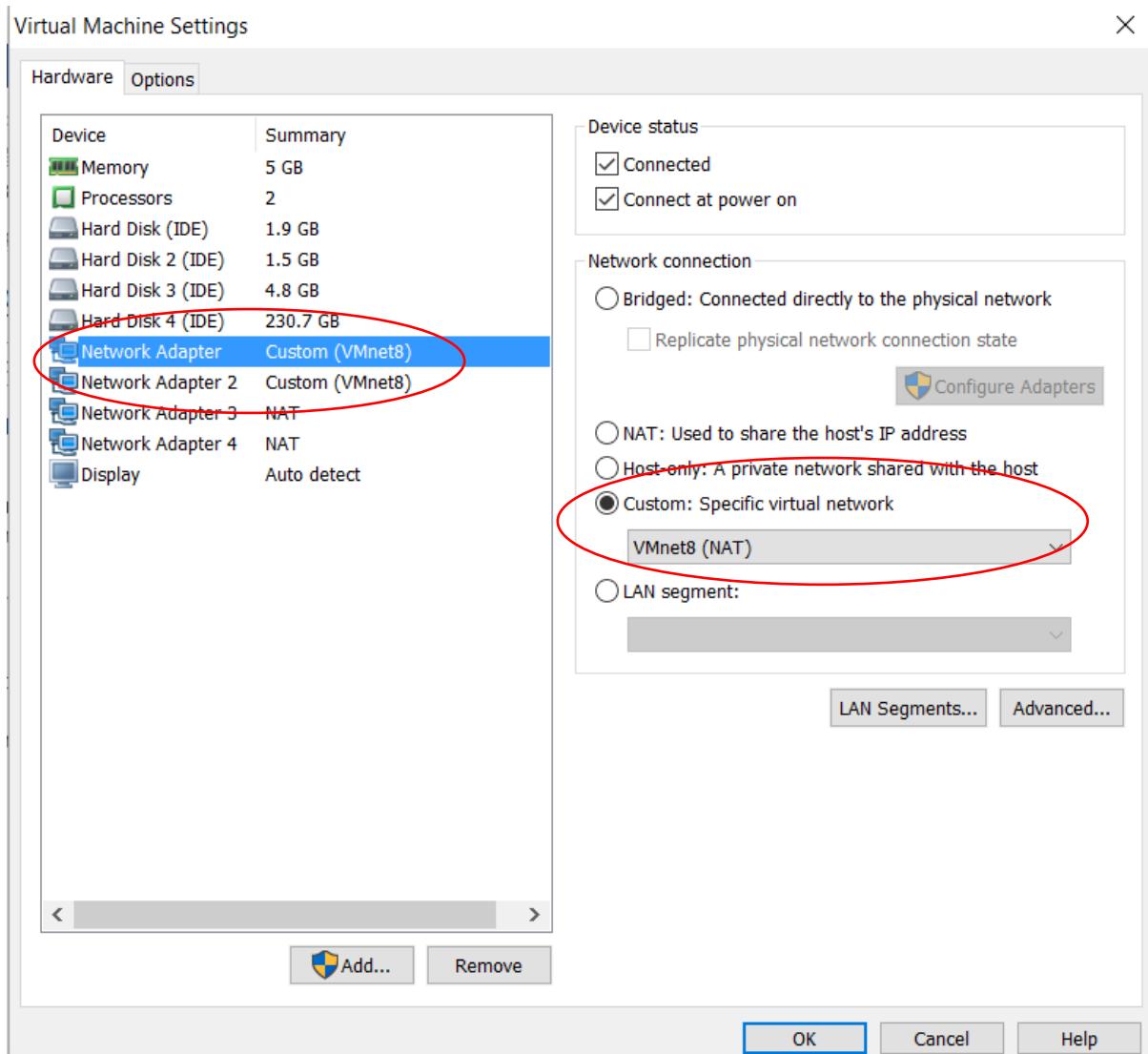
114. We are now ready to build Cluster 2. There is only one node in Cluster 2. There is no need to change the serial number as it is a different cluster.  
 115. Open Windows Explorer and browse to your NetApp Lab folder. Make a subfolder named **C2N1**.  
 116. Open VMware Player from the Windows Start menu.  
 117. Repeat steps 14 to 17. Name the virtual machine **C2N1** and save it in the **C2N1** folder.



118. After the image has completed importing, click **Player > Manage > Virtual Machine Settings...**

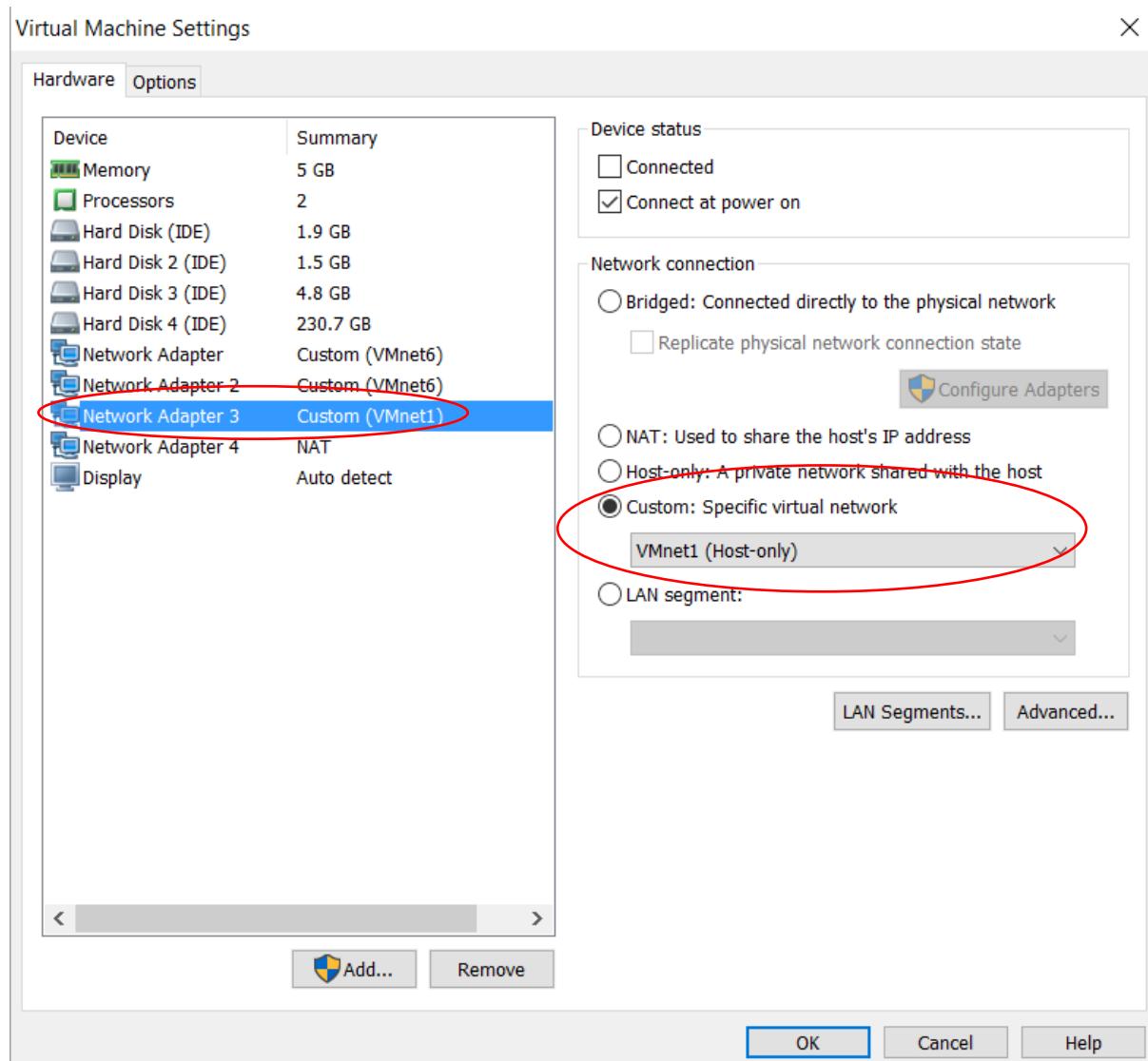


119. The first two network adapters are the Cluster Interconnect adapters. We will put them in their own private network. Click on the first **Network Adapter** and select Custom: Specific virtual network **VMnet8 (NAT)**. Repeat to set **Network Adapter 2** also to Custom: Specific virtual network **VMnet8 (NAT)**. We will not actually be using NAT, we just need a separate network for the Cluster Interconnect adapters and VMnet8 is the next available.



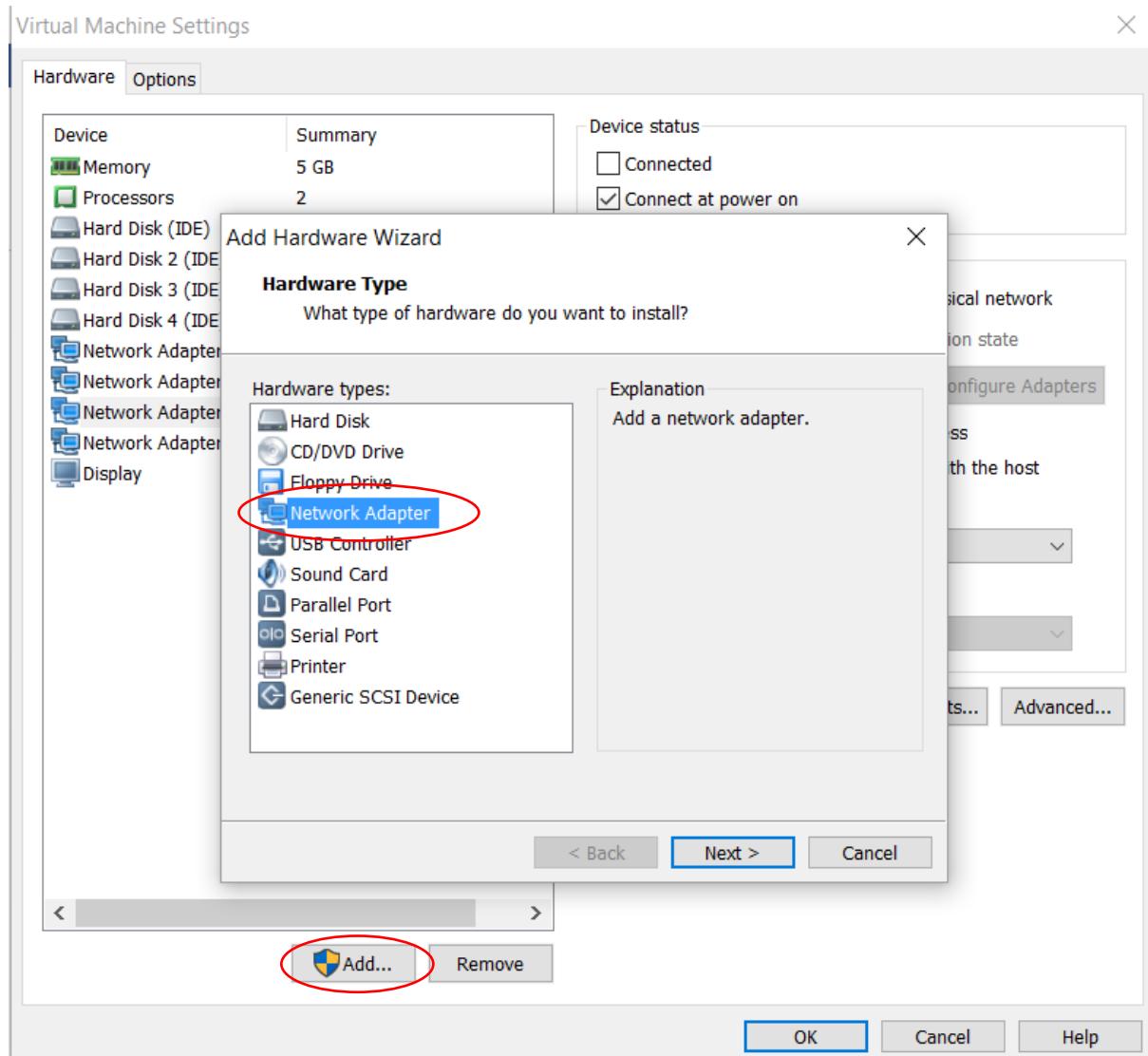
FLACKBOX  
www.flackbox.com

120. Click on **Network Adapter 3** and select Custom: Specific virtual network **VMnet1 (Host-only)**. This is our management network.



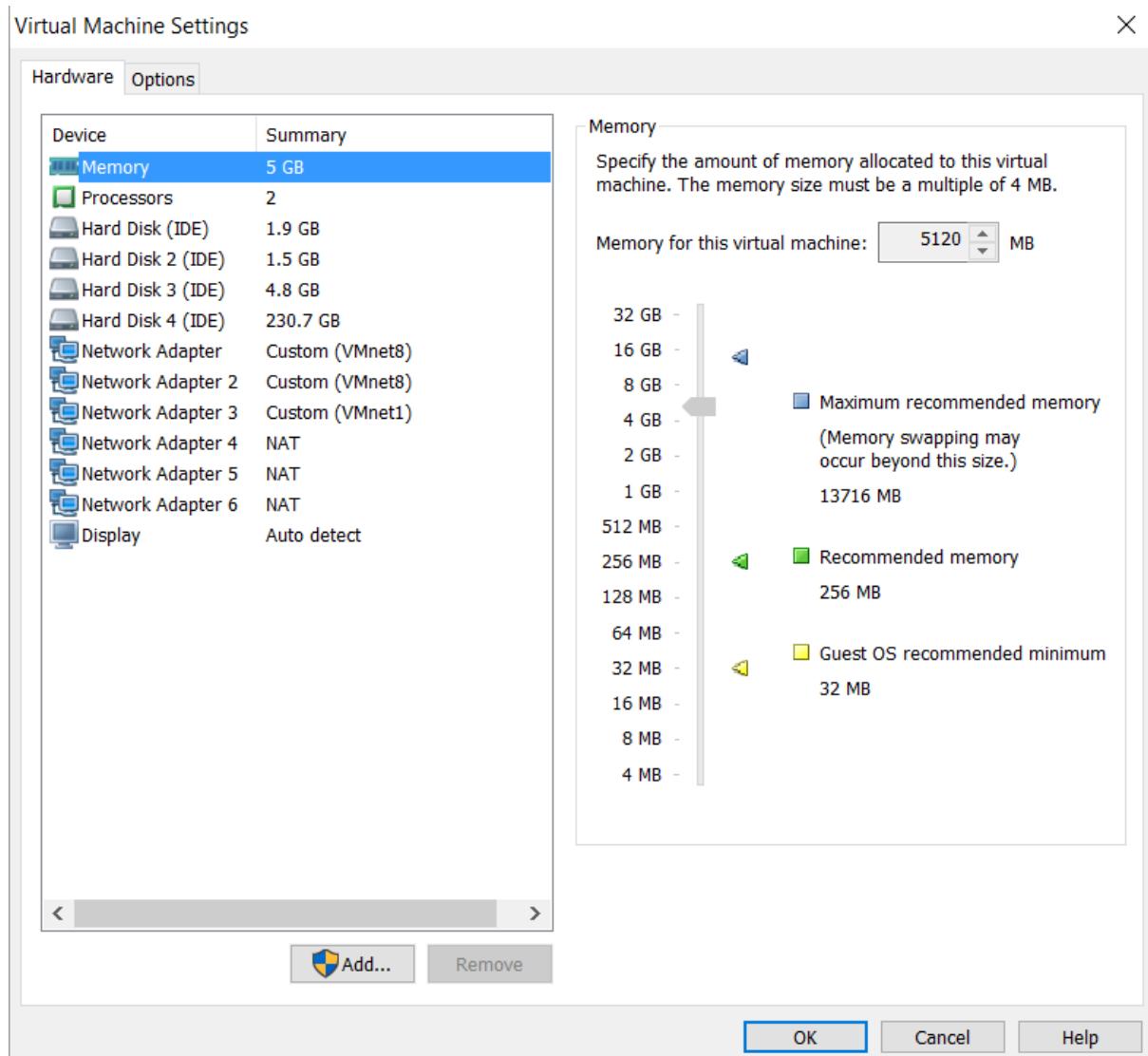
 FLACKBOX  
www.flackbox.com

121. Add additional adapters for our data networks. Click on the **Add** button and choose **Network Adapter** then click **Next** and **Finish**.



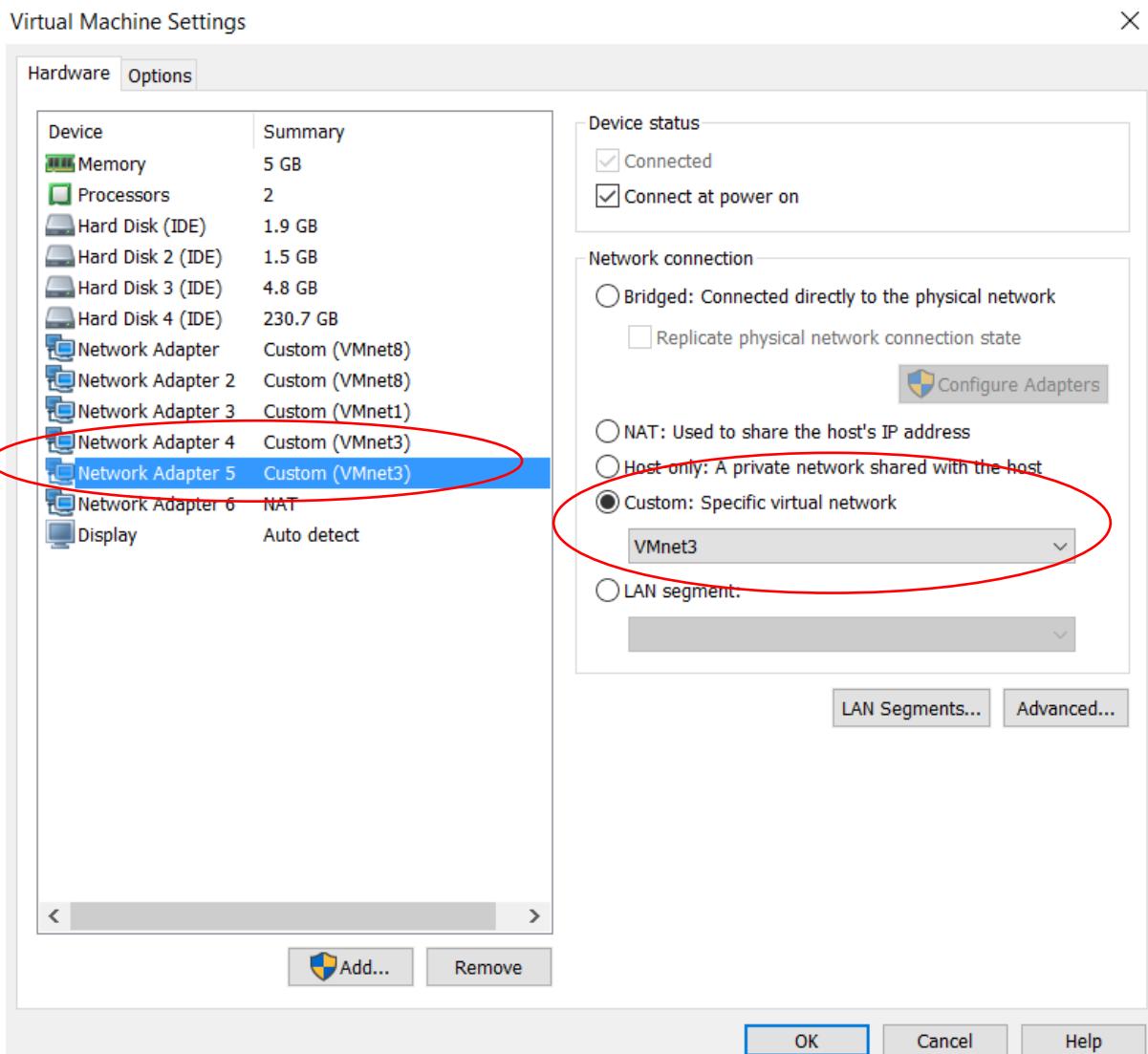
FLACKBOX  
www.flackbox.com

122. This will add **Network Adapter 5**. Repeat to add **Network Adapter 6**.



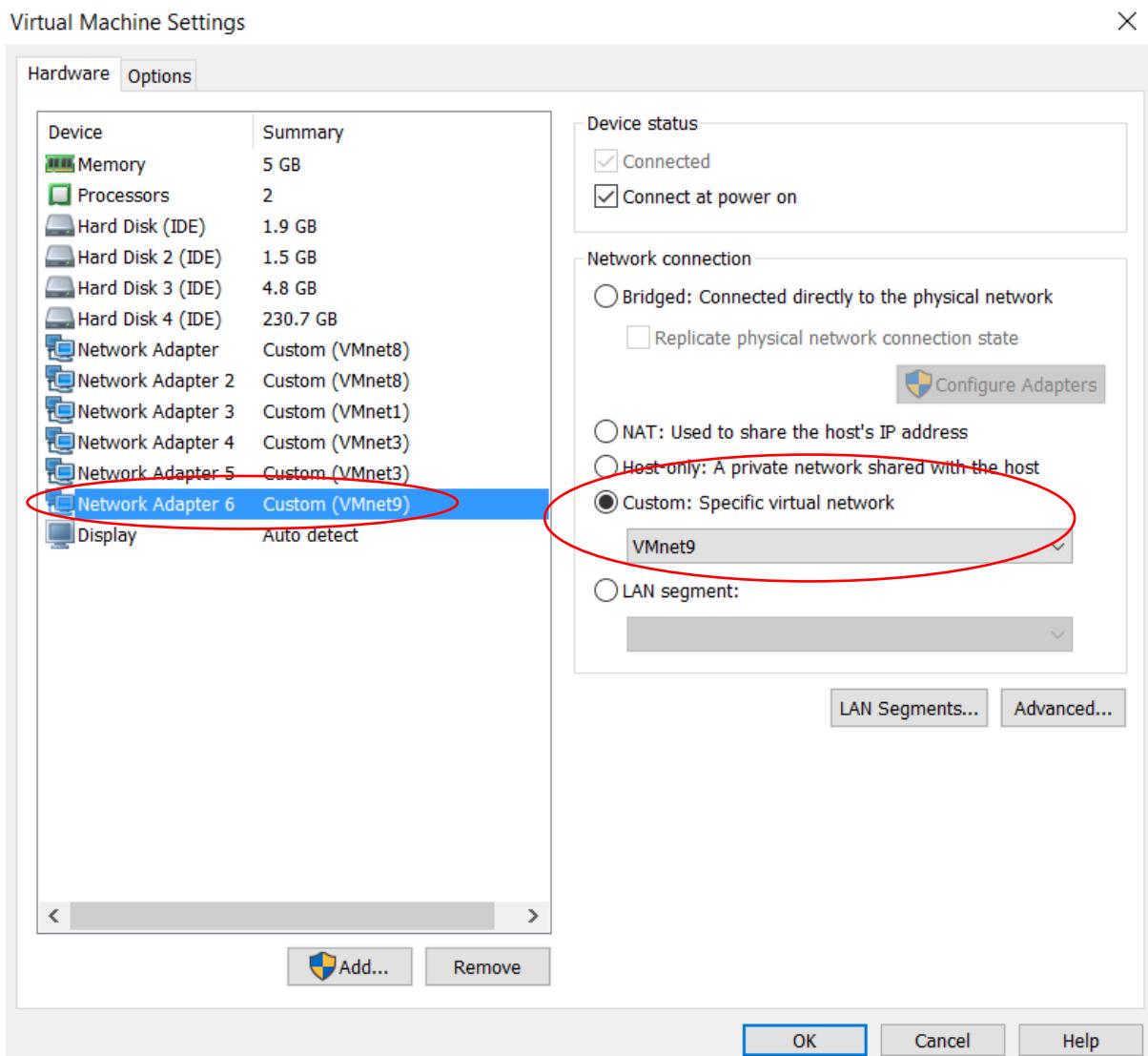
 FLACKBOX  
www.flackbox.com

123. Click on **Network Adapter 4** and then select Custom: Specific virtual network **VMnet3**.  
Repeat to set **Network Adapter 5** also to Custom: Specific virtual network **VMnet3**.

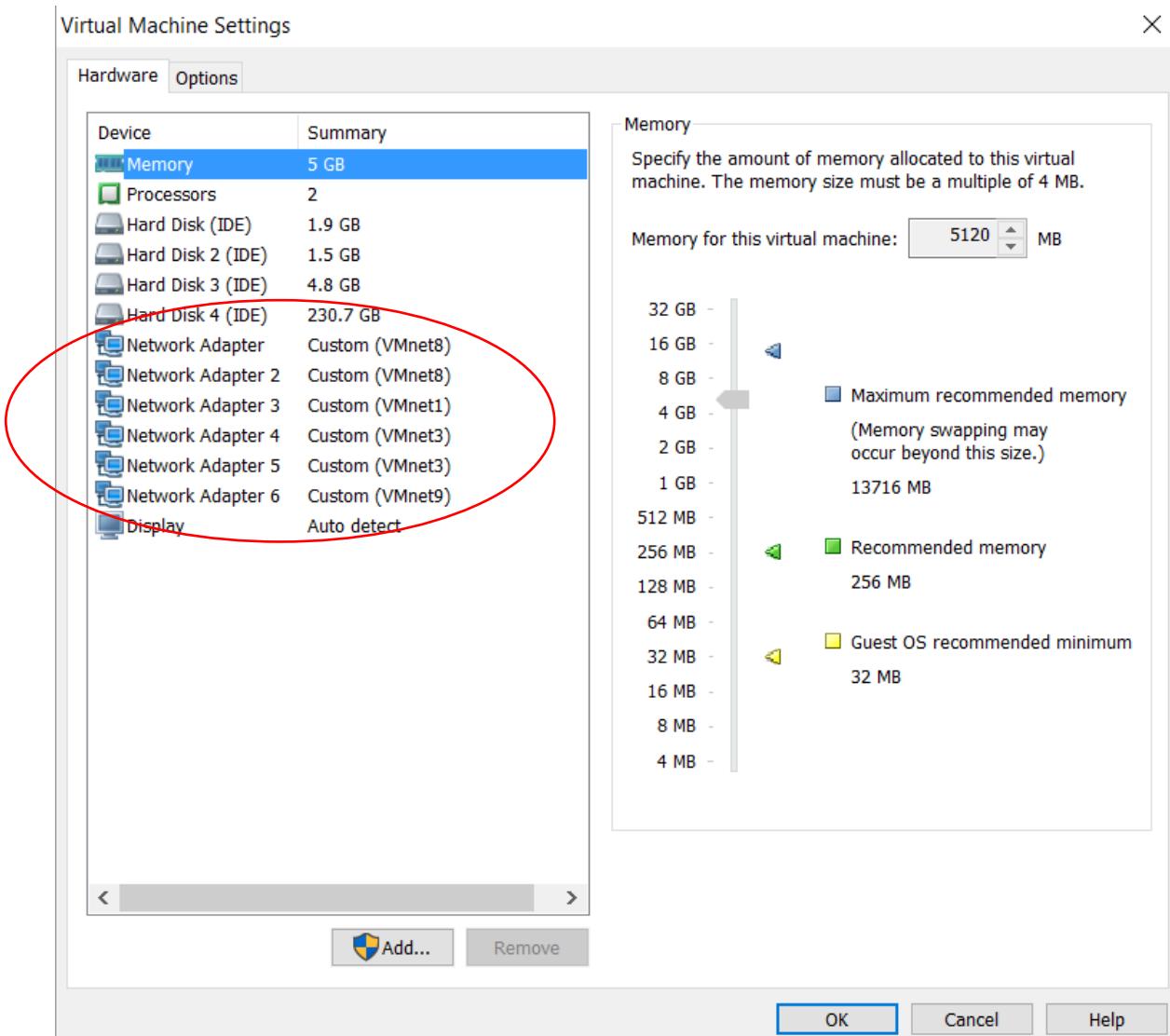


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124. Click on **Network Adapter 6** and then select Custom: Specific virtual network **VMnet9**.



125. Click **Player > Manage > Virtual Machine Settings...** again to verify your settings are the same as shown below. Make sure each adapter has the correct VMnet setting. Click **OK** to close the Settings window.



126. Repeat steps 26 to 40. Use the cluster name **cluster2**.

127. Enter **e0c** (in all lower case, it is case sensitive) as the **cluster management interface port**.  
Note that this is different from the default.
128. Enter the cluster management interface IP address **172.23.1.21**
129. Enter the cluster management interface netmask **255.255.255.0**
130. Enter the cluster management interface default gateway **172.23.1.254**
131. Enter the DNS domain name: **flackboxA.lab**
132. Enter the name server IP address: **172.23.4.1**. This is the Windows Active Directory server for Department A.

```

Enter the cluster Management interface port [e0d]: e0c
Enter the cluster Management interface IP address: 172.23.1.21
Enter the cluster Management interface netmask: 255.255.255.0
Enter the cluster Management interface default gateway: 172.23.1.254

A cluster Management interface on port e0c with IP address 172.23.1.21 has been
created. You can use this address to connect to and manage the cluster.

Enter the DNS domain names: flackboxA.lab
Enter the name server IP addresses: 172.23.4.1
DNS lookup for the admin Userver will use the flackboxA.lab domain.

```

133. Enter Where is the controller located: **Flackbox-lab**. This is informational only.
134. Enter **e0c** as the node management interface port. Note this is a shared physical port with the cluster management interface.
135. Enter the node management interface IP address: **172.23.1.22**
136. Enter the node management interface netmask: **255.255.255.0**
137. Enter the node management default gateway: **172.23.1.254**

```

Step 5 of 5: Set Up the Node
You can type "back", "exit", or "help" at any question.

Where is the controller located []: Flackbox-lab
Enter the node Management interface port [e0c]:
Enter the node Management interface IP address: 172.23.1.22
Enter the node Management interface netmask: 255.255.255.0
Enter the node Management interface default gateway [172.23.1.254]:

A node Management interface on port e0c with IP address 172.23.1.22 has been cre
ated.

```

138. Press **Enter** to enable AutoSupport and continue. The system will automatically send logs and error messages to NetApp when AutoSupport this is enabled.
139. The cluster setup wizard has completed and Cluster 2 Node 1 is available.
140. Log in with the username **admin** and the password **Flackbox1**
141. Add all existing disks to Cluster 2 Node 1 with the command **storage disk assign –all true –node cluster2-01**

```
cluster2::> storage disk assign -all true -node cluster2-01
```

142. There is a limited amount of disk space so we will delete snapshots on the root volume vol0.
143. Enter the command **run local** to enter the local node shell. Notice that the command prompt changes.
144. Enter the command **snap delete –a –f vol0** to force the deletion of any existing snapshots.
145. Enter the command **snap sched vol0 0 0 0** to disable automatic snapshots on the root volume.

146. Enter the command **exit** to return to the cluster shell. The command prompt changes back to the cluster shell prompt.

```
cluster2::> run local
Type 'exit' or 'Ctrl-D' to return to the CLI
cluster2-01> snap delete -a -f vol0
cluster2-01> snap sched vol0 0 0 0
cluster2-01> exit
logout

cluster2::>
```

147. Set up of Cluster 2 is now complete.  
148. Gracefully shut down Cluster 2 Node 1 with the command **system node halt local –ignore-quorum-warnings**. When you see the **operating system has halted** message then click **Player > Power > Shut Down Guest** in VMware Player.

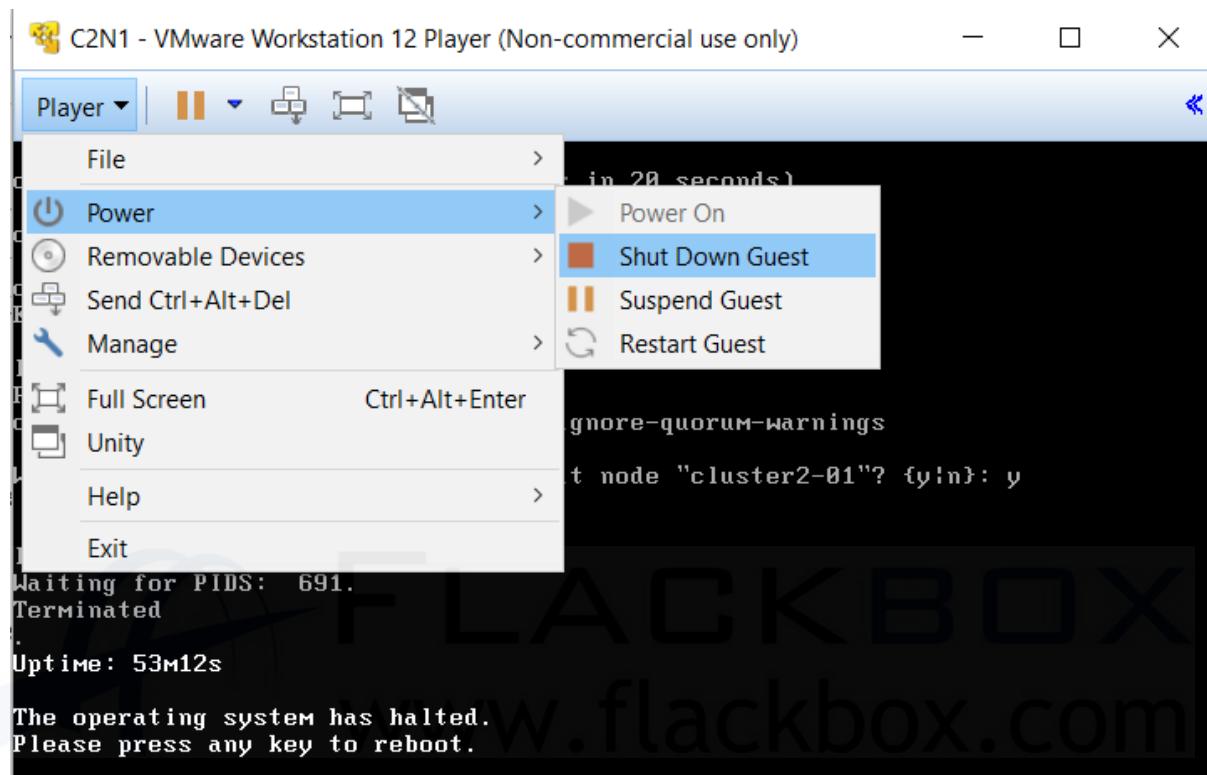
```
cluster2::> system node halt local -ignore-quorum-warnings

Warning: Are you sure you want to halt node "cluster2-01"? {y\!n}: y

login:
Waiting for PIDS: 691.
Terminated
.

Uptime: 53m12s

The operating system has halted.
Please press any key to reboot.
```



149. You can run the cluster setup wizard again at any time on any of your nodes by entering the **cluster setup** command. You will not lose any of your configuration.

# Windows Server Build

In this section you will build the Windows servers for Department A and Department B.

1. Open the Windows Server 2012 R2 evaluation page at <https://www.microsoft.com/en-us/evalcenter/evaluate-windows-server-2012-r2> in your browser
2. Click Sign In under the Windows Server 2012 R2 180 day evaluation

The screenshot shows the Microsoft evaluation center page for Windows Server 2012 R2. It features a large green 'Download' button at the top. Below it, there's a sign-in prompt and a 'Sign In' button. At the bottom, there are links for 'Can't access your account?' and 'Sign in with a different Microsoft account'.

3. Sign in with your Microsoft account. If you don't have an account then choose the option to **Sign Up Now**.

## Sign in

Because you're accessing sensitive info, you need to verify your password.

The screenshot shows a sign-in form with an email field containing 'test@hotmail.com' and a password field. Below the fields is a blue 'Sign in' button. At the bottom, there are links for 'Can't access your account?' and 'Sign in with a different Microsoft account'.

4. Choose file type **ISO** and click **Register to continue**

The screenshot shows the Windows Server 2012 R2 evaluation page again. It highlights the 'Register to continue' button in a green box. Above the button, there's a note about registration and a file type selection section where 'ISO' is selected.

5. Fill in the form with your details, choose **No** when asked **Do you want System Center components included with your Windows Server download?** Click **Continue**

\* Do you want System Center components included with your Windows Server download?

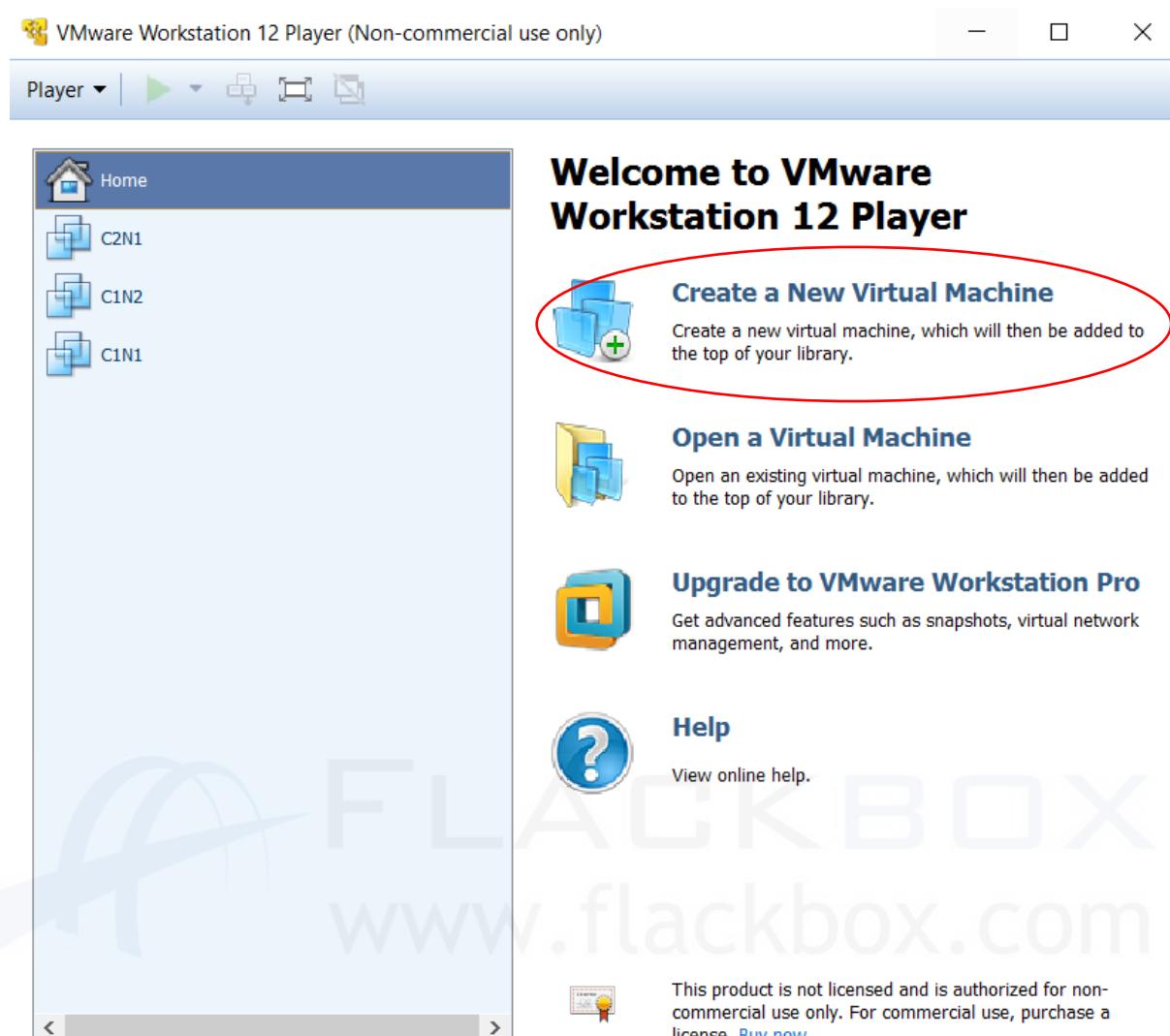
A dropdown menu is shown with the word 'No' selected. There is also a small downward arrow icon next to the menu.

By downloading the Windows Server 2012 R2 trial software, you may be contacted by Microsoft several times during the evaluation period to enhance your experience.

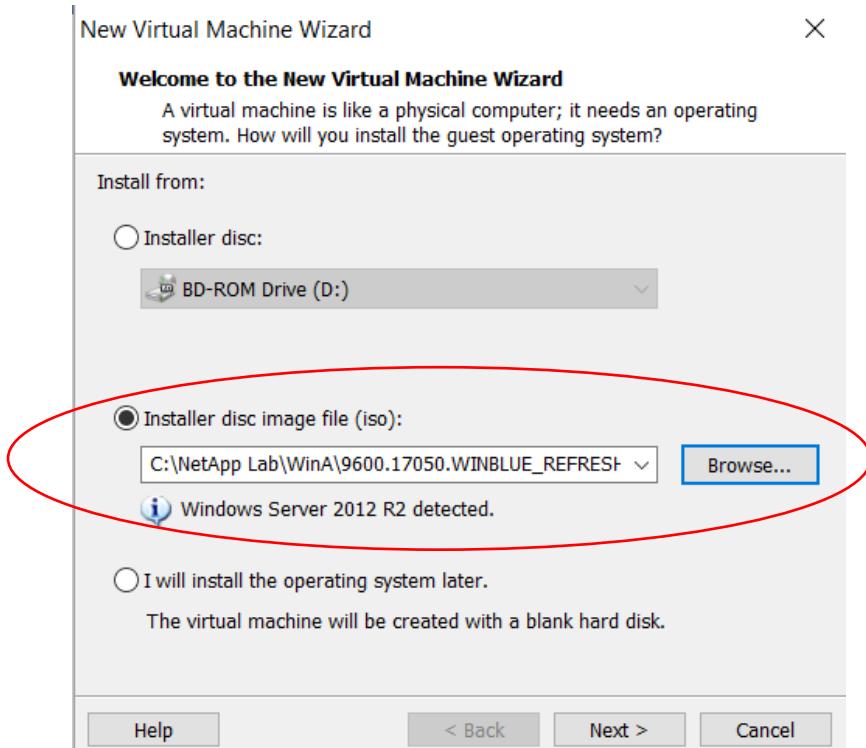
**Continue**

**Cancel**

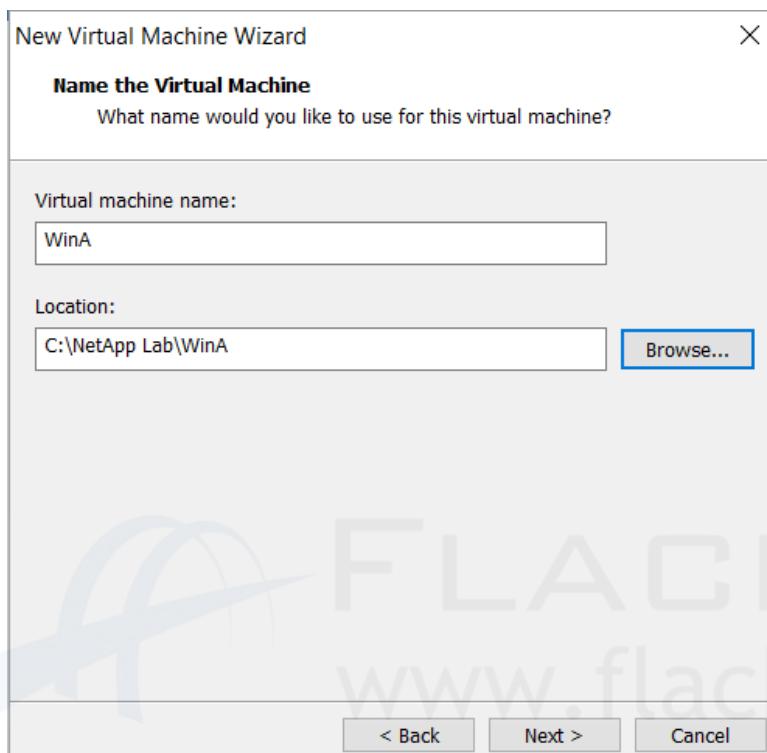
6. Select your language from the drop-down and click **Continue**. The ISO file will then download. Be patient as it is over 4GB in size.
7. Open Windows Explorer and browse to the folder you created earlier on your laptop named **NetApp Lab**.
8. In the NetApp Lab folder, make a subfolder named **WinA**. We will create the Windows Server in here.
9. Find the Windows Server ISO file you downloaded from the Microsoft website and move it into the **WinA** folder. It will have a name similar to  
**9600.17050.WINBLUE\_REFRESH.140317-1640\_X64FRE\_SERVER\_EVAL\_EN-US-IR3\_SSS\_X64FREE\_EN-US\_DV9.ISO**
10. Open VMware Player
11. Click **Create a New Virtual Machine**



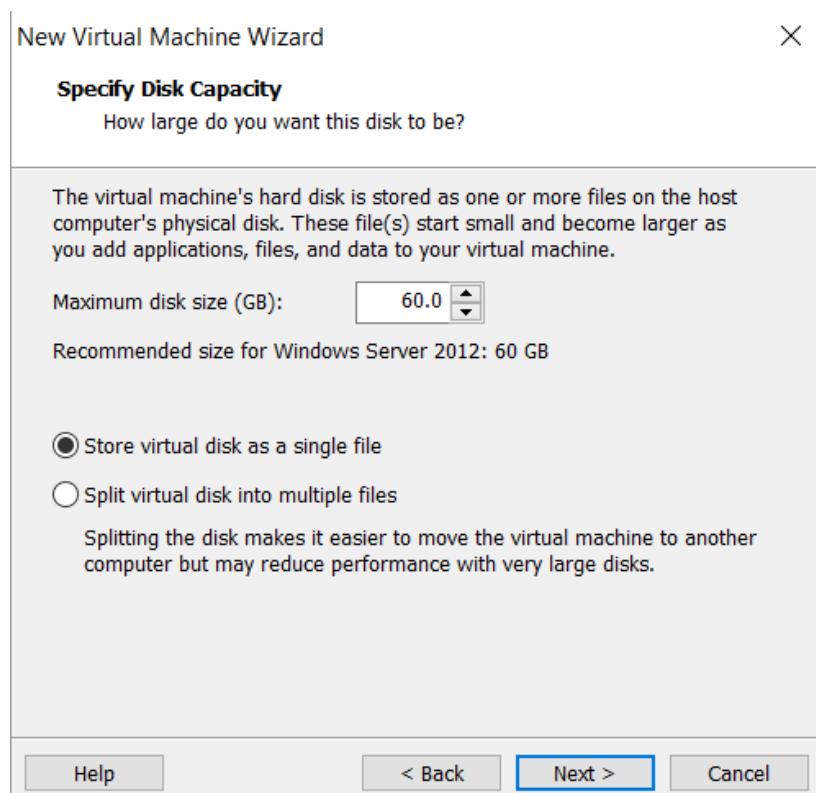
12. Select **Installer disc image file (iso)**: and **Browse** to the Windows Server ISO file in the WinA folder.



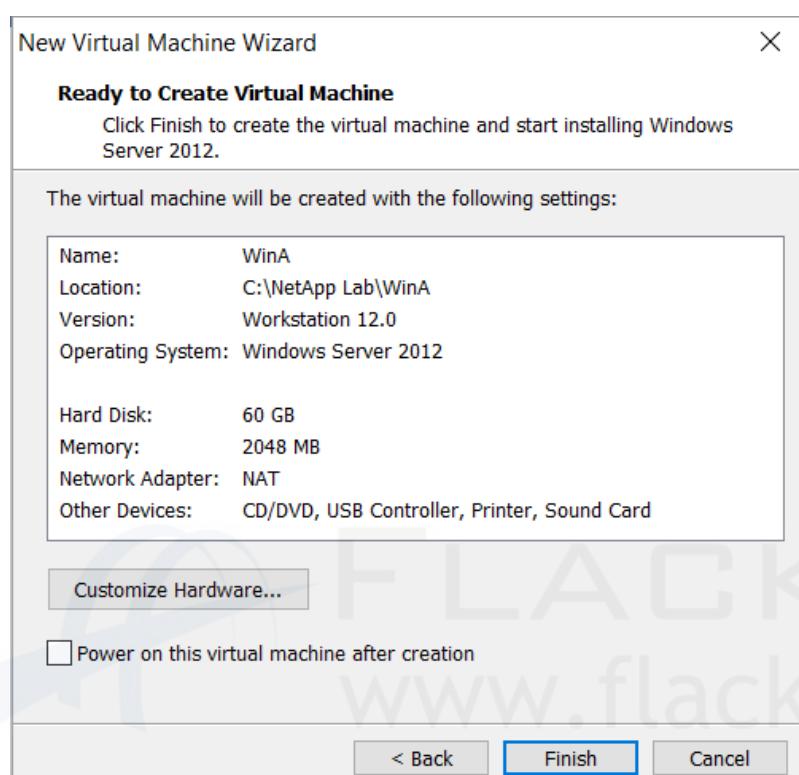
13. Name the virtual machine **WinA** and save it in the **NetApp Lab\WinA** folder



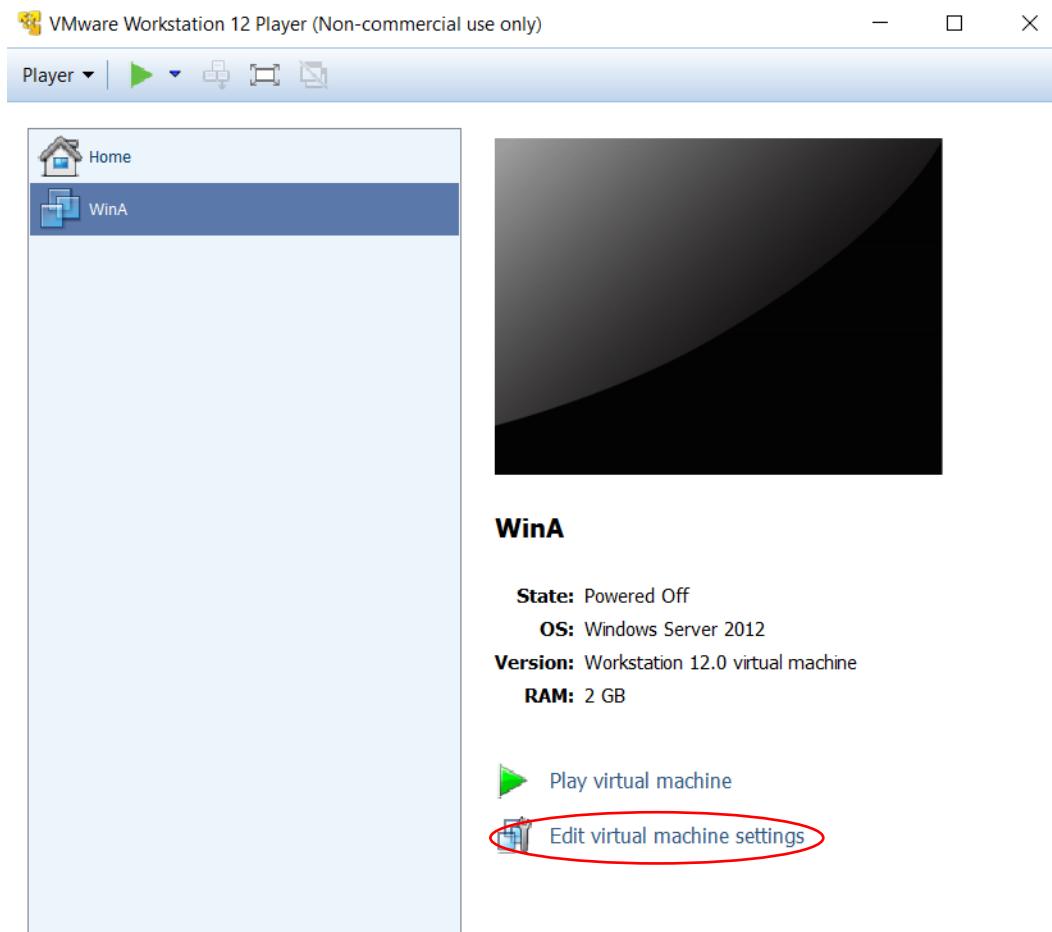
14. Select the option to **Store Virtual Disk as a single file** and click **Next**.



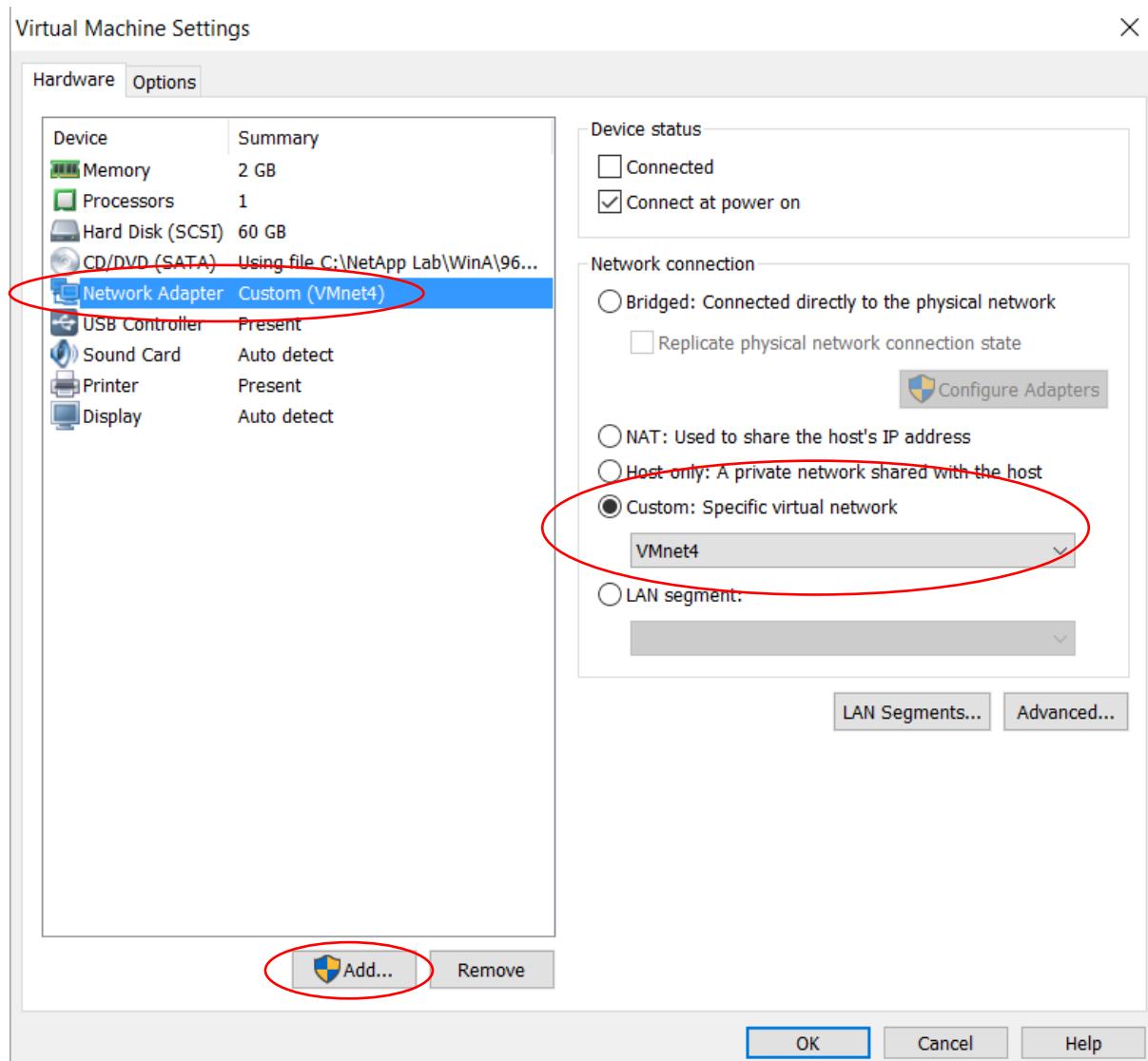
15. Uncheck the option to **Power on this virtual machine after creation** and click **Finish**



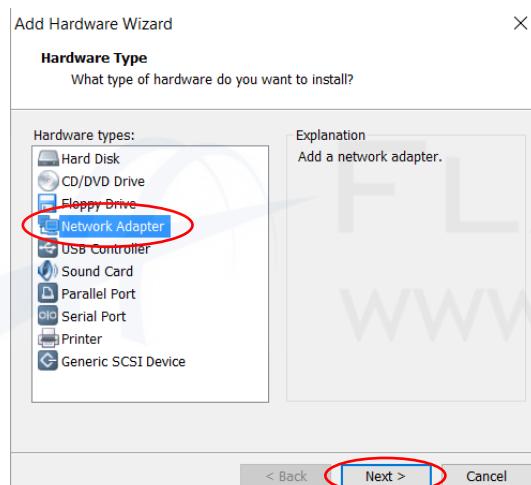
16. Click **Edit Virtual Machine Settings**



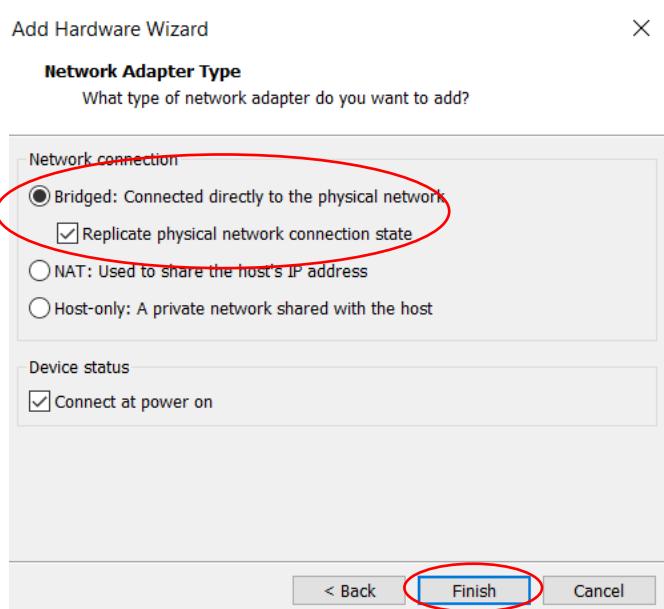
17. Click on **Network Adapter** and select **Custom** virtual network VMnet4, then click on the **Add** button



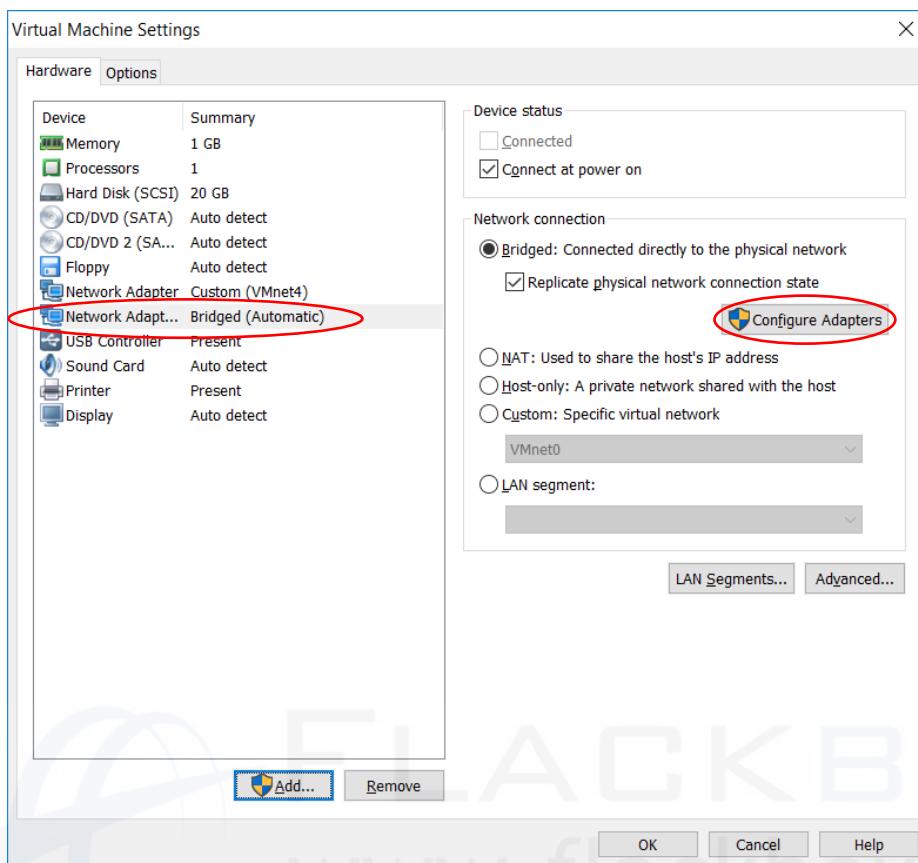
18. Choose **Network Adapter** and click **Next**



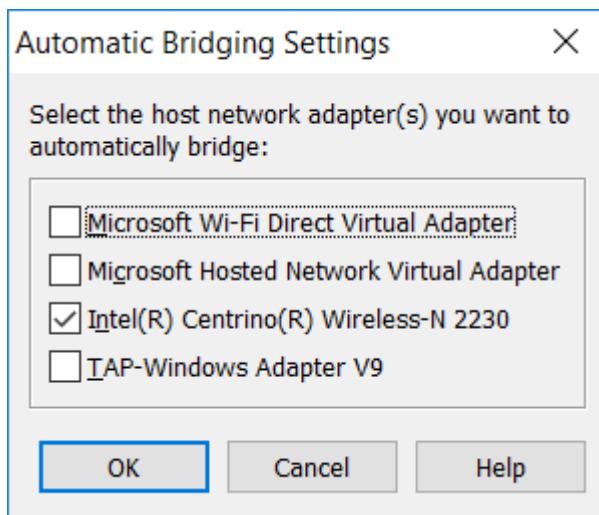
19. Choose **Bridged** and **Replicate physical network connection state**, then click **Finish**



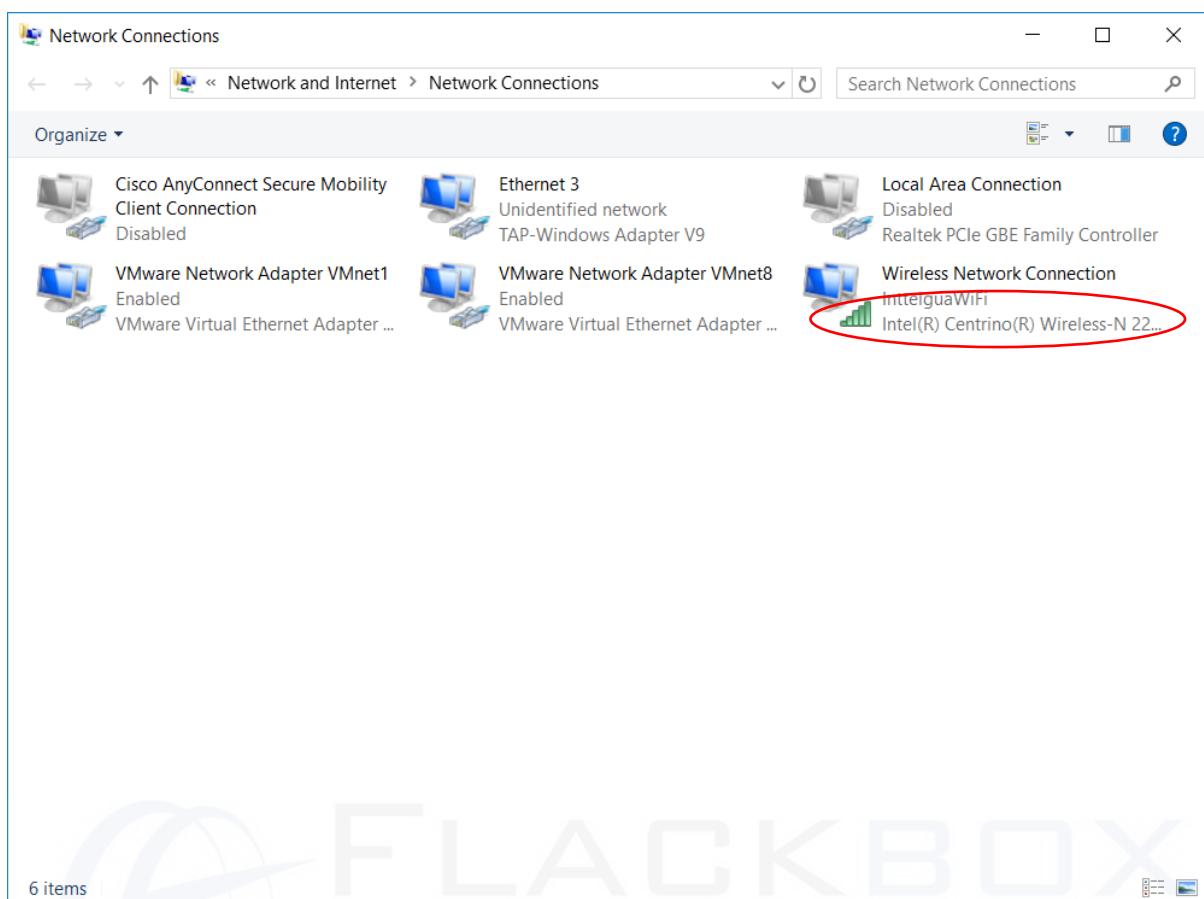
20. With the Bridged network adapter selected, click the **Configure Adapters** button



21. Select the checkbox for the network adapter which has Internet connectivity on your laptop. Deselect any other network adapters. Click **OK**



22. If you need to check which network adapter to use in the previous step, open **Control Panel** > **Network and Sharing Center** and click **Change Adapter Settings**



23. Click **Play Virtual Machine** to power on the server.

24. The Windows Setup wizard will run. Set the time and keyboard to your local settings.



25. Click **Next** and then **Install Now**.

26. Select **Windows Server 2012 R2 Standard Evaluation (Server with a GUI)** and click **Next**



Operating system	Architecture	Data
Windows Server 2012 R2 Standard Evaluation (Server Core Installation)	x64	3/2
<b>Windows Server 2012 R2 Standard Evaluation (Server with a GUI)</b>	x64	3/2
Windows Server 2012 R2 Datacenter Evaluation (Server Core Installation)	x64	3/2
Windows Server 2012 R2 Datacenter Evaluation (Server with a GUI)	x64	3/2

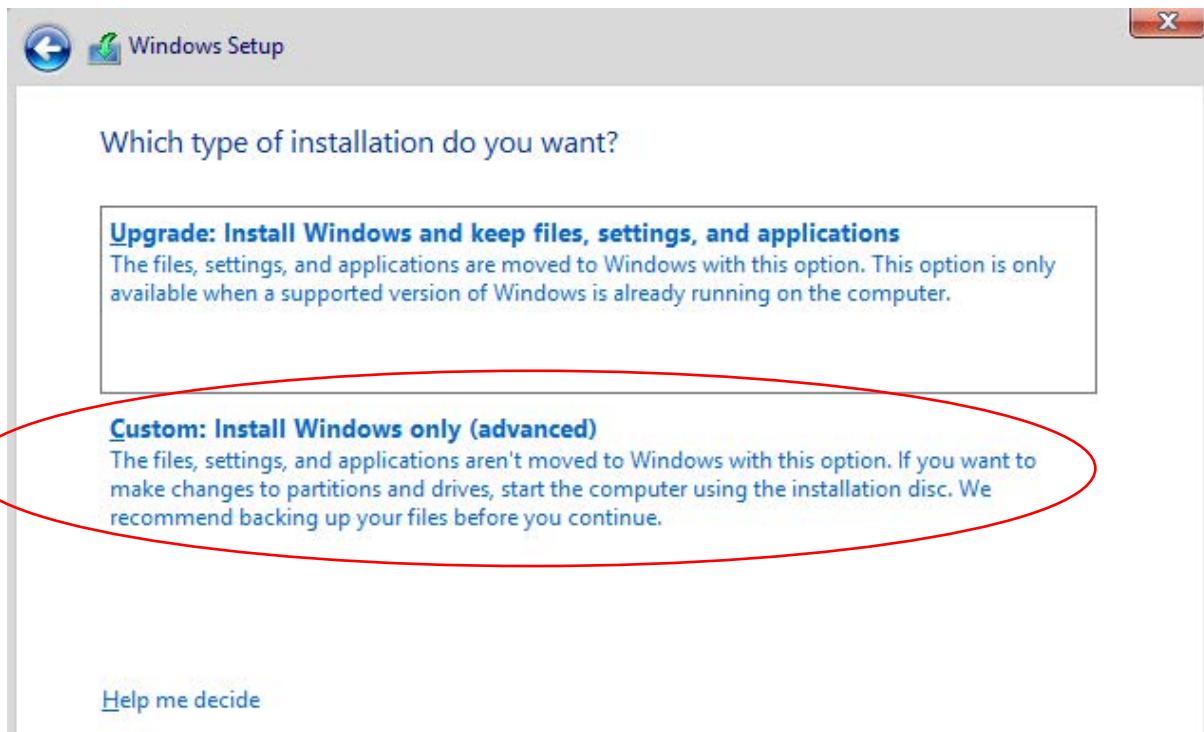
Description:

This option is useful when a GUI is required—for example, to provide backward compatibility for an application that cannot be run on a Server Core installation. All server roles and features are supported. You can switch to a different installation option later. See "Windows Server Installation Options."

**Next**

27. Accept the license terms and click **Next**

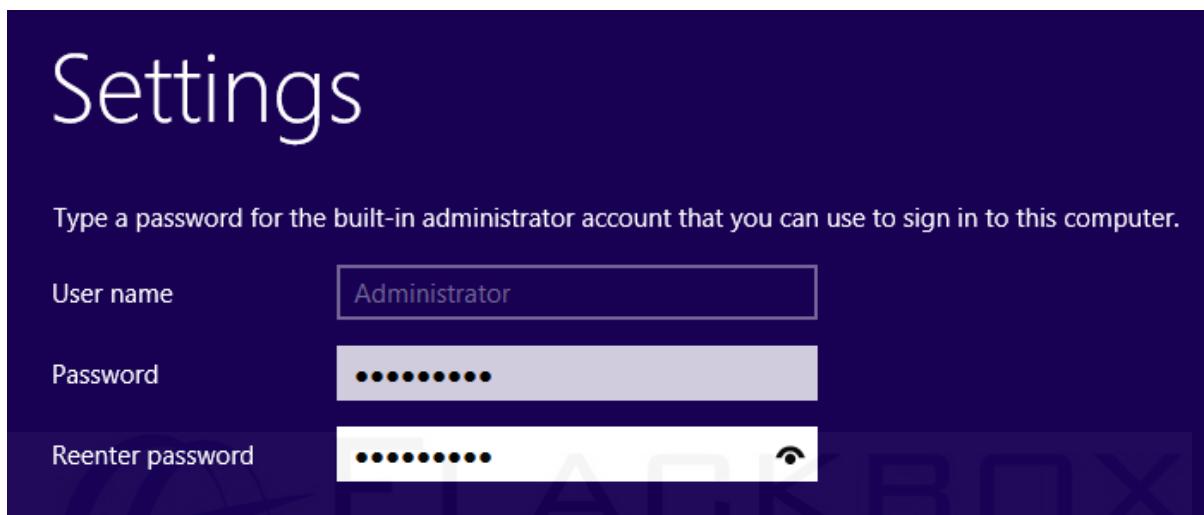
28. Select the option **Custom: Install Windows only (advanced)**



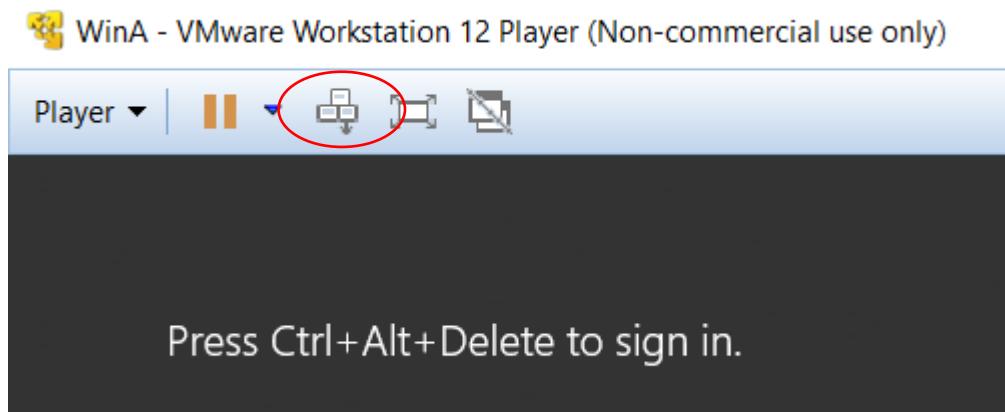
29. Leave the default on the 'Where do you want to install Windows?' page and click **Next**

30. Windows will then complete installation.

31. Wait for the installation to complete, and then enter **Flackbox1** for the administrator password and click **Finish**.



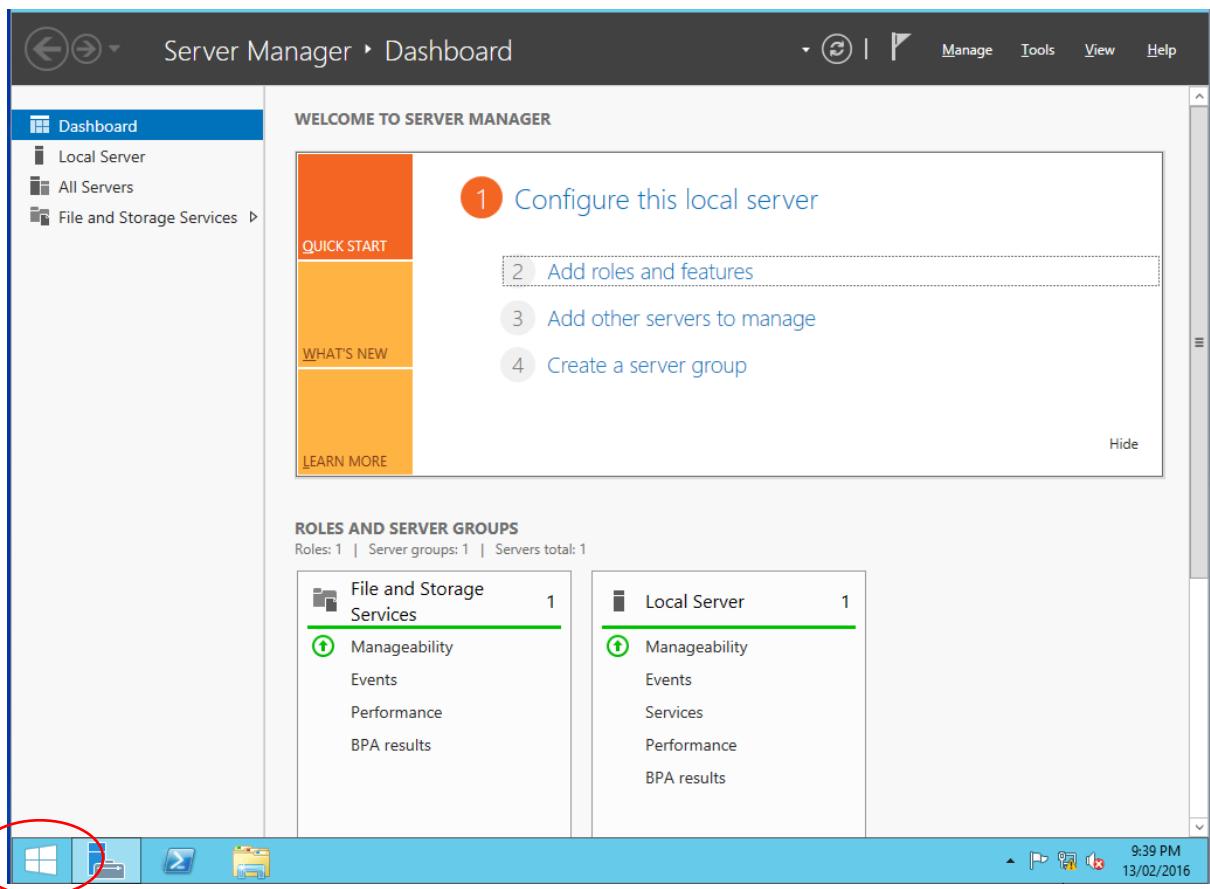
32. Click on the button to send Ctrl-Alt-Del to the virtual machine (do not press Ctrl-Alt-Del on your keyboard as this will send the keystrokes to your local machine).



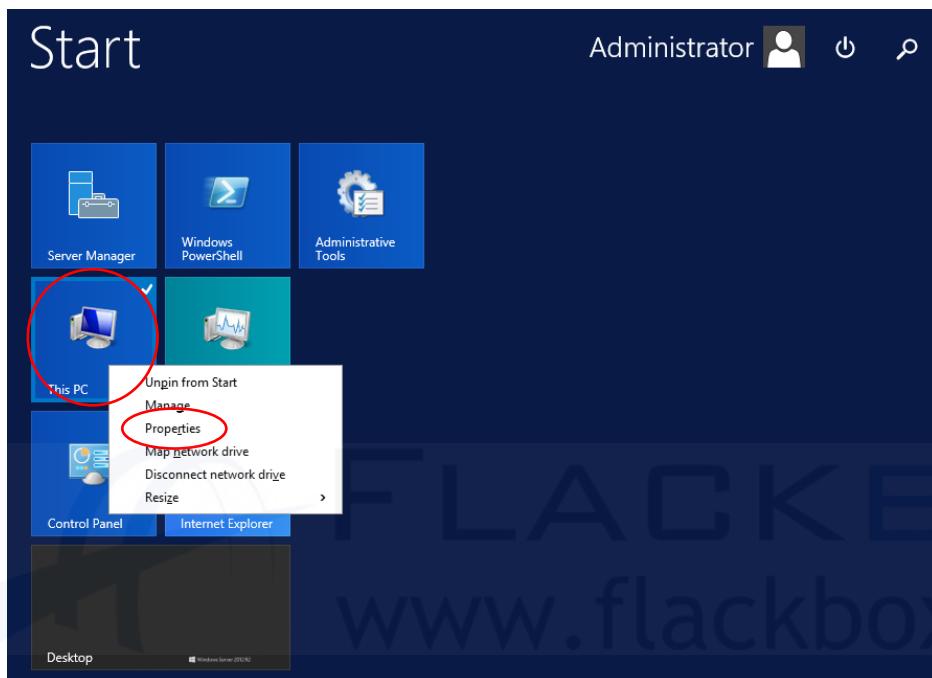
33. Log in as username **administrator** and password **Flackbox1**



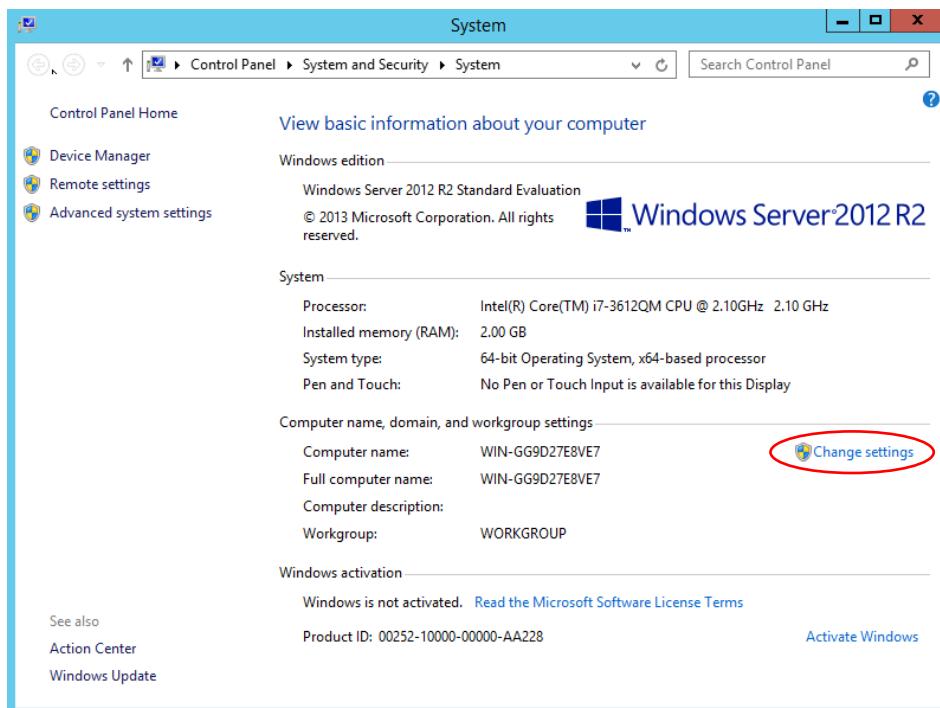
34. Click on the **Start** button



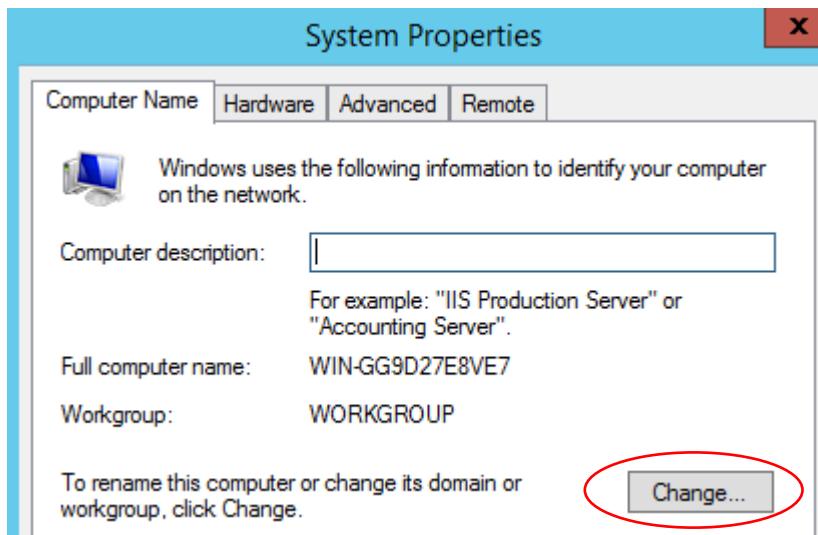
35. Right-click on **This PC** and select **Properties**



36. Click on Change Settings to set the server's computer name

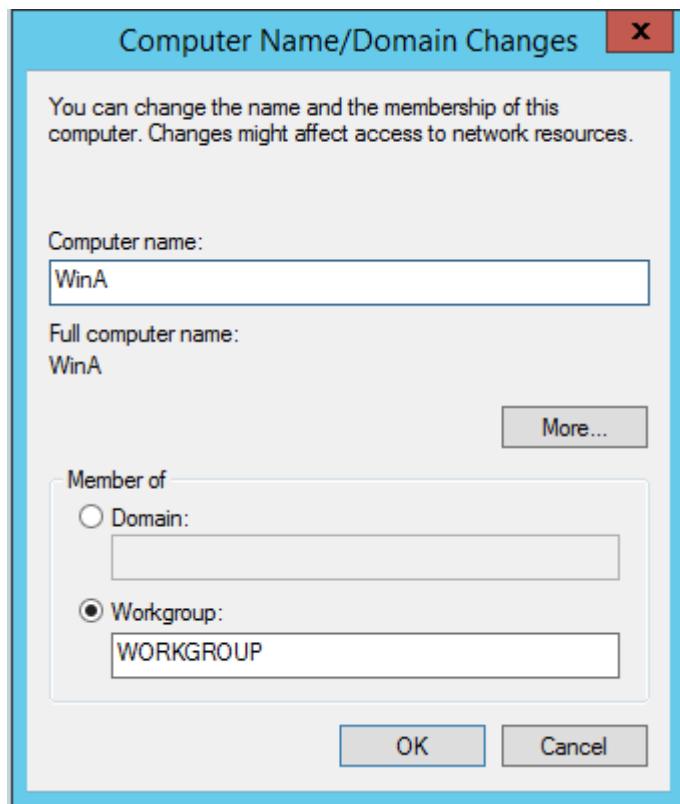


37. Click Change



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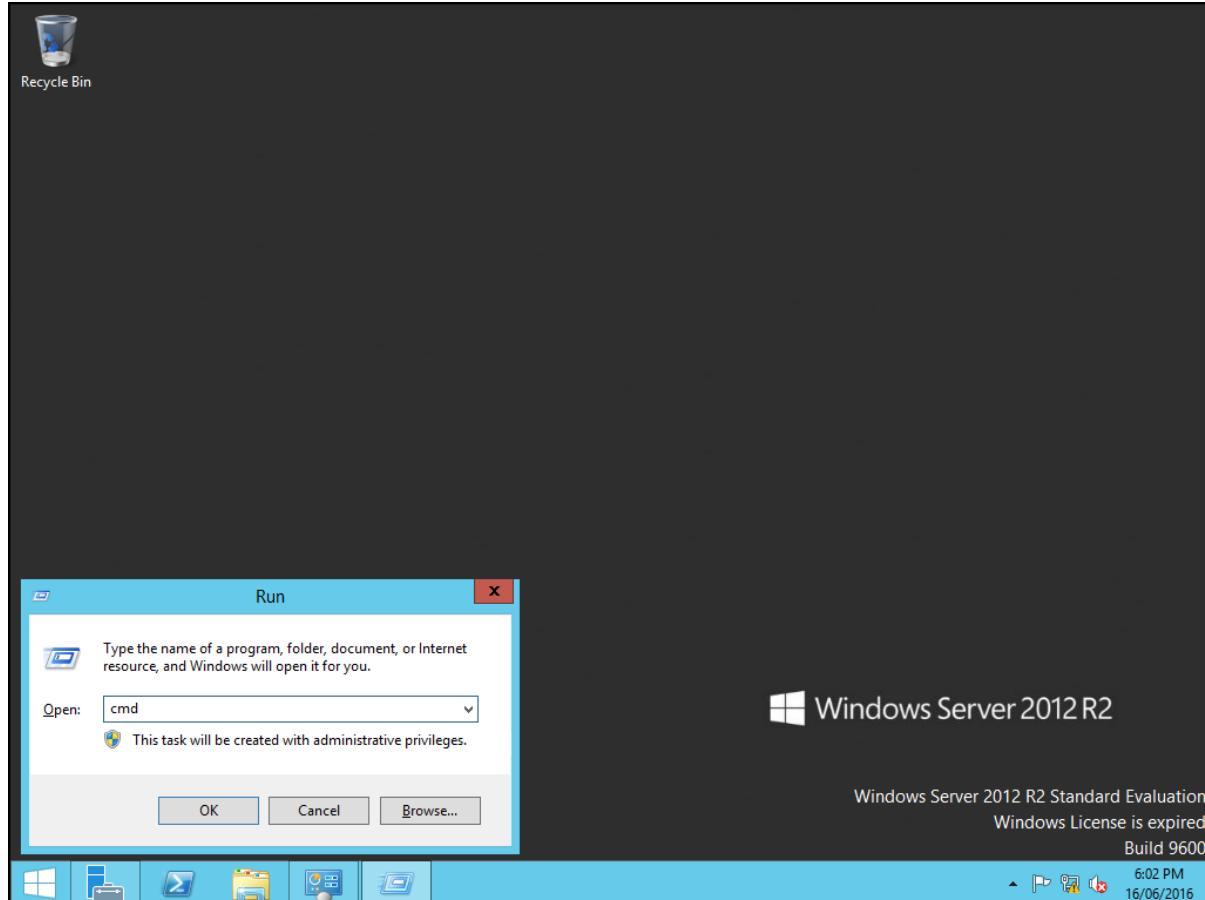
38. Set the Computer Name **WinA** and click **OK**



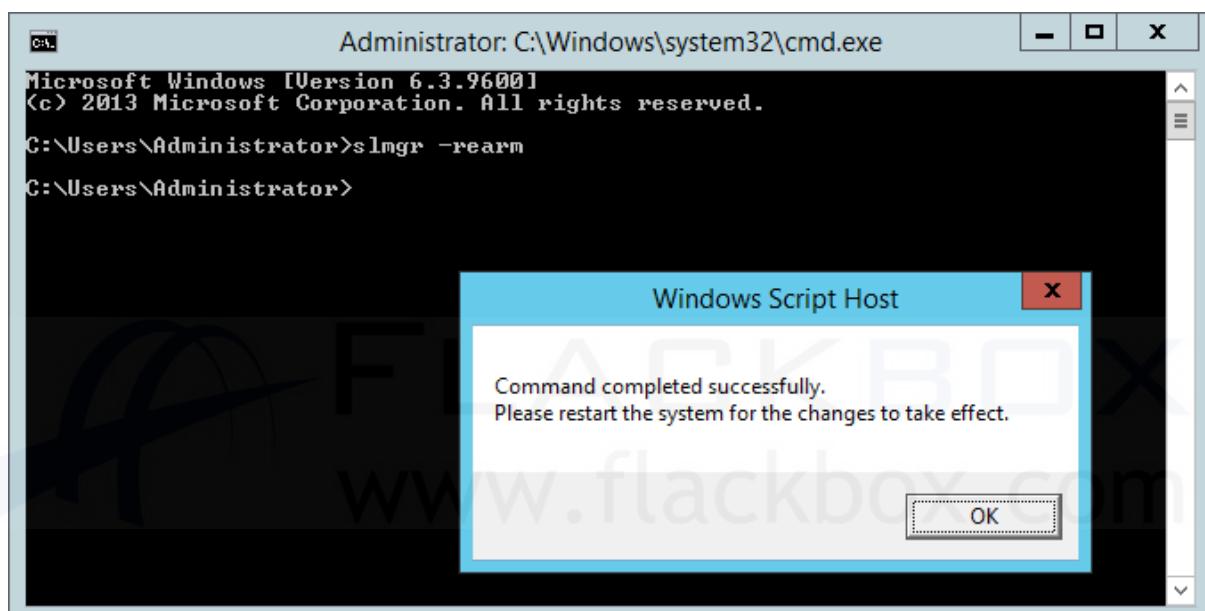
39. You will be prompted to restart to apply the change. Click **OK** and then **Close** the dialog window

40. Select **Restart Later**

41. On your keyboard, press the **Windows key** (near the bottom left corner, next to the Alt key) and the **R** key to open a Run prompt, then type **cmd** and hit **Enter** to open a command prompt



42. Type **slmgr -rearm** to activate the Windows evaluation license and prevent the server from automatically shutting down every hour. Click **OK**.



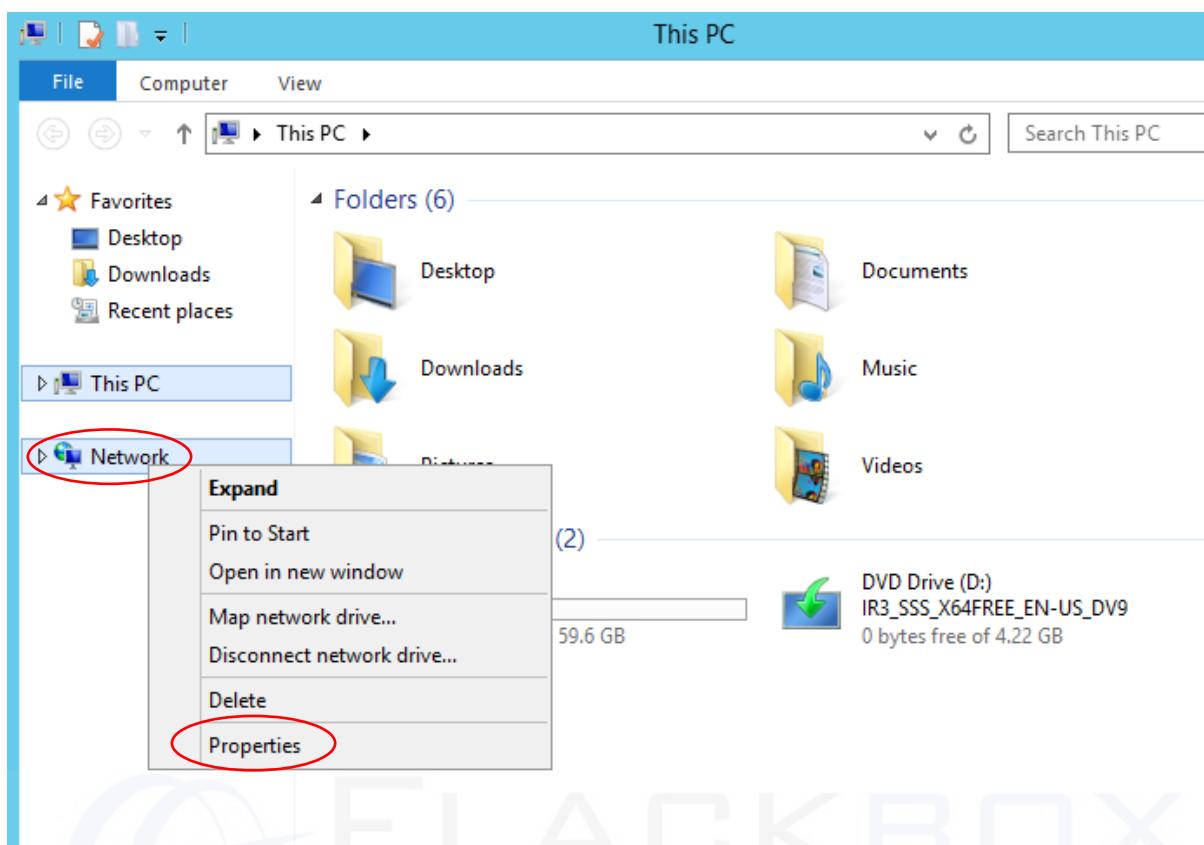
43. The Windows evaluation license will be activated after we reboot later.



44. Click the **Windows Explorer** button



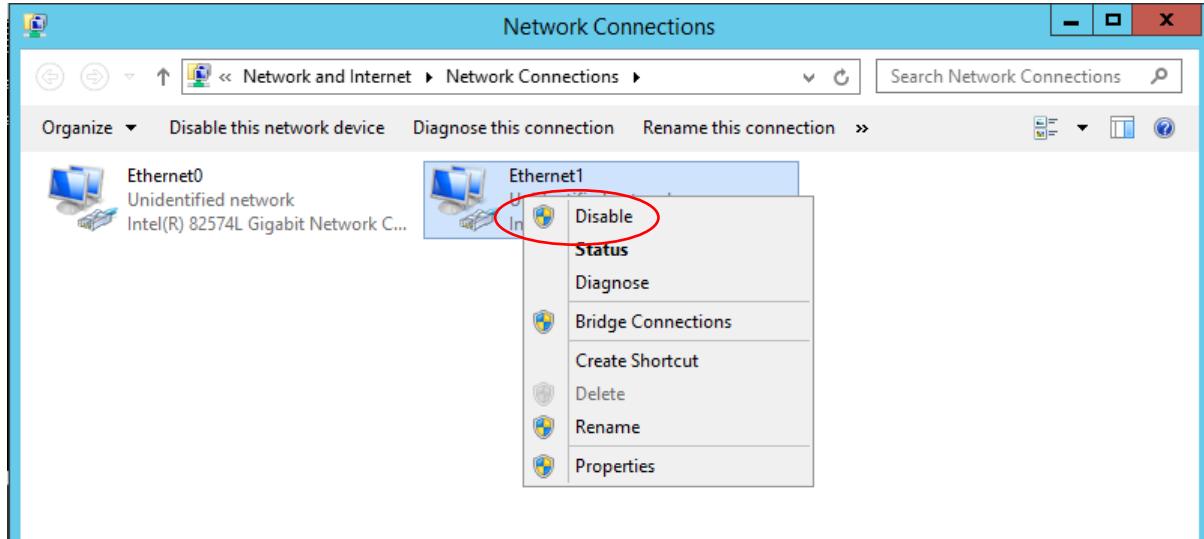
45. Right-click on **Network** and select **Properties**



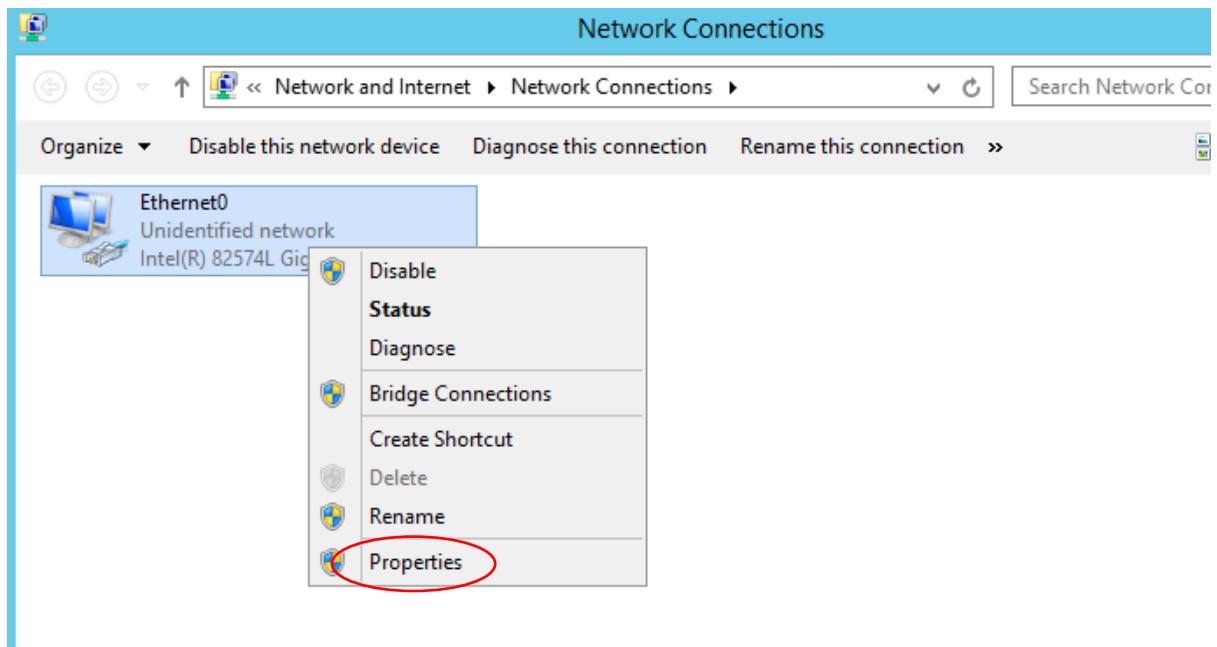
46. Click **Change Adapter Settings**

www.flackbox.com

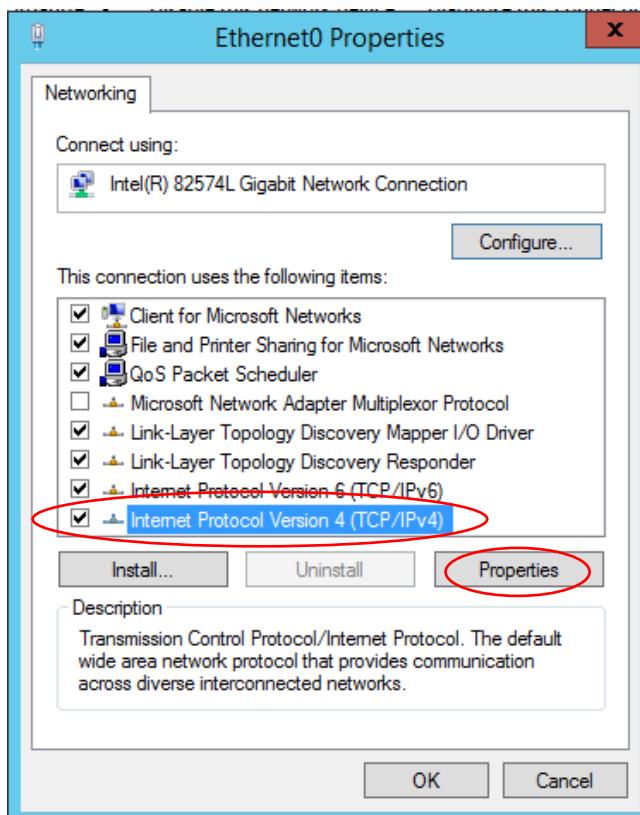
47. Right-click on the **Ethernet1** network card and select **Disable**. We do this to disable the Internet connection on Ethernet1 to allow connectivity to the lab through the Ethernet0 network card. If you need Internet connectivity on the Windows host in future (for example to install additional software) then disable Ethernet0 and enable Ethernet1. Switch them back to re-enable connectivity to the lab.



48. Right-click on the **Ethernet0** network card and select **Properties**

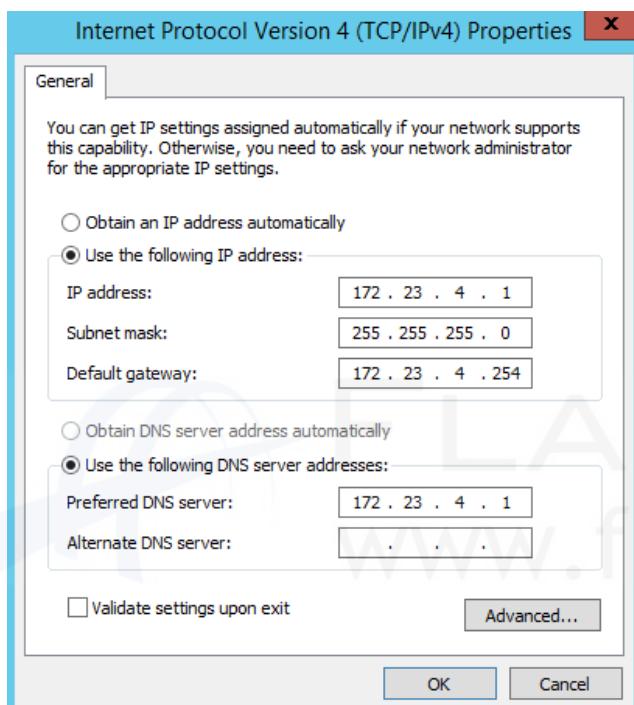


49. Click on **Internet Protocol Version 4 (TCP/IPv4)** and select **Properties**



50. Enter the following IP settings:

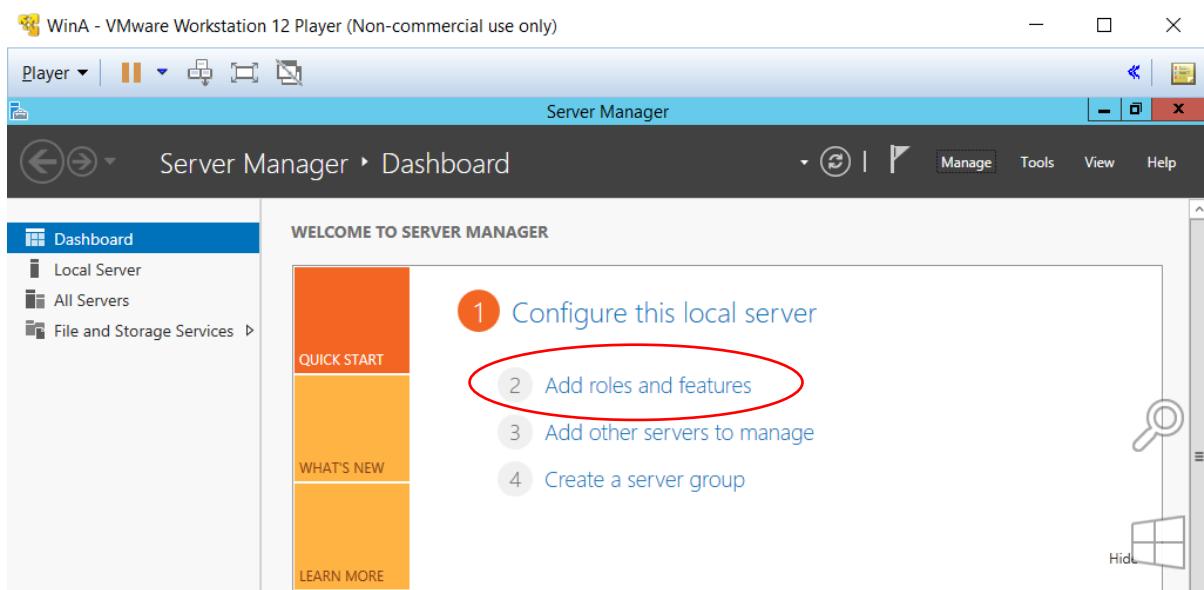
IP Address	172.23.4.1
Subnet Mask	255.255.255.0
Default Gateway	172.23.4.254
Preferred DNS Server	172.23.4.1



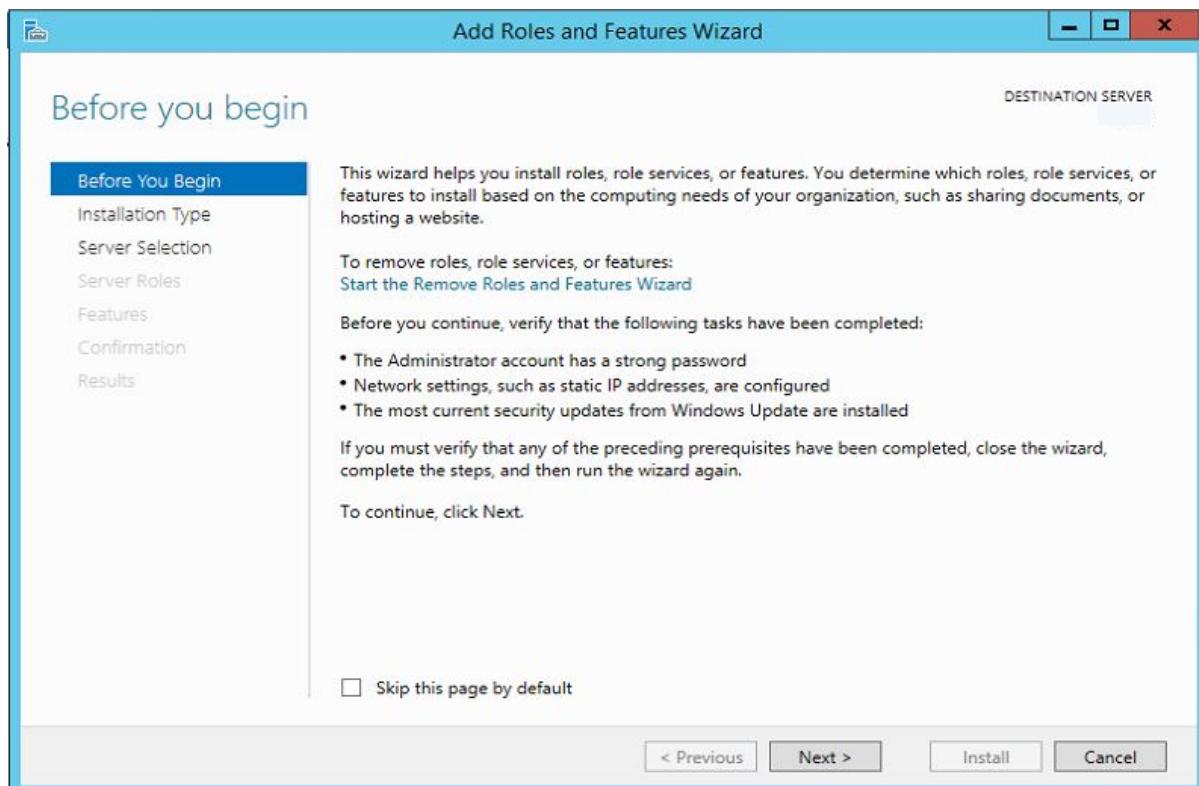
51. Click **OK** and close the Network Properties windows
52. Click on the **Start** button and then **Restart** the server



53. Log back in when the server reboots
54. **Server Manager** will open by default. Click **Add Roles and Features**

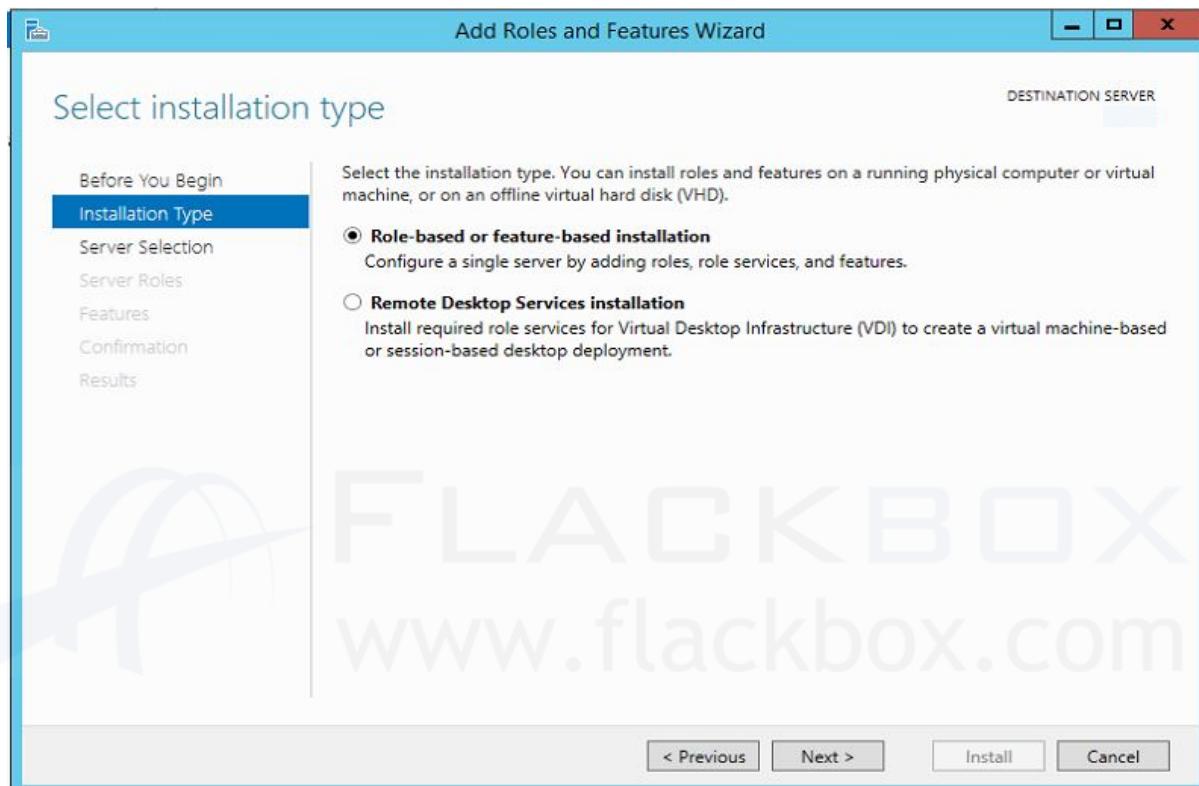


55. The Add Roles and Features wizard opens. Click **Next**

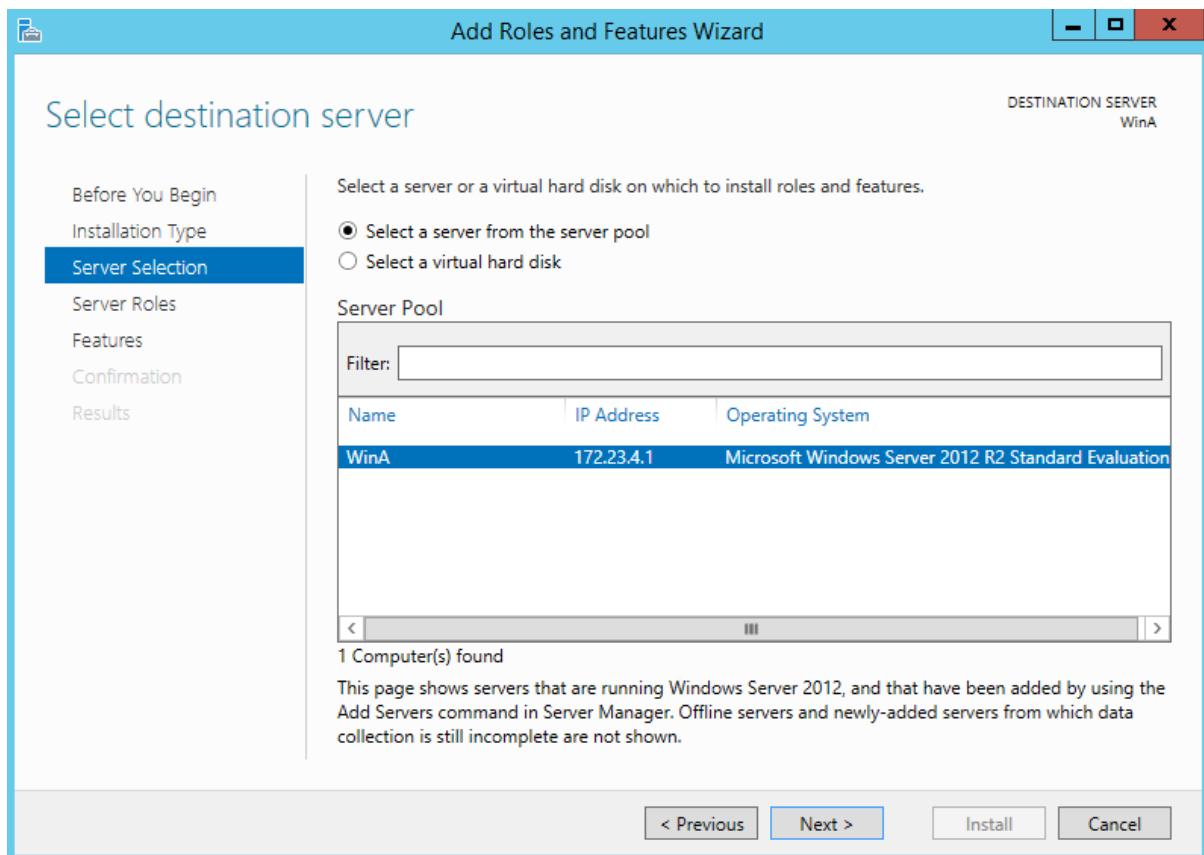


56. Click **Next** on the Before You Begin page

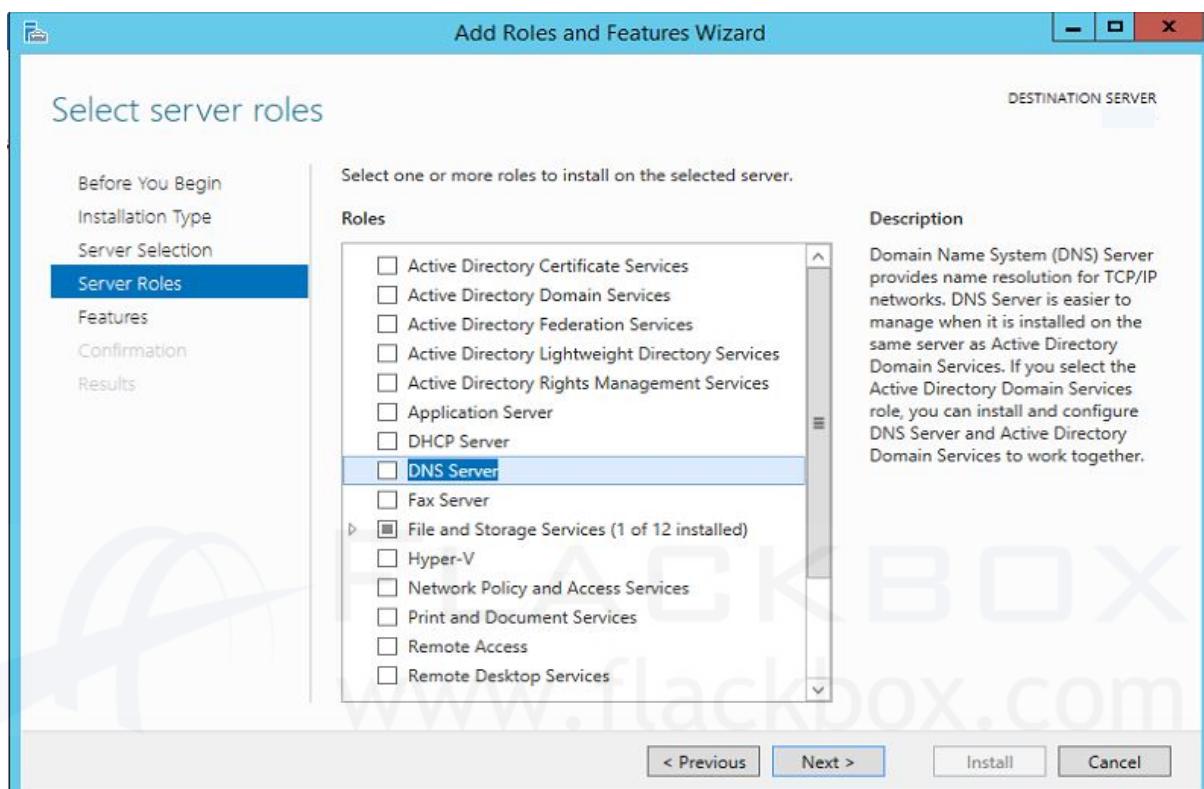
57. For installation type, select **Role-based or feature-based installation**



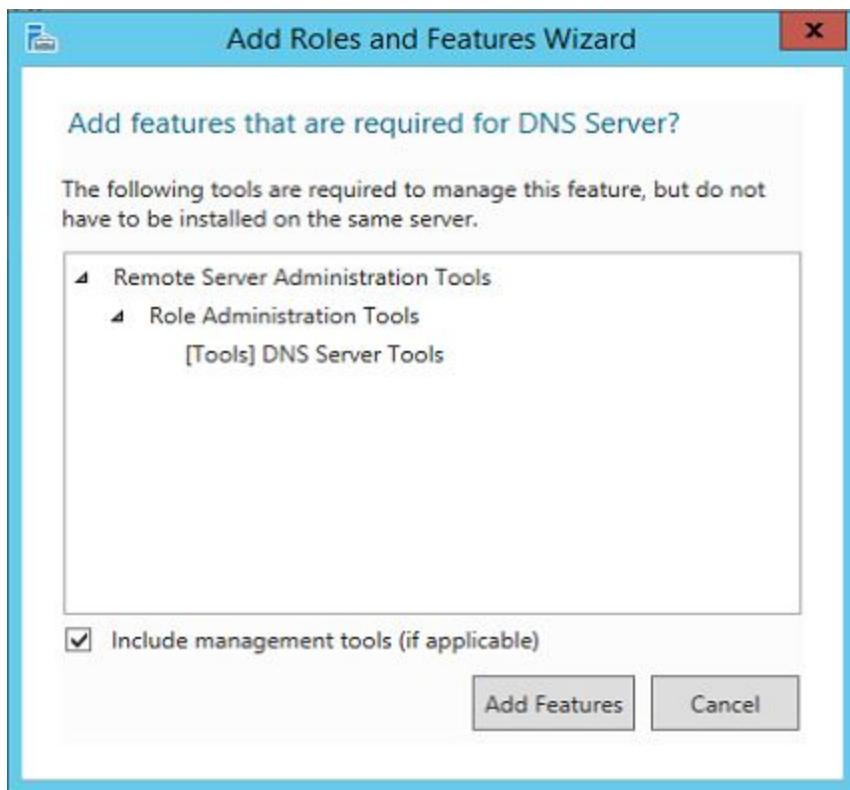
58. Accept the defaults and click **Next** on the Server Selection page



59. Select **DNS Server** on the Server Roles page

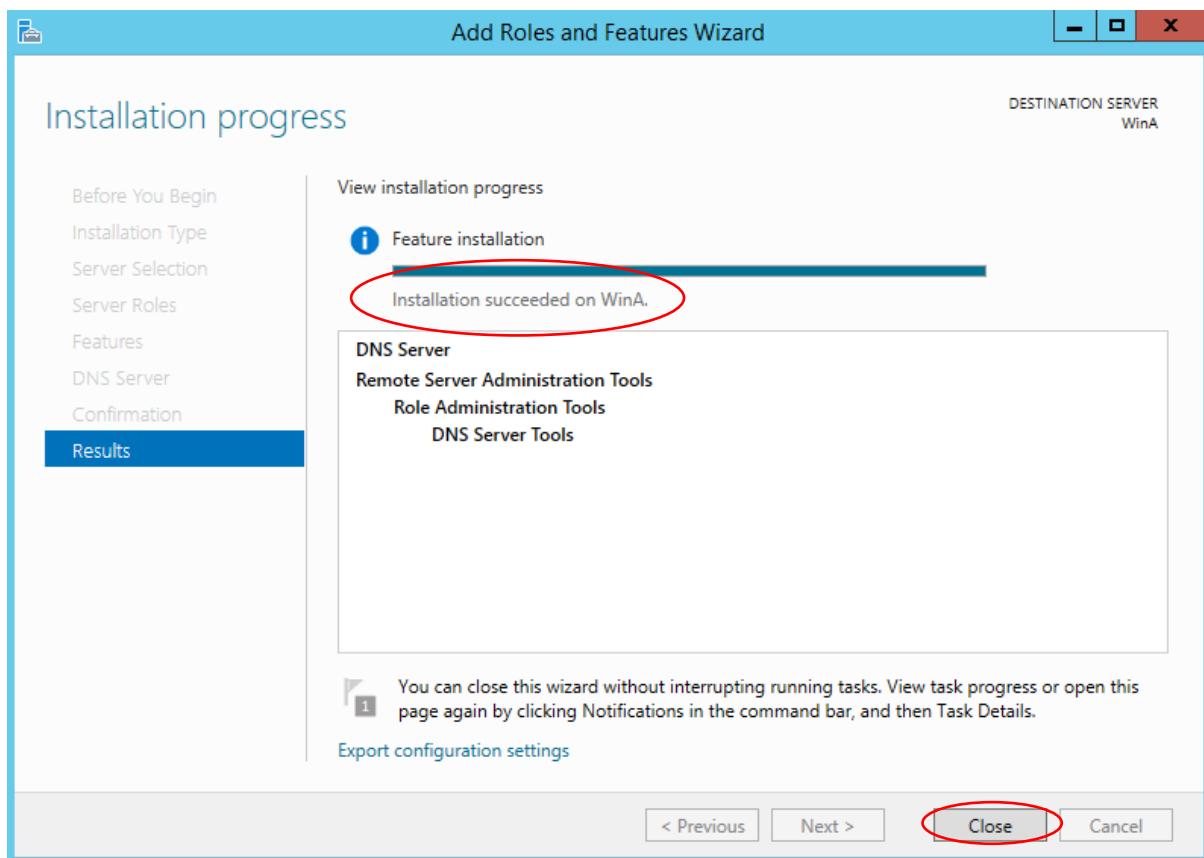


60. Click **Add Features** and then click **Next**

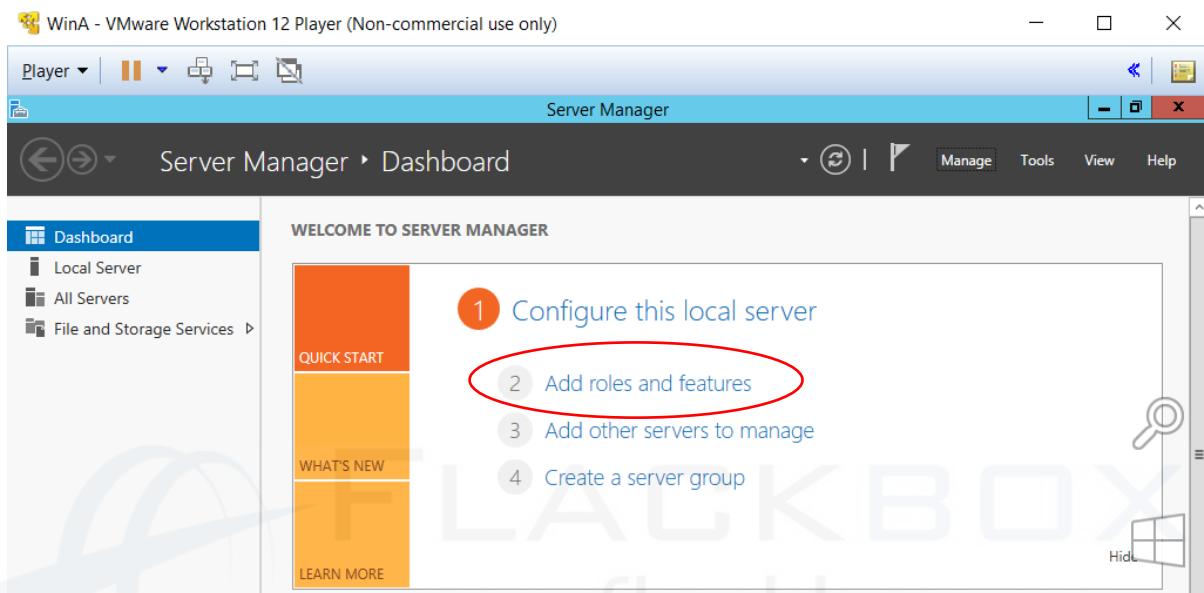


61. Accept the defaults and click **Next** on the Features page
62. Read the information and click **Next** on the DNS Server page
63. Click **Install** on the Confirmation page
64. Wait for the DNS Server installation to complete

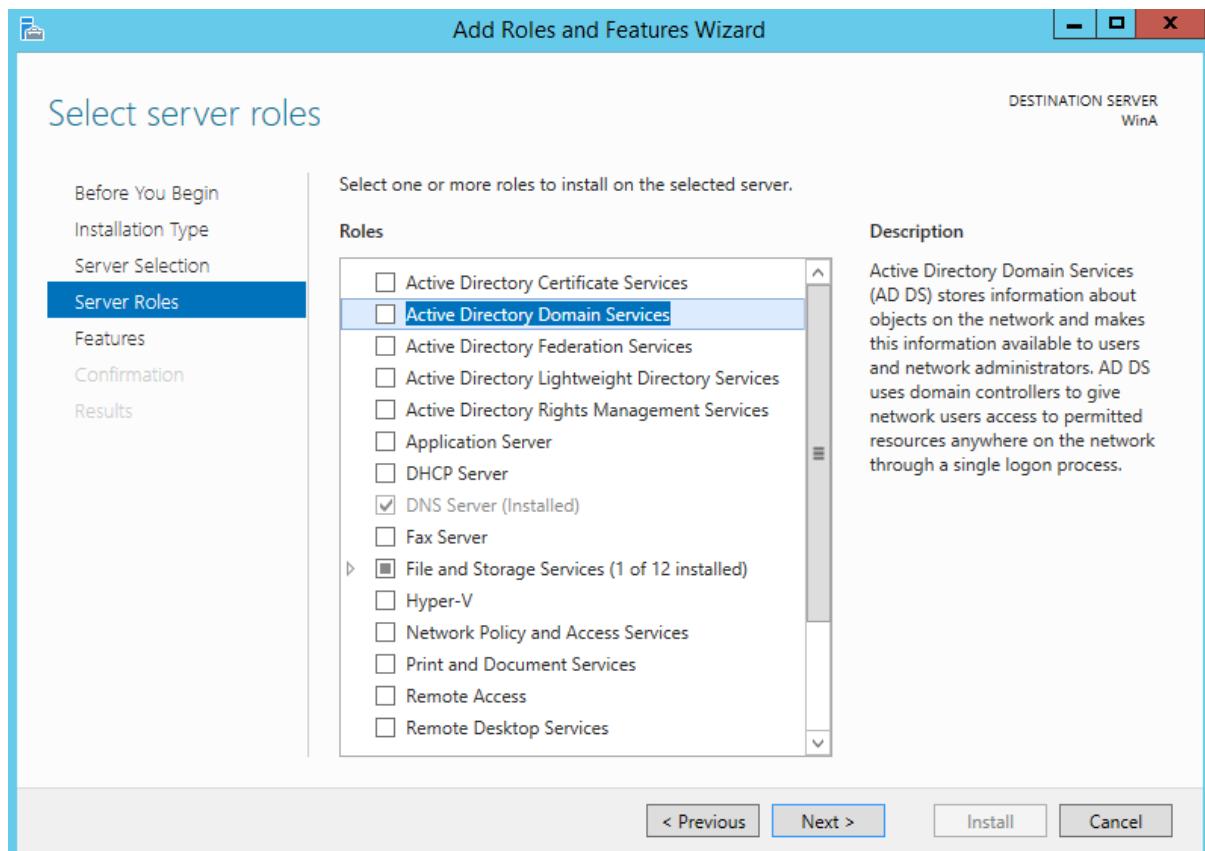
65. When you see the message ‘Installation succeeded on WinA’ click **Close**



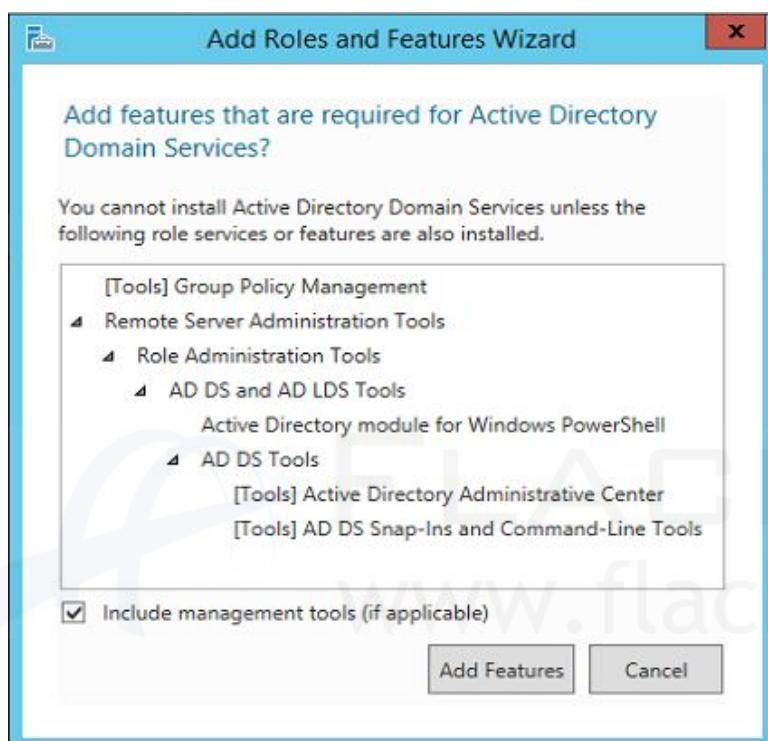
66. Click **Add Roles and Features** in Server Manager again



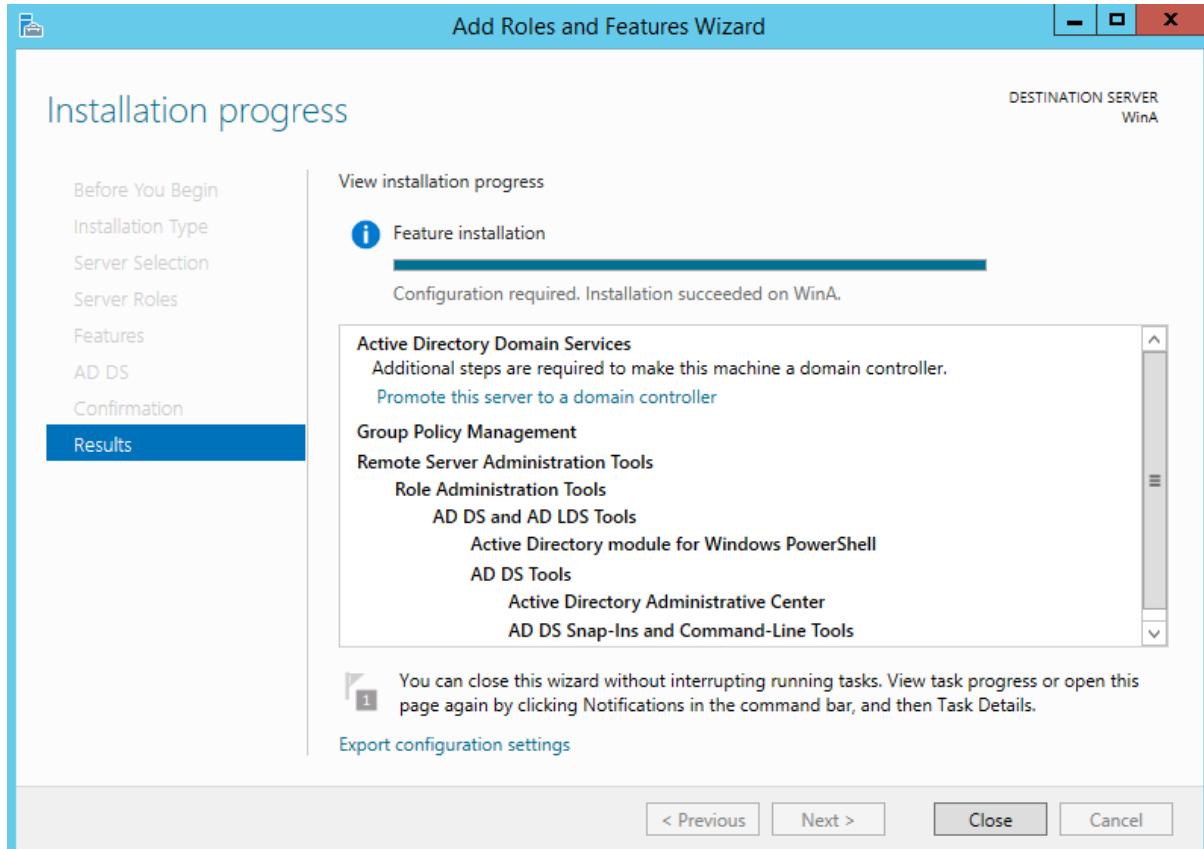
67. Click **Next** on the Before You Begin page
68. For installation type, select **Role-based or feature-based installation**
69. Accept the defaults and click **Next** on the Server Selection page
70. Select **Active Directory Domain Services** on the Server Roles page



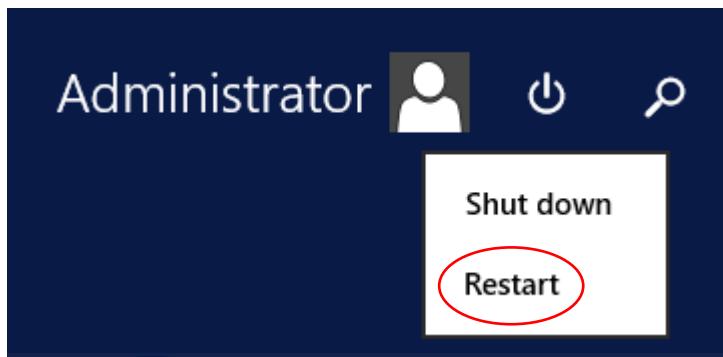
71. Click **Add Features** and then click **Next**



72. Accept the defaults and click **Next** on the Features page
73. Read the information and click **Next** on the Active Directory Domain Services page
74. Click **Install** on the Confirmation page
75. Wait for the DNS Server installation to complete
76. When you see the message 'Configuration required. Installation succeeded on WinA' click **Close**

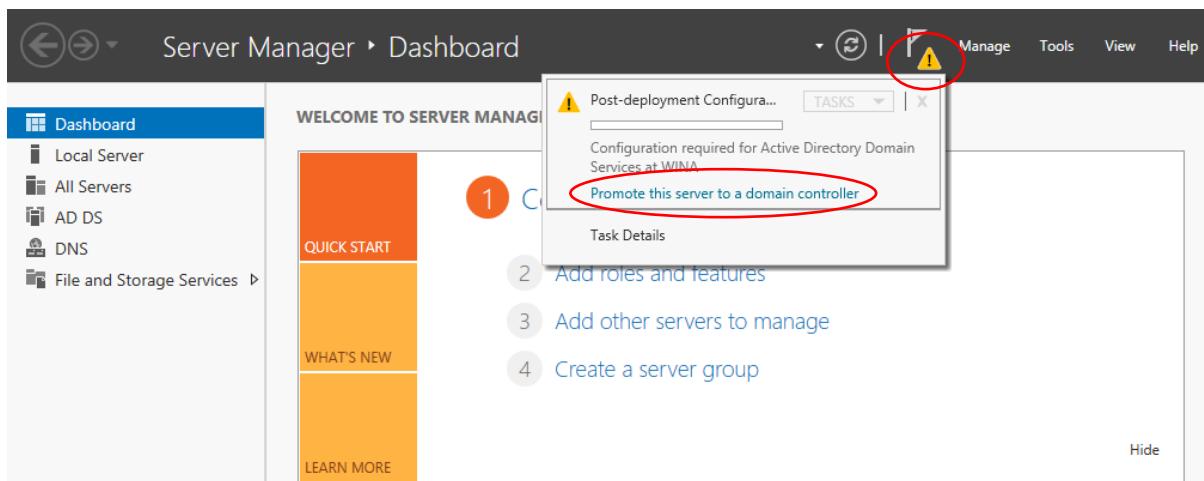


77. Click on the **Start** button and then **Restart** the server

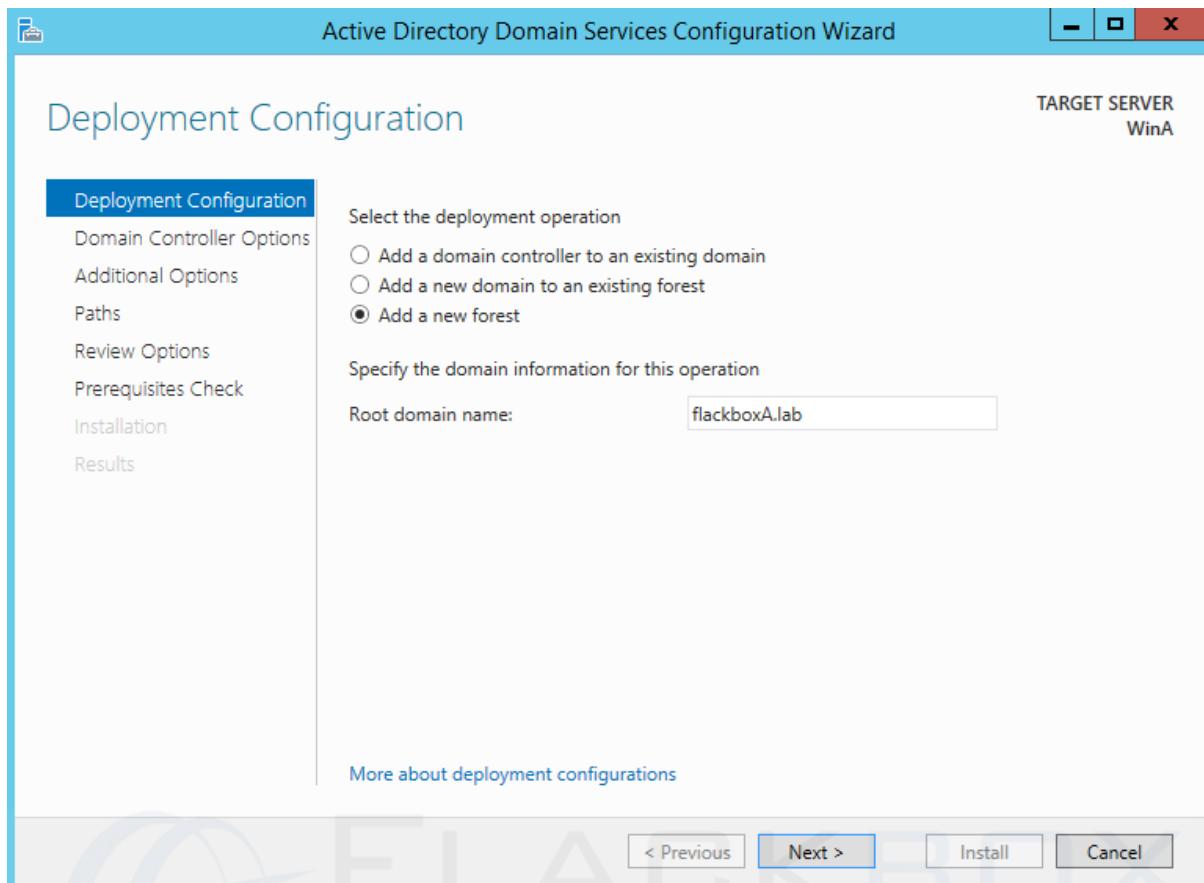


78. Log back in when the server reboots

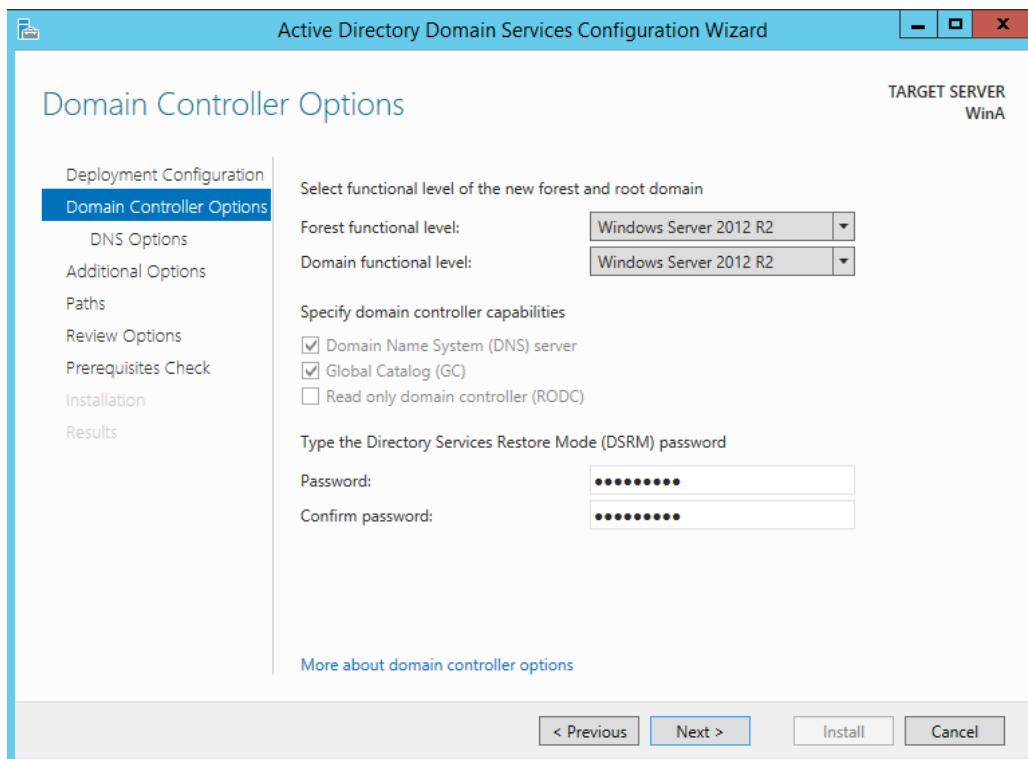
79. In Server Manager, click on the Notifications flag yellow warning triangle and then select **Promote this server to a domain controller**



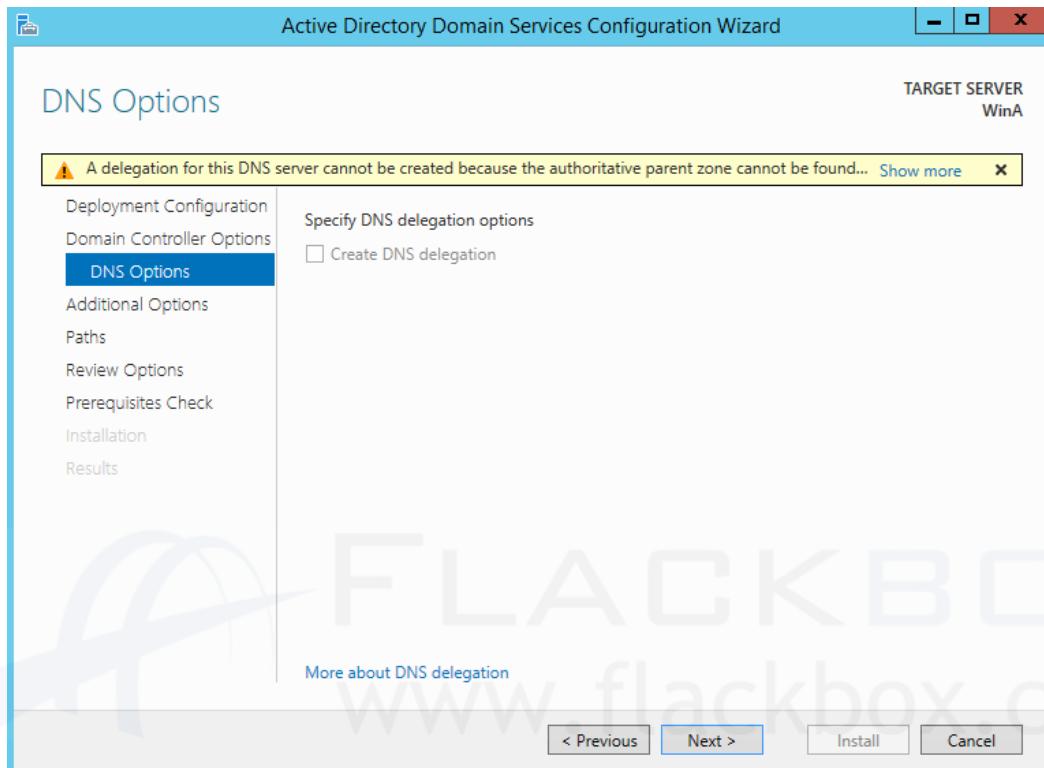
80. Select **Add a new forest** and enter the Root domain name **flackboxA.lab** and click **Next**



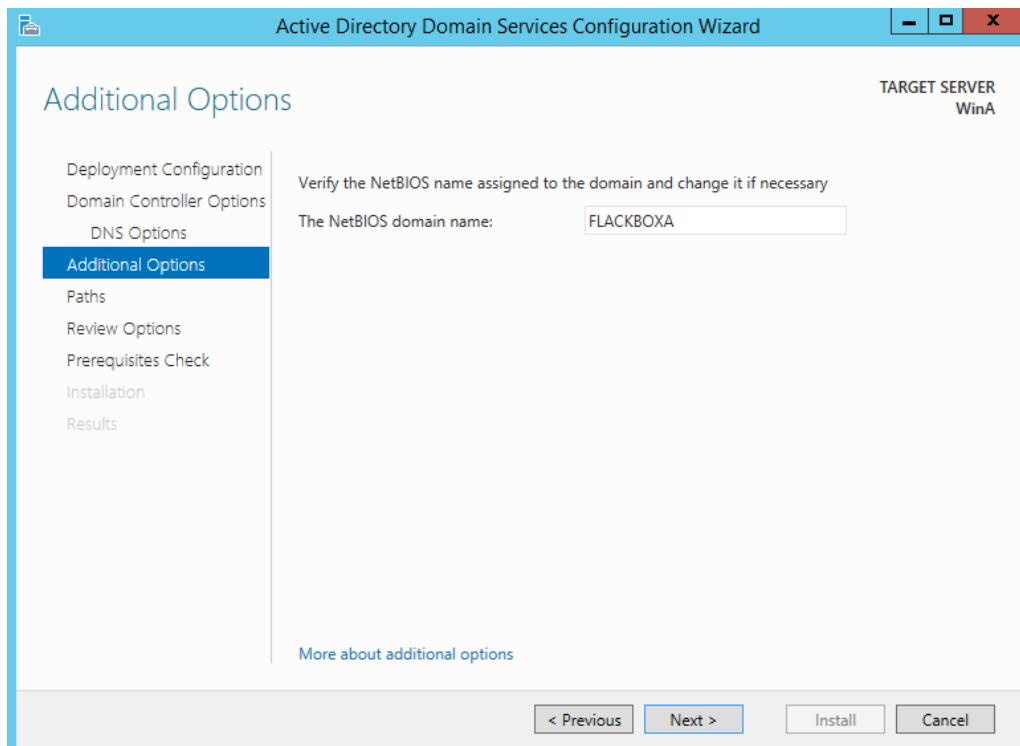
81. Enter **Flackbox1** for the Directory Services Restore Mode (DSRM) password. Leave all other options at the defaults and click **Next**



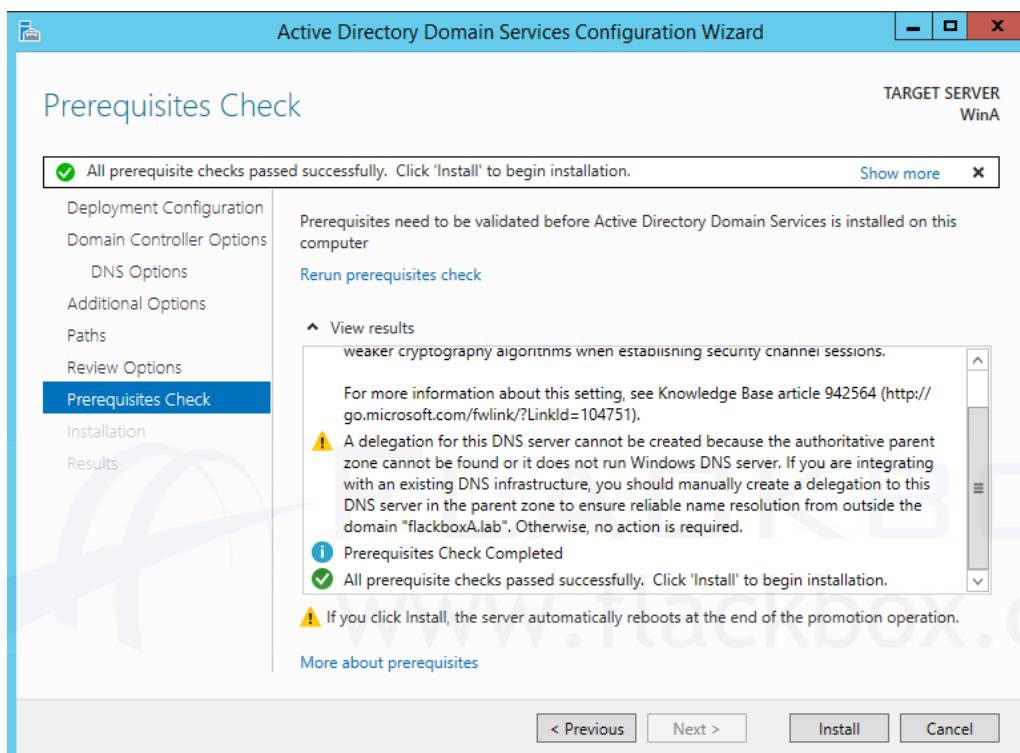
82. Ignore the warning message on the DNS Options page and click **Next**



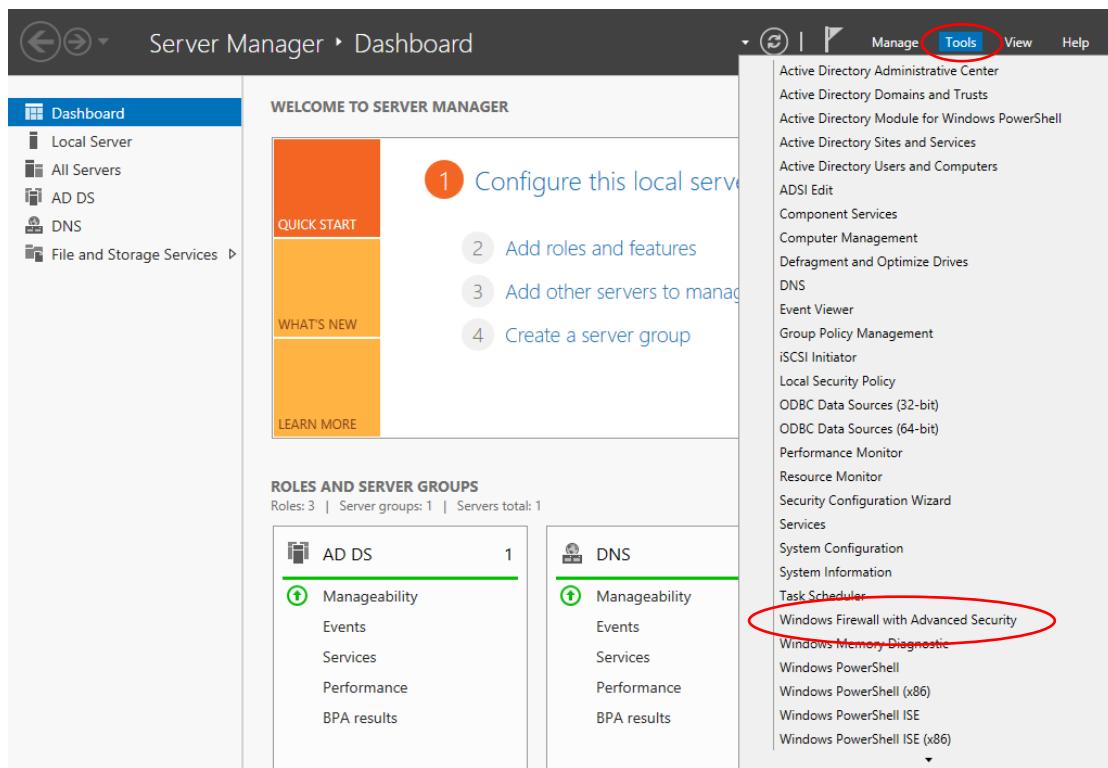
83. **FLACKBOXA** will be automatically filled in as the NetBIOS domain name on the Additional Options page. Click **Next**



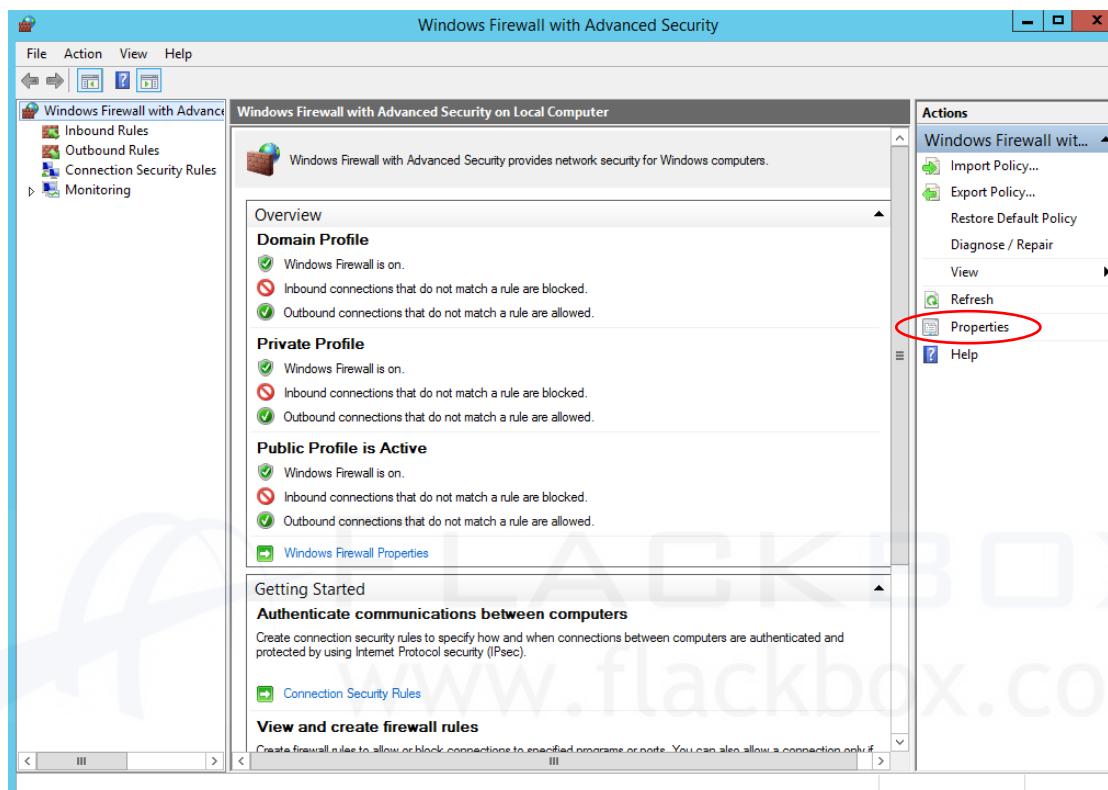
84. Accept the defaults on the Paths page and click **Next**  
85. Read the information and click **Next** on the Review Options page  
86. Read the information on the Prerequisites Check page. The warning messages are normal and expected. Click **Install**



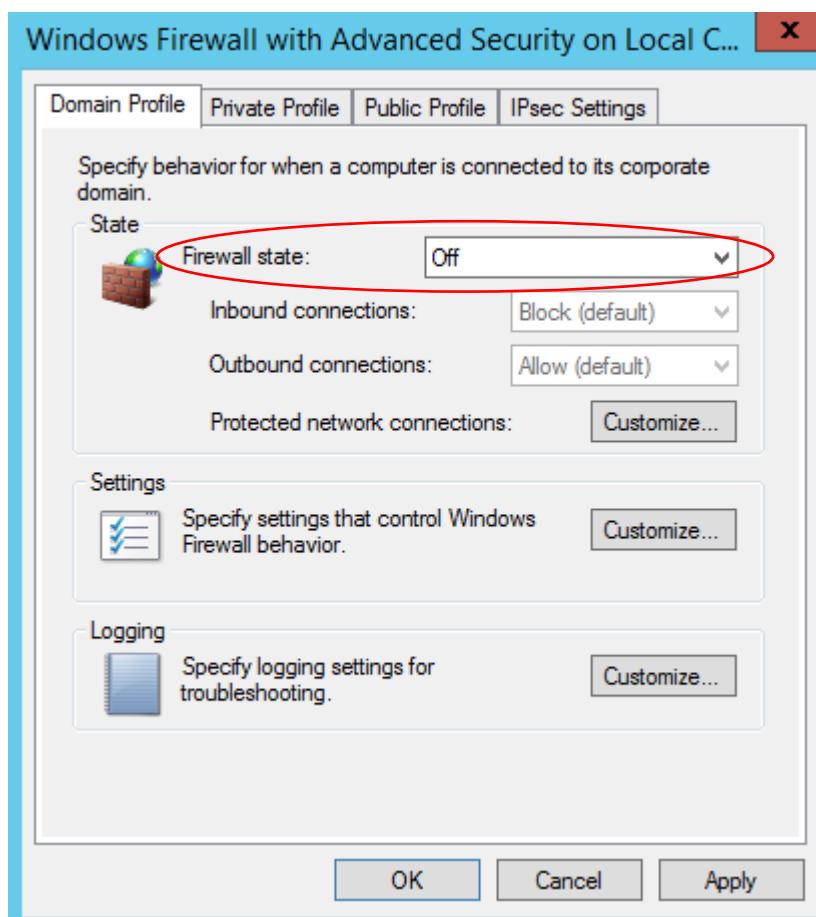
87. The installation will take some time. The server will automatically reboot when the installation is complete.
88. Log back in when the server has rebooted
89. In Server Manager, click **Tools > Windows Firewall with Advanced Security**



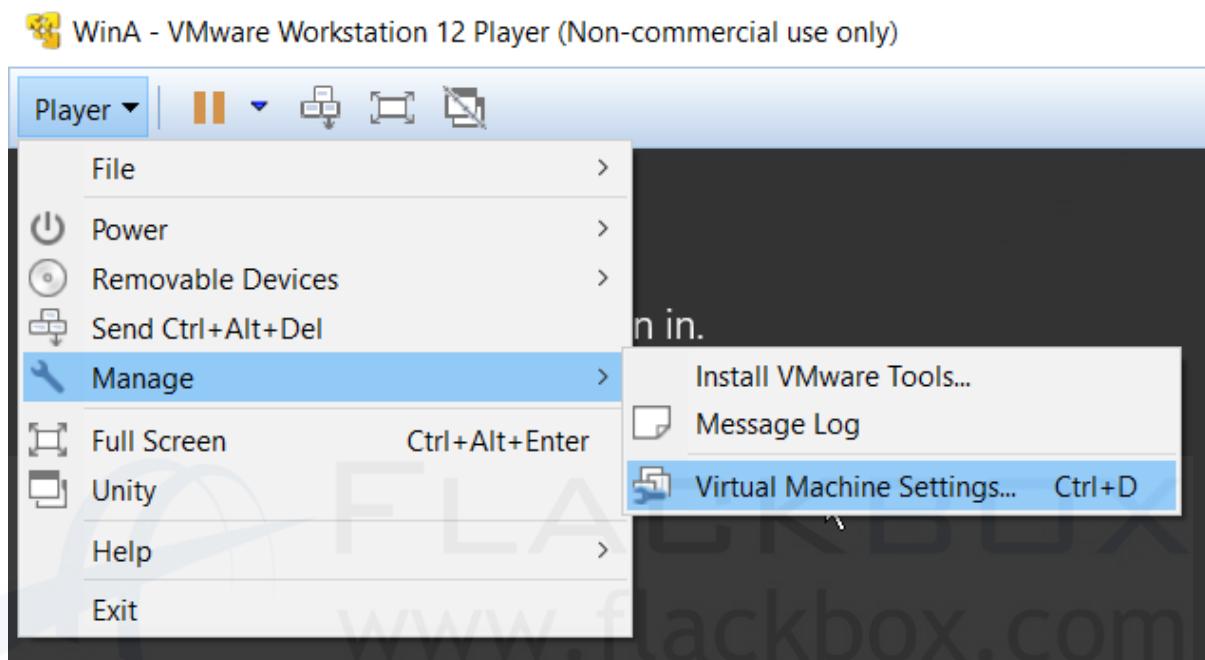
## 90. Click Properties



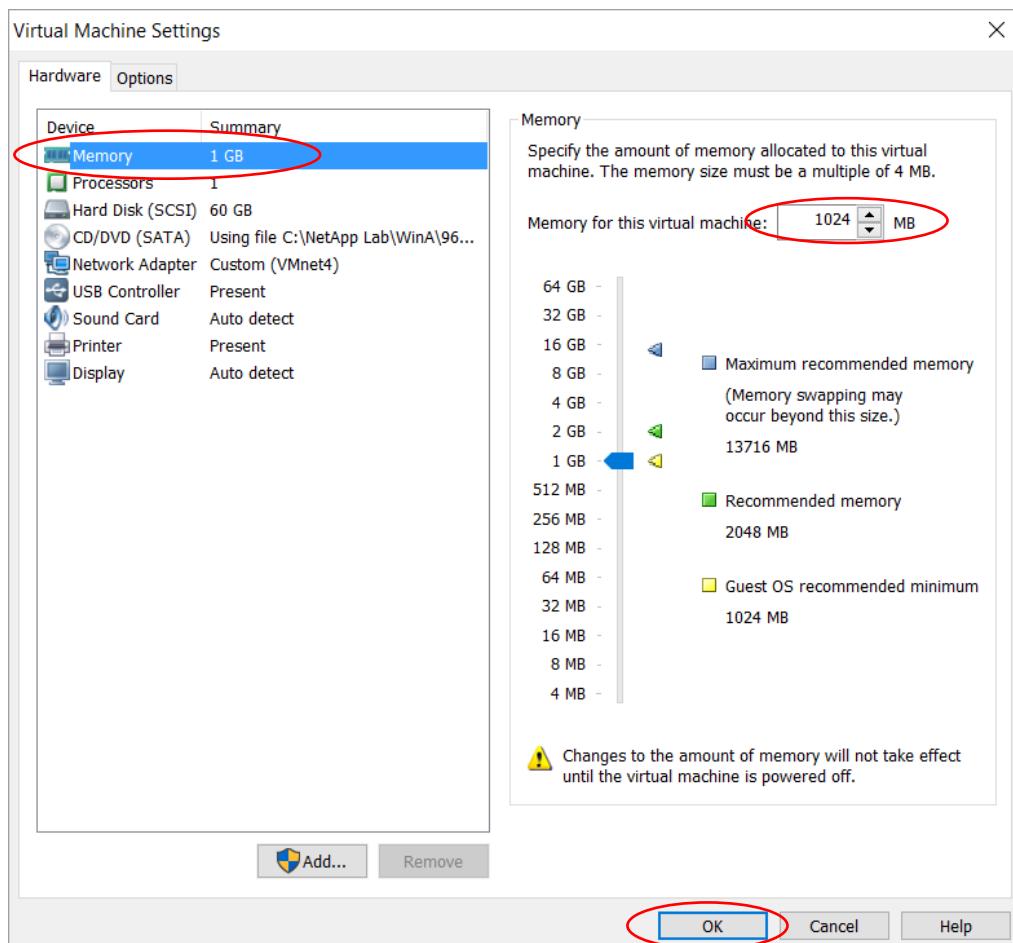
91. Set the Firewall State to **Off** and click **OK**



92. In VMware Workstation Player click **Player > Manage > Virtual Machine Settings...**



93. Change the Memory to **1024 MB** and click **OK**

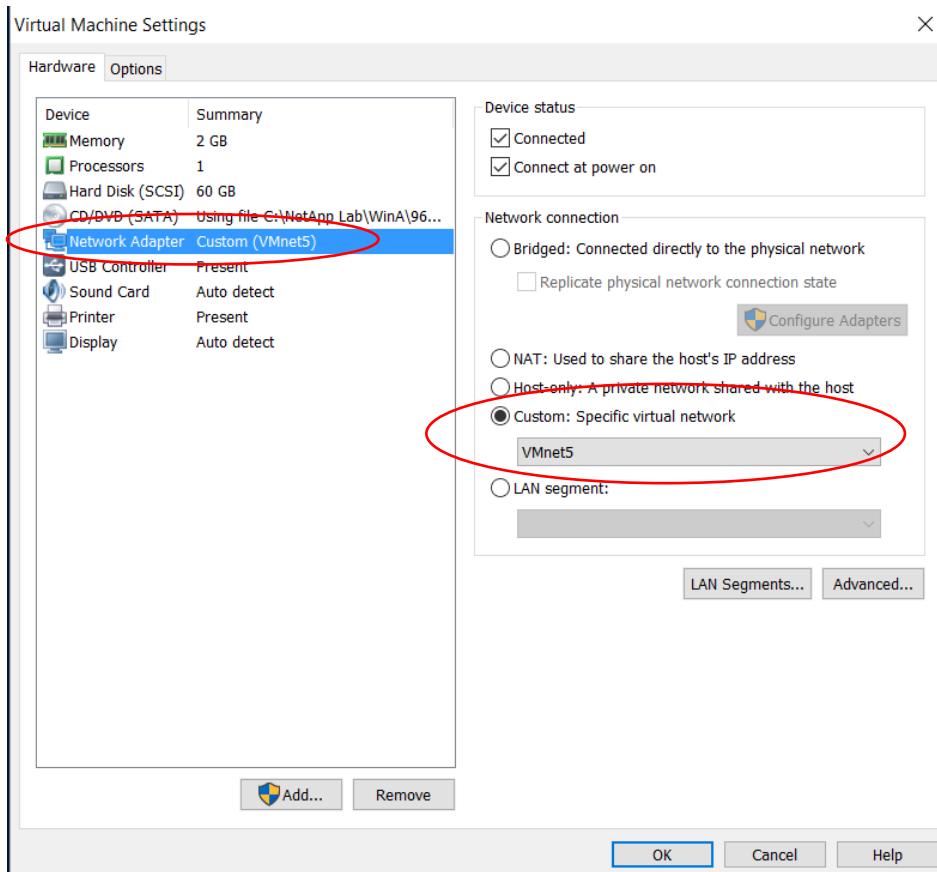


94. Click on the **Start** button and then **Shut Down** the server



95. Repeat steps 7 to 91 to create another server named **WinB** in folder WinB. Use VMnet5 as the virtual network, IP address 172.23.5.1, and the domain name flackboxB.lab

Step	Setting	Value
8,9,12,13	Folder Name	WinB
13	Virtual Machine Name	WinB
17	Custom Virtual Network	VMnet5
33	Computer Name	WinB
41	IP Address	172.23.5.1
41	Subnet Mask	255.255.255.0
41	Default Gateway	172.23.5.254
41	Preferred DNS Server	172.23.5.1
71	Root Domain Name	flackboxB.lab
74	NETBIOS Name	FLACKBOXB



96. Installation of the Windows servers is now complete.

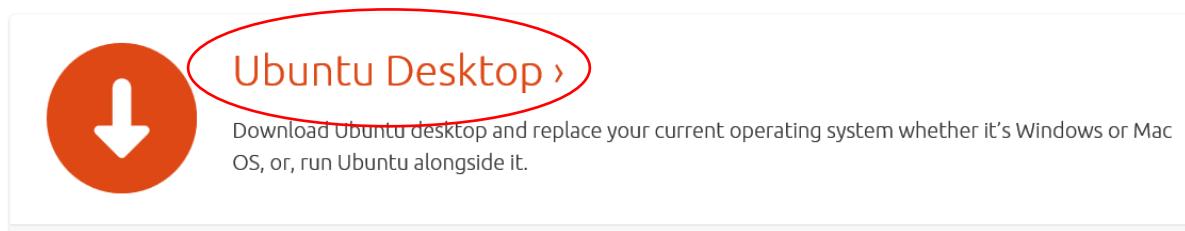
## Linux Build

In this section you will install the Linux hosts for Department A and Department B.

1. Open the Ubuntu Linux download page at <http://www.ubuntu.com/download> in your browser
2. Click on **Ubuntu Desktop**

## Get Ubuntu

Ubuntu is completely free to download, use and share.



3. Click on the **Download** button for the latest recommended version of Ubuntu

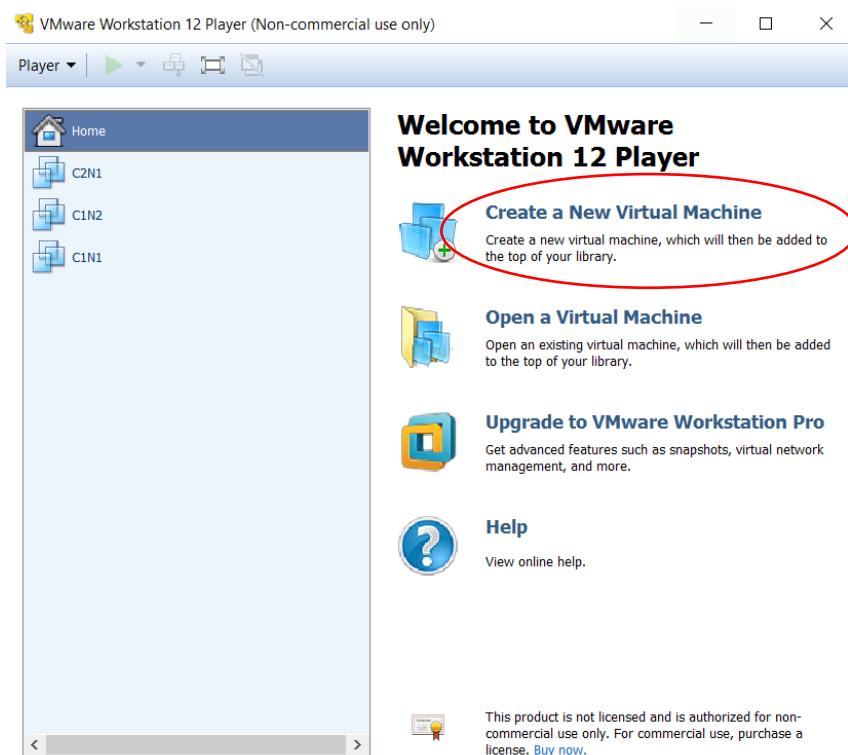
A screenshot of the Ubuntu 16.04.1 LTS download page. It features a sidebar on the left with information about the LTS release and system requirements, followed by a main content area with a large orange "Download" button. This "Download" button is highlighted with a red oval.

4. Scroll to the bottom of the page and select **Not now, take me to the download**

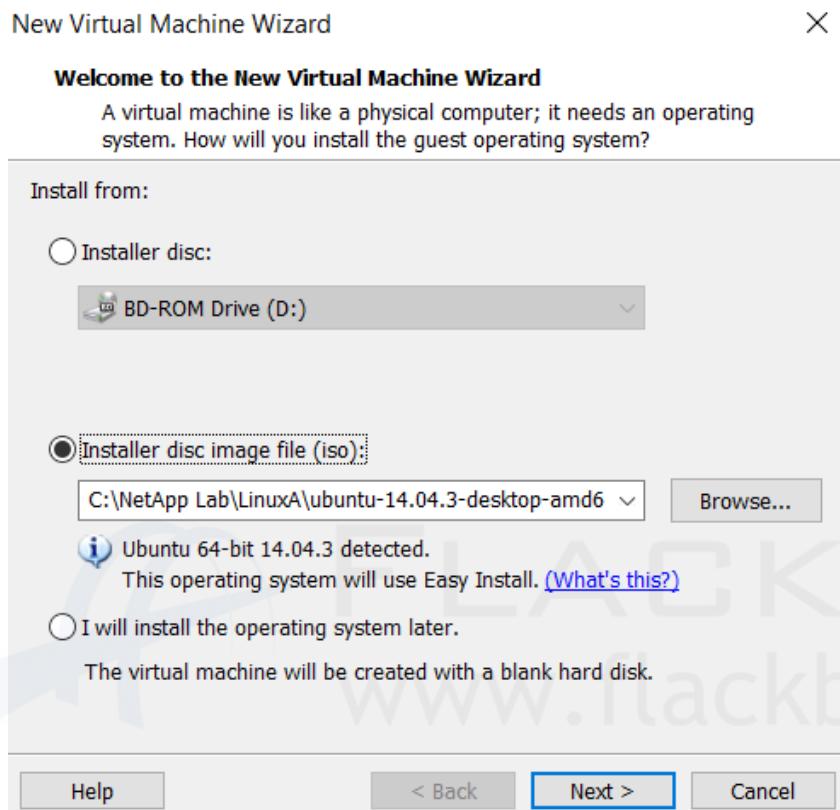


5. After the file has completed downloading, open Windows Explorer and browse to the folder you created earlier on your laptop named **NetApp Lab**.
6. In the NetApp Lab folder, make a subfolder named **LinuxA**. We will create the Department A Linux host in here.
7. Find the Ubuntu ISO file you downloaded and move it into the **LinuxA** folder. It will have a name similar to **ubuntu-16.04.1-desktop-amd64.iso**
8. Open VMware Player

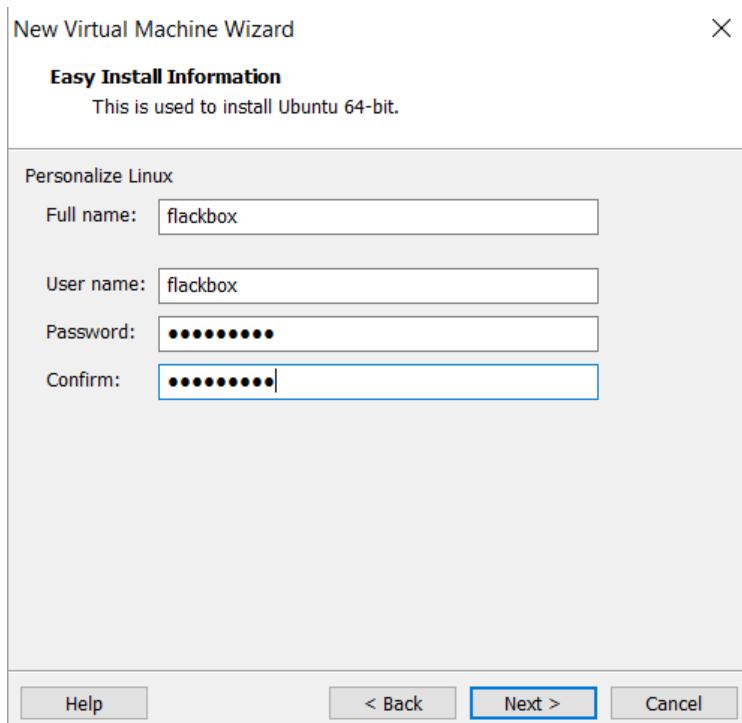
9. Click **Create a New Virtual Machine**



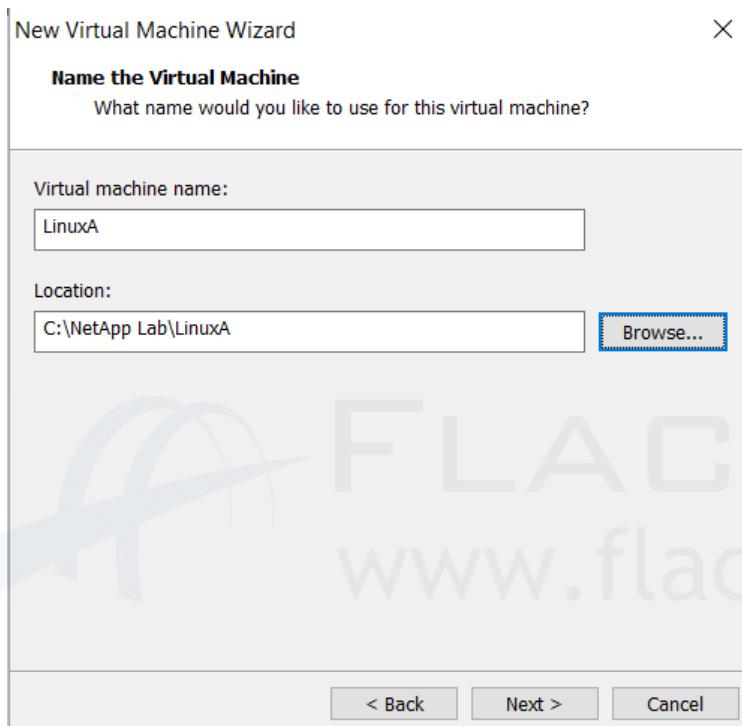
10. Select **Installer disc image file (iso)**: and **Browse** to the Ubuntu ISO file in the LinuxA folder.



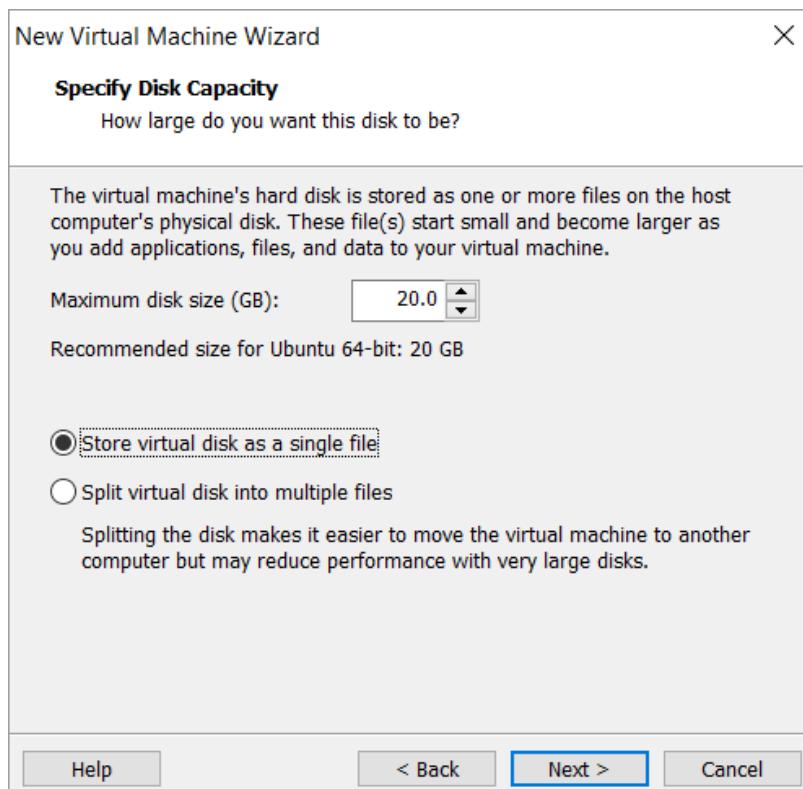
11. On the Easy Install Information page, enter the information below.  
Full name: **flackbox**  
User name: **flackbox**  
Password: **Flackbox1**  
Confirm: **Flackbox1**



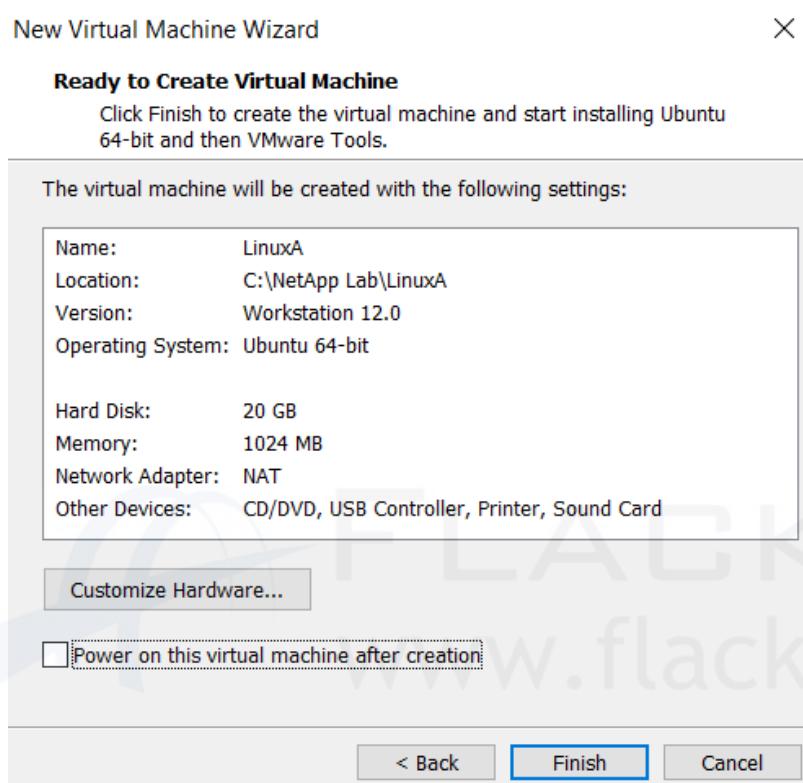
12. Name the virtual machine **LinuxA** and save it in the **NetApp Lab\LinuxA** folder



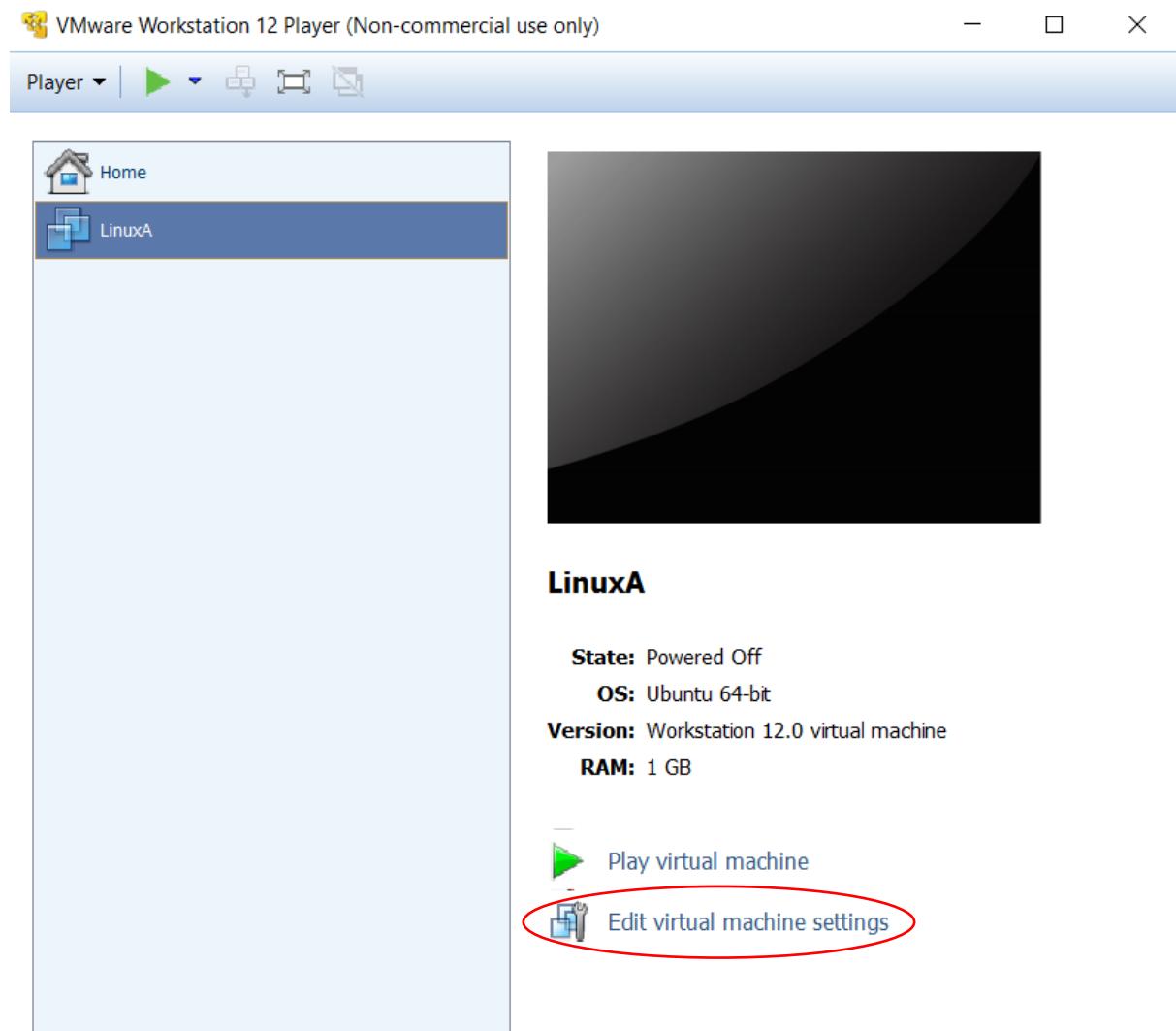
13. Select the option to **Store Virtual Disk as a single file** and click **Next**.



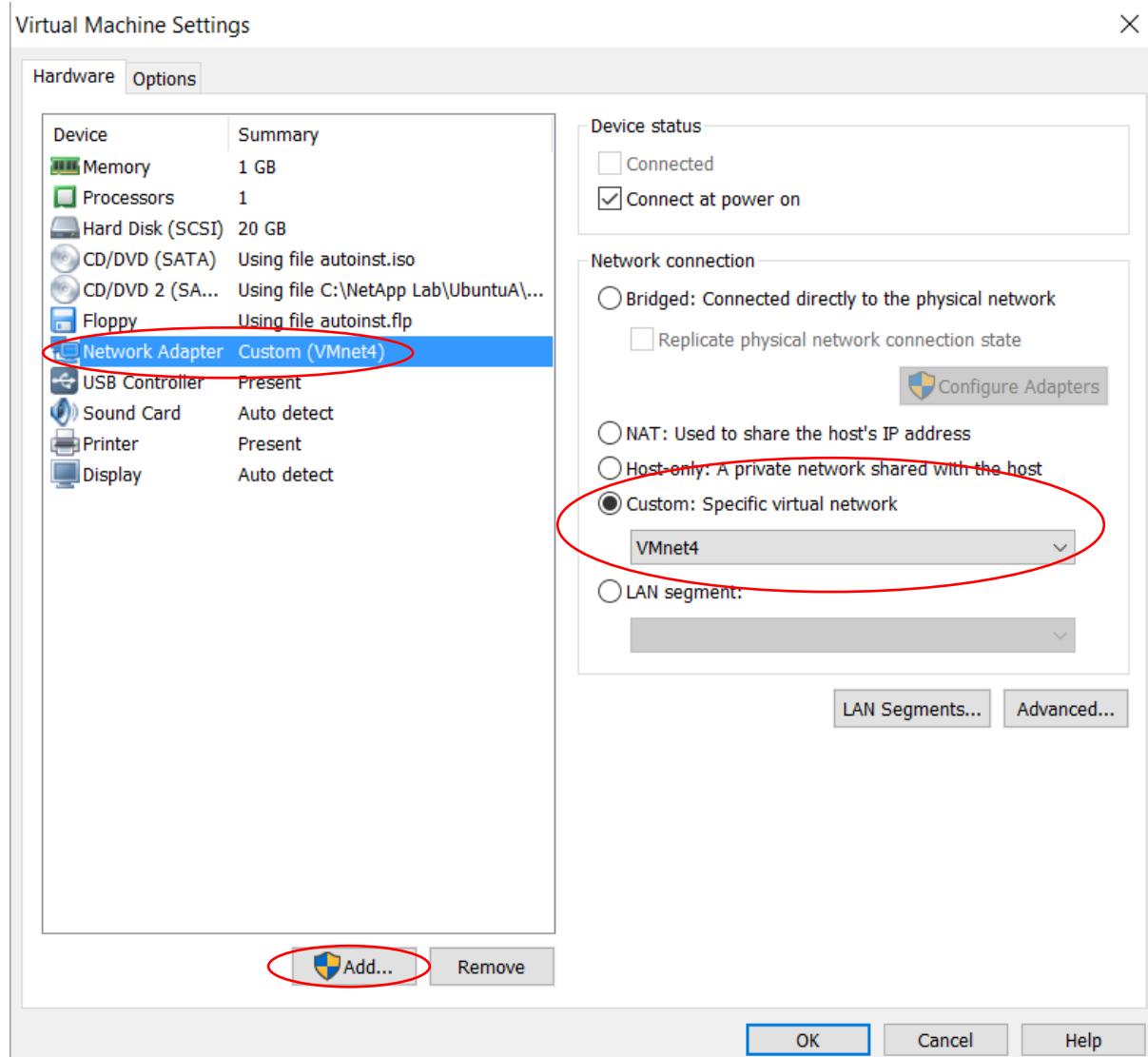
14. Uncheck the option to **Power on this virtual machine after creation** and click **Finish**



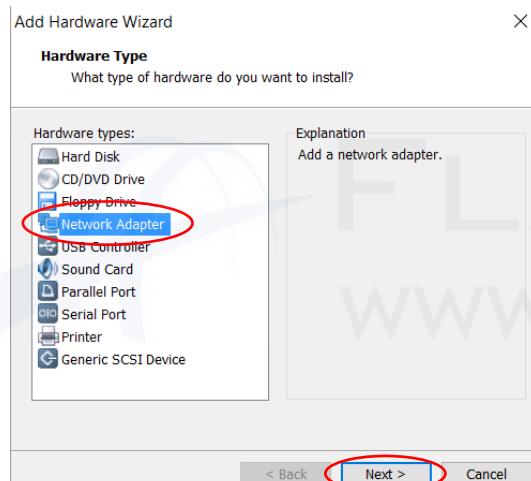
**15. Click **Edit Virtual Machine Settings****



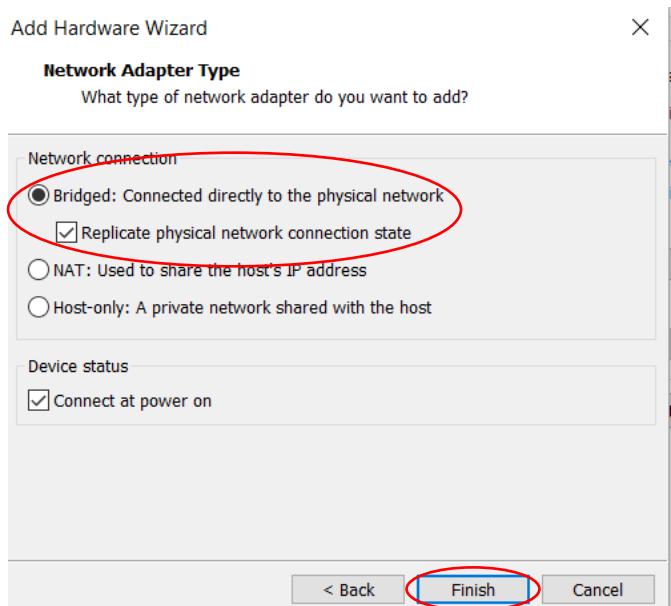
16. Click on **Network Adapter** and select **Custom** virtual network VMnet4, then click on the **Add** button



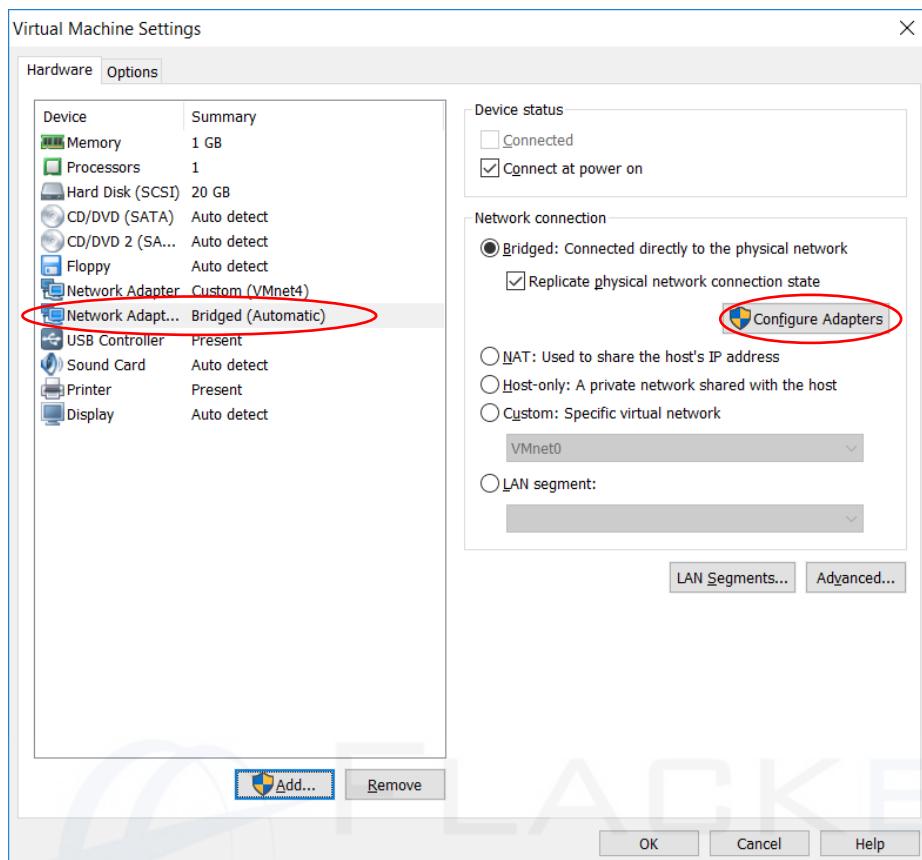
17. Choose **Network Adapter** and click **Next**



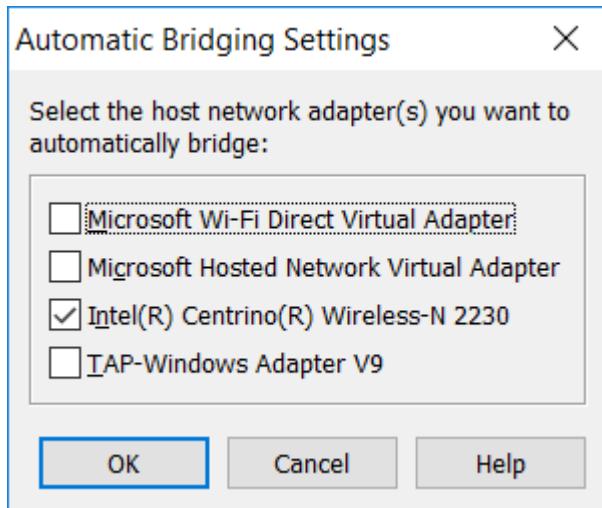
18. Choose **Bridged** and **Replicate physical network connection state**, then click **Finish**



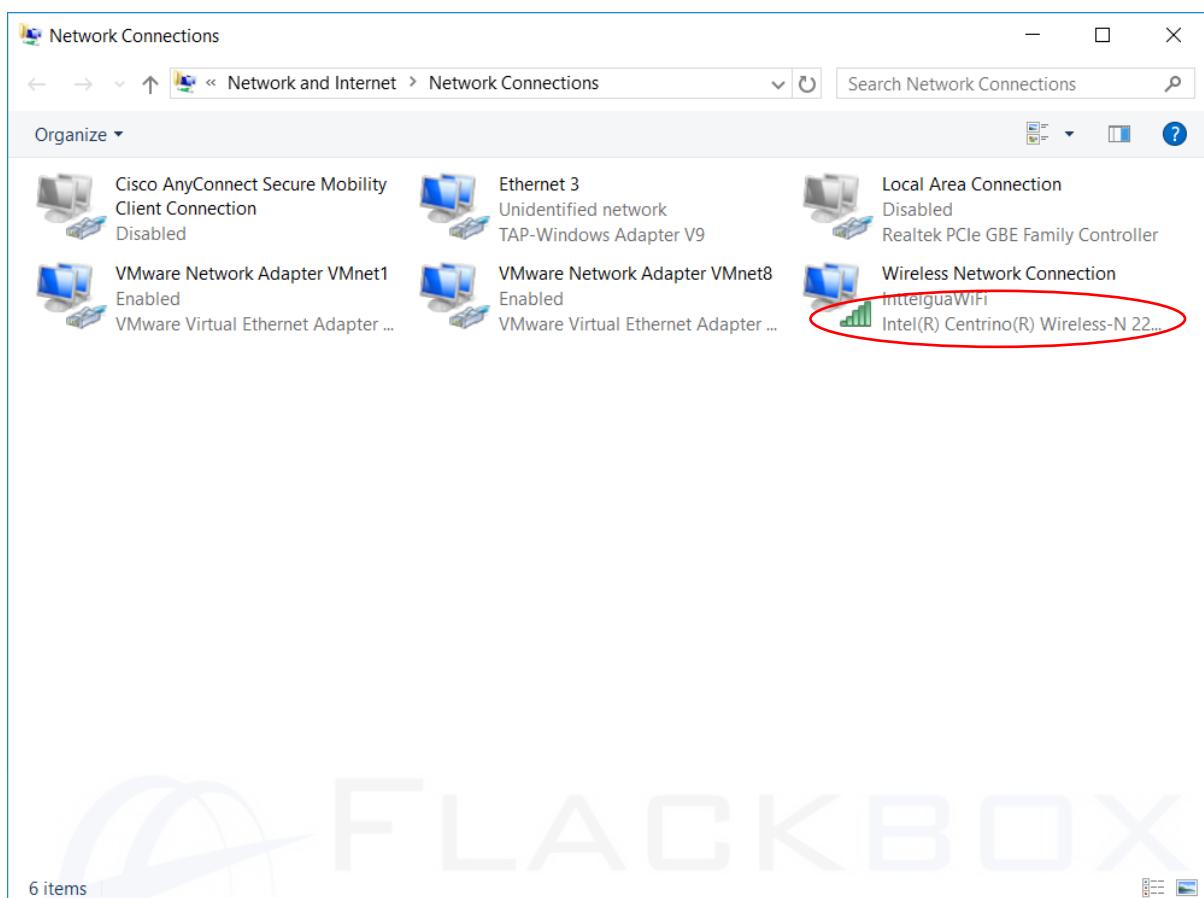
19. With the Bridged network adapter selected, click the **Configure Adapters** button



20. Select the network adapter which has Internet connectivity on your laptop. Deselect any other network adapters. Click **OK**

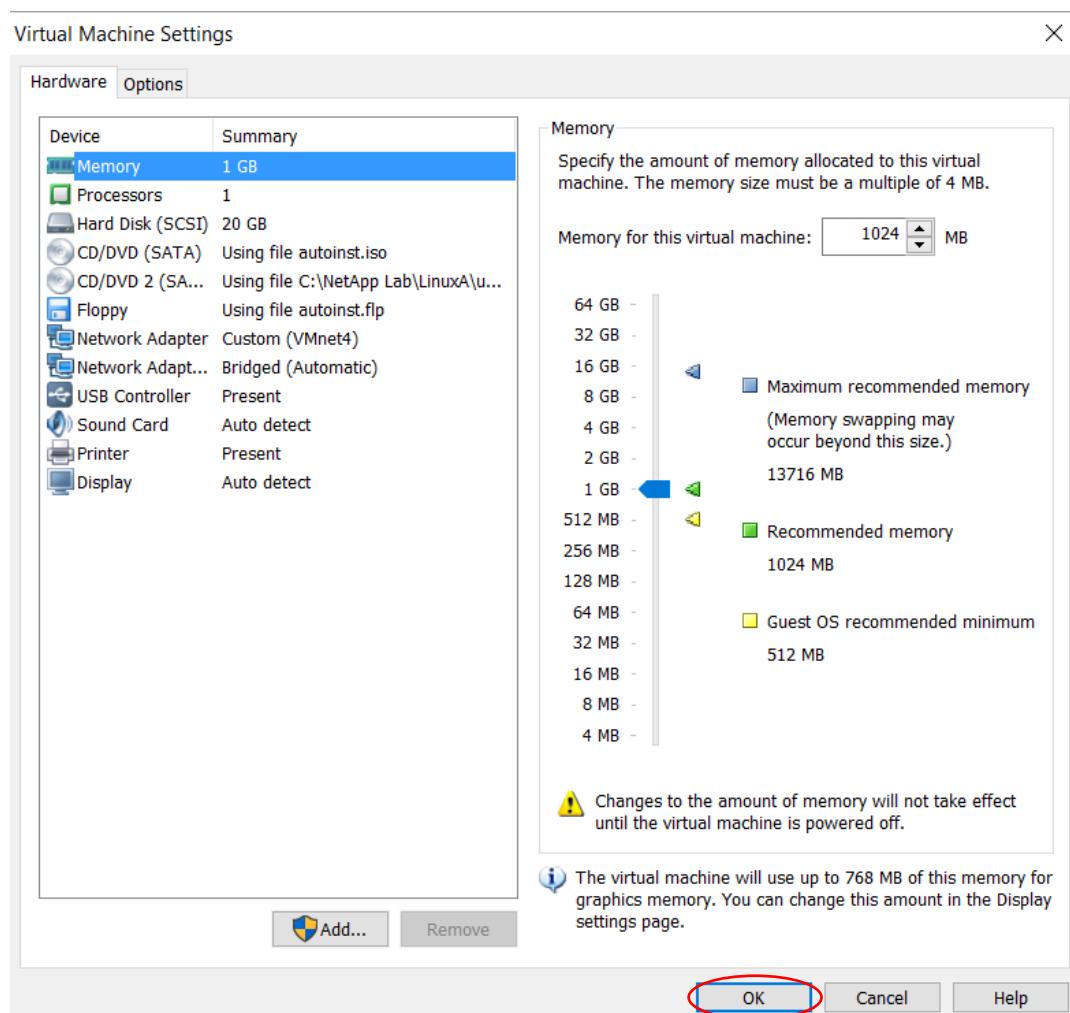


21. If you need to check which network adapter to use in the previous step, open **Control Panel** > **Network and Sharing Center** and click **Change Adapter Settings**



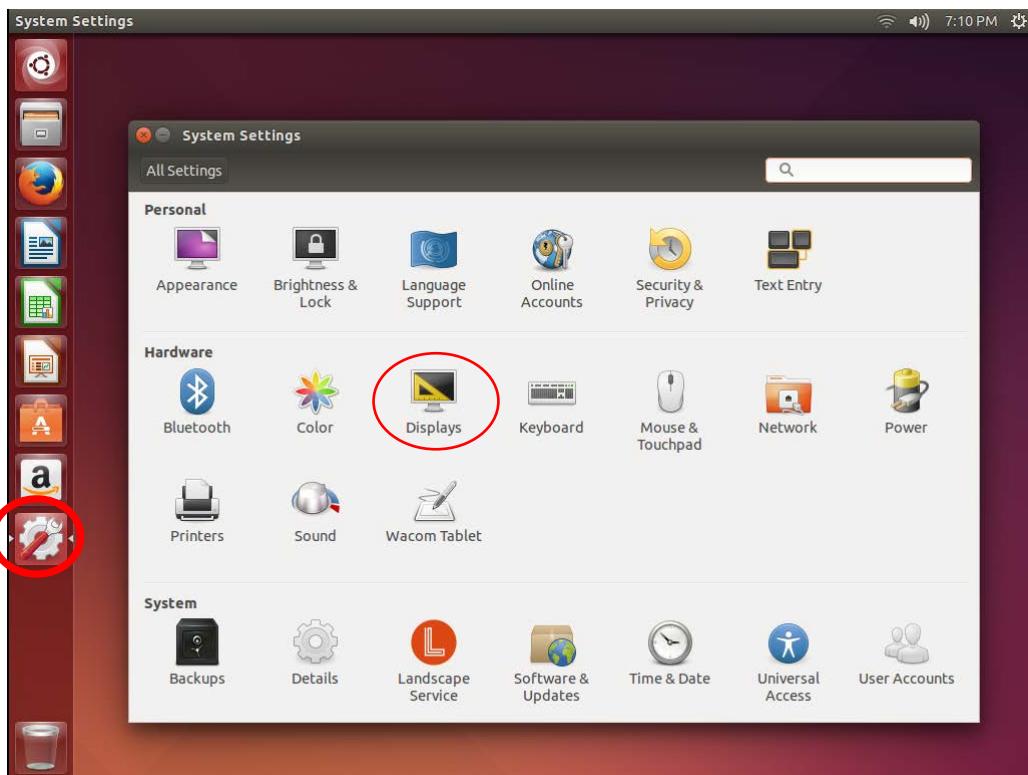
6 items

22. The Virtual Machine Settings for the network adapters should look like the picture below.  
Click **OK** to close

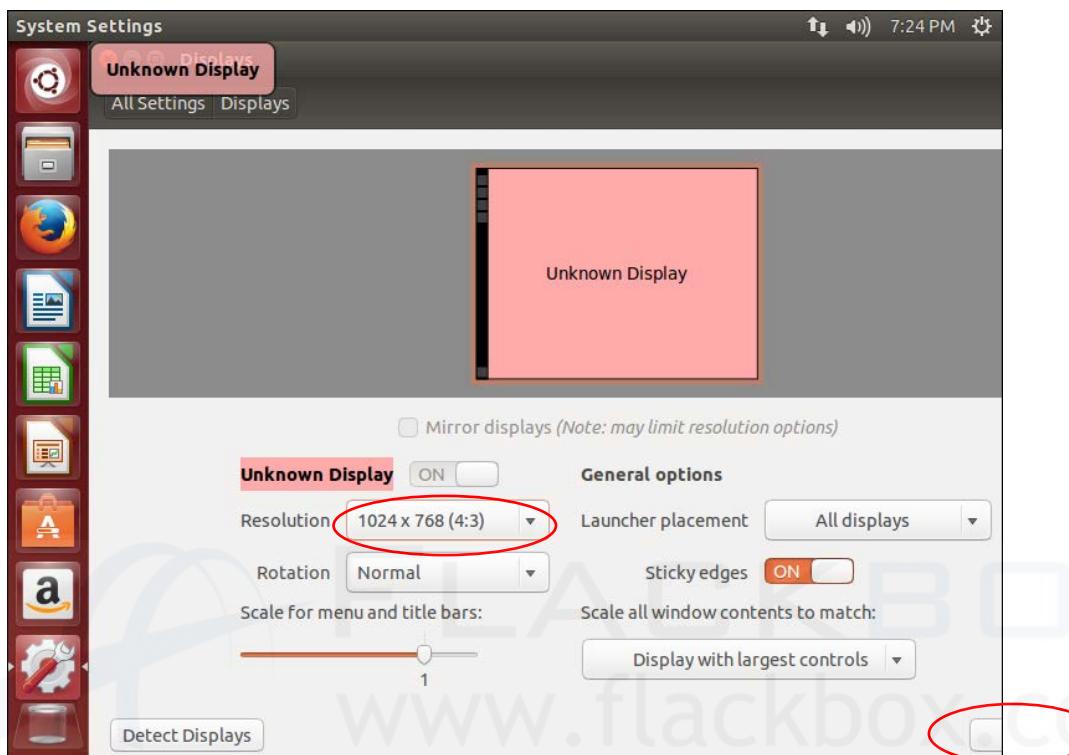


23. Click **Play Virtual Machine** to power on the Linux host  
24. The host will run through the Ubuntu install process, this will take some time  
25. When the installation has completed, log in as username **flackbox** and password **Flackbox1**

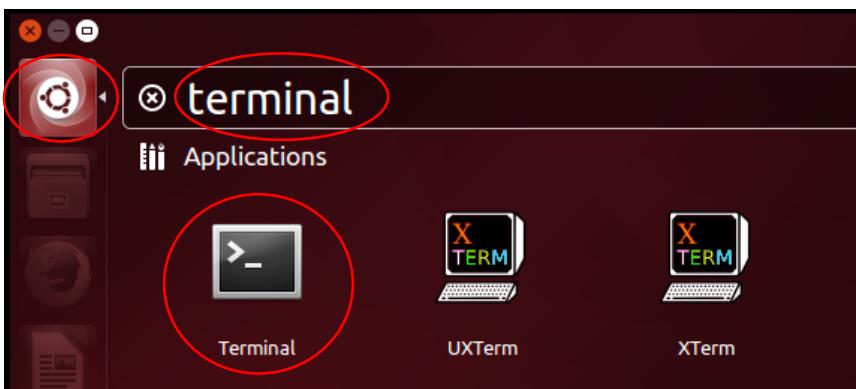
26. If the virtual machine window is too small, click on the **Settings** button and then **Displays**



27. Select a higher resolution. The Apply button is on the bottom right.



28. Click on the **Search** button in the top left, type **terminal** and then click on the Terminal icon to open it



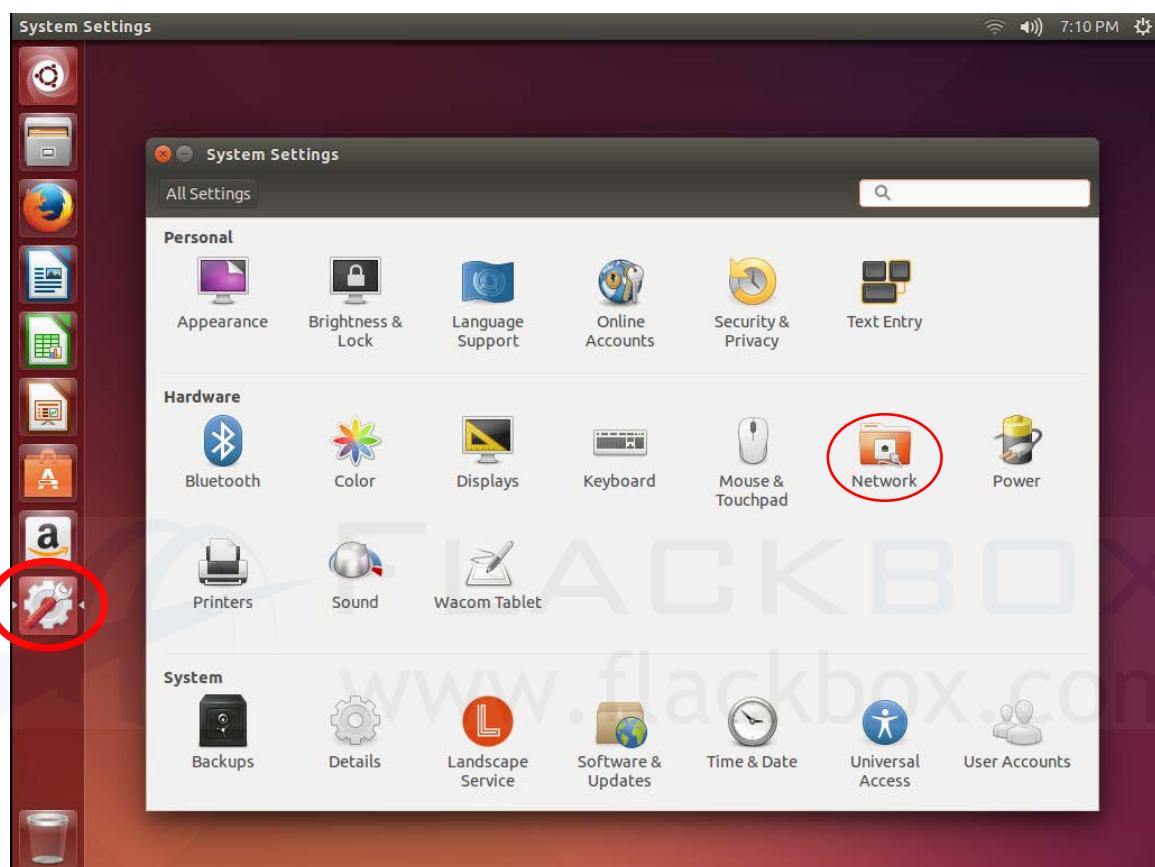
29. Elevate your privilege level to root by typing **sudo su -**  
30. Enter the password **Flackbox1** when prompted  
31. Update the software package list by typing **apt-get update**

```
flackbox@ubuntu:~$ sudo su -  
[sudo] password for flackbox:  
root@ubuntu:~# apt-get update
```

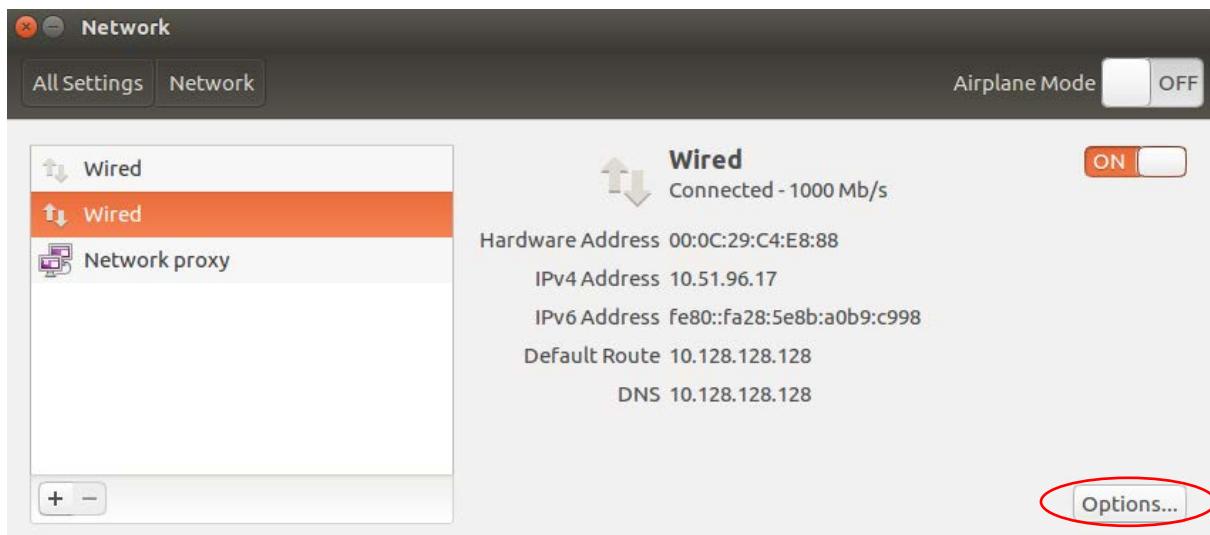
32. Install the packages for NFS, CIFS, iSCSI and SSH with the command **apt-get install portmap nfs-common cifs-utils open-iscsi smbclient openssh-server**. Type **y** when prompted for confirmation.

```
root@ubuntu:~# apt-get install portmap nfs-common cifs-utils smbclient open-iscsi openssh-server
```

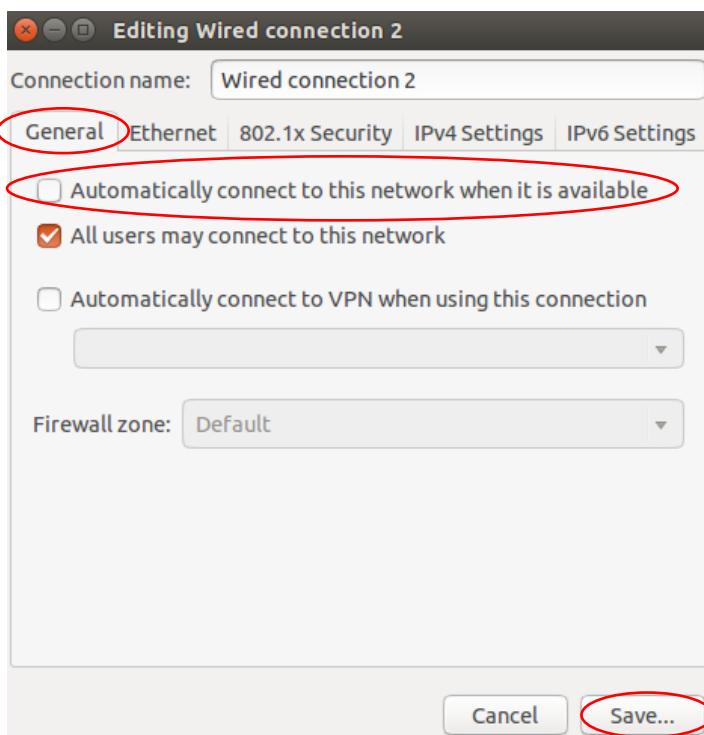
33. Click on the **Settings** button and then **Network**



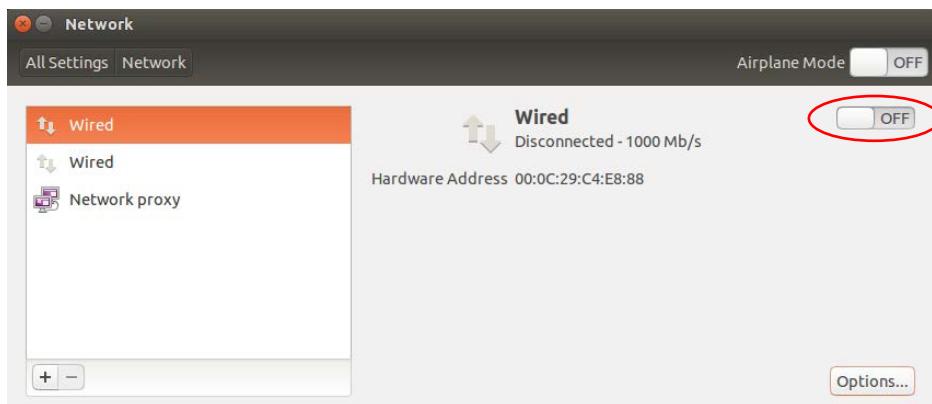
34. Click **Options** on the network card which has internet access (the network card which has an IP address)



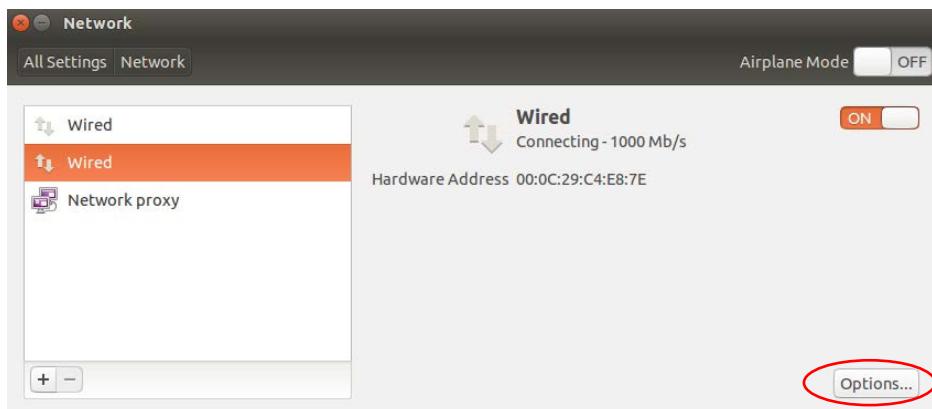
35. Click the **General** tab and deselect **Automatically connect to this network when it is available**, and click **Save**



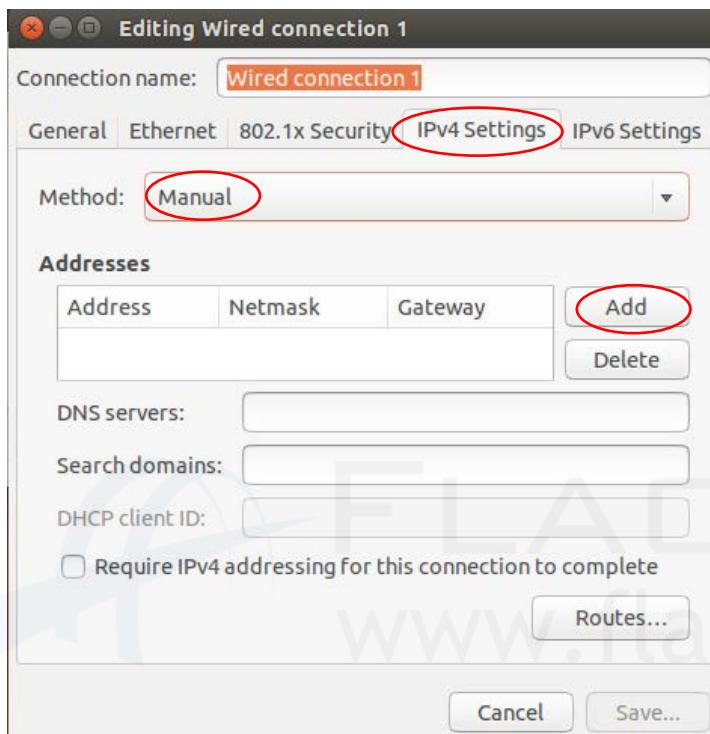
36. Turn the network card Off



37. Select the other network card and click **Options**



38. Click the **IPv4 Settings** tab and select **Manual** from the Method drop-down menu, then click on the **Add** button



39. Enter the settings below and click **Save**.

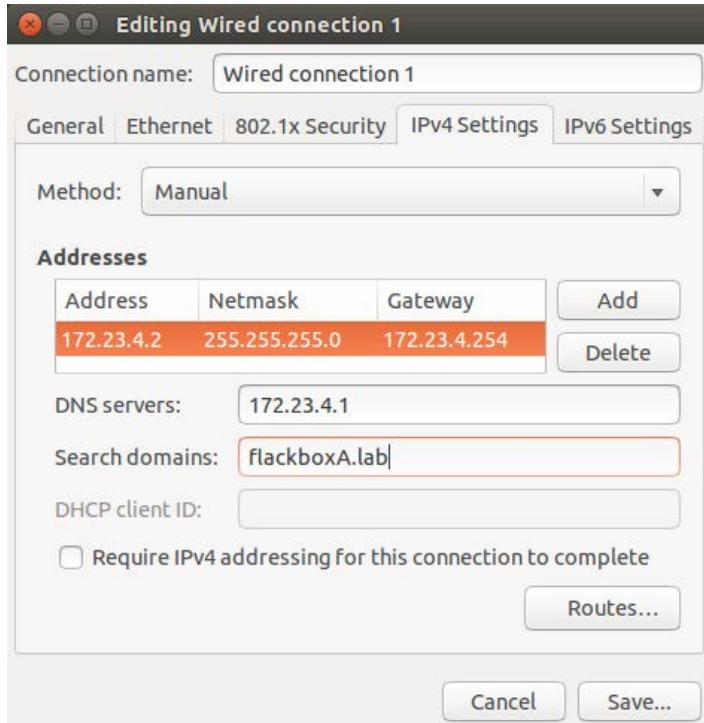
Address: **172.23.4.2**

Netmask: **255.255.255.0**

Gateway: **172.23.4.254**

DNS servers: **172.23.4.1**

Search domains: **flackboxA.lab**

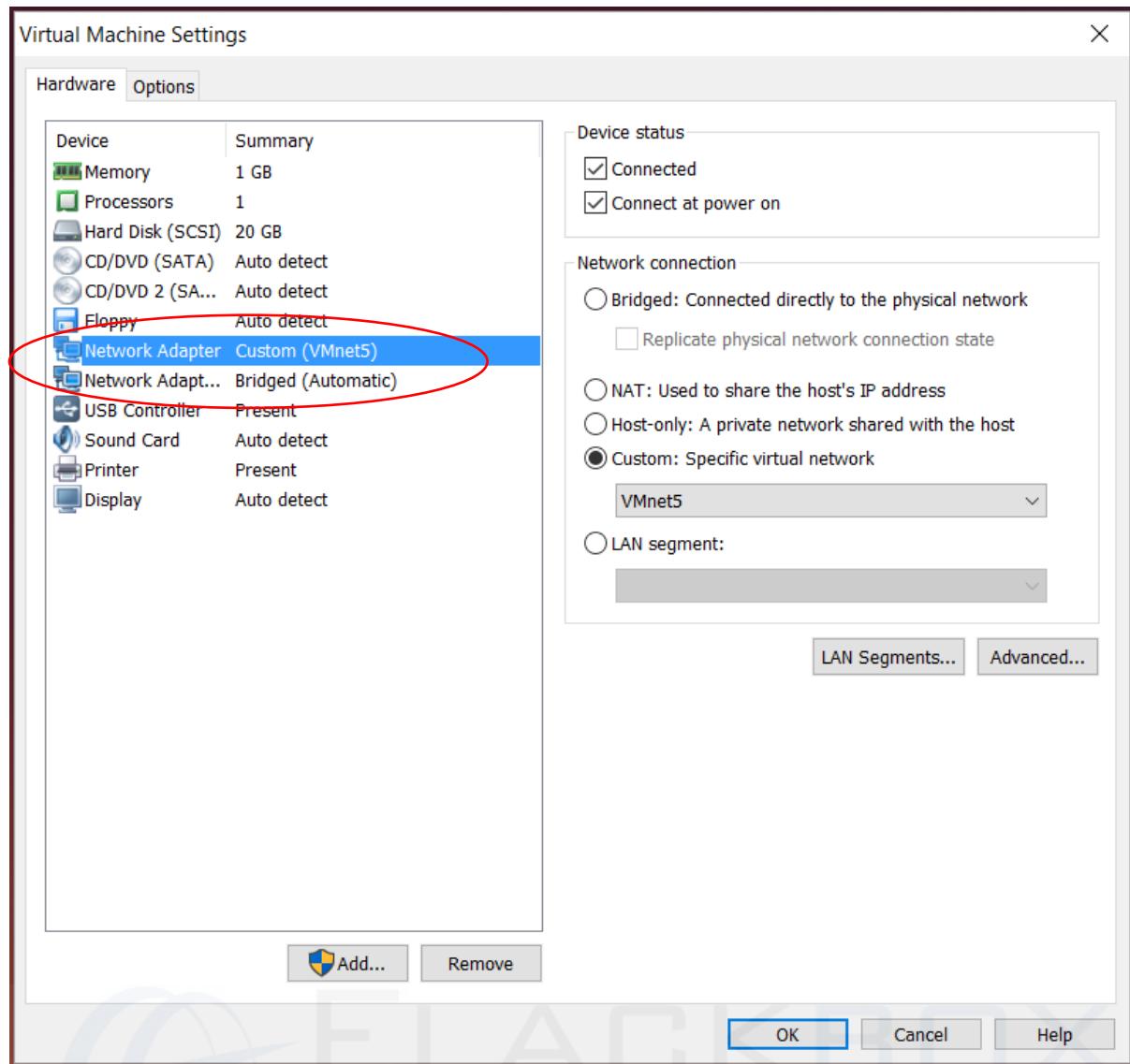


40. Click on the **Power** button and then **Shut Down**. Confirm the shutdown.



41. Repeat steps 6 to 37 to create another Linux host named **LinuxB** in folder **LinuxB**. Use VMnet5 as the virtual network, IP address 172.23.5.2, and the domain name **flackboxB.lab**

Step	Setting	Value
6,7,10,12	Folder Name	LinuxB
12	Virtual Machine Name	LinuxB
16	Custom Virtual Network	VMnet5
25	Address	172.23.5.2
25	Netmask	255.255.255.0
25	Gateway	172.23.5.254
25	DNS Servers	172.23.5.1
25	Search Domain	flackboxB.lab



42. Installation of the Linux hosts is now complete.

## SuperPutty Install

In this section you will install Putty and SuperPutty.

1. Open the Putty downloads page at <http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html> in your browser
2. Click on the link to download **putty.exe**

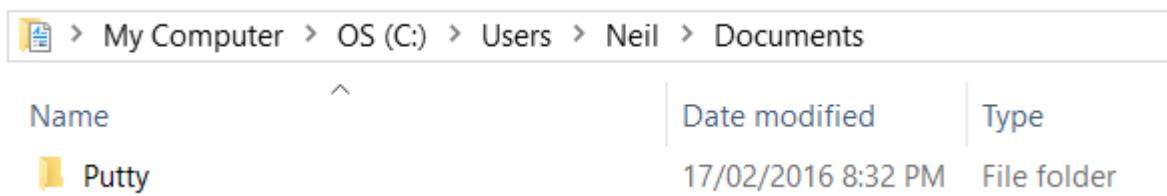
### The latest release version (beta 0.66)

This will generally be a version we think is reasonably likely to work well. If you have a problem before reporting it.

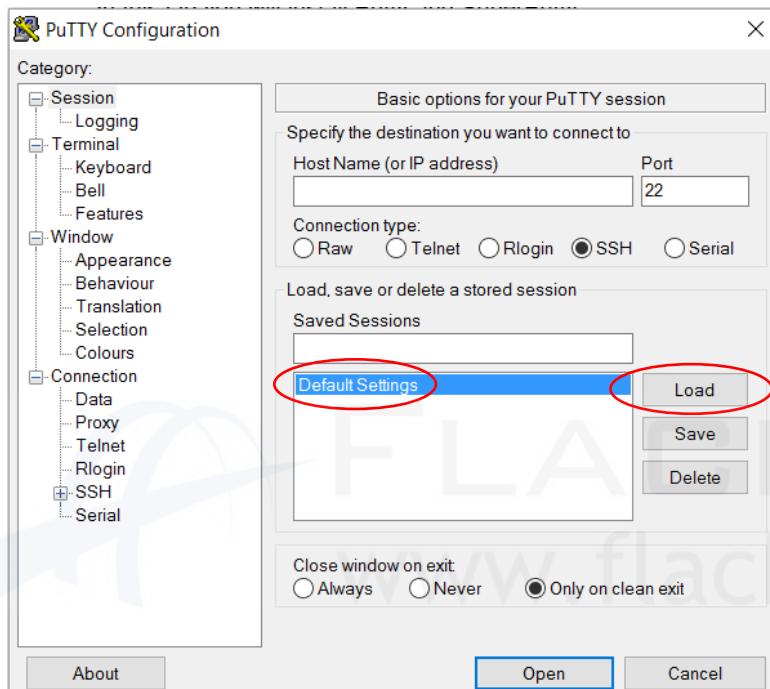
#### For Windows on Intel x86

PuTTY:	<a href="#">putty.exe</a>	(or by FTP)	(signature)
PuTTYtel:	<a href="#">puttytel.exe</a>	(or by FTP)	(signature)

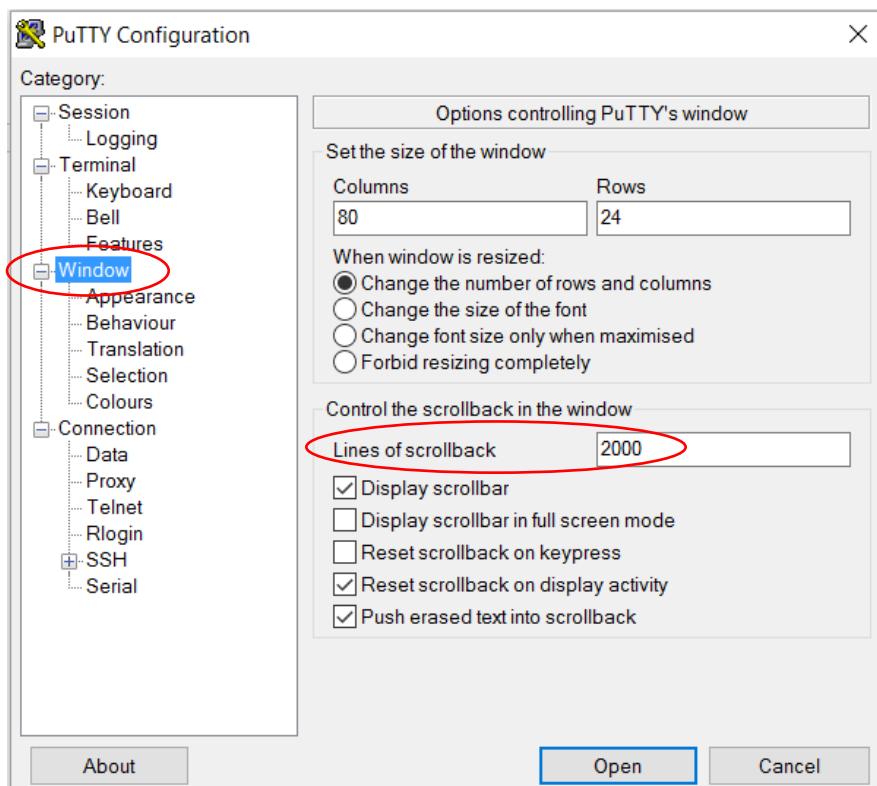
3. Create a folder named **Putty** in your **Documents** folder and copy **putty.exe** there



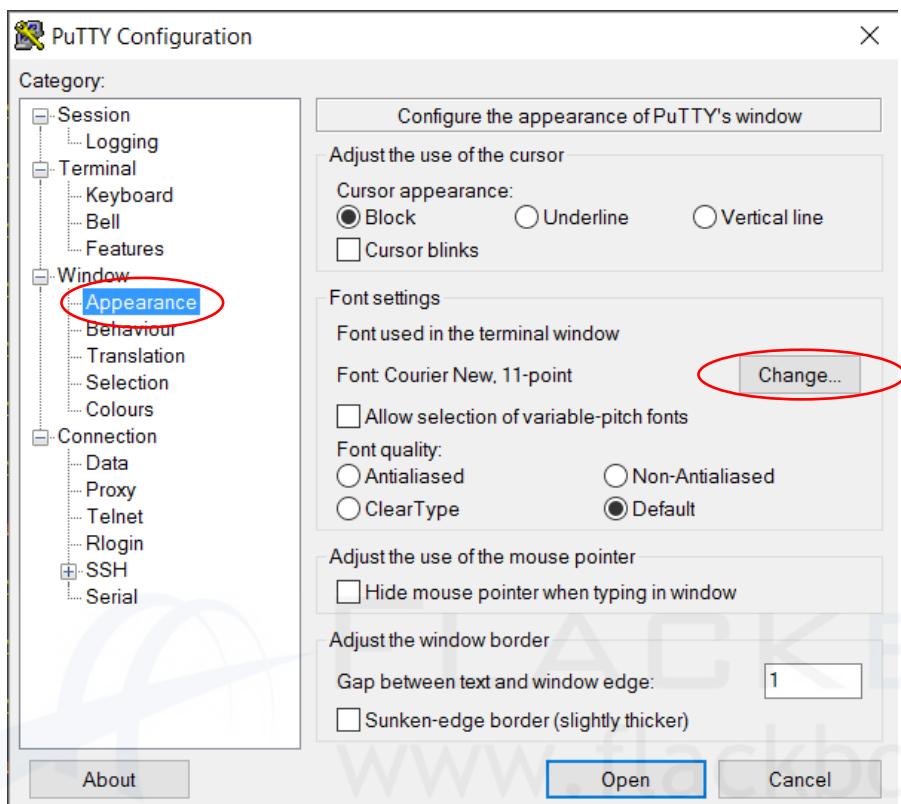
4. Double-click on **putty.exe** to run the program
5. Click on **Default Settings** and **Load**



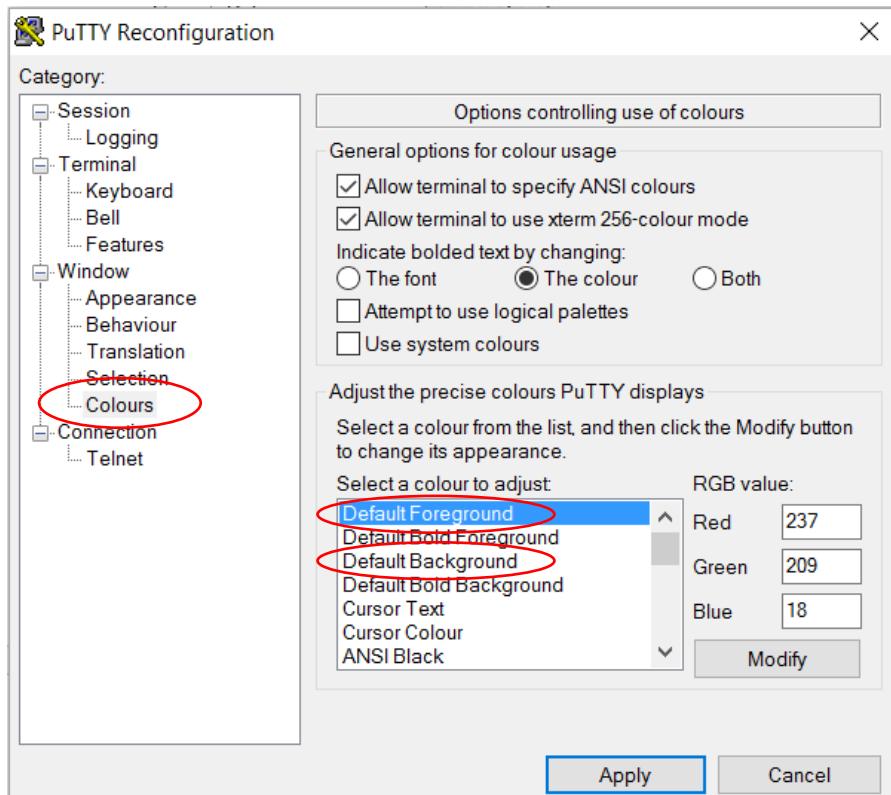
6. Click **Window** and set **Lines of Scrollback** to **2000**



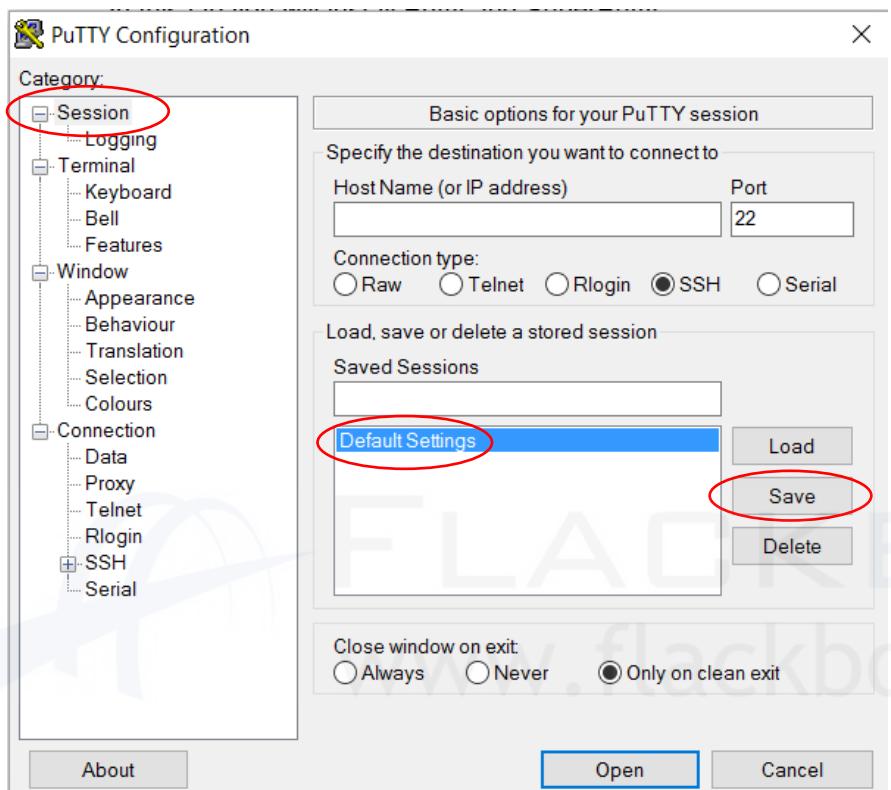
7. Click on **Appearance** and **Change** if you want to change the font size or style.



8. Click on **Colours** and edit the **Default Foreground** and **Default Background** if you want to change the colour scheme.



9. Click on **Session** then **Default Settings** and **Save** to save your changes



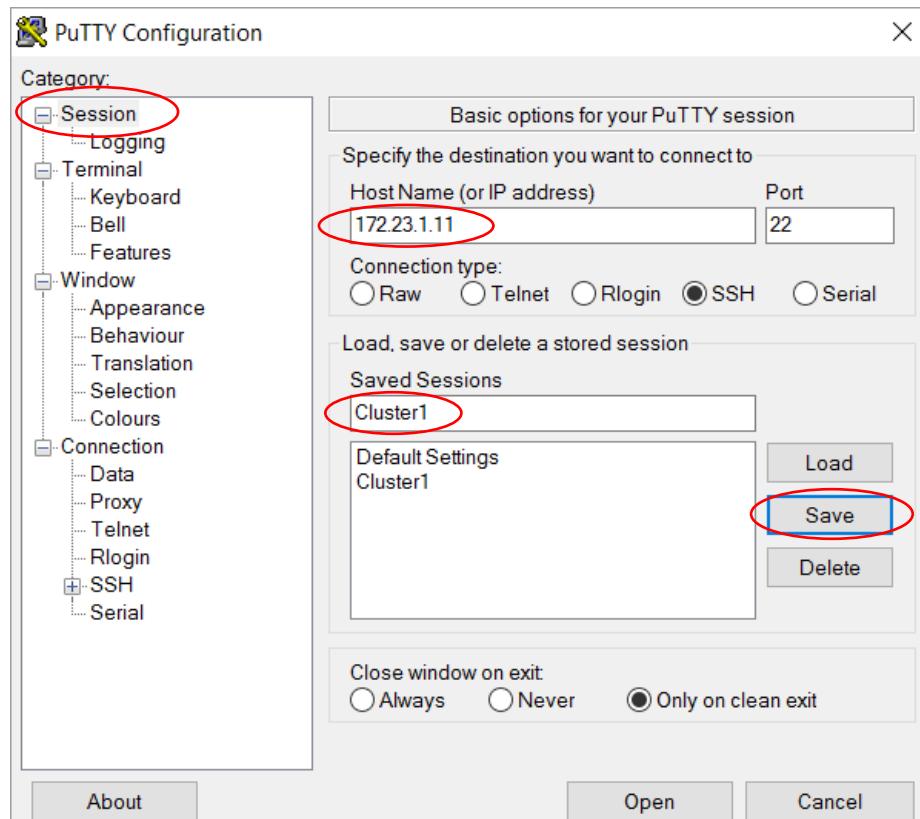
10. Configure a shortcut for the Cluster 1 Management address.

On the Session page, enter the information below.

Host Name (or IP address): **172.23.1.11**

Saved Sessions: **Cluster1**

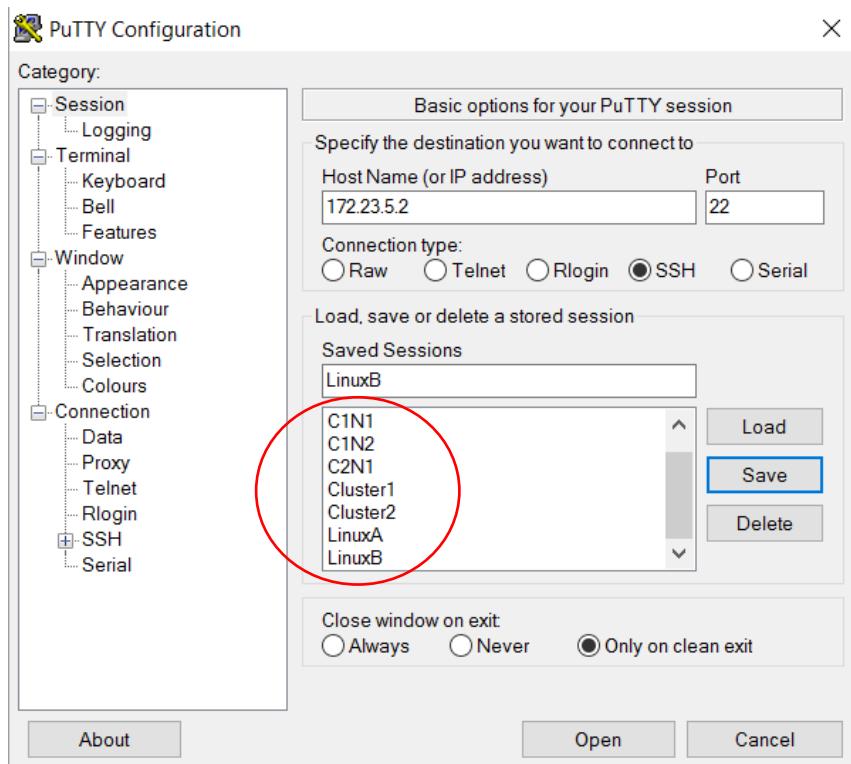
Click **Save**



11. Repeat to create six more shortcuts for the other hosts in the lab. Use the information from the table below.

Host Name (or IP address)	Saved Session
172.23.1.12	C1N1
172.23.1.13	C1N2
172.23.1.21	Cluster2
172.23.1.22	C2N1
172.23.4.2	LinuxA
172.23.5.2	LinuxB

12. Your Saved Sessions should look like the picture below when you have finished creating the shortcuts.



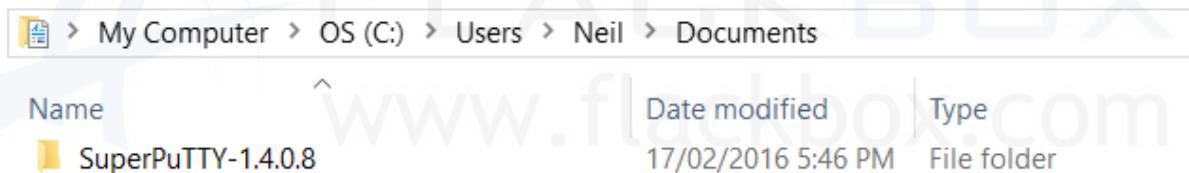
13. Open the GitHub SuperPutty download page at  
<https://github.com/jimradford/superputty/releases> in your browser

14. In the Download section, click on the link to download the SuperPutty installation zip file

## Downloads

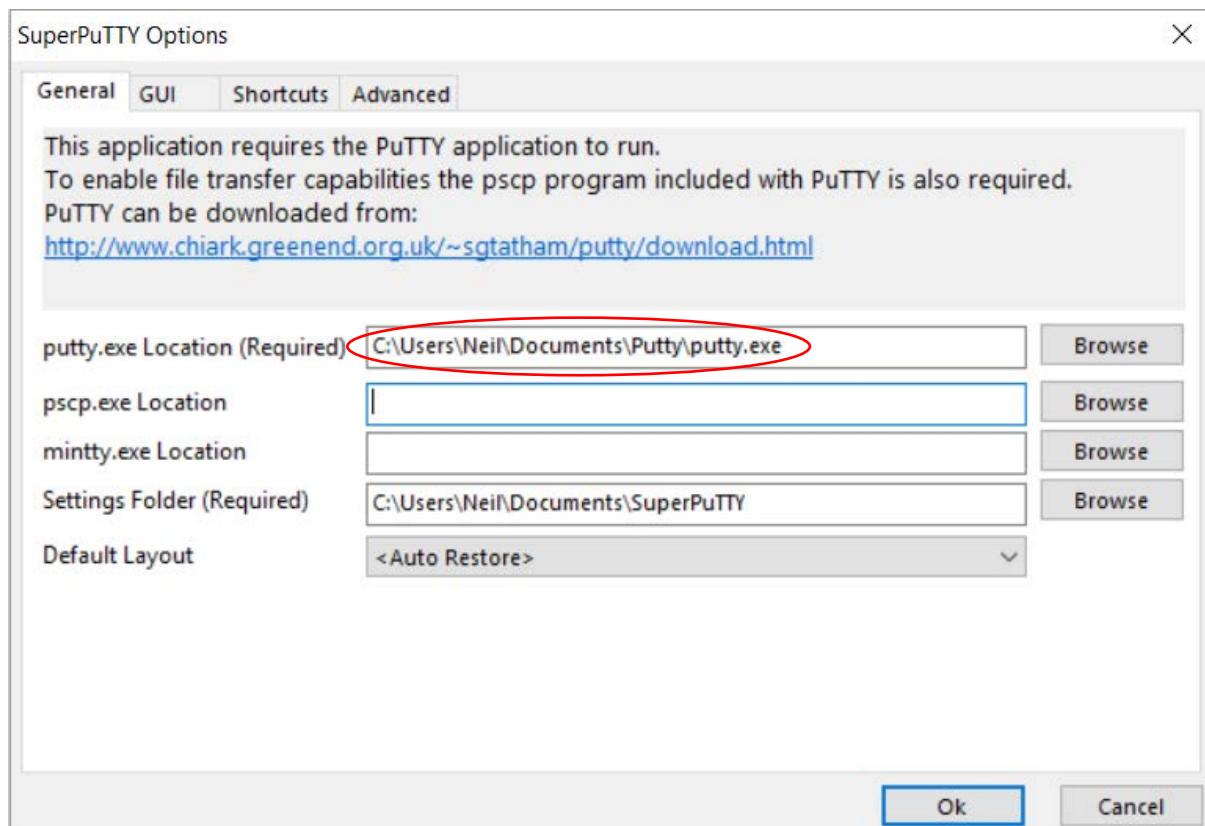
<a href="#">SuperPuTTY-1.4.0.8.zip</a>	587 KB
<a href="#">SuperPuttySetup-v1.4.0.8-DEBUG.msi</a>	1.78 MB
<a href="#">SuperPuttySetup-v1.4.0.8.msi</a>	1.77 MB
<a href="#">Source code (zip)</a>	
<a href="#">Source code (tar.gz)</a>	

15. Extract the SuperPutty folder from the zip file to your Documents folder

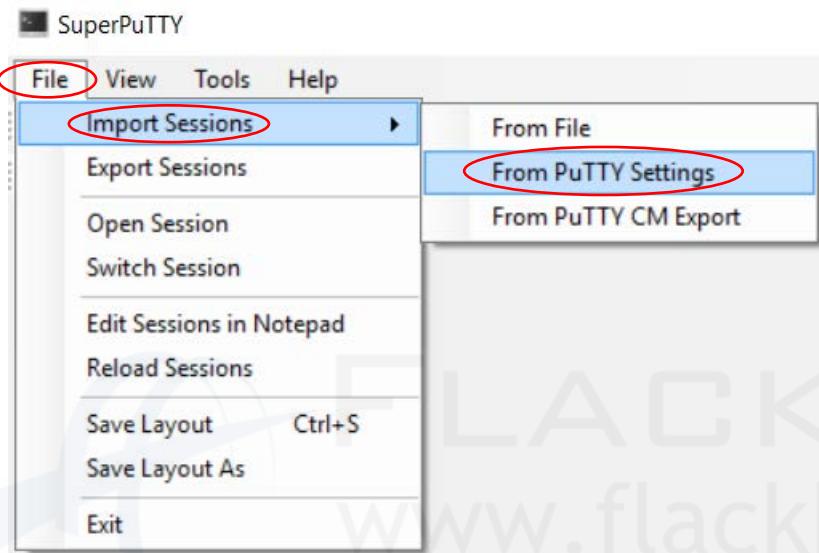


16. Open the SuperPutty folder and double-click on **superputty.exe** to run the program

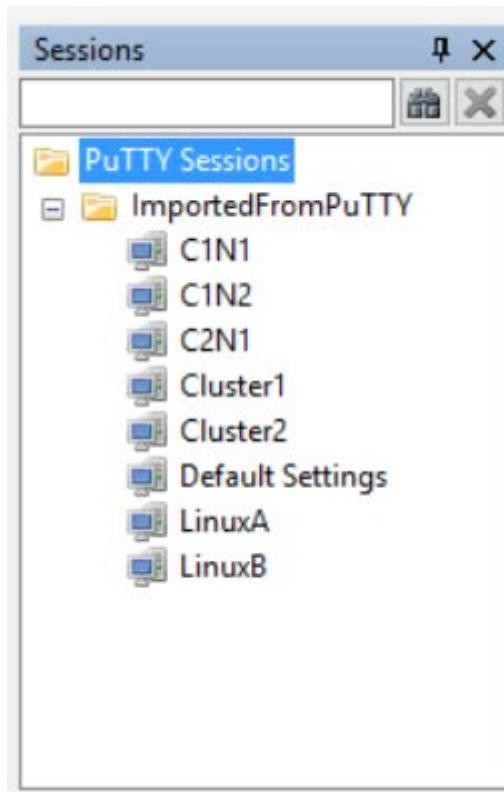
17. The SuperPutty options window will open. Enter the path to the putty.exe location in your Documents folder and click **OK**



18. The SuperPutty main window will open. Click **File > Import Sessions > From PuTTY Settings** to import your Putty sessions. Click **Yes** when asked if you want to copy all sessions.



19. Expand the Session window to see your saved sessions. You can now open up your sessions in multiple tabs in SuperPutty.



20. Check that you can open the Putty sessions to NetApp Cluster 1 and Cluster 2.

21. If the Putty session cannot connect, a common problem is that the cluster management logical interface is not on its home port. Enter **network interface show** to check.

User/Server	Logical Interface	Status Admin/Oper	Network Address/Mask	Current Node	Current Port	Is Home
<hr/>						
Cluster	cluster1-01_clus1	up/up	169.254.142.33/16	cluster1-01	e0a	true
	cluster1-01_clus2	up/up	169.254.210.190/16	cluster1-01	e0b	true
	cluster1-02_clus1	up/up	169.254.53.193/16	cluster1-02	e0a	true
	cluster1-02_clus2	up/up	169.254.31.98/16	cluster1-02	e0b	true
cluster1	cluster1-01_mgmt1	up/up	172.23.1.12/24	cluster1-01	e0c	true
	cluster1-02_mgmt1	up/up	172.23.1.13/24	cluster1-02	e0c	true
	cluster_mgmt	up/up	172.23.1.11/24	cluster1-01	e0d	false
7 entries were displayed.						

22. If the cluster\_mgmt LIF reports **false** for **Is Home** then run the **network interface revert –vserver \*** command to revert it back to its home port. Connectivity should now be restored.

```
cluster1::> network interface revert -vserver *
1 entry was acted on.
```

UserServer	Logical Interface	Status Admin/Oper	Network Address/Mask	Current Node	Current Port	Is Home
Cluster	cluster1-01_clus1	up/up	169.254.142.33/16	cluster1-01	e0a	true
	cluster1-01_clus2	up/up	169.254.210.190/16	cluster1-01	e0b	true
	cluster1-02_clus1	up/up	169.254.53.193/16	cluster1-02	e0a	true
	cluster1-02_clus2	up/up	169.254.31.98/16	cluster1-02	e0b	true
cluster1	cluster1-01_Mgmt1	up/up	172.23.1.12/24	cluster1-01	e0c	true
	cluster1-02_Mgmt1	up/up	172.23.1.13/24	cluster1-02	e0c	true
	cluster_Mgmt	up/up	172.23.1.11/24	cluster1-01	e0c	true

7 entries were displayed.

23. Installation of Putty and SuperPutty is now complete.



