COMP 4632
Practicing Cybersecurity: Attacks and Counter-measures

Week 1 Lab Exercise

Topic: *Access Control Systems and Virtualization Environment*

Lab Objective

In this lab, we will go through some simple steps to determine the Windows authentication and access control policies

Task 1 - Access Control Security Lab

Question 1. What is the current policy being implemented at the machine? How to determine that? (0.5 mark)

Question 2. What is the difference between access control matrix in Windows and Linux? (1 mark)

Question 3. Which log record stores the user authentication information? (0.5 mark)

Lab Objective

In this lab, we are going to introduce and walk through the setup procedure of virtualization platform (e.g. bare-metal hypervisor and management console). The whole setup will include the following components:

- Install VMware vSphere Hypervisor
- VMware vSphere Hypervisor Network Configuration
- Install VMware vSphere Client
- VMware vSphere Hypervisor Connection
- VMware vSphere Hypervisor Function Walkthrough

Task 2 – Bare-Metal Hypervisor Installation Walkthrough

Bare-metal hypervisors run directly on the host's hardware to control the hardware and to manage guest operating systems. All guest operating systems run as a "process"

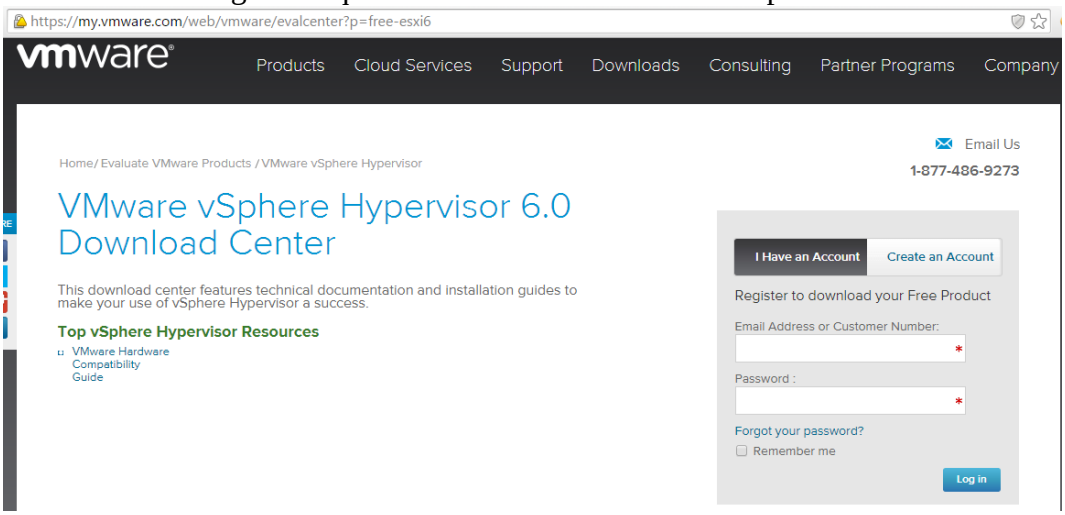
on the host. Examples of bare-metal hypervisors include Oracle VM, the Citrix XenServer, VMware ESX/ESXi and Microsoft Hyper-V.

Task 2.1 Download VMware vSphere Hypervisor

In the following tasks, we are going to use ESXi as an example of bare-metal hypervisor. Firstly, we need to download the required files.

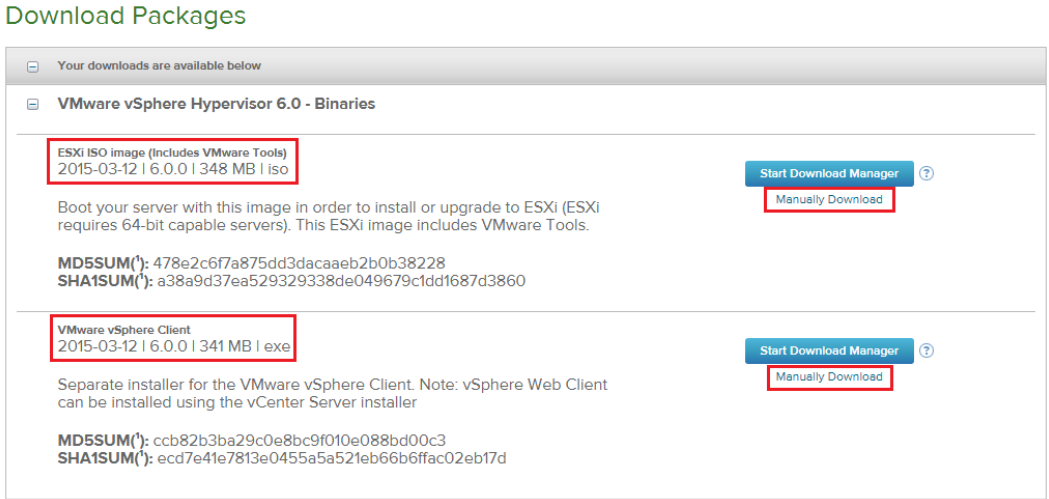
Step 1. Go to VMware Official Website

- Go to the following VMware Official Website
  - https://my.vmware.com/web/vmware/evalcenter?p=free-esxi6
  - Login is required to download the ESXi setup file



Step 2. Download ESXi ISO Image and VMware vSphere Client

- After login the portal, scroll down to "Download Package"
  - Click "Manually Download" to download both "**ESXi ISO Image (Includes VMware Tools)**" and "**VMware vSphere Client**".

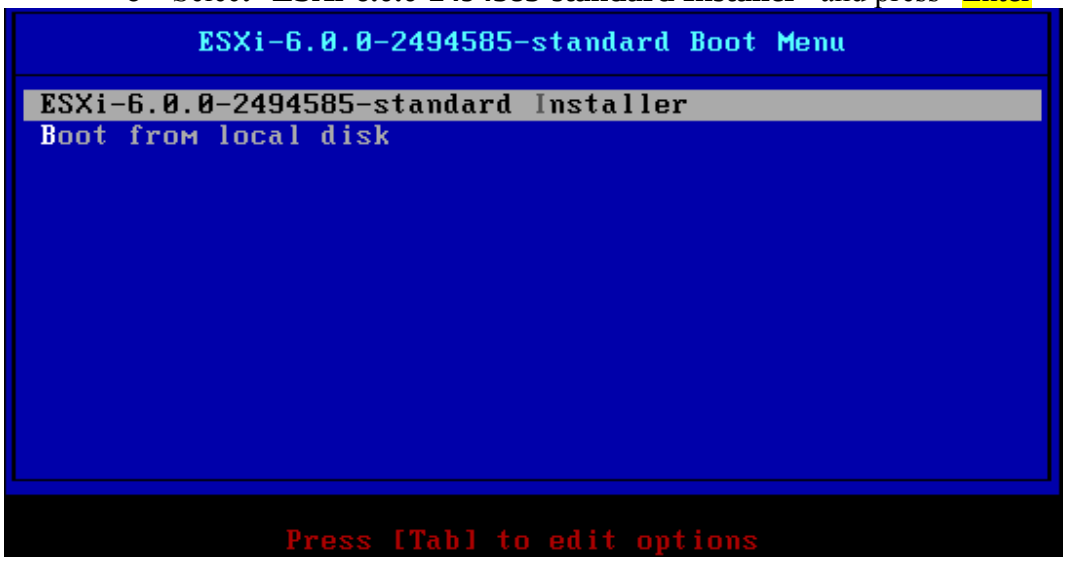


Task 2.2 Install VMware vSphere Hypervisor

In this task, we are going to walkthrough the installation process of ESXi 6.0.0.

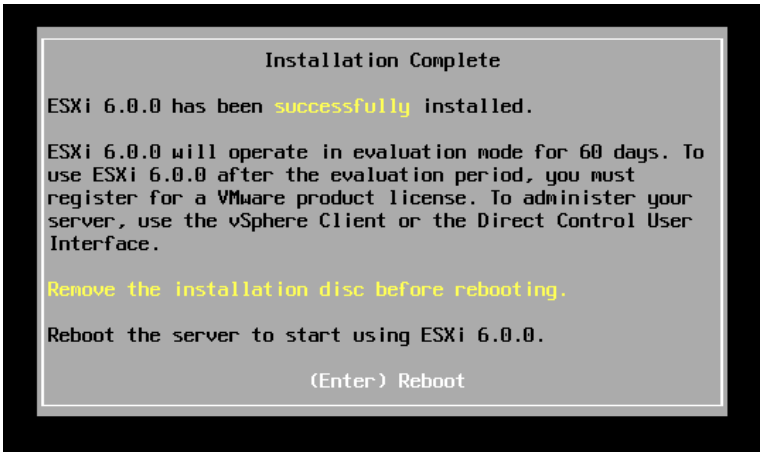
- After downloading the image, burn the image into a DVD/USB and insert it to the target machine.
- Restart the target machine and enter the boot menu

- Select "**ESXi-6.0.0-2494585-standard Installer**" and press "Enter"



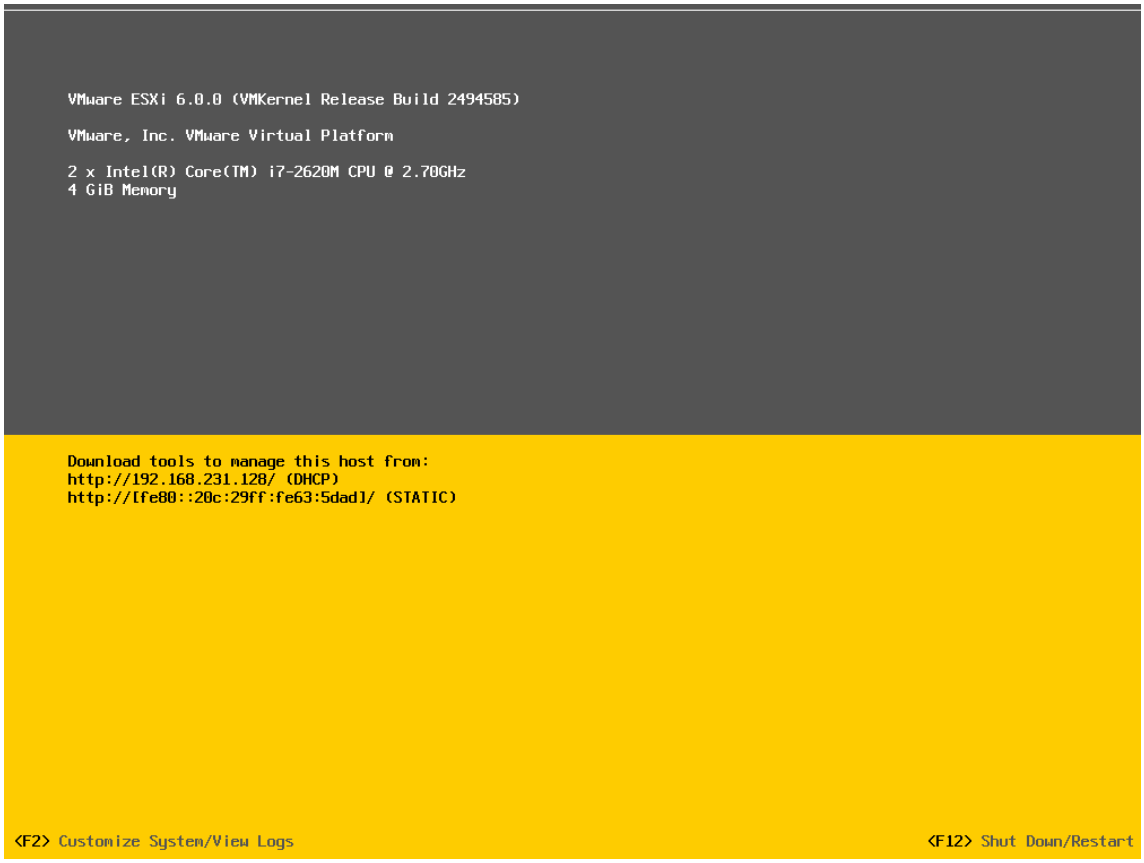
- After loading the installer, a welcome message would be shown
  - Press "Enter" to continue
  - Press "F11" to accept and continue the license agreement
  - Select the storage device and press "Enter"
  - Select a keyboard layout with default setting "US Default" and press "Enter"
- Enter the password for the root account and press "Enter"

- After entering the root password, press "F11" to confirm installation
- After completing the installation, an installation complete message would be shown
  - Remove the installation disc from the machine
  - Press "Enter" to reboot the server to start ESXi 6.0.0



- Upon completion, the ESXi 6.0.0 management console would be shown, from the management console, you would be able to view

- ESXi version
- Hardware information (CPU and RAM)
- IP Address assigned to the ESXi, which will be used to manage and access the ESXi via vSphere Client

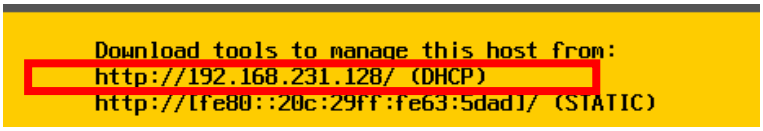


Task 2.2 Configure VMware vSphere Hypervisor Network Setting

In this task, we are going to configure the network setting of the installed ESXi 6.0.0

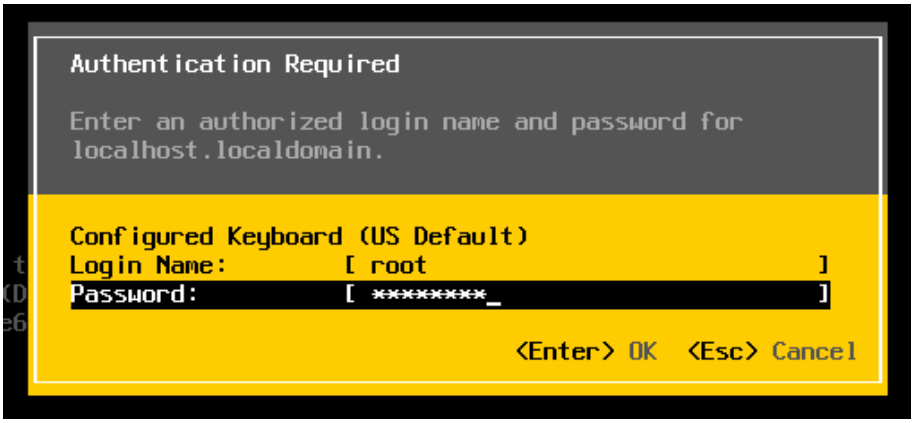
Step 1. Go to ESXi Console

- From the console, you would observe that the IPv4 Address of the ESXi is assigned via DHCP



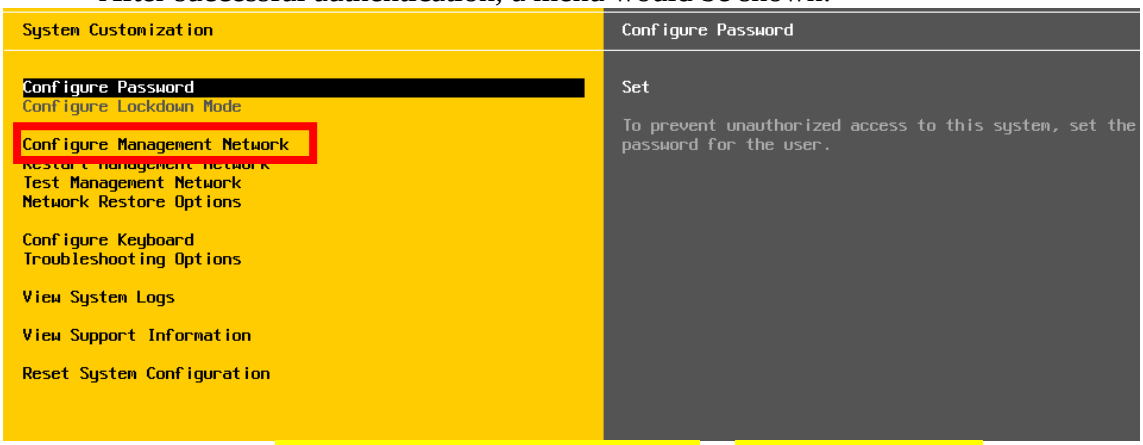
Step 2. Enter System Configuration

- From the console, press "F2" to enter "Customize System/ View Logs"
- Authentication would be required, enter the root password set earlier during the installation process



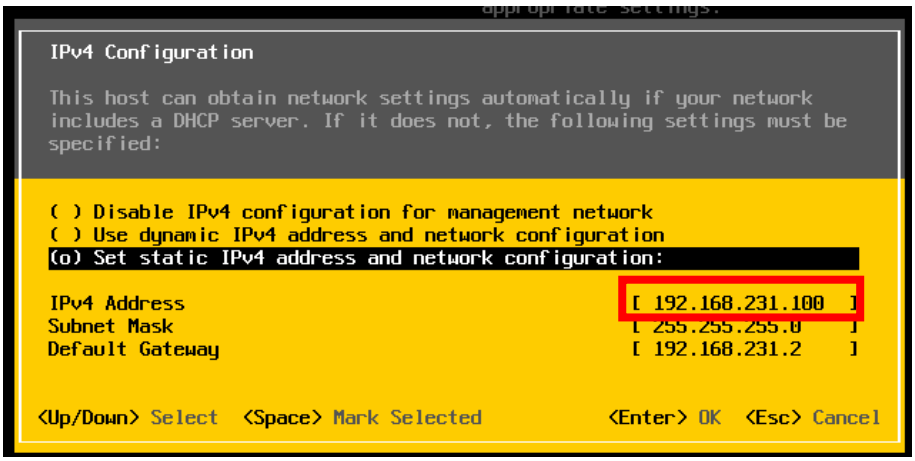
Step 3. Set Static IP Address for ESXi

- After successful authentication, a menu would be shown:



  - Go to Configure Management Network > IPv4 Configuration
  - Press "Enter" to edit the setting
  - Press "Space" on "Set static IPv4 address and network configuration" to mark the selection
  - Edit the IPv4 address to a static IP

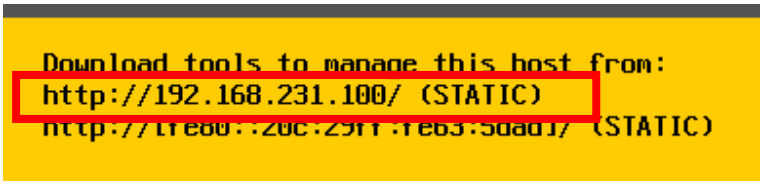
Question 4: How should the IPv4 address be set? Please provide a valid IP range. (0.5 mark)



- Press "Enter" to confirm the modification
- Press "Esc" to exit the management console
- Press "Y" to confirm and apply the change

Step 4. Checkpoint

- Upon completion of the above configuration, you could observe that the IPv4 Address of the ESXi is static in the ESXi interface



Bonus Question 1: Why do we want to set the IP Address of ESXi to be static? (0.5 mark)

Task 3 – VMware vSphere Client Installation and Connection Walkthrough

After installing ESXi, a management tool – VMware vSphere Client could be installed to manage the host.

Task 3.1 Install VMware vSphere Client and Manage the ESXi

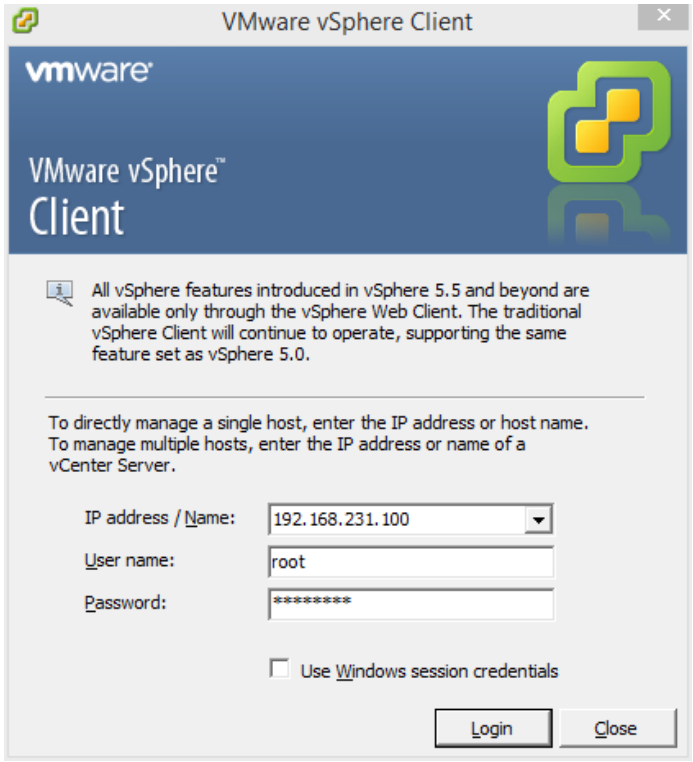
In this task, we are going to walkthrough the installation process of VMware vSphere Client.

Step 1. Install VMware vSphere Client

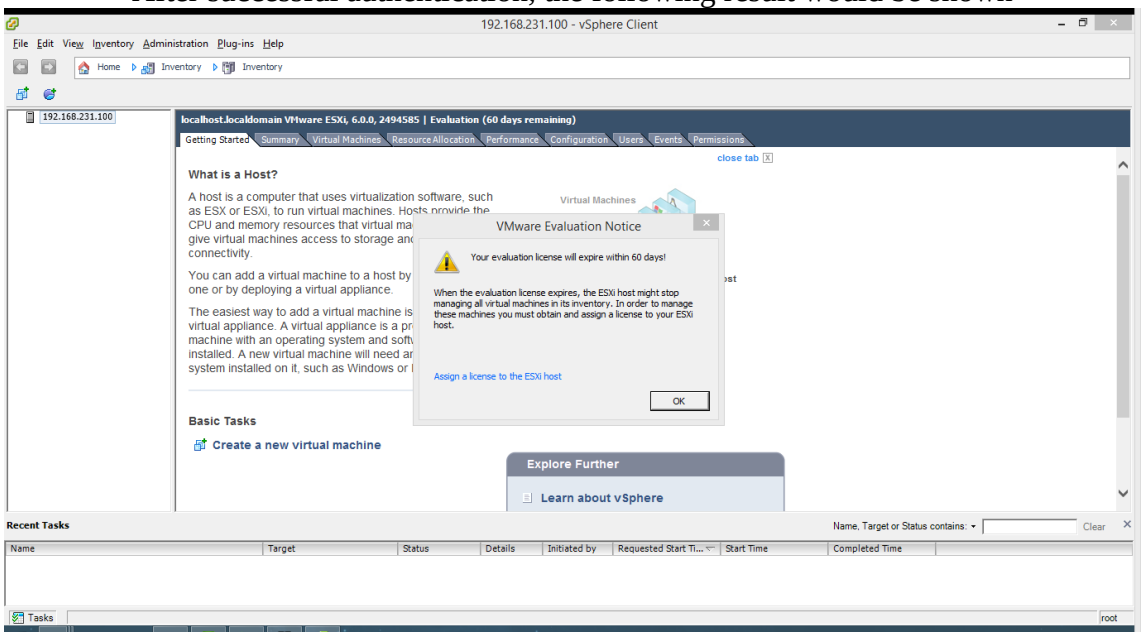
- Execute the installation package downloaded in task 1.1
- Install the package with default value set
- After the installation, press "Finish" to complete the process
-

Step 2. Manage ESXi via vSphere Client

- Execute the "VMware vSphere Client"
  - Enter the IPv4 Address of the ESXi and credentials to login the management console



- After successful authentication, the following result would be shown

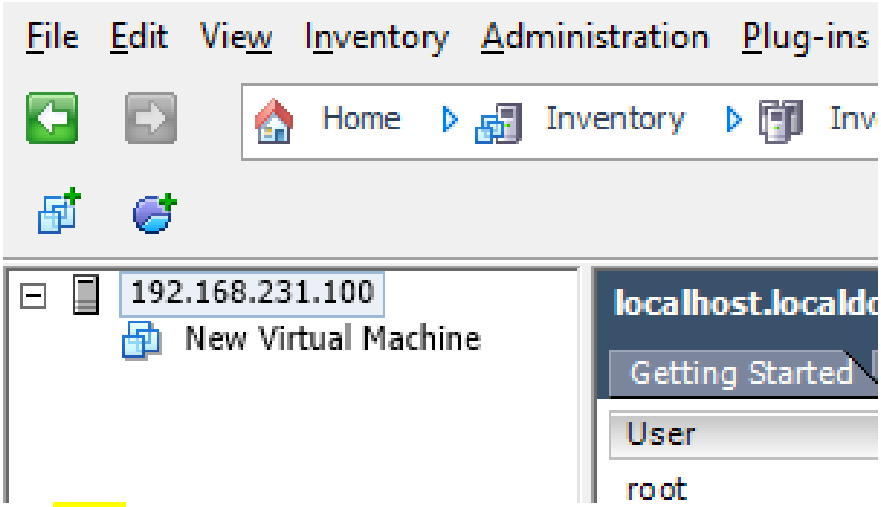


Task 4 – VMware vSphere Client Function Walkthrough

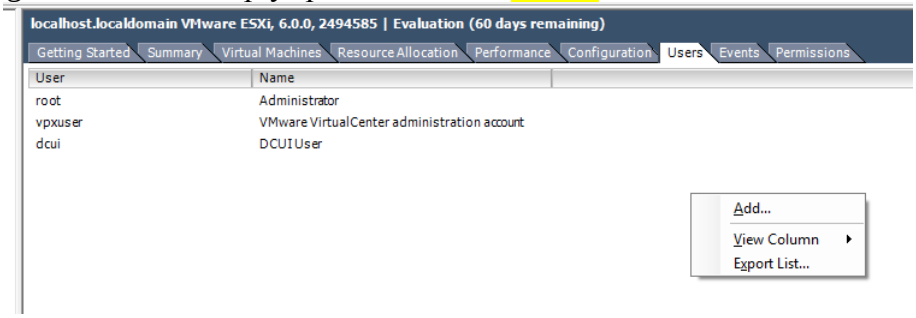
VMware vSphere Client could be used to manage the ESXi, such as creating new users, creating virtual machines and configuring virtual networks etc.

Task 4.1 Creating New Users

- Select the ESXi machine on the left panel



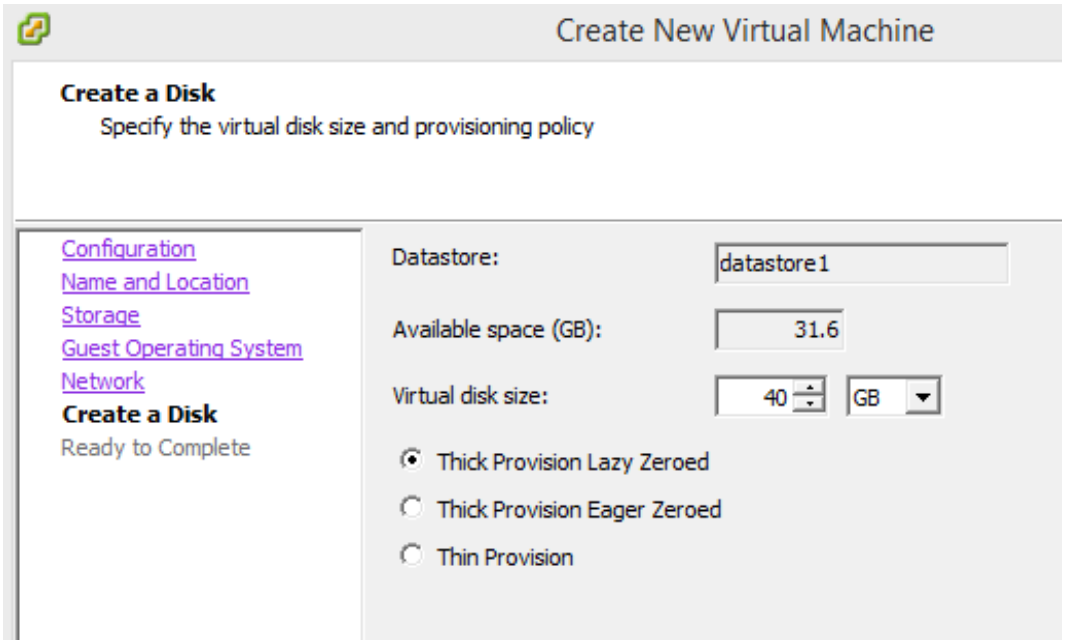
- Go to "Users" tab
- Right click in the empty space and click "Add…"



- Enter the new Login ID and password for the new user

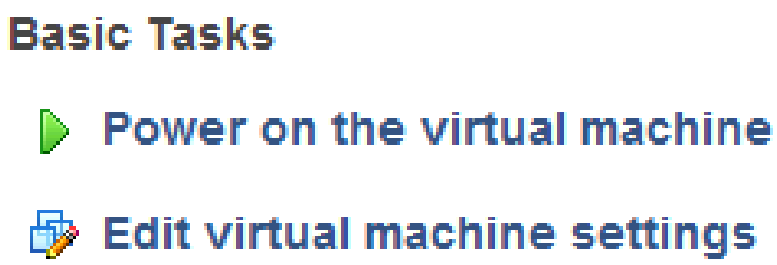
Task 4.2 Launching Virtual Machines

- Select the ESXi machine on the left panel
- Go to "Getting Started" tab
- Click "Create a new virtual machine"
- Configure the following settings
  - Configuration type
  - Virtual machine name and location
  - Destination Storage
  - Guest Operating System
  - Network
  - Disk size and provisioning policy

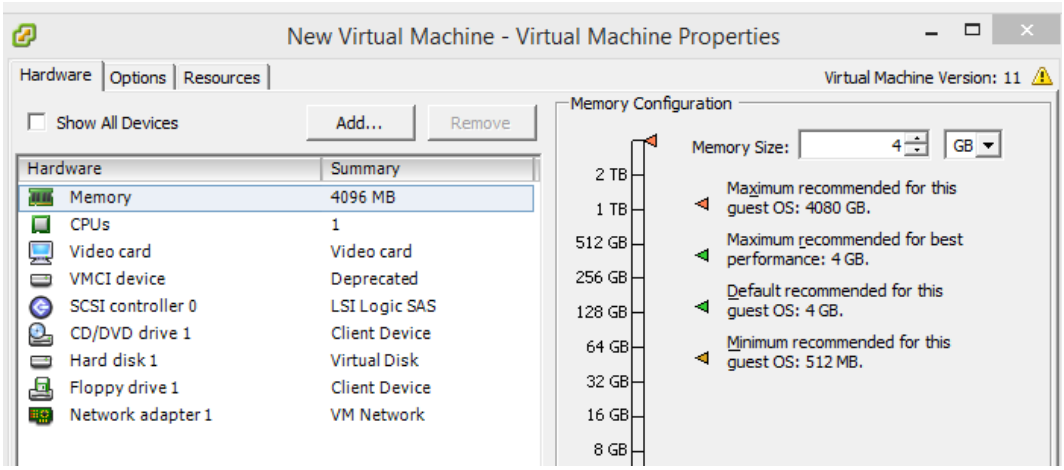


Bonus Question 2: What are the difference between the provisioning policy listed above? (0.5 mark)

- A new virtual machine would be created and shown of the left panel
- Select the newly created virtual machine
- You could start the VM by pressing "Power on the virtual machine"

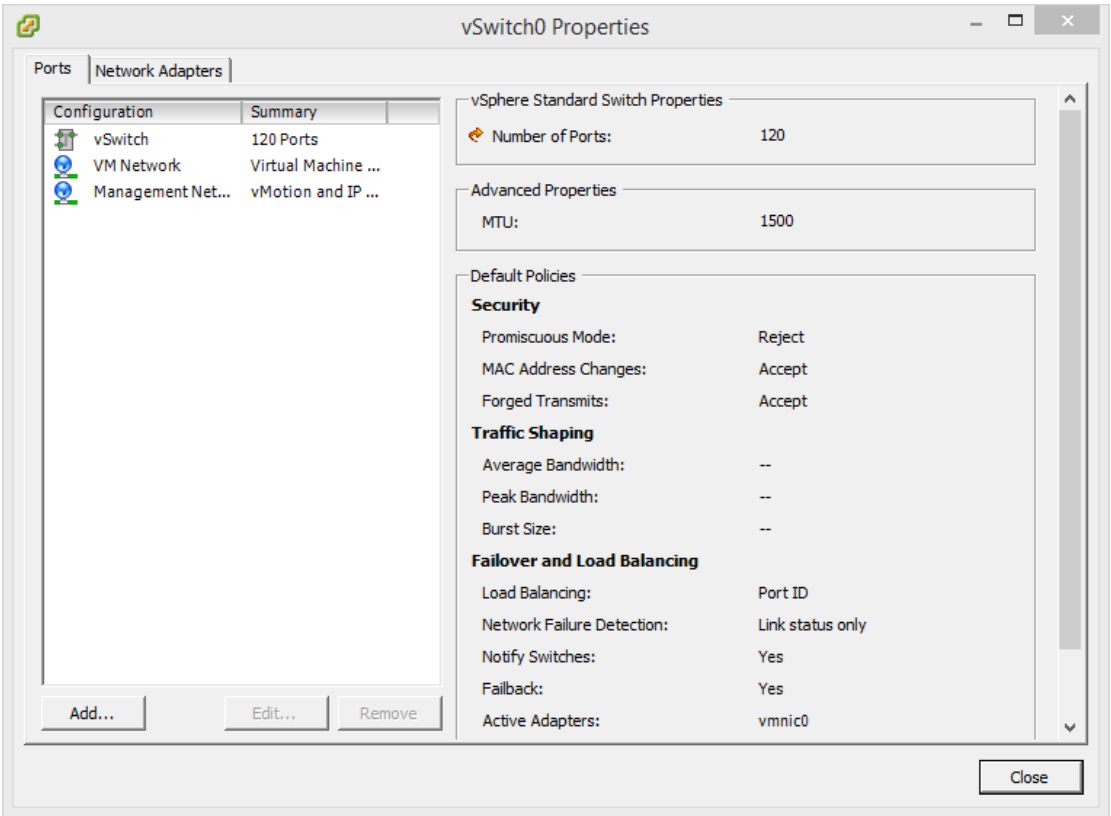


- You could also edit the VM setting in "Edit virtual machine settings"



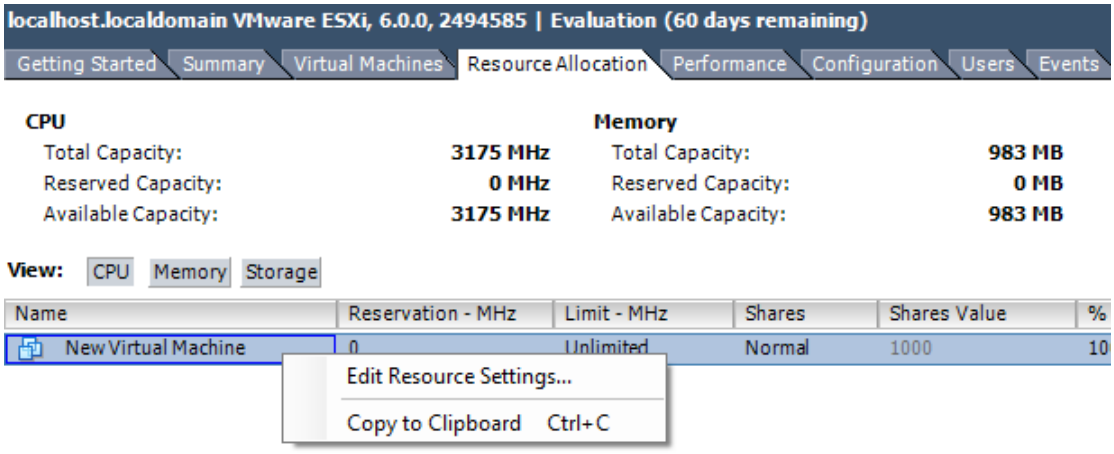
Task 4.3 Configuring Virtual Network

- Select the ESXi machine on the left panel
- Go to "Configuration" tab
- Go to Hardware -> Networking
- Click "Properties" to configure network settings, such as
  - Set VM Port Group
  - Set VLAN ID

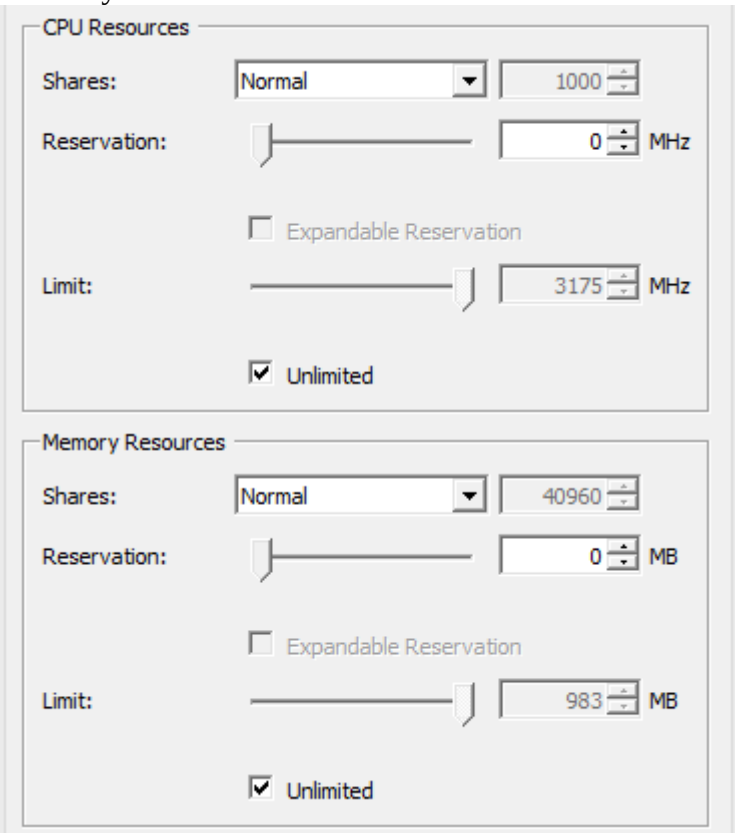


Task 4.4 Edit Resource Allocation

- Select the ESXi machine on the left panel
- Go to "Resource Allocation" tab
- Right click on the created virtual machine and select "Edit Resource Settings"



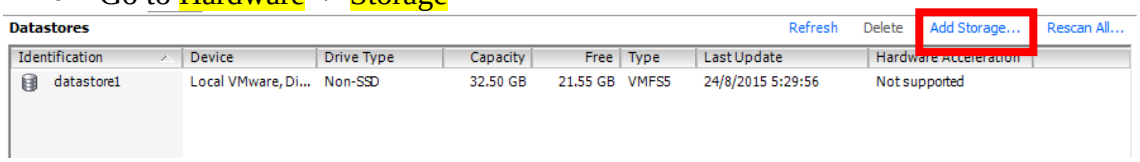
- The following resources could be managed
  - CPU Resources
  - Memory Resources



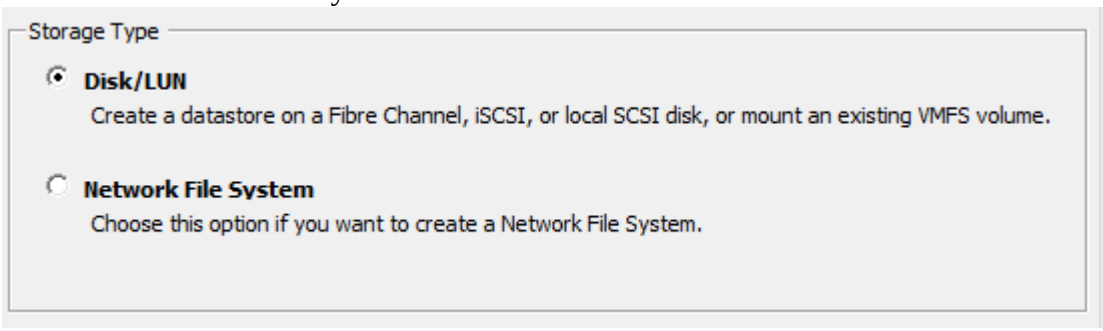
BONUS Question 3: Why do we want to limit the resources allocated to a machine? (0.5 mark)

Task 4.5 Configuring Storage

- Select the ESXi machine on the left panel
- Go to "Configuration" tab
- Go to Hardware -> Storage



- You could manage the storage by adding/ removing datastores
  ** Network File System could also be added



Lab Objective
This lab is to test your network and communication skills

Task 5 – Network Connection

Question 4: Explain what is TCP 3-way handshaking? (0.5 mark)

Bonus Question 4: Which OSI layer the following network components operates at: (1 mark)

Hub – Layer:

Switch – Layer:

Router – Layer:

Bonus Question 5: What is the different ICMP, UDP and TCP protocol? (0.5 mark)

End of Lab