CSCI322 Lab Exercises

Lab 1

Objective

You will learn how to install desktop and server operating systems as virtual machines running on a host machine, set up a virtual network and install the LAMP stack on the server.

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1. Oracle VirtualBox 6.1.26 installation

- Download the Oracle VirtualBox from the Internet at Virtualbox 6.1.26 and save it to a directory on the host machine.
- If you are using a Mac, download the Oracle VirtualBox from Virtualbox 6.1.26.
- Install the Oracle Virtualbox
- You may wish to download and install Oracle VirtualBox Extension pack at Oracle Virtualbox Extension Pack so that you can have support for USB 2.0 and USB 3.0 devices.

(Optional choice of VM software) Or VMware Workstation/Fusion installation, if your machine somehow not support Virtual Box (e.g Macbook with M2 chip).

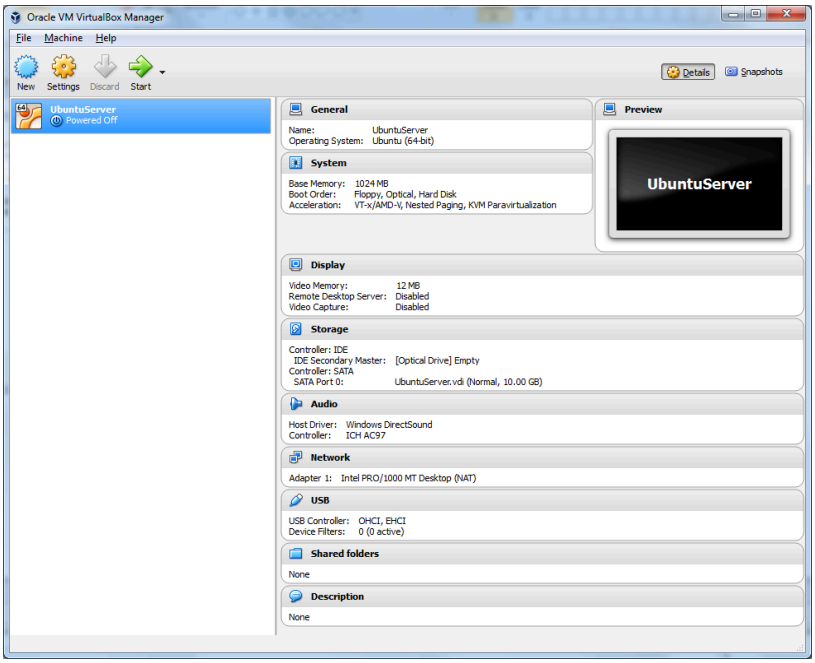
1. Download the VMware Fusion and Workstation Free for personal use by following the instruction here and save it to a directory on the host machine.
2. Install the VMware Workstation for windows or VMware Fusion Player for Mac.

2. Ubuntu Server 22.04 LTS installation

- Sign into your machine (Window, Linux or MAC)
- Download the Ubuntu Server Edition from the Internet at Ubuntu server 22.04 and save it to a directory on your machine.
- Now, it is advisable to skim the Ubuntu Server Installation Tutorial from Ubuntu that will help you to anticipate what you will be required to act during the installation.
- Note the RAM requirement of **1 Gb** for a "live server" install by Recommended Minimum Requirements of a Server Installation from Ubuntu.
- Start Oracle VM VirtualBox (or VMware Workstation or Fusion).
- ***The following steps will be different for VMware Workstation or Fusion. Hence, you may need to adapt and apply the following setting on your own.***
- You need first create a VM then install an operating system on it. Press the **New** button at the top panel to start creating a new VM. Follow the screen to provide required information as follows.

  Name: **UbuntuServer**
  Type: **Linux**
  Versoin: **Ubuntu (64-bit)**
  Memory size: **1024** MB
  Hard disk file type: **VDI** (default)
  File Location: **UbuntuServer** (default)
  File size: **10.00**GB

  After you have created the VM, you will be presented with the following screen:



- Now you need to attach the ISO file (insert a CD disc like on a real machine) to the VM by clicking at the **Storage** link on the **Details** pane of the VirtualBox Manager as above and you will be presented with a Settings popup window.
    - Select the optical disc icon under *Controller: IDE*
    - Click the optical disc icon next to the *IDE Secondary Master* under *Attributes* panel and select *Choose Virtual Disc File* and select the ISO file you just downloaded earlier.

- Now it is ready to boot up the VM by pressing the **Start** button.
- Follow the screen and instructions to install the Ubuntu Server. Accept default values offered by the installer but provide your own for Profile as follows. Note that if you are presented notifications about Auto capture keyboard or mouse pointer integration you can turn them off. When you are warned about the loss of data on the disks, you can confirm to continue as it attributes to the virtual hard disk you have just created for the VM. When you see "**SSH configuration**" page, select "**Install OpenSSH server**".

    Your name: (*Your name*)
    Your server's name: **server-(Your student number) , e.g. server-653535**
    Pick a username: **csci322**

- Follow the instruction to restart the VM and omit the notice to remove the install media as it will be removed (ejected) automatically.
- Sign in to your new Ubuntu server machine.
- To test the successful installation, you can "`ping -c 4 google.com`" and you should receive the responses.
- Stop the ping command with "Ctrl+c".

    - **Take a screenshot and put it on the report.**

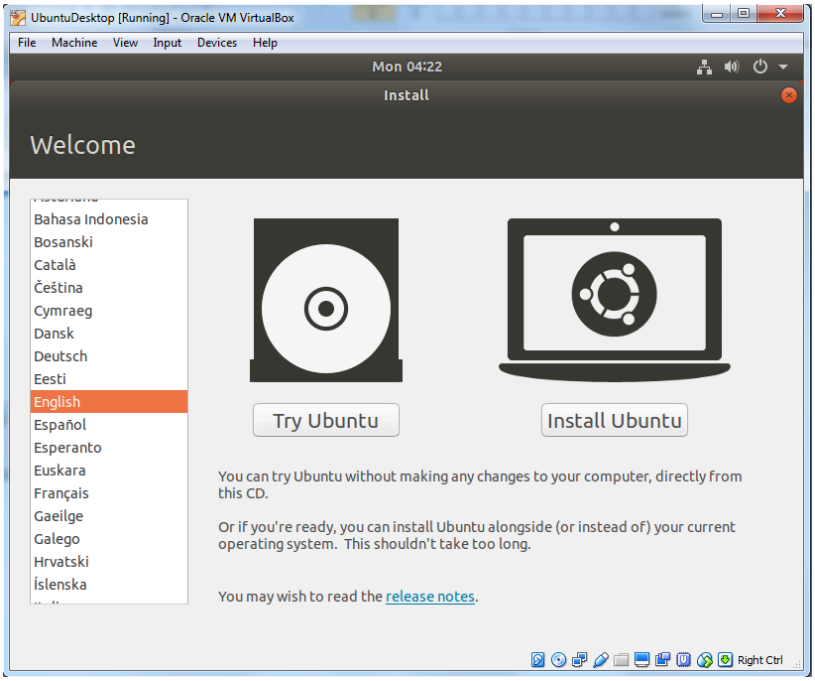
3. Ubuntu Desktop 22.04 LTS installation

- Download the Ubuntu Desktop Edition from the Internet at ubuntu-22.04-desktop-amd64.iso and save it to a directory on your machine.
- Now, it is advisable to skim the Ubuntu Desktop Installation Tutorial from Ubuntu that will help you to anticipate what you will be required to act during the installation.
- Note the RAM requirement of **2 Gb** and **dual core processor or better** for a desktop install by Recommended system requirements from Ubuntu.
- ***The following steps will be different for VMware Workstation or Fusion. Hence, you may need to adapt and apply the following setting on your own.***
- Press the **New** button at the top-left corner to start creating a new VM. Follow the screen to provide required information as follows.

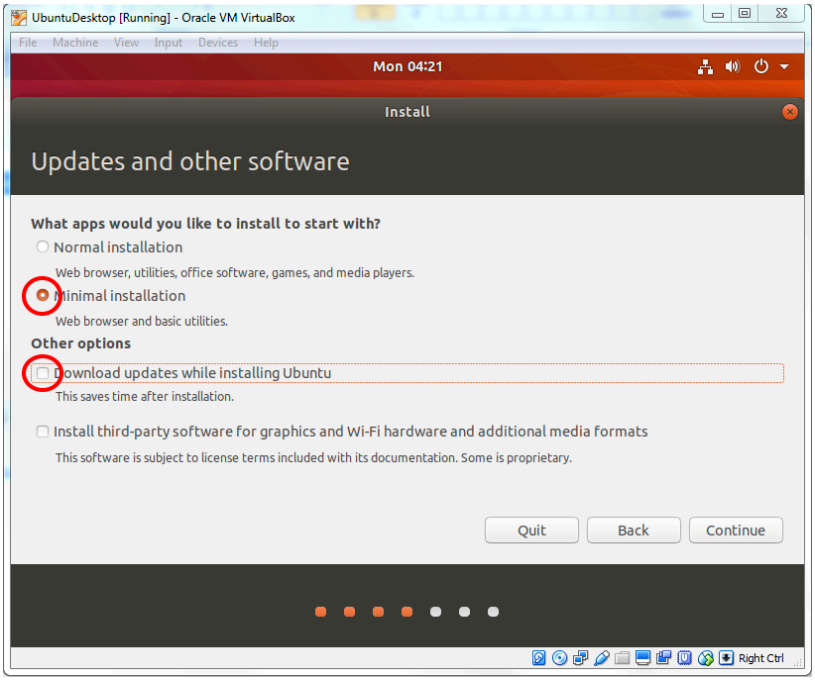
    Name: **UbuntuDesktop**
    Type: **Linux**
    Versoin: **Ubuntu (64-bit)**
    Memory size: **2048** MB
    Hard disk file type: **VDI** (default)

File Location: **UbuntuDesktop** (default)
File size: **10.00**GB

- After you have created the VM, you attach the ISO file to the VM as you have done for the server installation.
- Now you need to configure the VM to use two (2) processors by clicking at the **System** link on the **Details** pane of the VirtualBox Manager and you will be presented with a Settings popup window.
    - Select the **Processor** tab
    - Set the **Processor(s)** to **2**
- Set the **Video Memory** to **128MB** by clicking at **Display** in the left pane. This will improve the desktop performance.
- Boot up the VM by pressing the **Start** button.
- When you are presented with the following screen, press **Install Ubuntu** button.



- You are presented with the following screen, make sure you:
    - select **Minimal installation**
    - untick **Download updates while installing Ubuntu**



- When you are warned to erase disk and install Ubuntu, you can simply press the **Install Now** button to continue as it attributes to the virtual hard disk you have just created for the VM.

- Then follow the screen and instructions to install the Ubuntu Desktop. Accept default values offered by the installer (make sure you have correct time zone.)
- Answer the Who are you ? questions as follows.

  Your name: (*Your name*)
  Your server's name: **desktop-(Your student number) , e.g. desktop-653535**
  Pick a username: **csci322**

- Follow the instruction to restart the VM and omit the notice to remove the install media as it will be removed (ejected) automatically.
- Sign in to your new Ubuntu desktop machine.
- To test the successful installation, you can open the Firefox web browser to point to any website Google and you should see the web page.

  - **Take a screenshot and put it on the report.**

- Now shutdown both VMs.
  - To shutdown the server, you can issue the command: `shutdown -h now`
  - To shutdown the desktop, you can press the switch button at the top-right corner and **Power off**.

4. Set up a virtual network (VirtualBox version 6)

- Bring up the **Preferences** popup window from File menu item.
- Select Network from the left selection.
- Press the icon with + to add new NAT network.
- Accept the **Name** as **NatNetwork.**
- NOTE: for version 7. It is similar. You can go to File-Tools-Network Manager

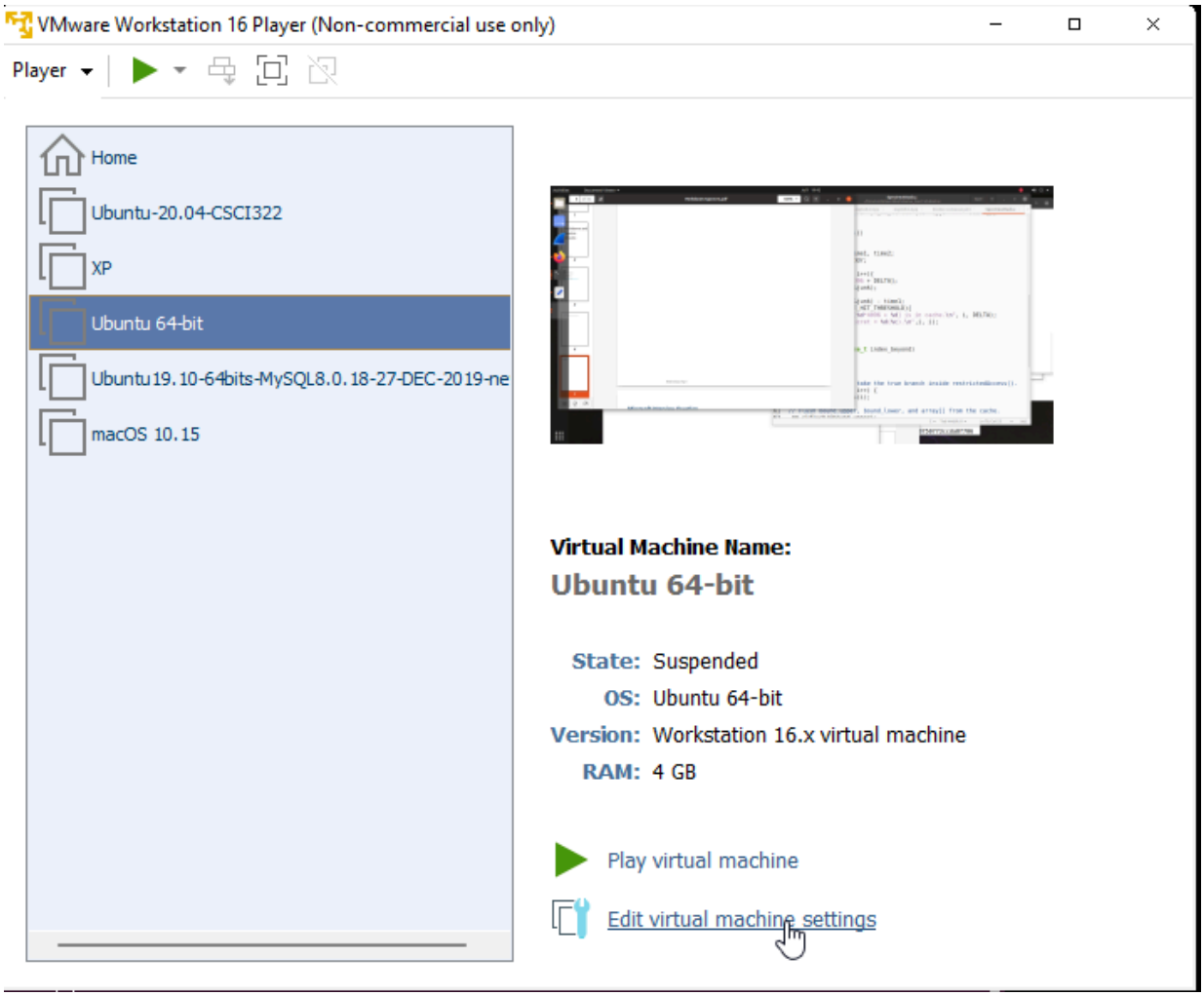
5. Attach the two VMs to the virtual network

- Select the server from the left pane of the VirtualBox Manager and click at the **Network** link on the **Details** pane
- Change the **Attached to** to **NAT Network** and **NatNetwork** should show in the **Name**.
- Do the same for the desktop.

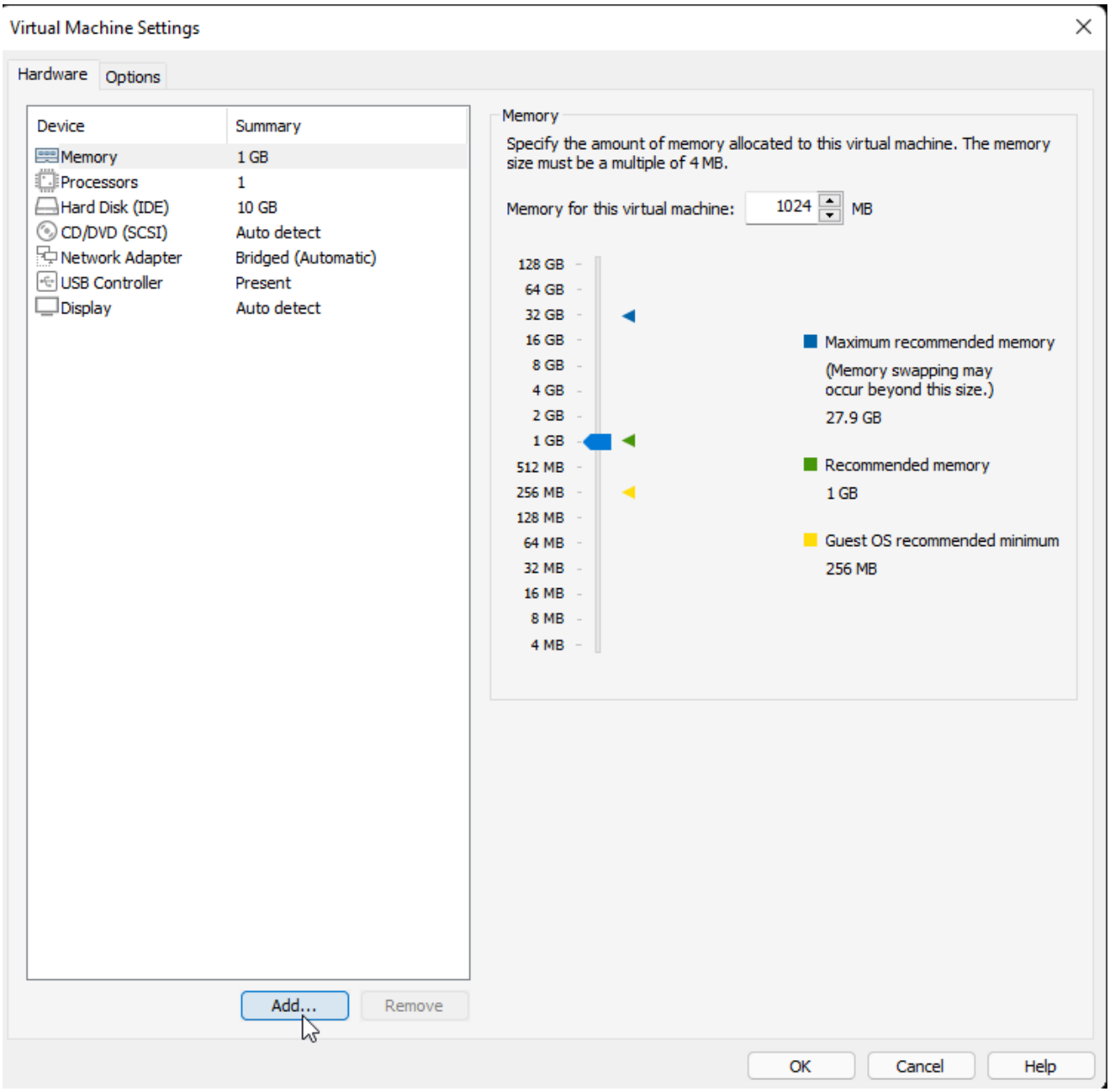
- Now start both VMs and sign in to both.

NTOES: Step 3 and 4 for VMware: The virtual network for VMware workstation 16.0 player

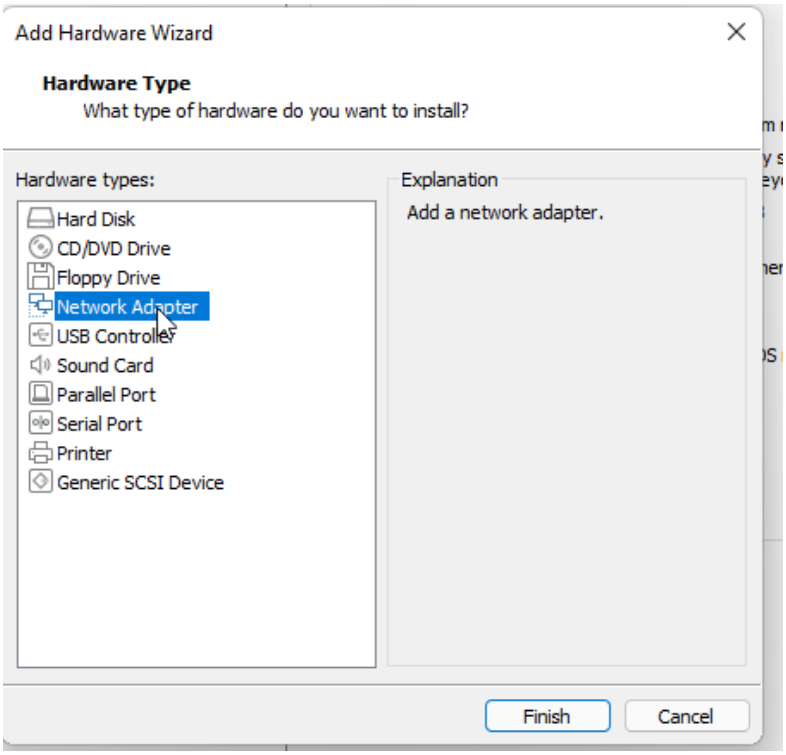
1. Select the server from the left pane and click at "Edit virtual machine setting".



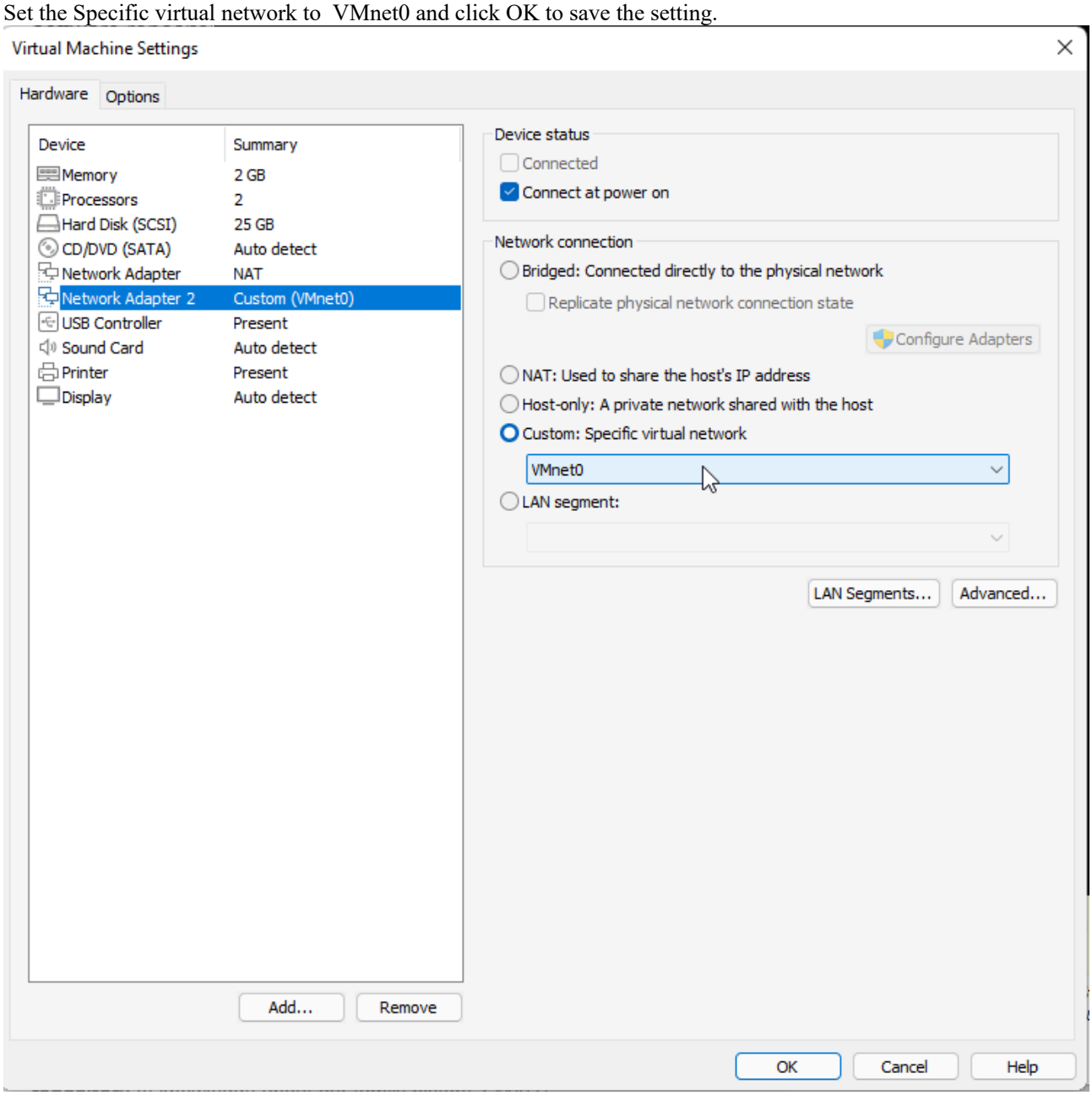
2. Click at the Add button on the **Hardware** tab.



3. Select Network Adapter and Click Finish.



4. Click at **Network Adapter 2** and on the right hand pane under the **Network connection section** select **Custom: Specific virtual network.**
5. Set the Specific virtual network to VMnet0 and click OK to save the setting.



6. Do the same for the desktop.
7. Now start both VMs and sign in to both.

6. Install LAMP applications on the server

LAMP (Linux + Apache + MySQL + PHP/Perl/Python) are a popular setup for Ubuntu servers. There is a lot of applications using the LAMP application stack.

It is a good practice to bring up your system to the latest updates before you install any packages.

- Install the latest update from the Ubuntu repository using the following commands.

```
sudo apt update
sudo apt upgrade
```

- To install a LAMP stack

```
sudo apt install lamp-server^
```

It is important to have the caret (^) at the end of the command, which suggests that the package is a meta-package for installing a number of packages together. However if you try to remove this meta-package you could remove a lot of dependencies that you are not expecting. So you can install LAMP stack using meta-package but do not remove it as a meta-package.

You can also install LAMP components individually. You can find a lot of tutorials to do so from a variety of sources.

7. Test LAMP installation

- First find out the IP address of the server using the following command on the *server*.

  ```
  ip addr
  ```

  or

  ```
  ifconfig
  ```

  You should find the IP from the output. It is likely to be some thing like 192.168.127.4, 10.0.2.4 or similar.

- Point your Firefox browser on the *desktop* to the server IP and you should see the **Apache2 Ubuntu Default Page** from Apache web server on the server VM you have just installed.
- Now create a PHP file on the *server* to test the PHP installation.
  - Use the command line editor `nano` to create a PHP file as follows.

    ```
    sudo nano /var/www/html/info.php
    ```

    Type in the following code:

    ```
    <?php
    phpinfo();
    ?>
    ```

    and press Ctrl + `X` to save and exit.

  - Now point your Firefox browser on the *desktop* to `serverIP/info.php` and you should see the PHP information page showing the version at the top.

  - **Take a screenshot and put it on the report.**

8. Install the latest updates for the desktop VM

We skipped to download and install the latest updates during installation. Now it is the time to do so. Even you just installed a fresh OS but you will find a lot of updates ready for install. Ubuntu Linux releases various updates fairly frequently for security, bug fixes and feature enhancement.

If you run out of time now, you can do this later and go ahead to the next stage to save your VMs to your USB device.

- Press the icon of nine (9) dots at the bottom-left corner to show all applications on the desktop and look to the program **Software Updater**. Run it and press **Install Now** when it is ready. It may take a while.
- If you have problem with the official mirror http://au.archive.ubuntu.com/ubuntu/, then you may change the software repository to http://mirror.aarnet.edu.au/pub/ubuntu/
  or http://mirror.optus.net/ubuntu/

Save your VMs for Face-to-Face Lab

- Shutdown both VMs.
- Bring up the Preference popup windows from File menu of the VirtualBox Manager.
- Find out Default Machine Folder in the General panel. It should be like `C:\Users\yourUserID\VirtualBox VMs`
- Please make sure to insert your USB 3.0 device into the blue USB 3.0 socket on the lab machine.
- Copy the entire folder to your USB device.

Save your VMs for online Lab

- Shutdown both VMs, or you can save state on Virtual Box (like hibernation mode on Windows)

Submission and mark

For full 2 marks today, show your lab tutor that you have successfully intalled both virtual machines and your Apache server works fine.

End of the lab!