

IT 341 Introduction to System Administration

Project I – Installing Ubuntu Server on a Virtual Machine

Here we create a new virtual machine and install Ubuntu 20.04 LTS Server on it.

- In this instance, we follow most of the defaults, meaning that the virtual network spoofs the identity of your server to be that of the host (the real) computer. This is how most home networks work.
- A router attached to the internet service provider (ISP) uses Network Address Translation to fool the ISP into thinking all of the computers on your local network are actually just one, by
 - rewriting packets going out via the router with a single (spoofed) MAC address
 - keeping track of this in a table
 - using this table when packets come back from the ISP
 - to rewrite the destination MAC addresses
 - for the local computers the packets are really meant for.
- In the next project, we will change this configuration -- considerably!

Please read instructions in full before proceeding!

1. Decide which team will be first to create a VM. *One* member from *that* team should log into your physical host (it2x, where x = 1-8), using your Windows login.
 - This step assumes you have your Linux account **AND** your Windows login.
 - *If you do not have a Windows login, then please notify your professor.*
2. Check the Ethernet outlets next to your host:
 - If the CAT5 cable is plugged into the **top-side** CAT5 outlet associated with your host then the computer is connected to it20 on the IT Lab LAN, an Ubuntu server that acts as a router for the network it.cs.umb.edu
 - If the CAT5 cable is plugged into the **bottom-side**) CAT5 outlet the computer is another network, which is not as relevant to our purposes.

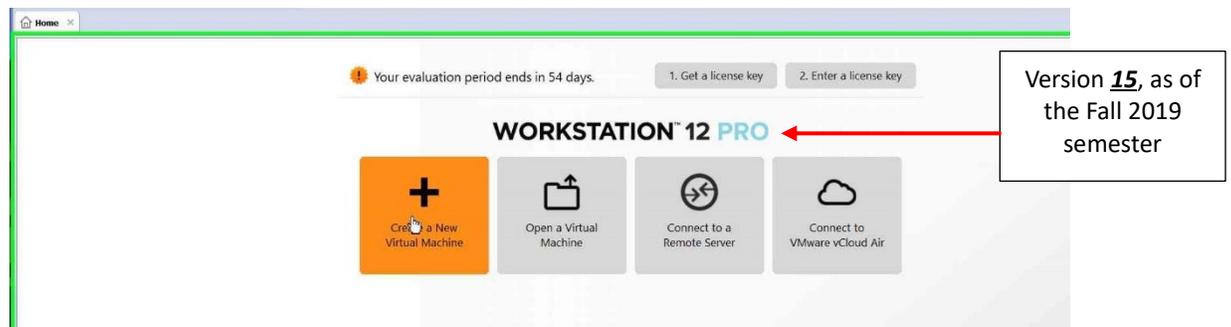
If in doubt about this, ask me, and I can check your Ethernet connection for you!
3. We want to install a virtual machine running Ubuntu 20.04 LTS Server. Fortunately, we have ISO images on our computers, so it will not be necessary to download them.

We begin by starting up VMWare Workstation. Use the Start Menu, or there may be a shortcut for this on the desktop. (*If you are unable to get VMWare Workstation working, then please see me.*)

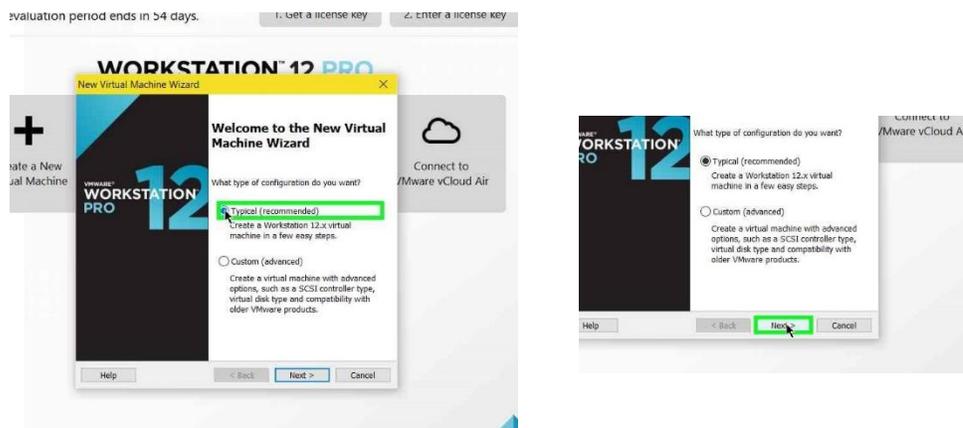
At this point, you will almost certainly be sharing the physical machine with at least one other team, if not more. Each team must create a VM, but while one team is creating a VM, the other team(s) should sit and watch, as preparation for creating their own.

4. Create a new Virtual Machine.

- Click **Create a New Virtual Machine** or **File > New Virtual Machine**



- Make sure the radio button for Typical is highlighted, and then click the **Next >** button.

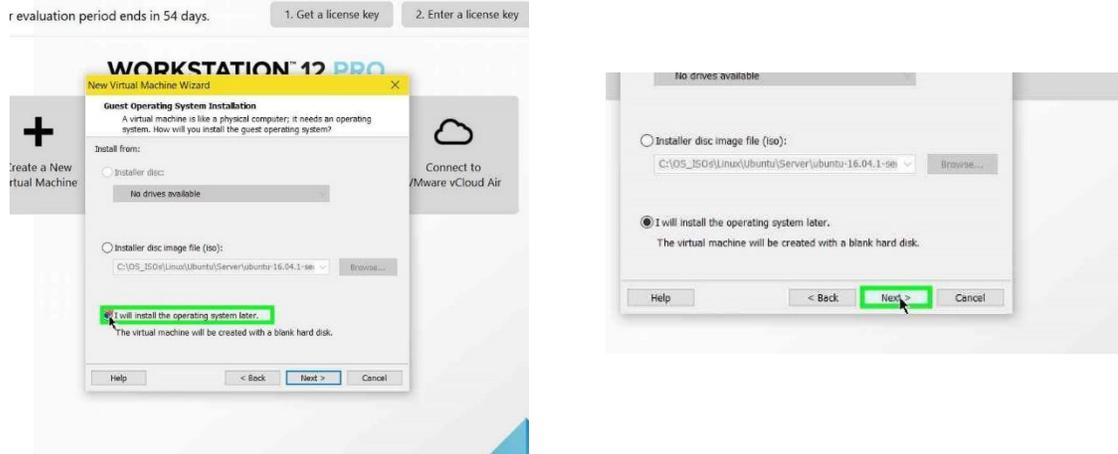


5. Now we have a choice. We can either let the installation proceed on its own after giving a few parameters – which is suitable if you’ve installed Ubuntu before – or we can **install Ubuntu step-by-step**. We will do the latter, which is suitable if you...

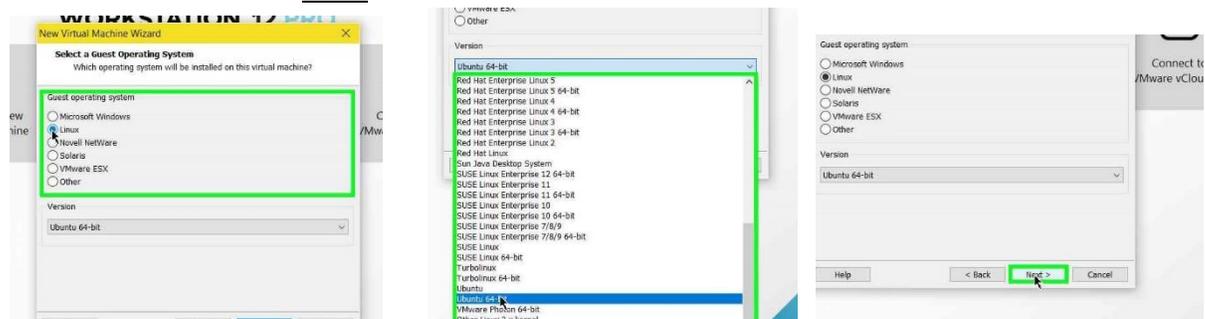
- are installing Ubuntu for the first time
- or just want to refresh your memory.

Here, we will first create a VM and then (later) install Ubuntu, proceeding step by step...

i. Choose I will install the operating system later. Then, click Next.



ii. For a Guest Operating System, choose Linux. For a Version, choose Ubuntu 64-bit. Then, click Next.



iii. Now, for a virtual machine name, we want (instead of the default "Ubuntu") a name that is meaningful to our network. Use your team name, based upon:

- The name of your host: it2x, where x = 1-8
- Your section number (or that number plus two)
- Your group ID: a or b
- For example, if you are sitting at host it28, in section 4 and group b, then use the name itvm28-4b

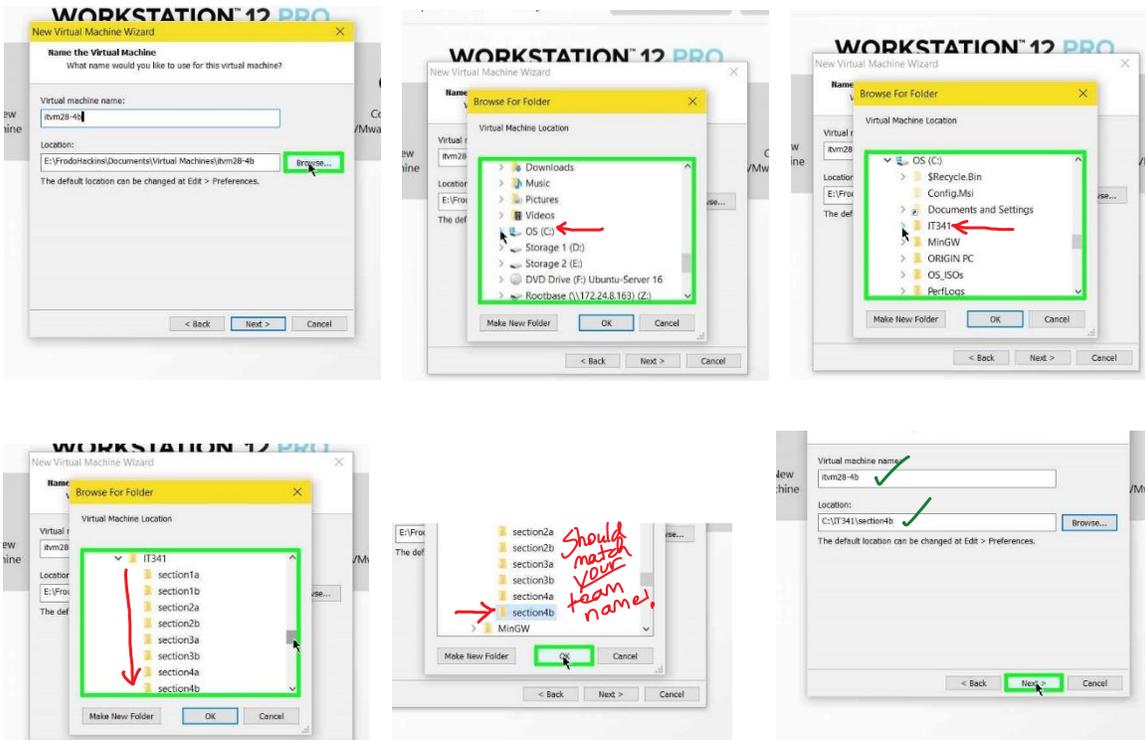


iv. There exists a subdirectory of C:/IT341 with the name "sectionyz" where y is your section number (or plus two) and z is your group ID.

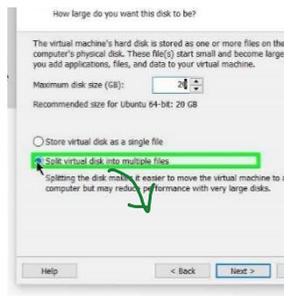
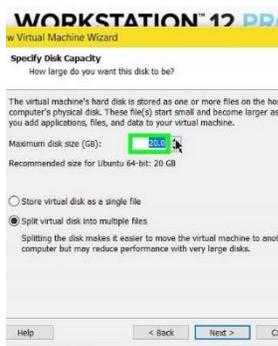
- For example, if your team name is "itvm28-4b", then your VM will be in the directory C:/IT341/section4b of machine it28

If this directory does not already exist, then I will need to create it for you...

- The location where the virtual machine image will be stored is in the directory **C:/IT341/sectionyz** so browse to that location, and hit the **OK** button, followed by the **Next** button.
- You may get a prompt about the location containing another virtual machine. As long as you are following directions for naming your machine, this will not be a problem so click the continue button.



v. Go along with the default disk size and "Split virtual disk into multiple files". **20 GB** should be more than sufficient. Choose **Next**.

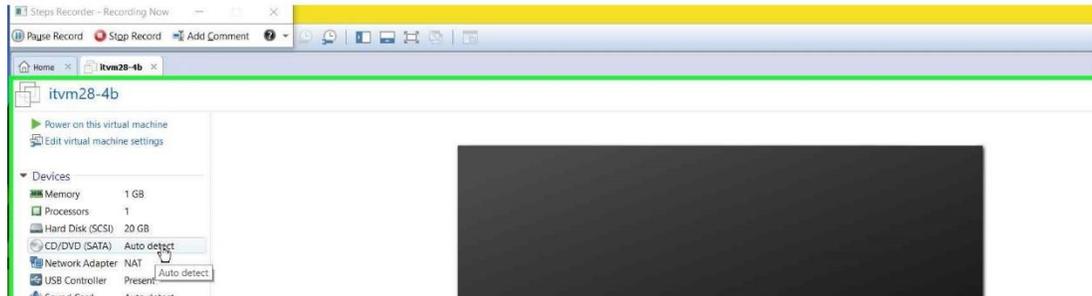


vi. We needn't customize any hardware. If we want to later, it is very easy, as long as our virtual machine has been **shut down**. Click **Finish**.



vii. Now, under **Devices**, you will see that the **CD/DVD** drive has the value "**Auto detect**". We want to change this temporarily, so:

A. Double-click on **CD/DVD**. This will bring us to a panel where we can (temporarily) change the association so that we can install Ubuntu Server from an **ISO** image.

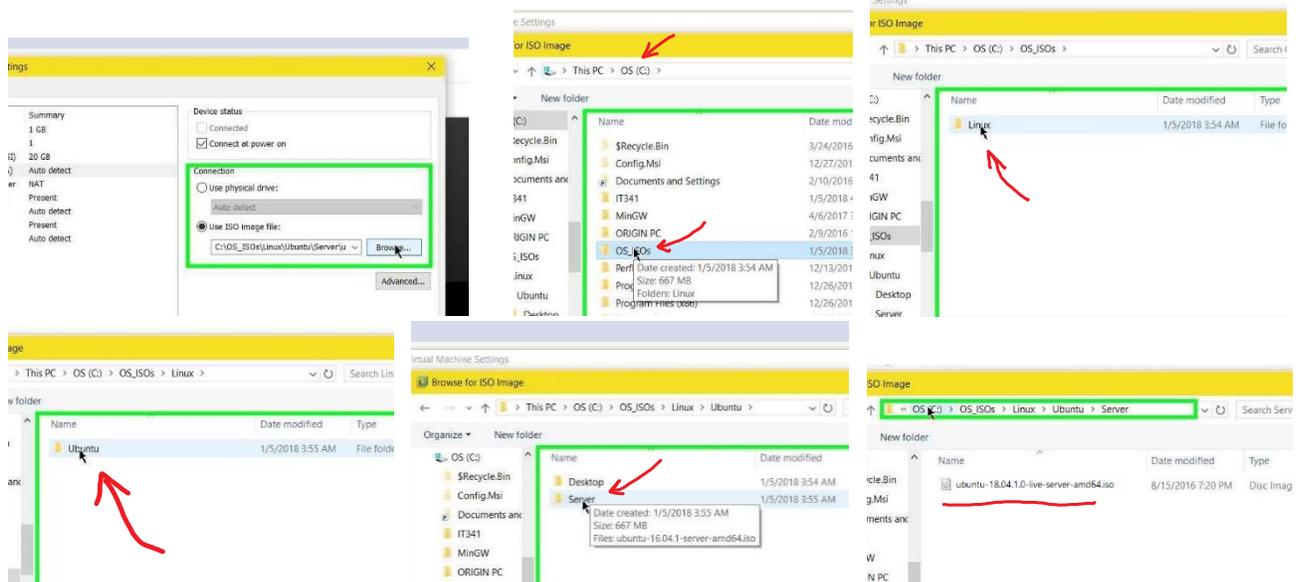


B. Choose **Use ISO image**; and then browse to (from File System)

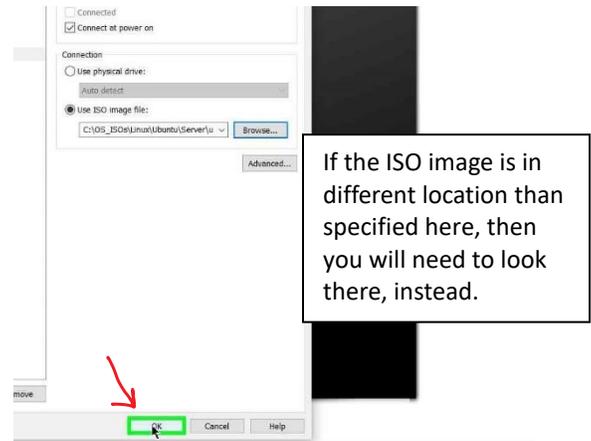
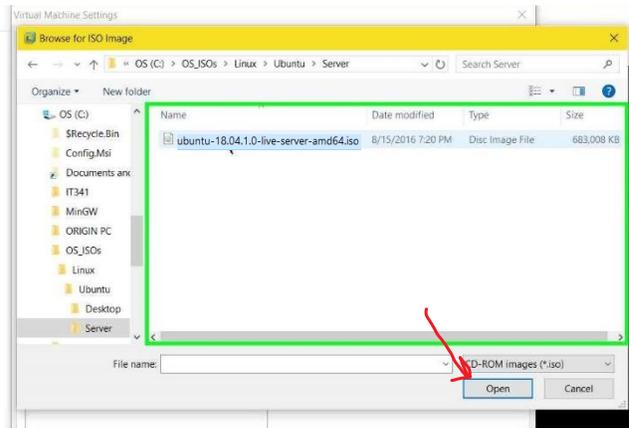
(NOTE: The exact file path may differ from what you see here!)

C:\OS_ISOs\Linux\Ubuntu\LTS\Server\ubuntu-20.04.1-live-server-amd64.iso

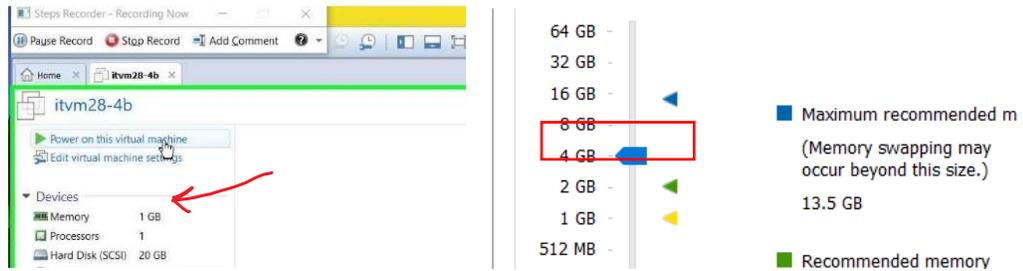
Make sure you have "**20.04**"! If in doubt, **ask me!**



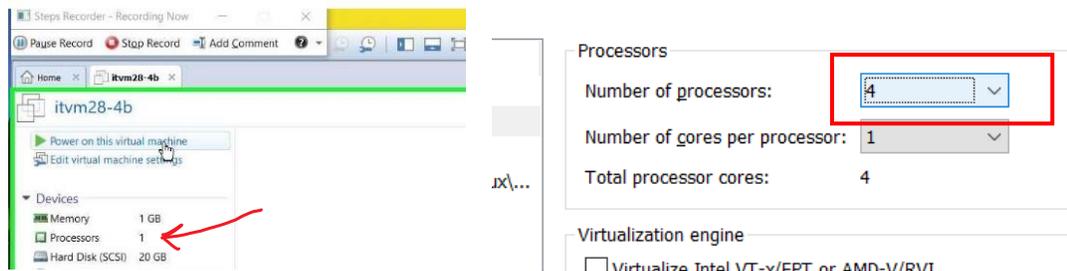
C. Once **ubuntu-20.04.1-live-server-amd64.iso** is highlighted, choose **Open**, and then **OK**.



D. Now, our (virtual) CD/DVD reader is associated with the **ISO** image for Ubuntu Server, so we can now install the OS on our VMs. Next, make a note of your VM's current memory, likely at **4 GB**.

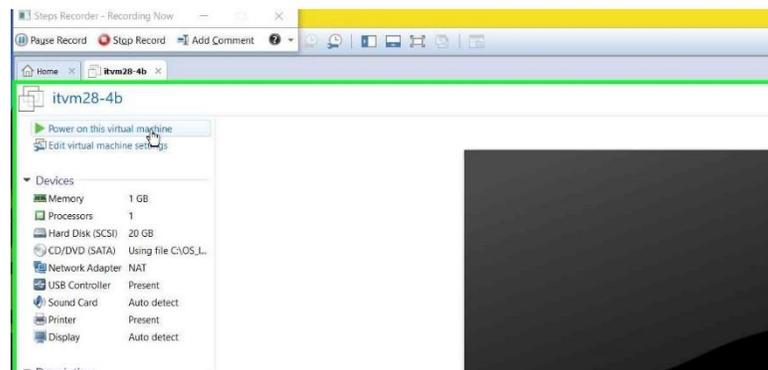


i. Your VM should have only 2 processors right now. Click on **Processors**, and increase processors to **4**, and do not worry about cores. Click **OK**.



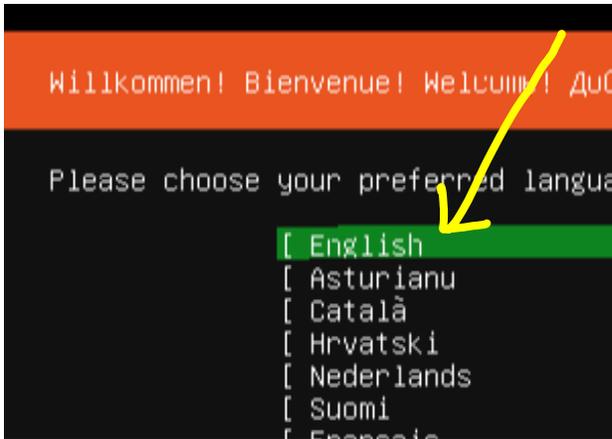
ii. Choose **Power on this virtual machine**.

You will be led, step-by-step, through the installation.

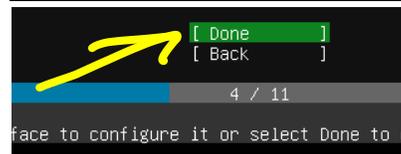


iii. To give control of your keyboard and mouse over to the virtual machine, click on its screen. (Whenever you want to give control back to your host, press **Ctrl-Alt**. A reminder of this simple sequence is on the lower-left corner of your VMware Workstation window.)

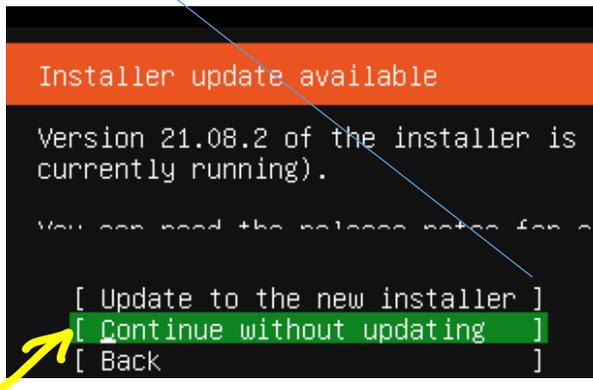
iv. For a Language, choose **English** and hit **Enter**.



vii. If you see **ens33** and **eth** for **NAME** and **TYPE**, arrow to "Done" and hit **Enter**.



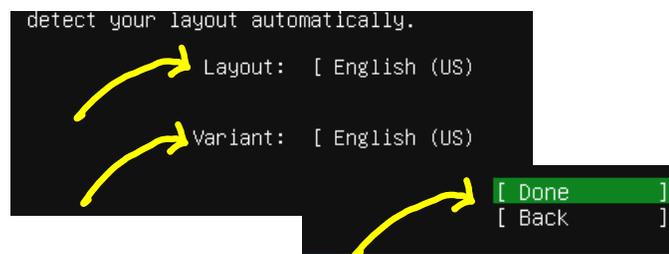
v. When you receive the **Installer update available** screen, choose **Continue without updating**, and hit **Enter**.



viii. We **don't** want a proxy, so leave **Proxy address** **blank** and hit **Enter**.



vi. For "Layout" and "Variant", choose **English (US)**, arrow to "Done", and hit **Enter**. (*steps cont'd rt. column*)



ix. If **Mirror address** matches the below, then arrow to "Done" and hit Enter.

```
Configure Ubuntu archive mirror

If you use an alternative mirror for Ubuntu, enter it
Mirror address: http://us.archive.ubuntu.com/ubuntu
                you may provide an archive mirror th
                the default 'http://archive.ubuntu.c
```

```
[ Done ]
[ Back ]

6 / 11
```

x. Use the arrow to choose "**Use an entire disk**" and hit Enter. **Uncheck** the LVM option! (See end-of-report questions.) Tab/choose Done

```
Guided storage configuration

Configure a guided storage layout, or create a custom
(X) Use an entire disk
    [ /dev/sda local disk 20.000G ▾ ]
    [ ] Set up this disk as an LVM group
    [ ] Encrypt the LVM group with LUKS
```

xi. Assuming things are in order as indicated below, arrow to "Done" and hit Enter. When asked to confirm, arrow to "Continue" and hit Enter.

```
Filesystem setup

FILE SYSTEM SUMMARY

MOUNT POINT      SIZE  TYPE  DEVICE TYPE
[ /              19.997G  ext4  partition of local disk ▶ ]

AVAILABLE DEVICES

No available devices

[ Create software RAID (md) ▶ ]
[ Create volume group (LVM) ▶ ]

USED DEVICES

DEVICE           SIZE  TYPE
[ /dev/sda       20.000G  local disk ▶ ]
[ partition 1    1.000M (0%) ▶ ]
  bios_grub
[ partition 2    19.997G (99%) ▶ ]
  formatted as ext4, mounted at /

Confirm destructive action
Selecting Continue below will begin the install
result in the loss of data on the disks select
You will not be able to return to this or a pr
installation has started.
Are you sure you want to continue?
[ No ]
[ Continue ]

[ Done ]
[ Reset ]
[ Back ]
```

xii. At this point, the install will start to commence, and you will be given a "Profile setup" screen. Here, it is extremely important that you provide the **correct** information to define your hostname, admin username, and admin password. Carrying out these steps

correctly NOW saves you the trouble of having to fix mistakes later! To make it easier, remember you are using the following two pieces of (*case-sensitive*) information:

The name **sysadmin**

Your team name (ex. **itvm28-4b**)

Enter the relevant information below. (**Replace** **itvm28-4b** with your own team name, naturally.) Then arrow to "Done" and hit Enter.

Profile setup

Enter the username and password (or ssh identity) you will use to log in to the system.

Your name:

Your server's name:
The name it uses when it talks to other computers.

Pick a username:

Choose a password:

Confirm your password:

Import SSH identity: [No]
You can import your SSH keys from Github or Launchpad.

Import Username:

[Done]

[Done]

(Notice that your team name is serving as your hostname and as your admin password!)

In response to the following prompt, leave UN-selected, tab to Done, and press Enter:

Do you wish to install the OpenSSH server package to enable secure communications on your server.

[] Install OpenSSH server

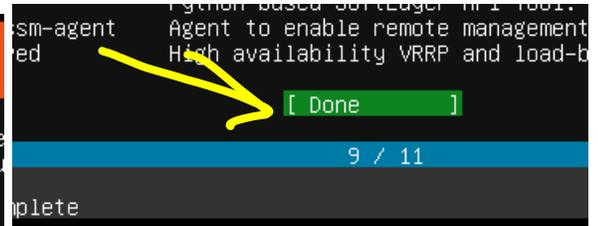
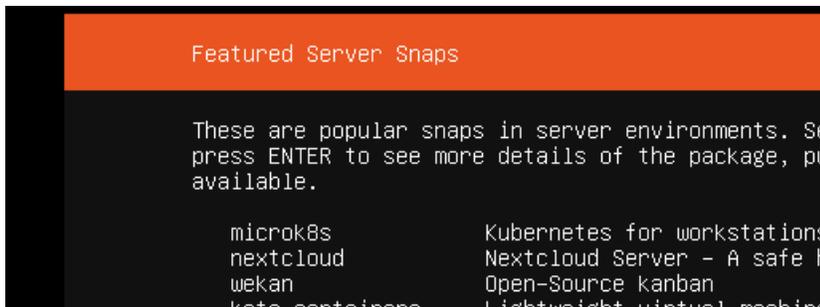
identity: [No]
You can import your SSH keys from Github or Launchpad.

[Done]

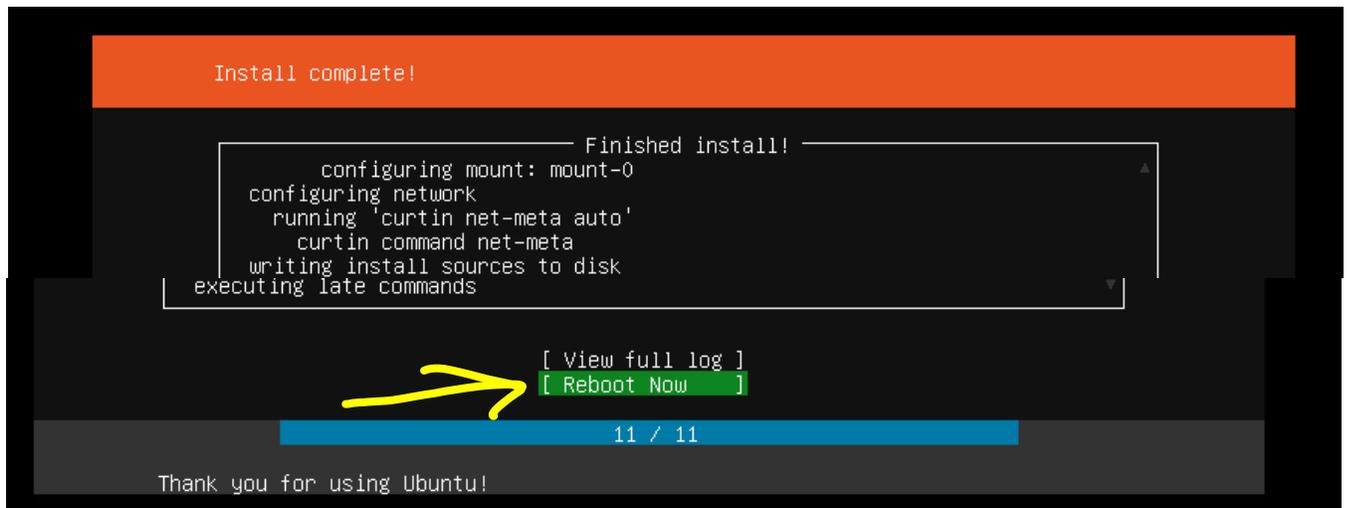
[Back]

xiii. We do not want to add any snaps, hit Tab – which should move focus directly to

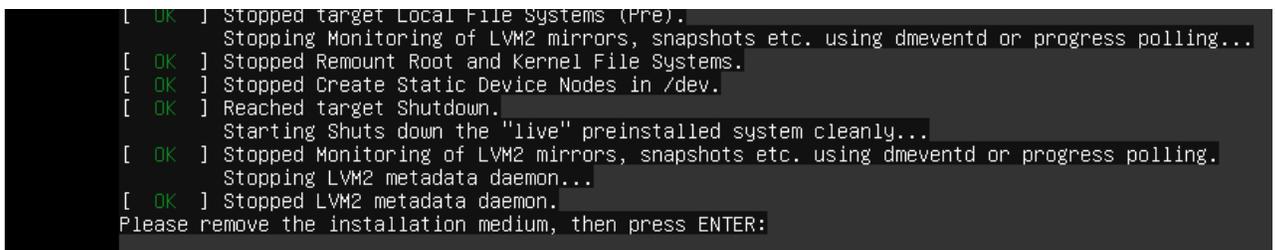
"Done" – and hit Enter. (Installation will take a **while!**)



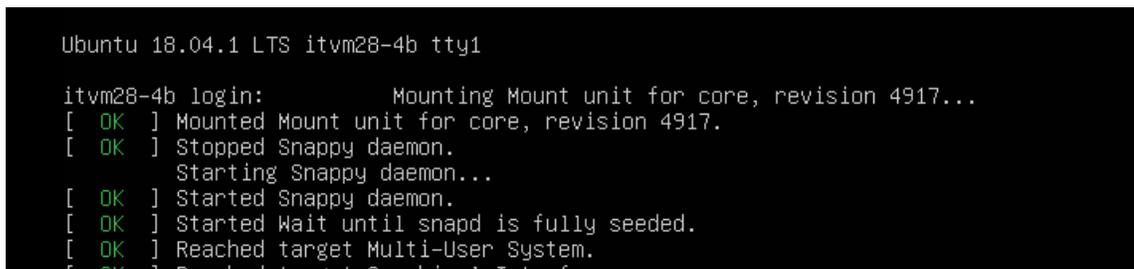
- xiv. Choose "Reboot Now" (only "Reboot Now", specifically) and hit Enter.



- xv. You should click "I Finished Installing". Then, click inside your VM, so that you can press Enter in response to the prompt:



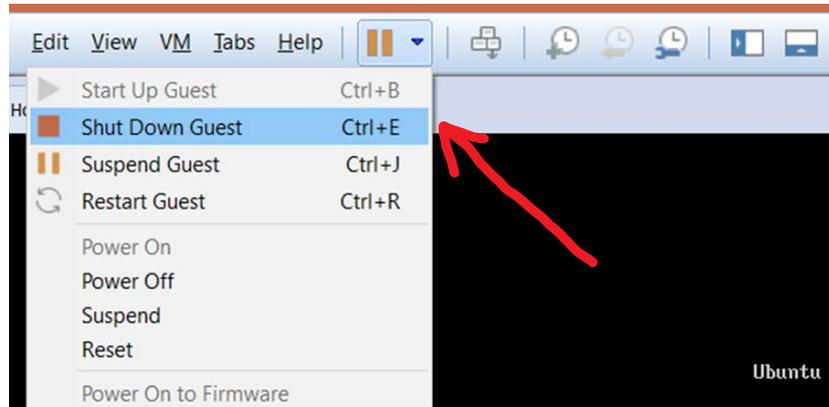
- xvi. (After a wait...) The system will reboot, and your screen may look something like this:



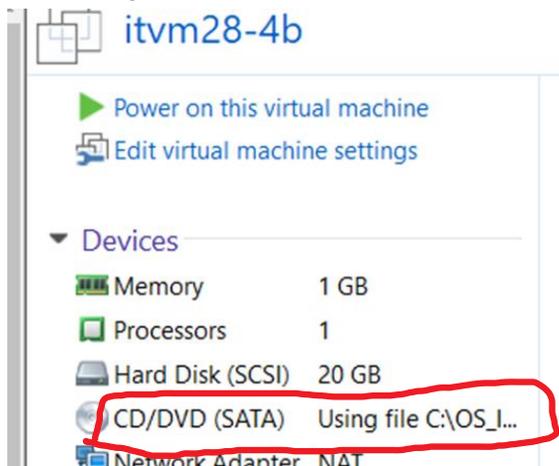
Though it may not be exact. If in doubt, just ask me!

1. Ctrl-Alt to return focus to the host.

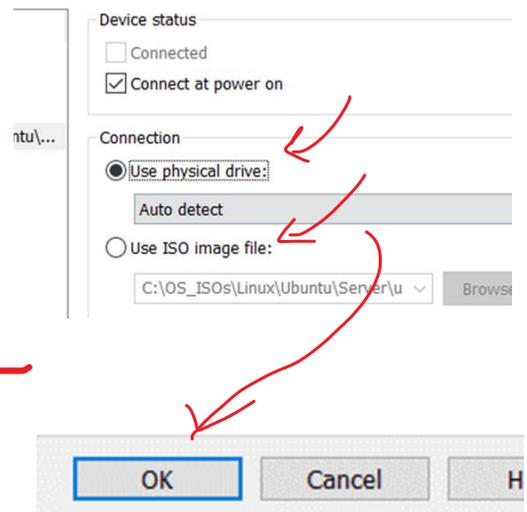
2. Click the icon indicated below, and choose **Shut Down Guest**; confirm to shutdown.



3. Double-click on **CD/DVD**. This will let us change the association back.

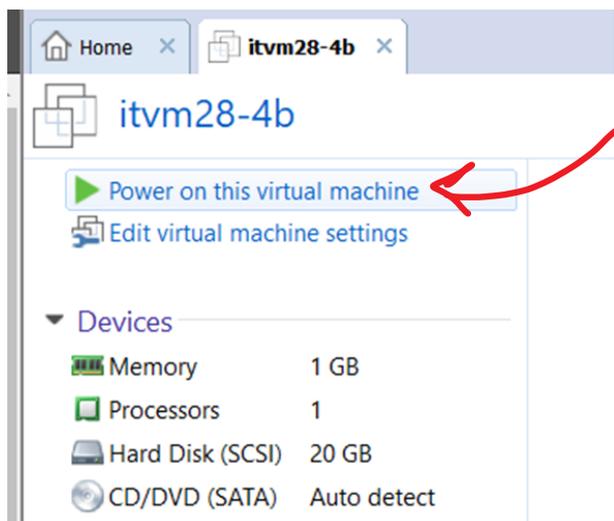


4. Choose **Use physical drive** and "**Auto detect**" for the device. Click **OK**.

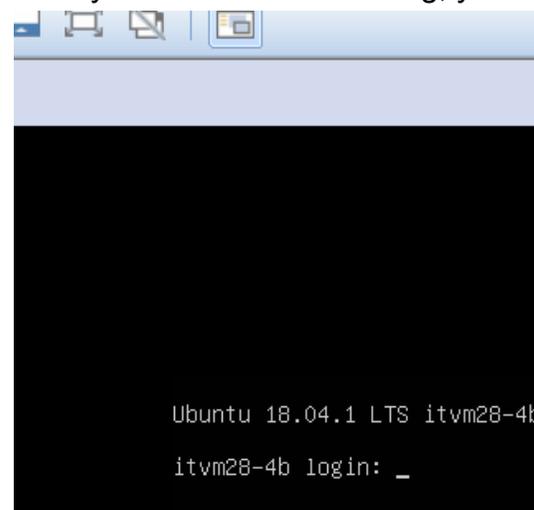


5. Now we are ready to turn the virtual machine **back on**...

Choose **Power on this Virtual Machine**.



After your VM finishes booting, you will see:



6. Log in as sysadmin. Remember, the password is the same as your team name, same as your VM's name.

```
itvm28-4b login: sysadmin  
Password:
```

```
197 packages can be updated.  
108 updates are security updates.  
  
The programs included with the Ubuntu system are  
the exact distribution terms for each program are  
individual files in /usr/share/doc/*/copyright.  
  
Ubuntu comes with ABSOLUTELY NO WARRANTY, to the  
applicable law.  
  
To run a command as administrator (user "root"),  
See "man sudo_root" for details.  
  
sysadmin@itvm28-4b:~$ _
```

On successful login, you should see this

Before you continue, enter the **script** command as indicated below.

```
sysadmin@itvm28-4b:~$ script $(date +"%Y%m%d_%H%M").session.txt  
Script started, file is 20190204_2320.session.txt  
sysadmin@itvm28-4b:~$ _
```

This will allow you to save the output of your CLI session to a text file, with a unique file name. You can export this file from your VM to another source, later, and have access to the material to use in your lab report.

7. Let's see if we can reach the outside. Enter the following command:

```
ping -c 5 www.yahoo.com
```

```
sysadmin@itvm28-4b:~$ ping -c 5 www.yahoo.com  
PING atsv2-fp.wg1.b.yahoo.com (98.139.180.180) 56(84) bytes of data.  
64 bytes from media-router-fp1.prod.media.vip.bf1.yahoo.com (98.139.180.180): icmp_seq=1 ttl=128 time=34.0 ms  
64 bytes from media-router-fp1.prod.media.vip.bf1.yahoo.com (98.139.180.180): icmp_seq=2 ttl=128 time=33.8 ms  
64 bytes from media-router-fp1.prod.media.vip.bf1.yahoo.com (98.139.180.180): icmp_seq=3 ttl=128 time=29.0 ms  
64 bytes from media-router-fp1.prod.media.vip.bf1.yahoo.com (98.139.180.180): icmp_seq=4 ttl=128 time=48.5 ms  
64 bytes from media-router-fp1.prod.media.vip.bf1.yahoo.com (98.139.180.180): icmp_seq=5 ttl=128 time=35.4 ms  
  
--- atsv2-fp.wg1.b.yahoo.com ping statistics ---  
5 packets transmitted, 5 received, 0% packet loss, time 4003ms  
rtt min/avg/max/mdev = 29.027/36.170/48.530/6.550 ms  
sysadmin@itvm28-4b:~$
```

Example Output

Be sure to record success or failure as part of your lab report's daily entries.

8. We want to install some software; but we need to do some preparatory steps. For each of the four commands below, type the command and then press Enter. After the first

command, you will be prompted for `sysadmin`'s password because you invoked the `sudo` command. Hereafter, you need not re-enter the password because it has been "cached".

```
sudo systemctl disable apt-daily.service
sudo systemctl disable apt-daily.timer

sudo systemctl disable apt-daily-upgrade.timer
sudo systemctl disable apt-daily-upgrade.service
```

```
see man sudo_root for details.
sysadmin@itvm28-4b:~$ sudo systemctl disable apt-daily.service
[sudo] password for sysadmin: _
```

Team name / VM name

Also, it's always a good idea to do an update of your catalog before these installations.

This, too, will require invoking administrative privileges with the `sudo` command.

```
sudo apt-get update
```

```
sysadmin@itvm28-4b:~$ sudo apt-get update
Hit:1 http://archive.ubuntu.com/ubuntu bionic InRelease
Hit:2 http://archive.ubuntu.com/ubuntu bionic-updates InRelease
Hit:3 http://archive.ubuntu.com/ubuntu bionic-backports InRelease
Hit:4 http://archive.ubuntu.com/ubuntu bionic-security InRelease
Get:5 http://archive.ubuntu.com/ubuntu bionic/main Translation-en [516 kB]
Get:6 http://archive.ubuntu.com/ubuntu bionic/restricted Translation-en [3,584 B]
Get:7 http://archive.ubuntu.com/ubuntu bionic/universe Translation-en [4,941 kB]
```

Then we will do an upgrade → `sudo apt-get upgrade`

```
Fetches 306 kB in 2s (122 kB/s)
Reading package lists... Done
sysadmin@itvm28-4b:~$ sudo apt-get upgrade
```

After lots of output, you are asked if you want to continue. Choose Y, or just press Enter

```
quid-runtime vim vim-common vim-runtime vim-tiny vlan wget xfsprogs zlib1g
189 upgraded, 0 newly installed, 0 to remove and 4 not upgraded.
Need to get 139 MB of archives.
After this operation, 129 MB of additional disk space will be used.
Do you want to continue? [Y/n] _
```

Much more output will follow...

(Note that this is the ONLY time you will run an upgrade in this course. If you feel you have a compelling reason to run an upgrade at a later date, ask me before proceeding!)

9. Then install the ssh server → `sudo apt-get install openssh-server`

```
Running hooks in /etc/ca-certificates/update.d...
done.
Processing triggers for resolvconf (1.78ubuntu5) ...
sysadmin@itvm28-4b:~$ sudo apt-get install openssh-server
```

(You will want to answer Y at the prompt)

```
0 upgraded, 8 newly installed, 0 to remove and 4 not upgraded.
Need to get 817 kB of archives.
After this operation, 5,898 kB of additional disk space will be used.
Do you want to continue? [Y/n]
```

10. Be sure you are *documenting* all of this in your lab report's daily log entries. May be part of *exam questions*.

11. Now you can end your **script** session and log out.

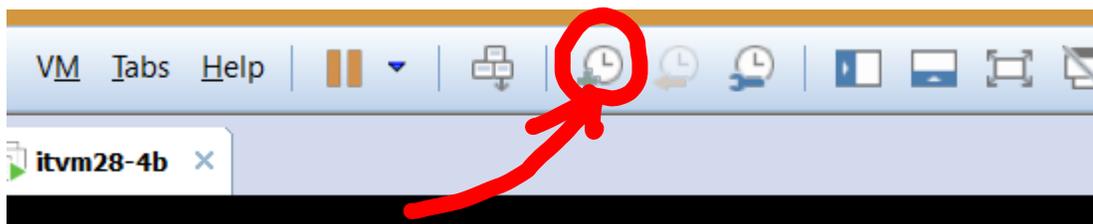
exit

logout

```
sysadmin@itvm28-4b:~$ exit
exit
Script done, file is 20190204_2320.session.txt
sysadmin@itvm28-4b:~$ logout
```

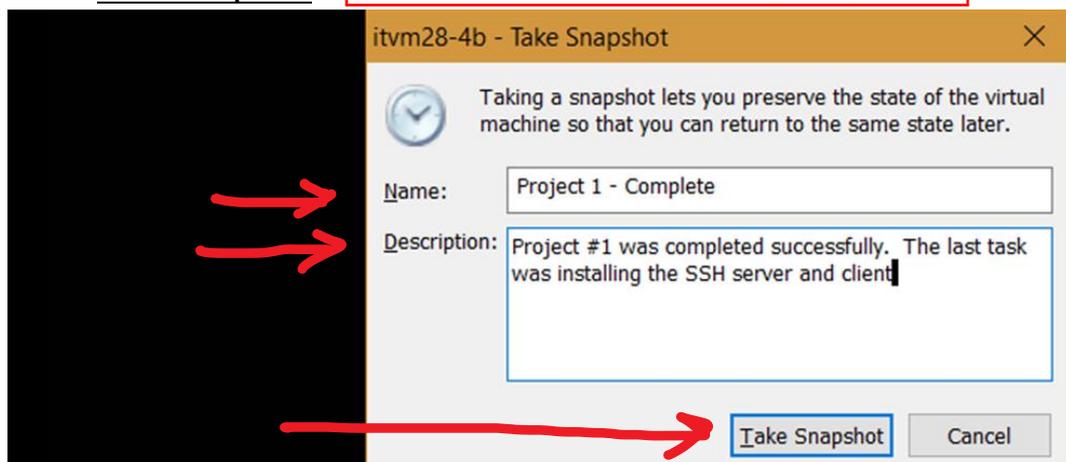
12. At this point, you should do two things: **Shut down VM first!**

- First, recall how we made changes to the VM's specs for **Memory** and **Processors**.
 - Referring back to the step where you made these changes, you need to change the memory back to the original amount of **4 GB**.
 - You will also want to change the number of processors back to **2**.
 - When we "upgraded" your VM's specs back then, it was just to speed up the installation process. Now that installation is finished, we need to "downgrade" *so that your VM does not consume too many of the physical workstation's hardware resources!*
- Second, you need to create your first **snapshot**. Ctrl-Alt to return focus to the host, and then click the first of the 3 clock icons below – the one with a plus sign.

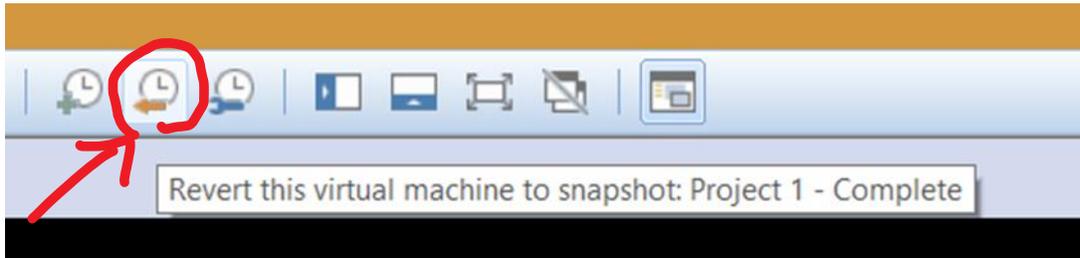


13. In the dialog box, give your snapshot **a meaningful name** and **a useful description**.

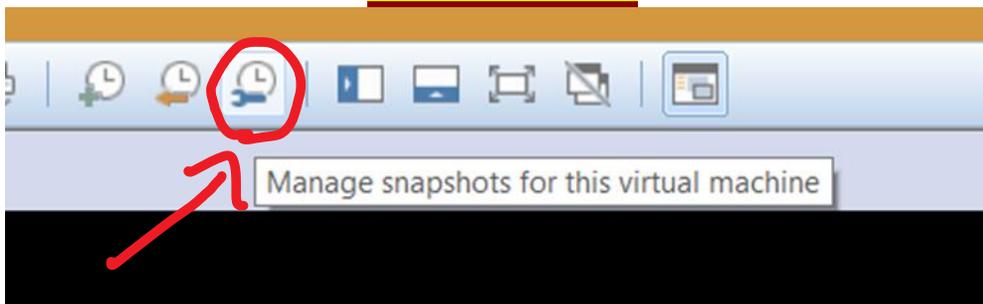
Then, click **Take Snapshot**. **Shut down VM before taking snapshots!**



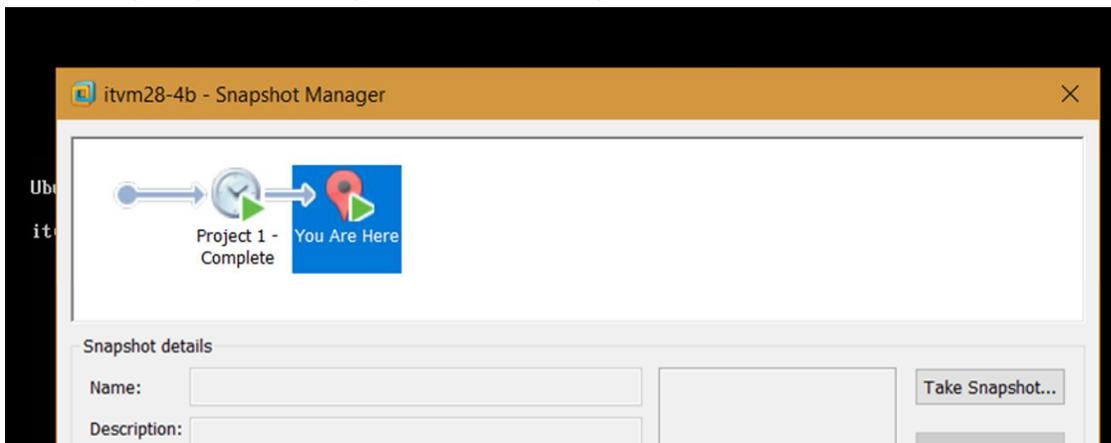
14. You can take a Snapshot of your VM at any time, and you can have several of them, representing the VM's state at various points in time. In order to **restore** your VM to the state as of the latest snapshot, click the second clock icon:



15. You can view and manage all of your snapshots for your VM by clicking the third clock icon, which opens the **Snapshot Manager**:



This will give you a dialog like the following:



Where was the snapshot saved? Figure this out and **write about it** in the indicated question below. You can change this, or you can copy it to a memory stick if you have one. Then you won't lose your work if you mess up!

FINALLY! It is imperative that you get in the habit of copying your VM files to an external memory source like a USB thumb drive. Accidental deletions of VMs DO happen, and you want to be prepared for this possibility!

Discussion Questions:

1. What does **LTS** stand for, and what does that mean? Please explain.
2. What is an **LVM**? (It stands for "logical volume manager".) Please explain what a logical volume is and what a logical volume manager does.
3. Please explain what the **sudo** command is, how it is used, and why we need it.
4. Please explain what **apt-get** is and why we use it.
5. Please explain what "snapshots" are *and* why they are useful to us.