



This document describes the documented class exercises . The objective of the document is to present complete and easy to follow detailed procedures to describe the necessary steps for installation, configuration, and administration of Operating Systems.

# Course Procedure Manual

420-631-AB OPERATING  
SYSTEMS I

Teacher: Michael Hughes  
Student: Monica Perez Mata  
Student id : 2498056

# TABLE OF CONTENTS

1	Introduction .....	5
2	General activities .....	5
2.1	Splashtop and Computer .....	6
2.2	Verify VMWare Workstation Pro is installed .....	7
2.3	Updating VMware Workstation Pro.....	8
2.3.1	Post VMware Workstation Pro upgrade activities .....	17
2.4	Delete VM .....	20
2.5	Create a snapshot for VM .....	23
3	Operating Systems I - Linux.....	24
3.1	Linux distributions.....	24
3.1.1	Fedora .....	25
3.1.1.1	Fedora download .....	25
3.1.1.2	Create VM for Fedora .....	27
3.1.1.3	Install Fedora on recently created virtual machine .....	37
3.1.1.4	Fedora post-installation activities.....	48
3.1.2	Debian .....	51
3.1.2.1	Debian download.....	52
3.1.2.2	Create VM for Debian .....	54
3.1.2.3	Install Debian on recently created virtual machine.....	65
3.1.2.4	Debian post installation activities.....	81
3.1.3	Ubuntu .....	82
3.1.3.1	Ubuntu download .....	83
3.1.3.2	Create VM for Ubuntu.....	85
3.1.3.3	Install Ubuntu on recently created Virtual Machine .....	98
3.1.3.4	Ubuntu post-installation activities.....	111
3.1.4	Centos .....	115
3.1.4.1	Centos download.....	115
3.1.4.2	Create VM for Centos .....	115
3.1.4.3	Install Centos on recently created virtual machine.....	126
3.1.4.4	Centos post installation activities.....	134
3.1.5	OpenSUSE .....	143
3.1.5.1	Opensuse download .....	143
3.1.5.2	Create VM for openSUSE.....	145

3.1.5.3	Install OpenSuse on recently created virtual machine.....	154
3.1.5.4	openSUSE post installation activities.....	164
3.2	Troubleshooting.....	167
3.2.1	Fedora 41 black Screen after update - Single user Mode and change to Runlevel 3.....	167
3.2.1.1	Restart Fedora 41 as runlevel3 .....	167
3.2.1.2	Set runlevel3 as default.....	170
3.2.1.3	Workaround to get graphical interface .....	170
3.3	LINUX commands .....	176
3.3.1	Preliminary Commands navigating.....	177
3.3.2	Assign static IP to a server .....	189
3.3.3	Configure the server with a name .....	192
3.3.4	Create user .....	195
3.3.5	Permissions change dnf man pages cd mkdir rmdir chmod part.....	205
3.3.6	Change commands (chown chgrp chmod ) .....	215
3.3.6.1	Command chmod with symbolic notation .....	215
3.3.6.2	Command chown change owner .....	218
3.3.6.3	Command change group chgrp .....	220
3.3.7	How to Create a user and Delete users files vs Delete user and files at same time .....	221
3.3.8	Permissions Overview and SUID SGID and Sticky Bits .....	226
3.3.8.1	SUID (Set User ID) .....	227
3.3.8.2	SGID (Set Group ID).....	228
3.3.8.3	Sticky Bit.....	228
3.3.9	Creating users Cat bc cal commands and Shadow and passwd files .....	228
3.4	Install services .....	241
3.4.1	Install BIND DNS service and Webin .....	242
3.4.1.1	Install BIND.....	242
3.4.1.2	Install sendmail .....	243
3.4.1.3	Install webmin .....	244
3.4.2	Use Webmin to configure BIND DNS .....	250
3.4.2.1	Define the DNS server .....	250
<b>3.4.2.2</b>	Assign the recently configured DNS to local server .....	254
3.4.3	Use Webmin to create DNS records .....	257
3.4.3.1	Configure Master zone fed1.com .....	257
3.4.4	Configure sendmail service .....	286
3.4.5	Setup 3rd Domain DNS manually and Sendmail .....	292

3.4.5.1	Create records for fed1.net via CLI .....	292
3.4.5.2	Create slave zone in Class DNS server via webmin.....	298
3.4.5.3	Modify files to add .net to sendmail service .....	300
3.4.5.4	Test send/receive emails with Alpine.....	303
3.4.6	Setup Skel directory and users.....	306
3.4.6.1	Create public_html folder to be used as skeleton.....	306
3.4.6.2	Create users .....	306
3.4.7	Install and configure sshd.....	308
3.4.8	Create user group and test it.....	309
3.5	Install windows 10 in VMWare .....	315
3.5.1	Windows 10 download .....	315
3.5.2	Create VM for windows 10 .....	316
3.5.3	Install Windows 10 on recently created Virtual Machine .....	328
3.6	Install Dovecot on Fedora and Test with outlook in Microsoft VM .....	350
3.6.1	Install Microsoft office in Windows virtual machine .....	350
3.6.2	Install Dovecot in Fedora machine .....	354
3.6.3	Setup and run outlook in windows virtual machine.....	358
3.6.4	Set user and permissions on mail files in Fedora .....	362
3.6.5	Test send/receive emails in Outlook.....	363
3.7	Install Apache in Fedora .....	365
3.7.1	Install and configure Apache on Fedora .....	365
3.7.2	Install lynx.....	372
3.7.3	Prepare index.html for users .....	373
3.7.4	Test with Lynx.....	378
3.8	Test sshd with WinSCP and Install and Configure Samba on Fedora.....	380
3.8.1	Install WinSCP in Windows virtual machine.....	380
3.9	Install SAMBA .....	389
3.9.1	Create security group .....	389
3.9.2	Install samba .....	392
3.9.3	Testing SAMBA .....	399
3.10	Configure Alternate port in SSHD on Fedora .....	402
3.10.1	Configure the server-side settings for making SSH connections use port 8022.....	402
3.10.1.1	Test port 8022.....	405
3.10.2	Configure the client-side settings for making SSH connections use port 8022.....	406
3.10.2.1	Test port 8022.....	409
3.10.3	Test winSCP connection with new port 8022.....	410

3.11	Install LAMP on Fedora.....	414
3.11.1	Installing PHP.....	414
3.11.2	Installing MySQL.....	423

# 1 Introduction

This document outlines the procedures learned during the courses

- 420-631-AB OPERATING SYSTEMS I

The aim of the document is to present complete and easy to follow detailed procedures to describe the necessary steps for installation, configuration, and administration of Linux Operating Systems.

This document provides comprehensive procedures for the installation, configuration, and administration of various Linux distributions and services. It is designed to be a complete and easy-to-follow guide based on class exercises.

**Linux Distributions Covered:** The document details the installation and setup of several Linux distributions, including:

- Fedora: An open-source operating system developed by the Fedora Project, sponsored by Red Hat.  

- Debian: A popular and widely used Linux distribution known for its stability and extensive software repository.  

- Ubuntu: A user-friendly Linux distribution derived from Debian, known for its ease of use and community support.  

- CentOS: A free and open-source Linux distribution derived from the sources of Red Hat Enterprise Linux (RHEL).  

- openSUSE: An open-source Linux distribution developed by SUSE Linux GmbH, offering both Leap (stable) and Tumbleweed (rolling release) versions.  


**Services Installed:** The document also covers the installation and configuration of various services, including:

- BIND DNS Server: A widely used open-source DNS server that translates human-readable domain names into IP addresses.
- Sendmail: A Mail Transfer Agent (MTA) responsible for sending and receiving emails.
- Webmin: A web-based interface for managing system components, including BIND and Sendmail.
- SSHD: Secure Shell (SSH) protocol for secure remote access and management of Linux systems.
- Apache: A popular web server for hosting websites and applications.
- Dovecot: An open-source IMAP and POP3 email server.
- Samba: Software that allows Linux systems to share files and printers with Windows systems.
- LAMP

# 2 General activities

This section describes the pre-requisites and the setup to work with procedures related to operating systems.

The required pre-requisites:

- 1) The use of Splashtop to securely access John Abbott College Computer Lab is up and running.
- 2) A computer is available to work in John Abbott College Computer Lab
- 3) Vmware Workstation Pro Virtual environment software is installed to create virtual machines on the assigned computer and is up and running.

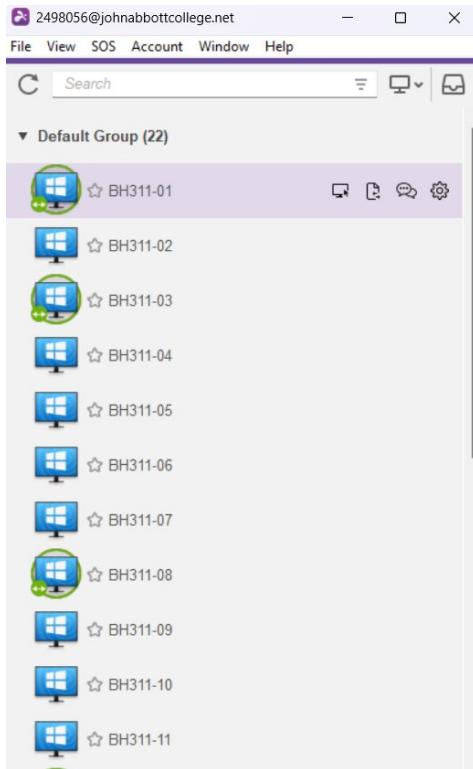
The procedures for installing Splashtop on your home computer are not included in this manual.

## 2.1 Splashtop and Computer

Splashtop Business is a remote desktop software that allows users to securely access their computers from anywhere. As a pre-requisite for all activities in this document, Splashtop Business is installed, and a PC is assigned, and both are working

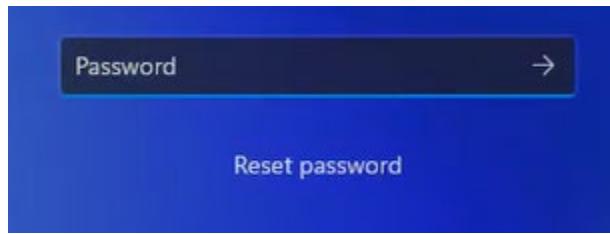


- A) Splashtop Business Application is installed in your home computer, user is logged in and a computer list appears on Splashtop Business, as shown in the image below:

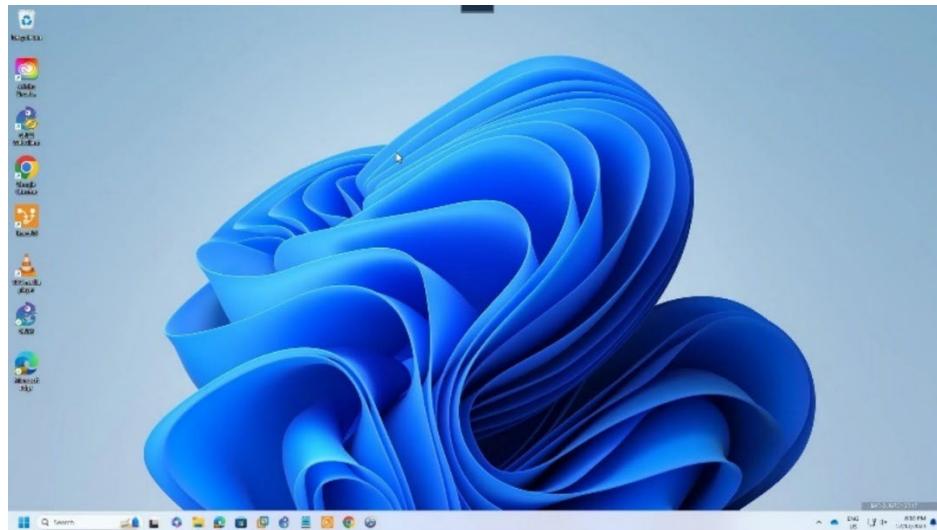


The computer assigned is correctly working when double click computer starts.

- B) User login to computer with appropriate user and password



C) Windows desktop (like the image below) appears when user logs in.



## 2.2 Verify VMWare Workstation Pro is installed

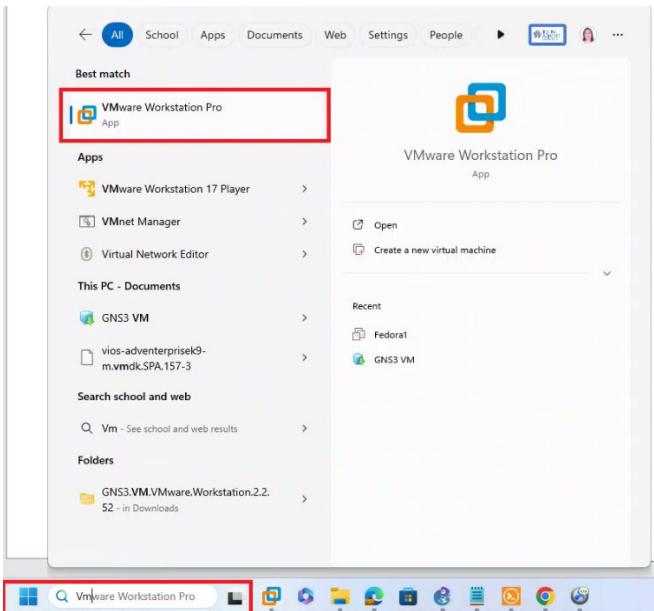
VMware Workstation Pro enables users to set up virtual machines (VMs) on a single physical machine.



As a pre-requisite for all activities in this document

- 1) Make sure VMware Workstation Pro is installed. Check in the search tab at the left down corner of the desktop and look for VMware Workstation Pro.

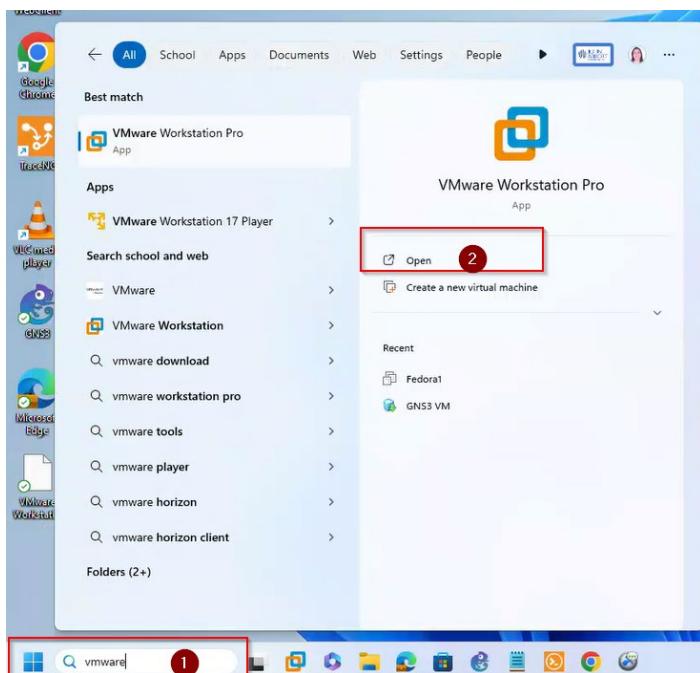
The application appears in the menu.



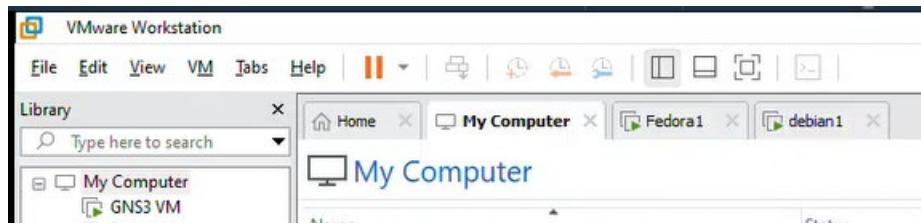
## 2.3 Updating VMware Workstation Pro

### A) Open the VMware Workstation App

- 1 Look for application in windows search
- 2 Once VMware Workstation Pro appears, open application

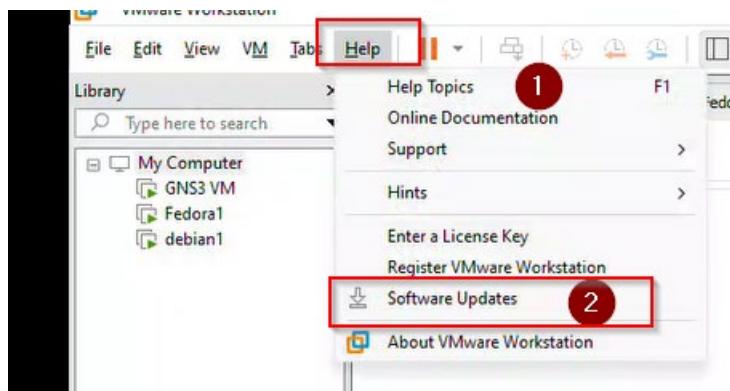


### B) VMware workstation opens:

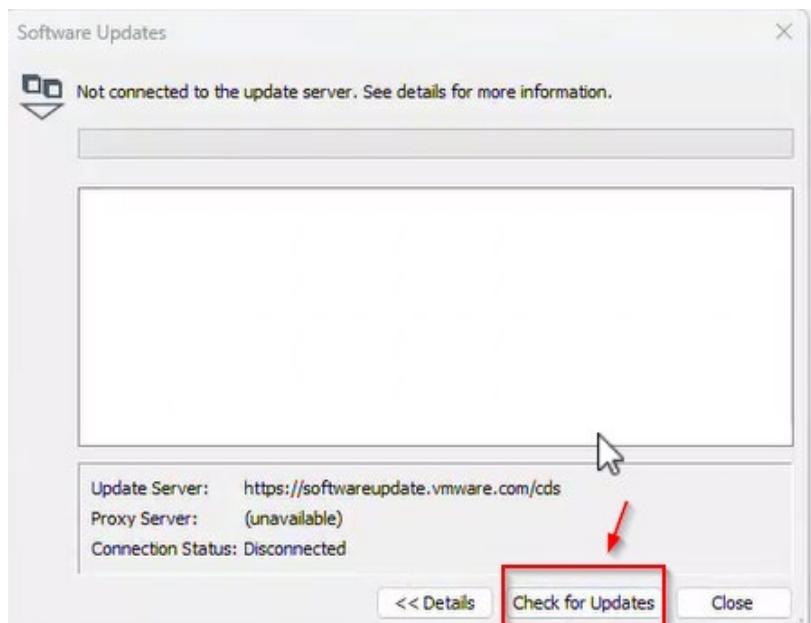


C) Select from top menu and submenu

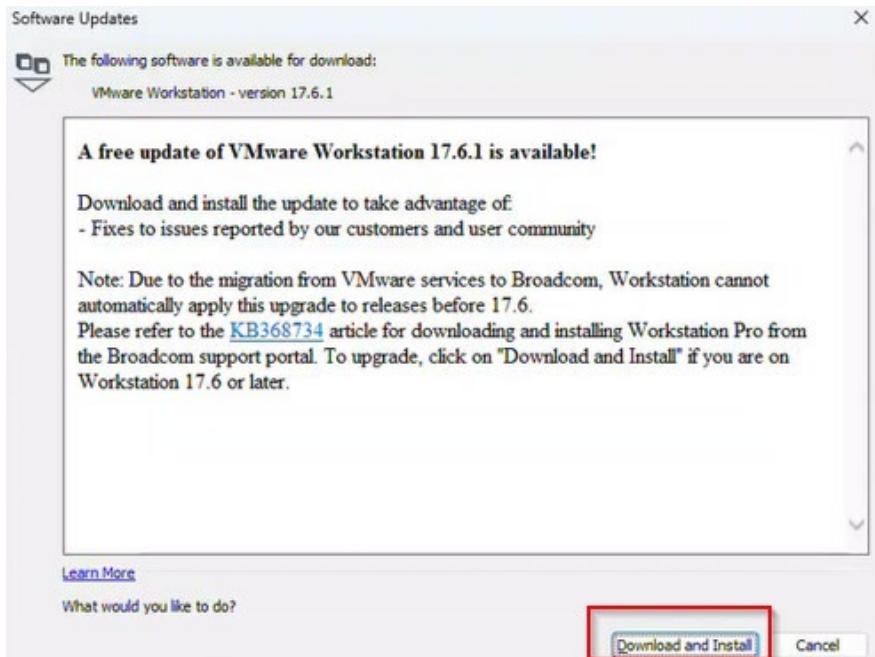
1. Help
2. Select Software Updates



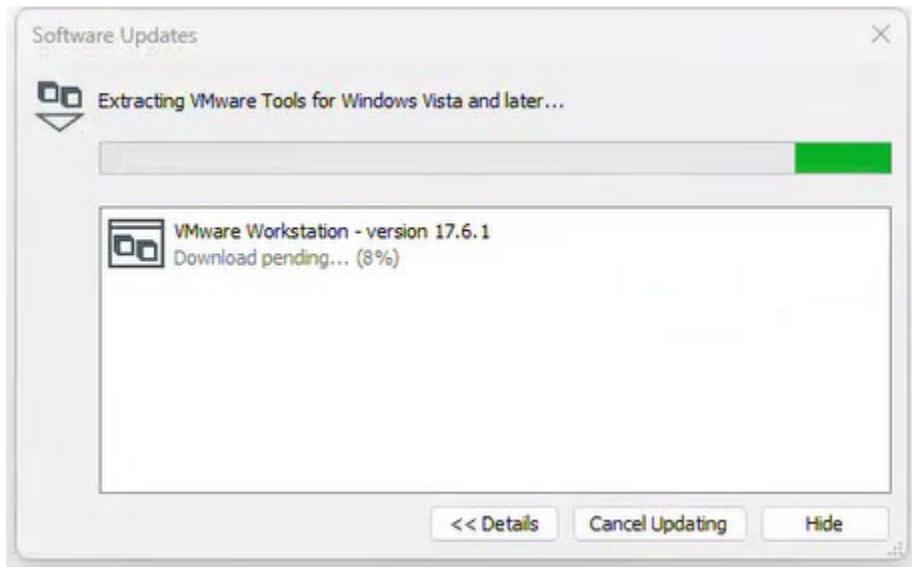
D) A new window will open, select Check for updates



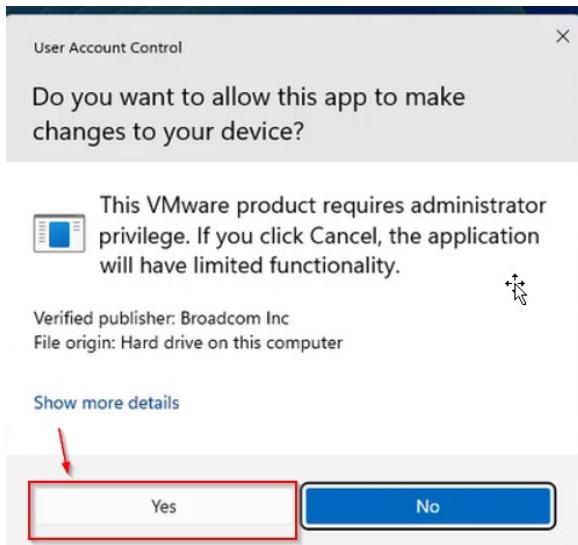
- E) After a couple of second a second a new window appears indicating upgrades are available, click “Download and Install”



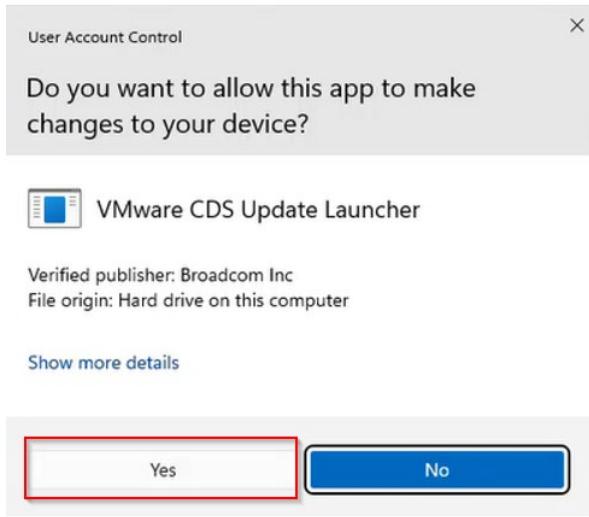
- F) Wait while new VMWare version is extracting



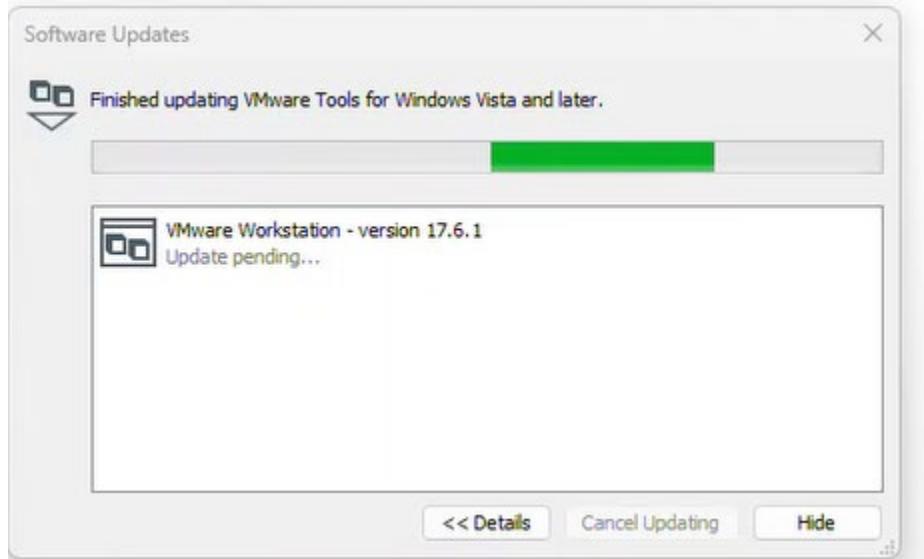
- G) When prompted that “Do you want to allow this app to make changes to your device? This VMware product requires administrator privilege. Click “Yes”



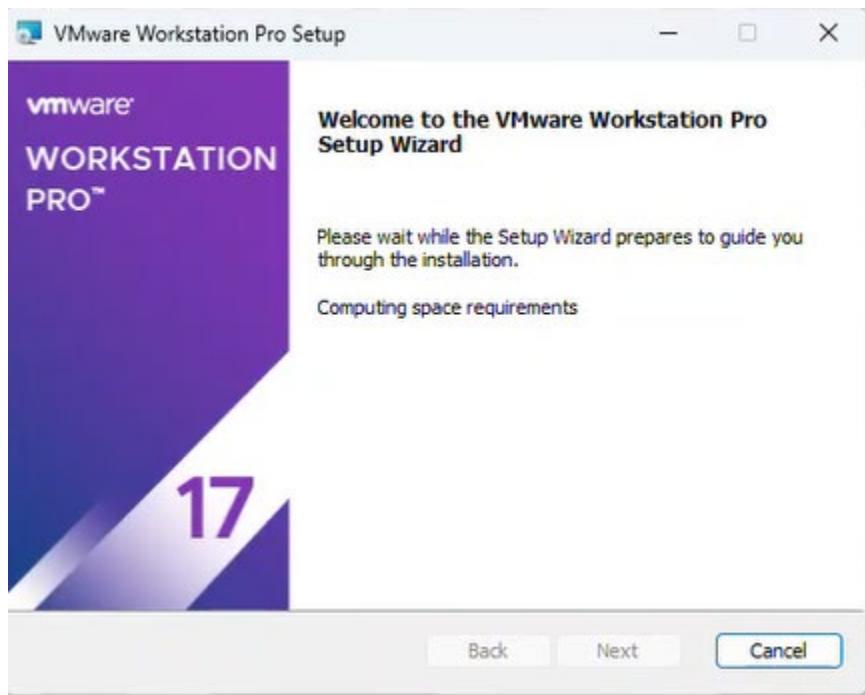
- H) When prompted “Do you want to allow this app to make changes to your device? VMware CDS Update Launcher”, click “Yes”.



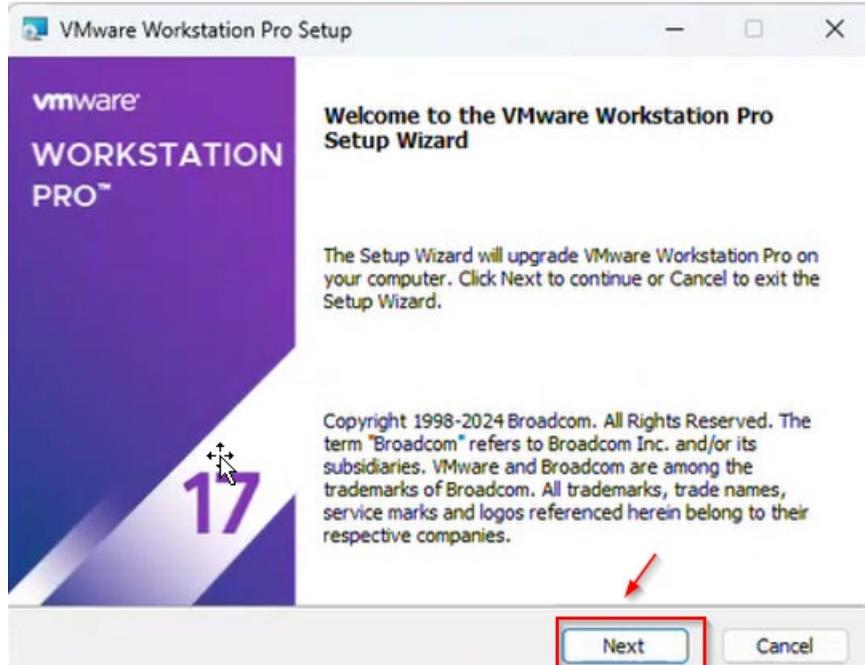
- I) Finished uploading VMware tools window appears, wait until finished.



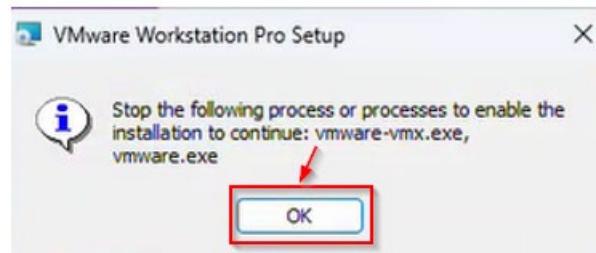
- J) New window with message “Welcome to VMware Workstation Pro Setup Wizard, wait until “Next” is enabled.



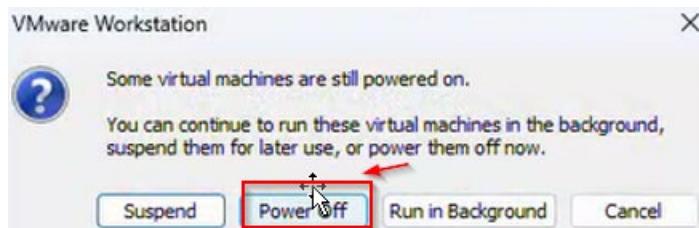
- K) When the in the window “Welcome to the VMware Workstation Pro Setup Wizard” “Next” is enabled, click on it.



- L) If the following window appears is because the VMWare Workstation is running virtual machines. Press “OK” and go ahead to close the VMWare Workstation



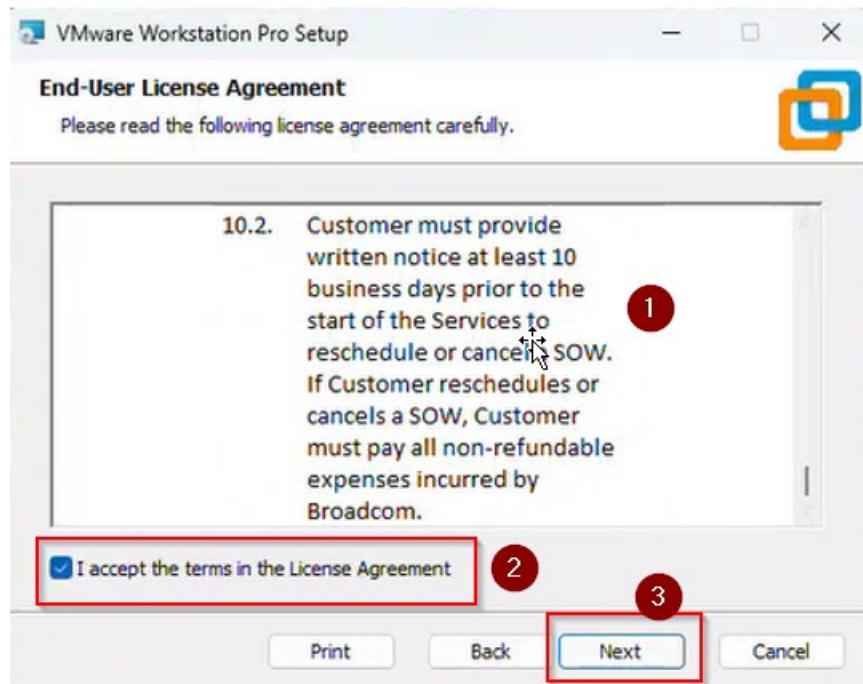
- M) To Stop VMWare Workstation all virtual machines should be powered off. Press “Power Off”



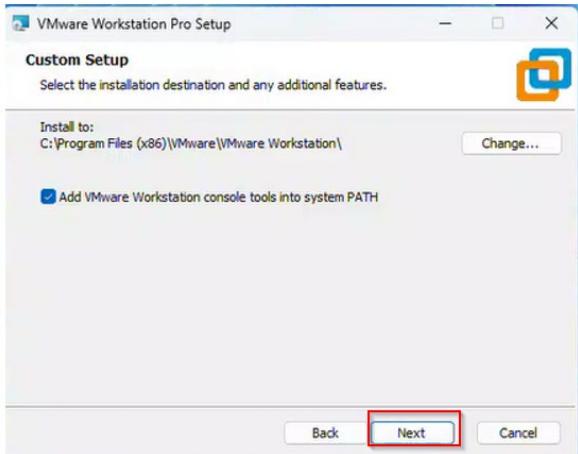
- N) End-User License Agreement,

1. Read the End-User License Agreement

2. Accept the End-User License Agreement by Selecting “I accept the terms in the License Agreement”.
3. Click “Next”

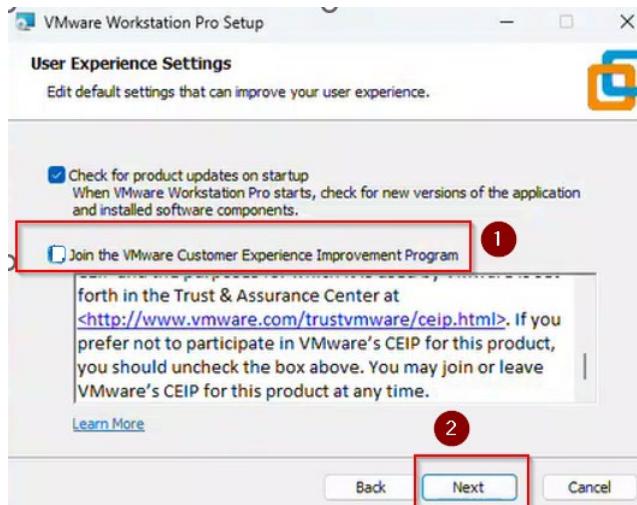


- O) In the “Custom Setup” window, keep the installation destination, select “Add VMWare Workstation console tools into system PATH” and then click “Next”

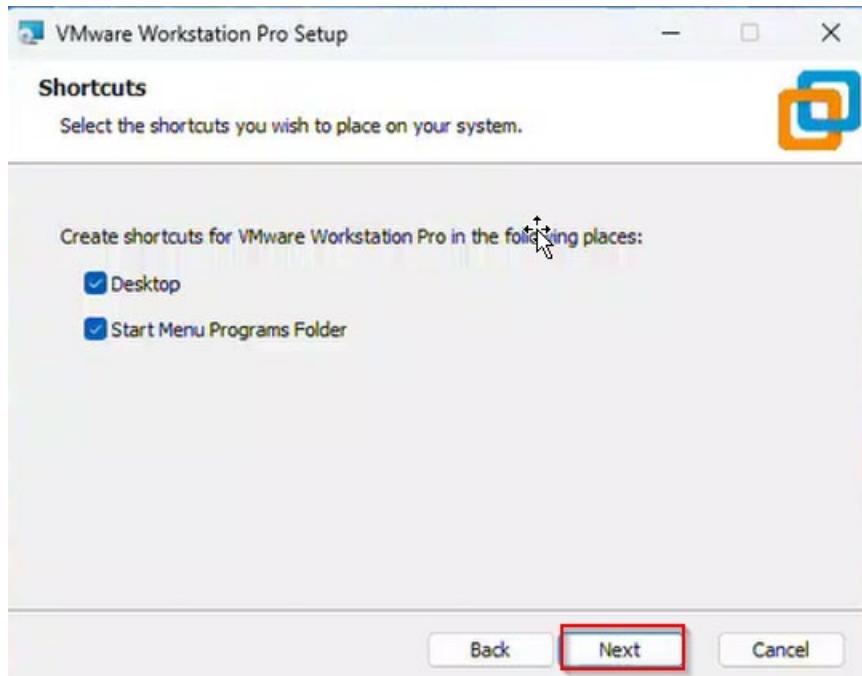


- P) When the “User Experience Settings” window pops up,

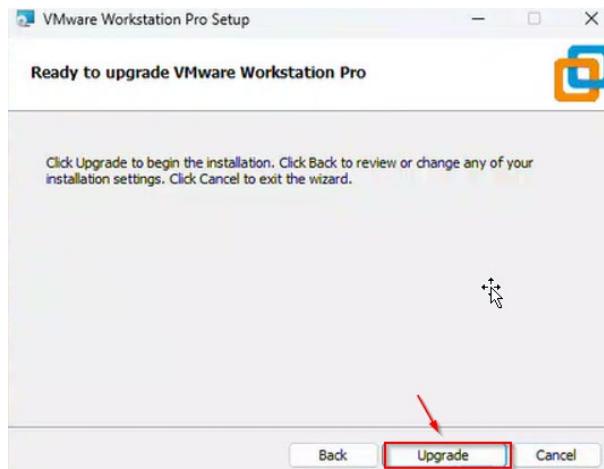
1. Uncheck the checkbox “Join the VMware Customer Experience Improvement Program”
2. Click “Next”



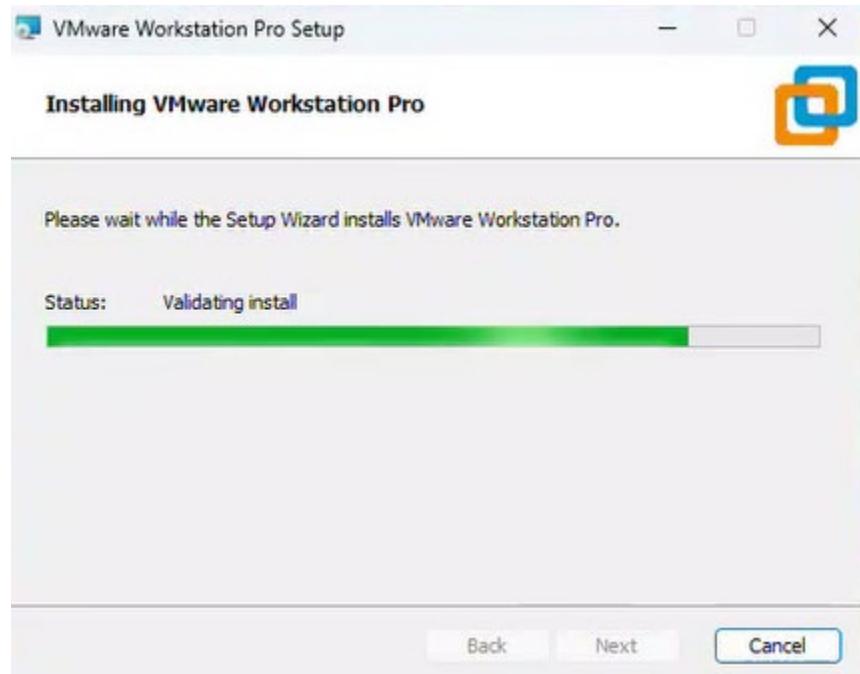
Q) When the “Shortcuts” window pops up, both boxes should be checked, then click “Next”.



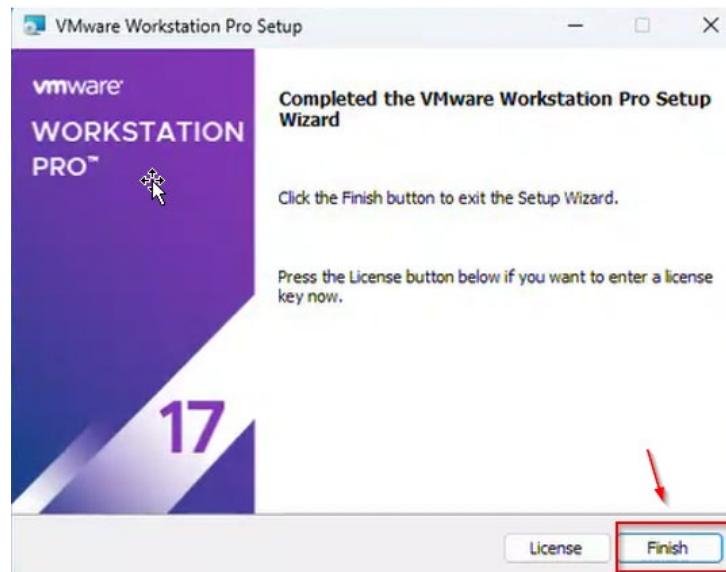
R) When the window “Ready to upgrade VMware Workstation Pro” appears click “Upgrade”



S) The window “Installing VMware Workstation Pro” showing the installation process is initiated, the green bar indicates the process status. Please wait this can take time.

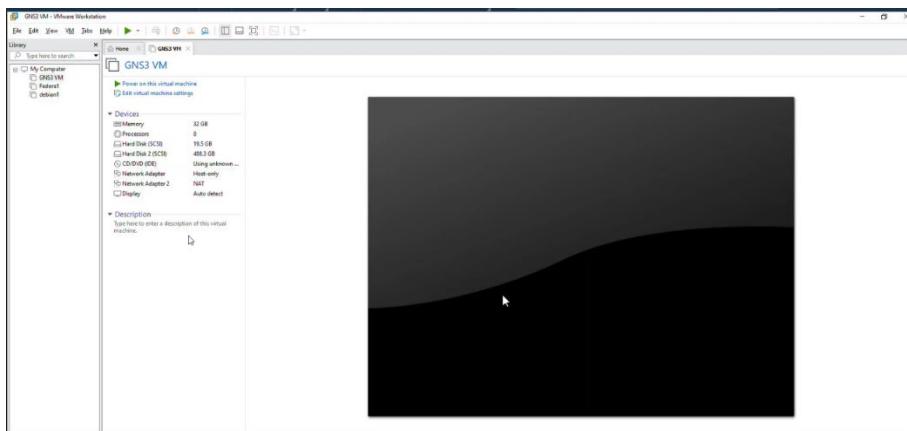


- T) When the “Completed the VMware Workstation Pro Setup Wizard” window pops up, click “Finish”.

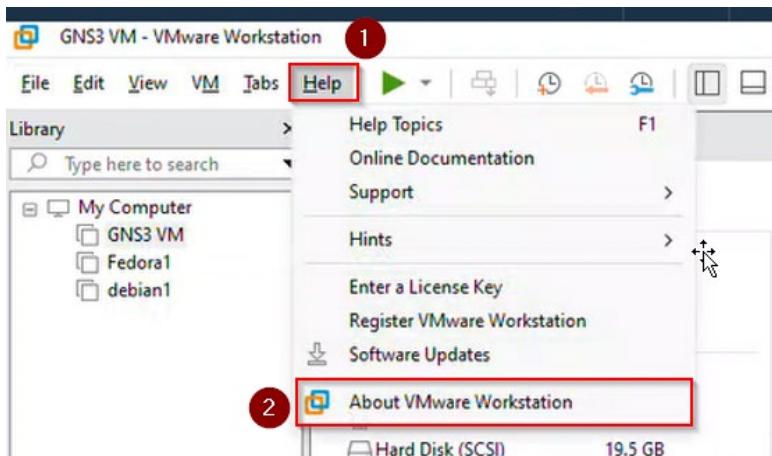


### 2.3.1 Post VMware Workstation Pro upgrade activities

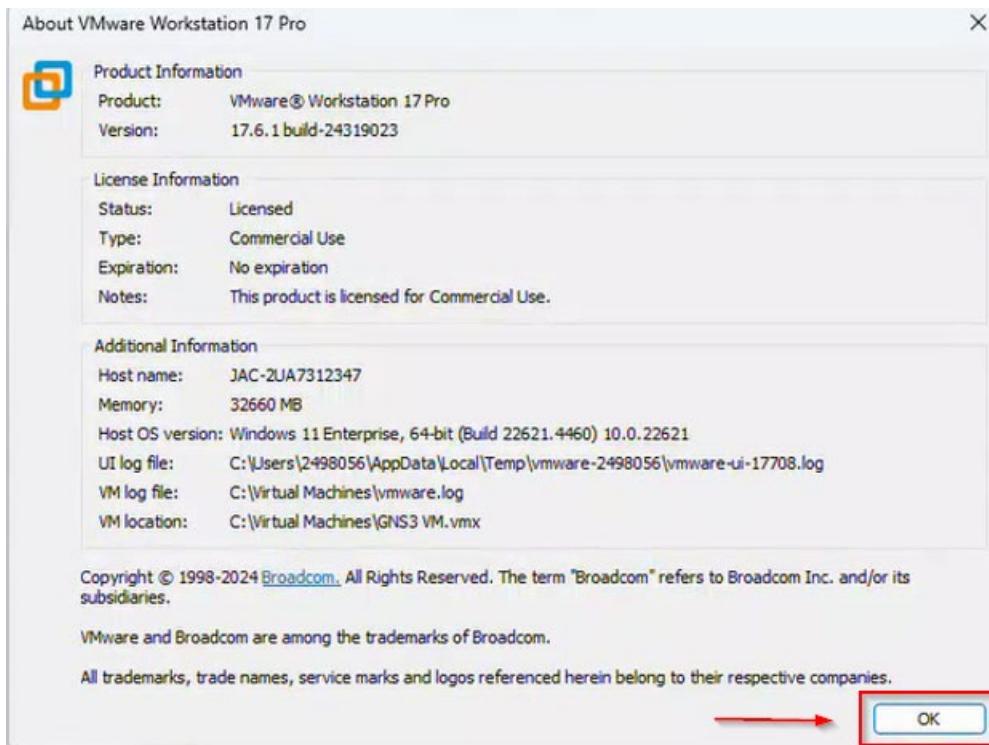
- A) When prompted “You must restart your system for the configuration changes made to VMware Workstation to take effect. Click “Yes” for restart or “No” if you plan to manually restart later.
- B) The virtual machines appear on the screen; virtual machines are not running.



- C) Verify the version of the VMWare workstation Select “Help” from the menu. A submenu will appear, select “About VMware Workstation.”



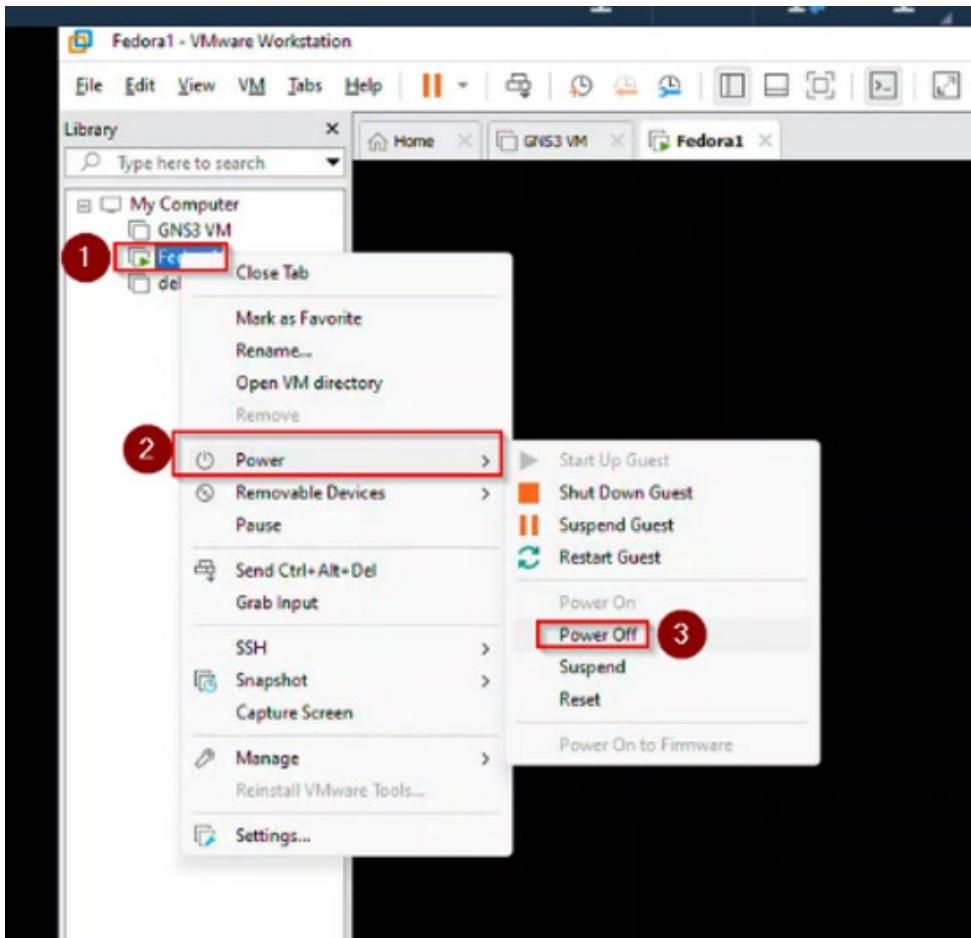
- D) The information about the installed software will pop up. Verify the latest version is installed. Click OK and you are ready to start the VMWare Workstation Pro.



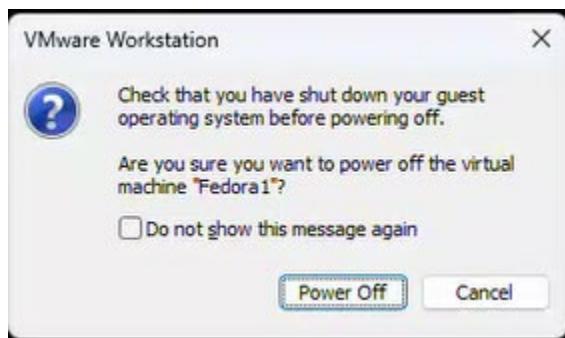
## 2.4 Delete VM

A) Power off virtual machine if needed.

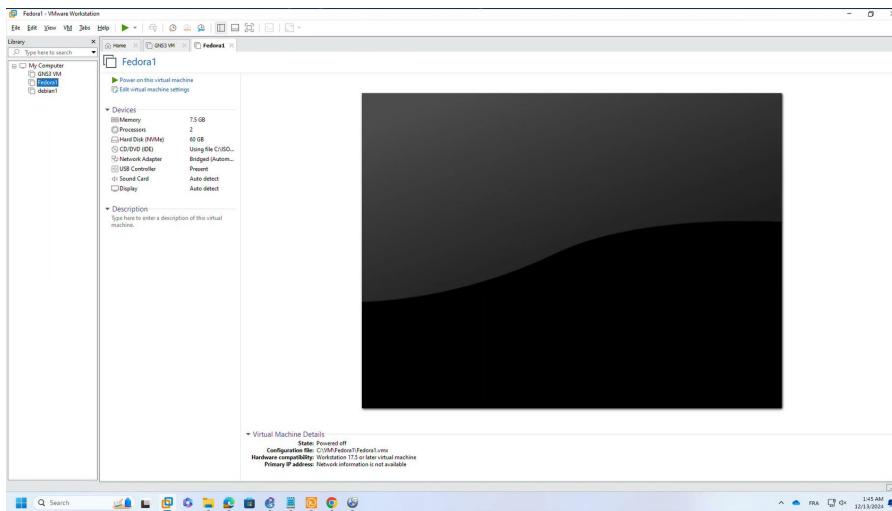
1. Select virtual machine to delete and right click to make submenu appear.
2. In the submenu select “Power>”
3. Submenu will appear select if machine is running “Power off”



4. A confirmation window will appear asking: Are you sure to want to power off the virtual machine <name>”? Press “Power off” to continue with the process.

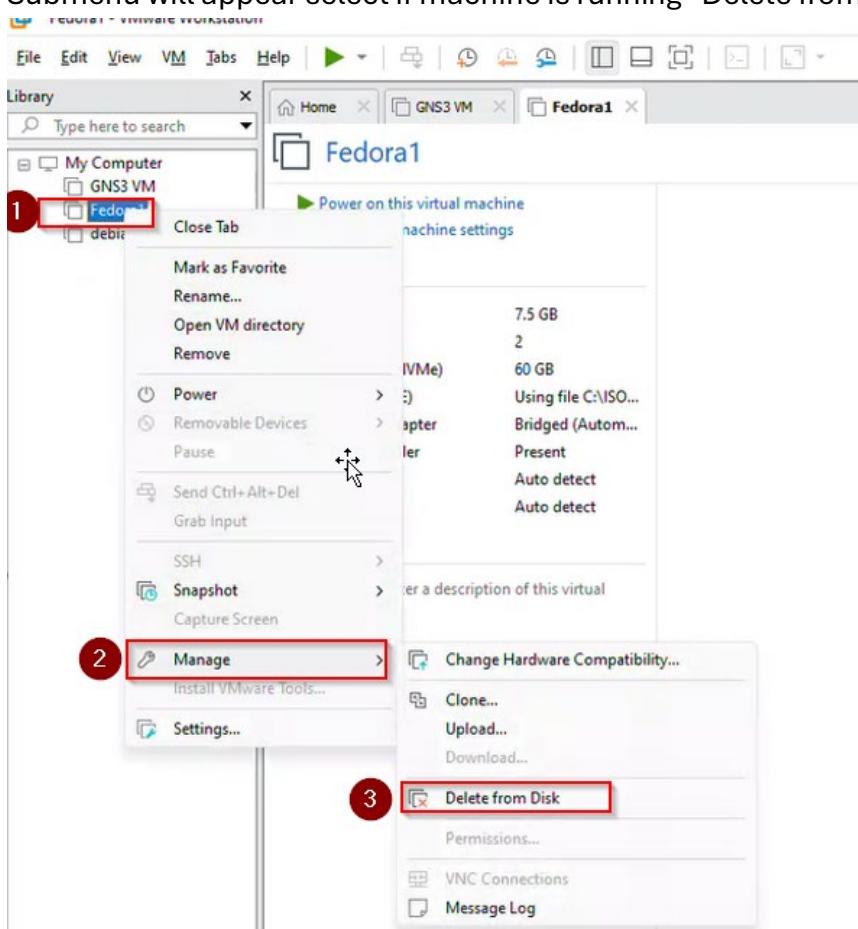


B) Verify virtual machine to be removed is turned off



C) Delete form disk

1. Select virtual machine to delete and right click to make submenu appear.
2. In the submenu select "Manage"
3. Submenu will appear select if machine is running "Delete from Disk"

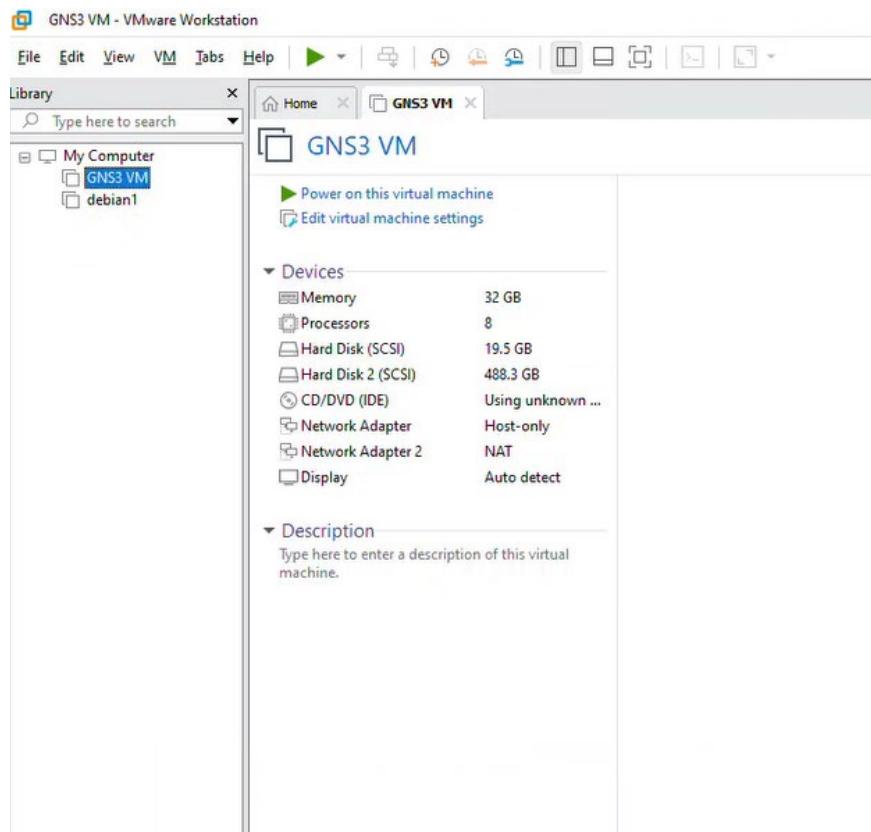


D) Confirm you want to delete VM Press “Yes”



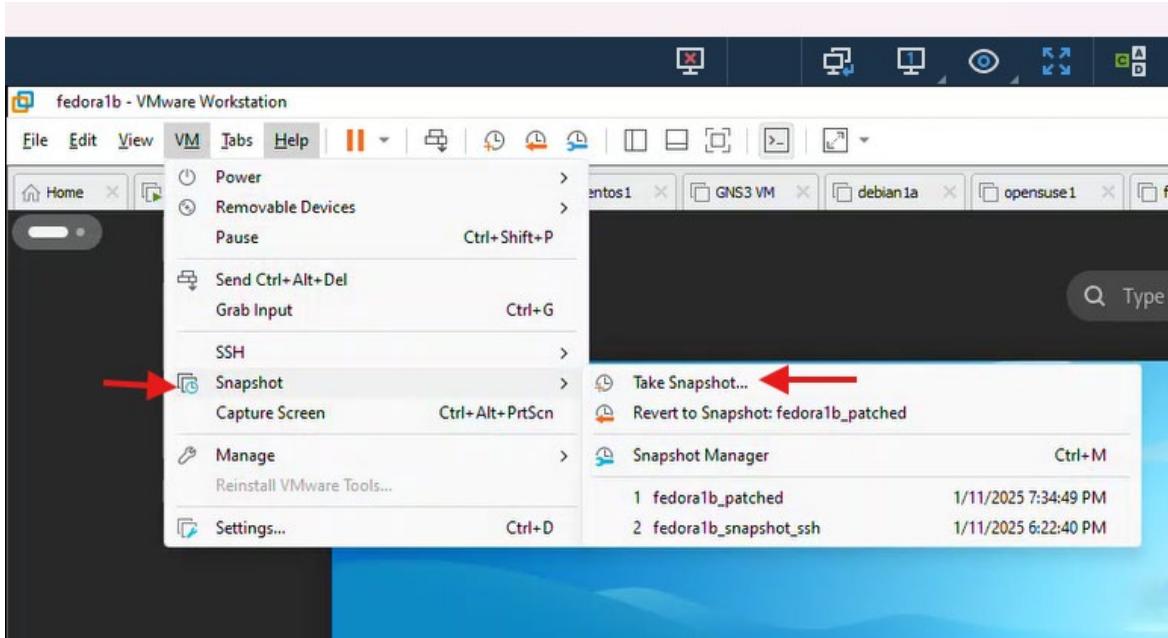
E) Immediately Deleted VM is removed from VMware Workstation Pro

Verify machine is removed from VMware Workstation Pro, VM does not appear on VMware Workstation Pro window.



## 2.5 Create a snapshot for VM

- A) From the VM you want tot take a snapshot select from Main menu “Snapshot” From Submenu Select “Take Snapshot”.



A window opens , give a name and a description to the snapshot. Press “Take Snapshot”



The process will start , It can take some time. Wait until; the snapshot finished to use the VM

The process per centage is seen at the bottom left of the VM



### 3 Operating Systems I - Linux

#### 3.1 Linux distributions

The use of various distributions of Linux (also called distro) allows to become familiar with command sets and location of key files and software installation methods.

The following sections explain how to install different Linux distributions in a virtual machine. The Linux distributions described are:

- Fedora
- Debian
- Ubuntu
- CentOS
- openSUSE

From the list above, we can classify Linux distributions based on their lineage, package management system, and general philosophy as

Debian-like:

- Debian
- Ubuntu

Red Hat-like:

- Fedora
- CentOS

SUSE-like:

openSUSE

Besides the different menus used at installation we can for example quickly identify the differences for upgrade commands used on each distro.

Distro family	Distribution	Find Updates Command	Apply Updates Command
Debian-like	Debian, Ubuntu	apt-get update	apt-get upgrade
RedHat-like	Fedora	dnf update	dnf upgrade
RedHat-like	CentOS	yum update or dnf update	yum upgrade or dnf upgrade
SUSE-like	openSUSE	zypper refresh	zypper update

### 3.1.1 Fedora

Fedora is an open-source operating system developed by the Fedora Project, sponsored by Red Hat.

#### CHECKPOINT

**CONTINUE** to next section if the following three conditions are met:

- Splashtop Business is ok, and
- Computer in John Abbott Computer Lab is accessible up and running and
- VMWare Workstation Pro is installed preferably with latest upgrades

For more information how to check the three previous conditions refer to [General activities](#) section “Splashtop and Computer” and section “Verify VMware Workstation Pro is installed”

If all three conditions are not met, the update can not be done procedure **STOPS** here.

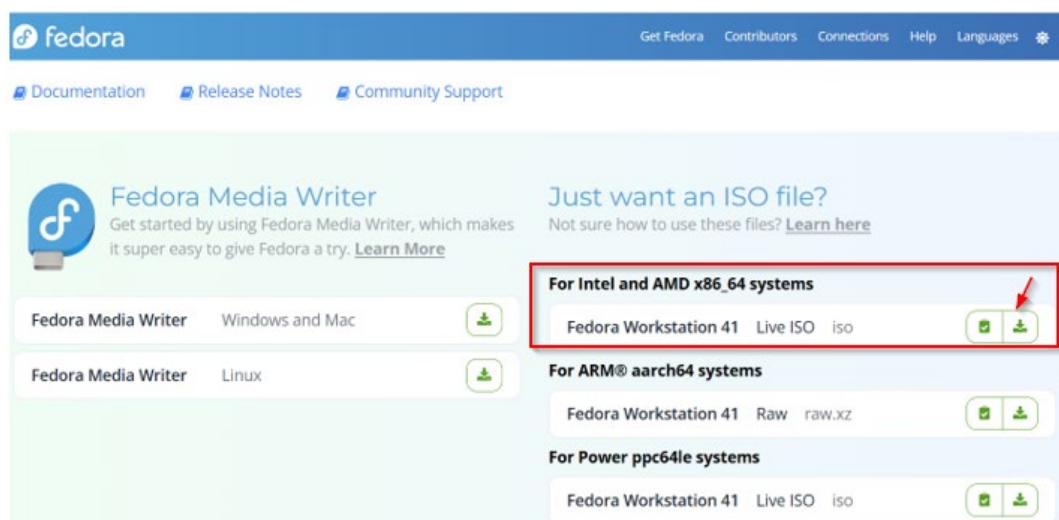
#### 3.1.1.1 Fedora download

- A) Go to Fedora page and download the latest Fedora version. For this document we will be using the following URL:

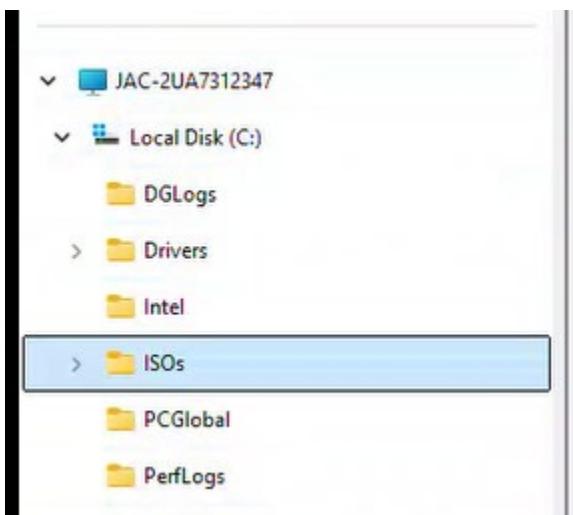
[Fedora Workstation | The Fedora Project](#)

- B) The version to use is seen in red square below

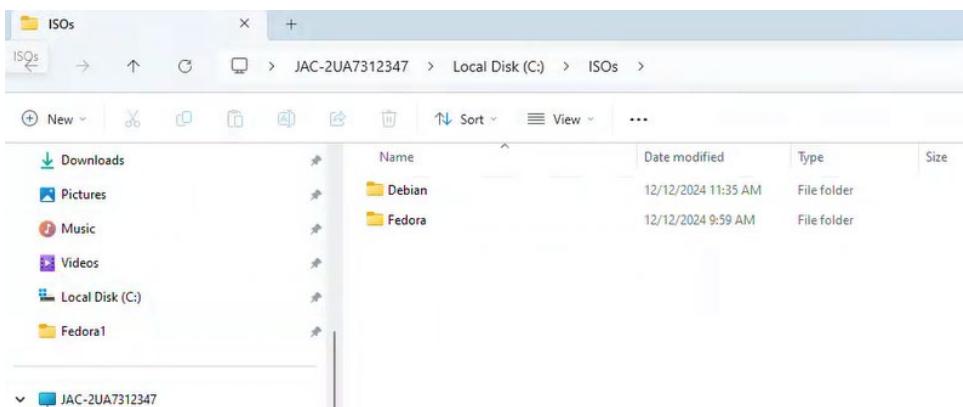
Select “For Intel and AMD x86\_64 systems / Fedora Workstation 41”. Click on download icon ↗



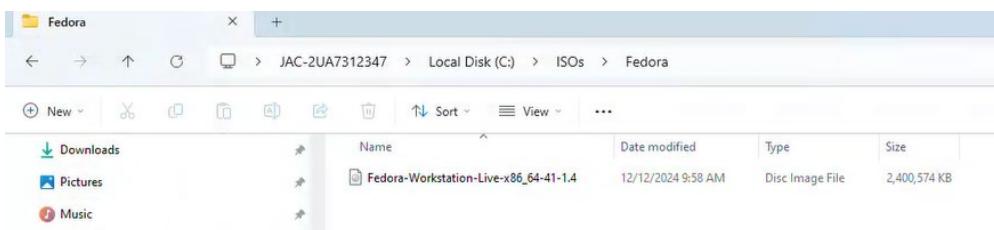
C) Once download is finished, store the downloaded image file in the ISOs directory:



D) Create a subdirectory named “Fedora”

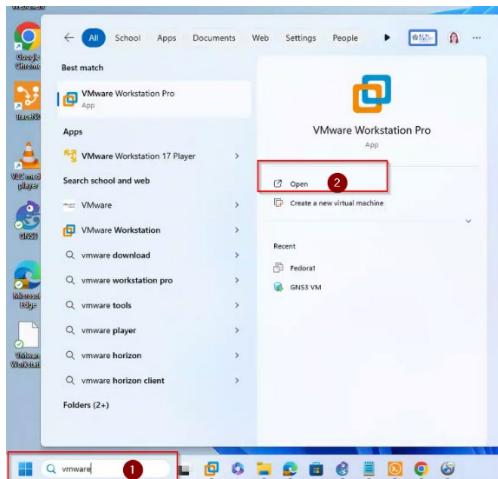


E) Copy the Image file into the recently created subdirectory

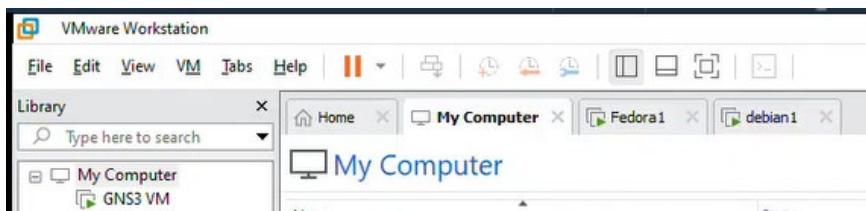


### 3.1.1.2 Create VM for Fedora

- A) Open the VMware Workstation App
  1. Look for application in windows search
  2. Once VMware Workstation Pro appears, open application

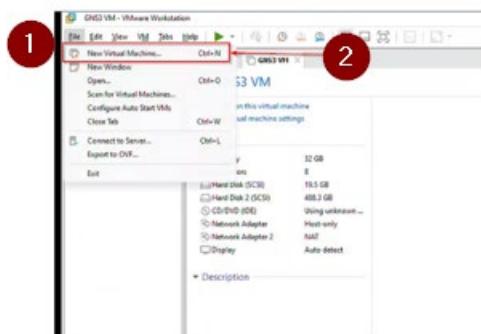


- B) VMware workstation opens:



- C) Select from top menu and submenu

1. File
2. New Virtual Machine...

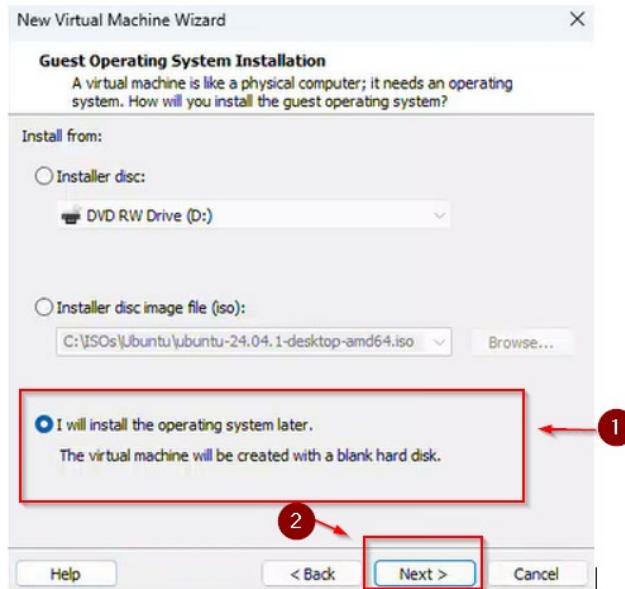


- D) When the “Welcome to the New Virtual Machine Wizard” window pops up, select “Typical (recommended)”, then click “Next >”



E) “Guest Operating System Installation” window pops up, please:

1. Select “I will install the operating system later. The virtual machine will be created with a blank hard disk.”.
2. Click “Next”

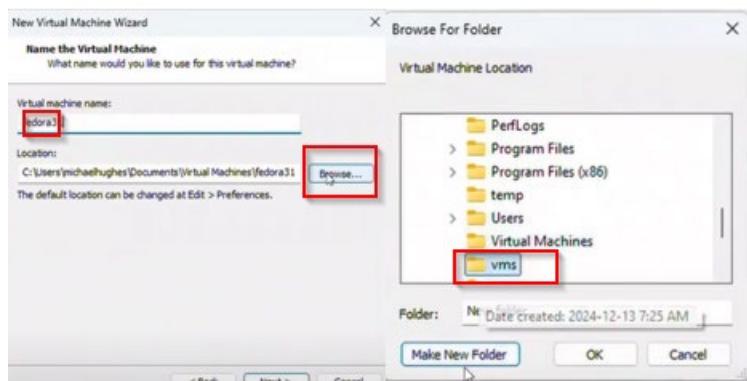
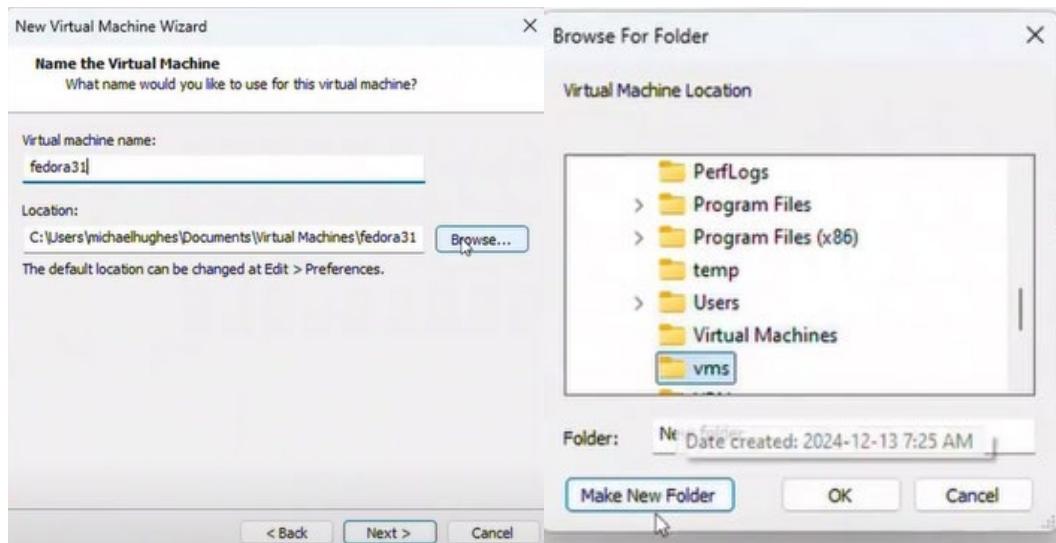


F) The window “Select a Guest Operating System Which operating system will be installed on this virtual machine?” Select Linux. Linux Fedora 64 bits (select they are in alphabetical order). Click on Next

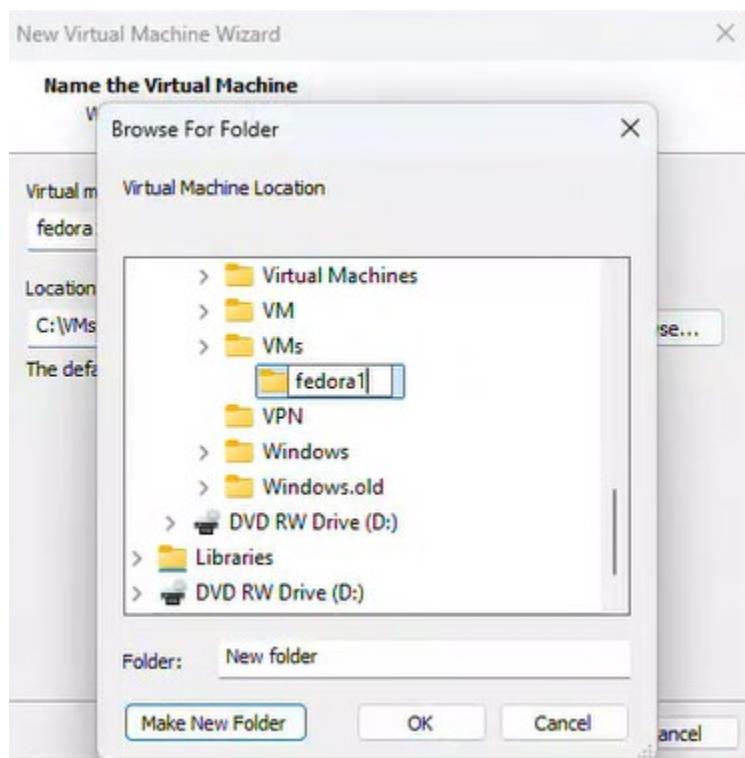
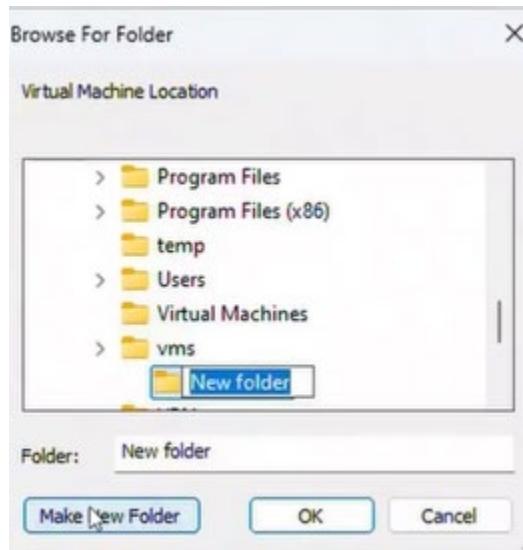


G) In the window “Name the Virtual Machine”

1. Set name Virtual machine name: “fedora1”
2. For the location Browse to change directory
3. Select VMs directory



H) Create a new folder named “fedora1”

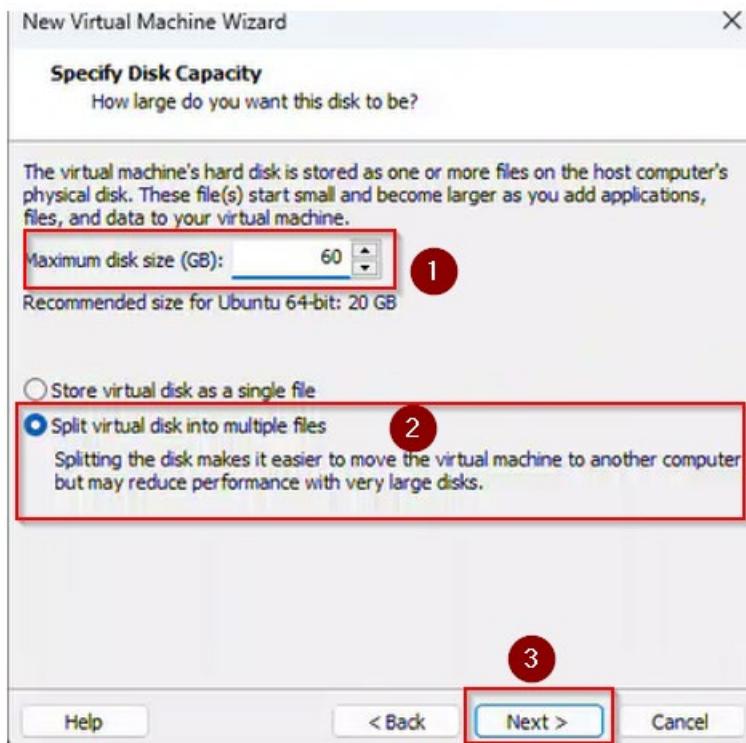


I) Click “Next” after Virtual machine name and location was set.



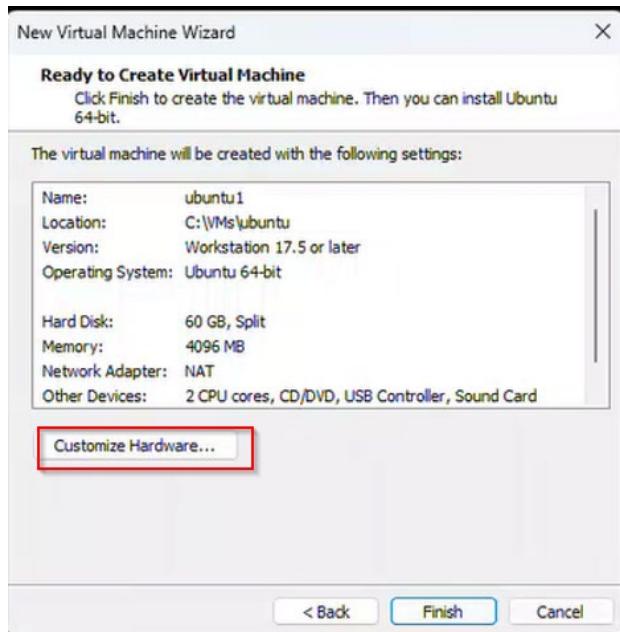
J) In the window Specify Disk Capacity, set:

1. Set the Maximum disk size (GB) to 60
2. Keep the default set to “Split virtual disk into multiple files”
3. Click Next >



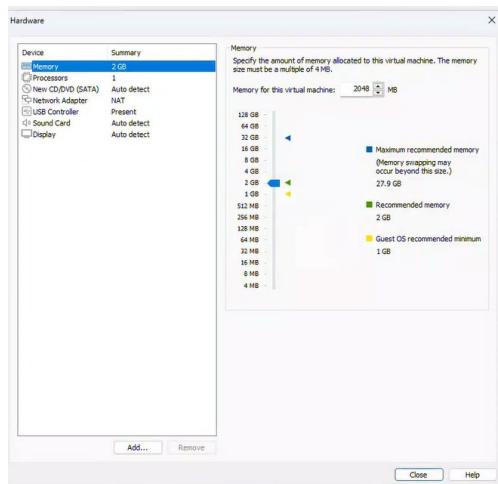


K) In the window “Ready to create Virtual Machine” select Customize hardware

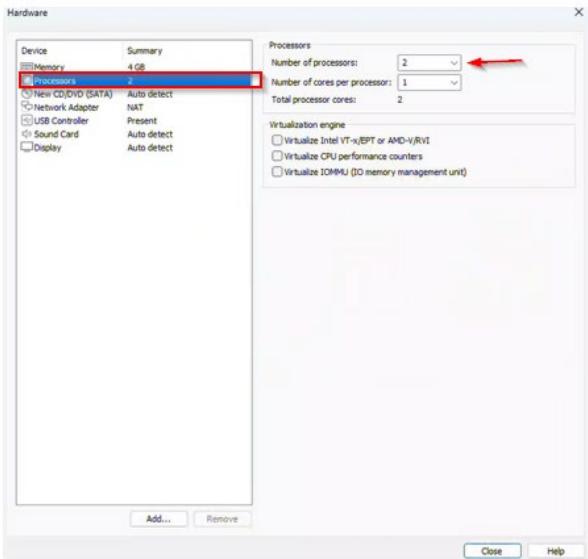


L) For Hardware settings:

1. Set Memory to 8GB

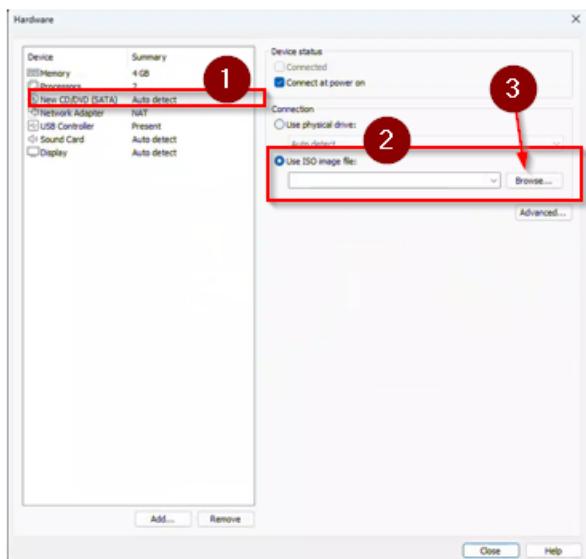


2. Set Processors to 2

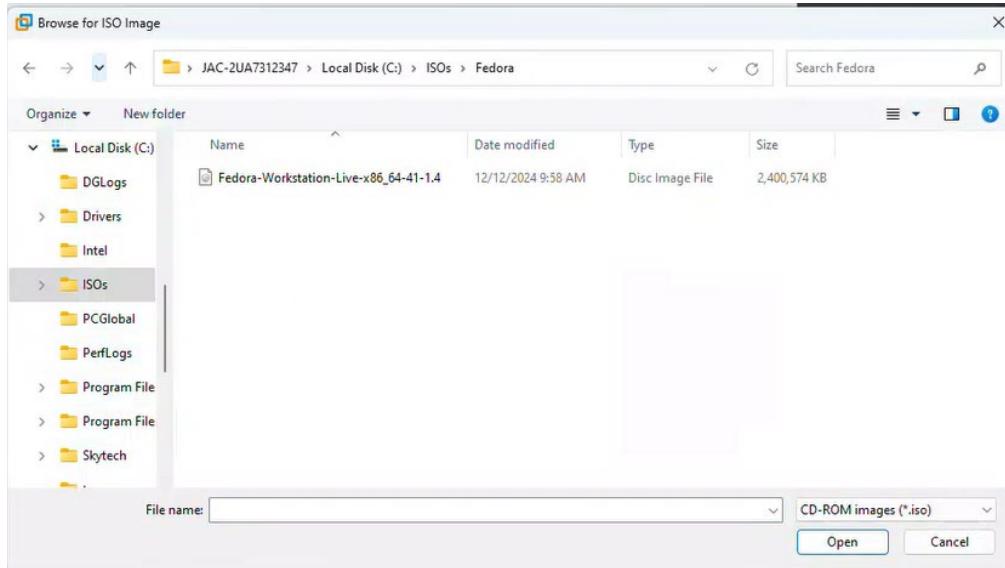


#### M) New CD/DVD (SATA)

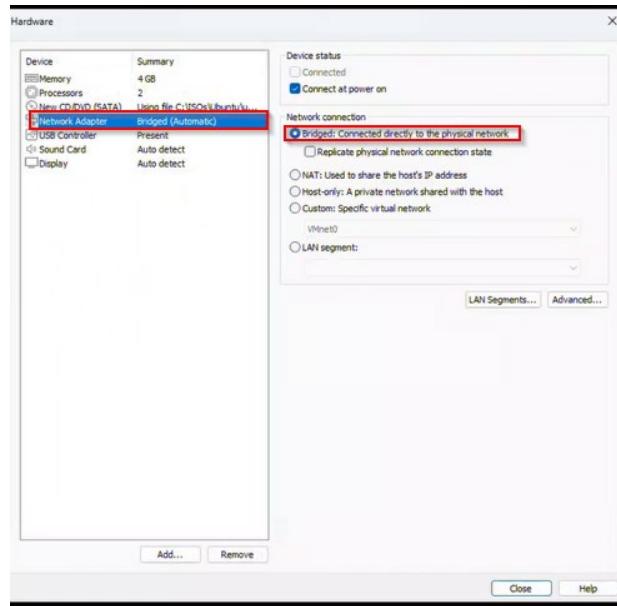
1. Select New CD/DVD (SATA)
2. Highlight Use ISO image file
3. select Browse.



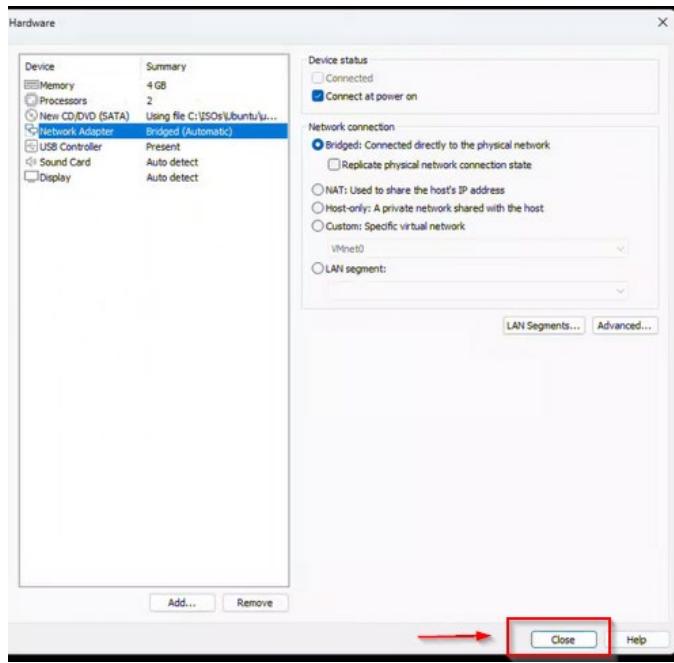
4. Once you select “Use ISO image file:”, browse for the Fedora iso file



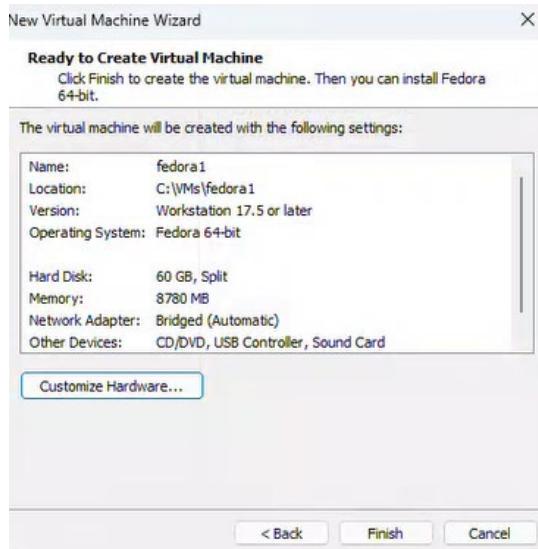
N) Set Network Adapter to bridged



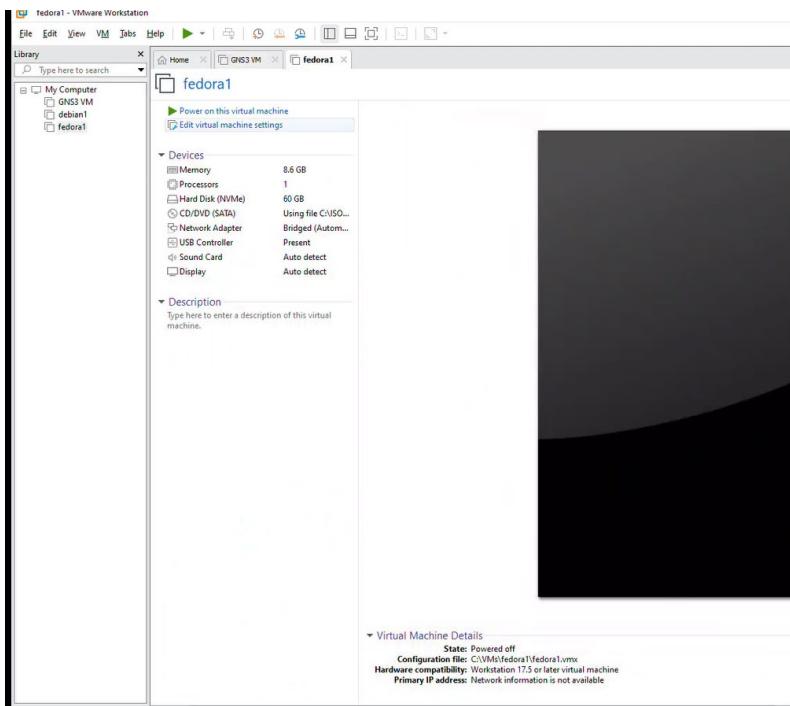
O) Click Close.



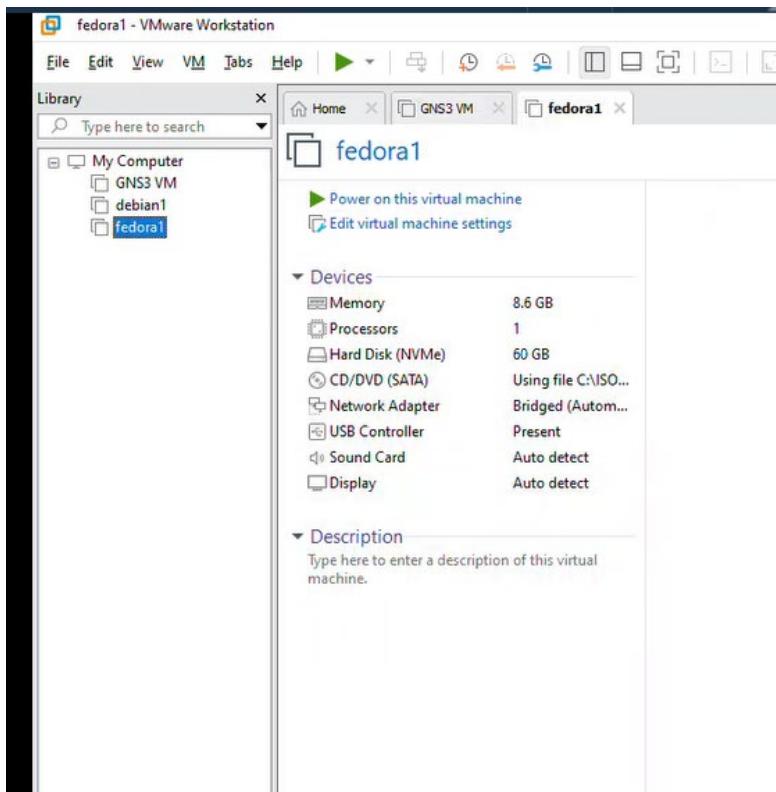
P) Review and press Finish



Q) VM opens



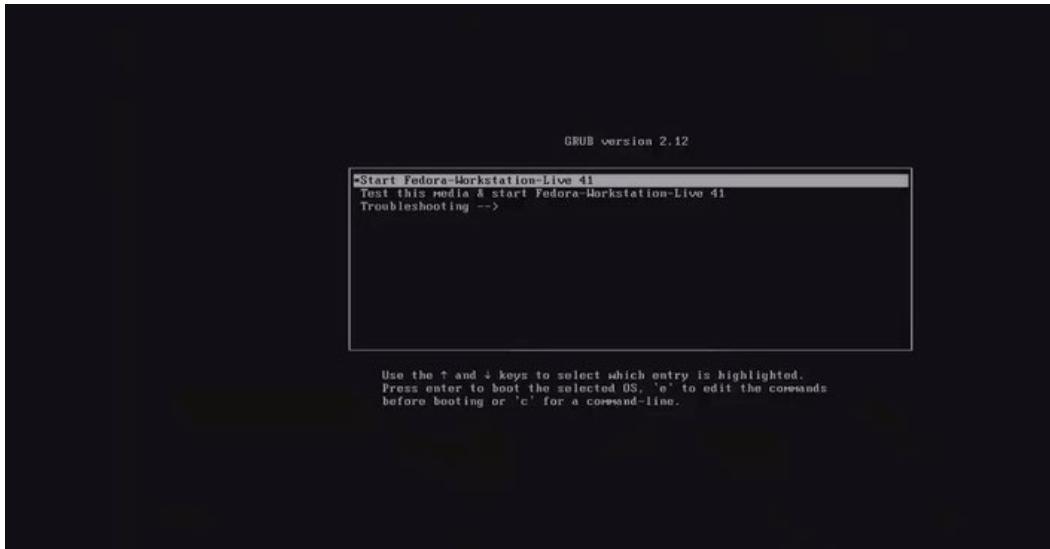
## R) Power on virtual machine



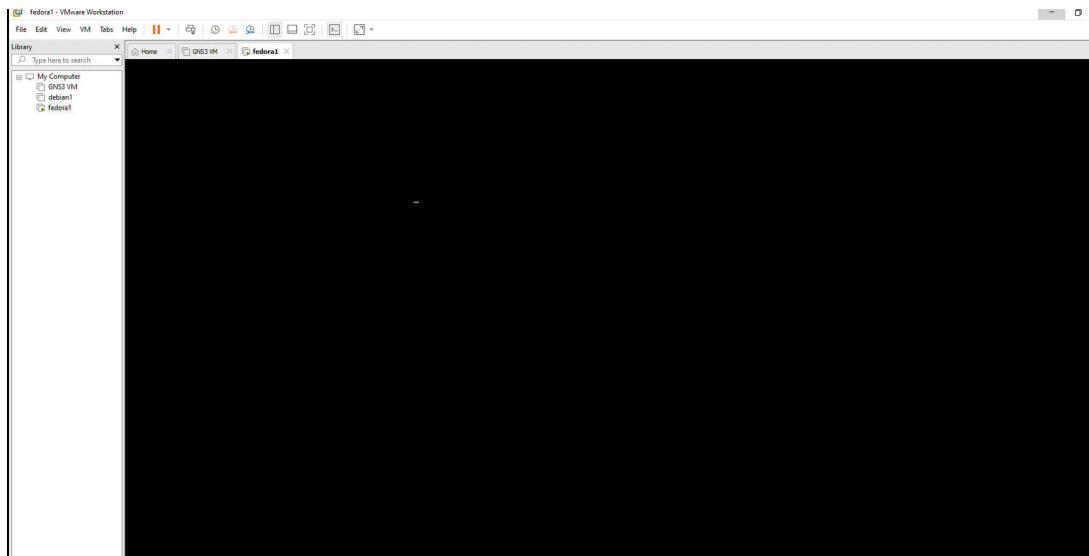
### 3.1.1.3 Install Fedora on recently created virtual machine

A) After restart, the machine a Menu appears on the screen

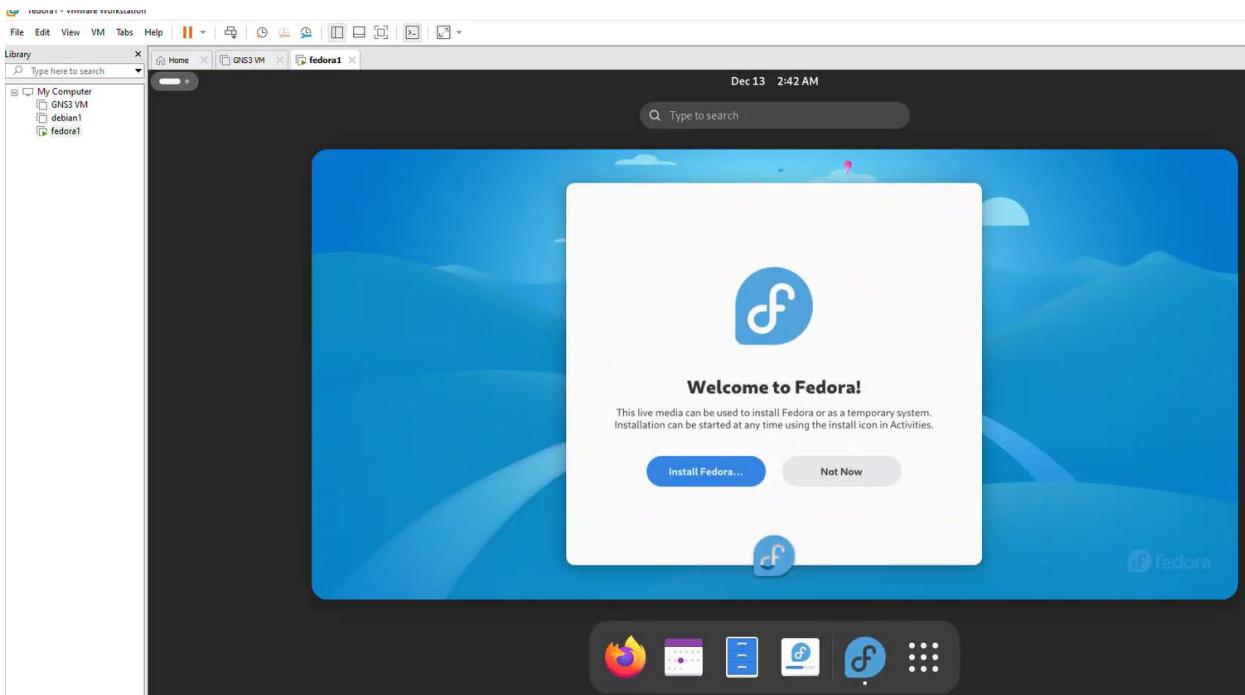
## Select Fedora-Workstation-Live 41



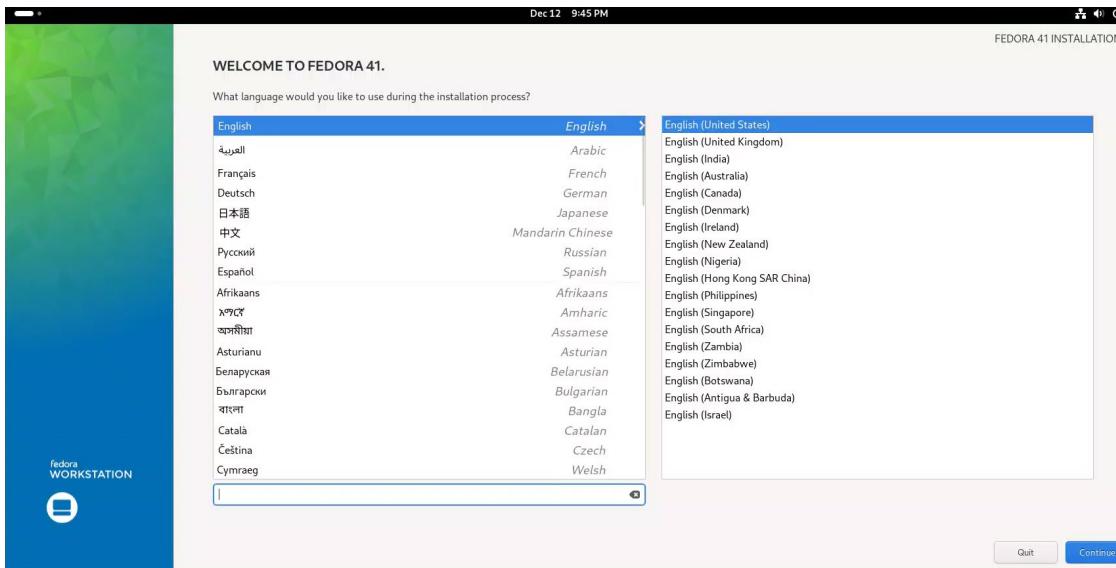
## B) Get black screen, wait for installation



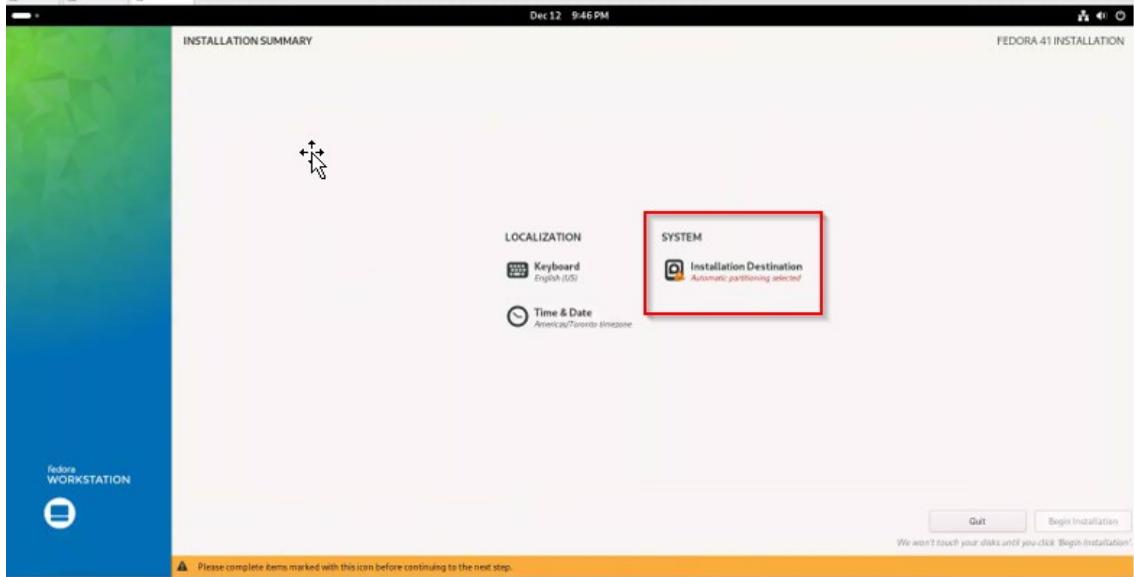
## C) In the screen click on “install Fedora”



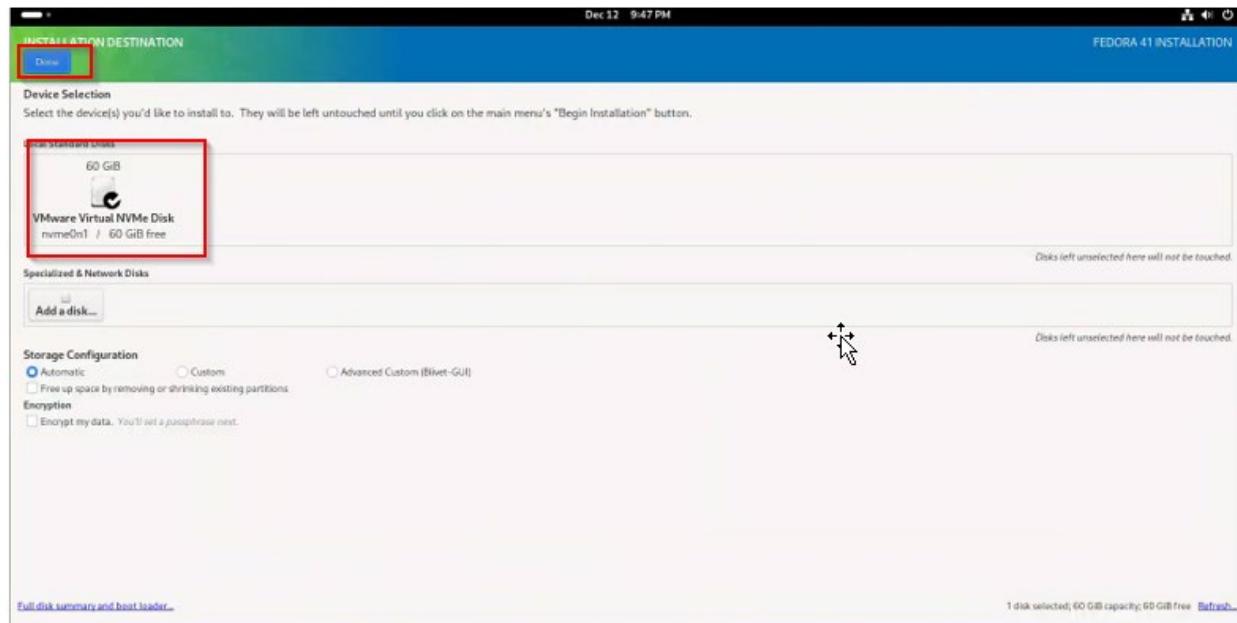
D) Wait and the next screen appears, we are going to chose English



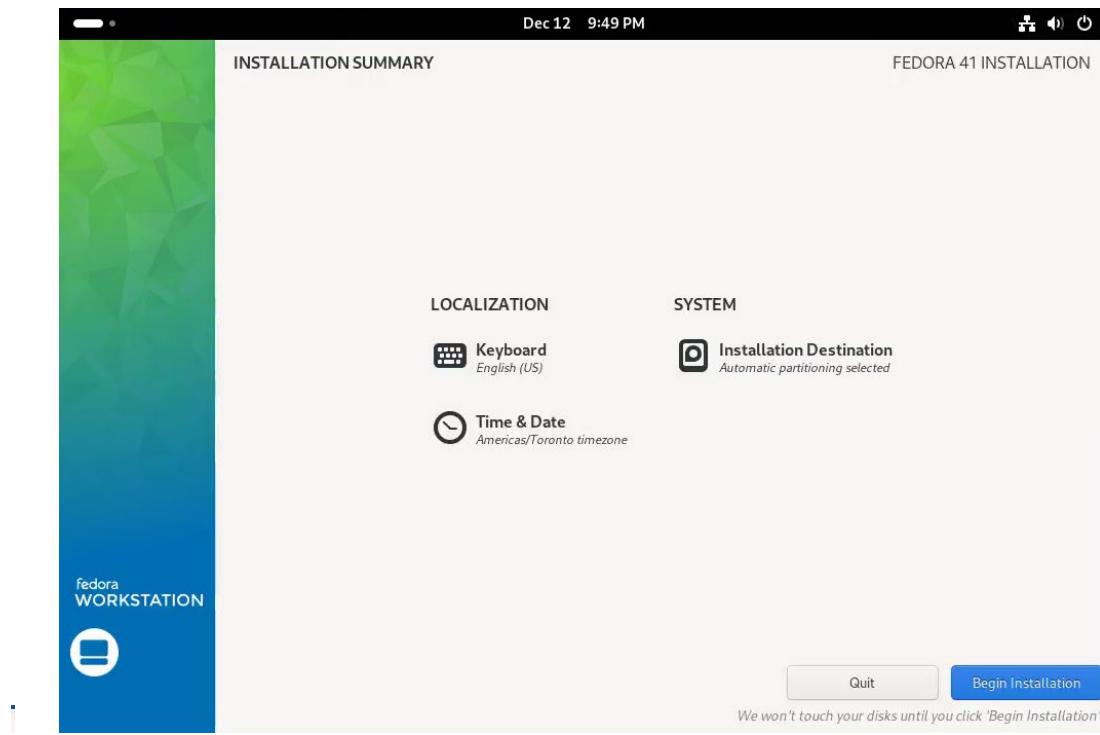
- E) Next screen appears, select SYSTEM “Installation Destination”



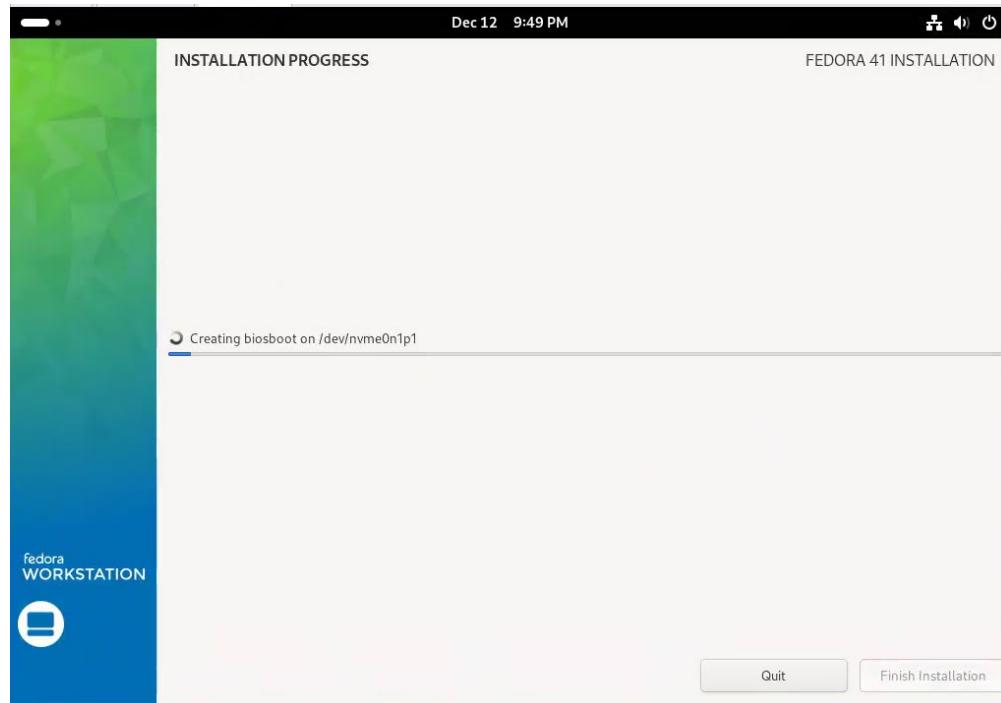
- F) Confirm the hard disk has been selected, and click done at the top left



- G) Click on Begin installation on screen INSTALLATION SUMMARY



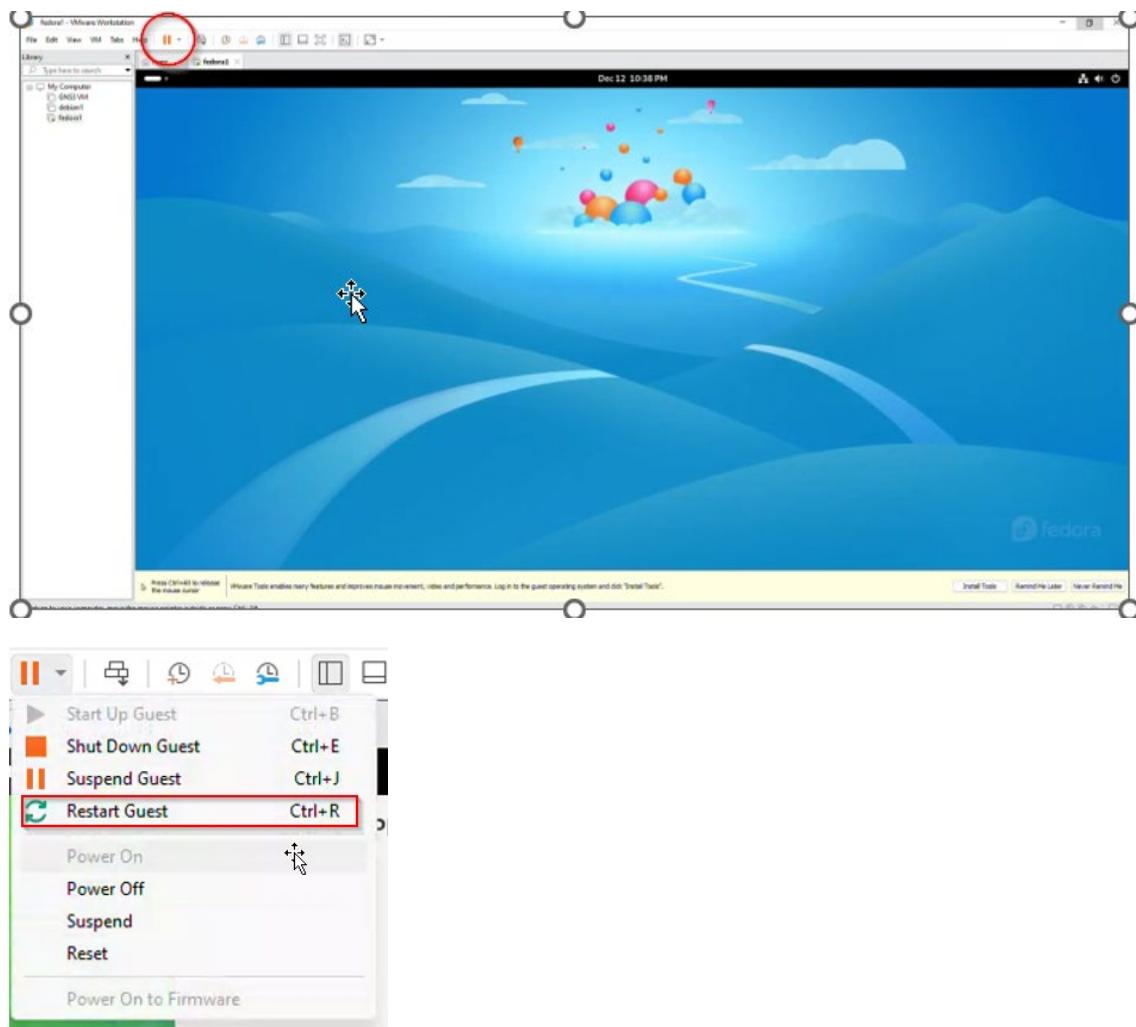
H) New screen INSTALLATION PROGRESS will appear.



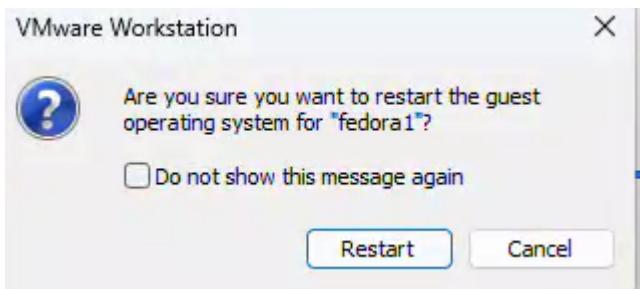
I) Wait (it can take time) and verify the blue installing software showing the percentage of advancement on the process. When finish, screen will show "Complete" click on "Finish installation"



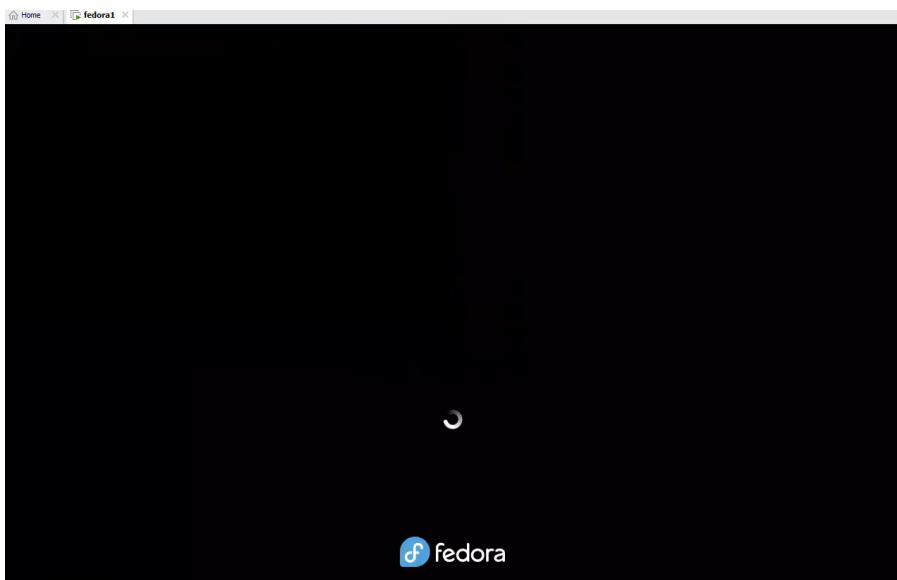
#### J) Now we restart the virtual machine with Restart Guest



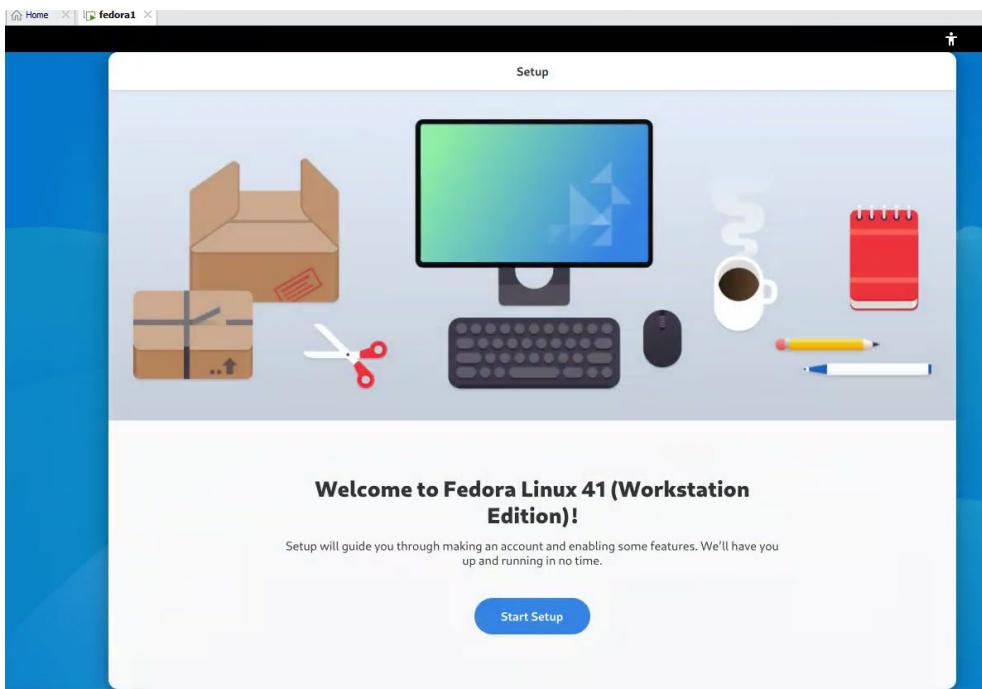
K) When restart Guest is selected a confirmation window appears, select “Restart”



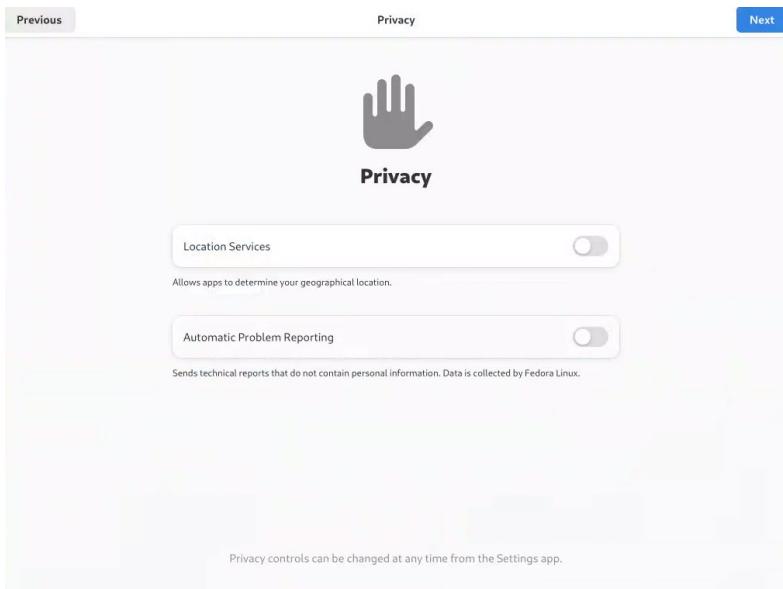
L) Machine will now restart (expect black screen)



M) Once restarted, the following screen will appear, click on Start Setup



- N) Unselect the choices “Location Services” and “Automatic Problem Reporting” and click on “Next” on the right top corner.



- O) Select Enable third party repositories once confirmed enabled, click on “Next” on the right top corner.

[Previous](#)

## Third-Party Repositories

[Next](#)**Third-Party Repositories**

Third-party repositories provide access to additional software from selected [external sources](#), including popular apps and drivers that are important for some devices. Some proprietary software is included.

[Enable Third-Party Repositories](#)[Previous](#)

## Third-Party Repositories

[Next](#)**Third-Party Repositories**

Third-party repositories provide access to additional software from selected [external sources](#), including popular apps and drivers that are important for some devices. Some proprietary software is included.

[Disable Third-Party Repositories](#)

- P) Use “student” for Full name and Username and click on “Next” on the right top corner.

[Previous](#)

About You

[Next](#)

## About You

We need a few details to complete setup.

Full Name  ✓

Username  ✓ ▾

This will be used to name your home folder and can't be changed.

[Enterprise Login](#)

Q) Set password to “Amf123456”

[Previous](#)

Password

[Next](#)

## Set a Password for student

Be careful not to lose your password.

Password  
Amf123456

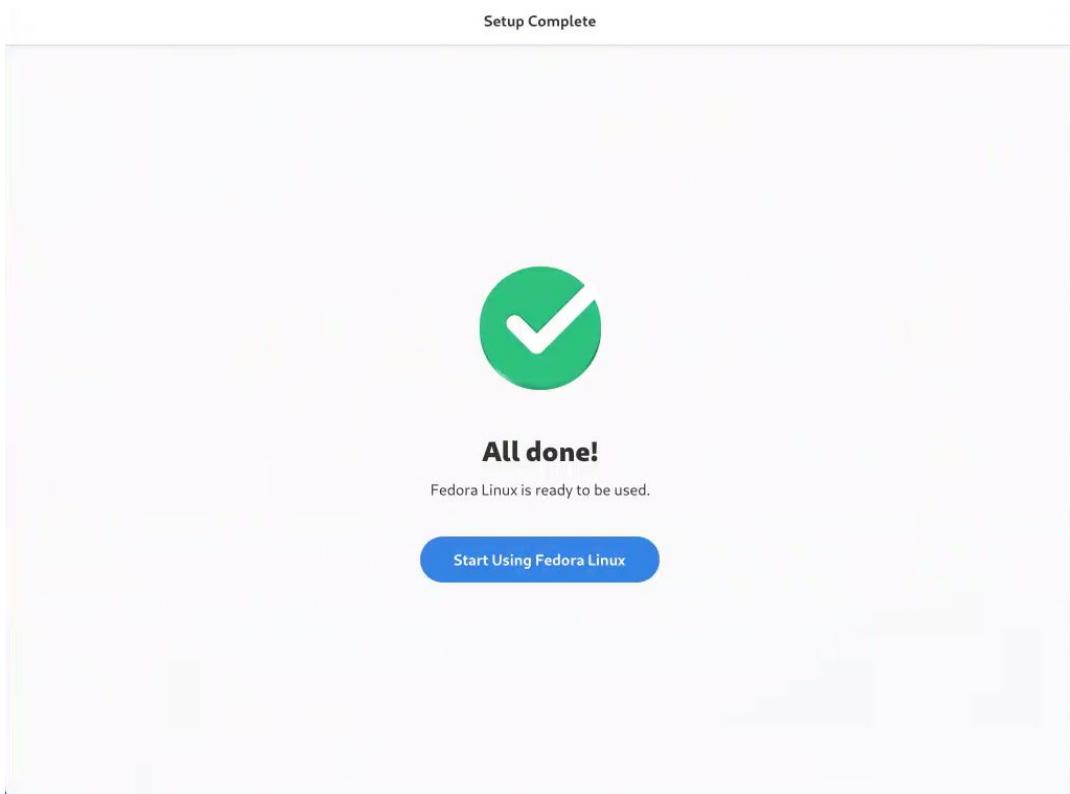


This is a weak password. Try to avoid common words.

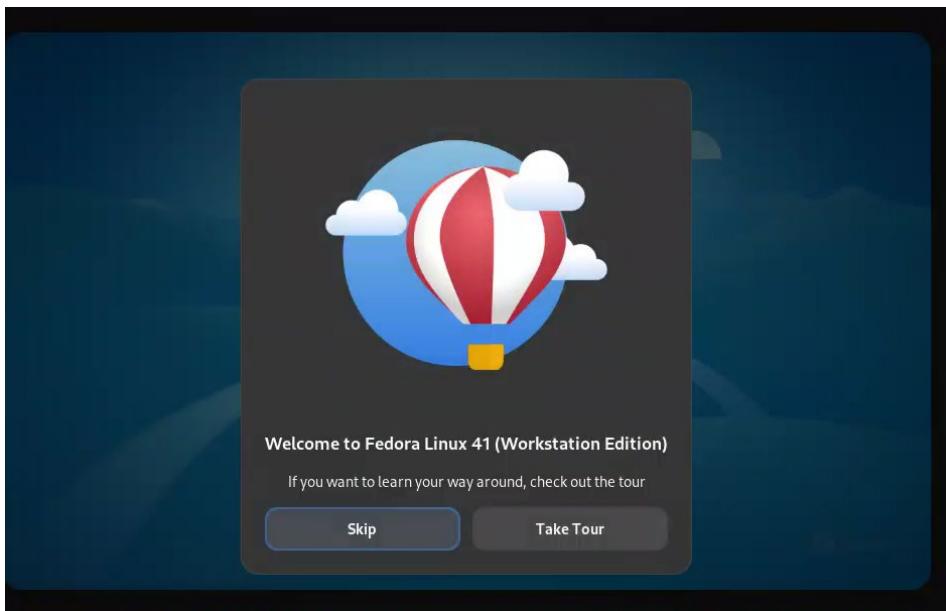
Confirm Password  
Amf123456



R) Now we have Fedora Linux installed, click “Start using Fedora Linux”

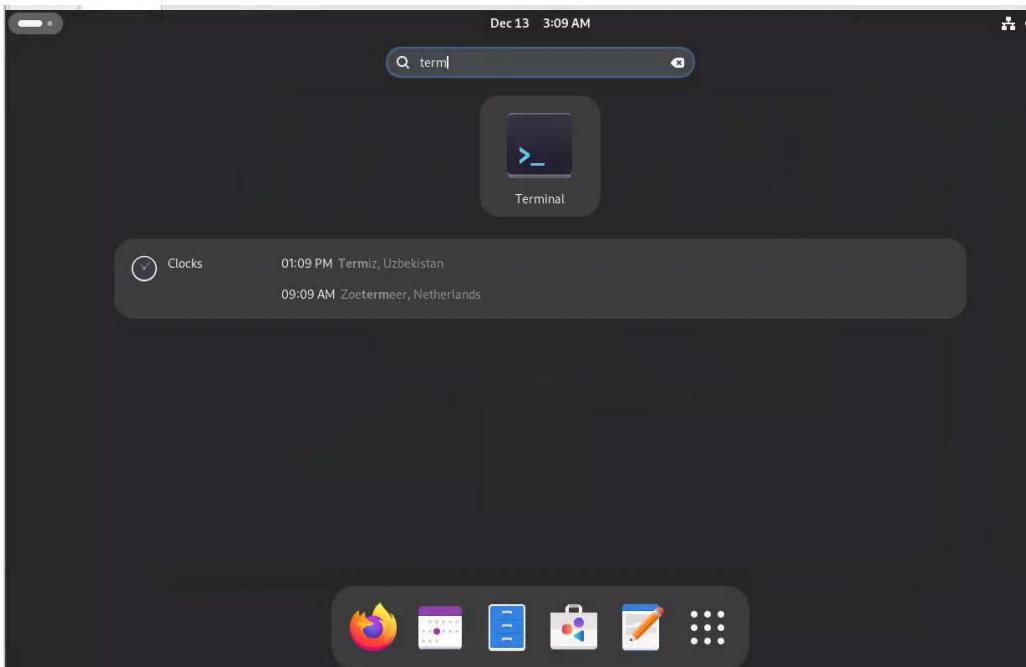


S) A new screen will appear. Select Skip

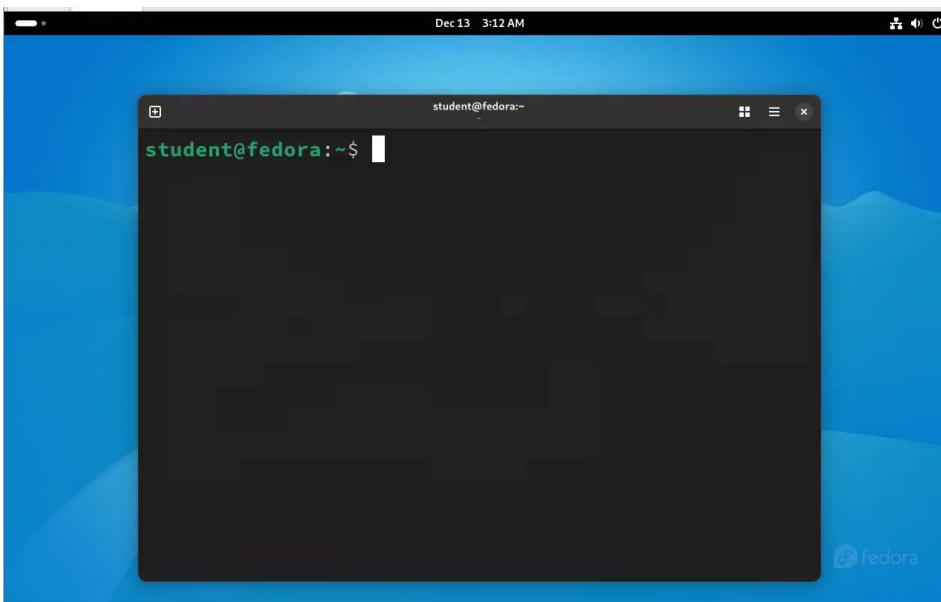


### 3.1.1.4 Fedora post-installation activities

- A) Click on search bar “term”, Select Terminal



- B) Open terminal



- C) Setup password for root user

sudo passwd

```
student@fedora:~$ sudo passwd  
We trust you have received the usual lecture from the local System Administrator. It usually boils down to these three things:  
#1) Respect the privacy of others.  
#2) Think before you type.  
#3) With great power comes great responsibility.  
For security reasons, the password you type will not be visible.  
[sudo] password for student:  
New password:  
BAD PASSWORD: The password fails the dictionary check - it is too simplistic/systematic  
Retype new password:  
passwd: password updated successfully  
student@fedora:~$
```

D) Type **su**

**SU -**

```
student@fedora:~$ su  
Password:  
root@fedora:/home/student#
```

Observe the prompt change to a **#** sign

E) Install all the updates provided by Fedora with command

**dnf update -y**

```
root@fedora:/home/student# dnf update  
Updating and loading repositories:  
Fedora 41 - x86_64 - Updates  
google-chrome  
Copr repo for PyCharm owned by phracek  
Fedora 41 openh264 (From Cisco) - x86_64  
RPM Fusion for Fedora 41 - Nonfree - NVIDIA Driver  
Fedora 41 - x86_64  
RPM Fusion for Fedora 41 - Nonfree - Steam  
100% | 2.8 MiB/s | 6.3 MiB | 00m02s  
100% | 7.4 KiB/s | 3.3 KiB | 00m00s  
100% | 11.7 KiB/s | 6.0 KiB | 00m01s  
100% | 5.8 KiB/s | 6.0 KiB | 00m01s  
100% | 33.9 KiB/s | 15.6 KiB | 00m00s  
100% | 10.0 MiB/s | 35.4 MiB | 00m04s  
100% | 39.7 KiB/s | 11.5 KiB | 00m00s
```

F) Let the process continue, Type y when prompted

```
Upgrading:      566 packages
Replacing:      568 package

Total size of inbound packages is 1 GiB. Need to download 1 GiB.
After this operation, 161 MiB extra will be used (install 4 GiB, remove 4 GiB).
Is this ok [y/N]: █
```

G) Wait until the process finishes, it can take a couple of minutes to complete, when it finishes “Complete” will appear on the screen. Type `dnf update` again to make sure no more updates are needed

```
student@fedora:/home/student
execute() instead
warning: posix.wait(): .fork(), .exec(), .wait() and .redirect2null() are deprecated, use rpm
.spawn() or rpm.execute() instead
warning: posix.exec(): .fork(), .exec(), .wait() and .redirect2null() are deprecated, use rpm
[1144/1145] Erasing glibc-gconv-extra-0:2.40-3.fc41. 100% | 8.2 KiB/s | 624.0 B | 00m00s
[1145/1145] Erasing glibc-common-0:2.40-3.fc41.x86_6 100% | 0.0 B/s | 52.0 B | 02m38s
Complete!
root@fedora:/home/student#
root@fedora:/home/student#
root@fedora:/home/student#
root@fedora:/home/student#
root@fedora:/home/student#
root@fedora:/home/student# dnf update
Updating and loading repositories:
Repositories loaded.
Nothing to do.
root@fedora:/home/student# █
```

H) Reboot after `dnf update`

```
reboot
```

### 3.1.2 Debian

#### CHECKPOINT

**CONTINUE** to next section if the following three conditions are met:

- Splashtop Business is ok, and
- Computer in John Abbott Computer Lab is accessible up and running and
- VMWare Workstation Pro is installed preferably with latest upgrades

For more information how to check the three previous conditions refer to [General activities](#) section “Splashtop and Computer” and section “Verify VMware Workstation Pro is installed”

If all three conditions are not met, the update can not be done procedure **STOPS** here.

### 3.1.2.1 Debian download

- A) Go to Debian page and download the latest version. For this document we will be using the following URL:

[www.debian.org](http://www.debian.org)

1. Select Other downloads below the Debian logo

The screenshot shows two main sections of the Debian website. On the left, under 'THE COMMUNITY', there is a large photo of a group of people at a conference, with a caption 'Debian is a Community of People!'. Below the photo are three items: 'People' (with a person icon), 'Our Philosophy' (with a heart icon), and 'Get Involved, Contribute' (with a person plus icon). On the right, under 'THE OPERATING SYSTEM', there is a large red Debian logo with a 'Download' button over it. Below the logo are four items: 'Why Debian' (with a trophy icon), 'User Support' (with a gear icon), and 'Security Updates' (with a shield icon). A red arrow points from the text 'Select Other downloads below the Debian logo' to the 'Other downloads' link under the 'Why Debian' item.

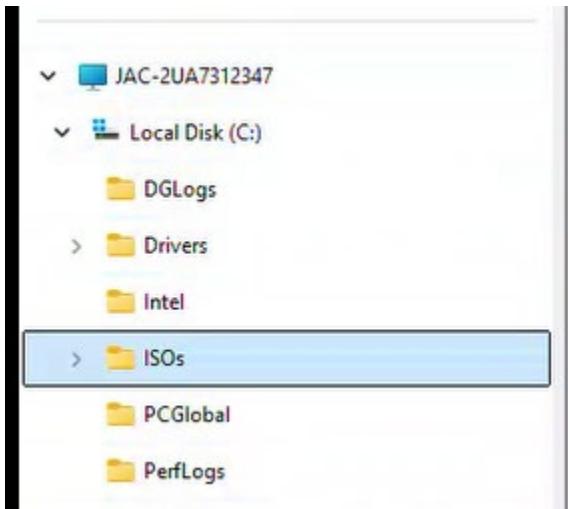
2. Another window will open. Select A small installation image

The screenshot shows the 'Download Debian' page. At the top, there is a navigation bar with links for 'Blog', 'Micronews', 'Planet', and a search bar. Below the navigation bar, the title 'Download Debian' is displayed. A sub-header states 'This page has options for downloading and installing Debian Stable.' followed by a bulleted list of links: 'Download mirrors', 'Installation Manual', 'Release notes', 'ISO images for Debian testing', and 'Verifying authenticity of Debian images'. A red arrow points to the first link, 'Download mirrors'. Below this, there is a section titled 'Download an installation image' with a sub-section titled 'A small installation image'. A red arrow points to this section. A note says: 'A small installation image can be downloaded quickly and should be recorded onto a removable disk. To use this, you will need a machine with an Internet connection.' Below this is a link to '64-bit PC netinst.iso, 32-bit PC netinst.iso, 64-bit PC netinst torrents, 32-bit PC netinst torrents'. Further down, another section titled 'A larger complete installation image' is shown with a note: 'A larger complete installation image contains more packages, making it easier to install machines without an Internet connection.' Below this is a link to '64-bit PC DVD-1.iso, 32-bit PC DVD-1.iso, 64-bit PC torrents (DVD), 32-bit PC torrents (DVD)'. At the bottom, there are links for 'Buy CDs, DVDs or USB sticks from a vendor of Debian installation media' and 'Use a Debian cloud image'. The 'Use a Debian cloud image' section includes a note: 'An official cloud image, built by the cloud team, can be used on: your OpenStack provider, in qcow2 or raw formats.' Below this is a link to '64-bit AMD/intel (qcow2, raw), 64-bit ARM (qcow2, raw), 64-bit Little Endian PowerPC (qcow2, raw)'.

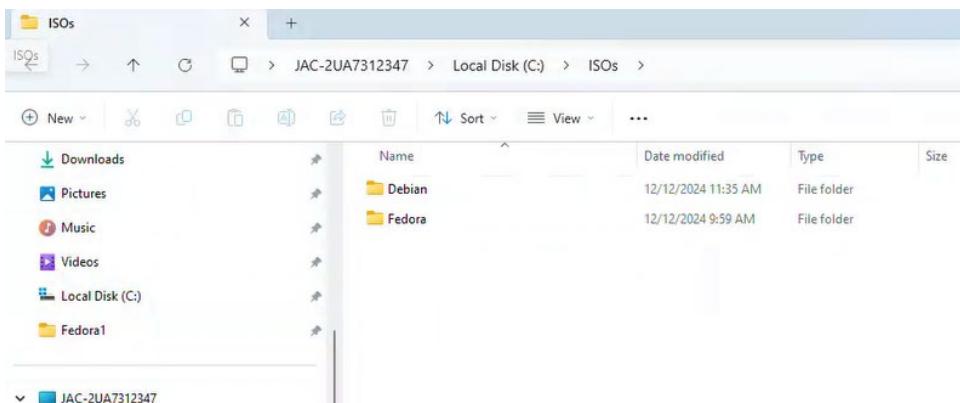
### 3. Select amd64

The screenshot shows the official Debian website at <https://www.debian.org/download/debian/installing>. The page title is "Installing Debian via the Internet". A red arrow points to the link "[Small CDs or USB sticks](#)". Below it, another red arrow points to the link "[Tiny CDs, flexible USB sticks, etc.](#)". Both links are under the heading "For advanced users: You can download a couple of image files of small size, suitable for USB Sticks and similar devices, write them to the media, and then start the installation by booting from that." The page also includes sections for "Network boot" and "amd64, arm64, armhf, i386, mips64el, mipsel, ppc64el, s390x" links.

B) Once download is finished, store the downloaded image file in the ISOs directory:



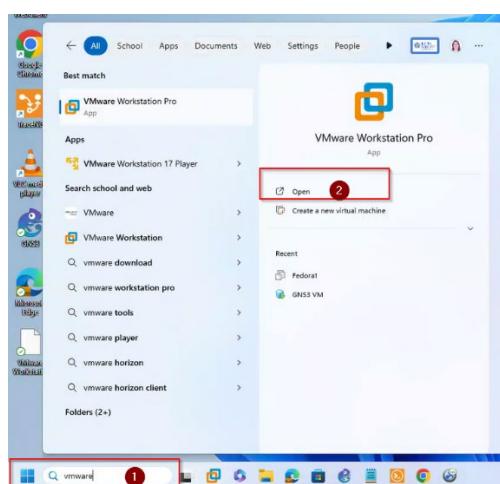
C) Create a subdirectory named “Debian”



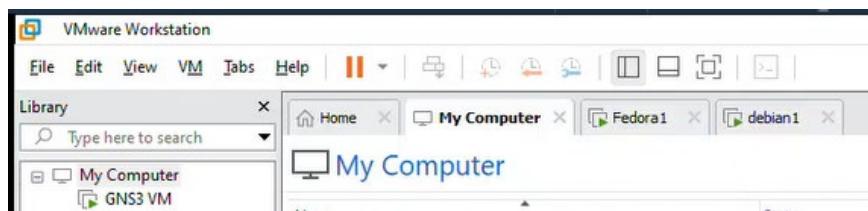
Name	Date modified	Type	Size
debian-12.8.0-amd64-netinst	2024-12-13 7:50 AM	Disc Image File	646,144 KB

### 3.1.2.2 Create VM for Debian

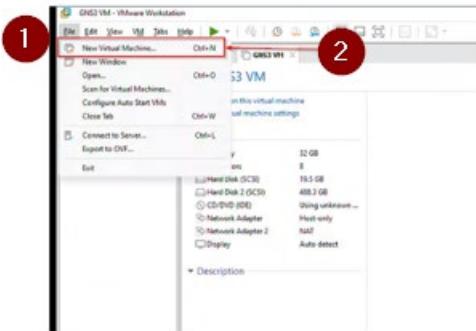
- A) Open the VMware Workstation App
1. Look for application in windows search
  2. Once VMware Workstation Pro appears, open application



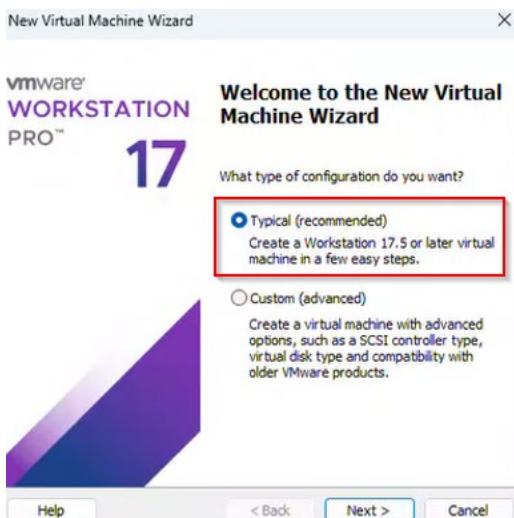
- B) VMware workstation opens:



- C) Select from top menu and submenu
1. File
  2. New Virtual Machine...

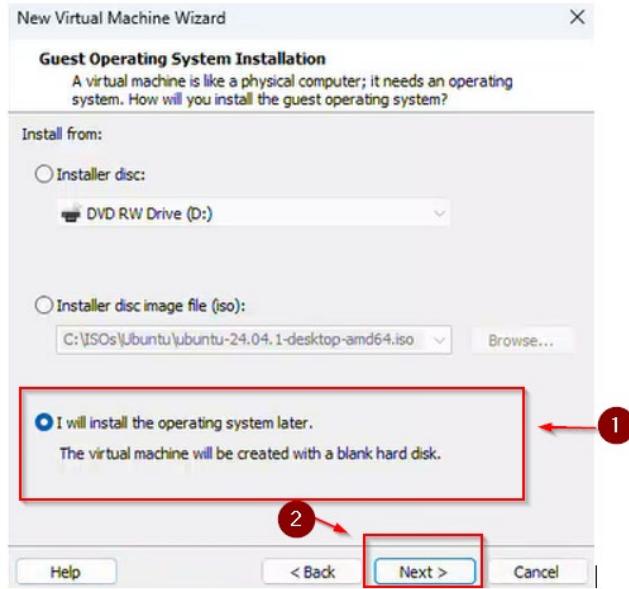


D) When the “Welcome to the New Virtual Machine Wizard” window pops up, select “Typical (recommended)”, then click “Next >”

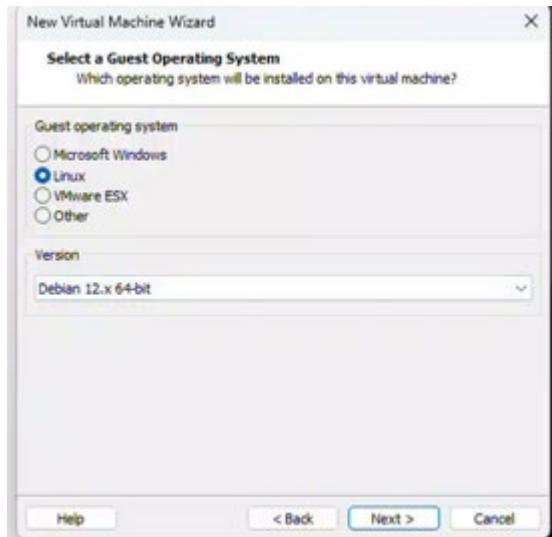


E) “Guest Operating System Installation” window pops up, please:

1. Select “I will install the operating system later. The virtual machine will be created with a blank hard disk.”.
2. Click “Next”

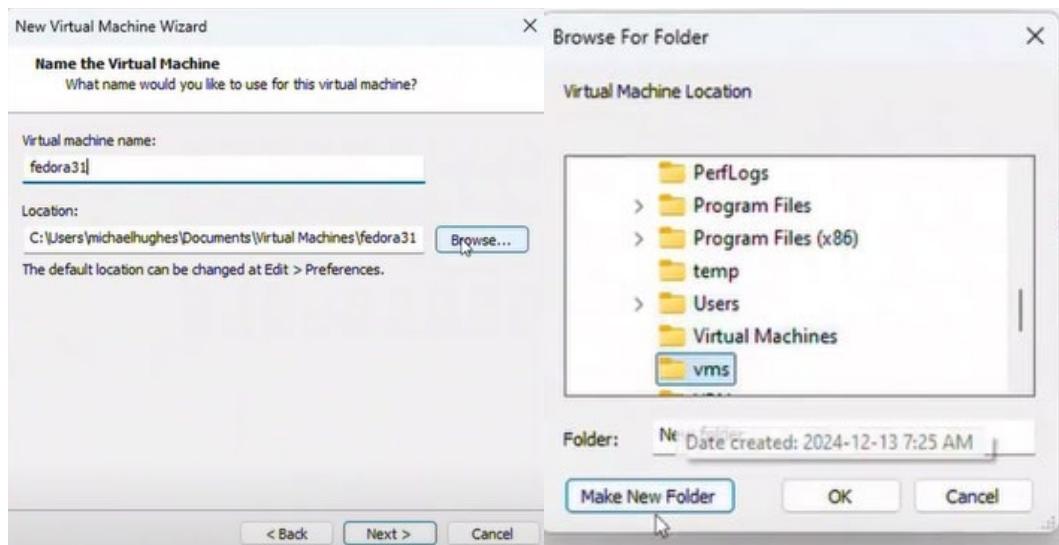


- F) The window “Select a Guest Operating System Which operating system will be installed on this virtual machine?” Select Linux. Debian 12.x 64-bits (select they are in alphabetical order). Click on Next

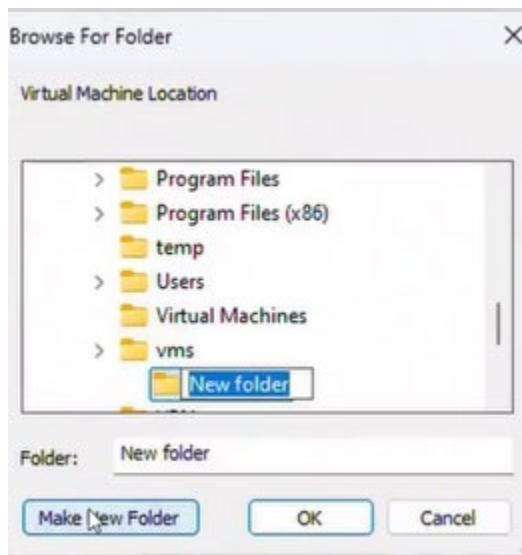


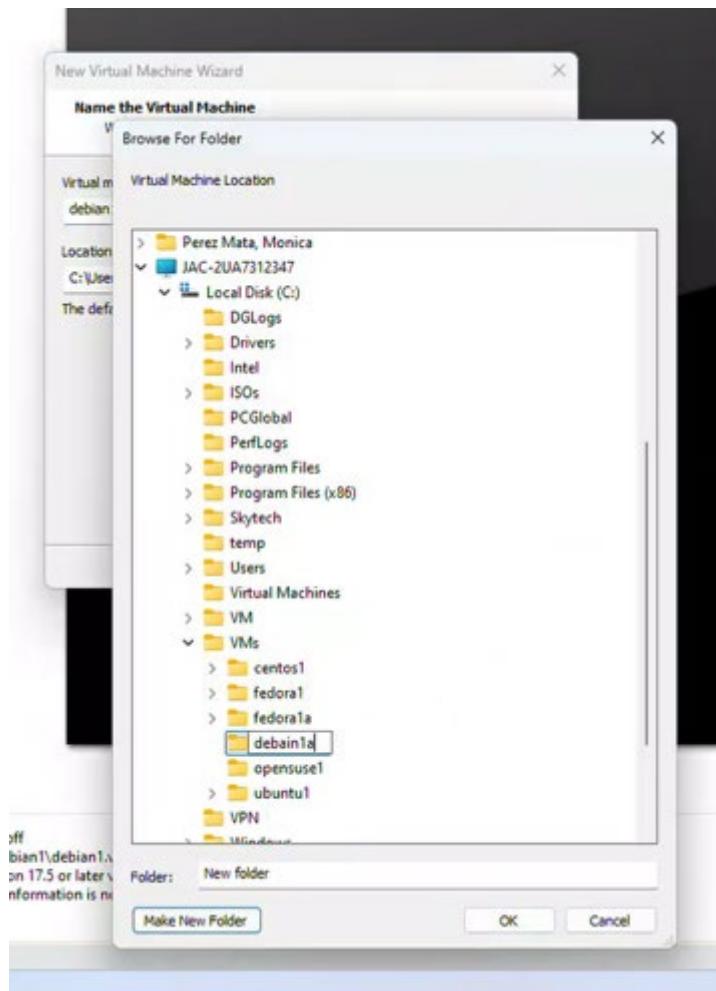
- G) In the window “Name the Virtual Machine”

1. Set name Virtual machine name: “debian1”
2. For the location Browse to change directory
3. Select VMs directory

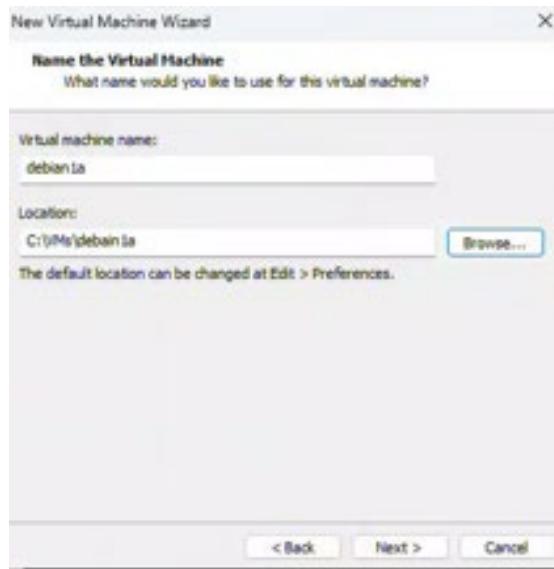


H) Create a new folder named “debian1”



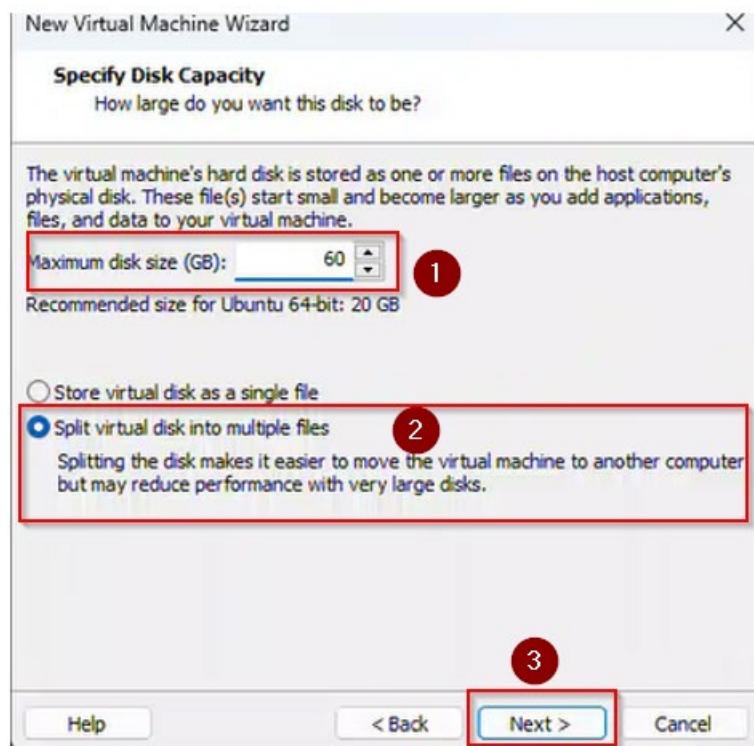


- I) Click "Next" after Virtual machine name and location was set.

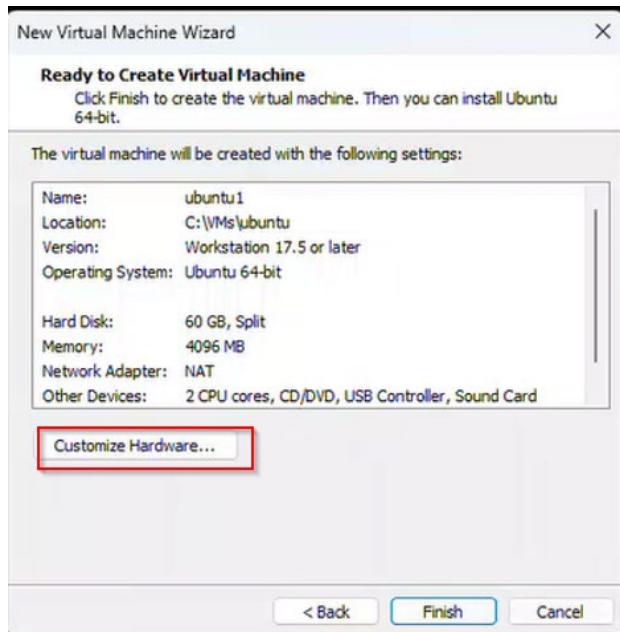


J) In the window Specify Disk Capacity, set:

1. Set the Maximum disk size (GB) to 60
2. Keep the default set to “Split virtual disk into multiple files”
3. Click Next >

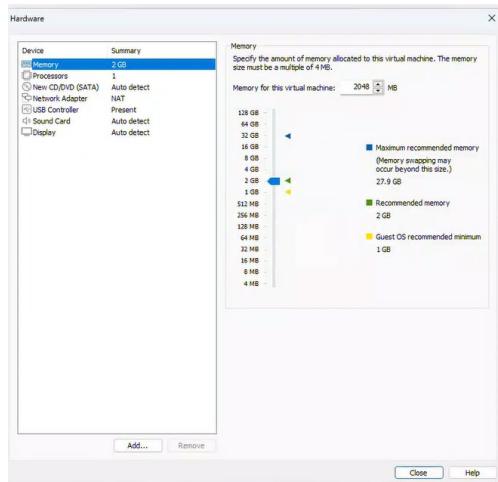


K) In the window “Ready to create Virtual Machine” select Customize hardware

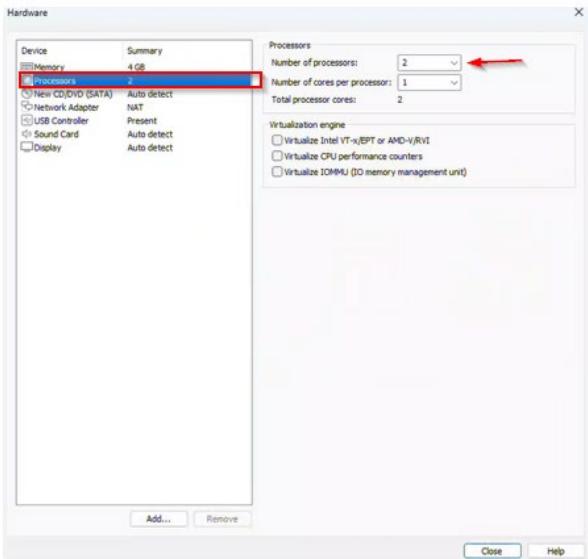


L) For Hardware settings:

1. Set Memory to 2GB

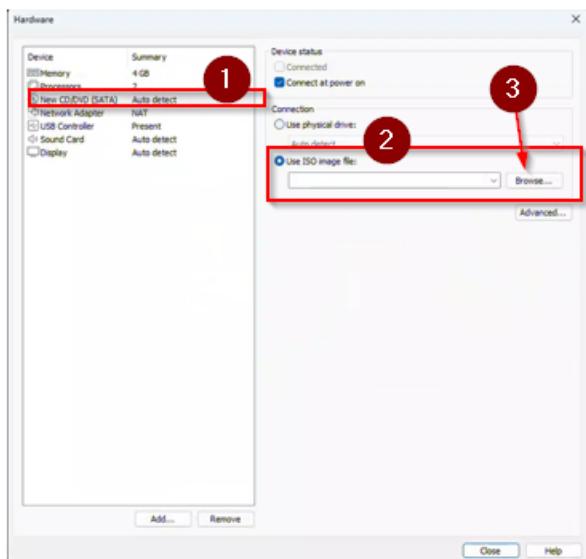


2. Set Processors to 2

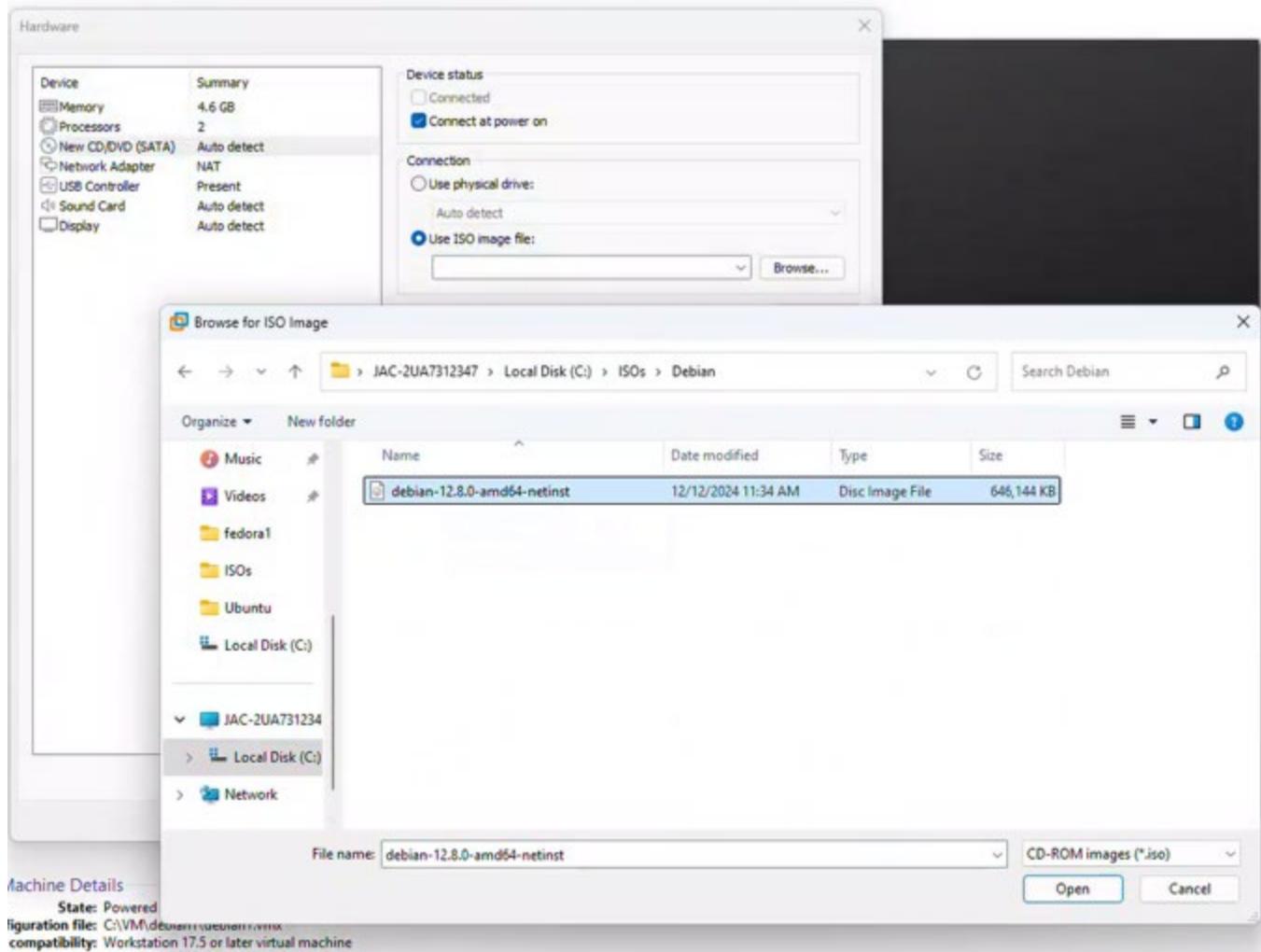


#### M) New CD/DVD (SATA)

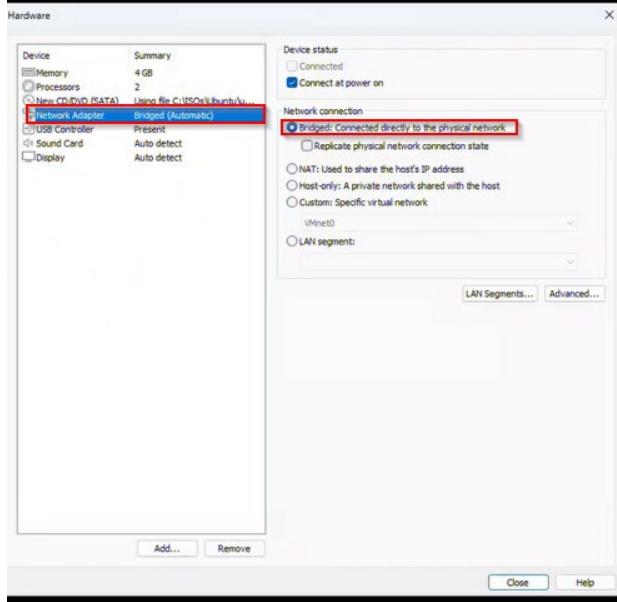
1. Select New CD/DVD (SATA)
2. Highlight Use ISO image file
3. select Browse.



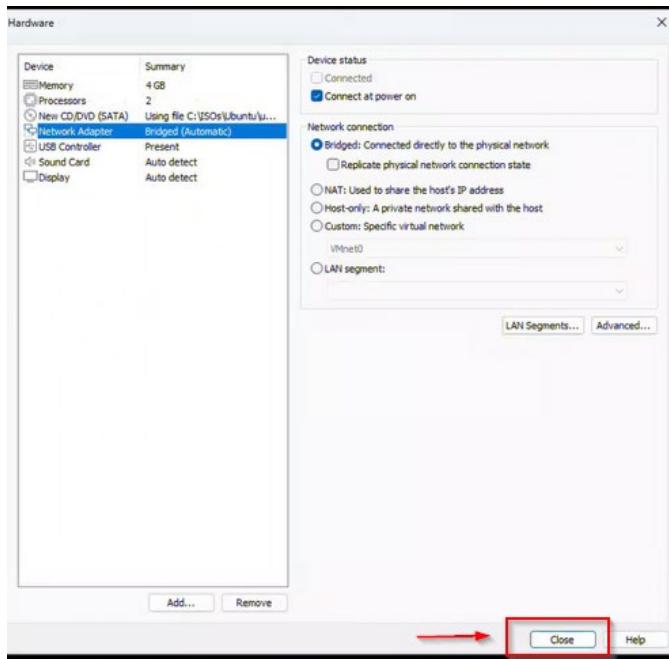
4. Once you select “Use ISO image file:”, browse for the Debian iso file



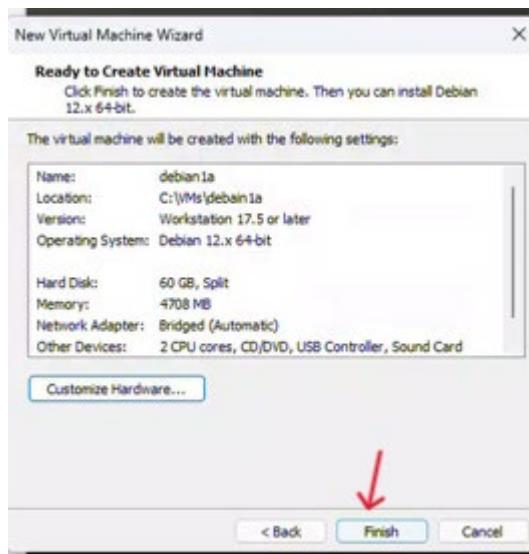
N) Set Network Adapter to bridged



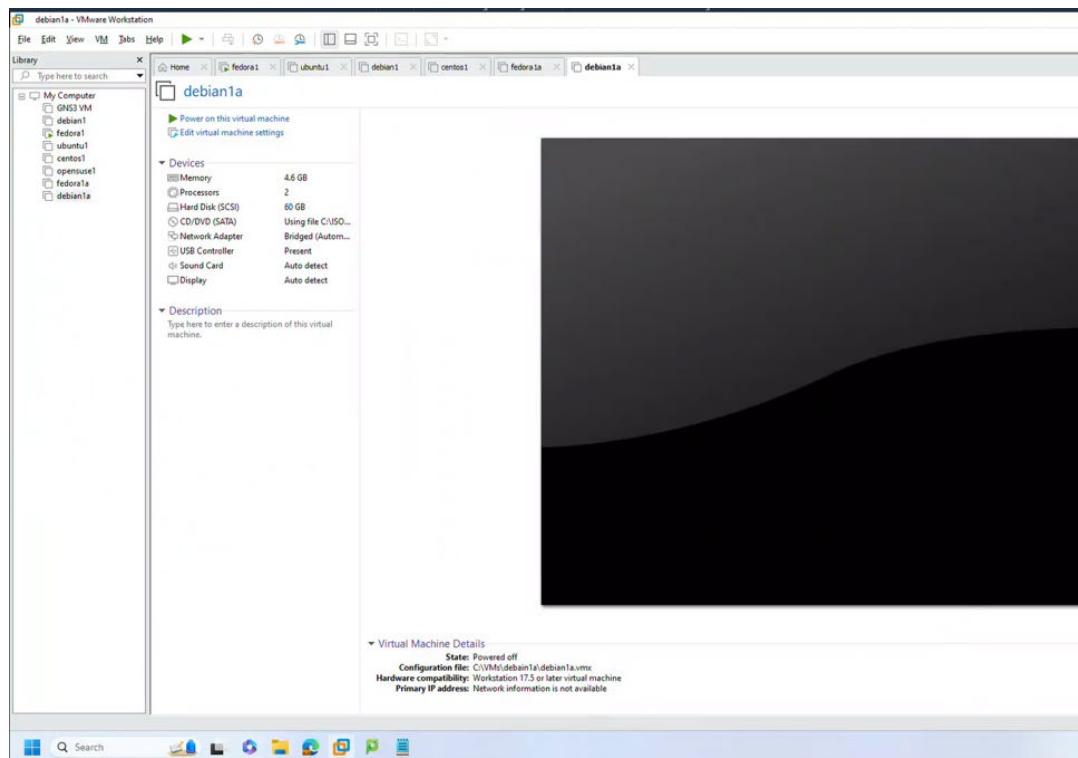
O) Click Close.



P) Review and press Finish

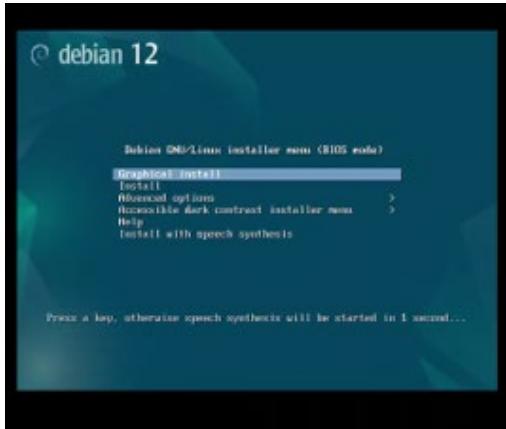


Q) VM opens, run the virtual machine

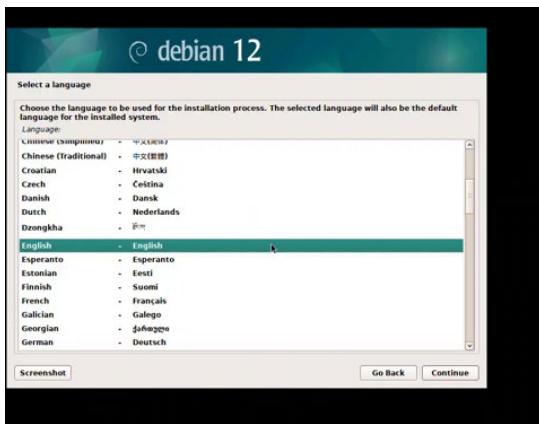


### 3.1.2.3 Install Debian on recently created virtual machine

- A) After starting the virtual machine, the installation screen appears. Select graphical install and press enter.



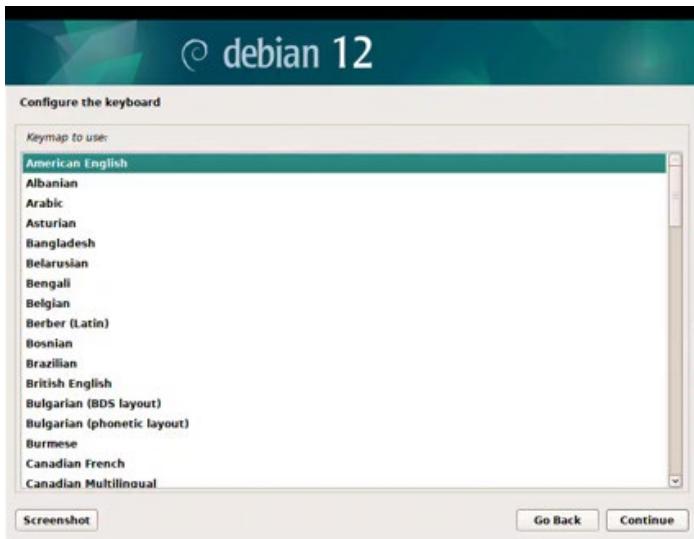
- B) Select language English



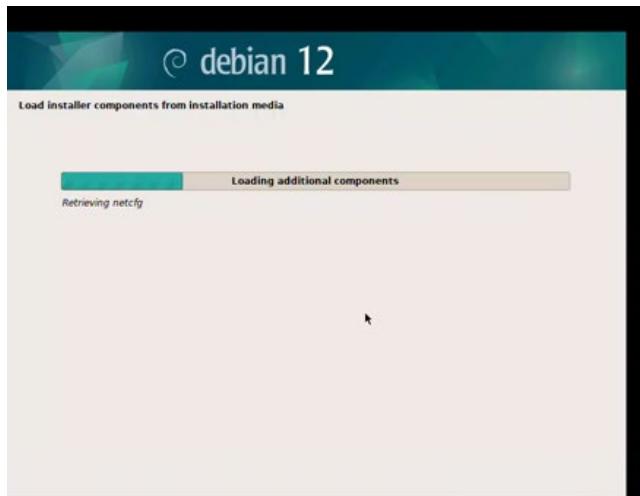
- C) Select location Canada



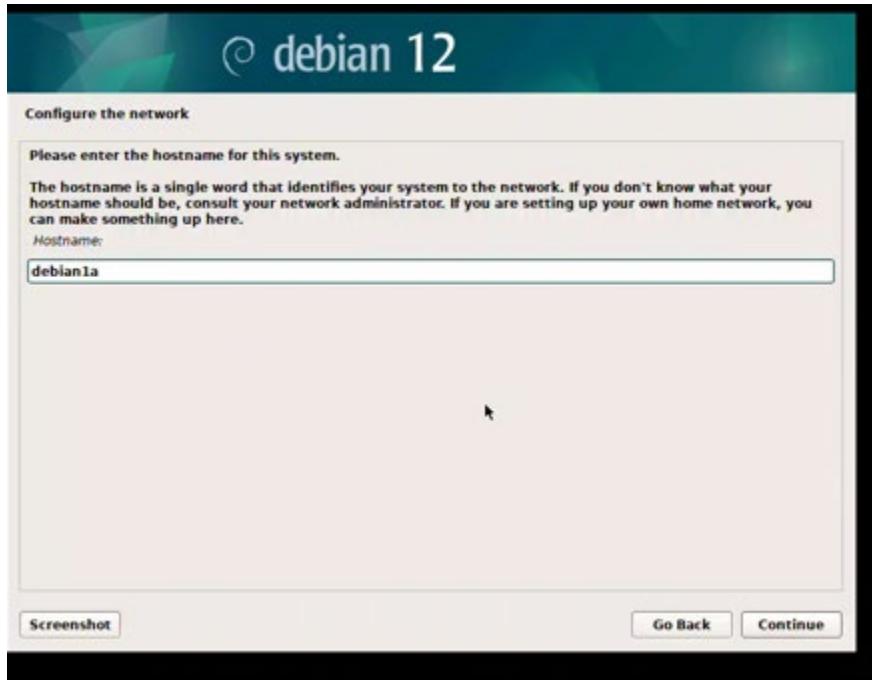
#### D) Configure keyboard American English



#### E) Load installer components start installing, wait until finished



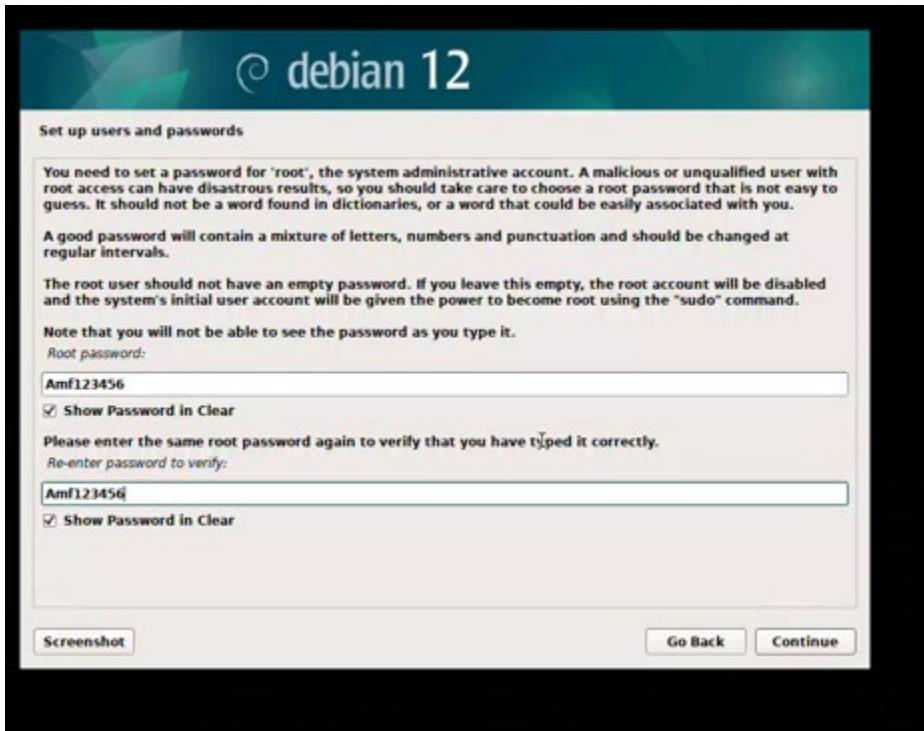
F) Set host name



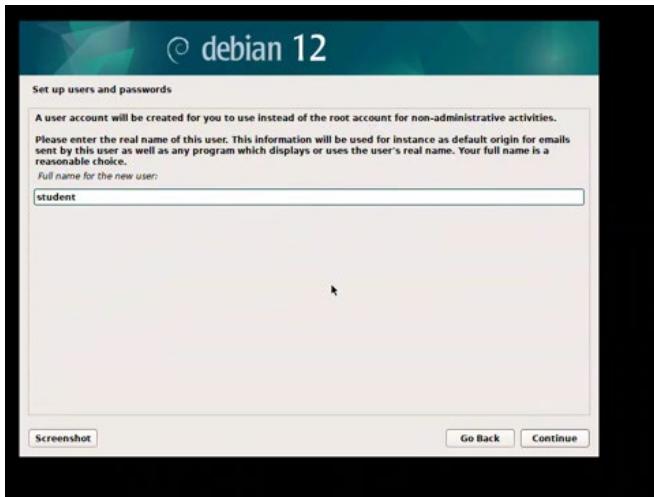
G) Set domain name deb1a.com



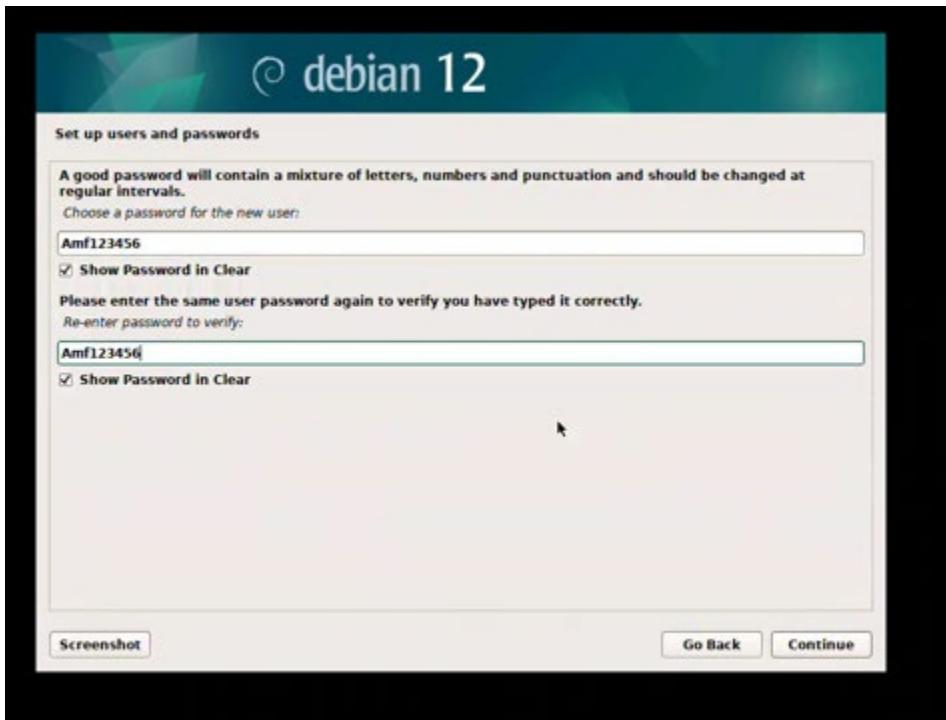
H) Setup root password



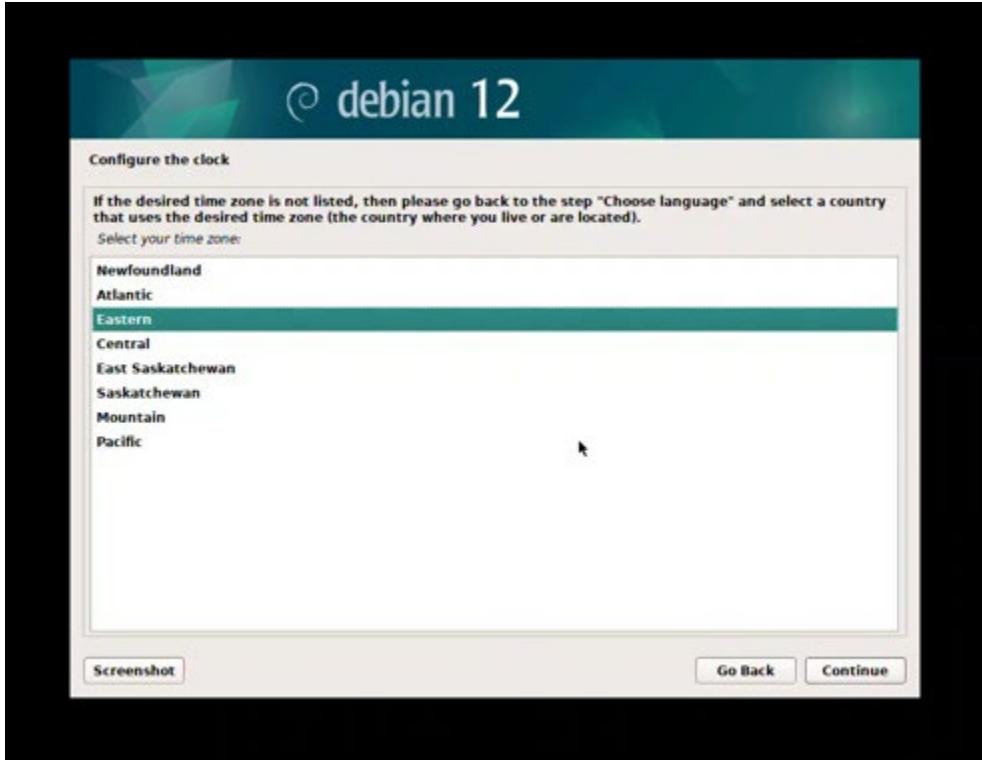
### I) Setup username student



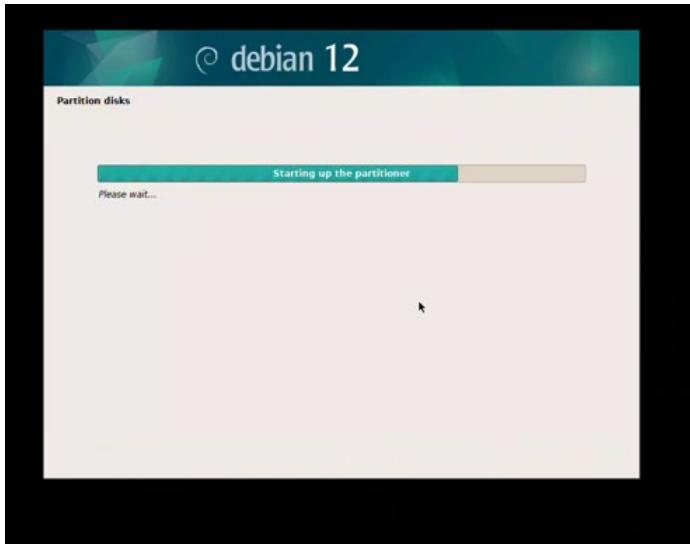
J) Set student password as Amf123456



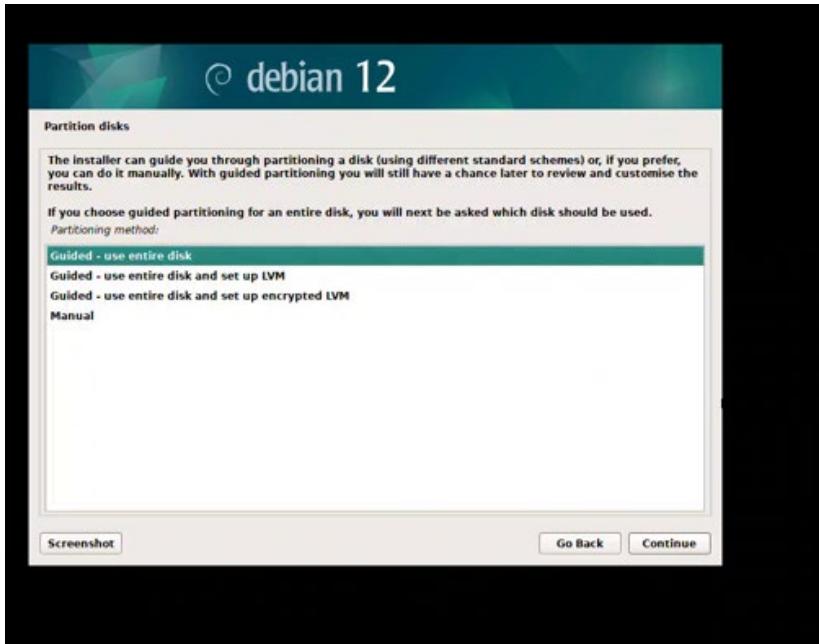
K) Configure clock as eastern



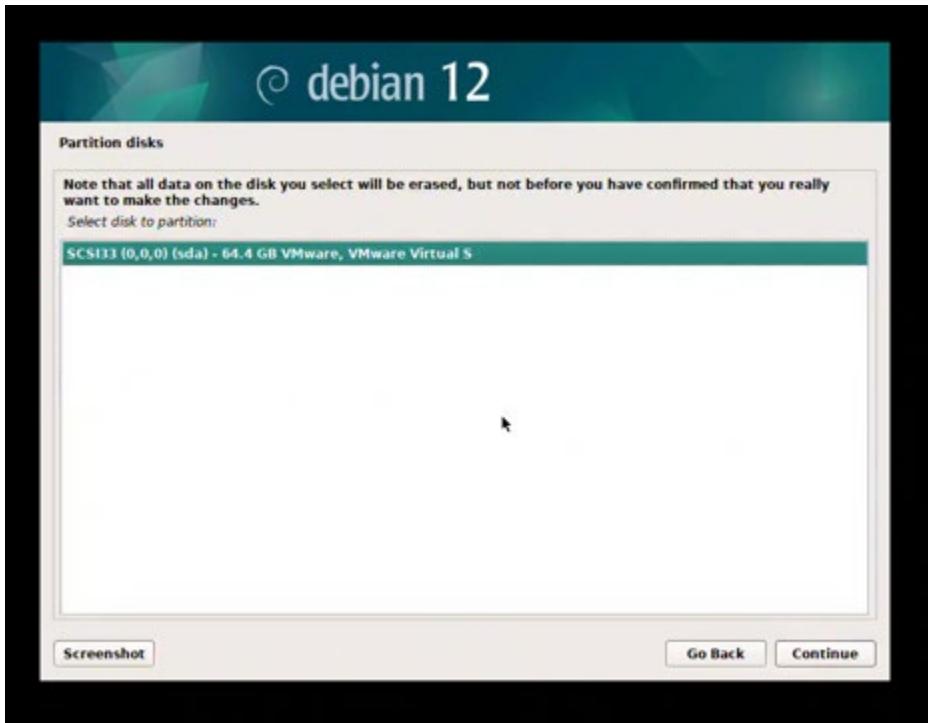
L) Partition disk starts wait until finishes



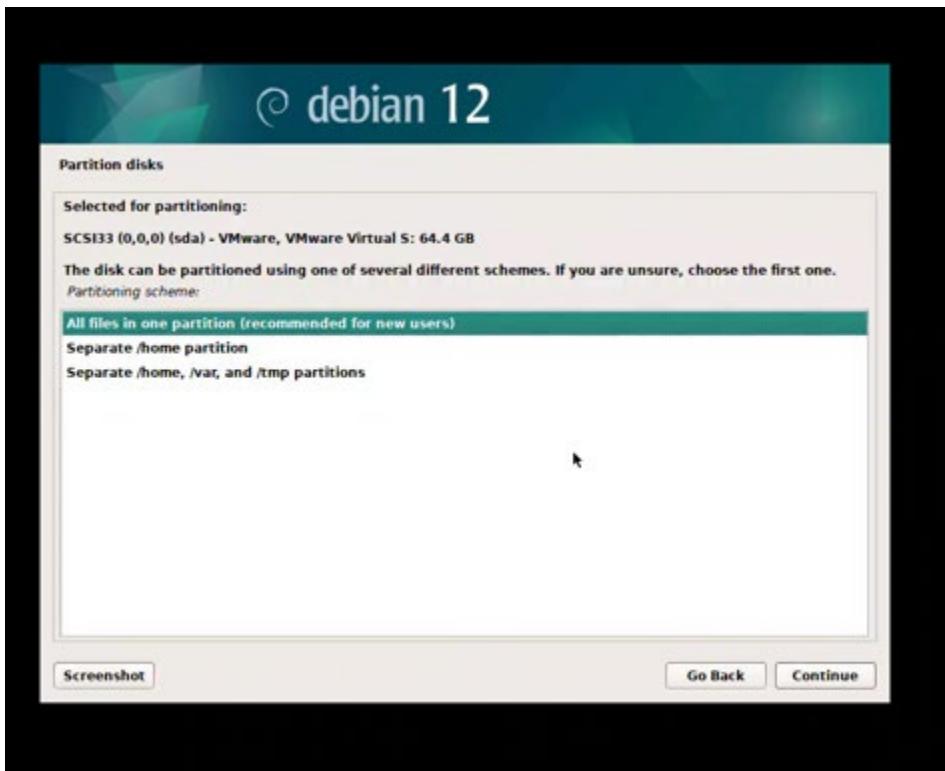
M) Select Guided – use entire disk for the Partition disk



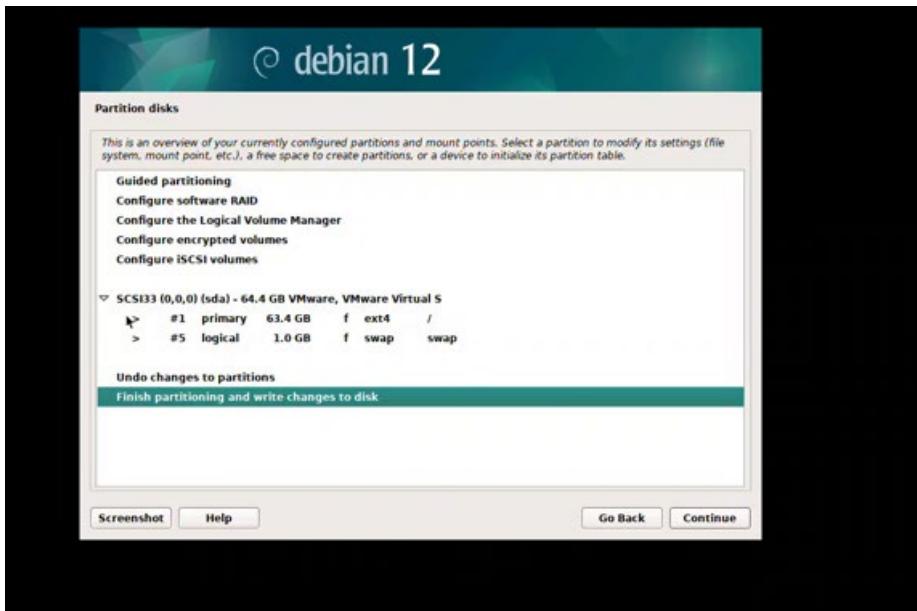
N) Select disk partition



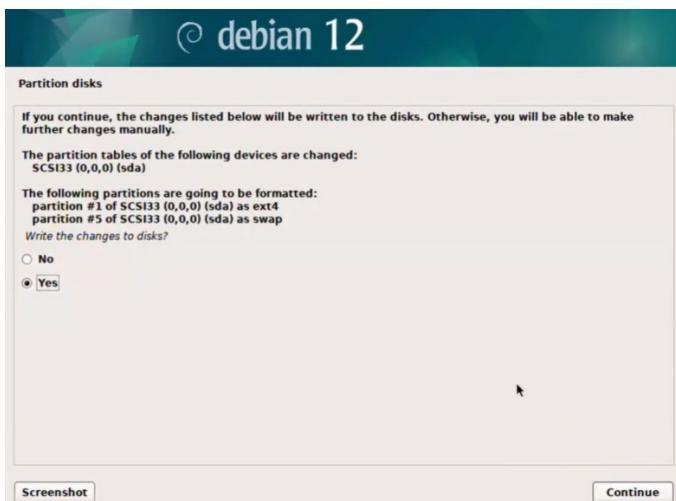
O) Select all files in one partition



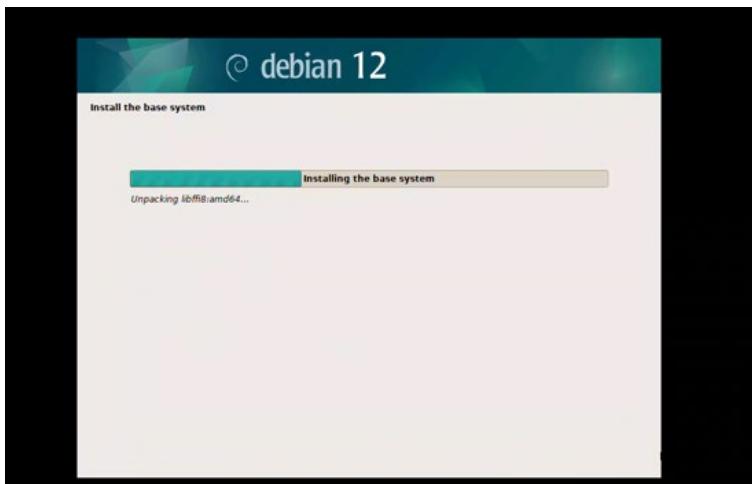
P) Select finish partitioning and write changes to disk



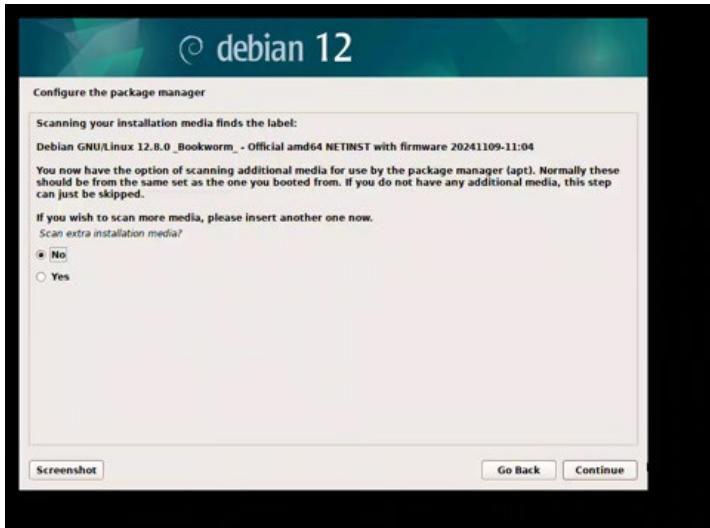
Q) At the question “Write the changes to disk?” answer Yes



R) Wait while install the base system



S) For the question “Install extra installation media?” answer No



T) Debian archive mirror country select “United States”



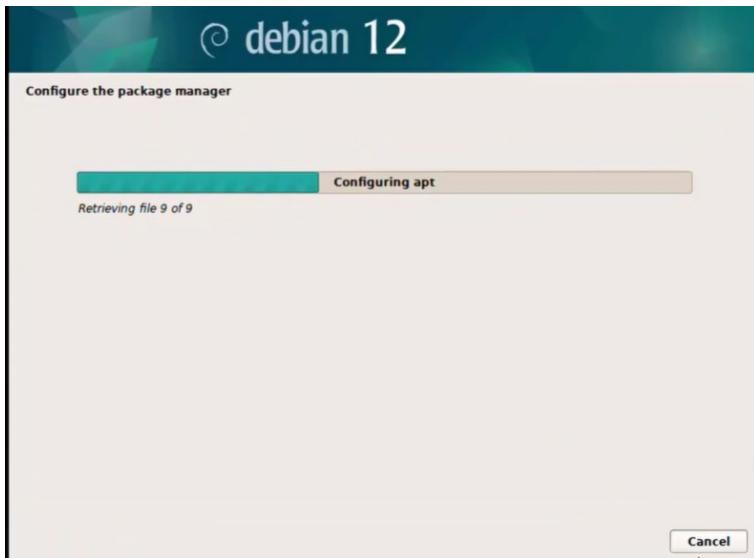
U) For Debian archive mirror select deb.debian.org



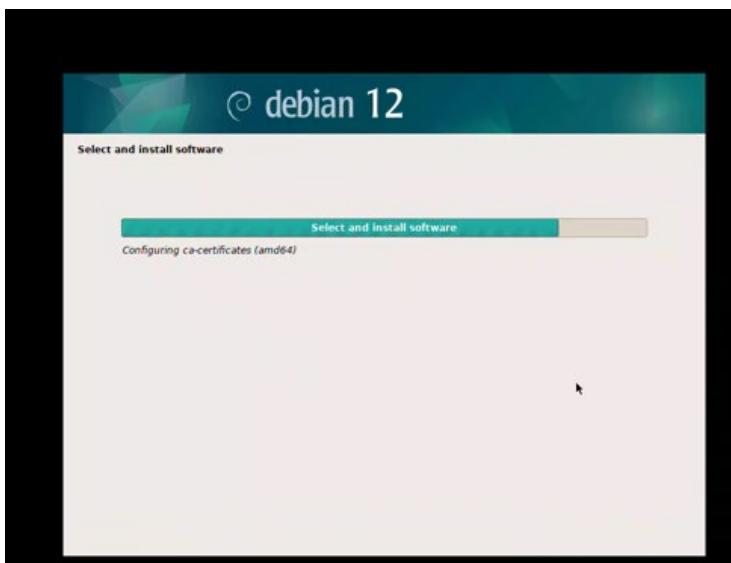
V) We leave blank Http proxy information



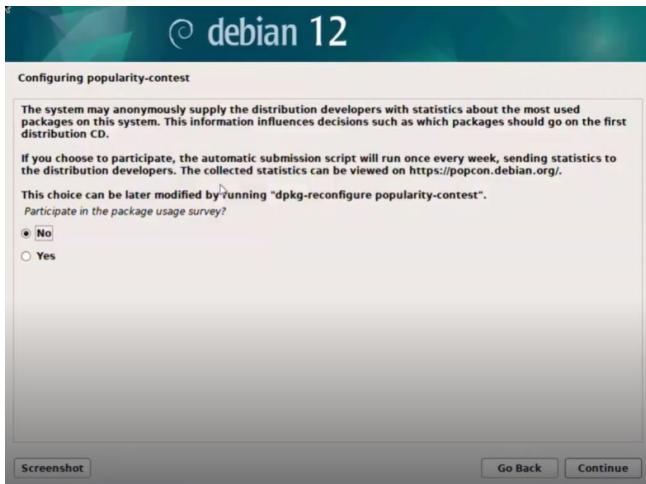
W) Wait until configure the package manager finishes



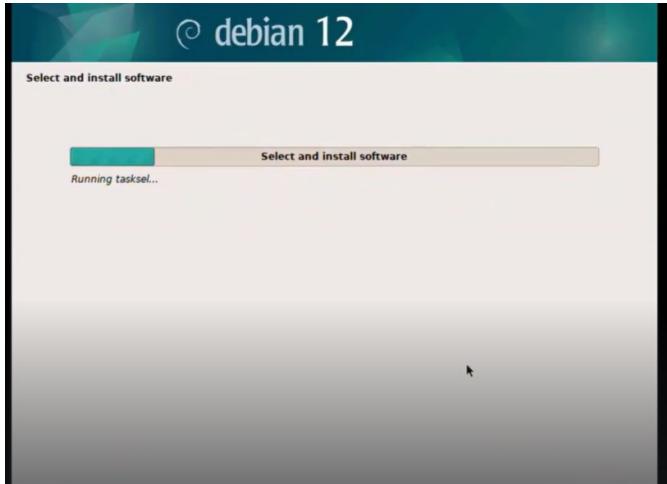
X) Wait until Select and install software finishes



Y) Do not participate in the package usage survey.



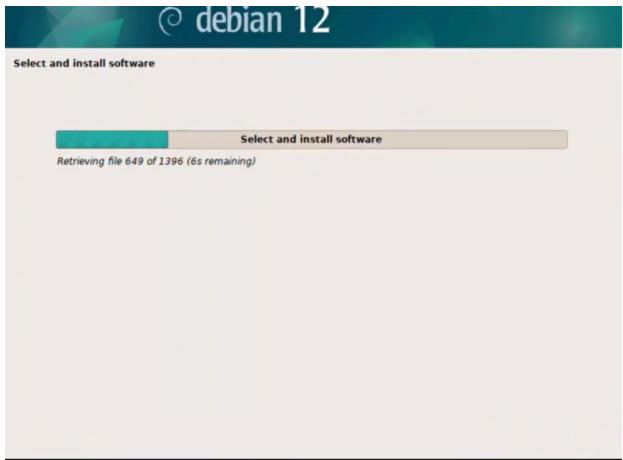
Z) Wait until Select and install software finishes



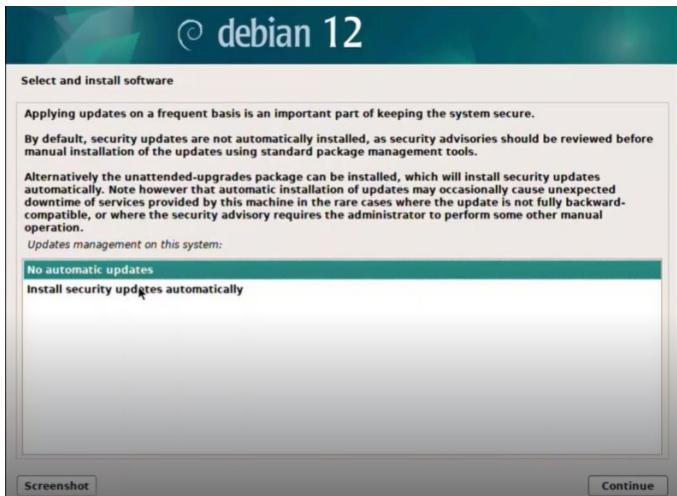
AA) Chose the default options and continue



AB) Select and install software continues



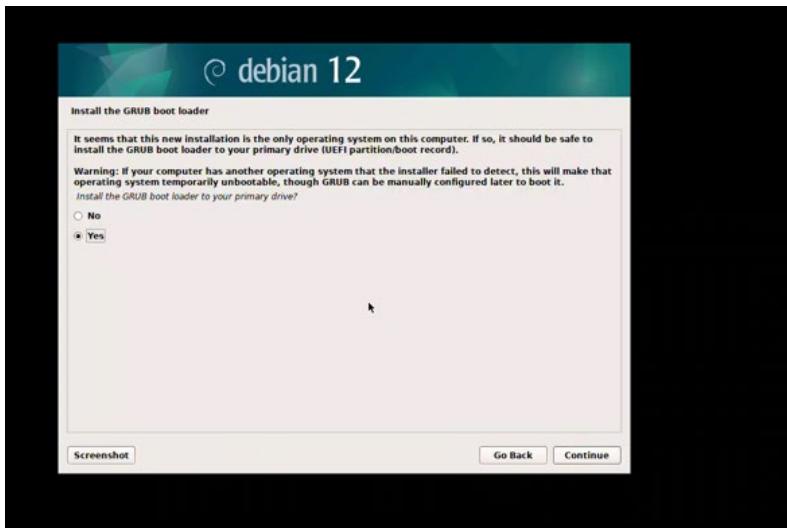
AC) Select “Install Security updates automatically”



AD) Select and install software continues



AE) Select Yes in the question "Install GRUB boot loader to your primary drive?"



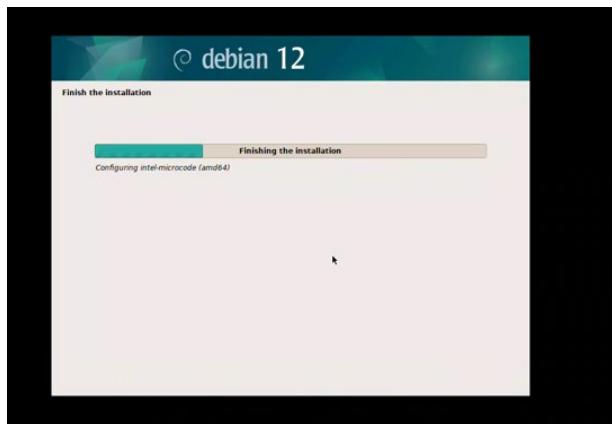
AF) Select /dev/sda for Device bootloader installation



AG) Install the GRUB boot loader continues wait until it finishes



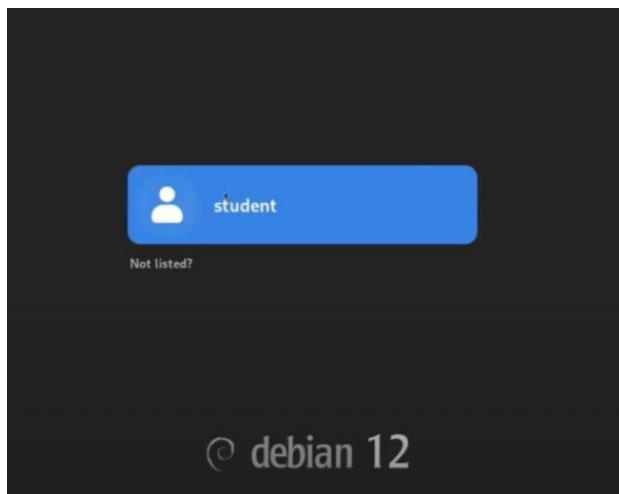
AH) Wait until finish the installation is completed.



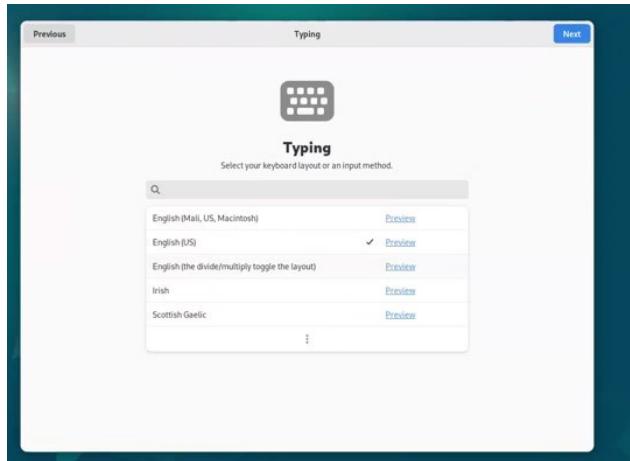
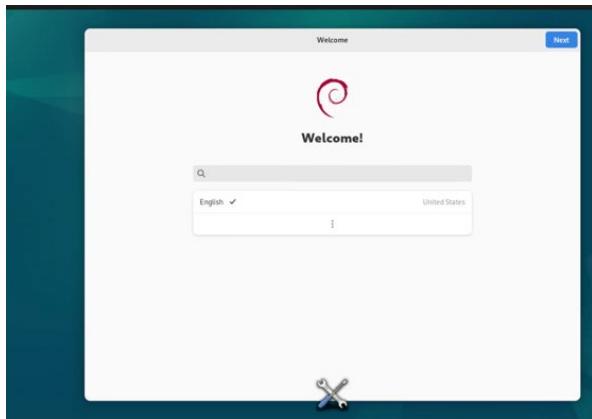
AI) Installation finishes and system automatically reboot



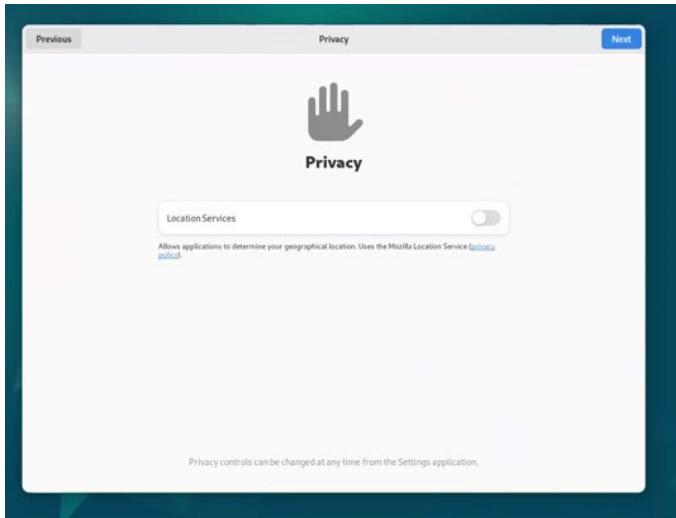
AJ) Login as student/Amf123456



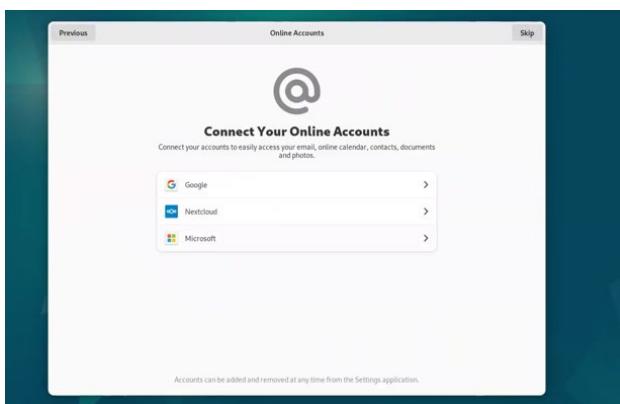
AK) For the series of screens just select Next to confirm config



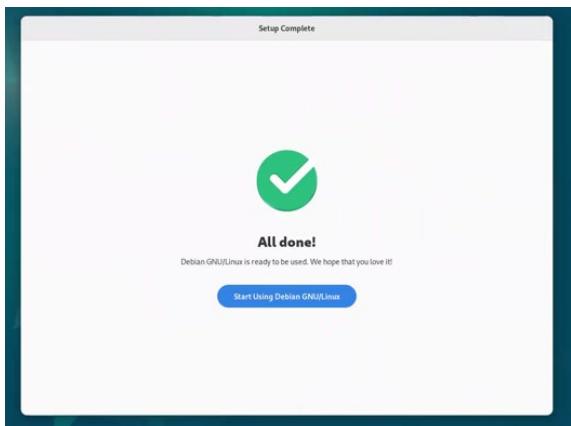
AL) Do not enable location services



AM) Skip to connect your online accounts



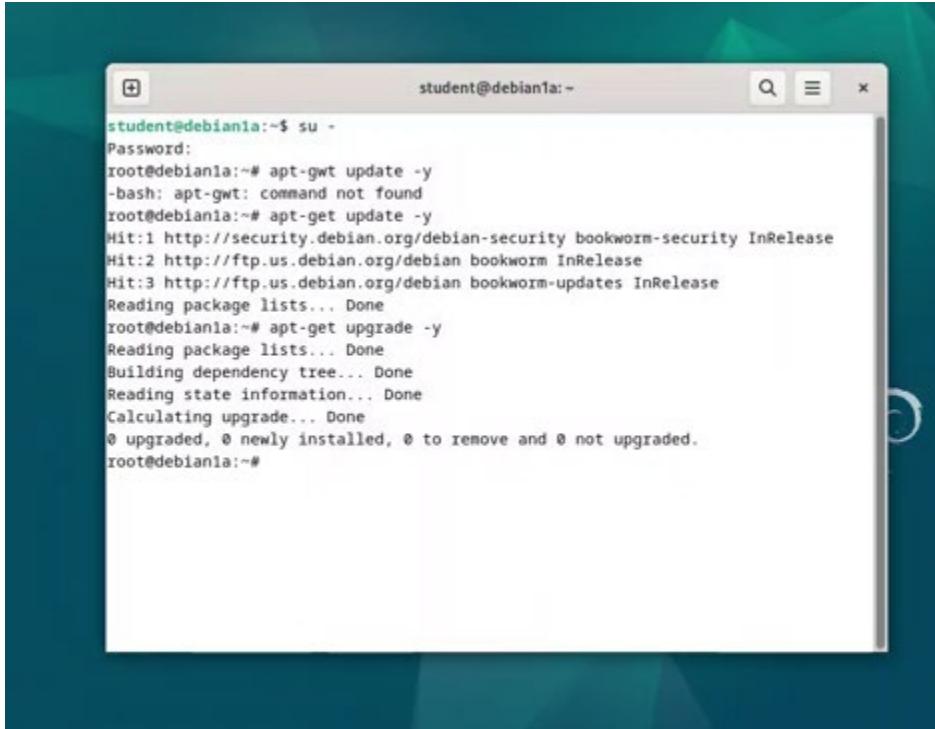
AN) Select “Start using Debian”



### 3.1.2.4 *Debian post installation activities*

A) Open a terminal

B) Login as root and do update using command `apt-get update` and `apt-get upgrade`



A screenshot of a terminal window titled "student@debian1a:~". The window shows the following command sequence:

```
student@debian1a:~$ su -
Password:
root@debian1a:~# apt-get update -y
-bash: apt-gwt: command not found
root@debian1a:~# apt-get update -y
Hit:1 http://security.debian.org/debian-security bookworm-security InRelease
Hit:2 http://ftp.us.debian.org/debian bookworm InRelease
Hit:3 http://ftp.us.debian.org/debian bookworm-updates InRelease
Reading package lists... Done
root@debian1a:~# apt-get upgrade -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
root@debian1a:~#
```

### 3.1.3 Ubuntu

Ubuntu is a Linux distribution derived from Debian and composed mostly of free and open-source software.

#### CHECKPOINT

**CONTINUE** to next section if the following three conditions are met:

- Splashtop Business is ok, and
- Computer in John Abbott Computer Lab is accessible up and running and
- VMWare Workstation Pro is installed preferably with latest upgrades

For more information how to check the three previous conditions refer to [General activities](#) section “Splashtop and Computer” and section “Verify VMware Workstation Pro is installed”

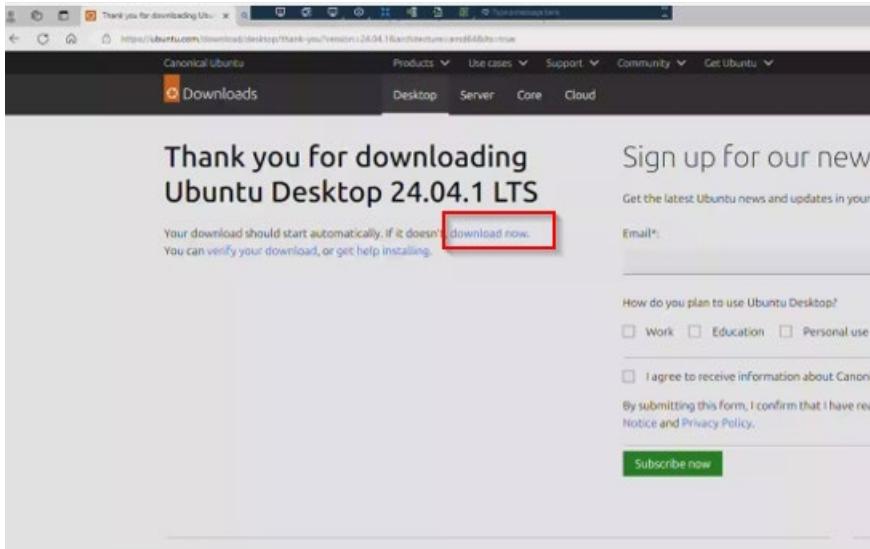
If all three conditions are not met, the update can not be done procedure **STOPS** here.

### 3.1.3.1 Ubuntu download

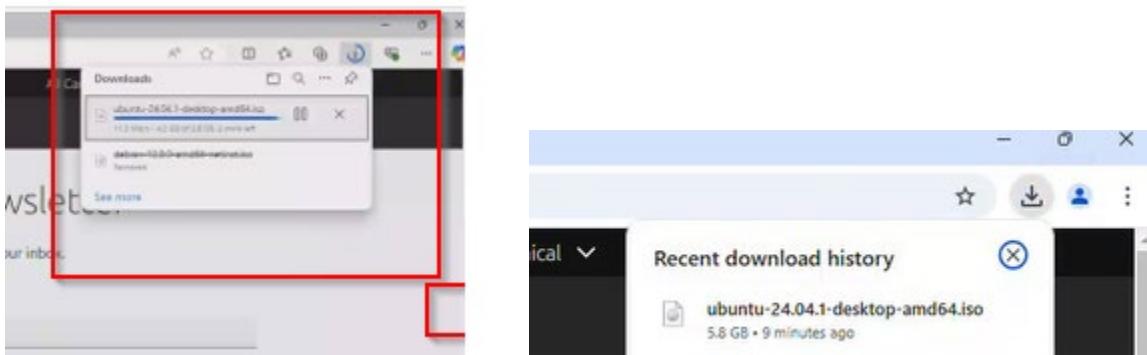
Go to Ubuntu page and download the latest Ubuntu version. For this document we will be using the following URL:

<https://ubuntu.com/download/desktop/thankyou?version=24.04.1&architecture=amd64&lts=true>

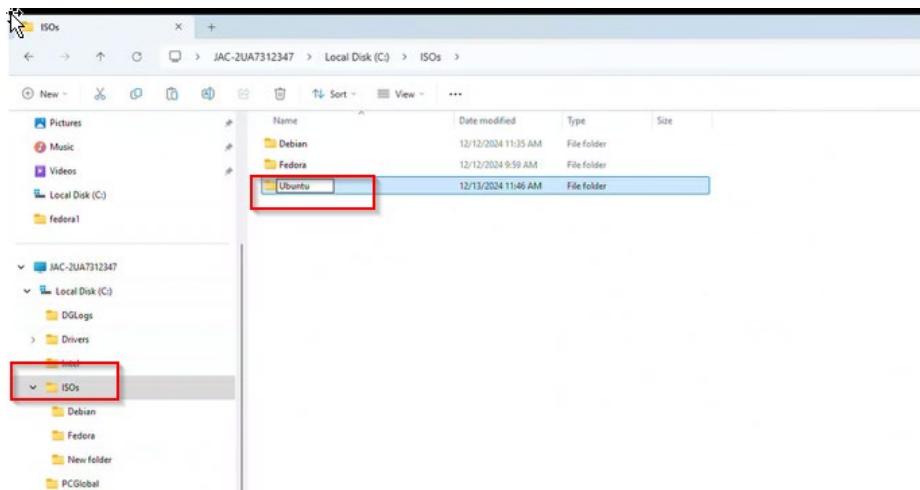
- A) Press “Download now” for Ubuntu 24.04.1 LTS



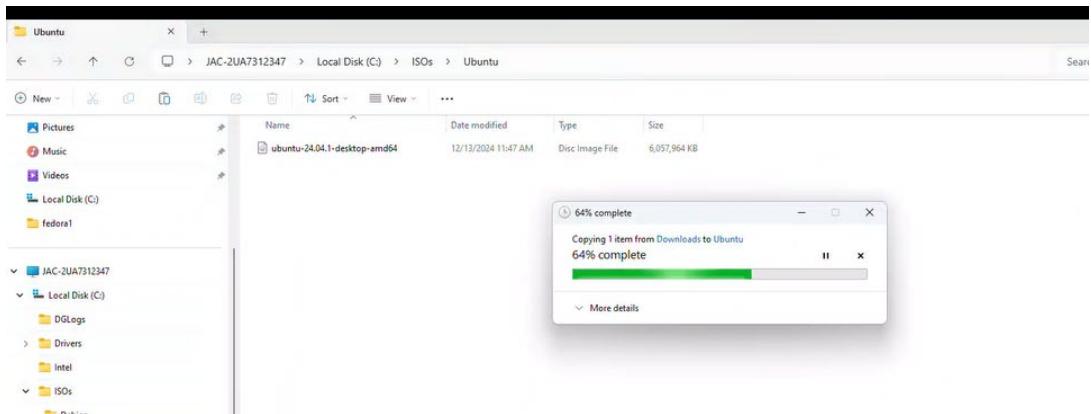
- B) Verify ISO image is being downloaded, you can verify how long does it take to download.



- C) Once the file is downloaded, create a directory named “Ubuntu” in the ISOs directory,



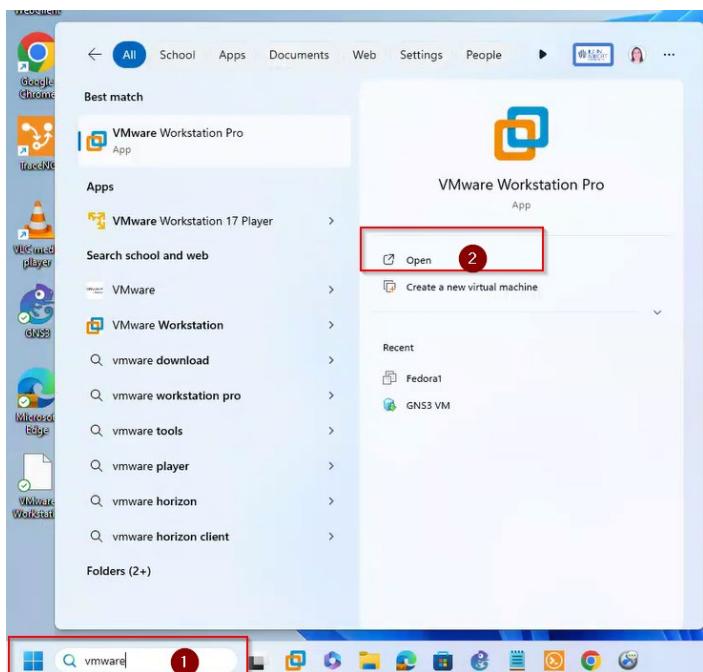
D) Transfer the file to the recently created directory.



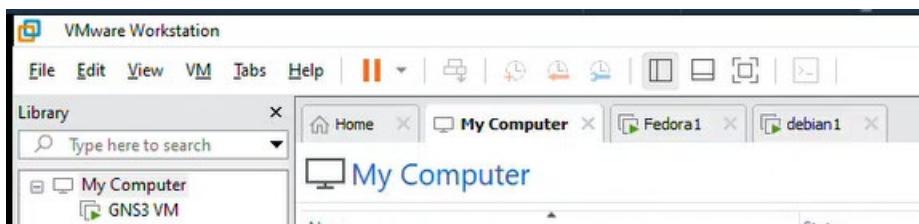
### 3.1.3.2 Create VM for Ubuntu

#### A) Open the VMware Workstation App

- 1 Look for application in windows search
- 2 Once VMware Workstation Pro appears, open application

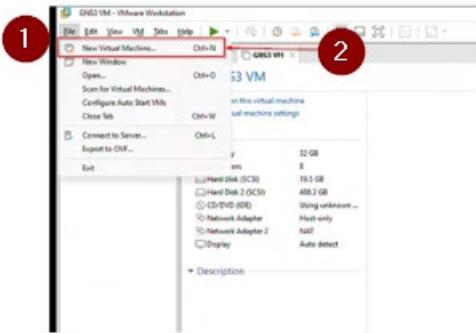


#### B) VMware workstation opens:

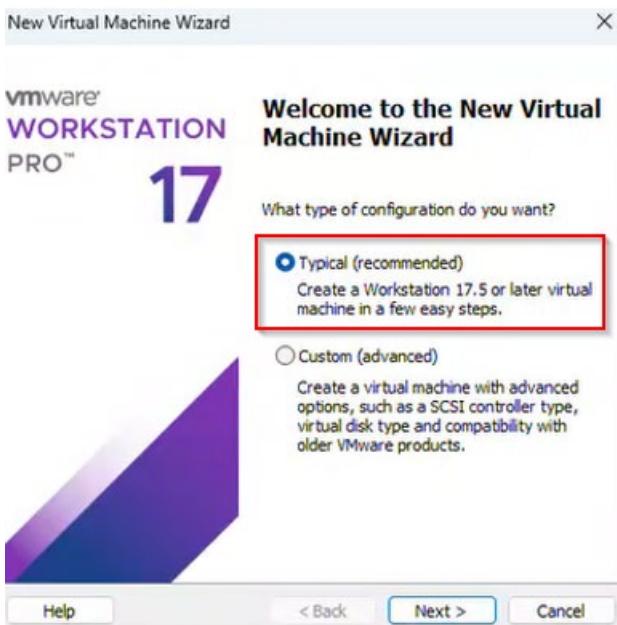


#### T) Select from top menu and submenu

1. File
2. New Virtual Machine...

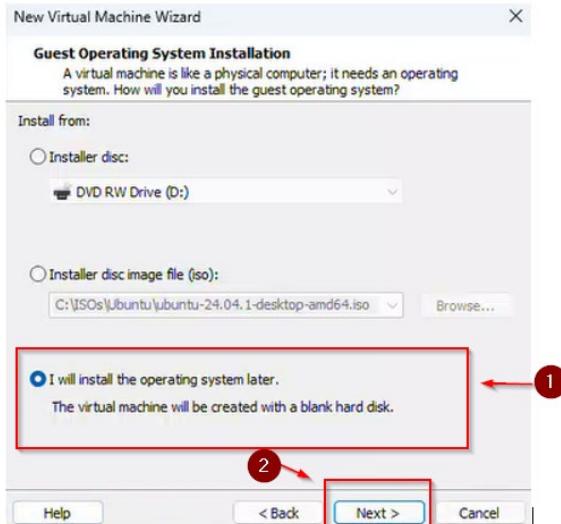


- C) When the “Welcome to the New Virtual Machine Wizard” window pops up, select “Typical (recommended)”, then click “Next >”

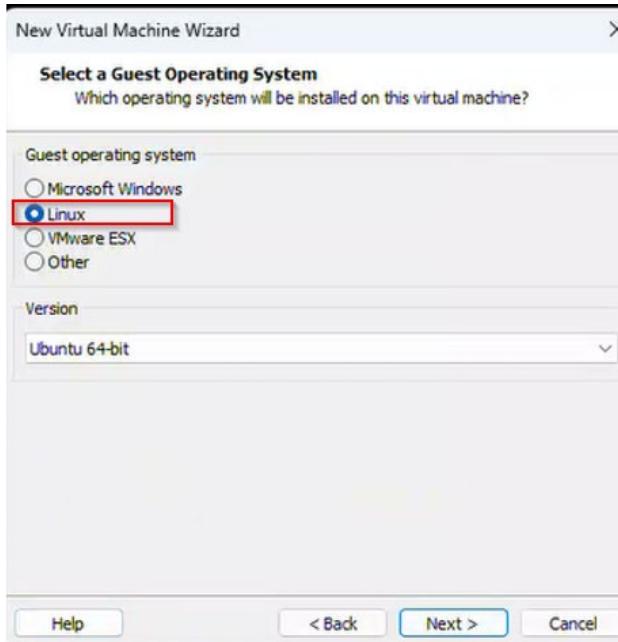


D) “Guest Operating System Installation” window pops up, please:

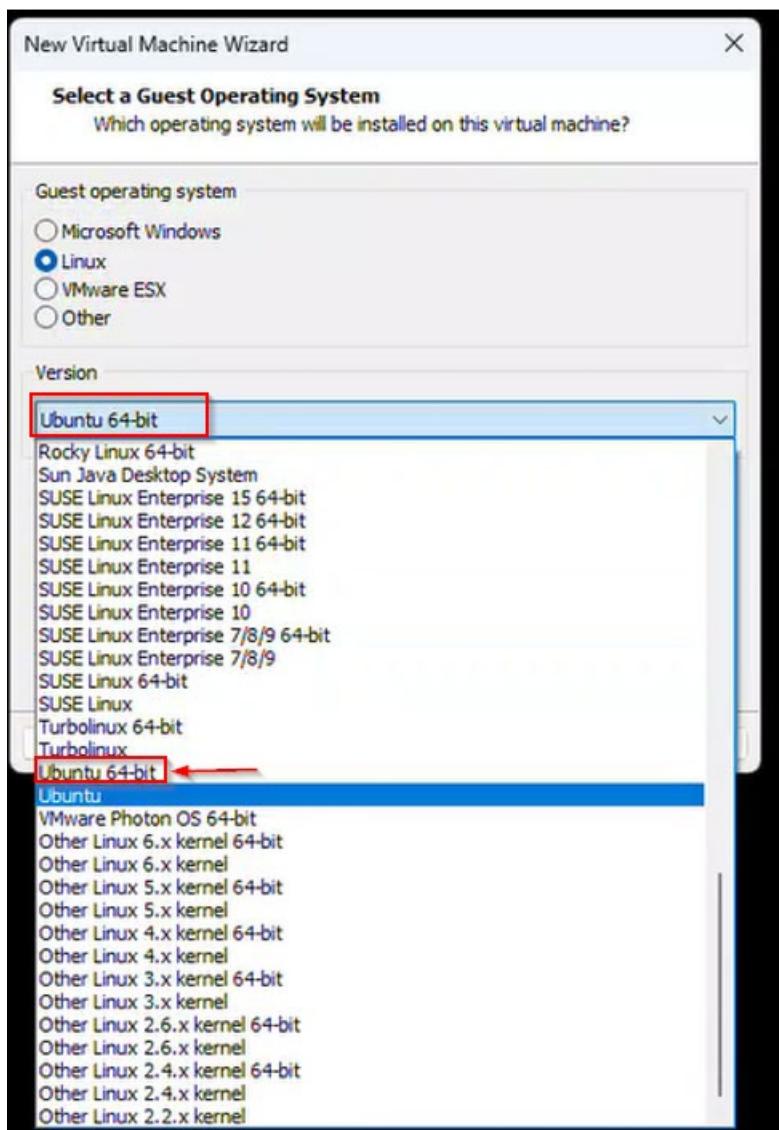
3. Select “I will install the operating system later. The virtual machine will be created with a blank hard disk.”.
4. Click “Next”



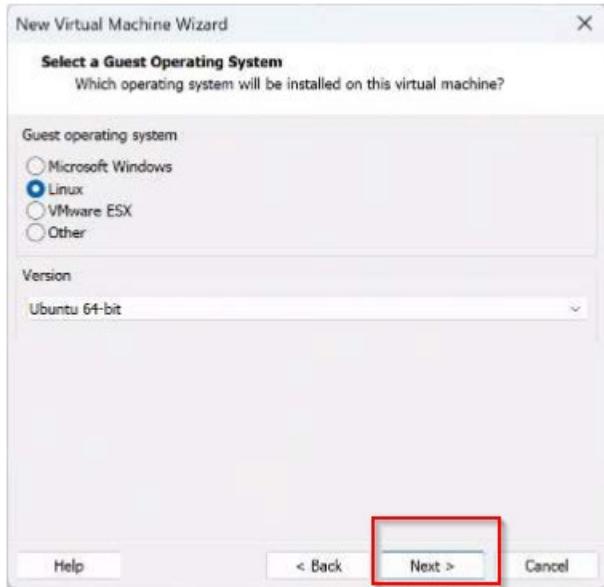
E) The window “Select a Guest Operating System Which operating system will be installed on this virtual machine?” Select Linux



F) For Version, select “Ubuntu 64-bit” from the list (in alphabetical order).

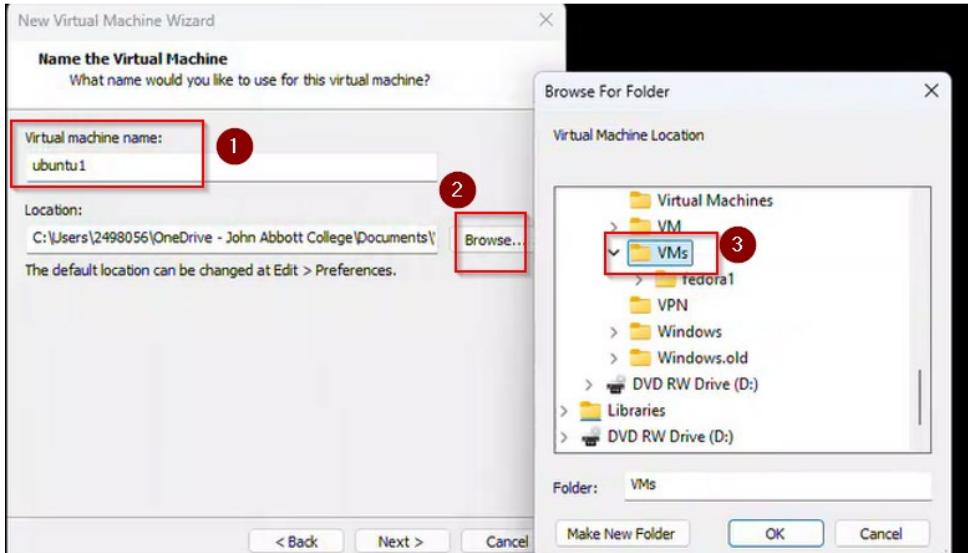


G) Select Next

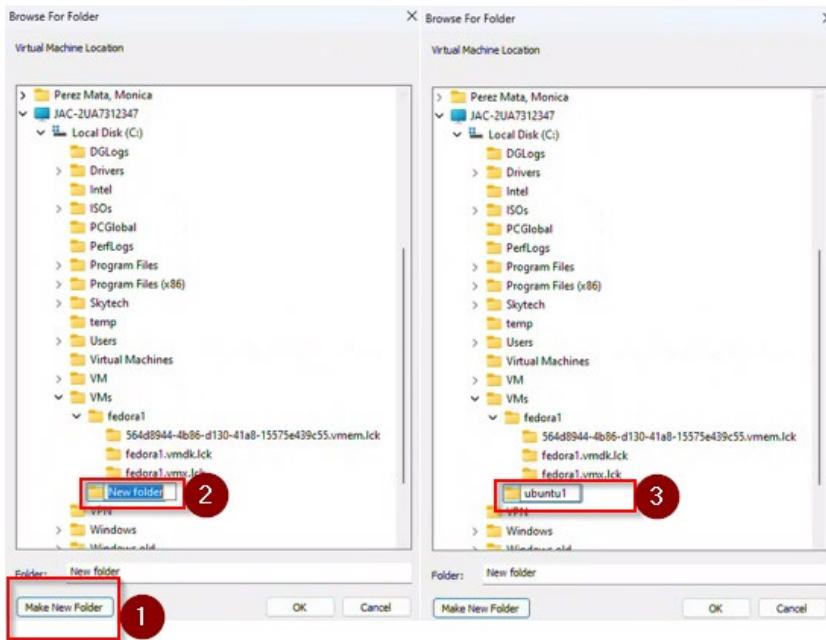


H) In the window “Name the Virtual Machine”

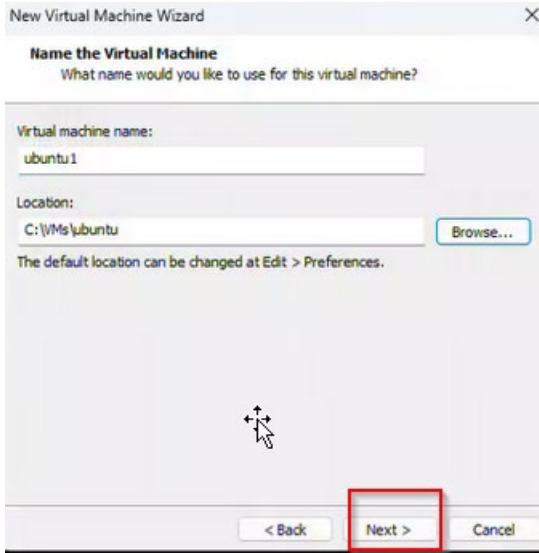
1. Set name Virtual machine name: “ubuntu1”
2. For the location Browse to change directory
3. Select VMs directory



I) Create a new folder named “ubuntu1”



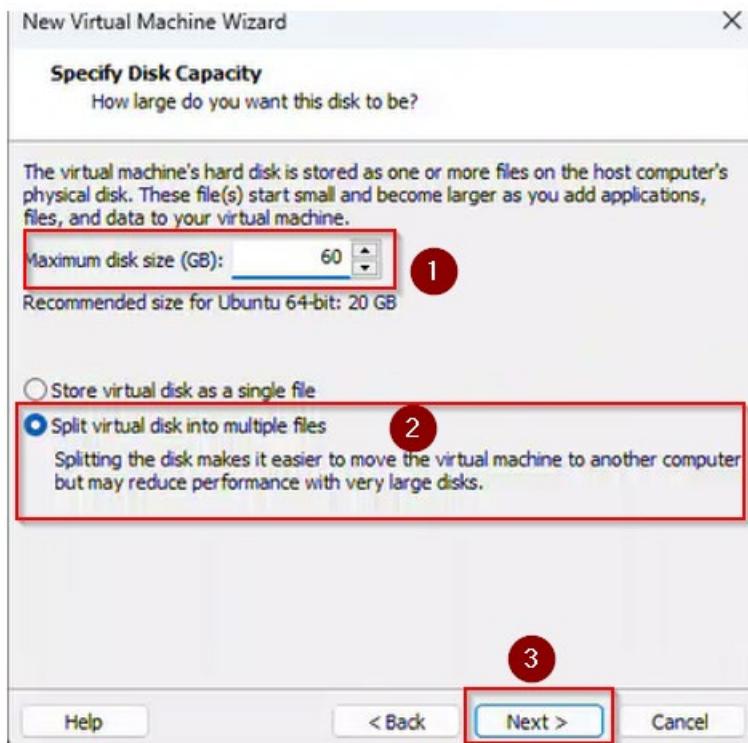
J) Click “Next” after Virtual machine name and location was set.



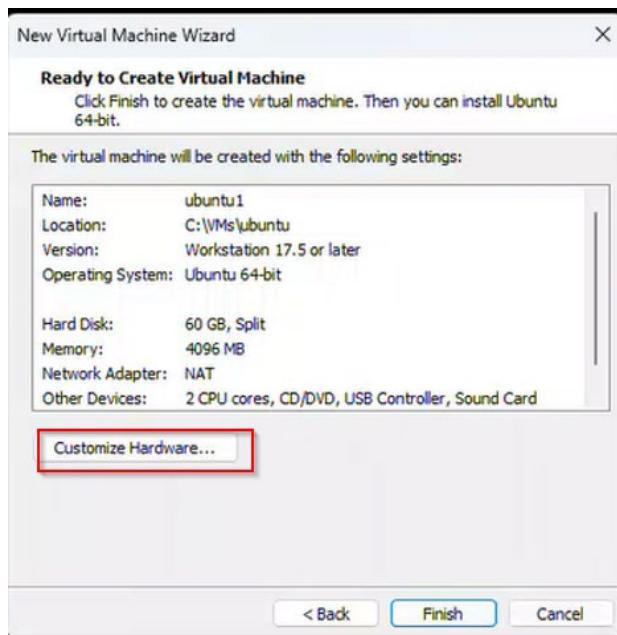
K) In the window Specify Disk Capacity, set:

1. Set the Maximum disk size (GB) to 60
2. Keep the default set to “Split virtual disk into multiple files”

3. Click Next >

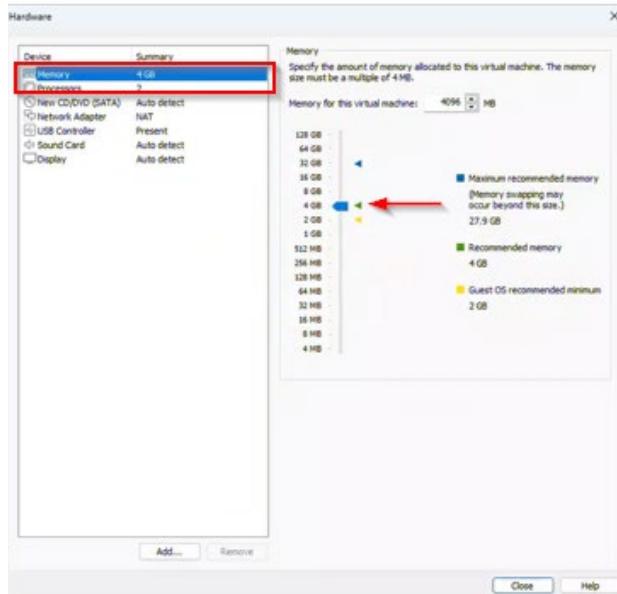


- L) In the window “Ready to create Virtual Machine” select Customize hardware

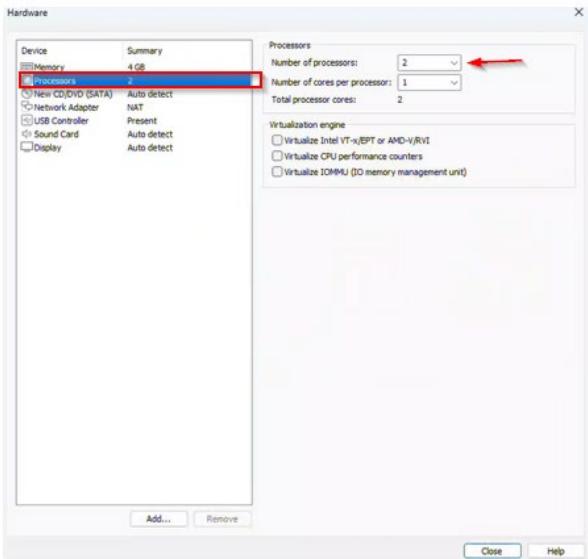


- M) For Hardware settings:

1. Set Memory to 4GB

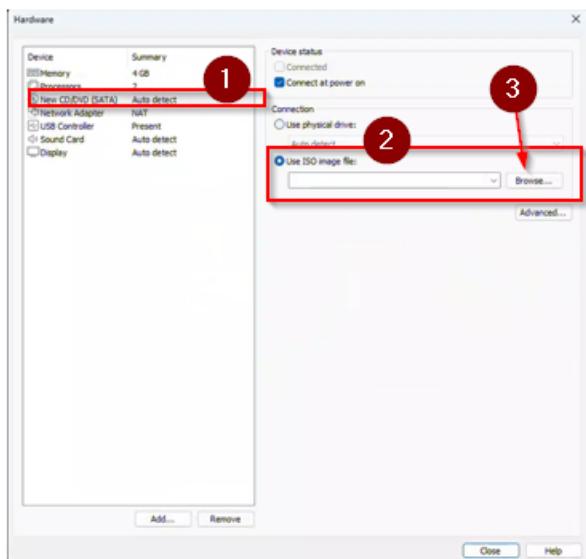


2. Set Processors to 2

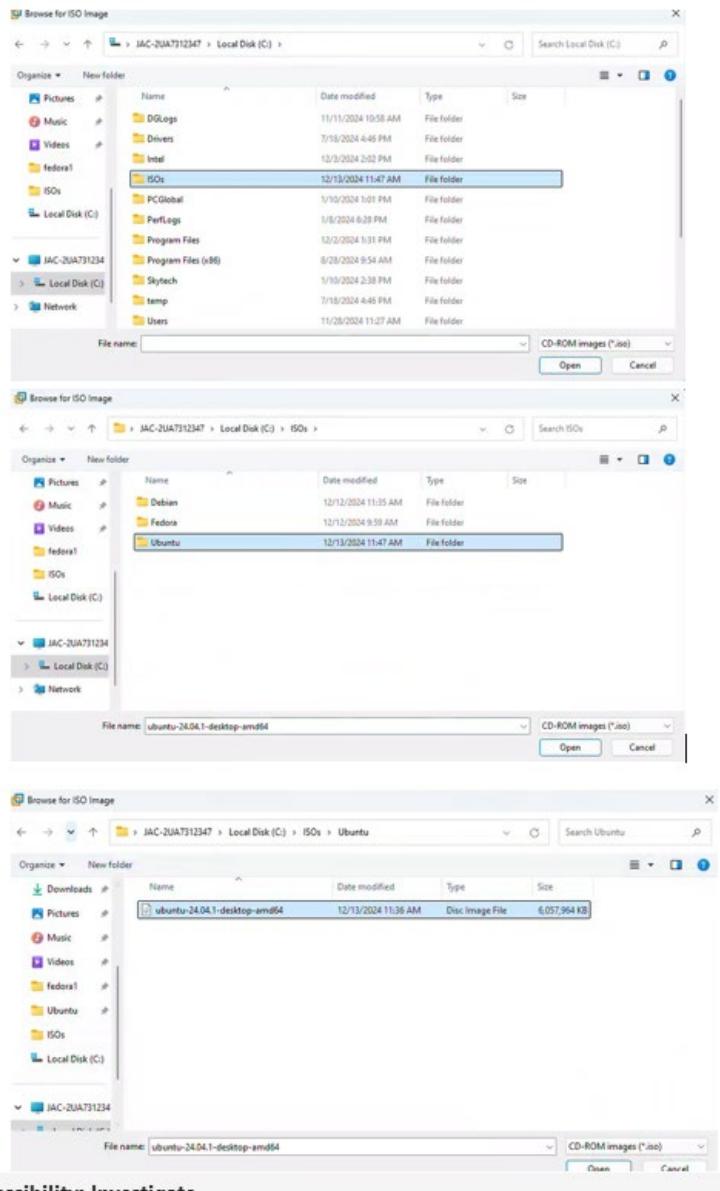


N) New CD/DVD (SATA)

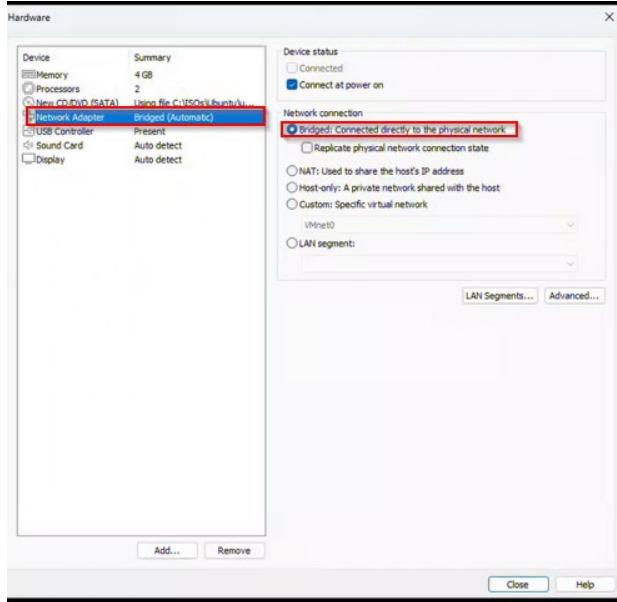
1. Select New CD/DVD (SATA)
2. Highlight Use ISO image file
3. select Browse.



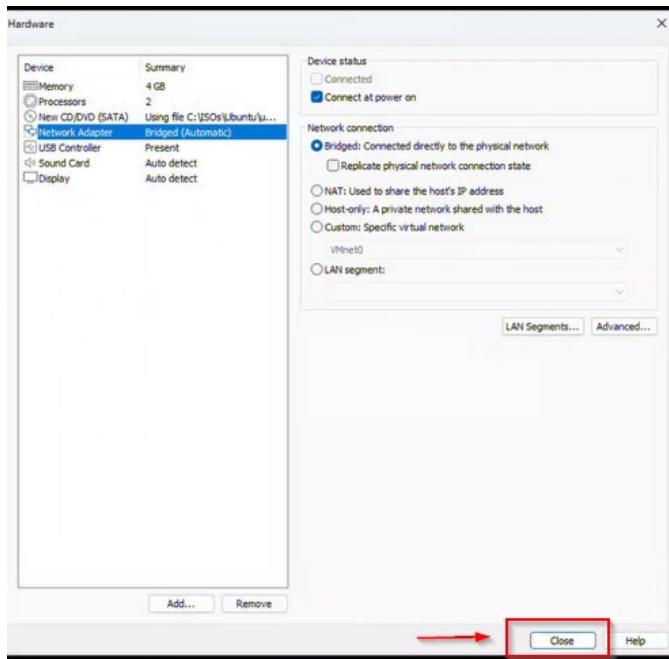
4. Once you select “Use ISO image file:”, browse for the Ubuntu iso file



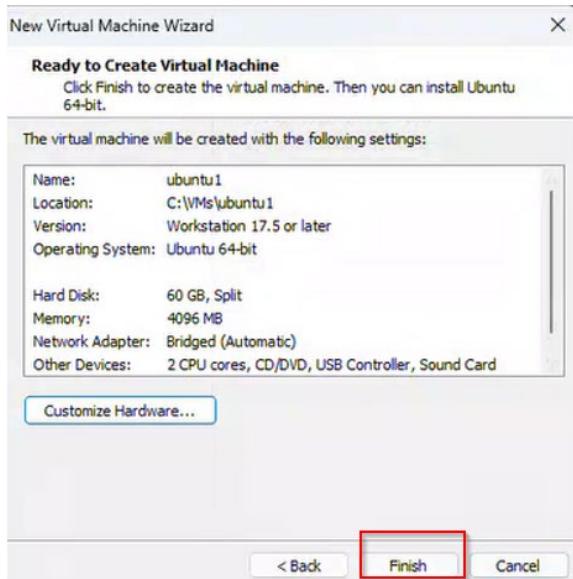
O) Set Network Adapter to bridged



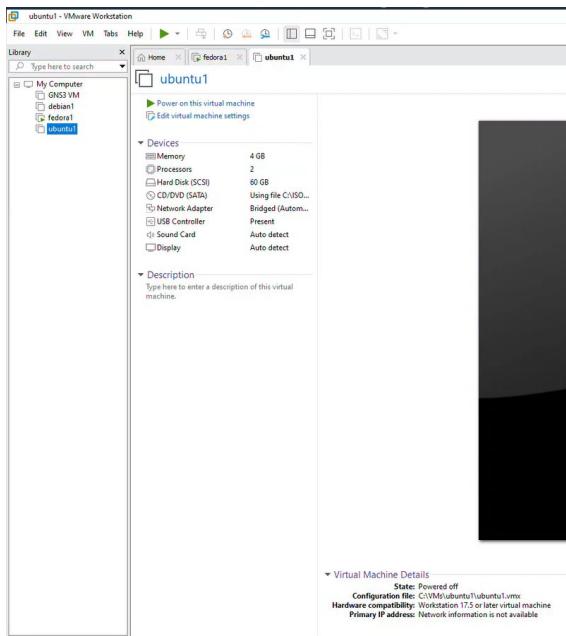
P) Click Close.



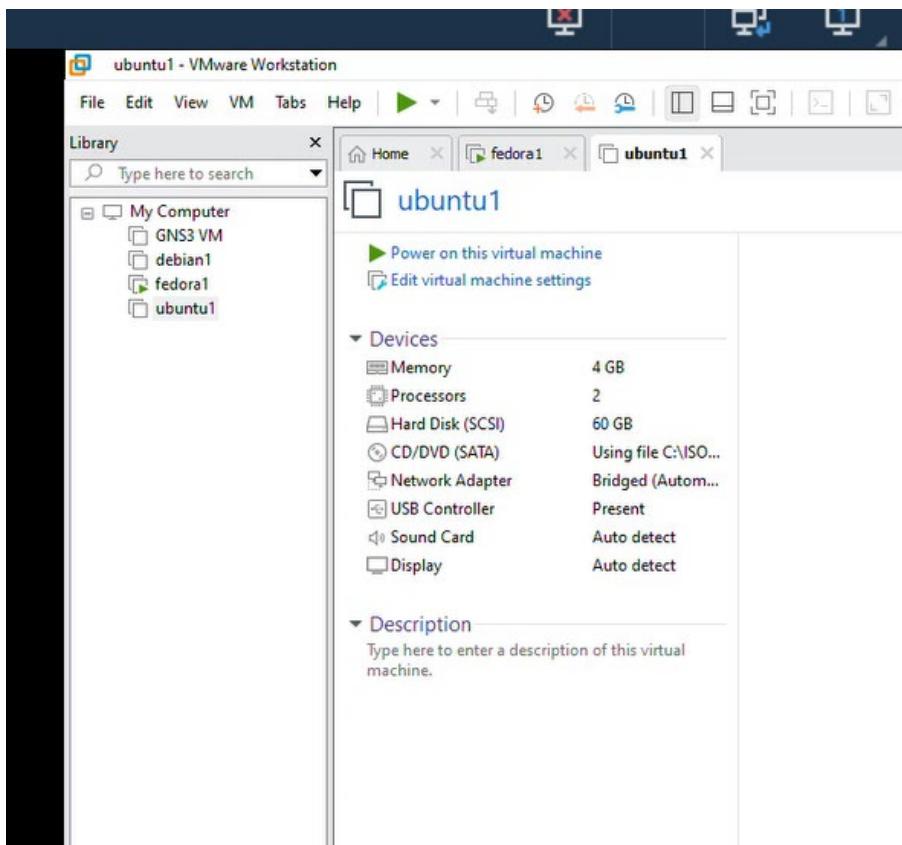
Q) Review and press Finish



R) VM opens



S) Power on virtual machine

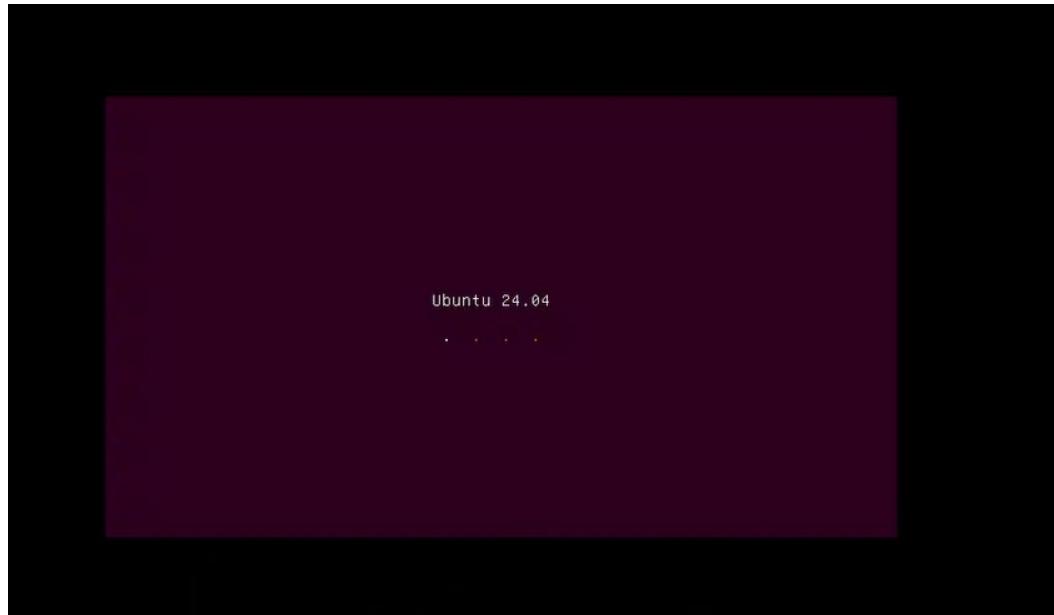


### 3.1.3.3 Install Ubuntu on recently created Virtual Machine

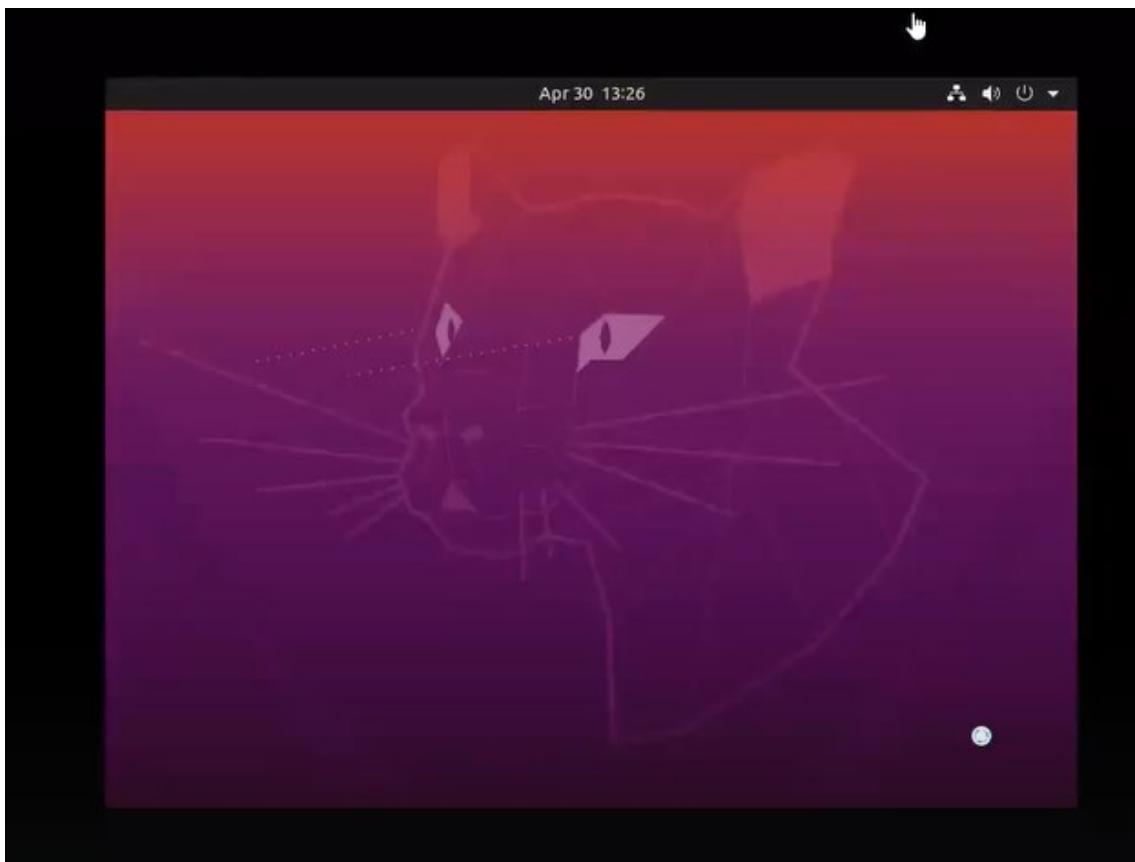
- A) Wait until GNU GRUB screen appears, select Try or Install Ubuntu



- B) Wait until the process is completed

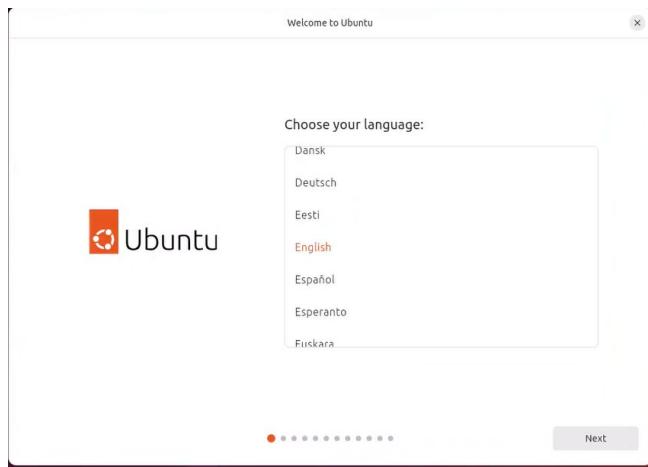


- C) The following screen appears

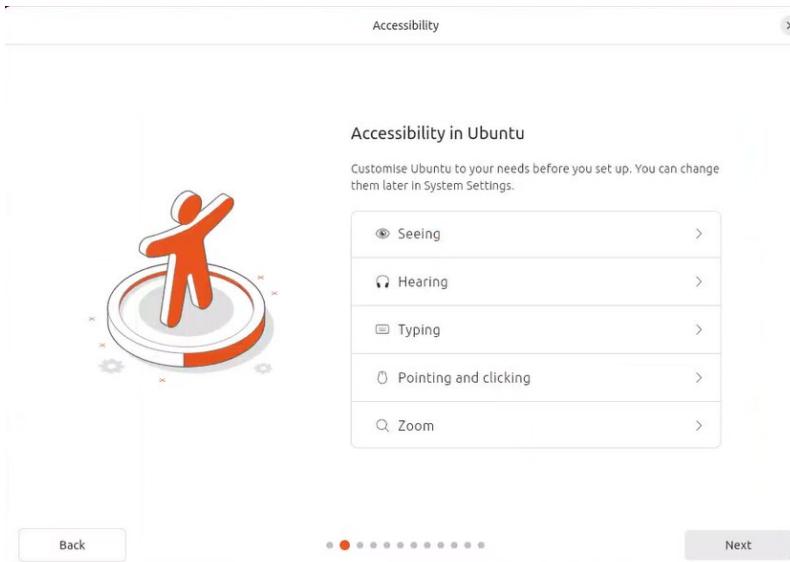


D) Follow the on-screen instructions:

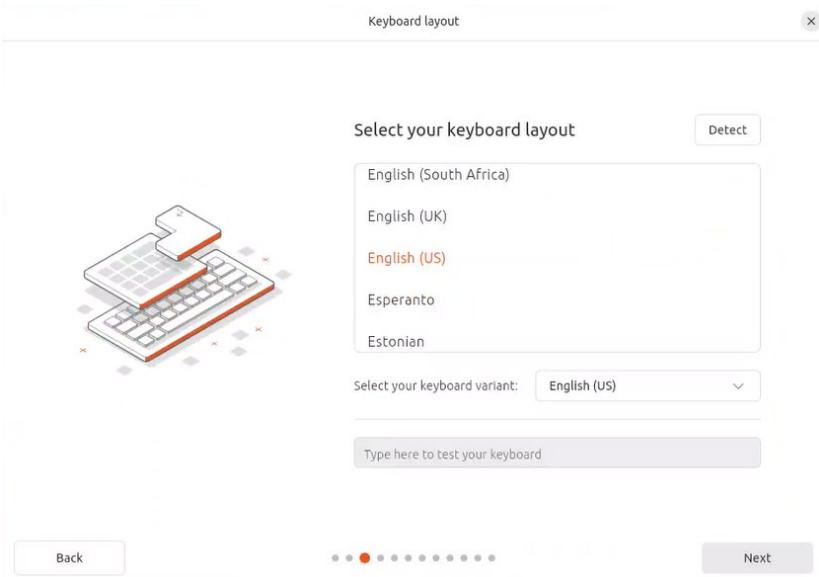
1. Choose your language. Select “English”



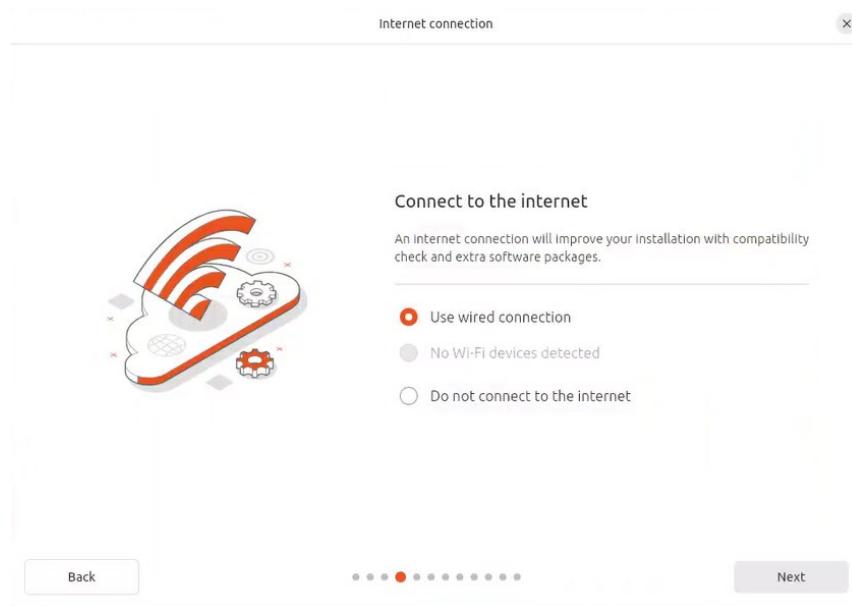
2. In the window Accessibility Ubuntu, just click “Next”



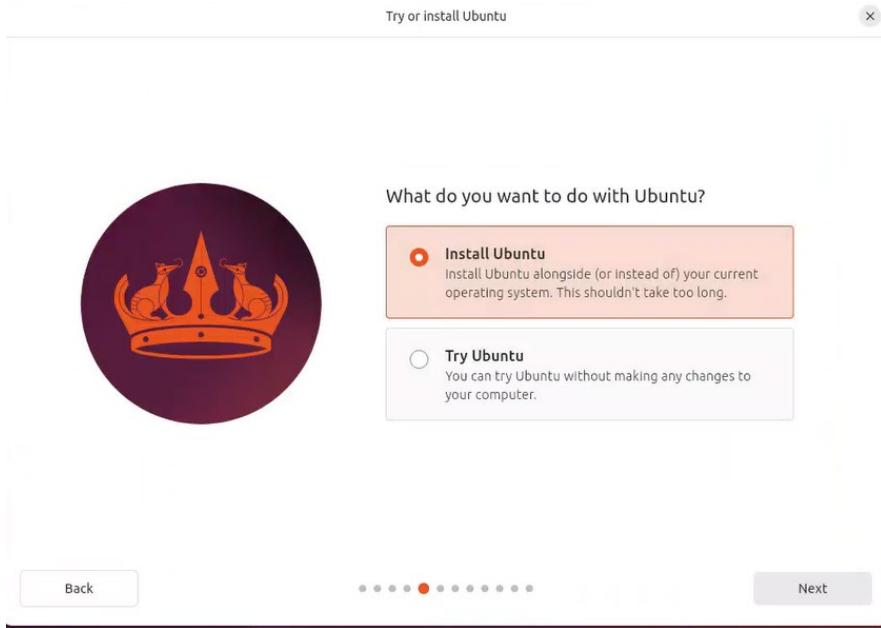
### 3. Keyboard layout: I stick with the default (English US).



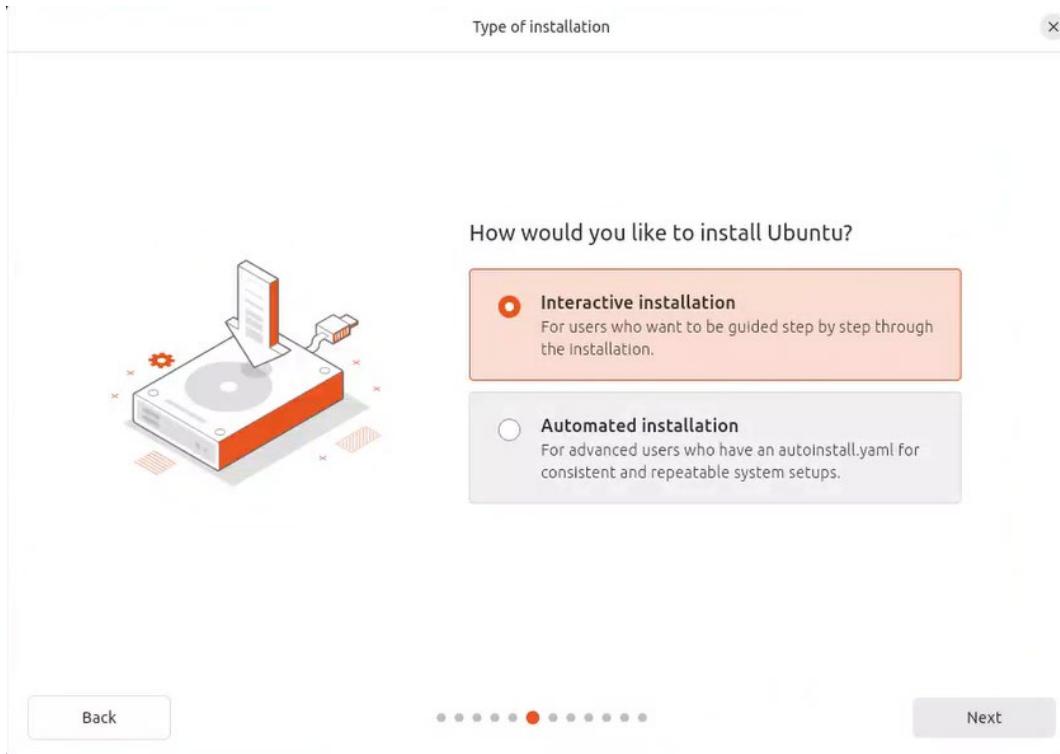
### 4. Select Use wired connection for Connection to Internet



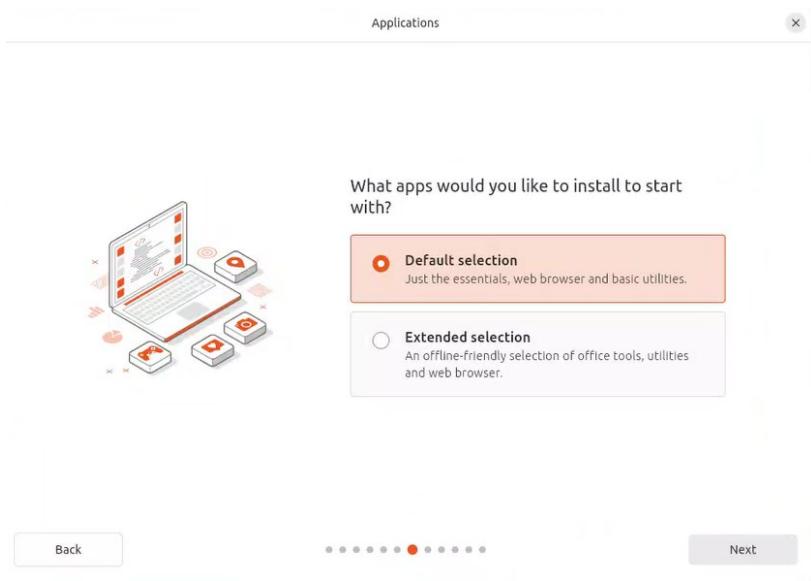
## 5. Select “Install Ubuntu”.



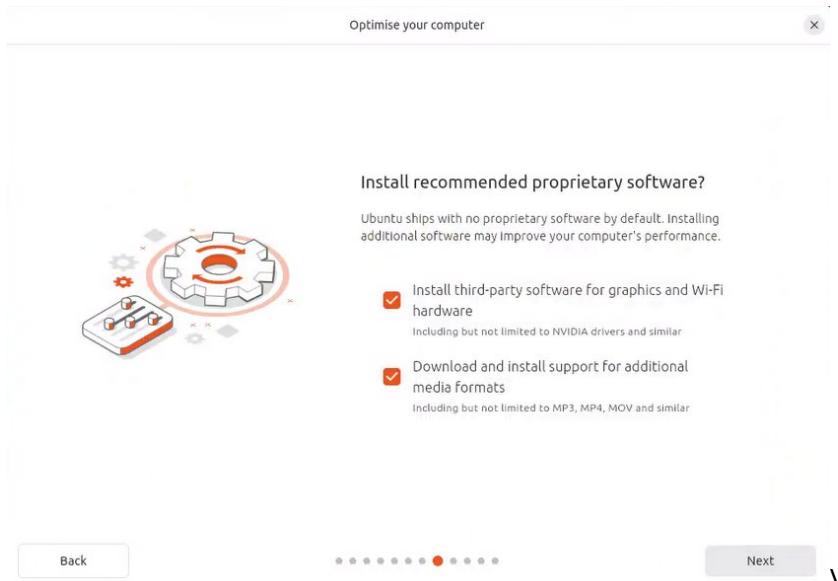
## 6. Select Interactive Installation



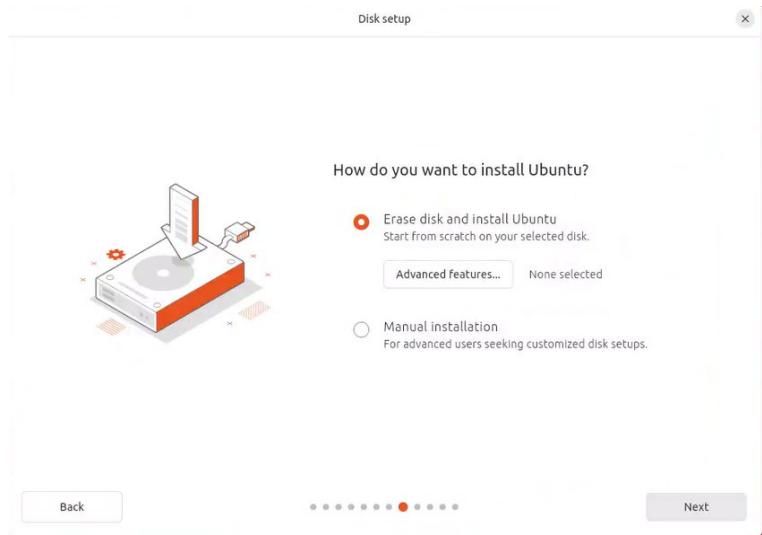
## 7. Select Default Selection



## 8. Select both choices available for Install recommended software.

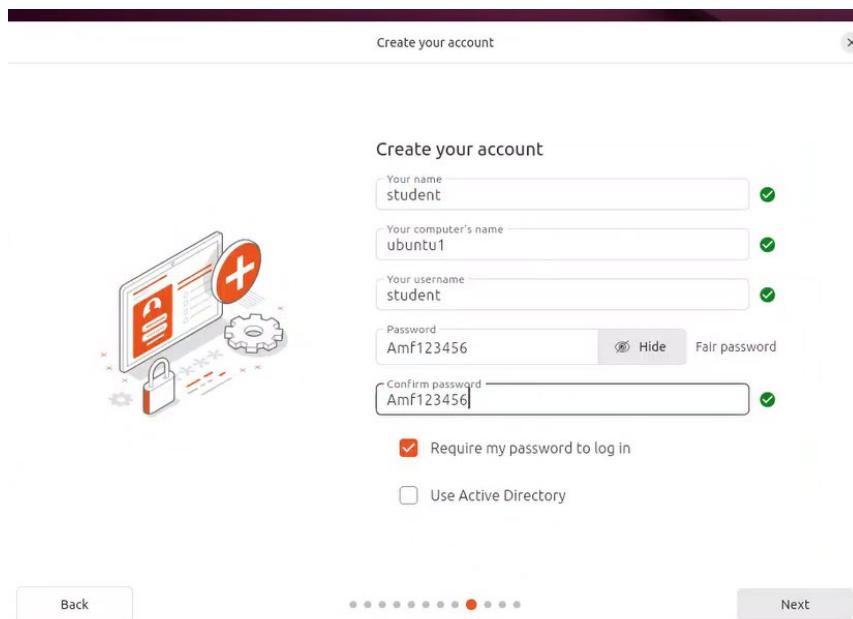


## 9. Erase disk and install Ubuntu (it's a VM, so no real disks are harmed).

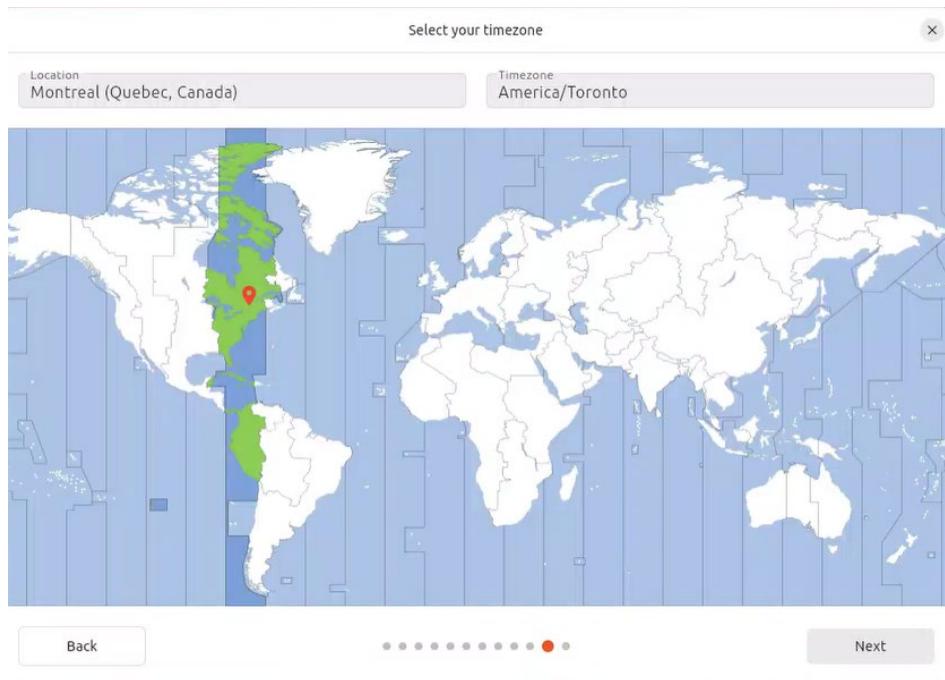


10. Create a user, the following is used in the example:

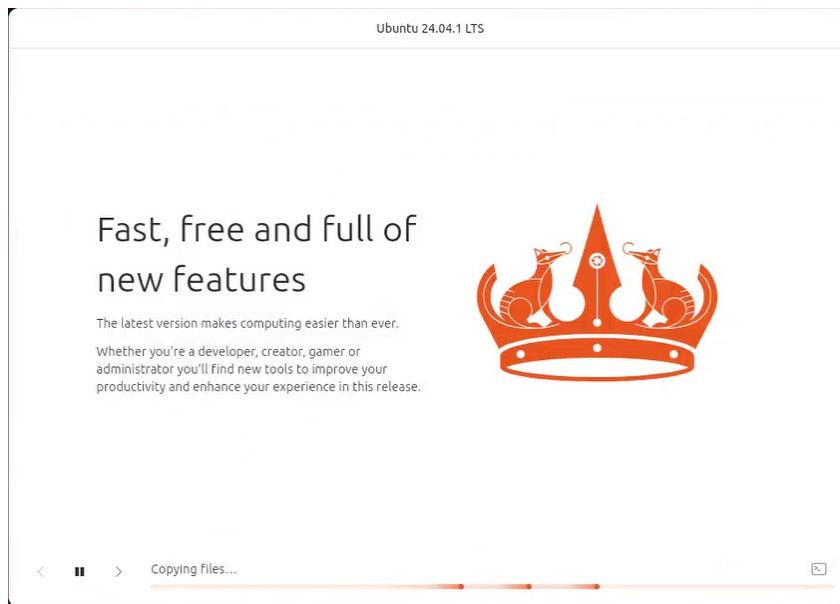
- a) Username: "student"
- b) Password: "Amf123456"



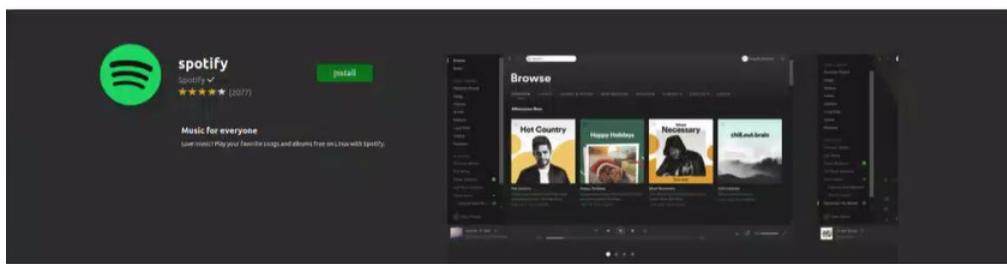
11. Select Location and Time zone



12. The installation starts, a series of screens will appear showing the process (copying file, installing the system, Setting up the system)



Ubuntu 24.04.1 LTS



## All the applications you need

Install, manage and update all your apps in the App Center, including thousands of applications from both the Snap Store and the Ubuntu archive.

Spotify Shotcut Telegram Nextcloud



## Power up your productivity

Ubuntu Desktop includes LibreOffice, a suite of Microsoft Office compatible open source applications for documents, spreadsheets and presentations. Popular collaboration tools are also available.

Thunderbird LibreOffice Microsoft Teams Slack



## Help and support

The official Ubuntu documentation is available both online and via the Help icon in the dock.

Ask Ubuntu covers a range of questions and responses and the Ubuntu Discourse provides guides and discussions for new and experienced users.

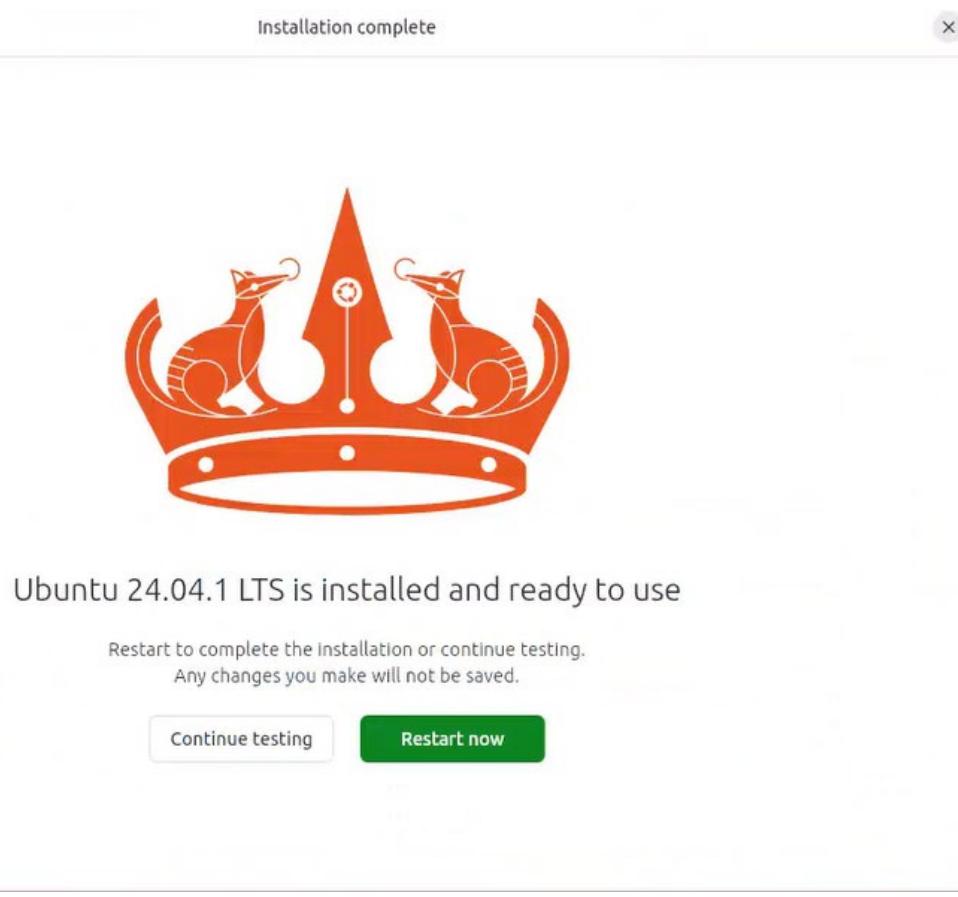
For enterprise users Canonical provides commercial support to make it easy to onboard and manage Ubuntu securely in the workplace.

### ask Ubuntu

- [Official documentation](#)
- [Ask Ubuntu](#)
- [Ubuntu Discourse](#)
- [Enterprise-grade 24/7 support with Ubuntu Pro](#)



13. Press “Restart now” when the following screen appears.



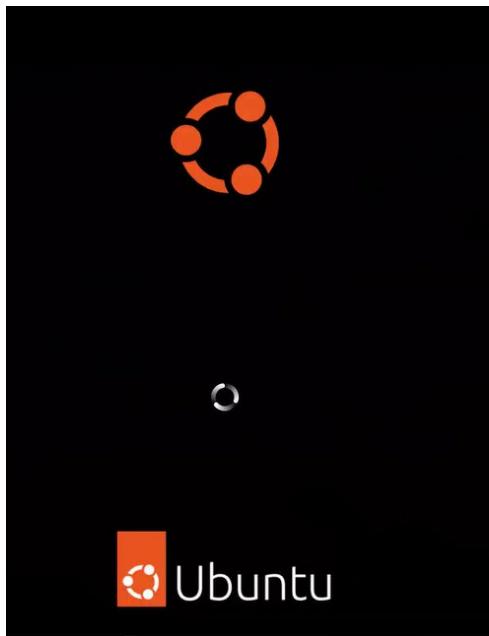
14. After restart comes back a set of screens with installation ongoing will be displayed.

```
overlayfs: fs on '/tmp/tmp_dohgwt8/root.dir' does not support file handles, falling back to xino=off.
overlayfs: fs on '/tmp/tmp5psqhrge/root.dir' does not support file handles, falling back to xino=off.
overlayfs: fs on '/tmp/tmp5psqhrge/root.dir' does not support file handles, falling back to xino=off.
overlayfs: lowerdir is in-use as upperdir/workdir of another mount, accessing files from both mounts will result in undefined behavior.
overlayfs: fs on '/tmp/tmp5psqhrge/root.dir' does not support file handles, falling back to xino=off.
overlayfs: lowerdir is in-use as upperdir/workdir of another mount, accessing files from both mounts will result in undefined behavior.
overlayfs: lowerdir is in-use as upperdir/workdir of another mount, accessing files from both mounts will result in undefined behavior.
overlayfs: fs on '/tmp/tmp5psqhrge/root.dir' does not support file handles, falling back to xino=off.
overlayfs: lowerdir is in-use as upperdir/workdir of another mount, accessing files from both mounts will result in undefined behavior.
overlayfs: lowerdir is in-use as upperdir/workdir of another mount, accessing files from both mounts will result in undefined behavior.
Starting plymouth-switch-root-init...ll Plymouth To Jump To initramfs...
[ OK ] Finished plymouth-switch-root-init...Tell Plymouth To Jump To initramfs.

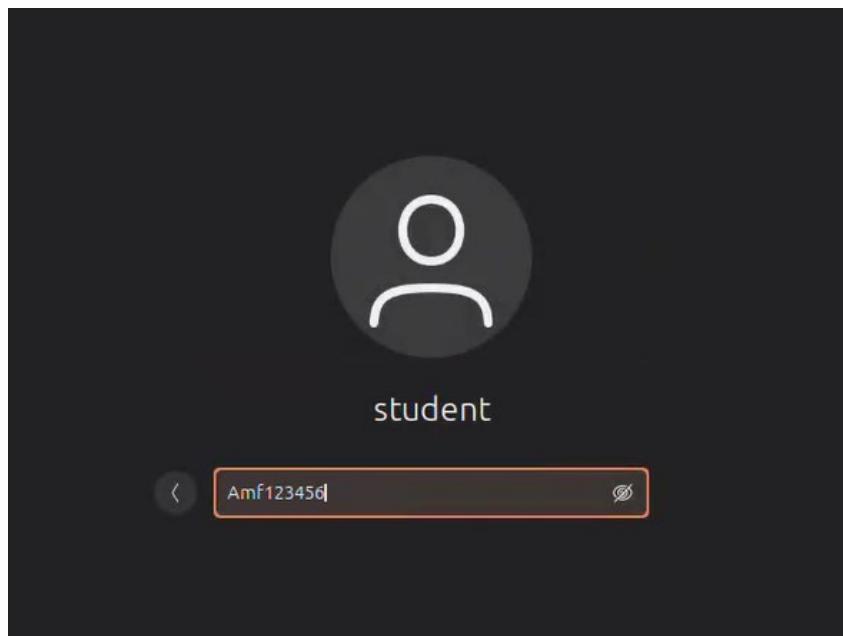
[ *** ] Job session-1.scope/stop running (46s / 1min 30s)
```

```
[ OK ] Unmounted tmp-tmprtpf43yd-mount-cd...unt - /tmp/tmprtpf43yd/mount/cdrom.
[ OK ] Unmounted tmp-tmpwwp3okz5-mount.mount - /tmp/tmpwwp3okz5/mount.
[ OK ] Stopped target snapd.mounts-pre.target - Mounting snaps.
    Unmounting run-snapd-ns.mount - /run/snapd/ns...
    Unmounting tmp-tmprtpf43yd-mount.mount - /tmp/tmprtpf43yd/mount...
[ OK ] Unmounted run-snapd-ns.mount - /run/snapd/ns.
[ OK ] Unmounted tmp-tmprtpf43yd-mount.mount - /tmp/tmprtpf43yd/mount.
    Unmounting tmp.mount - /tmp...
[ OK ] Unmounted tmp.mount - /tmp.
[ OK ] Stopped target local-fs-pre.target...Preparation for Local File Systems.
[ OK ] Stopped target swap.target - Swaps.
[ OK ] Reached target umount.target - Unmount All Filesystems.
    Stopping lvm2-monitor.service - Monitoring dmeventd or progress polling...
[ OK ] Stopped systemd-tmpfiles-setup-dev...Create Static Device Nodes in /dev.
[ OK ] Stopped systemd-sysusers.service - Create System Users.
[ OK ] Stopped systemd-remount-fs.service...mount Root and Kernel File Systems.
[ OK ] Stopped systemd-tmpfiles-setup-dev...ic Device Nodes in /dev gracefully.
[ OK ] Stopped lvm2-monitor.service - Monitoring dmeventd or progress polling.
[ OK ] Reached target shutdown.target - System Shutdown.
    Starting casper.service - Shuts down" preinstalled system cleanly...
Please remove the installation medium, then press ENTER:
    Unmounting cdrom.mount - /cdrom...
[FAILED] Failed unmounting cdrom.mount - /cdrom.
cdrom.mount
```

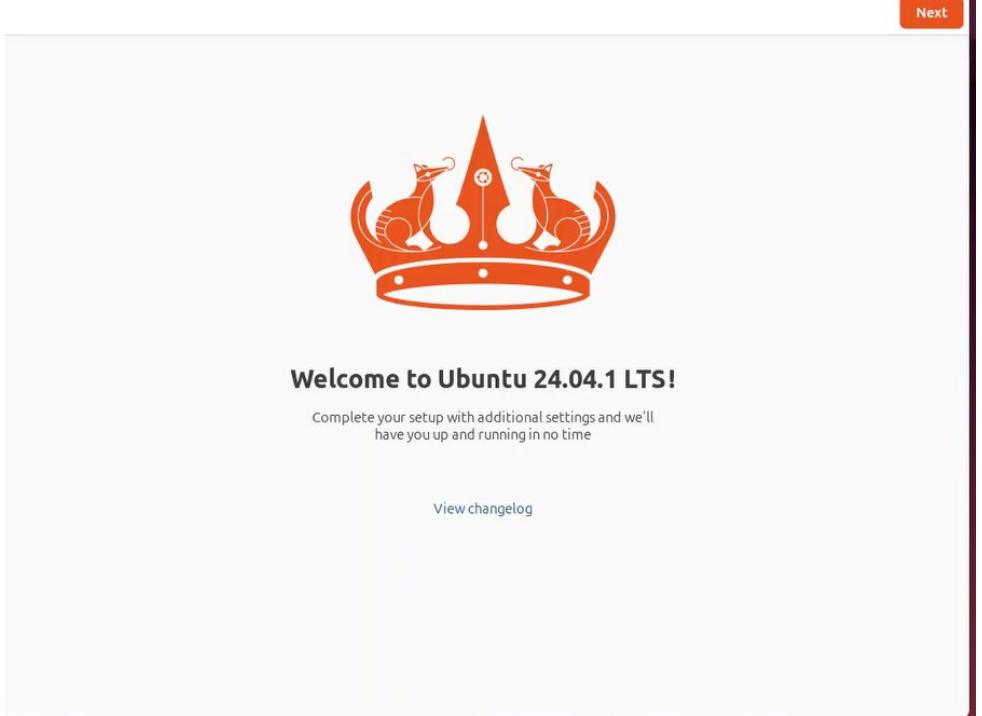
15. When the process finishes, the following screen appears to indicate to wait.



16. Login prompt appears, select user student and put corresponding password.



17. At login, the screen appears:



18. Select “Skip for now”, then click Next.

Previous      Ubuntu Pro      Next

**Enable Ubuntu Pro**

Upgrade this machine to Ubuntu Pro. Free for up to 5 machines.

 **Ubuntu Pro**

Get security updates on a wide range of packages until 2034

• Fulfill FedRAMP, FIPS, STIG and HIPAA and other compliance and hardening requirements with certified tooling and crypto-modules

Learn more at [ubuntu.com/pro](https://ubuntu.com/pro).

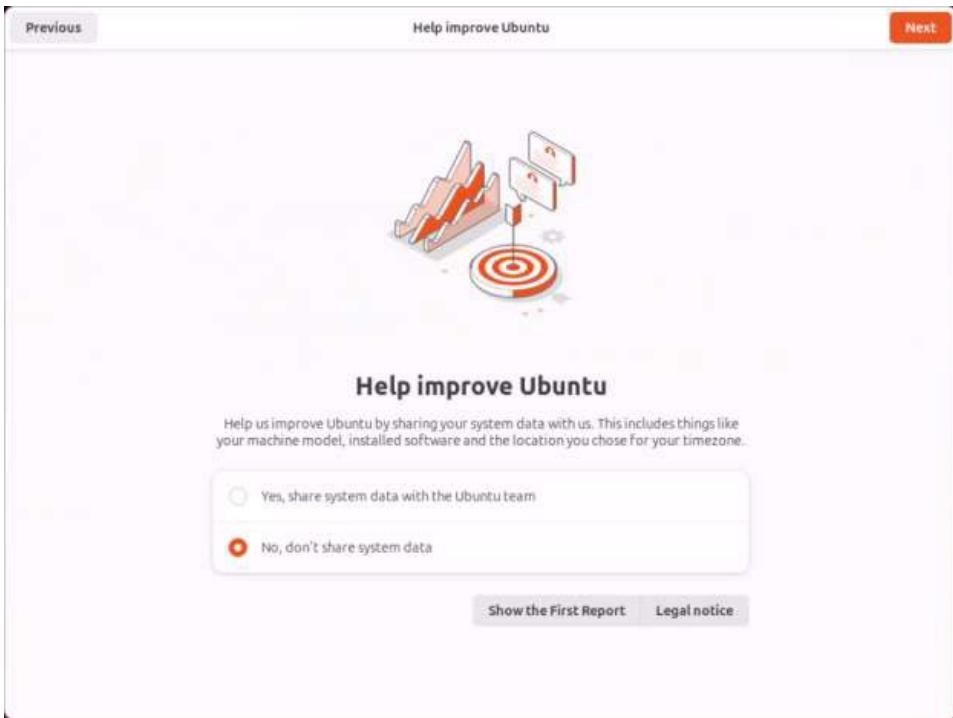
Enable Ubuntu Pro now, or skip this step.

Enable Ubuntu Pro

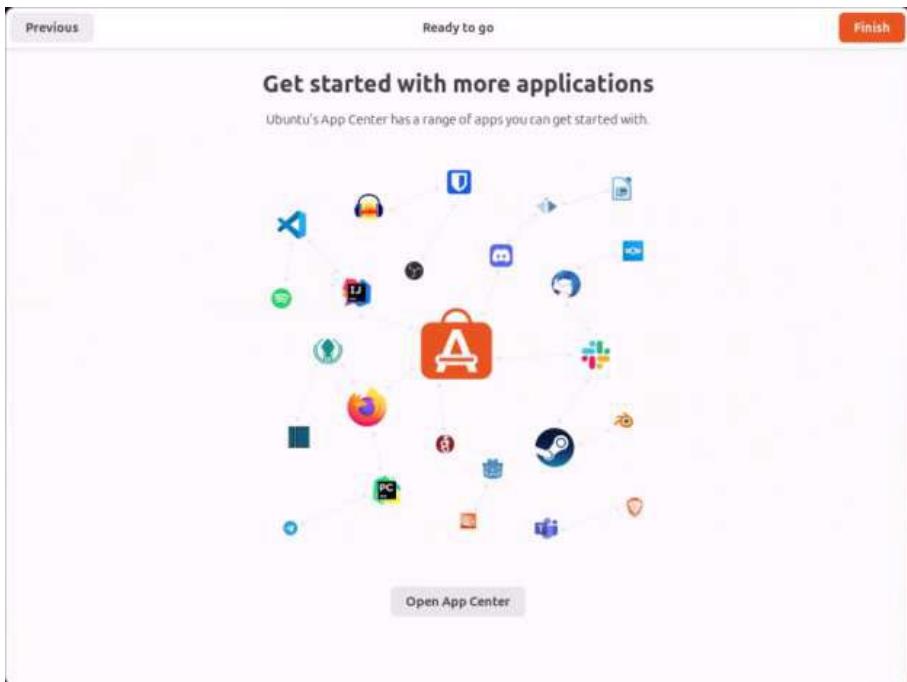
Skip for now

You can always enable Ubuntu Pro later via the Software & Updates application

19. Select “No, don’t share system data”, then click Next.



20. Click Finish.



### 3.1.3.4 Ubuntu post-installation activities

Open a terminal and follow the instructions of the following steps.

- A) Issue `sudo passwd` command will prompt the user to set a new password for the root account

```
student@ubuntu1:~$ To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo_root" for details.  
  
student@ubuntu1:~$ sudo passwd  
[sudo] password for student:  
New password:  
BAD PASSWORD: The password fails the dictionary check - it is too simplistic/systematic  
Retype new password:  
passwd: password updated successfully  
student@ubuntu1:~$
```

- B) Update your system:

1. Use command `su` to change to the root user.

```
student@ubuntu1:~$  
student@ubuntu1:~$  
student@ubuntu1:~$  
student@ubuntu1:~$ su  
Password:  
root@ubuntu1:/home/student#
```

- C) Issue command `sudo apt-get update` to fetch the list of available updates

```
root@ubuntu1:/home/student#  
root@ubuntu1:/home/student# sudo apt-get update
```

```
root@ubuntu1:/home/student#
root@ubuntu1:/home/student# sudo apt-get update
Hit:1 http://security.ubuntu.com/ubuntu noble-security InRelease
Hit:2 http://ca.archive.ubuntu.com/ubuntu noble InRelease
Hit:3 http://ca.archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:4 http://ca.archive.ubuntu.com/ubuntu noble-backports InRelease
Reading package lists... Done
root@ubuntu1:/home/student#
```

D) Issue command `sudo apt-get upgrade` to install the updates, when prompted “Do you want to continue (y/n) “press “y”

```
root@ubuntu1:/home/student# sudo apt-get upgrade
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
The following upgrades have been deferred due to phasing:
  gir1.2-nm-1.0 libnm0 network-manager network-manager-config-connectivity-ubuntu python3-distupgrade ubuntu-release-upgrader-core ubuntu-release-upgrader-gtk
The following packages have been kept back:
  gnome-control-center
The following packages will be upgraded:
  acf als-audio-conf apparmor apport apport-core-dump-handler apport-gtk cloud-init distro-info-data dmidecode dmsetup evince evince-common fwupd
  gir1.2-gnomebluetooth-3.0 gir1.2-gtk-3.0 gir1.2-mutter-14 gir1.2-packagekitglib-1.0 gnome-bluetooth-3-common gnome-bluetooth-sentto gnome-control-center-data
  gnome-control-center-faces gnome-initial-setup gnome-shell gnome-shell-common gnome-shell-extension-appindicator gnome-shell-extension-ubuntu-dock
  gstreamer1.0-packagekit gstreamer1.0-pipewire gtk-update-icon-cache initramfs-tools initramfs-tools-bin initramfs-tools-core krb5-locales ldap-utils libacl1
  libapparmor1 libaudit1-common libaudit1 libcryptsetup12 libdevmapper1.02.1 libevdocument3-4t64 libevview3-3t64 libfwupd2 libgnome-bluetooth-3.0-13
  libgnome-bluetooth-ui-3.0-13 libgsapt-krb5-2 libgtk-3-0t64 libgtk-3-bin libgtk-3-common libipa-hbac0t64 libkrb5crypto1 libkrb5-3 libkrb5support0 libldap-common
  libldapi libmutter-14-0 libnss-sss libpackagekit-glib2-18 libpam-sss libpipewire-0.3-0t64 libpipewire-0.3-common libpipewire-0.3-modules libproc2-0
  libspice-0.2-bluetooth libspice-0.2-modules libspexi libssss-certmap0 libssss-idmap0 libssss-nss-idmap0 libudisks2-0 login mtr-tiny mutter-common mutter-common-bin
  openvpn packagekit packagekit-tools passwd pipewire pipewire-alsa pipewire-bin pipewire-pulse procps python3-apport python3-problem-report
  python3-software-properties python3-sss python3-update-manager snapd software-properties-common software-properties-gtk sssd sssd-ad sssd-ad-common sssd-common
  sssd-ldap sssd-krb5 sssd-krb5-common sssd-sssd sssd-proxy systemd-hwe-hwdb ubuntu-drivers-common ubuntu-pro-client ubuntu-pro-client-l10n ubuntu-settings
  udisks2 update-manager update-manager-core xdg-desktop-portal zip
111 upgraded, 0 newly installed, 0 to remove and 8 not upgraded.
Need to get 58.2 MB of archives.
After this operation, 5,761 kB of additional disk space will be used.
N: Some packages may have been kept back due to phasing.
Do you want to continue? [Y/n] 
```

```
Preparing to unpack .../passwd_1:5a4.13+dfsg1-4ubuntu3.2_amd64.deb ...
Unpacking passwd (1:4.13+dfsg1-4ubuntu3.2) over (1:4.13+dfsg1-4ubuntu3) ...
Setting up passwd (1:4.13+dfsg1-4ubuntu3.2) ...
(Reading database ... 149114 files and directories currently installed.)
Preparing to unpack .../00-libproc2-0_2%3a4.0.4-4ubuntu3.2_amd64.deb ...
Unpacking libproc2-0:amd64 (2:4.0.4-4ubuntu3.2) over (2:4.0.4-4ubuntu3) ...
Preparing to unpack .../01-procps_2%3a4.0.4-4ubuntu3.2_amd64.deb ...
Unpacking procps (2:4.0.4-4ubuntu3.2) over (2:4.0.4-4ubuntu3) ...
Preparing to unpack .../02-distro-info-data_0.60ubuntu0.2_all.deb ...
Unpacking distro-info-data (0.60ubuntu0.2) over (0.60ubuntu0.1) ...
Preparing to unpack .../03-libdevmapper1.02.1_2%3a1.02.185-3ubuntu3.1_amd64.deb ...
Unpacking libdevmapper1.02.1:amd64 (2:1.02.185-3ubuntu3.1) over (2:1.02.185-3ubuntu3) ...
Preparing to unpack .../04-dmsetup_2%3a1.02.185-3ubuntu3.1_amd64.deb ...
Unpacking dmsetup (2:1.02.185-3ubuntu3.1) over (2:1.02.185-3ubuntu3) ...
Preparing to unpack .../05-krb5-locales_1.20.1-6ubuntu2.2_all.deb ...
Unpacking krb5-locales (1.20.1-6ubuntu2.2) over (1.20.1-6ubuntu2.1) ...
Preparing to unpack .../06-libapparmor1_4.0.1really4.0.1-0ubuntu0.24.04.3_amd64.deb ...
Unpacking libapparmor1:amd64 (4.0.1really4.0.1-0ubuntu0.24.04.3) over (4.0.1really4.0.0-beta3-0ubuntu0.1) ...
Preparing to unpack .../07-libcryptsetup12_2%3a2.7.0-1ubuntu4.1_amd64.deb ...
Unpacking libcryptsetup12:amd64 (2:2.7.0-1ubuntu4.1) over (2:2.7.0-1ubuntu4) ...
Preparing to unpack .../08-libgssapi-krb5-2_1.20.1-6ubuntu2.2_amd64.deb ...
Unpacking libgssapi-krb5-2:amd64 (1.20.1-6ubuntu2.2) over (1.20.1-6ubuntu2.1) ...
Preparing to unpack .../09-libkrb5-3_1.20.1-6ubuntu2.2_amd64.deb ...
Unpacking libkrb5-3:amd64 (1.20.1-6ubuntu2.2) over (1.20.1-6ubuntu2.1) ...
Preparing to unpack .../10-libkrb5support0_1.20.1-6ubuntu2.2_amd64.deb ...
Unpacking libkrb5support0:amd64 (1.20.1-6ubuntu2.2) over (1.20.1-6ubuntu2.1) ...
Preparing to unpack .../11-libk5crypto3_1.20.1-6ubuntu2.2_amd64.deb ...
Unpacking libk5crypto3:amd64 (1.20.1-6ubuntu2.2) over (1.20.1-6ubuntu2.1) ...
Preparing to unpack .../12-systemd-hwe-hwdb_255.1.4_all.deb ...
Unpacking systemd-hwe-hwdb (255.1.4) over (255.1.3) ...
Preparing to unpack .../13-ubuntu-pro-client-l10n_34-24.04_amd64.deb ...
Unpacking ubuntu-pro-client-l10n (34-24.04) over (32.3.1-24.04) ...
Preparing to unpack .../14-ubuntu-pro-client_34-24.04_amd64.deb ...
Unpacking ubuntu-pro-client (34-24.04) over (32.3.1-24.04) ...
```

## Wait until process finishes

```
Setting up update-manager (1:24.04.9) ...
Setting up gnome-shell-extension-ubuntu-dock (90ubuntu2) ...
Setting up evince (46.3.1-0ubuntu1) ...
Processing triggers for initramfs-tools (0.142ubuntu25.4) ...
update-initramfs: Generating /boot/initrd.img-6.8.0-50-generic
Processing triggers for libc-bin (2.39-0ubuntu8.3) ...
root@ubuntu1:/home/student#
root@ubuntu1:/home/student#
root@ubuntu1:/home/student#
root@ubuntu1:/home/student#
```

### 3.1.4 Centos

#### CHECKPOINT

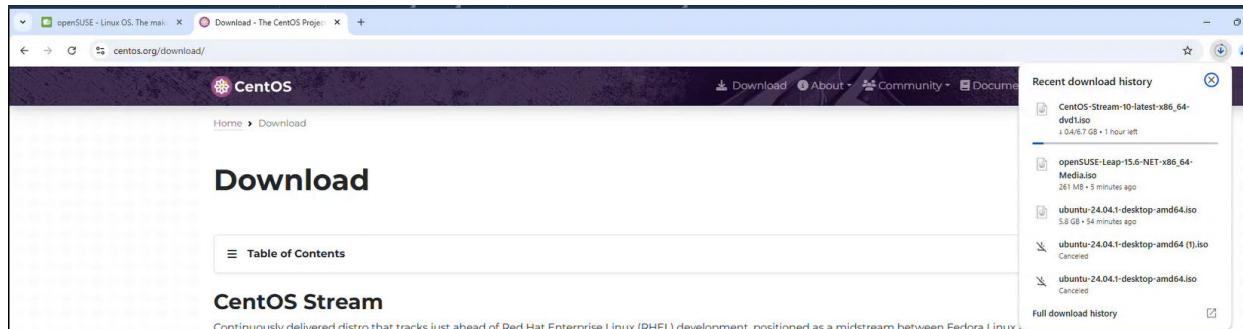
CONTINUE to next section if the following three conditions are met:

- Splashtop Business is ok, and
- Computer in John Abbott Computer Lab is accessible up and running and
- VMWare Workstation Pro is installed preferably with latest upgrades

For more information how to check the three previous conditions refer to [General activities](#) section “Splashtop and Computer” and section “Verify VMware Workstation Pro is installed”

If all three conditions are not met, the update can not be done procedure **STOPS** here.

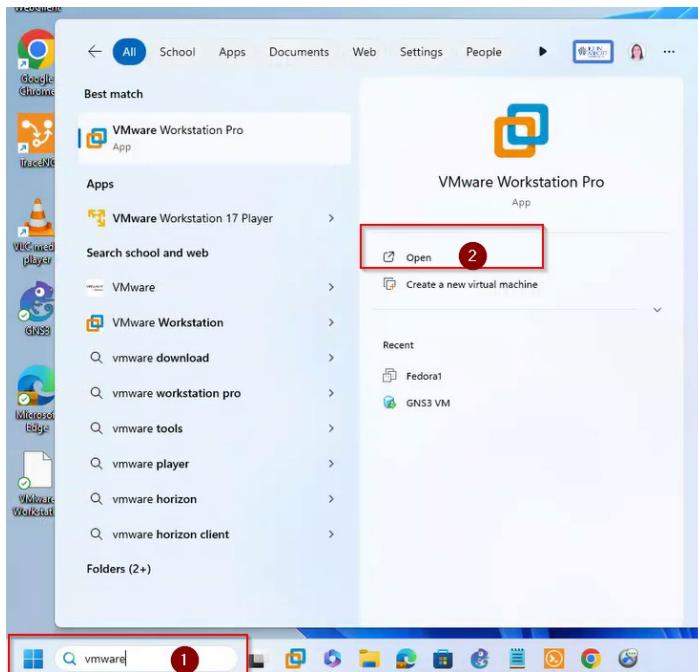
#### 3.1.4.1 Centos download



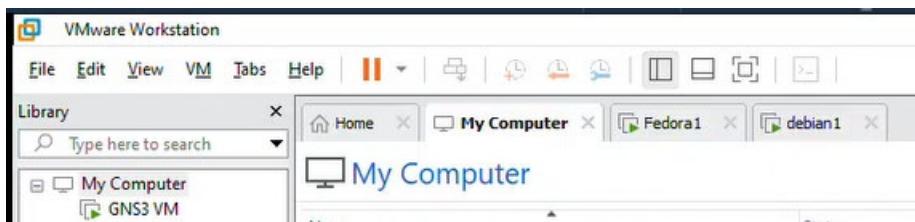
#### 3.1.4.2 Create VM for Centos

##### A) Open the VMware Workstation App

- 1 Look for application in windows search
- 2 Once VMware Workstation Pro appears, open application

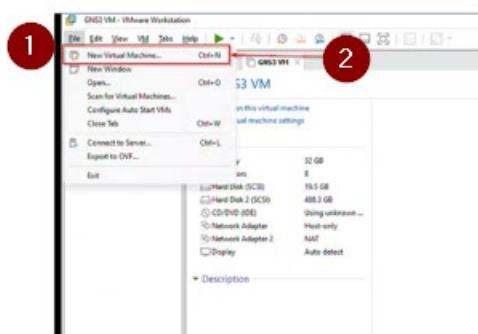


B) VMware workstation opens:



C) Select from top menu and submenu

1. File
2. New Virtual Machine...

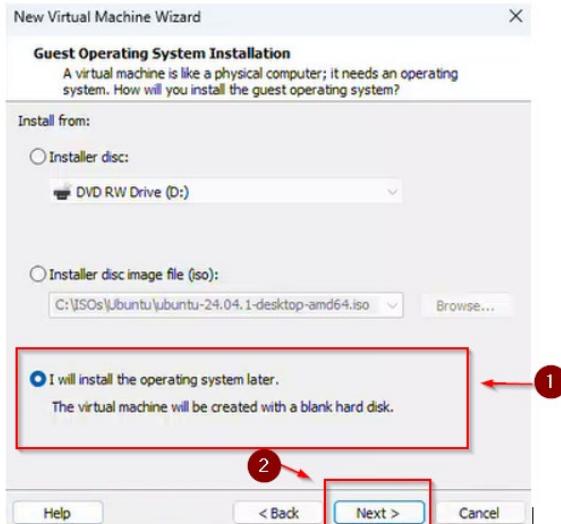


- D) When the “Welcome to the New Virtual Machine Wizard” window pops up, select “Typical (recommended)”, then click “Next >”



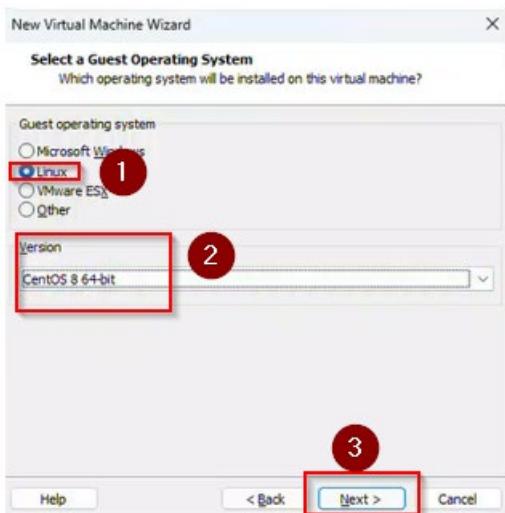
E) “Guest Operating System Installation” window pops up, please:

1. Select “I will install the operating system later. The virtual machine will be created with a blank hard disk.”.
2. Click “Next”



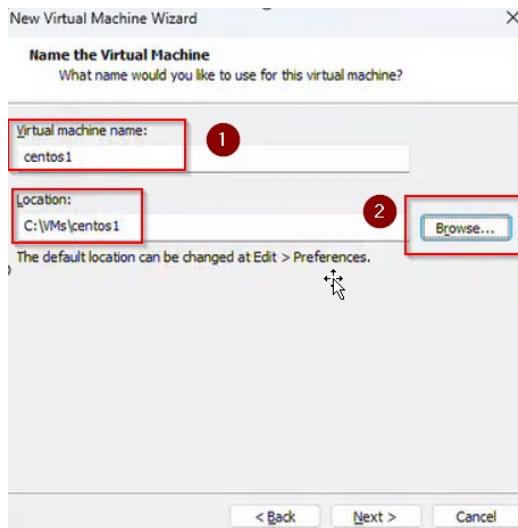
F) The window “Select a Guest Operating System Which operating system will be installed on this virtual machine?”

1. Select Linux for Guest operating system
2. For Version, select “Ubuntu 64-bit”
3. Select “Next”



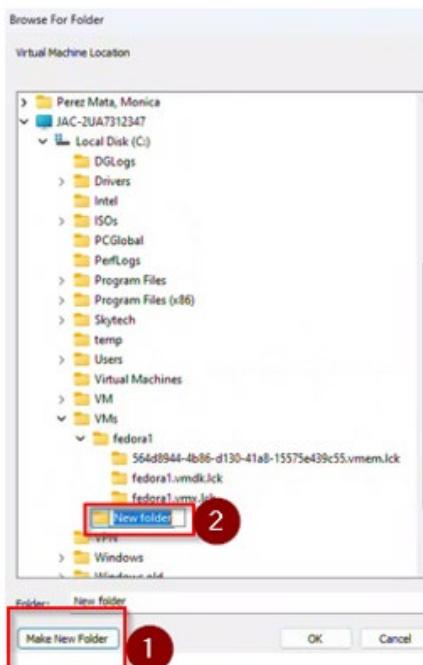
G) In the window “Name the Virtual Machine”

1. Set name Virtual machine name: “ubuntu1”
2. For the location Browse to change directory

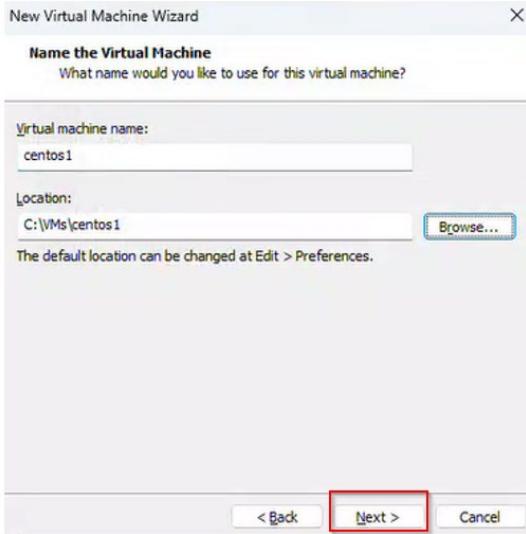


H) Create a new directory for centos1

1. Select VMs directory and click on “New directory”
2. Create a directory for centos1

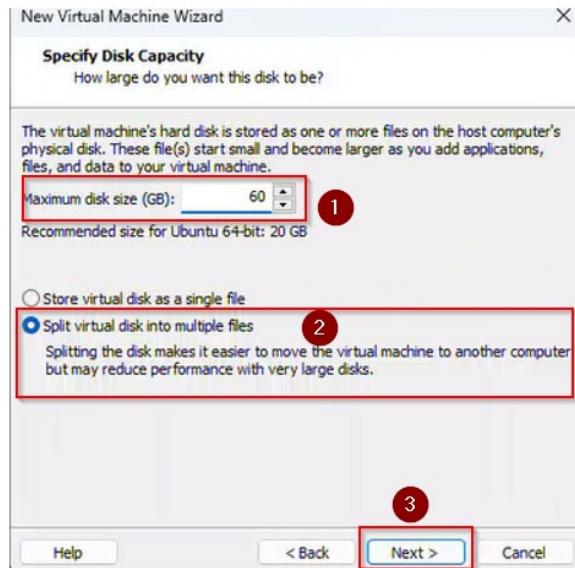


I) Click “Next” after Virtual machine name and location was set.

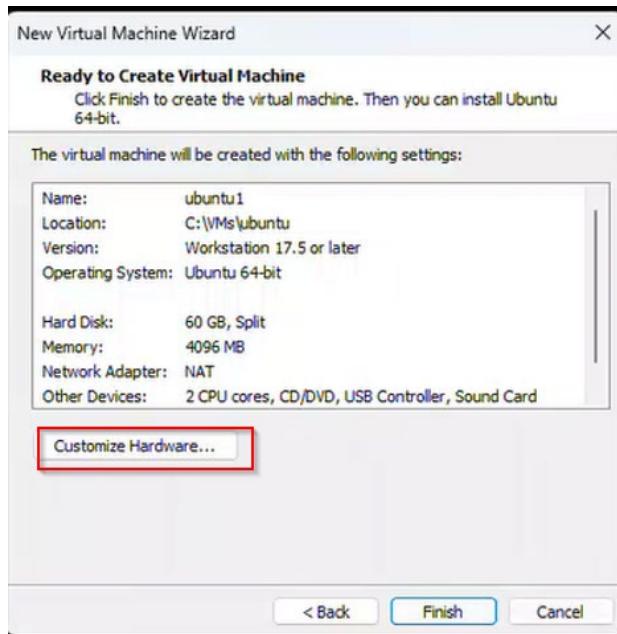


J) In the window Specify Disk Capacity, set:

1. Set the Maximum disk size (GB) to 60
2. Keep the default set to “Split virtual disk into multiple files”
3. Click “Next >”

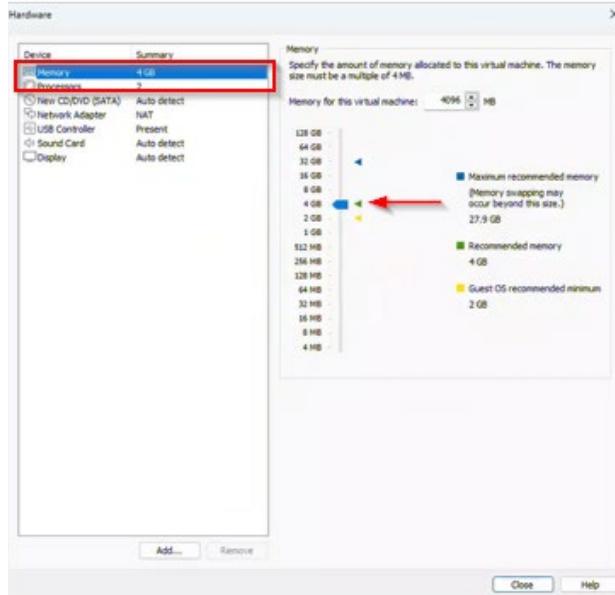


K) In the window “Ready to create Virtual Machine” select Customize hardware

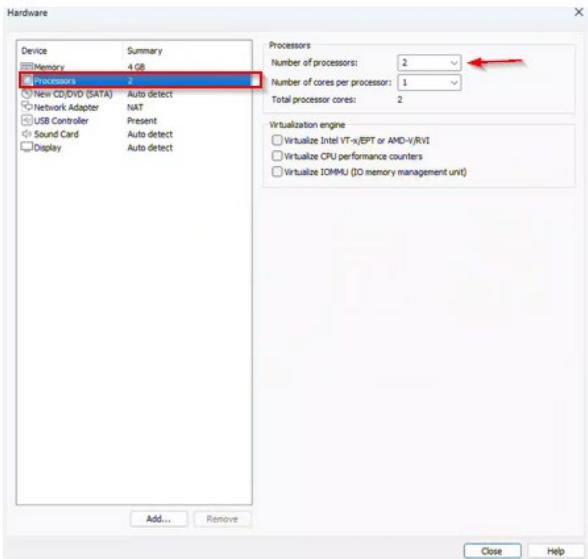


## L) For Hardware settings:

### 1. Set Memory to 4GB

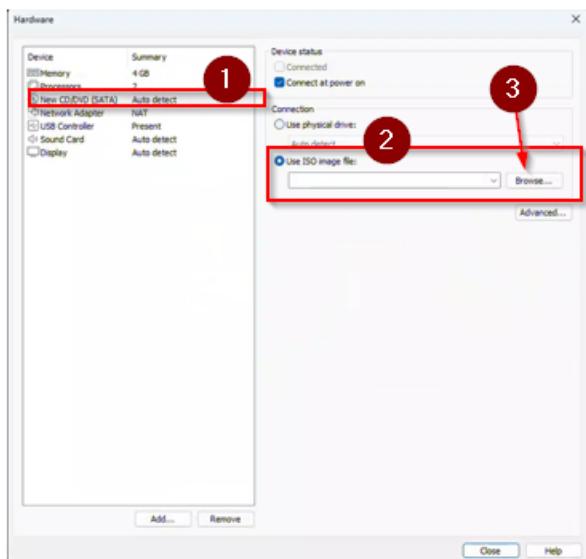


### 2. Set Processors to 2

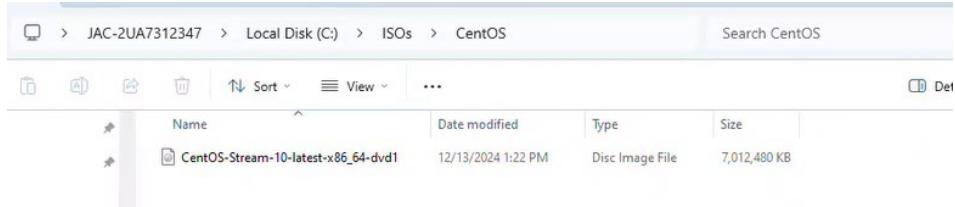


#### M) New CD/DVD (SATA)

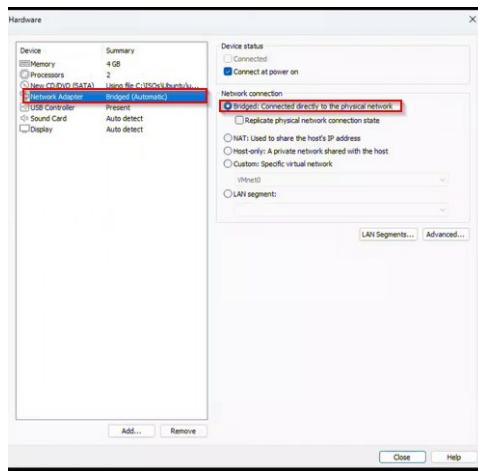
1. Select New CD/DVD (SATA)
2. Highlight Use ISO image file
3. select Browse.



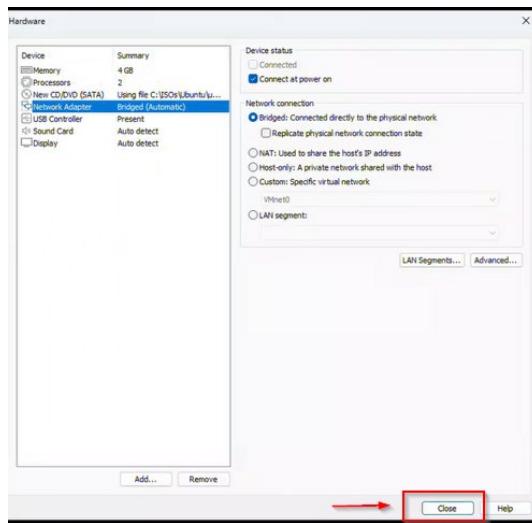
4. Once you select “Use ISO image file:”, browse for the Ubuntu iso file



N) Set Network Adapter to bridged



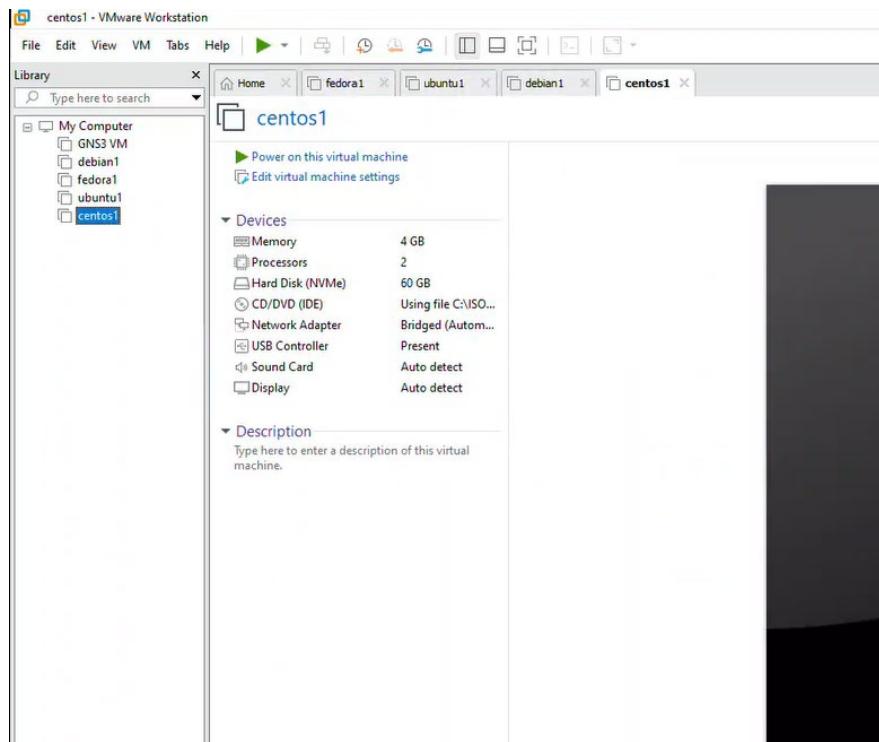
O) Click Close.



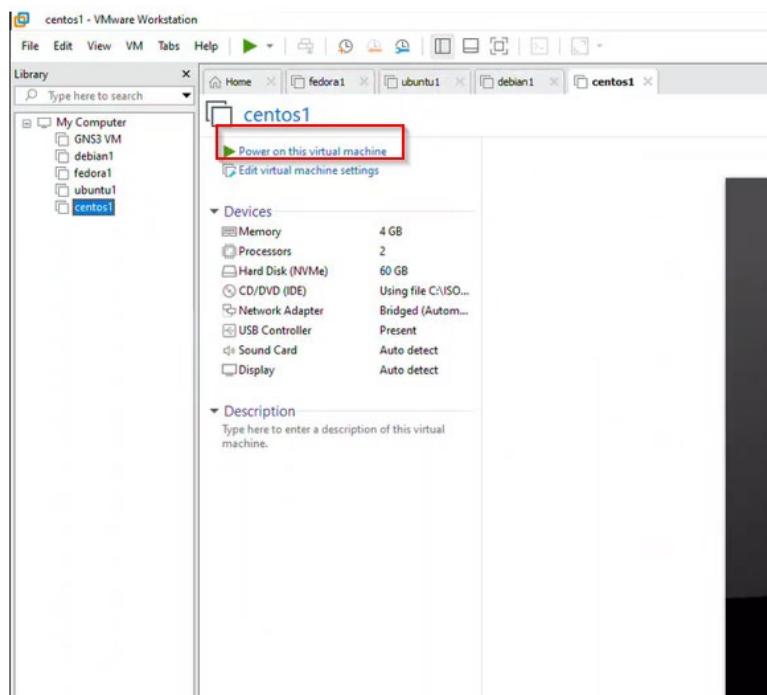
P) Review and press Finish



Q) VM opens

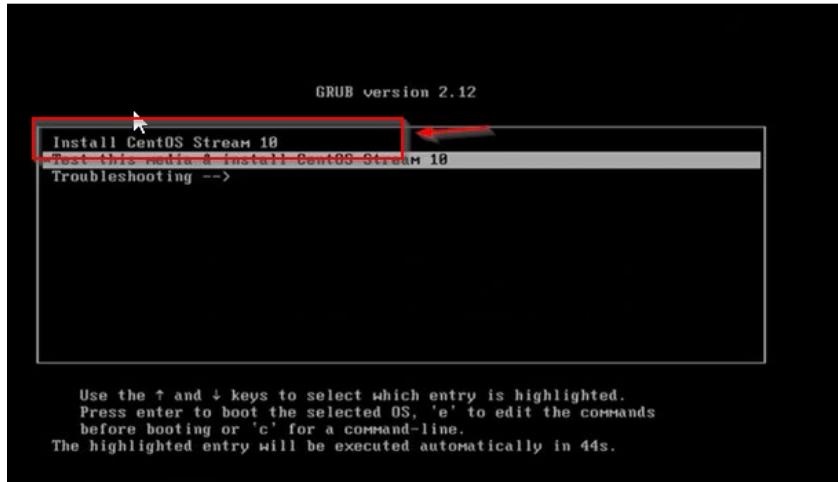


R) Power on virtual machine



### 3.1.4.3 Install Centos on recently created virtual machine

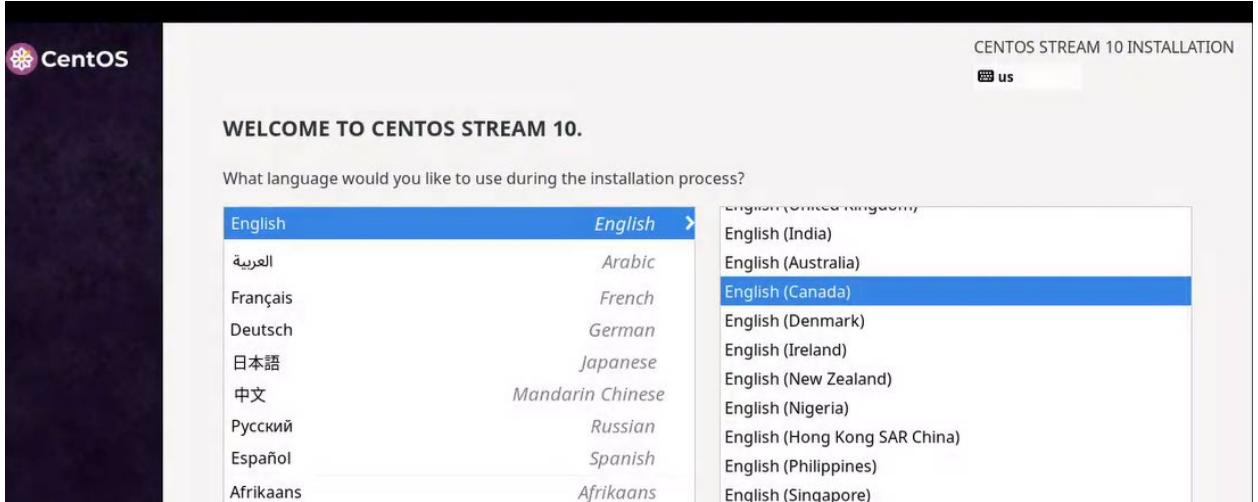
- A) Select in the first screen that appears “Install CentOS Stream 10”



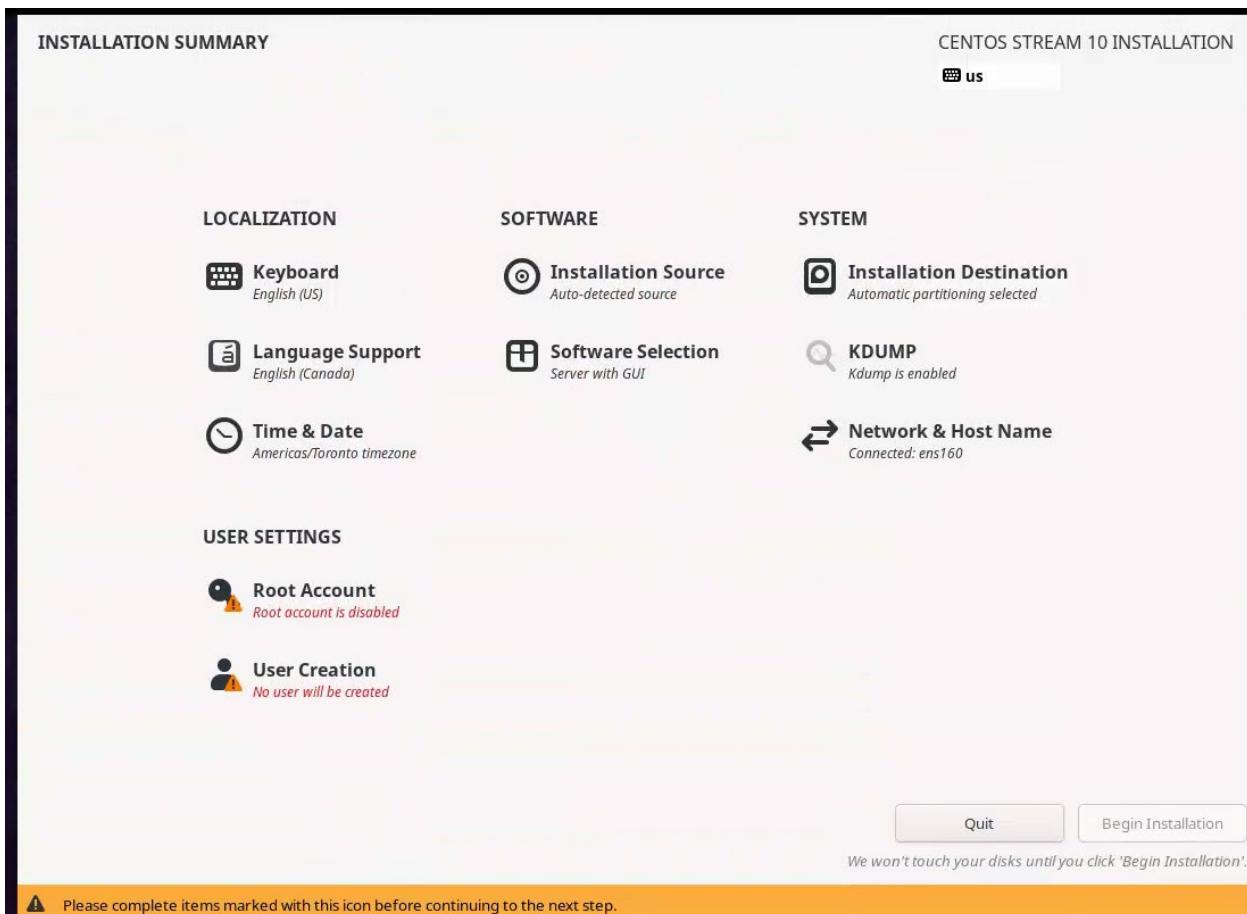
- B) The installation starts and a screen showing the procedure appears

```
[ OK ] Mounted sys-kernel-config.mount - Kernel Configuration File System.
core: CPUID marked event: 'cpu cycles' unavailable
core: CPUID marked event: 'instructions' unavailable
core: CPUID marked event: 'bus cycles' unavailable
core: CPUID marked event: 'cache references' unavailable
core: CPUID marked event: 'cache misses' unavailable
core: CPUID marked event: 'branch instructions' unavailable
core: CPUID marked event: 'branch misses' unavailable
device-mapper: core: CONFIG_IMA_DISABLE_HTABLE is disabled. Duplicate IMA measurements will not be recorded in the IMA log.
db_root: cannot open: /etc/target
Warning: Unmaintained driver is detected: cnic
Warning: Unmaintained driver is detected: bnx2i
[ OK ] Started plymouth-start.service - Show Plymouth Boot Screen.
[ OK ] Started systemd-ask-password-plymouth@guests to Plymouth Directory Watch.
[ OK ] Reached target cryptsetup.target - Local Encrypted Volumes.
[ OK ] Reached target paths.target - Path Units.
[ OK ] Reached target sysinit.target - System Initialization.
[ OK ] Reached target basic.target - Basic System.
[ OK ] Stopped systemd-vconsole-setup.service - Virtual Console Setup.
      Stopping systemd-vconsole-setup.service - Virtual Console Setup...
      Starting systemd-vconsole-setup.service - Virtual Console Setup...
[ OK ] Stopped systemd-vconsole-setup.service - Virtual Console Setup.
      Starting systemd-vconsole-setup.service - Virtual Console Setup...
[ OK ] Stopped systemd-vconsole-setup.service - Virtual Console Setup.
      Starting systemd-vconsole-setup.service - Virtual Console Setup...
[ OK ] Finished systemd-vconsole-setup.service - Virtual Console Setup.
-
```

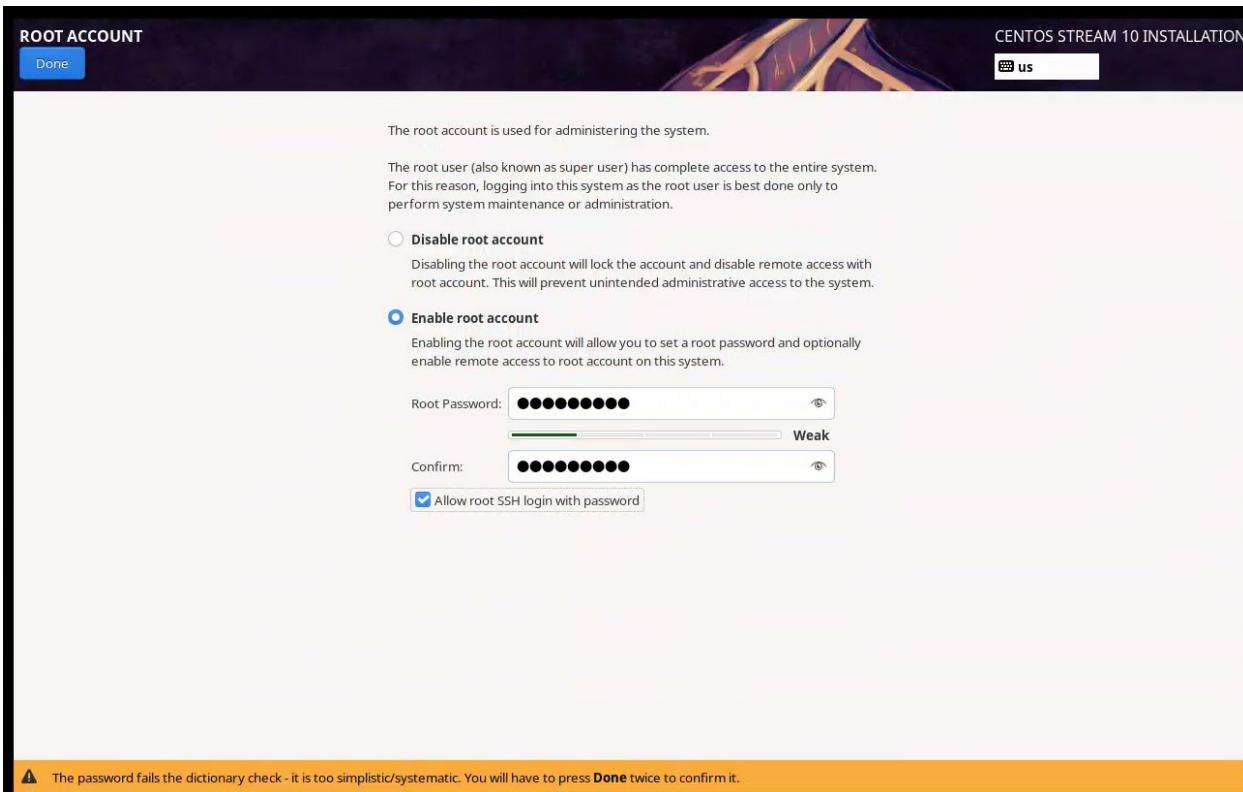
- C) Once procedure is finished, a screen called WELCOME TO CENTOS STREAM 10" appears, in the option to select the language. Select “English” and click Continue.



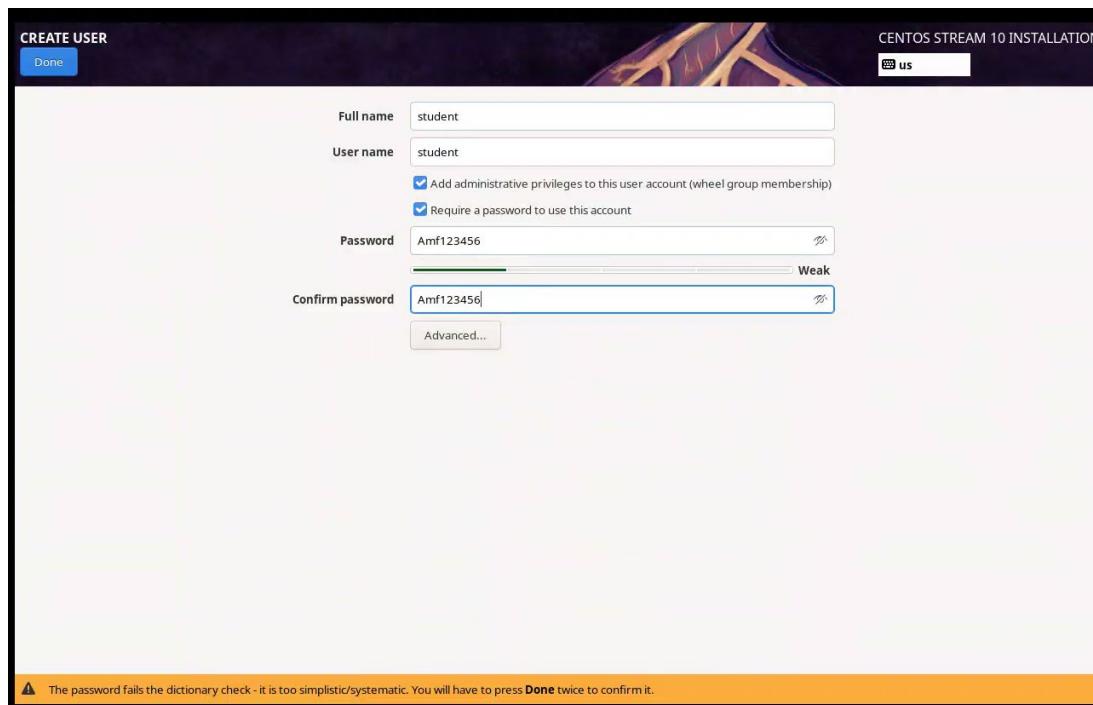
- D) In the window “INSTALLATION SUMMARY” inside the section USER SETTINGS Select “Root Account”



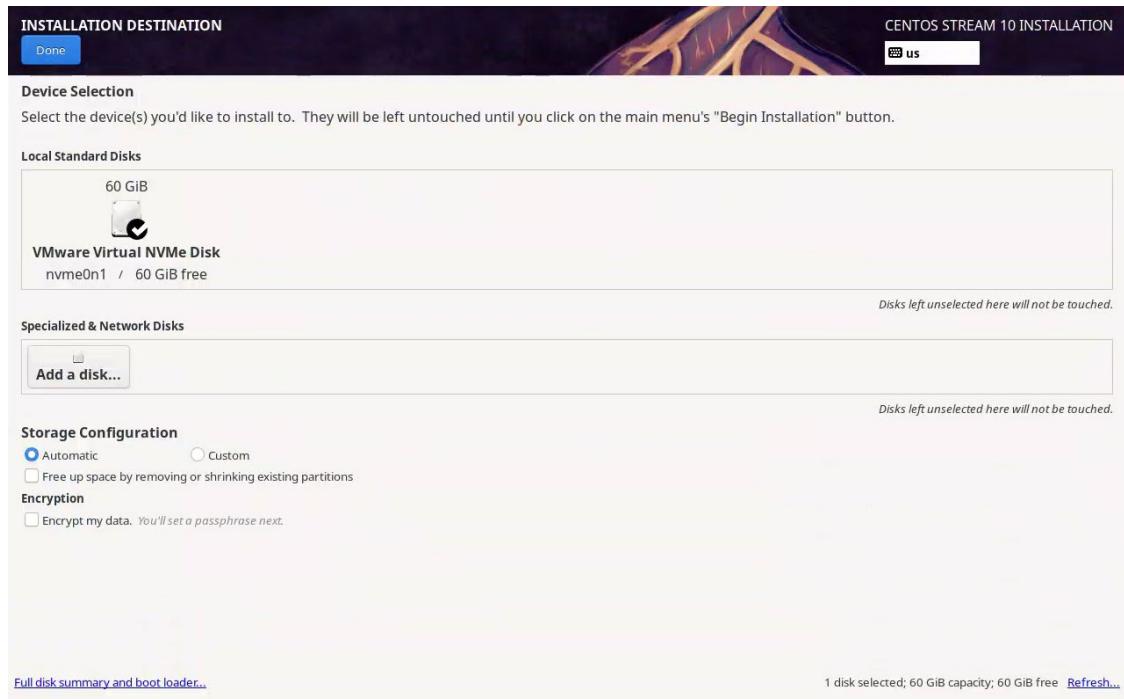
- E) Select “Enable root account” and configure Root account with password “Amf123456”, make sure you click on “Allow root SH with password”



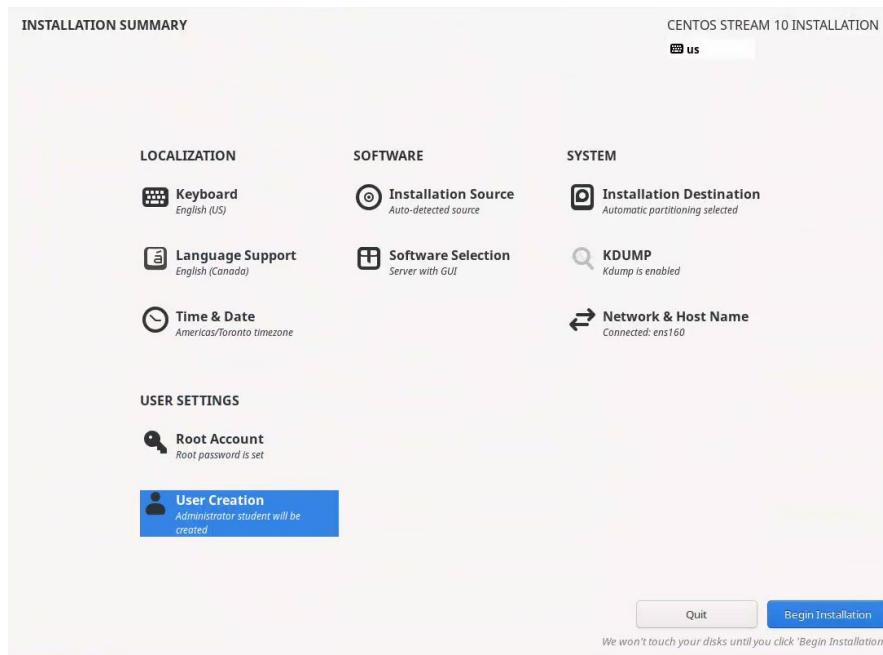
- F) In the window “INSTALLATION SUMMARY” inside the section USER SETTINGS Select “User creation” create user “student” with password “Amf123456”. When finished click the blue button “Done” on the top left corner of the window



- G) In the window “INSTALLATION DESTINATION” verify “VMware Virtual NVMe disk” is selected and click the blue button “Done” on the top left corner of the window.



- H) In the INSTALLATION SUMMARY check the setup, the click “Begin Installation” blue button at the right down of the screen



- I) INSTALLATION PROGRESS window appears, wait until completed.



- J) At the end , INSTALLATION PROGRESS window indicates installation is completed. Select blue button at the right down corner “Reboot system”



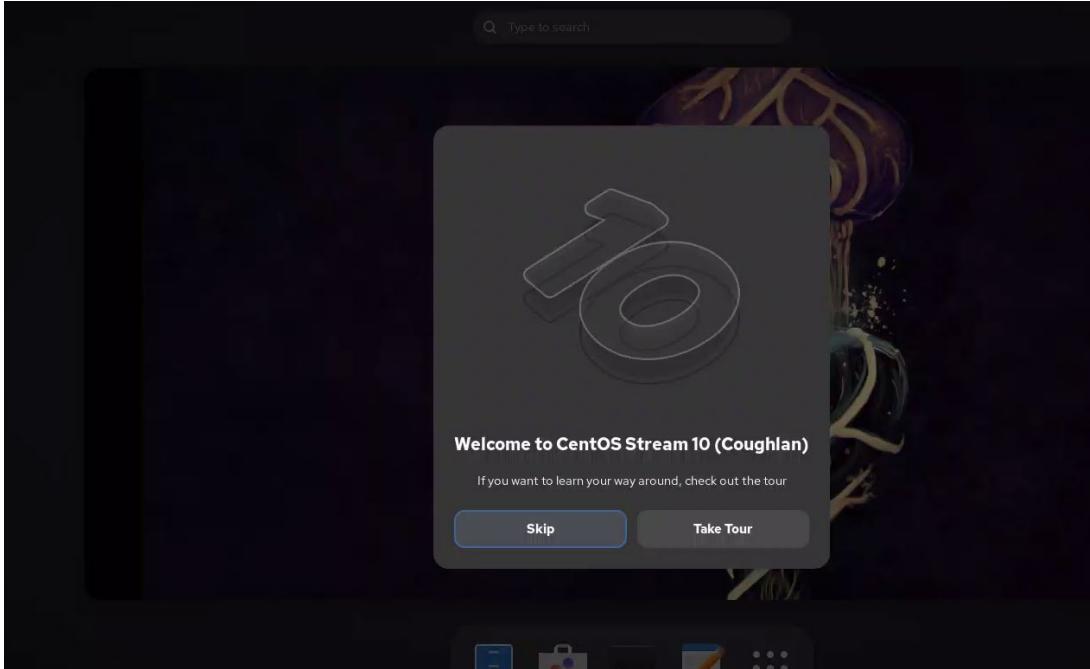
- K) After reboot, a screen showing the reboot is ongoing appears

```
[ OK ] Unmounted run-user-0.mount - /run/user/0.
[ OK ] Stopped user-runtime-dir@0.service - User Runtime Directory /run/user/0.
[ OK ] Removed slice user-0.slice - User Slice of UID 0.
[ OK ] Started plymouth-reboot.service - Show Plymouth Reboot Screen.
[ OK ] Stopped brltty.service - Braille display driver for Linux/Unix.
-
```

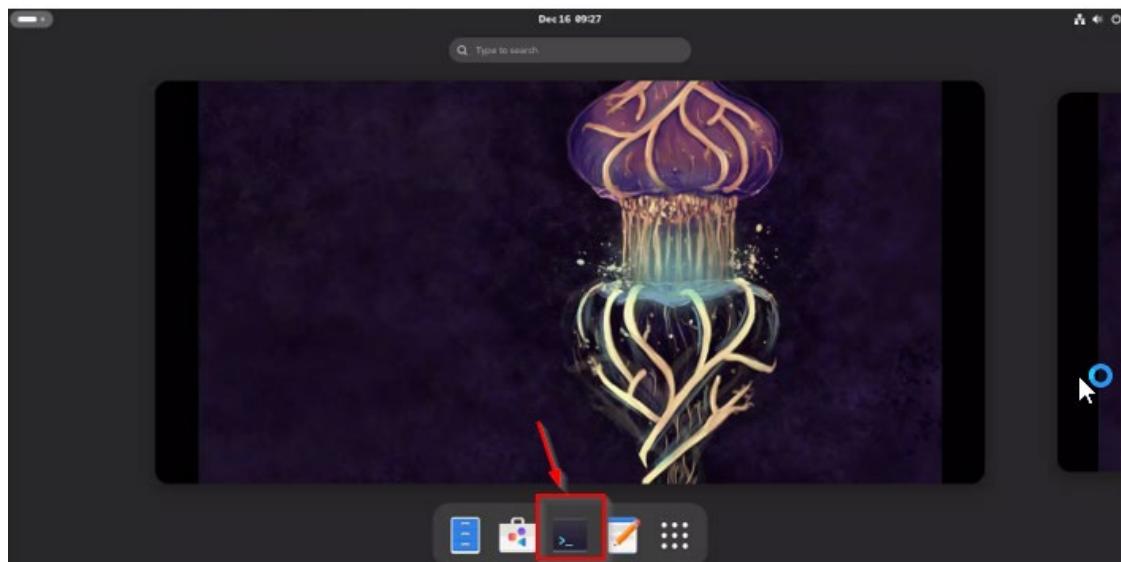
- L) After reboot, the user student appears ready to login. Login as “student”



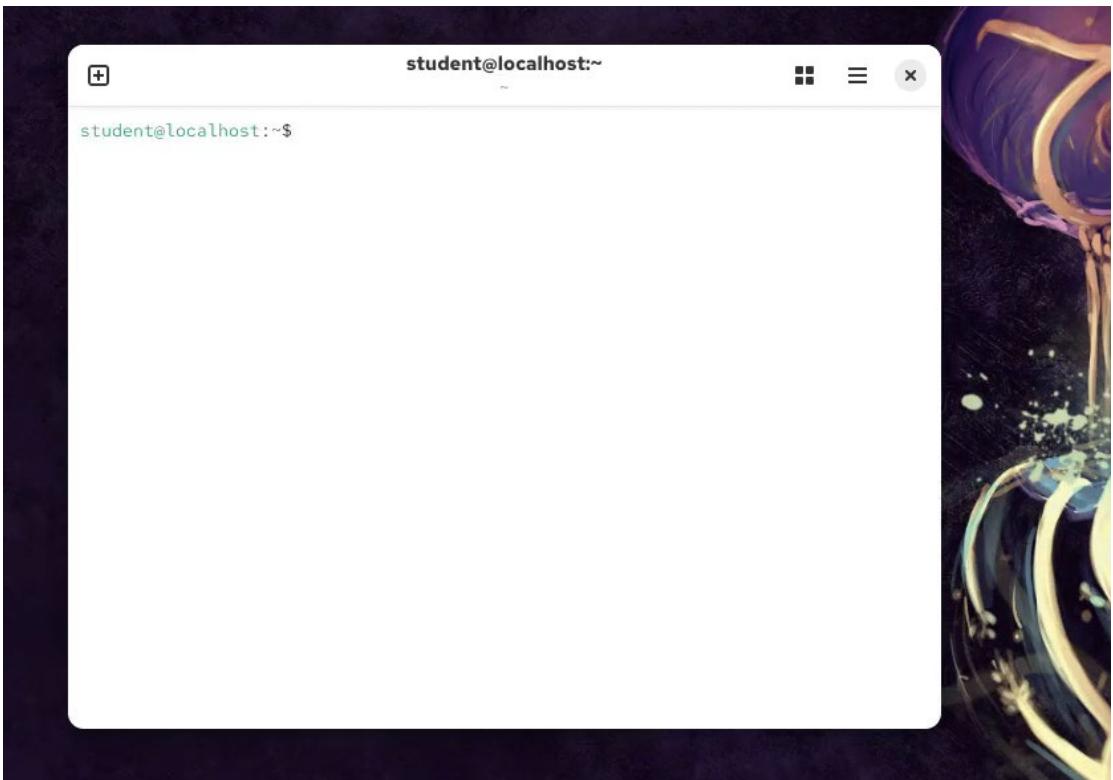
- M) Welcome to Centos screen appears showing the system is ready for use. Select “Skip” at the left down to skip the tour.



N) Open Terminal , the terminal can be opened using the icon at the bottom of the screen.



O) Note that host name is localhost, hostname needs to be changed



### 3.1.4.4 Centos post installation activities

#### 3.1.4.4.1 Assign manual static ip to do hostname change

A) Verify existing ip using command `ifconfig`

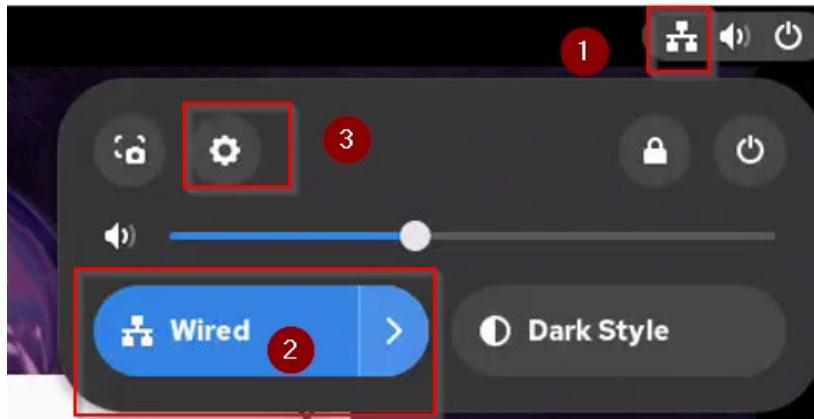
```
root@centos1:~# ifconfig
ens160: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.164.1.69 netmask 255.255.0.0 broadcast 10.164.255.255
        inet6 fe80::20c:29ff:fe52:30cb prefixlen 64 scopeid 0x20<link>
            ether 00:0c:29:52:30:cb txqueuelen 1000 (Ethernet)
            RX packets 22602 bytes 2294736 (2.1 MiB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 865 bytes 207063 (202.2 KiB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
        inet6 ::1 prefixlen 128 scopeid 0x10<host>
            loop txqueuelen 1000 (Local Loopback)
            RX packets 239 bytes 22863 (22.3 KiB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 239 bytes 22863 (22.3 KiB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

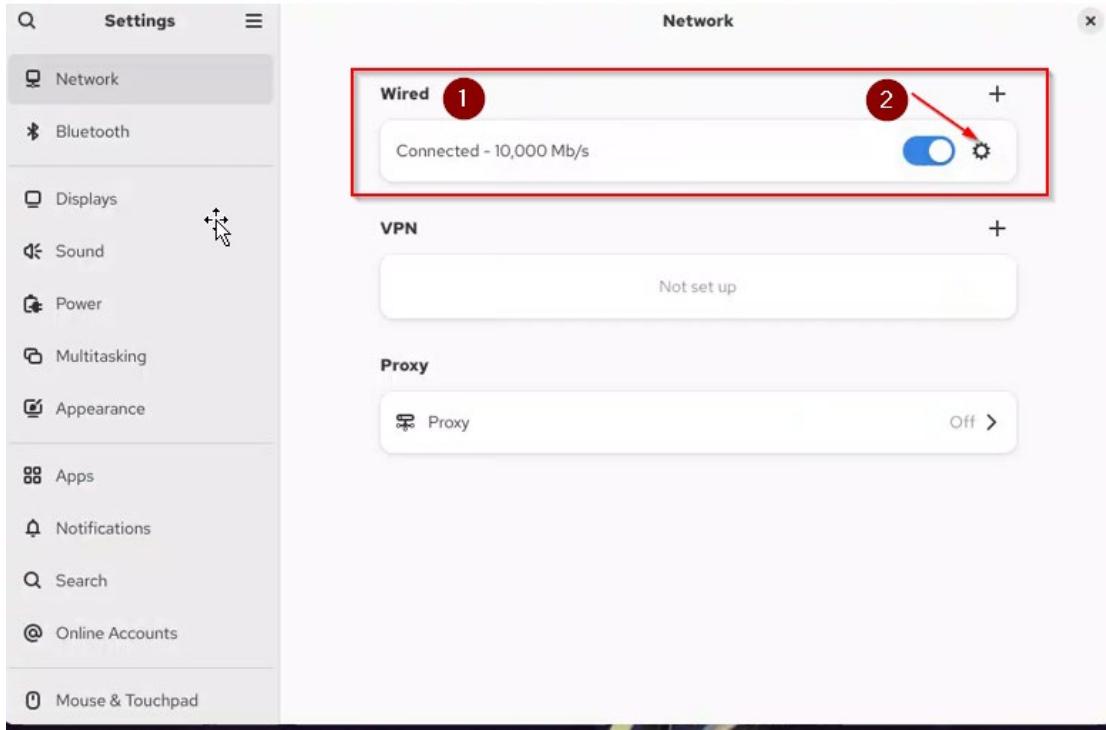
B) Use wired to assign static IP.

Open wired

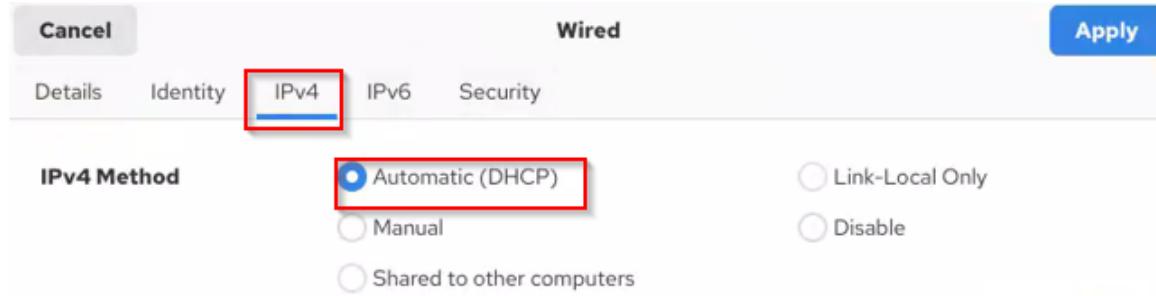
1. Select icon  located at the top right of the screen.
2. Make sure the Wired icon is selected (colored blue) 
3. Select the wheel  on top of blue wired icon



C) Window network is opened, open Wired , select the wheel



D) A new window called “Wired” opens select tab for IPV4. Note Automatic (DHCP) is selected



E) In the window called “Wired”. Set to Manual and give the following values:

1. Select Manual
2. Set Ip address = 10.164.101.2
3. Set Netmask = 255.255.0.0
4. Set Gateway = 10.164.0.1
5. Set DNS = 8.8.8.8
6. Click Apply (blue button on top right)

**Cancel** **Wired** **6** **Apply**

Details Identity **IPv4** IPv6 Security

**IPv4 Method**

Automatic (DHCP)  **Manual**  Link-Local Only  Disable  
 Shared to other computers

**Addresses**

Address	Netmask	Gateway
10.164.101.2 <b>2</b>	255.255.0.0 <b>3</b>	10.164.0.1 <b>4</b> <input type="button" value="X"/>

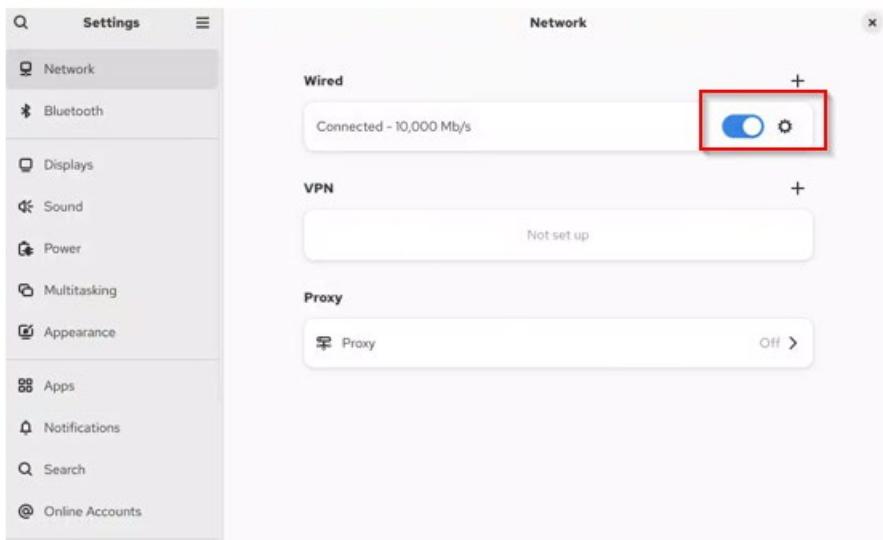
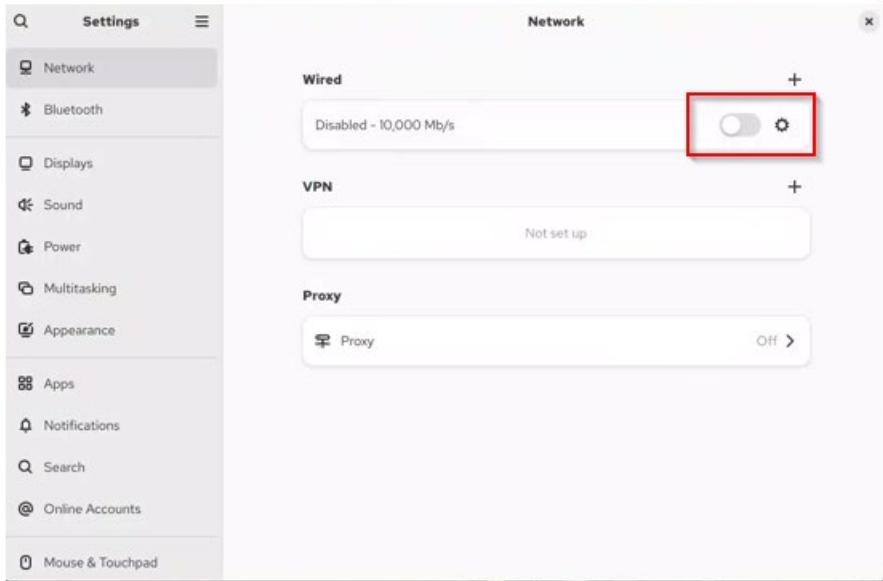
**DNS**  Automatic **5**

8.8.8.8

Separate IP addresses with commas

**Routes**  Automatic

F) In the window Network disable/enable Wired to reset configuration



## G) Verify new ip address using command ifconfig

```
root@centos1:~# ifconfig
ens160: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.164.101.2 netmask 255.255.0.0 broadcast 10.164.255.255
        inet6 fe80::20c:29ff:fe52:30cb prefixlen 64 scopeid 0x20<link>
            ether 00:0c:29:52:30:cb txqueuelen 1000 (Ethernet)
            RX packets 30320 bytes 3102785 (2.9 MiB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 1086 bytes 257858 (251.8 KiB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
        inet6 ::1 prefixlen 128 scopeid 0x10<host>
            loop txqueuelen 1000 (Local Loopback)
            RX packets 239 bytes 22863 (22.3 KiB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 239 bytes 22863 (22.3 KiB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

## H) Test setup with ping

Ping Ip address displayed in ifconfig and Ping 8.8.8.8 (google.com)



```
root@centos1:~# ping 10.164.101.2
PING 10.164.101.2 (10.164.101.2) 56(84) bytes of data.
64 bytes from 10.164.101.2: icmp_seq=1 ttl=64 time=0.092 ms
64 bytes from 10.164.101.2: icmp_seq=2 ttl=64 time=0.175 ms
64 bytes from 10.164.101.2: icmp_seq=3 ttl=64 time=0.130 ms
64 bytes from 10.164.101.2: icmp_seq=4 ttl=64 time=0.076 ms
^C
--- 10.164.101.2 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3062ms
rtt min/avg/max/mdev = 0.076/0.118/0.175/0.038 ms
root@centos1:~#
root@centos1:~#
root@centos1:~# ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=118 time=7.27 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=118 time=12.6 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=118 time=4.73 ms
^C--- 8.8.8.8 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2004ms
rtt min/avg/max/mdev = 4.725/8.200/12.602/3.281 ms
root@centos1:~#
```

## I) Reboot the system to allow name change using command reboot

### 3.1.4.4.2 Change host name

- A) Switch to the superuser (root), password will be prompted.

```
student@centos1:~$ su -
Password:
Last login: Mon Dec 16 09:30:18 EST 2024 on pts/0
Last failed login: Mon Dec 16 23:53:01 EST 2024 on pts/0
There was 1 failed login attempt since the last successful login.
```

- B) Print current hostname, there are two files where hostname is set:

- /etc/hostname
- /etc/hosts

Use vi to verify contents of the files

```
root@centos1:~# vi /etc/hostname
root@centos1:~# vi /etc/hosts
```

File /etc/hostname is empty



```
--No lines in buffer--
```

File /etc/hosts does not have any configuration set

C) Edit file /etc/hosts with vi and add the following line:

10.164.101.2 centos1.cen1.com centos1

```
root@centos1:~# yum update
Updating Subscription Management repositories.
Unable to read consumer identity

This system is not registered with an entitlement server. You can use subscription-manager to register.

CentOS Stream 10 - AppStream           27 kB/s | 4.9 kB   00:00
CentOS Stream 10 - AppStream           1.5 MB/s | 2.4 MB   00:01
CentOS Stream 10 - Extras packages    63 kB/s | 6.9 kB   00:00
Error:
Problem 1: cannot install the best update candidate for package cups-1:2.4.10-8.el10.x86_64
- nothing provides cups-filesystem = 1:2.4.10-9.el10 needed by cups-1:2.4.10-9.el10.x86_64 from appstream
- nothing provides cupslibs(x86-64) = 1:2.4.10-9.el10 needed by cups-1:2.4.10-9.el10.x86_64 from appstream
Problem 2: cannot install the best update candidate for package cups-client-1:2.4.10-8.el10.x86_64
- nothing provides cupslibs(x86-64) = 1:2.4.10-9.el10 needed by cups-client-1:2.4.10-9.el10.x86_64 from appstream
Problem 3: cannot install the best update candidate for package cups-ippool-1:2.4.10-8.el10.x86_64
- nothing provides cupslibs(x86-64) = 1:2.4.10-9.el10 needed by cups-ippool-1:2.4.10-9.el10.x86_64 from appstream
Problem 4: cannot install the best update candidate for package fwupd-plugin-flashrom-1.9.19-1.el10.x86_64
- nothing provides fwupd(x86-64) = 1.9.26-2.el10 needed by fwupd-plugin-flashrom-1.9.26-2.el10.x86_64 from appstream
Problem 5: cannot install the best update candidate for package python3-unversioned-command-3.12.6-2.el10.noarch
- nothing provides python3 = 3.12.8-2.el10 needed by python-unversioned-command-3.12.8-2.el10.noarch from appstream
Problem 6: cannot install the best update candidate for package rpm-plugin-systemd-inhibit-4.19.1.1-7.el10.x86_64
- nothing provides rpmlibs(x86-64) = 4.19.1.1-9.el10 needed by rpm-plugin-systemd-inhibit-4.19.1.1-9.el10.x86_64 from appstream
m
(try to add '--skip-broken' to skip uninstallable packages or '--nobest' to use not only best candidate packages)
root@centos1:~#
```

```
[+]
root@centos1:~ - /usr/bin/vim /etc/hosts

# Loopback entries; do not change.
# For historical reasons, localhost precedes localhost.localdomain:
127.0.0.1    localhost localhost.localdomain localhost4 localhost4.localdomain4
::1          localhost localhost.localdomain localhost6 localhost6.localdomain6
# See hosts(5) for proper format and other examples:
# 192.168.1.10 foo.example.org foo
# 192.168.1.13 bar.example.org bar
10.164.101.2    centos1.cen1.com    centos1
```

D) Edit file /etc/hostname with vi and add the following line:

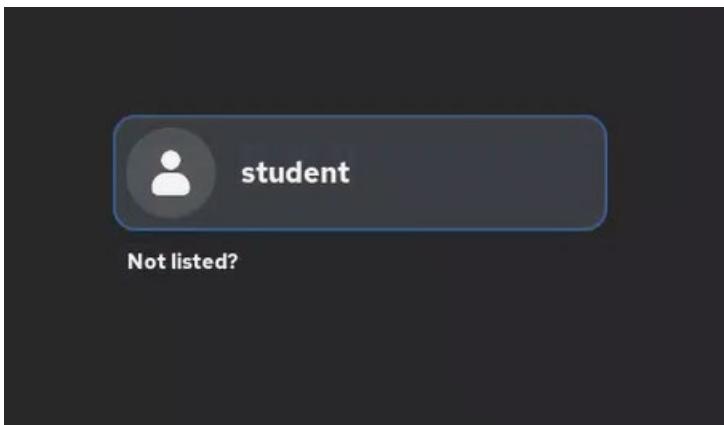
centos01

```
centos1
~
~
```

E) Reboot for change of host name takes effect

```
root@centos1:~#
root@centos1:~# reboot
```

F) After reboot login screen appears



G) Login and open terminal

Note the name of the terminal appears in the prompt.

#### 3.1.4.4.3 Update system

Issue command **yum update** to update all installed packages to their latest version

```
root@localhost:~# sudo yum update
Updating Subscription Management repositories.
Unable to read consumer identity

This system is not registered with an entitlement server. You can use subscription-manager to register.

CentOS Stream 10 - BaseOS
CentOS Stream 10 - AppStream
CentOS Stream 10 - Extras packages
Dependencies resolved.
Nothing to do.
Complete!
```

A) Issue command **yum upgrade** to update all installed packages to their latest version

```
root@localhost:~# sudo yum upgrade
Updating Subscription Management repositories.
Unable to read consumer identity

This system is not registered with an entitlement server. You can use subscription-manager to register.

Last metadata expiration check: 0:00:40 ago on Mon 16 Dec 2024 09:33:00 AM.
Dependencies resolved.
Nothing to do.
Complete!
root@localhost:~#
```

### 3.1.5 OpenSUSE

openSUSE is an open-source Linux distribution developed by SUSE Linux GmbH.

openSUSE offers two main versions: Leap and Tumbleweed.

- Leap: A stable, enterprise-focused release with long-term support.
- Tumbleweed: A rolling release that provides the latest software and updates.

#### CHECKPOINT

**CONTINUE** to next section if the following three conditions are met:

- Splashtop Business is ok, and
- Computer in John Abbott Computer Lab is accessible up and running and
- VMWare Workstation Pro is installed preferably with latest upgrades

For more information how to check the three previous conditions refer to [General activities](#) section “Splashtop and Computer” and section “Verify VMware Workstation Pro is installed”

If all three conditions are not met, the update can not be done procedure **STOPS** here.

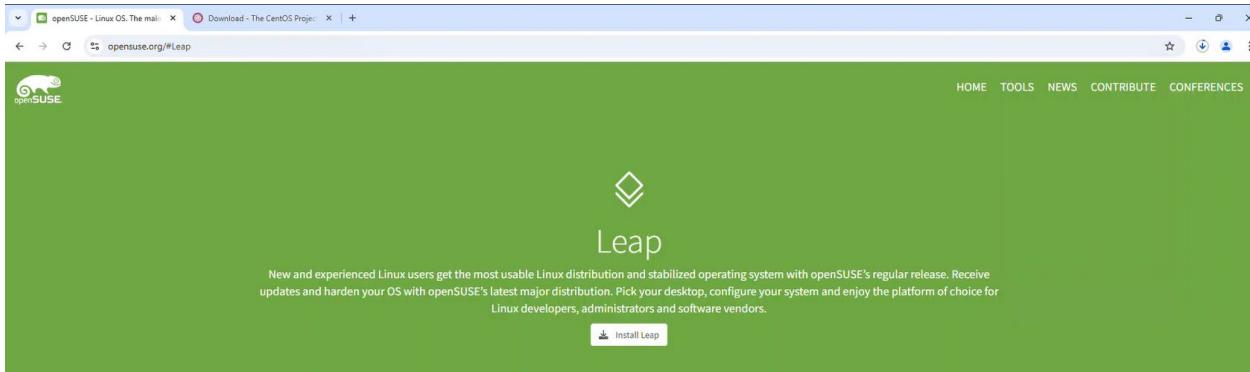
#### 3.1.5.1 Opensuse download

Use URL <https://www.opensuse.org/>

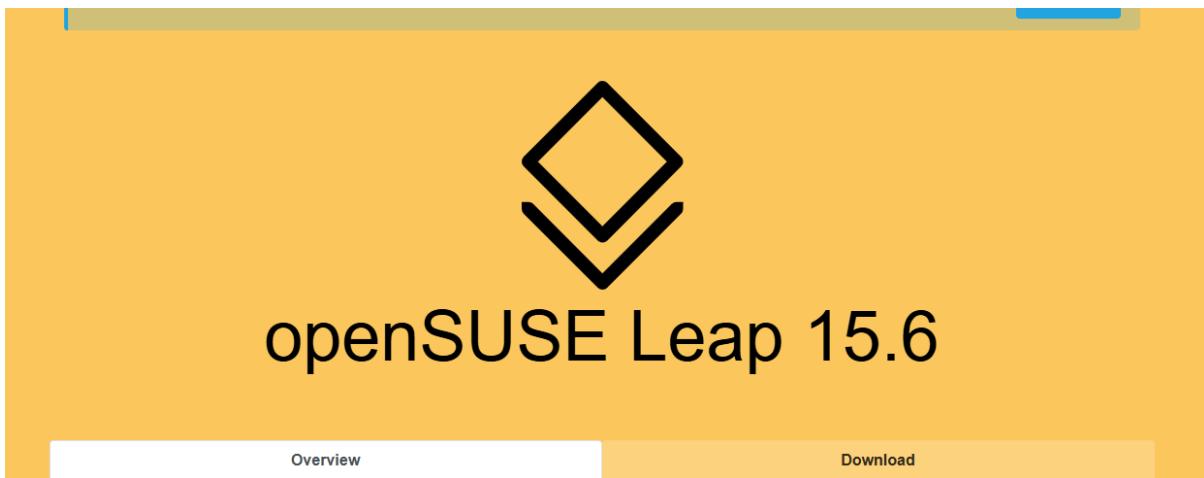
Open URL and select Leap at the right

The screenshot shows the official openSUSE website homepage. At the top, there's a navigation bar with links for HOME, TOOLS, NEWS, CONTRIBUTE, and CONFERENCES. Below the navigation, a banner states "The makers' choice for sysadmins, developers and desktop users." The main content area is divided into two sections. On the left, under "Tumbleweed", there's a logo of a stylized infinity symbol and the text "Get the newest Linux packages with our rolling release. Fast! Integrated! Stabilized! Tested!". On the right, under "Leap", there's a logo of a diamond shape and the text "Get the most complete Linux distribution with openSUSE's latest regular-release version!". At the bottom of the page, there's a green footer bar with the text "MicroOS -○-

## Select Install Leap



Select download at the left bottom



A brand new way of building openSUSE and a new type of a hybrid Linux distribution

Leap uses source from SUSE Linux Enterprise (SLE), which gives Leap a level of stability unmatched by other Linux distributions, and combines that with community developments to give users, developers and sysadmins the best stable Linux experience available.

[Download](#)

Select Network Image for AMD 64 Bit

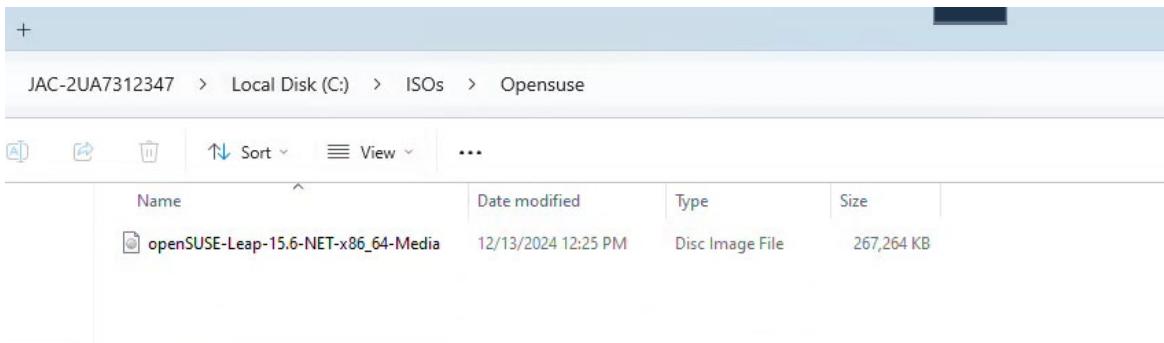
The screenshot shows the 'Get' section of the openSUSE website. It displays two main categories: 'Intel or AMD 64-bit desktops, laptops, and servers (x86\_64)' and 'UEFI Arm 64-bit servers, desktops, laptops and boards (aarch64)'. Under the x86\_64 category, there are two options: 'Offline Image (4.3 GiB)' and 'Network Image (261.0 MiB)'. The 'Network Image' option is circled in red. Both options have a 'Download' button next to them. Below these are sections for 'PowerPC servers, little-endian (ppc64le)' and 'IBM zSystems and LinuxONE (s390x)', each with their own 'Offline Image' and 'Network Image' options.

### Choosing Which Media to Download

The Offline Image is typically recommended as it contains most of the packages available in the distribution and does not require a network connection during the installation.

The Network Image is recommended for users who have limited bandwidth on their internet connections, as it will only download the packages they choose to install, which is likely to be significantly less than 4.7GB.

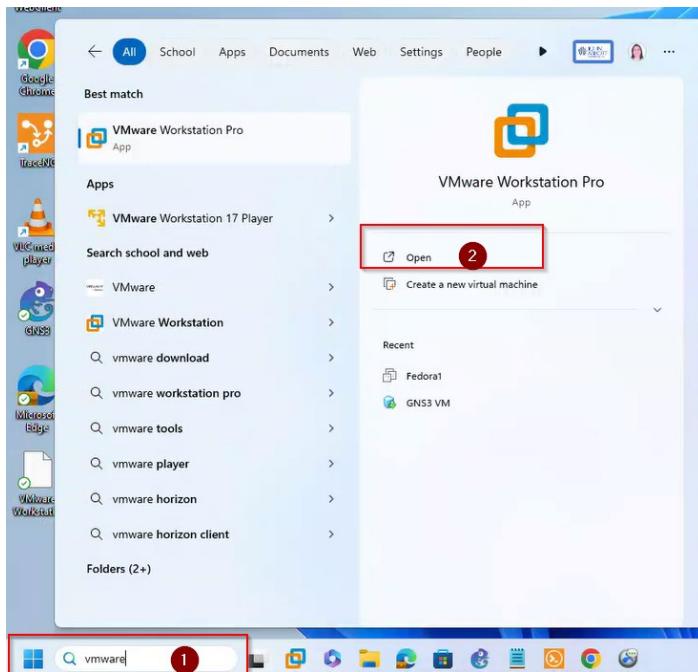
### Wait for download to complete and store in ISOs directory



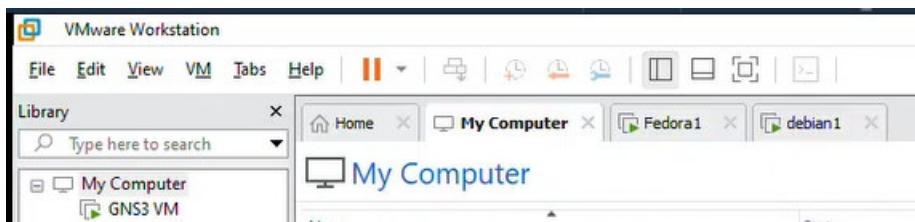
### 3.1.5.2 Create VM for openSUSE

#### A) Open the VMware Workstation App

- 1 Look for application in windows search
- 2 Once VMware Workstation Pro appears, open application

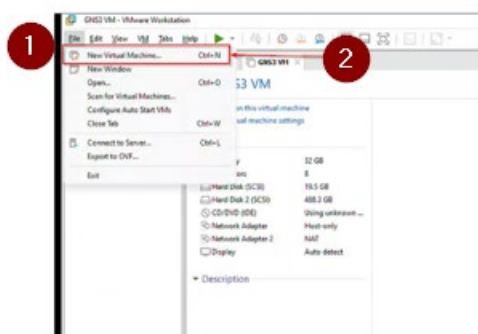


B) VMware workstation opens:



C) Select from top menu and submenu

1. File
2. New Virtual Machine...

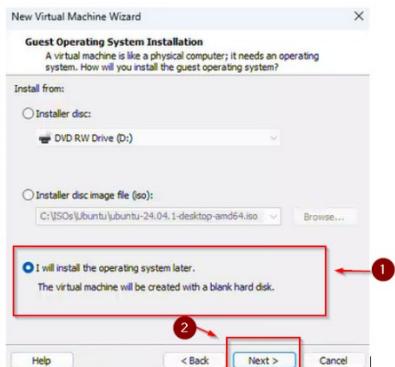


- D) When the “Welcome to the New Virtual Machine Wizard” window pops up, select “Typical (recommended)”, then click “Next >”

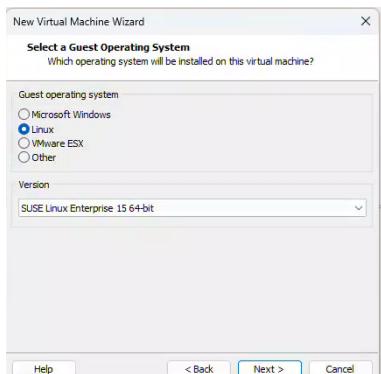


- E) “Guest Operating System Installation” window pops up, please:

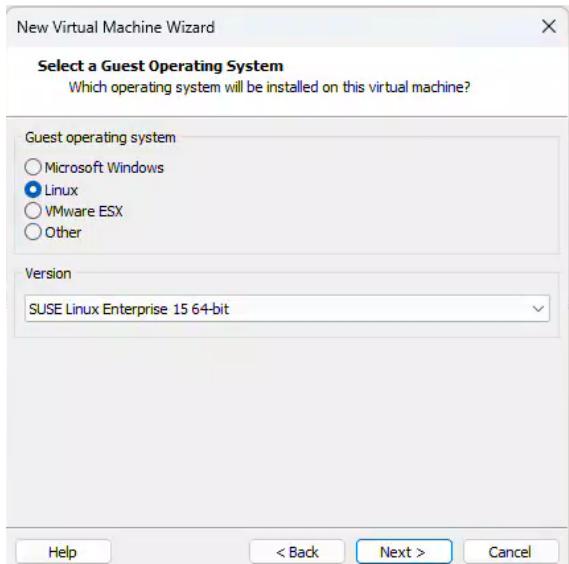
5. Select “I will install the operating system later. The virtual machine will be created with a blank hard disk.”.
6. Click “Next”



- F) The window “Select a Guest Operating System Which operating system will be installed on this virtual machine?” Select Linux. For Version, select “SUSE Linux Enterprise 15 64-Bit” from the list (in alphabetical order).

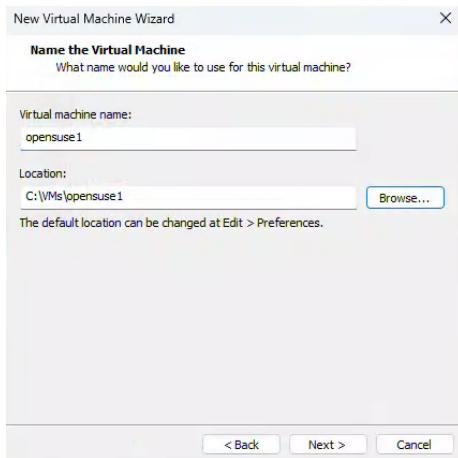


G) Select Next

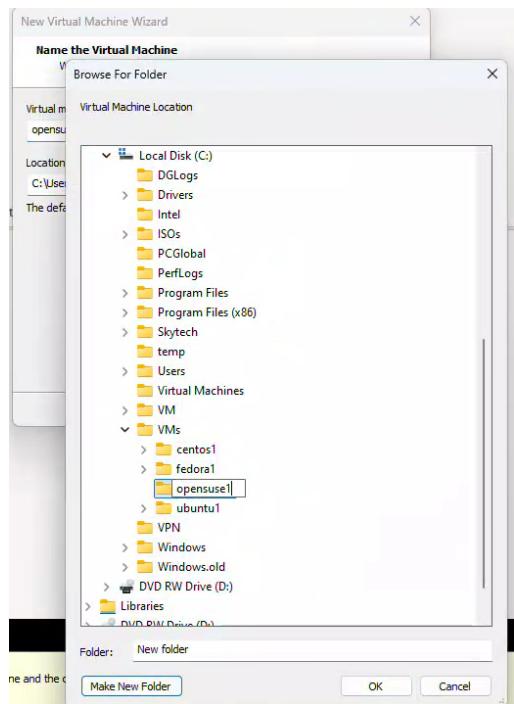


H) In the window “Name the Virtual Machine”

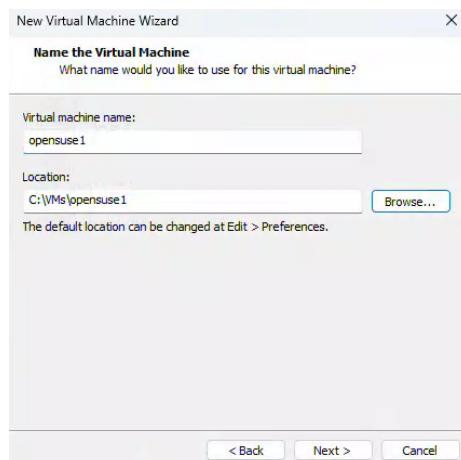
1. Set name Virtual machine name: “openuse1”
2. For the location Browse to change directory
3. Select VMs directory



I) Create a new folder named “openuse1”

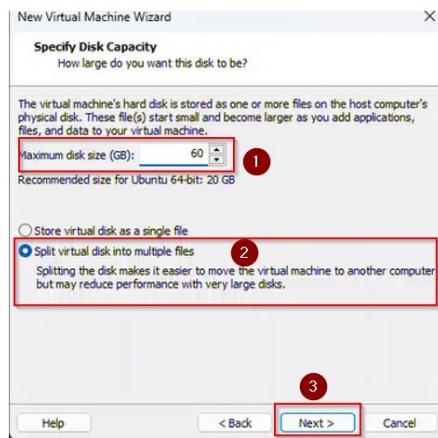


J) Click “Next” after Virtual machine name and location was set.

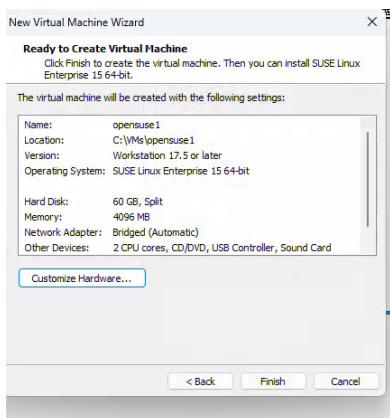


K) In the window Specify Disk Capacity, set:

1. Set the Maximum disk size (GB) to 60
2. Keep the default set to “Split virtual disk into multiple files”
3. Click Next >

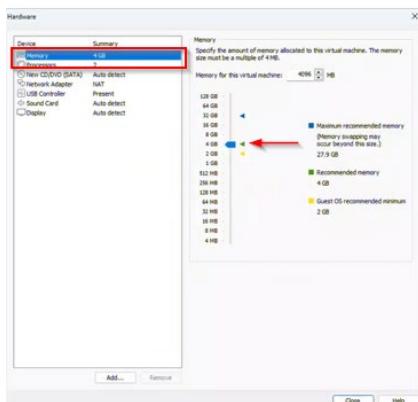


L) In the window “Ready to create Virtual Machine” select Customize hardware

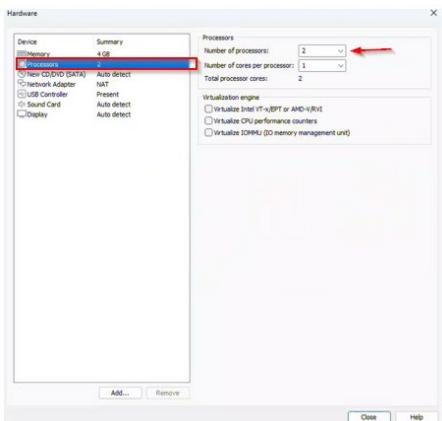


M) For Hardware settings:

### 1. Set Memory to 4GB

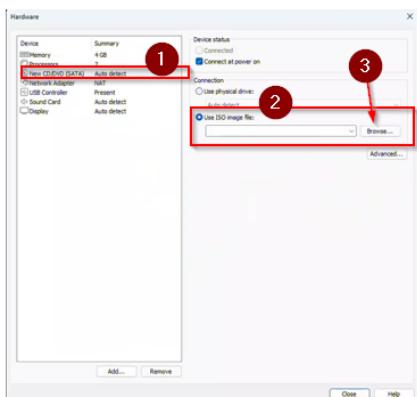


### 2. Set Processors to 2

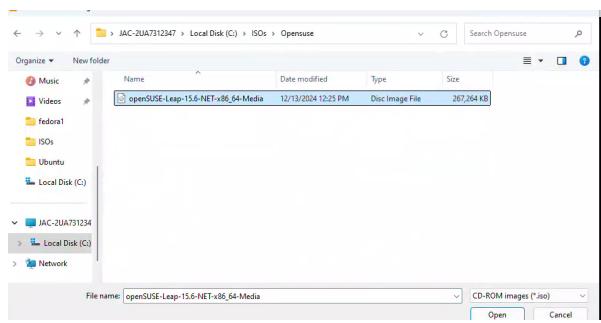


## N) New CD/DVD (SATA)

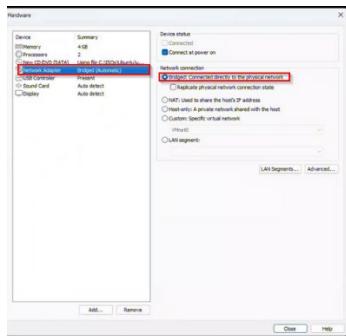
1. Select New CD/DVD (SATA)
2. Highlight Use ISO image file
3. select Browse.



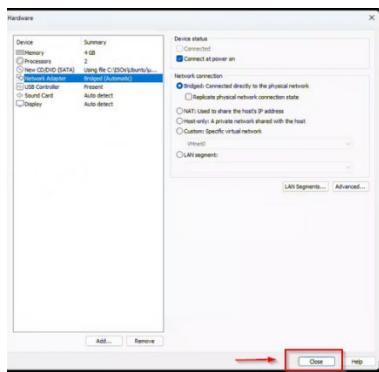
4. Once you select “Use ISO image file:”, browse for the openSUSE iso file



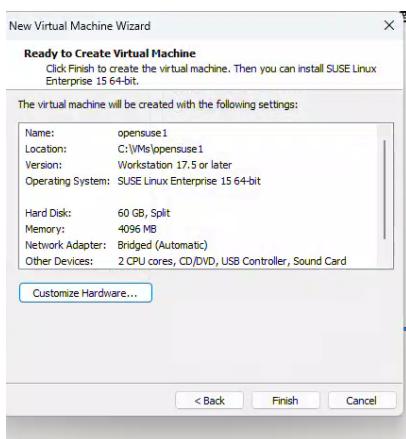
## O) Set Network Adapter to bridged



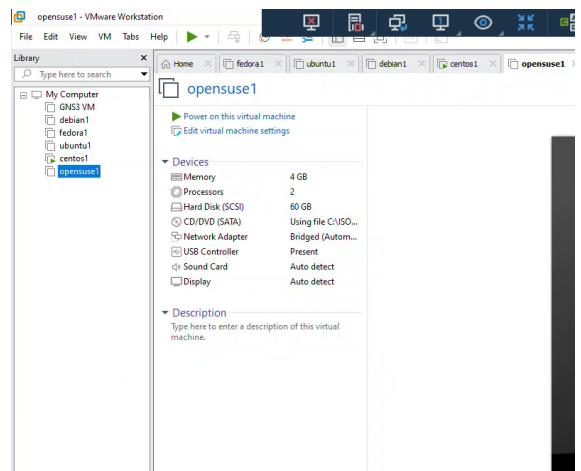
P) Click Close.



Q) Review and press Finish

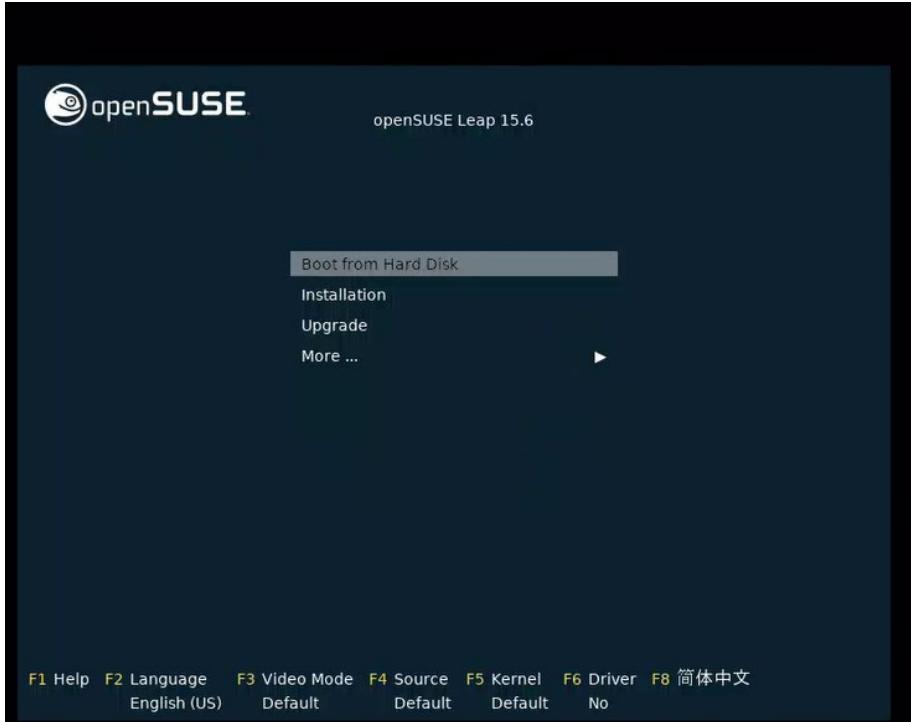


R) VM opens, please power on virtual machine



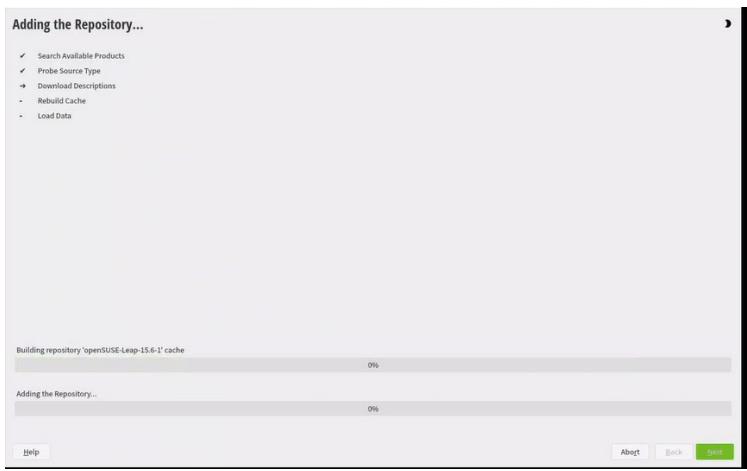
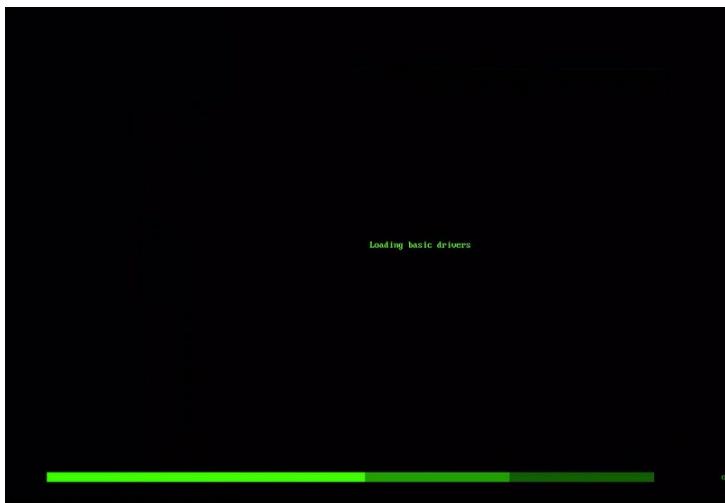
### 3.1.5.3 Install OpenSuse on recently created virtual machine

- A) After starting the virtual machine, installation menu appears Select “Installation”

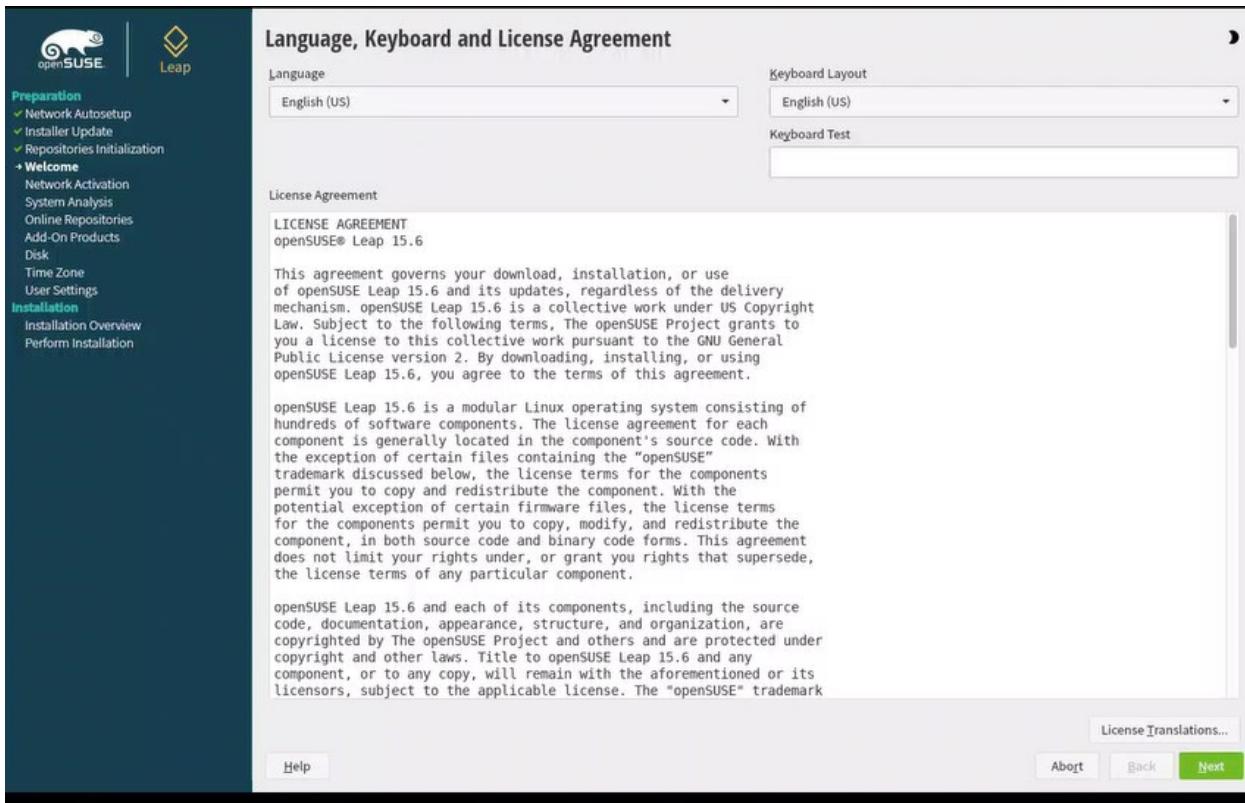


- B) Installation automatically begins with a series of screens

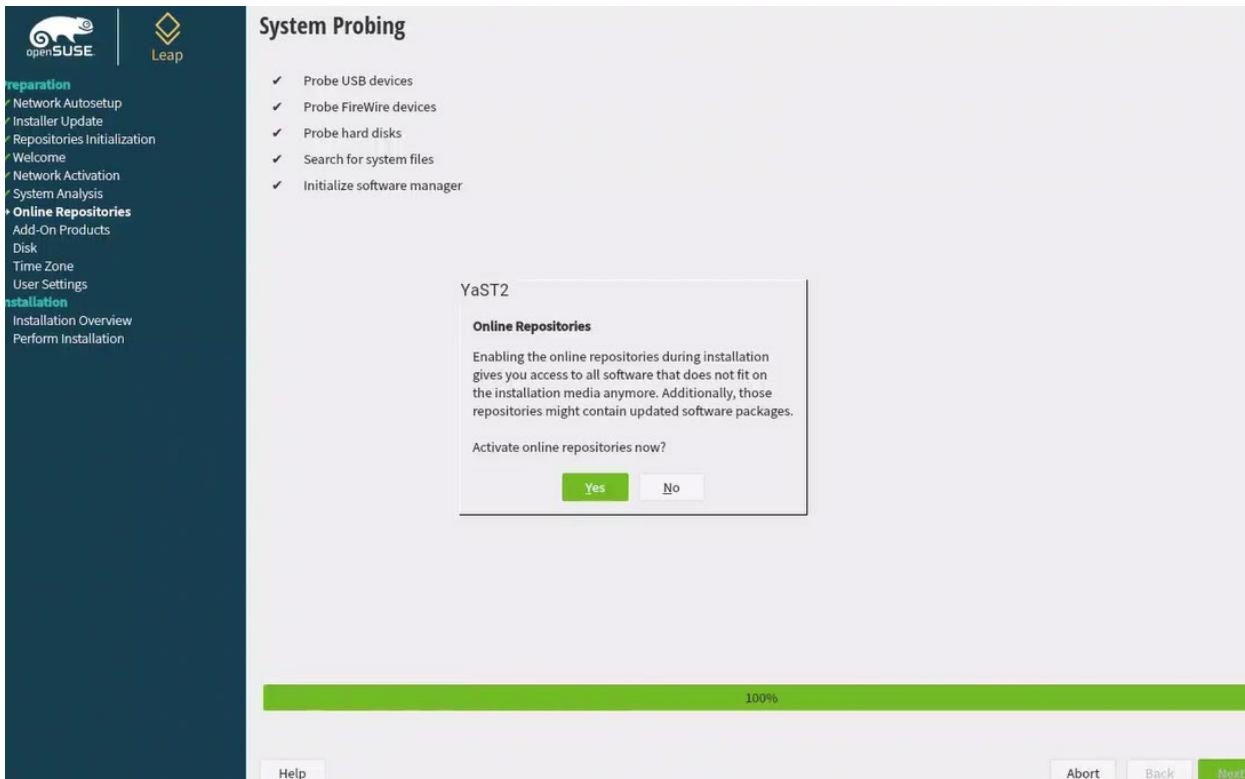
```
[ 9.294521] T1] evm: security.SMACK64TRANSmute (disabled)
[ 9.295617] T1] evm: security.SMACK64MMAP (disabled)
[ 9.296615] T1] evm: security.apparmor
[ 9.297533] T1] evm: security.ima
[ 9.298370] T1] evm: security.capability
[ 9.299885] T1] evm: HMAC attrs: 0x1
[ 9.431060] T1] PM: Magic number: 4:326:677
[ 9.432158] T1] acpi LNXCPU:22: hash matches
[ 9.437442] T1] RRS: Correctable Errors collector initialized.
[ 9.438691] T1] clk: Disabling unused clocks
[ 9.440983] T1] Freeing unused decrypted memory: 2020K
[ 9.442487] T1] Freeing unused kernel image (initmem) memory: 4044K
[ 9.443044] T1] Write protecting the kernel read-only data: 38720K
[ 9.446882] T1] Freeing unused kernel image (rodata/data gap) memory: 161
6K
[ 9.448349] T1] Run /init as init process
[ 9.494689] T163] zram: Added device: zram0
[ 9.642996] T162] zram0: detected capacity change from 8 to 2087152
[ 9.657393] T1] EXT4-fs (zram0): Mounting ext2 file system using the ext4
subsystem
[ 9.657779] T1] EXT4-fs (zram0): mounted filesystem 8c344799-54b8-4af3-8d
36-000ae6872479 r/w without journal. Quota mode: none.
[ 12.339911] T178] loop: module loaded
[ 12.686110] T210] squashfs: version 4.8 (2009/01/31) Phillip Louher
```



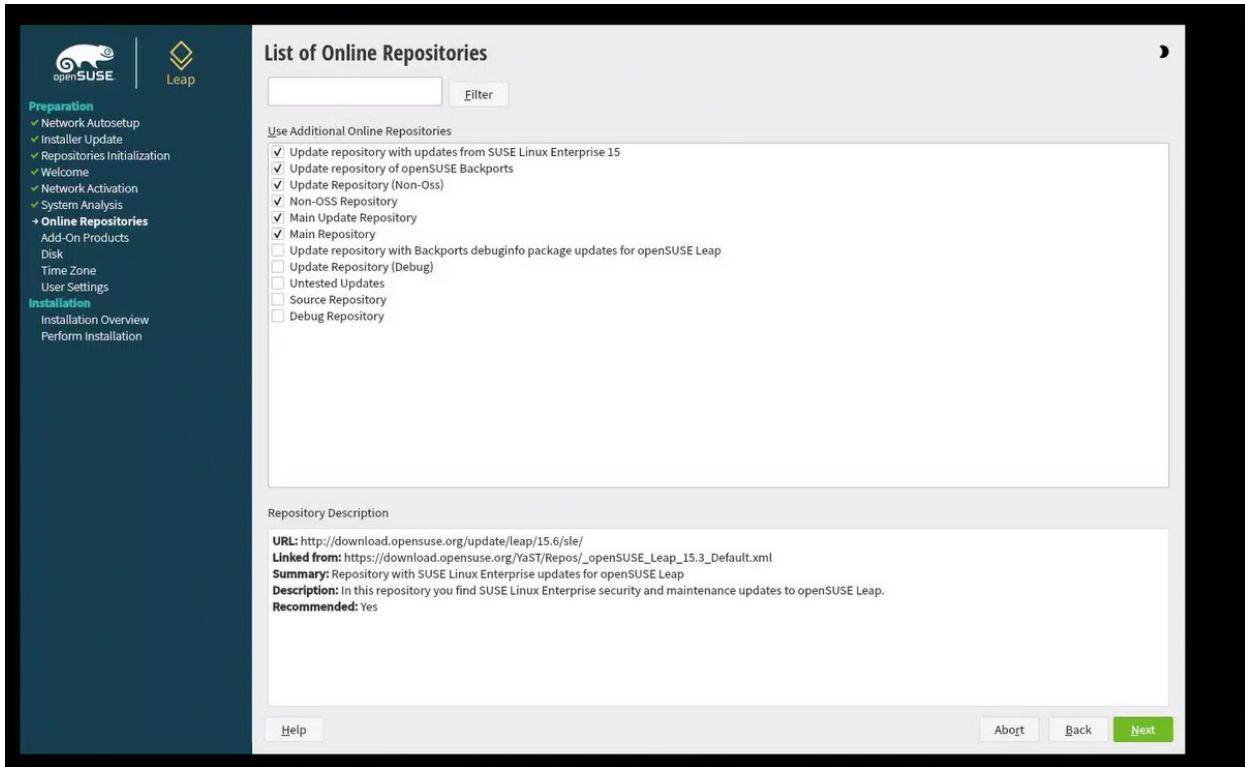
C) Select Language English , read License Agreement, click on Next



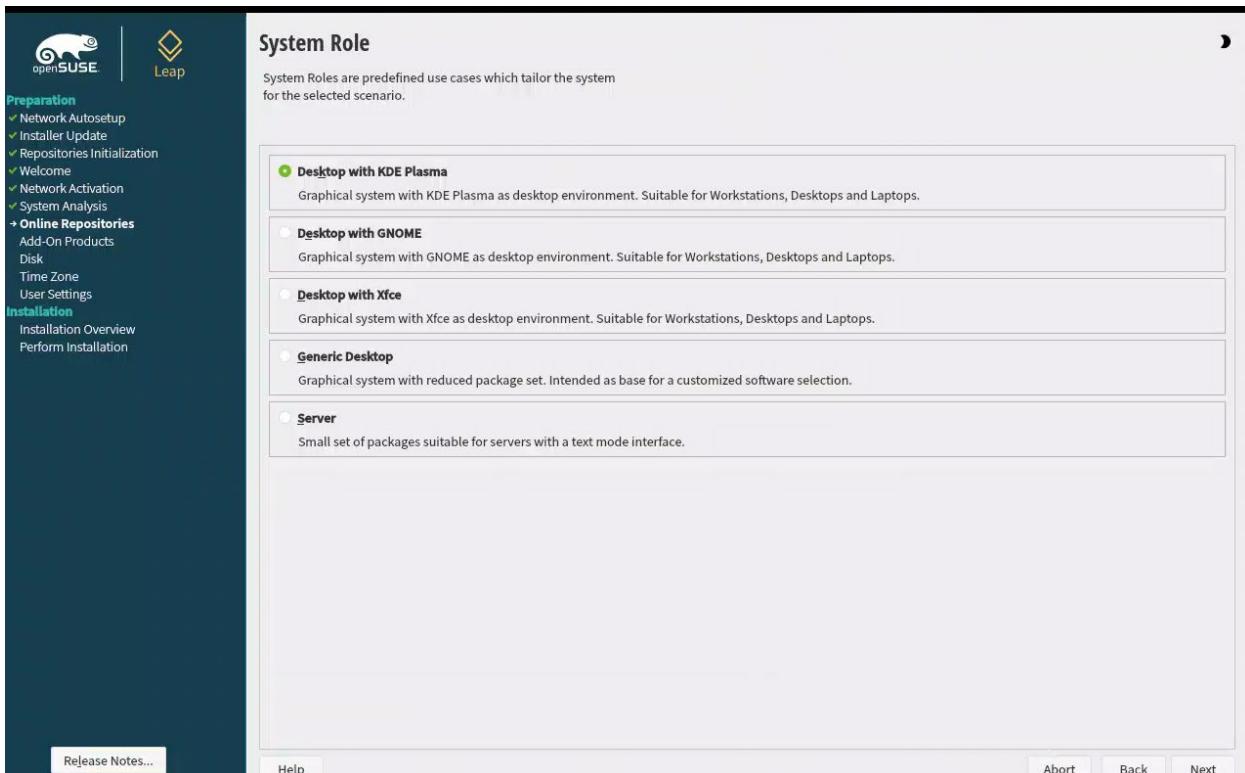
D) Answer yes to activate online repositories



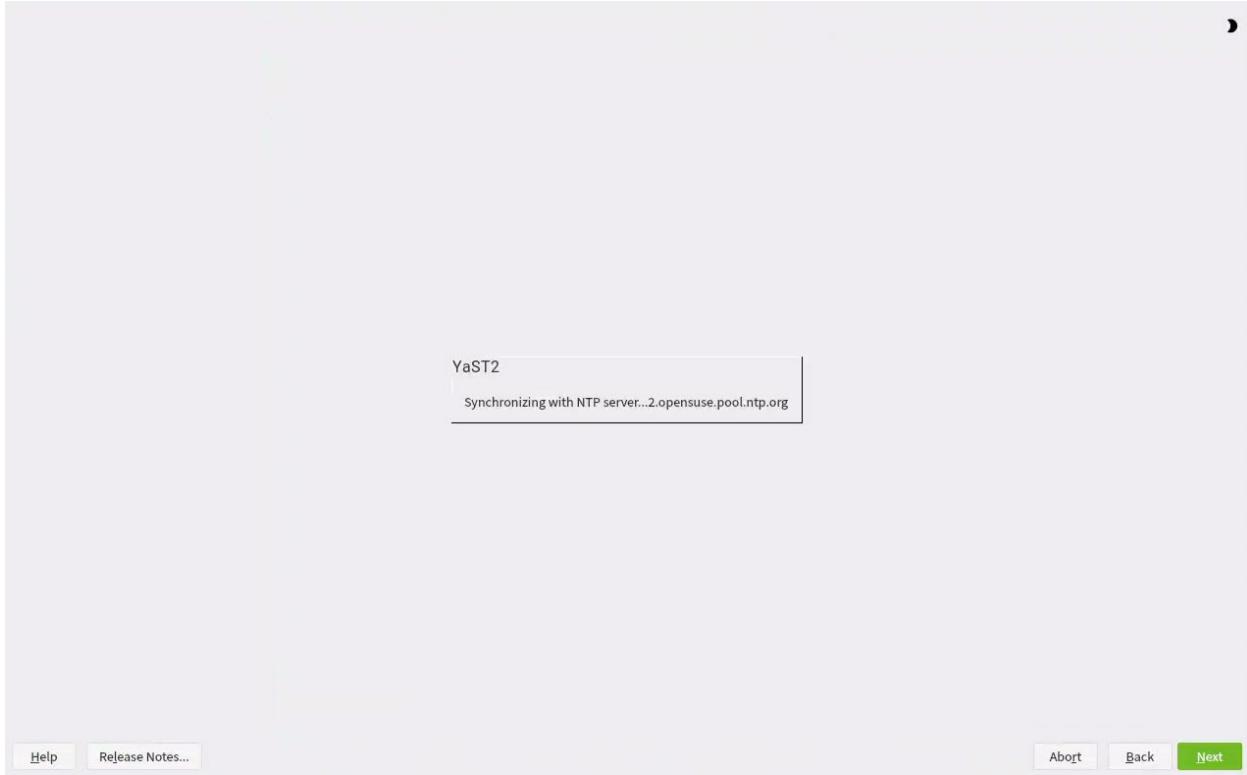
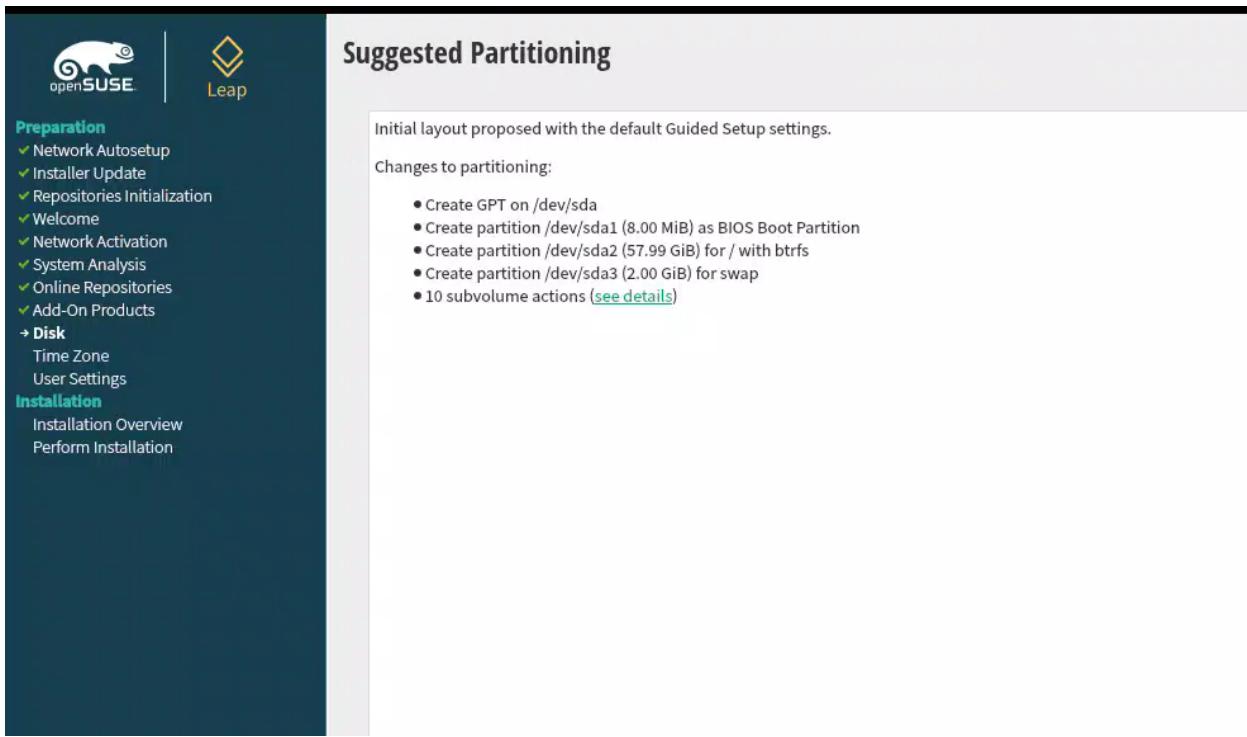
E) Leave it as the default and click Next



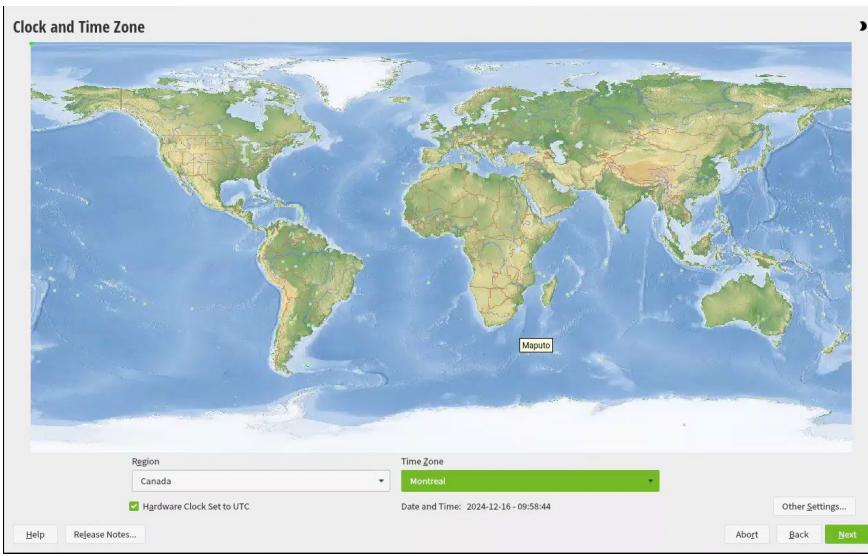
F) Select Desktop with KDE Plasma and click Next



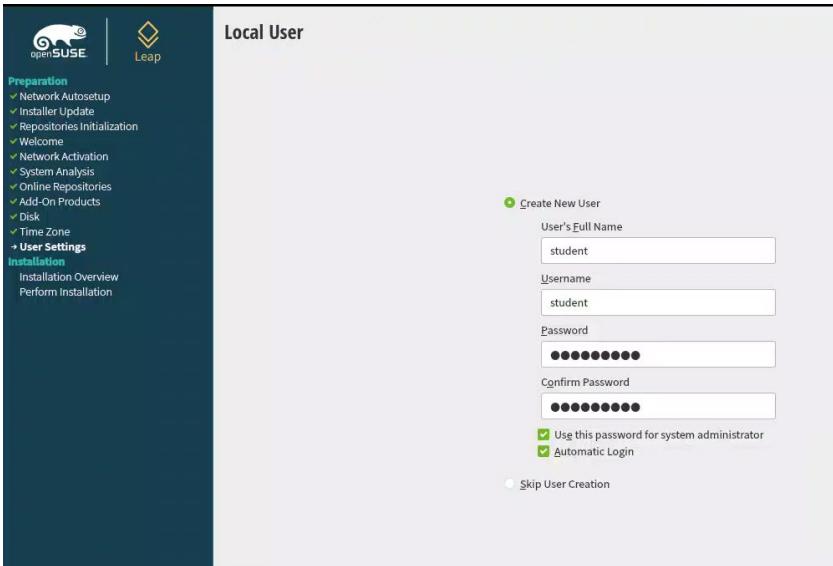
G) Installation continues, let it go



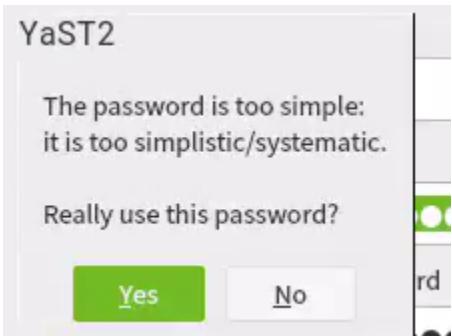
H) Select location



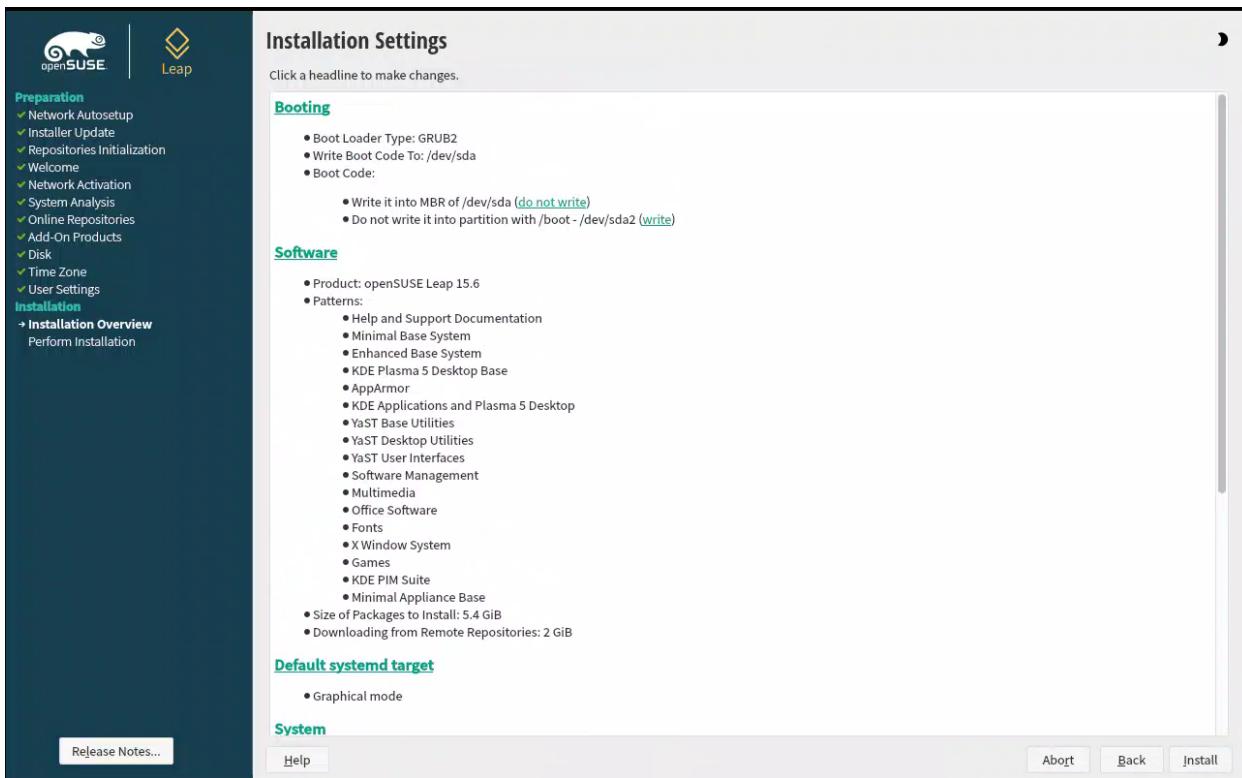
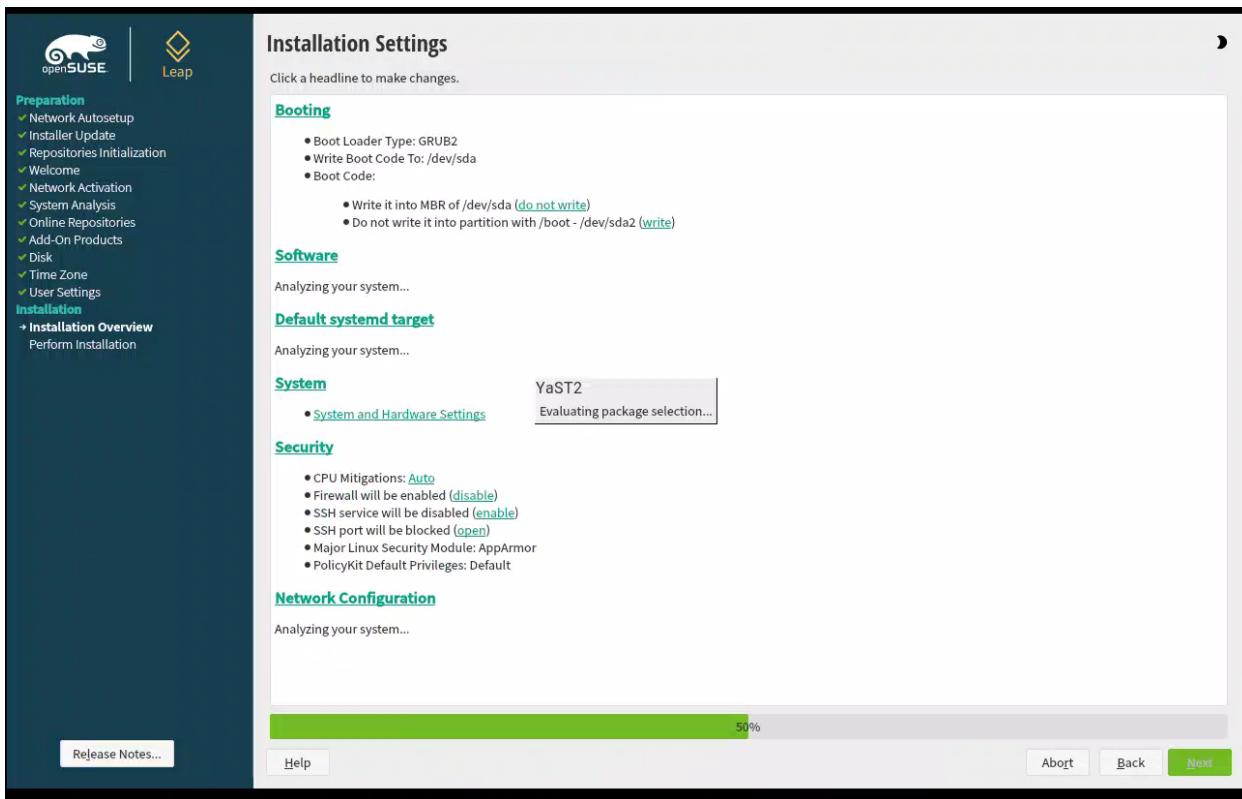
### I) Set username student and password Amf123456



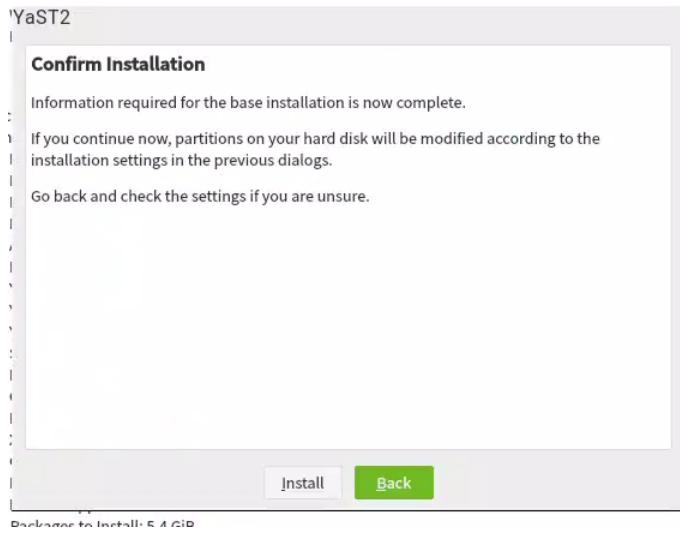
Say yes to simple password



### I) Click on Install when Installation settings finish download



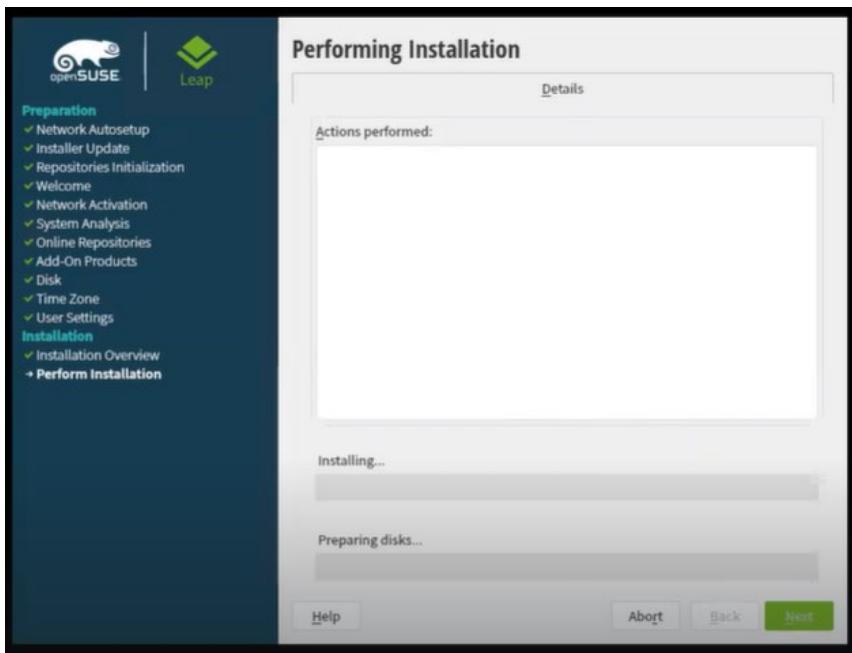
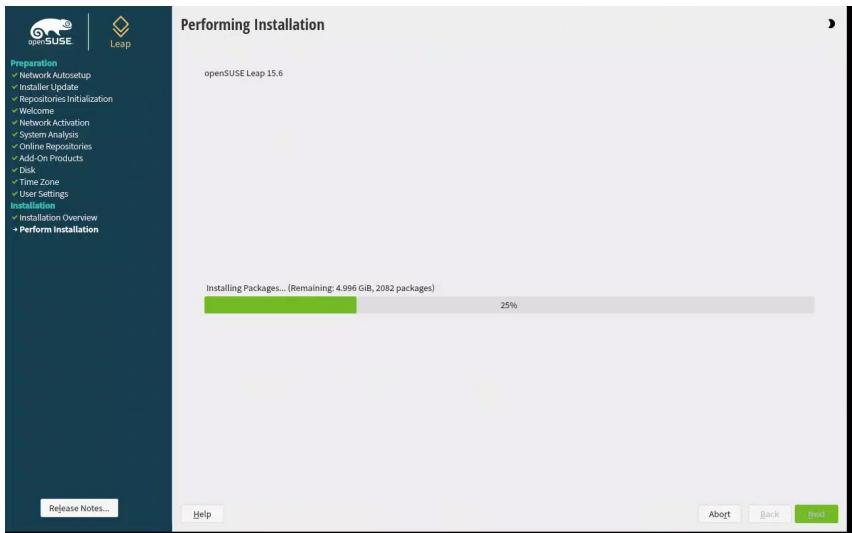
## J) Confirm installation

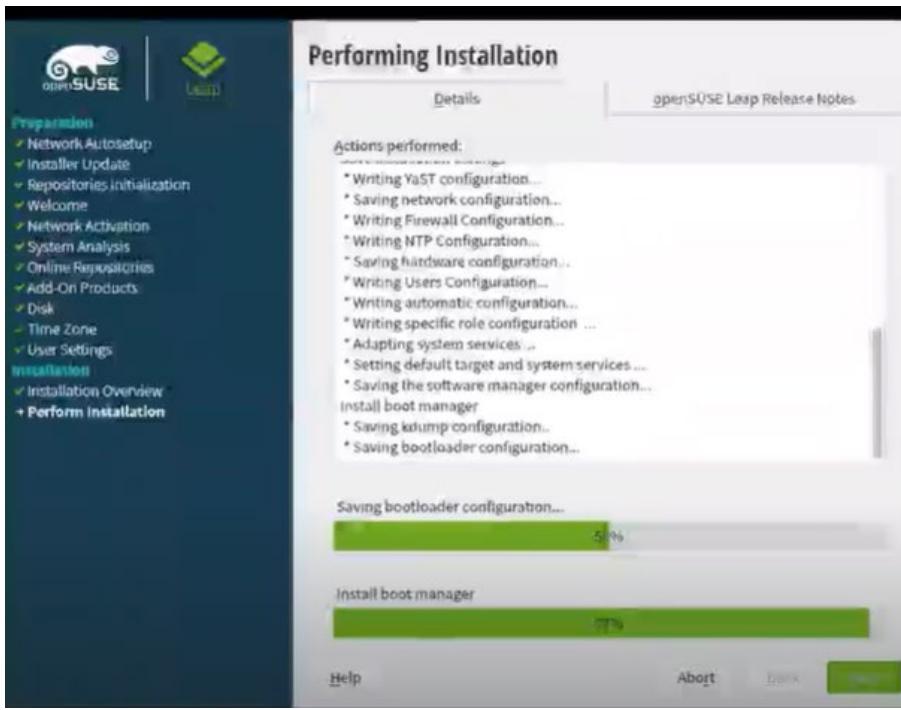


K) Click Next

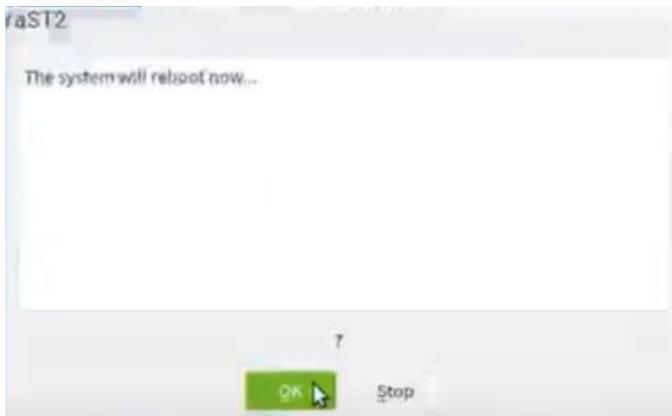


L) Wait for process of installation finishes, note installation windows changes showing the process

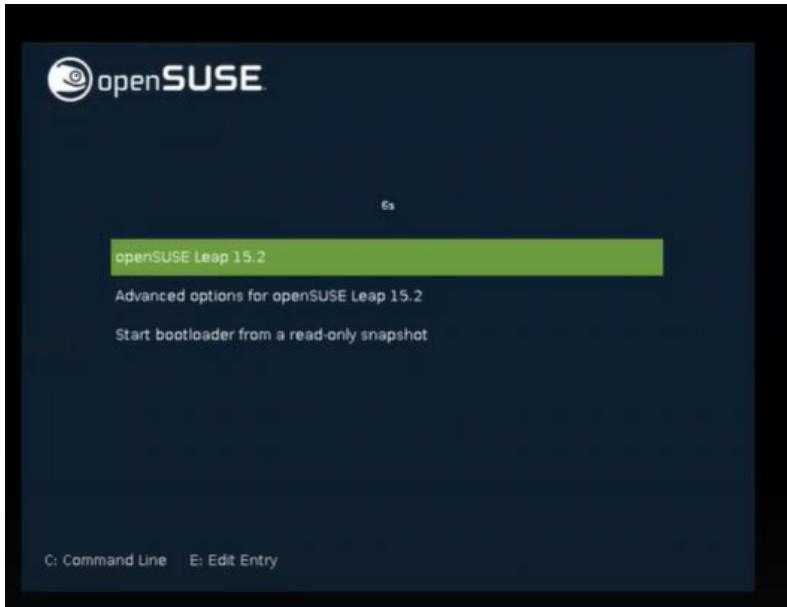




M) Window indicates , the system will reboot now press Ok



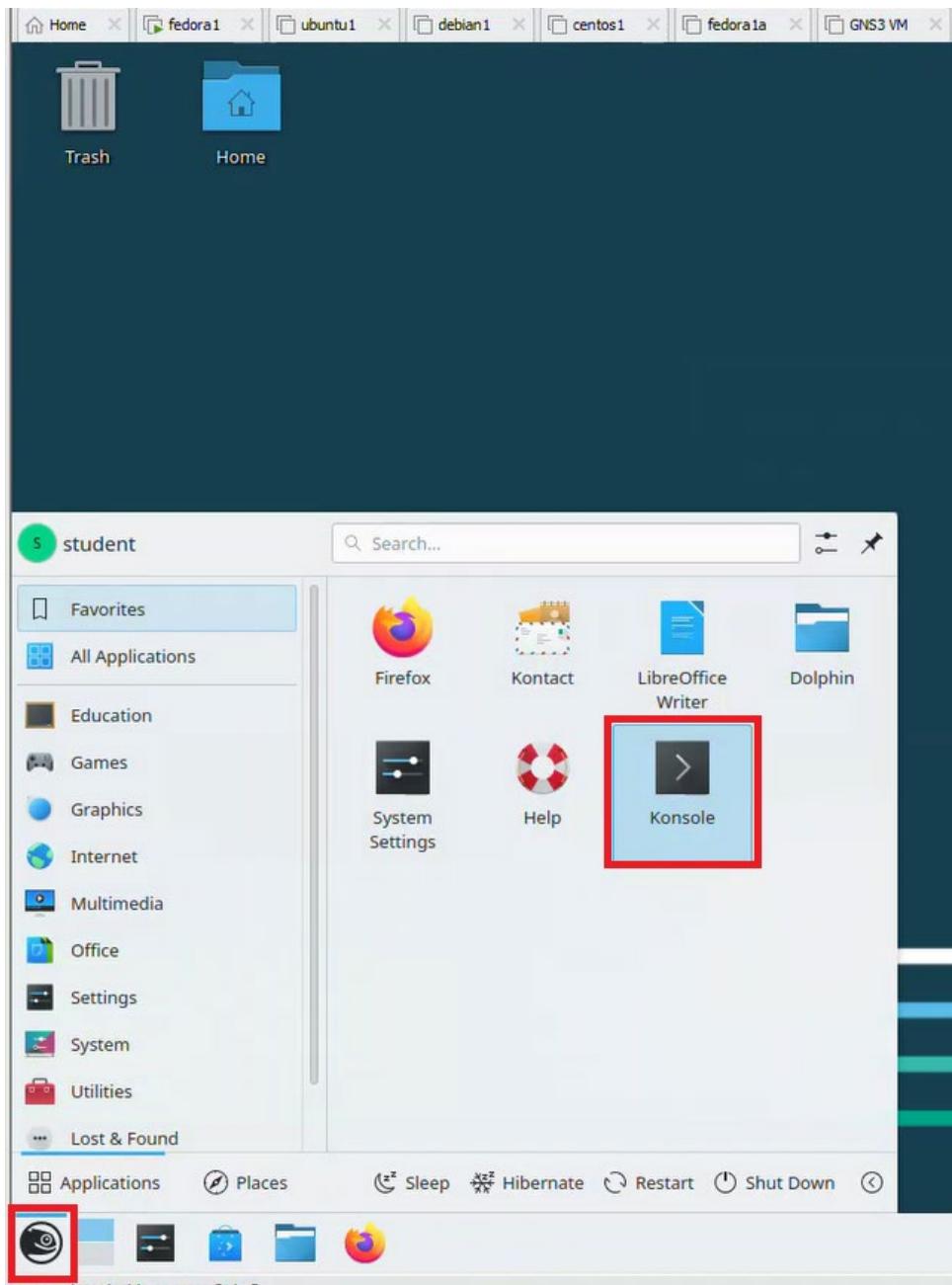
N) After reboot system comes back Select “openSUSE Leap 15.2”



## System is now ready to use

### 3.1.5.4 openSUSE post installation activities

- A) Open a terminal (called Konsole) , select the openSUSE icon at the left bottom and right click. A submenu appears select Konsole



B) Login as root with `su-` and update the system with command `zipper refresh` and `zipper update`

Update will start at zipper refresh, answer y when prompted and wait until finished.

```

localhost:~ # 
localhost:~ # zypper refresh
Repository 'openSUSE-Leap-15.6-1' is up to date.
Repository 'Update repository of openSUSE Backports' is up to date.
Repository 'Non-OSS Repository' is up to date.
Repository 'Open H.264 Codec (openSUSE Leap)' is up to date.
Repository 'Main Repository' is up to date.
Repository 'Update repository with updates from SUSE Linux Enterprise 15' is up to date.
Repository 'Main Update Repository' is up to date.
Repository 'Update Repository (Non-oss)' is up to date.
All repositories have been refreshed.
Loading repository data...
Reading installed packages...
27 packages to upgrade.

Package download size: 16.3 MB
Package install size change:
 234.5 KiB | - 74.9 MB required by packages that will be installed
 234.5 KiB | - 74.7 MB released by packages that will be removed

Backend: classic_rpmtrans
Continuing [y/n/v/...? shows all options] (y): y
Retrieving: aaa_base-84.87git20180849_849dce-158300.10.23.1.x86_64 (Update repository with updates from SUSE Linux Enterprise 15)
(1/27), 106.8 kB [done (261.2 kB/s)]
Retrieving: system-254.20-158600.4.18.2.x86_64 (update repository with updates from SUSE Linux Enterprise 15)
(2/27), 3.7 kB [done (131.4 kB/s)]
Retrieving: delta-./x86_64/systemd-254.18.254.20-158600.4.15.10.158600.4.18.2.x86_64.rpm [done (131.4 kB/s)]
Applying delta: ./systemd-254.18.254.20-158600.4.15.10.158600.4.18.2.x86_64.rpm [done]
Retrieving: udev-254.20-158600.4.18.2.x86_64 (update repository with updates from SUSE Linux Enterprise 15)
(3/27), 1.9 MB [done (496.9 kB/s)]
Retrieving: delta-./x86_64/udev-254.18.254.20-158600.4.15.10.158600.4.18.2.x86_64.rpm, 422.9 kB [done (496.9 kB/s)]
Applying delta: ./udev-254.18.254.20-158600.4.15.10.158600.4.18.2.x86_64.rpm [done]
Retrieving: grub2-2.12-158600.8.12.1.x86_64 (Update repository with updates from SUSE Linux Enterprise 15)
Retrieving: grub2-2.12-158600.8.9.2-158600.8.9.2.x86_64.rpm [done (139.5 kB/s)]
Applying delta: ./grub2-2.12-158600.8.12.1.x86_64.rpm [done]
Retrieving: grub2-1386-pc-2.12-158600.8.12.1.noarch (Update repository with updates from SUSE Linux Enterprise 15)
(5/27), 925.5 kB [done]

```

Once finished do `zypper refresh` and `zypper update` again, it should show “Nothing to do”

```

localhost:~ # zypper refresh
Repository 'openSUSE-Leap-15.6-1' is up to date.
Repository 'Update repository of openSUSE Backports' is up to date.
Repository 'Non-OSS Repository' is up to date.
Repository 'Open H.264 Codec (openSUSE Leap)' is up to date.
Repository 'Main Repository' is up to date.
Repository 'Update repository with updates from SUSE Linux Enterprise 15' is up to date.
Repository 'Main Update Repository' is up to date.
Repository 'Update Repository (Non-oss)' is up to date.
All repositories have been refreshed.
localhost:~ # zypper update
Loading repository data...
Reading installed packages...
Nothing to do.
localhost:~ #

```

## 3.2 Troubleshooting

### 3.2.1 Fedora 41 black Screen after update - Single user Mode and change to Runlevel 3

It was noticed that after upgrade the Fedora system gets back to a black screen.

As a workaround the system is started in level 3 as cli command with the procedure described below.

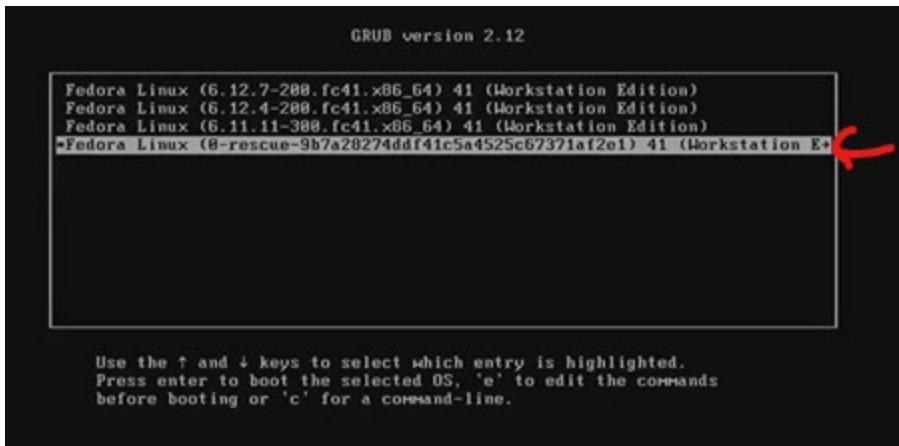
In Fedora, runlevel 3 is a multi-user mode with networking enabled. It is commonly used for server environments where a graphical user interface (GUI) is not needed<sup>1</sup>. In this mode, essential services like networking, file systems, and system logging are started, but no graphical desktop environment is launched.

#### 3.2.1.1 Restart Fedora 41 as runlevel3

- A) Restart Fedora machine
- B) Press ESC and the following menu is displayed



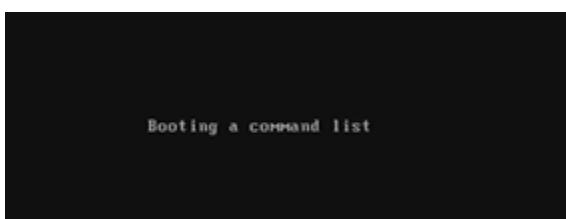
Select the last one and press **e** to edit



A new window appears go to the line before the last one and edit it. In the fifth line after the word quiet write “single” and press Ctrl-x to quit



In the next screen press <Enter> and wait a couple of minutes , we will be going into single user mode



Restart initiates and a series of screens appear, when finish we will go to level 1 what is called rescue mode, in rescue mode we will change to run from graphical interface to run level 3 which is booting without graphical interface but with networking.

```
[ OK ] Finished modprobe@configfs.service - Load Kernel Module configfs.
[ OK ] Finished modprobe@dm_mod.service - Load Kernel Module dm_mod.
[ OK ] Finished modprobe@efi_pstore.service - Load Kernel Module efi_pstore.
[ OK ] Finished modprobe@fuse.service - Load Kernel Module fuse.
[ OK ] Finished modprobe@loop.service - Load Kernel Module loop.
[ OK ] Finished systemd-modules-load.service - Load Kernel Modules.
[ OK ] Finished systemd-remount-fs.service - Remount Root and Kernel File Systems.
Mounting sys-fs-fuse-connections.mount - FUSE Control File System...
Starting systemd-random-seed.service - Load/Save OS Random Seed...
Starting systemd-sysctl.service - Apply Kernel Variables...
[ OK ] Finished systemd-udev-load-credentials.service - Load udev Rules From Credentials.
[ OK ] Finished systemd-network-generator.service - Generate network units from Kernel command line.
[ OK ] Reached target network-pre.target - Preparation for Network.
[ OK ] Mounted sys-fs-fuse-connections.mount - FUSE Control File System.
[ OK ] Started systemd-journald.service - Journal Service.
Starting systemd-journal-flush.service - Flush Journal to Persistent Storage...
[ OK ] Finished systemd-random-seed.service - Load/Save OS Random Seed.
[ OK ] Finished systemd-sysctl.service - Apply Kernel Variables.
[ OK ] Finished systemd-tmpfiles-setup-dev-early.service - Create Static Device Nodes in /dev gracefully.
Starting systemd-tmpfiles-setup-dev.service - Create Static Device Nodes in /dev...
[ OK ] Finished systemd-journal-flush.service - Flush Journal to Persistent Storage.
[ OK ] Finished systemd-tmpfiles-setup-dev.service - Create Static Device Nodes in /dev.
[ OK ] Reached target local-fs-pre.target - Preparation for Local File Systems.
Starting systemd-udevd.service - Rule-based Manager for Device Events and Files...
[ OK ] Started systemd-udevd.service - Rule-based Manager for Device Events and Files.
Starting modprobe@configfs.service - Load Kernel Module configfs...
[ OK ] Finished modprobe@udev-trigger.service - Coldplug All udev devices.
[ OK ] Finished modprobe@configfs.service - Load Kernel Module configfs.
Starting modprobe@fuse.service - Load Kernel Module fuse...
[ OK ] Finished modprobe@fuse.service - Load Kernel Module fuse.
Starting systemd-fsck@dev-disk-by\x2duuid-bfeb3e58\x2d481d\x2d8b67.device - System Check on /dev/disk/by-uuid/bfeb3e58-5569-481d-8b67-e7b2dc5bd6af...
[ OK ] Finished systemd-fsck@dev-disk-by\x2duuid-bfeb3e58\x2d481d\x2d8b67.device - System Check on /dev/disk/by-uuid/bfeb3e58-5569-481d-8b67-e7b2dc5bd6af.
Mounting boot.mount - /boot...
[ OK ] Mounted boot.mount - /boot.
[ OK ] Found device dev-disk-by\x2deuid-58329245\x2d5b1a\x2d4446\x2dacbf\x2d961154f8ef15.device - VMware Virtual Nvme Disk Fedora.
Mounting home.mount - /home...
[ OK ] Mounted home.mount - /home.
Starting modprobe@dm_mod.service - Load Kernel Module dm_mod...
Starting modprobe@efi_pstore.service - Load Kernel Module efi_pstore...
Starting modprobe@loop.service - Load Kernel Module loop...
[ OK ] Finished modprobe@dm_mod.service - Load Kernel Module dm_mod.
[ OK ] Finished modprobe@loop.service - Load Kernel Module loop.
[ OK ] Stopped systemd-vconsole-setup.service - Virtual Console Setup.
Stopping systemd-vconsole-setup.service - Virtual Console Setup...
Starting systemd-vconsole-setup.service - Virtual Console Setup...
[ OK ] Stopped systemd-vconsole-setup.service - Virtual Console Setup.
Starting systemd-vconsole-setup.service - Virtual Console Setup...
[ OK ] Finished systemd-vconsole-setup.service - Virtual Console Setup.
```

At the end, the screen asks for the root password, give it and continue

```
You are in rescue mode. After logging in, type "journalctl -xb" to view
system logs, "systemctl reboot" to reboot, or "exit"
to continue bootup.
Give root password for maintenance
(or press Control-D to continue): _
```

Command to change the run level is given

```
sudo systemctl isolate multi-user.target
```

```
Give root password for maintenance
(or press Control-D to continue):
root@fedora13:~# sudo systemctl isolate multi-user.target
-
```

Login as “student” with corresponding password

```
fedora13 login: student
Password:
Last login: Wed Dec 18 12:07:23 on ttym
student@fedora13:~$ _
```

Use su – to login as root, once as root, ping google.com to check VM is working correctly

```
Last login: Wed Dec 18 12:07:23 on ttym2
student@fedora13:~$ su
Password:
root@fedora13:/home/student# ping google.com
PING google.com (142.250.69.118) 56(84) bytes of data.
64 bytes from pugula-ab-in-f14.1e188.net (142.250.69.118): icmp_seq=1 ttl=118 time=4.00 ms
-
```

### 3.2.1.2 Set runlevel3 as default

systemd uses ‘targets’ instead of runlevels. By default, there are two main targets:

- multi-user.target: analogous to runlevel 3
- graphical.target: analogous to runlevel 5

The default target returned by command `systemctl get-default`

```
root@fedora1:/etc# systemctl get-default
graphical.target
Note: found "single" on the kernel command line, which overrides the default unit.
root@fedora1:/etc# systemctl get-default
```

To set default target to run level3 (command line) use command `systemctl set-default multi-user.target`

```
root@fedora1:/etc# systemctl get-default
graphical.target
Note: found "single" on the kernel command line, which overrides the default unit.
root@fedora1:/etc# systemctl set-default multi-user.target
Removed '/etc/systemd/system/default.target'.
Created symlink '/etc/systemd/system/default.target' → '/usr/lib/systemd/system/multi-user.target'.
Note: found "single" on the kernel command line, which overrides the default unit.
root@fedora1:/etc# systemctl get-default
multi-user.target
Note: found "single" on the kernel command line, which overrides the default unit.
root@fedora1:/etc#
```

### 3.2.1.3 Workaround to get graphical interface

#### 3.2.1.3.1 Preparation

This work around assumes starting from the CLI after previous section 4.1.2 has been applied.

```
Fedora Linux 41 (Workstation Edition)
Kernel 6.12.8-200.fc41.x86_64 on an x86_64 (tty1)

fedora login: _
```

#### A) Login to Fedora box from CLI command

The sudo command in Linux stands for Super User DO. It allows users to execute commands with elevated privileges, typically those of the root user, without needing to log in as the root user.

In the commands for workaround sudo is used. Note that , if user student is used for login sudo needs to be used before commands. If root is used sudo it is not needed.

```
Fedora Linux 41 (Workstation Edition)
Kernel 6.12.8-200.fc41.x86_64 on an x86_64 (tty1)

fedora login: student
Password:
Last login: Thu Jan  9 15:42:30 from 10.164.0.17
student@fedora:~$ _
```

- B) It is recommended that ssh is used, so once logged in make sure sshd is active and enabled.

SSH (Secure Shell) is a protocol which facilitates secure communications between two systems using a client-server architecture and allows users to log into server host systems remotely. Fedora includes the general OpenSSH server,

1. Verify if openssh-server service is already installed since Fedora includes it no need to be installed.

```
dnf install openssh-server
```

```
root@fedora1:/etc/skel# dnf install openssh-server
Updating and loading repositories:
Repositories loaded.
Package "openssh-server-9.8p1-3.fc41.2.x86_64" is already installed.

Nothing to do.
root@fedora1:/etc/skel#
```

2. Enable the sshd service

```
systemctl enable sshd
```

```
man:sshd_config(5)
root@fedora1:~# systemctl enable sshd
Created symlink '/etc/systemd/system/multi-user.target.wants/sshd.service' → '/usr/lib/systemd/system/sshd.service'.
```

3. Start the sshd service and check its status to ensure it is running correctly.

```
systemctl start sshd
```

```
sudo systemctl status sshd
```

In the status printout note in green **enabled** and **active (running)**

```
man:sshd_config(5)
root@fedora1:~# systemctl start sshd
root@fedora1:~# systemctl status sshd
● sshd.service - OpenSSH server daemon
   Loaded: loaded (/usr/lib/systemd/system/sshd.service; enabled; preset: disabled)
   Drop-In: /usr/lib/systemd/system/service.d
             └─10-timeout-abort.conf, 50-keep-warm.conf
     Active: active (running) since Wed 2025-01-08 09:47:54 EST; 2s ago
   Invocation: bfa6c646f974131a544e?eee1761d10
   Docs: man:sshd(8)
         man:sshd_config(5)
 Main PID: 233832 (sshd)
   Tasks: 1 (limit: 8771)
  Memory: 1.4M (peak: 1.4M)
    CPU: 2ms
   CGroup: /system.slice/sshd.service
           └─233832 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

Jan 08 09:47:54 fedora1 systemd[1]: Starting sshd.service - OpenSSH server daemon...
Jan 08 09:47:54 fedora1 (sshd)[233832]: sshd.service: Referenced but unset environment variable evaluates to an empty string: OPTIONS
Jan 08 09:47:54 fedora1 sshd[233832]: Server listening on 0.0.0.0 port 22.
Jan 08 09:47:54 fedora1 sshd[233832]: Server listening on :: port 22.
Jan 08 09:47:54 fedora1 systemd[1]: Started sshd.service - OpenSSH server daemon.
```

4. Verify the ip address to be used for ssh use command

```
ifconfig
```

See ip address to be used to ssh is 10.164.0.60

```
-- google.com ping statistics --
3 packets transmitted, 3 received, 0% packet loss, time 2004ms
rtt min/avg/max/mdev = 2.744/6.036/8.217/2.368 ms
root@fedora:~# ifconfig
ens160: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.164.0.60 netmask 255.255.0.0 broadcast 10.164.255.255
        inet6 fe80::1bd9:78f6:de26:9d24 prefixlen 64 scopeid 0x20<link>
          ether 00:0c:29:64:e4:e4 txqueuelen 1000 (Ethernet)
            RX packets 1433 bytes 138846 (135.5 KiB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 91 bytes 10318 (10.0 KiB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
      loop txqueuelen 1000 (Local Loopback)
        RX packets 17 bytes 2890 (2.8 KiB)
        RX errors 0 dropped 0 overruns 0 frame 0
        TX packets 17 bytes 2890 (2.8 KiB)
        TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

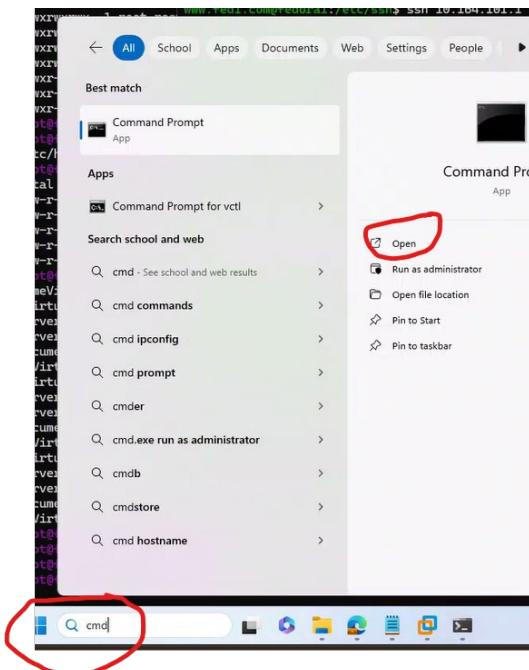
root@fedora:~# _
```

### 3.2.1.3.2 Install Fedora 41 Update and Fix Black Screen

- A) Connect to the system using SSH. Utilizing SSH enables the use of copy/paste functions, which allows for quicker execution of the workaround and reduces the likelihood of errors.

Use cmd from windows bare metal machine (JAC lab machine).

Note - A bare metal machine is a physical computer that runs an operating system directly on its hardware without virtualization.



```
Microsoft Windows [Version 10.0.22621.4602]
(c) Microsoft Corporation. All rights reserved.

C:\Users\2498056>
```

B) Use the cmd to login via ssh. Login to the server using the ip showed in ifconfig in earlier section

**ssh student@10.164.0.60**

```
C:\Users\2498056>ssh student@10.164.0.60
student@10.164.0.60's password:
Last login: Thu Jan  9 12:52:59 2025 from 10.164.0.17
student@fedora:~$ su -
```

C) Remove any existing Nvidia drivers

**sudo dnf remove \*nvidia\* -y**

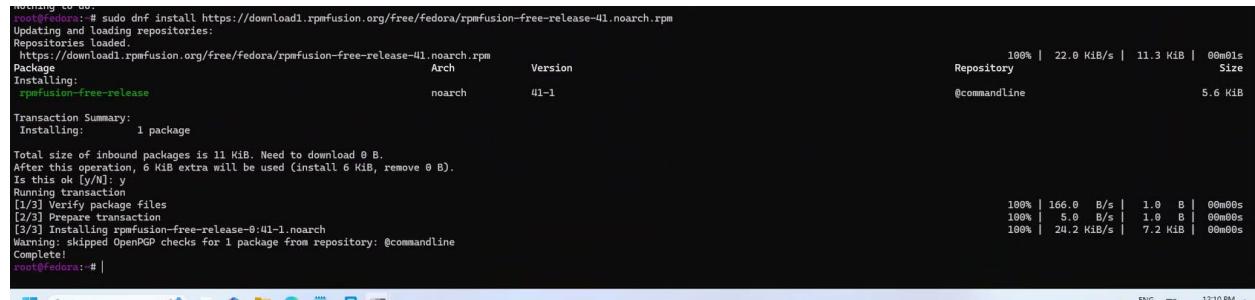
Removes any existing Nvidia drivers from your system. If they are causing issues after an update, this will help clear them out.

```
root@Fedora:~# sudo dnf remove *nvidia*
Package Removing: nvidia-gpu-firmware
Transaction Summary: Removing: 1 package
Is this ok [y/N]: y
Running transaction
[1/2] Prepare transaction
[2/2] Removing nvidia-gpu-firmware-0:20241210-1.fc41.noarch
Complete!
root@Fedora:~#
```

#### D) Install the "RPM Fusion Free" repository

```
sudo dnf install https://download1.rpmfusion.org/free/fedora/rpmfusion-free-release-41.noarch.rpm
```

Installs the "RPM Fusion Free" repository. This repo contains free and open-source software packages that are not included in Fedora by default.



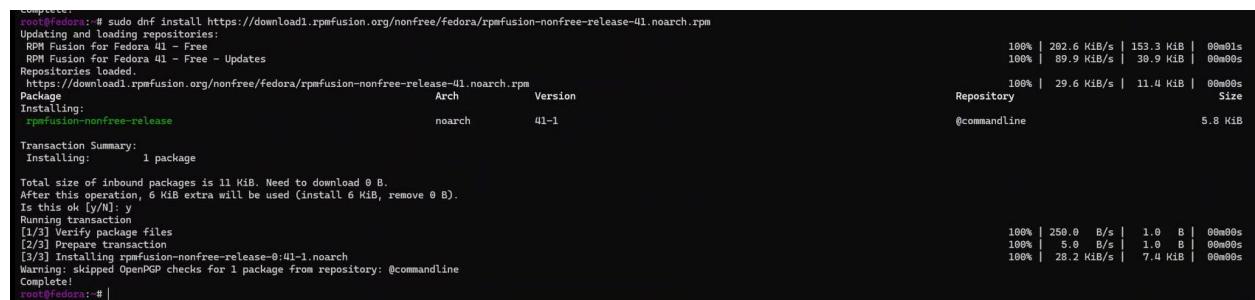
```
running transaction
root@fedora: # sudo dnf install https://download1.rpmfusion.org/free/fedora/rpmfusion-free-release-41.noarch.rpm
Updating and loading repositories:
Repositories loaded.
https://download1.rpmfusion.org/free/fedora/rpmfusion-free-release-41.noarch.rpm
Package          Arch      Version           Repository      Size
Installing:
  rpmfusion-free-release               noarch    41-1                  @commandline   5.6 Kib
Transaction Summary:
  Installing: 1 package

Total size of inbound packages is 11 KiB. Need to download 0 B.
After this operation, 6 KiB extra will be used (install 6 KiB, remove 0 B).
Is this ok [y/N]: y
Running transaction
[1/2] Verify package files
[2/2] Prepare transaction
[3/3] Installing rpmfusion-free-release-0:41-1.noarch
Warning: skipped OpenPGP checks for 1 package from repository: @commandline
Complete!
root@fedora: # |
```

#### E) Installs the "RPM Fusion Non-Free" repository

```
sudo dnf install https://download1.rpmfusion.org/nonfree/fedora/rpmfusion-nonfree-release-41.noarch.rpm -y
```

Installs the "RPM Fusion Non-Free" repository. This repo contains proprietary software, such as drivers for Nvidia GPUs, which aren't open-source but are necessary for some hardware.



```
running transaction
root@fedora: # sudo dnf install https://download1.rpmfusion.org/nonfree/fedora/rpmfusion-nonfree-release-41.noarch.rpm
Updating and loading repositories:
  RPM Fusion for Fedora 41 - Free
  RPM Fusion for Fedora 41 - Free - Updates
Repositories loaded.
https://download1.rpmfusion.org/nonfree/fedora/rpmfusion-nonfree-release-41.noarch.rpm
Package          Arch      Version           Repository      Size
Installing:
  rpmfusion-nonfree-release               noarch    41-1                  @commandline   5.8 Kib
Transaction Summary:
  Installing: 1 package

Total size of inbound packages is 11 KiB. Need to download 0 B.
After this operation, 6 KiB extra will be used (install 6 KiB, remove 0 B).
Is this ok [y/N]: y
Running transaction
[1/3] Verify package files
[2/3] Prepare transaction
[3/3] Installing rpmfusion-nonfree-release-0:41-1.noarch
Warning: skipped OpenPGP checks for 1 package from repository: @commandline
Complete!
root@fedora: # |
```

#### F) Installs the akmod-nvidia package

```
sudo dnf install akmod-nvidia -y
```

Installs the akmod-nvidia package. This package provides an automatic kernel module builder for Nvidia drivers, ensuring that the right driver is always built when you update your kernel.



```
running transaction
root@fedora: # sudo dnf install akmod-nvidia
Updating and loading repositories:
  RPM Fusion for Fedora 41 - Nonfree - Updates
  RPM Fusion for Fedora 41 - Nonfree
Repositories loaded.
Package          Arch      Version           Repository      Size
Installing:
  akmod-nvidia                x86_64    3:565.77-1.fc41                    rpmfusion-nonfree-nvidia-driver   90.9 Kib
Dependencies:
  add-determinism             x86_64    0.3.6-3.fc41                      updates                   2.4 MiB
  akmods                       noarch   0.6.0-8.fc41                      updates                   64.2 MiB
  nvidia-dkms                noarch   12.69-1.fc41                      fedora                   97.7 MiB
100% | 48.4 KiB/s | 24.8 KiB | 00m01s
100% | 127.1 KiB/s | 84.5 KiB | 00m00s
```

## G) Install the X server

```
dnf install xorg-x11-server-Xorg -y
```

Installs the X server, which is needed for the graphical interface to work. It is essential for running graphical applications and logging into the desktop environment.

```
Complete!
root@fedora: ~# dnf install xorg-x11-server-Xorg
Updating and loading repositories: 100%
Repository                    Release ID          Sync Status      Size
updates                         3.3 MiB          0 B           3.3 MiB
fedora                          181.6 KiB        181.6 KiB
rpmsfusion-nonfree-nvidia-driver 19.3 MiB        19.3 MiB
updates                         127.1 KiB        127.1 KiB
updates                         487.6 KiB        487.6 KiB
Transaction Summary:           5 packages
Installing:
xorg-x11-server-Xorg           x86_64          21.1.15-1.fc41
Installing dependencies:
xorg-x11-common                x86_64          1.4.0-3.fc41
xorg-x11-drivers-nvidia-libcs  x86_64          3:1565.77-3.fc41
xorg-x11-server-common          x86_64          21.1.15-1.fc41
Installing weak dependencies:
libreoffice-xml                x86_64          1:24.8.4.2-2.fc41
Total size of inbound packages is 4 MiB. Need to download 4 MiB.
After this operation, 23 MiB extra will be used (install 23 MiB, remove 0 B).
Is this ok [y/N]: y
[1/5] xorg-x11-server-common-0:21.1.15-1.fc41.x86_64
```

## H) Make sure you are in level3 so you will get to CLI after reboot.

```
systemctl get-default
```

```
Created symlink '/etc/systemd/system/multi-user.target'.
root@fedora: ~# systemctl get-default
multi-user.target
root@fedora: ~#
```

## I) Reboot to allow changes to be applied.

Note – if reboot is used done with a user different than root, password will be asked.

```
reboot
```

Reboots your system to apply the changes made (like installing drivers and X server).

```
root@fedora: ~# reboot
root@fedora: ~# client_loop: send disconnect: Connection reset
C:\Users\2498056>
```

## J) Login after reboot

When reboot comes back login in **CLI** as a user **student** (not root)

```
Fedora Linux 41 (Workstation Edition)
Kernel 6.12.8-200.fc41.x86_64 on an x86_64 (tty1)

fedora login: student
Password:
Last login: Thu Jan  9 12:56:55 from 10.164.0.17
student@fedora: ~ $ _
```

## K) Initialize an X session

**WARNING**

Command needs to be done from CLI as user **student** in virtual machine (not ssh).

```
startx
```

Starts the X server and launches your graphical environment (e.g., the desktop), which should allow you to get back to your normal desktop after login.

NOTE – startx needs to be issued in user student to get the graphical interface right away

Make sure you run startx after logging in to your user account in run level 3.

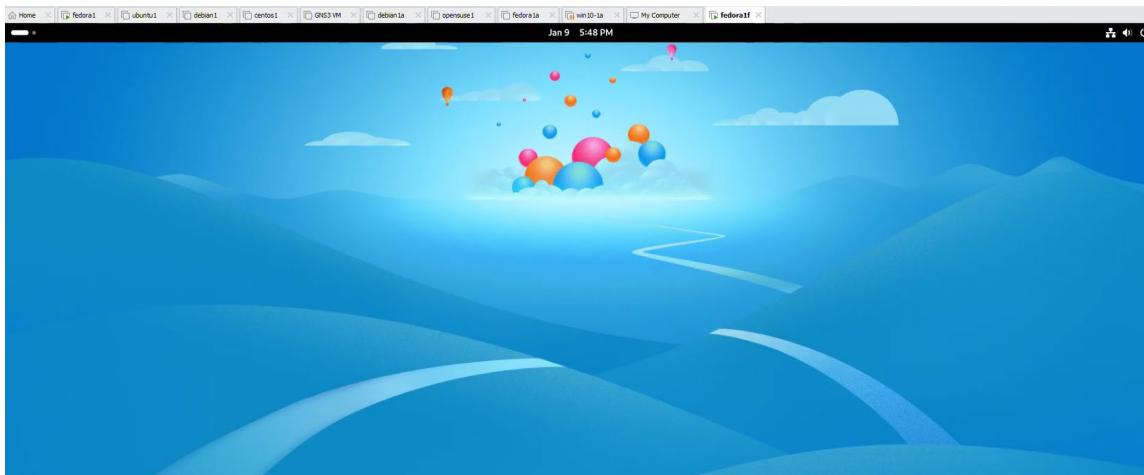
Never change to level 5 for this workaround

Startx does not survive restart, so if you reboot the system the command startx needs to be done after reboot.

```
Fedora Linux 41 (Workstation Edition)
Kernel 6.12.8-200.fc41.x86_64 on an x86_64 (tty1)

fedora login: student
Password:
Last login: Thu Jan  9 15:42:30 from 10.164.0.17
student@fedora:~$ startx
```

After startx is issued you will get the graphical interface



### 3.3 LINUX commands

This section includes exercises done with Linux commands.

## CHECKPOINT

**CONTINUE** to next section if the following condition is met:

- Linux distro is up and running (the examples below use Fedora) and

For more information how to check the condition refer to Linux distributions section. If the condition is not met, the documented processes in this section can not be done procedure **STOPS** here.

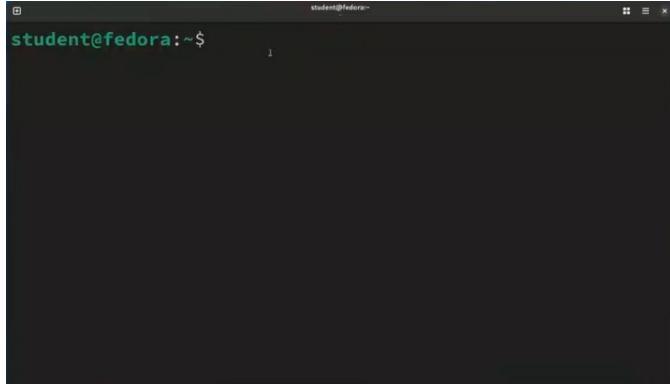
### 3.3.1 Preliminary Commands navigating

The following commands are used in this section:

1. `pwd` print working directory. Displays the current directory you are working in.
2. `cd` change directory. Change the current working directory in the terminal
3. `ls` list . List the contents of a directory
4. `man` manual Interface to system reference manuals
5. `su -` substitute user. Allows you to switch to another user account
6. `clear` clear the terminal screen
7. `ctrl-c` cancel

A) Connect to a fedora machine with user student

B) Open a terminal in Fedora virtual machine



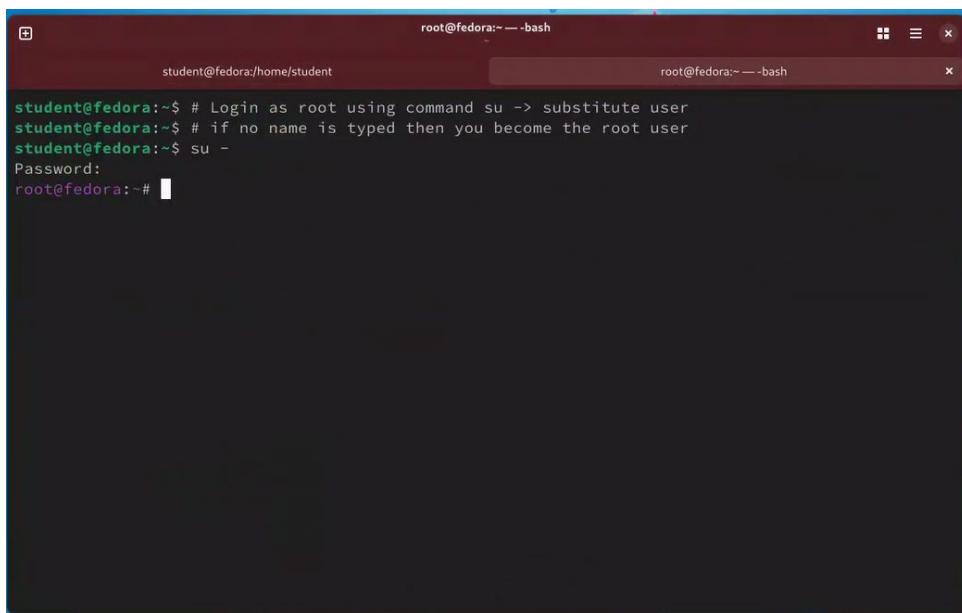
C) Login as root. Use command **su -** and when prompted the corresponding password

Notes:

- If su is used without arguments it gets you to root user

Dash – is used after su to login

-



D) Check which folder you are currently on with command **pwd**

The command indicates where we are in the home folder of the root user

```
student@fedora:~$ # Login as root using command su -> substitute user
student@fedora:~$ # if no name is typed then you become the root user
student@fedora:~$ su -
Password:
root@fedora:~# # Check which folder you are currently in with command pwd
root@fedora:~# # pwd -> present working directory
root@fedora:~# pwd
/root
root@fedora:~#
```

## E) Use command man to display the manual for command ls

Note on the output the description of the command is shown describing the available options to use. Some of the options that can be used in this case:

- -a , -all - do not ignore entries starting with .
- -A -almost-all do not list implied . and ..

To quit the man page use q

```
ls(1)                                         User Commands                                         LS(1)

NAME
    ls - list directory contents

SYNOPSIS
    ls [OPTION]... [FILE]...

DESCRIPTION
    List information about the FILES (the current directory by default). Sort entries alphabetically if none of -cftuvSUX nor --sort is specified.

    Mandatory arguments to long options are mandatory for short options too.

    -a, --all
        do not ignore entries starting with .

    -A, --almost-all
        do not list implied . and ..

    --author
        with -l, print the author of each file

    -b, --escape
        print C-style escapes for nongraphic characters

    --block-size=SIZE
        with -l, scale sizes by SIZE when printing them; e.g., '--block-size=M'; see SIZE format below

    -B, --ignore-backups
        do not list implied entries ending with ~

    -c      with -lt: sort by, and show, ctime (time of last change of file status information); with -l: show ctime and sort by name;
           otherwise: sort by ctime, newest first

    -C      list entries by columns

    --color[=WHEN]
        color the output WHEN; more info below

Manual page ls(1) line 1 (press h for help or q to quit)
```

F) List the contents of a folder use command `ls`

You can see that there is only one file named `anaconda-ks.cfg`

```
student@fedora:~$ # Login as root using command su -> substitute user
student@fedora:~$ # if no name is typed then you become the root user
student@fedora:~$ su -
Password:
root@fedora:~# # Check which folder you are currently in with command pwd
root@fedora:~# # pwd -> present working directory
root@fedora:~# pwd
/root
root@fedora:~# # To list the contents of a folder use command ls
root@fedora:~# # ls -> list
root@fedora:~# ls
anaconda-ks.cfg
root@fedora:~#
```

G) List the contents of a folder use command `ls -a` and `ls -A`

Note in the output there are files that start with a period “.”

A file or a folder that starts with a period is a hidden file. Is hidden for protection

The `-A` option in this case shows the same output. The difference will be if we have subfolders, we then could see differences.

```
student@fedora1:~$ ls -a
student@fedora1:~$ ls -A
. .bash_history .bash_profile .cache Desktop Downloads .mozilla Pictures Templates
.. .bash_logout .bashrc config Documents .local Music Public Videos
student@fedora1:~$ ls -A
.bash_history .bash_profile .cache Desktop Downloads .mozilla Pictures Templates
.bash_logout .bashrc config Documents .local Music Public Videos
student@fedora1:~$
```

H) Go to a different location using command `cd` to change directory. Use command `cd /etc`

Note the prompt changes showing we are on the etc folder

```

root@fedoral:~#
root@fedoral:~# cd /etc
root@fedoral:/etc#
root@fedoral:/etc# █

```

- I) Once in /etc folder list the contents using command `ls -a`

The output here is different see distinct colors in the output

```

root@fedoral:/etc#
root@fedoral:/etc#
root@fedoral:/etc# ls -a
.
.. dhcp gshadow- locale.conf nvme redhat-release sysctl.conf
DIR_COLORS gss localtime openal request-key.conf sysctl.d
DIR_COLORS.lightbgcolor gsproxr login.defs openldap request-key.d systemd
dlyena-server-service.conf host.conf logrotate.conf opensc.conf resolv.conf system-release
aliases hostname logrotate.d opensc-x86_64.conf rncd.key system-release-cpe
dnf hosts lvm openvpn rpc terminfo
dnsmasq.conf hp lynx.cfg opt rpm thermal
dnsmasq.d httpd lynx.lss os-release rsyncd.conf tmpfiles.d
alternatives dracut.conf idmapd.conf lynx-site.cfg ostree rstatd.tpm2-tss
anaconda dracut.conf.d imageMagick-7 machine-id PackageKit Trolltech.conf
anthy-unicode.conf eac init.d magic paperspecs samba trusted-key.key
asound.conf egl inittab mailcap passim.conf sane.d ts.conf
audit environment inputrc mailcap makedumpfile.conf.sample passwd tuned
authselect ethertypes java modprobe.d pkcs11 sasl2 udev
avahi exports ipp-usb man_db.conf passwd- passwd- unbound
bash_completion.d exports.d iscsi modules-load.d Plymouth shells
bashrc favicon.png issue mctog passwdqc.conf services
bindresvport.blacklist fedora-release issue.d mdevctl.d pinorc sestatus.conf
binfmt.d filesystems issue.net mime.types pkcs11 sasl
bluetooth firefox java mke2fs.conf pkconfig shadow uPower
brlapci.key firewalld jvm modules-load.d pk1 shadow- uresourceed.conf
britty flatpak jvm-common motd plymouth shells
britty.conf fonts kde motd.d polkit-1 smartmontools vconsole.comf
ceph fprintd.conf kde4rc mtab popt.d srash virc
chkconfig.d fstab kderc mtools.conf ppp sos vmware-tools
chromium fuse.conf kdump my.cnf printcap speech-dispatcher vpl
chrony.conf fmupd kdump.conf my.cnf.d profile ssh vpnc
cifs-utils gcrypt kernel named protocols sssd vulkan
colord gdbinit keys named.conf pulse statetab.d webmin
containers gdinit.d keyutils named.rfc1912.zones .pwd.lock subgid whois.conf
credstore gdm geoclue krb5.conf named.root.key qemu subgid- wireplumber
credstore.encrypted glvnd krb5.conf.d nanorc _ oemu ga subuid wpa_supplicant
crypto-policies gnome-remote-desktop ld.so.cache ndctl rc0.d subuid- x11
crypttab ld.so.conf ld.so.conf ndctl.conf netconfig rc1.d sudo.conf xattr.conf
csh.cshrc groups libaudit.conf NetworkManager rc2.d sudoers xdg
csh.login GREP_COLORS group libblockdev networks rc3.d sudoers.d yum.repos.d
cups groff liblbervs.d nfts.conf rc4.d serial zfs-fuse
cupshelpers group- libnl libmount.conf rc5.d swtpm-localca.conf
dbus-1 grub2.cfg libreport nftables rc6.d swtpm-localca.options
dconf grub2-efi.cfg libssh nilfs_cleanerd.conf rc.d swtpm_setup.conf
debuginfod default grub.d libvirt nsswitch.conf reader.conf.d sysconfig
default grub_d gshadow libvirt
root@fedoral:/etc#

```

- J) Command `clear` is used to clear the screen.

- K) Command `ls -a | more` will allow to go through pages when output is big

Note the period and double period on the top indicates that /etc is a folder that is inside another location, we can go up from here.

```
.  
..  
abrt  
adjtime  
aliases  
aliases.db  
alsa  
alternatives  
anaconda  
anthy-unicode.conf  
asound.conf  
audit  
authselect  
avahi  
bash_completion.d  
bashrc  
bindresvport.blacklist  
binfmt.d  
--More--
```

L) The option `ls -A | more`

Note the period and double period does not appear here compared with `ls -a` option

```
root@fedora1:/etc# ls -A | more
abrt
adjtime
aliases
aliases.db
alsa
alternatives
anaconda
anthy-unicode.conf
asound.conf
audit
authselect
avahi
bash_completion.d
bashrc
bindresvport.blacklist
binfmt.d
bluetooth
brlapi.key
brltty
brltty.conf
ceph
chkconfig.d
chromium
chrony.conf
cifs-utils
colord
containers
credstore
credstore.encrypted
crypto-policies
crypttab
csh.cshrc
csh.login
```

```

root@federal1:/etc# ls -A
abrt
adjtime
aliases
aliases.db
alsa
alternatives
anaconda
anthy-unicode.conf
asound.conf
audit
authselect
avahi
bash_completion.d
bashrc
bindresvport.blacklist
binfmt.d
bluetooth
brlapi.key
brltty
brltty.conf
ceph
chkconfig.d
chromium
chrony.conf
cifs-utils
colord
containers
credstore
credstore.encrypted
crypto-policies
crypttab
csh.cshrc
csh.login
iscsi
issue
issue.d
issue.net
.java
java
jvm
jvm-common
kde
kde4rc
kdrc
kdump
kdump.conf
kernel
keys
keyutils
krb5.conf
krb5.conf.d
ld.so.cache
ld.so.conf
ld.so.conf.d
libaudit.conf
libblockdev
libibverbs.d
libnl
libreport
libssh
libvirt
locale.conf
localtime
login.defs
logrotate.conf
logrotate.d
profile
profile.d
protocols
pulse
.pwd.lock
qemu
qemu-ga
rc0.d
rc1.d
rc2.d
rc3.d
rc4.d
rc5.d
rc6.d
rc.d
reader.conf.d
redhat-release
request-key.conf
request-key.d
resolv.conf
rndc.key
rpc
rpm
rsyncd.conf
rwtab.d
rygel.conf
samba
sane.d
sasl2
security
selinux
services
sestatus.conf

```

- M) List the contents of a folder use command `ls -l` , where `-l` is used for long listing format. This option provides a detailed listing of files and directories. This includes file permissions, number of links, owner, group, size, and modification date.

```
root@fedora1:~# pwd
/root
root@fedora1:~# ls -l
total 12
-rw-----. 1 root root 449 Dec 12 22:37 anaconda-ks.cfg
-rw-r--r--. 1 root root 5286 Dec 17 09:32 webmin-setup-repos.sh
root@fedora1:~#
```

The output shows more information about the file, for example anaconda-ks.cfg

```
total 12
-rw-----. 1 root root 449 Dec 12 22:37 anaconda-ks.cfg
```

A) File type:

- a dash indicates a regular file

B) Permission settings

The letters used in the permission are :

- a) r - read
- b) w - write
- c) x - execute

The first three slots are the permissions for the owner of the file

**-rw-** indicates the owner can read and write but not execute the file

The second three slots are the permissions for the group

**---** group does not have any permission

The last three slots are the permissions for the world.

**--** the world does not have any permission

C) Extended attributes: dot (.)

A dot means the file has no special SELinux (Security-Enhanced Linux) attributes set beyond what is inherited from its parent directory or the system's default policy

D) User owner – username

root is the owner of the file

E) Group name

root is the name of the group to which this file belongs

F) This is the file's size in bytes

In this case 449 bytes

G) Indicates the last modification date of the file.

- H) Indicates the last modification time of the file.
  - I) Name of the file
- N) Use command `cd /` to bring to the top of the file, the issue `ls` command to list content of directories

```
cd /
```

This command changes your current working directory to the root directory (`/`). The root directory is the top-level directory in the Linux file system hierarchy. Everything in the filesystem starts from here.

```
root@federal1:~# cd /
root@federal1:/# ls
afs bin boot dev etc home lib lib64 long lost+found media mnt opt proc root
sbin srv sys test tmp usr var
root@federal1:/#
```

Each one of these folders contains different files:

- a) afs: Andrew File System. This directory, when present, is used for mounting the AFS client.
- b) bin: Contains essential command binaries (executable programs) that are needed by both the system administrator and users. Examples include `ls`, `cp`, `rm`, etc.
- c) boot: Contains everything needed to boot the system, like the kernel, bootloader, and `initramfs` images.
- d) dev: Device files. Each device in the system is represented by a file here, allowing programs to interact with hardware.
- e) etc: Configuration files for the system. Most system-wide configuration files are stored here.
- f) home: Home directories for users. Each user typically has a directory here for personal files.
- g) lib: Libraries essential for the binaries in `/bin` and `/sbin`.
- h) lib64: this directory holds 64-bit libraries
- i) lost+found: This directory is used by the `fsck` (file system check) program. If `fsck` finds orphaned files or data blocks that do not belong to any file, it places them here to prevent data loss
- j) media: Mount points for removable media like CDs, USB drives, etc. (More common in older Linux systems or specific distributions.)
- k) mnt: Temporary mount point for mounting filesystems; often used for manual mounts.
- l) opt: Optional application software packages.
- m) proc: A virtual filesystem providing process and kernel information as files.
- n) root: The home directory of the root user (user ID 0).
- o) run: Run-time variable data. Data here is supposed to be valid only during system runtime.
- p) sbin: Essential system binaries, mostly used for system administration (e.g., `iptables`, `fdisk`).
- q) srv: Data for services provided by the system.
- r) sys: Like `/proc`, but for information about devices, drivers, and some kernel features.
- s) tmp: Temporary files used by the system, cleared on reboot.

- t) usr: Multi-user applications, libraries, and shared resources. Traditionally, this is where software not essential for booting is stored.
- u) var: Variable data. This includes log files, spool files, temporary files, and more.

#### O) Using the commands to navigate example

In the next sequence starting from root directory

<code>pwd</code>	Print current location in our case /
<code>cd /etc</code>	go to directory etc
<code>cd ..</code>	go up one level , in our case comeback to /
<code>ls</code>	list content of directory
<code>cd etc</code>	go to subdirectory etc

```
root@fedora1:/# pwd
/
root@fedora1:/# cd /etc
root@fedora1:/etc# cd ..
root@fedora1:/# ls
afs  boot  etc  lib  long  media  opt  root  sbin  sys  tmp  var
bin  dev   home lib64 lost+found  mnt  proc  run  srv  test  usr
root@fedora1:/# cd etc
```

#### P) Do a ls command and see distinct colors mean different kind of files

White - File

Blue – subdirectories

```
drwxr-xr-x. 1 root          root          274 Nov 11 19:00 dnf
root@fedora:/etc#
root@fedora:/etc# ls
abrt           init.d          profile
adjtime        inittab         profile.d
aliases        inputrc         protocols
alsa           ipp-usb          pulse
alternatives   iscsi           qemu
anaconda       issue           qemu-ga
anthy-unicode.conf issue.d      rc0.d
asound.conf    issue.net      rc1.d
audit          java            rc2.d
authselect     jvm             rc3.d
avahi          jvm-common     rc4.d
bash_completion.d kde             rc5.d
bashrc         kde4rc         rc6.d
bindresvport.blacklist kderc          rc.d
binfmt.d      kdump          reader.conf.d
bluetooth     kdump.conf     redhat-release
```

#### Q) Trick use tab to autocomplete the commands, for example in next command to go to a specific directory use command cd “yu <tab>” and the name will autocomplete

```
root@fedora:/etc#
root@fedora:/etc#
root@fedora:/etc# cd yum.repos.d/
root@fedora:/etc/yum.repos.d#
```

## R) Using absolute path

An absolute path specifies the location of a file or directory by describing the entire path from the root directory

Use these commands to use absolute path:

- a) From /etc directory go back to /
- b) To go from / to /etc/yum.com.repos.d absolute path is needed
- c) cd /etc/yum.com.repos.d

Use the complete path

```
root@fedora:/etc# cd yum.repos.d/
root@fedora:/etc/yum.repos.d# cd /
root@fedora:/# cd /etc/yum.repos.d/
root@fedora:/etc/yum.repos.d#
```

Go up one level

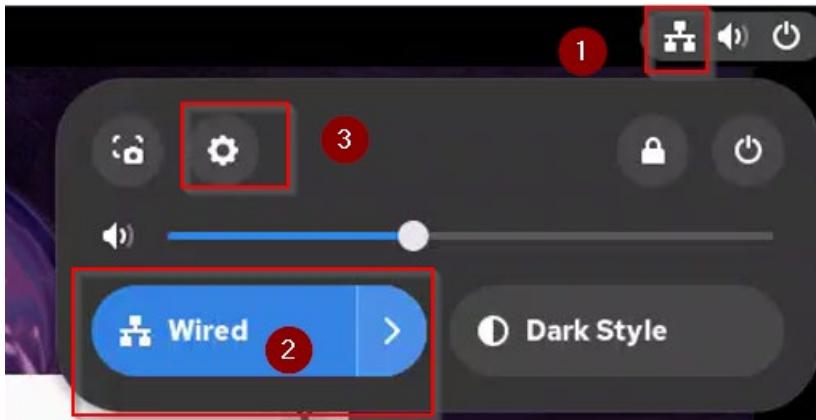
```
root@fedora:/etc/yum.repos.d#
root@fedora:/etc/yum.repos.d# # Go up one level
root@fedora:/etc/yum.repos.d# cd ..
root@fedora:/etc#
```

### 3.3.2 Assign static IP to a server

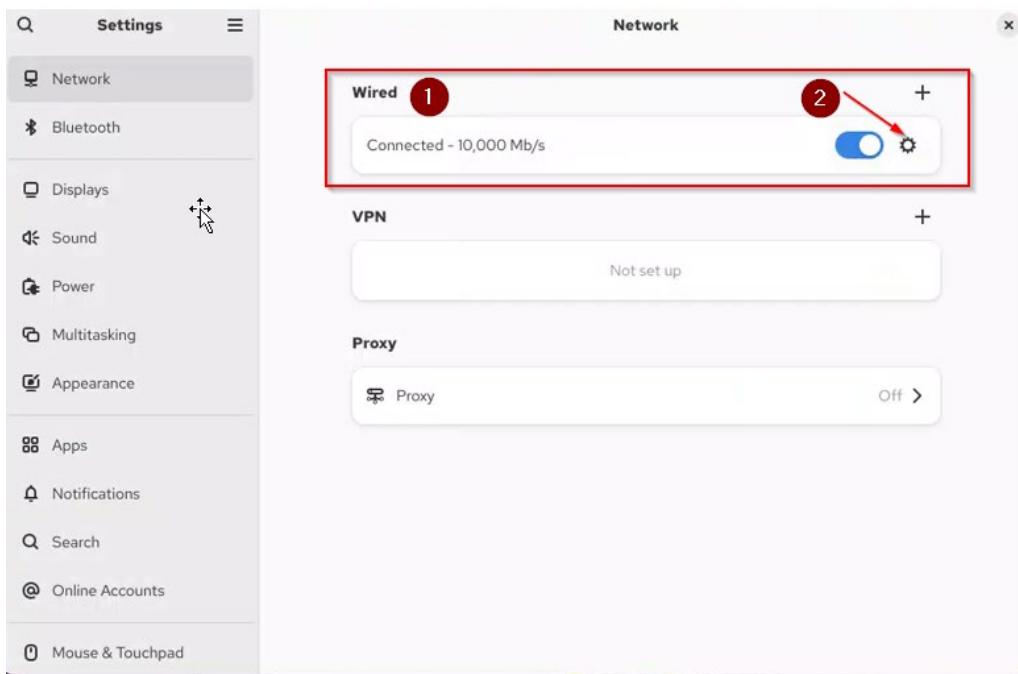
A) Use wired to assign static IP.

Open wired

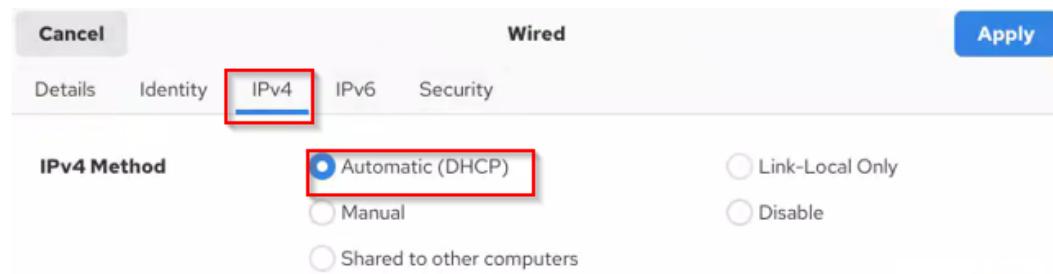
1. Select icon  located at the top right of the screen.
2. Make sure the Wired icon is selected (colored blue) 
3. Select the wheel  on top of blue wired icon



B) Window network is opened, open Wired , select the wheel



C) A new window called “Wired” opens select tab for IPV4. Note Automatic (DHCP) is selected

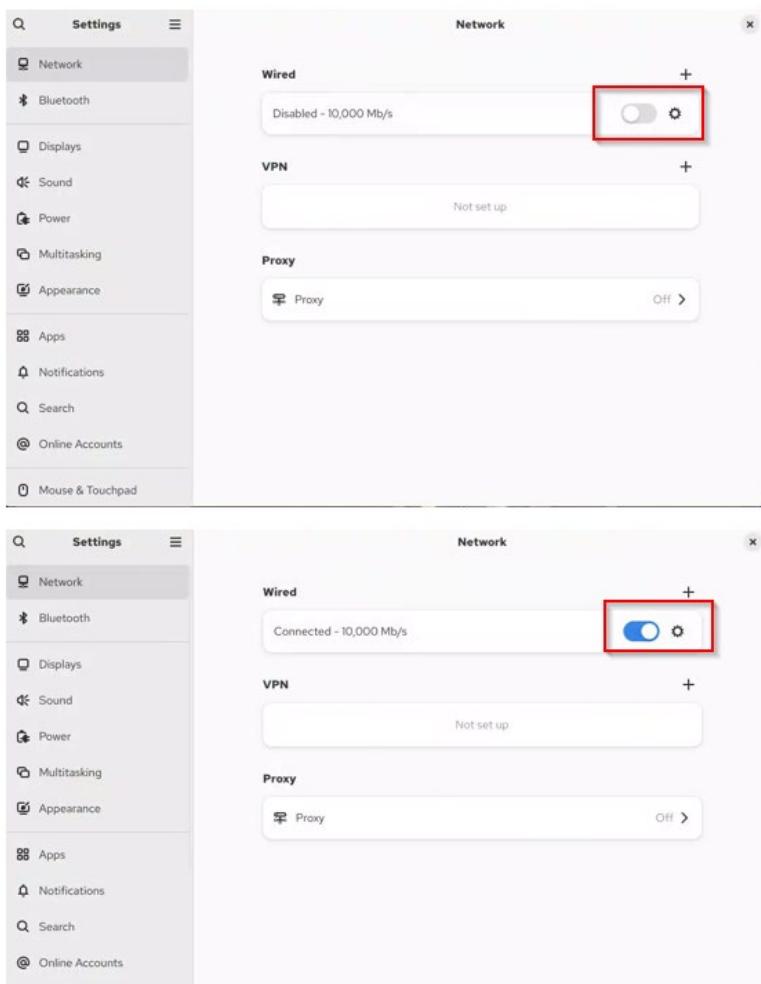


D) In the window called “Wired”. Set to Manual and give the following values:

- Select Manual
- Set Ip address = 10.164.101.1
- Set Netmask = 255.255.0.0
- Set Gateway = 10.164.0.1
- Set DNS = 8.8.8.8
- Click Apply (blue button on top right)

The screenshot shows the same "Wired" configuration window as before, but with different settings. Under "IPv4 Method", "Manual" is selected. In the "Addresses" section, there is one entry: Address 10.164.101.1, Netmask 255.255.0.0, and Gateway 10.164.0.1. In the "DNS" section, the value "8.8.8.8" is entered. In the "Routes" section, the "Automatic" toggle switch is turned on. The "Apply" button is visible at the top right.

E) In the window Network disable/enable Wired to reset configuration



F) Print new given ip address

`ifconfig`

```
root@fedora:/etc# ifconfig
ens160: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.164.101.1  netmask 255.255.0.0  broadcast 10.164.255.255
        inet6 fe80::ece8:a77c:9ca1:38b4  prefixlen 64  scopeid 0x20<link>
          ether 00:0c:29:43:9c:55  txqueuelen 1000  (Ethernet)
            RX packets 1583093  bytes 1730041584 (1.6 GiB)
            RX errors 0  dropped 0  overruns 0  frame 0
            TX packets 109016  bytes 7651950 (7.2 MiB)
            TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
          loop  txqueuelen 1000  (Local Loopback)
            RX packets 176  bytes 20659 (20.1 KiB)
            RX errors 0  dropped 0  overruns 0  frame 0
            TX packets 176  bytes 20659 (20.1 KiB)
            TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

root@fedora:/etc#
```

G) Use ping to confirm is working

ping <new ip>

ping www.google.com

```
root@fedora:/etc#  
root@fedora:/etc# ping 10.164.0.1  
PING 10.164.0.1 (10.164.0.1) 56(84) bytes of data.  
64 bytes from 10.164.0.1: icmp_seq=1 ttl=64 time=0.882 ms  
64 bytes from 10.164.0.1: icmp_seq=2 ttl=64 time=1.31 ms  
64 bytes from 10.164.0.1: icmp_seq=3 ttl=64 time=1.40 ms  
64 bytes from 10.164.0.1: icmp_seq=4 ttl=64 time=0.960 ms  
^C  
--- 10.164.0.1 ping statistics ---  
4 packets transmitted, 4 received, 0% packet loss, time 3006ms  
rtt min/avg/max/mdev = 0.882/1.137/1.396/0.220 ms  
root@fedora:/etc#
```

```
root@fedora:/etc# ping www.google.com  
PING www.google.com (142.250.69.100) 56(84) bytes of data.  
64 bytes from pnyula-ab-in-f4.1e100.net (142.250.69.100): icmp_seq=1 ttl=118 time=2.72 ms  
64 bytes from pnyula-ab-in-f4.1e100.net (142.250.69.100): icmp_seq=2 ttl=118 time=2.35 ms  
64 bytes from pnyula-ab-in-f4.1e100.net (142.250.69.100): icmp_seq=3 ttl=118 time=2.55 ms  
^C  
--- www.google.com ping statistics ---  
3 packets transmitted, 3 received, 0% packet loss, time 2006ms  
rtt min/avg/max/mdev = 2.350/2.537/2.717/0.149 ms  
root@fedora:/etc#
```

### 3.3.3 Configure the server with a name

A) Look for the files to be changed use command ls h\* on /etc directory

```
root@fedora:/etc# ls h*  
host.conf  hostname  hosts  
  
hp:  
hplip.conf  
  
httpd:  
conf  conf.d  conf.modules.d  logs  modules  run  state  
root@fedora:/etc#
```

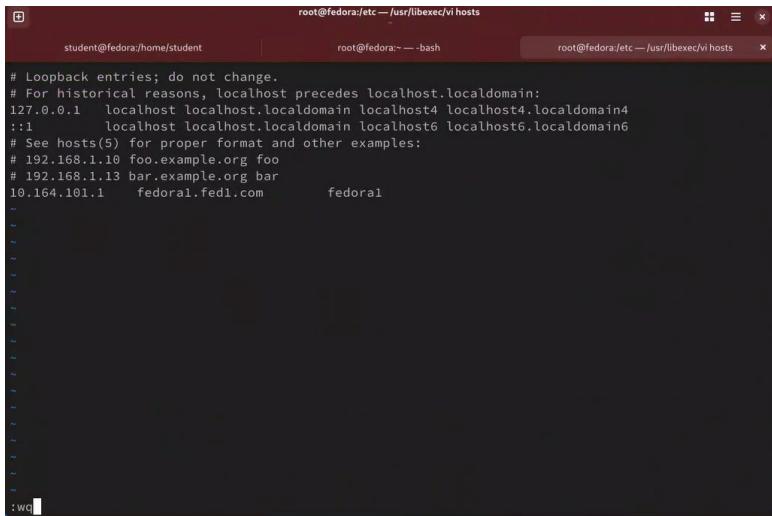
B) Use vi to edit file #####

vi /etc/hosts

Add line:

10.164.101.1 fedora1.fed1.com fedora1

Save the file

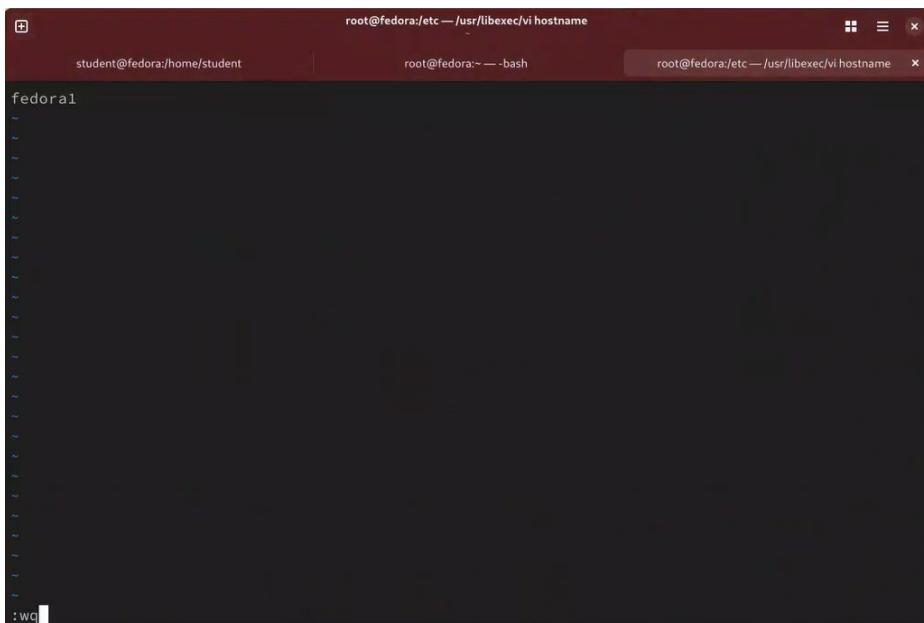


```
# Loopback entries; do not change.
# For historical reasons, localhost precedes localhost.localdomain:
127.0.0.1    localhost localhost.localdomain localhost4 localhost4.localdomain4
::1          localhost localhost.localdomain localhost6 localhost6.localdomain6
# See hosts(5) for proper format and other examples:
# 192.168.1.10 foo.example.org foo
# 192.168.1.13 bar.example.org bar
10.164.101.1    fedora1.fed1.com      fedora1
```

C) Use vi to modify /etc/hostname

```
vi /etc/hostname
```

Write fedora1 and save the file



```
fedora1
```

D) Reboot

```
reboot
```



```
root@fedora:/etc#
root@fedora:/etc# # Reboot
root@fedora:/etc# reboot
```

E) Login when prompted and open a terminal. Note the name changes to fedora1

A screenshot of a terminal window titled "student@fedora1:~". The window has a dark background and light-colored text. It shows the command "student@fedora1:~\$" at the prompt.

F) Login as root

A screenshot of a terminal window titled "root@fedora1:~ — bash". The window shows the command "student@fedora1:~\$ su -" followed by a "Password:" prompt. The password field is empty.

G) Ping to test

`ping fedora1.fed1.com`

A screenshot of a terminal window titled "root@fedora1:~ — bash". The window shows the command "root@fedora1:~# ping fedore1.fed1.com" followed by several lines of ping output. The output includes: "ping: fedore1.fed1.com: Name or service not known", "PING fedora1.fed1.com (10.164.101.1) 56(84) bytes of data.", "64 bytes from fedora1.fed1.com (10.164.101.1): icmp\_seq=1 ttl=64 time=0.165 ms", "64 bytes from fedora1.fed1.com (10.164.101.1): icmp\_seq=2 ttl=64 time=0.078 ms", "64 bytes from fedora1.fed1.com (10.164.101.1): icmp\_seq=3 ttl=64 time=0.078 ms", "64 bytes from fedora1.fed1.com (10.164.101.1): icmp\_seq=4 ttl=64 time=0.077 ms", "^C", "-- fedora1.fed1.com ping statistics ---", "4 packets transmitted, 4 received, 0% packet loss, time 3043ms", "rtt min/avg/max/mdev = 0.077/0.099/0.165/0.037 ms", "root@fedora1:~#".

### 3.3.4 Create user

Command used in this section

1. `useradd` To add new users to the system
2. `passwd` To change or set a password
3. `ls` Lists the contents of a directory.
4. `cd` Changes the current working directory.
5. `mkdir` Creates a new directory.
6. `rmdir` Removes an empty directory.
7. `cp` Copies files or directories.
8. `rm` Removes files or directories.

**Make sure you are root user**

```
student@fedora1:~$ su -
Password:
root@fedora1:~#
root@fedora1:~#
```

**Create user asmith**

```
root@fedora1:~# # Create a user
root@fedora1:~# # user asmith with password Amf123456
root@fedora1:~# useradd asmith
```

**Assign a password**

```
root@fedora1:~# passwd asmith
New password:
BAD PASSWORD: The password fails the dictionary check - it is too
simplistic/systematic
Retype new password:
passwd: password updated successfully
root@fedora1:~#
```

```
asmith student
root@fedora1:~# # after user is created
root@fedora1:~# # check home folder
root@fedora1:~# ls /home
asmith student
root@fedora1:~#
```

Go inside the /home and list its contents

```
root@fedora1:~# cd /home
root@fedora1:/home# ls -l
total 0
drwx----- 1 asmith asmith 80 Dec 13 10:50 asmith
drwx----- 1 student student 262 Dec 13 10:11 student
root@fedora1:/home#
```

Note the information for the folders above

For user asmith :

The first character of the line is a “d” for directory

Permissions

Rwx read write and execute for the user = asmith

--- means nothing for group (asmith) and world

User owner – username

asmith is the owner of the file

Group name

asmith is the name of the group to which this file belongs

Size in bytes

In this case 80 bytes

Date

Time

Name of directory asmith in blue

Go inside the directory asmith and see it has no files if we use the `ls` or `ls -l` command.

But if we use `ls -a` shows the hidden files. The hidden files start with a dot.

```
root@fedora1:/home# cd asmith/
root@fedora1:/home/asmith# pwd
/home/asmith
root@fedora1:/home/asmith# ls
root@fedora1:/home/asmith# ls -l
total 0
root@fedora1:/home/asmith# ls -a
. .. .bash_logout .bash_profile .bashrc .mozilla
root@fedora1:/home/asmith#
```

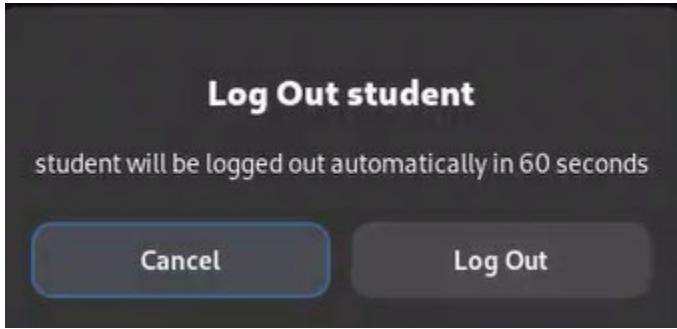
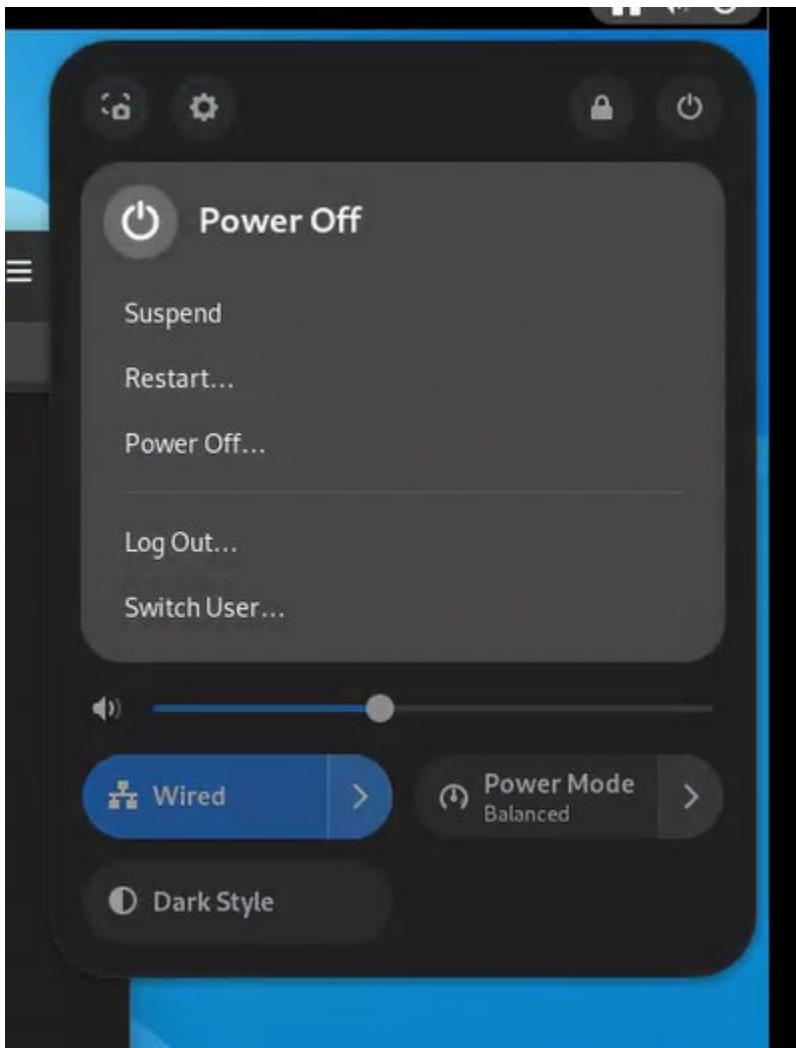
Exit and logout from asmith

```
root@fedora1:/home/asmith# exit
logout
student@fedora1:~$
```

Now we are on student user

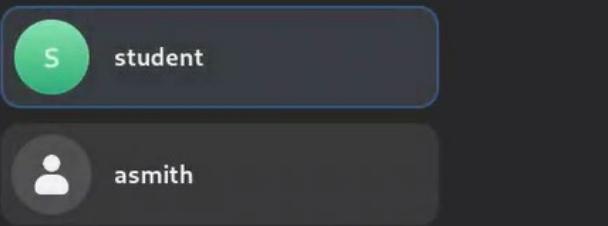
Logout as student



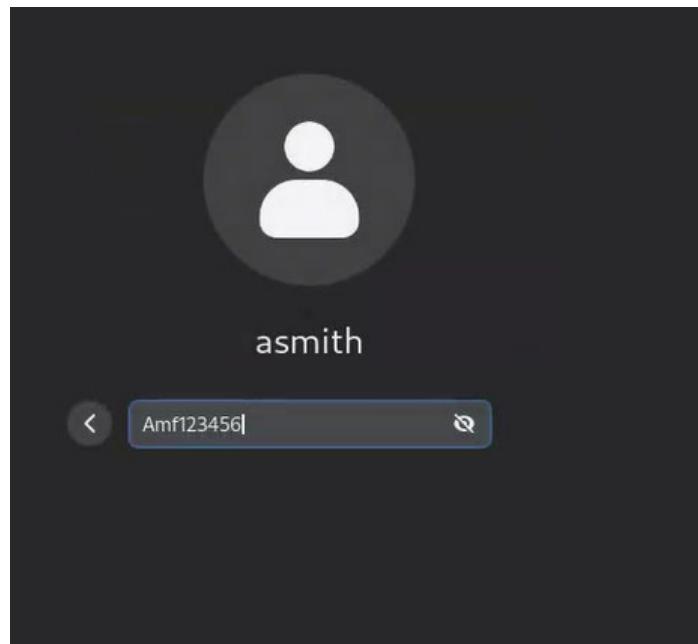


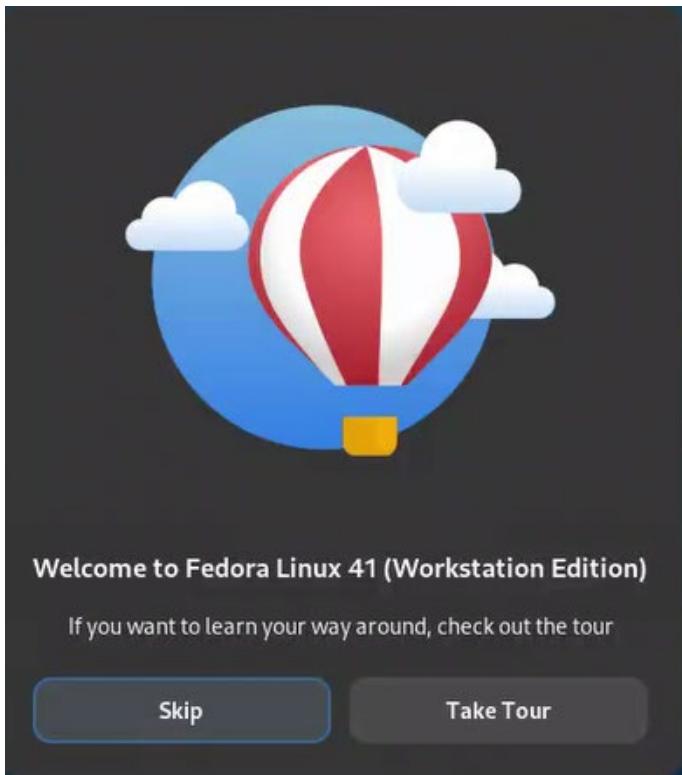
We have now two users

Dec 13 11:06 AM



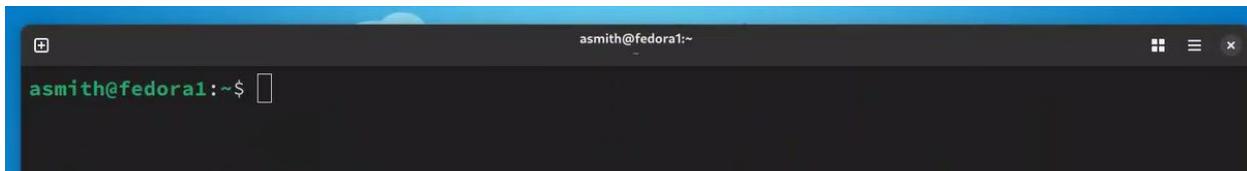
Login as asmith





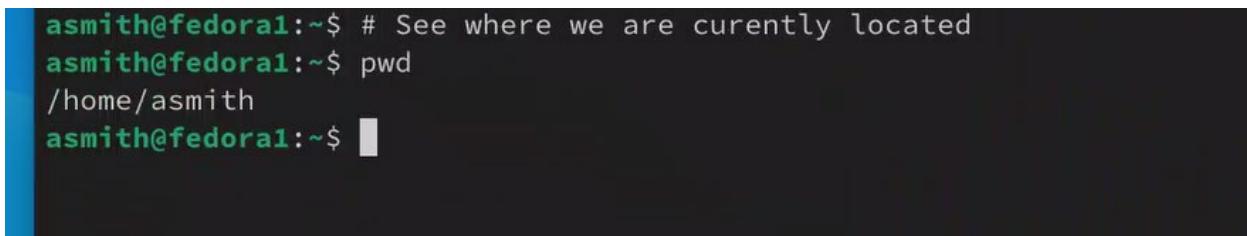
Open a terminal

Now you can see you are logged in as asmith user



A screenshot of a terminal window titled "asmith@fedora1:~". The window shows a single line of text: "asmith@fedora1:~\$". The terminal has a dark theme with light-colored text and a light blue header bar.

Use `pwd` to see where you are currently located



```
asmith@fedora1:~$ # See where we are currently located
asmith@fedora1:~$ pwd
/home/asmith
asmith@fedora1:~$
```

List content of directory (including hidden files)

```
asmith@fedora1:~$ ls -a
. .bash_logout .bashrc .config Documents .local Music Public Videos
.. .bash_profile .cache Desktop Downloads .mozilla Pictures Templates
asmith@fedora1:~$ ls
Desktop Documents Downloads Music Pictures Public Templates Videos
asmith@fedora1:~$
```

Make a dir project 1 using command `mkdir project1`

Verify if directory is created with `ls -l`

```
asmith@fedora1:~$ mkdir project1
asmith@fedora1:~$ # Verify directory is created
asmith@fedora1:~$ ls
Desktop Documents Downloads Music Pictures project1 Public Templates Videos
asmith@fedora1:~$ ls -l
total 0
drwxr-xr-x. 1 asmith asmith 0 Dec 13 11:07 Desktop
drwxr-xr-x. 1 asmith asmith 0 Dec 13 11:07 Documents
drwxr-xr-x. 1 asmith asmith 0 Dec 13 11:07 Downloads
drwxr-xr-x. 1 asmith asmith 0 Dec 13 11:07 Music
drwxr-xr-x. 1 asmith asmith 0 Dec 13 11:07 Pictures
drwxr-xr-x. 1 asmith asmith 0 Dec 13 11:12 project1
drwxr-xr-x. 1 asmith asmith 0 Dec 13 11:07 Public
drwxr-xr-x. 1 asmith asmith 0 Dec 13 11:07 Templates
drwxr-xr-x. 1 asmith asmith 0 Dec 13 11:07 Videos
asmith@fedora1:~$
```

Enter into the project1 directory with `cd project1` list the content of directory with `ls -l` note is empty

```
drwxr-xr-x. 1 asmith asmith 0 Dec 13 11:07 Videos
asmith@fedora1:~$ 
asmith@fedora1:~$ 
asmith@fedora1:~$ # Enter into project1 directory
asmith@fedora1:~$ cd project1
asmith@fedora1:~/project1$ ls -l
total 0
asmith@fedora1:~/project1$ # note there is nothing there
asmith@fedora1:~/project1$ 
asmith@fedora1:~/project1$ 
asmith@fedora1:~/project1$ 
asmith@fedora1:~/project1$ # Create a file named vi.1
asmith@fedora1:~/project1$ # use vi
asmith@fedora1:~/project1$ vi doc.1
asmith@fedora1:~/project1$
```

Use vi to create a file, call the file doc.1 use command `vi doc.1`

Put anything into the file, save the file

Verify file is created using command `ls -l`

```
asmith@federal1:~/project1$ # Verify file is created
asmith@federal1:~/project1$ ls -l
total 4
-rw-r--r--. 1 asmith asmith 8 Dec 13 11:15 doc.1
asmith@federal1:~/project1$
```

Make directory schedules and directory meeting with

```
mkdir schedules  
mkdir meetings
```

Verify directories are created, list the content of directory with ls

```
asmith@fedoral:~/project1$  
asmith@fedoral:~/project1$  
asmith@fedoral:~/project1$  
asmith@fedoral:~/project1$  
asmith@fedoral:~/project1$ # Make two directories  
asmith@fedoral:~/project1$ # Directory 1 schedules  
asmith@fedoral:~/project1$ # Directory 2 meetings  
asmith@fedoral:~/project1$ mkdir schedules  
asmith@fedoral:~/project1$ mkdir meetings  
asmith@fedoral:~/project1$ # list directory content  
asmith@fedoral:~/project1$ ls  
doc.1 meetings schedules  
asmith@fedoral:~/project1$
```

## Copy command

Doc1 needs to be copied to subdirectories schedules and to subdirectories meeting. There are two ways

1. cp doc.1 meetings/ will copy the file to the subdirectory meetings
2. cp doc.1 /home/asmith/project1/schedules/ will copy the file to the desired destination indicated as an absolute path

```
asmith@fedora1:~/project1$  
asmith@fedora1:~/project1$ # Copy command  
asmith@fedora1:~/project1$ # cp <source> destination  
asmith@fedora1:~/project1$ # # two methods to copy  
asmith@fedora1:~/project1$ # Method 1  
asmith@fedora1:~/project1$ cp doc.1 meetings/  
asmith@fedora1:~/project1$ ls meetings/  
doc.1  
asmith@fedora1:~/project1$ @ doc.1 copied to meetings directory  
bash: @: command not found...  
asmith@fedora1:~/project1$ #doc.1 copied to meetings directory  
asmith@fedora1:~/project1$  
asmith@fedora1:~/project1$ pwd  
/home/asmith/project1  
asmith@fedora1:~/project1$ # the second way to copy the file into the scehdules folder  
asmith@fedora1:~/project1$ # using absolute path  
asmith@fedora1:~/project1$ cp doc.1 /home/asmith/project1/schedules/  
asmith@fedora1:~/project1$ # we use absolute path to tell the exacte path where file is to be copied  
asmith@fedora1:~/project1$  
asmith@fedora1:~/project1$ █
```

## List command with absolute path from another directory

Now we want to see what is in /etc we can do it from the current directory giving the path we want to see without changing directory ls /etc will display contents on /etc that we can see form our current location /home/asmith/project1

```
asmit@federal:/project1$ ls schedules/
doc.1
asmit@federal:/project1$ # now we want to see what is in /etc
asmit@federal:/project1$ # we can do it from the current directory
asmit@federal:/project1$ # giving the path we want to se
asmit@federal:/project1$ ls /etc
abrt          csh.login           fuse.conf      ioscsi        lvm             nfs.conf       profile.d     shadow        tpm2-tss
adjtime       cups                fmpd          issue        lynx         nfsmount.conf  protocols     shadow-
aliases       cupshelpers        gcrypt        issue.d      lynx.cfg      nftables      pulse        shells        Trolltech.conf
aliases.db    dbus-1             gdbinit       issue.net    lynx.lss      nilfs_cleanerd.conf qemu        skel         shells
alsa          dconf              gdbinitd     java         machine-id  nsswitch.conf  qemu-ga      smartmontools
alternatives  debuginfod        gdm          jvm         magic        nvme        pulse        shells
anaconda      default            geoclue     jvm-common  mail         openal        rcl1.d      ts.conf
anthy-unicode.conf  depmod.d    glvnd       kde         mailcap     openldap     rcl2.d      trusted-key.key
asound.conf   dhcpc              gnome-remote-desktop kde4rc     makedumpfile.conf.sample opensc.conf  rcl3.d      unbound
audit          DIR_COLORS        gnugrep     kdrc        man_db.conf  opensc-x86_64.conf rcl4.d      updated.conf
authselect    DIR_COLORS.lightgbcolor GREP_COLORS  kdump       mcelog       openvpn     rc4.d       ssh         UPower
avahi          dleyna-server-service.conf group       kernel      mime_types  os-release   rc5.d       ssd         ureourced.conf
hash_completion.d  dnf          group-       keys        mke2fs.conf  ostree       reader.conf.d statetab.d
bashrc        dnsmasq.conf      grub2.cfg   grub2-efi.cfg  keyutils    modprobe.d  redhat-release  subgid-
bindresvport.blacklist  dnsmasq.d      grub2-efi.cfg  krb5.conf   modules-load.d  pam        request-key.conf subuid-
binfmt.d      dracut.conf      grub2-efi.cfg  krbd       mōtōd       paperspecs  request-key.d sudo.conf
bluetooth     dracut.conf.d    grub2-efi.cfg  krbd      mōtōd       passim.conf  resolv.conf  sudoers
brlapi.key    eas               gshadow     ld.so.cache  mōtōd       passwd      rmdc.key     sudoers.d
brlity        egl               gshadow-    ld.so.conf   mōtōd       passwd-     rpc         syncd
brlity.conf   environment      gss         libauditd   libauditd   my.cnf      password-  swtpm-localca.conf vulkan
ceph          ethertypes      gssproxy     host.conf   liblockdev  my.cnf      passwordqc.conf  syncd
chkconfig.d   exports          hostname    libverbs.d  named      pinforc    rsyncd.conf  swtpm-localca.options whois.conf
chromium     exports.d        hosts       libnl      named.conf  pinctrl    rsyncd        swtpm_setup.conf  syncd
chrony.conf   favicon.png     libreport   libssh     named.conf  pinctrl    rsyncd        swtpm_localca.conf x11
cifs-utils   fedora-release   httpd       libvirt     named.root.key  pinctrl    rygel.conf   sysctl.conf
colorfd      filesystems     idmapd.conf  libvirt     nanorc     pm         rsyncd        sysctl.d
containers   firewalld        init.d      localtime  netctl     polkit-1   security     system-release
credstore    firewalld        initramfs  logrotate.conf  NetworkManager  polkit-1   security     system-release-cpe
credstore_encrypted  flatpak     initramfs  logrotate.conf  NetworkManager  polkit-1   security     system-release-cpe
crypto-policies  fants       inittab     login.defs  netconfig   popl.d     services     terinfo
crypttab     fprintd.conf    inpt       logrotate.conf  NetworkManager  popl.d     services     thermal
csh.cshrc    fstab            ippp-usb   logrotate.d   networks   printcap   sestatus.conf  tmpfiles.d
asmit@federal:/project1$ ls
asmit@federal:/project1$ doc.1 meetings schedules
asmit@federal:/project1$
```

## Delete commands (rm and rmdir)

To delete file doc.1 inside /home/asmith/project1/meetings

use command `rm /home/asmith/project1/meetings/doc.1`

List the directory with ls /home/asmith/project1/meetings and note file is removed. Now directory is empty

To remove directory meetings now empty we use command `rmdir meetings`

List the contents of project1 with ls and note meetings is gone

```
asmith@federal1:~/project1$ ##### DELETE files
asmith@federal1:~/project1$ ls /home/asmith/project1/meetings/
doc.1
asmith@federal1:~/project1$ # delet doc1 inside dirctory meetings
asmith@federal1:~/project1$ pwd
/home/asmith/project1
asmith@federal1:~/project1$ # use command rm
asmith@federal1:~/project1$ rm /home/asmith/project1/meetings/doc.1
asmith@federal1:~/project1$ # verify file was removed
asmith@federal1:~/project1$ ls /home/asmith/project1/meetings/
asmith@federal1:~/project1$ 
asmith@federal1:~/project1$ # Directory is empty
asmith@federal1:~/project1$ ls
doc.1 meetings schedules
asmith@federal1:~/project1$ # remove directory
asmith@federal1:~/project1$ rm dir meetings/
rm: cannot remove 'dir': No such file or directory
rm: cannot remove 'meetings/': Is a directory
asmith@federal1:~/project1$ rm dir meetings
rm: cannot remove 'dir': No such file or directory
rm: cannot remove 'meetings': Is a directory
asmith@federal1:~/project1$ rmdir meetings
asmith@federal1:~/project1$ ls
doc.1 schedules
asmith@federal1:~/project1$ # directory is gone
asmith@federal1:~/project1$
```

Use `rmdir` to remove directory . the directory needs to be empty.

See example below

```
asmith@fedoral:~/project1$  
asmith@fedoral:~/project1$ ## Check what is inside schedules  
asmith@fedoral:~/project1$ ls schedules/  
doc.1  
asmith@fedoral:~/project1$ @ if we try to delete it will not allow  
bash: @: command not found...  
asmith@fedoral:~/project1$ rmdir schedules/  
rmdir: failed to remove 'schedules/': Directory not empty  
asmith@fedoral:~/project1$  
asmith@fedoral:~/project1$  
asmith@fedoral:~/project1$ ### the file doc1 will be deleted  
asmith@fedoral:~/project1$ # so we can delete the directory  
asmith@fedoral:~/project1$ rm /home/asmith/project1/schedules/doc.1  
asmith@fedoral:~/project1$ ls schedules/  
asmith@fedoral:~/project1$ # empty directory  
asmith@fedoral:~/project1$ rmdir schedules/  
asmith@fedoral:~/project1$ ls  
doc.1  
asmith@fedoral:~/project1$ # directory is gone  
asmith@fedoral:~/project1$ █
```

### 3.3.5 Permissions change dnf man pages cd mkdir rmdir chmod part

1. `cd` Changes the current working directory.
2. `mkdir` Creates a new directory.
3. `yum` Package manager for RPM-based distributions, used for installing, updating, and removing packages.
4. `man` Displays the manual pages for commands and programs.
5. `dnf` Next-generation package manager for RPM-based distributions, replacing yum.
6. `chmod` Changes the permissions of files or directories.

Open a terminal as root user

List contents directory with `ls`

```
student@fedoral:~$ # Become a su  
student@fedoral:~$ su -  
Password:  
root@fedoral:~# ## cd command  
root@fedoral:~# cd /  
root@fedoral:/# # see we have no name at the beginning of directory because we are at root  
root@fedoral:/# # use ls command to list directory contents  
root@fedoral:/# ls  
afs  boot  etc  lib  lost+found  mnt  proc  run  srv  tmp  var  
bin  dev   home lib64 media      opt  root  sbin  sys  usr  
root@fedoral:/# # We have different colors  
root@fedoral:/# # indicating different kind of files  
root@fedoral:/# # if you use ls -l > long list you will be able to see
```

The files are different color indicating files, directories or links an example of a link is `bin -> usr/bin`

```

root@federal1:/# # if you use ls -l -> long list you will be able to see
root@federal1:/# #moreprecisely what is inside each directory
root@federal1:/# ls -l
total 20
dr-xr-xr-x.  1 root root    0 Jul 16 20:00 afs
lrwxrwxrwx.  1 root root    7 Jul 16 20:00 bin -> usr/bin
dr-xr-xr-x.  6 root root 4096 Dec 16 02:34 boot
drwxr-xr-x. 20 root root 4000 Dec 16 10:49 dev
drwxr-xr-x.  1 root root 4704 Dec 16 02:34 etc
drwxr-xr-x.  1 root root   26 Dec 13 10:50 home
lrwxrwxrwx.  1 root root    7 Jul 16 20:00 lib -> usr/lib
lrwxrwxrwx.  1 root root    9 Jul 16 20:00 lib64 -> usr/lib64
-rw-r--r--.  1 root root    0 Dec 16 11:09 long
drwx-----.  1 root root    0 Oct 24 10:47 lost+found
drwxr-xr-x.  1 root root    0 Jul 16 20:00 media
drwxr-xr-x.  1 root root    0 Jul 16 20:00 mnt
drwxr-xr-x.  1 root root    0 Jul 16 20:00 opt
dr-xr-xr-x. 411 root root    0 Dec 16 10:49 proc
dr-xr-x---.  1 root root 230 Dec 16 11:06 root
drwxr-xr-x.  56 root root 1420 Dec 16 11:05 run
lrwxrwxrwx.  1 root root    8 Jul 16 20:00 sbin -> usr/sbin
drwxr-xr-x.  1 root root    0 Jul 16 20:00 srv
dr-xr-xr-x. 13 root root    0 Dec 16 10:49 sys
drwxrwxrwt. 22 root root  520 Dec 16 11:06 tmp
drwxr-xr-x.  1 root root 168 Oct 24 10:49 usr
drwxr-xr-x.  1 root root 200 Oct 24 10:57 var
root@federal1:/# cat long
root@federal1:/#

```

For example, the e directory /usr/bin is the same as bin

## Files in bin

```

root@federal1:/# cd bin
root@federal1:/bin# ls
['
 ab
 abrt
 abrt-action-analyze-backtrace
 abrt-action-analyze-c
 abrt-action-analyze-ccpp-local
 abrt-action-analyze-oops
 abrt-action-analyze-python
 abrt-action-analyze-vmcore
 abrt-action-analyze-vulnerability
 abrt-action-analyze-xorg
 abrt-action-check-oops-for-alt-component
 abrt-action-check-oops-for-hw-error
 abrt-action-find-bodhi-update
 abrt-action-generate-backtrace
 abrt-action-generate-core-backtrace
 abrt-action-list-dsos
 abrt-action-notify
 abrt-action-save-package-data
 abrt-action-trim-files
 abrt-applet
 abrt-bodhi
 abrt-cli
 abrt-dump-journal-core
 abrt-dump-journal-oops
 abrt-dump-journal-xorg
 abrt-dump-oops
 identify
 iddiag-socket-details
 iecset
 iio_event_monitor
 iio_generic_buffer
 implantisomd5
 import
 importctl
 infocmp
 infotocap
 install
 install-catalog
 instperf
 intel-speed-select
 ionice
 ipcalc
 ipcmk
 ipcrm
 ipcs
 ipod-read-sysinfo-extended
 ippfind
 ipptool
 iptc
 irqtop
 isodebug
 isodump
 iso-info
 renice
 report-cli
 reporter-bugzilla
 reporter-kerneloops
 reporter-print
 reporter-systemd-journal
 reporter-upload
 reporter-ureport
 report-gtk
 reset
 resizecons
 resollectl
 rev
 rhythmbox
 rhythmbox-client
 rm
 rmail
 rmail.sendmail
 rmcpc
 rmdir
 rmiregistry
 rnano
 roqet
 rpcbind
 rpcclient
 rpcinfo
 rnode

```

Are the same as usr/bin

```
root@federal1:/# cd /  
root@federal1:/# ls usr/bin  
[''  
ab  
abrt  
abrt-action-analyze-backtrace  
abrt-action-analyze-c  
abrt-action-analyze-ccpp-local  
abrt-action-analyze-oops  
abrt-action-analyze-python  
abrt-action-analyze-vmcore  
abrt-action-analyze-vulnerability  
abrt-action-analyze-xorg  
abrt-action-check-oops-for-alt-component  
abrt-action-check-oops-for-hw-error  
abrt-action-find-bodhi-update  
abrt-action-generate-backtrace  
abrt-action-generate-core-backtrace  
abrt-action-list-dsos  
abrt-action-notify  
abrt-action-save-package-data  
abrt-action-trim-files  
abrt-applet  
abrt-bodhi  
abrt-cli  
abrt-dump-journal-core  
abrt-dump-journal-oops  
abrt-dump-journal-xorg  
abrt-dump-oops  
abrt-dump-xorg  
abrt-handle-upload  
abrt-merge-pstoreoops  
abrt-watch-log  
identify  
idiag-socket-details  
iecset  
io_event_monitor  
io_generic_buffer  
implantisomds  
import  
importctl  
infocmp  
infotocap  
install  
install-catalog  
instperf  
intel-speed-select  
ionice  
ipcalc  
ipcmk  
ipcrm  
ipcs  
ipod-read-sysinfo-extended  
ippfind  
iptool  
iptc  
irqtop  
isodebug  
isodump  
iso-info  
isoinfo  
iso-read  
isosize  
isovf  
renice  
report-cli  
reporter-bugzilla  
reporter-kerneloops  
reporter-print  
reporter-systemd-journal  
reporter-upload  
reporter-ureport  
report-gtk  
reset  
resizecons  
resolvectl  
rev  
rhythmbox  
rhythmbox-client  
rm  
rmail  
rmail.sendmail  
rmcp  
rmdir  
rmiregistry  
rnano  
roqet  
rpcbind  
rpcclient  
rpcinfo  
rpdump  
rupload  
rpm  
rpm2archive  
rpm2cpio
```

Directory tmp is used for systeme files that are not permanent

```
-bash: syntax error near unexpected token ;'  
root@federal1:/tmp# ls  
systemd-private-be673fd41dd349fe8e993ccde2373fc2-abrtd.service-qRoYxr  
systemd-private-be673fd41dd349fe8e993ccde2373fc2-chronyd.service-6mxtI4  
systemd-private-be673fd41dd349fe8e993ccde2373fc2-colord.service-z3Dz5p  
systemd-private-be673fd41dd349fe8e993ccde2373fc2-dbus-broker.service-TYfXb7  
systemd-private-be673fd41dd349fe8e993ccde2373fc2-fwupd.service-00IBYu  
systemd-private-be673fd41dd349fe8e993ccde2373fc2-low-memory-monitor.service-fnkY9T  
systemd-private-be673fd41dd349fe8e993ccde2373fc2-ModemManager.service-GT1IJa  
systemd-private-be673fd41dd349fe8e993ccde2373fc2-named.service-RAEHj0  
systemd-private-be673fd41dd349fe8e993ccde2373fc2-passim.service-2PYhpM  
systemd-private-be673fd41dd349fe8e993ccde2373fc2-polkit.service-70CoFI  
systemd-private-be673fd41dd349fe8e993ccde2373fc2-rtkit-daemon.service-FYzPwG  
systemd-private-be673fd41dd349fe8e993ccde2373fc2-switcheroo-control.service-fSjigr  
systemd-private-be673fd41dd349fe8e993ccde2373fc2-systemd-logind.service-5TAGKV  
systemd-private-be673fd41dd349fe8e993ccde2373fc2-systemd-oomd.service-ZIRPiB  
systemd-private-be673fd41dd349fe8e993ccde2373fc2-systemd-resolved.service-VF1gYp  
systemd-private-be673fd41dd349fe8e993ccde2373fc2-upower.service-pZNQPo  
vmware-root_895-3979642976
```

Move directories with `cd /` and `cd ..`

Being in /tmp if I do `cd /` will go to / directory

From / I do `cd /tmp/` go back to /tmp

From /tmp do cd .. go back one level to /

```
root@fedora1:/tmp#  
root@fedora1:/tmp# cd /  
root@fedora1:/# cd /tmp/  
root@fedora1:/tmp# cd ..  
root@fedora1:/#
```

## Install and uninstall software

### YUM

Install Apache with

```
yum install httpd
```

Remove Apache with

```
yum remove httpd
```

```
drwxr-xr-x. 1 root          root          28 Oct 24 10:50 xfs-fuse  
root@fedora1:/etc# yum install httpd  
Updating and loading repositories:  
  Fedora 41 - x86_64 - Updates  
  Repositories loaded.  
Package "httpd-2.4.62-2.fc41.x86_64" is already installed.  
  
Nothing to do.  
root@fedora1:/etc# yum remove httpd  
Package          Arch    Version       Repository      Size  
Removing:  
  httpd           x86_64  2.4.62-2.fc41      anaconda      64.8 KiB  
Removing dependent packages:  
  gnome-user-share x86_64  47.2-1.fc41      updates       267.6 KiB  
Removing unused dependencies:  
  apr             x86_64  1.7.5-1.fc41      anaconda      302.3 KiB  
  apr-util        x86_64  1.6.3-21.fc41     anaconda      220.5 KiB  
  apr-util-lmdb   x86_64  1.6.3-21.fc41     anaconda      15.2 KiB  
  apr-util-openssl x86_64  1.6.3-21.fc41     anaconda      23.5 KiB  
  fedora-logos-httpd noarch  38.1.0-6.fc41     anaconda      12.1 KiB  
  httpd-core      x86_64  2.4.62-2.fc41     anaconda      4.8 MiB  
  httpd-filesystem noarch  2.4.62-2.fc41     anaconda      464.0 B  
  httpd-tools      x86_64  2.4.62-2.fc41     anaconda      215.7 KiB  
  mod_dnssd       x86_64  0.6-32.fc41      anaconda      57.6 KiB  
  mod_http2       x86_64  2.0.29-2.fc41     anaconda      432.0 KiB  
  mod_lua         x86_64  2.4.62-2.fc41     anaconda      138.1 KiB  
  
Transaction Summary:  
  Removing:      13 packages
```

To confirm installation and automatically answer yes

```
yum install httpd -y
```

```

root@fedoral:/etc# yum install httpd -y
Updating and loading repositories:
Repositories loaded.
Package          Arch    Version       Repository      Size
httpd           x86_64  2.4.62-2.fc41   fedora        64.8 Kib
Installing:
httpd           x86_64  2.4.62-2.fc41   fedora        64.8 Kib
Installing dependencies:
apr             x86_64  1.7.5-1.fc41    fedora        302.3 Kib
apr-util        x86_64  1.6.3-21.fc41   fedora        220.5 Kib
apr-util-lmdb   x86_64  1.6.3-21.fc41   fedora        15.2 Kib
fedora-logos-httpd noarch  38.1.0-6.fc41   fedora        12.1 Kib
httpd-core      x86_64  2.4.62-2.fc41   fedora        4.8 Mib
httpd-filesystem noarch  2.4.62-2.fc41   fedora        464.0 B
httpd-tools     x86_64  2.4.62-2.fc41   fedora        215.7 Kib
Installing weak dependencies:
apr-util-openssl x86_64  1.6.3-21.fc41   fedora        23.5 Kib
mod_http2       x86_64  2.0.29-2.fc41   fedora        432.0 Kib
mod_lua         x86_64  2.4.62-2.fc41   fedora        138.1 Kib
Transaction Summary:
  Installing: 11 packages

Total size of inbound packages is 2 MiB. Need to download 2 MiB.
After this operation, 6 MiB extra will be used (install 6 MiB, remove 0 B).
[ 1/11] httpd-0:2.4.62-2.fc41.x86_64
[ 2/11] apr-0:1.7.5-1.fc41.x86_64
[ 3/11] apr-util-0:1.6.3-21.fc41.x86_64

```

## DNF

We can use dnf to install or uninstall software

We can use man page of dnf command

`man dnf`

```

DNF5(8)                                     dnf5                                         DNF5(8)
NAME
dnf5 - DNF5 Package Management Utility

SYNOPSIS
dnf5 <command> [options] [<args>...]

DESCRIPTION
DNF5 is the new version of DNF, a package manager for RPM-based Linux distributions. It has been completely rewritten in C++ aiming for better performance and reducing external dependencies.

COMMANDS
Here is the list of the available commands. For more details see the separate man page for the specific command, f.e. man dnf5 install.
advisory
Manage advisories.

autoremove
Remove unneeded packages.

check
Check for problems in the package database.

check-upgrade
Check for available package upgrades.

clean
Remove or invalidate cached data.

distro-sync
Upgrade or downgrade installed packages to the latest available version.

Manual page dnf(8) line 1 (press h for help or q to quit)

```

DNF can be used for search software

`dnf search apache`

```
root@fedoral:/etc#
root@fedoral:/etc# dnf search apache
Updating and loading repositories:
Repositories loaded.
Matched fields: name, summary
ant-apache-bcel.noarch: Optional apache bcel tasks for ant
ant-apache-bsf.noarch: Optional apache bsf tasks for ant
ant-apache-oro.noarch: Optional apache oro tasks for ant
ant-apache-regexp.noarch: Optional apache regexp tasks for ant
ant-apache-resolver.noarch: Optional apache resolver tasks for ant
ant-apache-xalan2.noarch: Optional apache xalan2 tasks for ant
apache-cloudstack-cloudmonkey.x86_64: Apache Cloudstack Cloudmonkey
apache-commons-beanutils-javadoc.noarch: Javadoc for apache-commons-beanutils
apache-commons-cli-javadoc.noarch: API documentation for apache-commons-cli
apache-commons-codec-javadoc.noarch: API documentation for apache-commons-codec
apache-commons-collections-javadoc.noarch: Javadoc for apache-commons-collections
apache-commons-collections-testframework.noarch: Testframework for apache-commons-collections
apache-commons-collections4-javadoc.noarch: API documentation for apache-commons-collections4
apache-commons-compress-javadoc.noarch: API documentation for apache-commons-compress
apache-commons-configuration-javadoc.noarch: API documentation for apache-commons-configuration
apache-commons-digester-javadoc.noarch: API documentation for apache-commons-digester
apache-commons-exec-javadoc.noarch: Javadocs for apache-commons-exec
apache-commons-io-javadoc.noarch: API documentation for apache-commons-io
```

dnf install apache will fail because is not the name of the software

```
root@fedoral:~#
root@fedoral:~# dnf install apache
Updating and loading repositories:
Repositories loaded.
Failed to resolve the transaction:
No match for argument: apache
You can try to add to command line:
--skip-unavailable to skip unavailable packages
root@fedoral:~#
```

dnf remove httpd

```
root@fedoral:~# dnf remove httpd
Package           Arch      Version          Repository        Size
Removing:
httpd              x86_64    2.4.62-2.fc41          fedora       64.8 KiB
Removing unused dependencies:
apr                 x86_64    1.7.5-1.fc41          fedora     302.3 KiB
apr-util            x86_64    1.6.3-21.fc41         fedora     220.5 KiB
apr-util-lmdb        x86_64    1.6.3-21.fc41         fedora      15.2 KiB
apr-util-openssl    x86_64    1.6.3-21.fc41         fedora      23.5 KiB
fedora-logos-httpd  noarch   38.1.0-6.fc41         fedora      12.1 KiB
httpd-core          x86_64    2.4.62-2.fc41          fedora      4.8 MiB
httpd-filesystem     noarch   2.4.62-2.fc41         fedora       464.0 B
httpd-tools          x86_64    2.4.62-2.fc41          fedora     215.7 KiB
mod_http2            x86_64    2.0.29-2.fc41         fedora     432.0 KiB
mod_lua              x86_64    2.4.62-2.fc41         fedora     138.1 KiB

Transaction Summary:
Removing:           11 packages

Is this ok [y/N]: y
Running transaction
[ 1/12] Prepare transaction
[ 2/12] Removing mod_lua-0:2.4.62-2.fc41.x86_64
[ 3/12] Removing httpd-0:2.4.62-2.fc41.x86_64
[ 4/12] Removing mod_http2-0:2.0.29-2.fc41.x86_64
[ 5/12] Removing httpd-core-0:2.4.62-2.fc41.x86_64
[ 6/12] Removing httpd-tools-0:2.4.62-2.fc41.x86_64
[ 7/12] Removing apr-util-lmdb-0:1.6.3-21.fc41.x86_64
[ 8/12] Removing apr-util-openssl-0:1.6.3-21.fc41.x86_64
[ 9/12] Removing apr-util-1.6.3-21.fc41.x86_64
[10/12] Removing apr-1.6.3-21.fc41.x86_64
[11/12] Removing apr-1.6.3-21.fc41.x86_64
[12/12] Removing apr-1.6.3-21.fc41.x86_64
```

dnf install httpd -y

```

root@fedora1:~# dnf install httpd -y
Updating and loading repositories:
Repositories loaded.
Package                                Arch      Version       Repository      Size
httpd                                 x86_64    2.4.62-2.fc41   fedora        64.8 KiB
Installing:
httpd                                 x86_64    2.4.62-2.fc41   fedora        64.8 KiB
Installing dependencies:
apr                                  x86_64    1.7.5-1.fc41   fedora        302.3 KiB
apr-util                            x86_64    1.6.3-21.fc41   fedora        220.5 KiB
apr-util-lmdb                         x86_64    1.6.3-21.fc41   fedora        15.2 KiB
fedora-logos-httpd                   noarch    38.1.0-6.fc41   fedora        12.1 KiB
httpd-core                           x86_64    2.4.62-2.fc41   fedora        4.8 MiB
httpd-filesystem                     noarch    2.4.62-2.fc41   fedora        464.0 B
httpd-tools                          x86_64    2.4.62-2.fc41   fedora        215.7 KiB
Installing weak dependencies:
apr-util-openssl                    x86_64    1.6.3-21.fc41   fedora        23.5 KiB
mod_http2                           x86_64    2.0.29-2.fc41   fedora        432.0 KiB
mod_lua                             x86_64    2.4.62-2.fc41   fedora        138.1 KiB
Transaction Summary:
Installing: 11 packages

Total size of inbound packages is 2 MiB. Need to download 2 MiB.
After this operation, 6 MiB extra will be used (install 6 MiB, remove 0 B).
[ 1/11] httpd-0:2.4.62-2.fc41.x86_64
[ 2/11] apr-0:1.7.5-1.fc41.x86_64
[ 3/11] apr-util-0:1.6.3-21.fc41.x86_64
[ 4/11] apr-util-lmdb-0:1.6.3-21.fc41.x86_64
[ 5/11] httpd-core-0:2.4.62-2.fc41.x86_64
[ 6/11] httpd-filesystem-0:2.4.62-2.fc41.noarch
[ 7/11] httpd-tools-0:2.4.62-2.fc41.noarch
[ 8/11] mod_http2-0:2.0.29-2.fc41.noarch
[ 9/11] mod_lua-0:2.4.62-2.fc41.noarch
[10/11] apr-util-openssl-0:1.6.3-21.fc41.noarch
[11/11] fedora-logos-httpd-38.1.0-6.fc41.noarch

```

Inside /etc there is a file called yum.repos.d

```

drwxr-xr-x. 1 root          root          344 Oct 24 10:50 xdg
drwxr-xr-x. 1 root          root          14 Oct 24 10:49 xml
drwxr-xr-x. 1 root          root         456 Dec 17 09:32 yum.repos.d
drwxr-xr-x. 1 root          root          28 Oct 24 10:50 zfs-fuse
root@fedora1:/etc#

```

To get inside yum.repos.d

Go to the directory with command `cd yum.repos.d`

Or go with absolute path `cd /etc/yum.repos.d`

```

root@fedora1:/etc# cd yum.repos.d/
root@fedora1:/etc/yum.repos.d# pwd
/etc/yum.repos.d
root@fedora1:/etc/yum.repos.d# cd /etc
root@fedora1:/etc# cd /etc/yum.repos.d/
root@fedora1:/etc/yum.repos.d# pwd
/etc/yum.repos.d

```

Another example of `cd` with absolute path

```
root@federal1:/etc/yum.repos.d#  
root@federal1:/etc/yum.repos.d# cd /etc/  
root@federal1:/etc# cd httpd  
root@federal1:/etc/httpd# ls  
conf conf.d conf.modules.d logs modules run state  
root@federal1:/etc/httpd# cd conf  
root@federal1:/etc/httpd/conf# cd /etc/httpd/conf  
root@federal1:/etc/httpd/conf# pwd  
/etc/httpd/conf  
root@federal1:/etc/httpd/conf#
```

/etc location has all configuration file for all applications that runs in Linux

## Chmod command

Concepts

Types of Permissions:

Read (r): Permission to read the contents of the file or directory.

Write (w): Permission to modify the contents of the file or directory.

Execute (x): Permission to run the file as a program or to enter a directory.

User Classes:

Owner (u): The person who owns the file.

Group (g): A group of users who share the same permissions.

Others (o): Everyone else.

Permission Values:

Read (r): 4

Write (w): 2

Execute (x): 1

Combining Permissions:

Permissions are combined by adding their values.

Read and write (rw):  $4 + 2 = 6$

Read and execute (rx):  $4 + 1 = 5$

Read, write, and execute (rwx):  $4 + 2 + 1 = 7$

The numeric mode is a three-digit number where each digit represents the permissions for the owner, group, and others, respectively.

We can use chmod with numeric values to indicate what permissions a file has.

### Summary of values

Numeric Value	Permissions	Symbolic Notation
0	None	---
1	Execute	--x
2	Write	-w-
3	Write, Execute	-wx
4	Read	r--
5	Read, Execute	r-x
6	Read, Write	rwx
7	Read, Write, Execute	rwx

### Command chmod examples

We want to change directory test permissions

from 755

Owner Read Write Execute rwx

Group Read and execute r-x

World Read and execute r-x

to 555

Owner Read and Execute r-x

Group Read and execute r-x

World Read and execute r-x

```
dr-xr-xr-x. 13 root root 0 Dec 20 02:56 test
drwxrwxrwt. 24 root root 560 Dec 20 03:24 tmp
drwxr-xr-x. 1 root root 168 Oct 24 10:49 usr
drwxr-xr-x. 1 root root 222 Dec 20 03:24 var
root@federal1:#
root@federal1:#
root@federal1:#
root@federal1:# chmod 555 test
root@federal1:# ls -l
total 24
dr-xr-xr-x. 1 root root 0 Jul 16 20:00 afs
lrwxrwxrwx. 1 root root 7 Jul 16 20:00 bin -> usr/bin
dr-xr-xr-x. 6 root root 4096 Dec 16 02:34 boot
drwxr-xr-x. 20 root root 4000 Dec 20 02:50 dev
drwxr-xr-x. 1 root root 4924 Dec 20 03:24 etc
drwxr-xr-x. 1 root root 26 Dec 20 02:13 home
lrwxrwxrwx. 1 root root 7 Jul 16 20:00 lib -> usr/lib
lrwxrwxrwx. 1 root root 9 Jul 16 20:00 lib64 -> usr/lib64
-rw-r--r--. 1 root root 0 Dec 16 11:09 long
drwx-----. 1 root root 0 Oct 24 10:47 lost+found
drwxr-xr-x. 1 root root 0 Jul 16 20:00 media
drwxr-xr-x. 1 root root 0 Jul 16 20:00 mnt
drwxr-xr-x. 1 root root 0 Jul 16 20:00 opt
dr-xr-xr-x. 408 root root 0 Dec 20 02:50 proc
dr-xr-x--. 1 root root 448 Dec 20 03:38 root
drwxr-xr-x. 57 root root 1480 Dec 20 03:24 run
lrwxrwxrwx. 1 root root 8 Jul 16 20:00 sbin -> usr/sbin
drwxr-xr-x. 1 root root 0 Jul 16 20:00 srv
dr-xr-xr-x. 13 root root 0 Dec 20 02:50 sys
dr-xr-xr-x. 1 root root 0 Dec 16 11:56 test
drwxrwxrwt. 24 root root 560 Dec 20 03:24 tmp
drwxr-xr-x. 1 root root 168 Oct 24 10:49 usr
```

### rm command Remove file

We can not remove a directory if there are contents inside, we need to remove the contents first then remove directory. See example below

```
root@federal1:~# ls
afs bin boot dev etc home lib lib64 long lost+found media mnt opt proc root run sbin srv sys test tmp usr var
root@federal1:~# rmdir test/
rmdir: failed to remove 'test/': Directory not empty
root@federal1:~# cd test/
root@federal1:/test# ls
test2
root@federal1:/test# rmdir test2
root@federal1:/test# ls
root@federal1:/test# cd ..
root@federal1:~# ls
afs bin boot dev etc home lib lib64 long lost+found media mnt opt proc root run sbin srv sys test tmp usr var
root@federal1:~# rmdir test
root@federal1:~#
```

## 3.3.6 Change commands (chown chgrp chmod )

### 3.3.6.1 Command chmod with symbolic notation

#### Symbolic Mode:

- **Syntax:** chmod [who][operation][permission] file

**Users (|who):** u, g, o, a

u: user

g: Group

o: Others

a: All (includes owner, group, and others)

**Permissions:** r, w, x

r: Read

w: Write

x: Execute

**Operation:** +, -, =.

+: Add permission

-: Remove permission

=: Set exact permission

Using symbolic notation makes it easy to specify exactly who gets which permissions in a clear and readable way.

Example of symbolic notation

```
drwxr-xr-x. 57 root root 1480 Dec 20 03:24 run
lrwxrwxrwx. 1 root root 8 Jul 16 20:00 sbin -> usr/sbin
drwxr-xr-x. 1 root root 0 Jul 16 20:00 srv
dr-xr-xr-x. 13 root root 0 Dec 20 02:50 sys
drwxr-xr-x. 1 root root 0 Dec 20 04:16 test
drwxrwxrwt. 24 root root 560 Dec 20 04:16 tmp
drwxr-xr-x. 1 root root 168 Oct 24 10:49 usr
drwxr-xr-x. 1 root root 222 Dec 20 03:24 var
root@federal:/# chmod u+x test
root@federal:/# ls -l
total 24
dr-xr-xr-x. 1 root root 0 Jul 16 20:00 afs
lrwxrwxrwx. 1 root root 7 Jul 16 20:00 bin -> usr/bin
dr-xr-xr-x. 6 root root 4096 Dec 16 02:34 boot
drwxr-xr-x. 20 root root 4000 Dec 20 02:50 dev
drwxr-xr-x. 1 root root 4924 Dec 20 03:24 etc
drwxr-xr-x. 1 root root 26 Dec 20 02:13 home
lrwxrwxrwx. 1 root root 7 Jul 16 20:00 lib -> usr/lib
lrwxrwxrwx. 1 root root 9 Jul 16 20:00 lib64 -> usr/lib64
-rw-r--r--. 1 root root 0 Dec 16 11:09 long
drwx-----. 1 root root 0 Oct 24 10:47 lost+found
drwxr-xr-x. 1 root root 0 Jul 16 20:00 media
drwxr-xr-x. 1 root root 0 Jul 16 20:00 mnt
drwxr-xr-x. 1 root root 0 Jul 16 20:00 opt
dr-xr-xr-x. 406 root root 0 Dec 20 02:50 proc
dr-xr-xr-x. 1 root root 448 Dec 20 03:38 root
drwxr-xr-x. 57 root root 1480 Dec 20 03:24 run
lrwxrwxrwx. 1 root root 8 Jul 16 20:00 sbin -> usr/sbin
drwxr-xr-x. 13 root root 0 Dec 20 02:50 sys
drw-r-xr-x. 1 root root 0 Dec 20 04:16 test
drwxrwxrwt. 24 root root 560 Dec 20 04:16 tmp
drwxr-xr-x. 1 root root 168 Oct 24 10:49 usr
drwxr-xr-x. 1 root root 222 Dec 20 03:24 var
root@federal:# # put it back with chmod u+x test
root@federal:# chmod u+x test
root@federal:#
```

```
drwxr-xr-x. 1 root root 0 Jul 16 20:00 srv
dr-xr-xr-x. 13 root root 0 Dec 20 02:50 sys
drw-r-xr-x. 1 root root 0 Dec 20 04:16 test
drwxrwxrwt. 24 root root 560 Dec 20 04:16 tmp
drwxr-xr-x. 1 root root 168 Oct 24 10:49 usr
drwxr-xr-x. 1 root root 222 Dec 20 03:24 var
root@federal:# 
root@federal:# # put it back with chmod u+x test
root@federal:# chmod u+x test
root@federal:# 
root@federal:# chmod g-x test
root@federal:# ls -l
total 24
dr-xr-xr-x. 1 root root 0 Jul 16 20:00 afs
lrwxrwxrwx. 1 root root 7 Jul 16 20:00 bin -> usr/bin
dr-xr-xr-x. 6 root root 4096 Dec 16 02:34 boot
drwxr-xr-x. 20 root root 4000 Dec 20 02:50 dev
drwxr-xr-x. 1 root root 4924 Dec 20 03:24 etc
drwxr-xr-x. 1 root root 26 Dec 20 02:13 home
lrwxrwxrwx. 1 root root 7 Jul 16 20:00 lib -> usr/lib
lrwxrwxrwx. 1 root root 9 Jul 16 20:00 lib64 -> usr/lib64
-rw-r--r--. 1 root root 0 Dec 16 11:09 long
drwx-----. 1 root root 0 Oct 24 10:47 lost+found
drwxr-xr-x. 1 root root 0 Jul 16 20:00 media
drwxr-xr-x. 1 root root 0 Jul 16 20:00 mnt
drwxr-xr-x. 1 root root 0 Jul 16 20:00 opt
dr-xr-xr-x. 406 root root 0 Dec 20 02:50 proc
dr-xr-xr-x. 1 root root 448 Dec 20 03:38 root
drwxr-xr-x. 57 root root 1480 Dec 20 03:24 run
lrwxrwxrwx. 1 root root 8 Jul 16 20:00 sbin -> usr/sbin
drwxr-xr-x. 1 root root 0 Jul 16 20:00 srv
dr-xr-xr-x. 13 root root 0 Dec 20 02:50 sys
drwrxr--r-x. 1 root root 0 Dec 20 04:16 test
drwxrwxrwt. 24 root root 560 Dec 20 04:16 tmp
drwxr-xr-x. 1 root root 168 Oct 24 10:49 usr
drwxr-xr-x. 1 root root 222 Dec 20 03:24 var
root@federal:# 
root@federal:# chmod g+x test
```

```
drwxr-xr-x. 1 root root 0 Jul 16 20:00 mnt
drwxr-xr-x. 1 root root 0 Jul 16 20:00 opt
dr-xr-xr-x. 406 root root 0 Dec 20 02:50 proc
dr-xr-x---. 1 root root 448 Dec 20 03:38 root
drwxr-xr-x. 57 root root 1480 Dec 20 03:24 run
lrwxrwxrwx. 1 root root 8 Jul 16 20:00 sbin -> usr/sbin
drwxr-xr-x. 1 root root 0 Jul 16 20:00 srv
dr-xr-xr-x. 13 root root 0 Dec 20 02:50 sys
drwxr-xr--. 1 root root 0 Dec 20 04:16 test ✓
drwxrwxrwt. 24 root root 560 Dec 20 04:16 tmp
drwxr-xr-x. 1 root root 168 Oct 24 10:49 usr
drwxr-xr-x. 1 root root 222 Dec 20 03:24 var
root@federal:#
root@federal:/# chmod ugo-x test
root@federal:/# ls -l
total 24
dr-xr-xr-x. 1 root root 0 Jul 16 20:00 afs
lrwxrwxrwx. 1 root root 7 Jul 16 20:00 bin -> usr/bin
dr-xr-xr-x. 6 root root 4096 Dec 16 02:34 boot
drwxr-xr-x. 20 root root 4000 Dec 20 02:50 dev
drwxr-xr-x. 1 root root 4924 Dec 20 03:24 etc
drwxr-xr-x. 1 root root 26 Dec 20 02:13 home
lrwxrwxrwx. 1 root root 7 Jul 16 20:00 lib -> usr/lib
lrwxrwxrwx. 1 root root 9 Jul 16 20:00 lib64 -> usr/lib64
-rw-r--r--. 1 root root 0 Dec 16 11:09 long
drwx-----. 1 root root 0 Oct 24 10:47 lost+found
drwxr-xr-x. 1 root root 0 Jul 16 20:00 media
drwxr-xr-x. 1 root root 0 Jul 16 20:00 mnt
drwxr-xr-x. 1 root root 0 Jul 16 20:00 opt
dr-xr-xr-x. 406 root root 0 Dec 20 02:50 proc
dr-xr-x---. 1 root root 448 Dec 20 03:38 root
drwxr-xr-x. 57 root root 1480 Dec 20 03:24 run
lrwxrwxrwx. 1 root root 8 Jul 16 20:00 sbin -> usr/sbin
drwxr-xr-x. 1 root root 0 Jul 16 20:00 srv
dr-xr-xr-x. 13 root root 0 Dec 20 02:50 sys
drw-r--r--. 1 root root 0 Dec 20 04:16 test ✓
drwxrwxrwt. 24 root root 560 Dec 20 04:16 tmp
```

### 3.3.6.2 Command chown change owner

chown helps manage file permissions and access control in a multi-user environment

Change User: chown new\_owner file

Change Group: chown :new\_group file

Change Both: chown new\_owner:new\_group file

**Change user to asmith for file test**

```
drwxr-xr-x.  1 root root   0 Jul 16 20:00 afs
dr-xr-xr-x.  13 root root   0 Dec 20 02:50 sys
drwxr-xr-x.  1 root root   0 Dec 20 04:16 test -> test
drwxrwxrwt.  24 root root  560 Dec 20 04:29 tmp
drwxr-xr-x.  1 root root  168 Oct 24 10:49 usr
drwxr-xr-x.  1 root root  222 Dec 20 03:24 var
root@federal:#
root@federal: # Test is owned by roort adn root
root@federal:#
root@federal: # chown asmith test ←
root@federal:#
root@federal: # ls -l
total 24
dr-xr-xr-x.  1 root  root  0 Jul 16 20:00 afs
lrwxrwxrwx.  1 root  root  7 Jul 16 20:00 bin -> usr/bin
dr-xr-xr-x.  6 root  root 4096 Dec 16 02:34 boot
drwxr-xr-x.  20 root  root 4000 Dec 20 02:50 dev
drwxr-xr-x.  1 root  root 4924 Dec 20 03:24 etc
drwxr-xr-x.  1 root  root 26 Dec 20 02:13 home
lrwxrwxrwx.  1 root  root  7 Jul 16 20:00 lib -> usr/lib
lrwxrwxrwx.  1 root  root  9 Jul 16 20:00 lib64 -> usr/lib64
-rw-r--r--.  1 root  root  0 Dec 16 11:09 long
drwxr-----.  1 root  root  0 Oct 24 10:47 lost+found
drwxr-xr-x.  1 root  root  0 Jul 16 20:00 media
drwxr-xr-x.  1 root  root  0 Jul 16 20:00 mnt
drwxr-xr-x.  1 root  root  0 Jul 16 20:00 opt
dr-xr-xr-x.  405 root  root  0 Dec 20 02:50 proc
dr-xr-x---.  1 root  root  448 Dec 20 03:38 root
drwxr-xr-x.  57 root  root 1480 Dec 20 03:24 run
lrwxrwxrwx.  1 root  root  8 Jul 16 20:00 sbin -> usr/sbin
drwxr-xr-x.  1 root  root  0 Jul 16 20:00 srv
dr-xr-xr-x.  13 root  root  0 Dec 20 02:50 sys
drwxr-xr-x.  1 asmith root  0 Dec 20 04:16 test -> test
drwxrwxrwt.  24 root  root  560 Dec 20 04:29 tmp
drwxr-xr-x.  1 root  root  168 Oct 24 10:49 usr
drwxr-xr-x.  1 root  root  222 Dec 20 03:24 var
root@federal:#
```

Change group to asmith for file test

```
dr-xr-xr-x. 13 root root 0 Dec 20 02:50 sys
drwxr-xr-x. 1 asmith root 0 Dec 20 04:16 test —
drwxrwxrwt. 24 root root 560 Dec 20 04:42 tmp
drwxr-xr-x. 1 root root 168 Oct 24 10:49 usr
drwxr-xr-x. 1 root root 222 Dec 20 03:24 var
root@federal:/# chown :asmith test —
root@federal:/# ls -l
total 24
dr-xr-xr-x. 1 root root 0 Jul 16 20:00 afs
lrwxrwxrwx. 1 root root 7 Jul 16 20:00 bin -> usr/bin
dr-xr-xr-x. 6 root root 4096 Dec 16 02:34 boot
drwxr-xr-x. 20 root root 4000 Dec 20 02:50 dev
drwxr-xr-x. 1 root root 4924 Dec 20 03:24 etc
drwxr-xr-x. 1 root root 26 Dec 20 02:13 home
lrwxrwxrwx. 1 root root 7 Jul 16 20:00 lib -> usr/lib
lrwxrwxrwx. 1 root root 9 Jul 16 20:00 lib64 -> usr/lib64
-rw-r--r--. 1 root root 0 Dec 16 11:09 long
drwx-----. 1 root root 0 Oct 24 10:47 lost+found
drwxr-xr-x. 1 root root 0 Jul 16 20:00 media
drwxr-xr-x. 1 root root 0 Jul 16 20:00 mnt
drwxr-xr-x. 1 root root 0 Jul 16 20:00 opt
dr-xr-xr-x. 406 root root 0 Dec 20 02:50 proc
dr-xr-x---. 1 root root 448 Dec 20 03:38 root
drwxr-xr-x. 57 root root 1480 Dec 20 03:24 run
lrwxrwxrwx. 1 root root 8 Jul 16 20:00 sbin -> usr/sbin
drwxr-xr-x. 1 root root 0 Jul 16 20:00 srv
dr-xr-xr-x. 13 root root 0 Dec 20 02:50 sys
drwxr-xr-x. 1 asmith asmith 0 Dec 20 04:16 test —
drwxrwxrwt. 24 root root 560 Dec 20 04:42 tmp
drwxr-xr-x. 1 root root 168 Oct 24 10:49 usr
drwxr-xr-x. 1 root root 222 Dec 20 03:24 var
root@federal:/#
```

Change for both owner and group

```
drwxr-xr-x.  1 root  root      0 Jul 16 20:00 srv
dr-xr-xr-x. 13 root  root      0 Dec 20 02:50 sys
drwxr-xr-x.  1 asmith asmith   0 Dec 20 04:16 test -----
drwxrwxrwt. 24 root  root    560 Dec 20 04:42 tmp
drwxr-xr-x.  1 root  root    168 Oct 24 10:49 usr
drwxr-xr-x.  1 root  root    222 Dec 20 03:24 var
root@federal1:#  
root@federal1:#  
root@federal1:# chown root:root test -----
root@federal1:# ls -l
total 24
dr-xr-xr-x.  1 root  root      0 Jul 16 20:00 afs
lrwxrwxrwx.  1 root  root      7 Jul 16 20:00 bin -> usr/bin
dr-xr-xr-x.  6 root  root  4096 Dec 16 02:34 boot
drwxr-xr-x. 20 root  root  4000 Dec 20 02:50 dev
drwxr-xr-x.  1 root  root  4924 Dec 20 03:24 etc
drwxr-xr-x.  1 root  root    26 Dec 20 02:13 home
lrwxrwxrwx.  1 root  root      7 Jul 16 20:00 lib -> usr/lib
lrwxrwxrwx.  1 root  root      9 Jul 16 20:00 lib64 -> usr/lib64
-rw-r--r--.  1 root  root      0 Dec 16 11:09 long
drwx-----.  1 root  root      0 Oct 24 10:47 lost+found
drwxr-xr-x.  1 root  root      0 Jul 16 20:00 media
drwxr-xr-x.  1 root  root      0 Jul 16 20:00 mnt
drwxr-xr-x.  1 root  root      0 Jul 16 20:00 opt
dr-xr-xr-x. 406 root  root      0 Dec 20 02:50 proc
dr-xr-x---.  1 root  root  448 Dec 20 03:38 root
drwxr-xr-x. 57 root  root 1480 Dec 20 03:24 run
lrwxrwxrwx.  1 root  root      8 Jul 16 20:00 sbin -> usr/sbin
drwxr-xr-x.  1 root  root      0 Jul 16 20:00 srv
dr-xr-xr-x. 13 root  root      0 Dec 20 02:50 sys
drwxr-xr-x.  1 root  root      0 Dec 20 04:16 test -----
drwxrwxrwt. 24 root  root    560 Dec 20 04:42 tmp
drwxr-xr-x.  1 root  root    168 Oct 24 10:49 usr
drwxr-xr-x.  1 root  root    222 Dec 20 03:24 var
root@federal1:#
```

### 3.3.6.3 Command change group chgrp

Using chgrp helps manage access permissions by assigning the appropriate group to files and directories

```
chgrp new_group file_or_directory
```

Example change group for file test from root to asmith

```
drwxr-xr-x.  1 root root    0 Jul 16 20:00 srv
dr-xr-xr-x. 13 root root    0 Dec 20 02:50 sys
drwxr-xr-x.  1 root root    0 Dec 20 04:16 test
drwxrwxrwt. 24 root root  560 Dec 20 04:42 tmp
drwxr-xr-x.  1 root root  168 Oct 24 10:49 usr
drwxr-xr-x.  1 root root  222 Dec 20 03:24 var
root@federal:/# chgrp asmith test
root@federal:/# ls -l
total 24
dr-xr-xr-x.  1 root root    0 Jul 16 20:00 afs
lrwxrwxrwx.  1 root root    7 Jul 16 20:00 bin -> usr/bin
dr-xr-xr-x.  6 root root  4096 Dec 16 02:34 boot
drwxr-xr-x. 20 root root  4000 Dec 20 02:50 dev
drwxr-xr-x.  1 root root  4924 Dec 20 03:24 etc
drwxr-xr-x.  1 root root   26 Dec 20 02:13 home
lrwxrwxrwx.  1 root root    7 Jul 16 20:00 lib -> usr/lib
lrwxrwxrwx.  1 root root    9 Jul 16 20:00 lib64 -> usr/lib64
-rw-r--r--.  1 root root    0 Dec 16 11:09 long
drwx-----.  1 root root    0 Oct 24 10:47 lost+found
drwxr-xr-x.  1 root root    0 Jul 16 20:00 media
drwxr-xr-x.  1 root root    0 Jul 16 20:00 mnt
drwxr-xr-x.  1 root root    0 Jul 16 20:00 opt
dr-xr-xr-x. 408 root root    0 Dec 20 02:50 proc
dr-xr-x---.  1 root root   448 Dec 20 03:38 root
drwxr-xr-x. 57 root root  1480 Dec 20 03:24 run
lrwxrwxrwx.  1 root root    8 Jul 16 20:00 sbin -> usr/sbin
drwxr-xr-x.  1 root root    0 Jul 16 20:00 srv
dr-xr-xr-x. 13 root root    0 Dec 20 02:50 sys
drwxr-xr-x.  1 root asmith  0 Dec 20 04:16 test
drwxrwxrwt. 25 root root  580 Dec 20 04:51 tmp
drwxr-xr-x.  1 root root  168 Oct 24 10:49 usr
drwxr-xr-x.  1 root root  222 Dec 20 03:24 var
root@federal:/#
```

### 3.3.7 How to Create a user and Delete users files vs Delete user and files at same time

Sign as root user

```
student@federal:~$ su -
Password:
```

Add user “asmith” with command useradd asmith

```
root@fedoral:~#
root@fedoral:~# ##### add user asmith
root@fedoral:~# ## add user asmith
root@fedoral:~# useradd asmith
root@fedoral:~#
```

Verify the files and directories created for the newly added user using command `ls -altrh` the command lists all files, including hidden ones, in a long format, sorted by modification time in reverse order, with human-readable file sizes.

```
root@fedoral:~#
root@fedoral:~# ##### Verify files and directories created for asmith user
root@fedoral:~# ## Verify files and directories created for asmith user
root@fedoral:~# pwd
/root
root@fedoral:~# cd /home
root@fedoral:/home# ls -altrh
total 0
drwx----- 1 student student 262 Dec 13 10:11 student
dr-xr-xr-x 1 root      root   174 Dec 16 11:56 ..
drwxr-xr-x 1 root      root    26 Dec 16 13:40 .
drwx----- 1 asmith   asmith  80 Dec 16 13:40 asmith
root@fedoral:/home#
root@fedoral:/home# #####
```

```
root@fedoral:/home#
root@fedoral:/home#
root@fedoral:/home# cd /var/mail
root@fedoral:/var/mail# ls -altrh
total 0
-rw-rw---- 1 rpc      mail   0 Oct 24 10:50 rpc
drwxr-xr-x 1 root     root   68 Oct 24 10:54 ..
-rw-rw---- 1 student  mail   0 Dec 13 03:40 student
-rw-rw---- 1 asmith   mail   0 Dec 16 13:40 asmith
drwxrwxr-x 1 root     mail   32 Dec 16 13:40 .
root@fedoral:/var/mail# #####
```

```
root@federal:~#  
root@federal:~# ##### Verify files and directories created for asmith user  
root@federal:~# #####  
root@federal:~# pwd  
/root  
root@federal:~# cd /home  
root@federal:/home# ls -altrh  
total 0  
drwx-----. 1 student student 262 Dec 13 10:11 student  
dr-xr-xr-x. 1 root root 174 Dec 16 11:56 ..  
drwxr-xr-x. 1 root root 26 Dec 16 13:40 .  
drwx-----. 1 asmith asmith 80 Dec 16 13:40 asmith  
root@federal:/home#  
root@federal:/home# #####
```

```
root@federal:/var/mail#  
root@federal:/var/mail# # ##### As per previous commands there is a subdirectory in /home  
root@federal:/var/mail# # ##### As per previous commands there is a file on /var/mail  
root@federal:/var/mail# #####
```

Remove the directory /home/asmith, since directory is not empty files inside the directory must be removed.

Note file names inside directory start with a dot . (.bashrc, bash\_profile, bash\_logout and .mozilla).

To remove everything starting with a dot “.” Use the following command `rm .* -rf`

```
root@federal:/home# cd asmith/  
root@federal:/home/asmith# ls -altrh  
total 12K  
-rw-r--r--. 1 asmith asmith 522 Aug 11 20:00 .bashrc  
-rw-r--r--. 1 asmith asmith 144 Aug 11 20:00 .bash_profile  
-rw-r--r--. 1 asmith asmith 18 Aug 11 20:00 .bash_logout  
drwxr-xr-x. 1 asmith asmith 34 Oct 24 10:49 .mozilla  
drwxr-xr-x. 1 root root 26 Dec 16 13:40 ..  
drwx-----. 1 asmith asmith 80 Dec 16 13:40 .  
root@federal:/home/asmith# rm .* -rf  
root@federal:/home/asmith# ls -altrh  
total 0  
drwxr-xr-x. 1 root root 26 Dec 16 13:40 ..  
drwx-----. 1 asmith asmith 0 Dec 16 13:43 .
```

List again and see files disappeared

```
root@federal:/home/asmith# ls -altrh  
total 0  
drwxr-xr-x. 1 root root 26 Dec 16 13:40 ..  
drwx-----. 1 asmith asmith 0 Dec 16 13:43 .
```

Remove the subdirectory asmith now that is empty and list to make sure is gone

```
root@fedora1:/home# #remove subdirectory asmith
root@fedora1:/home# # now that is empty
root@fedora1:/home# rmdir asmith/
root@fedora1:/home# ls -altrh
total 0
drwx-----. 1 student student 262 Dec 13 10:11 student
dr-xr-xr-x. 1 root      root    174 Dec 16 11:56 ..
drwxr-xr-x. 1 root      root     14 Dec 16 13:44 ..
```

Go to the other directory and remove the files related to asmith

```
root@fedora1:/home# cd /var/mail
root@fedora1:/var/mail# ls -ltrh
total 0
-rw-rw----. 1 rpc      mail 0 Oct 24 10:50 rpc
-rw-rw----. 1 student  mail 0 Dec 13 03:40 student
-rw-rw----. 1 asmith   mail 0 Dec 16 13:40 asmith
root@fedora1:/var/mail# rm -rf asmith
root@fedora1:/var/mail# ls -ltrh
total 0
-rw-rw----. 1 rpc      mail 0 Oct 24 10:50 rpc
-rw-rw----. 1 student  mail 0 Dec 13 03:40 student
root@fedora1:/var/mail#
root@fedora1:/var/mail#
root@fedora1:/var/mail# ##### User and directories have been removed
root@fedora1:/var/mail# #####
root@fedora1:/var/mail#
root@fedora1:/var/mail#
root@fedora1:/var/mail#
```

Verify again no directories exist for the user

```
root@federal1:/var/mail#
root@federal1:/var/mail# pwd
/var/mail
root@federal1:/var/mail# ls -altrh
total 0
-rw-rw----. 1 rpc      mail  0 Oct 24 10:50 rpc
drwxr-xr-x. 1 root     root  68 Oct 24 10:54 ..
-rw-rw----. 1 student   mail  0 Dec 13 03:40 student
drwxrwxr-x. 1 root     mail  20 Dec 16 13:45 .
root@federal1:/var/mail# cd /home
root@federal1:/home# ls -altrh
total 0
drwx-----. 1 student  student 262 Dec 13 10:11 student
dr-xr-xr-x. 1 root    root  174 Dec 16 11:56 ..
drwxr-xr-x. 1 root    root  14 Dec 16 13:44 .
root@federal1:/home#
```

```
root@federal1:/home# #####
root@federal1:/home# ##### Create user and delete the user and directories with one command
root@federal1:/home# #####
root@federal1:/home# useradd asmith
root@federal1:/home# cd /home
root@federal1:/home# ls -altrh
total 0
drwx-----. 1 student  student 262 Dec 13 10:11 student
dr-xr-xr-x. 1 root    root  174 Dec 16 11:56 ..
drwxr-xr-x. 1 root    root  26 Dec 16 13:49 .
drwx-----. 1 asmith  asmith  80 Dec 16 13:49 asmith
root@federal1:/home# cd /var/mail
root@federal1:/var/mail# ls -altrh
total 0
-rw-rw----. 1 rpc      mail  0 Oct 24 10:50 rpc
drwxr-xr-x. 1 root     root  68 Oct 24 10:54 ..
-rw-rw----. 1 student   mail  0 Dec 13 03:40 student
-rw-rw----. 1 asmith   mail  0 Dec 16 13:49 asmith
drwxrwxr-x. 1 root     mail  32 Dec 16 13:49 .
root@federal1:/var/mail#
```

```
root@federal:/var/mail#
root@federal:/var/mail#
root@federal:/var/mail# userdel asmith -r
root@federal:/var/mail#
root@federal:/var/mail#
root@federal:/var/mail# # user and directories were deleted with one command
root@federal:/var/mail#
root@federal:/var/mail# pwd
/var/mail
root@federal:/var/mail# ls -altrh
total 0
-rw-rw----. 1 rpc      mail  0 Oct 24 10:50 rpc
drwxr-xr-x. 1 root     root 68 Oct 24 10:54 ..
-rw-rw----. 1 student   mail  0 Dec 13 03:40 student
drwxrwxr-x. 1 root     mail 20 Dec 16 13:49 .
root@federal:/var/mail# # file removed
root@federal:/var/mail# cd /home
root@federal:/home# ls -altrh
total 0
drwx-----. 1 student  student 262 Dec 13 10:11 student
dr-xr-xr-x. 1 root    root 174 Dec 16 11:56 ..
drwxr-xr-x. 1 root    root 14 Dec 16 13:49 .
root@federal:/home# # subdirectory removed
root@federal:/home#
```

```
root@federal:/home# # Proof user can be added again without issues
root@federal:/home# useradd asmith
root@federal:/home#
```

```
root@federal:/etc# cat /etc/passwd | grep 'asmith'
asmith:x:1001:1001::/home/asmith:/bin/bash
root@federal:/etc#
```

### 3.3.8 Permissions Overview and SUID SGID and Sticky Bits

Beyond the standard permissions, there are special permission bits—SUID, SGID, and Sticky Bits—that provide additional control over file and directory behavior.

These special permissions help manage access and control in a multi-user environment.

Bit	Purpose	chmod Command	ls -l Output	Explanation	Octal
SUID- Set User ID	Execute with <b>owner's</b> privileges	chmod u+s	-rwsr-xr-X	rws: The next three characters show the permissions for the file owner: r (read): The owner can read the file. w (write): The owner can modify the file. <b>s (setuid)</b> : The file is executed with the owner's privileges. This replaces the usual execute (x) permission for the owner.	4755
SGID (Set Group ID)	Execute with <b>group's</b> privileges	chmod g+s	-rwxr-sr-X	r-s: The next three characters show the permissions for the file group: r (read): Group members can read the file. - (write): Group members cannot modify the file. <b>s (setgid)</b> : The file is executed with the privileges of the file's group. This replaces the usual execute (x) permission for the group.	2755
Sticky bit	Restrict file deletion/rename in directory chmod +t	chmod +t	drwxrwxrwt	d: The first character indicates the file type. A d means it is a directory <b>rwt</b> : The last three characters show the permissions for others (everyone else): <ul style="list-style-type: none"><li>• r (read): Others can list the contents of the directory.</li><li>• w (write): Others can add, remove, or rename files in the directory.</li><li>• <b>t (sticky bit)</b>: Others can only remove or rename files that they own, even if they have write permission.</li></ul>	1755

### 3.3.8.1 SUID (Set User ID)

When a file has the SUID bit set, it allows the file to be executed with the privileges of the file owner, rather than the privileges of the user who is executing the file.

This is commonly used for executable files that require elevated privileges.

You can set the SUID bit using the chmod command with the u+s option:

```
chmod u+s filename
```

When the SUID bit is set, the ls -l command will show an s in the user's execute permission position (e.g., -rwsr-xr-x).

**Example Use Case:** The passwd command, which allows users to change their password by modifying the /etc/shadow file, a root-owned file.

### 3.3.8.2 SGID (Set Group ID)

When a file has the GUID bit set, it allows the file to be executed with the privileges of the file's group, rather than the privileges of the user's group.

This is useful for sharing files among group members.

You can set the GUID bit using the chmod command with the g+s option:

```
chmod g+s filename
```

When the GUID bit is set, the ls -l command will show an s in the group's execute permission position (e.g., -rwxr-sr-x).

**Example Use Case:** Shared project directories where group collaboration is required.

### 3.3.8.3 Sticky Bit

The sticky bit is used primarily on directories to prevent users from deleting or renaming files in that directory unless they own the files or have appropriate permissions.

This is commonly used on shared directories like /tmp.

You can set the sticky bit using the chmod command with the +t option:

```
chmod +t directoryname
```

When the sticky bit is set, the ls -ld command will show a t in the others' execute permission position (e.g., drwxrwxrwt).

**Example Use Case:** /tmp directory, where multiple users have write access but cannot delete each other's files.

## 3.3.9 Creating users Cat bc cal commands and Shadow and passwd files

Login as root

Go to /

List files

```
student@debian1:/$ su -
Password:
root@debian1:~#
root@debian1:~#
root@debian1:~# cd /
root@debian1:/# ls -l
total 68
lrwxrwxrwx 1 root root 7 Dec 12 13:22 bin -> usr/bin
drwxr-xr-x 3 root root 4096 Dec 12 14:06 boot
drwxr-xr-x 18 root root 3380 Jan 6 09:51 dev
drwxr-xr-x 121 root root 12288 Jan 6 09:53 etc
drwxr-xr-x 3 root root 4096 Dec 12 14:05 home
lrwxrwxrwx 1 root root 30 Dec 12 13:54 initrd.img -> boot/initrd.img-6.1.0-28-amd64
lrwxrwxrwx 1 root root 30 Dec 12 13:23 initrd.img.old -> boot/initrd.img-6.1.0-27-amd64
lrwxrwxrwx 1 root root 7 Dec 12 13:22 lib -> usr/lib
lrwxrwxrwx 1 root root 9 Dec 12 13:22 lib64 -> usr/lib64
drwx----- 2 root root 16384 Dec 12 13:22 lost+found
drwxr-xr-x 3 root root 4096 Dec 12 13:22 media
drwxr-xr-x 2 root root 4096 Dec 12 13:22 mnt
drwxr-xr-x 2 root root 4096 Dec 12 13:22 opt
dr-xr-xr-x 331 root root 0 Jan 6 09:51 proc
drwx----- 4 root root 4096 Dec 12 14:07 root
drwxr-xr-x 27 root root 660 Jan 6 09:52 run
lrwxrwxrwx 1 root root 8 Dec 12 13:22 sbin -> usr/sbin
drwxr-xr-x 2 root root 4096 Dec 12 13:22 srv
dr-xr-xr-x 13 root root 0 Jan 6 09:51 sys
drwxrwxrwt 19 root root 4096 Jan 6 10:01 tmp
drwxr-xr-x 12 root root 4096 Dec 12 13:22 usr
drwxr-xr-x 11 root root 4096 Dec 12 13:22 var
lrwxrwxrwx 1 root root 27 Dec 12 13:54 vmlinuz -> boot/vmlinuz-6.1.0-28-amd64
lrwxrwxrwx 1 root root 27 Dec 12 13:23 vmlinuz.old -> boot/vmlinuz-6.1.0-27-amd64
root@debian1:/#
```

Create a file named monica.txt

Write welcome to Linux in the file, save the file and exit

## List files and find newly created file

```
root@debian1:/# ls -l
total 72
lrwxrwxrwx  1 root root    7 Dec 12 13:22 bin -> usr/bin
drwxr-xr-x  3 root root  4096 Dec 12 14:06 boot
drwxr-xr-x 18 root root  3380 Jan  6 09:51 dev
drwxr-xr-x 121 root root 12288 Jan  6 09:53 etc
drwxr-xr-x  3 root root  4096 Dec 12 14:05 home
lrwxrwxrwx  1 root root   30 Dec 12 13:54 initrd.img -> boot/initrd.img-6.1.0-28-amd64
lrwxrwxrwx  1 root root   30 Dec 12 13:23 initrd.img.old -> boot/initrd.img-6.1.0-27-amd64
lrwxrwxrwx  1 root root    7 Dec 12 13:22 lib -> usr/lib
lrwxrwxrwx  1 root root    9 Dec 12 13:22 lib64 -> usr/lib64
drwx----- 2 root root 16384 Dec 12 13:22 lost+found
drwxr-xr-x  3 root root  4096 Dec 12 13:22 media
drwxr-xr-x  2 root root  4096 Dec 12 13:22 mnt
-rw-r--r--  1 root root   17 Jan  6 11:31 monica.txt ←
drwxr-xr-x  2 root root  4096 Dec 12 13:22 opt
dr-xr-xr-x 332 root root    0 Jan  6 09:51 proc
drwx----- 4 root root  4096 Dec 12 14:07 root
drwxr-xr-x 27 root root   660 Jan  6 09:52 run
lrwxrwxrwx  1 root root    8 Dec 12 13:22 sbin -> usr/sbin
drwxr-xr-x  2 root root  4096 Dec 12 13:22 srv
dr-xr-xr-x 13 root root    0 Jan  6 09:51 sys
drwxrwxrwt 19 root root  4096 Jan  6 10:01 tmp
drwxr-xr-x 12 root root  4096 Dec 12 13:22 usr
drwxr-xr-x 11 root root  4096 Dec 12 13:22 var
lrwxrwxrwx  1 root root   27 Dec 12 13:54 vmlinuz -> boot/vmlinuz-6.1.0-28-amd64
lrwxrwxrwx  1 root root   27 Dec 12 13:23 vmlinuz.old -> boot/vmlinuz-6.1.0-27-amd64
root@debian1:/#
```

Cat the file monica.txt

```
root@debian1:/# cat monica.txt
Welcome to Linux
root@debian1:/# █
```

cd /home/asmith

ls -a

cat .bash\_profile

```
student@fedora1:~$ 
student@fedora1:~$ cd /home/asmith/
-bash: cd: /home/asmith/: Permission denied
student@fedora1:~$ su -
Password:
root@fedora1:#
root@fedora1:#
root@fedora1:#
root@fedora1:~# cd /home/asmith/
root@fedora1:/home/asmith# ls -a
. .bash_history .bash_profile .cache Desktop Downloads .mozilla Pictures Public Videos
.. .bash_logout .bashrc .config Documents .local Music project1 Templates
root@fedora1:/home/asmith# _
```

Cat .bash\_profile is useful instead of opening the file, you can just look without opening

```
.. .bash_logout .bashrc      .config  documents  .local
root@fedora1:/home/asmith# cat .bash_profile
# .bash_profile

# Get the aliases and functions
if [ -f ~/.bashrc ]; then
    . ~/.bashrc
fi

# User specific environment and startup programs
root@fedora1:/home/asmith#
```

Cal command to see the current calendar or specifying a year example cal 2022

```
root@fedora1:/home/asmith# cal
January 2025
Su Mo Tu We Th Fr Sa
      1  2  3  4
 5  6  7  8  9 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28 29 30 31

root@fedora1:/home/asmith# cal 2022
2022
          January           February           March
Su Mo Tu We Th Fr Sa   Su Mo Tu We Th Fr Sa   Su Mo Tu We Th Fr Sa
      1   2   3   4   5   6   7   1   2   3   4   5   6   7   8   9   10 11 12
 2   3   4   5   6   7   8   6   7   8   9   10 11 12   13 14 15 16 17 18 19
 9 10 11 12 13 14 15   13 14 15 16 17 18 19   20 21 22 23 24 25 26
16 17 18 19 20 21 22   20 21 22 23 24 25 26   27 28 29 30 31
23 24 25 26 27 28 29   27 28
          April            May             June
Su Mo Tu We Th Fr Sa   Su Mo Tu We Th Fr Sa   Su Mo Tu We Th Fr Sa
      1   2   3   4   5   6   7   1   2   3   4   5   6   7   8   9   10 11
 3   4   5   6   7   8   9   8   9 10 11 12 13 14   12 13 14 15 16 17 18
10 11 12 13 14 15 16   15 16 17 18 19 20 21   19 20 21 22 23 24 25
17 18 19 20 21 22 23   22 23 24 25 26 27 28   26 27 28 29 30
24 25 26 27 28 29 30   29 30 31
          July            August           September
Su Mo Tu We Th Fr Sa   Su Mo Tu We Th Fr Sa   Su Mo Tu We Th Fr Sa
      1   2   3   4   5   6   7   1   2   3   4   5   6   7   8   9   10
 3   4   5   6   7   8   9   7   8   9 10 11 12 13   11 12 13 14 15 16 17
10 11 12 13 14 15 16   14 15 16 17 18 19 20   18 19 20 21 22 23 24
17 18 19 20 21 22 23   21 22 23 24 25 26 27   25 26 27 28 29 30
24 25 26 27 28 29 30   28 29 30 31
          October          November          December
Su Mo Tu We Th Fr Sa   Su Mo Tu We Th Fr Sa   Su Mo Tu We Th Fr Sa
      1   2   3   4   5   6   7   1   2   3   4   5   6   7   8   9   10
 2   3   4   5   6   7   8   6   7   8   9 10 11 12   11 12 13 14 15 16 17
 9 10 11 12 13 14 15   13 14 15 16 17 18 19   18 19 20 21 22 23 24
16 17 18 19 20 21 22   20 21 22 23 24 25 26   25 26 27 28 29 30 31
23 24 25 26 27 28 29   27 28 29 30
          31
root@fedora1:/home/asmith#
```

Calculator command bc use Ctrl-x to exit

```
root@fedora1:/home/asmith# bc
bc 1.07.1
Copyright 1991-1994, 1997, 1998, 2000, 2004, 2006, 2008, 2012-2017 Free Software Foundation, Inc.
This is free software with ABSOLUTELY NO WARRANTY.
For details type `warranty'.
12 +2
14
128 / 3
40
^C
(interrupt) Exiting bc.
root@fedora1:/home/asmith#
```

## MODIFY password file

Go to /etc with command cd /etc

```
root@fedora1:/home/asmith# cd /etc
root@fedora1:/etc# pwd
/etc
root@fedora1:/etc# _
```

List file that starts with sha using command ls sha\*

```
/etc
root@fedora1:/etc# ls sha*
shadow  shadow-
root@fedora1:/etc# _
```

Vi shadow file

```

shutdown:*:19925:0:99999:7:::
halt:*:19925:0:99999:7:::
mail:*:19925:0:99999:7:::
operator:*:19925:0:99999:7:::
games:*:19925:0:99999:7:::
ftp:*:19925:0:99999:7:::
nobody:*:19925:0:99999:7:::
dbus:!:20020:::::
apache:!:20020:::::
tss:!:20020:::::
avahi:!:20020:::::
geoclue:!:20020:::::
usbmuxd:!:20020:::::
systemd-oom:!*:20020:::::
qemu:!:20020:::::
polkitd:!:20020:::::
rtkit:!:20020:::::
chrony:!:20020:::::
dnsmasq:!:20020:::::
gluster:!:20020:::::
rpc:!:20020:0:99999:7:::
pipewire:!:20020:::::
unbound:!:20020:::::
nm-openconnect:!:20020:::::
rpcuser:!:20020:::::
wsdd:!:20020:::::
sssd:!:20020:::::
openvpn:!:20020:::::
nm-openvpn:!:20020:::::
flatpak:!:20020:::::
colord:!:20020:::::
abrt:!:20020:::::
gdm:!:20020:::::
gnome-initial-setup:!:20020:::::
vboxadd:!:20020:::::
sshd:!:20020:::::
tcpdump:!:20020:::::
gnome-remote-desktop:!*:20020:::::
passim:!*:20020:::::
systemd-coredump:!*:20020:::::
systemd-network:!*:20020:::::
systemd-resolve:!*:20020:::::
systemd-timesync:!*:20020:::::
student:$y$jT$lwZM2JKnug9GWFktTRqGU0$jhGfrAQBU.0HMSIQshZvYq.mStGuEf6cHQEFQZ1zMgA:20070:0:99999:7::: ↵
named:!:20074:::::
saslauth:!:20074:::::
mailnull:!:20074:::::
smmsp:!:20074:::::
asmith:$y$j9T$R/YtckC1PZ311IBXXGUha.$nXy3YwmxIyoXvx1vUZh1f5zS36anRiE4xpo41yum80:20077:0:99999:7::: ↵

```

## /etc/shadow Format

The /etc/shadow file has one entry per line, each representing a user account.

### Copy

Typically, the first line describes the root user, followed by the system and normal user accounts. New entries are appended at the end of the file.

Each line of the /etc/shadow file contains nine comma-separated fields:

### Example

**root:\$y\$j9T\$fap4QjfF2kpjXEfYXNpfv.\$trn99vMHXO6HwV6jcpN1A5aoNfRNF2vvnyiTLAs45tB:20069:0:999  
99:7:::**

**mark:\$6\$.n.:17736:0:99999:7:::**

[--] [----] [---] - [---] -----  
| | | | || +-----> 9. Unused

```
| | | | ||+-----> 8. Expiration date  
| | | | |+-----> 7. Inactivity period  
| | | | +-----> 6. Warning period  
| | | +-----> 5. Maximum password age  
| | | +-----> 4. Minimum password age  
| | +-----> 3. Last password change  
| +-----> 2. Encrypted Password  
+-----> 1. Username |
```

Student password

```
student:$y$J9T$LuZM2JKnug9GWFktTRqGU0$jhGfrAQBU.0HMSIQshZvYq.mStGuEf6cHQEFQZlzMgA:20070:0:99999:7:::
```

See <https://linuxize.com/post/etc-shadow-file/>

The file shadow- we can see is a previous version of the shadow file (backup).

A user bsmith is created and note file shadow is modified

```
root@fedora1:/etc#  
root@fedora1:/etc# useradd bsmith  
root@fedora1:/etc# ls -ltrha sha*  
-----. 1 root root 1.6K Dec 20 02:13 shadow-  
-----. 1 root root 1.6K Jan 7 02:00 shadow
```

Cat the file shadow and see bsmith user is added and no password is there

```
smmsp:!:20074:::::::  
asmith:$y$J9T$R.YtckC1PZ311BXGUha.$nXy3YwmxIyoXvx1vUzWH1f5zS36anRiE4xpo41yum80:20077:0:99999:7:::  
bsmith:!:20095:0:99999:7:::  
root@fedora1:/etc#
```

The other file is the password file

```
root@fedora1:/etc# ls -ltrha pass*  
-rw-r--r--. 1 root root 263 Jun 23 2023 passwdqc.conf  
-rw-r--r--. 1 root root 51 Apr 29 2024 passim.conf  
-rw-r--r--. 1 root root 3.2K Dec 20 02:13 passwd-  
-rw-r--r--. 1 root root 3.2K Jan 7 02:00 passwd  
root@fedora1:/etc#
```

If cat passwd file is examined we can see bsmith recently added at the end.

```
smmsp:x:51:51::/var/spool/mqueue:/sbin/nologin
asmith:x:1001:1001::/home/asmith:/bin/bash
bsimth:x:1002:1002::/home/bsimth:/bin/bash
root@fedora1:/etc# _
```

We change password for user asmith

```
root@fedora1:/etc#
root@fedora1:/etc# # change password for asmith user
root@fedora1:/etc# passwd asmith
New password:
BAD PASSWORD: The password fails the dictionary check - it is too simplistic/systematic
Retype new password:
passwd: password updated successfully
root@fedora1:/etc# _
```

We can see changes in passwd and shadow files

```
passwd: password updated successfully
root@fedora1:/etc# ls -ltrha sha*
----- 1 root root 1.6K Dec 20 02:13 shadow-
----- 1 root root 1.6K Jan  7 02:05 shadow
root@fedora1:/etc# ls -ltrha pass*
-rw-r--r--. 1 root root 263 Jun 23 2023 passwdqc.conf
-rw-r--r--. 1 root root   51 Apr 29 2024 passim.conf
-rw-r--r--. 1 root root 3.2K Dec 20 02:13 passwd-
-rw-r--r--. 1 root root 3.2K Jan  7 02:00 passwd
root@fedora1:/etc# _
```

If we open shadow file we can see it changed for asmith user

```
mailnull:!:20074::::::
smmsp:!:20074::::::
asmith:$y$j9T$1UMje5YbP8Tg0uMICpxEU/$oQKZrIo/Je5XWi1aBV0Ue6A2nWpqJg98JkEdmBK1U6C:20095:0:99999:7:::
bsimth:!:20095:0:99999:7:::
root@fedora1:/etc# _
```

We see the passwd file

```
saslauthd:x:972:76:Saslauthd user:/run/saslauthd:/sbin/nologin
mailnull:x:47:47::/var/spool/mqueue:/sbin/nologin
smmsp:x:51:51::/var/spool/mqueue:/sbin/nologin
asmith:x:1001:1001::/home/asmith:/bin/bash
bsimth:x:1002:1002::/home/bsimth:/bin/bash
root@fedora1:/etc# _
```

In the password file no password is shown for security reasons.

Now I change the root user to user asmith with command `su asmith`

```
bsimth:x:1002:1002::/home-bsimth:/bin/ba  
root@fedora1:/etc# su asmith  
asmith@fedora1:/etc$
```

Because I was root no password is asked

Go back to root user and change password to bsmith user

```
asmith@fedora1:/etc$  
asmith@fedora1:/etc$ exit  
exit  
root@fedora1:/etc# passwd bsmith  
  
root@fedora1:/etc# passwd bsimth  
New password:  
BAD PASSWORD: The password fails the dictionary check - it is too simplistic/systematic  
Retype new password:  
passwd: password updated successfully  
root@fedora1:/etc#
```

From root change to asmith user (no password is asked).

From asmith change to bsmith and password is asked

```
root@fedora1:/etc#  
root@fedora1:/etc# su asmith  
asmith@fedora1:/etc$ su bsimth  
Password:  
bsimth@fedora1:/etc$ _
```

Command `w` and `who`

The `who` command in Linux is used to display a list of users who are currently logged into the system. When you run the `who` command, it provides information such as usernames, terminal lines, login times, and hostnames or IP addresses of the users.

```
bsimth@fedora1:~/etc$ who
student  tty1          2025-01-07 01:09
bsimth@fedora1:~/etc$ w
02:20:02 up 1:11, 2 users, load average: 0.27, 0.11, 0.03
USER     TTY      LOGIN@    IDLE   JCPU   PCPU WHAT
student  tty1      01:09    2.00s  0.78s  0.07s login -- student
student            01:09    1:11m  0.00s  0.35s /usr/lib/systemd/systemd --user
bsimth@fedora1:~/etc$
```

In this showing me student as the user that is logged in.

This shows that student is the user logged in in the system. The underlying user is student.

To return to be asmith use `exit`, then to return to root type `exit`

```
bsimth@fedora1:~/etc$ 
bsimth@fedora1:~/etc$ exit
exit
asmith@fedora1:~/etc$ exit
exit
root@fedora1:~/etc# _
```

Every time that you create a user the password file gets updated with at the bottom the users name and whether they are allowed to login to Linux system, when the user is logged in a bash script is assigned in passwd file.

In the case of asmith and bsimth users the /bin/bash is assigned

```
smmsp:x:51:51::/var/spool/mqueue:/sbin/nologin
asmith:x:1001:1001::/home/asmith:/bin/bash
bsimth:x:1002:1002::/home/bsimth:/bin/bash
root@fedora1:~/etc# _
```

/bin/bash is the path to the Bash shell executable on Unix-like operating systems, including Linux. Bash stands for "Bourne Again SHell," and it is a command-line interpreter that allows you to interact with the system by typing commands.

The set of commands they have access to are in the bash shell and allow a specific set of commands.

Another file that is created when user is created is the group file

```
root@fedora1:/etc# ls -ltrha group*
-rw-r--r--. 1 root root 1.2K Dec 20 02:13 group-
-rw-r--r--. 1 root root 1.2K Jan  7 02:00 group
root@fedora1:/etc#
```

If we do cat tat the file we can see at the end asmith an bsimth

```
smmsp:x:51:
asmith:x:1001:
bsimth:x:1002:
root@fedora1:/etc#
```

1001 is id associated with asmith 1002 is associated with bsimth

Use history command to see which commands were used

We can see the command we used in this section

```
532 systemctl get-default
533 systemctl get-default
534 systemctl get-default
535 systemctl set-default multi-user.target
536 systemctl get-default
537 runlevel
538 who -r
539 systemctl reboot
540 cd /etc
541 pwd
542 ls sha*
543 vi shadow
544 ls shad*
545 ls shadow~
546 ls -ltrha
547 ls -ltrha sha*
548 vi shadow~
549 ls -ltrha sha*
550 vi shadow
551 vi shadow-
552 useradd bsmith
553 ls -ltrha sha*
554 cat shadow
555 ls -ltrha pass*
556 cat passwd
557 # change password for asmith user
558 passwd asmith
559 ls -ltrha sha*
560 ls -ltrha pass*
561 cat shadow
562 cat passwd
563 su asmith
564 passwd bsmith
565 passwd bsimth
566 su asmith
567 cd .etc
568 cd /etc
569 cat passwd
570 ls -ltrha gr*
571 ls -ltrha grou*
572 cat group
573 cat group | grep root
574 history
root@fedora1:/etc# _
```

Being user asmith try to change the password from Am123456 to Amf654321

The system will complain and say password is too simple.

```
root@fedora1:/etc# ##### Login in as asmith
root@fedora1:/etc# su asmith
asmith@fedora1:/etc$ 
asmith@fedora1:/etc$ # change password for asmith
asmith@fedora1:/etc$ passwd
Current password:
New password:
BAD PASSWORD: The password fails the dictionary check - it is too simplistic/systematic
passwd: Authentication token manipulation error
passwd: password unchanged
asmith@fedora1:/etc$ 
asmith@fedora1:/etc$ 
asmith@fedora1:/etc$ passwd
Current password:
New password:
BAD PASSWORD: The password fails the dictionary check - it is too simplistic/systematic
passwd: Authentication token manipulation error
passwd: password unchanged
asmith@fedora1:/etc$
```

Chang password to Amf654321! Again, system complains the password dis too simple

```
passwd: authentication token manipulation error
passwd: password unchanged
asmith@fedora1:/etc$ 
asmith@fedora1:/etc$ 
asmith@fedora1:/etc$ # Change password to Amf654321!
asmith@fedora1:/etc$ passwd
Current password:
New password:
BAD PASSWORD: The password fails the dictionary check - it is too simplistic/systematic
passwd: Authentication token manipulation error
passwd: password unchanged
asmith@fedora1:/etc$
```

Passwords must be complex with special characters, etc.

Amf123456

Old is the same as new

```
asmith@fedora1:/etc$ 
asmith@fedora1:/etc$ # use new passord equals to old password
asmith@fedora1:/etc$ passwd
Current password:
New password:
BAD PASSWORD: The password is the same as the old one
passwd: Authentication token manipulation error
passwd: password unchanged
asmith@fedora1:/etc$
```

This password is ok and will be accepted Amf654321!+#\$

```
asmith@fedora1:/etc$ # use password Amf654321!+#$
asmith@fedora1:/etc$ passwd
Current password:
New password:
Retype new password:
passwd: password updated successfully
asmith@fedora1:/etc$
```

Password is successfully changed

### 3.4 Install services

This section explains the installation of software packages in Linux used for different task.

This section includes the following services installation and configuration

- Bind (Berkeley Internet Name Domain) DNS server - widely used open-source DNS (Domain Name System) server. This software translates human-readable domain names (like www.mydomain.com) into IP addresses.
- Sendmail is a Mail Transfer Agent (MTA) responsible for sending and receiving emails.
- Webmin provides a web-based interface for managing various system components, including Bind and Sendmail.
- SSHD - SSH (Secure Shell) is a protocol which facilitates secure communications between two systems using a client-server architecture and allows users to log into server host systems remotely. Fedora includes the general OpenSSH server

#### CHECKPOINT

**CONTINUE** to next section if the following conditions are met:

- Linux distro is up and running (the examples below use Fedora) and
- Host name and local ip address used

For more information how to check the previous conditions refer to Linux distributions section

If both conditions are not met, the documented processes in this section can not be done procedure **STOP**s here.

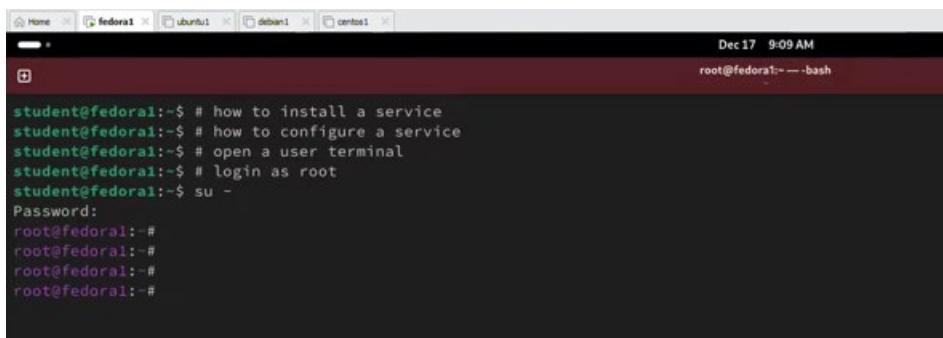
### 3.4.1 Install BIND DNS service and Webin

#### 3.4.1.1 Install BIND

BIND (Berkeley Internet Name Domain) is an open-source software that implements Domain Name System (DNS) protocols. It is one of the most widely used DNS servers on the internet. Essentially, BIND translates human-readable domain names (like example.com) into IP addresses that computers use to locate each other on a network. It was originally developed at the University of California, Berkeley, hence the name. It's a critical component for the functioning of the internet, providing the backbone service for domain name resolution.

- A) Open a terminal and login as root

```
su-
```

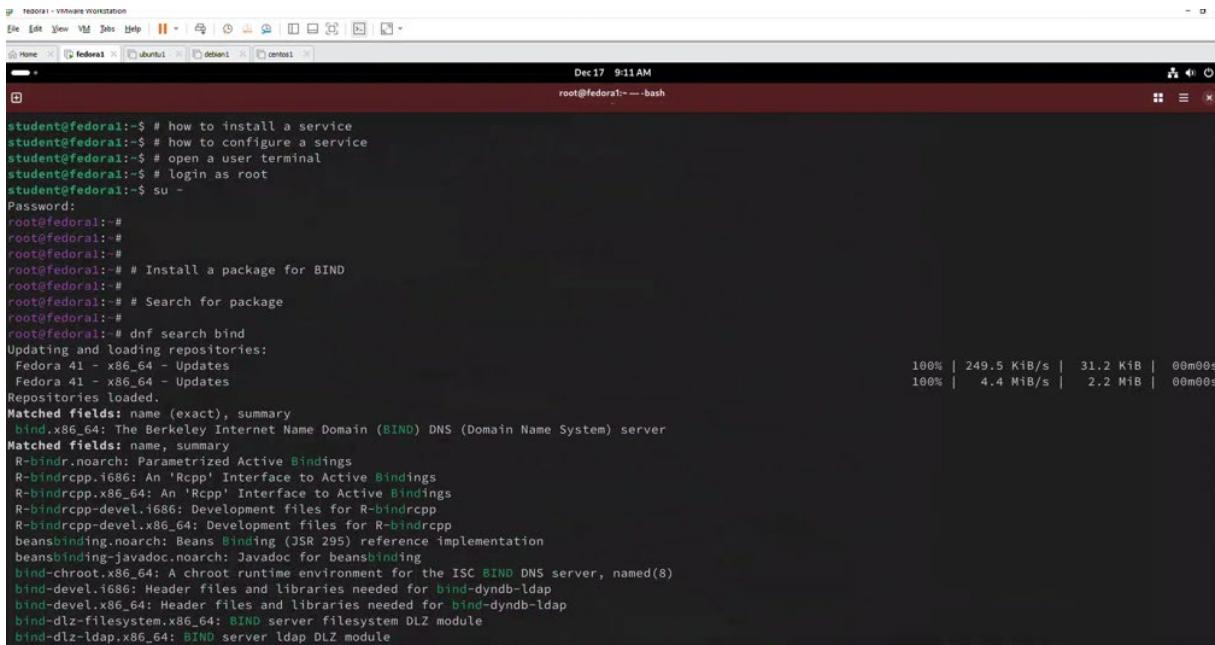


The screenshot shows a terminal window titled 'fedora1' with a black background and white text. At the top, it says 'Dec 17 9:09 AM' and 'root@fedora1:~ - bash'. The user has typed the command 'su-' followed by their password. The terminal shows the progression from a standard user to root access.

```
student@fedora1:~$ # how to install a service
student@fedora1:~$ # how to configure a service
student@fedora1:~$ # open a user terminal
student@fedora1:~$ # login as root
student@fedora1:~$ su -
Password:
root@fedora1:~#
root@fedora1:~#
root@fedora1:~#
root@fedora1:~#
```

- B) Search for BIND package look for it with

```
dnf search bind
```



The screenshot shows a terminal window titled 'fedora1 - VMware Workstation' with a black background and white text. At the top, it says 'Dec 17 9:11 AM' and 'root@fedora1:~ - bash'. The user has typed 'dnf search bind' and the terminal is displaying the results of the search. It lists several packages related to BIND, including 'bind.x86\_64' and 'bind-devel.x86\_64'. The search results are displayed in green text.

```
student@fedora1:~$ # how to install a service
student@fedora1:~$ # how to configure a service
student@fedora1:~$ # open a user terminal
student@fedora1:~$ # login as root
student@fedora1:~$ su -
Password:
root@fedora1:~#
root@fedora1:~#
root@fedora1:~#
root@fedora1:~# Install a package for BIND
root@fedora1:~#
root@fedora1:~# Search for package
root@fedora1:~#
root@fedora1:~# dnf search bind
Updating and loading repositories:
  Fedora 41 - x86_64 - Updates
  Fedora 41 - x86_64 - Updates
Repositories loaded.
Matched fields: name (exact), summary
bind.x86_64: The Berkeley Internet Name Domain (BIND) DNS (Domain Name System) server
Matched fields: name, summary
R-bindr.noarch: Parametrized Active Bindings
R-bindrcpp.i686: An 'Rcpp' Interface to Active Bindings
R-bindrcpp.x86_64: An 'Rcpp' Interface to Active Bindings
R-bindrcpp-devel.i686: Development files for R-bindrcpp
R-bindrcpp-devel.x86_64: Development files for R-bindrcpp
beansbinding.noarch: Beans Binding (JSR 295) reference implementation
beansbinding-javadoc.noarch: Javadoc for beansbinding
bind-chroot.x86_64: A chroot runtime environment for the ISC BIND DNS server, named(8)
bind-devel.i686: Header files and libraries needed for bind-dyndb-ldap
bind-devel.x86_64: Header files and libraries needed for bind-dyndb-ldap
bind-dlz-filesystem.x86_64: BIND server filesystem DLZ module
bind-dlz-ldap.x86_64: BIND server ldap DLZ module
```

- C) Install BIND package.

```
dnf install bind -y
```

```
root@fedora17:~# dnf install bind
```

### 3.4.1.2 Install sendmail

Sendmail is a widely used mail transfer agent (MTA) for Unix-based systems, including Linux. It's designed to route and deliver email. It acts as a server that receives emails from local users or remote hosts and forwards them to their destination, either to another email server or a local mailbox.

- A) After you open a terminal and login as root

SU-

```
student@federal:~$ # how to install a service
student@federal:~$ # how to configure a service
student@federal:~$ # open a user terminal
student@federal:~$ # login as root
student@federal:~$ su -
Password:
root@federal:~#
root@federal:~#
root@federal:~#
root@federal:~#
```

- #### B) Install sendmail service

```
dnf install sendmail -y
```

```

root@fedorai:~ # Install send mail
root@fedorai:~ #
root@fedorai:~ # dnf install sendmail
Last release is end-of-life.
Updating and loading repositories:
  Repositories loaded.
Package          Arch    Version           Repository      Size
Installing:
  sendmail        x86_64  8.18.1-4.fc41      fedora       1.7 MB
Installing dependencies:
  cyrus-sasl      x86_64  2.1.28-27.fc41     fedora      145.2 kB
  openslssl       x86_64  1.13.2-2.9.fc41     fedora      1.7 MB
  procmail        x86_64  3.24-7.fc41       fedora      365.5 kB
  tinycdb         x86_64  0.80-3.fc41       fedora      55.3 kB

Transaction Summary:
  Installing:      5 packages

Total size of inbound packages is 2 MIB. Need to download 2 MIB.
After this operation, 4 MIB extra will be used (install 4 MIB, remove 0 B).
Is this ok? (y/n) [y]: y

[1/5]  procmail-0:3.24-7.fc41.x86_64
[2/5]  sendmail-0:8.18.1-4.fc41.x86_64
[3/5]  tinycdb-0:0.80-3.fc41.x86_64
[4/5]  openslssl-1:3.2.2-9.fc41.x86_64
[5/5]  cyrus-sasl-0:2.1.28-27.fc41.x86_64

-----[5/5] Total-----[100%] 2.5 MiB/s | 2.2 MiB | 00m01s

Running transaction
[1/7] Verify package files
[2/7] Prepare transaction
[3/7] Installing cyrus-sasl-0:2.1.28-27.fc41.x86_64
[4/7] Installing tinycdb-0:0.80-3.fc41.x86_64
[5/7] Installing procmail-0:3.24-7.fc41.x86_64
[6/7] Installing openslssl-1:3.2.2-9.fc41.x86_64
[7/7] Installing sendmail-0:8.18.1-4.fc41.x86_64
Complete!
root@fedorai:~ #

```

- ### C) Install sendmail-cf with command

```
dnf install sendmail-cf -y
```

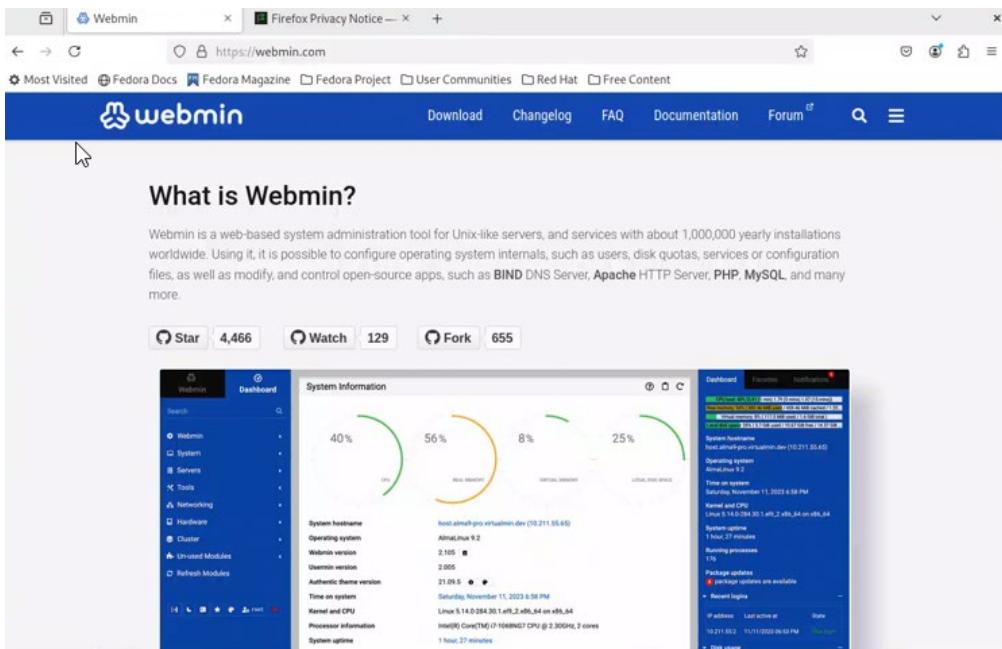
```
Complete:  
root@fedora17:~# dnf install sendmail-cf  
Updating and loading repositories:  
Repositories loaded.
```

### 3.4.1.3 Install webmin

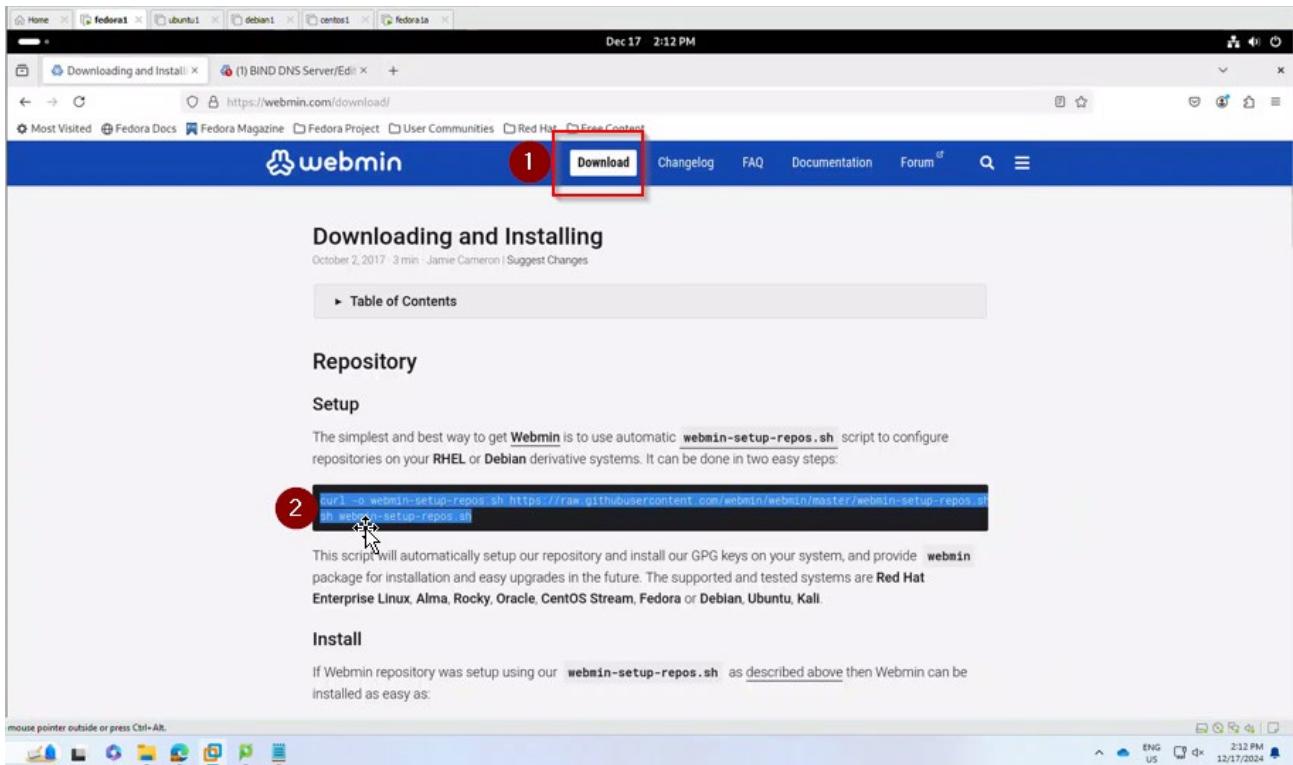
Webmin is a popular open-source web-based control panel for system administration

#### 3.4.1.3.1 Look for webmin repository

- A) Open a Firefox browser and look for <https://webmin.com>



- B) Inside Webmin url, go to download and copy the curl command in Setup section,



### 3.4.1.3.2 Install webmin in Fedora via terminal

#### A) Issue the copied curl command in the terminal

The command curl will go to internet and get files.

The curl command in Linux is a versatile tool used to transfer data from or to a server, using various protocols such as HTTP, HTTPS, FTP, and more. It is widely used for web scraping, downloading files, and interacting with REST APIs, among other tasks

```
curl -o webmin-setup-repos.sh
```

```
https://raw.githubusercontent.com/webmin/webmin/master/webmin-setup-repos.sh
```

```
root@federal:~# ## CURL Command
root@federal:~# curl -o webmin-setup-repos.sh https://raw.githubusercontent.com/webmin/webmin/master/webmin-setup-repos.sh
sh webmin-setup-repos.sh
% Total    % Received % Xferd  Average Speed   Time   Time     Current
          Dload  Upload Total Spent   Left Speed
100  5286  100  5286    0     0  50305      0 --:--:-- --:--:-- 50826
Setup Webmin repository? (y/N) y
Downloading Webmin key ...
... done
Installing Webmin key ...
... done
Setting up Webmin repository ...
... done
Webmin package can now be installed using dnf install webmin command.
root@federal:~#
```

#### B) List the files and note the file webmin-setup-repos.sh is in the directory

```
ls
```

```
root@federal1:~# ls
anaconda-ks.cfg  webmin-setup-repos.sh
root@federal1:~#
root@federal1:~# ls -altrh
total 56K
-rw-r--r--. 1 root root 129 Jul 18 20:00 .tcshrc
-rw-r--r--. 1 root root 100 Jul 18 20:00 .cshrc
-rw-r--r--. 1 root root 429 Jul 18 20:00 .bashrc
-rw-r--r--. 1 root root 141 Jul 18 20:00 .bash_profile
-rw-r--r--. 1 root root 18 Jul 18 20:00 .bash_logout
drwx-----. 1 root root 0 Oct 24 10:50 .ssh
-rw-----. 1 root root 449 Dec 12 22:37 anaconda-ks.cfg
drwx-----. 1 root root 0 Dec 12 22:39 .cache
-rw-----. 1 root root 102 Dec 16 02:32 .xauth5wi6sx
-rw-----. 1 root root 20 Dec 16 11:46 .lesshtst
dr-xr-xr-x. 1 root root 174 Dec 16 11:56 ..
-rw-----. 1 root root 8.7K Dec 17 09:06 .bash_history
-rw-----. 1 root root 102 Dec 17 09:09 .xauthmocVwv
-rw-r--r--. 1 root root 5.2K Dec 17 09:32 webmin-setup-repos.sh
drwxr-xr-x. 1 root root 18 Dec 17 09:32 .local
dr-xr-x---. 1 root root 284 Dec 17 09:32 .
root@federal1:~#
```

C) Issue command

```
sh webmin-setup-repos.sh
```

A message will appear :

*Webmin and Usermin can be installed with:*

*dnf install webmin usermin*

```
-rw-r--r--. 1 root root 729 Jan 10 09:28 webmin-setup-repos.
root@federal1f:~# sh webmin-setup-repos.sh
Setup Webmin releases repository? (y/N) y
  Downloading Webmin developers key ..
  .. done
  Installing Webmin developers key ..
  .. done
  Setting up Webmin releases repository ..
  .. done
  Downloading repository metadata ..
  .. done
Webmin and Usermin can be installed with:
  dnf install webmin usermin ←
```

D) Install webmin

```
dnf install webmin usermin -y
```

```

root@fedoralf:~# dnf install webmin usermin
Updating and loading repositories:
Repositories loaded.
Package          Repository           Size   Arch      Version
Installing:
usermin          webmin-stable-noarch    46.2 MiB  noarch   2.100-1
webmin           webmin-stable-noarch    115.5 MiB  noarch   2.202-1
Installing dependencies:
perl-B-Hooks-EndOfScope      fedora      69.3 KiB  noarch   0.28-2.fc41
perl-Class-Data-Inheritable  fedora      6.3 KiB   noarch   0.09-9.fc41
perl-Class-Inspector         fedora      57.5 KiB  noarch   1.36-17.fc41
perl-Class-Method-Modifiers  fedora      102.5 KiB noarch   2.15-5.fc41
perl-Class-Singleton         fedora      39.7 KiB  noarch   1.6-12.fc41
perl-Clone             fedora      36.5 KiB  x86_64  0.47-1.fc41
perl-Compress-Raw-Bzip2      fedora      69.5 KiB  x86_64  2.212-512.fc41
perl-Compress-Raw-Zlib       fedora      162.11 KiB x86_64  2.212-512.fc41

```

E) Verify your ip address using command `ifconfig`

```

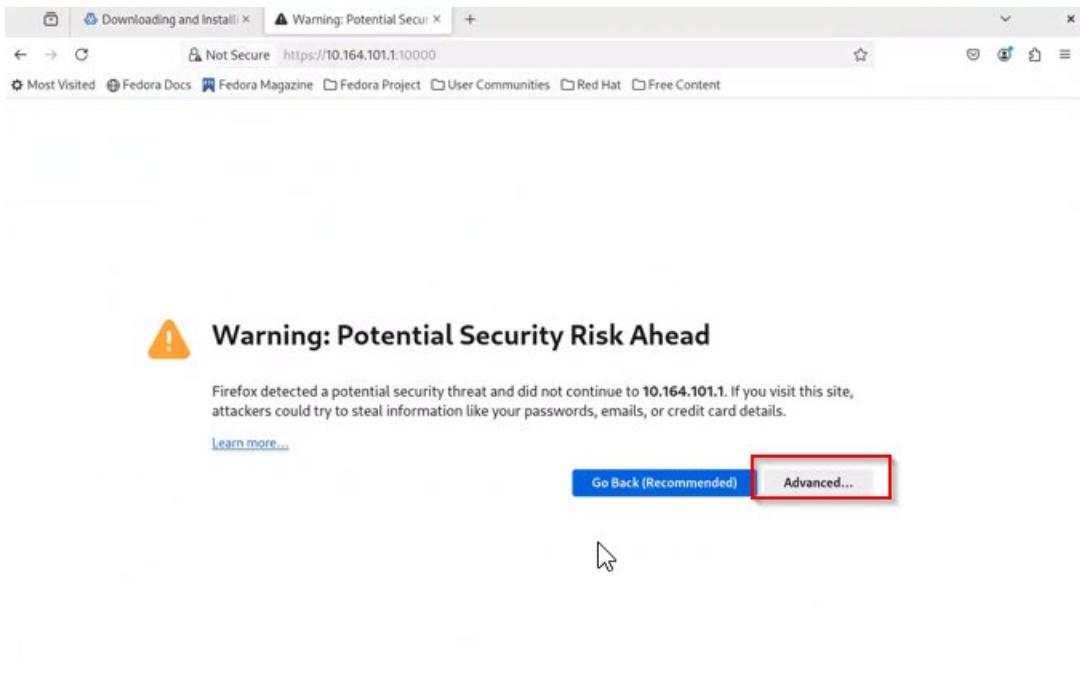
root@fedoral:~#
root@fedoral:~# ifconfig
ens160: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 10.164.101.1 netmask 255.255.0.0 broadcast 10.164.255.255
                brd ::ec6a:a7c:9ca1:38b4/64 scopeid 0x20<link>
                  ether 00:0c:29:43:9c:55 txqueuelen 1000 (Ethernet)
                    RX packets 1572114 bytes 274772057 (262.0 MiB)
                    RX errors 0 dropped 0 overruns 0 frame 0
                    TX packets 37229 bytes 2865350 (2.7 MiB)
                    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
        inet 127.0.0.1 netmask 255.0.0.0
        inet6 ::1 prefixlen 128 scopeid 0x10<host>
          loop txqueuelen 1000 (Local Loopback)
            RX packets 285 bytes 38416 (37.5 KiB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 285 bytes 38416 (37.5 KiB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

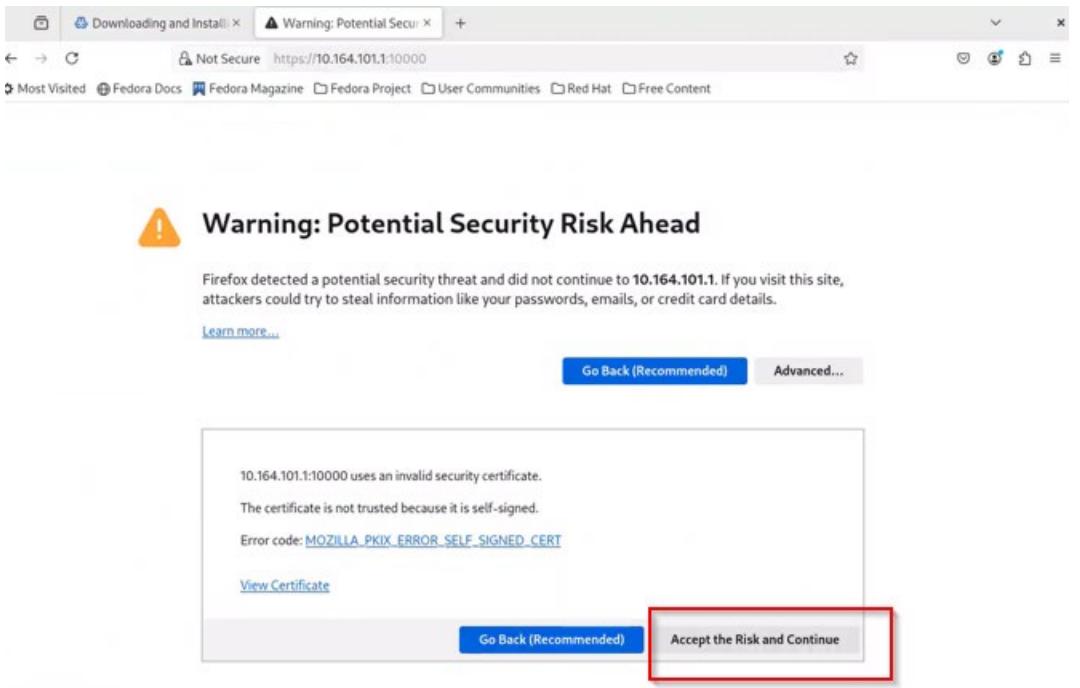
```

J) On the Firefox browser type the ip of your computer port 10000 to access webmin

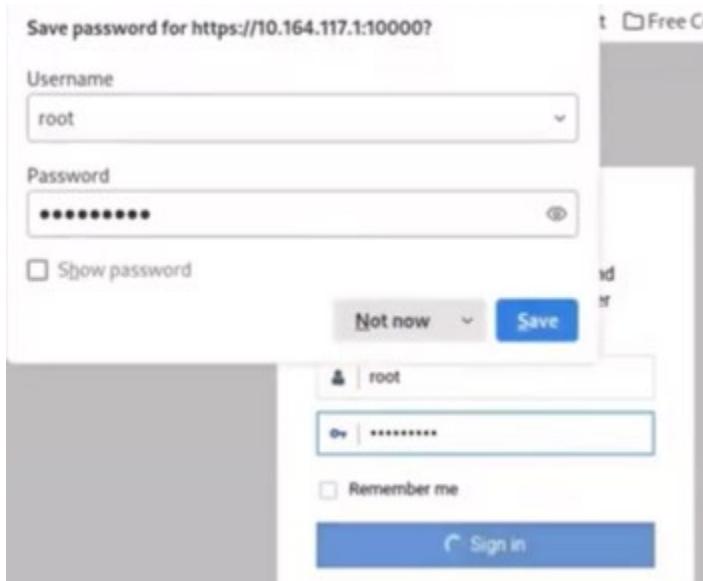
10.164.101.1:10000 Ignore the warnings and continue click on “Advance”



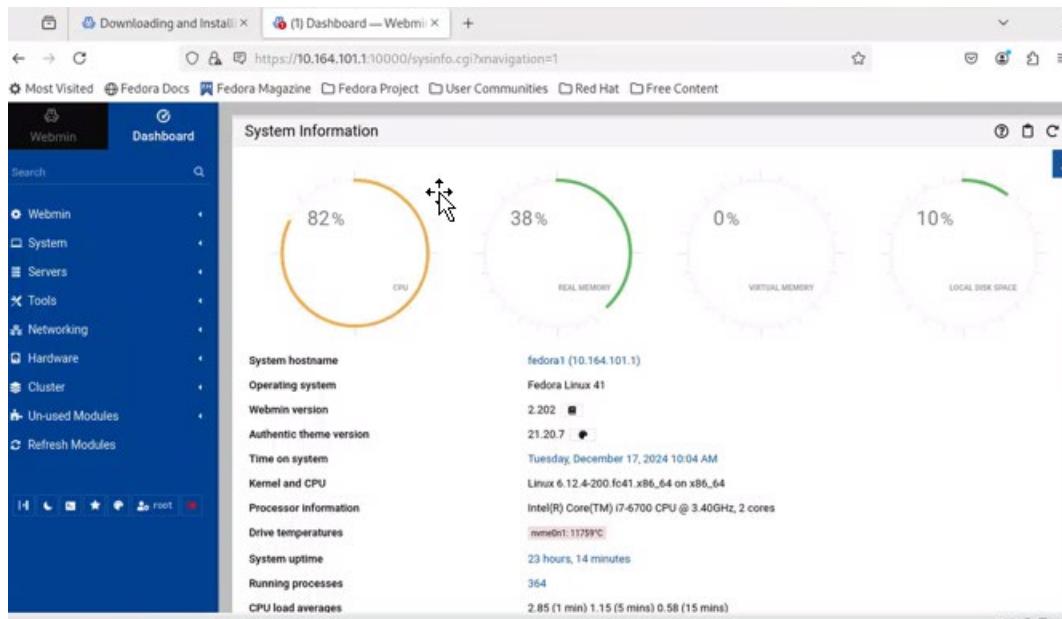
F) Click on “Accept the risk and continue”



G) Webmin is opened and ask for login, login wit user root and password Amf123456

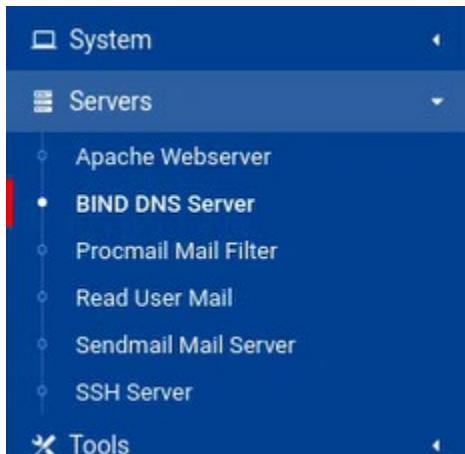


#### H) Webmin is opened



- I) Click on servers on the left and note the submenu server on the left where we have available servers
- Apache Webserver
  - BIND DNS Server
  - Procmail Mail Filter
  - Read User Mail
  - Sendmail Mail Server

- SSH Server



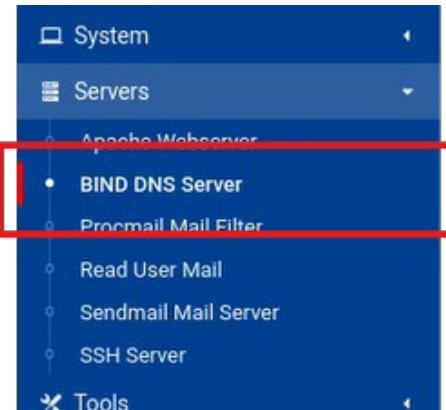
### 3.4.2 Use Webmin to configure BIND DNS

#### 3.4.2.1 Define the DNS server

Define global server configuration options using [`/etc/named.conf`](#) via Webmin.

The [`/etc/named.conf`](#) file is the main configuration file for the BIND (Berkeley Internet Name Domain) DNS server.

- A) Inside Webmin select BIND DNS server



- B) Select “Edit Config file”

C) Edit the file and make sure you have with the following values changed:

10.164.101.1 is the ip address gotten in ifconfig

- listen-on port 53 { 10.164.101.1; };
- allow-query { any; };
- dnssec-validation no;

```

1 // 
2 // named.conf
3 //
4 // Provided by Red Hat bind package to configure the ISC BIND named(8) DNS
5 // server as a caching only nameserver (as a localhost DNS resolver only).
6 //
7 // See /usr/share/doc/bind*/sample/ for example named configuration files.
8 //
9
10 options {
11     listen-on port 53 { 10.164.101.1; }; ←
12     listen-on-v6 port 53 { ::1; };
13     directory "/var/named";
14     dump-file "/var/named/data/cache_dump.db";
15     statistics-file "/var/named/data/named_stats.txt";
16     memstatistics-file "/var/named/data/named_mem_stats.txt";
17    秘roots-file "/var/named/data/named.secroots";
18     recursing-file "/var/named/data/named.recurse";
19     allow-query { any; }; ←
20
21 }
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36

```

★ Edit Config File

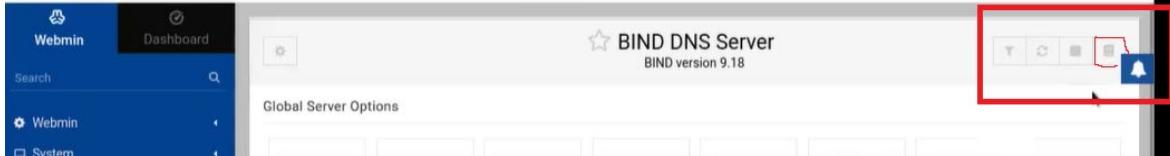
Editing config file: /etc/named.conf

```
25      - If your recursive DNS server has a public IP address, you MUST enable access
26      control to limit queries to your legitimate users. Failing to do so will
27      cause your server to become part of large scale DNS amplification
28      attacks. Implementing BCP38 within your network would greatly
29      reduce such attack surface
30  */
31  recursion yes;
32
33  dnssec-validation no; ←
34
35  managed-keys-directory "/var/named/dynamic";
36  geoip-directory "/usr/share/GeoIP";
37
38  pid-file "/run/named/named.pid";
39  session-keyfile "/run/named/session.key";
40
41  /* https://fedoraproject.org/wiki/Changes/CryptoPolicy */
42  include "/etc/crypto-policies/back-ends/bind.config";
43 };
44
45 logging {
46     channel default_debug {
47         file "data/named.run";
48         severity dynamic;
49     };
50 };
51
52 zone "." IN {
53     type hint;
54     file "named.ca";
55 };
56
57 include "/etc/named.rfc1912.zones";
58 include "/etc/named.root.key";
59
60
```

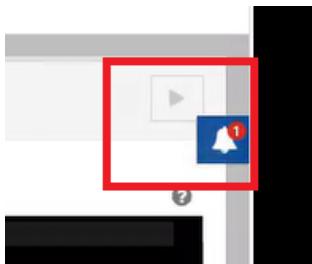
D) Once changes are made save the file



E) Stop service pressing the square on the right up corner



F) Start the service pressing the green arrow on the right up corner



G) Start and enable BIND DNS service

Open a terminal and issue the following commands:

1. This command enables the BIND DNS service (named) to start automatically at boot

```
systemctl enable named
```

Output:

```
Created symlink '/etc/systemd/system/multi-user.target.wants/named.service' →  
'/usr/lib/systemd/system/named.service'.
```

The output of the command indicates that a symbolic link has been created, enabling the named service to start automatically at system boot.

2. This command starts the BIND DNS service (named). When executed, it will initiate the DNS service, allowing it to handle DNS queries.

```
systemctl start named
```

No output is expected for this command

3. Check if the named service is enabled and running.

```
systemctl status named
```

Verify the command output :

Loaded: loaded - indicates the configuration file has been loaded

Active: **active(running)** – indicates the status of the service is active and the exact time when service was activated

```

student@federal:~$ su -
Password:
root@federal:~# systemctl enable named 1
Created symlink '/etc/systemd/system/multi-user.target.wants/named.service' → '/usr/lib/systemd/system/named.service'.
root@federal:~# systemctl start named 2
root@federal:~# systemctl start status 3
Failed to start status.service: Unit status.service not found.
root@federal:~# systemctl status named
● named.service - Berkeley Internet Name Domain (DNS)
   Loaded: loaded (/usr/lib/systemd/system/named.service; enabled; preset: disabled)
   Drop-In: /usr/lib/systemd/system/service.d
             └─10-timeout-abort.conf, 50-keep-warm.conf
     Active: active (running) 1 since Tue 2024-12-17 10:12:03 EST; 2min 22s ago
       Main PID: 218602 (named) 2
         Tasks: 8 (limit: 8778)
        Memory: 16.9M (peak: 17.4M)
          CPU: 107ms
        CGroup: /system.slice/named.service
                  └─218602 /usr/sbin/named -u named -c /etc/named.conf

Dec 17 10:12:03 federal named[218602]: network unreachable resolving './NS/IN': 2001:500:9f::42#53
Dec 17 10:12:03 federal named[218602]: network unreachable resolving './DNSKEY/IN': 2001:7fd::1#53
Dec 17 10:12:03 federal named[218602]: network unreachable resolving './NS/IN': 2001:7fd::1#53
Dec 17 10:12:03 federal named[218602]: network unreachable resolving './DNSKEY/IN': 2801:1b8:10::b#53
Dec 17 10:12:03 federal named[218602]: network unreachable resolving './NS/IN': 2801:1b8:10::b#53
Dec 17 10:12:03 federal named[218602]: network unreachable resolving './DNSKEY/IN': 2001:500:2::c#53
Dec 17 10:12:03 federal named[218602]: network unreachable resolving './NS/IN': 2001:500:2::c#53
Dec 17 10:12:03 federal named[218602]: managed-keys-zone: Initializing automatic trust anchor management for zone '.'; DNSKEY ID 20
Dec 17 10:12:27 federal named[218602]: no longer listening on 10.164.101.1#53
Dec 17 10:12:28 federal named[218602]: listening on IPv4 interface ens160, 10.164.101.1#53
lines 1-22/23 (Fwded)

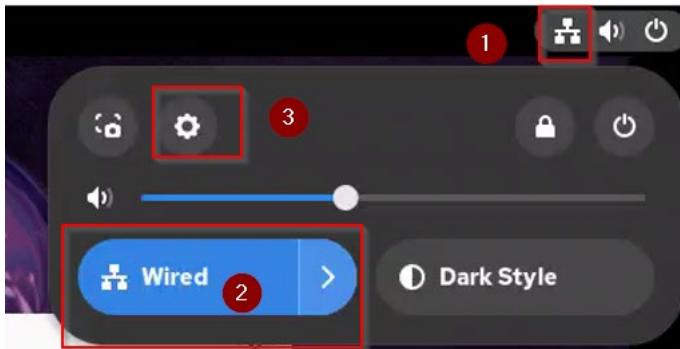
```

### 3.4.2.2 Assign the recently configured DNS to local server

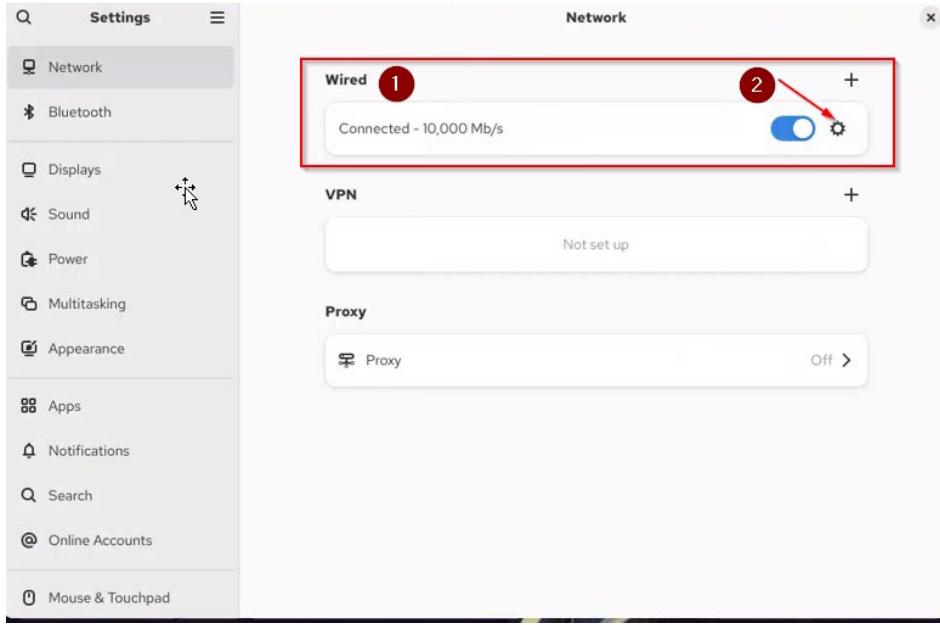
- A) Use wired to assign DNS IP.

Open wired

1. Select icon  located at the top right of the screen.
2. Make sure the Wired icon is selected (colored blue) 
3. Select the wheel  on top of blue wired icon.

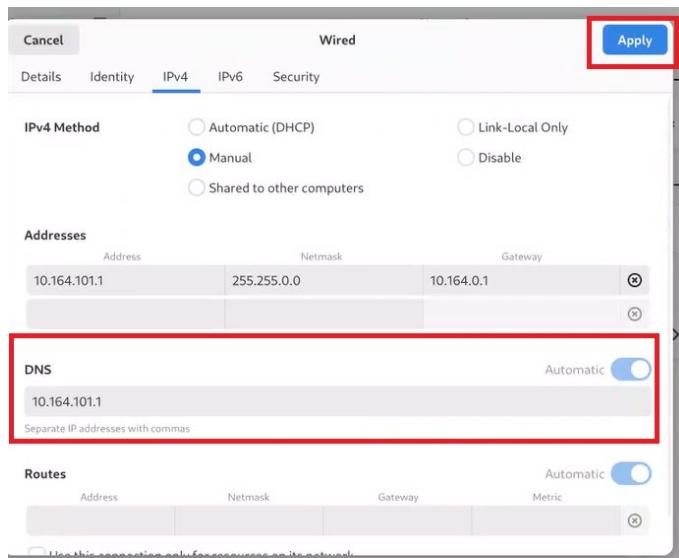


- B) Window network is opened, open Wired , select the wheel

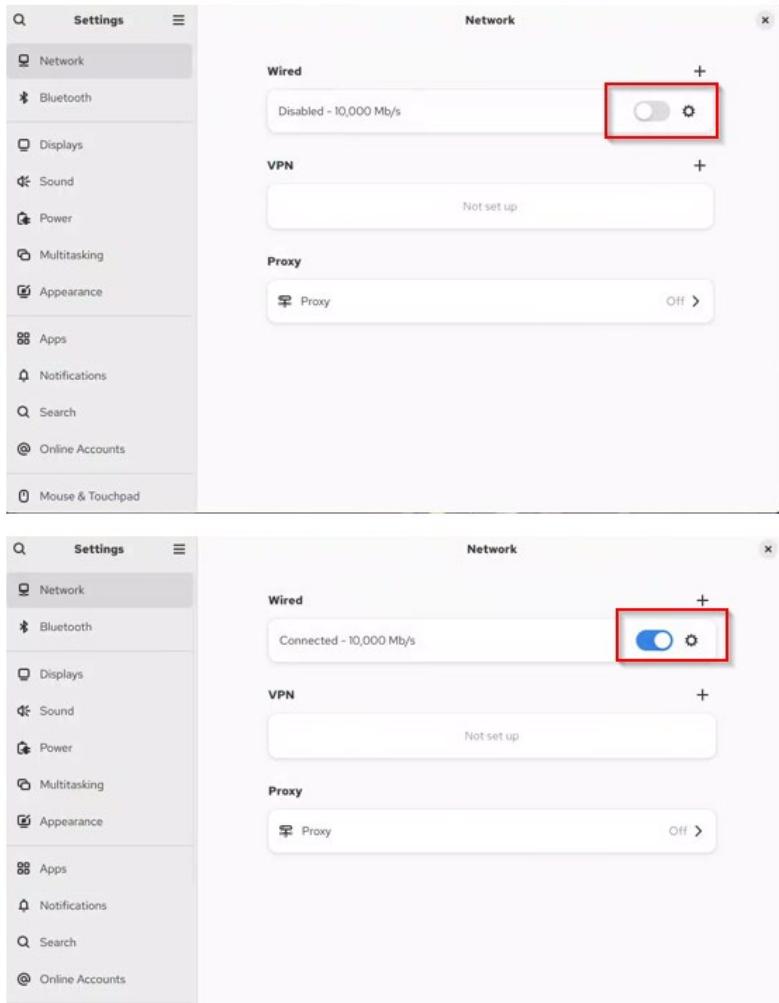


### C) Select IPV4

Changed the DNS to the IP address of the machine, once ip address changed click on Apply.



### D) In the window Network disable/enable Wired to reset configuration



- E) check DNS servers with systemd-resolved  
 systemd-resolve --status

```
root@fedoralb:~# systemd-resolve --status
Global
  Protocols: LLMNR=resolve -mDNS -DNSOverTLS DNSSEC=no/unsupported
  resolv.conf mode: stub

Link 2 (ens160)
  Current Scopes: DNS LLMNR/IPv4 LLMNR/IPv6
  Protocols: +DefaultRoute LLMNR=resolve -mDNS -DNSOverTLS DNSSEC=no/unsupported
  Current DNS Server: 10.164.101.7 ←
  DNS Servers: 10.164.101.7
```

- F) Check interfaces

nmcli is a command-line interface tool for managing NetworkManager, which is used to configure network connections on Linux systems

`nmcli dev show`

```

[prox] root@fedoralb:~# nmcli dev show
GENERAL.DEVICE:                         ens160
GENERAL.TYPE:                            ethernet
GENERAL.HWADDR:                          00:0C:29:2E:7D:4A
GENERAL.MTU:                             1500
GENERAL.STATE:                           100 (connected)
GENERAL.CONNECTION:                     Wired connection 1
GENERAL.CON-PATH:                        /org/freedesktop/NetworkManager/ActiveConnection/4
WIRED-PROPERTIES.CARRIER:                on
IP4.ADDRESS[1]:                          10.164.101.7/16
IP4.GATEWAY:                            10.164.0.1
IP4.ROUTE[1]:                           dst = 10.164.0.0/16, nh = 0.0.0.0, mt = 100
IP4.ROUTE[2]:                           dst = 0.0.0.0/0, nh = 10.164.0.1, mt = 100
IP4.DNS[1]:                             10.164.101.7
IP6.ADDRESS[1]:                          fe80::ef60:b8b:a489:8c13/64
IP6.GATEWAY:                            --
IP6.ROUTE[1]:                           dst = fe80::/64, nh = ::, mt = 1024

GENERAL.DEVICE:                         lo
GENERAL.TYPE:                           loopback
GENERAL.HWADDR:                          00:00:00:00:00:00
GENERAL.MTU:                            65536
GENERAL.STATE:                           100 (connected (externally))
GENERAL.CONNECTION:                     lo
GENERAL.CON-PATH:                       /org/freedesktop/NetworkManager/ActiveConnection/1
IP4.ADDRESS[1]:                          127.0.0.1/8
IP4.GATEWAY:                            --
IP6.ADDRESS[1]:                          ::1/128
IP6.GATEWAY:                            --

```

### 3.4.3 Use Webmin to create DNS records

#### 3.4.3.1 Configure Master zone fed1.com

- A) Connect in Webmin to local server <https://10.164.101.1:10000>

Using ifconfig to get the IP address to be used

**ifconfig**

The port to be used is 10000 (ten thousand).

```

root@fedoralb:#
root@fedoralb:~# ifconfig
ens160: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.164.101.1  netmask 255.255.0.0  broadcast 10.164.255.255
                ether 00:0C:29:2E:7D:4A  txqueuelen 1000  (Ethernet)
                RX packets 1572114  bytes 274772057 (262.0 MiB)
                RX errors 0  dropped 0  overruns 0  frame 0
                TX packets 37229  bytes 2865350 (2.7 MiB)
                TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
                inet6 ::1  prefixlen 128  scopeid 0x10<host>
                loop  txqueuelen 1000  (Local Loopback)
                RX packets 285  bytes 38416 (37.5 KiB)
                RX errors 0  dropped 0  overruns 0  frame 0
                TX packets 285  bytes 38416 (37.5 KiB)
                TX errors 0  dropped 0  overruns 0  carrier 0  collisions 0

```

### 3.4.3.1.1 Create Masterzone

A) Select BIND DNS at the left blue zone in Servers

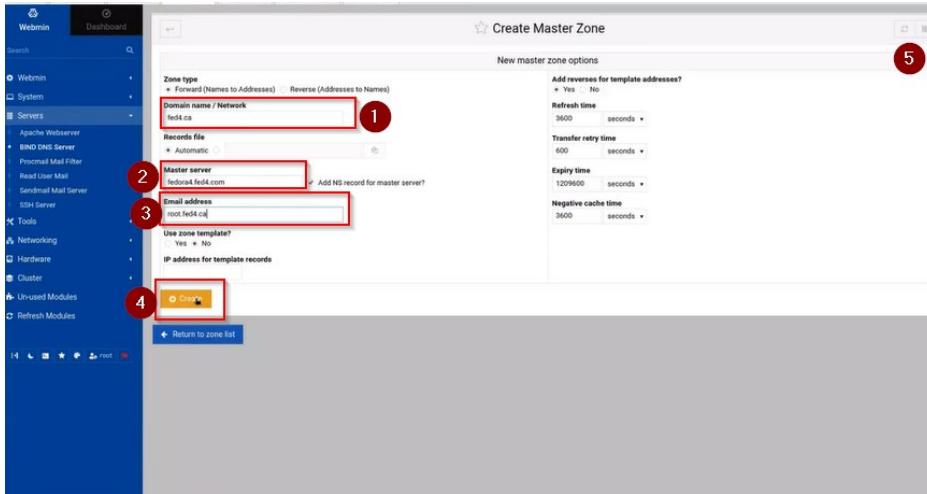
The screenshot shows the BIND DNS Server interface. The left sidebar is titled 'Services' and has 'BIND DNS Server' selected. The main area is titled 'Global Server Options' and contains various configuration icons. Below this is a table titled 'Existing DNS Zones' with two columns: 'Zone' and 'Type'. The 'Zone' column lists several zones, and the 'Type' column indicates their nature (e.g., Master, Root). At the bottom of the table are several buttons: 'Delete Selected', 'Update Records in Selected', 'Add Record to Selected', and 'Delete Records in Selected'. A red box highlights the URL bar (https://10.164.101.1:10000/bind8/navigation1) and the 'Create master zone' button.

B) In window BIND DNS Server window select Create a master zone

This screenshot is identical to the one above, showing the 'Existing DNS Zones' table. A red arrow points specifically to the 'Create master zone' button located at the bottom of the table, just above the other management buttons.

C) Window Create Master Zone opens. Do the following steps:

1. Set “Domain name / Network” = fed1.com
2. Set “Master server “ = fedora1.fed1.com
3. Set “Email address”= root.fed1.com
4. Create
5. Start stop



### 3.4.3.1.2 Create records on master Zone fed1.com

A) In the window called “BIND DNS Server”, select Masterzone fed1.com

Zone	Type	Type
0	Master	Master
Root zone	Root	Master
0000:1	Master	Master
127.0.0.1	Master	Master
<b>fed1.com</b>	<b>Master</b>	<b>Master</b>
localhost		Master
localhost.localdomain		Master

#### 3.4.3.1.2.1 Address record

Three address records are created for domain fed1.com

1. blank record
2. www record
3. fedora1 record

A) The window “Edit Master Zone” for Master zone fed1.com create records select “Address”

**Edit Master Zone**  
fed1.ca

Type	Records	Type	Records
Address	3	Location	0
Name Server	1	Service Address	0
Name Alias	1	Public Key	0
Mail Server	1	SSL Certificate	0
Host Information	0	SSH Public Key	0
Text	0	Certificate Authority	0
Sender Permitted From	0	Name Authority	0
DMARC	0	DNSSEC Parameters	0
Well Known Service	0	IPv6 Address	0
Responsible Person	0	All	6
Reverse Address	0		

Buttons:

- Edit Zone
- Records File
- Edit Zone Parameters
- Edit Zone Options
- Find Free IPs
- Record Generators
- Lookup WHOIS Information
- Setup DNSSEC Key

Buttons at the bottom:

- Freeze Zone
- Unfreeze Zone
- Check Records
- Convert to Slave Zone

**Address Records**  
In fed1.ca

Add Address Record

Name   1

Address   2

Time-To-Live  
 Default    seconds  

Create 3

Show records matching:

Update reverse?  
 Yes    Yes (and replace existing)    No

Select all    Invert selection

## B) Create Address records

### Create blank record

1. Set Name
2. Set Address 10.164.101.1
3. Click Create

### Create www record

1. Set Name www
2. Set Address 10.164.101.1
3. Create

### Create for fedora1

1. Set Name – fedora1
2. Set IP Address – 10.164.101.1

### 3. Create

C) Once all records are created click “Return to record types”

The screenshot shows the Webmin interface for managing BIND DNS Server. On the left, the navigation menu is visible with 'Servers' expanded, showing 'BIND DNS Server' as selected. The main window title is 'Address Records In fed1.ca'. It displays a table of address records with columns for Name, TTL, and Address. Three entries are listed: 'fed1.ca' (TTL 3600, Address 10.164.101.1), 'www.fed1.ca' (TTL 3600, Address 10.164.101.1), and 'fedora1.fed1.ca' (TTL 3600, Address 10.164.101.1). At the bottom of the table, there are buttons for 'Delete Selected' and 'Return to zone list' (highlighted with a red box and arrow), followed by 'Return to record types'.

#### 3.4.3.1.2.2 Create Alias records

A) Select “Name Alias” to create records

The screenshot shows the 'Edit Master Zone' window for the 'fed1.ca' zone. The left sidebar shows 'Servers' expanded, with 'BIND DNS Server' selected. The main area displays two tables: one for 'Type' (Address, Name Server, Name Alias, Mail Server, Host Information, Text, Sender Permitted From, DMARC, Well Known Service, Responsible Person, Reverse Address) and another for 'Type' (Location, Service Address, Public Key, SSL Certificate, SSH Public Key, Certificate Authority, Name Authority, DNSSEC Parameters, IPv6 Address, All). Below the tables are several buttons: 'Edit Zone Records File', 'Edit Zone Parameters', 'Edit Zone Options', 'Find Free IPs', 'Record Generators', 'Lookup WHOIS Information', and 'Setup DNSSEC Key'. At the bottom, there are buttons for 'Freeze Zone', 'Unfreeze Zone', 'Check Records', 'Convert to Slave Zone', and 'Delete Zone' (highlighted with a red box and arrow).

B) The window “Edit Name Alias’ to create alias record appears

Create record alias record:

1. Set Name **ftp**
2. Real Name **fed1.com.**

**Make sure to add the ":" at the end of fed1.com.**

3. Click “Create”
4. Click “Return to record type”

The screenshot shows the BIND DNS Server interface in Webmin. The URL in the browser is [https://10.164.101.1:10000/bind8/edit\\_recs.cgi?zone=fed1.ca&view=any&type=CNAME&xnavigation=1](https://10.164.101.1:10000/bind8/edit_recs.cgi?zone=fed1.ca&view=any&type=CNAME&xnavigation=1). The main window is titled "Name Alias Records In fed1.ca". A red box labeled 1 highlights the "Name" input field. A red box labeled 2 highlights the "Real Name" input field. A red box labeled 3 highlights the green "Create" button. A red box labeled 4 highlights the "Return to record types" button at the bottom left.

#### 3.4.3.1.2.3 Create Mail server record

##### A) Create Mail server record

The screenshot shows the BIND DNS Server interface in Webmin. The URL in the browser is [https://10.164.101.1:10000/bind8/edit\\_master.cgi?zone=fed1.ca&xnavigation=1](https://10.164.101.1:10000/bind8/edit_master.cgi?zone=fed1.ca&xnavigation=1). The main window is titled "Edit Master Zone fed1.ca". On the left, under "Type", "Mail Server" is highlighted with a red box and has a value of 1. On the right, there is a table of records with columns "Type" and "Records". The "Type" column includes Address (3), Name Server (1), Name Alias (1), and Mail Server (1). The "Records" column shows various record types like Location, Service Address, Public Key, etc., all with a count of 0. At the bottom, there are several buttons: "Edit Zone Records File", "Edit Zone Parameters", "Edit Zone Options", "Find Free IPs", "Record Generators", "Lookup WHOIS Information", and "Setup DNSSEC Key".

##### B) Window “Mail Server Records”

1. Set Name fed1.com.
2. Set Mail server fed1.com.  
**Make sure to add the ":" at the end of fed1.com.**
3. Set Priority 5
4. Click “Create”
5. Click “Return to record types”

The screenshot shows the 'Mail Server Records' section of the BIND DNS Server. A new record is being created with the following details:

- Name:** (empty field, circled 1)
- Mail Server:** (empty field, circled 2)
- Priority:** (empty field, circled 3)
- Create button:** (highlighted in green, circled 4)
- Return to record types button:** (highlighted in red, circled 5)

The table below lists existing records:

Name	TTL	Priority	Mail Server
fed1.ca.	3600	5	fed1.ca.

### C) Back in the window “Edit Master Zone” do stop/start to the BIND DNS server

The screenshot shows the 'Edit Master Zone' interface for the 'fed1.ca' zone. The left sidebar shows the following configuration options:

- Type: Address, Name Server, Name Alias, Mail Server, Host Information, Text, Sender Permitted From, DMARC, Well Known Service, Responsible Person, Reverse Address.
- Records: Edit Zone Records File, Edit Zone Parameters, Edit Zone Options, Find Free IPs, Record Generators, Lookup WHOIS Information, Setup DNSSEC Key.
- Freeze Zone: Click this button to freeze a dynamic zone before updating it.
- Unfreeze Zone: Click this button to unfreeze a dynamic zone after having updated it.
- Check Records: Click this button to have BIND check the records in this zone, and report on any problems.
- Convert to Slave Zone: Turns this master zone into a slave, so that it will receive records from another master server instead of serving them locally.
- Delete Zone: Click this button to delete this zone from your DNS server. Matching reverse address records in other zones hosted by this server will also be deleted.

A red box highlights the 'Delete Zone' button at the bottom of the interface.

### 3.4.3.1.2.4 Test records

#### A) Test with ping and nslookup

Ping [www.fed1.com](http://www.fed1.com)

Ping fed1.com=mx

Nslookup -q=mx fed1.com

```
student@fedora1:~$ su -
Password:
root@fedora1:~$ ping www.fed1.com
PING fed1.com (10.164.101.1) 56(84) bytes of data.
64 bytes from fedoral.fed1.com (10.164.101.1): icmp_seq=1 ttl=64 time=0.101 ms
64 bytes from fedoral.fed1.com (10.164.101.1): icmp_seq=2 ttl=64 time=0.073 ms
64 bytes from fedoral.fed1.com (10.164.101.1): icmp_seq=3 ttl=64 time=0.079 ms
^C
--- www.fed1.com ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2051ms
rtt min/avg/max/mdev = 0.073/0.084/0.101/0.012 ms
root@fedora1:~$ nslookup -q=mx fed1.com
Server: 127.0.0.53
Address: 127.0.0.53#53

Non-authoritative answer:
fed1.com mail exchanger = 5 fed1.com.

Authoritative answers can be found from:
fed1.com internet address = 10.164.101.1

root@fedora1:~$
```

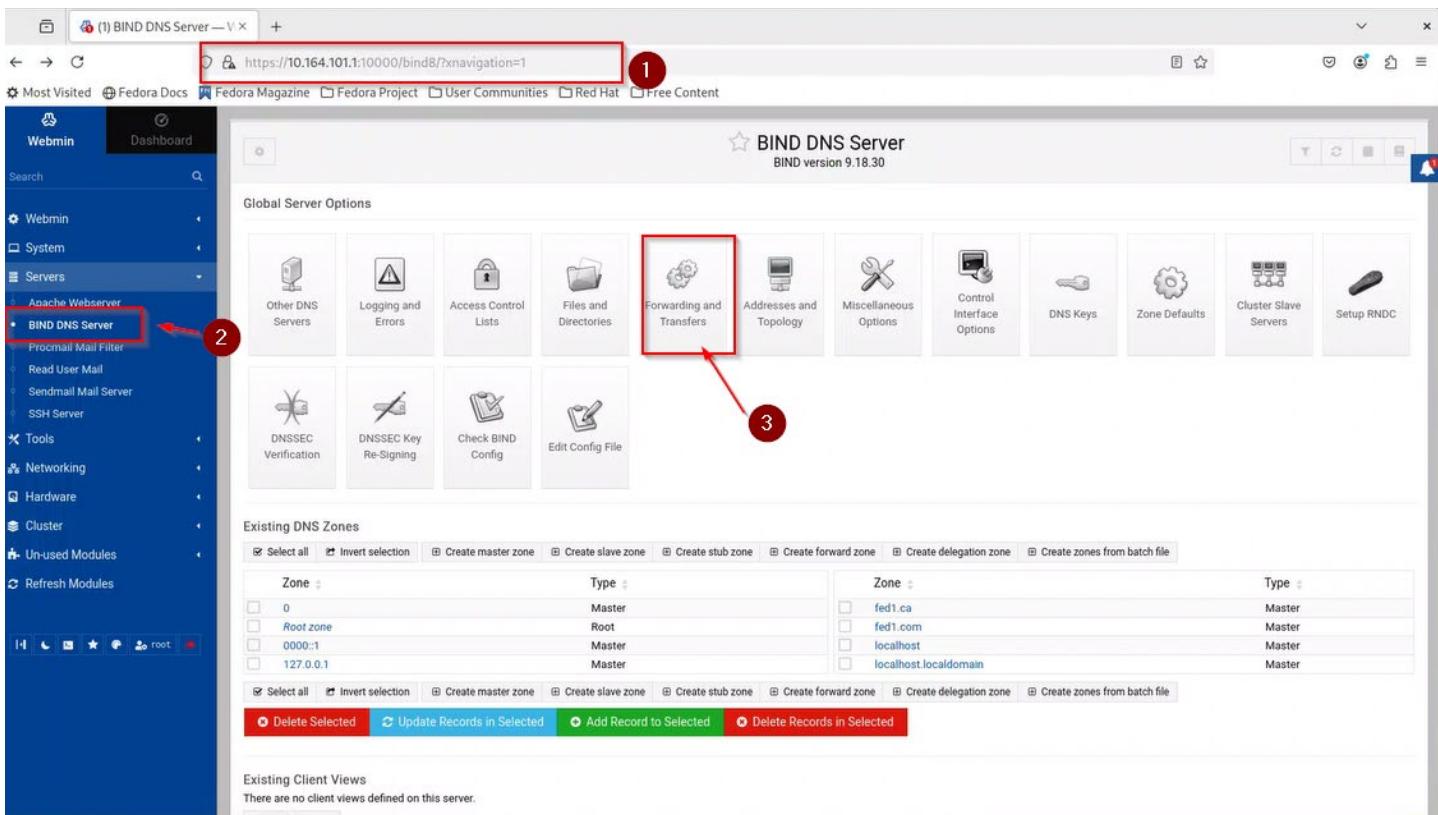
### 3.4.3.1.3 Setup a forwarder

#### A) Setup Forwarding and Transfers

#### B) in the local DNS 10.164.101.1

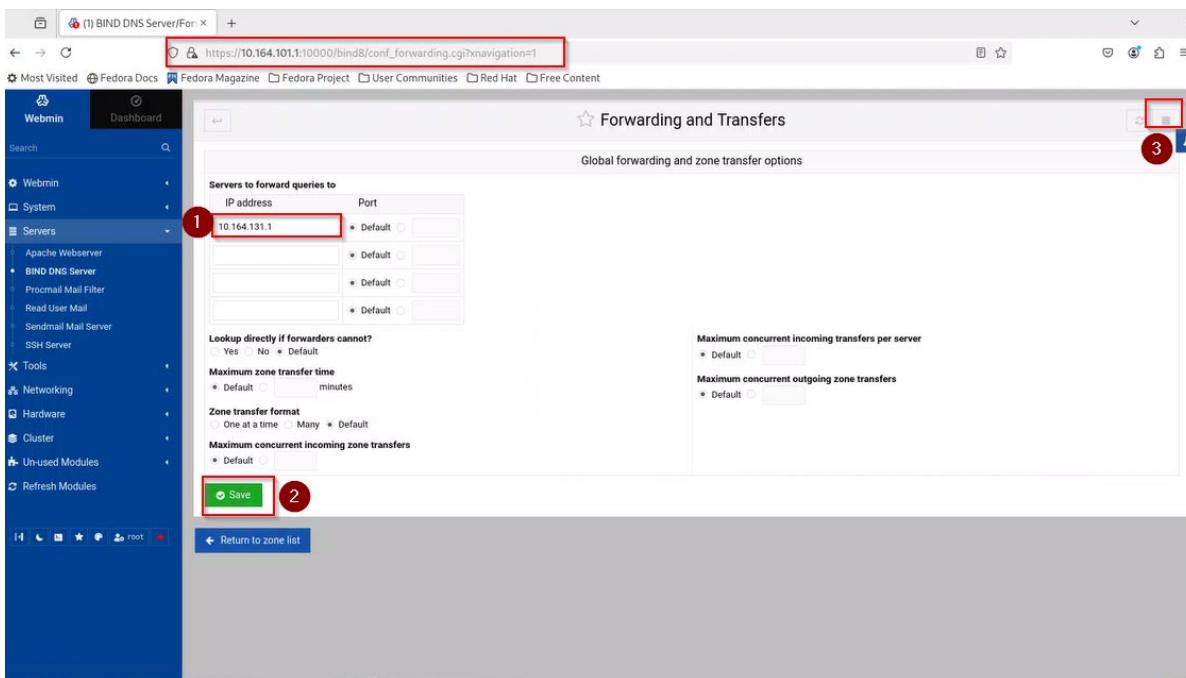
1. Open Webmin using the local DNS server ip **10.164.101.1:10000**
2. Select form “BIND DNS server” in the blue menu at the left
3. Select the icon “Forwarding and Transfers”





### C) The “Forwarding and transfer “ window opens

1. Under section “Servers to forward queries to” Put the IP address of the class DNS **10.164.131.1**
2. Click on save
3. Stop and start the BIND DNS server



### 3.4.3.1.4 Modify Zone Options to allow transfers from and allow queries from

#### A) Edit zone options for fed1.com

1. Make sure you are in the local DNS server **10.164.101.1**
2. In the window “BIND DNS Server”, section “Existing DNS Zones” select the fed1.com

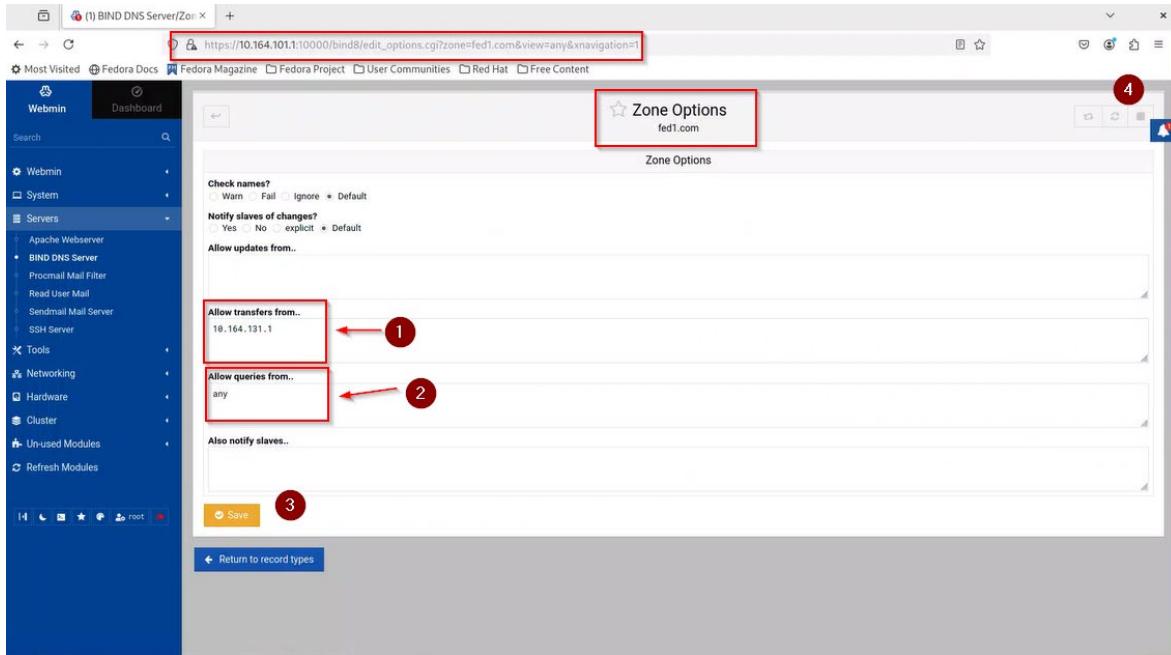
The screenshot shows the Webmin interface for the BIND DNS Server. The URL in the address bar is https://10.164.101.1:10000/bind8/xnavigation=1. The main window title is "BIND DNS Server" with version 9.18.30. The left sidebar shows the navigation menu with "Servers" selected, and "BIND DNS Server" is expanded. The "Existing DNS Zones" section is active, displaying a list of zones. The "fed1.com" zone is selected and highlighted with a red box. A red arrow labeled '1' points to the URL bar. A red arrow labeled '2' points to the "Edit Zone Options" button at the bottom of the page.

#### B) The Window “Edit Master Zone fed1.com” will open Select Edit zone options

The screenshot shows the "Edit Master Zone" window for the "fed1.com" zone. The URL in the address bar is https://10.164.101.1:10000/bind8/edit\_master.cgi?zone=fed1.com&xnavigation=1. The main area displays a table of records categorized by type. Below the table, there is a toolbar with several buttons: "Edit Zone Records File", "Edit Zone Parameters", "Edit Zone Options" (which is highlighted with a red box and has a red arrow labeled '1' pointing to it), "Find Free IPs", "Record Generators", "Lookup WHOIS Information", and "Setup DNSSEC Key". At the bottom of the window, there are several buttons: "Freeze Zone", "Unfreeze Zone", "Check Records", "Convert to Slave Zone", and "Delete Zone" (which is highlighted with a red box and has a red arrow labeled '2' pointing to it).

C) The window “Zone Options fed1.com” opens

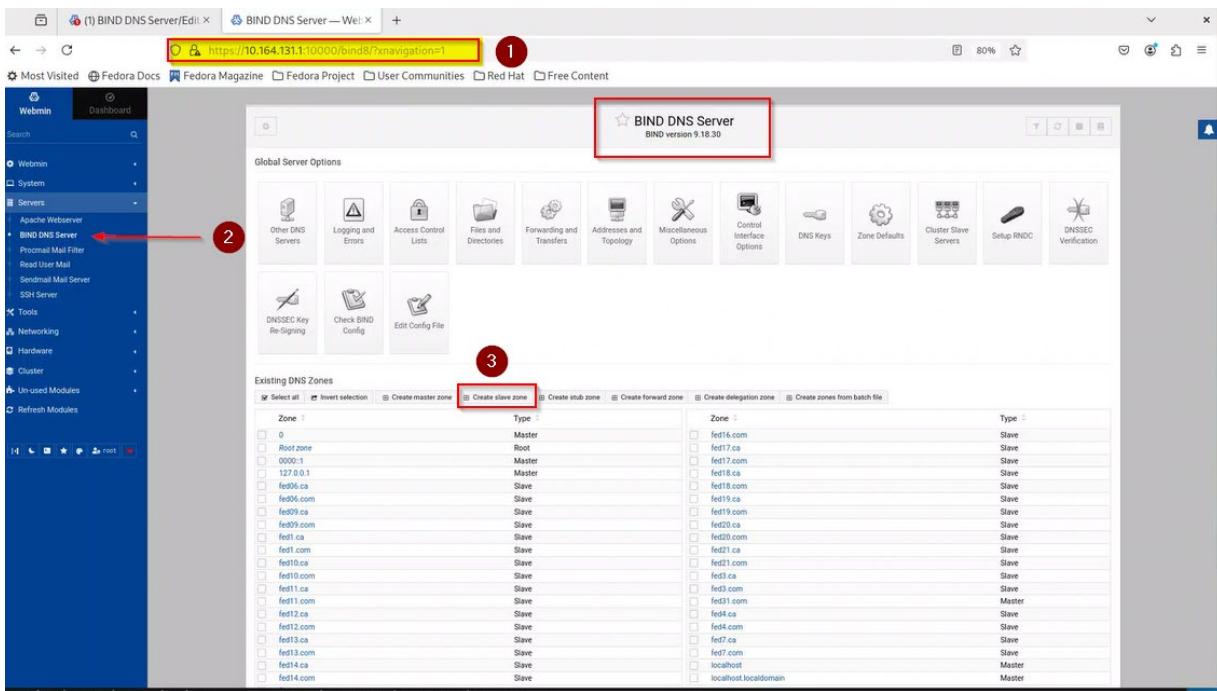
1. In the window “Allow transfers from” put the class DNS server ip **10.164.131.1**
2. In the window “Allow queries from” write any
3. Save the change
4. Press stop and start



#### 3.4.3.1.5 Create Slave zone in class DNS

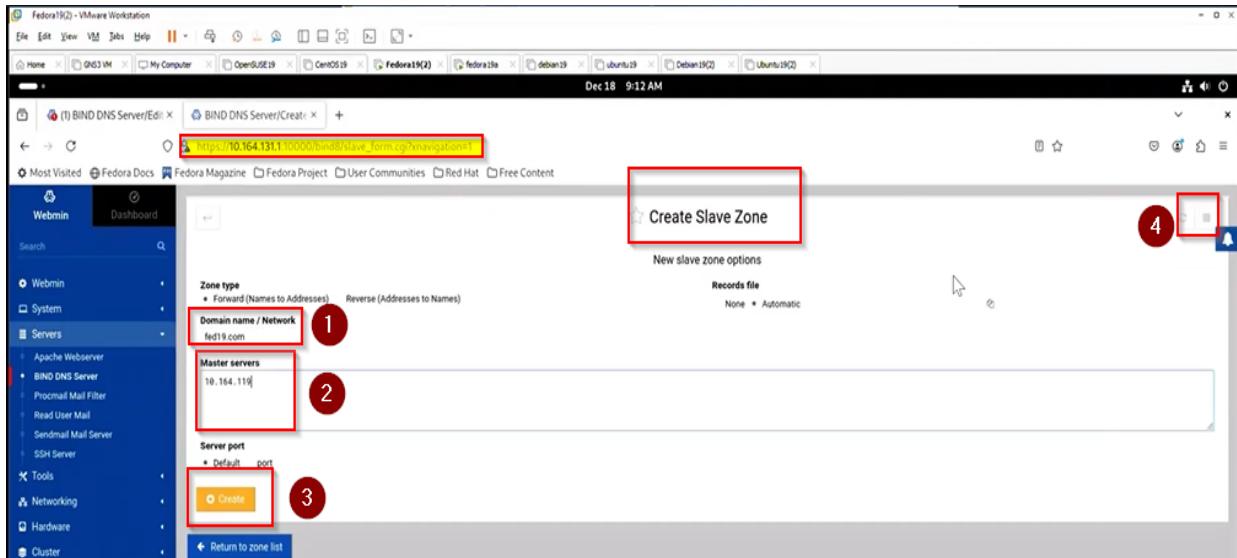
A) Open webmin to create slave zone

1. Open the class DNS server **10.164.131.1** on webmin, ignore the warnings and login as root/Amf123456
2. Open Servers/BIND DNS server, the window “BIND DNS Server opens”
3. Select the Create slave zone button in the “Existing DNS Zones” area



## B) Create Master zone server in the Create Slave Zone window in the class DNS server

1. Write fed1.com in the Domain name / Network
2. In Master servers Put the local server ip address **10.164.101.1**
3. Save the record
4. Start stop the server



## C) Disable and stop the firewall

1. Open a terminal issue command `su -` to be root user

2. Issue command `iptables -L` to see the rules for the firewall. The iptable output print out how table is empty , nothing to do here
3. Disable the firewall with command `systemctl disable firewalld`  
The command stops the firewalld service from starting automatically when the system boots up, but it does not stop the service immediately.
4. Issue command `systemctl stop firewalld` to immediately stop the firewalld service in the system. No output is expected.

```
student@fedoral1:/etc$ su -
Password:
root@fedoral:~# iptables -L
Chain INPUT (policy ACCEPT)
target     prot opt source               destination
Chain FORWARD (policy ACCEPT)
target     prot opt source               destination
Chain OUTPUT (policy ACCEPT)
target     prot opt source               destination
root@fedoral:~# systemctl disable firewalld
Removed '/etc/systemd/system/dbus-org.fedoraproject.FirewallD1.service'.
Removed '/etc/systemd/system/multi-user.target.wants/firewalld.service'.
root@fedoral:~# systemctl stop firewalld
```

#### D) Test zone transfer in class DNS server

In webmin for the class DNS server (10.164.101.1) , click on “Test Zone Transfer”

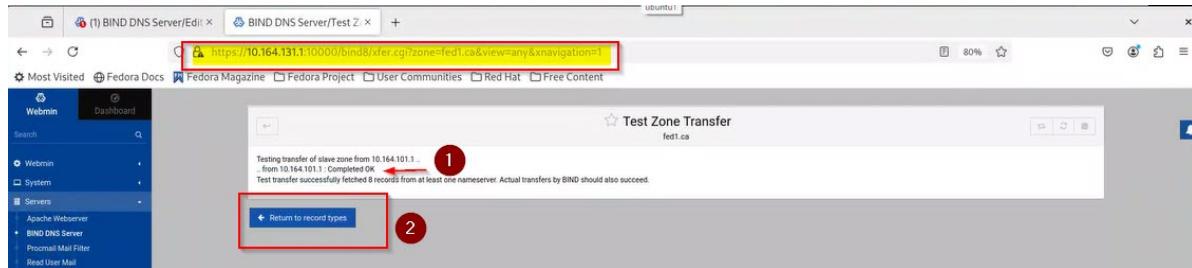
The screenshot shows the Webmin interface for managing a BIND DNS server. The left sidebar has 'Webmin' selected under 'Servers'. In the main content area, there's a 'Edit Slave Zone' dialog box with a red border. Inside the dialog, at the top, it says 'Edit Slave Zone' and 'Last transferred : 12/18/2024 06:41 PM fed1.ca'. Below this is a table showing records for various zone types. At the bottom of the dialog, there are several buttons: 'View Records File', 'Edit Zone Options', 'Lookup WHOIS Information', and a large red-bordered button labeled 'Test Zone Transfer'. Below the dialog, there are two links: 'Convert to Master Zone' and 'Delete Zone'. A blue 'Return to zone list' button is at the very bottom.

#### E) The result for of the test transfer is successful.

- See the message in the window “Test Zone Transfer” indicating test was performed successfully.

*“Testing transfer of slave zone from 10.164.101/1  
.. from 10.164.101.1: Completed OK  
Test transfer successfully fetched 8 records from at least one nameserver. Actual transfers by BIND should also succeed.”*

- Click on blue button “Return to record types”



F) Reboot the system to configure the changes in the system.

G) When system comes back from reboot login , open a terminal and change to root user.

#### 3.4.3.1.6 Test created Masterzone fed1.com

- Test the system doing the following pings:

- ping fed1.com
- ping 10.164.131.1
- ping google.ca
- test if we can ping other servers in the class

```
root@fedora1:~# ping fed1.com
PING fed1.com (10.164.101.1) 56(84) bytes of data.
64 bytes from fedora1.fed1.com (10.164.101.1): icmp_seq=1 ttl=64 time=0.017 ms
64 bytes from fedora1.fed1.com (10.164.101.1): icmp_seq=2 ttl=64 time=0.028 ms
64 bytes from fedora1.fed1.com (10.164.101.1): icmp_seq=3 ttl=64 time=0.029 ms
^C
--- fed1.com ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2083ms
rtt min/avg/max/mdev = 0.017/0.024/0.029/0.005 ms
root@fedora1:~# ping 10.164.131.1
PING 10.164.131.1 (10.164.131.1) 56(84) bytes of data.
64 bytes from 10.164.131.1: icmp_seq=1 ttl=64 time=2.21 ms
64 bytes from 10.164.131.1: icmp_seq=2 ttl=64 time=2.71 ms
64 bytes from 10.164.131.1: icmp_seq=3 ttl=64 time=2.18 ms
^C
--- 10.164.131.1 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2004ms
rtt min/avg/max/mdev = 2.183/2.367/2.709/0.241 ms
root@fedora1:~# ping google.com
PING google.com (142.250.69.110) 56(84) bytes of data.
64 bytes from 142.250.69.110: icmp_seq=1 ttl=118 time=2.01 ms
64 bytes from 142.250.69.110: icmp_seq=2 ttl=118 time=12.2 ms
64 bytes from 142.250.69.110: icmp_seq=3 ttl=118 time=16.3 ms
64 bytes from 142.250.69.110: icmp_seq=4 ttl=118 time=10.8 ms
64 bytes from 142.250.69.110: icmp_seq=5 ttl=118 time=7.62 ms
^C
```

The screenshot shows a terminal window with four tabs open. The tabs are:

- root@fedoral:/etc—bash
- root@fedoral:/var/log—bash
- root@fedoral:/etc/mail — alpine
- root@fedoral:~—bash

The terminal content is as follows:

```
tt min/avg/max/mdev = 2.014/9.770/16.282/4.774 ms
root@fedoral:~# ping 10.164.105.1
PING 10.164.105.1 (10.164.105.1) 56(84) bytes of data.
64 bytes from 10.164.105.1: icmp_seq=1 ttl=64 time=4.76 ms
64 bytes from 10.164.105.1: icmp_seq=2 ttl=64 time=2.47 ms
64 bytes from 10.164.105.1: icmp_seq=3 ttl=64 time=2.94 ms
^C
--- 10.164.105.1 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2004ms
tt min/avg/max/mdev = 2.469/3.388/4.756/0.985 ms
root@fedoral:~# ping 10.164.106.1
PING 10.164.106.1 (10.164.106.1) 56(84) bytes of data.
From 10.164.101.1 icmp_seq=1 Destination Host Unreachable
From 10.164.101.1 icmp_seq=2 Destination Host Unreachable
From 10.164.101.1 icmp_seq=3 Destination Host Unreachable
^C
--- 10.164.106.1 ping statistics ---
0 packets transmitted, 0 received, +3 errors, 100% packet loss, time 3058ms
pipe 3
root@fedoral:~# ping fed16.com
PING fed16.com (10.164.116.1) 56(84) bytes of data.
64 bytes from 10.164.116.1: icmp_seq=1 ttl=64 time=2.79 ms
64 bytes from 10.164.116.1: icmp_seq=2 ttl=64 time=2.18 ms
^C
--- fed16.com ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1001ms
tt min/avg/max/mdev = 2.182/2.484/2.787/0.302 ms
root@fedoral:~# ping fed17.com
```

### 3.4.3.1.7 Configure Master zone fed1.ca

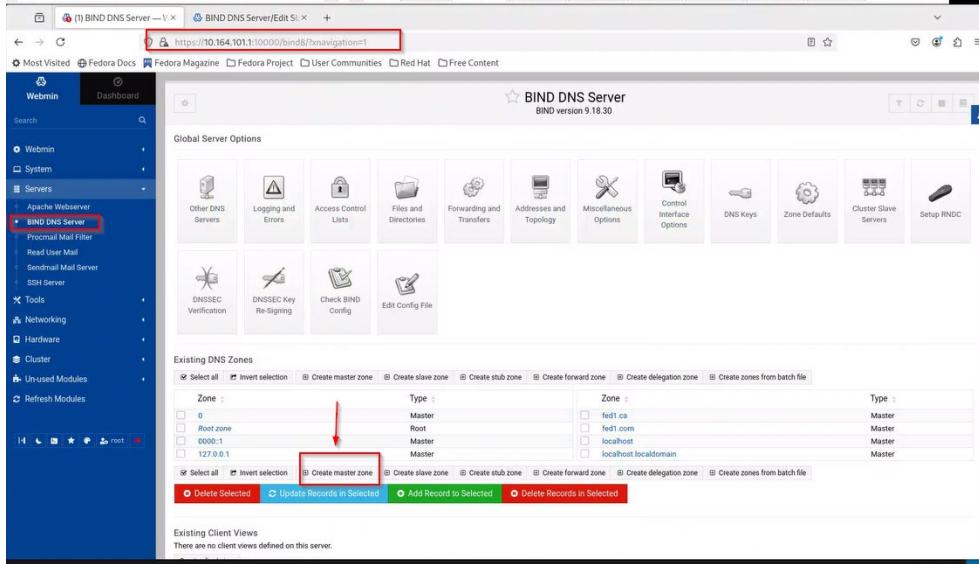
A) Connect in webmin to local server <https://10.164.101.1:10000>

B) Select BIND DNS at the left blue zone in Servers

The screenshot shows the Webmin interface for the BIND DNS Server. The left sidebar is titled 'Webmin' and has a 'Servers' section with 'BIND DNS Server' selected, highlighted by a red box. The main content area is titled 'BIND DNS Server' and 'BIND version 9.18.30'. It features a grid of icons for various server options. Below the icons is a table titled 'Existing DNS Zones' showing existing zones and their types. A red box highlights the 'Delete Selected' button at the bottom of the zone list. At the very bottom, there is a note about 'Existing Client Views' stating 'There are no client views defined on this server.'

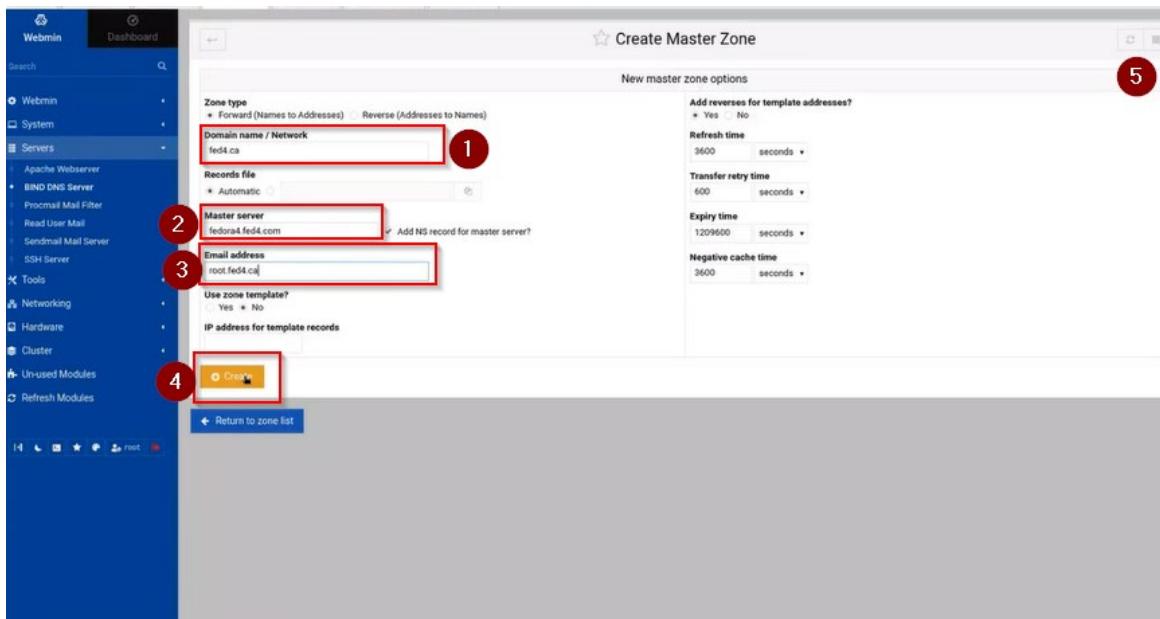
Zone	Type
0	Master
Root zone	Root
0000:1	Master
127.0.0.1	Master
fed1.ca	Master
fed1.com	Master
localhost.localdomain	Master

C) In window BIND DNS Server window select Create a master zone



D) Window Create Master Zone opens. Do the following steps:

1. Set “Domain name / Network” = fed1.ca
2. Set “Master server “ = fedora1.fed1.ca
3. Set “Email address” = root.fed1.ca
4. Create
5. Start stop



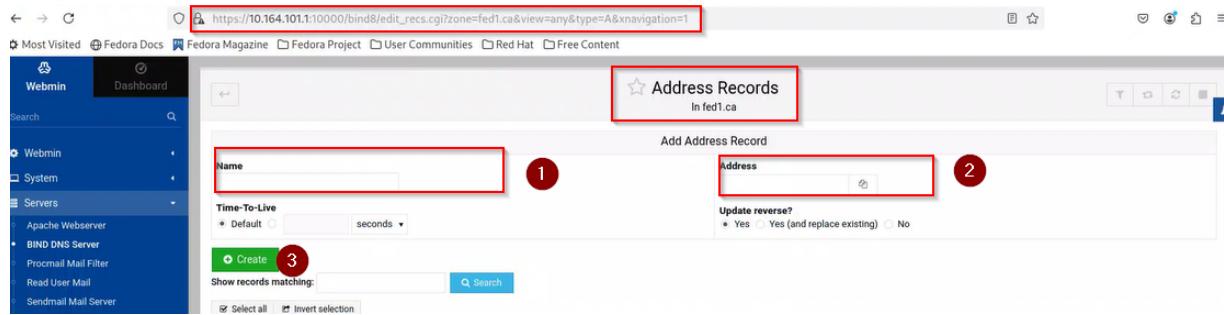
E) Create records on master Zone fed1.ca

In the window called “BIND DNS Server” select fed1.ca

The screenshot shows the 'BIND DNS Server' interface with the URL <https://10.164.101.1:10000/bind8/xnavigation=1>. The main area displays 'Existing DNS Zones' with a table. One row for 'fed1.ca' is highlighted with a red box and has a red arrow pointing to it. At the bottom of the table, there are several buttons: 'Delete Selected', 'Update Records in Selected', 'Add Record to Selected', and 'Delete Records in Selected'. A red box also highlights the 'Add Record to Selected' button.

F) The window “Edit Master Zone” for Master zone fed1.ca create records select “Address”

The screenshot shows the 'Edit Master Zone' window for the 'fed1.ca' zone. The URL is [https://10.164.101.1:10000/bind8/edit\\_master.cgi?zone=fed1.ca&xnavigation=1](https://10.164.101.1:10000/bind8/edit_master.cgi?zone=fed1.ca&xnavigation=1). The left sidebar shows the 'Servers' section under 'Apache Webserver'. The main area has a table with columns 'Type', 'Records', and 'Type'. The first row under 'Type' has a red box around the word 'Address' and is circled with a red circle. Below the table are several buttons: 'Edit Zone Records File', 'Edit Zone Parameters', 'Edit Zone Options', 'Find Free IPs', 'Record Generators', 'Lookup WHOIS Information', and 'Setup DNSSEC Key'. At the bottom, there are buttons for 'Freeze Zone', 'Unfreeze Zone', 'Check Records', and 'Convert to Slave Zone'.



## G) Create Address records

Create blank record

4. Set Name
5. Set Address 10.164.101.1
6. Click Create

Create www record

4. Set Name www
5. Set Address 10.164.101.1
6. Create

Create for fedora1

4. Set Name – fedora1
5. Set IP Address – 10.164.101.1
6. Create

H) Once all records are created, click “Return to record types”

The screenshot shows the Webmin interface for managing DNS records. On the left, the navigation tree is visible with 'Servers' expanded, showing 'Apache Webserver', 'BIND DNS Server', and other options. The main panel is titled 'Address Records' for the zone 'fed1.ca'. It displays a table of A records with columns for Name, TTL, and Address. Three records are listed: 'fed1.ca' with TTL 3600 and address 10.164.101.1, 'www.fed1.ca.' with TTL 3600 and address 10.164.101.1, and 'fedora1.fed1.ca.' with TTL 3600 and address 10.164.101.1. Below the table are buttons for 'Delete Selected' and 'Delete reverses too?'. At the bottom, there are two buttons: 'Return to zone list' and 'Return to record types', with 'Return to record types' being highlighted by a red box.

I) Select “Name Alias” to create records

The screenshot shows the 'Edit Master Zone' interface for the 'fed1.ca' zone. The left sidebar shows the same navigation tree as the previous screenshot. The main area has a table titled 'Edit Master Zone' for 'fed1.ca'. The table lists various record types and their counts: Address (3), Name Server (1), Mail Server (1), Host Information (0), Text (0), Sender Permitted From (0), DMARC (0), Well Known Service (0), Responsible Person (0), and Reverse Address (0). The 'Name Alias' row is highlighted with a red box. Below the table are several management buttons: 'Edit Zone Records File', 'Edit Zone Parameters', 'Edit Zone Options', 'Find Free IPs', 'Record Generators', 'Lookup WHOIS Information', and 'Setup DNSSEC Key'. At the bottom, there are buttons for 'Delete Zone' (highlighted with a red box) and other zone management functions like 'Freeze Zone', 'Unfreeze Zone', 'Check Records', and 'Convert to Slave Zone'.

J) The window “Edit Name Alias’ to create alias record appears

Create record alias record:

1. Set Name ftp
2. Real Name fed1.com.". Again, be sure to add the "." at the end of fed1.com.
3. Click “Create”
4. Click “Return to record type”

The screenshot shows the 'Name Alias Records' section of the BIND DNS Server. A new record is being created with the following details:

- Name:** ftp (highlighted by red box 1)
- Real Name:** fed1.ca. (highlighted by red box 2)
- Create button:** A green 'Create' button is highlighted with red box 3.
- Return buttons:** Two blue buttons at the bottom left are highlighted with red box 4: 'Return to zone list' and 'Return to record types'.

K) Create Mail server record

The screenshot shows the 'Edit Master Zone' interface for the 'fed1.ca' zone. A new record is being created with the following details:

- Type:** Mail Server (highlighted by red box 1)
- Records:** 1 (highlighted by red box 2)

Below the table, there are several management buttons:

- Icons for: Edit Zone Records File, Edit Zone Parameters, Edit Zone Options, Find Free IPs, Record Generators, Lookup WHOIS Information, and Setup DNSSEC Key.
- Freeze Zone:** Click this button to freeze a dynamic zone before updating it.
- Unfreeze Zone:** Click this button to unfreeze a dynamic zone after having updated it.
- Check Records:** Click this button to have BIND check the records in this zone, and report on any problems.
- Convert to Slave Zone:** Turns this master zone into a slave, so that it will receive records from another master server instead of serving them locally.
- Delete Zone:** Click this button to delete this zone from your DNS server. Matching reverse address records in other zones hosted by this server will also be deleted.

## L) Window “Mail Server Records”

1. Set Name fed1.ca.
2. Set Mail server fed1.ca.
3. Set Priority 5
4. Click “Create”
5. Click “Return to record types”

The screenshot shows the 'Mail Server Records' page in the Webmin interface for the BIND DNS Server. The URL in the browser is [https://10.164.101.1:10000/bind8/edit\\_recs.cgi?zone=fed1.ca&view=any&type=MX&xnavigation=1](https://10.164.101.1:10000/bind8/edit_recs.cgi?zone=fed1.ca&view=any&type=MX&xnavigation=1). The page displays a form to 'Add Mail Server Record'. The 'Name' field (1) is empty, the 'Mail Server' field (2) contains 'fed1.ca.', the 'Priority' field (3) is set to 5, and the 'Create' button (4) is highlighted. Below the form is a table of existing records, showing one entry for 'fed1.ca.' with TTL 3600 and Priority 5. At the bottom, the 'Return to zone list' and 'Return to record types' buttons (5) are highlighted.

## M) Back in the window “Edit Master Zone” do stop/start to the BIND DNS server

The screenshot shows the 'Edit Master Zone' page in the Webmin interface for the BIND DNS Server. The URL in the browser is [https://10.164.101.1:10000/bind8/edit\\_master.cgi?zone=fed1.ca&xnavigation=1](https://10.164.101.1:10000/bind8/edit_master.cgi?zone=fed1.ca&xnavigation=1). The page displays a table of record types and their counts. A red box highlights the 'Delete Zone' button at the bottom left. On the right side, there is a toolbar with icons for 'Edit Zone Records File', 'Edit Zone Parameters', 'Edit Zone Options', 'Find Free IPs', 'Record Generators', 'Lookup WHOIS Information', and 'Setup DNSSEC Key'. Below the table, there are buttons for 'Freeze Zone', 'Unfreeze Zone', 'Check Records', and 'Convert to Slave Zone'. A red arrow points to the top right corner of the main content area.

### 3.4.3.1.7.1 fed1.ca additional configuration

#### A) Edit zone options for fed1.com

1. Make sure you are in the local DNS server **10.164.101.1**
2. In the window “BIND DNS Server”, section “Existing DNS Zones” select the fed1.com

The screenshot shows the Webmin interface for the BIND DNS Server. The URL in the browser is `https://10.164.101.1:10000/bind8/?xnavigation=1`. The main title bar says "BIND DNS Server - BIND version 9.18.30". On the left, the navigation menu is open under "Servers", with "BIND DNS Server" selected. The main content area has a title "Global Server Options" with various icons for configuration. Below that is a section titled "Existing DNS Zones" with a red box around it. A table lists existing zones: "0" (Master), "Root zone" (Root), "0000-1" (Master), "127.0.0.1" (Master), "fed1.ca" (Master), "fed1.com" (Master), "localhost" (Master), and "localdomain" (Master). The "fed1.com" row is highlighted with a red box and a red arrow pointing to it from a callout. At the bottom of the table are buttons: "Delete Selected", "Update Records in Selected", "Add Record to Selected", and "Delete Records in Selected".

#### B) The Window “Edit Master Zone fed1.com” will open Select Edit zone options



Webmin Dashboard

Most Visited: Fedora Docs, Fedora Magazine, Fedora Project, User Communities, Red Hat, Free Content

Webmin

Servers

- Apache Webserver
- BIND DNS Server**
- Procmail Mail Filter
- Read User Mail
- Sendmail Mail Server
- SSH Server

Tools

- Networking
- Hardware
- Cluster
- Un-used Modules
- Refresh Modules

Address 3  
Name Server 1  
Name Alias 1  
Mail Server 1  
Host Information 0  
Text 0  
Sender Permitted From 0  
DMARC 0  
Well Known Service 0  
Responsible Person 0  
Reverse Address 0

Location 0  
Service Address 0  
Public Key 0  
SSL Certificate 0  
SSH Public Key 0  
Certificate Authority 0  
Name Authority 0  
DNSSEC Parameters 0  
IPv6 Address 0  
All 6

**Edit Master Zone**  
fed1.com

**Edit Zone Options**

Freeze Zone Click this button to freeze a dynamic zone before updating it.

Unfreeze Zone Click this button to unfreeze a dynamic zone after having updated it.

Check Records Click this button to have BIND check the records in this zone, and report on any problems.

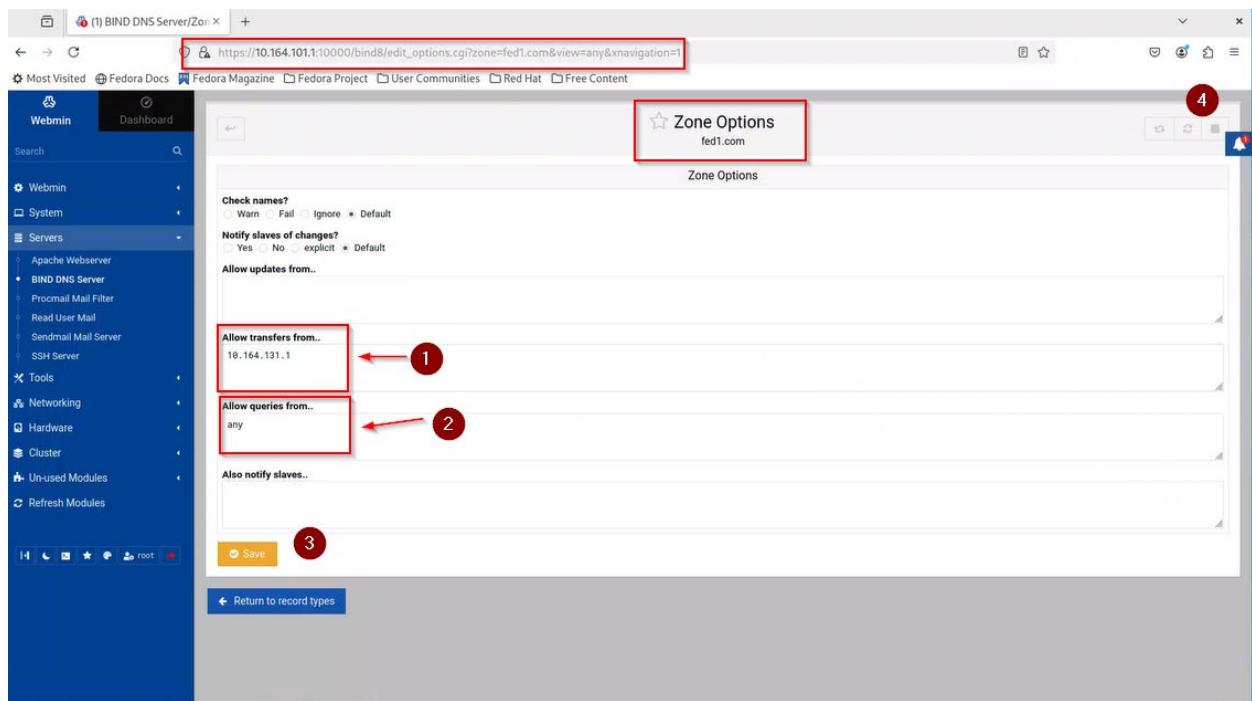
Convert to Slave Zone Turns this master zone into a slave, so that it will receive records from another master server instead of serving them locally.

Delete Zone Click this button to delete this zone from your DNS server. Matching reverse address records in other zones hosted by this server will also be deleted.

https://10.164.101.1:10000/bind8/edit\_master.cgi?zone=fed1.com&xnavigation=1

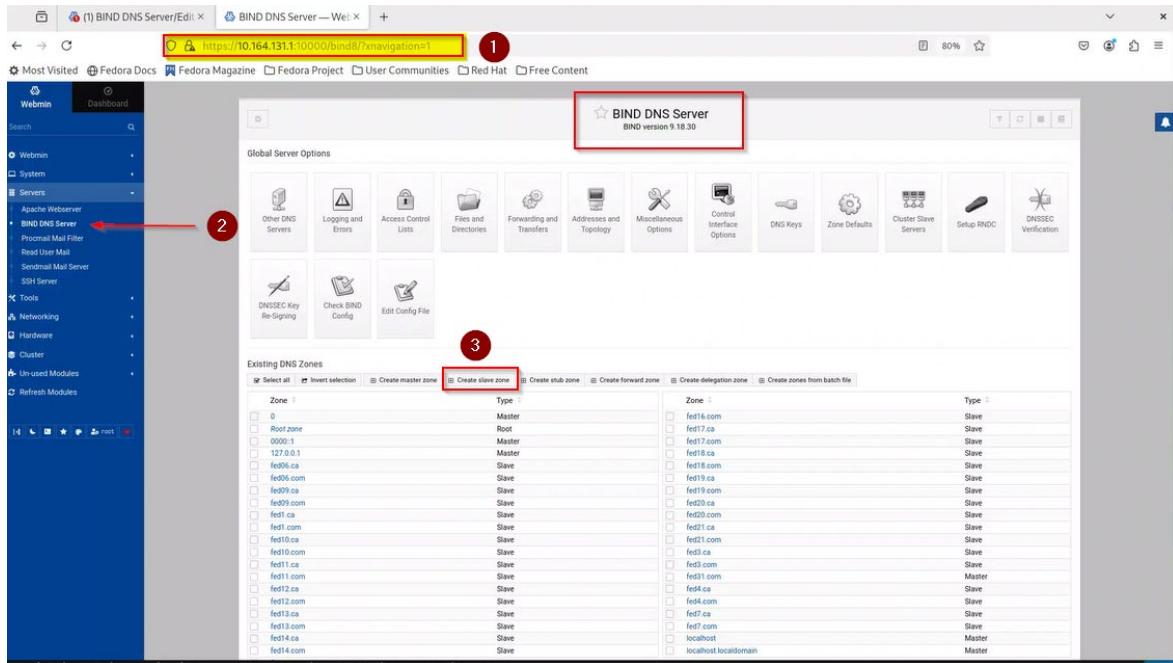
C) The window “Zone Options fed1.ca” opens

1. In the window “Allow transfers from” put the class DNS server ip 10.164.131.1
2. In the window “Allow queries from” write any
3. Save the change
4. Press stop and start



#### D) Create slave zone

1. Open the class DNS server 10.164.131.1 on webmin, ignore the warnings and login as root/Amf123456
2. Open Servers/BIND DNS server, the window “BIND DNS Server opens”
3. Select the Create slave zone button in the “Existing DNS Zones” area



#### E) In the “Create Slave Zone” window in the class DNS server

1. Write fed1.ca in the Domain name / Network
2. Put the local server ip address 10.164.101.1
3. Save the record

The screenshot shows the "Create Slave Zone" window. The URL in the address bar is https://10.164.131.1:10000/slave\_form.cgi?xnavigation=1. The window title is "Create Slave Zone".  
Fields and controls:

- "Zone type": Radio buttons for "Forward (Names to Addresses)" (selected) and "Reverse (Addresses to Names)".
- "Domain name / Network": Input field containing "fed1.ca" (labeled 1).
- "Master servers": Input field (labeled 2).
- "Server port": Radio buttons for "Default" (selected) and "port".
- "Records file": Radio buttons for "None" (selected), "Automatic", and a dropdown menu.
- "Create": Green "Create" button (labeled 3).
- "Return to zone list": Blue "Return to zone list" button.

#### F) Start stop the server

## G) Test zone transfer in class DNS server

In webmin for the class DNS server (10.164.101.1) , click on “Test Zone Transfer”

The screenshot shows the Webmin interface for editing a slave zone. The URL in the address bar is https://10.164.131.1:10000/bind8/edit\_slave.cgi?zone=fed.ca&xnavigation=-1. The main content area is titled "Edit Slave Zone" and shows a table of records. At the bottom of the page, there are several buttons: "View Records File", "Edit Zone Options", "Lookup WHOIS Information", and "Test Zone Transfer". The "Test Zone Transfer" button is highlighted with a red box. Below these buttons are two links: "Convert to Master Zone" and "Delete Zone". A message at the bottom states: "Click this button to convert this slave zone into a master, with all the records that were last transferred from the original master system." and "Click this button to delete this zone from your DNS server. The source master zone will be un-touched." A blue "Return to zone list" button is also visible.

## H) The result for of the test transfer is successful.

1. See the message in the window “ Test Zone Transfer ” indicating test was performed successfully.

*“Testing transfer of slave zone from 10.164.101/1*

*.. from 10.164.101: Completed OK*

*Test transfer successfully fetched 8 records from at least one nameserver. Actual transfers by BIND should also succeed.”*

2. Click on blue button “Return to record types”

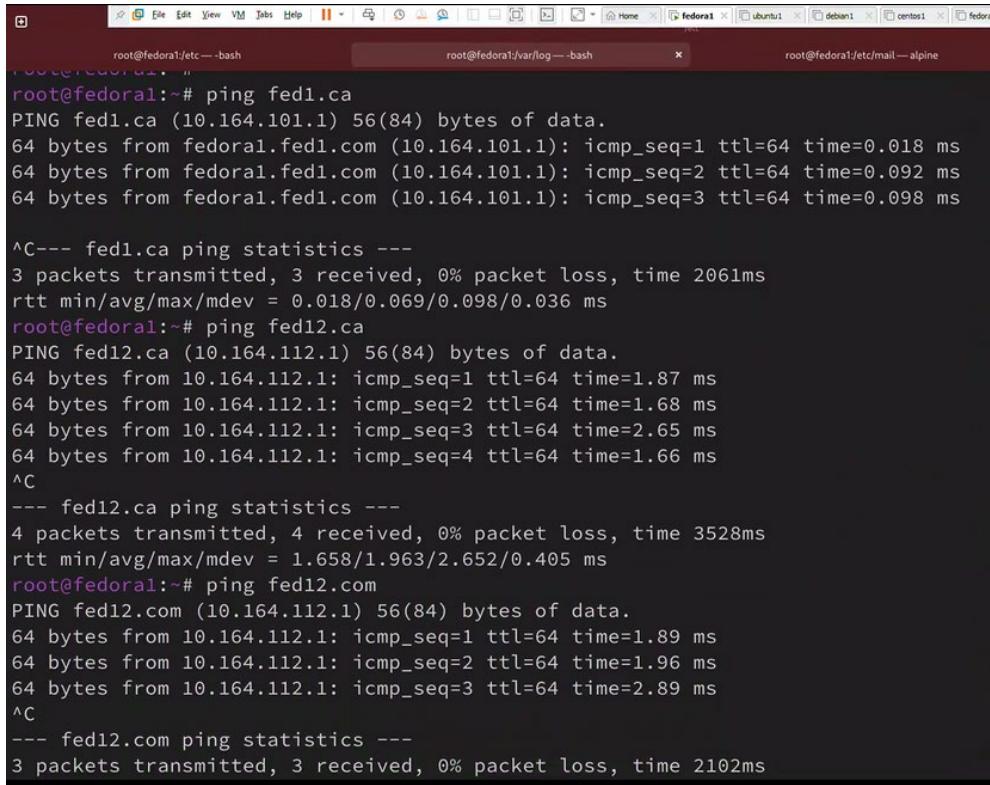
The screenshot shows the Webmin interface for testing a zone transfer. The URL in the address bar is https://10.164.131.1:10000/bind8/test.cgi?zone=fed.ca&xnavigation=-1. The main content area is titled "Test Zone Transfer" and displays a message: "Testing transfer of slave zone from 10.164.101/1 .. from 10.164.101: Completed OK" and "Test transfer successfully fetched 8 records from at least one nameserver. Actual transfers by BIND should also succeed." A red box highlights this message, and a red circle with the number "1" is placed over it. Below the message is a blue "Return to record types" button, which is also highlighted with a red box and has a red circle with the number "2" placed over it.

## I) Reboot the system

- J) When system comes back from reboot login , open a terminal and change to root user.

## K) Test the system doing pings

- ping fed1.ca
- ping 10.164.131.1
- test if we can ping other servers in the class



```
root@fedora1:/etc -bash
root@fedora1:/var/log -bash
root@fedora1:/etc/mail — alpine

root@fedora1:~# ping fed1.ca
PING fed1.ca (10.164.101.1) 56(84) bytes of data.
64 bytes from fedora1.fed1.com (10.164.101.1): icmp_seq=1 ttl=64 time=0.018 ms
64 bytes from fedora1.fed1.com (10.164.101.1): icmp_seq=2 ttl=64 time=0.092 ms
64 bytes from fedora1.fed1.com (10.164.101.1): icmp_seq=3 ttl=64 time=0.098 ms

^C--- fed1.ca ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2061ms
rtt min/avg/max/mdev = 0.018/0.069/0.098/0.036 ms
root@fedora1:~# ping fed12.ca
PING fed12.ca (10.164.112.1) 56(84) bytes of data.
64 bytes from 10.164.112.1: icmp_seq=1 ttl=64 time=1.87 ms
64 bytes from 10.164.112.1: icmp_seq=2 ttl=64 time=1.68 ms
64 bytes from 10.164.112.1: icmp_seq=3 ttl=64 time=2.65 ms
64 bytes from 10.164.112.1: icmp_seq=4 ttl=64 time=1.66 ms
^C
--- fed12.ca ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3528ms
rtt min/avg/max/mdev = 1.658/1.963/2.652/0.405 ms
root@fedora1:~# ping fed12.com
PING fed12.com (10.164.112.1) 56(84) bytes of data.
64 bytes from 10.164.112.1: icmp_seq=1 ttl=64 time=1.89 ms
64 bytes from 10.164.112.1: icmp_seq=2 ttl=64 time=1.96 ms
64 bytes from 10.164.112.1: icmp_seq=3 ttl=64 time=2.89 ms
^C
--- fed12.com ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2102ms
```

- Test nslookup

```
rtt min/avg/max/mdev = 1.885/2.241/2.885/0.455 ms
root@federal:~# nslookup fed12.ca
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
Name:   fed12.ca
Address: 10.164.112.1

root@federal:~# nslookup fed12.com
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
Name:   fed12.com
Address: 10.164.112.1

root@federal:~# nslookup fed1.com
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
Name:   fed1.com
Address: 10.164.101.1

root@federal:~# nslookup fed1.ca
Server:      127.0.0.53
Address:     127.0.0.53#53

Non-authoritative answer:
Name:   fed1.ca
Address: 10.164.101.1
```

### 3.4.4 Configure sendmail service

#### CHECKPOINT

CONTINUE to next section if the following three conditions are met:

- BIND DNS have been installed and
- BIND DNS have been configured for fed1.com and fed1.ca

For more information how to check the two previous conditions refer to section

#### 5.1.2 Install DNS service

If both conditions are not met, the update can not be done procedure **STOPS** here.

A) Verify if sendmail has been installed

With command `dnf install sendmail`

If already installed the message below will appear

```
root@fedora1:/etc# dnf install sendmail
Updating and loading repositories:
Repositories loaded.
Package "sendmail-8.18.1-4.fc41.x86_64" is already installed.
```

Nothing to do.

```
root@fedora1:/etc#
```

If sendmail has not been installed the following will appear

```

root@federal1:~# # Install send mail
root@federal1:#
root@federal1:~# dnf install sendmail
Updating and loading repositories:
Repositories loaded.
Package                           Arch      Version           Repository      Size
sendmail                         x86_64    8.18.1-4.fc41      fedora       1.7 Mib
Installing:
  sendmail
  cyrus-sasl                      x86_64    2.1.28-27.fc41     fedora     145.2 Kib
  openssl                         x86_64    1:3.2.2-9.fc41     fedora      1.7 Mib
  procmail                        x86_64    3.24-7.fc41       fedora     365.5 Kib
  tinycdb                          x86_64    0.80-3.fc41       fedora      55.3 Kib

Transaction Summary:
  Installing: 5 packages

Total size of inbound packages is 2 MiB. Need to download 2 MiB.
After this operation, 4 MiB extra will be used (install 4 MiB, remove 0 B).
Is this ok [y/N]: y
[1/5] procmail-0:3.24-7.fc41.x86_64
[2/5] sendmail-0:8.18.1-4.fc41.x86_64
[3/5] tinycdb-0:0.80-3.fc41.x86_64
[4/5] openssl-1:3.2.2-9.fc41.x86_64
[5/5] cyrus-sasl-0:2.1.28-27.fc41.x86_64
-----
[5/5] Total
Running transaction
[1/7] Verify package files
[2/7] Prepare transaction
[3/7] Installing cyrus-sasl-0:2.1.28-27.fc41.x86_64
[4/7] Installing tinycdb-0:0.80-3.fc41.x86_64
[5/7] Installing procmail-0:3.24-7.fc41.x86_64
[6/7] Installing openssl-1:3.2.2-9.fc41.x86_64
[7/7] Installing sendmail-0:8.18.1-4.fc41.x86_64
Complete!
root@federal1:~#

```

- B) Install sendmail-cf (if not already installed) with command `dnf install sendmail-cf`

If already installed the output will indicate it as shown in next figure

```

root@federal1:/etc# dnf install sendmail-cf
Updating and loading repositories:
Repositories loaded.
Package "sendmail-cf-8.18.1-4.fc41.noarch" is already installed.

Nothing to do.
root@federal1:/etc# 

```

If not installed a similar output will appear, answer yes when prompted and wait until package install is completed.

```

Complete!
root@federal1:~# dnf install sendmail-cf
Updating and loading repositories:
Repositories loaded.

```

- C) Modify file `sendmail.mc`, this file contains macro definitions and configurations that are used to build the `sendmail.cf` (configuration file used by sendmail).

```
cd /etc/mail
```

```
ls
```

Locate into the directory the file sendmail.mc and a file named access

```
root@fedora4:/etc/mail# ls
access  aliasesdb-stamp  domainable.db  local-host-names  mailertable.db  Makefile  sendmail.mc  submit.mc  virtusertable
access.db  domainable    helpfile       mailertable      make        sendmail.cf  submit.cf  trusted-users  virtusertable.db
root@fedora4:/etc/mail#
```

Modify sendmail.mc file using vi:

```
vi sendmail.mc
```

1. Inside vi type “/127” to activate search
2. Locate the line just below 127 that starts with “  
DAEMON\_OPTIONS(` Port=smtp,Addr=127.0.0.1,“
3. And modify it adding **dnl ##** at the beginning (please be aware a space must exist between # and DAEMON)

```
dnl # The following causes sendmail to only listen on the IPv4 loopback address
dnl # 127.0.0.1 and not on any other network devices. Remove the loopback
dnl # address restriction to accept email from the internet or intranet.
dnl #
dnl ## DAEMON_OPTIONS(` Port=smtp,Addr=127.0.0.1, Name=MTA')dnl
dnl #
dnl # The following causes sendmail to additionally listen to port 587 for
dnl # mail from MUAs that authenticate. Roaming users who cannot reach their
dnl # preferred sendmail daemon due to port 25 being blocked or redirected find
dnl # this useful.
```

4. Save the vi file using “:wq” enter and exit

#### D) Modify file access.

The file access by sendmail service to accept or reject mail from selected domains or hosts.

Modify the file using the following procedure:

1. **cd /etc/mail**

2. **ls**

3. Locate into the directory the file named **access**

```
root@fedora4:/etc/mail# ls
access  aliasesdb-stamp  domainable.db  local-host-names  mailertable.db  Makefile  sendmail.mc  submit.mc  virtusertable
access.db  domainable    helpfile       mailertable      make        sendmail.cf  submit.cf  trusted-users  virtusertable.db
root@fedora4:/etc/mail#
```

4. Use vi to edit the file

```
vi access
```

5. Add the following lines at the end of the file (use tab instead of spaces), when done save the file.

Connect:10.164	RELAY
Cennect:fedora1.fed1.com	RELAY
Connect:fed1.com	RELAY
Connect:fed1.ca	RELAY

These lines are used to allow the specified hosts or networks to send mail through your mail server.

The file will look like this:

```
# Check the /usr/share/doc/sendmail/README.cf file for a description
# of the format of this file. (search for access_db in that file)
# The /usr/share/doc/sendmail/README.cf is part of the sendmail-doc
# package.
#
# If you want to use AuthInfo with "M:PLAIN LOGIN", make sure to have the
# cyrus-sasl-plain package installed.
#
# By default we allow relaying from localhost...
Connect:localhost.localdomain      RELAY
Connect:localhost                  RELAY
Connect:127.0.0.1                 RELAY
Connect:10.164                     RELAY
Cennect:federal.fed1.com          RELAY
Connect:fed1.com                   RELAY
Connect:fed1.ca                    RELAY
```

#### E) Edit file local-host-names under /etc/mail

1. Locate the file local-host-names, this file is read by Sendmail on startup to determine which hostnames it should accept mail for.

```
root@fedora4:/etc/mail# ls
access      aliasesdb-stamp    domainable.db   local-host-names  mailertable.db  Makefile     sendmail.mc  submit.mc    virtusertable
access.db   domainable        helpfile       mailertable     make          sendmail.cf  submit.cf   trusted-users virtusertable.db
root@fedora4:/etc/mail#
```

2. Edit file with vi

```
vi /etc/mail/local-host-names
```

Add the following lines at the end of the file:

fedora1.fed1.com

fed1.com

fed1.ca

### 3. Save the file

The file should look like this after edited

```
# local-host-names - include all aliases for your machine here.
fedora1.fed1.com
fed1.com
fed1.ca
```

- F) Run `make -C /etc/mail`, the command in the context of Sendmail usually triggers the Makefile in that directory to update the necessary database files based on the current contents of the corresponding configuration files.

1. `make -C /etc/mail`

When prompted answer y

```
root@fedora1:/etc/mail# make -C /etc/mail
bash: make: command not found...
Install package 'make' to provide command 'make'? [N/y] y

* Waiting in queue...
* Loading list of packages....
The following packages have to be installed:
make-1:4.4.1-8.fc41.x86_64      A GNU tool which simplifies the build process for users
Proceed with changes? [N/y] y

* Waiting in queue...
* Waiting for authentication...
* Waiting in queue...
* Downloading packages...
* Requesting data...
* Testing changes...
* Installing packages...
make: Entering directory '/etc/mail'
make: Leaving directory '/etc/mail'
```

2. Run command a second time `make -C /etc/mail` just top make sure

```
root@fedora1:/etc/mail# make -C /etc/mail
make: Entering directory '/etc/mail'
make: Leaving directory '/etc/mail'
```

- G) Enable and start sendmail and check status to confirm everything is working.

```
systemctl enable sendmail
```

```
systemctl start sendmail
```

```
systemctl status sendmail
```

```
root@federal:/etc/mail# systemctl start sendmail.service
root@federal:/etc/mail# systemctl enable sendmail.service
Created symlink '/etc/systemd/system/multi-user.target.wants/sendmail.service' → '/usr/lib/systemd/system/sendmail.service'.
Created symlink '/etc/systemd/system/multi-user.target.wants/sm-client.service' → '/usr/lib/systemd/system/sm-client.service'.
root@federal:/etc/mail# systemctl status sendmail.service
● sendmail.service - Sendmail Mail Transport Agent
   Loaded: loaded (/usr/lib/systemd/system/sendmail.service; enabled; preset: disabled)
   Drop-In: /usr/lib/systemd/system/sendmail.service.d
             └─10-timeout-abort.conf, 50-keep-warm.conf
     Active: active (running) since Wed 2024-12-18 11:32:26 EST; 1min 22s ago
       Invocation: 19b9326800ab40cc878fa5fe6c4fdcc2
      Main PID: 151612 (sendmail)
        Tasks: 1 (limit: 8770)
       Memory: 4.8M (peak: 5M)
         CPU: 101ms
        CGroup: /system.slice/sendmail.service
                  └─151612 "sendmail: accepting connections"

Dec 18 11:32:26 federal systemd[1]: Starting sendmail.service - Sendmail Mail Transport Agent...
Dec 18 11:32:26 federal (sendmail)[151610]: sendmail.service: Referenced but unset environment var>
Dec 18 11:32:26 federal sendmail[151612]: starting daemon (8.18.1): SMTP+queueing@01:00:00
Dec 18 11:32:26 federal systemd[1]: sendmail.service: Can't open PID file /run/sendmail.pid (yet?)>
Dec 18 11:32:26 federal systemd[1]: Started sendmail.service - Sendmail Mail Transport Agent.
```

## H) Install alpine.

Alpine is used to send and receive emails. Use command

```
alpine
```

since it has not been installed the installation will be triggered.

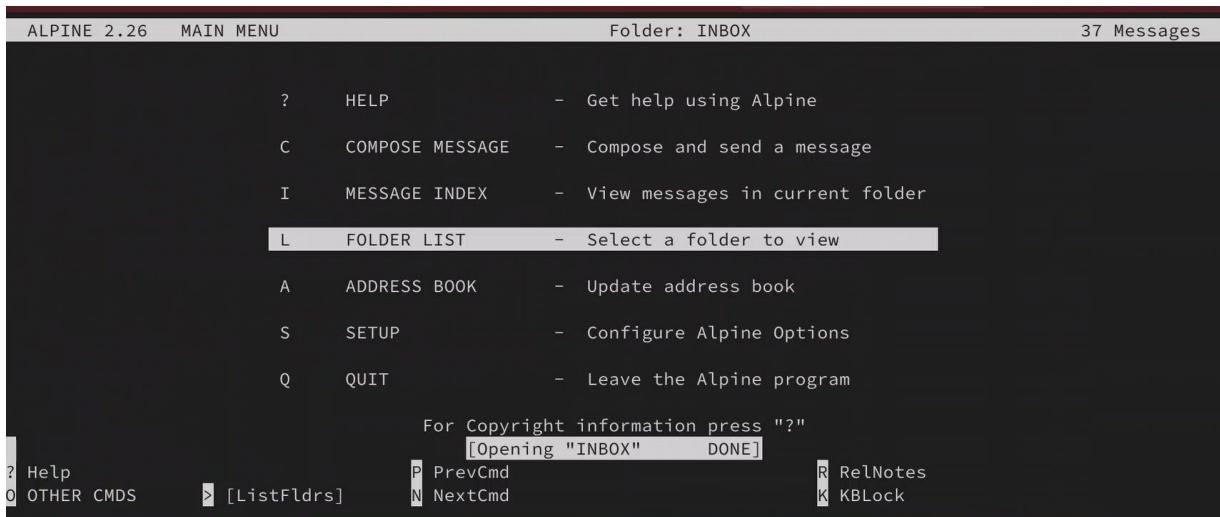
```
root@federal:/etc/mail# alpine
bash: alpine: command not found...
Install package 'alpine' to provide command 'alpine'? [N/y] y

* Waiting in queue...
* Loading list of packages....
The following packages have to be installed:
alpine-2.26-15.fc41.x86_64      powerful, easy to use console email client
Proceed with changes? [N/y] y

* Waiting in queue...
* Waiting for authentication...
* Waiting in queue...
* Downloading packages...
* Requesting data...
* Testing changes...
* Installing packages...
Argument Error: Cannot take input from pipe when opening a folder
Possible Starting Arguments for Alpine program:

Argument      Meaning
<addrs>...    Go directly into composer sending to given address
                List multiple addresses with a single space between them.
                Standard input redirection is allowed with addresses.
                Note: Places addresses in the "To" field only.
-attach <file> Go directly into composer with given file
-attachlist <file-list>
-attach_and_delete <file>
                Go to composer, attach file, delete when finished
                Note: Attach options can't be used if -f, -F
                added to Attachment list. Attachlist must be the last
                option on the command line
-bail          Exit if pinerc file doesn't already exist
-d n           Debug - set debug level to 'n', or use the following:
-d keywords... flush,timestamp,imap=0..4,tcp,http,numfiles=0..31,verbose=0..9
-f <folder>    Folder - give folder name to open
```

- I) Once installed open Alpine with command `alpine`



- J) Use Alpine to test the send and receive emails to local computer

1. email to `root@fed1.com`
2. email to `root@fed1.ca`

- K) Use Alpine to test send and receiving emails to/from the rest of the class

Using `root@fedx.com` and `root@fedx.ca`, where x is the number of the machine.

### 3.4.5 Setup 3rd Domain DNS manually and Sendmail

#### 3.4.5.1 Create records for fed1.net via CLI

- A) Login as root su -

```
cd /etc/
```

```
root@fedora1:/etc# cd /etc/
```

- B) List the contents of /etc file, for files starting with nam\*

```
ls -lqrha /etc/nam*
```

```
root@fedoralf:/var/named# cd /etc
root@fedoralf:/etc# ls -lqrtha name*
-rw-r--r--. 1 root named 686 Oct  3 20:00 named.root.key
-rw-r-----. 1 root named 1.1K Oct  3 20:00 named.rfc1912.zones
-rw-r-----. 1 root root  1.8K Jan 10 10:12 named.conf.orig
-rw-r-----. 1 root named 2.4K Jan 10 15:57 named.conf 
named:
total 0
drwxr-x---. 1 root named    0 Oct  3 20:00 .
drwxr-xr-x. 1 root root   4.9K Jan 10 15:57 ..
root@fedoralf:/etc# |
```

C) Verify the content of file **/etc/named.conf**

The `/etc/named.conf` file is the primary configuration file for the BIND (Berkeley Internet Name Domain) DNS server. It contains various settings and directives that control the behavior of the DNS server.

```
cat /etc/named.conf
```

D) Edit the file `/etc/named.conf`. Based on previous zone add lines for new zone `fed1.net`  
Save the file when changes are done.

```
vi /etc/named.conf
```

```
; 
zone "fed1.ca" {
    type master;
    file "/var/named/fed1.ca.hosts";
    allow-transfer {
        10.164.131.1;
    };
    allow-query {
        any;
    };
}
zone "fed1.net" {
    type master;
    file "/var/named/fed1.net.hosts";
    allow-transfer {
        10.164.131.1;
    };
    allow-query {
        any;
    };
};_
-- INSERT --
```

E) List the contents of `/etc` file, for files starting with `nam*`

```
-rw-r-----. 1 root named    686 Oct  3 20:00 named.root.key
-rw-r-----. 1 root named   1.1K Oct  3 20:00 named.rfc1912.zones
-rw-r-----. 1 root root    2.0K Jan  7 09:44 named.conf.bak
-rw-r-----. 1 root named   2.2K Jan  7 09:57 named.conf

named:
total 0
root@fedora1:/etc# cat named
```

F) Go to the directory **/var/named**

```
cd /var/named
```

```
root@fedora1:/etc# cd /var/named
```

G) List files in **/var/named**

```
ls -ltrh /var/named
```

```
root@fedora1:/var/named# ls -ltrh
total 24K
drwxrwx---. 1 named named    0 Oct  3 20:00 slaves
-rw-r-----. 1 root  named   168 Oct  3 20:00 named.loopback
-rw-r-----. 1 root  named   152 Oct  3 20:00 named.localhost
-rw-r-----. 1 root  named   152 Oct  3 20:00 named.empty
-rw-r-----. 1 root  named  3.3K Oct  3 20:00 named.ca
-rwxrwxr-x. 1 root  named  302 Dec 17 11:44 fed1.com.hosts
-rwxrwxr-x. 1 root  named  292 Dec 18 11:18 fed1.ca.hosts
drwxrwx---. 1 named named   54 Jan  6 08:47 data
drwxrwx---. 1 named named   76 Jan  7 02:09 dynamic
root@fedora1:/var/named#
```

H) Copy one of the files with \*.hosts to a new one fed1.net.hosts

```
cp fed1.com.hosts fed1.net.hosts
```

```

root@fedora1:/var/named# cp fed1.com.hosts fed1.net.hosts
root@fedora1:/var/named# ls -ltrha
total 28K
drwxrwx---. 1 named named    0 Oct  3 20:00 slaves
-rw-r-----. 1 root  named   168 Oct  3 20:00 named.loopback
-rw-r-----. 1 root  named   152 Oct  3 20:00 named.localhost
-rw-r-----. 1 root  named   152 Oct  3 20:00 named.empty
-rw-r-----. 1 root  named  3.3K Oct  3 20:00 named.ca
-rwxrwxr-x. 1 root  named   302 Dec 17 11:44 fed1.com.hosts
-rwxrwxr-x. 1 root  named   292 Dec 18 11:18 fed1.ca.hosts
drwxr-xr-x. 1 root  root    222 Dec 20 03:24 ..
drwxrwx---. 1 named named    54 Jan  6 08:47 data
drwxrwx---. 1 named named    76 Jan  7 02:09 dynamic
-rw-r--r--. 1 root  root    302 Jan  7 10:01 fed1.net.hosts
drwxrwx--T. 1 root  named   212 Jan  7 10:01 .
root@fedora1:/var/named#

```

- I) Print the contents of the existing .hosts files

```
cat fed1.com.hosts
```

and

```
cat fed1.net.hosts
```

```

root@fedora1:/var/named# cat fed1.net.hosts
$ttl 3600
fed1.com.      IN      SOA     fedora1.fed1.com. root.fed1.com (
2024121707
3600
600
1209600
3600 )
fed1.com.      IN      NS      fedora1.fed1.com.
fed1.com.      IN      A       10.164.101.1
www.fed1.com. IN      A       10.164.101.1
ftp.fed1.com. IN      CNAME   fed1.com.
fed1.com.      IN      MX      5 fed1.com.
fedora1.fed1.com. IN      A       10.164.101.1
root@fedora1:/var/named# cat fed1.com.hosts
$ttl 3600
fed1.com.      IN      SOA     fedora1.fed1.com. root.fed1.com (
2024121707
3600
600
1209600
3600 )
fed1.com.      IN      NS      fedora1.fed1.com.
fed1.com.      IN      A       10.164.101.1
www.fed1.com. IN      A       10.164.101.1
ftp.fed1.com. IN      CNAME   fed1.com.
fed1.com.      IN      MX      5 fed1.com.
fedora1.fed1.com. IN      A       10.164.101.1
root@fedora1:/var/named#

```

- J) Modify file /var/named/fed1.net.hosts

```
vi /var/named/fed1.net.hosts
```

Press <i> to insert, then replace instances of ".com" in the file with ".net". Save changes and exit the file by press <esc>:wq.

```
$ttl 3600
fed1.net.      IN      SOA     fedora1.fed1.com. root.fed1.net (
2024121707
3600
600
1209600
3600 )
fed1.net.      IN      NS      fedora1.fed1.net.
fed1.net.      IN      A       10.164.101.1
www.fed1.net. IN      A       10.164.101.1
ftp.fed1.net. IN      CNAME   fed1.net.
fed1.net.      IN      MX      5 fed1.net.
fedora1.fed1.net. IN      A       10.164.101.1
```

- K) Show the contents of the files to compare

```
cat fed1.com.hosts
```

```
cat def1.net.hosts
```

Note in red what is not changed.

```
root@fedora1:/var/named# cat fed1.com.hosts
$ttl 3600
fed1.com.      IN      SOA     fedora1.fed1.com. root.fed1.com (
2024121707
3600
600
1209600
3600 )
fed1.com.      IN      NS      fedora1.fed1.com.
fed1.com.      IN      A       10.164.101.1
www.fed1.com. IN      A       10.164.101.1
ftp.fed1.com. IN      CNAME   fed1.com.
fed1.com.      IN      MX      5 fed1.com.
fedora1.fed1.com. IN      A       10.164.101.1
root@fedora1:/var/named# cat fed1.net.hosts
$ttl 3600
fed1.net.      IN      SOA     fedora1.fed1.com. root.fed1.net (
2024121707
3600
600
1209600
3600 )
fed1.net.      IN      NS      fedora1.fed1.net.
fed1.net.      IN      A       10.164.101.1
www.fed1.net. IN      A       10.164.101.1
ftp.fed1.net. IN      CNAME   fed1.net.
fed1.net.      IN      MX      5 fed1.net.
fedora1.fed1.net. IN      A       10.164.101.1
root@fedora1:/var/named#
```

L) Restart named service after fed1.net was created

```
systemctl restart named.service  
systemctl status named.service
```

```
allow-query {  
root@fedora1:/etc# systemctl restart named  
root@fedora1:/etc# systemctl status named  
● named.service - Berkeley Internet Name Domain (DNS)  
  Loaded: loaded (/usr/lib/systemd/system/named.service; enabled; preset: disabled)  
  Drop-In: /usr/lib/systemd/system/service.d  
           └─10-timeout-abort.conf, 50-keep-warm.conf  
 Active: active (running) since Tue 2025-01-07 10:30:08 EST; 2min 26s ago  
   Invocation: 30ebf821137544b0be03ff58217fd319  
     Process: 9825 ExecStartPre=/bin/bash -c if [ ! "$DISABLE_ZONE_CHECKING" == "yes" ]; then /usr/bin/named-checkconf -z "$NAMEDCONF"; else echo "Checking of z  
    Process: 9827 ExecStart=/usr/sbin/named -u named -c ${NAMEDCONF} $OPTIONS (code=exited, status=0/SUCCESS)  
 Main PID: 9829 (named)  
   Tasks: 8 (limit: 8721)  
  Memory: 6.9M (peak: 7.3M)  
    CPU: 99ms  
   CGroup: /system.slice/named.service  
           └─9829 /usr/sbin/named -c /etc/named.conf  
  
Jan 07 10:30:08 fedora1 named[9829]: network unreachable resolving '.NS/IN': 2001:500:2::c#53  
Jan 07 10:30:08 fedora1 named[9829]: network unreachable resolving '.NS/IN': 2001:dc3::35#53  
Jan 07 10:30:08 fedora1 systemd[1]: Started named.service - Berkeley Internet Name Domain (DNS).  
Jan 07 10:30:08 fedora1 named[9829]: network unreachable resolving '.NS/IN': 2001:500:c27::2:30#53  
Jan 07 10:30:08 fedora1 named[9829]: network unreachable resolving '.NS/IN': 2001:500:12::d0d#53  
Jan 07 10:30:08 fedora1 named[9829]: running  
Jan 07 10:30:08 fedora1 named[9829]: zone fed1.net/IN: sending notifies (serial 2024121707)  
Jan 07 10:30:08 fedora1 named[9829]: network unreachable resolving '.NS/IN': 2001:500:9f::42#53  
Jan 07 10:30:08 fedora1 named[9829]: managed-keys-zone: Key 20326 for zone . is now trusted (acceptance timer complete)  
Jan 07 10:30:08 fedora1 named[9829]: network unreachable resolving '.NS/IN': 2001:500:1::53#53  
root@fedora1:/etc#
```

M) Test

Ping and check everything work fine

```
ping fed1.net  
ping www.fed1.net  
nslookup -q=mx fed.net
```

```

root@fedora1:/etc# ping fed1.net
PING fed1.net (10.164.101.1) 56(84) bytes of data.
64 bytes from fedora1.fed1.com (10.164.101.1): icmp_seq=1 ttl=64 time=0.046 ms
64 bytes from fedora1.fed1.com (10.164.101.1): icmp_seq=2 ttl=64 time=0.114 ms
64 bytes from fedora1.fed1.com (10.164.101.1): icmp_seq=3 ttl=64 time=0.256 ms
^C
--- fed1.net ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2041ms
rtt min/avg/max/mdev = 0.046/0.138/0.256/0.087 ms
root@fedora1:/etc# ping www.fed1.net
PING www.fed1.net (10.164.101.1) 56(84) bytes of data.
64 bytes from fedora1.fed1.com (10.164.101.1): icmp_seq=1 ttl=64 time=0.056 ms
64 bytes from fedora1.fed1.com (10.164.101.1): icmp_seq=2 ttl=64 time=0.077 ms
^C
--- www.fed1.net ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1034ms
rtt min/avg/max/mdev = 0.056/0.066/0.077/0.010 ms
root@fedora1:/etc# nslookup -q=mx fed1.net
Server:          127.0.0.53
Address:         127.0.0.53#53

Non-authoritative answer:
fed1.net          mail exchanger = 5 fed1.net.

Authoritative answers can be found from:
fed1.net          internet address = 10.164.101.1

root@fedora1:/etc#

```

### 3.4.5.2 Create slave zone in Class DNS server via webmin

- A) Open CLASS DNS
- B) Select Create slave zone

The screenshot shows the Webmin BIND DNS Server interface. The left sidebar navigation bar includes 'Webmin', 'Dashboard', 'Search', 'Webmin', 'System', 'Servers' (selected), 'Apache Webserver', 'BIND DNS Server' (selected), 'Procmail Mail Filter', 'Read User Mail', 'Sendmail Mail Server', 'SSH Server', 'Tools', 'Networking', 'Hardware', 'Cluster', 'Un-used Modules', and 'Refresh Modules'. The main content area is titled 'Global Server Options' and contains a grid of icons for various configuration options: Other DNS Servers, Logging and Errors, Access Control Lists, Files and Directories, Forwarding and Transfers, Addresses and Topology, Miscellaneous Options, Control Interface Options, DNS Keys, Zone Defaults, Cluster Slave Servers, Setup RNDC, and DNSSEC Verification. Below this grid are two buttons: 'Check BIND Config' and 'Edit Config File'. A section titled 'Existing DNS Zones' displays a message: 'There are too many zones on your system to display here.' It includes a search bar and buttons for 'Create master zone', 'Create slave zone', 'Create stub zone', 'Create forward zone', 'Create delegation zone', and 'Create zones from batch file'. A final section titled 'Existing Client Views' shows a message: 'There are no client views defined on this server.' with a 'Create client view' button.

- C) In window Create Slave zone  
Domain name fed1.net

## Master server 10.164.101.1

The screenshot shows the Webmin interface under the 'Servers' section. A new slave zone is being created for the domain 'fed1.net'. The 'Zone type' is set to 'Forward (Names to Addresses)'. The 'Master servers' field contains '10.164.101.1'. The 'Server port' is set to 'Default'. A 'Create' button is visible at the bottom left.

Press create then stop and start

The screenshot shows the 'Edit Slave Zone' page for 'fed1.net'. It displays various record types and their counts. Below the table are four buttons: 'View Records File', 'Edit Zone Options', 'Lookup WHOIS Information', and 'Test Zone Transfer'. At the bottom, there are buttons for 'Convert to Master Zone' (disabled), 'Delete Zone' (disabled), and other actions.

Type	Records	Type	Records
Address	3	Reverse Address	0
Name Server	1	Location	0
Name Alias	1	Service Address	0
Mail Server	1	Public Key	0
Host Information	0	SSL Certificate	0
Text	0	SSH Public Key	0
Sender Permitted From	0	Certificate Authority	0
DMARC	0	Name Authority	0
Well Known Service	0	DNSSEC Parameters	0
Responsible Person	0	IPv6 Address	0

The screenshot shows the 'Find Zones' search results for '.net'. The search bar contains '.net..'. On the left, there are checkboxes for 'Select all' and 'Invert selection'. Below the search bar is a table with columns 'Zone', 'Type', 'Zone', and 'Type'. The table lists several zones: fed06.net, fed09.net, fed1.net, fed10.net, fed11.net, fed12.net, fed13.net, fed16.net, fed17.net, fed18.net, fed19.net, fed3.net, fed4.net, and fed7.net. All zones listed are of type 'Slave'. At the bottom, there are buttons for 'Delete Selected', 'Update Records in Selected', and 'Add Record to Selected'.

### **3.4.5.3 Modify files to add .net to sendmail service**

A) Modify access file to include fed1.net

```
vi /etc/mail/access
```

B) Print file after modified

```
cat /etc/mail/access
```

```
"access" 17L, 600B written
root@fedora1:/etc/mail# cat access
# Check the /usr/share/doc/sendmail/README.cf file for a description
# of the format of this file. (search for access_db in that file)
# The /usr/share/doc/sendmail/README.cf is part of the sendmail-doc
# package.
#
# If you want to use AuthInfo with "M:PLAIN LOGIN", make sure to have the
# cyrus-sasl-plain package installed.
#
# By default we allow relaying from localhost...
Connect:localhost.localdomain      RELAY
Connect:localhost                  RELAY
Connect:127.0.0.1                 RELAY
Connect:10.164                     RELAY
Connect:fedora1.fed1.com           RELAY
Connect:fed1.com                   RELAY
Connect:fed1.ca                    RELAY
Connect:fed1.net                   RELAY
root@fedora1:/etc/mail# _
```

C) Print local-host-cat names

```
cat /etc/mail/local-host-names
```

```
root@fedora1:/etc/mail#
root@fedora1:/etc/mail# ls -ltrha local-ho*
-rw-r--r--. 1 root root 98 Dec 18 11:30 local-host-names
root@fedora1:/etc/mail# cat local-host-names
# local-host-names - include all aliases for your machine here.
fedora1.fed1.com
fed1.com
fed1.ca
root@fedora1:/etc/mail# _
```

D) Modify local-host-name file and add fed1.net

```
vi /etc/mail/local-host-names
```

- E) Print local-host-cat names after modification

```
cat /etc/mail/local-host-names
```

```
"local-host-names" 5L, 107B written
root@fedora1:/etc/mail# cat local-host-names
# local-host-names - include all aliases for your machine here.
fedora1.fed1.com
fed1.com
fed1.ca
fed1.net
root@fedora1:/etc/mail#
```

## F) Restart sendmail service

make -C /etc/mail

systemctl restart sendmail

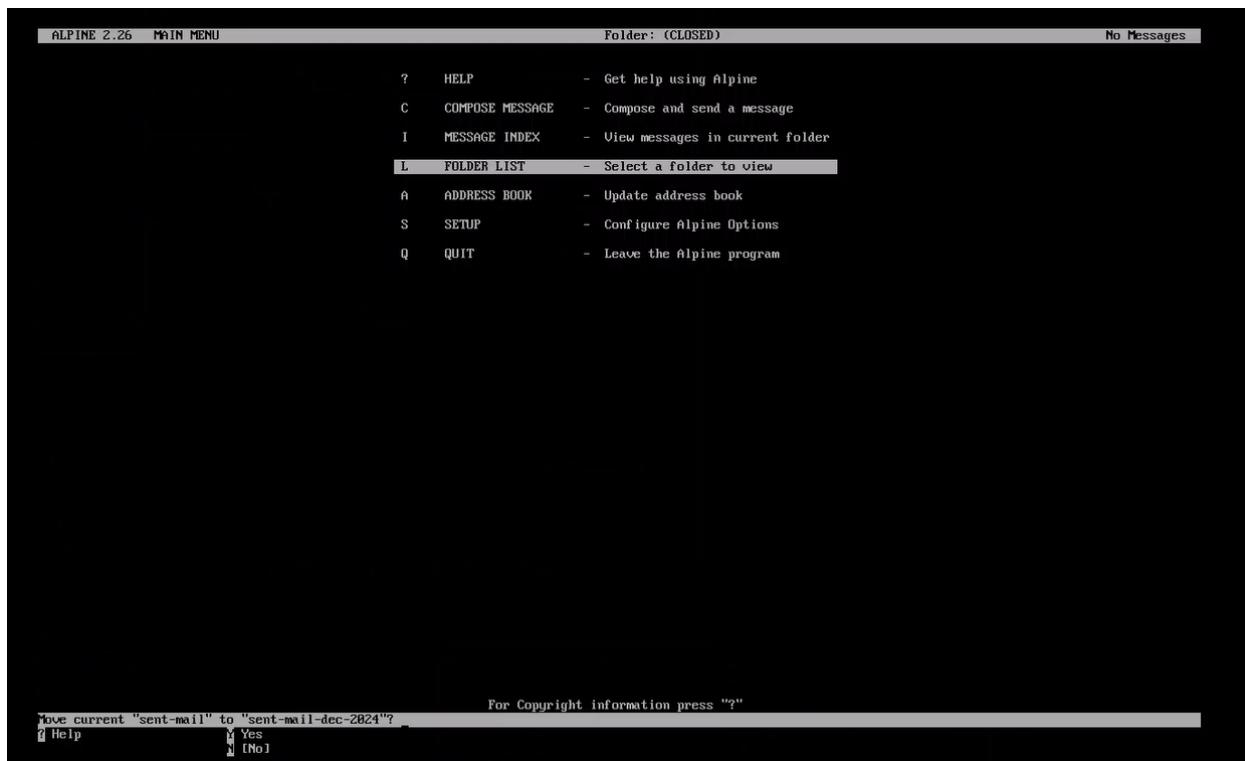
systemctl status sendmail

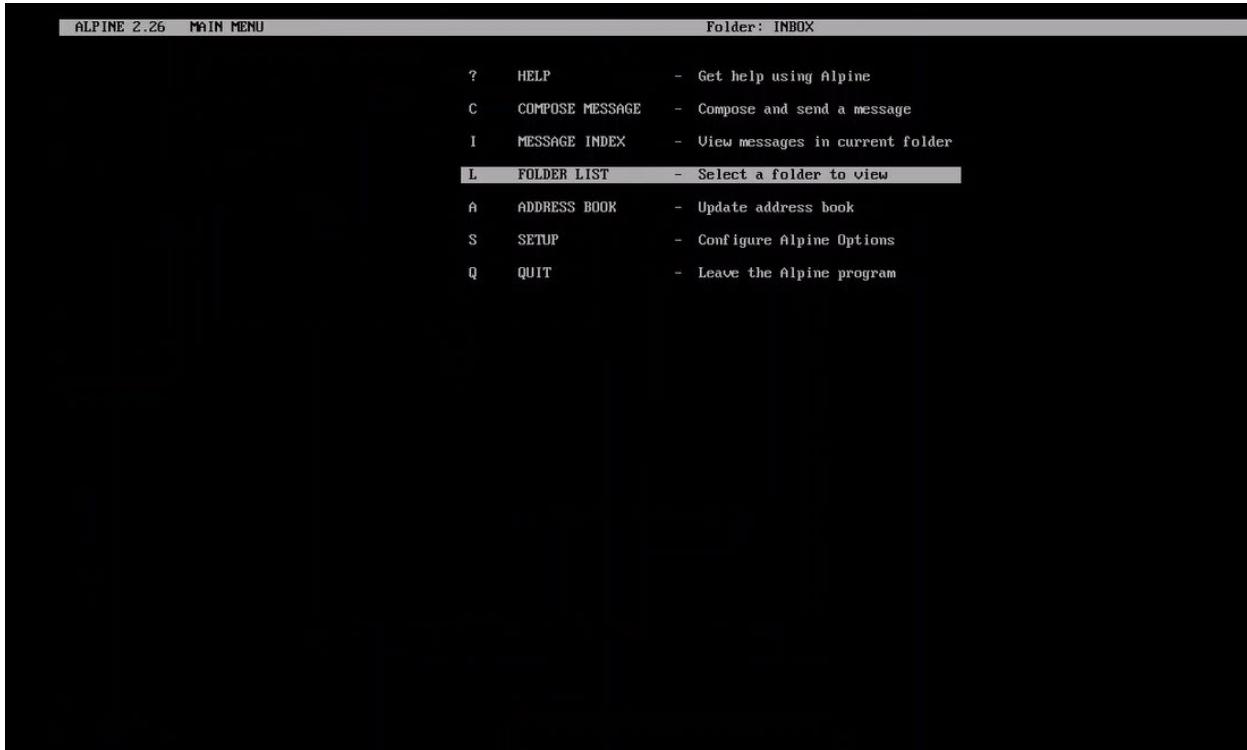
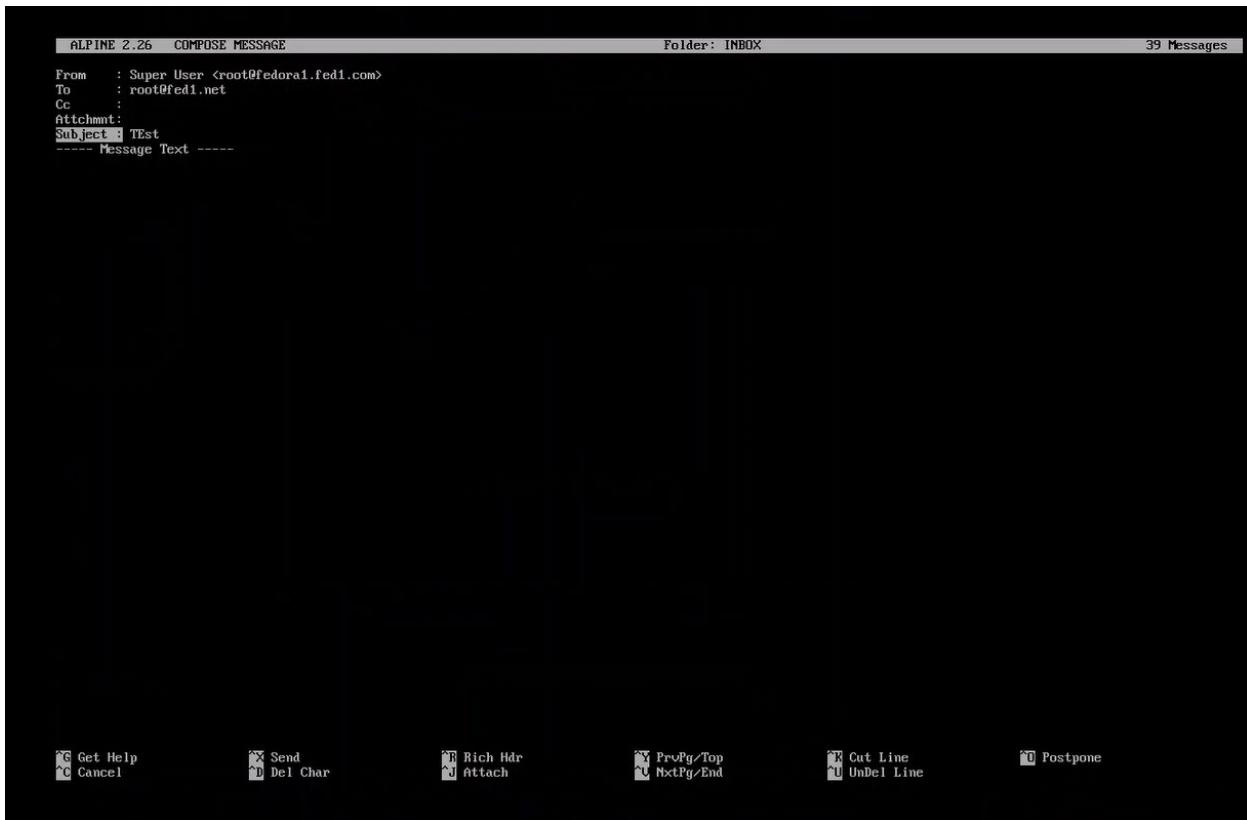
```
fed1.net
root@federal:/etc/mail# make -C /etc/mail/
make: Entering directory '/etc/mail'
make: Leaving directory '/etc/mail'
root@federal:/etc/mail# systemctl restart sendmail.service
root@federal:/etc/mail# systemctl status sendmail.service
● sendmail.service - Sendmail Mail Transport Agent
   Loaded: loaded (/usr/lib/systemd/system/sendmail.service; enabled; preset: disabled)
   Drop-In: /usr/lib/systemd/system/sendmail.service.d
             └─10-timeout-abort.conf, 50-keep-warns.conf
     Active: active (running) since Tue 2025-01-07 11:46:46 EST; 7s ago
       PID: 56e53408004d12976741f87224be8b
      Process: 17487 ExecStartPre=/etc/mail/make (code=exited, status=0/SUCCESS)
     Process: 17487 ExecStartPre=/etc/mail/make aliases (code=exited, status=0/SUCCESS)
     Process: 17414 ExecStart=/usr/sbin/sendmail -bd $SENDMAIL_OPTS $SENDMAIL_OPTARG (code=exited, status=0/SUCCESS)
    Main PID: 17415 (sendmail)
       Tasks: 1 (limit: 8771)
      Memory: 3.5M (peak: 3.8M)
         CPU: 10ms
        CGroup: /system.slice/sendmail.service
                  └─17415 "sendmail: accepting connections"

Jan 07 11:46:45 federal systemd[1]: Starting sendmail.service - Sendmail Mail Transport Agent...
Jan 07 11:46:46 federal (sendmail)[17414]: sendmail.service: Referenced but unset environment variable evaluates to an empty string: SENDMAIL_OPTS
Jan 07 11:46:46 federal sendmail[17415]: starting daemon (0.10.1): $MD*queueing981:88:88
Jan 07 11:46:46 federal systemd[1]: sendmail.service: Can't open PID file /run/sendmail.pid (yet?) after start: No such file or directory
Jan 07 11:46:46 federal systemd[1]: Started sendmail.service - Sendmail Mail Transport Agent.
root@federal:/etc/mail# _
```

### 3.4.5.4 Test send/receive emails with Alpine

Open alpine





**ALPINE 2.26 FOLDER LIST**

Folder: INBOX

**INBOX****sent-mail****saved-messages****sent-mail-dec-2024**

+ N 38 Yesterday Mail Delivery Subsystem  
+ M 39 Yesterday Mail Delivery Subsystem  
N 48 11:48 To: root@fed1.net

(3K) Returned mail: see transcript for details  
(2K) Returned mail: see transcript for details  
(727) TEst

**ALPINE 2.26 MESSAGE TEXT**

Folder: INBOX

Date: Tue, 7 Jan 2025 11:48:54 -0500 (EST)  
From: Super User <root@fedoral1.fed1.com>  
To: root@fed1.net  
Subject: TEst

### 3.4.6 Setup Skel directory and users

#### 3.4.6.1 Create public\_html folder to be used as skeleton

- A) Open a terminal and connect as root with command

```
su -
```

```
student@fedora1:~$ su -
Password:
root@fedora1:~# _
```

- B) Go to directory /etc/skel. Directory **/etc/skel/** (skel is derived from the “skeleton”) is used to initiate home directory when a user is first created.

```
cd /etc/skel
```

```
root@fedora1:~# cd /etc/skel
root@fedora1:/etc/skel# pwd
/etc/skel
root@fedora1:/etc/skel# _
```

- C) List the contents of directory, directory is empty

```
ls -ltrha
```

```
ls
```

```
root@fedora1:/etc/skel# cd /etc/skel
root@fedora1:/etc/skel# ls -ltrha
total 16K
-rw-r--r--. 1 root root 522 Aug 11 20:00 .bashrc
-rw-r--r--. 1 root root 144 Aug 11 20:00 .bash_profile
-rw-r--r--. 1 root root 18 Aug 11 20:00 .bash_logout
drwxr-xr-x. 1 root root 34 Oct 24 10:49 .mozilla
drwxr-xr-x. 1 root root 88 Oct 24 10:49 .
drwxr-xr-x. 1 root root 4.9K Jan 7 11:59 ..
root@fedora1:/etc/skel# ls
root@fedora1:/etc/skel# _
```

- D) Create the public\_html folder is the document root for your primary domain name. This is where you put all website files you want to appear when someone types your main domain

```
mkdir public_html
```

```
root@fedora1:/etc/skel# mkdir public_html
root@fedora1:/etc/skel# _
```

- E) List the contents of directory, directory contains directory [public\\_html](#)

```
ls
```

```
root@fedora1:/etc/skel# ls
public_html
root@fedora1:/etc/skel# _
```

#### 3.4.6.2 Create users

- A) The following three users will be created :

```
useradd www.fed1.com
```

```
useradd www.fed1.ca
```

```
useradd www.fed1.net
```

```
root@fedora1:/etc/skel#  
root@fedora1:/etc/skel# # create users  
root@fedora1:/etc/skel# useradd www.fed1.com  
root@fedora1:/etc/skel# useradd www.fed1.ca  
root@fedora1:/etc/skel# useradd www.fed1.net  
root@fedora1:/etc/skel#
```

- B) For each user password “Amf123456” will be set

```
passwd www.fed1.com
```

```
passwd www.fed1.ca
```

```
passwd www.fed1.net
```

```
root@fedora1:/etc/skel#  
root@fedora1:/etc/skel# passwd www.fed1.com  
New password:  
BAD PASSWORD: The password is shorter than 8 characters  
Retype new password:  
Sorry, passwords do not match.  
passwd: Authentication token manipulation error  
passwd: password unchanged  
root@fedora1:/etc/skel#  
root@fedora1:/etc/skel#  
root@fedora1:/etc/skel# passwd www.fed1.com  
New password:  
BAD PASSWORD: The password fails the dictionary check - it is too simplistic/systematic  
Retype new password:  
passwd: password updated successfully  
root@fedora1:/etc/skel#  
root@fedora1:/etc/skel# passwd www.fed1.ca  
New password:  
BAD PASSWORD: The password fails the dictionary check - it is too simplistic/systematic  
Retype new password:  
passwd: password updated successfully  
root@fedora1:/etc/skel#  
root@fedora1:/etc/skel# _
```

- C) Once users are created and password are set verify the contents of the home user folder. Note the folder public\_html was created automatically as indicated in the skeleton

```
cd /home/www.fed1.com
```

```
ls -ltrha
```

```
bash: cd: /www.fed1.com: No such file or directory
root@fedora1:/etc/skel# cd /home/www.fed1.com
root@fedora1:/home/www.fed1.com# ls -ltrha
total 12K
-rw-r--r--. 1 www.fed1.com www.fed1.com 522 Aug 11 20:00 .bashrc
-rw-r--r--. 1 www.fed1.com www.fed1.com 144 Aug 11 20:00 .bash_profile
-rw-r--r--. 1 www.fed1.com www.fed1.com 18 Aug 11 20:00 .bash_logout
drwxr-xr-x. 1 www.fed1.com www.fed1.com 34 Oct 24 10:49 .mozilla
drwxr-xr-x. 1 www.fed1.com www.fed1.com 0 Jan 8 09:16 public_html
drwx-----. 1 www.fed1.com www.fed1.com 102 Jan 8 09:17 .
drwxr-xr-x. 1 root      root      108 Jan 8 09:17 ..
root@fedora1:/home/www.fed1.com#
root@fedora1:/home/www.fed1.com#
```

```
cd /home/www.fed1.ca
```

```
ls -ltrha
```

```
root@fedora1:/home/www.fed1.ca# cd /home/www.fed1.ca
root@fedora1:/home/www.fed1.ca# ls -ltrha
total 12K
-rw-r--r--. 1 www.fed1.ca www.fed1.ca 522 Aug 11 20:00 .bashrc
-rw-r--r--. 1 www.fed1.ca www.fed1.ca 144 Aug 11 20:00 .bash_profile
-rw-r--r--. 1 www.fed1.ca www.fed1.ca 18 Aug 11 20:00 .bash_logout
drwxr-xr-x. 1 www.fed1.ca www.fed1.ca 34 Oct 24 10:49 .mozilla
drwxr-xr-x. 1 www.fed1.ca www.fed1.ca 0 Jan 8 09:16 public_html
drwx-----. 1 www.fed1.ca www.fed1.ca 102 Jan 8 09:17 .
drwxr-xr-x. 1 root      root      108 Jan 8 09:17 ..
root@fedora1:/home/www.fed1.ca#
```

```
cd /home/www.fed1.net
```

```
ls -ltrha
```

```
root@fedora1:/home/www.fed1.ca# cd /home/www.fed1.net
root@fedora1:/home/www.fed1.net# ls -ltrha
total 12K
-rw-r--r--. 1 www.fed1.net www.fed1.net 522 Aug 11 20:00 .bashrc
-rw-r--r--. 1 www.fed1.net www.fed1.net 144 Aug 11 20:00 .bash_profile
-rw-r--r--. 1 www.fed1.net www.fed1.net 18 Aug 11 20:00 .bash_logout
drwxr-xr-x. 1 www.fed1.net www.fed1.net 34 Oct 24 10:49 .mozilla
drwxr-xr-x. 1 www.fed1.net www.fed1.net 0 Jan 8 09:16 public_html
drwxr-xr-x. 1 root      root      108 Jan 8 09:17 ..
drwx-----. 1 www.fed1.net www.fed1.net 102 Jan 8 09:17 .
```

### 3.4.7 Install and configure sshd

SSH (Secure Shell) is a protocol which facilitates secure communications between two systems using a client-server architecture and allows users to log into server host systems remotely. Fedora includes the general OpenSSH server,

- Verify if openssh-server service is already installed since Fedora includes it no need to be installed.

```
dnf install openssh-server
```

```
root@fedoral:/etc/skel# dnf install openssh-server
Updating and loading repositories:
Repositories loaded.
Package "openssh-server-9.8p1-3.fc41.2.x86_64" is already installed.

Nothing to do.
root@fedoral:/etc/skel#
```

- B) Enable the sshd service

```
systemctl enable sshd
```

```
man:sshd_config(5)
root@fedoral:/home/www.fedi.net# systemctl enable sshd
Created symlink '/etc/systemd/system/multi-user.target.wants/sshd.service' → '/usr/lib/systemd/system/sshd.service'.
```

- C) Start the sshd service and check its status to ensure it is running correctly.

```
systemctl start sshd
```

```
sudo systemctl status sshd
```

In the status printout note in green **enabled** and **active (running)**

```
man:sshd_config(5)
root@fedoral:/home/www.fedi.net# systemctl start sshd
root@fedoral:/home/www.fedi.net# systemctl status sshd
● sshd.service - OpenSSH server daemon
   Loaded: loaded (/usr/lib/systemd/system/sshd.service; enabled; preset: disabled)
   Drop-In: /usr/lib/systemd/system/service.d
             └─10-timeout-abort.conf , 50-keep-warm.conf
     Active: active (running) since Wed 2025-01-08 09:47:54 EST; 2s ago
   Invocation: bf8a6c646f974131a544e7eee1761d18
     Docs: man:sshd(8)
           man:sshd_config(5)
 Main PID: 233832 (sshd)
   Tasks: 1 (limit: 8771)
  Memory: 1.4M (peak: 1.4M)
    CPU: 21ms
   CGroup: /system.slice/sshd.service
           └─233832 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

Jan 08 09:47:54 fedoral systemd[1]: Starting sshd.service - OpenSSH server daemon...
Jan 08 09:47:54 fedoral (sshd)[233832]: sshd.service: Referenced but unset environment variable evaluates to an empty string: OPTIONS
Jan 08 09:47:54 fedoral sshd[233832]: Server listening on 0.0.0.0 port 22.
Jan 08 09:47:54 fedoral sshd[233832]: Server listening on :: port 22.
Jan 08 09:47:54 fedoral systemd[1]: Started sshd.service - OpenSSH server daemon.
```

### 3.4.8 Create user group and test it

Groups in Linux refer to the user groups. Groups in Linux allow administrators to organize and control user access to various resources and files

- A) From root user go to directory /etc/ssh

```
cd /etc/ssh
```

```
root@fedoral:~# cd /etc/ssh
```

- B) To secure our SSH server we will set it to only allow users from a specific group. Create the group sshusers using the groupadd command.

```
groupadd sshusers
```

```
root@federal:/etc/ssh# groupadd sshusers
```

- C) Add the users to the group sshusers using command ‘usermod -a -G GROUP USER’.

```
usermod -a -G sshusers www.fed1.com
```

```
usermod -a -G sshusers www.fed1.ca
```

```
usermod -a -G sshusers www.fed1.net
```

```
root@federal:/etc/ssh# # only allow users from an specific group
root@federal:/etc/ssh# # use groupadd command
root@federal:/etc/ssh# usermod -a -G sshusers www.fed1.com
root@federal:/etc/ssh# usermod -a -G sshusers www.fed1.ca
root@federal:/etc/ssh# usermod -a -G sshusers www.fed1.net
root@federal:/etc/ssh#
```

- D) Go to /etc, list the file contents, looking for files starting with gr. Note there is a file called group.

```
cd /etc
```

```
ls gr*
```

```
root@federal:/etc/ssh# cd /etc
root@federal:/etc# ls gr*
group  group-  grub2.cfg  grub2-efi.cfg

groff:
site-font  site-tmac

grub.d:
00_header  01_users          10_linux
00_tuned    08_fallback_counting  10_reset_boot
```

- E) See file called group and you can see users there, at the end newly added users

```
cat /etc/group
```

```
root@federal:/etc# cat group
root:x:0:
```

```
dovecot:x:97:dovecot
dovenuull:x:972:dovenuull
www.fed1.com:x:1003:
www.fed1.ca:x:1004:
www.fed1.net:x:1005:
sshusers:x:1006:www.fed1.com,www.fed1.ca,www.fed1.net
root@federal:/etc# |
```

- F) Login to server using ssh. Verify if the user asmith already exists login as asmith (if user does not exist , create it)

```
su asmith
```

```
root@federal:/etc/ssh# # login with user asmith
root@federal:/etc/ssh# su asmith
```

- G) Verify the ip of the server using command

```
Ifconfig
```

```
asmith@federal:/etc/ssh$ ifconfig
ens160: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 10.164.101.1 netmask 255.255.0.0 broadcast 10.164.255.255
        inet6 fe80::ece8:a77c:9cal:38b4 prefixlen 64 scopeid 0x20<link>
          ether 00:0c:29:43:9c:55 txqueuelen 1000 (Ethernet)
            RX packets 2256159 bytes 204338658 (194.8 MiB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 45987 bytes 4461327 (4.2 MiB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
        inet 127.0.0.1 netmask 255.0.0.0
        inet6 ::1 prefixlen 128 scopeid 0x10<host>
          loop txqueuelen 1000 (Local Loopback)
            RX packets 14178 bytes 971987 (949.2 KiB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 14178 bytes 971987 (949.2 KiB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

- H) The user asmith connects to the server via ssh using the ip shown in ifconfig printout without issue even when not in sshgroup

```
ssh 10.164.101.1
```

```
asmith@federal:/etc/ssh$ ssh 10.164.101.1
The authenticity of host '10.164.101.1 (10.164.101.1)' can't be established.
ED25519 key fingerprint is SHA256:xOdVMrf3r4e0HLTTEbZ7GESo2qE0xdfU7vx0qhzMXc.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '10.164.101.1' (ED25519) to the list of known hosts.
asmith@10.164.101.1's password:
Last login: Wed Jan  8 09:59:29 2025
asmith@federal:~$ |
```

- I) As root user, go to directory /etc/ssh and list the content of directory. Note the file named sshd\_config

```
su -
cd /etc/ssh
ls -ltrha
```

```
student@federal:~$ su -
Password:
root@federal:~# cd /etc/ssh
root@federal:/etc/ssh# ls -ltrha
total 648K
-rw-----. 1 root root 3.6K Oct 15 20:00 sshd_config
-rw-r--r--. 1 root root 1.9K Oct 15 20:00 ssh_config
-rw-r--r--. 1 root root 689K Oct 15 20:00 moduli
drwx-----. 1 root root 88 Dec 20 19:00 sshd_config.d
drwxr-xr-x. 1 root root 128 Dec 20 19:00 ssh_config.d
drwxr-xr-x. 1 root root 4.9K Jan  8 09:18 ..
-rw-r--r--. 1 root root 162 Jan  8 09:47 ssh_host_ecdsa_key.pub
-rw-----. 1 root root 480 Jan  8 09:47 ssh_host_ecdsa_key
-rw-r--r--. 1 root root 82 Jan  8 09:47 ssh_host_ed25519_key.pub
-rw-----. 1 root root 387 Jan  8 09:47 ssh_host_ed25519_key
-rw-r--r--. 1 root root 554 Jan  8 09:47 ssh_host_rsa_key.pub
-rw-----. 1 root root 2.6K Jan  8 09:47 ssh_host_rsa_key
drwxr-xr-x. 1 root root 344 Jan  8 09:47 .
```

- J) Edit a file called ‘sshd\_config’ in the directory /etc/ssh/ using vi editor.

```
vi sshd_config
```

```
root@federal:/etc/ssh# vi sshd_config
```

- K) Add line “Allowgroups sshusers” at the end of the file save the file and quit.

```
#ChrootDirectory none
#VersionAddendum none

# no default banner path
#Banner none

# override default of no subsystems
Subsystem      sftp    /usr/libexec.openssh/sftp-ser

# Example of overriding settings on a per-user basis
#Match User anoncvs
#      X11Forwarding no
#      AllowTcpForwarding no
#      PermitTTY no
#      ForceCommand cvs server
AllowGroups sshusers
```

AllowGroups directive is used to specify which user groups are allowed to log in via SSH. By restricting access to certain groups, you can enhance the security of your system.

- L) Restart sshd service

```
systemctl restart sshd
```

```
root@federal:/etc/ssh# systemctl restart sshd
```

- M) Now try to ssh with user asmith (not in sshusers group) and note “Permission denied”

```
root@federal:/etc/ssh# ssh asmith@10.164.101.1
asmith@10.164.101.1's password:
Permission denied, please try again.
asmith@10.164.101.1's password:

root@federal:/etc/ssh#
```

- N) Test ssh access with users in sshgroup and note it is allowed

Commands issued from root

```
su www.fed1.com
ssh 10.164.101.1
exit
exit
```

```
su www.fed1.ca
```

```
ssh 10.164.101.1
```

```
exit
```

```
exit
```

```
su www.fed1.net
```

```
ssh 10.164.101.1
```

```
exit
```

```
exit
```

```
root@federal:/etc/ssh# su www.fed1.com
www.fed1.com@federal:/etc/ssh$ ssh 10.164.101.1
www.fed1.com@10.164.101.1's password:
Last login: Wed Jan  8 10:27:59 2025
www.fed1.com@federal:~$ pwd
/home/www.fed1.com
www.fed1.com@federal:~$ exit
logout
Connection to 10.164.101.1 closed.
www.fed1.com@federal:/etc/ssh$ exit
exit
root@federal:/etc/ssh# su www.fed1.ca
www.fed1.ca@federal:/etc/ssh$ ssh 10.164.101.1
The authenticity of host '10.164.101.1 (10.164.101.1)' can't be established.
ED25519 key fingerprint is SHA256:xDvMrf3r4e0HLTTFEbZ7GESo2qE0xdfU7vx0qhzMXc.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '10.164.101.1' (ED25519) to the list of known hosts.
www.fed1.ca@10.164.101.1's password:
Last login: Wed Jan  8 10:28:33 2025
www.fed1.ca@federal:~$ pwd
/home/www.fed1.ca
www.fed1.ca@federal:~$ exit
logout
Connection to 10.164.101.1 closed.
www.fed1.ca@federal:/etc/ssh$ exit
exit
root@federal:/etc/ssh# su www.fed1.net
www.fed1.net@federal:/etc/ssh$ ssh 10.164.101.1
The authenticity of host '10.164.101.1 (10.164.101.1)' can't be established.
ED25519 key fingerprint is SHA256:xDvMrf3r4e0HLTTFEbZ7GESo2qE0xdfU7vx0qhzMXc.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '10.164.101.1' (ED25519) to the list of known hosts.
www.fed1.net@10.164.101.1's password:
Last login: Wed Jan  8 10:29:11 2025
www.fed1.net@federal:~$ pwd
/home/www.fed1.net
www.fed1.net@federal:~$ exit
logout
Connection to 10.164.101.1 closed.
www.fed1.net@federal:/etc/ssh$ exit
exit
root@federal:/etc/ssh# |
```

### 3.5 Install windows 10 in VMWare

#### CHECKPOINT

CONTINUE to next section if the following three conditions are met:

- Splashtop Business is ok, and
- Computer in John Abbott Computer Lab is accessible up and running and
- VMWare Workstation Pro is installed preferably with latest upgrades

For more information how to check the three previous conditions refer to [General activities](#) section “Splashtop and Computer” and section “Verify VMware Workstation Pro is installed”

If all three conditions are not met, the update can not be done procedure **STOPS**

#### 3.5.1 Windows 10 download

- A. Connect via file explorer to designated disk and download the image for Windows 10

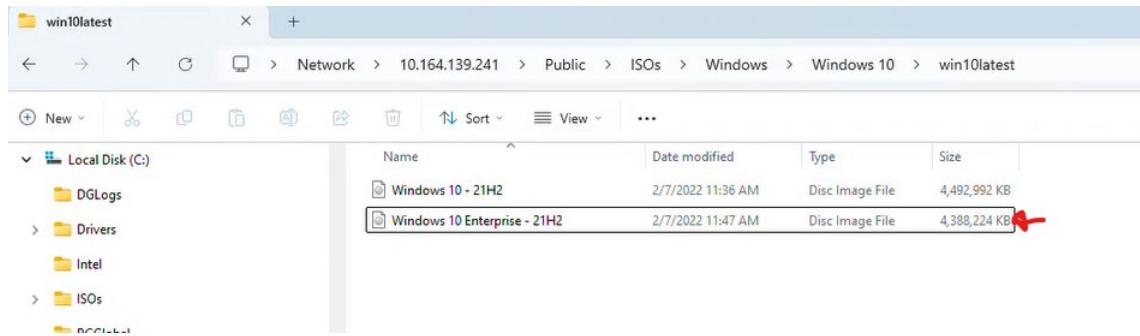
\\"10.164.139.241

student

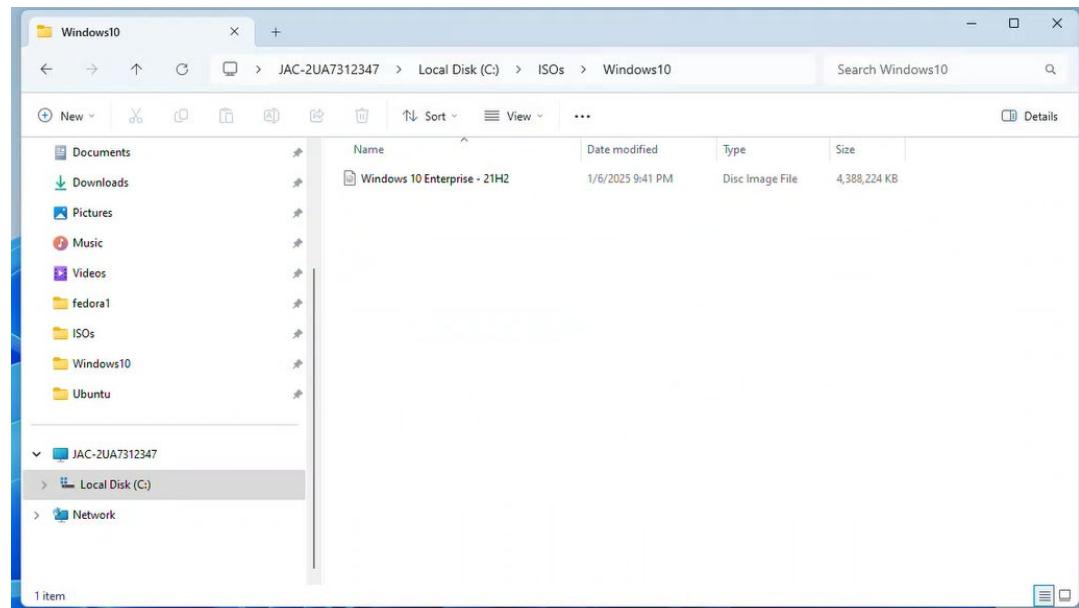
N3T202#1

\\"10.164.139.241\Public\ISOs\Windows\Windows 10\win10latest

Selected file is: Windows 10 Enterprise - 21H2



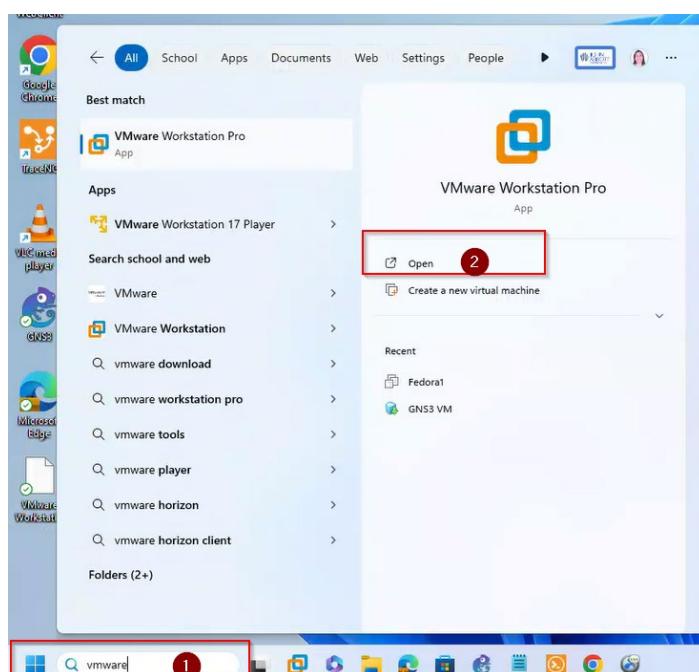
- B. Copy to ISOs directory on local C disk



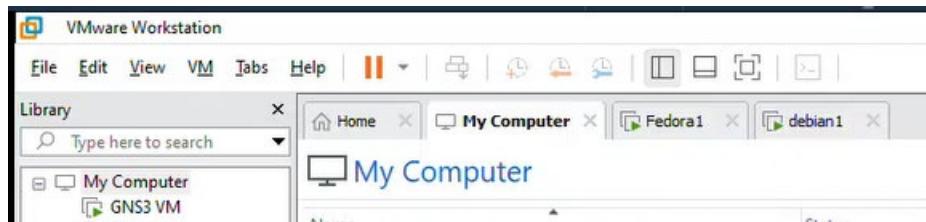
### 3.5.2 Create VM for windows 10

#### A) Open the VMware Workstation App

- 1 Look for application in windows search
- 2 Once VMware Workstation Pro appears, open application

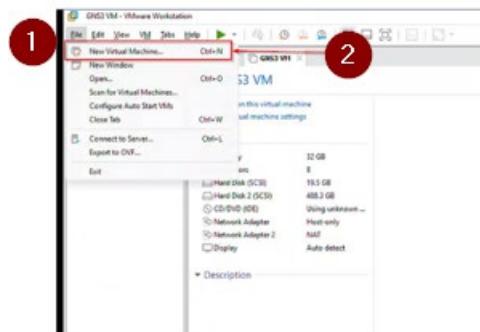


B) VMware workstation opens:

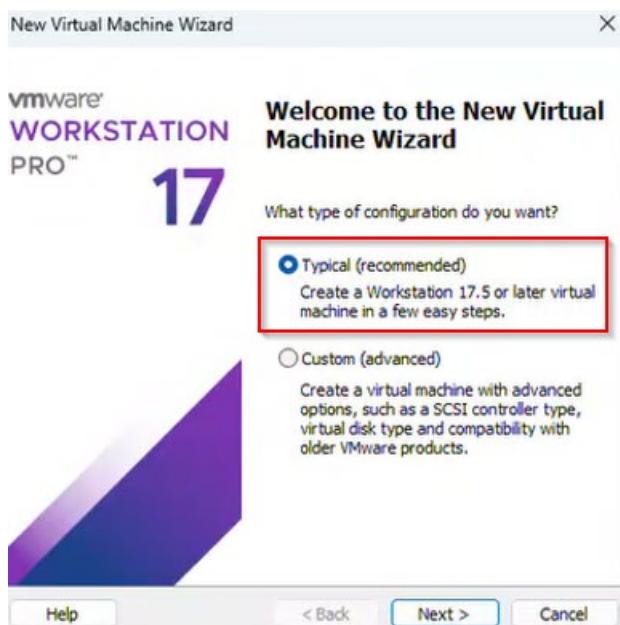


C) Select from top menu and submenu

1. File
2. New Virtual Machine...



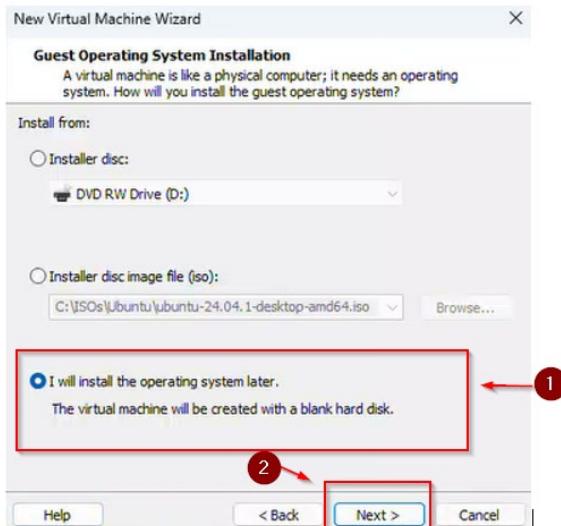
D) When the “Welcome to the New Virtual Machine Wizard” window pops up, select “Typical (recommended)”, then click “Next >”





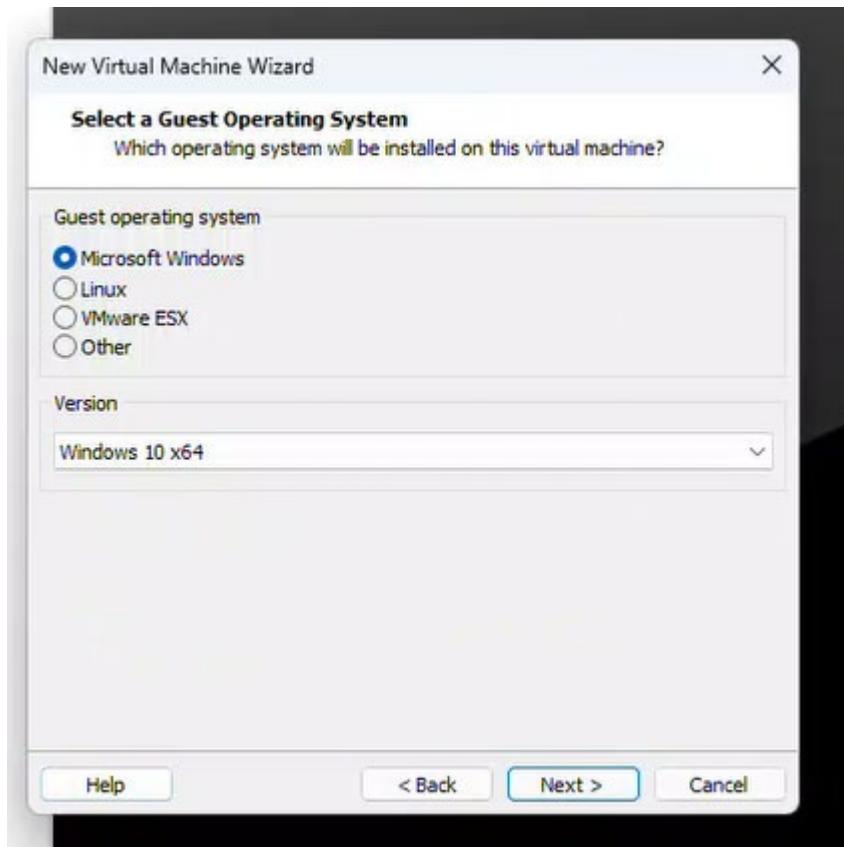
E) “Guest Operating System Installation” window pops up, please:

1. Select “I will install the operating system later. The virtual machine will be created with a blank hard disk.”.
2. Click “Next”



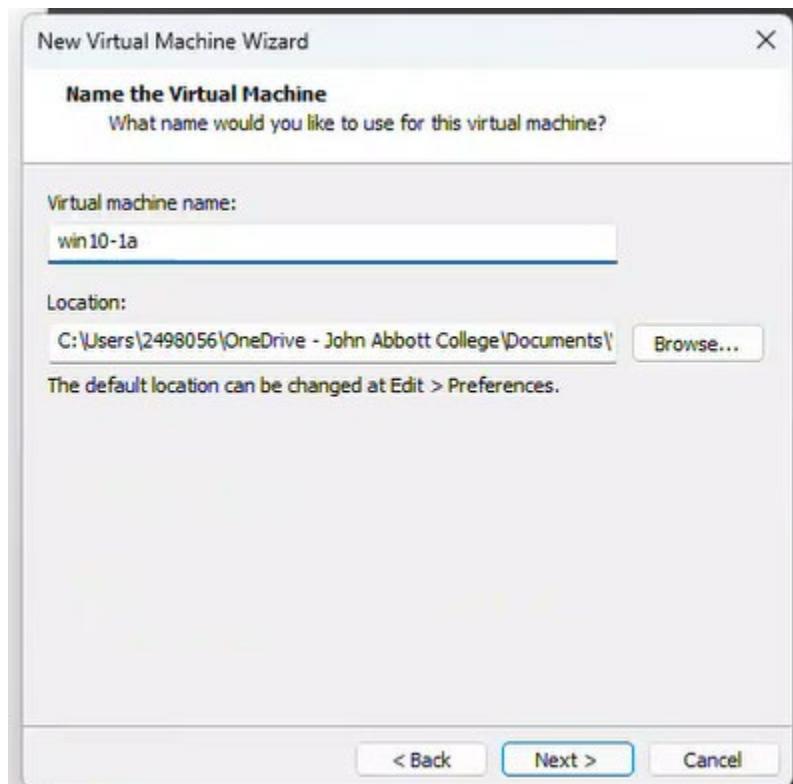
F) The window “Select a Guest Operating System Which operating system will be installed on this virtual machine?”

1. Select Microsoft Windows operating system
2. For Version, select “Windows 10 x64”
3. Select “Next”



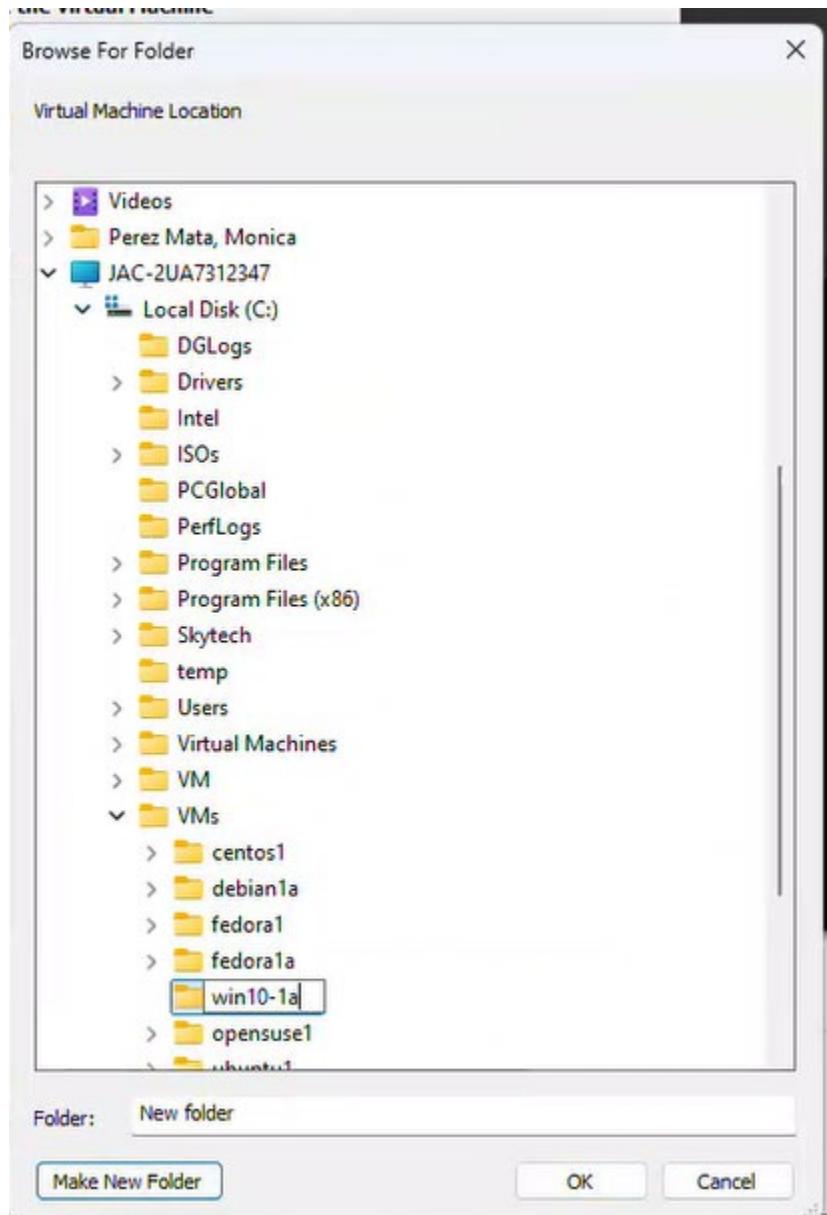
G) In the window “Name the Virtual Machine”

1. Set name Virtual machine name: “win10-1a”
2. For the location Browse to change directory

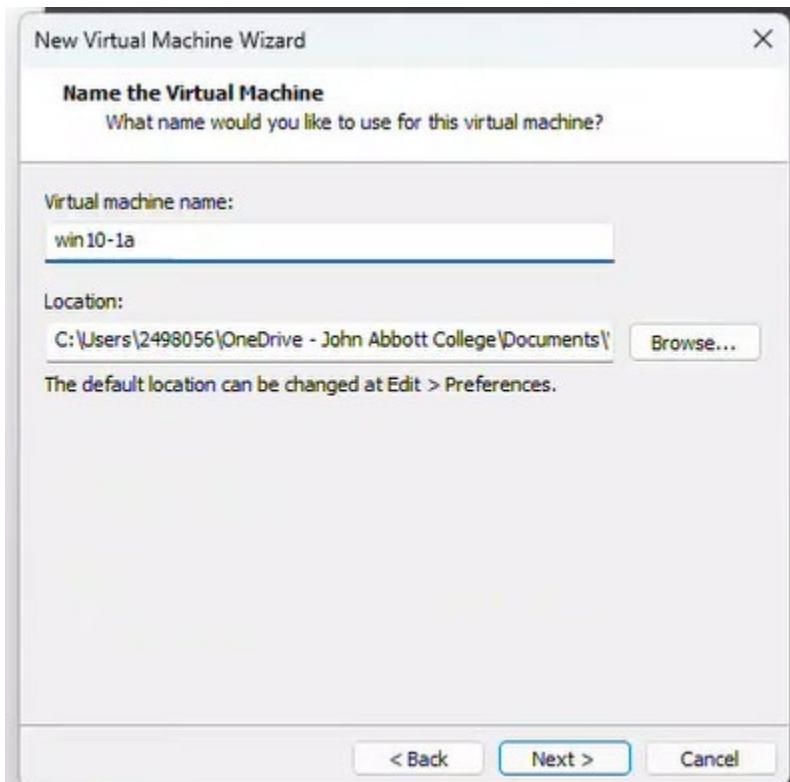


H) Create a new directory for windows10

1. Select VMs directory and click on “New directory”
2. Create a directory for windows

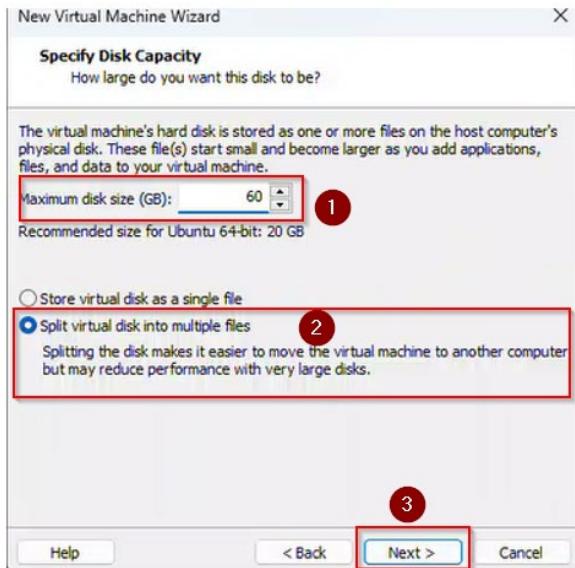


I) Click “Next” after Virtual machine name and location was set.

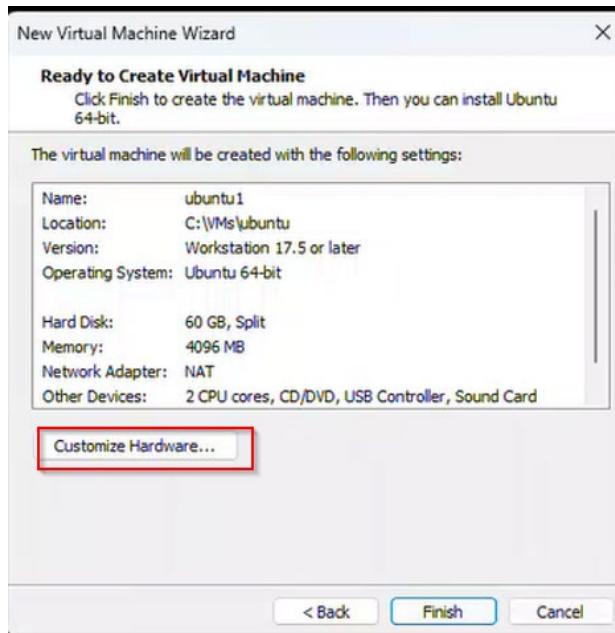


J) In the window Specify Disk Capacity, set:

1. Set the Maximum disk size (GB) to 60
2. Keep the default set to “Split virtual disk into multiple files”
3. Click “Next >”

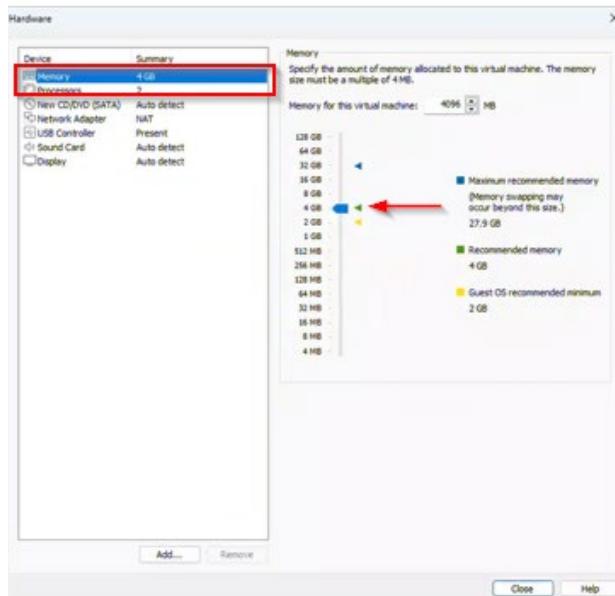


K) In the window “Ready to create Virtual Machine” select Customize hardware

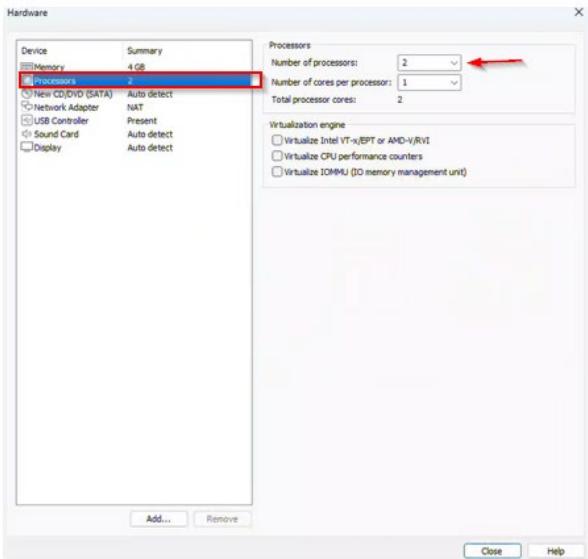


## L) For Hardware settings:

### 1. Set Memory to 4GB

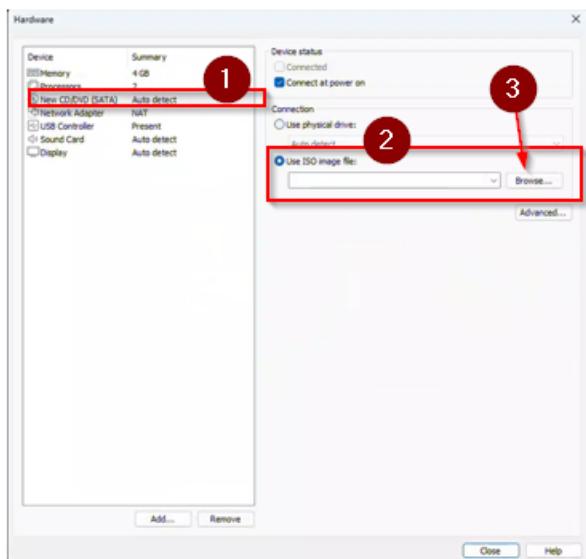


### 2. Set Processors to 2

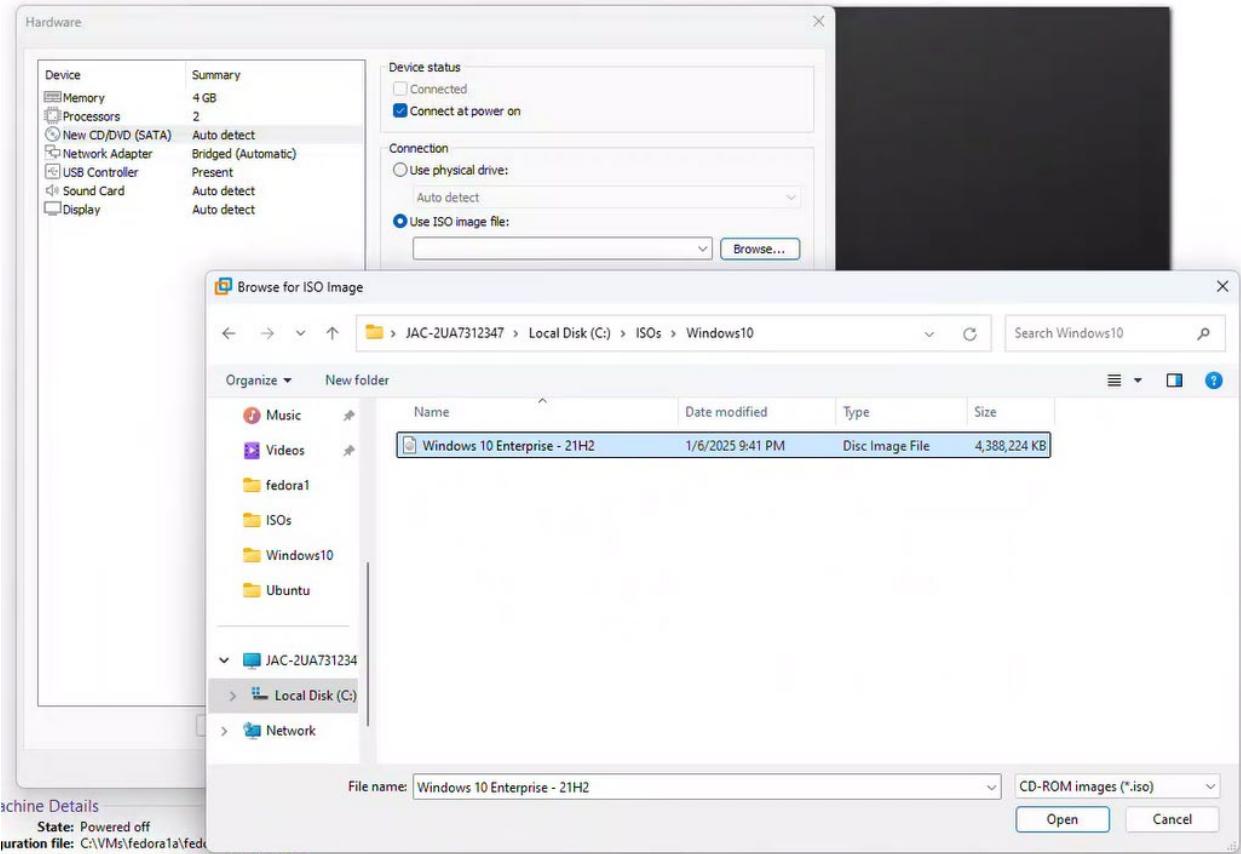


#### M) New CD/DVD (SATA)

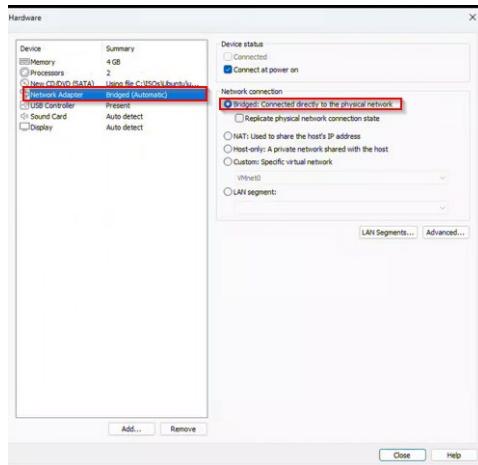
1. Select New CD/DVD (SATA)
2. Highlight Use ISO image file
3. select Browse.



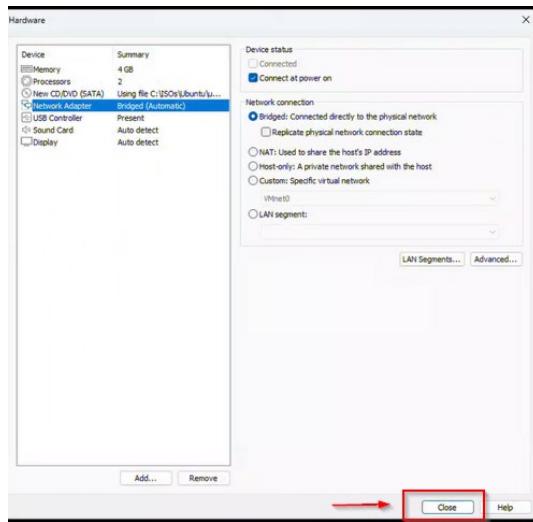
4. Once you select “Use ISO image file:”, browse for the iso file



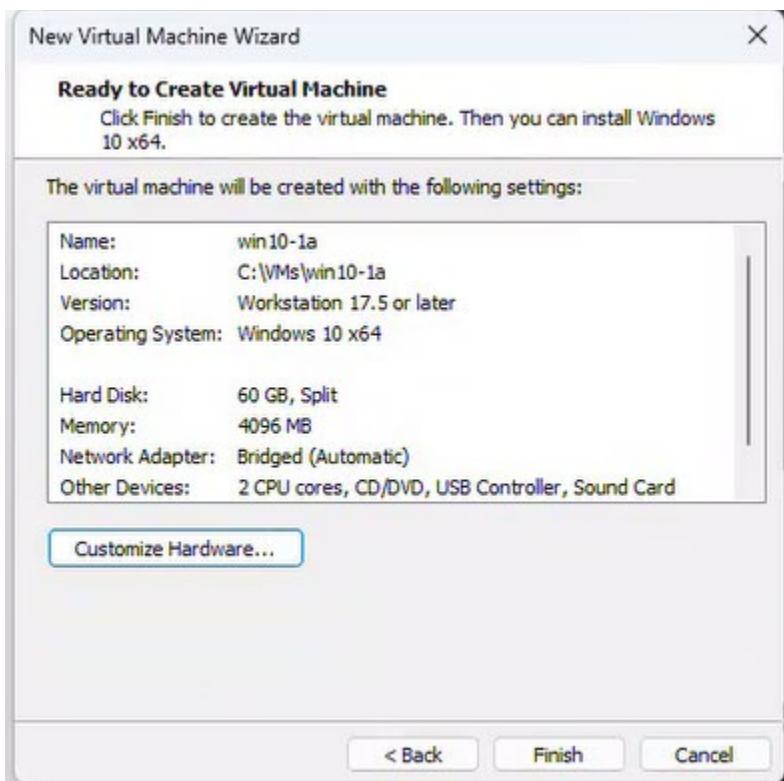
N) Set Network Adapter to bridged



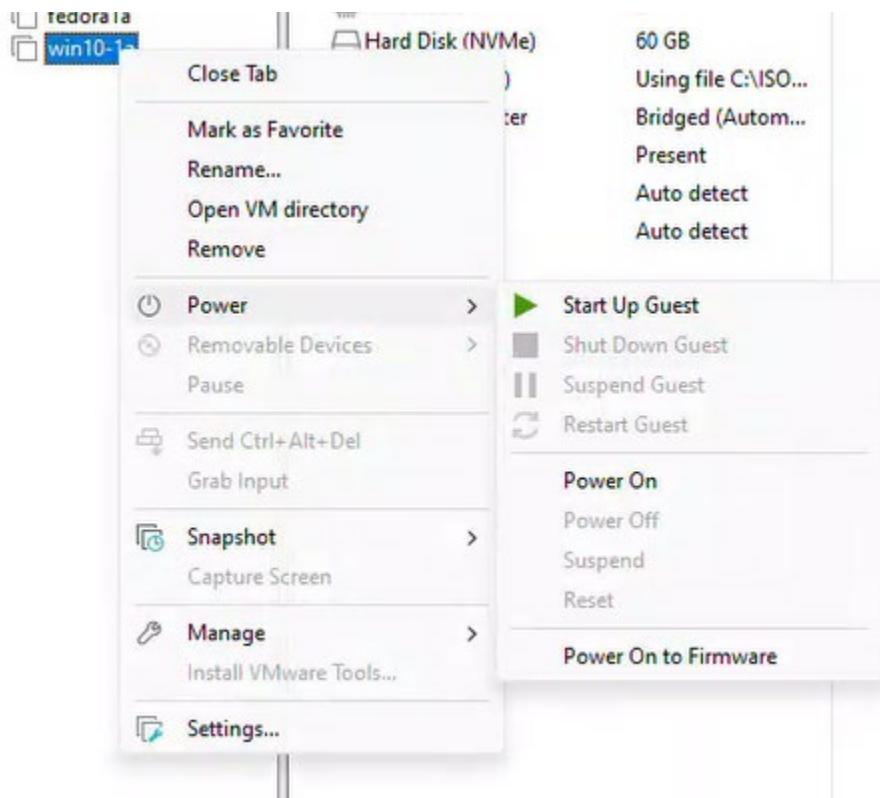
O) Click Close.



P) Review and press Finish

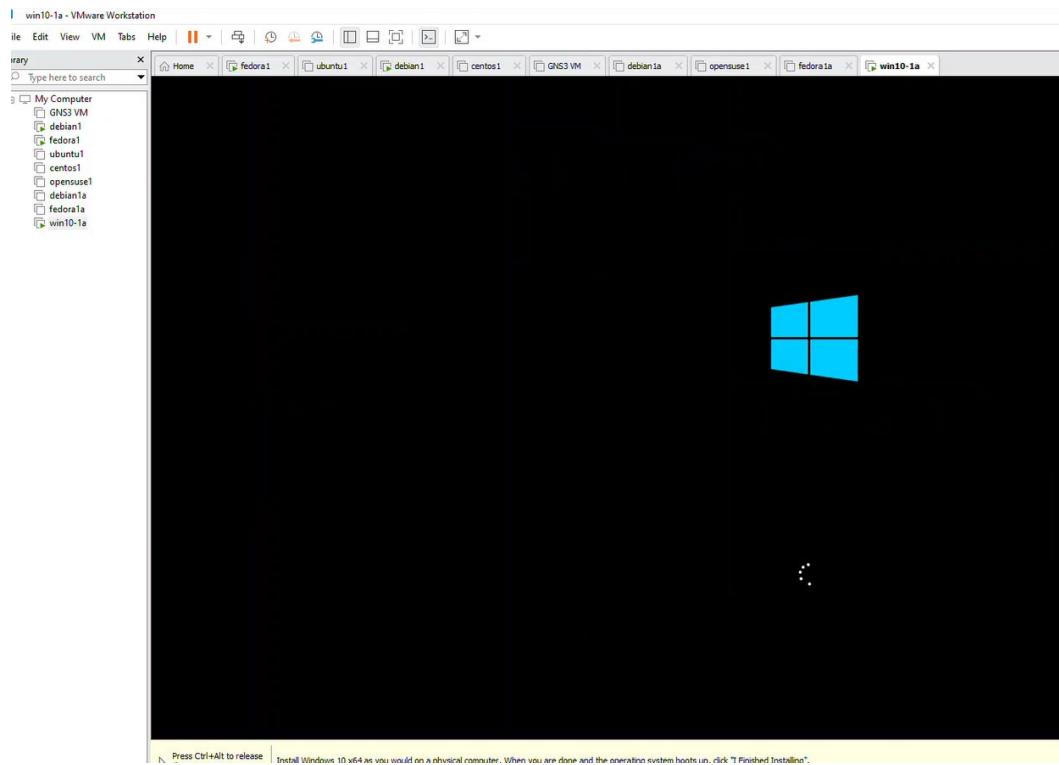


Q) VM opens, Power on virtual machine



### 3.5.3 Install Windows 10 on recently created Virtual Machine

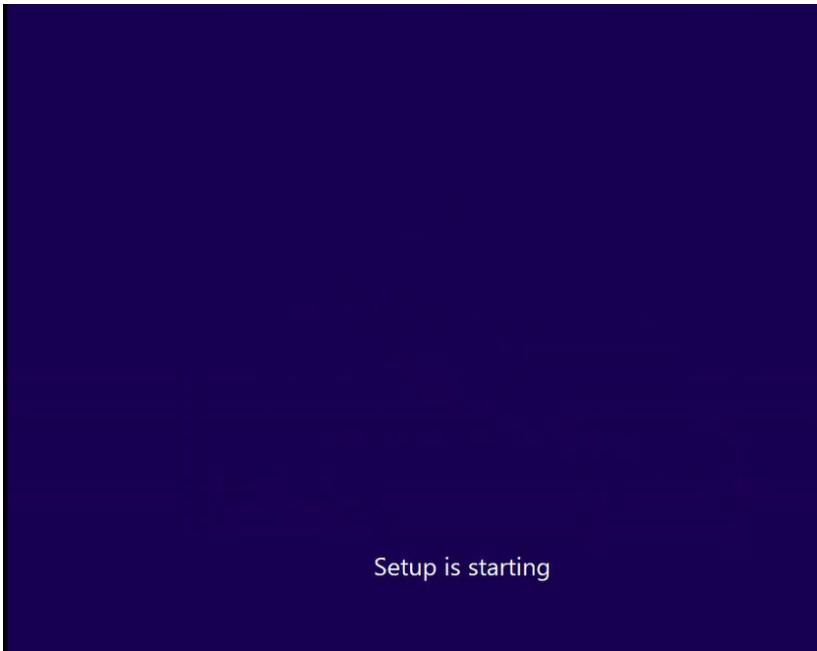
- A) When the “win10-XX – VMware Workstation” window pops up, click “Okay”, then IMMEDIATELY click on the screen and press any key on your keyboard when prompted. If you miss it, and your VM is timed out, restart the VM by clicking the dropdown menu next to the Pause button on the toolbar on the top, click “Restart”, then try again.



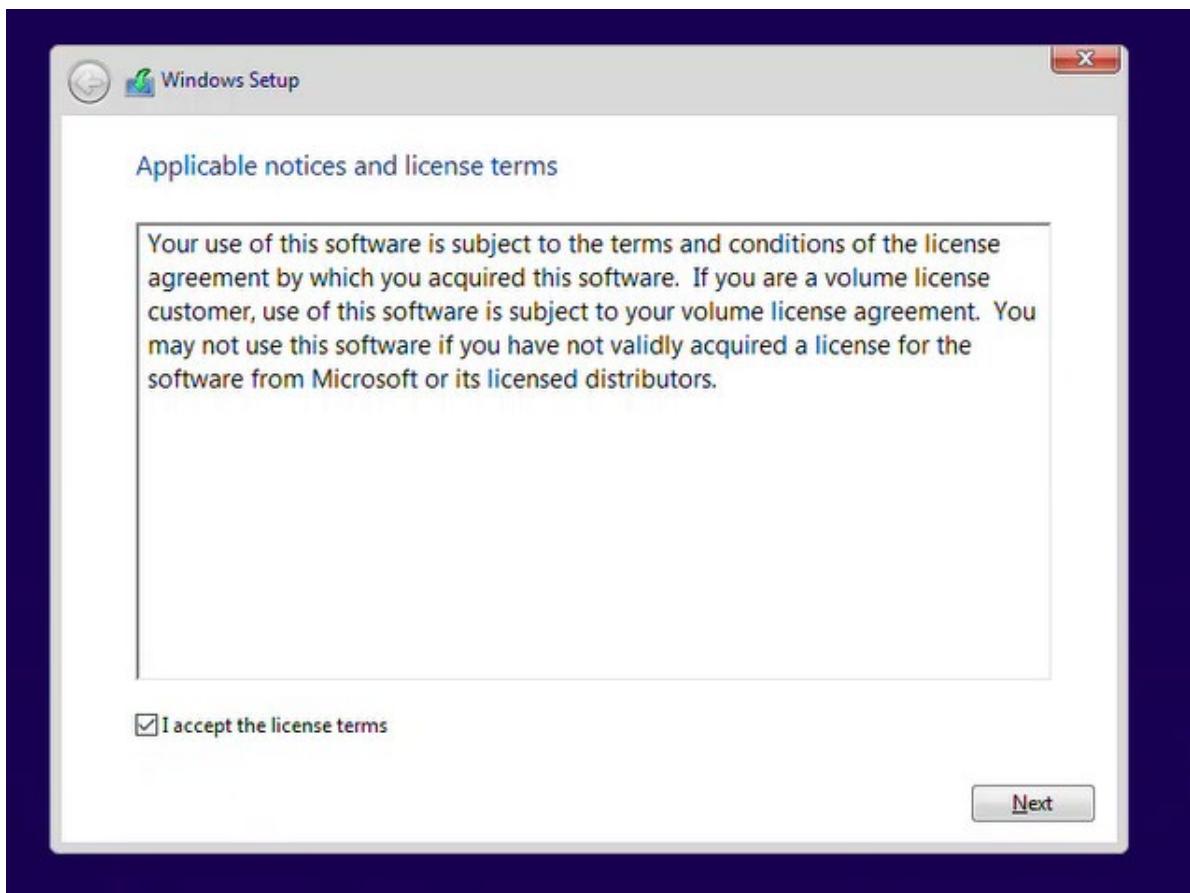
- B) When the “Windows Setup” window appears, keep the language, time and currency format to “English (United States) and the Keyboard or input method to “US”, then click “Next”. Then click “Install Now”.



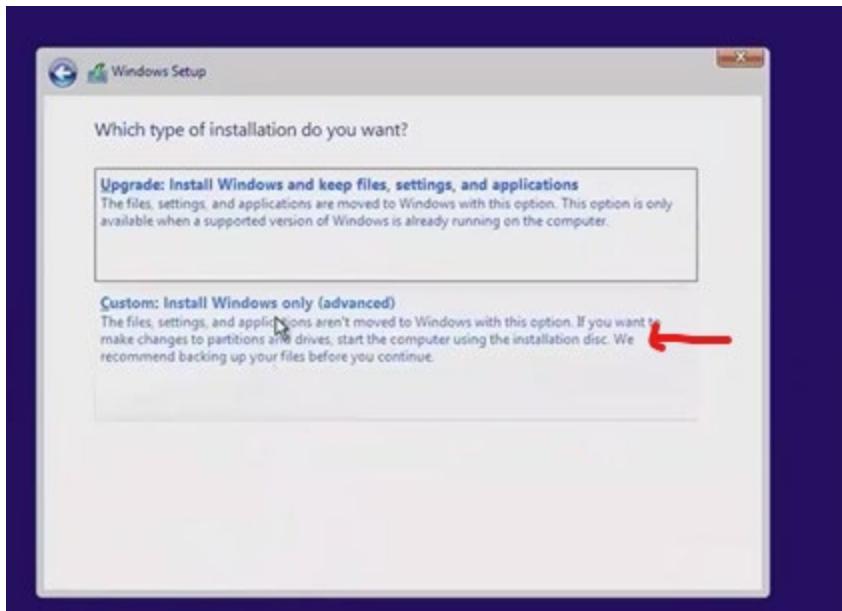
C) Wait for a series of screens indicating installation process



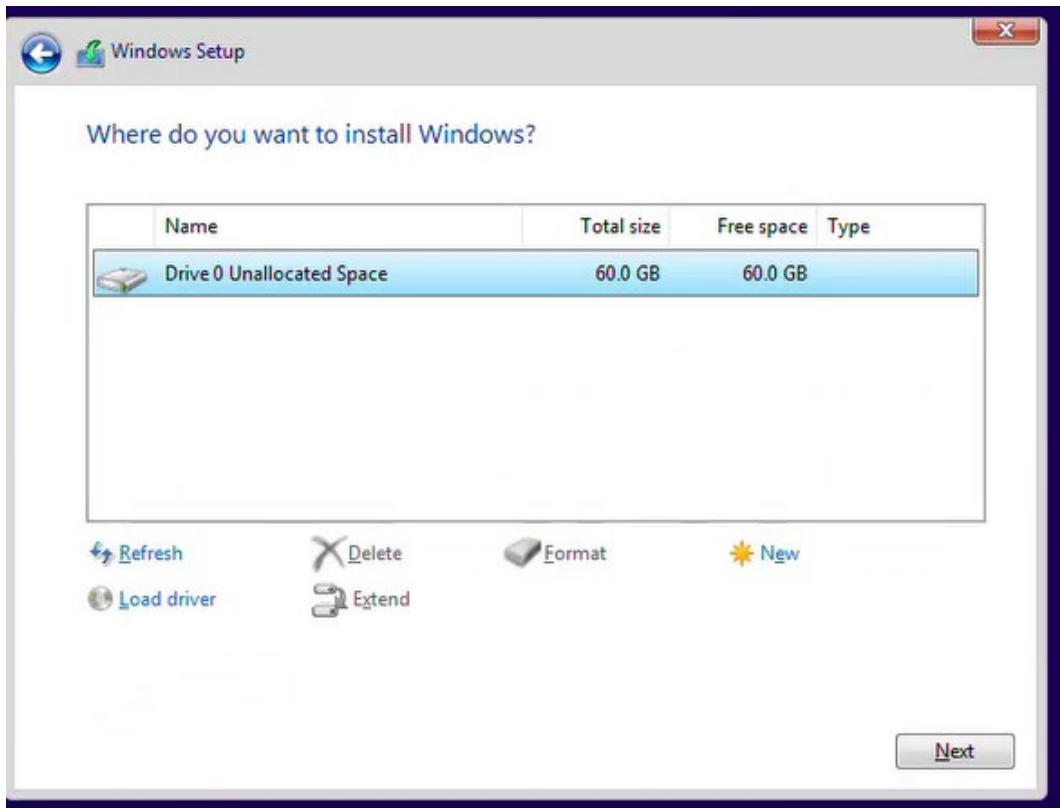
- D) When license and terms window appear accept it.



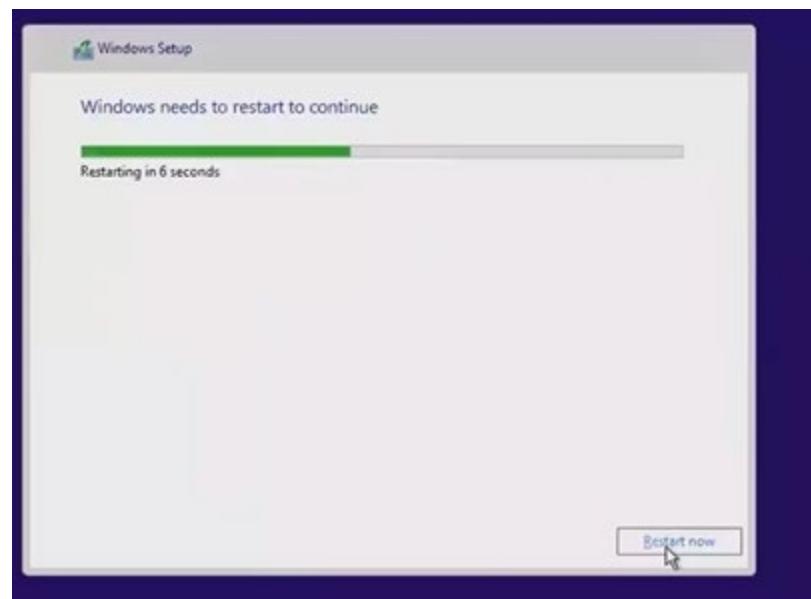
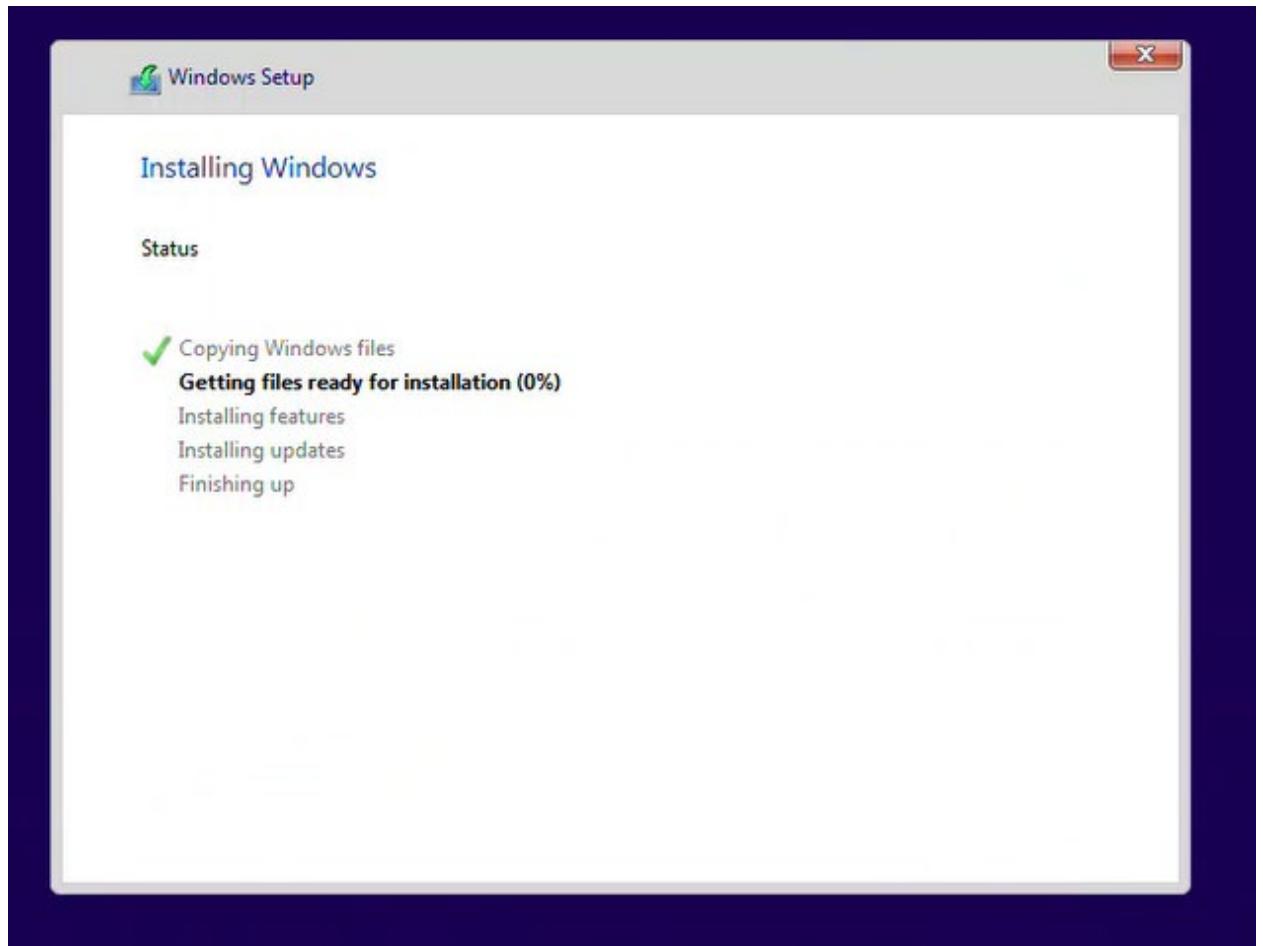
- E) In the next window select “Custom Install windows only (advanced)”



F) Click Next on the window “Where do you want to install windows?”



G) Wait for a series of windows for the installation process



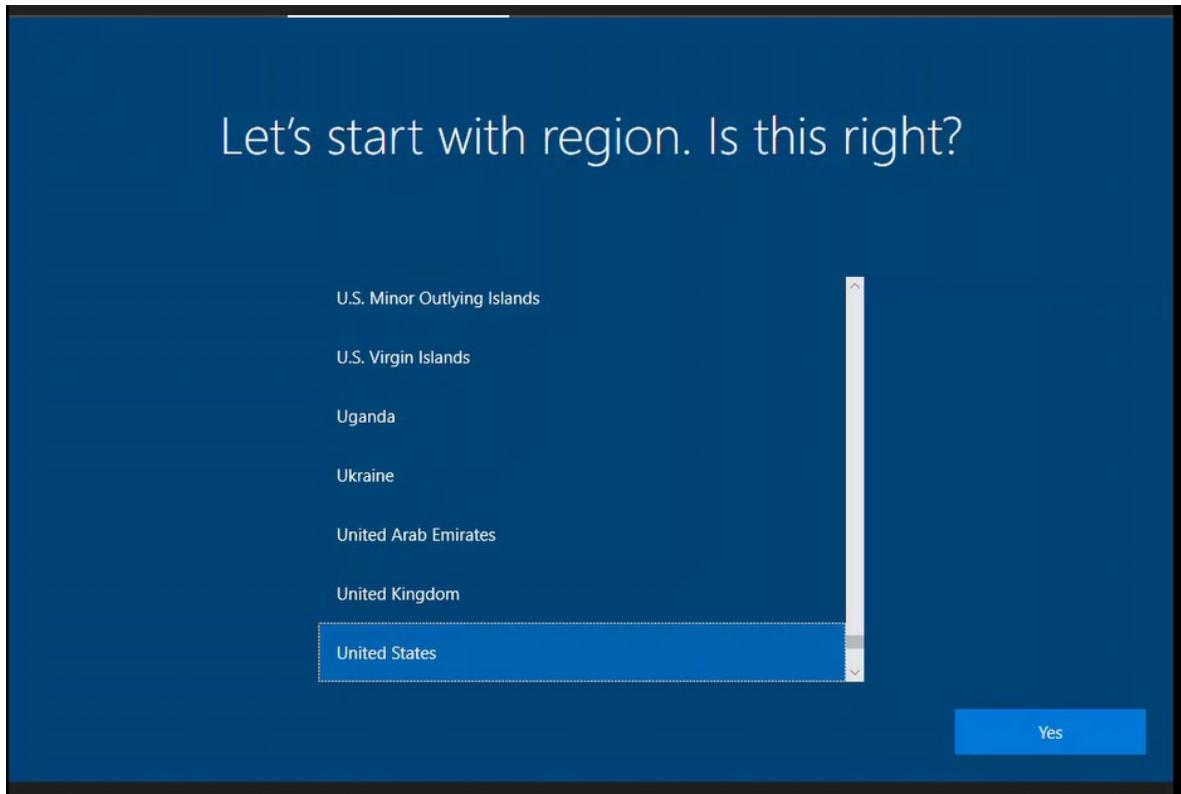


Getting ready

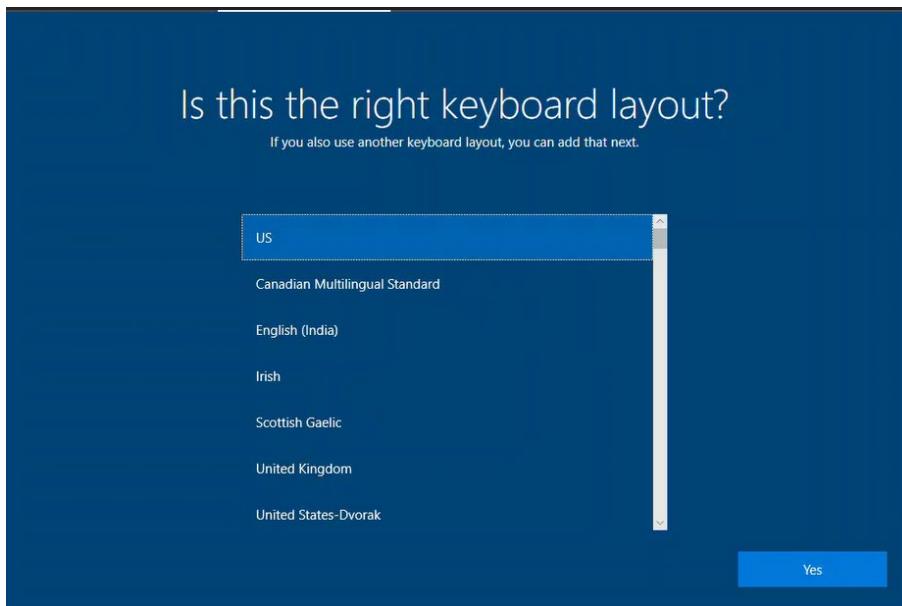


Just a moment...

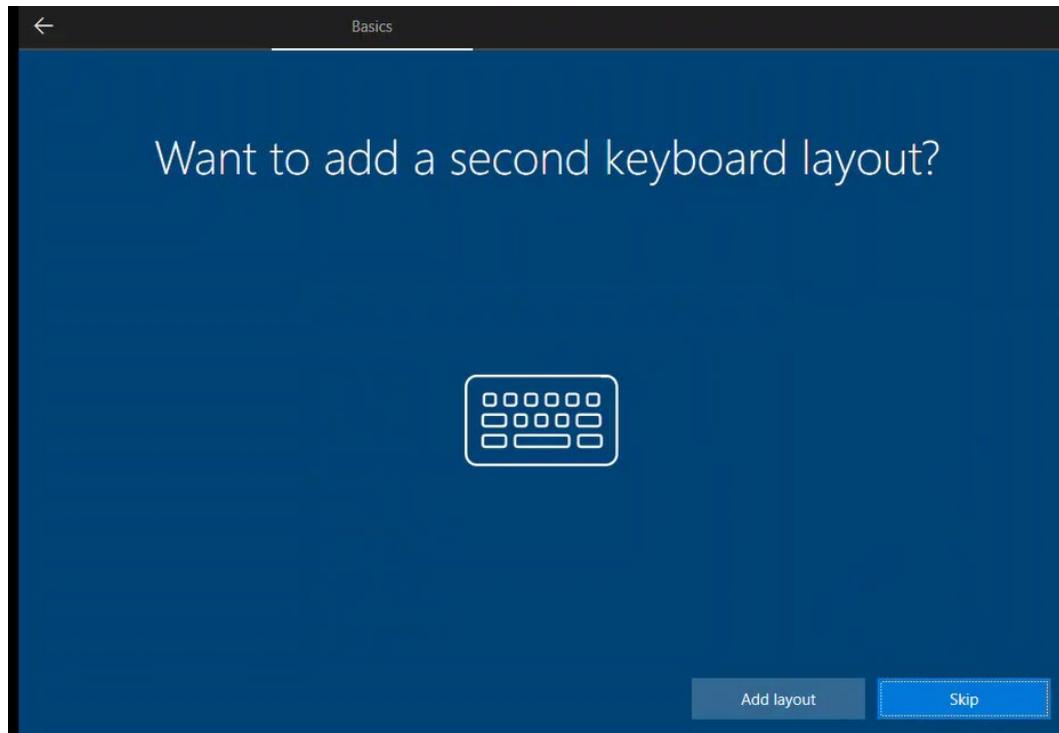
- H) When the system is done rebooting, you will see “Let us start with region. Is this right?”, keep it at “United States”, then click “Yes”.



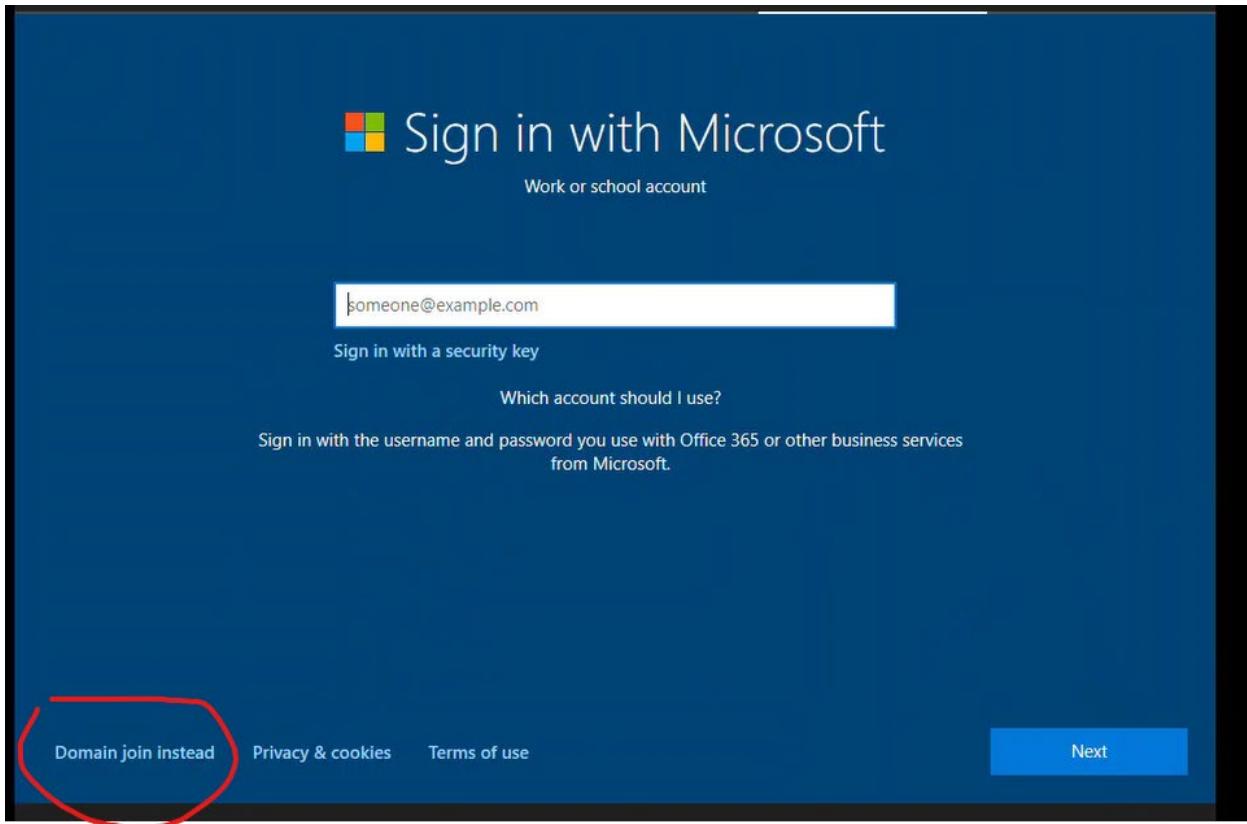
- I) When asked “Is this the right keyboard layout?”, keep it at “US”, then click “Yes”.



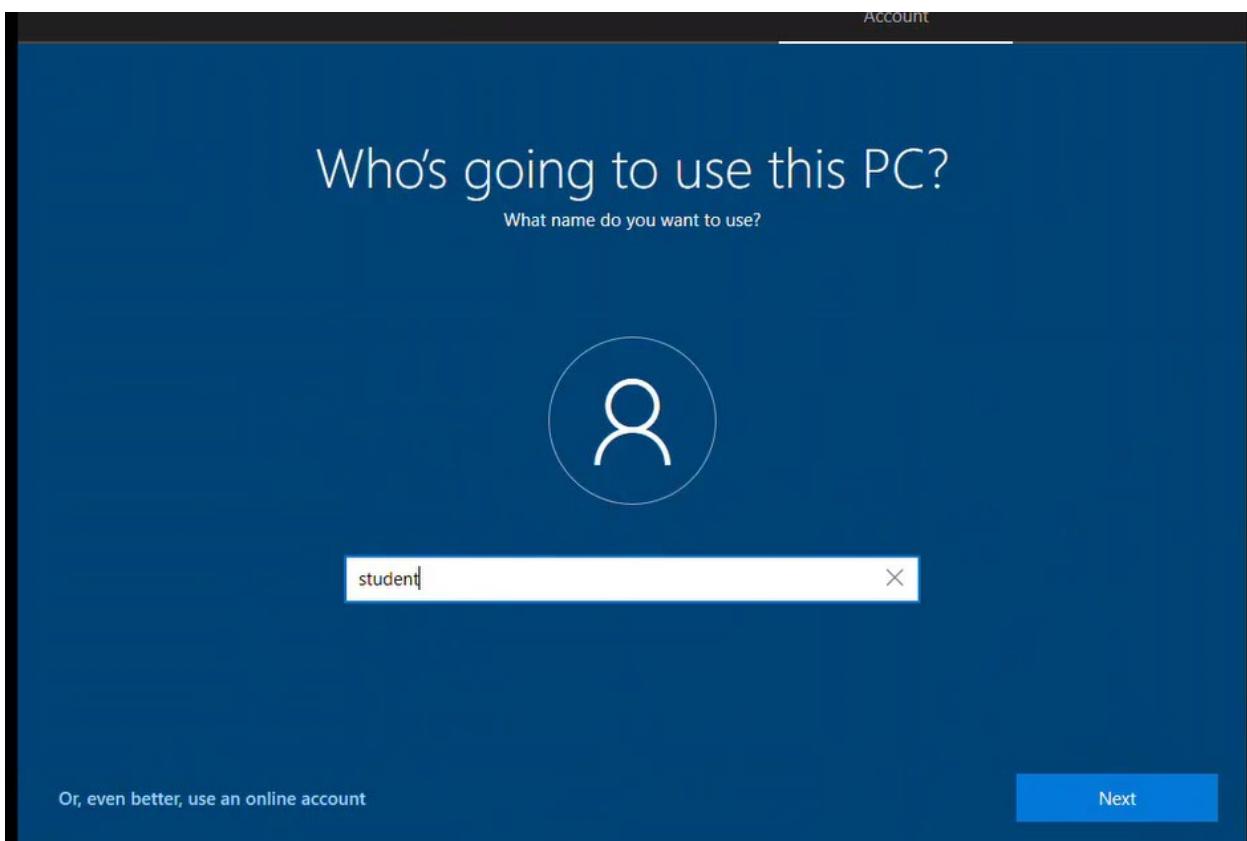
- J) When asked “Want to add a second keyboard layout?”, select “Skip”. And wait for the installation to continue.

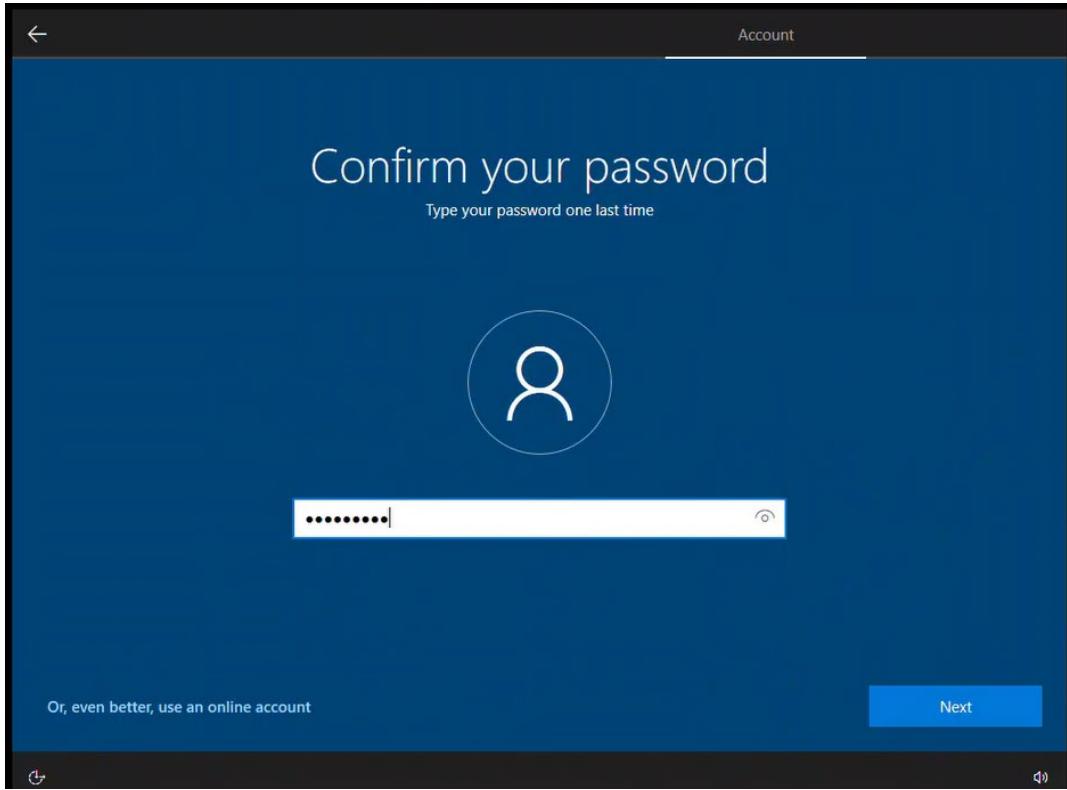
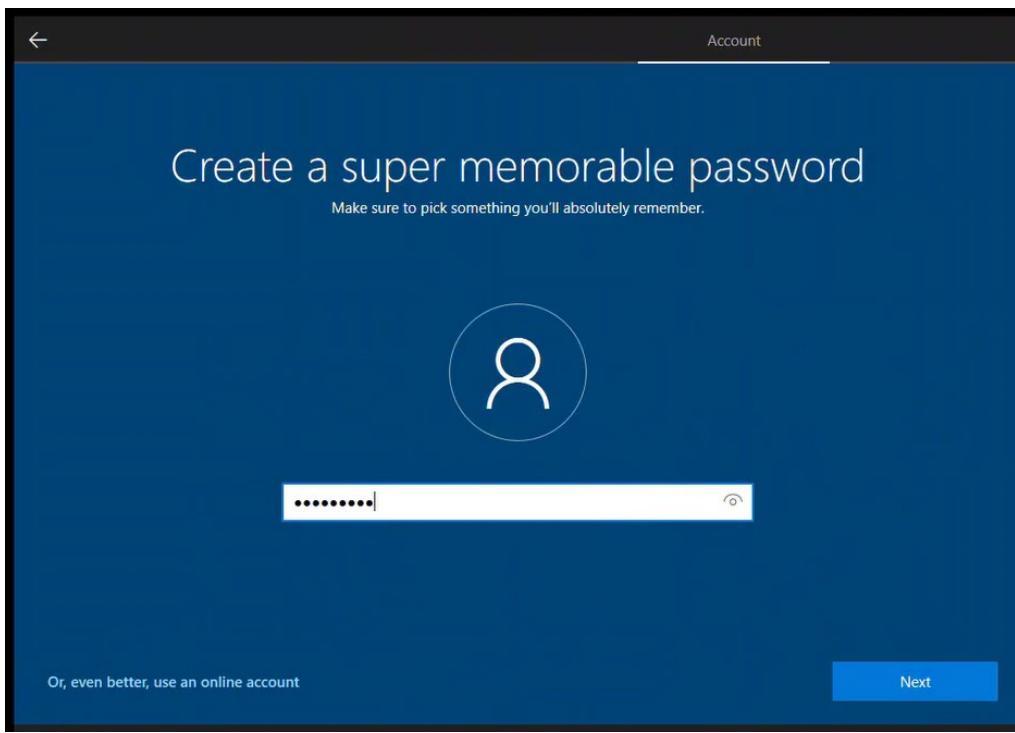


- K) In the window “Sign in with Microsoft” select on the bottom left “Domain join instead”



L) Create user student with password “Amf123456”



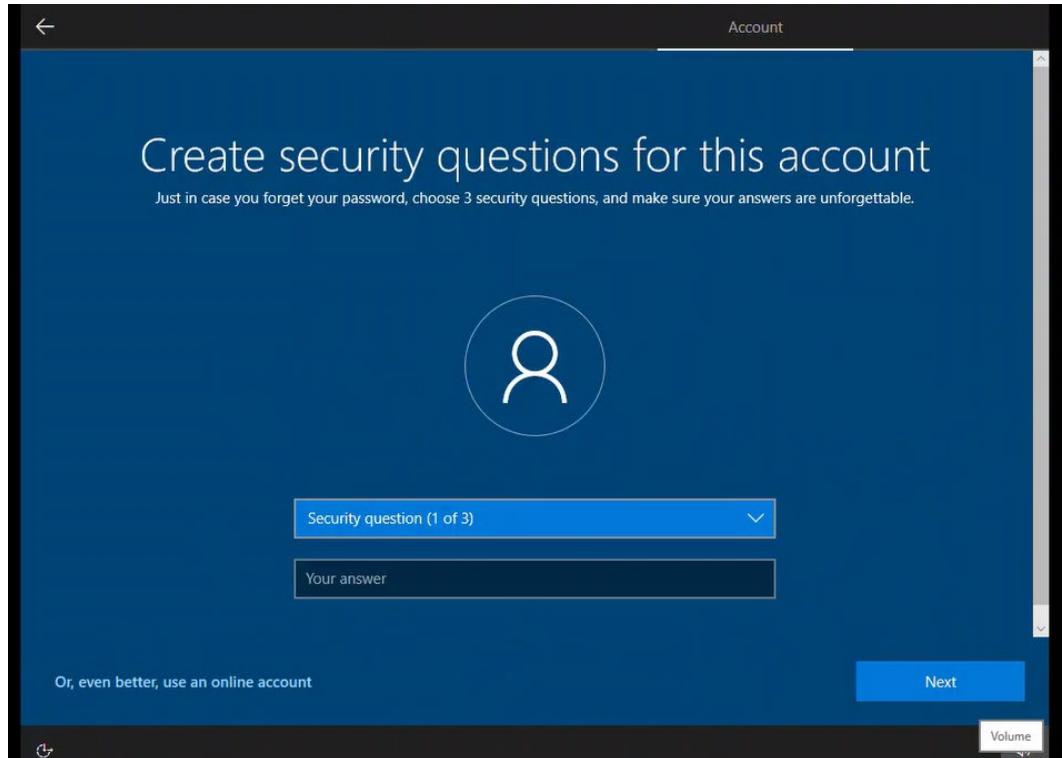


M) Security questions:

What was the name of your first pet? > I.e. Answer: dog \*choose your own answer\*

What's the name of the city where you were born? > I.e. Answer: montreal \*choose your own answer\*

What was your childhood nickname? > I.e. answer: mike \*choose your own answer\*



← Account

## Create security questions for this account

Just in case you forget your password, choose 3 security questions, and make sure your answers are unforgettable.



What was your first pet's name?  X

Or, even better, use an online account [Next](#)

← Account

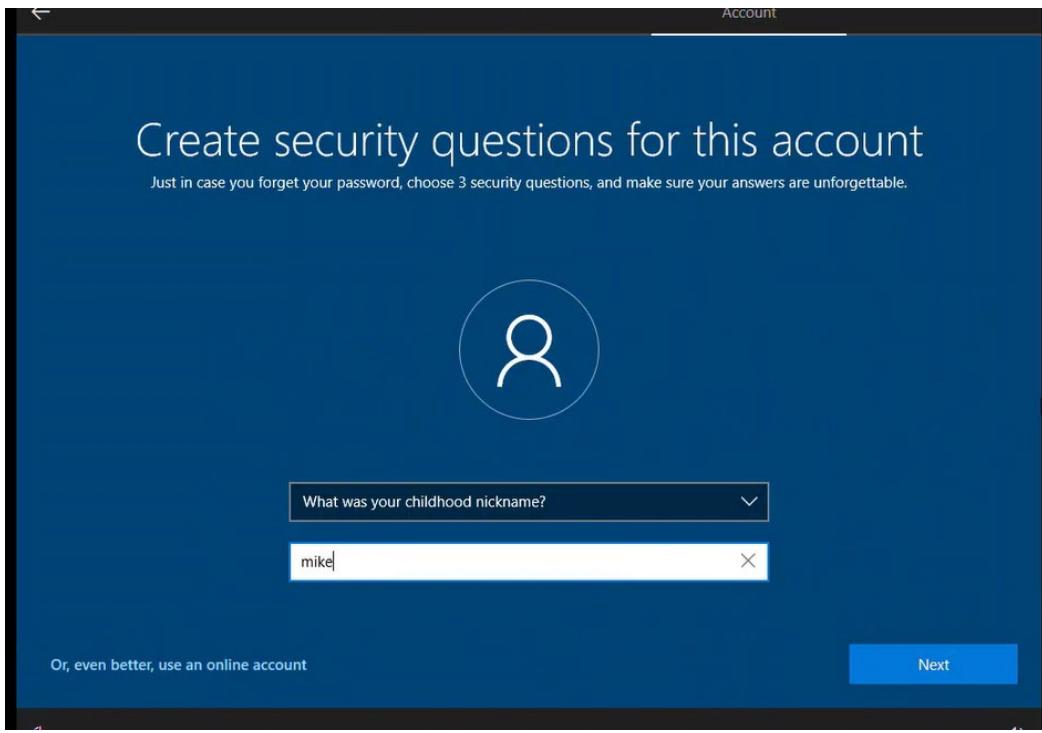
## Create security questions for this account

Just in case you forget your password, choose 3 security questions, and make sure your answers are unforgettable.

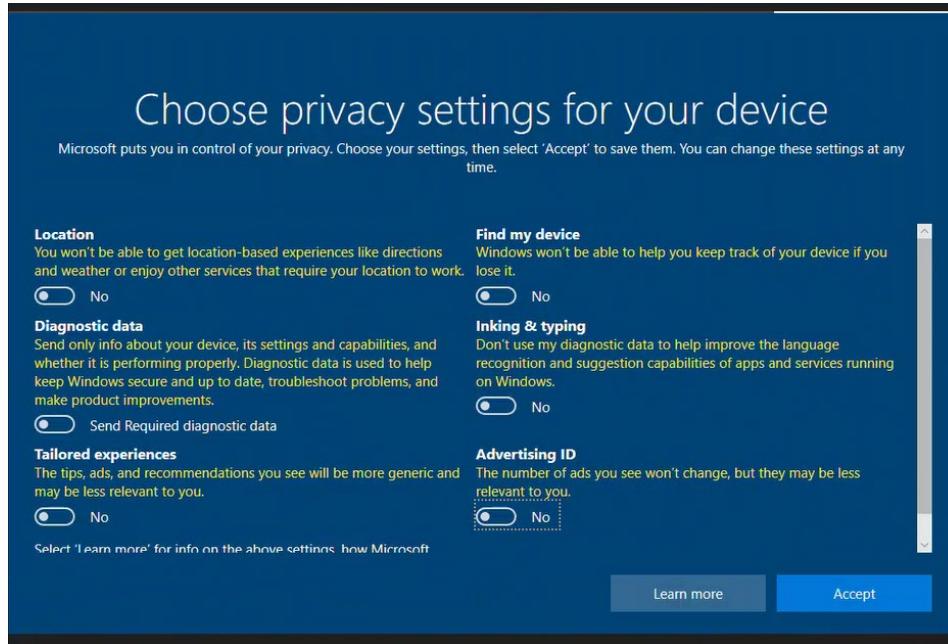


What's the name of the city where you were born?  X

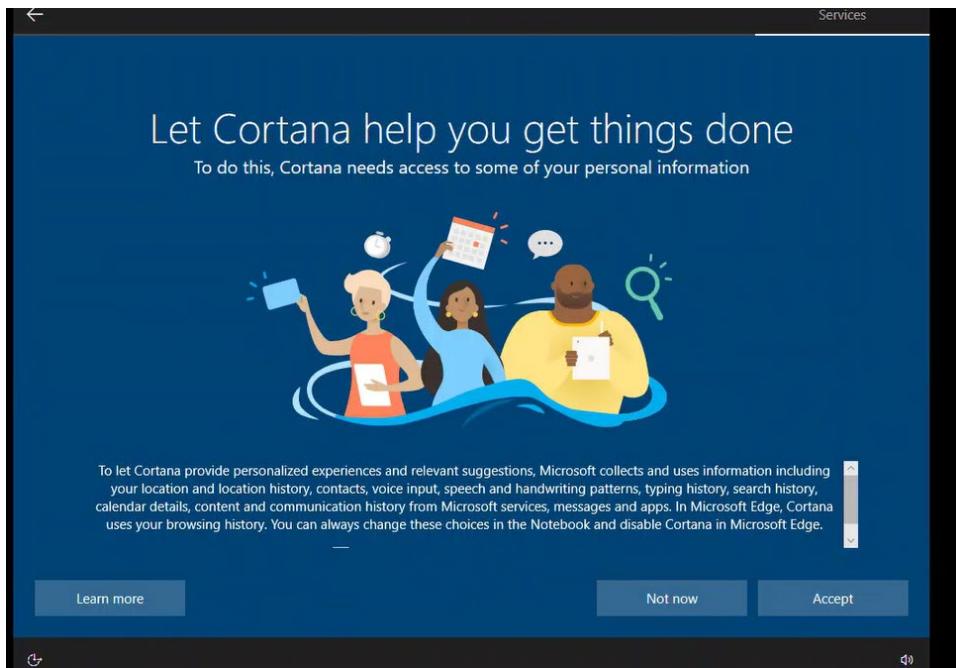
Or, even better, use an online account [Next](#)



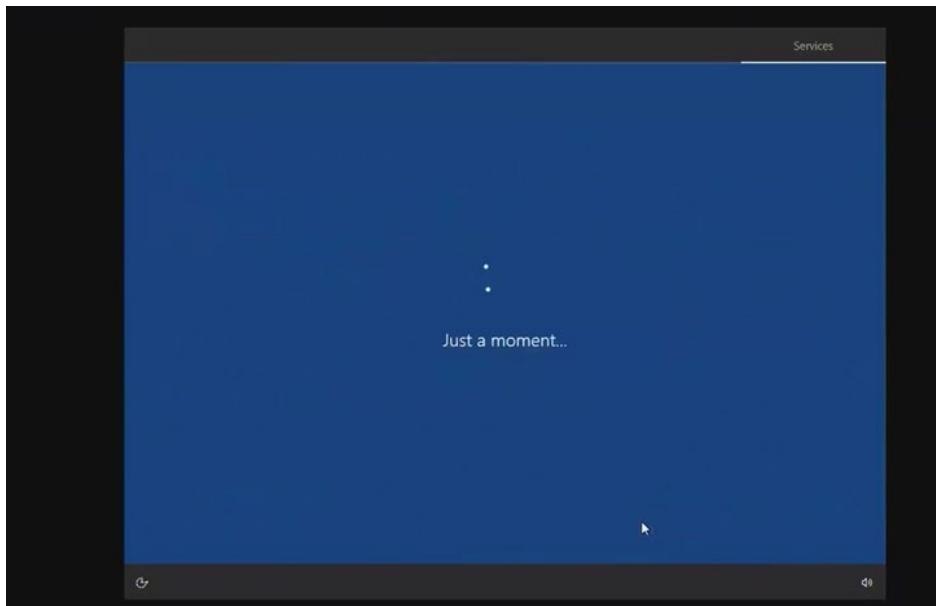
N) When asked “Let’s customize your experience”, click “Skip”.



O) For Cortana help select “Not now”



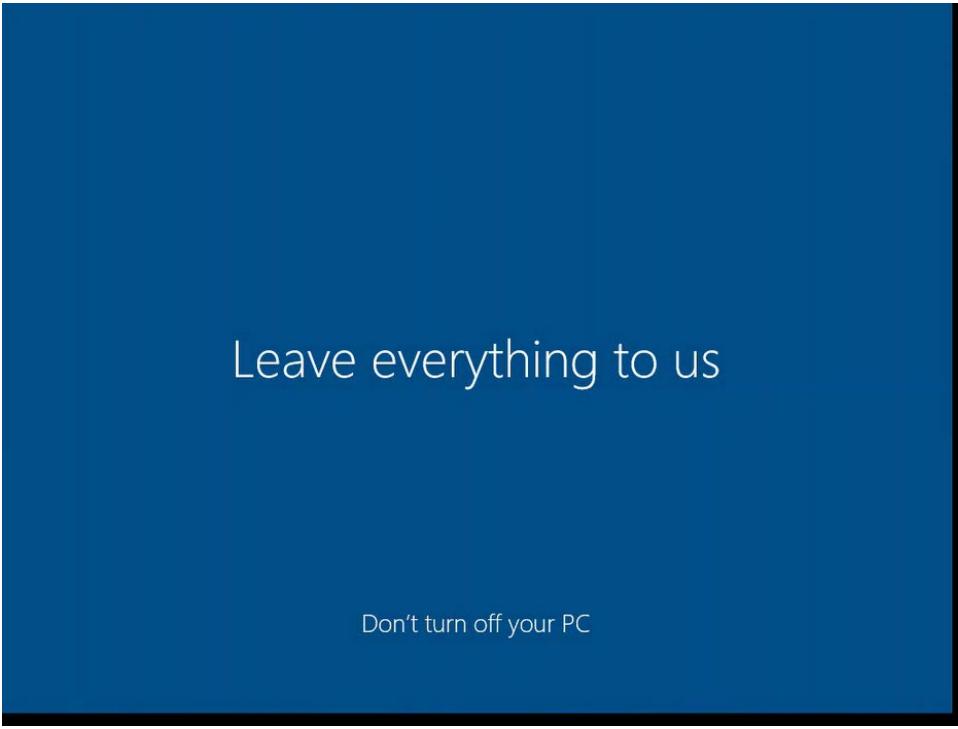
P) A series of windows appear indicating installation process is ongoing





This might take several minutes

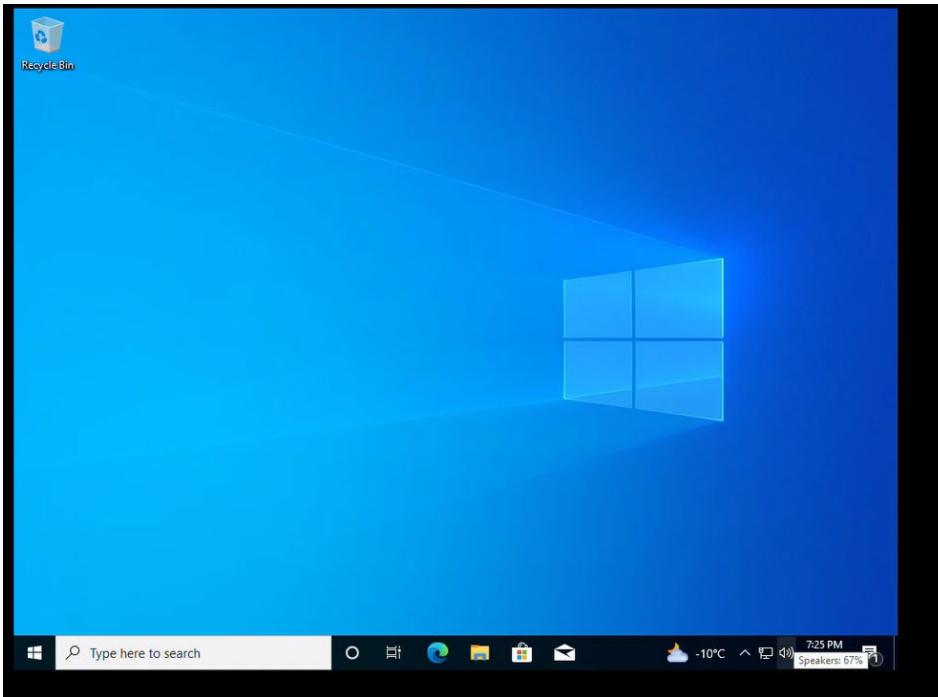
Don't turn off your PC



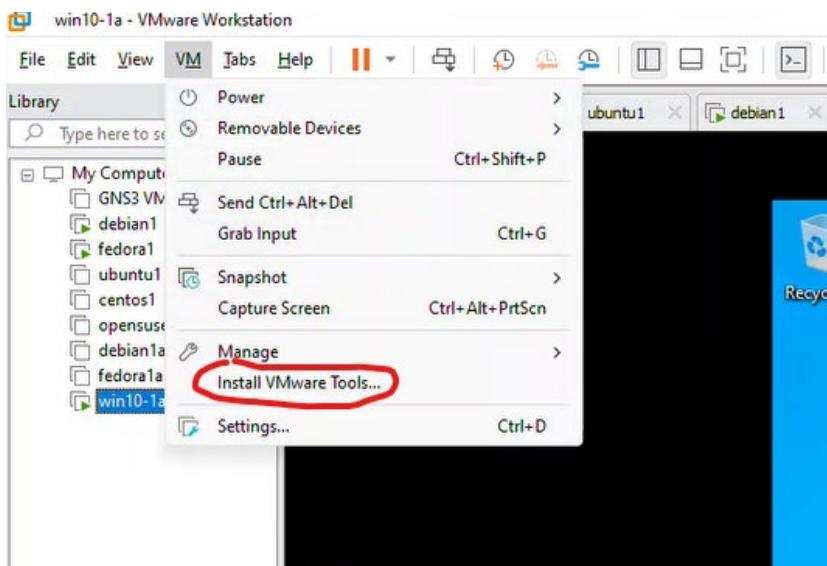
Leave everything to us

Don't turn off your PC

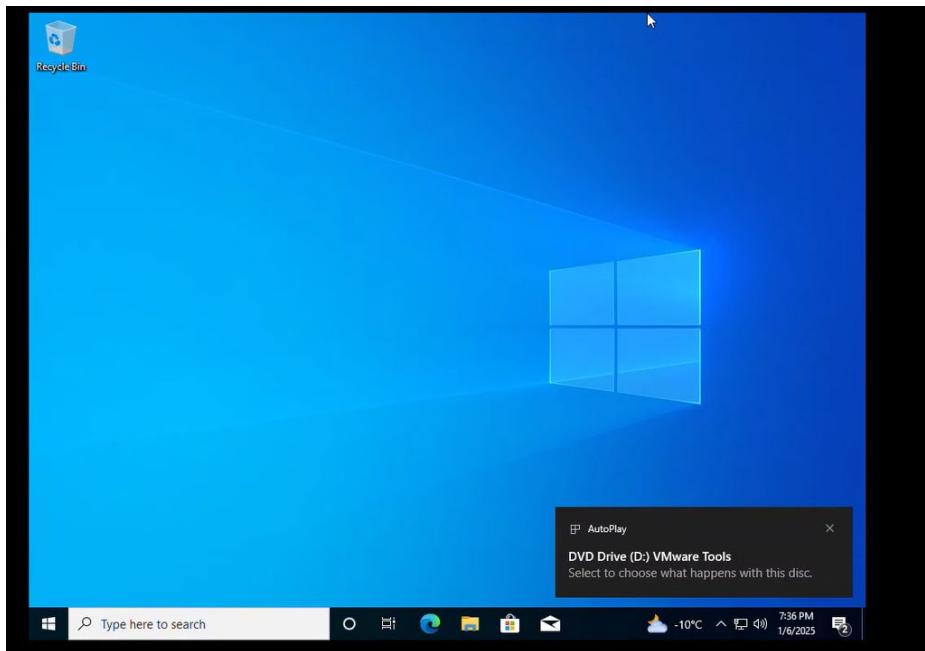
Q) The windows screen appears after the installation is done



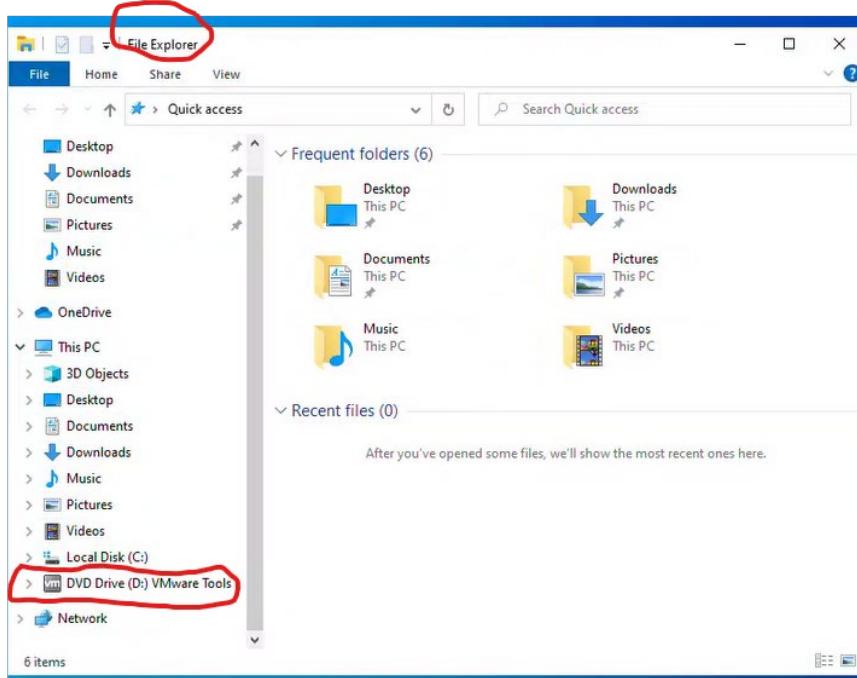
R) Click on “VM” in the toolbar at the top, then click “Install VMware tools”.

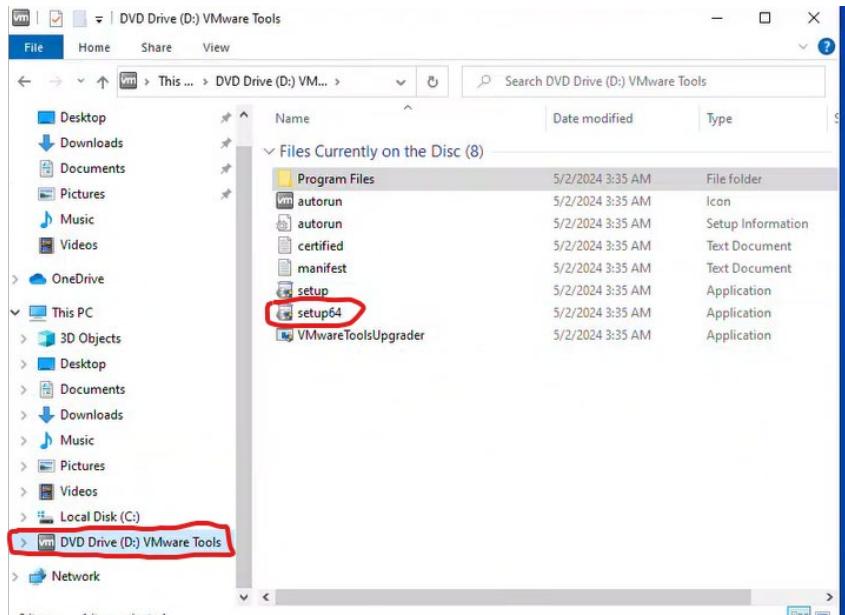


S) A window pop ups letting you know that “DVD drive (D:) VMware tools”, click on the prompt, double-click on the “setup64” file.



If missed, click on your File Explorer, and locate your DVD Drive (D:), double-click on the “setup64” file.

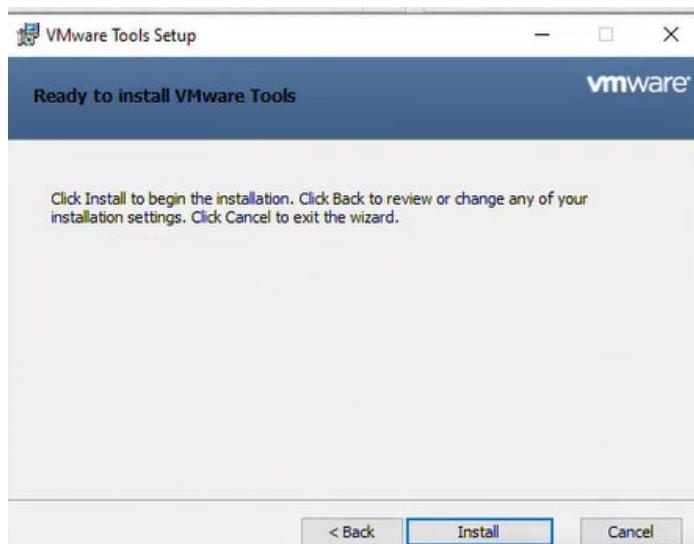
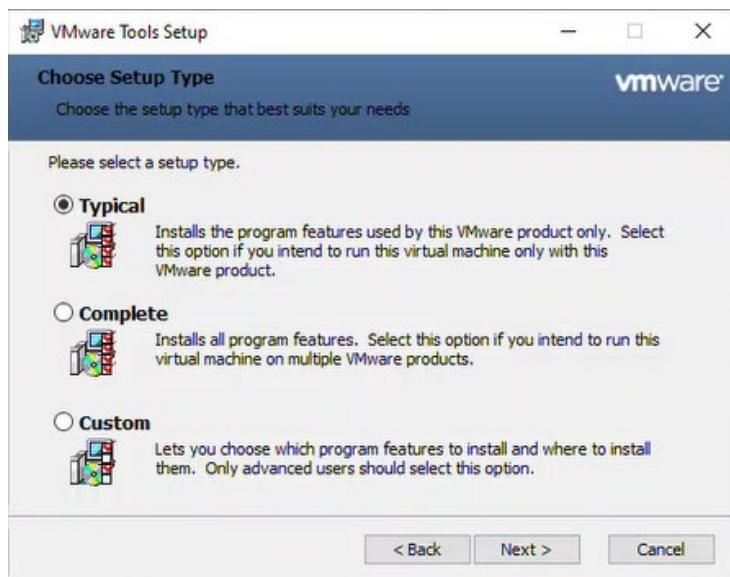


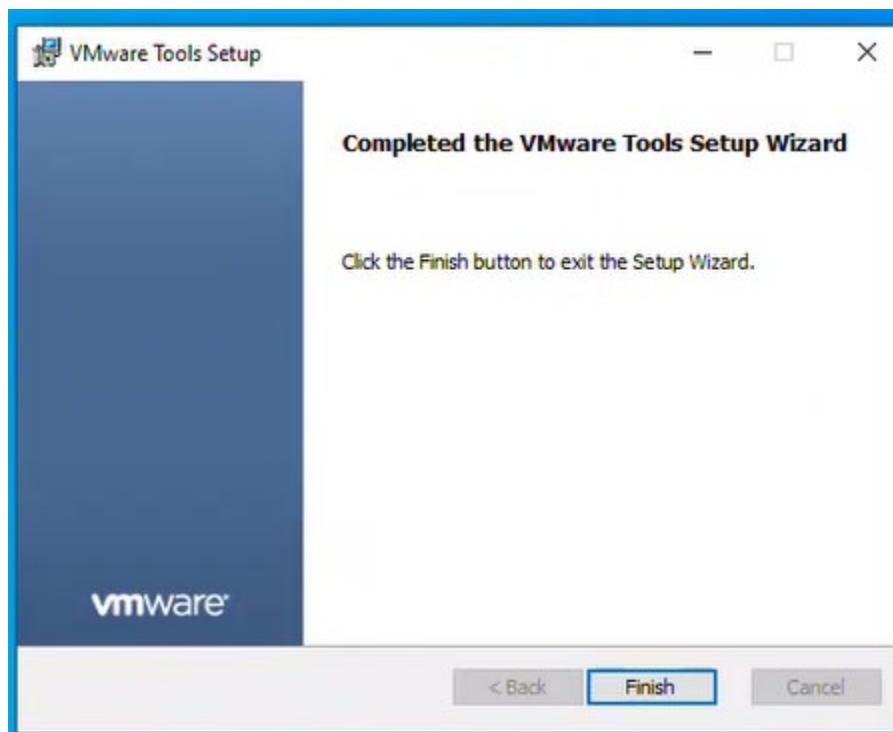
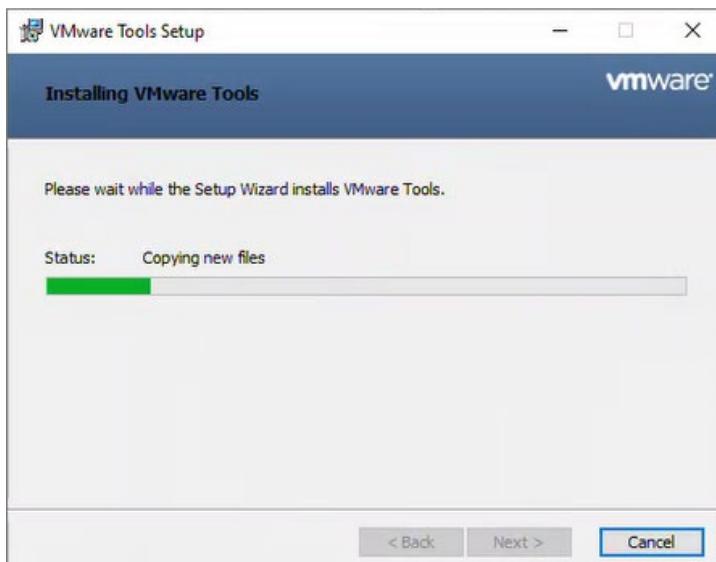


- T) To the question “Do you want to allow changes to your device?”

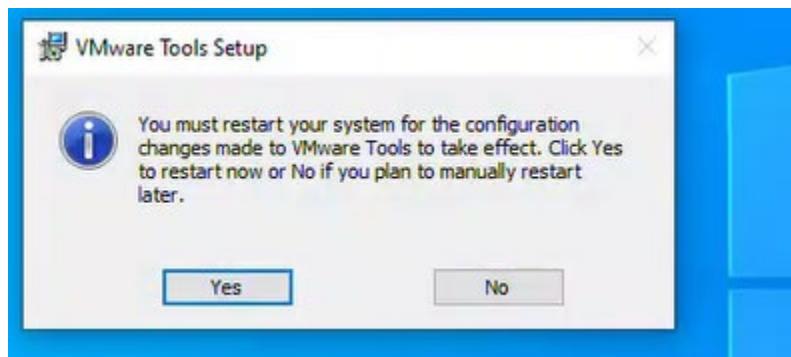


- U) When the “VMware Tools Setup” window pops up, click “Next ”, then select “Typical”, then click “Next >”, then click “Install”. Allow everything to install, then click “Finish.”

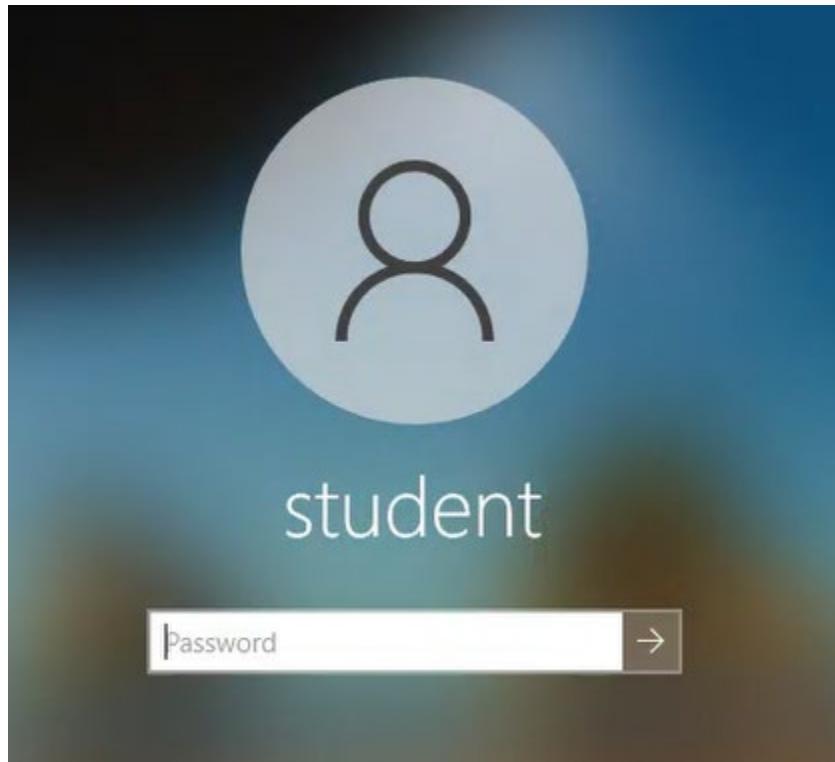




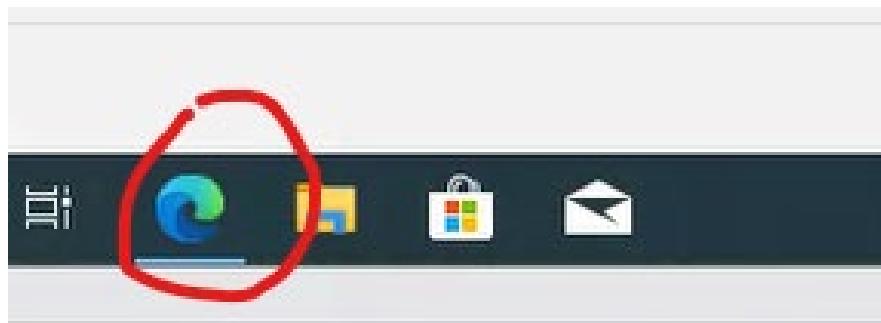
V) When prompted , click “Yes” and allow the system to reboot

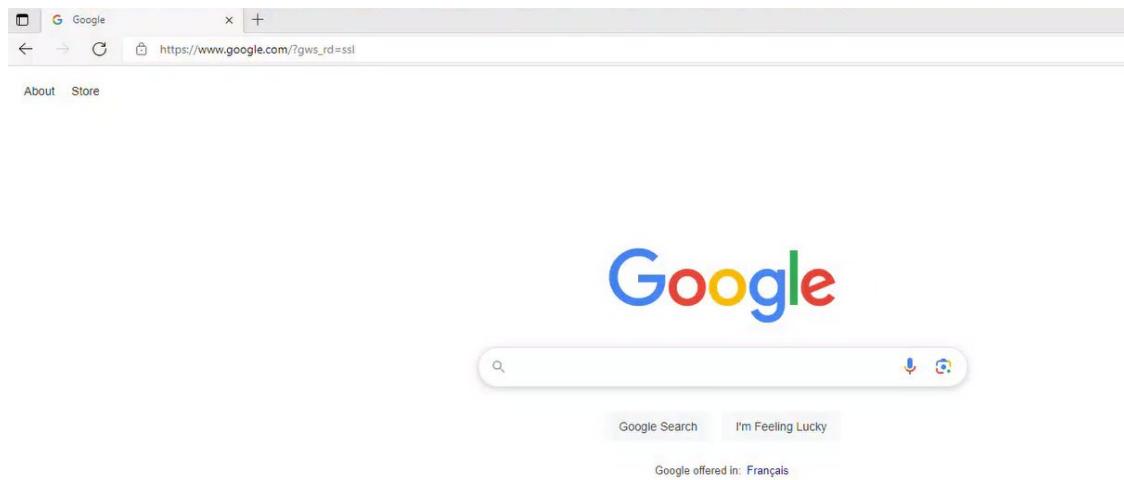


W) Once Windows is done rebooting, log in as user “student”



X) Once logged in, open the Microsoft Edge web browser to check your internet connection. Go to google.com to test it





### 3.6 Install Dovecot on Fedora and Test with outlook in Microsoft VM

Install and Configure Dovecot on windows

POP3 (Post Office Protocol version 3) is used for retrieving emails from a remote server to a local client.

Dovecot is an open-source IMAP and POP3 email server for Unix-like operating systems.

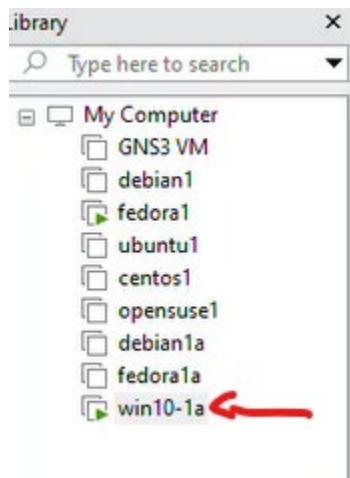
#### CHECKPOINT

**CONTINUE** to next section if virtual machine for windows 10 is installed up and running.

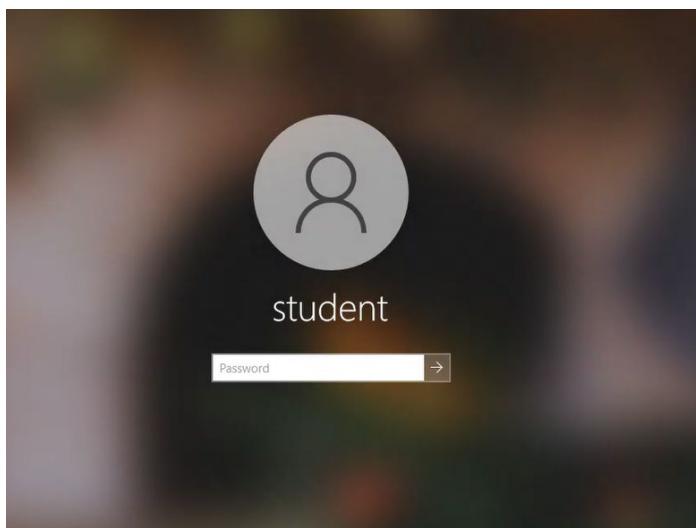
If condition is not met, the update can not be done procedure **STOP**s here.

#### 3.6.1 Install Microsoft office in Windows virtual machine

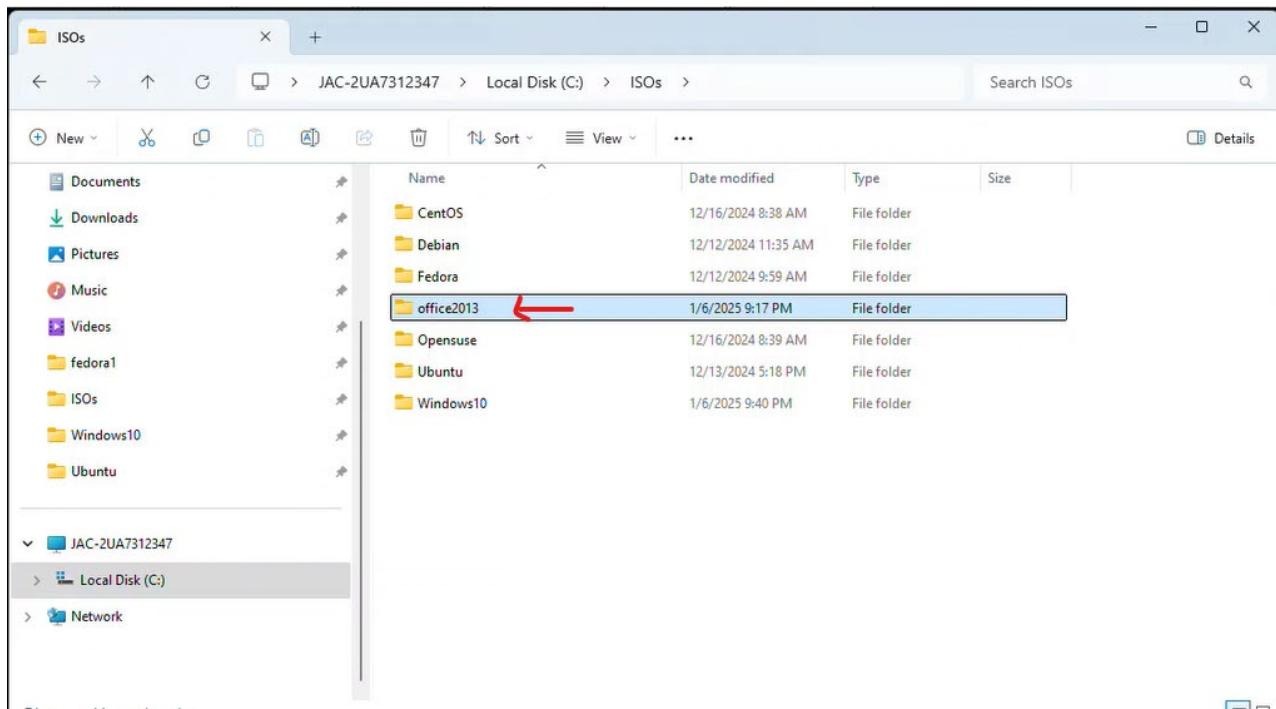
- Power on windows VM



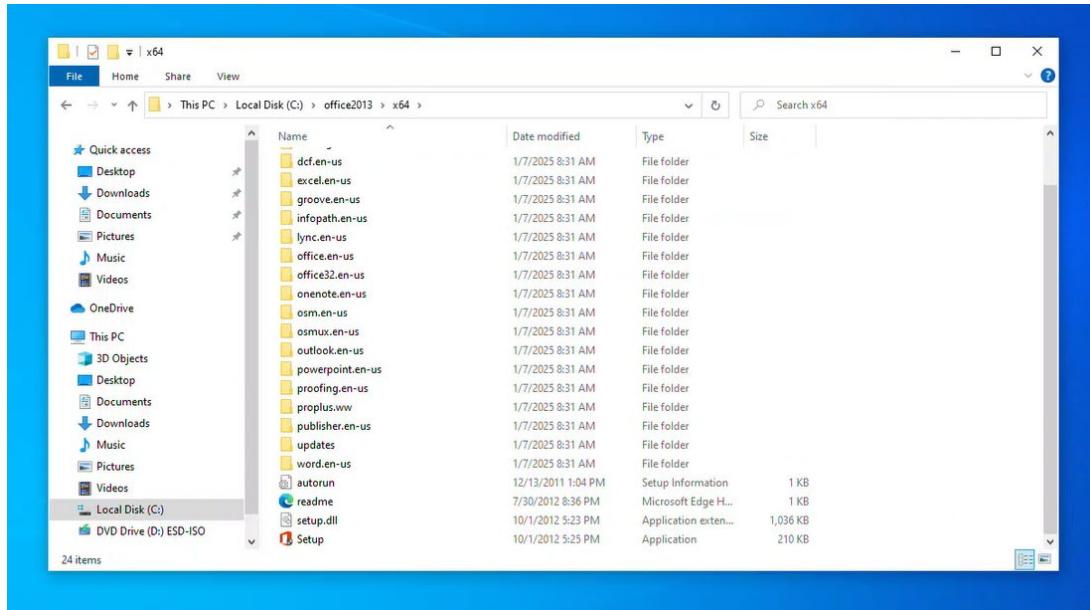
- Login as a student



c) Go to folder in your local drive and copy it to the office2013 to vm in c drive



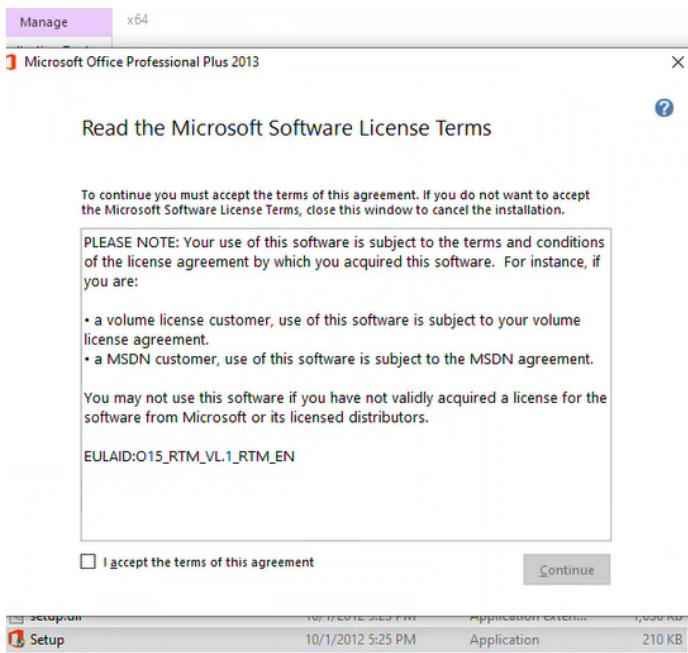
D) Run setup



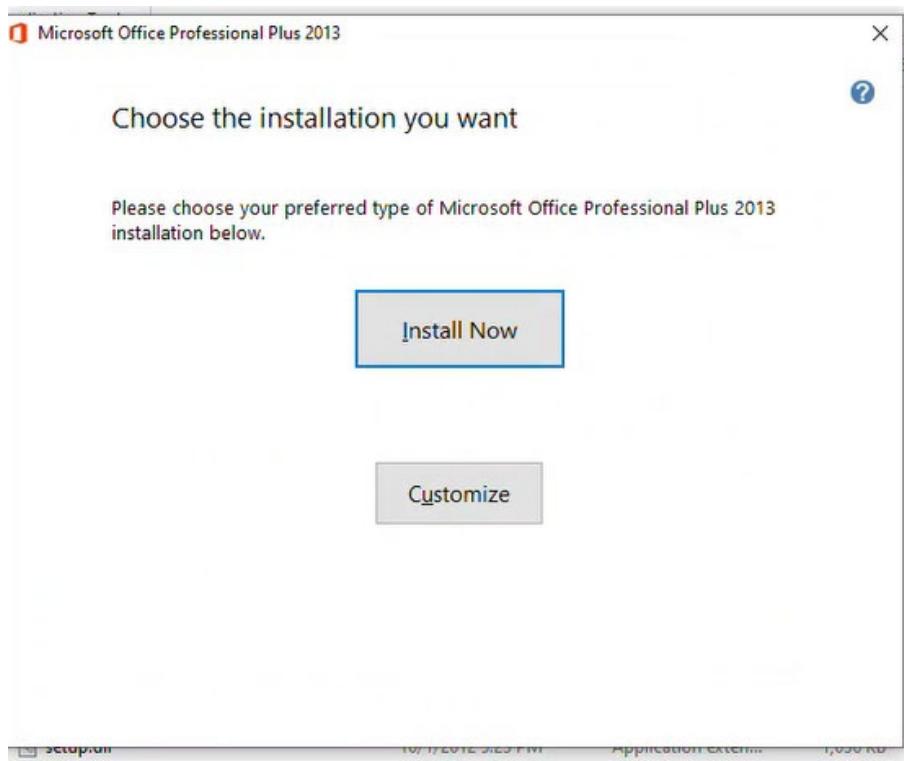
E) Answer yes to the question in the box below:



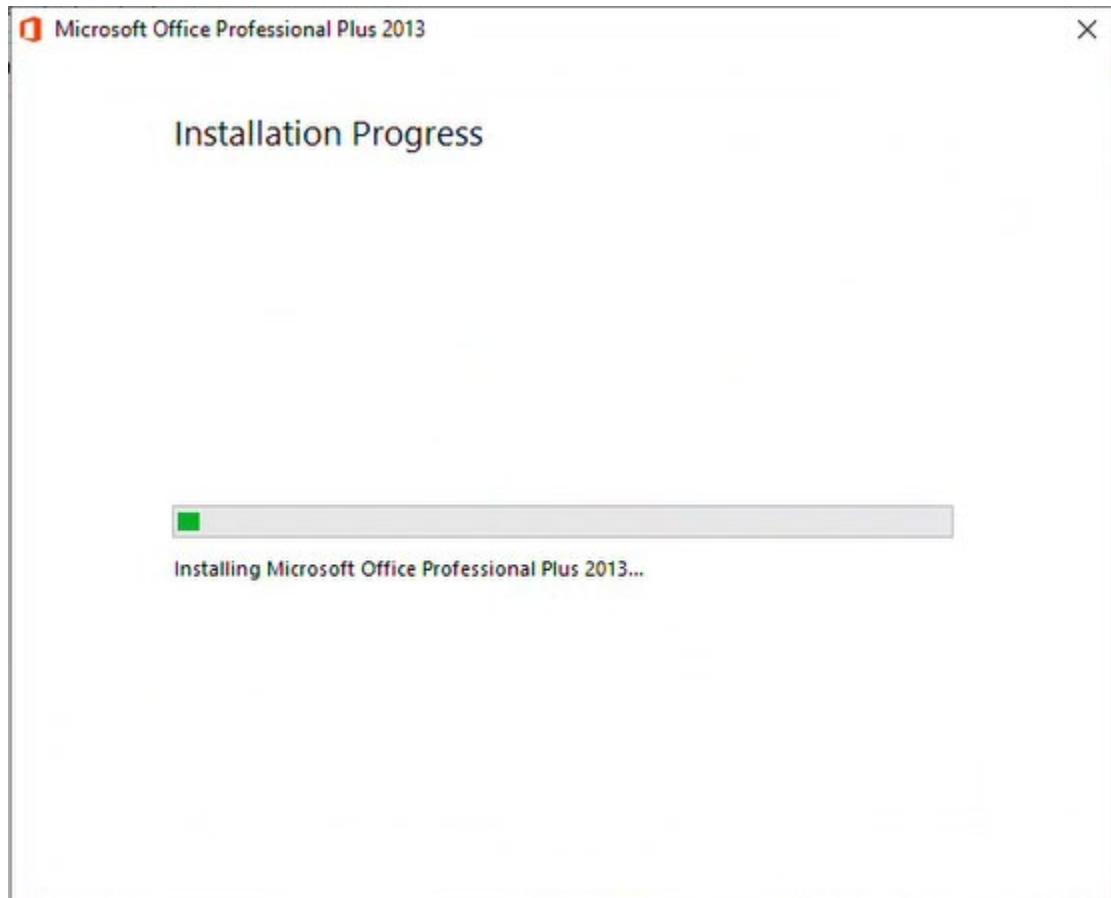
F) Accept license and terms



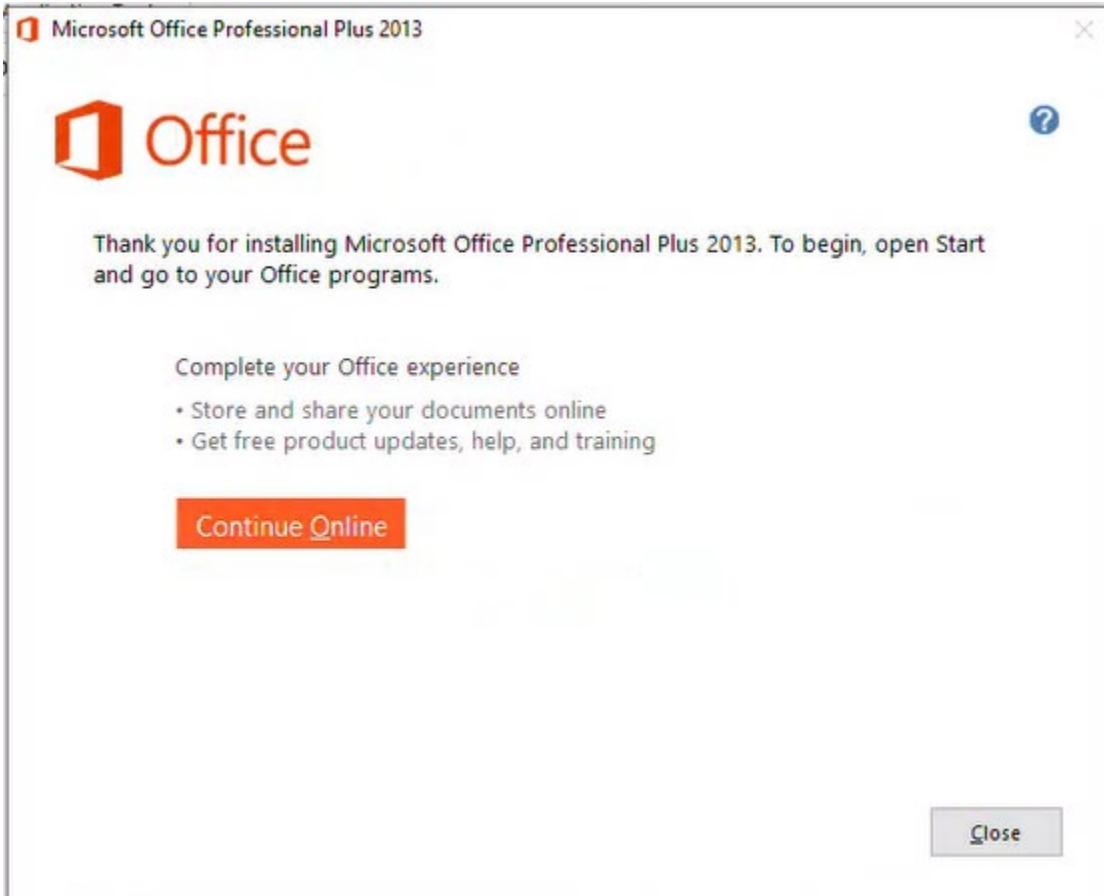
G) Initiate the installation clicking on “Install now”



- H) Installation will start and will take time; process progress will be shown.



I) Process is finished , select close



### 3.6.2 Install Dovecot in Fedora machine

A) Install dovecot:

# dnf install dovecot -y

```
root@fedora:/etc/mail# dnf install dovecot -y
Updating and loading repositories:
Repositories loaded.
Package           Arch      Version       Repository      Size
dovecot          x86_64    1:2.3.21.1-1.fc41   fedora        18.3 MiB
Transaction Summary:
Installing:      1 package

Total size of inbound packages is 5 MiB. Need to download 5 MiB.
After this operation, 18 MiB extra will be used (Install 18 MiB, remove 0 B).
[1/1] dovecot-1:2.3.21.1-1.fc41.x86_64
[1/1] Total
Running transaction
[1/3] Verify package files
[2/3] Prepare transaction
[3/3] Installing dovecot-1:2.3.21.1-1.fc41.x86_64
Complete!
root@fedora:/etc/mail#
```

B) Check the file dovecot.conf and see the line protocols is commented out we might need it to change it after

cat dovecot.conf

```
root@fedora1:/etc/dovecot# cat dovecot.conf | grep protocol
# Most (but not all) settings can be overridden by different protocols and/or
# protocol imap { }, local 127.0.0.1 { }, remote 10.0.0.0/8 { }
protocols = imap pop3 lmtp submission
root@fedora1:/etc/dovecot# _
```

C) Go to /etc/dovecot/conf.d directory and list the contents

```
cd /etc/dovecot/conf.d
```

```
ls /etc/dovecot/conf.d
```

```
#protocols = imap pop3 lmtp submission
root@fedora1:/etc/dovecot# ls -ltrah
total 12K
-rw-r--r--. 1 root root 4.3K Aug 13 06:37 dovecot.conf
drwxr-xr-x. 1 root root 794 Jan 7 11:59 conf.d
drwxr-xr-x. 1 root root 36 Jan 7 11:59 .
drwxr-xr-x. 1 root root 4.9K Jan 7 11:59 ..
root@fedora1:/etc/dovecot#
```

```
root@fedora1:/etc/dovecot# cd conf.d
root@fedora1:/etc/dovecot/conf.d# ls -ltrah
total 128K
-rw-r--r--. 1 root root 2.2K Aug 13 06:37 auth-system.conf.ext
-rw-r--r--. 1 root root 611 Aug 13 06:37 auth-static.conf.ext
-rw-r--r--. 1 root root 788 Aug 13 06:37 auth-sql.conf.ext
-rw-r--r--. 1 root root 515 Aug 13 06:37 auth-passwdfile.conf.ext
-rw-r--r--. 1 root root 561 Aug 13 06:37 auth-master.conf.ext
-rw-r--r--. 1 root root 924 Aug 13 06:37 auth-ldap.conf.ext
-rw-r--r--. 1 root root 343 Aug 13 06:37 auth-dict.conf.ext
-rw-r--r--. 1 root root 489 Aug 13 06:37 auth-deny.conf.ext
-rw-r--r--. 1 root root 499 Aug 13 06:37 auth-checkpassword.conf.ext
-rw-r--r--. 1 root root 2.6K Aug 13 06:37 90-quota.conf
-rw-r--r--. 1 root root 292 Aug 13 06:37 90-plugin.conf
-rw-r--r--. 1 root root 676 Aug 13 06:37 90-acl.conf
-rw-r--r--. 1 root root 4.2K Aug 13 06:37 20-submission.conf
-rw-r--r--. 1 root root 4.0K Aug 13 06:37 20-pop3.conf
-rw-r--r--. 1 root root 1.4K Aug 13 06:37 20-lmtp.conf
-rw-r--r--. 1 root root 4.5K Aug 13 06:37 20-imap.conf
-rw-r--r--. 1 root root 3.1K Aug 13 06:37 15-mailboxes.conf
-rw-r--r--. 1 root root 1.7K Aug 13 06:37 15-lda.conf
-rw-r--r--. 1 root root 1.6K Aug 13 06:37 10-metrics.conf
-rw-r--r--. 1 root root 3.6K Aug 13 06:37 10-master.conf
-rw-r--r--. 1 root root 3.7K Aug 13 06:37 10-logging.conf
-rw-r--r--. 1 root root 1.8K Aug 13 06:37 10-director.conf
-rw-r--r--. 1 root root 5.2K Aug 13 06:37 10-auth.conf
-rw-r--r--. 1 root root 3.6K Aug 18 20:00 10-ssl.conf
-rw-r--r--. 1 root root 18K Aug 18 20:00 10-mail.conf
root@fedora1:/etc/dovecot/conf.d# _
```

D) Inside the file 10-mail.conf I see there are locations for email that will be later changed. Those configurations indicate where the mail is stored.

```
cat /etc/dovecot/conf.d/10-mail.conf | grep "mail_loca"
```

```
vi /etc/dovecot/conf.d/10-mail.conf
```

```
root@fedora1:/etc/dovecot/conf.d# cat 10-mail.conf | grep "mail_loca"
# path given in the mail_location setting.
# mail_location = maildir:~/Maildir
# mail_location = mbox:~/mail:INBOX=/var/mail/%u
# mail_location = mbox:/var/mail/%d/%n/%n:INDEX=/var/indexes/%d/%n/%n
#mail_location =
    # mail_location, which is also the default for it.
root@fedora1:/etc/dovecot/conf.d# _
```

```
root@fedora1:/etc/dovecot/conf.d# vi 10-mail.conf
```

E) Uncomment line related to location of mail save the file and exit

```
# %u - username
# %m - user part in user@domain, same as %u if there's no domain
# %d - domain part in user@domain, empty if there's no domain
# %h - home directory
#
# See doc/wiki/Variables.txt for full list. Some examples:
#
# mail_location = maildir:~/Maildir
# mail_location = mbox:~/mail:INBOX=/var/mail/%u ←
# mail_location = mbox:/var/mail/%d/%n/%n:INDEX=/var/indexes/%d/%n/%n
#
# <doc/wiki/MailLocation.txt>
#
#mail_location =
```

```
root@fedora1:/etc/dovecot/conf.d# cat 10-mail.conf | grep "mail_loca"
# path given in the mail_location setting.
# mail_location = maildir:~/Maildir
# mail_location = mbox:~/mail:INBOX=/var/mail/%u
# mail_location = mbox:/var/mail/%d/%n/%n:INDEX=/var/indexes/%d/%n/%n
#mail_location =
    # mail_location, which is also the default for it.
root@fedora1:/etc/dovecot/conf.d#
```

F) List files in /var/mail

```
# mail_location, which is also the default for it.
root@fedora1:/etc/dovecot/conf.d# ls /var/mail
asmith bsimth root rpc student
root@fedora1:/etc/dovecot/conf.d# ls -lth /var/mail
```

```
rw-rw-rwx. 1 root root 18 Jul 16 20:00 /var/mail -> spool/mail  
root@fedora1:/etc/dovecot/conf.d# ls -lthr /var/mail  
lrwxrwxrwx. 1 root root 18 Jul 16 20:00 /var/mail -> spool/mail  
root@fedora1:/etc/dovecot/conf.d# _
```

G) Go to directory /var/spool/mail

```
root@fedora1:/etc/dovecot/conf.d# cd /var/spool/mail/  
root@fedora1:/var/spool/mail# ls -lthr  
total 68K  
-rw-rw----. 1 rpc mail 0 Oct 24 10:50 rpc  
-rw-rw----. 1 student mail 0 Dec 13 03:48 student  
-rw-rw----. 1 asmith mail 0 Dec 20 02:13 asmith  
-rw-rw----. 1 bsimth mail 0 Jan 7 02:00 bsimth  
-rw-----. 1 root root 66K Jan 7 11:50 root  
root@fedora1:/var/spool/mail# _
```

H) If we open the file we can see for example for root, this is where all the email is stored,

```
root@fedora1:/var/spool/mail# vi root
```

```
Action: failed  
Status: 4.4.7  
Last-Attempt-Date: Mon, 6 Jan 2025 08:37:45 -0500  
--506Dbig6001090.1736170665/fedora1.fed1.com  
Content-Type: message/rfc822  
  
Return-Path: <root@fedora1.fed1.com>  
Received: from fedora1.fed1.com (localhost [127.0.0.1])  
    by fedora1.fed1.com (8.18.1/8.18.1) with ESMTPS id 4BIH0s1177788  
    (version=TLSv1.3 cipher=TLS_AES_256_GCM_SHA384 bits=256 verify=NOT);  
    Wed, 18 Dec 2024 12:51:24 -0500  
Received: from localhost (root@localhost)  
    by fedora1.fed1.com (8.18.1/8.18.1/Submit) with ESMTP id 4BIH0sP177767;  
    Wed, 18 Dec 2024 12:51:22 -0500  
Date: Wed, 18 Dec 2024 12:51:20 -0500 (EST)  
From: Super User <root@fedora1.fed1.com>  
To: root@fed8.ca, root@fed8.com  
Subject: Test to Human fed8 .com and .ca  
Message-ID: <dfe5550-aab0-3da9-3eff-3de3fb6d377a@fedora1.fed1.com>  
MIME-Version: 1.0  
Content-Type: text/plain; format=flowed; charset=US-ASCII  
  
Hi Human  
  
--506Dbig6001090.1736170665/fedora1.fed1.com--  
  
From root@fedora1.fed1.com Tue Jan 7 11:48:55 2025  
Return-Path: <root@fedora1.fed1.com>  
Received: from fedora1.fed1.com (localhost [127.0.0.1])  
    by fedora1.fed1.com (8.18.1/8.18.1) with ESMTPS id 507GmsE2017844  
    (version=TLSv1.3 cipher=TLS_AES_256_GCM_SHA384 bits=256 verify=NOT)  
    for <root@fed1.net>; Tue, 7 Jan 2025 11:48:55 -0500  
Received: from localhost (root@localhost)  
    by fedora1.fed1.com (8.18.1/8.18.1/Submit) with ESMTP id 507GmsQ2017841  
    for <root@fed1.net>; Tue, 7 Jan 2025 11:48:54 -0500  
Date: Tue, 7 Jan 2025 11:48:54 -0500 (EST)  
From: Super User <root@fedora1.fed1.com>  
To: root@fed1.net  
Subject: TEst  
Message-ID: <d54962f0-ed91-39d6-44a7-4499a0974bfe@fedora1.fed1.com>  
MIME-Version: 1.0  
Content-Type: text/plain; format=flowed; charset=US-ASCII  
Status: R0  
X-Status:  
X-Keywords:  
X-UID: 41
```

- I) Enable and start dovecot, then verify its status:

```
systemctl enable dovecot
```

```
systemctl start dovecot
```

```
systemctl status dovecot
```

```
root@fedora1:/var/spool/mail# # enable dovecot
root@fedora1:/var/spool/mail# systemctl enable dovecot.service
Created symlink /etc/systemd/system/multi-user.target.wants/dovecot.service → '/usr/lib/systemd/system/dovecot.service'.
root@fedora1:/var/spool/mail# systemctl start dovecot.service
root@fedora1:/var/spool/mail# systemctl status dovecot.service
● dovecot.service - Dovecot IMAP/POP3 email server
   Loaded: loaded (/usr/lib/systemd/system/dovecot.service; enabled; preset: disabled)
   Drop-In: /usr/lib/systemd/system/dovecot.service.d
             └─10-timeout-abort.conf 50-kern-warn.conf
     Active: active (running) since Tue 2025-01-07 16:46:24 EST; 10s ago
   Invocation: systemctl start dovecot.service
   Docs: man:dovecot(1)
         https://doc.dovecot.org/
 Main PID: 66536 (dovecot)
 Status: "v2.3.21.1 (d492236fa0) running"
   Tasks: 4 (limit: 8771)
  Memory: 5.3M (peak: 5.6M)
    CPU: 0ms
   CGroup: /system.slice/dovecot.service
           ├─66536 /usr/sbin/dovecot -F
           ├─66538 dovecot/anvil
           ├─66539 dovecot/log
           ├─66540 dovecot/config
Jan 07 16:46:24 fedora1 systemd[1]: Starting dovecot.service - Dovecot IMAP/POP3 email server...
Jan 07 16:46:24 fedora1 dovecot[66536]: master: Dovecot v2.3.21.1 (d492236fa0) starting up for imap, pop3, lmtp
Jan 07 16:46:24 fedora1 systemd[1]: Started dovecot.service - Dovecot IMAP/POP3 email server.
root@fedora1:/var/spool/mail#
```

- J) Confirm the ip address with command ifconfig to be used in next step

```
ifconfig
```

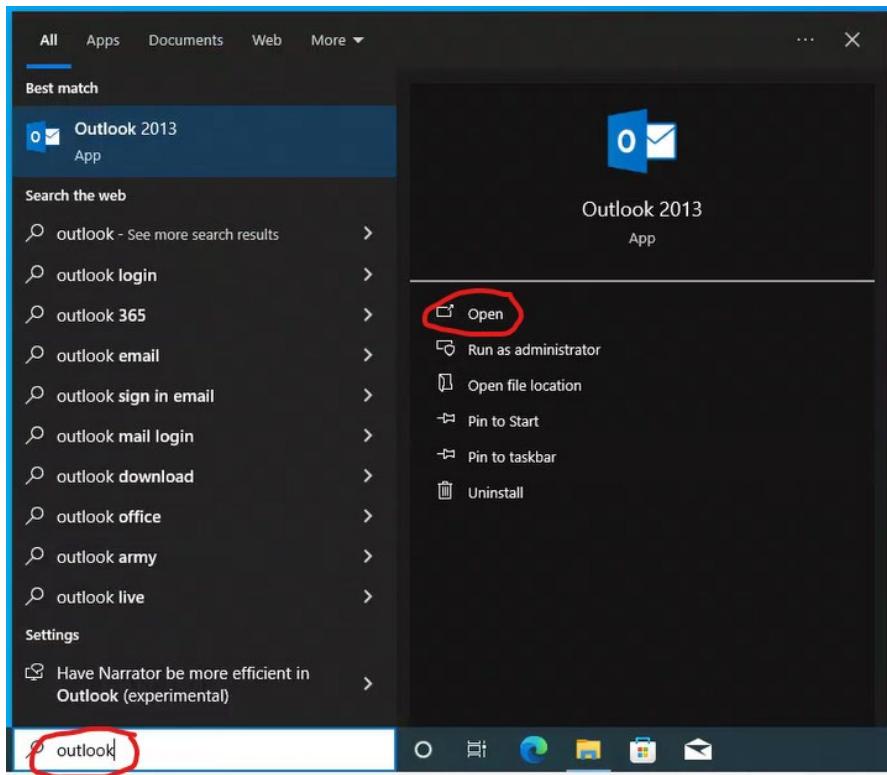
```
root@fedora1:/var/spool/mail# ifconfig
ens160: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
      inet 10.164.181.1 netmask 255.255.0.0 broadcast 10.164.255.255
        inet6 fe80::ece8:a77c:9ca1:38b4 prefixlen 64 scopeid 0x20<link>
          ether 00:0c:29:43:9c:55 txqueuelen 1000 (Ethernet)
            RX packets 1193261 bytes 110595131 (105.4 MiB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 16472 bytes 2103224 (2.0 MiB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
      inet 127.0.0.1 netmask 255.0.0.0
        inet6 ::1 prefixlen 128 scopeid 0x10<host>
          loop txqueuelen 1000 (Local Loopback)
            RX packets 5085 bytes 386931 (377.8 KiB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 5085 bytes 386931 (377.8 KiB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

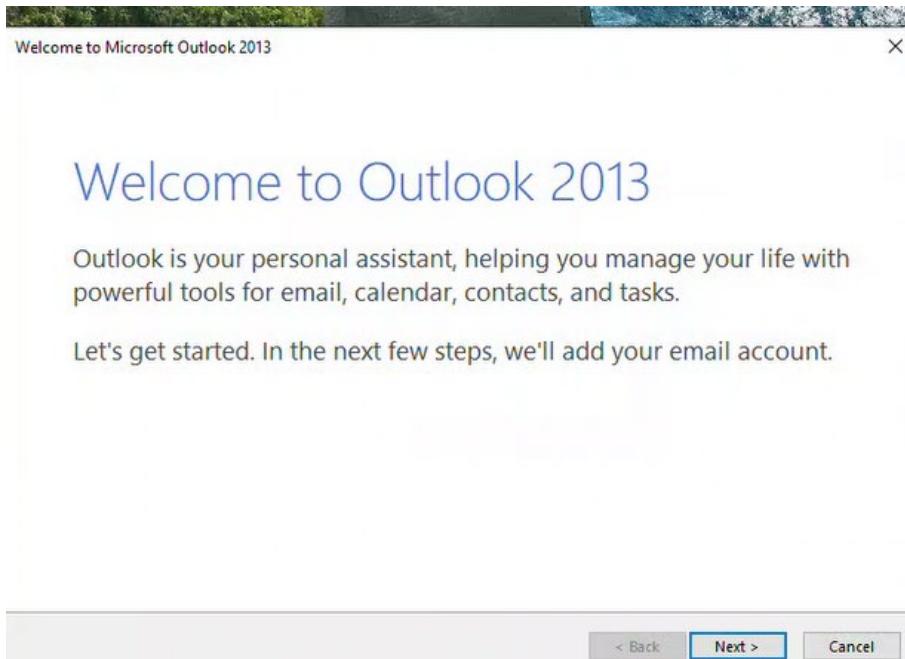
root@fedora1:/var/spool/mail# _
```

### 3.6.3 Setup and run outlook in windows virtual machine

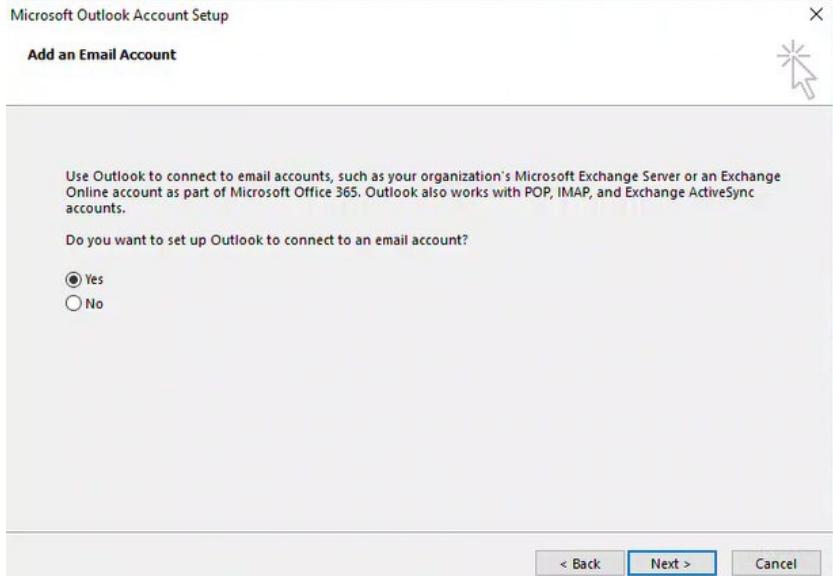
- A) Type outlook in the Search box once found open it



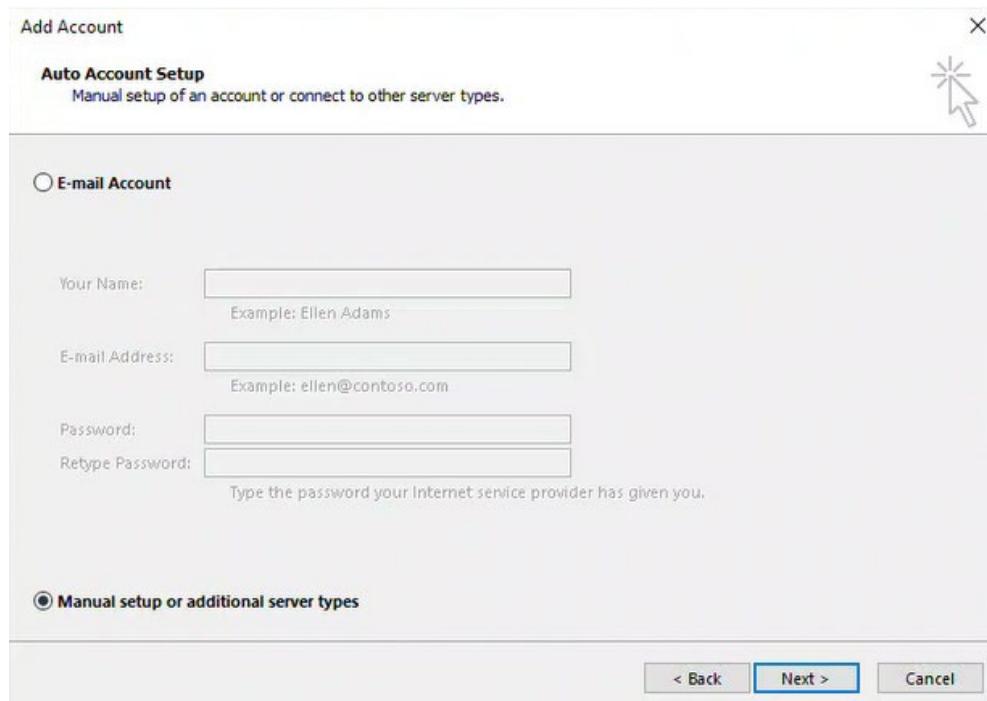
B) Go through the installation wizard menus



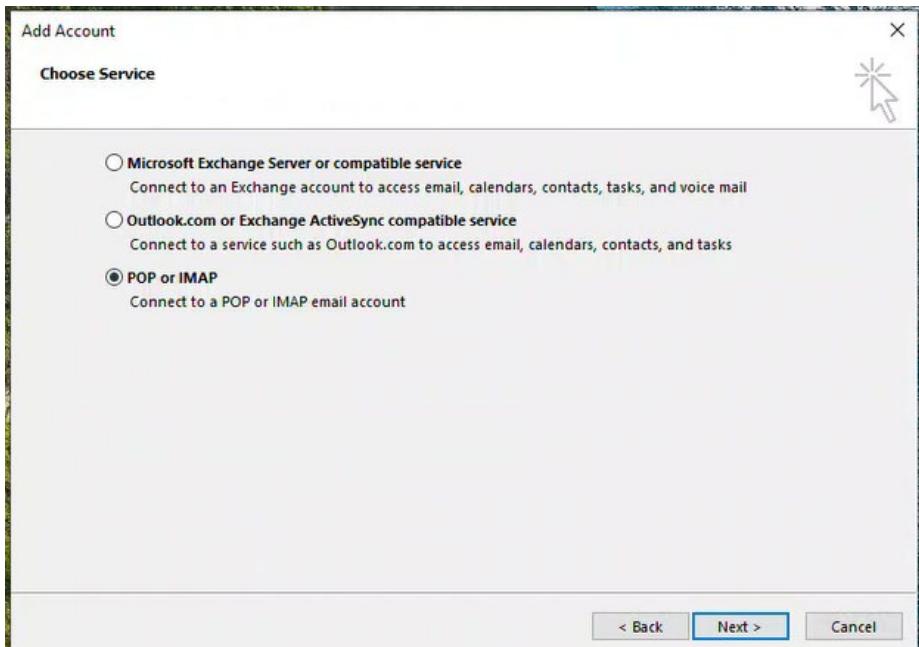
C) We want to install an email say yes



#### D) Select Manual setup or additional server types



#### E) Choose service “POP or IMAP”



F) Add account

Name is asmith

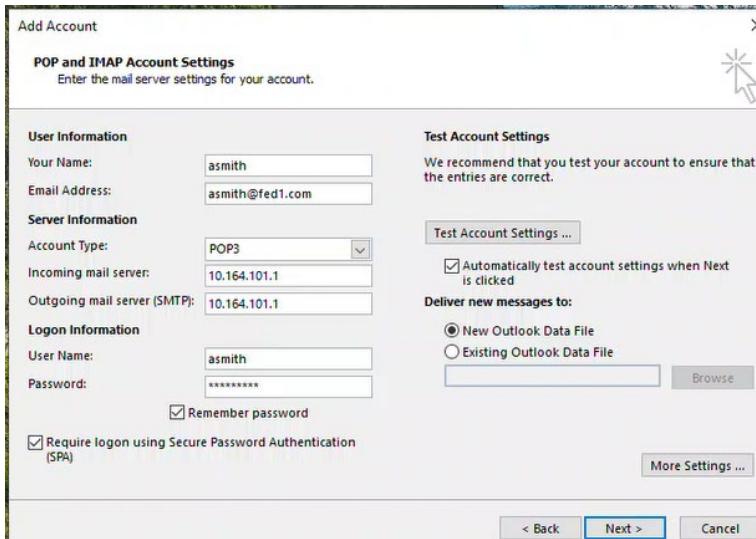
Email [asmith@fed1.com](mailto:asmith@fed1.com)

Put the ip address 10.164.101.1 for incoming and outgoing

Username asmith

Password Amf123456

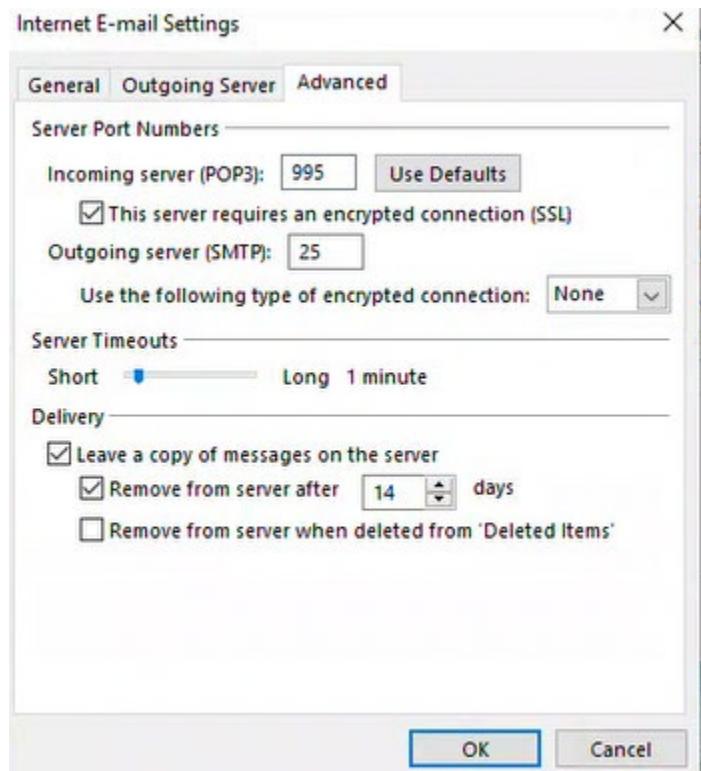
Require login using secure password authentication is selected



G) More settings/Outgoing server/Advanced

Select This server requires an encrypted connection (SSL)

Press ok



### 3.6.4 Set user and permissions on mail files in Fedora

- A) Go back to fedora and verify if user asmith already exists. Create it if it does not exist,

Pwd

Under /var/spool/mail asmith has been created

```
root@fedora1:/var/spool/mail# pwd
/var/spool/mail
root@fedora1:/var/spool/mail# ls -lthr
total 68K
-rw-rw----. 1 rpc      mail    0 Oct 24 10:50 rpc
-rw-rw----. 1 student   mail    0 Dec 13 03:40 student
-rw-rw----. 1 asmith   mail    0 Dec 20 02:13 asmith
-rw-rw----. 1 bsimth   mail    0 Jan  7 02:00 bsimth
-rw-----. 1 root     root   66K Jan  7 11:50 root
root@fedora1:/var/spool/mail#
```

- B) Check permissions are not same as root  
C) Chmod 600 \* to set permissions as root where anyone except for the owner has read and write access

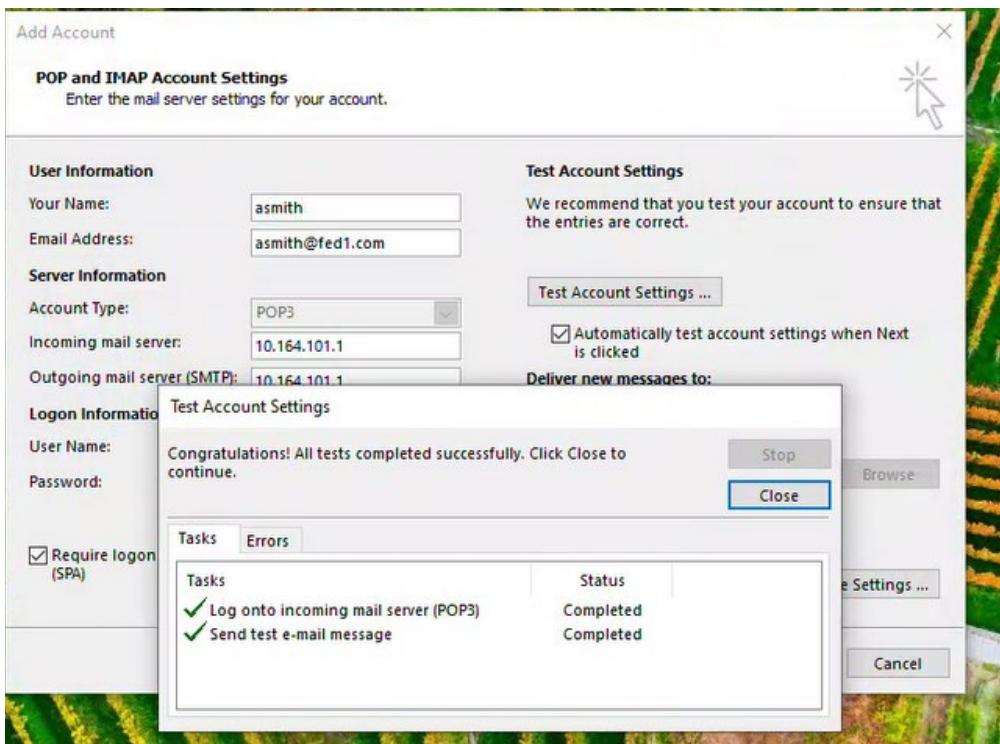
```

-rw----- . 1 root      root 66K Jan  7 11:50 root
root@fedora1:/var/spool/mail# chmod 600 *
root@fedora1:/var/spool/mail# ls -ltrh
total 68K
-rw----- . 1 rpc      mail    0 Oct 24 10:50 rpc
-rw----- . 1 student   mail    0 Dec 13 03:40 student
-rw----- . 1 asmith   mail    0 Dec 20 02:13 asmith
-rw----- . 1 bsimth   mail    0 Jan  7 02:00 bsimth
-rw----- . 1 root     root 66K Jan  7 11:50 root
root@fedora1:/var/spool/mail#

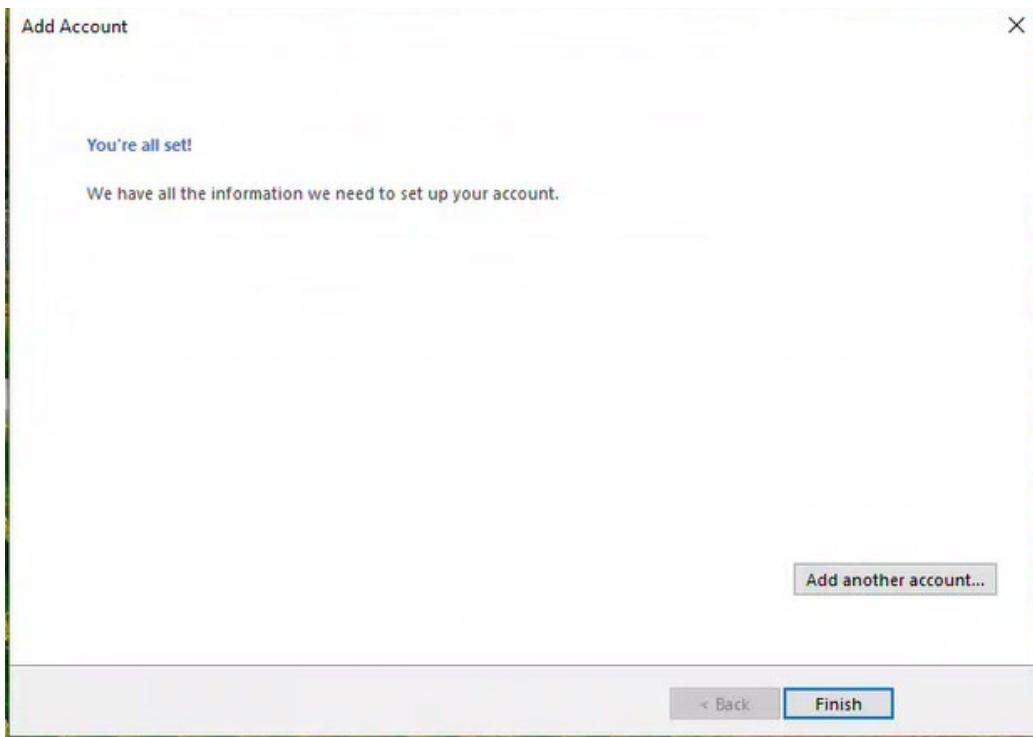
```

### 3.6.5 Test send/receive emails in Outlook

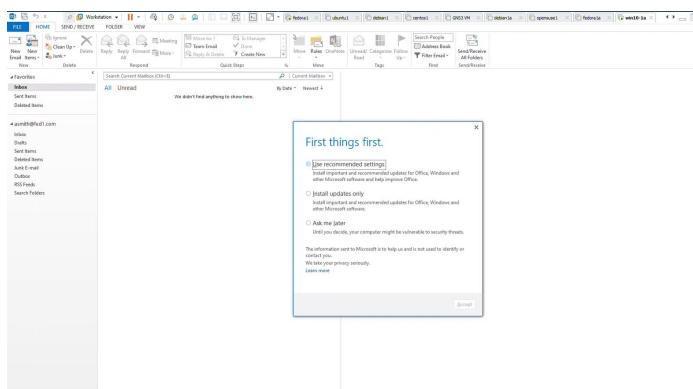
- A) Go back to windows 10, let test you can send emails press Test Account settings . The test is done and is successful we are ready to send and receive emails  
 Press close in test Account Settings, then press next (test will run again press close again) and then finish



- B) Press finish

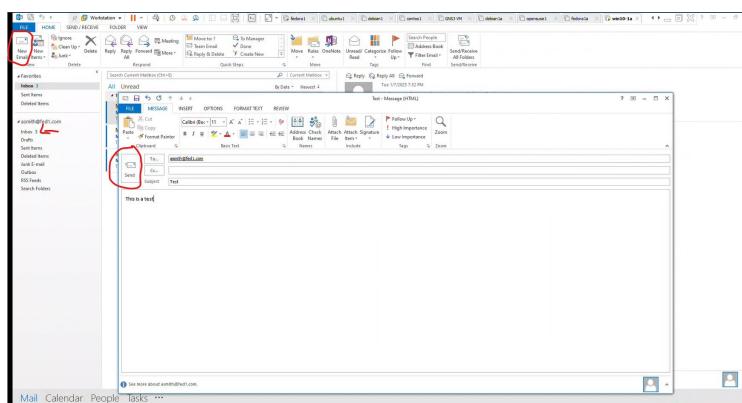


C) Outlook will open automatically, in the screen first things first select Ask me later

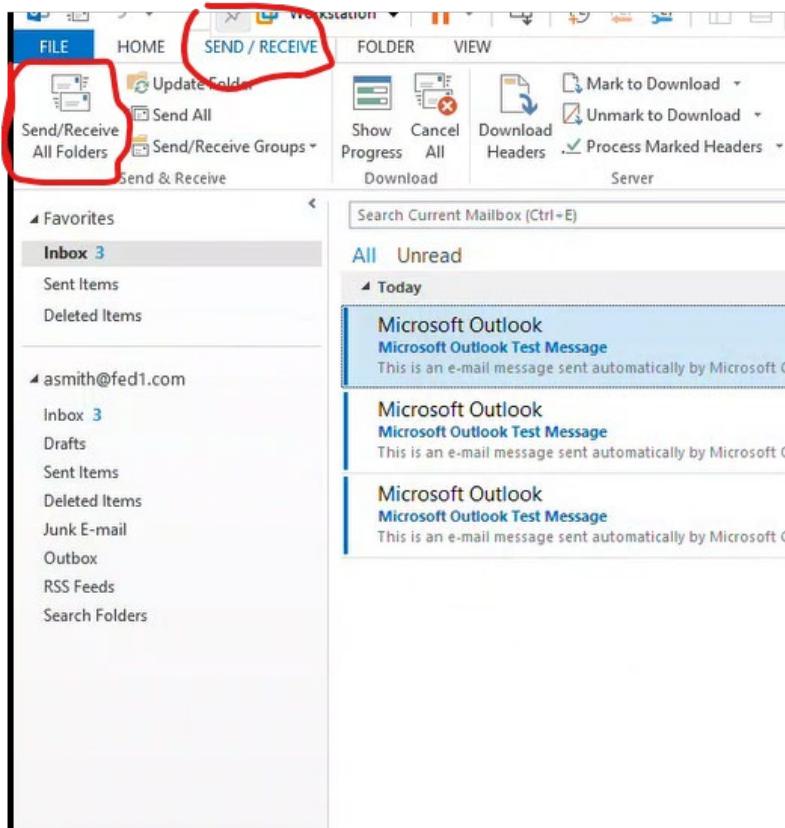


D) Click on inbox

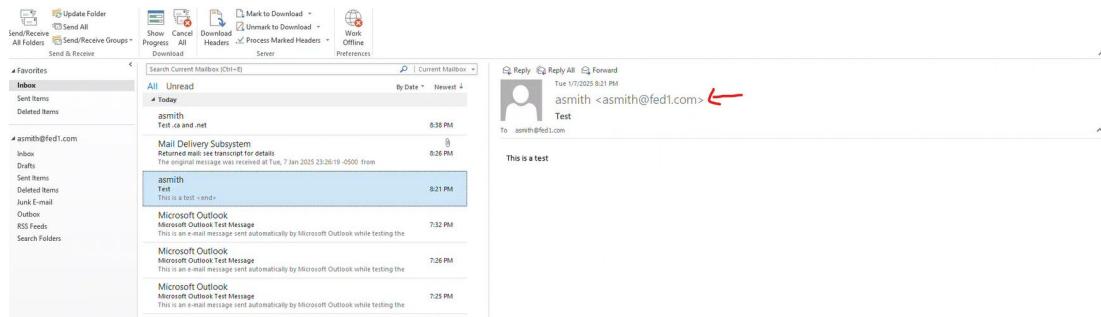
E) Click on new mail to try to send email to [asmith@fed1.com](mailto:asmith@fed1.com), title test, Press Send



F) Press send and receive



G) And you can see the test message in inbox



## 3.7 Install Apache in Fedora

The Apache web server is a popular choice for hosting websites and applications, known for its reliability and flexibility. After installing Apache, you can use its robust capabilities to efficiently host and control your websites.

### 3.7.1 Install and configure Apache on Fedora

```
Nothing to do.
root@federal:~# cd /etc/httpd/
root@federal:/etc/httpd# ls -ltrah
total 20K
lrwxrwxrwx. 1 root root 19 Jul 31 20:00 state -> ../../var/lib/httpd
lrwxrwxrwx. 1 root root 10 Jul 31 20:00 run -> /run/httpd
lrwxrwxrwx. 1 root root 29 Jul 31 20:00 modules -> ../../usr/lib64/httpd/modules
lrwxrwxrwx. 1 root root 19 Jul 31 20:00 logs -> ../../var/log/httpd
drwxr-xr-x. 1 root root 88 Dec 20 03:24 conf.d
drwxr-xr-x. 1 root root 30 Dec 20 03:24 conf
drwxr-xr-x. 1 root root 86 Dec 20 03:24 .
drwxr-xr-x. 1 root root 292 Dec 20 03:24 conf.modules.d
drwxr-xr-x. 1 root root 4.9K Jan 8 09:56 ..
root@federal:/etc/httpd# cd conf
root@federal:/etc/httpd/conf# ls
httpd.conf magic
root@federal:/etc/httpd/conf#
```

- A) Connect to the fedora box and log into root:

```
Last login: Fri Jan 10 17:10
student@federalf:~$ su -
Password:
```

- B) Enter “**dnf install httpd**”. You will see that httpd is already installed.

```
dnf install httpd
```

```
root@federalf:~# dnf install httpd
Updating and loading repositories:
Repositories loaded.
Package "httpd-2.4.62-2.fc41.x86_64" is already installed.

Nothing to do.
```

- C) Check the status of Apache web server by entering “**systemctl status httpd**”. You will see that it is **disabled** and **inactive**.

**systemctl status httpd**

```
Last login: Wed Jan 8 10:28:10 2025 from 10.164.101.1
www.fed1.com@federal:~$ su -
Password:
root@federal:~# systemctl status httpd
● httpd.service - The Apache HTTP Server
   Loaded: loaded (/usr/lib/systemd/system/httpd.service; disabled; preset: disabled)
   Drop-In: /usr/lib/systemd/system/service.d
             └─10-timeout-abort.conf, 50-keep-warm.conf
     Active: inactive (dead)
       Docs: man:httpd.service(8)
root@federal:~# dnf install httpd
Updating and loading repositories:
Repositories loaded.
Package "httpd-2.4.62-2.fc41.x86_64" is already installed.

Nothing to do.
root@federal:~#
```

D) Enable Apache by entering

```
systemctl enable httpd
```

```
root@federal:~# systemctl enable httpd
Created symlink '/etc/systemd/system/multi-user.target.wants/httpd.service' → '/usr/lib/systemd/system/httpd.service'.
root@federal:~#
```

E) Start `systemctl start httpd`

```
root@federal:~# systemctl start httpd
```

F) Check the status of Apache by entering “`systemctl status httpd`”. You will see that it is now **enabled** and **active (running)**.

```
systemctl status httpd
```

```
root@federal:~# systemctl status httpd
● httpd.service - The Apache HTTP Server
   Loaded: loaded (/usr/lib/systemd/system/httpd.service; enabled; preset: disabled)
   Drop-In: /usr/lib/systemd/system/service.d
             └─10-timeout-abort.conf, 50-keep-warm.conf
     Active: active (running) since Wed 2025-01-08 11:41:52 EST; 2s ago
   Invocation: c77d7bee3e164ea7a1bed40ed1b51289
     Docs: man:httpd.service(8)
   Main PID: 253198 (httpd)
     Status: "Started, listening on: port 80"
       Tasks: 177 (limit: 8771)
      Memory: 17.9M (peak: 18.1M)
        CPU: 189ms
      CGroup: /system.slice/httpd.service
              ├─253198 /usr/sbin/httpd -DFOREGROUND
              ├─253201 /usr/sbin/httpd -DFOREGROUND
              ├─253202 /usr/sbin/httpd -DFOREGROUND
              ├─253203 /usr/sbin/httpd -DFOREGROUND
              └─253205 /usr/sbin/httpd -DFOREGROUND

Jan 08 11:41:52 federal systemd[1]: Starting httpd.service - The Apache HTTP Server...
Jan 08 11:41:52 federal (httpd)[253198]: httpd.service: Referenced but unset environment variable evaluates to an empty string: OPTIONS
Jan 08 11:41:52 federal httpd[253198]: AH00548: NameVirtualHost has no effect and will be removed in the next release /etc/httpd/conf.d/vhosts.conf:1
Jan 08 11:41:52 federal httpd[253198]: AH00112: Warning: DocumentRoot [/home/www.fed1.net/public_htm] does not exist
Jan 08 11:41:52 federal httpd[253198]: Server configured, listening on: port 80
Jan 08 11:41:52 federal systemd[1]: Started httpd.service - The Apache HTTP Server.
root@federal:~#
```

G) Go to `/etc/httpd/conf`

Directory `/etc/httpd/conf/`: Centralizes the main configuration file `httpd.conf` and essential settings.

```
cd /etc/httpd/conf
```

```
root@federal:f# cd /etc/httpd/conf.d
```

H) List content in directory

```
ls -lqrtha
```

```
root@federal1f:/etc/httpd/conf# ls -ltrqha
total 28K
-rw-r--r--. 1 root root 14K Jul 31 20:00 magic
-rw-r--r--. 1 root root 12K Jul 31 20:00 httpd.conf
drwxr-xr-x. 1 root root 86 Oct 24 10:50 ..
drwxr-xr-x. 1 root root 30 Oct 24 10:50 .
root@federal1f:/etc/httpd/conf# |
```

I) Check the contents of [httpd.conf](#)

The httpd.conf file holds the global settings for the Apache server, including server-wide directives and configurations.

We can find some elements

- **Server root directive** The ServerRoot directive in the httpd.conf file specifies the top-level directory where the Apache HTTP server's configuration, error, and log files are located. It serves as the base directory for relative paths specified in the configuration file.

```
# 
# ServerRoot: The top of the directory tree under which the server's
# configuration, error, and log files are kept.
#
# Do not add a slash at the end of the directory path. If you point
# ServerRoot at a non-local disk, be sure to specify a local disk on the
# Mutex directive, if file-based mutexes are used. If you wish to share the
# same ServerRoot for multiple httpd daemons, you will need to change at
# least PidFile.
#
ServerRoot "/etc/httpd"
```

- The **Listen 80** directive in the httpd.conf file tells the Apache HTTP server to listen for incoming connections on port 80, which is the default port for HTTP traffic.

```
# 
# Listen: Allows you to bind Apache to specific IP addresses and/or
# ports, instead of the default. See also the <VirtualHost>
# directive.
#
# Change this to Listen on a specific IP address, but note that if
# httpd.service is enabled to run at boot time, the address may not be
# available when the service starts. See the httpd.service(8) man
# page for more information.
#
#Listen 12.34.56.78:80
Listen 80
```

- **Modules** The httpd.conf file modules enhance the core functionality of Apache, enabling features like secure connections, URL rewriting, proxying, authentication, and

more. You can include or exclude modules based on the specific needs of your web server.

- **User:** Specifies the user account that the Apache server processes will run under. Ensures that the server has the necessary permissions while maintaining security by running with limited privileges.
- **Group:** Specifies the group that the Apache server processes will run under. Helps manage file permissions and access control.

```
#  
# If you wish httpd to run as a different user or group, you must run  
# httpd as root initially and it will switch.  
#  
# User/Group: The name (or #number) of the user/group to run httpd as.  
# It is usually good practice to create a dedicated user and group for  
# running httpd, as with most system services.  
#  
User apache  
Group apache
```

- **Main Server Configuration** This configuration sets up the basic parameters for the Apache server, including how it listens for connections, manages permissions, and logs activities. By adjusting these settings, you can tailor the server's behavior to meet your specific needs.

```
# 'Main' server configuration  
#  
# The directives in this section set up the values used by the 'main'  
# server, which responds to any requests that aren't handled by a  
# <VirtualHost> definition. These values also provide defaults for  
# any <VirtualHost> containers you may define later in the file.  
#  
# All of these directives may appear inside <VirtualHost> containers,  
# in which case these default settings will be overridden for the  
# virtual host being defined.  
#
```

- **ServerAdmin** directive in the httpd.conf file specifies the email address of the server administrator. This address is included in server-generated error messages, which can help users report issues they encounter. By setting the ServerAdmin directive, you ensure that users know whom to contact if they run into trouble with your website.

```
#  
# ServerAdmin: Your address, where problems with the server should be  
# e-mailed. This address appears on some server-generated pages, such  
# as error documents. e.g. admin@your-domain.com  
#  
ServerAdmin root@localhost
```

- By setting the DocumentRoot directive, you establish the base directory for your website's content, helping Apache know where to find the files it needs to serve to visitors.

```
#  
# DocumentRoot: The directory out of which you will serve your  
# documents. By default, all requests are taken from this directory, but  
# symbolic links and aliases may be used to point to other locations.  
#  
DocumentRoot "/var/www/html"
```

- By setting the DirectoryIndex directive, you control what default files Apache will look for and serve when a directory is requested, ensuring a smooth user experience.

```
#  
# DirectoryIndex: sets the file that Apache will serve if a directory  
# is requested.  
#  
<IfModule dir_module>  
    DirectoryIndex index.html  
</IfModule>
```

- Several special files, often referred to as .ht\* files, which control various aspects of web server behavior

```
#  
# The following lines prevent .htaccess and .htpasswd files from being  
# viewed by Web clients.  
#  
<Files ".ht*">  
    Require all denied  
</Files>
```

```
cat /etc/httpd/conf/httpd.conf
```

J) Go to [/etc/httpd/conf.d](#)

Directory [/etc/httpd/conf.d](#): Provides a way to modularize configurations, allowing for easier management of virtual hosts, modules, and additional settings.

```
cd /etc/httpd/conf.d
```

```
root@fedoral:/etc/httpd/conf.d# pwd  
/etc/httpd/conf.d  
root@fedoral:/etc/httpd/conf.d# |
```

K) Create vhosts file including all three users.

The vhosts.conf file is used to configure virtual hosts in the Apache HTTP server

```
vi /etc/httpd/conf.d/vhosts.conf
```

```
root@federal:/etc/httpd/conf.d# vi vhosts.conf
```

L) Add the following lines n the **vhosts.conf** file

```
NameVirtualHost 10.164.101.1
<VirtualHost 10.164.101.1>
    ServerName www.fed1.com
    ServerAlias fed1.com
    DocumentRoot /home/www.fed1.com/public_html
</VirtualHost>
<VirtualHost 10.164.101.1>
    ServerName www.fed1.ca
    ServerAlias fed1.ca
    DocumentRoot /home/www.fed1.ca/public_html
</VirtualHost>
</VirtualHost>
<VirtualHost 10.164.101.1>
    ServerName www.fed1.net
    ServerAlias fed1.net
    DocumentRoot /home/www.fed1.ca/public_html
</VirtualHost>
```

Exit vi and save changes.

M) Display content of **vhosts.conf** file

```
cat /etc/httpd/conf.d/vhosts.conf
```

```
cat: hosts.conf: No such file or directory
root@federal:/etc/httpd/conf.d# cat vhosts.conf
NameVirtualHost 10.164.101.1
<VirtualHost 10.164.101.1>
ServerName www.fed1.com
ServerAlias fed1.com
DocumentRoot /home/www.fed1.com/public_html
</VirtualHost>
<VirtualHost 10.164.101.1>
ServerName www.fed1.ca
ServerAlias fed1.ca
DocumentRoot /home/www.fed1.ca/public_html
</VirtualHost>
<VirtualHost 10.164.101.1>
ServerName www.fed1.net
ServerAlias fed1.net
DocumentRoot /home/www.fed1.net/public_html
</VirtualHost>
root@federal:/etc/httpd/conf.d# |
```

- N) Enable Apache by entering  
systemctl enable httpd

```
root@federal:/etc/httpd/conf.d# systemctl enable httpd
Created symlink '/etc/systemd/system/multi-user.target.wants/httpd.service' → '/usr/lib/systemd/system/httpd.service'.
root@federal:/etc/httpd/conf.d# |
```

- O) Start httpd  
systemctl start httpd

```
root@federal:f:/etc/httpd/conf# systemctl start httpd|
```

### 3.7.2 Install lynx.

Lynx is a text-based web browser that runs in the Linux terminal and allows users to access the internet

- A) Install lynx. For Fedora is installed by default

```
dnf install -y lynx
```

```
root@fedoral:/etc/httpd/conf.d# 
root@fedoral:/etc/httpd/conf.d# # INSTALL LYNX
root@fedoral:/etc/httpd/conf.d# # TEXT BASED BROWSER
root@fedoral:/etc/httpd/conf.d#
root@fedoral:/etc/httpd/conf.d#
root@fedoral:/etc/httpd/conf.d#
root@fedoral:/etc/httpd/conf.d# dnf install -y lynx
Updating and loading repositories:
Repositories loaded.
Package "lynx-2.9.2-2.fc41.x86_64" is already installed.

Nothing to do.
root@fedoral:/etc/httpd/conf.d# |
```

### 3.7.3 Prepare index.html for users

Login as user and create a file to be used by Lynx

- A) Check sites are pingable

```
ping fed1.com
ping www.fed1.com
ping fed1.ca
ping www.fed1.ca
ping fed1.net
ping www.fed1.net
```

- A) Login as user www.fed1.com.

```
su www.fed1.com
```

- B) Go to the directory /home/www.fed1.com/public\_html

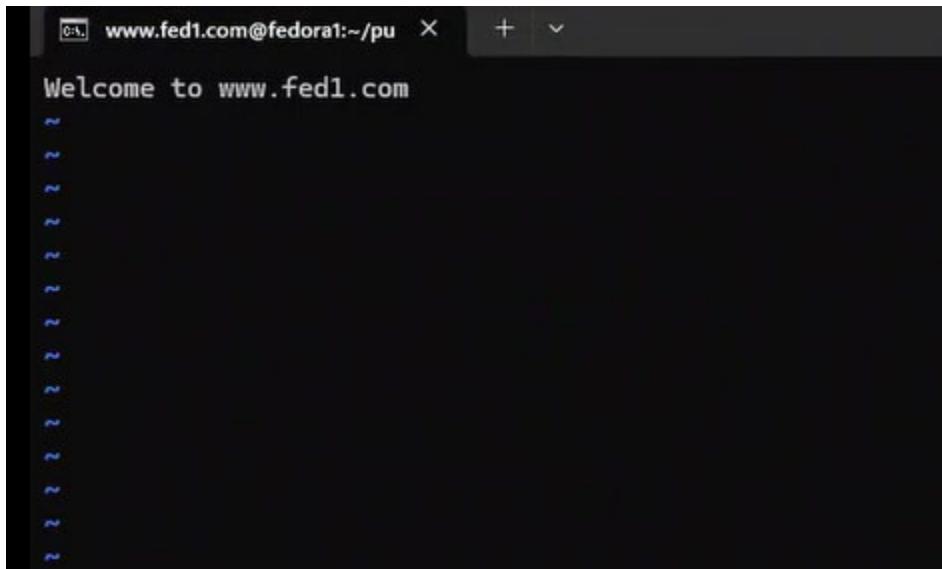
```
cd /home/www.fed1.com/public_html
```

```
root@fedoral:/home/www.fed1.com/public_html#
root@fedoral:/home/www.fed1.com/public_html# su www.fed1.com
www.fed1.com@fedoral:~/public_html$ pwd
/home/www.fed1.com/public_html
www.fed1.com@fedoral:~/public_html$ vi index.html
www.fed1.com@fedoral:~/public_html$ exit
exit
```

**C) Create file index.html**

**vi index.html**

Write Welcome to [www.fed1.com](http://www.fed1.com) and save file



The screenshot shows a terminal window with a dark background and light-colored text. The title bar reads "www.fed1.com@fedorat:~/pu". The main content of the window is the text "Welcome to www.fed1.com" followed by approximately 20 blank lines, each starting with a tilde (~).

**D) Login as user www.fed1.ca**

**su www.fed1.ca**

**E) Go to the directory /home/www.fed1.ca/public\_html**

**cd /home/www.fed1.ca/public\_html**

```
root@federal:~#  
root@federal:~# # Login as user fed.ca  
root@federal:~# su www.fed1.ca  
www.fed1.ca@federal:~# pwd  
/root  
www.fed1.ca@federal:~# cd /home/www.fed1.ca  
www.fed1.ca@federal:~$ ls -ltrh  
total 0  
drwxr-xr-x. 1 www.fed1.ca www.fed1.ca 0 Jan  8 09:16 public_html  
www.fed1.ca@federal:~$ cd public_html/  
www.fed1.ca@federal:~/public_html$ pwd  
/home/www.fed1.ca/public_html  
www.fed1.ca@federal:~/public_html$
```

**F) Create file index.html**

**vi index.html**

Write Welcome to [www.fed1.ca](http://www.fed1.ca) and save file

```
[04] www.fed1.ca@fedoral:~/public_html ~
```

Welcome to www.fed1.ca

~

~

~

~

~

~

~

~

~

~

~

~

~

```
www.fed1.ca@fedoral:~/public_html$ vi index.html
www.fed1.ca@fedoral:~/public_html$ ls -ltrh
total 4.0K
-rw-r--r-- 1 www.fed1.ca www.fed1.ca 23 Jan  8 12:21 index.html
www.fed1.ca@fedoral:~/public_html$ cat index
cat: index: No such file or directory
www.fed1.ca@fedoral:~/public_html$ cat index.html
Welcome to www.fed1.ca
www.fed1.ca@fedoral:~/public_html$ exit
exit
```

G) Login as user [www.fed1.ca](http://www.fed1.ca)

```
su www.fed1.net
```

H) Go to the directory /home/www.fed1.ca/public\_html

```
cd /home/www.fed1.net/public_html
```

I) Create file index.html

```
vi index.html
```

Write Welcome to [www.fed1.net](http://www.fed1.net) and save file

```
root@fedoral:~# su www.fed1.net
www.fed1.net@fedoral:/root$ cd /home/www.fed1.net/public_html/
www.fed1.net@fedoral:~/public_html$ pwd
/home/www.fed1.net/public_html
www.fed1.net@fedoral:~/public_html$ vi index.html
www.fed1.net@fedoral:~/public_html$ cat index.html
Welcome to www.fed1.net
www.fed1.net@fedoral:~/public_html$ ls -ltrha
total 4.0K
drwxr-x--- 1 www.fed1.net www.fed1.net 148 Jan  8 10:29 ..
-rw-r--r-- 1 www.fed1.net www.fed1.net  24 Jan  8 12:24 index.html
drwxr-xr-x 1 www.fed1.net www.fed1.net  20 Jan  8 12:24 .
www.fed1.net@fedoral:~/public_html$ exit
exit
root@fedoral:~# |
```

J) Go back to /home

```
cd /home
```

```
root@fedoralf:/home/www.fed1f.ca/public_html# cd /home
```

K) List the contents in directory

```
ls -l /home
```

See the file permissions

```
root@fedoralf:/home/www.fed1f.ca/public_html# cd /home
root@fedoralf:/home# ls -l
total 0
drwx----- 1 asmith      asmith      156 Jan 10 23:48 asmith
drwx----- 1 student     student     316 Jan 10 14:30 student
drwx----- 1 www.fed1f.ca www.fed1f.ca 140 Jan 12 01:48 www.fed1f.ca
drwx----- 1 www.fed1f.com www.fed1f.com 140 Jan 12 01:45 www.fed1f.com
root@fedoralf:/home# chmod 751 www.*
```

L) Change the permissions to 751

Resulting Permissions:

Owner: Read, write, and execute (rwx)

Group: Read and execute (r-x)

Others: Execute (--x)

```
chmod 751 www*
```

M) List the contents in directory

```
ls -l /home
```

See the file permissions

```
root@fedoralf:/home# ls -l
total 0
drwx----- 1 asmith      asmith      156 Jan 10 23:48 asmith
drwx----- 1 student     student     316 Jan 10 14:30 student
drwxr-x--x  1 www.fed1f.ca www.fed1f.ca 140 Jan 12 01:48 www.fed1f.ca
drwxr-x--x  1 www.fed1f.com www.fed1f.com 140 Jan 12 01:45 www.fed1f.com
root@fedoralf:/home# |
```

N) Go to directory /etc/selinux

```
cd /etc/selinux
```

O) List directory contents

```
ls -l /etc/selinux
```

```
root@fedoral1f:/etc/selinux# ls -l
total 8
-rw-r--r--. 1 root root 1187 Oct 24 10:57 config
-rw-r--r--. 1 root root 2668 Jul 17 20:00 semanage.conf
drwxr-xr-x. 1 root root 142 Jan  9 11:49 targeted
root@fedoral1f:/etc/selinux# |
```

P) Display the contents of config file

```
cat /etc/selinux/config
```

```
drwxr-xr-x. 1 root root 142 Jan  6 08:46 targeted
drwxr-xr-x. 1 root root 4.9K Jan  8 09:56 ..
root@fedoral1f:/etc/selinux# cat config
```

```
drwxr-xr-x. 1 root root 4.9K Jan  8 09:56 ..
root@fedoral1f:/etc/selinux# cat config

# This file controls the state of SELinux on the system.
# SELINUX= can take one of these three values:
#       enforcing - SELinux security policy is enforced.
#       permissive - SELinux prints warnings instead of enforcing.
#       disabled - No SELinux policy is loaded.
# See also:
# https://docs.fedoraproject.org/en-US/quick-docs/getting-started-with-selinux/#getting-started-with-selinux-selinux-states-and-modes
#
# NOTE: In earlier Fedora kernel builds, SELINUX=disabled would also
# fully disable SELinux during boot. If you need a system with SELinux
# fully disabled instead of SELinux running with no policy loaded, you
# need to pass selinux=0 to the kernel command line. You can use grubby
# to persistently set the bootloader to boot with selinux=0:
#
#   grubby --update-kernel ALL --args selinux=0
#
# To revert back to SELinux enabled:
#
#   grubby --update-kernel ALL --remove-args selinux
#
SELINUX=enforcing
# SELINUXTYPE= can take one of these three values:
#       targeted - Targeted processes are protected,
#       minimum - Modification of targeted policy. Only selected processes are protected.
#       mls - Multi Level Security protection.
SELINUXTYPE=targeted
```

Q) Edit /etc/selinux/config file.

Change #SELINUX=enforcing to SELINUX=disabled

Save the file

```
vi /etc/selinux/config
```

```
# This file controls the state of SELinux on the system.
# SELINUX= can take one of these three values:
#       enforcing - SELinux security policy is enforced.
#       permissive - SELinux prints warnings instead of enforcing.
#       disabled - No SELinux policy is loaded.
# See also:
# https://docs.fedoraproject.org/en-US/quick-docs/getting-started-with-selinux/#getting-started-with-selinux-selinux-states-and-modes
#
# NOTE: In earlier Fedora kernel builds, SELINUX=disabled would also
# fully disable SELinux during boot. If you need a system with SELinux
# fully disabled instead of SELinux running with no policy loaded, you
# need to pass selinux=0 to the kernel command line. You can use grubby
# to persistently set the bootloader to boot with selinux=0:
#
#   grubby --update-kernel ALL --args selinux=0
#
# To revert back to SELinux enabled:
#
#   grubby --update-kernel ALL --remove-args selinux
#
SELINUX=disabled
# SELINUXTYPE= can take one of these three values:
#       targeted - Targeted processes are protected,
#       minimum - Modification of targeted policy. Only selected processes are protected.
#       mls - Multi Level Security protection.
SELINUXTYPE=targeted
```

R) Display the file and verify the change was done

```
cat /etc/selinux/config
```

```
root@fedoralf:/etc/selinux# vi config
root@fedoralf:/etc/selinux# cat config

# This file controls the state of SELinux on the system.
# SELINUX= can take one of these three values:
#       enforcing - SELinux security policy is enforced.
#       permissive - SELinux prints warnings instead of enforcing.
#       disabled - No SELinux policy is loaded.
# See also:
# https://docs.fedoraproject.org/en-US/quick-docs/getting-started-with-selinux/#getting-started-with-selinux-selinux-states-and-modes
#
# NOTE: In earlier Fedora kernel builds, SELINUX=disabled would also
# fully disable SELinux during boot. If you need a system with SELinux
# fully disabled instead of SELinux running with no policy loaded, you
# need to pass selinux=0 to the kernel command line. You can use grubby
# to persistently set the bootloader to boot with selinux=0:
#
#   grubby --update-kernel ALL --args selinux=0
#
# To revert back to SELinux enabled:
#
#   grubby --update-kernel ALL --remove-args selinux
#
SELINUX=disabled
# SELINUXTYPE= can take one of these three values:
#       targeted - Targeted processes are protected,
#       minimum - Modification of targeted policy. Only selected processes are protected.
#       mls - Multi Level Security protection.
SELINUXTYPE=targeted

root@fedoralf:/etc/selinux# |
```

S) Reboot the system

```
root@fedoralf:/etc/selinux# reboot|
```

### 3.7.4 Test with Lynx

Test the connection to web pages

```
www.fed1.com@fedoral1:~$ lynx www.fed1.com
www.fed1.com@fedoral1:~$ lynx www.fed1.ca
www.fed1.com@fedoral1:~$ lynx www.fed1.net
www.fed1.com@fedoral1:~$ lynx
```

```
lynx www.fed1.com
```

press q to exit



lynx [www.fed1.ca](http://www.fed1.ca)

press q to exit



lynx [www.fed1.net](http://www.fed1.net)

press q to exit

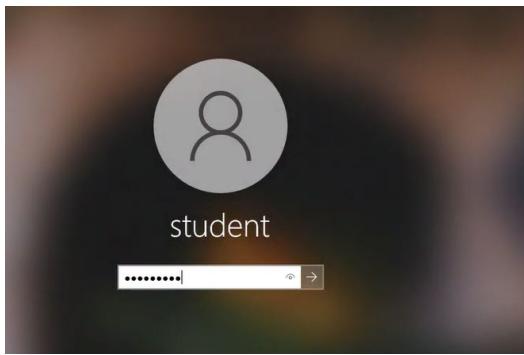


## 3.8 Test sshd with WinSCP and Install and Configure Samba on Fedora

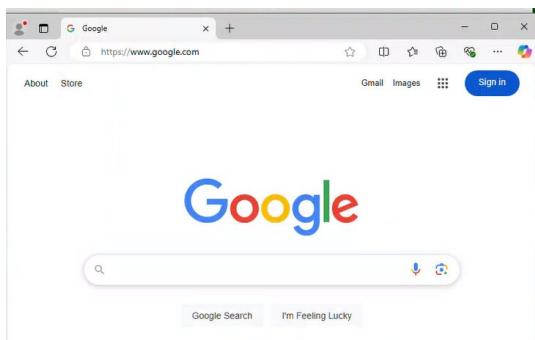
### 3.8.1 Install WinSCP in Windows virtual machine

WinSCP (Windows Secure Copy) is an open-source SecureFTP client for Windows. It allows secure file transfers between the client's local computer and the remote server.

- A) Login to windows virtual machine as user student.



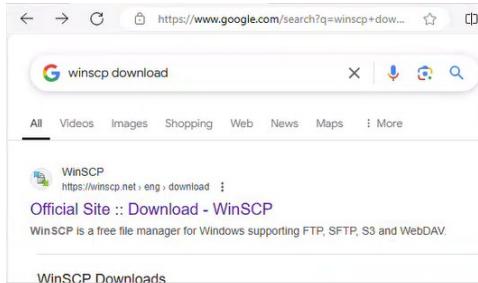
- B) Inside the windows virtual machine, Open a browser and go to google



C) Look for “winscp download”



D) Use WinSCP Official site to download software



E) Start download of latest WinSCP version

WinSCP 6.3 Download

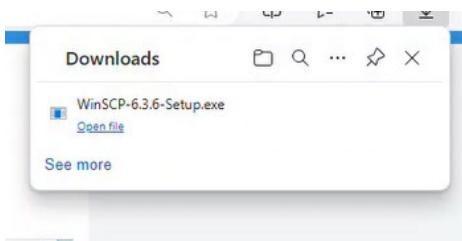
**Complete PRTG, no hidden costs**

WinSCP 6.3 is a major application update. New features and enhancements include:

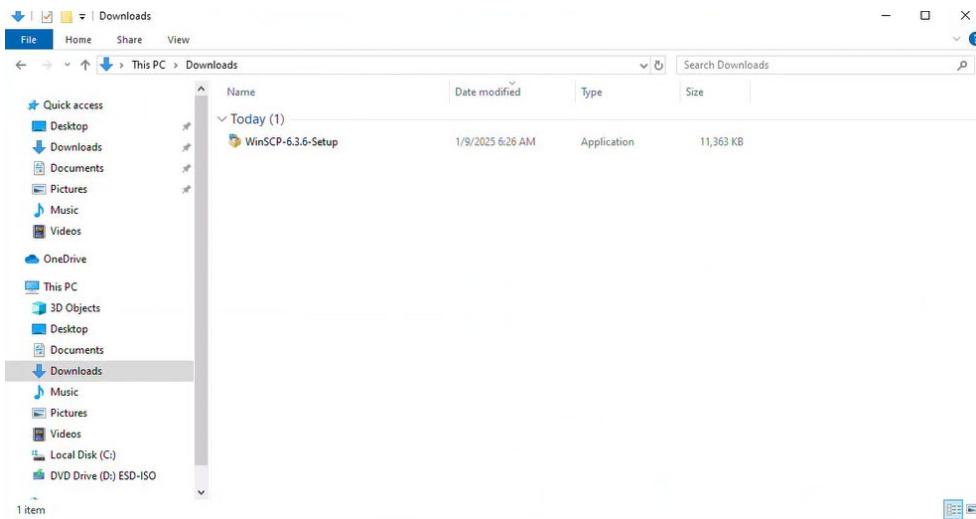
- Single large file can be downloaded using multiple SFTP connections.
- Support for OpenSSH certificates for host verification.
- File hash can be used as criterion for synchronization.
- Improved behavior when duplicating and moving remote files.
- Support for HMAC-SHA-512.
- TLS/SSL core upgraded to OpenSSL 3.
- List of all changes.

[DOWNLOAD WINSCP 6.3.6 \(11 MB\)](#) [Get it from Microsoft](#) [OTHER DOWNLOADS](#)

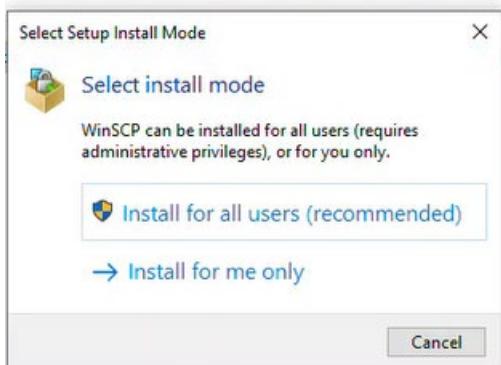
F) The software is downloaded, when finished open the folder including the downloaded software.



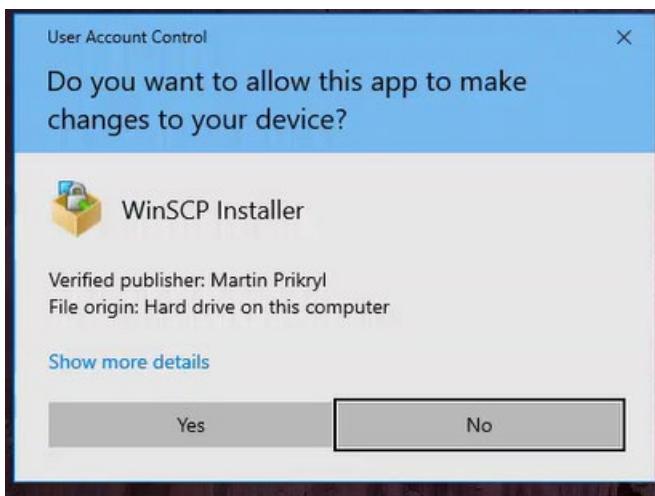
G) Open the downloaded file to start installation.



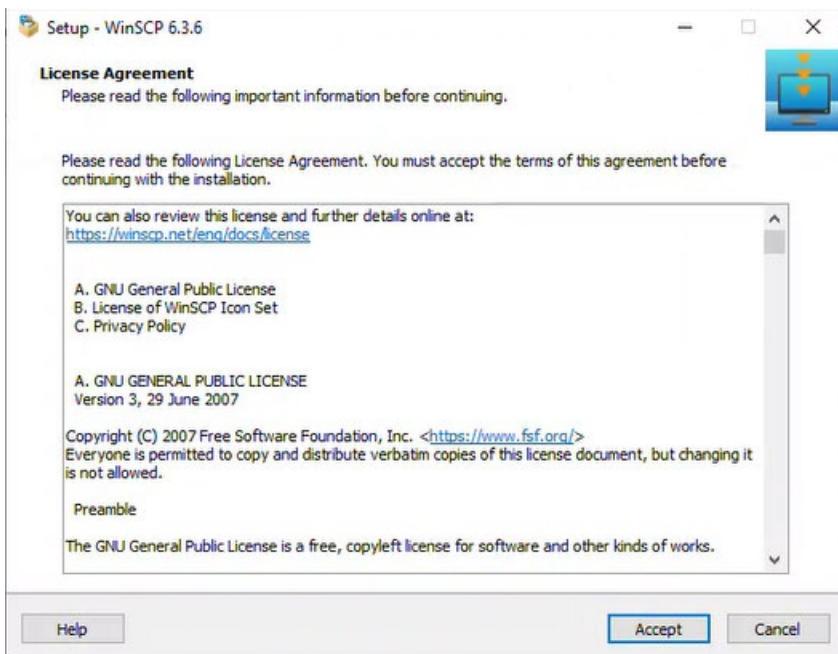
H) In the window “Select Install mode” Select “Install for all users (recommended)



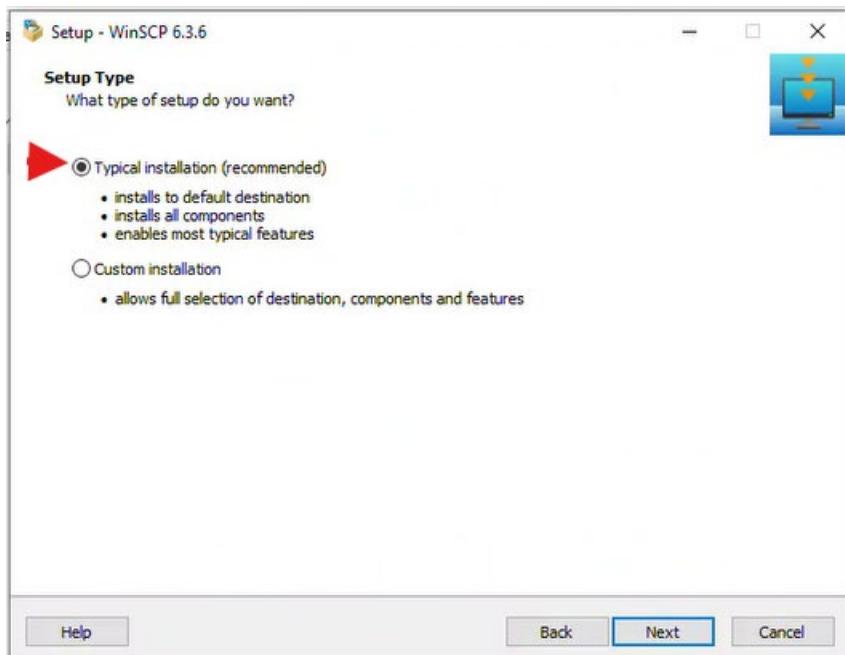
- I) Select Yes in the window “Do you want to allow this app to make changes to your device?”



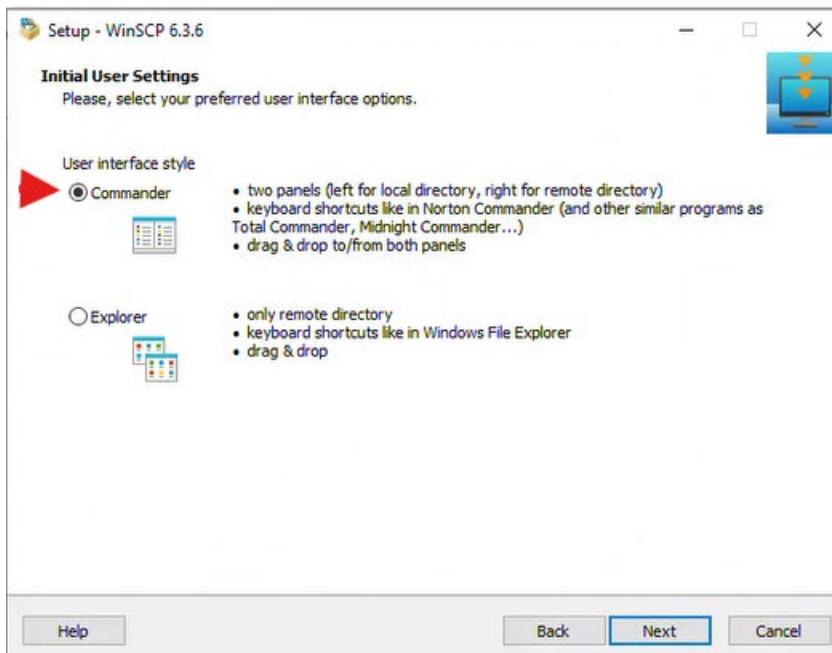
- J) Accept license agreement



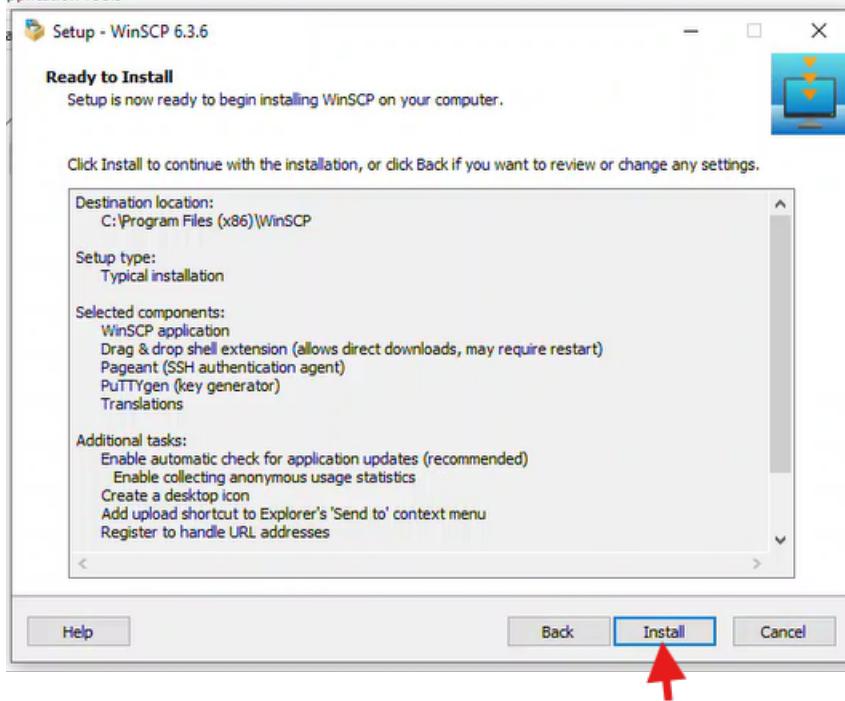
K) Select typical interface



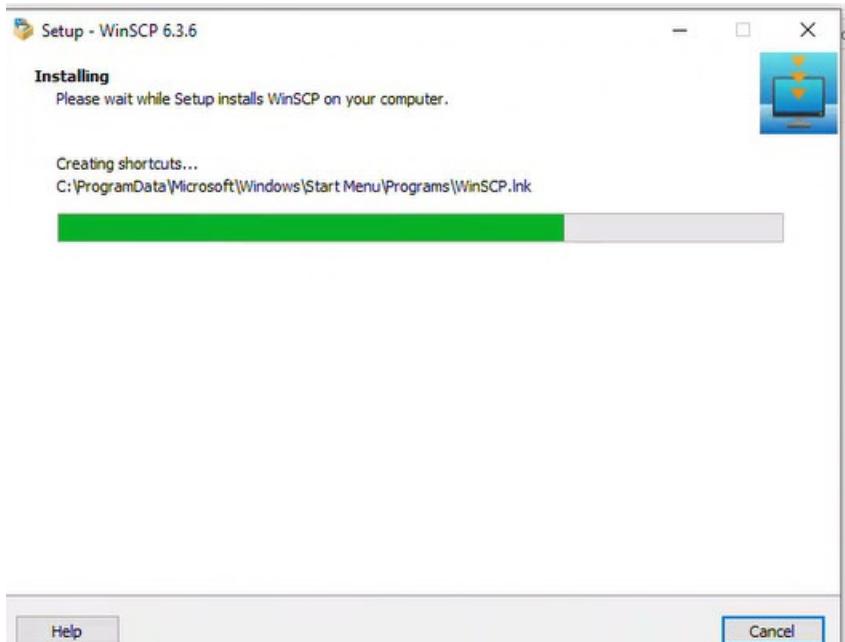
L) Select commander



M) Click on install to initiate Installation



N) Installation process starts



O) When process is finished the window “Completing the WinSCP Setup Wizard” appears, click Finish

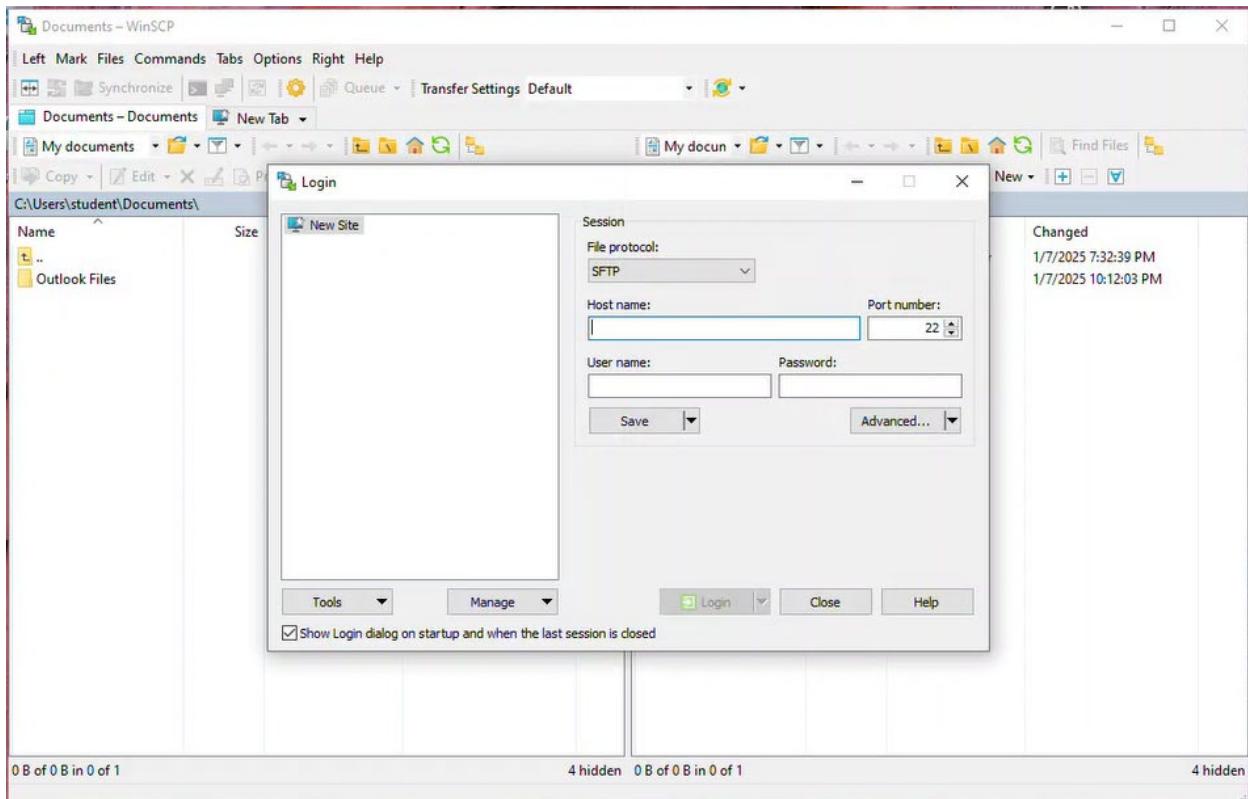


P) WinSCP Icon appears now on the windows desktop, open it up.

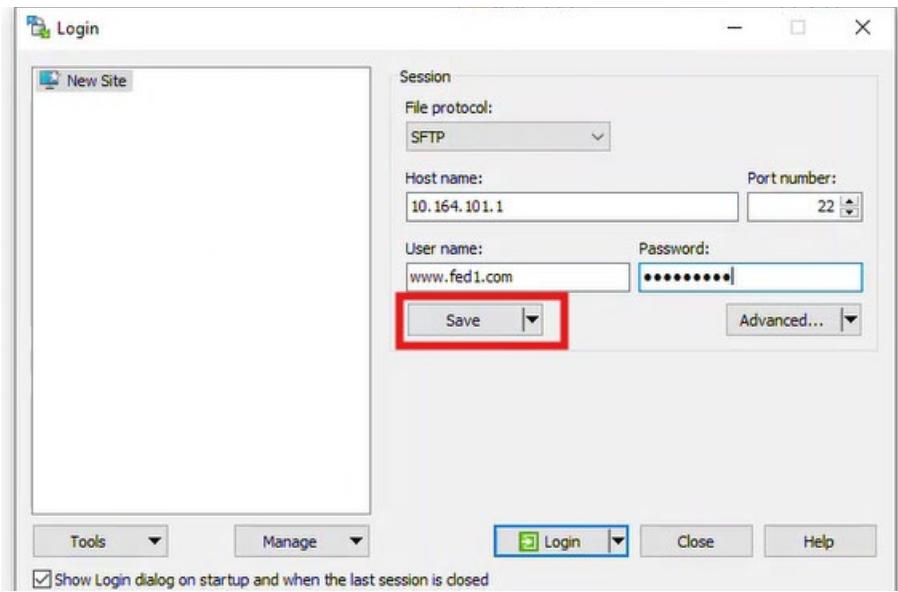


Q) Login in WinSCP

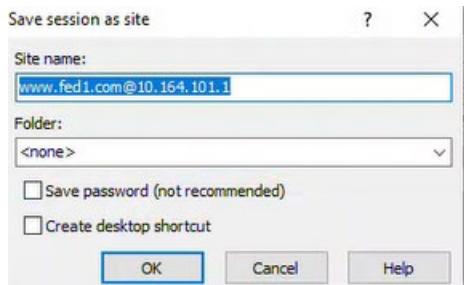
Login as [www.fwed1.com](http://www.fwed1.com) and give password



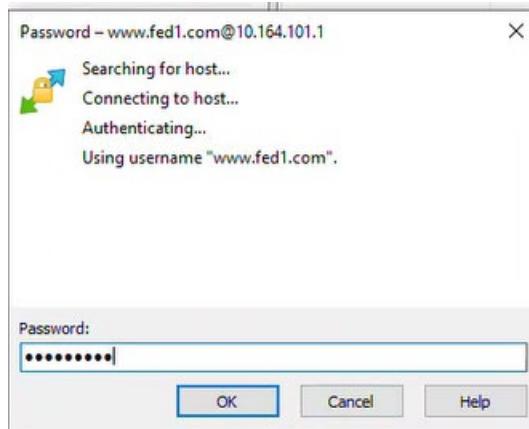
R) Save the login information



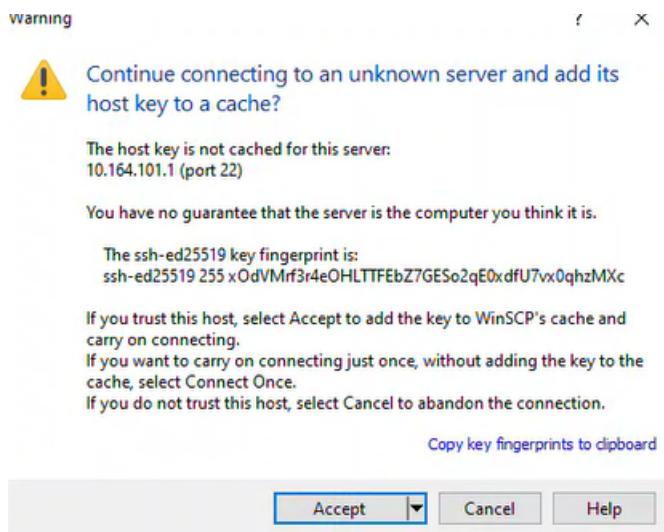
S) Save the session file



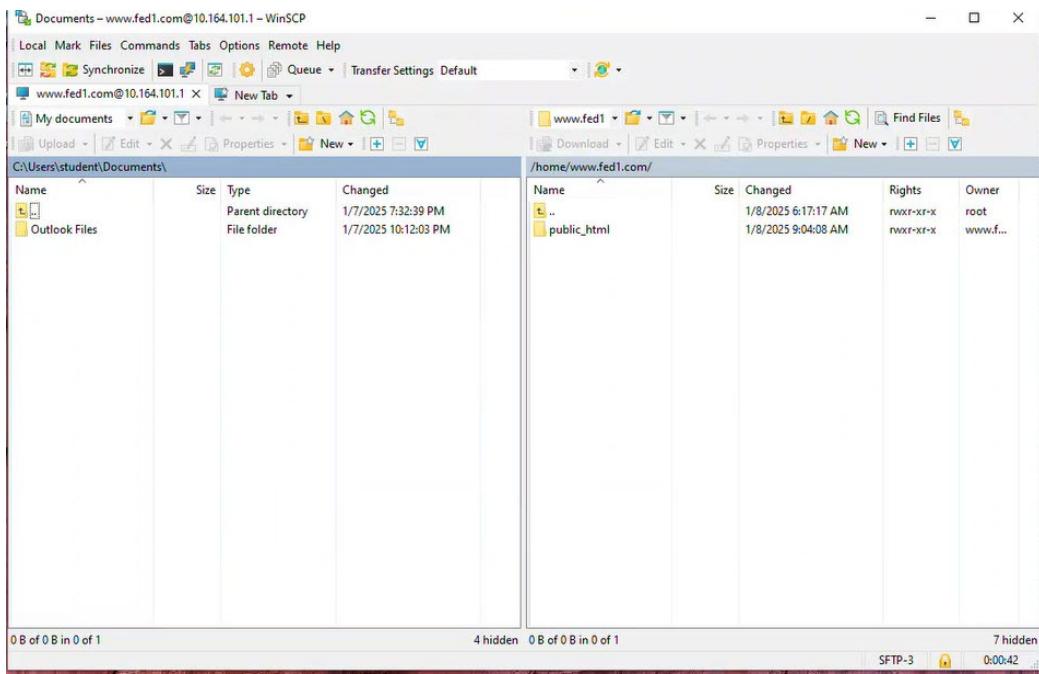
T) Give the password in the next window



First time connecting to a server it will ask for confirmation since key is new.



U) WinSCP opens and we are able to see files in remote machine (our Fedora virtual machine) and the local computer files.  
Files can be copied/moved/deleted from one machine to the other.



## 3.9 Install SAMBA

Samba is an open-source software suite that allows Linux systems to share files and printers with Windows systems.

Samba is a free software re-implementation of the SMB networking protocol. Server Message Block (SMB) is a communication protocol used to share files, printers, serial ports, and miscellaneous communications between nodes on a network.

Samba serves as a bridge between Linux and Windows systems, facilitating smooth and efficient communication and resource sharing.

### 3.9.1 Create security group

- Go to Fedora Box and login as root user

```
www.fed1.com@federal:~$ su -
Password:
root@federal:~#
```

- Create a group called security

```
Password:
root@federal:~# groupadd security
root@federal:~#
```

- C) Change to the root / directory and add a new directory called “security”.

```
cd /  
mkdir security
```

```
root@federal:~#  
root@federal:~# cd /  
root@federal:/# mkdir security
```

- D) List directory content and see permissions for recently created security directory

```
root@federal:/# ls -ltrha  
total 20K  
drwxr-xr-x. 1 root root 0 Jul 16 20:00 srv  
lrwxrwxrwx. 1 root root 8 Jul 16 20:00 sbin -> usr/sbin  
drwxr-xr-x. 1 root root 0 Jul 16 20:00 opt  
drwxr-xr-x. 1 root root 0 Jul 16 20:00 mnt  
drwxr-xr-x. 1 root root 0 Jul 16 20:00 media  
lrwxrwxrwx. 1 root root 9 Jul 16 20:00 lib64 -> usr/lib64  
lrwxrwxrwx. 1 root root 7 Jul 16 20:00 lib -> usr/lib  
lrwxrwxrwx. 1 root root 7 Jul 16 20:00 bin -> usr/bin  
dr-xr-xr-x. 1 root root 0 Jul 16 20:00 afs  
drwx----- 1 root root 0 Oct 24 10:47 lost+found  
drwxr-xr-x. 1 root root 168 Oct 24 10:49 usr  
-rw-r--r--. 1 root root 0 Dec 16 11:09 long  
drwxr-xr-x. 1 root root 222 Dec 20 03:24 var  
drwxr-xr-x. 1 root asmith 0 Dec 20 04:16 test  
dr-xr-xr-x. 6 root root 4.0K Jan 6 08:47 boot  
dr-xr-x---. 1 root root 472 Jan 7 11:48 root  
drwxr-xr-x. 1 root root 108 Jan 8 09:17 home  
-rw-r--r--. 1 root root 0 Jan 8 12:16 .autorelabel  
dr-xr-xr-x 13 root root 0 Jan 9 09:52 sys  
dr-xr-xr-x 336 root root 0 Jan 9 09:52 proc  
drwxr-xr-x 20 root root 4.0K Jan 9 09:52 dev  
drwxr-xr-x 55 root root 1.5K Jan 9 09:54 run  
drwxrwxrwt 20 root root 400 Jan 9 10:05 tmp  
drwxr-xr-x. 1 root root 4.9K Jan 9 10:08 etc  
drwxr-xr-x. 1 root root 0 Jan 9 10:10 security  
dr-xr-xr-x. 1 root root 214 Jan 9 10:10 ..  
dr-xr-xr-x. 1 root root 214 Jan 9 10:10 .  
root@federal:/# |
```



- E) Change the group for the new security directory to be the group security.

```
chgrp security /security
```

```
root@federal:~# chgrp security /security
```

- F) List directory contents and see how group changed

```
root@federal:~# ls -ltrhqa
total 20K
drwxr-xr-x. 1 root root      0 Jul 16 20:00 srv
lrwxrwxrwx. 1 root root      8 Jul 16 20:00 sbin -> usr/sbin
drwxr-xr-x. 1 root root      0 Jul 16 20:00 opt
drwxr-xr-x. 1 root root      0 Jul 16 20:00 mnt
drwxr-xr-x. 1 root root      0 Jul 16 20:00 media
lrwxrwxrwx. 1 root root      9 Jul 16 20:00 lib64 -> usr/lib64
lrwxrwxrwx. 1 root root      7 Jul 16 20:00 lib -> usr/lib
lrwxrwxrwx. 1 root root      7 Jul 16 20:00 bin -> usr/bin
dr-xr-xr-x. 1 root root      0 Jul 16 20:00 afs
drwx----- 1 root root      0 Oct 24 10:47 lost+found
drwxr-xr-x. 1 root root     168 Oct 24 10:49 usr
-rw-r--r--. 1 root root      0 Dec 16 11:09 long
drwxr-xr-x. 1 root root     222 Dec 20 03:24 var
drwxr-xr-x. 1 root asmith    0 Dec 20 04:16 test
dr-xr-xr-x. 6 root root     4.0K Jan  6 08:47 boot
dr-xr-x---. 1 root root     472 Jan  7 11:48 root
drwxr-xr-x. 1 root root     108 Jan  8 09:17 home
-rw-r--r-- 1 root root      0 Jan  8 12:16 .autorelabel
dr-xr-xr-x 334 root root     0 Jan  9 09:52 proc
drwxr-xr-x 20 root root     4.0K Jan  9 09:52 dev
drwxr-xr-x 55 root root     1.5K Jan  9 09:54 run
drwxrwxrwt 20 root root     400 Jan  9 10:05 tmp
drwxr-xr-x. 1 root root    11.9K Jan  9 10:08 etc
drwxr-xr-x 1 root security   0 Jan  9 10:10 security
dr-xr-xr-x. 1 root root     214 Jan  9 10:10 ..
dr-xr-xr-x. 1 root root     214 Jan  9 10:10 .
dr-xr-xr-x. 13 root root     0 Jan  9 10:11 sys
root@federal:~# |
```



G) Set the permissions of the /security directory to 770

When you apply chmod 770 to a file or directory, both the owner and the group will have full access, while everyone else will have no access at all

```
chmod 770 /security
```

```
root@federal:/# chmod 770 /security
root@federal:~#
```

H) List file contents and see how permissions changed

```
root@federal:~# ls -ltrhqa
total 20K
drwxr-xr-x.  1 root root          0 Jul 16 20:00 srv
Lrwxrwxrwx.  1 root root          8 Jul 16 20:00 sbin -> usr/sbin
drwxr-xr-x.  1 root root          0 Jul 16 20:00 opt
drwxr-xr-x.  1 root root          0 Jul 16 20:00 mnt
drwxr-xr-x.  1 root root          0 Jul 16 20:00 media
Lrwxrwxrwx.  1 root root          9 Jul 16 20:00 lib64 -> usr/lib64
Lrwxrwxrwx.  1 root root          7 Jul 16 20:00 lib -> usr/lib
Lrwxrwxrwx.  1 root root          7 Jul 16 20:00 bin -> usr/bin
dr-xr-xr-x.  1 root root          0 Jul 16 20:00 afs
drwx-----.  1 root root          0 Oct 24 10:47 lost+found
drwxr-xr-x.  1 root root          168 Oct 24 10:49 usr
-rw-r--r--.  1 root root          0 Dec 16 11:09 long
drwxr-xr-x.  1 root root          222 Dec 20 03:24 var
drwxr-xr-x.  1 root asmith       0 Dec 20 04:16 test
dr-xr-xr-x.  6 root root          4.0K Jan  6 08:47 boot
dr-xr-x---.  1 root root          472 Jan  7 11:48 root
drwxr-xr-x.  1 root root          108 Jan  8 09:17 home
-rw-r--r--.  1 root root          0 Jan  8 12:16 .autorelabel
dr-xr-xr-x.  333 root root        0 Jan  9 09:52 proc
drwxr-xr-x.  20 root root         4.0K Jan  9 09:52 dev
drwxr-xr-x.  55 root root         1.5K Jan  9 09:54 run
drwxrwxrwt.  20 root root         400 Jan  9 10:05 tmp
drwxr-xr-x.  1 root root         4.9K Jan  9 10:08 etc
drwxrwx---.  1 root security     0 Jan  9 10:10 security ←
dr-xr-xr-x.  1 root root          214 Jan  9 10:10 ..
dr-xr-xr-x.  1 root root          214 Jan  9 10:10 .
dr-xr-xr-x.  13 root root         0 Jan  9 10:11 sys
root@federal:/# |
```

### 3.9.2 Install samba

#### A) Install samba software

```
dnf install samba
```

```

root@fedoral:/# 
root@fedoral:/# dnf install samba
Updating and loading repositories: 
Repositories loaded.
Package                                              Arch    Version          Repository      Size
samba                                                 x86_64  2:4.21.2-1.fc41   updates       3.1 MiB
Installing dependencies:
libnetapi                                             x86_64  2:4.21.2-1.fc41   updates       484.0 KiB
samba-common-tools                                     x86_64  2:4.21.2-1.fc41   updates       1.3 MiB
samba-dcerpc                                           x86_64  2:4.21.2-1.fc41   updates       2.9 MiB
samba-ldb-ldap-modules                             x86_64  2:4.21.2-1.fc41   updates       59.4 KiB
samba-libs                                            x86_64  2:4.21.2-1.fc41   updates       374.7 KiB

Transaction Summary:
Installing:      6 packages

Total size of inbound packages is 3 MiB. Need to download 3 MiB.
After this operation, 8 MiB extra will be used (install 8 MiB, remove 0 B).
Is this ok [y/N]: y
[1/6] samba-2:4.21.2-1.fc41.x86_64
[2/6] samba-dcerpc-2:4.21.2-1.fc41.x86_64
[3/6] samba-common-tools-2:4.21.2-1.fc41.x86_64
[4/6] samba-libs-2:4.21.2-1.fc41.x86_64
[5/6] libnetapi-2:4.21.2-1.fc41.x86_64
[6/6] samba-ldb-ldap-modules-2:4.21.2-1.fc41.x86_64

[6/6] Total
Running transaction
[1/8] Verify package files
[2/8] Prepare transaction
[3/8] Installing libnetapi-2:4.21.2-1.fc41.x86_64
[4/8] Installing samba-libs-2:4.21.2-1.fc41.x86_64
[5/8] Installing samba-dcerpc-2:4.21.2-1.fc41.x86_64
[6/8] Installing samba-ldb-ldap-modules-2:4.21.2-1.fc41.x86_64
[7/8] Installing samba-common-tools-2:4.21.2-1.fc41.x86_64
[8/8] Installing samba-2:4.21.2-1.fc41.x86_64
Complete!
root@fedoral:/#

```

## B) Changed directory to /etc/samba

```
cd /etc/samba
```

```

root@fedoral:/# cd /etc/samba
root@fedoral:/etc/samba#

```

## C) List directory contents and see there is a **smb.conf** file

```
ls
```

```

root@fedoral:/etc/samba# ls
lmhosts  smb.conf  smb.conf.example
root@fedoral:/etc/samba#

```

The **smb.conf** file is the main configuration file for Samba, and it plays a crucial role in how Samba operates. This file controls the settings for both the Samba server (`smbd`) and the Samba NetBIOS name server (`nmbd`).

Here are some key functions of the **smb.conf** file:

- **Defining Shares:** You can specify which directories and printers will be shared and set the access permissions for these shares.

- Global Settings: This section includes settings that apply to the entire Samba server, such as server name, workgroup name, security options, and logging configurations.
  - User Authentication and Permissions: It controls how users authenticate to the Samba server and what level of access they have to shared resources.
  - Network Configuration: It includes settings for network interfaces, hosts allow/deny rules, and NetBIOS names.
  - Performance Tuning: You can configure various options to optimize the performance of the Samba server, such as socket options and read/write settings.
  - Integration with Windows Domains: It includes settings for joining a Windows domain or acting as a domain controller.
- 

D) Display the contents of file smb.conf before editing

```

root@federal:/etc/samba# vi smb.conf
root@federal:/etc/samba# cat smb.conf
# See smb.conf.example for a more detailed config file or
# read the smb.conf manpage.
# Run 'testparm' to verify the config is correct after
# you modified it.
#
# Note:
# SMB1 is disabled by default. This means clients without support for SMB2 or
# SMB3 are no longer able to connect to smbd (by default).

[global]
    workgroup = SAMBA
    security = user

    passdb backend = tdbsam

    printing = cups
    printcap name = cups
    load printers = yes
    cups options = raw

    # Install samba-usershare package for support
    include = /etc/samba/usershare.conf

[homes]
    comment = Home Directories
    valid users = %S, %D%w%S
    browsable = No
    read only = No
    inherit acls = Yes

[printers]
    comment = All Printers
    path = /var/tmp
    printable = Yes
    create mask = 0600
    browsable = No

[print$]
    comment = Printer Drivers
    path = /var/lib/samba/drivers
    write list = @printadmin root
    force group = @printadmin
    create mask = 0664
    directory mask = 0775
root@federal:/etc/samba# |

```

- E) Use vi command to open the file smb.conf for editing.

```
vi smb.conf
```

```
root@federal:/etc/samba# vi smb.conf
```

- F) Do the following changes and save the file

```
[global]
workgroup = WORKGROUP
security = user
hosts allow = 127. 10.164.
max protocol = SMB2
```

In the [global] section, ensure the text is as follows:

```
workgroup = WORKGROUP
security = user
hosts allow = 127. 10.164.
max protocol = SMB2
```

```
[security]
directory mask = 0775
path = /security
writable = yes
create mode = 0770
directory mode = 0770
share modes = yes
guest ok = no
valid users = @security
```

At the end of the document, add a new section called “[security]” and enter the following:

```
[security]
path = /security
writable = yes
create mode = 0770
directory mode = 0770
share modes = yes
guest ok = no
valid users = @security
```

- G) Display smb.conf after editing

```

root@federal:/etc/samba#
root@federal:/etc/samba# cat smb.conf
# See smb.conf.example for a more detailed config file or
# read the smb.conf manpage.
# Run 'testparm' to verify the config is correct after
# you modified it.
#
# Note:
# SMB1 is disabled by default. This means clients without support for SMB2 or
# SMB3 are no longer able to connect to smbd (by default).

[global]
    workgroup = WORKGROUP
    security = user
    hosts allow = 127. 10.164.
    max protocol = SMB2

    passdb backend = tdbSAM

    printing = cups
    printcap name = cups
    load printers = yes
    cups options = raw

    # Install samba-usershares package for support
    include = /etc/samba/usershares.conf

[homes]
    comment = Home Directories
    valid users = %S, %D%w%S
    browsable = No
    read only = No
    inherit acls = Yes

[printers]
    comment = All Printers
    path = /var/tmp
    printable = Yes
    create mask = 0600
    browseable = No

[print$]
    comment = Printer Drivers
    path = /var/lib/samba/drivers
    write list = @printadmin root
    force group = @printadmin
    create mask = 0664
    directory mask = 0775

[security]
    path = /security
    writable = yes
    create mode = 0770
    directory mode = 0770
    share modes = yes
    guest ok = no
    valid users = @security

root@federal:/etc/samba# |

```

- H) Add a new user samba and set password as Amf123456

```

useradd samba
passwd samba

```

```

root@federal:/etc/samba#
root@federal:/etc/samba# useradd samba
root@federal:/etc/samba# passwd samba
New password:
BAD PASSWORD: The password fails the dictionary check - it is too simplistic/systematic
Retype new password:
passwd: password updated successfully
root@federal:/etc/samba# |

```

- I) Add the user samba to the group security.

```

usermod -a -G security samba

```

```
root@federal:/etc/samba# usermod -a -G security samba
root@federal:/etc/samba# |
```

- J) Set the **SAMBA password** for the user samba to “Amf123456”.

```
smbpasswd -a samba
```

```
root@federal:/etc/samba# usermod -a -G security samba
root@federal:/etc/samba# smbpasswd -a samba
New SMB password:
Retype new SMB password:
Added user samba.
root@federal:/etc/samba# |
```

- K) Flush the iptables cache.

```
iptables -F
```

```
Added user samba.
root@federal:/etc/samba# iptables -F
root@federal:/etc/samba# |
```

- L) Check firewall status. In our system is already disabled as per printout

```
systemctl status firewalld.service
```

```
root@federal:/etc/samba# systemctl status firewalld.service
● firewalld.service - firewalld - dynamic firewall daemon
   Loaded: loaded (/usr/lib/systemd/system/firewalld.service; disabled; preset: enabled)
   Drop-In: /usr/lib/systemd/system/service.d
             └─10-timeout-abort.conf, 50-keep-warm.conf
     Active: inactive (dead)
       Docs: man:firewalld(1)
```

- M) If firewall service status is not disabled :

Disable the firewall with command `systemctl disable firewalld`

The command stops the firewalld service from starting automatically when the system boots up, but it does not stop the service immediately.

Issue command `systemctl stop firewalld` to immediately stop the firewalld service in the system. No output is expected.

```
root@federal:~# systemctl disable firewalld
Removed '/etc/systemd/system/dbus-org.fedoraproject.FirewallD1.service'.
Removed '/etc/systemd/system/multi-user.target.wants/firewalld.service'.
root@federal:~# systemctl stop firewalld
```

```
root@fedoral:/etc/samba# # disable firewall
root@fedoral:/etc/samba# systemctl status firewalld.service
○ firewalld.service - firewalld - dynamic firewall daemon
    Loaded: loaded (/usr/lib/systemd/system/firewalld.service; disabled; preset: enabled)
    Drop-In: /usr/lib/systemd/system/service.d
              └─10-timeout-abort.conf, 50-keep-warm.conf
    Active: inactive (dead)
      Docs: man:firewalld(1)
root@fedoral:/etc/samba# systemctl disable firewalld.service
root@fedoral:/etc/samba# systemctl stop firewalld.service
root@fedoral:/etc/samba# systemctl status firewalld.service
○ firewalld.service - firewalld - dynamic firewall daemon
    Loaded: loaded (/usr/lib/systemd/system/firewalld.service; disabled; preset: enabled)
    Drop-In: /usr/lib/systemd/system/service.d
              └─10-timeout-abort.conf, 50-keep-warm.conf
    Active: inactive (dead)
      Docs: man:firewalld(1)
root@fedoral:/etc/samba# |
```

N) Print the status of smb and nmb

```
systemctl status smb
```

```
systemctl status nmb
```

```
root@fedoral:/etc/samba# systemctl status smb
○ smb.service - Samba SMB Daemon
    Loaded: loaded (/usr/lib/systemd/system/smb.service; disabled; preset: disabled)
    Drop-In: /usr/lib/systemd/system/service.d
              └─10-timeout-abort.conf, 50-keep-warm.conf
    Active: inactive (dead)
      Docs: man:smbd(8)
            man:samba(7)
            man:smb.conf(5)
root@fedoral:/etc/samba# systemctl status nmb
○ nmb.service - Samba NMB Daemon
    Loaded: loaded (/usr/lib/systemd/system/nmb.service; disabled; preset: disabled)
    Drop-In: /usr/lib/systemd/system/service.d
              └─10-timeout-abort.conf, 50-keep-warm.conf
    Active: inactive (dead)
      Docs: man:nmbd(8)
            man:samba(7)
            man:smb.conf(5)
root@fedoral:/etc/samba# |
```

O) Restart, start, and enable the services smb and nmb.

```
systemctl restart smb
```

```
systemctl restart nmb
```

```
root@fedoral:/etc/samba# systemctl restart smb
root@fedoral:/etc/samba# systemctl restart nmb
root@fedoral:/etc/samba# |
```

```
systemctl enable smb
```

```
systemctl enable nmb
```

```
root@fedoral:/etc/samba# systemctl start smb && systemctl enable smb
Created symlink '/etc/systemd/system/multi-user.target.wants/smb.service' → '/usr/lib/systemd/system/smb.service'.
root@fedoral:/etc/samba# systemctl start nmb && systemctl enable nmb
Created symlink '/etc/systemd/system/multi-user.target.wants/nmb.service' → '/usr/lib/systemd/system/nmb.service'.
```

P) Print the status of smb and nmb

```
systemctl status smb
```

```
systemctl status nmb
```

```

root@federal:/etc/samba# systemctl status smb
● smb.service - Samba SMB Daemon
   Loaded: loaded (/usr/lib/systemd/system/smb.service; enabled; preset: disabled)
   Drop-In: /usr/lib/systemd/system/service.d
             └─10-timeout-abort.conf, 50-keep-warm.conf
     Active: active (running) since Thu 2025-01-09 10:57:14 EST; 2min 21s ago
   Invocation: 647491be25cc413ab520348027be5ab0
     Docs: man:smbd(8)
           man:samba(7)
           man:smb.conf(5)
   Main PID: 2898 (smbd)
     Status: "smbd: ready to serve connections..."
       Tasks: 3 (limit: 8771)
      Memory: 11.2M (peak: 11.5M)
        CPU: 77ms
      CGroup: /system.slice/smb.service
              ├─2898 /usr/sbin/smbd --foreground --no-process-group
              ├─2901 /usr/sbin/smbd --foreground --no-process-group
              ├─2902 /usr/sbin/smbd --foreground --no-process-group

Jan 09 10:57:14 federal systemd[1]: Starting smb.service - Samba SMB Daemon...
Jan 09 10:57:14 federal smbd[2898]: [2025/01/09 10:57:14.364642,  0] ../../source3/smbd/server.c:1965(main)
Jan 09 10:57:14 federal smbd[2898]:   smbd version 4.21.2 started.
Jan 09 10:57:14 federal smbd[2898]:   Copyright Andrew Tridgell and the Samba Team 1992-2024
Jan 09 10:57:14 federal smbd[2898]: [2025/01/09 10:57:14.365552,  0] ../../lib/param/Loadparm.c:749(lpcfg_map_parameter)
Jan 09 10:57:14 federal smbd[2898]:   Unknown parameter encountered: "share modes"
Jan 09 10:57:14 federal smbd[2898]: [2025/01/09 10:57:14.365608,  0] ../../lib/param/Loadparm.c:1937(lpcfg_do_service_parameter)
Jan 09 10:57:14 federal smbd[2898]:   Ignoring unknown parameter "share modes"
Jan 09 10:57:14 federal systemd[1]: Started smb.service - Samba SMB Daemon.
root@federal:/etc/samba# systemctl status nmb

```

```

Jan 09 10:57:14 federal systemd[1]: Started smb.service - Samba SMB Daemon.
root@federal:/etc/samba# systemctl status nmb
● nmb.service - Samba NMB Daemon
   Loaded: loaded (/usr/lib/systemd/system/nmb.service; enabled; preset: disabled)
   Drop-In: /usr/lib/systemd/system/service.d
             └─10-timeout-abort.conf, 50-keep-warm.conf
     Active: active (running) since Thu 2025-01-09 10:57:18 EST; 2min 25s ago
   Invocation: 7a0ed3b732d1462aaa13983d0d2a8157
     Docs: man:nmbd(8)
           man:samba(7)
           man:smb.conf(5)
   Main PID: 2906 (nmbd)
     Status: "nmbd: ready to serve connections..."
       Tasks: 1 (limit: 8771)
      Memory: 3.1M (peak: 3.4M)
        CPU: 64ms
      CGroup: /system.slice/nmb.service
              └─2906 /usr/sbin/nmbd --foreground --no-process-group

Jan 09 10:57:18 federal systemd[1]: Starting nmb.service - Samba NMB Daemon...
Jan 09 10:57:18 federal nmbd[2906]: [2025/01/09 10:57:18.494589,  0] ../../source3/nmbd/nmbd.c:901(main)
Jan 09 10:57:18 federal nmbd[2906]:   nmbd version 4.21.2 started.
Jan 09 10:57:18 federal nmbd[2906]:   Copyright Andrew Tridgell and the Samba Team 1992-2024
Jan 09 10:57:18 federal systemd[1]: Started nmb.service - Samba NMB Daemon.
Jan 09 10:57:18 federal nmbd[2906]: [2025/01/09 10:57:18.503648,  0] ../../source3/nmbd/nmbd_namequery.c:109(query_name_response)
Jan 09 10:57:18 federal nmbd[2906]:   query_name_response: Multiple (2) responses received for a query on subnet 10.164.101.1 for name WORKGROUP<1d>.
Jan 09 10:57:18 federal nmbd[2906]:   This response was from IP 10.164.116.1, reporting an IP address of 10.164.116.1.
root@federal:/etc/samba#

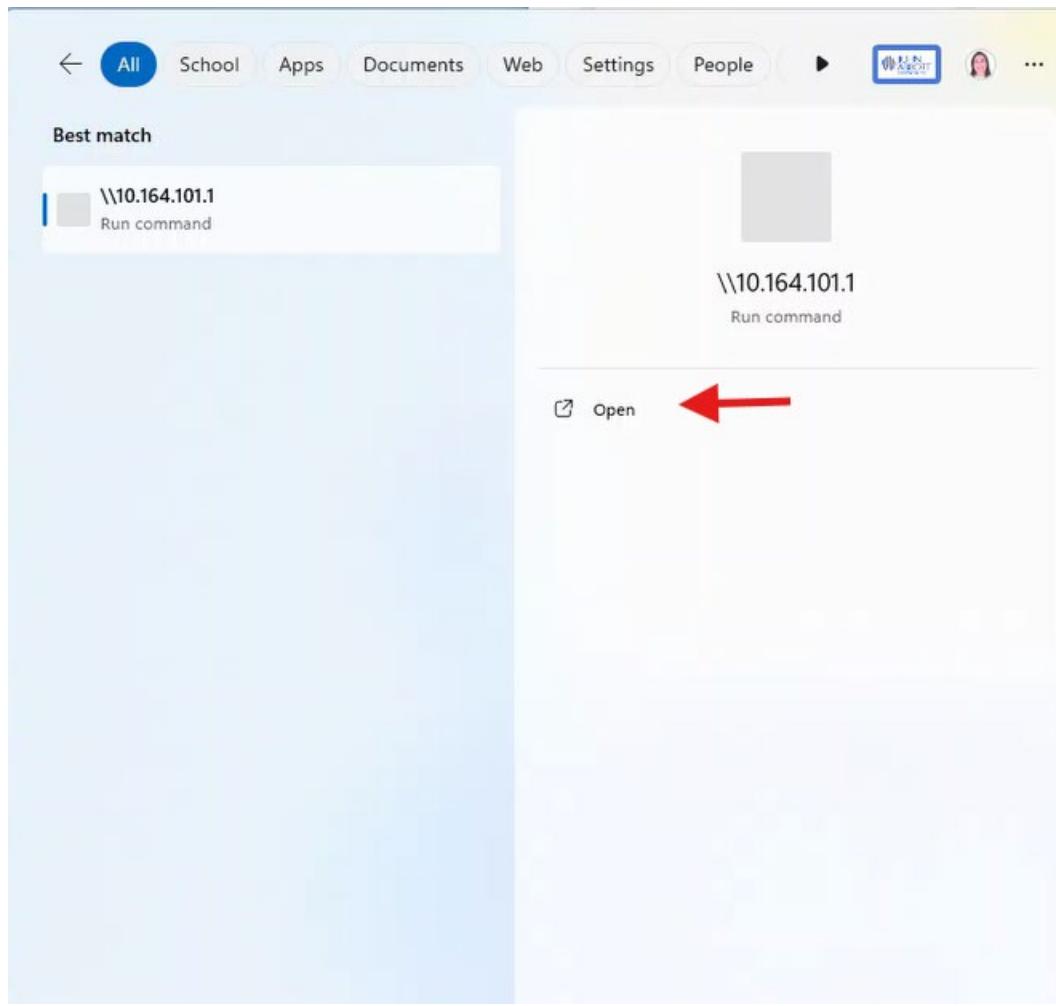
```

### 3.9.3 Testing SAMBA

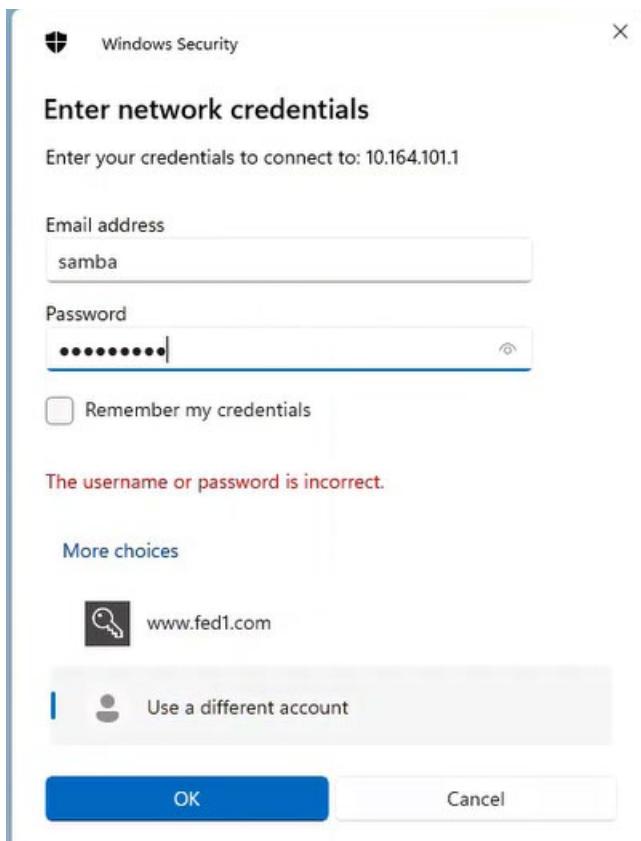
- A) Go to the bare metal machine (JAC lab machine) and type the ip address of the Fedora Virtual box in the command line



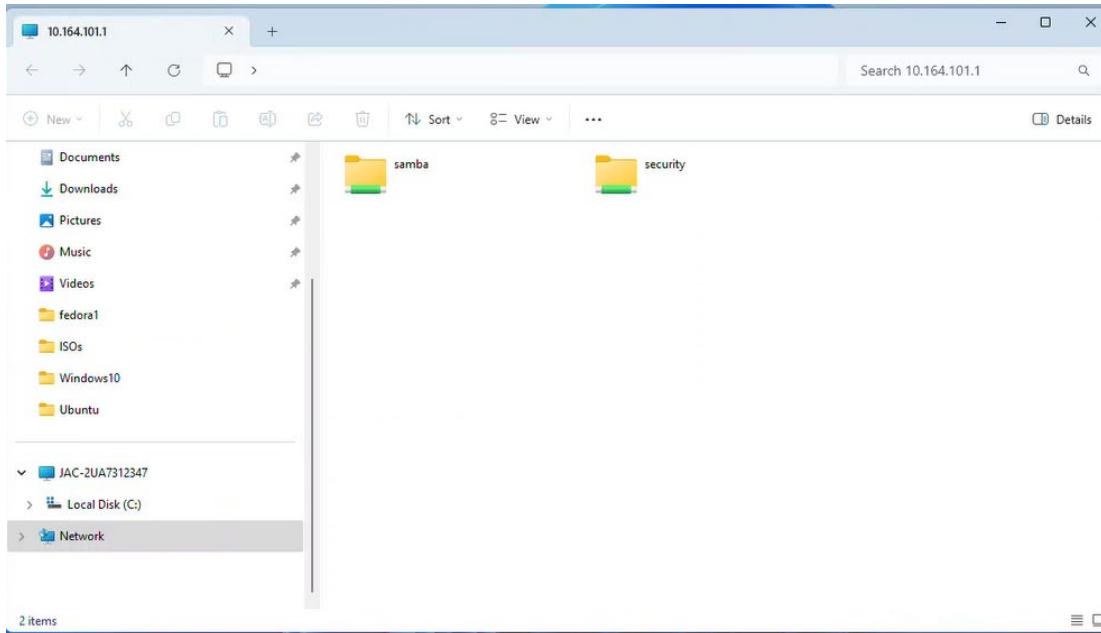
- B) Open the machine



C) Login as user samba and password Amf123456



D) You are now able to see the folders in the Fedora Linux virtual machine in windows.



### 3.10 Configure Alternate port in SSHD on Fedora

The sshd service enables secure remote access and management of Linux systems. By default, port 22 is used for SSH. For security reasons, we need to change this to port 8022 on a Fedora VM.

Two files are used for configuration ssh\_config and sshd\_config

The ssh\_config and sshd\_config files serve different purposes in the context of SSH (Secure Shell) on Unix and Linux systems. Here are the key differences:

#### ssh\_config:

Purpose: This file configures the settings for the SSH client. It controls the behavior of outgoing SSH connections.

Location: Typically found at /etc/ssh/ssh\_config

Scope: Affects only the SSH client, i.e., the user making the SSH connection.

Common Settings:

- Host: Specifies a host or a pattern to match.
- Port: Specifies the port number to connect to on the remote host.
- IdentityFile: Specifies the private key file to use for authentication.
- User: Specifies the username to log in as on the remote host.

#### sshd\_config:

Purpose: This file configures the settings for the SSH server (sshd). It controls the behavior of incoming SSH connections.

Location: Typically found at /etc/ssh/sshd\_config.

Scope: Affects only the SSH server, i.e., the system accepting the SSH connections.

Common Settings:

- Port: Specifies the port number on which the SSH server listens.
- PermitRootLogin: Specifies whether root can log in via SSH.
- PasswordAuthentication: Specifies whether password authentication is allowed.
- AllowUsers/AllowGroups: Specifies which users or groups are allowed to connect.
- 

#### 3.10.1 Configure the server-side settings for making SSH connections use port 8022

- A) Login to linux box Fedora with student and change to root user

```
www.fed1.com@fedoral:~$ cd ..
www.fed1.com@fedoral:/home$ su -
Password:
```

```
cd /etc/ssh
```

```
root@fedoral:~# cd /etc/ssh/
```

```
ls -ltrhqa
```

```
root@federal:/etc/ssh# ls -ltrha
total 644K
-rw-r--r--. 1 root root 1.9K Oct 15 20:00 ssh_config
-rw-r--r--. 1 root root 609K Oct 15 20:00 moduli
drwx-----. 1 root root 88 Dec 20 19:00 sshd_config.d
drwxr-xr-x. 1 root root 128 Dec 20 19:00 ssh_config.d
-rw-r--r--. 1 root root 162 Jan 8 09:47 ssh_host_ecdsa_key.pub
-rw-----. 1 root root 480 Jan 8 09:47 ssh_host_ecdsa_key
-rw-r--r--. 1 root root 82 Jan 8 09:47 ssh_host_ed25519_key.pub
-rw-----. 1 root root 387 Jan 8 09:47 ssh_host_ed25519_key
-rw-r--r--. 1 root root 554 Jan 8 09:47 ssh_host_rsa_key.pub
-rw-----. 1 root root 2.6K Jan 8 09:47 ssh_host_rsa_key
-rw-----. 1 root root 3.7K Jan 8 10:24 sshd_config
drwxr-xr-x. 1 root root 344 Jan 8 10:24 .
drwxr-xr-x. 1 root root 4.9K Jan 9 10:49 ..
root@federal:/etc/ssh# cat sshd_config
```

Display the contents of file sshd\_config

```
cat sshd_config
```

```
v_str LISTEN 0      0                                     *:22
root@federal:/etc/ssh# cat sshd_config
#      $OpenBSD: sshd_config,v 1.104 2021/07/02 05:11:21 dtucker Exp $

# This is the sshd server system-wide configuration file. See
# sshd_config(5) for more information.

# This sshd was compiled with PATH=/usr/local/bin:/usr/bin:/usr/local/sbin:/usr/sbin

# The strategy used for options in the default sshd_config shipped with
# OpenSSH is to specify options with their default value where
# possible, but leave them commented. Uncommented options override the
# default value.

# To modify the system-wide sshd configuration, create a *.conf file under
# /etc/ssh/sshd_config.d/ which will be automatically included below
Include /etc/ssh/sshd_config.d/*.conf

# If you want to change the port on a SELinux system, you have to tell
# SELinux about this change.
# semanage port -a -t ssh_port_t -p tcp #PORTNUMBER
#
#Port 22
#AddressFamily any
#ListenAddress 0.0.0.0
#ListenAddress ::

#HostKey /etc/ssh/ssh_host_rsa_key
#HostKey /etc/ssh/ssh_host_ecdsa_key
#HostKey /etc/ssh/ssh_host_ed25519_key

# Ciphers and keying
#RekeyLimit default none
```

Open the SSH Configuration File: Open the sshd\_config file in a text editor with root privileges:

```
vi sshd_config
```

```
root@federal:/etc/ssh#
root@federal:/etc/ssh# vi sshd_config
root@federal:/etc/ssh# |
```

Change the Port Number: Find the line that starts with #Port 22 (it might be commented out with a #). Uncomment this line and change the port number to your desired port. Port 8022):

```
#      $OpenBSD: sshd_config,v 1.104 2021/07/02 05:11:21 dtucker Exp $
#
# This is the sshd server system-wide configuration file. See
# sshd_config(5) for more information.
#
# This sshd was compiled with PATH=/usr/local/bin:/usr/bin:/usr/local/sbin:/usr/sbin
#
# The strategy used for options in the default sshd_config shipped with
# OpenSSH is to specify options with their default value where
# possible, but leave them commented. Uncommented options override the
# default value.
#
# To modify the system-wide sshd configuration, create a *.conf file under
# /etc/ssh/sshd_config.d/ which will be automatically included below
Include /etc/ssh/sshd_config.d/*.conf
#
# If you want to change the port on a SELinux system, you have to tell
# SELinux about this change.
# semanage port -a -t ssh_port_t -p tcp #PORTNUMBER
#
# Port 8022 ←
#AddressFamily any
#ListenAddress 0.0.0.0
#ListenAddress ::

#HostKey /etc/ssh/ssh_host_rsa_key
#HostKey /etc/ssh/ssh_host_ecdsa_key
#HostKey /etc/ssh/ssh_host_ed25519_key

# Ciphers and keying
#RekeyLimit default none

# Logging
#SyslogFacility AUTH
#LogLevel INFO

# Authentication:

#LoginGraceTime 2m
#PermitRootLogin prohibit-password
#StrictModes yes
#MaxAuthTries 6
#MaxSessions 10

#PubkeyAuthentication yes

# The default is to check both .ssh/authorized_keys and .ssh/authorized_keys2
# but this is overridden so installations will only check .ssh/authorized_keys
AuthorizedKeysFile      .ssh/authorized_keys

-- INSERT --
```

Save and Exit: Save the changes and exit the text editor.

**Restart the SSH Service:** Restart the SSH service to apply the changes:

```
systemctl status sshd
```

```

root@federal:/etc/ssh# systemctl status sshd
● sshd.service - OpenSSH server daemon
   Loaded: loaded (/usr/lib/systemd/system/sshd.service; enabled; preset: disabled)
   Drop-In: /usr/lib/systemd/system/service.d
     └─10-timeout-abort.conf, 50-keep-warm.conf
     Active: active (running) since Thu 2025-01-09 09:52:44 EST; 17h ago
   Invocation: 47cb20fb99aaab5cae77a592f1816fbc
     Docs: man:sshd(8)
           man:sshd_config(5)
   Main PID: 958 (sshd)
     Tasks: 1 (limit: 8771)
    Memory: 11.2M (peak: 28.5M)
      CPU: 1.156s
     CGroup: /system.slice/sshd.service
             └─958 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

Jan 10 02:22:26 federal sshd-session[15080]: Accepted password for www.fed1.com from 10.164.0.21 port 57797 ssh2
Jan 10 02:22:26 federal sshd-session[15080]: pam_unix(sshd:session): session opened for user www.fed1.com(uid=1003) by www.fed1.com(uid=0)
Jan 10 02:38:32 federal sshd-session[19886]: User student from 10.164.0.17 not allowed because none of user's groups are listed in AllowGroups
Jan 10 02:38:36 federal sshd-session[19886]: pam_unix(sshd:auth): authentication failure; logname= uid=0 euid=0 tty=ssh ruser= rhost=10.164.0.17 user=student
Jan 10 02:38:38 federal sshd-session[19886]: Failed password for invalid user student from 10.164.0.17 port 54644 ssh2
Jan 10 02:38:45 federal sshd-session[19886]: Failed password for invalid user student from 10.164.0.17 port 54644 ssh2
Jan 10 02:38:46 federal sshd-session[19886]: Connection reset by invalid user student 10.164.0.17 port 54644 [preauth]
Jan 10 02:38:46 federal sshd-session[19886]: PAM 1 more authentication failure; logname= uid=0 euid=0 tty=ssh ruser= rhost=10.164.0.17 user=student
Jan 10 02:39:05 federal sshd-session[20015]: Accepted password for www.fed1.com from 10.164.0.17 port 54650 ssh2
Jan 10 02:39:09 federal sshd-session[20015]: pam_unix(sshd:session): session opened for user www.fed1.com(uid=1003) by www.fed1.com(uid=0)
root@federal:/etc/ssh#

```

systemctl restart sshd

```

root@federal:/etc/ssh# systemctl restart sshd
root@federal:/etc/ssh#

```

systemctl status sshd

Note in logs port now is 8022

```

root@federal:/etc/ssh# systemctl status sshd
● sshd.service - OpenSSH server daemon
   Loaded: loaded (/usr/lib/systemd/system/sshd.service; enabled; preset: disabled)
   Drop-In: /usr/lib/systemd/system/service.d
     └─10-timeout-abort.conf, 50-keep-warm.conf
     Active: active (running) since Fri 2025-01-10 03:17:29 EST; 24s ago
   Invocation: c404cdf4d82645fe932f493fa4fbc997
     Docs: man:sshd(8)
           man:sshd_config(5)
   Main PID: 26373 (sshd)
     Tasks: 1 (limit: 8771)
    Memory: 1M (peak: 1.2M)
      CPU: 15ms
     CGroup: /system.slice/sshd.service
             └─26373 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

Jan 10 03:17:29 federal systemd[1]: Starting sshd.service - OpenSSH server daemon...
Jan 10 03:17:29 federal (sshd)[26373]: sshd.service: Referenced but unset environment variable evaluates to an empty string: OPTIONS
Jan 10 03:17:29 federal sshd[26373]: Server listening on 0.0.0.0 port 8022. ←
Jan 10 03:17:29 federal sshd[26373]: Server listening on :: port 8022. ←
Jan 10 03:17:29 federal systemd[1]: Started sshd.service - OpenSSH server daemon.
root@federal:/etc/ssh#

```

### 3.10.1.1 Test port 8022

Display ip address ifconfig

Ifconfig

```
root@federal:/etc/ssh# ifconfig
ens160: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.164.101.1 brd 10.164.255.255 netmask 255.255.0.0 broadcast 10.164.255.255
        inet6 fe80::ece8:a77c:9cal:38b4 brd fe80::ff77c:9cal:38b4/64 scopeid 0x20<link>
            ether 00:0c:29:43:9c:55 txqueuelen 1000 (Ethernet)
            RX packets 1284621 bytes 117382176 (111.9 MiB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 57814 bytes 8845721 (8.4 MiB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 brd 127.0.0.1 netmask 255.0.0.0
        inet6 ::1 brd ::1 prefixlen 128 scopeid 0x10<host>
            loop txqueuelen 1000 (Local Loopback)
            RX packets 2874 bytes 378614 (369.7 KiB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 2874 bytes 378614 (369.7 KiB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

Note the ip address assigned to the machine, to later use it to connect via 22h

Connect Using the New Port: When connecting to the server via SSH, specify the new port using the -p option:

```
ssh -p 8022 www.fed1.com@10.164.101.1
```

```
exit
```

Connection is successful

```
root@federal:/etc/ssh# ssh -p 8022 www.fed1.com@10.164.101.1
www.fed1.com@10.164.101.1's password:
Last login: Fri Jan 10 02:39:05 2025 from 10.164.0.17
www.fed1.com@federal:~$ exit
logout
Connection to 10.164.101.1 closed.
root@federal:/etc/ssh# |
```

```
ssh www.fed1.com@10.164.101.1
```

will get connection refuse since will try port 22 and is not used anymore

```
root@federal:/etc/ssh# ssh www.fed1.com@10.164.101.1
ssh: connect to host 10.164.101.1 port 22: Connection refused
root@federal:/etc/ssh# |
```

### 3.10.2 Configure the client-side settings for making SSH connections use port 8022

Make sure you are in /etc/ssh

```
root@federal:/etc/ssh#
root@federal:/etc/ssh# pwd
/etc/ssh
```

If not cd /etc/ssh

Display contents of file ssh\_config, note Port 22 is defined

cat ssh\_config

```
root@federal:/etc/ssh# cat ssh_config
#      $OpenBSD: ssh_config,v 1.36 2023/08/02 23:04:38 djm Exp $

# This is the ssh client system-wide configuration file. See
# ssh_config(5) for more information. This file provides defaults for
# users, and the values can be changed in per-user configuration files
# or on the command line.

# Configuration data is parsed as follows:
# 1. command line options
# 2. user-specific file
# 3. system-wide file
# Any configuration value is only changed the first time it is set.
# Thus, host-specific definitions should be at the beginning of the
# configuration file, and defaults at the end.

# Site-wide defaults for some commonly used options. For a comprehensive
# list of available options, their meanings and defaults, please see the
# ssh_config(5) man page.

# Host *
# ForwardAgent no
# ForwardX11 no
# PasswordAuthentication yes
# HostbasedAuthentication no
# GSSAPIAuthentication no
# GSSAPIDelegateCredentials no
# GSSAPIKeyExchange no
# GSSAPITrustDNS no
# BatchMode no
# CheckHostIP no
# AddressFamily any
# ConnectTimeout 0
# StrictHostKeyChecking ask
# IdentityFile ~/.ssh/id_rsa
# IdentityFile ~/.ssh/id_dsa
# IdentityFile ~/.ssh/id_ecdsa
# IdentityFile ~/.ssh/id_ed25519
# Port 22 ←
# Ciphers aes128-ctr,aes192-ctr,aes256-ctr,aes128-cbc,3des-cbc
# MACs hmac-md5,hmac-sha1,umac-64@openssh.com
# EscapeChar ~
# Tunnel no
# TunnelDevice any:any
```

Edit file

vi ssh\_config

```

#      $OpenBSD: ssh_config,v 1.36 2023/08/02 23:04:38 djm Exp $

# This is the ssh client system-wide configuration file. See
# ssh_config(5) for more information. This file provides defaults for
# users, and the values can be changed in per-user configuration files
# or on the command line.

# Configuration data is parsed as follows:
# 1. command line options
# 2. user-specific file
# 3. system-wide file
# Any configuration value is only changed the first time it is set.
# Thus, host-specific definitions should be at the beginning of the
# configuration file, and defaults at the end.

# Site-wide defaults for some commonly used options. For a comprehensive
# list of available options, their meanings and defaults, please see the
# ssh_config(5) man page.

# Host *
#   ForwardAgent no
#   ForwardX11 no
#   PasswordAuthentication yes
#   HostbasedAuthentication no
#   GSSAPIAuthentication no
#   GSSAPIDelegateCredentials no
#   GSSAPIKeyExchange no
#   GSSAPITrustDNS no
#   BatchMode no
#   CheckHostIP no
#   AddressFamily any
#   ConnectTimeout 0
#   StrictHostKeyChecking ask
#   IdentityFile ~/.ssh/id_rsa
#   IdentityFile ~/.ssh/id_dsa
#   IdentityFile ~/.ssh/id_ecdsa
#   IdentityFile ~/.ssh/id_ed25519
Port 8022 ←
#   Ciphers aes128-ctr,aes192-ctr,aes256-ctr,aes128-cbc,3des-cbc
#   MACs hmac-md5,hmac-sha1,umac-64@openssh.com
#   EscapeChar ~
#   Tunnel no
#   TunnelDevice any:any
#   PermitLocalCommand no
#   VisualHostKey no
#   ProxyCommand ssh -q -W %h:%p gateway.example.com
#   RekeyLimit 1G 1h
#   UserKnownHostsFile ~/.ssh/known_hosts.d/%k
-- INSERT --

```

Inside the file controls the setting for client portion of ssh change port 22 to 8022

Restart sshd

Systemctl status sshd

```

root@fedoral:/etc/ssh# systemctl status sshd
● sshd.service - OpenSSH server daemon
  Loaded: loaded (/usr/lib/systemd/system/sshd.service; enabled; preset: disabled)
  Drop-In: /usr/lib/systemd/system/service.d
            └─10-timeout-abort.conf, 50-keep-warm.conf
    Active: active (running) since Fri 2025-01-10 03:17:29 EST; 13min ago
  Invocation: c404cdf4d82645fe932f493fa4fb997
    Docs: man:sshd(8)
          man:sshd_config(5)
  Main PID: 26373 (sshd)
    Tasks: 1 (limit: 8771)
   Memory: 1M (peak: 19.9M)
     CPU: 153ms
    CGroup: /system.slice/sshd.service
              └─26373 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

Jan 10 03:17:29 fedoral sshd[26373]: Server listening on 0.0.0.0 port 8022.
Jan 10 03:17:29 fedoral sshd[26373]: Server listening on :: port 8022.
Jan 10 03:17:29 fedoral systemd[1]: Started sshd.service - OpenSSH server daemon.
Jan 10 03:20:20 fedoral sshd-session[26890]: Invalid user www.fed1.com from 10.164.101.1 port 59878
Jan 10 03:20:24 fedoral sshd-session[26890]: pam_unix(sshd:auth): check pass; user unknown
Jan 10 03:20:24 fedoral sshd-session[26890]: pam_unix(sshd:auth): authentication failure; logname= uid=0 euid=0 tty=ssh ruser= rhost=10.164.101.1
Jan 10 03:20:26 fedoral sshd-session[26890]: Failed password for invalid user www.fed1.com from 10.164.101.1 port 59878 ssh2
Jan 10 03:20:28 fedoral sshd-session[26890]: Connection closed by invalid user www.fed1.com 10.164.101.1 port 59878 [preauth]
Jan 10 03:20:37 fedoral sshd-session[26937]: Accepted password for www.fed1.com from 10.164.101.1 port 54778 ssh2
Jan 10 03:20:37 fedoral sshd-session[26937]: pam_unix(sshd:session): session opened for user www.fed1.com(uid=1003) by www.fed1.com(uid=0)

root@fedoral:/etc/ssh#

```

Systemctl restart sshd

```

root@fedoral:/etc/ssh#
root@fedoral:/etc/ssh# systemctl restart sshd
root@fedoral:/etc/ssh# |

```

Stystemctl status sshd

```

root@fedoral:/etc/ssh# systemctl status sshd
● sshd.service - OpenSSH server daemon
  Loaded: loaded (/usr/lib/systemd/system/sshd.service; enabled; preset: disabled)
  Drop-In: /usr/lib/systemd/system/service.d
            └─10-timeout-abort.conf, 50-keep-warm.conf
    Active: active (running) since Fri 2025-01-10 03:31:23 EST; 39s ago
  Invocation: 735abd9623a94873b1f317052aa0f995
    Docs: man:sshd(8)
          man:sshd_config(5)
  Main PID: 28731 (sshd)
    Tasks: 1 (limit: 8771)
   Memory: 1M (peak: 1.1M)
     CPU: 16ms
    CGroup: /system.slice/sshd.service
              └─28731 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

Jan 10 03:31:23 fedoral systemd[1]: Starting sshd.service - OpenSSH server daemon...
Jan 10 03:31:23 fedoral (sshd)[28731]: sshd.service: Referenced but unset environment variable evaluates to an empty string: OPTIONS
Jan 10 03:31:23 fedoral sshd[28731]: Server listening on 0.0.0.0 port 8022. ←
Jan 10 03:31:23 fedoral sshd[28731]: Server listening on :: port 8022.
Jan 10 03:31:23 fedoral systemd[1]: Started sshd.service - OpenSSH server daemon.

root@Fedoral:/etc/ssh# |

```

### 3.10.2.1 Test port 8022

ssh [www.fed1.com](http://www.fed1.com)@10.164.101.1

exit

```

root@fedoral:/etc/ssh# 
root@fedoral:/etc/ssh# # TEST
root@fedoral:/etc/ssh# ssh www.fed1.com@10.164.101.1
www.fed1.com@10.164.101.1's password:
Last login: Fri Jan 10 03:20:37 2025 from 10.164.101.1
www.fed1.com@fedoral:~$ exit
Logout
Connection to 10.164.101.1 closed.
root@fedoral:/etc/ssh# |

```

This one still works

ssh -p 8022 [www.fed1.com](http://www.fed1.com)@10.164.101.1

```
root@fedora1:/etc/ssh# ssh -p 8022 www.fed1.com@10.164.101.1
www.fed1.com@10.164.101.1's password:
Last login: Fri Jan 10 03:33:37 2025 from 10.164.101.1
www.fed1.com@fedora1:~$ exit
logout
Connection to 10.164.101.1 closed.
root@fedora1:/etc/ssh# |
```

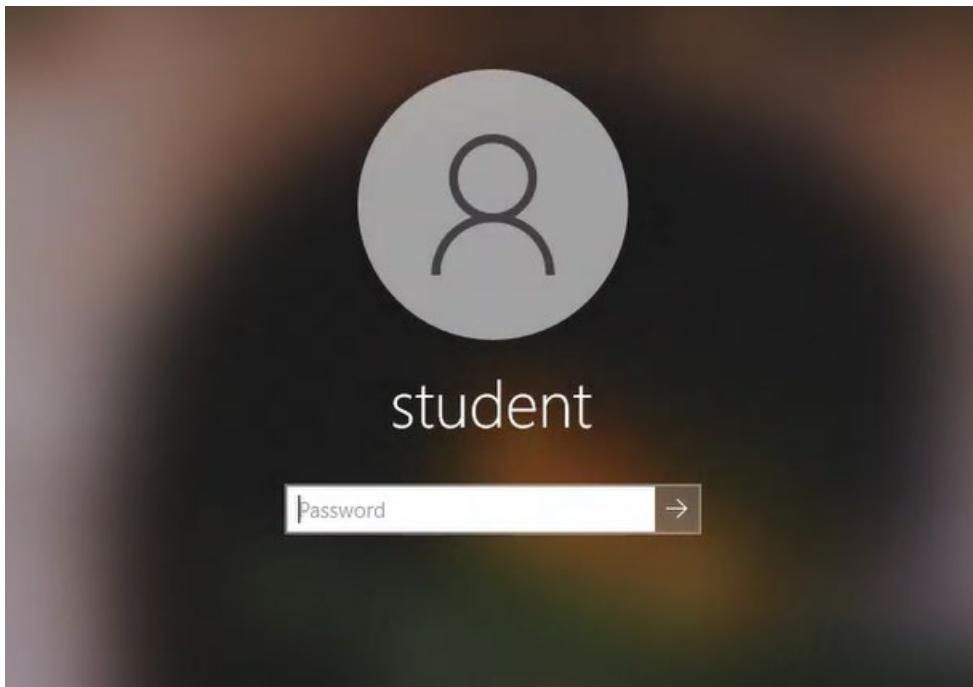
ssh -p 22 www.fed1.com@10.164.101.1

Does not work

```
root@fedora1:/etc/ssh#
root@fedora1:/etc/ssh# ssh -p 22 www.fed1.com@10.164.101.1
ssh: connect to host 10.164.101.1 port 22: Connection refused
root@fedora1:/etc/ssh# |
```

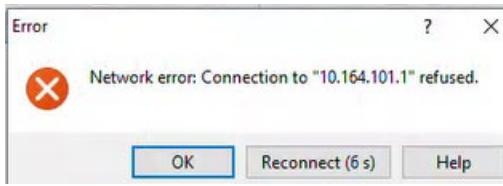
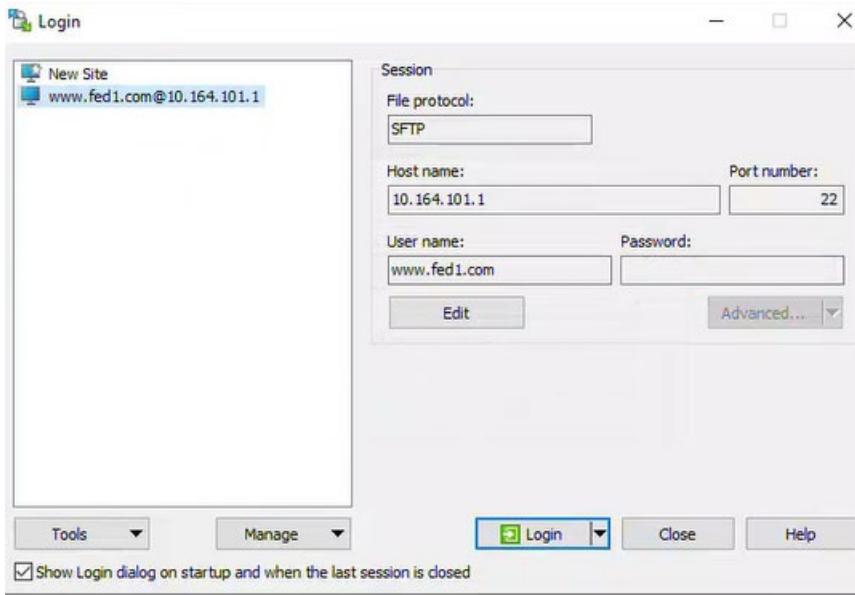
### 3.10.3 Test winSCP connection with new port 8022

Login to Windows Virtual machine



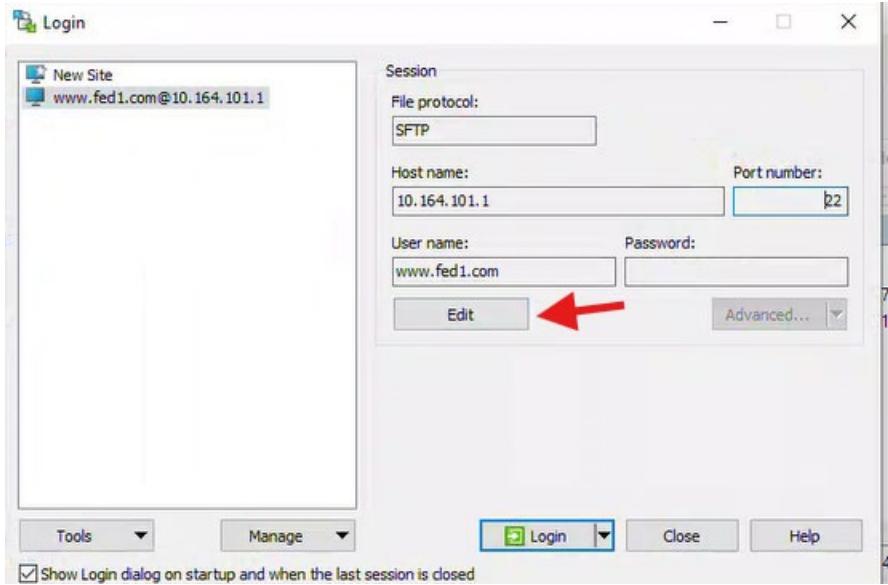
We need to test from or windows winscp

Try winscp with port 22

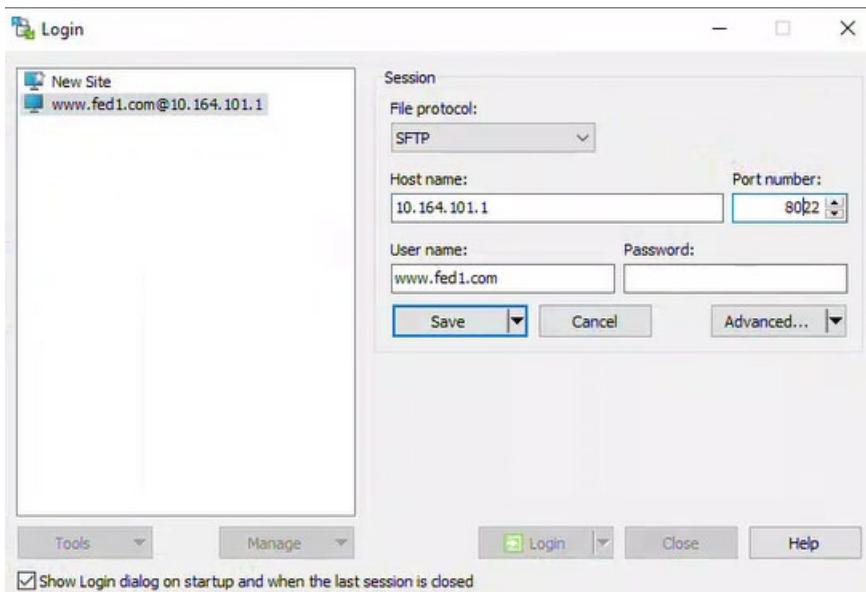


In winscp change the port number to 8022

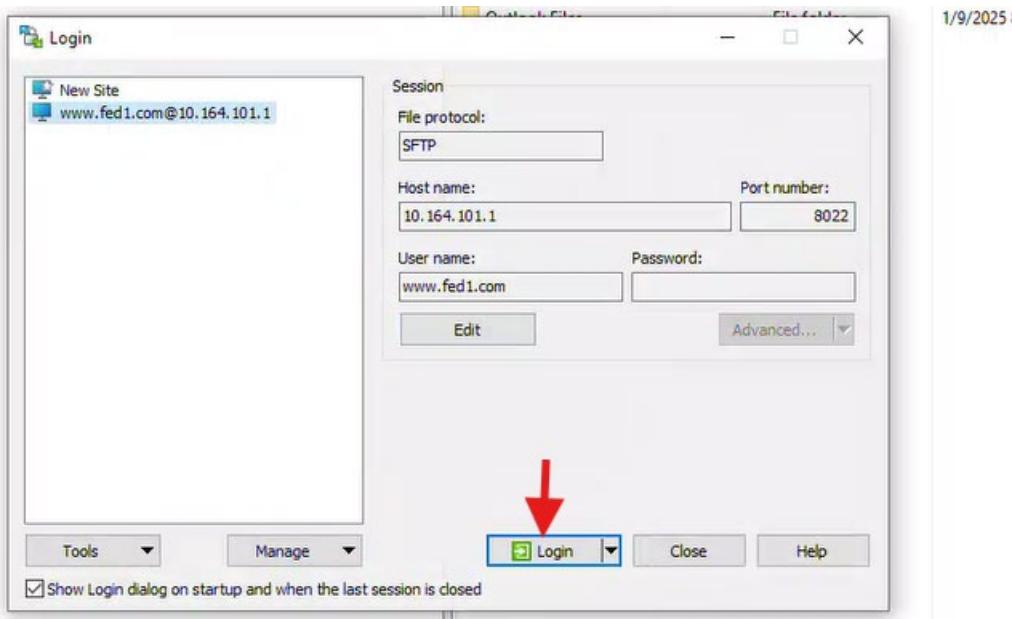
Edit to change port 22 to 8022

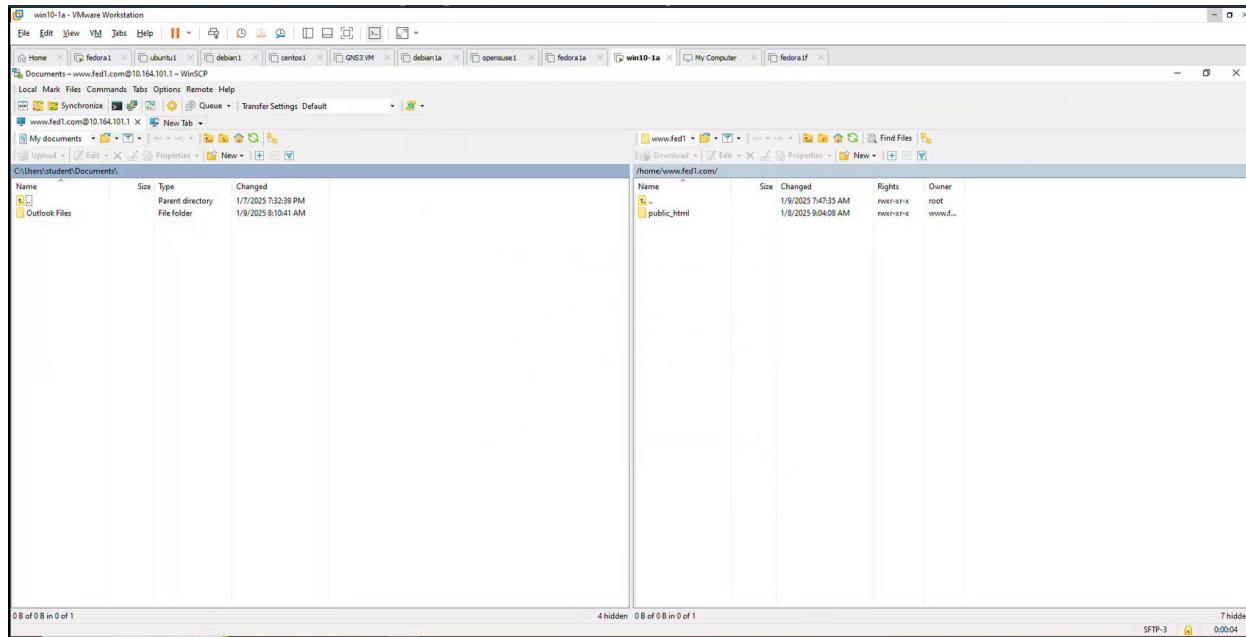
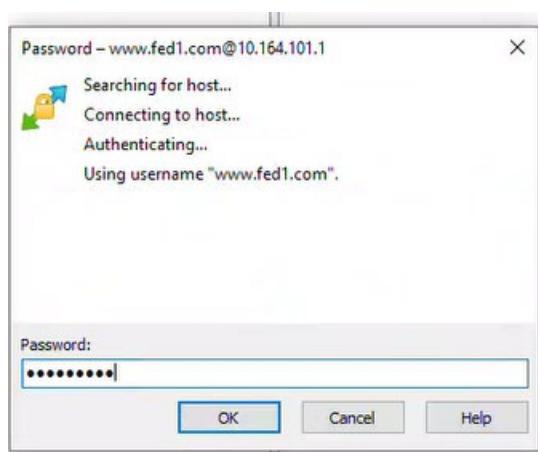
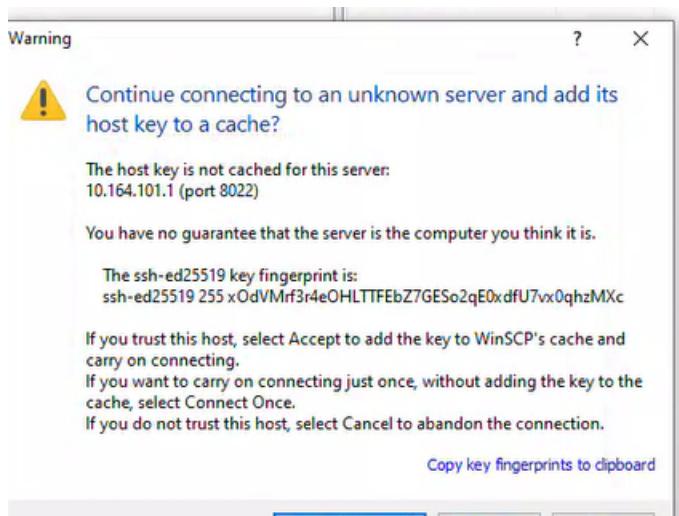


Save



## Login





And it will work

### 3.11 Install LAMP on Fedora

LAMP stands for Linux, Apache, MySQL, and PHP, and describes a very common web service stack. A stack is a software set which creates a complete platform. With a stack, no additional software is needed to support applications, and those applications then “run on” or “run on top of” the stack.

Lamp servers are not limited to the above bundle of software.

For LAMP stack, you'll primarily need PHP, MySQL, Apache, and any additional extensions or modules specific to your project's requirements.

#### 3.11.1 Installing PHP

PHP is a server side scripting language that can be used to develop static or dynamic websites/web applications.

A) Start by installing php

```
dnf install php
```

```
root@fedoralg:~# dnf install php
Updating and loading repositories:
Repositories loaded.
Package           Arch      Version       Repository      Size
Installing:
php               x86_64    8.3.15-1.fc41   updates          0.0  B
Installing dependencies:
nginx-filesystem noarch    2:1.26.2-1.fc41   fedora          0.0  B
php-common        x86_64    8.3.15-1.fc41   updates          8.9 MiB
Installing weak dependencies:
php-cli           x86_64    8.3.15-1.fc41   updates          16.0 MiB
php-fpm           x86_64    8.3.15-1.fc41   updates          8.1 MiB
php-mbstring      x86_64    8.3.15-1.fc41   updates          1.1 MiB
php-opcache       x86_64    8.3.15-1.fc41   updates          889.6 KiB
php-pdo            x86_64    8.3.15-1.fc41   updates          227.5 KiB
php-sodium         x86_64    8.3.15-1.fc41   updates          102.5 KiB
php-xml            x86_64    8.3.15-1.fc41   updates          431.1 KiB
Transaction Summary:
Installing:      10 packages
```

B) Restart the httpd service.

```
root@fedoralg:~# systemctl restart httpd
```

C) We've already set up virtual hosting on this machine and have 2 users: [www.practice1g.com](http://www.practice1g.com) and [www.practice1g.ca](http://www.practice1g.ca).

Swap to the user [www.practice1g.com](http://www.practice1g.com).

```
su www.practice1g.com
```

```
root@fedoralg:~# su www.practice1g.com
www.practice1g.com@fedoralg:~/root$ pwd
```

D) Change to the /home/www.practice1g.com/public\_html directory.

```
www.practice1g.com@fedora1g:/root$ cd /home/www.practice1g.com/public_html/
www.practice1g.com@fedora1g:~/public_html$
```

E) Create a new file called “info.php”.

```
www.practice1g.com@fedora1g:~/public_html$ vi info.php
```

vi info.php

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

Enter the following text:

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

Save the file and exit

F) Exit the user and go back to root

```
exit
exit
```

```
www.practice1g.com@fedora1g:/root$ exit
exit
root@fedora1g:~# # confirm DNS is running
```

G) Confirm that DNS is running.

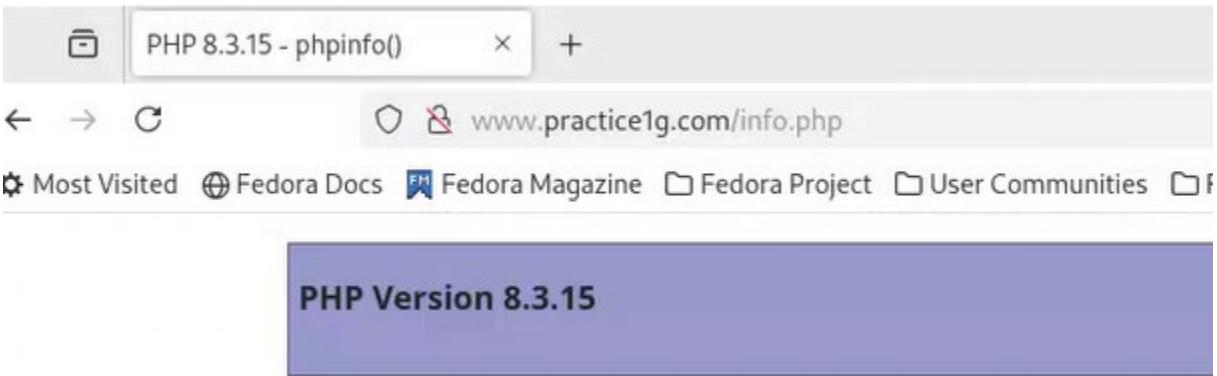
```

root@fedoral1g:~# systemctl status named
● named.service - Berkeley Internet Name Domain (DNS)
   Loaded: loaded (/usr/lib/systemd/system/named.service; enabled; preset: disabled)
   Drop-In: /usr/lib/systemd/system/service.d
             └─10-timeout-abort.conf, 50-keep-warm.conf
     Active: active (running) since Mon 2025-01-13 21:02:06 EST; 12h ago
   Invocation: 6d415ace9df4a90989763d70a0a94ce
     Main PID: 1014 (named)
       Tasks: 8 (limit: 9419)
      Memory: 23.5M (peak: 24M)
        CPU: 1.857s
      CGroup: /system.slice/named.service
                 └─1014 /usr/sbin/named -u named -c /etc/named.conf

Jan 13 21:02:06 fedoral1g named[1014]: network unreachable resolving './NS/IN': 198.97.190.53#53
Jan 13 21:02:06 fedoral1g named[1014]: resolver priming query complete: failure
Jan 13 21:02:08 fedoral1g named[1014]: listening on IPv4 interface ens160, 10.164.101.9#53
Jan 13 21:02:08 fedoral1g named[1014]: network unreachable resolving './NS/IN': 2001:500:2d::#53
Jan 13 21:02:08 fedoral1g named[1014]: network unreachable resolving './NS/IN': 2001:500:1::53#53
Jan 13 21:02:08 fedoral1g named[1014]: network unreachable resolving './NS/IN': 2001:dc3::35#53
Jan 13 21:02:22 fedoral1g named[1014]: network unreachable resolving './NS/IN': 2001:500:2d::#53
Jan 13 21:02:22 fedoral1g named[1014]: network unreachable resolving './NS/IN': 2001:dc3::35#53
Jan 13 22:02:06 fedoral1g named[1014]: managed-keys-zone: Key 20326 for zone . is now trusted (acceptance timer complete)
Jan 13 22:02:06 fedoral1g named[1014]: managed-keys-zone: Key 38696 for zone . is now trusted (acceptance timer complete)

```

- H) To confirm php has installed successfully, open a web browser on the VM (Fedora box) and navigate to the web page [www.practice1g.com/info.php](http://www.practice1g.com/info.php).



PHP Version 8.3.15	
<b>System</b>	Linux fedoral1g 6.12.8-200.fc41.x86_64 #1 SMP PREEMPT_DYNAMIC Thu Jan 2 19:26:03 UTC 2025 x86_64
<b>Build Date</b>	Dec 17 2024 18:18:02
<b>Build System</b>	Fedora release 41 (Forty One)
<b>Build Provider</b>	Fedora Project
<b>Compiler</b>	gcc (GCC) 14.2.1 20240912 (Red Hat 14.2.1-3)
<b>Architecture</b>	x86_64
<b>Server API</b>	FPM/FastCGI
<b>Virtual Directory Support</b>	disabled
<b>Configuration File (php.ini) Path</b>	/etc
<b>Loaded Configuration File</b>	/etc/php.ini
<b>Scan this dir for additional .ini files</b>	/etc/php.d
<b>Additional .ini files parsed</b>	/etc/php.d/10-opcache.ini, /etc/php.d/20-bz2.ini, /etc/php.d/20-calendar.ini, /etc/php.d/20-ctype.ini, /etc/php.d/20-curl.ini, /etc/php.d/20-dom.ini, /etc/php.d/20-exif.ini, /etc/php.d/20-fileinfo.ini, /etc/php.d/20-ftp.ini, /etc/php.d/20-gettext.ini, /etc/php.d/20-iconv.ini, /etc/php.d/20-mbstring.ini, /etc/php.d/20-pdo.ini, /etc/php.d/20-phar.ini, /etc/php.d/20-simplexml.ini, /etc/php.d/20-sodium.ini, /etc/php.d/20-sqlite3.ini, /etc/php.d/20-tokenizer.ini, /etc/php.d/20-xml.ini, /etc/php.d/20-xmlwriter.ini, /etc/php.d/20-xsl.ini, /etc/php.d/30-pdo_sqlite.ini, /etc/php.d/30-xmlreader.ini
<b>PHP API</b>	20230831
<b>PHP Extension</b>	20230831
<b>Zend Extension</b>	420230831
<b>Zend Extension Build</b>	API420230831,NTS
<b>PHP Extension Build</b>	API20230831,NTS
<b>Debug Build</b>	no

- I) Now we will install some additional packages for php. Run the following commands:

```
dnf install php-mysql php-gd php-imap php-ldap php-odbc php-pear php-xml php-xmlrpc
```

```
dnf install php-magickwand php-mbstring php-mcrypt php-mssql php-shout php-snmp
```

```
dnf install php-soap php-tidy
```

- J) Note, some of these packages might not install. The name might have been update, or the package may no longer be available. For us, we are missing php-magickwand, php-mysql, and php-shout.

```
root@fedoralg:~# dnf install php-mysql php-gd php-imap php-ldap php-odbc php-pear php-xml php-xmlrpc
Updating and loading repositories:
Repositories loaded.
Failed to resolve the transaction:
No match for argument: php-mysql ←
No match for argument: php-imap ←
Package "php-xml-8.3.15-1.fc41.x86_64" is already installed.
You can try to add to command line:
--skip-unavailable to skip unavailable packages
root@fedoralg:~#
```

- K) For any missing packages, use the ‘dnf search NAME’ and grep commands to search for newer packages

```
root@fedoralg:~# dnf search php-* | grep mysql
Updating and loading repositories:
Repositories loaded.
php-mysqlnd.x86_64: A module for PHP applications that use MySQL databases
php-pear-MDB2-Driver-mysqli.noarch: MySQL Improved MDB2 driver
php-williamdes-mariadb-mysql-kbs.noarch: An index of the MariaDB and MySQL Knowledge bases
```

- L) The only package was missing , and found in the search was php-mysql. It had been renamed to ‘php-mysqlnd’. Install this package.

```
root@fedoralg:~# dnf install php-mysqlnd.x86_64
Updating and loading repositories:
Repositories loaded.
Transaction Summary:
  Installing: 1 package

Total size of inbound packages is 131 KiB. Need to download 131 KiB.
After this operation, 367 KiB extra will be used (install 367 KiB, remove 0 B).
Is this ok [y/N]: y
[1/1] php-mysqlnd-0:8.3.15-1.fc41.x86_64          100% | 545.1 KiB/s | 130.8 KiB | 00m00s
-----[1/1] Total                                100% | 300.7 KiB/s | 130.8 KiB | 00m00s
-----[1/3] Verify package files                  100% | 71.0   B/s | 1.0    B | 00m00s
[2/3] Prepare transaction                      100% | 2.0    B/s | 1.0    B | 00m00s
[3/3] Installing php-mysqlnd-0:8.3.15-1.fc41.x86_64 100% | 588.7 KiB/s | 369.1 KiB | 00m01s
Complete!
```

M) `php-imap` was not found and `mysql` was already installed remove it from the command and Install

```
dnf install php-gd php-ldap php-odbc php-pear php-xml php-xmlrpc
```

```
Repositories loaded.
root@fedora1g:~# dnf install php-gd    php-ldap php-odbc php-pear php-xml php-xmlrpc
Updating and loading repositories:
Repositories loaded.
Package "php-xml-8.3.15-1.fc41.x86_64" is already installed.

Package          Arch    Version           Repository      Size
Installing:
php-gd           x86_64  8.3.15-1.fc41      updates        98.5 KiB
php-ldap         x86_64  8.3.15-1.fc41      updates        94.5 KiB
php-odbc         x86_64  8.3.15-1.fc41      updates       105.0 KiB
php-pear         noarch  1:1.10.16-1.fc41   updates        2.1 MiB
php-pecl-xmlrpc x86_64  1.0.0~rc3-12.fc41 fedora       220.6 KiB
Installing dependencies:
php-process      x86_64  8.3.15-1.fc41      updates        128.6 KiB
unixODBC         x86_64  2.3.12-5.fc41     fedora        1.0 MiB
Installing weak dependencies:
php-fedorautoloader noarch  1.0.1-14.fc41    fedora       14.8 KiB

Transaction Summary:
Installing: 8 packages

Total size of inbound packages is 1 MiB. Need to download 1 MiB.
After this operation, 4 MiB extra will be used (install 4 MiB, remove 0 B).
Is this ok [y/N]: y
[1/8] php-gd-0:8.3.15-1.fc41.x86_64          100% | 367.1 KiB/s | 40.7 KiB | 00m00s
[2/8] php-pecl-xmlrpc-0:1.0.0~rc3-12.fc41.x86_64 100% | 526.3 KiB/s | 65.3 KiB | 00m00s
[3/8] php-ldap-0:8.3.15-1.fc41.x86_64          100% | 346.6 KiB/s | 44.7 KiB | 00m00s
[4/8] unixODBC-0:2.3.12-5.fc41.x86_64         100% | 5.3 MiB/s | 414.9 KiB | 00m00s
[5/8] php-pear-1:1.10.16-1.fc41.noarch        100% | 3.2 MiB/s | 341.2 KiB | 00m00s
[6/8] php-process-0:8.3.15-1.fc41.x86_64       100% | 474.9 KiB/s | 40.4 KiB | 00m00s
[7/8] php-odbc-0:8.3.15-1.fc41.x86_64         100% | 261.8 KiB/s | 47.1 KiB | 00m00s
[8/8] php-fedorautoloader-0:1.0.1-14.fc41.noarch 100% | 211.7 KiB/s | 12.3 KiB | 00m00s
-----
[8/8] Total                                100% | 1.4 MiB/s | 1.0 MiB | 00m01s
Running transaction
[ 1/10] Verify package files                100% | 615.0 B/s | 8.0 B | 00m00s
[ 2/10] Prepare transaction                 100% | 17.0 B/s | 8.0 B | 00m00s
[ 3/10] Installing php-process-0:8.3.15-1.fc41.x86_6 100% | 8.0 MiB/s | 131.7 KiB | 00m00s
[ 4/10] Installing unixODBC-0:2.3.12-5.fc41.x86_64 100% | 23.3 MiB/s | 1.0 MiB | 00m00s
[ 5/10] Installing php-odbc-0:8.3.15-1.fc41.x86_64 100% | 11.5 MiB/s | 106.3 KiB | 00m00s
[ 6/10] Installing php-pear-1:1.10.16-1.fc41.noarch 100% | 25.7 MiB/s | 2.2 MiB | 00m00s
[ 7/10] Installing php-fedorautoloader-0:1.0.1-14. 100% | 3.9 MiB/s | 16.1 KiB | 00m00s
[ 8/10] Installing php-ldap-0:8.3.15-1.fc41.x86_64 100% | 8.5 MiB/s | 95.3 KiB | 00m00s
[ 9/10] Installing php-gd-0:8.3.15-1.fc41.x86_64 100% | 8.8 MiB/s | 99.3 KiB | 00m00s
[10/10] Installing php-pecl-xmlrpc-0:1.0.0~rc3-12.fc 100% | 158.3 KiB/s | 223.3 KiB | 00m01s
Complete!
root@fedora1g:~# dnf install php-magickwand php-mbstring php-mcrypt php-mssql php-shout php-snmp
```

N) Continue with next modules

```
dnf install php-magickwand php-mbstring php-mcrypt php-mssql php-shout php-snmp
```

```
root@fedora1g:~# dnf install php-magickwand php-mbstring php-mcrypt php-mssql php-shout php-snmp
Updating and loading repositories:
Repositories loaded.
Failed to resolve the transaction:
No match for argument: php-magickwand
Package "php-mbstring-8.3.15-1.fc41.x86_64" is already installed.
No match for argument: php-mssql
No match for argument: php-shout
You can try to add to command line:
--skip-unavailable to skip unavailable packages
```

Search for missing package

```
dnf search php-* | grep magic
```

```
root@fedora1g:~# dnf search php-* | grep magic
Updating and loading repositories:
Repositories loaded.
php-pecl-gmagick.x86_64: Provides a wrapper to the GraphicsMagick library
php-pecl-imagick.x86_64: Provides a wrapper to the ImageMagick library
php-pecl-imagick-devel.x86_64: imagick extension developer files (header)
```

Only the first of the found is installed , the other two cause issues

```
dnf install php-pecl-gmagick.x86_64
```

```
root@fedora1g:~# dnf install php-pecl-gmagick.x86_64
Updating and loading repositories:
Repositories loaded.
Package          Arch    Version           Repository      Size
Installing:
php-pecl-gmagick   x86_64   2.0.6~RC1-14.fc41      fedora        292.4 KiB
Installing dependencies:
GraphicsMagick     x86_64   1.3.45-1.fc41       fedora        5.2 MiB
mkfontscale        x86_64   1.2.3-1.fc41       fedora        49.2 KiB
urw-base35-fonts-legacy noarch   20200910-23.fc41   fedora        4.3 MiB

Transaction Summary:
Installing: 4 packages

Total size of inbound packages is 5 MiB. Need to download 5 MiB.
After this operation, 10 MiB extra will be used (install 10 MiB, remove 0 B).
Is this ok [y/N]: y
[1/4] php-pecl-gmagick-0:2.0.6~RC1-14.fc41.x86_64 100% | 751.8 KiB/s | 82.7 KiB | 00m00s
[2/4] mkfontscale-0:1.2.3-1.fc41.x86_64           100% | 255.1 KiB/s | 31.9 KiB | 00m00s
[3/4] urw-base35-fonts-legacy-0:20200910-23.fc41.noa 100% | 9.9 MiB/s | 3.0 MiB | 00m00s
[4/4] GraphicsMagick-0:1.3.45-1.fc41.x86_64        100% | 5.1 MiB/s | 1.6 MiB | 00m00s
-----
[4/4] Total                                         100% | 9.1 MiB/s | 4.8 MiB | 00m01s
Running transaction
[1/6] Verify package files                         100% | 93.0 B/s | 4.0 B | 00m00s
[2/6] Prepare transaction                          100% | 8.0 B/s | 4.0 B | 00m00s
[3/6] Installing mkfontscale-0:1.2.3-1.fc41.x86_64 100% | 5.5 MiB/s | 50.6 KiB | 00m00s
[4/6] Installing urw-base35-fonts-legacy-0:20200910- 100% | 32.5 MiB/s | 4.3 MiB | 00m00s
[5/6] Installing GraphicsMagick-0:1.3.45-1.fc41.x86_ 100% | 54.7 MiB/s | 5.3 MiB | 00m00s
[6/6] Installing php-pecl-gmagick-0:2.0.6~RC1-14.fc4 100% | 154.2 KiB/s | 294.1 KiB | 00m02s
Complete!
root@fedora1g:~# dnf install php-pecl-imagick.x86_64
```

```

root@fedora1g:~# dnf install php-pecl-imagick.x86_64
Updating and loading repositories:
Repositories loaded.
Failed to resolve the transaction:
Problem: problem with installed package
- installed package php-pecl-gmagick-2.0.6~RC1-14.fc41.x86_64 conflicts with php-pecl-imagick provided by php-pecl-imagick-3.7.0-13.fc41.x86_64 from fedora
- package php-pecl-gmagick-2.0.6~RC1-14.fc41.x86_64 from fedora conflicts with php-pecl-imagick provided by php-pecl-imagick-3.7.0-13.fc41.x86_64 from fedora
a
- conflicting requests
You can try to add to command line:
--allow-erasing to allow removing of installed packages to resolve problems
--skip-broken to skip un/installable packages
root@fedora1g:~# dnf install php-pecl-imagick-devel.x86_64
Updating and loading repositories:
Repositories loaded.
Failed to resolve the transaction:
Problem: problem with installed package
- installed package php-pecl-gmagick-2.0.6~RC1-14.fc41.x86_64 conflicts with php-pecl-imagick provided by php-pecl-imagick-3.7.0-13.fc41.x86_64 from fedora
- package php-pecl-gmagick-2.0.6~RC1-14.fc41.x86_64 from fedora conflicts with php-pecl-imagick provided by php-pecl-imagick-3.7.0-13.fc41.x86_64 from fedora
a
- package php-pecl-imagick-devel-3.7.0-13.fc41.x86_64 from fedora requires php-pecl-imagick(x86-64) = 3.7.0-13.fc41, but none of the providers can be installed
- conflicting requests
You can try to add to command line:
--allow-erasing to allow removing of installed packages to resolve problems
--skip-broken to skip un/installable packages
root@fedora1g:~#

```

From original

```
dnf install php-magickwand php-mbstring php-mcrypt php-mssql php-shout php-snmp
```

change to

```
dnf install php-mbstring php-mcrypt php-snmp
```

because **php-magickwand** is already installed and **php-mssql** **php-shout**

did not install as their names might have been update, or the package may no longer be available.

```

root@fedora1g:~# dnf install php-mbstring php-mcrypt php-snmp
Updating and loading repositories:
Repositories loaded.
Package "php-mbstring-8.3.15-1.fc41.x86_64" is already installed.

      Package           Arch   Version        Repository      Size
Installing:
  php-pecl-mcrypt     x86_64  1.0.6-7.fc41          fedora    62.6 KiB
  php-snmp            x86_64  8.3.15-1.fc41         updates   62.5 KiB
Installing dependencies:
  libmcrypt           x86_64  2.5.8-39.fc41         fedora   269.4 KiB
  net-snmp             x86_64  1:5.9.4-8.fc41        fedora   883.7 KiB
  net-snmp-agent-libs x86_64  1:5.9.4-8.fc41        fedora    2.2 MiB
  perl-Term-ReadLine  noarch  1.17-512.fc41       updates   17.3 KiB

Transaction Summary:
  Installing:       6 packages

Total size of inbound packages is 1 MiB. Need to download 1 MiB.
After this operation, 3 MiB extra will be used (install 3 MiB, remove 0 B).
Is this ok [y/N]: y
[1/6] php-pecl-mcrypt-0:1.0.6-7.fc41.x86_64          100% | 141.8 KiB/s | 27.6 KiB | 00m00s
[2/6] php-snmp-0:8.3.15-1.fc41.x86_64              100% | 160.0 KiB/s | 34.9 KiB | 00m00s
[3/6] libmcrypt-0:2.5.8-39.fc41.x86_64            100% | 391.9 KiB/s | 105.4 KiB | 00m00s
[4/6] perl-Term-ReadLine-0:1.17-512.fc41.noarch    100% | 527.6 KiB/s | 19.0 KiB | 00m00s
[5/6] net-snmp-1:5.9.4-8.fc41.x86_64              100% | 1.9 MiB/s | 306.0 KiB | 00m00s
[6/6] net-snmp-agent-libs-1:5.9.4-8.fc41.x86_64    100% | 3.5 MiB/s | 695.2 KiB | 00m00s
-----
```

O) Continue with next module

```
dnf install php-soap php-tidy
```

```

root@fedora1g:~# dnf install php-soap php-tidy
Updating and loading repositories:
Repositories loaded.
Package          Arch    Version          Repository      Size
Installing:
php-soap           x86_64   8.3.15-1.fc41       updates        334.5 KiB
php-tidy           x86_64   8.3.15-1.fc41       updates        58.5 KiB
Installing dependencies:
libtidy            x86_64   5.8.0-9.fc41        fedora        851.8 KiB

Transaction Summary:
Installing:         3 packages

Total size of inbound packages is 397 KiB. Need to download 397 KiB.
After this operation, 1 MiB extra will be used (install 1 MiB, remove 0 B).
Is this ok [y/N]: y
[1/3] php-tidy-0:8.3.15-1.fc41.x86_64           100% | 353.2 KiB/s | 31.8 KiB | 00m00s
[2/3] php-soap-0:8.3.15-1.fc41.x86_64           100% | 1.1 MiB/s | 143.4 KiB | 00m00s
[3/3] libtidy-0:5.8.0-9.fc41.x86_64             100% | 722.0 KiB/s | 221.7 KiB | 00m00s
-----
[3/3] Total                                         100% | 520.2 KiB/s | 396.9 KiB | 00m01s

```

```

root@fedora1g:~# dnf search php-* | grep imap
Updating and loading repositories:
Repositories loaded.
root@fedora1g:~# dnf install php-gd  php-ldap php-odbc php-pear php-xml php-xmlrpc
Updating and loading repositories:
Repositories loaded.
Package "php-xml-8.3.15-1.fc41.x86_64" is already installed.

Package          Arch    Version          Repository      Size
Installing:
php-gd             x86_64   8.3.15-1.fc41       updates        98.5 KiB
php-ldap           x86_64   8.3.15-1.fc41       updates        94.5 KiB
php-odbc           x86_64   8.3.15-1.fc41       updates        105.0 KiB
php-pear            noarch   1:1.10.16-1.fc41     updates        2.1 MiB
php-pecl-xmlrpc    x86_64   1.0.0-rc3-12.fc41    fedora        220.6 KiB
Installing dependencies:
php-process         x86_64   8.3.15-1.fc41       updates        128.6 KiB
unixODBC            x86_64   2.3.12-5.fc41       fedora        1.0 MiB
Installing weak dependencies:
php-fedorautoloader noarch   1.0.1-14.fc41       fedora        14.8 KiB

Transaction Summary:
Installing:         8 packages

Total size of inbound packages is 1 MiB. Need to download 1 MiB.
After this operation, 4 MiB extra will be used (install 4 MiB, remove 0 B).

```

```

root@fedoralg:~# dnf install php-soap php-tidy
Updating and loading repositories:
Repositories loaded.
Package          Arch    Version          Repository          Size
Installing:
php-soap           x86_64  8.3.15-1.fc41      updates            334.5 KiB
php-tidy           x86_64  8.3.15-1.fc41      updates            58.5 KiB
Installing dependencies:
libtidy            x86_64  5.8.0-9.fc41      fedora             851.8 KiB

Transaction Summary:
Installing:       3 packages

Total size of inbound packages is 397 KiB. Need to download 397 KiB.
After this operation, 1 MiB extra will be used (install 1 MiB, remove 0 B).
Is this ok [y/N]: y
[1/3] php-tidy-0:8.3.15-1.fc41.x86_64          100% | 353.2 KiB/s | 31.8 KiB | 00m00s
[2/3] php-soap-0:8.3.15-1.fc41.x86_64          100% | 1.1 MiB/s | 143.4 KiB | 00m00s
[3/3] libtidy-0:5.8.0-9.fc41.x86_64          100% | 722.0 KiB/s | 221.7 KiB | 00m00s
-----
[3/3] Total          100% | 520.2 KiB/s | 396.9 KiB | 00m01s
Running transaction
[1/5] Verify package files          100% | 375.0 B/s | 3.0 B | 00m00s
[2/5] Prepare transaction          100% | 6.0 B/s | 3.0 B | 00m00s
[3/5] Installing libtidy-0:5.8.0-9.fc41.x86_64 100% | 37.9 MiB/s | 852.9 KiB | 00m00s
[4/5] Installing php-tidy-0:8.3.15-1.fc41.x86_64 100% | 6.4 MiB/s | 59.3 KiB | 00m00s
[5/5] Installing php-soap-0:8.3.15-1.fc41.x86_64 100% | 487.4 KiB/s | 335.3 KiB | 00m01s
Complete!
root@fedoralg:~# dnf install php-soap php-tidy

```

#### P) Test if already installed

```

root@fedoralg:~# dnf install php-soap php-tidy
Updating and loading repositories:
Repositories loaded.
Package "php-soap-8.3.15-1.fc41.x86_64" is already installed.
Package "php-tidy-8.3.15-1.fc41.x86_64" is already installed.

Nothing to do.

```

#### Q) Restart the httpd service.

```

NOTHING to do.
root@fedoralg:~# systemctl restart httpd

```

#### R) Now, when you return to www.practice1g.com/info.php you'll see the list of additional packages

System	Linux fedora1g 6.12.8-200.fc41.x86_64 #1 SMP PREEMPT_DYNAMIC Thu Jan 2 19:26:03 UTC 2025 x86_64
Build Date	Dec 17 2024 18:18:02
Build System	Fedora release 41 (Forty One)
Build Provider	Fedora Project
Compiler	gcc (GCC) 14.2.1 20240912 (Red Hat 14.2.1-3)
Architecture	x86_64
Server API	FPM/FastCGI
Virtual Directory Support	disabled
Configuration File (php.ini) Path	/etc
Loaded Configuration File	/etc/php.ini
Scan this dir for additional .ini files	/etc/php.d
Additional .ini files parsed	/etc/php.d/10-opcache.ini, /etc/php.d/20-bz2.ini, /etc/php.d/20-calendar.ini, /etc/php.d/20-ctype.ini, /etc/php.d/20-curl.ini, /etc/php.d/20-dom.ini, /etc/php.d/20-exif.ini, /etc/php.d/20-fileinfo.ini, /etc/php.d/20-ftp.ini, /etc/php.d/20-gd.ini, /etc/php.d/20-gettext.ini, /etc/php.d/20-iconv.ini, /etc/php.d/20-ldap.ini, /etc/php.d/20-mbstring.ini, /etc/php.d/20-mysqlind.ini, /etc/php.d/20-odbc.ini, /etc/php.d/20-pdo.ini, /etc/php.d/20-phar.ini, /etc/php.d/20-posix.ini, /etc/php.d/20-shmop.ini, /etc/php.d/20-simplexml.ini, /etc/php.d/20-snmp.ini, /etc/php.d/20-soap.ini, /etc/php.d/20-sodium.ini, /etc/php.d/20-sqlite3.ini, /etc/php.d/20-sysvmsg.ini, /etc/php.d/20-sysvsem.ini, /etc/php.d/20-sysvshm.ini, /etc/php.d/20-tidy.ini, /etc/php.d/20-tokenizer.ini, /etc/php.d/20-xml.ini, /etc/php.d/20-xmlwriter.ini, /etc/php.d/20-xslini, /etc/php.d/30-mcrypt.ini, /etc/php.d/30-mysqli.ini, /etc/php.d/30-pdo_mysql.ini, /etc/php.d/30-pdo_odbc.ini, /etc/php.d/30-pdo_sqlite.ini, /etc/php.d/30-xmlreader.ini, /etc/php.d/30-xmlrpc.ini, /etc/php.d/40-gmagick.ini
PHP API	20230831
PHP Extension	20230831
Zend Extension	420230831
Zend Extension Build	API420230831,NTS

### 3.11.2 Installing MySQL

A) Install both mysql and mysql-server

```
dnf install mysql mysql-server
```

```
root@fedoralab: ~ dnf install mysql mysql-server
Updating and loading repositories:
Repositories loaded.
Package           Arch      Version          Repository       Size
Installing:
mysql              x86_64    8.0.40-1.fc41   updates          58.3 MiB
mysql-server       x86_64    8.0.40-1.fc41   updates          108.0 MiB
Installing dependencies:
mecab              x86_64    0.996-8.fc41   fedora          1.2 MiB
mysql-common       noarch    8.0.40-1.fc41   updates          442.2 KiB
mysql-errmsg        noarch    8.0.40-1.fc41   updates          9.9 MiB
mysql-selinux       noarch    1.0.11-1.fc41   fedora          49.7 KiB
protobuf-lite       x86_64    3.19.6-10.fc41  fedora          861.2 KiB

Transaction Summary:
Installing:    7 packages
```

B) Start and enable the MySql service

```
systemctl start mysqld
```

```
systemctl enable mysqld
```

```
systemctl status mysqld
```

```

root@fedoral1g:~# systemctl enable mysqld
Created symlink '/etc/systemd/system/multi-user.target.wants/mysqld.service' → '/usr/lib/systemd/system/mysqld.service'.
root@fedoral1g:~# systemctl start mysqld
root@fedoral1g:~# systemctl status mysqld

● mysqld.service - MySQL 8.0 database server
   Loaded: loaded (/usr/lib/systemd/system/mysqld.service; enabled; preset: disabled)
   Drop-In: /usr/lib/systemd/system/service.d
             └─10-timeout-abort.conf, 50-keep-warm.conf
     Active: active (running) since Tue 2025-01-14 10:00:24 EST; 7s ago
    Invocation: 24d7e6c3122c4c92934a332bde689a28
   Process: 97168 ExecStartPre=/usr/libexec/mysql-check-socket (code=exited, status=0/SUCCESS)
   Process: 97190 ExecStartPre=/usr/libexec/mysql-prepare-db-dir mysqld.service (code=exited, status=0/SUCCESS)
 Main PID: 97303 (mysqld)
   Status: "Server is operational"
     Tasks: 38 (limit: 9419)
    Memory: 532.7M (peak: 546.7M)
      CPU: 5.969s
     CGroup: /system.slice/mysqld.service
             └─97303 /usr/libexec/mysqld --basedir=/usr

Jan 14 10:00:08 fedoral1g systemd[1]: Starting mysqld.service - MySQL 8.0 database server...
Jan 14 10:00:08 fedoral1g mysql-prepare-db-dir[97190]: Initializing MySQL database
Jan 14 10:00:24 fedoral1g systemd[1]: Started mysqld.service - MySQL 8.0 database server.

```

C) Begin the mysql configuration wizard.

`mysql_secure_installation`

```

root@fedoral1g:~# mysql_secure_installation

```

Answer the following questions as indicated:

Would you like to setup VALIDATE PASSWORD component?: n

Type root passwd Amf123456

Remove anonymous users? (Press y|Y for Yes, any other key for No) : y

Disallow root login remotely? (Press y|Y for Yes, any other key for No) : Y

Remove test database and access to it? (Press y|Y for Yes, any other key for No) : n

Reload privilege tables now? (Press y|Y for Yes, any other key for No) : y

At the end you will see the message All done!

```

root@fedoral1g:~# mysql_secure_installation
Securing the MySQL server deployment.
Connecting to MySQL using a blank password.
VALIDATE PASSWORD COMPONENT can be used to test passwords
and improve security. It checks the strength of password
and allows the users to set only those passwords which are
secure enough. Would you like to setup VALIDATE PASSWORD component?
Press y|Y for Yes, any other key for No: N
Please set the password for root here.
New password:
Re-enter new password:
By default, a MySQL installation has an anonymous user,
allowing anyone to log into MySQL without having to have
a user account created for them. This is intended only for
testing, and to make the installation go a bit smoother.
You should remove them before moving into a production
environment.
Remove anonymous users? (Press y|Y for Yes, any other key for No) : Y
Success.
Normally, root should only be allowed to connect from
'localhost'. This ensures that someone cannot guess at

```

```

the root password from the network.
Disallow root login remotely? (Press y|Y for Yes, any other key for No) : Y
Success.
By default, MySQL comes with a database named 'test' that
anyone can access. This is also intended only for testing,
and should be removed before moving into a production
environment.
Remove test database and access to it? (Press y|Y for Yes, any other key for No) : n
... skipping.
Reloading the privilege tables will ensure that all changes
made so far will take effect immediately.
Reload privilege tables now? (Press y|Y for Yes, any other key for No) : y
Success.
All done!

```

D) Run ifconfig to get the ip address

Ifconfig

```

root@fedoralg:~# ifconfig
ens160: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.164.101.9 netmask 255.255.0.0 broadcast 10.164.255.255
        inetb fe80::e1b0:b8b:a489:8c13 prefixlen 64 scopeid 0x20<link>
            ether 00:0c:29:2e:7d:4a txqueuelen 1000 (Ethernet)
            RX packets 1611514 bytes 214240882 (204.3 MiB)
            RX errors 0 dropped 0 overruns 0 frame 0
            TX packets 46864 bytes 4919587 (4.6 MiB)
            TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

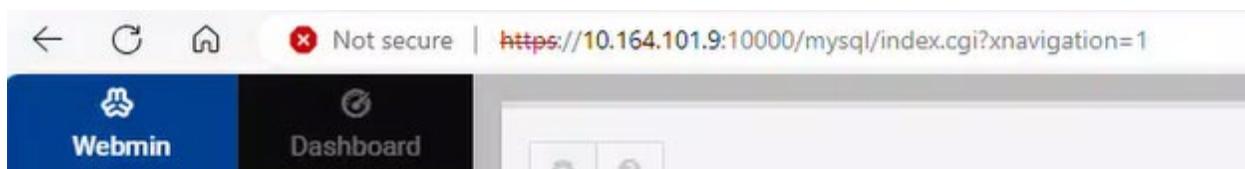
lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
        loop txqueuelen 1000 (Local Loopback)
        RX packets 3243 bytes 607653 (593.4 KiB)
        RX errors 0 dropped 0 overruns 0 frame 0
        TX packets 3243 bytes 607653 (593.4 KiB)
        TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

root@fedoralg:~# |

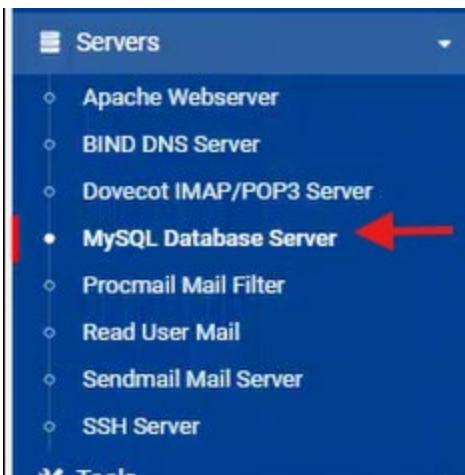
```

E) Form BareMetal machine (JAC lab) go to Firefox and enter Webmin

<https://10.164.101.9:10000/>



F) Select MySQL Database Server



G) First time you will be asked for root password

Give root password Amf123456

MySQL Database Server  
MySQL version 8.0.40

**Warning!** Webmin needs to know your MySQL administration login and password in order to manage your database. Please enter your administration username (usually root) and password below.

MySQL error message  
The full MySQL error message was: mysqladmin: connect to server at 'localhost' failed: error: 'Access denied for user 'root'@'localhost' (using password: NO)'

**MySQL Login**

Login	root	Password	Amf123456
-------	------	----------	-----------

Force override the given password, if lost or forgotten

**Save**

H) You can see the MySQL Database Server

Webmin Dashboard

MySQL Database Server  
MySQL version 8.0.40

Select all Invert selection Create a new database

Database name	Tables	Indexes	Views	Database name	Tables	Indexes	Views
information_schema	79	0	0	performance_schema	111	35	0
mysql	37	5	0	sys	1	0	100

**Drop Selected Databases**

Global Options

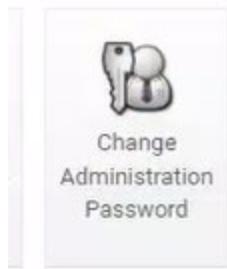
- User Permissions
- Database Permissions
- Table Permissions
- Field Permissions
- MySQL Server Configuration
- Edit Config Files
- Database Connections
- MySQL System Variables
- SSL Certificate
- Change Administration Password

**Stop MySQL Server** Click this button to stop the MySQL database server on your system. This will prevent any users or programs from accessing the database, including this Webmin module.

**Backup Databases** Click this button to setup the backup of all MySQL databases, either immediately or on a configured schedule.

**Warning!** The Perl modules DBI and DBD::mysql are not installed on your system, so Webmin will not be able to reliably access your MySQL database. Click here to install them now.

I) Select Icon "Change Administration Password"



A window with the password set in the first step appears, We can see the password Amf123456 as Current password.

The screenshot shows a web-based administration interface. At the top right, there is a title bar with a star icon and the text "Change Administration Password". Below the title, there are two main sections: "Administration login" on the left and "New administration password" on the right. In the "Administration login" section, the "root" user is listed under "Current password", which is currently set to "Amf123456". In the "New administration password" section, there are two input fields: "New password" and "Repeat password", both of which are currently empty. At the bottom left, there is a blue button labeled "Change Now" with a checked checkbox. At the very bottom, there is a dark blue footer bar with a white arrow pointing left and the text "Return to database list".