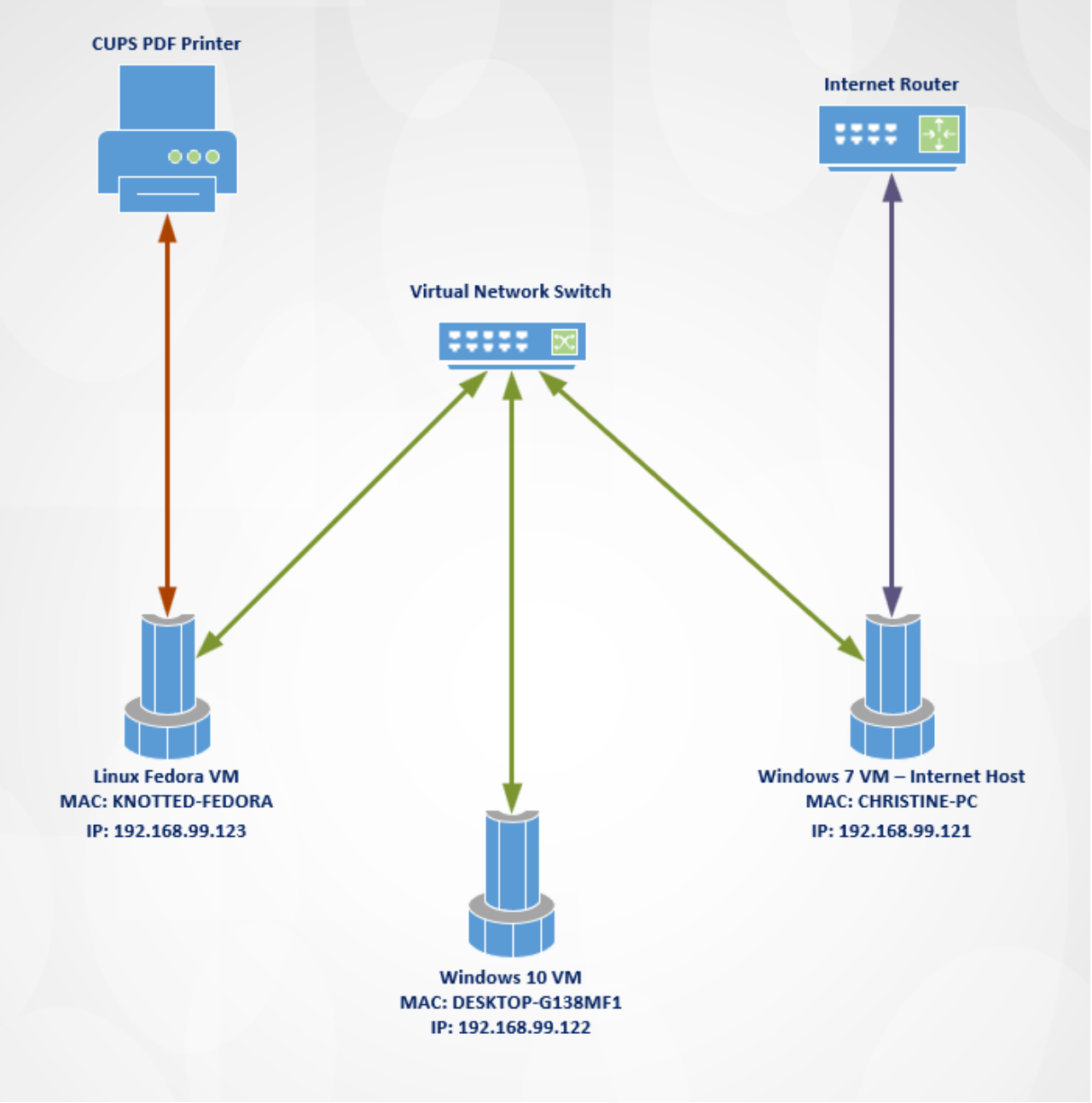

THE NETWORK KNOT

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DECEMBER 10, 2022

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Objective:

To create a private network consisting of the following hardware and operating systems:

1. Internet connection/router
2. Virtual Network Switch
3. Windows 7 Virtual Machine (which will be the internet host)
4. Windows 10 Virtual Machine
5. Linux Fedora Virtual Machine (Which will be the host for a shared PDF printer)
6. PDF Printer (hosted by Linux)

The goals for functionality of our virtual network:

1. The Windows 7 VM will act as the internet host, with the other 2 VMs obtaining their connection through the Windows 7 VM
2. Being able to share files between all VMs
3. Being able to use a remote desktop function between all VMs
4. Shared printer able to print a PDF document on all VMs
5. A script that is automatically run to backup a set of files from Linux to Windows 7

1. Create a Virtual Network Switch.

This switch will act as the communication point for our 3 VMs.

1.1 Open the Virtual network Editor in VM ware. In the bottom right click “Change Settings”. Then click “Add Network”.

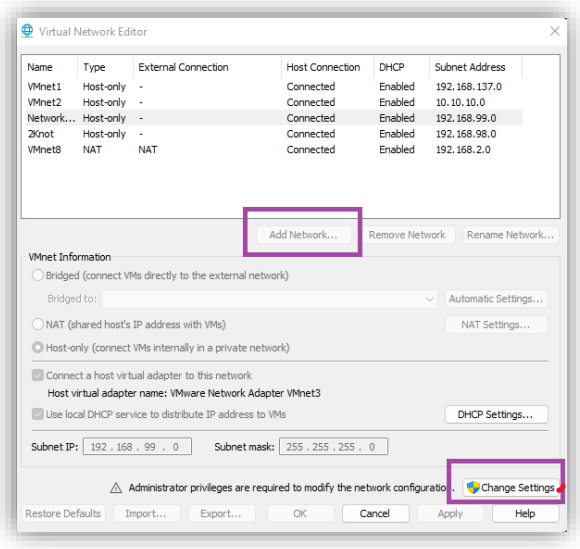

Figure 1: Create New Network Switch

1.2 Create the new virtual network with the same settings as the picture below. For the Subnet IP, the second to last set of 3 digits can be altered as you’d like, with a zero in the last field (ex: 192.168. x . 0). The subnet mask should be either 255.255.255.0 or 255.255. 0 . 0.

You can also rename the network at this point if you’d like. Click “OK” when you have configured the settings. Make note of the Subnet IP and Subnet Mask as you will need them later.

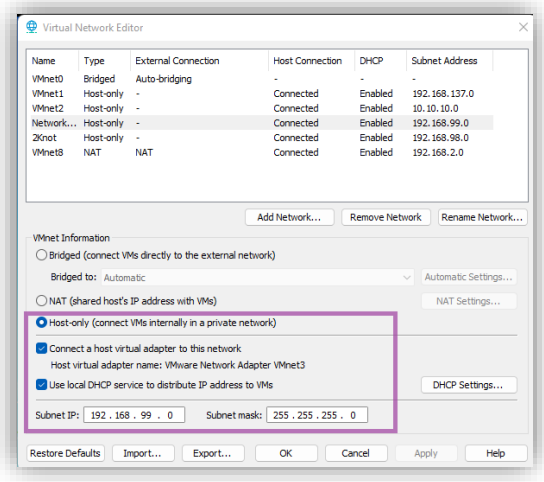

Figure 2: Settings for Network Switch

2. Configure Network Interface Cards (NICs) on the Windows 7 VM.

These settings are required so that the windows 7 VM will become the internet Host and share it's internet connection with the other VMs. The Windows 7 VM needs 2 NICs.

2.1 The first NIC will be the connection to our Host computer's internet connection. Configure the settings of the first one to match the picture and click "OK" when done.

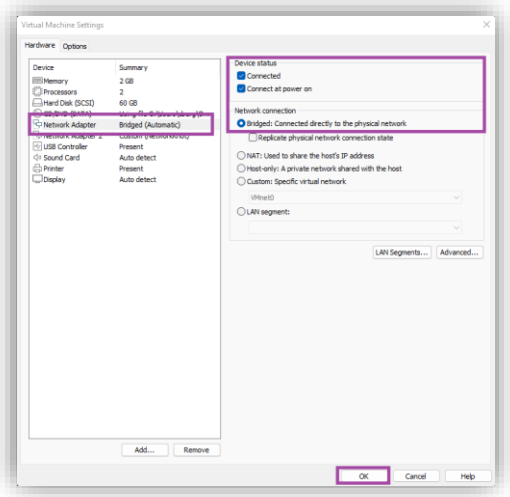

Figure 3: Configure NIC #1

2.2 The Second NIC will be the one that is connecting to the 2 other VMs and will share the internet connection to them. Configure the settings as below, ensuring to select the Virtual Network Switch that was created previously.

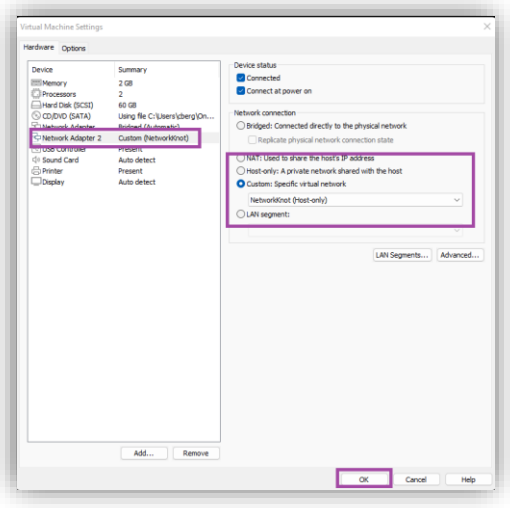

Figure 4: Configure NIC #2

3. Configure IP and internet sharing settings for the Windows 7 VM

The windows 7 VM needs some specific settings so that it will be able to act as the Internet Host.

3.1 Click the Start button and open the Control Panel

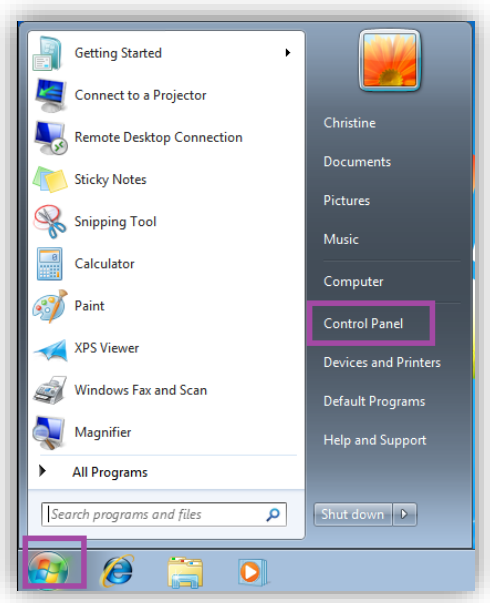

Figure 5: Open Control Panel

3.2 Select Network and Internet

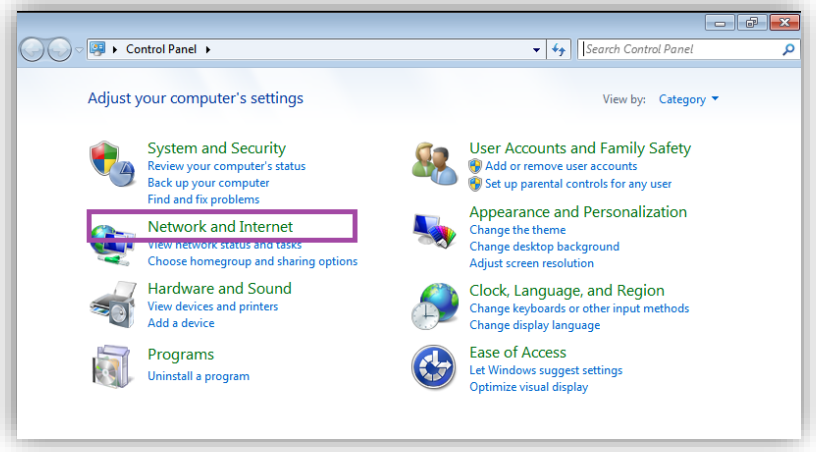

Figure 6: Select Network and Internet

3.3 Click “Network and Sharing Center”

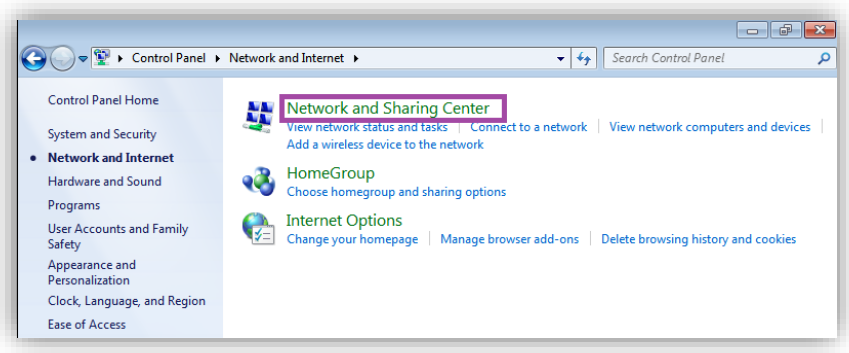

Figure 7: Network and Sharing Center

3.4 On the top left, Click “Change Adapter Settings”

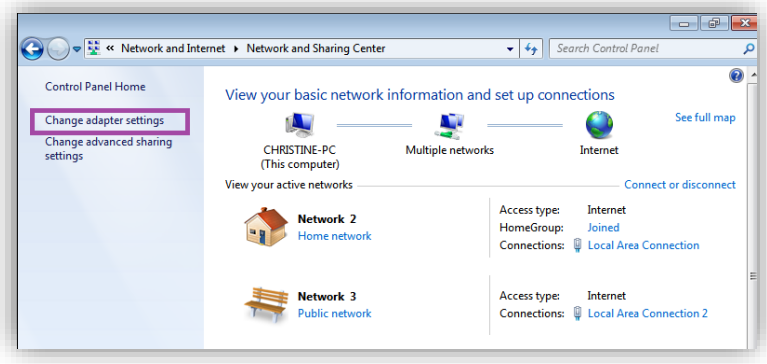

Figure 8: Change Adapter Settings

3.5 Right click on the first network adapter and click properties.

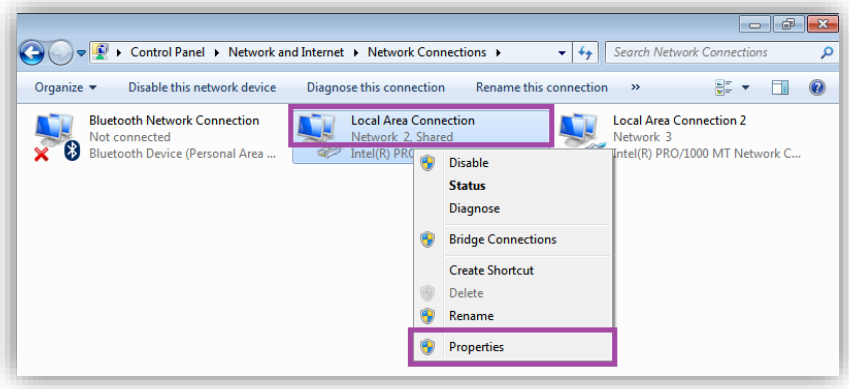

Figure 9: Network Adapter #1 Properties

3.6 Double click on “Internet Protocol Version 4”, and in the new window, ensure that “Obtain an IP address automatically” and “Obtain DNS server address automatically” are both checked. Click “OK” to close the IPv4 properties window.

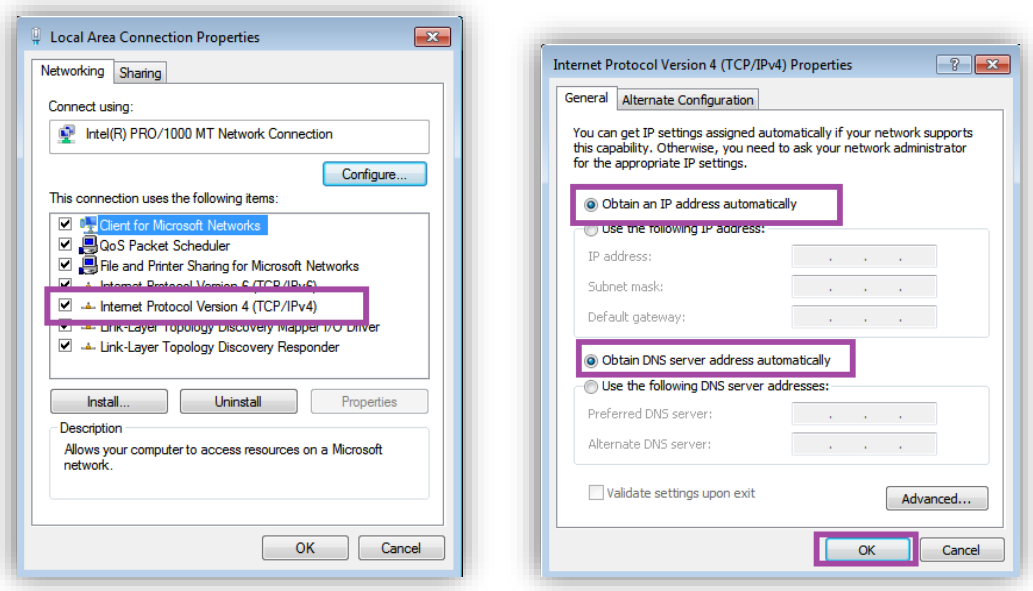

Figure 10: IPv4 settings & Obtain IP address automatically

3.7 In the “Local Area Connection Properties” window that we were just in, click the “Sharing” tab at the top, and check the box to “Allow other network users to connect through this computer’s internet connection”, and click “OK”. This will now allow the Windows 7 VM to share it’s internet with the other VMs.

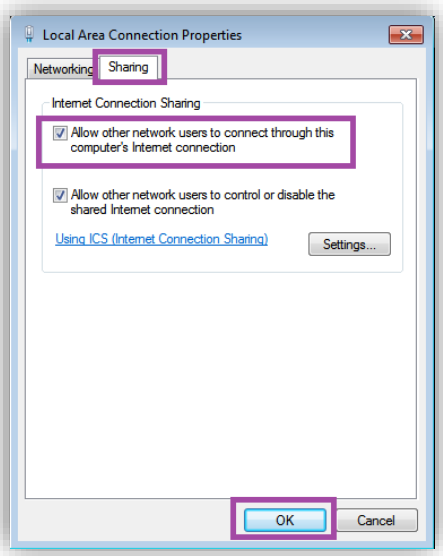

Figure 11: Share internet connection to network

3.8 We now need to change the settings for the second NIC on the Windows 7 VM. From the Network Connections screen, right click the second network adapter and select Properties.

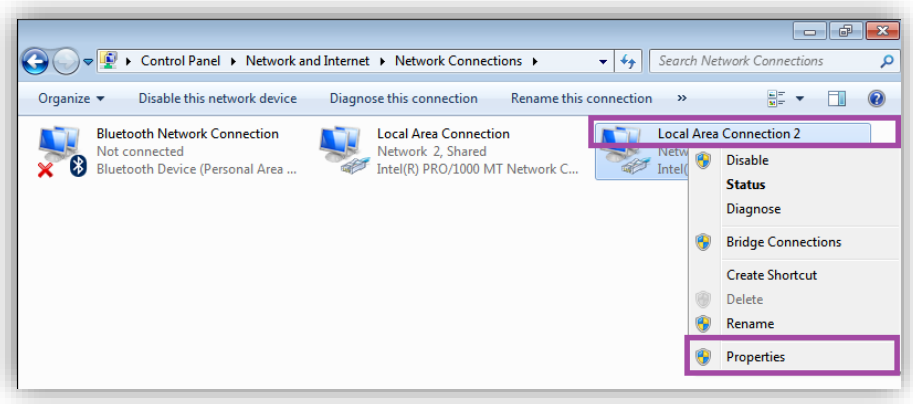

Figure 12: Network Adapter #2 properties

3.9 Double click the "Internet Protocol Version 4" and check the box for "Use the following IP address" to set the IP address manually.

- ➔ Set the first IP address to any number within the range you set in step 1.2 – in this case we used 192.168.99.121. Make note of this as you will need it later.
- ➔ The Subnet mask needs to be set the same as you used in the previous step as well.
- ➔ Set an IP for the default gateway using the same first 3 fields as the IP address, but a different last number.
- ➔ Check the box to "Use the following DNS server address", and set them to a default DNS server, in this case we used 8.8.8.8 and 4.4.4.4. Click "OK".

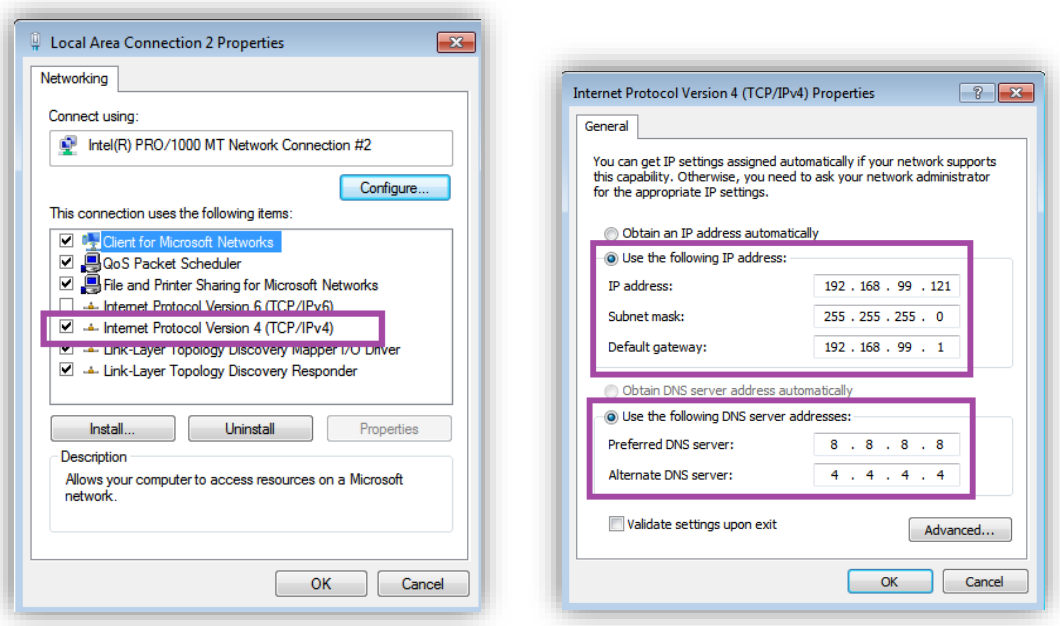

Figure 13: IPv4 settings and setting manual IP address for Windows 7

4. Configuring IP and internet settings for Windows 10 VM

We will follow some of the same steps for Windows 10 as we did for Windows 7.

4.1 Type “Control Panel” into the search bar in the bottom left of the screen on windows 10 and click on “Control Panel” when it comes up.

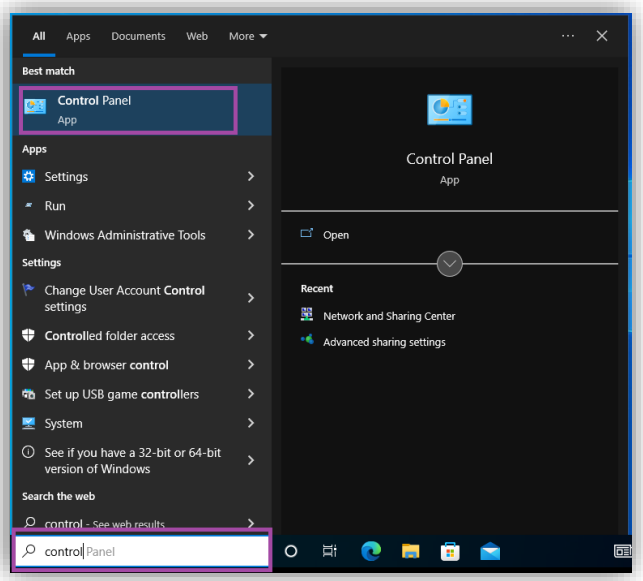

Figure 14: Control Panel

4.2 Select “Network and Internet”

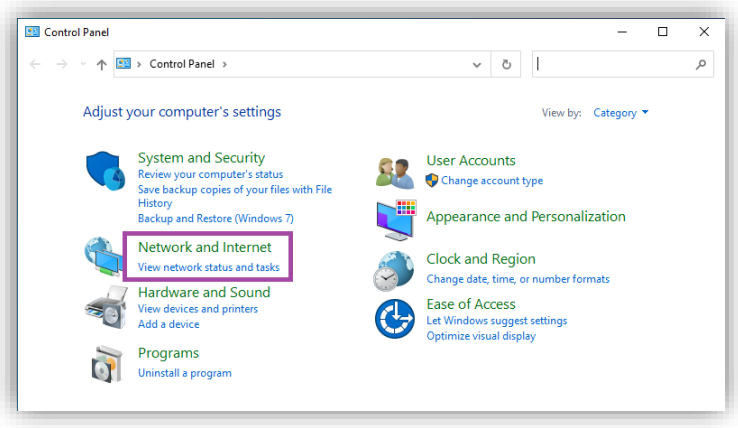

Figure 15: Network and Internet

4.3 Select “Network and Sharing Center”

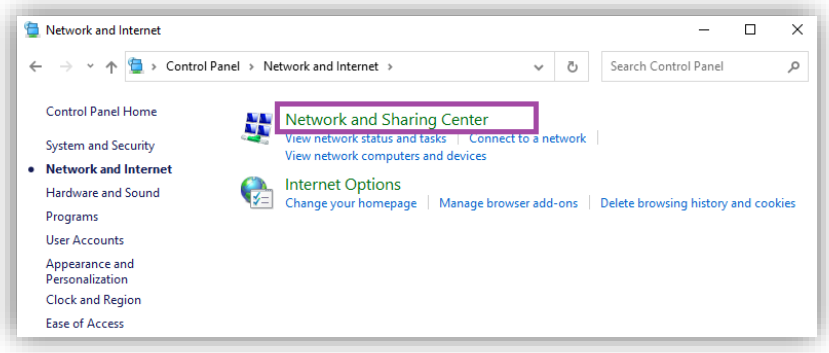

Figure 16: Network and Sharing Center

4.4 Click “Change Adapter Settings” on the far left side

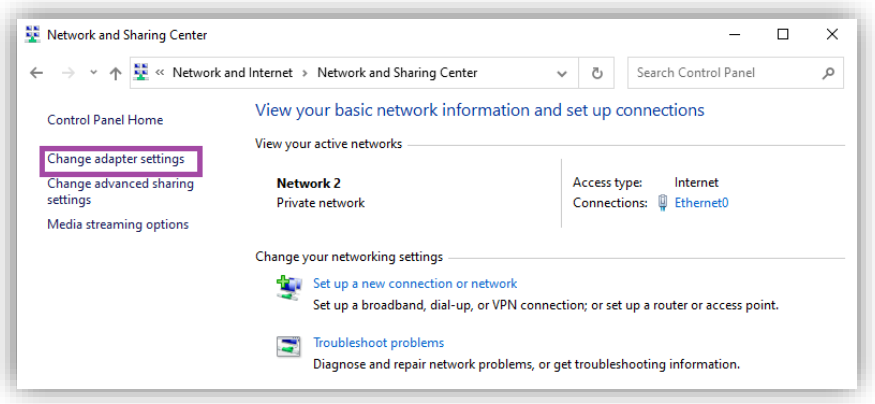

Figure 17: Change Adapter Settings

4.5 Right click on the Network adapter and select properties

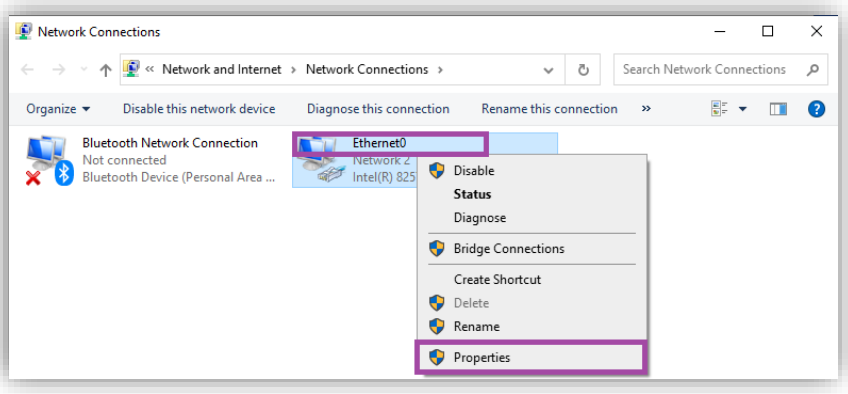

Figure 18: NIC properties

4.6 This will be similar to step 3.9. Double click the “Internet Protocol Version 4” and check the box for “Use the following IP address” to set the IP address manually.

- ➔ Set the first IP address to any number within the range you set in step 1.2 – in this case we used 192.168.99.122. Make note of this as you will need it later.
- ➔ The Subnet mask needs to be set the same as you used previously (255.255.255.0).
- ➔ The default gateway must be set as the same IP address as the Windows 7 VM uses. In this case that is 192.168.99.121. This will allow the Windows 10 VM to have an internet connection provided by the Windows 7 VM.
- ➔ Check the box to “Use the following DNS server address”, and set them to a default DNS server, in this case we used 8.8.8.8 and 4.4.4.4. Click “OK”.

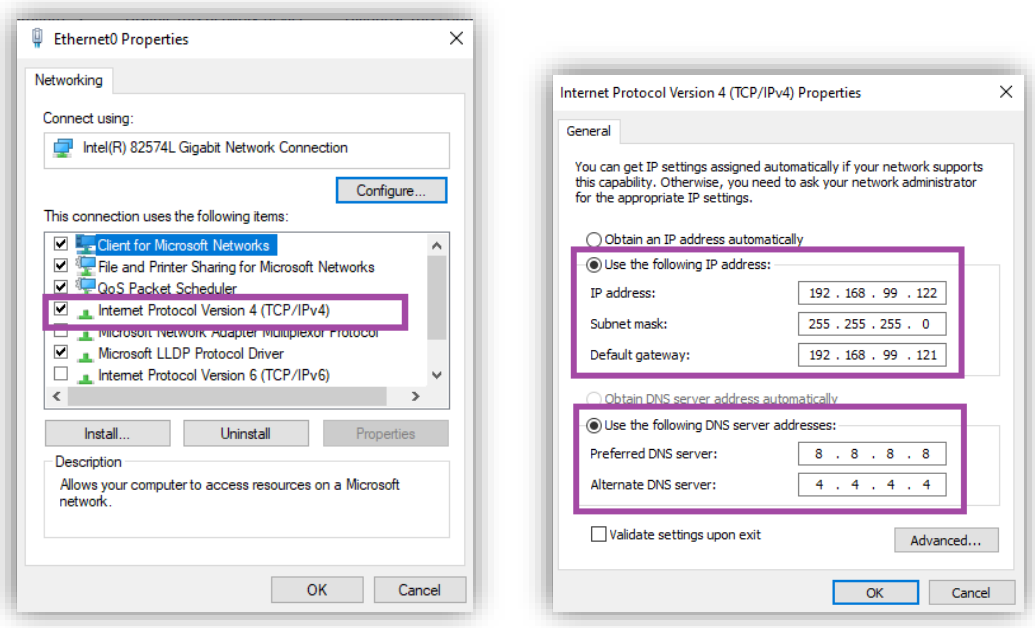

Figure 19: IPv4 Settings & Manual IP address for WIndows 10

5. Configuring IP and Internet Settings for Linux Fedora 28

The settings to allow Linux Fedora to use the internet provided are slightly different from Windows.

5.1 Click “Activities” in the top left corner of Fedora. In the search bar, type “Network”. Select the top option, “Network”.

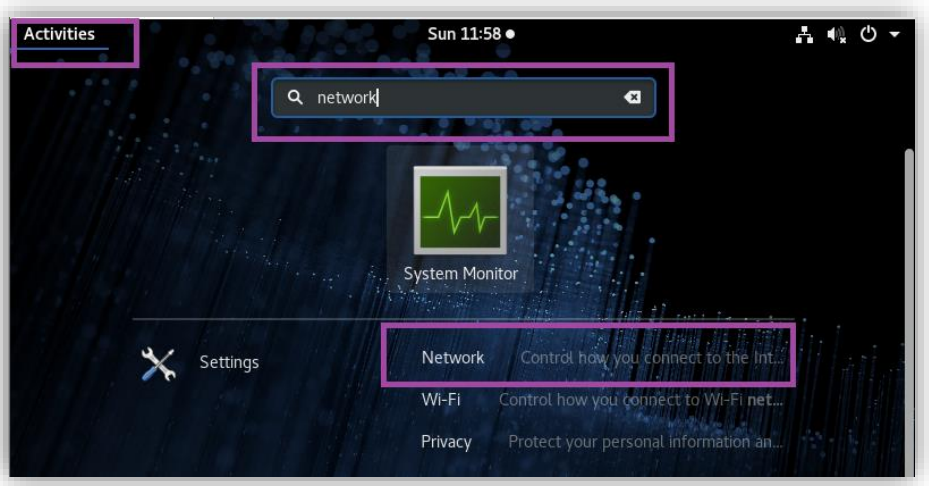

Figure 20: Fedora Network Settings

5.2 Click the little gear on the right side of the “Wired” option.

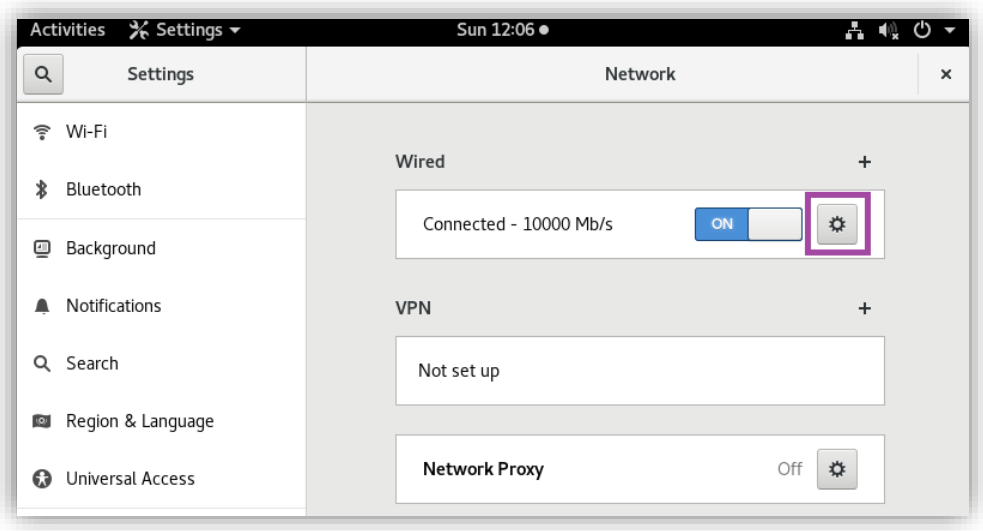

Figure 21: Fedora Internet settings

5.3 Check the bullet for IPv4 Method "Manual"

- ➔ Change the Address to an address within the range set previously, but different from the addresses we have already used. In this case we used 192.168.99.123. Make note of this, you'll need it later.
- ➔ Set the Netmask to 255.255.255.0 (the same as the other VMs)
- ➔ Set the Gateway to the IP of the Windows 7 VM: 192.168.99.121
- ➔ Set the DNS to the default of 8.8.8.8
- ➔ Make sure the "automatic" switch above DNS is set to "Off"
- ➔ Click "Apply"

The Linux Fedora VM should now have access to the internet through the Windows 7 VM.

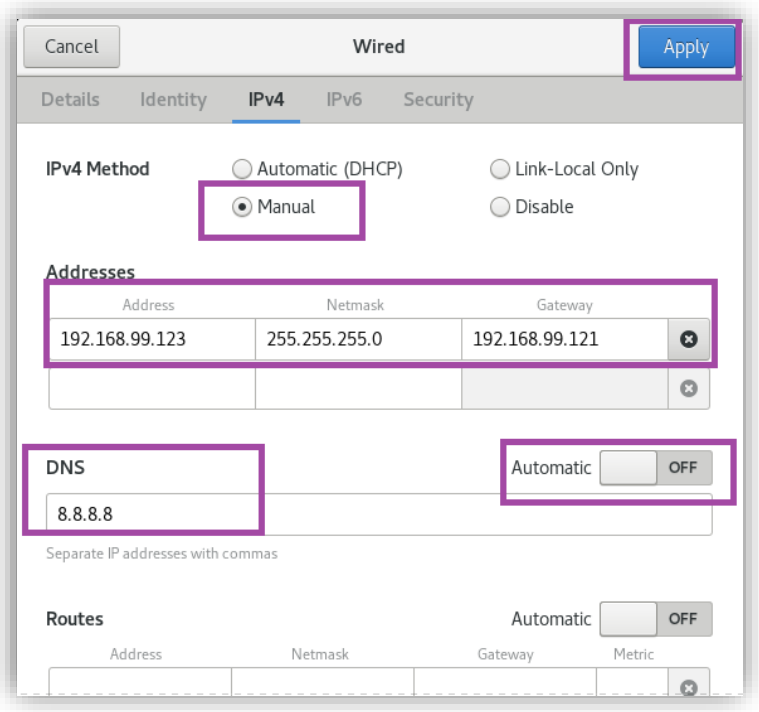

Figure 22: Manual IP address on Fedora

6. Enabling Network Discovery and File Sharing in Windows 7

Windows and Linux will not naturally "talk" to each other. Part of the goal of the network knot is to have all 3 VMs "networked" together and able to easily share files with one another. (Brown 2017)

6.1 Enabling "Network discovery" in Windows 7. To accomplish this, we have to visit the "Network and Sharing Center" again that we visited in 3.3. Click "Advanced Sharing Settings" on the left side of the window.

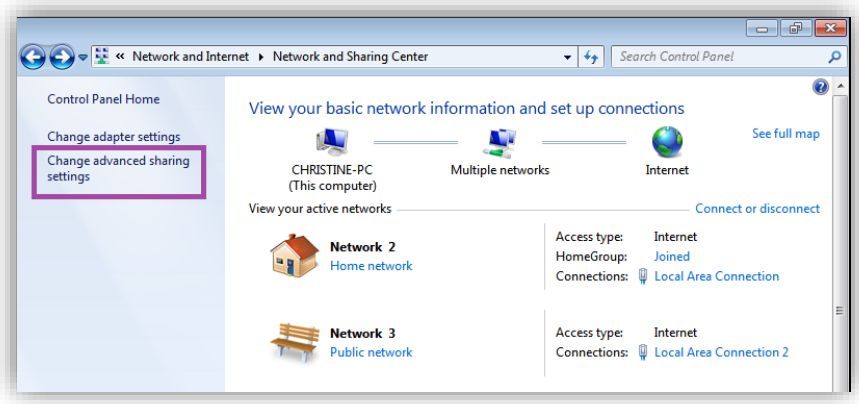

Figure 23: Windows 7 Change Advanced Sharing Settings

6.2 Click the arrows beside “Home or Work” and “Public” to view the sharing options.

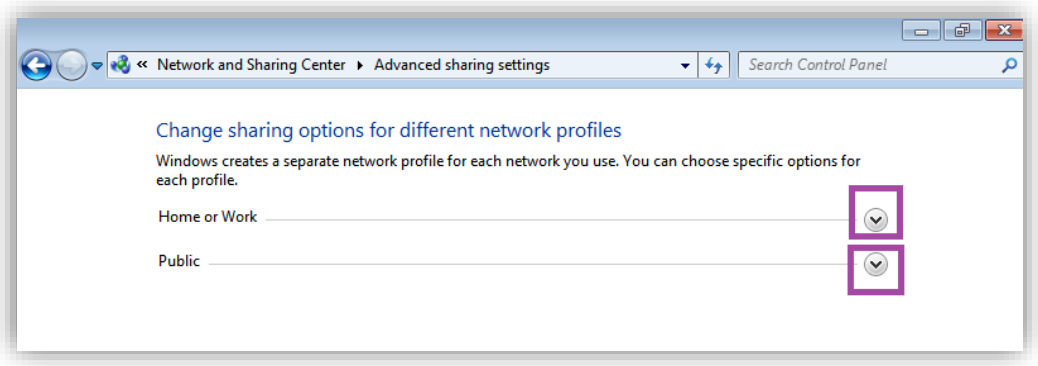

Figure 24: Change Sharing Options

6.3 In the top section, “Home or Work”, click the bullets to “Turn on network discovery”, “Turn on file and print sharing” and “Turn on sharing so anyone with network access can read and write files in public folders”

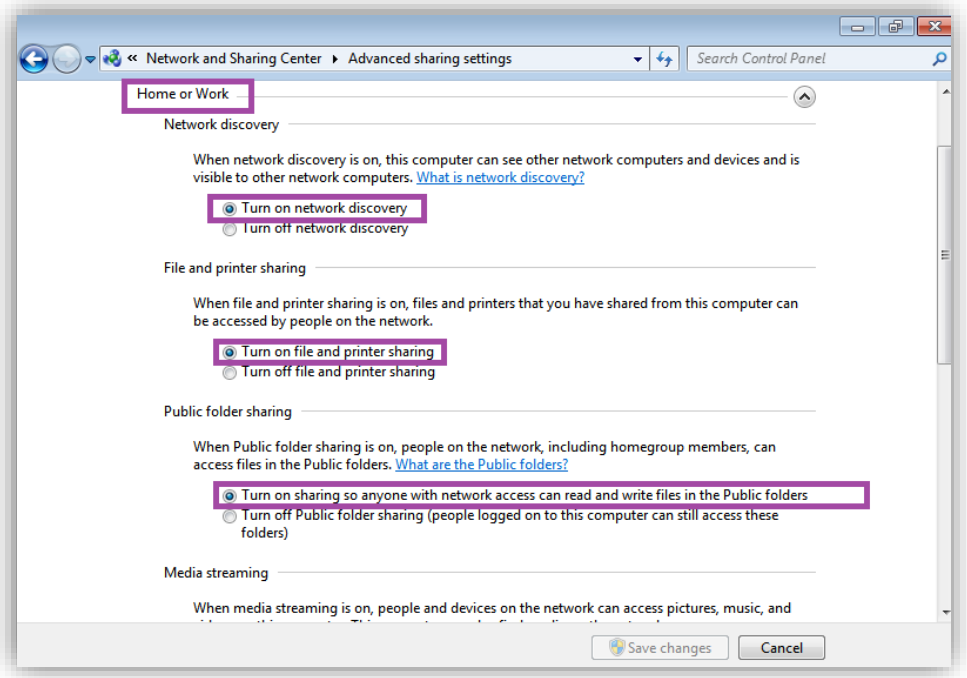

Figure 25: Turn on Network Discovery and Sharing

6.4 Scroll down to the “Public” settings, and click all the same bullets, then click “Save Changes”

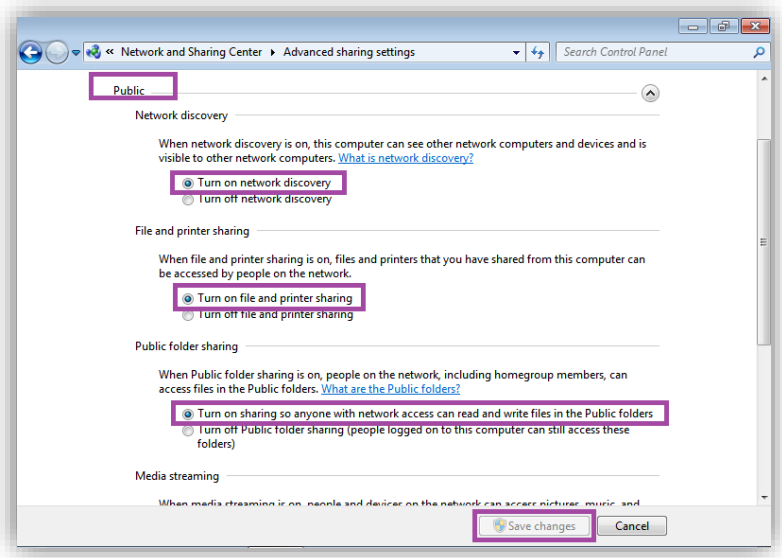

Figure 26: Turn on Network Discovery and Sharing

6.5 Open File explorer. Click on “My computer” in the left window, then double click on the “Local Disk C:” drive.

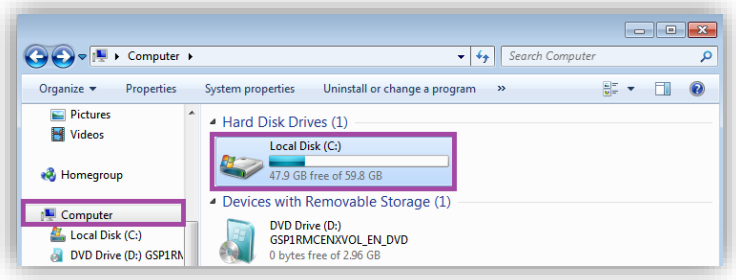

Figure 27: Open C: drive on Windows 7

6.6 Double Click “Users”

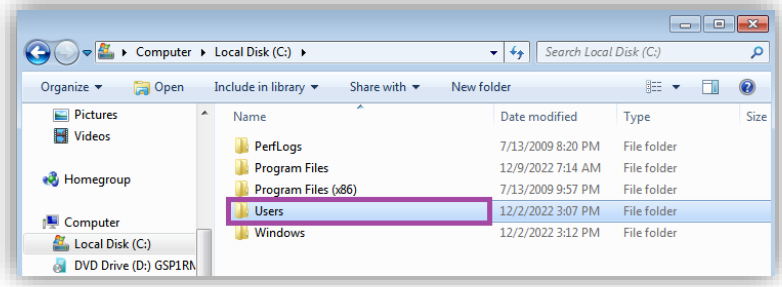

Figure 28: Users folder in C: drive

6.7 Right click “Public” and select “properties”

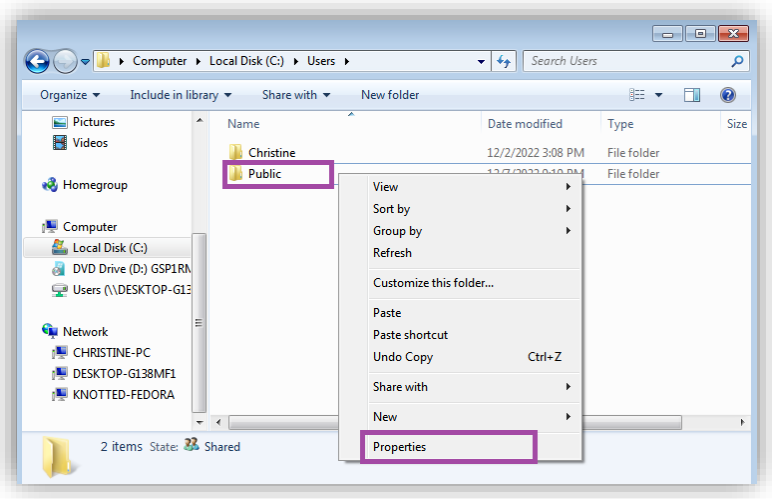

Figure 29: Properties of Public folder

6.8 Click the “Sharing” tab at the top of the window.

- ➔ There are 2 buttons on this tab – “Share” and “Advanced Sharing”
- ➔ Click “Advanced Sharing” and check the box in the top left corner of the new window to “Share this Folder”, Click “Apply”, then “OK”.
- ➔ Next, Click the “Share” Button and refer to the next screenshot.

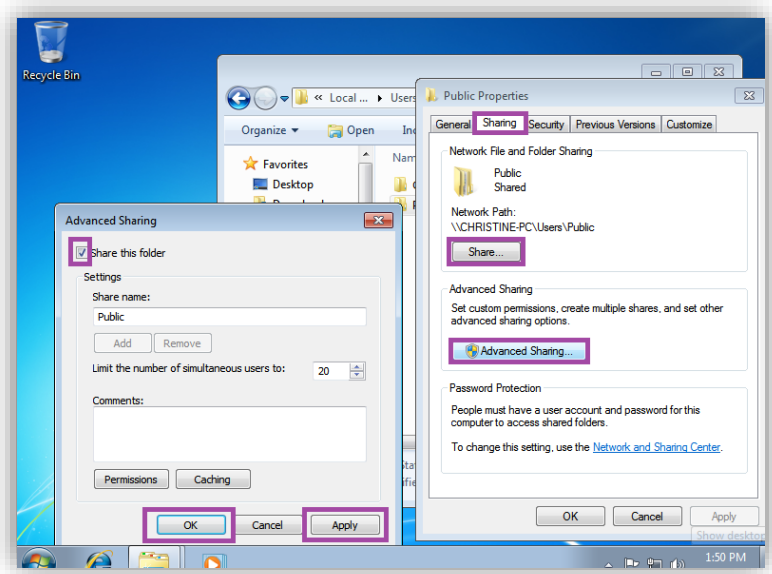

Figure 30: Change folder sharing settings

6.9 In the next window that opens, click the arrow for the drop down menu. Select “Everyone” and click “Add”, then click “Share

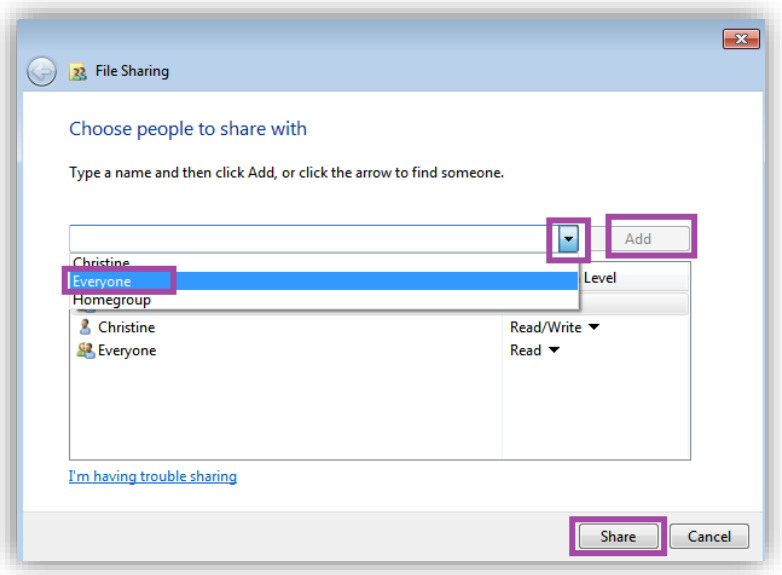

Figure 31: Change File Sharing Permissions to Everyone

6.10 The Folder is now shared with anyone who has access to the network. Click "Done".

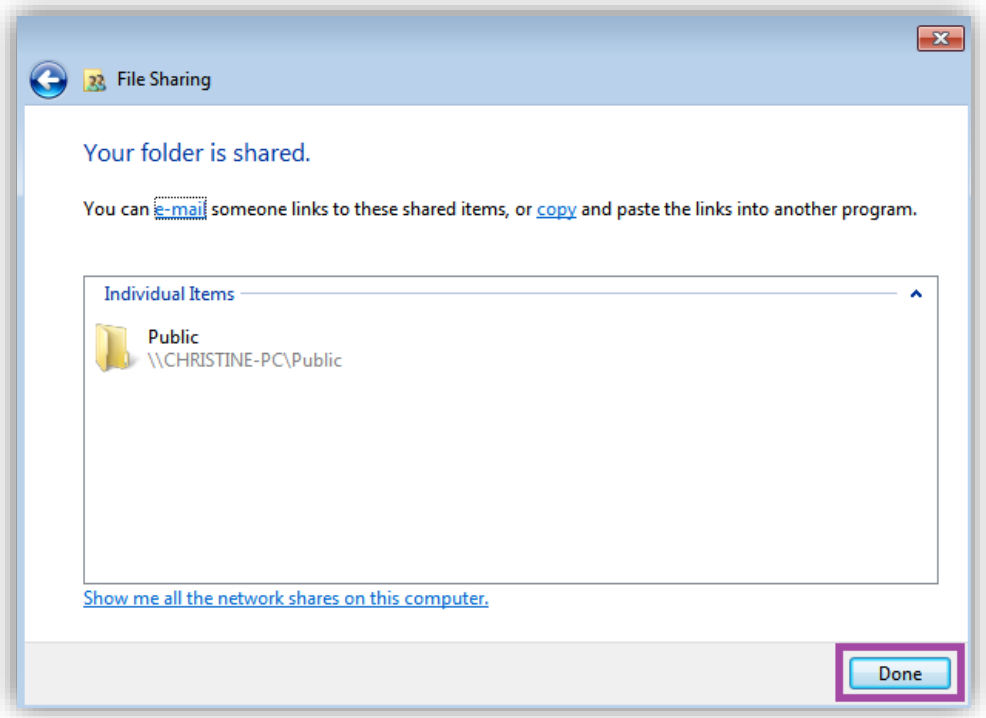

Figure 32: Folder is Shared

7. Enabling Network Discovery and File Sharing in Windows 10

Windows 10 is somewhat similar to the process for Windows 7. (Brown 2017)

7.1 You'll need to go back into the "Network and Sharing Center" again. Click on "Advanced Network Settings"

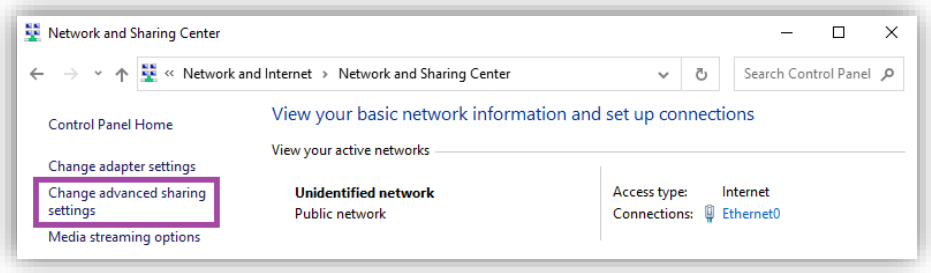

Figure 33: Change Advanced Sharing Settings

7.2 Click the arrow to expand "All Networks". Check the bullet for "Turn on sharing so anyone with network access can read and write files in public folders"

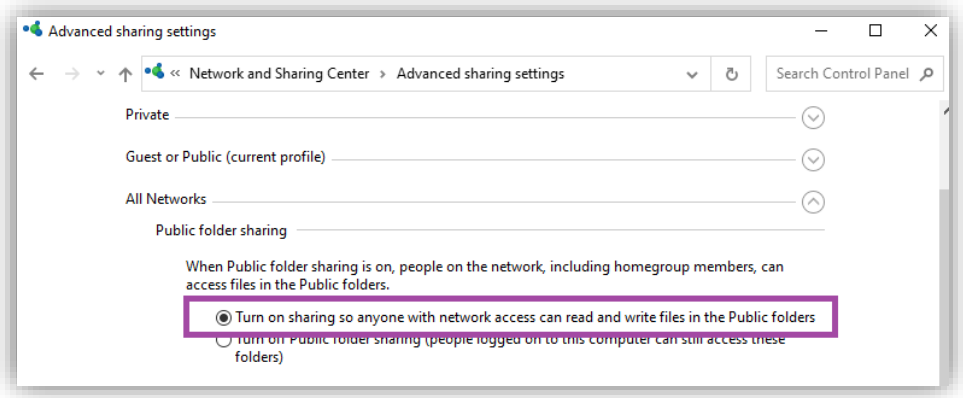

Figure 34: Turn on sharing

7.3 Click the Arrow to expand "General or Public" and check the bullets for "Turn on Network Discovery" and "Turn on File and Printer Sharing".

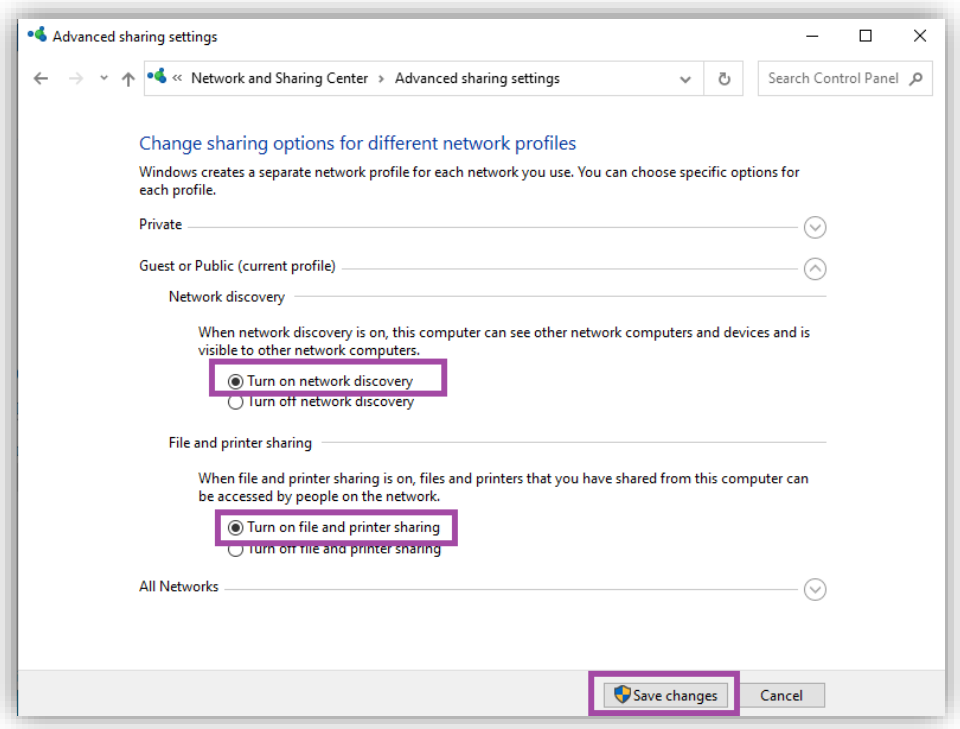

Figure 35: Turn on Network Discovery and File sharing

7.4 Follow steps 6.5 to 6.10 again to set the file permissions on Windows 10.

8. Disabling the Windows Defender Firewall

Windows defender firewall is a part of windows, for good reason. It's purpose is to block unwanted traffic from reaching our system and its data. For the purpose of this project and to be able to fully share files and allow network access, we are going to disable Windows Firewall completely. The following steps can be completed on both Windows 7 and 10.

8.1 Visit the Control Panel again. Click on "System and Security"

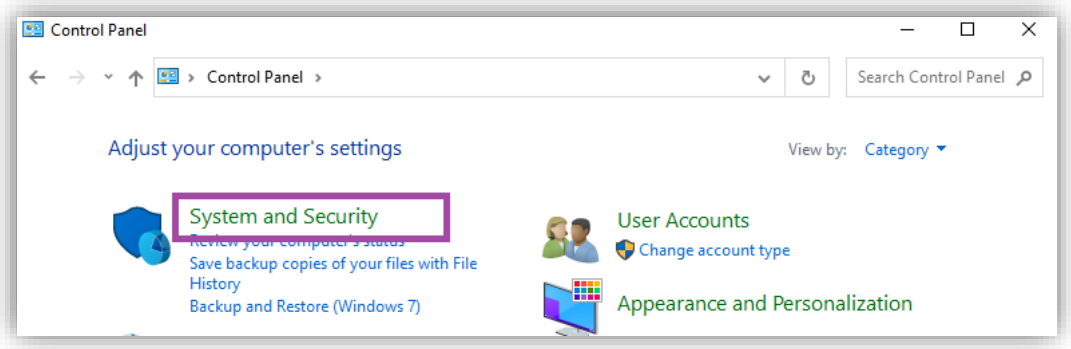

Figure 36: System and Security Settings

8.2 Select “Windows Defender Firewall”

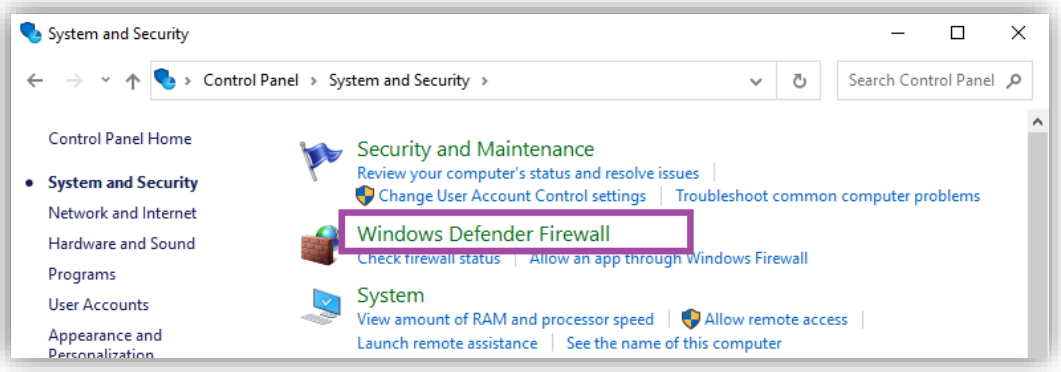

Figure 37: Windows Firewall Settings

8.3 Click “Turn Windows Defender on or off” on the left side of the window.

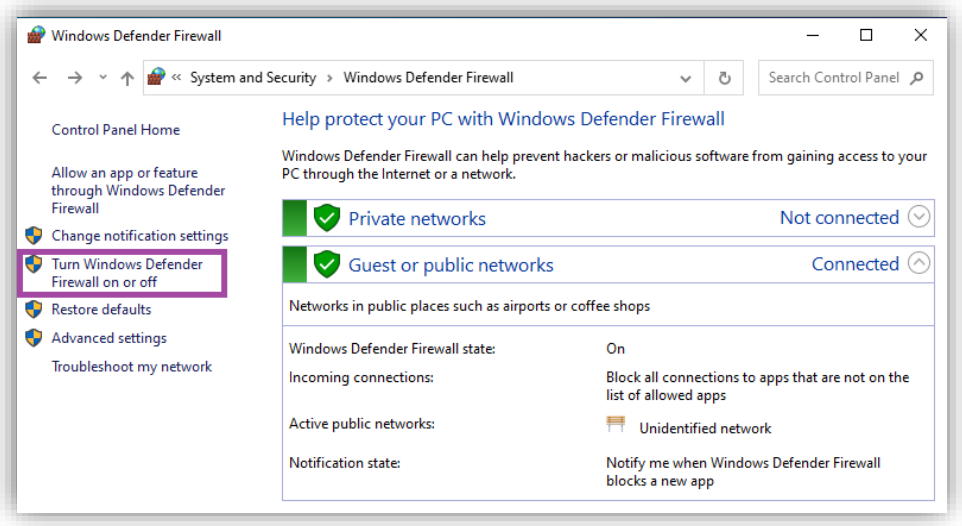

Figure 38: Turn Windows Defender on or off

8.4 Check the bullets to disable the firewall and click ok.

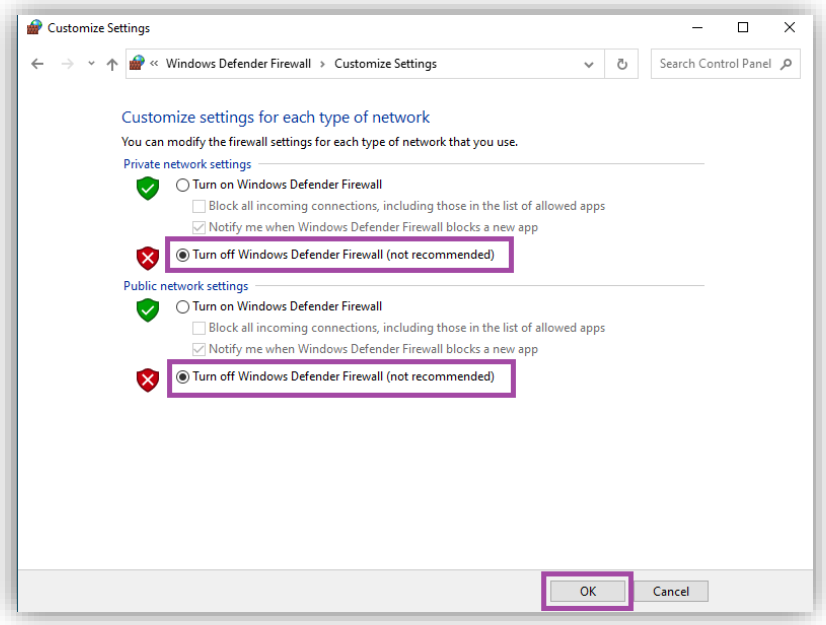

Figure 39: Turn off Windows Firewall

8.5 The firewall is now turned off completely.

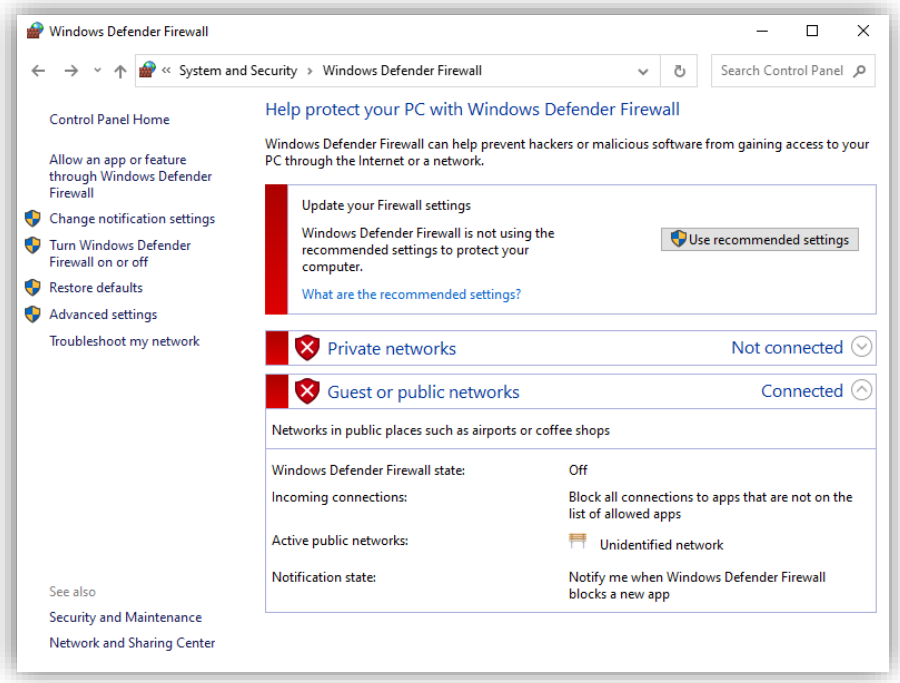

Figure 40: Firewall is disabled

9. Enabling Network Discovery and File Sharing in Fedora

Linux Fedora 28 doesn't communicate with Windows very easily, but it is possible. To accomplish this task, we used mostly the command line to install various components as well as allow.

9.1 First, we will enable network access to the Linux system by disabling the firewall for certain services. The following commands will allow this to happen:

```
[root@localhost ~]# firewall-cmd --add-service ipp
success
[root@localhost ~]# firewall-cmd --permanent --add-service ipp
success
[root@localhost ~]# firewall-cmd --add-service http
success
[root@localhost ~]# firewall-cmd --permanent --add-service http
success
[root@localhost ~]# firewall-cmd --add-service https
success
[root@localhost ~]# firewall-cmd --permanent --add-service https
success
[root@localhost ~]#
```

Figure 41: Commands to enable network discovery on Fedora

9.2 Next, we need to install Samba which is a file sharing add-on for Linux. The commands in the screenshot below will complete this task. The commands below will also allow Samba through Linux's firewall. (Kenlon, 2022)

```
[root@localhost ~]# dnf install samba
Last metadata expiration check: 0:00:00 ago on Tue 06 Dec 2022 05:08:16 PM PST.
Package samba-2:4.8.10-0.fc28.x86_64 is already installed, skipping.
Dependencies resolved.
Nothing to do.
Complete!
[root@localhost ~]# systemctl enable --now smb
[root@localhost ~]# systemctl enable --now nmb
[root@localhost ~]# systemctl enable --now firewalld
[root@localhost ~]# firewall-cmd --list-services
dhcpv6-client ssh samba-client mdns samba ipp http https
[root@localhost ~]# firewall-cmd --add-service samba
Warning: ALREADY_ENABLED: 'samba' already in 'FedoraWorkstation'
success
```

Figure 42: Install Samba

9.3 Samba will also need a shared location to be created with the following commands:

```
[root@localhost ~]# mkdir /sambashare
[root@localhost ~]# chcon -t samba_share_t /sambashare/
[root@localhost ~]# vi /etc/samba/smb.conf
[root@localhost ~]#
```

Figure 43: Create shared location for Samba

9.4 Then, the /etc/samba/smb.conf file will need to be edited using the command: vi /etc/samba/smb.conf and ensuring that the values in the boxes below match your vi file. (Avenwedde 2021)

```
[global]
        workgroup = SAMBA
        server string = %h server (Samba %V)
        invalid users = root
        security = user

        passdb backend = tdbsam

        printing = cups
        printcap name = cups
        load printers = yes
        cups options = raw

[homes]
        comment = Home Directories
        valid users = %S, %D%w%S
        browseable = No
        read only = No
        writable = yes
        inherit acls = Yes
```

Figure 44: Create shared location for Samba (cont'd)

```
        inherit acls = Yes
        read only = No
        valid users = %S %D%w%S


[printers]
        browseable = No
        comment = All Printers
        create mask = 0600
        path = /var/tmp
        printable = Yes


[print$]
        comment = Printer Drivers
        create mask = 0664
        directory mask = 0775
        force group = @printadmin
        path = /var/lib/samba/drivers
        write list = @printadmin root


[sambashare]
        path = /sambashare
        read only = No
[root@localhost ~]#
```

Figure 45: Create shared location for Samba (cont'd)

9.5 In order to allow Samba to access our home directory, we need to use the following commands: (Avenwedde 2021)

```
File  Edit  View  Search  Terminal  Help

[root@knotted-fedora ~]# setsebool -P samba_enable_home_dirs on
[root@knotted-fedora ~]# getsebool samba_enable_home_dirs
samba_enable_home_dirs --> on
[root@knotted-fedora ~]# smbpasswd -a christine
New SMB password:
Retype new SMB password:
[root@knotted-fedora ~]# pdbedit -L -v
```

Figure 46: Allowing Samba to access home directory

10. Viewing Shared Files on the Windows VMs

At this point we can test to see if the network settings have worked, and if we are able to view the shared files on Windows.

10.1 All VMs and shared files are viewable on Windows 7.

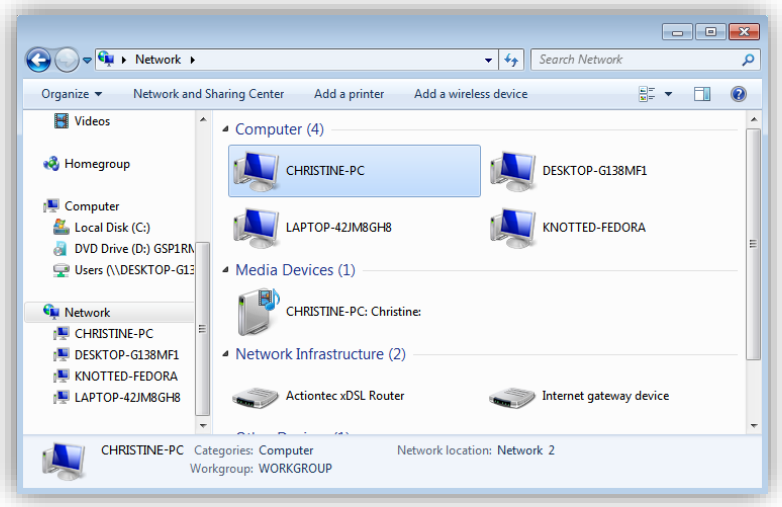

Figure 47: Network computers visible on WIndows 7

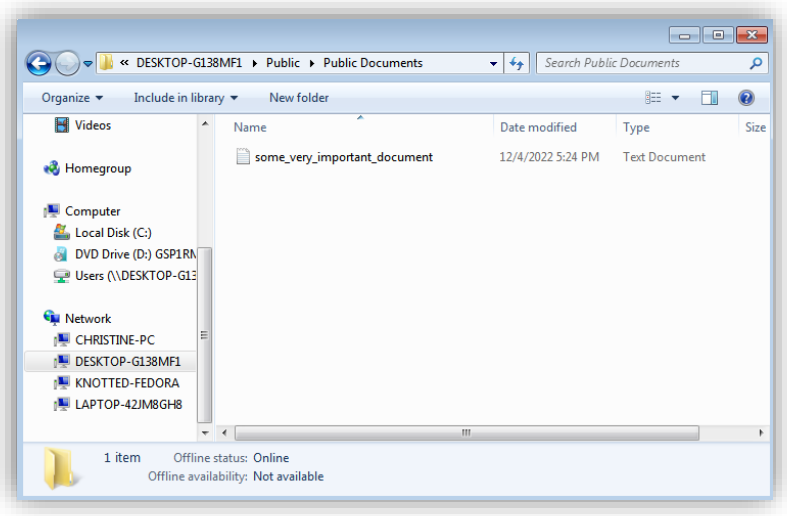

Figure 48: Documents from Windows 10 visible

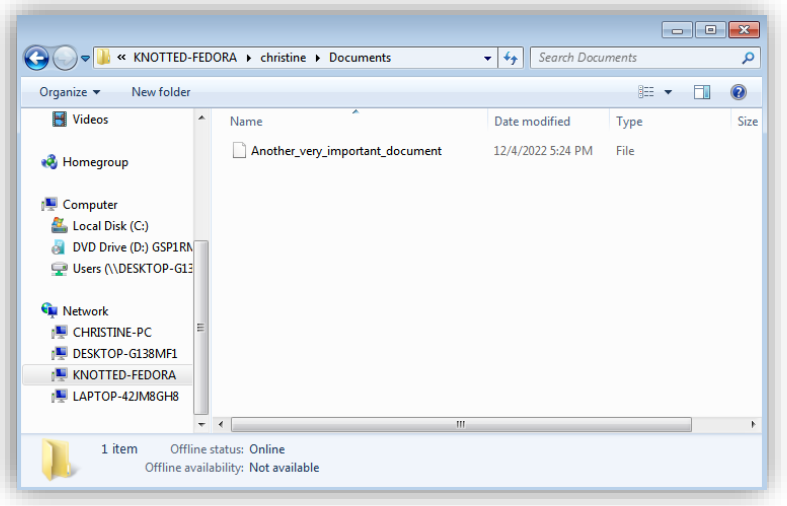

Figure 49: Documents from Fedora visible

10.2 We had some trouble getting the Fedora VM to show up on Windows 10, which required an extra fix. In the bottom search bar, type “Windows Features” (Koley, 2022)

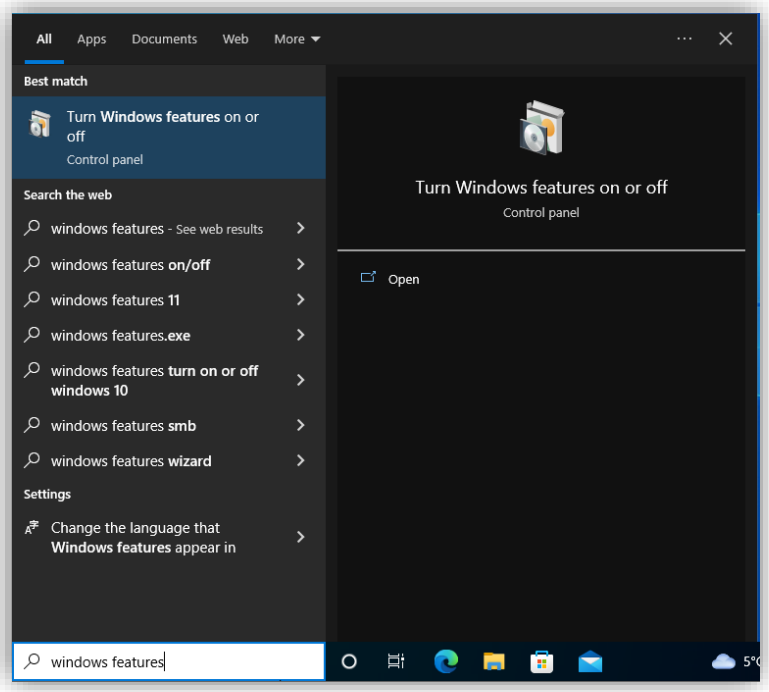

Figure 50: Turn Windows Features on or off

10.3 In the "Windows Features" window, check the box beside "SMB 1.0/CIFS File Sharing Support"

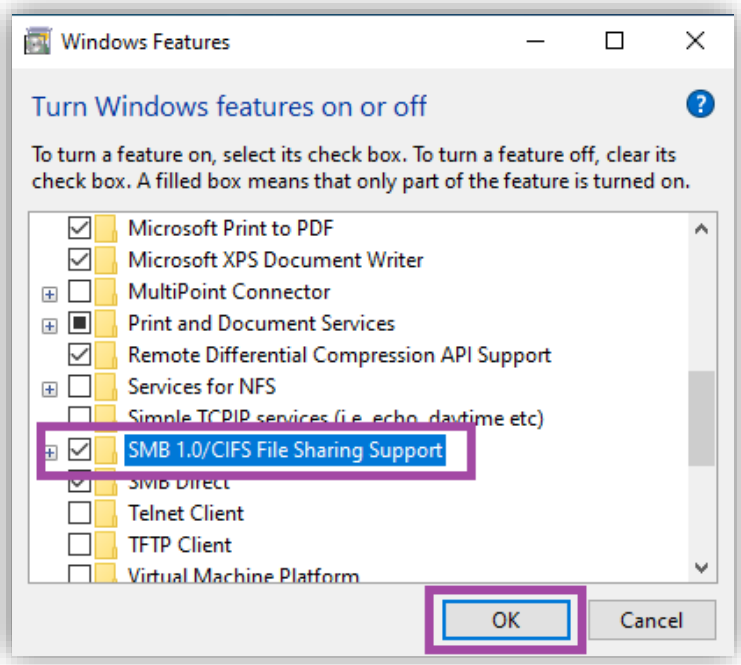

Figure 51: Windows features: turn on SMB/CIFS File sharing support

10.4 After changing this setting, the computer asked to be restarted.

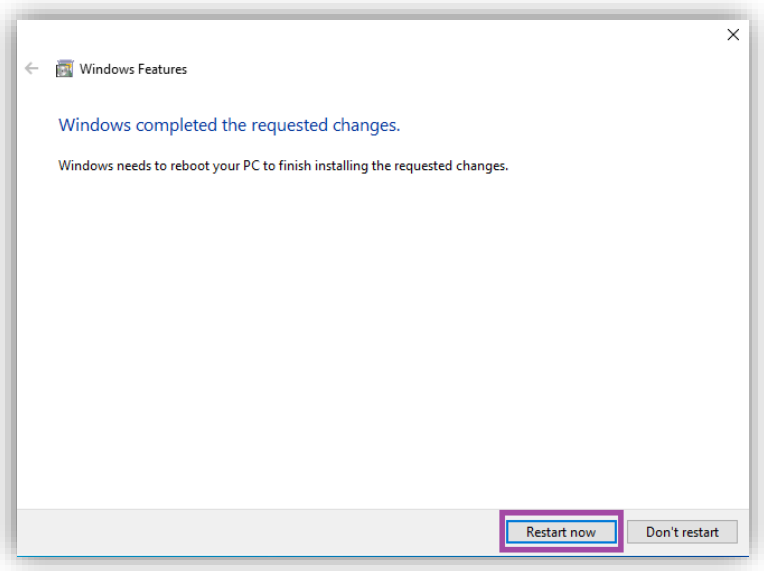

Figure 52: Windows 10 restart request

10.5 All VMs and shared files are now visible on Windows 10

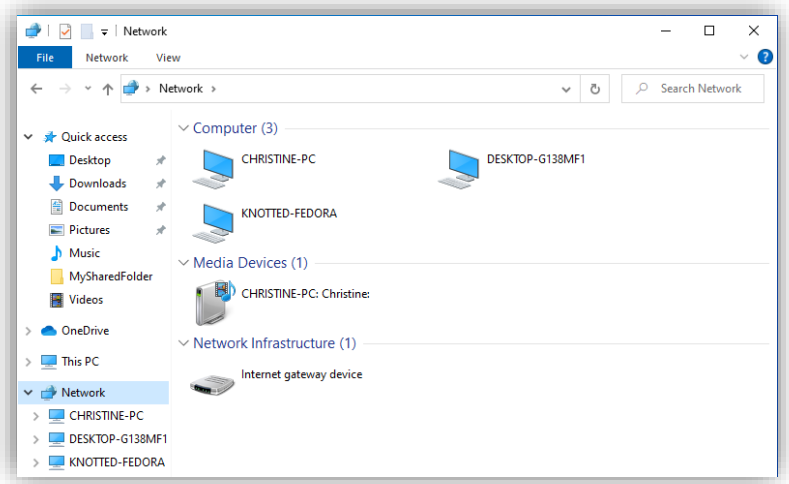

Figure 53: Network computers visible on Windows 10

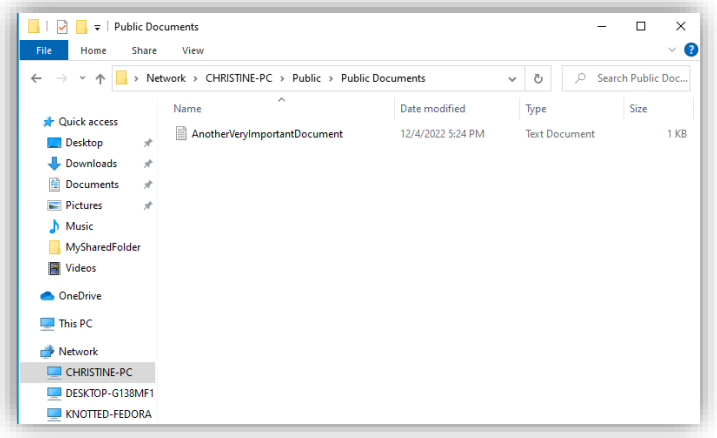

Figure 54: Windows 7 documents visible on Windows 10

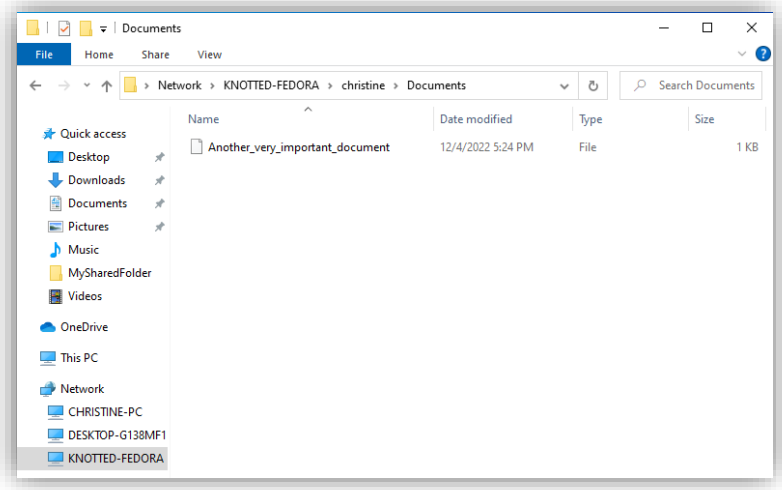

Figure 55: Fedora documents visible on Windows 10

11.Viewing Network Connections and Shared files on Linux

As we already know, sharing files with Linux can be challenging. There are a couple of extra steps that need to be taken so that Linux is able to access our Windows VMs to view the shared files.

11.1 First, we need to create mount points for our Windows shared files to be mounted to.

```
[root@knotted-fedora ~]# mkdir /mnt/win10share
[root@knotted-fedora ~]# mkdir /mnt/win7share
```

Figure 56: Creating directories to mount folders on

11.2 We then need to ensure that the cifs utility has been installed.

```
[root@knotted-fedora ~]# apt-get install cifs-utils
Reading Package Lists... Done
Building Dependency Tree... Done
cifs-utils is already the newest version.
0 upgraded, 0 newly installed, 0 removed and 0 not upgraded.
```

Figure 57: Install cifs utility

11.3 We can then mount the shared folders to our Linux directories that were created.

```
[root@knotted-fedora ~]# mount.cifs //192.168.99.121/Users/Public /mnt/win7share
 -o user=christine
Password for christine@//192.168.99.121/Users/Public:  ****
[root@knotted-fedora ~]# mount.cifs //192.168.99.122/Users/Public /mnt/win10shar
e -o user=christine
Password for christine@//192.168.99.122/Users/Public:  ****
[root@knotted-fedora ~]#
```

Figure 58: mount shared folders to directories that were created

11.4 The Shared folders from both Windows VMs are now viewable on Linux:

```
[root@knotted-fedora ~]# cd /mnt
[root@knotted-fedora mnt]# cd win7share
[root@knotted-fedora win7share]# ls -l
total 1
-rwxr-xr-x. 1 root root 174 Jul 13  2009  desktop.ini
dr-xr-xr-x. 2 root root   0 Dec  7 15:55  Documents
dr-xr-xr-x. 2 root root   0 Jul 13  2009  Downloads
dr-xr-xr-x. 2 root root   0 Jul 13  2009  Favorites
drwxr-xr-x. 2 root root   0 Dec  7 21:19  FedoraBackup
dr-xr-xr-x. 2 root root   0 Dec  2 15:07  Libraries
dr-xr-xr-x. 2 root root   0 Jul 13  2009  Music
dr-xr-xr-x. 2 root root   0 Jul 13  2009  Pictures
dr-xr-xr-x. 2 root root   0 Apr 12  2011 'Recorded TV'
dr-xr-xr-x. 2 root root   0 Jul 13  2009  Videos
[root@knotted-fedora win7share]# cd documents
[root@knotted-fedora documents]# ls -l
total 1
-rwxr-xr-x. 1 root root  52 Dec  4 17:24 AnotherVeryImportantDocument.txt
-rwxr-xr-x. 1 root root 278 Jul 13  2009 desktop.ini
[root@knotted-fedora documents]#
```

Figure 59: Viewing Shared files and folders on Windows 7

```
[root@knotted-fedora mnt]# cd win10share
[root@knotted-fedora win10share]# ls -l
total 45225
dr-xr-xr-x. 2 root root        0 Dec  2 15:05 AccountPictures
-rwxr-xr-x. 1 root root      174 Dec  7  2019 desktop.ini
dr-xr-xr-x. 2 root root        0 Dec  7 15:59 Documents
dr-xr-xr-x. 2 root root        0 Dec  7  2019 Downloads
dr-xr-xr-x. 2 root root        0 Dec  7  2019 Libraries
dr-xr-xr-x. 2 root root        0 Dec  7  2019 Music
dr-xr-xr-x. 2 root root        0 Dec  7  2019 Pictures
-rwxr-xr-x. 1 root root 46307440 Dec  9 07:09 TeamViewer_Setup_x64.exe
dr-xr-xr-x. 2 root root        0 Dec  7  2019 Videos
[root@knotted-fedora win10share]# cd documents
[root@knotted-fedora documents]# ls -l
total 1
-rwxr-xr-x. 1 root root 278 Dec  7  2019 desktop.ini
-rwxr-xr-x. 1 root root  42 Dec  4 17:24 some_very_important_document.txt
[root@knotted-fedora documents]#
```

Figure 60: Viewing Shared files and folders on Windows 10

12. Installing a CUPS PDF Printer

The CUPS PDF printer is a printer that will be installed on our Linux VM and shared to the Windows VMs through our network.

12.1 First we need to install a CUPS printer on Linux. To do this, we will start with the Web browser on the linux system, and type “localhost:631/admin” into the address bar. Make sure you are on the “Administration” tab, and then Click “add Printer”.

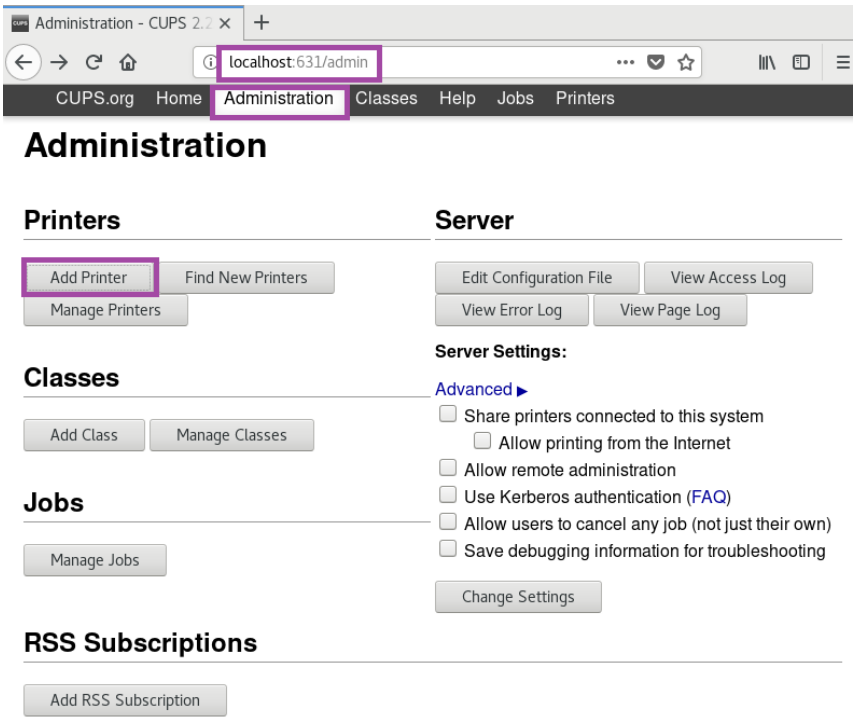

Figure 61: Add new printer

12.2 Select “CUPS-PDF (Virtual PDF Printer) from the options for Local Printers, and click “Continue”

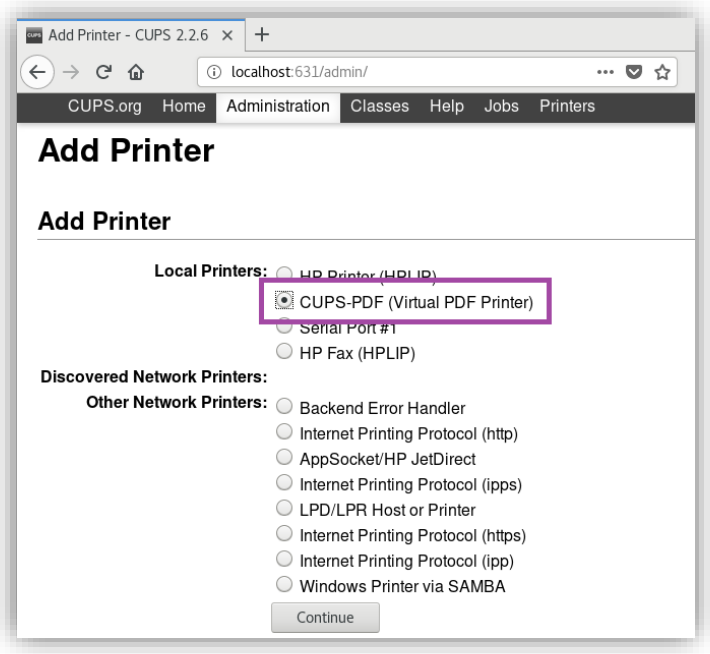

Figure 62: Add CUPS-PDF printer

12.3 Choose a name, description, and location for your printer. You’ll also need to check the box to “Share this printer”. Click “Continue”.

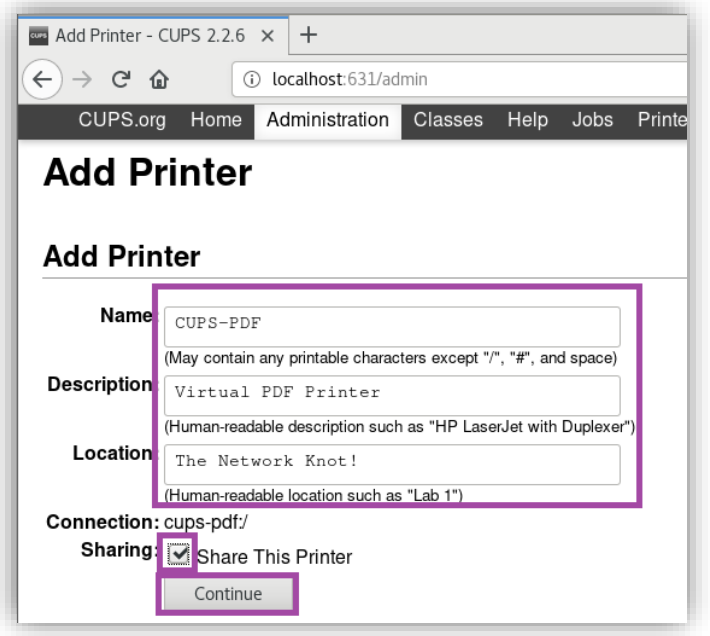

Figure 63: Specify name, description, location of new printer

12.4 Select the Make of your printer and click “Continue”.

Figure 64: Select make of printer

12.5 Select the Model of your printer, and Click “Add printer”

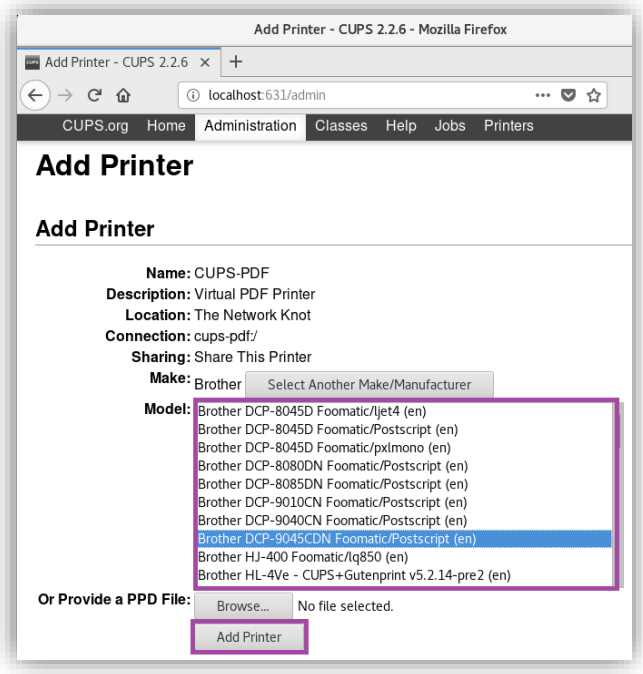

Figure 65: Select model of printer

12.6 Verify the options for the CUPS printer and click “Set Default Options”.

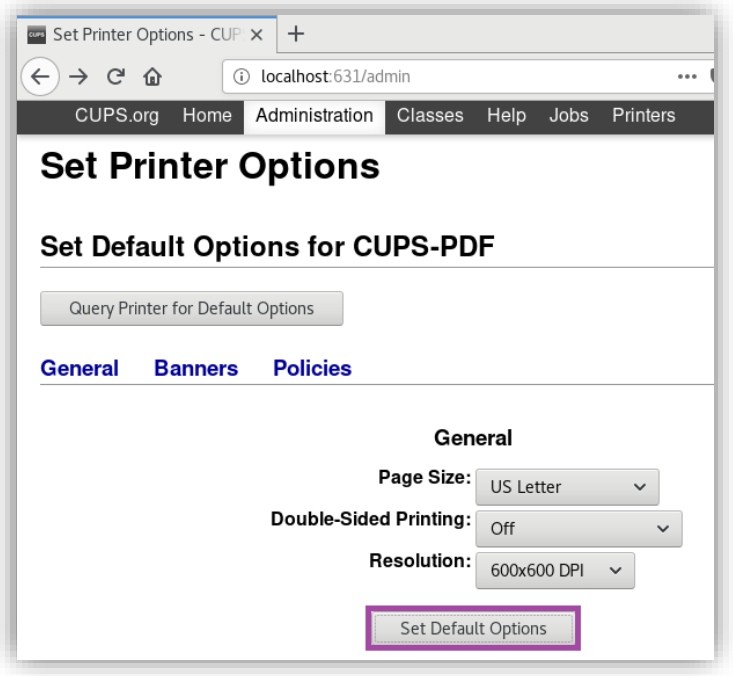

Figure 66: Set Default printer options

12.7 CUPS printer has been successfully added! This printer should now be discoverable by the windows VMs.

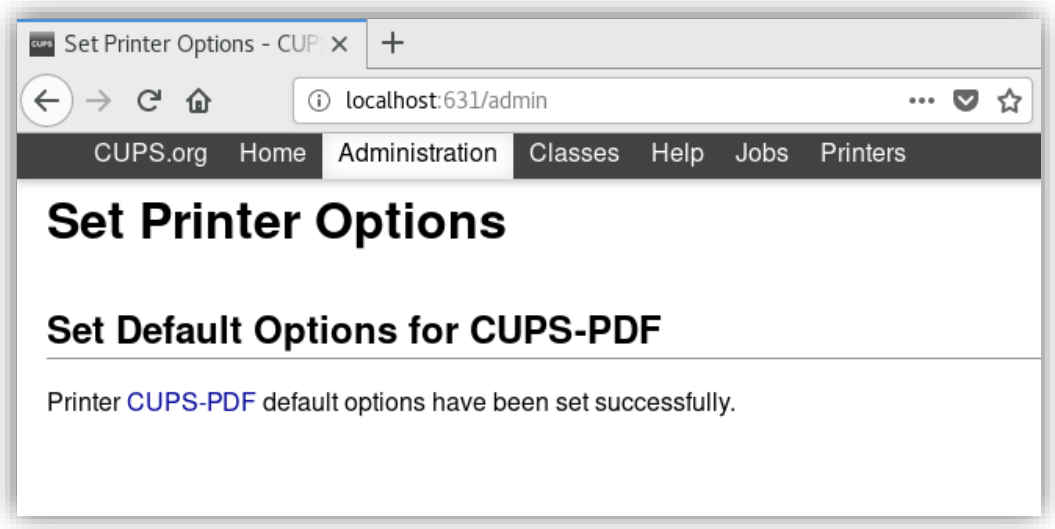

Figure 67: CUPS printer added

13. Printing PDFs on the CUPS printer from Windows

We will start in Windows 10 by finding out where the print logs go to. To Find the print logs (to see the things we have been printing), type “Event Viewer” into the Search bar at the bottom of Windows.

13.1 In the Event Viewer window, double click “Applications and Services Logs”, then “Microsoft”, then “Windows”, then “Print Service”. (Patwegar)

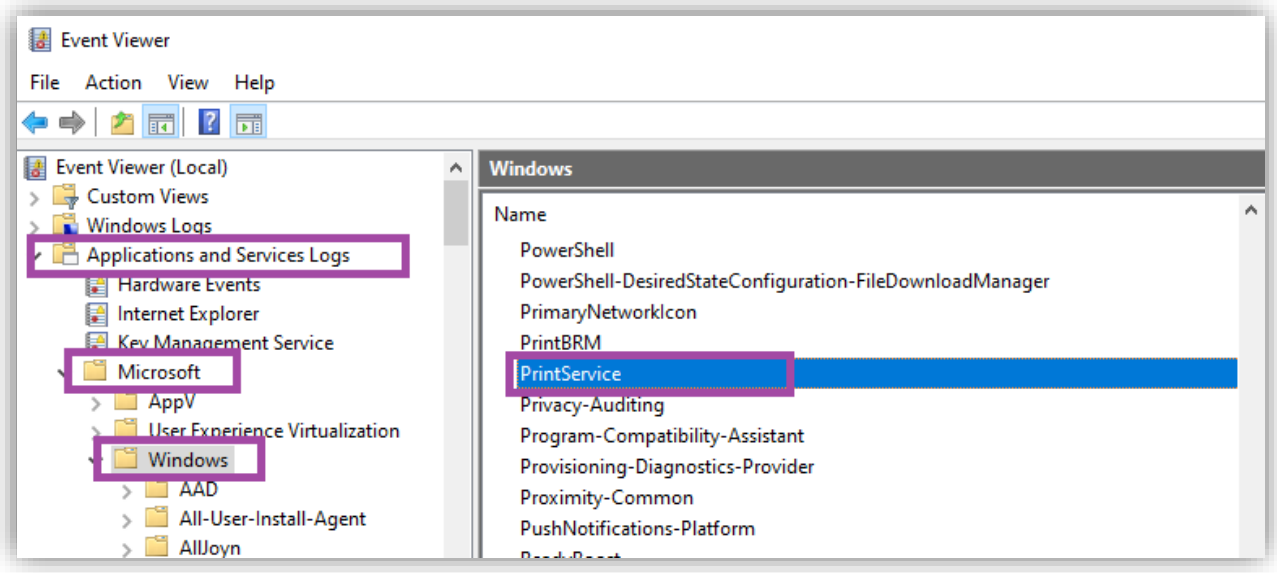

Figure 68: Event Viewer print service settings

13.2 With “Print Service” highlighted, right click “operational” and click “Enable print log”.

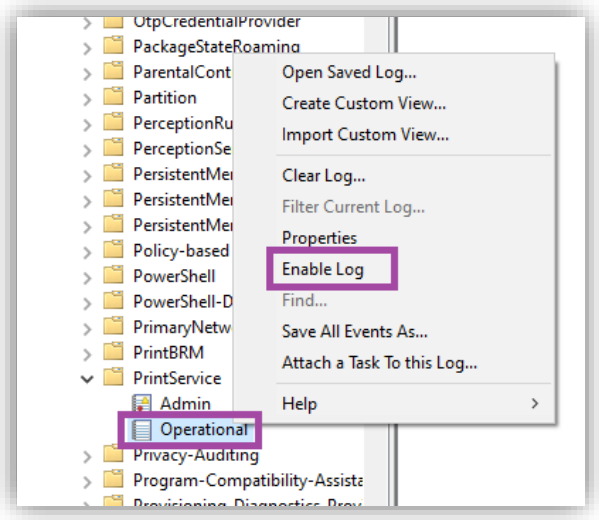

Figure 69: Event viewer Printing log enabled

13.3 Repeat these same steps for Windows 7.

13.4 To test by printing a PDF document: open any PDF document, click the “print” button, and select the CUPS-PDF printer. Because the Linux VM is in our network, we should be able to see the printer automatically in our list.

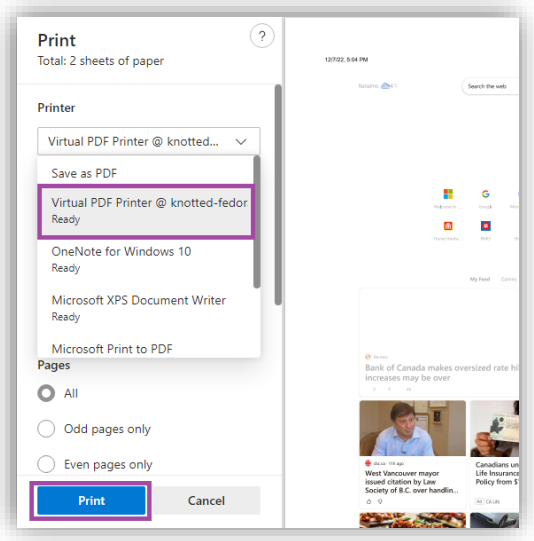

Figure 70: CUPS printer available on Windows 10

13.4 The Printing log shows the most recent print job.

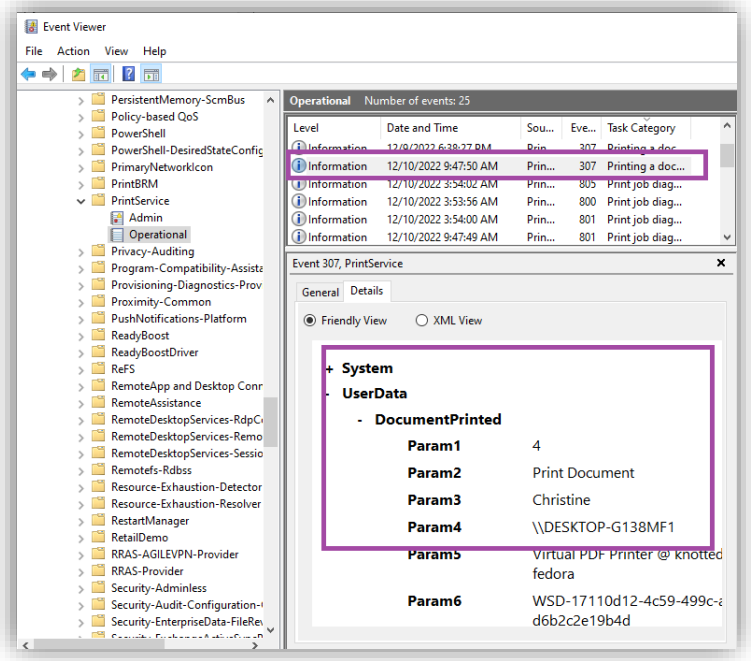

Figure 71: Printing log

14. Printing on Fedora

Printing on Fedora should be much simpler, as it's not a network-connected printer.

14.1 From any PDF document, click "Print" and it will be sent to the CUPS PDF printer.

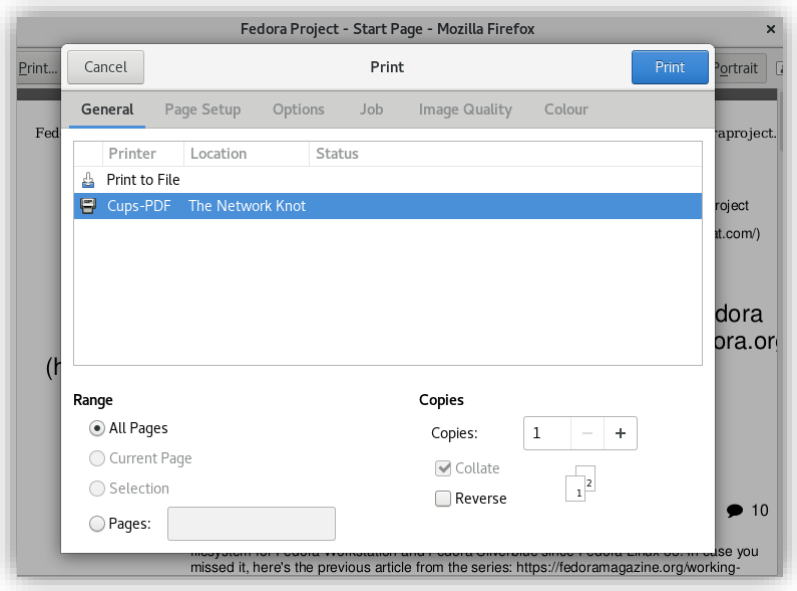

Figure 72: CUPS printer on Fedora

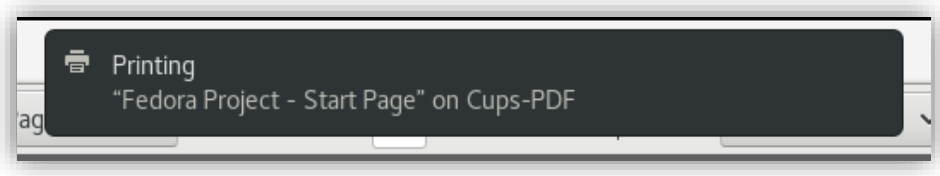

Figure 73: Printing Successful

15. Remote Desktop Access – Windows to Windows

Another goal of this project is to be able to remote desktop into each VM, from each other VM. In windows, this is fairly straight forward.

15.1 We will start with Windows 10. First we need to enable the Remote Desktop option. Type "Remote settings" into the bottom search bar. Select "Remote Desktop Settings"

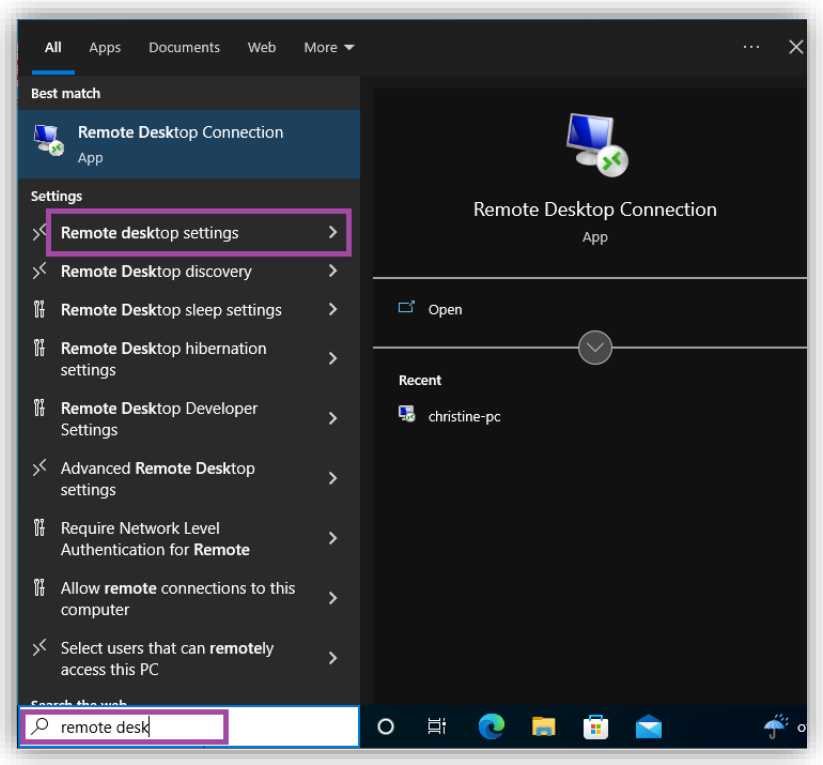

Figure 74: Remote Dekstop Settings

15.2 Toggle the button to “Enable Remote Desktop”. A new window will pop up, and click “Confirm”

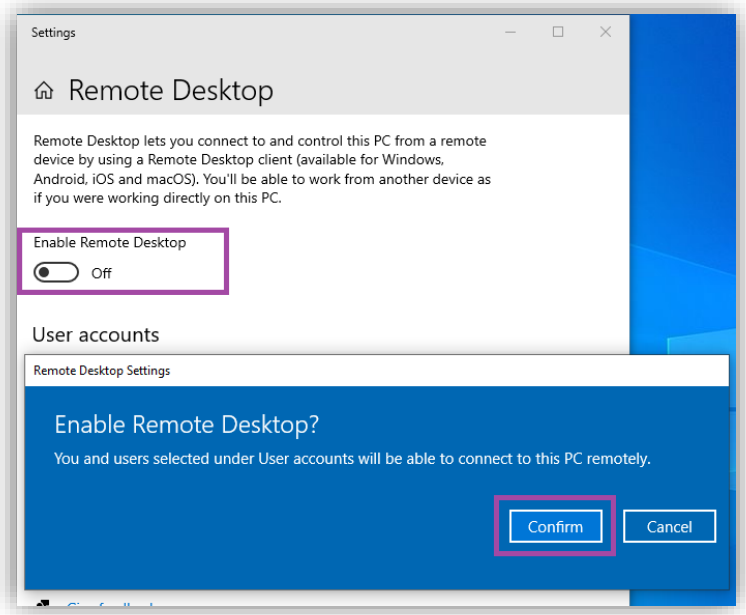

Figure 75: Enable Remote Desktop

15.3 Click “Advanced Settings”

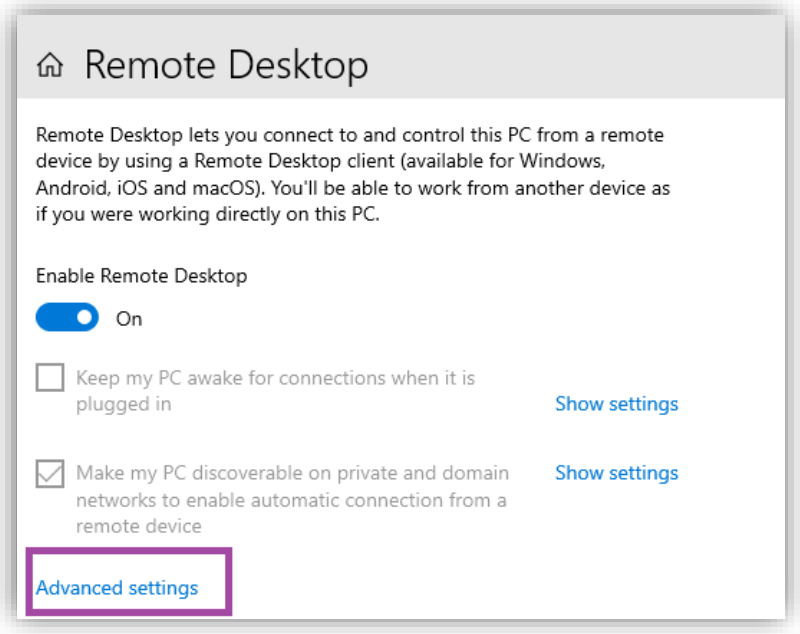

Figure 76: Remote Desktop -Advanced Settings

15.4 Un-check the box to require Authentication. For the purpose of this project, we want to make this as simple as possible. Click “Proceed Anyway”

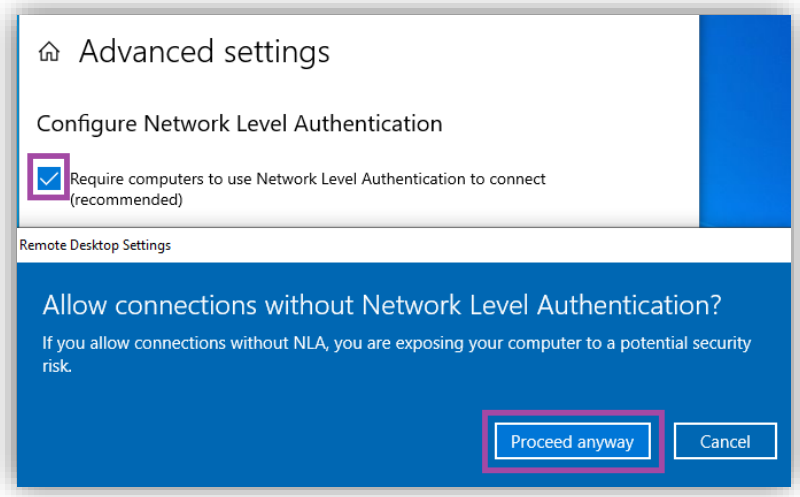

Figure 77: Allow connections without Network Level Authentication

15.4 For Windows 7: Type “Remote Access” into the search bar and select “Allow remote access to your computer.

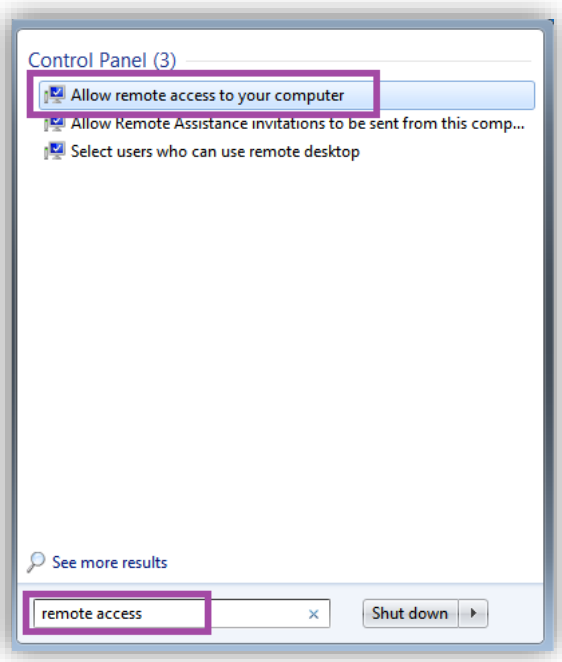

Figure 78:Allow remote access Windows 7

15.5 Check the bullet for "Allow Remote Assistance connections to this computer", and also ensure that the bullet "Allow connections from computers running any version of Remote Desktop (less secure)" is checked. Click "Apply".

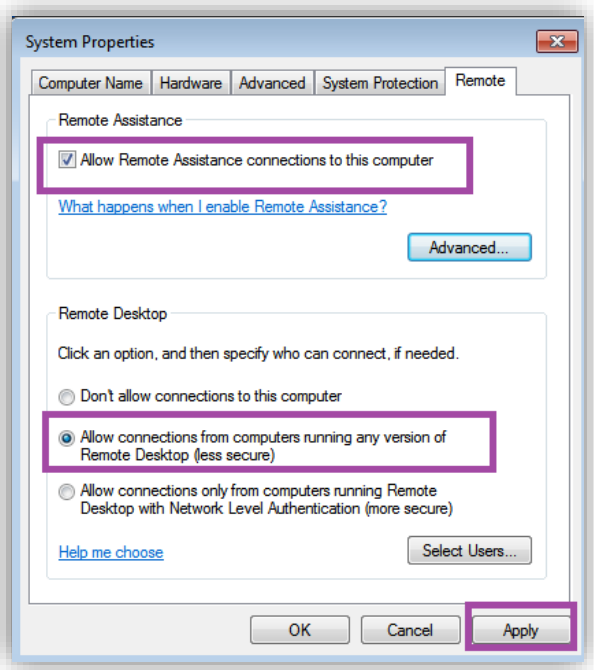

Figure 79: Allow remote connections

15.6 To Remote desktop into another VM from Windows, in the Network section of file explorer, right click the VM you want to remote into.

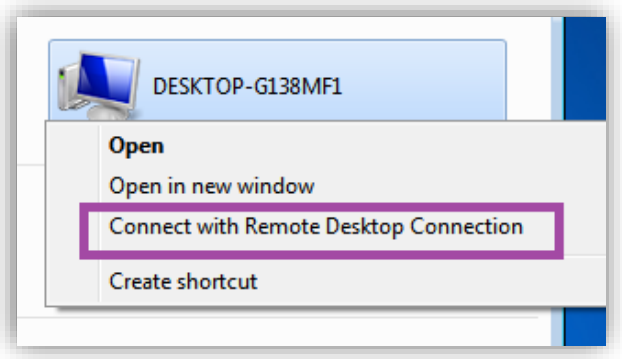

Figure 80:Connect with Remote Desktop Connection

15.7 You will need to enter the password for the account you'd like to remote into.

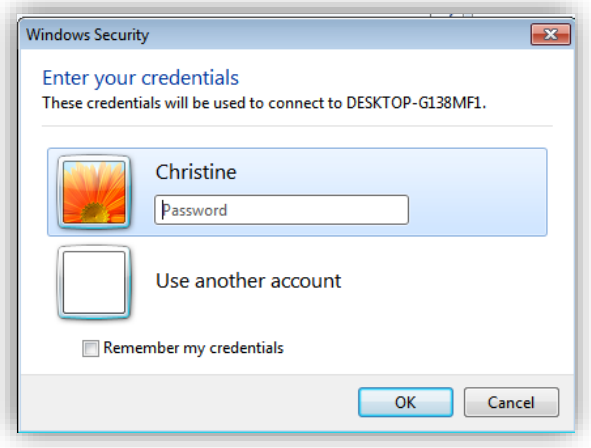

Figure 81: Enter account password

15.8 The system will work on connecting.

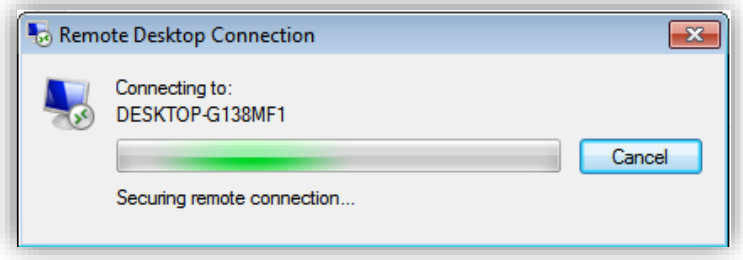

Figure 82: System connecting

15.9 Remote connection successful! Steps 15.6 to 15.9 will work on both Windows 7 and Windows 10.

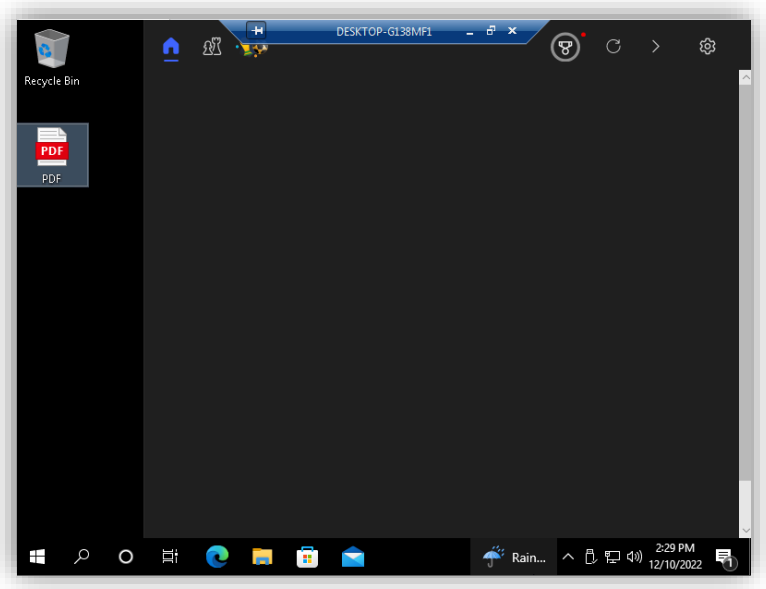

Figure 83: Remote Connection Successful

16. Remote Desktop Fedora to Windows

Fedora required a bit more wrangling to get working as Windows and Fedora don't naturally talk to each other. The easiest way to remote into Windows from Fedora was by downloading and installing a program called Remmina. (Kulkarni 2021)

16.1 Remmina can be downloaded and installed quickly and easily with the command:

```
[root@knotted-fedora ~]# dnf install -y remmina
Importing GPG key 0x0C1289C0:
 Userid     : "TeamViewer GmbH (TeamViewer Linux 2017) <support@teamviewer.com>"
 Fingerprint: 8CAE 012E BFAC 38B1 7A93 7CD8 C5E2 2450 0C12 89C0
 From       : https://linux.teamviewer.com/pubkey/currentkey.asc
TeamViewer - x86_64                             1.7 MB/s | 327 kB     00:00
Last metadata expiration check: 0:00:00 ago on Sat 10 Dec 2022 02:10:08 PM PST.
Package remmina-1.3.3-1.fc28.x86_64 is already installed, skipping.
Dependencies resolved.
Nothing to do.
Complete!
[root@knotted-fedora ~]#
```

Figure 84: Remmina installed

16.2 Remmina can now be accessed from the GUI. Search for Remmina and click to open. The first time you open it, you'll need to click "Launch", but after it completes installation, you'll be able to use it anytime for Remote Desktop connections.

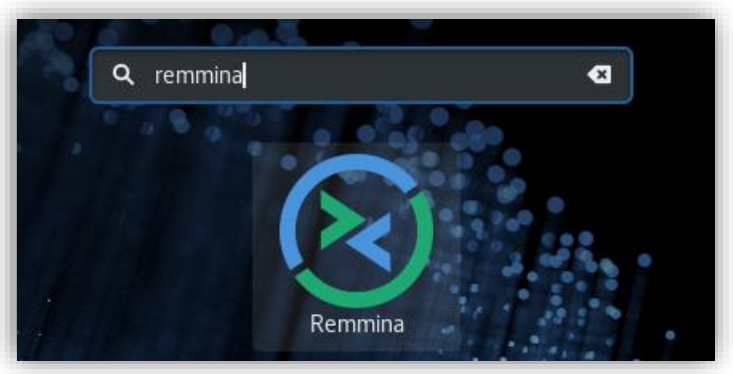

Figure 85: Search for Remmina in the GUI

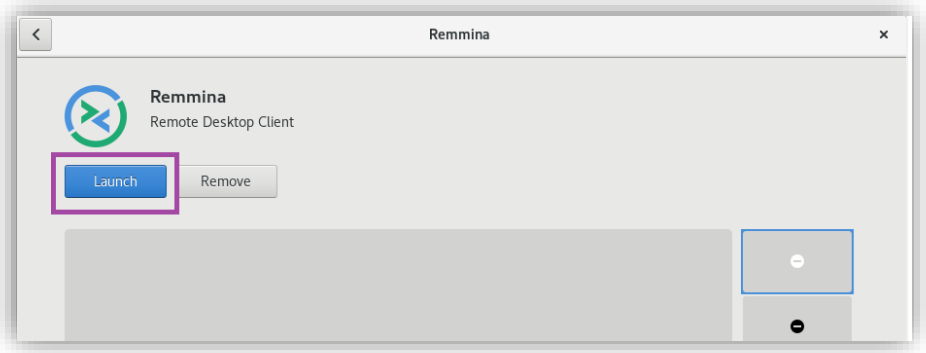

Figure 86: Launch Remmina to complete installation

16.3 Rimmina connects to other computers via the IP address. Type in the IP address of the VM you'd like to connect to.

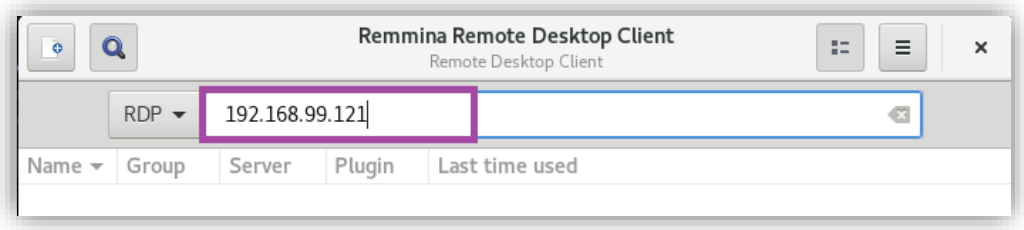

Figure 87: Remmina remote desktop

16.4 Enter the credentials of the account you'd like to log into and click "OK"

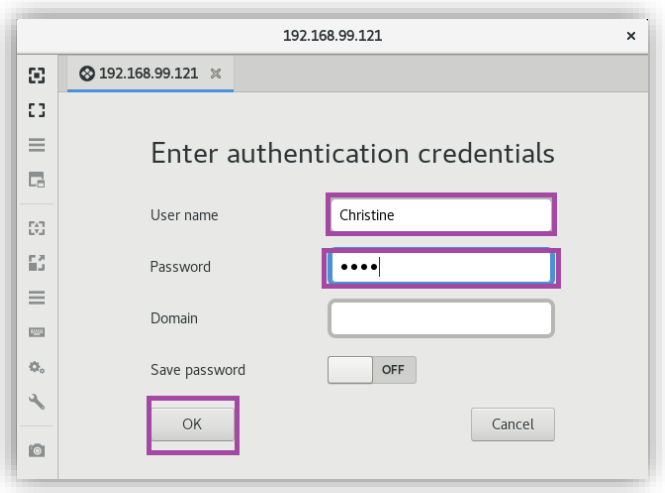

Figure 88: Enter Credentials

16.5 Remote Desktop is successful!

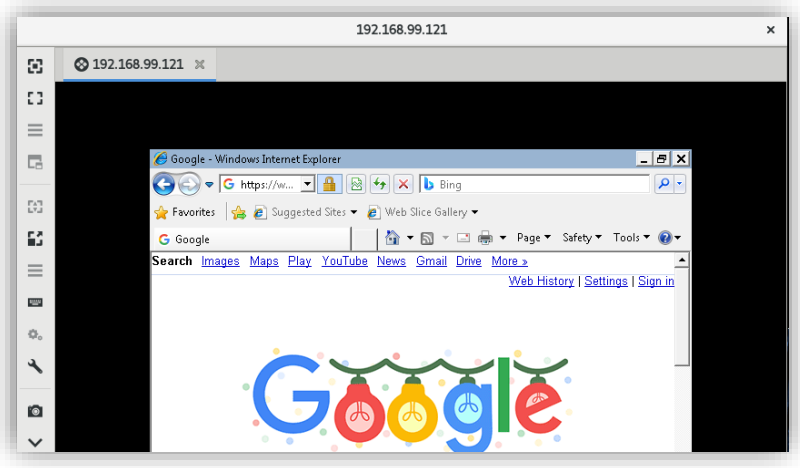

Figure 89: Remote Desktop Successful

17. Remote Desktop Windows 10 to Fedora

This was a fairly simple task, that included installing an application on Fedora called XRDP.

17.1 The following commands were used to install XRDP. This also required allowing access through the firewall to port 3389, the port that allows remote desktop. (Kumar 2021)

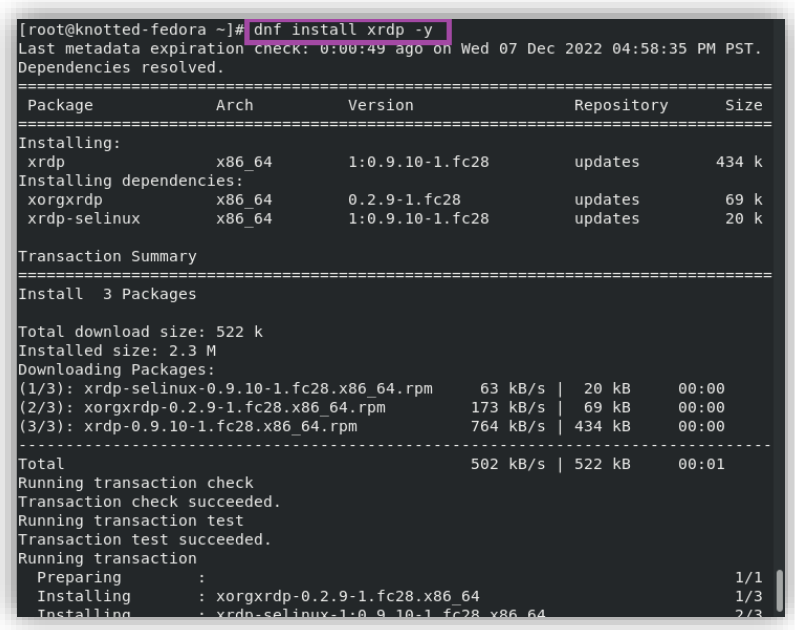

Figure 90: Install XRDP

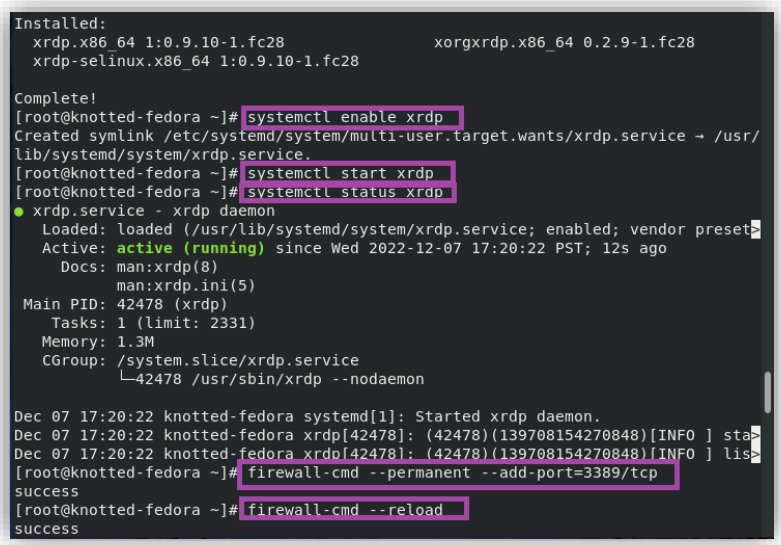

Figure 91: Allow access through firewall to port 3389

17.2 From Windows 10, Right click on the Fedora VM in the Network section of File Explorer. Click “Connect with Remote Desktop Connection”.

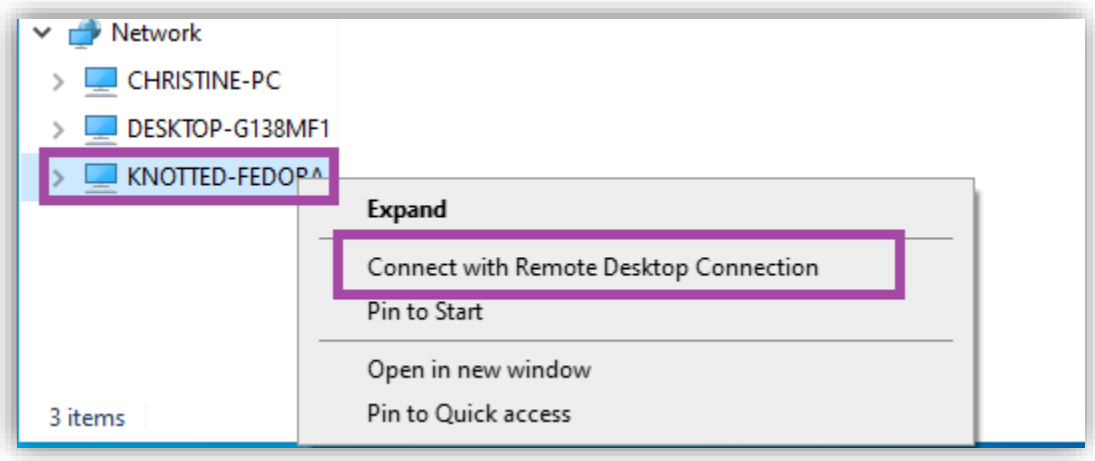

Figure 92: Remote Desktop Connection to Fedora

17.3 Verify the identity of the Remote Computer by clicking “Yes”.

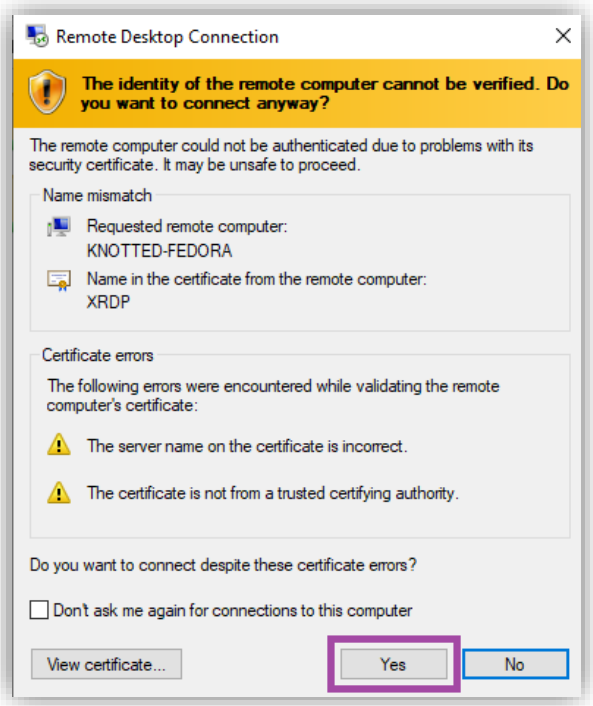

Figure 93: Verify Identity of Remote Computer

17.4 Enter the credentials of the account you'd like to access and click "OK".

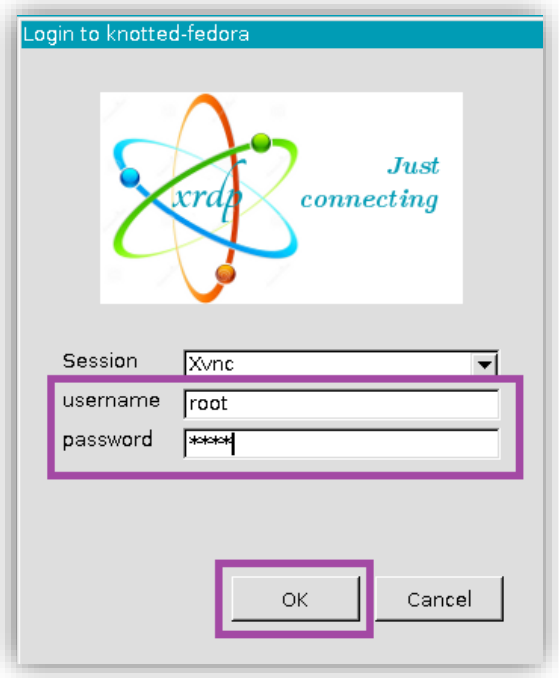

Figure 94: Login to Fedora

17.5 Remote Desktop has worked successfully!

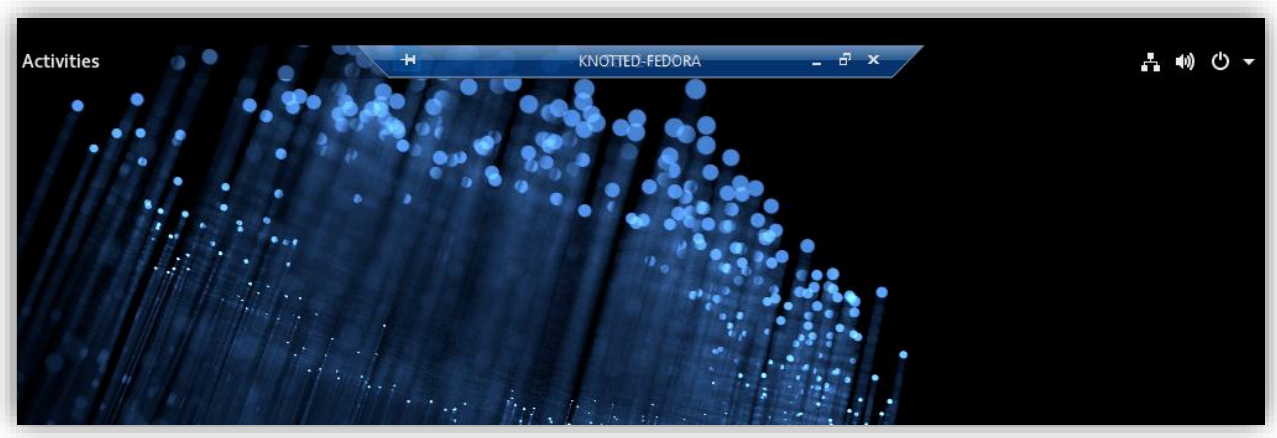

Figure 95: Windows 10 Successful Remote Desktop into Fedora

18. Remote Desktop Windows 7 to Fedora

We had some extreme complications with making this task happen. It seems that maybe some windows updates are getting in the way. For the sake of completion, we have chosen to use a 3rd party application to access remote desktop from Windows 7 onto Fedora.

18.1 First, download and install the program “TeamViewer” onto both Windows 7 and Fedora. Then open the program on both VMs. TeamViewer will provide you with an access code and password to allow Remote Desktop. We will put the “Allow Remote Control” code from Fedora into the “Control Remote Computer” field in the Windows VM and click “Connect”.

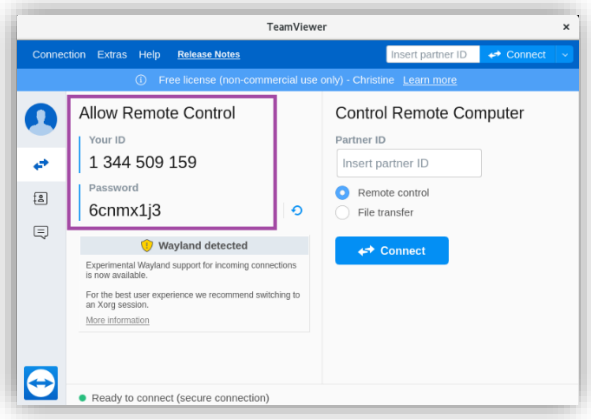

Figure 96: Fedora's Allow code

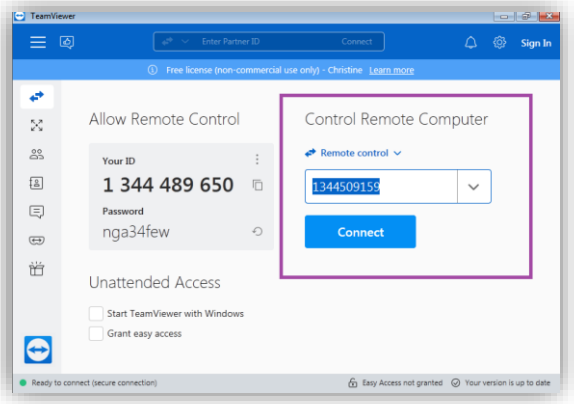

Figure 97: Windows 7 - Control Remote Computer

18.2 Enter the password from the Fedora TeamViewer window, and click “Log On”

Figure 98: TeamViewer Authentication

18.3 In testing, we were able to get the TeamViewer to work successfully. Unfortunately, for completion of the documentation, it wasn't able to connect for the final screen shots to show. You'll just have to believe us that it was working 😉

19. Bash Script for Backing up Fedora to Windows 7

The last step of this project is to create a shell script to automatically backup a folder from Fedora to Windows 7. We attempted to get this to work, but it was clear there were some errors in our process. With already having a time extension to complete this project, and running out of time a second time, we ended up being unable to complete this particular task. In the screencast, we will show what we were able to accomplish.

Conclusion:

Network Set-up and Administration is a LOT of work! Especially when multiple operating systems with their own quirks are concerned. It definitely makes sense that a business would choose one operating system to use for the majority of their computers, as it would allow for a much smoother time setting up and running the network. Although it is possible to network multiple different operating systems together (as shown here), it does not happen without challenges that would need to be overcome.

Citations:

Brown, K. (2017, July 3). *How to share files between windows and linux*. How-To-Geek. Retrieved December 8, 2022, from https://www.howtogeek.com/176471/how-to-share-files-between-windows-and-linux/

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Kulkarni, K. V. (2021, February 17). *How to connect to a remote desktop from linux*. Opensource.com. Retrieved December 10, 2022, from https://opensource.com/article/18/6/linux-remote-desktop

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