



## Bachelor of Science in Computer Science and Information Technology

# Laboratory Report On

## Network and System Administration

**Submitted By :**

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Department Of Computer  
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# LAB 1: Creating virtual machine and CentOS Installation

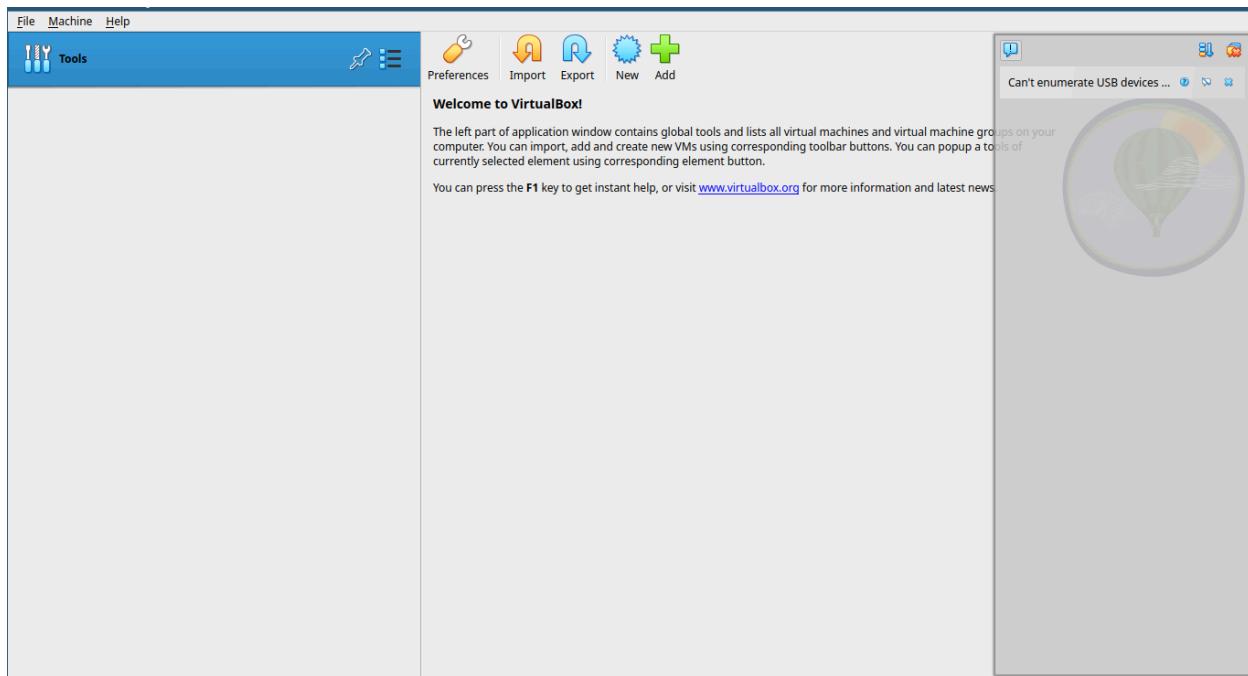
## Installing VirtualBox in linux.

To install virtualBox in linux (Ubuntu 24.04) we can use it's package manager i.e apt. The following command will install the oracle virtualBox.

```
$ sudo apt-get install virtualbox
```

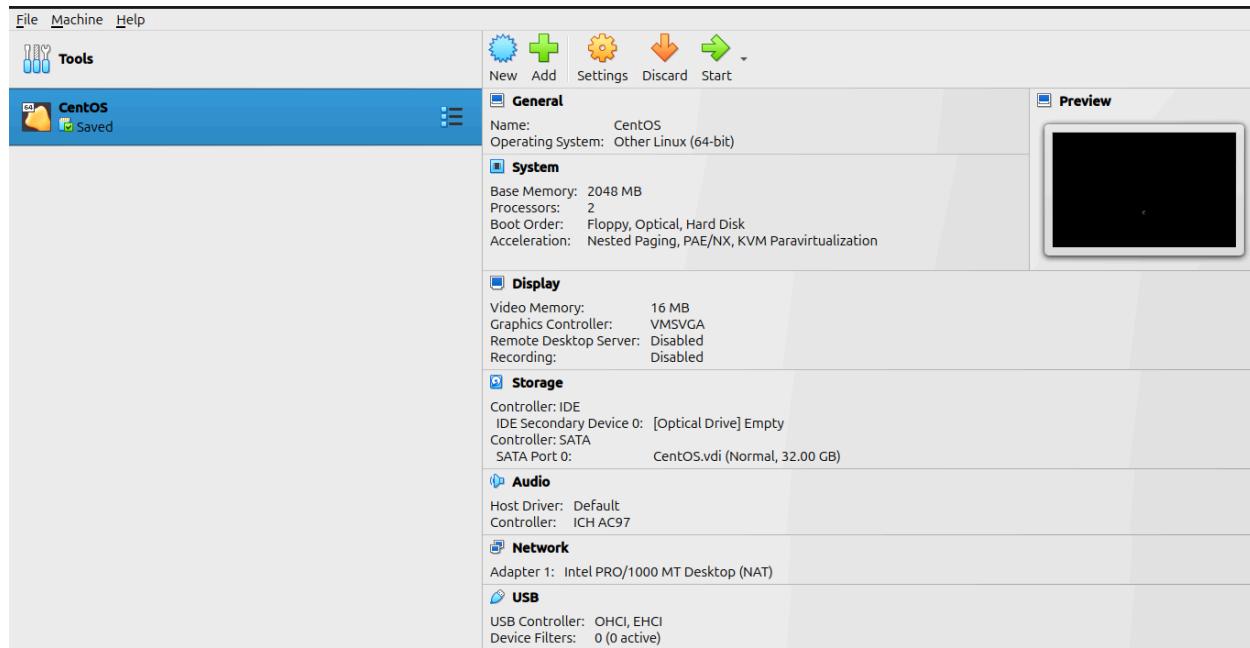
```
basanta@machine: ~
File Edit View Search Terminal Help
basanta@machine:~$ sudo apt-get install virtualbox
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  virtualbox-qt
Suggested packages:
  vde2 virtualbox-guest-additions-iso
The following NEW packages will be installed:
  virtualbox virtualbox-qt
0 upgraded, 2 newly installed, 0 to remove and 7 not upgraded.
Need to get 0 B/56.8 MB of archives.
After this operation, 190 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Selecting previously unselected package virtualbox.
(Reading database ... 192347 files and directories currently installed.)
Preparing to unpack .../virtualbox_7.0.16-dfsg-2_amd64.deb ...
Unpacking virtualbox (7.0.16-dfsg-2) ...
Selecting previously unselected package virtualbox-qt.
Preparing to unpack .../virtualbox-qt_7.0.16-dfsg-2_amd64.deb ...
Unpacking virtualbox-qt (7.0.16-dfsg-2) ...
Setting up virtualbox (7.0.16-dfsg-2) ...
Setting up virtualbox-qt (7.0.16-dfsg-2) ...
Processing triggers for desktop-file-utils (0.27-2build1) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for gnome-menus (3.36.0-1ubuntu3) ...
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for shared-mime-info (2.4-4) ...
basanta@machine:~$
```

After installation we can use the virtual box. It's dashboard is as shown in picture below.

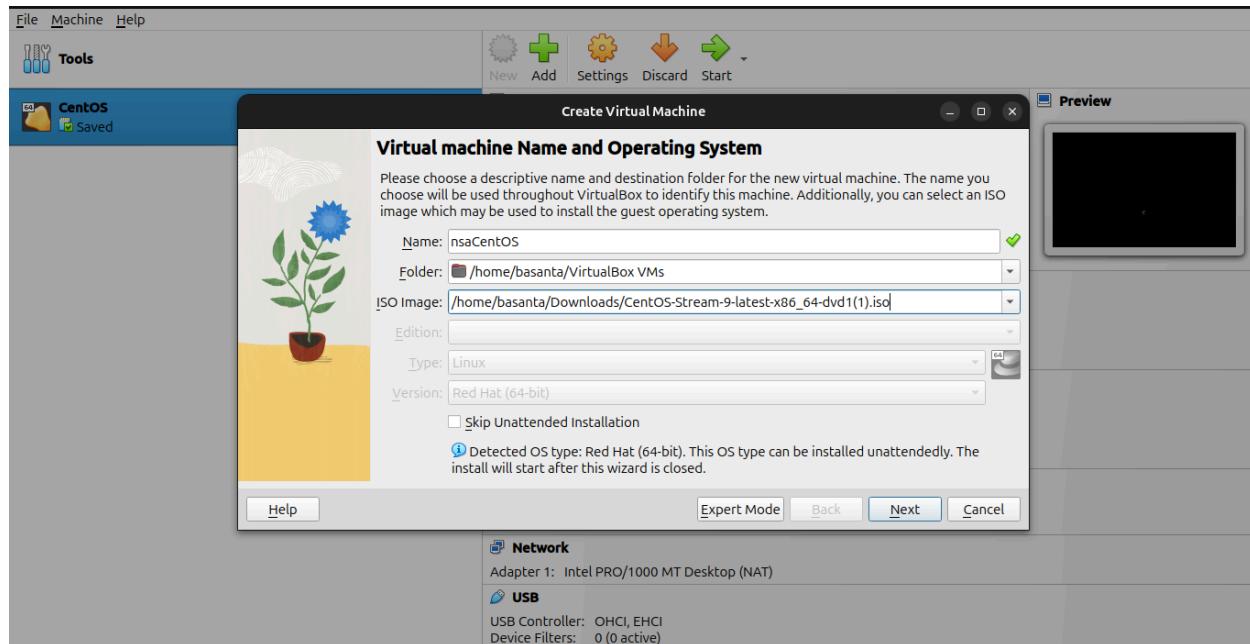


## Installing CentOS in virtualbox

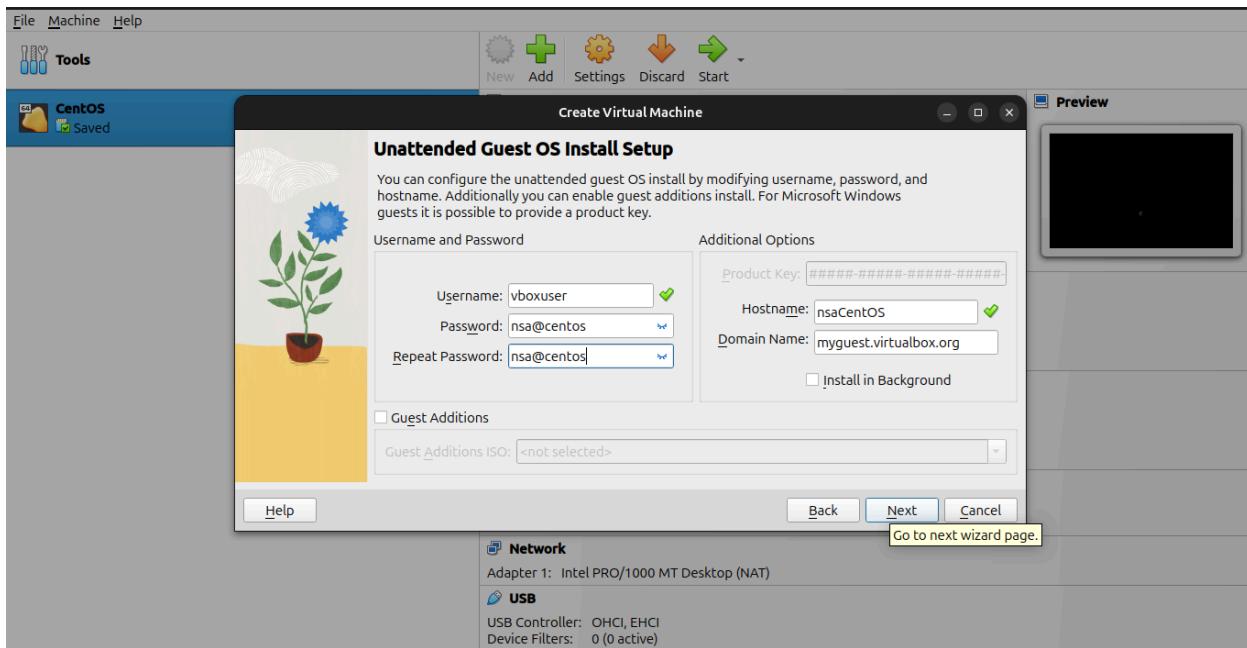
1. Open virtualbox and click on **New** button



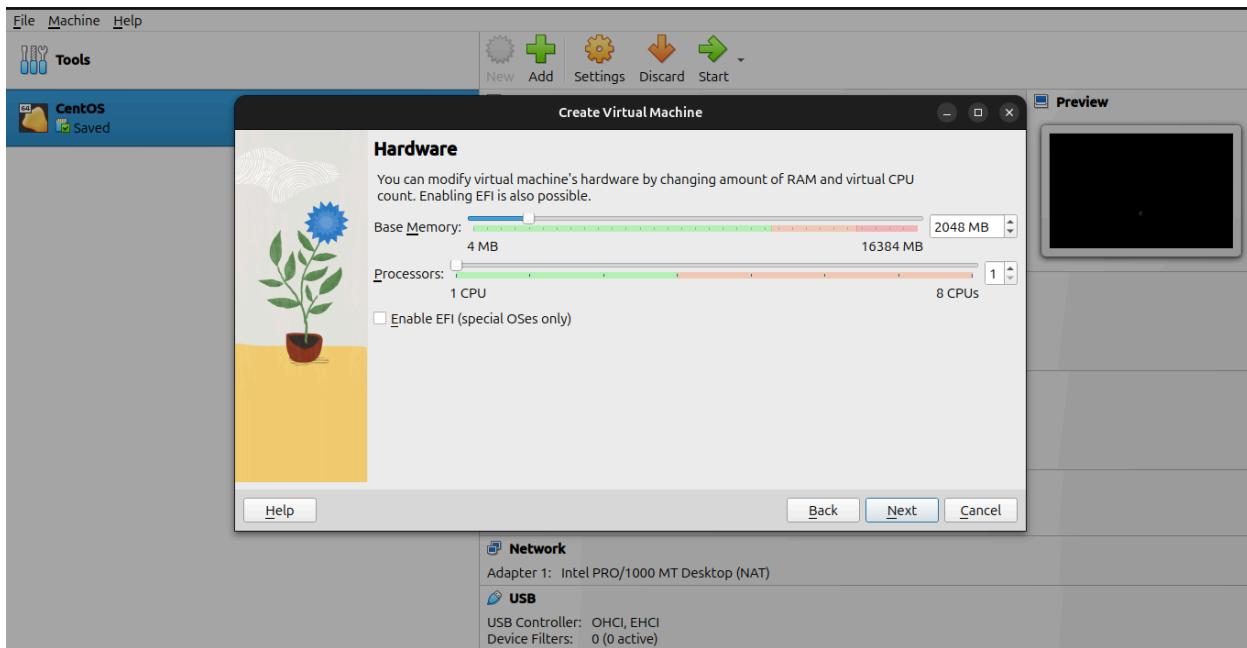
After clicking the new button you will be prompted with the popup menu as shown in picture below. Here select the operating system of your choice. Here we are choosing **Linux** since we are going to install **CentOs**.



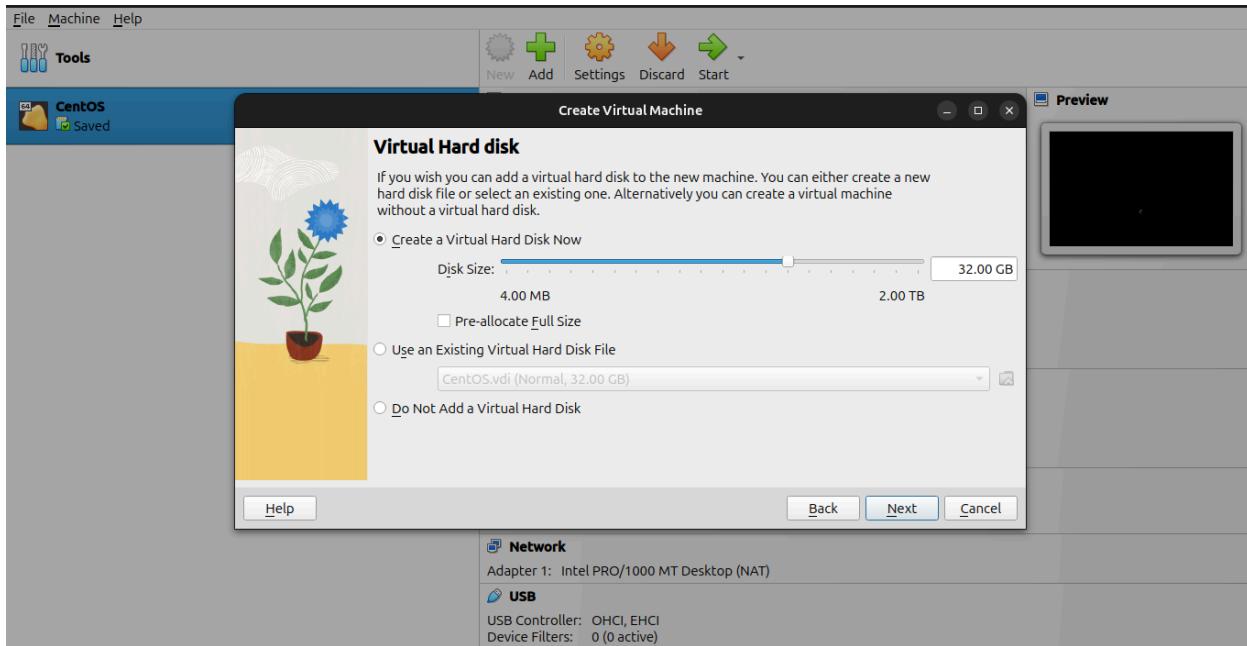
Once you select the click on **Next**. You will be promoted into another menu which would look like the picture below. You can set these values as default or change it with your desired values.



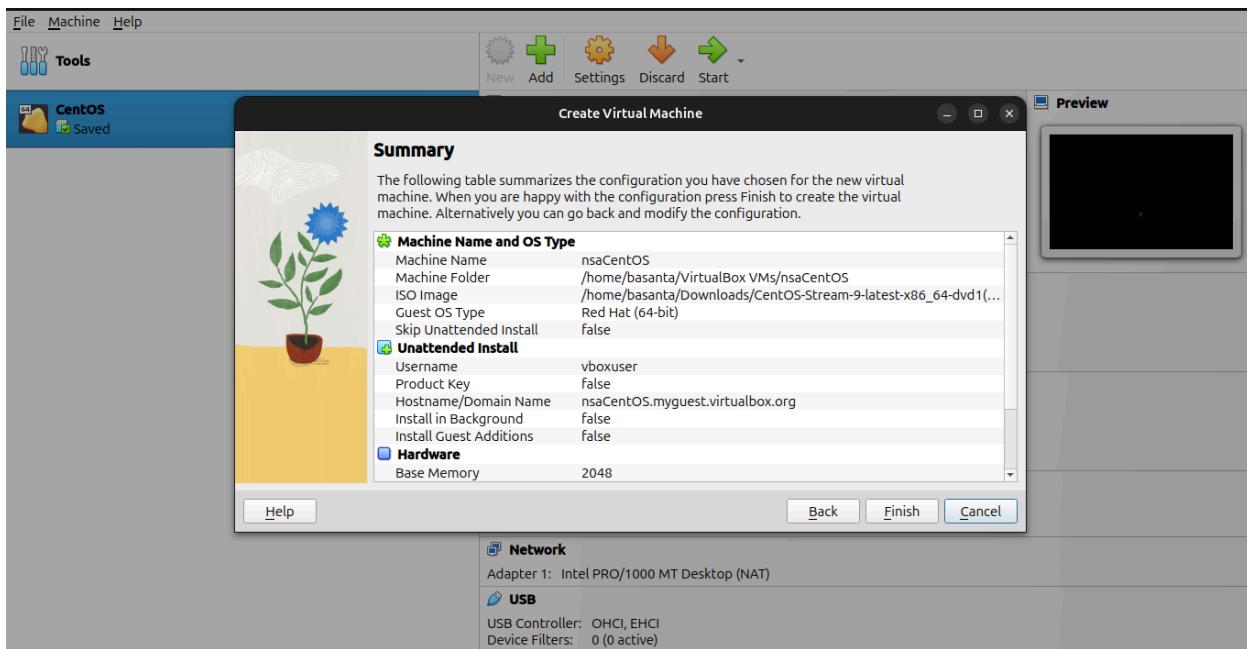
After doing it, you will see a menu like the following picture. Here you should define the hardware sizes to your virtual machine. I'll select 2048MB i.e. 2GB of ram and 1 core CPU.



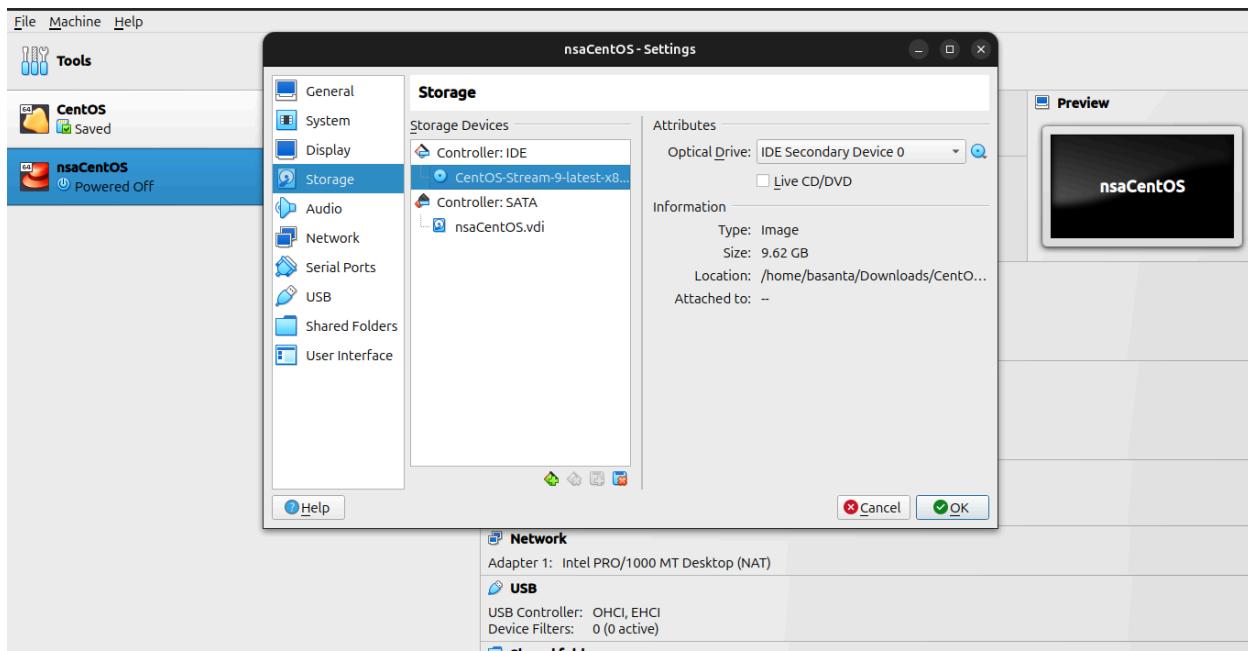
After choosing the appropriate RAM and CPU cores, you can press on the **Next** button. After pressing on the **Next** button you will an interface to set the storage for your virtual machine. Choose it according to your need and press on **Next** button. Here I'll choose 32GB.



After doing this press on the **Next** button.

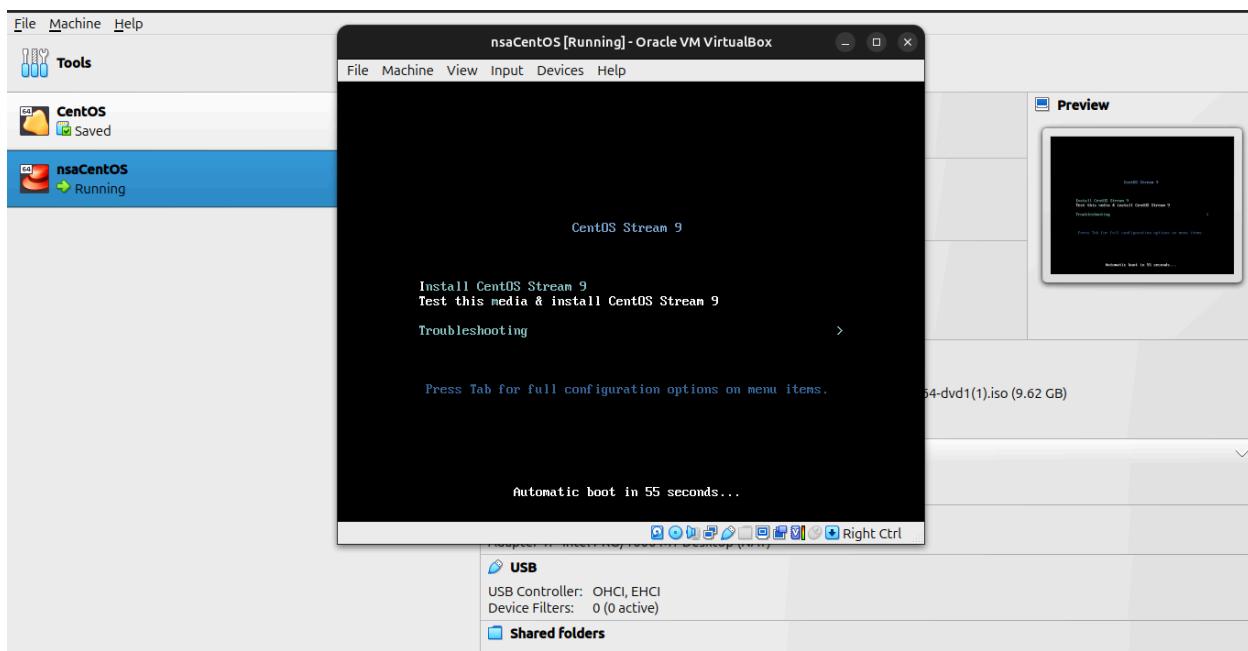


Once you set up all of the physical requirements for your virtual machine you can now choose the ISO file of the linux distribution you wish to install on. To do that, press on **Settings**, **Storage** and on the **Controller: IDE**, choose the ISO file for your system. Here I'll be selecting the iso image of a CentOS.



After selecting the ISO image press on **OK**.

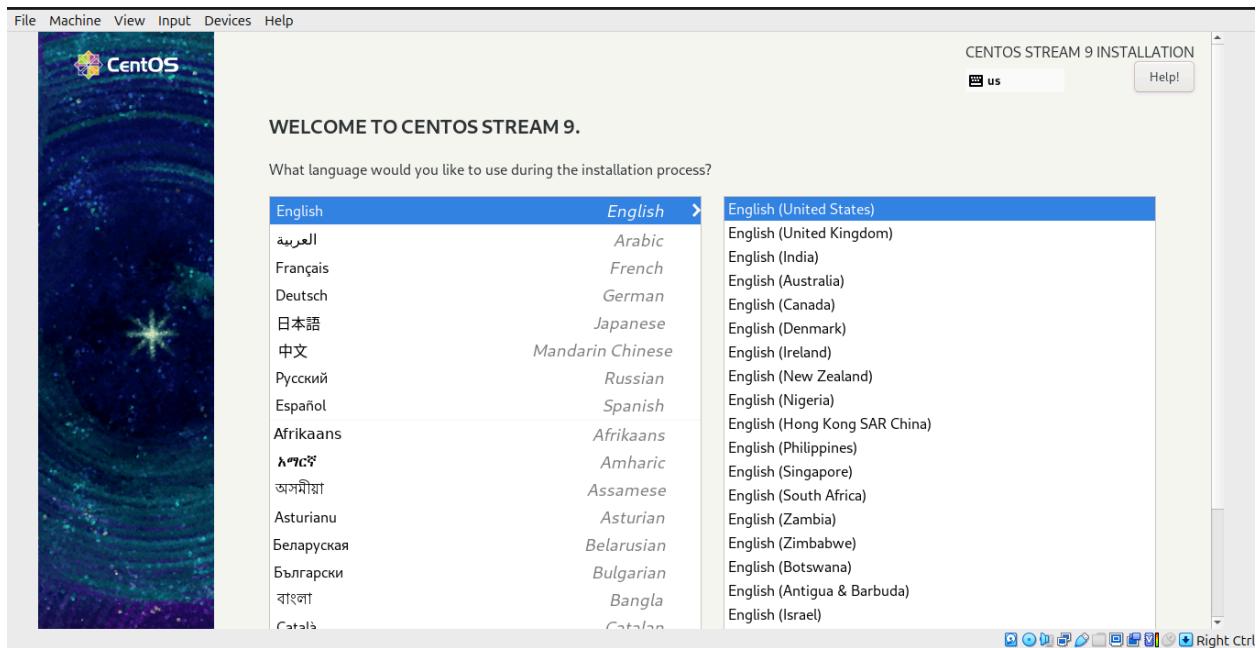
After that press on start button and you will see following screen, to install CentOS.



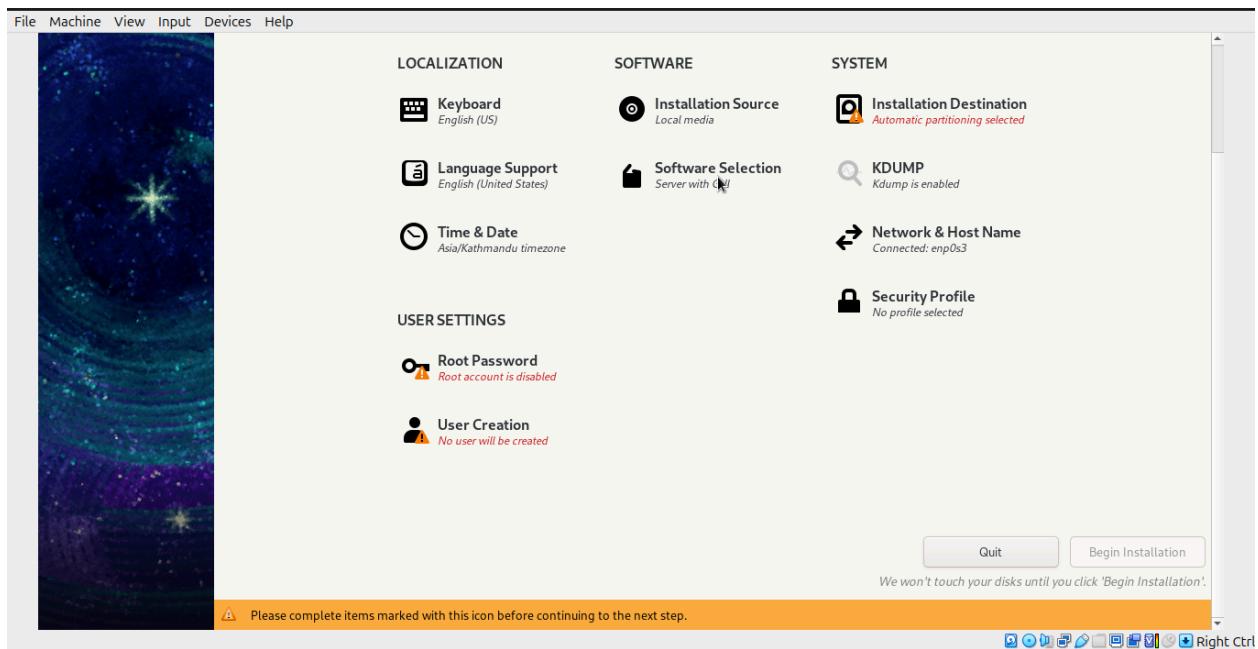
## Installation screen.

```
[ OK ] Started Show Plymouth Boot Screen.
[ OK ] Started Forward Password Requests to Plymouth Directory Watch.
[ OK ] Reached target Local Encrypted Volumes.
[ OK ] Reached target Path Units.
[ OK ] Started camel waiting for multipath siblings of sda.
[ OK ] Finished Wait for udev To Complete Device Initialization.
Starting Device-Mapper Multipath Device Controller...
[ OK ] Started Device-Mapper Multipath Device Controller.
[ OK ] Reached target Preparation For Local File Systems.
[ OK ] Reached target Local File Systems.
[ OK ] Reached target System Initialization.
[ OK ] Reached target Basic System.
/dev/sr0: 1d0c1f171885792b112f5c743241c214
Fragment sums: bab1feac67d729972764eb348a02dd3d7585918e5784f25d8af61678afc2
Fragment count: 20
Supported ISO: yes
Press [Esc] to abort check.
Checking: 009.0%
```

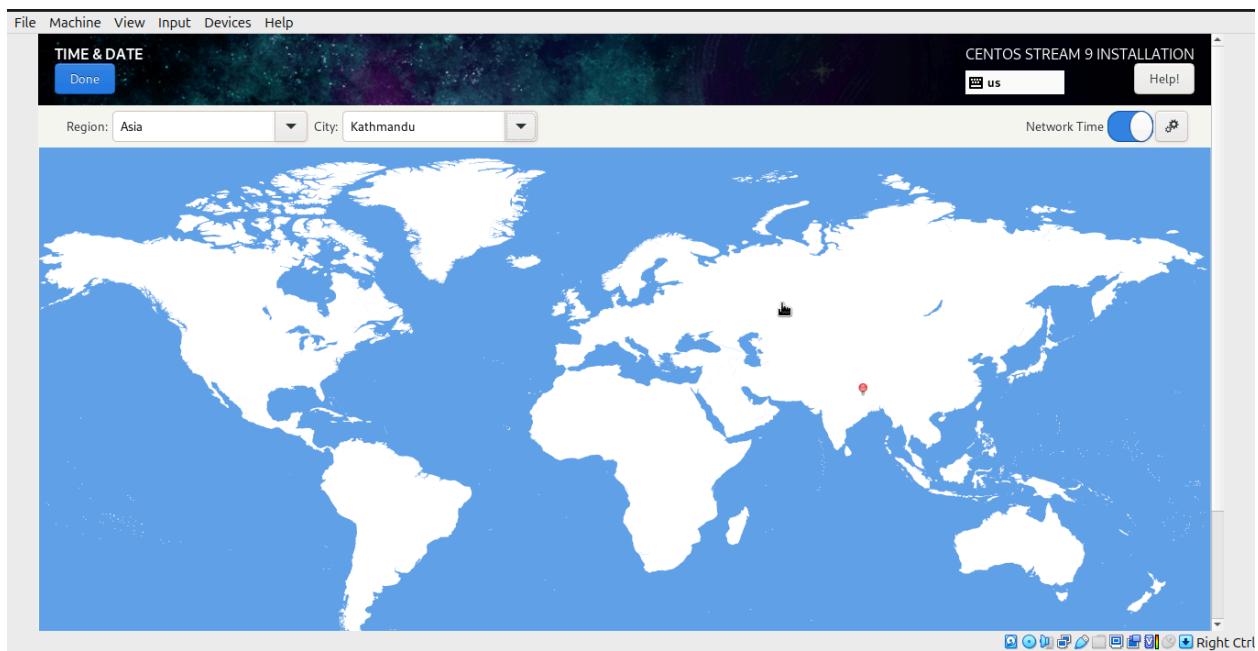
After this choose the language of your choice.



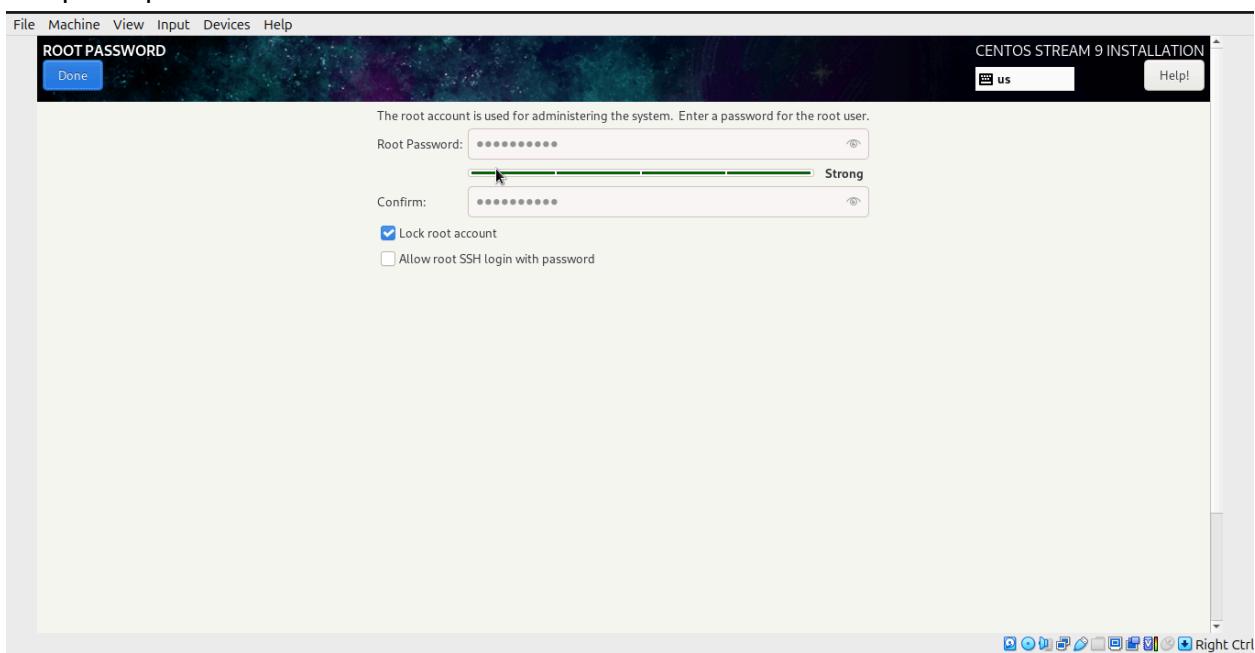
After choosing the language of your choice, continue the installation and you will see the following interface. Here you need to configure **Date & time**, **Root Password**, **User Creation** and **Installation Destination**.



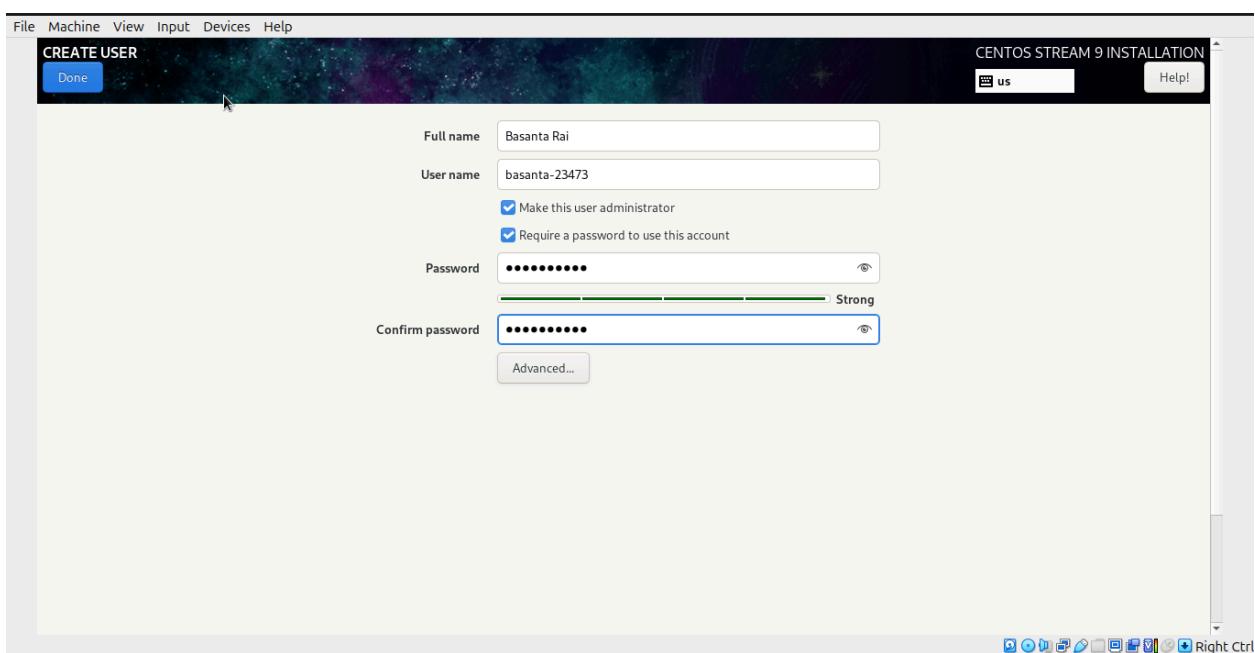
Choose your geolocation for Date and time.



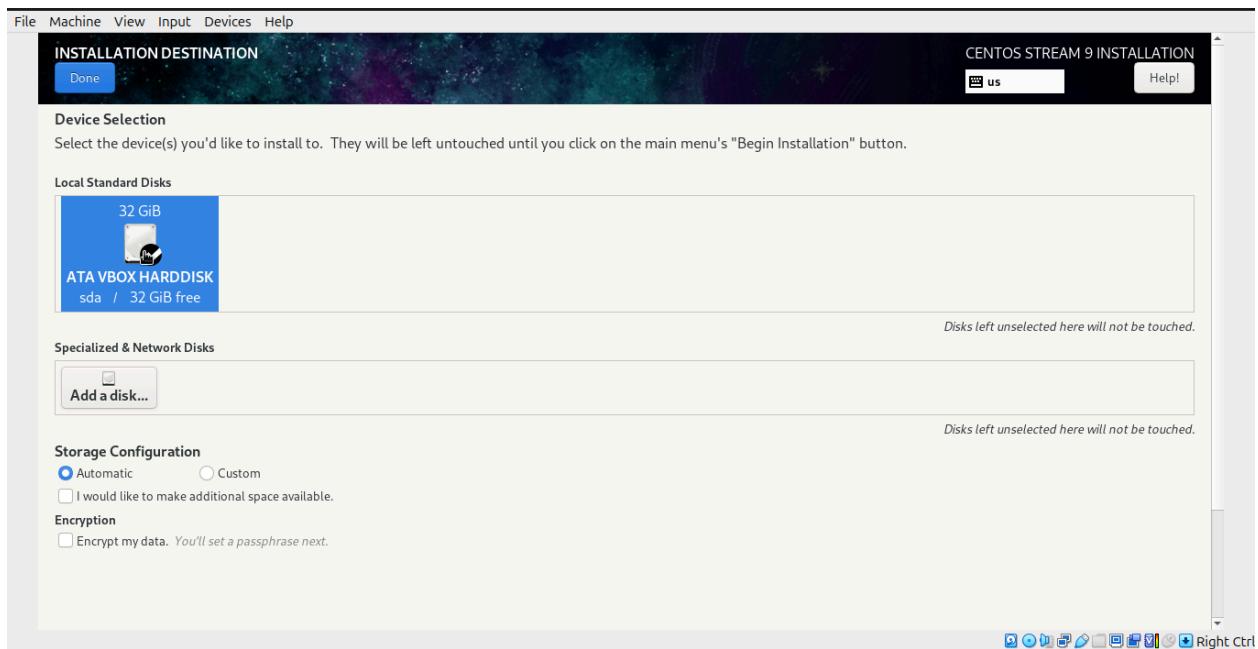
## Setup root password.



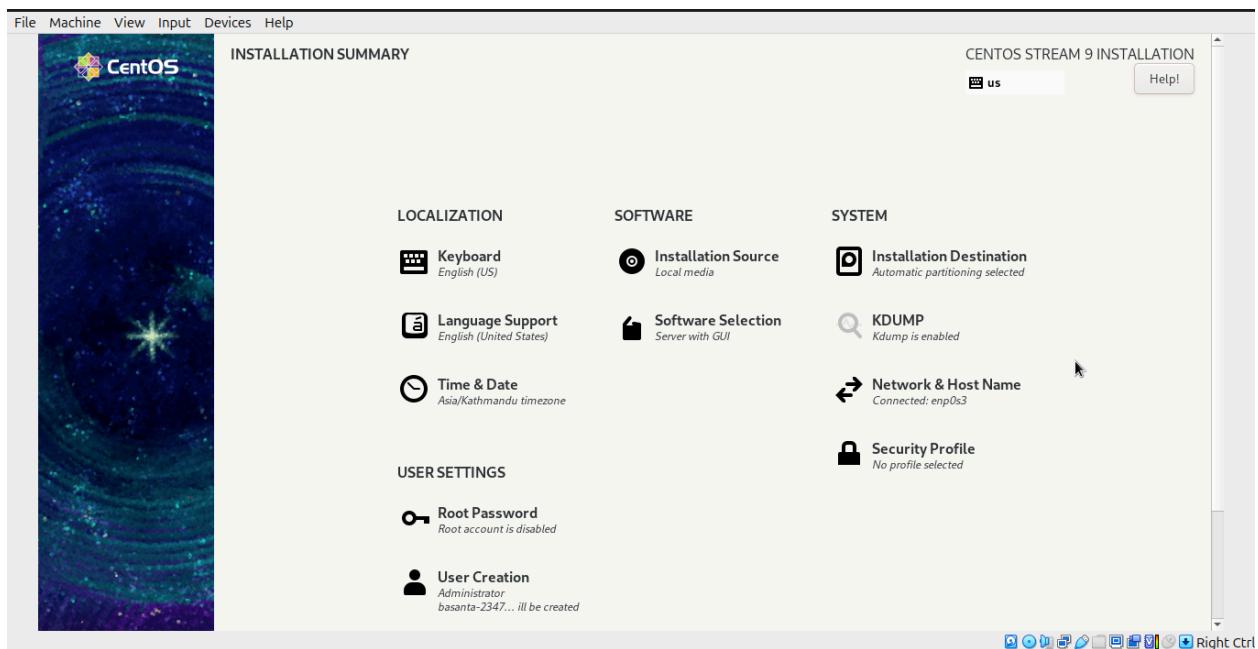
## User Creation. Create a new user .

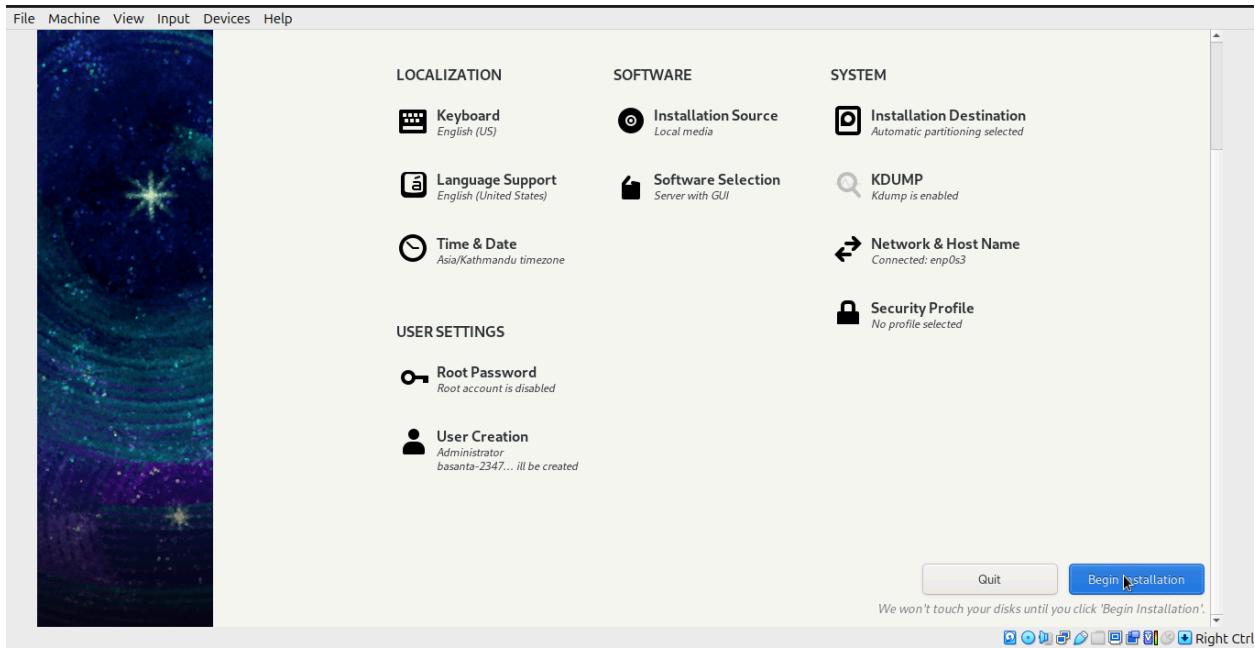


After creating a user, now you need to choose the installation destination for your CentOS. Here select the device we decided earlier of the installation process.

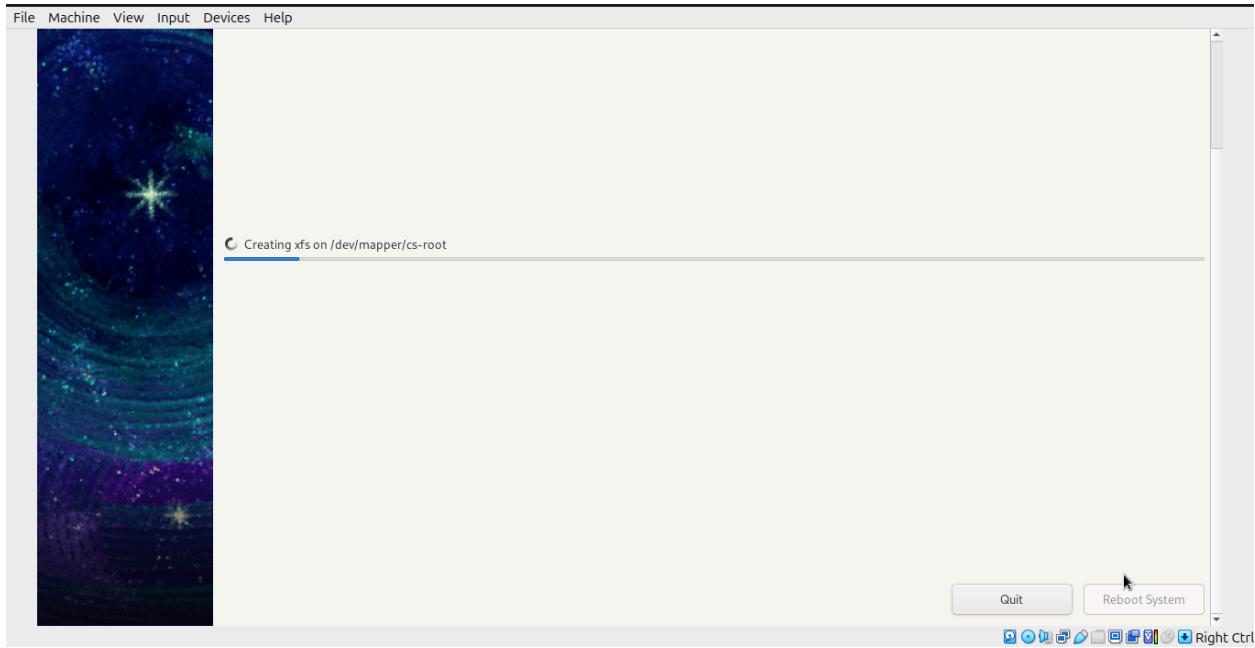


After choosing it you can continue your installation.

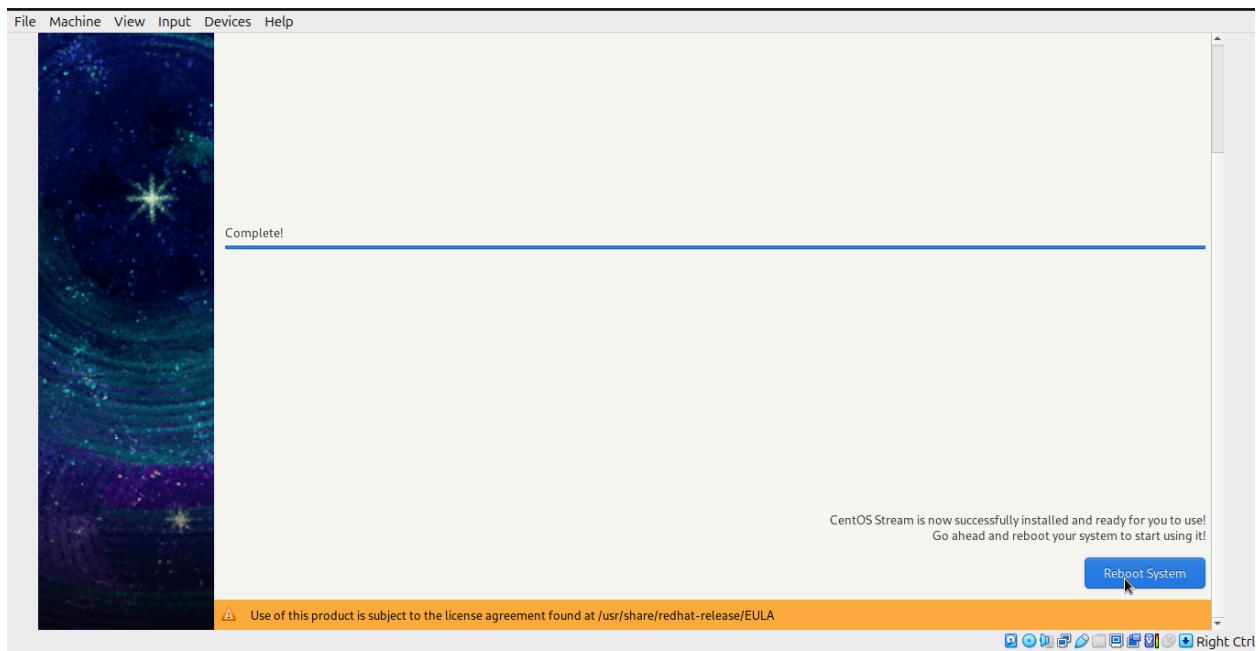




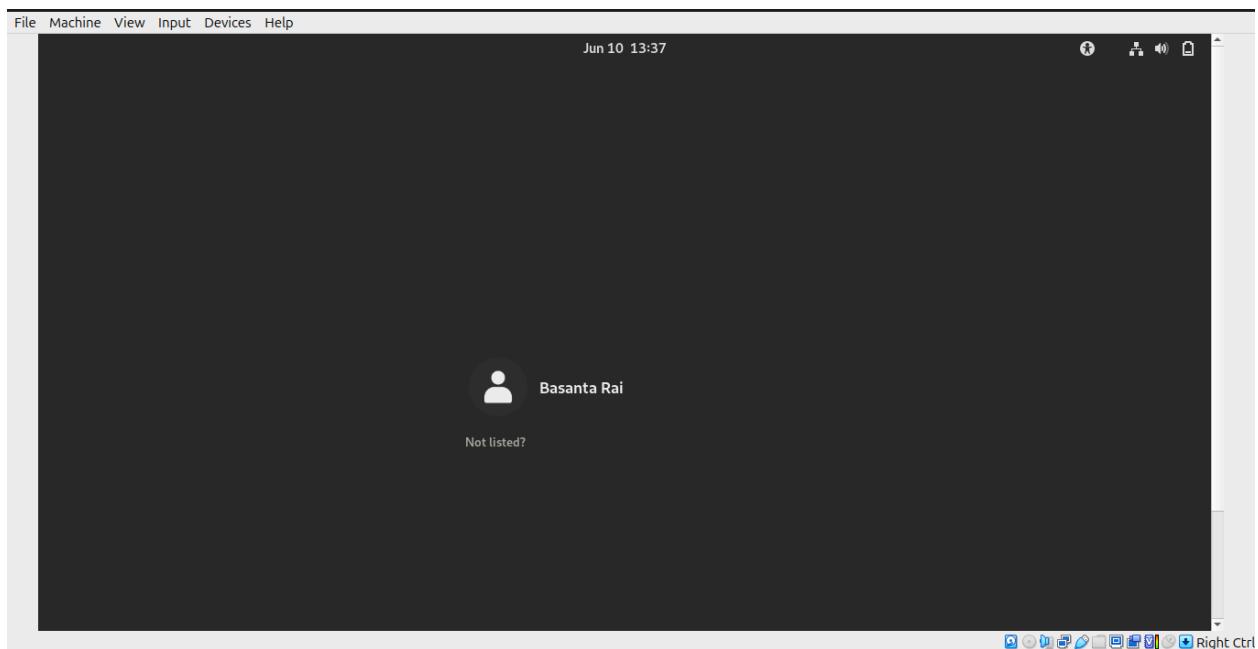
Installation in process.

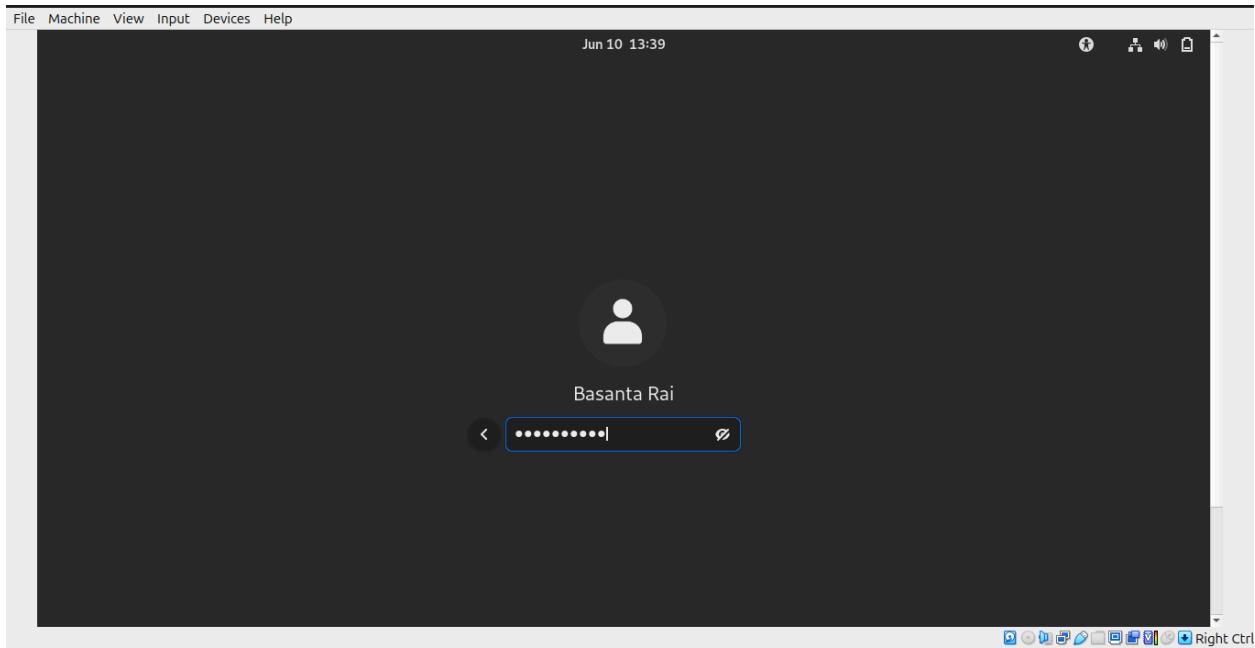


Once the installation is finished, you will see the following screen to reboot the system.

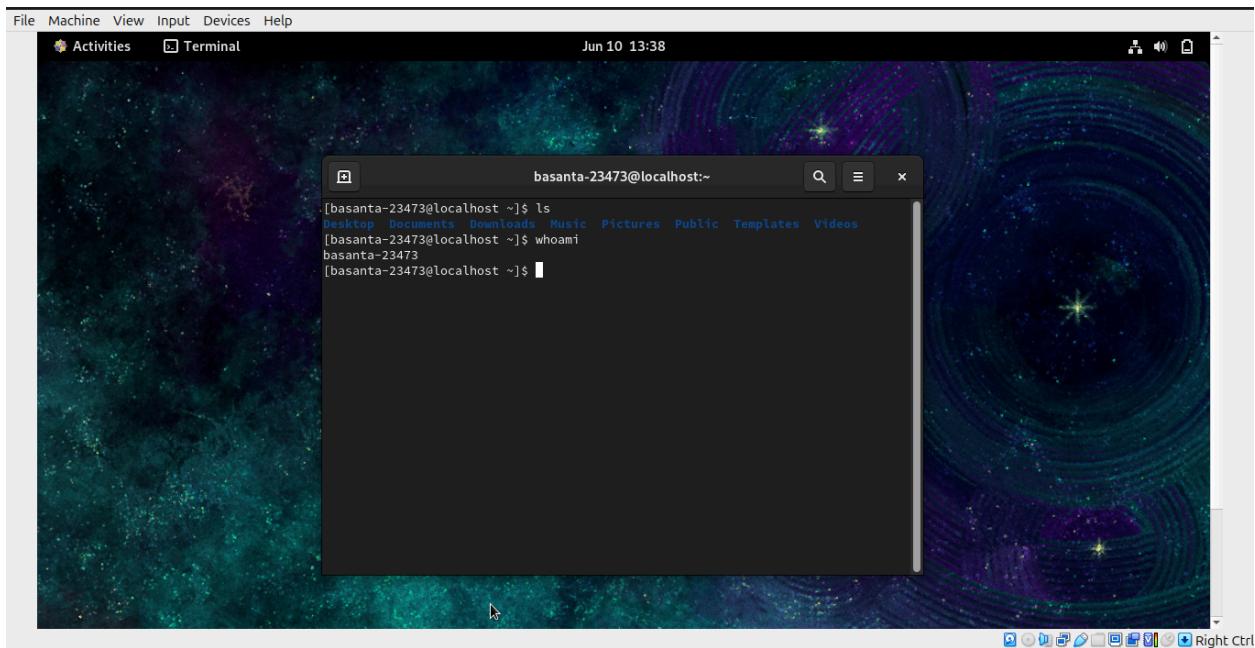


After reboot you will see a login page, here enter your credentials.



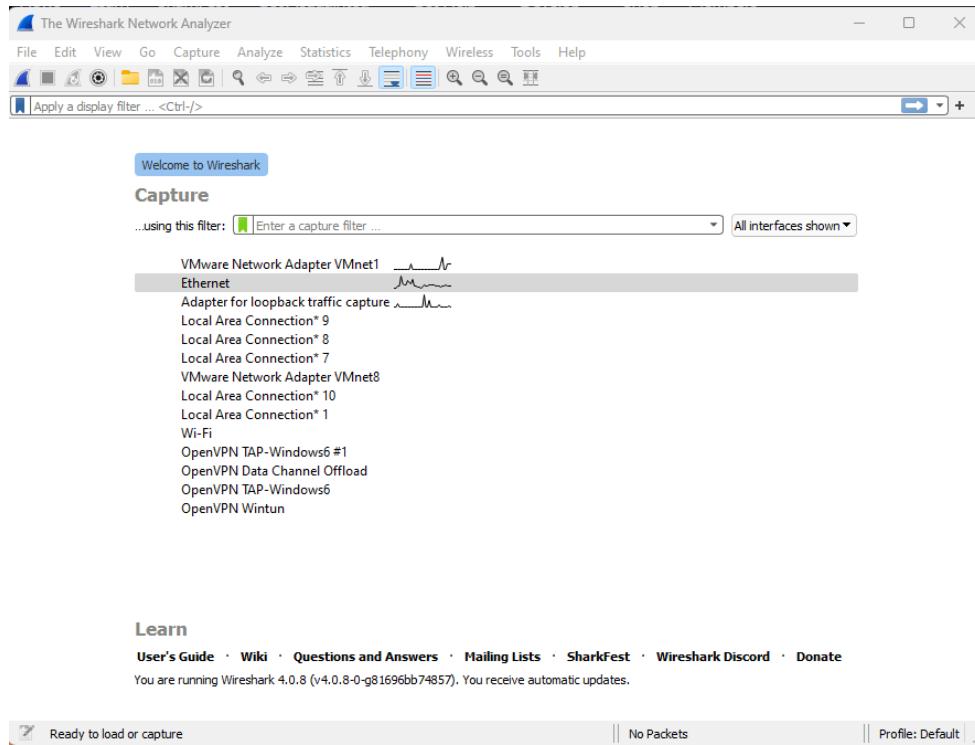


After entering your credentials you have successfully installed and entered the CentOS. Now you can perform whatever operation you wish to.

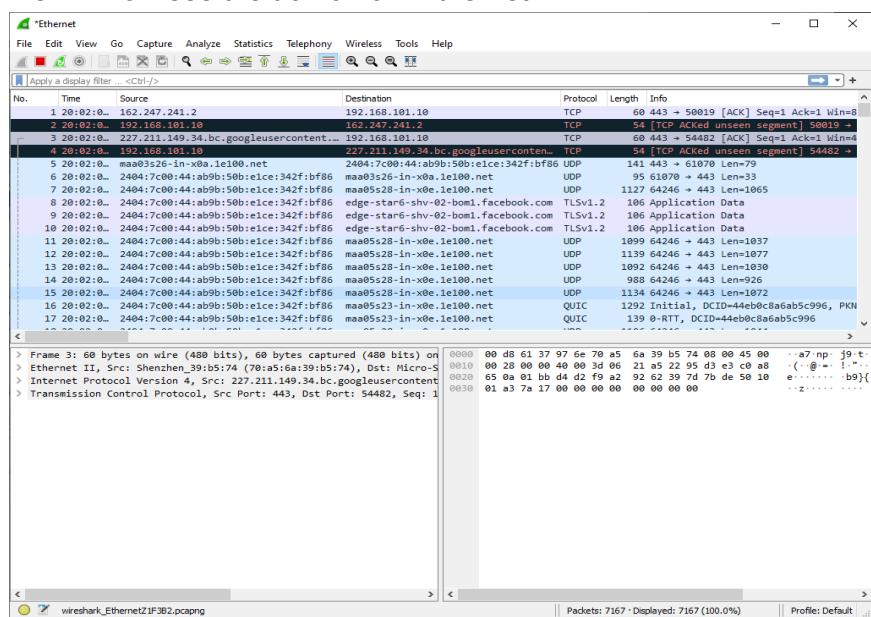


# LAB 2: Packet analysis with wireshark

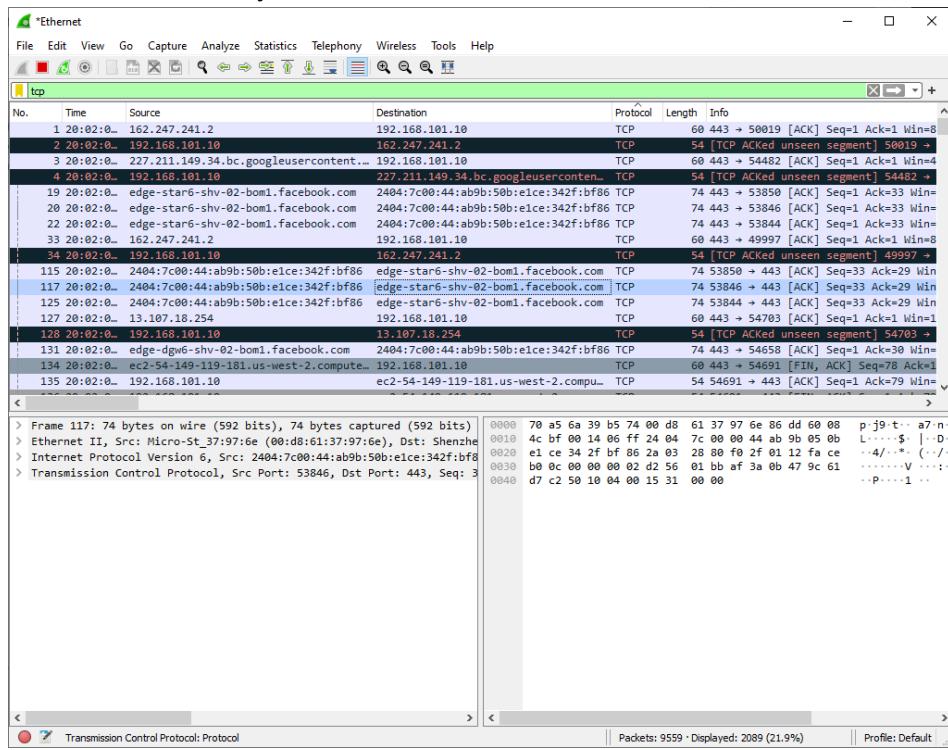
1. Download and install Wireshark from the browser.
2. Run the wireshark after installation. We can see the following dashboard.



3. We will now see the traffic from Ethernet.



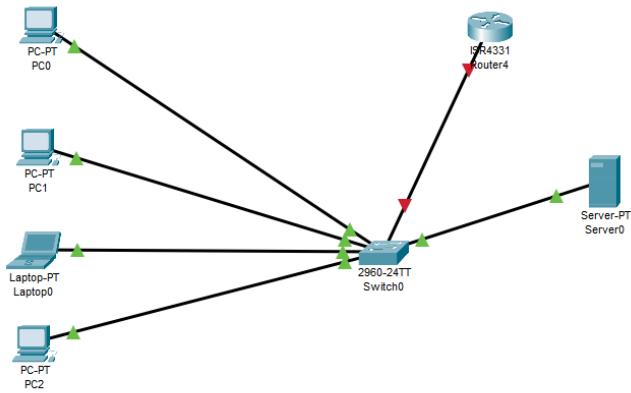
#### 4. In Ethernet we analyze the traffic from Port 80.



# LAB 3: Network practice with packet tracer.

## DHCP SERVER.

Design a simple network consisting of DHCP server, switches and PCs.



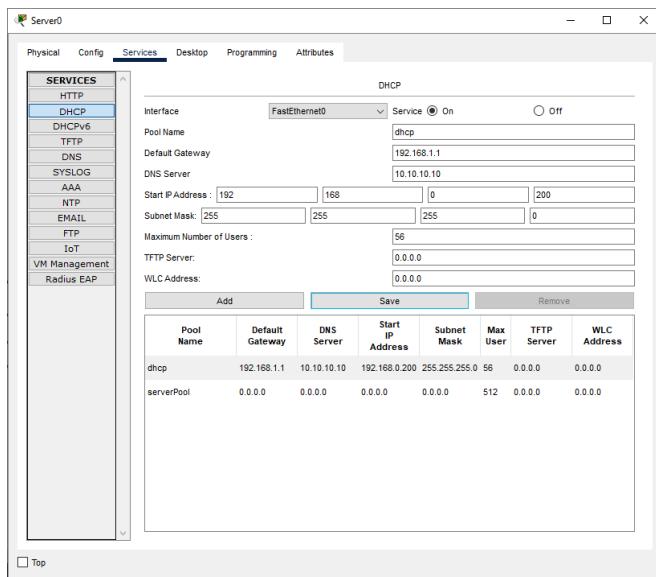
Enable the DCHP in settings in the server and give the following details.

Start IP address.

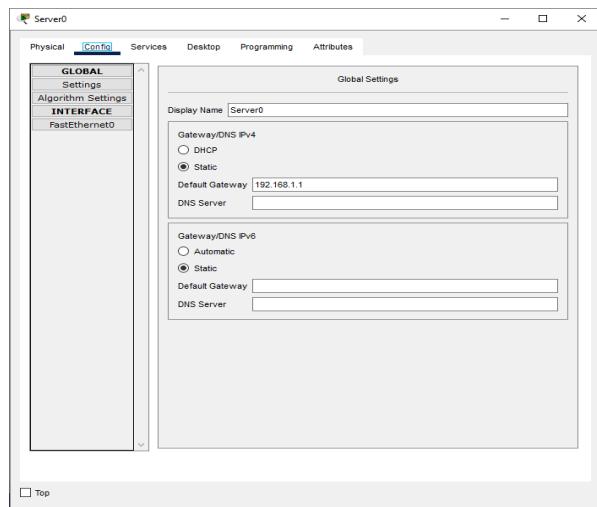
Subnet Mask

Max Users

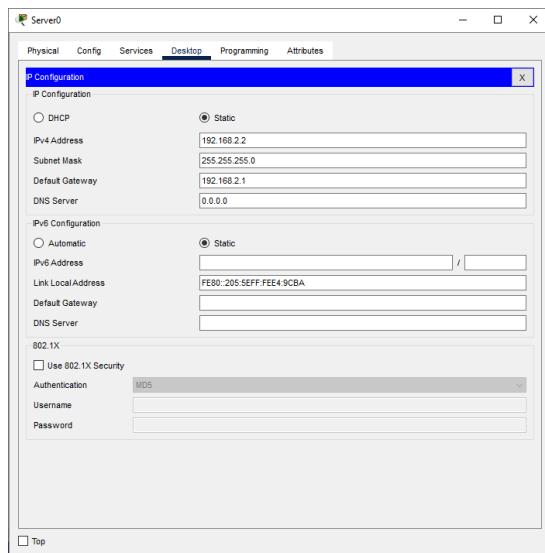
Default Gateway



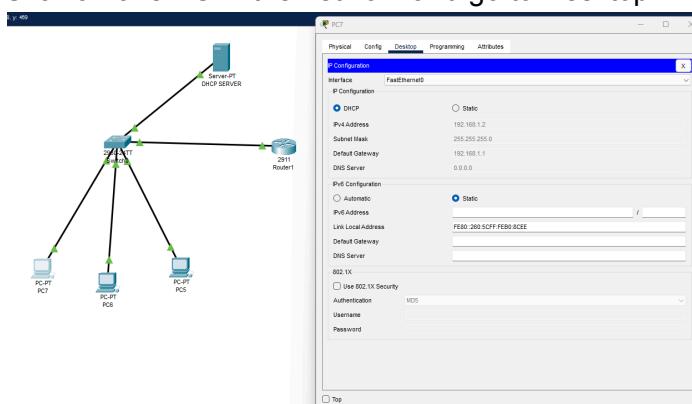
We can see DHCP has been successfully configured.



Provide Static IP to DHCP server with Gateway.

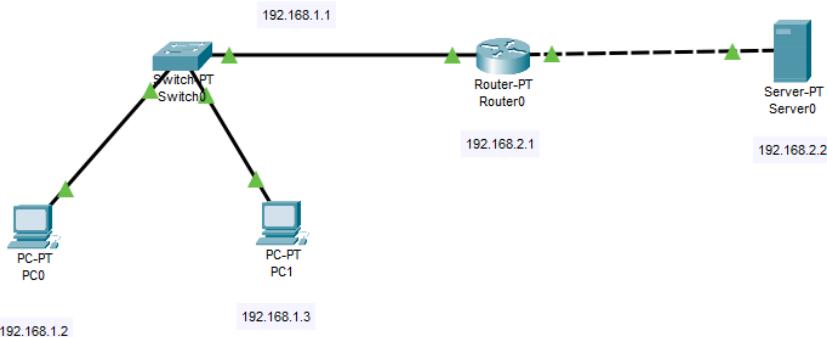


Click on one PC in the network and go to Desktop >> IP config and select DHCP.

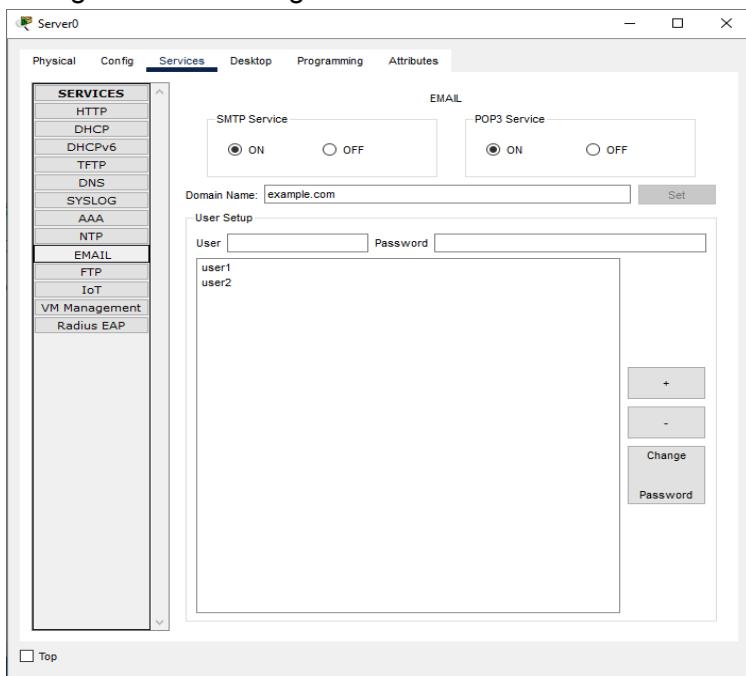


## Email Configuration

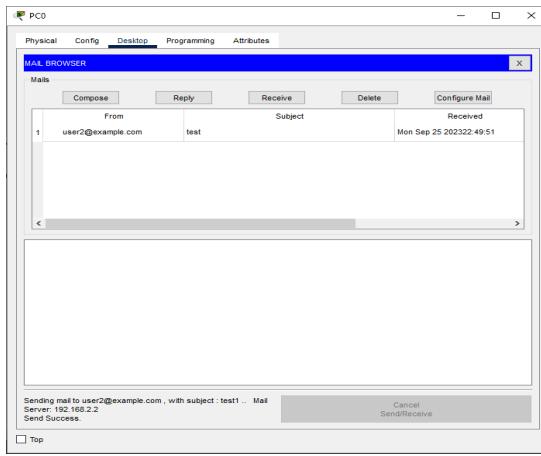
Design a network consisting Email server, Switches, Router and PCs.



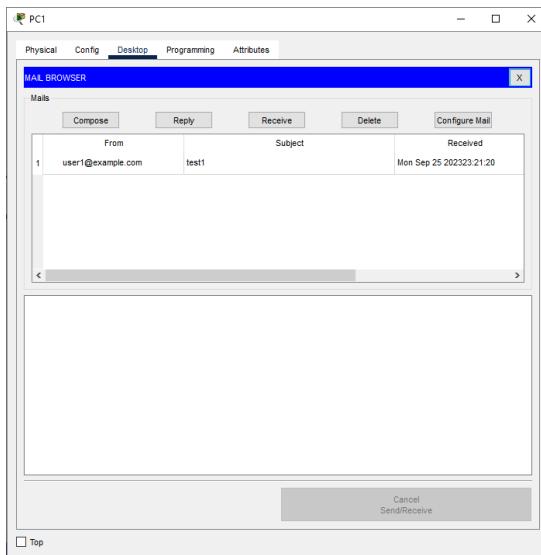
Configure Email settings in the server.



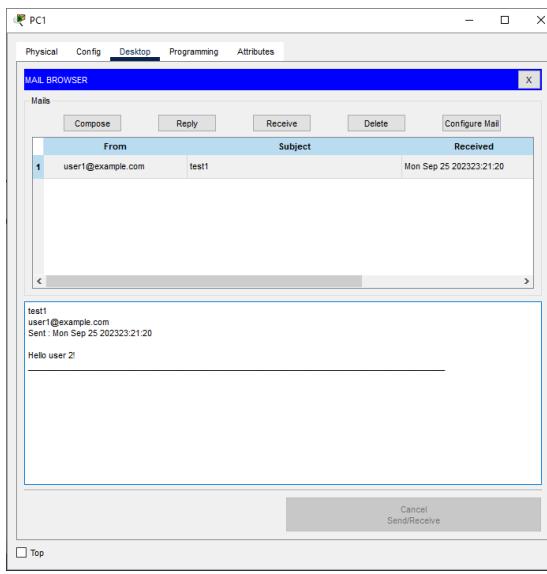
Now send mail from user1 to user2



Click on receive on user2.



We can see the email from user1 in user2.



# LAB 4: User/Group Management in Linux

## Create user

```
$ sudo useradd <user_name> // add user  
$ sudo passwd <user_name> // setup password for created user
```

```
basanta-23473@localhost:~ — sudo tcpdump -i enp0s3 port 80 -w capture.pcap ×  
  
[basanta-23473@localhost ~]$ sudo useradd osin  
[sudo] password for basanta-23473:  
[basanta-23473@localhost ~]$ sudo passwd osin  
Changing password for user osin.  
New password:  
BAD PASSWORD: The password is shorter than 8 characters  
Retype new password:  
passwd: all authentication tokens updated successfully.  
[basanta-23473@localhost ~]$ █
```

## View user options

```
$ sudo usermod -options <user_name>
```

```
[basanta-23473@localhost ~]$ sudo usermod -options osin  
usermod: -o flag is only allowed with the -u flag  
Usage: usermod [options] LOGIN  
  
Options:  
-b, --badname          allow bad names  
-c, --comment COMMENT    new value of the GECOS field  
-d, --home HOME_DIR      new home directory for the user account  
-e, --expiredate EXPIRE_DATE  set account expiration date to EXPIRE_DATE  
-f, --inactive INACTIVE    set password inactive after expiration  
                           to INACTIVE  
-g, --gid GROUP          force use GROUP as new primary group  
-G, --groups GROUPS      new list of supplementary GROUPS  
-a, --append               append the user to the supplemental GROUPS  
                           mentioned by the -G option without removing  
                           the user from other groups  
-h, --help                 display this help message and exit  
-l, --login NEW_LOGIN     new value of the login name  
-L, --lock                  lock the user account  
-m, --move-home            move contents of the home directory to the  
                           new location (use only with -d)  
-o, --non-unique           allow using duplicate (non-unique) UID  
-p, --password PASSWORD    use encrypted password for the new password  
-R, --root CHROOT_DIR      directory to chroot into  
-P, --prefix PREFIX_DIR    prefix directory where are located the /etc/* files  
-s, --shell SHELL          new login shell for the user account  
-u, --uid UID              new UID for the user account  
-U, --unlock                unlock the user account  
-v, --add-subuids FIRST-LAST  add range of subordinate uids  
-V, --del-subuids FIRST-LAST remove range of subordinate uids  
-w, --add-subgids FIRST-LAST add range of subordinate gids  
-W, --del-subgids FIRST-LAST remove range of subordinate gids  
-Z, --selinux-user SEUSER    new SELinux user mapping for the user account
```

### Add user to a group

```
$ sudo usermod -aG <group_name> <user_name>
```

```
basanta-23473@localhost:~ — sudo tcpdump -i enp0s3 port 80 -w capture.pcap ×  
[basanta-23473@localhost ~]$ sudo usermod -aG root osin  
[basanta-23473@localhost ~]$ █
```

### Delete user

```
$ sudo userdel <user_name>
```

```
basanta-23473@localhost:~ — sudo tcpdump -i enp0s3 port 80 -w capture.pcap ×  
[basanta-23473@localhost ~]$ sudo userdel osin  
[basanta-23473@localhost ~]$ █
```

### Create group

```
$ sudo groupadd <group_name> // create new group
```

```
$ sudo groupmod -options <group_name> // view options
```

```
[basanta-23473@localhost ~]$ sudo groupadd system_architect  
[basanta-23473@localhost ~]$ cat /etc/group | grep "sys_arch"  
[basanta-23473@localhost ~]$ cat /etc/group | grep "system_architect"  
system_architect:x:1001:  
[basanta-23473@localhost ~]$ sudo groupmod -opttions system_architect  
Usage: groupmod [options] GROUP
```

#### Options:

-a, --append	append the users mentioned by -U option to the group without removing existing user members
-g, --gid GID	change the group ID to GID
-h, --help	display this help message and exit
-n, --new-name NEW_GROUP	change the name to NEW_GROUP
-o, --non-unique	allow to use a duplicate (non-unique) GID
-p, --password PASSWORD	change the password to this (encrypted) PASSWORD
	...

### Rename group

```
$ sudo groupmod -n <new_name> <old_name>
```

```
[basanta-23473@localhost ~]$ sudo groupmod -n sys_arch system_architect^C  
[basanta-23473@localhost ~]$ cat /etc/group | grep "sys_arch"  
sys_arch:x:1001:  
[basanta-23473@localhost ~]$ █
```

## Delete group

```
$ sudo groupdel <group_name>
```

```
[basanta-23473@localhost ~]$ sudo groupdel sys_arch  
[basanta-23473@localhost ~]$ cat /etc/group | grep "sys_arch"  
[basanta-23473@localhost ~]$ █
```

## File system management

### # Change file group

```
$ sudo chgrp <group_name> <file_name>
```

```
[basanta-23473@localhost ~]$ ls  
capture.pcap design.sh Desktop Documents Downloads intro.sh Music Pictures Public Templates Videos  
[basanta-23473@localhost ~]$ ls -lah intro.sh  
-rwxr-xr-x. 1 basanta-23473 basanta-23473 10 Jun 10 15:13 intro.sh  
[basanta-23473@localhost ~]$ sudo chgrp archGroup intro.sh  
[basanta-23473@localhost ~]$ ls -lah intro.sh  
-rwxr-xr-x. 1 basanta-23473 archGroup 10 Jun 10 15:13 intro.sh  
[basanta-23473@localhost ~]$ █
```

### # Change file permission

```
$ sudo chown <user_name>:<group_name> <file_name>
```



```
[basanta-23473@localhost ~]$ ls -lah design.sh  
-rw-r--r--. 1 basanta-23473 basanta-23473 0 Jun 10 15:09 design.sh  
[basanta-23473@localhost ~]$ sudo chown akansha:archGroup design.sh  
[basanta-23473@localhost ~]$ ls -lah design.sh  
-rw-r--r--. 1 akansha archGroup 0 Jun 10 15:09 design.sh  
[basanta-23473@localhost ~]$ █
```

### # Make file executable

```
$ sudo chmod +x <file_name>
```

```
[basanta-23473@localhost ~]$ touch intro.sh  
[basanta-23473@localhost ~]$ echo "echo \"hi\"" > intro.sh  
> ^C  
[basanta-23473@localhost ~]$ echo "echo 'hi'" >> intro.sh  
[basanta-23473@localhost ~]$ chmod +x intro.sh  
[basanta-23473@localhost ~]$ ./intro.sh  
hi  
[basanta-23473@localhost ~]$ █
```

# LAB 5: Network Configuration: Start/Stop network Service, network interface configuration

## View network manager status

```
$ which NetworkManager
```

```
$ systemctl status NetworkManager
```

```
[basanta-23473@localhost ~]$ which NetworkManager
/usr/sbin/NetworkManager
[basanta-23473@localhost ~]$ systemctl status NetworkManager
● NetworkManager.service - Network Manager
   Loaded: loaded (/usr/lib/systemd/system/NetworkManager.service; enabled; preset: enabled)
     Active: active (running) since Mon 2024-06-10 13:09:49 +0545; 2h 7min ago
       Docs: man:NetworkManager(8)
   Main PID: 826 (NetworkManager)
     Tasks: 3 (limit: 10962)
    Memory: 7.9M
      CPU: 169ms
     CGroup: /system.slice/NetworkManager.service
             └─ 826 /usr/sbin/NetworkManager --no-daemon

Jun 10 13:09:50 localhost.localdomain NetworkManager[826]: <info> [1718004290.3270] device (enp0s3): state change: ip-check -> secondaries (reason 'none', s>
Jun 10 13:09:50 localhost.localdomain NetworkManager[826]: <info> [1718004290.3275] device (enp0s3): state change: secondaries -> activated (reason 'none', s>
Jun 10 13:09:50 localhost.localdomain NetworkManager[826]: <info> [1718004290.3282] manager: NetworkManager state is now CONNECTED_SITE
Jun 10 13:09:50 localhost.localdomain NetworkManager[826]: <info> [1718004290.3289] device (enp0s3): Activation: successful, device activated.
Jun 10 13:09:50 localhost.localdomain NetworkManager[826]: <info> [1718004290.3296] manager: NetworkManager state is now CONNECTED_GLOBAL
Jun 10 13:09:50 localhost.localdomain NetworkManager[826]: <info> [1718004290.3300] manager: startup complete
Jun 10 13:09:51 localhost.localdomain NetworkManager[826]: <info> [1718004291.3926] policy: set-hostname: set hostname to 'localhost.localdomain' (no hostna>
Jun 10 13:09:52 localhost.localdomain NetworkManager[826]: <info> [1718004292.5044] agent-manager: agent[1bc65de8a56aa1c1,:1.25/org.gnome.Shell.NetworkAgent]
Jun 10 14:05:23 localhost.localdomain NetworkManager[826]: <info> [1718007623.0053] agent-manager: agent[99c777d017afe558,:1.77/org.gnome.Shell.NetworkAgent]
Jun 10 14:35:09 localhost.localdomain NetworkManager[826]: <info> [1718009409.6614] agent-manager: agent[54b738a7efcf6c29,:1.77/org.gnome.Shell.NetworkAgents
[basanta-23473@localhost ~]$
```

## Enable network manager

```
$ systemctl enable NetworkManager
```

```
[basanta-23473@localhost ~]$ systemctl enable NetworkManager
[basanta-23473@localhost ~]$ systemctl status NetworkManager
bash: systemctl: command not found...
Similar command is: 'systemctl'
[basanta-23473@localhost ~]$ systemctl status NetworkManager
● NetworkManager.service - Network Manager
   Loaded: loaded (/usr/lib/systemd/system/NetworkManager.service; enabled; preset: enabled)
     Active: active (running) since Mon 2024-06-10 15:20:40 +0545; 1min 14s ago
       Docs: man:NetworkManager(8)
   Main PID: 38828 (NetworkManager)
     Tasks: 3 (limit: 10962)
    Memory: 7.1M
      CPU: 61ms
     CGroup: /system.slice/NetworkManager.service
             └─ 38828 /usr/sbin/NetworkManager --no-daemon

Jun 10 15:20:40 localhost.localdomain NetworkManager[38828]: <info> [1718012140.6624] policy: set-hostname: set hostname to 'localhost.localdomain' (no host>
Jun 10 15:20:40 localhost.localdomain NetworkManager[38828]: <info> [1718012140.6819] policy: set-hostname: set hostname to 'localhost.localdomain' (no host>
Jun 10 15:20:40 localhost.localdomain NetworkManager[38828]: <info> [1718012140.6821] device (enp0s3): state change: ip-config -> ip-check (reason 'none', s>
Jun 10 15:20:40 localhost.localdomain NetworkManager[38828]: <info> [1718012140.6848] device (enp0s3): state change: ip-check -> secondaries (reason 'none',>
Jun 10 15:20:40 localhost.localdomain NetworkManager[38828]: <info> [1718012140.6849] device (enp0s3): state change: secondaries -> activated (reason 'none',>
Jun 10 15:20:40 localhost.localdomain NetworkManager[38828]: <info> [1718012140.6855] manager: NetworkManager state is now CONNECTED_SITE
Jun 10 15:20:40 localhost.localdomain NetworkManager[38828]: <info> [1718012140.6884] policy: set-hostname: set hostname to 'localhost.localdomain' (no host>
Jun 10 15:20:40 localhost.localdomain NetworkManager[38828]: <info> [1718012140.6886] device (enp0s3): Activation: successful, device activated.
Jun 10 15:20:40 localhost.localdomain NetworkManager[38828]: <info> [1718012140.6889] manager: NetworkManager state is now CONNECTED_GLOBAL
Jun 10 15:20:40 localhost.localdomain NetworkManager[38828]: <info> [1718012140.6891] manager: startup complete
[basanta-23473@localhost ~]$
```

## Disable network manager

\$ systemctl disable NetworkManager

```
[basanta-23473@localhost ~]$ sudo systemctl disable NetworkManager
[sudo] password for basanta-23473:
Removed "/etc/systemd/system/multi-user.target.wants/NetworkManager.service".
Removed "/etc/systemd/system/dbus-org.freedesktop.nm-dispatcher.service".
Removed "/etc/systemd/system/network-online.target.wants/NetworkManager-wait-online.service".
[basanta-23473@localhost ~]$ systemctl status NetworkManager
Unknown command verb status.
[basanta-23473@localhost ~]$ systemctl status NetworkManager
● NetworkManager.service - Network Manager
   Loaded: loaded (/usr/lib/systemd/system/NetworkManager.service; disabled; preset: enabled)
     Active: active (running) since Mon 2024-06-10 15:20:40 +0545; 2min 42s ago
       Docs: man:NetworkManager(8)
   Main PID: 38828 (NetworkManager)
     Tasks: 3 (limit: 10962)
    Memory: 7.1M
      CPU: 64ms
     CGroup: /system.slice/NetworkManager.service
             └─38828 /usr/sbin/NetworkManager --no-daemon

Jun 10 15:20:40 localhost.localdomain NetworkManager[38828]: <info> [1718012140.6624] policy: set-hostname: set hostname to 'localhost.localdomain' (no host>
Jun 10 15:20:40 localhost.localdomain NetworkManager[38828]: <info> [1718012140.6819] policy: set-hostname: set hostname to 'localhost.localdomain' (no host>
Jun 10 15:20:40 localhost.localdomain NetworkManager[38828]: <info> [1718012140.6821] device (enp0s3): state change: ip-config -> ip-check (reason 'none', s>
Jun 10 15:20:40 localhost.localdomain NetworkManager[38828]: <info> [1718012140.6848] device (enp0s3): state change: ip-check -> secondaries (reason 'none',>
Jun 10 15:20:40 localhost.localdomain NetworkManager[38828]: <info> [1718012140.6849] device (enp0s3): state change: secondaries -> activated (reason 'none')>
Jun 10 15:20:40 localhost.localdomain NetworkManager[38828]: <info> [1718012140.6855] manager: NetworkManager state is now CONNECTED_SITE
Jun 10 15:20:40 localhost.localdomain NetworkManager[38828]: <info> [1718012140.6884] policy: set-hostname: set hostname to 'localhost.localdomain' (no host>
Jun 10 15:20:40 localhost.localdomain NetworkManager[38828]: <info> [1718012140.6886] device (enp0s3): Activation: successful, device activated.
Jun 10 15:20:40 localhost.localdomain NetworkManager[38828]: <info> [1718012140.6889] manager: NetworkManager state is now CONNECTED_GLOBAL
Jun 10 15:20:40 localhost.localdomain NetworkManager[38828]: <info> [1718012140.6891] manager: startup complete
[basanta-23473@localhost ~]$ █
```

## View network interfaces

\$ ip addr

```
[basanta-23473@localhost ~]$ ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
  link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
      valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
      valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
  link/ether 08:00:27:81:46:fb brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
      valid_lft 86190sec preferred_lft 86190sec
    inet6 fe80::a00:27ff:fe81:46fb/64 scope link noprefixroute
      valid_lft forever preferred_lft forever
[basanta-23473@localhost ~]$ █
```

## View routes

\$ ip route show

```
[basanta-23473@localhost ~]$ ip route show
default via 10.0.2.2 dev enp0s3 proto dhcp src 10.0.2.15 metric 100
10.0.2.0/24 dev enp0s3 proto kernel scope link src 10.0.2.15 metric 100
[basanta-23473@localhost ~]$ ping google.com -c 3
PING google.com (142.250.183.238) 56(84) bytes of data.
64 bytes from maa05s23-in-f14.1e100.net (142.250.183.238): icmp_seq=1 ttl=63 time=49.3 ms
64 bytes from maa05s23-in-f14.1e100.net (142.250.183.238): icmp_seq=2 ttl=63 time=50.9 ms
64 bytes from maa05s23-in-f14.1e100.net (142.250.183.238): icmp_seq=3 ttl=63 time=51.2 ms

--- google.com ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2041ms
rtt min/avg/max/mdev = 49.255/50.457/51.207/0.858 ms
[basanta-23473@localhost ~]$ █
```

## LAB 6: Firewall configuration

**View status of firewall and enable it**

```
$ sudo firewall-cmd --state  
$ sudo systemctl start firewalld  
$ sudo systemctl enable firewalld
```

```
[basanta-23473@localhost ~]$ sudo firewall-cmd --state  
[sudo] password for basanta-23473:  
Sorry, try again.  
[sudo] password for basanta-23473:  
running  
[basanta-23473@localhost ~]$ sudo systemctl start firewalld  
[basanta-23473@localhost ~]$ sudo systemctl enable firewalld
```

**Add services to firewall**

```
$ sudo firewall-cmd --permanent --add-service={ssh,http,https}  
$ sudo firewall-cmd --permanent --add-port=8080/tcp  
$ sudo firewall-cmd --reload  
$ sudo firewall-cmd --list-all
```

```
[basanta-23473@localhost ~]$ sudo firewall-cmd --permanent --add-service={ssh,http,https}  
Warning: ALREADY_ENABLED: ssh  
success  
[basanta-23473@localhost ~]$ sudo firewall-cmd --permanent --add-port=8080/ttcp  
Error: INVALID_PROTOCOL: 'ttcp' not in {'tcp'|'udp'|'sctp'|'dccp'}  
[basanta-23473@localhost ~]$ sudo firewall-cmd --permanent --add-port=8080/tcp  
success  
[basanta-23473@localhost ~]$ sudo firewall-cmd --reload  
success  
[basanta-23473@localhost ~]$ sudo firewall-cmd --list-all  
public (active)  
  target: default  
  icmp-block-inversion: no  
  interfaces: enp0s3  
  sources:  
  services: cockpit dhcpcv6-client http https ssh  
  ports: 8080/tcp  
  protocols:  
  forward:  
    forward: yes  
    masquerade: no  
  forward-ports:  
  source-ports:  
  icmp-blocks:  
  rich rules:  
[basanta-23473@localhost ~]$ █
```

### **Remove services from firewall**

```
$ sudo firewall-cmd --permanent --remove-service={ssh,http,https}  
$ sudo firewall-cmd --permanent --remove-port=8080/tcp  
$ sudo firewall-cmd --reload  
$ sudo firewall-cmd --list-all
```

```
[basanta-23473@localhost ~]$ sudo firewall-cmd --permanent --remove-service={ssh,http,https}  
success  
[basanta-23473@localhost ~]$ sudo firewall-cmd --permanent --remove-port=8080/tcp  
success  
[basanta-23473@localhost ~]$ sudo firewall-cmd --reload  
success  
[basanta-23473@localhost ~]$ sudo firewall-cmd --list-all  
public (active)  
  target: default  
  icmp-block-inversion: no  
  interfaces: enp0s3  
  sources:  
  services: cockpit dhcpcv6-client  
  ports:  
  protocols:  
  forward: yes  
  masquerade: no  
  forward-ports:  
  source-ports:  
  icmp-blocks:  
  rich rules:  
[basanta-23473@localhost ~]$ █
```

## LAB 7: DNS configuration

Install bind

```
$ sudo yum install bind bind-utils -y
```

Update named.conf file and add following zone

```
$ sudo vi /etc/named.conf
```

```
zone "basantarai.com.np" IN {  
    type master;  
    file "/var/named/basantarai.com.np.zone";  
};
```

Create a zone in specified path.

```
$ sudo vi /var/named/basantarai.com.np.zone
```

```
[basanta-23473@localhost ~]$ sudo cat /var/named/basantarai.com.np.zone  
[sudo] password for basanta-23473:  
$TTL 86400  
@ IN SOA basantarai.com.np. root.basantarai.com.np. (  
    2011071001 ;Serial  
    3600        ;Refresh  
    1800        ;Retry  
    604800      ;Expire  
    86400       ;Minimum TTL  
)  
@ IN NS basantarai.com.np.  
@ IN NS ns2.basantarai.com.np.  
@ IN A 192.168.1.101  
@ IN A 192.168.1.102  
ns1 IN A 192.168.1.101  
ns2 IN A 192.168.1.102  
  
@ IN A 192.168.1.101  
www IN A 192.168.1.102  
[basanta-23473@localhost ~]$ █
```

Start and enable bind

```
$ systemctl start bind
```

```
$ systemctl enable bind
```

Add firewall ports

```
$ sudo firewall-cmd --permanent --add-services=dns
```

```
$ sudo firewall-cmd --reload
```

Test the DNS server

```
$ nslookup basantarai.com.np
```

```
[basanta-23473@localhost ~]$ nslookup basantarai.com.np
Server:      10.0.2.3
Address:     10.0.2.3#53

Non-authoritative answer:
Name:   basantarai.com.np
Address: 104.21.38.251
Name:   basantarai.com.np
Address: 172.67.141.151
Name:   basantarai.com.np
Address: 2606:4700:3033::ac43:8d97
Name:   basantarai.com.np
Address: 2606:4700:3032::6815:26fb
```

# LAB 8: DHCP Configuration

## Installation

```
$ sudo dnf install dhcp-server
```

```
[basanta-23473@localhost ~]$ sudo dnf install dhcp-server -y
Last metadata expiration check: 5:24:36 ago on Mon 10 Jun 2024 02:57:53 PM +054
5.
Dependencies resolved.
=====
 Package           Architecture Version          Repository      Size
=====
Installing:
  dhcp-server       x86_64        12:4.4.2-19.b1.el9    baseos        1.2 M
Installing dependencies:
  dhcp-common      noarch        12:4.4.2-19.b1.el9    baseos        129 k

Transaction Summary
=====
Install 2 Packages

Total download size: 1.3 M
Installed size: 4.2 M
```

## Configure dhcp server

```
$ sudo vi /etc/dhcp/dhcpd.conf
```

```
[basanta-23473@localhost ~]$ sudo cat /etc/dhcp/dhcpd.conf
#
# DHCP Server Configuration file.
#   see /usr/share/doc/dhcp-server/dhcpd.conf.example
#   see dhcpd.conf(5) man page
#
# create new

# specify domain name

option domain-name      "basanta.rai";
# specify DNS server's hostname or IP address

option domain-name-servers      dlp.basanta.rai;
# default lease time

default-lease-time 600;
# max lease time

max-lease-time 7200;
# this DHCP server to be declared valid

authoritative;
# specify network address and subnetmask

subnet 10.0.0.0 netmask 255.255.255.0 {
    # specify the range of lease IP address
    range dynamic-bootp 10.0.0.200 10.0.0.254;
    # specify broadcast address
    option broadcast-address 10.0.0.255;
    # specify gateway
```

## Check status of dhcp server

```
$ sudo systemctl status dhcpcd
```

```
● dhcpcd.service - DHCPv4 Server Daemon
   Loaded: loaded (/usr/lib/systemd/system/dhcpcd.service; enabled; preset: disabled)
   Active: active (running) since Sun 2024-06-09 20:44:12 +0545; 1min 55s ago
     Docs: man:dhcpcd(8)
           man:dhcpcd.conf(5)
 Main PID: 3834 (dhcpcd)
   Status: "Dispatching packets..."
    Tasks: 1 (limit: 4316)
   Memory: 4.6M
      CPU: 15ms
     CGroup: /system.slice/dhcpcd.service
             └─3834 /usr/sbin/dhcpcd -f -cf /etc/dhcp/dhcpcd.conf -user dhcpcd -group dhcpcd --no-pid ens160

Jun 09 20:44:12 2400-1A00-B020.ip6.wlink.com.np dhcpcd[3834]: Database file: /var/lib/dhcpcd/dhcpcd.leases
Jun 09 20:44:12 2400-1A00-B020.ip6.wlink.com.np dhcpcd[3834]: PID file: /var/run/dhcpcd.pid
Jun 09 20:44:12 2400-1A00-B020.ip6.wlink.com.np dhcpcd[3834]: Source compiled to use binary-leases
Jun 09 20:44:12 2400-1A00-B020.ip6.wlink.com.np dhcpcd[3834]: Wrote 0 leases to leases file.
Jun 09 20:44:12 2400-1A00-B020.ip6.wlink.com.np dhcpcd[3834]: Listening on LPF/ens160/00:0c:29:c2:6c:93/192.168.11.0/>
Jun 09 20:44:12 2400-1A00-B020.ip6.wlink.com.np dhcpcd[3834]: Sending on  LPF/ens160/00:0c:29:c2:6c:93/192.168.11.0/>
Jun 09 20:44:12 2400-1A00-B020.ip6.wlink.com.np dhcpcd[3834]: Sending on  Socket/fallback/fallback-net
Jun 09 20:44:12 2400-1A00-B020.ip6.wlink.com.np dhcpcd[3834]: Server starting service.
Jun 09 20:44:12 2400-1A00-B020.ip6.wlink.com.np systemd[1]: Started DHCPv4 Server Daemon.
Jun 09 20:45:00 2400-1A00-B020.ip6.wlink.com.np dhcpcd[3834]: DHCPREQUEST for 192.168.11.75 from a4:fc:77:19:f4:71 via ens160
```

## Configure firewall

```
$ sudo firewall-cmd --add-service=dhcp --permanent
```

```
$ sudo firewall-cmd --reload
```

```
[basanta-23473@localhost ~]$ firewall-cmd --add-service=dhcp
success
[basanta-23473@localhost ~]$ firewall-cmd --runtime-no-permanent
usage: 'firewall-cmd --help' for usage information or see firewall-cmd(1) man page
firewall-cmd: error: unrecognized arguments: --runtime-no-permanent
[basanta-23473@localhost ~]$ firewall-cmd --runtime-to-permanent
success
```

## Verify dhcp functionality

```
Jun  9 20:44:12 localhost dhcpcd[3834]: Wrote 0 leases to leases file.
Jun  9 20:44:12 localhost dhcpcd[3834]: Listening on LPF/ens160/00:0c:29:c2:6c:93/192.168.11.0/24
Jun  9 20:44:12 localhost dhcpcd[3834]: Sending on  LPF/ens160/00:0c:29:c2:6c:93/192.168.11.0/24
Jun  9 20:44:12 localhost dhcpcd[3834]: Sending on  Socket/fallback/fallback-net
Jun  9 20:44:12 localhost dhcpcd[3834]: Server starting service.
Jun  9 20:44:12 localhost systemd[1]: Started DHCPv4 Server Daemon.
Jun  9 20:44:12 localhost systemd[1]: Reloading.
Jun  9 20:44:34 localhost systemd-rc-local-generator: /etc/rc.d/rc.local is not marked executable, skipping.
Jun  9 20:45:00 localhost dhcpcd[3834]: DHCPREQUEST for 192.168.11.75 from a4:fc:77:19:f4:71 via ens160: unknown lease
192.168.11.75.
Jun  9 20:47:57 localhost dhcpcd[3834]: DHCPREQUEST for 192.168.11.75 from a4:fc:77:19:f4:71 via ens160: unknown lease
192.168.11.75.
```

# LAB 9: Web and Proxy server configuration

## Web server configuration

### Install apache

```
$ sudo dnf install httpd -y
```

```
[basanta-23473@localhost ~]$ sudo dnf install httpd -y
[sudo] password for basanta-23473:
Last metadata expiration check: 5:43:19 ago on Mon 10 Jun 2024 02:57:53 PM +0545
.
Dependencies resolved.
=====
 Package           Architecture Version      Repository   Size
 =====
 Installing:
 httpd             x86_64       2.4.57-8.el9    appstream   48 k
 Installing dependencies:
 apr                x86_64       1.7.0-12.el9    appstream   123 k
 apr-util          x86_64       1.6.1-23.el9    appstream   95 k
 apr-util-bdb      x86_64       1.6.1-23.el9    appstream   13 k
 centos-logos-httpd noarch     90.4-1.el9      appstream   252 k
 httpd-core        x86_64       2.4.57-8.el9    appstream   1.5 M
 httpd-filesystem  noarch     2.4.57-8.el9    appstream   13 k
 httpd-tools        x86_64       2.4.57-8.el9    appstream   83 k
 Installing weak dependencies:
 apr-util-openssl  x86_64       1.6.1-23.el9    appstream   15 k
 mod_http2          x86_64       2.0.26-2.el9    appstream   163 k
 mod_lua            x86_64       2.4.57-8.el9    appstream   60 k
```

### Start and enable http server

```
$ sudo systemctl start httpd
```

```
$ sudo systemctl status httpd
```

```
[basanta-23473@localhost ~]$ sudo systemctl start httpd
[basanta-23473@localhost ~]$ sudo systemctl status httpd
● httpd.service - The Apache HTTP Server
    Loaded: loaded (/usr/lib/systemd/system/httpd.service; enabled; preset: disabled)
    Active: active (running) since Mon 2024-06-10 20:41:34 +0545; 7s ago
      Docs: man:httpd.service(8)
   Main PID: 9221 (httpd)
     Status: "Started, listening on: port 80"
        Tasks: 177 (limit: 10962)
       Memory: 24.0M
         CPU: 45ms
      CGroup: /system.slice/httpd.service
              └─9221 /usr/sbin/httpd -DFOREGROUND
                  ├─9222 /usr/sbin/httpd -DFOREGROUND
                  ├─9223 /usr/sbin/httpd -DFOREGROUND
                  ├─9224 /usr/sbin/httpd -DFOREGROUND
                  ├─9225 /usr/sbin/httpd -DFOREGROUND
```

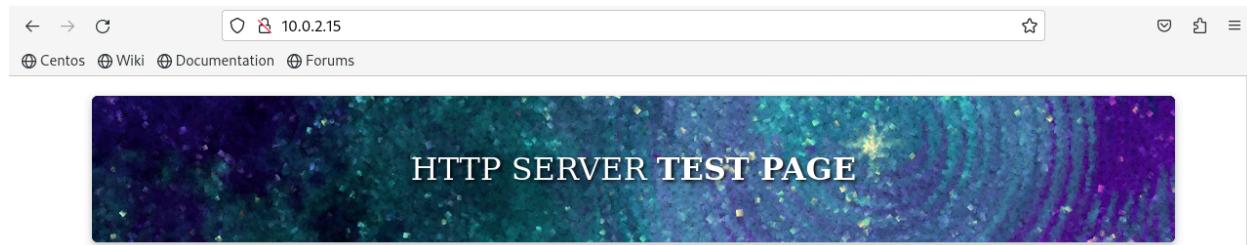
## Configure firewall

```
$ sudo firewall-cmd --add-service=http --permanent
```

```
$ sudo firewall-cmd --reload
```

```
[basanta-23473@localhost ~]$  
[basanta-23473@localhost ~]$ sudo firewall-cmd --add-service=http --permanent  
success  
[basanta-23473@localhost ~]$ sudo firewall-cmd --reload  
success
```

## Verify http server.



This page is used to test the proper operation of the HTTP server after it has been installed. If you can read this page it means that this site is working properly. This server is powered by [CentOS](#).

### If you are a member of the general public:

The website you just visited is either experiencing problems or is undergoing routine maintenance.

If you would like to let the administrators of this website know that you've seen this page instead of the page you expected, you should send them e-mail. In general, mail sent to the name "webmaster" and directed to the website's domain should reach the appropriate person.

For example, if you experienced problems while visiting

### If you are the website administrator:

You may now add content to the webroot directory. Note that until you do so, people visiting your website will see this page, and not your content.

For systems using the Apache HTTP Server: You may now add content to the directory `/var/www/html/`. Note that until you do so, people visiting your website will see this page, and not your content. To prevent this page from ever being used, follow the instructions in the file `/etc/httpd/conf.d/welcome.conf`.

For systems using NGINX: You should now put your content in a location of your choice and edit the `root` configuration directive in

## Proxy server configuration

### Install squid

```
$ sudo dnf install squid
```

```
[basanta-23473@localhost ~]$ sudo dnf install squid -y
Last metadata expiration check: 5:50:51 ago on Mon 10 Jun 2024 02:57:53 PM +0545
.
Dependencies resolved.
=====
 Package           Architecture Version      Repository    Size
 =====
 Installing:
 squid             x86_64       7:5.5-13.el9   appstream   3.9 M
 Installing dependencies:
 libcap            x86_64       1.0.1-10.el9   appstream   26 k
 perl-Digest-SHA  x86_64       1:6.02-461.el9 appstream   62 k
 perl-English     noarch      1.11-481.el9   appstream   13 k
 Transaction Summary
```

### Enable and start squid

```
$ sudo systemctl enable squid
```

```
$ sudo systemctl start squid
```

```
[basanta-23473@localhost ~]$ sudo systemctl enable squid
Created symlink /etc/systemd/system/multi-user.target.wants/squid.service → /usr
/lib/systemd/system/squid.service.
[basanta-23473@localhost ~]$ sudo systemctl start squid
[basanta-23473@localhost ~]$ █
```

### Configure firewall

```
$ sudo firewall-cmd --add-service=squid --permanent
```

```
$ sudo firewall-cmd --reload
```

```
[basanta-23473@localhost ~]$ sudo firewall-cmd --add-service=squid --permanent
success
[basanta-23473@localhost ~]$ sudo firewall-cmd --reload
success
[basanta-23473@localhost ~]$ █
```

## LAB 10: Basic Mail server configuration and troubleshooting

### Install sendmail

```
$ sudo yum install sendmail-cf m4 -y
```

```
[basanta-23473@localhost ~]$ sudo yum install sendmail-cf m4 -y
[sudo] password for basanta-23473:
Last metadata expiration check: 0:07:33 ago on Mon 10 Jun 2024 09:38:28 PM +0545
.
Dependencies resolved.
=====
 Package           Architecture Version      Repository    Size
=====
Installing:
 m4                  x86_64       1.4.19-1.el9   appstream    300 k
 sendmail-cf        noarch       8.16.1-11.el9  appstream    190 k
Installing dependencies:
 cyrus-sasl         x86_64       2.1.27-21.el9  baseos       73 k
 procmail          x86_64       3.22-56.el9   appstream    184 k
```

### Set your smtp hostname: uncomment dnl at the beginning of the line no 26

```
[basanta-23473@localhost ~]$ vi /etc/mail/sendmail.mc
[basanta-23473@localhost ~]$ sudo vi /etc/mail/sendmail.mc
[basanta-23473@localhost ~]$ m4 /etc/mail/sendmail.mc > /etc/mail/sendmail.cf
```

### Update sendmail configuration and restart the service

```
$ m4 /etc/mail/sendmail.mc > /etc/mail/sendmail.cf
```

```
$ service sendmail restart
```

```
[basanta-23473@localhost ~]$ sudo su
[root@localhost basanta-23473]# m4 /etc/mail/sendmail.mc > /etc/mail/sendmail.cf
[root@localhost basanta-23473]# service sendmail restart
Redirecting to /bin/systemctl restart sendmail.service
[root@localhost basanta-23473]# █
```

### Test mail server

```
$ echo "Hello, world!" | sendmail -v test@yopmail.com
```

```
[basanta-23473@localhost ~]$ sudo m4 /etc/mail/sendmail.mc > /etc/mail/sendmail.cf
bash: /etc/mail/sendmail.cf: Permission denied
[basanta-23473@localhost ~]$ udo su
bash: udo: command not found...
[basanta-23473@localhost ~]$ ^C
[basanta-23473@localhost ~]$ sudo su
[root@localhost basanta-23473]# m4 /etc/mail/sendmail.mc > /etc/mail/sendmail.cf
[root@localhost basanta-23473]# service sendmail restart
Redirecting to /bin/systemctl restart sendmail.service
[root@localhost basanta-23473]# echo "Hello, world" | sendmail -v test@yopmail.com
test@yopmail.com... Connecting to [127.0.0.1] via relay...
220 localhost.localdomain ESMTP Sendmail 8.16.1/8.16.1; Mon, 10 Jun 2024 21:56:48 +0545
>>> EHLO localhost.localdomain
250-localhost.localdomain Hello localhost [127.0.0.1], pleased to meet you
250-ENHANCEDSTATUSCODES
250-PIPELINING
250-8BITMIME
250-SIZE
250-DSN
250-ETRN
250-AUTH GSSAPI
250-STARTTLS
250-DELIVERBY
250 HELP
>>> STARTTLS
220 2.0.0 Ready to start TLS
>>> EHLO localhost.localdomain
250-localhost.localdomain Hello localhost [127.0.0.1], pleased to meet you
250-ENHANCEDSTATUSCODES
250-PIPELINING
250-8BITMIME
250-SIZE
250-DSN
250-ETRN
250-AUTH GSSAPI
250-DELIVERBY
250 HELP
>>> MAIL From:<basanta-23473@localhost.localdomain> SIZE=13 AUTH=basanta-23473@localhost.localdomain
250 2.1.0 <basanta-23473@localhost.localdomain>... Sender ok
>>> RCPT To:<test@yopmail.com>
>>> DATA
250 2.1.5 <test@yopmail.com>... Recipient ok
354 Enter mail, end with "." on a line by itself
>>> .
250 2.0.0 45AGBmYa017798 Message accepted for delivery
test@yopmail.com... Sent (45AGBmYa017798 Message accepted for delivery)
Closing connection to [127.0.0.1]
```

# LAB 11: SAMBA, CUPS and FTP configuration and Troubleshooting

## Setting up CUPS (Common UNIX Printing System)

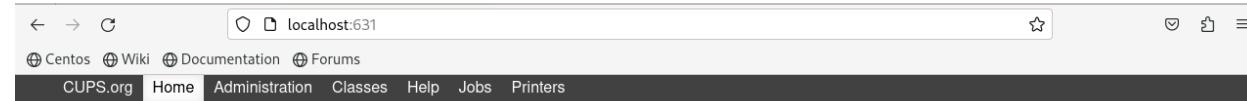
```
$ sudo yum install cups  
$ sudo systemctl enable cups  
$ sudo systemctl start cups  
$ sudo systemctl status cups
```

```
[root@localhost basanta-23473]# yum install cups  
Last metadata expiration check: 0:30:10 ago on Mon 10 Jun 2024 09:38:28 PM +0545.  
Package cups-1:2.3.3op2-26.el9.x86_64 is already installed.  
Dependencies resolved.  
Nothing to do.  
Complete!  
You have new mail in /var/spool/mail/basanta-23473  
[root@localhost basanta-23473]# systemctl enable cups  
[root@localhost basanta-23473]# systemctl start cups  
[root@localhost basanta-23473]# systemctl status cups  
● cups.service - CUPS Scheduler  
   Loaded: loaded (/usr/lib/systemd/system/cups.service; enabled; preset: enabled)  
   Drop-In: /usr/lib/systemd/system/cups.service.d  
             └─server.conf  
     Active: active (running) since Mon 2024-06-10 19:43:36 +0545; 2h 25min ago  
   TriggeredBy: ● cups.socket  
               ● cups.path  
     Docs: man:cupsd(8)  
   Main PID: 844 (cupsd)  
     Status: "Scheduler is running..."  
       Tasks: 1 (limit: 10962)  
      Memory: 1.0M  
        CPU: 22ms  
      CGroup: /system.slice/cups.service  
              └─844 /usr/sbin/cupsd -l  
  
Jun 10 19:43:36 localhost.localdomain systemd[1]: Starting CUPS Scheduler...  
Jun 10 19:43:36 localhost.localdomain systemd[1]: Started CUPS Scheduler.  
Jun 10 19:43:39 localhost.localdomain cupsd[844]: REQUEST localhost - - "POST / HTTP/1.1" 200 359 Create-Printer-Subscriptions successful-ok  
Jun 10 19:43:57 localhost.localdomain cupsd[844]: REQUEST localhost - - "POST / HTTP/1.1" 200 369 Create-Printer-Subscriptions successful-ok  
Jun 10 20:42:18 localhost.localdomain cupsd[844]: REQUEST localhost - - "POST / HTTP/1.1" 200 192 Renew-Subscription successful-ok  
Jun 10 21:40:38 localhost.localdomain cupsd[844]: REQUEST localhost - - "POST / HTTP/1.1" 200 192 Renew-Subscription successful-ok  
[root@localhost basanta-23473]#
```

## Setup the firewall

```
[root@localhost basanta-23473]# firewall-cmd --zone=public --add-port=631/tcp --permanent  
success  
[root@localhost basanta-23473]# firewall-cmd --reload  
success  
[root@localhost basanta-23473]#
```

## Access the CUPS web interface at <http://localhost:631>



### CUPS 2.3.3op2

CUPS is the standards-based, open source printing system developed by [Apple Inc.](#) for macOS® and other UNIX®-like operating systems.

#### CUPS for Users

[Overview of CUPS](#)  
[Command-Line Printing and Options](#)  
[User Forum](#)

#### CUPS for Administrators

[Adding Printers and Classes](#)  
[Managing Operation Policies](#)  
[Using Network Printers](#)  
[Firewalls](#)  
[cupsd.conf Reference](#)

#### CUPS for Developers

[CUPS Programming Manual](#)  
[Filter and Backend Programming](#)  
[Developer Forum](#)

**Configure your printers and perform your required printing tasks.**

## Configuring FTP

**\$ sudo yum install vsftpd -y**

```
[root@localhost basanta-23473]# sudo yum install vsftpd -y
Last metadata expiration check: 0:38:46 ago on Mon 10 Jun 2024 09:38:28 PM +0545.
Dependencies resolved.
=====
=====
  Package           Architecture      Version       Repository      Size
=====
=====
Installing:
  vsftpd           x86_64          3.0.5-5     appstream      168 k
.e19

Transaction Summary
=====
=====
Install 1 Package
```

## Start and enable vsftpd

**\$ sudo systemctl enable vsftpd**

**\$ sudo systemctl start vsftpd**

**\$ sudo systemctl status vsftpd**

```
[root@localhost basanta-23473]# sudo systemctl enable vsftpd
Created symlink /etc/systemd/system/multi-user.target.wants/vsftpd.service → /usr/lib/systemd/system/vsftpd.service.
[root@localhost basanta-23473]# sudo systemctl start vsftpd
[root@localhost basanta-23473]# sudo systemctl status vsftpd
sudo: systemctl: command not found
[root@localhost basanta-23473]# sudo systemctl status vsftpd
● vsftpd.service - Vsftpd ftp daemon
   Loaded: loaded (/usr/lib/systemd/system/vsftpd.service; enabled; preset: disabled)
   Active: active (running) since Mon 2024-06-10 22:20:49 +0545; 3min 50s ago
     Process: 19348 ExecStart=/usr/sbin/vsftpd /etc/vsftpd/vsftpd.conf (code=exited, status=0)
    Main PID: 19349 (vsftpd)
      Tasks: 1 (limit: 10962)
     Memory: 916.0K
        CPU: 2ms
       CGroup: /system.slice/vsftpd.service
               └─19349 /usr/sbin/vsftpd /etc/vsftpd/vsftpd.conf

Jun 10 22:20:49 localhost.localdomain systemd[1]: Starting Vsftpd ftp daemon...
Jun 10 22:20:49 localhost.localdomain systemd[1]: Started Vsftpd ftp daemon.
[root@localhost basanta-23473]# █
```

## Configure vsftpd

**\$ sudo vi /etc/vsftpd/vsftpd.conf**

```

# Example config file /etc/vsftpd/vsftpd.conf
#
# The default compiled in settings are fairly paranoid. This sample file
# loosens things up a bit, to make the ftp daemon more usable.
# Please see vsftpd.conf.5 for all compiled in defaults.
#
# READ THIS: This example file is NOT an exhaustive list of vsftpd options.
# Please read the vsftpd.conf.5 manual page to get a full idea of vsftpd's
# capabilities.
#
# Allow anonymous FTP? (Beware - allowed by default if you comment this out).
anonymous_enable=YES
#
# Uncomment this to allow local users to log in.
local_enable=YES
#
# Uncomment this to enable any form of FTP write command.
write_enable=YES
#
# Default umask for local users is 077. You may wish to change this to 022,
# if your users expect that (022 is used by most other ftptd's)
local_umask=022
#
# Uncomment this to allow the anonymous FTP user to upload files. This only
# has an effect if the above global write enable is activated. Also, you will
# obviously need to create a directory writable by the FTP user.
# When SELinux is enforcing check for SE bool allow_ftpd_anon_write, allow_ftpd_full_access
anon_upload_enable=YES
#
# Uncomment this if you want the anonymous FTP user to be able to create
# new directories.
#anon_mkdir_write_enable=YES

```

## Configure firewall

```

$ sudo firewall-cmd --add-service=ftp --permanent
$ sudo firewall-cmd --add-port=6969-6970/tcp --permanent
$ sudo firewall-cmd --reload

```

```

Jun 10 22:20:49 localhost.localdomain systemd[1]: Starting Vsftpd ftp daemon...
Jun 10 22:20:49 localhost.localdomain systemd[1]: Started Vsftpd ftp daemon.
[root@localhost basanta-23473]# sudo firewall-cmd --add-service=ftp --permanent
success
[root@localhost basanta-23473]# sudo firewall-cmd --add-port=6969-6970/tcp --permanent
success
[root@localhost basanta-23473]# sudo firewall-cmd --reload
success
[root@localhost basanta-23473]# 

```

## Add ftp user

```

$ sudo useradd ftpuser
$ sudo passwd ftpuser

```

## Connect to the ftp server

```

root@User:/# ftp 172.23.221.3
Connected to 172.23.221.3.
220 (vsFTPd 3.0.5)
Name (172.23.221.3:root): ftpuser
331 Please specify the password.
Password:
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> |

```