Charchar, Alexandre (1784011)

NET-45

420-635-AB-Network Installation and Administration I

Assignment 2

Handed to

MR. Antoine Thome

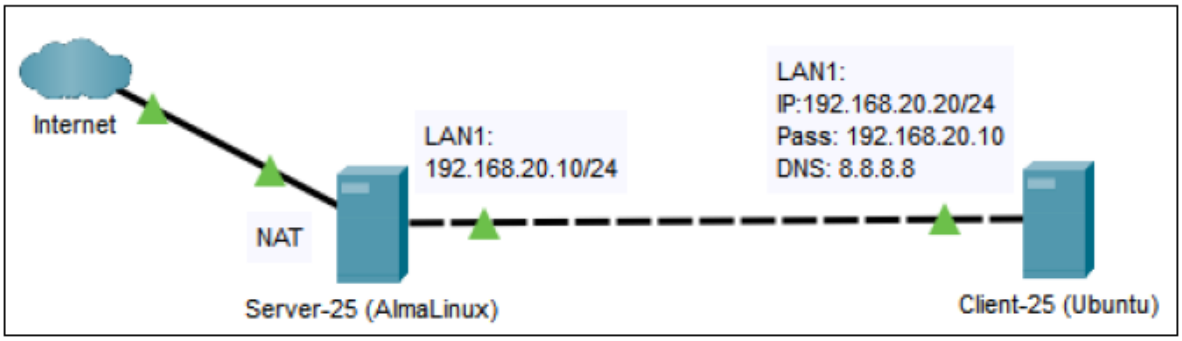
Date

2025-04-10

Introduction – Deploying Real-World Network Services with Linux 4
Assignment 2 5
Part 1: 5
DNS Configuration with BIND (AlmaLinux Server) 5
On AlmaLinux Server: 5
1. Install BIND on AlmaLinux 5
2. Add the new alias to the /etc/hosts file 6
3. Configure BIND to Listen on Specific IP and Allow Queries 7
4. Check BIND Configuration Syntax 8
5. Configure the Forward Master DNS Zone 8
6. Create the Forward Zone File 9
7. Check Forward Zone File Syntax 10
8. Set Correct Ownership on Zone File 10
9. Start and Enable the DNS Server 11
10. Configure the Reverse Master DNS Zone 12
11. Create the Reverse Zone File 13
12. Check Reverse Zone File Syntax 14
13. Set Correct Ownership on Reverse Zone File 14
14. Restart and Reload BIND 15
DNS Client Configuration 16
On Ubuntu Client: 16
1. Disable Automatic DNS from NetworkManager 16
2. Manually Set DNS Servers 17
3. Test the DNS Server 18
Part 2: 22
DHCP Server Configuration (AlmaLinux & Ubuntu) 22
On AlmaLinux Server: 22
1. Install the DHCP Server 22
2. Configure the DHCP Server 22

3. Check Configuration Syntax 23
4. Enable and Start the DHCP Service 24
On Ubuntu Client: 24
5. Configure the Network to Use DHCP 24
6. Verify DHCP Lease 25
7. Test Connectivity 26
On AlmaLinux Server: 27
8. Check Active DHCP Leases 27
Part 3: 27
FTP Server Configuration with vsftpd (AlmaLinux & Ubuntu) 27
On AlmaLinux Server: 27
1. Install the FTP Server 27
2. Configure vsftpd for Anonymous Access 28
3. Configure the Firewall for FTP Access 29
4. Set Correct Ownership for the FTP Public Directory 29
5. Set SELinux Permissions to Allow Uploads 30
6. Allow Anonymous Uploads 30
7. Enable and Start the FTP Service 31
On Ubuntu Client: 31
8. Create a Test File for Upload 31
9. Connect to the FTP Server Anonymously 32
10. Upload the Test File 32
On AlmaLinux Server: 33
11. Verify the File Was Uploaded 33
12. Verify FTP Server Is Listening 34
On Ubuntu Client: 35
13. Test with FileZilla 35
On AlmaLinux Server: 38
14. Verify the changes on the Server 38

Conclusion 38



Introduction – Deploying Real-World Network Services with Linux

In this assignment, we go beyond basic configuration and step into the world of real-world network service deployment. Building on the foundation set in Assignment 1, we now install and configure three essential services on a Linux server: DNS, DHCP, and FTP. These services are critical for any functioning network—handling everything from hostname resolution and IP address assignment to file sharing between systems.

Finally, we deploy an FTP server with anonymous upload capabilities, simulating a public-facing file-sharing service. While many modern networks now rely on SFTP or cloud-based storage, FTP remains widely used in legacy systems and embedded environments. Configuring it helps us understand how to manage file permissions, control user access, and enable secure data transfer—skills that remain highly relevant in many IT environments.

This lab mirrors the kind of hands-on work done by professionals in roles such as IT Support Specialists, System Administrators, and Network Administrators. Learning to deploy and manage services like BIND, DHCPd, and vsFTPd doesn't just deepen our understanding—it prepares us for the demands of real IT environments.

The skills we develop here directly contribute to industry certifications like **CompTIA Linux+** and **Red Hat Certified System Administrator (RHCSA)**, both of which are recognized stepping stones into IT careers. By completing this lab, we're not only practicing commands—we're laying the groundwork for professional readiness and future job opportunities in Linux-based system administration.

Assignment 2

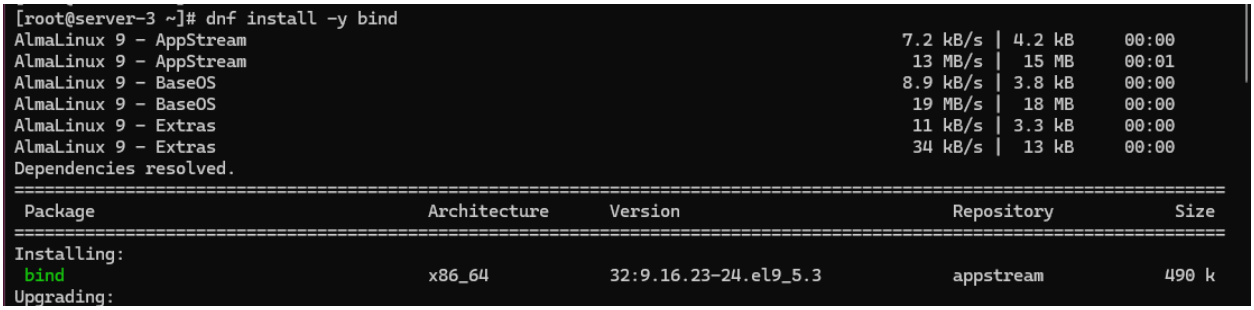
Part 1:

DNS Configuration with BIND (AlmaLinux Server)

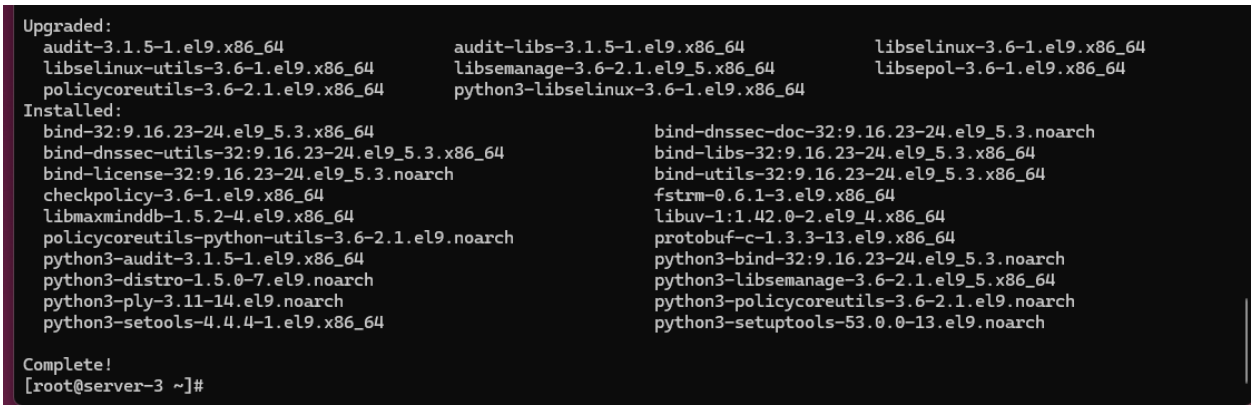
On AlmaLinux Server:

1. Install BIND on AlmaLinux

dnf install -y bind



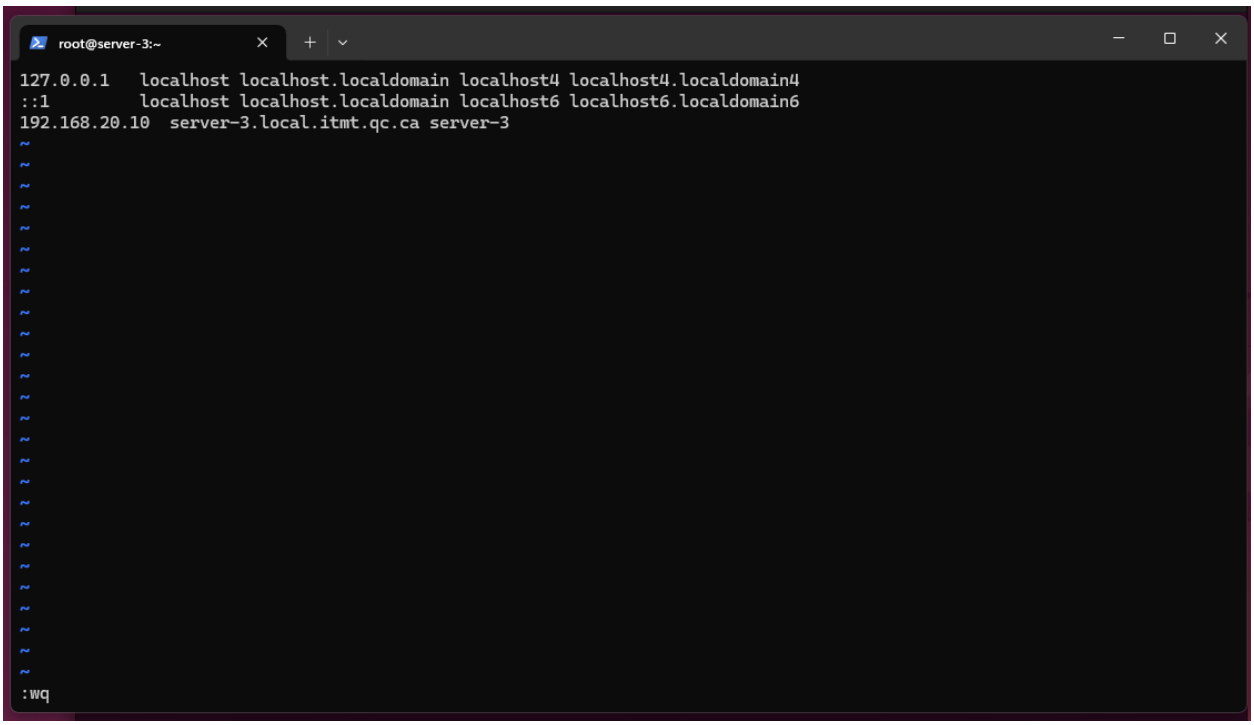
```
[root@server-3 ~]# dnf install -y bind
AlmaLinux 9 - AppStream                                                    7.2 kB/s | 4.2 kB     00:00
AlmaLinux 9 - AppStream                                                     13 MB/s |  15 MB     00:01
AlmaLinux 9 - BaseOS                                                       8.9 kB/s | 3.8 kB     00:00
AlmaLinux 9 - BaseOS                                                        19 MB/s |  18 MB     00:00
AlmaLinux 9 - Extras                                                        11 kB/s | 3.3 kB     00:00
AlmaLinux 9 - Extras                                                        34 kB/s |  13 kB     00:00
Dependencies resolved.
==========================================================================================================
 Package                                Architecture      Version                          Repository            Size
==========================================================================================================
Installing:
 bind                                   x86_64            32:9.16.23-24.el9_5.3            appstream            490 k
Upgrading:
```



```
Upgraded:
  audit-3.1.5-1.el9.x86_64                audit-libs-3.1.5-1.el9.x86_64            libselinux-3.6-1.el9.x86_64
  libselinux-utils-3.6-1.el9.x86_64       libsemanage-3.6-2.1.el9_5.x86_64         libsepol-3.6-1.el9.x86_64
  policycoreutils-3.6-2.1.el9.x86_64      python3-libselinux-3.6-1.el9.x86_64
Installed:
  bind-32:9.16.23-24.el9_5.3.x86_64                          bind-dnssec-doc-32:9.16.23-24.el9_5.3.noarch
  bind-dnssec-utils-32:9.16.23-24.el9_5.3.x86_64             bind-libs-32:9.16.23-24.el9_5.3.x86_64
  bind-license-32:9.16.23-24.el9_5.3.noarch                  bind-utils-32:9.16.23-24.el9_5.3.x86_64
  checkpolicy-3.6-1.el9.x86_64                               fstrm-0.6.1-3.el9.x86_64
  libmaxminddb-1.5.2-4.el9.x86_64                            libuv-1:1.42.0-2.el9_4.x86_64
  policycoreutils-python-utils-3.6-2.1.el9.noarch            protobuf-c-1.3.3-13.el9.x86_64
  python3-audit-3.1.5-1.el9.x86_64                           python3-bind-32:9.16.23-24.el9_5.3.noarch
  python3-distro-1.5.0-7.el9.noarch                          python3-libsemanage-3.6-2.1.el9_5.x86_64
  python3-ply-3.11-14.el9.noarch                             python3-policycoreutils-3.6-2.1.el9.noarch
  python3-setools-4.4.4-1.el9.x86_64                         python3-setuptools-53.0.0-13.el9.noarch

Complete!
[root@server-3 ~]#
```

2. Add the new alias to the /etc/hosts file

```
[root@server-3 ~]# vim /etc/hosts
[root@server-3 ~]#
```



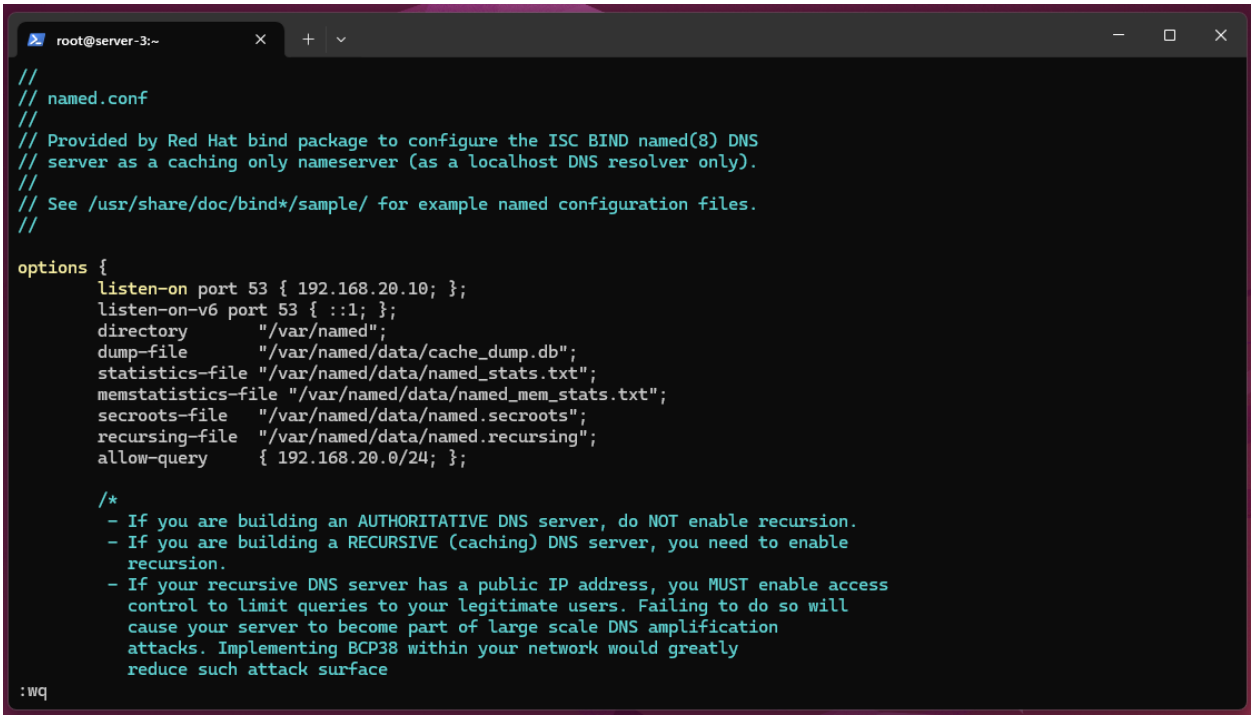
3. Configure BIND to Listen on Specific IP and Allow Queries

Edit the configuration file:

```
vim /etc/named.conf
```

Under the options section, add or modify:

```
listen-on port 53 { 192.168.20.10; };
allow-query { 192.168.20.0/24; };
```



4. Check BIND Configuration Syntax

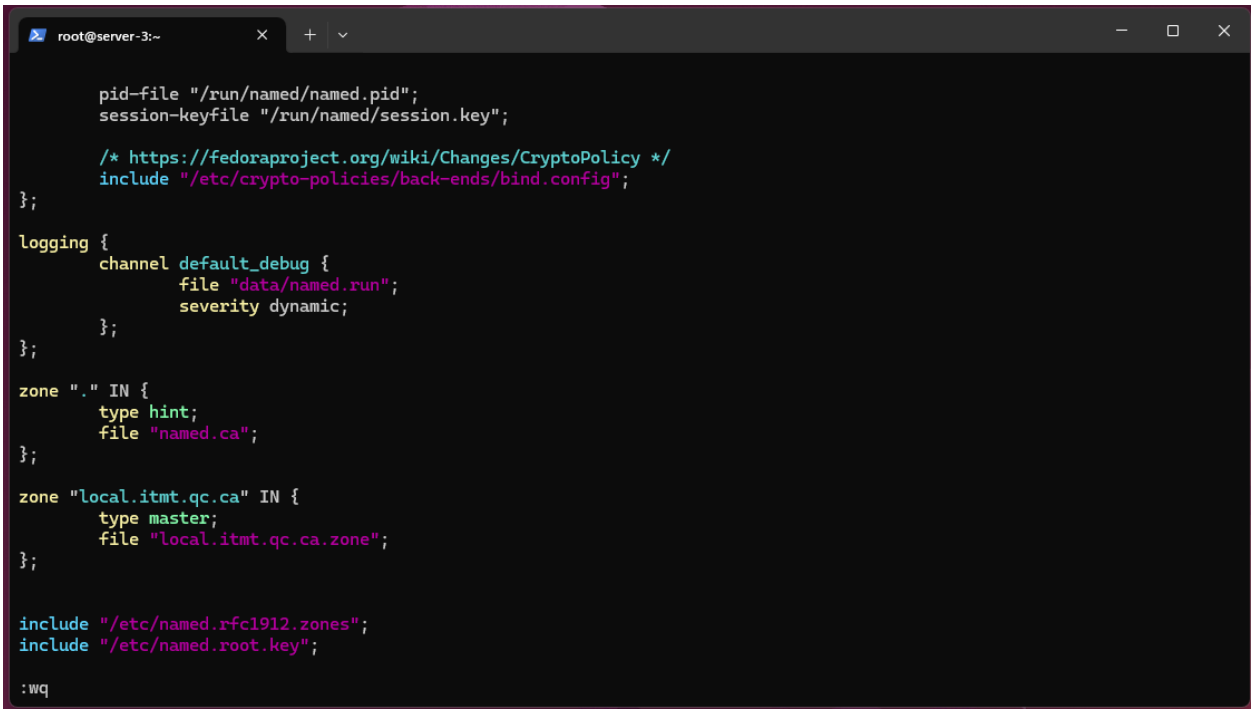
named-checkconf

(*No output means the syntax is correct*)

5. Configure the Forward Master DNS Zone

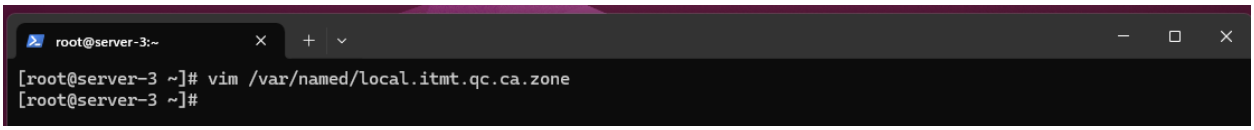
In /etc/named.conf, add the following below the existing zones:

```
zone "local.itmt.qc.ca" IN {
   type master;
   file "local.itmt.qc.ca.zone";
};
```



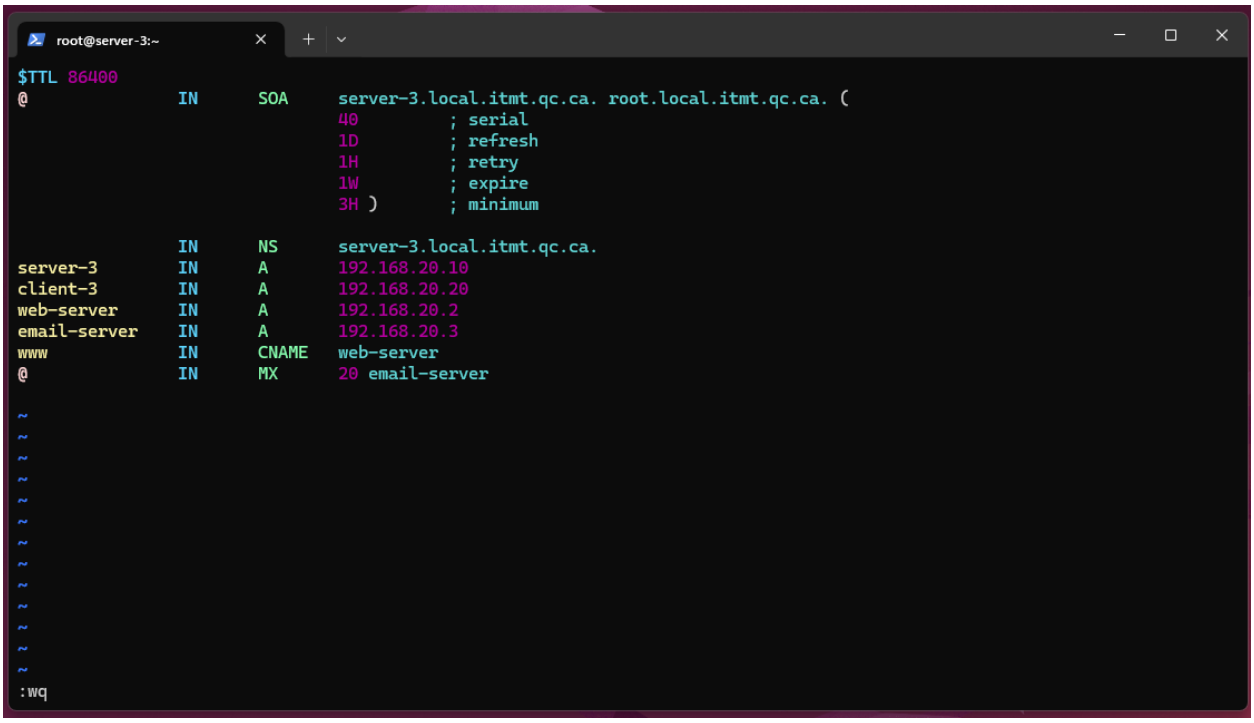
6. Create the Forward Zone File

vim /var/named/local.itmt.qc.ca.zone



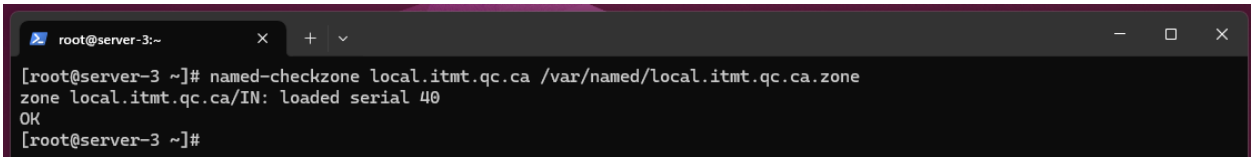
Add the following content:

```
$TTL 86400
@ IN SOA server-3.local.itmt.qc.ca. root.local.itmt.qc.ca. (
    40 ; serial
    1D ; refresh
    1H ; retry
    1W ; expire
    3H ) ; minimum

            IN NS server-3.local.itmt.qc.ca.
server-3    IN A 192.168.20.10
client-3    IN A 192.168.20.20
web-server IN A 192.168.20.2
email-server IN A 192.168.20.3
www          IN CNAME web-server
@            IN MX 20 email-server
```



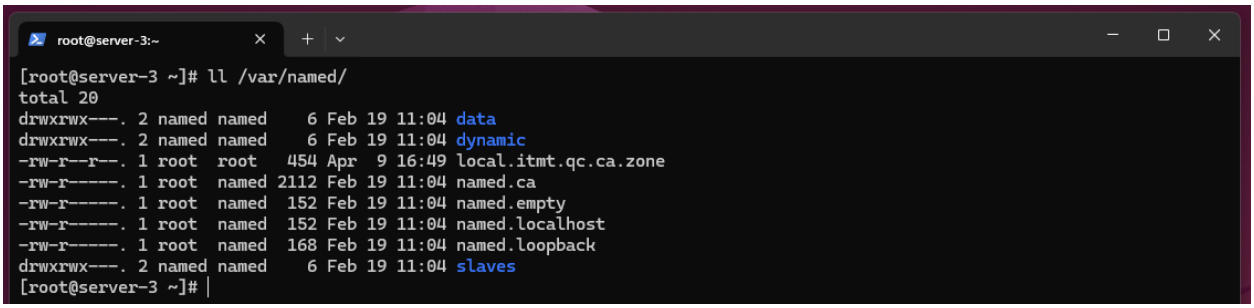
7. Check Forward Zone File Syntax

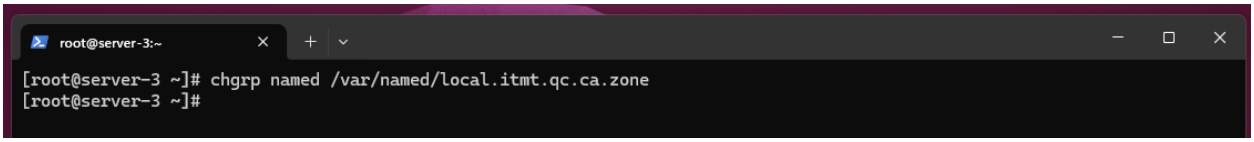
named-checkzone local.itmt.qc.ca /var/named/local.itmt.qc.ca.zone

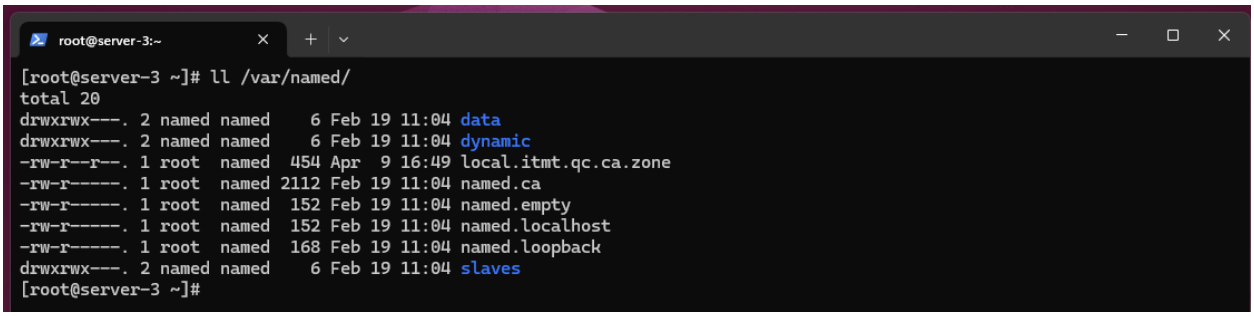


8. Set Correct Ownership on Zone File

chgrp named /var/named/local.itmt.qc.ca.zone



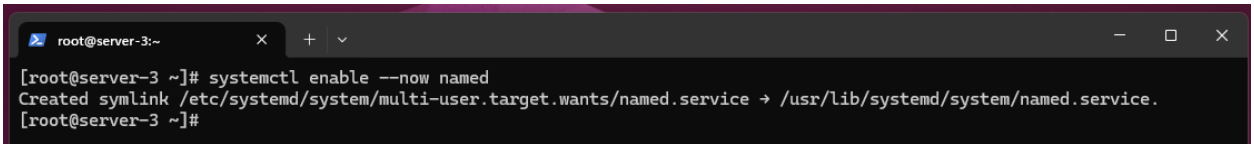


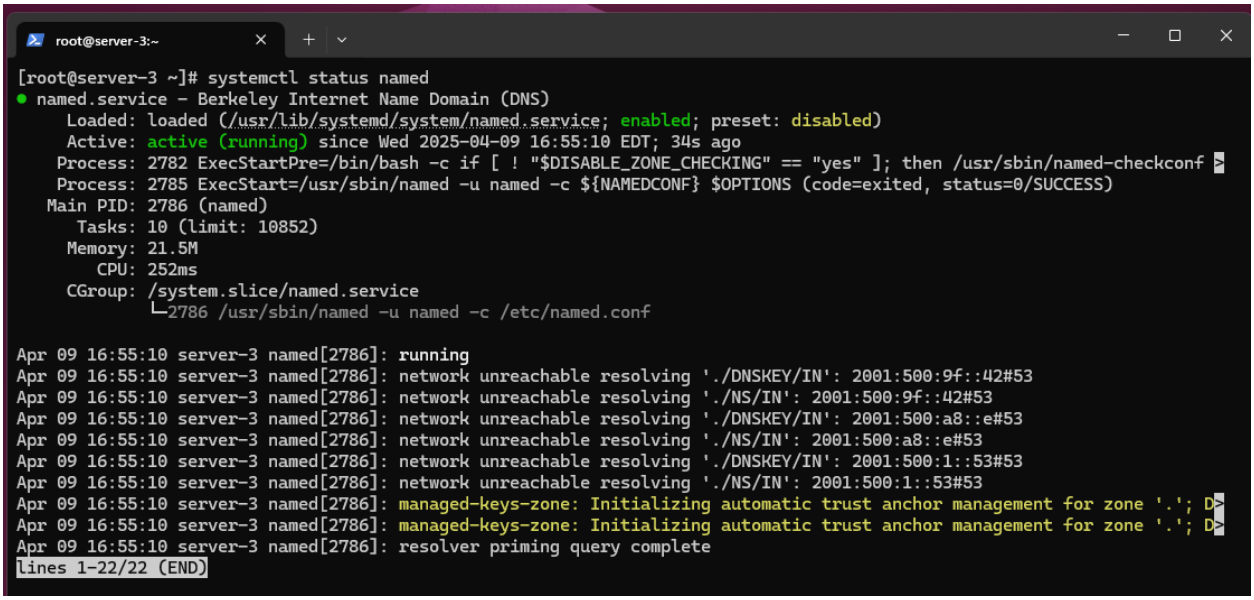


9. Start and Enable the DNS Server

systemctl enable --now named

systemctl status named

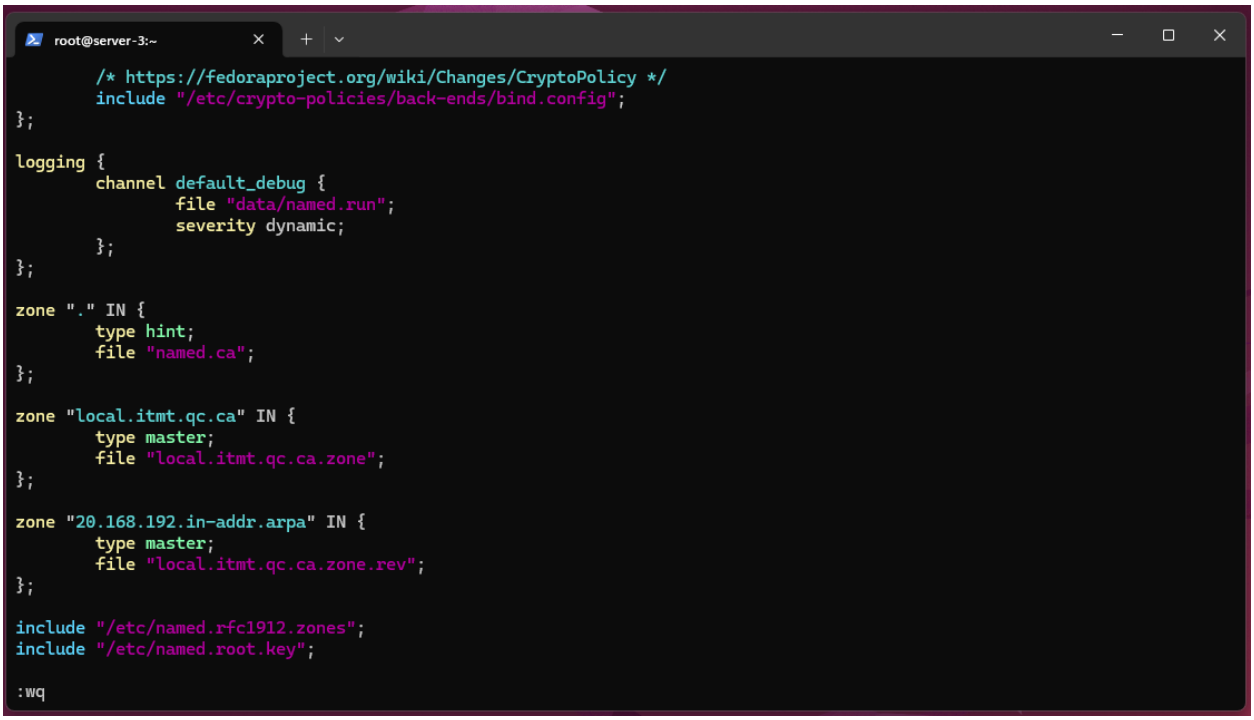




10. Configure the Reverse Master DNS Zone

Edit /etc/named.conf and add below the forward zone:

```
zone "20.168.192.in-addr.arpa" IN {
    type master;
    file "local.itmt.qc.ca.zone.rev";
};
```

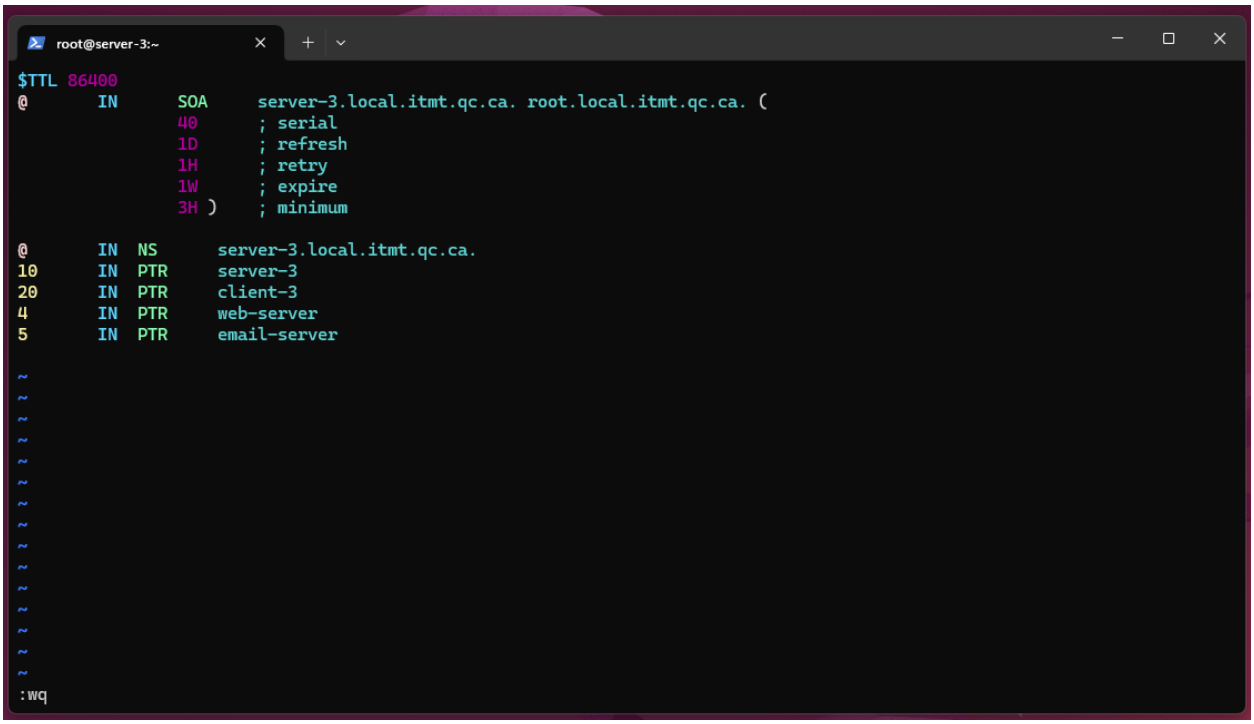


11. Create the Reverse Zone File

vim /var/named/local.itmt.qc.ca.zone.rev

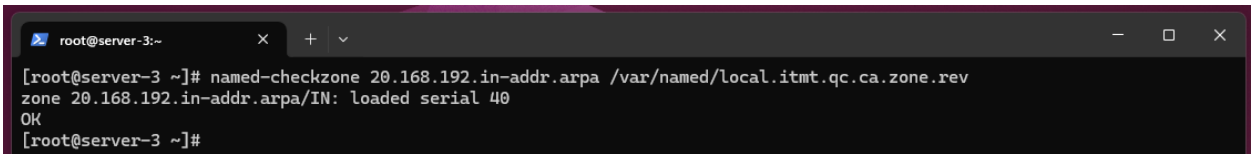
Add the following content:

```
$TTL 86400
@ IN SOA server-3.local.itmt.qc.ca. root.local.itmt.qc.ca. (
   40 ; serial
   1D ; refresh
   1H ; retry
   1W ; expire
   3H ) ; minimum

@          IN NS server-3.local.itmt.qc.ca.
10       IN PTR server-3
20       IN PTR client-3
4       IN PTR web-server
5       IN PTR email-server
```



12. Check Reverse Zone File Syntax

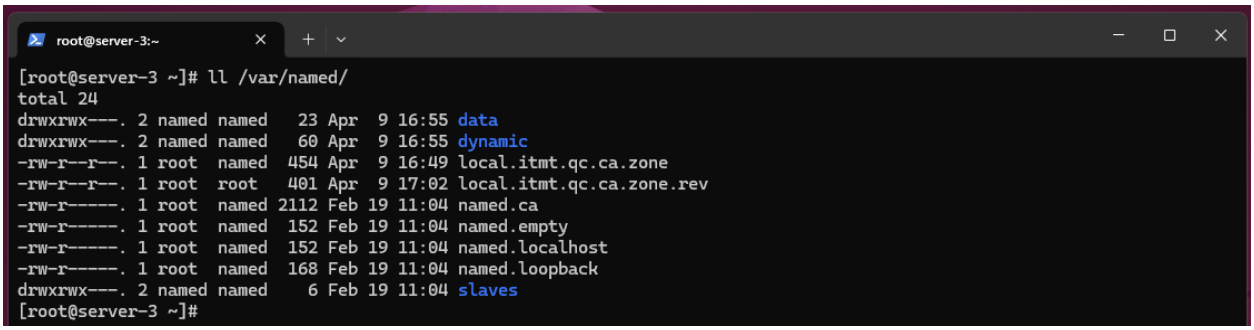
named-checkzone 20.168.192.in-addr.arpa /var/named/local.itmt.qc.ca.zone.rev

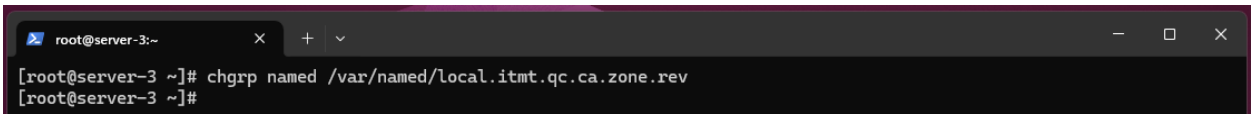


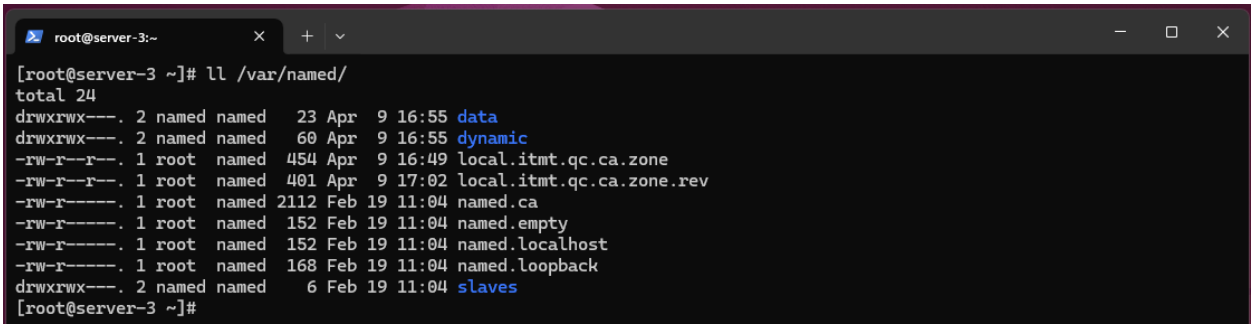
---

13. Set Correct Ownership on Reverse Zone File

chgrp named /var/named/local.itmt.qc.ca.zone.rev





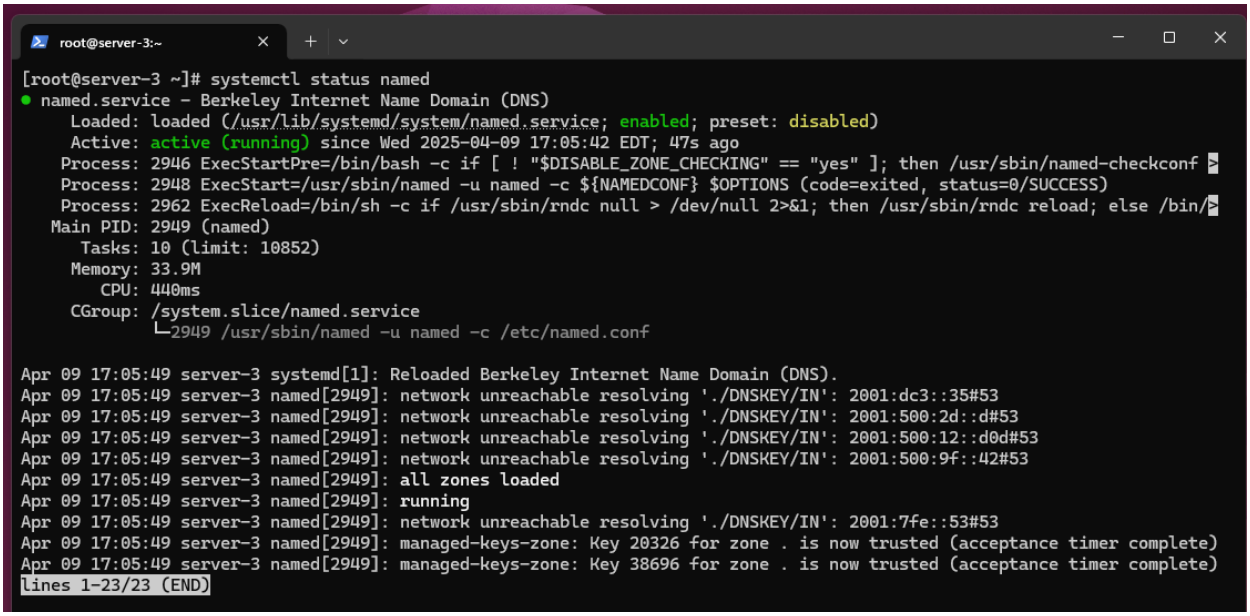


14. Restart and Reload BIND

systemctl restart named

systemctl reload named

systemctl status named



DNS Client Configuration

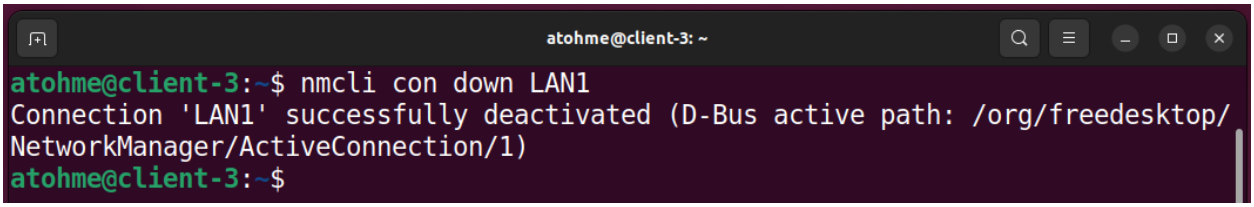
On Ubuntu Client:

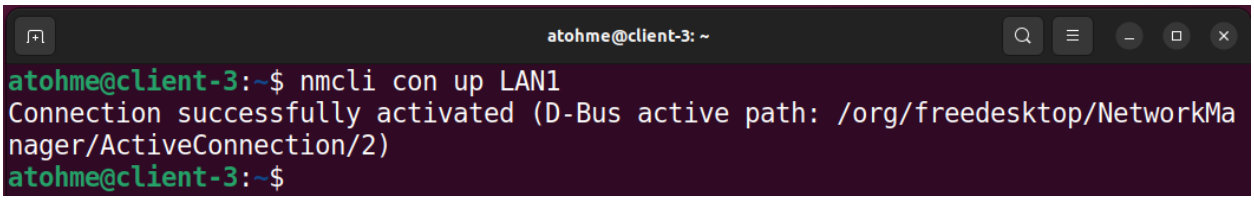
1. Disable Automatic DNS from NetworkManager

nmcli con mod LAN1 ipv4.ignore-auto-dns yes

nmcli con down LAN1

nmcli con up LAN1



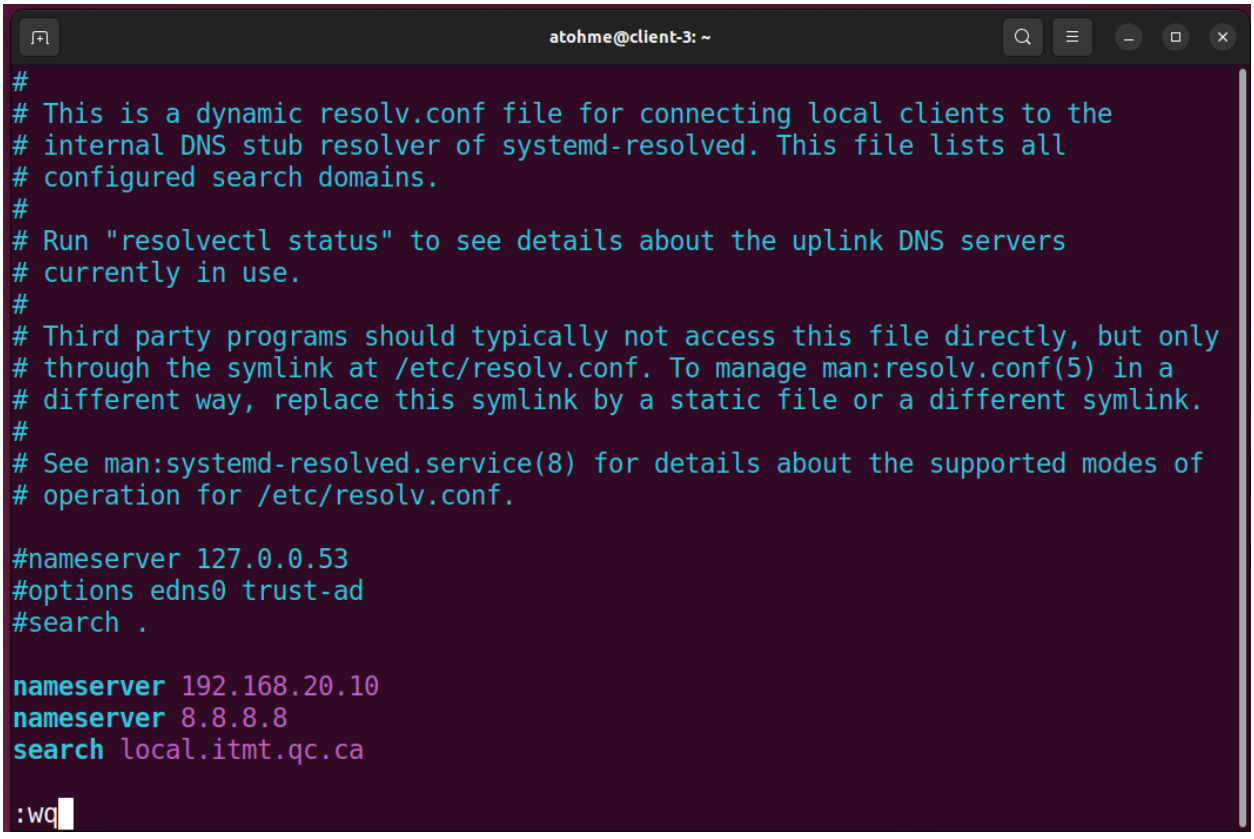


2. Manually Set DNS Servers

sudo vim /etc/resolv.conf

Add the following:

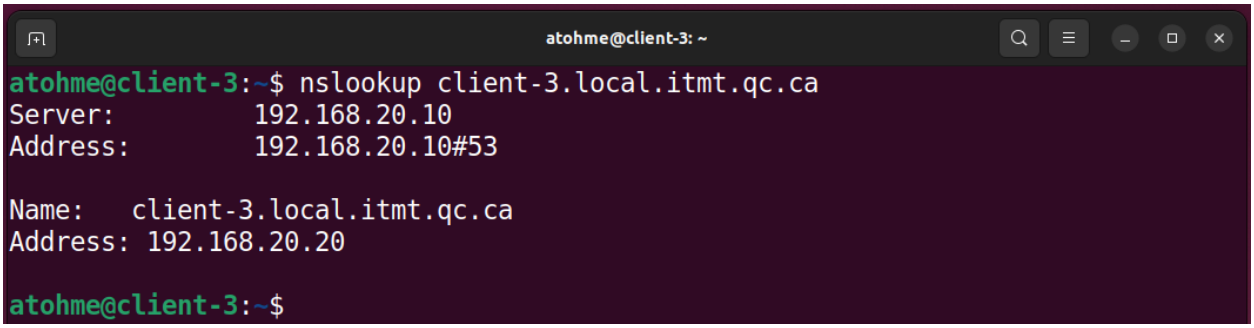
nameserver 192.168.20.10
nameserver 8.8.8.8
search local.itmt.qc.ca

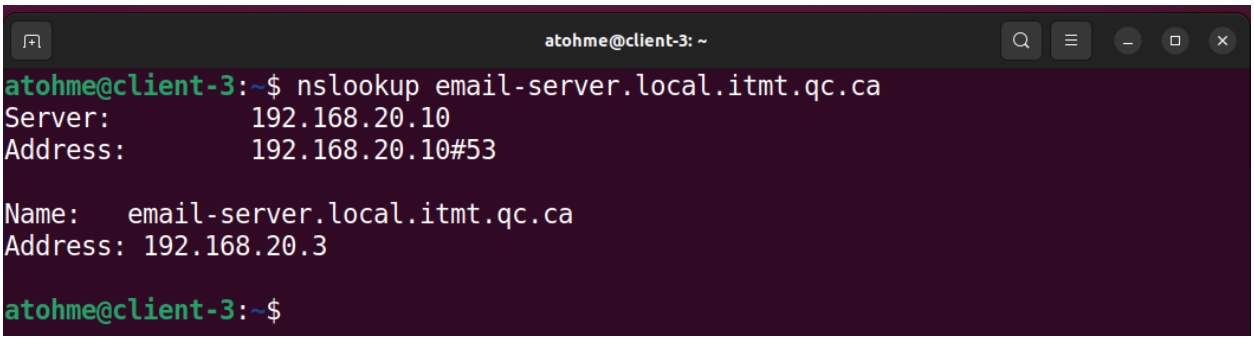


3. Test the DNS Server

Using nslookup:

nslookup server-3.local.itmt.qc.ca
nslookup client-3.local.itmt.qc.ca
nslookup email-server.local.itmt.qc.ca



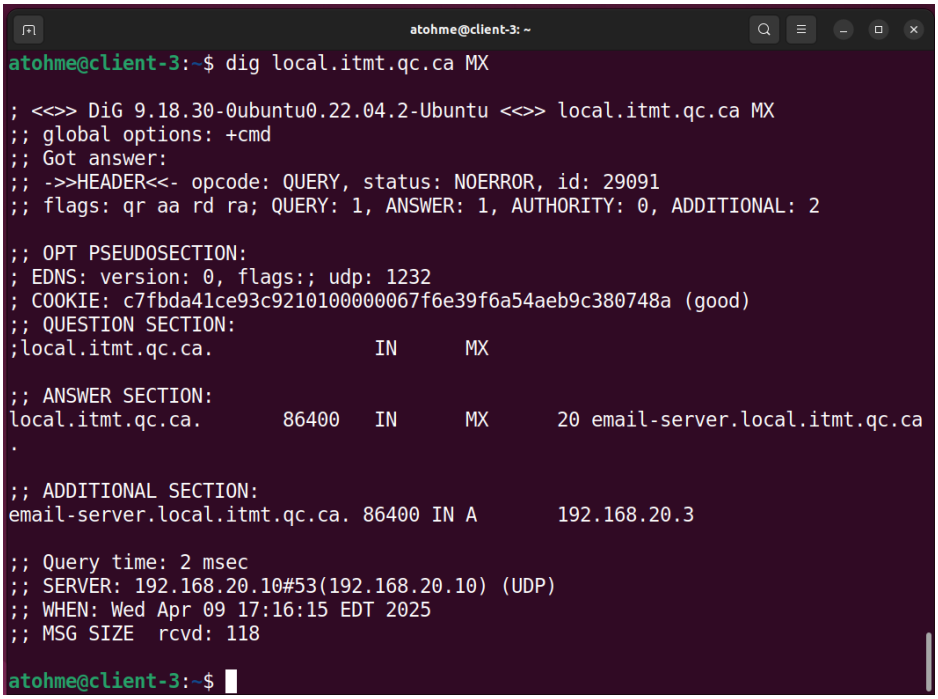


Using dig:

dig server-3.local.itmt.qc.ca
dig -x 192.168.20.10
dig local.itmt.qc.ca MX

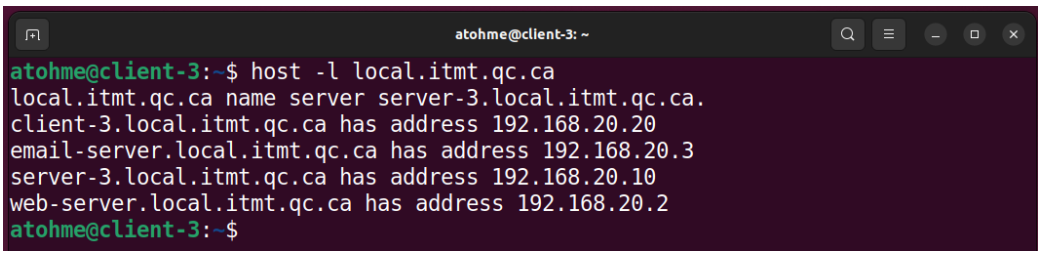
```
atohme@client-3: ~
atohme@client-3:~$ dig server-3.local.itmt.qc.ca

; <<>> DiG 9.18.30-0ubuntu0.22.04.2-Ubuntu <<>> server-3.local.itmt.qc.ca
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 51282
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: 0dd11eeda702c5a90100000067f6e34b6ba5d8e11a6e397a (good)
;; QUESTION SECTION:
;server-3.local.itmt.qc.ca.     IN      A

;; ANSWER SECTION:
server-3.local.itmt.qc.ca. 86400 IN     A       192.168.20.10

;; Query time: 3 msec
;; SERVER: 192.168.20.10#53(192.168.20.10) (UDP)
;; WHEN: Wed Apr 09 17:14:51 EDT 2025
;; MSG SIZE  rcvd: 98

atohme@client-3:~$
```

```
atohme@client-3: ~
atohme@client-3:~$ dig -x 192.168.20.10

; <<>> DiG 9.18.30-0ubuntu0.22.04.2-Ubuntu <<>> -x 192.168.20.10
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 33046
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: acb0b05de75fefa90100000067f6e377feccc2876effa46f (good)
;; QUESTION SECTION:
;10.20.168.192.in-addr.arpa.    IN      PTR

;; ANSWER SECTION:
10.20.168.192.in-addr.arpa. 86400 IN    PTR     server-3.20.168.192.in-addr.arpa
.

;; Query time: 4 msec
;; SERVER: 192.168.20.10#53(192.168.20.10) (UDP)
;; WHEN: Wed Apr 09 17:15:35 EDT 2025
;; MSG SIZE  rcvd: 106

atohme@client-3:~$
```



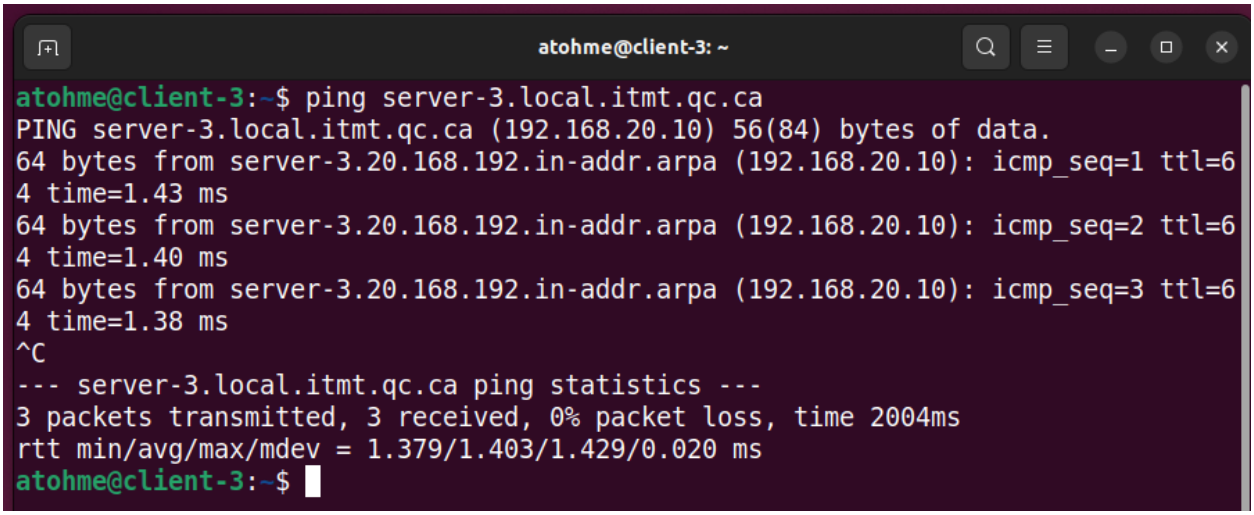
Using host:

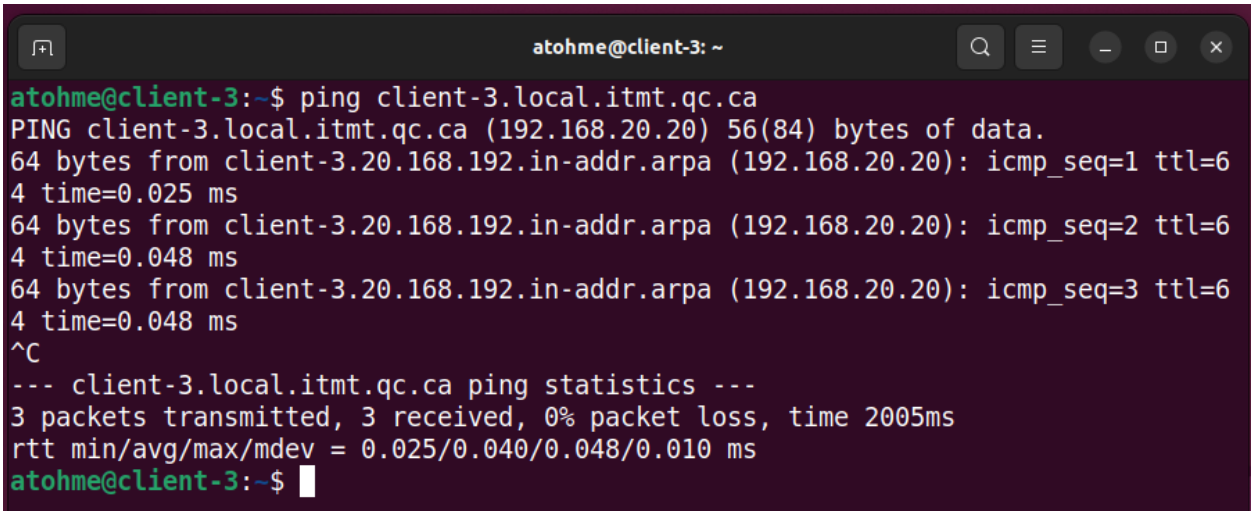
host -l local.itmt.qc.ca



Using ping:

ping server-3.local.itmt.qc.ca and client-3.local.itmt.qc.ca





Part 2:

DHCP Server Configuration (AlmaLinux & Ubuntu)

On AlmaLinux Server:

1. Install the DHCP Server

dnf -y install dhcp-server

```
[root@server-3 ~]# dnf -y install dhcp-server
Last metadata expiration check: 21:23:00 ago on Wed Apr  9 16:55:11 2025.
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                 128 k

Transaction Summary
================================================================================================================
Install  2 Packages

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

```
Installed:
  dhcp-common-12:4.4.2-19.b1.el9.noarch                    dhcp-server-12:4.4.2-19.b1.el9.x86_64

Complete!
[root@server-3 ~]#
```

---

2. Configure the DHCP Server

Edit the DHCP configuration file:

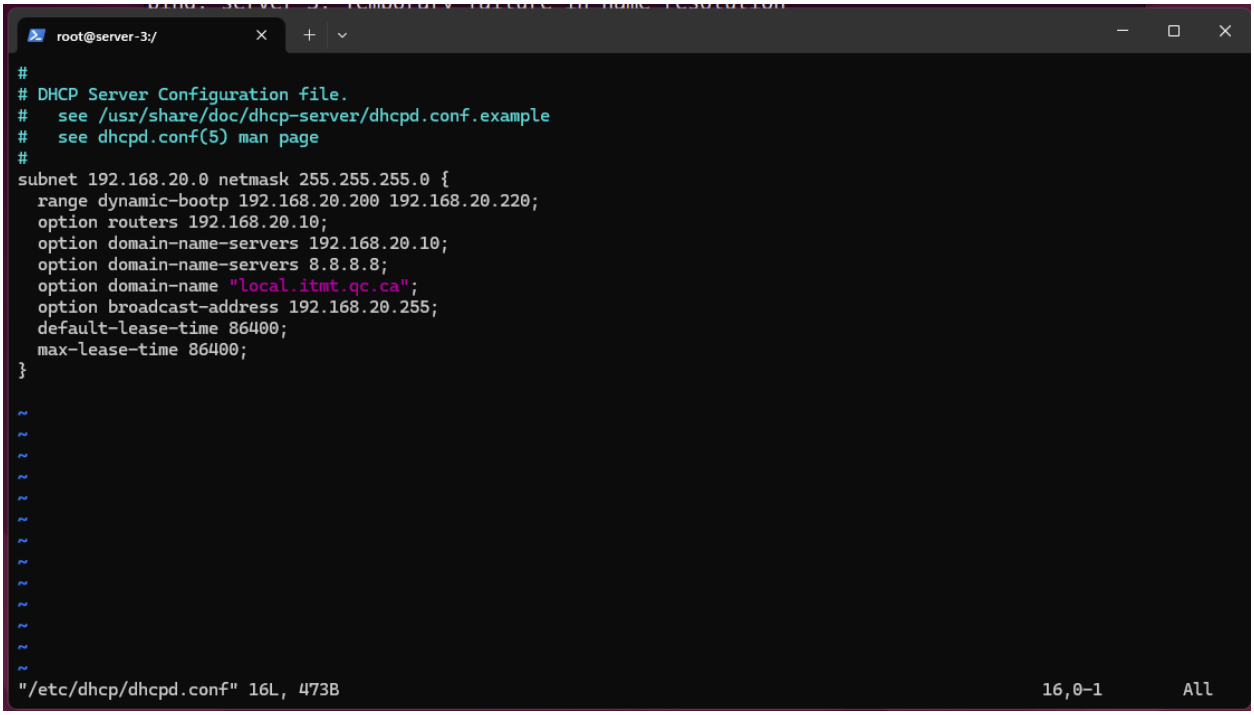
vim /etc/dhcp/dhcpd.conf

```
root@server-3:/
[root@server-3 /]# vim /etc/dhcp/dhcpd.conf
[root@server-3 /]#
```

Add the following configuration to define the IP address range and options:

```
subnet 192.168.20.0 netmask 255.255.255.0 {
    range dynamic-bootp 192.168.20.200 192.168.20.220;
    option routers 192.168.20.10;
    option domain-name-servers 192.168.20.10;
    option domain-name-servers 8.8.8.8;
    option domain-name "local.itmt.qc.ca";
    option broadcast-address 192.168.20.255;
    default-lease-time 86400;
```

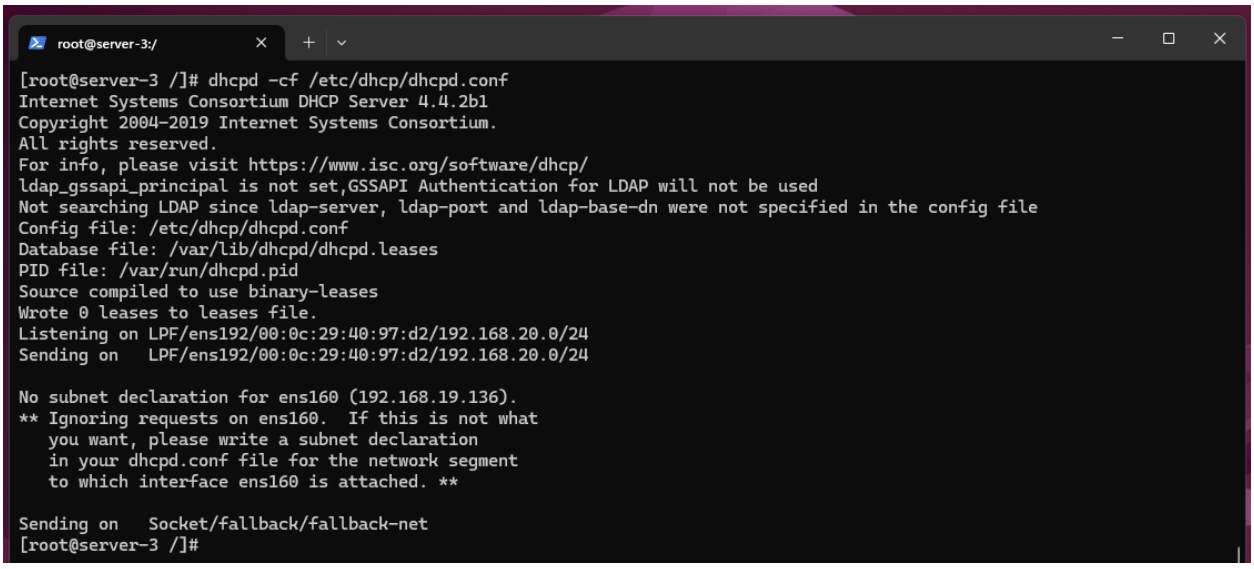
```
    max-lease-time 86400;
}
```



---

3. Check Configuration Syntax

```
dhcpd -cf /etc/dhcp/dhcpd.conf
```

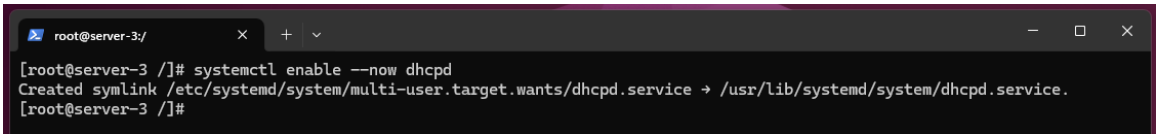


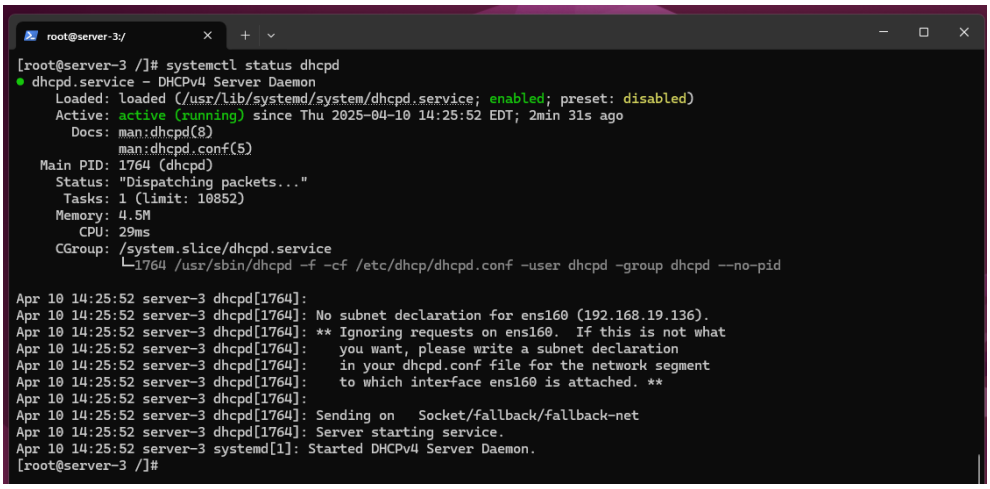
---

4. Enable and Start the DHCP Service

systemctl enable --now dhcpd

systemctl status dhcpd





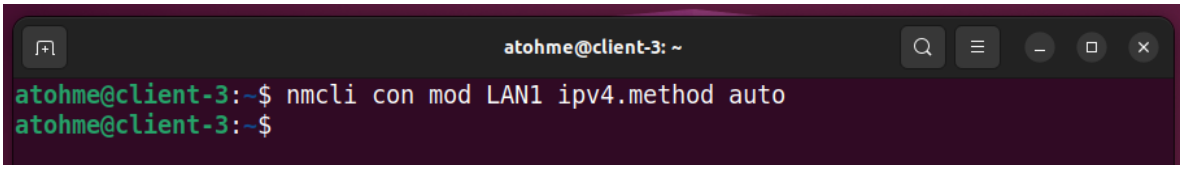
On Ubuntu Client:

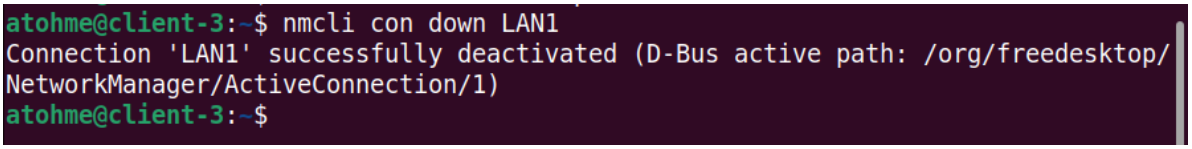
5. Configure the Network to Use DHCP

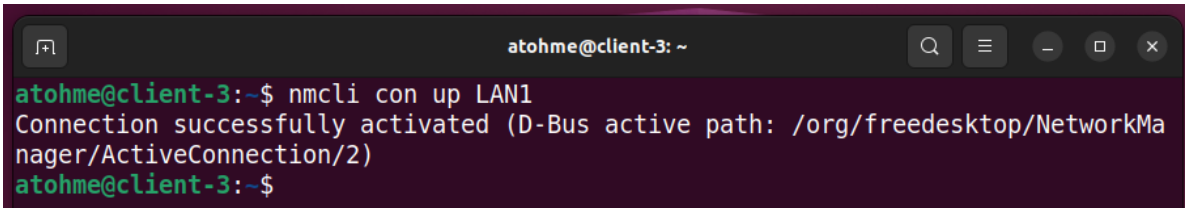
nmcli con mod LAN1 ipv4.method auto

nmcli con down LAN1

nmcli con up LAN1







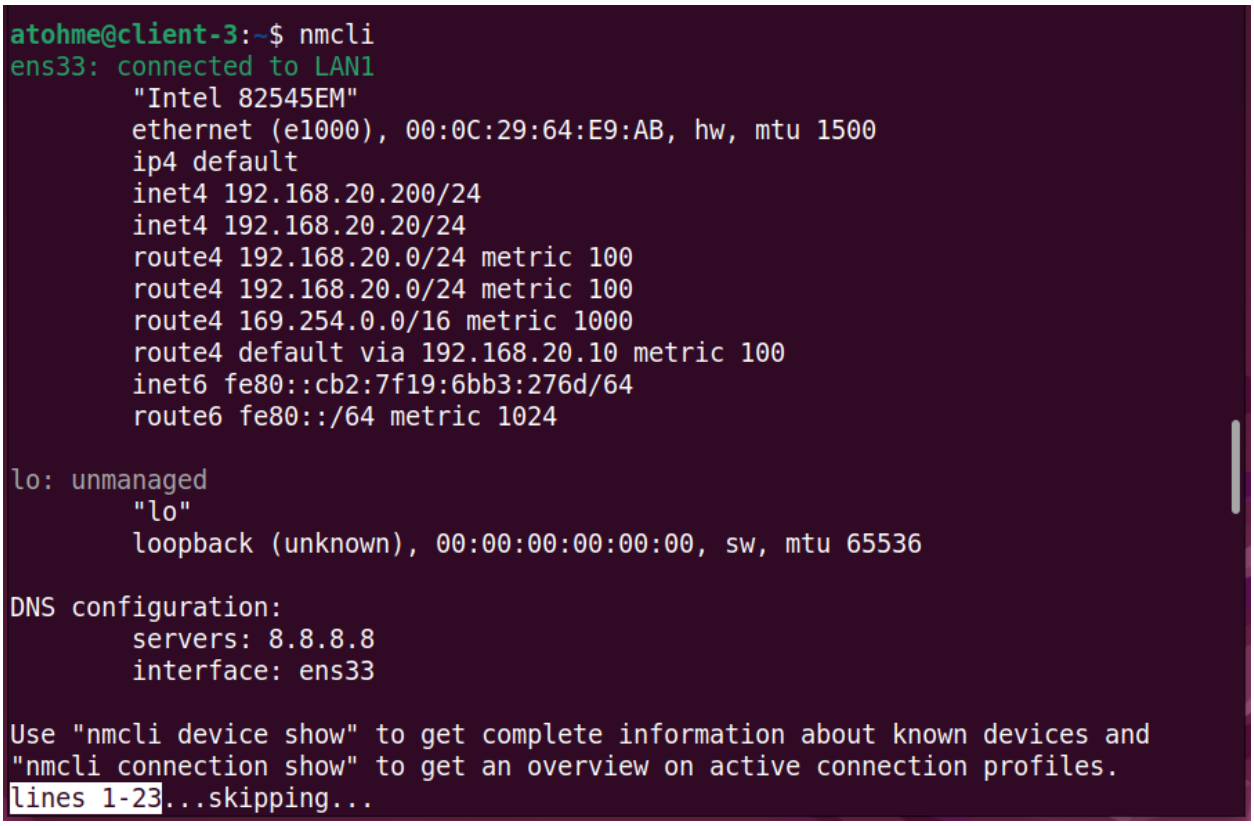
After changing the network connection from static to automatic you need to redo steps 1 and 2 of “DNS Client Configuration on Ubuntu” from Part 1

---

6. Verify DHCP Lease

Run the following to confirm the client received an IP address:

```
nmcli
```

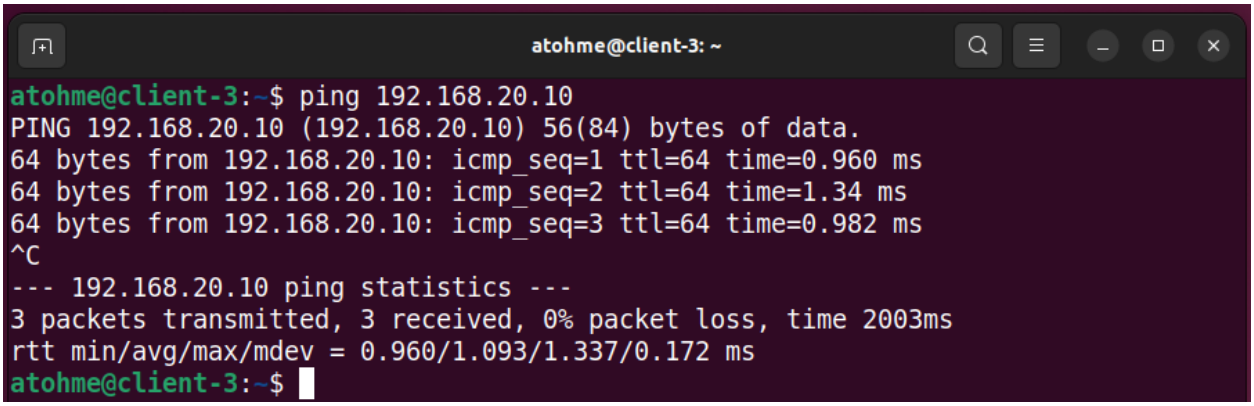


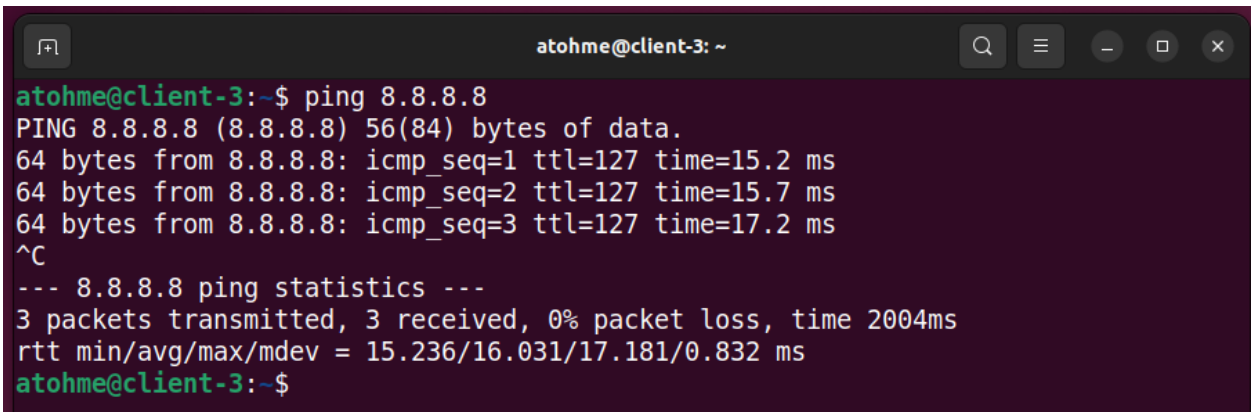
7. Test Connectivity

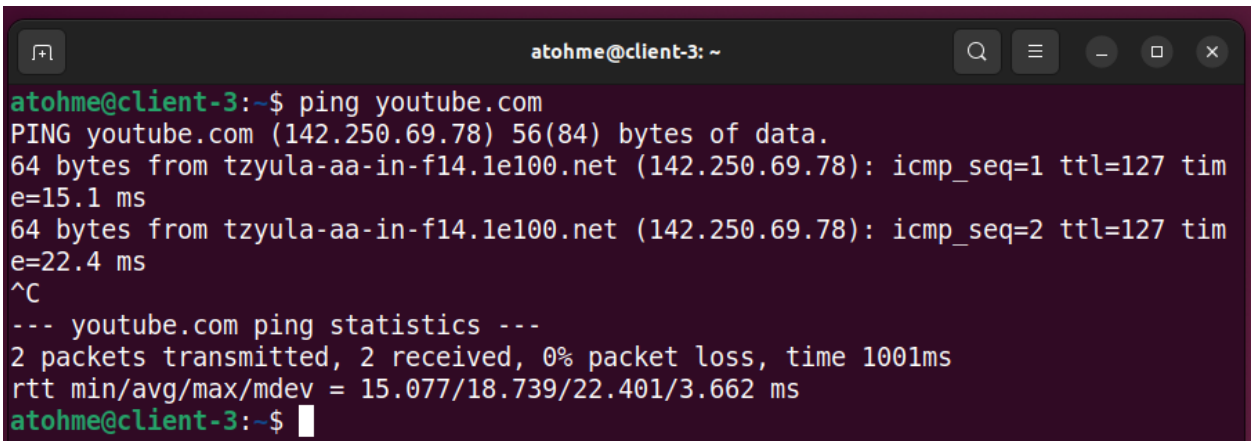
ping 192.168.20.10

ping 8.8.8.8

ping youtube.com



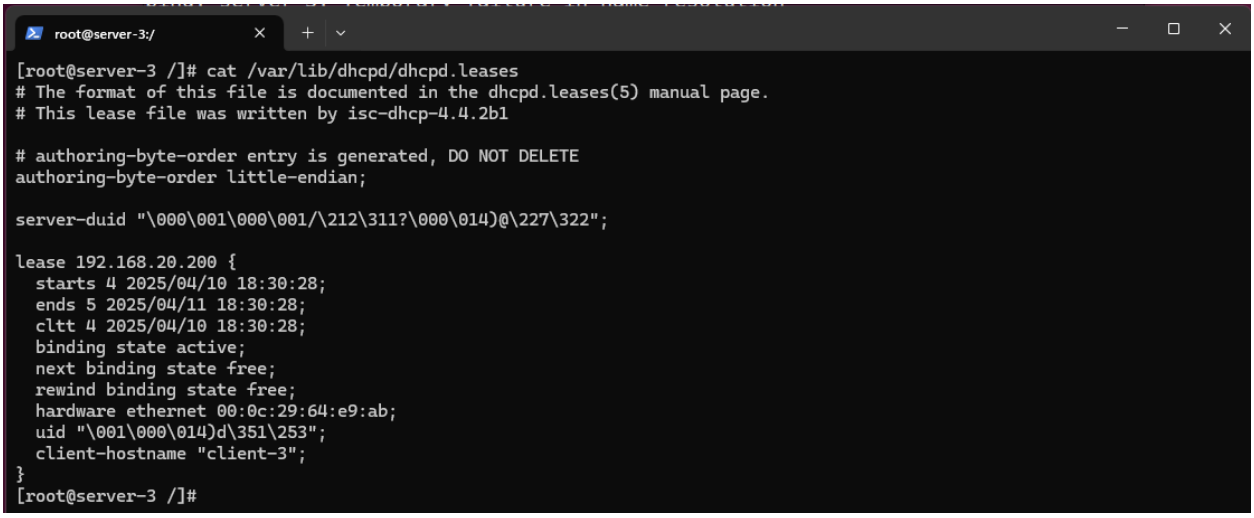




On AlmaLinux Server:

8. Check Active DHCP Leases

cat /var/lib/dhcpd/dhcpd.leases



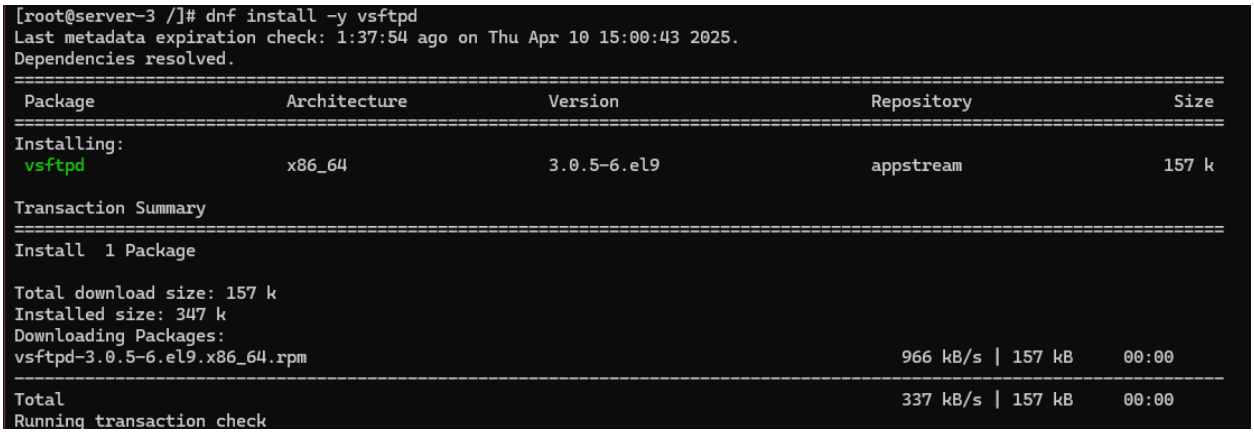
Part 3:

FTP Server Configuration with vsftpd (AlmaLinux & Ubuntu)

On AlmaLinux Server:

1. Install the FTP Server

dnf install -y vsftpd



2. Configure vsftpd for Anonymous Access

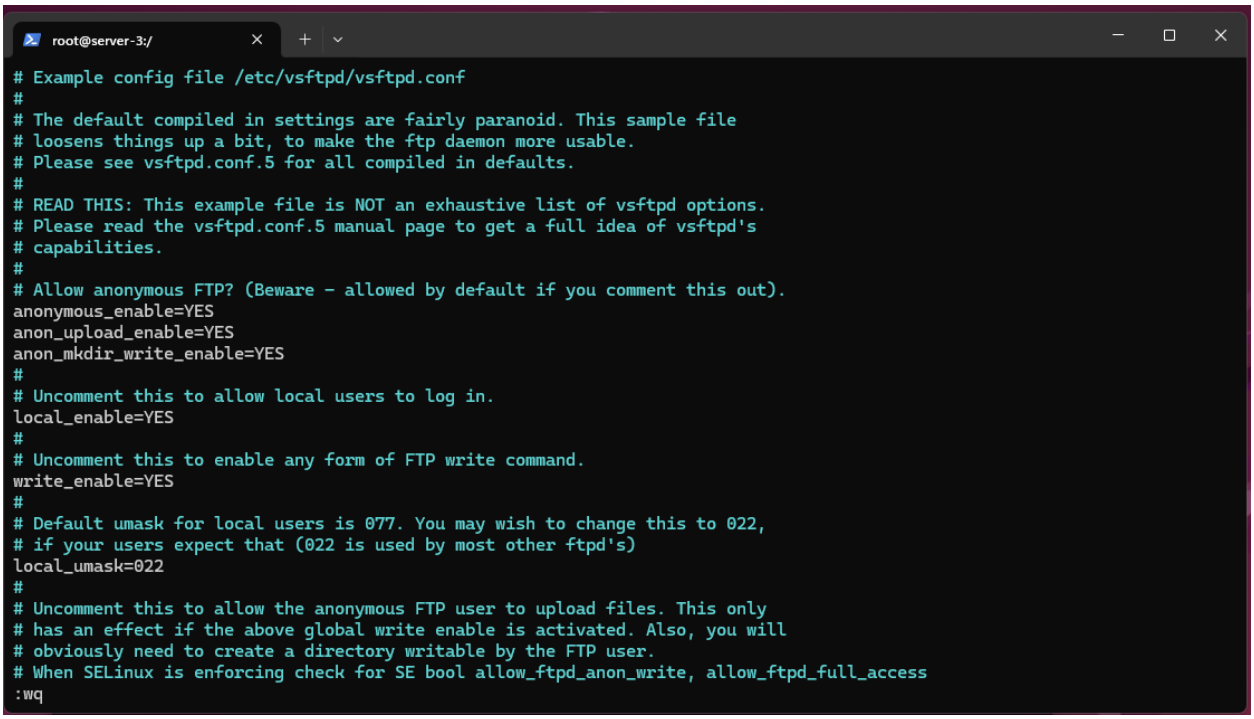
Edit the configuration file:

```
vim /etc/vsftpd/vsftpd.conf
```

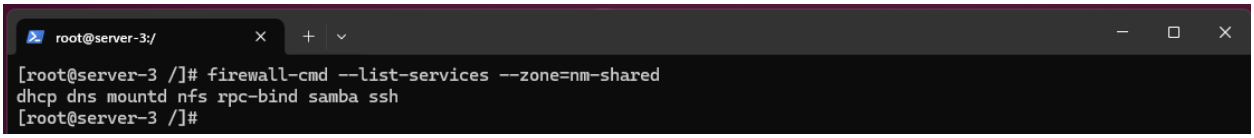
Make the following changes:

```
anonymous_enable=YES
anon_upload_enable=YES
anon_mkdir_write_enable=YES
local_enable=YES
write_enable=YES
local_umask=022
```

Save the file and exit vim.



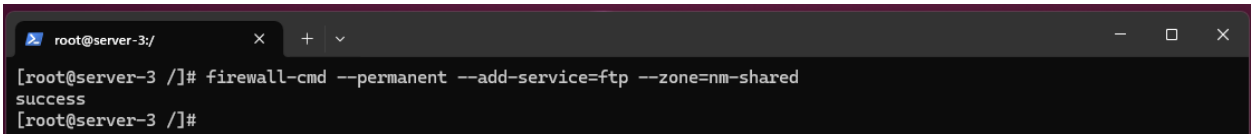
3. Configure the Firewall for FTP Access

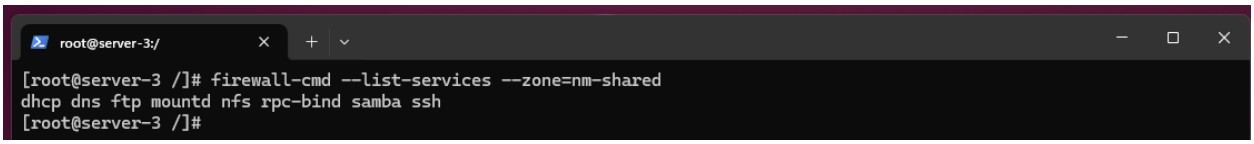


firewall-cmd --permanent --add-service=ftp --zone=nm-shared

firewall-cmd --reload

firewall-cmd --list-services --zone=nm-shared

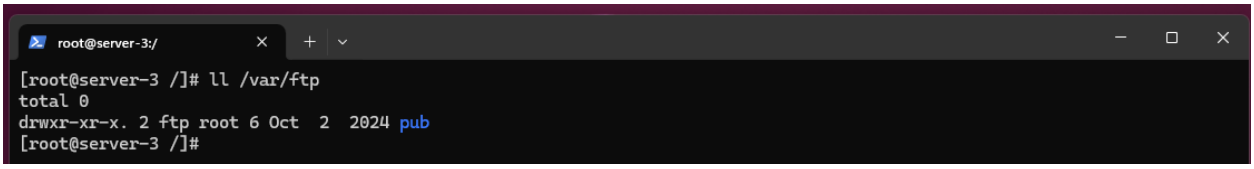




---

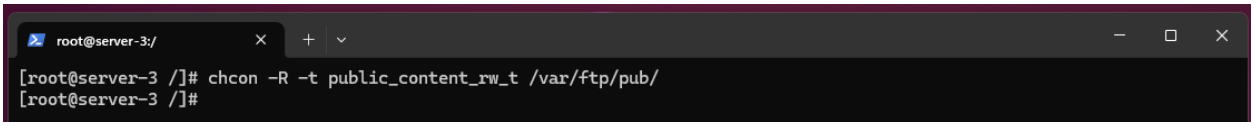
4. Set Correct Ownership for the FTP Public Directory

chown -R ftp /var/ftp/pub



5. Set SELinux Permissions to Allow Uploads

chcon -R -t public_content_rw_t /var/ftp/pub



6. Allow Anonymous Uploads

##setenforce 0 ## *Note: This disables SELinux enforcement temporarily. Use cautiously.*

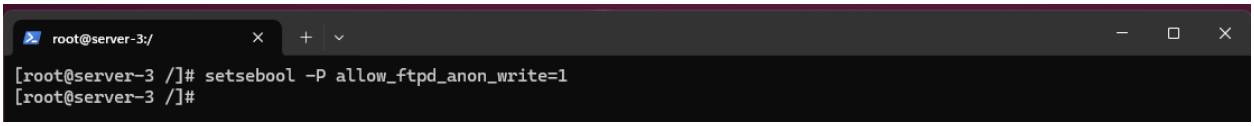
setsebool -P allow_ftpd_anon_write=1

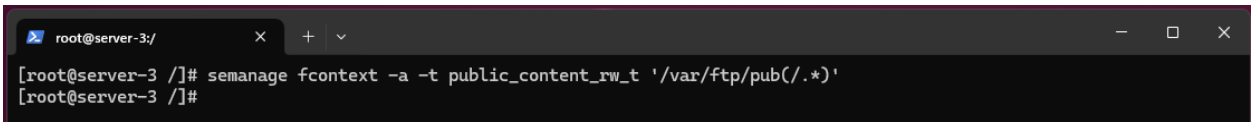
setsebool -P allow_ftpd_full_access=1

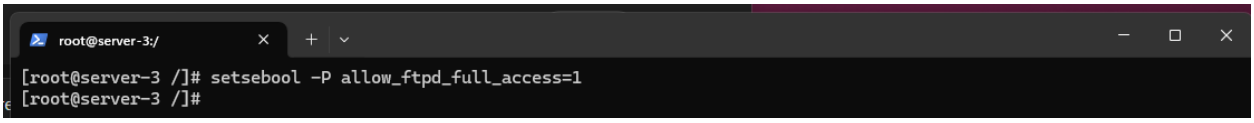
semanage fcontext -a -t public_content_rw_t '/var/ftp/pub(/.*)'

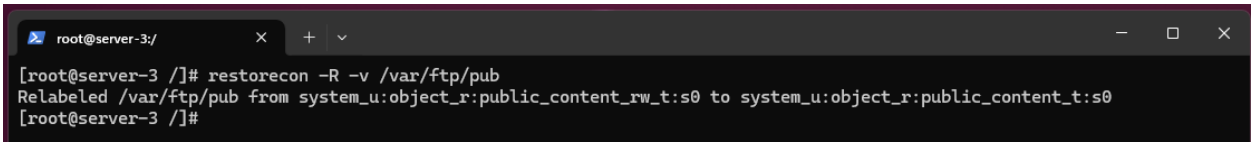
restorecon -R -v /var/ftp/pub

ls -dZ /var/ftp/pub





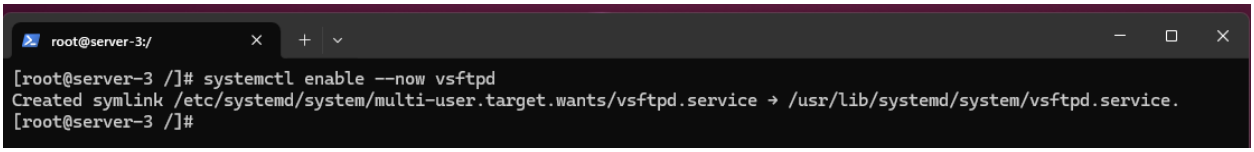


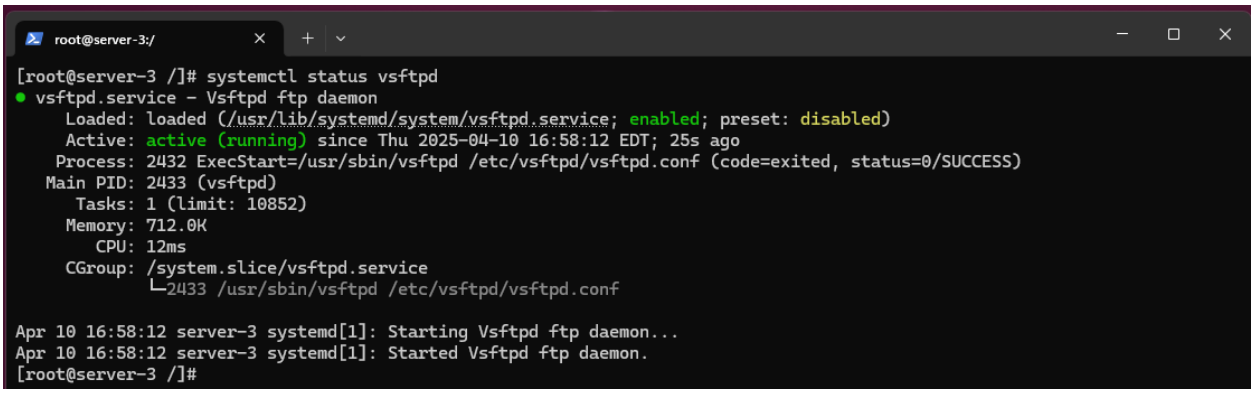


7. Enable and Start the FTP Service

systemctl enable --now vsftpd

systemctl status vsftpd

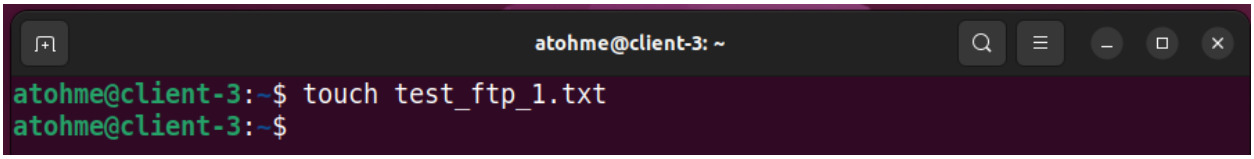


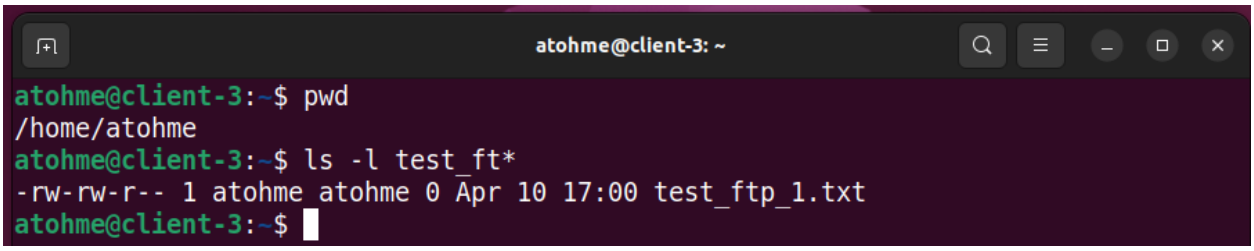


On Ubuntu Client:

8. Create a Test File for Upload

touch test_ftp_1.txt



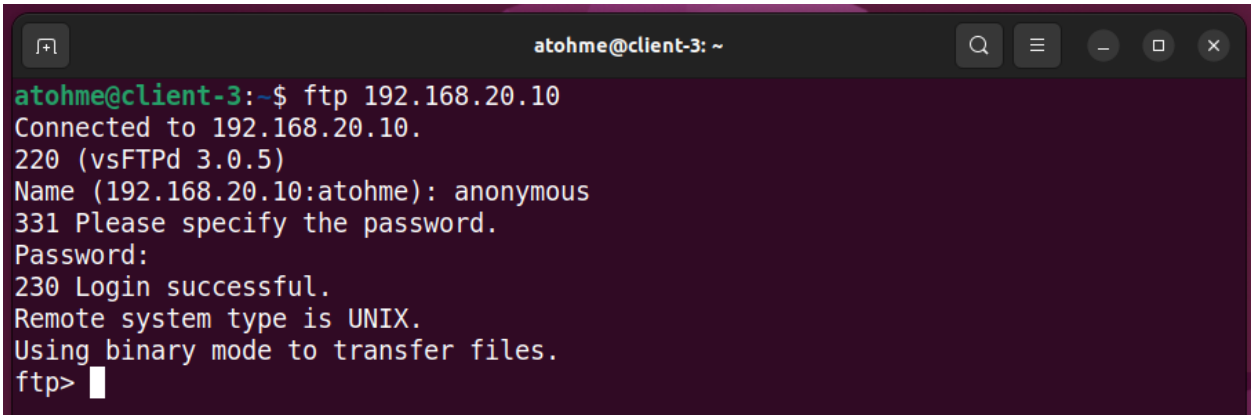


9. Connect to the FTP Server Anonymously

ftp 192.168.20.10

At the Name: prompt, enter:

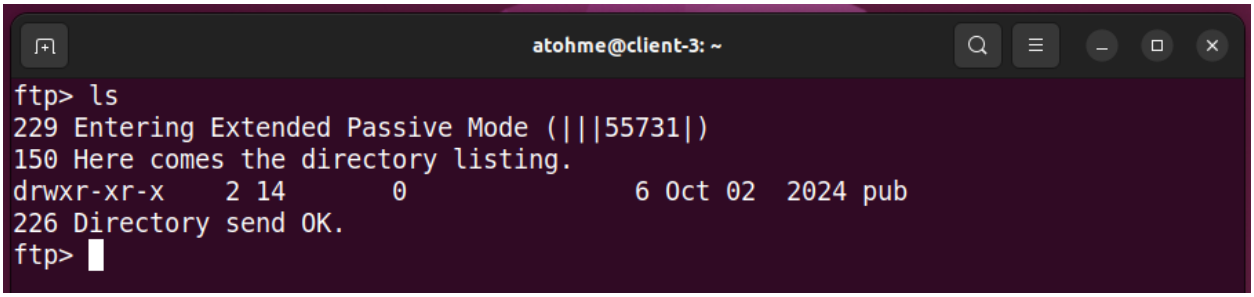
anonymous

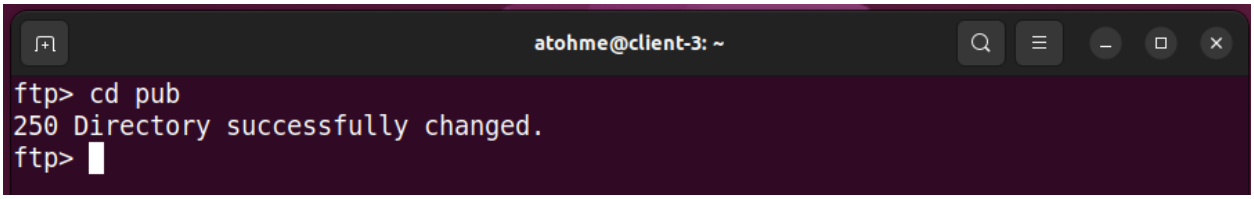


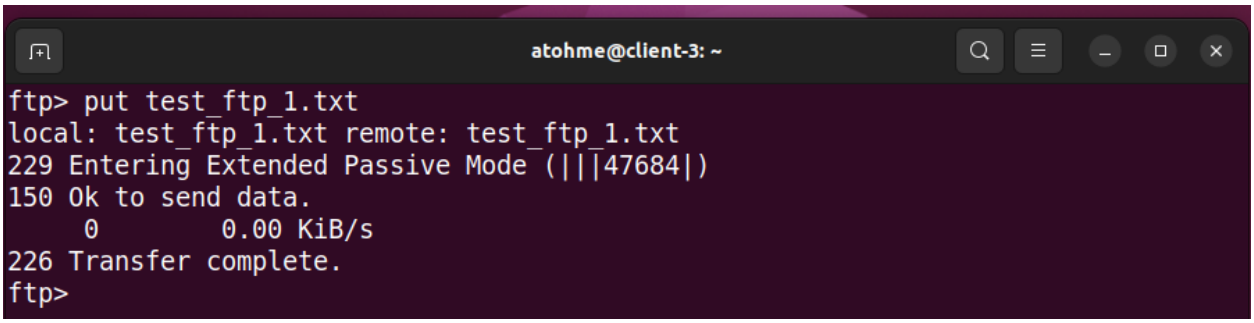
10. Upload the Test File

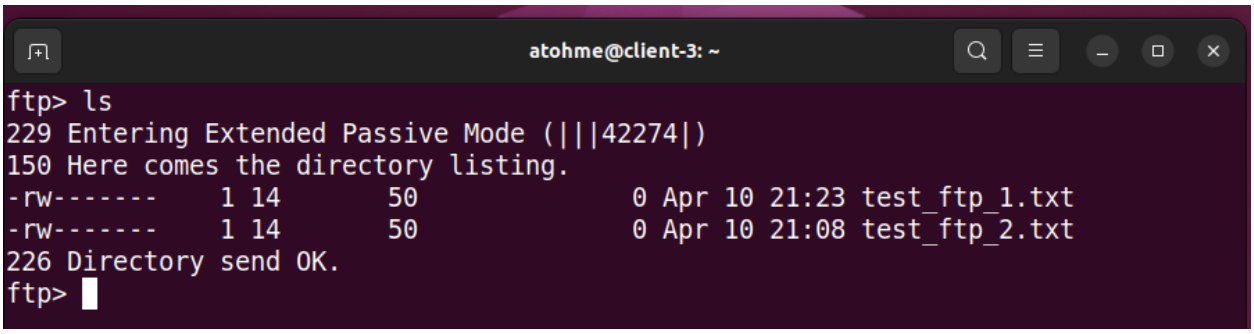
Use these FTP commands after connecting:

ls
cd pub
put test_ftp_1.txt
ls





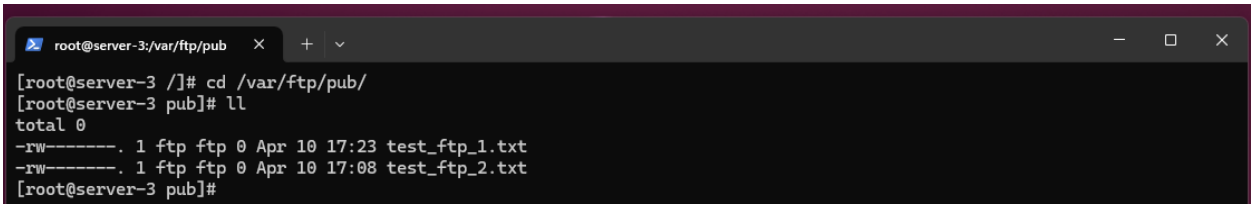




On AlmaLinux Server:

11. Verify the File Was Uploaded

```
cd /var/ftp/pub
ll
```



You should see test_ftp_1.txt (and other files you added) listed.

12. Verify FTP Server Is Listening

Install net-tools if required

```
[root@server-3 pub]# dnf install net-tools -y
Last metadata expiration check: 2:28:59 ago on Thu Apr 10 15:00:43 2025.
Dependencies resolved.
==========================================================================================================
 Package                  Architecture          Version                                Repository             Size
==========================================================================================================
Installing:
 net-tools                x86_64                2.0-0.64.20160912git.el9               baseos                294 k

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

Total download size: 294 k
```

```
Installing:
 net-tools                x86_64                2.0-0.64.20160912git.el9               baseos                294 k

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

Total download size: 294 k
Installed size: 906 k
Downloading Packages:
net-tools-2.0-0.64.20160912git.el9.x86_64.rpm                                    1.4 MB/s | 294 kB     00:00
----------------------------------------------------------------------------------------------------------
Total                                                                             504 kB/s | 294 kB     00:00
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing        :                                                                                      1/1
  Installing       : net-tools-2.0-0.64.20160912git.el9.x86_64                                            1/1
  Running scriptlet: net-tools-2.0-0.64.20160912git.el9.x86_64                                            1/1
  Verifying        : net-tools-2.0-0.64.20160912git.el9.x86_64                                            1/1

Installed:
  net-tools-2.0-0.64.20160912git.el9.x86_64

Complete!
[root@server-3 pub]#
```

netstat -tunap | grep ftp

```
root@server-3:/var/ftp/pub

[root@server-3 pub]# netstat -tunap | grep ftp
tcp6       0      0 :::21                   :::*                    LISTEN      2533/vsftpd
[root@server-3 pub]#
```

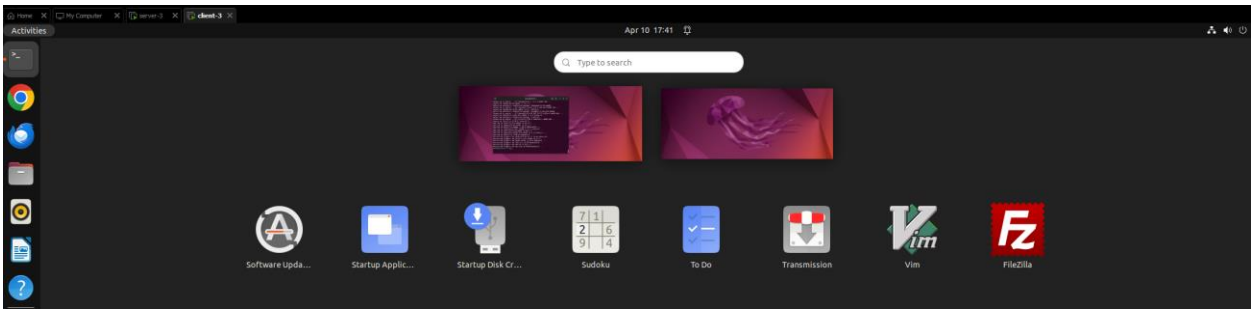
On Ubuntu Client:

13. Test with FileZilla

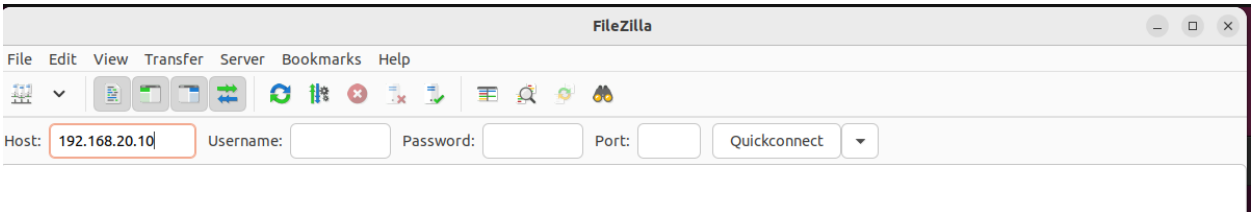
1. Open FileZilla on the Ubuntu client (install via ‘sudo apt install filezilla -y’ if needed).

```
atohme@client-3:~$ sudo apt install filezilla -y
[sudo] password for atohme:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
```

```
Preparing to unpack .../6-filezilla_3.58.0-1ubuntu0.1_amd64.deb ...
Unpacking filezilla (3.58.0-1ubuntu0.1) ...
Setting up libfilezilla-common (0.36.0-2) ...
Setting up libpugixml1v5:amd64 (1.12.1-1) ...
Setting up filezilla-common (3.58.0-1ubuntu0.1) ...
Setting up libwxbase3.0-0v5:amd64 (3.0.5.1+dfsg-4) ...
Setting up libfilezilla24:amd64 (0.36.0-2) ...
Setting up libwxgtk3.0-gtk3-0v5:amd64 (3.0.5.1+dfsg-4) ...
Setting up filezilla (3.58.0-1ubuntu0.1) ...
Processing triggers for desktop-file-utils (0.26-1ubuntu3) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for gnome-menus (3.36.0-1ubuntu3) ...
Processing triggers for libc-bin (2.35-0ubuntu3.9) ...
Processing triggers for man-db (2.10.2-1) ...
Processing triggers for mailcap (3.70+nmu1ubuntu1) ...
atohme@client-3:~$
```

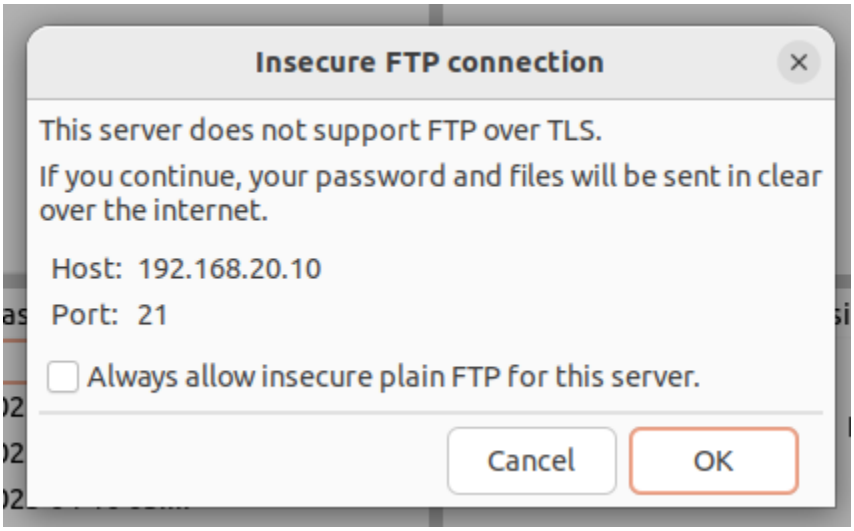


2. In the **Host** field, enter: 192.168.20.10

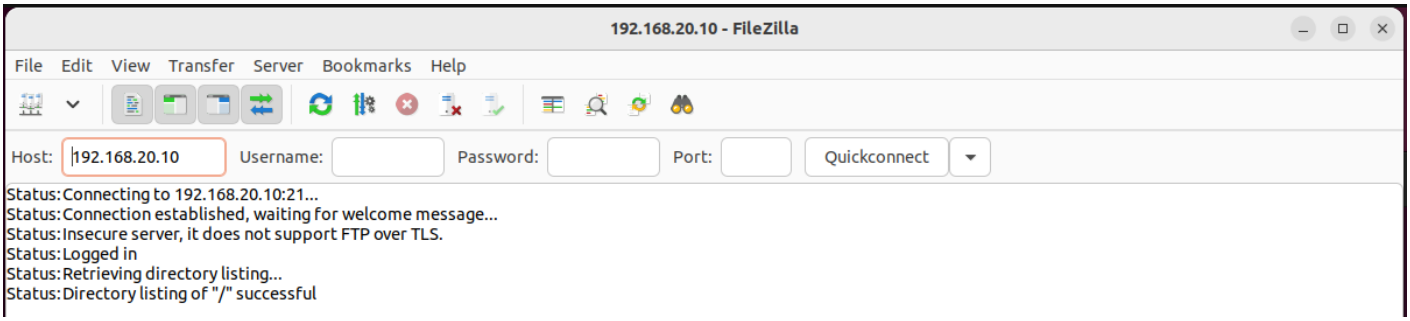


3. Click **Quickconnect → then press enter**

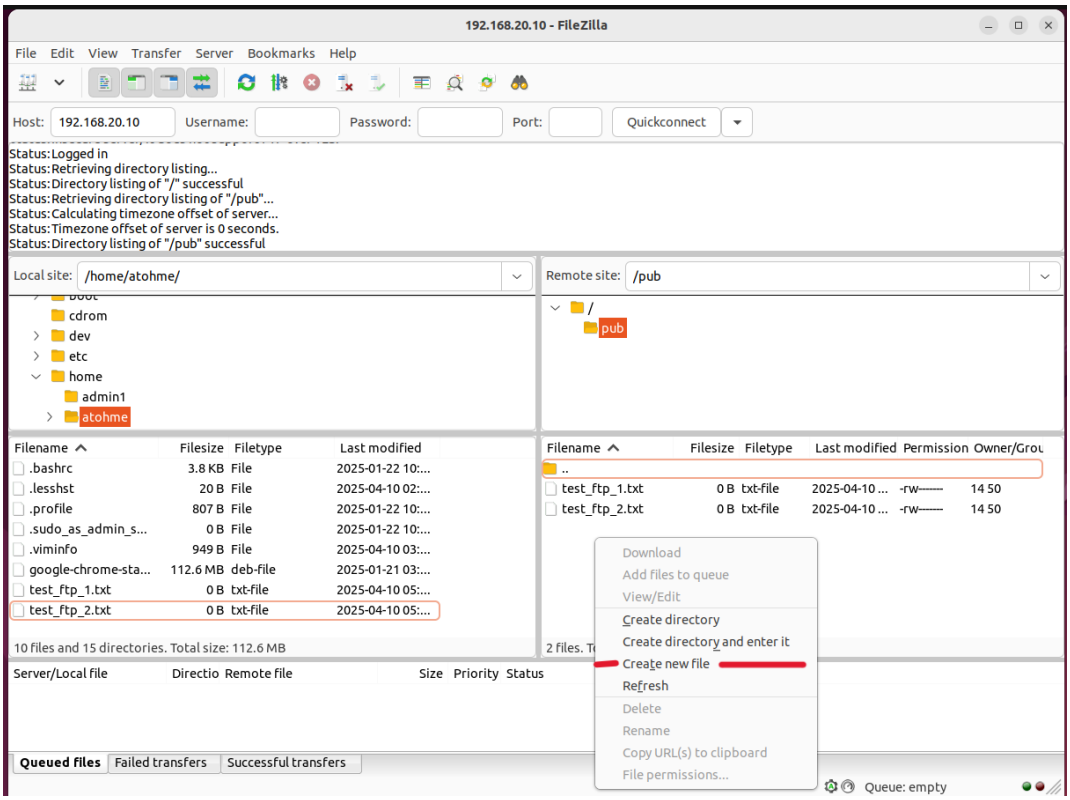
   When prompted answer **yes**

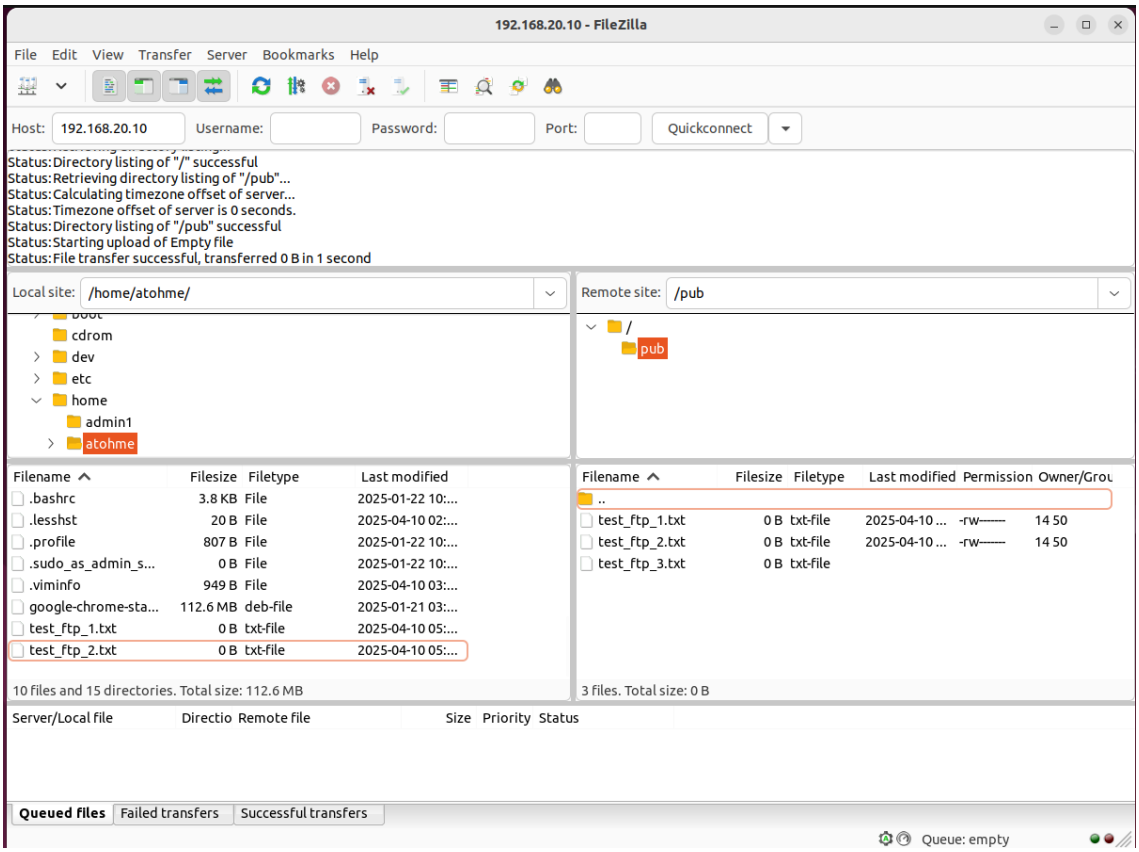


4. You should see a successful connection in the status window.



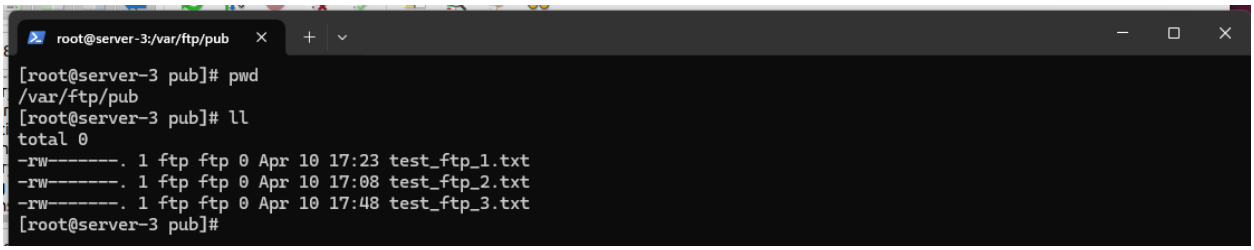
5. Create a new file on the server using FileZila from the client





On AlmaLinux Server:

14. Verify the changes on the Server



Conclusion

This lab gave us valuable, hands-on experience with deploying and validating core network services in a Linux environment. By setting up DNS with BIND, configuring DHCP for dynamic IP management, and enabling FTP for anonymous file sharing, we've reinforced key administrative tasks that are critical in real-world IT infrastructures.

More than just completing a checklist of tasks, this assignment helped build practical skills that are directly relevant to roles in system and network administration. These exercises also align closely with the requirements of certifications like **CompTIA Linux+** and **RHCSA**, making this lab an important step toward becoming a confident, job-ready IT professional. As we continue developing our technical abilities, these foundational experiences will serve as the building blocks for more advanced projects and real-world challenges in the industry.