Exercise 1 –NFS Server Installation and configuration

Installation and configuration of NSF Server

Exercise 1.1: Tasks to perform on AlmaLinux:

Use the root account to complete this exercise

1. Install the **NFS server** package.

```
[root@server12 ~]# dnf install -y nfs-utils
AlmaLinux 9 - AppStream                                          35 kB/s | 4.2 kB     00:00
AlmaLinux 9 - AppStream                                          34 MB/s |  15 MB     00:00
AlmaLinux 9 - BaseOS                                             32 kB/s | 3.8 kB     00:00
AlmaLinux 9 - BaseOS                                             52 MB/s |  17 MB     00:00
AlmaLinux 9 - Extras                                             26 kB/s | 3.3 kB     00:00
AlmaLinux 9 - Extras                                            101 kB/s |  13 kB     00:00
Extra Packages for Enterprise Linux 9 - x86_64                  196 kB/s |  33 kB     00:00
Extra Packages for Enterprise Linux 9 - x86_64                  6.0 MB/s |  23 MB     00:03
Dependencies resolved.
```

```
Installed:
  gssproxy-0.8.4-7.el9.x86_64              libev-4.33-5.el9.x86_64           libnfsidmap-1:2.5.4-27.el9.x86_64
  libverto-libev-0.3.2-3.el9.x86_64        nfs-utils-1:2.5.4-27.el9.x86_64   rpcbind-1.2.6-7.el9.x86_64
  sssd-nfs-idmap-2.9.5-4.el9_5.4.x86_64
```

2. Start and enable the **NFS service**.

```
[root@server12 ~]# systemctl enable --now nfs-server
Created symlink /etc/systemd/system/multi-user.target.wants/nfs-server.service → /usr/lib/systemd/system/nfs-serv
er.service.
[root@server12 ~]# systemctl status nfs-server
● nfs-server.service - NFS server and services
     Loaded: loaded (/usr/lib/systemd/system/nfs-server.service; enabled; preset: disabled)
     Active: active (exited) since Tue 2025-04-01 10:29:22 EDT; 14s ago
       Docs: man:rpc.nfsd(8)
             man:exportfs(8)
    Process: 6275 ExecStartPre=/usr/sbin/exportfs -r (code=exited, status=0/SUCCESS)
    Process: 6276 ExecStart=/usr/sbin/rpc.nfsd (code=exited, status=0/SUCCESS)
    Process: 6297 ExecStart=/bin/sh -c if systemctl -q is-active gssproxy; then systemctl reload gssproxy ; fi (>
   Main PID: 6297 (code=exited, status=0/SUCCESS)
        CPU: 13ms

Apr 01 10:29:22 server12 systemd[1]: Starting NFS server and services...
Apr 01 10:29:22 server12 systemd[1]: Finished NFS server and services.
lines 1-13/13 (END)
```

3. Verify that both the **NFS** and **rpcbind** services are **started** and **enabled**.

```
[root@server12 ~]# systemctl status nfs-mountd.service
● nfs-mountd.service - NFS Mount Daemon
     Loaded: loaded (/usr/lib/systemd/system/nfs-mountd.service; static)
     Active: active (running) since Tue 2025-04-01 10:29:21 EDT; 1min 43s ago
       Docs: man:rpc.mountd(8)
    Process: 6269 ExecStart=/usr/sbin/rpc.mountd (code=exited, status=0/SUCCESS)
   Main PID: 6272 (rpc.mountd)
      Tasks: 1 (limit: 22829)
     Memory: 1.0M
        CPU: 11ms
     CGroup: /system.slice/nfs-mountd.service
             └─6272 /usr/sbin/rpc.mountd

Apr 01 10:29:21 server12 systemd[1]: Starting NFS Mount Daemon...
Apr 01 10:29:21 server12 rpc.mountd[6272]: Version 2.5.4 starting
Apr 01 10:29:21 server12 systemd[1]: Started NFS Mount Daemon.
```

```
[root@server12 ~]# systemctl status nfs-idmapd.service
● nfs-idmapd.service - NFSv4 ID-name mapping service
     Loaded: loaded (/usr/lib/systemd/system/nfs-idmapd.service; static)
     Active: active (running) since Tue 2025-04-01 10:29:22 EDT; 2min 13s ago
       Docs: man:idmapd(8)
    Process: 6262 ExecStart=/usr/sbin/rpc.idmapd (code=exited, status=0/SUCCESS)
   Main PID: 6265 (rpc.idmapd)
      Tasks: 1 (limit: 22829)
     Memory: 568.0K
        CPU: 2ms
     CGroup: /system.slice/nfs-idmapd.service
             └─6265 /usr/sbin/rpc.idmapd

Apr 01 10:29:21 server12 systemd[1]: Starting NFSv4 ID-name mapping service...
Apr 01 10:29:21 server12 rpc.idmapd[6265]: Setting log level to 0
Apr 01 10:29:22 server12 systemd[1]: Started NFSv4 ID-name mapping service.
```

```
[root@server12 ~]# systemctl status rpcbind
● rpcbind.service - RPC Bind
     Loaded: loaded (/usr/lib/systemd/system/rpcbind.service; enabled; preset: enabled)
     Active: active (running) since Tue 2025-04-01 10:29:21 EDT; 2min 51s ago
TriggeredBy: ● rpcbind.socket
       Docs: man:rpcbind(8)
   Main PID: 6266 (rpcbind)
      Tasks: 1 (limit: 22829)
     Memory: 1.6M
        CPU: 11ms
     CGroup: /system.slice/rpcbind.service
             └─6266 /usr/bin/rpcbind -w -f
```

4. Authorize the necessary NFS services through the **firewall.**

```
[root@server12 ~]# firewall-cmd --permanent --add-service=nfs --zone=nm-shared
success
[root@server12 ~]# firewall-cmd --permanent --add-service=rpc-bind --zone=nm-shared
success
[root@server12 ~]# firewall-cmd --permanent --add-service=mountd --zone=nm-shared
success
[root@server12 ~]#
```

5. Verify that the required services are added and allowed in the firewall.

```
[root@server12 ~]# firewall-cmd --reload
success
[root@server12 ~]# firewall-cmd --list-services --zone=nm-shared
dhcp dns mountd nfs rpc-bind ssh
[root@server12 ~]#
```

6. List all **TCP** and **UDP** ports currently listening on the server.

```
[root@server12 ~]# rpcinfo -p
   program vers proto   port  service
    100000    4   tcp    111  portmapper
    100000    3   tcp    111  portmapper
    100000    2   tcp    111  portmapper
    100000    4   udp    111  portmapper
    100000    3   udp    111  portmapper
    100000    2   udp    111  portmapper
    100024    1   udp  57569  status
    100024    1   tcp  33257  status
    100005    1   udp  20048  mountd
    100005    1   tcp  20048  mountd
    100005    2   udp  20048  mountd
    100005    2   tcp  20048  mountd
    100005    3   udp  20048  mountd
    100005    3   tcp  20048  mountd
    100003    3   tcp   2049  nfs
    100003    4   tcp   2049  nfs
    100227    3   tcp   2049  nfs_acl
    100021    1   udp  44013  nlockmgr
    100021    3   udp  44013  nlockmgr
    100021    4   udp  44013  nlockmgr
    100021    1   tcp  38103  nlockmgr
    100021    3   tcp  38103  nlockmgr
    100021    4   tcp  38103  nlockmgr
[root@server12 ~]#
```

7. Identify the **TCP port numbers** used by the NFS services.

```
[root@server12 ~]# netstat -tunap
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State       PID/Program name
tcp        0      0 0.0.0.0:20048           0.0.0.0:*               LISTEN      6272/rpc.mountd
tcp        0      0 127.0.0.1:631           0.0.0.0:*               LISTEN      1060/cupsd
tcp        0      0 0.0.0.0:38103           0.0.0.0:*               LISTEN      -
tcp        0      0 0.0.0.0:33257           0.0.0.0:*               LISTEN      6268/rpc.statd
tcp        0      0 0.0.0.0:111             0.0.0.0:*               LISTEN      1/systemd
tcp        0      0 0.0.0.0:22              0.0.0.0:*               LISTEN      1063/sshd: /usr/sbi
tcp        0      0 0.0.0.0:2049            0.0.0.0:*               LISTEN      -
tcp6       0      0 :::20048                :::*                    LISTEN      6272/rpc.mountd
tcp6       0      0 ::1:631                 :::*                    LISTEN      1060/cupsd
tcp6       0      0 :::40385                :::*                    LISTEN      -
tcp6       0      0 :::111                  :::*                    LISTEN      1/systemd
tcp6       0      0 :::22                   :::*                    LISTEN      1063/sshd: /usr/sbi
tcp6       0      0 :::2049                 :::*                    LISTEN      -
tcp6       0      0 :::49319                :::*                    LISTEN      6268/rpc.statd
udp        0      0 0.0.0.0:5353            0.0.0.0:*                           776/avahi-daemon: r
udp        0      0 0.0.0.0:20048           0.0.0.0:*                           6272/rpc.mountd
udp        0      0 0.0.0.0:52911           0.0.0.0:*                           776/avahi-daemon: r
udp        0      0 192.168.56.130:68       192.168.56.254:67       ESTABLISHED 1028/NetworkManager
udp        0      0 0.0.0.0:111             0.0.0.0:*                           1/systemd
udp        0      0 0.0.0.0:57569           0.0.0.0:*                           6268/rpc.statd
udp        0      0 127.0.0.1:323           0.0.0.0:*                           785/chronyd
udp        0      0 127.0.0.1:932           0.0.0.0:*                           6268/rpc.statd
udp        0      0 0.0.0.0:44013           0.0.0.0:*                           -
udp6       0      0 :::5353                 :::*                                776/avahi-daemon: r
udp6       0      0 :::56672                :::*                                6268/rpc.statd
udp6       0      0 :::46483                :::*                                -
udp6       0      0 :::20048                :::*                                6272/rpc.mountd
udp6       0      0 :::111                  :::*                                1/systemd
udp6       0      0 :::39080                :::*                                776/avahi-daemon: r
udp6       0      0 ::1:323                 :::*                                785/chronyd
[root@server12 ~]#
```

8. What is the name of the **main configuration file** used by the NFS server?

   Nfs.conf

Network share creation

Exercise 1.2: Tasks to perform on AlmaLinux:

Use the root account to complete this exercise

1. Create a user named **teacher1** with UID **1500**.

```
[root@server12 ~]# useradd -u 1500 teacher1
[root@server12 ~]#
```

2. Create a group named **teachers** with GID **1700**.

```
[root@server12 ~]# groupadd -g 1700 teachers
[root@server12 ~]#
```

3. Set the primary group of **teacher1** to **teachers**.

```
[root@server12 ~]# usermod -g teachers teacher1
[root@server12 ~]#
```

4. Using a single command, create the **/mnt/share/IT** directory.

```
[root@server12 ~]# mkdir -p /mnt/share/IT
[root@server12 ~]#
```

5. Change the owner and group of the **/mnt/share/IT** directory to **teacher1** and **teachers.**

```
[root@server12 ~]# chown -R teacher1:teachers /mnt/share/IT
[root@server12 ~]#
```

6. Set the directory permissions of **/mnt/share/IT** to **770**.

```
[root@server12 ~]# chmod -R 770 /mnt/share/IT
[root@server12 ~]#
```

7. List the contents of **/mnt/share/IT** to verify the configuration.

```
drwxrwx---. 2 teacher1 teachers 6 Apr  1 11:16 /mnt/share/IT
[root@server12 ~]#
```

8. Configure NFS to make the **/mnt/share/IT** directory accessible to the **192.168.50.0/24** network with **read** and **write** permissions.

```
[root@server12 etc]# vim /etc/exports
```

```
/mnt/share/IT           192.168.50.0/24(rw)
~
~
~
```

9. Export the directory.

```
[root@server12 etc]# exportfs -arv
exporting 192.168.50.0/24:/mnt/share/IT
[root@server12 etc]#
```

10. View the current list of exported directories.

```
[root@server12 etc]# exportfs -s
/mnt/share/IT  192.168.50.0/24(sync,wdelay,hide,no_subtree_check,sec=sys,rw,secure,root_squash,no_all_squash)
[root@server12 etc]#
```

Mounting shared directories on the client

Exercise 1.3: Tasks to perform on Ubuntu:

Use your Ubuntu user account to complete this exercise on Ubuntu

1. Install the **NFS client** on **Ubuntu**.

```
lmohammed@client12:~$ sudo apt -y install nfs-common nfs4-acl-tools
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libwpe-1.0-1 libwpebackend-fdo-1.0-1
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  keyutils libevent-core-2.1-7 libnfsidmap1 rpcbind
Suggested packages:
  open-iscsi watchdog
The following NEW packages will be installed:
  keyutils libevent-core-2.1-7 libnfsidmap1 nfs-common nfs4-acl-tools rpcbind
0 upgraded, 6 newly installed, 0 to remove and 26 not upgraded.
Need to get 502 kB of archives.
After this operation, 1,792 kB of additional disk space will be used.
Get:1 http://ca.archive.ubuntu.com/ubuntu jammy/main amd64 libevent-core-2.1-7 a
md64 2.1.12-stable-1build3 [93.9 kB]
Get:2 http://ca.archive.ubuntu.com/ubuntu jammy-updates/main amd64 libnfsidmap1
amd64 1:2.6.1-1ubuntu1.2 [42.9 kB]
Get:3 http://ca.archive.ubuntu.com/ubuntu jammy/main amd64 rpcbind amd64 1.2.6-2
build1 [46.6 kB]
Get:4 http://ca.archive.ubuntu.com/ubuntu jammy/main amd64 keyutils amd64 1.6.1-
2ubuntu3 [50.4 kB]
```

2. Run a command to list the directories exported by the NFS server.

```
lmohammed@client12:~$ showmount -e 192.168.50.10
Export list for 192.168.50.10:
/mnt/share/IT 192.168.50.0/24
lmohammed@client12:~$
```

3. Create the user **teacher1** and the group **teachers** using the **same UID** and **GID** as in the previous exercise. Assign the password alma to the teacher1 user.

```
root@client12:~# groupadd -g 1700 teachers
```

```
root@client12:~# sudo adduser --ingroup teachers -u 1500 teacher1
Adding user `teacher1' ...
Adding new user `teacher1' (1500) with group `teachers' ...
Creating home directory `/home/teacher1' ...
Copying files from `/etc/skel' ...
New password:
BAD PASSWORD: The password is shorter than 8 characters
Retype new password:
passwd: password updated successfully
Changing the user information for teacher1
Enter the new value, or press ENTER for the default
        Full Name []: teacher1
        Room Number []:
        Work Phone []:
        Home Phone []:
        Other []:
Is the information correct? [Y/n] y
root@client12:~#
```

4. Create the local directory: **/share/tech**.

```
root@client12:~# mkdir -p /share/tech
root@client12:~#
```

5. Mount the **/mnt/share/IT** directory exported by the **AlmaLinux** server to the local **/share/tech** directory on **Ubuntu**.

```
root@client12:~# sudo mount -t nfs 192.168.50.10:/mnt/share/IT /share/tech
```

6. Run a command to confirm that the NFS share has been successfully mounted.

```
root@client12:~# mount | grep nfs
192.168.50.10:/mnt/share/IT on /share/tech type nfs4 (rw,relatime,vers=4.2,rsize
=524288,wsize=524288,namlen=255,hard,proto=tcp,timeo=600,retrans=2,sec=sys,clien
taddr=192.168.50.20,local_lock=none,addr=192.168.50.10)
root@client12:~#
```

7. Use the **su -** command to switch to the **teacher1** user.

```
root@client12:~# su - teacher1
teacher1@client12:~$
```

8. Try to create a text file in the **/share/tech** directory. Are you able to create the file? Why or why not?

```
teacher1@client12:/share/tech$ ls -la
total 4
drwxrwx--- 2 teacher1 teachers   23 Apr  2 10:33 .
drwxr-xr-x 3 root     root     4096 Apr  2 10:29 ..
-rw-r--r-- 1 teacher1 teachers    0 Apr  2 10:33 test1.txt
teacher1@client12:/share/tech$
```

Because we gave the user teacher1 read and write permissions to the shared directory

9. Return to the **AlmaLinux** server and check the contents of the **/mnt/share/IT** directory. What do you observe?

```
[root@server12 IT]# ls -la
total 0
drwxrwx---. 2 teacher1 teachers 23 Apr  2 10:33 .
drwxr-xr-x. 3 root     root     16 Apr  1 13:52 ..
-rw-r--r--. 1 teacher1 teachers  0 Apr  2 10:33 test1.txt
[root@server12 IT]#
```

The newly created file by teacher1 is visible.

10. Go back to **Ubuntu** and **log out** from the **teacher1** session.

```
teacher1@client12:/share/tech$ exit
logout
```

11. Unmount the **/share/tech** directory.

```
root@client12:~# umount /share/tech
root@client12:~#
```

12. Ensure that the **/share/tech** directory is now empty.

```
root@client12:~# ls -l /share/tech
total 0
root@client12:~#
```