

## 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.

**dnf install nfs-utils -y**

```
[root@server1 ~]#
[root@server1 ~]# dnf install -y nfs-utils
Last metadata expiration check: 2:45:09 ago on Tue 01 Apr 2025 07:49:51 AM.
Dependencies resolved.
=====
Package                               Architecture      Version            Repository          Size
=====
Installing:
nfs-utils                             x86_64            1:2.5.4-27.el9    baseos               431 k
Installing dependencies:
gssproxy                              x86_64            0.8.4-7.el9       baseos               108 k
libev                                  x86_64            4.33-5.el9        baseos               52 k
libnfsidmap                           x86_64            1:2.5.4-27.el9    baseos               59 k
libverto-libev                        x86_64            0.3.2-3.el9       baseos               13 k
rpcbind                               x86_64            1.2.0-7.el9       baseos               56 k
sssd-nfs-idmap                        x86_64            2.9.3-4.el9_5.4   baseos               38 k
=====
Transaction Summary
-----
Install 7 Packages
```

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

**Systemctl enable --now nfs-server**

```
[root@server1 ~]#
[root@server1 ~]# systemctl enable --now nfs-server
Created symlink /etc/systemd/system/multi-user.target.wants/nfs-server.service → /usr/lib/systemd/system/nfs-server.service.
[root@server1 ~]# systemctl status nf
```

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

**systemctl status nf-server.service**

```
[root@server1 ~]# systemctl status nf
nfs-blkmap.service nfs-client.target nfsdclld.service nfs-idmapd.service nfs-mountd.service nfs-server.service nfs-utils.service nftables.service
[root@server1 ~]# systemctl status nfs-server.service
● 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 10:42:54 EDT; 18s ago
     Docs: man:rpc.nfsd(8)
           man:exportfs(8)
   Process: 59003 ExecStartPre=/usr/sbin/exportfs -r (code=exited, status=0/SUCCESS)
   Process: 59004 ExecStart=/usr/sbin/rpc.nfsd (code=exited, status=0/SUCCESS)
   Process: 59019 ExecStart=/bin/sh -c if systemctl -q is-active gssproxy; then systemctl reload gssproxy; fi (code=exited, status=0/SUCCESS)
   Main PID: 59019 (code=exited, status=0/SUCCESS)
    CPU: 13ms

Apr 01 10:42:54 server1 systemd[1]: Starting NFS server and services...
Apr 01 10:42:54 server1 systemd[1]: Finished NFS server and services.
[root@server1 ~]# systemctl status r
```

**systemctl status rpcbind**

```
[root@server1 ~]# 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 10:42:53 EDT; 5min ago
   TriggeredBy: ● rpcbind.socket
     Docs: man:rpcbind(8)
    Main PID: 58996 (rpcbind)
      Tasks: 1 (limit: 22829)
     Memory: 1.0M
        CPU: 10ms
     CGroup: /system.slice/rpcbind.service
            └─58996 /usr/bin/rpcbind -w -f

Apr 01 10:42:53 server1 systemd[1]: Starting RPC Bind...
Apr 01 10:42:53 server1 systemd[1]: Started RPC Bind.
[root@server1 ~]#
```

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

```
firewall-cmd --permanent --add-service=nfs --zone=nm-shared
```

```
firewall-cmd --permanent --add-service=rpc-bind --zone=nm-shared
```

```
firewall-cmd --permanent --add-service=mountd --zone=nm-shared
```

```
[root@server1 ~]# firewall-cmd --permanent --add-service=nfs --zone=nm-shared
success
[root@server1 ~]# firewall-cmd --permanent --add-service=rpc-bind --zone=nm-shared
success
[root@server1 ~]# firewall-cmd --permanent --add-service=mountd --zone=nm-shared
success
[root@server1 ~]#
```

```
firewall-cmd - -reload
```

```
firewall-cmd      firewallld
[root@server1 ~]# firewall-cmd --reload
success
[root@server1 ~]#
```

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

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

```
[root@server1 ~]# firewall-cmd --list-services --zone=nm-shared
dhcp dns mountd nfs rpc-bind ssh
[root@server1 ~]#
```

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

```
netstat -tunap
```

```
[root@server1 ~]#
[root@server1 ~]# 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      59002/rpc.mountd
tcp        0      0 0.0.0.0:44808*          0.0.0.0:*               LISTEN      -
tcp        0      0 0.0.0.0:55909*          0.0.0.0:*               LISTEN      58998/rpc.statd
tcp        0      0 127.0.0.1:631           0.0.0.0:*               LISTEN      995/cupsd
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      996/sshd: /usr/sbin
tcp        0      0 0.0.0.0:2049*           0.0.0.0:*               LISTEN      -
tcp6       0      0 :::20048*               :::*                     LISTEN      59002/rpc.mountd
tcp6       0      0 :::49985                :::*                     LISTEN      58998/rpc.statd
tcp6       0      0 :::1631                 :::*                     LISTEN      995/cupsd
tcp6       0      0 :::111*                 :::*                     LISTEN      1/systemd
tcp6       0      0 :::22                   :::*                     LISTEN      996/sshd: /usr/sbin
tcp6       0      0 :::2049*                :::*                     LISTEN      -
tcp6       0      0 :::45501                 :::*                     LISTEN      -
udp        0      0 0.0.0.0:111            0.0.0.0:*               1/systemd
udp        0      0 127.0.0.1:323           0.0.0.0:*               787/chronyd
udp        0      0 127.0.0.1:700           0.0.0.0:*               58998/rpc.statd
udp        0      0 0.0.0.0:51924           0.0.0.0:*               766/avahi-daemon: r
udp        0      0 0.0.0.0:56484*          0.0.0.0:*               -
udp        0      0 0.0.0.0:6353            0.0.0.0:*               766/avahi-daemon: r
udp        0      0 0.0.0.0:60967*          0.0.0.0:*               58998/rpc.statd
udp        0      0 0.0.0.0:20048*          0.0.0.0:*               59002/rpc.mountd
udp        0      0 192.168.204.128:68      192.168.204.254:67      ESTABLISHED 972/NetworkManager
udp6       0      0 :::111*                 :::*                     1/systemd
udp6       0      0 :::39221                :::*                     58998/rpc.statd
udp6       0      0 :::1323                 :::*                     787/chronyd
udp6       0      0 :::45789                :::*                     766/avahi-daemon: r
udp6       0      0 :::52147                :::*                     -
udp6       0      0 :::5353                 :::*                     766/avahi-daemon: r
udp6       0      0 :::20048*               :::*                     59002/rpc.mountd
[root@server1 ~]#
```

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

### rpcinfo -p

```
[root@server1 ~]#  
[root@server1 ~]# 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 60967 status  
100024 1 tcp 55909 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 58484 nlockmgr  
100021 3 udp 58484 nlockmgr  
100021 4 udp 58484 nlockmgr  
100021 1 tcp 44809 nlockmgr  
100021 3 tcp 44809 nlockmgr  
100021 4 tcp 44809 nlockmgr  
[root@server1 ~]#
```

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

### /etc/nfs.conf

```
[root@server1 ~]# cat /etc/nfs.conf  
#  
# This is a general configuration for the  
# NFS daemons and tools  
#  
[general]  
# pipefs-directory=/var/lib/nfs/rpc_pipefs  
#  
[nfsrahead]  
# nfs=15000  
# nfs4=16000  
#  
[exports]  
# rootdir=/export  
#  
[exportfs]  
# debug=0  
#  
[gssd]  
# verbosity=0  
# rpc-verbosity=0  
# use-memcache=0  
# use-machine-creds=1  
use-gss-proxy=1  
# avoid-dns=1  
# limit-to-legacy-encetypes=0  
# allowed-encetypes=aes256-cts-hmac-sha384-192,aes128-cts-hmac-sha256-128,camellia256-cts-  
cmac,camellia128-cts-cmac,aes256-cts-hmac-sha1-96,aes128-cts-hmac-sha1-96  
# context-timeout=0  
# rpc-timeout=5  
# keytab-file=/etc/krb5.keytab  
# cred-cache-directory=  
# preferred-realm=  
# set-home=1
```

```
# upcall-timeout=30
# cancel-timed-out-upcalls=0
#
[lockd]
# port=0
# udp-port=0
#
[exportd]
# debug="all|auth|call|general|parse"
# manage-gids=n
# state-directory-path=/var/lib/nfs
# threads=1
# cache-use-ipaddr=n
# ttl=1800
[mountd]
# debug="all|auth|call|general|parse"
# manage-gids=n
# descriptors=0
# port=0
# threads=1
# reverse-lookup=n
# state-directory-path=/var/lib/nfs
# ha-callout=
# cache-use-ipaddr=n
# ttl=1800
#
[nfsdclld]
# debug=0
# storagedir=/var/lib/nfs/nfsdclld
#
[nfsdcltrack]
# debug=0
# storagedir=/var/lib/nfs/nfsdcltrack
#
[nfsd]
# debug=0
# threads=8
# host=
# port=0
# grace-time=90
# lease-time=90
# udp=n
# tcp=y
# vers3=y
# vers4=y
# vers4.0=y
# vers4.1=y
# vers4.2=y
rdma=y
rdma-port=20049

[statd]
# debug=0
# port=0
# outgoing-port=0
# name=
# state-directory-path=/var/lib/nfs/statd
# ha-callout=
# no-notify=0
#
[sm-notify]
# debug=0
# force=0
# retry-time=900
# outgoing-port=
# outgoing-addr=
# lift-grace=y

#tag1234 - Used for install purposes only

[root@server1 ~]#
```

## 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**.

**useradd -u 1500 teacher1**

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

**groupadd -g 1700 teachers**

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

**usermod -g teachers teacher1**

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

**mkdir -p /mnt/share/IT**

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

**chown teacher1:teachers /mnt/share/IT**

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

**chmod 770 /mnt/share/IT**

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

**ls -ld /mnt/share/IT**

```
[root@server1 ~]#  
[root@server1 ~]# useradd -u 1500 teacher1  
[root@server1 ~]# groupadd -g 1700 teachers  
[root@server1 ~]# usermod -g teachers teacher1  
[root@server1 ~]# mkdir -p /mnt/share/IT  
[root@server1 ~]# chown teacher1:teachers /mnt/share/IT  
[root@server1 ~]# chmod 770 /mnt/share/IT  
[root@server1 ~]# ls -lda /mnt/share/IT  
drwxrwx---. 2 teacher1 teachers 6 Apr  1 17:48 /mnt/share/IT  
[root@server1 ~]#
```

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

**Edit the `/etc/exports` file and add the following line:**

**`/mnt/share/IT 192.168.50.0/24(rw,sync,no_all_squash)`**

**This line in the `/etc/exports` file configures the Network File System (NFS) to share the directory `/mnt/share/IT` with devices on the `192.168.50.0/24` network.**

**`vim /mnt/share/IT`**

```
root@server1:~  
/mnt/share/IT 192.168.50.0/24(rw,sync,no_all_squash)  
:
```

9. Export the directory.

### exportfs -arv

- a Export all directories listed in /etc/exports.
- r Re-export all entries (useful after editing /etc/exports).
- v Enable verbose mode to display detailed information about what is being exported.

```
[root@server1 ~]# exportfs -arv
exporting 192.168.50.0/24:/mnt/share/IT
[root@server1 ~]#
```

10. View the current list of exported directories.

### exportfs -v

```
[root@server1 ~]# exportfs -v
/mnt/share/IT 192.168.50.0/24(sync,wdelay,hide,no_subtree_check,sec=sys,rw,secure,root_squash,no_all_squash)
[root@server1 ~]#
```

or

### exportfs -s

```
[root@server1 ~]#
[root@server1 ~]# 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@server1 ~]#
```

### Export Details:

- Directory: `/mnt/share/IT`
- Allowed Clients: `192.168.50.0/24`
- Options: sync, wdelay, hide, no\_subtree\_check, sec=sys, rw, secure, root\_squash, no\_all\_squash
  1. sync: Write changes to disk before acknowledging requests (safer but slower).
  2. wdelay: Delay writes to improve performance (enabled by default).
  3. hide: Hide subdirectories if the parent is exported elsewhere.
  4. no\_subtree\_check: Disable subtree checking (improves reliability for frequently renamed directories).
  5. sec=sys: Use UNIX user/group IDs for authentication.
  6. rw: Allow read and write access.
  7. secure: Restrict exports to ports below 1024 (default).
  8. root\_squash: Map `root` (UID 0) to an anonymous user for security.
  9. no\_all\_squash: Do not map all users to anonymous (preserve client UIDs/GIDs).



### 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.

`sudo apt -y install nfs-common nfs4-acl-tools vim`

```
mperez@client1:~$ sudo apt -y install nfs-common nfs4-acl-tools vim
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  keyutils libevent-core-2.1-7 libnfsidmap1 rpcbind vin-runtime
Suggested packages:
  open-iscsi watchdog ctags vim-doc vim-scripts
The following NEW packages will be installed:
  keyutils libevent-core-2.1-7 libnfsidmap1 nfs-common nfs4-acl-tools rpcbind vin-runtime
0 upgraded, 8 newly installed, 0 to remove and 13 not upgraded.
Need to get 9.067 kB of archives.
After this operation, 39.4 MB of additional disk space will be used.
Get:1 http://ca.archive.ubuntu.com/ubuntu jammy/main amd64 libevent-core-2.1-7 amd64 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 1.2.6-2build1 [46.6 kB]
Get:4 http://ca.archive.ubuntu.com/ubuntu jammy/main amd64 keyutils amd64 1.6-1-ubuntu3 [59.4 kB]
Get:5 http://ca.archive.ubuntu.com/ubuntu jammy-updates/main amd64 nfs-common amd64 1:2.6.1-1ubuntu1.2 [241 kB]
Get:6 http://ca.archive.ubuntu.com/ubuntu jammy-updates/main amd64 vin-runtime all 2:8.2-3995-1ubuntu2.23 [6.833 kB]
Get:7 http://ca.archive.ubuntu.com/ubuntu jammy-updates/main amd64 nfs4-acl-tools amd64 2:8.2-3995-1ubuntu2.23 [1.732 kB]
Get:8 http://ca.archive.ubuntu.com/ubuntu jammy/universe amd64 nfs4-acl-tools amd64 0.3.7-1 [27.5 kB]
Fetched 9.067 kB in 0s (23.4 MB/s)
Selecting previously unselected package libevent-core-2.1-7:amd64.
(Reading database ... 201956 files and directories currently installed.)
Preparing to unpack .../0-libevent-core-2.1-7_2.1.12-stable-1build3_amd64.deb ...
Unpacking libevent-core-2.1-7:amd64 (2.1.12-stable-1build3) ...
Selecting previously unselected package libnfsidmap1:amd64.
Preparing to unpack .../1-libnfsidmap1_1:2.6.1-1ubuntu1.2_amd64.deb ...
Unpacking libnfsidmap1:amd64 (1:2.6.1-1ubuntu1.2) ...
Selecting previously unselected package rpcbind.
Preparing to unpack .../2-rpcbind_1.2.6-2build1_amd64.deb ...
Unpacking rpcbind (1.2.6-2build1) ...
Selecting previously unselected package keyutils.
Preparing to unpack .../3-keyutils_1.6-1-ubuntu3_amd64.deb ...
Unpacking keyutils (1.6-1-ubuntu3) ...
Selecting previously unselected package nfs-common.
Preparing to unpack .../4-nfs-common_1:2.6.1-1ubuntu1.2_amd64.deb ...
Unpacking nfs-common (1:2.6.1-1ubuntu1.2) ...
Selecting previously unselected package vin-runtime.
Preparing to unpack .../5-vin-runtime_2:8.2-3995-1ubuntu2.23_all.deb ...
Adding diversion of /usr/share/vin/vlnb2/doc/help.txt to /usr/share/vin/vlnb2/doc/help.txt.vin-runtime'
Adding diversion of /usr/share/vin/vlnb2/doc/tags to /usr/share/vin/vlnb2/doc/tags.vin-runtime'
Unpacking vin-runtime (2:8.2-3995-1ubuntu2.23) ...
Selecting previously unselected package vim.
Preparing to unpack .../6-vim_2:8.2-3995-1ubuntu2.23_amd64.deb ...
Unpacking vim (2:8.2-3995-1ubuntu2.23) ...
Unpacking vim (2:8.2-3995-1ubuntu2.23) ...
Unpacking nfs4-acl-tools (0.3.7-1) ...
Setting up libnfsidmap1:amd64 (1:2.6.1-1ubuntu1.2) ...
Setting up rpcbind (1.2.6-2build1) ...
Created symlink /etc/systemd/system/multi-user.target.wants/rpcbind.service → /lib/systemd/system/rpcbind.service.
Created symlink /etc/systemd/system/sockets.target.wants/rpcbind.socket → /lib/systemd/system/rpcbind.socket.
Setting up libevent-core-2.1-7:amd64 (2.1.12-stable-1build3) ...
Setting up nfs4-acl-tools (0.3.7-1) ...
Setting up keyutils (1.6-1-ubuntu3) ...
Setting up vin-runtime (2:8.2-3995-1ubuntu2.23) ...
Setting up vim (2:8.2-3995-1ubuntu2.23) ...
update-alternatives: using /usr/bin/vim.basic to provide /usr/bin/vim (vim) in auto mode
update-alternatives: using /usr/bin/vim.basic to provide /usr/bin/vimdiff (vimdiff) in auto mode
update-alternatives: using /usr/bin/vim.basic to provide /usr/bin/vim (vi) in auto mode
update-alternatives: using /usr/bin/vim.basic to provide /usr/bin/rview (rview) in auto mode
update-alternatives: using /usr/bin/vim.basic to provide /usr/bin/vi (vi) in auto mode
update-alternatives: using /usr/bin/vim.basic to provide /usr/bin/rview (rview) in auto mode
update-alternatives: using /usr/bin/vim.basic to provide /usr/bin/ex (ex) in auto mode
Setting up nfs-common (1:2.6.1-1ubuntu1.2) ...
Creating config file /etc/idmapd.conf with new version
Creating config file /etc/nfs.conf with new version
Adding system user 'nfsd' (UID 130) ...
Adding new user 'nfsd' (UID 130) with group 'nogroup' ...
Not creating home directory /var/lib/nfs/.
Created symlink /etc/systemd/system/multi-user.target.wants/nfs-client.target → /lib/systemd/system/nfs-client.target.
Created symlink /etc/systemd/system/remote-fs.target.wants/nfs-client.target → /lib/systemd/system/nfs-client.target.
auth-rpcgss-module.service is a disabled or a static unit, not starting it.
nfs-ldm.service is a disabled or a static unit, not starting it.
nfs-umds.service is a disabled or a static unit, not starting it.
procfs-nfsd.mount is a disabled or a static unit, not starting it.
rpc-gssd.service is a disabled or a static unit, not starting it.
rpc-statd-notify.service is a disabled or a static unit, not starting it.
rpc-statd.service is a disabled or a static unit, not starting it.
rpc-svcgssd.service is a disabled or a static unit, not starting it.
rpc_uhpd.target is a disabled or a static unit, not starting it.
var-lib-nfs-rpc-pipefs.mount is a disabled or a static unit, not starting it.
Processing triggers for man-db (2.10.2-1) ...
Processing triggers for libc-bin (2.35-0ubuntu3.9) ...
mperez@client1:~$ sudo apt upgrade
```

```
Unpacking vim (2:8.2-3995-1ubuntu2.23) ...
Selecting previously unselected package nfs4-acl-tools.
Preparing to unpack .../7-nfs4-acl-tools_0.3.7-1_amd64.deb ...
Unpacking nfs4-acl-tools (0.3.7-1) ...
Setting up libnfsidmap1:amd64 (1:2.6.1-1ubuntu1.2) ...
Setting up rpcbind (1.2.6-2build1) ...
Created symlink /etc/systemd/system/multi-user.target.wants/rpcbind.service → /lib/systemd/system/rpcbind.service.
Created symlink /etc/systemd/system/sockets.target.wants/rpcbind.socket → /lib/systemd/system/rpcbind.socket.
Setting up libevent-core-2.1-7:amd64 (2.1.12-stable-1build3) ...
Setting up nfs4-acl-tools (0.3.7-1) ...
Setting up keyutils (1.6-1-ubuntu3) ...
Setting up vin-runtime (2:8.2-3995-1ubuntu2.23) ...
Setting up vim (2:8.2-3995-1ubuntu2.23) ...
update-alternatives: using /usr/bin/vim.basic to provide /usr/bin/vim (vim) in auto mode
update-alternatives: using /usr/bin/vim.basic to provide /usr/bin/vimdiff (vimdiff) in auto mode
update-alternatives: using /usr/bin/vim.basic to provide /usr/bin/vim (vi) in auto mode
update-alternatives: using /usr/bin/vim.basic to provide /usr/bin/rview (rview) in auto mode
update-alternatives: using /usr/bin/vim.basic to provide /usr/bin/vi (vi) in auto mode
update-alternatives: using /usr/bin/vim.basic to provide /usr/bin/rview (rview) in auto mode
update-alternatives: using /usr/bin/vim.basic to provide /usr/bin/ex (ex) in auto mode
Setting up nfs-common (1:2.6.1-1ubuntu1.2) ...
Creating config file /etc/idmapd.conf with new version
Creating config file /etc/nfs.conf with new version
Adding system user 'nfsd' (UID 130) ...
Adding new user 'nfsd' (UID 130) with group 'nogroup' ...
Not creating home directory /var/lib/nfs/.
Created symlink /etc/systemd/system/multi-user.target.wants/nfs-client.target → /lib/systemd/system/nfs-client.target.
Created symlink /etc/systemd/system/remote-fs.target.wants/nfs-client.target → /lib/systemd/system/nfs-client.target.
auth-rpcgss-module.service is a disabled or a static unit, not starting it.
nfs-ldm.service is a disabled or a static unit, not starting it.
nfs-umds.service is a disabled or a static unit, not starting it.
procfs-nfsd.mount is a disabled or a static unit, not starting it.
rpc-gssd.service is a disabled or a static unit, not starting it.
rpc-statd-notify.service is a disabled or a static unit, not starting it.
rpc-statd.service is a disabled or a static unit, not starting it.
rpc-svcgssd.service is a disabled or a static unit, not starting it.
rpc_uhpd.target is a disabled or a static unit, not starting it.
var-lib-nfs-rpc-pipefs.mount is a disabled or a static unit, not starting it.
Processing triggers for man-db (2.10.2-1) ...
Processing triggers for libc-bin (2.35-0ubuntu3.9) ...
mperez@client1:~$ sudo apt upgrade
```

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

`showmount -e 192.168.50.10`

```
mperez@client1:~$ ssh mperez@client1
mperez@client1:~/.ssh$ showmount -e 192.168.50.10
Export list for 192.168.50.10:
/mnt/share/IT 192.168.50.0/24
mperez@client1:~/.ssh$
```

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.

`sudo groupadd -g 1700 teachers`

`sudo adduser --ingroup teachers -u 1500 teacher1`

## Lab 7.1 - Installation and Configuration of NFS

```
mperez@client1:~/.ssh$ sudo groupadd -g 1700 teachers
[sudo] password for mperez:
mperez@client1:~/.ssh$ 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 []: Nikola Tesla
    Room Number []: 111
    Work Phone []: 555-555-5555
    Home Phone []: 444-444-4444
    Other []: Inventor
Is the information correct? [Y/n] y
mperez@client1:~/.ssh$
```

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

**sudo mkdir -p /share/tech**

```
mperez@client1:~/.ssh$ sudo mkdir -p /share/tech
mperez@client1:~/.ssh$
```

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

**sudo mount 192.168.50.10:/mnt/share/IT /share/tech**

```
mperez@client1:~/.ssh$
mperez@client1:~/.ssh$ sudo mount -t nfs 192.168.50.10:/mnt/share/IT /share/tech/
mperez@client1:~/.ssh$
```

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

**sudo mount | grep nfs**

```
mperez@client1:~/.ssh$
mperez@client1:~/.ssh$ sudo mount | grep nfs
192.168.50.10:/mnt/share/IT on /share/tech type nfs4 (rw,relatime,vers=4.2,rsize=524288,wsz=524288,namlen=255,hard,proto=tcp,timeo=600,retrans=2,sec=sys,clientaddr=192.168.50.20,local_lock=none,addr=192.168.50.10)
mperez@client1:~/.ssh$
mperez@client1:~/.ssh$ df -h | grep '/share/tech'
192.168.50.10:/mnt/share/IT 40G 5.3G 35G 14% /share/tech
mperez@client1:~/.ssh$
```

**df -h**

```
mperez@client1:~/.ssh$ df -h
Filesystem      Size  Used Avail Use% Mounted on
tmpfs           387M  2.0M  385M   1% /run
/dev/sda6       22G   8.6G   12G  43% /
tmpfs           1.9G   14M   1.9G   1% /dev/shm
tmpfs           5.0M   4.0K   5.0M   1% /run/lock
/dev/sda4       944M  198M  682M  23% /boot
/dev/sda2       976M   6.1M  969M   1% /boot/efi
/dev/sda5       4.6G  254M   4.1G   6% /home
tmpfs           387M  108K   387M   1% /run/user/1000
192.168.50.10:/mnt/share/IT 40G  5.3G  35G  14% /share/tech
mperez@client1:~/.ssh$
```

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

**su - teacher1**



```
mperez@client1:~/.ssh$
mperez@client1:~/.ssh$ su - teacher1
Password:
teacher1@client1:~$
teacher1@client1:~$
teacher1@client1:~$
```

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

Yes I am able to create the file, as we can see the permissions for folder **/share/tech** the user **teacher1** is able to read, write and execute.

**touch /share/tech/testfile.txt**

**ll -a /share/tech/**

```
teacher1@client1:~$
teacher1@client1:~$ touch /share/tech/testfile.txt
teacher1@client1:~$ ll -a /share/tech/
total 4
drwxrwx--- 2 teacher1 teachers 26 Apr 1 21:05 ./
drwxr-xr-x 3 root      root    4096 Apr 1 20:50 ../
-rw-r--r-- 1 teacher1 teachers  0 Apr 1 21:05 testfile.txt
teacher1@client1:~$
```

```
teacher1@client1:~$ ll -a /share/
total 8
drwxr-xr-x 3 root      root    4096 Apr 1 20:50 ./
drwxr-xr-x 22 root      root    4096 Apr 1 20:50 ../
drwxrwx--- 2 teacher1 teachers 26 Apr 1 21:05 tech/
teacher1@client1:~$
```

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

**ll -a /mnt/share/IT/**

The directory includes **testfile.txt** file created by **teacher1** in **Ubuntu** client.

```
[root@server1 ~]# ll -a /mnt/share/IT/
total 0
drwxrwx--- 2 teacher1 teachers 26 Apr 1 21:05 .
drwxr-xr-x 3 root      root    16 Apr 1 17:48 ..
-rw-r--r-- 1 teacher1 teachers  0 Apr 1 21:05 testfile.txt
```

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

**exit**

```
teacher1@client1:~$ exit
logout
mperez@client1:~/.ssh$
mperez@client1:~/.ssh$
```

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

**sudo umount /share/tech**

```
mperez@client1:~/.ssh$
mperez@client1:~/.ssh$ sudo umount /share/tech/
mperez@client1:~/.ssh$
```

Check is not mounted

`sudo mount | grep nfs`

`df -h`

```
mperez@client1:~/.ssh$ sudo mount | grep nfs
mperez@client1:~/.ssh$ df -h
Filesystem      Size  Used Avail Use% Mounted on
tmpfs           387M  2.0M  385M   1% /run
/dev/sda6        22G   8.6G   12G  43% /
tmpfs           1.9G   14M   1.9G   1% /dev/shm
tmpfs           5.0M   4.0K   5.0M   1% /run/lock
/dev/sda4        944M  198M  682M  23% /boot
/dev/sda2        976M   6.1M  969M   1% /boot/efi
/dev/sda5        4.6G  254M   4.1G   6% /home
tmpfs           387M  108K   387M   1% /run/user/1000
mperez@client1:~/.ssh$
```

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

`sudo ls -la /share/tech`

```
mperez@client1:~/.ssh$ sudo ls -la /share/tech/
total 8
drwxr-xr-x 2 root root 4096 Apr  1 20:50 .
drwxr-xr-x 3 root root 4096 Apr  1 20:50 ..
mperez@client1:~/.ssh$
```