

# NFS(NETWORK FILE SYSTEM)

- Network File System is a protocol that works on all the networks of IP-based.
- It is implemented in that client/server application in which the server of NFS manages the authorization, authentication, and clients.

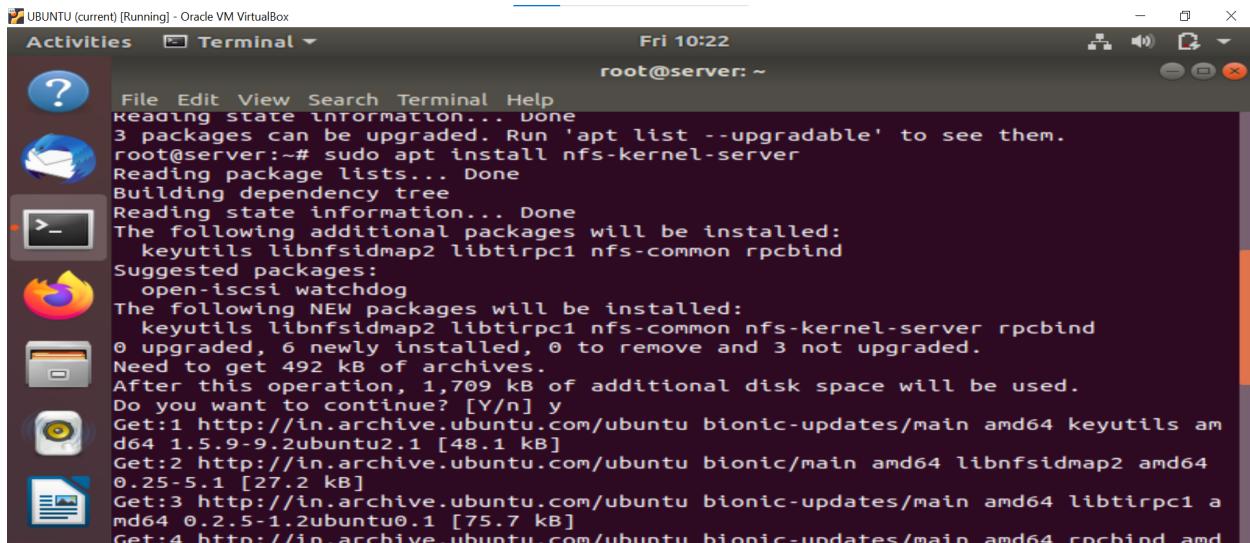
## Downloading and Installing the Components

### On the Host

On the host server, install the nfs-kernel-server

```
sudo apt update
```

```
sudo apt install nfs-kernel-server
```

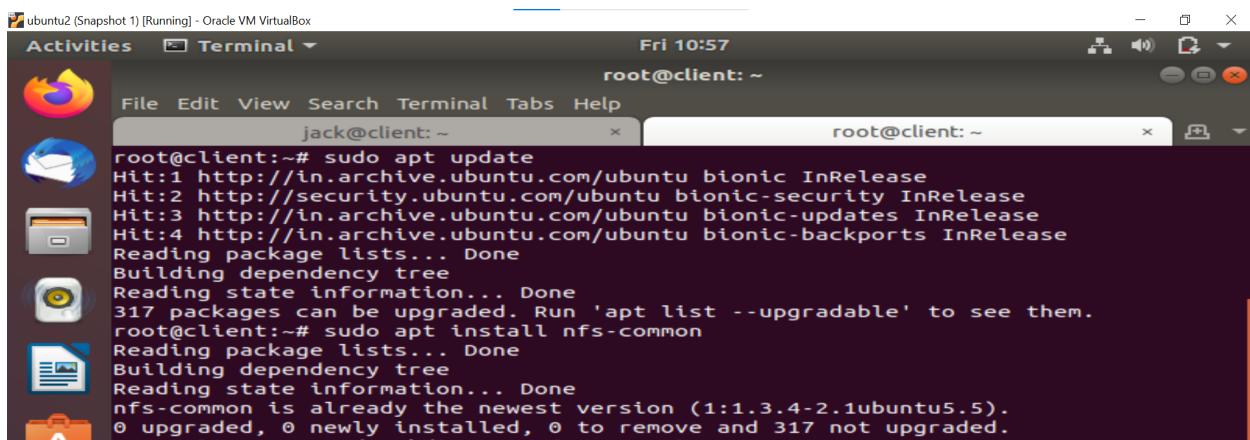


```
UBUNTU (current) [Running] - Oracle VM VirtualBox
Activities Terminal Fri 10:22
root@server: ~
File Edit View Search Terminal Help
Reading state information... done
3 packages can be upgraded. Run 'apt list --upgradable' to see them.
root@server:~# sudo apt install nfs-kernel-server
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  keyutils libnfsidmap2 libtirpc1 nfs-common rpcbind
Suggested packages:
  open-iscsi watchdog
The following NEW packages will be installed:
  keyutils libnfsidmap2 libtirpc1 nfs-common nfs-kernel-server rpcbind
0 upgraded, 6 newly installed, 0 to remove and 3 not upgraded.
Need to get 492 kB of archives.
After this operation, 1,709 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://in.archive.ubuntu.com/ubuntu bionic-updates/main amd64 keyutils am
d64 1.5.9-9.2ubuntu2.1 [48.1 kB]
Get:2 http://in.archive.ubuntu.com/ubuntu bionic/main amd64 libnfsidmap2 amd64
0.25-5.1 [27.2 kB]
Get:3 http://in.archive.ubuntu.com/ubuntu bionic-updates/main amd64 libtirpc1 a
md64 0.2.5-1.2ubuntu0.1 [75.7 kB]
Get:4 http://in.archive.ubuntu.com/ubuntu bionic/main amd64 rpcbind amd
```

### On the Client

```
sudo apt update
```

```
sudo apt install nfs-common
```



```
ubuntu2 (Snapshot 1) [Running] - Oracle VM VirtualBox
Activities Terminal Fri 10:57
root@client: ~
File Edit View Search Terminal Tabs Help
jack@client: ~ root@client: ~
root@client:~# sudo apt update
Hit:1 http://in.archive.ubuntu.com/ubuntu bionic InRelease
Hit:2 http://security.ubuntu.com/ubuntu bionic-security InRelease
Hit:3 http://in.archive.ubuntu.com/ubuntu bionic-updates InRelease
Hit:4 http://in.archive.ubuntu.com/ubuntu bionic-backports InRelease
Reading package lists... Done
Building dependency tree
Reading state information... Done
317 packages can be upgraded. Run 'apt list --upgradable' to see them.
root@client:~# sudo apt install nfs-common
Reading package lists... Done
Building dependency tree
Reading state information... Done
nfs-common is already the newest version (1:1.3.4-2.1ubuntu5.5).
0 upgraded, 0 newly installed, 0 to remove and 317 not upgraded.
```

## Step 2 – Creating the Share Directories on the Host

First, make the share directory:

```
sudo mkdir /var/nfs/general -p
```

```
ls -la /var/nfs/general
```

```
Processing triggers for libtalloc-dbin (2.27-3ubuntu0.8) ...
root@server:~# sudo mkdir /var/nfs/general -p
root@server:~# ls -la /var/nfs/general
total 8
drwxr-xr-x 2 root root 4096 Aug 11 10:18 .
drwxr-xr-x 3 root root 4096 Aug 11 10:18 ..
root@server:~# sudo chown nobody:nogroup /var/nfs/general
root@server:~#
```

NFS will translate any root operations on the client to `nobody:nogroup` credentials as a security measure.

```
sudo chown nobody:nogroup /var/nfs/general
```

```
Processing triggers for libtalloc-dbin (2.27-3ubuntu0.8) ...
root@server:~# sudo mkdir /var/nfs/general -p
root@server:~# ls -la /var/nfs/general
total 8
drwxr-xr-x 2 root root 4096 Aug 11 10:18 .
drwxr-xr-x 3 root root 4096 Aug 11 10:18 ..
root@server:~# sudo chown nobody:nogroup /var/nfs/general
root@server:~#
```

## Exporting the Home Directory

### Step 3 – Configuring the NFS Exports on the Host Server

```
sudo nano /etc/exports
```

```
File Edit View Search Terminal Help
GNU nano 2.9.3          /etc/exports
root@server: ~

# /etc/exports: the access control list for filesystems which may be exported
#           to NFS clients. See exports(5).
#
# Example for NFSv2 and NFSv3:
# /srv/homes      hostname1(rw,sync,no_subtree_check) hostname2(ro,sync,no_su$#
#
# Example for NFSv4:
# /srv/nfs4       gss/krb5i(rw,sync,fsid=0,crossmnt,no_subtree_check)
# /srv/nfs4/homes gss/krb5i(rw,sync,no_subtree_check)
#
# /var/nfs/general   192.168.1.86(rw,sync,no_subtree_check)
# /home            192.168.1.86(rw,sync,no_root_squash,no_subtree_check)
```

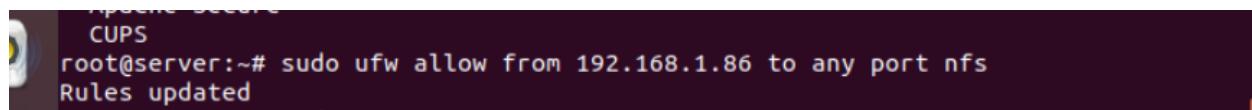
```
sudo systemctl restart nfs-kernel-server
```

```
sudo ufw status
```

```
root@server:~# sudo ufw status verbose
Status: active
Logging: on (low)
Default: deny (incoming), allow (outgoing), disabled (routed)
New profiles: skip

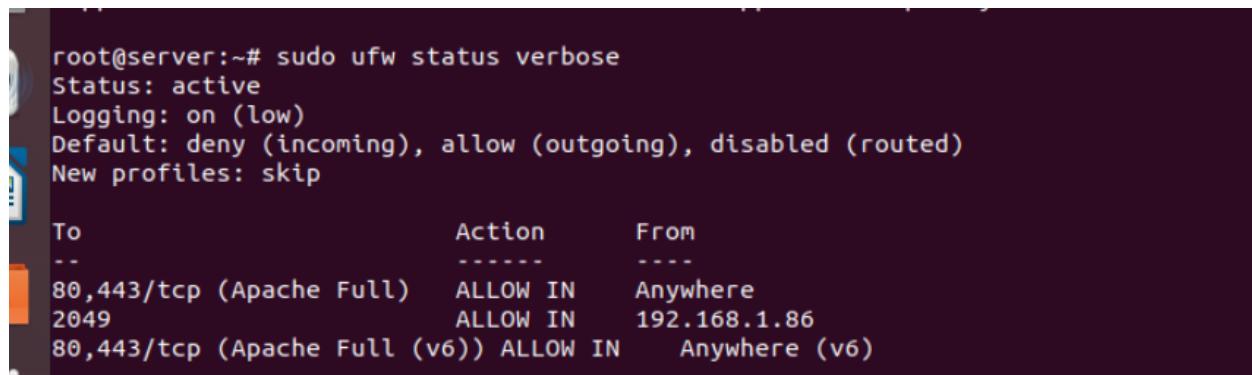
To                         Action      From
--                         --         --
80,443/tcp (Apache Full)  ALLOW IN   Anywhere
2049                       ALLOW IN   192.168.1.86
80,443/tcp (Apache Full (v6)) ALLOW IN   Anywhere (v6)
```

```
sudo ufw allow from client_ip to any port nfs
```



```
root@server:~# sudo ufw allow from 192.168.1.86 to any port nfs
Rules updated
```

```
sudo ufw status
```



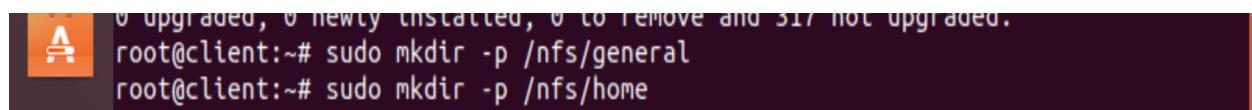
```
root@server:~# sudo ufw status verbose
Status: active
Logging: on (low)
Default: deny (incoming), allow (outgoing), disabled (routed)
New profiles: skip

To                         Action      From
--                         --          --
80,443/tcp (Apache Full)  ALLOW IN   Anywhere
2049                       ALLOW IN   192.168.1.86
80,443/tcp (Apache Full (v6)) ALLOW IN   Anywhere (v6)
```

## Step 5 – Creating Mount Points and Mounting Directories on the Client

```
sudo mkdir -p /nfs/general
```

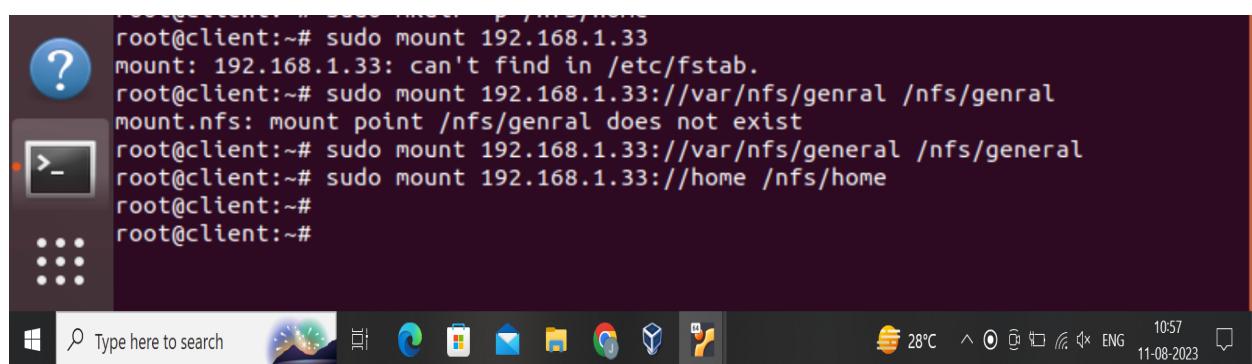
```
sudo mkdir -p /nfs/home
```



```
root@client:~# sudo mkdir -p /nfs/general
root@client:~# sudo mkdir -p /nfs/home
```

```
sudo mount host_ip:/var/nfs/general /nfs/general
```

```
sudo mount host_ip:/home /nfs/home
```



```
root@client:~# sudo mount 192.168.1.33
mount: 192.168.1.33: can't find in /etc/fstab.
root@client:~# sudo mount 192.168.1.33://var/nfs/genral /nfs/genral
mount.nfs: mount point /nfs/genral does not exist
root@client:~# sudo mount 192.168.1.33://var/nfs/general /nfs/general
root@client:~# sudo mount 192.168.1.33://home /nfs/home
root@client:~#
root@client:~#
```

```
df -h
```

```
root@client:~# df -h
Filesystem      Size  Used Avail Use% Mounted on
udev            970M    0  970M   0% /dev
tmpfs           199M  1.6M 198M   1% /run
/dev/sda5        11G  5.7G  3.9G  60% /
tmpfs           994M    0  994M   0% /dev/shm
tmpfs            5.0M  4.0K  5.0M   1% /run/lock
tmpfs           994M    0  994M   0% /sys/fs/cgroup
/dev/loop0       2.5M  2.5M    0 100% /snap/gnome-calculator/884
/dev/loop1       2.5M  2.5M    0 100% /snap/gnome-system-monitor/163
/dev/loop2       219M  219M    0 100% /snap/gnome-3-34-1804/72
/dev/loop3        66M  66M    0 100% /snap/gtk-common-themes/1515
/dev/loop4        33M  33M    0 100% /snap/snapd/12883
/dev/loop5        62M  62M    0 100% /snap/core20/1081
/dev/loop6       768K  768K    0 100% /snap/gnome-characters/726
/dev/loop7       242M  242M    0 100% /snap/gnome-3-38-2004/70
/dev/loop8        56M  56M    0 100% /snap/core18/2128
/dev/loop9       640K  640K    0 100% /snap/gnome-logs/106
tmpfs           199M  16K  199M   1% /run/user/121
tmpfs           199M  28K  199M   1% /run/user/1000
tmpfs           199M    0  199M   0% /run/user/0
```

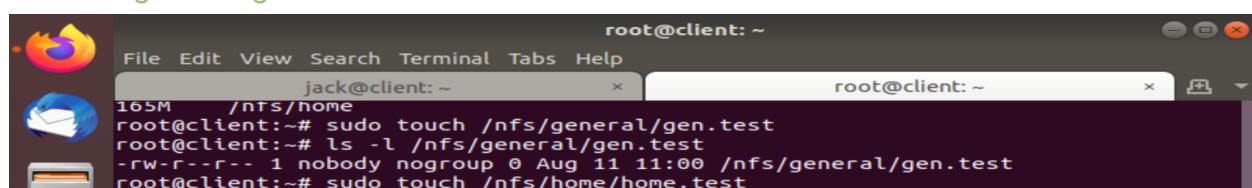
```
du -sh /nfs/home
```

```
root@client:~# du -sh /nfs/home
4.0K  /nfs/home
root@client:~#
root@client:~#
root@client:~#
root@client:~#
```

Testing NFS Access

```
sudo touch /nfs/general/general.test
```

```
ls -l /nfs/general/general.test
```

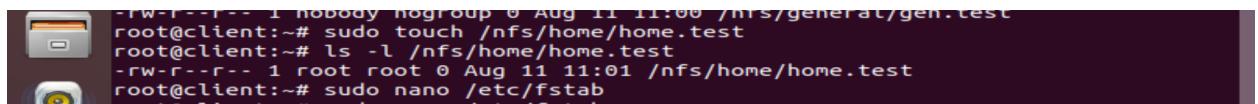


```
root@client: ~
File Edit View Search Terminal Tabs Help
jack@client: ~
root@client:~# sudo touch /nfs/general/gen.test
root@client:~# ls -l /nfs/general/gen.test
-rw-r--r-- 1 nobody nogroup 0 Aug 11 11:00 /nfs/general/gen.test
root@client:~# sudo touch /nfs/home/home.test
```

## The Home Directory Share

```
sudo touch /nfs/home/home.test
```

```
ls -l /nfs/home/home.test
```



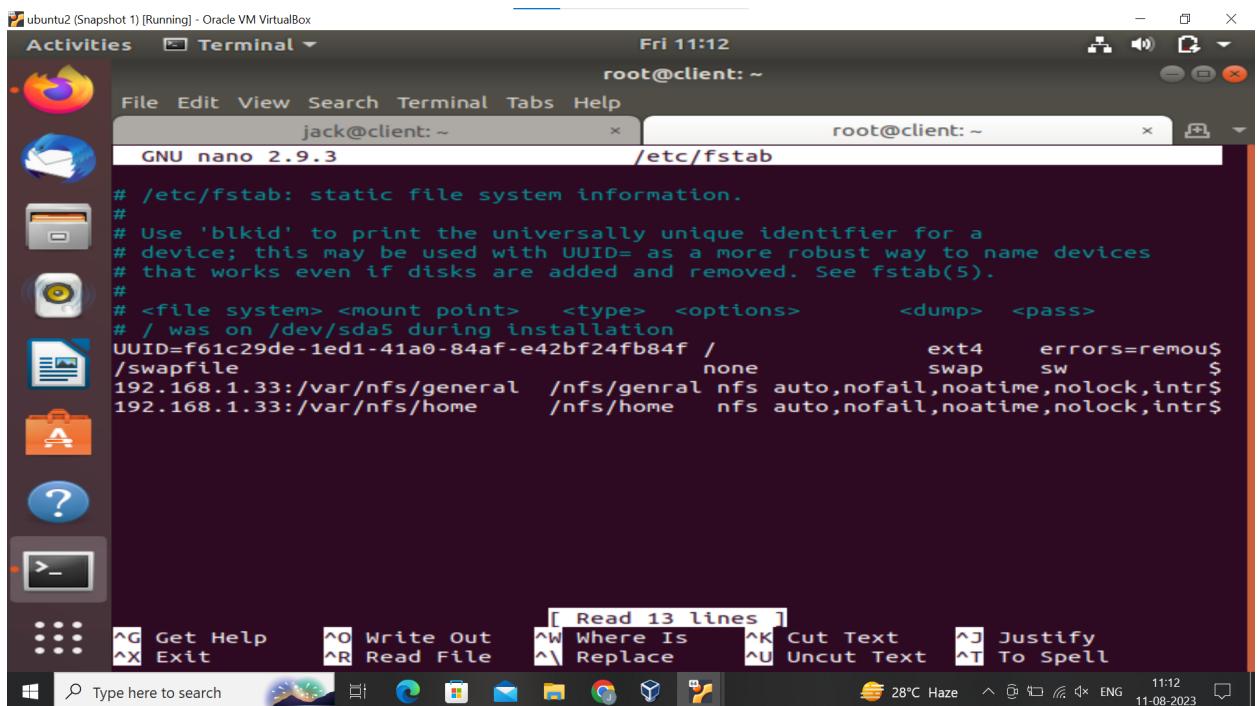
```
-rw-r--r-- 1 nobody nogroup 0 Aug 11 11:00 /nfs/general/gen.test
root@client:~# sudo touch /nfs/home/home.test
root@client:~# ls -l /nfs/home/home.test
-rw-r--r-- 1 root root 0 Aug 11 11:01 /nfs/home/home.test
root@client:~# sudo nano /etc/fstab
```

## Mounting the Remote NFS Directories at Boot

```
sudo nano /etc/fstab
```



```
# /etc/fstab: static file system information.
#
# Use 'blkid' to print the universally unique identifier for a
# device; this may be used with UUID= as a more robust way to name devices
# that works even if disks are added and removed. See fstab(5).
#
# <file system> <mount point> <type> <options> <dump> <pass>
# / was on /dev/sda5 during installation
UUID=f61c29de-1ed1-41a0-84af-e42bf24fb84f / ext4 errors=remou$ /swapfile none swap sw $ 192.168.1.33:/var/nfs/general /nfs/genral nfs auto,nofail,noatime,nolock,intr$ 192.168.1.33:/var/nfs/home /nfs/home nfs auto,nofail,noatime,nolock,intr$
```



This screenshot shows a desktop environment with a terminal window open. The terminal window title is 'root@client: ~'. It displays the contents of the /etc/fstab file, which includes entries for mounting the root file system and two NFS shares from a server at 192.168.1.33. The desktop interface includes a dock with icons for various applications like a browser, file manager, and terminal.

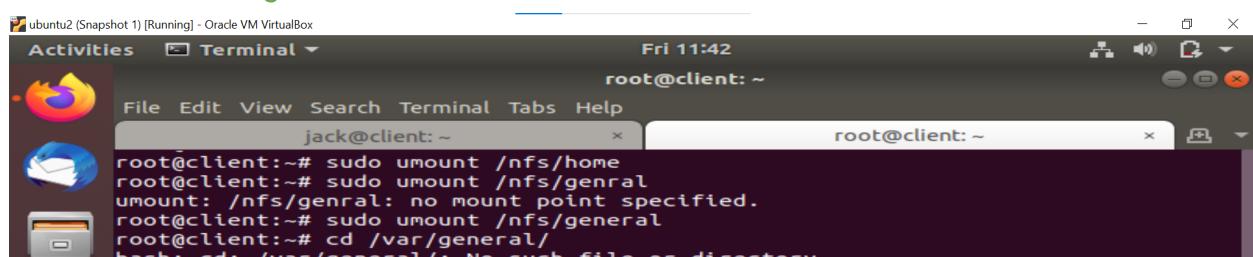
```
# /etc/fstab: static file system information.
#
# Use 'blkid' to print the universally unique identifier for a
# device; this may be used with UUID= as a more robust way to name devices
# that works even if disks are added and removed. See fstab(5).
#
# <file system> <mount point> <type> <options> <dump> <pass>
# / was on /dev/sda5 during installation
UUID=f61c29de-1ed1-41a0-84af-e42bf24fb84f / ext4 errors=remou$ /swapfile none swap sw $ 192.168.1.33:/var/nfs/general /nfs/genral nfs auto,nofail,noatime,nolock,intr$ 192.168.1.33:/var/nfs/home /nfs/home nfs auto,nofail,noatime,nolock,intr$
```

## Unmounting NFS remote Share

```
cd ~
```

```
sudo umount /nfs/home
```

```
sudo umount /nfs/general
```



This screenshot shows a terminal window with the title 'root@client: ~'. It displays the command 'cd ~' followed by two 'sudo umount' commands: one for '/nfs/home' and one for '/nfs/general'. Both attempts fail with the message 'umount: /nfs/genral: no mount point specified.' The desktop interface includes a dock with icons for various applications like a browser, file manager, and terminal.

```
root@client:~# cd ~
root@client:~# sudo umount /nfs/home
root@client:~# sudo umount /nfs/general
umount: /nfs/genral: no mount point specified.
root@client:~# sudo umount /nfs/general
root@client:~# cd /var/general/
bash: cd: /var/general/: No such file or directory
```

df -h

```
bash: cd: /var/general/: NO SUCH FILE OR DIRECTORY
root@client:~# df -h
Filesystem      Size   Used  Avail   Use% Mounted on
udev            970M     0    970M    0% /dev
tmpfs           199M   1.6M   198M   1% /run
/dev/sda5        11G   5.7G   3.9G   60% /
tmpfs           994M     0   994M    0% /dev/shm
tmpfs            5.0M   4.0K   5.0M   1% /run/lock
tmpfs           994M     0   994M    0% /sys/fs/cgroup
/dev/loop0       2.5M     0    2.5M  100% /snap/gnome-calculator/884
/dev/loop1       2.5M     0    2.5M  100% /snap/gnome-system-monitor/163
/dev/loop2       219M     0   219M  100% /snap/gnome-3-34-1804/72
/dev/loop3        66M    66M    0  100% /snap/gtk-common-themes/1515
/dev/loop4        33M    33M    0  100% /snap/snapd/12883
/dev/loop5        62M    62M    0  100% /snap/core20/1081
/dev/loop6       768K   768K    0  100% /snap/gnome-characters/726
/dev/loop7       242M   242M    0  100% /snap/gnome-3-38-2004/70
/dev/loop8        56M    56M    0  100% /snap/core18/2128
/dev/loop9       640K   640K    0  100% /snap/gnome-logs/106
tmpfs           199M   16K   199M   1% /run/user/121
tmpfs           199M   28K   199M   1% /run/user/1000
tmpfs           199M     0   199M    0% /run/user/0
root@client:~#
```

The screenshot shows two separate Linux desktop environments running side-by-side. Both desktops have a dark theme with a dock at the bottom containing icons for various applications like a file manager, terminal, and browser.

**Left Desktop (Ubuntu Server):**

- A terminal window titled "root@server:/var/nfs/general" is open, showing the output of the "ufw" command. It lists rules for ports 80, 2049, and 80,443/tcp (Apache Full).
- A file manager window titled "gen.test" is open, showing the contents of the "/var/nfs/general" directory.

**Right Desktop (Ubuntu Client):**

- A terminal window titled "root@client:~" is open, showing the output of the "df -h" command. It lists numerous mounted volumes, mostly snaps, along with standard system partitions like /dev/sda5 and /tmp.
- A file manager window titled "home.test" is open, showing the contents of the "/nfs/home" directory.