. NFS (Network File System)

NFS stands for Network File System, which is a distributed file system protocol that allows a user to access and share files across a network. In Ubuntu, NFS is a commonly used protocol for sharing files and directories between Linux systems.

NFS के साथ, एक users एक remote server से एक directory को mount कर सकता है जैसे कि यह एक local directory थी, users को remote server पर files को access करने और modify करने की permission देता है जैसे कि वे users के अपने system पर stored थे। यह उन situation में uses हो सकता है जहां एक से अधिक users को file के एक ही set तक access की requirement होती है या जहां users को remote system पर files तक access की requirement होती है।

Ubuntu में एक NFS server और एक NFS client दोनों add होते हैं, जिन्हें network पर other systems के साथ files को partnership करने के लिए या NFS server run करने वाले remote systems पर files तक access के लिए installed and configured किया जा सकता है। NFS server को "nfs-kernel-server" package का use करके install किया जा सकता है, जबकि NFS client को "nfs-common" package का use करके install किया जा सकता है।

```
himanshu@himanshu-Inspiron-15-3511:~$ lsb_release -a
No LSB modules are available.
Distributor ID: Ubuntu
Description:    Ubuntu 22.04.2 LTS
Release:        22.04
Codename:       jammy
himanshu@himanshu-Inspiron-15-3511:~$ sudo apt install nfs-kernel-server
[sudo] password for himanshu:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
nfs-kernel-server is already the newest version (1:2.6.1-1ubuntu1.2).
The following package was automatically installed and is no longer required:
  libjson-c4
Use 'sudo apt autoremove' to remove it.
0 upgraded, 0 newly installed, 0 to remove and 4 not upgraded.
himanshu@himanshu-Inspiron-15-3511:~$ systemctl status nfs-kernel-server
● nfs-server.service - NFS server and services
     Loaded: loaded (/lib/systemd/system/nfs-server.service; enabled; vendor preset: enabled)
     Active: active (exited) since Thu 2023-04-20 14:50:35 IST; 13min ago
    Process: 11042 ExecStartPre=/usr/sbin/exportfs -r (code=exited, status=0/SUCCESS)
    Process: 11043 ExecStart=/usr/sbin/rpc.nfsd (code=exited, status=0/SUCCESS)
   Main PID: 11043 (code=exited, status=0/SUCCESS)
        CPU: 5ms

Apr 20 14:50:35 himanshu-Inspiron-15-3511 systemd[1]: Starting NFS server and services...
Apr 20 14:50:35 himanshu-Inspiron-15-3511 systemd[1]: Finished NFS server and services.
himanshu@himanshu-Inspiron-15-3511:~$ systemctl enable nfs-kernel-server
Synchronizing state of nfs-kernel-server.service with SysV service script with /lib/systemd/systemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install enable nfs-kernel-server
```

```
himanshu@himanshu-Inspiron-15-3511:~$ sudo apt install nfs-common
[sudo] password for himanshu:
Sorry, try again.
[sudo] password for himanshu:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
nfs-common is already the newest version (1:2.6.1-1ubuntu1.2).
nfs-common set to manually installed.
The following package was automatically installed and is no longer required:
  libjson-c4
Use 'sudo apt autoremove' to remove it.
0 upgraded, 0 newly installed, 0 to remove and 4 not upgraded.
himanshu@himanshu-Inspiron-15-3511:~$ sudo apt install nfs-common
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
nfs-common is already the newest version (1:2.6.1-1ubuntu1.2).
The following package was automatically installed and is no longer required:
  libjson-c4
Use 'sudo apt autoremove' to remove it.
0 upgraded, 0 newly installed, 0 to remove and 4 not upgraded.
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$ mkdir /nfs
```

```
himanshu@himanshu-Inspiron-15-3511:~$ vi /etc/exports
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$ nano /etc/exports
himanshu@himanshu-Inspiron-15-3511:~$ nano /etc/exports
himanshu@himanshu-Inspiron-15-3511:~$ systemctl restart nfs-kernel-server
himanshu@himanshu-Inspiron-15-3511:~$ systemctl restart nfs-kernel-server
himanshu@himanshu-Inspiron-15-3511:~$
```

```
  GNU nano 6.2                                                          /etc/exports
# /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_subtree_check)
#
/NFSshare 127.0.0.1(rw,sync,no_root_squash,no_subtree_check)
# 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)
#
```

```
himanshu@himanshu-Inspiron-15-3511:/$ mount 127.0.0.1:/NFSshare /nfs
mount.nfs: failed to apply fstab options

himanshu@himanshu-Inspiron-15-3511:/$ sudo mount 127.0.0.1:/NFSshare /nfs
himanshu@himanshu-Inspiron-15-3511:/$
himanshu@himanshu-Inspiron-15-3511:/$
himanshu@himanshu-Inspiron-15-3511:/$
himanshu@himanshu-Inspiron-15-3511:/$
himanshu@himanshu-Inspiron-15-3511:/$
himanshu@himanshu-Inspiron-15-3511:/$
himanshu@himanshu-Inspiron-15-3511:/$
himanshu@himanshu-Inspiron-15-3511:/$ touch /nfs/file
himanshu@himanshu-Inspiron-15-3511:/$
himanshu@himanshu-Inspiron-15-3511:/$
himanshu@himanshu-Inspiron-15-3511:/$
himanshu@himanshu-Inspiron-15-3511:/$
himanshu@himanshu-Inspiron-15-3511:/$
himanshu@himanshu-Inspiron-15-3511:/$
himanshu@himanshu-Inspiron-15-3511:/$
himanshu@himanshu-Inspiron-15-3511:/$ touch /nfs/himanshu
```

```
himanshu@himanshu-Inspiron-15-3511:/$ ls
bin   cdrom   etc   lib    lib64   lost+found   mnt   nfsshare   opt   root   sbin   srv        sys   usr
boot  dev     home  lib32  libx32  media        nfs   NFSshare   proc  run    snap  swapfile   tmp   var
himanshu@himanshu-Inspiron-15-3511:/$ touch /nfs/file1
himanshu@himanshu-Inspiron-15-3511:/$
```

```
himanshu@himanshu-Inspiron-15-3511:~$ ls /NFSshare
file
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$ ls /NFSshare
file   himanshu
himanshu@himanshu-Inspiron-15-3511:~$ ls /NFSshare
file   file1   himanshu
```

. Samba {CIFS (Common Internet File System) }

Samba is an open-source software suite that provides seamless file and print services to SMB/CIFS (Server Message Block/Common Internet File System) clients, including Microsoft Windows. In Ubuntu, Samba is used to enable file and printer sharing between Linux and Windows computers.

Samba के साथ, Linux users अपनी files and printers Windows users के साथ पर partnership कर सकते हैं, और इसके opposite । यह users को network पर files and printers के साथ work करने की permission देता है जैसे कि वे अपने computer के लिए local थे। samba authentication and authorization services भी provide करता है, जो यह verify करती हैं कि केवल authorized users ही partnership resources तक access दे सकते हैं।

To install Samba on Ubuntu, you can install the Samba package from the Ubuntu Software Repositories. Once installed, you can configure Samba using the smb.conf configuration file, which defines shared resources and access rules. You can use the graphical interface provided by the Samba package called

system-config-samba to configure Samba settings in a user-friendly manner.

```
himanshu@himanshu-Inspiron-15-3511:~$ lsb_release -a
No LSB modules are available.
Distributor ID: Ubuntu
Description:    Ubuntu 22.04.2 LTS
Release:        22.04
Codename:       jammy
himanshu@himanshu-Inspiron-15-3511:~$ sudo apt install samba
[sudo] password for himanshu:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following package was automatically installed and is no longer required:
  libjson-c4
Use 'sudo apt autoremove' to remove it.
Suggested packages:
  bind9 bind9utils ctdb ldb-tools ntp | chrony smbldap-tools winbind
The following NEW packages will be installed:
  samba
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 1,192 kB of archives.
After this operation, 17.6 MB of additional disk space will be used.
Get:1 http://in.archive.ubuntu.com/ubuntu jammy-updates/main amd64 samba amd64 2:4.15.13+dfsg-0ubuntu1.1 [1,192 kB]
Fetched 1,192 kB in 3s (435 kB/s)
Selecting previously unselected package samba.
(Reading database ... 295144 files and directories currently installed.)
Preparing to unpack .../samba_2%3a4.15.13+dfsg-0ubuntu1.1_amd64.deb ...
Unpacking samba (2:4.15.13+dfsg-0ubuntu1.1) ...
Setting up samba (2:4.15.13+dfsg-0ubuntu1.1) ...
Samba is not being run as an AD Domain Controller: Masking samba-ad-dc.service
```

```
himanshu@himanshu-Inspiron-15-3511:~$ sudo systemctl status smbd
● smbd.service - Samba SMB Daemon
     Loaded: loaded (/lib/systemd/system/smbd.service; enabled; vendor preset: enabled)
     Active: active (running) since Mon 2023-04-24 14:32:06 IST; 1min 8s ago
       Docs: man:smbd(8)
             man:samba(7)
             man:smb.conf(5)
    Process: 21439 ExecStartPre=/usr/share/samba/update-apparmor-samba-profile (code=exited, status=0/SUCCESS)
   Main PID: 21443 (smbd)
     Status: "smbd: ready to serve connections..."
      Tasks: 4 (limit: 9138)
     Memory: 15.6M
        CPU: 71ms
     CGroup: /system.slice/smbd.service
             ├─21443 /usr/sbin/smbd --foreground --no-process-group
             ├─21445 /usr/sbin/smbd --foreground --no-process-group
             ├─21446 /usr/sbin/smbd --foreground --no-process-group
             └─21447 /usr/lib/x86_64-linux-gnu/samba/samba-bgqd --ready-signal-fd=45 --parent-watch-fd=11 --debuglevel=0

Apr 24 14:32:06 himanshu-Inspiron-15-3511 systemd[1]: Starting Samba SMB Daemon...
Apr 24 14:32:06 himanshu-Inspiron-15-3511 systemd[1]: Started Samba SMB Daemon.
```

```
himanshu@himanshu-Inspiron-15-3511:~$ mkdir /home/himanshu/share2
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$ chmod 777 /home/himanshu/share1
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$ chmod 777 /home/himanshu/share2
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$ useradd user1
useradd: Permission denied.
useradd: cannot lock /etc/passwd; try again later.
himanshu@himanshu-Inspiron-15-3511:~$ sudo useradd user1
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$ sudo useradd user2
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$ sudo smbpasswd -a user1
New SMB password:
Retype new SMB password:
Added user user1.
```

```
himanshu@himanshu-Inspiron-15-3511:~$ sudo smbpasswd -a user2
New SMB password:
Retype new SMB password:
Added user user2.
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$ nano /etc/samba/smb.conf
himanshu@himanshu-Inspiron-15-3511:~$ vim /etc/samba/smb.conf
himanshu@himanshu-Inspiron-15-3511:~$ vim /etc/samba/smb.conf
himanshu@himanshu-Inspiron-15-3511:~$ nano /etc/samba/smb.conf
himanshu@himanshu-Inspiron-15-3511:~$ chmod 777 /etc/samba/smb.conf
chmod: changing permissions of '/etc/samba/smb.conf': Operation not permitted
himanshu@himanshu-Inspiron-15-3511:~$ sudo chmod 777 /etc/samba/smb.conf
[sudo] password for himanshu:
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$ sudo chmod 777 /etc/samba/smb.conf
himanshu@himanshu-Inspiron-15-3511:~$ nano /etc/samba/smb.conf
himanshu@himanshu-Inspiron-15-3511:~$ sudo chmod 444  /etc/samba/smb.conf
```

```
himanshu@himanshu-Inspiron-15-3511:~$ nano /etc/samba/smb.conf
himanshu@himanshu-Inspiron-15-3511:~$ sudo chmod 444 /etc/samba/smb.conf
himanshu@himanshu-Inspiron-15-3511:~$ nano /etc/samba/smb.conf
himanshu@himanshu-Inspiron-15-3511:~$ sudo chmod 777 /etc/samba/smb.conf
himanshu@himanshu-Inspiron-15-3511:~$
himanshu@himanshu-Inspiron-15-3511:~$ nano /etc/samba/smb.conf
himanshu@himanshu-Inspiron-15-3511:~$ testparm
```

```
        server string = %h server (Samba, Ubuntu)
        unix password sync = Yes
        usershare allow guests = Yes
        idmap config * : backend = tdb


[printers]
        browseable = No
        comment = All Printers
        create mask = 0700
        path = /var/spool/samba
        printable = Yes


[print$]
        comment = Printer Drivers
        path = /var/lib/samba/printers


[share1]
        path = /home/himanshu chaudhary/share1
        read list = user2
        valid users = user1 user2
        write list = user1


[share2]
        path = /home/himanshu chaudhary/share2
        read list = user1
        valid users = user1 user2
        write list = user2
```

```
# Windows clients look for this share name as a source of downloadable
# printer drivers
[print$]
    comment = Printer Drivers
    path = /var/lib/samba/printers
    browseable = yes
    read only = yes
    guest ok = no
# Uncomment to allow remote administration of Windows print drivers.
# You may need to replace 'lpadmin' with the name of the group your
# admin users are members of.
# Please note that you also need to set appropriate Unix permissions
# to the drivers directory for these users to have write rights in it
;         write list = root, @lpadmin


[share1]
    path = /home/himanshu chaudhary/share1
    valid users = user1, user2
    read list = user2
    write list = user1
    browseable = yes


[share2]
    path = /home/himanshu chaudhary/share2
    valid users = user1, user2
    read list = user1
    write list = user2
    browseable = yes
```