HPS
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High-Performance System Administration

Introduction to Network File System (NFS)

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Learning Objectives

After the course the students should be able to:

- Describe common usage of NFS
- Depoly NFS infrastructure on a server and a client
- Examine NFS deployments

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What is NFS

NFS (either Network File System or Network File Service) is the most common protocol for sharing files between Unix systems over a network. NFS servers export directories from their local hard disks to NFS clients, which mount them so that they can be accessed like any other directory.

How is NFS structured

- Server / client architecture
- The server
  - shares its filesystem and stores the data
  - can be to grant access to several clients based of groups or users
- The client
  - accesses and modifies the data on the server
  - does not store data on their own
  - folder is included as a mounted drive

Why even use NFS

- Pro
  - reduce storage costs
  - works great in fast local networks
  - enables access on the same files by network for multiple parties
  - supports heterogeneous environments as NFS works for Windows Apple and Linux
  - Reduces system administration overhead
  - NFS service makes the physical location of the file system irrelevant to the user
  - You can mount an NFS file system automatically with autofs.
- Con
  - Needs a fast network connection, as all the files are shared through the network
  - does not work great through the internet due to latency

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Installing an NFS server

- Ubuntu and Debian
  - `sudo apt-get update`
  - `sudo apt install nfs-kernel-server`
- CentOS and Fedora
  - `yum -y install nfs-utils`
  - `apt-get install nfs-kernel-server`
- Create Root NFS Directory

  `sudo mkdir /mnt/nfs-share`
- check your user and its group
  - user: `whoami`
  - group: `groups %output from whoami%`
- Set the permissions

  `sudo chown %user%:%group% /mnt/nfs-share`

  #our current user is owner

Enabling access with /etc/exports

- Access to a single client
  - `/mnt/nfs-share {clientIP}(rw,sync,no_subtree_check)`
- Access to several clients

  -
    ```
    /mnt/nfs-share {clientIP}(rw,sync,no_subtree_check)
    {clientIP-2}(...)
    {clientIP-3}(...)
    ```
- Access to an entire subnet
  - `/mnt/nfs-share {subnetIP}/{subnetMask}(rw,sync,no_subtree_check)`

Make the NFS Share Available to Clients

- With exportfs we can now make the shared directory available
  - `sudo exportfs -a #making the file share available`
  - `sudo systemctl restart nfs-kernel-server #restarting the NFS kernel`
- if you run a firewall you have to allow access
  - `sudo ufw allow`

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Setup on an NFS client

- Ubuntu and Debian
  - `sudo apt update`
  - `sudo apt install nfs-common`
- CentOS and Fedora
  - `sudo yum install nfs-utils`

Mounting the NFS file

- We create a local directory as a mount point for the NFS share
  - `sudo mkdir /var/local-nfs-folder`
- Now we mount the NFS share by running the mount command
  - `sudo mount -t nfs {IP of NFS server}:{folder path on server} /var/local-nfs-folder`
  - `sudo mount -t nfs 10.254.1.234:/nfs-share /var/local-nfs-folder`

the mount point now acts as the root of the nfs-share, displaying all subfolders contained in the folder on the server

- To verify the correct mounting of the NFS share run either
  - `mount`
  - `df -h`

Mounting the NFS file permanently

- Remote NFS directories can be mounted on startup automatically. this is defined in the file
  - `/etc/fstab`
- As before we create a local directory as a mount point for the NFS share
  - `sudo mkdir /var/local-nfs-folder`
- We edit the /etc/fstab, adding a line for every file share we want to include, similar to etc/export when installing the server
  - `nano /etc/fstab`
  - `vim /etc/fstab`
  - We add a line defining the NFS share, dividing the parameter with tabulator. It should be one line with no line breaks.

Parameters

- The last three parameters are NFS options, which we leave on default
  - `{IP of NFS server}:{folder path on server} /var/local-nfs-folder nfs defaults 0 0`
- examples of NFS options would be
  - `timeo=n`
    - How long the client waits for a response before it retries an NFS request. Default is 60 seconds (600 * 1/10 second)
  - `rsize=n`
    - The maximum number of bytes in each network READ request. The largest read payload supported by the Linux NFS client is 1,048,576 bytes (one megabyte). The rsize value is a multiple of 1024 with a minimum of 4096 and maximum of 1048576 rounded down to the nearest multiple of 1024.

Mounting the Share

- finally we will mount the share
  - `mount /var/ local-nfs-folder`
  - `mount {IP of NFS server}:{folder path on server}`

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Short reminder, Terminal Editors

- nano
  - call a file with "`nano %file`"
  - crtl + s - save file
  - crtl + o - save file as
  - crtl + x - exit nano
- vim
  - call a file with "`vim %file`"
  - to switch between edit and command mode press esc, in the command mode you start commands with :
  - :w - writes the file
  - :w !sudo tee % - writes into a file with sudo
  - to exit vim
    - :q! - closes vim without saving changes
    - :wq - exits vim saving the file

The /etc/exports Configuration File

- This file controls
  - which file systems are exported
  - options on how they are exported
- Options
  - Blank lines are ignored
  - # starts a comment
  - \backslashes can wrap long lines\
  - for each exported item you use an individual line