Network File System (NFS)

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Overview

- Background
- What NFS is
- How set up NFS

Ask any questions as you have them!

Background

- **Drives and Media**
  - Hard drives and any other drives are by default inaccessible in Linux
  - To read the data on the drives, we must first mount the drive
    - mount DRIVE LOCATION
      - Where DRIVE is the name of the drive or partition
      - Where LOCATION is the place for the files to be accessed
  - Once mounted, the files can be read like a normal folder

Background

- **Filesystem Table (fstab)**
  - Contains a list of all of the drives within a system that are to be mounted automatically on startup
  - Includes the primary Linux partition, mounted at /
    - May also include any additional partitions

The Problem with Clusters

- **Sharing Data**
  - We can use MPI to pass process information or send small bits of data to a slave within the cluster
    - But that's doesn't help if the applications or other files don't exist on all of the nodes…
  - We can copy all of the files from one node to another using secure copy
    - But what if a file needs to be updated on all of them? The changes would need to be copied over again

What is NFS?

- **Network File System (NFS)**
  - A technology developed by Sun Microsystems
  - Allows a computer to access a drive or folder across a network as if the drive was installed locally
    - Useful for clusters that are on the same network

What is NFS?

- **For clusters, we can use NFS to share files between nodes**
  - Share user's home directories across nodes
  - Share applications across nodes
  - No more copying files between nodes, NFS handles it all

How to set up NFS

- **Host Setup**
  - Install NFS utilities
    - sudo dnf install nfs-utils
  - Enable NFS server
    - sudo systemctl enable --now nfs-server rpcbind
  - Configure firewall to allow NFS
    - sudo firewall-cmd --add-service={nfs,nfs3,mountd,rpc-bind} --permanent
    - sudo firewall-cmd --reload

How to set up NFS

- **Host Setup**
  - Exports
    - NFS needs to know what directories to export as a file system
  - These exports are listed in /etc/exports
    - /SHARE_NAME CLIENT(PERMISSIONS)
      - Where /SHARE_NAME is the folder to share
      - Where CLIENT is a client that can access the share (can add more than one)
      - Where PERMISSIONS is read-only (ro) or read-write (rw)

How to set up NFS

- **Client Setup**
  - Make a directory to mount the NFS share to
    - This will be where we see all of the files in
    - mkdir MOUNT_LOCATION
      - Where MOUNT_LOCATION is the location where the NFS drive should be mounted
  - Mount the NFS share
    - mount -t nfs SERVER_IP:/SHARE_NAME MOUNT_LOCATION
      - Where SERVER_IP is the NFS server's IP
      - Where SHARE_NAME is the NFS share name

How to set up NFS

- **Client Setup**
  - Auto-mount NFS share on startup
    - Useful since we want to share the drives across the network
    - Add an entry to the /etc/fstab:
      - SERVER_IP:/SHARE_NAME MOUNT_LOCATION nfs defaults 0 0
- **For out clusters, we mount an NFS share at /home**
  - This allows us to share all of our user's home directories across all of the nodes