LINUX FOUNDATION

TRAINING

Mounting Networked Filesystems

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Overview

In a multi-computer environment it is useful to be able to share files between computers, often as a way of centralizing storage space. Multiple clients can connect over a network to a server sharing everything from boot information to documents.

Windows-heavy environments often use the common internet file system (CIFS) protocol for network filesharing, which is an extension of the older server message block (SMB) protocol. The Linux implementation of the CIFS/SMB protocol is called Samba. A Linux system can both share files and access them on other servers using the CIFS protocol.

Linux-heavy environments often use the network file system (NFS) protocol. The NFS protocol is defined by an open standard with development managed by an international standards body NFSv3 and NFSv4 are the most widely deployed versions of the protocol.

Key Ideas

CIFS/SMB: The network protocol most commonly used by Windows computers to provide networked access to files and printers. Linux systems are able to interoperate using an open source implementation of the CIFS/SMB protocol called Samba.

NFS: The network protocol most commonly used in Linux environment to provide networked access to files and storage space.

Example Scenario

List the shares on an CIFS/SMB server, and mount one of them to /mnt on your Linux system. You will need to be on a network where a CIFS/SMB server is operating to complete this exercise.

Now Do It

1. Use your operating system's package manager to install the samba-client, samba-common, and cifs-utils packages
   # yum install samba-client samba-common cifs-utils

   or

   # apt-get install samba-client samba-common cifs-utils

2. Use the smbclient utility to list the shares on the CIFS/SMB server.
   # smbclient -L SERVER
   Where SERVER is the hostname or IP address of the CIFS/SMB server you are connecting to. Note that, depending on the security configuration of the server, you may also need to specify a user (-U USERNAME) with permission to list the

shares and specify a password. If passwordless access is allowed, you can avoid the password prompt with the -N argument.

3. Use the mount command to mount a CIFS/SMB share to the /mnt directory.
   # mount -t cifs -o USERNAME //SERVER/SHARE /mnt
   Where USERNAME is a user with permission to access the share, SERVER is the server providing the share, and SHARE is the name of the share.

4. Optionally edit your /etc/fstab file to mount the CIFS/SMB share automatically at boot time adding the following line to /etc/fstab. In this example, 192.168.0.2 is the IP address of the NFS server.

   //SERVER/SHARE /MOUNTPOINT cifs credentials=/root/.smbcredentials,iocharset=utf8,_netdev 0 0

   Note that there are no linebreaks in this fstab entry. The "_netdev" entry prevents this filesystem from being mounted before networking is up.

5. Create the credentials file to store the username and password used to access the share. Following #4, these two lines must be inserted in /root/.smbcredentials.

   Note that hiding a file is not a safe security mechanism. Changing its permissions and ownership are usually required.

   The contents of the file look like this:

   username=USERNAME
   password=PASSWORD

6. Where USERNAME is a user with sufficient permissions to access the share, and PASSWORD is that user's password. If you are connecting with no password as guest, the password entry is still required, but looks like this:
   password=""

7. Test that the fstab entry and credentials file are working correctly together with the mount command.
   # mount -a

   Note that if the fstab file and credentials file are correctly configured, there is no output.
   # mount
   The CIFS/SMB share is listed alongside all the other mounted filesystems.

If you remember nothing else...

The username and password you use to access a remote CIFS/SMB share is not your local user and password, but rather an account on the remote server with sufficient permissions to access the share.

Example Scenario: Mounting an NFS share

List the shares on an NFS server, and mount one of them to /mnt on your Linux system. You will need to be on a network where a NFS server is operating to complete this exercise.

Now do it

1. Use your operating system's package manager to install the nfs-common package, or the nfs-utils and nfs-utils-lib packages.
   # yum install nfs-utils nfs-utils-lib
   or
   # apt-get install nfs-common
2. Use the showmount command to list the directories available from the NFS server.
   # showmount -e SERVER
   Where SERVER is the IP address or hostname of the NFS server.
3. Use the mount command to mount an NFS share to your /mnt directory.
   # mount -t nfs SERVER:/PATH/TO/SHARE /mnt

   Where /PATH/TO/SHARE is the full path to the directory shared over NFS. Note that you can only mount shares that have been configured to accept your connection.
4. Optionally configure your operating system to mount the NFS share automatically at boot time.
   192.168.0.2:/mnt/thedump /mnt/thedump nfs defaults,_netdev 0 0
5. Test that the fstab entry is working correctly with the mount command.
   # mount -a

   Note that if the fstab file is correctly configured, there is no output.
   # mount
   The NFS share is listed alongside all the other mounted filesystems.

If you remember nothing else...

NFS access is configured on the server side using policies. Your connection can be allowed as part of a general rule ("*") or specifically (eg IP address). Don't forget the ":" between the server address and the path.

Answer Key - Mounting a CIFS/SMB share

1. Output from installation of Samba tools varies by package management system.

2. Example output from successful listing of shares on a server:
   ```
   # smbclient -L SERVER
   Domain=[WORKGROUP] OS=[Unix] Server=[Samba 3.6.6]

   Sharename       Type      Comment
      ---------       ----      -------
      IPC$            IPC       IPC Service (Orodruin server)
      iso             Disk      ISO files
      print$          Disk      Printer Drivers

   Domain=[WORKGROUP] OS=[Unix] Server=[Samba 3.6.6]
      Server               Comment
      ---------            -------
      OPENELEC             OpenELEC
      ORODRUIN             Orodruin server

      Workgroup            Master
      ---------            -------
      WORKGROUP            OPENELEC
   ```

3. No output on successful mount command
   ```
   # mount -t cifs -o USERNAME //SERVER/SHARE /mnt
   ```

4. Edit and save etc fstab:
   ```
   # nano /etc/fstab
   ```

5. Create and edit a Samba credentials storage file:
   ```
   # nano /root/.smbcredentials
   ```

6. No output on successful mount of all entries in /etc/fstab
   ```
   # mount -a
   ```

Answer Key - Mounting a NFS Share

1. Output from installation of NFS tools varies by package management system.

2. Note that access permission is displayed after each directory. For example, a "*" means that the folder is universally accessible. Example output of showmount command:

   ```
   # showmount -e SERVER
   Export list for 192.168.0.2:
   /mnt/thedump/music              *
   ```

3. No output from successful mount command.
   ```
   # mount -t nfs SERVER:/PATH/TO/SHARE /mnt
   ```

4. Edit and save etc fstab:
   ```
   # nano /etc/fstab
   ```

5. No output on successful mount of all entries in /etc/fstab
   ```
   # mount -a
   ```

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