ComS 252 Homework 12: NFS and NIS

Group assignment (with 5% penalty per group member)

Due November 30, 2021

1 Objectives

For this assignment, you will share files and other information over the network using NFS and NIS. For more information, consult Chapters 21 and 22 of the textbook.

2 Downloads

There are two virtual machines for this assignment:

1. `Server12.ova`, the server machine. This has accounts `root`, `alice`, `bob`, and `chuck` with passwords `rootpw`, `alicepw`, `bobpw`, and `chuckpw`.
2. `Client12.ova`, the client machine. This has account `root` with password `rootpw`. There are no user accounts on this machine, and **you should not create any accounts on this machine**.

You will need to run these *simultaneously* to test your configuration. *Both* machines will need to be configured properly to complete this assignment. You will not need to install any packages on the VMs. **Important note!** You will be editing files that configure how it is determined if users can login to the system. It is possible to edit these files such that *no users* are able to login to the system, not even root. Therefore, you are encouraged to make snapshots of your (halted) VMs as you successfully complete each section. Then, if you make a mistake and are unable to login, you can easily roll back to a recent working version.

2.1 Network setup

Both VMs have two network adapters. The first is of type "NAT", for connecting to the Internet. The second is for the "Internal network" named `intnet`. The client and server VMs communicate on this private network.

3 Configuring the network interfaces

The network interfaces on the server and client are *mostly* configured already.

3.1 `enp0s3` interfaces

For both machines, you will need to add the appropriate

```
HWADDR=xx:xx:xx:xx:xx:xx
```

line to the network configuration files for device `enp0s3`. This interface should already be configured to use DHCP and to start automatically at boot time.

3.2 `enp0s8` interfaces

For both machines, you will need to add the appropriate

```
HWADDR=xx:xx:xx:xx:xx:xx
```

line to the network configuration files for device `enp0s8`. Also, you will need to set "`ONBOOT`" to yes. This interface should already be configured to use a static IP address on the `172.27.12` subnetwork[1].

3.3 Test

After specifying the hardware addresses, reboot and make sure the client and server can communicate on their private network (using `ping`). Also, make sure the client and server can connect to the Internet (try `ping google.com`); otherwise, you will not be able to submit your work.

4 Sharing files (1)

4.1 Server

Configure the server VM so that the `nfs-server` service starts at boot time, and exports the directory `/export` to any clients on the `172.27.12` subnetwork. For now, you should *disable the firewall*; we will set up the firewall later.

4.2 Client

Check your server configuration on the client VM by mounting the server's `/export` directory to `/shares/server` "by hand". Note that this directory does not yet exist on the client; you will need to create it. Once that works, configure the automounter (`autofs`) to start at boot time, and to mount the server's `/export` directory to `/shares/server`. You should set `/shares` as a family of mount points for various network shares, that should be accessible by all users. Reboot the client and check that this works.

5 Network identity

5.1 Server

Configure the server VM as an NIS "master" server for domain "`cs252`", whenever the machine boots. There are no other NIS servers.

5.2 Client

Configure the client VM as an NIS client for domain "`cs252`", whenever the machine boots. The utility `ypcat` is useful for debugging NIS. When this is working, files in `/shares/server` should have proper owners and groups, and users `alice`, `bob`, and `chuck` should be able to login on the client VM. However, when these users login, they will not have any home directory; we will fix that next.

6 Sharing files (2)

6.1 Server

Configure the server VM to export the directory `/home`, using NFS, to any clients on the `172.27.12` subnetwork. This change should persist across reboots.

[1] If this happens to be a subnet that your host machine uses, you will need to choose a different subnet for this assignment, and update the static IP addresses on both machines.

6.2 Client

Configure the client VM to automount the users' home directories from the server. Specifically, for each user `user`, directory `/home/user` from the server should be automounted to directory `/home/user` on the client. Use `/home` as a family of mount points. You **must** use wildcards in the map file for `/home`; you are not allowed to create a separate entry for each user. Once this works, users `alice`, `bob`, and `chuck` should be able to login on the client VM and access their home directories.

7 Secure the server VM

On the server, turn the firewall back on. Configure the firwall to permanently allow the NFS and rpc-bind services through the firewall. You will also need to permanently allow UDP connections for NIS; you will need to allow this port number through "by hand" (read the `man` page for `firewall-cmd` to see how to allow port numbers through). Some hints:

- Look at `/etc/services` to find an unused port number below 1000, to use for `ypserv`.
- Read the man page for `ypserv` to see how to set its port number. (By default, it gets a random port number.)
- You can add a line of the form

  ```
  YPSERV_ARGS="arg1 arg2"
  ```

  to `/etc/sysconfig/network` to send arguments `arg1 arg2` to `ypserv` when it is started.
- `rpcinfo -p` is your friend.

Be sure these changes to the server persist across reboots. Reboot the *client* and make sure everything still works.

8 Submitting your work

8.1 Server

Login as `root`, and run `Turnin yourISUusername` to automatically submit your work. If you worked in a group, run `Turnin` once with the usernames of everyone in your group: `Turnin alice bob chuck`. Check the `man` page for `Turnin` for more information.

8.2 Client

Login as `root`, and run `Turnin yourISUusername` to automatically submit your work. If you worked in a group, run `Turnin` once with the usernames of everyone in your group: `Turnin alice bob chuck`. Check the `man` page for `Turnin` for more information.