Week 4

Session 1

Storage

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1. NFS

Network File System is a type file system that can be used across network. It gives you the ability to mount a directory as a drive in other systems.

1.1 Install NFS Kernel on your server

Run `sudo apt-get install nfc-kernel-server` in the terminal

1.2 Create a NFS Export Directory on your server and export it

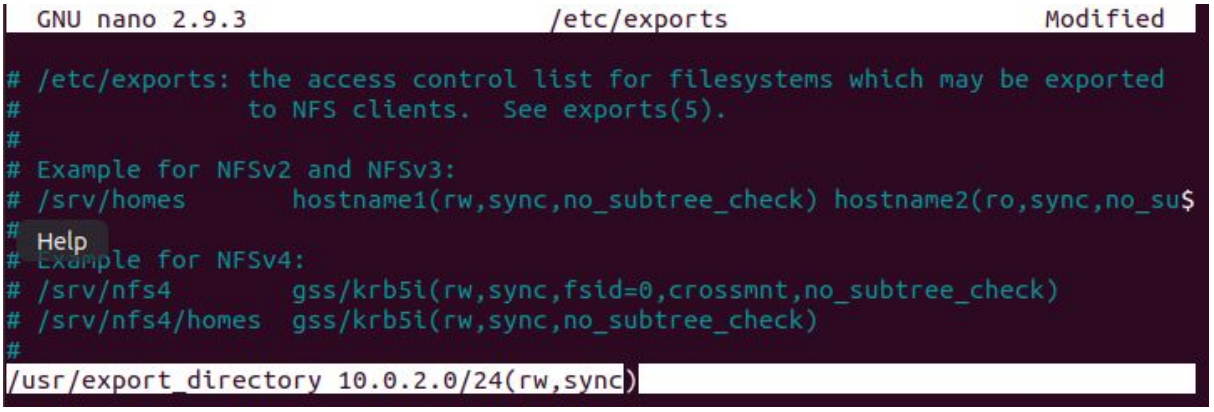
1. Create a folder that is going to be shared
2. Allow anyone to access the directory by changing ownership to `nogroup` and `nobody`
3. Allow everyone to perform all operations via changing folder permissions to `rwxrwxrwx`

```
user2@cli2-VirtualBox:~$ sudo mkdir -p /usr/export_directory
user2@cli2-VirtualBox:~$ sudo chown nobody:nogroup /usr/export_directory
user2@cli2-VirtualBox:~$ sudo chmod 777 /usr/export_directory
```

Search the network credentials:

```
user2@cli2-VirtualBox:~$ ifconfig -a
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.0.2.8  netmask 255.255.255.0  broadcast 10.0.2.255
        inet6 fe80::9b8:c613:53aa:41c5  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:13:69:e5  txqueuelen 1000  (Ethernet)
        RX packets 273465  bytes 408216546 (408.2 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 33654  bytes 2201796 (2.2 MB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

Open configuration file of the nfs `sudo nano /etc/exports:`



Type the following:
`/usr/export_directory` - directoru we want to configure
`10.0.2.0/24` - allow everyone from the network we are currently working with to access it
`rw` - allow reading and writing (the other option is ro - read only)
`sync` - write changes to the disc before they will be applyed
`no_subtree_check` - default behavior

Export the directory to the outside world: `sudo exportfs -a`

Restart the server: `sudo systemctl restart nfs-kernel-server`

1.3 Install NFS Client on your client machine

Run `sudo apt-get install nfc-common` in the terminal of client machine

1.4 Create a mount point in your client, mount the NFS on it and test it

1. Create a directory on the client machine `- sudo mkdir -p /usr/export_directory_cli`

2. Mount the directory

```
cli2@cli2-VirtualBox:~$ sudo mkdir -p /usr/export_directory_cli
cli2@cli2-VirtualBox:~$
cli2@cli2-VirtualBox:~$
cli2@cli2-VirtualBox:~$ sudo mount 10.0.2.8:/usr/export_directory /usr/export_d
irectory_cli
```

Testing:

1. Content of the directory on the client apriori (empty)

```
cli2@cli2-VirtualBox:~$ ls /usr/export_directory_cli
```

2. Create a folder on the server machine:

```
user2@cli2-VirtualBox:~$ sudo mkdir /usr/export_directory/test_folder
```

3. Content of the client directory after creation:

```
cli2@cli2-VirtualBox:~$ ls /usr/export_directory_cli
test_folder
```

4. Deleting this folder on the client machine

```
cli2@cli2-VirtualBox:~$ sudo rm -r /usr/export_directory_cli/test_folder
```

5. Content on the server before and after deletion on the client:

```
user2@cli2-VirtualBox:~$ ls /usr/export_directory
test_folder
```

```
user2@cli2-VirtualBox:~$ ls /usr/export_directory
user2@cli2-VirtualBox:~$
```

2. Samba

2.1 Install Samba on your machine

Run `sudo apt-get install samba` in the terminal

2.2 Create a public shared folder and test it

Create a folder and change its permissions (later permissions were changed to allow -x for others since in another case it was impossible to mount this folder from the outside client)

```
user2@cli2-VirtualBox:~$ sudo mkdir -p /usr/smb_shared
user2@cli2-VirtualBox:~$ sudo chmod 666 /usr/smb_shared
```

Add configuration for this folder to `/etc/samba/smb.conf` file

```
[smb_shared]
    path=/usr/smb_shared
    writable = yes
    guest ok = yes
    browsable = yes
```

`path` - Directory to share
`guest ok = yes` – Turn on guest share
`browsable = yes` – Allow it to be listed and searched
`writable = yes` – Set share directory as writable

On the client machine run `sudo apt-get install smbclient cifs-utils` to install samba and directories mount tools

On the client machine test connection to the created directory:

```
cli2@cli2-VirtualBox:~$ sudo smbclient //10.0.2.8/smb_shared -U user
WARNING: The "syslog" option is deprecated
Enter WORKGROUP\user's password:
Try "help" to get a list of possible commands.
smb: \> ^C
```

Create the directory to mount on the client machine `sudo mkdir /usr/smb_shared` and mount them:

```
cli2@cli2-VirtualBox:~$ sudo mount -t cifs -o username=user //10.0.2.8/smb_shar
ed /usr/smb_shared
Password for user@//10.0.2.8/smb_shared:
cli2@cli2-VirtualBox:~$
```

Test:

1. Create a test directory on the server:

```
user2@cli2-VirtualBox:~$ sudo mkdir /usr/smb_shared/test_directory
[sudo] password for user2:
```

2. Directory tree on the client machine before and after creation:

```
cli2@cli2-VirtualBox:~$ ls /usr/smb_shared
cli2@cli2-VirtualBox:~$
cli2@cli2-VirtualBox:~$ ls /usr/smb_shared
test_directory
```

2.3 Create a private shared folder and test it

Create a folder

```
user2@cli2-VirtualBox:~$ sudo mkdir -p /usr/smb_private
```

Add a group for the folder:

```
user2@cli2-VirtualBox:~$ sudo groupadd smb_group
```

Add a user that belongs to the group
Change ownership of the folder
Change permissions of the folder (everything is allowed to the owner and to the group and nothing is allowed for others)
Add a password for the user
Enable the user

```
user2@cli2-VirtualBox:~$ sudo useradd smb_user -G smb_group
user2@cli2-VirtualBox:~$ sudo chown smb_user:smb_group /usr/smb_private
user2@cli2-VirtualBox:~$ sudo chgrp smb_group /usr/smb_private
user2@cli2-VirtualBox:~$ sudo chmod 2770 /usr/smb_private
user2@cli2-VirtualBox:~$ sudo smbpasswd -a smb_user
New SMB password:
Retype new SMB password:
Added user smb_user.
user2@cli2-VirtualBox:~$ sudo smbpasswd -e smb_user
Enabled user smb_user.
```

Add configuration for this folder to `/etc/samba/smb.conf` file

```
[smb_private]
    path=/usr/smb_private
    read_only = no
    browsable = yes
    valid users = @smb_user @smb_group
```

`path` - Directory to share
`browsable = yes` – Allow it to be listed and searched
`valid users` = list of users with the rights to rwx

On the client machine test connection to the created directory:

```
cli2@cli2-VirtualBox:~$ sudo smbclient //10.0.2.8/smb_private -U smb_user
WARNING: The "syslog" option is deprecated
Enter WORKGROUP\smb_user's password:
Try "help" to get a list of possible commands.
smb: \> ^C
cli2@cli2-VirtualBox:~$
```

Create the directory to mount on the client machine `sudo mkdir /usr/smb_private` and mount them:

```
cli2@cli2-VirtualBox:~$ sudo mount -t cifs -o username=smb_user //10.0.2.8/smb_
private /usr/smb_private
Password for smb_user@//10.0.2.8/smb_private:  ********
cli2@cli2-VirtualBox:~$ df -h
Filesystem                      Size  Used Avail Use% Mounted on
udev                            971M     0  971M   0% /dev
tmpfs                           199M  1,6M  198M   1% /run
/dev/sda1                       8,1G  5,5G  2,2G  72% /
tmpfs                           994M  7,8M  987M   1% /dev/shm
tmpfs                           5,0M  4,0K  5,0M   1% /run/lock
tmpfs                           994M     0  994M   0% /sys/fs/cgroup
/dev/loop0                      2,5M  2,5M     0 100% /snap/gnome-calculator/74
```

Test:

1. Try to access from a non-permitted user:

   ```
   cli2@cli2-VirtualBox:~$ sudo smbclient //10.0.2.8/smb_private -U not_permitted_
   user
   WARNING: The "syslog" option is deprecated
   Enter WORKGROUP\not_permitted_user's password:
   tree connect failed: NT_STATUS_ACCESS_DENIED
   ```

   Access denied!

2. Try to mount from a non-permitted user:

   ```
   cli2@cli2-VirtualBox:~$ sudo mount -t cifs -o username=not_permitted_user //10.
   0.2.8/smb_private /usr/smb_private
   Password for not_permitted_user@//10.0.2.8/smb_private:
   mount error(13): Permission denied
   Refer to the mount.cifs(8) manual page (e.g. man mount.cifs)
   ```

   Permission denied!

3. Create a test directory on the server:

   ```
   user2@cli2-VirtualBox:~$ sudo mkdir /usr/smb_private/test_directory
   ```

4. Directory tree on the client machine before and after creation: