

## File System Navigation

List the contents of the home directory. :

```
arifurrahman@Arifurs-MacBook-Air / % ls
Applications  Volumes      etc           sbin
Library       bin           home          tmp
System        cores        opt           usr
Users         dev          private       var
arifurrahman@Arifurs-MacBook-Air / %
```

Change the current directory to **/var/log** and list its contents.

```
arifurrahman@Arifurs-MacBook-Air / % cd var/log
arifurrahman@Arifurs-MacBook-Air log % ls
[CoreDuet                      system.log
[DiagnosticMessages            system.log.0.gz
PrivacyPreservingMeasurement  system.log.1.gz
apache2                        system.log.2.gz
asl                             uucp
com.apple.wifivelocity         weekly.out
com.apple.xpc.launchd          wifi.log
cups                            wifi.log.0.bz2
daily.out                      wifi.log.1.bz2
dm                              wifi.log.10.bz2
fsck_apfs.log                  wifi.log.2.bz2
fsck_apfs_error.log            wifi.log.3.bz2
fsck_hfs.log                   wifi.log.4.bz2
install.log                    wifi.log.5.bz2
mDNSResponder                  wifi.log.6.bz2
monthly.out                    wifi.log.7.bz2
powermanagement                wifi.log.8.bz2
ppp                             wifi.log.9.bz2
shutdown_monitor.log
```

Find and display the path to the **bash** executable using the **which** command.

```
arifurrahman@Arifurs-MacBook-Air / % cd /
arifurrahman@Arifurs-MacBook-Air / % which bash
/bin/bash
arifurrahman@Arifurs-MacBook-Air / %
```

Find current shell

```
/bin/zsh
arifurrahman@Arifurs-MacBook-Air / % echo $SHELL
/bin/zsh
arifurrahman@Arifurs-MacBook-Air / %
```

### File and Directory Operations

Create a directory named linux\_fundamentals in your home directory. :

```
arifurrahman@Arifurs-MacBook-Air / % mkdir ~/linux_fundamentals
```

Inside linux\_fundamentals, create a subdirectory named scripts :

```
arifurrahman@Arifurs-MacBook-Air / % cd ~/linux_fundamentals
arifurrahman@Arifurs-MacBook-Air linux_fundamentals % mkdir scripts
arifurrahman@Arifurs-MacBook-Air linux_fundamentals % ls
scripts
```

Create an empty file named example.txt inside the linux\_fundamentals directory.

```
arifurrahman@Arifurs-MacBook-Air linux_fundamentals % touch example.txt
arifurrahman@Arifurs-MacBook-Air linux_fundamentals % ls
example.txt      scripts
```

Copy example.txt to the scripts directory.

```
arifurrahman@Arifurs-MacBook-Air linux_fundamentals % cp example.txt scripts
arifurrahman@Arifurs-MacBook-Air linux_fundamentals % cd scripts
arifurrahman@Arifurs-MacBook-Air scripts % ls
example.txt
```

Move example.txt from linux\_fundamentals to linux\_fundamentals/backup :

```
[arifurrahman@Arifurs-MacBook-Air linux_fundamentals % ls
backup      example.txt  scripts
[arifurrahman@Arifurs-MacBook-Air linux_fundamentals % mv example.txt backup
[arifurrahman@Arifurs-MacBook-Air linux_fundamentals % ls
backup  scripts
[arifurrahman@Arifurs-MacBook-Air linux_fundamentals % cd backup
[arifurrahman@Arifurs-MacBook-Air backup % ls
example.txt
arifurrahman@Arifurs-MacBook-Air backup %
```

Change the permissions of example.txt to read and write for the owner, and read-only for the group and others.

```
[arifurrahman@Arifurs-MacBook-Air backup % chmod u=rw,g=r,o=r example.txt
[arifurrahman@Arifurs-MacBook-Air backup % ls -l example.txt
-rw-r--r-- 1 arifurrahman staff 0 Nov 29 12:37 example.txt
arifurrahman@Arifurs-MacBook-Air backup %
```

Verify the permission changes using ls -l

```
[arifurrahman@Arifurs-MacBook-Air backup % chmod u=rw,g=r,o=r example.txt
[arifurrahman@Arifurs-MacBook-Air backup % ls -l example.txt
-rw-r--r-- 1 arifurrahman staff 0 Nov 29 12:37 example.txt
arifurrahman@Arifurs-MacBook-Air backup %
```

### File Modification

Create a file named **example.txt** in your home directory.

```
[arifurrahman@Arifurs-MacBook-Air ~ % touch example.txt
[arifurrahman@Arifurs-MacBook-Air ~ % ls
Applications      Music              nasa_project
Desktop           Pictures           src
Documents         Postman           untitled.blend
Downloads         Public            untitled.blend1
Library          example.txt
Movies           linux_fundamentals
```

Change the owner of **example.txt** to a user named student

```
arifurrahman@Arifurs-MacBook-Air ~ % sudo chown student example.txt
arifurrahman@Arifurs-MacBook-Air ~ % ls -l example.txt
-rw-r--r-- 1 student staff 0 Nov 29 14:47 example.txt
arifurrahman@Arifurs-MacBook-Air ~ %
```

### Ownership

Create a directory named project in your home directory.

```
arifurrahman@Arifurs-MacBook-Air ~ % mkdir project
arifurrahman@Arifurs-MacBook-Air ~ % ls
Applications      Music              nasa_project
Desktop           Pictures           project
Documents         Postman            src
Downloads         Public             untitled.blend
Library          example.txt        untitled.blend1
Movies            linux_fundamentals
arifurrahman@Arifurs-MacBook-Air ~ %
```

Create a file named **report.txt** inside the project directory.

```
arifurrahman@Arifurs-MacBook-Air ~ % cd project
arifurrahman@Arifurs-MacBook-Air project % touch report.txt
arifurrahman@Arifurs-MacBook-Air project % ls
report.txt
arifurrahman@Arifurs-MacBook-Air project %
```

Set the permissions of **report.txt** to read and write for the owner, and read-only for the group and others.

```
arifurrahman@Arifurs-MacBook-Air project % chmod u=rw,g=r,o=r report.txt
arifurrahman@Arifurs-MacBook-Air project % ls -l report.txt
-rw-r--r-- 1 arifurrahman staff 0 Nov 29 15:54 report.txt
arifurrahman@Arifurs-MacBook-Air project %
```

Set the permissions of the project directory to read, write, and execute for the owner, and read and execute for the group and others

```
arifurrahman@Arifurs-MacBook-Air project % chmod u=rwx,g=rx,o=rx report.txt
arifurrahman@Arifurs-MacBook-Air project % ls -l report.txt
-rwxr-xr-x 1 arifurrahman staff 0 Nov 29 15:54 report.txt
arifurrahman@Arifurs-MacBook-Air project %
```

Verify the changes using appropriate commands.

```
arifurrahman@Arifurs-MacBook-Air project % chmod u=rwx,g=rx,o=rx report.txt
arifurrahman@Arifurs-MacBook-Air project % ls -l report.txt
-rwxr-xr-x 1 arifurrahman staff 0 Nov 29 15:54 report.txt
arifurrahman@Arifurs-MacBook-Air project %
```

### User add/modify

Create a new user named developer.

```
arifurrahman@Arifurs-MacBook-Air ~ % sudo sysadminctl -addUser developer
Password:
2024-11-29 19:51:47.571 sysadminctl[24713:305166] -----
2024-11-29 19:51:47.571 sysadminctl[24713:305166] No clear text password or interactive o
ion was specified (adduser, change/reset password will not allow user to use FDE) !
2024-11-29 19:51:47.571 sysadminctl[24713:305166] -----
2024-11-29 19:51:47.963 sysadminctl[24713:305166] Creating user record...
2024-11-29 19:51:48.000 sysadminctl[24713:305166] Assigning UID: 504 GID: 20
2024-11-29 19:51:51.880 sysadminctl[24713:305166] Creating home directory at /Users/devel
er
```

Set the home directory of the user developer to /home/developer\_home.

```
sudo mkdir -p /home/developer_home

sudo usermod -d /home/developer_home -m developer
```

Assign the shell /bin/sh to the user developer.

```
sudo usermod -s /bin/sh developer
```

Verify the new user's information.

Change the username of the user developer to devuser. :

```
sudo usermod -l devuser developer
```



## Hard/Soft Link

Create a file named **original.txt** in your home directory.

```
arifurrahman@Arifurs-MacBook-Air ~ % touch original.txt
arifurrahman@Arifurs-MacBook-Air ~ % ls
Applications      Music              nasa_project
Desktop           Pictures           original.txt
Documents         Postman           project
Downloads         Public            src
Library          example.txt       untitled.blend
Movies           linux_fundamentals untitled.blend1
```

Create a symbolic link named **softlink.txt** pointing to **original.txt**.

```
arifurrahman@Arifurs-MacBook-Air ~ % ln -s original.txt softlink.txt
arifurrahman@Arifurs-MacBook-Air ~ % ls -al
total 3840
```

Verify the symbolic link and ensure it points to the correct file.

```
arifurrahman@Arifurs-MacBook-Air ~ % ls -al | grep softlink.txt
lrwxr-xr-x  1 arifurrahman  staff   12 Nov 29 16:24 softlink.txt -> original.txt
arifurrahman@Arifurs-MacBook-Air ~ %
```

Delete the original file **original.txt** and observe the status of the symbolic link.

```

[arifurrahman@Arifurs-MacBook-Air ~ % rm original.txt
[arifurrahman@Arifurs-MacBook-Air ~ % ls -al | grep softlink.txt
lrwxr-xr-x  1 arifurrahman  staff   12 Nov 29 16:24 softlink.txt -> original.txt
[arifurrahman@Arifurs-MacBook-Air ~ % ls
Applications      Music              nasa_project
Desktop           Pictures          project
Documents         Postman           softlink.txt
Downloads         Public            src
Library           example.txt       untitled.blend
Movies            linux_fundamentals  untitled.blend1
[arifurrahman@Arifurs-MacBook-Air ~ % cat softlink.txt
cat: softlink.txt: No such file or directory
[arifurrahman@Arifurs-MacBook-Air ~ % ls
Applications      Music              nasa_project
Desktop           Pictures          project
Documents         Postman           softlink.txt
Downloads         Public            src
Library           example.txt       untitled.blend
Movies            linux_fundamentals  untitled.blend1
[arifurrahman@Arifurs-MacBook-Air ~ % ls -al | grep softlink.txt

```

Create a file named **datafile.txt** in your home directory.

```

[arifurrahman@Arifurs-MacBook-Air ~ % touch datafile.txt
[arifurrahman@Arifurs-MacBook-Air ~ % ls
Applications      Pictures          project
Desktop           Postman          softlink.txt
Documents         Public           src
Downloads         datafile.txt     untitled.blend
Library           example.txt      untitled.blend1
Movies            linux_fundamentals
Music             nasa_project
arifurrahman@Arifurs-MacBook-Air ~ % █

```

Create a hard link named **hardlink.txt** pointing to datafile.txt.

```

[arifurrahman@Arifurs-MacBook-Air ~ % ln datafile.txt hardlink.txt
[arifurrahman@Arifurs-MacBook-Air ~ % ls
Applications      Pictures          nasa_project
Desktop           Postman          project
Documents         Public           softlink.txt
Downloads         datafile.txt     src
Library           example.txt      untitled.blend
Movies            hardlink.txt     untitled.blend1
Music             linux_fundamentals
arifurrahman@Arifurs-MacBook-Air ~ % █

```

Verify the hard link and ensure it correctly points to the file.

```

[arifurrahman@Arifurs-MacBook-Air ~ % ls -all | grep hardlink.txt
-rw-r--r--  2 arifurrahman  staff   0 Nov 29 16:49 hardlink.txt
arifurrahman@Arifurs-MacBook-Air ~ % █

```

Check the inode of both **datafile.txt** and **hardlink.txt**

```
arifurrahman@Arifurs-MacBook-Air ~ % ls -i datafile.txt
50135108 datafile.txt
arifurrahman@Arifurs-MacBook-Air ~ % ls -i hardlink.txt
50135108 hardlink.txt
```

Delete the original file **datafile.txt** and observe the status of the hard link.

```
arifurrahman@Arifurs-MacBook-Air ~ % rm datafile.txt
arifurrahman@Arifurs-MacBook-Air ~ % ls
Applications      Pictures          project
Desktop           Postman          softlink.txt
Documents         Public           src
Downloads         example.txt      untitled.blend
Library          hardlink.txt     untitled.blend1
Movies           linux_fundamentals
Music            nasa_project
arifurrahman@Arifurs-MacBook-Air ~ % cat hardlink.txt
```

Find all .txt files in your home directory. ( use find command. Run find --help for usage)

```
arifurrahman@Arifurs-MacBook-Air ~ % find ~ -type f -name "*.txt"
/Users/arifurrahman/linux_fundamentals/scripts/example.txt
/Users/arifurrahman/linux_fundamentals/backup/example.txt
/Users/arifurrahman/.local/share/CMakeTools/log.txt
find: /Users/arifurrahman/Pictures/Photos Library.photoslibrary: Operation not permitted
/Users/arifurrahman/.nvm/test/fast/Unit tests/mocks/LTS_names.txt
/Users/arifurrahman/.nvm/test/fast/Unit tests/mocks/nvm_ls_remote.txt
/Users/arifurrahman/.nvm/test/fast/Unit tests/mocks/nvm_ls_remote LTS argon.txt
/Users/arifurrahman/.nvm/test/fast/Unit tests/mocks/lts-star.txt
/Users/arifurrahman/.nvm/test/fast/Unit tests/mocks/nvm_ls_remote lts.txt
/Users/arifurrahman/.nvm/test/fast/Unit tests/mocks/nvm_print_implicit_alias remote stable.
txt
/Users/arifurrahman/.nvm/test/fast/Unit tests/mocks/nvm_ls_remote.txt
/Users/arifurrahman/.nvm/test/fast/Unit tests/mocks/nvm_ls_remote nightly.txt
/Users/arifurrahman/.nvm/test/fast/Unit tests/mocks/nvm_ls_remote LTS nightly argon.txt
/Users/arifurrahman/.nvm/test/fast/Unit tests/mocks/nvm_ls_remote_iojs.txt
/Users/arifurrahman/.nvm/test/fast/Unit tests/mocks/nvm_print_implicit_alias remote stable
```

## Package installation

Update repo cache using apt/apt-get

```
arifurrahman@Arifurs-MacBook-Air ~ % sudo apt update
Password:
The operation couldn't be completed. Unable to locate a Java Runtime.
Please visit http://www.java.com for information on installing Java.

arifurrahman@Arifurs-MacBook-Air ~ %
```



Install a package named **tree** :

```
sudo apt install tree -y
```

Install gcloud CLI tool using apt ( Follow instructions from here:

<https://cloud.google.com/sdk/docs/install#deb> )

```
sudo apt install apt-transport-https ca-certificates gnupg -y

echo "deb [signed-by=/usr/share/keyrings/cloud.google.gpg]
https://packages.cloud.google.com/apt cloud-sdk main" | sudo tee -a
/etc/apt/sources.list.d/google-cloud-sdk.list

curl https://packages.cloud.google.com/apt/doc/apt-key.gpg | sudo apt-key add -

sudo apt update

sudo apt install google-cloud-cli -y
```