WELCOME FREESURFER COURSE ATTENDEES!

Introduction to Unix for FreeSurfer Users

- changing directories
- copying files
- listing file contents
- Setting up environment variables specific to FreeSurfer

What is Unix/Linux?

- An operating system (like Windows and OS X)
- Linux is the free, modifiable, and redistributable version of Unix
- Why use it?
  - power to write many scripts with many commands to work with lots of data
  - to use computer resources on the network efficiently, such as clusters

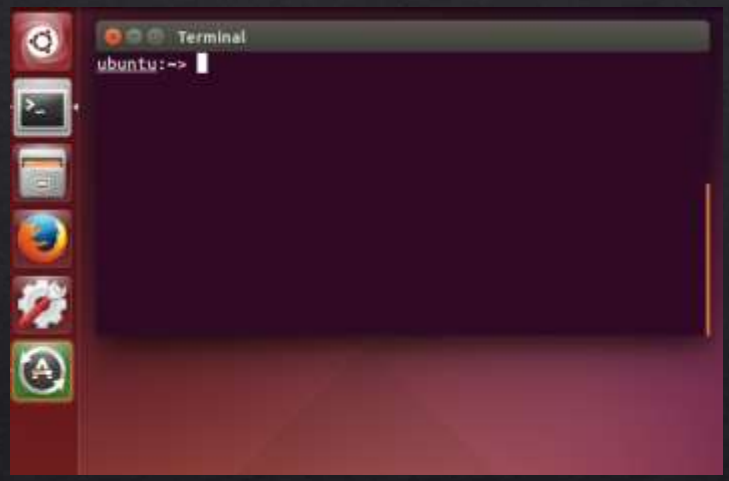
Getting Started

Communicate with operating system through a "shell" or terminal window.

For course-provided Linux computers:

Double click Terminal icon

on Desktop



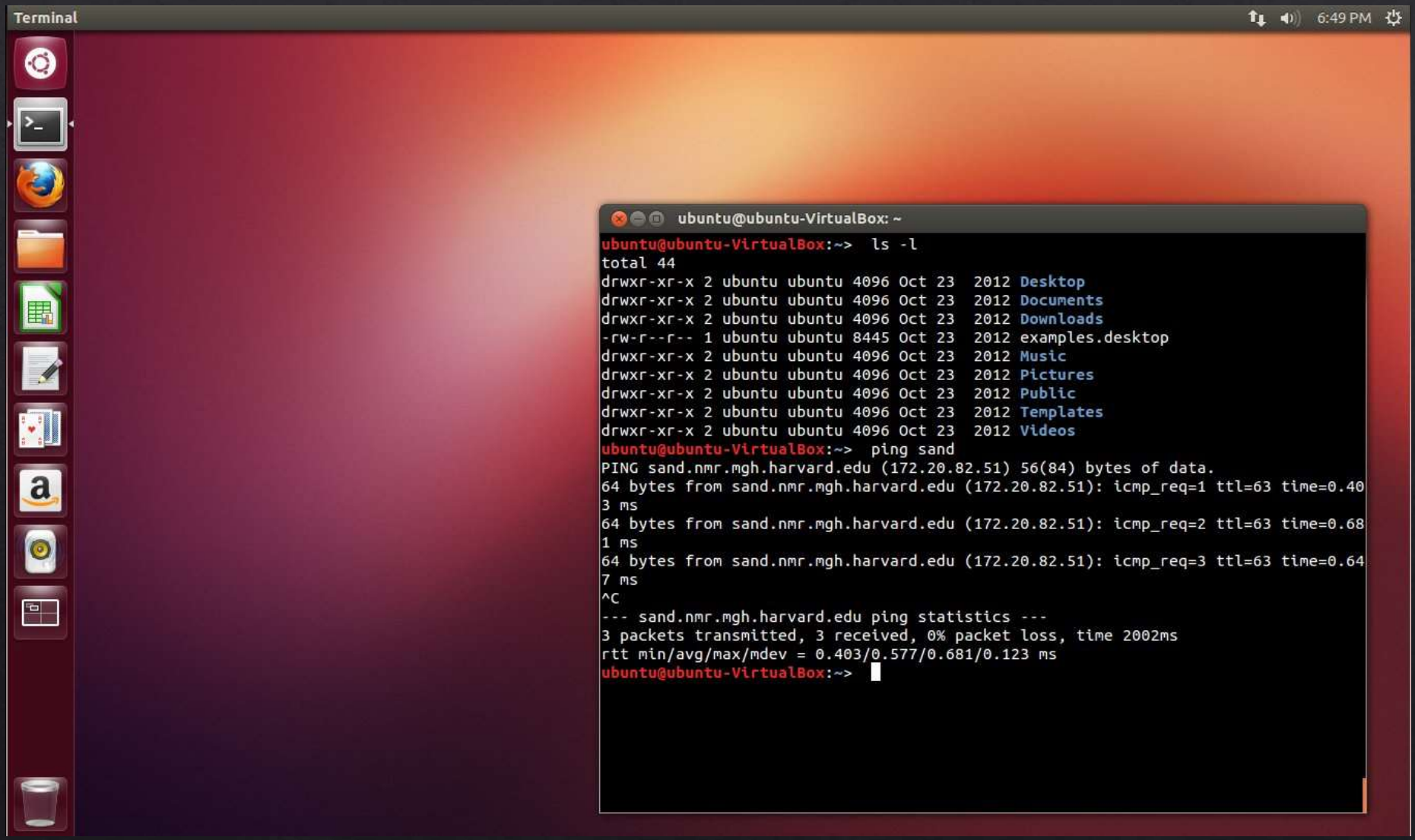
For Macs:

Applications > Utilities > XQuartz (double click)

Applications > Utilities > Terminal

Linux Desktop

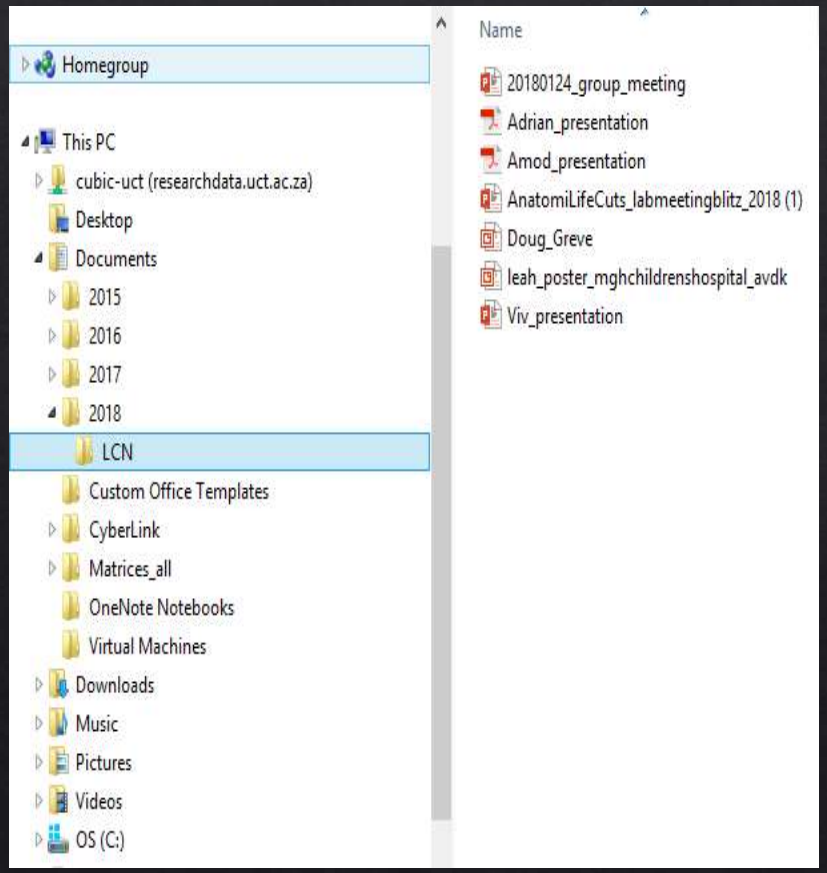
Most course laptops are set up with the Ubuntu Linux distribution

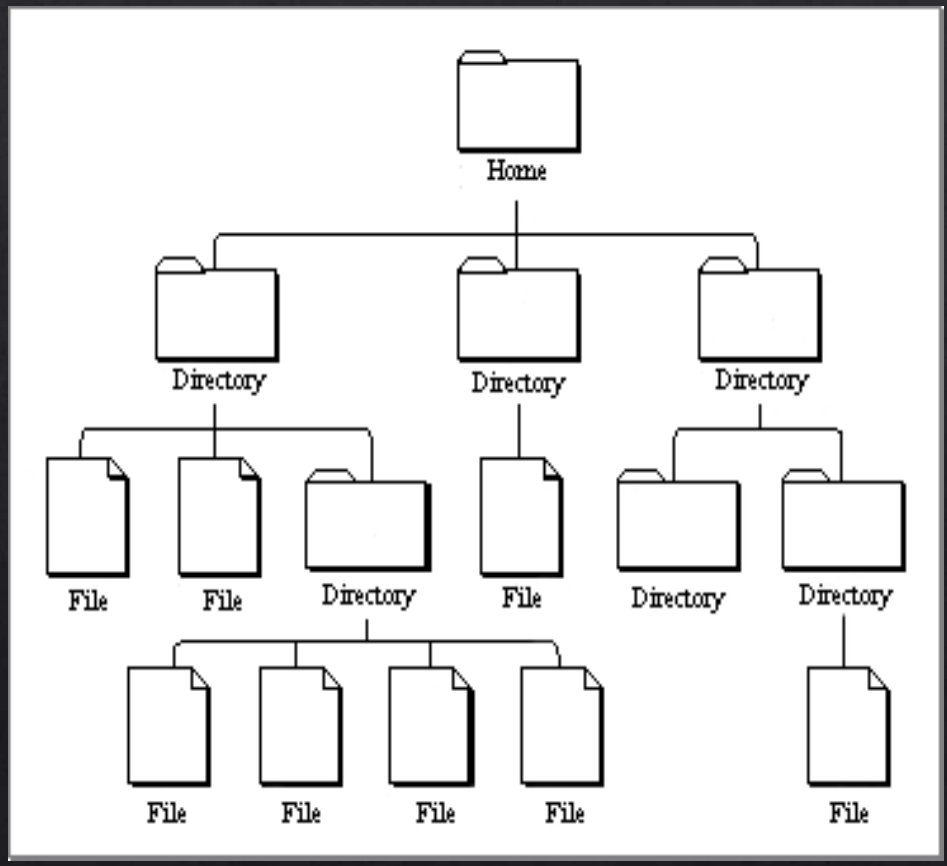


Directories

- Unix uses a hierarchical file system

  (*think folders in Windows*)

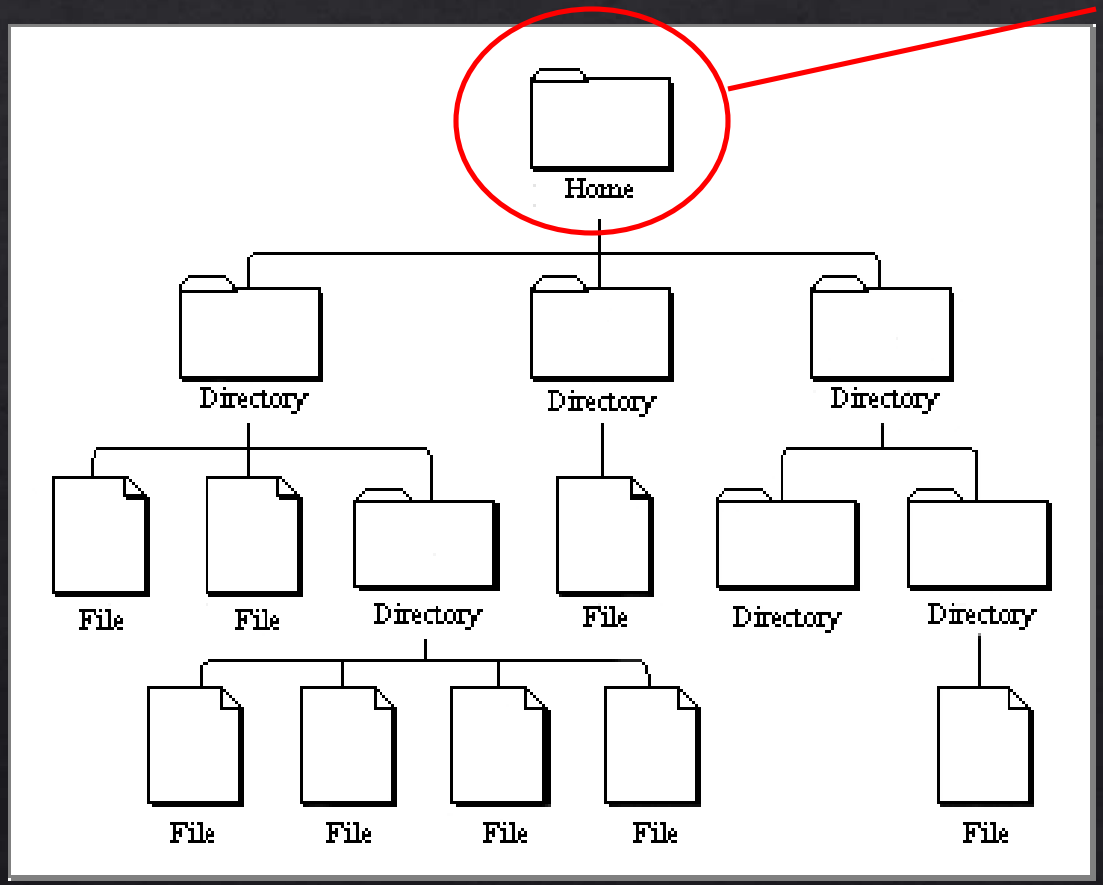




Directories

- Unix uses a hierarchical file system

  (*think folders in Windows*)

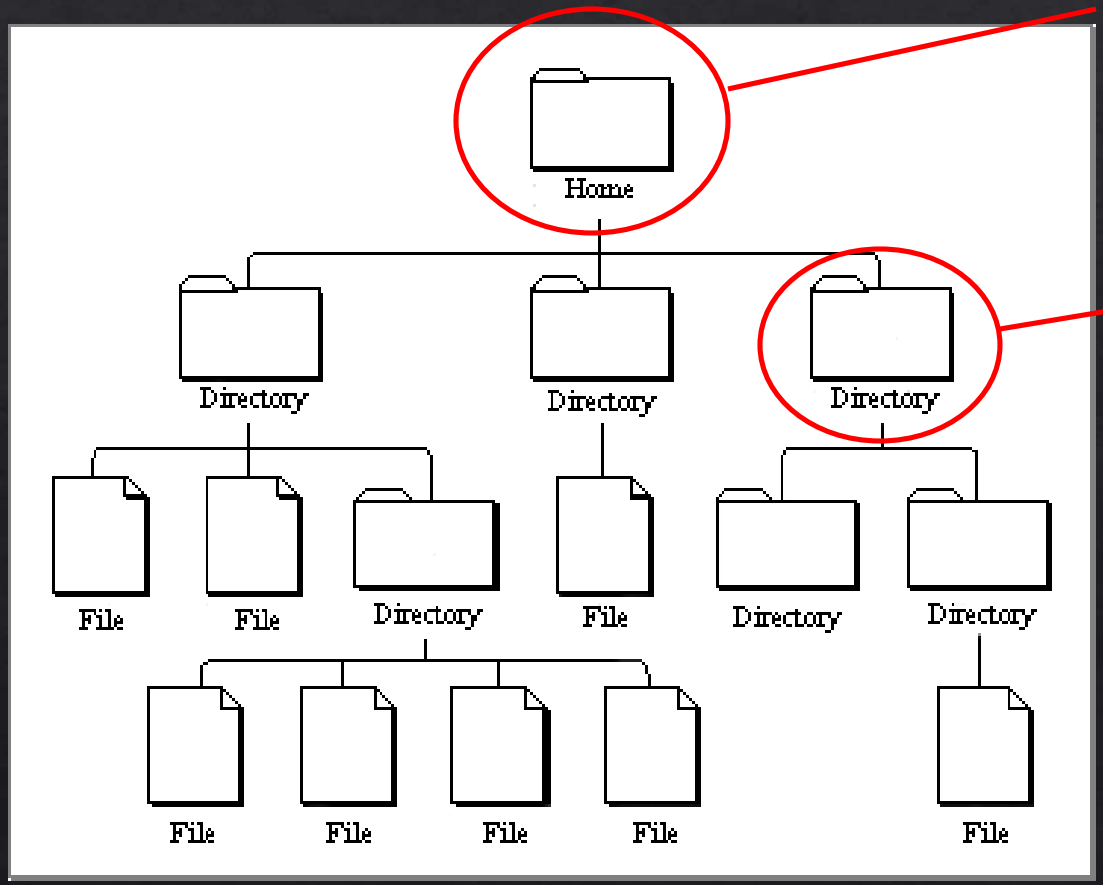


Home is like "My Computer"

Directories

- Unix uses a hierarchical file system

  (*think folders in Windows*)



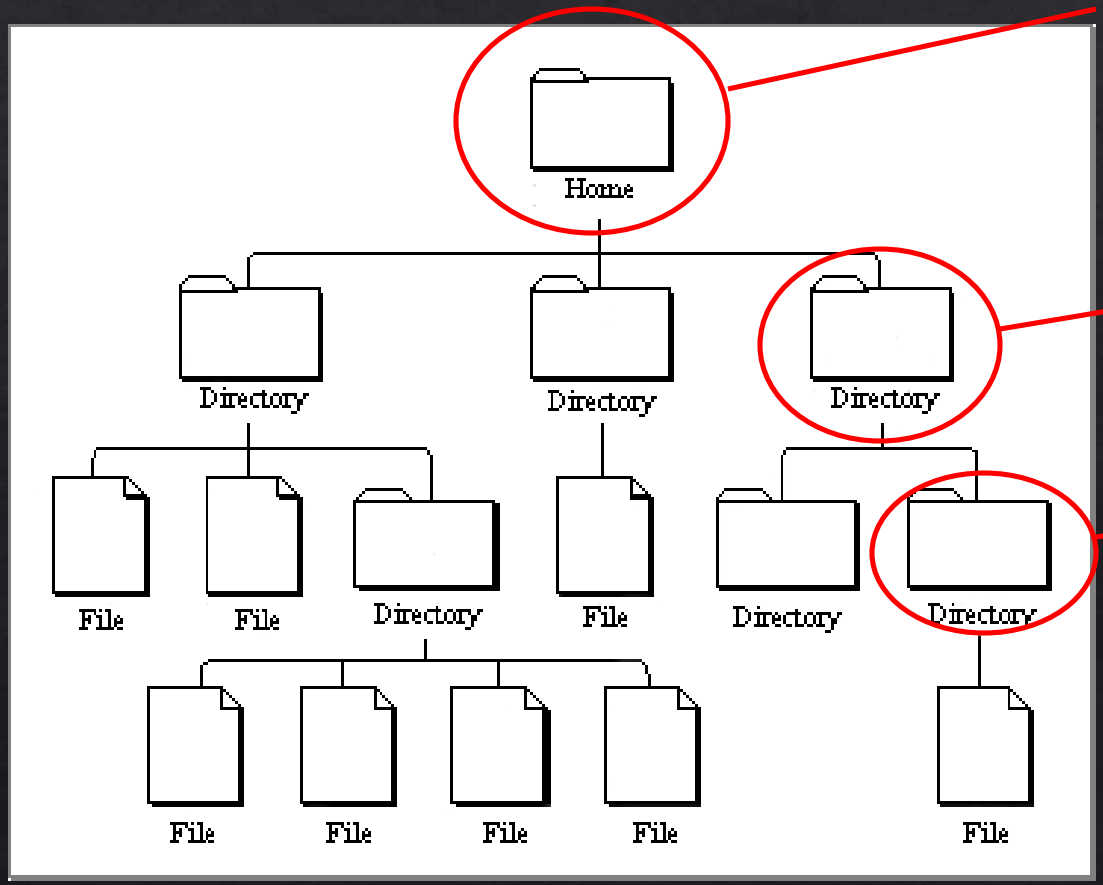
Home is like "My Computer"

Like "My Documents"

Directories

- Unix uses a hierarchical file system

  (*think folders in Windows*)



Home is like "My Computer"

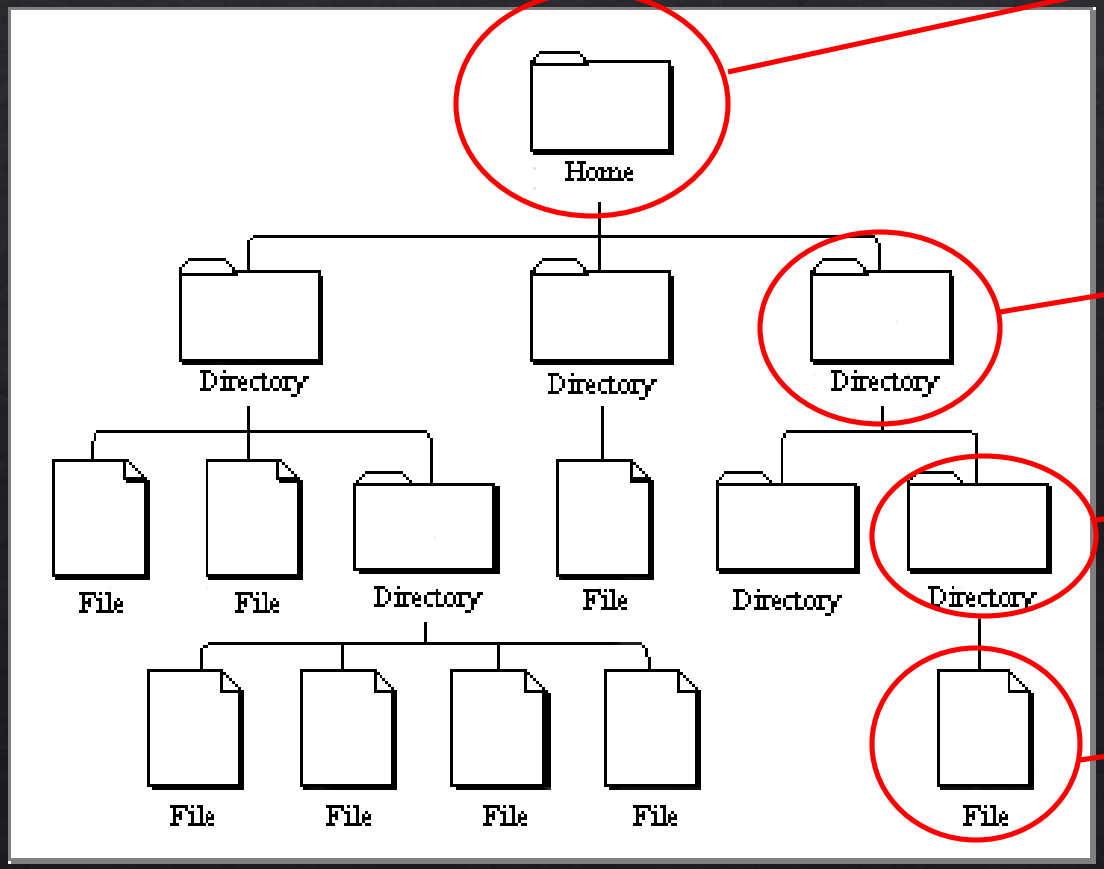
Like " Documents"

Like "My Photos"

Directories

- Unix uses a hierarchical file system

  (*think folders in Windows*)



Anatomy of a Command

```
command  -option1  –option2  file
```

```
command  - -help
```

Anatomy of a Command

command -option1 –option2 file

command - -help

Try:

pwd - - help

Location

Type:

`pwd`

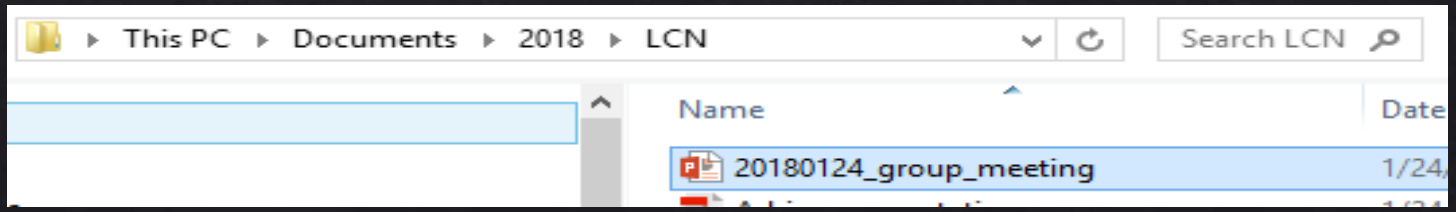
and hit enter. Should see

`/home/nmrclass`

OR

`/Users/YourName`

shows "present working directory" or current location as a *path*



Navigating Directories

"list": see contents of directory

```
ls
```

"change directory": move into a folder

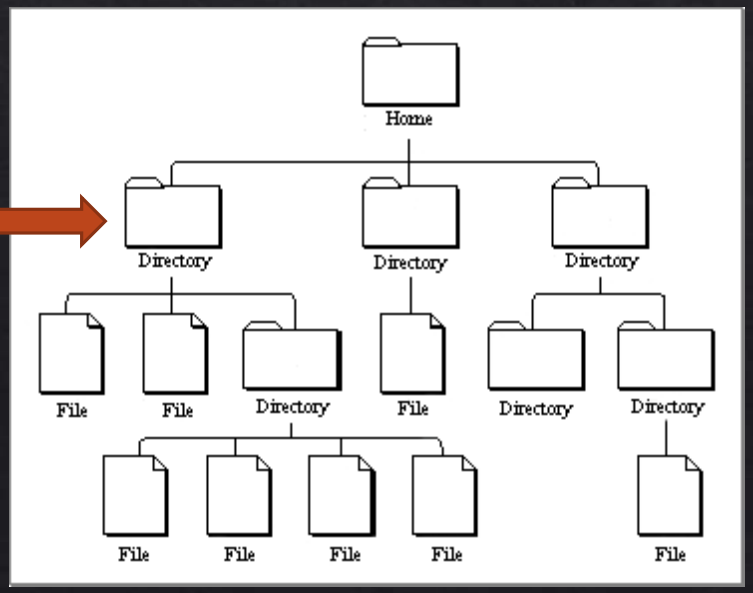
```
cd  <directory_name>
```

Type: pwd

Type: cd /home/nmrclass/

If your present working directory is this

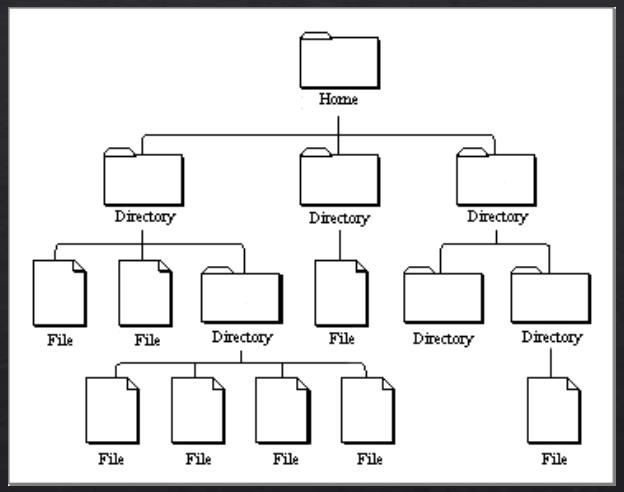
Typing ls will print these names to your terminal



Directory Contents

- List contents of directory you are in

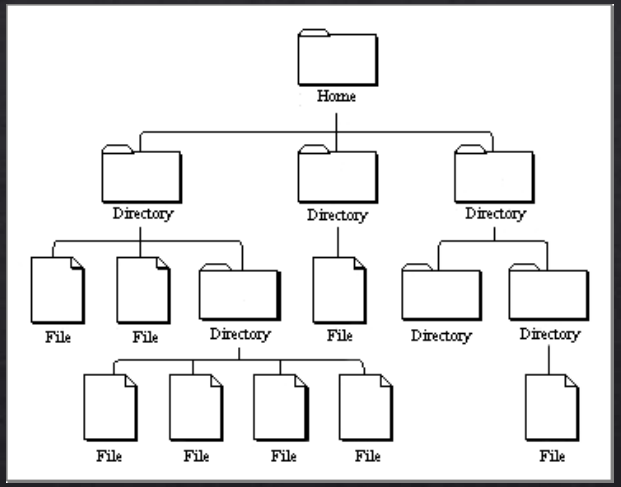
ls	←	*lists names of directories/files*
ls -a		
ls -l		
ls -lrt		



Directory Contents

- List contents of directory you are in

ls	*lists names of directories/files*
ls -a	*lists hidden files too*
ls -l	
ls -lrt	



.cshrc

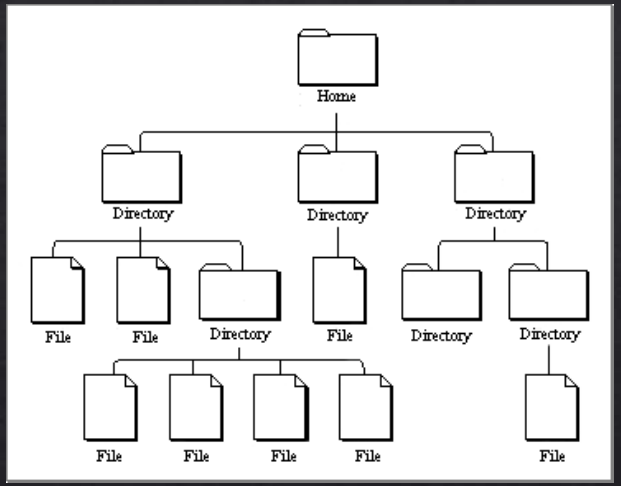
.bashrc

.alias

Directory Contents

- List contents of directory you are in

ls	←	*lists names of directories/files*
ls -a	←	*lists hidden files too*
ls -l	←	*lists file details*
ls -lrt		



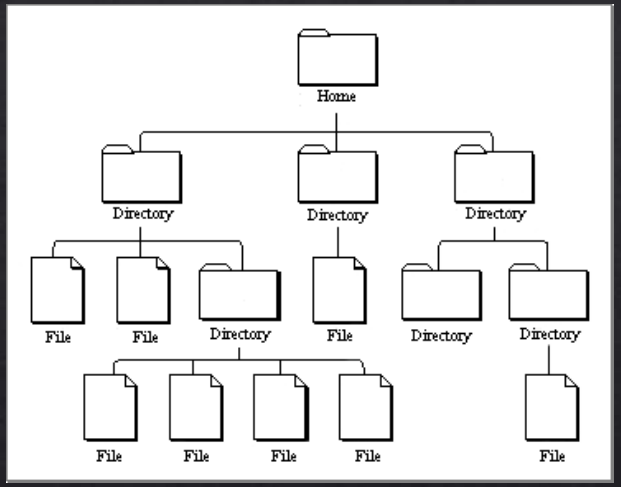
d{rwx}{rwx}{---} # owner group

user group others

Directory Contents

- List contents of directory you are in

ls	*lists names of directories/files*
ls -a	*lists hidden files too*
ls -l	*lists file details*
ls -lrt	*lists recent files last*



Save Some Time

Filename Completion

Type

```
ls Des
```

hit Tab key and you should see

```
ls Desktop
```

hit enter

***Without changing directories, you can list what is under the directory Desktop*

History

hit ↑ key and you should see

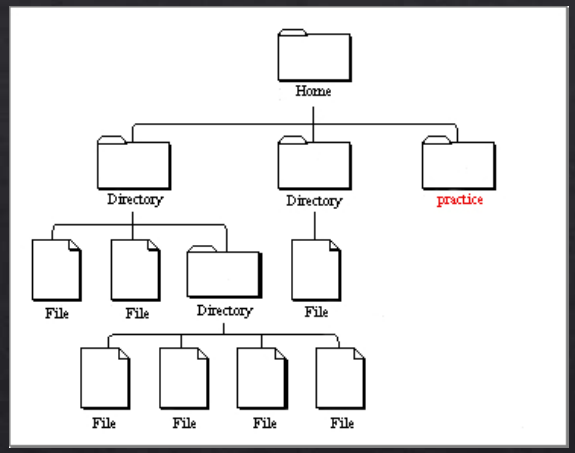
```
ls Desktop
```

```
history
```

Changing Directories

mkdir practice

makes a new directory "practice"



ls -lrt

pwd *should see* /home/nmrclass

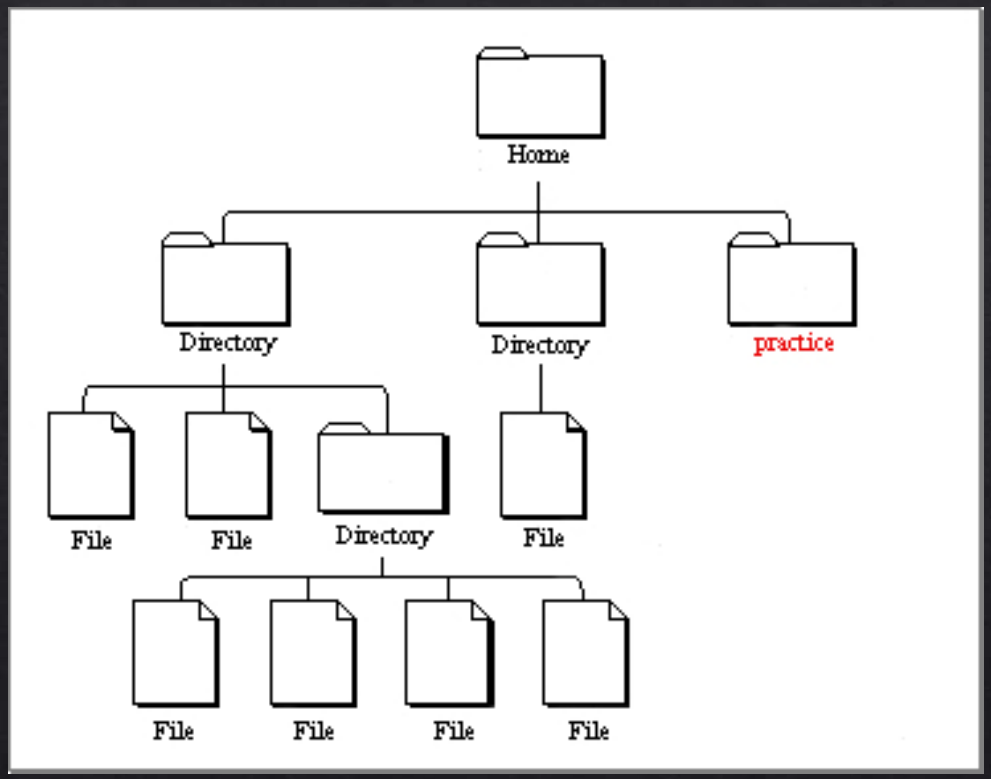
cd practice

changes to directory "practice"

pwd *should see* /home/nmrclass/practice

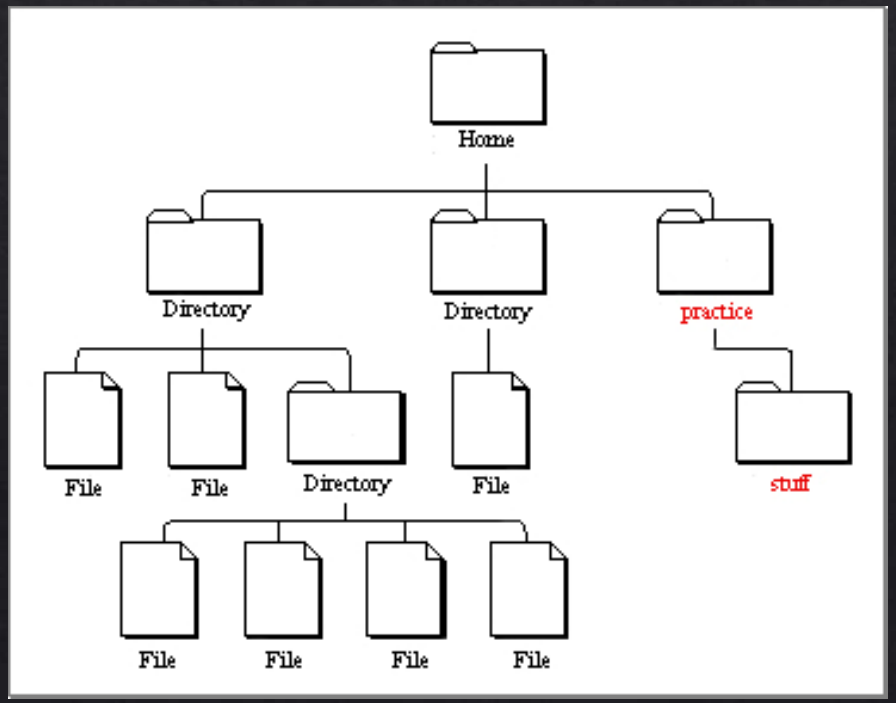
ls *should see* *Nothing – Folder is empty*

Changing Directories

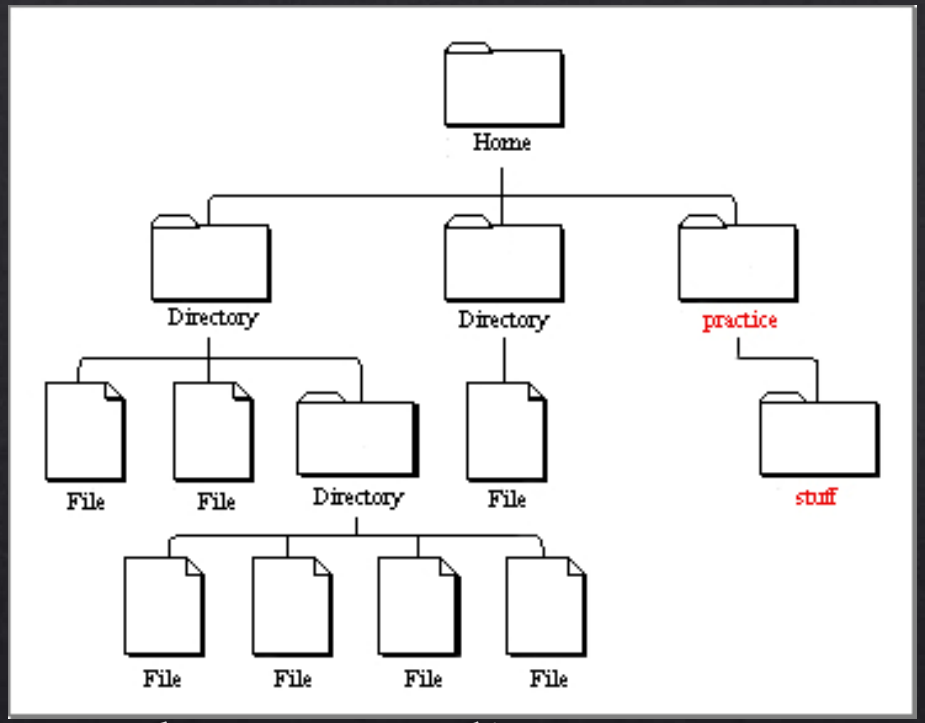


Changing Directories

mkdir stuff	*makes folder "stuff" inside practice*
ls	*should see "stuff"*



Using Dots …



`ls ..` *shows one directory up*

`ls ../..` *goes up two!*

can also do (but don't right now):

`cd ..` `cd ../..`

`pwd` *should see* `/home/nmrclass/practice/`

Using an Editor

If using Linux type:

```
gedit  mynotes.txt
```

If using a Mac type:

```
emacs
mynotes.txt
```

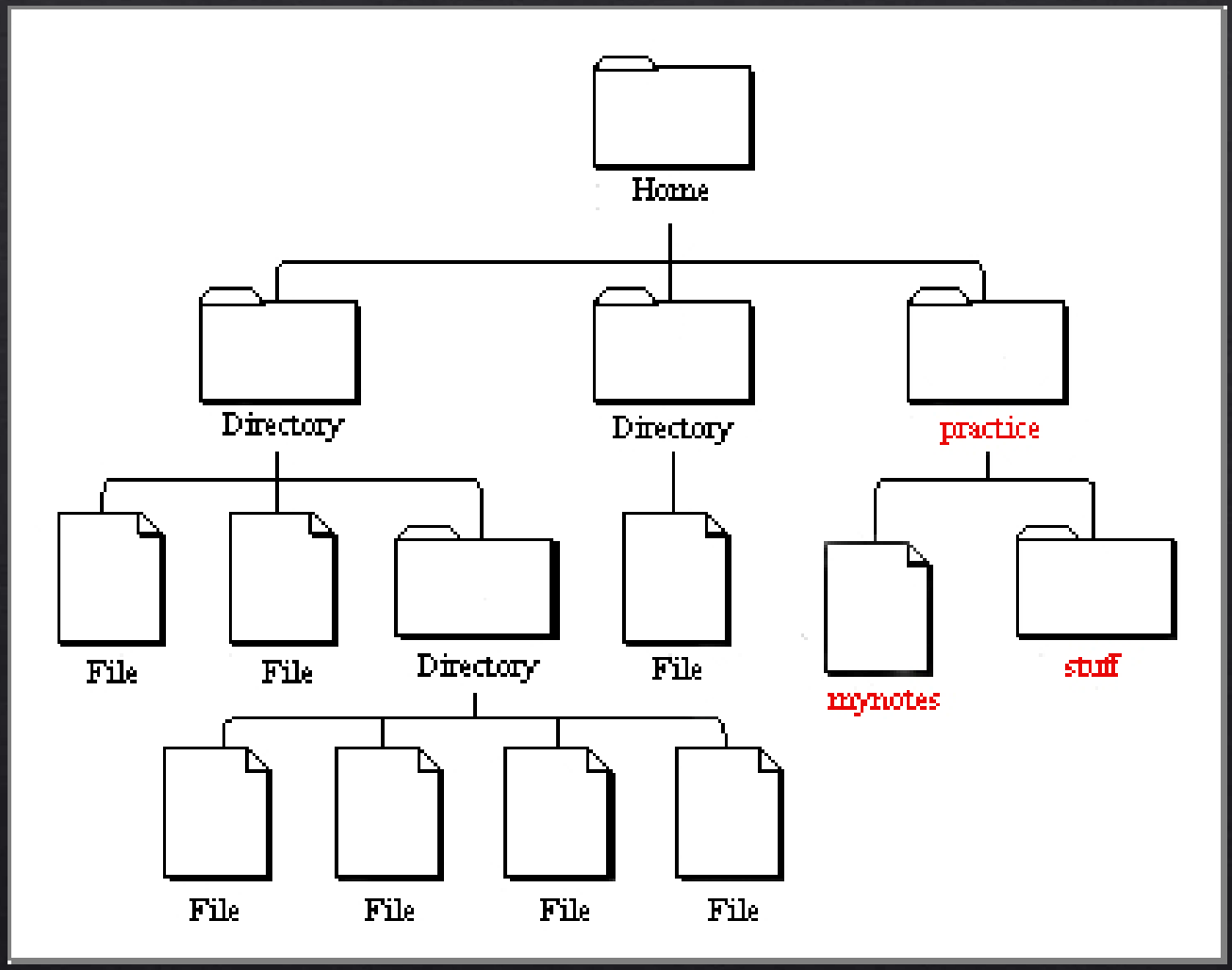
Type: “I could write a script”

File > Save
Close gedit
Or Ctrl+q to quit

Ctrl+x (save)
and Ctrl+c (exit)

Type `ls` *should see* “mynotes.txt”

Using an Editor



Copying files

`cp` *is the copy command*

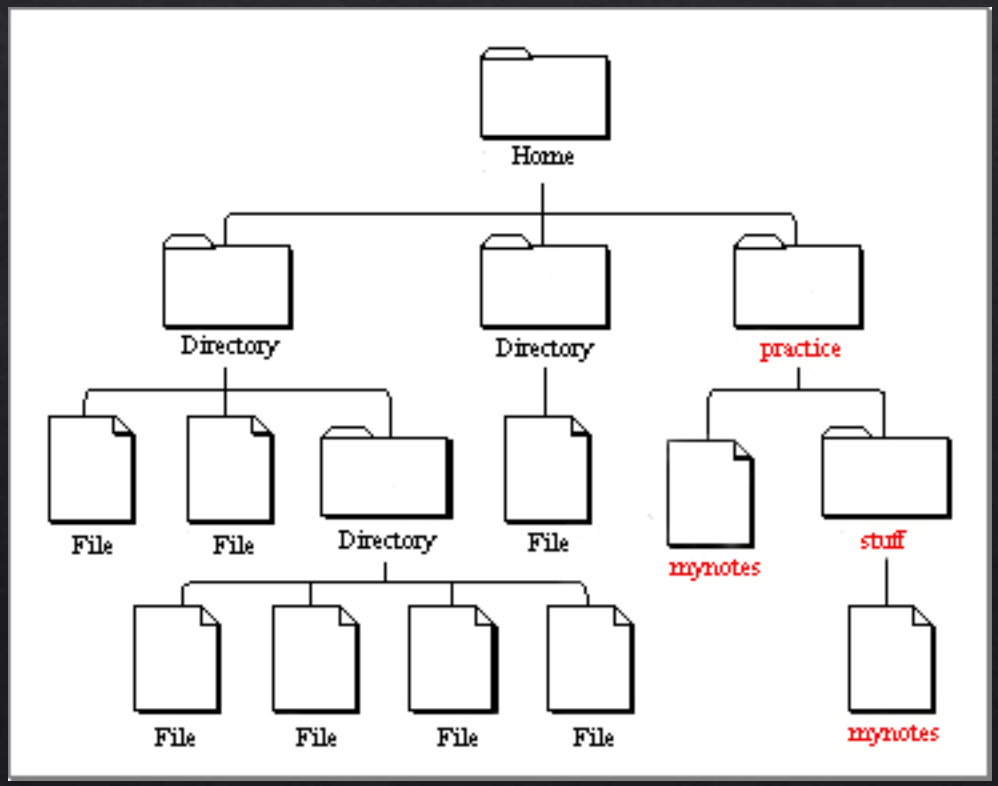
`cp --help`

`cp mynotes.txt stuff`

`cd stuff`

`ls`

`more mynotes.txt`



Copying files

`cp` *is the copy command*

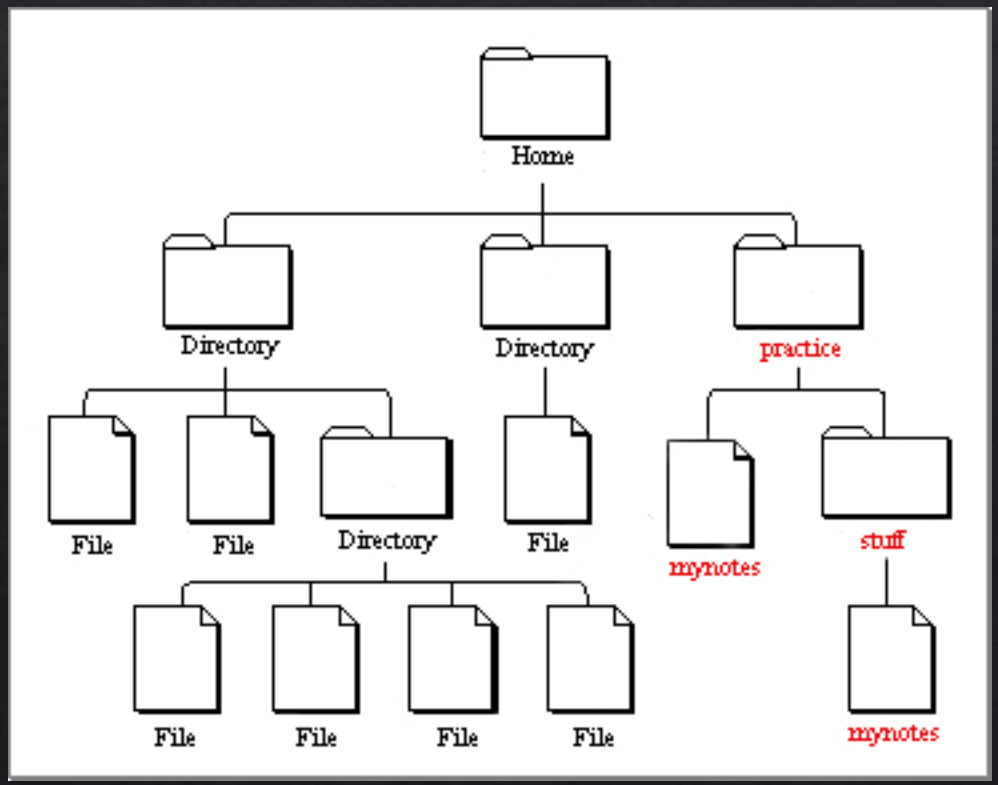
`cp --help`

`cp mynotes.txt stuff`

`cd stuff`

`ls`

`less mynotes.txt`



Copying / Moving files

```
cp   mynotes.txt   myothernotes.txt
```

```
mv   myothernotes.txt   hernotes.txt
```

Could also use dots:

```
mv   hernotes.txt    ..
```

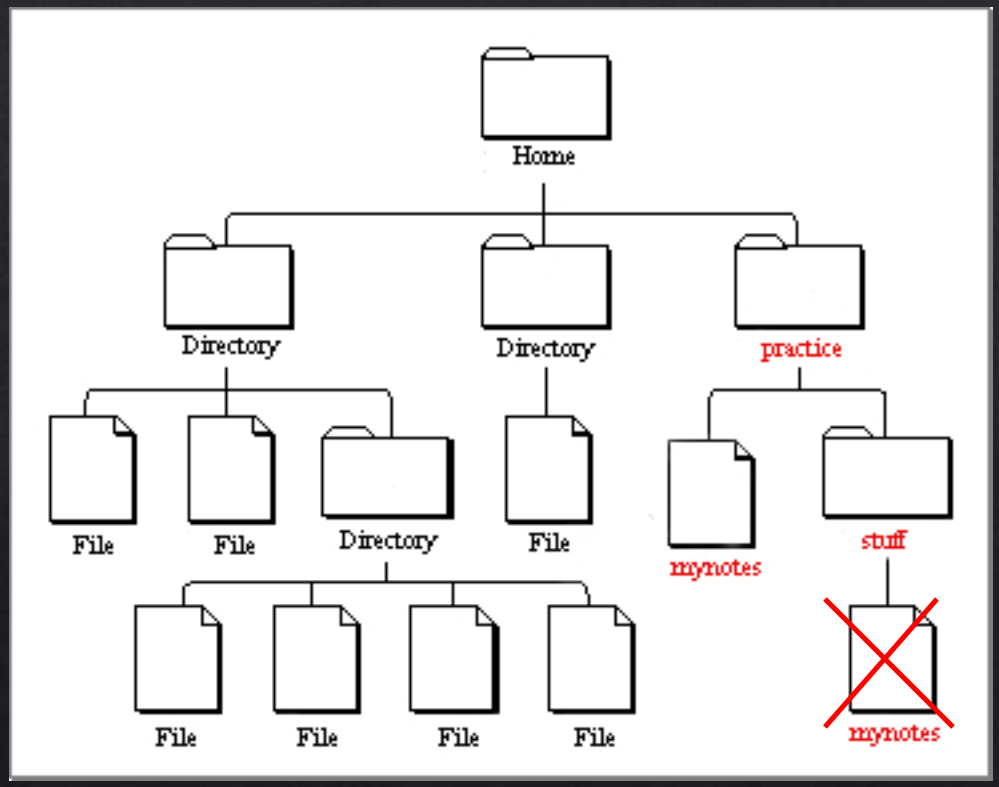
Removing Files

pwd *should be in "stuff"*

ls

rm mynotes.txt

ls



Things to know

- Case sensitive – Ls vs ls
- Does not like spaces in file names

  (e.g. filename.txt vs. file name.txt – use file_name.txt
- Ctrl+c kills a process & brings back command prompt
- Type ‘q’ to quit the program ‘less’
- Highlight & middle click to copy & paste
- Use ‘&’ to open a program in the background
- Ctrl+a on mac goes to home; ctrl+e goes to end
- Ctrl+u clears the command line

Using FreeSurfer

With FreeSurfer, certain variables must be set in order to use it correctly:

FREESURFER_HOME

tell Operating System where FreeSurfer is

SUBJECTS_DIR

tell FreeSurfer where data is

Required Variables

- To use FreeSurfer you'll have to do:

```
export   FREESURFER_HOME=/home/apps/freesurfer
```

tell Operating System where FreeSurfer is

```
source     $FREESURFER_HOME/SetUpFreeSurfer.csh
```

source this script to get your computer ready to use FreeSurfer (sources other scripts & sets other variables)

```
export    SUBJECTS_DIR=/path/to/data
```

Required Variables

- To use FreeSurfer you'll have to do:

```
setenv  FREESURFER_HOME  /home/apps/freesurfer
```

tell Operating System where FreeSurfer is

```
source  $FREESURFER_HOME/SetUpFreeSurfer.csh
```

source this script to get your computer ready to use FreeSurfer (sources other scripts & sets other variables)

```
setenv  SUBJECTS_DIR  /path/to/data
```

Required Variables

To go to location of your data:

```
cd  $SUBJECTS_DIR
```

$ means take the value of the variable

Required Variables

To go to location of your data:

```
cd  $SUBJECTS_DIR
aka
cd  /path/to/data
```

$ means take the value of the variable

How ‘echo’ works

```
echo  $<any_variable>
```

Required Variables

With FreeSurfer, certain variables must be set in order to use it correctly:

FREESURFER_HOME

tell Operating System where FreeSurfer is

SUBJECTS_DIR

tell FreeSurfer where data is

More Help

- http://surfer.nmr.mgh.harvard.edu/fswiki/FsTutorial/CommandLineNavigation
- Homework packet
- CoursePrep on wiki has helpful links

The End

Good Luck!