CIS241

System-Level Programming and Utilities

Linux Filesystems

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> **Based on material provided by Erin Carrier, Austin Ferguson, and Katherine Bowers**

```
[frederer@eos22 public]$ curl https://wttr.in/~Detroit
Weather report: Detroit

     \  /       Partly cloudy
   _ /""._.     +32(36) °C
     \_(   ).   ↑ 17 km/h
     /(___(__)  16 km
                0.0 mm
```

Time to become a terminal wizard

Morning	Noon	Evening	Night
\ / Sunny .-. +27(29) °C – ( ) – ↑ 11-13 km/h `-’ 10 km / \ 0.0 mm | 0%	\ / Sunny .-. +33(38) °C – ( ) – ↑ 16-18 km/h	\ / Partly Cloudy _ /"".-. +31(35) °C _( ). ↑ 16-18 km/h	_`/"".-. Thundery outbr… ,_( ). +29(32) °C /(___(__) ↑ 8-14 km/h

Morning
\ / Sunny .-. +28(31) °C – ( ) – ↗ 11-14 km/h `-’ 10 km / \ 0.0 mm | 0%

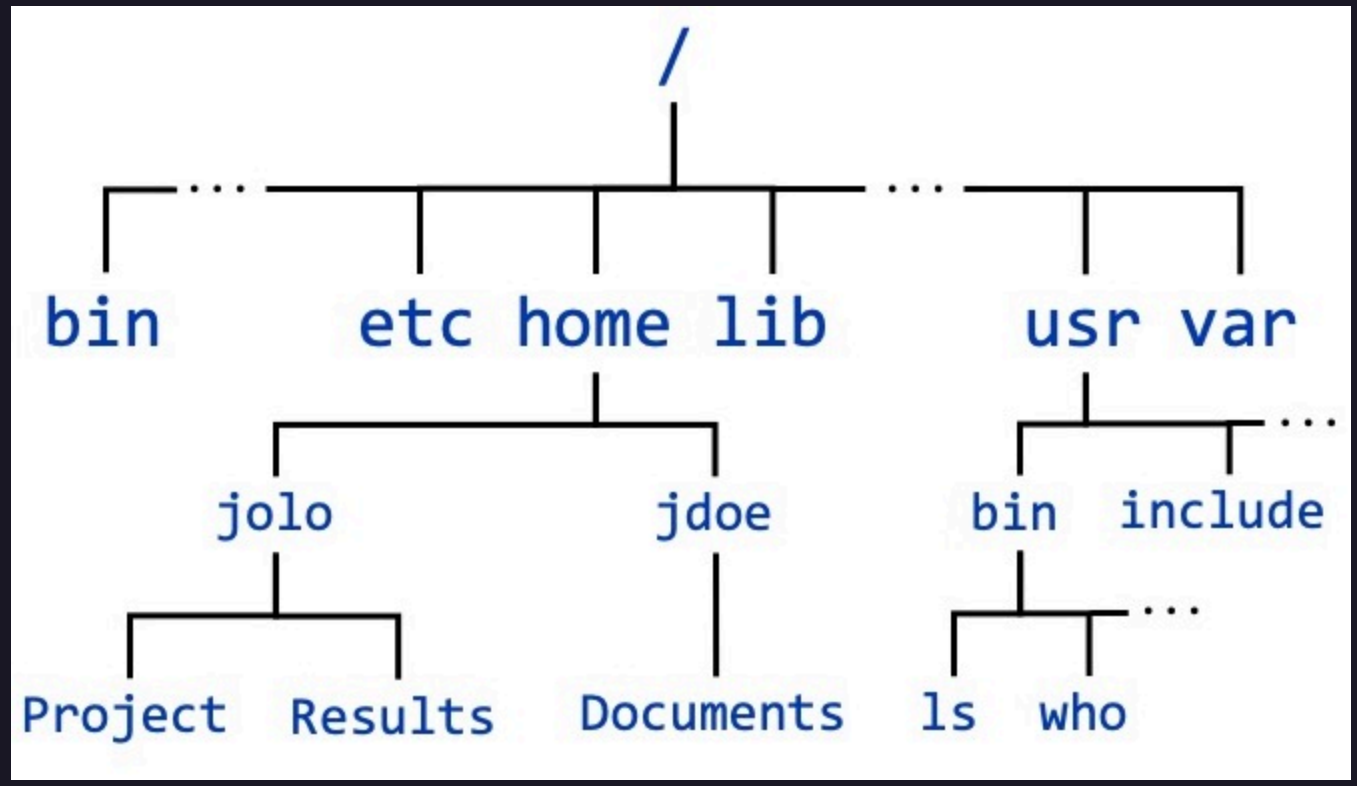
Morning
Overcast 22 °C .-( ). ↗ 7-9 km/h (___.__)__) 10 km

```
Password: **************
Welcome to Ubuntu 24.04.2 LTS (GNU/Linux 6.14.0-27-generic x86_64)

 System information as of Mon Aug 11 02:54:47 PM EDT 2025

  System load:  0.18              Temperature:             126.0 C
  Usage of /:   67.8% of 97.87GB  Processes:               334
  Memory usage: 16%               Users logged in:         0
  Swap usage:   0%                IPv4 address for enp1s0: 35.39.29.91
```

The *nux filesystem

Heirarchical

- Think of it like a tree



Important directories

Root: `/`

Your home directory: `/home/username`

- Shortcut to your home: `~`

For example, to change the current directory to your home directory:

- `cd /home/username` or
- `cd ~`

Paths

We have relative and absolute

Absolute paths - start from the root of the filesystem (`/`)

- You can easily access these from anywhere

Relative paths - start from your current location (`.`)

- You have to know where you are in the current filesystem!
  - E.g., what folder you are in
  - The command that tells you is `pwd` (print working directory)

Useful tip - `tab` expansion

If you hit `tab` the shell will try to autocomplete for you

- Avoid typing in those pesky filenames
- E.g., `cd /home/fre` -> `tab` -> autoexpands to `cd /home/frederer`

If the file/path is ambiguous, double-tap `tab` to get a list of options

More important directories

- `.`: current working directory
- `..`: parent of current directory

What is this? `./../../`

Common commands (with basic usage)

- `cd`: Change to another directory
  - Usage: `cd directory`
- `ls`: List contents in directory
  - Usage: `ls` for current directory or `ls directory` for somewhere else
    - Is there a difference between `ls` and `ls .`?
- `mkdir`: Make directory
  - Usage: `mkdir newdirectory` | Example: `mkdir /home/frederer/mynewdirectory/`
- `pwd`: Show current working directory path
- `touch filename`: Create an empty file

“Try all of these!!!”

How on earth do you remember all this?

Practice!

- Also, more practice!

Check the `man` pages!

Search with `apropos`

- `apropos "remove file"`
- `apropos "remote"`
- `apropos "ssh"`

Some practice

1. Create a directory in the `/tmp` folder

- `/tmp` is scratch space shared by all on the machine and is regularly deleted

2. **Create a directory named `CIS241` in *your* user directory on EOS**

3. **Navigate to the new `CIS241` folder in your user directory and create an empty file called `TODO`**

- Interestingly, Linux doesn't care about extensions.
  - They're only used to help out in the desktop environment
  - File type is determined by the inner header within the file

More commands!

Use these with caution - deleting / overwriting files in Linux cannot be reversed/undone

- **There is no recycle bin in the shell!**
- `rm`**: Remove file/directory (i.e., delete forever)**
  - Usage: `rm file`
- `cp`**: Copy file/directory (i.e., copy and paste)**
  - Usage `cp file1 file2`
- `mv`**: Move file/directory (i.e., cut and paste)**
  - Usage: `mv file1 file2`
- `cat file`**: Output the contents of a file**

Command options (or flags, or arguments, ...)

Most terminal commands accept arguments to change its behavior

Typically delineated with a dash (by convention)

E.g.,:

- `ls -la`
  - Equivalent to `ls -l -a`
  - Meaning, give me the long listing and all information (i.e., hidden info)
- `cp -r`
  - Recursively copy (or, how you copy directories and their contents)

Options can be found typically by adding `--help` or reading the `man` pages

THE MANUAL

Linux commands often have an accompanying manual!

- `man <cmd>`
  - `man cp`
  - `man ls`

Some more practice: `bashcrawl`

Intended to give you practice navigating in a video game setting

- Reminiscent of classic terminal games (like Zork)!

I have installed it to my user directory on EOS

- Read-only so that it can't be destroyed
  - You can find it in `/home/frederer/CIS241/public/bashcrawl`
- However, you can pull down a copy yourself!
  - bashcrawl: https://gitlab.com/slackermedia/bashcrawl