

Linux



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INFORMATION AND
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TECHNOLOGY SERVICES
(ICT SERVICES)

Contents

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- Linux User Interfaces
- Linux File System
- Linux Terminal Demonstration

Introduction

Linux

- Unix-like operating system
- GNU/Linux
 - GNU system packages with Linux Kernel
- Standard operating system for HPC / Servers / etc.
- Community driven, open-source and free to use and distribute
- Thus, many flavors or distributions

Linux Advantages & Disadvantages

- Advantages
 - Free to use and distribute
 - Bugs are found and fixed quicker
 - Transparency natural fit for scientists
- Disadvantages
 - Software compilation – not user friendly
 - Not Windows

Linux Distributions

- Linux Mint (<https://linuxmint.com/>)
- Pop!_OS (<https://pop.system76.com/>)
- Fedora (<https://getfedora.org/>)
- Ubuntu (<https://ubuntu.com/>)
- Hanna Montana Linux (<http://hannahmontana.sourceforge.net/>)

Linux User Interfaces

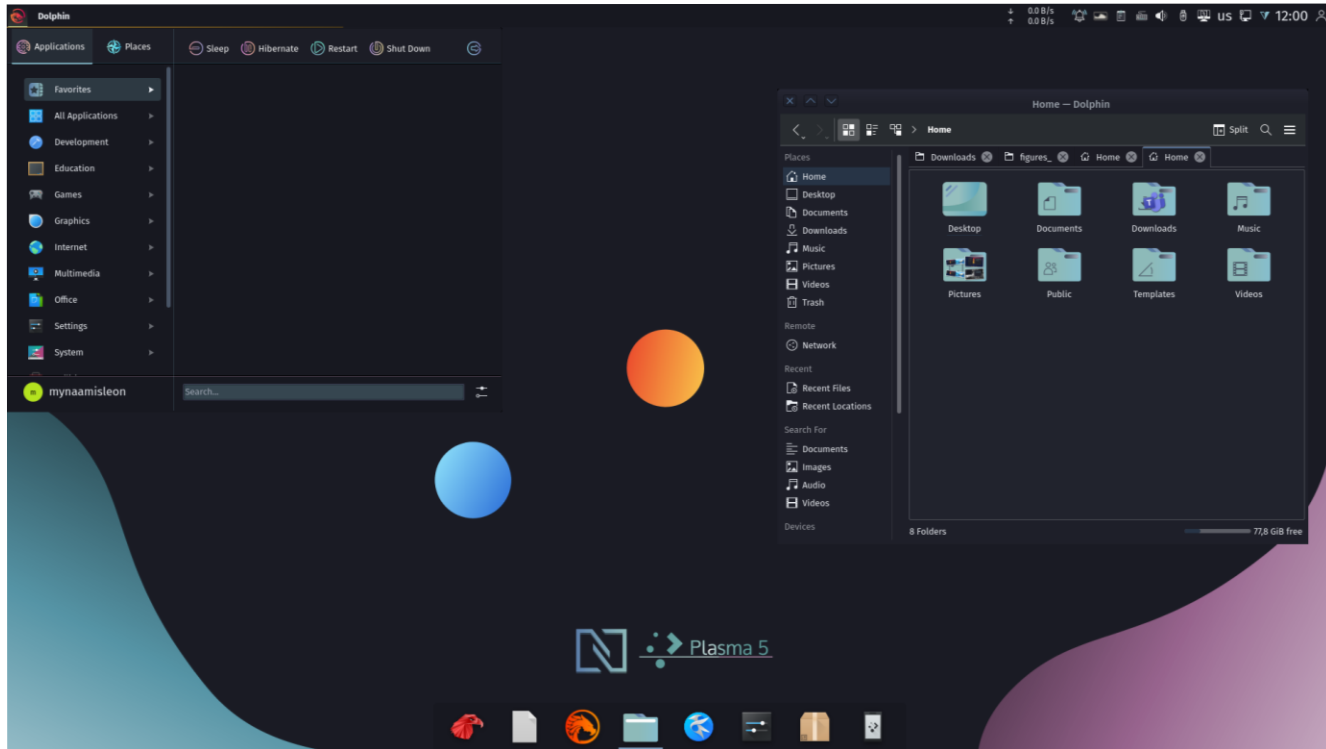
Linux User Interfaces

- Two main types
 - Graphical User Interface (GUI)
 - Text Interface (Terminal)
- Main HPC interface → Text Interface

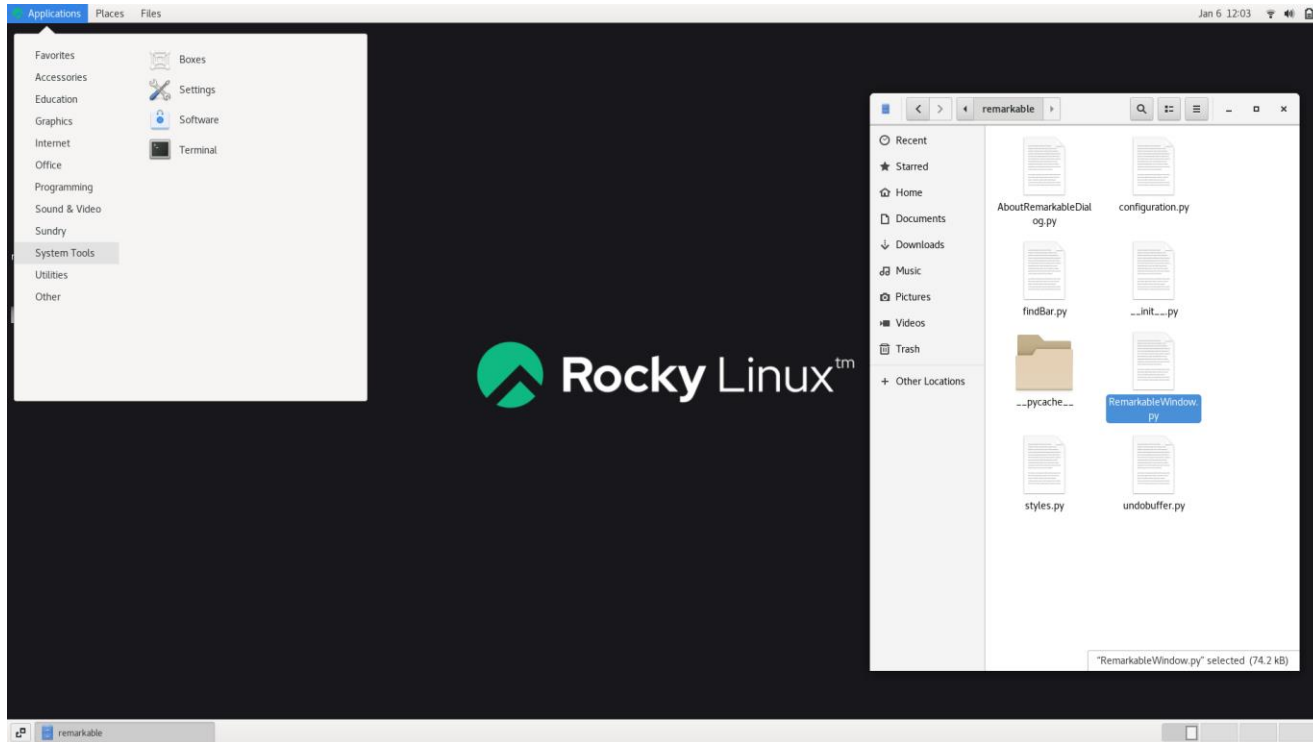
Linux GUIs

- Many options
- Desktop Managers
 - GNOME
 - KDE Plasma
 - XFCE
 - Cinnamon
 - ETC

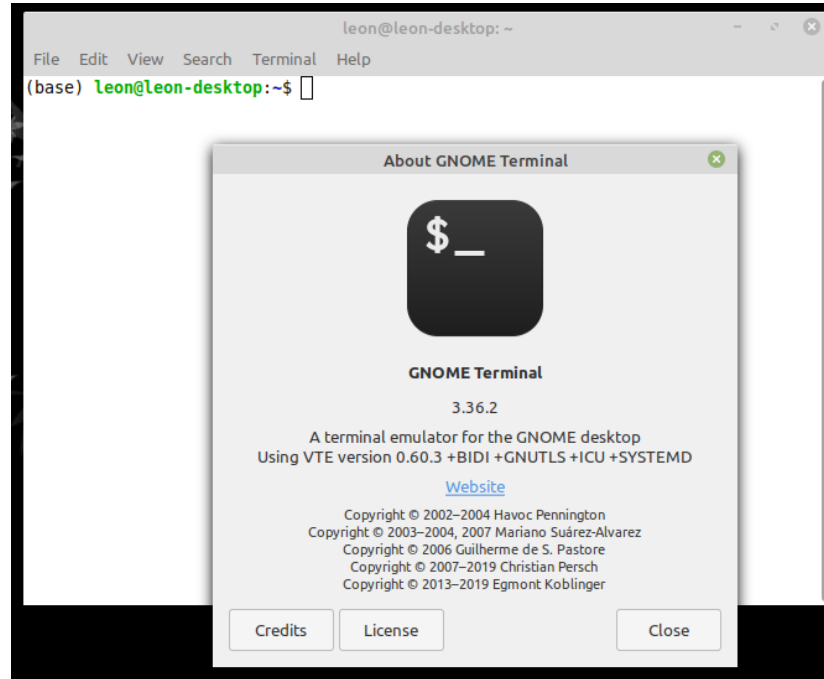
Garuda Linux with KDE Plasma



Rocky Linux with GNOME3



Terminal – Terminal Emulators

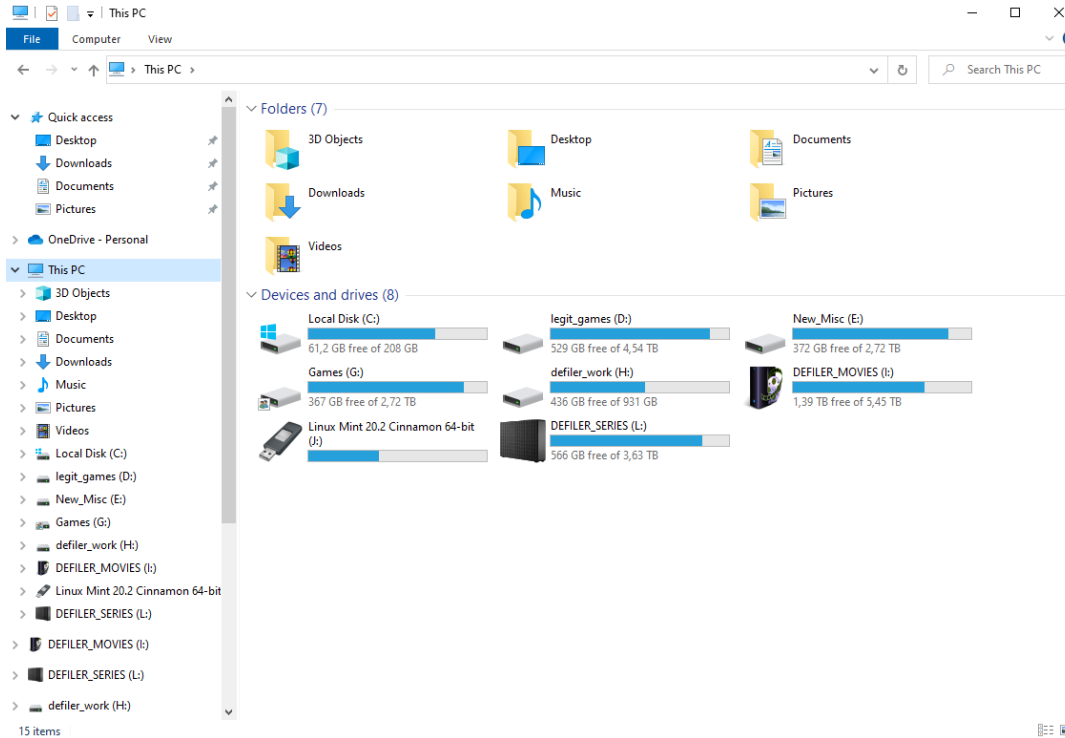


Linux File System

Linux File system

- File System
 - Collection of methods OS uses to manage data on a storage device such as hard disks
- Partition Types:
 - NTFS, FATx (Microsoft)
 - Ext4 (Linux)
 - HFS (Apple)
- Windows can only read NTFS and FATx partition / not Ext4
- Linux can read most partition types
- Files and directories organized differently from Windows

Windows File System



Windows File System

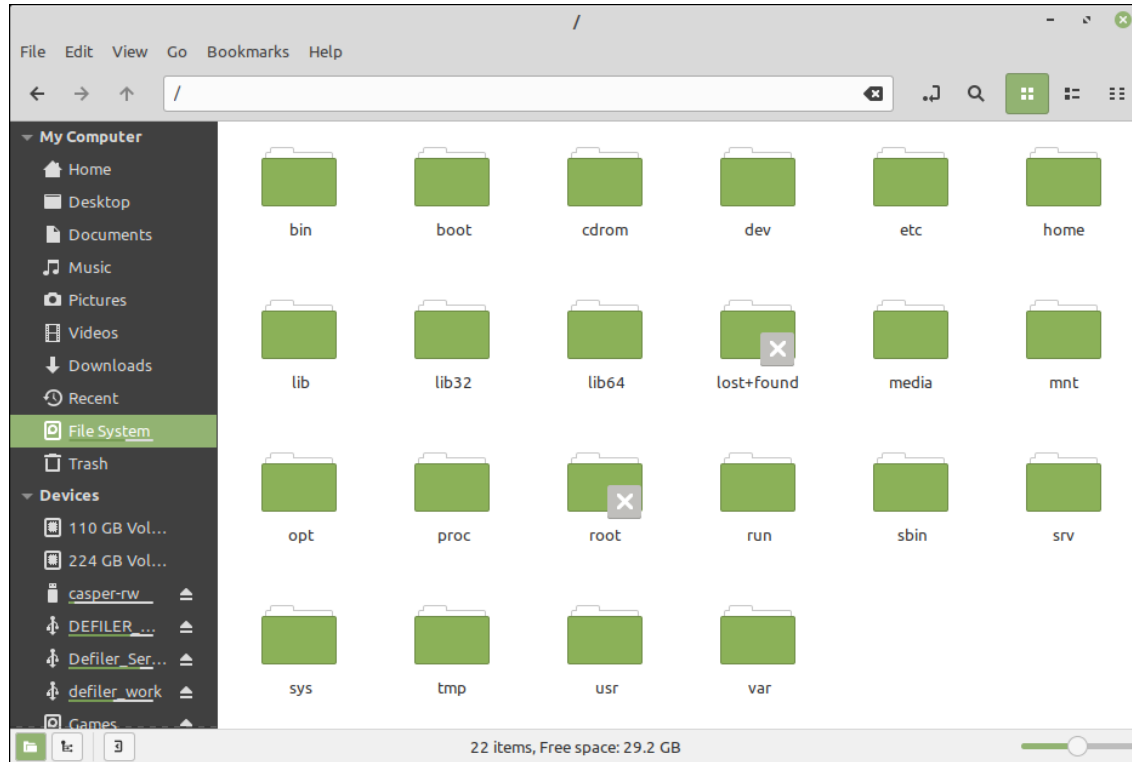
The screenshot shows a Windows File Explorer window titled "DEFILER_MOVIES (I:)" with the "Manage" ribbon tab active. The address bar shows the path "This PC > DEFILER_MOVIES (I:) >". The left sidebar shows the navigation pane with "DEFILER_MOVIES (I:)" selected. The main pane displays a list of 27 items in a table view, sorted by "Date modified". The "Fantasy" folder is currently selected.

| Name | Date modified | Type | Size |
|-----------------|---------------------|----------------------|--------|
| .fseventsd | 2021/10/29 3:01 PM | File folder | |
| Action | 2021/10/28 8:32 PM | File folder | |
| Adventure | 2021/05/28 11:22 PM | File folder | |
| Afrikaans | 2019/12/05 9:43 AM | File folder | |
| Animation | 2021/10/28 9:08 PM | File folder | |
| Bollywood | 2019/12/05 10:02 AM | File folder | |
| CGI | 2021/01/02 12:01 AM | File folder | |
| Comedy | 2021/10/28 8:58 PM | File folder | |
| Crime | 2021/08/29 8:37 PM | File folder | |
| DC&Marvel | 2021/08/14 3:16 PM | File folder | |
| Drama | 2021/07/24 12:56 PM | File folder | |
| Exploitation | 2021/10/28 9:06 PM | File folder | |
| Family | 2020/04/10 8:42 PM | File folder | |
| Fantasy | 2020/12/05 10:36 PM | File folder | |
| Foreign | 2021/02/07 1:17 AM | File folder | |
| hddstuff | 2019/12/05 9:41 AM | File folder | |
| Horror | 2021/10/28 9:04 PM | File folder | |
| Parody | 2020/01/06 9:45 PM | File folder | |
| Romance | 2021/02/14 11:37 PM | File folder | |
| Sci-Fi | 2021/07/24 2:03 PM | File folder | |
| Thriller | 2021/10/28 8:40 PM | File folder | |
| Untitled Folder | 2021/02/04 1:35 AM | File folder | |
| War | 2019/12/05 8:05 AM | File folder | |
| Western | 2019/12/05 8:05 AM | File folder | |
| .VolumIcon.ico | 2019/12/05 9:41 AM | Icon | 423 KB |
| Autorun.inf | 2018/02/21 4:20 AM | Setup Information | 1 KB |
| msdia80.dll | 2006/12/01 11:37 PM | Application exten... | 884 KB |

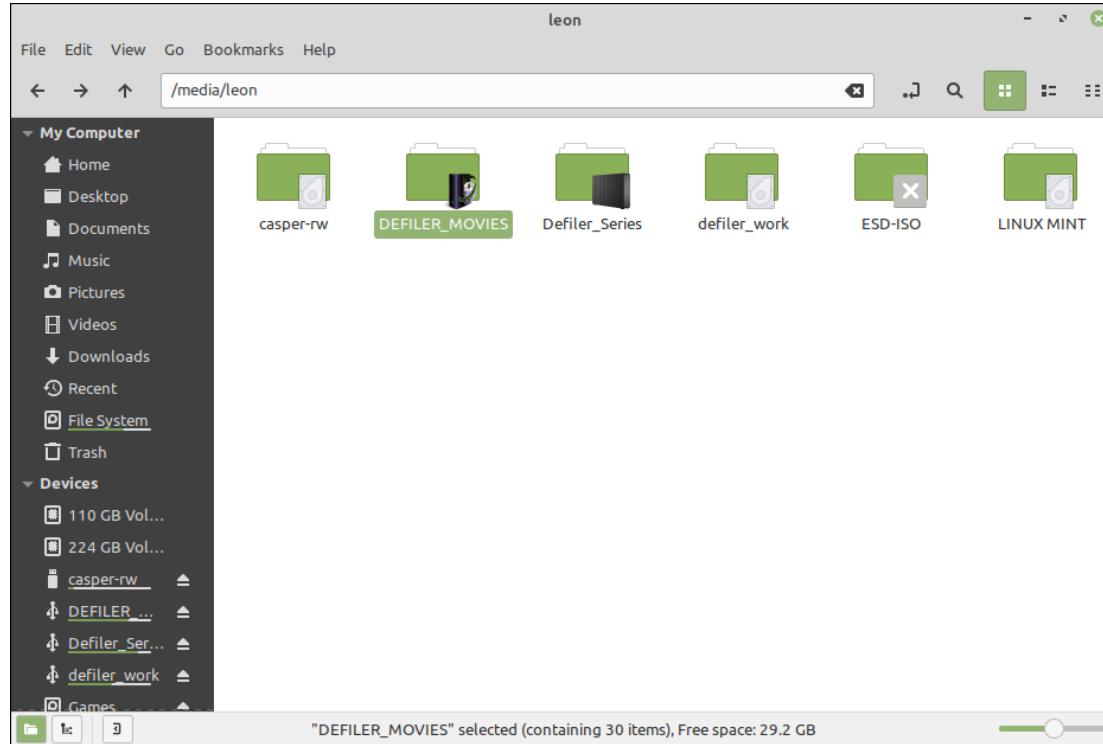
Linux File system

- All storage devices amalgamated into one root file system
- Top directory --> Root or /
- Storage devices mounted in directories within /
- Home directories --> / *home* / *<username>*
 - Users have full permissions in their own home directories
 - No write permissions in system directories
 - More secure
- File extensions for your convenience and not important in Linux

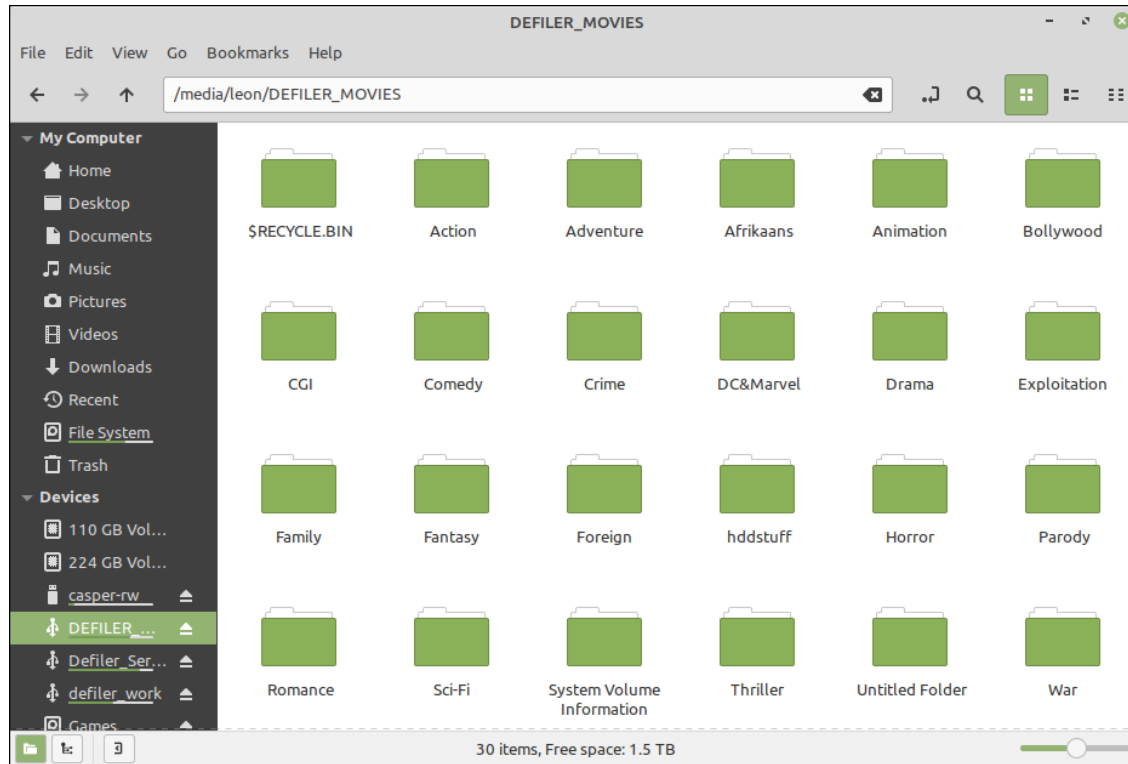
Linux File system



Linux File system



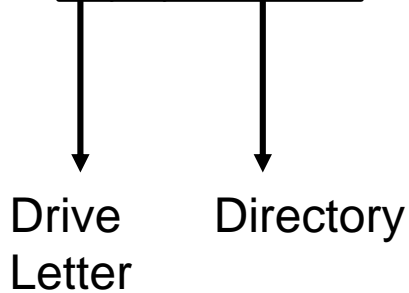
Linux File system



File and directory paths

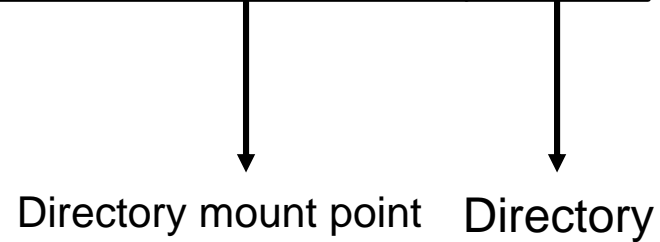
Windows

I: \ Fantasy



Linux

/media/leon/MOVIES/Fantasy



Linux Terminal Demonstration

Introduction

- Use terminal commands to navigate and perform actions
- Each terminal command is usually a stand-alone program
- Common interfaces with most CLI commands / programs
 - Positional arguments: `cp <source> <destination>`
 - Options/Flags can be in long form or short hand
 - Long form: `--help`
 - Short hand: `-h`
 - Using `(-h)` or `(--help)` --> most cases --> show how to use command/program
 - Using `man <command>` will display the command's manual

Navigation in the Linux

- Short-cuts:
 - */* : Root Directory
 - *.* : Present Working Directory (PWD)
 - *..* : One directory above the PWD
 - *~* : Home directory for the current user
 - *-* : Previous directory (only used with *cd*)
- *pwd*
- *ls*
- *cd*
- *find*

Performing File Operations

- *mkdir*
- *touch*
- *cp*
- *mv*
- *rm*

Viewing File Contents

- *cat*
- *more*
- *less*
- *head*
- *tail*

Miscellaneous Commands

- *tar*
- *screen*

Regular Expressions

- Patterns that match strings
- Can become complex very quickly → gentle introduction
- Steps for crafting a regular expression:
 - Identify common patterns
 - Write the regular expression based on common pattern
 - Test the regular expression

Identifying Patterns

- Example: The following files are generated by an experiment:
 - foo_stats.txt
 - foo_seq1.fasta
 - foo_seq2.fasta
 - foo_seq3.fasta
 - foo_timings.fasta
 - hpc_job.error
 - hpc_job.output
 - hpc_job.nodes
 - hpc_job.txt

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Writing regular expressions

| Element | Definition | Example |
|------------------------|--|---|
| Character set or class | Characters retaining their literal meaning | The prefix foo |
| Modifiers | Expand or narrow the text to match | Asterisk (*) expands selection to all characters |
| Anchors | Indicates the location from where to match | Caret (^) indicates that the pattern should be at the beginning of the text |

* Note that Anchors can only be used with tools such as *grep* and *sed*

Writing regular expressions - Example

- List all files that start with the prefix *foo*
 - `$ ls foo*`
- List all files that end with the *.fasta* extension
 - `$ ls *.fasta`
- Copy all files that start with the prefix *hpc_job*
 - `$ cp hpc_job* new_directory`