Files, Directories, and Paths

- **date**: Displays the current system date and time

- **echo**: Prints text or variables to the terminal.

- **pwd** (Print Working Directory): Shows the full path of the current directory.

- **cd** (Change Directory): Changes to the specified directory   (cd /home/user)

- **cd .** Refers to the current directory (no effect)

- **cd ..** Moves up one level in the directory hierarchy

- **ls**: lists files and directories in the current directory

- **ls -l**: (Long Listing Format): Displays detailed information about files and directories
  (permissions, owner, size, date, etc.)

- **man ls**: Opens the manual (help documentation) for the ls command.

File Naming/Content Representation

- *****: Matches zero or more characters in filenames

  - ***.txt** matches all .txt files.

- **?**: Matches exactly one character.

  - **file?.txt** matches file1.txt, fileA.txt.

- **[]**: Matches any one character from the set inside the brackets.

  - **file[12].txt** matches file1.txt, file2.txt

- **{}**: Used for brace expansion (e.g., creating multiple files or directories).

  - **echo file{1,2,3}.txt** → file1.txt file2.txt file3.txt

Content Creation

- **mkdir:** Creates a new directory   (mkdir new_folder)

- **cp**: Copies files or directories   (cp file1.txt file2.txt)

- **mv:** Moves or renames files/directories   (mv old.txt new.txt)

- **rm**: Removes files   (rm file.txt)

- **rmdir**: Removes an empty directory   (rmdir empty_folder)

Accessing Content

- **more**: Views file content one page at a time; <u>forward</u> only
- **less**: More advanced than more; allows both <u>forward and backward</u> navigation.
- **head**: Displays the <u>first few lines</u> of a file; default: 10 lines   (head file.txt)
- **tail**: Displays the <u>last few lines</u> of a file   (tail file.txt)
- **wc** (Word Count): Counts lines, words, and characters   (wc file.txt)
- **cat**: <u>Concatenates</u> and displays file contents   (cat file.txt)

Redirecting Content

- **stdin** (Standard Input): usually from the keyboard
- **stdout** (Standard Output): usually to the terminal.
- **stderr** (Standard Error Output): used for error messages.
- **<**: Redirects <u>input from</u> a file   (command < input.txt)
- **>**: Redirects <u>output to</u> a file; overwrites   (echo "Hello" > out.txt)
- **|** (Pipe): Sends <u>output of one</u> command <u>as input to another</u>   (ls | grep "txt")

Querying Content

- **sort**: Sorts lines in a file   (sort file.txt)

Flag	Meaning
-k N	Sort by field number N
n	Numeric sort (e.g., 2 < 10)
r	Reverse order
-k A -k B	Primary sort by A, secondary by B

  - **sort -k 3 months**: sort starting at the 3rd field (season)
    - lines are sorted alphabetically by the season: fall, spring, summer, winter
    - Within each season group, the order of months is not guaranteed; just by season
  - **sort -k 3 -k 2n months**: sort primarily by the 3rd field (season), then secondarily by the 2nd field (month number) <u>numerically</u>

- o **sort -k 3 -k 2rn months**: primary sort by season, secondary sort by month number, numerically and in reverse
- **uniq**: Removes duplicate lines; <u>requires sorted input</u>　　　　　(uniq sorted.txt)
- **cut**: <u>Extracts</u> specific fields/columns from text　　　　　(cut -d'', -f1 file.csv)
- **grep**: Searches for patterns in files using regular expressions　　(grep "pattern" file.txt)

Comparing Content

- **diff**: Compares two files line by line and <u>shows the differences</u>　(diff file1.txt file2.txt)
  - o Output is in the form of instructions to convert one file to another
  - o Useful for seeing what changed between two files
- **Comm**: Compares two <u>sorted</u> files line by line and displays lines <u>only in file1</u>, lines <u>only in file2</u>, and lines <u>common to both</u>　　　　　　　　　　　(comm file1.txt file2.txt)
  - o Options:
  - o -1 suppress column 1 (lines unique to file1)
  - o -2 suppress column 2 (lines unique to file2)
  - o -3 suppress column 3 (lines common to both)
  - o **comm -1 -2 file1.txt file2.txt**: show only common lines
  - o **comm -2 -3 file1.txt file2.txt**: show lines only in file1
  - o **comm -1 -3 file1.txt file2.txt**: show lines only in file2

Archiving Content

- **gzip**: <u>Compresses</u> a file using the <u>GNU</u> zip algorithm　　　　(gzip file.txt → create file.txt.gz)
  - o Replaces the original file with a .gz version
  - o Commonly used for fast, lightweight compression
- **gunzip**: <u>Decompresses</u> .gz files created with gzip　　　(gunzip file.txt.gz → restore file.txt)
  - o Restores the original file
  - o Often used in pipelines for reading compressed logs or data
- **bzip2**: <u>Compresses</u> file using the <u>Burrows-Wheeler</u> algorithm　(bzip2 file.txt → create file.txt.bz2)
  - o Provides better compression ratio than gzip, but slower
  - o Original file is replaced by .bz2 file

- **bunzip2**: <u>Decompresses</u> .bz2 files created with bzip2   (bunzip2 file.txt.bz2 → restore file.txt)
    - Restores the original uncompressed file
    - Used to read .bz2 archives or prepare for extraction
- **tar**: Archives multiple files/directories into one .tar file   (tar -cvf archive.tar file1 file2 dir/)
    - -c to create, -x to extract, -v for verbose, -f to specify filename
    - Does not compress by default; often combined with gzip or bzip2
    - <u>Compress with gzip:</u>   (tar -czvf archive.tar.gz file1 dir/)
    - <u>Extract gzip archive:</u>   (tar -xzvf archive.tar.gz)
    - <u>Compress with bzip2:</u>   (tar -cjvf archive.tar.bz2 file1 dir/)
    - <u>Extract bzip2 archive:</u>   (tar -xjvf archive.tar.bz2)