



INTRO TO LINUX



UNIX

UNIX is a family of multitasking, multi-user computer operating systems that derive from the original AT&T Unix, whose development started in 1969 at the Bell Labs research center by Ken Thompson, Dennis Ritchie, and others.



(GNU's Not UNIX)

- Founded by Richard Stallman in 1983 with the goal of creating a completely free Unix-like operating system.
- **GNU General Public License (GPL):** Ensures that software remains free and open.
- **GNU Tools:** Includes critical components like the GNU Compiler Collection (GCC) and the GNU Bash shell.



LINUX

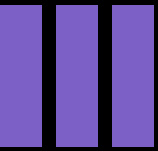
- Linux is a generic name for a family of open-source Unix-like operating systems based on the Linux kernel
- Linux kernel was created by Linus Torvalds in 1991 as a free and open-source alternative to UNIX.



DISTROS

Aka Distributions





Terminal

Wrapper program which runs a shell.

It is a software application that provides a text-based interface for interacting with the operating system.

Examples:

- GNOME Terminal
- KDE Konsole
- Kitty
- Alacritty



Shell

- A shell is a program that acts as an interface between the user and the operating system.
- It interprets commands entered by the user and executes them.
- It can also be used for scripting to automate tasks.
- Eg : sh, bash, zsh, fish



BASH
THE BOURNE-AGAIN SHELL



Bash

- Bourne-Again SHell
- Released in 1989 as a free software alternative to Bourne Shell (sh)
- Default login shell for many Linux distributions and earlier versions of macOS.



Shell Scripting

- A bash script is a series of commands written in a file which are read and executed by the bash program line by line.
- Convention: ends with .sh (Not mandatory)
- Scripts start with a shebang followed by the absolute path to the shell.

`#!/bin/bash`



Shell Scripting

- Give execution rights / permission
`chmod u+x yourfile.sh`
- Execute:
`./yourfile.sh`



Package Managers

- A package manager is a tool that allows users to install, remove, upgrade, configure and manage software packages on an operating system.
- A Package can be a GUI application, command line tool or a software library
- Eg : apt, dnf, pacman
- To install a package in Ubuntu :
`sudo apt install your-package`

Some Useful Commands

```
nushkasharma@pop-os:~$ ls
android          Downloads        na
androidStudioProjects  firstrepo       na
lab-Miloge-Deployment  Music           0
Desktop          mutter-rounded  0
Documents        my_env         P
nushkasharma@pop-os:~$ ls -a
.
.
android          .gtk
androidStudioProjects  .gconf
lab-Miloge-Deployment  .gitconfig
Desktop              .gnome
Documents            .gradle
bash_history         .hello.c.swp
bash_logout          .icons
bashrc               .ipynb_checkpoint
lab-Miloge-Deployment  .ipython
cache                .java
cert                 .jupyter
```

Command:

ls

The ls command in Linux is used to list the contents of a directory, showing files and subdirectories.

some important flags used with the ls command:

- **-l**: Displays a detailed list, including file permissions, number of links, owner, group, size, and modification date.
- **-a**: Lists all files, including hidden files (those starting with a dot).
- **-h**: Shows file sizes in a human-readable format (e.g., KB, MB).

Command:

cd

The cd (change directory) command in Linux is used to navigate between directories in the filesystem.

Example:

- cd folder
- cd ..
- cd
- cd ~

```
nushkasharma@pop-os:~$  
nushkasharma@pop-os:~$ cd Desktop/  
nushkasharma@pop-os:~/Desktop$ cd IIIT/Sem_1/C_Pro/  
nushkasharma@pop-os:~/Desktop/IIIT/Sem_1/C_Pro$
```

```
anushkasharma@pop-os:~$ touch file.txt
anushkasharma@pop-os:~$ ls
Android          Downloads
AndroidStudioProjects  file.txt
Lab-Miloge-Deployment firstrepo
Desktop          Music
Documents        mutter-rounded
anushkasharma@pop-os:~$
```

Command:

touch

The touch command in Linux is primarily used to create an empty file or update the timestamp of an existing file.

some important flags used with the touch command:

- **-a**: Updates only the access time of the file.
- **-m**: Updates only the modification time of the file.
- **-c**: Does not create the file if it does not exist; only updates timestamps if the file is present.

```
anushkasharma@pop-os:~$ echo Hello world
Hello world
anushkasharma@pop-os:~$ echo "Hello World"
Hello World
anushkasharma@pop-os:~$
```

Command:

echo

The echo command in Linux is used to display a line of text or string to the terminal.

some important flags used with the echo command:

- -n: Prevents the trailing newline, so the output stays on the same line as the next command.
- -e: Enables interpretation of backslash-escaped characters like \n for a new line, \t for a tab, and \\ for a backslash.

Command:

cat

The `cat` command in Linux is used to concatenate and display the contents of files. It can read one or multiple files and output their content to the terminal or another file.

some useful flags for the `cat` command:

- `-n`: Numbers all output lines.
- `-b`: Numbers only non-blank output lines.
- `-s`: Suppresses repeated empty lines, reducing multiple blank lines to a single blank line.

```
anushkasharma@pop-os:~$ cat file.txt  
This is random text!  
  
anushkasharma@pop-os:~$
```

Command:

pwd

The pwd (print working directory) command in Linux displays the full path of the current working directory.

```
anushkasharma@pop-os:~$ pwd  
/home/anushkasharma  
anushkasharma@pop-os:~$
```

```
anushkasharma@pop-os:~$ mkdir demo
anushkasharma@pop-os:~$ ls
android          Documents      mutt
AndroidStudioProjects Downloads      my_e
Lab-Miloge-Deployment file.txt      navi
demo             firstrepo     navi
desktop         Music        o2_1
anushkasharma@pop-os:~$
```

mkdir

Command:

The mkdir (make directory) command in Linux is used to create new directories. By providing a directory name as an argument, you can create a single directory.

some commonly used flags with the mkdir command:

- -p: Creates parent directories as needed. For example, `mkdir -p /path/to/new/dir` will create the entire directory structure if it doesn't already exist.

Command:

tail

The tail command in Linux is used to display the end of a file or output from a command. By default, it shows the last 10 lines of a file.

some useful flags for the tail command:

- -n [NUM]: Shows the last [NUM] lines of the file or output. For example, tail -n 20 file.txt shows the last 20 lines.

```
anushkasharma@pop-os:~$ tail file.txt
other countries, according to Similarweb.
Wikipedia has been praised for its enable
of coverage, unique structure, and cultu
systemic bias, particularly gender bias a
the Global South (Eurocentrism).[9][10]
frequently criticized in the 2000s, it ha
from the late 2010s onward[3][11][12] whi
14]
Wikipedia has been censored by some nati
to the entire site.[15][16] Articles on t
```

```
mushkasharma@pop-os:~$ cp file.txt Desktop/file2.txt
mushkasharma@pop-os:~$ cd Desktop/
mushkasharma@pop-os:~/Desktop$ ls
coding file2.txt IIIT iiit.jpeg img2.png me.jpeg
mushkasharma@pop-os:~/Desktop$ nano file2.txt
mushkasharma@pop-os:~/Desktop$
```

Command:

cp

The cp command in Linux is used to copy files and directories from one location to another.

some commonly used flags with the cp command:

- -r or -R: Recursively copies directories and their contents. This is necessary when copying directories.
- -i: Prompts for confirmation before overwriting files.

Command:

mv

The mv command in Linux is used to move or rename files and directories.

some useful flags for the mv command:

- -i: Prompts for confirmation before overwriting an existing file at the destination.
- -f: Forces the move without prompting for confirmation, even if it overwrites existing files.
- -u: Moves the file only if the source file is newer than the destination file, or if the destination file does not exist.

```
anushkasharma@pop-os:~$ mv file.txt Desktop/  
anushkasharma@pop-os:~$ cd Desktop/  
anushkasharma@pop-os:~/Desktop$ ls  
Coding  file.txt  iiit.jpeg  me.jpeg  projects  
file2.txt  IIIT  img2.png  OSDG  quote8.jpg  
anushkasharma@pop-os:~/Desktop$
```

useful flags for the mv command

Command:

rm

The `rm` command in Linux is used to remove files or directories.

some useful flags for the `rm` command:

- `-r` or `-R`: Recursively removes directories and their contents.
- `-i`: Prompts for confirmation before each file or directory is removed, adding a layer of safety to the deletion process.
- `-f`: Forces the removal of files or directories without prompting for confirmation

```
anushkasharma@pop-os:~$ rm file.txt
anushkasharma@pop-os:~$ ls
Android                Documents
AndroidStudioProjects Downloads
Cab-Miloge-Deployment  firstrepo
demo                  Music
Desktop                mutter-rounded
```

```
nushkasharma@pop-os:~/Desktop/IIIT/Sem_1$ find RA/  
RA/  
RA/RA notes complete.pdf  
RA/S.K. Mapa RA 1.pdf  
RA/S.K. Mapa 2.pdf  
RA/Questions.pdf  
RA/Real Analysis.pdf  
nushkasharma@pop-os:~/Desktop/IIIT/Sem_1$
```

find

Command:

The `find` command in Linux is used to search for files and directories within a directory hierarchy. It can search based on various criteria such as name, type, size, modification time, and more.

Some commonly used flags with the `find` command:

- `-name [pattern]`: Searches for files or directories that match a specific name or pattern
- `-type [f/d]`: Specifies the type of file to search for: `f` for regular files and `d` for directories
- Etc.

Command:

grep

The `grep` command in Linux is used to search for patterns within files or output. It scans the content for lines that match a specified pattern, making it a powerful tool for filtering text.

Some useful flags for the `tail` command:

- `-i`: Ignores case
- `-r` or `-R`: Recursively searches through directories, allowing you to find matches in all files within a directory tree.
- `-c`: Outputs the count of matching lines instead of the lines themselves
- `-l`: list the names of files that contain the specified pattern.

```
anushkasharma@pop-os:~/Desktop$ grep Wikipedia file2.txt
Wikipedia[c] is a free content online encyclo
pedia written and maintained by a community of volunteers
pen collaboration and the wiki softwa
re MediaWiki. Wikipedia is the largest and most-read refe
ales and Larry Sanger on January 15, 2001, Wikipedia has
imedia Foundation,
Initially only available in English, editions of Wikipedi
languages have been developed. The English Wikipedia, wi
,
Wikipedia's traffic was from the United States, followed
dom
Wikipedia has been praised for its enablement of the dem
the Global South (Eurocentrism).[9][10] While the reliab
Wikipedia has been censored by some national governments
```

```
anushkasharma@pop-os:~/Desktop$ sort file2.txt
an American nonprofit organization funded ma
and attract more than 1.5 billion unique devic
at 5 edits
and is consistently ranked among the ten
at 5.8%, Russia at 5.2%, Germany at 5%, and th
frequently criticized in the 2000s, it has imp
frequently updated information about those eve
from the late 2010s onward[3][11][12] while be
[4]
ith by Semrush,[5] and seventh by Similarweb.[
initially only available in English, editions
is the largest of the editions, which togethe
languages have been developed. The English W
s,
most visited websites; as of July 2024, it was
of coverage, unique structure, and culture. 7
```

Command:

sort

The sort command in Linux is used to sort lines of text files

Some commonly used flags with the find command:

- -n: Sorts lines numerically.
- -r: Reverses the order of the sort
- -f: Ignores case when sorting
- -u: Removes duplicate lines from the output

pipng

A pipe (|) is used to connect the output of one command directly into the input of another command. This allows you to chain multiple commands together, creating a pipeline of processes that work sequentially.

Examples:

- `cat file.txt | wc -w`
- `ls | grep "file"`

```
nushkasharma@pop-os:~/Desktop$ cat file2.txt|wc -w  
104  
nushkasharma@pop-os:~/Desktop$
```

```
anushkasharma@pop-os:~/Desktop$ sort file2.txt
an American nonprofit organization funded ma
and attract more than 1.5 billion unique devic
at 5 edits
and is consistently ranked among the ten
at 5.8%, Russia at 5.2%, Germany at 5%, and th
frequently criticized in the 2000s, it has imp
requently updated information about those eve
from the late 2010s onward[3][11][12] while be
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is the largest of the editions, which togethe
languages have been developed. The English W
s,
most visited websites; as of July 2024, it was
of coverage, unique structure, and culture. 7
```

Redirection

Redirection is the act of dictating where the inputs or outputs of your commands go.

Input Redirection :

- `./a.out < input.txt`

Output Redirection :

- `./a.out > output.txt`

Command:

man

The "man" command, short for manual, is a powerful tool in the Linux operating system that allows users to access detailed information about various commands, utilities, and system calls.

Examples:

- man scanf
- man 3 printf
- man qsort
- man cat

```
nushkasharma@pop-os:~$  
nushkasharma@pop-os:~$ cd Desktop/  
nushkasharma@pop-os:~/Desktop$ cd IIIT/Sem_1/C_Pro/  
nushkasharma@pop-os:~/Desktop/IIIT/Sem_1/C_Pro$
```



Hyperlinks

- <https://github.com/anushkasharma2005/Intro-to-Bash-Linux/tree/main>
- <https://cmdchallenge.com/>
- <https://devhints.io/bash>
- <https://github.com/RehanSaeed/Bash-Cheat-Sheet>
- <https://youtube.com/watch?v=m20pNf-ZieUpNf-ZieU>

Let's Practice!

Thank You!