# Linux Summer Training 2024 🎉

# Session 1

# Introduction to Linux

# Agenda

1. **What Is Open Source?**
2. **Introduction to Linux.**
3. **Why Linux?**
4. **How to use Linux?**
5. **Linux File System & CLI.**
6. **Getting Help.**
7. **Viewing Files.**
8. **Nano.**

# What Is Open Source?

# Open Source VS Closed Source🤔

# Closed Source Software

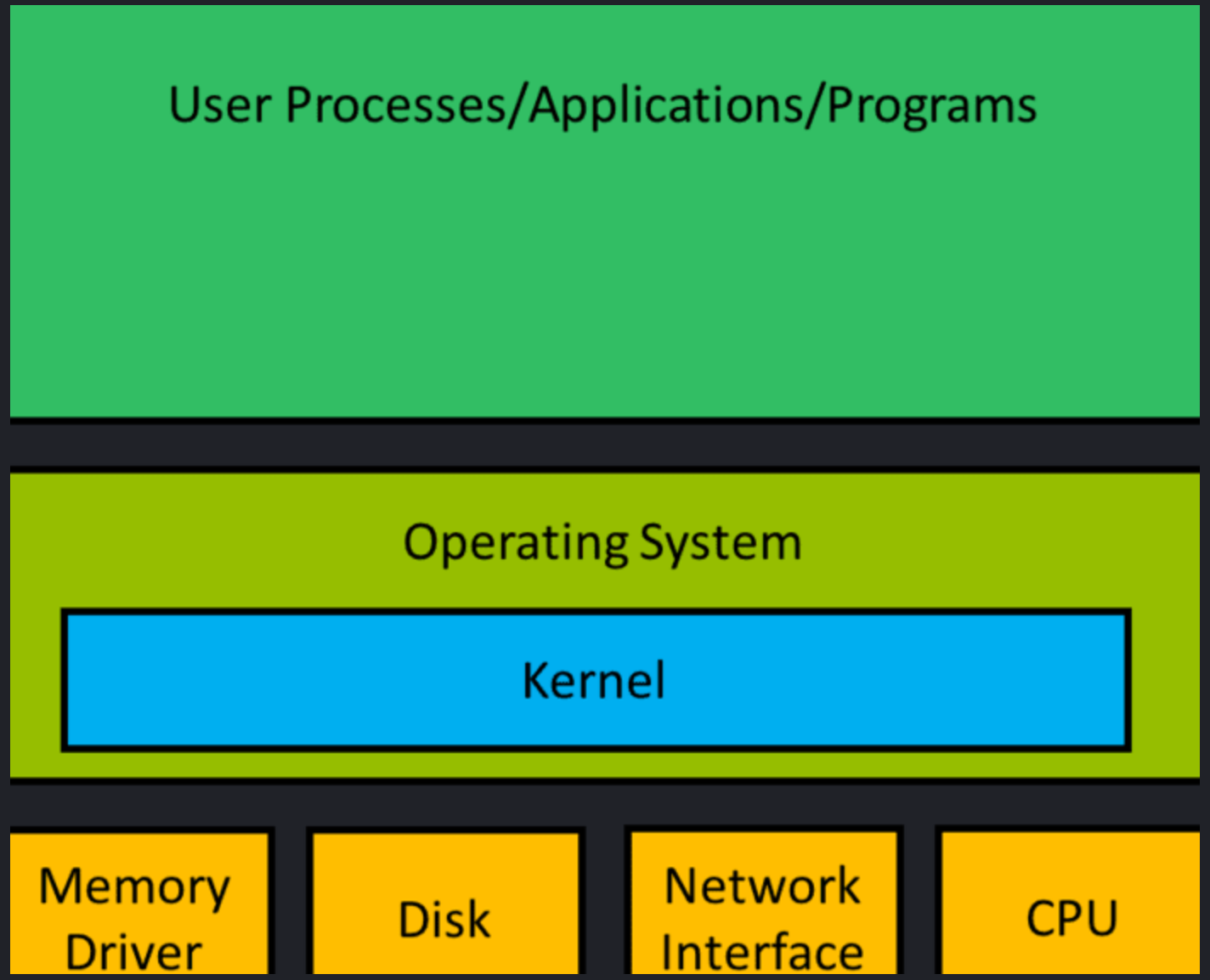
- This is software whose author owns all rights to use, modify, and copy it, but users cannot view or modify the program code themselves, like:
  - Microsoft Office (Word, Excel, PowerPoint, etc).
  - Adobe Creative Suite (Photoshop, Illustrator, InDesign, and Premiere Pro.)
  - Zoom, AutoCAD, SolidWorks.

# Open Source Software

- The source code of these programs is freely available for anyone to see, and you will typically be able to inspect, modify, and distribute, for example:
  - Mozilla Firefox: A web browser.
  - Git: A version control system.
  - Audacity: A free audio editor and recorder.
  - Chromium: The open-source foundation for Google Chrome.
  - Linux.

# Introduction to Linux. 

- Operating System: The software that manages computer hardware and software resources.(The computer's brain.)
- The kernel acts as a bridge between application software and hardware of the system. It directly communicates with the hardware and lets it know what the application software has requested.


User Processes/Applications/Programs
Operating System
Kernel
Memory Driver
Disk
Network Interface
CPU

# Linux Story

- Once upon a time, there was an OS called "UNIX", which was:
  - Stable, secure & reliable.
  - First to introduce "Hierarchical File System".
  - First to introduce CLI within an OS.
- But unfortunatly, it was EXPENSIVE.

- But Richard Stallman wanted to develop a free-UNIX operating system so he developed the GNU project.
- GNU project developed many essential software components such as compilers, editors, and utilities BUT with one missing crucial component...

  → The kernel!

- Stallman and Linus trovalds then developed the GNU/Linux project, which is commonly referred to as "Linux".
- Linux now has over 500 distributions like: Pop Os, Ubunto, Kali, Debian, Arch, etc.

- **Distribution: "Distro" is a pre-packaged set of software that includes the Linux kernel and various other components needed to run an operating system. It can be thought of as a specific edition of Linux.**
- **There are different Linux distros to suit any type of user, from new users to hard-core users.**

# Why Linux?

- Open Source
- Security
- Helps you to learn about your computer
- Performance
- Customizability
- Shell and Scripting
- Community and Documentation
- Support for Development
- And finally, it's everywhere

# How to use Linux?

- Virtual Machine: Running multiple operating systems by sharing resources(A computer inside a computer).
- Dual boot: Refers to the process of installing and running multiple operating systems on a single computer.
- Live USB: Burn Linux ISO image to a flash drive and boot directly from it

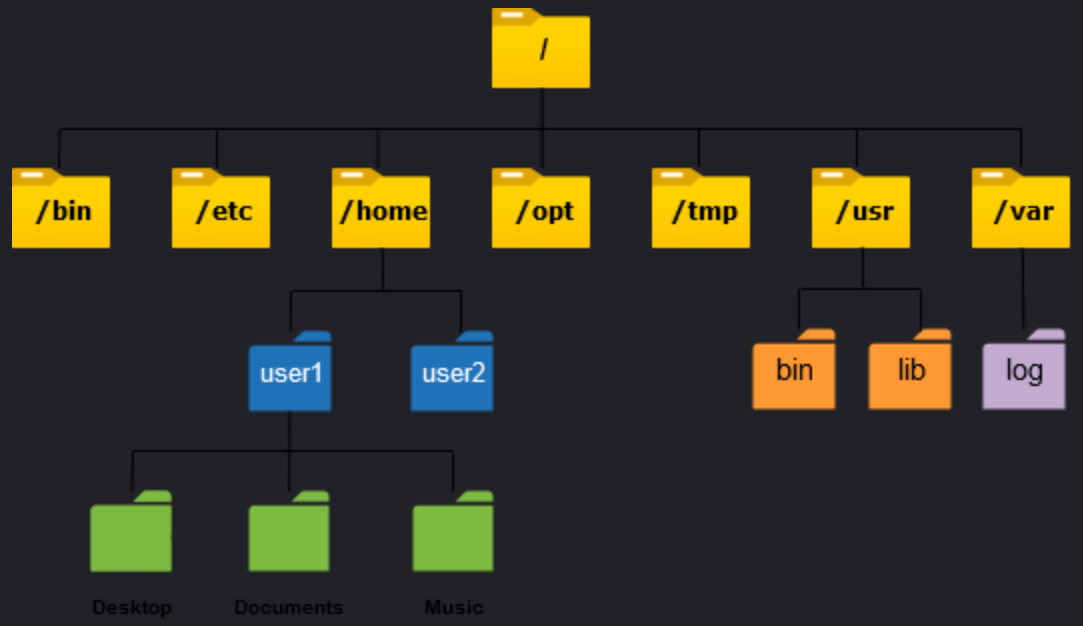
# Linux File System & CLI

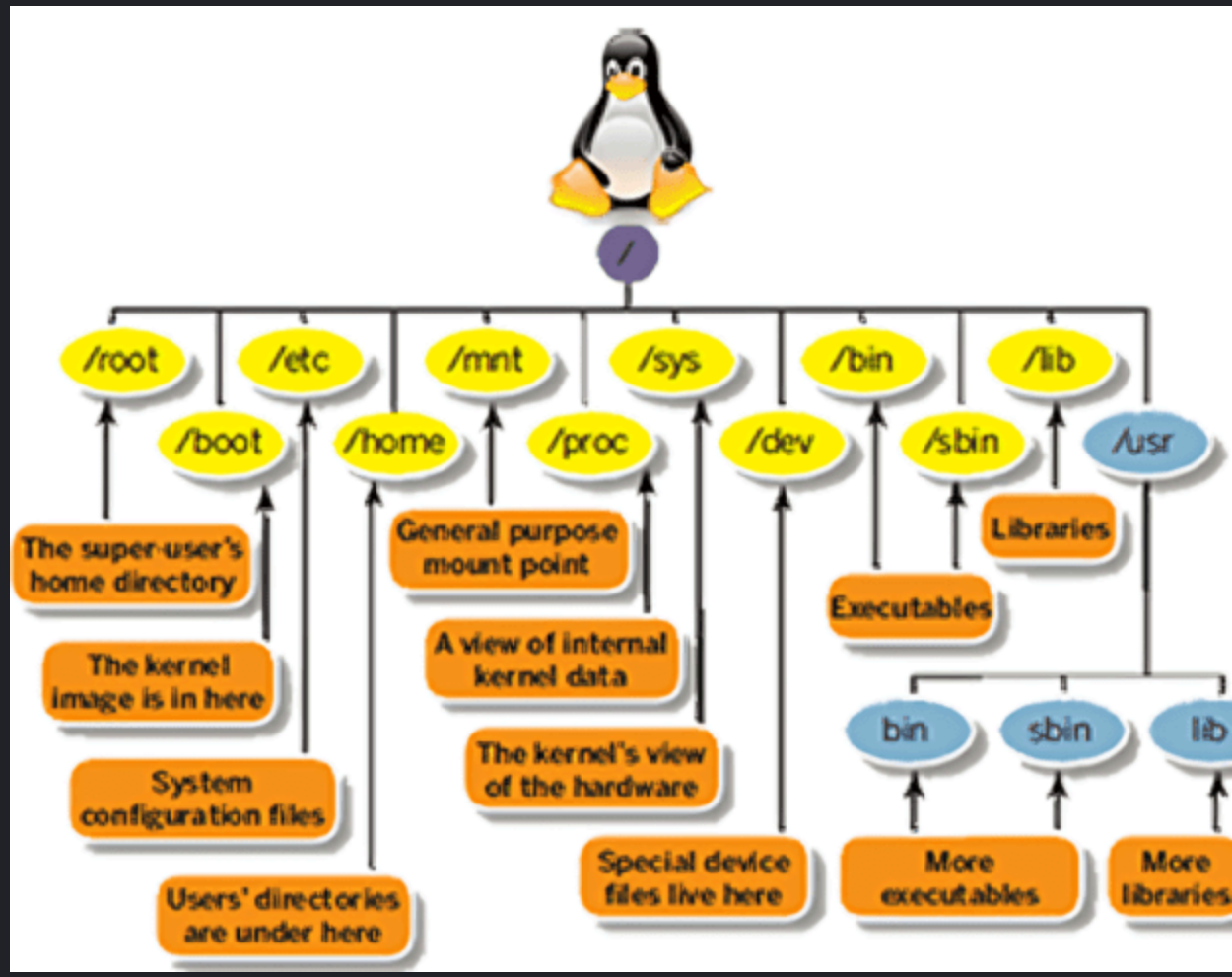
- **File System: The organizational structure that your computer uses to manage data on a storage device.**

Linux → EXT4, XFS

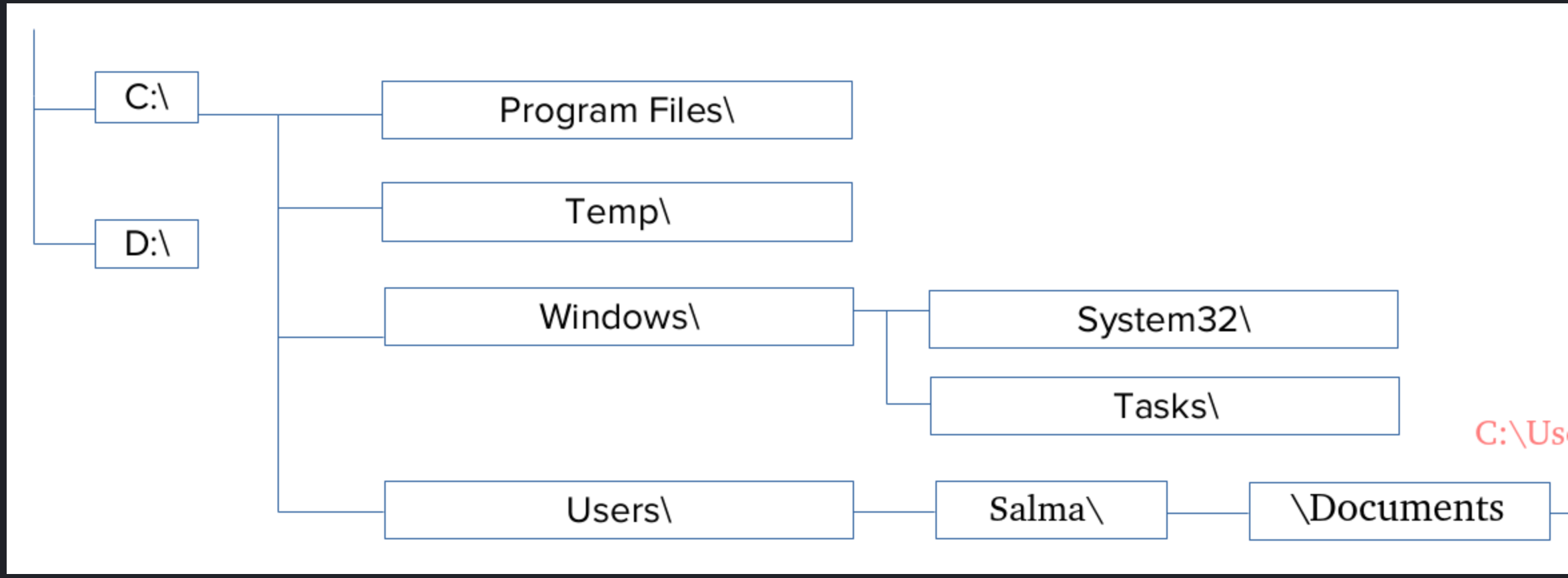
Windows → NTFS, FAT32

- File systems affects the file hierarchy structure.
- Linux Directory Structure



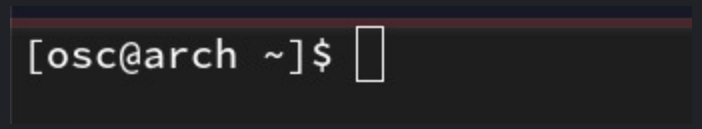



- **Windows Directory Structure.**

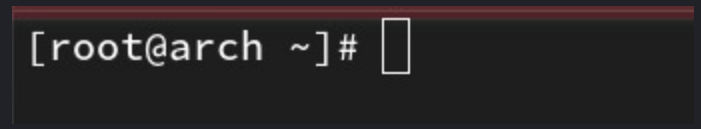


- **Terminal is a text based command line interface (CLI) that runs instructions on Linux machine. It is usually faster than using the GUI.**
- **Shell is a software that takes commands from users and makes the operating system execute them.**

**$ → Normal user**




**# → Root(admin)**




- Username@Hostname_Working_Directory($/#).

# Break! 😄

# Basic Linux Commands

# Navigation Commands

- **pwd: Print working directory.**

```
[osc@arch hello]$ pwd
/home/osc/temp/hello
```

- **ls: List the content of the directory.**

```
[osc@arch ~]$ ls
Android  Desktop  Documents  Downloads  ss  temp
```

- **ls -l: "Long List".**

```
[osc@arch ~]$ ls -l
total 40
drwxr-xr-x 2 osc osc 4096 Jul 27 12:03  Android
drwxr-xr-x 2 osc osc 4096 Jul 27 12:03  Desktop
drwxr-xr-x 2 osc osc 4096 Jul 27 12:03  Documents
drwxr-xr-x 2 osc osc 4096 Jul 27 12:03  Downloads
```

- **ls -a: "List All".**

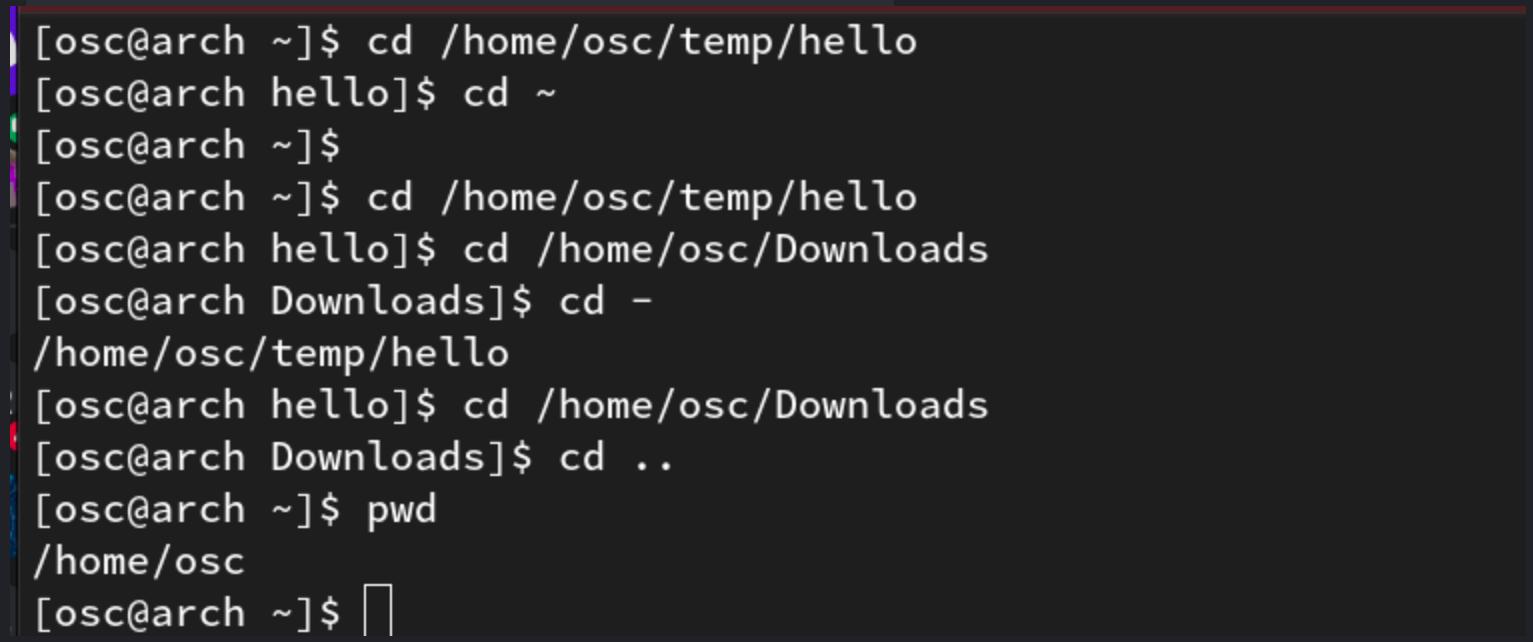
```
[osc@arch ~]$ ls -a
 .    .bash_history   Android   Documents  'Linux is better'
 ..   .lesshst        Desktop   Downloads   linux
```

- **ls -la: "Long List All".**

```
[osc@arch ~]$ ls -la
total 56
drwxr-x--- 12 osc  osc  4096 Jul 27 12:25  .
drwxr-xr-x  4 root root 4096 Jul 27 11:43  ..
-rw-------  1 osc  osc   440 Jul 27 12:25  .bash_history
-rw-------  1 osc  osc    20 Jul 27 12:24  .lesshst
drwxr-xr-x  2 osc  osc  4096 Jul 27 12:03  Android
drwxr-xr-x  2 osc  osc  4096 Jul 27 12:03  Desktop
drwxr-xr-x  2 osc  osc  4096 Jul 27 12:03  Documents
drwxr-xr-x  2 osc  osc  4096 Jul 27 12:03  Downloads
drwxr-xr-x  2 osc  osc  4096 Jul 27 12:09 'Linux is better'
drwxr-xr-x  2 osc  osc  4096 Jul 27 12:08  linux
```

- **cd: "Change Directory".**
  - **cd ~: Change to the home directory.**
  - **cd -: Change to the previous working directory.**
  - **cd ..: Change to the parent directory.**
  - **cd + "Directory name/path": Change to the named directory.**

- **Relative Path: Location relative to the current directory. You just need to write the directory name after the "cd" command.**
- **Absolute Path: Complete adress ex: `/home/OSC/documents` .**



- clear: Clears the content of the terminal.
- whoami: Prints the name of the current user.

```
[osc@arch ~]$ whoami
osc
```

- date: Prints the current date and time.

```
[osc@arch ~]$ date
Sat Jul 27 13:51:50 EEST 2024
```

- history: Prints a list of commands you've executed before.

```
[osc@arch ~]$ history
    1  cd
    2  mkdir /home/osc
    3  mkdir /home/osc
    4  cd
```

# File Management (Creation)

- **mkdir: "Make Directory".**

```
[osc@arch ~]$ mkdir linux
[osc@arch ~]$ cd linux
[osc@arch linux]$ mkdir one two three 'linux is better'
[osc@arch linux]$ ls
'linux is better'   one   three   two
[osc@arch linux]$ mkdir -p directory/subdirectory
[osc@arch linux]$ ls
 directory  'linux is better'   one   three   two
[osc@arch linux]$ cd directory/
[osc@arch directory]$ ls
subdirectory
[osc@arch directory]$
```

- **touch: Create new file.**

```
[osc@arch ~]$ touch hello
[osc@arch ~]$ ls
Android  Desktop  Documents  Downloads  hello  linux  temp
[osc@arch ~]$ touch file1.txt file2.cpp
[osc@arch ~]$ ls
Android  Desktop  Documents  Downloads  file1.txt  file2.cpp  hello  linux  temp
[osc@arch ~]$
```

# File Management (Modification)

- **echo: Prints the text you provide (same as "cout" in C++).**

```
[osc@arch ~]$ echo "Hello OSC"
Hello OSC
[osc@arch ~]$ cat file1
$x = 2
[osc@arch ~]$ echo "I'm editing the file" >> file1
[osc@arch ~]$ cat file1
$x = 2
I'm editing the file
```

# File Management (Manipulation)

- **mv: "Move file to directory".**

```
[osc@arch linux]$ mv file.txt /home/osc/Downloads
[osc@arch linux]$ cd /home/osc/Downloads
[osc@arch Downloads]$ ls
file.txt
[osc@arch Downloads]$ cd -
/home/osc/linux
[osc@arch linux]$ ls
[osc@arch linux]$
```

# ⚠ Note!

- Using the "mv" command without a name/path of a directory will either:
  - Rename the first file to the name of the second file (if the second file doesn't exist).
  - If the second file already exists, then it will be deleted and the first file will be renamed to the name of the second file.

```
[osc@arch linux]$ touch file1 file2
[osc@arch linux]$ echo osc >> file1
[osc@arch linux]$ echo Linux >> file2
[osc@arch linux]$ mv file1 file2
[osc@arch linux]$ ls
file2
[osc@arch linux]$ cat file2
osc
```

- **cp: Copy file to a specific path of a directory.**

```
[osc@arch linux]$ touch origin.txt
[osc@arch linux]$ cp origin.txt /home/osc/Downloads
[osc@arch linux]$ cd /home/osc/Downloads
[osc@arch Downloads]$ ls
file.txt  linux  origin.txt
```

- **cp -r: "Copy Recursively", used to copy a directory with all of its content to a specific path.**

```
[osc@arch ~]$ ls
Desktop    Downloads  hello  temp
Documents  file2.cpp  linux
[osc@arch ~]$ cp -r linux Downloads
[osc@arch ~]$ cd Downloads
[osc@arch Downloads]$ ls
linux
```

# File Management (Deletion)

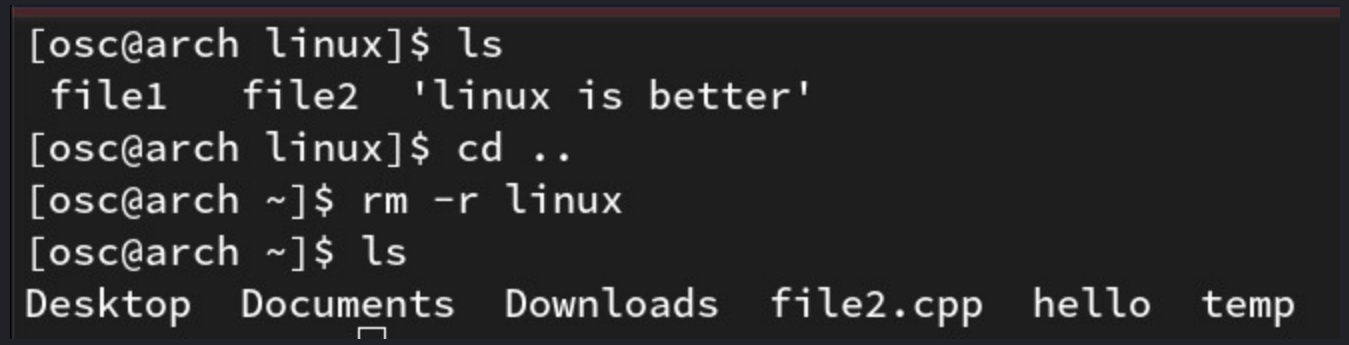
- **rmdir: Removes an empty directory.**

```
[osc@arch ~]$ ls
Android  Desktop  Documents  Downloads  file1.txt  file2.cpp  hello  linux  temp
[osc@arch ~]$ rmdir Android
[osc@arch ~]$ ls
Desktop  Documents  Downloads  file1.txt  file2.cpp  hello  linux  temp
```

- **rm: Removes a file.**

```
[osc@arch ~]$ ls
Desktop  Documents  Downloads  file1.txt  file2.cpp  hello  linux  temp
[osc@arch ~]$ rm file1.txt
[osc@arch ~]$ ls
Desktop  Documents  Downloads  file2.cpp  hello  linux  temp
[osc@arch ~]$
```

- **rm -r: "Remove Recursively". This removes all data in a specific directory till it's empty, then removes the directory itself.**



# Hands On 😟

- **Create a directory named "Linux Summer Training".**
- **Move into the new directory.**
- **Create a file with your first name and echo anything in it.**
  - (echo Hello world > test)
- **Move out of this directory and copy it some where else.**
- **Go to the copied directory and delete everything in it.**
- **Move out of the copied directory and delete it.**

# Viewing Files

- **cat: Reads the content of the named file.**

```
[osc@arch ~]$ cat hello
Welcome to Linux summer training.
Enjoy your day!
[osc@arch ~]$
```

- **head**

```
[osc@arch ~]$ head hello
1- Hello there, this is OSC
2- Hello there, this is OSC
3- Hello there, this is OSC
4- Hello there, this is OSC
5- Hello there, this is OSC
6- Hello there, this is OSC
7- Hello there, this is OSC
8- Hello there, this is OSC
9- Hello there, this is OSC
10- Hello there, this is OSC
```

- **tail**

```
[osc@arch ~]$ tail hello
11- Hello there, this is OSC
12- Hello there, this is OSC
13- Hello there, this is OSC
14- Hello there, this is OSC
15- Hello there, this is OSC
16- Hello there, this is OSC
17- Hello there, this is OSC
18- Hello there, this is OSC
19- Hello there, this is OSC
20- Hello there, this is OSC
```

- **Note: You can specify the number of displayed lines when using the head/tail command.**

```
[osc@arch ~]$ head -3 hello
1- Hello there, this is OSC
2- Hello there, this is OSC
3- Hello there, this is OSC
[osc@arch ~]$
[osc@arch ~]$ tail -3 hello
18- Hello there, this is OSC
19- Hello there, this is OSC
20- Hello there, this is OSC
```

- **file: This command gives a description of the type of the specified file.**

```
[osc@arch ~]$ file script.sh
script.sh: Bourne-Again shell script, ASCII text executable
```

- **Types of files:**

| Types | Description |
|---|---|
| d | Directories |
| - | Regular file |
| c/b/l | Special files |

- **Example:**

```
[osc@arch ~]$ ls -l
total 28
drwxr-xr-x 2 osc osc 4096 Jul 27 12:03 Desktop
drwxr-xr-x 2 osc osc 4096 Jul 27 12:03 Documents
drwxr-xr-x 3 osc osc 4096 Jul 27 23:38 Downloads
-rw-r--r-- 1 osc osc  571 Jul 27 23:58 hello
drwxr-xr-x 2 osc osc 4096 Jul 27 23:31 linux
-rwx------ 1 osc osc  111 Jul 27 23:58 script.sh
drwxr-xr-x 3 osc osc 4096 Jul 27 12:01 temp
```

- **File Extensions: Linux is extentionless (does not care about the extension of your file). It looks into the file content and figures it out on its own.**

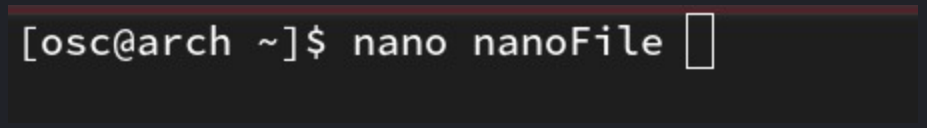
# Getting help

- man: "Manual". Opens manual (guide) for any command.
- --help: This command Provides basic usage information about a specific command compared to "man" command.
- whatis: Gives a one line manual description about a specific command.

```
[osc@arch ~]$ whatis ls
whatis: can't set the locale; make sure $LC_* and $LANG are correct
ls (1)               - list directory contents
```

# Nano

- GNU nano is an easy-to-use command line text editor for UNIX and Linux Operating system.
- Nano commands is also considered as a modification command.




osc@arch:~
GNU nano 7.2
nanoFile
[ Read 0 lines ]
^G Help
^O Write Out
^W Where Is
^K Cut
^T Execute
^C Location
M-U Undo
^X Exit
^R Read File
^\ Replace
^U Paste
^J Justify
^/ Go To Line
M-E Redo

# Thank you 😄