



WALCHAND COLLEGE OF ENGINEERING, SANGLI

(Government Aided Autonomous Institute)



WALCHAND LINUX USERS' GROUP

LINUXDIARY 6.0

EXCITING
PRIZES

LIMITED
SEATS

16
AUG

WARGAMES

17
AUG

01

BORN TO
BOOT

03

FILE
FORGE

02

COMMAND
QUEST

04

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CONTENT

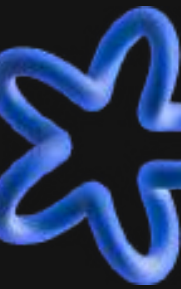
- File Systems
- Journaling
- Types of File Systems
- Linux directory structure



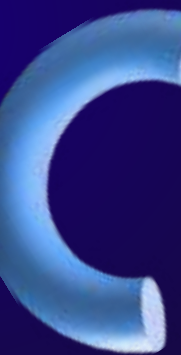


Linux File System





What is a File?



FILE

- Collection of data or information
- Stored on a storage device
- Treated as a single unit by OS



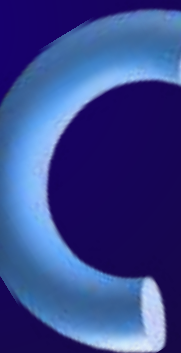
What is a File System?



FILE SYSTEM

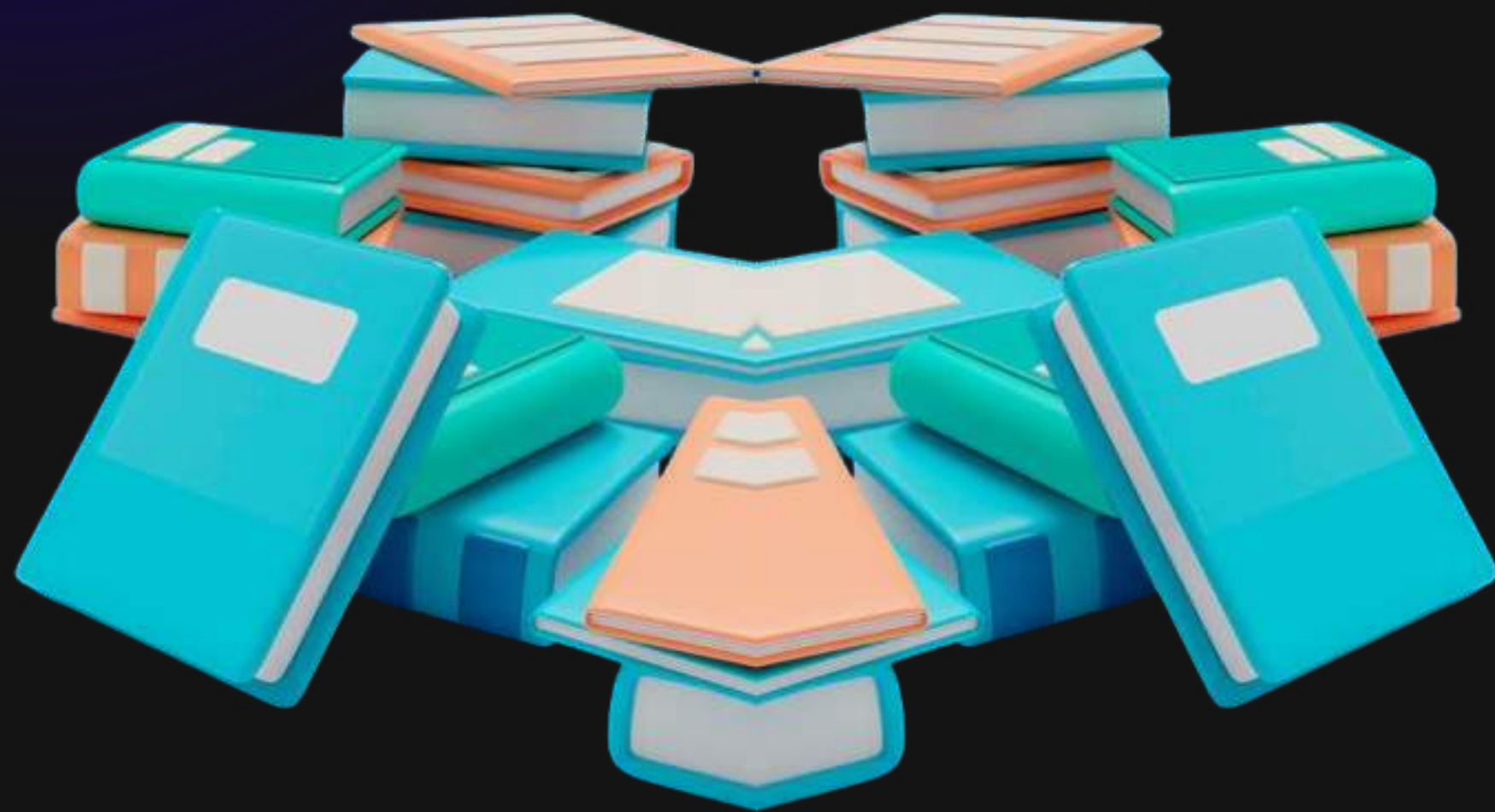


- Method used by an Operating System
- Used to store and organize files



Why it is
needed?



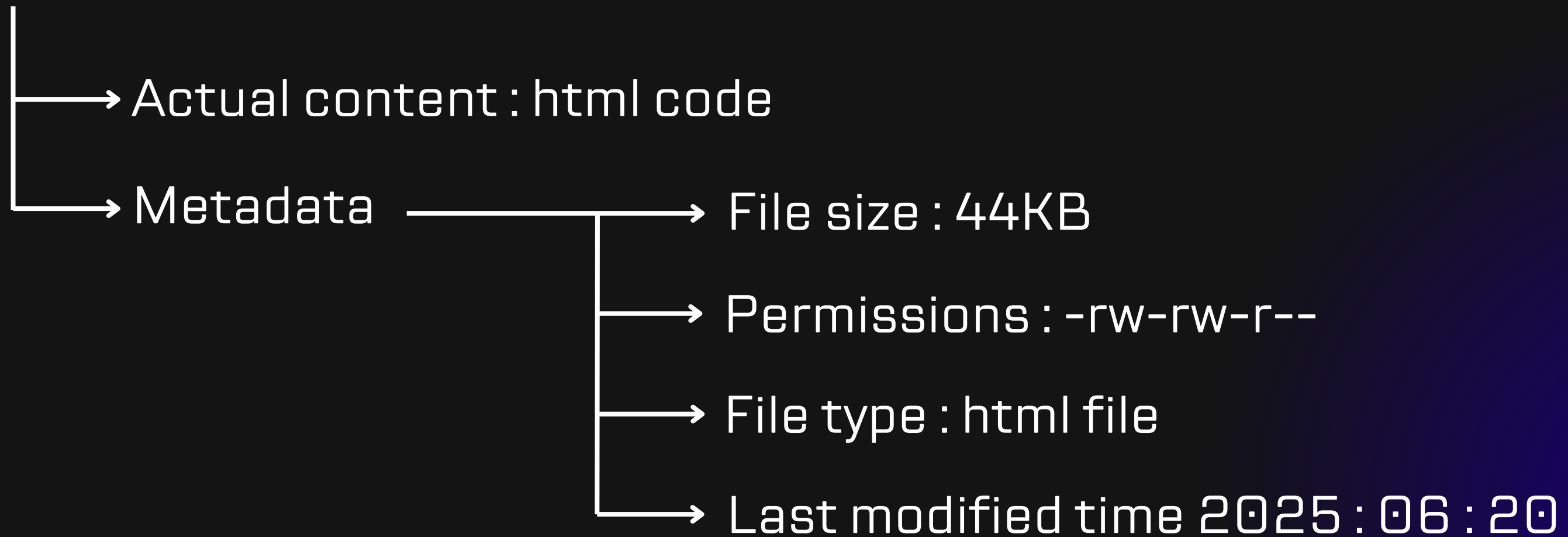
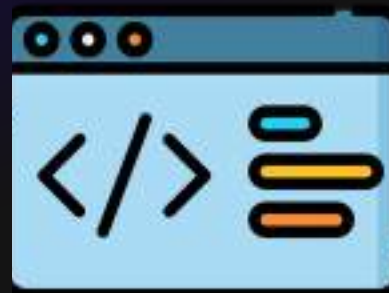


What is Metadata?



METADATA

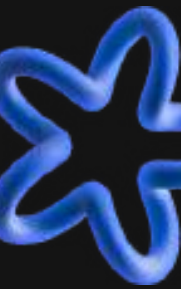
Program.html



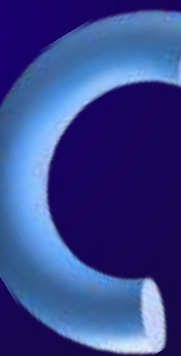


What is INODE?

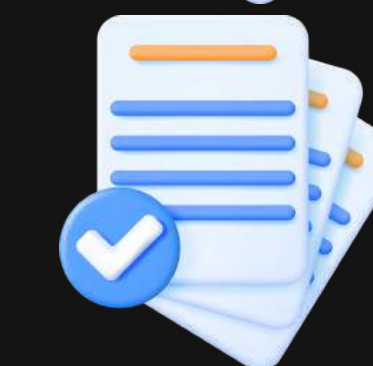
INODE



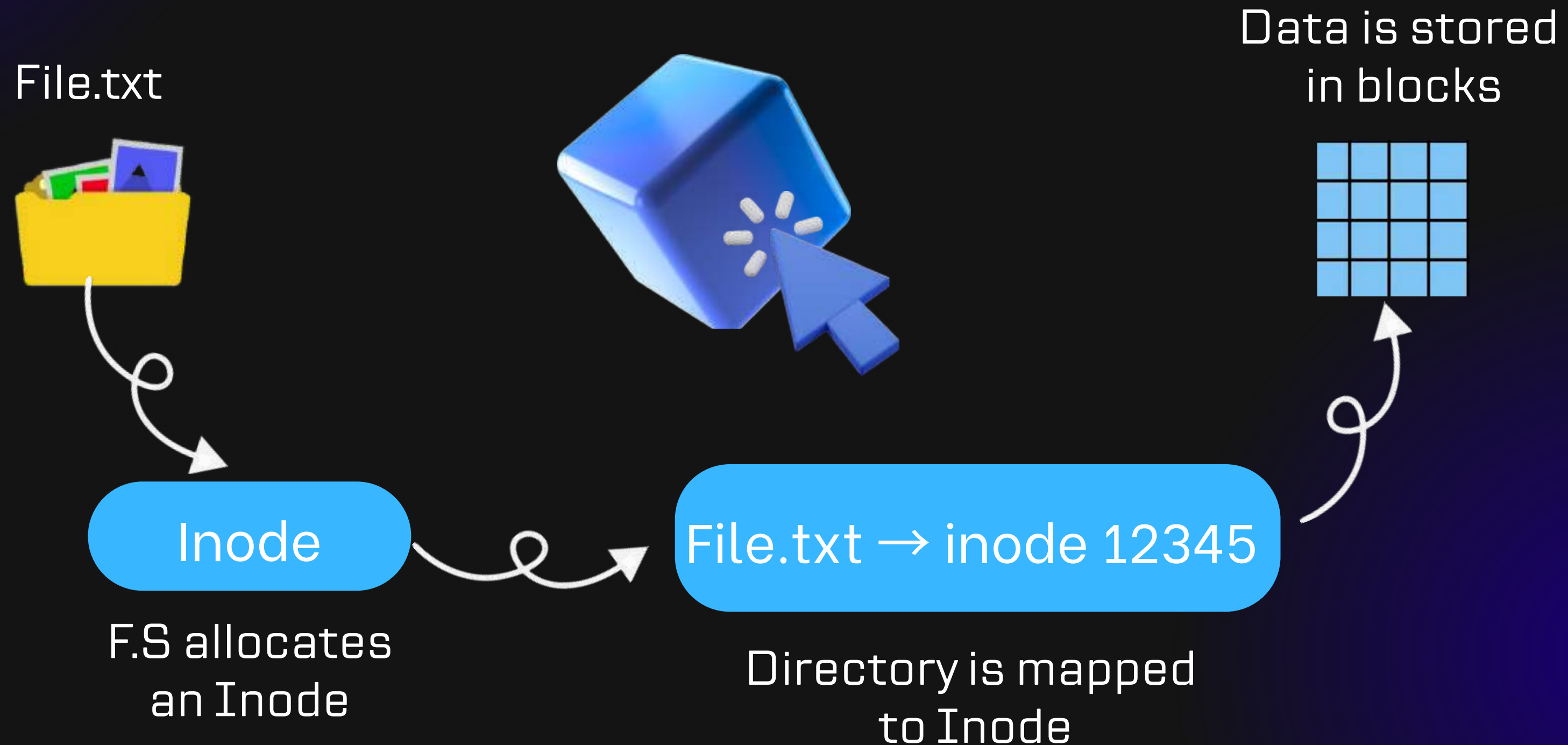
- Data structure used by Linux
- Used to store metadata of a file or directory



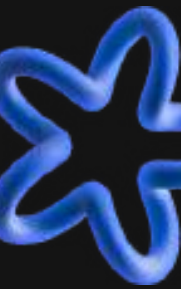
```
Inode Table  
  
Inode Table{  
    inode number 1  
    inode number 2  
    inode number 3  
    .  
    .  
    .  
    .  
    .  
    inode number 456787654  
}
```



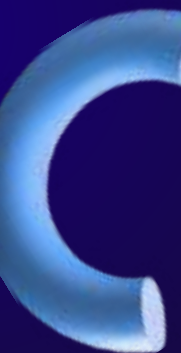
WORKING OF INODE



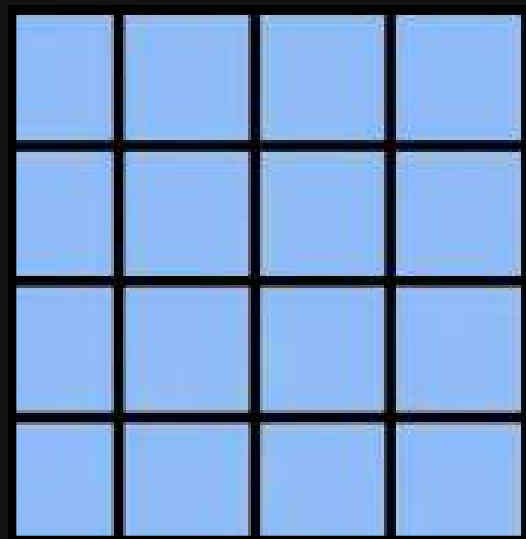
WORKING OF FILE SYSTEM



- Divide files into blocks (4KB)
- Store file data in blocks
- Keeps track of data
- Manage free and used space



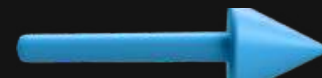
STORING OF DATA IN FILE SYSTEM



Blocks



Block
Storage



Metadata



Uses Directories



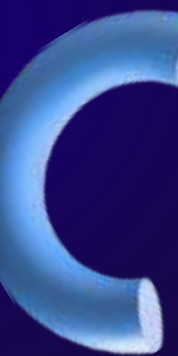
What is Journaling?



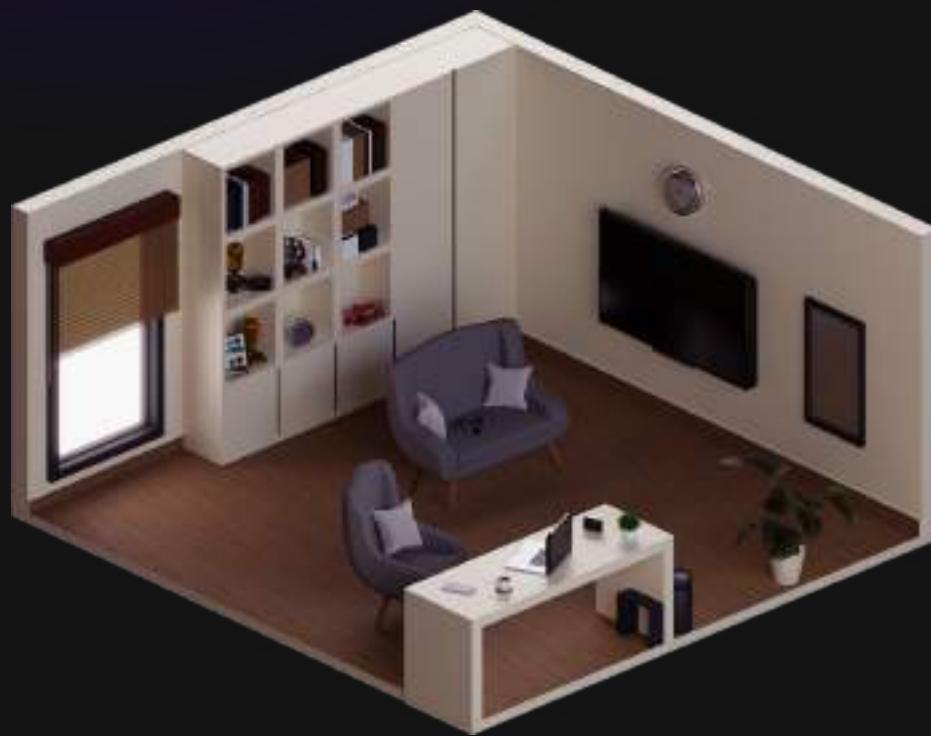
WHAT IS JOURNALING?



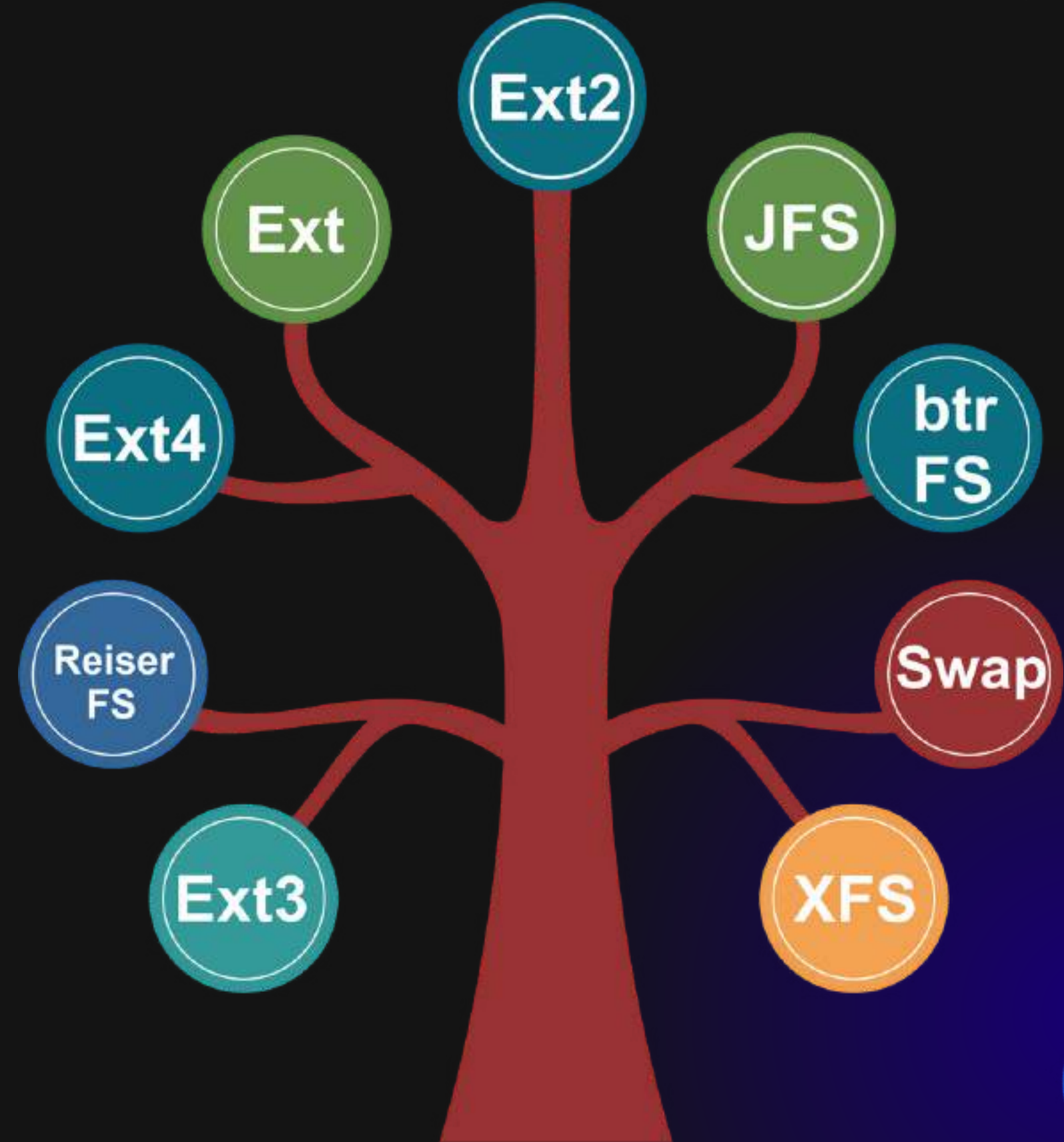
- Feature of the file system
- Keeps log of changes
- Prevent data loss during crashes



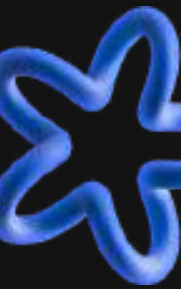
JOURNALING



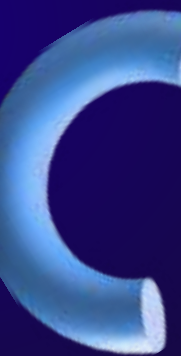
DIFFERENT TYPES OF FILE SYSTEM



JFS



- Journaling File System
- Developed by IBM in 1990
- Maintains the log of changes
- Fast and lightweight



FEATURES OF JFS

- Journaling
- Open Source
- Low CPU and memory usage
- Provides faster recovery



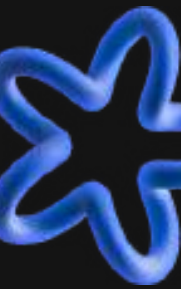


Storage Units

Byte	8 bits
Kilobyte	1024 Bytes
Megabyte	1024 KB
Gigabyte	1024 MB

Terabyte	1024 GB
Petabyte	1024 TB
Exabyte	1024 PB
Zettabyte	1024 EB

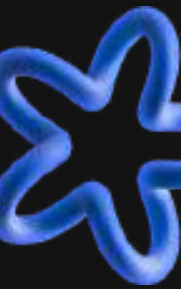
EXT4



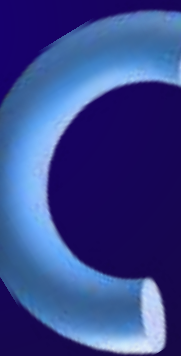
- Extended file system 4
- Default in most of the Linux distros
- Huge file support



FEATURES OF EXT4



- Journaling
- Delayed Allocation
- Fast fsck
(file system consistency check)
- Backward compatibility



Delayed vs Normal Allocation



Normal Allocation

		501	
	506		
			512

With Delayed Allocation

501	502	503	504
505	506	507	508
509	510	511	512



ext v/s ext2 v/s ext3 v/s ext4

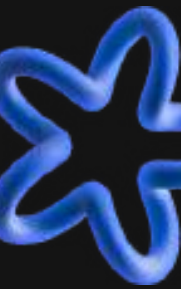
Feature	ext	ext2	ext3	ext4
Journaling	No	No	Yes	Yes
Max File Size	2 GB	2 TB	2 TB	16 TB
Max Filesystem Size	16 GB	32 TB	32 TB	1 EB [exabyte]
Backward Compatible	N/A	With ext	With ext2	With ext3/ ext2

XFS

- Developed by Silicon Graphics
- 64 bit journaling file system
- Used heavily in RHEL and CentOS



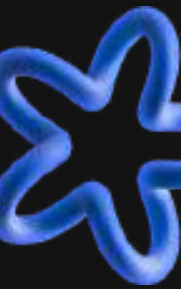
FEATURES OF XFS



- Journaling
- High Scalability (Upto 8 EB)
- Excellent parallel I/O
- Online resizing



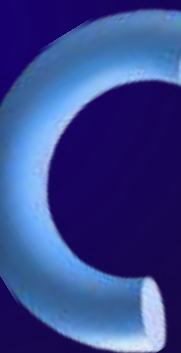
BTRFS



- Butter FS or B- tree FS
- Developed by Oracle
- Designed to replace ext4

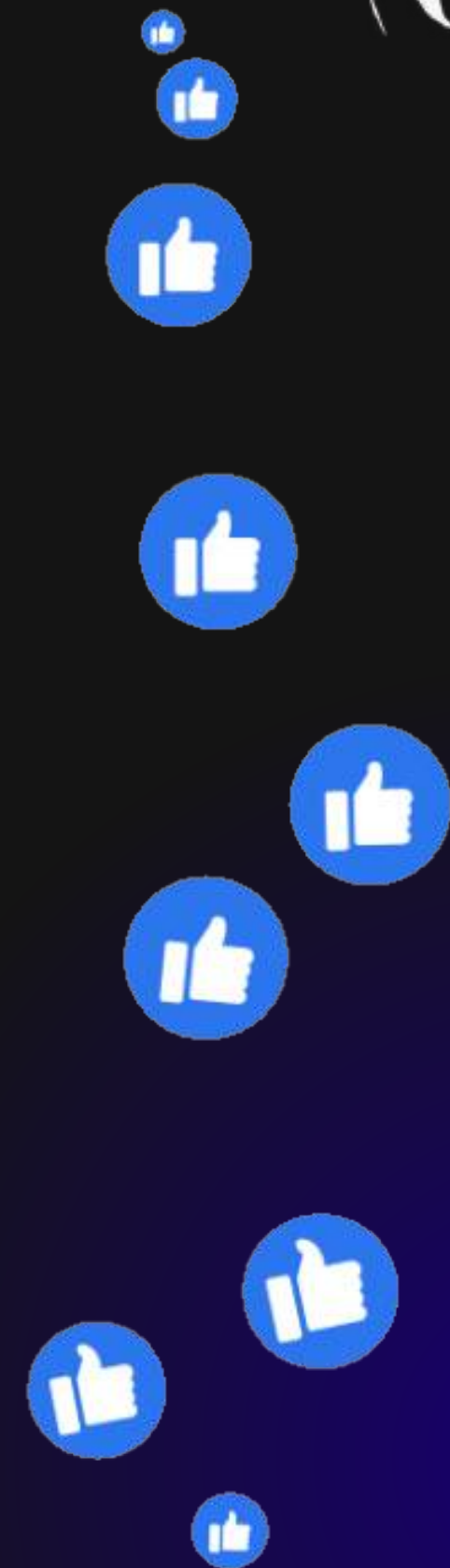


ORACLE

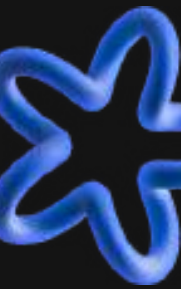


FEATURES OF BTRFS

- Build in snapshots
- Checksums
- Excellent parallel I/O
- Multi-Device spanning



ZFS



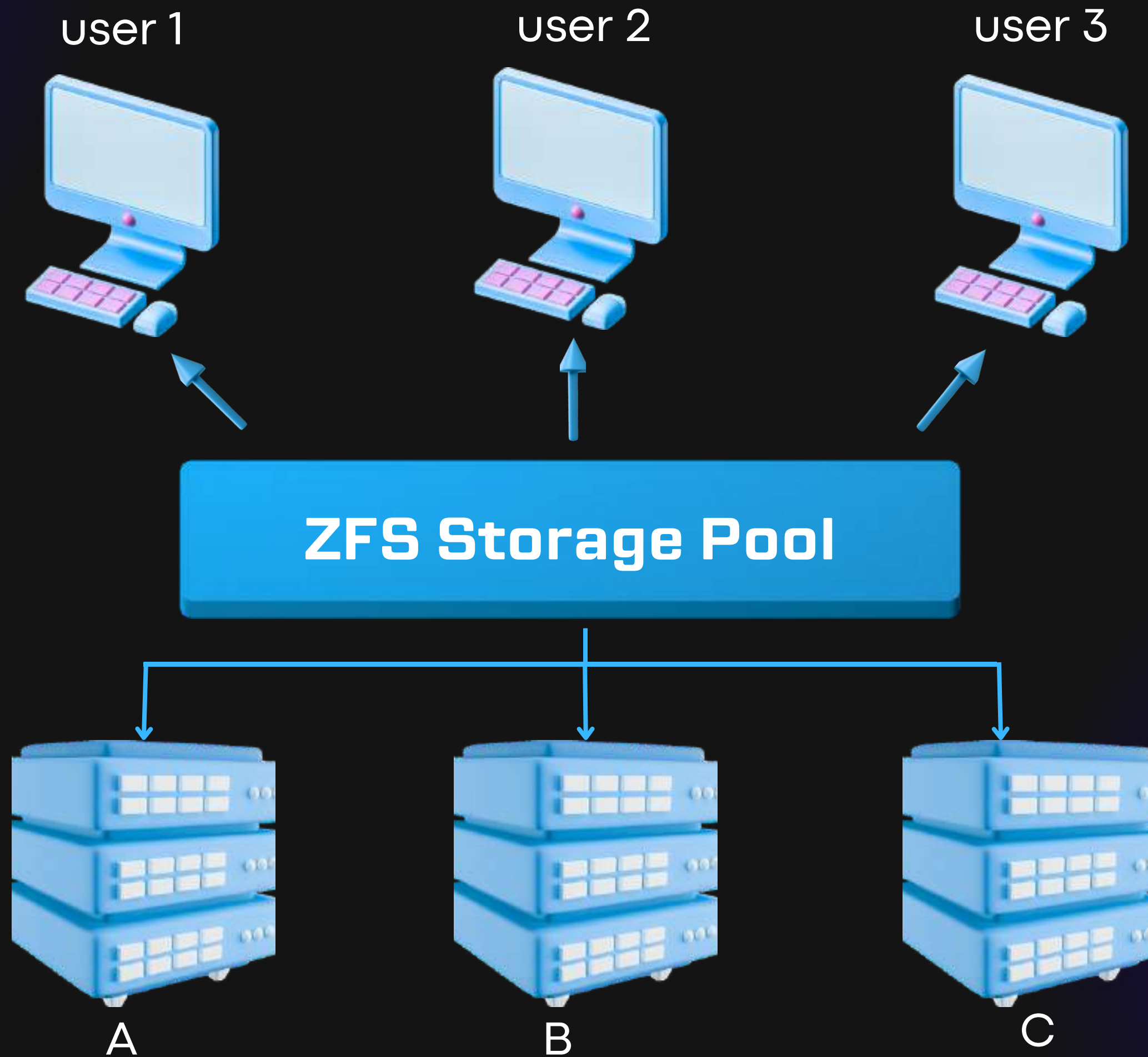
- Zettabyte File System
- Known for data integrity and self healing features
- Developed by Sun Microsystems



FEATURES OF ZFS

- Copy-on-write (COW)
- Compressions
- Pools





me v/s the guy she tells not to worry about



COMMANDS

- Shows files in long listing format



```
$ ls -l
```

- Shows directories with their inode no



```
$ ls -li
```

COMMANDS

Show disk block usage

```
$ df -T
```

Show Inode usage

```
$ df -i
```

COMMANDS

 Creates a new file



```
$ touch wlug.txt
```

 Shows metadata of file

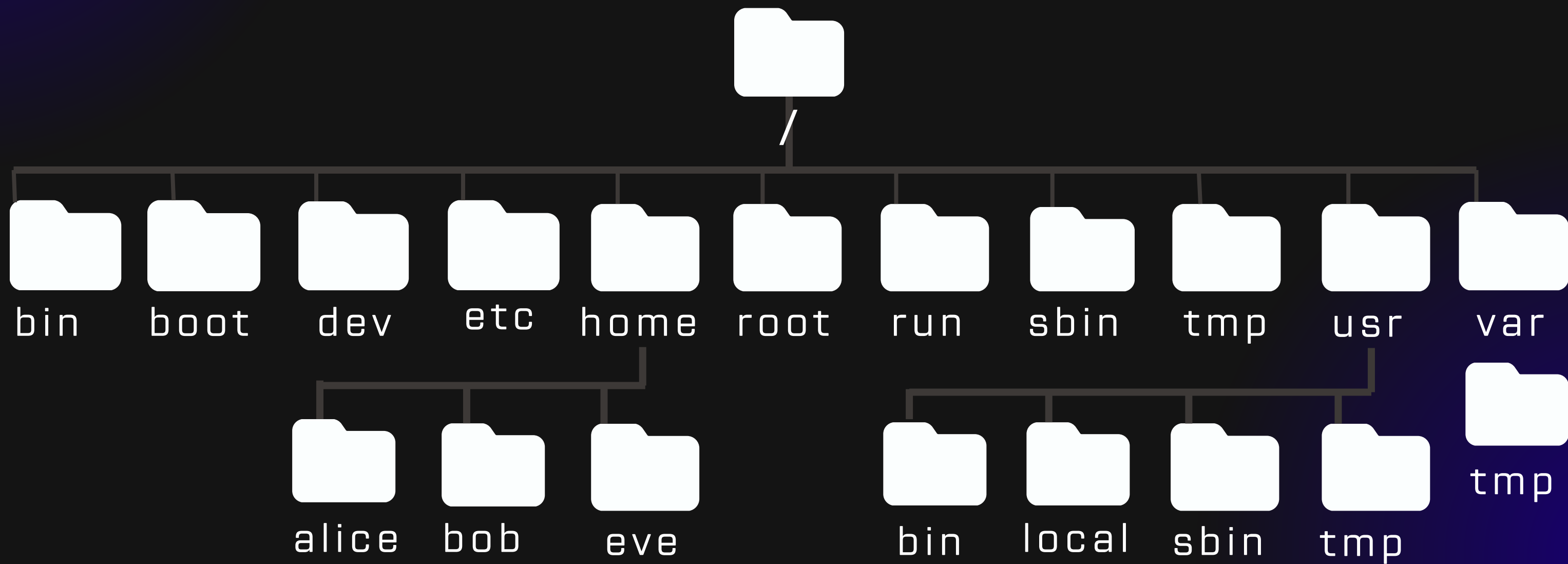


```
$ stat wlug.txt
```


Linux Directory Structure

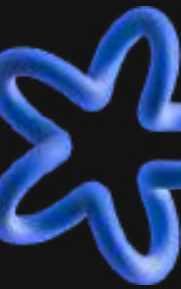
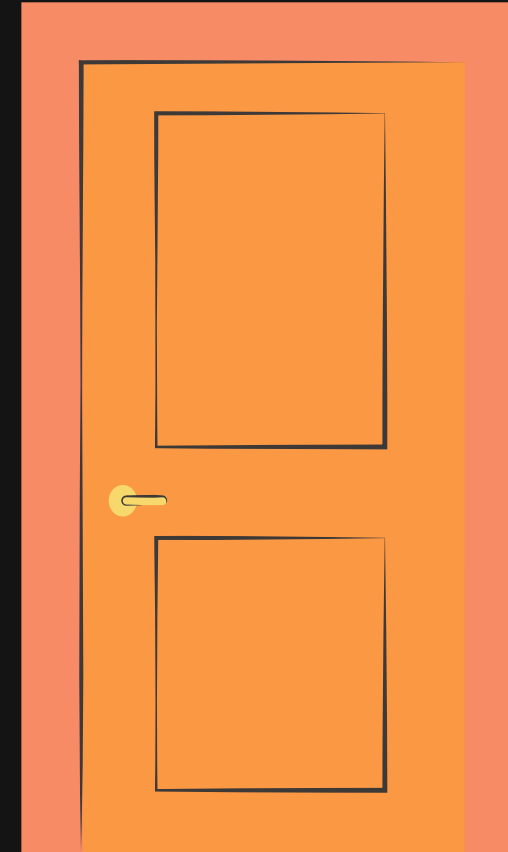


File System Hierarchy



/ ROOT

- It is the starting point of all paths and no directory lies above it.



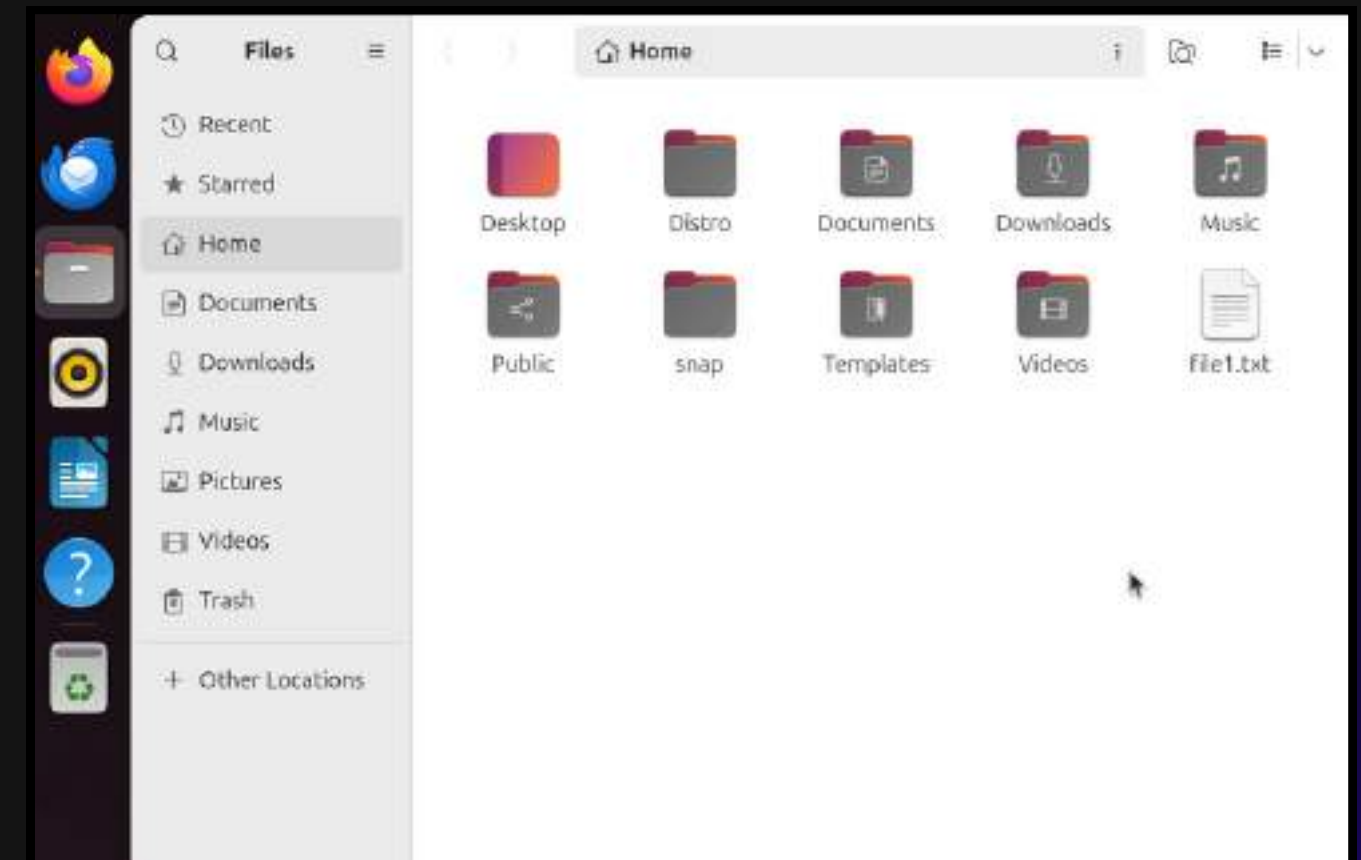
/ROOT



/home



For all users to store their
personal files

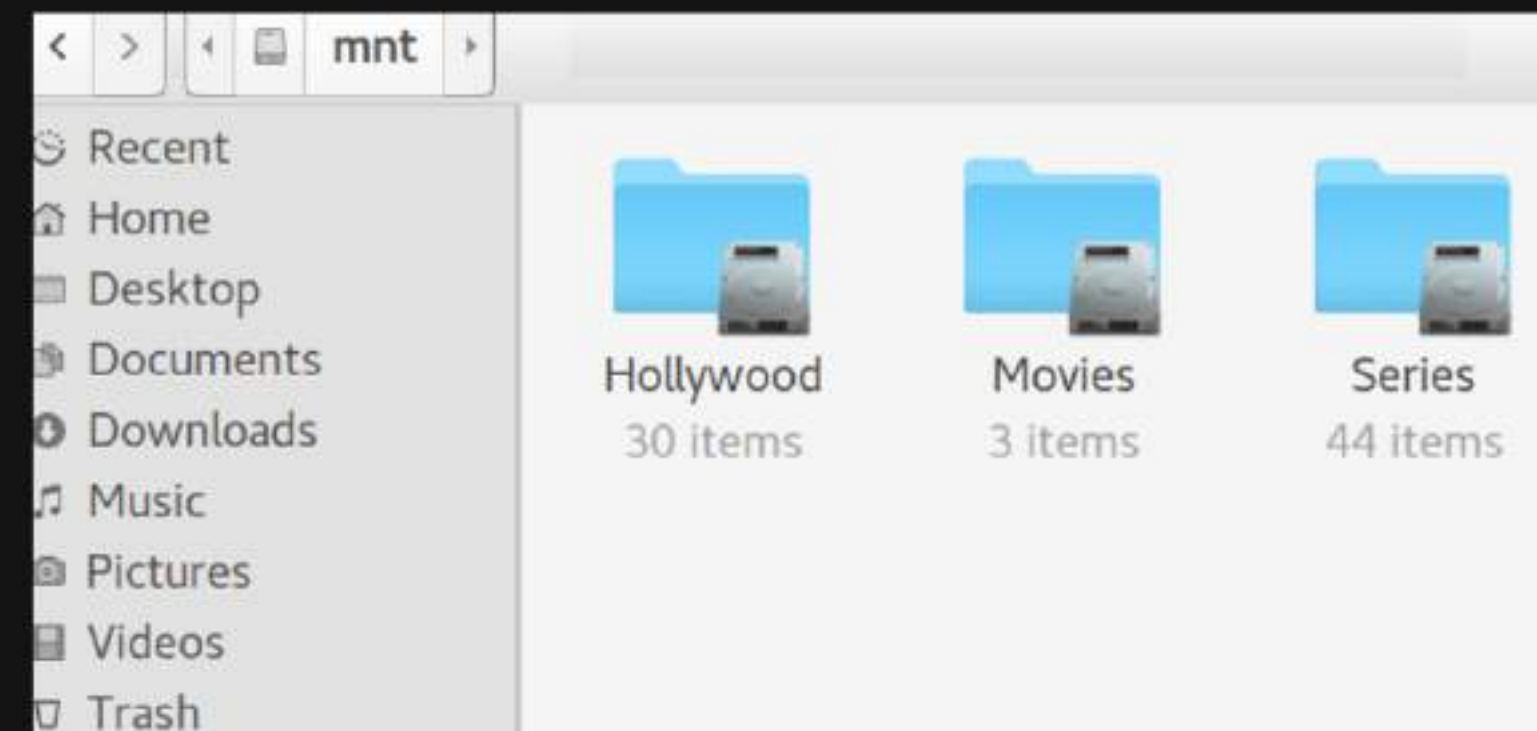


/home



/mnt AND **/media**

- Both are used as Temporary mount directory for removable devices like USB, CDs, SD cards.








/bin

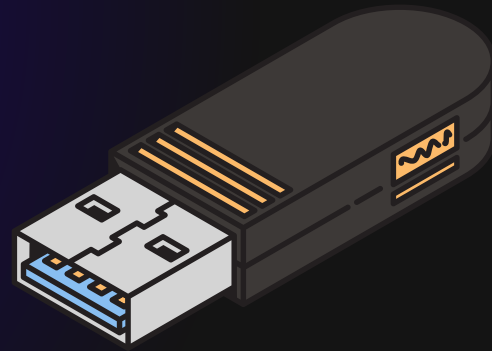


/sbin



- Contains essential command binaries needed by all users

- Contains system binaries typically for administrative tasks and are used by root user
- 



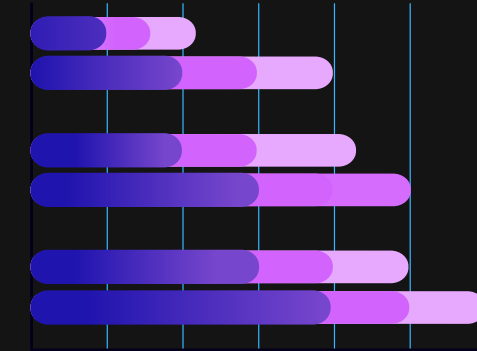
/boot

- Contains the essential files needed to boot the Linux operating system

/dev

- Contains special device files that represent hardware devices like printer, keyboard, CD, DVD



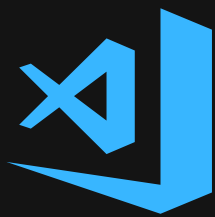


/opt

- Used to store optional, third party software that is not part of the core Linux distribution

/var

- Used to store variable data files. Such as cache, data within the data base



Visual Studio Code



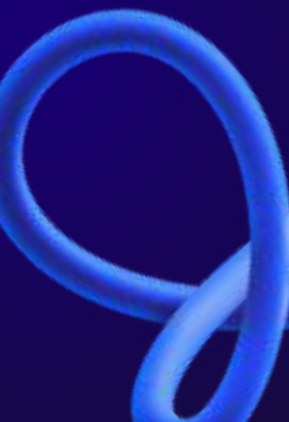
/run

- It contains information about the running system since the last boot



/tmp

- Used for storing temporary files created by programs and users





/etc

- It stores the system-wide configuration files



```
passwd: Stores user account info (but not passwords).  
shadow: Stores encrypted passwords (only readable by root).  
group:  Defines user groups.  
hostname:  Contains the systems hostname
```

COMMANDS



Install Tree package



```
$ sudo apt install tree
```



Shows file structure



```
$ tree ~
```

COMMANDS



Shows file structure of root



```
$ tree /
```



Shows file structure of directories



```
$ mkdir -p Debian/ubuntu/{apt,gnome,bash}
```

COMMANDS

- Install figlet and lolcat packages



```
$ sudo apt install figlet lolcat
```



- Print coloured ASCII art



```
$ figlet "LINUX ROCKS" | lolcat
```


Users and Groups in Linux



What is User ?





What is Multi-User OS ?



Types of Users in Linux



- **Super User**
- **Regular User**
- **System User**

Why Different Users ?





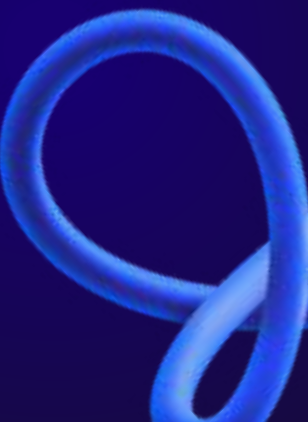
Manager



Chef



Delivery



Super User



Super User is also known as **Root User**.

- Administrative tasks.
- Installing softwares.
- Managing system settings.

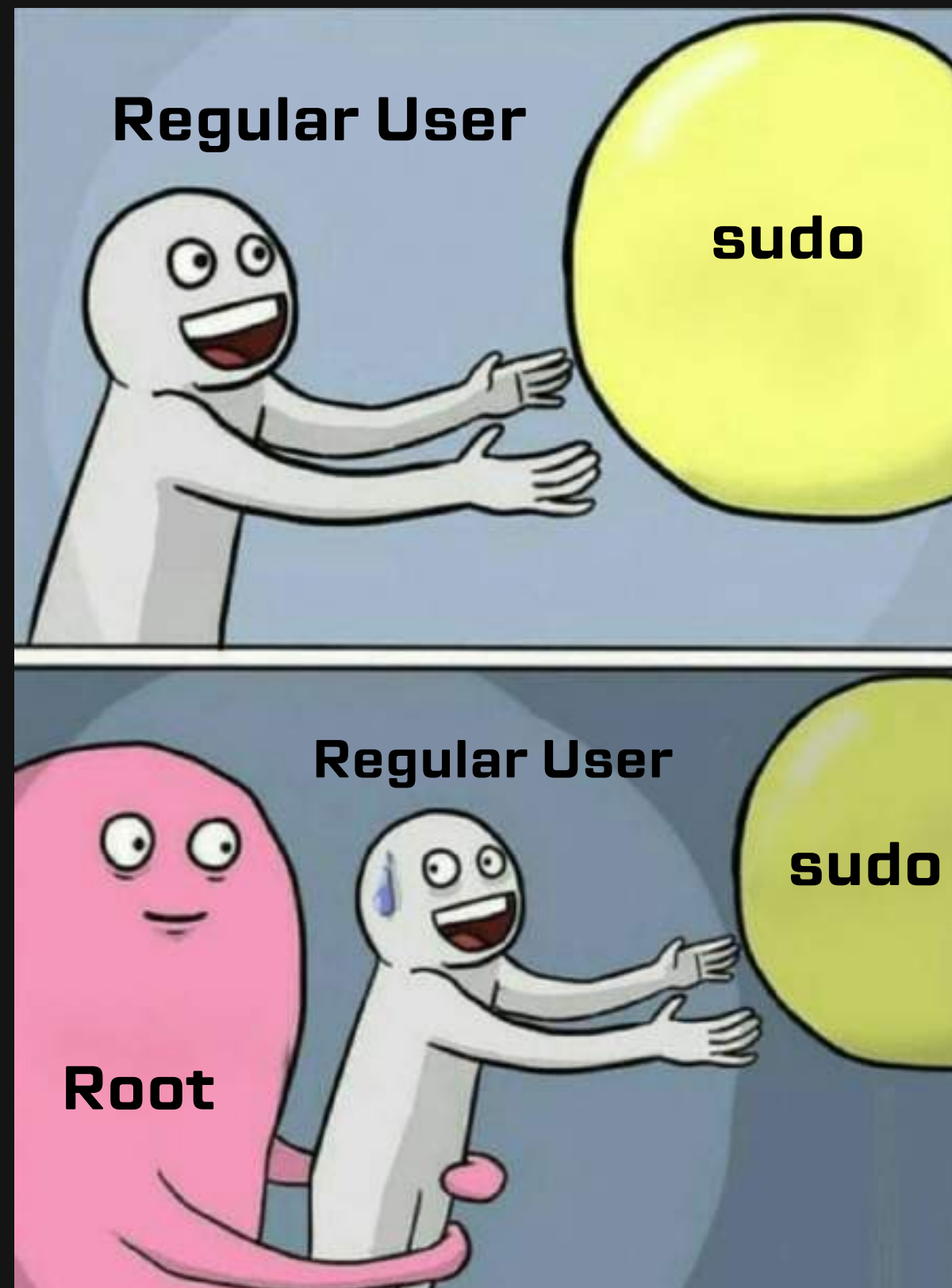


Regular User

Regular User is known as **Normal User**.

- Managing files and directories.
- Managing personal data.
- Interacting with peripheral devices.





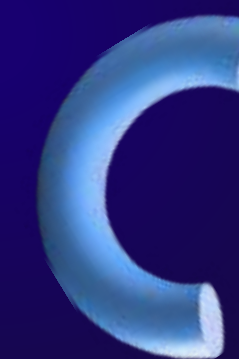
System User



System Users are Service Accounts.

- Limited or no login shell.
- Restricted permissions.
- Specific functionality.

SYSTEM USERS = NO LOGIN SHELL?

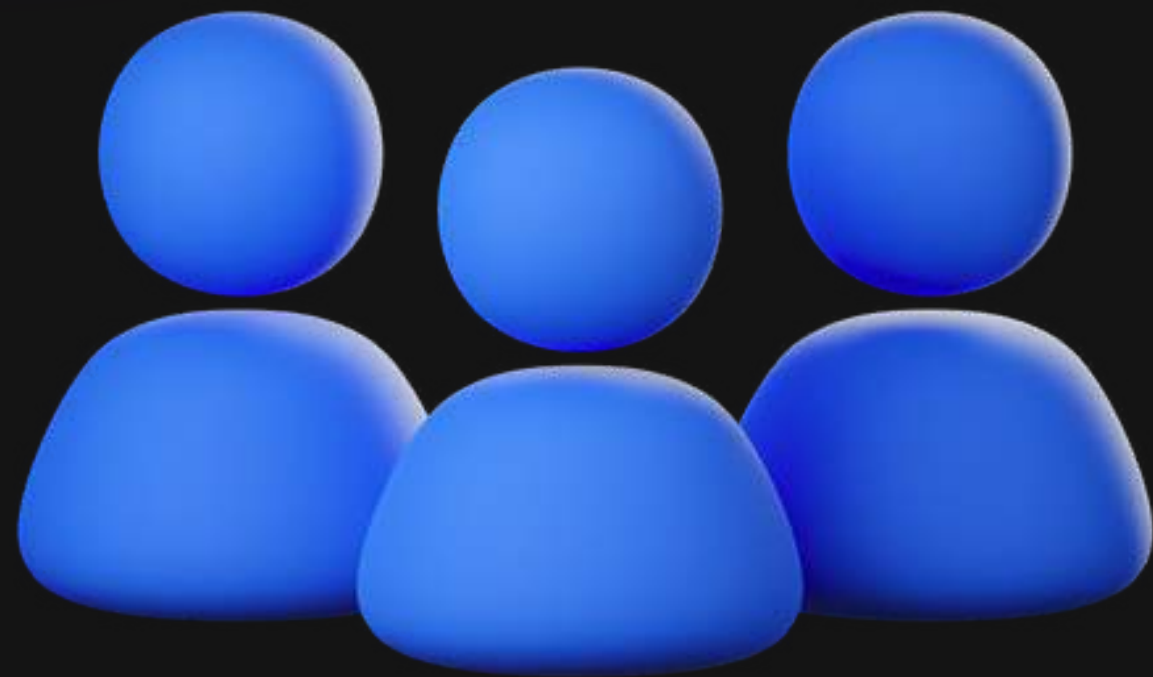


Groups in Linux



- What is a Group ?
- Need of a Group ?

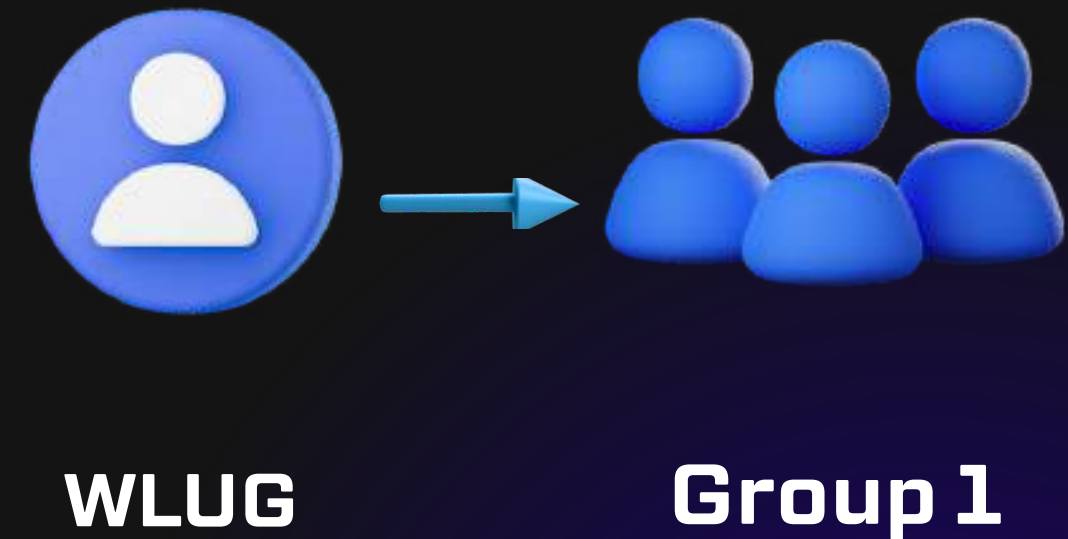
Types of Groups In Linux



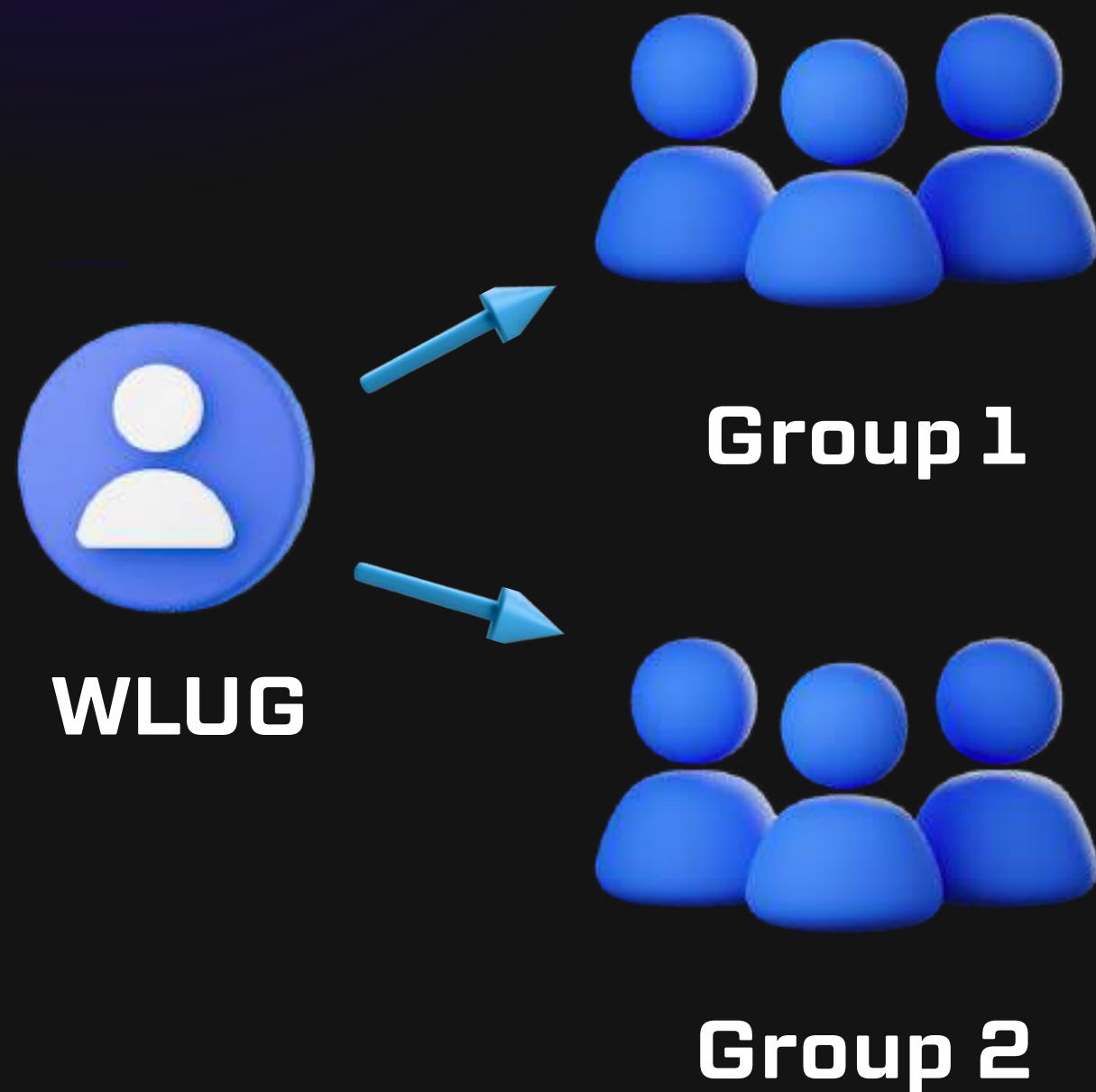
- **Primary Group.**
- **Secondary Group.**

Primary Group

- Every User is associated with a **Primary Group**.
- Control over Default Permissions and ownership of a Directory



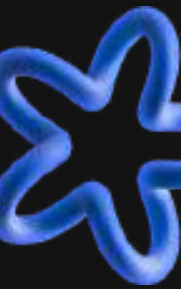
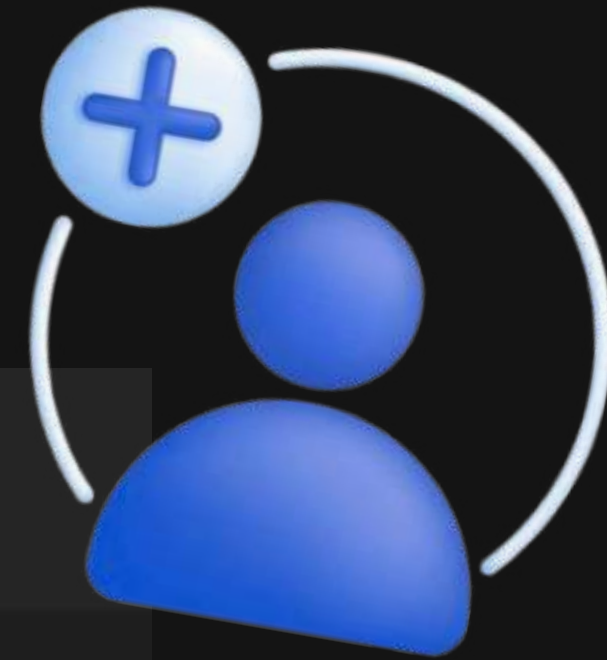
Secondary Group



- Additional **Groups** that a user can belong to.
- Extends **User's** access beyond what is allowed by their **Primary Group**.

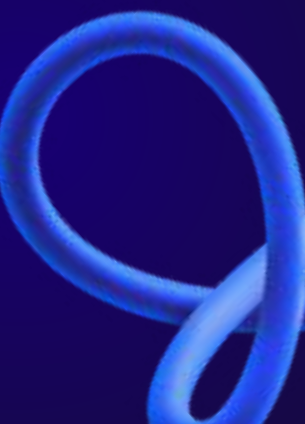
Hands on Time





```
//Create a new user  
$ sudo adduser <user_name>
```

```
//Delete an existing user  
$ sudo deluser <user_name>
```






```
//View existing users  
$ cat/etc/passwd
```

```
//view existing groups  
$ cat/etc/group
```





```
//Create new group
$ sudo groupadd <group_name>

//Rename existing group
$ sudo groupmod -n <new_name> <old_name>

//Delete existing group
$ sudo groupdel <group_name>
```





//Add user to the group

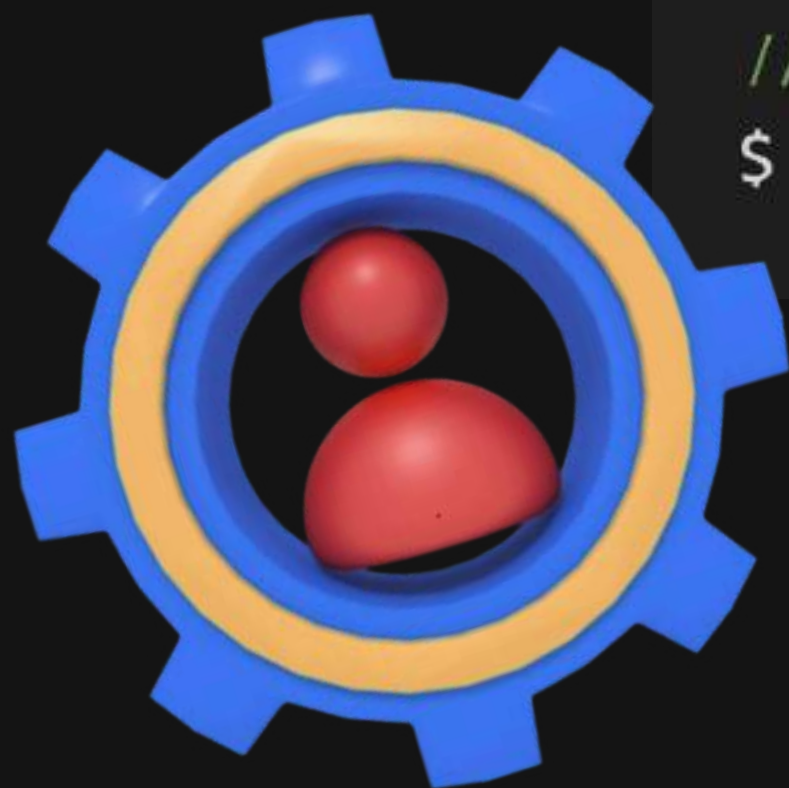
```
$ sudo usermod -aG <group_name> <user_name>
```

//Change the primary group of user

```
$ sudo usermod -g <new_primary_group> <user_name>
```

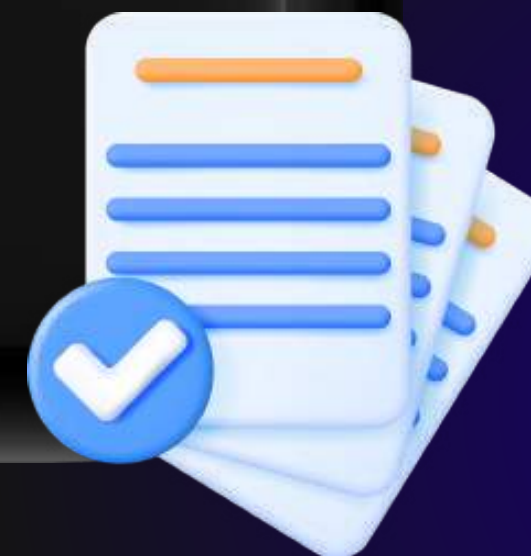
//Remove user from a group

```
$ sudo gpasswd -d <user_name> <group_name>
```





File Permissions





● What are File Permission?

● Need of File Permissions?

● Which Permissions?





● How to view Permissions?

● How to change Permissions?





ISKA MATLAB SAMJHE DAYA?


Need of File Permissions?



- Data Security
- User Control
- Access Restriction
- System Integrity

How to view Permission?

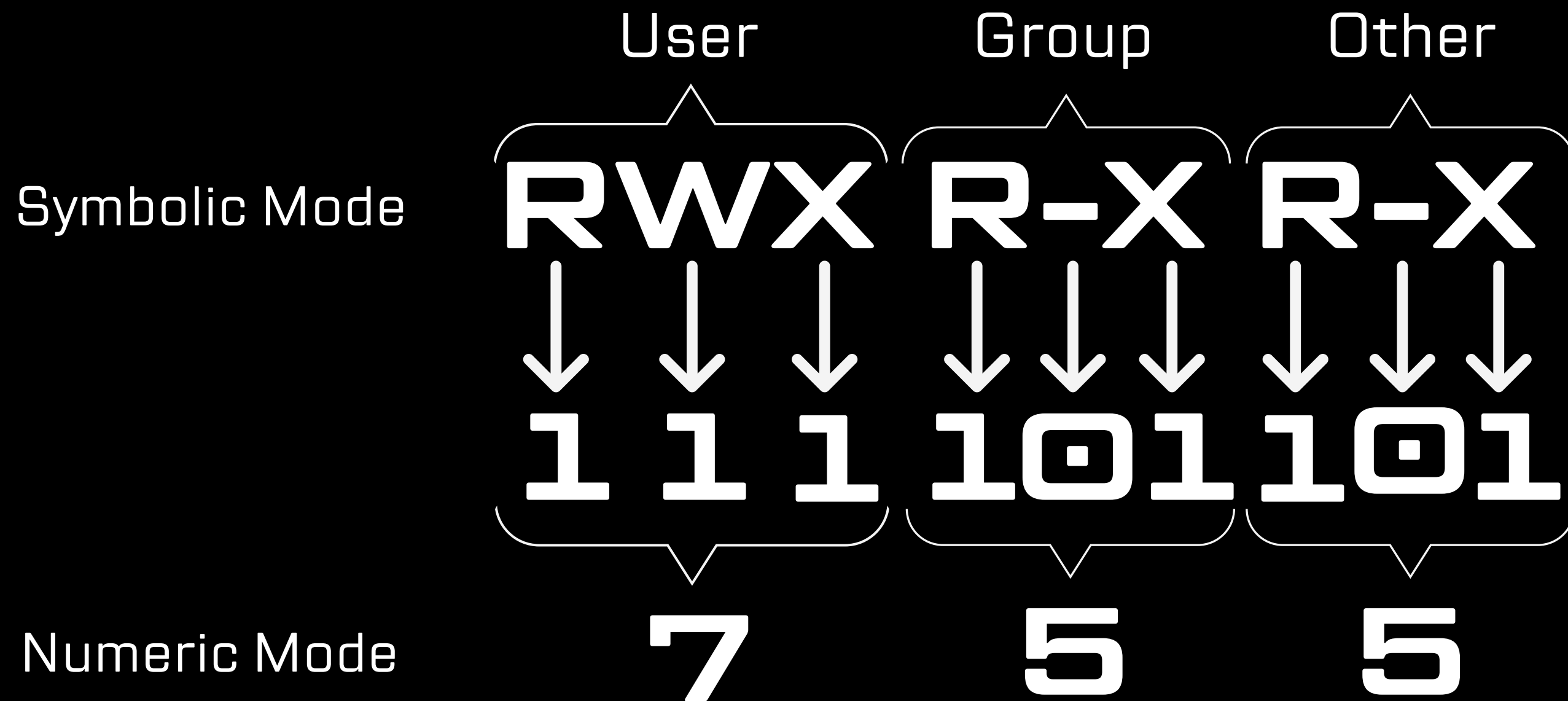
- List the file and directories
- In a detailed or “long” format
- First 10 characters are used to check the permission



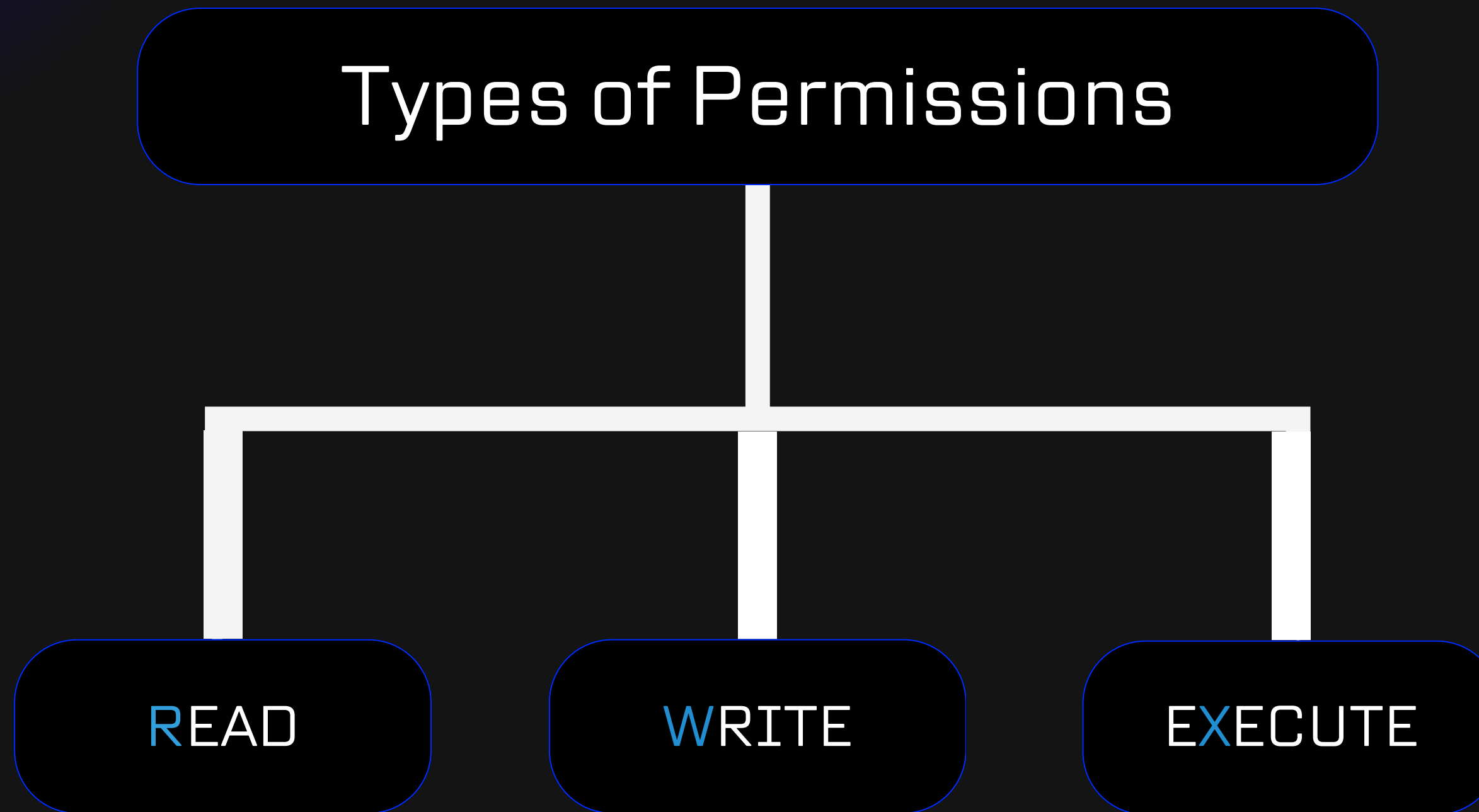
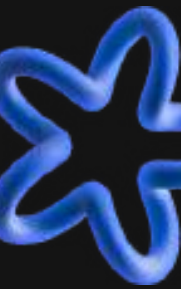
```
// view permission  
$ ls -l
```



How to view Permission?





Which Permission?



READ Permission



-  Reading contents of a file
-  View directory listing




WRITE Permission



-  Modify file contents
-  Create new files
-  Delete existing files

EXECUTE Permission



-  Run executable files
-  Execute scripts
-  Access directory

How to change Permission?



- Change mode
- Used to update the permission
- Two modes
 - Symbolic
 - Numeric



```
// change permission  
$ chmod
```



How to change Permission?

- Change owner
- Used to change owner of a file

```
// change owner  
$ chown
```



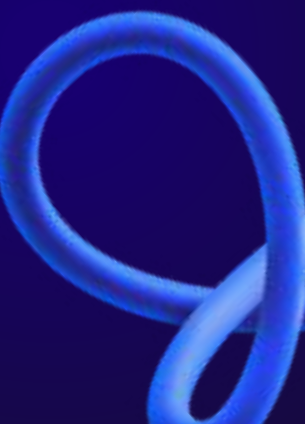
How to change Permission?



- Change owner
- Used to change owner of a file



```
// change group  
$ chgrp
```



Customization



.bashrc FILE

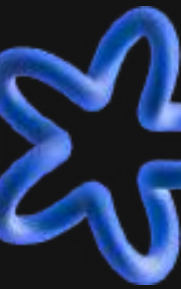


Important Instruction:-




- Important file of terminal
- Do not change any other content



GOLI BETA MASTI NAHI



Extension

-  Burn my windows
-  Dash to dock
-  Compiz windows effects



```
// burn my windows  
$ sudo apt install gnome-shell-extension-manager
```

Tweaks

```
// burn my windows  
$ sudo apt install gnome-tweaks
```



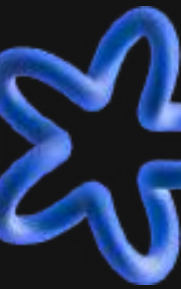
Thank You!



Refreshment Time



Linux Diary 6.0





**Add these
stars to meme
corners**