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WALCHAND LINUX USERS' GROUP



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SEATS

LINUXDIARY 5.0

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KICKOFF**

10
AUG

Session 02:
**ROUTE TO
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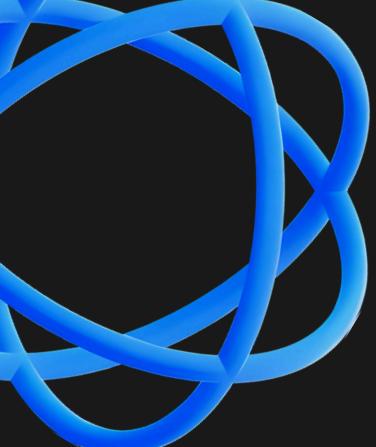
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Linux File Systems

Linux File Systems



Contents

- ◆ File System
- ◆ Types of File Systems
- ◆ Linux Directory Structure



Why is Linux often referred to as a file-based system?



Inodes

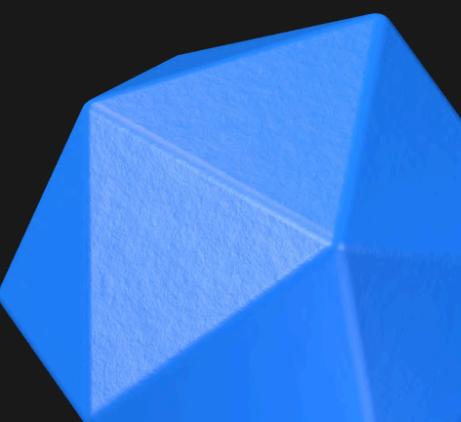
- ◆ Index node
- ◆ Metadata
- ◆ Points to location of a file



```
$ stat wlug
```



```
$ df -i
```

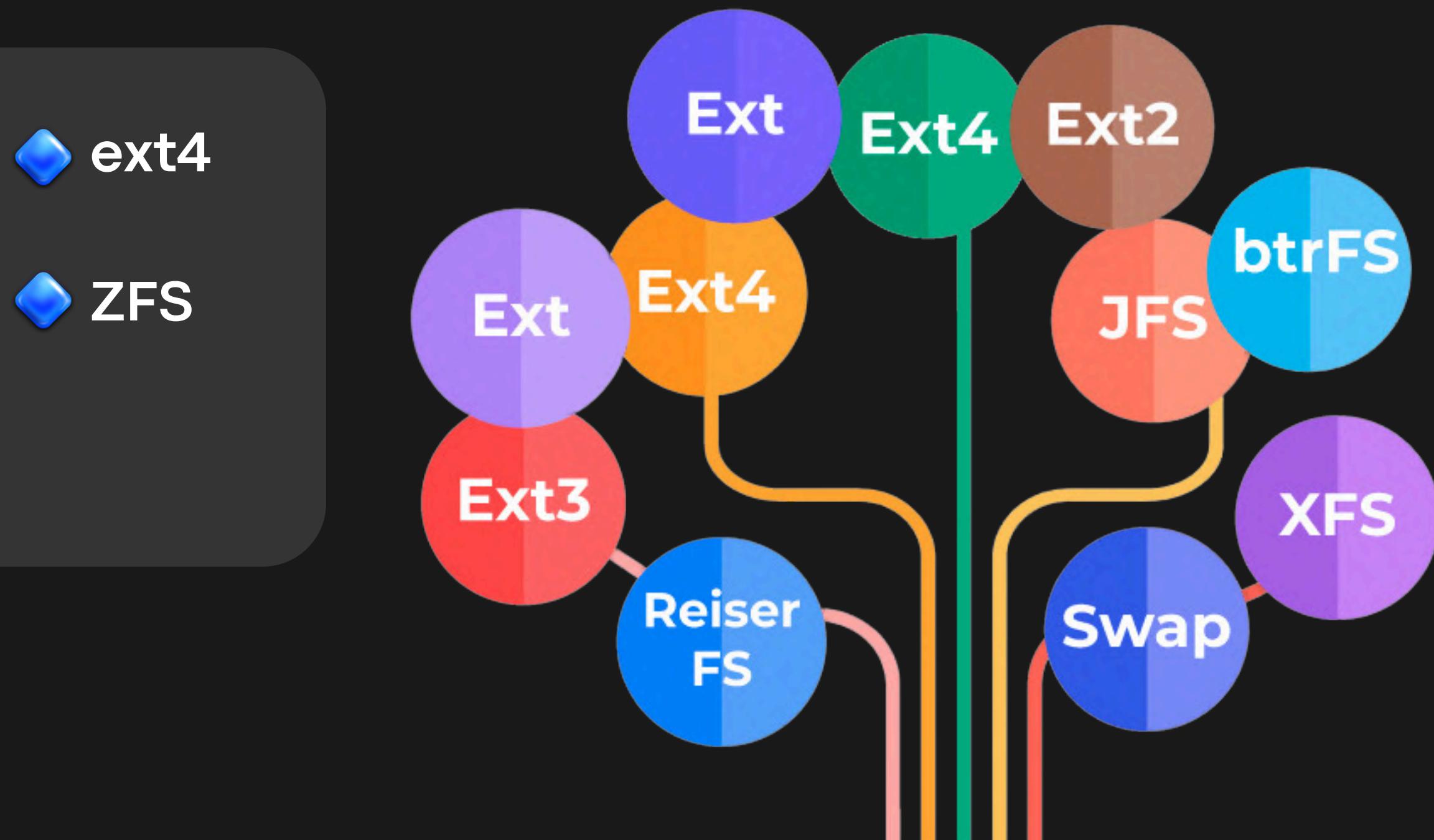
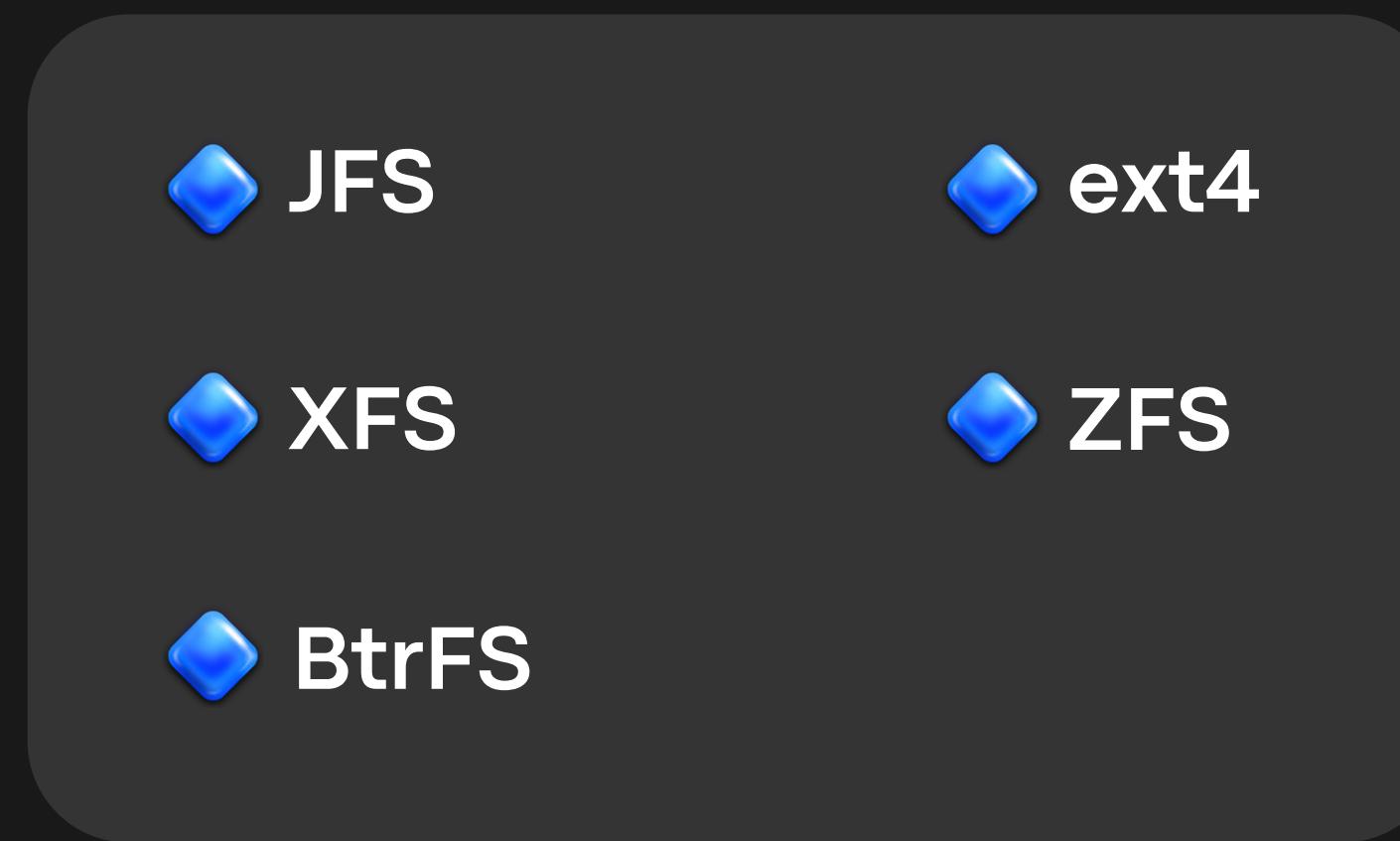


What is a file system?

Way to organize and manage files on a storage device such as a hard drive



Main Types



JFS

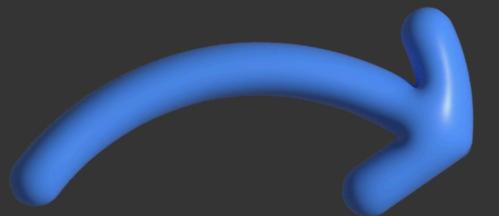
- ◆ Journaling file system
- ◆ Developed by IBM in 1990
- ◆ JFS maintains a log of changes
- ◆ Provides faster recovery



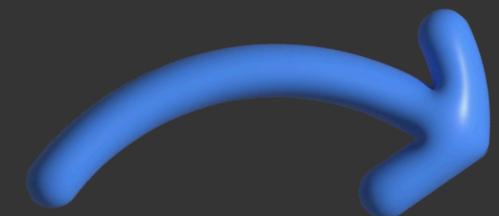
Journaling



User



Rough book



Fair book

ext4

- ◆ 32-Bit Journaling file system
- ◆ Developed between 2003 and 2006
- ◆ Maximum individual file size of 16 Tb
- ◆ File system volume size of 1 Eb



Features of ext4

- ◆ Backward compatibility
- ◆ Delayed allocation
- ◆ Journal checksums



XFS

- ◆ 64-Bit journaling file system
- ◆ Optimized for high performance
- ◆ For systems having large number of CPUs and huge disk size



Features of XFS

- ◆ Speedy parallel I/O operations
- ◆ Extent-based allocation
- ◆ High recovery chances

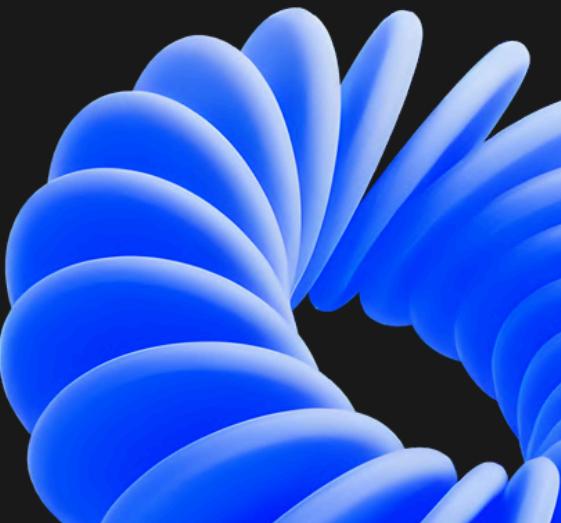


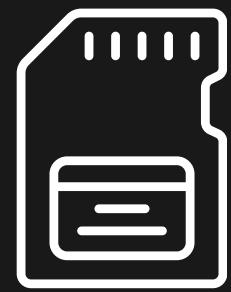
Do You Know?



- ◆ **64 bit = $2^{64} \times$ Size Allocated**

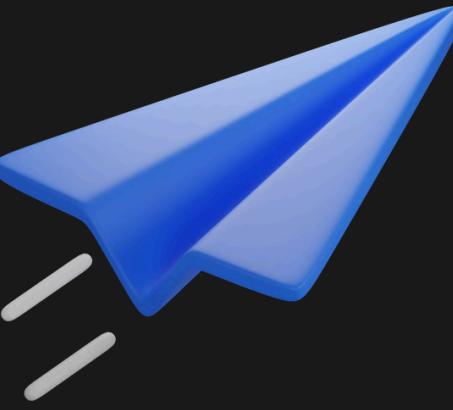
- ◆ **32 bit = $2^{32} \times$ Size Allocated**





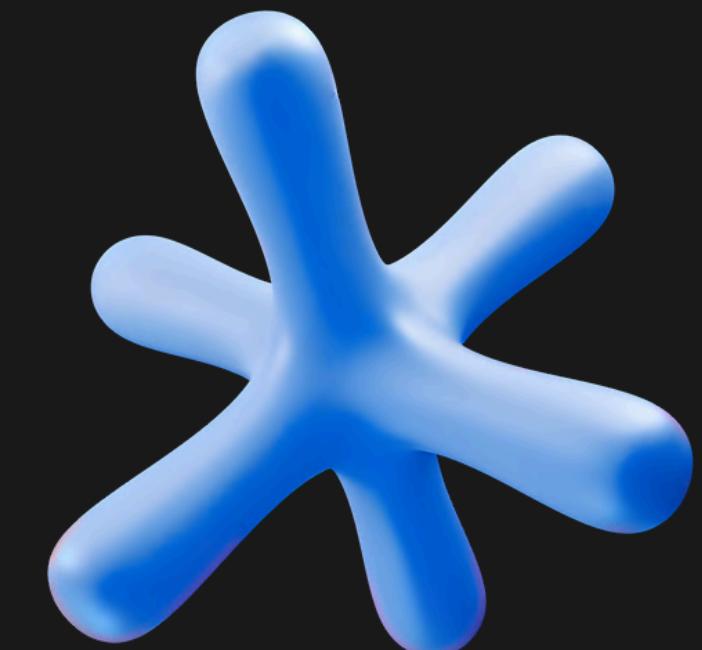
Storage Units

Byte	8 bits
Kilobyte	1024 Bytes
Megabyte	1024 KB
Gigabyte	1024 MB
Terabyte	1024 GB
Petabyte	1024 TB
Exabyte	1024 PB
Zettabyte	1024 EB



ZFS

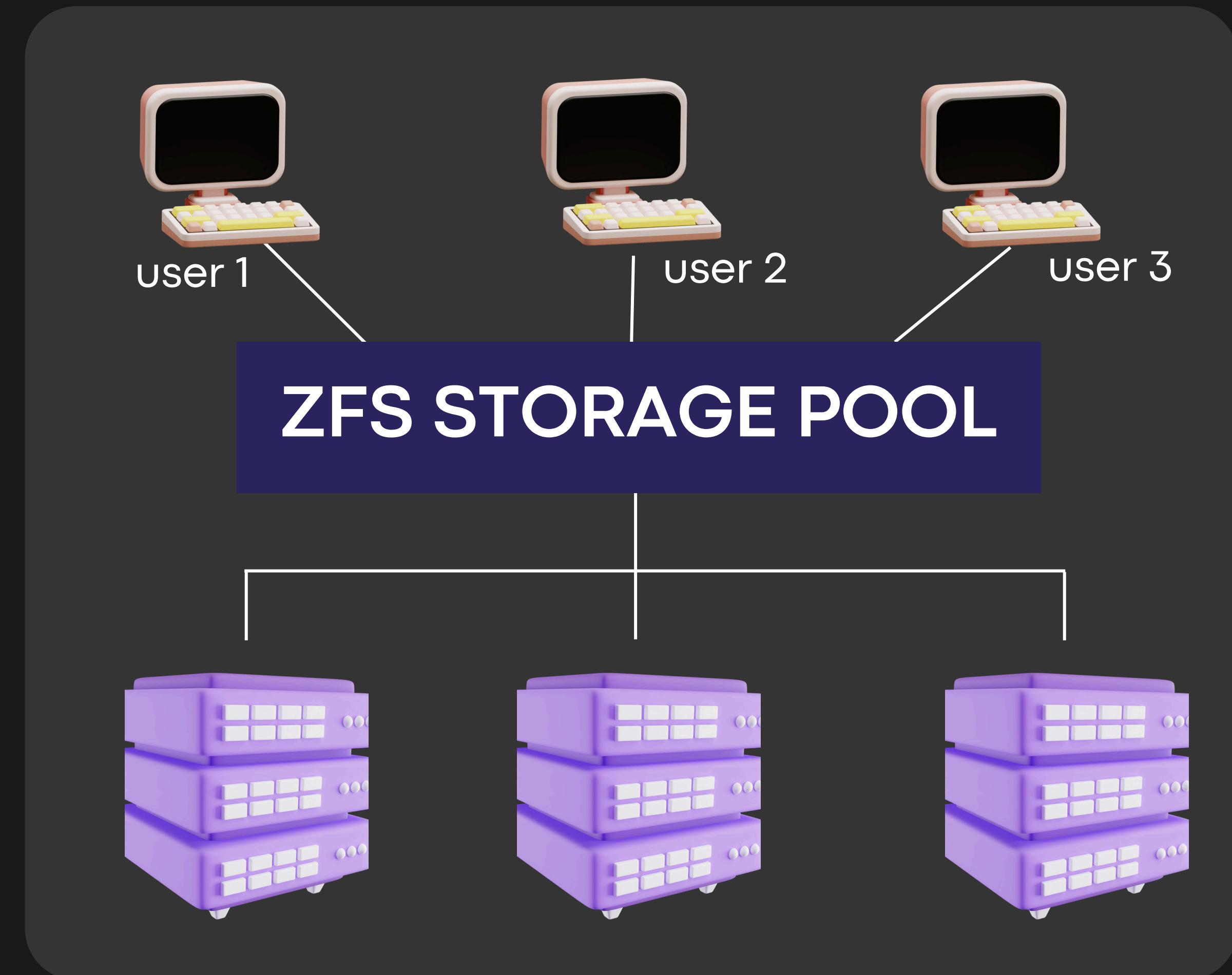
- ◆ Zettabyte file system
- ◆ Maximum file size - 16 Eb
- ◆ Maximum volume size - 256 trillion Yb
- ◆ 128-bit file system



Features

- ◆ Copy-on-write transactional model
- ◆ Built-in scrub
- ◆ Single FS snapshot
- ◆ Default compression





Quick Question

How much is an exabyte?

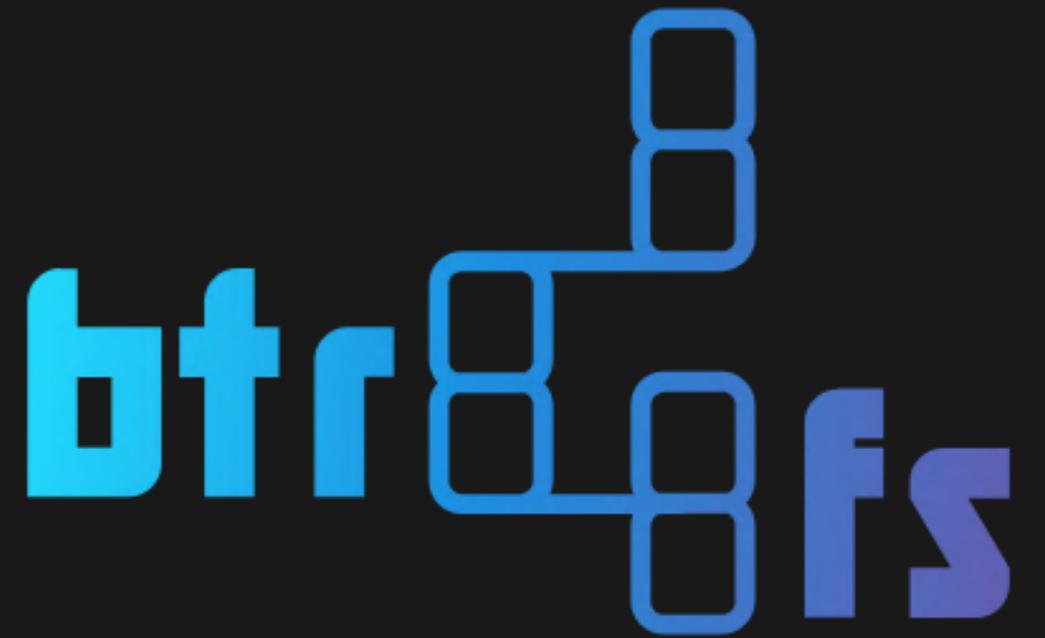
Approx ~ 2^{60} bytes



+++

Btrfs

- ◆ Developed by Oracle in 2007
- ◆ Maximum individual file size of 16 EB
- ◆ Supports self-healing property



Features

- ◆ Single FS snapshot
- ◆ Checksums
- ◆ Multidevice spanning



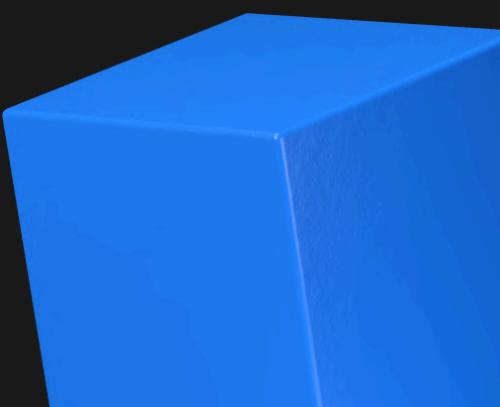
Companies using Btrfs



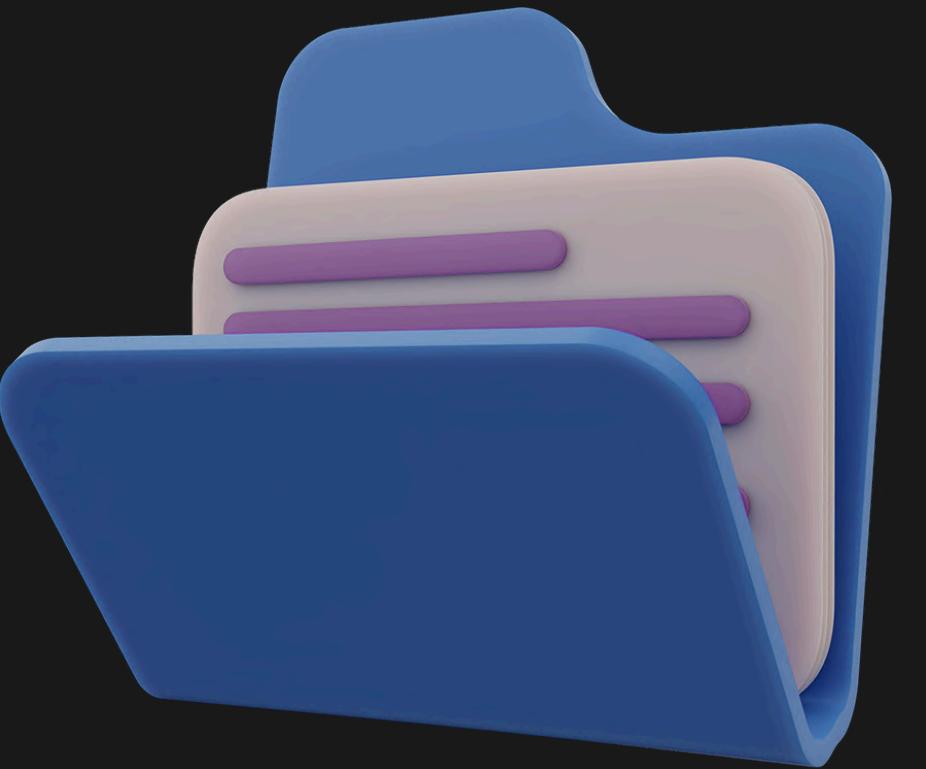
Linux Directory Structure

Some Basic Commands

- ◆ Sudo command
- ◆ List directory content
- ◆ Change directory
- ◆ Change to parent directory

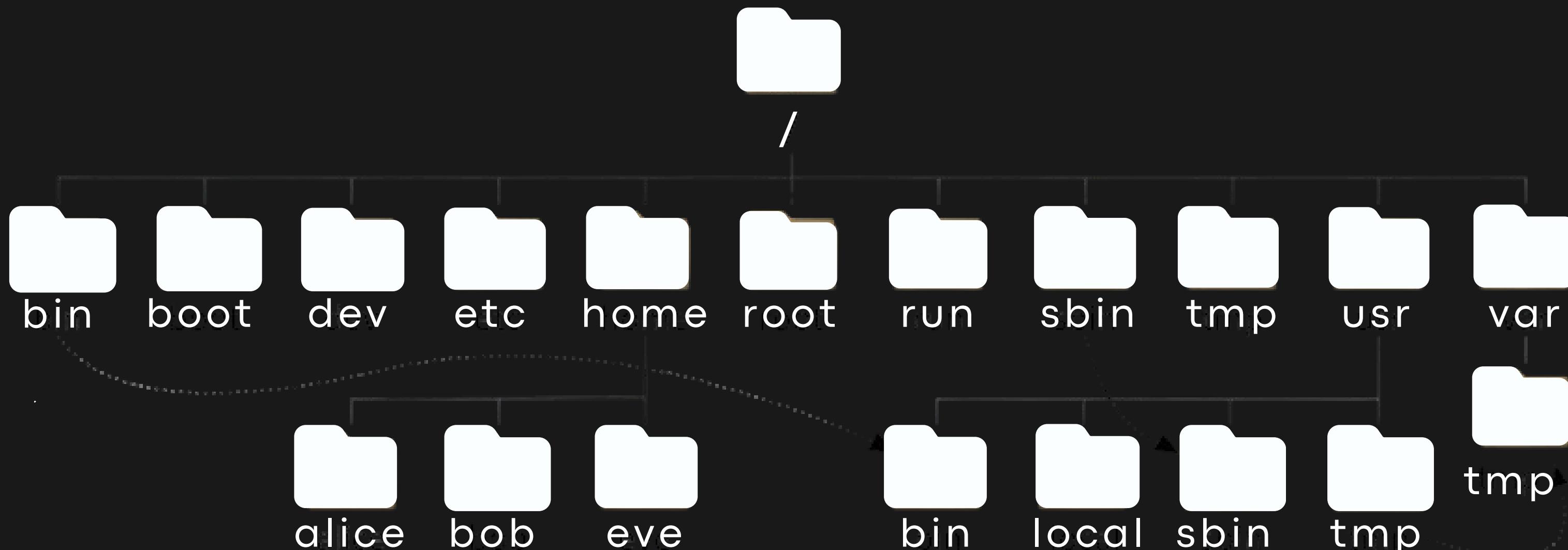


Linux Directory Structure?





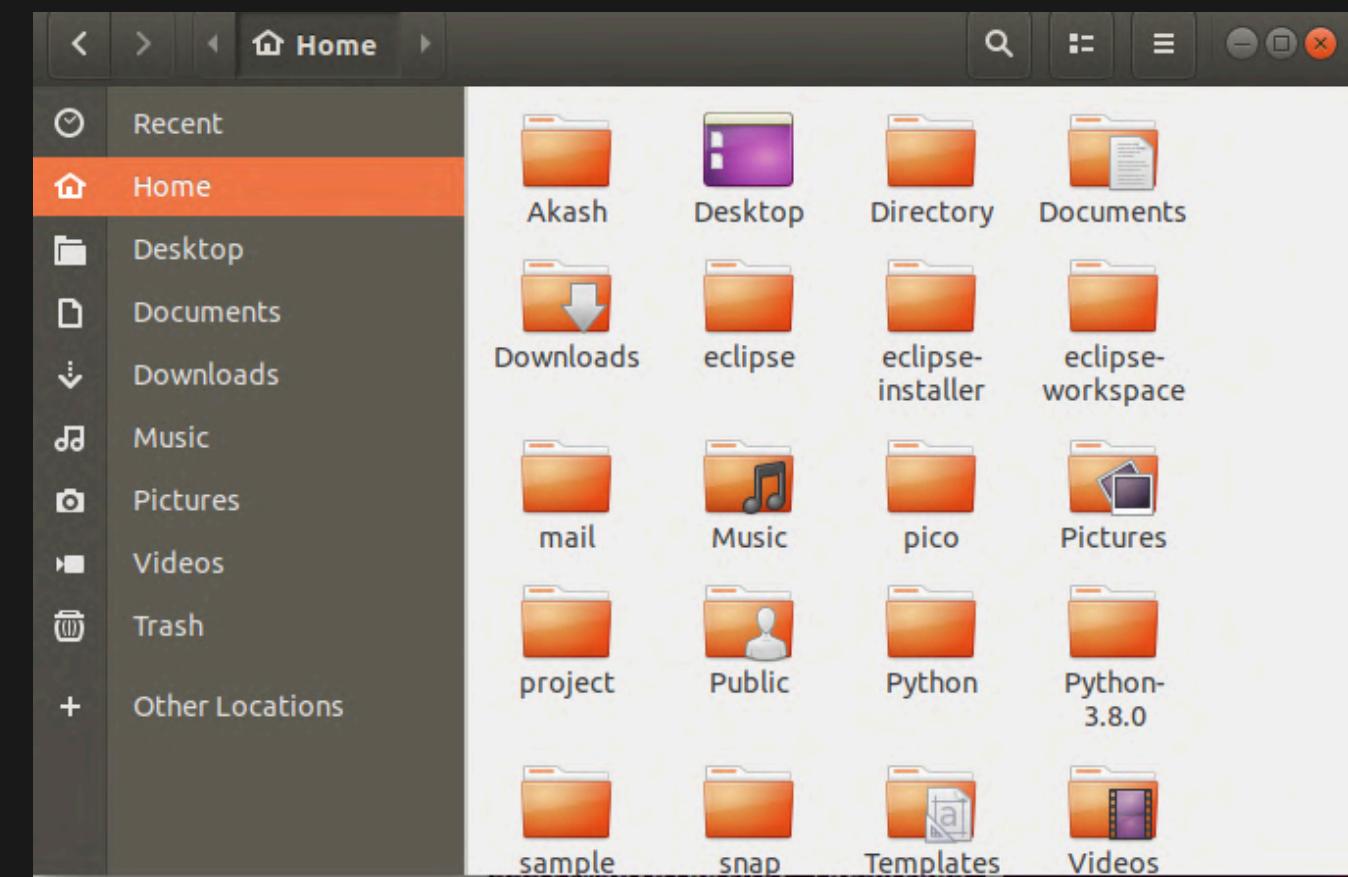
File System Hierarchy





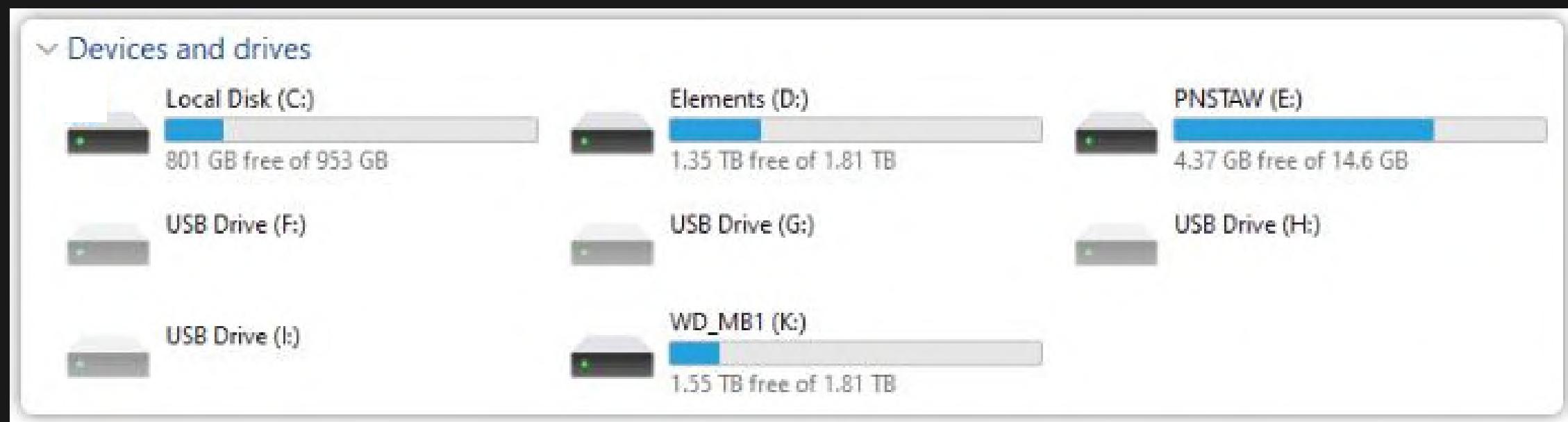
home

- ◆ For all users to store their personal files



media & mnt

- ◆ Temporary mount directory for removable devices



bin

- ◆ Contains command binaries that are required by all user

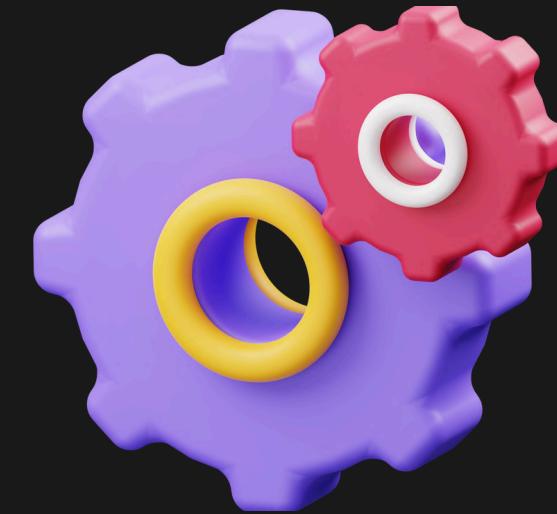


sbin

- ◆ Contains system binaries typically for administrative tasks

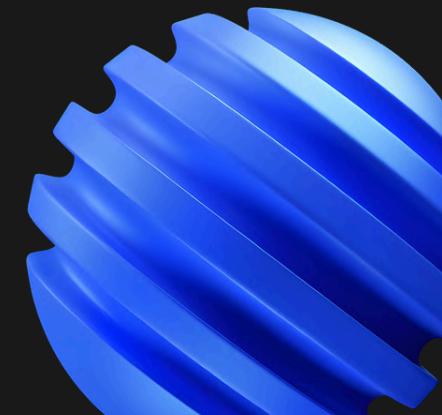
boot

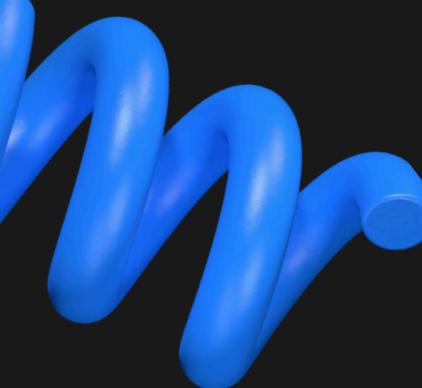
- ❖ Contains everything required for the boot process



dev

- ❖ Contains special device files for all the devices





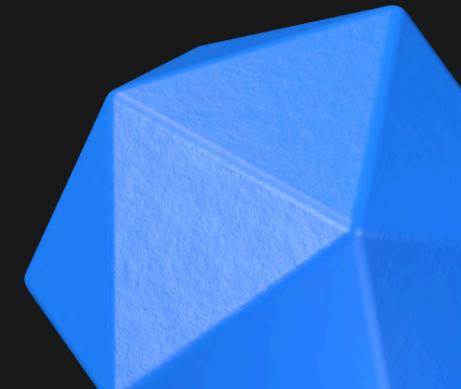
opt

- ❖ Used to store optional software packages



var

- ❖ Used to store variable data files



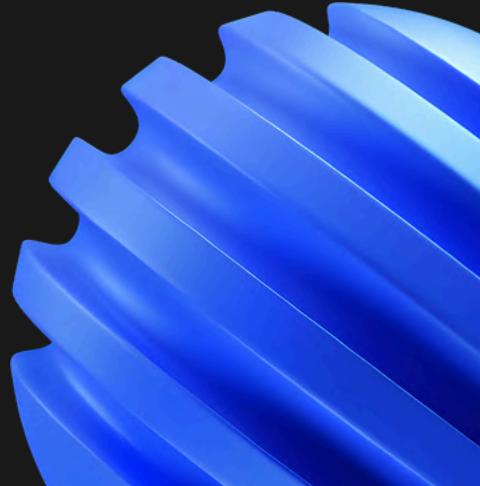
run

- ❖ Files loaded onto to the RAM when OS is booted
- ❖ Files deleted when PC shuts down



tmp

- ❖ Used for storing temporary files created



etc

- ◆ Contains all the system-wide configuration files



Open your browser and goto
10.40.11.81:8000

Open a new terminal and run command

```
$ cd Downloads  
$ sudo chmod +x script.sh  
$ sudo bash script.sh
```



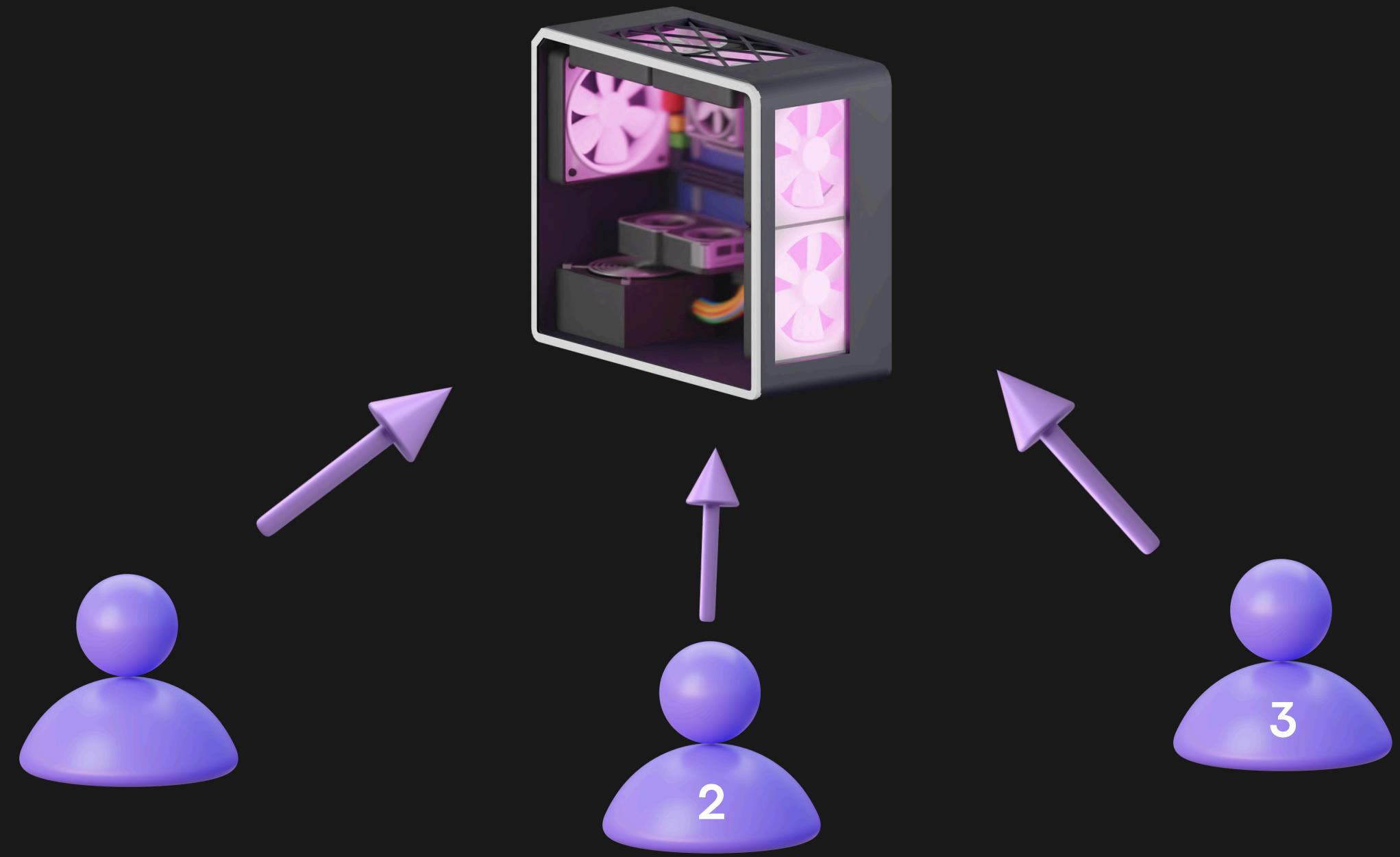
Users and Groups in Linux



What is a User?



What is a Multi-User OS?



Types of Users in Linux



Super User

Regular User

System User

Super User



- ◆ Super user is also known as Root user

- ◆ Super user can perform:
 - Administrative tasks
 - Installing softwares
 - Managing system settings

Regular User



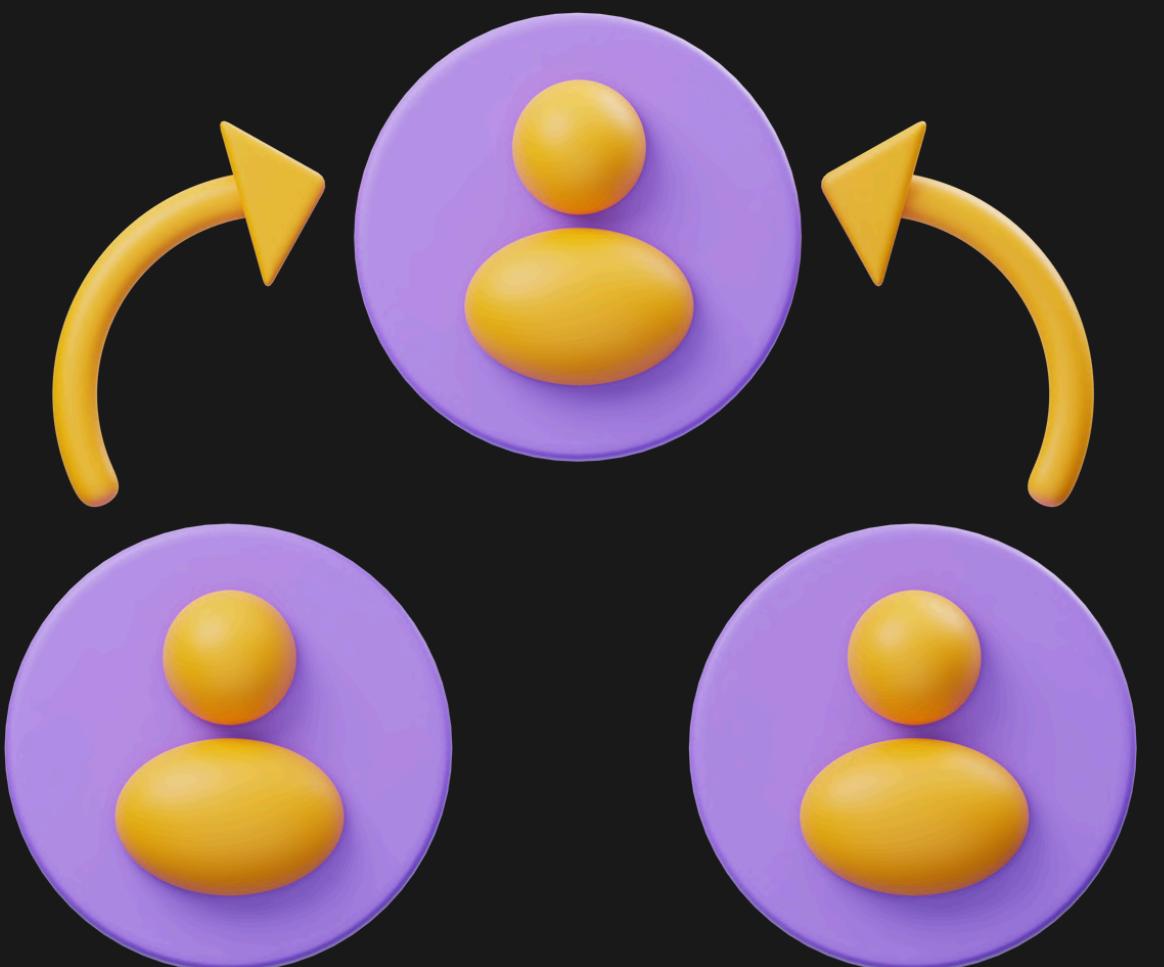
- ◆ Regular user also known as Normal user

- ◆ Regular user can perform:
 - Managing files and directories
 - Managing personal data
 - Interacting with peripheral devices

System User

- ◆ **System** users are service accounts
- ◆ **System** user has:
 - Limited or no login shell
 - Restricted permissions
 - Specific functionality

Groups in Linux



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

+++

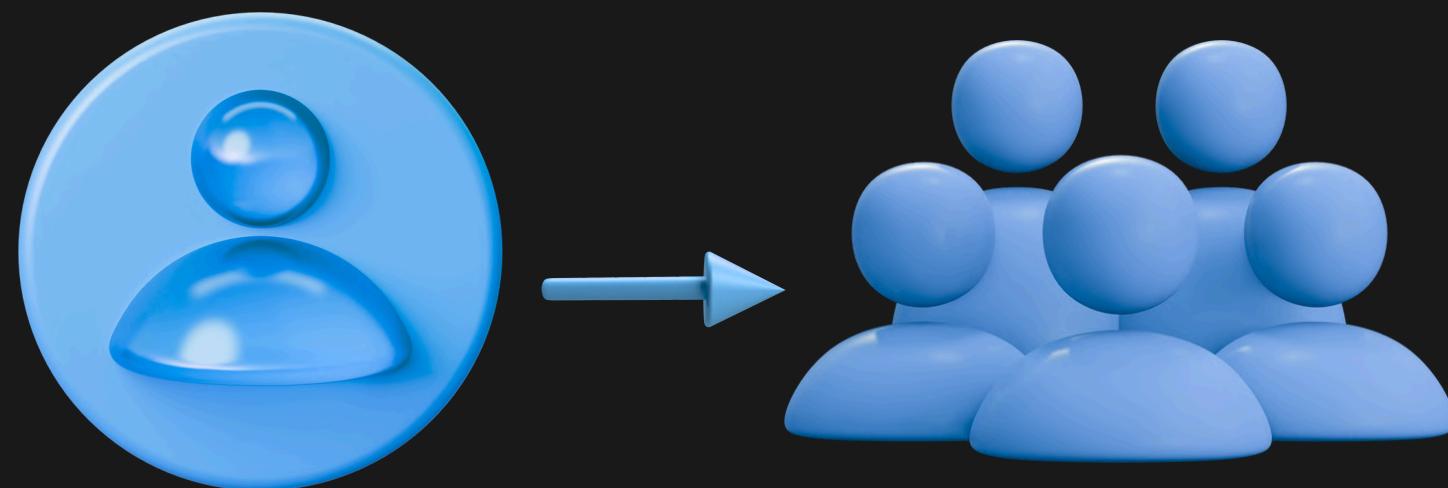
Types of Groups in Linux



Primary Group

Secondary Group

Primary Group

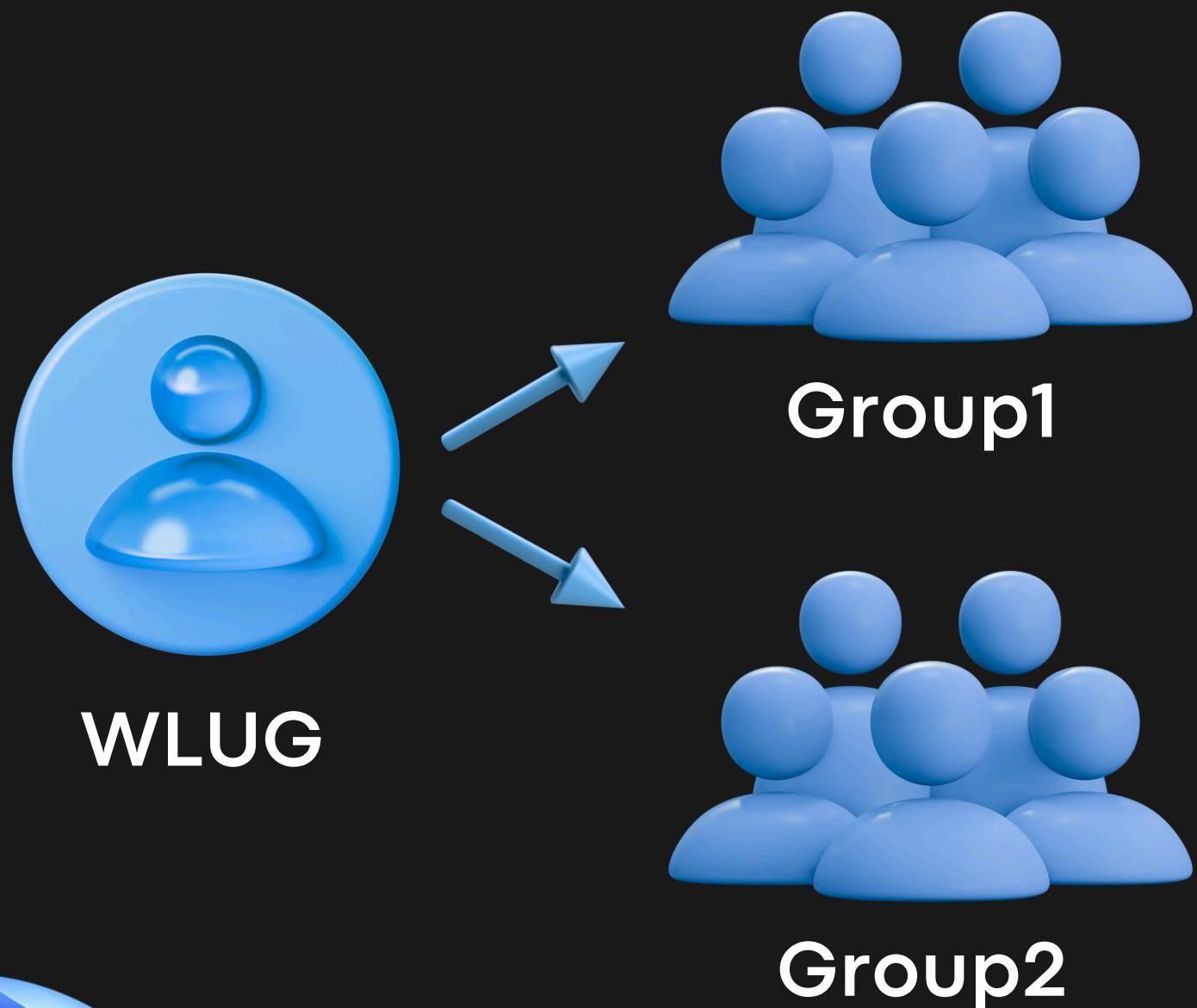


WLUG

WLUG

- Every user is associated with a Primary Group
- Used to control the default ownership and permissions of files and directories

Secondary Group



- ◆ Additional groups that a user can belong to
- ◆ Used to extend the user's access beyond what is allowed by their primary group

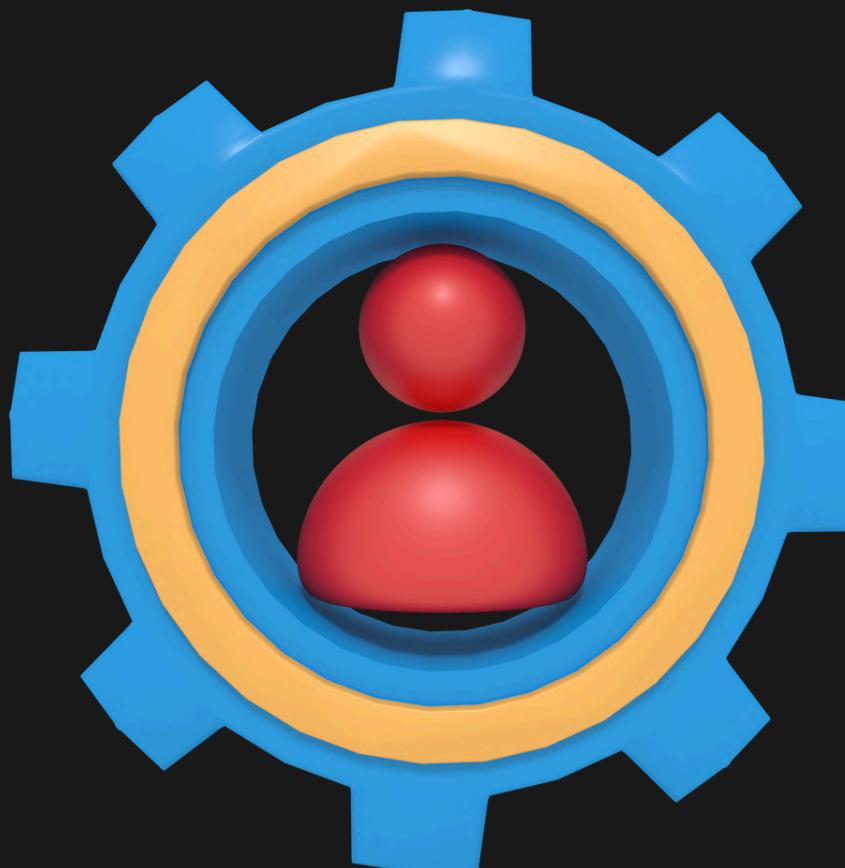
List of Users and Groups



```
$ cat /etc/passwd
```

```
$ cat /etc/group
```

Add, Modify & Delete user



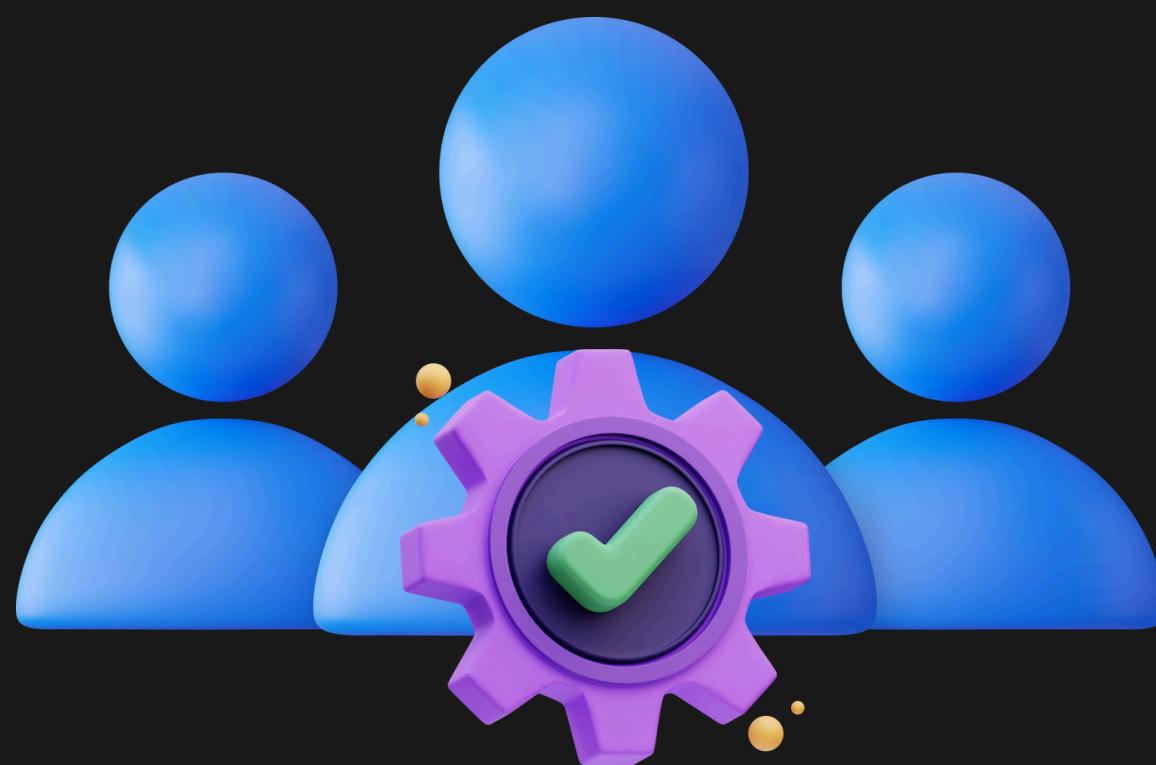
```
# add a new user
$ sudo adduser <username>

# change the name of a user
$ sudo usermod -l <newname> <oldname>

# delete an existing user
$ sudo userdel -r <username>
```

+++

Add, Modify & Delete group



+++

```
# add a new group
$ sudo groupadd <groupname>

# change the name of a group
$ sudo groupmod -n <newname> <oldname>

# delete an existing group
$ sudo groupdel <groupname>
```

Add & Delete Users from Group



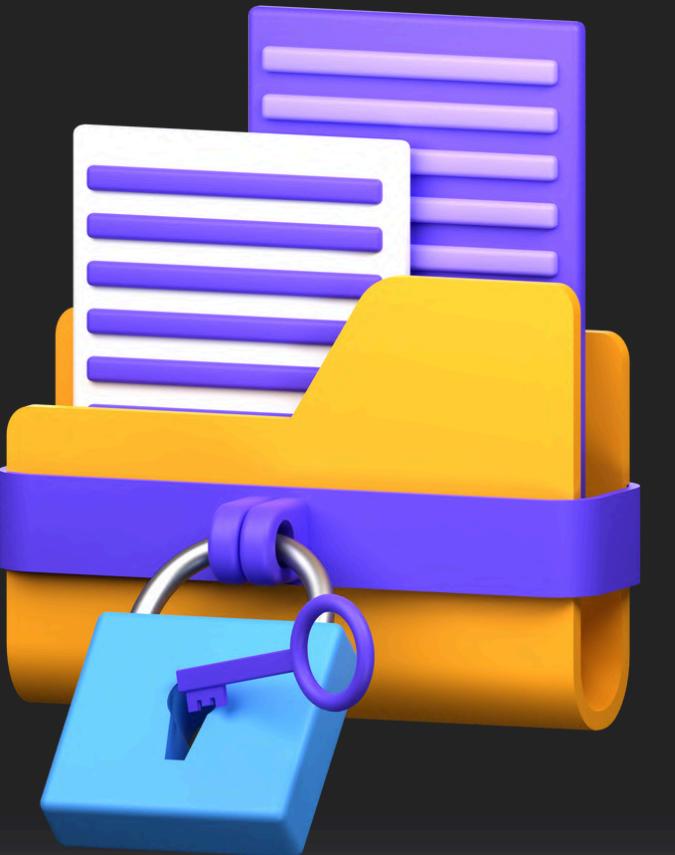
+++

```
# add user in a group
$ sudo usermod -aG <groupname> <username>

# delete user from a group
$ sudo gpasswd -d <username> <groupname>

# change primary group of a user
$ sudo usermod -g <newprimarygroup> <username>
```

File Permissions



File Permissions

1

What is a Permission?

2

Why do we need file
Permissions?

3

Which Permissions?

FILE Permissions

4

How to view Permissions?



5

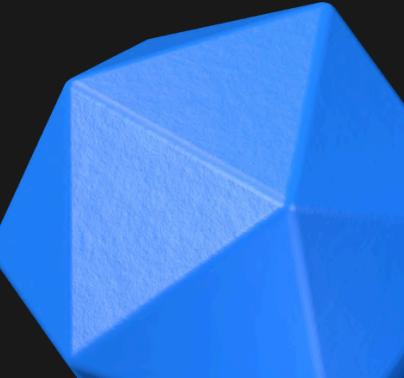
How to change Permissions?



Why do we need permission?

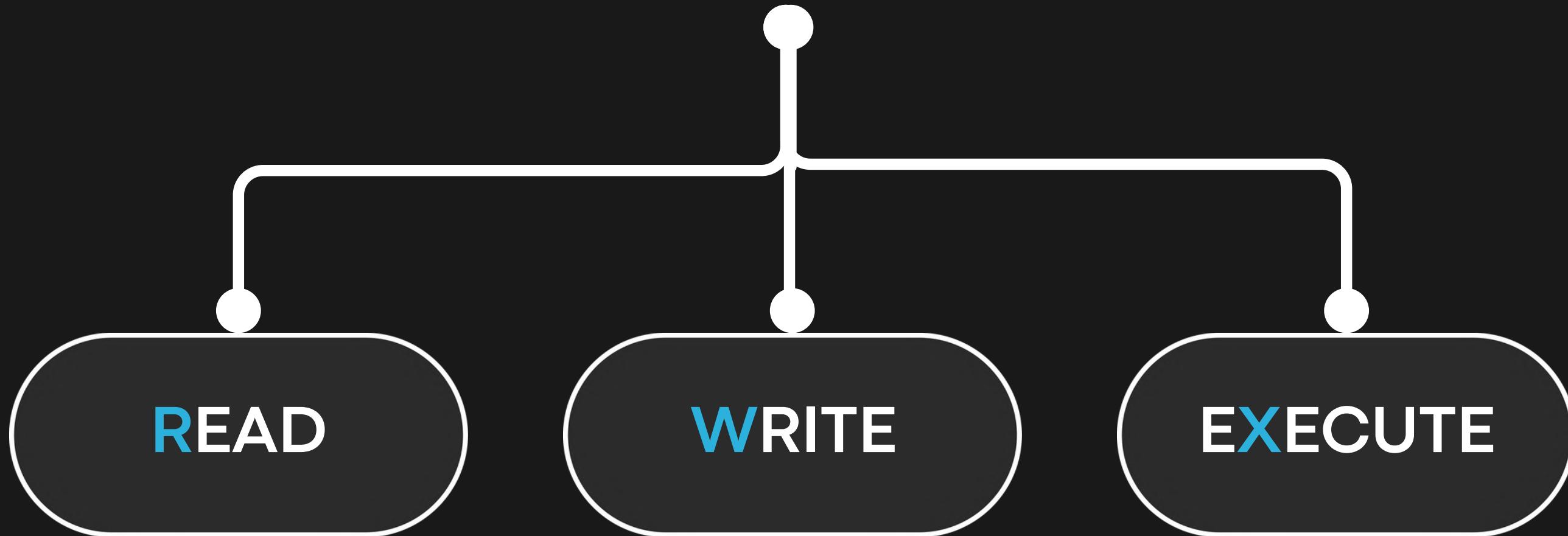


- ◆ Data security
- ◆ User control
- ◆ Access restriction
- ◆ System integrity



WHICH PERMISSIONS?

Types of Permissions



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READ Permission



- ◆ Reading contents of a file
- ◆ View directory listings

WRITE Permission



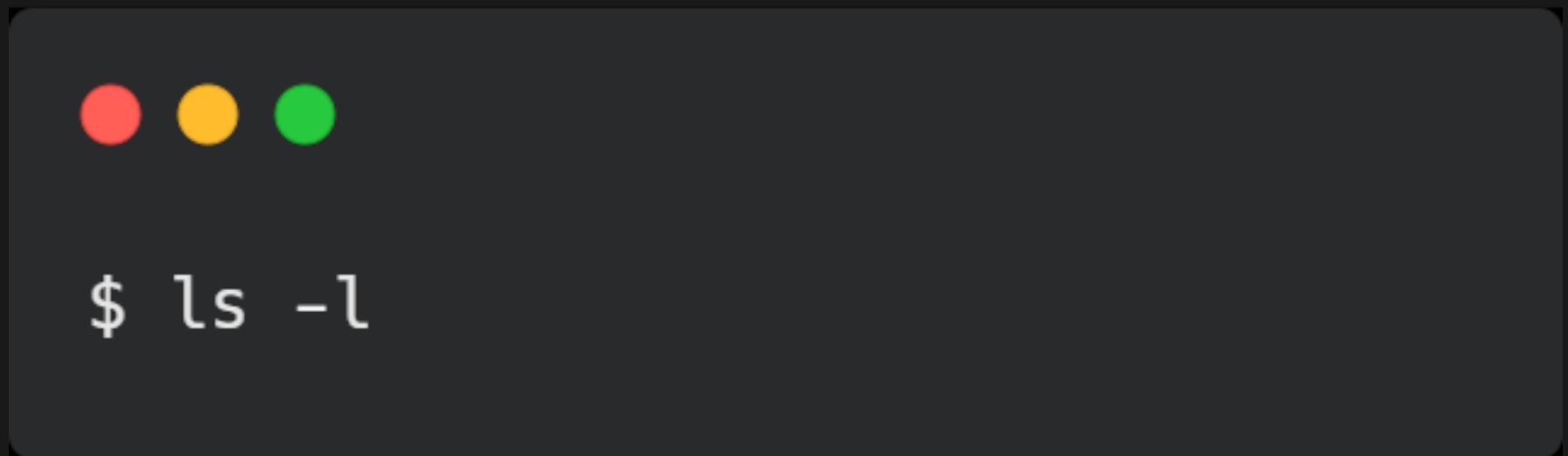
- ❖ Modify file contents
- ❖ Create new files
- ❖ Delete existing files

EXECUTE Permission



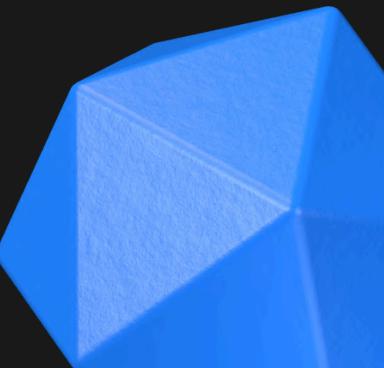
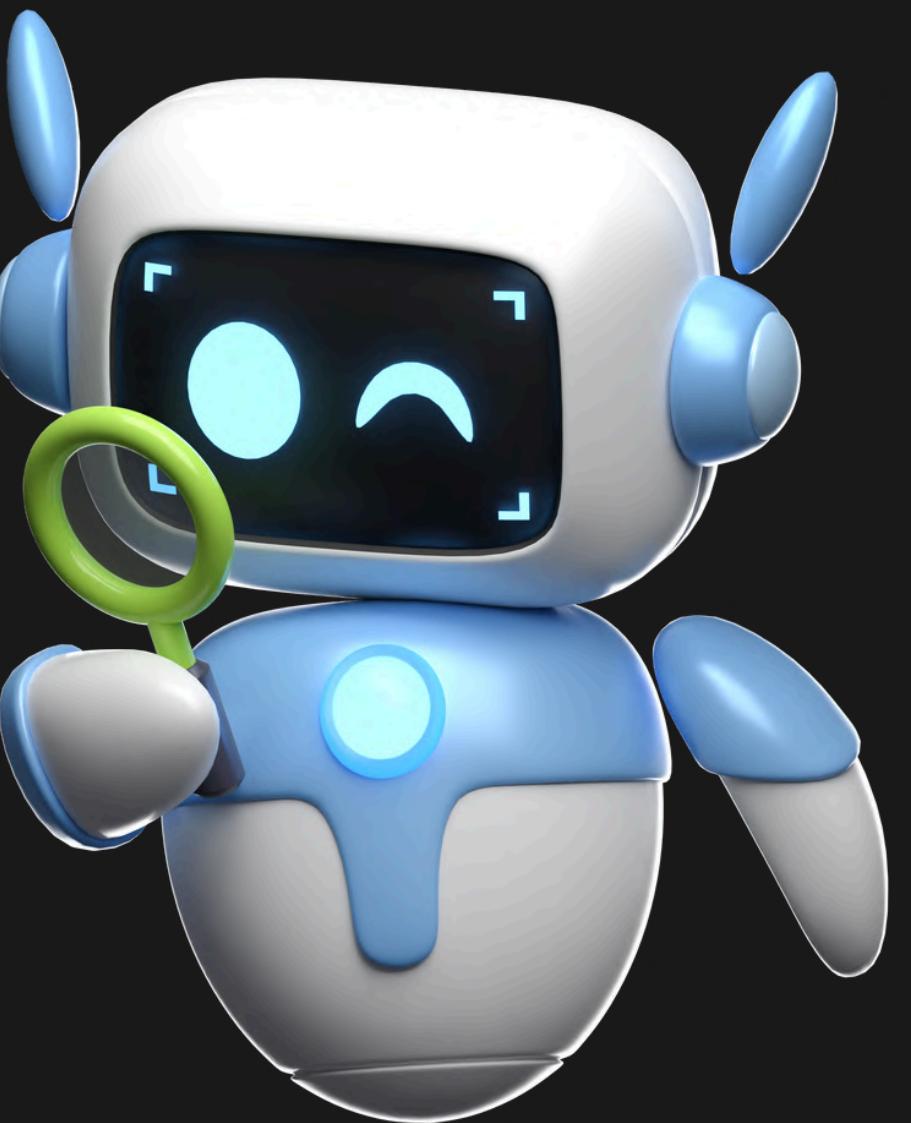
- ❖ Run executable files
- ❖ Execute scripts
- ❖ Access directory

How to view Permissions?

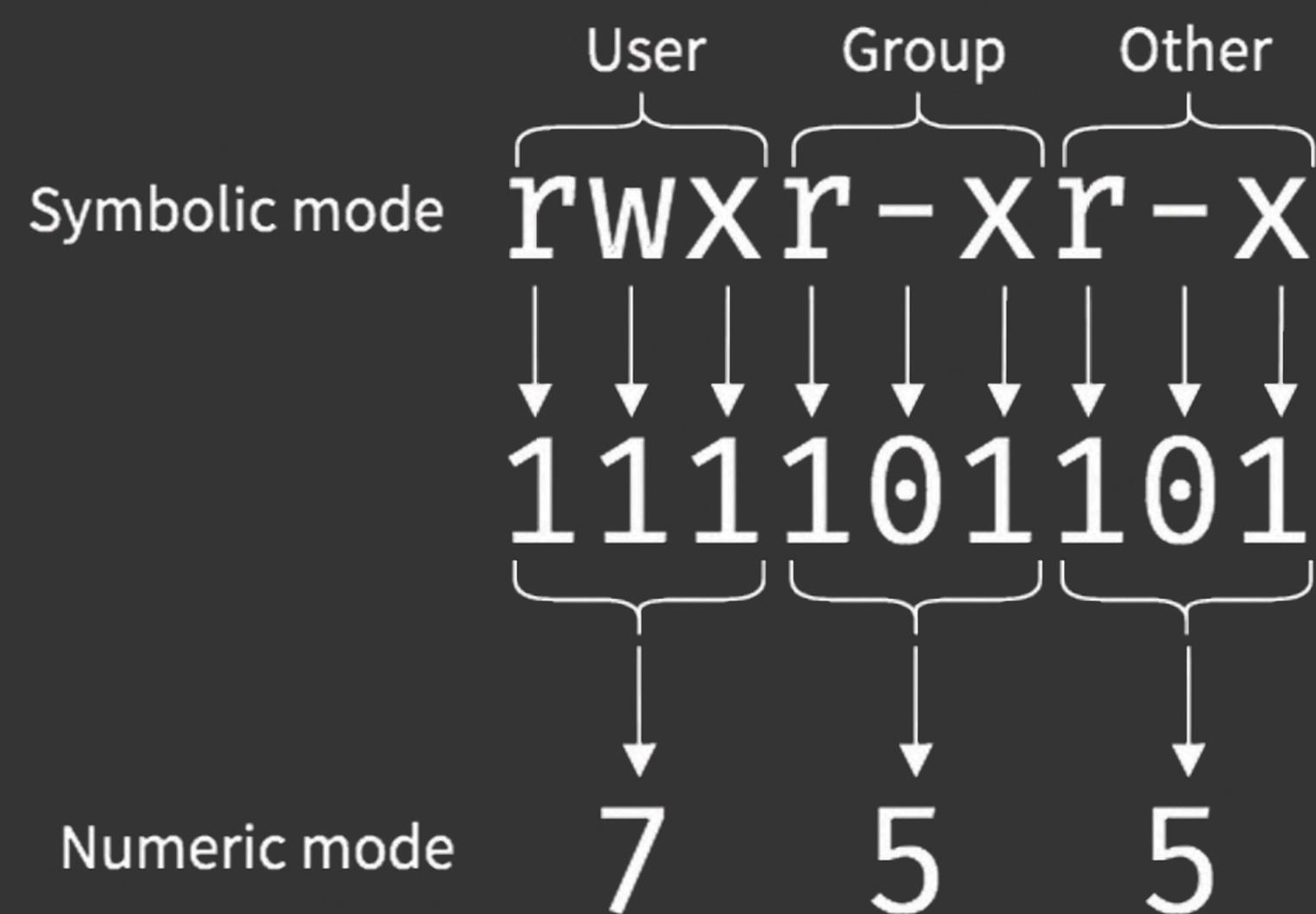
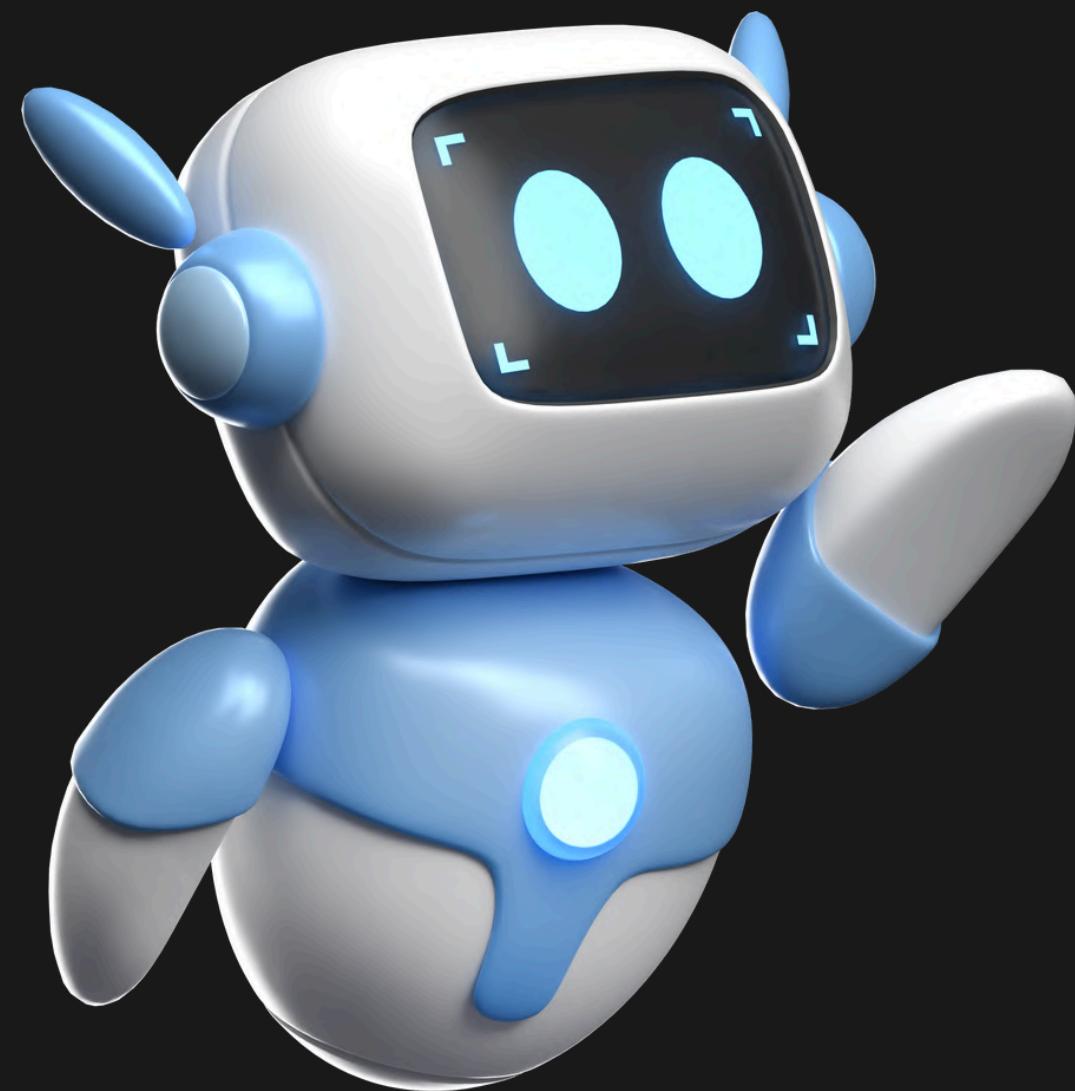


```
$ ls -l
```

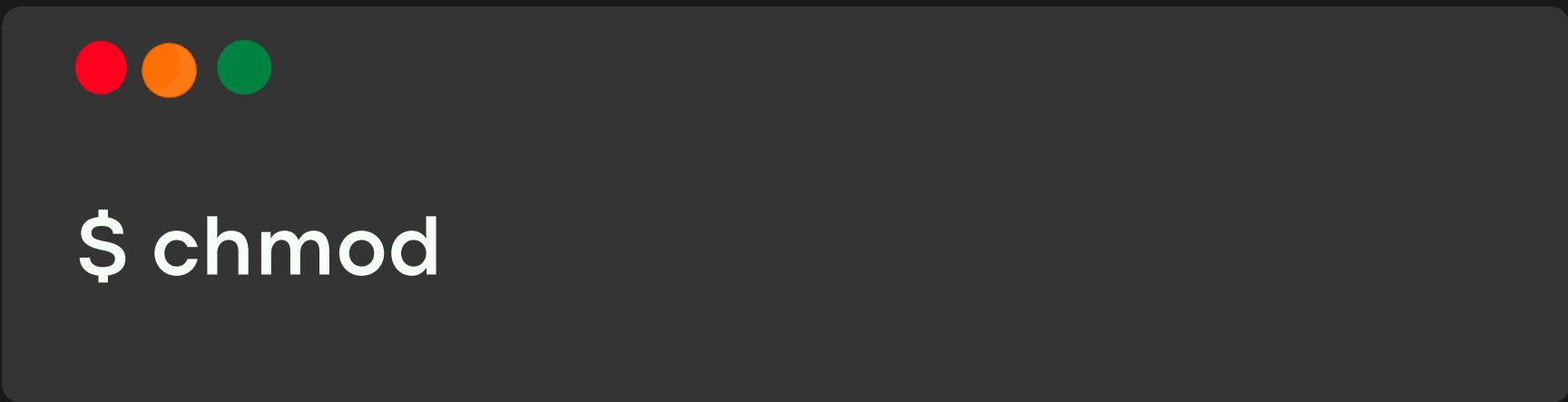
- ◆ List the files and directories
- ◆ In a detailed or "long" format
- ◆ First 10 characters are used to check the permission



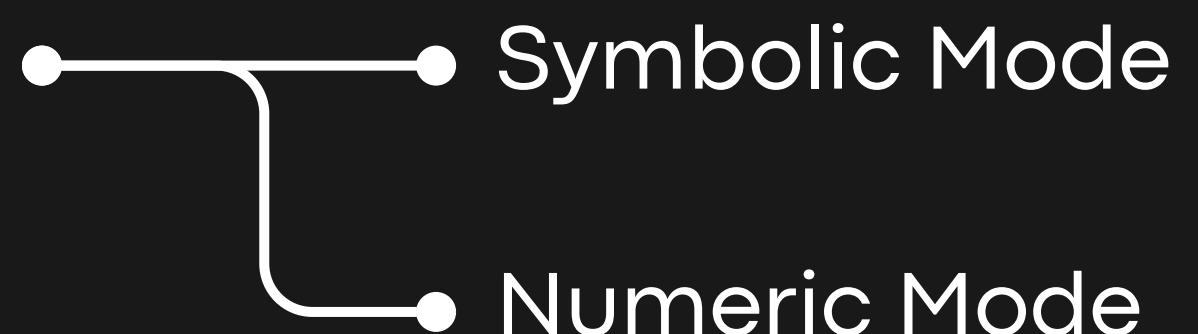
How to View Permissions?



How to Change Permissions?

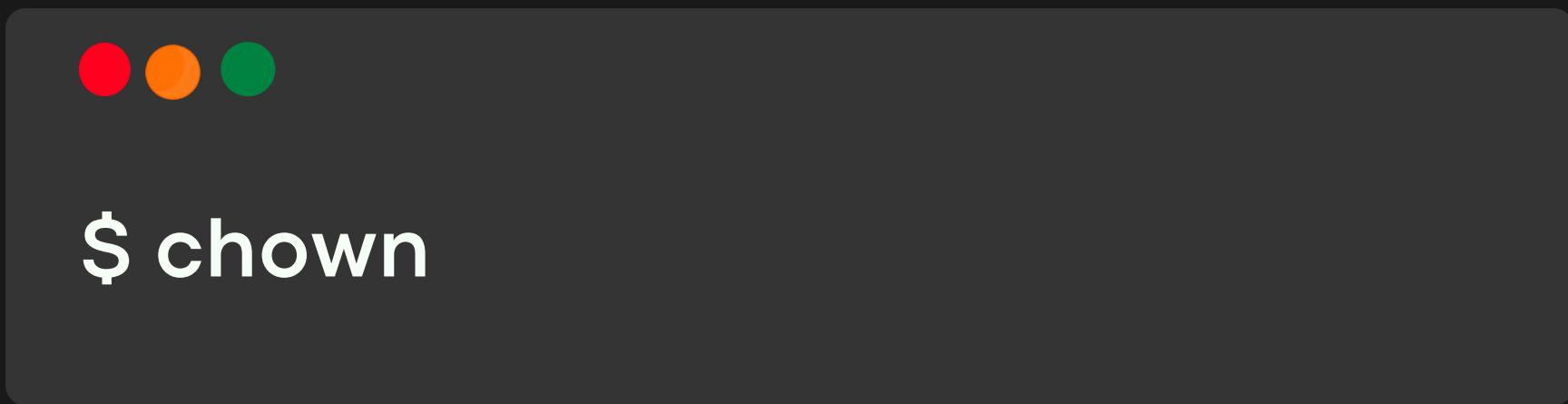


- ❖ Change Mode
- ❖ Used to update the permission
- ❖ Two Modes



Wlug

How to Change Permissions?



- ❖ Change Owner
- ❖ Used to change owner of a file



Wlug

How to Change Permissions?

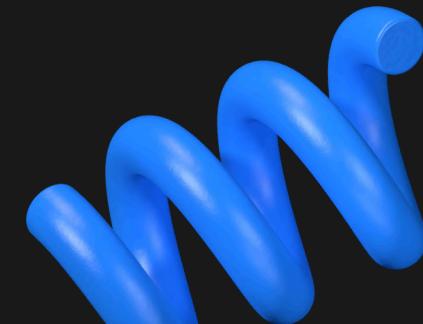


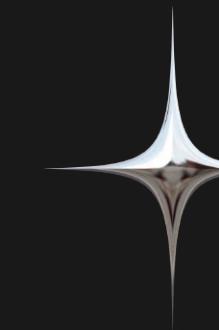
```
$ chgrp
```

- ◆ Change group
- ◆ Used to change group ownership

Change group

Used to change group ownership





CUSTOMIZATION



.bashrc FILE

Important Instructions

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

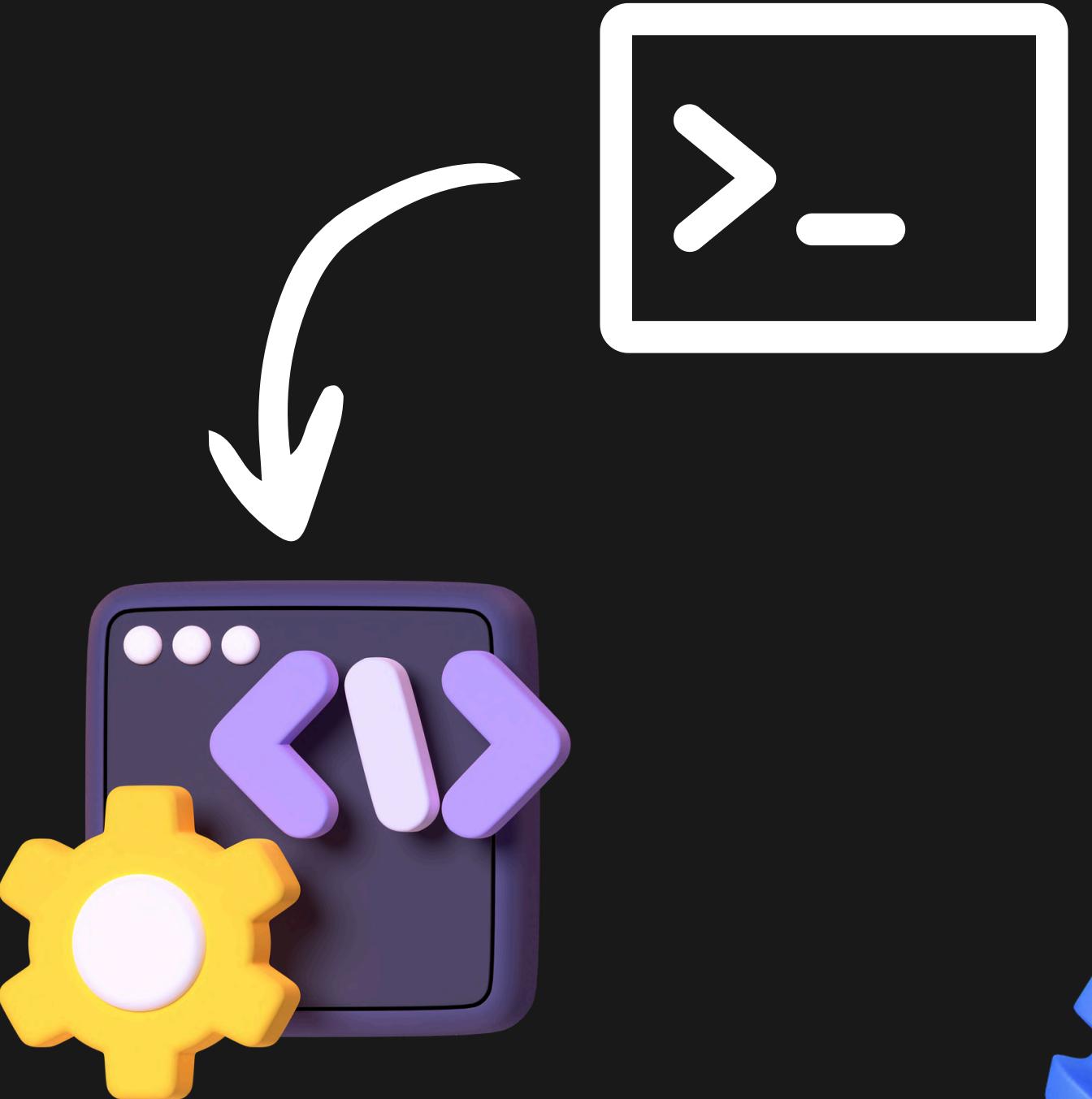




GOLI BETA MASTI NAHI

Let's Customize our terminal

- ❖ figlet
- ❖ lolcat
- ❖ terminaltexteffects



+++

Extensions



```
$ sudo apt install gnome-shell-extension-manager
```

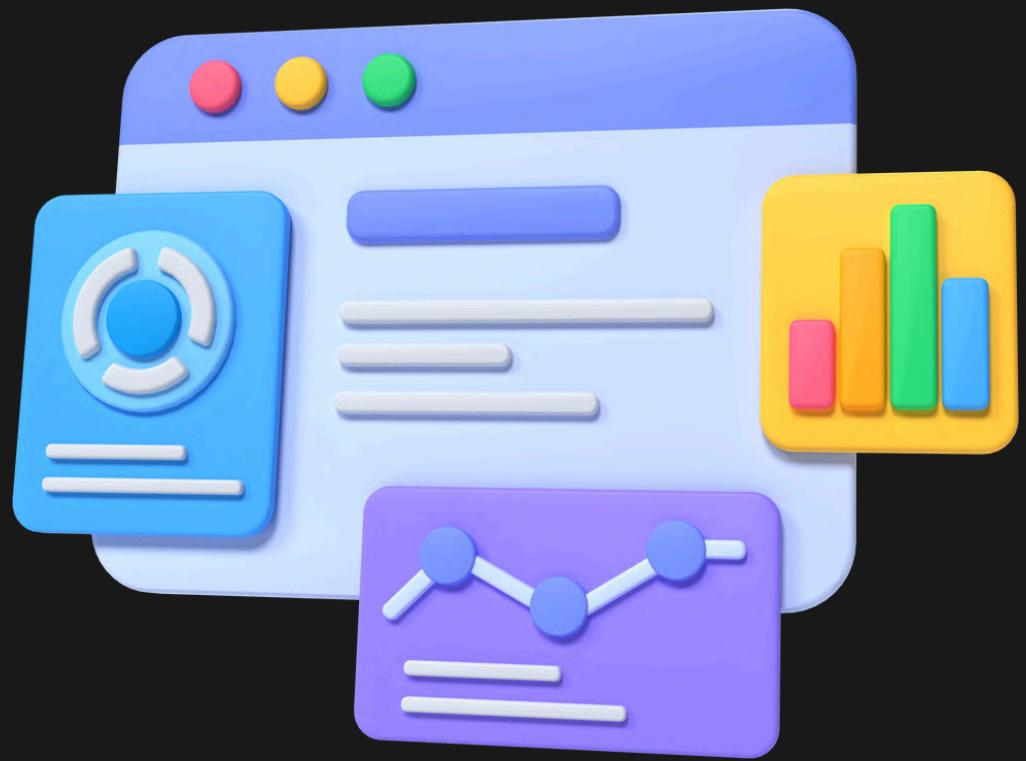
- ❖ Burn my windows
- ❖ Dash to Dock
- ❖ Compiz windows effects



TWEAKS



```
$ sudo apt install gnome-tweaks
```



THANK YOU!

Community | Knowledge | Share