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

02 COMMAND QUEST

03 FILE FORGE

04 NET NAVIGATORS

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Basic Commands

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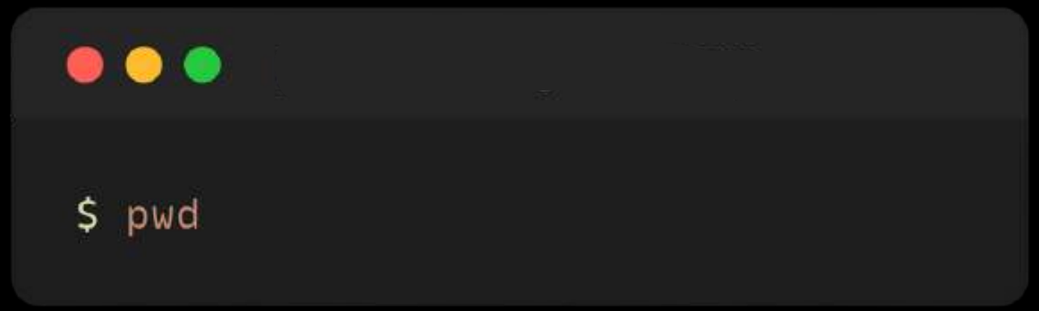
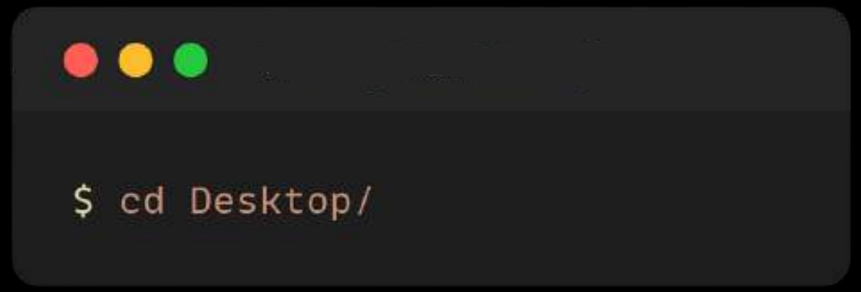
pwd

Print working directory



cd

Change directory



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ls

List directory contents

-a, -l, -h

```
$ ls
```

mkdir

Create an empty directory

```
$ mkdir dir_name
$ mkdir -p dir1/dir2
```

touch

Create an empty file

```
$ touch file.txt
$ touch file1.txt file2.txt
```

mv

Move or rename existing files / directories

```
$ mv oldName newName
$ mv file destination/
```

cp

Copy files or directories

```
$ cp file destination/
```

cat

Add and display file contents

```
$ cat >> file_name
$ cat file_name
```

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rm and rm -r

Remove files and non empty directories

```
$ rm file.txt
$ rm -r directory
```

rmdir

Remove an empty directories

```
$ rmdir directory
```

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help

Short information on built-in commands only

```
$ command --help
```

man

Manual pages for other commands

```
$ man command
```

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sl

Displays an animated train on the terminal

```
$ sudo apt install sl
$ sl
```

espeak

Converts text into spoken voice

```
$ sudo apt install espeak
$ espeak
```

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Advance Commands

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find

Search for a file in directory hierarchy

```
$ find -name fileName
```

grep

Search text using patterns

-i , -n

```
$ grep -i "Linux" file.txt
```

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tar

Archive files

-c : Create archive -v : Verbose -f : File name

```
$ tar cvf archive.tar file1 file2
```

zip

Compress one or multiple files

```
$ zip -e zipper.zip file1 file2
```

shutdown

To shutdown the system

```
$ shutdown
$ shutdown now
```

reboot

Restarts the system immediately

```
$ rebbot
$ reboot -f
```

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Text Editors

Text Editors

- Software for editing plain text files
- Writing and editing code
- Configuration files
- Different from Word Processors

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CLI

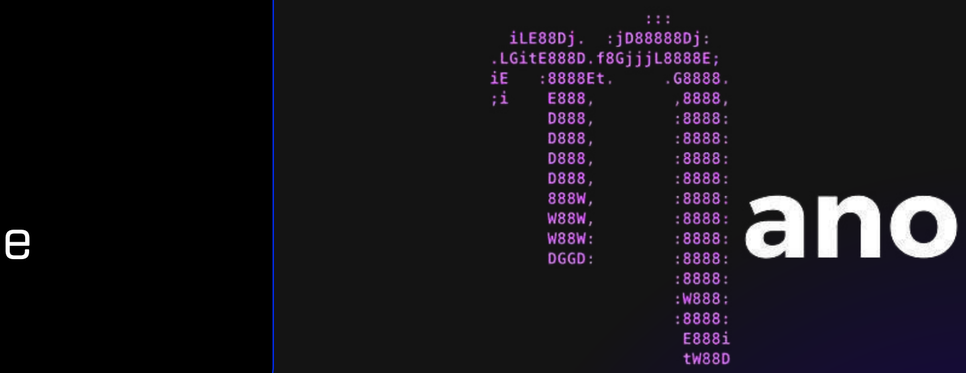
GUI

Vim

- Most powerful command line text editor
- Modes: COMMAND (default)
  INSERT ('i' key)

Nano

- No multiple modes
- Popular for its simplicity and ease of use



Pluma

- Graphical text editor for MATE desktop environment
- Simple, clean and user-friendly interface

VS code

- Free and Open Source text editor
- Used for programming and web development

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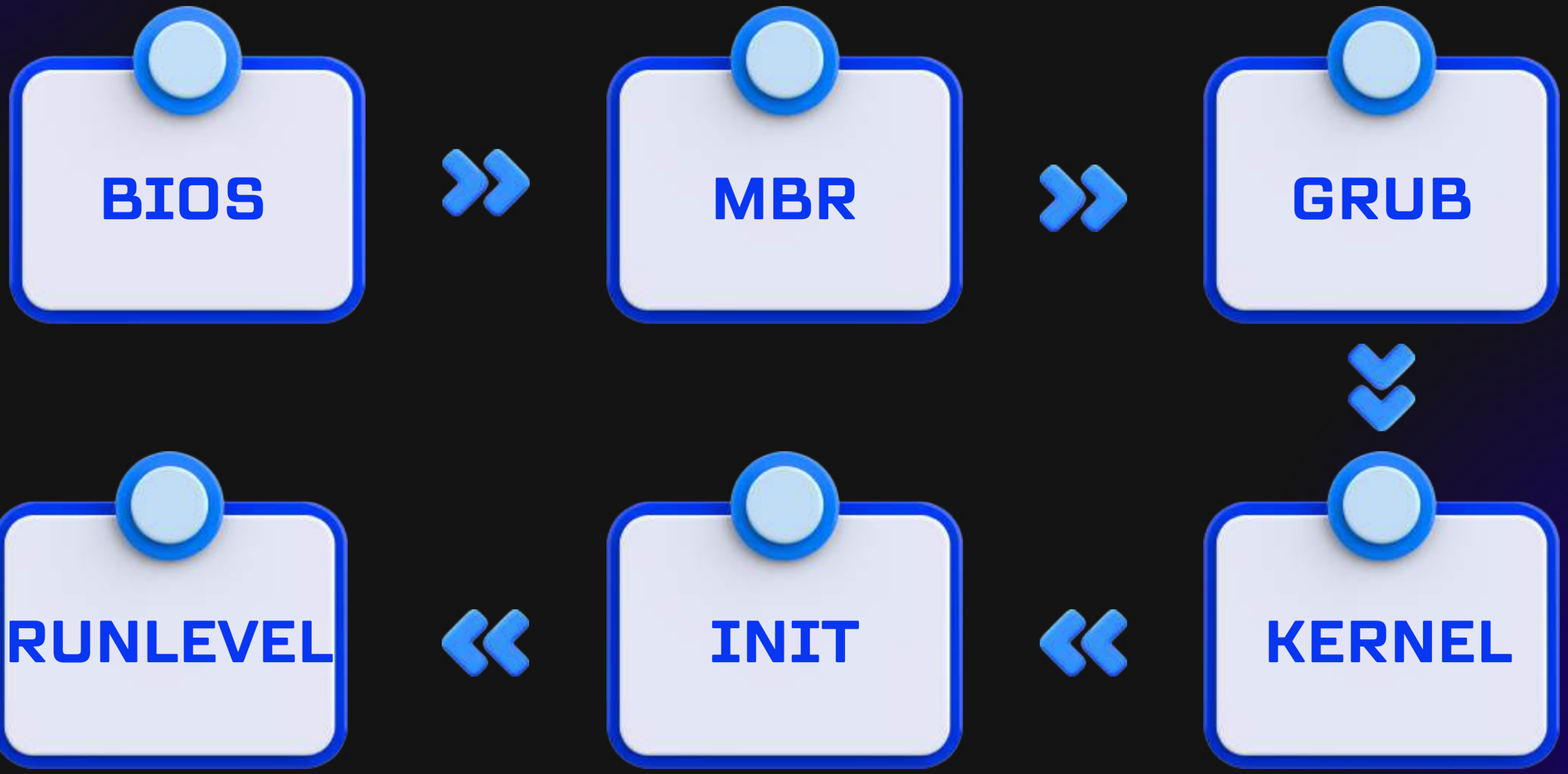
Booting

WHAT HAPPENS AT OUR END?

WHAT IS BOOTING?

- Process of switching on computer by loading the OS in the computer's main memory
- Involves 6 distinct stages known as booting sequence

BOOTING SEQUENCE



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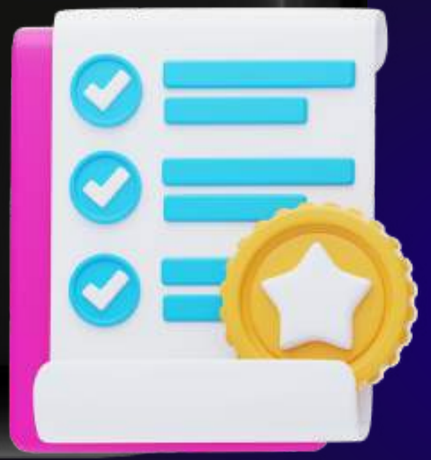
Terminologies



BOOT DEVICE

- Storage area from which OS is loaded
- e.g. Hard disk, pen drive, CD, DVD etc

BOOTLOADER

- Program that loads the kernel in the computer's main memory
- e.g. GRUB, Windows Boot Manager etc

BIOS

- Basic Input Output System
- Performs POST (Power On Self Test)
- Checks for boot device
- Loads the first sector of boot device (MBR) into memory and transfers control to it


Keyboard not found
Press F1 to continue,DEL to enter Setup

MBR

- Master Boot Record
- First Sector of the boot device with size 512 bytes
- Contains information for bootloader
- Loads the bootloader into memory and passes control to it

GRUB

- Grand Unified Bootloader
- Displays all available kernel images
- The GRUB Configuration file is present at /boot/grub/grub.cfg
- Loads and executes OS's kernel and initrd/initramfs images

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BIOS

SYSTEM

GRUB

MBR

KERNEL

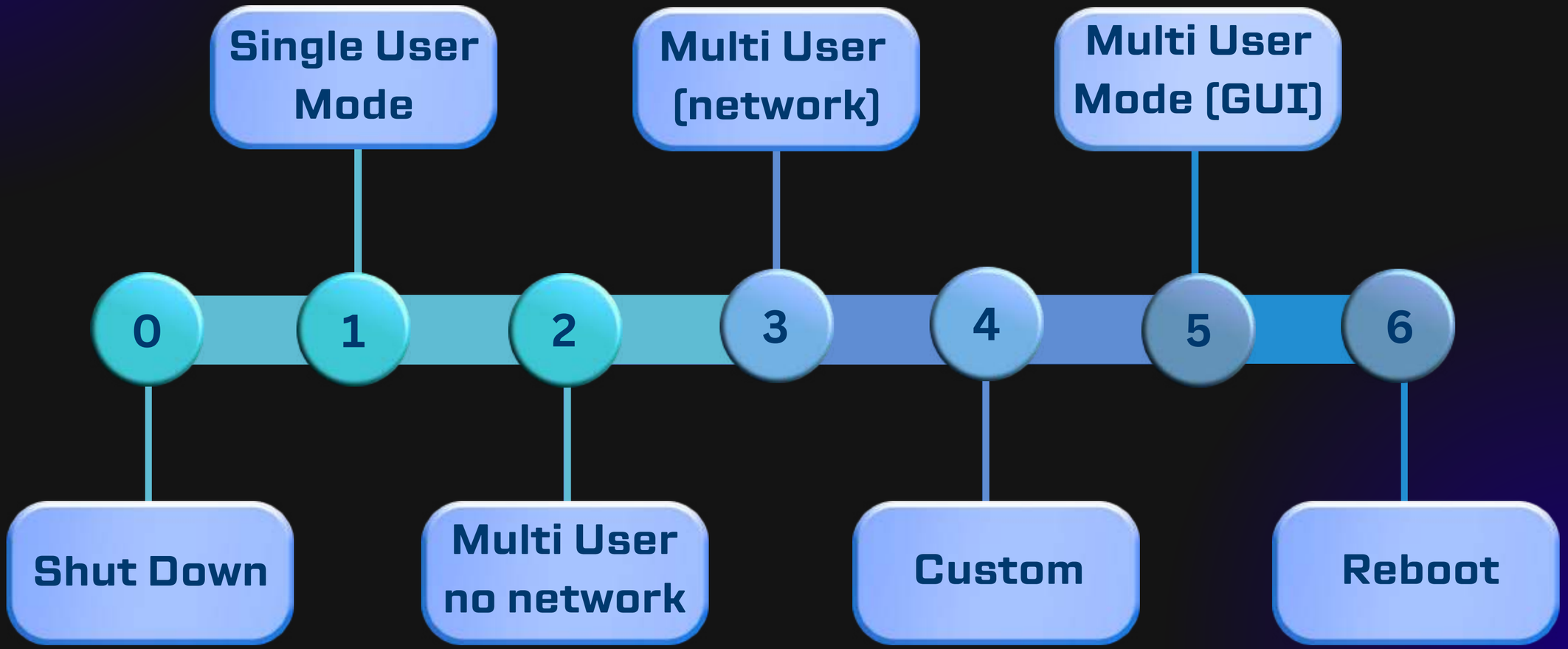
- Starts the process of initializing the system
- Loads the temporary file system using initrd/initramfs images
- Initialization of the first process called ‘init’

INIT

- First process to start when computer boots up with PID =1
- The init configuration file is present at /etc/init directory

RUNLEVEL

- Mode or state in which a linux system operates
- Determines which system services and processes are started during booting
- Numbered from 0 to 6


Single User Mode
Multi User (network)
Multi User Mode (GUI)
0
1
2
3
4
5
6
Shut Down
Multi User no network
Custom
Reboot

RUNLEVEL

```
who -r
```

- Displays information about the current runlevel

```
runlevel
```

- Displays the previous and current runlevels

SUMMARY

BIOS	Initializes and tests hardware during startup, loads MBR and passes control to it
MBR	The first sector of a storage device that contains the bootloader and partition table
GRUB	A bootloader that loads and transfers control to the operating system kernel

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KERNEL	The core of the operating system that manages hardware, processes, memory and system calls
INIT	The first user-space program run by the kernel that initializes the system and starts essential services
RUNLEVEL	A predefined state of the system that determines which services and processes are running

TYPES OF BOOTING

COLD BOOT

WARM BOOT

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COLD BOOT V/S WARM BOOT

- Starting the computer from a completely powered-off state
- Full hardware reinitialization with complete POST

- Restarting the computer without turning off the power
- Partial reinitialization, may skip some POST steps

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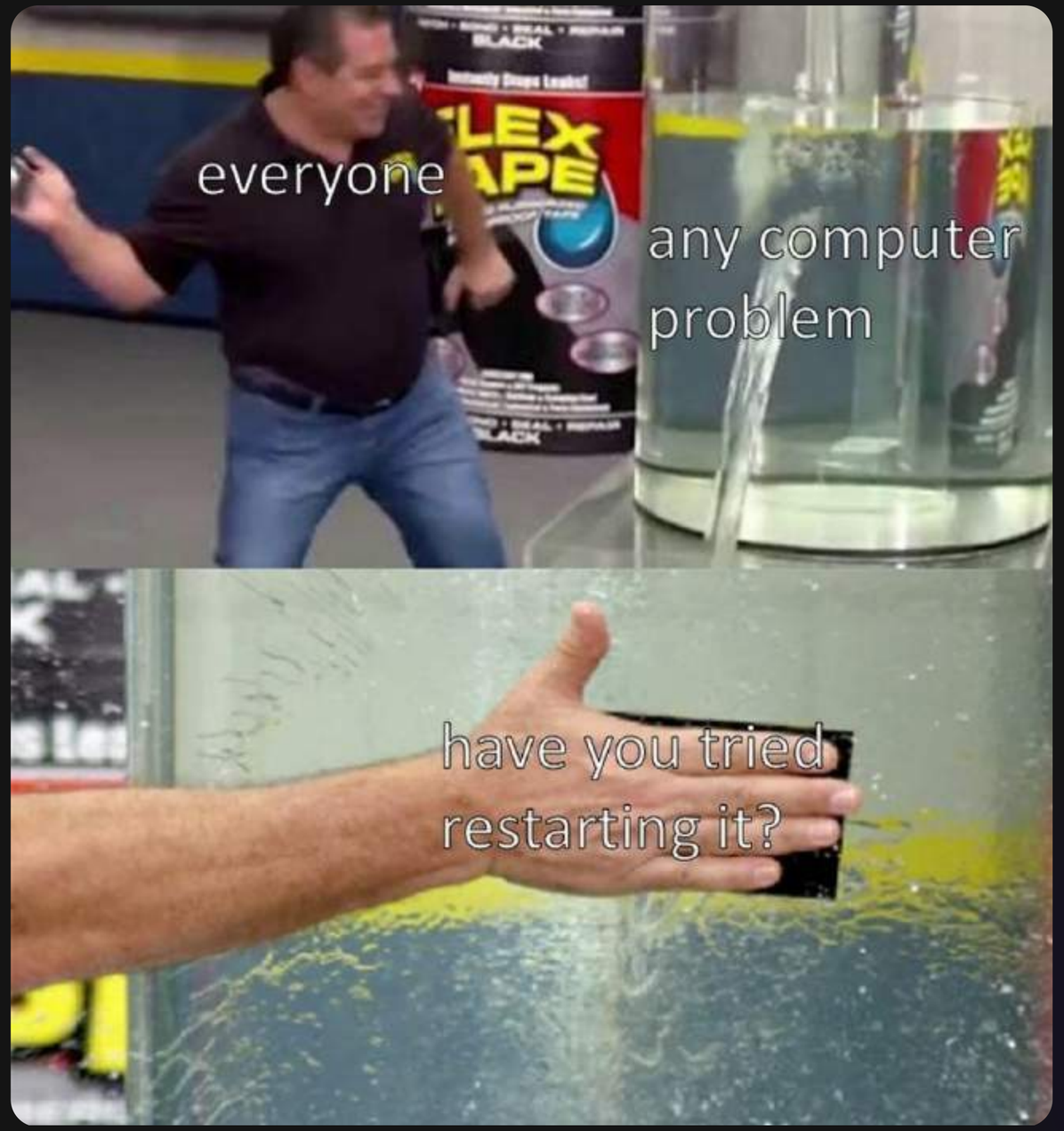
COLD BOOT V/S WARM BOOT

- Slower (due to full checks)
- Used when system is powered off or crashes

- Faster (fewer checks)
- Used during software updates or app restarts


everyone
any computer problem
have you tried restarting it?

WHAT IS UEFI

- Modern replacement for BIOS.
- Faster compared to BIOS.
- Supports large drives upto 9.2 ZB.
- Supports secure boot features.
- User-friendly interface as compared to BIOS

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BIOS

UEFI

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BIOS V/S UEFI

- ROM/EEPROM as memory
- MBR as booting method

- Flash memory on motherboard
- GPT (Guid Partition Table) as Booting method

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BIOS V/S UEFI

- 4 primary partition with size max of 2TB
- Sequential and slower boot

- Up to 128 partitions with size of almost 9 ZB
- Parallel and faster boot

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BIOS V/S UEFI

- 16 bit Real Mode architecture.
- Lacks secure boot feature

- 32 or 64 bit architecture
- Supports secure boot, preventing unauthorized bootloaders

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Process Management

Contents

What is process?

- A running instance of a program
- Start, run and stop
- Processes operate in isolation
- The kernel manages processes

Stages of process

NEW

READY

RUNNING

TERMINATED

WAITING

Process Identifiers

- A Unique Number
- Process - Process ID (PID)
- Parent Process - Parent Process ID (PPID)
- Temporary in nature

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Displays the current Process ID

```
$ echo $$
```

Displays the Parent Process ID

```
$ echo $PPID
```

Forking

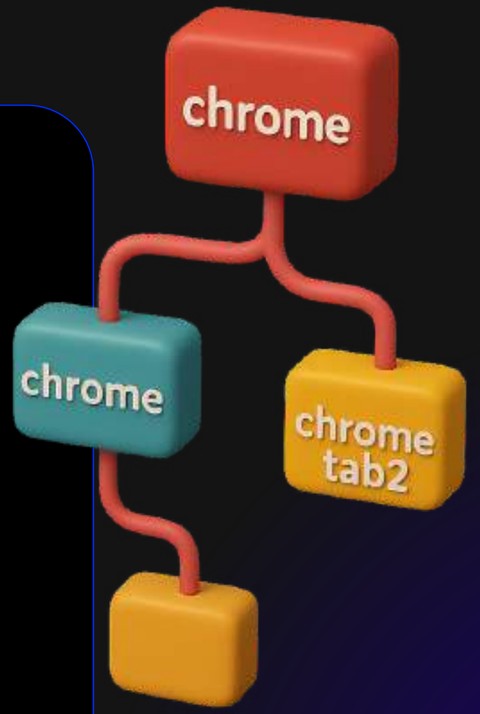
- Creates a copy of the current process
- System call - fork( )

Execute

- Overwrites the existing copy of the process
- System call - exec( )

Process Tree

- Displays process relationships
- Parent process creates child processes
- Init is the parent of all processes
- Use pstree command to view



Zombie process

- Terminated child process
- Yet to be noticed by parent process
- Parent process collects it's exit status
- Done by invoking the wait( ) system call

Orphan Process

- A process whose parent has terminated, but the child is still running
- The orphan process is automatically adopted by the init process

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Type Of Process

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Foreground

- Requires user interaction
- Blocks other processes
- Commands run as foreground processes by default

Background

- Independent of user interaction
- Starts in the background
- Add an (&) at the end to run the command in background

Process Management

- Organizing and prioritizing processes
- Continuous cycle of improvement
- Improves efficiency
- Enhances security

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Command Line Tools

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- Displays a static snapshot of running processes when executed

```
$ ps -ef
```

- Shows a dynamic, real-time view of running processes

```
$ top
```

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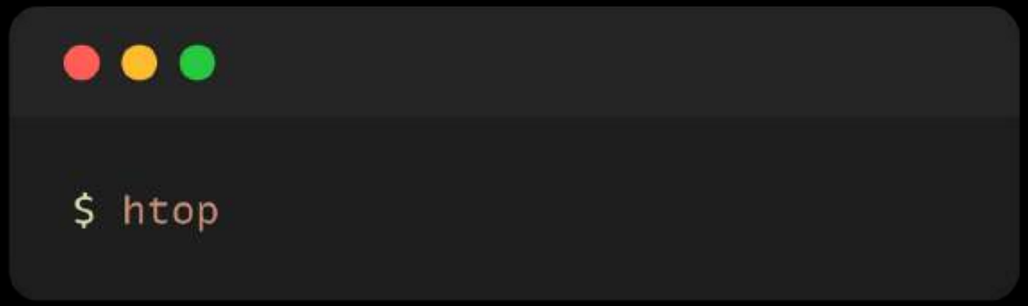
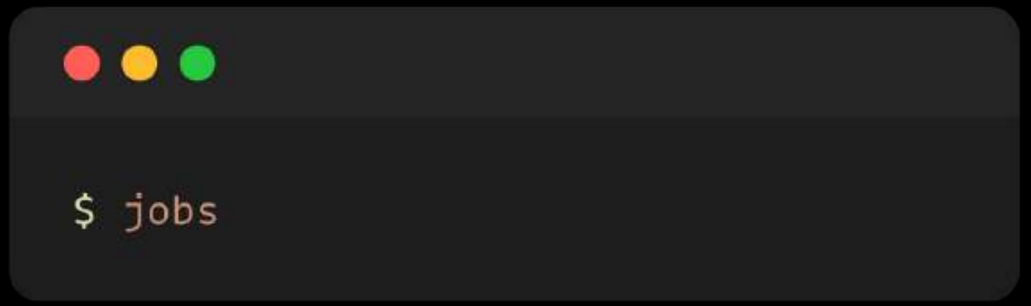
- Offers a user-friendly interface with color-coded and interactive elements



- Lists background and suspended processes



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Brings a background process to the foreground

```
$ fg %[job_id]
```

Resume a suspended job in the background

```
$ bg %[job_id]
```

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- Finds the Process ID (PID) of a running process based on its name

```
$ pidof [option] <program>
```

- Detaches a job from the shell to prevent it from ending on logout.

```
$ command & disown
```

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- Keeps process running even after you log out or close the terminal.

```
$ nohup command
```

- Terminates a process by sending it a signal

```
$ kill [option] <pid>
```

Where is PID info stored?

/proc

- PID info is stored in the /proc filesystem.
- Each process has its own directory: /proc/[PID]/
- /proc is a Virtual Filesystem
- Dynamically created and maintained by the Linux kernel

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Pipelining

Pipelining Mechanism

- Establishing data flow between processes
- This is done through pipe '|'
- Syntax :

command_1 | command_2 | .... | command_N

Examples

```
$ ps -ef | grep bash
```

```
$ sl | lolcat
```

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THANK YOU!


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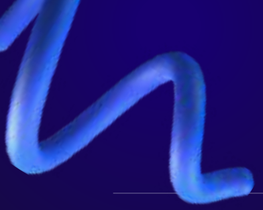


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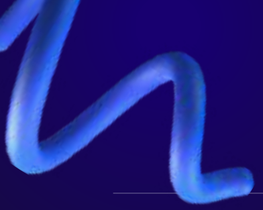


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Examples

```
ps -ef |grep bash
```

```
sl | lolcat
```