



WALCHAND COLLEGE OF ENGINEERING
WALCHAND LINUX USERS' GROUP



LINUXDIARY 4.0

LIMITED
SEATS

19

Explore the Linux Realm

August

COMPETITIVE
WARGAMES

20

EXCITING
PRIZES

REGISTER AT



- ▶ Session 01:
Open Source 101
- ▶ Session 02:
Echo Linux

- ▶ Session 03:
The File Maze
- ▶ Session 04:
NetVerse

• CONNECT WITH US •



Registration Fee:
Rs 199/-

wcewlug.org

Venue:
Mini & Main CCF



For any query
84210 06401
99236 71592

Mr. D. N. Gangji
President
Walchand Linux Users' Group

Dr. M. A. Shah
HoD Computer Science
and Engineering

Dr. R. R. Rathod
HoD Information
Technology

Dr. A. J. Umbarkar
Staff Advisor,
Walchand Linux Users' Group

Dr. A. R. Surve
Assoc. Dean Student
Activities and Staff Advisor

Dr. U. A. Dabade
I/C Director
Walchand College of Engineering

LinuxDiary 4.0

2023



Day 1 | Session 1

Open Source 101



Open Source Softwares

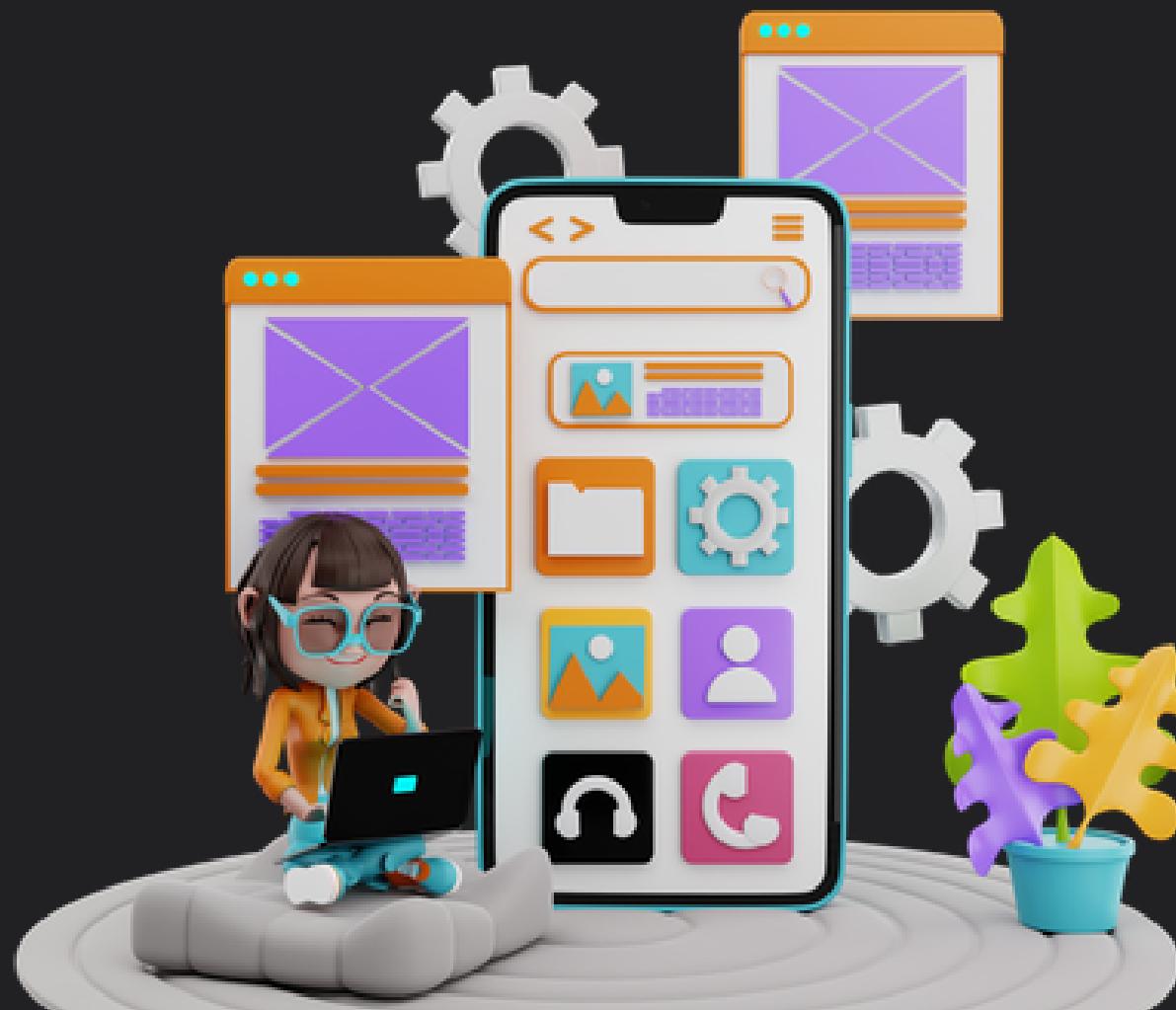
Understanding Kernel

Introduction to Linux

Linux Applications and Distributions

Desktop Environments

Softwares



- Collection of instructions that commands computer to perform tasks
- Instructions that tells computer how to work
- Ex: VLC Media Player



Application Software

Performs a specific task or a basic operation

System Software

System Software

Controls the internal functioning of computer





How are Software Built?

Source Code

Human-readable set of instructions written in a programming language



Executable File

Compiled version of source code that can be directly execute

SOFTWARE





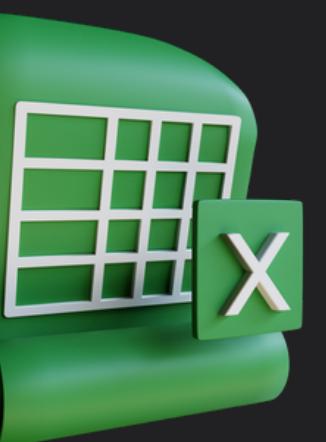
Open Source Softwares

Open Source Softwares are the software with source code that anyone can inspect, modify and enhance



Closed Source Softwares

Software whose source code is not public, available for a specific team, person or an organization



Advantages of Open Source



- ⚡ Transparency
- ⚡ Community
- ⚡ Cost Efficient
- ⚡ Security

Transparency



- Open Source software operates with utmost transparency, leaving nothing hidden
- The code's visibility ensures that the software's inner workings are fully visible

Community

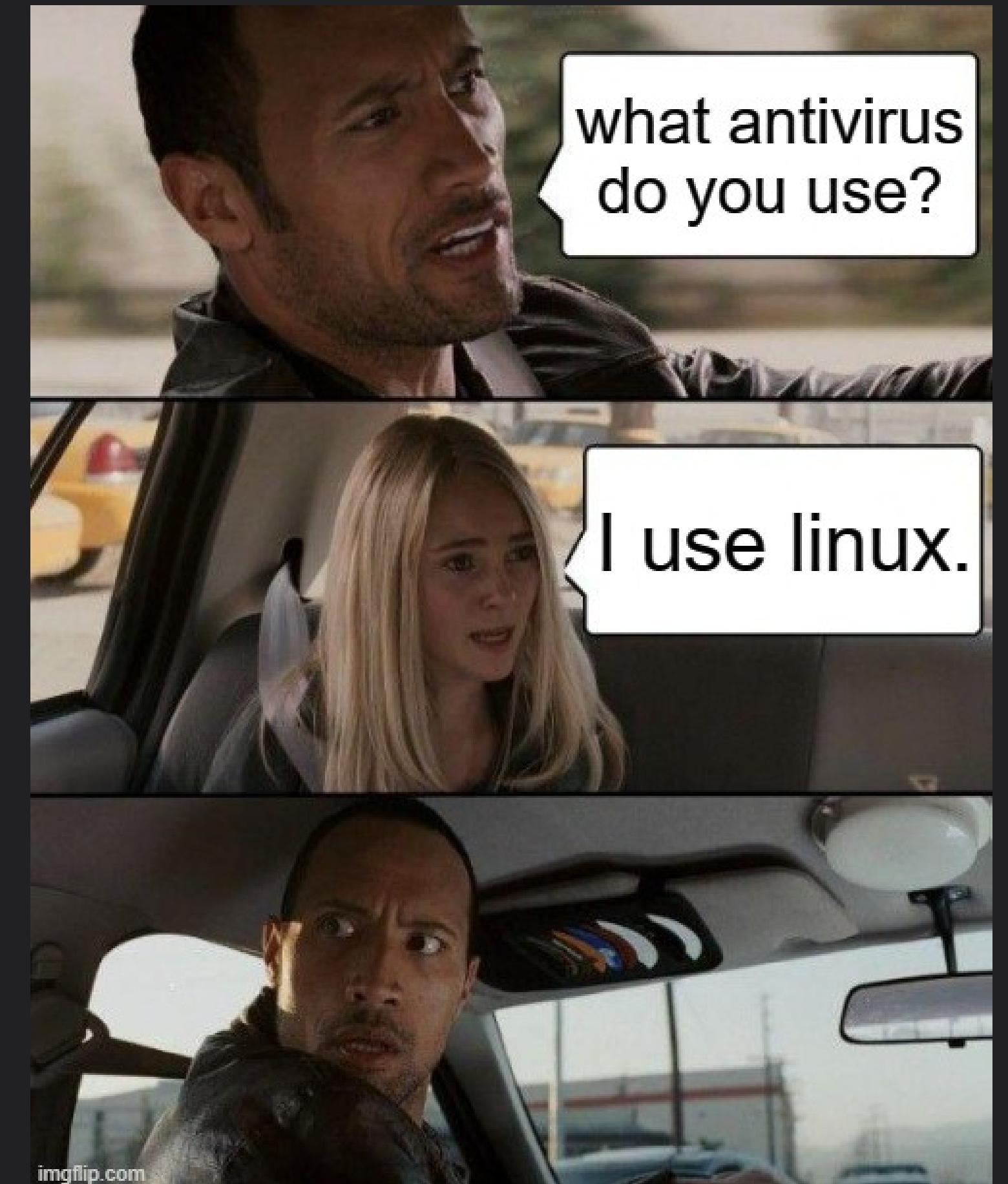


- **Contributors** from different backgrounds come together to contribute
- **Feedback** helps to identify the bugs, potential threats, and issues of the software
- **Peer code review** exposes the vulnerability

Cost Efficient



- With open-source software, organizations can **avoid expensive licensing fees** and upfront implementation costs
- The availability of **free** documentation and community support helps streamline the implementation process



//////////

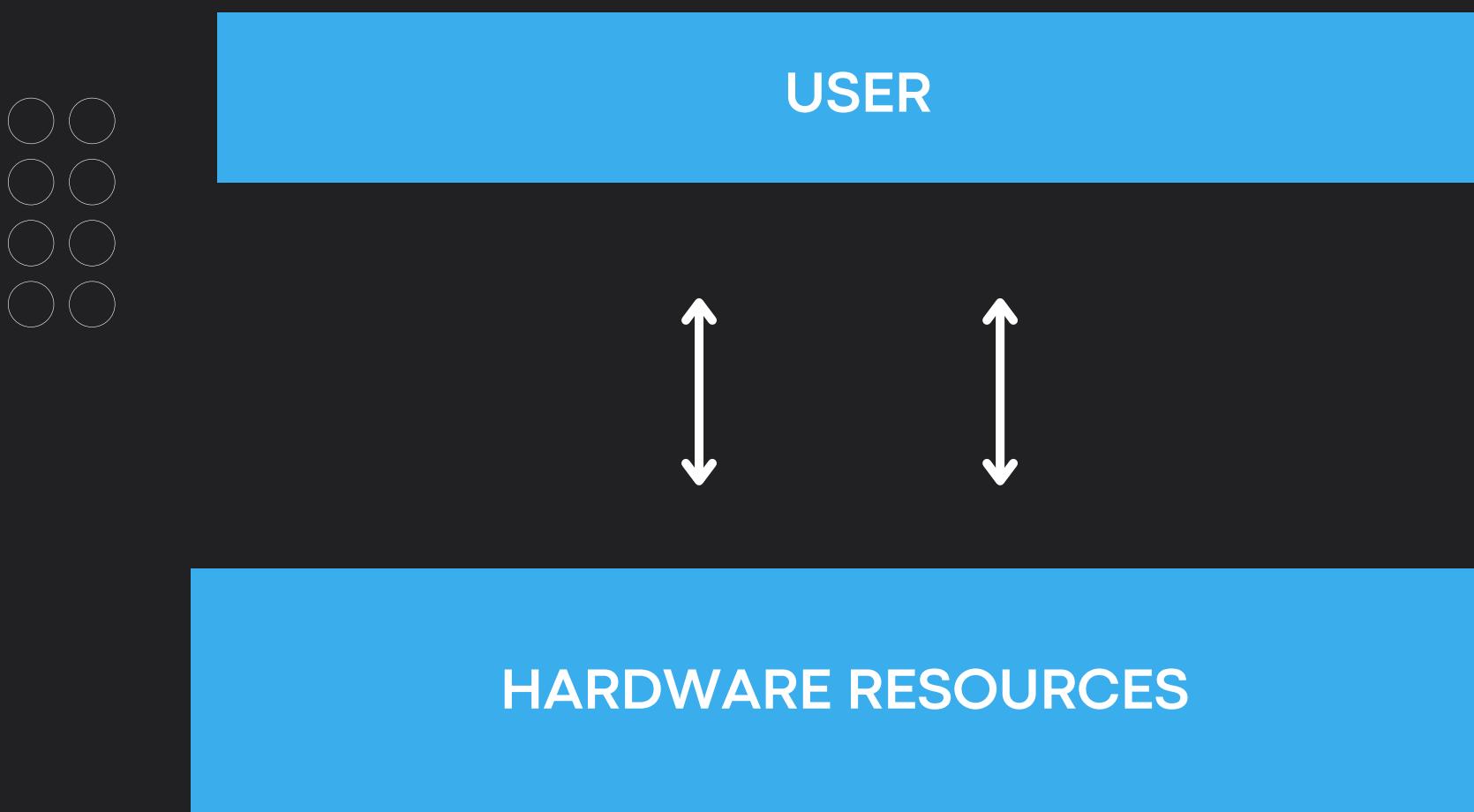
Security



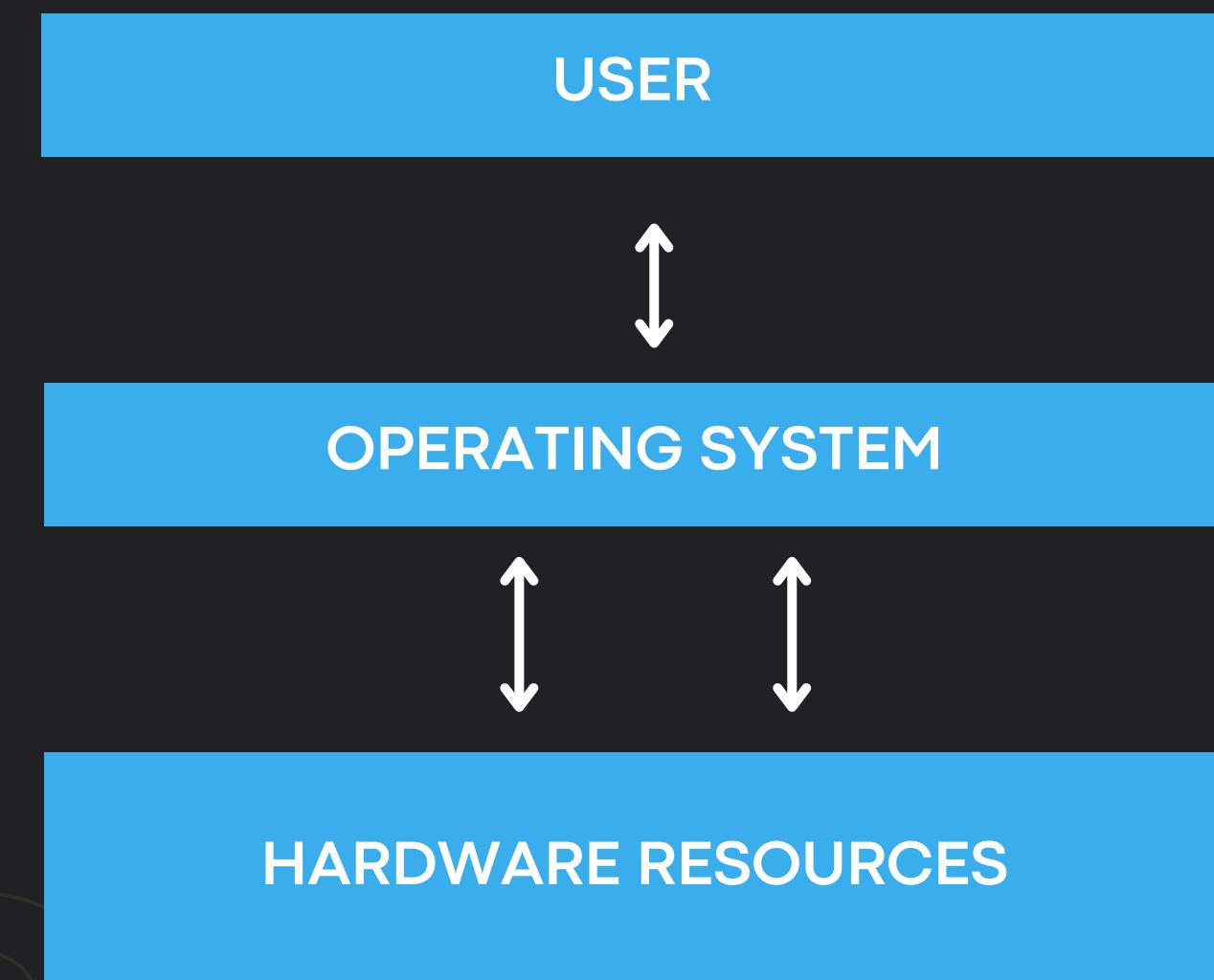
- Extensive **Code Review** by experts
- Maintainer Oversight has the **authority** to accept/reject code changes
- **Incentives** and Community-driven Security

Operating System

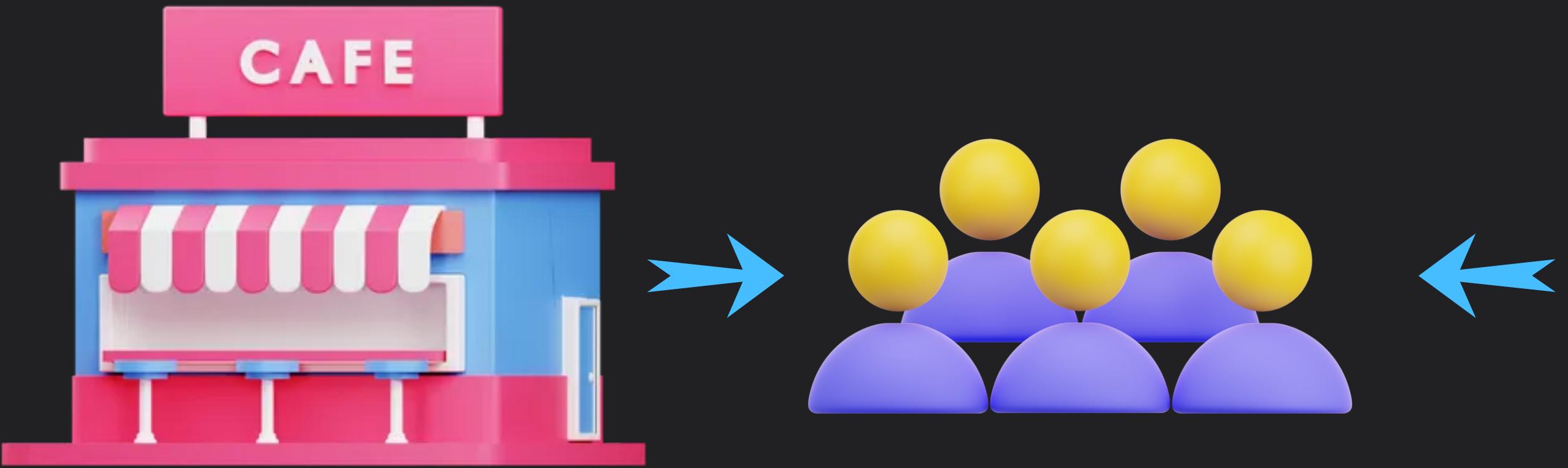
If Not Operating System



Operating System



Kernel OS



//////////



Kernel OS

<p>Kernel is part of OS</p>	<p>OS is a system software</p>
<p>Heart of Operating System</p>	<p>Along with Kernel and other utilities form OS</p>
<p>Interface between application and hardware</p>	<p>Interface between user and hardware</p>
<p>Ex:Linux, XNU</p>	<p>Ex:Ubuntu, macOS</p>





Kernel OS

<p>Kernel is part of OS</p>	<p>OS is a system software</p>
<p>Heart of Operating System</p>	<p>Along with Kernel and other utilities form OS</p>
<p>Interface between application and hardware</p>	<p>Interface between user and hardware</p>
<p>Ex:Linux, XNU</p>	<p>Ex:Ubuntu, macOS</p>



Linux

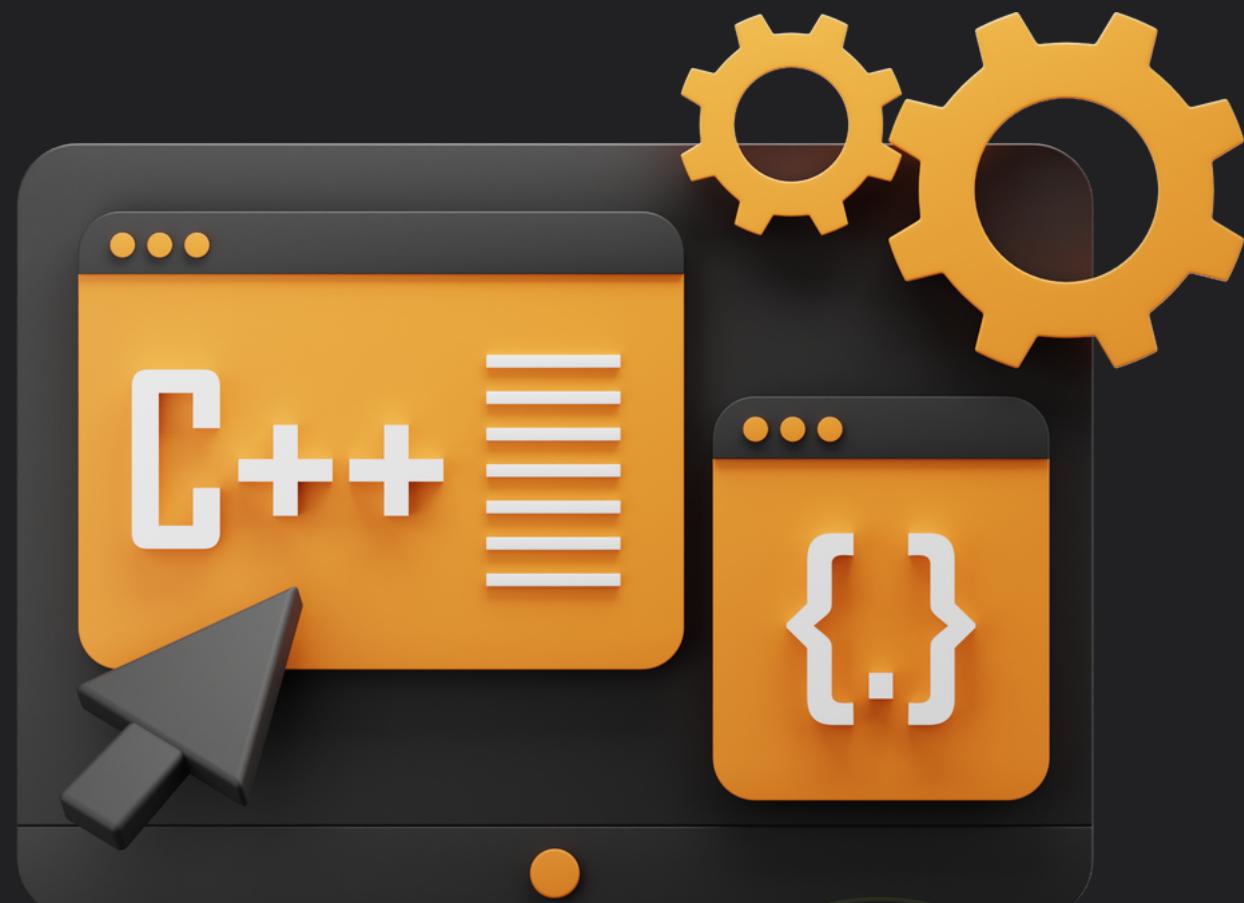


- It is the component of the **Operating System** that acts as a bridge between hardware and software
- It is responsible for managing **hardware resources**

//////////



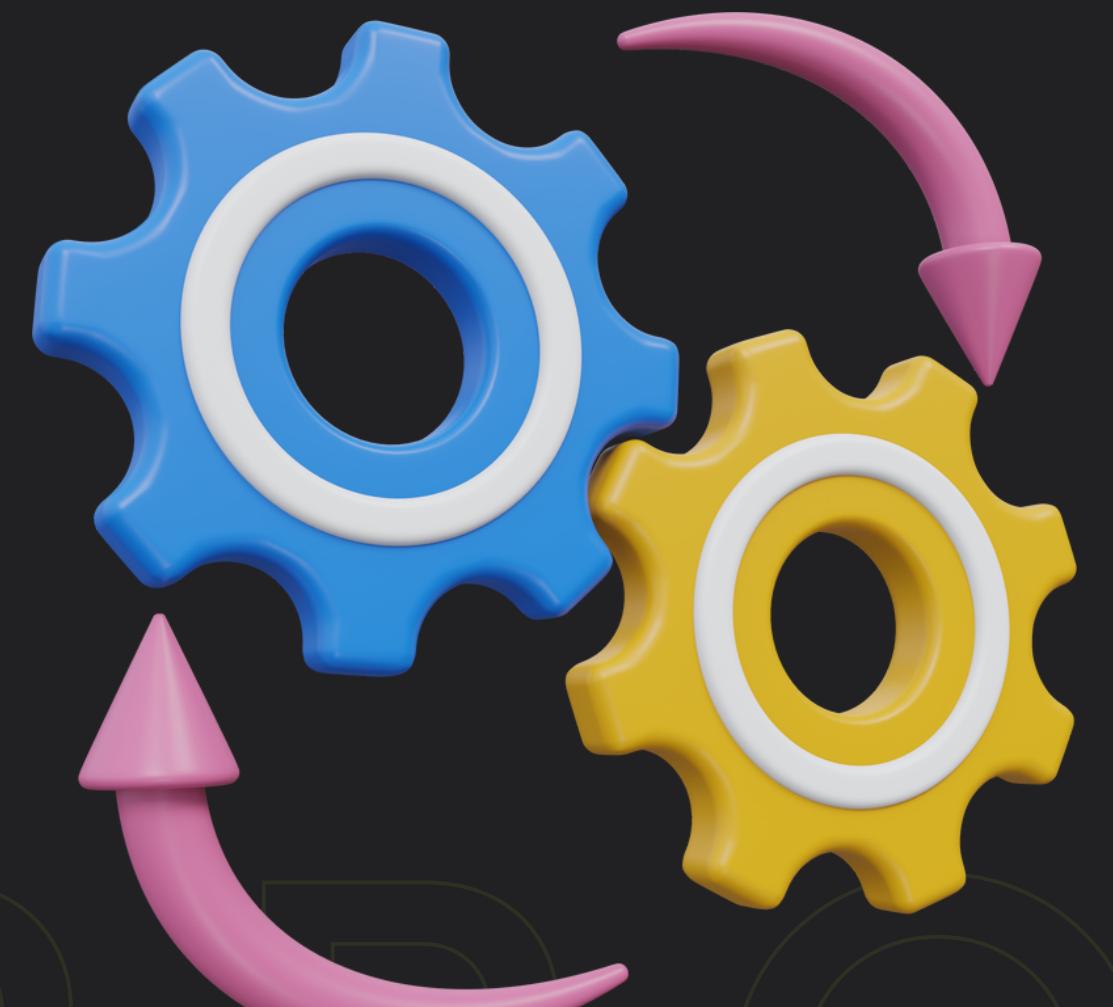
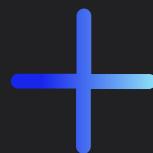
Program



A **program** is a set of instructions written in a programming language that directs a computer to perform specific tasks or operations

PROGRAM

Process



- Process is the execution of a program
- It is an running instance of a program

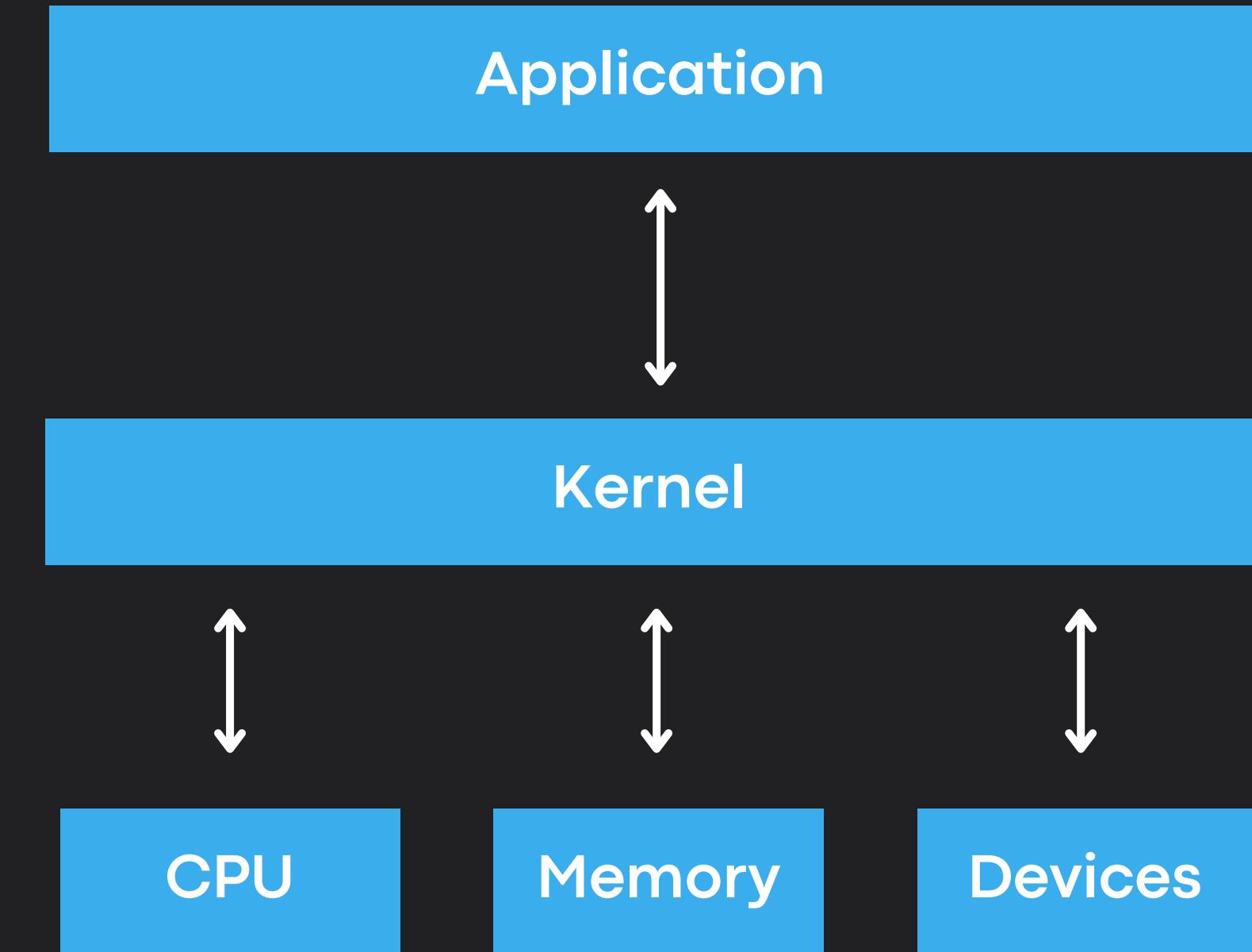
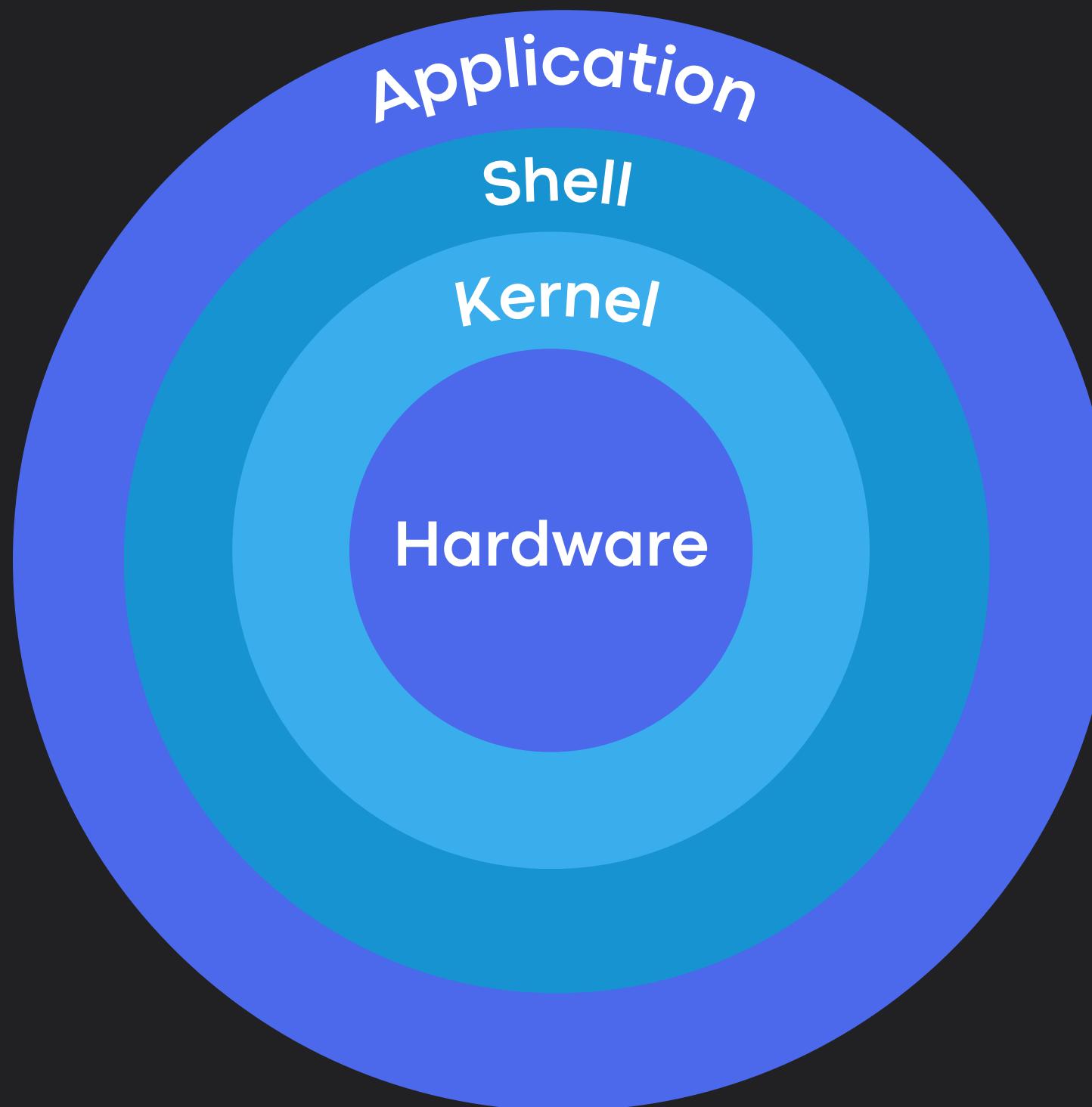
Shell



- A shell is a program that provides an interface for users to interact with an operating system
- Communicates between Hardware and Software



Kernel Architecture



//////////



Types of Kernel



-  Monolithic Kernel
-  Micro Kernel
-  Hybrid Kernel



//////////



Monolithic



- All operating system services and functionalities are implemented as a single, large program running in kernel space
- It has direct access to the hardware and provides various services, such as memory management, process management
- Ex: Linux Kernel

Microkernel

- Kernel provides only essential services such as process management, Inter-Process Communication(IPC)
- The Rest of the programs and services are executed on User space
- Ex: Serenity OS



LINUX



Hybrid Kernel

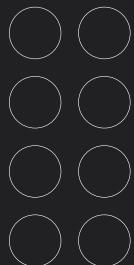


- Combination of Monolithic and Micro Kernel
- Isolation of services and direct access to hardware
- Kernel and User space integration

History of Linux

1969:

Dennis Ritchie and Ken Thompson developed UNIX Operating System and C Language in AT&T Labs



1975:

AT&T started selling UNIX commercially

1983:

Richard Stallman released GNU Project



History of Linux



1991:

The Linux Kernel (Freax) is announced publicly on 25 August by Linus Torvalds



1991:

Linux Kernel 0.01 version was released

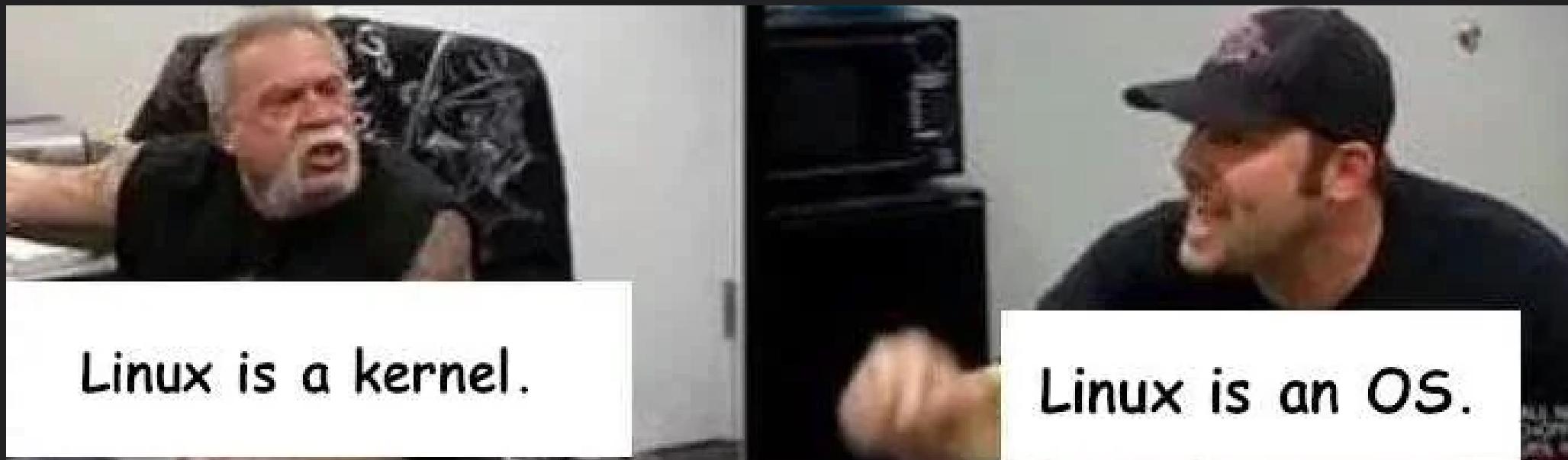
1993:

Linux Kernel adopted GNU environment





//////////

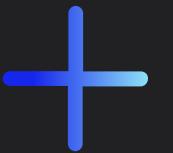
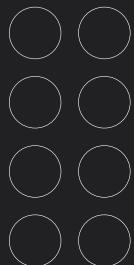


//////////

History of Linux

1994:

Linux 1.0 version was released



1998:

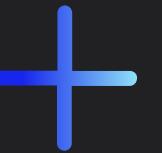
Major companies announced their support for Linux

2006:

Oracle releases its own distribution Red Hat Enterprise Linux

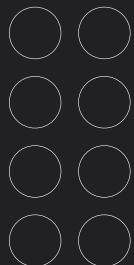


History of Linux



2013:

Google claims 75% of Linux-based smartphones market share



2017:

All of the Top 500 list of fastest supercomputers run Linux

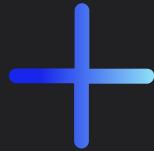
2018:

Linux Kernel 4.15 version with more than 23.8 million lines of source code



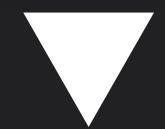
Linux Unix

Linux is Kernel	Unix is OS
Free and Open Source	Proprietary with licensing fees
Community-driven	Commercial
Ex: Fedora, Ubuntu	Ex: macOS, Solaris

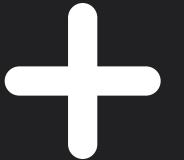


Linux Distributions

Linux Distributions



Linux kernel

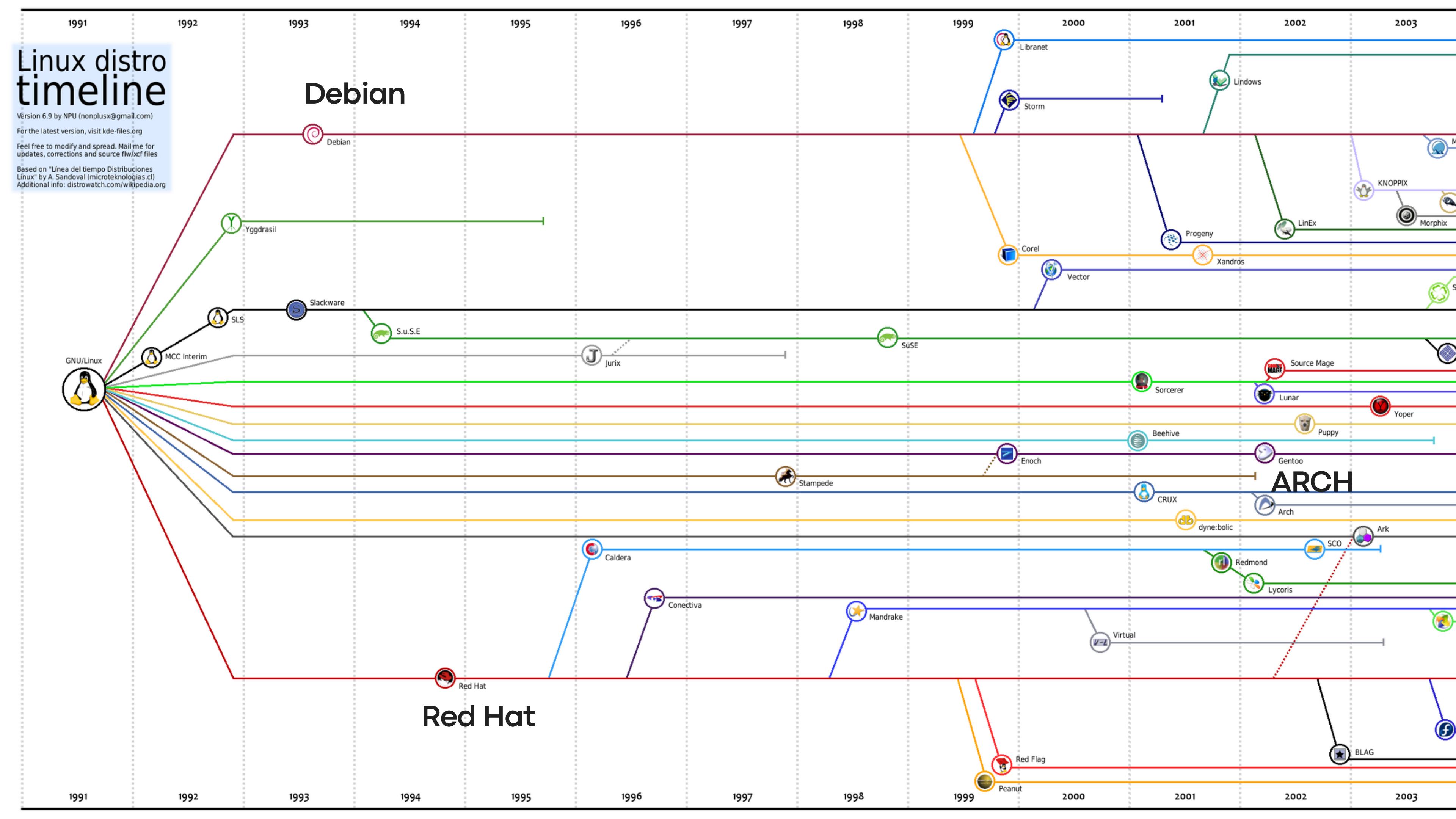


Software
Applications



User interface





Activities

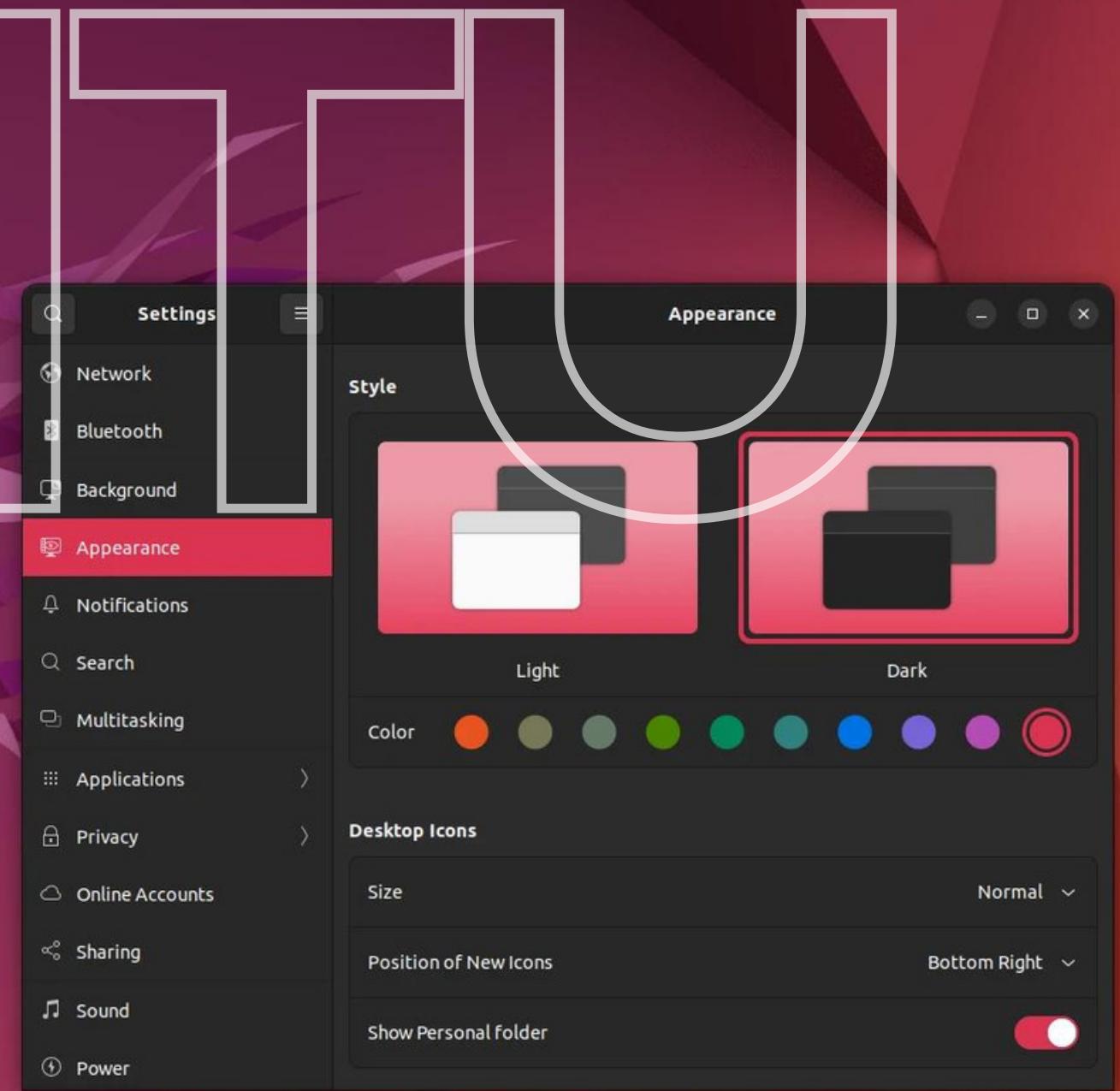
Settings

21 Apr 22:04



Home

UBUN



Ubuntu



- Most well-known Linux distribution
- Developed in 2004 by Canonical
- Beginner-friendly and Stable
- Lots of pre-installed apps
- Available for desktops, phones, tablets, servers and the cloud

UBUNTU +





```
debugpoint@debugpoint: ~
File Actions Edit View Help
Virtualization: kvm
Operating System: Kali GNU/Linux Rolling
Kernel: Linux 5.18.0-kali5-amd64
Architecture: x86-64
Hardware Vendor: QEMU
Hardware Model: Standard PC _Q35 + ICH9, 2009_
Firmware Version: 1.15.0-1.fc35

(debugpoint@ debugpoint)-[~]
$ uname -r
5.18.0-kali5-amd64

(debugpoint@ debugpoint)-[~]
$ 
```

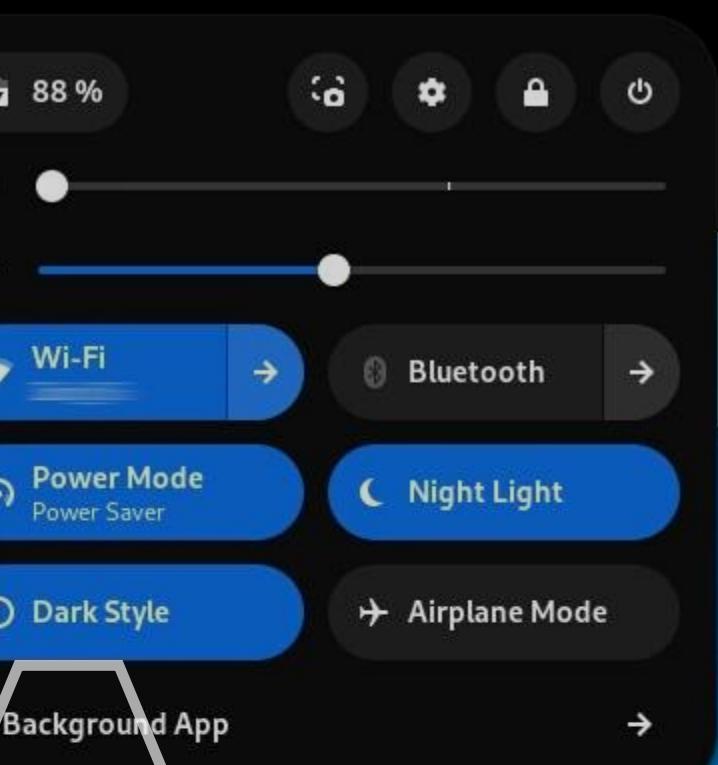
Kali



- Debian-based Linux distro by Offensive Security
- Pen testing, Digital forensics
- Meant for Cybersecurity experts and students
- Wireless Attacks: Aircrack-ng and Reaver
- Password Attacks: Ripper and Hydra



Type to search



Fedora



- Sponsored by Red Hat
- Built on the latest technologies
- Lightweight yet powerful and scalable
- For desktops & laptops, servers, and even for IoT ecosystems

FEDORA +



/ / / / / / /

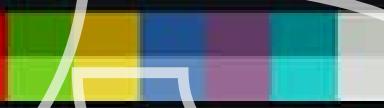
CEN

egee@localhost:/run/media/egee/brunchmark/5benchmarks

```
[egee@localhost 5benchmarks]$ neofetch
  .PLTJ.
  ooo
KKSV' 4KKK LJ KKKL.'VSSKK
KKV' 4KKKKK LJ KKKKAL 'VKK
V' ' VKKKK LJ KKKKV' ' 'V
.4MA.' 'VKK LJ KKVK' '.4Mb.
. KKKKA.' 'V LJ V' '.4KKKKK .
.4D KKKKKKA.' ' LJ '''.4KKKKKKK FA.
<QDD ++++++ ++++++ ++++++ GFD>
'VD KKKKKKK' ' LJ ..'KKKKKKKK FV
' VKKKK' ' 4 LJ K. .'KKKKKV '
' VK' ' .4KK LJ KKA. .'KV'
A. ' .4KKK LJ KKKKA. ' .4
KKA. ' KKKK LJ KKKK' ' .4KK
KKSSA. VKKK LJ KKKV ' 4SSKK
 <><><>
'MKKM'
' '
[egee@localhost 5benchmarks]$
```

egee@localhost.localdomain

OS: CentOS Linux 8 (Core) x86_64
Kernel: 4.18.0-193.6.3.el8_2.x86_64
Uptime: 10 hours, 46 mins
Packages: 1722 (rpm), 9 (flatpak)
Shell: bash 4.4.19
Resolution: 1920x1080
DE: GNOME
WM: Mutter
WM Theme: Adwaita
Theme: Adwaita [GTK2/3]
Icons: Adwaita [GTK2/3]
Terminal: gnome-terminal
CPU: AMD A8-7600 Radeon R7 4C+6G (4) @ 3
GPU: NVIDIA GeForce GTX 750 Ti
Memory: 1739MiB / 7729MiB



CentOS



- Based on Red Hat Enterprise Linux (RHEL)
- Stable and secure Linux distro
- LTS and binary compatibility with RHEL
- Server deployments and enterprise environments
- Widely trusted by Businesses

CENTOS +



brian@lemur-pro:~\$ neofetch

```

      ` 
      .o+` 
      `ooo/ 
      `+oooo: 
      `+oooooo: 
      -+oooooo+: 
      `/:-++oooo+: 
      `/++++/+++++++: 
      `/+++++++/+++++++: 
      `/+++++oooooooooooo/` 
      ./ooosssso++osssssso+` 
      .oosssssso-` ``/osssssss+` 
      -osssssso. :ssssssso. 
      :osssssss/ osssso+++. 
      /osssssss/ +sssssooo/- 
      `/osssssso+/- -:/+osssso+- 
      `+ssso+:-` `.-/+oso: 
      `++:. ` -/+` 
      :` 
      
```

[brian@lemur-pro ~]\$]

brian@lemur-pro

OS: Arch Linux x86_64
Host: Lemur Pro lemp10
Kernel: 5.15.55-1-lts
Uptime: 32 secs
Packages: 1086 (pacman), 14 (flatpak)
Shell: bash 5.1.16
Resolution: 1920x1080
DE: Budgie 10.6.1
WM: Mutter(Budgie)
Theme: Adwaita-dark [GTK2/3]
Icons: kora [GTK2/3]
Terminal: gnome-terminal
CPU: 11th Gen Intel i7-1165G7 (8) @ 4.
GPU: Intel TigerLake-IP GT2 [Iris Xe G]
Memory: 1078MiB / 15849MiB

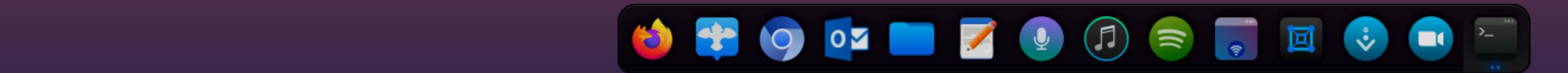
brian@lemur-pro:~

0[0.0%]	4[0.0%]
1[0.0%]	5[0.7%]
2[0.0%]	6[0.7%]
3[2.0%]	7[0.0%]
Mem[858M/15.5G]	Tasks: 101, 349 thr, 174 kthr; 1 runni	
Swp[0K/4.00G]	Load average: 0.39 0.34 0.15	
		Uptime: 00:03:24	

Main **I/O**

PID	USER	PRI	NI	VIRT	RES	SHR	S	CPU% MEM%	TIME+	Command
1034	brian	20	0	245M	35800	25784	S	2.0	0.2	/usr/lib/budg
500	root	20	0	324M	20932	17612	S	0.7	0.1	/usr/bin/Netw
512	root	20	0	1444M	94760	60304	S	0.7	0.6	/usr/lib/Xorg
807	brian	20	0	369M	28268	22080	S	0.7	0.2	/usr/lib/gsd-
929	brian	20	0	1313M	103M	74592	S	0.7	0.7	0:05.86 budgie-wm
951	brian	20	0	808M	55812	40280	S	0.7	0.3	0:03.12 budgie-panel
1525	brian	20	0	466M	52092	40408	S	0.7	0.3	/usr/lib/gnom
1736	brian	20	0	8940	5296	3812	R	0.7	0.0	0:01.51 htop
1	root	20	0	162M	12508	9572	S	0.0	0.1	/sbin/init
283	root	20	0	108M	59460	58072	S	0.0	0.4	0:00.22 /usr/lib/syst
297	root	20	0	32828	10440	7600	S	0.0	0.1	0:00.10 /usr/lib/syst
466	systemd-ti	20	0	89660	7220	6352	S	0.0	0.0	0:00.01 /usr/lib/syst

F1Help F2Setup F3Search F4Filter F5Tree F6SortBy F7Nice -F8Nice +F9Kill F10Quit



Arch



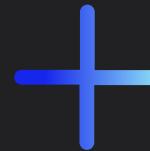
- Lightweight and flexible
- Rolling release
- Requires users to manually configure and install the system
 1. Partitioning
 2. Package Selection
 3. Desktop Environment
 4. Driver Installations

ARC



Desktop Environments

What is a Desktop Environment?



- A GUI for your Linux distribution
- A collection of software and tools
- Separate and interchangeable
- Affects productivity, ease of use, and system performance



DESKTOP ENVIRONMENT



GNOME

GNOME

Modern and user-friendly

"Focuses more on producing distros that are stable"

- GNU Network Object Model Env
- Clutter-free and minimalist
- Simple and Easy to Use
- Productivity-oriented features
- Large user-base



Activities

Sep 27 12:13



Type to search



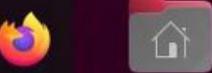
Show Applications



Activities

Settings

21 Apr 22:04



Home



Settings

Appearance

Network

Bluetooth

Background

Appearance

Notifications

Search

Multitasking

Applications

Privacy

Online Accounts

Sharing

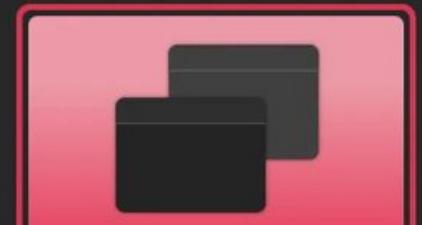
Sound

Power

Style



Light



Dark

Color



Desktop Icons

Size

Normal

Position of New Icons

Bottom Right

Show Personal folder





04:36 | Sun:23



Pods

Summary
1 container, running

Only running

divergent-zebra 5432/tcp
docker.io/library/postgres:latest

+

Images Containers Pods

Default 4.5.0

```
psql -h localhost -p 5432 -U postgres -d postgres -W
/0.0s
> psql -h localhost -p 5432 -U postgres -d postgres -W
Password:
psql (15.2)
Type "help" for help.

postgres=# \d+
              List of relations
 Schema | Name | Type  | Owner   | Persistence | Access method | Size  | Description
-----+-----+-----+-----+-----+-----+-----+-----+
 public | test | table | postgres | permanent  | heap        | 16 kB |
(1 row)

postgres=# SELECT * FROM public.test;
 id | val
----+---
 1 | 300
 2 | 400
(2 rows)

postgres=# 
```

SYSTEM_INFO		
Distribution:	Arch Linux	
Kernel:	6.2.11-arch1-1	x86_64
Hostname:	archlinux	
Uptime:	3h 43m 21s	
CPU		
Intel Core i7 9xx (Nehalem Class Core i7)		
Core_1:	58%	
Core_2:	60%	
FILE_SYSTEM		
/boot	71.2MiB / 197MiB	36%
/	9.98GiB / 19.3GiB	51%
/home	6.41GiB / 39.1GiB	16%
MEMORY		
RAM	2.75GiB / 3.83GiB	71%
SWAP	523MiB / 1.91GiB	26%
TOP PROCESSES		
NAME	PID	CPU
nautilus	62891	22.05%
gnome-shell	21815	16.47%
dbus-daemon	21813	11.95%
orca	22050	9.56%
at-spi2-registr	22012	4.52%
pods	59079	1.73%
kgx	59425	0.53%
pipewire-pulse	21896	0.40%
NETWORK		
Interface:	enp0s2	
Default Gateway:	10.0.2.2	
IP address:	10.0.2.15	
Public IP address:	17.99.91.119	
Down_Speed:	460MiB kb/s	Total: 5.12TiB
Up_Speed:	9.78MiB kb/s	Total: 97.8GiB

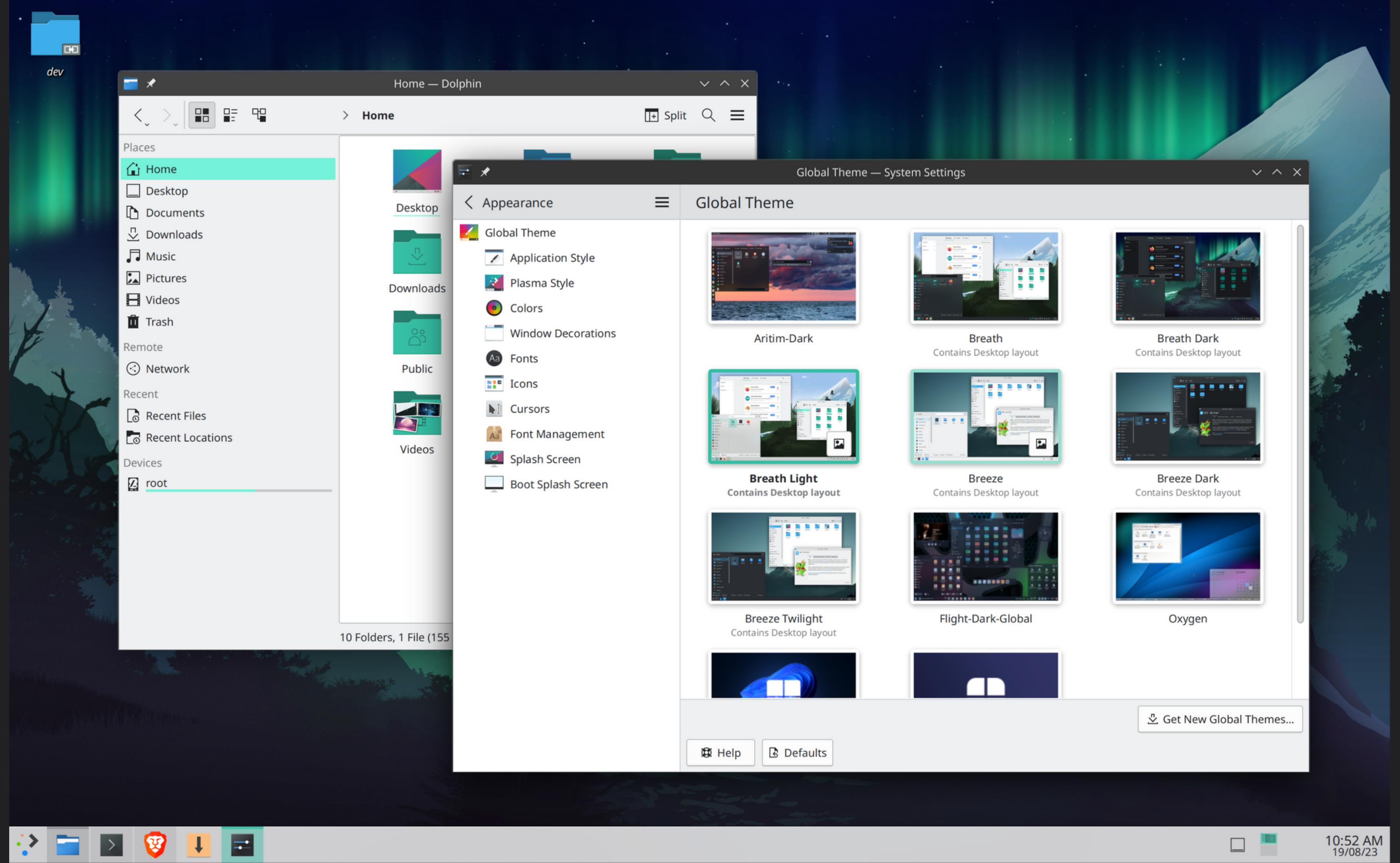
KDE

KDE

Highly Customizable DE

- K Desktop Environment
- Advanced and flexible
- Extensive personalization and control
- Traditional desktop paradigm







dev

SATURDAY

19 AUG 2023
- 04:09 PM -



Hi, Smit

★ Favorite Apps

All apps >



Dolphin



System
Settings



Brave



Kate

Search your computer

20.4%
6.4%



4:09:20 PM
19 Aug, Sat



Trash
6 items

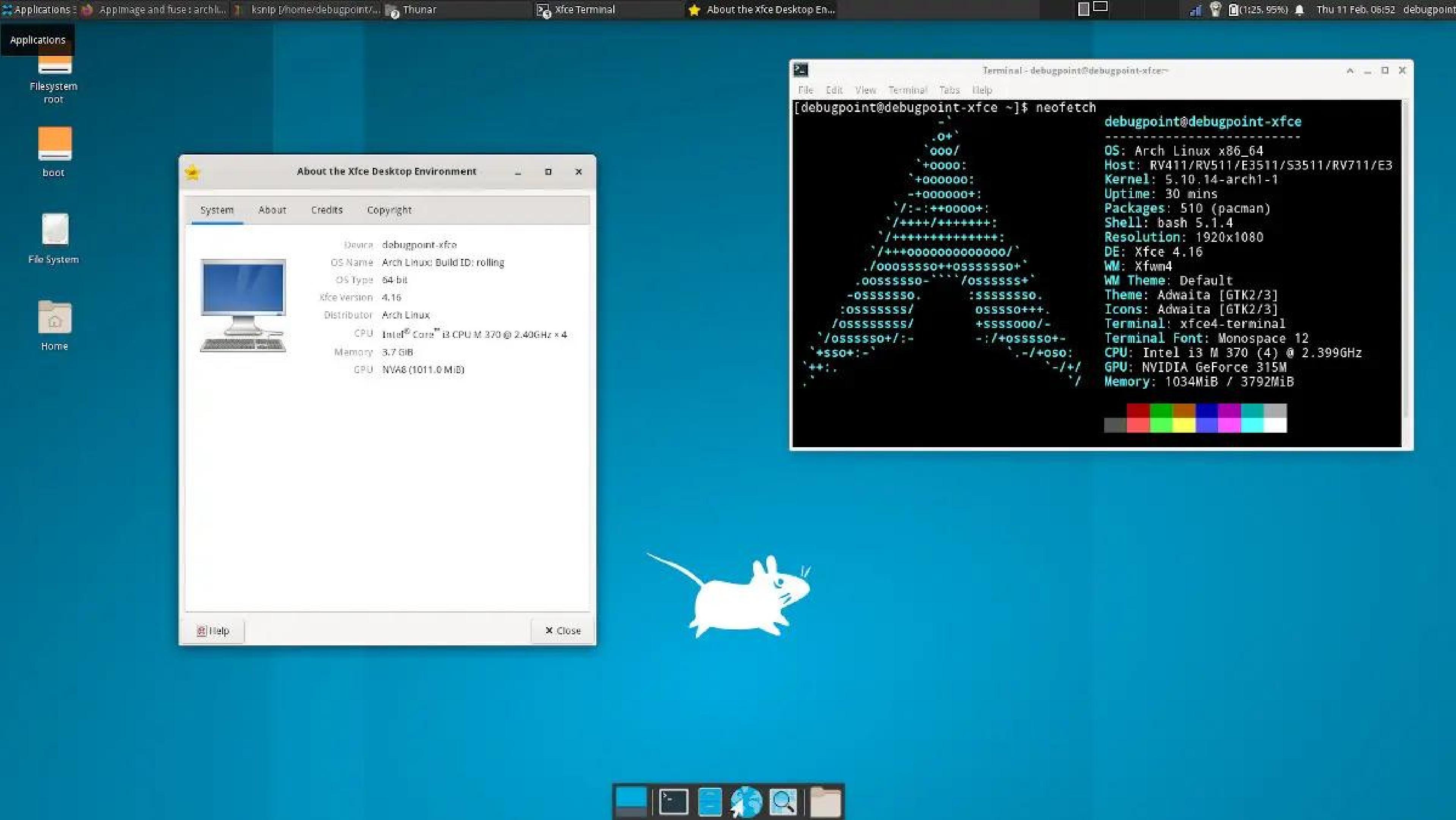
XFCE

Where Everything Goes Faster

- XForms Common Environment
- Lightweight nature
- Adaptability to older hardware
- Similar to the age-old version of windows, though it is completely customizable.

XFCE







Package Management

Packages

- Pre-compiled binary files,
installation scripts, config files,
dependencies requirements,
documentation, etc



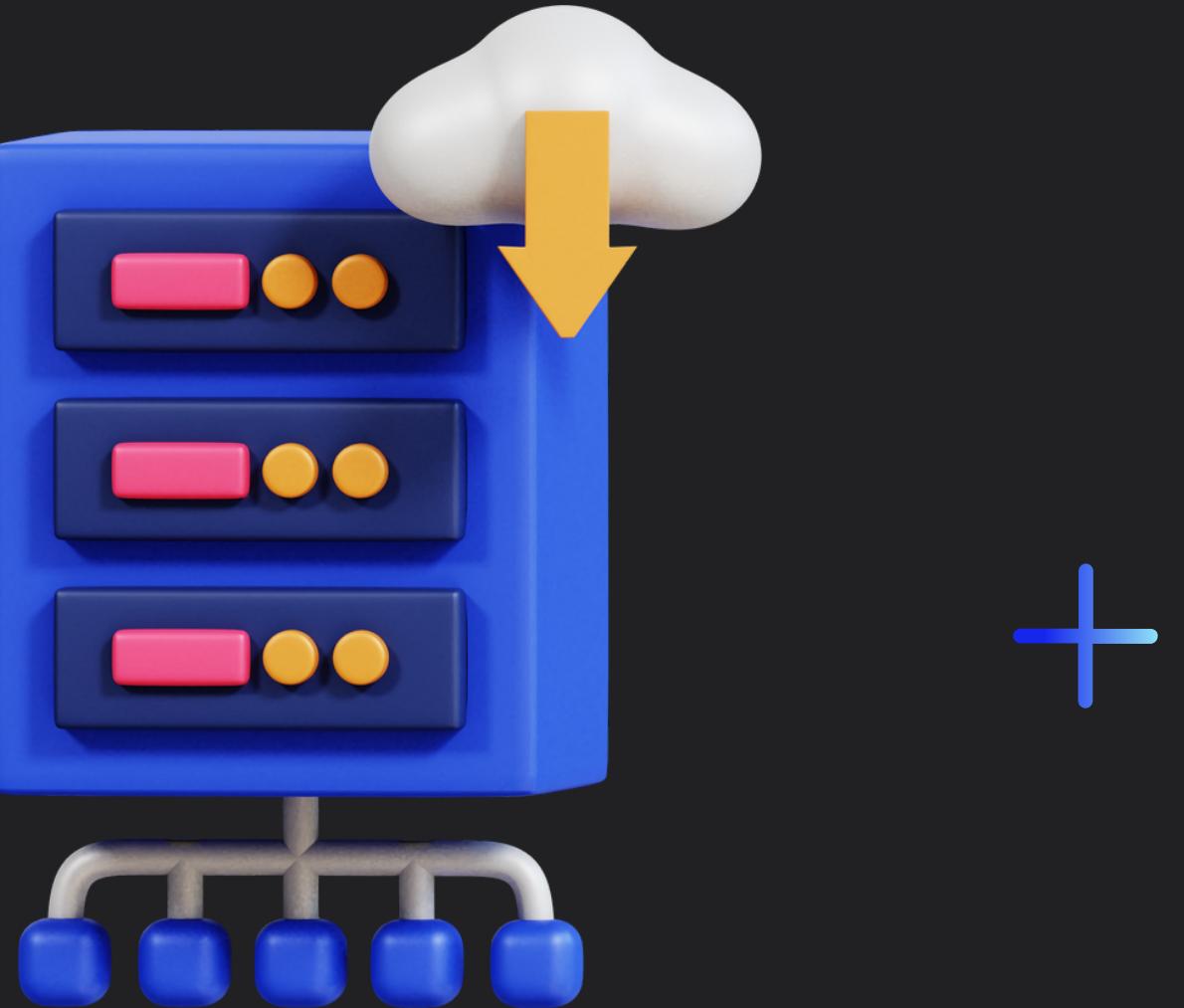
Dependencies

- The additional packages that are required to run software are dependencies



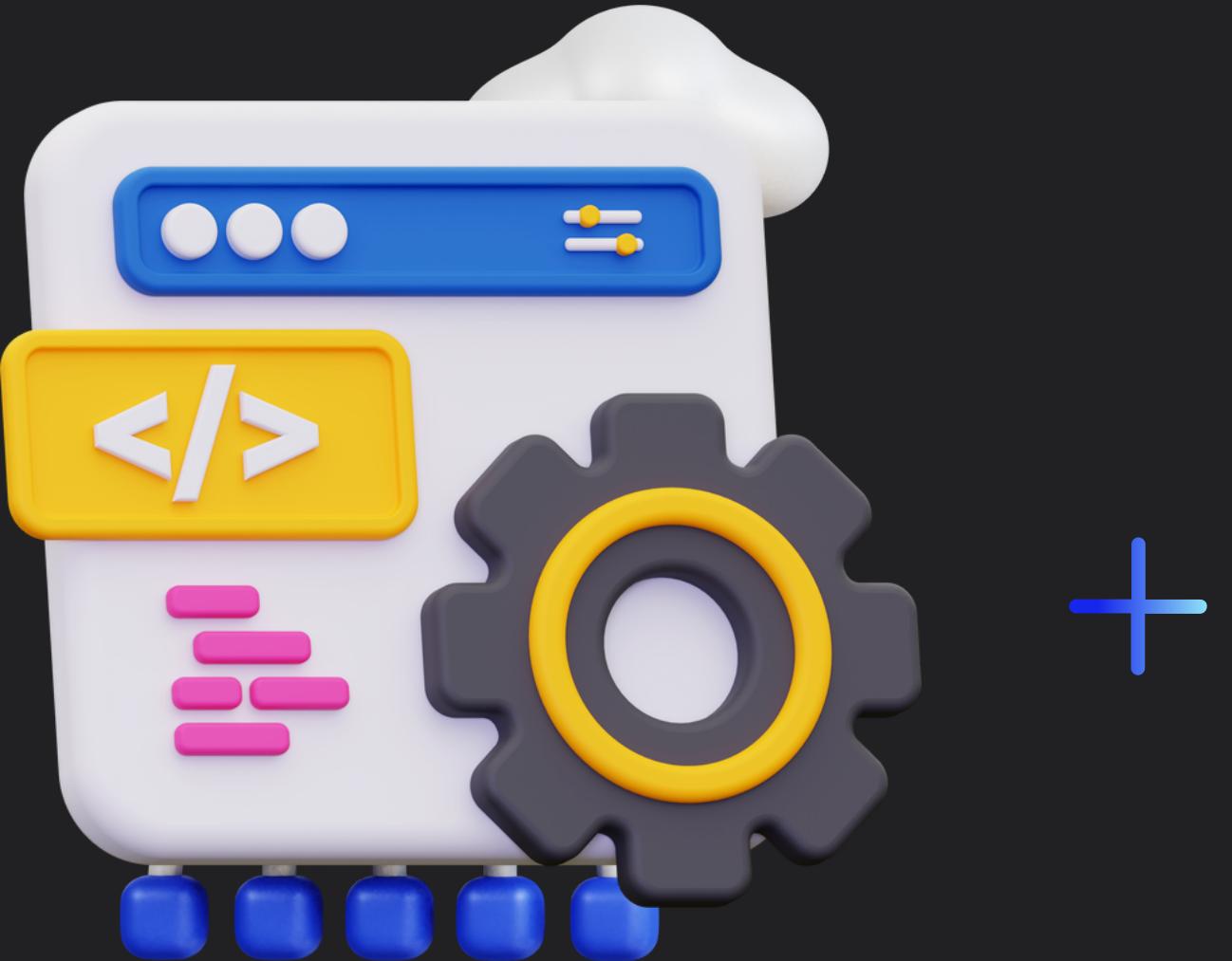
Repositories

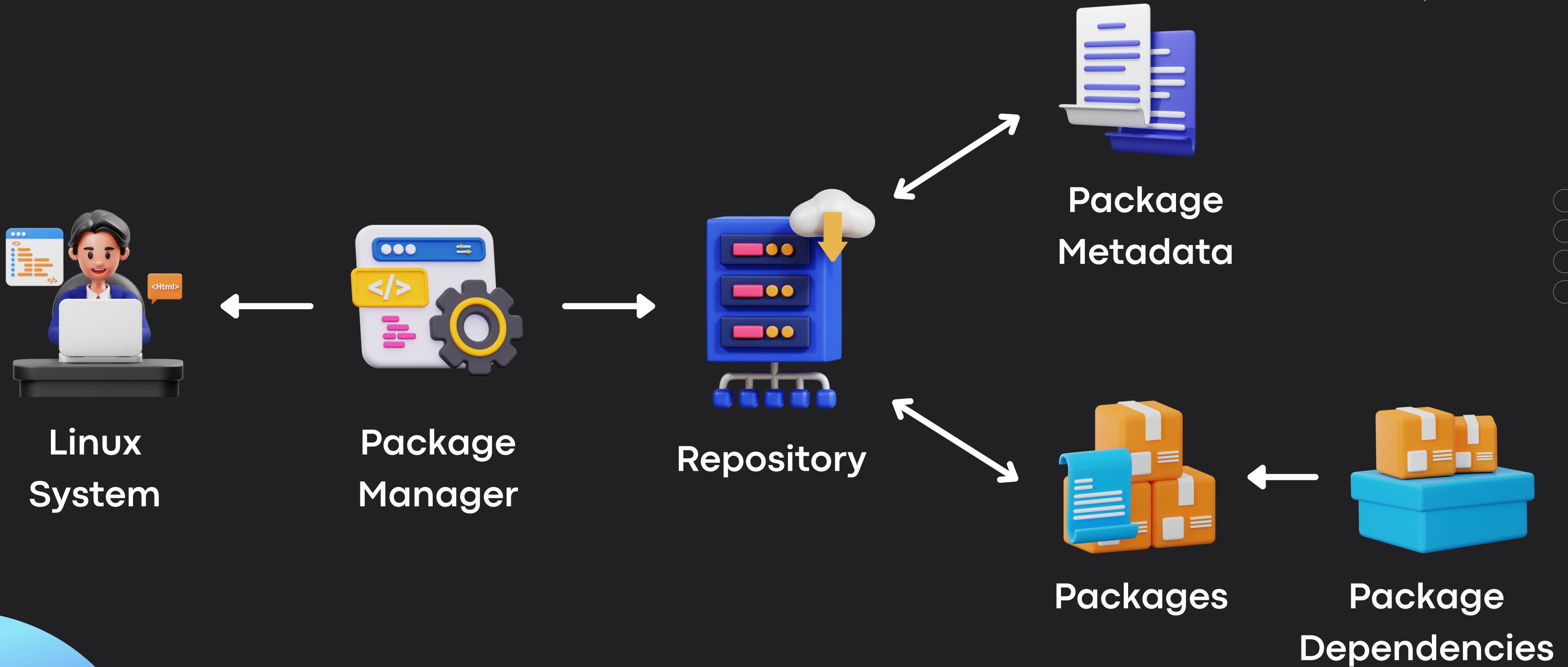
- Centralized storage location that hosts a collection of software packages for a specific Linux distribution



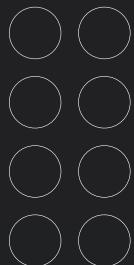
Package Managers

- A tool that allows users to install, remove, upgrade, configure and manage packages





Different Package Managers



APT

DNF

Pacman

APT



- Advanced Package Tool
- Debian-based distros (Ubuntu, Kali, Mint, PopOS, etc)
- '.deb' package file format
- Based on 'dpkg' package manager
- Commands: apt, apt-get

//////////

DNF



- **Dandified YUM**
- Based on the 'rpm' package manager and successor to the YUM package manager
- RHEL, CentOS 8, Fedora 22 and later versions
- '.rpm' package file format
- Commands: DNF, YUM

PACMAN



- Arch and Other arch-based distros (Manjaro, Garuda, etc)
- PAckage + MANager
- '.tar.xz' package file format
- Command: pacman

/ / / / / / / /

APT Commands

Terminal

- Takes input from the user in the form of commands
- Displays output on the screen
- Terminal needs Shell to process the input



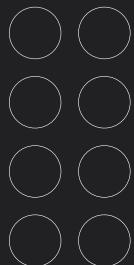
TERMINAL



```
~$ sudo apt update
```



Updates the package list
or index



Upgrade the installed
packages



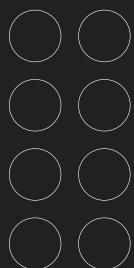
```
~$ sudo apt upgrade
```



```
~$ apt list --installed
```



List of installed packages



List of upgradable packages



```
~$ apt list --upgradable
```

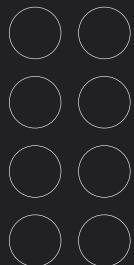




```
~$ apt search [package_name]
```



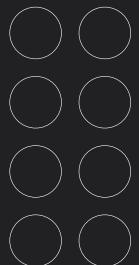
Search packages available
in the repositories



Provides detailed information



```
~$ apt show [package_name]
```



```
~$ sudo apt install [package_name]
```



Install a specific package
from the repositories



```
~$ sudo apt remove [package_name]
```



Uninstalls the package



Completely deletes package
and its configuration files



```
~$ sudo apt purge [package_name]
```

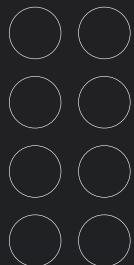


```
~$ sudo apt autoremove
```



Cleans up the system by
removing orphaned or
unused packages

Applications

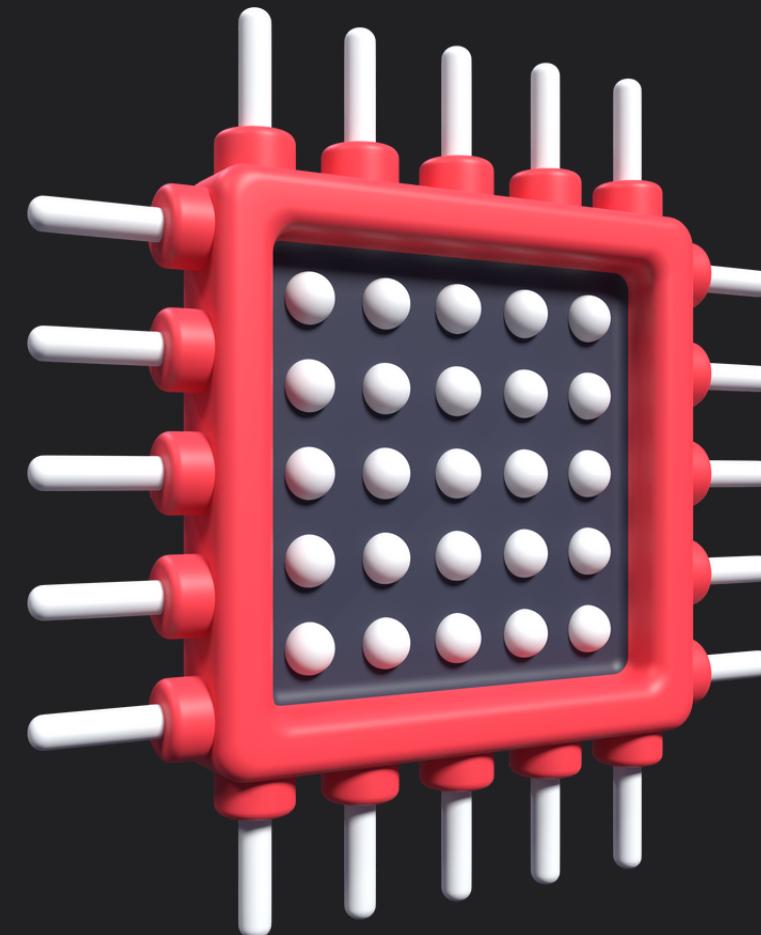


Web Servers



- 96.3% of the top one million web servers are running Linux
- Ubuntu Server, CentOS and Debian provide optimized configurations and package repositories

Super-computing (HPC's)



- All 500 of the world's fastest supercomputers run on Linux
 - Excellent scalability
 - Performance optimization
 - Parallel computing
-

Embedded Systems



- Suitable for resource-constrained devices
- Smartphones, tablets, smart TVs, gaming consoles, and IoT (Internet of Things) devices

Cyber Security



- Vulnerability assessment
 - Network scanning
 - Penetration testing
 - Digital forensics
-
- Kali Linux
 - Parrot Security OS

```
lugin
in
s
s.plugin
plugin
e.so
o
er.so
.so

plugin.so
ugin
e
e.plugin

ugin

gin

ugin
s/__init__.py
s/capture.py
s/filelookup.py
s/functions.py
s/library.py
s/linkparsing.py
s/manager.py
s/outputpanel.py
s/windowactivat
e/__init__.py
e/config.py
e/console.py
init__.py
pup.py
rtualdirs.py
**  **
```

Gaming Industry



- Steam Deck runs **SteamOS** (Debian Based Distro)
- Run Windows apps on Linux using **PROTON** and **WINE**

And many more...



**Server
Systems**

Android OS

**Development
Environments**

Networking

MySQL

Nginx

Raspberry Pi

Docker

**Apache
Hadoop**

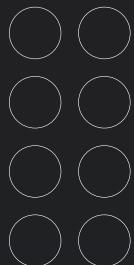
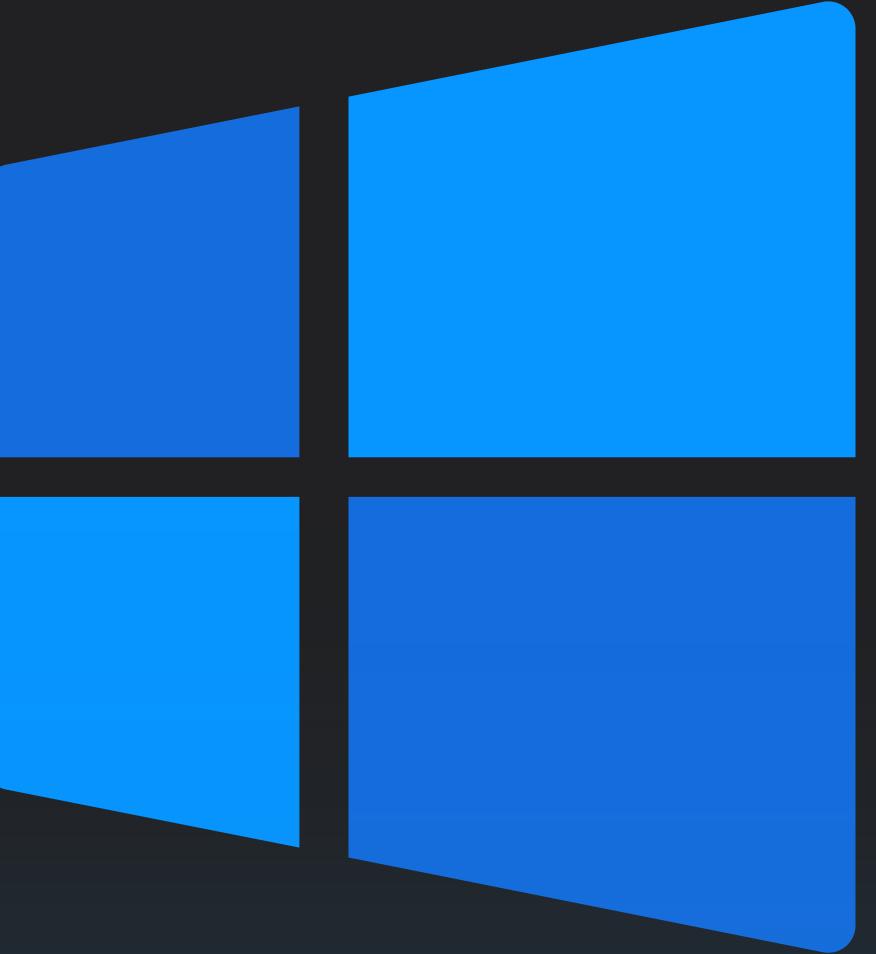
**Apache
Spark**

**AWS
GCP**

**VPN
Firewalls**

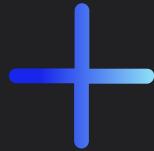


VS





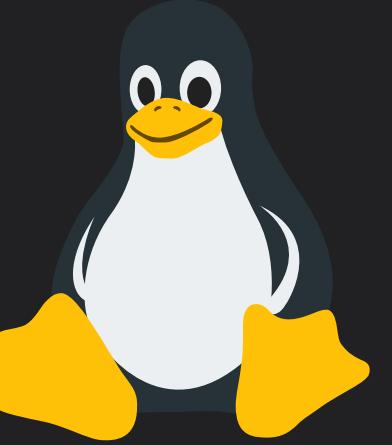
Free	Paid
Open Source	Proprietary
Low System Requirements	High System Requirements
Safe and Secure	Vulnerable
Highly customizable	Fewer options to customize



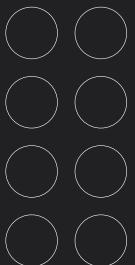
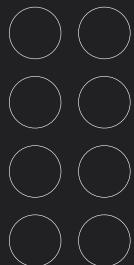
Is Linux Good for Developers and Student Programmers?



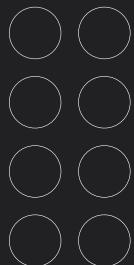
Why Linux?



- Open Source
- Powerful terminal and CLI
- Vast Software Ecosystem
- Stability and Performance
- Flexibility and Customizability
- Industry Relevance



THANK YOU



COMMUNITY | KNOWLEDGE | SHARE