```
ahmed-gwely@ahmed-gwely-ASUS-TUF-Gaming-F15-FX507VV4-FX507VV4:~$ sudo apt update
[sudo] password for ahmed-gwely:
Hit:1 https://brave-browser-apt-release.s3.brave.com stable InRelease
Hit:2 http://eg.archive.ubuntu.com/ubuntu noble InRelease
Hit:3 http://security.ubuntu.com/ubuntu noble-security InRelease
Hit:4 http://eg.archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:5 http://eg.archive.ubuntu.com/ubuntu noble-backports InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
All packages are up to date.
ahmed-gwely@ahmed-gwely-ASUS-TUF-Gaming-F15-FX507VV4-FX507VV4:~$ sudo apt upgrade -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
Get more security updates through Ubuntu Pro with 'esm-apps' enabled:
  libzvbi-common mosquitto-clients mosquitto libcjson1 libpostproc57
  libavcodec60 libgstreamer-plugins-bad1.0-0 libzvbi0t64 libavutil58
  libswscale7 libswresample4 libavformat60 libmosquitto1 libavfilter9
Learn more about Ubuntu Pro at https://ubuntu.com/pro
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
ahmed-gwely@ahmed-gwely-ASUS-TUF-Gaming-F15-FX507VV4-FX507VV4:~$ sudo apt full-upgrade -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
Get more security updates through Ubuntu Pro with 'esm-apps' enabled:
  libzvbi-common mosquitto-clients mosquitto libcjson1 libpostproc57
  libavcodec60 libgstreamer-plugins-bad1.0-0 libzvbi0t64 libavutil58
  libswscale7 libswresample4 libavformat60 libmosquitto1 libavfilter9
Learn more about Ubuntu Pro at https://ubuntu.com/pro
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
ahmed-gwely@ahmed-gwely-ASUS-TUF-Gaming-F15-FX507VV4-FX507VV4:~$ uname -r
6.14.0-29-generic
ahmed-gwely@ahmed-gwely-ASUS-TUF-Gaming-F15-FX507VV4-FX507VV4:~$ uname -a
Linux ahmed-gwely-ASUS-TUF-Gaming-F15-FX507VV4-FX507VV4 6.14.0-29-generic #29~24.04.1-Ubuntu SMP PREEMPT_DYNAMIC Thu Aug 14 16:52:50 UTC 2 x86_64 x86_64 x86_64 GNU/Linux
ahmed-gwely@ahmed-gwely-ASUS-TUF-Gaming-F15-FX507VV4-FX507VV4:~$ whoami
ahmed-gwely
ahmed-gwely@ahmed-gwely-ASUS-TUF-Gaming-F15-FX507VV4-FX507VV4:~$ date
Sun Aug 31 10:13:14 PM EEST 2025
ahmed-gwely@ahmed-gwely-ASUS-TUF-Gaming-F15-FX507VV4-FX507VV4:~$
```

```
ahmed-gwely@ahmed-gwely-ASUS-TUF-Gaming-F15-FX507VV4-FX507VV4:~$ mkdir -p /home/ahmed-gwely/iot_logger/{logs,scripts,data}
ahmed-gwely@ahmed-gwely-ASUS-TUF-Gaming-F15-FX507VV4-FX507VV4:~$ tree /home/ahmed-gwely/iot_logger/{logs,scripts,data}
/home/ahmed-gwely/iot_logger/logs
/home/ahmed-gwely/iot_logger/scripts
/home/ahmed-gwely/iot_logger/data

0 directories, 0 files
ahmed-gwely@ahmed-gwely-ASUS-TUF-Gaming-F15-FX507VV4-FX507VV4:~$
```

1. Linux Architecture Layers
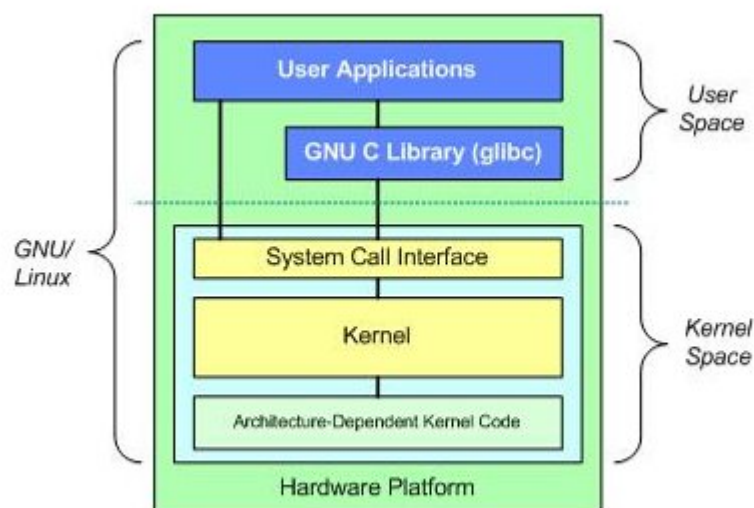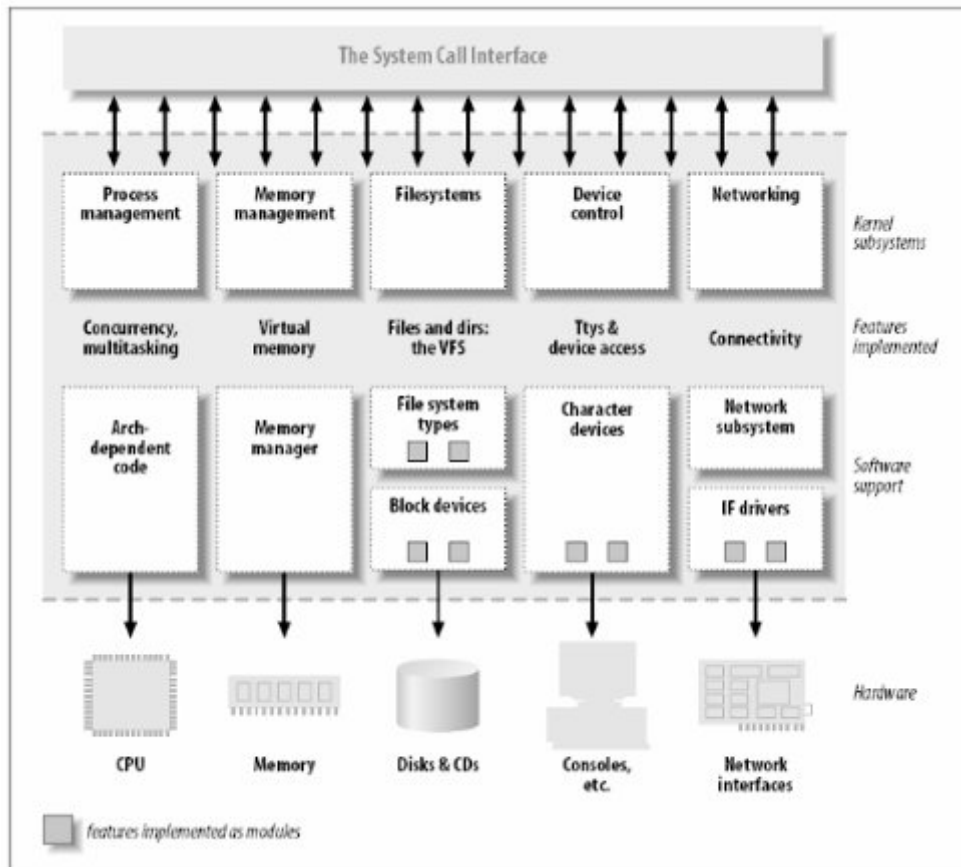
1. Purpose of Key Directories:

   - / → Root directory, the starting point of the filesystem.
   - /bin → Essential user binaries (e.g., ls, cp, cat) available for all users.
   - /sbin → System binaries, mainly for administration (e.g., fdisk, shutdown).
   - /usr → User-related programs, libraries, and documentation.
   - /etc → Configuration files for the system and applications.
   - /var → Variable data like logs, caches, spools, temporary files

2. Why Linux Treats Everything as a File

   Linux follows the philosophy of "everything is a file." Devices (like USBs, disks), processes, sockets, and pipes are all represented as files. This unification simplifies system design—programs can interact with hardware and software using the same simple file operations (open, read, write, close).

3. Program vs. Process

   - Program → A static executable file stored on disk (e.g., /bin/ls).
   - Process → A running instance of a program in memory with its own state, resources, and Process ID (PID).

Example: The file /bin/bash is a program. When you open a terminal, each shell you start is a new process running that program.