Name : Ahmed Khaled Abdelmaksod

Group : IOT_701_O

Day 1

- **Refresh package lists and upgrade the system.**

```
ahmed@ahmed-HP-Laptop-15-da0xxx:~/college/Courses/SIC/SIC_intern$ sudo apt update
[sudo] password for ahmed:
Hit:1 http://repo.mysql.com/apt/ubuntu jammy InRelease
Hit:2 http://eg.archive.ubuntu.com/ubuntu jammy InRelease
Hit:3 http://security.ubuntu.com/ubuntu jammy-security InRelease
Hit:4 http://eg.archive.ubuntu.com/ubuntu jammy-updates InRelease
Hit:5 http://eg.archive.ubuntu.com/ubuntu jammy-backports InRelease
Hit:6 http://packages.ros.org/ros2/ubuntu jammy InRelease
Hit:7 https://ppa.launchpadcontent.net/obsproject/obs-studio/ubuntu jammy InRelease
Hit:8 https://dl.google.com/linux/chrome/deb stable InRelease
Hit:9 https://repo.mongodb.org/apt/ubuntu jammy/mongodb-org/7.0 InRelease
Hit:10 https://repo.mongodb.org/apt/ubuntu jammy/mongodb-org/8.0 InRelease
Hit:11 https://packages.microsoft.com/repos/edge stable InRelease
Hit:12 https://packages.microsoft.com/repos/code stable InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
66 packages can be upgraded. Run 'apt list --upgradable' to see them.
N: Skipping acquire of configured file 'multiverse/binary-i386/Packages' as repository 'https:
//repo.mongodb.org/apt/ubuntu jammy/mongodb-org/7.0 InRelease' doesn't support architecture 'i
386'
```

```
ahmed@ahmed-HP-Laptop-15-da0xxx:~/college/Courses/SIC/SIC_intern$ sudo apt upgrade
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:
  vlc-plugin-qt libpcl-stereo1.12 libvlc5 libopencv4.5d-jni
  libopencv-videoio4.5d libzvbi-common liburiparser1 libde265-dev
  libopencv-objdetect4.5d vlc-data libopencv-videoio-dev
  libopencv-superres4.5d libopencv-objdetect-dev libopencv-contrib4.5d
  libopencv-superres-dev libopencv-contrib-dev libpcl-keypoints1.12 maven
  opencv-data libvlccore9 libheif1 vlc libpcl-common1.12
  libopencv-imgcodecs4.5d libpcl-recognition1.12 libpcl-sample-consensus1.12
  libopencv-imgcodecs-dev vlc-bin libjs-jquery-ui libpathplan4 vlc-l10n
  libmaven3-core-java libopenexr-dev graphviz libavdevice58 libgvpr2 libgvc6
  libopencv-video4.5d libpcl-people1.12 libpcl-tracking1.12
  libopencv-shape4.5d libopencv-video-dev libopencv4.5-java libopenexr25
```

```
Get:32 http://eg.archive.ubuntu.com/ubuntu jammy-updates/main amd64 samba-libs amd64 2:4.15.13
+dfsg-0ubuntu1.7 [6,775 kB]
Get:33 http://packages.ros.org/ros2/ubuntu jammy/main amd64 ros-humble-desktop amd64 0.10.0-1j
ammy.20250728.103041 [6,560 B]
Get:34 http://eg.archive.ubuntu.com/ubuntu jammy-updates/main amd64 ubuntu-pro-client-l10n amd
64 36ubuntu0~22.04 [20.6 kB]
Get:35 http://eg.archive.ubuntu.com/ubuntu jammy-updates/main amd64 ubuntu-pro-client amd64 36
ubuntu0~22.04 [237 kB]
Get:36 http://eg.archive.ubuntu.com/ubuntu jammy-updates/main amd64 ubuntu-advantage-tools all
 36ubuntu0~22.04 [10.9 kB]
Get:37 http://eg.archive.ubuntu.com/ubuntu jammy-updates/main amd64 powermgmt-base all 1.36ubu
ntu0.22.04.1 [7,736 B]
Get:38 http://eg.archive.ubuntu.com/ubuntu jammy-updates/main amd64 dotnet-host-8.0 amd64 8.0.
19-0ubuntu1~22.04.1 [188 kB]
Get:39 http://eg.archive.ubuntu.com/ubuntu jammy-updates/main amd64 dotnet-hostfxr-8.0 amd64 8
.0.19-0ubuntu1~22.04.1 [147 kB]
Get:40 http://eg.archive.ubuntu.com/ubuntu jammy-updates/main amd64 dotnet-runtime-8.0 amd64 8
```

```
Setting up linux-libc-dev:amd64 (5.15.0-153.163) ...
Setting up aspnetcore-targeting-pack-8.0 (8.0.19-0ubuntu1~22.04.1) ...
Setting up ros-humble-tf2-msgs (0.25.16-1jammy.20250725.164219) ...
Setting up libwbclient0:amd64 (2:4.15.13+dfsg-0ubuntu1.7) ...
Setting up ros-humble-tf2 (0.25.16-1jammy.20250725.164248) ...
Setting up mongodb-org-shell (8.0.13) ...
Setting up libglib2.0-data (2.72.4-0ubuntu2.6) ...
Setting up linux-hwe-6.8-headers-6.8.0-79 (6.8.0-79.79~22.04.1) ...
Setting up dotnet-apphost-pack-8.0 (8.0.19-0ubuntu1~22.04.1) ...
Setting up mongodb-database-tools (100.13.0) ...
Setting up ros-humble-tf2-ros (0.25.16-1jammy.20250725.165207) ...
Setting up mongodb-org-mongos (8.0.13) ...
Setting up mongodb-org-database-tools-extra (8.0.13) ...
Setting up ros-humble-laser-geometry (2.4.0-2jammy.20250728.065204) ...
Setting up linux-modules-6.8.0-79-generic (6.8.0-79.79~22.04.1) ...

Progress: [ 64%] [##################################################.........................]
```

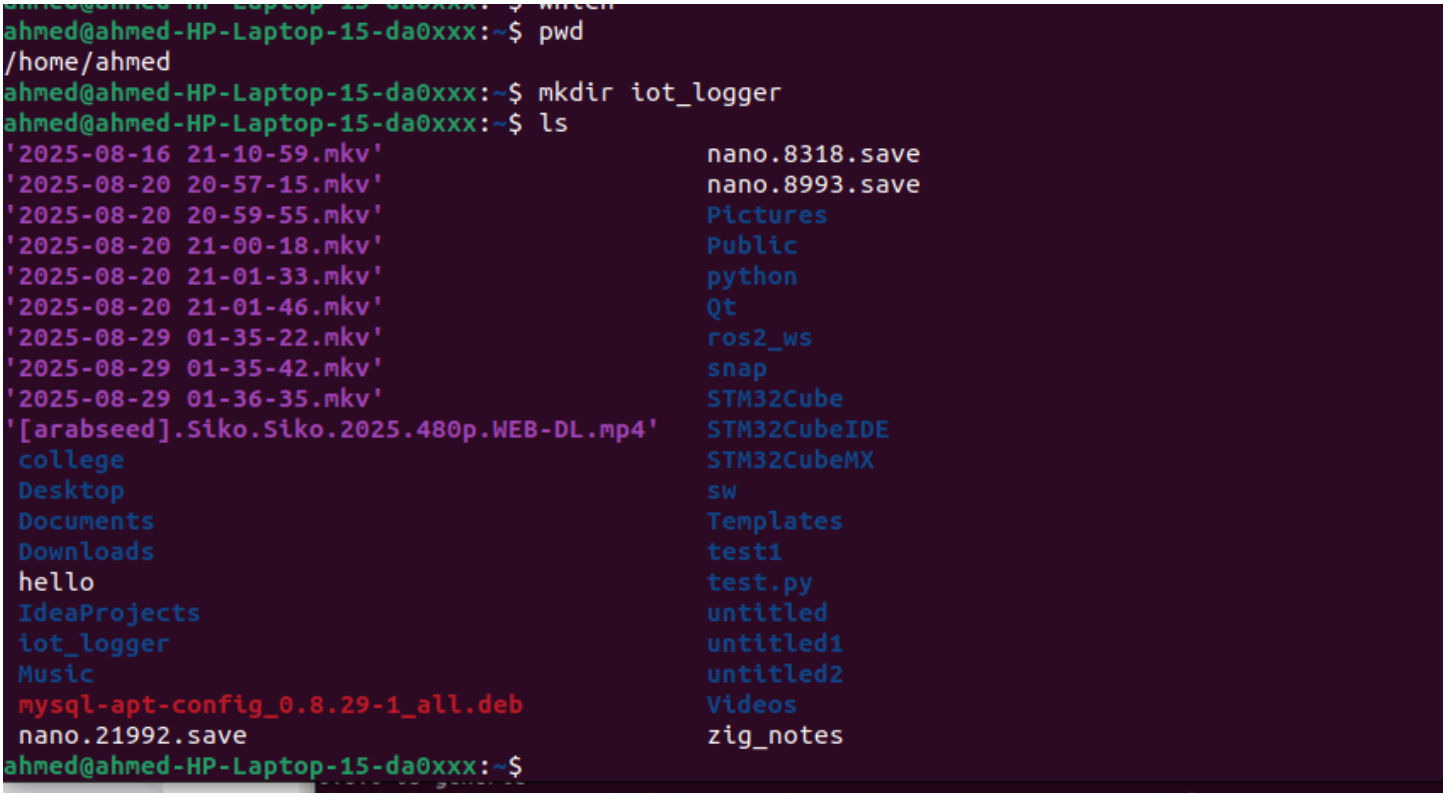
```
Sourcing file `/etc/default/grub.d/init-select.cfg'
Generating grub configuration file ...
Found linux image: /boot/vmlinuz-6.8.0-79-generic
Found initrd image: /boot/initrd.img-6.8.0-79-generic
Found linux image: /boot/vmlinuz-6.8.0-65-generic
Found initrd image: /boot/initrd.img-6.8.0-65-generic
Found linux image: /boot/vmlinuz-6.8.0-64-generic
Found initrd image: /boot/initrd.img-6.8.0-64-generic
Memtest86+ needs a 16-bit boot, that is not available on EFI, exiting
Warning: os-prober will be executed to detect other bootable partitions.
Its output will be used to detect bootable binaries on them and create new boot entries.
Found Windows Boot Manager on /dev/sda1@/EFI/Microsoft/Boot/bootmgfw.efi
Adding boot menu entry for UEFI Firmware Settings ...
done
ahmed@ahmed-HP-Laptop-15-da0xxx:~/college/Courses/SIC/SIC_intern$
```

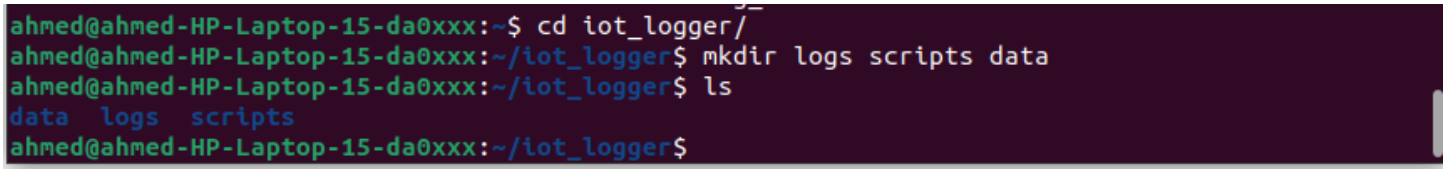
- **Verify system details: kernel version, user, time.**

```
ahmed@ahmed-HP-Laptop-15-da0xxx:~/college/Courses/SIC/SIC_intern$ uname -r
6.8.0-65-generic
ahmed@ahmed-HP-Laptop-15-da0xxx:~/college/Courses/SIC/SIC_intern$ whoami
ahmed
```

```
ahmed@ahmed-HP-Laptop-15-da0xxx:~/college/Courses/SIC/SIC_intern$ date
Sun Aug 31 11:56:25 AM EEST 2025
ahmed@ahmed-HP-Laptop-15-da0xxx:~/college/Courses/SIC/SIC_intern$
```

- **Create /home/<username>/iot_logger with subdirectories: logs, scripts, data.**

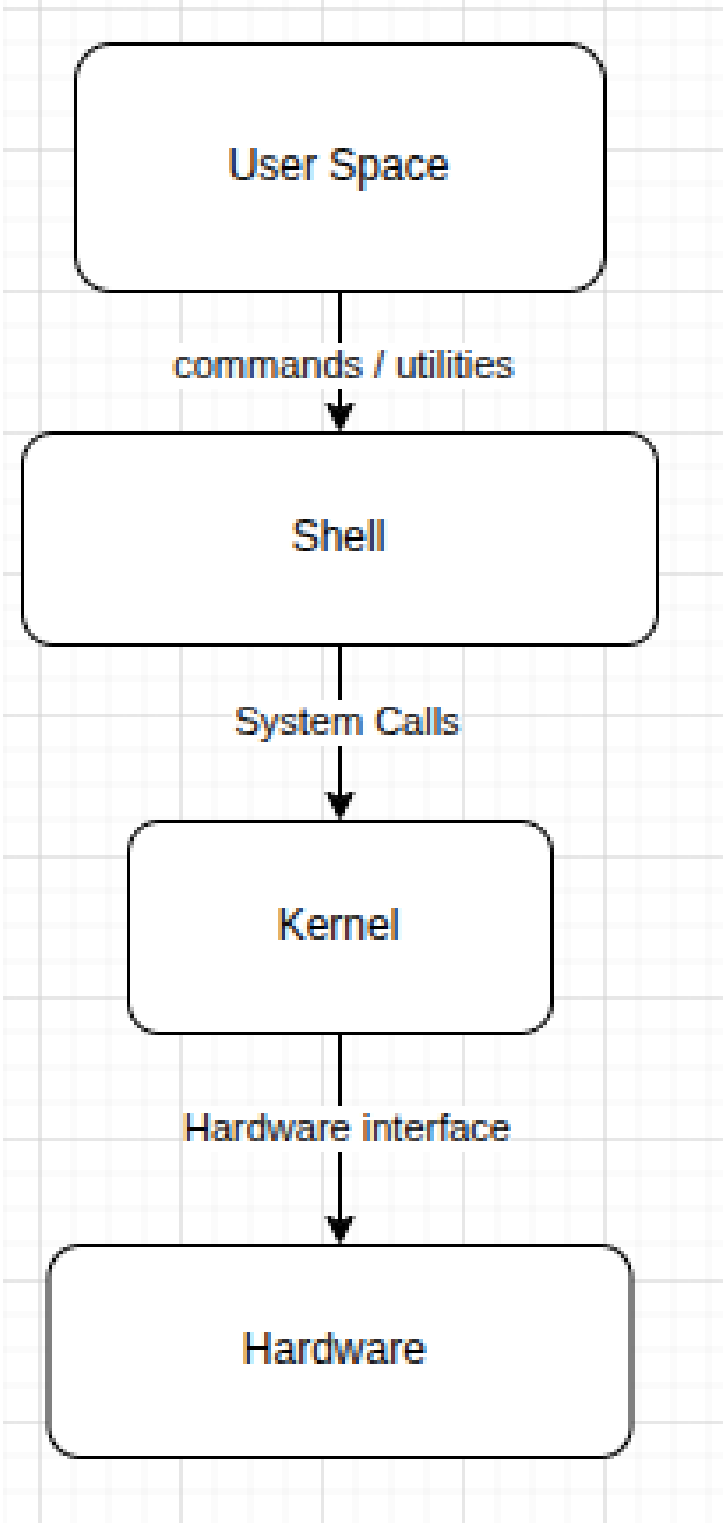




Open-Ended Questions:

- **Draw or describe the Linux architecture layers (hardware → kernel → shell → user space). Where do system calls fit?**

Hint : I used draw.io website to draw this.



- **Explain the purpose of these directories: /, /bin, /sbin, /usr, /etc, /var.**

/ → the head of the file system in linux. It contains other directories of the system such as home, bin,...etc

/bin → contains the needed commands and utilities such as cp,mv... etc

/sbin → contains commands of the root user such as ifconfig

/usr → contains the user applications and utilities

/etc → contains configuration files such as passwd

/var → contains variable data that changed during the operation of the system

- **Why does Linux treat everything as a file? Explain the difference between a program and a process.**
  - for simplicity → every thing is a file which means that we have only one interface (file interface) to deal with this files so we can learn the syscalls we need to deal with a file and control any thing in linux.
  - hide the details of the hardware → if we want to deal with an external device linux provide to us a file we can use and read or write on it the command or data we need to pass to the external device.
  - program → it is lines of code we develop to do anything it is stored on hard disk
  - when we load this program to the RAM it become a process and we execute this process on the CPU.