

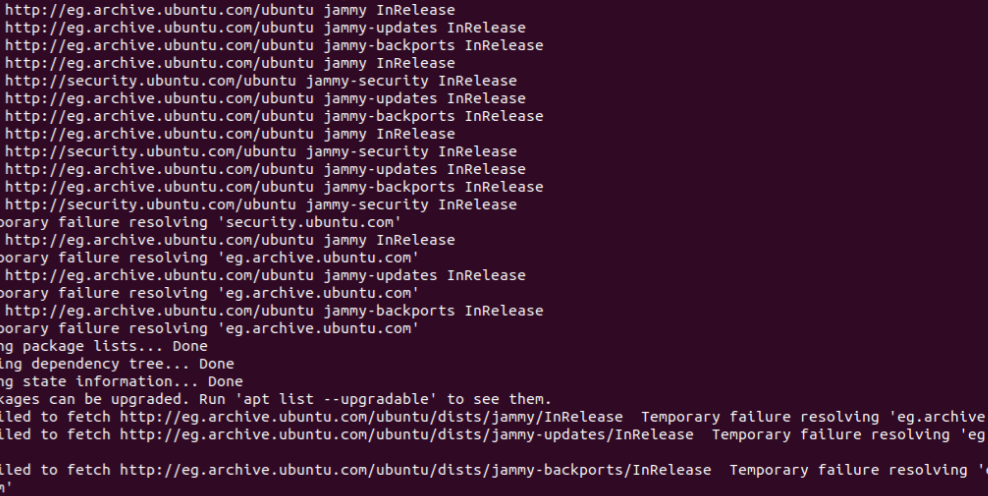
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# SIC7\_Task.Phase1

## Part1: Tasks

1. Refresh package lists and upgrade the system:



```

basant@basant-VirtualBox:~$ sudo apt update
[sudo] password for basant:
Ign:1 http://security.ubuntu.com/ubuntu jammy-security InRelease
Ign:2 http://eg.archive.ubuntu.com/ubuntu jammy InRelease
Ign:3 http://eg.archive.ubuntu.com/ubuntu jammy-updates InRelease
Ign:4 http://eg.archive.ubuntu.com/ubuntu jammy-backports InRelease
Ign:2 http://eg.archive.ubuntu.com/ubuntu jammy InRelease
Ign:1 http://security.ubuntu.com/ubuntu jammy-security InRelease
Ign:3 http://eg.archive.ubuntu.com/ubuntu jammy-updates InRelease
Ign:4 http://eg.archive.ubuntu.com/ubuntu jammy-backports InRelease
Ign:2 http://eg.archive.ubuntu.com/ubuntu jammy InRelease
Ign:1 http://security.ubuntu.com/ubuntu jammy-security InRelease
Ign:3 http://eg.archive.ubuntu.com/ubuntu jammy-updates InRelease
Ign:4 http://eg.archive.ubuntu.com/ubuntu jammy-backports InRelease
Err:1 http://security.ubuntu.com/ubuntu jammy-security InRelease
  Temporary failure resolving 'security.ubuntu.com'
Err:2 http://eg.archive.ubuntu.com/ubuntu jammy InRelease
  Temporary failure resolving 'eg.archive.ubuntu.com'
Err:3 http://eg.archive.ubuntu.com/ubuntu jammy-updates InRelease
  Temporary failure resolving 'eg.archive.ubuntu.com'
Err:4 http://eg.archive.ubuntu.com/ubuntu jammy-backports InRelease
  Temporary failure resolving 'eg.archive.ubuntu.com'
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
7 packages can be upgraded. Run 'apt list --upgradable' to see them.
W: Failed to fetch http://eg.archive.ubuntu.com/ubuntu/dists/jammy/InRelease Temporary failure resolving 'eg.archive.ubuntu.com'
W: Failed to fetch http://eg.archive.ubuntu.com/ubuntu/dists/jammy-updates/InRelease Temporary failure resolving 'eg.archive.ubuntu.com'
W: Failed to fetch http://eg.archive.ubuntu.com/ubuntu/dists/jammy-backports/InRelease Temporary failure resolving 'eg.archive.ubuntu.com'
W: Failed to fetch http://security.ubuntu.com/ubuntu/dists/jammy-security/InRelease Temporary failure resolving 'security.ubuntu.com'
W: Some index files failed to download. They have been ignored, or old ones used instead.
basant@basant-VirtualBox:~$

```

The screenshot shows a terminal window with the following content:

```

basant@basant-VirtualBox: ~
$ sudo apt upgrade -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done

The following NEW packages will be installed:
  linux-headers-6.8.0-79-generic linux-hwe-6.8.0-79
  linux-hwe-6.8-tools-6.8.0-79 linux-image-6.8.0-79-generic
  linux-modules-6.8.0-79-generic
  linux-modules-extra-6.8.0-79-generic
  linux-tools-6.8.0-79-generic

The following packages have been kept back:
  libpam-sssd

The following packages will be upgraded:
  grub2 libudisks2-0 libudisks2-0 linux-generic-hwe-22.04
  linux-headers-generic-hwe-22.04 linux-image-generic-hwe-22.04
  libudisks2

6 upgraded, 7 newly installed, 0 to remove and 1 not upgraded.
3 standard LTS security updates
Need to get 142 MB/143 MB of archives.
After this operation, 767 MB of additional disk space will be used.

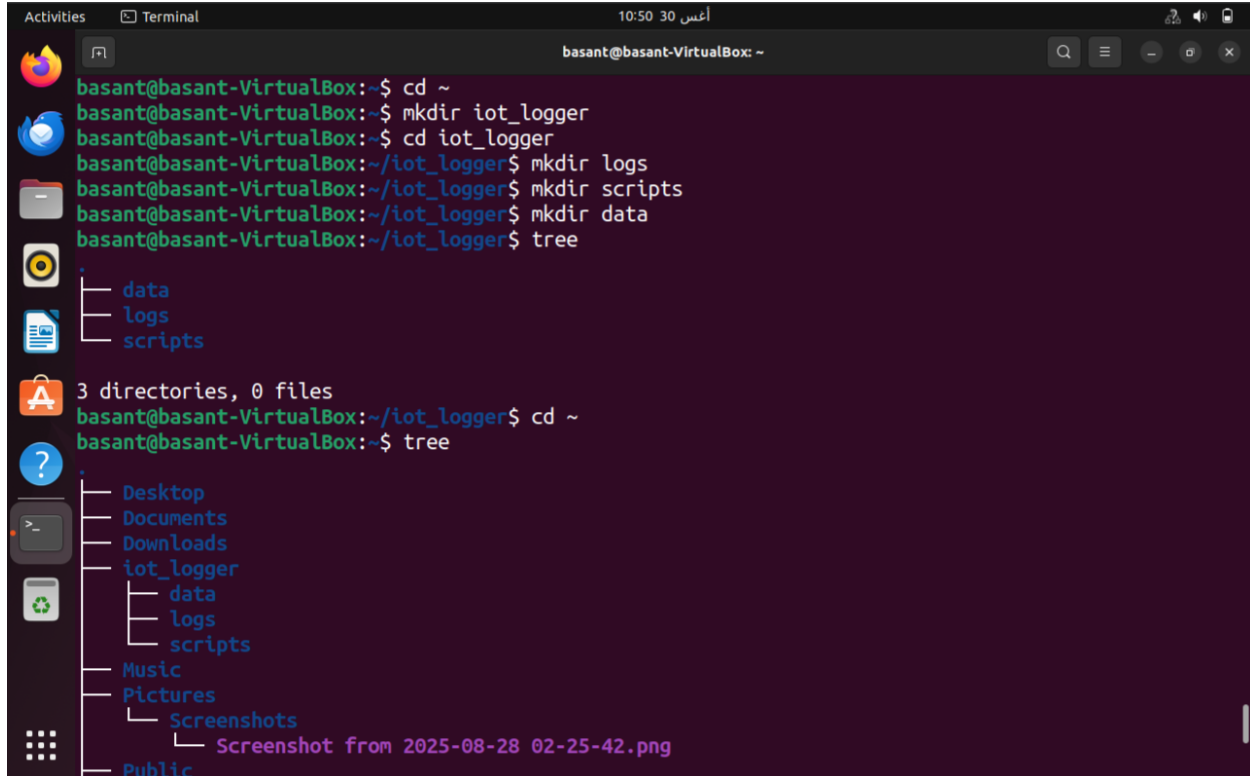
```

```
Activities Terminal 10:41 30 أغسطس
basant@basant-VirtualBox: ~
Setting up linux-image-generic-hwe-22.04 (6.8.0-79.79~22.04.1) ...
Setting up linux-generic-hwe-22.04 (6.8.0-79.79~22.04.1) ...
Processing triggers for man-db (2.10.2-1) ...
Processing triggers for dbus (1.12.20-2ubuntu4.1) ...
Processing triggers for libc-bin (2.35-0ubuntu3.10) ...
Processing triggers for linux-image-6.8.0-79-generic (6.8.0-79.79~22.04.1) ...
/etc/kernel/postinst.d/initramfs-tools:
update-initramfs: Generating /boot/initrd.img-6.8.0-79-generic
/etc/kernel/postinst.d/zz-update-grub:
Sourcing file '/etc/default/grub'
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-6.8.0-78-generic
Found initrd image: /boot/initrd.img-6.8.0-78-generic
Found linux image: /boot/vmlinuz-6.8.0-40-generic
Found initrd image: /boot/initrd.img-6.8.0-40-generic
Found memtest86+ image: /boot/memtest86+.elf
Found memtest86+ image: /boot/memtest86+.bin
Warning: os-prober will not be executed to detect other bootable partitions.
Systems on them will not be added to the GRUB boot configuration.
Check GRUB_DISABLE_OS_PROBER documentation entry.
done
basant@basant-VirtualBox:~$
```

## 2. Verify system details:

```
basant@basant-VirtualBox:~$ uname -r
6.8.0-78-generic
basant@basant-VirtualBox:~$ whoami
basant
basant@basant-VirtualBox:~$ date
30 2025 أغسطس EEST 10:45:46 ص
basant@basant-VirtualBox:~$
```

### 3. Create directory and Subdirectories:



```
basant@basant-VirtualBox:~$ cd ~
basant@basant-VirtualBox:~$ mkdir iot_logger
basant@basant-VirtualBox:~$ cd iot_logger
basant@basant-VirtualBox:~/iot_logger$ mkdir logs
basant@basant-VirtualBox:~/iot_logger$ mkdir scripts
basant@basant-VirtualBox:~/iot_logger$ mkdir data
basant@basant-VirtualBox:~/iot_logger$ tree
.
├── data
├── logs
└── scripts
3 directories, 0 files
basant@basant-VirtualBox:~/iot_logger$ cd ~
basant@basant-VirtualBox:~$ tree
.
├── Desktop
├── Documents
├── Downloads
├── iot_logger
│   ├── data
│   ├── logs
│   └── scripts
├── Music
├── Pictures
├── Screenshots
├── Screenshot from 2025-08-28 02-25-42.png
└── Public
```

## Part 2: Open Ended Questions

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

Ans.

The Linux is a layered structure operating system consisting of:

- Hardware: the first layer containing all the hard components like the CPU, memory, hard disk, devices, etc.
- Kernel: the core or the heart of the OS which manages the hardware directly. Where the **system calls** are executed.
- Shell: the interface between the user and the kernel where the commands are written to be translated to **system call** to be executed by the kernel.

- User Space: the applications and utilities the user deal with.

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

/: the root of everything where everything starts.

/bin: the toolbox of everyone including the basic tools that can be needed like ls, cp, mv.

/sbin: the toolbox for admins including the tools used only for system administration.

/usr: includes all the installed programs and applications.

/etc: includes the configuration files and the settings

/var: include the changing data

**3. Why does Linux treat everything as a file? Explain the difference between a program and a process:**

Ans.

- Treating everything as a file creates a uniform interface to enable accessing everything using the same file operation (using the same commands)
- Program is the written instructions stored on the disk
- Process is the running or the execution of the program on the memory