The Kernel of an operating system

The kernel is the most basic level or core of an operating system, responsible for managing resources including memory management, file management and security.

It is thought to be the program which controls other programs on the computer. The kernel lies below the user interface.

When a system uses Linux, the Linux part is the kernel and the user interface lies on top. This allows Linux users to customise their user interface.

This has the task of

1. **Loading/unloading the applications into the memory** and making sure they do not cause conflicts with one another. The kernel also unloads programs from the memory so identifies free space in memory and allocates it to be reused.
2. **Sharing the processing time** between programs and tasks efficiently by scheduling tasks to run on the CPU, allowing for multi-tasking.
3. **File management**: Handling the storage to and from secondary storage devices (HDD/SSD/OPTICAL).
4. **Data security:** The kernel is responsible for preventing rogue applications harming other programs or the device itself. Faulty programs are denied access to memory that has not been allocated to them and their CPU time restricted.
5. **Networking**: It provides services so that programs can request the use of the network card (or other peripherals like webcams)

The kernel of each operating system is designed with different duties in mind

- For a mobile smartphone, memory is a limited resource and so the kernel has a very efficient memory management system.
- A single user, single application operating system will not have to deal with networking, unlike the networking operating system.
- A multi-user-multi-tasking operating system has a complex system to efficiently share processing time between vast amounts of users running many threads within multiple processes.