Al-Hamdaniya University

College of Education

Computer Science

Stage: 4th

Operating System (OS)

- **Resident Monitor:**

  The resident monitor controls the instructions and performs all necessary functions. It also works like job sequencer because it also sequences the job and sends them to the processor.

  After scheduling the job Resident monitors loads the programs one by one into the main memory according to their sequences. One most important factor about the resident monitor is that when the program execution occurred there is no gap between the program execution and the processing is going to be faster.

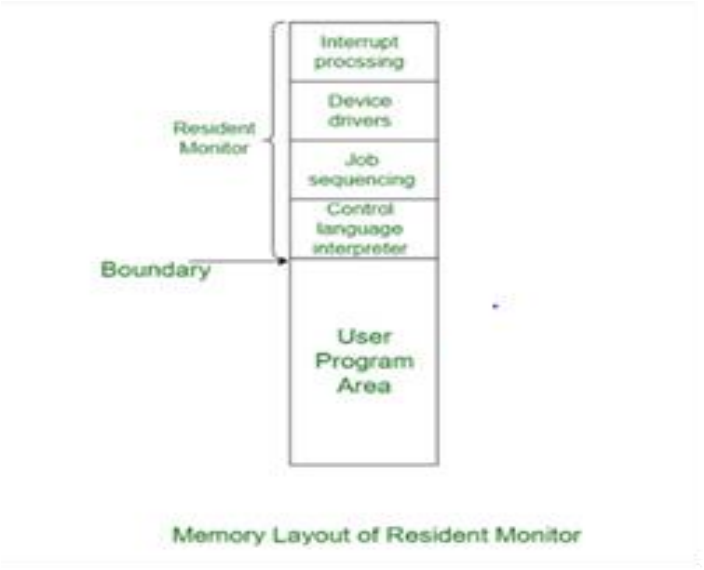
- **The Resident monitors are divided into 4 parts as:**

  1. Control Language Interpreter

  2. Loader

  3. Device Driver

  4. Interrupt Processing



Memory Layout of Resident Monitor

1- Control Language Interpreter:

The first part of the Resident monitor is control language interpreter which is used to read and carry out the instruction from one level to the next level.

2-Loader

The second part of the Resident monitor which is the main part of the Resident Monitor is Loader which Loads all the necessary system and application programs into the main memory.

3- Device Driver:

The third part of the Resident monitor is Device Driver which is used to manage the connecting input-output devices to the system. So basically it is the interface between the user and the system.

4- Interrupt Processing:

The fourth part as the name suggests, it processes the all occurred interrupt to the system.

➢ Advent of I/O devices

Input/output devices play a crucial role in computer programming by streamlining how computing devices communicate across a network. All types of data movement within a system rely on I/O operations, including audio files, software instruction sets, text and video.

Input/output falls into two categories:

- Hard I/O refers to a straightforward transfer of data that occurs between a computer and an external physical device, such as a keyboard or a mouse.
- Soft I/O occurs when data is transferred between computers or servers over a network, such as streaming media or file sharing.

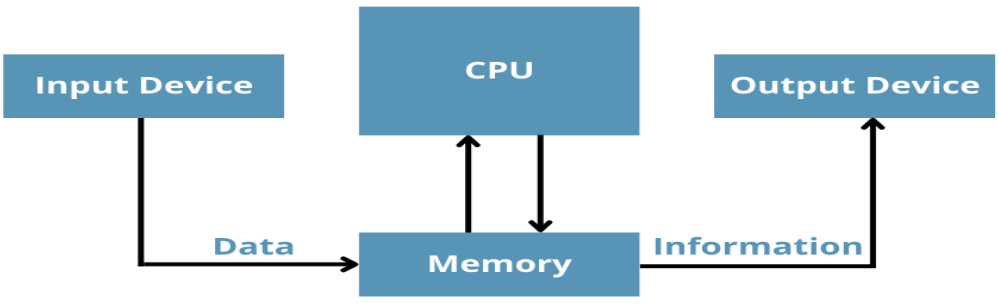
I/O operations are calculated based on the number of operations that occur per second, also known as IOPS, or as a measure of transfer speed.

Difference Between Input and Output Devices

Input Devices	Output Devices
The data here is accepted from the user's end.	The processed data is reflected to the user.
The user directly commands it.	The processor commands it.
The instruction is converted from a user-friendly format to a machine-friendly format.	It converts machine-friendly instruction to user-friendly instruction.
The data is taken from the user to the processor for execution.	The data is sent from the processor to the user after being processed.
Input devices help the computer in accepting the data.	The output devices help in displaying the data.
Its design is very complex.	The design of output devices is less complex than compared to the input devices.
A few examples of it are Keyboard, Image scanners, Microphones, Pointing devices, etc.	A few examples are Monitors, Printers, Plotters, etc.

- **I/O functions:**
  - **Programmed I/O**
  - **Interrupt-driven I/O**

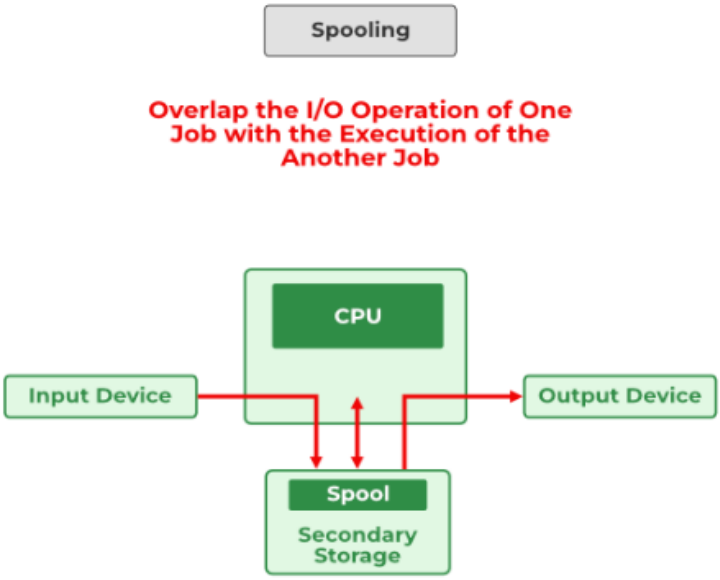
    Direct memory access (DMA)



I/O structure

➢ Spooling in OS

Spooling is the process of temporary storage of data for use and execution by a device, program, or system. Data is sent to and stored in main memory or other volatile storage until it is requested for execution by a program or computer.



- **How Spooling Works in Operating Systems?**

1- Spooling requires the creation of a buffer known as SPOOL, which is used to hold off jobs and data until the device in which the SPOOL is created is ready to use and execute the job or operate on the data.

2- A device can connect to multiple input devices, each of which may require some data processing.

3- After the CPU generates some output, this output is first saved in the main memory. This output is transferred to the secondary memory from the main memory, and from there, the output is sent to the respective output devices.

Example

Printing is the most obvious application of Spooling. The documents to be printed are saved in the SPOOL and then added to the printing queue. During this time, many processes can run and use the CPU without waiting while the printer runs the printing process on each document one by one.

➢ Buffering in OS

Basically, buffering in operating system is a method of storing data in a buffer or cache temporarily, this buffered data then can be accessed more quickly as compared to the original source of the data.

- **Reasons of Buffering**
    - Buffering creates a synchronization between two devices having different processing speed. For example, if a hard disc (supplier of data) has high speed and a printer (accepter of data) has low speed, then buffering is required.
    - Buffering is also required in cases where two devices have different data block sizes.
    - Buffering is also required to support copy semantics for application I/O operations.

- **Types of Buffering**
    - **Single Buffering**
    - **Double Buffering**
    - **Circular Buffering**