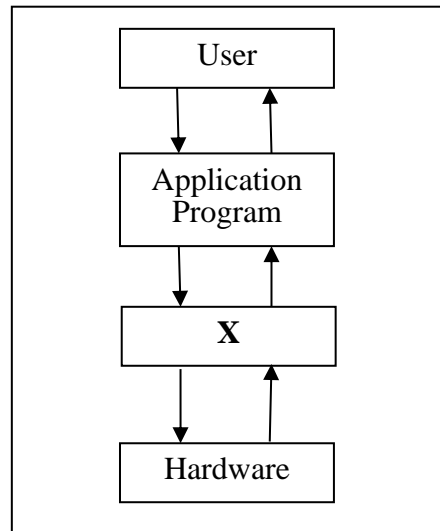


Q1. **Figure 1** shows the interaction among computer system components.



**Figure 1:** Interaction among computer system components

- (i) Identify and define component **X**.
  - **operating system:**
    - ✓ Software that sits between the hardware and application program/user
    - ✓ The most important s/w in a computer system
    - ✓ Controls and coordinates the use of the hardware among the various application programs for the various users.
    - ✓ Running at all time
- (ii) Give **TWO (2)** examples of component **X** in the market. (*exp of pc and phone OS*)
  - Window, Linux
  - Android, IOS
- (iii) Explain **FOUR (4)** functions which performed by component **X**.
  - Make the computer system convenient to use.
  - Use the computer hardware in an efficient manner.
  - Allocate resources to specific programs - thus increasing efficiency of computer system.
  - Controls the execution of user programs and the operations of I/O devices.
- (iv) Provide a scenario to illustrate how users use component **X** while using computer.
  - User use OS **GUI** to evaluate app software and this software will then be able to communicate with the hardware.
  - Another way is user can directly use **CLI** to communicate with computer components.
- (v) List the key elements of component **X**. (4 managers)
  - Processor manager, Memory manager, Device manager, File manager

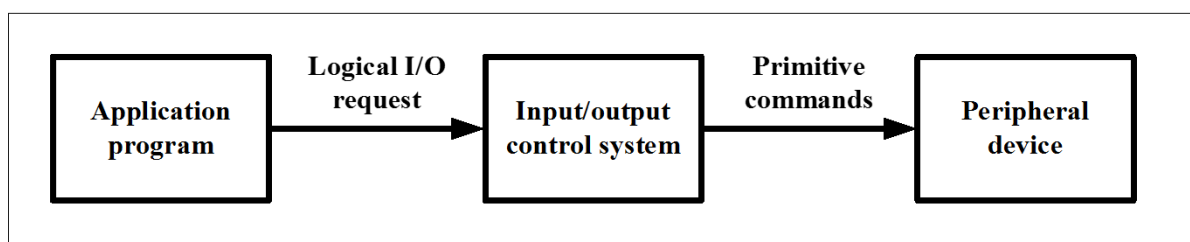
## AACS2284 Operating Systems

Q2. Based on the scenario given below, suggest the most appropriate type of operating system to support the operation respectively. Then justify each of your answer.

- a) A clerk is assigned to print the bills and mail these bills to the customers on a monthly basis.
  - **Batch Systems** - It can process a batch of similar jobs serially without user interaction on routine basis
- b) A multi-function laser printer which offers the features such as print, scan, fax, email, smart-card reader, connection to digital camera and so on.
  - **Embedded Systems** - The multi-function laser printer is added with multiple other features and capabilities.
- c) Windows 10 that makes it possible to run the same application on both a low power tablet or kiosk and a high-end desktop or laptop.
  - **Hybrid system** - Takes advantage of the free time between high-demand usage of the system and low-demand times.
- d) Fuzzy logic system used by automatic rice cooker helps to ensure the rice is properly cooked with a variety of customized cooking options.
  - **Embedded system.** It allows automatic rice cooker to have multiple features and capabilities.
- e) Information kiosk in shopping center that inform the visitors about interesting offers and allow the visitors to search for the shops by criteria such as shop name, shop category, floor plan for the shopping center with optimal guidance to the shops.
  - **Interactive systems.** It can interact with humans and provide a quick response time.

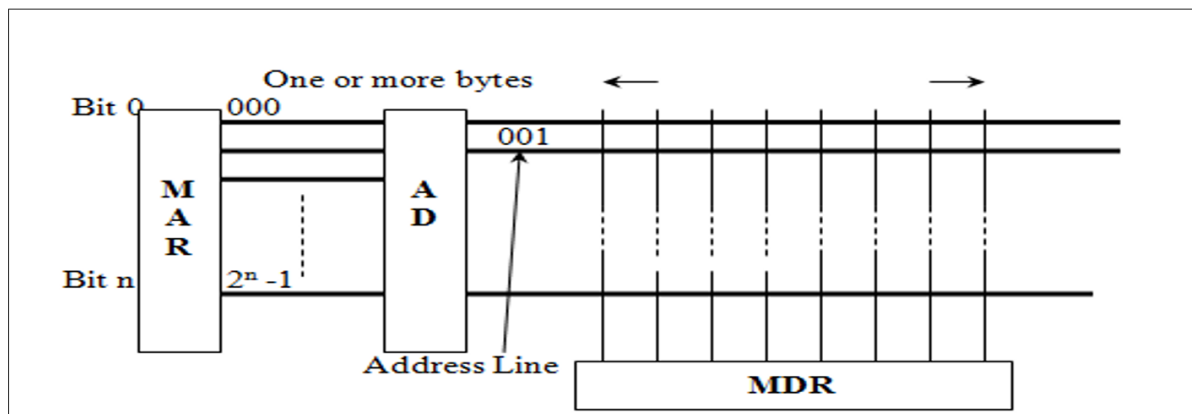
Q3. Briefly describe *I/O Control System and Memory*, and illustrate their operations using a diagram for each.

I/O Control System and Memory



### (1) I/O Control System

- Description: the input/output control system (IOCS) communicates directly with the computer's peripheral devices. Besides that, it generates the primitive commands that control the peripheral device.
  - Logical I/O – the programmer's view-one logical record
  - Physical I/O - the transfer of a physical record between memory and a peripheral device

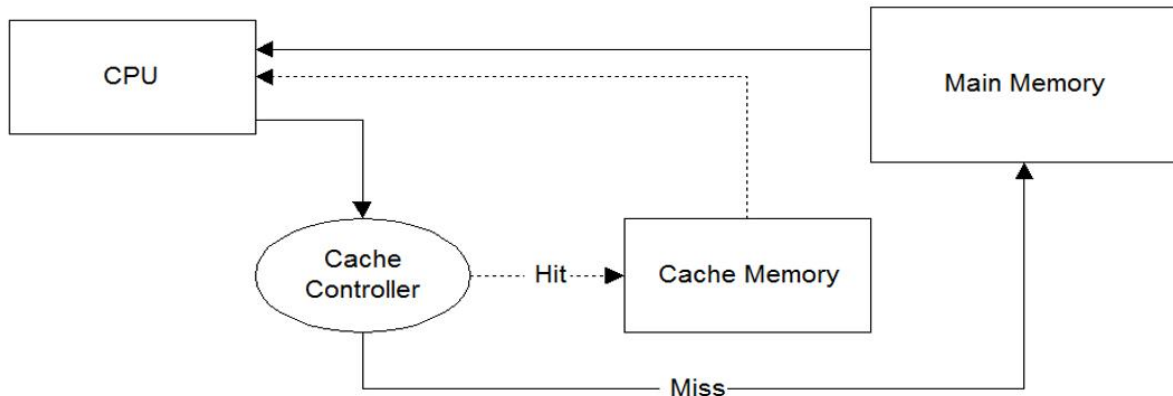


(2) **Memory**

- Description: Memory holds active programs and data. A program must be stored in memory before it can be executed.
- Data must be stored in memory before the computer can manipulate them.
- The memory address register (MAR) and memory data register (MDR) act as an interface between the CPU and Memory,

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Q4. With an aid of a diagram, explain how cache memory can help in speed up your computer processing.



What is cache memory?

- is a staging area for the processor
- is a random access memory that a CPU can access **more quickly** than it can access regular RAM

The program is stored in standard RAM. As the program executes, the active instructions and the active data are transferred to high-speed cache memory. From there, individual instructions and data referenced by those instructions move from cache to the processor, consequently, the processor waits for high-speed cache instead of slower RAM and that increases processing speed.

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### Self-Review

Q1. Differentiate between the various type of operating system in terms of their characteristics and best used. **(midterm !!!)**

Types of OS	Batch	Time sharing	Real time	Hybrid	Embedded
Characteristics	<ul style="list-style-type: none"><li>- Similar job</li><li>- Process serially</li><li>- Max throughput</li></ul>	<ul style="list-style-type: none"><li>- Multiprogramming</li><li>- Interactive</li></ul>	<ul style="list-style-type: none"><li>- Fast</li><li>- Min Delay</li></ul>	<ul style="list-style-type: none"><li>- Batch + Interactive</li><li>- Flexible</li></ul>	<ul style="list-style-type: none"><li>- Add to other product</li><li>- Add features</li></ul>
Execution	FCFS	<b>Round Robin</b>	<b>Priority</b>	<b>Batch at background with interactive</b>	Value Added
Best used for	Serial job	Interactive environment	Time Critical environment	High demand / low demand	Additional features

**Multiprogramming** = 指计算机同时运行多个程序的能力。多任务的一般方法是运行第一个程序的一段代码，保存工作环境；再运行第二个程序的一段代码，保存环境；.....恢复第一个程序的工作环境，执行第一个程序的下一段代码.....现代的多任务，每个程序的时间分配相对平均

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Q2. Discuss the problems that a user might face while interacting with a computer system, which is **without** an operating system.

- Without an operating system computer hardware is only an inactive electronic machine, which is inconvenient to user for execution of programs.
- As the computer hardware or machine understands only the machine language. It is difficult to develop each and every program in machine language in order to execute it.
- Thus, without OS, execution of user program or to solve user problems is extremely difficult.