**Tutorial 1: Introduction (System Software and Hardware Technology)**

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

User

Application Program

**X**

Hardware

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

1. Identify and define component **X.**
   1. **Component X is Operating System**
   2. bridge between hardware and application
   3. Controls and coordinates the use of the hardware among the various application programs for the various users.
2. Give **TWO (2)** examples of component **X** in the market.
   1. Linux, Windows, Android, IOS
3. Explain **FOUR (4)** functions which performed by component **X**.
   1. Make the computer system convenient to use.
   2. Use the computer hardware in an efficient manner
   3. Allocate resources (CPU time, Memory space, file storage) to specific programs
   4. Controls the execution of user programs and the operations of I/O devices
4. Provide a scenario to illustrate how users use component **X** while using computer.
   1. GUI - User can use the GUI to drag and drop while communicating with the computer component
   2. CLI - User can directly use CLI to communicate with computer component

1. List the key elements of component **X**.
   1. Memory manager
   2. Processor manager
   3. Device manager
   4. File manager

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.

1. A clerk is assigned to print the bills and mail these bills to the customers on a monthly basis.
   1. Batch - Running similar jobs on routine basis
2. 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.
   1. Embedded - Adding more feature

1. 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.
   1. Hybrid - Flexible, platform free
2. Fuzzy logic system used by automatic rice cooker helps to ensure the rice is properly cooked with a variety of customized cooking options.
   1. Embedded - Added feature, provide more options
3. 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.
   1. Interactive - info shown is based on user interaction.

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

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| --- | --- | --- | --- |
| (1) I/O Control System   * Description: * communicates directly with the computer’s peripheral devices, where the command processor is the OS module that accepts, interprets and carries out the commands that input by the end-users * Logical I/O - programmer’s view-one logical record * Physical I/O - the transfer of a physical record between memory and a peripheral device * Diagram:  |  | | --- | |  |   (2) Memory   * Description: * Memory holds active programs and data. * Program/data must be stored in memory before it can be execute/manipulate. * Diagram :  |  | | --- | |  | |  | |

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

|  |
| --- |
| Every memory request will go to the cache controller which checks the request against each tag. If there is a hit, which means the address is found in cache memory. On other hand, if the address is not found in cache memory, then main memory will be accessed. |

**Self-Review**

Q1. Differentiate between the various type of operating system in terms of their characteristics and best used.

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| --- | --- | --- | --- | --- | --- |
|  | Batch | Time sharing/Interactive | Real time | Hybrid | Embedded |
| Characteristics | Large amount of similar jobs  Process serially | -Multiprogramming  -  Interactive | fast processing speed | combination of batch and interactive  Flexible, platform free | A Computer inside another product to provide more feature |
| Execution | FCFS | Round robin | Priority | Batch at background, interactive with user | Value added |
| Best used for | Serial job | Interactive environment | Time critical environment | High demand/ low demand | Additional feature |

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

* Computer system will be very not user friendly as user will need to communicate with the hardware using machine language

Q3. One example of an organization that might find batch-mode processing useful would be an archival environment that is backing up a system every night. Give another real-world example with explanation.

* Payroll system - to generate bills for all employee at the end of every month.
* Bank calculate interest