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Computer Organization & Architecture (CER361)

Assignment - 1

Q.1. Explain how the following device works -

(i) CD

- A compact disc (CD) is a circular disc introduced by James Russell. It is 4-
- It is 4.75 in diameter, which is a flat, round, portable storage medium used to record, store and playback audio, video and other data.
- On 17 August 1982, in Germany, the first CD was created at a Philips factory.
- Sony and Philips proposed the CD standard, and in 1993 the technology was introduced to the U.S.
- It can store data upto 700 MB or 80 minutes of audio
- It stores data as small notches and read with the help of laser from an optical drive, and the notches are converted into usable data by drives.
- CDs or Compact Disks are optic readable media.
- CDs are the replacement of the phonograph disc.
- The main material of the CD is plastic.
- The shape of the plastic is circular and one side of the circular plastic is coated with the reflecting metal coating, usually aluminum.
- Data can be stored much more densely in optic media than in magnetic media, like Hard disk.

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- Optic media have a much longer life span.
- Millions of bits are burned into this coating.
- CDs are used to store data, which can be executed in the future.
- Thus, you can load software programs in the compact disc that can be moved onto the computer.
- Even, Windows files are also stored in the CD, which can be installed onto the computer.
- Furthermore, the stored files on the compact disc can be transferred to other computers, through which you can make a backup of all files.
- The data is read in the form of pits, each pits is of 0.83-micrometre & data is arranged as a spiral track from the disc's inner hole to its outer edge, because the CD is of circular shape.

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(ii) DVD

- DVD stands for Digital Versatile Disc. It is commonly known as Digital Video Disc.
- It is a digital optical disc storage format used to store high capacity data like high quality videos and movies.
- It is also used to store operating system.
- It is invented and developed by 4 companies named Philips, Sony, Toshiba and Panasonic in 1995.
- DVDs provide higher storage capacity than CDs (compact disc) and can be played in multiple types of players like DVD players.
- Optical data storage is a method of storing digital information (1's & 0's) by using light to read the information.
- Analog information is converted into digital information, which is then encoded onto the disc from the inside edge out.
- Digital data are encoded by means of pits on the recording layers of the disc.
- The encoding is done using a technique referred to as EFM, eight-to-fourteen-modulation in CDs & EFMPs, eight-to-sixteen-modulation in DVDs.
- The pits and the separations blw pits, called lands, vary in length to represent the digital information stored in the disc.
- The pits are arranged in a track that forms a spiral patters on the recording layer of the disc.
- The disc revolves a circular motion inside the player, while an optical head layer slowly moves outward & remains focused on the pits.
- The laser beam is reflected back to a detector when it hits the land, & is scattered away from the detector by the pits.
- The transite on blw a pit & a land corresponds to a "1" in the digital bit stream.

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(iii) Printer

- A printer is a hardware output device that is used to generate hard copy and print any document.
- A document can be of any type such as a text file, image or the combination of both. It accepts input command by users on a computer or on other devices to print the documents.
- For example, if you have to submit a project report at your college, you need to create a soft copy of your report and print it with the help of the printer.

- Printers are one of the common computer peripheral devices that can be classified into two categories that are 2D and 3D printers.
- The 2D printers are used to print text and graphics on a paper, and 3D printers are used to create three dimensional physical objects.
- Although there are different types of printers, nowadays two types of printers are commonly used, which are inkjet and laser printers.
- Following are the types of printers:-

(i) Inkjet Printers
(ii) Laser Printers
(iii) 3D Printers
(iv) LED Printers
(v) Solid Ink Printers
(vi) Dot Matrix Printers
(vii) Thermal Printer

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(iv) Mouse

- Mouse is the most popular pointing input device.
- It is a very famous cursor-control device having a small palm size box with a round ball as its base, which senses the movement of the mouse and sends corresponding signals to the CPU when the mouse buttons are pressed.
- Generally, mouse controls a cursor in a GUI and can move and select text, icons, files and folders.
- A typical mouse contain these parts :-

(i) LED Light
(ii) Scroll Wheel
(iii) Prism
(iv) Rotary Encoder
(v) CMOS Light Sensor
(vi) Switch Buttons
(vii) DSP Chip
(viii) USB Outlets

- These are three basic types of mouse :-

(i) Mechnical Mouse

- Mechanical mouse has a rubber or metal ball on its underside that can roll in all directions. Mechnical sensors within the mouse detect the direction the ball is rolling and move the screen pointer accordingly.

(ii) Optical - Mechanical Mouse

- Optical - Mechanical mouse use a combination of optical and mechanical technologies.
- Same as mechanical mouse, but only difference was in the type of sensor used for movement tracking.

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- It has two rotating wheels mounted at 90° to each other.

(iii) Optical Mouse

- Uses a layer to detect the mouse's movement.
- Optical mouse have no mechanical moving parts.
- This type of mouse has no wheels or balls.
- It has light emitting diode (LED) and a photodiode assembly.
- They respond more quickly and preciesly then mechanical and opto-mechanical mouse, but they are also more expensive.

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(v) Flash Memory

- Flash memory is a type of electronically erasable programmable read-only memory (EEPROM).
- Flash memory is a non-volatile memory chip used for storage and for transferring data between a personal computer (PC) and digital devices.
- It has the ability to be electronically reprogrammed and erased.
- It is often found in use flash driver MP3 player, digital cameras and solid state drives.

- Flash memory comes built into solid-state chips, and each chip houses an array of flash memory cells.
- Rather than use the traditional electromechanical method, flash memory uses electrical circuits to log data.
- Here's the process:

1. Current flows through the transistor between each cell's source (electric input) and drain (electric output).
2. The transistor controls the current's path of by acting as an on-off switch, or a gate.
3. An "on" transistor allows the flow of electrons across the cell, which stores a 1 in binary code.
4. An "off" transistor blocks electrons and stores a 0.

- Volatile memory like random access memory (RAM) returns all the gates to the 0 state when the power source turns off, thus erasing all stored data.
- But ROM, including flash memory, works by adding a second gate, known as the "floating gate" to each cell.