Information Technology
COMPUTERS

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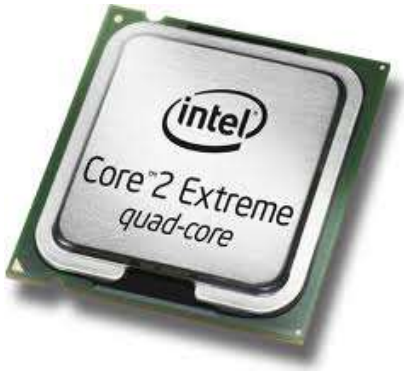
Computer Hardware

- Computer hardware is construed of the following:
  - Central Processing Unit (CPU)
  - Memory
  - Storage
  - Input Equipment
  - Output Equipment
  - Connectivity Equipment

Central Processing Unit

- The CPU is a microprocessor that is made up of millions of microscopic transistors embedded in a circuit on a silicon wafer
- CPU performs the actual computation inside the computer and hence it is the brain of the computer.
- CPU is constructed of the control unit, the arithmetic logic unit (ALU) and the registers.
- Buses or electrical pathways which determine the flow of information within the CPU



CPU

- The processing speed of the CPU will determine the overall capability of the computer. Faster processing speed will mean a higher performance for the computer.
- All chip activities and speed is measured in hertz. Millions of cycle per second is called Megahertz (MHz), while billions of cycles per second is called Gigahertz (GHz)
- Wider the bus, more data can be moved with faster processing
- The word length is the number of bits (0 and 1) that can be processed by the CPU at any given time. Majority of chips today are 64 bit, while most simple PC are 32 bit.

Advances in CPU Design

- Innovations in chip design are coming at a faster rate in concordance with the Moore's Law
- Moore's Law states that microprocessor complexity would double approximately every two years.
- Transistors are becoming more miniaturized and the physical layouts of chips allow building of smaller chips.
- New materials are being used to help improve conductivity or the flow of electricity in chips. Faster travelling of electrons in the Cpu will increase the speed and the performance.
- Also less heating of the chips also increase performance.

Computer Data Processing

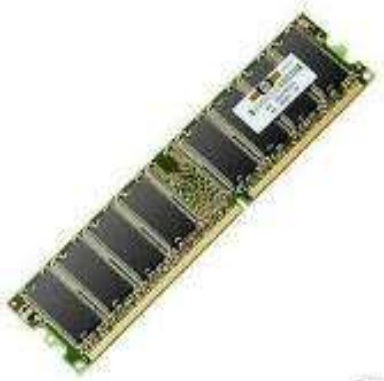
- CPU's can only process data in the form of O's and 1's. All information must be translated to 0's and 1's before it can be processed.
- One bit is either 0 or 1.
- When 8 bits come together they form a byte and one byte can be used to represent one alphanumeric character.
- Hence, memory and the storage capacity of computers are measured in bytes.

Bytes

- 1 bit = 0 or 1
- 1 byte = 8 bits
- 1 Kilobyte (KB) is 1000 bytes = 1024 bytes (exact)
- Megabyte (MB) is one million bytes =1,048,576 bytes or 1024 x 1024 bytes
- Gigabyte is one billion bytes or it is equivalent to 1,073,741,824 bytes or 1024 x 1024 x 1024
- Terabyte is one trillion bytes
- For example, a typical MP3 music file is 15-20 MB while a movie may be in the order of 1 GB and a typical word file may be in the KB range.

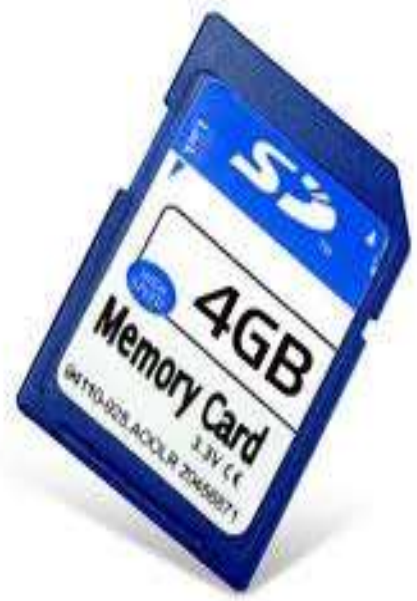
Random Access Memory (RAM)

- Whenever you open your computer and start your operating system, all of the instructions in the software will be played (read) from the RAM or Random Access Memory
- Any software that you work will load itself to RAM as soon as it opens (such as MS Word)
- RAM is temporary and volatile. Thus, as soon as you switch off your computer, the contents in the RAM are lost immediately.
- Most computers come with 2 GB RAM today



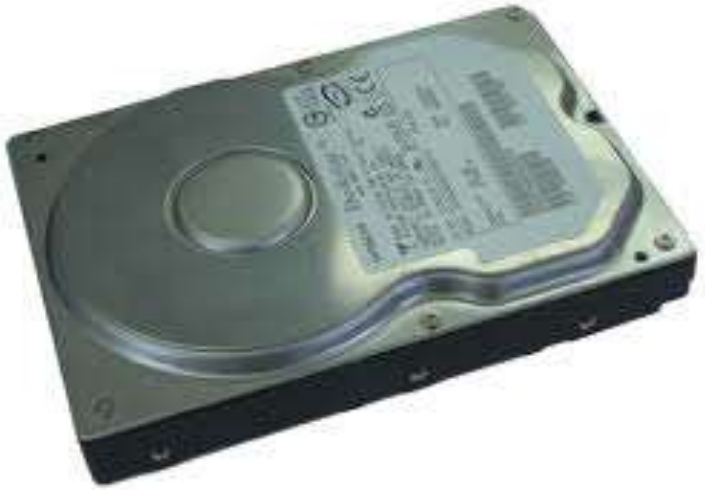
Memory Cards

- Nowadays, the data on PDAs, cell phones, digital cameras and other digital devices are interchangeable with computer data.
- Hence, Memory Cards have become very common such as SD cards as you can transfer data from your phone, PDA to your computer easily.
- Usually, these range around 1 to 4 GB and they are used for small file exchange.



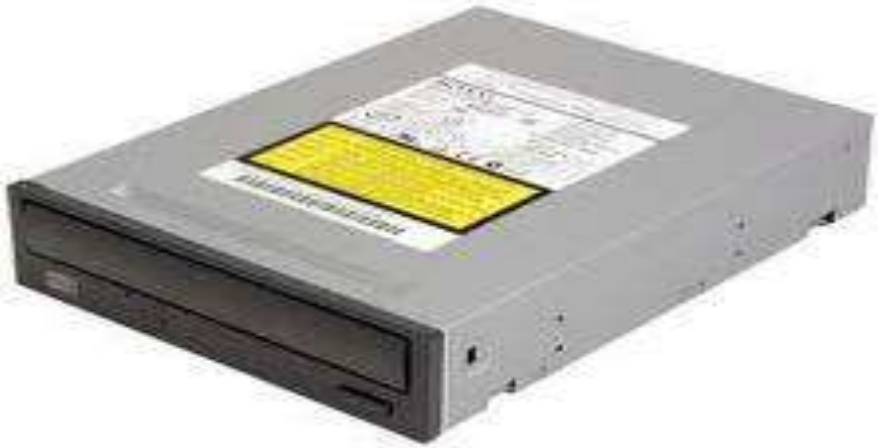
Storage Devices: Harddisks

- Hard disks are perhaps the second important component in a computer as it is the component that stores data permanently even when the computer is switched off.
- A typical harddisk today starts at 120 GB or more. It is possible to have harddisks in the capacity of Terrabytes (1 trillion bytes or 1000 GB)



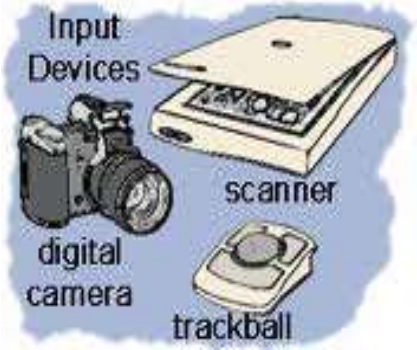
Optical Devices for Computers

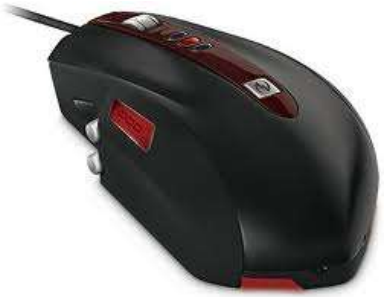
- Both for the purpose of inputting and outputting, it is possible to use Optical Devices for computers.
- Optical devices include CD-Rom, DVD – ROM, CD-Writer, DVD Writer
- Nowadays DVD Writers are the norm and optic technologies use laser beams to read or write data.
- A typical DVD disk will store around 4.7 GB of data.

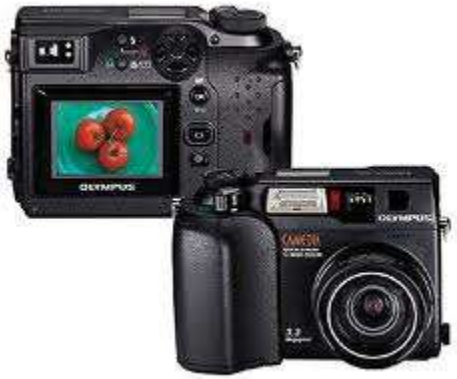


Input Devices

- Variety of input devices exist for the computer with keyboard and mouse being the most common input devices
- Some other input devices include trackball, digital pen, joystick and VGA camera for visual input and microphone for audio input.
- Nowadays, touch screens are also becoming common for inputting information.
- Scanners are for inputting scanned information to the computers.

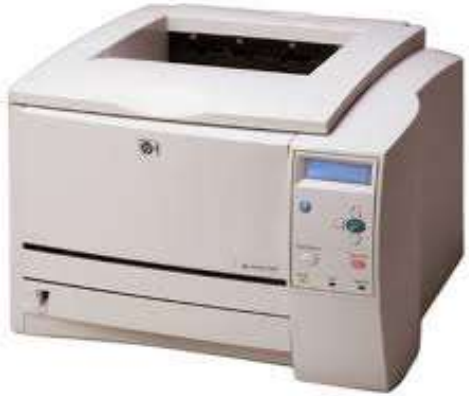


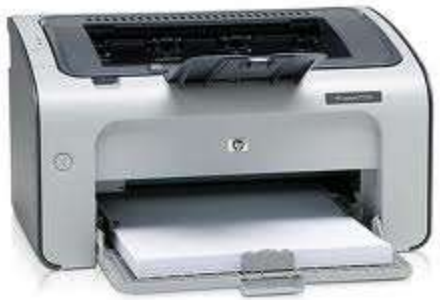




Output Devices

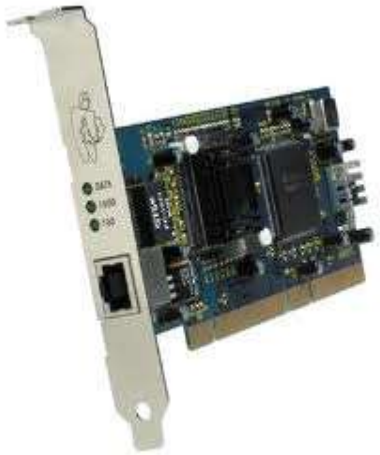
- Output devices are essential for outputting the data processed by the computer
- The primary output device used by computers is monitor. It allows all data to be graphically displayed as text and graphics to the user.
- Printers are for providing output on paper. Most common printers are inkjet printers and laser printers





Communication Devices

- Some communication devices that most computers posses are modems and ethernet cards.
- Modems are essentially for connecting the computer to a phone line. By using a modem you can connect to the internet or you can send a fax or even make calls through your computer.
- Some modems are only for connecting to regular phone lines, while some modems are for connecting to ISDN or ADSL lines for data transfer and for connection to the internet.



Network Devices

- Ethernet cards are for enabling the network communication to take place between computers.
- Especially for work places network cards are essential as computers can exchange data, print to network printers and connect to the internet through a single interface.
- Standard network cards use the Rj-45 jack entrance. You can also have a wireless network cards (as in notebooks) to connect to the network without a cable.
- Even phones and PDA have wireless network communication capability.

Source Data Automation

- It is possible to add some special source data automation devices to your computer.
- For example, you can add cash transaction devices such as point of sale (POS) terminals to your computer to keep track of transactions online.
- You can also add optical scanners to your computer and scan price tags and ISDN tags easily for data manipulation.
- Voice Recognition Systems are also becoming popular with the various systems as new operating systems will come with voice recognition capability. (This is possible to some extent even today)