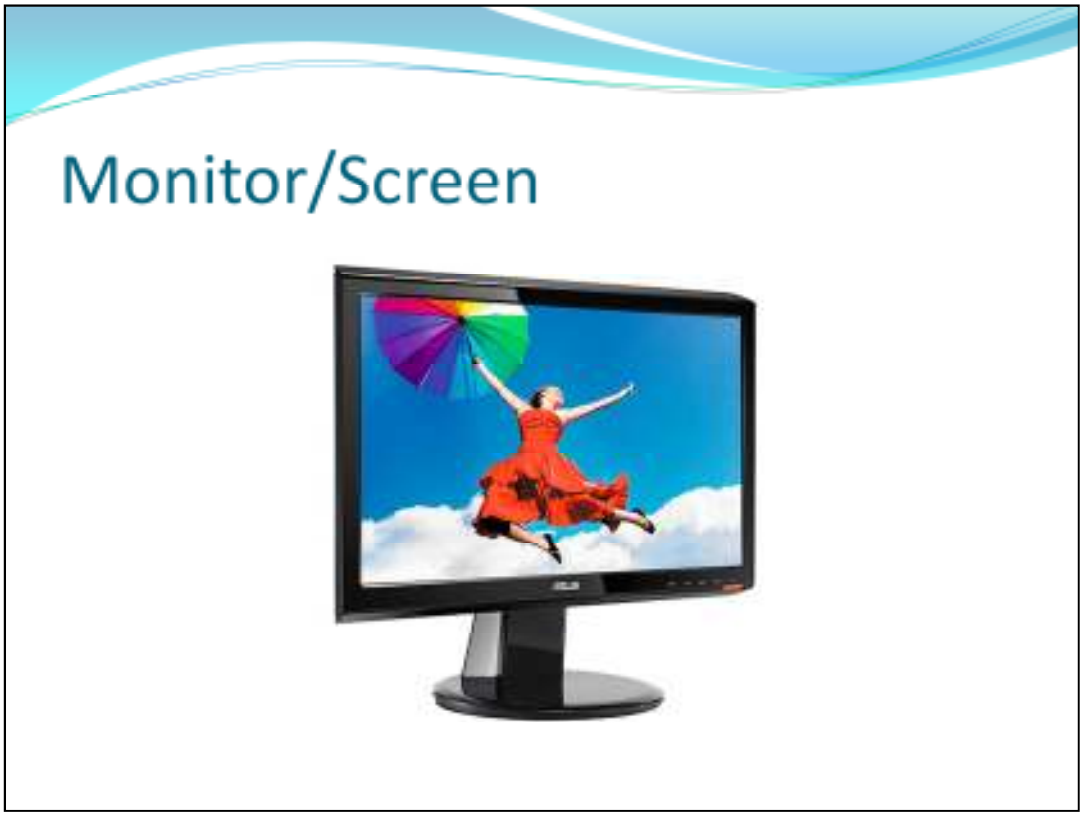
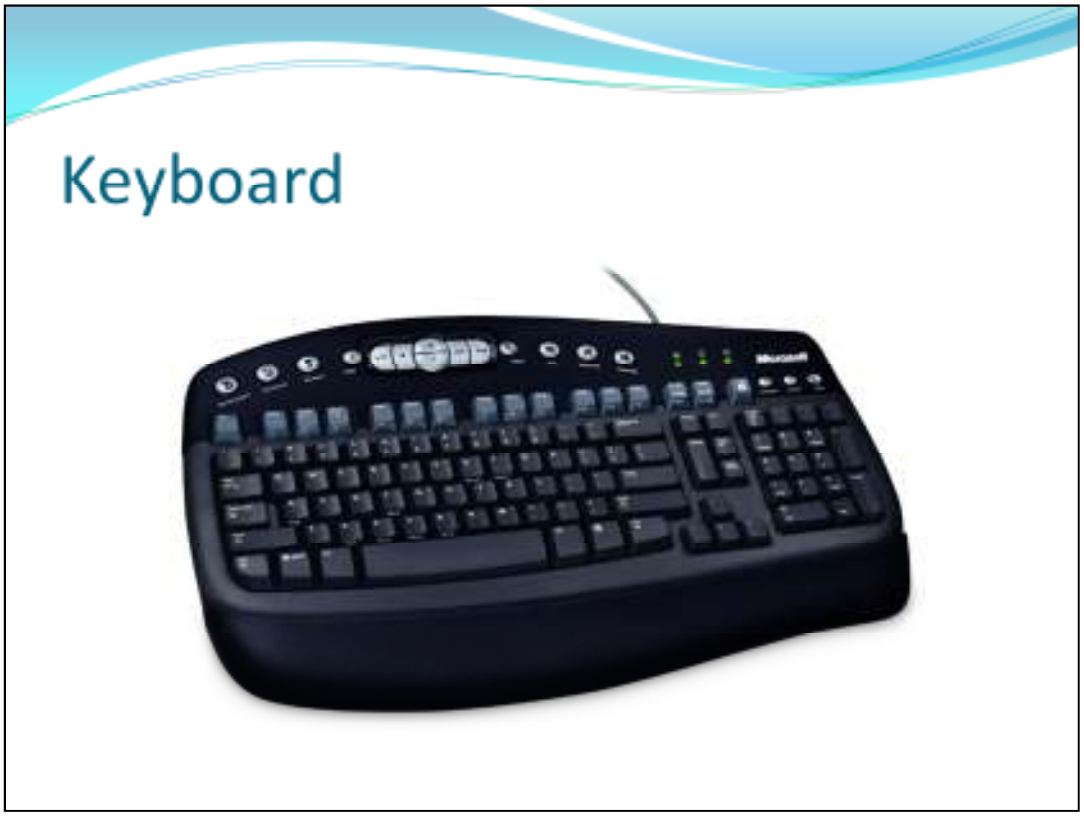
Computer Parts – The System Unit

- The system unit consists of the outer case ("the case") and a number of components held inside it, including the power supply, motherboard, processor, hard drives, and DVD drives.
- The case may come in a flat 'desktop form' or an upright 'tower' form. The tower form may be small (mini-tower), medium (midi-tower), or large (maxi-tower)
- In some cases the PC may have no case at all. In this instance the components may be held inside the monitor.



Monitor/Screen

- Most computer screens are now made using a Liquid Crystal Display (LCD), which uses much less energy and takes up less space than the more traditional Cathode Ray Tube (CRT) devices.
- The screen is defined as an output device and shows what's happening inside the computer. It forms part of the interface between the computer and its user.
- A monitor screen may also be touch-sensitive, as in a tablet device. In this case it acts as both an input and an output device.
- The monitor screen usually requires its own power lead and is also connected to the computer system unit by a dedicated cable.



Keyboard

- The keyboard is the main input device, which is used to control the computer and enter instructions or data.
- It is loosely based on a traditional typewriter keyboard but with added functions. These include a separate numeric keypad for numbers, navigation (arrow) keys, and the Alt, Ctrl, and Windows keys for extra functions
- Keyboards may be wireless or may be connected to a USB port on the computer case.

Mouse

- A mouse was not part of the original IBM PC design, but was added later when the graphical interface required a pointing device.
- It is an input device, used to control the actions of the computer
- A mouse may be wireless or connected to the computer case by a USB cable.

Printer

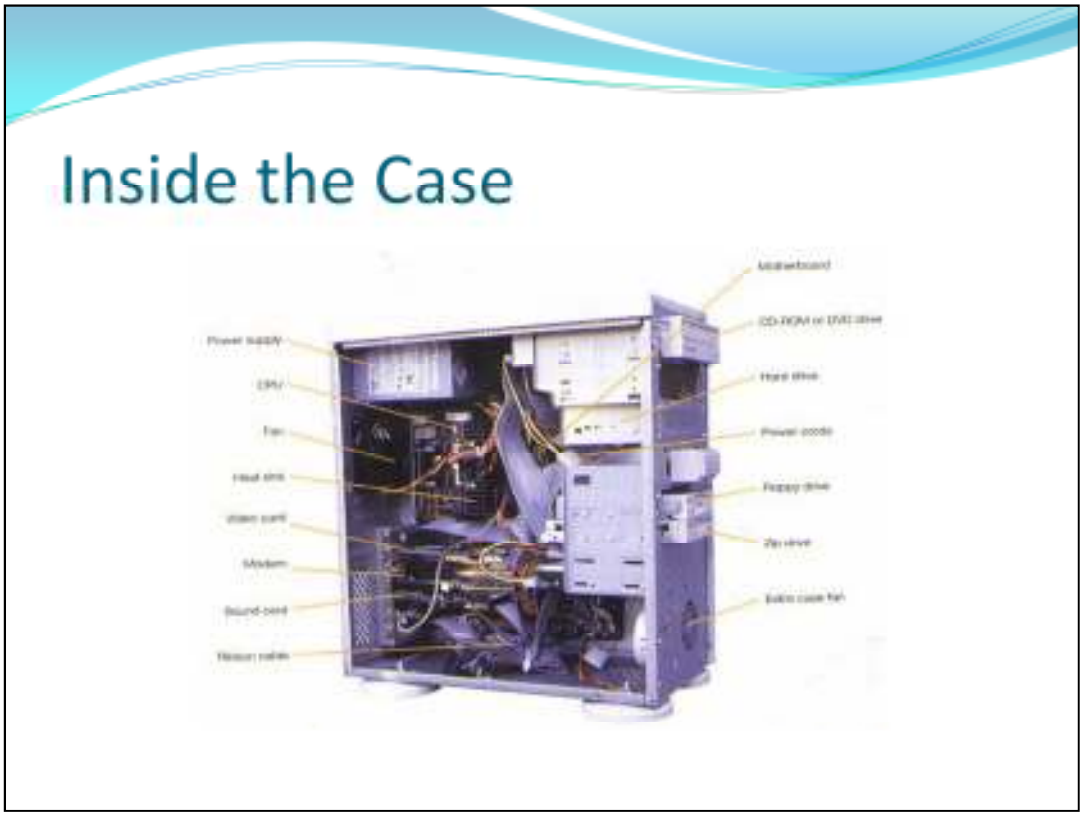
- Most computer users have a printer, which is used to ‘hard’ paper copies of documents, pictures, etc, which are produced or held on the computer. It requires its own power supply and usually connects by cable to the computer case.
- Printers may be inkjet or laser, B&W or colour, and may incorporate scanner, fax, or copier functions

Modem/Router

- A modem or router connects the computer to the Internet, usually via an existing telephone line.
- It connects to a network port on the PC and to the telephone line and sends and receives digital information.
- A modem can be shared to provide Internet connection to multiple PCs in a network

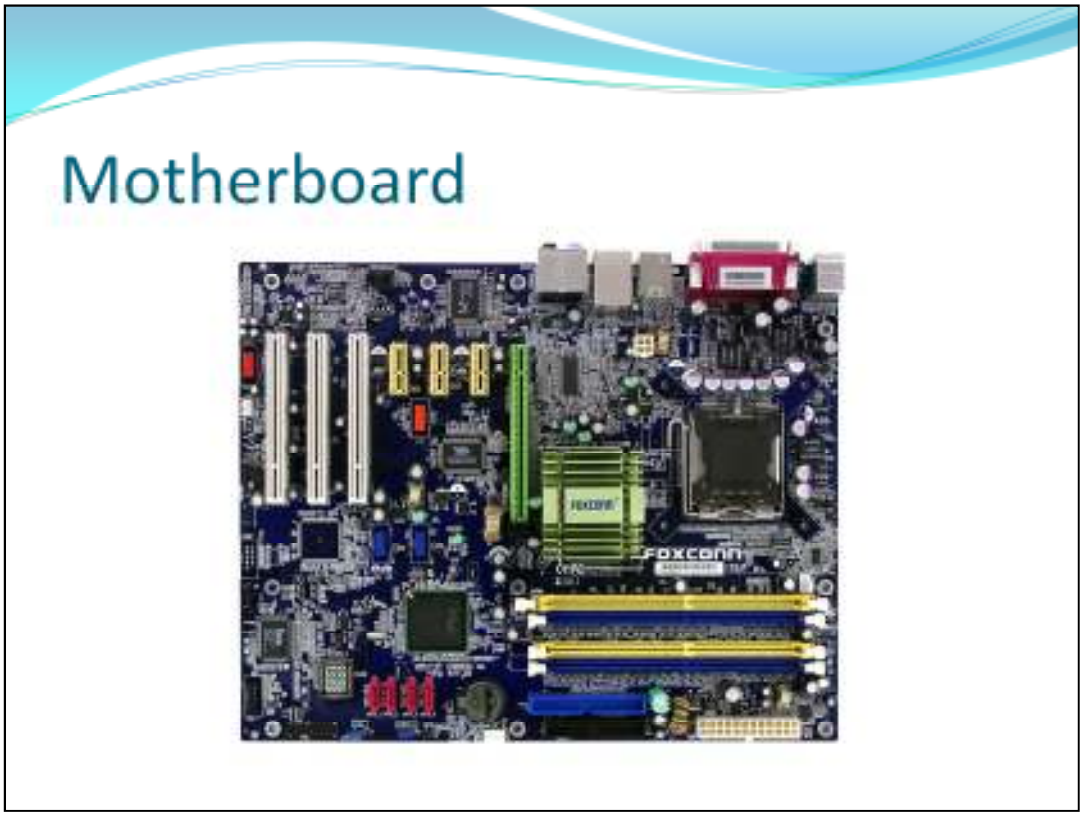
Other Peripherals

- Other devices which can be connected to the PC can include scanners, speakers or headphones, memory sticks/flash drives, web-cameras (webcam), digital still cameras, digital video cameras, memory card readers, TV tuners, video capture device, etc



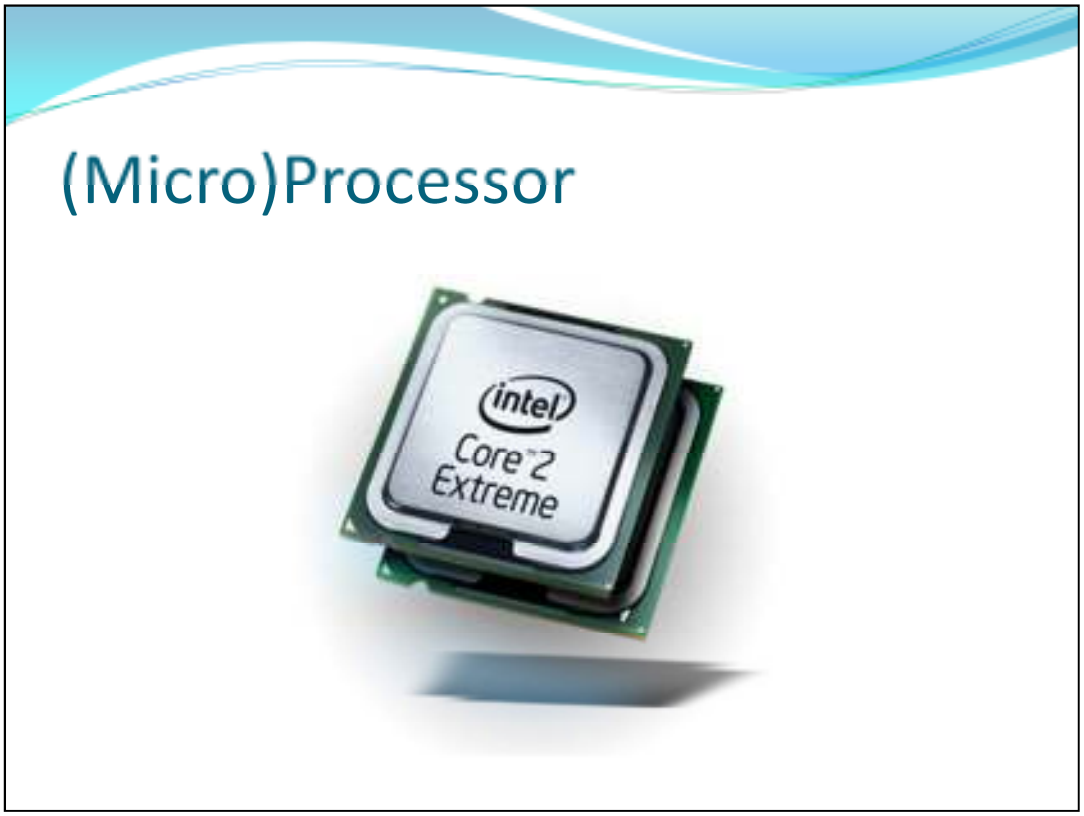
Inside the Case

- The computer case holds the power transformer, the main circuit board (or ‘motherboard’ which carries the main processor and the memory), the hard drive storage device, the floppy drive (when present), and the CD/DVD drive.



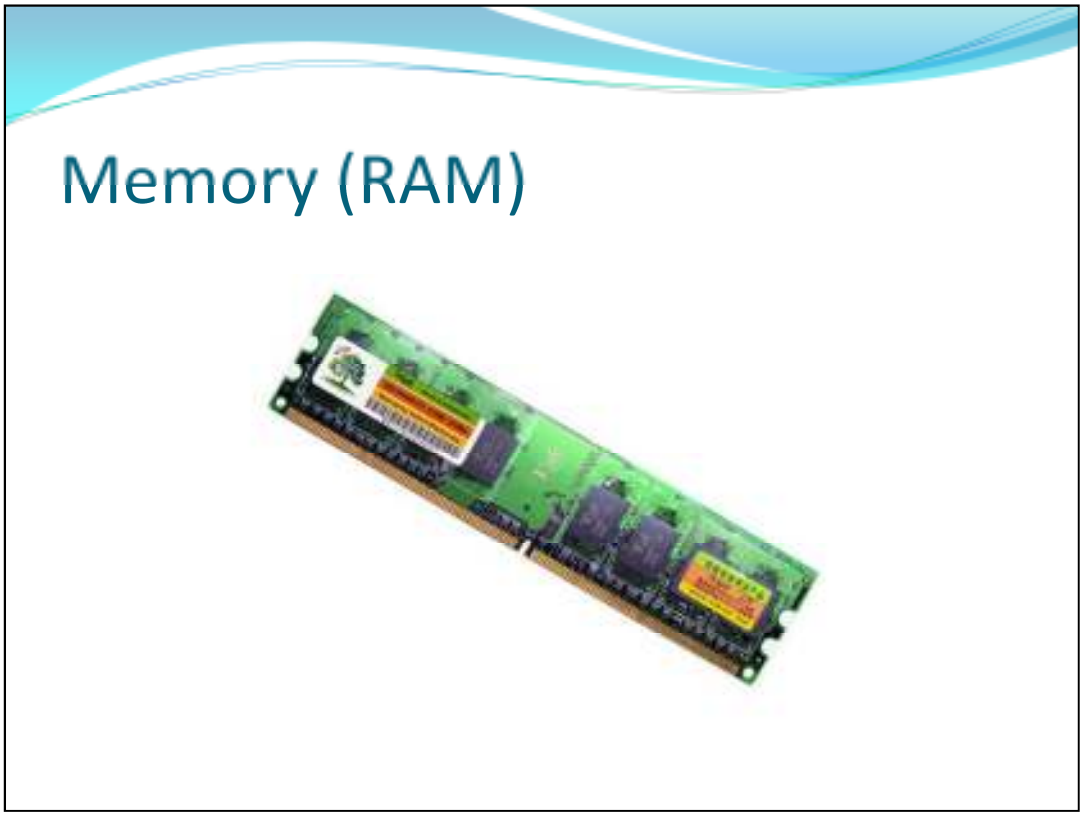
Motherboard/Mainboard

- The motherboard is the main circuit board holding the integrated circuits for the microprocessor, memory, etc
- The motherboard also supports internal connectors for the hard disk drives & optical drives (CD, DVD), etc, and external connectors for the mouse, keyboard, printer, speakers, etc.
- The motherboard also contains expansion slots for installing additional function cards



Microprocessor/Central Processing Unit/CPU

- This is the ‘computer on a chip’ and is the device which actually executes the instructions.
- It may be made by Intel or AMD, a manufacturer of Intel-compatible processors.



Memory/RAM

- Memory is the processor's working area and is where all operations actually take place while the computer is running.
- Memory is also called Random Access Memory and consists of small memory 'chips' which fit into slots on the motherboard.
- Installing more memory can speed up a computer as too little will mean the computer has to "swap" data and instructions between memory and storage, slowing down its operation.
- Most computers now have several Gigabytes of memory

Great Moments in History - 2

"640KB [of memory] ought to be enough for anybody"

Bill Gates, CEO of Microsoft, 1981

Hard Disk Drive Storage (HDD)

- Most PCs have at least one internal hard drive which is used as the main storage device for programs and data when the computer is not being used. Information is stored on the hard drive magnetically and the capacity of the device is usually measured in Megabytes, Gigabytes, or Terabytes, etc.
- Unlike memory, the contents of the hard drive are retained when the computer is switched off. When the PC is switched on, programs are copied from the hard drive into memory, where they execute.
- External hard disks can also be attached to a computer via USB ports to increase the available storage space.

Floppy Disk Drive (FDD)

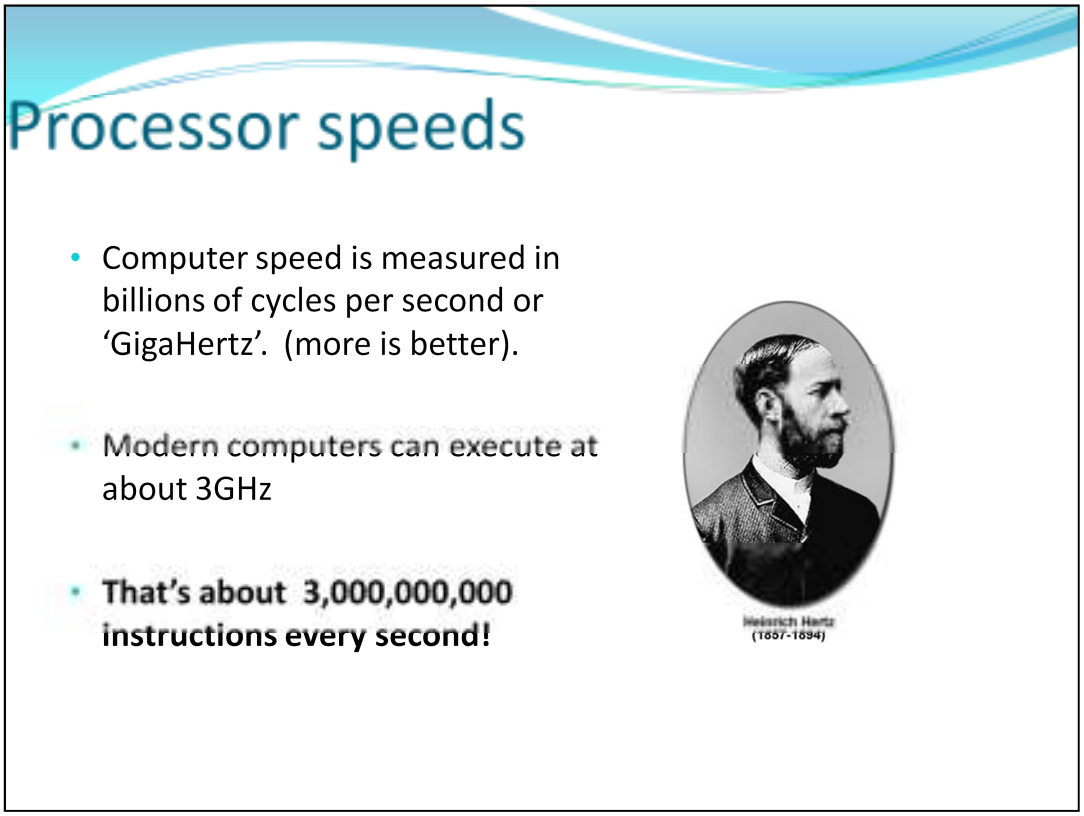
- A floppy disk drive allows removable magnetic disks to be used to store information.
- All early personal computers were fitted with floppy drives and these were useful for transporting programs and data to or from the computer. However, the limited capacity of the disks (1.2MBytes) means that these are mostly obsolete and replaced by memory sticks.

Optical Drive (CD/DVD)

- A DVD drive allows removable optical discs to be used to store information.
- Data is written and read on optical discs using a laser.
- DVDs have a greater storage capacity than floppy disks but this is still limited (CD = 700 MB, DVD = 4.7 GB). However, they are useful for transferring programs and for permanent safe storage of data and are still fitted to most PCs.

USB Storage

- Plug-in USB memory sticks are useful for transporting data and now come in large capacities (up to 512GB).
- Plug-in external hard drives can be used to extend the storage capacity of the computer by several Terabytes



Processor Speeds

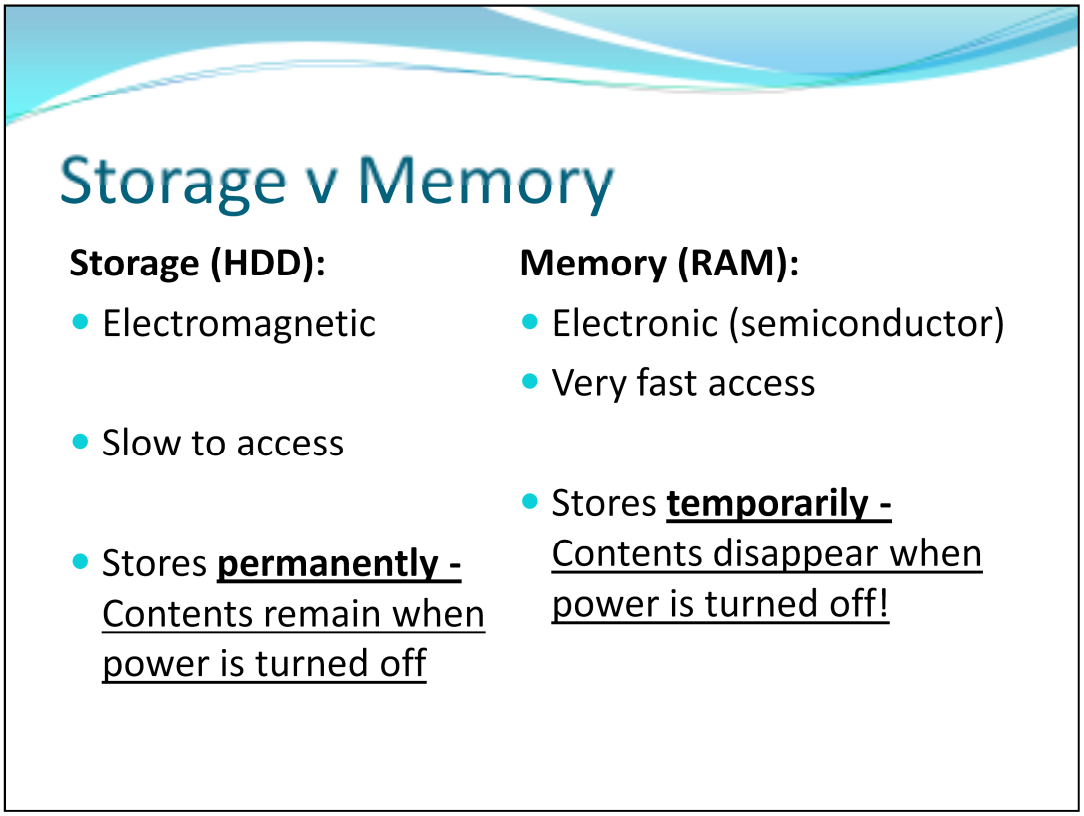
- The speed of a computer is measured by the rate at which its processor can execute instructions and is usually quoted in GigaHertz which indicates billions of cycles per second.
- The Hertz is named in honour of Heinrich Rudolf Hertz (1857-1894), a German Physicist who made some important discoveries in electromagnetism

1,000 Hertz = 1 KiloHertz (KHz)

1,000,000 Hertz = 1 MegaHertz (MHz)

1,000,000,000 Hertz = 1 GigaHertz (GHz)

- Modern computers can execute at about 3GHz, which is about 3,000,000,000 (simple) instructions every second!

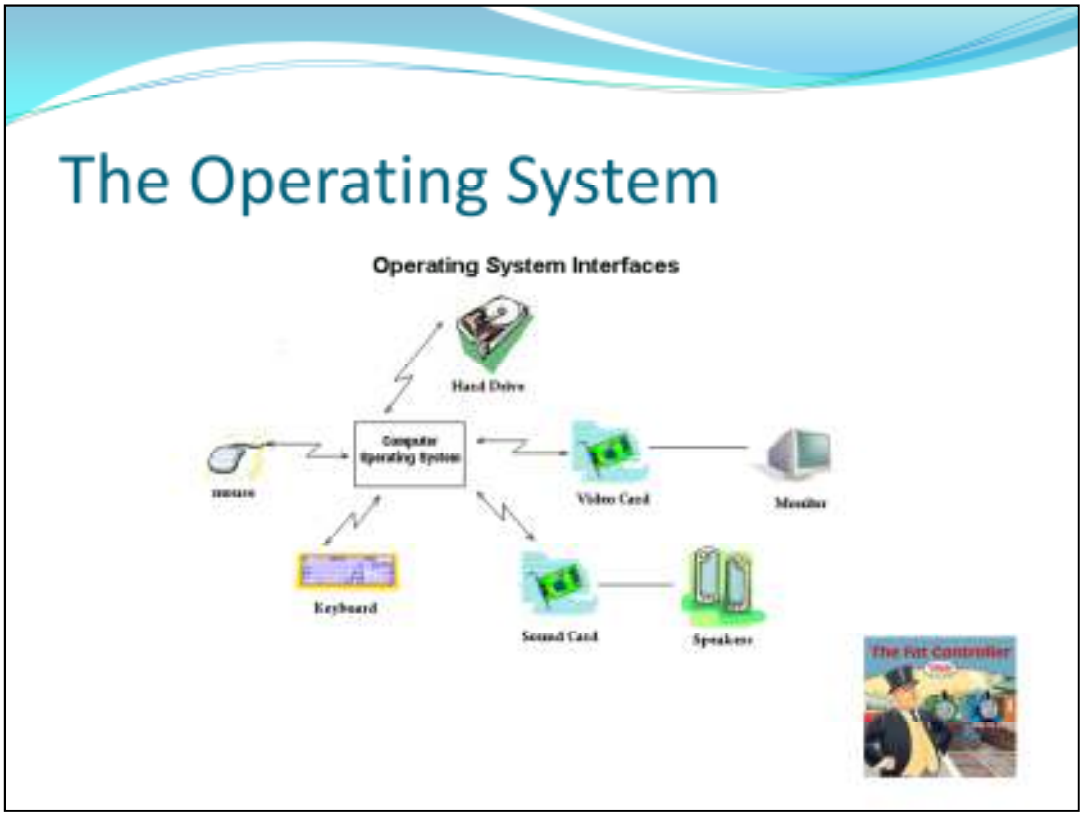


Storage vs Memory

- Storage devices, such as hard drives, are much slower for the processor to read from and write to than memory (which has no moving parts). This slows down the operation of the computer by many orders of magnitude. Storage is where programs and data is stored permanently. Unlike memory, the contents of storage device remain even when power is turned off to the computer.

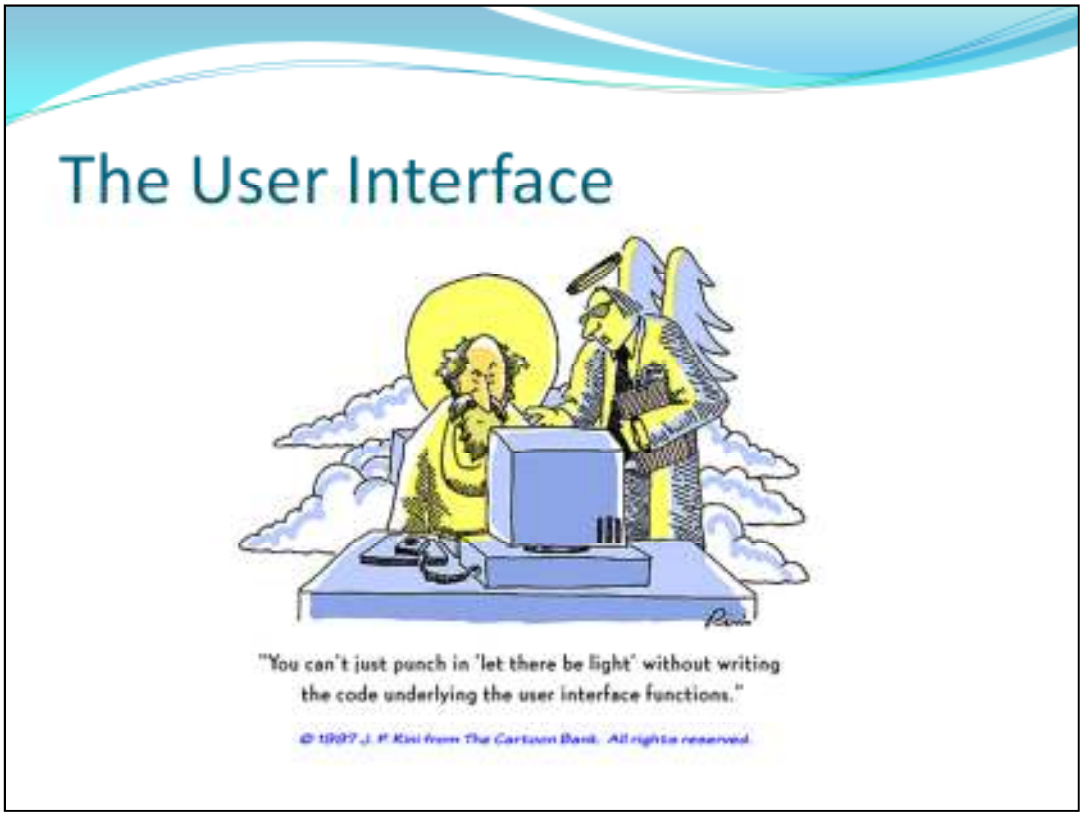
- Memory (also called Random Access Memory or RAM) provides very fast access to program instructions and data. Memory is the processor's working area and is where programs run when power is on to the computer. However, its contents are temporary and disappear when power is turned off!

- It is important to remember that any changes to (say) a document are only temporary until the changes are 'saved' to the hard drive.



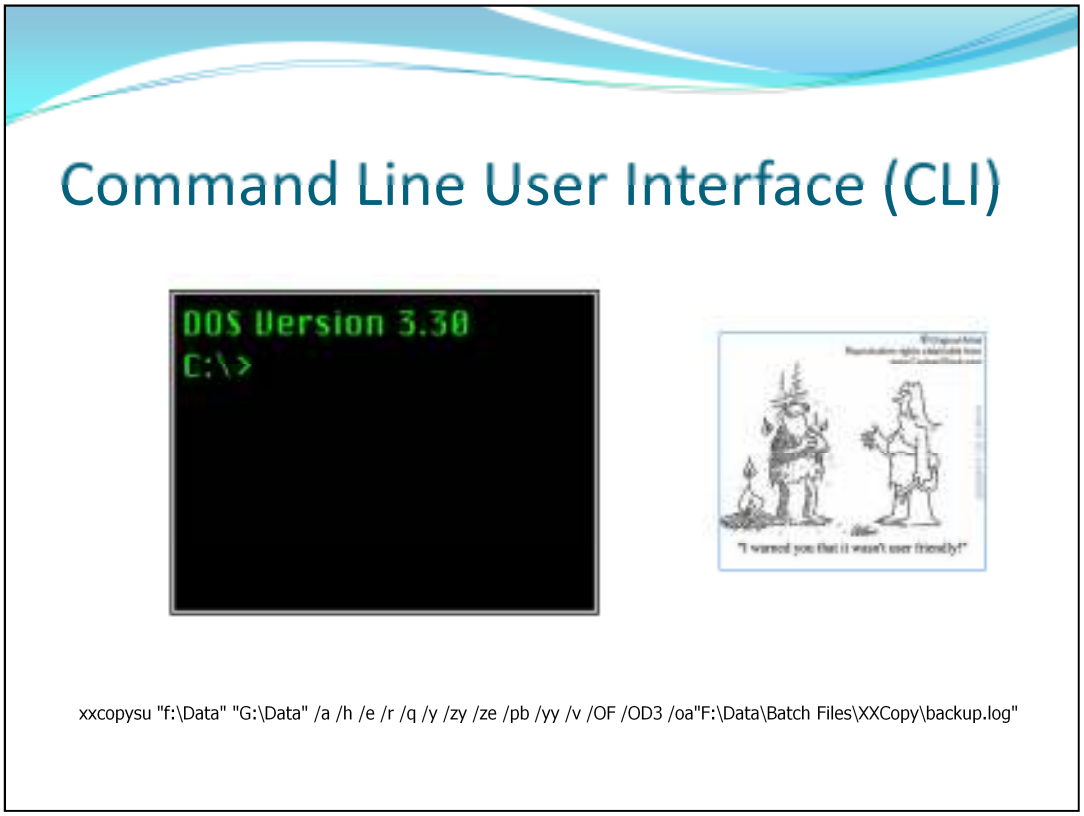
The Operating System

- This is the set of programs that allows all the parts of the computer and its peripheral devices to operate correctly,
- The operating system loads into memory automatically when the computer is powered up and runs continuously, performing many necessary background tasks while the computer is running. For example, it reads input from the keyboard or mouse, sends output to the display, etc.
- The operating system also keeps track of all information stored on computer, looks after peripherals such as printers, etc, is responsible for security, checks for hardware or program failures, controls any network connections, etc.
- The operating system also provides the interface between the computer and the user, called the USER INTERFACE.



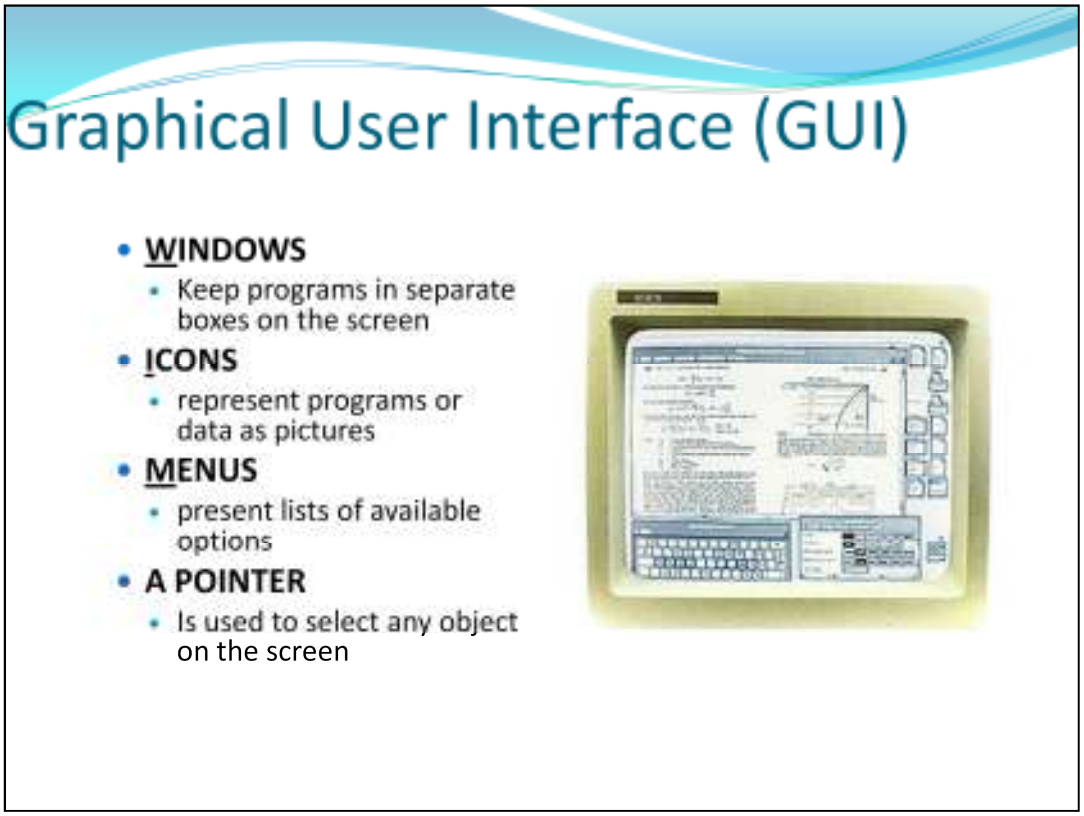
The User Interface

- The user interface is the process by which a user is able to interact with the computer.
- The user (you) sends instructions to the computer via the user interface.
- The computer sends information to the user via the user interface
- Some user interfaces are simple, while others are more complex



Command Line Interface

- Early personal computers had a very simple user interface. This required users to be able to type instructions manually into a Command Line Interface.
- Commands could be extremely complex and required expertise to get right
- The CLI is not intuitive or ‘user-friendly’



Graphical User Interface

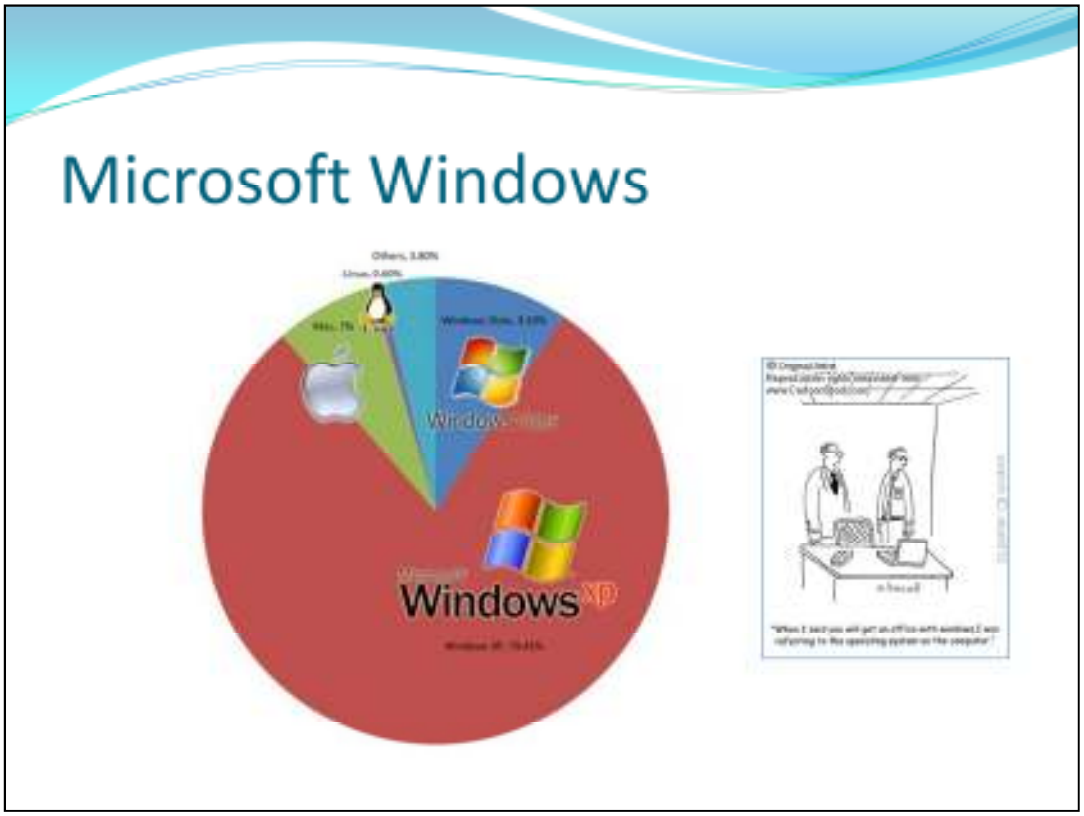
- A Graphical User Interface (GUI) is a much more intuitive way to operate a computer than a CLI
- The GUI was invented at Xerox PARC in Silicon Valley in the early 1970s and was later used as the basis for development of the Apple Lisa and Microsoft Windows interfaces. GUIs were invented before MS Windows or Apple
- GUIs make use of the intuitive WIMP principle, which is"

Windows (boxes) – i.e. each program runs in a separate box (window) on the screen

Icons (pictures) represent programs or data, and can be used to launch programs, etc

Menus (lists) – allow options to be selected by a simple point and click operation,

Pointer (mouse) – can be used to point to any object on the screen.



Microsoft Windows

- More computers use the Microsoft Windows operating system than all other systems combined. More than 90% of computers users will be familiar with the Windows GUI
- There have been many versions of Microsoft Windows since version 1 was introduced in 1978.
- The current version is called Windows Version 7