

Unit I

- **Basics**

Name and identify various PC hardware components

Basics

Hardware

All of the electronic and mechanical equipment in a computer is called the hardware. Examples include:

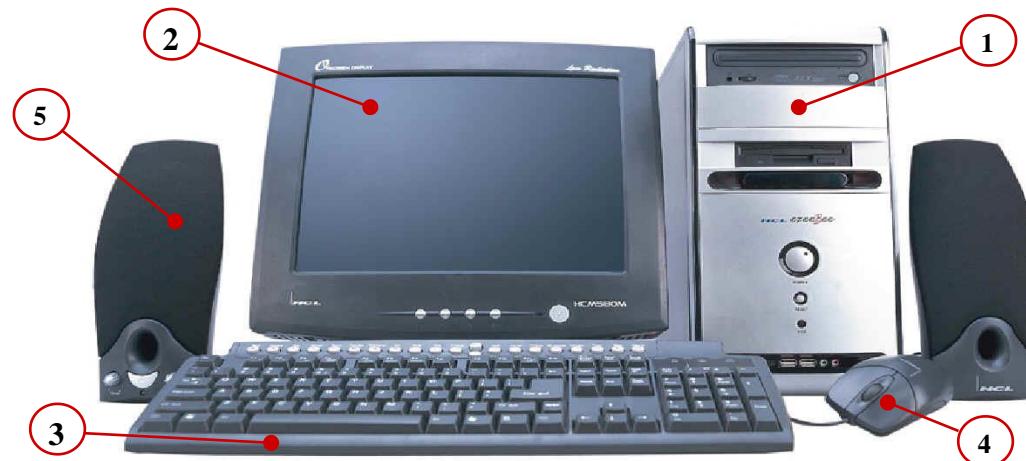
- **Motherboard**
- **Hard disk**
- **RAM**
- **Power supply**
- **Processor**
- **Monitor**
- **Keyboard**
- **Mouse**



PC Components

Computer system - collection of electronic and mechanical devices operating as a unit. The main parts are:

1. System unit
2. Monitor
3. Keyboard
4. Mouse
5. Speakers



System Unit

The **system unit** is the main container for system devices. It protects the delicate electronic and mechanical devices from damage. Typical system unit devices include:

- Motherboard
- CPU (Processor)
- Memory
- Disk drives
- Ports - USB etc.
- Power supply
- Expansion cards - sound card, network card, graphics card etc.



System Devices

Monitors

A computer monitor displays images generated by the graphics card.

Monitors are almost exclusively **LCD** (Liquid Crystal Display). **CRT** (Cathode Ray Tube) monitors are rare and are now as expensive as LCD monitors.



19 inch Widescreen LCD

System Devices

The **aspect ratio** of a computer monitor is the ratio between the width and height of the screen. The aspect ratios are:

- **Standard monitor** - 4:3
- **Widescreen monitor** - 16:9

Most LCD monitors offer a **VGA** and a **DVI** connection. The **VGA connector** is used for analogue signals and the **DVI connector** is used for digital. As the computer is a digital machine, it is best if no conversion is required and so the best option is the DVI connection.



System Devices

Keyboard

Primary input device - divided into sections:

- **Typing keys** - contains the letter and number keys, shift keys, spacebar, return key etc.
- **Numeric keypad** - These keys are arranged as on a calculator.
- **Function keys** - programmable keys used by software for special functions. E.g. - F1 - Help.
- **Control keys** - screen and cursor control.

System Devices

- Most common arrangement is called **QWERTY** after the first six keys.
- Other arrangements are available including **Dvorak**, **ABCDEF**, **AZERTY** etc.



QWERTY



Dvorak

System Devices

Keyboards are available wired or wireless:

- **Wired** - These are either **PS/2** or **USB**.
- **Wireless** - The keyboard uses batteries.



Wireless keyboard

System Devices

Mouse

Input device - uses point and click technology

- **Wired** - These are either **PS/2** or **USB**.
- **Wireless** - The keyboard uses batteries.

There are two main types:

- **Ball mouse** - uses a ball to roll across the surface and move rollers attached to sensors inside the mouse - reflecting the ball movement as cursor movement.
- **Optical mouse** - camera takes thousands of images per second and sends them for digital processing. The red LED lights up the surface for the camera.



Optical
mouse



Ball mouse

System Devices

Ports

Computer ports are interfaces between peripheral devices and the computer. They are mainly found at the back of the computer but are often also built into the front of the computer chassis for easy access.

Ports at the rear of the computer



Ports at the front of the computer



System Devices

- **PS/2 port** - used to connect keyboards and mice to the computer. The keyboard port is **purple** and the mouse port is **green**



- **Modem port** - used to connect a modem to a telephone line. **RJ11** is the technical term for the port.



System Devices

- **Serial port** - a 9-pin port. Often called Com ports - Com1, Com2 etc. Mice and external modems were connected to these ports. They are **turquoise** in colour.



- **Parallel port** - a 25-pin port used to connect printers, scanners, external hard disks, zip drives etc. to the computer. **Burgundy** in colour, they are often called LPT ports - LPT1, LPT2 etc.



System Devices

- **Video port** - used to connect a monitor to the computer system. There are two types:
 - **VGA port** - This is a 15-pin port and is **blue** in colour. It is an analogue port and is being replaced by the DVI port.



- **DVI port** - **white** in colour, it is a digital port. This means that no conversion is necessary between the computer and the monitor and that means that images can be produced more quickly on the monitor



System Devices

- **USB port** - intended to replace Serial, Parallel and PS/2 ports with a single standard. 127 devices can be connected to a single USB port.

There are different USB standards in use:

- **USB 1** - original standard - transfer data of **1.5MBps**.
- **USB 2** - current standard - transfer rate of **60MBps**.
- **USB3** - future standard (2009) transfer rate of **600MBps**.



System Devices

- **Ethernet port** - used to connect to a network.
Known as **RJ45**, it is larger than a modem port.



- **Audio ports** - used to input and output audio from the computer. Three mini jack ports but there may be more:
 - **Light blue** - Line in - connect external devices
 - **Lime** - Connect the speakers to this port.
 - **Pink** - Connect a microphone to this port.



System Devices

Processor

An **integrated circuit (IC)** supplied on a single silicon chip. Its function is to control all the computers functions. The main processor manufacturers are:

- **AMD** - Athlon and Turion (mobile)
- **Intel** - Pentium and Centrino (mobile)



AMD
Processor

System Devices

Random Access Memory (RAM)

On the circuit board

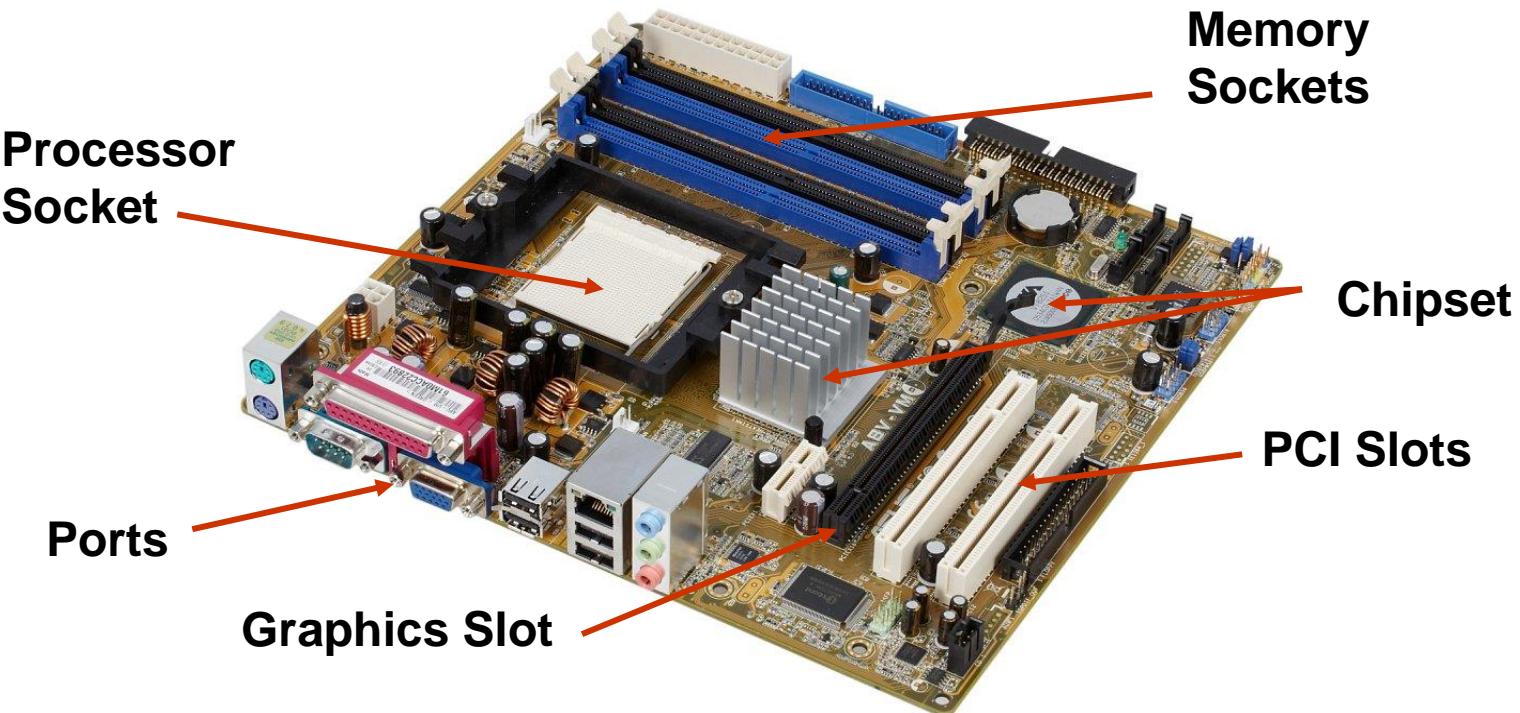
- **Primary storage** - main computer memory. Data, programs currently in use are held in RAM
- **Volatile** - contents of memory are lost if the computer is turned off
- **Module** - memory IC's on a circuit board



System Devices

Motherboard

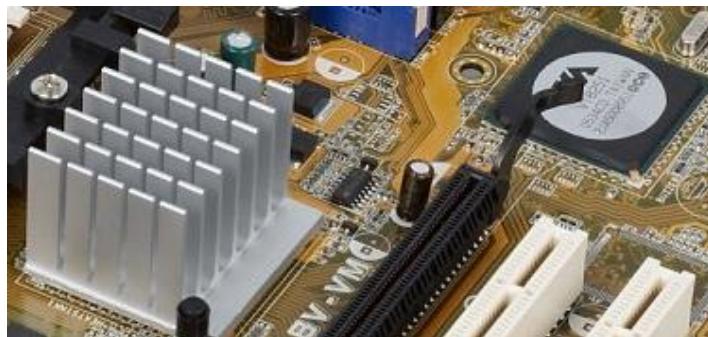
Mainboard or system board - the main circuit board for the computer system. All device in the computer system will either be part of the motherboard or connected to it.



System Devices

Chipset - controls data flow around the computer.
It consists of two chips:

- **Northbridge** - data flow between memory and processor
- **Southbridge** - controls data flow to the devices - USB, IDE, SATA, LAN and Audio - controls PCI slots and onboard graphics



System Devices

Network card

- allows computers join a network. Can be wired or wireless. The standard used is called **Ethernet** - covers wired and wireless networks.

The wired standards include:

- **Fast Ethernet** - transmission speed of **100Mbps**.
- **Gigabyte Ethernet** - transmission speed of **1000Mbps**.



PCI



PC card



USB

System Devices

Modem

- Internet access using a telephone line.
- Converts the digital computer data to analogue (**Modulation**) before transmission over the telephone line and converts the analogue data to digital (**DEM**odulation) before transmission to the computer. The device gets it's name from these two terms.
- The standard transmission speed of a modem is **56Kbps**.



PCI



USB

System Devices

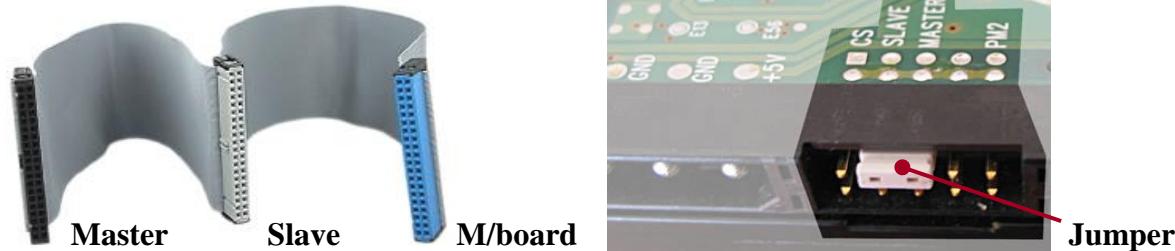
Hard Disk

- **Primary storage** (memory) - volatile - contents lost when power is turned off.
- **Secondary storage** (disk drives) - non-volatile - can store files when power is turned off.
- In memory, voltages are used to store data as binary 1's and binary 0's. It was decided to mimic the situation for secondary storage using **magnetism** instead of electrical voltages to represent the binary data.

System Devices

Hard disks can be **internal** or **external**. The internal standards are:

- **IDE** (Integrated Drive Electronics). The disks connect to the motherboard using a ribbon cable. Each cable can hold two drives - **master** and **slave**. The drive is set as master or slave by positioning a **jumper** switch on the back of the drive. There are two IDE connectors and a total of four drives can be connected.

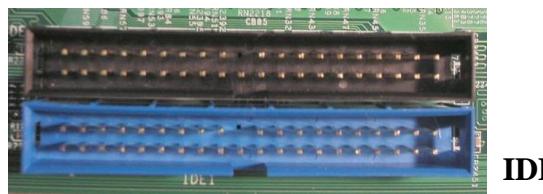


System Devices

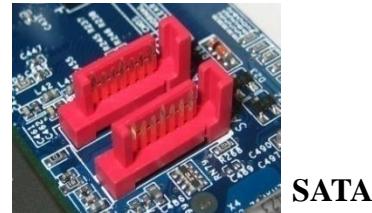
- **SATA** (Serial Advanced Technology Attachment) allow faster data transfer speeds than IDE. There is no master/slave arrangement with SATA and each drive has it's own cable. The cables are much smaller and allow better air circulation in the system unit.



Motherboard connectors



IDE



SATA

System Devices

External hard disk drives can be IDE or SATA and can be **mains powered** or **host powered**. Host powered drives receive their power from the USB port.



Mains
Powered



Host
Powered

Hard disk drives are also now found in video recorders, digital music players, digital camcorders, digital cameras and mobile phones.

2½ inch Notebook Drive



1 inch Microdrive



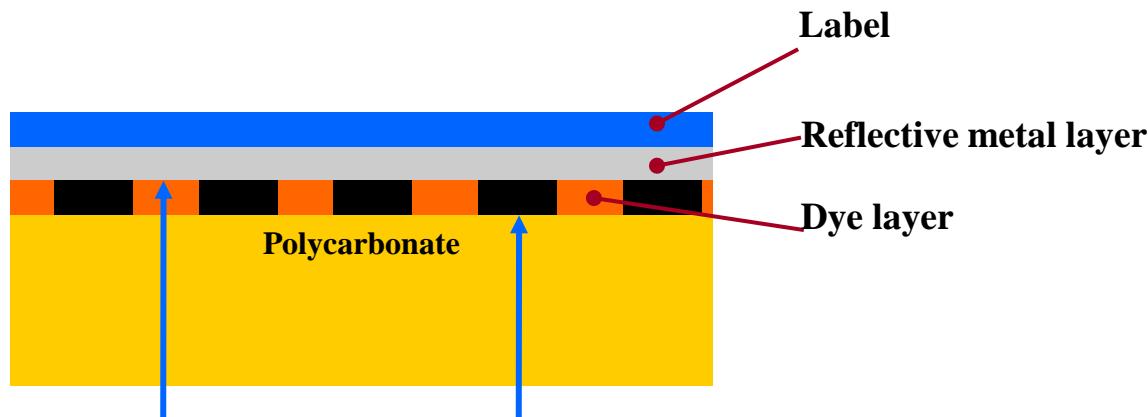
Microdrive



System Devices

CD-R (blank CD's) use a dye layer to mimic the lands and pits created mechanically on commercial disks.

- The laser used has **two intensities**.
- At the **high setting**, it burns spots on the dye layer changing it from transparent to opaque. This allows data to be written as spots of transparency and opacity.
- At the low setting, it reads these differences



System Devices

The CD-RW (re-writable) disk is similar but the laser has **three intensities**. The third and highest is needed to turn the burned areas of the dye layer back to their original condition. The dye layer can now be re-burned to hold new data.

The three laser intensities are:

- **Intensity 1** - Read data
- **Intensity 2** - Burn data
- **Intensity 3** - Erase data

The CD-R disk has a capacity of 650MB to 800MB.

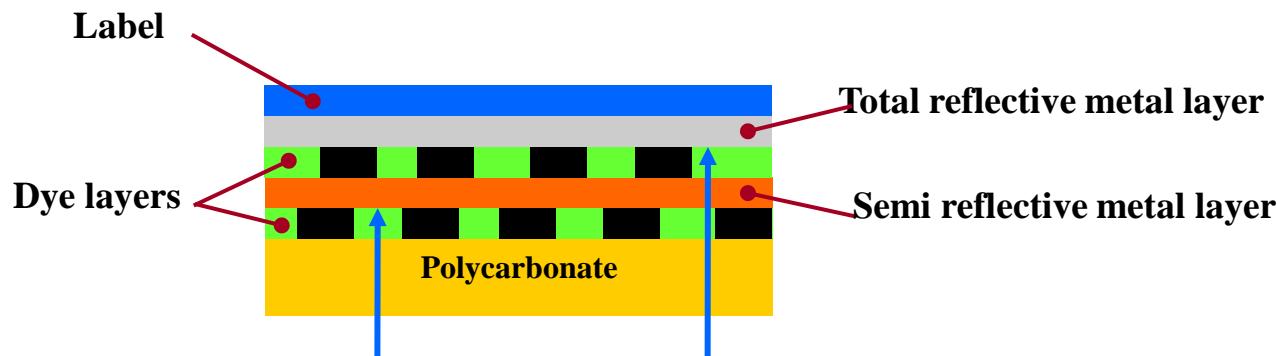
System Devices

DVD's hold a lot more data than CD's. They can have several layers, each holding **4.7GB** of data.

The possibilities are:

Number of sides	1	1	2	2
Number of layers	1	2	1	2
Disk capacity	4.7GB	8.5GB	9.4GB	17GB

Dual layer disks have two reflective layers, one which can be penetrated at a certain intensity



System Devices

A number of new high capacity formats have come onto the market.

These are:

1	HD-DVD	Uses a new laser technology resulting in layer of 15GB instead of the 4.7GB on standard DVD. This gives a total capacity of a double sided - double layered disk as 60GB.
2	Blu-Ray	Higher capacity than HD-DVD - 25GB of data/layer. A dual layer disk can hold 50GB. Technically, a double sided and double layered disk can hold 100GB of data.

