

# 1 Components of a Computer System

## Hardware and Software

Hardware and Software are the two basic parts of a computer system.

### Hardware

Hardware is any part of a computer system you can see or touch.



### Peripheral

A peripheral is any piece of hardware attached to a computer, such as a printer.

## Software

Software is a set of electronic instructions that tell a computer what to do. You cannot see or touch software, but you can see and touch the packaging the software comes in.



### Application Software

Application software lets you accomplish specific tasks. Popular application software includes Microsoft Office XP.



### Operating System Software

Operating system software controls the overall activity of a computer. Highly Advanced computers use Windows 2000 as an operating system software

## Types of Computer Systems

There are several types of computer systems.

### PC (Personal Computer)

A PC is a computer designed to meet the needs of a single person and usually refers to IBM-compatible computers. PCs are found in many businesses and are popular for home use.



### Macintosh

Macintosh computers are found in many homes and are very popular in the graphics, publishing and multimedia industries. The Macintosh was the first widely used computer that offered a graphical display.

**Mainframe**

A mainframe is a computer that can process and store large amounts of information and support many users at the same time. A terminal consisting of a keyboard and monitor, is used to input and output information on a mainframe.



**A Typical Computer**

A typical computer system consists of several parts.

**Computer Case**

A Computer case contains all the major components of a computer system.



**Monitor**

A monitor is a device that displays text and images generated by the computer.

**Printer**

A printer is a device that produces a paper copy of documents you create on the computer.



**Keyboard**

A keyboard is a device that lets you type information and instructions into a computer.

**Mouse**

A mouse is a hand-held device that lets you select and move items on the screen.



**Modem**

A modem is a device that lets computers communicate through telephone lines. A modem can be found inside or outside the computer case.










**Inside a Computer**

All computers contain the same basic components.

**Power Supply**

A power supply changes normal household electricity into one electricity that a computer can use.



<p><b>Hard Drive</b> A hard drive is the primary device that a computer uses to store information.</p>	
<p><b>Expansion Card</b> An expansion card lets you add new features to a computer. For example, an expansion card can give a computer the ability to record and play sound.</p>	
<p><b>Expansion Slot</b> An expansion slot is a socket on the motherboard. Expansion card plugs into an expansion slot.</p>	
<p><b>Motherboard</b> The motherboard is the main circuit board of a computer. All electrical components plug into the motherboard.</p>	
<p><b>Central Processing Unit (CPU)</b> The CPU is the main chip in a computer. The CPU processes instructions, performs calculations and manages the flow of information through a computer.</p>	
<p><b>Random Access Memory (RAM)</b> RAM temporarily stores information inside a computer. This information is lost when you turn off the computer.</p>	
<p><b>CD-ROM</b> A CD-ROM drive reads information stored in compact discs (CDs).</p>	
<p><b>Drive Bay</b> A drive bay is the space inside the computer case where a hard drive, floppy drive or CD-ROM drive sits.</p>	
<p><b>Floppy Drive</b> A floppy drive stores and retrieves information on floppy disks.</p>	

## The Operating System

An **operating system** is a set of **programs** that manages the operation of a computer.

Operating systems have become increasingly large and complex with the development of computer hardware and the use of multi-user systems.

The most frequently used sections of the operating system must be loaded into memory and stay there while applications are being run. When a computer is first switched on, the OS must be transferred from disc to memory. This process is called '**booting**' the system. There has to be a small program held in ROM which initiates the booting process.

## ***The main functions of an Operating System.***

- **Resource management**  
All operating systems must be able to load programs, store them in memory and start them running; more complex operating systems have to allocate CPU time, memory and I/O resources to different programs.
- **Memory management**  
Where more than one program is loaded, the operating system has to allocate sections of memory (**partitions**) to each program.
- **Backing store management**  
Including the creation, updating and deletion of files. Managing the **FAT** (File Allocation Table) and the directory of files.
- **I/O Control**  
Controlling data flow to and from peripherals.
- **Interrupt handling**  
Detecting and servicing interrupts.
- **Operator interface**  
Receiving and processing instructions from the operator. Reporting errors.
- **Security**  
Maintaining logging in codes and passwords; keeping a **log** of each user's time on the system.

Most operating systems also have **utility programs** for file management, editing files, reorganising disc space, making backups etc...

The operating system on your microcomputers is called **DOS** (Disc Operating Systems)

## ***Modes of Operation***

### **Batch Processing**

One or more programs (together with any data needed) are submitted to the computer as a '**job**' and put in a queue to await processing.

**Example:** *A job might be a payroll run for a company together with all the time-sheet details of the workers for that week (hours worked, overtime etc).*

There is **no interaction** between user and computer.

Processing can be done overnight as no interaction is needed.

A **JCL** (**Job Control Language**) is used to give instructions for processing the jobs.

### **Single-user on-line systems...**

- allow for interaction between user and job, to influence future processing.

**Example :** *Using a microcomputer for playing a computer game; word-processing;*

## Multi-user On-line systems (Multi-access systems)

- allow a number of users to access a central computer interactively. (Careful...this is not the same as a network.)

**Example** : *students using terminals to run software on a central computer.*

## Real-time processing

A mode of operation where data received is immediately processed, stored data is updated and any necessary actions taken.

**Example** : a computer guided missile; any control system



## Real-time transaction processing

An on-line system in which individual, discrete transactions are processed as they occur.

**Example** : *an airline booking system; a supermarket stock control system.*

*'Real-time' basically means that if you look at the state of the system at any instant it is up-to-date.*

## Multi-programming

A computer may store a number of different programs in its memory.

Each stored program will receive a **time-slice** of processing time (typically about 1/50th second) in turn. This happens so fast that it seems that the computer is processing all programs simultaneously.

In practice, most large on-line systems are a mixture of multi-access and multiprogramming systems.

## Multi-tasking

Generally applied to PCs...a number of tasks are loaded and processed in turn for short time-slices until completed.

**Example** : On a PC you can have a number of windows open with different applications running in each.

## Spooling

Items are sent to a hardware device and stored in a **queue** for processing.

Usually applied to a printer queue. Items to be printed are sent to a hard drive and stored in a queue. They are printed in turn when the printer is ready.

Spooling is needed because of the difference in speeds between peripherals and processors (printers are very slow compared to processors).

<b>Types of Operating System</b>	
<p><b>MS-DOS</b> MS-DOS stands for Microsoft Disk Operating System. MS-DOS displays lines of text on the screen. You perform tasks by typing text commands.</p>	<p><b>Windows</b> Windows is a Graphical User Interface (GUI, pronounced "gooey"). A GUI allows you to use pictures instead of text commands to perform tasks. This make Windows easier to use than MS-DOS.</p>
<p><b>UNIX</b> UNIX is a powerful operating system used by many computers on the Internet. There are many different versions of the UNIX operating system available.</p>	<p><b>Mac OS</b> <b>Mac OS is a Graphical User Interface (GUI) for Macintosh computers.</b></p>

### **Types of Software**

Software is generally divided into

- **systems** software
- **applications** software

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**Systems software** are programs which help in the running of a computer system. Some examples are..

- disc formatting programs
- operating system
- compiler

**Applications software** are programs which perform specific tasks for the user. Some examples are...

- word processing software
  - graphics package
- theatre booking software

### **Software Packages**

**Generic** software packages are general-purpose application packages.

Sometimes called '**content-free**' software. Distinguished by the absence of any specific application related content.

#### **Examples:**

- word processing packages
- desk-top publishing packages
- spreadsheet packages

- graphics packages
- information retrieval and database packages

**Specific** software packages would be used for a specific purpose.

**Examples** : Business Accounting; School Administration; Medical CAL package

## The Electronic Office

**Word processing** is now widespread and is now **integrated** with other packages (spreadsheets, databases etc)

**DTP** (Desk Top Publishing) allows the production of high quality newsletters, brochures, manuals etc. **Scanners** can be used to capture graphics.

**Databases** have largely replaced manual filing systems, providing fast access to information.

**Spreadsheets, accounts software, job-scheduling software** have made the jobs of budgeting, planning, monitoring and accurate record keeping far easier.

**LANs** mean that people can share software, data and hardware such as printers.

**WANs** allow people to communicate across the world via electronic mail, and access on-line databases anywhere in the world using the Internet.

## Integrated Packages

**Example** : Microsoft Office; Lotus Smart Suite

A number of generic software packages are incorporated in the same package and data can be transferred easily between the programs.

### General features of a 'good' package...

If you were to buy a software package, what would be the qualities you would look for? The following list suggests some qualities of 'good' software packages...

- Data from other packages should be **importable**.
- **Upgrades** - new versions should be able to load work done on older versions.
- **Speed** - slow-running software can be very frustrating!

Some software packages come with their own **programming** capabilities. For example Microsoft Access - the advantages of this include

- the ability to tailor your software more to your own needs.
- easier to maintain if changes need to be made.