Operating Systems

Function of the OS :
1. Provides instructions to display the on screen elements with which you interact. Collectively, these elements are known as the user interface.
2. Loads programs into the computers memory so that you can use them.
3. Co-ordinates how programs work with the CPU, RAM, keyboard, mouse, printer and other hardware as well as with software.
4. Manages the way information is stored on and retreived from disks.

The User Interface

With an OS you see and interact with a set of items on the screen, the **user interface**. In the case of most current OS the user interface looks like a collection of objects on a coloured background.

Graphical User Interface

Most current OS provide a graphical user interface (GUI). Apple computer introduced the first GUI with its Macintosh computer in 1984. GUIs are so called because you use a mouse (or other pointing device) to point at graphical objects on the screen.

The Desktop

The coloured area that is seen on the screen. The pictures stand for items you might see on real desktop such as "my computer".

Icons

Icons are pictures that represent the parts of the computer you work with. Software designers try to design the icons so that they look like what they represent.

You interact with your computers resources by activating the icon that represent the resource. This is done by using a pointing device. With most GUI based operating systems the rules for using the mouse to interact with the icons are fairly consistent,

1. Click on the icon to select it – this indicates that you plan to work with it.
2. You double click on an icon to choose or activate it. This action is called launching the program.
3. If you click on an icon and hold down the mouse button, you can drag the mouse to move the icon to another location on the desktop. You can drag an icon to another icon to perform an action, e.g. you can drag an icon for a file from one folder to another thus moving the file.
4. If you right click many parts of the desktop in the Windows OS you see a small menu containing the most common commands associated with that part.

Although icons generally look like the object they represent, another class of symbols called buttons generally look the same from program to program. Buttons are areas of the screen you can click to start an action or task.

The Taskbar and the Start Button (windows only)

When you start a program a button appears for it on the **taskbar** – an area at the bottom of the screen whose purpose is to display the buttons for the programs you are running.
The **start** button is a permanent feature of the taskbar. You click on it to open the **start menu**. From the start menu you can click a program icon to start a program.

Programs running in Windows

A running program may take up the whole screen or may appear in a rectangular frame called a **window**. All windows include a **title bar** across the top thatidentifies the windows content. Many windows also provide **scroll bars** with scroll arrows and scroll boxes enabling the user to view different parts of the program that do not fit into the window. The window that is currently in use is called the **active window**.

You can identify the active window in several ways:
- Unless all open windows are arranged side by side, the active window will appear on top of all other windows.
- The active windows title bar is highlighted.

- If you are using a windows system with a taskbar the active windows taskbar button is highlighted – i.e. it appears to be "pushed in".

The process of moving from one open window to another is called **task switching**

Menus

You can start tasks by choosing commands from lists called **menus**. The more standard type of menu appears at the top of many windows in a horizontal line and is called the **menu bar**. When you click a menus name a menu drops down and displays a list of commands.

Some commands are used so frequently that they have keyboard shortcuts that bypass the menu system all together.

Dialog Boxes

Dialog boxes are special purpose windows that appear when you need to tell a program (or OS) what to do next.

Command Line Interfaces

The GUI has become the standard, for years however computer OS used command line interfaces which are environments that use typewritten commands rather than graphical objects to execute tasks and process data.

During the 1980s the most popular command line interfaces were Microsofts MS-DOS, IBMs PC-DOS and UNIX. Users interact with with a **command line interface** by typing strings of characters at a **prompt** on the screen.

Running Programs

The OS provides an interface between programs and other computer resources. Programmers write programs with built in instructions called **system calls** that request servcies from the OS.

Some services that an OS provides to programs

- List all the files in a particular folder so as to retreive a file to open.
- Saving the contents of a file from the disk onto memory.
- Reading the contents of a file from disk into memory.
- Sending a document to the printer and activating the printer.
- Providing resources that let you copy or move data from one document or program to another.
- Allocating RAM among various programs that you may have open.
- Recognising keystrokes or mouse clicks and displaying characters or graphics o nthe screen.

Sharing Information

In many types of applications you may want to move chunks of data from one place to another. Most newer OS accomplish this feat with a feature known as **clipboard**. This is a temporary holding space for data that is being copied or moved.

The versality of the keyboard has been extended with a feature known in Windows as **OLE** (**Object Linking and Embedding**). The data which is known as an object is embedded in a new type of document. It maintains the formatting that was applied to it in the original application but its relationship with the original file is destroyed. The data retains a link with the original document so that a change to the original document also appears in the linked data.

Multitasking

Since the mid 1990s all Os have been able to multitask. Multitasking means being able to perform 2 or more procedures simultaneously.

Software engineers use 2 methods to develop multitasking OS. The first requires cooperation between the OS and application programs. Programs that are currently running will periodically check the OS to see whether any other programs need the CPU. If any do, the running program will relinquish control of the CPU to the next program. This methos is called **cooperative multitasking** and is used to allow activites such as printing while the user continues to type or use the mouse to input more data.

The second method is called **preemptive multitasking**. With this method the OS maintains a list of programs that are running and assigns a

priority to each program in the list. The OS can intervene and modify a programs priority status by rearranging the priority list. With preemptive multitasking the OS can preempt the program that is running and reassign the time to a higher priority task at any time. Preemptive multitasking thus has the advantage of being able to carry out higher priority programs faster than lower priority programs.

Managing Files

The files that the OS works with may be program or data files. It is the responsibility of the OS to keep track of all these files so that it can copy any one of them into RAM at a moments notice. To accomplish this the OS maintains a list of the contents of a disk on the disk itself. The file allocatio table (FAT) is updated any time a file is created, moved, renamed or deleted.

When there are hundreds of files on a disk finding the one you want can be time consuming. To find files quickly you can organise them using folders. Folders can contain other folders so you can create a structured system known as a **hierarchial file system**.

Managing Hardware

The OS is the intermediary between programs and hardware. In a computer network the OS also mediates between your computer and other devices on the network.

Processing Interrupts

The OS responds to requests to use memory and other devices, keeps track of which programs have access to which devices, and coordinates everything the hardware does so that various activities do not overlap and cause the computer to become confused and stop working. The OS uses interrupt requests (IRQs) to help the CPU coordinate processes.

Drivers

In addition to interrupts the OS often provides complete programs for working with special devices such as printers. These programs are called **drivers** because they allow the OS and other programs to activate and use (i.e. drive) the hardware device.

<u>Networking</u>

The OS also allows you to work with multiple computers on a network. On a network usually each person has a separate PC with its own OS. The network server also has its own OS which manages the flow of data on the file server and around the network.

Utility Software

OS are designed to let you do most of the tasks you normally would want to do with a computer – manage files, load programs, print files, multitask, and so on. These programs are sold by the giants of the software industry, Microsoft, Apple, IBM, SCO (Santa Cruz Operations) and Novell. The programs that they create are called **utilities**.

Because they aid the inner workings of the computer systems utilities are grouped with the OS under the category of system software.

Popular utilities range from programs that can organise or compress the files on a disk to programs that help you remove programs that you no longer use from your hard disk. Some of the major categories of utilities include,
- File defragmentation
- Utilities
- Data compression programs
- Backup utilities
- Antivirus computers
- Screen savers.