

Software (Operating System)

Computer Science (2210)

Prepared By: Engr. Fahad Ahmad Khan

Software is set of instructions to perform a particular task. It is non-tangible part of computer.

There are two broad categories of software:

- (1) System Software
- (2) Application Software

System software (systems software) is computer software designed to operate and control the computer hardware and to provide a platform for running application software. System software can be separated into two different categories, operating systems and utility software.

An operating system (OS) is software that manages computer hardware and software resources and provides common services for computer programs. The operating system is an essential component of the system software in a computer system. Application programs usually require an operating system to function.

Utility software is system software designed to help analyze, configure, optimize or maintain a computer e.g antiviruses, backup software, file managers etc.

Utility software usually focuses on *how* the computer infrastructure (including the computer hardware, operating system, software and data storage) operates. Utility software, along with operating system software, is a type of **system software**, distinguishing it from **application software**.

Application software is a set of one or more programs designed to carry out operations for a specific application. Application software cannot run on itself but is dependent on system software to execute.

Tasks (functions) of an Operating System (OS)

Operating systems perform the following functions:

1. **Accepts inputs** from the mouse or keyboard.
2. Sends **outputs** to the **monitor or printer**.
3. **Recognizes peripheral devices** such as external hard disks, pen drive, web cam etc and makes sure that **software** needed for the hardware to run **is installed**.
4. **Manages files and folders in the system** (Naming, Creating, Moving, Finding and Deleting folders etc).

5. Allows **applications software** (word-processing, spreadsheets etc) to **communicate with the system's hardware**.
7. **Loads and runs software applications**.
9. **Handles system problems and alerts the user**. For example if a printer is jammed and cannot printer, the operating system will stop the print job and alert the user with a warning message.
6. **Shares out system memory efficiently**. The operating system will decide how much memory to assign to particular tasks. It also moves data in and out of memory.
8. **Manages system security**. For example - allows passwords to be added / changed.
10. **Manages the moving of data** to and from a hard disk.

Types of Operating System (OS) Interfaces:

The way in which users communicate with the computer is called an 'interface'. The interface is what we use to give the computer commands. There are **two types** of operating system interfaces:

- **Command Line Interface (CLI)**
- **Graphical User Interface (GUI)**

Command Line Interface

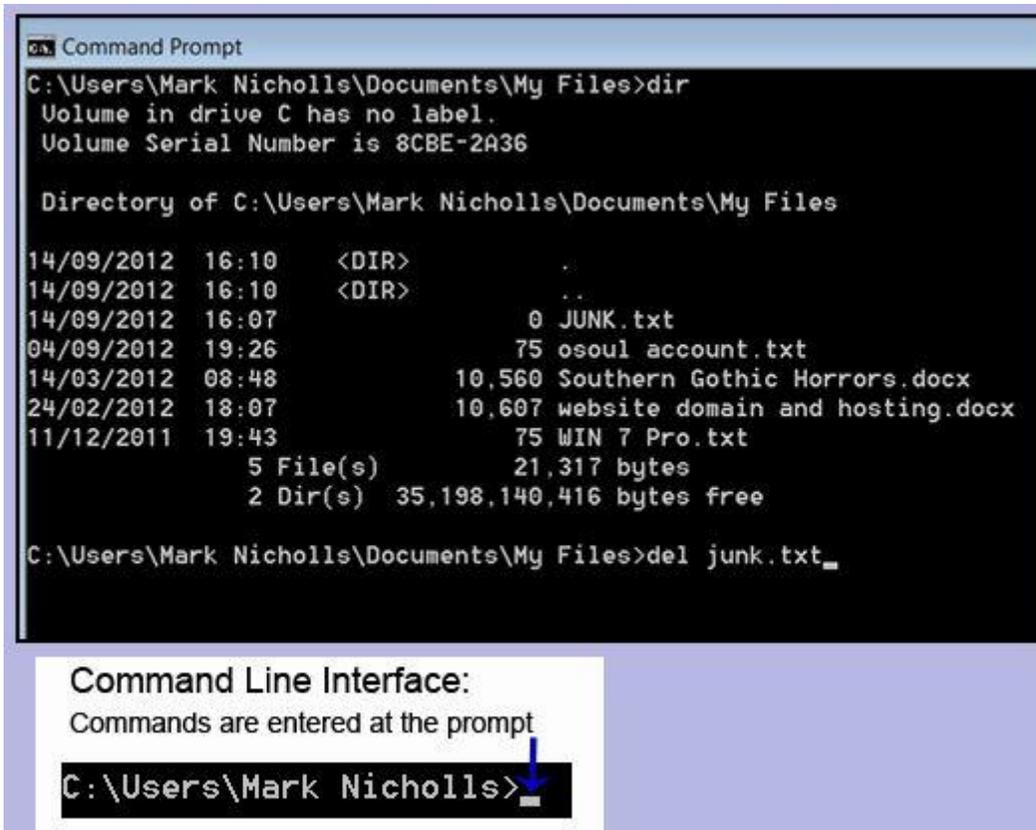
A Command Line Interface operating system works via the user entering **typed commands with a keyboard**. There is **no use for a mouse**.

Command Line Interfaces do not use windows, icons, menus or pointers.

There are over **270 commands** available for functions such as **delete, open, run** etc.

Commands must be entered precisely with no spelling mistakes. These commands can be difficult to remember and, as a result, this type of interface is considered **more difficult to use when compared to a GUI**.

In the example on the left I am using a version of MSDOS to delete a file named **JUNK.txt**



A command line interface is an older style operating system where users type in commands using keyboard.

Command Line Interface's **do not make use of images, icons or graphics**. All the user is sees is a plain black screen like the one to the right.

Because they use no graphics they require **very little computer power**.

There are over **270 different commands** that can be entered at the command prompt. Commands have to be **entered precisely** without spelling mistakes or else the operating system will return an error.

Remembering commands and the exact way to enter them can be difficult and so Command Line Interface Operating Systems are **considered hard to use**.

Graphical User Interface

The graphical user interface (or GUI) is a type of operating system that makes use of:

- # Windows
- # Icons
- # Menus
- # Pointers.

Icons and options on menus represent folders, applications and other commands which are activated when selected and clicked by the pointer.

A mouse is normally used to direct the pointer around the screen.



GUI's are visual (graphical) interfaces and they are more popular than CLI's because they are **very easy to use**. The graphics do need more computer power however.

Instead of typing in commands, the user can use a mouse to **point and click objects on the screen**.

The main features of a GUI are **Windows, Icons, Menus and Pointers** and often abbreviated as (WIMP).

File Management

A file is a program or set of data saved in backing storage.

Directories, sub-directories and folders

A file directory is an index of the contents of a storage drive or sub-directory (a subset of the drive's contents). A GUI often represents a directory as a folder.

Peripheral Device Control

A buffer is a data area shared by hardware devices or program processes that operate at different speeds or with different sets of priorities. The buffer allows each device or process to operate without being held up by the other.

Polling in operating system is a technique that continually interrogates a peripheral device to see if it has data to transfer. For example, if a mouse button was pressed or if data are available at a communications port. Contrast with event-driven or interrupt-driven techniques, in which the operating system generates a signal and interrupts the system.

An interrupt is a signal from a device attached to a computer or from a program within the computer that causes the operating system to stop doing the current processing and figure out what to do next.

Almost all personal (or larger) computers today are *interrupt-driven* - that is, they start down the list of computer instructions in one program (perhaps an application such as a word processor) and keep running the instructions until either they can't go any further or an interrupt signal is sensed. After the interrupt signal is sensed, the computer either resumes running the program it was running or begins running another program.

Handshaking is the process by which two devices initiate communications. Handshaking begins when one device sends a message to another device indicating that it wants to establish a communications channel. The two devices then send several messages back and forth that enable them to agree on a communications protocol.

A checksum is an error detection technique which is used to count the number of bits in a transmission unit that is included with the unit so that the receiver can check to see whether the same number of bits arrived.

Practice Questions

Question 1:

- (ii) The same student also wrote: *“to launch an application, a graphical user interface (GUI) requires typing the name of the application using a keyboard”*.

Why is this statement incorrect?

.....
.....
..... [1]

- (b) A user interface is a function of a typical operating system.

Write down **four** other functions of a typical operating system.

1
.....
2
.....
3
.....
4
..... [4]

Question 2: Describe two features of the following each.

Graphical User Interface (GUI)

Command Line Interface (CLI)

Question 3:

Computers have become more user-friendly with the development of graphical user interfaces.

- a Give four features of a graphical user interface.
- b Give two possible future developments to user interfaces.

Question 4: Match the appropriate statements.

A memory area shared by hardware devices or program processes that operate at different speeds or with different sets of priorities.	Interrupt
A technique that continually interrogates a peripheral device to see if it has data to transfer.	Handshaking
A signal from a device attached to a computer or from a program within the computer that causes the operating system to stop doing the current processing.	Buffer
The process by which two devices initiate communications and one device sends a message to another device indicating that it wants to establish a communications channel.	Checksum
An error detection technique which is used to count the number of bits in a transmission unit that is included with the unit.	Polling