

Figure 1.2.2 The Windows Task Manager utility.

are batched for later processing but the PIN for a customer must be checked in real time. You must be specific and justify your choice. For example, you could write “Because statements must be sent out by post, they can be processed while the computer is not doing other things. It makes sense to process a large number of statements at the same time as a batch.”

Control applications, in which the results of a process are used to inform the next input, use real-time processing. A good example would be the control of a robotic machine on a production line. Information systems also require real-time processing. It is necessary to update the file of information before the next enquiry is dealt with. The classic example is the airline (or theatre) booking system. If a customer decides to buy a ticket for a flight, the number of tickets available must be updated before the next person makes an enquiry, otherwise another person may be sold the same seat.

In general terms, an examination question will ask you to decide which of these two types of processing is most appropriate for a given application. It is not

sensible to try to memorise a list of applications for each type. You must learn to identify the characteristics of each of the types of processing for a given application.

1.2 d Types of user interface

The user interacts with a computer system through its **user interface**. The user gives input (e.g. the click of a mouse) and receives responses from the computer. A user interface (also called a human–computer interface (HCI)) consists of both hardware and software.

When a user types instructions into a computer and the computer responds by displaying details on a screen, then that is an interface. The keyboard and the screen are the hardware components; the software components of the interface allow the computer to understand the typed instructions. In the early days of computing, people could use a teleprinter instead of a monitor. The teleprinter was similar to a typewriter. As the user typed commands on it, the computer would print the commands and its response on paper. The hardware

and software components of the interface need to be appropriate to the use. For example, a keyboard and screen are needed for an interface that enables the user to make enquiries about theatre tickets; a printer would enable the user to print a booked ticket.

There are many different types of interface. Their features vary depending on the application, the conditions in which it is to be used and the knowledge and skills of the user. From the many types of HCI, you are expected to be able to describe the five software interfaces discussed below and give a typical application for each of them. In Chapter 1.9, we discuss the hardware that is necessary to put the software interface into operation.

Form-based interface

If the majority of the input to a system is standardised, a typical interface is an on-screen form to be filled in. This type of interface is used by an operator inputting information while talking to a customer over the telephone.

The interface:

- prompts the operator to ask each of the questions in turn
- makes the operator input the information in the correct order and ensures that nothing is missed out
- ensures that the information is input in the correct format
- makes the checking of the information easier.



A **form-based interface** (see Figure 1.2.3) has a specific area for each piece of data. For example, there may be:

- a drop-down list for restricted input (such as the person's title or a date)
- boxes for textual information (such as the name or email address)
- check boxes for yes–no information (such as a box to indicate acceptance of conditions).


The form uses standard widget controls – text boxes, radio buttons, check boxes and drop-down lists.

When the user enters data, the cursor often moves automatically to the next box to be filled in. Sometimes a

Book an appointment - your details

Please complete this form and we will telephone you within two days to confirm your booking (we will call you between 9am and 5pm, Monday to Saturday). If you require an appointment within the next 24 hours, please call us on  01823 259 416 

Fields with an * are mandatory.

Title *	Select ▼
First Name *	Tony
Surname *	Adams
Telephone *	01823 456342
Email *	tonyadams@sky.com
Appointment 1st choice *	25 ▼ May ▼  Any time ▼
Appointment 2nd choice	26 ▼ May ▼
Appointment type *	Sight Test ▼
Please select if you are a current customer of this store *	Select ▼
<input type="checkbox"/> I agree with the <u>Specsavers privacy policy</u>	
<input type="button" value="Submit"/>	

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Figure 1.2.3 Form-based interface.

box is highlighted to make it clear to the operator where the data are to be inserted. Some of the data are more important than others and the cursor does not move on until data have been supplied. The interface checks that the input is sensible for that box before moving on.

When a person orders something from a supplier on the Internet, a form-based interface is used. The customer fills in a number of standard personal and payment details.

Menu-based interface

A **menu-based interface** is used in situations where the user does not know what options are available. Examples of this are information systems for tourists and the on-screen menus for digital television. A list of choices is made available. When the user selects an option, a further set of choices is displayed, and so on until the result is obtained.

Imagine an information system at a train station in a popular holiday location. The first screen may ask for the general area of interest (accommodation, trips, shopping or entertainment). If the user selects “accommodation”, the next screen may offer a choice

of types of accommodation (hotels, guest houses, etc.). The third screen may offer different price bands. Finally, the user may see a list of all the available properties that match the choices of type and price band. Such an information system often uses a touch screen because other peripherals are less appropriate. For example, a mouse connected to an information system in a train station might be vandalised or damaged by the weather.

Graphical user interface

A **graphical user interface** (GUI) uses windows, icons, menus, and a pointer (giving rise to the acronym WIMP). The user of a GUI expects to be able to view different applications or files on the screen at the same time. This is done by putting each into its own bordered area known as a *window*. The user can select a command by clicking on a small picture (an *icon*) that represents it. The user selects further options from *menus*. Icons and menu options are selected by using some sort of *pointing device* such as a mouse.

In Figure 1.2.4, the main menu is displayed horizontally as text options (File, Edit, etc.). Selecting *Shape* from the menu opens a drop-down menu of

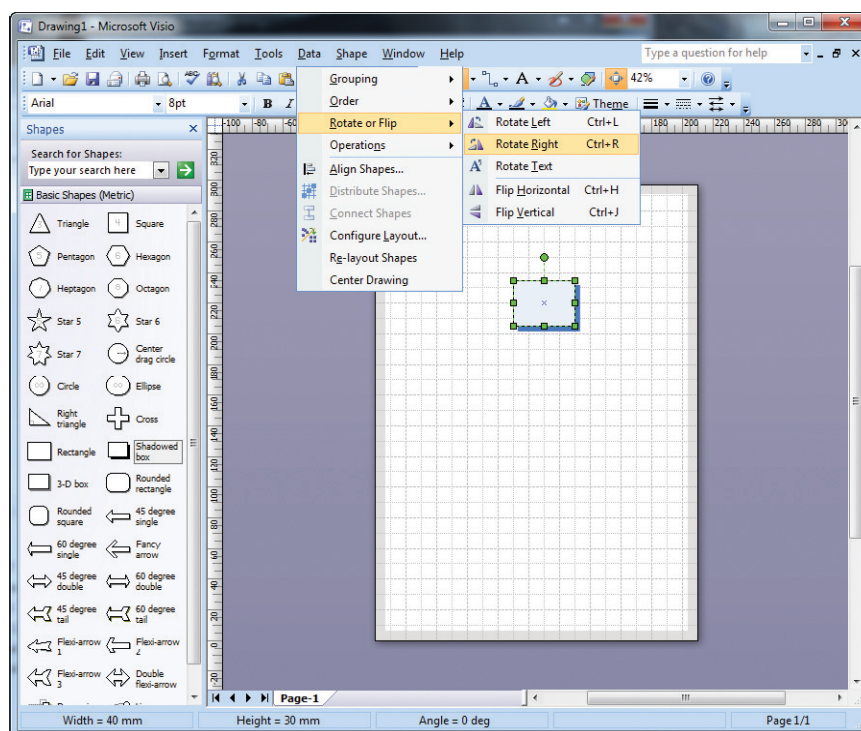


Figure 1.2.4 Graphical user interface.

selections. Selecting *Rotate* or *Flip* gives access to a final menu from which the user can select the final command – *Rotate Right*. The user can save a file in one step by clicking the “Save” icon (it represents a floppy disk); in Figure 1.2.4 you can see this button directly under the “Edit” button.

The whole principle of a GUI is to make using the system as simple as possible by hiding all the complicated bits! For example, when the user clicks an icon to bring a piece of software onto the screen, it involves only one action. In the background, the computer is executing a complicated process involving a lot of instructions. When the icon is chosen, the computer is simply told to run those instructions so the software will appear. The icon has hidden the complexity from the user.

Natural language interface

A **natural language interface** is sometimes referred to as a “conversational interface”. The computer displays or speaks questions that give the user the impression that the computer is talking to them. However, the system restricts itself to questions that will provoke very

simple responses which the computer can understand. If the user does not give one of the expected responses, a message is produced which makes it clear that the user must try again.

It is often assumed that a natural language interface is very close to a spoken language. This may be true but it is likely to be typed into the machine rather than actually being spoken. For example, some Internet search engines or large information systems can process natural language queries. This is the next step up from a simple keyword search, where the software picks out the keywords and then searches for matching documents or files.

Computerised telephone systems may use voice input to select menu choices. A true spoken interface might be used by a disabled person to communicate with a computer.

Command line interface

In a **command line interface**, or “command-based interface”, the user types a series of commands at the keyboard and the computer displays appropriate output (see Figure 1.2.5). The computer does not

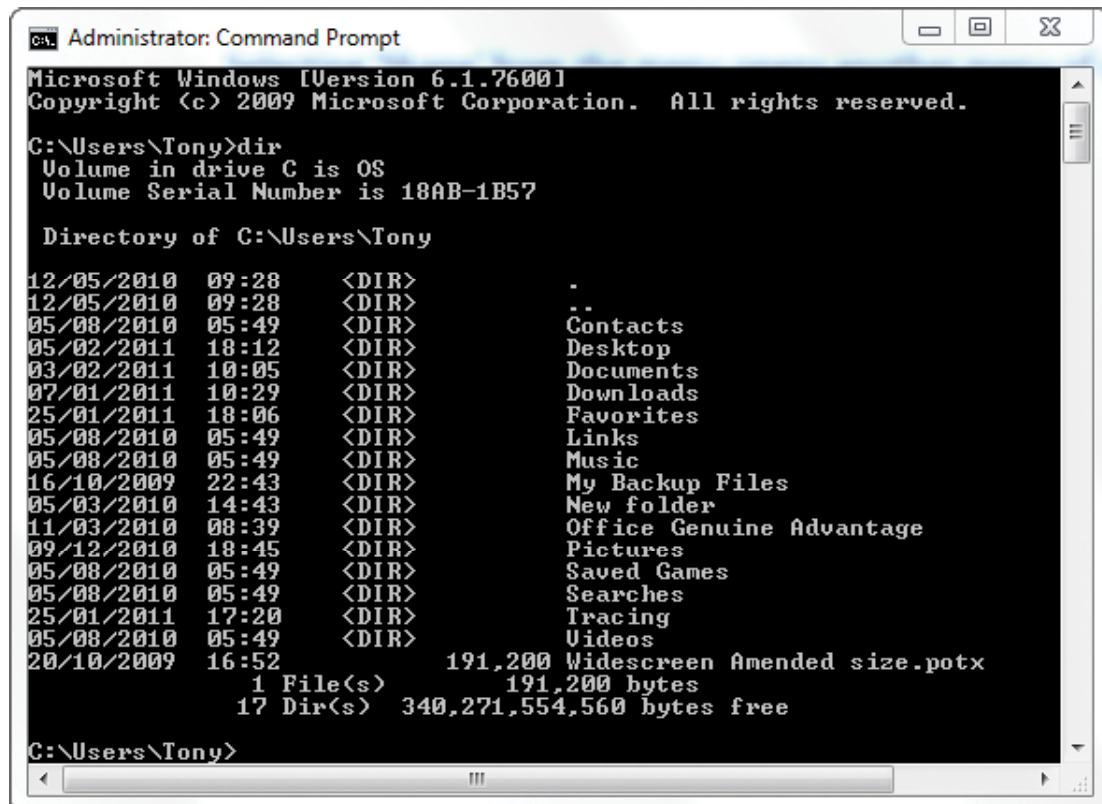


Figure 1.2.5 Command line interface.

prompt the user to enter any particular information. If the user enters a command incorrectly, the computer will give an error message.

To use a command line interface, the user needs:

- to know what commands are available
- to understand the commands
- to understand how material is stored in the computer system.

A command line interface, has two very important characteristics:

- The computer system is very much more open than in the other types of interface. Other interfaces restrict the options that the user has available to them. A command line interface allows anyone with a knowledge of the commands access to the entire operating system. Hence, they have access to the workings of the entire computer.
- Command line interfaces can only be used by people who are computer literate. Users need to understand the commands and their uses. They also need to understand something about how the computer operates and how information is stored.

1.2 e Utility software

Programs that carry out tasks necessary to the operation of the computer are known as **utility software**.

Disk formatter

When a disk is first produced the surface is blank. It cannot be used to store data until it has been formatted by **disk formatter** software. The formatting process divides the disk into smaller areas, each of which can be searched more easily (see Figure 1.2.6).

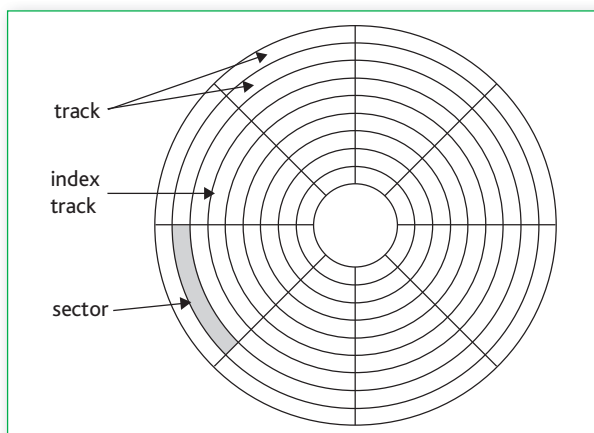


Figure 1.2.6 A formatted hard disk.

The disk surface is divided into a number of tracks and each track is divided into smaller blocks called sectors.

The amount of information that can be stored is enormous. One of the tracks is used as an index, to hold data about where the other data are stored. The formatting process removes all data from the disk so you should save the contents of a disk elsewhere before re-formatting it.

Hardware drivers

Any piece of hardware needs to be controlled and set up for communication with the processor.

The **hardware drivers** are programs that control the communication between the device and the operating system.

File handling

Data stored on a computer system are organised as files. A set of utility programs is needed to handle the storage and use of these files. There are programs to store and retrieve the files and programs that allow files to be altered or deleted. Sometimes the contents of two files need to be combined (*merged*) or the contents of a file may need to be put into a particular order (*sorted*).

A file handling utility normally does all these tasks. If an examination question asks for two examples of utility software, you should not describe two file handling routines.

Automatic backup or archive

Files on a computer system need to be protected from being damaged. A backup or archiving utility is a simple routine that copies the contents of files to another location. If the original file is damaged, the copy can be used to replace the damaged file.

If an examination question asks for an example of a utility, simply saying “backup” is not a satisfactory response. You can make a backup manually as a simple file copy process. A good example of a utility program would be one that automatically backs up the changes to files since the previous backup copy was made (incremental backups).

Email client software encourages the user to regularly archive files to reduce storage space.

Summary continued ...

- A multi-tasking operating system gives the user the impression that they can carry out more than one task at the same time.
- A network operating system links a number of computers together and enables them to share peripherals.
- Applications that require batch processing include:
 - payroll
 - bank statements
 - utility bills
- Applications that require a real-time response include:
 - industrial control systems
 - robots
 - ticket-booking systems.
- A form-based user interface provides boxes into which the user can type data. It provides the user with help (on-screen prompts and validation) in completing the data.
- A menu-based user interface provides the user with a set of options that restrict the available information. An information system for tourists and on-screen menus for digital television are easy for users to operate.
- A graphical user interface (GUI) provides windows, icons, menus and a pointer to enable the user to interact with the computer in complex ways.
- A natural language user interface enables the user to use a natural language (such as English) to interact with the computer. It may be spoken or typed input.
- A command line user interface requires the user to type commands to give specific instructions to the computer. It enables a technician to get close to the workings of the computer.
- Disk formatting software prepares a disk for use by the operating system.
- File handling software enables the user to move, copy and delete files.
- Hardware drivers enable successful communication between devices and the operating system.
- File compression software allows data to be stored in a smaller amount of storage space.
- Virus-checking software monitors input and stored data to ensure that it does not contain malicious software.

Test yourself

There are some areas of the specification where the topic is so narrow that only one question can possibly be asked. It may look different from one exam paper to the next but really it is testing the same knowledge. Question 1 is from one of those sections.

1. State **three** purposes of an operating system as part of a computer system.

[3]

Hint

There are many possible responses to this question. It asks for *three* purposes and awards *three* marks, one for each purpose. The word "state" indicates that you simply need to list the purposes.

2. a. Distinguish between a *multi-tasking* and a *multi-access* operating system. [2]

Hint

When a question asks you to "distinguish" two things, you must choose facts that compare the things.

- b. State what is meant by a *network system* and give an advantage of this type of system over a set of stand-alone computers. [2]

Hint

When a question asks you to "give an advantage", it usually tells you what to compare. In this instance, you must compare a network system with stand-alone computers.

3. A company payroll system uses a personnel file. [2]
- a. Explain the difference between batch processing and real-time processing. [2]
- b. Explain how both batch processing and real-time processing can be used sensibly in the context of the payroll being calculated using the personnel file. [4]

Hint

Notice that you are not asked for separate uses of batch processing and real-time processing. You must consider how batch processing and real-time processing apply to the given application.

4. A computer operator takes phone calls from the public who ring up asking whether a particular item in a catalogue is available. The operator needs to type in a series of responses to questions put to the caller, so that the computer can check the file and determine whether that item is available. Suggest what type of interface is appropriate and its possible contents in terms of options presented to the user. [4]

Hint

Notice that *four* marks are available. You are asked to suggest an interface design and its contents. Assume that *one* mark will be allocated to the interface type and give three or four contents of the interface you suggest. The contents must be based on the scenario described in the question.

5. The technician responsible for maintaining the system in Question 4 uses a command line interface. [2]
- a. Explain what is meant by a *command line interface*.

Hint

Two marks are available, so you should make *two* points.

- b. Give **two** advantages and **one** disadvantage to the technician of using a command line interface rather than a menu-based interface. [3]
6. a. Explain the need to have driver software installed for a printer. [2]
- b. Give **three** different utility programs which would be part of a single-user operating system and state what each program would be used for. [6]