

Note the spelling of software and hardware.

These devices are known as peripherals. Remember that the device is the drive. The CD, disc or DVD is the medium that goes into the drive.

1

The difference between hardware and software

Hardware – the physical part of the computer, including the processor, storage, input and output devices.

Software – the programs which make the computer work, such as operating systems and application packages, and the data in the storage of the computer.

2

Input, output and storage devices


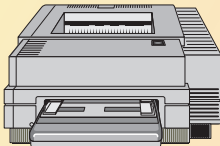

Type of device	Description	Examples
Input device 	A device for accepting data and submitting it to the processor	Keyboard, microphone, touch screen, mouse, scanner, joystick
Output device 	A device which translates the signals from the processor and puts them into a format readable by humans or suitable to be put back into the computer at a later stage	Printer, screen, speaker, lights (LEDs)
Storage device 	A device that can store data in an electronic or optical format which can only be read by the computer	Hard drive, USB flash memory, optical disc drives (CD drive, DVD drive)

Table 2.1 Types of devices

3

Specialist hardware and software

3.1 Specialist hardware devices

Many peripheral devices have been developed for special reasons, for instance for people who cannot see, hear or use their hands. Specialist peripheral devices include:

- Braille keypad – input device for the visually impaired
- mouth-stick – input device for someone who cannot use his/her hands
- puff-suck tube – input device for someone who cannot use his/her hands
- eye-typer – input device that uses the muscles around the eye to move a pointer
- foot-mouse – input device controlled by the foot
- embosser – output device that produces raised Braille characters on paper for those who cannot see

3.2 Specialist software

Help can be given by the software:

- Text to speech – changes any text written on the screen into speech. Suitable for people who cannot read what is written on the screen.
- Screen magnifier – text can be enlarged for those who need it, or individual parts of the screen can be enlarged.

4

Types of software

The programs used by the computer are loosely arranged into different types as shown in Table 2.2.

Type of software	Description	Examples
Applications program	A computer program for carrying out a simple task	<ul style="list-style-type: none"> • A program used for keeping household accounts • A text editing program • A program to design DVD labels
Applications package (generic programs)	Each application contains a set of programs with user documentation which can be used for a variety of tasks within the remit of the application	<ul style="list-style-type: none"> • A word processor for any word-processing tasks • A spreadsheet program that can be used for a variety of mathematics-based tasks • A database program for storing, querying and reporting data • A desktop publishing program used for many kinds of publishing such as posters, flyers and news-sheets • Presentation software for producing presentation slides, which may include sound and video
Systems software	Programs that control the operation of the computer	<ul style="list-style-type: none"> • Disc formatter • Network software • Operating systems • Printer spoolers • Drivers • Anti-virus software • Translators

Table 2.2 Types of software

5

User interfaces

A user interface is the way in which humans and computers can communicate with each other. The computer works in binary numbers and the human does not. Different interfaces are suitable for different needs. Often, as in well-known operating systems, more than one user interface is available.

5.1 Graphical user interface (GUI)

A graphical user interface (GUI) replaces words with small self-explanatory pictures known as icons. This allows access to applications using a mouse and a pointer instead of typing in commands. This method is often thought to be



intuitive – it is possible to use without a lot of training. It is the basis of the systems using ‘windows’, favoured by all the major computer software producers.



Figure 2.1 Graphical user interface with icons

5.2 Command-based interface or command line interface (CLI)

A command-based interface or command line interface (CLI) is one where the commands have to be typed in before the computer responds. Thus, to run a word processor you would have to type a command and press the enter key. The problem with this method is that a user needs to know the commands in advance. It is not intuitive like a GUI. However, an advantage is that more exact commands can be given to the computer than is possible by just clicking icons.

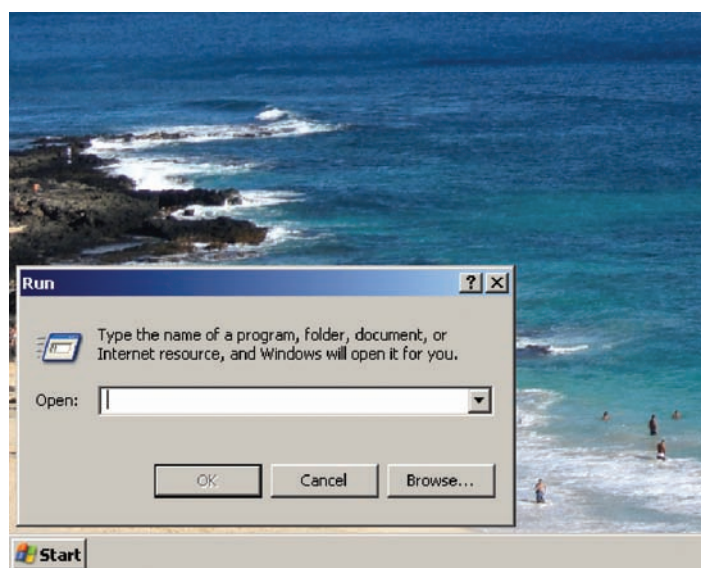


Figure 2.2 Command line interface

5.3 Forms-based interface

A forms-based interface is one in which the user is restricted to an area of the screen called a form, on which a series of spaces is left for the user to fill in. Any online ordering system will probably use this type of interface. It restricts the user to a limited number of responses and makes sure that all the necessary data has been collected before proceeding. It is also the basis of many tasks carried out on the computer. For instance, if a document is to be printed, a form will appear where the user can fill in how many copies, which printer to use etc.

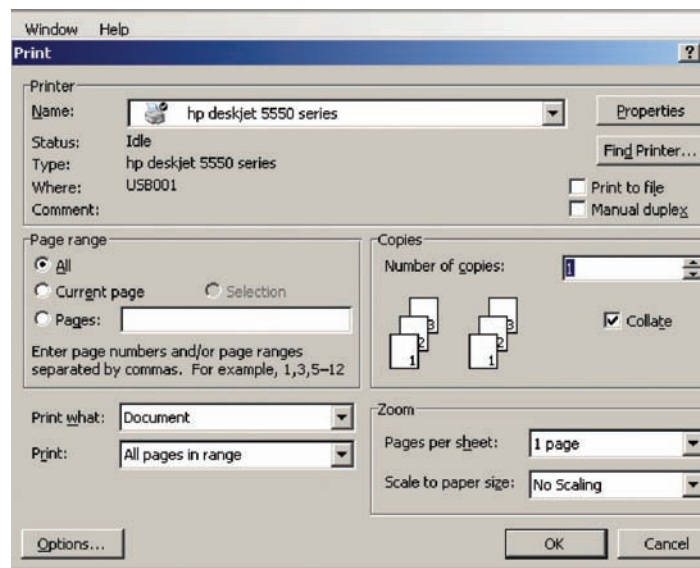


Figure 2.3 Forms-based interface

5.4 Menus

Menus, sometimes called drop-down menus, restrict the user to a limited number of options, but they also show the user all the options available for that particular command. Menus sometimes have **sub-menus**.

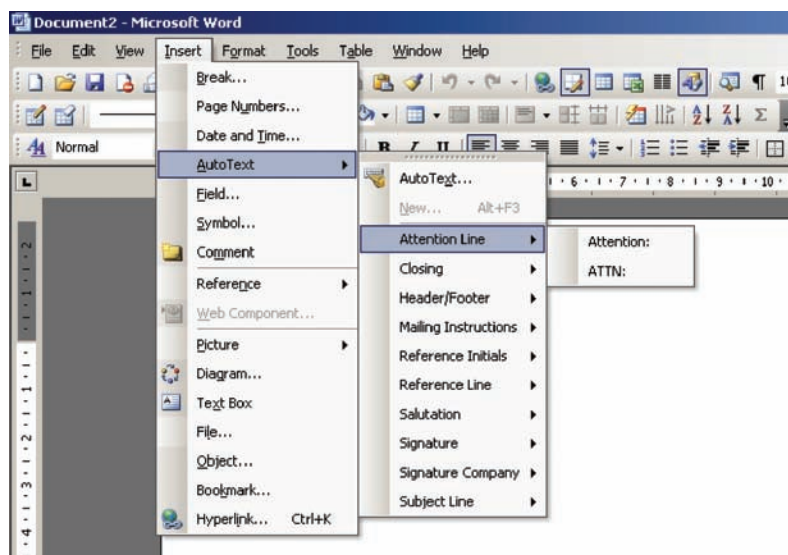


Figure 2.4 Menus



5.5 Natural language interface

A natural language interface is one which utilises the user's own language to communicate with the computer. You could do this by talking to the computer: 'Computer, please print my document.' Alternatively, you could type your commands in words or, on devices such as pocket organisers, use handwriting.

5.6 Windows, icons, menus, pointers (WIMP)

Many of the characteristics of the interfaces mentioned above can be combined to create the windows, icons, menus, pointers (WIMP) interface. The WIMP interface uses a pointer, moved by a mouse, with selections made by clicking the mouse, or another pointing device.

5.7 Advantages and disadvantages of interfaces

GUI (windows)

Advantages

- It is an intuitive approach and easy to use.
- Little or no training is needed.
- Using a mouse makes opening and closing packages quicker than other methods.
- Multiple windows can be open at once.

Disadvantages

- It requires significant system resources in terms of memory and speed of processing.
- Some commands to the operating system may not be possible using the GUI.

CLI

Advantages

- You can type in the exact item you are inquiring about.
- Customers are used to words and know the name of the item they want to find.

Disadvantages

- The system may not accept your spelling of the item.
- It is difficult to explain distinctions to the system, for example the difference between a large or small frying pan.
- It looks old fashioned and may not portray a modern image to the public.

Forms

Advantages

- The user is restricted to certain responses.
- Validation of individual entries is possible.
- Input can be recorded directly to a database.

Disadvantages

- It is not possible to record more information than has been anticipated by the designer.
- It can be difficult to fill in if sensible instructions are not given.

Menu system**Advantages**

- All the possibilities available can be seen at a glance.
- Entry is fast, using just a click.
- It is a user-friendly method – little or no expertise or training is needed.
- The firm does not have to validate the entries – only those on the list are accepted.

Disadvantages

- It is not possible to choose something that is not on the menu.
- If, for example, there are a lot of items for sale, it might not be possible to find the item you want buried in the sub-menus.
- If customers do not find what they want quickly it could put them off.

Natural language**Advantages**

- There is no need to learn special commands as ‘day-to-day’ language is used.
- It is useful for someone with disabilities who cannot use a keyboard.
- No special training is needed to use it.

Disadvantages

- Nuances in language can lead to misunderstandings by the computer.
- It is more difficult to program the computer to accept this interface than other interfaces.

Topic summary

Hardware — input, output, storage devices, specialist hardware.

Software — applications programs, applications packages, systems software, specialist software.

User interfaces — graphical user interface (GUI); command-based or command line interface (CLI); form-based interface; menus; natural language interface; windows, icons, menus, pointers (WIMP) interface.

1

Basic tasks for types of software

Software can be used for many tasks. Some of them are shown in Figure 3.1. Decide which type of software you would use for each of the following tasks: spreadsheet, database, word processor or presentation package.



Figure 3.1

2

Characteristics of systems

The characteristics of a system are a description of the application (the features of the application) and its facilities (what you can do with it).

The application of ICT has come to affect many systems, some of which are listed below. You will be expected to know the characteristics of these systems.

2.1 School administration and teaching systems

A school administration system might consist of:

- an electronic registration system
- a database containing details of the students, including:
 - name
 - address
 - date of birth
 - examination results
 - reports on behaviour and work
 - medical problems

Teachers and students would use computers in many subject areas for writing coursework and researching on the internet. They would use computers in the laboratories for measuring and recording experiments. Some computer-assisted learning (CAL) might be available to some students. Others might use computers in art or music technology, and even in PE lessons students would use videos of themselves to analyse their performance.

Students, teachers and parents might have the facility to view reports and work on the school network from home. There would be web pages advertising the

In an examination you will have to look at the key words and the context of the question to know exactly what the examiners want you to write.

school and the facility to contact the school by email, send in application details or order items from the school shop. Copies of the school magazine could be available electronically.

2.2 Other example systems

Abbreviated characteristics of some other systems are shown in Table 3.1. You should try to find out more about these systems using the internet, textbooks or your class notes.

System	Description	Facilities
Stock control system	An automatic system used by organisations to help them know how much they have in stock at any time, what needs ordering and how much and what is due to arrive	<ul style="list-style-type: none"> Keeps track of goods going out of and coming in to a system Records the location of stock Enables automatic reordering of stock Enables statistical analysis of stock movements, which helps efficient management of the business Enables 'just in time' ordering, which minimises the storage of stock
Booking system	A system based around a database which can be used to book hotel rooms, flights etc.	<ul style="list-style-type: none"> Eliminates 'double booking' Can be filled in by customers online Gives fast information on availability Records customers' data and automatically produces tickets, invoices etc. Allows multiple inputs from different terminals in any location – useful for companies with many branch offices
Online training system	A system of learning using the help of a computer. Lessons are conducted at a computer terminal. Usually used without a human tutor, but could be coupled with book learning	<ul style="list-style-type: none"> Allows lessons to be taken in any order and at the learner's own convenience Provides tests so the learner can check on his/her progress Allows management to monitor progress through the training Can produce an online assessment at the end of the course Allows the learning to follow the speed of the individual learner May incorporate sound, video, 'virtual world' simulation
Timetabling and route finding systems	Systems holding details of possible routes and times of travel and used by organisations such as the AA (planning a route from one place to another) and National Rail Enquires (timetabling)	<ul style="list-style-type: none"> Allows map printing of planned routes Allows online searching by customers Tickets can be produced and printed online Can give times of travel and alternative routes Can give instant changes to data for road works/track repairs/accidents/bad weather and so on



System	Description	Facilities
Customer records system	A database of details of the organisation's customers	<ul style="list-style-type: none"> • Records names and addresses of customers • Records customers' preferences and other information such as age and number of children to help with marketing strategies • May keep records of customers' past purchases • Holds details of customers' preferred payment methods • Records renewal dates for subscriptions • Online systems have methods for customers to alter some data, such as change of address and email address, themselves
Online banking system	A system for customers to manage their bank accounts online and from the comfort of their own homes etc.	<ul style="list-style-type: none"> • Holds details of customers' accounts which can be viewed by the customer after going through a security login • Is distributed from a secure site to combat hackers • Provides instant statements • Enables customers to move money between accounts electronically, pay bills, set up standing orders • Allows customers to order bank products (e.g. cheque books, insurances, traveller's cheques)

Table 3.1 Characteristics of other systems

3

Wizards and macros

3.1 Wizards

A wizard is usually part of a standard applications package which, by asking the user a series of questions and taking him/her step by step through a process, allows the user to complete a complex task without any expert knowledge. An example is a mail-merge wizard in an 'office'-style application or a chart wizard in a spreadsheet application. A wizard has limited uses, however, as the more expert a user becomes the more confining a wizard becomes, limiting the user's choice and producing results which look much the same as those of every other user of the wizard. The wizard may not produce exactly the result the user wished for.

3.2 Macros

A macro is a sequence of instructions, often written by the user of an application, which reduces a common task to a single key combination or button. Many applications allow the user to record a macro and then assign a key combination, while others allow the user to compile a series of programming instructions to produce the macro.

Examples of macros a user might produce are:

- clearing a section of a spreadsheet
- moving figures on a spreadsheet to a different worksheet
- printing a chart
- placing a letterhead at the top of a page
- running a calculation.

The possibilities for macros are endless.

4 Data entry screens

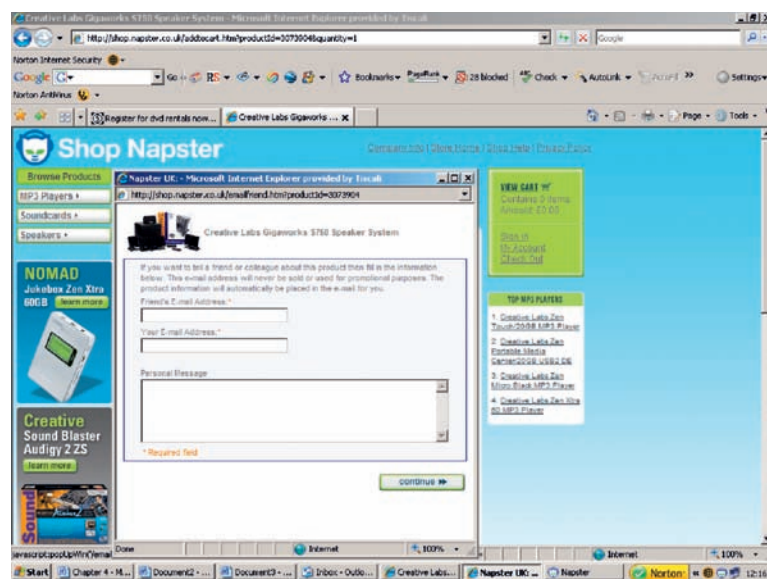


Figure 3.2 Data entry screen

A data entry screen must be designed with great care, as it is often used by inexperienced users. An example of a data entry screen is shown in Figure 3.2. A data entry screen should be set out logically, have an uncluttered screen and have clear instructions with possible online help. Validation of input helps to stop the user entering inappropriate data or accidentally forgetting information, such as the number of items ordered or their date of birth. (The design of the human–computer interface is covered in Topic 9.)

Data entry screens can use a variety of form controls, such as those shown in Table 3.2.