PROBLEM-SOLVING

These tasks provide students with the opportunity to use and acquire language in a much less controlled way. The problems have been chosen to interest the students and to allow them to use their knowledge of computing. The reading and listening texts in each unit and earlier units should provide most of the English terms they need and the language work sections should provide the means of expression. You may wish to revise language you anticipate will be useful. In striving to communicate their solution to the problem to their partner or the other students in the group, students will make this language their own. Do not interfere too much unless communication has broken down completely. It is in making an effort to understand and be understood that language is best acquired.

WRITING

As the book progresses, the writing tasks move from very controlled to less controlled. Where you think your students need more help, do the task orally in class and set the writing as homework. There are many approaches to correcting written work. If you wish to experiment with peer correction where students mark each other's work, our recommendation is that you ask students simply to mark lightly with a pencil dot any item in their partner's work which they do not understand or think may be incorrect. Then return the work to their partner. If he or she does not agree that there is a problem, you can then intervene.

SPEAKING

The speaking tasks are straightforward exchange activities. In the early units, they are mainly information exchange but in the later units there are examples of opinion exchange tasks. Like the problem-solving tasks, these activities provide opportunities for students to develop strategies for coping with not understanding and not being understood. Encourage your students to rephrase when they are not understood and to think of ways round the problem of not remembering a key word.

WORD STUDY

Train your students in good practice as regards vocabulary right from the beginning of the course. Get them to keep their own vocabulary notebooks in which they record not only the meaning of key terms in computing but examples of their usage. Encourage students to spend a few minutes every day learning new words. Regular vocabulary tests are a stimulus for students to make the effort to do this. You can use these tasks in the textbook as vocabulary tests. They are spaced at five-unit intervals and summarise the key terms presented in preceding units.

Present ways in which students can record and store their growing computing vocabulary. Encourage them to keep related words in the same part of their notebook. For example, names of storage devices. They can also list words with their common collocations. For example, *hard/floppy + disk, disk + drive*. Simple crosswords and word games like 'hang the man' are useful short activities to revise key vocabulary at the start of a lesson.

PROGRESS TESTS

Progress tests are included in this guide after every five units. The time you allow for these tests depends on the level of your class – 30 minutes is suggested for an advanced class.

UNIT 1 Computer Users

INTRODUCTION

A **computer** is a device that processes **data** according to a set of instructions known as a **program**. The equipment is known as the **hardware** and the programs and data are the **software**. A special set of programs, called an **operating system**, provides an interface for the user and allows applications programs to communicate with the hardware. Common **applications programs** include **wordprocessors** for creating and editing texts, **spreadsheets** for calculating mathematical formulae and **databases** for storing data in a way that allows the data to be sorted and searched. **Anti-virus programs** are used to detect and remove **viruses** (harmful programs that can reproduce themselves and attach themselves to other programs). Some operating systems have **graphical (user) interfaces** that allow the computer user to select items from **menus** (lists of choices) and to start programs using an input device called a **mouse**. This is done by pressing a button on the mouse i.e. **clicking** the mouse. The main device for inputting the data is a typewriter-style **keyboard** and the output is commonly displayed on a **monitor** screen that looks like a small television screen.

There is a range of sizes and types of computer. Those designed for use by one person at a time are known as **personal computers (PCs)** although the term PC is usually only applied to personal computers that are compatible with the standards laid down by the company known as **IBM** (International Business Machines). Personal computers include **desktop** computers (for use on an office desk) and **handheld** computers that can be carried around by the user. Electronics can be added to desktop computers by plugging in **expansion cards** (electronic circuit boards that can be plugged into special sockets called **expansion slots**).

It is also possible to build all the main parts of a computer into one electronic integrated circuit packaged as a single electronic **chip** (the common name for a microchip; an electronic integrated circuit in a small package) i.e. the '**computer on a chip**'. This enables computers to be built into other devices including household devices such as washing machines and fridges and to be incorporated into plastic cards i.e. **smart cards**, which are able to store information such as health records, drivers' licences, bank balances, etc. Devices that include a computer circuit are commonly referred to as **smart devices**. A **multimedia computer** can process different forms of data including **text**, graphics, **audio** (sound), animation and video. This enables computer systems to be used for a combination of education and entertainment, sometimes referred to as **edutainment**.

Unlike most machines, computers do not have a fixed purpose. They are multi-purpose tools. They can be used in a very wide variety of situations and are found in a wide range of systems including security systems, cars and phones. Advanced systems, known as **expert systems**, enable computers to 'think' like experts. Medical expert systems, for example, can help doctors diagnose an illness and decide on the best treatment. As computer systems are developed, they are becoming more common and are gradually being used for more and more purposes. How they are developed, and for what purposes they are actually used in the future, can be influenced by computer users. A variety of devices known as **peripherals** can be added externally to a computer. One of the most common peripherals is a **printer** used for printing the computer **output** (the processed data or signals that come out of a computer system)

on paper. A **digital camera** allows photographs to be input to a computer for editing.

Not all computer systems are **compatible** i.e. they cannot use the same programs and data. Connecting computers together to form a **network** can provide the **'connectivity'** required to enable computers and software to communicate and to share resources. Networks connected together form an **internet**. The connection of networks throughout the world is known as **the Internet** (note that a capital I is used) or, more simply, **the Net**. Various communication services are available on the Internet, including **email** (electronic mail) for sending and receiving text messages and **IRC** (Internet Relay Chat) which allows users to communicate using text messages in **real-time** i.e. without any delay, while the users are **logged on** (connected to a network system account, normally using a password) to the system. An Internet service called **FTP** (File Transfer Protocol) is used for transferring data or program files between the powerful **server** computers that provide the network services and the **client** computers that use these services e.g. downloading music files. Note that copying data from a larger server system to a client is referred to as **downloading** and copying from the client to the server is known as **uploading**.

One of the newest and most popular services available on the Internet is **the World Wide Web (WWW)** which is often simply referred to as **the Web** (note the use of the capital W). The Web contains interlinked documents called **webpages**. A set of related webpages stored together on a server computer is called a **website**. Websites, such as Dogpile and AskJeeves, give the user access to special programs called **search engines** that are designed to allow the user to find relevant webpages on the Web. An Internet system designed to provide free, interactive access to vast resources for people all over the world is sometimes referred to as an **information superhighway**.

Services such as these allow people to **telecommute** (use their computers to stay in touch with the office while they are working at home). Computer uses mentioned in this unit include producing greetings cards; learning, using three-dimensional graphics programs called 'Splat the Cat' and 'Pets 3'; using the Microsoft Word wordprocessing program including features such as **clipart** (ready-drawn graphic images that can be inserted into documents); communicating on the Internet using email and chat programs including the use of **email attachments** (other types of files e.g. video files attached to simple email text messages); distance learning and **videoconferencing** (a form of communication over a network that uses video cameras so that the people taking part can see and hear each other); electronic classrooms or boardrooms; **browsing** the Web (moving from webpage to webpage using a Web browser program); selling, using a website; painting; scanning pictures; downloading music and creating **CD-ROMs** (compact disk read only memory, commonly referred to as **CDs**). CD-ROMs are storage devices that use laser light for reading and writing data. The most common storage device is a **hard disk** (a set of aluminium disks coated in a magnetic material and enclosed in a vacuum-sealed case) used for storing the operating system and applications programs as well as the user's data.

OBJECTIVES

By the end of this unit, Ss (students) should be better at:

- listening for specific information
- speaking and writing about their own use of computers.

They should understand the difference between the Past simple and the Present perfect in describing completed past actions and completed past actions with current relevance and be able to use these tenses correctly.

They should know and be able to use terms to describe common computer uses such as: *wordprocessing, sending emails, downloading music, browsing the Web.*

STARTER

1 Use this task as a warm-up and to inform yourself about your Ss' computing habits. If you are new to the class or the class are new to each other, it can also serve as an ice-breaker. Demonstrate what you expect of the groups by asking a few Ss questions such as:

Do you have a computer at home/at college?
Do you have access to a computer?
What do you use it for?
Do you use the Internet?

Appoint one student in each group to compile a list for their group and to report back to the rest of the class. Ask Ss to add any new uses reported by other groups to their lists or keep a tally yourself on the board, adding new uses and recording the number of times similar uses are mentioned. Feed in terms such as *downloading, browsing, wordprocessing* as required.

LISTENING

2 This provides practice in listening for specific information. Make sure the class knows what the Open University is. Give them time to note possible uses for each speaker. Then record their predictions on the board. Don't comment on their predictions until Task 3 is complete.

3 The recordings are short. Play each one without stopping but pause after each speaker to give the class time to note their answers. Replay, ticking any correct or near-correct prediction on the board list and adding the actual uses where these were not predicted.

Key

User	Actual uses
primary school teacher	group story-telling
Open University student	write assignments, email tutor, chat with other students
girl (Louise), aged 6	makes cards, plays games
artist	produce CD of paintings for dealers

4 Give the class time to attempt these questions before they listen. They may be able to complete part answers from points they remember from the Task 3 listening. Then play the recording, pausing after each speaker to allow Ss time for noting the answers. There are two questions on each speaker. Play the recording again only if there is disagreement on the answers.

Key

1 the more children involved, the more interactive the program becomes
2 the computer doesn't get in the way of learning, it's simply a tool
3 maths

4 face to face at tutorials, through help group online
5 adopt a pet, name it, feed it, take its picture
6 makes cards for her friends
7 using slides
8 getting people to visit your site

LANGUAGE WORK

Past simple and Present perfect

This section contrasts the use of the Past simple for completed past actions with the use of the Present perfect for completed past actions with present relevance. Write some contrasting examples on the board, for example: *My PC crashed. I had to replace the hard disk.* and *My PC has crashed. Can you advise me what to do?* Ask the Ss to infer the difference in use. Use the examples given from the artist's recording to further contrast the two tenses. For most Ss at this level, this will be revision.

5, 6 These are straightforward fill-in-the-blanks exercises for individual practice but as the completed answers form a dialogue, follow up the individual work with paired speaking practice.

Key 5
Other answers are possible.
1 Q What did you do yesterday/today/etc.?
2 Q How many have you included?
3 Q What have you done/did you do with the others?
4 Q How did you record/enter them?
5 Q How have you organised them?
6 Q Have you added anything/any other features?
7 Q How long has it taken you?
8 Q When did you start painting?
9 Q What did you do before you had a computer?
10 Q Have you sold any?

Key 6
1 A What *did you do* today?
2 B I *worked* on my project. I *searched* the Web for sites on digital cameras.
3 A *Did you find* any good ones?
4 B I *found* several company sites – Sony, Canon, ... but I *wanted one* which *compared* all the models.
5 A Which search engine *did you use*?
6 B Dogpile mostly. *Have you ever used* it?
7 A Yes, I've *tried* it but *I've had* more luck with Ask Jeeves. Why don't you try it?
8 B *I've had* enough for one night. *I've spent* hours on that project.
9 A *I haven't started* on mine yet.
10 B Yeh? I bet you've *done* it all.

SPEAKING

7 This is a freer form of pair practice. Encourage more proficient Ss to go beyond the examples and cues provided. For example, with 8 student B can also ask *What did the program do? Did you include any macros?*

Select some pairs to demonstrate to the rest of the class to check the activity is working well.

Key (examples only)

architects:	to design structures
interior designers:	to demonstrate alternative designs to clients
farmers:	to keep financial accounts; to keep a database of livestock
landscape gardeners:	to experiment with different designs
musicians:	to compose music and to play it back
rally drivers:	to plot their best route
salespeople:	to keep a database of clients

WRITING

8 This task reinforces the speaking practice provided in Task 7. At this stage 150 to 200 words is sufficient.

Key (other answers are possible)
1 Have you ever sent a video email attachment?
Who did you send it to?
When did you send it?
2 Have you ever fitted an expansion card?
Which type did you fit?
3 Have you ever replaced a hard disk?
What model did you replace?
4 Have you ever fixed a printer fault?
What kind of fault was it? What kind of fault did you fix?
5 Have you ever made your own website?
How did you make/design it?
6 Have you ever had a virus?
Which virus did you have?
7 Have you ever watched TV on the Internet?
Which station did you watch?
8 Have you ever written a program?
Which language did you use?
Which language did you write it in?

SPECIALIST READING

Key A
1 Medical equipment, home appliances, cars, toys
2 To collect data at a customer's site, to generate forms, to control inventory, personal organisers
3 a Results in safer environments
b Improves energy efficiency
c Provides features such as call forwarding, call monitoring, and call answering
4 Smart cards, smart phones, smart cars, smart houses
5 To store vital information such as health records, drivers' licences, bank balances, and so on.
6 Multimedia greatly enhances the interaction between user and machine and can make information more interesting and appealing to people.
7 Help doctors pinpoint a patient's illness, suggest further tests, and prescribe appropriate drugs.
8 They help them to communicate more effectively with others.
9 Distance learning and videoconferencing
10 i That hardware, software, and connectivity are effectively integrated in a socially responsible way.
ii Which hardware, software, and networks endure and how great an impact they will have on our lives.
iii That computers are used not only efficiently but in a socially responsible way.

Key B
1 a iv b v c i d ii e iii
2 a False b True c True d False e False

UNIT 2 Computer Architecture

INTRODUCTION

There are different types of computer of varying size and power, including the following:

Supercomputer (the most powerful type of mainframe)

Mainframe (large, very powerful, **multi-user** i.e. can be used by many people at the same time, **multi-tasking** i.e. can run many programs and process different sets of data at the same time)

Minicomputer (smaller than a mainframe, powerful, multi-user, multi-tasking)

Personal computer (PC) (single user)
- **Desktop computer** (suitable size for sitting on an office desk)
  - **Workstation** (most powerful type of desktop, used for graphic design, etc.)
- **Portable** (can be carried around, can operate with batteries)
  - **Laptop** (large portable, can be rested on user's lap)
  - **Notebook** (size of a sheet of notebook paper)
  - **Handheld** (can be held in one hand)
    - **Pen-based** (main input device is an electronic pen)
    - **PDA** (personal digital assistant, has functions such as task lists, diary, address book)

Note that the term **PC** usually refers to an IBM compatible personal computer i.e. an Apple Mac personal computer is not referred to as a PC. A computer that provides a service on a network e.g. storing files, sharing a printer, is known as a **server** computer. Server computers usually have a **UPS** (uninterruptible power supply) attached to them. This is a battery that automatically provides an electricity supply to allow the server to shut itself down properly if the main supply fails.

The **processor** e.g. Pentium, is the most important part of the computer. It processes the data and controls the computer. Powerful computers used as servers often have more than one processor. There are two main types of **memory**:

a **RAM** (random access memory) holds the program instructions and the data that is being used by the processor.
b **ROM** (read only memory) holds the program instructions and settings required to start up the computer.

The combination of the processor and memory is sometimes referred to as the **CPU** (central processing unit), although sometimes the processor itself is referred to as the CPU. The other parts connected to the CPU are known as **peripherals**. These can include input devices, output devices, storage devices and communications devices. **Input devices** include: keyboards, scanners, barcode readers, digital cameras, microphones and video cameras e.g. webcams (small digital video cameras used on the Web). **Output devices** include: **monitors** (VDU display screens), printers, plotters, loudspeakers, headphones. **Storage devices** include: magnetic tape, **floppy disks** (diskettes), hard disks, CD-ROMs, CD-R disks, CD-RW disks, DVDs and MO disks. A common **communications device** is a **modem** (a modulator/demodulator used for converting digital signals to analogue signals and vice versa to allow a computer to be connected to the ordinary telephone system).

A set of connectors used for carrying signals between the different parts of a computer is known as a **bus**. Data is transferred constantly between the processor and memory along the **system bus**. Each part of memory has its own **memory address** and

the processor determines where processed data is stored by sending an address signal along an **address bus** and data along a **data bus**. This is synchronised by an electronic **clock** in the CPU that determines the operating speed of the processor. Transferring data between the processor and RAM can slow up the computer; therefore, some very expensive, extremely fast memory is usually used as a **cache** to hold the most frequently used data.

In a desktop computer, the **CPU** (central processing unit) and **storage devices** (pieces of equipment used for reading from and writing to a storage medium) are normal built inside a **system unit** which consists of a metal chassis enclosed in a flat desktop or a tower shaped case. Other peripherals are attached to the system unit by cables. Each peripheral uses its own **driver card** or **controller** (an expansion card that is plugged into special **expansion slots** in the system unit). **Expansion cards** contain the electronics required to communicate with and control the device e.g. **video** or **graphics cards** are used for monitors, **soundcards** are used for audio input/output and **NICs** (network interface cards) are used for connecting to other computers in a **network** (computing devices connected together). Extra memory can also be added to the computer using special **memory expansion slots** inside the computer. A portable computer that does not have enough space inside to fit expansion cards may use an external device called a **port replicator** to provide connections for peripherals.

Storage devices in the form of a **disk** or **tape** are used to store the programs and data that are not being used. Note that the American spelling of *disk* is commonly used, although the British spelling, *disc*, is sometimes used. Before a program or data can be used, it must be transferred from the storage device to the main RAM memory. **Hard disks** consist of a set of magnetic coated metal disks that are vacuum-sealed inside a case to keep out the dust. The magnetic surfaces of the disks are **formatted** using a **read/write head** to provide magnetic storage areas. These storage areas form concentric circles called **tracks** and each track is subdivided into sections called **sectors**. The disks are rotated at high speed and read from or written to by the read/write head that moves across the surface of the disks. In server computers, hard disks can be connected together and made to operate as one unit using **RAID** (a redundant array of inexpensive disks – see Unit 17). This can speed up the system and provide a way of recovering data if the system **crashes** (fails suddenly and completely, usually referring to the failure of a hard disk). There is a variety of optical storage devices that use laser light to read or write to a disk, including: **CD-ROMs** (compact disk read only memory), **CD-R** (recordable compact disk), **CD-RW** (re-writable compact disk), **DVD** (digital versatile disk – previously known as digital video disk).

An **input device** called a barcode reader is a special type of **scanner** for reading **barcodes** (a set of printed bars of varying thickness that are used to identify a product e.g. used to price items in supermarkets).

When comparing computers, the **power** of the computer is important. This is mainly determined by the **speed** and **capacity** (size) of each part of the computer.

Speed is measured in **hertz** (Hz) i.e. cycles per second.

Capacity is measured in **bytes** (B) where 1 byte = 8 **bits** (binary digits) = 1 character.

When specifying a computer the following are normally quoted:

a the speed of the processor (MHz – megahertz, GHz – gigahertz)

b the capacity (size) of the memory (MB – megabytes)
c the capacity (size) of the **magnetic storage devices** e.g. hard disk, floppy disk (MB – megabytes, GB – gigabytes)
d the speed of the **optical storage devices** e.g. CD-ROM, DVD (given as a multiple of the speed of the first devices produced e.g. 24× = 24 times, 12× = 12 times)
e the display monitor size (measured in inches diagonally across the screen surface)
f the monitor image quality (**resolution**) given by the number of **pixels** (picture elements) that are used across and down the screen e.g. 800 × 600, or by the graphics standard used e.g. **VGA** (video graphics array), **SVGA** (super video graphics array)
g the graphics card memory size (MB – megabytes)
h the speed of the modem (measured in **kbps** – kilobits per second)

Two different number systems are used in computer specifications:

a The **decimal system**, which consists of ten digits from 0 to 9, is used for measuring speed.

b The **binary system**, which only has two digits (1 and 0), is used for measuring capacity.

The following prefixes are also used in measurements:

	Decimal system	Binary system
kilo	10^3 = 1 thousand	2^{10} = 1,024
mega	10^6 = 1 million	2^{20} = 1,048,576
giga	10^9 = 1 thousand million	2^{30} = 1,073,741,824

e.g. 1.7 GHz = one point seven thousand million cycles per second
256 MB = 256 × 2^{20} bytes = approximately two hundred and fifty six million bytes

Communication is provided between **applications programs** (wordprocessors, drawing programs, etc.) and the computer **hardware** (the physical components of a computer system) by a set of programs collectively known as the **operating system** e.g. Microsoft Windows, MacOS.

OBJECTIVES

By the end of this unit, Ss should be better at:
- reading for specific information
- understanding computer advertisements.

They should understand and be able to use:
- structures for expressing function
- prepositions of place.

They should know and be able to use names of types of computers, computer features, sequence words.

STARTER

1 This provides an opportunity to revise the names of types of computer: *supercomputer, mainframe, workstation, desktop, portable, pen-based computer, PDA (Personal Digital Assistant).* Have Ss do the task individually and then compare answers in small groups. Where there is disagreement, Ss should justify their answers. You can then compare answers in plenary.

Key
Fig 1 a supercomputer b mainframe c workstation d desktop e portable f pen-based computer g PDA
1f Marketing research person collecting data from the general public
2b large company processing payroll data
3e travelling salesperson giving marketing presentations
4a large scientific organisation processing work on nuclear research
5g businessperson keeping track of appointments while travelling
6c graphic designer
7d secretary doing general office work

2 This is a pre-reading task as preparation for Task 3. Ss should do the task individually and then compare answers in pairs. They should use the Glossary to check on any disputed answers.

Key

1	CD-ROM	Compact Disk Read-Only Memory
2	RDRAM	Rambus Dynamic Random Access Memory
3	MB	Megabyte
4	GHz	Gigahertz
5	AGP	Advanced Graphics Port
6	SDRAM	Synchronous Dynamic Random Access Memory
7	SVGA	Super Video Graphics Array

3 This task provides practice in reading for specific information, in this case in understanding computer advertisements. Each feature of the computer is explained in the notes. Task 2 should provide sufficient preparation and the task can be done individually with checking in pairs or in plenary. For further practice photocopy some computer ads from computer magazines or the daily press and ask the Ss to work in groups, each with a different ad. They can then report to the class on the features of the computers advertised.

Key
1 256MB
2 mouse, keyboard
3 19 inch (17.9 inch VIS)
4 1.4GHz
5 60GB
7 Microsoft Windows 2000
8 soundcard, CD-ROM drive, graphics card

LANGUAGE WORK

Function of an item

These items should be revision for most Ss. Ask Ss about the functions of different kinds of memory: ROM, RAM, cache. It is a good opportunity for them to tell you about something in which they should be experts. Vary your questions:

What is it for?
What does it do?
What is it used for?
What is its function?

Write their answers on the board in note form and then expand the notes to illustrate the different structures. For example, *RAM: holds data* expand to *It's used for holding data, It holds data, It's used to hold data.*

Tasks 4 and 5 provide practice in these structures. Task 4 is two-stage: Ss must first find the correct match, then link object and function. They can do this individually. Task 5 requires more thought as Ss must identify and describe the function of each object. Do this individually, then compare answers in pairs. There may be some variation in the ways in which the Ss describe the functions. Make sure they agree with each other that their descriptions are technically correct.

Key 4

A Item	B Function
RAM	holds data read or written to it by the processor
processor	controls all the operations in a computer
mouse	controls the cursor
clock	controls the timing of signals in the computer
3.5" floppy drive	reads and writes to removable magnetic disks
monitor	displays the output from a computer on a screen
keyboard	inputs data through keys like a typewriter
DVD-ROM drive	reads DVD-ROMs
cache	provides extremely fast access for sections of a program and its data
ROM	holds instructions which are needed to start up the computer

1 RAM holds data read or written to it by the processor.
The function of RAM is to hold data read or written to it by the processor.
2 The processor is used to control all the operations in a computer.
The processor is used for controlling all the operations in a computer.
3 The mouse controls the cursor.
The mouse is used to control the cursor.
4 The clock is used for controlling the timing of signals in the computer.
The function of the clock is to control the timing of signals in the computer.
5 The 3.5" floppy drive is used for reading and writing to removable magnetic disks.
The 3.5" floppy drive is used to read and write to removable magnetic disks.
6 The monitor displays the output from a computer on a screen.
The function of the monitor is to display the output from a computer on a screen.
7 The keyboard is used to input data through keys like a typewriter.
The keyboard is used for inputting data through keys like a typewriter.
8 The DVD-ROM drive is used for reading DVD-ROMS.
The function of the DVD-ROM drive is to read DVD-ROMS.
9 Cache provides extremely fast access for sections of a program and its data.
Cache is used to provide extremely fast access for sections of a program and its data.
10 ROM is used to hold instructions which are needed to start up the computer.
ROM is used for holding instructions which are needed to start up the computer.

Key 5 (examples only)
1 A scanner is used for inputting text and graphics.
2 A printer is used to print out data from a computer.
3 An ATM provides cash and account information to bank customers on the evidence of a swipe card.
4 A PDA is used to store information such as appointments.
5 The function of a hard disk drive is to store programs and data.
6 A supercomputer is used to process quickly very large amounts of information, for example in a government department or a university.
7 A mainframe computer is used for processing large amounts of data such as a major company's accounts and client database.
8 Barcodes provide computer-readable information on a product so that it can be identified and priced automatically.
9 Swipe cards are used to provide a secure means of identifying authorised users of many different facilities such as banks, libraries, and computer labs.
10 The function of memory is to hold the instructions and data used by the processor.

Prepositions of place

Ask the Ss to explain to you how data flows in computer buses. It may help if you can draw Fig 2.3 on the board and mark the direction of data flow as they explain it to you. Feed in the correct prepositions as they explain by asking for confirmation. For example, *So data flows from the CPU along the address bus?*

Once the diagram is labelled, ask a few Ss to summarise the function of each of the buses.

6 Ss can do this individually.

Key
1 The CPU is a large chip *inside/in* the computer.
2 Data always flows *from* the CPU *to* the address bus.
3 The CPU can be divided *into* three parts.
4 Data flows *between* the CPU and memory.
5 Peripherals are devices outside the computer but linked *to* it.
6 The signal moves across the VDU screen *from* one side *to* the other.
7 The CPU puts the address *onto* the address bus.
8 The CPU can fetch data from memory *along* the data bus.

PROBLEM-SOLVING

7 Ss should work in small groups to maximise the opportunity to speak English. When they have completed the task, they can compare answers with a neighbouring group. Then select Ss to report back to the whole class. Make sure they give reasons for their answers. Encourage those with more computer knowledge to give fuller reasons.

Key
1 CD-RW Drive
2 memory module
3 APC 1400 SmartUPS
4 3Com 10/100 Ethernet controller

SPEAKING

8 This is an information-transfer activity. Give examples of the sort of questions your Ss can ask before they start. For example,

What kind of monitor does it have?
What is the capacity of the hard disk?
How much cache memory does it have?
What size of memory does it have?
What is the speed of the processor?
What type of case does it have?
At what speed does the bus operate?
Does it have a CD-ROM drive?
How fast is the CD-ROM drive?

Make sure the Ss exchange the information orally and do not simply show each other their data. More able Ss can also exchange information on the options available.

WRITING

8, 9, 10 and **11** These tasks provide practice in ordering instructions and marking their sequence with sequence words. As a follow-up, you can asks Ss to write their own instructions for tasks such as *fitting a sound card, upgrading the hard disk, installing more memory, fitting a DVD-ROM drive, replacing a floppy drive.*

Key 8

feature	A	B
processor type	Dual Pentium IV	Mobile Pentium III
processor speed	1.4GHz	850MHz
bus speed	133MHz	100MHz
memory (RAM)	256MB	128MB
memory type	ECC SDRAM	SDRAM
hard disk capacity	60GB	20GB
hard disk type	LVD SCSI	EIDE
monitor size	19" (17.9"VIS)	15"
monitor resolution	SVGA	SXGA (1400x1050)
CD-ROM drive speed	24/52X CD	16/40X DVD

Key 9
1b 2d 3c 4a 5e

Key 10
i c ii d iii a iv e

Key 11

First shut down your computer by choosing Shut Down from the Apple menu or the Special menu.

Then unplug all the cables except the power cord from your computer.

Next, if there are security screws on the vertical plate on the back of the computer, remove them with a Philips screwdriver.

After that, place your thumbs on the two tabs at the top of the computer's back panel, and press down.

Finally, pulling gently, swing the panel down, and slip it out.

SPECIALIST READING

Key A

1 The time it takes to move data in and out of memory
2 Cache
3 The cache controller
4 Write-back cache
5 Before using the space to cache new data
6 When data in the cache is changed
7 An algorithm

Key B

1 a iv b vi c v d iii e i f ii
2 a True b False c False d True e True f False g True

UNIT 3 Computer Applications

INTRODUCTION

As computer systems become more **intelligent**, they are used in a wider variety of work situations where previously it was necessary to employ people. Hospitals can increasingly use computers where highly trained people were required to deal with life-threatening situations. Computers can also be used in airports where highly trained experts were previously required to ensure safety and the police can make more use of computers to detect and investigate increasingly sophisticated crimes.

One of the uses considered in this unit is police **speed traps** used to catch drivers that are breaking the official speed limit. In earlier systems, **radar** equipment was used to bounce radio waves off the moving car. A small processor, known as a **microprocessor**, calculated the speed of the car from the changes in the radio waves and triggered an ordinary camera with a flashgun to take a photograph of the car if it was speeding. The details were stored on a **smart card** (a plastic card with a built-in computer system that can store large amounts of data). When the smart card was taken back to the police station, the driver's details were obtained from the **DVLC** (Driver and Vehicle Licensing Centre) **database** i.e. the central computerised records of all licensed drivers and vehicles.

Newer systems prevent **'surfing'** i.e. where the driver only slows down as they pass through the speed trap, by using two computerised units with digital cameras placed at a fixed distance apart. Each unit records the time that a vehicle passes it, as well as photographing and identifying the car licence number using **OCR software** (optical character recognition software that changes picture images of letters and numbers into digital form for use by a computer system). The computer then uses the difference in recorded times to calculate the speed of the vehicle. The registration numbers of vehicles exceeding the speed limit are immediately **downloaded** (copied from the computer to a server computer) to the computer at police headquarters where each vehicle is matched with the DVLC database. Standard letters are then printed off addressed to the vehicle owners using **mailmerge** (a wordprocessing feature that produces a separate standard letter containing details obtained from each record in a database).

There are many ways in which computer systems can be used in large supermarkets, particularly for financial calculations and in stock control using **EPOS tills** (electronic point of sale cash tills). Each item on a supermarket shelf has a **barcode label** with a **barcode** (a standard set of vertical bars of varying thickness used to identify products) printed on it. The barcode number system giving standard price and item code numbers used throughout Europe is known as **EAN** (European Article Number). The barcodes are read by scanner devices called **barcode readers** that are attached to the EPOS tills. When a checkout operator moves the barcode label across the scanner, the label is scanned and the barcode number for that item is read. The scanner signals are converted to a **digital** form (where the changing signal is either off or on) and sent to the supermarket branch computer. The branch computer checks the digital EAN code against a computer **database** (a type of applications program used for storing information so that it can be easily searched and sorted) that holds a record of each type of item. In this way the item and the price of the item can be identified and the sale of the product can be recorded by the computer. The item and the price are shown

on the EPOS till display and printed on a paper receipt.

Computers are also used to provide cash to users and to process bank cards such as Visa cards using an **ATM** (automatic teller machine – the type of machine used by banks for enabling customers to withdraw money from their bank accounts).

OBJECTIVES

By the end of this unit, Ss should be better at:

- ignoring irrelevant information when they read
- describing a process
- coping with not understanding and not being understood
- writing a description of a process.

They should understand and be able to use:

- the Present passive for descriptions of processes.

They should know and be able to use terms for describing computer applications.

STARTER

1 Divide the class into four sets of groups with each group within the set working on a different area. Groups who have worked on the same area should then compare answers. Finally, have selected groups report in plenary. Note the uses they describe on the board so that you can correct any important errors as you record their findings.

Key 1 (examples only)

1 supermarkets: identifying items; pricing; stock control; checking cash cards; checking sell-by dates; tracking customer buying habits; monitoring and controlling freezer temperatures
2 hospitals: database of patient records, appointments; database of equipment, drugs and supplies; patient monitoring; staff records; staff rosters; accounts; statistics on patients treated; wordprocessing of letters; database of patients awaiting transplants for easy matching with donors
3 airports: plotting aircraft movements – air traffic control; arrival and departure information displays; check-in facilities; baggage handling – some use bar codes to direct baggage; staff database; security for entry to restricted areas; intranet for internal communications
4 police headquarters: database of crimes, criminals, suspects, missing people; files of fingerprints and DNA data which can be matched with suspects; files of stolen cars and other stolen property; staff rosters, etc.

READING

2 Ss should be able to work out most of the stages in the operation of the speed camera system from the diagram which also includes most of the terms they need to describe how the system operates. They should work individually at first, then compare their solutions in pairs.

Key 2

1 The first unit records the time each vehicle passes.
2 It identifies each vehicle by its number plates using OCR software.
3 It relays the information to the second unit.
4 The second unit also records the time each vehicle passes.
5 The microprocessor calculates the time taken to travel between the units.
6 It relays the registration numbers of speeding vehicles to police headquarters.
7 A computer matches each vehicle with the DVLC database.
8 It prints off a letter to the vehicle owner using mailmerge.

3 An important reading skill for any student is being able to ignore irrelevant information. The only relevant information in this text is the final sentence which explains how speeding drivers can be traced. Ask Ss what the equivalent of the UK DVLC is in their country.

Key 3

Only the information that the owner of the vehicle can then be traced using the Driver and Vehicle Licensing Centre database.

4 Ss have a clear purpose for reading Part 2 of the text – to check and complete the stages in their explanation. Ss may know *surfing* from *surfing the Web*. *Outwit* they should be able to infer from context.

LANGUAGE WORK

Present passive

Write these sentences on the board:

1 The radar *sends* out a beam of radio waves.
2 The information *is stored* on a smart card.

Ask the class to explain why the verb is active in (1) and passive in (2). Explain that in (1) the agent responsible for the action is included – *the radar*. In (2) the agent is not included although we know what it is – *the microprocessor*. Explain that the present passive is often used to describe a process where actions, not the agents, are the important features.

5 Best done as an individual written task. Make sure the class know OCR – Optical Character Recognition.

Key 5

1 The time each vehicle passes is recorded by the first unit.
2 Each vehicle is identified by its number plates using OCR software.
3 The information is relayed to the second unit.
4 The time each vehicle passes is also recorded by the second unit.
5 The time taken to travel between the units is calculated by the microprocessor.
6 The registration numbers of speeding vehicles are relayed to police headquarters.
7 Each vehicle is matched with the DVLC database.
8 A letter is printed off to the vehicle owners using mailmerge.

6 Make sure EPOS – Electronic Point of Sale and EAN – European Article Number are known. Check that the Ss have correctly sequenced the steps, for example by asking them to compare in pairs, before the class proceed to the written description. This should be done individually. Ss can use the sequence words revised in Unit 2 as alternatives to numbering the steps.

Key 6

1 f The checkout operator scans the item.
2 c The scanner reads the barcode.
3 a The scanner converts the barcode into electrical pulses.
4 g The scanner sends the pulses to the branch computer.
5 i The branch computer searches the stock file for a product matching the barcode EAN.
6 d The branch computer records the sale of the product.
7 b The branch computer sends the price and description of the product to the EPOS till.
8 e The till shows the item and price.
9 h The till prints the item and price on the paper receipt.

PROBLEM-SOLVING

7 Get the class to work individually; then compare their answers in small groups. Ask selected groups to report in plenary and to justify their answers.

Key 7

On-board diagnosis of faults; Internet connections for passengers – for driver only if vehicle has stopped; systems to immobilise the vehicle if the driver is not recognised; automatic adjustment to suit individual drivers – seat height, steering wheel position, mirrors, etc.; monitoring of fuel efficiency; navigation systems; vehicle tracking if stolen, etc.

SPEAKING

8 This pair activity provides practice in speaking and note-taking but also in coping with not understanding and not being understood. Make sure your Ss know phrases such as:

I'm sorry I didn't catch that.
Can you explain the bit about ... again?
What do you mean by ...?

A students can prepare and rehearse with each other, as can B students, to iron out problems in production. Then re-pair A-B, A-B for the information exchange. When the activity is complete, Ss can look at each other's diagrams.

WRITING

9 Best done as an individual writing task. As an alternative, Ss can be asked to write a description of their partner's process based on their notes.

Key 9 (examples only)

ATM

First the customer puts their card into the machine and enters their PIN number on the keypad and the amount they wish to withdraw. The ATM reads the information on the magnetic strip on the card. The strip contains the name of the account holder, their account number and details of the network it is linked to. This information is then sent to a central computer which holds information on many accounts. The customer's PIN number is checked as well as the amount of money in their account. If their account has sufficient funds, the ATM is instructed to dispense the cash requested.

Visa

A customer uses a Visa card to pay for a $1,295 computer in Chicago. The store uses a swipe card reader to send details of the purchase and the customer's card number to a processing centre in New Jersey. The information may travel by satellite or phone lines. Because the purchase is above a certain limit, details are forwarded to a computer in Atlanta for closer scrutiny. Next the transaction is sent to San Mateo in California for processing. The California computer checks the card details in a database of card holders and finds that the card was issued by a Portland bank. Then it checks with the Portland bank's computer to see if the transaction request should be approved or denied. The response is sent back to the original store in approximately 15 seconds.

SPECIALIST READING

Key A

1 Artificial Intelligence
2 a decision trees b neural networks
c clustering
3 Rules
4 When data isn't labelled in a way that is favourable to mining.
5 All types of data storage, from large data warehouses to smaller desktop databases to flat files.
6 a Refine the parameters
b Use other data analysis tools to examine the data
7 a Analysing Supreme Court decisions
b Discovering patterns in health care
c Pulling stories about competitors from newswires
d Resolving bottlenecks in production processes
d Analysing sequences in the human genetic makeup

Key B

1 a iii b iv c ii d i
2 a False b True c True d True e False
3 Large amounts of data stored in data *warehouses* are often used for data *mining*. The data is first *cleansed* to remove *duplicate* data and errors. The *data* is then analysed using a tool such as *artificial intelligence*. An analysis report is then analysed by an *analyst* who decides if the *parameters* need to be refined, other data *analysis* tools need to be used, or if the results need to be discarded because they are *unusable*. The analyst passes the final results to the *decision* makers who decide on the *appropriate* action.

UNIT 4 Peripherals

INTRODUCTION

EPOS (electronic point of sale) **tills** used in supermarkets form part of a computer system with various input and output **peripheral devices** attached to the till, including: **electronic scales** for weighing produce, **barcode reader** for looking up prices using **barcodes, swipe card reader** for reading bank cards, **numeric keypad** for inputting prices manually, **LCD** (liquid crystal display) screen for outputting purchase details.

Digital cameras are gradually being developed that are as good as conventional cameras. They have various electronic devices inside, including:

a **LCD** (Liquid Crystal Display) screen used as a view-finder and for viewing the pictures after they have been taken.
b **CCD** (Charge-Coupled Device) consisting of thousands of **photo-transistors** (light-sensitive transistors – a transistor is an electronic switch). It creates the pictures as a set of dots or **pixels** (picture elements).
c Memory cards e.g. **flash cards – solid state memory** (electronic integrated circuits, i.e. chips, used for storing the pictures).

There is no delay in getting pictures from digital cameras because there is no film requiring chemical processing. They can be attached to a computer to directly transfer pictures for editing using special software and unwanted pictures can be deleted. However, they cost more than conventional cameras and the quality is not quite as good. You also need to buy rechargeable batteries and a photo-quality colour printer with high printing costs for paper, ink, etc. Two important features when buying a digital camera are:

a picture quality or resolution. The resolution of a camera is measured in pixels and given as two numbers, indicating how many pixels there are across the image and how many going down the image e.g. 1280 by 960 (or 1280 × 960).
b the number of pictures the camera can store. The higher the resolution, i.e. the more pixels, the more memory is required to store the pictures. Data can be compressed to allow more pictures to be stored.

Storage devices are used to store data and programs that are not being used by the processor. They usually consist of:

a **storage media** in the form of a circular disk or a tape where the data is stored
b a **disk or tape drive** that moves the media past a **read/write head** that reads the data from and writes data to the storage media.

Types of storage devices include:

magnetic devices (that use magnetism)	**floppy disks** (diskettes) and **magnetic tape** made of a magnetic coated flexible plastic; **hard disks** made of magnetic coated aluminium disks.	
optical devices (that use laser light)	**CD-ROM**	– compact disk read only memory
	CD-R	– recordable compact disk
	CD-RW	– re-writable compact disk
	DVD-ROM	– digital versatile disk read only memory
	DVD-RAM	– digital versatile disk random access memory

magneto-optical devices (that use a combination of magnetism and laser light)	**CD-MO** – magneto optical compact disk

Read only media enable the user to both read data from and write data to the media. **Read and write media** can only be used for reading data i.e. the stored data cannot be changed in any way.

Removable storage enables the user to change the media and transfer it to another computer.

Fixed storage does not allow the media to be changed or transferred to another computer.

Other factors that vary between storage devices include:

a the speed at which the drive moves the media past the read/write head and reads or writes data to the storage media
b the capacity of the media i.e. how much data can be stored on each disk or tape
c the cost of the drive and the media.

There are various types of **printers** for outputting text and graphics to paper.

Some types of printers are **mono** (print in black and white only) and others can print in colour. The speed, quality and cost of printing varies between different types of printer. Some are designed for printing text and are not really suited to printing graphics.

Data can take many forms and there is a wide variety of input, output, storage and communication **peripherals**.

Units of measurement used in data storage include:

bit	a binary digit i.e. a 1 or a 0
byte	8 bits = 1 character i.e. a letter, numerical digit or a punctuation mark
megabyte (MB)	1,048,576 bytes (approximately one million bytes)
gigabyte (GB)	1,073,741,824 bytes (approximately one thousand million bytes)
terabit	1,099,511,627,776 bits (approximately one thousand gigabits)
micron	one millionth of a metre
angstrom	the approximate radius of an atom

OBJECTIVES

By the end of this unit, Ss should be better at:
- listening for specific information.

They should understand and be able to use:
- ways to express comparison and contrast.

They should know and be able to use terms for common peripheral devices.

STARTER

1 EPOS tills and how they work should be familiar from Unit 3. *Swipe cards* may be a new term. Ss should do the task individually and then compare answers in pairs or small groups.

Key 1
Input devices
Electronic scales
Barcode reader
Swipe card reader
Numeric keypad

Output devices
Liquid Crystal Display

2 Ss should make the links individually. They can work in pairs or small groups to name the peripherals. Continue this task by asking them to name any other input and output device not shown in this diagram, for example:

input devices – joystick, touchscreen, mouse
output devices – plotter, headphones.

Key 2

Input	Peripheral	Output
Flower/image	Digital camera	
Text	Scanner	
Barcode	Barcode reader	
Voice	Microphone	
Swipe card	Swipe card reader	
	Monitor	Screen display
	Printer	Text
	Loudspeaker	Sound

LISTENING

3 This is a pre-listening task. Do it as a class activity and list the answers on the board but do not comment on whether or not they are correct at this stage.

Key 3
Using only the visual and captions
1 Memory cards not film, LCD screen for playback, editing, etc.
2 Image is captured by a CCD
3 Advantages: no processing involved, instant viewing of pictures
Disadvantages: none obvious on information available so far

4 Ask Ss to complete as much of the table as they can before they listen. Then play the recording to allow them to check their predictions and Question 1 of Task 3.

Key 4

feature	digital	conventional
lens	✓	✓
viewfinder	✓	✓
requires chemical processing	✗	✓
film	✗	✓
transfer images directly to PC	✓	✗
can delete unsatisfactory images	✓	✗

5 Play Part 2 of the recording. It contains informal terms such as *pricey* and *power-hungry*. Ss should be able to infer their meaning. Ss should tick any of the disadvantages they have listed in Question 3 of Task 3 and list any additional disadvantages. Play the recording for a second time to allow the Ss to correct their answers. Pause the recording if Ss request it.

Key 5
1 pricey (informal), i.e. expensive
2 quality isn't as sharp as a good 35 mm
3 If you want prints, you have to invest in a photo-quality colour printer. That can be expensive and printing costs can also be high – the paper, the ink and so on.
4 Batteries. Digitals are power-hungry.

6 Give the class time to answer as many of these questions as they can before they listen again to the recording. Then play both parts without pausing. Ss can compare answers in pairs. Do not play again unless there is disagreement on any of the answers.

Key 6
1 Thousands of photo-transistors – one for each pixel in the image.
2 A kind of dot which makes up a picture. It's short for *picture element*.
3 On the LCD.
4 Retouch them, manipulate them or print them out.
5 Yes, but it comes with the camera.
6 The higher the resolution, the more details you'll be able to get in the picture; the better the picture quality.
7 Memory size.
8 Because the cameras can use a lot of power so batteries need to be replaced often.

LANGUAGE WORK

Revision: Comparison and contrast

These points should be revision for this level. Put the blank table on the board and get the

class to tell you which boxes to cross and which to tick. Then ask what difference there is between the cameras for each of the features in turn. Reshape the Ss' answers to illustrate each of the structures taught in this Unit. For example,
That's right, there's no difference. Both cameras have lenses.

Ss who have specialist knowledge may be able to explain finer points of difference between the cameras. As long as the correct forms are used, this is to be encouraged.

7 Do a few examples orally; then set the rest as an individual writing task.

Key 7
1 You can write to hard disks *faster than* optical disks.
2 Floppy disks have a *lower* capacity *than* other devices.
3 CD-ROMs and floppy disks are *both* low priced.
4 DVD-RAM has a *higher* capacity than other optical disks.
5 CD-ROMs cannot be re-recorded *but* some other optical disks can be.
6 *Like* hard disks, you can read from and write to CD-MO drives.
7 *Unlike* CD-ROMs, CD-Rs are recordable.
8 Magnetic tape is *much slower* than other devices.
9 *Both* DVD-RAM and fixed hard disks have very high media capacity.
10 Floppy disks are cheap *but* DVD-RAM is expensive.

8 Do this as an individual writing task.

Key 8 (examples only)
1 Dot-matrix printers are slower than other printers.
2 Solid-ink printers are more expensive than dot-matrix printers.
3 Laser printers give better text quality than most other printers.
4 Thermal transfer printers have more graphics capability than electrostatic printers.

PROBLEM-SOLVING

9 This can be done in pairs or small groups. Ss should justify their answers.

Key 9
1 scanner
2 robot
3 joystick
4 touchscreen
5 digital videocamera
6 barcode reader
7 laser printer
8 graphics tablet or digitiser
9 plotter
10 microphone
11 headphones
12 hard disk
13 keyboard
14 tape drive

WRITING

10 and **11** Set either or both tasks depending on time available and access to the Internet. If access is possible, you can make Task 11 a project with different Ss asked to search different sites and then report their findings in plenary. You can make a board matrix to fill in the details of each model surveyed so that in addition to comparing the latest models with the model shown in Fig 3, they can compare one model with another.

Key 10 (example only)
barcode reader, swipe card reader for cash cards and loyalty cards, LCD screen, printer for receipts, electronic scales

The EPOS (Electronic Point Of Sale) till is linked to a number of peripherals. These include a barcode reader which is used to identify each item sold and match it to the correct price. It also allows it to provide stock control information. There is a swipe card reader used for reading information from cash cards to check the holder has sufficient money in their accounts or credit to pay for the goods. The EPOS till can also read loyalty cards to record information on the kind of goods bought by the customer for marketing information and to provide a small discount for the customer. The LCD screen displays the price and a description of each item. There is a printer which is used to print out a detailed receipt for the customer. The electronic scales are used to weigh purchases such as fruit and vegetables.

SPECIALIST READING

Key A
1 To build bigger storage
2 It doubled every 18 months
3 At least another 5 to 10 years
4 Superparamagnetism threatens to make densely packed bits unstable.
5 10 terabits per square inch
6 Atomic force microscopy and holographic storage
7 'Pages' of data can be superimposed on a single volume.
8 Improved network searches, video on demand, high-end servers, enterprise computing, and supercomputing
9 CD-ROMs and DVDs
10 Online delivery

Key A
1 a iii b iv c v d vi e vii f i g ii
2 a False b True c True d True e False

INTERVIEW

UNIT 5 Former Student

INTRODUCTION

A job in **Computing Support** involves setting up and maintaining computing systems and providing help and training to computer users.

Qualifications in computing available in the United Kingdom include:

Higher National Certificate (HNC) – this is a qualification available in a wide variety of subjects that is studied in a college after leaving school. It can be studied as a full-time course but is often studied part-time. It normally takes a year to complete.

Higher National Diploma (HND) – this is a higher qualification than an HNC, also available in a wide range of subjects and studied at college, often after completing an HNC. It is, however, at a lower level than a degree which is studied at a university. It is usually a full-time course and can take one or two years to complete.

Course subjects and topics discussed in this unit include:

Computer Architecture	the way that the components of a computer are connected together
HW Installation & Maintenance	installing and maintaining **hardware** (computer equipment)
Info Tech Applications	ways of using Information Technology (**IT**)
Multi-user Operating System	a set of programs used for controlling a computer such as a mainframe that can be used by many users at the same time
Network Technology	systems involved in connecting computers together
Software Development Life Cycle	the stages in developing a new computer program and training users how to use it
Standalone Computer System Support	setting up and maintaining computers that are not connected together in a network
Software Development Procedural Language	writing computer programs using a computer language that operates using modules called procedures
Data Communications, Telecommunications	transmitting and receiving data across a network system that uses the telephone network e.g. the Internet
Information Systems & Services, IT and Information Systems, Systems Building	creating systems for providing business information using combinations of computer applications programs
Systems Development	stages involved in developing a computer system
Project Management	organising a computer development project
Applications	using **applications programs** such as wordprocessors, spreadsheets and databases
Communication, Making Presentations	language skills; how to get your point over; how to make a **presentation** i.e. giving a talk about a subject
Creating a database, Learning Access	designing a system for storing related data so that it can be easily searched and sorted using the Microsoft **Access** database program
Systems Analysis	analysing systems and designing programs for computerising the system. Also training users to use the computerised system.
Programming, Writing a program	carried out by a person called a **programmer**. It involves writing a **program** (a set of instructions written in a computer language for controlling a computer).
Computer Use and Applications	ways of using computers and computer programs
Network Commands	computer instructions used to control computers connected together
Compilers vs Interpreters	using systems programs that convert **high-level languages** that humans use for writing programs into **machine code** that the computer processor can use. **Compilers** convert the whole program before the program is executed, whereas **interpreters** convert the program, one line at a time as the program is running.
Memory Management	the way that a computer uses electronic memory to store programs and data
LAN Topologies	ways of connecting computers together to form a **LAN** (local area network – a network over a small area)
PC Bus Architectures	how different types of buses work in **PCs** (IBM compatible personal computers). **Buses** are sets of connectors that carry signals between different parts of a computer.
How to connect printers	connecting printers to a computer to act as output devices
Unix Operating System	the **operating system** commonly used on mainframes and multi-user systems. An operating system is a set of computer instructions that allow computer applications to communicate with the hardware.
Pascal	a computer language used for teaching programming. Other computer languages mentioned include **COBOL** and **C++** (pronounced as C plus plus).
Maintenance of desktops	looking after personal computers designed for use on an office desk
Wordprocessing and other office applications	computer programs used in an office environment
Binary system	a number system with only two digits (1 and 0) used in computing

OBJECTIVES

By the end of this unit, Ss should be better at:

- Listening for specific information in an interview
- Speaking and writing about IT courses

They should understand and be able to use:

- Questions in the Past simple.

They should know and be able to use phrasal verbs with *up*.

STARTER

1 Ensure that Ss understand all the subjects on the list. Ask them for mother tongue equivalents in their own course to make sure. Ss should work individually and then compare their answers in pairs or small groups. They should justify their answers. If there is disagreement within their group, they should compare with a neighbouring group.

Key 1

a 6 b 1 c 10 d 2 e 5 f 9
g 7 h 11 i 8 j 3 k 15 l 13

2 Do not give time for predicting answers before you play the recording. Play it once without stopping. Give the Ss time to write their answers; then replay pausing after the information which provides the answer to each question.

Key 2

1 HW Installation & Maintenance
Info Tech Applications
Software Development
Communication
Mathematics for Computing
2 Planning, Design, Programming
3 There seemed to be more jobs in support, so support seemed a better career move.
4 Assembling computers
5 Maths

3 Handle in the same way as Part 1.

Key 3

1

Improvement	Reason
change the programming component perhaps to C++	Pascal and COBOL are not in demand
work experience	employers are looking for it

2

Subject	Example in work situation
Learning Access	has had to design databases for customers
Systems Building	has had to assemble computers for customers
Communication	making presentations to customers, job interviews

4 Do Part 3 in the same way as the other parts but after the second playing you can ask how Paul's comments relate to their own experiences. Ask what improvements they could suggest to their own course, what components they think may be most useful in their future work situations, what they feel about 'Communication skills'.

Key 4

1 When he's gone to customers who want something fixed that he doesn't know about.
2 Books, manuals, PC magazines, the Internet – Microsoft websites and the manufacturers' websites.
3 None formally, but one lecturer gave the students some advice on where to look.
4 It was full of mistakes so you had to check it against other books to make sure what was right.
5 He'd like to do a degree some time but getting the time and the money to do this is difficult.

LANGUAGE WORK

Revision: Past simple questions

This should be revision for most Ss. Ask questions in the Past simple about Paul's time as a student. For example,

1 What subjects did he study?
2 Who gave advice on the best place to look for help?
3 How many subjects did he study?
4 When did he complete his course?
5 What practical work did he do?

Write the questions on the board and make sure Ss are familiar with the question words. Then check they understand the structure of questions in the Past simple by writing this sentence on the board and asking them to make questions which focus on each piece of information in turn.

Paul[1] studied[2] IT[3] in Newcastle[4] two years ago[5].

Demonstrate that questions which focus on the subject or agent are not made with *did*.
Who studied IT?

Questions which focus on past actions require the dummy verb *do*.
What did Paul do two years ago?

Questions which focus on other points of information require *did*.
What did Paul study?

5 Ss should do this individually and then compare in pairs. You can also use the answers for a paired speaking activity asking and answering questions about Pauline's study. For example:

A How many subjects did she study in her first term?
B Six.

Key 5

1 How many subjects did you study in your first term?
2 How many days each week did you have classes?
3 What did you have on Monday morning?
4 Which day was a free day for home study?
5 Where/In which room did you have Systems Analysis on Wednesday?
6 What did you study on Thursdays?
7 When did Programming happen?
8 How often did Communication take place?
9 Whose classes did you like most?
10 When did you have your lunch break?

WORD STUDY

***up-* and *-up* verbs**

6 Check that Ss are familiar with the meaning of these verbs; then set the task for individual work.

Key 6

1 back up 2 upgrade 3 free up
4 uploaded 5 start up 6 update 7 starts up
8 set up 9 keep up/catch up
10 catch up/keep up 11 built up

SPEAKING

Role play

7 Pairs should switch roles so that each student has a chance to play both parts.

WRITING

8 This is quite a demanding task and Ss will need help in preparing for it. Refer them to their own college or university prospectus and website where they should find a course description and a statement of objectives. Make sure they know the English equivalents of the terms used. You can find English-language IT course descriptions in many UK college and university websites. It may help to print off a few to provide help with essential vocabulary.

UNIT 6 Operating Systems

interface = communication

INTRODUCTION

The **OS (operating system)** is the set of computer programs that allow the user to perform basic tasks like copying, moving, saving and printing files. It also provides an interface between (i.e. provides communication between) **applications programs** (e.g. wordprocessors or spreadsheets) and the computer hardware. As a user interacts with an applications program on the screen, the applications program communicates with the operating system and the operating system communicates with the computer hardware. The work of the operating system takes place in the background and is not always obvious to the user.

The most important program in an OS is the **supervisor program**. It remains in memory all the time that the computer is operating, and manages the OS. It loads other parts of the OS into memory when they are needed. Programs that remain in memory while the computer is in use are known as **resident programs**. Programs that only stay in memory while they are being used are known as **non-resident programs**.

Some operating systems are **command driven** (i.e. the user runs a program by typing a command). The screen is usually blank except for a symbol (e.g. $) which acts as a **command prompt**. When the command is typed at the prompt and the Enter key is pressed, the command is processed and the output is displayed on the screen. OS commands are usually short words or abbreviations (e.g., date, logout, passwd, ls).

Unix is a command driven operating system used on all sizes of computers, but mostly large multi-user, multi-tasking mainframe computers. It is available in many versions, such as Linux, Minix, HP-UX, Xenix, Venix, Ultrix, A/UX, AIX, Solaris, and PowerOpen. Other command driven operating systems mentioned in this unit include: VAX/VMS, MVS VM OS/390, NetWare, MS-DOS and PC-DOS.

Some operating systems have a **GUI** (pronounced like 'goo-ey' – **graphical user interface**) that allows the user to use a mouse to click on icons on the screen or choose commands from a list of choices known as a **menu**. Operating systems with graphical interfaces mentioned in this unit include: MacOS, OS/2, Penpoint, Windows NT, Windows 3.x, Windows 9X and Windows 2000.

OBJECTIVES

By the end of this unit, Ss should be better at:

- predicting text contents from figures and title
- making a summary
- exchanging information and defending decisions orally.

They should understand and be able to use:

- the *-ing* form in subject position and after prepositions.

They should know and be able to use logical connectives such as:
although/because/but/in addition/such as/therefore.

STARTER

1 Ss should work in pairs or small groups to make a list of any operating systems they know. Make a board list from their answers. Your task is to record and, where appropriate,

correct. Any disputes on technical matters should be referred back to the Ss to find the correct answers. They can then work out what the Unix commands mean and compare answers within their groups. BST is British Summer Time.

Key 1

1 Type them using a keyboard
2 date
passwd
ls
logout
3 date — displays date and time
passwd — allows user to change password
ls — lists files on screen
logout — closes user's account
4 The user's account will close.

READING

2 Give the class a few minutes to try this individually; then check the answers in plenary.

Key 2

a user
b applications programs
c operating system
d hardware

3 Discuss the meaning of the title; then give the class time to note their predictions for the remaining questions. Allow a fairly tight margin for Ss to read the text to check their answers. Deal with any disagreement on the answers which may arise by referring Ss to the relevant parts of the text.

Key 3

1 Applications software does not communicate directly with the computer hardware.
2 It controls the entire operating system and loads into memory other operating system programs as needed.
3 Programs which remain in memory are resident. Programs which are loaded in from disk storage as required are non-resident.
4 (1) manage the computer's resources
(2) establish a user interface
(3) execute and provide services for applications software

4 A summary can be a useful check on the understanding of a text. Advanced Ss can be asked to write their own but for most Ss at this level a gapped summary is a sufficient challenge. Set this as an individual task. Take the opportunity to revise any of these terms for linking ideas which may be unfamiliar to your class.

Key 4

The user is aware of the effects of different applications programs *but* operating systems are invisible to most users. They lie between applications programs, *such as* word processing, and the hardware. The supervisor program is the most important. It remains in memory, *therefore* it is referred to as resident. Others are called non-resident *because* they are loaded into memory only when needed. Operating systems manage the computer's resources, *such as* the central processing unit. *In addition*, they establish a user interface, and execute and provide services for applications software. *Although* input and output operations are invoked by applications programs, they are carried out by the operating system.

LANGUAGE WORK

-*ing* form (1) as a noun; after prepositions

This is the first of two *Language work* sections which focus on the *-ing* form. The other is Unit 9. The emphasis here is on the *-ing* form in subject position and after a preposition.

Start by eliciting the functions of an operating system. The answers are all in the text. Write the functions on the board:

(1) manage the computer's resources
(2) establish a user interface
(3) execute applications software
(4) provide services for applications software.

Then show how the *-ing* form can be used as the subject of sentences such as:

1 *Managing* the computer's resources is an important function of the operating system.

Demonstrate the use of the *-ing* form after prepositions using the example sentences in the text. Draw Ss' attention to cases where *to* is a preposition rather than part of the infinitive and is therefore followed by *-ing*. For example *look forward to, object to, used to doing something.*

5 and **6** Both these tasks are best done individually.

Key 5

1 Loading into memory nonresident programs as required is one task of the supervisor program.
2 Communicating directly with the hardware is the role of the operating system.
3 Establishing a user interface is one of the key functions of the operating system.
4 Providing services for applications software is an additional role.
5 Supporting multiple programs and users is part of the work of mainframe operating systems.
6 Facilitating interaction between a single user and a PC is the task in most cases.
7 Processing large amounts of data quickly is one of the most important functions of a computer.
8 Allowing the computer to process data faster is the main reason for installing more memory.

Key 6

1 Don't switch off without closing down your PC.
2 I want to upgrade my computer.
3 He can't get used to logging on with a password.
4 You can find information on the Internet by using a search engine.
5 He objected to paying expensive telephone calls for Internet access.
6 He tried to hack into the system without knowing the password.
7 You needn't learn how to program in HTML before designing webpages.
8 I look forward to inputting data by voice instead of using a keyboard.

PROBLEM-SOLVING

7 Do this in small groups. Encourage Ss to justify their choices where there is disagreement to maximise the quality of the interaction.

Key 7

Action	VMS command	Unix command
List all the files in a directory	directory	ls
Delete a file	delete	rm
Rename a file	rename	mv
Copy a file	copy	cp
Send a file to a printer	print	lpr
Obtain help	help	man
Create a directory	create/directory	mkdir
Show date and time	show time	date
Show users on system	show users	rwho
Talk to other users on system	phone	write
Search for a string in a file	search	grep

SPEAKING

8 Most of these popular operating systems should be known to your Ss either through their studies or the warmup work done for Task 1. The task is a straightforward information exchange

Key 8

1 MacOS
2 pen-based computers
3 MVS VM OS/390
4 Unix
5 PC-DOS
6 Windows 9X
7 Windows 3.x
8 2:Windows 95 and Windows 98
9 NetWare, OS/2 , MVS VM OS/390, Windows NT, Unix, Vax/VMS, Windows 9X, Windows 98, Windows for Workgroups, Windows 2000
10 VAX VMS

WRITING

9 Copy the MacOS X features onto the board and elicit different ways of combining the table information into full sentences and these sentences into paragraphs. Compare the final version with the description provided in the SB. Note any differences and decide which version is best. Then set the Linux description task for individual work.

Key 9

Linux

Linux is a Unix-based operating sytem designed for use on a wide variety of computer systems. The source code is freely available. A variety of distribution kits are available. Graphics are provided by a graphic engine called XFree86. It has both a command line interface and a GUI. Both KDE and Gnome GUIs can be used.

SPECIALIST READING

Key A

1 The GNU programming tools
2 The source code was released on the Internet.
3 Modify it to fix bugs or add new features.
4 Because they believe that if they make it available it will destroy their revenue stream.
5 Command interpreters, programming tools, text editors, typesetting tools and graphical user interfaces.
6 A complex standard distributed windowing system on which people implement graphical interfaces.
7 KDE and Gnome

Key B

1 a vi b v c ii d i e iii f iv
2 a False b False c True d True e True

UNIT 7 Graphical User Interfaces

INTRODUCTION

A **user interface** allows a user to interact with a computer. In particular, a **GUI** (graphical user interface) allows the user to use a **mouse** to interact with the computer. **Microsoft Windows** (commonly referred to as Windows) is a common GUI used on **PCs** (IBM compatible personal computers). The main Windows background screen is called the **desktop**. Programs, files and folders are represented on the desktop by small images called **icons**. Using a mouse, the user can move a pointer (**cursor**) across the screen. An icon can be **selected** by **clicking** the left mouse button (i.e. quickly pressing and releasing the button). By holding the pointer over an icon (**hovering**), a text box can be made to appear that explains what the icon represents. This text box is known as a **tooltip**. **Double-clicking** the mouse (pressing and releasing the button twice in quick succession) causes the program, file or folder represented by the icon to open in a rectangular box on the screen called a **window**. More than one window can be open at a time but the one with the focus is known as the **active window**. Windows can have a vertical **scroll bar** and a horizontal scroll bar to allow the user to move a document up and down or across the screen respectively. A user can **drag** a selected item from one part of the screen to another by holding down the left mouse button while moving the pointer. The user can then **drop** the item at the new location by releasing the mouse button.

Commands are displayed in a **menu bar** along the top of the window. Clicking on a command opens a list of choices known as a **menu**. Clicking on a menu item sometimes opens another related menu called a **submenu**. Common commands include:

Find	searches for a word, filename, or folder name
Undo	reverses the last action of the user
Cut	deletes the selected text, file or folder and copies it to a special area of memory called the **clipboard**
Paste	inserts the text, file or folder stored in the clipboard, at the location of the cursor

A bar, known as a **taskbar**, is displayed along the bottom of the desktop showing what programs, files and folders are currently open. At the far right of the taskbar is a special area called the **system tray** where icons are displayed showing what resident programs are continuously running in the background e.g. the system clock or a sound volume control. There is a **Start button** at the far left of the taskbar. When the Start button is clicked, the **Start menu** opens on the screen. The user can close down the operating system by choosing the **Shut Down** option on the Start Menu. A **touchscreen** allows the user to select icons and commands by touching the display screen with their finger instead of using a mouse. Graphical user interfaces were first introduced with the Apple Mac OS. Other GUIs with desktops, icons, pointers, windows, menus and submenus are also available.

Common icons on the Microsoft Windows desktop include:

Microsoft Outlook	a messaging program
My Briefcase	a program that allows the user to exchange files with a portable computer and to synchronise the files on each computer
Network Neighbourhood or My Network Places	a feature that displays the names of other computers networked with yours
My Computer	a feature that lets you see the resources on your computer
Internet Explorer	a browser program that allows the user to view webpages on the Internet
Recycle Bin	a feature that stores deleted files and allows the user to restore them to their original location i.e. the equivalent to the **trashcan** on an Apple Mac system.

A + sign used between the names of keyboard keys means that the user should press both keys simultaneously e.g. ALT + TAB. Keyboard keys and combination of keys mentioned in the text include:

Shift key	allows you to type in upper case (capital letters)
MouseKeys feature	enables you to use the numeric keypad to move the mouse pointer
ALT + TAB	allows you to switch between open programs
StickyKeys feature	helps disabled people to operate two keys simultaneously
PRINT SCREEN key	lets you copy an image of the whole screen to the Clipboard
ALT + PRINT SCREEN	lets you copy an image of the active window to the Clipboard

OBJECTIVES

By the end of this unit, Ss should be better at:

- reading for specific detail quickly.

They should understand and be able to use:

- *allow, enable, help, let, permit* correctly to describe developments in computing.

They should know and be able to use terms associated with GUIs such as: *button, desktop, icon, menu, pointer, submenu, system tray, taskbar, window.*

STARTER

1 Do this in small groups to encourage discussion.

Key 1

1d 2c 3a 4f 5g 6h 7e 8b

2 Ss should spot the differences individually at first, then compare in pairs.

Key 2

1 menu choices, toolbar terms, icons, no system tray, no task bar
2 windows, icons, menus, pointer

READING

3 This provides further practice in reading for detail, in this case the boxed texts which accompany the diagram. Ss should do this task individually. Write the time at one-minute intervals on the board so that Ss can note how quickly they can find the information.

Key 3
1 Send email if you have Internet access.
2 The taskbar
3 Pause the mouse pointer over the time box.
4 If you take files and documents to and from a PC at work, this feature helps keep them organised and up to date.
5 Solid green blue
6 My Network Places
7 My Computer
8 The Internet Connection Wizard
9 Empty the Recycle Bin

LANGUAGE WORK

Verbs + object + infinitive
Verbs + object + *to*-infinitive

The focus is on verbs with the general meaning of *permit* which are often used to describe new developments in computing. Although similar in meaning, they differ in whether they are followed by the infinitive or *to*-infinitive after an object.

Ask Ss what a GUI does, what is special about a GUI, why GUIs were developed. The answer you seek is that people can use a computer without knowing any operating system commands. Show how this idea can be expressed using each of the four 'permit' verbs. For example,

1 A GUI *lets you use* a computer without knowing any operating system commands.
2 A GUI *allows you to use* a computer without knowing any operating system commands.

4 and **5** Do individually, then compare answers in pairs.

Key 4
1 The Help facility enables users *to get* advice on most problems.
2 Adding more memory lets your computer *work* faster.
3 Windows allows you *to display* two different folders at the same time.
4 The shift key allows you *to type* in upper case.
5 The MouseKeys feature enables you *to use* the numeric keyboard to move the mouse pointer.
6 ALT + TAB allows you *to switch* between programs.
7 The StickyKeys feature helps disabled people *to operate* two keys simultaneously.
8 ALT + PRINT SCREEN lets you *copy* an image of an active window to the clipboard.

Key 5 (examples only)
1 In a window, the vertical scroll bar allows you to navigate a document quickly.
2 The Find command helps you to locate a file.
3 The Undo command enables you to undo previous actions.
4 Cut and paste lets you transfer data between files.
5 Print Screen allows you to make a copy of any screen display.
6 Menus enable you to select an option.
7 Recycle bin allows you to recover deleted documents.
8 Tooltips help you to learn about new features.

PROBLEM-SOLVING

6 Do this individually but get Ss to compare in pairs. Ss have to use their computer knowledge as well as their knowledge of English. Refer any dispute on technical matters back to the class to agree on or to find out for the next class.

Key 6
1 b
2 e
3 f
4 a
5 d
6 c
g delete a file
h find a file
i read email
j draw a picture
k access a calculator
l access tools

SPEAKING

7 Do as the task instructions suggest. When checking, ask selected Ss to explain how to perform one of these tasks to the rest of the class. With advanced Ss, as a follow up ask for volunteers to give clear instructions for a computer action of their own choice. The rest of the class have to identify the action as soon as possible.

Key 7
1 Right-click on the Desktop to open up the context sensitive menu. Choose 'New' on the menu. Choose 'Folder' on the submenu.
2 Double-click on the program icon.
3 Click on the Start button. Choose 'Shut Down' from the start menu. Select 'Shut down the computer?' in the dialog box. Click the 'Yes' button.
4 Double-click on the volume control icon in the system tray. Drag the volume slider up or down to the required volume setting.
5 Right-click on the desktop to open up the context sensitive menu. Choose 'Arrange Icons' from the menu. Click on the desired format in the submenu.
6 Allow the mouse pointer to hover over the time icon in the system tray. After a short delay the date will be displayed above the time.
7 Allow the mouse pointer to hover over an icon.

WRITING

8 Do this as an individual writing task.

SPECIALIST READING

Key A
1 i) Cheaper and more powerful personal computers
ii) Breakthroughs in technology, such as speech recognition
iii) Convergence of personal computers and consumer electronics
2 The hyperlinked design of the World Wide Web
3 They have allowed users to view content, including local and network files, within a single browser interface.
4 Palm-size and hand-held PCs
5 i) A mouse is a very efficient device for desktop navigation.
ii) A mouse is not so useful for changing the style of a paragraph.
6 Speech recognition, handwriting recognition, text to speech (TTS), the ability to recognise faces or gestures, and the ability to observe their surroundings.
7 Video cameras
8 The rapidly expanding increase of information, both on the Internet and within intranets.
9 They can be used as Web browsers, help desks, and shopping assistants.

Key B
1 a iii b v c i d ii e iv
2 a False b False c False d False e True f True