GCSE Revision Booklet

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Notes

Data and Information Technical Vocabulary

Computer System	Combination of hardware and software designed to process data
Data	Raw values input to and stored in a computer system.
Processing	Performing actions on data (such as calculating, searching or sorting) to provide information.
System Flowchart	A diagram that uses special symbols to represent the flow of data through a computer system.
Information	Processed data that is output from a computer system.

Data and Information – Key Points

- Data is input to a computer system and stored by it.
- Information is processed data – it is output from a computer system.
- A system flowchart is a diagram that shows the flow of data through a system.

Input Devices - Technical Vocabulary

Digital Camera	Used to capture digital still or moving images that can be input and processed directly by a computer.
Digitising	The process of converting a sound, picture or drawing to a series of numbers that can be stored and processed by a computer system.
Footprint	The amount of desktop space that a device takes up.
Graphics Digitiser	An input device that consists of a tablet and stylus and that is used for inputting drawings.
Input Device	Something that is used to enter data into a computer system.
Joystick	Device used to input direction. Mainly used in games applications.
Light Pen	Input device for graphical data.
Mouse	Handheld input device used to input position and speed. Often used to point to or select items in a graphic user interface.
OCR	Optical character recognition. A system of scanning written characters so that they are recognised for input to a computer.
QWERTY Keyboard	Keyboard with the letter keys arranged in the same way as on a standard typewriter.
Scanner	Input device used to digitise pictures or as part of an OCR or optical character recognition system.
Touch Pad	Flat surface, which detects movement of a finger touching it. Used as a pointing device on laptop computers.
Touch Screen	Input device where the user selects an item from the computer screen by pointing to it.

Tracker Ball	Specialised pointing device where a ball is rotated by hand to provide an accurate input of small movements.

Input Devices - Key Points

- Input devices are used to enter data into a computer system.
- Different input devices have different strengths and weaknesses that make them suitable for inputting different types of data or for use in different situations.
- The choice of which input device to use will depend on the type of data to be input and the situation that it is to be used in.
- Some of the input devices available are: keyboard, mouse, touch pad, tracker ball, joystick, scanner, digital camera, microphone, touch sensitive screen, light pen and graphics digitiser.

Input Devices – Strengths and Weaknesses

Keyboard

✓ Good for manual text entry.
✓ Special keys can be used for special functions.
✓ Hot-key combinations can simplify tasks for expert users.
✓ Familiar device – even for novice users.
✓ Specialised keyboards can be used to speed up data entry.
× Mistakes easily made – even by trained users.
× Large footprint – takes up a lot of space on a desk.
× Data input is slow compared to many other devices.
× Of limited use for moving, selecting and drawing.
× Specialised keyboards can only be used for a limited number of data values.

Typical Application : Inputting text.

Mouse

✓ Good for inputting movement and speed (converted to position).
✓ Good for selecting items in a graphic interface or from menus.
✓ Small.
✓ Optical mice are less vulnerable to dust and dirt.
× Not very good at inputting text.
× Limited range of functions.
× Needs a flat space to operate on (but see gyro mouse).
× Mechanical mice behave badly in a dusty or dirty environment.

Typical Application: Pointing device on a microcomputer.

Tally Grid

Use the grid below to keep track of how many words in each section you don't know. You can then focus your revision on the sections with the most ticks.

Computer Readable Forms								
Data and Information								
Data Capture Forms								
Data Logging								
Backing Storage and Memory								
Computer Languages and Control								
Databases								
Features of Applications								
File Processing								
File Security								
Human – Computer Interface								
Input Devices								
Networks								
Output Devices								
Searching and Validation								

☐	Printer Server	Networks
☐	Procedure	Computer Languages and Control
☐	Processing	Data and Information
☐	Query	Searching and Validation
☐	QWERTY Keyboard	Input Devices
☐	RAM	Backing Storage and Memory
☐	Random Access	File Processing
☐	Range Check	Searching and Validation
☐	Real Time	File Processing
☐	Record	Databases
☐	Relay Switch	Data Logging
☐	Resolution	Output Devices
☐	ROM	Backing Storage and Memory
☐	Scanner	Input Devices
☐	Search Engine	Networks
☐	Sensor	Data Logging
☐	Sequential Access	Backing Storage and Memory, File Processing
☐	Simulation	Software
☐	Smart Card	Computer Readable Forms
☐	Software	Software
☐	Sorting	File Processing
☐	Source Document	Data Capture Forms
☐	Spike	File Security
☐	Spreadsheet	Features of Applications
☐	System Flowchart	Data and Information
☐	Tabulation Stop	Features of Applications
☐	Tape Cartridge	Backing Storage and Memory
☐	Thermistor	Data Logging
☐	Touch Pad	Input Devices
☐	Touch Screen	Input Devices
☐	Tracker Ball	Input Devices
☐	Transaction	File Processing
☐	Transaction File	File Processing
☐	Transaction Log	File Processing
☐	Transaction processing	File Processing
☐	Update	File Processing
☐	UPS	File Security
☐	Validation	Searching and Validation, File Security
☐	VDU	Output Devices
☐	Virtual Reality	Software
☐	Volatile Storage	Backing Storage and Memory
☐	WAN	Networks
☐	WIMP	Human – Computer Interface

Touch Pad

- ✓ Good for inputting movement and speed (converted to position).
- ✓ Good for selecting items in a graphic interface or from menus.
- ✓ Can be built into the laptop and positioned close to keyboard for ease of use.
- ✓ Can be customised using software provided.
- ✗ Not very good at inputting text.
- ✗ Limited range of functions – maximum of three buttons.
- ✗ Some users find it difficult to operate.
- ✗ Actions can be accidentally triggered by hand or fingers unintentionally resting on the touch pad.

Typical Application : Pointing device on a laptop computer.

Tracker Ball

- ✓ Good for inputting changes in position accurately.
- ✓ Does not need a flat surface to operate on.
- ✗ Not very good at inputting text and can be awkward to use as a general purpose pointing device.
- ✗ Unresponsive to speed of change (unsuitable e.g. for spray painting).

Typical Application: Input of position in graphic design applications.

Joystick

- ✓ Good for inputting direction.
- ✓ Mimics the behaviour of a real joystick.
- ✗ Limited to one type of input.

Typical Application : Input device for games applications.

Digital Camera

- ✓ Pictures captured in a format that can be read directly into a computer with no need for scanning.
- ✓ Lower running costs than traditional camera – particularly if there is no need to print the picture.
- ✓ Images can be easily edited.
- ✓ Generally lighter and smaller than the equivalent film camera.
- ✗ Resolution not as good as traditional cameras. This is only really a problem if large format enlargements are needed.
- ✗ Images can take up a lot of storage space if stored on a hard drive.
- ✗ Unlike a scanner, cannot handle text (OCR).
- ✗ May run out of memory space or battery power in the middle of being used.

Typical Application: family camera.

Scanner

- ✓ Good for inputting pictures and line art.
- ✓ Good for inputting large amounts of text using OCR
- ✗ Files can be large – particularly if high resolution colour is used.
- ✗ Text can be incorrect – some characters like zero and the letter O can be confused.
- ✗ Flatbed scanner has large footprint.

Typical Application: scanning a photograph to use in a newsletter.

Microphone

- ✓ Any sound can be input and stored.
- ✓ Reasonably fast text input without the need to learn keyboard skills.
- × Needs a quiet environment.
- × Software needs to learn to recognise speech patterns for text input. Limited to one or two users.

Typical application: Inputting numbers and commands in a 'hands free' car phone.

Touch Sensitive Screen

- ✓ No moving parts to get damaged or dirty.
- ✓ No special skills needed to use it.
- × Special monitor needed and this is expensive.
- × Input restricted to selecting from a small number of options.

Typical application: advertising displays in shops.

Light Pen

- ✓ Good for inputting drawing data – e.g. start and end of line.
- ✓ Small footprint.
- ✓ Similar to pen or pencil that the user will be familiar with.
- × Poor at inputting more general data such as text.

Typical Application: Inputting technical drawing data.

Graphics Digitiser

- ✓ Good for inputting drawing data – e.g. start and end of line.
- ✓ More accurate than a light pen.
- ✓ Familiar look and feel for end user.
- × Poor at inputting more general data such as text.
- × Graphics tablet takes up room on desk (large footprint).

Typical application: Inputting architectural plans.

Output Devices - Technical Vocabulary

Dot-matrix printer	Impact printer that prints by firing pins at an inked ribbon to make dots on the page.
Inkjet printer	Non-impact printer that prints by firing droplets of ink at the paper
Laser Printer	Non-impact printer that prints by fusing small particles of toner onto the paper.
LED	Light emitting diode. A small device that converts electrical energy directly to red, green or orange light.
Plotter	A device that produces hard copy output by drawing on the paper using a series of pens.
Resolution	The number of dots per inch that a printer or VDU can produce. A measure of the quality of the output that the device can be expected to produce.
VDU	Visual Display Unit

☐	Formula (Spreadsheet)	Features of Applications
☐	Generations	File Processing, File Security
☐	Generic Software	Software
☐	Global ICT Service	Networks
☐	Graphics Digitiser	Input Devices
☐	GUI	Human – Computer Interface
☐	Hard Disk	Backing Storage and Memory
☐	Hardware	Software
☐	HCI	Human – Computer Interface
☐	Hotspot	Features of Applications
☐	Hyperlink	Features of Applications, Networks
☐	Information	Data and Information
☐	Inkjet printer	Output Devices
☐	Input Device	Input Devices
☐	Internet	Networks
☐	ISDN	Networks
☐	Joystick	Input Devices
☐	Justification	Features of Applications
☐	Key Field	Databases
☐	LAN	Networks
☐	Laser Printer	Output Devices
☐	LDR	Data Logging
☐	LED	Output Devices
☐	Light Pen	Input Devices
☐	List Check	Searching and Validation
☐	LOGO	Computer Languages and Control
☐	Loop	Computer Languages and Control
☐	Magnetic Strip Card	Computer Readable Forms
☐	Magnetic Tape	Backing Storage and Memory
☐	Memory	Backing Storage and Memory
☐	Menu	Human – Computer Interface
☐	Merge	File Processing
☐	Mesh Network	Networks
☐	MICR	Computer Readable Forms
☐	Model	Software
☐	Modem	Networks
☐	Mouse	Input Devices
☐	Multi-tasking System	Software
☐	Multi-user System	Software
☐	Network	Networks
☐	OCR	Input Devices
☐	OCR	Computer Readable Forms
☐	Off-line	Data Capture Forms
☐	OMR	Computer Readable Forms
☐	On Line System	File Processing
☐	Operating System	Software
☐	Packet Switching	Networks
☐	Parity Check	Searching and Validation
☐	Plotter	Output Devices
☐	Presence Check	Searching and Validation

Vocabulary Check List

Mark each of the words in that you are sure about with a tick. The section column tells you which section of the theory book applies to each word. If you have a lot of words without ticks from one particular section then it would be sensible to focus your revision on that section. You can use the tally chart at the end of this section to help keep count.

☐	Application	Software
☐	ATM	Computer Readable Forms
☐	Backing Store	Backing Storage and Memory
☐	Backup	File Processing,File Security
☐	Bar code	Computer Readable Forms
☐	Batch Processing	File Processing
☐	Bespoke Software	Software
☐	Bitmap	Features of Applications
☐	BIOS	Backing Storage and Memory, Software
☐	Bootstrap Loader	Backing Storage and Memory, Software
☐	Browser	Networks
☐	Bus Network	Networks
☐	Byte	Backing Storage and Memory
☐	CD-R	Backing Storage and Memory
☐	CD-ROM	Backing Storage and Memory
☐	CD-RW	Backing Storage and Memory
☐	Cell (Spreadsheet)	Features of Applications
☐	Check Digit	Searching and Validation
☐	Command Language	Human – Computer Interface
☐	Computer System	Data and Information, Software
☐	Data	Data and Information
☐	Data Capture Form	Data Capture Forms
☐	Data Compression	Databases
☐	Data Logging	Data Logging
☐	Data Preparation	Data Capture Forms
☐	Digital Camera	Input Devices
☐	Digitising	Input Devices
☐	Direct Access	Backing Storage and Memory, Databases
☐	Dot-matrix printer	Output Devices
☐	DVD-R	Backing Storage and Memory
☐	DVD-RAM	Backing Storage and Memory
☐	DVD-ROM	Backing Storage and Memory
☐	DVD-RW	Backing Storage and Memory
☐	E-mail	Networks
☐	Encryption	File Security
☐	Feedback	Data Logging
☐	Field	Databases
☐	File	Databases
☐	File Format	Software
☐	File Server	Networks
☐	Flash Memory	Backing Storage and Memory
☐	Floppy Disk	Backing Storage and Memory
☐	Footprint	Input Devices

Output Devices - Key Points

- Output devices display information that is produced by the computer.
- Some output devices produce permanent output, others only display the output temporarily.
- The actual output device chosen in a particular situation depends on the nature and quality of the output required, the amount of output to be produced and environmental factors such as noise and size.
- Impact printers such as a dot-matrix can print several copies at the same time.
- Plotters can produce high quality output on large sized paper.
- Laser printers are fast, expensive to buy, produce high quality output with moderate running costs.
- Inkjet printers are slower than laser printers, cost less than a laser printer and can produce high quality colour output.

Output Devices – Strengths and Weaknesses

VDU

✓ Low running cost.
✓ Silent operation.
✓ High quality colour output – also animated output is possible.
✓ Large screen size provides good output display for DTP and design applications.
✗ Output is not permanent.
✗ Large footprint.
✗ CRT monitors are heavy.
✗ Some concern over possible health risks of CRT screens – radiation from high voltage sources inside the device.

Typical application: Standard output device for computer systems.

Dot-matrix

✓ Low purchase cost.
✓ Very low running costs.
✓ Graphics and text can be output and colour is possible using special ribbons
✓ Can produce duplicate copies using special multi-part stationery.
✗ Slow printing.
✗ Noisy when printing.
✗ Quality is reasonable for text but graphics are poor.
✗ Cannot print overhead transparencies that are often needed for business presentations.

Typical application: Printing till receipts.

Inkjet Printer

- ✓ Medium to low purchase cost.
- ✓ Almost silent printing.
- ✓ Excellent quality text and colour images.
- ✓ Can print overhead transparencies and some can print directly onto printable CD and other specialised media.
- × High running costs.
- × Faster than a dot-matrix printer but still slower than a laser.
- × Special expensive paper needed for best results.
- × Cannot produce duplicate copies while printing top copy.

Typical application: As printer for home computers

Laser Printer

- ✓ Medium running costs.
- ✓ Almost silent printing.
- ✓ High quality text and images.
- ✓ Colour laser printers are very expensive to buy
- ✓ Fast printing.
- ✓ Can print overhead transparencies.
- × Cannot print on glossy photo paper.
- × Produce ozone so have to be used in ventilated space.
- × Large size.
- × Cannot produce duplicate copies while printing top copy
- × Do not normally take paper sizes larger than A4.

Typical application: As printer for network or office use

Plotter

- ✓ Can print on larger sizes of paper.
- ✓ Excellent for drawing accurate lines and text.
- × High purchase cost.
- × Cannot reproduce photographic type images.
- × Very slow output.

Typical application: Producing large size plans and drawings

Data Storage - Technical Vocabulary

Backing Store	Where data is stored when not actually being processed by the computer.
BIOS	Basic Input Output System. The program that starts up (boots) the computer system.
Bootstrap Loader	The program that loads the operating system into RAM from a backing store device.
Byte	Unit used to measure storage capacity. Equivalent to one character being stored.
CD-ROM	Compact Disk Read Only Memory. Optical storage that is read only.
CD-R	Compact Disk Recordable. Optical storage that can be written to

work

- **Information Available by Law** - Data does not have to be kept confidential if the law requires it to be disclosed – e.g. electoral register data.
- **Domestic Purposes Personal** - Data stored for family or household affairs (e.g. Christmas Card lists) are exempt from the act. The individual's rights do not apply and the Commissioner does not need to be notified of the use.

The Computer Misuse Act 1990

This act created three new criminal offences:

1. To gain or attempt to gain unauthorised access to a computer system. This makes hacking a criminal offence.
2. To gain or attempt to gain unauthorised access to a computer system with the intention of committing some further criminal act. This is a more serious offence and applies where the hacker intends to commit fraud or steal or damage data.
3. To make or attempt to make unauthorised changes to data stored on a computer system. This offence also includes knowingly distributing viruses since these are designed to make unauthorised changes to computer data.

Computers and Society - Key Points

- Society is now totally dependent on IT.

Potential Health problem	Possible Solutions
Eye strain from long periods using a VDU	Employer must provide free eye tests and glasses if necessary Special lights in room to reduce screen reflection. Provide screen filters to increase contrast and reduce reflection. Position the VDU screen or use blinds to reduce reflection from windows. Use 'flat screen' LCD displays to eliminate screen flicker.
Repetitive Strain Injury. Wrist or hand pain caused by fingers repeatedly hitting the keyboard.	Have correctly positioned keyboards and adjustable chairs so that the angle between the wrist and hand is correct. Provide wrist supports. Allow workers regular breaks.
General Aches and Pains (e.g. Backache)	Provide swivel mounted VDU, fully adjustable chairs and use of foot rests so that the working position is comfortable.
Electromagnetic Radiation from VDU screen	Use LCD displays which do not emit radiation VDU screens must be low emission meeting a minimum legal standard.

(4) Data must be accurate and kept up to date.
(5) Data must not be kept longer than necessary.
(6) Data must be processed in accordance with the data subject's rights under the act.
(7) Data must be protected against unauthorised access and against accidental loss or damage.
(8) Data must not be transferred to a country that does not have appropriate data protection legislation.

The Subject's Rights – Data Protection Act 1998

The Act gives the data subject seven rights. These are:

(1) **Right of Access** – The right to be told if his or her personal data is being processed and to be provided with a copy of the data in printed format if requested. A reasonable fee can be charged to cover administrative costs.
(2) **Prevention of Processing** – The right to halt or prevent processing that would cause damage or distress to them.
(3) **Prevention of Direct Marketing** – The right to prevent advertising or marketing material being sent to them.
(4) **Prevention of Automated Decision Taking** – The right to prevent decisions about them being made on the basis of automatic processing – e.g. whether or not to interview them for a job based only on a computer scan of their CV for key words.
(5) **Compensation** – The right to compensation if they have suffered damage or distress due to a breach of the act.
(6) **Correction** – The right to have inaccurate data corrected or erased The Data Subject can obtain a Court Order to enforce this if necessary.
(7) **Assessment** – The right to ask the Commissioner to see whether or not personal data is being processed in accordance with the act.

Exemptions – Data Protection Act 1998

- **National Security** - The data protection principles do not apply if a government minister signs an exemption certificate in order to safeguard national security. In this situation the Data Subject has no rights and the Information Commissioner cannot enforce the act.
- **Crime and Taxation**. Exemptions from disclosure and some other principles where applying the act would interfere with police and tax authorities carrying out their work.
- **Special Purposes** – allows journalists and publishers exemption from some of the data protection principles in order to carry out their

once.

CD-RW	Compact Disk Re-writable. Optical storage that can be re-written
Direct Access	The data is read or written without the need to access any other data.
DVD-ROM	Digital Versatile Disk Read Only Memory. Large capacity optical storage that is read only.
DVD-RAM	Digital Versatile Random Access Memory. Large capacity optical storage that is re-writable and is held within a special protective cartridge.
DVD-R	DVD recordable. Large capacity optical storage that can be written to once.
DVD-RW	DVD rewritable. Large capacity optical storage that is re-writable.
Floppy Disk	Small magnetic disk which can store about 1Mbyte of data.
Flash Memory	Type of memory chip that can be written to and that retains its data when the power is turned off. Slower to access than RAM.
Hard Disk	Rigid, fast spinning disk with fast access and large capacity.
Memory	Where data is stored while it is being processed.
Magnetic Tape	Sequential storage medium, sometimes used for active files but more commonly used for backup.
RAM	Random Access Memory – stores the user's data and software. Loses its data when power is turned off.
ROM	Read Only Memory – data is permanently stored in this memory chip when manufactured and cannot be changed.
Sequential Access	Data is read or written in order.
Tape Cartridge	Self-contained tape as opposed to reel to reel tape.
Volatile Storage	Storage where the data is lost when the power is turned off.

Data Storage - Key Points

- Backing storage holds the data that the computer does not currently need.
- Data that is currently being processed is held in memory.
- Backing storage is either magnetic or optical.
- Memory chips are either RAM, ROM or Flash Memory.
- RAM is volatile memory, ROM and Flash Memory are non-volatile.
- The data in both RAM and Flash Memory can be changed but RAM chips are much faster to write data to.
- Disks storage allows direct or sequential access, tape storage only sequential.
- CD storage is suitable for reference material and software installations.
- DVD Storage is suitable for video, large encyclopaedias, very large amounts of

data and backup.

Data Storage – Strengths and Weaknesses

Floppy Disks

- ✓ Disks are cheap to buy.
- ✓ Most computers have a floppy disk drive.
- ✓ Direct and sequential access is possible.
- × The amount of storage space is limited for modern needs.
- × Easily damaged by heat, magnetic fields or dirt. Data can be accidentally erased.
- × Access time is slow.

Typical application: Transferring files between computers.
Typical Capacity: 1.4 MBytes.

Hard Disks

- ✓ Fast access.
- ✓ Large amount of storage capacity.
- ✓ Direct and sequention access is possible.
- × Easily damaged by sudden movement or shock.
- × Cannot be removed from the computer and taken elsewhere.
- × Data easily lost if disk drive fails or if it is accidentally deleted.

Typical application: Main backing storage for a computer system.
Typical Capacity: 100 GBytes.

Magnetic Tape

- ✓ Large amount of storage capacity
- ✓ Tapes are cheap to buy.
- ✓ Tape can be removed from tape unit for safe storage.
- × Sequential access only.
- × More bulky than disk.
- × Vulnerable to magnetic fields or accidental deletion of data.

Typical application: Backup of data .
Typical Capacity: Depends on length of tape.

CD-ROM

- ✓ Large amount of storage capacity.
- ✓ Data is permanent – no accidental change or deletion.
- ✓ Production is very cost effective when a large number of copies are needed.
- ✓ Direct and sequential access possible.
- ✓ Most computers have a CD drive.
- × Access is not as fast as for magnetic disk
- × Cannot write your own data to the CD
- × Set-up costs for manufacture are high so small-scale production is not cost effective.

Typical application: Software installation disk.
Typical Capacity: 800 MBytes

- A set of instructions, written in a computer language, that instruct the computer to do some task, is called a program.
- A computer can be programmed to control one or more devices.
- If we need to program the computer to repeat same set of instructions a set number of times then a loop can be used.
- A procedure is a section of program that is given a name and saved. The procedure name can then be used each time we want that set of instructions to be carried out.

System Life Cycle - Key Points

- An IT system is developed through a number of stages called the system life cycle.
- The System Life Cycle consists of Analysis, Design, Implementation, Testing, Changeover and Evaluation.
- A Systems Analyst is a specialist who will work with the people running the existing system and identify what the requirements of the new system are.
- A number of different documents are produced. Some of these are technical and some are for the end user.

Computers and the Law - Key Points

- The Data Protection Act is designed to regulate the collection, use and distribution of personal data about living individuals.
- Data Controllers must notify their use of personal data and abide by the eight principles of the act.
- A data subject has the right to view his or her own data, to have mistakes corrected and to claim damages resulting from breach of the principles.
- A data subject can prevent data being processed if it causes damage or distress or for direct marketing.
- There are some exemptions to the act, which are made in the public interest.
- The Computer Misuse Act makes hacking and distribution of viruses criminal offences.
- Copyright Law makes software piracy illegal.
- A number of Health and Safety regulations apply to computer workstations in the workplace.

The Data Protection Principles – Data Protection Act 1998

There are eight principles that a Data Controller has a duty to abide by when using personal data. They must make sure:

(1) Data must be collected and processed fairly and lawfully.
(2) Data must be collected for specified purposes and cannot be used in ways that are not compatible with those purposes.
(3) Data must be adequate, relevant and not excessive for the purposes.

- ✓ Work is available at any network station
- × The system is more vulnerable to unauthorised access (hacking) and virus attack
- × If the network goes down then no-one can access their work
- × There are additional set-up costs for the network cable, file server and network operating system software.
- × Access to data and software can be slow if the network is busy.
- × You can only put computers in places where there is a network point.

Data Logging - Technical Vocabulary

Data Logging	The process of using a computer system to collect physical data.
Feedback	Where the output from a system affects the subsequent input.
LDR	Light Dependent Resistor.
Relay Switch	A special type of switch that allows a low voltage and low power device to turn a high voltage, high power device on or off.
Sensor	A device that allows a computer system to measure a physical quantity or detect some physical event.
Thermistor	A temperature sensor.

Data Logging - Key Points

- Computer systems can collect measurement data in a process called data logging.
- Data logging requires sensors for input devices. Sensors may need to be calibrated before they can provide accurate measurements.
- Data logging allows measurements to be taken over long or short time intervals and over long or short distances.
- Measurement data can be stored for later processing.

Computer Languages and Control - Technical Vocabulary

Logo	A computer language that can be used to control the movements of a 'turtle' as it draws on the screen.
Loop	A set of instructions that repeats several times.
Procedure	A named set of instructions that can be saved and reused.

Computer Languages and Control - Key Points

- A computer language is made up of special words that can be used to give a computer instructions.

CD-R

- ✓ Can be read by ordinary CD drives.
- ✓ Data is permanent.
- ✓ Both the CD writer and the CD-R disks are reasonably inexpensive.
- ✓ Direct and sequential access possible.
- × Access is not as fast as for magnetic disk.
- × Not all computers have a CD writer.
- × The disk cannot be reused if the data on it is no longer needed.
- × Disk surface is more easily damaged than a CD-ROM disk.

Typical application: Small scale data distribution.
Typical Capacity: 800 MBytes

CD-RW

- ✓ Disk can be reused.
- ✓ Can be read by a normal CD drive.
- ✓ Direct and sequential access possible.
- × Access is not as fast as for magnetic disk.
- × Not all computers have a CD writer.
- × Slower to write to than CD-R.
- × Disks are more expensive than CD-R.

Typical application: Backup of data on a PC.
Typical Capacity: 800 Mbytes.

DVD-ROM

- ✓ Very large amount of storage space compared to CD
- ✓ DVD drives can read CD disks
- ✓ Direct and sequential access possible
- ✓ Cost of DVD drive is not much greater than cost of CD drive
- × Access is not as fast as for magnetic disk
- × Not all computers have a DVD drive
- × If a disk is accidentally scratched the data on it could be lost.
- × Data cannot be changed.

Typical application: Distribution of multimedia files
Typical Capacity: 9 GBytes

DVD-R

- ✓ Very large amount of storage space compared to CD.
- ✓ DVD writer drives can read and write CD disks.
- ✓ Direct and sequential access possible.
- ✓ Data is permanent.
- × Access is not as fast as for magnetic disk.
- × Not all computers have a DVD writer drive.
- × If a disk is accidentally scratched the data on it could be lost.
- × Disk cannot be reused if the data is no longer needed.

Typical application: Backup.

Typical Capacity: 5 GBytes.

DVD-RW

- ✓ Very large amount of storage space compared to CD.
- ✓ DVD writer drives can read and write CD disks.
- ✓ Direct and sequential access possible.
- ✓ Disk can be reused.
- × Access is not as fast as for magnetic disk.
- × Not all computers have a DVD writer drive.
- × Slower to write than DVD-R.
- × Disks are more expensive than DVD-R.

Typical application: Backup.
Typical Capacity: 5 GBytes.

DVD-RAM

- ✓ Very large amount of storage space compared to CD.
- ✓ Data can be written as well as read.
- ✓ Direct and sequential access possible.
- ✓ Disk is protected by a special caddy so it is not likely to be scratched or damaged.
- × Access is not as fast as for magnetic disk.
- × Can only be used in a DVD-RAM compatible drive.
- × Not many computers have a compativle drive.

Typical application: Backup
Typical Capacity: 5 GBytes

Flash Memory

- ✓ Large amount of storage space.
- ✓ Small physical size.
- ✓ Direct and sequential access possible.
- ✓ Not very susceptible to physical damage.
- × Data could be accidentally deleted or overwritten.
- × May be lost or mislaid.
- × Older computers may not have a USB port to connect to the device.

Typical application: Transporting files between computers.
Typical Capacity: 250 MBytes

Software - Technical Vocabulary

Application	A computer program written to perform some task for the user.
Bespoke Software	Application software written to order for a particular user.
Bootstrap loader	A small computer program that loads the operating system program into the computer's memory when it is first switched on.
Computer System	A combination of hardware and software designed to

E-mail	Letter	Telephone	Fax
Communication sent to a central computer that can be accessed from anywhere.	Communication sent to a physical location.	Communication to a physical location.	Communication to a physical location.
Recipient does not need to be available when the communication is sent.	Recipient does not need to be available when the communication is sent.	Recipient needs to be present while the communication is in progress.	Recipient does not need to be available when the communication is sent .
Fast – usually available for reading within minutes of sending.	Usually takes one or more days.	Fast – immediate communication if the other person is available.	Fast – available for reading as soon as it is sent.
Private - can only be read by the intended recipient (password needed to log on/read mail)	Private as long as mail is secure when received.	Private - an only be heard by intended recipient.	Not private. A fax waiting to be picked up and left on a fax machine can be read by anyone.
Recipient has to collect the e-mail by logging on and downloading	Delivered to the recipient – no need for any special action.	The recipient is there to collect the message – does not need to do anything apart from answer the phone.	Recipient does not need to do anything to receive the fax.
one e-mail can be sent to multiple destinations at no extra cost	One letter goes to one address.	One phone call goes to one recipient.	One fax goes to one fax machine.
Not interactive	Not interactive.	Interactive.	Not interactive.
Recipient must have an e-mail facility and computer hardware and software. Not everyone has these.	Everyone has an address.	Most people have a telephone.	Many companies and some individuals have fax machines.
Copies of computer files can be sent.	A physical document is sent. This may be necessary on –for example- legal documents where a signature is needed	Only spoken information can be exchanged.	Copies of diagrams and documents can be sent but the quality may be poor because of low resolution.
Low cost per message sent – many e-mails can be sent all over the world for the minimum cost of a local telephone call.	Fairly high cost per message – cost increases sharply with size (weight) of message and if the address is outside the UK.	Cost increases sharply with distance and with length (duration) of message.	Fairly low cost per message but cost increases with distance because of the way that telephone charges are structured.

	destination where the original data is reassembled.
Printer Server	A computer that handles the printing of jobs stored in a print queue.
Search Engine	A specialised web site that maintains an index of other web sites and that can match sites to keywords entered by the user.
WAN	Wider area network. It connects computers that are in different cities, countries or continents.

Networks - Key Points

- Computers can be linked together to form a network
- Networked computers can share data and other resources such as printers.
- Networks are also an important method of communication
- Networks may be slow at busy times and it may be impossible to work if there is a network fault
- There are two types of network – LAN and WAN
- Connection can be via an ordinary telephone line or via an ISDN line.
- E-mail is an important method of communication. It has advantages and disadvantages compared to the more traditional methods of letter, 'phone and fax.
- A bus network may be used to connect computers on a LAN and a mesh network for computers on a WAN
- A mesh network is likely to use packet switching to transmit data.
- The Internet is a world-wide linking of networks. It provides information and opportunities for commerce including on-line booking systems, sales and auctions.
- A search engine can be used to find web-sites relating to particular key words.

Network Strengths and Weaknesses

- ✓ Expensive resources like a colour laser printer can be shared.
- ✓ Software can be installed centrally for everyone to use (a network licence must be bought).
- ✓ Can be used for communication – e-mail, personal time management, electronic diary and meeting scheduling.
- ✓ Data is stored centrally so everyone has access to the latest information

	process data.
Generic Software	Software written to solve a wide variety of jobs.
File Format	A way of structuring data so that it can be read by one or (usually) more applications. All data must be stored in a file format that can be read by at least the application that stored it.
Hardware	The physical components of a computer system - e.g. printer, VDU, keyboard etc.
Model	Computer software that predicts how some real world situation or object will behave under different conditions.
Multi-tasking System	A computer system where several programs are loaded into central memory at the same time.
Multi-user System	A computer system where several users appear to have access to the computer at the same time. POS terminals in a supermarket are part of a multi-user system.
Operating System	A computer program that is present in memory all the time that the computer is working. It controls and manages the computer system resources.
Simulation	Computer software that behaves like some real life system or object.
Software	Computer programs that are made up of series of instructions that the computer follows to perform some task.
Virtual Reality	Computer system that uses visual and sound input to produce the effect that the user is actually present in a computer generated environment.

Software - Key Points

- A computer system is made up of hardware and software.
- Computer programs are made up of sets of instructions that the computer follows and are called software.
- There are two types of software, applications software and system software.
- Applications software is written to make the computer do a particular task for the user. It can be configured to suit the user's needs.
- Systems software is written to make the computer hardware work.
- The operating system is a part of the systems software and it controls and manages the computer systems resources.
- Computer models and simulators use sets of rules to predict how an object or system will behave in real life.
- Standard file formats allow data to be transferred between different applications software and also between different computer systems.

Features of Applications - Technical Vocabulary

Bit Map	A way of storing a graphics image like a photograph as a series of coloured dots.

Cell	One rectangle in a spreadsheet grid. It can contain text, a number or a formula.
Formula	A rule for performing a calculation on a spreadsheet. It begins with an equals sign and may contain numbers, references to other cells and special functions.
Hot Spot	An active area on a web page which results in some action when the mouse is moved over or clicks on it. A hot spot can be a hyperlink.
Hyperlink	Text or graphics on a web page which, when clicked, take the user to another point on that page or to another page.
Justification	Lining up the text in a paragraph. This can mean lining up one or both of the text margins or it can refer to centring each line.
Mail Merge	Combining text in a document with data in a database or other format to produce a set of new documents. Each of the new documents contains the standard text from the original document together with personalised data from the data source.
Replication	A special way of copying formulas on a spreadsheet where the pasted formulas are changed to match their new position on the sheet.
Spreadsheet	An arrangement of cells in columns and rows. Used for modelling and calculation.
Tabulation Stop	A point on the line that can be set so that text can be lined up vertically on the page.

Features of Applications - Key Points

- Spreadsheets are made up of cells. Each cell can contain text, a number or a formula.
- Spreadsheet cells can be formatted to display their contents in a particular way.
- Spreadsheets can be set up to model a situation and then used to answer 'What If' questions.
- There are four types of justification that can be applied to text. They are Left, Right, Centre and Full.
- Tabulation can be used to set out text in a document in a table-like format.
- DTP software is mainly designed to allow complex layouts of text and graphics on a page.
- Web design software allows the user to create hyperlinks and hot spots to make a web page interactive.
- Mail merging requires several distinct stages: creating the data source, creating the main document with the text that does not change, linking the data source and main document and inserting place holders linked to the data source and then merging them to produce a set of documents, one for each line or record

software for all network users to access.

Global ICT Service	Any ICT service where the provider and customer can be based in different countries.
Hyperlink	An active part of a page which, when clicked on, causes the destination page to be loaded and displayed.
Internet	A large number of networks linked together. It is a world-wide source of information.
ISDN	Integrated Services Digital Network. A service that allows digital data to be transmitted without the need for a modem. Data transmission speeds are many times faster than a normal telephone line is capable of.
LAN	A local area network. It connects computers within a single room, building or site.
Modem	A modulator-demodulator. A device that converts the on/off pulses used by computer systems into a form that will travel efficiently down a long cable. It is also responsible for converting the signals back to pulses at the other end of the cable.
Mesh Network	A method of connecting computers together so that there are a number of direct connections between them.
Network	A number of computers connected together so that they can exchange data and share other resources.
Packet Switching	A system of splitting up the data to be transmitted through a network into small packets. The packets have additional data added to identify their sequence number, source address and destination address. Each packet then travels individually to the

LAN	WAN
Connect computers in a single room, building or site	Connect computers in different towns, countries or continents
Involve mainly PC's with possibly a mini computer	Connect main-frame computers, mini computers, PC's and terminals
May involve a file server, printer server and terminators.	Will need a modem if wire rather than fibre optic cable is used
Signals sent directly as binary pulses (1's and 0's)	Signal modulated (high pitch/low pitch) for transmission through wire cable.
Limited length unless special repeaters are installed	No length restriction

Security - Key Points

- Loss of data could result in a company going out of business.
- Data must be protected from accidental or deliberate loss or damage.
- Magnetic media can be damaged by fire, heat or stray magnetic fields and must be protected from exposure to them.
- Computer systems and their data need to be protected from unauthorised access and from exposure to natural disaster.
- If data is lost then a proper backup strategy will allow files to be recreated from backup copies kept in a safe location.

Human – Computer Interface Technical Vocabulary

Command Language	A special language, which the user learns to communicate instructions to the computer system.
GUI	Graphic user interface. An HCI that uses graphics in the form of icons to help communication with the user.
HCI	Human-computer interface. The mixture of hardware and software that allows the user to communicate and interact with the computer.
Menu	A list of options that are available to the user. The user selects one of the options with a mouse or by pressing a key or, with touch screen systems, by touching the screen.
WIMP	Windows, Icons Menus and Pointing device. A graphic interface system that uses these components to interact with the user.

Human Computer Interface - Key Points

- A Human Computer interface allows the user to interact with the computer system.
- There are three different types of HCI. They are Graphic, Menu and Command.
- Each type of interface is appropriate for different uses and for users with different levels of skill.
- The designer of an HCI will aim for consistency between the different parts of the interface.

Networks - Technical Vocabulary

Browser	An computer program that downloads and displays web pages.
E-mail	An electronic message sent to an address to be stored on a central computer. The message can be downloaded and read by the recipient.
File Server	A central computer on a LAN that stores data and

in the data source.

Databases -Technical Vocabulary

Data Compression	A method of storing data so that it takes up less space.
Direct Access	A form of file access where a particular record can be processed without the need to process or access any other records in the file by calculating its position and going directly to the required record.
Field	Stores one piece of data such as colour of a stock item or customer surname.
File	A file is where data about one type of thing (stock item, customer etc.) is stored. It is made up of records.
Key Field	A field that uniquely identifies a record.
Record	Stores data about one occurrence of the thing that the file holds data on (one stock item, one customer etc). It is made up of fields.

Databases - Key Points

- Data is stored in databases which are made up of groups of related files.
- A file is made up of similar records and each record is made up of a number of fields.
- A special field, called a key, is used to identify each record uniquely. The key field is often a made up value – account number, payroll number etc.
- Key fields can also be used to link files together so that data needs to be stored only once.
- When a database is set up the field type for each field will be decided. This identifies the type of data that will be stored in the field and the database software will report an error if the user tries to enter a different type of data.
- Data is often coded to reduce the amount of storage space needed and to speed up data entry and searches.
- Data can be stored in fixed or variable length fields. If Direct Access is to be used then the fields and records must be fixed length.
- Software can be used to compress large files so that they take up less storage space. Compressed files must be uncompressed before they can be used.

Searching and Validation -Technical Vocabulary

Check Digit	An extra digit placed at the end of a number to perform self validation. A check digit cannot be used on numbers where calculation will be performed but it is extensively used for key field identification numbers.
Presence	

Check	Checking that an essential field contains data.
List Check	Validating data by checking to see that it is one of an allowed set of values contained in a list.
Parity Check	Method of self validation where the number of ones making up a group of eight bits is made even by using the parity bit.
Query	An instruction to a database program to select certain records according to the criteria defined either by words or by a screen representation.
Range Check	Method of validation that checks that a data value lies between two known extreme values.
Validation	Checking data values to make sure that they are reasonable and possible values. Validation is performed in order to try and detect incorrect data.

Searching and Validation - Key Points

- A Database can be searched using a special query language or a Query-by-example screen to select a particular group of records.
- The words AND and OR can be used to link conditions together.
- If AND is used all the conditions must be true to select the record.
- If OR is used any one or more of the conditions must be true to select the record.
- Validation is the process of checking data to make sure that it is reasonable and possible.
- A number of different types of validation techniques are possible depending on the nature and type of the data that is being checked.
- A check digit is an important validation check that is especially used for key field values like account number or payroll number. It will always spot a single digit being mis-entered or two digits being accidentally swapped round.

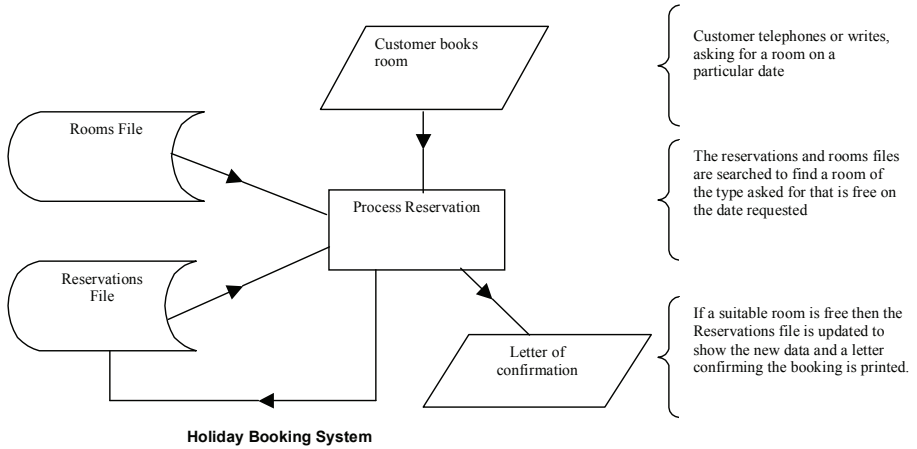
Data Capture Forms - Technical Vocabulary

Data Capture Form	A document used to collect data for input to a computer system.
Data Preparation	The process of copying data from a data capture form to a computer readable format such as tape or disk.
Off-line	Not connected to the computer.
Source Document	The original document on which data was captured.

Data Capture Forms - Key Points

- A data capture form is designed to collect data for input to a computer system.
- The data on the form must be copied to a computer readable format.
- Copying the data may introduce errors into the data.
- The form must be carefully designed to reduce the chance of errors

transaction log.



Holiday Booking System

Batch Processing - Electricity Billing

The following system flowchart shows an electricity billing system that uses batch processing.

Transaction Processing - Holiday Bookings

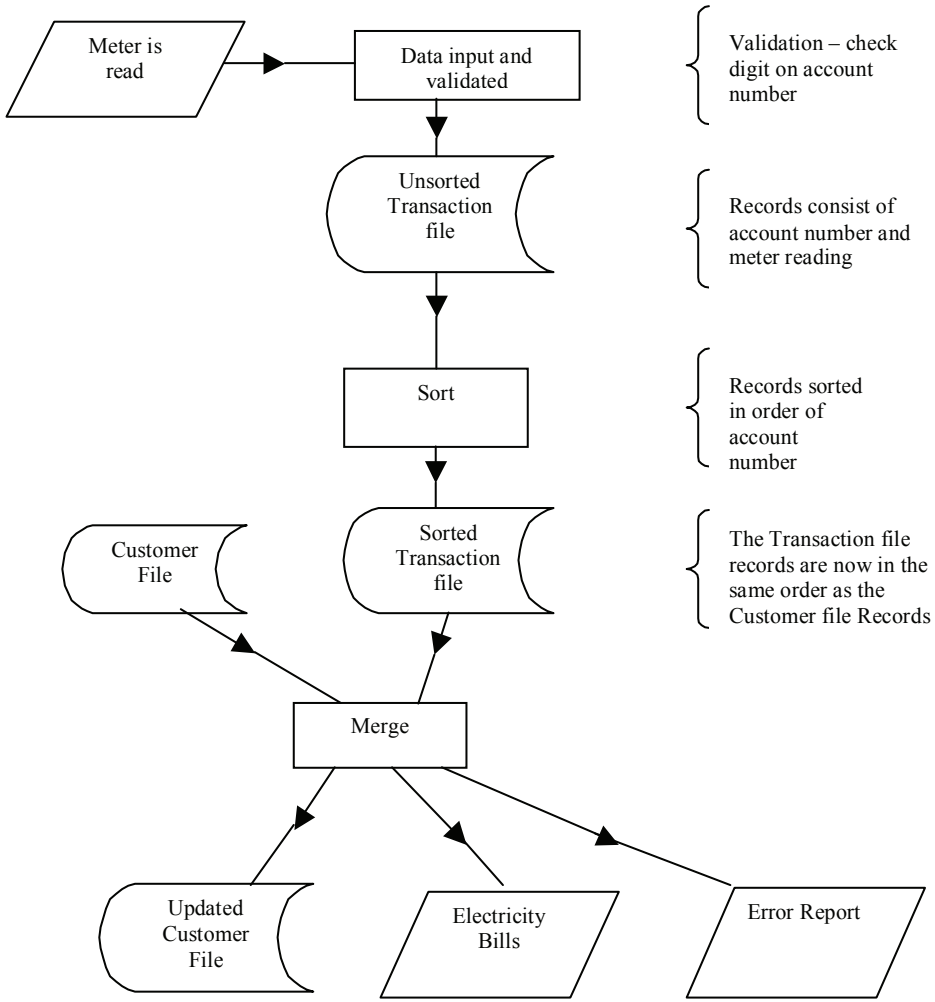
File Security - Technical Vocabulary

Backup	The process of keeping copies of files and data so that a working copy of a current file can be recreated if the file is corrupted, damaged or lost.
Encryption	Changing data in an apparently random way, based on some key so that the data appears meaningless.
Generations	Grandfather, father and son versions of the same file. The son generation is the latest version and will be used in processing. The Father and Grandfather are kept for backup purposes.
Spike	A sudden change in voltage in the electrical power supply. Spikes can be caused when something connected to the supply is turned on or off.
UPS	Uninteruptable Power Supply. A piece of hardware that automatically cuts in to provide the computer with electrical power if the mains supply fails.
Validation	Checking data to make sure that its value is reasonable or possible.

File

generations method for backup.

- Transaction processing uses random access for processing and backup requires regular snapshots of the files together with a



Electricity Billing System

both when it is completed and when it is copied.

- The form must be designed to collect all the data that is needed.

Computer Readable Forms - Technical Vocabulary

ATM	Automatic Teller Machine (cash point).
Bar code	A series of black and white strips of varying widths that represent a number.
Magnetic Strip Card	A plastic card with a magnetic strip stuck to the back. Data is stored on the strip.
MICR	Magnetic Ink Character Recognition – characters are recognised by their effect on a magnetic field.
OCR	Optical Character Recognition – characters are scanned and recognised by reflecting light off them.
OMR	Optical Mark Recognition.
Smart Card	A plastic card with memory circuits embedded in it to store data.

Computer Readable Forms - Key Points

- Forms that a computer can read directly need no data preparation and therefore reduce the chances of errors being introduced.
- Computer readable forms allow data to be input faster than manual methods.
- Some applications deal with such large amounts of data that it would be impossible to use manual methods.
- A variety of different computer readable formats are available.
- The actual hardware and software chosen for a particular application depends on a number of factors.

Computer Readable Data Capture Forms

✓ Data input is faster.
✓ No data preparation staff are needed so running costs are reduced.
✓ No data preparation means there is one less stage for error to be introduced.
✗ Damaged forms may be unreadable by the hardware so some manual input will still be needed.
✗ There will be costs involved in setting up the system. Both hardware and software will be needed.

OMR

✓ The form is simple to understand and data entry is easy.
✓ The form can be read very quickly.
✗ The forms are expensive.
✗ The user must use soft pencil or an ink that the scanner can detect
✗ Only limited types of data can be collected.

✗ Creased or dirty forms cannot be read.

Typical application: Marking multiple choice exams/Lottery Tickets.

OCR

✓ The form is in a human understandable format.
✓ Data input is faster than typing the text.
✗ Errors may occur unless a special font is used.
✗ Only typed or printed text can be read.
✗ Dirty or creased documents cannot be read.

Typical application: Automatic letter sorting.

MICR

✓ The form is in a human understandable format.
✓ Fast data input.
✓ Accurate data input – few reading errors.
✓ Dirty and overwritten documents can still be read.
✓ Documents are difficult to alter – reduced chance of fraud.
✗ Printing is expensive.
✗ Creased or torn documents will not pass through the reader.

Typical application: Cheques.

Magnetic Strip Cards

✓ Small convenient size.
✓ Fast and accurate data input.
✗ Data can be accidentally wiped if the card is scratched or exposed to strong magnetic fields.
✗ The data is easily read and can be changed so fraud can be a problem.

Typical application: Credit cards.

Bar Codes

✓ Easily printable so customisable systems are possible.
✓ Variety of reading devices to suit different applications.
✓ Can easily be incorporated into product packaging.
✗ Cannot be read if dirty or overwritten.
✗ Limited data can be stored. Only suitable for storing ID data.

Typical application: Food labels.

File Processing - Technical Vocabulary

Backup	The process of keeping files and data so that a working copy of a current file can be recreated if the file is corrupted, damaged or lost.
Batch Processing	A system of file processing where transaction data is collected in a transaction log and processed together in a single batch.
Generations	Grandfather, father and son versions of the same file. The son generation is the latest version and will be used in processing. The Father and Grandfather are kept for backup purposes.
Merge	The process of combining data from records in two files to create a new file.
On Line System	A transaction processing system. This is called on line because the transaction is processed by equipment connected directly to the computer system.
Random Access	A type of file access that allows individual records to be processed in any order, without needing to access any other record.
Real Time	Any system where data is updated as soon as transactions occur.
Sequential Access	A type of file access in which each record in the file is processed in turn.
Sorting	The process of rearranging records in a sequential file so that they are in a particular order.
Transaction	An event that makes it necessary to update the data in a file.
Transaction File	A file containing data waiting to be processed in a batch processing system.
Transaction Log	A file containing details of all transactions that have changed data in a random access master file since the last copy of the master file was made.
Transaction Processing	A system of file processing where records are updated as soon as a transaction relating to them occurs.
Update	The process of merging a master file with a transaction file so that the data in the master file represents the latest situation.

File Processing Key Points

- A number of different processes can be performed on files. These include sorting, merging and updating.
- Batch processing is appropriate to any system where transactions are collected together and dealt with in a batch, transaction processing must be used if the main files need to contain up-to-date data at all times.
- Batch processing uses sequential access for processing and the