

RAM

- volatile
- allows data to be changed
- speed: ★★
- used for the temporary storage of currently running programs and data
- consists of a large number of store locations, each of which is identified by a unique address
- e.g. used to store the program and the data when working on a word-processed document

ROM

- permanent
- does not allow data to be changed
- speed: ★★★
- used for the permanent storage of data
- e.g. used to store programs such as the BIOS – but it cannot be updated

Flash memory

- permanent
- allows data to be changed
- speed: ★
- used for the permanent storage of data
- e.g. used to store programs such as the BIOS – and can be updated

Cache memory

- volatile
- allows data to be changed
- speed: ★★★★★
- used for the temporary storage of frequently accessed data and instructions
- consists of a small number of store locations that can be accessed very quickly by the CPU
- quicker than RAM
- e.g. often stores the next set of instructions that need to be processed by the CPU

Hardware ports

- serve as an interface between the computer and other computers or devices
- a piece of equipment to which a plug or cable connects
- e.g. HDMI, USB, audio in and audio out

Software ports

- allow multiple software applications to use different software ports on the same physical connection

Optical storage technology

- uses laser beams, which are projected onto a CD/DVD/Blu-ray disk, and if light is reflected back, data is read as a 1 and if light is not reflected back, data is read as a 0
- can be used to read and write information to a disk

Magnetic technology

- used in floppy disks, hard disks and tapes (magnetic media), on which data is stored by writing data using a write-head and read by reading on a read-head

Solid state technology

- used in storage media (such as USB flash memory sticks)
- does not have any moving parts (such as read-head)
- increasingly used to replace both magnetic and optical storage (especially in mobile devices) where its low power consumption and high-speed access is advantageous

Storage in the cloud

- a contemporary data storage facility
- allows users to store their data on third-party servers and access it from many computing devices
- allows maintenance tasks, backup and data replication
- requires Internet connection
- may allow personal data that is held on a third-party server to be physically stored in a country where adequate data protection legislation does not exist
- leaves users solely reliant on the cloud storage provider when it comes to ensuring that their data is stored safely and can be retrieved at a later date

Network security

- of paramount importance to any network as the loss of data (particularly personal and confidential data) can have many serious consequences

User access levels

- a method used to allow certain users read and/or write access to data on a computer system
- e.g. An administrator will have read and write access to all data, while a secretary will not have access to confidential data (such as employees' salaries)

Suitable passwords

- should be complex, with a combination of uppercase and lowercase alphanumeric characters and non-alphanumeric characters

Brute force attack

- when a hacker has access to programs that have the ability to try multiple guesses in quick succession
- slower with complex passwords

The number of attempts taken to brute force a password

- attempts = number of characters^{password length}
- e.g. 'Computer1': attempts = $(26 + 26 + 10)^9 = 62^9 = 13,537,086,546,263,552$

Encryption

- the conversion of data using an algorithm into a form called cyphertext that cannot be easily understood by people without the decryption key
- involves performing the XOR logical operator on the original data and a key (a secure binary number known only to the sender and recipient)
- e.g.

Original Data	10101010	
Key	11110000	XOR
Cyphertext	01011010	

- has other techniques (such as SHA256 and Blowfish)

Network policies for acceptable use

- documents (each several pages long) written and agreed by a committee to outline the rules that users are required to follow while using a computer network following publication
- typically include a list of unacceptable types of website that should not be visited, activities that are not allowed on the network (such as gambling), and installation of unauthorised software

Packet switching

- the process of delivering packets from one computer system to another using a designated device (such as a switch and a router)
- used in the Internet

Routing

- the method of selecting paths along which packets are sent on a computer network
- involves constructing a routing table (which are essential to maintain to ensure that packets are delivered as quickly as possible) in the memory of specialist computer systems (such as routers, switches, bridges, firewalls and gateways) which stores a number of paths along which it is best to send packets to reach a specific destination
- mostly use only one network path at a time, but there are some multipath routing techniques

MAC (media access control) addresses

- also known as a physical address and a hardware address
- a unique hexadecimal number given to any communication device (such as a NIC)
- e.g. 74:E1:B6:8E:18:27
- stored in a communication device's ROM
- uses hexadecimal notation to allow over 281 trillion different combinations of MAC address
- stored in the routing tables in computer systems on its network (as the addresses are permanent and do not change like IP addresses)

IP addresses

- allocated to computer systems on networks (usually by a DHCP server, although you may assign your own IP address if you do not wish to rely on the services of a DHCP server)
- e.g. 195.10.213.120
- used by the TCP/IP to identify computer systems on a network, thus allowing communication between them
- stored in routing tables and updated as necessary

Data Protection Act 1998 (DPA)

- put in place by the government in response to growing concerns about the amount of personal data being stored on and processed by computer systems
- requires organisations that store and process personal data to register information on the type of data they wish to store and why it is being collected with the Information Commissioner (the person responsible for the DPA)

Personal data in the DPA

- processed against loss, theft or corruption
- accurate and where relevant kept up to date
- adequate, relevant and not excessive
- prevented from being transferred outside EU countries without adequate permission
- fairly and lawfully processed
- processed within the rights of subjects
- deleted when no longer needed
- used only for the purpose collected

Exemptions from the DPA

- the prevention or detection of crime
- the capture or prosecution of offenders
- the assessment or collection of tax or duty
- personal data by an individual for the purposes of their personal, family or household affairs
- national security and the armed forces
- personal data that is processed only for journalistic, literary or artistic purposes
- personal data that is processed only for research, statistical or historical purposes
- personal data relating to an individual's physical or mental health
- personal data that consists of educational records or relates to social work
- personal data relating to human fertilisation and embryology
- adoption records
- statements of a child's special educational needs
- personal data processed for, or in connection with, a corporate finance service
- examination marks and personal data contained in examination scripts