

TM111 Study Guide

Introduction to Computing and Information Technology 1

Hardware & Computer Systems

Q: What is the CPU?

A: Central Processing Unit - the 'brain' of the computer that executes instructions and performs calculations

Q: What does RAM stand for, and what is its purpose?

A: Random Access Memory - temporary, volatile memory that stores data and programs currently in use. Data is lost when the power is off

Q: What is ROM?

A: Read-Only Memory - permanent non-volatile memory containing boot instructions. Cannot be easily modified

Q: What is the difference between volatile and non-volatile memory?

A: Volatile memory (RAM) loses data when power is off. Non-volatile memory (ROM, hard drives) retains data without power

Q: What are the main components of the Von Neumann architecture?

A: CPU (ALU + Control Unit), Memory, Input devices, Output devices, and buses connecting them

Q: What is cache memory?

A: High-speed memory located close to or in the CPU that stores frequently accessed data to speed up processing

Q: What is the fetch-execute cycle?

A: The process where the CPU fetches an instruction from memory, decodes it, executes it, and stores the result. This repeats continuously

Q: What does the ALU do?

A: Arithmetic Logic Unit - performs mathematical calculations and logical operations (AND, OR, NOT, etc.)

Q: What is clock speed measured in?

A: Hertz (Hz), typically GHz (gigahertz). It determines how many instructions per second the CPU can process

Q: What is a bus in computer architecture?

A: A communication pathway that transfers data between components (data bus, address bus, control bus)

Software & Operating Systems

Q: What is system software?

A: Software that manages hardware and provides services for application software (e.g., operating systems, device drivers)

Q: What is application software?

A: Programs designed for end-users to perform specific tasks (e.g., word processors, browsers, games)

Q: What are the main functions of an operating system?

A: Process management, memory management, file system management, device management, user interface, security

Q: What is a process?

A: A program in execution - an instance of a running program with its own memory space and resources

Q: What is multitasking?

A: The ability of an OS to run multiple processes apparently simultaneously by rapidly switching between them

Q: What is virtual memory?

A: A memory management technique that uses hard disk space as extended RAM, allowing programs larger than physical RAM to run

Q: What is a file system?

A: The method an OS uses to organise and store files on storage devices (e.g., NTFS, FAT32, ext4)

Q: What is the difference between CLI and GUI?

A: CLI (Command Line Interface) uses text commands. GUI (Graphical User Interface) uses visual elements like windows and icons

Q: What is a device driver?

A: Software that allows the OS to communicate with and control hardware devices

Q: What is open source software?

A: Software with source code that is freely available to view, modify, and distribute

Programming Fundamentals

Q: What is an algorithm?

A: A step-by-step procedure or set of rules for solving a problem or completing a task

Q: What is a variable in programming?

A: A named storage location that holds a value which can change during program execution

Q: What are the three basic control structures in programming?

A: Sequence (steps in order), Selection (if/then decisions), Iteration (loops/repetition)

Q: What is a loop?

A: A control structure that repeats a block of code multiple times until a condition is met

Q: What is the difference between a while loop and a for loop?

A: While loops continue until a condition is false. For loops repeat a set number of times with a counter

Q: What is a Boolean value?

A: A data type with only two possible values: True or False (1 or 0)

Q: What is a function/procedure?

A: A reusable block of code that performs a specific task and can be called from other parts of the program

Q: What is pseudocode?

A: A plain language description of programming logic that's independent of any specific programming language

Q: What are the main primitive data types?

A: Integer (whole numbers), Float/Real (decimal numbers), Character (single character), Boolean (true/false), String (text)

Q: What is debugging?

A: The process of finding and fixing errors (bugs) in program code

Networks & Internet

Q: What is a network?

A: Two or more computers connected to share resources and communicate

Q: What is a LAN?

A: Local Area Network - a network covering a small geographical area like a home, office, or building

Q: What is a WAN?

A: Wide Area Network - a network covering a large geographical area, potentially worldwide (the Internet is the largest WAN)

Q: What is a protocol?

A: A set of rules governing how data is transmitted over a network

Q: What is TCP/IP?

A: Transmission Control Protocol/Internet Protocol - the fundamental communication protocols of the Internet

Q: What is an IP address?

A: A unique numerical address (e.g., 192.168.1.1) assigned to each device on a network

Q: What is DNS?

A: Domain Name System - translates human-readable domain names (google.com) into IP addresses

Q: What is HTTP/HTTPS?

A: Hypertext Transfer Protocol - the protocol for transferring web pages. HTTPS is the secure, encrypted version

Q: What is a router?

A: A network device that forwards data packets between networks and connects local networks to the Internet

Q: What is bandwidth?

A: The maximum amount of data that can be transmitted over a network connection in a given time (measured in bps)

Q: What is a client-server model?

A: An architecture where clients request services/resources from centralised servers

Q: What is a packet?

A: A small unit of data transmitted over a network, containing both payload data and routing information

Data & Information

Q: What is the difference between data and information?

A: Data is raw facts and figures. Information is processed data that has meaning and context

Q: What is a bit?

A: Binary digit - the smallest unit of data in computing, representing either 0 or 1

Q: What is a byte?

A: A group of 8 bits, the standard unit for measuring storage and memory

Q: What is binary?

A: Base-2 number system using only 0s and 1s - the fundamental language of computers

Q: What is hexadecimal?

A: Base-16 number system (0-9, A-F) is often used as a shorthand for binary in computing

Q: What is ASCII?

A: American Standard Code for Information Interchange - a character encoding standard assigning numbers to letters and symbols

Q: What is Unicode?

A: A universal character encoding standard that can represent characters from all writing systems worldwide

Q: What is compression?

A: Reducing file size by encoding data more efficiently. Can be lossy (some data lost) or lossless (fully reversible)

Q: What is encryption?

A: Converting data into a coded form to prevent unauthorised access

Q: What is a database?

A: An organised collection of structured data stored electronically for easy access and management

Security & Ethics

Q: What is malware?

A: Malicious software designed to damage, disrupt, or gain unauthorised access to computer systems

Q: What are the main types of malware?

A: Viruses, worms, trojans, ransomware, spyware, adware

Q: What is a firewall?

A: A Security system that monitors and controls incoming and outgoing network traffic based on security rules

Q: What is authentication?

A: The process of verifying the identity of a user or system (e.g., passwords, biometrics)

Q: What is social engineering?

A: Manipulating people into divulging confidential information or performing actions that compromise security

Q: What is phishing?

A: Fraudulent attempts to obtain sensitive information by disguising oneself as a trustworthy entity (typically via email)

Q: What is the Data Protection Act/GDPR?

A: Legislation protecting personal data and privacy, giving individuals rights over their information

Q: What is intellectual property?

A: Legal rights protecting creations of the mind (copyright, patents, trademarks)

Q: What is backup?

A: Creating copies of data to restore in case of loss, corruption, or disaster

Q: What is two-factor authentication?

A: Security method requiring two different forms of identification (e.g., password + phone code)

Web Technologies

Q: What is HTML?

A: Hypertext Markup Language - the standard language for creating web page structure and content

Q: What is CSS?

A: Cascading Style Sheets - language for describing the presentation and styling of web pages

Q: What is JavaScript?

A: A Programming language that adds interactivity and dynamic behaviour to web pages

Q: What is a web browser?

A: Software application for accessing and viewing websites (e.g., Chrome, Firefox, Safari)

Q: What is a URL?

A: Uniform Resource Locator - the address of a resource on the web (e.g.,
<https://www.example.com>)

Q: What is a cookie?

A: A Small text file stored by websites on a user's computer to remember information about their visit

Q: What is a search engine?

A: A web service that searches the Internet and returns relevant results (e.g., Google, Bing)

Q: What is cloud computing?

A: Delivery of computing services (storage, processing, software) over the Internet rather than locally