

Computer Science definitions are marked on the technical distinction, and most of the lost marks come from pairs that sound similar and are not – compiler and interpreter, authentication and authorisation, latency and bandwidth.

Data representation

- Bit / byte** – a single binary digit; a group of eight bits
- Two's complement** – a representation of signed integers in which the most significant bit carries a negative place value, so addition and subtraction use the same circuitry
- Floating-point representation** – a number stored as a mantissa and an exponent, trading precision for range
- Normalisation** – adjusting a floating-point number so the mantissa begins with the digits 01 or 10, giving the greatest precision for the bits available
- Character set** – an agreed mapping between characters and binary codes – ASCII uses 7 or 8 bits, Unicode encodes far more characters
- Lossy / lossless compression** – compression that discards data and cannot be exactly reversed; compression that preserves every bit and can be reversed exactly
- Run-length encoding** – a lossless method replacing a run of identical values with the value and a count

Hardware and architecture

- Von Neumann architecture** – a design in which program instructions and data share the same memory and the same bus
- Fetch–decode–execute cycle** – the repeated sequence by which the processor fetches the next instruction from memory, decodes it, and carries it out
- Register** – a very small, very fast store inside the processor used during instruction execution
- Cache** – a small fast memory holding recently or frequently used data, reducing the average time to access main memory
- Interrupt** – a signal to the processor requesting attention, which causes the current program's state to be saved and a service routine to run
- Bus** – a set of parallel wires carrying data, addresses or control signals between components
- Volatile memory** – memory that loses its contents when power is removed – RAM is volatile, ROM is not

Software and programming

- Compiler** – a translator that converts the whole source program into object code before execution, reporting all errors at the end
- Interpreter** – a translator that converts and executes the source program one statement at a time, stopping at the first error
- Assembler** – a translator that converts assembly language into machine code, one instruction to one
- Operating system** – software that manages the hardware and provides an environment in which applications run
- Scheduling** – the operating system's allocation of processor time between competing processes
- Virtual memory** – the use of secondary storage as an extension of main memory, so programs larger than RAM can run
- Abstraction** – removing detail that is not relevant to the problem, so the essential structure can be reasoned about
- Decomposition** – breaking a problem into smaller sub-problems that can each be solved separately

Data structures and algorithms

- Stack** – a last-in-first-out structure, with push and pop operating at the same end
- Queue** – a first-in-first-out structure, with items added at one end and removed at the other
- Linked list** – a sequence in which each node holds data and a pointer to the next, so insertion needs no shifting
- Binary tree** – a structure in which each node has at most two children, ordered so a search can discard half the remaining nodes at each step
- Hash table** – a structure that computes a storage address from the key, giving near-constant access time; a collision occurs when two keys hash to the same address
- Binary search** – repeatedly halving a SORTED list by comparing the target with the middle item
- Time complexity** – how the number of operations grows with the size of the input, expressed in big-O notation
- Recursion** – a routine that calls itself, with a base case that stops the calls and a general case that moves towards it

Databases

- Primary key** – an attribute or set of attributes that uniquely identifies each record in a table
- Foreign key** – an attribute in one table that is the primary key of another, creating the link between them
- Referential integrity** – the rule that a foreign key must match an existing primary key, so no record refers to something that does not exist

Normalisation (database) – organising tables to remove redundancy and update anomalies; third normal form requires every non-key attribute to depend on the key, the whole key, and nothing but the key

Transaction – a group of operations treated as a single unit, which either completes entirely or has no effect at all

Networks and security

Protocol – an agreed set of rules governing how devices communicate

Packet switching – dividing data into packets routed independently across the network and reassembled at the destination

Bandwidth / latency – the amount of data transferable per unit time; the delay before a transfer begins. High bandwidth does not imply low latency

Encryption – converting plaintext into ciphertext so it is unintelligible without the key

Symmetric / asymmetric encryption – the same key encrypts and decrypts; a public key encrypts and a matching private key decrypts

Digital signature – a hash of a message encrypted with the sender's private key, which proves both origin and integrity

Authentication / authorisation – establishing WHO a user is; establishing WHAT that user is permitted to do

Firewall – hardware or software that filters traffic between networks according to a set of rules