

OxfordAQA

International AS/A-level

Computer Science (9645)

Vocabulary list

For teaching from September 2024 onwards

For International AS exams in May/June 2025 onwards

For International A-Level exams in May/June 2026 onwards

Absolute error

The difference between the actual number and the nearest representable value.

Abstract data type (ADT)

A data type whose properties are specified independently of any particular programming language.

Abstraction

Representation that is arrived at by removing unnecessary details.

Address bus

Used to specify the memory addresses where data is stored or retrieved in a computer system.

Addressable memory

The total amount of memory locations that can be uniquely identified and accessed by a computer system.

Adjacency lists

A data structure used to represent a graph, where each vertex has a list of all the vertices it is directly connected to.

Adjacency matrix

A grid used to represent both weighted and unweighted graphs.

Aggregation

A type of association where the aggregated object has a weaker form of association with the objects that it is aggregating than is the case with composition. These objects have an existence independent of the aggregated object and can continue to exist even after the aggregated object is disposed of.

Algorithm

Unambiguous instructions for solving a problem. It can be represented as a Turing machine program.

Analogue

A type of signal or data representation that varies continuously and can take any value within a given range.

Analysis (Software development)

Defining the requirements of a new system that is being developed.

Application software

Programs designed to perform specific tasks by users, such as word processing or web browsing.

Arithmetic logic unit (ALU)

A component of the CPU that performs arithmetic and logical operations.

Array

A data structure consisting of a collection of elements, each identified by an index, that are stored contiguously in memory.

Artificial intelligence

A system that can arrive at a solution using a similar method to that which a human might follow or that is at least as good as a human might arrive at.

ASCII

A character encoding standard that uses 7-bits or 8-bits to represent each character.

Assembler

A tool that translates assembly language code into machine code executable by a computer's CPU.

Assembly language

A low-level programming language that uses mnemonics to represent machine-level instructions.

Assignment

The process of setting or updating the value of a variable or constant in a program.

Association

An association is a relationship between two classes. There are different types of association: composition and aggregation.

Asymmetric cipher

An asymmetric cipher uses different mathematically related keys to encrypt and decrypt the data: since the encryption and decryption keys are different the key exchange problem does not apply.

Attribute

A property or characteristic of an entity (databases) or an object (OOP).

Backpropagation

A training algorithm for artificial neural networks that adjusts weights by propagating errors backward from the output layer to the input layer.

Backus-aur form (BNF)

A notation for formally describing the syntax of programming languages using production rules.

Bandwidth

Determines how much data can be transmitted over the network within a given period of time.

Base case

A value that has a solution which does not involve any reference to the general case solution.

Baud rate

The rate at which signals on a wire may change.

Big data

A catch-all term for data that cannot be stored or processed using traditional methods.

Big O Notation

Used to evaluate an algorithmic complexity.

Binary (Base 2)

A number system that uses only two digits, 0 and 1, to represent all numerical values.

Binary search

A search algorithm for finding an item in a sorted list by repeatedly dividing the list of values in half and comparing the middle element with the required value until a match is found or there are no items left to examine.

Bit rate

The number of bits transmitted per second.

Bitmap image

A type of digital image composed of a matrix of pixels, where each pixel's colour is stored as a binary value.

Boolean (Data type)

A data type that can hold only two values: true or false.

Breadth-first graph search algorithm

An algorithm for traversing or searching through a graph by exploring all neighbouring nodes at the present depth before moving on to nodes at the next depth level.

Bubble sort

A sorting algorithm where during a pass, neighbouring values are compared and swapped. Passes are made until no further swaps are needed.

By reference (Parameter passing)

A method of passing arguments to a subroutine where the reference (address) of the variable is passed, allowing the subroutine to modify the original variable.

By value (Parameter passing)

A method of passing arguments to a subroutine where a copy of the variable's value is passed, so changes made within the subroutine do not affect the original variable.

Caesar cipher

An encryption technique that shifts each letter in the plaintext by a fixed number of positions down the alphabet.

Carrier sense multiple access with collision detection (CSMA/CD)

A network protocol that listens for carrier signals before transmitting data to avoid collisions and detects collisions if they occur, taking steps to resolve them.

Character (Data type)

A data type that represents a single textual character, such as a letter, digit, or symbol.

Character set

A collection of characters that a computer recognises and can encode, such as ASCII or Unicode.

Checksum

A value calculated from a data set to detect errors or changes, often used in data transmission and storage integrity verification.

Cipher

A method for encrypting or decrypting text to protect information, making it unreadable to unauthorised users.

Cipher text

Message data after it has been encrypted.

Circular queue

When the array element with the largest possible index has been used, the next element to join the queue reuses the vacated location at the beginning of the array.

Class

A class defines methods and attribute fields that capture the common behaviours and characteristics of objects.

Class diagram

A diagram that shows class inheritance and association relationships.

Client

A computer in a network that uses the services provided by a server.

Client-server networks

A system in which some computers (the clients), request services provided by other computers, the servers.

Clock

Generates a consistent signal used to synchronise the operations of a computer's components.

Cloud storage

A service that allows data to be stored and accessed remotely on web servers via the internet.

Code comments

Annotations in the source code of a program that explain the code's functionality, intended for human readers and ignored by the compiler or interpreter.

Colour depth

The number of bits used to represent the colour of a single pixel in an image, determining the range of colours that can be displayed.

Compiler

A program that translates source code written in a high-level programming language into machine code executable by a computer's CPU.

Composite key

A combination of attributes that uniquely identifies a tuple/record in a database.

Composition

A type of association where the composite object has ownership of the objects within it. The objects that are part of the composite objects have a lifecycle determined by the composite object. If the composite object ceases to exist then they too will cease to exist.

Computationally secure cipher

A cipher for which information about the plaintext can be learned from the cipher text, but algorithms to crack the cipher take an unfeasible time to complete or have a very low probability of success.

Concatenation

The process of combining two or more strings or other data structures end-to-end to create a new entity.

Constant complexity

An algorithmic complexity where the time taken to complete an operation remains constant regardless of the input size.

Constructor method

A special method in object-oriented programming languages that is automatically called when an instance (object) of a class is created, used for initialising the object's state.

Control bus

Used for transmitting control signals between the CPU, memory, and other hardware components in a computer system.

Control unit

A component of a CPU that manages the execution of instructions by decoding them and controlling the flow of data within the CPU and between other hardware components.

Current instruction register (CIR)

A register in a CPU that holds the instruction currently being executed or decoded.

Data bus

Used for transmitting data between the CPU, memory, and peripherals.

Data structure

A way of organising and storing data in a computer system so that it can be accessed and manipulated efficiently.

Data type

A classification of data that determines the possible values it can hold and the way it is stored in memory.

Database

A structured collection of data.

Date (Data type)

A data type used to represent dates, including day, month, year, and sometimes time.

Decimal (Base 10)

A numeral system that uses ten symbols (0-9) to represent numerical values.

Decomposition

Breaking down a complex problem into smaller more manageable parts.

Dedicated registers

Specialised storage locations within a CPU designed to hold specific types of data temporarily during processing.

Deep learning

Artificial intelligence systems that use multiple layers of neural networks to learn and make decisions from vast amounts of data.

Definite iteration

A loop in programming that continues for a set number of times.

Depth-first graph search algorithm

An algorithm that explores as far as possible along each branch before backtracking in graph traversal.

Design (Software development)

Planning the data structures, algorithms, modular structure and user interface for a new program.

Dictionary

A collection of key-value pairs in which the value is accessed via the associated key.

Digital certificates

A method to verify the identity of an entity and are used in secure communication over networks.

Digital signatures

Cryptographic methods that are used to verify the authenticity and integrity of digital messages.

Dijkstra's shortest path algorithm

An algorithm used to find the shortest path from a source node to all other nodes in a weighted graph.

Direct memory addressing

The operand is the address from which the value to operate on should be fetched.

Directed graph

A diagram consisting of vertices, joined by directed edges.

DIV

An operation that returns the quotient of a division operation.

Domain name

A unique name that identifies a website on the internet.

Domain name system (DNS)

A naming system that translates domain names into IP addresses and vice versa, enabling devices to locate resources on the internet.

D-Type flip-flop

Contains a clock and data input and when the clock signal goes high the current state of the input is stored and will be output until the clock signal goes high again.

Dynamic data structure

The memory taken up by the data structure varies at run time.

Dynamic host configuration protocol (DHCP)

A network protocol used to dynamically assign IP addresses and other network configuration parameters to devices on a network.

Encapsulation

Combining a record with the procedures and functions that manipulate it to form a new data type; a class in OOP.

Encryption

Uses an algorithm and a key to convert message data into a form that is not understandable without that key.

Entity relationship diagram (ERD)

A visual representation used in database design to describe the relationships between entities (tables).

Evaluation (Software development)

Reviewing the suitability of program code including correctness, efficiency and maintainability.

Exception handling

A programming technique that manages and responds to unexpected or exceptional situations that arise during program execution.

Exponential complexity

An algorithmic complexity where the execution time grows exponentially with input size.

Exponentiation (Power)

An operation that raises a base number to a specified power.

Field

A column in a database table that represents a specific piece of data in a database.

Finite state machines (FSMs)

A finite state machine is a model of computation for a machine that is always in one of a fixed number of states.

Firewall

Software that monitors and controls incoming and outgoing network traffic based on predetermined security rules.

Floating point notation

A method of representing real numbers in a way that accommodates a wide range of values using a mantissa and exponent.

Foreign key

An attribute in one table that is a primary key in another table.

File transfer protocol (FTP)

A protocol used for transferring files between a client and a server on a computer network.

Full-adder circuit

A circuit that performs addition of three binary digits: two inputs and a carry from a previous stage of the addition.

Fully qualified domain name (FQDN)

The complete domain name for a specific computer, including its host name and all levels of the domain hierarchy.

Functional programming

A programming paradigm where computation is expressed as the evaluation of functions.

General-purpose registers

Registers in a CPU that can store data temporarily and are used for various purposes by the CPU during program execution.

Getter methods

Methods in object-oriented programming used to retrieve the values of private attributes of an object.

Global variables

Variables in a program that can be accessed and modified from any part of the program, regardless of where they are declared.

Graph data structure

A diagram consisting of vertices joined by edges.

Half-adder circuit

A circuit that adds two binary digits and produces a sum and a carry output.

Halting problem

The unsolvable problem of writing a program that can tell whether a given program and its inputs will halt, without running the given program.

Hardware

The physical components of a computer system, such as the processor, memory, and peripherals.

Harvard architecture

A computer architecture where memory for data and instructions is separate, allowing simultaneous access to data and instructions.

Hash functions

Uses a record key to calculate a value which represents the position that the record is stored at in a hash table.

Hash table

A data structure that creates a mapping between keys and values.

Heuristic methods

An approach that uses experience to make informed guesses that assist in finding a polynomial time solution to an intractable algorithmic problem.

Hexadecimal (Base 16) numbers

A number system that uses 16 symbols (0-9 and A-F) to represent values.

Hierarchy charts

A diagram that shows the hierarchical structure of modules or components in a system or program.

High-level language

Programming code written in a human-readable language that abstracts away low-level details of the computer hardware.

Hypertext transfer protocol (HTTP)

A protocol used for transferring hypertext requests and information on the World Wide Web.

Hypertext transfer protocol secure (HTTPS)

An extension of HTTP that encrypts data sent and received over the internet, ensuring secure communication.

I/O Controllers

Hardware devices responsible for managing input and output operations between a computer and its peripherals.

I/O Device management

The process of controlling and coordinating input and output operations between a computer system and its peripherals.

Internet message access protocol (IMAP)

A protocol used by email clients to retrieve emails from a mail server and manage them without downloading them to the client computer.

Immediate memory addressing

The operand is the value to operate on.

Imperative high-level language

A type of programming language that follows a sequence of statements to perform computations and alter program state.

Implementation (Software development)

Converting program designs into code (instructions) that a computer can process.

Indefinite iteration

A condition or loop in programming that continues indefinitely until a certain condition is met or a break statement is encountered.

Indirect memory addressing

The operand is a register that contains the address in main memory from which the value to operate on should be fetched.

Inheritance

The relationship between two object types in which one is a kind of the other and shares some of its properties or behaviours.

In-order tree-traversal

Outputting the contents of a binary search tree in ascending order.

Instantiation

The process of creating an instance (object) of a class in object-oriented programming.

Integer (Data type)

A data type in programming that represents whole numbers without fractions or decimal points.

Intermediate language

A low-level programming language used as an intermediate step between source code and machine code in software development.

Internet

A global wide area network that is formed from the interconnection of many other networks and that uses the TCP/IP protocol.

Interpreter

An interpreter works its way through a set of source code instructions identifying the next instruction and then running routine(s) to execute it, before moving on to the next instruction.

Interrupt handling

The process by which a computer system responds to interrupts (signals that indicate the need for attention from the CPU).

Interrupt service routine (ISR)

Functions or routines in software that are executed in response to specific hardware interrupts to handle the event.

Intractable algorithms

A problem which can be solved, but for which no polynomial time solution (or better) has been found.

IP address

A unique numerical label assigned to each device connected to a computer network that uses the Internet Protocol (IP) for communication.

Iteration

The repetition of a process or set of instructions in a computer program, typically controlled by loops, to achieve a desired result.

Key exchange problem

The problem of sharing the key between the sender and receiver without it being at risk of being intercepted.

Latency

The delay between the initiation of a request and the response in a computer system.

Libraries

Collections of precompiled routines, subroutines, and code modules that can be linked to a program to provide specific functionalities.

Linear queue

Elements join the queue at one end and leave the queue at the other.

Linear search

Starts at the beginning of the list and compares each element in turn with the required value until a match is found, or the end of the list is reached.

Linear complexity

An algorithmic complexity that executes in $O(n)$ time.

List

A collection of elements with an inherent order.

Local variable

Variables that are declared and only exist while the subroutine is executing.

Logarithmic complexity

An algorithmic complexity where the time taken for execution increases logarithmically with the size of the input.

Logic circuit

A digital circuit that performs logical operations on binary inputs to produce a binary output.

Low-level language

A programming language that provides minimal abstraction from a computer's hardware, directly reflecting its architecture.

Media access control (MAC) addresses

Unique identifiers assigned to network interfaces for communication on a physical network.

Machine code

The binary language directly executable by a computer's CPU, representing instructions in their lowest-level form.

Machine learning

A type of artificial intelligence in which the performance of the system is improved based on experience.

Magnetic hard disk

A type of storage device that uses magnetic storage to store and retrieve digital information.

Main memory

The primary storage area in a computer that holds data and instructions currently being processed by the CPU.

Majority voting

A technique used in fault-tolerant systems where the most frequent result among multiple redundant components is considered correct.

Memory address register (MAR)

A CPU register that holds the memory address from which data will be fetched or to which data will be stored.

Memory allocation

The process of reserving and assigning memory space to programs or processes during execution.

Memory buffer register (MBR)

A CPU register that temporarily holds data being transferred between main memory and the CPU.

Metadata

Data that provides information about other data, describing its structure, format, and characteristics.

Method

A subroutine or function associated with an object or class in object-oriented programming, defining behaviour or actions.

MOD

An operation that returns the remainder of a division.

Natural number

A positive integer used to count and order items.

Nested iteration

The use of one or more loops inside another loop to perform repeated actions.

Nested selection

The use of conditional statements inside another conditional statement to control program flow.

Neural networks

A network of nodes that are connected together in a similar way to neurons in the human brain.

Normalisation (Databases)

A technique used to produce a normalised set of entities in a database.

Normalisation of floating point form

The process of representing floating-point numbers in a standardised format, ensuring consistency and precision.

Nyquist's theorem

A principle in signal processing stating that to accurately reconstruct a signal, the sampling rate must be at least twice the highest frequency present in the signal.

Object-oriented programming (OOP)

A programming paradigm based on the concept of objects, which can contain data (attributes) and methods (subroutines).

Object (Executable) code

The output of a compiler or assembler that represents executable instructions in machine code format.

Objects

Objects based on a class are created using a constructor method.

Opcode

The part of a machine instruction that specifies the operation to be performed.

Operand

The data on which an operation is performed by an instruction in a computer program.

Operating system (OS)

Software that manages computer hardware and provides services for computer programs, facilitating communication between hardware and software.

Overflow

The result of a calculation is too large to be represented using the available number of bits.

Overriding

When a method from the base class is redefined in a subclass so that an instance of the subclass can behave in a different way to an instance of the base class.

Parallel data transmission

Multiple bits are sent down several wires simultaneously.

Parameter

A variable passed into a subroutine to provide data for processing.

Parity bit

An extra bit added to data to ensure that the number of bits with a value of one is even (even parity) or odd (odd parity), used for error detection.

Peer-to-peer network

A network that has no dedicated servers. All computers are of equal status and can both share resources themselves and use resources from other computers.

Perfectly security Cipher

When nothing can be learned about the plaintext from examining the cipher text.

Plain text

Message data before it is encrypted.

Polynomial complexity

An algorithmic complexity whose execution time grows as a polynomial of input size.

Post office protocol (POP)

A protocol used by email clients to retrieve emails from a mail server.

Post-order tree-traversal

Producing a postfix expression from an expression tree and used to empty a tree.

Pre-order tree-traversal

Copying a tree and producing a prefix expression from an expression tree.

Primary key

An attribute or set of attributes which uniquely identifies a tuple or record in a database.

Priority queue

Each element of a priority queue has an associated priority.

Procedural paradigm

A programming paradigm where programs are structured around procedures or routines that perform tasks sequentially.

Processor

The central processing unit (CPU) of a computer that executes instructions and processes data.

Processor instruction set

The collection of all machine instructions that a CPU can execute.

Program counter (PC)

A register in a CPU that holds the memory address of the next instruction to be executed.

Protocol

A set of agreed signals, codes and rules to be used for data and information exchange between computers.

Pseudocode

A high-level description of a computer algorithm or process that uses natural language to outline its logic.

Queue

A first-in-first-out (FIFO) abstract data type.

Rational number

A number that can be expressed as the quotient or fraction of two integers, where the denominator is not zero.

Real (Data type)

A data type that represents numbers with decimal points.

Records

Database data structures that contain fields, organised in a way that represents information about a specific entity.

Recursion

A subroutine that calls itself.

Relative error

The absolute error divided by the actual numbers.

Request to send/clear to send (RTS/CTS)

A protocol used to manage the transmission of data by allowing devices to request and receive permission before sending data to avoid collisions.

Rooted tree

A tree in which one vertex has been designated as the root and every edge is directed away from the root.

Router

A networking device that forwards data packets between computer networks, typically using routing protocols to determine the best path.

Scheduling

The process of determining when and in what order tasks or processes will be executed on a computer system.

Selection

A programming construct that allows different actions to be taken based on a condition.

Serial transmission

Single bits are sent one after another along a single wire.

Server

A computer that provides shared resources to network users.

Setter methods

Methods in object-oriented programming used to set the values of private attributes of an object.

Simple mail transfer protocol (SMTP)

A protocol used for sending and receiving email messages on the internet.

Software

Programs and applications that run on a computer system, providing functionality for users or other software.

Solid-state drive (SSD)

A storage device that uses solid-state memory (such as flash memory) to store data persistently.

Source code

Human-readable instructions written in a programming language before being translated into machine code by a compiler or interpreter.

Secure shell (SSH)

A protocol for secure remote login and other secure network services over an insecure network.

Stack

A last-in-first-out (LIFO) abstract data type.

Start bit

Brings the clock of the receiver into phase with the clock of the sender.

State transition diagram

A visual representation that gives the states of a system and the transitions between those states based on events or conditions.

Static data structure

Data structures that have fixed size and memory allocation at compile-time.

Status register (SR)

A register in a computer's CPU that stores various status flags and condition codes generated by arithmetic and logical operations.

Stop bit

Allows the next start bit to be recognised.

Stored program concept

The stored program concept is that machine code instructions stored in main memory are fetched and executed serially by a processor that performs arithmetic and logical operations.

String (Data type)

A sequence of characters, typically letters, numbers and punctuation.

String conversion operations

Operations that convert between strings and other data types such as integer to string or string to integer.

Structure chart

A diagram that represents the modular structure of a program or system, showing modules and the relationships between them.

Structured programming approach

An organised approach to coding where programs are made up of different modules.

Structured query language (SQL)

A language used for managing and querying relational databases.

Subroutine

A named block of code that performs a specific task, designed to be called from other parts of a program.

Substring

A contiguous sequence of characters within a string.

Symmetric cipher

A symmetric cipher uses the same key to encrypt and decrypt the data.

Syntax diagram

A graphical representation that illustrates the syntax rules of a language or grammar using symbols and arrows.

System software

A program that manages the operation of a computer.

Table

A database structure that organises information into rows and columns.

TCP/IP stack

A suite of communication protocols used to interconnect network devices on the internet, consisting of Transmission Control Protocol (TCP) and Internet Protocol (IP).

Testing (Software development)

Checking for the presence of errors in program code.

Thick-client computing

A computing model where most of the processing and data storage occurs on the client side.

Thin-client computing

A computing model where most of the processing and data storage occurs on a central server, with clients mainly handling user interface tasks.

Time (Data type)

A data type that represents time.

Trace table

A table used in software debugging and testing to trace the values of variables or program states through successive stages of execution.

Tractable algorithms

Problems that have a polynomial (or less) time solution are called tractable problems.

Translator

A program or tool that converts source code written in one programming language into machine code.

Traveller's problem

The solution finds a route that visits each city exactly once before returning to the starting point.

Tree

A connected undirected graph with no cycles.

Trojan

A program that hides in or masquerades as desirable software, such as utility or a game, but attacks computers it infects.

Truncation

The process of discarding the fractional part of a number, resulting in an integer value.

Truth table

A table that displays the output of a logical expression for all possible combinations of input values.

Turing machines

A formal model of computation that consists of a finite state machine (FSM) that controls one or more tapes, where at least one tape is of unbounded length (ie infinitely long).

Two's complement

A method of representing signed integers in binary form, where the most significant bit indicates the sign of the number.

Underflow

The result of a calculation is too small to be represented using the available number of bits.

Unicode

A character encoding standard that assigns a unique numeric value to every character and symbol.

Uniform resource locator (URL)

A web address that specifies the location of a resource on the internet.

Universal turing machine

A universal Turing machine can simulate any other Turing machine. A UTM, U , is an interpreter that reads the description $\langle M \rangle$ of any arbitrary Turing machine M and faithfully executes operations on data D precisely as M does. For single-tape Turing machines, it is imagined that $\langle M \rangle$ is written at the beginning of the tape, followed by D .

Utility program

Software tools or applications that perform specific tasks to assist in managing and maintaining a computer system or network.

Variable declaration

The act of defining a variable in a programming language by specifying its name and data type.

Vector graphic

A type of computer graphic that uses geometric primitives such as points, lines, curves, and shapes based on mathematical equations.

Vernam cipher

A method of encrypting alphabetic text by using a one-time pad of randomly generated letters.

Virtual machine

The apparent machine that the operating system presents to the user, achieved by hiding the complexities of the hardware behind layers of operating system software.

Virus

A small program attached to another program or data file. It replicates itself by attaching itself to other programs.

Von neumann architecture

A computer architecture model that describes a CPU with separate storage and processing units, using a single memory to store both data and instructions.

Weighted graph

A graph in which the edges are labelled or given a value called its weight.

Wi-Fi

Trademarked IEEE 802.11 technologies that support wireless networking of home and business networks.

Worm

A small program that exploits a network security weakness (security hole) to replicate itself through computer networks.