AP CSP Vocabulary Glossary

Working in Python · alphabetical · 300 terms · all terms

Terms marked **AP** *appear on the College Board AP CSP exam's own vocabulary list. A superscript chapter number links to where this book defines the term.*

A

absolute path 13 A path that does not depend on the current directory.

abstraction AP Reducing complexity by exposing essential features and hiding implementation detail.

accumulator 10 A variable used in a loop to add up or accumulate a result.

aggregation of information AP Combining separately harmless pieces of data to identify or profile a person.

algorithm AP A finite sequence of steps that solves a problem or completes a task. Can be written in English, pseudocode, or code.

algorithmic efficiency AP An estimate of the computational resources an algorithm uses as a function of input size.

aliased 9 If there is more than one variable that refers to an object, the object is aliased.

analog data AP 7b Values that vary continuously and smoothly, with no steps.

anonymization AP Removing identifying details from data — and its limits, since aggregation can re-identify.

API AP The specification of how a library's procedures are called and how they behave.

argument AP 2 A value provided to a function when the function is called.

arithmetic operator 1 A symbol, like + and *, that denotes an arithmetic operation like addition or multiplication.

ASCII AP 7b A table assigning a number from 0 to 127 to each of a small set of characters.

assignment statement AP 2 A statement that assigns a value to a variable.

attribute 9,14 A named value associated with an object; called an instance variable when it belongs to a class instance.

authentication AP Verifying that a user is who they claim to be.

B

bandwidth AP Maximum data transmittable per unit time, in bits per second.

base case 5 A conditional branch in a recursive function that does not make a recursive call.

beneficial and harmful effects AP Every computing innovation has both, and they can fall on different groups of people.

bias AP Systematic unfairness embedded in an algorithm or in the data it was built from.

bigram 12 A sequence of two elements, often words.

binary AP 7b Base-2 representation, using only the digits 0 and 1.

binary mode 13 A way of opening a file so the contents are interpreted as a sequence of bytes rather than a sequence of characters.

binary search AP Repeatedly halving a sorted list to locate a value.

bit AP 7b A single binary digit, 0 or 1.

block 5 One or more statements indented to indicate they are part of another statement. Statements in a block are frequently said to have the same scope.

body 3 The sequence of statements inside a function definition.

boolean expression AP 5 An expression whose value is either True or False.

boundary case 6b A test case at the value where a function's behavior changes, such as zero, an empty string, or the first or last item.

branch 5 One of the alternative sequences of statements in a conditional statement.

bug 1 An error in a program.

byte AP 7b Eight bits. Enough to hold one of 256 values.

C

call graph 10 A diagram that shows every frame created during the execution of a program, with an arrow from each caller to each callee.

canvas 4 A window used to display graphical elements including lines, circles, rectangles, and other shapes.

certificate authority AP An organization that issues and vouches for digital certificates.

chained conditional 5 A conditional statement with a series of alternative branches.

character 8 An element of a string, including letters, numbers, and symbols.

character encoding 7b The agreement about which numbers stand for which characters. Read bits with the wrong encoding and you get the right data as the wrong text.

child class 17 A class that inherits from another class.

citizen science AP Scientific research carried out partly by volunteers using their own devices.

class 14 A programmer-defined type. A class definition creates a new class object.

class object 14 An object that represents a class — it is the result of a class definition.

class variable 17 A variable defined inside a class definition, but not inside any method.

code segment AP A portion of a program, one or more lines, treated as a unit.

collaboration AP Working with others to develop a computing innovation; benefits from varied perspectives and skills.

comment AP 2 Text included in a program that provides information about the program but has no effect on its execution.

compound conditional AP A single condition combining multiple Boolean expressions with AND, OR, or NOT.

compression ratio 7b Compressed size divided by original size.

computer network AP Interconnected computing devices able to send and receive data.

computer virus AP Malware that copies itself, typically by attaching to other programs or files.

computing device AP A physical artifact that can run a program.

computing innovation AP A product, service, or concept that includes a program as an integral part of its function. May be physical, software, or conceptual.

computing system AP A group of computing devices and programs working together.

concatenation AP 1 Joining two strings end-to-end.

condition 5 The boolean expression in a conditional statement that determines which branch runs.

conditional expression 18 An expression that uses a conditional to select one of two values.

conditional statement AP 5 A statement that controls the flow of execution depending on some condition. Informally, this is usually an if statement, which might include an elif and an else. *(AP calls this selection.)*

configuration data 13 Data, often stored in a file, that specifies what a program should do and how.

constant AP A named value that does not change during execution.

cookies AP Small data files stored by a site to track a user's state or behavior.

copyright AP The exclusive right of a creator to reproduce, distribute, and display a work.

correlation AP An association between two variables where changes in one accompany changes in the other.

counter 7 A variable used to count something, usually initialized to zero and then incremented.

creative commons AP A set of public licenses letting a creator pre-authorize specific reuse under stated conditions.

crowdsourcing AP Gathering input, funding, or labor from many people over the Internet.

current working directory 13 The default directory used by a program unless another directory is specified.

D

data AP Values that can be stored and processed by a program.

data abstraction AP Using a data structure, typically a list, to represent related values as one named unit, hiding the individual pieces.

data cleaning AP Making data uniform and consistent without changing its meaning.

data mining AP Analyzing large data sets to find patterns and relationships.

data set AP A collection of related data organized for analysis.

data structure 11 A collection of values, organized to perform certain operations efficiently.

database 13 A file whose contents are organized to perform certain operations efficiently.

dead code 6 Part of a program that can never run, often because it appears after a return statement.

debugging AP 1 The process of finding and correcting errors.

decidable problem AP A yes/no problem for which an algorithm can always produce the correct answer.

decimal AP 7b Base-10, the system you already use.

decrement 7 Decrease the value of a variable.

deep copy 16 A copy operation that also copies nested objects.

default value 12 The value assigned to a parameter if no argument is provided.

delegation 17 When one method passes responsibility to another method to do most or all of the work.

delimiter 9 A character or string used to indicate where a string should be split.

deserialization 13 Converting a string to an object.

design-first development 14 A way of developing programs with more careful planning than prototype and patch.

deterministic 12 A deterministic program does the same thing each time it runs, given the same inputs.

development plan 4 A process for writing programs.

dictionary 10 An object that contains key-value pairs, also called items.

digest 13 The result of a hash function, especially when it is used to check whether two objects are the same.

digital certificate AP A credential issued by an authority binding a public key to an identity.

digital data AP 7b Values represented in discrete steps, ultimately as bits.

digital divide AP Unequal access to computing and the Internet across socioeconomic, geographic, or demographic lines.

directory 13 A collection of files and other directories.

distributed computing AP Multiple devices in different locations running parts of one program.

DNS AP Translates domain names into IP addresses.

docstring AP 4,6b A string at the beginning of a function that documents what the function does; unlike a comment, it is stored on the function and can be read by the program. *(AP calls this program documentation.)*

doctest 6b An example call and its expected result, written inside a docstring, that can be run automatically to check the function.

dot operator 2 The operator, ., used to access a function in another module by specifying the module name followed by a dot and the function name.

E

edge case 6b A test case at an unusual or extreme input, where a function is most likely to be wrong.

element AP 9 One of the values in a list or other sequence.

empty string 8 A string that contains no characters and has length 0.

encapsulation 4 The process of transforming a sequence of statements into a function definition.

encode 17 To represent one set of values using another set of values by constructing a mapping between them.

encryption AP Encoding data so only holders of the key can read it.

enumerate object 11 The result of calling the built-in function enumerate, can be used to loop through a sequence of tuples.

ephemeral 13 An ephemeral program typically runs for a short time and, when it ends, its data are lost.

equivalent 9 Having the same value.

evaluate 2 Perform the operations in an expression in order to compute a value.

event AP An action supplied to a program as input: key press, click, sensor reading.

event-driven programming AP Statements execute in response to events rather than in top-to-bottom sequence.

exception 2 An error that is detected while the program is running.

execute 2 Run a statement and do what it says.

expected value 6b What a test says the answer should be, as opposed to what the code actually produced.

expression AP 1 A combination of variables, values, and operators.

F

f-string 13 A string that has the letter f before the opening quotation mark, and contains one or more expressions in curly braces.

factory 18 A function used to create objects, often passed as a parameter to a function.

fail 6b,7 A test whose actual result does not match its expected value.

fault tolerance AP Continuing to operate when components fail.

file object 7 An object that represents an open file and keeps track of which parts of the file have been read or written.

filtering AP 10 Looping through a sequence and selecting or omitting elements. *(AP calls this data filtering.)*

floating-point 1 A type that represents integers and numbers with decimal parts.

formal language 1 Any of the languages that people have designed for specific purposes, such as representing mathematical ideas or computer programs. All programming languages are formal languages.

format specifier 14 In an f-string, a format specifier determines how a value is converted to a string.

frame 3 A box in a stack diagram that represents a function call. It contains the local variables and parameters of the function.

function AP 1 A named sequence of statements that performs some useful operation. Functions may or may not take arguments and may or may not produce a result. *(AP calls this a procedure.)*

function call 1 An expression — or part of an expression — that runs a function. It consists of the function name followed by an argument list in parentheses.

function definition 3 A statement that creates a function.

function object 3 A value created by a function definition. The name of the function is a variable that refers to a function object.

functional programming style 14 A way of programming that uses pure functions whenever possible.

G

generalization [4] The process of replacing something unnecessarily specific (like a number) with something appropriately general (like a variable or parameter).

generator expression [18] Similar to a list comprehension except that it does not create a list.

H

hand tracing **AP** [6b] Working through code on paper line by line, writing down each variable's value, in order to find an error without running the program.

hash function [10,13] A function that takes an object and computes an integer — sometimes called a digest — used to locate a key in a hash table or to check whether two objects are the same.

hash table [10] A collection of key-value pairs organized so that we can look up a key and find its value efficiently.

hashable [10] Immutable types like integers, floats and strings are hashable. Mutable types like lists and dictionaries are not.

header [3] The first line of a function definition.

heuristic **AP** An approach that finds a good-enough solution when finding the optimal one is impractical.

hexadecimal **AP** [7b] Base-16, using 0 through 9 and A through F. Four bits per digit, so one byte is exactly two hex digits.

HTTP / HTTPS **AP** The Web's request/response protocol; HTTPS adds encryption in transit.

I

identical [9] Being the same object (which implies equivalence).

immutable [8] If the elements of an object cannot be changed, the object is immutable.

import statement [2] A statement that reads a module file so we can use the variables and functions it contains.

increment [7] Increase the value of a variable.

incremental development **AP** [6] A program development plan intended to avoid debugging by adding and testing only a small amount of code at a time.

index **AP** [8] An integer value used to select an item in a sequence, such as a character in a string. In Python indices start from 0.

infinite loop **AP** A loop whose ending condition never becomes true.

infinite recursion [5] A recursion that doesn't have a base case, or never reaches it. Eventually, an infinite recursion causes a runtime error.

information **AP** Meaning, patterns, or insight extracted from data.

inheritance [17] The ability to define a new class that is a modified version of a previously defined class.

initialize [7] Create a new variable and give it a value.

input validation [6] Checking the parameters of a function to make sure they have the correct types and values.

instance [14] An object that belongs to a class.

instance method [15] A method that must be invoked with an object as receiver.

instantiation [14] The process of creating an object that belongs to a class.

integer **AP** [1] A type that represents numbers with no fractional or decimal part.

integer division [1] An operator, //, that divides two numbers and rounds down to an integer.

intellectual property **AP** Creative or technical work legally owned by its creator.

interface design **AP** [4] A process for designing the interface of a function, which includes the parameters it should take. *(AP calls this procedural abstraction.)*

internet **AP** A network of interconnected networks using standardized open protocols.

invariant [15] A condition that should always be true during the execution of a program.

invocation [8] An expression — or part of an expression — that calls a method.

IP **AP** Protocol for addressing devices and routing packets between them.

IP address **AP** The unique identifier assigned to a device on a network.

item [10] In a dictionary, another name for a key-value pair.

iterative development **AP** Repeated cycles of build, feedback, and revision; earlier phases get revisited.

K

key [10] An object that appears in a dictionary as the first part of a key-value pair.

key-value stores [13] A database whose contents are organized like a dictionary with keys that correspond to values.

keylogging **AP** Recording keystrokes to capture passwords and confidential input.

keyword [2] A special word used to specify the structure of a program.

keyword argument [4] An argument that includes the name of the parameter.

L

linear search **AP** [7] A computational pattern that searches through a sequence of elements and stops when it finds what it is looking for.

list **AP** [9] An object that contains a sequence of values. *(on the AP exam, list indices start at 1; in Python, at 0.)*

list comprehension [18] A concise way to loop through a sequence and create a list.

local variable 3 A variable defined inside a function, and which can only be accessed inside the function.

logical operator AP 5 One of the operators that combines boolean expressions, including and, or, and not.

loop AP 3 A statement that runs one or more statements, often repeatedly. *(AP calls this iteration.)*

loop variable 7 A variable defined in the header of a for loop.

lossless compression AP 7b Reduces size while allowing the original to be reconstructed exactly.

lossy compression AP 7b Reduces size further, but only an approximation of the original can be recovered.

M

machine learning AP Systems that improve at a task from data rather than from explicit programming.

malware AP Software intended to damage or take control of a system.

mapping 10 A relationship in which each element of one set corresponds to an element of another set.

memo 10 A computed value stored to avoid unnecessary future computation.

metadata AP Data describing other data: creation date, size, author, location, format.

method 7,15 A function that is associated with an object and called using the dot operator; when defined inside a class it is invoked on instances of that class.

modularity AP Dividing a program into independent parts each responsible for one aspect.

module AP 2 A file that contains Python code, including function definitions and sometimes other statements. *(AP calls this a software library.)*

modulus operator AP 5 An operator, %, that works on integers and returns the remainder when one number is divided by another. *(AP calls this MOD.)*

multifactor authentication AP Requiring evidence from two or more categories: knowledge, possession, inherence.

multiline string 4 A string enclosed in triple quotes that can span more than one line of a program.

N

n-gram 12 A sequence of an unspecified number of elements.

natural language 1 Any of the languages that people speak that evolved naturally.

nested conditional AP 5 A conditional statement that appears in one of the branches of another conditional statement.

nested list 9 A list that is an element of another list.

newline 5 A character that creates a line break between two parts of a string.

O

object 8 Something a variable can refer to. An object has a type and a value.

object diagram 14 A graphical representation of an object, its attributes, and their values.

object-oriented language 15 A language that provides features to support object-oriented programming, notably user-defined types.

object-oriented programming 14 A style of programming that uses objects to organize code and data.

open access AP Research or data made available free of access restrictions.

open source AP Software whose source is public and may be modified and redistributed.

open standard AP A publicly available specification that anyone may implement without permission or fee.

operand 1 One of the values on which an operator operates.

operator overloading 15 The process of using special methods to change the way operators work with user-defined types.

overflow error AP 7b An error that happens when a value is too large for the number of bits available to hold it.

override 12 To replace a default value with an argument.

P

pack 11 Collect multiple arguments into a tuple.

packet AP A chunk of data carrying metadata such as its destination, sent across a network.

packet switching AP Splitting a message into packets that travel independently, possibly by different routes, and are reassembled at the destination.

pair programming AP Two programmers at one workstation: one drives, one reviews and thinks ahead.

parallel computing AP A program split into operations, some performed simultaneously.

parameter AP 3 A name used inside a function to refer to the value passed as an argument.

parent class 17 A class that is inherited from.

pass 6b,7 A test whose actual result matches its expected value.

path 13 A string that specifies a sequence of directories, often leading to a file.

pattern 8 A rule that specifies the requirements a string has to meet to constitute a match.

persistent 13 A persistent program runs indefinitely and keeps at least some of its data in permanent storage.

phishing AP Tricking a user into revealing private information by impersonating a trusted party.

PII AP Information that identifies or can be linked to a specific individual.

pixel AP The smallest addressable color element of a display or image.

plagiarism AP Presenting someone else's work as your own.

polymorphism 16 The ability of a method or operator to work with multiple types of objects.

postcondition 4 A requirement that should be satisfied by the function before it ends.

precondition 4 A requirement that should be satisfied by the caller before a function starts.

procedure AP 6b The exam's word for a named, reusable block of code, whether or not it returns a value. This book says function. In older languages the two words were distinct: a procedure returned nothing, a function returned a value.

program AP A collection of statements that performs a task when run.

program function AP 6b What a program does when it runs, described as behavior.

program input AP 6b Data a program receives while it is running.

program output AP 6b What a program produces: displayed text, a returned value, a file, a sound, a movement.

program purpose AP 6b The need a program serves, or the problem it solves; why it exists.

protocol AP An agreed set of rules governing system behavior.

prototype and patch 14 A way of developing programs by starting with a rough draft and gradually adding features and fixing bugs.

pseudorandom AP 12 A pseudorandom sequence of numbers appears to be random, but is generated by a deterministic program. *(AP calls this RANDOM(a, b) — inclusive on both ends, unlike Python's range.)*

public key encryption AP A public key encrypts; a different private key decrypts.

pure function 6,14 A function that does not modify its parameters or have any effect other than returning a value.

R

reasonable time AP Run time that grows polynomially or slower with input size.

receiver 15 The object a method is invoked on.

recursion 5 The process of calling the function that is currently executing.

recursive 5 A function that calls itself is recursive.

redundancy AP Duplicate paths or components that allow operation to continue after a failure.

refactoring 4 The process of modifying a working program to improve function interfaces and other qualities of the code.

reference 9 The association between a variable and its value.

regression 6b A bug that reappears in code that used to work.

regular expression 8 A sequence of characters that defines a search pattern.

relational operator AP 5 One of the operators that compares its operands: ==, !=, >, <, >=, and <=.

relative path 13 A path that starts from the current working directory, or some other specified directory.

return value AP 6 The result of a function. If a function call is used as an expression, the return value is the value of the expression. *(AP calls this the RETURN statement.)*

RGB AP 7b Color stored as three numbers, the amounts of red, green, and blue, each usually one byte.

rogue access point AP An unauthorized wireless access point used to intercept network traffic.

roundoff error AP 6b,7b A loss of precision that happens because a fixed number of bits cannot represent some numbers exactly.

router AP A device that forwards packets between networks toward their destination.

routing AP Determining a path from sender to receiver across a network.

rubber duck debugging 12 A way of debugging by explaining a problem aloud to an inanimate object.

run-length encoding 7b A lossless scheme that replaces runs of a repeated value with the value and a count.

runtime error AP 2 An error that causes a program to display an error message and exit.

S

sampling AP 7b Approximating an analog signal by measuring it at regular intervals. Two independent settings: how often you measure (rate) and how precisely you record each measurement (bit depth).

scaffolding 6 Code that is used during program development but is not part of the final version.

scalability AP A system's ability to keep working acceptably as demand grows.

semantic error AP 2,6b An error that lets the program run but produces a wrong result. *(AP calls this a logic error.)*

sequence 8 An ordered collection of values where each value is identified by an integer index.

sequencing AP Executing steps in the order written.

sequential computing AP Operations performed one at a time, in order.

serialization 13 Converting an object to a string.

shallow copy 16 A copy operation that does not copy nested objects.

shell command 8 A statement in a shell language, which is a language used to interact with an operating system.

side effect 6 Any effect a function has other than returning a value, such as displaying output or drawing on a canvas.

simulation AP An abstraction of a real phenomenon using varying values to represent changing states, run for a purpose.

slice 8 A part of a string specified by a range of indices.

sort key 11 A value, or function that computes a value, used to sort the elements of a collection.

special method 15 A method that changes the way operators and some functions work with an object.

specialization 17 A way of using inheritance to create a new class that is a specialized version of an existing class.

speedup AP Sequential time divided by parallel time.

stack diagram 3 A graphical representation of a stack of functions, their variables, and the values they refer to.

state diagram 2 A graphical representation of a set of variables and the values they refer to.

statement 2 One or more lines of code that represent a command or action.

static method 15 A method that can be invoked without an object as receiver.

string AP 1 A type that represents sequences of characters.

string substitution 8 Replacement of a string, or part of a string, with another string.

substring AP A contiguous portion of a string.

symmetric key encryption AP One shared key both encrypts and decrypts.

syntax error AP 1 An error in a program that makes it impossible to parse — and therefore impossible to run.

T

TCP AP Transport protocol providing reliable, ordered delivery with retransmission.

test case AP 6b A specific input paired with its expected output. Good sets include typical, boundary, and edge values.

test discovery 18 A process used to find and run tests.

testing AP 6b Checking that a program behaves correctly by running it on chosen inputs and comparing what comes out against what should have come out.

totally ordered 17 A set of objects is totally ordered if we can compare any two elements and the results are consistent.

traceback 3 A list of the functions that are executing, printed when an exception occurs.

traversal AP Iterating over the items of a list. Full traversal visits every element; partial stops early.

trigram 12 A sequence of three elements.

Turing complete 6 A language, or subset of a language, is Turing complete if it can perform any computation that can be described by an algorithm.

type AP 1 A category of values. The types we have seen so far are integers (type int), floating-point numbers (type float), and strings (type str). *(AP calls this data type.)*

U

UDP AP Lightweight transport protocol with minimal error checking; faster, less reliable.

undecidable problem AP A problem for which no algorithm can always give a correct yes/no answer for every input.

Unicode AP 7b A far larger table, covering the writing systems ASCII left out.

unpack 11 Treat a tuple (or other sequence) as multiple arguments.

unreasonable time AP Run time that grows exponentially or factorially with input size.

update 7 An assignment statement that gives a new value to a variable that already exists, rather than creating a new variable.

V

value 1,10 An integer, floating-point number, string, or other kind of data a program works with. In a dictionary, a value is specifically the second part of a key-value pair.

variable AP 2 A name that refers to a value.

W

world wide web AP A system of linked pages and files that runs on top of the Internet using HTTP.

Z

zip object 11 The result of calling the built-in function zip, can be used to loop through a sequence of tuples.