

# Glossary

**Address.** Each memory (RAM) location (each byte) has a unique address. The first address in memory is 0, the second RAM location's address is 1, and so on until the last RAM location (thousands of bytes later).

**ANSI.** American National Standards Institute, the committee that approves computer standards.

**Argument.** The value sent to a function or procedure. This can be a constant or a variable and is enclosed inside parentheses.

**Array.** A list of variables, sometimes called a table of variables.

**Array of Structures.** A table of one or more structure variables.

**ASCII.** Acronym for American Standard Code for Information Interchange.

**ASCII File.** A file containing characters that can be used by any program on most computers. Sometimes called a text file or an ASCII text file.

**AUTOEXEC.BAT.** A batch file in PCs that executes a series of commands whenever you start or reset the computer.

**Automatic Variables.** Local variables that lose their values when their block (the one in which they are defined) ends.

**Backup File.** A duplicate copy of a file that preserves your work in case you damage the original file. Files on a hard disk are commonly backed up on floppy disks or tapes.

**Binary.** A numbering system based on only two digits. The only valid digits in a binary system are 0 and 1. See also *Bit*.

**Binary zero.** Another name for null zero.

**Bit.** Binary digit, the smallest unit of storage on a computer. Each bit can have a value of 0 or 1, indicating the absence or presence of an electrical signal. See also *Binary*.

**Bit Mask.** A pattern of bits that changes other bits on and off to meet a certain logical condition.

**Bitwise Operators.** C++ operators that manipulate the binary representation of values.

**Block.** One or more statements treated as though they are a single statement. A block is always enclosed in braces, { and }.

**Boot.** To start a computer with the operating system software in place. You must boot your computer before using it.

**Bubble Sort.** A method of sorting data into ascending or descending order. See also *Quicksort*, *Shell Sort*.

**Bug.** An error in a program that prevents the program from running correctly. The term originated when a moth short-circuited a connection in one of the first computers, preventing the computer from working!

**Byte.** A basic unit of data storage and manipulation. A byte is equivalent to eight bits and can contain a value ranging from 0 to 255.

**Cathode Ray Tube (CRT).** The television-like screen, also called the *monitor*. It is one place to which the output of the computer can be sent.

**Central Processing Unit (CPU).** The controlling circuit responsible for operations in the computer. These operations generally include system timing, logical processing, and logical operations. It controls every operation of the computer system. On PCs, the central processing unit is called a microprocessor; it is stored on a single integrated circuit chip.

**Code.** A set of instructions written in a programming language. See *Source Code*.

**Comment.** A message in a program, ignored by the computer, that tells users what the program does.

**Compile.** Process of translating a program written in a programming language such as C++ into machine code that your computer understands.

**Class.** A C++ user-defined data type that consists of data members and member functions. Its members are private by default.

**Concatenation.** The process of attaching one string to the end of another or combining two or more strings into a longer string.

**Conditional Loop.** A series of C++ instructions that occurs a fixed number of times.

**Constant.** Data defined with the `const` keyword that do not change during a program run.

**Constructor Function.** The function executed when the program declares an instance of a class.

**CPU.** Central Processing Unit.

**CRT.** Cathode Ray Tube.

**Data.** Information stored in the computer as numbers, letters, and special symbols such as punctuation marks. This also refers to the characters you input into your program so the program can produce meaningful information.

**Data Member.** A data component of a class or structure.

**Data Processing.** What computers really do. They take data and manipulate it into meaningful output. The meaningful output is called information.

**Data Validation.** The process of testing the values entered in a program. Checking whether a number is negative or positive or simply ensuring that a number is in a certain range are two examples of data validation.

**Debug.** Process of locating an error (bug) in a program and removing it.

**Declaration.** A statement that declares the existence of a data object or function. A declaration reserves memory.

**Default.** A predefined action or command that the computer chooses unless you specify otherwise.

**Default Argument List.** A list of argument values, specified in a function's prototypes, that determine initial values of the arguments if no values are passed for those arguments.

**Definition.** A statement that defines the format of a data object or function. A definition reserves no memory.

**Demodulate.** To convert an analog signal into a digital signal for use by a computer. See also *Modulate*.

**Dereference.** The process of finding a value to which a pointer variable is pointing.

**Destructor.** The function called when a class instance goes out of scope.

**Determinate Loop.** A `for` loop that executes a fixed number of times.

**Digital Computer.** A term that comes from the fact that your computer operates on binary (*on* and *off*) digital impulses of electricity.

**Directory.** A list of files stored on a disk. Directories within existing directories are called *subdirectories*.

**Disk.** A round, flat magnetic storage medium. Floppy disks are made of flexible material and enclosed in 5 1/4-inch or 3 1/2-inch protective cases. Hard disks consist of a stack of rigid disks housed in a single unit. A disk is sometimes called *external memory*. Disk storage is nonvolatile. When you turn off your computer, the disk's contents do not go away.

**Disk Drive.** A device that reads and writes data to a floppy or hard disk.

**Diskettes.** Another name for the removable floppy disks.

**Display.** A screen or monitor.

**Display Adapter.** Located in the system unit, the display adapter determines the amount of *resolution* and the possible number of colors on-screen.

**DOS.** Disk Operating System.

**Dot-Matrix Printer.** One of the two most common PC printers. The *laser* printer is the other. A dot-matrix printer is inexpensive and fast; it uses a series of small dots to represent printed text and graphics.

**Element.** An individual variable in an array.

**Execute.** To run a program.

**Expanded Memory.** A tricky way of expanding your computer's memory capacity beyond the 640K barrier using a technique called bank switching. See also *Extended Memory*.

**Extended Memory.** RAM above 640K, usually installed directly on the motherboard of your PC. You cannot access this extra RAM without special programs. See also *Expanded Memory*.

**External Modem.** A modem that sits in a box outside your computer. See also *Internal Modem*.

**Field.** A member in a data record.

**File.** A collection of data stored as a single unit on a floppy or hard disk. Files always have a filename that identifies them.

**File Extension.** Used by PCs and consists of a period followed by up to three characters. The file extension follows the filename.

**Filename.** A unique name that identifies a file. Filenames can be up to eight characters long, and can have a period followed by an extension (normally three characters long).

**Fixed Disk.** See *Hard Disk*.

**Fixed-Length Records.** A record where each field takes the same amount of disk space, even if that field's data value does not fill the field.

**Floppy Disk.** See *Disk*.

**Format.** Process of creating a “map” on the disk that tells the operating system how the disk is structured. This process is how the operating system keeps track of where files are stored.

**Function.** A self-contained coding segment designed to do a specific task. All C++ programs must have at least one function called `main()`. Some functions are library routines that manipulate numbers, strings, and output.

**Function Keys.** The keys labeled F1 through F12 (some keyboards only have up to F10).

**Global Variables.** A variable that can be seen from (and used by) every statement in the program.

**Hard Copy.** The printout of a program (or its output). Also a safe backup copy for a program in case the disk is erased.

**Hard Disk.** Sometimes called *fixed disks*. These hold much more data and are many times faster than floppy disks. See *Disk*.

**Hardware.** The physical parts of the machine. Hardware has been defined as “anything you can kick.”

**Header Files.** Files that contain prototypes of C++’s built-in functions.

**Hexadecimal.** A numbering system based on 16 elements. Digits are numbered 0 through F, as follows: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F.

**Hierarchy of Operators.** See *Order of Operators*.

**Indeterminate Loop.** A loop that continues an indeterminate amount of times (unlike the `for` loop, which continues a known amount of times).

**Infinite Loop.** The never-ending repetition of a block of C++ statements.

**Information.** The meaningful product from a program. Data go into a program to produce meaningful output (information).

**Inline Function.** A function that compiles as inline code each time the function is called.

**Input.** The entry of data into a computer through a device such as the keyboard.

**Input-Process-Output.** This model is the foundation of everything that happens in your computer. Data are input, then processed by your program in the computer, and finally information is output.

**I/O.** Acronym for Input/Output.

**Integer Variable.** Variables that can hold integers.

**Internal Modem.** A modem that resides inside the system unit. See also *External Modem*.

**Kilobyte (K).** A unit of measurement that refers to 1,024 bytes.

**Laser Printer.** A type of printer that is faster, in general, than dot-matrix printers. Laser printer output is much sharper than that of a dot-matrix printer, because a laser beam actually burns toner ink into the paper. Laser printers are more expensive than dot-matrix printers.

**Least Significant Bit.** The rightmost bit of a byte. For example, a binary 00000111 would have a 1 as the least significant bit.

**Line Printer.** Another name for your printer.

**Link Editing.** The last step the C++ compiler performs when preparing your program for execution.

**Literal.** Data that remains the same during program execution.

**Local Variable.** A variable that can be seen from (and used by) only the block in which it is defined.

**Loop.** The repeated execution of one or more statements.

**Machine Language.** The series of binary digits that a microprocessor executes to perform individual tasks. People seldom (if ever) program in machine language. Instead, they program in assembly language, and an assembler translates their instructions into machine language.

**Main Module.** The first function of a modular program called `main()` that controls the execution of the other functions.

**Maintainability.** The computer industry's word for the ability to change and update programs written in a simple style.

**Manipulator.** A value used by a program to inform the stream to modify one of its modes.

**Math Operator.** A symbol used for addition, subtraction, multiplication, division, or other calculations.

**Megabyte (M).** In computer terminology, approximately a million bytes (1,048,576 bytes).

**Member.** A piece of a structure variable that holds a specific type of data, or a class variable that holds a specific type of data or a function acting on that data.

**Member Function.** A function defined inside a class.

**Memory.** Storage area inside the computer, used to temporarily store data. The computer's memory is erased when the power is off.

**Menu.** A list of commands or instructions displayed on-screen. These lists organize commands and make a program easier to use.

**Menu-Driven.** Describes a program that provides menus for choosing commands.

**Microchip.** A small wafer of silicon that holds computer components and occupies less space than a postage stamp.

**Microcomputer.** A small computer that can fit on a desktop, such as a PC. The microchip is the heart of the microcomputer. Microcomputers are much less expensive than their larger counterparts.

**Microprocessor.** The chip that does the calculations for PCs. Sometimes it is called the Central Processing Unit (CPU).

**Modem.** A piece of hardware that modulates and demodulates signals so your computer can communicate with other computers over telephone lines. See also *External Modems*, *Internal Modems*.

**Modular Programming.** The process of writing your programs in several modules rather than as one long program. By breaking a program into several smaller program-line routines, you can isolate problems better, write correct programs faster, and produce programs that are much easier to maintain.



**Modulate.** Before your computer can transmit data over a telephone line, the information to be sent must be converted (modulated) into analog signals. See also *Demodulate*.

**Modulus.** The integer remainder of division.

**Monitor.** The television-like screen that enables the computer to display information. It is an output device.

**Mouse.** A hand-held device that you move across the desktop to move an indicator, called a mouse pointer, across the screen. Used instead of the keyboard to select and move items (such as text or graphics), execute commands, and perform other tasks.

**MS-DOS.** An operating system for IBM and compatible PCs.

**Multidimensional Arrays.** Arrays with more than one dimension. As two-dimensional arrays, they are sometimes called tables or matrices, which have rows and columns.

**Nested Loop.** A loop within a loop.

**Null String.** An empty string with an initial character of null zero and with a length of 0.

**Null Zero.** The string-terminating character. All C++ string constants and strings stored in character arrays end in null zero. The ASCII value for the null zero is 0.

**Numeric Functions.** Library routines that work with numbers.

**Object.** C++ class members consisting of both data and member functions.

**Object Code.** A “halfway step” between source code and executable machine language. Object code consists mostly of machine language but is not directly executable by the computer. It must first be linked in order to resolve external references and address references. See also *Source Code, Machine Language*.

**Object-Oriented Programming.** A programming approach that treats data as objects capable of manipulating themselves.

**Operator.** An operator works on data and performs math calculations or changes data to other data types. Examples include the +, -, and `si` `zEOF()` operators.

**Order of Operators.** Sometimes called the *hierarchy of operators* or the *precedence of operators*. It determines exactly how C++ computes formulas.

**Output Device.** Where the results of a program are output, such as the screen, the printer, or a disk file.

**Overloading.** The process of writing more than one function with the same name. The functions must differ in their argument lists so C++ can identify which one to call.

**Parallel Arrays.** Two arrays working side by side. Each element in each array corresponds to one in the other array.

**Parallel Port.** A connector used to plug a device such as a printer into the computer. Transferring data through a parallel port is much faster than transferring data through a serial port.

**Parameter.** A list of variables enclosed in parentheses that follow the name of a function or procedure. Parameters indicate the number and type of arguments that are sent to the function or procedure.

**Passing by Address.** Also called *passing by reference*. When an argument (a local variable) is passed by address, the variable's address in memory is sent to, and is assigned to, the receiving function's parameter list. (If more than one variable is passed by address, each of their addresses is sent to and assigned to the receiving function's parameters.) A change made to the parameter in the function also changes the value of the argument variable.

**Passing by Copy.** Another name for *passing by value*.

**Passing by Reference.** Another name for *passing by address*.

**Passing by Value.** By default, all C++ variable arguments are passed *by value*. When the value contained in a variable is passed to the parameter list of a receiving function, changes made to the parameter in the routine do not change the value of the argument variable. Also called *passing by copy*.

**Path.** The route the computer travels from the root directory to any subdirectories when locating a file. The path also refers to the subdirectories that MS-DOS examines when you type a command that requires it to find and access a file.

**Peripheral.** A device attached to the computer, such as a modem, disk drive, mouse, or printer.

**Personal Computer.** A microcomputer, also called a PC, which stands for *personal computer*.

**Pointer.** A variable that holds the address of another variable.

**Precedence of Operators.** See *Order of Operators*.

**Preprocessor Directive.** A command, preceded by a #, that you place in your source code that directs the compiler to modify the source code in some fashion. The two most common preprocessor directives are `#define` and `#include`.

**Printer.** A device that prints data from the computer to paper.

**Private Class Member.** A class member inaccessible except to the class's member functions.

**Program.** A group of instructions that tells the computer what to do.

**Programming Language.** A set of rules for writing instructions for the computer. Popular programming languages include BASIC, C, Visual Basic, C++, and Pascal.

**Prototype.** The definition of a function; includes its name, return type, and parameter list.

**Public Class Member.** A class member accessible to any function.

**Quicksort.** A method of sorting data values into ascending or descending order (faster than a Bubble Sort.) See also *Bubble Sort*, *Shell Sort*.

**RAM.** Random-Access Memory.

**Random-Access File.** Records in a file that can be accessed in any order you want.

**Random-Access Memory.** Memory that your computer uses to temporarily store data and programs. RAM is measured in kilobytes and megabytes. Generally, the more RAM a computer has, the more powerful programs it can run.

**Read-Only Memory.** A permanent type of computer memory. It contains the BIOS (*Basic Input/ Output System*), a special chip used to provide instructions to the computer when you turn the computer on.

**Real Numbers.** Numbers that have decimal points and a fractional part to the right of the decimal.

**Record.** Individual rows in files.

**Relational Operators.** Operators that compare data; they tell how two variables or constants relate to each other. They tell you whether two variables are equal or not equal, or which one is less than or more than the other.

**ROM.** Read-Only Memory.

**Scientific Notation.** A shortcut method of representing numbers of extreme values.

**Sectors.** A pattern of pie-shaped wedges on a disk. Formatting creates a pattern of *tracks* and sectors where your data and programs are stored.

**Sequence Point/Comma Operator.** This operator ensures that statements are performed in a left-to-right sequence.

**Sequential File.** A file that has to be accessed one record at a time beginning with the first record.

**Serial Port.** A connector used to plug in serial devices, such as a modem or a mouse.

**Shell Sort.** A method of sorting values into ascending or descending order. Named after the inventor of this method. See also *Bubble Sort*, *Quicksort*.

**Single-Dimensional Arrays.** Arrays that have only one subscript. Single-dimensional arrays represent a list of values.

**Software.** The data and programs that interact with your hardware. The C++ language is an example of software.

**Sorting.** A method of putting data in a specific order (such as alphabetical or numerical order), even if that order is not the same order in which the elements were entered.

**Source Code.** The C++ language instructions, written by programmers, that the C++ compiler translates into object code. See also *Object Code*.

**Spaghetti Code.** Term used when there are too many `gotos` in a program. If a program branches all over the place, it is difficult to follow and trying to follow the logic resembles a “bowl of spaghetti.”

**Static Variables.** Variables that do not lose their values when the block in which they are defined ends. See also *Automatic Variables*.

**Standard Input Device.** The target of each `cin` and input function. Normally the keyboard unless rerouted to another device at the operating system’s prompt.

**Standard Output Device.** The target of each `cout` and output function. Normally the screen unless rerouted to another device at the operating system’s prompt.

**Stream.** Literally, a stream of characters, one following another, flowing among devices in your computer.

**String.** One or more characters terminated with a null zero.

**String Constant.** One or more groups of characters that end in a null zero.

**String Delimiter.** See *Null Zero*.

**String Literal.** Another name for a *String Constant*.

**Structure.** A unit of related information containing one or more members, such as an employee number, employee name, employee address, employee pay rate, and so on.

**Subscript.** A number inside brackets that differentiates one *element* of an array from another.

**Syntax Error.** The most common error a programmer makes. Often a misspelled word.

**System Unit.** The large box component of the computer. The system unit houses the PC’s microchip (the *CPU*).

**Timing Loop.** A loop used to delay the computer for a specific amount of time.

**Tracks.** A pattern of paths on a disk. Formatting creates a pattern of tracks and *sectors* where your data and programs go.

**Truncation.** The fractional part of a number (the part of the number to the right of the decimal point) is taken off the number. No rounding is done.

**Two's Complement.** A method your computer uses to take the negative of a number. This method, plus addition, allows the computer to simulate subtraction.

**Unary Operator.** The addition or subtraction operator used before a single variable or constant.

**User-Friendliness.** A program is user-friendly if it makes the user comfortable and simulates an atmosphere that the user is already familiar with.

**Variable.** Data that can change as the program runs.

**Variable-Length Records.** A record that takes up no wasted space on the disk. As soon as a field's data value is saved to the file, the next field's data value is stored after it. There is usually a special separating character between the fields so your programs know where the fields begin and end.

**Variable Scope.** Sometimes called the *visibility of variables*, this describes how variables are "seen" by your program. See also *Global Variables* and *Local Variables*.

**Volatile.** Temporary state of memory. For example, when you turn the computer off, all the RAM is erased.

**Word.** In PC usage, two consecutive bytes (16 bits) of data.