**http://en.wikipedia.org/wiki/Computer\_programming**

**Computer programming** (often shortened to **programming** or **coding**) is the process of [designing](http://en.wikipedia.org/wiki/Software_design), writing, [testing](http://en.wikipedia.org/wiki/Software_testing), [debugging](http://en.wikipedia.org/wiki/Debugging), and maintaining the [source code](http://en.wikipedia.org/wiki/Source_code) of [computer programs](http://en.wikipedia.org/wiki/Computer_program). This source code is written in one or more [programming languages](http://en.wikipedia.org/wiki/Programming_language). The purpose of programming is to create a program that performs specific operations or exhibits a certain desired behavior. The process of writing source code often requires expertise in many different subjects, including knowledge of the application domain, specialized [algorithms](http://en.wikipedia.org/wiki/Algorithm) and [formal logic](http://en.wikipedia.org/wiki/Logic).

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## [[edit](http://en.wikipedia.org/w/index.php?title=Computer_programming&action=edit&section=1)] Overview

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| http://upload.wikimedia.org/wikipedia/commons/thumb/9/91/Wikiversity-logo.svg/40px-Wikiversity-logo.svg.png | Wikiversity has learning materials about [***programming***](http://en.wikiversity.org/wiki/programming) |

Within [software engineering](http://en.wikipedia.org/wiki/Software_engineering), programming (the *implementation*) is regarded as one phase in a [software development process](http://en.wikipedia.org/wiki/Software_development_process).

There is an ongoing debate on the extent to which the writing of programs is an [art](http://en.wikipedia.org/wiki/Art), a [craft](http://en.wikipedia.org/wiki/Craft) or an [engineering](http://en.wikipedia.org/wiki/Engineering) discipline.[[1]](http://en.wikipedia.org/wiki/Computer_programming#cite_note-0) In general, good programming is considered to be the measured application of all three, with the goal of producing an efficient and evolvable software solution (the criteria for "efficient" and "evolvable" vary considerably). The discipline differs from many other technical professions in that [programmers](http://en.wikipedia.org/wiki/Programmer), in general, do not need to be licensed or pass any standardized (or governmentally regulated) certification tests in order to call themselves "programmers" or even "software engineers." Because the discipline covers many areas, which may or may not include critical applications, it is debatable whether licensing is required for the profession as a whole. In most cases, the discipline is self-governed by the entities which require the programming, and sometimes very strict environments are defined (e.g. [United States Air Force](http://en.wikipedia.org/wiki/United_States_Air_Force) use of [AdaCore](http://en.wikipedia.org/wiki/AdaCore) and security clearance). However, representing oneself as a "Professional Software Engineer" without a license from an accredited institution is [illegal in many parts of the world](http://en.wikipedia.org/wiki/Controversies_over_the_term_Engineer).

Another ongoing debate is the extent to which the [programming language](http://en.wikipedia.org/wiki/Programming_language) used in writing [computer programs](http://en.wikipedia.org/wiki/Computer_program) affects the form that the final program takes. This debate is analogous to that surrounding the [Sapir–Whorf hypothesis](http://en.wikipedia.org/wiki/Linguistic_relativity)[[2]](http://en.wikipedia.org/wiki/Computer_programming#cite_note-1) in [linguistics](http://en.wikipedia.org/wiki/Linguistics) and [cognitive science](http://en.wikipedia.org/wiki/Cognitive_science), which postulates that a particular spoken language's nature influences the habitual thought of its speakers. Different language patterns yield different patterns of [thought](http://en.wikipedia.org/wiki/Thought). This idea challenges the possibility of representing the world perfectly with language, because it acknowledges that the mechanisms of any language condition the thoughts of its speaker community.

## [[edit](http://en.wikipedia.org/w/index.php?title=Computer_programming&action=edit&section=2)] History

*See also:* [*History of programming languages*](http://en.wikipedia.org/wiki/History_of_programming_languages)

[](http://en.wikipedia.org/wiki/File:IBM402plugboard.Shrigley.wireside.jpg)

[http://bits.wikimedia.org/skins-1.18/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:IBM402plugboard.Shrigley.wireside.jpg)

Wired control panel for an [IBM 402 Accounting Machine](http://en.wikipedia.org/wiki/IBM_402_Accounting_Machine).

The [Antikythera mechanism](http://en.wikipedia.org/wiki/Antikythera_mechanism) from [ancient Greece](http://en.wikipedia.org/wiki/Ancient_Greece) was a calculator utilizing gears of various sizes and configuration to determine its operation,[[3]](http://en.wikipedia.org/wiki/Computer_programming#cite_note-2) which tracked the [metonic cycle](http://en.wikipedia.org/wiki/Metonic_cycle) still used in lunar-to-solar calendars, and which is consistent for calculating the dates of the [Olympiads](http://en.wikipedia.org/wiki/Olympiad).[[4]](http://en.wikipedia.org/wiki/Computer_programming#cite_note-3) [Al-Jazari](http://en.wikipedia.org/wiki/Al-Jazari) built programmable [Automata](http://en.wikipedia.org/wiki/Humanoid_robot) in 1206. One system employed in these devices was the use of pegs and [cams](http://en.wikipedia.org/wiki/Cam) placed into a wooden drum at specific locations. which would sequentially trigger [levers](http://en.wikipedia.org/wiki/Lever) that in turn operated [percussion instruments](http://en.wikipedia.org/wiki/Percussion_instrument). The output of this device was a small drummer playing various rhythms and drum patterns.[[5]](http://en.wikipedia.org/wiki/Computer_programming#cite_note-4)[[6]](http://en.wikipedia.org/wiki/Computer_programming#cite_note-5) The [Jacquard Loom](http://en.wikipedia.org/wiki/Jacquard_Loom), which Joseph Marie Jacquard developed in 1801, uses a series of [pasteboard](http://en.wikipedia.org/wiki/Card_stock) cards with holes punched in them. The hole pattern represented the pattern that the loom had to follow in weaving cloth. The loom could produce entirely different weaves using different sets of cards. [Charles Babbage](http://en.wikipedia.org/wiki/Charles_Babbage) adopted the use of [punched cards](http://en.wikipedia.org/wiki/Punched_cards) around 1830 to control his [Analytical Engine](http://en.wikipedia.org/wiki/Analytical_Engine). The first computer program was written for the Analytical Engine by mathematician [Ada Lovelace](http://en.wikipedia.org/wiki/Ada_Lovelace) to calculate a sequence of Bernoulli Numbers.[[7]](http://en.wikipedia.org/wiki/Computer_programming#cite_note-IEEE-6) The synthesis of numerical calculation, predetermined operation and output, along with a way to organize and input instructions in a manner relatively easy for humans to conceive and produce, led to the modern development of computer programming. Development of computer programming accelerated through the [Industrial Revolution](http://en.wikipedia.org/wiki/Industrial_Revolution).

In the late 1880s, [Herman Hollerith](http://en.wikipedia.org/wiki/Herman_Hollerith) invented the recording of data on a medium that could then be read by a machine. Prior uses of machine readable media, above, had been for control, not data. "After some initial trials with paper tape, he settled on [punched cards](http://en.wikipedia.org/wiki/Punched_card)..."[[8]](http://en.wikipedia.org/wiki/Computer_programming#cite_note-7) To process these punched cards, first known as "Hollerith cards" he invented the [tabulator](http://en.wikipedia.org/wiki/Tabulating_machine), and the [keypunch](http://en.wikipedia.org/wiki/Keypunch) machines. These three inventions were the foundation of the modern information processing industry. In 1896 he founded the [*Tabulating Machine Company*](http://en.wikipedia.org/wiki/Tabulating_Machine_Company) (which later became the core of [IBM](http://en.wikipedia.org/wiki/IBM)). The addition of a [control panel](http://en.wikipedia.org/wiki/Plugboard) (plugboard) to his 1906 Type I Tabulator allowed it to do different jobs without having to be physically rebuilt. By the late 1940s, there were a variety of control panel programmable machines, called [unit record equipment](http://en.wikipedia.org/wiki/Unit_record_equipment), to perform data-processing tasks.

[](http://en.wikipedia.org/wiki/File:PunchCardDecks.agr.jpg)

[http://bits.wikimedia.org/skins-1.18/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:PunchCardDecks.agr.jpg)

Data and instructions could be stored on external [punched cards](http://en.wikipedia.org/wiki/Punched_card), which were kept in order and arranged in program decks.

The invention of the [von Neumann architecture](http://en.wikipedia.org/wiki/Von_Neumann_architecture) allowed computer programs to be stored in [computer memory](http://en.wikipedia.org/wiki/Computer_memory). Early programs had to be painstakingly crafted using the instructions (elementary operations) of the particular machine, often in [binary](http://en.wikipedia.org/wiki/Binary_numeral_system) notation. Every model of computer would likely use different instructions ([machine language](http://en.wikipedia.org/wiki/Machine_language)) to do the same task. Later, [assembly languages](http://en.wikipedia.org/wiki/Assembly_language) were developed that let the programmer specify each instruction in a text format, entering abbreviations for each operation code instead of a number and specifying addresses in symbolic form (e.g., ADD X, TOTAL). Entering a program in assembly language is usually more convenient, faster, and less prone to human error than using machine language, but because an assembly language is little more than a different notation for a machine language, any two machines with different instruction sets also have different assembly languages.

In 1954, [FORTRAN](http://en.wikipedia.org/wiki/FORTRAN) was invented; it was the first [high level programming language](http://en.wikipedia.org/wiki/High-level_language) to have a functional implementation, as opposed to just a design on paper.[[9]](http://en.wikipedia.org/wiki/Computer_programming#cite_note-8)[[10]](http://en.wikipedia.org/wiki/Computer_programming#cite_note-9) (A high-level language is, in very general terms, any programming language that allows the programmer to write programs in terms that are more [abstract](http://en.wikipedia.org/wiki/Abstraction_(computer_science)) than assembly language instructions, i.e. at a level of abstraction "higher" than that of an assembly language.) It allowed programmers to specify calculations by entering a formula directly (e.g. Y = X\*2 + 5\*X + 9). The program text, or *source*, is converted into machine instructions using a special program called a [compiler](http://en.wikipedia.org/wiki/Compiler), which translates the FORTRAN program into machine language. In fact, the name FORTRAN stands for "Formula Translation". Many other languages were developed, including some for commercial programming, such as [COBOL](http://en.wikipedia.org/wiki/COBOL). Programs were mostly still entered using punched cards or [paper tape](http://en.wikipedia.org/wiki/Paper_tape). (See [computer programming in the punch card era](http://en.wikipedia.org/wiki/Computer_programming_in_the_punch_card_era)). By the late 1960s, [data storage devices](http://en.wikipedia.org/wiki/Data_storage_device) and [computer terminals](http://en.wikipedia.org/wiki/Computer_terminal) became inexpensive enough that programs could be created by typing directly into the computers. [Text editors](http://en.wikipedia.org/wiki/Text_editor) were developed that allowed changes and corrections to be made much more easily than with punched cards. (Usually, an error in punching a card meant that the card had to be discarded and a new one punched to replace it.)

As time has progressed, computers have made giant leaps in the area of processing power. This has brought about newer programming languages that are more abstracted from the underlying hardware. Although these high-level languages usually incur greater [overhead](http://en.wikipedia.org/wiki/Computational_overhead), the increase in speed of modern computers has made the use of these languages much more practical than in the past. These increasingly abstracted languages typically are easier to learn and allow the programmer to develop applications much more efficiently and with less source code. However, high-level languages are still impractical for a few programs, such as those where low-level hardware control is necessary or where maximum processing speed is vital.

Throughout the second half of the twentieth century, programming was an attractive career in most developed countries. Some forms of programming have been increasingly subject to [offshore outsourcing](http://en.wikipedia.org/wiki/Offshore_outsourcing) (importing software and services from other countries, usually at a lower wage), making programming career decisions in developed countries more complicated, while increasing economic opportunities in less developed areas. It is unclear how far this trend will continue and how deeply it will impact programmer wages and opportunities.[*[citation needed](http://en.wikipedia.org/wiki/Wikipedia:Citation_needed" \o "Wikipedia:Citation needed)*]

## [[edit](http://en.wikipedia.org/w/index.php?title=Computer_programming&action=edit&section=3)] Modern programming

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| [Question book-new.svg](http://en.wikipedia.org/wiki/File:Question_book-new.svg) | This section **relies largely or entirely upon a** [**single source**](http://en.wikipedia.org/wiki/Wikipedia:Reliable_sources). Please help [improve this article](http://en.wikipedia.org/w/index.php?title=Computer_programming&action=edit) by introducing [citations](http://en.wikipedia.org/wiki/Wikipedia:Citing_sources) to additional sources. Discussion about the problems with the sole source used may be found on the [talk page](http://en.wikipedia.org/wiki/Talk:Computer_programming#section). *(August 2010)* |

### [[edit](http://en.wikipedia.org/w/index.php?title=Computer_programming&action=edit&section=4)] Quality requirements

Whatever the approach to software development may be, the final program must satisfy some fundamental properties. The following properties are among the most relevant:

* [**Reliability**](http://en.wikipedia.org/wiki/Reliability_engineering#Software_reliability): how often the results of a program are correct. This depends on conceptual correctness of algorithms, and minimization of programming mistakes, such as mistakes in resource management (e.g., [buffer overflows](http://en.wikipedia.org/wiki/Buffer_overflow) and [race conditions](http://en.wikipedia.org/wiki/Race_condition)) and logic errors (such as division by zero or [off-by-one errors](http://en.wikipedia.org/wiki/Off-by-one_error)).
* [**Robustness**](http://en.wikipedia.org/wiki/Robustness_(computer_science)): how well a program anticipates problems not due to programmer error. This includes situations such as incorrect, inappropriate or corrupt data, unavailability of needed resources such as memory, operating system services and network connections, and user error.
* [**Usability**](http://en.wikipedia.org/wiki/Usability): the [ergonomics](http://en.wikipedia.org/wiki/Ergonomics) of a program: the ease with which a person can use the program for its intended purpose, or in some cases even unanticipated purposes. Such issues can make or break its success even regardless of other issues. This involves a wide range of textual, graphical and sometimes hardware elements that improve the clarity, intuitiveness, cohesiveness and completeness of a program's user interface.
* [**Portability**](http://en.wikipedia.org/wiki/Software_portability): the range of [computer hardware](http://en.wikipedia.org/wiki/Computer_hardware) and [operating system](http://en.wikipedia.org/wiki/Operating_system) platforms on which the [source code](http://en.wikipedia.org/wiki/Source_code) of a program can be [compiled](http://en.wikipedia.org/wiki/Compiler)/[interpreted](http://en.wikipedia.org/wiki/Interpreter_(computing)) and run. This depends on differences in the programming facilities provided by the different platforms, including hardware and operating system resources, expected behaviour of the hardware and operating system, and availability of platform specific compilers (and sometimes libraries) for the language of the source code.
* [**Maintainability**](http://en.wikipedia.org/wiki/Maintainability): the ease with which a program can be modified by its present or future developers in order to make improvements or customizations, fix [bugs](http://en.wikipedia.org/wiki/Software_bug) and [security holes](http://en.wikipedia.org/wiki/Vulnerability_(computing)), or adapt it to new environments. Good practices during initial development make the difference in this regard. This quality may not be directly apparent to the end user but it can significantly affect the fate of a program over the long term.
* [**Efficiency**](http://en.wikipedia.org/wiki/Algorithmic_efficiency)/[**performance**](http://en.wikipedia.org/wiki/Performance_engineering): the amount of system resources a program consumes (processor time, memory space, slow devices such as disks, network bandwidth and to some extent even user interaction): the less, the better. This also includes correct disposal of some resources, such as cleaning up [temporary files](http://en.wikipedia.org/wiki/Temporary_file) and lack of [memory leaks](http://en.wikipedia.org/wiki/Memory_leak).

### [[edit](http://en.wikipedia.org/w/index.php?title=Computer_programming&action=edit&section=5)] Readability of source code

In computer programming, readability refers to the ease with which a human reader can comprehend the purpose, control flow, and operation of [source code](http://en.wikipedia.org/wiki/Source_code). It affects the aspects of quality above, including portability, usability and most importantly maintainability.

Readability is important because programmers spend the majority of their time reading, trying to understand and modifying existing source code, rather than writing new source code. Unreadable code often leads to [bugs](http://en.wikipedia.org/wiki/Software_bug), inefficiencies, and [duplicated code](http://en.wikipedia.org/wiki/Code_duplication). A study[[11]](http://en.wikipedia.org/wiki/Computer_programming" \l "cite_note-10) found that a few simple readability transformations made code shorter and drastically reduced the time to understand it.

Following a consistent [programming style](http://en.wikipedia.org/wiki/Programming_style) often helps readability. However, readability is more than just programming style. Many factors, having little or nothing to do with the ability of the computer to efficiently compile and execute the code, contribute to readability.[[12]](http://en.wikipedia.org/wiki/Computer_programming" \l "cite_note-11) Some of these factors include:

* Different [indentation styles](http://en.wikipedia.org/wiki/Indentation_style) (whitespace)
* [Comments](http://en.wikipedia.org/wiki/Comment_(computer_programming))
* [Decomposition](http://en.wikipedia.org/wiki/Decomposition_(computer_science))
* [Naming conventions](http://en.wikipedia.org/wiki/Naming_conventions_(programming)) for objects (such as variables, classes, procedures, etc.)

### [[edit](http://en.wikipedia.org/w/index.php?title=Computer_programming&action=edit&section=6)] Algorithmic complexity

The academic field and the engineering practice of computer programming are both largely concerned with discovering and implementing the most efficient [algorithms](http://en.wikipedia.org/wiki/Algorithm) for a given class of problem. For this purpose, algorithms are classified into *orders* using so-called [Big O notation](http://en.wikipedia.org/wiki/Big_O_notation), *O(n)*, which expresses resource use, such as execution time or memory consumption, in terms of the size of an input. Expert programmers are familiar with a variety of well-established algorithms and their respective complexities and use this knowledge to choose algorithms that are best suited to the circumstances.

### [[edit](http://en.wikipedia.org/w/index.php?title=Computer_programming&action=edit&section=7)] Methodologies

The first step in most formal software development processes is requirements analysis, followed by testing to determine value modeling, implementation, and failure elimination ([debugging](http://en.wikipedia.org/wiki/Debugging)). There exist a lot of differing approaches for each of those tasks. One approach popular for [requirements analysis](http://en.wikipedia.org/wiki/Requirements_analysis) is [Use Case](http://en.wikipedia.org/wiki/Use_Case) analysis. Nowadays many programmers use forms of [Agile software development](http://en.wikipedia.org/wiki/Agile_software_development) where the various stages of formal software development are more integrated together into short cycles that take a few weeks rather than years. There are many approaches to the [Software development process](http://en.wikipedia.org/wiki/Software_development_process).

Popular modeling techniques include Object-Oriented Analysis and Design ([OOAD](http://en.wikipedia.org/wiki/OOAD)) and Model-Driven Architecture ([MDA](http://en.wikipedia.org/wiki/Model-Driven_Architecture)). The Unified Modeling Language ([UML](http://en.wikipedia.org/wiki/Unified_Modeling_Language)) is a notation used for both the OOAD and MDA.

A similar technique used for database design is Entity-Relationship Modeling ([ER Modeling](http://en.wikipedia.org/wiki/Entity-Relationship_Model)).

Implementation techniques include imperative languages ([object-oriented](http://en.wikipedia.org/wiki/Object-oriented_programming) or [procedural](http://en.wikipedia.org/wiki/Procedural_programming)), [functional languages](http://en.wikipedia.org/wiki/Functional_programming), and [logic languages](http://en.wikipedia.org/wiki/Logic_programming).

### [[edit](http://en.wikipedia.org/w/index.php?title=Computer_programming&action=edit&section=8)] Measuring language usage

It is very difficult to determine what are the most popular of modern programming languages. Some languages are very popular for particular kinds of applications (e.g., [COBOL](http://en.wikipedia.org/wiki/COBOL) is still strong in the corporate data center, often on large [mainframes](http://en.wikipedia.org/wiki/Mainframe_computer), [FORTRAN](http://en.wikipedia.org/wiki/Fortran_(programming_language)) in engineering applications, [scripting languages](http://en.wikipedia.org/wiki/Scripting_language) in web development, and [C](http://en.wikipedia.org/wiki/C_(programming_language)) in [embedded applications](http://en.wikipedia.org/wiki/Embedded_software)), while some languages are regularly used to write many different kinds of applications. Also many applications use a mix of several languages in their construction and use.

Methods of [measuring programming language popularity](http://en.wikipedia.org/wiki/Measuring_programming_language_popularity) include: counting the number of job advertisements that mention the language,[[13]](http://en.wikipedia.org/wiki/Computer_programming#cite_note-12) the number of books teaching the language that are sold (this overestimates the importance of newer languages), and estimates of the number of existing lines of code written in the language (this underestimates the number of users of business languages such as COBOL).

### [[edit](http://en.wikipedia.org/w/index.php?title=Computer_programming&action=edit&section=9)] Debugging

[](http://en.wikipedia.org/wiki/File:H96566k.jpg)

[http://bits.wikimedia.org/skins-1.18/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:H96566k.jpg)

The [bug](http://en.wikipedia.org/wiki/Software_bug) from 1947 which is at the origin of a popular (but incorrect) etymology for the common term for a software defect.

[Debugging](http://en.wikipedia.org/wiki/Debugging) is a very important task in the software development process, because an incorrect program can have significant consequences for its users. Some languages are more prone to some kinds of faults because their specification does not require [compilers](http://en.wikipedia.org/wiki/Compiler) to perform as much checking as other languages. Use of a [static code analysis](http://en.wikipedia.org/wiki/Static_code_analysis) tool can help detect some possible problems.

Debugging is often done with [IDEs](http://en.wikipedia.org/wiki/Integrated_development_environment) like [Eclipse](http://en.wikipedia.org/wiki/Eclipse_(software)), [Kdevelop](http://en.wikipedia.org/wiki/Kdevelop), [NetBeans](http://en.wikipedia.org/wiki/NetBeans), [Code::Blocks](http://en.wikipedia.org/wiki/Code::Blocks), and [Visual Studio](http://en.wikipedia.org/wiki/Visual_Studio). Standalone debuggers like [gdb](http://en.wikipedia.org/wiki/Gdb) are also used, and these often provide less of a visual environment, usually using a [command line](http://en.wikipedia.org/wiki/Command_line).

## [[edit](http://en.wikipedia.org/w/index.php?title=Computer_programming&action=edit&section=10)] Programming languages

*Main articles:* [*Programming language*](http://en.wikipedia.org/wiki/Programming_language) *and* [*List of programming languages*](http://en.wikipedia.org/wiki/List_of_programming_languages)

Different programming languages support different styles of programming (called [*programming paradigms*](http://en.wikipedia.org/wiki/Programming_paradigm)). The choice of language used is subject to many considerations, such as company policy, suitability to task, availability of third-party packages, or individual preference. Ideally, the programming language best suited for the task at hand will be selected. Trade-offs from this ideal involve finding enough programmers who know the language to build a team, the availability of [compilers](http://en.wikipedia.org/wiki/Compiler) for that language, and the efficiency with which programs written in a given language execute. Languages form an approximate spectrum from "low-level" to "high-level"; "low-level" languages are typically more machine-oriented and faster to execute, whereas "high-level" languages are more abstract and easier to use but execute less quickly. It is usually easier to code in "high-level" languages than in "low-level" ones.

Allen Downey, in his book *How To Think Like A Computer Scientist*, writes:

The details look different in different languages, but a few basic instructions appear in just about every language:

* **input**: Get data from the keyboard, a file, or some other device.
* **output**: Display data on the screen or send data to a file or other device.
* **arithmetic**: Perform basic arithmetical operations like addition and multiplication.
* **conditional execution**: Check for certain conditions and execute the appropriate sequence of statements.
* **repetition**: Perform some action repeatedly, usually with some variation.

Many computer languages provide a mechanism to call functions provided by libraries such as in a [.so](http://en.wikipedia.org/wiki/Library_(computing)). Provided the functions in a library follow the appropriate run time conventions (e.g., method of passing arguments), then these functions may be written in any other language.

## [[edit](http://en.wikipedia.org/w/index.php?title=Computer_programming&action=edit&section=11)] Programmers

*Main article:* [*Programmer*](http://en.wikipedia.org/wiki/Programmer)

*See also:* [*Software developer*](http://en.wikipedia.org/wiki/Software_developer) *and* [*Software engineer*](http://en.wikipedia.org/wiki/Software_engineer)

Computer [programmers](http://en.wikipedia.org/wiki/Programmer) are those who write computer software. Their jobs usually involve:

* [Coding](http://en.wikipedia.org/wiki/Source_code)
* [Compilation](http://en.wikipedia.org/wiki/Compiler)
* [Debugging](http://en.wikipedia.org/wiki/Debugging)
* [Documentation](http://en.wikipedia.org/wiki/Documentation)
* [Integration](http://en.wikipedia.org/wiki/Digital_integration)
* [Maintenance](http://en.wikipedia.org/wiki/Software_maintenance)
* [Requirements analysis](http://en.wikipedia.org/wiki/Requirements_analysis)
* [Software architecture](http://en.wikipedia.org/wiki/Software_architecture)
* [Software testing](http://en.wikipedia.org/wiki/Software_testing)
* [Specification](http://en.wikipedia.org/wiki/Specification)

**http://en.wikipedia.org/wiki/HTML\_5**

**HTML5** is a language for structuring and presenting content for the [World Wide Web](http://en.wikipedia.org/wiki/World_Wide_Web), and is a core technology of the [Internet](http://en.wikipedia.org/wiki/Internet) originally proposed by [Opera Software](http://en.wikipedia.org/wiki/Opera_Software).[[1]](http://en.wikipedia.org/wiki/HTML5#cite_note-0) It is the fifth revision of the [HTML](http://en.wikipedia.org/wiki/HTML) standard (created in 1990 and standardized as HTML4 as of 1997)[[2]](http://en.wikipedia.org/wiki/HTML5" \l "cite_note-HTML5-20110405-1) and as of November 2011[[update]](http://en.wikipedia.org/w/index.php?title=HTML5&action=edit) is still under development. Its core aims have been to improve the language with support for the latest multimedia while keeping it easily readable by humans and consistently understood by computers and devices ([web browsers](http://en.wikipedia.org/wiki/Web_browser), [parsers](http://en.wikipedia.org/wiki/Parsing), etc.). HTML5 is intended to subsume not only [HTML 4](http://en.wikipedia.org/wiki/HTML_4), but [XHTML](http://en.wikipedia.org/wiki/XHTML) 1 and [DOM2HTML](http://en.wikipedia.org/wiki/Document_Object_Model) (particularly [JavaScript](http://en.wikipedia.org/wiki/JavaScript)) as well.[[2]](http://en.wikipedia.org/wiki/HTML5#cite_note-HTML5-20110405-1)

Following its immediate predecessors HTML 4.01 and XHTML 1.1, HTML5 is a response to the observation that the HTML and XHTML in common use on the World Wide Web are a mixture of features introduced by various specifications, along with those introduced by software products such as web browsers, those established by common practice, and the many [syntax errors](http://en.wikipedia.org/wiki/Syntax_error) in existing [web documents](http://en.wikipedia.org/wiki/Web_document). It is also an attempt to define a single [markup language](http://en.wikipedia.org/wiki/Markup_language) that can be written in either HTML or XHTML syntax. It includes detailed processing models to encourage more interoperable implementations; it extends, improves and rationalises the markup available for documents, and introduces markup and [application programming interfaces](http://en.wikipedia.org/wiki/Application_programming_interfaces) (APIs) for complex [web applications](http://en.wikipedia.org/wiki/Web_application).[[3]](http://en.wikipedia.org/wiki/HTML5#cite_note-HTML5diffHTML4-2) For the same reasons, HTML5 is also a potential candidate for cross-platform mobile applications. Many features of HTML5 have been built with the consideration of being able to run on low-powered devices such as smartphones and tablets.

In particular, HTML5 adds many new [syntactical](http://en.wikipedia.org/wiki/Syntax_(programming_languages)) features. These include the <video>, <audio>, <header> and [<canvas>](http://en.wikipedia.org/wiki/Canvas_element) [elements](http://en.wikipedia.org/wiki/HTML_element), as well as the integration of [SVG](http://en.wikipedia.org/wiki/Scalable_Vector_Graphics) content that replaces the uses of generic <object> tags. These features are designed to make it easy to include and handle [multimedia](http://en.wikipedia.org/wiki/Multimedia) and [graphical](http://en.wikipedia.org/wiki/2D_computer_graphics) content on the web without having to resort to proprietary [plugins](http://en.wikipedia.org/wiki/Plug-in_(computing)) and [APIs](http://en.wikipedia.org/wiki/Application_programming_interface). Other new elements, such as <section>, <article>, <header> and <nav>, are designed to enrich the [semantic](http://en.wikipedia.org/wiki/Semantic_web) content of documents. New [attributes](http://en.wikipedia.org/wiki/HTML_attribute) have been introduced for the same purpose, while some elements and attributes have been removed. Some elements, such as <a>, <cite> and <menu> have been changed, redefined or standardized. The APIs and [document object model](http://en.wikipedia.org/wiki/Document_object_model) (DOM) are no longer afterthoughts, but are fundamental parts of the HTML5 specification.[[3]](http://en.wikipedia.org/wiki/HTML5#cite_note-HTML5diffHTML4-2) HTML5 also defines in some detail the required processing for invalid documents so that syntax errors will be treated uniformly by all conforming browsers and other [user agents](http://en.wikipedia.org/wiki/User_agent).[[4]](http://en.wikipedia.org/wiki/HTML5#cite_note-3)

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## [[edit](http://en.wikipedia.org/w/index.php?title=HTML5&action=edit&section=1)] History

The [Web Hypertext Application Technology Working Group](http://en.wikipedia.org/wiki/Web_Hypertext_Application_Technology_Working_Group) (WHATWG) began work on the new standard in 2004, when the [World Wide Web Consortium](http://en.wikipedia.org/wiki/World_Wide_Web_Consortium) (W3C) was focusing future developments on [XHTML 2.0](http://en.wikipedia.org/wiki/XHTML#XHTML_2.0), and HTML 4.01 had not been updated since 2000.[[5]](http://en.wikipedia.org/wiki/HTML5#cite_note-4) In 2009, the W3C allowed the XHTML 2.0 Working Group's charter to expire and decided not to renew it. W3C and WHATWG are currently working together on the development of HTML5.[[6]](http://en.wikipedia.org/wiki/HTML5#cite_note-5)

Even though HTML5 has been well known among web developers for years, it became the topic of mainstream media in April 2010[[7]](http://en.wikipedia.org/wiki/HTML5#cite_note-6)[[8]](http://en.wikipedia.org/wiki/HTML5#cite_note-7)[[9]](http://en.wikipedia.org/wiki/HTML5#cite_note-8)[[10]](http://en.wikipedia.org/wiki/HTML5#cite_note-9) after [Apple Inc](http://en.wikipedia.org/wiki/Apple_Inc)'s then-CEO [Steve Jobs](http://en.wikipedia.org/wiki/Steve_Jobs) issued a public letter titled "Thoughts on Flash" where he concludes that [Adobe](http://en.wikipedia.org/wiki/Adobe_Systems) "[Flash](http://en.wikipedia.org/wiki/Adobe_Flash) is no longer necessary to watch video or consume any kind of web content" and that "new open standards created in the mobile era, such as HTML5, will win".[[11]](http://en.wikipedia.org/wiki/HTML5#cite_note-10) This sparked a debate in web development circles where some suggested that while HTML5 provides enhanced functionality, developers must consider the varying browser support of the different parts of the standard as well as other [functionality differences between HTML5 and Flash](http://en.wikipedia.org/wiki/Comparison_of_HTML5_and_Flash).[[12]](http://en.wikipedia.org/wiki/HTML5#cite_note-11) In early November 2011 Adobe announced that it will discontinue development of Flash for mobile devices and reorient its efforts in developing tools utilizing HTML 5.[[13]](http://en.wikipedia.org/wiki/HTML5#cite_note-12)

## [[edit](http://en.wikipedia.org/w/index.php?title=HTML5&action=edit&section=2)] W3C standardization process

WHATWG started work on the specification in June 2004 under the name Web Applications 1.0.[[14]](http://en.wikipedia.org/wiki/HTML5#cite_note-13) As of January 2011[[update]](http://en.wikipedia.org/w/index.php?title=HTML5&action=edit), the specification is in the Draft Standard state at the WHATWG, and in [Working Draft](http://en.wikipedia.org/wiki/W3c#Recommendations_and_Certifications) state at the W3C. [Ian Hickson](http://en.wikipedia.org/wiki/Ian_Hickson) of [Google](http://en.wikipedia.org/wiki/Google) is the editor of HTML5.[[15]](http://en.wikipedia.org/wiki/HTML5#cite_note-14)

The HTML5 specification was adopted as the starting point of the work of the new HTML working group of the World Wide Web Consortium (W3C) in 2007. This working group published the First Public Working Draft of the specification on 22 January 2008.[[16]](http://en.wikipedia.org/wiki/HTML5#cite_note-HTML5-15) The specification is an ongoing work, and is expected to remain so for many years, although parts of HTML5 are going to be finished and implemented in browsers before the whole specification reaches final Recommendation status.[[17]](http://en.wikipedia.org/wiki/HTML5#cite_note-when-16)

According to the W3C timetable, it was estimated that HTML5 would reach W3C Recommendation by late 2010. However, the First Public Working Draft estimate was missed by eight months, and Last Call and Candidate Recommendation were expected to be reached in 2008,[[18]](http://en.wikipedia.org/wiki/HTML5#cite_note-17) but as of January 2011[[update]](http://en.wikipedia.org/w/index.php?title=HTML5&action=edit) HTML5 is still at Working Draft stage in the W3C.[[19]](http://en.wikipedia.org/wiki/HTML5#cite_note-18) HTML5 has been at Last Call in the WHATWG since October 2009.[[20]](http://en.wikipedia.org/wiki/HTML5#cite_note-whatwg1-19)[[21]](http://en.wikipedia.org/wiki/HTML5#cite_note-HTML5_Up_.26_Running-20)

Ian Hickson, editor of the HTML5 specification, expects the specification to reach the [Candidate Recommendation](http://en.wikipedia.org/wiki/W3C_recommendation#Candidate_Recommendation_.28CR.29) stage during 2012.[[22]](http://en.wikipedia.org/wiki/HTML5#cite_note-W3Crec-21) The criterion for the specification becoming a [W3C Recommendation](http://en.wikipedia.org/wiki/W3C_recommendation#W3C_Recommendation_.28REC.29) is “two 100% complete and fully interoperable implementations”.[[22]](http://en.wikipedia.org/wiki/HTML5#cite_note-W3Crec-21) In an interview with TechRepublic, Hickson guessed that this would occur in the year 2022 or later.[[23]](http://en.wikipedia.org/wiki/HTML5#cite_note-techrepublicref-22) However, many parts of the specification are stable and may be implemented in products:

Some sections are already relatively stable and there are implementations that are already quite close to completion, and those features can be used today (e.g. <canvas>).

— WHAT Working Group, When will HTML5 be finished?[[22]](http://en.wikipedia.org/wiki/HTML5#cite_note-W3Crec-21), FAQ

In December 2009, WHATWG switched to an unversioned development model for the HTML5 specification.[[24]](http://en.wikipedia.org/wiki/HTML5#cite_note-23) W3C will still continue with publishing a snapshot of the HTML5 specification.[[25]](http://en.wikipedia.org/wiki/HTML5#cite_note-24)

On 14 February 2011, the W3C extended the charter of its HTML Working Group with clear milestones for HTML5. The Working Group is expected to advance HTML5 to "Last Call", an invitation to communities inside and outside W3C to confirm the technical soundness of the specification, in May 2011. The group will then shift focus to gathering implementation experience. W3C is also developing a comprehensive test suite to achieve broad interoperability for the full specification by 2014, which is now the target date for Recommendation.[[26]](http://en.wikipedia.org/wiki/HTML5#cite_note-w3c2014-25)

Even as innovation continues, advancing HTML5 to Recommendation provides the entire Web ecosystem with a stable, tested, interoperable standard. The decision to schedule the HTML5 Last Call for May 2011 was an important step in setting industry expectations. Today we take the next step, announcing 2014 as the target for Recommendation.

— Jeff Jaffe, Chief Executive Officer, [*World Wide Web Consortium*](http://en.wikipedia.org/wiki/World_Wide_Web_Consortium)[[26]](http://en.wikipedia.org/wiki/HTML5#cite_note-w3c2014-25)

### [[edit](http://en.wikipedia.org/w/index.php?title=HTML5&action=edit&section=3)] Markup

HTML5 introduces a number of new [elements](http://en.wikipedia.org/wiki/HTML_element) and attributes that reflect typical usage on modern [websites](http://en.wikipedia.org/wiki/Website). Some of them are [semantic](http://en.wikipedia.org/wiki/Semantic_web) replacements for common uses of generic block (<div>) and inline (<span>) elements, for example <nav> (website navigation block), <footer> (usually referring to bottom of web page or to last lines of HTML code), or <audio> and [<video>](http://en.wikipedia.org/wiki/HTML5_video) instead of <object>.[[27]](http://en.wikipedia.org/wiki/HTML5#cite_note-26)[[28]](http://en.wikipedia.org/wiki/HTML5#cite_note-27)[[29]](http://en.wikipedia.org/wiki/HTML5#cite_note-28) Some deprecated elements from [HTML 4.01](http://en.wikipedia.org/wiki/HTML_4.01) have been dropped, including purely presentational elements such as <font> and <center>, whose effects are achieved using [Cascading Style Sheets](http://en.wikipedia.org/wiki/Cascading_Style_Sheet). There is also a renewed emphasis on the importance of [DOM scripting](http://en.wikipedia.org/wiki/DOM_scripting) (e.g., JavaScript) in Web behavior.

The HTML5 syntax is no longer based on [SGML](http://en.wikipedia.org/wiki/Standard_Generalized_Markup_Language) despite the similarity of its markup. It has, however, been designed to be backward compatible with common parsing of older versions of HTML. It comes with a new introductory line that looks like an SGML [document type declaration](http://en.wikipedia.org/wiki/Document_type_declaration), <!DOCTYPE html>, which triggers the standards-compliant [rendering mode](http://en.wikipedia.org/wiki/Quirks_mode).[[30]](http://en.wikipedia.org/wiki/HTML5#cite_note-29) As of 5 January 2009, HTML5 also includes *Web Forms 2.0*, a previously separate [WHATWG](http://en.wikipedia.org/wiki/WHATWG) specification.

### [[edit](http://en.wikipedia.org/w/index.php?title=HTML5&action=edit&section=4)] New APIs

In addition to specifying markup, HTML5 specifies scripting [application programming interfaces](http://en.wikipedia.org/wiki/Application_programming_interfaces) (APIs).[[31]](http://en.wikipedia.org/wiki/HTML5#cite_note-30) Existing [document object model](http://en.wikipedia.org/wiki/Document_object_model) (DOM) interfaces are extended and [*de facto*](http://en.wikipedia.org/wiki/De_facto) features documented. There are also new APIs, such as:

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| * The [canvas element](http://en.wikipedia.org/wiki/Canvas_element) for [immediate mode](http://en.wikipedia.org/wiki/Immediate_mode) 2D drawing. See Canvas 2D API Specification 1.0 specification[[32]](http://en.wikipedia.org/wiki/HTML5#cite_note-31) * Timed media playback * [Offline storage database](http://en.wikipedia.org/wiki/Web_Storage) (offline web applications)[[33]](http://en.wikipedia.org/wiki/HTML5#cite_note-32) * Document editing | * [Drag-and-drop](http://en.wikipedia.org/wiki/Drag-and-drop) * [Cross-document messaging](http://en.wikipedia.org/wiki/Cross-document_messaging)[[34]](http://en.wikipedia.org/wiki/HTML5#cite_note-33) * Browser history management * [MIME type](http://en.wikipedia.org/wiki/MIME_type) and protocol handler registration * [Microdata](http://en.wikipedia.org/wiki/Microdata_(HTML5)) |

Not all of the above technologies are included in the W3C HTML5 specification, though they are in the WHATWG HTML specification.[[35]](http://en.wikipedia.org/wiki/HTML5#cite_note-34) Some related technologies, which are not part of either the W3C HTML5 or the WHATWG HTML specification, are as follows. The W3C publishes specifications for these separately.

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| * [Geolocation](http://en.wikipedia.org/wiki/W3C_Geolocation_API) * [Web SQL Database](http://en.wikipedia.org/wiki/Web_SQL_Database), a local SQL Database (no longer maintained).[[36]](http://en.wikipedia.org/wiki/HTML5#cite_note-35) * The [Indexed Database API](http://en.wikipedia.org/wiki/Indexed_Database_API), an indexed hierarchical key-value store (formerly WebSimpleDB).[[37]](http://en.wikipedia.org/wiki/HTML5#cite_note-36) * [Web Storage](http://en.wikipedia.org/wiki/Web_Storage), a key-value pair storage framework that provides enhanced behaviour similar to [Cookies](http://en.wikipedia.org/wiki/HTTP_Cookie) but with larger storage capacity and improved API. | * [File API](http://www.w3.org/TR/FileAPI/), Handle file uploads and file manipulation.[[38]](http://en.wikipedia.org/wiki/HTML5#cite_note-37) * [Directories and System](http://www.w3.org/TR/file-system-api/). This API is intended to satisfy client-side-storage use cases not well served by databases.[[39]](http://en.wikipedia.org/wiki/HTML5#cite_note-38) * [File Writer](http://www.w3.org/TR/file-writer-api/). An API for writing to files from web applications.[[40]](http://en.wikipedia.org/wiki/HTML5#cite_note-39) |

A common misconception is that HTML5 can provide animation within web pages, which is untrue. Either [JavaScript](http://en.wikipedia.org/wiki/JavaScript) or [CSS3](http://en.wikipedia.org/wiki/Cascading_Style_Sheets#CSS_3) is necessary for animating HTML elements. Animation is also possible using JavaScript and HTML 4[[41]](http://en.wikipedia.org/wiki/HTML5#cite_note-40)[[*not in citation given*](http://en.wikipedia.org/wiki/Wikipedia:Verifiability)], and within SVG elements through [SMIL](http://en.wikipedia.org/wiki/SMIL), although browser support of the latter remains uneven as of 2011.

### [[edit](http://en.wikipedia.org/w/index.php?title=HTML5&action=edit&section=5)] XHTML5

**XHTML5** is the [XML](http://en.wikipedia.org/wiki/XML) [serialization](http://en.wikipedia.org/wiki/Serialization) of HTML5. XML documents must be served with an XML [Internet media type](http://en.wikipedia.org/wiki/Internet_media_type) such as application/xhtml+xml or application/xml.[[42]](http://en.wikipedia.org/wiki/HTML5#cite_note-41) XHTML5 requires XML's strict, well-formed syntax. The choice between HTML5 and XHTML5 boils down to the choice of a MIME/content type: the media type you choose determines what type of document should be used.[[43]](http://en.wikipedia.org/wiki/HTML5#cite_note-42) In XHTML5 the HTML5 [doctype](http://en.wikipedia.org/wiki/Doctype) html is optional and may simply be omitted.[[44]](http://en.wikipedia.org/wiki/HTML5#cite_note-43) HTML that has been written to conform to both the HTML and XHTML specifications—and which will therefore produce the same DOM tree whether parsed as HTML or XML—is termed "[polyglot markup](http://en.wikipedia.org/wiki/Polyglot_markup)".[[45]](http://en.wikipedia.org/wiki/HTML5#cite_note-w3c-44)

### [[edit](http://en.wikipedia.org/w/index.php?title=HTML5&action=edit&section=6)] Error handling

An HTML5 (text/html) browser will be flexible in handling incorrect [syntax](http://en.wikipedia.org/wiki/Syntax). HTML5 is designed so that old browsers can safely ignore new HTML5 constructs. In contrast to HTML 4.01, the HTML5 specification gives detailed rules for [lexing](http://en.wikipedia.org/wiki/Lexing) and [parsing](http://en.wikipedia.org/wiki/Parsing), with the intent that different compliant browsers will produce the same result in the case of incorrect syntax.[[46]](http://en.wikipedia.org/wiki/HTML5#cite_note-whatfaq-45) Although HTML5 now defines a consistent behavior for "[tag soup](http://en.wikipedia.org/wiki/Tag_soup)" documents, those documents are not regarded as conforming to the HTML5 standard.[[46]](http://en.wikipedia.org/wiki/HTML5#cite_note-whatfaq-45)

## [[edit](http://en.wikipedia.org/w/index.php?title=HTML5&action=edit&section=7)] Popularity

According to a report released on 30 September 2011, 34 of the world's top 100 Web sites were using HTML5 – the adaptation led by search engines and social networks.[[47]](http://en.wikipedia.org/wiki/HTML5#cite_note-46)

## [[edit](http://en.wikipedia.org/w/index.php?title=HTML5&action=edit&section=8)] Differences from HTML 4.01 and XHTML 1.x

The following is a cursory list of differences and some specific examples.

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| * New [parsing](http://en.wikipedia.org/wiki/Parsing) rules: oriented towards flexible parsing and compatibility; not based on SGML * Ability to use inline [SVG](http://en.wikipedia.org/wiki/SVG) and [MathML](http://en.wikipedia.org/wiki/MathML) in text/html * New [elements](http://en.wikipedia.org/wiki/HTML_element): article, aside, audio, bdo, [canvas](http://en.wikipedia.org/wiki/Canvas_element), command, datalist, details, embed, figcaption, figure, footer, header, hgroup, keygen, mark, meter, nav, output, progress, rp, rt, [ruby](http://en.wikipedia.org/wiki/Ruby_(annotation_markup)), section, source, summary, time, [video](http://en.wikipedia.org/wiki/HTML5_video), wbr | * New types of form controls: dates and times, email, url, search, number, range, tel, color[[48]](http://en.wikipedia.org/wiki/HTML5" \l "cite_note-47) * New [attributes](http://en.wikipedia.org/wiki/HTML#Attributes): charset (on meta), async (on script) * Global attributes (that can be applied for every element): id, tabindex, hidden, data-\* (custom data attributes) * Deprecated elements will be dropped altogether: acronym, applet, basefont, big, center, dir, font, frame, [frameset](http://en.wikipedia.org/wiki/Framing_(World_Wide_Web)), isindex, noframes, strike, tt |

dev.w3.org provides the latest *Editors Draft* (last dated *4 August 2011*) of "HTML5 differences from HTML4",[[49]](http://en.wikipedia.org/wiki/HTML5#cite_note-48) which provides a complete outline of additions, removals and changes between HTML5.

## [[edit](http://en.wikipedia.org/w/index.php?title=HTML5&action=edit&section=9)] The HTML5 logo

[](http://en.wikipedia.org/wiki/File:HTML5-logo.svg)

[http://bits.wikimedia.org/skins-1.18/common/images/magnify-clip.png](http://en.wikipedia.org/wiki/File:HTML5-logo.svg)

The W3C HTML5 logo

On 18 January 2011, the W3C introduced a logo to represent the use of or interest in HTML5. Unlike other badges previously issued by the W3C, it does not imply validity or conformance to a certain standard. As of 1 April 2011, this logo is official.[[50]](http://en.wikipedia.org/wiki/HTML5#cite_note-logo-faq-49)

When initially presenting it to the public, the W3C announced the HTML5 logo as a "general-purpose visual identity for a broad set of open web technologies, including HTML5, [CSS](http://en.wikipedia.org/wiki/Cascading_Style_Sheets), [SVG](http://en.wikipedia.org/wiki/Scalable_Vector_Graphics), [WOFF](http://en.wikipedia.org/wiki/Web_Open_Font_Format), and others".[[51]](http://en.wikipedia.org/wiki/HTML5#cite_note-waspopenletter-50) Some web standard advocates, including The Web Standards Project, criticised that definition of "HTML5" as an umbrella term, pointing out the blurring of terminology and the potential for miscommunication.[[51]](http://en.wikipedia.org/wiki/HTML5#cite_note-waspopenletter-50) Three days later, the W3C responded to community feedback and changed the logo's definition, dropping the enumeration of related technologies.[[52]](http://en.wikipedia.org/wiki/HTML5#cite_note-51) The W3C then said the logo "represents HTML5, the cornerstone for modern Web applications".[[50]](http://en.wikipedia.org/wiki/HTML5#cite_note-logo-faq-49)

**http://www.bbc.co.uk/news/technology-12070627**

# HTML5: the language aiming to make the web wider

**By Bobbie Johnson** Technology reporter, BBC News

Sir Tim took the web worldwide but its capabilities are about to undergo another big leap

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Just 20 years after it took its first tentative steps into the world, the web has become a revolutionary phenomenon.

Almost 2 billion people are now online globally, and internet connections are now a vital part of international trade, communication and even politics.

Despite the web's rapid growth, however, the technology underpinning it has changed surprisingly little - in many cases remaining more or less the same as when Sir Tim Berners-Lee built the very first web pages in his lab in Switzerland in 1990.

That could all be about to change, however, thanks to a new web technology called HTML5 that promises to shake up the web from top to bottom.

Backed by some of the internet's biggest companies, it is a long-awaited update to HyperText Markup Language, the basic dictionary used by almost every web page. Created by Sir Tim in 1991, HTML tells a web browser everything it needs to know: what a web page does, where it goes and what it looks like.

HTML5, the fifth version of this language, is due to be ratified as a standard for the web soon, after more than a decade in the making. It adds a series of new capabilities for web pages that advocates say will radically change the way we use the web.

In fact, the system is so highly-regarded that it even prompted Apple chief executive Steve Jobs to tout it as an alternative to Flash, which is used by millions of people to play games and watch videos online.

"HTML5… lets web developers create advanced graphics, typography, animations and transitions without relying on third party browser plug-ins like Flash," [he wrote in late April](http://www.apple.com/hotnews/thoughts-on-flash/).

Under the new rules of HTML5, video and audio can be added to a page without complicated computer code. Complex graphics can be created directly on a page using the Canvas tool. And other capabilities — such as being able to access web pages while offline and voice recognition features — are being added all the time.

Play time

All this makes powerful web applications, the sort of thing pioneered by Google Maps, much easier to create. It's important to keep making advances says Ian Fette, the product manager for Google's Chrome browser.

HTML 5 games are improving rapidly and do away with the need for Flash and other add-ons

"If you look at any large, successful website, it uses HTML," he says. "Clearly there are a lot of companies that have managed to make the web work and make a lot of money off it. But you can't just sit back and say 'the web works, so we're done'."

Programmers are still experimenting to find out what the new system can do, but some are finding themselves surprised by its power — including the notoriously picky games industry.

Gaming often requires powerful machines and the use of highly advanced graphics. Yet James Smith, the chief technology officer at games network HeyZap, says he is seeing increasing interest in HTML5.

"It's a very new space," he says. "But there are many people doing serious stuff with games in HTML5. We had developers coming to us, telling us they were making games in the browser."

This is the sort of support that could be crucial for the technology if it is to reach its potential — but not everybody thinks that HTML5 will significantly alter the web.

Some critics say that the impact of the changes is overhyped, and often pushed by self-interested parties like Apple. Others have highlighted the potential for greater security problems as browsers become more capable.

Security companies including McAfee and Kaspersky Labs have warned that HTML5 will increase the web's "attack surface" — the number of potentially vulnerable places that hackers can target.

But one critical ally for HTML5 could be the internet's most powerful company, Google. Not only is its Chrome web browser one of the most HTML5 - friendly on the market, but the Californian internet giant has also invested heavily in HTML5 for its Chrome operating system, which it hopes can one day rival the ubiquity of Windows.

Although Google's first attempt at the system has received mixed reviews Chrome OS shows that ambitious projects can rely on this brand-new technology.

A wider web

If all that doesn't prove to be enough, then HTML5 has another trick up its sleeve: it isn't just limited to the PC. As well being used by desktop-based web browsers - including Firefox, Chrome and Safari and the forthcoming internet Explorer 9 - many mobile phones support the new standard too.

HTML5 extends the capabilities of code that has not changed much since it was created.

This opens all sorts of new possibilities for companies to build services that can potentially be used by almost anyone, no matter what device they use to surf the web.

"Browsers reach billions of people on a wide range of devices," says Hakon Wium Lie, the chief technology officer of browser maker Opera. "Users will be able to run HTML5 apps on expensive computers and cheap mobile phones — this means we can reach the people on this planet who can't afford an iPhone."

Ultimately, say experts, HTML5's success may be in the link between PC and mobile: after all, building a single web service that can work equally well on a desktop computer, a BlackBerry, a Google machine or an Apple iPad, may be too tempting an opportunity to pass up.

"If you want to play something like Farmville on your iPad, you can't load it up," says HeyZap's Smith. "We're seeing a lot of developers now say 'if we can make this game work in HTML5, we can make it work on all devices straight out'. That's huge."

