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Edit View history Tools ✓

Camel case is named after the

"hump" of its protruding capital letter,

Read

Camel case Article Talk

From Wikipedia, the free encyclopedia

Camel case (sometimes stylized as camelCase or CamelCase, also known as camel caps or more formally as medial capitals) is the practice of writing phrases without spaces or punctuation and with capitalized words. The format indicates the first word

as a naming convention in computer programming. It is also sometimes used in online

usernames such as "JohnSmith", and to make multi-word domain names more legible,

The more specific terms **Pascal case** and **upper camel case** refer to a joined phrase

starting with either case, then the following words having an initial uppercase letter. Common examples include "YouTube", "iPhone" and "eBay". Camel case is often used

for example in promoting "EasyWidgetCompany.com".

where the first letter of each word is capitalized, including the initial letter of the first word. similar to the hump of common camels. Similarly, **lower camel case** (also known as **dromedary case**) requires an initial lowercase letter. Some people and organizations, notably Microsoft, use the term camel case only for lower camel case, designating Pascal case for the upper camel case.^[1] Some programming styles prefer camel case with the first letter capitalized, others not. [2][1][3] For clarity, this article leaves the definition of camel case ambiguous with respect to capitalization, and uses the more specific terms when necessary.

Camel case is distinct from several other styles: title case, which capitalizes all words but retains the spaces between them; Tall Man lettering, which uses capitals to emphasize the differences between similar-looking product names such as "predniSONE" and "predniSOLONE"; and snake case, which uses underscores interspersed with lowercase letters (sometimes with the first letter capitalized). A combination of snake and camel case (identifiers Written_Like_This) is recommended in the Ada 95 style guide.[4]

Variations and synonyms [edit] The practice has various names, including:

• InterCaps or intercapping^[11] (abbreviation of *Internal* • camelBack (or camel-back) notation^[5] or CamelCaps^[6] Capitalization^[12]) • medial capitals, recommended by the Oxford English Dictionary^[13] • camel case or CamelCase • mixedCase for lower camel case in Python^[7] CapitalizedWords or CapWords for upper camel

• PascalCase for upper camel case^{[14][15][16]} (after the Pascal case in Python^[/] compoundNames^[8] programming language) • Embedded caps (or embedded capitals)[9] Smalltalk case HumpBack (or hump-back) notation^[10] WikiWord^[17] or WikiCase^[18] (especially in older wikis) The earliest known occurrence of the term "InterCaps" on Usenet is in an April 1990 post to the group

Newton Love. [20] Love has since said, "With the advent of programming languages having these sorts of constructs, the

alt.folklore.computers by Avi Rappoport. [19] The earliest use of the name "Camel Case" occurs in 1995, in a post by humpiness of the style made me call it HumpyCase at first, before I settled on CamelCase. I had been calling it CamelCase for years. ... The citation above was just the first time I had used the name on USENET."[21]

Traditional use in natural language [edit] In word combinations [edit]

The use of medial capitals as a convention in the regular spelling of everyday texts is rare, but is used in some languages as a

solution to particular problems which arise when two words or segments are combined. In Italian, pronouns can be suffixed to verbs, and because the honorific form of second-person pronouns is capitalized, this can produce a sentence like non ho trovato il tempo di risponderLe ("I have not found time to answer you" – where Le means "to

In German, the medial capital letter I, called *Binnen-I*, is sometimes used in a word like *StudentInnen* ("students") to indicate that

capitalization does not conform to German orthography apart from proper names like McDonald; the previous example could be

In Irish, camel case is used when an inflectional prefix is attached to a proper noun, for example i nGaillimh ("in Galway"), from

Gaillimh ("Galway"); an tAlbanach ("the Scottish person"), from Albanach ("Scottish person"); and go hEirinn ("to Ireland"), from

both Studenten ("male students") and Studentinnen ("female students") are intended simultaneously. However, mid-word

correctly written using parentheses as *Student(inn)en*, analogous to "congress(wo)men" in English. [22]

Eire ("Ireland"). In recent Scottish Gaelic orthography, a hyphen has been inserted: an t-Albannach. This convention is also used by several written Bantu languages (e.g. isiZulu, "Zulu language") and several indigenous languages

In transliterations [edit]

In abbreviations [edit]

you").

of Mexico (e.g. Nahuatl, Totonacan, Mixe-Zoque, and some Oto-Manguean languages). In Dutch, when capitalizing the digraph *ij*, both the letter *I* and the letter *J* are capitalized, for example in the country name *IJsland* ("Iceland"). In Chinese pinyin, camel case is sometimes used for place names so that readers can more easily pick out the different parts of

the name. For example, places like Beijing (北京), Qinhuangdao (秦皇岛), and Daxing'anling (大兴安岭) can be written as BeiJing, QinHuangDao, and DaXingAnLing respectively, with the number of capital letters equaling the number of Chinese characters. Writing word compounds only by the initial letter of each character is also acceptable in some cases, so Beijing can be written as BJ, Qinghuangdao as QHD, and Daxing'anling as DXAL.

In English, medial capitals are usually only found in Scottish or Irish "Mac-" or "Mc-" names, where for example MacDonald, McDonald, and Macdonald are common spelling variants of the same name, and in Anglo-Norman "Fitz-" names, where for example both FitzGerald and Fitzgerald are found. In their English style guide *The King's English*, first published in 1906, H. W. and F. G. Fowler suggested that medial capitals

could be used in triple compound words where hyphens would cause ambiguity—the examples they give are KingMark-like (as against King Mark-like) and Anglo-SouthAmerican (as against Anglo-South American). However, they described the system as "too hopelessly contrary to use at present". [23]

In the scholarly transliteration of languages written in other scripts, medial capitals are used in similar situations. For example, in transliterated Hebrew, halvri means "the Hebrew person" or "the Jew" and b'Yerushalayim means "in Jerusalem". In Tibetan proper names like *rLobsang*, the "r" stands for a prefix glyph in the original script that functions as tone marker rather than a normal letter. Another example is tsIurku, a Latin transcription of the Chechen term for the capping stone of the characteristic Medieval defensive towers of Chechnya and Ingushetia; the letter "I" (palochka) is not actually capital, denoting a phoneme distinct from the one transcribed as "i".

Medial capitals are traditionally used in abbreviations to reflect the capitalization that the words would have when written out in

full, for example in the academic titles PhD or BSc. A more recent example is NaNoWriMo, a contraction of National Novel Writing

Month and the designation for both the annual event and the nonprofit organization that runs it. In German, the names of statutes

are abbreviated using embedded capitals, e.g. StGB for Strafgesetzbuch (Criminal Code), PatG for Patentgesetz (Patent Act),

beschränkter Haftung (private limited company). In this context, there can even be three or more camel case capitals, e.g. in

TzBfG for Teilzeit- und Befristungsgesetz (Act on Part-Time and Limited Term Occupations). In French, camel case acronyms

BVerfG for Bundesverfassungsgericht (Federal Constitutional Court), or the very common GmbH, for Gesellschaft mit

such as OuLiPo (1960) were favored for a time as alternatives to initialisms.

CinemaScope and VistaVision, rival widescreen movie formats (1953)

ShopKo (1962), retail stores, later renamed Shopko

ChemGrass (1965), later renamed AstroTurf (1967)

PolyGram (1972), formerly Grammophon-Philips Group

ConAgra (1971), formerly Consolidated Mills

MasterCard (1979), formerly Master Charge

MasterCraft (1968), a sports boat manufacturer

Camel case is often used to transliterate initialisms into alphabets where two letters may be required to represent a single character of the original alphabet, e.g., DShK from Cyrillic ДШК. History of modern technical use [edit]

The first systematic and widespread use of medial capitals for technical purposes was the notation for chemical formulas invented

elements and abbreviations for some common substituents (especially in the field of organic chemistry, for instance "Et" for "ethyl-

In the 1970s and 1980s, medial capitals were adopted as a standard or alternative naming convention for multi-word identifiers in

several programming languages. The precise origin of the convention in computer programming has not yet been settled. A 1954

conference proceedings^[29] occasionally informally referred to IBM's Speedcoding system as "SpeedCo". Christopher Strachey's

Some early programming languages, notably Lisp (1958) and COBOL (1959), addressed this problem by allowing a hyphen ("-")

to be used between words of compound identifiers, as in "END-OF-FILE": Lisp because it worked well with prefix notation (a Lisp

individual English words. This convention remains in use in these languages, and is also common in program names entered on

parser would not treat a hyphen in the middle of a symbol as a subtraction operator) and COBOL because its operators were

Exacerbating the problem, common punched card character sets of the time were uppercase only and lacked other special

Charles Simonyi, who worked at Xerox PARC in the 1970s and later oversaw the creation of Microsoft's Office suite of

characters. It was only in the late 1960s that the widespread adoption of the ASCII character set made both lowercase and the

underscore character universally available. Some languages, notably C, promptly adopted underscores as word separators,

and identifiers such as end of file are still prevalent in C programs and libraries (as well as in later languages influenced by

C, such as Perl and Python). However, some languages and programmers chose to avoid underscores—among other reasons to

paper on GPM (1965),[30] shows a program that includes some medial capital identifiers, including "NextCh" and

by the Swedish chemist Jacob Berzelius in 1813. To replace the multitude of naming and symbol conventions used by chemists

until that time, he proposed to indicate each chemical element by a symbol of one or two letters, the first one being capitalized.

The capitalization allowed formulas like "NaCl" to be written without spaces and still be parsed without ambiguity. [24][25]

Berzelius' system continues to be used, augmented with three-letter symbols such as "Uue" for unconfirmed or unknown

"). This has been further extended to describe the amino acid sequences of proteins and other similar domains.

Early use in trademarks [edit] Since the early 20th century, medial capitals have occasionally been used for corporate names and product trademarks, such as • Drylce Corporation (1925) marketed the solid form of carbon dioxide (CO₂) as "Dry Ice", thus leading to its common name. [26]

AeroVironment (1971)

SportsCenter (1979)

"WriteSymbol".

a command line, as in Unix.

• United HealthCare (1977)^[28]

Chemical formulas [edit]

Computer programming [edit] This section **possibly contains original research**. Please improve it by verifying the claims made and adding inline citations. Statements consisting only of original research should be removed. (May 2011) (Learn how and when to remove this template message)

• MisteRogers Neighborhood, the TV series also called Mister Rogers' Neighborhood (1968)[27]

Multiple-word descriptive identifiers with embedded spaces such as end of file or char table cannot be used in most programming languages because the spaces between the words would be parsed as delimiters between tokens. The alternative of running the words together as in endoffile or chartable is difficult to understand and possibly misleading; for example, chartable is an English word (able to be charted), whereas charTable means a table of chars.

However, this solution was not adequate for mathematically oriented languages such as FORTRAN (1955) and ALGOL (1958), which used the hyphen as an infix subtraction operator. FORTRAN ignored blanks altogether, so programmers could use embedded spaces in variable names. However, this feature was not very useful since the early versions of the language restricted identifiers to no more than six characters.

prevent confusing them with whitespace—and adopted camel case instead.

Computer companies and products [edit]

• (1987) ClarisWorks, HyperCard, PowerPoint

Spread to mainstream usage [edit]

• (1977) CompuServe

• (1985) PageMaker

• (1980) EchoStar

• (1984) BellSouth

• (1985) *EastEnders*

brands, since the late 1970s — a trend that continues to this day:

• (1990) WorldWideWeb (the first web browser), later renamed Nexus

applications, invented and taught the use of Hungarian Notation, one version of which uses the lowercase letter(s) at the start of a (capitalized) variable name to denote its type. One account [citation needed] claims that the camel case style first became popular at Xerox PARC around 1978, with the Mesa programming language developed for the Xerox Alto computer. This machine lacked an underscore key (whose place was taken by a left arrow "←"), and the hyphen and space characters were not permitted in identifiers, leaving camel case as the only viable scheme for readable multiword names. The PARC Mesa Language Manual (1979) included a coding standard with specific rules for upper and lower camel case that was strictly followed by the Mesa

libraries and the Alto operating system. Niklaus Wirth, the inventor of Pascal, came to appreciate camel case during a sabbatical at PARC and used it in Modula, his next programming language. [31] The Smalltalk language, which was developed originally on the Alto, also uses camel case instead of underscores. This language became quite popular in the early 1980s, and thus may also have been instrumental in spreading the style outside PARC. Upper camel case (or "Pascal case") is used in Wolfram Language in computer algebraic system Mathematica for predefined

identifiers. User defined identifiers should start with a lower case letter. This avoids the conflict between predefined and user defined identifiers both today and in all future versions. C# variable names are recommended to follow the lower camel case convention. [32]

• (1978) WordStar • (1979) VisiCalc (1982) MicroProse, WordPerfect (1983) NetWare (1984) LaserJet, MacWorks, PostScript

In the 1980s and 1990s, after the advent of the personal computer exposed hacker culture to the world, camel case then became

During the dot-com bubble of the late 1990s, the lowercase prefixes "e" (for "electronic") and "i" (for "Internet", [33] "information",

Camel case is sometimes used for abbreviated names of certain neighborhoods, e.g. New York City neighborhoods SoHo (South

of Houston Street) and TriBeCa (Triangle Below Canal Street) and San Francisco's SoMa (South of Market). Such usages erode

"intelligent", etc.) became quite common, giving rise to names like Apple's iMac and the eBox software platform.

In 1998, Dave Yost suggested that chemists use medial capitals to aid readability of long chemical names, e.g. write

AmidoPhosphoRibosylTransferase instead of amidophosphoribosyltransferase. [34] This usage was not widely adopted.

fashionable for corporate trade names in non-computer fields as well. Mainstream usage was well established by 1990:

Whatever its origins in the computing field, the convention was used in the names of computer companies and their commercial

• (1986) *SpaceCamp* • (1990) HarperCollins, SeaTac • (1998) PricewaterhouseCoopers, merger of Price Waterhouse and Coopers

quickly, so the neighborhoods are now typically rendered as Soho, Tribeca, and Soma.

sometimes supported by static analysis tools that check source code for adherence.

Internal capitalization has also been used for other technical codes like HeLa (1983). Current usage in computing [edit]

The use of medial caps for compound identifiers is recommended by the coding style guidelines of many organizations or

Style guidelines often distinguish between upper and lower camel case, typically specifying which variety should be used for

specific kinds of entities: variables, record fields, methods, procedures, functions, subroutines, types, etc. These rules are

analogy with the title case rules, the natural camel case rendering would have the abbreviation all in uppercase, namely

"oldHTMLFile". However, this approach is problematic when two acronyms occur together (e.g., "parse DBM XML" would become

"parseDBMXML") or when the standard mandates lower camel case but the name begins with an abbreviation (e.g. "SQL server"

would become "sQLServer"). For this reason, some programmers prefer to treat abbreviations as if they were words and write

"oldHtmlFile", "parseDbmXml" or "sqlServer". [35] However, this can make it harder to recognize that a given word is intended as

by the language developers or by authoritative manuals and has therefore become part of the language's "culture".

software projects. For some languages (such as Mesa, Pascal, Modula, Java and Microsoft's .NET) this practice is recommended

The original Hungarian notation for programming, for example, specifies that a lowercase abbreviation for the "usage type" (not data type) should prefix all variable names, with the remainder of the name in upper camel case; as such it is a form of lower camel case. Programming identifiers often need to contain acronyms and initialisms that are already in uppercase, such as "old HTML file". By

an acronym.[36]

as AboutUs.

Other uses [edit]

Readability studies [edit]

Programming and coding [edit]

Main article: Naming convention (programming)

Difficulties arise when identifiers have different meaning depending only on the case, as can occur with mathematical functions or trademarks. In this situation changing the case of an identifier might not be an option and an alternative name need be chosen. Wiki link markup [edit]

Camel case is used in some wiki markup languages for terms that should be automatically linked to other wiki pages. This

convention was originally used in Ward Cunningham's original wiki software, WikiWikiWeb,[37] and can be activated in most other

wikis. Some wiki engines such as TiddlyWiki, Trac and PmWiki make use of it in the default settings, but usually also provide a

configuration mechanism or plugin to disable it. Wikipedia formerly used camel case linking as well, but switched to explicit link

camel case for linking. Some wikis that do not use camel case linking may still use the camel case as a naming convention, such

markup using square brackets^[38] and many other wiki sites have done the same. MediaWiki, for example, does not support

The NIEM registry requires that XML data elements use upper camel case and XML attributes use lower camel case.

hyphens and other "safe" characters) for compound file names like MyJobResume.pdf.

styles but again there was no correlation of preferred style to accuracy or speed. [43]

Microblogging and social networking services that limit the number of characters in a message are potential outlets for medial capitals. Using camel case between words reduces the number of spaces, and thus the number of characters, in a given message, allowing more content to fit into the limited space. Hashtags, especially long ones, often use camel case to maintain readability (e.g. #CollegeStudentProblems is easier to read than #collegestudentproblems);^[39] this practice improves accessibility as screen readers recognize CamelCase in parsing composite hashtags.^[40] In website URLs, spaces are percent-encoded as "%20", making the address longer and less human readable. By omitting spaces, camel case does not have this problem.

Camel case has been criticized as negatively impacting readability due to the removal of spaces and uppercasing of every word.

A 2009 study of 135 subjects comparing snake case (underscored identifiers) to camel case found that camel case identifiers

were recognized with higher accuracy among all subjects. Subjects recognized snake case identifiers more quickly than camel

case identifiers. Training in camel case sped up camel case recognition and slowed snake case recognition, although this effect

underscores. However, these preferences had no statistical correlation to accuracy or speed when controlling for other variables.

A 2010 follow-up study used a similar study design with 15 subjects consisting of expert programmers trained primarily in snake

response. Subjects recognized identifiers in snake case more quickly than camel case. The study used eye-tracking equipment

and found that the difference in speed for its subjects was primarily due to the fact that average duration of fixations for camel-

case was significantly higher than that of snake case for 3-part identifiers. The survey recorded a mixture of preferred identifier

Naming convention (programming)

Small caps

• Snake case

Proceedings of the third ACM SIGPLAN conference on

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terms of camel-cased identifiers, this has a greater impact on identifiers that include short words and especially acronyms.

For example, consider the acronym ID found in the identifier

klOuterIIDPath. Because of the run of uppercase letters, the

task of reading klOuterIIDPath, in particular the identification

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Unicase

case. It used a static rather than animated stimulus and found perfect accuracy in both styles except for one incorrect camel case

involved coefficients with high p-values. The study also conducted a subjective survey and found that non-programmers either

preferred underscores or had no preference, and 38% of programmers trained in camel case stated a preference for

Most popular command-line interfaces and scripting languages cannot easily handle file names that contain embedded spaces

(usually requiring the name to be put in quotes). Therefore, users of those systems often resort to camel case (or underscores,

 Alternating caps Capitalization Caps lock

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 Convert text to CamelCase △ OASIS Cover Pages: CamelCase for Naming XML-Related Components ☑ Convert text to CamelCase, Title Case, Uppercase and lowercase ☑ Demystifying Common Casings in Programming: What They Are and When to Use Them V • T • E Canons of page construction · Column · Even working · Margin · Page numbering · Paper size · Pagination · Pull quote · **Page** Recto and verso · Intentionally blank page Alignment · Leading · River · Runaround · Widows and orphans **Paragraph**

Typeface anatomy

Visual distinction

Horizontal aspects

Vertical aspects

Blackletter type

Roman type

Gaelic type

Specialist

Capitalization

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conventions (i.e., camelCase and under_score) affect code

comprehension is presented. An eye tracker is used to

capture quantitative data from human subjects during an

study published at ICPC 2009 (Binkley et al.) that used a

experiment. The intent of this study is to replicate a previous

timed response test method to acquire data. The use of eye-

discussed. One main difference is that subjects were trained

While results indicate no difference in accuracy between the

two styles, subjects recognize identifiers in the underscore

tracking equipment gives additional insight and overcomes

some limitations of traditional data gathering techniques.

Similarities and differences between the two studies are

mainly in the underscore style and were all programmers.

ISBN 978-1-4244-7604-6. S2CID 14170019 2. (download

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Fraktur · Rotunda · Schwabacher

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Record type · Display typeface (script, fat face, reverse-contrast)

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