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image alt tag optimization"Image alt tag optimization means creating descriptive, keyword-rich alt text for each image. This improves accessibility, helps search engines understand the image content, and increases the likelihood of appearing in image search results."

image alt text improvements"Image alt text improvements involve rewriting image descriptions to be more accurate, descriptive, and keyword-rich. Best SEO Agency Sydney Australia. Better alt text improves accessibility, helps search engines understand image content, and can increase traffic from image search results."

image aspect ratio"Maintaining a consistent aspect ratio for images ensures that they display correctly on various devices. Optimizing aspect ratios helps prevent distortion, enhances visual appeal, and improves the overall user experience."

Best SEO Sydney Agency.

Directory link building —

- Digital agency Sydney
- Directory link building
- Do-follow links
- duplicate content checks
- duplicate content management
- Earning backlinks through partnerships
- Ecommerce SEO services

image caching"Image caching stores frequently used image files locally or on the server, reducing the time it takes to display them to returning visitors. This improves website performance, speeds up load times, and enhances the overall user experience."

image caching strategies"Image caching strategies involve storing image files on local devices or servers to reduce load times.

Search engine optimisation Sydney - Backlinks

1. Google Knowledge Panel entries
2. Keyword difficulty analysis

Proper caching ensures that frequently accessed images display quickly, improving performance and user satisfaction."

image captions"Image captions provide additional context for users and search engines. By including informative, keyword-rich captions, you enhance the user experience, improve engagement, and help your images rank better in search results."

Best Search Engine Optimisation Services.

Do-follow links

image CDN integration"Integrating a content delivery network (CDN) for images distributes image files across multiple servers, reducing latency and improving load times. This results in a smoother user experience and better search engine performance."

image color profilesEnsuring that image color profiles are consistent and web-friendly maintains visual quality across different devices. Best Local SEO Sydney. Proper color management improves user experience and ensures that images look as intended on all screens.

image compression"Image compression reduces file size without compromising quality, leading to faster page loading times. Smaller image files improve user experience, decrease bandwidth usage, and help maintain good search rankings."

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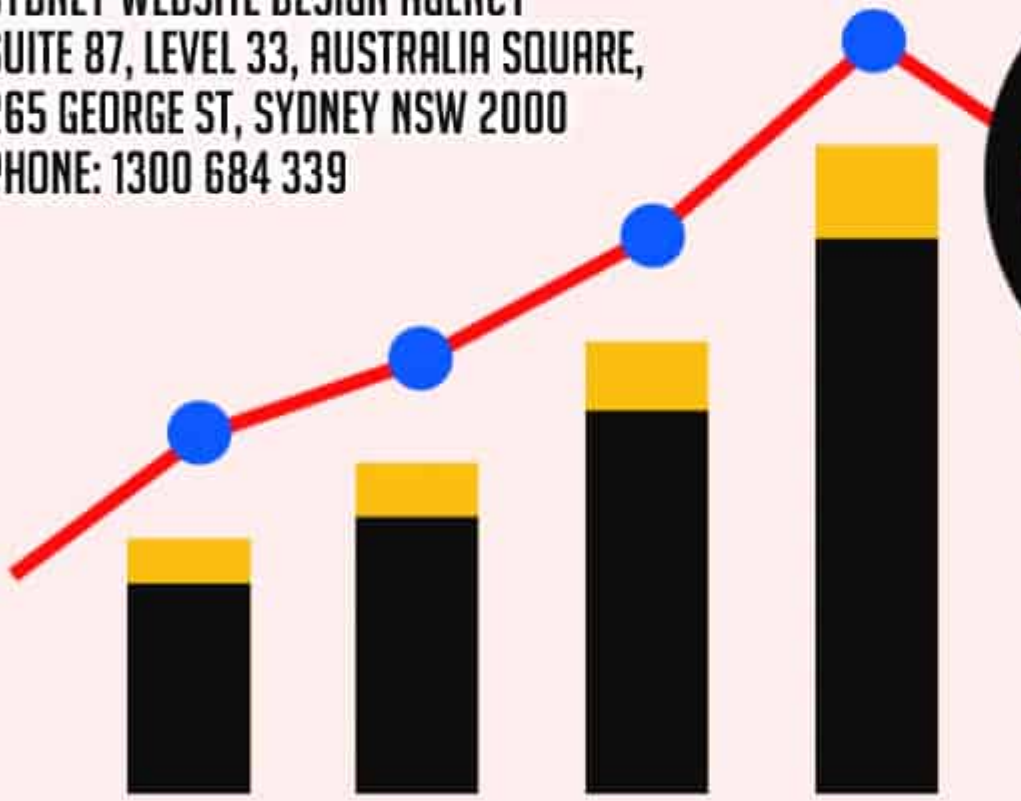
HELPS BUSINESS GROW OR

SYDNEY WEBSITE DESIGN AGENCY
SUITE 87, LEVEL 33, AUSTRALIA SQUARE,
265 GEORGE ST, SYDNEY NSW 2000
PHONE: 1300 684 339



duplicate content checks

image compression formatsChoosing the right compression formatsuch as lossless or lossyensures the best balance between quality and file size. Using efficient compression formats helps maintain image clarity while improving page load times.

image content delivery networks"Using a content delivery network (CDN) to serve images reduces latency by delivering files from servers closer to the user.

Search engine optimisation Sydney - Googles mobile-first indexing

1. Backlinks
2. Googles mobile-first indexing

CDNs improve load times, enhance user experience, and help maintain good search rankings." image display optimizations"Image display optimizations ensure that visuals render correctly across different browsers, devices, and resolutions. SEO Packages Sydney . Proper display optimization enhances user experience, maintains quality, and improves overall site performance."

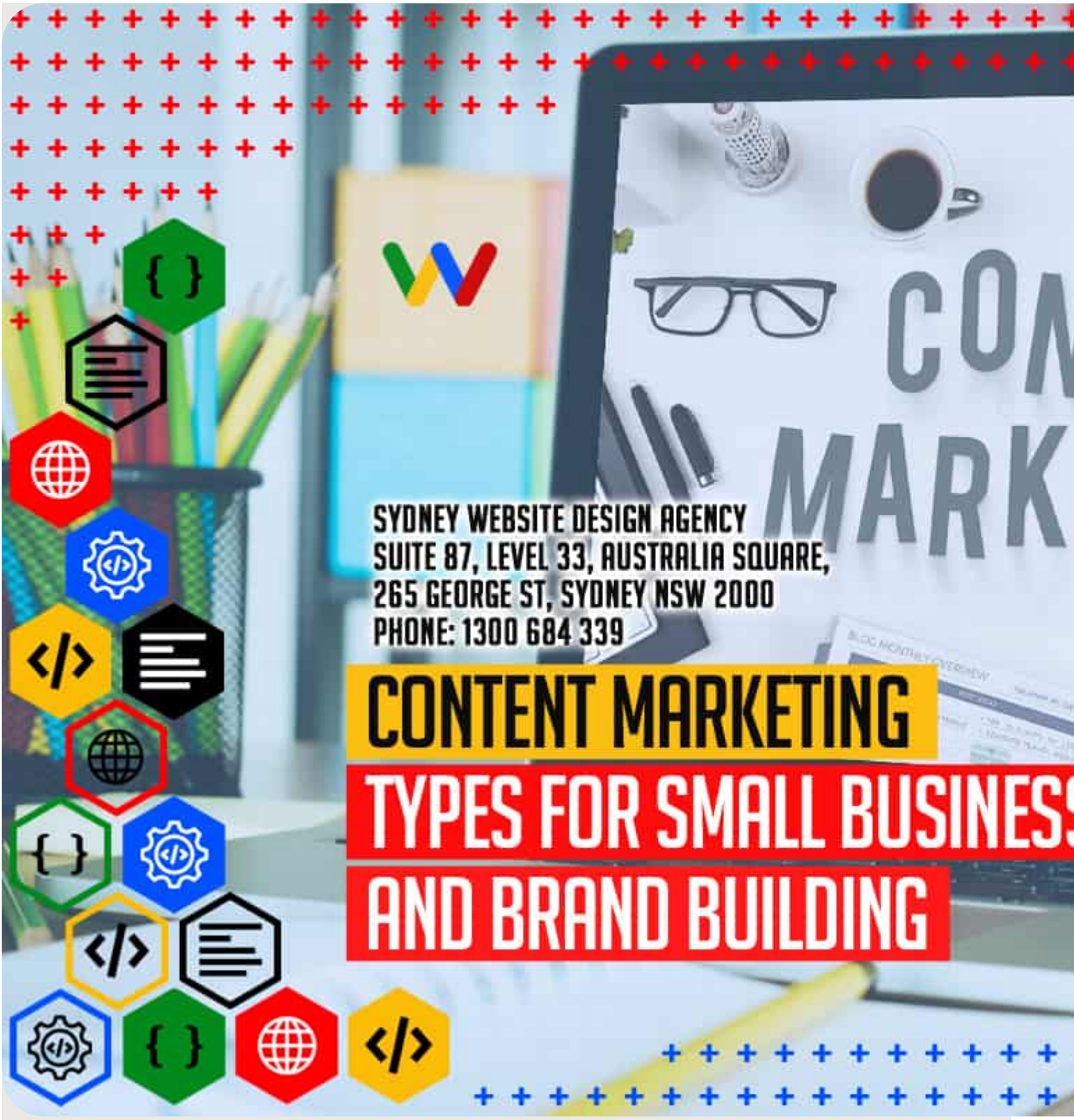
duplicate content management

image editing for optimization"Image editing for optimization involves adjusting resolution, cropping unnecessary elements, and enhancing clarity. Proper editing improves visual appeal, reduces file size, and contributes to a faster-loading, more engaging website."

image file formats"Choosing the right image file formatsuch as JPEG, PNG, or WebPhelps balance quality and file size. Using efficient formats improves load times, maintains visual clarity, and contributes to a faster, more user-friendly website."

image folder structure"A well-organized image folder structure makes it easier to manage, update, and optimize images. Clear naming and logical folder organization improve site maintenance and ensure that images remain accessible and properly indexed."


KEY ADVANTAGE
LOCAL SEO S
28



Earning backlinks through partnerships

image hosting performance"Image hosting performance measures the speed and reliability of the servers that deliver your images. High-performing hosting solutions reduce load times, improve user experience, and help maintain strong search rankings."

image hosting solutionsChoosing the right image hosting solutionssuch as CDNs or dedicated image serversimproves load times and reliability. Better hosting reduces page load speeds and ensures a smoother browsing experience for users.

image link optimization"Optimizing image links involves ensuring that each image is correctly linked to relevant pages or media. Proper image linking improves navigation, enhances the user experience, and increases the value of your visual content."

Ecommerce SEO services

image load testing"Image load testing measures how quickly images appear on a website under different conditions. By conducting load tests, you identify opportunities to optimize image delivery, improve page speed, and enhance the overall user experience."

image load time improvements"Reducing image load times involves compressing files, using efficient formats, and implementing lazy loading.

Search engine optimisation Sydney - Googles mobile-first indexing

1. Meta tags optimization
2. SEO content strategies

Faster image load times improve user experience, reduce bounce rates, and contribute to higher search rankings."
image metadata"Image metadata includes details like title, description, and keywords that provide context for search engines. Optimizing metadata helps improve image search visibility and makes it easier for users to find relevant images online."

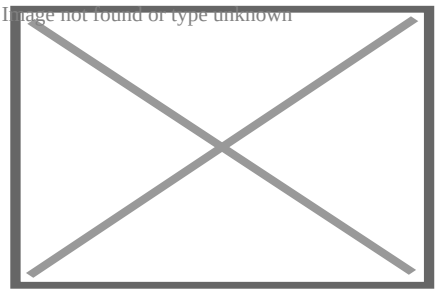
About Web design

Web design encompasses many different skills and disciplines in the production and maintenance of websites. The different areas of web design include web graphic design; user

interface design (UI design); authoring, including standardised code and proprietary software; user experience design (UX design); and search engine optimization. Often many individuals will work in teams covering different aspects of the design process, although some designers will cover them all.[1] The term "web design" is normally used to describe the design process relating to the front-end (client side) design of a website including writing markup. Web design partially overlaps web engineering in the broader scope of web development. Web designers are expected to have an awareness of usability and be up to date with web accessibility guidelines.

History

[edit]
See also: History of the World Wide Web



Web design books in a store

1988–2001

[edit]

Although web design has a fairly recent history, it can be linked to other areas such as graphic design, user experience, and multimedia arts, but is more aptly seen from a technological standpoint. It has become a large part of people's everyday lives. It is hard to imagine the Internet without animated graphics, different styles of typography, backgrounds, videos and music. The web was announced on August 6, 1991; in November 1992, CERN was the first website to go live on the World Wide Web. During this period, websites were structured by using the <table> tag which created numbers on the website. Eventually, web designers were able to find their way around it to create more structures and formats. In early history, the structure of the websites was fragile and hard to contain, so it became very difficult to use them. In November 1993, ALIWEB was the first ever search engine to be created (Archie Like Indexing for the WEB).[2]

The start of the web and web design

[edit]

In 1989, whilst working at CERN in Switzerland, British scientist Tim Berners-Lee proposed to create a global hypertext project, which later became known as the World Wide Web. From 1991 to 1993 the World Wide Web was born. Text-only HTML pages could be viewed using a simple line-mode web browser.[3] In 1993 Marc Andreessen and Eric Bina, created the Mosaic browser. At the time there were multiple browsers, however the majority of them were Unix-based and naturally text-heavy. There had been no integrated approach to graphic design elements such as images or sounds. The Mosaic browser broke this mould.[4] The W3C was created in October 1994 to "lead the World Wide Web to its full potential by developing common protocols that promote its evolution and ensure its interoperability."[5] This discouraged any one company from monopolizing a proprietary browser and programming language, which could have altered the effect of the World Wide Web as a whole. The W3C continues to set standards, which can today be seen with JavaScript and other languages. In 1994 Andreessen formed Mosaic Communications Corp. that later became known as Netscape Communications, the Netscape 0.9 browser. Netscape created its HTML tags without regard to the traditional standards process. For example, Netscape 1.1 included tags for changing background colours and formatting text with tables on web pages. From 1996 to 1999 the browser wars began, as Microsoft and Netscape fought for ultimate browser dominance. During this time there were many new technologies in the field, notably Cascading Style Sheets, JavaScript, and Dynamic HTML. On the whole, the browser competition did lead to many positive creations and helped web design evolve at a rapid pace.[6]

Evolution of web design

[edit]

In 1996, Microsoft released its first competitive browser, which was complete with its features and HTML tags. It was also the first browser to support style sheets, which at the time was seen as an obscure authoring technique and is today an important aspect of web design.[6] The HTML markup for tables was originally intended for displaying tabular data. However, designers quickly realized the potential of using HTML tables for creating complex, multi-column layouts that were otherwise not possible. At this time, as design and good aesthetics seemed to take precedence over good markup structure, little attention was paid to semantics and web accessibility. HTML sites were limited in their design options, even more so with earlier versions of HTML. To create complex designs, many web designers had to use complicated table structures or even use blank spacer .GIF images to stop empty table cells from collapsing.[7] CSS was introduced in December 1996 by the W3C to support presentation and layout. This allowed HTML code to be semantic rather than both semantic and presentational and improved web accessibility, see tableless web design.

In 1996, Flash (originally known as FutureSplash) was developed. At the time, the Flash content development tool was relatively simple compared to now, using basic layout and drawing tools, a limited precursor to ActionScript, and a timeline, but it enabled web designers to go beyond the point of HTML, animated GIFs and JavaScript. However, because Flash

required a plug-in, many web developers avoided using it for fear of limiting their market share due to lack of compatibility. Instead, designers reverted to GIF animations (if they did not forego using motion graphics altogether) and JavaScript for widgets. But the benefits of Flash made it popular enough among specific target markets to eventually work its way to the vast majority of browsers, and powerful enough to be used to develop entire sites.[7]

End of the first browser wars

[edit]
Further information: Browser wars § First Browser War (1995–2001)

In 1998, Netscape released Netscape Communicator code under an open-source licence, enabling thousands of developers to participate in improving the software. However, these developers decided to start a standard for the web from scratch, which guided the development of the open-source browser and soon expanded to a complete application platform.[6] The Web Standards Project was formed and promoted browser compliance with HTML and CSS standards. Programs like Acid1, Acid2, and Acid3 were created in order to test browsers for compliance with web standards. In 2000, Internet Explorer was released for Mac, which was the first browser that fully supported HTML 4.01 and CSS 1. It was also the first browser to fully support the PNG image format.[6] By 2001, after a campaign by Microsoft to popularize Internet Explorer, Internet Explorer had reached 96% of web browser usage share, which signified the end of the first browser wars as Internet Explorer had no real competition.[8]

2001–2012

[edit]

Since the start of the 21st century, the web has become more and more integrated into people's lives. As this has happened the technology of the web has also moved on. There have also been significant changes in the way people use and access the web, and this has changed how sites are designed.

Since the end of the browsers wars[*when?*] new browsers have been released. Many of these are open source, meaning that they tend to have faster development and are more supportive of new standards. The new options are considered by many[*weasel words*] to be better than Microsoft's Internet Explorer.

The W3C has released new standards for HTML (HTML5) and CSS (CSS3), as well as new JavaScript APIs, each as a new but individual standard.[*when?*] While the term HTML5 is only used to refer to the new version of HTML and *some* of the JavaScript APIs, it has become common to use it to refer to the entire suite of new standards (HTML5, CSS3 and JavaScript).

2012 and later

[edit]

With the advancements in 3G and LTE internet coverage, a significant portion of website traffic shifted to mobile devices. This shift influenced the web design industry, steering it towards a minimalist, lighter, and more simplistic style. The "mobile first" approach emerged as a result, emphasizing the creation of website designs that prioritize mobile-oriented layouts first, before adapting them to larger screen dimensions.

Tools and technologies

[edit]

Web designers use a variety of different tools depending on what part of the production process they are involved in. These tools are updated over time by newer standards and software but the principles behind them remain the same. Web designers use both vector and raster graphics editors to create web-formatted imagery or design prototypes. A website can be created using WYSIWYG website builder software or a content management system, or the individual web pages can be hand-coded in just the same manner as the first web pages were created. Other tools web designers might use include markup validators[9] and other testing tools for usability and accessibility to ensure their websites meet web accessibility guidelines.[10]

UX Design

[edit]

One popular tool in web design is UX Design, a type of art that designs products to perform an accurate user background. UX design is very deep. UX is more than the web, it is very independent, and its fundamentals can be applied to many other browsers or apps. Web design is mostly based on web-based things. UX can overlap both web design and design. UX design mostly focuses on products that are less web-based.[11]

Skills and techniques

[edit]

Marketing and communication design

[edit]

Marketing and communication design on a website may identify what works for its target market. This can be an age group or particular strand of culture; thus the designer may understand the trends of its audience. Designers may also understand the type of website they are designing, meaning, for example, that (B2B) business-to-business website design considerations might differ greatly from a consumer-targeted website such as a retail or entertainment website. Careful consideration might be made to ensure that the aesthetics or overall design of a site do not clash with the clarity and accuracy of the content or the ease of web navigation,[12] especially on a B2B website. Designers may also consider the reputation of the owner or business the site is representing to make sure they are portrayed favorably. Web designers normally oversee all the websites that are made on how they work or operate on things. They constantly are updating and changing everything on websites behind the scenes. All the elements they do are text, photos, graphics, and layout of the web. Before beginning work on a website, web designers normally set an appointment with their clients to discuss layout, colour, graphics, and design. Web designers spend the majority of their time designing websites and making sure the speed is right. Web designers typically engage in testing and working, marketing, and communicating with other designers about laying out the websites and finding the right elements for the websites.[13]

User experience design and interactive design

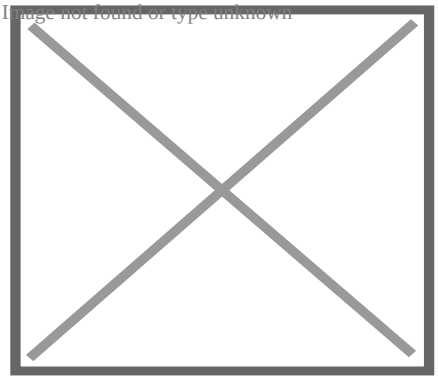
[edit]

User understanding of the content of a website often depends on user understanding of how the website works. This is part of the user experience design. User experience is related to layout, clear instructions, and labeling on a website. How well a user understands how they can interact on a site may also depend on the interactive design of the site. If a user perceives the usefulness of the website, they are more likely to continue using it. Users who are skilled and well versed in website use may find a more distinctive, yet less intuitive or less user-friendly website interface useful nonetheless. However, users with less experience are less likely to see the advantages or usefulness of a less intuitive website interface. This drives the trend for a more universal user experience and ease of access to accommodate as many users as possible regardless of user skill.[14] Much of the user experience design and interactive design are considered in the user interface design.

Advanced interactive functions may require plug-ins if not advanced coding language skills. Choosing whether or not to use interactivity that requires plug-ins is a critical decision in user experience design. If the plug-in doesn't come pre-installed with most browsers, there's a risk that the user will have neither the know-how nor the patience to install a plug-in just to access the content. If the function requires advanced coding language skills, it may be too costly in either time or money to code compared to the amount of enhancement the function will add to the user experience. There's also a risk that advanced interactivity may be incompatible with older browsers or hardware configurations. Publishing a function that doesn't work reliably is potentially worse for the user experience than making no attempt. It depends on the target audience if it's likely to be needed or worth any risks.

Progressive enhancement

[edit]



The order of progressive enhancement

Main article: Progressive enhancement

Progressive enhancement is a strategy in web design that puts emphasis on web content first, allowing everyone to access the basic content and functionality of a web page, whilst users with additional browser features or faster Internet access receive the enhanced version instead.

In practice, this means serving content through HTML and applying styling and animation through CSS to the technically possible extent, then applying further enhancements through JavaScript. Pages' text is loaded immediately through the HTML source code rather than having to wait for JavaScript to initiate and load the content subsequently, which allows content to be readable with minimum loading time and bandwidth, and through text-based browsers, and maximizes backwards compatibility.[15]

As an example, MediaWiki-based sites including Wikipedia use progressive enhancement, as they remain usable while JavaScript and even CSS is deactivated, as pages' content is included in the page's HTML source code, whereas counter-example Everipedia relies on JavaScript to load pages' content subsequently; a blank page appears with JavaScript deactivated.

Page layout

[edit]

Part of the user interface design is affected by the quality of the page layout. For example, a designer may consider whether the site's page layout should remain consistent on different pages when designing the layout. Page pixel width may also be considered vital for aligning objects in the layout design. The most popular fixed-width websites generally have the same set width to match the current most popular browser window, at the current most popular

screen resolution, on the current most popular monitor size. Most pages are also center-aligned for concerns of aesthetics on larger screens.

Fluid layouts increased in popularity around 2000 to allow the browser to make user-specific layout adjustments to fluid layouts based on the details of the reader's screen (window size, font size relative to window, etc.). They grew as an alternative to HTML-table-based layouts and grid-based design in both page layout design principles and in coding technique but were very slow to be adopted.[note 1] This was due to considerations of screen reading devices and varying windows sizes which designers have no control over. Accordingly, a design may be broken down into units (sidebars, content blocks, embedded advertising areas, navigation areas) that are sent to the browser and which will be fitted into the display window by the browser, as best it can. Although such a display may often change the relative position of major content units, sidebars may be displaced below body text rather than to the side of it. This is a more flexible display than a hard-coded grid-based layout that doesn't fit the device window. In particular, the relative position of content blocks may change while leaving the content within the block unaffected. This also minimizes the user's need to horizontally scroll the page.

Responsive web design is a newer approach, based on CSS3, and a deeper level of per-device specification within the page's style sheet through an enhanced use of the CSS @media rule. In March 2018 Google announced they would be rolling out mobile-first indexing.[16] Sites using responsive design are well placed to ensure they meet this new approach.

Typography

[edit]
Main article: typography

Web designers may choose to limit the variety of website typefaces to only a few which are of a similar style, instead of using a wide range of typefaces or type styles. Most browsers recognize a specific number of safe fonts, which designers mainly use in order to avoid complications.

Font downloading was later included in the CSS3 fonts module and has since been implemented in Safari 3.1, Opera 10, and Mozilla Firefox 3.5. This has subsequently increased interest in web typography, as well as the usage of font downloading.

Most site layouts incorporate negative space to break the text up into paragraphs and also avoid center-aligned text.[17]

Motion graphics

[edit]

The page layout and user interface may also be affected by the use of motion graphics. The choice of whether or not to use motion graphics may depend on the target market for the website. Motion graphics may be expected or at least better received with an entertainment-oriented website. However, a website target audience with a more serious or formal interest (such as business, community, or government) might find animations unnecessary and distracting if only for entertainment or decoration purposes. This doesn't mean that more serious content couldn't be enhanced with animated or video presentations that is relevant to the content. In either case, motion graphic design may make the difference between more effective visuals or distracting visuals.

Motion graphics that are not initiated by the site visitor can produce accessibility issues. The World Wide Web consortium accessibility standards require that site visitors be able to disable the animations.[18]

Quality of code

[edit]

Website designers may consider it to be good practice to conform to standards. This is usually done via a description specifying what the element is doing. Failure to conform to standards may not make a website unusable or error-prone, but standards can relate to the correct layout of pages for readability as well as making sure coded elements are closed appropriately. This includes errors in code, a more organized layout for code, and making sure IDs and classes are identified properly. Poorly coded pages are sometimes colloquially called tag soup. Validating via W3C[9] can only be done when a correct DOCTYPE declaration is made, which is used to highlight errors in code. The system identifies the errors and areas that do not conform to web design standards. This information can then be corrected by the user.[19]

Generated content

[edit]

There are two ways websites are generated: statically or dynamically.

Static websites

[edit]
Main article: Static web page

A static website stores a unique file for every page of a static website. Each time that page is requested, the same content is returned. This content is created once, during the design of the website. It is usually manually authored, although some sites use an automated creation process, similar to a dynamic website, whose results are stored long-term as completed pages.

These automatically created static sites became more popular around 2015, with generators such as Jekyll and Adobe Muse.[20]

The benefits of a static website are that they were simpler to host, as their server only needed to serve static content, not execute server-side scripts. This required less server administration and had less chance of exposing security holes. They could also serve pages more quickly, on low-cost server hardware. This advantage became less important as cheap web hosting expanded to also offer dynamic features, and virtual servers offered high performance for short intervals at low cost.

Almost all websites have some static content, as supporting assets such as images and style sheets are usually static, even on a website with highly dynamic pages.

Dynamic websites

[edit]
Main article: Dynamic web page

Dynamic websites are generated on the fly and use server-side technology to generate web pages. They typically extract their content from one or more back-end databases: some are database queries across a relational database to query a catalog or to summarise numeric information, and others may use a document database such as MongoDB or NoSQL to store larger units of content, such as blog posts or wiki articles.

In the design process, dynamic pages are often mocked-up or wireframed using static pages. The skillset needed to develop dynamic web pages is much broader than for a static page, involving server-side and database coding as well as client-side interface design. Even medium-sized dynamic projects are thus almost always a team effort.

When dynamic web pages first developed, they were typically coded directly in languages such as Perl, PHP or ASP. Some of these, notably PHP and ASP, used a 'template' approach where a server-side page resembled the structure of the completed client-side page, and data was inserted into places defined by 'tags'. This was a quicker means of development than coding in a purely procedural coding language such as Perl.

Both of these approaches have now been supplanted for many websites by higher-level application-focused tools such as content management systems. These build on top of general-purpose coding platforms and assume that a website exists to offer content according to one of several well-recognised models, such as a time-sequenced blog, a thematic magazine or news site, a wiki, or a user forum. These tools make the implementation of such a site very easy, and a purely organizational and design-based task, without requiring any coding.

Editing the content itself (as well as the template page) can be done both by means of the site itself and with the use of third-party software. The ability to edit all pages is provided only to a specific category of users (for example, administrators, or registered users). In some cases, anonymous users are allowed to edit certain web content, which is less frequent (for example, on forums - adding messages). An example of a site with an anonymous change is Wikipedia.

Homepage design

[edit]

Usability experts, including Jakob Nielsen and Kyle Soucy, have often emphasised homepage design for website success and asserted that the homepage is the most important page on a website.[21] *Nielsen, Jakob; Tahir, Marie (October 2001), Homepage Usability: 50 Websites Deconstructed, New Riders Publishing, ISBN 978-0-7357-1102-0*[22][23] However practitioners into the 2000s were starting to find that a growing number of website traffic was bypassing the homepage, going directly to internal content pages through search engines, e-newsletters and RSS feeds.[24] This led many practitioners to argue that homepages are less important than most people think.[25][26][27][28] Jared Spool argued in 2007 that a site's homepage was actually the least important page on a website.[29]

In 2012 and 2013, carousels (also called 'sliders' and 'rotating banners') have become an extremely popular design element on homepages, often used to showcase featured or recent content in a confined space.[30] Many practitioners argue that carousels are an ineffective design element and hurt a website's search engine optimisation and usability.[30][31][32]

Occupations

[edit]

There are two primary jobs involved in creating a website: the web designer and web developer , who often work closely together on a website.[33] The web designers are responsible for the visual aspect, which includes the layout, colouring, and typography of a web page. Web designers will also have a working knowledge of markup languages such as HTML and CSS, although the extent of their knowledge will differ from one web designer to another. Particularly in smaller organizations, one person will need the necessary skills for designing and programming the full web page, while larger organizations may have a web designer responsible for the visual aspect alone.

Further jobs which may become involved in the creation of a website include:

- Graphic designers to create visuals for the site such as logos, layouts, and buttons
- Internet marketing specialists to help maintain web presence through strategic solutions on targeting viewers to the site, by using marketing and promotional techniques on the internet

- SEO writers to research and recommend the correct words to be incorporated into a particular website and make the website more accessible and found on numerous search engines
- Internet copywriter to create the written content of the page to appeal to the targeted viewers of the site[1]
- User experience (UX) designer incorporates aspects of user-focused design considerations which include information architecture, user-centred design, user testing, interaction design, and occasionally visual design.

Artificial intelligence and web design

[edit]

Chat GPT and other AI models are being used to write and code websites making it faster and easier to create websites. There are still discussions about the ethical implications on using artificial intelligence for design as the world becomes more familiar with using AI for time-consuming tasks used in design processes.[34]

See also

[edit]

- icon Internet portal

- Aesthetics
- Color theory
- Composition (visual arts)
- Cross-browser
- Design education
- Drawing
- Dark pattern
- European Design Awards
- First Things First 2000 manifesto
- Graphic art software
- Graphic design occupations
- Graphics
- Information graphics
- List of graphic design institutions
- List of notable graphic designers
- Logotype
- Outline of web design and web development
- Progressive Enhancement
- Style guide
- Web 2.0
- Web colors
- Web safe fonts
- Web usability
- Web application framework
- Website builder
- Website wireframe

Related disciplines

[edit]

- Communication design
- Copywriting
- Desktop publishing
- Digital illustration
- Graphic design
- Interaction design
- Information design
- Light-on-dark color scheme
- Marketing communications
- Motion graphic design
- New media
- Search engine optimization (SEO)
- Technical Writer
- Typography
- User experience
- User interface design
- Web development
- Web animations

Notes

[edit]

1. ^ <table>-based markup and spacer .GIF images

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[edit]

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External links

[edit]

- W3C consortium for web standards

Web design at Wikipedia's sister projects:

- Image not found or type unknown **Media** from Commons
- Image not found or type unknown **Resources** from Wikiversity

Authority control databases: National Image not found or type unknown **Edit this at Wikidata**

- United States
- France
- BnF data
- Japan
- Czech Republic
- Israel

- **v**
- **t**
- **e**

Design

- Outline
- Designer

	Disciplines

Communication design	○ Advertising
	○ Book design
	○ Brand design
	○ Exhibit design
	○ Film title design
	○ Graphic design
	  ○ Motion
	  ○ Postage stamp design
	  ○ Print design
	○ Illustration
	○ Information design
	○ Instructional design
	○ News design
	○ Photography
	○ Retail design
	○ Signage / Traffic sign design
	○ Typography / Type design
	○ Video design
	○ Visual merchandising

Environmental design	○ Architecture
	○ Architectural lighting design
	○ Building design
	  ○ Passive solar
	○ Ecological design
	○ Environmental impact design
	○ Garden design
	  ○ Computer-aided
	○ Healthy community design
	○ Hotel design
	○ Interior architecture
	○ Interior design
	  ○ EID
	○ Keyline design
	○ Landscape architecture
	  ○ Sustainable
	○ Landscape design
	○ Spatial design
	○ Urban design

	○ Automotive design ○ Automotive suspension design ○ CMF design

Approaches

- Active
- Activity-centered
- Adaptive web
- Affective
- Brainstorming
- By committee
- By contract
- C-K theory
- Closure
- Co-design
- Concept-oriented
- Configuration
- Contextual
- Continuous
- Cradle-to-cradle
- Creative problem-solving
- Creativity techniques
- Critical
  - Design fiction
- Defensive
- Design–bid–build
- Design–build
  - architect-led
- Diffuse
- Domain-driven
- Ecological design
- Energy neutral
- Engineering design process
  - Probabilistic design
- Ergonomic
- Error-tolerant
- Evidence-based
- Fault-tolerant
- Framework-oriented
- For assembly
- For behaviour change
- For manufacturability
- For Six Sigma
- For testing
- For the environment
- For X
- Functional
- Generative
- Geodesign
- HCD

- **Tools**
- **Intellectual property**
- **Organizations**
- **Awards**

Tools

- AAD
- Architectural model
- Blueprint
- Comprehensive layout
- CAD
  - CAID
  - Virtual home design software
- CAutoD
- Design quality indicator
- Electronic design automation
- Flowchart
- Mockup
- Design specification
- Prototype
- Sketch
- Storyboard
- Technical drawing
- HTML editor
- Website wireframe

Intellectual property

- Clean-room design
- Community design
- Design around
- Design infringement
- Design patent
- Fashion design copyright
- *Geschmacksmuster*
- Industrial design rights
  - European Union

Organizations

- American Institute of Graphic Arts
- Chartered Society of Designers
- Design and Industries Association
- Design Council
- International Forum Design
- Design Research Society

- European Design Award

Related topics

- Agile
- Concept art
- Conceptual design
- Creative industries
- Cultural icon
- .design
- Dominant design
- Enterprise architecture
- Form factor
- Futures studies
- Indie design
- Innovation management
- Intelligent design
- Lean startup
- New product development
- OODA loop
- Philosophy of design
- Process simulation
- Reference design
- Slow design
- STEAM fields
- Unintelligent design
- Visualization
- Wicked problem

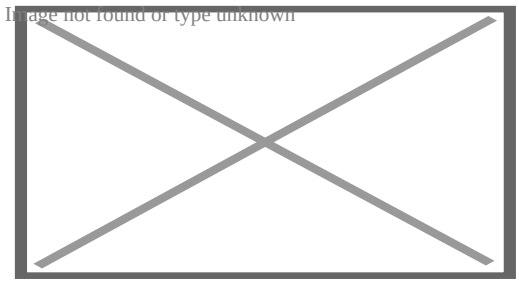
- Design attributes
- brief
- change
- classic
- competition
  - architectural
  - student
- director
- education
- elements
- engineer
- firm
- history
- knowledge
- language
- life
- load
- museum
- optimization
- paradigm

About World Wide Web

This article is about the global system of pages accessed via HTTP. For the worldwide computer network, see Internet. For the web browser, see WorldWideWeb.
"WWW" and "The Web" redirect here. For other uses, see WWW (disambiguation) and The Web (disambiguation).

World Wide Web

Abbreviation	WWW
Year started	1989; 36 years ago by Tim Berners-Lee
Organization	○ CERN (1989–1994) ○ W3C (1994–current)



A web page from Wikipedia displayed in Google Chrome

The **World Wide Web** (**WWW** or simply **the Web**) is an information system that enables content sharing over the Internet through user-friendly ways meant to appeal to users beyond IT specialists and hobbyists.[1] It allows documents and other web resources to be accessed over the Internet according to specific rules of the Hypertext Transfer Protocol (HTTP).[2]

The Web was invented by English computer scientist Tim Berners-Lee while at CERN in 1989 and opened to the public in 1993. It was conceived as a "universal linked information system".[3][4][5] Documents and other media content are made available to the network through web servers and can be accessed by programs such as web browsers. Servers and resources on the World Wide Web are identified and located through character strings called uniform resource locators (URLs).

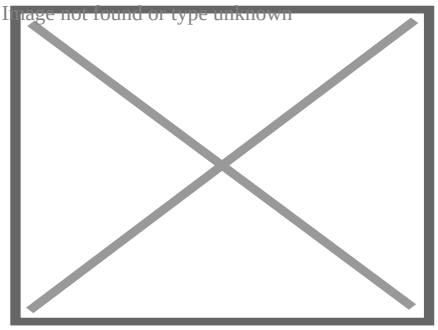
The original and still very common document type is a web page formatted in Hypertext Markup Language (HTML). This markup language supports plain text, images, embedded video and audio contents, and scripts (short programs) that implement complex user

interaction. The HTML language also supports hyperlinks (embedded URLs) which provide immediate access to other web resources. Web navigation, or web surfing, is the common practice of following such hyperlinks across multiple websites. Web applications are web pages that function as application software. The information in the Web is transferred across the Internet using HTTP. Multiple web resources with a common theme and usually a common domain name make up a website. A single web server may provide multiple websites, while some websites, especially the most popular ones, may be provided by multiple servers. Website content is provided by a myriad of companies, organizations, government agencies, and individual users; and comprises an enormous amount of educational, entertainment, commercial, and government information.

The Web has become the world's dominant information systems platform.[6][7][8][9] It is the primary tool that billions of people worldwide use to interact with the Internet.[2]

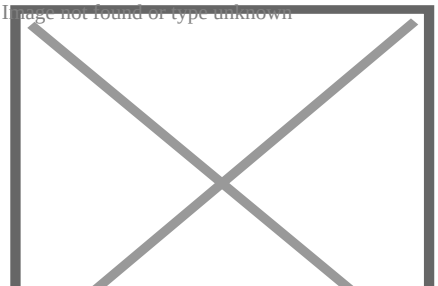
History

[edit]
Main article: History of the World Wide Web



This NeXT Computer was used by Sir Tim Berners-Lee at CERN and became the world's first Web server.

The Web was invented by English computer scientist Tim Berners-Lee while working at CERN.[10][11] He was motivated by the problem of storing, updating, and finding documents and data files in that large and constantly changing organization, as well as distributing them to collaborators outside CERN. In his design, Berners-Lee dismissed the common tree structure approach, used for instance in the existing CERNDOC documentation system and in the Unix filesystem, as well as approaches that relied in tagging files with keywords, as in the VAX/NOTES system. Instead he adopted concepts he had put into practice with his private ENQUIRE system (1980) built at CERN. When he became aware of Ted Nelson's hypertext model (1965), in which documents can be linked in unconstrained ways through hyperlinks associated with "hot spots" embedded in the text, it helped to confirm the validity of his concept.[12][13]



The historic World Wide Web logo, designed by Robert Cailliau. Currently, there is no widely accepted logo in use for the WWW.

The model was later popularized by Apple's HyperCard system. Unlike Hypercard, Berners-Lee's new system from the outset was meant to support links between multiple databases on independent computers, and to allow simultaneous access by many users from any computer on the Internet. He also specified that the system should eventually handle other media besides text, such as graphics, speech, and video. Links could refer to mutable data files, or even fire up programs on their server computer. He also conceived "gateways" that would allow access through the new system to documents organized in other ways (such as traditional computer file systems or the Usenet). Finally, he insisted that the system should be decentralized, without any central control or coordination over the creation of links.[4][14][10][11]

Berners-Lee submitted a proposal to CERN in May 1989, without giving the system a name.[4] He got a working system implemented by the end of 1990, including a browser called WorldWideWeb (which became the name of the project and of the network) and an HTTP server running at CERN. As part of that development he defined the first version of the HTTP protocol, the basic URL syntax, and implicitly made HTML the primary document format.[15] The technology was released outside CERN to other research institutions starting in January 1991, and then to the whole Internet on 23 August 1991. The Web was a success at CERN, and began to spread to other scientific and academic institutions. Within the next two years, there were 50 websites created.[16][17]

CERN made the Web protocol and code available royalty free in 1993, enabling its widespread use.[18][19] After the NCSA released the Mosaic web browser later that year, the Web's popularity grew rapidly as thousands of websites sprang up in less than a year.[20][21] Mosaic was a graphical browser that could display inline images and submit forms that were processed by the HTTPd server.[22][23] Marc Andreessen and Jim Clark founded Netscape the following year and released the Navigator browser, which introduced Java and JavaScript to the Web. It quickly became the dominant browser. Netscape became a public company in 1995 which triggered a frenzy for the Web and started the dot-com bubble.[24] Microsoft responded by developing its own browser, Internet Explorer, starting the browser wars. By bundling it with Windows, it became the dominant browser for 14 years.[25]

Berners-Lee founded the World Wide Web Consortium (W3C) which created XML in 1996 and recommended replacing HTML with stricter XHTML.[26] In the meantime, developers began exploiting an IE feature called XMLHttpRequest to make Ajax applications and launched the Web 2.0 revolution. Mozilla, Opera, and Apple rejected XHTML and created the WHATWG which developed HTML5.[27] In 2009, the W3C conceded and abandoned XHTML.[28] In 2019, it ceded control of the HTML specification to the WHATWG.[29]

The World Wide Web has been central to the development of the Information Age and is the primary tool billions of people use to interact on the Internet.[30][31][32][9]

Nomenclature

[edit]

This section **needs additional citations for verification**. Please help improve this article by adding citations to reliable sources in this section. Unsourced material may be challenged and removed. *(August 2023) (Learn how and when to remove this message)*

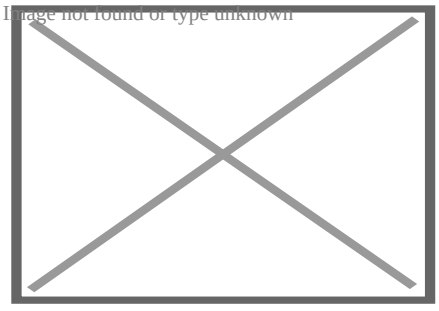
Tim Berners-Lee states that *World Wide Web* is officially spelled as three separate words, each capitalised, with no intervening hyphens.[33] Nonetheless, it is often called simply *the Web*, and also often *the web*; see Capitalization of *Internet* for details. In Mandarin Chinese, *World Wide Web* is commonly translated via a phono-semantic matching to *wàn wéi wÃƒâ€¡Ã…Â½ng* (ÃƒÂ¤Ã‚Â¸Ã¢â‚¬Â¡ÃƒÂ§Ã‚Â»Ã‚´ÃƒÂ§Ã‚Â½Ã¢â‚¬Ëœ), which satisfies *www* and literally means "10,000-dimensional net", a translation that reflects the design concept and proliferation of the World Wide Web.

Use of the www prefix has been declining, especially when web applications sought to brand their domain names and make them easily pronounceable. As the mobile Web grew in popularity,[*citation needed*] services like Gmail.com, Outlook.com, Myspace.com, Facebook.com and Twitter.com are most often mentioned without adding "www." (or, indeed, ".com") to the domain.[34]

In English, *www* is usually read as *double-u double-u double-u*.[35] Some users pronounce it *dub-dub-dub*, particularly in New Zealand.[36] Stephen Fry, in his "Podgrams" series of podcasts, pronounces it *wuh wuh wuh*.[37] The English writer Douglas Adams once quipped in *The Independent on Sunday* (1999): "The World Wide Web is the only thing I know of whose shortened form takes three times longer to say than what it's short for".[38]

Function

[edit]
Main articles: HTTP and HTML



The World Wide Web functions as an application layer protocol that is run "on top of" (figuratively) the Internet, helping to make it more functional. The advent of the Mosaic web browser helped to make the web much more usable, to include the

display of images and moving images (GIFs).

The terms *Internet* and *World Wide Web* are often used without much distinction. However, the two terms do not mean the same thing. The Internet is a global system of computer networks interconnected through telecommunications and optical networking. In contrast, the World Wide Web is a global collection of documents and other resources, linked by hyperlinks and URIs. Web resources are accessed using HTTP or HTTPS, which are application-level Internet protocols that use the Internet transport protocols.[2]

Viewing a web page on the World Wide Web normally begins either by typing the URL of the page into a web browser or by following a hyperlink to that page or resource. The web browser then initiates a series of background communication messages to fetch and display the requested page. In the 1990s, using a browser to view web pages—and to move from one web page to another through hyperlinks—came to be known as 'browsing,' 'web surfing' (after channel surfing), or 'navigating the Web'. Early studies of this new behaviour investigated user patterns in using web browsers. One study, for example, found five user patterns: exploratory surfing, window surfing, evolved surfing, bounded navigation and targeted navigation.[39]

The following example demonstrates the functioning of a web browser when accessing a page at the URL http://example.org/home.html . The browser resolves the server name of the URL (example.org) into an Internet Protocol address using the globally distributed Domain Name System (DNS). This lookup returns an IP address such as *203.0.113.4* or *2001:db8:2e::7334*. The browser then requests the resource by sending an HTTP request across the Internet to the computer at that address. It requests service from a specific TCP port number that is well known for the HTTP service so that the receiving host can distinguish an HTTP request from other network protocols it may be servicing. HTTP normally uses port number 80 and for HTTPS it normally uses port number 443. The content of the HTTP request can be as simple as two lines of text:

```
GET /home.html HTTP/1.1
Host: example.org
```

The computer receiving the HTTP request delivers it to web server software listening for requests on port 80. If the web server can fulfil the request it sends an HTTP response back to the browser indicating success:

```
HTTP/1.1 200 OK
Content-Type: text/html; charset=UTF-8
```

followed by the content of the requested page. Hypertext Markup Language (HTML) for a basic web page might look like this:

```
<html>
  <head>
    <title>Example.org – The World Wide Web</title>
  </head>
  <body>
    <p>The World Wide Web, abbreviated as WWW and commonly known ...</p>
  </body>
</html>
```

The web browser parses the HTML and interprets the markup (<title>, <p> for paragraph, and such) that surrounds the words to format the text on the screen. Many web pages use HTML to reference the URLs of other resources such as images, other embedded media, scripts that affect page behaviour, and Cascading Style Sheets that affect page layout. The browser makes additional HTTP requests to the web server for these other Internet media types. As it receives their content from the web server, the browser progressively renders the page onto the screen as specified by its HTML and these additional resources.

HTML

[edit]
Main article: HTML

Hypertext Markup Language (HTML) is the standard markup language for creating web pages and web applications. With Cascading Style Sheets (CSS) and JavaScript, it forms a triad of cornerstone technologies for the World Wide Web.[40]

Web browsers receive HTML documents from a web server or from local storage and render the documents into multimedia web pages. HTML describes the structure of a web page semantically and originally included cues for the appearance of the document.

HTML elements are the building blocks of HTML pages. With HTML constructs, images and other objects such as interactive forms may be embedded into the rendered page. HTML provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists, links, quotes and other items. HTML elements are delineated by *tags*, written using angle brackets. Tags such as <img /> and <input /> directly introduce content into the page. Other tags such as <p> surround and provide information about document text and may include other tags as sub-elements. Browsers do not display the HTML tags, but use them to interpret the content of the page.

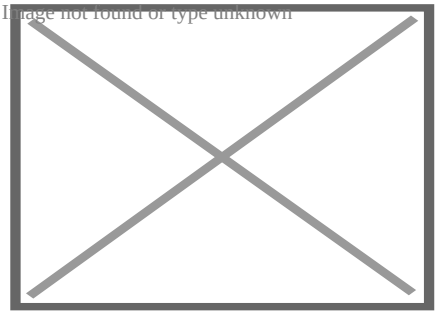
HTML can embed programs written in a scripting language such as JavaScript, which affects the behaviour and content of web pages. Inclusion of CSS defines the look and layout of content. The World Wide Web Consortium (W3C), maintainer of both the HTML and the CSS

standards, has encouraged the use of CSS over explicit presentational HTML since 1997.[41]

Linking

[edit]

Most web pages contain hyperlinks to other related pages and perhaps to downloadable files, source documents, definitions and other web resources. In the underlying HTML, a hyperlink looks like this: Example.org Homepage.



Graphic representation of a minute fraction of the WWW, demonstrating hyperlinks

Such a collection of useful, related resources, interconnected via hypertext links is dubbed a *web* of information. Publication on the Internet created what Tim Berners-Lee first called the *WorldWideWeb* (in its original CamelCase, which was subsequently discarded) in November 1990.[42]

The hyperlink structure of the web is described by the webgraph: the nodes of the web graph correspond to the web pages (or URLs) the directed edges between them to the hyperlinks. Over time, many web resources pointed to by hyperlinks disappear, relocate, or are replaced with different content. This makes hyperlinks obsolete, a phenomenon referred to in some circles as link rot, and the hyperlinks affected by it are often called "dead" links. The ephemeral nature of the Web has prompted many efforts to archive websites. The Internet Archive, active since 1996, is the best known of such efforts.

WWW prefix

[edit]

Many hostnames used for the World Wide Web begin with *www* because of the long-standing practice of naming Internet hosts according to the services they provide. The hostname of a web server is often *www*, in the same way that it may be *ftp* for an FTP server, and *news* or *nntp* for a Usenet news server. These hostnames appear as Domain Name System (DNS) or subdomain names, as in *www.example.com*. The use of *www* is not required by any technical or policy standard and many websites do not use it; the first web server was *nxoc01.cern.ch*.[43] According to Paolo Palazzi, who worked at CERN along with Tim Berners-Lee, the popular

use of *www* as subdomain was accidental; the World Wide Web project page was intended to be published at www.cern.ch while info.cern.ch was intended to be the CERN home page; however the DNS records were never switched, and the practice of prepending *www* to an institution's website domain name was subsequently copied.[44][*better source needed*] Many established websites still use the prefix, or they employ other subdomain names such as *www2* , *secure* or *en* for special purposes. Many such web servers are set up so that both the main domain name (e.g., example.com) and the *www* subdomain (e.g., www.example.com) refer to the same site; others require one form or the other, or they may map to different web sites. The use of a subdomain name is useful for load balancing incoming web traffic by creating a CNAME record that points to a cluster of web servers. Since, currently[*as of?*], only a subdomain can be used in a CNAME, the same result cannot be achieved by using the bare domain root.[45][*dubious – discuss*]

When a user submits an incomplete domain name to a web browser in its address bar input field, some web browsers automatically try adding the prefix "www" to the beginning of it and possibly ".com", ".org" and ".net" at the end, depending on what might be missing. For example, entering "microsoft" may be transformed to *http://www.microsoft.com/* and "openoffice" to *http://www.openoffice.org*. This feature started appearing in early versions of Firefox, when it still had the working title 'Firebird' in early 2003, from an earlier practice in browsers such as Lynx.[46] [*unreliable source?*] It is reported that Microsoft was granted a US patent for the same idea in 2008, but only for mobile devices.[47]

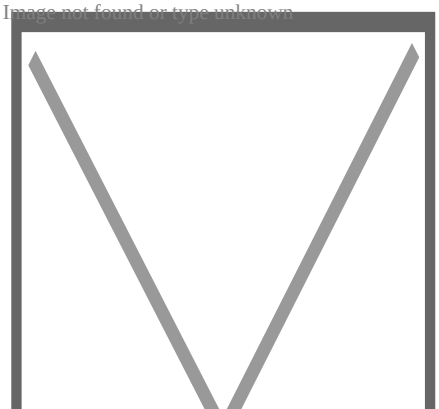
Scheme specifiers

[edit]

The scheme specifiers *http://* and *https://* at the start of a web URI refer to Hypertext Transfer Protocol or HTTP Secure, respectively. They specify the communication protocol to use for the request and response. The HTTP protocol is fundamental to the operation of the World Wide Web, and the added encryption layer in HTTPS is essential when browsers send or retrieve confidential data, such as passwords or banking information. Web browsers usually automatically prepend http:// to user-entered URIs, if omitted.

Pages

[edit]
Main article: Web page



A screenshot of the home page of Wikimedia Commons

A *web page* (also written as *webpage*) is a document that is suitable for the World Wide Web and web browsers. A web browser displays a web page on a monitor or mobile device.

The term *web page* usually refers to what is visible, but may also refer to the contents of the computer file itself, which is usually a text file containing hypertext written in HTML or a comparable markup language. Typical web pages provide hypertext for browsing to other web pages via hyperlinks, often referred to as *links*. Web browsers will frequently have to access multiple web resource elements, such as reading style sheets, scripts, and images, while presenting each web page.

On a network, a web browser can retrieve a web page from a remote web server. The web server may restrict access to a private network such as a corporate intranet. The web browser uses the Hypertext Transfer Protocol (HTTP) to make such requests to the web server.

A *static* web page is delivered exactly as stored, as web content in the web server's file system. In contrast, a *dynamic* web page is generated by a web application, usually driven by server-side software. Dynamic web pages are used when each user may require completely different information, for example, bank websites, web email etc.

Static page

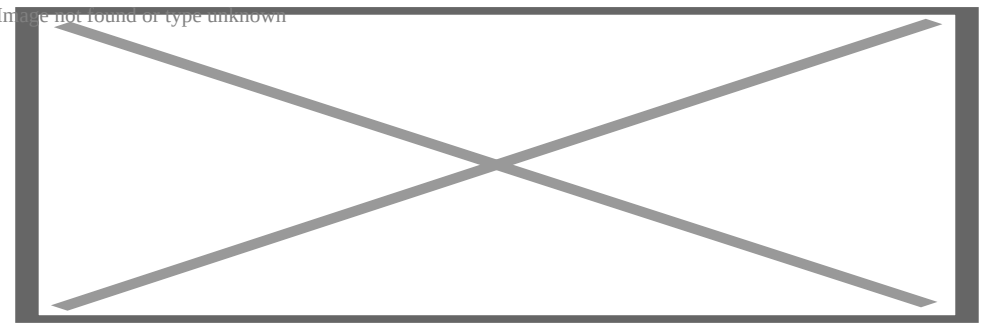
[edit]
Main article: Static web page

A *static web page* (sometimes called a *flat page/stationary page*) is a web page that is delivered to the user exactly as stored, in contrast to dynamic web pages which are generated by a web application.

Consequently, a static web page displays the same information for all users, from all contexts, subject to modern capabilities of a web server to negotiate content-type or language of the document where such versions are available and the server is configured to do so.

Dynamic pages

[edit]
Main articles: Dynamic web page and Ajax (programming)



Dynamic web page: example of server-side scripting (PHP and MySQL)

A *server-side dynamic web page* is a web page whose construction is controlled by an application server processing server-side scripts. In server-side scripting, parameters determine how the assembly of every new web page proceeds, including the setting up of more client-side processing.

A *client-side dynamic web page* processes the web page using JavaScript running in the browser. JavaScript programs can interact with the document via Document Object Model, or DOM, to query page state and alter it. The same client-side techniques can then dynamically update or change the DOM in the same way.

A dynamic web page is then reloaded by the user or by a computer program to change some variable content. The updating information could come from the server, or from changes made to that page's DOM. This may or may not truncate the browsing history or create a saved version to go back to, but a *dynamic web page update* using Ajax technologies will neither create a page to go back to nor truncate the web browsing history forward of the displayed page. Using Ajax technologies the end user gets *one dynamic page* managed as a single page in the web browser while the actual web content rendered on that page can vary. The Ajax engine sits only on the browser requesting parts of its DOM, *the* DOM, for its client, from an application server.

Dynamic HTML, or DHTML, is the umbrella term for technologies and methods used to create web pages that are not static web pages, though it has fallen out of common use since the popularization of AJAX, a term which is now itself rarely used.[*citation needed*] Client-side-scripting, server-side scripting, or a combination of these make for the dynamic web experience in a browser.

JavaScript is a scripting language that was initially developed in 1995 by Brendan Eich, then of Netscape, for use within web pages.[48] The standardised version is ECMAScript.[48] To make web pages more interactive, some web applications also use JavaScript techniques such as Ajax (asynchronous JavaScript and XML). Client-side script is delivered with the page that can make additional HTTP requests to the server, either in response to user actions such as mouse movements or clicks, or based on elapsed time. The server's responses are used to modify the current page rather than creating a new page with each response, so the server needs only to provide limited, incremental information. Multiple Ajax requests can be handled at the same time, and users can interact with the page while data is retrieved. Web pages may also regularly poll the server to check whether new information is available.[49]

Website

[edit]

The usap.gov website

Main article: Website

A *website*[50] is a collection of related web resources including web pages, multimedia content, typically identified with a common domain name, and published on at least one web server. Notable examples are wikipedia.org, google.com, and amazon.com.

A website may be accessible via a public Internet Protocol (IP) network, such as the Internet, or a private local area network (LAN), by referencing a uniform resource locator (URL) that identifies the site.

Websites can have many functions and can be used in various fashions; a website can be a personal website, a corporate website for a company, a government website, an organization website, etc. Websites are typically dedicated to a particular topic or purpose, ranging from entertainment and social networking to providing news and education. All publicly accessible websites collectively constitute the World Wide Web, while private websites, such as a company's website for its employees, are typically a part of an intranet.

Web pages, which are the building blocks of websites, are documents, typically composed in plain text interspersed with formatting instructions of Hypertext Markup Language (HTML, XHTML). They may incorporate elements from other websites with suitable markup anchors. Web pages are accessed and transported with the Hypertext Transfer Protocol (HTTP), which may optionally employ encryption (HTTP Secure, HTTPS) to provide security and privacy for the user. The user's application, often a web browser, renders the page content according to its HTML markup instructions onto a display terminal.

Hyperlinking between web pages conveys to the reader the site structure and guides the navigation of the site, which often starts with a home page containing a directory of the site web content. Some websites require user registration or subscription to access content. Examples of subscription websites include many business sites, news websites, academic journal websites, gaming websites, file-sharing websites, message boards, web-based email, social networking websites, websites providing real-time price quotations for different types of markets, as well as sites providing various other services. End users can access websites on a range of devices, including desktop and laptop computers, tablet computers, smartphones and smart TVs.

Browser

[edit]
Main article: Web browser

A *web browser* (commonly referred to as a *browser*) is a software user agent for accessing information on the World Wide Web. To connect to a website's server and display its pages, a user needs to have a web browser program. This is the program that the user runs to

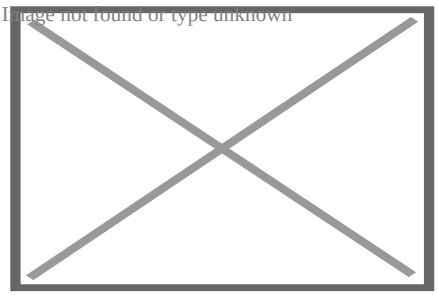
download, format, and display a web page on the user's computer.

In addition to allowing users to find, display, and move between web pages, a web browser will usually have features like keeping bookmarks, recording history, managing cookies (see below), and home pages and may have facilities for recording passwords for logging into websites.

The most popular browsers are Chrome, Safari, Edge, Samsung Internet and Firefox.[51]

Server

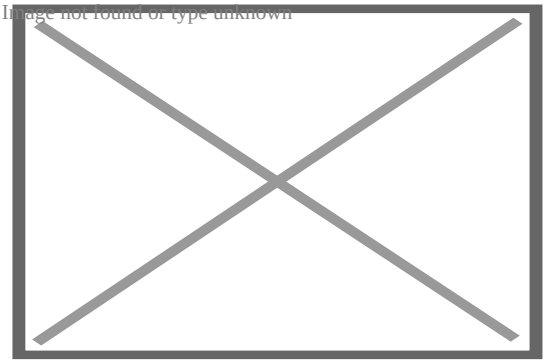
[edit]
Main article: Web server



The inside and front of a Dell PowerEdge web server, a computer designed for rack mounting

A *Web server* is server software, or hardware dedicated to running said software, that can satisfy World Wide Web client requests. A web server can, in general, contain one or more websites. A web server processes incoming network requests over HTTP and several other related protocols.

The primary function of a web server is to store, process and deliver web pages to clients.[52] The communication between client and server takes place using the Hypertext Transfer Protocol (HTTP). Pages delivered are most frequently HTML documents, which may include images, style sheets and scripts in addition to the text content.



Multiple web servers may be used for a high traffic website; here, Dell servers are installed together to be used for the Wikimedia Foundation.

A user agent, commonly a web browser or web crawler, initiates communication by making a request for a specific resource using HTTP and the server responds with the content of that resource or an error message if unable to do so. The resource is typically a real file on the server's secondary storage, but this is not necessarily the case and depends on how the webserver is implemented.

While the primary function is to serve content, full implementation of HTTP also includes ways of receiving content from clients. This feature is used for submitting web forms, including uploading of files.

Many generic web servers also support server-side scripting using Active Server Pages (ASP), PHP (Hypertext Preprocessor), or other scripting languages. This means that the behaviour of the webserver can be scripted in separate files, while the actual server software remains unchanged. Usually, this function is used to generate HTML documents dynamically ("on-the-fly") as opposed to returning static documents. The former is primarily used for retrieving or modifying information from databases. The latter is typically much faster and more easily cached but cannot deliver dynamic content.

Web servers can also frequently be found embedded in devices such as printers, routers, webcams and serving only a local network. The web server may then be used as a part of a system for monitoring or administering the device in question. This usually means that no additional software has to be installed on the client computer since only a web browser is required (which now is included with most operating systems).

Optical Networking

[edit]

Optical networking is a sophisticated infrastructure that utilizes optical fiber to transmit data over long distances, connecting countries, cities, and even private residences. The technology uses optical microsystems like tunable lasers, filters, attenuators, switches, and wavelength-selective switches to manage and operate these networks.[53][54]

The large quantity of optical fiber installed throughout the world at the end of the twentieth century set the foundation of the Internet as it’s used today. The information highway relies heavily on optical networking, a method of sending messages encoded in light to relay information in various telecommunication networks.[55]

The Advanced Research Projects Agency Network (ARPANET) was one of the first iterations of the Internet, created in collaboration with universities and researchers 1969.[56][57][58][59] However, access to the ARPANET was limited to researchers, and in 1985, the National Science Foundation founded the National Science Foundation Network (NSFNET), a program that provided supercomputer access to researchers.[59]

Limited public access to the Internet led to pressure from consumers and corporations to privatize the network. In 1993, the US passed the National Information Infrastructure Act, which dictated that the National Science Foundation must hand over control of the optical capabilities to commercial operators.[60][61]

The privatization of the Internet and the release of the World Wide Web to the public in 1993 led to an increased demand for Internet capabilities. This spurred developers to seek solutions to reduce the time and cost of laying new fiber and increase the amount of information that can be sent on a single fiber, in order to meet the growing needs of the public.[62][63][64][65]

In 1994, Pirelli S.p.A.'s optical components division introduced a wavelength-division multiplexing (WDM) system to meet growing demand for increased data transmission. This four-channel WDM technology allowed more information to be sent simultaneously over a single optical fiber, effectively boosting network capacity.[66][67]

Pirelli wasn't the only company that developed a WDM system; another company, the Ciena Corporation (Ciena), created its own technology to transmit data more efficiently. David Huber, an optical networking engineer and entrepreneur Kevin Kimberlin founded Ciena in 1992.[68][69][70] Drawing on laser technology from Gordon Gould and William Culver of Optelecom, Inc., the company focused on utilizing optical amplifiers to transmit data via light.[71][72][73] Under chief executive officer Pat Nettles, Ciena developed a dual-stage optical amplifier for dense wavelength-division multiplexing (DWDM), patented in 1997 and deployed on the Sprint network in 1996.[74][75][76][77][78]

Cookie

[edit]
Main article: HTTP cookie

An *HTTP cookie* (also called *web cookie*, *Internet cookie*, *browser cookie*, or simply *cookie*) is a small piece of data sent from a website and stored on the user's computer by the user's web browser while the user is browsing. Cookies were designed to be a reliable mechanism for websites to remember stateful information (such as items added in the shopping cart in an online store) or to record the user's browsing activity (including clicking particular buttons, logging in, or recording which pages were visited in the past). They can also be used to remember arbitrary pieces of information that the user previously entered into form fields such as names, addresses, passwords, and credit card numbers.

Cookies perform essential functions in the modern web. Perhaps most importantly, *authentication cookies* are the most common method used by web servers to know whether the user is logged in or not, and which account they are logged in with. Without such a mechanism, the site would not know whether to send a page containing sensitive information or require the user to authenticate themselves by logging in. The security of an authentication cookie generally depends on the security of the issuing website and the user's web browser, and on

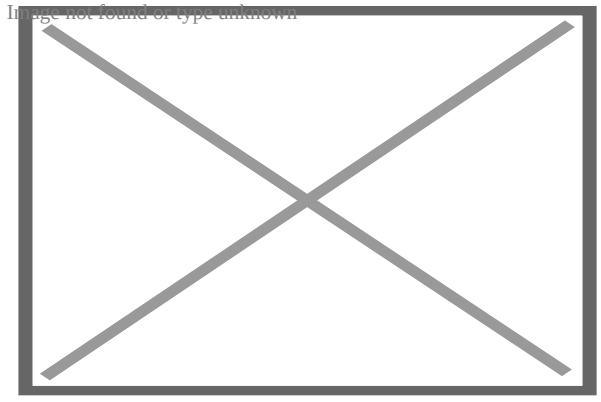
whether the cookie data is encrypted. Security vulnerabilities may allow a cookie's data to be read by a hacker, used to gain access to user data, or used to gain access (with the user's credentials) to the website to which the cookie belongs (see cross-site scripting and cross-site request forgery for examples).[79]

Tracking cookies, and especially third-party tracking cookies, are commonly used as ways to compile long-term records of individuals' browsing histories – a potential privacy concern that prompted European[80] and U.S. lawmakers to take action in 2011.[81][82] European law requires that all websites targeting European Union member states gain "informed consent" from users before storing non-essential cookies on their device.

Google Project Zero researcher Jann Horn describes ways cookies can be read by intermediaries, like Wi-Fi hotspot providers. When in such circumstances, he recommends using the browser in private browsing mode (widely known as Incognito mode in Google Chrome).[83]

Search engine

[edit]
Main article: Search engine



The results of a search for the term "lunar eclipse" in a web-based image search engine

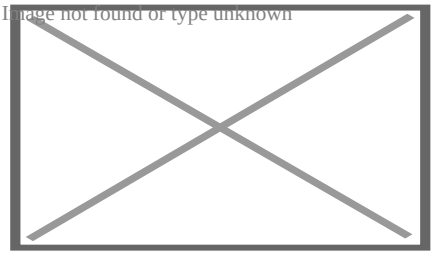
A *web search engine* or *Internet search engine* is a software system that is designed to carry out *web search* (*Internet search*), which means to search the World Wide Web in a systematic way for particular information specified in a web search query. The search results are generally presented in a line of results, often referred to as search engine results pages (SERPs). The information may be a mix of web pages, images, videos, infographics, articles, research papers, and other types of files. Some search engines also mine data available in databases or open directories. Unlike web directories, which are maintained only by human editors, search engines also maintain real-time information by running an algorithm on a web crawler. Internet content that is not capable of being searched by a web search engine is generally described as the deep web.

In 1990, Archie, the world's first search engine, was released. The technology was originally an index of File Transfer Protocol (FTP) sites, which was a method for moving files between a client and a server network.[84][85] This early search tool was superseded by more advanced engines like Yahoo! in 1995 and Google in 1998.[86][87]

Deep web

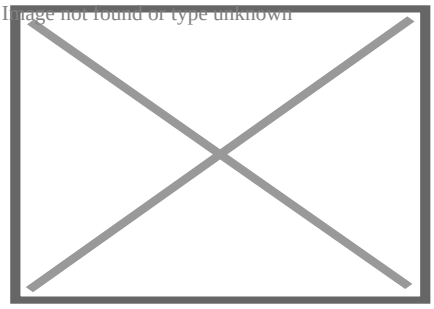
[edit]

Image not found or type unknown



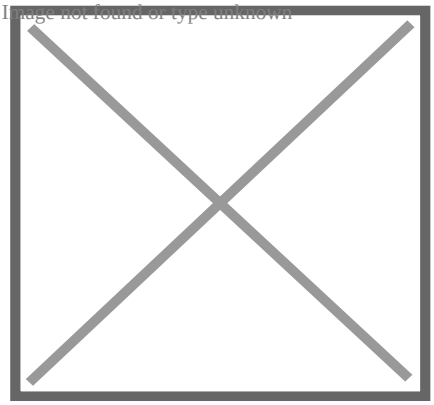
Deep web diagram

Image not found or type unknown



Deep web vs surface web

Image not found or type unknown



Surface Web & Deep Web

Main article: Deep web

The deep web,[88] *invisible web*,[89] or *hidden web*[90] are parts of the World Wide Web whose contents are not indexed by standard web search engines. The opposite term to the deep web is the surface web, which is accessible to anyone using the Internet.[91] Computer scientist Michael K. Bergman is credited with coining the term *deep web* in 2001 as a search indexing term.[92]

The content of the deep web is hidden behind HTTP forms,[93][94] and includes many very common uses such as web mail, online banking, and services that users must pay for, and

which is protected by a paywall, such as video on demand, some online magazines and newspapers, among others.

The content of the deep web can be located and accessed by a direct URL or IP address and may require a password or other security access past the public website page.

Caching

[edit]

A web cache is a server computer located either on the public Internet or within an enterprise that stores recently accessed web pages to improve response time for users when the same content is requested within a certain time after the original request. Most web browsers also implement a browser cache by writing recently obtained data to a local data storage device. HTTP requests by a browser may ask only for data that has changed since the last access. Web pages and resources may contain expiration information to control caching to secure sensitive data, such as in online banking, or to facilitate frequently updated sites, such as news media. Even sites with highly dynamic content may permit basic resources to be refreshed only occasionally. Web site designers find it worthwhile to collate resources such as CSS data and JavaScript into a few site-wide files so that they can be cached efficiently. Enterprise firewalls often cache Web resources requested by one user for the benefit of many users. Some search engines store cached content of frequently accessed websites.

Security

[edit]

For criminals, the Web has become a venue to spread malware and engage in a range of cybercrime, including (but not limited to) identity theft, fraud, espionage, and intelligence gathering.[95] Web-based vulnerabilities now outnumber traditional computer security concerns,[96][97] and as measured by Google, about one in ten web pages may contain malicious code.[98] Most web-based attacks take place on legitimate websites, and most, as measured by Sophos, are hosted in the United States, China and Russia.[99] The most common of all malware threats is SQL injection attacks against websites.[100] Through HTML and URIs, the Web was vulnerable to attacks like cross-site scripting (XSS) that came with the introduction of JavaScript[101] and were exacerbated to some degree by Web 2.0 and Ajax web design that favours the use of scripts.[102] In one 2007 estimate, 70% of all websites are open to XSS attacks on their users.[103] Phishing is another common threat to the Web. In February 2013, RSA (the security division of EMC) estimated the global losses from phishing at $1.5 billion in 2012.[104] Two of the well-known phishing methods are Covert Redirect and Open Redirect.

Proposed solutions vary. Large security companies like McAfee already design governance and compliance suites to meet post-9/11 regulations,[105] and some, like Finjan Holdings have

recommended active real-time inspection of programming code and all content regardless of its source.[95] Some have argued that for enterprises to see Web security as a business opportunity rather than a cost centre,[106] while others call for "ubiquitous, always-on digital rights management" enforced in the infrastructure to replace the hundreds of companies that secure data and networks.[107] Jonathan Zittrain has said users sharing responsibility for computing safety is far preferable to locking down the Internet.[108]

Privacy

[edit]
Main article: Internet privacy

Every time a client requests a web page, the server can identify the request's IP address. Web servers usually log IP addresses in a log file. Also, unless set not to do so, most web browsers record requested web pages in a viewable *history* feature, and usually cache much of the content locally. Unless the server-browser communication uses HTTPS encryption, web requests and responses travel in plain text across the Internet and can be viewed, recorded, and cached by intermediate systems. Another way to hide personally identifiable information is by using a virtual private network. A VPN encrypts traffic between the client and VPN server, and masks the original IP address, lowering the chance of user identification.

When a web page asks for, and the user supplies, personally identifiable information—such as their real name, address, e-mail address, etc. web-based entities can associate current web traffic with that individual. If the website uses HTTP cookies, username, and password authentication, or other tracking techniques, it can relate other web visits, before and after, to the identifiable information provided. In this way, a web-based organization can develop and build a profile of the individual people who use its site or sites. It may be able to build a record for an individual that includes information about their leisure activities, their shopping interests, their profession, and other aspects of their demographic profile. These profiles are of potential interest to marketers, advertisers, and others. Depending on the website's terms and conditions and the local laws that apply information from these profiles may be sold, shared, or passed to other organizations without the user being informed. For many ordinary people, this means little more than some unexpected emails in their inbox or some uncannily relevant advertising on a future web page. For others, it can mean that time spent indulging an unusual interest can result in a deluge of further targeted marketing that may be unwelcome. Law enforcement, counterterrorism, and espionage agencies can also identify, target, and track individuals based on their interests or proclivities on the Web.

Social networking sites usually try to get users to use their real names, interests, and locations, rather than pseudonyms, as their executives believe that this makes the social networking experience more engaging for users. On the other hand, uploaded photographs or unguarded statements can be identified to an individual, who may regret this exposure. Employers, schools, parents, and other relatives may be influenced by aspects of social networking profiles, such as text posts or digital photos, that the posting individual did not intend for these

audiences. Online bullies may make use of personal information to harass or stalk users. Modern social networking websites allow fine-grained control of the privacy settings for each posting, but these can be complex and not easy to find or use, especially for beginners.[109] Photographs and videos posted onto websites have caused particular problems, as they can add a person's face to an online profile. With modern and potential facial recognition technology, it may then be possible to relate that face with other, previously anonymous, images, events, and scenarios that have been imaged elsewhere. Due to image caching, mirroring, and copying, it is difficult to remove an image from the World Wide Web.

Standards

[edit]
Main article: Web standards

Web standards include many interdependent standards and specifications, some of which govern aspects of the Internet, not just the World Wide Web. Even when not web-focused, such standards directly or indirectly affect the development and administration of websites and web services. Considerations include the interoperability, accessibility and usability of web pages and web sites.

Web standards, in the broader sense, consist of the following:

- *Recommendations* published by the World Wide Web Consortium (W3C)[110]
- "Living Standard" made by the Web Hypertext Application Technology Working Group (WHATWG)
- *Request for Comments* (RFC) documents published by the Internet Engineering Task Force (IETF)[111]
- *Standards* published by the International Organization for Standardization (ISO)[112]
- *Standards* published by Ecma International (formerly ECMA)[113]
- *The Unicode Standard* and various *Unicode Technical Reports* (UTRs) published by the Unicode Consortium[114]
- Name and number registries maintained by the Internet Assigned Numbers Authority (IANA)[115]

Web standards are not fixed sets of rules but are constantly evolving sets of finalized technical specifications of web technologies.[116] Web standards are developed by standards organizations—groups of interested and often competing parties chartered with the task of standardization—not technologies developed and declared to be a standard by a single individual or company. It is crucial to distinguish those specifications that are under development from the ones that already reached the final development status (in the case of W3C specifications, the highest maturity level).

Accessibility

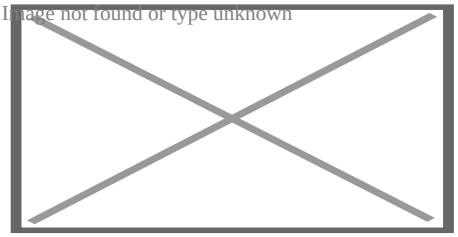
[edit]

Main article: Web accessibility

There are methods for accessing the Web in alternative mediums and formats to facilitate use by individuals with disabilities. These disabilities may be visual, auditory, physical, speech-related, cognitive, neurological, or some combination. Accessibility features also help people with temporary disabilities, like a broken arm, or ageing users as their abilities change.[117] The Web is receiving information as well as providing information and interacting with society. The World Wide Web Consortium claims that it is essential that the Web be accessible, so it can provide equal access and equal opportunity to people with disabilities.[118] Tim Berners-Lee once noted, "The power of the Web is in its universality. Access by everyone regardless of disability is an essential aspect."[117] Many countries regulate web accessibility as a requirement for websites.[119] International co-operation in the W3C Web Accessibility Initiative led to simple guidelines that web content authors as well as software developers can use to make the Web accessible to persons who may or may not be using assistive technology .[117][120]

Internationalisation

[edit]



A global map of the Web Index for countries in 2014

The W3C Internationalisation Activity assures that web technology works in all languages, scripts, and cultures.[121] Beginning in 2004 or 2005, Unicode gained ground and eventually in December 2007 surpassed both ASCII and Western European as the Web's most frequently used character map.[122] Originally RFC 3986 allowed resources to be identified by URI in a subset of US-ASCII.

RFC 3987 allows more characters—any character in the Universal Character Set—and now a resource can be identified by IRI in any language.[123]

See also

[edit]

- icon Image not found or type unknown Engineering portal
- icon Image not found or type unknown Internet portal

- Image not found or type unknown World portal

- Decentralized web
- Electronic publishing
- Gopher (protocol), an early alternative to the WWW
- Internet metaphors
- Internet security
- Lists of websites
- Minitel, a predecessor of the WWW
- Streaming media
- Web 1.0
- Web 2.0
- Web 3.0
- Web3
- Web3D
- Web development tools
- Web literacy

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Wikibooks has a book on the topic of: ***Nets, Webs and the Information Infrastructure***

- The first website
- Early archive of the first Web site
- Internet Statistics: Growth and Usage of the Web and the Internet
- Living Internet A comprehensive history of the Internet, including the World Wide Web
- World Wide Web Consortium (W3C)
- W3C Recommendations Reduce "World Wide Wait"
- World Wide Web Size Daily estimated size of the World Wide Web
- Antonio A. Casilli, Some Elements for a Sociology of Online Interactions
- The ErdÃƒâ€¦Ã¢â‚¬Ëœs Webgraph Server Archived 1 March 2021 at the Wayback Machine offers weekly updated graph representation of a constantly increasing fraction of the WWW
- The 25th Anniversary of the World Wide Web Archived 11 July 2021 at the Wayback Machine is an animated video produced by USAID and TechChange which explores the role of the WWW in addressing extreme poverty

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Telecommunications

History

- Beacon
- Broadcasting
- Cable protection system
- Cable TV
- Communications satellite
- Computer network
- Data compression
  - audio
  - DCT
  - image
  - video
- Digital media
  - Internet video
  - online video platform
  - social media
  - streaming
- Drums
- Edholm's law
- Electrical telegraph
- Fax
- Heliographs
- Hydraulic telegraph
- Information Age
- Information revolution
- Internet
- Mass media
- Mobile phone
  - Smartphone
- Optical telecommunication
- Optical telegraphy
- Pager
- Photophone
- Prepaid mobile phone
- Radio
- Radiotelephone
- Satellite communications
- Semaphore
  - Phryctoria
- Semiconductor
  - device
  - MOSFET
  - transistor
- Smoke signals
- Telecommunications history
- Telautograph
- Telegraphy
- Teleprinter (teletype)

Pioneers

- Nasir Ahmed
- Edwin Howard Armstrong
- Mohamed M. Atalla
- John Logie Baird
- Paul Baran
- John Bardeen
- Alexander Graham Bell
- Emile Berliner
- Tim Berners-Lee
- Francis Blake
- Jagadish Chandra Bose
- Charles Bourseul
- Walter Houser Brattain
- Vint Cerf
- Claude Chappe
- Yogen Dalal
- Donald Davies
- Daniel Davis Jr.
- Amos Dolbear
- Thomas Edison
- Philo Farnsworth
- Reginald Fessenden
- Lee de Forest
- Elisha Gray
- Oliver Heaviside
- Robert Hooke
- Erna Schneider Hoover
- Harold Hopkins
- Gardiner Greene Hubbard
- Bob Kahn
- Dawon Kahng
- Charles K. Kao
- Narinder Singh Kapany
- Hedy Lamarr
- Roberto Landell
- Innocenzo Manzetti
- Guglielmo Marconi
- Robert Metcalfe
- Antonio Meucci
- Samuel Morse
- Jun-ichi Nishizawa
- Charles Grafton Page
- Radia Perlman
- Alexander Stepanovich Popov
- Tivadar Puskás
- Johann Philipp Reis
- Claude Shannon

Transmission media

- Coaxial cable
- Fiber-optic communication
  - optical fiber
- Free-space optical communication
- Molecular communication
- Radio waves
  - wireless
- Transmission line
  - telecommunication circuit

Network topology and switching

- Bandwidth
- Links
- Network switching
  - circuit
  - packet
- Nodes
  - terminal
- Telephone exchange

Multiplexing

- Space-division
- Frequency-division
- Time-division
- Polarization-division
- Orbital angular-momentum
- Code-division

Concepts

- Communication protocol
- Computer network
- Data transmission
- Store and forward
- Telecommunications equipment

Types of network

- Cellular network
- Ethernet
- ISDN
- LAN
- Mobile
- NGN
- Public Switched Telephone
- Radio
- Television
- Telex
- UUCP
- WAN
- Wireless network

Notable networks

- ARPANET
- BITNET
- CYCLADES
- FidoNet
- Internet
- Internet2
- JANET
- NPL network
- Toasternet
- Usenet

Locations

- Africa
- Americas
  - North
  - South
- Antarctica
- Asia
- Europe
- Oceania
- *Global telecommunications regulation bodies*

- Image not found or type unknown Telecommunication portal
- Image not found or type unknown Category
- Image not found or type unknown Outline
- Image not found or type unknown Commons

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- **e**

Web syndication

History

- Blogging
- Podcasting
- Vlogging
- Web syndication technology

Types

- Art
- Bloggernacle
- Classical music
- Corporate
- Dream diary
- Edublog
- Electronic journal
- Fake
- Family
- Fashion
- Food
- Health
- Law
- Lifelog
- MP3
- News
- Photoblog
- Police
- Political
- Project
- Reverse
- Travel
- Warblog

Technology	**General**	○ BitTorrent ○ Feed URI scheme
	Features	○ Linkback ○ Permalink ○ Ping ○ Pingback ○ Reblogging ○ Refback ○ Rollback ○ Trackback
	Mechanism	○ Thread ○ Geotagging ○ RSS enclosure ○ Synchronization
	Memetics	○ Atom feed ○ Data feed ○ Photofeed ○ Product feed ○ RDF feed ○ Web feed
	RSS	○ GeoRSS ○ MRSS ○ RSS TV
	Social	○ Inter-process communication ○ Mashup ○ Referencing ○ RSS editor ○ RSS tracking ○ Streaming media
	Standard	○ OPML ○ RSS Advisory Board ○ Usenet ○ World Wide Web ○ XBEL ○ XOXO

- Audio podcast
- Enhanced podcast
- Mobilecast
- Narrowcasting
- Peercasting
- Screencast
- Slidecasting
- Videocast
- Webcomic
- Webtoon
- Web series

Form

- Anonymous blogging
- Collaborative blog
- Columnist
- Instant messaging
- Liveblogging
- Microblog
- Mobile blogging
- Spam blog
- Video blogging
- Motovlogging

Media

Alternative media

- Carnivals
- Fiction
- Journalism
  - Citizen
  - Database
- Online diary
- Search engines
- Sideblog
- Software
- Web directory

Micromedia

- Aggregation
  - News
  - Poll
  - Review
  - Search
  - Video
- Atom
- AtomPub
- Broadcatching
- Hashtag
- NewsML
  - 1
  - G2
- Social communication
- Social software
- Web Slice

Related

- Blogosphere
- Escribitionist
- Glossary of blogging
- Pay per click
- Posting style
- Slashdot effect
- Spam in blogs
- Uses of podcasting

- **v**

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Semantic Web

Background	○ Databases ○ Hypertext ○ Internet ○ Ontologies ○ Semantics ○ Semantic networks ○ World Wide Web
Sub-topics	○ Dataspaces ○ Hyperdata ○ Linked data ○ Rule-based systems
Applications	○ Semantic analytics ○ Semantic broker ○ Semantic computing ○ Semantic mapper ○ Semantic matching ○ Semantic publishing ○ Semantic reasoner ○ Semantic search ○ Semantic service-oriented architecture ○ Semantic wiki ○ Solid

Related topics

- Collective intelligence
- Description logic
- Folksonomy
- Geotagging
- Information architecture
- iXBRL
- Knowledge extraction
- Knowledge management
- Knowledge representation and reasoning
- Library 2.0
- Digital library
- Digital humanities
- Metadata
- References
- Topic map
- Web 2.0
- Web engineering
- Web Science Trust

Standards	**Syntax and supporting technologies**	○ HTTP
		○ IRI
		  ○ URI
		○ RDF
		  ○ triples
		  ○ RDF/XML
		  ○ JSON-LD
		  ○ Turtle
		  ○ TriG
		  ○ Notation3
		  ○ N-Triples
		  ○ TriX (no W3C standard)
		○ RRID
		○ SPARQL
		○ XML
		○ Semantic HTML

	Schemas, ontologies and rules	○ Common Logic ○ OWL ○ RDFS ○ Rule Interchange Format ○ Semantic Web Rule Language ○ ALPS ○ SHACL
	Semantic annotation	○ eRDF ○ GRDDL ○ Microdata ○ Microformats ○ RDFa ○ SAWSDL ○ Facebook Platform
	Common vocabularies	○ DOAP ○ Dublin Core ○ FOAF ○ Schema.org ○ SIOC ○ SKOS
	Microformat vocabularies	○ hAtom ○ hCalendar ○ hCard ○ hProduct

Authority control databases Image not found or type unknown **Edit this at Wikidata**

International	○ FAST
National	○ Germany ○ United States ○ France ○ BnF data ○ Czech Republic ○ Spain ○ Latvia ○ Israel
Other	○ NARA

About Google Search

"Google.com" redirects here. For the company itself, see Google.

Google Search

Image not found or type unknown

Image not found or type unknown

Google Search on desktop

Type of site	Web search engine
Available in	149 languages

Owner	Google
Revenue	Google Ads
URL	google.com Image not found or type unknown Edit this at Wikidata
IPv6 support	Yes[1]
Commercial	Yes
Registration	Optional
Launched	○ 1995; 30 years ago (first prototype) ○ 1997; 28 years ago (final launch)
Current status	Online
Written in	○ Python ○ C ○ C++[2]

Google Search (also known simply as **Google** or **Google.com**) is a search engine operated by Google. It allows users to search for information on the Web by entering keywords or phrases. Google Search uses algorithms to analyze and rank websites based on their relevance to the search query. It is the most popular search engine worldwide.

Google Search is the most-visited website in the world. As of 2020, Google Search has a 92% share of the global search engine market.[3] Approximately 26.75% of Google's monthly global traffic comes from the United States, 4.44% from India, 4.4% from Brazil, 3.92% from the United Kingdom and 3.84% from Japan according to data provided by Similarweb.[4]

The order of search results returned by Google is based, in part, on a priority rank system called "PageRank". Google Search also provides many different options for customized searches, using symbols to include, exclude, specify or require certain search behavior, and offers specialized interactive experiences, such as flight status and package tracking, weather forecasts, currency, unit, and time conversions, word definitions, and more.

The main purpose of Google Search is to search for text in publicly accessible documents offered by web servers, as opposed to other data, such as images or data contained in databases. It was originally developed in 1996 by Larry Page, Sergey Brin, and Scott Hassan.[5][6][7] The search engine would also be set up in the garage of Susan Wojcicki's Menlo Park home.[8] In 2011, Google introduced "Google Voice Search" to search for spoken, rather than typed, words.[9] In 2012, Google introduced a semantic search feature named Knowledge Graph.

Analysis of the frequency of search terms may indicate economic, social and health trends.[10] Data about the frequency of use of search terms on Google can be openly inquired via Google Trends and have been shown to correlate with flu outbreaks and unemployment levels, and

provide the information faster than traditional reporting methods and surveys. As of mid-2016, Google's search engine has begun to rely on deep neural networks.[11]

In August 2024, a US judge in Virginia ruled that Google's search engine held an illegal monopoly over Internet search.[12][13] The court found that Google maintained its market dominance by paying large amounts to phone-makers and browser-developers to make Google its default search engine.[13]

Search indexing

[edit]
See also: Googlebot

Google indexes hundreds of terabytes of information from web pages.[14] For websites that are currently down or otherwise not available, Google provides links to cached versions of the site, formed by the search engine's latest indexing of that page.[15] Additionally, Google indexes some file types, being able to show users PDFs, Word documents, Excel spreadsheets, PowerPoint presentations, certain Flash multimedia content, and plain text files.[16] Users can also activate "SafeSearch", a filtering technology aimed at preventing explicit and pornographic content from appearing in search results.[17]

Despite Google search's immense index, sources generally assume that Google is only indexing less than 5% of the total Internet, with the rest belonging to the deep web, inaccessible through its search tools.[14][18][19]

In 2012, Google changed its search indexing tools to demote sites that had been accused of piracy.[20] In October 2016, Gary Illyes, a webmaster trends analyst with Google, announced that the search engine would be making a separate, primary web index dedicated for mobile devices, with a secondary, less up-to-date index for desktop use. The change was a response to the continued growth in mobile usage, and a push for web developers to adopt a mobile-friendly version of their websites.[21][22] In December 2017, Google began rolling out the change, having already done so for multiple websites.[23]

"Caffeine" search architecture upgrade

[edit]

In August 2009, Google invited web developers to test a new search architecture, codenamed "Caffeine", and give their feedback. The new architecture provided no visual differences in the user interface, but added significant speed improvements and a new "under-the-hood" indexing infrastructure. The move was interpreted in some quarters as a response to Microsoft's recent release of an upgraded version of its own search service, renamed Bing, as well as the launch of Wolfram Alpha, a new search engine based on "computational knowledge".[24][25] Google announced completion of "Caffeine" on June 8, 2010, claiming 50% fresher results due to

continuous updating of its index.[26]

With "Caffeine", Google moved its back-end indexing system away from MapReduce and onto Bigtable, the company's distributed database platform.[27][28]

"Medic" search algorithm update

[edit]

In August 2018, Danny Sullivan from Google announced a broad core algorithm update. As per current analysis done by the industry leaders Search Engine Watch and Search Engine Land, the update was to drop down the medical and health-related websites that were not user friendly and were not providing good user experience. This is why the industry experts named it "Medic".[29]

Google reserves very high standards for YMYL (Your Money or Your Life) pages. This is because misinformation can affect users financially, physically, or emotionally. Therefore, the update targeted particularly those YMYL pages that have low-quality content and misinformation. This resulted in the algorithm targeting health and medical-related websites more than others. However, many other websites from other industries were also negatively affected.[30]

Search results

[edit]

Ranking of results

[edit]

By 2012, it handled more than 3.5 billion searches per day.[31] In 2013 the European Commission found that Google Search favored Google's own products, instead of the best result for consumers' needs.[32] In February 2015 Google announced a major change to its mobile search algorithm which would favor mobile friendly over other websites. Nearly 60% of Google searches come from mobile phones. Google says it wants users to have access to premium quality websites. Those websites which lack a mobile-friendly interface would be ranked lower and it is expected that this update will cause a shake-up of ranks. Businesses who fail to update their websites accordingly could see a dip in their regular websites traffic.[33]

PageRank

[edit]
Main article: PageRank

Google's rise was largely due to a patented algorithm called PageRank which helps rank web pages that match a given search string.[34] When Google was a Stanford research project, it was nicknamed BackRub because the technology checks backlinks to determine a site's importance. Other keyword-based methods to rank search results, used by many search engines that were once more popular than Google, would check how often the search terms occurred in a page, or how strongly associated the search terms were within each resulting page. The PageRank algorithm instead analyzes human-generated links assuming that web pages linked from many important pages are also important. The algorithm computes a recursive score for pages, based on the weighted sum of other pages linking to them. PageRank is thought to correlate well with human concepts of importance. In addition to PageRank, Google, over the years, has added many other secret criteria for determining the ranking of resulting pages. This is reported to comprise over 250 different indicators,[35][36] the specifics of which are kept secret to avoid difficulties created by scammers and help Google maintain an edge over its competitors globally.

PageRank was influenced by a similar page-ranking and site-scoring algorithm earlier used for RankDex, developed by Robin Li in 1996. Larry Page's patent for PageRank filed in 1998 includes a citation to Li's earlier patent. Li later went on to create the Chinese search engine Baidu in 2000.[37][38]

In a potential hint of Google's future direction of their Search algorithm, Google's then chief executive Eric Schmidt, said in a 2007 interview with the *Financial Times*: "The goal is to enable Google users to be able to ask the question such as 'What shall I do tomorrow?' and 'What job shall I take?' ".[39] Schmidt reaffirmed this during a 2010 interview with *The Wall Street Journal*: "I actually think most people don't want Google to answer their questions, they want Google to tell them what they should be doing next."[40]

Google optimization

[edit]
Main article: Search engine optimization

Because Google is the most popular search engine, many webmasters attempt to influence their website's Google rankings. An industry of consultants has arisen to help websites increase their rankings on Google and other search engines. This field, called search engine optimization, attempts to discern patterns in search engine listings, and then develop a methodology for improving rankings to draw more searchers to their clients' sites. Search engine optimization encompasses both "on page" factors (like body copy, title elements, H1 heading elements and image alt attribute values) and Off Page Optimization factors (like anchor text and PageRank). The general idea is to affect Google's relevance algorithm by incorporating the keywords being targeted in various places "on page", in particular the title element and the body copy (note: the higher up in the page, presumably the better its keyword prominence and thus the ranking). Too many occurrences of the keyword, however, cause the page to look suspect to Google's spam checking algorithms. Google has published guidelines

for website owners who would like to raise their rankings when using legitimate optimization consultants.[41] It has been hypothesized, and, allegedly, is the opinion of the owner of one business about which there have been numerous complaints, that negative publicity, for example, numerous consumer complaints, may serve as well to elevate page rank on Google Search as favorable comments.[42] The particular problem addressed in *The New York Times* article, which involved DecorMyEyes, was addressed shortly thereafter by an undisclosed fix in the Google algorithm. According to Google, it was not the frequently published consumer complaints about DecorMyEyes which resulted in the high ranking but mentions on news websites of events which affected the firm such as legal actions against it. Google Search Console helps to check for websites that use duplicate or copyright content.[43]

"Hummingbird" search algorithm upgrade

[edit]
Main article: Google Hummingbird

In 2013, Google significantly upgraded its search algorithm with "Hummingbird". Its name was derived from the speed and accuracy of the hummingbird.[44] The change was announced on September 26, 2013, having already been in use for a month.[45] "Hummingbird" places greater emphasis on natural language queries, considering context and meaning over individual keywords.[44] It also looks deeper at content on individual pages of a website, with improved ability to lead users directly to the most appropriate page rather than just a website's homepage.[46] The upgrade marked the most significant change to Google search in years, with more "human" search interactions[47] and a much heavier focus on conversation and meaning.[44] Thus, web developers and writers were encouraged to optimize their sites with natural writing rather than forced keywords, and make effective use of technical web development for on-site navigation.[48]

Search results quality

[edit]

In 2023, drawing on internal Google documents disclosed as part of the United States v. Google LLC (2020) antitrust case, technology reporters claimed that Google Search was "bloated and overmonetized"[49] and that the "semantic matching" of search queries put advertising profits before quality.[50] *Wired* withdrew Megan Gray's piece after Google complained about alleged inaccuracies, while the author reiterated that «As stated in court, "A goal of Project Mercury was to increase commercial queries"».[51]

In March 2024, Google announced a significant update to its core search algorithm and spam targeting, which is expected to wipe out 40 percent of all spam results.[52] On March 20th, it was confirmed that the roll out of the spam update was complete.[53]

Shopping search

[edit]

On September 10, 2024, the European-based EU Court of Justice found that Google held an illegal monopoly with the way the company showed favoritism to its shopping search, and could not avoid paying €2.4 billion.[54] The EU Court of Justice referred to Google's treatment of rival shopping searches as "discriminatory" and in violation of the Digital Markets Act.[54]

Interface

[edit]

Page layout

[edit]

At the top of the search page, the approximate result count and the response time two digits behind decimal is noted. Of search results, page titles and URLs, dates, and a preview text snippet for each result appears. Along with web search results, sections with images, news, and videos may appear.[55] The length of the previewed text snipped was experimented with in 2015 and 2017.[56][57]

Universal search

[edit]

"Universal search" was launched by Google on May 16, 2007, as an idea that merged the results from different kinds of search types into one. Prior to Universal search, a standard Google search would consist of links only to websites. Universal search, however, incorporates a wide variety of sources, including websites, news, pictures, maps, blogs, videos, and more, all shown on the same search results page.[58][59] Marissa Mayer, then-vice president of search products and user experience, described the goal of Universal search as "we're attempting to break down the walls that traditionally separated our various search properties and integrate the vast amounts of information available into one simple set of search results.[60]

In June 2017, Google expanded its search results to cover available job listings. The data is aggregated from various major job boards and collected by analyzing company homepages. Initially only available in English, the feature aims to simplify finding jobs suitable for each user.[61][62]

Rich snippets

[edit]

In May 2009, Google announced that they would be parsing website microformats to populate search result pages with "Rich snippets". Such snippets include additional details about results, such as displaying reviews for restaurants and social media accounts for individuals.[63]

In May 2016, Google expanded on the "Rich snippets" format to offer "Rich cards", which, similarly to snippets, display more information about results, but shows them at the top of the mobile website in a swipeable carousel-like format.[64] Originally limited to movie and recipe websites in the United States only, the feature expanded to all countries globally in 2017.[65]

Knowledge Graph

[edit]
Main article: Knowledge Graph

The Knowledge Graph is a knowledge base used by Google to enhance its search engine's results with information gathered from a variety of sources.[66] This information is presented to users in a box to the right of search results.[67] Knowledge Graph boxes were added to Google's search engine in May 2012,[66] starting in the United States, with international expansion by the end of the year.[68] The information covered by the Knowledge Graph grew significantly after launch, tripling its original size within seven months,[69] and being able to answer "roughly one-third" of the 100 billion monthly searches Google processed in May 2016.[70] The information is often used as a spoken answer in Google Assistant[71] and Google Home searches.[72] The Knowledge Graph has been criticized for providing answers without source attribution.[70]

Google Knowledge Panel

[edit]

A Google Knowledge Panel[73] is a feature integrated into Google search engine result pages, designed to present a structured overview of entities such as individuals, organizations, locations, or objects directly within the search interface. This feature leverages data from Google's Knowledge Graph,[74] a database that organizes and interconnects information about entities, enhancing the retrieval and presentation of relevant content to users.

The content within a Knowledge Panel[75] is derived from various sources, including Wikipedia and other structured databases, ensuring that the information displayed is both accurate and contextually relevant. For instance, querying a well-known public figure may trigger a Knowledge Panel displaying essential details such as biographical information, birthdate, and

links to social media profiles or official websites.

The primary objective of the Google Knowledge Panel is to provide users with immediate, factual answers, reducing the need for extensive navigation across multiple web pages.

Personal tab

[edit]

In May 2017, Google enabled a new "Personal" tab in Google Search, letting users search for content in their Google accounts' various services, including email messages from Gmail and photos from Google Photos.[76][77]

Google Discover

[edit]

Google Discover, previously known as Google Feed, is a personalized stream of articles, videos, and other news-related content. The feed contains a "mix of cards" which show topics of interest based on users' interactions with Google, or topics they choose to follow directly.[78] Cards include, "links to news stories, YouTube videos, sports scores, recipes, and other content based on what [Google] determined you're most likely to be interested in at that particular moment."[78] Users can also tell Google they're not interested in certain topics to avoid seeing future updates.

Google Discover launched in December 2016[79] and received a major update in July 2017.[80] Another major update was released in September 2018, which renamed the app from Google Feed to Google Discover, updated the design, and adding more features.[81]

Discover can be found on a tab in the Google app and by swiping left on the home screen of certain Android devices. As of 2019, Google will not allow political campaigns worldwide to target their advertisement to people to make them vote.[82]

AI Overviews

[edit]

At the 2023 Google I/O event in May, Google unveiled Search Generative Experience (SGE), an experimental feature in Google Search available through Google Labs which produces AI-generated summaries in response to search prompts.[83] This was part of Google's wider efforts to counter the unprecedented rise of generative AI technology, ushered by OpenAI's launch of ChatGPT, which sent Google executives to a panic due to its potential threat to Google Search.[84] Google added the ability to generate images in October.[85] At I/O in 2024, the feature was upgraded and renamed AI Overviews.[86]

"cheese not sticking to pizza"

Image not found or type unknown

Early AI Overview response to the problem of "cheese not sticking to pizza"

AI Overviews was rolled out to users in the United States in May 2024.[86] The feature faced public criticism in the first weeks of its rollout after errors from the tool went viral online. These included results suggesting users add glue to pizza or eat rocks,[87] or incorrectly claiming Barack Obama is Muslim.[88] Google described these viral errors as "isolated examples", maintaining that most AI Overviews provide accurate information.[87][89] Two weeks after the rollout of AI Overviews, Google made technical changes and scaled back the feature, pausing its use for some health-related queries and limiting its reliance on social media posts.[90] *Scientific American* has criticised the system on environmental grounds, as such a search uses 30 times more energy than a conventional one.[91] It has also been criticized for condensing information from various sources, making it less likely for people to view full articles and websites. When it was announced in May 2024, Danielle Coffey, CEO of the News/Media Alliance was quoted as saying "This will be catastrophic to our traffic, as marketed by Google to further satisfy user queries, leaving even less incentive to click through so that we can monetize our content."[92]

In August 2024, AI Overviews were rolled out in the UK, India, Japan, Indonesia, Mexico and Brazil, with local language support.[93] On October 28, 2024, AI Overviews was rolled out to 100 more countries, including Australia and New Zealand.[94]

AI Mode

[edit]

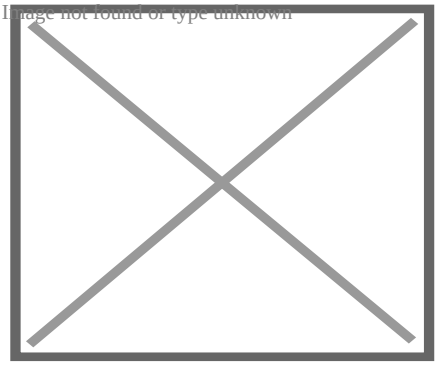
In March 2025, Google introduced an experimental "AI Mode" within its Search platform, enabling users to input complex, multi-part queries and receive comprehensive, AI-generated responses. This feature leverages Google's advanced Gemini 2.0 model, which enhances the system's reasoning capabilities and supports multimodal inputs, including text, images, and voice.

Initially, AI Mode is available to Google One AI Premium subscribers in the United States, who can access it through the Search Labs platform. This phased rollout allows Google to gather user feedback and refine the feature before a broader release.

The introduction of AI Mode reflects Google's ongoing efforts to integrate advanced AI technologies into its services, aiming to provide users with more intuitive and efficient search experiences.[95][96]

Redesigns

[edit]



Product Sans, Google's typeface since 2015

In late June 2011, Google introduced a new look to the Google homepage in order to boost the use of the Google+ social tools.[97]

One of the major changes was replacing the classic navigation bar with a black one. Google's digital creative director Chris Wiggins explains: "We're working on a project to bring you a new and improved Google experience, and over the next few months, you'll continue to see more updates to our look and feel."[98] The new navigation bar has been negatively received by a vocal minority.[99]

In November 2013, Google started testing yellow labels for advertisements displayed in search results, to improve user experience. The new labels, highlighted in yellow color, and aligned to the left of each sponsored link help users differentiate between organic and sponsored results.[100]

On December 15, 2016, Google rolled out a new desktop search interface that mimics their modular mobile user interface. The mobile design consists of a tabular design that highlights search features in boxes. and works by imitating the desktop Knowledge Graph real estate, which appears in the right-hand rail of the search engine result page, these featured elements frequently feature Twitter carousels, People Also Search For, and Top Stories (vertical and horizontal design) modules. The Local Pack and Answer Box were two of the original features of the Google SERP that were primarily showcased in this manner, but this new layout creates a previously unseen level of design consistency for Google results.[101]

Smartphone apps

[edit]

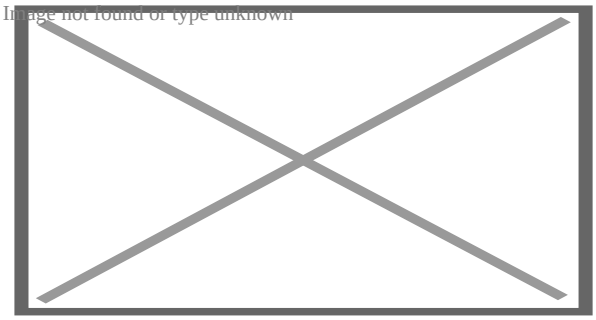
Google offers a "Google Search" mobile app for Android and iOS devices.[102] The mobile apps exclusively feature Google Discover and a "Collections" feature, in which the user can save for later perusal any type of search result like images, bookmarks or map locations into groups.[103] Android devices were introduced to a preview of the feed, perceived as related to Google Now, in December 2016,[104] while it was made official on both Android and iOS in July 2017.[105][106]

In April 2016, Google updated its Search app on Android to feature "Trends"; search queries gaining popularity appeared in the autocomplete box along with normal query autocompletion.[107] The update received significant backlash, due to encouraging search queries unrelated to users' interests or intentions, prompting the company to issue an update with an opt-out option.[108] In September 2017, the Google Search app on iOS was updated to feature the same functionality.[109]

In December 2017, Google released "Google Go", an app designed to enable use of Google Search on physically smaller and lower-spec devices in multiple languages. A Google blog post about designing "India-first" products and features explains that it is "tailor-made for the millions of people in [India and Indonesia] coming online for the first time".[110]

Performing a search

[edit]



A definition link is provided for many search terms.

Google Search consists of a series of localized websites. The largest of those, the google.com site, is the top most-visited website in the world.[111] Some of its features include a definition link for most searches including dictionary words, the number of results you got on your search, links to other searches (e.g. for words that Google believes to be misspelled, it provides a link to the search results using its proposed spelling), the ability to filter results to a date range,[112] and many more.

Search syntax

[edit]

Google search accepts queries as normal text, as well as individual keywords.[113] It automatically corrects apparent misspellings by default (while offering to use the original spelling as a selectable alternative), and provides the same results regardless of capitalization.[113] For more customized results, one can use a wide variety of operators, including, but not limited to:[114][115]

- OR or | – Search for webpages containing one of two similar queries, such as *marathon OR race*
- AND – Search for webpages containing two similar queries, such as *marathon AND runner*
- - (minus sign) – Exclude a word or a phrase, so that *"apple -tree"* searches where word *"tree"* is not used
- "" – Force inclusion of a word or a phrase, such as *"tallest building"*
- * – Placeholder symbol allowing for any substitute words in the context of the query, such as *"largest * in the world"*
- .. – Search within a range of numbers, such as *"camera $50..$100"*
- site: – Search within a specific website, such as *"site:youtube.com"*
- define: – Search for definitions for a word or phrase, such as *"define:phrase"*
- stocks: – See the stock price of investments, such as *"stocks:googl"*
- related: – Find web pages related to specific URL addresses, such as *"related:www.wikipedia.org"*
- cache: – Highlights the search-words within the cached pages, so that *"cache:www.google.com xxx"* shows cached content with word "xxx" highlighted.
- ( ) – Group operators and searches, such as *(marathon OR race) AND shoes*
- filetype: or ext: – Search for specific file types, such as *filetype:gif*
- before: – Search for before a specific date, such as spacex *before:2020-08-11*
- after: – Search for after a specific date, such as iphone *after:2007-06-29*
- @ – Search for a specific word on social media networks, such as *"@twitter"*

Google also offers a **Google Advanced Search** page with a web interface to access the advanced features without needing to remember the special operators.[116]

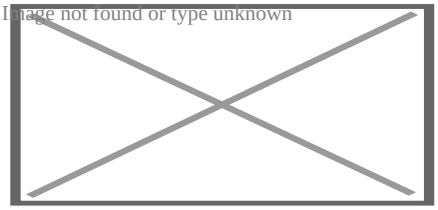
Query expansion

[edit]

Google applies query expansion to submitted search queries, using techniques to deliver results that it considers "smarter" than the query users actually submitted. This technique involves several steps, including:[117]

- Word stemming – Certain words can be reduced so other, similar terms, are also found in results, so that *"translator"* can also search for *"translation"*

- Acronyms – Searching for abbreviations can also return results about the name in its full length, so that *"NATO"* can show results for *"North Atlantic Treaty Organization"*
- Misspellings – Google will often suggest correct spellings for misspelled words
- Synonyms – In most cases where a word is incorrectly used in a phrase or sentence, Google search will show results based on the correct synonym
- Translations – The search engine can, in some instances, suggest results for specific words in a different language
- Ignoring words – In some search queries containing extraneous or insignificant words, Google search will simply drop those specific words from the query



A screenshot of suggestions by Google Search when "wikip" is typed

In 2008, Google started to give users autocompleted search suggestions in a list below the search bar while typing, originally with the approximate result count previewed for each listed search suggestion.[118]

"I'm Feeling Lucky"

[edit]
"I'm Feeling Lucky" redirects here. For the 2011 book by Douglas Edwards, see *I'm Feeling Lucky* (book).

Google's homepage includes a button labeled "I'm Feeling Lucky". This feature originally allowed users to type in their search query, click the button and be taken directly to the first result, bypassing the search results page. Clicking it while leaving the search box empty opens Google's archive of Doodles.[119] With the 2010 announcement of Google Instant, an automatic feature that immediately displays relevant results as users are typing in their query, the "I'm Feeling Lucky" button disappears, requiring that users opt-out of Instant results through search settings to keep using the "I'm Feeling Lucky" functionality.[120] In 2012, "I'm Feeling Lucky" was changed to serve as an advertisement for Google services; users hover their computer mouse over the button, it spins and shows an emotion ("I'm Feeling Puzzled" or "I'm Feeling Trendy", for instance), and, when clicked, takes users to a Google service related to that emotion.[121]

Tom Chavez of "Rapt", a firm helping to determine a website's advertising worth, estimated in 2007 that Google lost $110 million in revenue per year due to use of the button, which bypasses the advertisements found on the search results page.[122]

Special interactive features

[edit]
See also: List of Google Easter eggs § Embedded tools

Besides the main text-based search-engine function of Google search, it also offers multiple quick, interactive features. These include, but are not limited to:[123][124][125]

- Calculator
- Time zone, currency, and unit conversions
- Word translations
- Flight status
- Local film showings
- Weather forecasts
- Population and unemployment rates
- Package tracking
- Word definitions
- Metronome
- Roll a die
- "Do a barrel roll" (search page spins)
- "Askew" (results show up sideways)

"OK Google" conversational search

[edit]
See also: Google Now and Google Assistant

During Google's developer conference, Google I/O, in May 2013, the company announced that users on Google Chrome and ChromeOS would be able to have the browser initiate an audio-based search by saying "OK Google", with no button presses required. After having the answer presented, users can follow up with additional, contextual questions; an example include initially asking "OK Google, will it be sunny in Santa Cruz this weekend?", hearing a spoken answer, and reply with "how far is it from here?"[126][127] An update to the Chrome browser with voice-search functionality rolled out a week later, though it required a button press on a microphone icon rather than "OK Google" voice activation.[128] Google released a browser extension for the Chrome browser, named with a "beta" tag for unfinished development, shortly thereafter.[129] In May 2014, the company officially added "OK Google" into the browser itself;[130] they removed it in October 2015, citing low usage, though the microphone icon for activation remained available.[131] In May 2016, 20% of search queries on mobile devices were done through voice.[132]

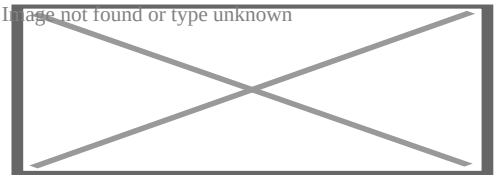
Operations

[edit]

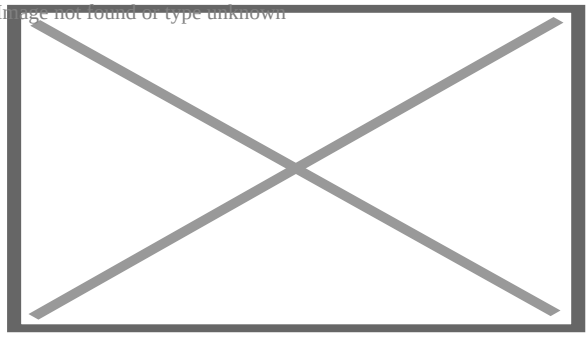
Search products

[edit]
Main article: List of Google products
"Google Videos" redirects here. For other uses, see Google Videos (disambiguation).

Google Videos



Screenshot



Google Videos homepage as of 2016

Type of site	Video search engine
Available in	Multilingual
Owner	Google
URL	www.google.com/videohp
Commercial	Yes
Registration	Recommended
Launched	August 20, 2012; 12 years ago

In addition to its tool for searching web pages, Google also provides services for searching images, Usenet newsgroups, news websites, videos (**Google Videos**), searching by locality, maps, and items for sale online. **Google Videos** allows searching the World Wide Web for video clips.[133] The service evolved from Google Video, Google's discontinued video hosting service that also allowed to search the web for video clips.[133]

In 2012, Google has indexed over 30 trillion web pages, and received 100 billion queries per month.[134] It also caches much of the content that it indexes. Google operates other tools and services including Google News, Google Shopping, Google Maps, Google Custom Search, Google Earth, Google Docs, Picasa (discontinued), Panoramio (discontinued), YouTube, Google Translate, Google Blog Search and Google Desktop Search (discontinued[135]).

There are also products available from Google that are not directly search-related. Gmail, for example, is a webmail application, but still includes search features; Google Browser Sync does not offer any search facilities, although it aims to organize your browsing time.

Energy consumption

[edit]

In 2009, Google claimed that a search query requires altogether about 1 kJ or 0.0003 kW·h,[136] which is enough to raise the temperature of one liter of water by 0.24 °C. According to green search engine Ecosia, the industry standard for search engines is estimated to be about 0.2 grams of CO_2 emission per search.[137] Google's 40,000 searches per second translate to 8 kg CO_2 per second or over 252 million kilos of CO_2 per year.[138]

Google Doodles

[edit]
Main article: Google Doodle

On certain occasions, the logo on Google's webpage will change to a special version, known as a "Google Doodle". This is a picture, drawing, animation, or interactive game that includes the logo. It is usually done for a special event or day although not all of them are well known.[139] Clicking on the Doodle links to a string of Google search results about the topic. The first was a reference to the Burning Man Festival in 1998,[140][141] and others have been produced for the birthdays of notable people like Albert Einstein, historical events like the interlocking Lego block's 50th anniversary and holidays like Valentine's Day.[142] Some Google Doodles have interactivity beyond a simple search, such as the famous "Google Pac-Man" version that appeared on May 21, 2010.

Criticism

[edit]

Privacy

[edit]
Main article: Privacy concerns regarding Google

Google has been criticized for placing long-term cookies on users' machines to store preferences, a tactic which also enables them to track a user's search terms and retain the data for more than a year.[143]

Since 2012, Google Inc. has globally introduced encrypted connections for most of its clients, to bypass governative blockings of the commercial and IT services.[144]

Complaints about indexing

[edit]

In 2003, *The New York Times* complained about Google's indexing, claiming that Google's caching of content on its site infringed its copyright for the content.[145] In both *Field v. Google* and *Parker v. Google*, the United States District Court of Nevada ruled in favor of Google.[146][147]

Child sexual abuse

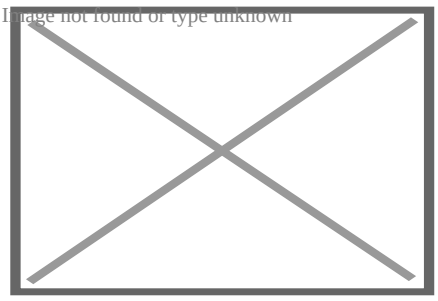
[edit]

[icon] This section **needs expansion**. You can help by making an edit requestadding to it . *(May 2024)*

A 2019 *New York Times* article on Google Search showed that images of child sexual abuse had been found on Google and that the company had been reluctant at times to remove them.[148]

January 2009 malware bug

[edit]



A screenshot of the error of January 31, 2009

Google flags search results with the message "This site may harm your computer" if the site is known to install malicious software in the background or otherwise surreptitiously. For approximately 40 minutes on January 31, 2009, all search results were mistakenly classified as malware and could therefore not be clicked; instead a warning message was displayed and the user was required to enter the requested URL manually. The bug was caused by human error.[149][150][151][152] The URL of "/" (which expands to all URLs) was mistakenly added to the malware patterns file.[150][151]

Possible misuse of search results

[edit]

In 2007, a group of researchers observed a tendency for users to rely exclusively on Google Search for finding information, writing that "With the Google interface the user gets the impression that the search results imply a kind of totality. ... In fact, one only sees a small part of what one could see if one also integrates other research tools."[153]

In 2011, Google Search query results have been shown by Internet activist Eli Pariser to be tailored to users, effectively isolating users in what he defined as a filter bubble. Pariser holds algorithms used in search engines such as Google Search responsible for catering "a personal ecosystem of information".[154] Although contrasting views have mitigated the potential threat of "informational dystopia" and questioned the scientific nature of Pariser's claims,[155] filter bubbles have been mentioned to account for the surprising results of the U.S. presidential election in 2016 alongside fake news and echo chambers, suggesting that Facebook and Google have designed personalized online realities in which "we only see and hear what we like".[156]

FTC fines

[edit]

In 2012, the US Federal Trade Commission fined Google US$22.5 million for violating their agreement not to violate the privacy of users of Apple's Safari web browser.[157] The FTC was also continuing to investigate if Google's favoring of their own services in their search results violated antitrust regulations.[158]

Payments to Apple

[edit]

In a November 2023 disclosure, during the ongoing antitrust trial against Google, an economics professor at the University of Chicago revealed that Google pays Apple 36% of all search advertising revenue generated when users access Google through the Safari browser. This revelation reportedly caused Google's lead attorney to cringe visibly.[*citation needed*] The revenue generated from Safari users has been kept confidential, but the 36% figure suggests that it is likely in the tens of billions of dollars.

Both Apple and Google have argued that disclosing the specific terms of their search default agreement would harm their competitive positions. However, the court ruled that the information was relevant to the antitrust case and ordered its disclosure. This revelation has raised concerns about the dominance of Google in the search engine market and the potential anticompetitive effects of its agreements with Apple.[159]

Big data and human bias

[edit]

Google search engine robots are programmed to use algorithms that understand and predict human behavior. The book, *Race After Technology: Abolitionist Tools for the New Jim Code*[160] by Ruha Benjamin talks about human bias as a behavior that the Google search engine can recognize. In 2016, some users Google searched "three Black teenagers" and images of criminal mugshots of young African American teenagers came up. Then, the users searched "three White teenagers" and were presented with photos of smiling, happy teenagers. They also searched for "three Asian teenagers", and very revealing photos of Asian girls and women appeared. Benjamin concluded that these results reflect human prejudice and views on different ethnic groups. A group of analysts explained the concept of a racist computer program: "The idea here is that computers, unlike people, can't be racist but we're increasingly learning that they do in fact take after their makers ... Some experts believe that this problem might stem from the hidden biases in the massive piles of data that the algorithms process as they learn to recognize patterns ... reproducing our worst values".[160]

Monopoly ruling

[edit]

On August 5, 2024, Google lost a lawsuit which started in 2020 in D.C. Circuit Court, with Judge Amit Mehta finding that the company had an illegal monopoly over Internet search.[161] This monopoly was held to be in violation of Section 2 of the Sherman Act.[162] Google has said it will appeal the ruling,[163] though they did propose to loosen search deals with Apple and others requiring them to set Google as the default search engine.[164]

Trademark

[edit]
Main article: Google (verb)

As people talk about "googling" rather than searching, the company has taken some steps to defend its trademark, in an effort to prevent it from becoming a generic trademark.[165][166] This has led to lawsuits, threats of lawsuits, and the use of euphemisms, such as calling Google Search a **famous web search engine**.[167]

Discontinued features

[edit]

Translate foreign pages

[edit]

Until May 2013, Google Search had offered a feature to translate search queries into other languages. A Google spokesperson told *Search Engine Land* that "Removing features is always tough, but we do think very hard about each decision and its implications for our users. Unfortunately, this feature never saw much pick up".[168]

Instant search

[edit]

Instant search was announced in September 2010 as a feature that displayed suggested results while the user typed in their search query, initially only in select countries or to registered users.[169] The primary advantage of the new system was its ability to save time, with Marissa Mayer, then-vice president of search products and user experience, proclaiming that the feature would save 2–5 seconds per search, elaborating that "That may not seem like a lot at first, but it adds up. With Google Instant, we estimate that we'll save our users 11 hours with each passing second!"[170] Matt Van Wagner of *Search Engine Land* wrote that "Personally, I kind of like Google Instant and I think it represents a natural evolution in the way search works", and also praised Google's efforts in public relations, writing that "With just a press conference and a few well-placed interviews, Google has parlayed this relatively minor speed improvement into an attention-grabbing front-page news story".[171] The upgrade also became notable for the company switching Google Search's underlying technology from HTML to AJAX.[172]

Instant Search could be disabled via Google's "preferences" menu for those who didn't want its functionality.[173]

The publication *2600: The Hacker Quarterly* compiled a list of words that Google Instant did not show suggested results for, with a Google spokesperson giving the following statement to *Mashable*:[174]

> There are several reasons you may not be seeing search queries for a particular topic. Among other things, we apply a narrow set of removal policies for pornography, violence, and hate speech. It's important to note that removing queries from Autocomplete is a hard problem, and not as simple as blacklisting particular terms and phrases.
>
> In search, we get more than one billion searches each day. Because of this, we take an algorithmic approach to removals, and just like our search algorithms, these are imperfect. We will continue to work to improve our approach to removals in Autocomplete, and are listening carefully to feedback from our users.
>
> Our algorithms look not only at specific words, but compound queries based on those words, and across all languages. So, for example, if there's a bad word in Russian, we may remove a compound word including the transliteration of the

> Russian word into English. We also look at the search results themselves for given queries. So, for example, if the results for a particular query seem pornographic, our algorithms may remove that query from Autocomplete, even if the query itself wouldn't otherwise violate our policies. This system is neither perfect nor instantaneous, and we will continue to work to make it better.

PC Magazine discussed the inconsistency in how some forms of the same topic are allowed; for instance, "lesbian" was blocked, while "gay" was not, and "cocaine" was blocked, while "crack" and "heroin" were not. The report further stated that seemingly normal words were also blocked due to pornographic innuendos, most notably "scat", likely due to having two completely separate contextual meanings, one for music and one for a sexual practice.[175]

On July 26, 2017, Google removed Instant results, due to a growing number of searches on mobile devices, where interaction with search, as well as screen sizes, differ significantly from a computer.[176][177]

Instant previews[edit]

"Instant previews" allowed previewing screenshots of search results' web pages without having to open them. The feature was introduced in November 2010 to the desktop website and removed in April 2013 citing low usage.[178][179]

Dedicated encrypted search page

[edit]

Various search engines provide encrypted Web search facilities. In May 2010 Google rolled out SSL-encrypted web search.[180] The encrypted search was accessed at encrypted.google.com[181] However, the web search is encrypted via Transport Layer Security (TLS) by default today, thus every search request should be automatically encrypted if TLS is supported by the web browser.[182] On its support website, Google announced that the address encrypted.google.com would be turned off April 30, 2018, stating that all Google products and most new browsers use HTTPS connections as the reason for the discontinuation.[183]

Real-Time Search

[edit]

Google Real-Time Search was a feature of Google Search in which search results also sometimes included real-time information from sources such as Twitter, Facebook, blogs, and

news websites.[184] The feature was introduced on December 7, 2009,[185] and went offline on July 2, 2011, after the deal with Twitter expired.[186] Real-Time Search included Facebook status updates beginning on February 24, 2010.[187] A feature similar to Real-Time Search was already available on Microsoft's Bing search engine, which showed results from Twitter and Facebook.[188] The interface for the engine showed a live, descending "river" of posts in the main region (which could be paused or resumed), while a bar chart metric of the frequency of posts containing a certain search term or hashtag was located on the right hand corner of the page above a list of most frequently reposted posts and outgoing links. Hashtag search links were also supported, as were "promoted" tweets hosted by Twitter (located persistently on top of the river) and thumbnails of retweeted image or video links.

In January 2011, geolocation links of posts were made available alongside results in Real-Time Search. In addition, posts containing syndicated or attached shortened links were made searchable by the *link:* query option. In July 2011, Real-Time Search became inaccessible, with the Real-Time link in the Google sidebar disappearing and a custom 404 error page generated by Google returned at its former URL. Google originally suggested that the interruption was temporary and related to the launch of Google+;[189] they subsequently announced that it was due to the expiry of a commercial arrangement with Twitter to provide access to tweets.[190]

See also

[edit]

- icon
  Image not found or type unknown Internet portal

- List of search engines by popularity – Software system for finding relevant information on the Web
- Timeline of Google Search
- Censorship by Google § Google Search
- Google (verb) – Transitive verb, to search using Google
- Dragonfly (search engine) – Prototype Internet search engine to comply with Chinese censorship requirements
- Google bombing – Practice that causes a webpage to have a high rank in Google
- Google Panda – Change to Google's search results ranking algorithm
- Google Penguin – Google search engine algorithm update
- Googlewhack – Contest to find a Google Search query that returns a single result
- Halalgoogling – Islamic search engine blocking haram content
- Prabhakar Raghavan – American computer scientist
- Reunion (advertisement) – Google India advertisement for Google Search
- List of search engines
- Comparison of web search engines
- History of Google
- List of Google products

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Further reading

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Google

a subsidiary of Alphabet

Company

Divisions

- AI
- *Area 120*
- ATAP
- *Brain*
- China
- Cloud Platform
- Energy
- Google.org
  - Crisis Response
- *Health*
- Registry

Subsidiaries

Active

- Security Operations
- DeepMind
- Fitbit
- ITA Software
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- Looker
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- Flutter
- Global IP Solutions
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- ImageAmerica
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Development

A–C

- Accelerated Linear Algebra
- AMP
- *Actions on Google*
- ALTS
- American Fuzzy Lop
- *Android Cloud to Device Messaging*
- Android Debug Bridge
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- Android Runtime
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- Angular
- *AngularJS*
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- APIs
- App Engine
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- *Base*
- Bazel
- BeyondCorp
- Bigtable
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- Bionic
- Blockly
- *Borg*
- *Caja*
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- Chart API
- Charts
- *Chrome Frame*
- Chromium
  - Blink
- Closure Tools
- *Cloud Connect*
- Cloud Dataflow
- Cloud Datastore
- *Cloud Messaging*

Software

A

- *Aardvark*
- Account
  - Dashboard
  - Takeout
- Ad Manager
- AdMob
- Ads
- AdSense
- *Affiliate Network*
- Alerts
- *Allo*
- Analytics
- Android Auto
- *Android Beam*
- *Answers*
- *Apture*
- Arts & Culture
- Assistant
- *Attribution*
- Authenticator

B

- *BebaPay*
- *BeatThatQuote.com*
- *Blog Search*
- Blogger
- *Body*
- *Bookmarks*
- Books
  - Ngram Viewer
- *Browser Sync*
- *Building Maker*
- *Bump*
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- *Buzz*

- Calendar
- Cast
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- *Checkout*
- Chrome
- *Chrome Apps*
- Chrome Experiments

Hardware

Pixel

Smartphones

- Pixel (2016)
- Pixel 2 (2017)
- Pixel 3 (2018)
- Pixel 3a (2019)
- Pixel 4 (2019)
- Pixel 4a (2020)
- Pixel 5 (2020)
- Pixel 5a (2021)
- Pixel 6 (2021)
- Pixel 6a (2022)
- Pixel 7 (2022)
- Pixel 7a (2023)
- Pixel Fold (2023)
- Pixel 8 (2023)
- Pixel 8a (2024)
- Pixel 9 (2024)
- Pixel 9 Pro Fold (2024)

Smartwatches

- Pixel Watch (2022)
- Pixel Watch 2 (2023)
- Pixel Watch 3 (2024)

Tablets

- Pixel C (2015)
- Pixel Slate (2018)
- Pixel Tablet (2023)

Laptops

- Chromebook Pixel (2013–2015)
- Pixelbook (2017)
- Pixelbook Go (2019)

Other

- Pixel Buds (2017–present)

Smartphones

- Nexus One (2010)
- Nexus S (2010)
- Galaxy Nexus (2011)
- Nexus 4 (2012)
- Nexus 5 (2013)
- Nexus 6 (2014)

- **v**
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Litigation

Advertising	○ *Feldman v. Google, Inc.* (2007) ○ *Rescuecom Corp. v. Google Inc.* (2009) ○ *Goddard v. Google, Inc.* (2009) ○ *Rosetta Stone Ltd. v. Google, Inc.* (2012) ○ *Google, Inc. v. American Blind & Wallpaper Factory, Inc.* (2017) ○ Jedi Blue
Antitrust	○ European Union (2010–present) ○ *United States v. Adobe Systems, Inc., Apple Inc., Google Inc., Intel Corporation, Intuit, Inc., and Pixar* (2011) ○ *Umar Javeed, Sukarma Thapar, Aaqib Javeed vs. Google LLC and Ors.* (2019) ○ *United States v. Google LLC* (2020) ○ *United States v. Google LLC* (2023)
Intellectual property	○ *Perfect 10, Inc. v. Amazon.com, Inc.* (2007) ○ *Viacom International Inc. v. YouTube, Inc.* (2010) ○ *Lenz v. Universal Music Corp.*(2015) ○ *Authors Guild, Inc. v. Google, Inc.* (2015) ○ *Field v. Google, Inc.* (2016) ○ *Google LLC v. Oracle America, Inc.* (2021) ○ Smartphone patent wars
Privacy	○ *Rocky Mountain Bank v. Google, Inc.* (2009) ○ *Hibnick v. Google, Inc.* (2010) ○ *United States v. Google Inc.* (2012) ○ Judgement of the German Federal Court of Justice on Google's autocomplete function (2013) ○ *Joffe v. Google, Inc.* (2013) ○ *Mosley v SARL Google* (2013) ○ *Google Spain v AEPD and Mario Costeja González* (2014) ○ *Frank v. Gaos* (2019)
Other	○ *Garcia v. Google, Inc.* (2015) ○ *Google LLC v Defteros* (2020) ○ *Epic Games v. Google* (2021) ○ *Gonzalez v. Google LLC* (2022)

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- BookTube
- BreadTube
- "Don't be evil"
- Gayglers
- *Google* as a verb
- Google bombing
  - 2004 U.S. presidential election
- Google effect
- Googlefight
- Google hacking
- Googleshare
- Google tax
- Googlewhack
- Googlization
- Illegal flower tribute
- Objectives and key results
- Rooting
- Search engine manipulation effect
- Side project time
- Sitelink
- Site reliability engineering
- StudyTube
- VTuber
- YouTube Poop
- YouTuber
  - list

Android

- Booting process
- Custom distributions
- Features
- Recovery mode
- Software development

Street View coverage

- Africa
- Antarctica
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  - Israel
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  - Canada
  - United States

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Alphabet Inc.

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Current

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  - Google Fiber
- Calico
- CapitalG
- Google
  - DeepMind
    - AlphaFold
    - AlphaGo
      - vs. Fan Hui
      - vs. Ke Jie
      - vs. Lee Sedol
        - film
      - Future of Go Summit
    - AlphaGo Zero
    - AlphaStar
    - AlphaZero
    - Master
    - MuZero
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  - Tenor
  - Waze
  - YouTube
- GV
- Isomorphic Labs
- Verily
  - Baseline Study
- X Development
- Waymo
- Wing

Former

- Boston Dynamics
- Chronicle Security
- Jigsaw
- Loon
- Makani
- Meka Robotics
- Nest Labs
- Sidewalk Labs
  - Toronto
- Vicarious

Executives

Current

- Sundar Pichai (CEO)
- Ruth Porat (president and CIO)
- Anat Ashkenazi (CFO)

Former

- Larry Page (CEO)
- Sergey Brin (President)
- David Drummond (CLO)

People

Board of directors

Current

- Frances Arnold
- Sergey Brin
- R. Martin Chavez
- John Doerr
- John L. Hennessy
- Ann Mather
- Larry Page
- Sundar Pichai
- Ram Shriram
- Roger W. Ferguson Jr.

Former

- Diane Greene
- Alan Mulally
- Eric Schmidt

Others

- Andrew Conrad
- Tony Fadell
- Arthur D. Levinson
- David Krane
- Astro Teller

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- **v**
- **t**
- **e**

Android

- Android Go
  - Comparison of products

Software development

Development tools

Official

- Android Runtime (ART)
- Software development kit (SDK)
  - Android Debug Bridge (ADB)
  - Fastboot
  - Android App Bundle
  - Android application package (APK)
- Bionic
- Dalvik
- Firebase
  - Google Cloud Messaging (GCM)
  - Firebase Cloud Messaging (FCM)
- Google Mobile Services (GMS)
- Native development kit (NDK)
- Open accessory development kit (OADK)
- RenderScript
- Skia
- AdMob
- Material Design
- Fonts
  - Droid
  - Roboto
  - Noto
- Google Developers

Other

- OpenBinder
- Apache Harmony
- OpenJDK
- Gradle

Integrated development environments (IDE)

- Android Studio
  - IntelliJ IDEA
- Eclipse
  - Android Development Tools (ADT)
- MIT App Inventor

Languages, databases

- Java
- Kotlin
- XML
- C
- C++
- SQLite

Releases

- Cupcake (1.5)
- Donut (1.6)
- Eclair (2.0–2.1)
- Froyo (2.2)
- Gingerbread (2.3)
- Honeycomb (3.x)
- Ice Cream Sandwich (4.0)
- Jelly Bean (4.1–4.3)
- KitKat (4.4)
- Lollipop (5.x)
- Marshmallow (6.0)
- Nougat (7.x)
- Oreo (8.x)
- Pie (9)
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Derivatives

- Android Automotive
- Android Things
- TV
  - devices
- Android XR
- Wear OS

- **Devices**
  - **Pixel**
    - C
    - Pixel & Pixel XL
    - 2 & 2 XL
    - 3 & 3 XL
      - 3a & 3a XL
    - 4 & 4 XL
      - 4a & 4a (5G)
    - 5
      - 5a
    - 6 & 6 Pro
      - 6a
    - 7 & 7 Pro
      - 7a
    - Fold
    - Tablet
    - 8 & 8 Pro
      - 8a
    - 9, 9 Pro & 9 Pro XL
      - 9 Pro Fold
  - **Nexus**
    - One
    - S
    - Galaxy Nexus
    - 4
    - 10
    - Q
    - 5
      - 5X
    - 6
      - 6P
    - 7
      - 2012
      - 2013
    - 9
    - Player
  - **Play edition**
    - HTC One (M7)
    - HTC One (M8)
    - LG G Pad 8.3
    - Moto G
    - Samsung Galaxy S4
    - Sony Xperia Z Ultra
- Android One

Custom distributions

- AliOS
- Android-x86
  - Remix OS
- AOKP
- Baidu Yi
- Barnes & Noble Nook
- CalyxOS
- ColorOS
  - realme UI
- CopperheadOS
- EMUI
  - Magic UI
- Fire OS
- Flyme OS
- GrapheneOS
- Xiaomi HyperOS
  - MIUI
  - MIUI for Poco
- LeWa OS
- LineageOS
  - /e/
  - CrDroid
  - CyanogenMod
  - DivestOS
  - iodéOS
  - Kali NetHunter
- LiteOS
- Meta Horizon OS
- MicroG
- Nokia X software platform
- OmniROM
- OPhone
- OxygenOS
- PixelExperience
- Pixel UI
- Replicant
- Resurrection Remix OS
- SlimRoms
- TCL UI
- Ubuntu for Android
- XobotOS
- ZUI

Booting and recovery	○ Booting process
	○ Recovery mode
	  ○ TWRP
	  ○ ClockworkMod
	○ Fastboot

APIs	○ Google Maps ○ Google Play Services ○ SafetyNet ○ Google Search

Alternative UIs	○ Asus ZenFone
	○ Cherry OS
	○ ColorOS
	○ EMUI
	○ Funtouch OS
	○ Flyme OS
	○ HiOS
	○ Hive UI (XOLO Hive)
	○ HTC Sense
	○ LG UX
	  ○ Optimus UI
	○ Motoblur
	○ One UI
	○ Origin OS
	  ○ Experience
	  ○ TouchWiz
	○ OxygenOS
	○ Pixel UI
	○ XOS
	○ Xperia UI

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