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HTML5: HTML5 is a markup language used for structuring and presenting content on the World Wide Web. It is the fifth and final major HTML version that is a World Wide Web Consortium (W3C) recommendation. The current specification is known as the HTML Living Standard. It is maintained by the Web Hypertext Application Technology Working Group (WHATWG), a consortium of the major browser vendors (Apple, Google, Mozilla, and Microsoft).

A markup language is the standard text-encoding system consisting of a set of symbols inserted in a text document to control its structure, formatting, or the relationship between its parts. The most widely used markup languages are SGML (Standard Generalized Markup Language)**,** HTML (Hypertext Markup Language)**,** and XML (Extensible Markup Language)**.**

A markup language in computer science stands for a language that uses human-readable language while coding instead of using typical technical syntax as used by all of the other programming languages. These human-readable features in the markup language are obtained by using tags.

Tags are used to define elements of a markup language program, for example: a tag that is used to define a title of a document is named as “Title tag” in markup languages. These tags tell the web server what the style and structure of a web document are. There are many markup languages available, and the most popular ones are HTML, HTML5, and XML.

HTML5 was first released in a public-facing form on 22 January 2008 with a major update and "W3C Recommendation" status in October 2014. Its goals were to improve the language with support for the latest multimedia and other new features; to keep the language both easily readable by humans and consistently understood by computers and devices such as web browsers, parsers, etc., without XHTML's rigidity; and to remain backward-compatible with older software. HTML5 is

intended to subsume not only HTML 4 but also XHTML 1 and DOM Level 2 HTML.

HTML5 allows you to build offline applications. Browsers that support HTML5 offline applications (which is most) will download the HTML, CSS, JavaScript, images, and other resources that make up the application and cache them locally. Hypertext Markup Language (HTML) is the primary language for developing web pages. HTML5 is a new version of HTML with new functionalities with markup language with Internet technologies. HTML does not have support for video and audio but, HTML5 supports both video and audio.

Like HTML, the structure of HTML5 is the same. It is also divided into two types:

- Head
- Body

1. HEAD:

Head contains title, metadata, encoding style, external link, etc.

2. BODY:

The body contains all the elements that are displayed on the website. Along with normal HTML tags there are also new tags like <header>, <footer>, <article>, <video>, <audio> etc.

CSS3: Cascading Style Sheets (CSS) is a style sheet language used for describing the look and formatting of a document written in a markup language. CSS3 is a latest standard of CSS earlier versions (CSS2). The main difference between CSS2 and CSS3 is follows −

- Media Queries
- Namespaces
- Selectors Level 3
- Color

CSS is designed to enable the separation of content and presentation, including layout, colors, and fonts. This separation can improve content accessibility; provide more flexibility and control in the specification of presentation characteristics; enable multiple web pages to share formatting by specifying the relevant CSS in a separate .css file, which reduces complexity and repetition in the structural content; and enable the .css file to be cached to improve the page load speed between the pages that share the file and its formatting.

Separation of formatting and content also makes it feasible to present the same markup page in different styles for different rendering methods, such as on-screen, in print, by voice (via speech-based browser or screen reader), and on Braille-based tactile devices. CSS also has rules for alternate formatting if the content is accessed on a mobile device.

CSS3 stands for Cascading Style Sheet level 3, which is the advanced version of CSS. It is used for structuring, styling, and formatting web pages. Several new features have been added to CSS3 and it is supported by all modern web browsers. The most important feature of CSS3 is the splitting of CSS standards into separate modules that are simpler to learn and use.

CSS3 is capable of making the web page more attractive and takes less time to create. CSS3 is backward compatible with CSS. CSS3 is the latest version, hence it supports responsive design. CSS3 can be breakdown into modules. In CSS3 we can perform all kinds of animation and transformations as it supports animation and 3D transformations.

CSS3 is collaboration of CSS2 specifications and new specifications, we can call this collaboration is module. Some of the modules are shown below −

- Selectors
- Box Model
- Backgrounds
- Image Values and Replaced Content
- Text Effects
- 2D Transformations
- 3D Transformations

- Animations
- Multiple Column Layout
- User Interface

CSS3 is faster than CSS. CSS3 has a good collection of HSL RGBA, HSLA, and gradient colors. In CSS3 we can use multi-column text blocks. CSS3 codes are supported by all modern browsers. CSS3 provides advanced codes for setting rounded gradients and corners. CSS3 has many advance features like text shadows, visual effects, and a wide range of font styles and colors. CSS3 has many advance features like text shadows, visual effects, and a wide range of font styles and colors. Plenty of new pseudo-elements have been added to CSS3 to give easy styling in depth. Even a new convention of double colons :: is also added. The latest CSS3 also has new border styling features like *border-radius, image-slice, image-source,* and values for "width stretch", etc.

Bootstrap: Bootstrap is a free and open-source CSS framework directed at responsive, mobile-first front-end web development. It contains HTML, CSS and (optionally) JavaScript-based design templates for typography, forms, buttons, navigation, and other interface components.

Bootstrap is an HTML, CSS and JS library that focuses on simplifying the development of informative web pages (as opposed to web applications). The primary purpose of adding it to a web project is to apply Bootstrap's choices of color, size, font and layout to that project. As such, the primary factor is whether the developers in charge find those choices to their liking. Once added to a project, Bootstrap provides basic style definitions for all HTML elements. The result is a uniform appearance for prose, tables and form elements across web browsers. In addition, developers can take advantage of CSS classes defined in Bootstrap to further customize the appearance of their contents. For example, Bootstrap has provisioned for light- and dark-colored tables, page headings, more prominent pull quotes, and text with a highlight.

Bootstrap also comes with several JavaScript components which do not require other libraries like jQuery. They provide additional user interface elements such as dialog boxes, tooltips, progress bars, navigation drop-downs, and carousels. Each Bootstrap

component consists of an HTML structure, CSS declarations, and in some cases accompanying JavaScript code. They also extend the functionality of some existing interface elements, including for example an auto-complete function for input fields.

The most prominent components of Bootstrap are its layout components, as they affect an entire web page. The basic layout component is called "Container", as every other element in the page is placed in it. Developers can choose between a fixed-width container and a fluid-width container. While the latter always fills the width with the web page, the former uses one of the five predefined fixed widths, depending on the size of the screen showing the page:

- Smaller than 576 pixels
- 576–768 pixels
- 768–992 pixels
- 992–1200 pixels
- Larger than 1200 pixels

Once a container is in place, other Bootstrap layout components implement a CSS Flexbox layout through defining rows and columns.

A precompiled version of Bootstrap is available in the form of one CSS file and three JavaScript files that can be readily added to any project. The raw form of Bootstrap, however, enables developers to implement further customization and size optimizations. This raw form is modular, meaning that the developer can remove unneeded components, apply a theme and modify the uncompiled Sass files.

Vanilla JS (ES6+): JavaScript, often abbreviated as JS, is a programming language that is one of the core technologies of the World Wide Web, alongside HTML and CSS. As of 2022, 98% of websites use JavaScript on the client side for webpage behavior, often incorporating third-party libraries. All major web browsers have a dedicated JavaScript engine to execute the code on users' devices.

JavaScript is a high-level, often just-in-time compiled language that conforms to the ECMAScript standard. It has dynamic typing, prototype-based object-orientation, and first-class functions. It is multi-paradigm, supporting event-driven, functional, and imperative programming styles. It has application programming interfaces

(APIs) for working with text, dates, regular expressions, standard data structures, and the Document Object Model (DOM).

The ECMAScript standard does not include any input/output (I/O), such as networking, storage, or graphics facilities. In practice, the web browser or other runtime system provides JavaScript APIs for I/O.

JavaScript engines were originally used only in web browsers, but are now core components of some servers and a variety of applications. The most popular runtime system for this usage is Node.js. Although Java and JavaScript are similar in name, syntax, and respective standard libraries, the two languages are distinct and differ greatly in design.

Examples of scripted behavior:

- Loading new web page content without reloading the page, via Ajax or a WebSocket. For example, users of social media can send and receive messages without leaving the current page.
- Web page animations, such as fading objects in and out, resizing, and moving them.
- Playing browser games.
- Controlling the playback of streaming media.
- Generating pop-up ads or alert boxes.
- Validating input values of a web form before the data is sent to a web server.
- Logging data about the user's behavior then sending it to a server. The website owner can use this data for analytics, ad tracking, and personalization.
- Redirecting a user to another page.
- Storing and retrieving data on the user's device, via the storage or IndexedDB standards.

Over 80% of websites use a third-party JavaScript library or web framework for their client-side scripting.

jQuery is by far the most popular library, used by over 75% of websites. Facebook created the React library for its website and later released it as open source; other sites, including Twitter, now use it. Likewise, the Angular framework created by

Google for its websites, including YouTube and Gmail, is now an open source project used by others.

In contrast, the term "Vanilla JS" has been coined for websites not using any libraries or frameworks, instead relying entirely on standard JavaScript functionality.

Flask: Flask is a micro web framework written in Python. It is classified as a microframework because it does not require particular tools or libraries. It has no database abstraction layer, form validation, or any other components where pre-existing third-party libraries provide common functions. However, Flask supports extensions that can add application features as if they were implemented in Flask itself. Extensions exist for object-relational mappers, form validation, upload handling, various open authentication technologies and several common framework related tools. Applications that use the Flask framework include Pinterest and LinkedIn.

Features:

- Development server and debugger
- Integrated support for unit testing
- RESTful request dispatching
- Uses Jinja templating
- Support for secure cookies (client-side sessions)
- 100% WSGI 1.0 compliant
- Unicode-based
- Complete documentation
- Google App Engine compatibility
- Extensions available to extend functionality

Wagtail (CMS): Wagtail is a free and open source content management system (CMS) written in Python, It is popular amongst websites using the Django framework. The project is maintained by a team of open-source contributors backed by companies around the world. The project has a focus on developer friendliness as well as ease of use of its administration interface, translated in multiple languages.

The Wagtail project was started in 2014 by Torchbox, a digital agency. The development of the CMS evolved from being the sole action of its creators to receiving contributions from 46 external contributors by its version 1.0 in July 2015. Since then, development sprints have been organized to foster the community. During those sprints, contributors gather to work on selected topics and steer the project. As of July 2016, 257 people had directly contributed to the code and translations. In January 2017, the core development team had increased to nine developers and the main GitHub repository was moved from the Torchbox namespace to a dedicated Wagtail namespace.

NodeJS: Node.js is an open-source server environment. Node.js is cross-platform and runs on Windows, Linux, Unix, and macOS. Node.js is a back-end JavaScript runtime environment. Node.js runs on the V8 JavaScript Engine and executes JavaScript code outside a web browser.

Node.js lets developers use JavaScript to write command line tools and for server-side scripting. The functionality of running scripts server-side produces dynamic web page content before the page is sent to the user's web browser. Consequently, Node.js represents a "JavaScript everywhere" paradigm, unifying web-application development around a single programming language, rather than different languages for server-side and client-side scripts.

Node.js has an event-driven architecture capable of asynchronous I/O. These design choices aim to optimize throughput and scalability in web applications with many input/output operations, as well as for real-time Web applications (e.g., real-time communication programs and browser games).

The Node.js distributed development project was previously governed by the Node.js Foundation, and has now merged with the JS Foundation to form the OpenJS Foundation. OpenJS Foundation is facilitated by the Linux Foundation's Collaborative Projects program.

Corporate users of Node.js software include GoDaddy, Groupon, IBM, LinkedIn, Microsoft, Netflix, PayPal, SAP, Walmart, Yahoo!, and Amazon Web Services.

Node.js allows the creation of Web servers and networking tools using JavaScript and a collection of "modules" that handle various core functionalities. Modules are provided for file system I/O, networking (DNS, HTTP, TCP, TLS/SSL, or UDP), binary data (buffers), cryptography functions, data streams, and other core functions. Node.js's modules use an API designed to reduce the complexity of writing server applications.

JavaScript is the only language that Node.js supports natively, but many compile-to-JS languages are available. As a result, Node.js applications can be written in CoffeeScript, Dart, TypeScript, ClojureScript and others.

Node.js is primarily used to build network programs such as Web servers. The most significant difference between Node.js and PHP is that most functions in PHP block until completion (commands execute only after previous commands finish), while Node.js functions are non-blocking (commands execute concurrently or even in parallel, and use callbacks to signal completion or failure).

Node.js is officially supported on Linux, macOS and Microsoft Windows 8.1 and Server 2012 (and later), with tier 2 support for SmartOS and IBM AIX and experimental support for FreeBSD. OpenBSD also works, and LTS versions available for IBM i (AS/400). The provided source code may also be built on similar operating systems to those officially supported or be modified by third parties to support others such as NonStop OS and Unix servers.

Platform architecture:

Node.js brings event-driven programming to web servers, enabling development of fast web servers in JavaScript. Developers can create scalable servers without using threading, by using a simplified model of event-driven programming that uses callbacks to signal the completion of a task. Node.js connects the ease of a scripting language (JavaScript) with the power of Unix network programming.

Node.js was built on top of Google's V8 JavaScript engine since it was open-sourced under the BSD license. It is proficient with internet fundamentals such as HTTP, DNS, and TCP. JavaScript was also a well-known language, making Node.js accessible to the web development community.

Industry support:

There are thousands of open-source libraries for Node.js, most of them hosted on the npm website. There are multiple developer conferences and events that support the Node.js community, including NodeConf, Node Interactive, and Node Summit as well as a number of regional events.

The open-source community has developed web frameworks to accelerate the development of applications. Such frameworks include Connect, Express.js, Socket.IO, Feathers.js, Koa.js, Hapi.js, Sails.js, Meteor, Derby, and many others. Various packages have also been created for interfacing with other languages or runtime environments such as Microsoft .NET.

Modern desktop IDEs provide editing and debugging features specifically for Node.js applications. Such IDEs include Atom, Brackets, JetBrains WebStorm, Microsoft Visual Studio (with Node.js Tools for Visual Studio, or TypeScript with Node definitions) NetBeans, Nodeclipse Enide Studio (Eclipse-based), and Visual Studio Code. Certain online web-based IDEs also support Node.js, such as Codeanywhere, Codenvy, Cloud9 IDE, Koding, and the visual flow editor in Node-RED.

Node.js is supported across a number of cloud-hosting platforms like Jelastic, Google Cloud Platform, AWS Elastic Beanstalk, Joyent and others.

Node.js operates on a single-thread event loop, using non-blocking I/O calls, allowing it to support tens of thousands of concurrent connections without incurring the cost of thread context switching. The design of sharing a single thread among all the requests that use the observer pattern is intended for building highly concurrent applications, where any function performing I/O must use a callback. To accommodate the single-threaded event loop, Node.js uses the libuv library—which, in turn, uses a fixed-sized thread pool that handles some of the non-blocking asynchronous I/O operations.

MySQL: MySQL is an open-source relational database management system (RDBMS). Its name is a combination of "My", the name of co-founder Michael Widenius's daughter My, and "SQL", the abbreviation for Structured Query Language. A relational database organizes data into one or more data tables in which data may be related to each other; these relations help structure the data. SQL is a language programmers use to create, modify and extract data from the relational database, as well as control user access to the database. In addition to relational databases and SQL, an RDBMS like MySQL works with an operating system to implement a relational database in a computer's storage system, manages users, allows for network access and facilitates testing database integrity and creation of backups.

MySQL is free and open-source software under the terms of the GNU General Public License, and is also available under a variety of proprietary licenses. MySQL was owned and sponsored by the Swedish company MySQL AB, which was bought by Sun Microsystems (now Oracle Corporation). In 2010, when Oracle acquired Sun, Widenius forked the open-source MySQL project to create MariaDB.

MySQL has stand-alone clients that allow users to interact directly with a MySQL database using SQL, but more often, MySQL is used with other programs to implement applications that need relational database capability. MySQL is a component of the LAMP web application software stack (and others), which is an acronym for *Linux, Apache, MySQL, Perl/PHP/Python*. MySQL is used by many database-driven web applications, including Drupal, Joomla, phpBB, and WordPress. MySQL is also used by many popular websites, including Facebook, Flickr, MediaWiki, Twitter, and YouTube.

MySQL is written in C and C++. Its SQL parser is written in yacc, but it uses a home-brewed lexical analyzer. MySQL works on many system platforms, including AIX, BSDi, FreeBSD, HP-UX, ArcaOS, eComStation, IBM i, IRIX, Linux, macOS, Microsoft Windows, NetBSD, Novell NetWare, OpenBSD, OpenSolaris, OS/2 Warp, QNX, Oracle Solaris, Symbian, SunOS, SCO OpenServer, SCO UnixWare, Sanos and Tru64. A port of MySQL to OpenVMS also exists.

The MySQL server software itself and the client libraries use dual-licensing distribution. They are offered under GPL version 2, or a proprietary license.

Support can be obtained from the official manual. Free support additionally is available in different IRC channels and forums. Oracle offers paid support via its MySQL Enterprise products. They differ in the scope of services and in price. Additionally, a number of third-party organizations exist to provide support and services.

MySQL has received positive reviews, and reviewers noticed it "performs extremely well in the average case" and that the "developer interfaces are there, and the documentation (not to mention feedback in the real world via Web sites and the like) is very, very good". It has also been tested to be a "fast, stable and true multi-user, multi-threaded SQL database server".

MySQL is offered under two different editions: the open source MySQL Community Server and the proprietary Enterprise Server. MySQL Enterprise Server is differentiated by a series of proprietary extensions which install as server plugins, but otherwise shares the version numbering system and is built from the same code base.

Major features as available in MySQL 5.6:

- A broad subset of ANSI SQL 99, as well as extensions
- Cross-platform support
- Stored procedures, using a procedural language that closely adheres to SQL/PSM[79]
- Triggers
- Cursors
- Updatable views
- Online Data Definition Language (DDL) when using the InnoDB Storage Engine.
- Information schema
- SSL Support
- Query caching

Limitations:

When using some storage engines other than the default of InnoDB, MySQL does not comply with the full SQL standard for some of the implemented functionality, including foreign key references. Check constraints are parsed but ignored by all storage engines before MySQL version 8.0.15.

Up until MySQL 5.7, triggers are limited to one per action / timing, meaning that at most one trigger can be defined to be executed after an INSERT operation, and one before INSERT on the same table. No triggers can be defined on views.

MySQL database's inbuilt functions like UNIX_TIMESTAMP() will return 0 after 03:14:07 UTC on 19 January 2038. Recently, there had been an attempt to solve the problem which had been assigned to the internal queue.

Some cloud platforms offer MySQL "as a service". In this configuration, application owners do not have to install and maintain the MySQL database on their own. Instead, the database service provider takes responsibility for installing and maintaining the database, and application owners pay according to their usage. Notable cloud-based MySQL services are the Amazon Relational Database Service; Oracle MySQL Cloud Service, Azure Database for MySQL, Rackspace; HP Converged Cloud; Heroku and Jelastic. In this model the database service provider takes responsibility for maintaining the host and database.

MySQL Workbench is the integrated environment for MySQL. It was developed by MySQL AB, and enables users to graphically administer MySQL databases and visually design database structures.

MySQL Workbench is available in three editions, the regular free and open source *Community Edition* which may be downloaded from the MySQL website, and the proprietary *Standard Edition* which extends and improves the feature set of the Community Edition, and the MySQL Cluster CGE.

JQuery: jQuery is a JavaScript library designed to simplify HTML DOM tree traversal and manipulation, as well as event handling, CSS animation, and Ajax. It is free, open-source software using the permissive MIT License. As of Aug 2022, jQuery is used by 77% of the 10 million most popular websites. Web analysis indicates that it is the most widely deployed JavaScript library by a large margin, having at least 3 to 4 times more usage than any other JavaScript library.

jQuery's syntax is designed to make it easier to navigate a document, select DOM elements, create animations, handle events, and develop Ajax applications. jQuery also provides capabilities for developers to create plug-ins on top of the JavaScript library. This enables developers to create abstractions for low-level interaction and animation, advanced effects and high-level, theme-able widgets. The modular approach to the jQuery library allows the creation of powerful dynamic web pages and Web applications.

The set of jQuery core features—DOM element selections, traversal, and manipulation—enabled by its *selector engine* (named "Sizzle" from v1.3), created a new "programming style", fusing algorithms and DOM data structures. This style influenced the architecture of other JavaScript frameworks like YUI v3 and Dojo, later stimulating the creation of the standard *Selectors API*.

Microsoft and Nokia bundle jQuery on their platforms. Microsoft includes it with Visual Studio for use within Microsoft's ASP.NET AJAX and ASP.NET MVC frameworks while Nokia has integrated it into the Web Run-Time widget development platform.

jQuery, at its core, is a Document Object Model (DOM) manipulation library. The DOM is a tree-structure representation of all the elements of a Web page. jQuery simplifies the syntax for finding, selecting, and manipulating these DOM elements. For example, jQuery can be used for finding an element in the document with a certain property (e.g. all elements with an h1 tag), changing one or more of its attributes (e.g. color, visibility), or making it respond to an event (e.g. a mouse click).

jQuery also provides a paradigm for event handling that goes beyond basic DOM element selection and manipulation. The event assignment and the event callback function definition are done in a single step in a single location in the code. jQuery

also aims to incorporate other highly used JavaScript functionality (e.g., fade ins and fade outs when hiding elements, animations by manipulating CSS properties).

The principles of developing with jQuery are:

- Separation of JavaScript and HTML: The jQuery library provides simple syntax for adding event handlers to the DOM using JavaScript, rather than adding HTML event attributes to call JavaScript functions. Thus, it encourages developers to completely separate JavaScript code from HTML markup.
- Brevity and clarity: jQuery promote brevity and clarity with features like "chainable" functions and shorthand function names.
- Elimination of cross-browser incompatibilities: The JavaScript engines of different browsers differ slightly so JavaScript code that works for one browser may not work for another. Like other JavaScript toolkits, jQuery handles all these cross-browser inconsistencies and provides a consistent interface that works across different browsers.
- Extensibility: New events, elements, and methods can be easily added and then reused as a plugin.

jQuery 3.0 and newer supports "current−1 versions" (meaning the current stable version of the browser and the version that preceded it) of Firefox (and ESR), Chrome, Safari, and Edge as well as Internet Explorer 9 and newer. On mobile it supports iOS 7 and newer, and Android 4.0 and newer.