

WEB TECHNOLOGY

Assignment

1. How internet works?

The Internet connects millions of computers to each other so that they can interact with each other and also transmit data to each other.

Have you ever thought about how the internet makes these connections and sends data? Let's discuss how the internet works.

- Internet uses a packet switching technique to transmit the data. Thus, the data to be sent is divided into packets and the data is sent in the form of packets only. Each packet of data contains various information like the address of the destination, error control information, etc.
- Internet majorly uses protocols called Internet Protocol (IP) and Transmission Control Protocol (TCP) to transmit data from one computer to another.

Internet Protocol (IP) The internet protocol is a network layer protocol that is responsible for defining the rules that define how the information is sent over an internet connection from one computer to another.

Internet Protocol is responsible for gathering the addresses to which the data is to be transmitted.

Transmission Control Protocol (TCP) The transmission control protocol (TCP) is a transport layer protocol that works along with the internet protocol to transmit data over the internet. It is a connection-oriented and reliable protocol i.e. it establishes the connection first and then only, sends data over the established connection hence, there is no packet loss in the transmission control protocol.

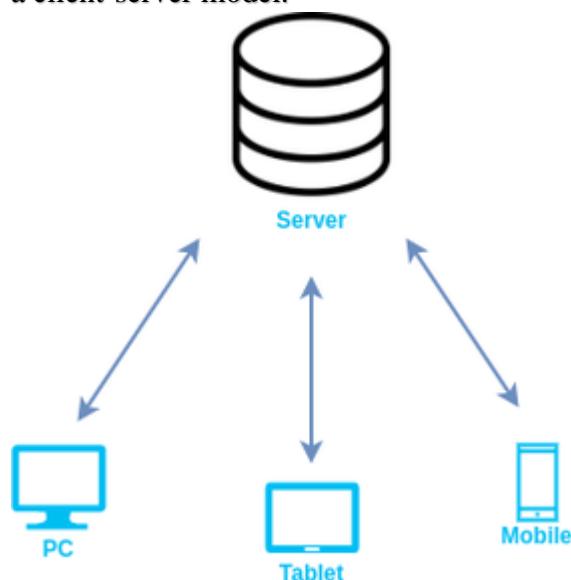
Transmission Control Protocol is responsible for the delivery of data once the Internet protocol gets the IP address of the destination.

- Also, there are several other protocols that are used by the internet for different purposes. For example, it uses Simple Mail Transfer Protocol (SMTP) to send mail from one client to another, it uses File Transfer Protocol (FTP) to transfer files over the internet, it uses Hypertext Transfer Protocol (HTTP) through which a browser (client) can interact with the internet server.

2.How browser works?

The web browser is an application software to explore www (World Wide Web). It provides an interface between the server and the client and it requests to the server for web documents and services. It works as a compiler to render HTML which is used to design a webpage. Whenever we search for anything on the internet, the browser loads a web page written in HTML, including text, links, images, and other items such as style sheets and JavaScript functions. Google Chrome, Microsoft Edge, Mozilla Firefox, and Safari are examples of web browsers

A web browser helps us find information anywhere on the internet. It is installed on the client computer and requests information from the web server such a type of working model is called a client-server model.



Client-server model

The browser receives information through HTTP protocol. In which transmission of data is defined. When the browser received data from the server, it is rendered in HTML to user-readable form and, information is displayed on the device screen.

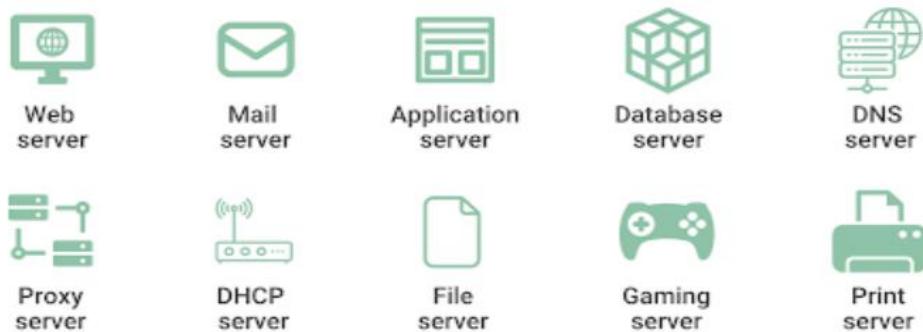
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3.What is Server?

A server is a computer or system that provides resources, data, services, or programs to other computers, known as clients, over a network. In theory, whenever computers share resources with client machines they are considered servers. There are many types of servers, including web servers, mail servers, and virtual servers.

4. What are the types of server available?

Types of Servers



1. Web server

Web servers are designed to run websites and apps through client programs (web browsers) such as Internet Explorer, Chrome, Firefox, Opera, or Safari. They are responsible for storing, processing, and delivering web content to users. They support protocols such as HTTP, FTP, and SMTP that are key to information exchange between network devices.

In a network, all machines hosting websites have web server software to better manage user access to hosted files. Some examples of web servers include Apache HTTP Server, Microsoft Internet Information Services (IIS), and Sun Microsystem's Sun Java System Web Server.

2. Mail server

A mail server facilitates email storage and management for clients. It uses different protocols for sending and receiving emails. For example, the Simple Mail Transfer Protocol (SMTP) is used to send an email. The server relies on the Post Office Protocol (POP3) to store and receive an email.

Mail servers are similar to a typical post office that stores and sorts mail before sending it to the target destination. Simply put, when a user sends an email to another computer, it requests the mail server to deliver it to the intended recipient. Mail servers rely on several software modules that allow emails to be sent, received, retrieved, and forwarded.

3. Application server

An application server provides an environment that helps develop, process, and run web-based applications, irrespective of their functionality. The server executes computer programs or scripts essential for running PHP, Java, or .Net applications.

Application servers are much like web servers as they tend to use HTTP protocol and answer client requests. However, these servers focus on creating dynamic websites that use object pooling, messaging services, and others; for example, ecommerce websites, blogs, etc. On the other hand, web servers are inclined towards creating static websites where information remains the same, for example, technical documentation websites, corporate portfolio websites, read-only websites, landing pages, and so on.

In some cases, application servers include a web server component in them so that they can perform the function of a web server when needed.

4. Database server

Database servers offer database services to client computers. Users can access, modify, store, and retrieve data from a database by executing a query; for example, an SQL query. Database servers are responsible for handling the security and recovery of database management systems (DBMS). They store digital files, application files, and non-database files. Large organizations use these servers to safeguard their sensitive and valuable corporate data. Some examples of database servers include Microsoft SQL, MySQL, MongoDB, and SQLite.

5. DNS server

DNS servers are domain name servers. These computers resolve server names that reside in a network. DNS servers are an integral part of the internet as they translate user-understandable URLs (for example, www.spiceworks.com) into their corresponding IP addresses.

6. Proxy server

A proxy server acts as an intermediary between local networks and worldwide networks. It provides a communication interface between interacting networks by accepting requests from one network and forwarding them using its own IP address. These servers cache frequently accessed web pages, which helps faster loading when accessed in the future. As a result, the network's bandwidth is reduced significantly.

Moreover, proxy servers filter network communication and are always available, which is crucial for network load balancing. These servers also keep clients anonymous as their original IP address is replaced with a proxy.

7. DHCP server

Dynamic host configuration protocol (DHCP) servers refer to computer systems that dynamically assign IP addresses to clients. The advantage of this automatic process is that it minimizes the errors that manual handling may bring along, such as typo errors or IP conflicts. DHCP servers maintain configuration updates of network devices; for example, they update or change expired IP addresses or manage the IP addresses of devices that move from location to location. These servers also play a key role in network administration since they can simultaneously address multiple client requests.

8. File server

A file server refers to a machine that provides shareable disks that can be accessed by the workstations on a network. The disk holds computer files such as text files, images, graphic files, audio & video files, and so on. File servers are typically used for storage purposes. Hence, they neither run computer programs nor perform computational tasks.

File servers use different protocols to access files depending on the computing environment. For example, internet file servers are accessible via FTP and HTTP protocols, while file servers on LAN, such as the ones used in offices and schools, are accessed using SMB or NFS protocol.

9. Gaming server

Gaming servers connect the global online gaming community. They support multiplayer games such as Counter-Strike, Minecraft, etc. Moreover, these servers manage player and game data while synchronizing player activity in the virtual world. Scala Cube, Host Havoc, and Cloudzy are popular game server hosting solutions that rent game servers for games such as ARK, Rust, and others.

10. Print server

Print servers connect printing devices to clients on a network. They accept print tasks from users and queue them in anticipation that printers can fail to cope with the number of requests

received in a certain timeframe. These servers use different protocols to accomplish print jobs, such as Internet Printing Protocol, Line Printer Daemon protocol, or Jet Direct. Popular brands in the print server market include IOGEAR and HP.

5.What is SEO? Importance of SEO?

SEO is the practice of increasing the quantity and quality of traffic to your website through organic search engine results. A higher rank when someone searches a term in your industry increases your brand's visibility online. The increase in visibility will drive more organic traffic to your site, and this, in turn, gives you more opportunities to convert qualified prospects into customers. When done correctly, SEO can help your brand stand above others as a trustworthy company and further improve the user's experience with your brand and website.

Importance: SEO is important for brands as it's a highly effective way to improve your brand's visibility through search, drive more traffic to your website, establish your brand as a trusted authority in your industry, sustainably and reliably grow your business, and much more. Here's how each of these factors contributes to the importance of SEO for your brand.

6.What is Accessibility?

Accessibility is the practice of making your websites usable by as many people as possible. We traditionally think of this as being about people with disabilities, but the practice of making sites accessible also benefits other groups such as those using mobile devices, or those with slow network connections.

You might also think of accessibility as treating everyone the same, and giving them equal opportunities, no matter what their ability or circumstances. Just as it is wrong to exclude someone from a physical building because they are in a wheelchair (modern public buildings generally have wheelchair ramps or elevators), it is also not right to exclude someone from a website because they have a visual impairment. We are all different, but we are all human, and therefore have the same human rights.

Accessibility is the right thing to do. Providing accessible sites is part of the law in some countries, which can open up some significant markets that otherwise would not be able to use your services or buy your products.

7. What is Markup Language?

A markup language is a set of rules that defines how the layout and presentation of text and images should appear in a digital document. It allows structuring documents, adding

formatting, and specifying how different elements should be displayed (or “rendered”) on webpages.

This structuring helps search engines like Google understand the information on websites better. If search engines know more about what a page is about, they are more likely to show it to people who are looking for its content. Which, in result, can bring more people to websites with the right markup.

An example of a markup language—and the one most people know—is HTML. And it looks like this:

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<b>Example of a Markup Language</b>
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8. What is HTML?

HTML, or HyperText Markup Language, is the standard markup language used to create web pages. It’s a combination of Hypertext, which defines the link between web pages, and Markup language, which is used to define the text document within tags to structure web pages. This language is used to annotate text so that machines can understand and manipulate it accordingly. HTML is human-readable and uses tags to define what manipulation has to be done on the text.

HTML stands for HyperText Markup Language and it is used to create webpages. It uses HTML tags and attributes to describe the structure and formatting of a web page.

HTML consists of various elements, that are responsible for telling search engines how to display page content. For example, headings, lists, images, links, and more.

9. What is browser engine?

Think of a browser engine as the heart of your web browser. It is the essential software that acts as a bridge between the web page’s code (HTML, CSS, JavaScript) and the visual experience you see on your screen. Here’s what it does:

- Starts the Process: The browser engine handles the initial request to load a web page and coordinates the resources needed.
- Navigation: It manages your browsing actions – things like going back, forward, or reloading.
- Error Handling: The browser engine gracefully displays error messages if something goes wrong.
- Visual Layout: It works behind the scenes, using HTML and CSS to calculate the precise position and appearance of every element on the page.

10. What is rendering engine? share the available rendering engine?

The rendering engine is one of the basic components of a web browser. It's responsible for interpreting the HTML (Hypertext Markup Language), CSS (Cascading Style Sheets), and Java script files to present (render) them on screen, in other words, convert them to pixels.

It's responsible for displaying the requested web resources by parsing the contents. By default it can parse html, xml, and images. It uses different plugins and/or extensions to display other type of data such as flash, PDF, etc.

There are different rendering engines such as Gecko, Web Kit, and Trident. Most widely used rendering engine is Web Kit or its variant version. Gecko and Web Kit are open source rendering engines while Trident is not. Firefox uses Gecko, Safari uses Web Kit, Internet Explorer uses Trident, Chrome and Opera uses Blink, which is a variant of Web Kit. Different rendering engines use different algorithms and also have their different approaches to parse a particular request. The best example to support this statement is that you might have encountered some website which work with a particular browser because that website is designed compatible to that browser's rendering engine so in other browsers they don't work well.

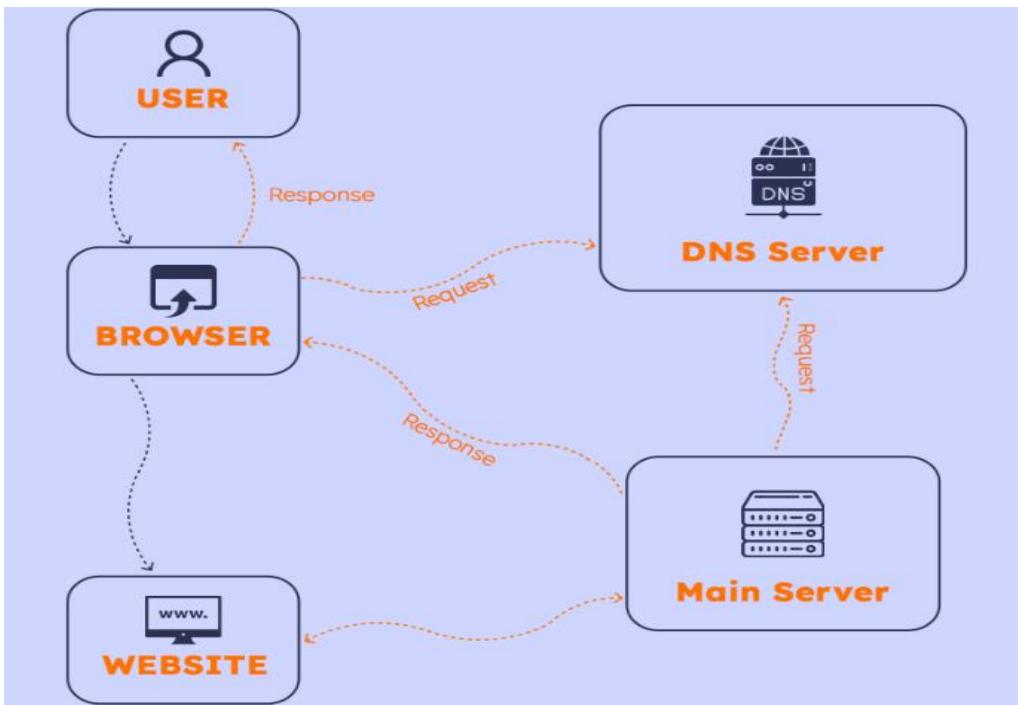
11. What is JavaScript Engine? share the available JS engine? Purpose of JS Engine?

JavaScript is a scripting language and is not directly understood by computer but the browsers have inbuilt JavaScript engine which help them to understand and interpret JavaScript codes. These engines help to convert our JavaScript program into computer-understandable language. A JavaScript engine is a computer program that executes JavaScript code and converts it into computer understandable language.

List of JavaScript Engines:

Browser	Name of Javascript Engine
Google Chrome	V8
Edge (Internet Explorer)	Chakra
Mozilla Firefox	Spider Monkey
Safari	Javascript Core Webkit

12. How website works?



The process is quite simple. Firstly, you enter a domain name or a website address in the search bar. Then the browser passes the request to DNS Server. DNS server acts as an address directory. It converts the human-readable address to a machine-readable address i.e. the IP address of the Website address to a machine-readable address i.e. the IP address of the website.

Then it passes the request to the main server or the server where your site is stored. Then the server provides the response to the browser and now you are able to access the website. The whole process takes hardly 1 or 2 seconds.

13. What is Data Structure?

A data structure is a way of organizing and storing data in a computer so that it can be accessed and used efficiently. It refers to the logical or mathematical representation of data, as well as the implementation in a computer program.

14. Explain Tree Data Structure?

Tree data structure is a hierarchical structure that is used to represent and organize data in a way that is easy to navigate and search. It is a collection of nodes that are connected by edges and has a hierarchical relationship between the nodes.

The topmost node of the tree is called the root, and the nodes below it are called the child nodes. Each node can have multiple child nodes, and these child nodes can also have their own child nodes, forming a recursive structure.

Why Tree is considered a non-linear data structure?

The data in a tree are not stored in a sequential manner i.e., they are not stored linearly. Instead, they are arranged on multiple levels or we can say it is a hierarchical structure. For this reason, the tree is considered to be a non-linear data structure.

15. What is user agent? share the list and its purpose?

A user agent is a string of text that is sent by a web browser to a web server to identify itself and provide information about the browser's capabilities. The User Agent string can include information such as the browser type and version, the operating system, and the device type.

Purpose:

Overall, user agents are an essential component of the web ecosystem, enabling users to access and interact with online content and services in a convenient and secure manner.

16. What is Hypertext?

Hypertext is text that is displayed on a computer or other electronic device and is linked to other documents or resources[1]. When you click on a hypertext link, you are taken to the linked resource, which can be a webpage, an image, a video, or any other type of digital content. Hypertext links are created using HTML (HyperText Markup Language) and are usually underlined and colored differently than the surrounding text to make them stand out[2].

17. What is HTML Tags?

HTML tags are the building blocks of any website. They are keywords used to create web pages in various formats. These tags come in pairs, with opening and closing tags, although some tags don't need to be closed. For example, the HTML document structure is defined using tags like <!DOCTYPE html>, <html>, <head>, and <body>.

18. What is HTML Attributes?

HTML attributes provide additional information about elements within an HTML document. Every HTML element can have attributes. Attributes are always defined in the start tag. They are specified using a name/value pair format, where the attribute name defines the property, and its value provides specific details, like name="value". These attributes impact content display and interaction on web pages.

19. What is HTML Elements?

An HTML Element is a collection of start and end tags with the content inserted between them. HTML elements are building blocks of web pages, representing different types of content such as headings, paragraphs, links, and images.

20. How do convert elements to tree?

Converting elements into trees typically involves conceptualizing hierarchical relationships where elements are organized into parent-child structures.

Steps to Convert Elements to Trees:

1. Define the Tree Structure:
2. Identify the Root Node:
3. Map Elements to Nodes:
4. Establish Parent-Child Relationships:
5. Choose a Representation:
6. Implement the Conversion:

21. What is DOCTYPE?

HTML Doctypes declared at the beginning of HTML documents, inform browsers about the document type and version, ensuring correct rendering. They aren't HTML tags but provide essential information. The most common doctype is <!DOCTYPE html>, used for HTML5, ensuring modern web standards.

Declaration of a Doctype

A DOCTYPE declaration, appearing at the top of a web page before all other elements, is required by HTML standards. It ensures that browsers display the page as intended, adhering to the specified HTML version.

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22. What are the ways we can save html file?

Using a Text Editor:

- Open a text editor such as Notepad (Windows), TextEdit (Mac), or any code editor like VS Code, Sublime Text, Atom, etc.
- Write or paste your HTML code into the editor.
- Go to File > Save As (or press Ctrl+S or Command+S).
- Choose the location where you want to save the file.
- Enter a filename with the .html extension (e.g., index.html).
- Click Save.

Using Online HTML Editors:

- There are several online HTML editors where you can write and save HTML directly in your web browser. Examples include JSFiddle, CodePen, and many others.
- In these editors, you typically write your HTML code in the provided editor pane.
- There is usually a save or export feature that allows you to save your code to a file with a .html extension.

Saving HTML from a Web Browser:

- If you have an HTML file open in a web browser and want to save it:
 - Right-click on the page and select "Save As" or use the browser menu to find the "Save As" option.
 - Choose the location on your computer where you want to save the file.
 - Enter a filename with the .html extension.
 - Click Save.

Using Integrated Development Environments (IDEs):

- IDEs like Visual Studio, IntelliJ IDEA, or Eclipse have built-in support for HTML editing.
- You can create new HTML files, edit existing ones, and save them directly from within the IDE.

Command Line:

- For advanced users comfortable with command-line interfaces (CLI):
 - Use text editors that can be accessed from the command line, such as Vim or Nano.
 - Save the file with the .html extension using commands like :wq in Vim or Ctrl+O then Enter followed by Ctrl+X in Nano.

23. What is charset? why we need to use this?

HTML charsets define character encodings used by the document. The charset attribute within the <meta> tag specifies the character encoding for the HTML document, ensuring proper interpretation of text. Common values include UTF-8 and ISO-8859-1.

A charset or character set in full is essentially a set of characters recognized by the computer the same way the calculator can identify numbers. Each of these characters is represented by a number known as code point and this creates a communication channel for encoding and decoding content.

24. What is meta data? what is the purpose of it?

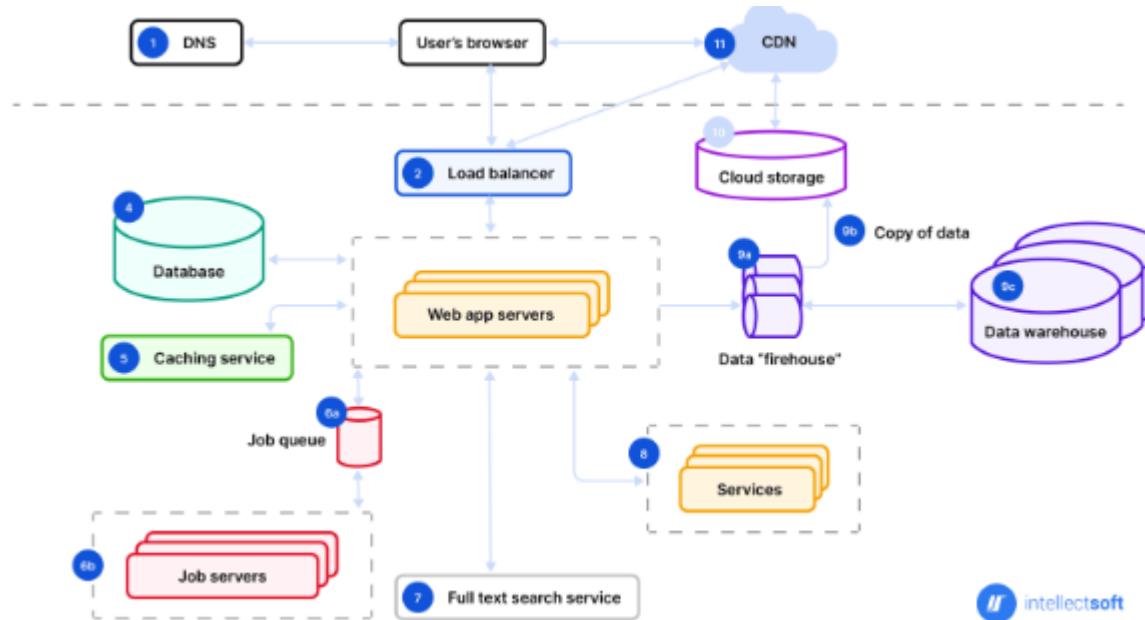
The <meta> tag defines metadata about an HTML document. Metadata is data (information) about data. <meta> tags always go inside the <head> element, and are typically used to specify character set, page description, keywords, author of the document, and viewport settings.

25. Explain Web Application Architecture?

A web application architecture is a model of interaction between web application components. The specific kind of architecture for web applications strictly depends on the way application logic will be allocated among client and server sides.

Technically, it's the skeleton of a web app, including its elements, databases, systems, servers, interfaces, and all the communication happening between them. In more abstract terms, it indicates the logic behind responses to client and server requests.

When it comes to business benefits, web application architecture is related to the process of creating web applications and planning for their needs in terms of speed, scalability, security, and other quality attributes.



1. DNS

The abbreviation DNS stands for the domain name system. It's a key element that matches IP addresses to domain names. In this way, a particular server receives a request sent by an end user.

2. Load Balancer

It directs incoming requests from app users to one of the multiple servers, which distributes load more evenly when too many users are active at the same time. Generally, web app services exist as various copies mirroring one another to enable all servers to process requests in the same manner. Also, the load balancer is an element that distributes tasks in order to prevent them from overcharging.

3. Web App Servers

This component is basically an app deployment descriptor. What does it mean? It means that it processes the user's requests and sends responses back to an initial browser. To make it

happen, it refers to the back-end infrastructure, including the database, job queue, cache server, etc.

4. Database

The meaning of this component is pretty much straightforward. It offers a wide variety of instruments to perform, delete, organize, and update data entries. Mainly, web app servers interact with job servers without any intermediary.

5. Caching Service

The component grants easy and quick data storage and search. When the user receives the info from the server, search results can be cached. As a result, future requests will be returned much faster.

These are the scenarios when caching is efficient:

- Slow or repeated computation
- When a user receives similar results for a specific request

6. Job Queue (Optional)

This one has two components in it, which are a job queue and servers that process those jobs. Many web servers operate a large number of jobs of minor importance. A job that has to be fulfilled goes in the queue and will be operated according to the schedule.

7. Full-Text Search Service (Optional)

There are plenty of web apps that support search by text feature. After this, an application sends the relevant results to an end user. The whole process is called a full-text search, and it can find the requested data by a keyword among all the documents available in a system.

8. CDN

The abbreviation CDN stands for the content delivery system. This system sends static content, including images and other files. Basically, it includes multiple servers that are closer to the geographical locations of end users than an app's database. As a result, CDN delivers content more effectively to users around the globe, drastically reducing load times.