1. WWW and Web Development  
 1. What is the World Wide Web [www] and how does it differ from the internet?  
 The World Wide Web is a system of interconnected web pages that are accessible  
 through the internet, while the Internet itself is a vast network of connected computers  
 and d Devices that allow the transmission of data, including the information accessed  
 through the www.  
 2. Explain the basic structure of Web page. What are the essential elements?  
 A basic structure of web page   
 DOCTYPE: Specify the HTML version used on the page, informing the browser how to

Interpret the code.   
 HTML elements: The root element that encapsulates all other page elements.  
 Head section: Title, Meta tags, CSS links  
 Body section: header, Navigation menu, Main content area, optional, Footer  
 Essential elements of web page  
 Text content, Images, Links, Forms  
 3. What is the role of HTML, CSS and JAVA script in Web development?  
 HTML plays an important role in the development of web pages as it provides a basic

Structure for the development, in simple words we can say that HTML acts as a skeleton   
 of a web page.  
 CSS allows you to apply consistent styling of elements across all pages on your site, so that  
 all headings, lists, and paragraphs look and act the same on every page of a site.  
 The role of JAVA script is design and construct online applications for client.  
 4. Describe the difference between static and dynamic web pages?  
 Static web pages displays the same content to all users, While Dynamic web pages can change   
 based on user input or data.

2. Web applications and types of web applications  
 1. What is a web application and how does it differ from the website?  
 Web application is a software program that runs in a web browser and   
 allows users to perform a specific task by interacting with dynamic content,   
 while website is a primarily collection of static pages providing information   
 to users with interactive capabilities.  
 Website serve to inform, and Web apps serve to help.  
 2. Name and Describe three types of web applications?  
 Static web application:   
 The very first type of web application available on the Internet is the static web application, which is built using HTML and CSS to facilitate exhibiting significant content and information. This is usually the simplest web application as it exhibits only limited content and is not flexible. Normally these apps have no personalization and will make changes after the page is fully loaded.  
 Dynamic Web application:  
 Dynamic web application delivers live data based on the requests of the users and is therefore considered one of the best web application types. They have improved technical sophistication when compared to static web applications. There are multiple elements of interactions and methods to draw the attention of the client to the services and products provided by the web app.  
 E-Commerce Web application:  
 When your web application promotes products or services directly to your potential customers, you can call it an e-commerce web application which is no different from an online shopping store. Many of the basic features of the e-commerce web app include the addition of new products, removal of outdated and old products, managing payments, facilitating electronic payments, and a user-friendly interface.

3. What are the advantages and disadvantages of single page applications [SPAs] compared to multi-page application [MPAs]?  
 [ a] Advantages of Single Page Application (SPA):

**Fast and Responsive:**

SPAs load quickly as only necessary data is updated dynamically, leading to a smooth user experience.

**Reduced Server Load:**

The server only needs to send data updates, not entire pages, minimizing server workload.

**Improved User Interaction:**

Seamless transitions between sections within the application create a more engaging experience.

**Offline Capability:**

With proper caching, SPAs can function partially even when offline.

**Easier Development:**

Often utilize JavaScript frameworks which can streamline development process.

[b] Disadvantages of Single Page Application (SPA):

**SEO Challenges:**

Search engines may struggle to crawl and index SPA content effectively, impacting search rankings.

**Initial Load Time:**

The first load of an SPA might be slower as the entire application needs to be loaded initially.

**Browser Compatibility Issues:**

Older browsers might not fully support the JavaScript features used in SPAs.

**Security Concerns:**

Potential vulnerabilities if not properly secured due to client-side processing.  
 [c] Disadvantages of Multi Page Application (MPA):

**Better SEO:**

Each page is fully rendered and can be easily indexed by search engines, leading to better search ranking.

**Scalability:**

Easier to add new pages and features to an existing application without affecting the overall structure.

**Intuitive Navigation:** Users are familiar with the traditional page navigation pattern.

**Data Analytics:**

Easier to track user behavior on individual pages with standard analytics tools.

[d] Disadvantages of Multi Page Application (MPA):

**Slower Loading Times:** Each page load involves a full page refresh, impacting user experience.

**Increased Server Load:** The server needs to render a complete page for each request.

**Less Dynamic Interaction:** May lack the smooth transitions and interactive elements of an SPA.

3. Web client and web server

1. What is a web client and how does interact with a web server?  
    A "web client" is a software application, like a web browser, that allows users to access and interact with content on the internet by sending requests to a web server, which then responds with the requested information, essentially acting as the intermediary between the user and the web server to display content on the user's device; this communication happens through the Hypertext Transfer Protocol (HTTP).

1. Explain the role of a Web server in delivering web content to users?

A web server acts as the central hub for storing and delivering website content to users by processing requests from their browsers, locating the requested web pages, files, or data on the server, and then sending that information back to the user in a format that can be displayed on their device, essentially acting as the intermediary between a user's request and the website content they want to access; this communication happens primarily through the Hypertext Transfer Protocol (HTTP)

1. What is the purpose of a server- side language, and how does it differ from client- side language?

Server-side development, sometimes called back-end Development, is a type of development that involves programs that run on a server. This type of programming is important because web browsers, or clients, interact with web servers to retrieve information.

Applications for the web are written in scripting languages. Both the client-side and the server-side use it. Client-side scripting languages include JavaScript, AJAX, j Query, and PHP. Server-side scripting languages include JavaScript, PHP, Perl, and others.

4. Client-server communication  
   
 1. Describe the process of client-server communication in a typical web application?

In a typical web application, client-server communication happens when a user's web browser (the "client") sends a request to a web server, which then processes the request and sends back a response, usually in the form of a webpage, data, or an image, completing the communication cycle with a request-response pattern; this interaction is primarily facilitated by the Hypertext Transfer Protocol (HTTP)

2. What is a RESTful API, and how does it facilitate client-server communication?  
   
 A RESTful API (Representational State Transfer Application Programming Interface) is a standardized way for applications to communicate with each other over the internet, using standard HTTP methods like GET, POST, PUT, and DELETE to access and manipulate data on a server, essentially acting as a structured interface for client-server interaction where each request is treated independently and contains all necessary information to complete the operation, enabling scalability and flexibility in web services.   
  
 3. Explain the concept of a session in the context of web development?

In web development, a "session" refers to a series of related interactions a user has with a website within a specific timeframe, essentially allowing the website to remember information about a user across multiple pages they visit during that time, enabling personalized experiences like keeping items in a shopping cart or remembering login details without requiring repeated input on every page.    
   
   
 5. HTTP and HTTP methods  
  
 1. What is HTTP and why is it essential for web communication?  
  
 HTTP, which stands for Hypertext Transfer Protocol, is a fundamental protocol that enables communication between web browsers (clients) and web servers, allowing users to access and view web pages by sending requests for information and receiving responses from servers, essentially acting as the foundation for the World Wide Web and making web browsing possible; it's essential because it defines the rules for how data like HTML documents, images, and videos are exchanged between devices on the internet.

2. List and describe different HTTP methods [e,g; GET,POST,PUT,DELETE] when should each be used?

|  |  |  |
| --- | --- | --- |
| **Method** | **Summary** | **CRUD** |
| GET | To fetch a single resource or group of resources | Read |
| PUT | To update an entire resource in one go | Update |
| POST | To create a new resource | Create |
| PATCH | To partially update a resource | Update |

3. How does the HTTP request-response cycle works?  
  
 An HTTP request-response cycle works by a client (like a web browser) sending a request to a server for a specific resource (like a webpage), and the server then processing that request and sending back a response containing the requested data to the client, completing the cycle once the client receives the response and displays it to the user; essentially, it's a communication loop where the client asks for information and the server provides it.

6. HTTPS VS HTTP

1. What is HTTPS and how does it differ from HTTP?

HTTPS stands for "Hypertext Transfer Protocol Secure" and is essentially a more secure version of HTTP (Hypertext Transfer Protocol) by adding encryption to data transmission, meaning any information sent between a user's browser and a website is scrambled and protected from being intercepted by third parties, making it crucial for sensitive data like login credentials and credit card details; while HTTP sends data in plain text, making it vulnerable to eavesdropping.

1. Why is HTTPS important in modern web application, and what role does SSL/TLS play?

HTTPS establishes trust from website users, allowing them to double-check the domain name against the SSL Certificate. As the protocol encrypts all client-server communications through SSL/TLS authentication, attackers cannot intercept data, meaning users can safely enter their personal information   
   
SSL/TLS stands for secure sockets layer and transport layer security. It is a protocol or communication rule that allows computer systems to talk to each other on the internet safely. SSL/TLS certificates allow web browsers to identify and establish encrypted network connections to web sites using the SSL/TLS protocol.

7. HTTP status codes.

1. what are HTTP status codes, and why are they important?

HTTP status codes are three-digit numbers sent by a web server to a client (like a browser) to indicate the outcome of a request, essentially telling whether the request was successful, resulted in an error, or needs further action, making them crucial for understanding how a website is performing and troubleshooting issues when a user interacts with it.  
  
  
 **200 OK:** The request was successful.

* **404 Not Found:** The requested resource could not be found.
* **301 Moved Permanently:** The requested resource has been moved to a new URL permanently.
* **403 Forbidden:** Access to the resource is denied

Developers can use status codes to identify issues with a website, such as broken links, incorrect server configurations, or user authentication problems.

1. List and explain the meaning of the following HTTP status codes 200, 301, 404, 500.

* **200 (OK):**

This is the standard successful response, indicating that the request was received, understood, and successfully completed by the server; essentially meaning everything is working as expected.

* **301 (Moved Permanently):**

This code signifies that a webpage has been permanently moved to a new location, prompting browsers to update their records with the new URL.

* **404 (Not Found):**

This means the server could not locate the requested resource, usually because the URL is incorrect or the page doesn't exist.

* **500 (Internal Server Error):**

This indicates a generic problem on the server side, meaning the server encountered an unexpected condition and could not fulfill the request.

Key points to remember:

* **200:** The ideal status code for a functioning webpage.
* **301:** Used for permanent redirects when a page is moved to a new location.
* **404:** A common error message displayed when a requested page cannot be found.
* **500:** A broad server-side error, usually requiring further investigation to identify the root cause.

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