Internet & Web Technology – Assignment

Q1. What is Internet? Why do we need an Internet?

Definition of Internet

The **Internet** is a global network of computers and devices that are interconnected using standardized communication protocols such as TCP/IP, enabling data exchange and resource sharing across diverse systems and platforms. It forms an expansive "network of networks," facilitating the transfer of information globally.

Key Points: What is Internet?

- Worldwide system of interconnected computer networks using the TCP/IP suite[**?**].
- Provides access to vast information, services, and resources like websites, emails, file transfers, and multimedia.
- Typically consists of millions of private, public, academic, business, and government networks[**?**].
- Supports a wide variety of communication, commerce, education, and entertainment applications.

Why Do We Need the Internet?

- **Communication:** Enables instant communication via email, messaging, and video calls regardless of geographical boundaries.
- **Information Access:** Provides on-demand access to knowledge, news, research, and multimedia content.
- **Resource Sharing:** Allows sharing of files, documents, software, and hardware resources efficiently.
- **E-Commerce and Banking:** Facilitates online business transactions, digital payments, and banking.
- **Remote Work and Education:** Supports e-learning, remote work, collaboration tools, and online examinations.
- **Social Networking:** Makes it possible to connect with friends, family, and professional peers via social media platforms[**?**].
- **Automation and IoT:** Enables smart devices, smart homes, and industry automation through the Internet of Things.

Table: Advantages of Internet

Category	Advantage
Communication	Real-time global messaging, VoIP, video calls
Information	Available 24/7, easily searchable, educational and research materials
Commerce	Online shopping, e-banking, business services
Entertainment	Streaming movies/music, gaming, social media
Collaboration	Cloud document sharing, virtual meetings, project management
Automation	IoT applications, industrial automation, smart devices

Table 1: Major Advantages and Uses of the Internet

Diagram: Basic Structure of the Internet

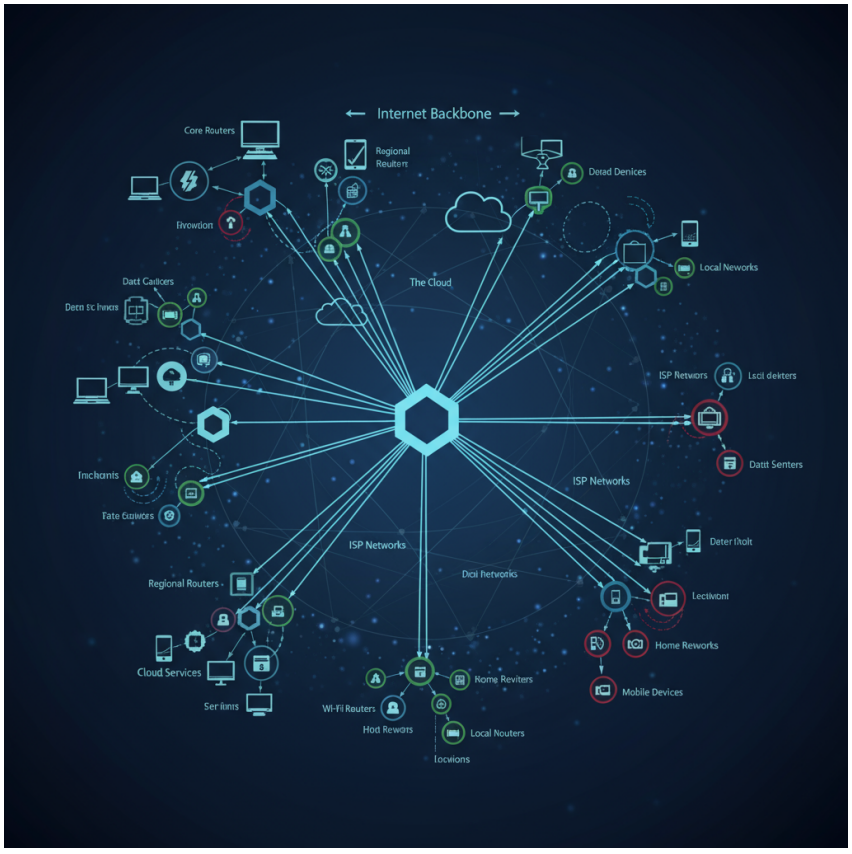

Figure 1: Basic Structure of the Internet: Interconnection of Networks

Conclusion

Internet is the backbone of modern digital society, vital for access to information, communication, business, and globalization. Its need arises from the demand for instant connectivity, rapid knowledge exchange, and efficient resource utilization across all sectors of life.

Q2. What is Web Design? Why do we need Web Design?

Definition of Web Design

Web design refers to the process of planning, conceptualizing, and arranging content intended for the Internet, typically in the form of websites or web applications. It involves both the aesthetic aspects (layout, color, graphics, typography) and functional elements (navigation, usability, accessibility) of web development.

Key Points: What is Web Design?

- Incorporates visual design (look and feel), interface design, and user experience design.
- Utilizes standard technologies such as HTML, CSS, JavaScript for structure, style, and interactivity.
- Focuses on accessibility, responsiveness, and browser compatibility.
- Encompasses static (fixed content) and dynamic (interactive/data-driven) web pages.
- Plays a critical role in how users perceive and interact with websites.

Why Do We Need Web Design?

- **First Impressions:** High-quality web design ensures that visitors have a positive first impression of the organization or individual.
- **Usability:** Effective design makes websites easy to navigate and information easy to find.
- **User Retention:** Engaging and intuitive layouts increase the likelihood that visitors will stay on the site and return in the future.
- **Brand Identity:** Consistent design reflects the brand's image and values.
- **Accessibility:** Well-designed sites are usable by people with disabilities, meeting global accessibility standards.
- **Mobile Responsiveness:** Ensures websites work seamlessly across a variety of devices and screen sizes.
- **SEO Benefits:** Search engine-friendly layouts and structure contribute to higher search rankings.

Element	Description
Layout	Structural arrangement of content for clarity and flow
Color Scheme	Consistent and readable color combinations
Typography	Font style and size for readability and aesthetics
Navigation	Menus and links for easy information access
Responsiveness	Adaptive design for various devices and resolutions
Visuals	Use of images, videos, icons for engagement
Accessibility	Catering to users with disabilities through proper markup
Loading Speed	Efficient content delivery for reduced wait times

Table 2: Key Elements of Modern Web Design

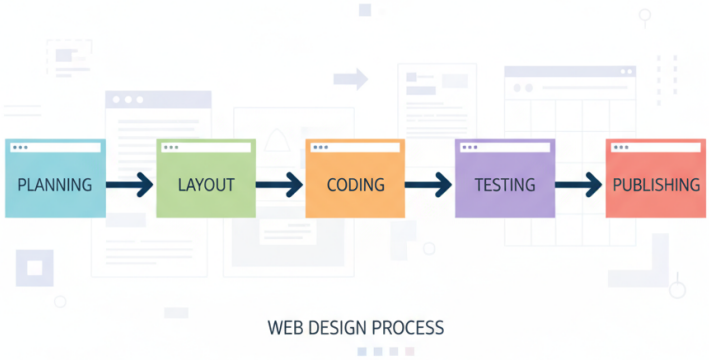

Figure 2: General Flow of Web Design Process

Table: Elements of Effective Web Design

Diagram: Web Design Process Flow

Conclusion

Web design is essential to ensure not only an attractive and brand-aligned appearance but also a seamless, accessible, and user-friendly experience for a global audience. Its importance spans usability, engagement, inclusivity, and business success.

Q3. What are the differences between Webpage, Website, Web browser, and Web server?

Definitions

Webpage: A single document, typically written in HTML, that is accessible by browsers over the Internet. A webpage contains text, images, links, and multimedia, and forms part of a website.
Website: A collection of related webpages identified by a common domain name, hosted on a web server.
Web browser: An application software that enables users to access, view, and navigate webpages and websites (e.g. Chrome, Firefox, Edge).
Web server: A computer system and software that stores, processes, and delivers webpages to clients (browsers) via HTTP/HTTPS protocols (e.g. Apache, Nginx).

Key Differences Table

Aspect **Web Server**	**Webpage**	**Website**	**Web Browser**
Definition System serving web content to clients	Single HTML document	Collection of webpages under one domain	Software to access the Web
Example Apache, Nginx	`index.html`	`example.com`	Chrome, Firefox
Content Hosts web files	Text, media, links	Multiple webpages	Interface for viewing
Functionality Delivers content via HTTP/HTTPS	Displays content	Organizes content	Renders and fetches content
User Access Indirect (backend)	By browser	By browser	Direct use
Existence Backend hardware/software	Part of website	Consists of webpages	Standalone application

Table 3: Comparison of Webpage, Website, Web Browser, and Web Server

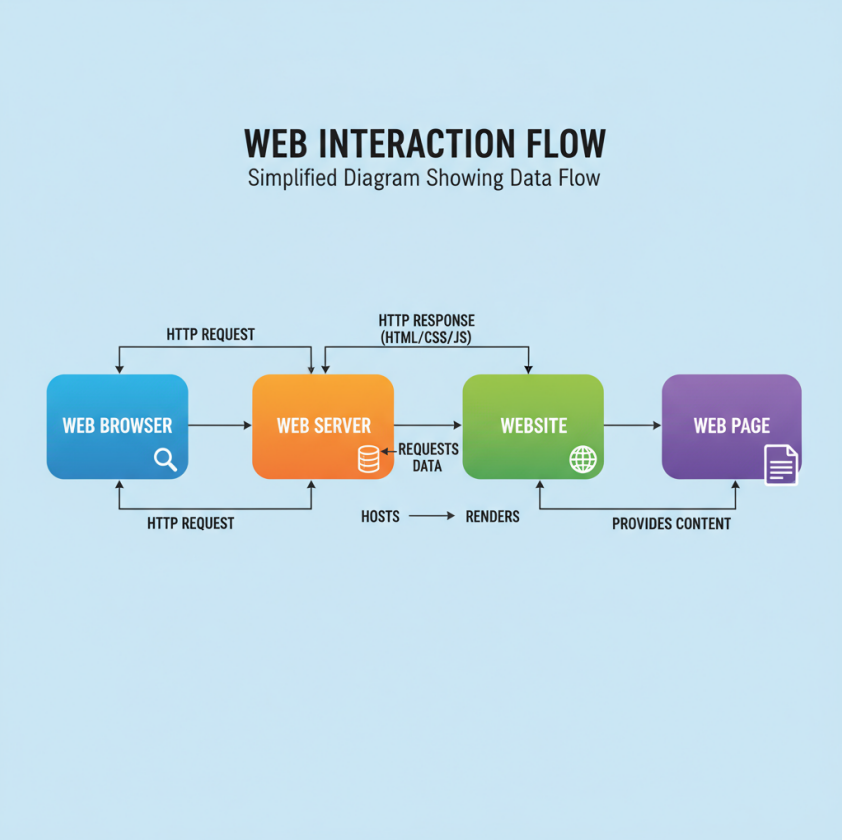

Figure 3: Interaction between Web Browser, Web Server, Website, and Webpage

Diagram: Web Interaction Flow

Explanation and Key Points

- A **webpage** is a single document; a **website** is a group of webpages.
- A **web browser** is required to access and display webpages/websites.
- A **web server** provides the resources (webpages, files) upon request from the browser.
- Communication occurs via web protocols, primarily HTTP/HTTPS.

Conclusion

Each component plays a unique and critical role in the web ecosystem, enabling users to interact with and retrieve information from the vast resources available online.

References

Q4. What do you mean by WWW? What is the difference between WWW and Internet?

Definition of WWW

The **World Wide Web (WWW)** is a global system of interlinked hypertext documents and multimedia content, accessed via the Internet using web browsers. It uses protocols like HTTP and HTTPS to retrieve, display, and interact with documents that are linked using hyperlinks[**?**].

Key Points: WWW

- Utilizes web browsers to access and display web pages.
- Web content is organized via Uniform Resource Locators (URLs).
- WWW is just one of many services (like email, FTP) running over the Internet.
- Invented by Tim Berners-Lee in 1989.
- Employs technologies such as HTML, HTTP, and web servers.

Difference Table: WWW vs Internet

Feature	**World Wide Web (WWW)**	**Internet**
Definition	Collection of information accessed via the Internet, organized as interlinked web pages	Global network of interconnected computers enabling data transmission and communication
Components	Web servers, browsers, HTML documents, URLs, hyperlinks	Networking hardware, routers, transmission media, computers, protocols (TCP/IP)
Scope	Service (subset) that operates over the Internet	Entire infrastructure including WWW, email, FTP, chat, etc.
Protocols Used	HTTP, HTTPS	TCP/IP, UDP, FTP, SMTP, HTTP, etc.
Inventor	Tim Berners-Lee (1989)	Evolved from ARPANET (1960s-1980s)
Access Method	Via web browsers	Via various clients (browsers, email, FTP, etc.)

Table 4: Comparison: WWW vs Internet

Diagram: Relationship Between WWW and Internet

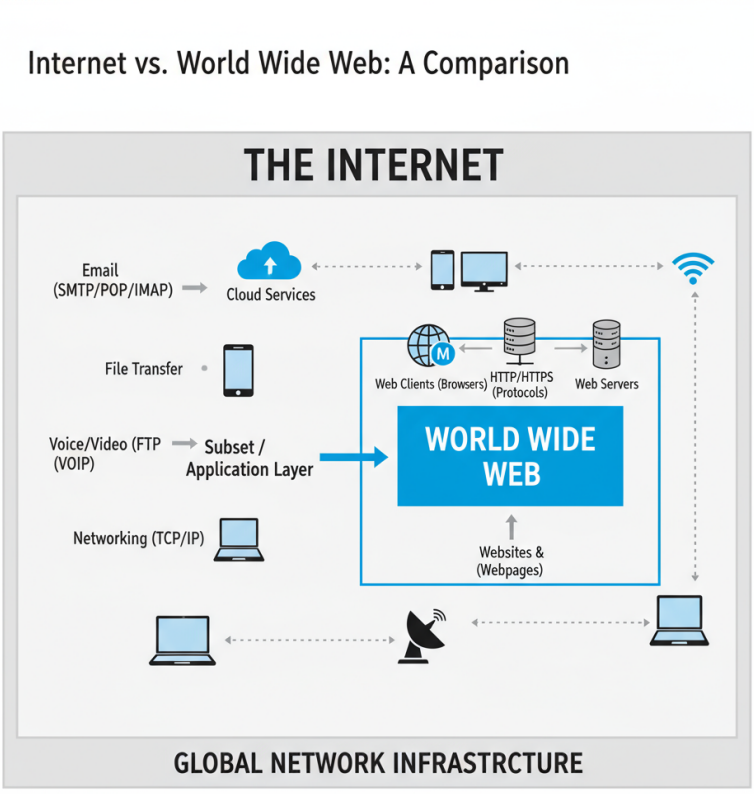

Figure 4: WWW as a Service Running Over the Internet

Explanation and Key Points

- The Internet is the underlying network infrastructure, while the WWW is a service running on top of it.
- Not all services on the Internet are part of the WWW (e.g., email is not part of WWW).
- WWW provides a graphical and multimedia interface for users, while the Internet handles the actual data transmission.

Conclusion

WWW revolutionized information sharing and communication by making it easy to access, create, and link documents over the already existing Internet infrastructure, but it is only one part of what the Internet provides.

References

Q5. What is HTTP? What are the features of HTTP? Explain different methods and status codes of HTTP.

Definition of HTTP

The **Hypertext Transfer Protocol (HTTP)** is an application-layer protocol used for transmitting hypermedia documents, such as HTML, between web clients and servers. HTTP is the foundation of data communication for the World Wide Web[**?**].

Key Features of HTTP

- **Stateless**: Each HTTP request from a client to a server is independent; the server does not retain session information by default.
- **Simple and Flexible**: Easy to use, supports different types of data (text, images, multimedia).
- **Extensible**: Allows for new methods, status codes, and headers.
- **Connectionless**: Typically uses a request-response model where connections are created as needed and then closed.
- **Media Independent**: Any type of data can be sent, so long as both client and server understand the content type.
- **Supports Caching**: Improves performance by saving frequently requested resources.
- **Supports Authentication and Security**: HTTPS (HTTP over SSL/TLS) encrypts data and provides secure communication.

Common HTTP Methods

Method	**Purpose**
GET	Requests data from a server at a specified resource.
POST	Sends new data to the server for processing (e.g., form submission).
PUT	Updates existing data at a specified resource.
DELETE	Removes data at a specified resource.
HEAD	Same as GET, but retrieves only response headers.
OPTIONS	Describes the communication options for the target resource.
PATCH	Partially modifies a resource.

Table 5: Common HTTP Methods

Common HTTP Status Codes

Code	Name	Meaning
200	OK	The request has succeeded.
201	Created	The request succeeded and resulted in a new resource being created.
301	Moved Permanently	The resource has been moved to a new URL.
400	Bad Request	The server could not understand the request due to invalid syntax.
401	Unauthorized	Authentication is required and has failed or not been provided.
403	Forbidden	The server understood the request but refuses to authorize it.
404	Not Found	The requested resource could not be found.
500	Internal Server Error	The server encountered an unexpected condition.

Table 6: Common HTTP Status Codes

Diagram: HTTP Request-Response Cycle

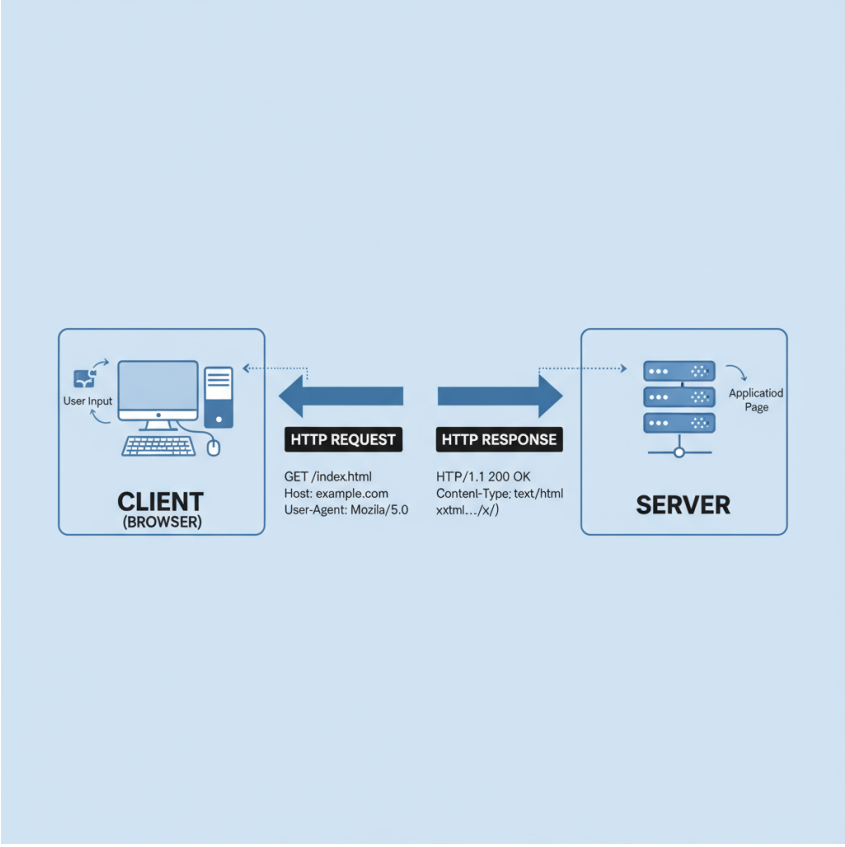

Figure 5: HTTP Request-Response Cycle between Client and Server

Conclusion

HTTP is critical to web communication, enabling browsers and servers to exchange structured information using flexible methods and status reporting, forming the backbone of client-server interaction on the WWW.

References

Q6. What are the differences between static and dynamic websites? List out components of a website.

Static vs Dynamic Websites

Feature	Static Website	Dynamic Website
Content	Fixed, does not change unless manually updated	Can be generated and changed in real-time, often using databases
Technologies Used	HTML, CSS, simple JavaScript	Server-side scripting (PHP, ASP.NET, Node.js), databases (MySQL, MongoDB), HTML, CSS, JavaScript
User Interaction	Minimal or none; mostly displays information	High—supports forms, user logins, comments, e-commerce, etc.
Maintenance	Requires manual editing to update content	Content can be updated using backend interfaces or CMS
Performance	Loads fast, less resource intensive	May have slower loading due to processing, but optimized dynamic sites can be very fast
Examples	Portfolio, brochure websites, landing pages	Social media sites, online stores, blogs

Table 7: Differences Between Static and Dynamic Websites

Diagram: Static vs Dynamic Website Structure

Components of a Website

- **Web Pages**: The individual documents (usually HTML) that make up the website.
- **Navigation**: Menus or links that allow users to move between pages.
- **Multimedia Content**: Images, videos, audio to enhance the information.

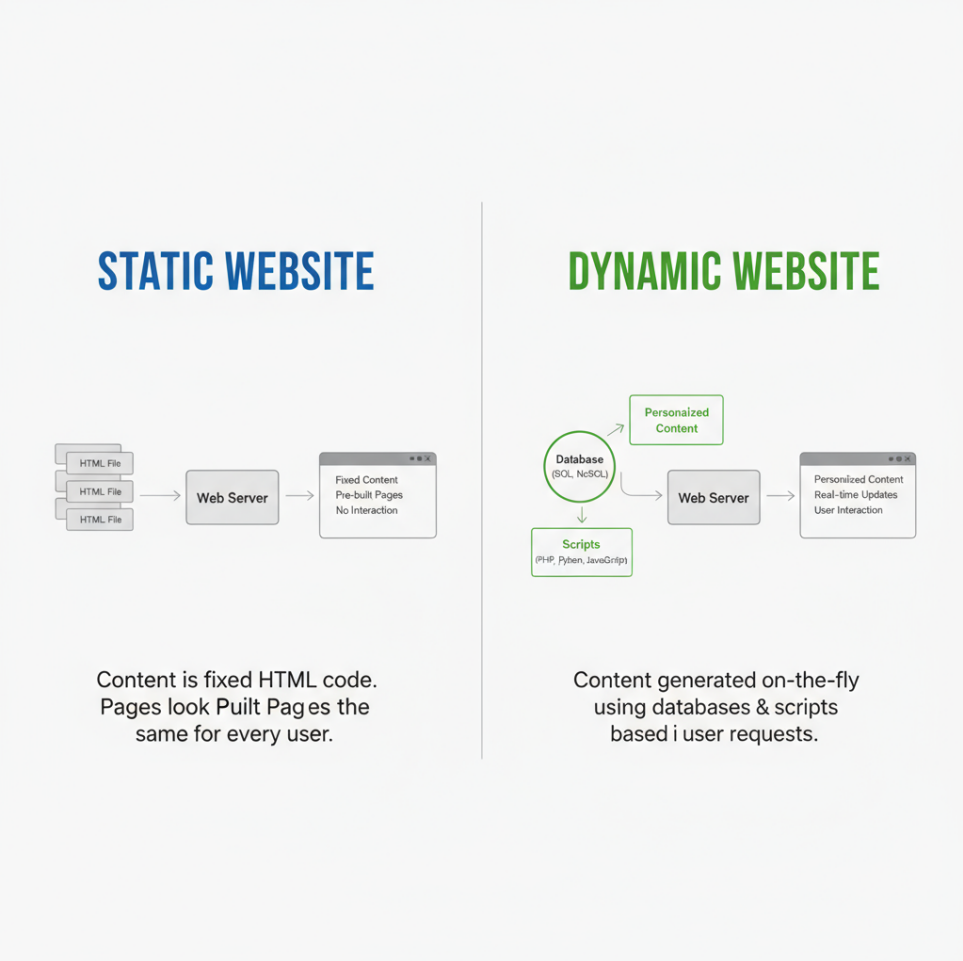

Figure 6: Comparison of Static and Dynamic Website Architecture

- **Web Server**: The server where the website files are hosted.
- **Database**: Used in dynamic websites for storing and retrieving content.
- **Frontend**: The visual part users interact with, built with HTML, CSS, JavaScript.
- **Backend**: The server-side logic handling dynamic content, authentication, processing (e.g., PHP, Node.js).
- **Domain Name**: The website's address (e.g., www.example.com).
- **Web Forms**: Used for user input (contact, login, registration).
- **SEO Components**: Metadata, sitemaps, tags for better search visibility.

Conclusion

Static websites are simple and efficient for basic needs, while dynamic websites deliver interactive, tailored experiences by generating content in real-time. Understanding website components helps in designing scalable, maintainable, and effective web solutions.

References

Q7. Explain the client-server architecture with neat diagram.

Definition

Client-server architecture is a distributed computing model where client devices request resources or services, and servers provide those resources or services. A server typically resides on a powerful computer, while clients are user devices connected over a network.

Key Points

- **Clients**: End-user devices (like PCs, tablets, smartphones) that initiate communication by sending requests.
- **Servers**: Centralized systems that process client requests and send back responses.
- **Communication**: Interaction happens over network protocols (such as HTTP, TCP/IP).
- **Separation of Concerns**: Clients handle user interface and input, servers manage data, processing, and security.
- **Scalability**: Multiple clients can connect to a single or pool of servers, allowing system scaling.
- **Security**: Servers manage access controls, data integrity, and authentication.

Advantages

- Centralized data and resource management.
- Easier to maintain, update, and back up.
- Enhanced security and control over data.
- Supports multiple and diverse clients simultaneously.

Diagram: Client-Server Architecture

Explanation

- Clients (browsers, apps) send requests (such as data fetch, page load) to the server.
- The server receives, processes the request, and sends the appropriate response (HTML page, data, etc.).
- All major internet services (web, email, database access) use the client-server model.

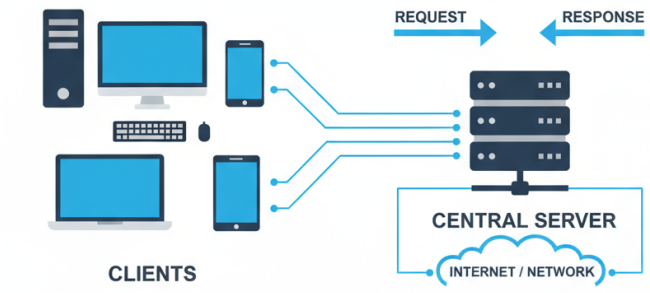

Figure 7: Basic Client-Server Architecture

Conclusion

The client-server architecture underpins modern web and network applications by dividing responsibilities and enabling scalable, secure, and manageable systems.

References

Q8. Describe the Architecture of WWW.

Definition

The architecture of the World Wide Web (WWW) is a multi-layered design that facilitates transferring, accessing, and presenting hypermedia documents via web browsers and servers over the Internet using standard protocols.

Key Components of WWW Architecture

- **Client (Web Browser)**: Requests web pages via URLs, renders and displays content to users, handles interaction with web content.
- **Web Server**: Stores, processes, and serves web documents to clients upon request.

- **Internet (Network Infrastructure)**: Connects clients with servers for communication and data transfer.
- **Documents/Resources**: Hypertext documents (HTML, images, videos), identified by URLs.
- **Protocols**: Uses HTTP/HTTPS for client-server communication.
- **Search Engines/Directories**: Help users locate information present on the WWW.

Working of WWW

1. User enters a URL into the web browser.
2. Browser makes an HTTP/HTTPS request to corresponding web server.
3. Web server processes request and sends back required web page resource.
4. Browser interprets and renders the received document using HTML, CSS, and JavaScript.
5. Hyperlinks within the document allow navigation to other web resources.

Diagram: WWW Architecture

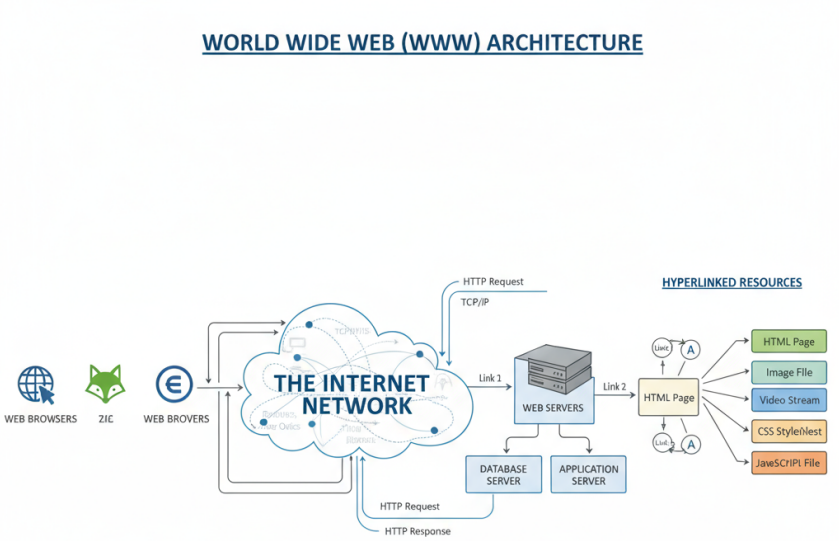

Figure 8: Functional Architecture of the World Wide Web

Layered Architecture of WWW

- **Application Layer:** Web browsers, search engines, content management systems.
- **Presentation Layer:** HTML, CSS, JavaScript—defines how data is presented.
- **Transport/Protocol Layer:** TCP/IP, HTTP/HTTPS.
- **Data/Resource Layer:** Databases and files storing web content.

Conclusion

The WWW architecture connects clients and servers seamlessly, enabling access, navigation, and interactive experiences across a diverse, hyperlink-based information ecosystem.

References

Q9. Web Site, Web Page

Web Site

A **website** is a collection of related web pages, multimedia content, and resources, typically discovered by a common domain name and hosted on a web server. Websites can be static or dynamic, and may include text, images, video, and other multimedia. The website is accessed via a Uniform Resource Locator (URL) using web browsers.

Key Points about Website

- Consists of multiple web pages organized under a single domain (e.g., www.example.com).
- Provides a cohesive user experience with navigation, branding, and content structure.
- Can serve various functions including informational, e-commerce, portfolio, social media, and more.
- Hosted on web servers and accessible 24/7 from anywhere with internet connectivity.
- Utilizes HTML, CSS, JavaScript, server-side technologies, and databases.

Web Page

A **web page** is a single document on the World Wide Web that is displayed in a browser window. Web pages are written in HTML and can include text, images, audio, video, scripts, and hyperlinks to other pages.

Key Points about Web Page

- Basic building block of a website—each site has one or more web pages.
- Linked together via hyperlinks for navigation.
- Rendered by web browsers for presentation to the user.
- Can be static (unchanging) or dynamic (generated on request).
- Examples include Homepage, Contact Us, About Us, Blog Post, etc.

Table: Website vs Web Page

Website	**Web Page**
Collection of multiple web pages and resources	Single document within a website
Identified by a domain name (www.example.com)	Identified by its own unique URL (www.example.com/about.html)
Hosted on a web server	Part of a website hosted on a server
Navigation links and menu structure	Contains content with possible links to other pages
Examples: Social networks, news portals, e-commerce	Examples: Homepage, FAQ, product page, article

Table 8: Difference Between Website and Web Page

Diagram: Website and Web Page Structure

Conclusion

A website is like a book and web pages are its individual pages. Both collectively allow users to experience organized, interconnected information on the World Wide Web.

References

Q10. Define the following: (i) Web browser (ii) Web page (iii) Web site

(i) Web Browser

A **web browser** is application software that enables users to access, retrieve, and view documents and other resources on the World Wide Web. Browsers render HTML content, execute scripts, manage cookies, and provide interfaces for navigation, bookmarking, and history. Examples include Google Chrome, Mozilla Firefox, Microsoft Edge, Safari, and Opera.

Key Features:

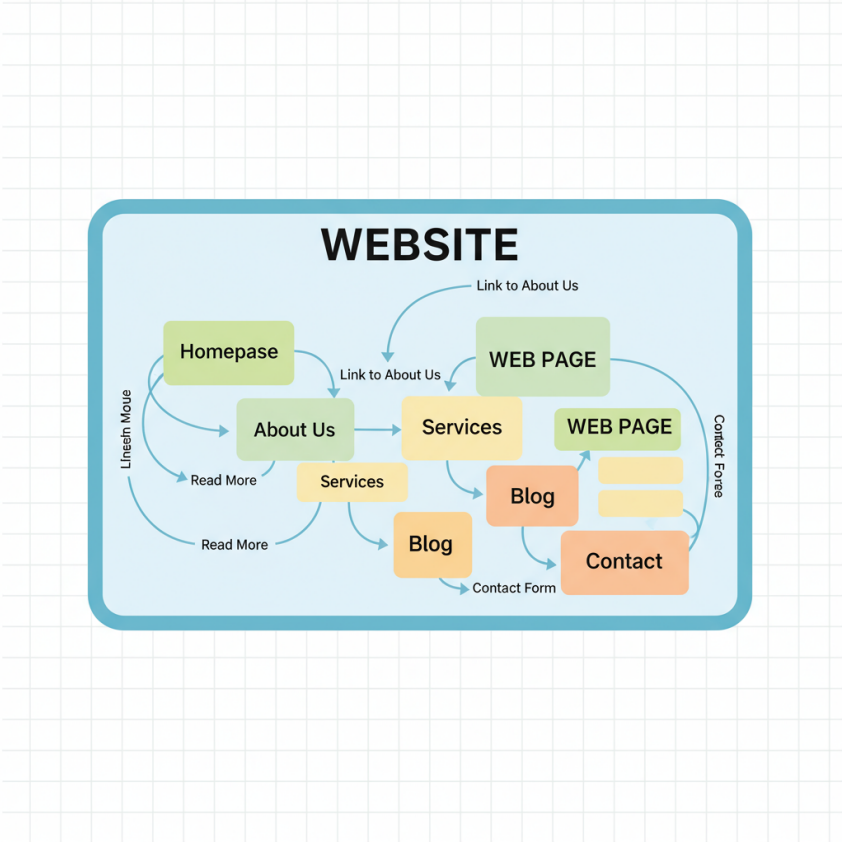

Figure 9: Relationship Between Websites and Web Pages

- Supports HTML, CSS, JavaScript, multimedia, and extensions.
- Allows navigation via web addresses (URLs).
- Manages sessions, cookies, caching, and downloads.
- Ensures security via HTTPS and privacy features.

(ii) Web Page

A **web page** is a single hypertext document on the WWW, created using HTML and possibly enhanced with CSS, JavaScript, images, audio, and video. Web pages are rendered within browsers and can display text, multimedia, forms, and links to other pages.

Key Features:

- The basic unit of information on a website.
- Uniquely identified by a specific URL.
- Can be static (fixed content) or dynamic (content changes in real time).
- Examples: home.html, about.html, contact.html.

(iii) Web Site

A **website** is a collection of related web pages, content, and resources organized under a single domain name and accessible via the Internet. Websites provide navigation, consistent branding, and structure for delivering information and interactive services to users.

Key Features:

- Consists of multiple interconnected web pages.
- Accessed with a domain name (e.g., www.example.com).
- Can serve various purposes: informational, commercial, social, entertainment, governmental, etc.
- Hosted on servers and available globally 24/7.

Diagram: Relationship

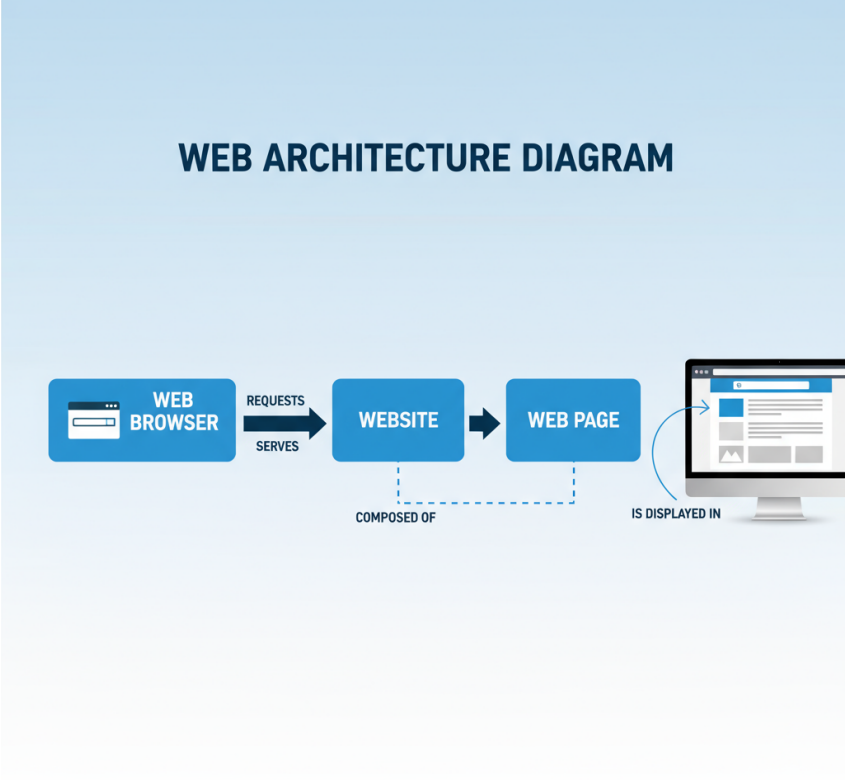

Figure 10: Relationship between Web Browser, Web Site, and Web Page

Conclusion

A web browser enables access to web pages, which are individual files forming part of a website; collectively, these elements create the interactive web experiences fundamental to the Internet.

References