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Web Programming Assignment # 1

Submitted to:

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Web Development Fundamentals Assignment

Part 1: Understanding Web Basics

1. **Research on How the Web Works**:
    - Task: Write a brief explanation on how the World Wide Web functions. o Requirements: Include key concepts like HTTP/HTTPS protocols, client-server model, DNS, and the role of browsers.
2. **Exploring Web Hosting Options**:
    - Task: Research and compare different web hosting services.
    - Requirements: Discuss factors like cost, reliability, scalability, and types of hosting (shared, VPS, dedicated).

Part 2: Deployment and Security

3. **Deploying a Website**:
    - Task: Outline the steps involved in deploying a website to a web server. o Requirements: Include considerations like domain registration, FTP/SFTP, and file permissions.
4. **Web Security Essentials**:
    - Task: Research common web security threats and preventive measures. o Requirements: Discuss topics such as HTTPS, SSL/TLS certificates, secure coding practices, and web application firewalls.

Part 3: Research and Presentation

5. **Emerging Trends in Web Development**:
    - Task: write on emerging trend (e.g., progressive web apps, serverless architecture)
    - Requirements: Cover its definition, benefits, challenges, and real-world examples.

Part 1: Understanding Web Basics

1. How the World Wide Web Functions

The World Wide Web (WWW) is a network of servers, websites, and browsers, which relies on certain protocols and technologies to provide and access information. Here are some of the key concepts:

- **HTTP/HTTPS Protocols**: The Web uses HTTP (HyperText Transfer Protocol) or its secure version, HTTPS. HTTP is responsible for transferring data from a web server to a web browser. HTTPS uses SSL/TLS encryption to ensure that data transmitted between the server and browser is secure.
- **Client-Server Model**: The Web operates on a client-server model, where the client is the user's device (computer, smartphone, etc.) that sends requests to a server. The server processes these requests and sends back the requested information or web page. The client and server communicate over the Internet.
- **DNS (Domain Name System)**: DNS is like a phonebook for the internet. When you type a website address (like www.example.com) into your browser, the DNS system translates this domain name into an IP address, allowing your browser to connect to the correct web server.
- **Role of Browsers**: Browsers (such as Chrome, Firefox, Safari) are the software that users interact with to view websites. They request information from web servers and display the retrieved data (HTML, CSS, JavaScript) to users in a readable format.

2. Exploring Web Hosting Options

There are various web hosting options to consider when deploying a website. Here's a comparison of common types:

- **Shared Hosting**: In shared hosting, multiple websites share the same server resources (RAM, CPU, bandwidth). It's the most affordable option, ideal for small websites with low traffic. However, it can be less reliable as performance may vary due to other sites on the same server.
- **VPS (Virtual Private Server) Hosting**: VPS hosting offers more dedicated resources than shared hosting. While still sharing a physical server with other users, each website gets a portion of server resources, which provides better performance, flexibility, and control. It's ideal for growing websites.

- **Dedicated Hosting**: With dedicated hosting, you rent an entire physical server. This option offers maximum performance, control, and security, but it comes with a higher cost. It’s ideal for high-traffic websites, large businesses, or websites requiring complex setups.
- **Cost**: VPS hosting tends to be more expensive than shared hosting but still relatively affordable compared to dedicated hosting.
- **Reliability**: Shared hosting is least reliable, while VPS and dedicated hosting provide better uptime and performance.
- **Scalability**: VPS and dedicated hosting are more scalable than shared hosting, as you can upgrade resources (e.g., CPU, RAM) easily to accommodate increased traffic.

Part 2: Deployment and Security

3. Deploying a Website

Here are the general steps for deploying a website to a web server:

- **Domain Registration**: First, choose and register a domain name (e.g., www.mywebsite.com) through a domain registrar. This will give your website a unique address.
- **Choose a Hosting Provider**: Select a hosting provider (shared, VPS, or dedicated) and purchase the hosting plan that suits your needs.
- **Upload Website Files**: To upload your website’s files (HTML, CSS, JavaScript, images), use FTP (File Transfer Protocol) or SFTP (Secure FTP). You’ll need an FTP client (such as FileZilla) to connect to your server and transfer files.
- **Configure DNS Settings**: After registering your domain, point it to your web hosting provider by updating the DNS settings. This step ensures that your domain directs users to your website.
- **File Permissions**: Make sure the correct file permissions are set for your website files and directories. This ensures security and prevents unauthorized access.

4. Web Security Essentials

Web security is critical for protecting your website and users. Here are some common threats and preventive measures:

- **HTTPS and SSL/TLS Certificates**: Secure your website by using HTTPS, which encrypts data between the server and browser. Obtain an SSL/TLS certificate to enable HTTPS. Many hosting providers offer free SSL certificates via Let's Encrypt.
- **Secure Coding Practices**: Write secure code to prevent vulnerabilities such as SQL injection, cross-site scripting (XSS), and cross-site request forgery (CSRF). Use secure libraries and frameworks, validate user inputs, and avoid hardcoding sensitive data (e.g., passwords).
- **Web Application Firewalls (WAFs)**: A WAF monitors and filters incoming traffic to your website, blocking malicious requests and protecting against attacks like SQL injection or DDoS (Distributed Denial of Service).

Part 3: Research and Presentation

5. Emerging Trends in Web Development

Progressive Web Apps (PWAs) are one of the emerging trends in web development:

- **Definition**: PWAs are web applications that provide a native app-like experience on the web. They use modern web technologies to offer features such as offline access, push notifications, and fast load times.
- **Benefits**: PWAs offer better performance, improved user engagement, and enhanced offline functionality. They are responsive, can be installed on devices, and don't require app store installations.
- **Challenges**: While PWAs are gaining popularity, they may not be fully supported on older browsers, and some advanced features (such as background sync) require HTTPS.
- **Real-World Examples**: Some examples of PWAs include Twitter Lite, Pinterest, and Uber. These applications are lightweight, fast, and accessible even with limited internet connectivity.