Introduction to Internet and Web Technologies

Internet and web technologies have revolutionized global communication, commerce, and information access.

This dynamic medium connects people, powers businesses, and facilitates rapid exchange of data worldwide.

What is the Internet?

Global Network

The Internet is a global network of interconnected devices and servers.

Data Transfer

It facilitates the transfer of data and communication across the world.

Information Access

Users can access vast amounts of information, resources, and services online.

Empowerment & Connectivity

It empowers individuals and fosters connectivity on a global scale.

Evolution of the Internet

1 Development of ARPANET

ARPANET, the precursor to the internet, was developed in the 1960s by the U.S. Department of Defense.

2 Birth of the World Wide Web

Tim Berners-Lee created the first web browser and server, laying the foundation for the modern internet.

3 Expansion of Connectivity

The internet rapidly expanded in the 1990s, leading to global connectivity and the birth of e-commerce and social media.

4 Current Trends

New technologies such as cloud computing, artificial intelligence, and Internet of Things (IoT) are shaping the current trend of the internet.

The Internet

In simplest terms, the Internet is a global network comprised of smaller networks that are interconnected using standardized communication protocols. The Internet standards describe a framework known as the Internet protocol suite. This model divides methods into a layered system of protocols.

These layers are as follows:

✓ Application layer (highest) – concerned with the data(URL, type, etc.). This is where HTTP, HTTPS, etc., comes in.

✓ Transport layer – responsible for end-to-end communication over a network.

✓ Network layer – provides data route.

The Internet provides a variety of information and communication facilities; contains forums, databases, email, hypertext, etc. It consists of private, public, academic, business, and government networks of local to global scope, linked by a broad array of electronic, wireless, and optical networking technologies.

The World Wide Web

The Web is the only way to access information through the Internet. It's a system of Internet servers that support specially formatted documents. The documents are formatted in a markup language called HTML, or "HyperText Markup Language", which supports a number of features including links and multimedia. These documents are interlinked using hypertext links and are accessible via the Internet.

To link hypertext to the Internet, we need:

- ➢ The markup language, i.e., HTML.
- ➢ The transfer protocol, e.g., HTTP.
- ➢ Uniform Resource Locator (URL), the address of the resource.

We access the Web using **Web browsers.**

The Uniform Resource Identifier

URI stands for 'Uniform Resource Identifier'. A URI can be a name, locator, or both for an online resource whereas a URL is just the locator. URLs are a subset of URIs. A URL is a human-readable text that was designed to replace the numbers (IP addresses) that computers use to communicate with servers.

A URL consists of a protocol, domain name, and path (which includes the specific subfolder structure where a page is located) like-

protocol://WebSiteName.topLevelDomain/path

Protocol – HTTP or HTTPS.

Website Name – wikipedia, google etc.

Top Level Domain- .com, .edu, .in etc.

path- specific folders and/or subfolders that are on a given website.

Uses of Internet

1.Communication: The internet and web have made communication faster and easier than ever before. We can now send emails, chat online, make video calls, and use social media platforms to connect with people all over the world.

2.Information sharing: The web has made it possible to access vast amounts of information on any topic from anywhere in the world. We can read news articles, watch videos, listen to podcasts, and access online libraries and databases.

3.Online shopping: The internet and web have revolutionized the way we shop. We can now browse and purchase products online, from clothes and groceries to electronics and furniture.

4.Entertainment: The internet and web provide a wealth of entertainment options, from streaming movies and TV shows to playing online games and listening to music.

Uses of Internet

5. Education: The web has made it possible to access educational resources from anywhere in the world. We can take online courses, access e-books and digital libraries, and connect with educators and other learners through online communities.

6.Business: The internet and web have transformed the way businesses operate. Companies can now use e-commerce platforms to sell products and services, collaborate with remote workers, and access global markets.

7.Research: The internet and web have made it easier for researchers to access and share information. We can now access scientific journals and databases, collaborate with other researchers online, and conduct surveys and experiments through online platforms.

Issues in Internet

1. Privacy and security: The internet and web are vulnerable to various security threats, such as hacking, identity theft, and phishing attacks. These threats can compromise our personal information, such as login credentials, financial information, and personal data.

2. Cyberbullying: The anonymity of the internet and web can lead to cyberbullying, where individuals are harassed or threatened online. Cyberbullying can have severe consequences, including depression, anxiety, and suicide.

3. Online addiction: The internet and web can be addictive, and individuals can spend hours browsing social media or playing online games, leading to neglect of other important aspects of their lives.

4. Disinformation: The internet and web are filled with inaccurate or false information, which can lead to misinformation, propaganda, and conspiracy theories.

Issues in Internet

5. Digital divide: Access to the internet and web is not universal, and many individuals, particularly those in low-income areas or rural communities, lack access to reliable and high-speed internet.

6. Online censorship: Some governments or organizations may censor or restrict access to certain websites or information, limiting freedom of speech and expression.

7. Environmental impact: The internet and web consume a significant amount of energy, contributing to carbon emissions and climate change.

Basics of Web Technologies

Web technologies encompass various tools and software used for building and maintaining websites. This includes protocols, languages, and frameworks.

Key components of web technologies include HTTP, URL, web browsers, and web servers, which are fundamental to the functioning of the internet.
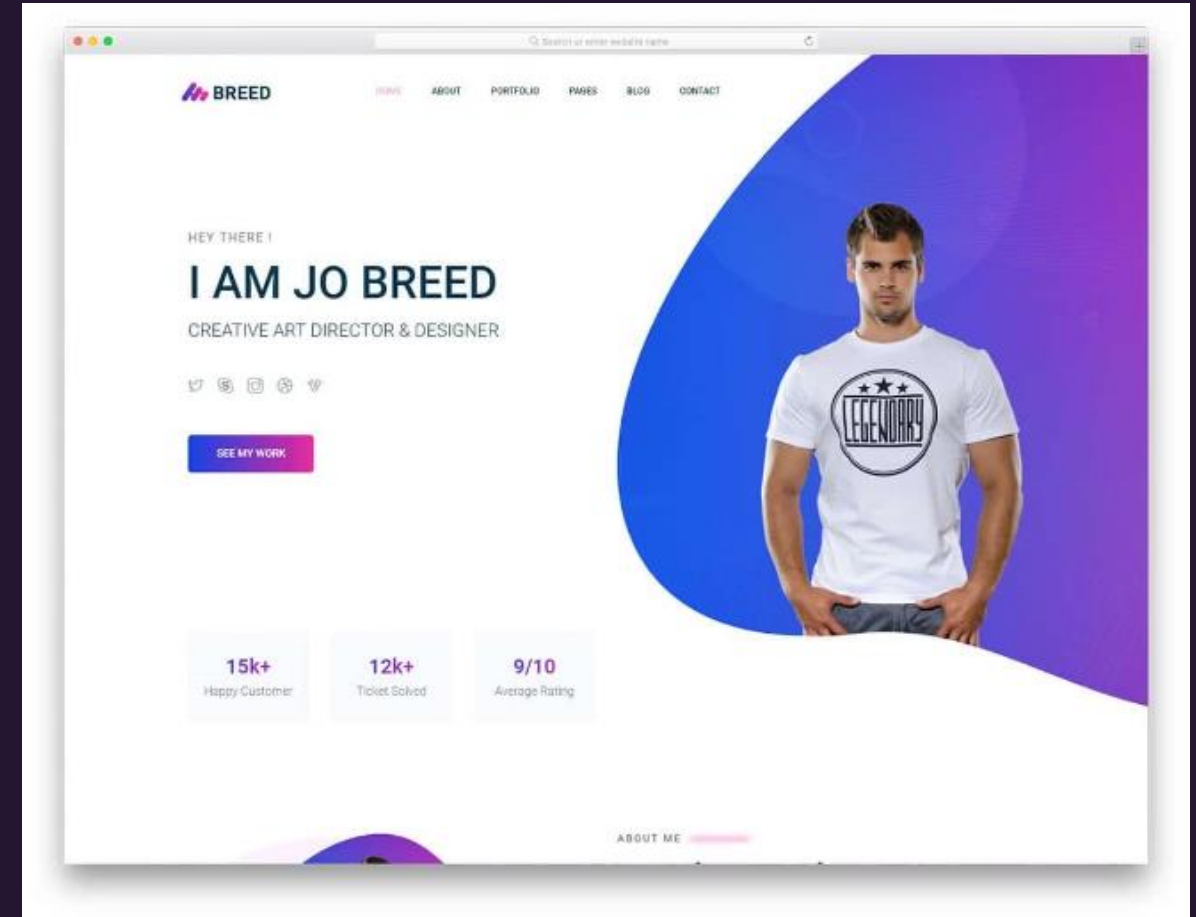
HTML and CSS

HTML (Hypertext Markup Language) is the standard language for creating web pages and web applications. It provides the structure and content of a webpage.

CSS (Cascading Style Sheets) is used to style the visual presentation of HTML elements. It controls the layout, colors, and fonts of a webpage.

JavaScript and Front-end Development

- **Client-side scripting language:** JavaScript is used for enhancing interactivity and functionality on web pages.

- **Frameworks and libraries:** Utilize tools like React, Angular, and Vue to build dynamic user interfaces.

- **Cross-browser compatibility:** Ensuring smooth performance across different web browsers is crucial in front-end development.

Backend Development and Databases

Backend Development

Backend development focuses on server-side logic and database interactions to ensure the functionality of web applications.

It involves writing code that operates behind the scenes and provides the necessary support for the frontend to function.

Database Management

Databases are essential for storing, managing, and retrieving data used in web applications and websites.

Skills in database management include designing schemas, optimizing queries, and ensuring data integrity and security.

Web Servers and Hosting

Data Center Servers

Data center servers provide the infrastructure for web hosting, delivering the necessary computing power and resources to support websites and applications.
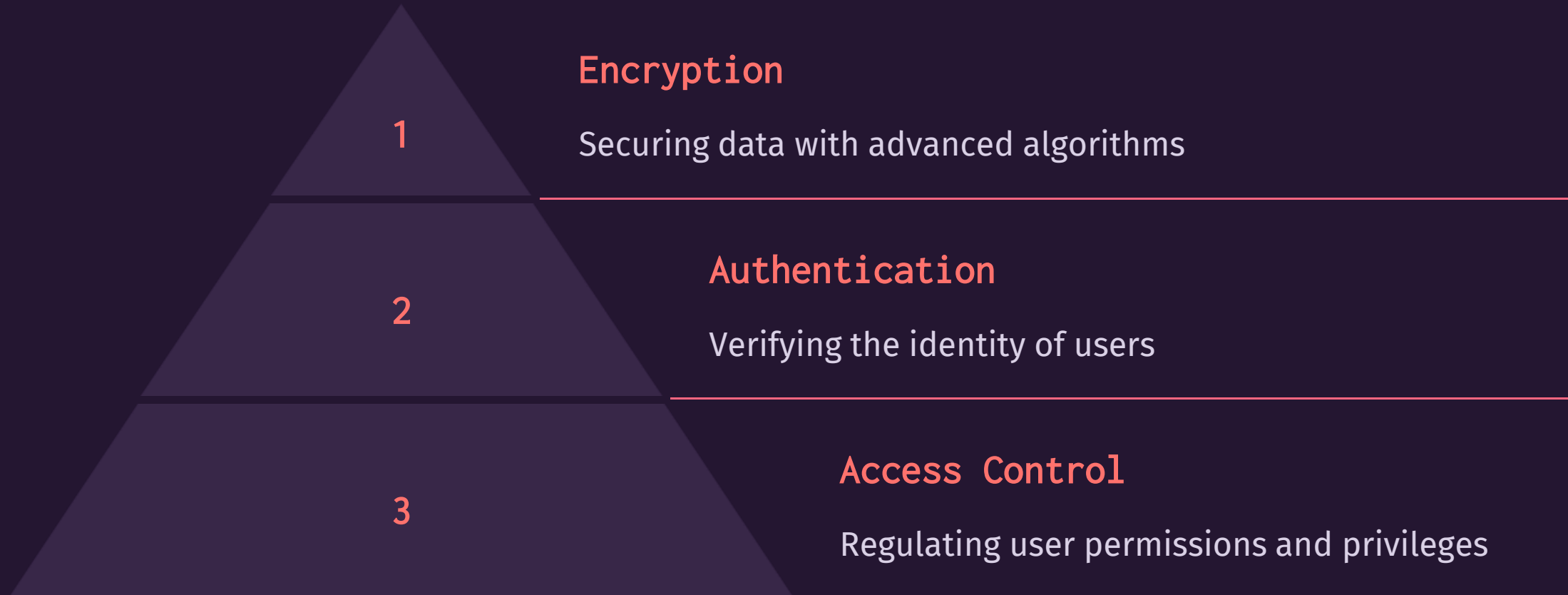
Cloud Web Hosting

Cloud hosting offers scalability and flexibility, allowing websites to utilize resources as needed, ensuring seamless performance and reliability.

Web Security and Privacy

1

Encryption

Securing data with advanced algorithms

2

Authentication

Verifying the identity of users

3

Access Control

Regulating user permissions and privileges

Web security and privacy are upheld through encryption, ensuring data is protected with advanced algorithms. Authentication plays a crucial role in verifying the identity of users accessing sensitive information. Access control is essential for regulating user permissions and privileges to maintain a secure online environment.

Future Trends in Internet and Web Technologies

1 AI and Machine Learning Integration

Advancements in AI and machine learning will revolutionize data analysis and user experience personalization.

2 Responsive Design for Wearables

Web development will focus on creating responsive designs specifically tailored for wearable devices and smart appliances.

3 Progressive Web Apps (PWAs)

More websites will adopt PWAs to offer app-like experiences, offline capabilities, and faster load times.

4 Enhanced Web Security Measures

Continued focus on cybersecurity with advancements in encryption, authentication, and protection against data breaches.