Building Trust & Careers

WEB DEVELOPMENT

TOPIC 1: HOW THE INTERNET WORKS

1.Brief History: Web 1.0 → Web 3.0

Web 1.0 (1990s – early 2000s) – The "Read-Only" Web

- Websites were static with no interactivity.
- Built using HTML and CSS (no JavaScript).
- Users could only read content; there was no user engagement.
- No social media or real-time interactions.
- Example: Early Yahoo! pages, simple blogs.

Web 2.0 (2004 – Present) – The "Read-Write" Web

- Enabled dynamic and interactive experiences.
- Technologies like AJAX and JavaScript allowed live updates without page reloads.
- Social media, e-commerce, and cloud applications emerged.
- Users could generate content (comments, reviews, blog posts, real-time chats).
- Example: Facebook, YouTube, Twitter, Amazon.

Web 3.0 (Emerging) – The "Decentralized" Web

- Uses blockchain technology to ensure decentralization.
- AI-driven and privacy-focused to give users more control over data.
- Example: Cryptocurrencies, smart contracts, decentralized apps (Ethereum, Filecoin).

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2.Basics of Computer Communication & Data Transmission

Data Transmission & Packets

- The internet sends data in packets, which are small chunks of information.
- Each packet has:
  - Header (destination and sender information).
  - Payload (actual data being transferred).
- Uses TCP/IP protocols to ensure data reaches the right destination.

Two Types of Communication

- Wired (Ethernet, Fiber Optics) – More stable and faster; used in offices.
- Wireless (Wi-Fi, 5G) – Provides flexibility but can be slower.

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3.Domain Names, IP Addresses, MAC Addresses, and Routing

IP Address (Internet Protocol Address)

- A unique number assigned to every internet-connected device.
- IPv4 (xxx.xxx.xxx.xxx) has 4.3 billion addresses.
- IPv6 provides a larger address space for the future.

MAC Address (Media Access Control)

- A unique identifier assigned to a device's network adapter.
- Example: 00:1A:2B:3C:4D:5E.
- Used within local networks but not on the broader internet.

Domain Names

- Example: www.google.com.
- Human-friendly names mapped to IP addresses via DNS (Domain Name System).
- DNS servers resolve domain names into IP addresses.

Routing

- Routers and gateways direct traffic efficiently.
- Packets take different routes to reach the destination efficiently.

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4.Overview of ISP & DNS Functionality

Internet Service Providers (ISP)

- Companies like Jio, Airtel, BSNL provide internet access.
- They act as intermediaries between users and the global internet.

How DNS Works

1. A user types www.google.com in a browser.
2. The browser contacts a DNS server to get the IP address.
3. The DNS translates the domain into an IP (e.g., 142.250.183.206).
4. The browser connects to the website's server using the IP.