# Fundamentals of Web Design

BSIT, BSDS, BSCS

# Introduction to the Internet

---

**What is the Internet?**

- Global system of interconnected computer networks.
- Enables communication between devices worldwide.

**History of the Internet:**

- **ARPANET (1969):** The precursor to the Internet.
- **Evolution:** Transition to NSFNET and the commercial Internet.

# How the Internet Works

**Clients and Servers:**

- Clients request data (e.g., browsers).
- Servers provide data (e.g., web servers).

**IP Address:**

- Unique numerical label for devices on a network.

**Domain Name System (DNS):**

- Converts domain names to IP addresses.

**Internet Protocols:**

- **HTTP/HTTPS:** Web page transfer.
- **FTP:** File transfer.
- **SMTP:** Email transfer.

# The World Wide Web (WWW)

---

**What is the Web?**

- Interlinked hypertext documents accessible via the Internet.

**Components of the Web:**

- **Web Pages:** HTML documents.
- **Web Browsers:** Tools to access the web (e.g., Chrome, Firefox).
- **URLs:** Address for accessing web resources.

**Web Servers:**

- **Role:** Host and deliver web pages.
- **Examples:** Apache, Nginx.

# How the Web Works

**Request/Response Cycle:**

- **HTTP Request:** User requests a web page.
- **HTTP Response:** Server sends the web page back.

**Web Hosting:**

- **Hosting Services:** Companies providing space for websites.
- **Domain Registration:** Process of acquiring a website domain.

# Introduction to Network Concepts

**Network Types:**

- **LAN (Local Area Network):** Limited area networks.
- **WAN (Wide Area Network):** Broad area networks, e.g., the Internet.
- **PAN (Personal Area Network):** Network around a person’s workspace.

**IP Addressing:**

- **IPv4 vs. IPv6:** Addressing systems for devices.
- **Subnetting:** Dividing a network into smaller sections.

# Network Protocols & Devices

**Protocols:**

- **TCP/IP:** Fundamental communication protocols.
- **DNS:** Converts domain names to IP addresses.
- **HTTP/HTTPS:** Web communication protocols.

**Network Devices:**

- **Router:** Directs data between networks.
- **Switch:** Connects devices within a network.
- **Modem:** Converts data for transmission over different media.

# Basic Internet Security Concepts

**Encryption:**

- **Symmetric vs. Asymmetric:** Types of encryption.
- **SSL/TLS:** Protocols for secure web communication.

**Firewalls:**

- **Purpose:** Protect networks by controlling traffic.
- **Types:** Hardware and software-based firewalls.

**Common Threats:**

- **Malware:** Viruses, worms, Trojan horses.
- **Phishing:** Fraudulent attempts to obtain sensitive information.
- **DDoS Attacks:** Overwhelming a server to disrupt services.

# Best Practices for Internet Security

**Strong Passwords:**

- ❏ Use complex, unique passwords.
- ❏ Change passwords regularly.

**Two-Factor Authentication (2FA):**

- ❏ Adds a second layer of security.

**Regular Software Updates:**

- ❏ Protect against vulnerabilities.

# Practical Session: Exploring the Web

**Web Browsing:**

- Navigate websites to understand URLs and links.

**Viewing Page Source:**

- Inspect HTML, CSS, and JavaScript of web pages.

**Setting Up a Basic Web Server:**

- Use Python's SimpleHTTPServer or XAMPP.
- Host a basic HTML page locally.

# Practical Session: Network Exploration

**The ping Command:**

➔ Test connectivity to websites.

**The traceroute Command:**

➔ Explore the path data takes across the Internet.

# The Web

# What Does Web Mean?

The Web is the common name for the World Wide Web, a **subset of the Internet** consisting of the pages that can be accessed by a Web browser. Many people assume that the Web is the same as the Internet, and use these terms interchangeably. However, the term Internet actually refers to the global network of servers that makes the information sharing that happens over the Web possible.

So, although the Web does make up a large portion of the Internet, but they are not one and same.

# Vague but exciting!

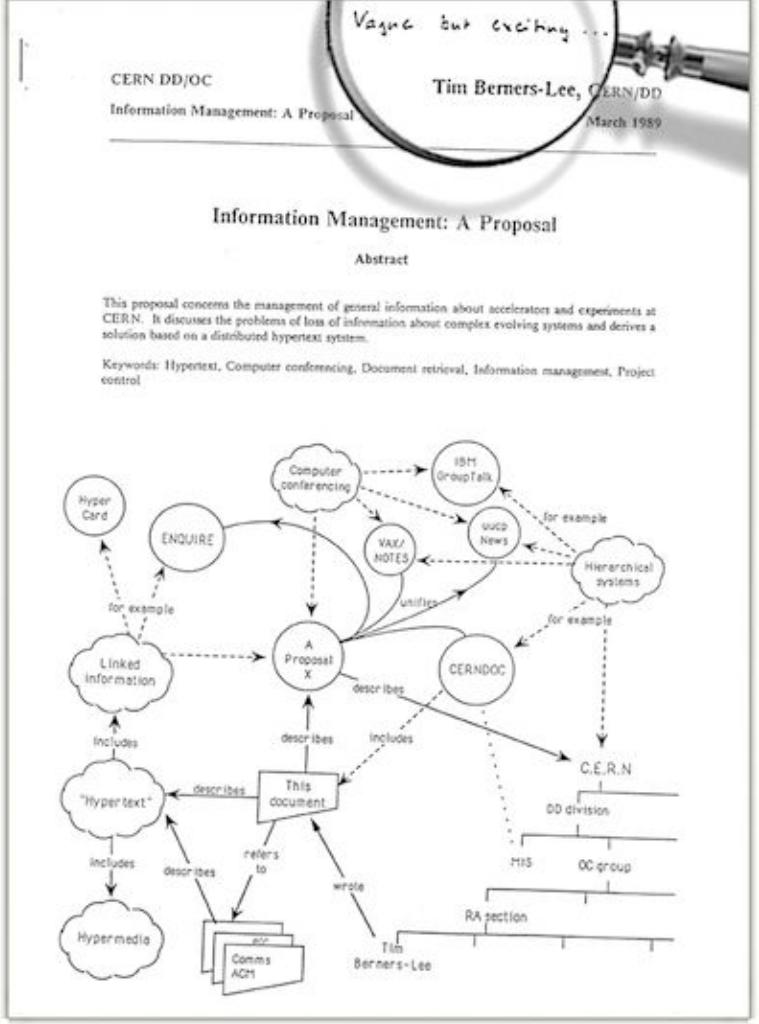
In March 1989, a proposal was sent internally at CERN outlying a universal linked information system. Dubbed 'Information Management: A proposal', pictured below, the proposal was created by Sir Tim Berners-Lee and was sent to his boss Mike Sendall, who described it as 'vague but exciting...'.

***Sir Tim Berners-Lee's vision for universality enabled the development of a high-level network of content that allows any document to link to any other documents.***

The World Wide Web was initially created to make it easier to share research papers. It is a system of interlinked 'hypertext' documents that are accessed via the Internet; in essence, an information space. While he did not invent hypertext systems, Berners-Lee proposed using them 'to link and access information of various kinds as a web of nodes in which the user can browse at will.'

His breakthrough was to link hypertext to the Internet and he used three technologies to do this:

- HyperText Transfer Protocol (**HTTP**) is the foundation of data communication for the Web.
- HyperText Markup Language (**HTML**) is the main markup language for creating Web pages and information that can be displayed on a Web browser.
- Web addresses or a Uniform Resource Locator (**URL**) are used to reference a Web page.



# Regulation of the Web

# What is W3C?

The ***World Wide Web Consortium*** is the main international standards organization for the World Wide Web. Founded in 1994 and currently led by Tim Berners-Lee, the consortium is made up of member organizations that maintain full-time staff working together in the development of standards for the World Wide Web.

*The W3C community is passionate about creating free and open Web standards. They value that the Web is:*

1. **Universal**, international and truly “World Wide”
2. **Available** on any device, for any type of information, in any language
3. **Accessible** by people with disabilities
4. **Royalty-free** and built on open standards
5. **Powerful** - The Open Web Platform makes Web pages themselves powerful tools
6. **Transformational** for how business gets done; improving delivery, enhancing user satisfaction, and reducing costs

# Quiz

---

1. What is the difference between Internet and Web?
2. What is the difference between HTML and HTTP?

# Diversity and Inclusion

# What is Web accessibility?

*The power of the Web is in its universality.*

*Access by everyone regardless of disability is an essential aspect.*
**Tim Berners-Lee, W3C Director and inventor of the World Wide Web**

The Web has become an essential aspect of our daily lives, and everyone should have access to this technology. Web accessibility focuses on ensuring equivalent access for people with disabilities. It is increasingly important to many organizations and governments from around the world, and has many business benefits. Access to information, including on the Web, is also recognized by the UN Convention on the Rights of Persons with Disabilities (CRPD).

# Who is impacted?

Web accessibility addresses all disabilities, including hearing, learning and cognitive, neurological, physical, speech, and visual disabilities. Some examples of Web accessibility features include:

- Captions on audio and multimedia content for people who are hard of hearing;
- Clear and consistent layout for people with learning and cognitive disabilities;
- Keyboard support for people who do not use their mouse, for example, people with physical disabilities;
- Text alternatives for people with visual disabilities and who are using screen readers.

# Web accessibility benefits people with and without disabilities

---

Web accessibility features also benefit many more users, such as:

- People with temporary situational limitations, such as a broken arm;
- People using mobile devices, televisions, and other access channels;
- People using older computers, with low bandwidth, and other limitations;
- People who are new to computers, to the Web, or to your own Website;
- People who are not fluent in the language of your particular Web site.

The Web is an increasingly important resource in many aspects of life: education, employment, government, commerce, health care, recreation, and more. When Web pages, Web technologies, Web tools, or Web applications are badly designed, they can create barriers that exclude people from using the Web.

# Group Activity

---

1. Why is Diversity and Inclusion an important aspect in web design?
2. As a web engineer and architect, how can you ensure accessibility to be to websites that you develop?