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Unit - I

Introduction to web:

The web, is short for world wide web (WWW), is a system of interconnected documents and resources that are ~~connected~~ accessed via internet.

It is composed of millions of websites and web pages that contain text, images, videos and other multimedia content, all of which are linked together through hyperlinks. The web is a fundamental part of modern internet, enabling communication, commerce, information sharing and much more across the globe.

Internet:

The internet is a global network of interconnected computers and devices that enables data exchange and communication worldwide.
The internet support the access of World Wide Web (WWW).

Web pages:

Web pages are individual documents on web that contain text, videos, audios ~~and~~ or other media content and can access through unique URLs.

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Websites:

Websites are collection of related web pages under a common domain.

Types of websites -

i) Static websites:
These websites display fixed content that doesn't change frequently. They are typically built with HTML and CSS.

ii) Dynamic websites:
Generate content in real-time that is based on user interactions or database queries. They used server-side technologies like PHP, Python or JavaScript.

Web Browsers:

The web browser is an application software to explore www (world wide web). It provides an interface between the server and client and requests to the server for web documents and services.

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Internet Protocols :

Internet protocols are a set of rules that governs the communication and exchange of data over the internet. Both sender and reciever should follow the same protocols in order to communicate the data.

Types of internet protocols -

i) TCP/IP :
Fundamental protocols that govern how data is transmitted and routed across the internet. TCP ensures reliable data delivery, while IP handles addressing and routing.

ii) SMTP :
The standard protocol for sending emails from one server to another. It manages the outgoing mail process and ensuring message reach the correct recipient.

iii) FTP :
A protocol used for transfering files between client and a server over a network. Commonly used for uploading and downloading files from web servers.

iv) SFTP:
A secure version of FTP that encrypts file transfer and ensuring data protection during transmission.

v) HTTP:
The protocol used for transmitting web pages over the internet. It defines how requests and responses are formatted between clients (browsers) and servers.

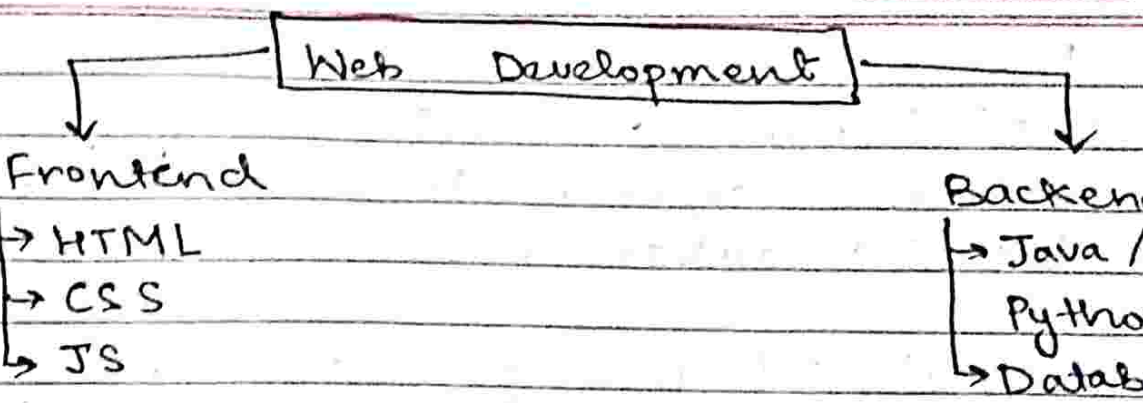
vi) HTTPS:
An encryted version of HTTP that secure data exchange between browser and server.

Web Development:

Web development refers to the building creating and maintaining of websites. It includes aspects such as-

i) Web design
ii) Web publishing
iii) Web programming
iv) Database Management

It refers to the creation of an application that works over the internet, i.e. websites accessed by web browsers.



Web Applications:

Web Applications are basically websites that are interacted, dynamic and functional allowing users to perform tasks, enter data and interact with the system often in real time.

examples – Online banking systems, email service, social media sites etc.

Web Projects:

Web projects involve creating, developing, and managing websites and web applications. They encompass the entire lifecycle of a website, from initial planning to deployment and maintainance.

The web projects development involves several steps –

1. Project Planning:
It involves identification of objectives gathering requirements and identify target audience / users.

Objective : Purpose, goal, what & why.
Gathering requirements - to gather the various requirements of system using some method like goal-oriented.
↳ FRs : features & functionalities of the system. What a system is suppose to do.
e.g - Login, signup, payment etc.
↳ NFRs : How the system suppose to do.
e.g - security, performance, usability.
Identifying target users : This include interviewing users, surveys, analyzing compititors etc.

2. Design and User Experience:
Create wireframes (simple sketches) and prototypes to visualize the structure and functionality of the website or application.

3- Development

3. Frontend Development:
This include the implementation of design using HTML and CSS and provide some functionalities (static) and dynamic elements using JavaScript.

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- Backend Development:
Develop the server side code that handles requests, processes and ~~resp~~ send respones. It include intraction with database and performing queries for insertion, modification, updation and deletion.

4. Testing:
Conduct system / functional testing to check work as expected.
- Usability testing - real user testing
- Performance testing - Speed, responsiveness
- Security testing - vulnerabilities.

5. Deployment:
It include choosing a hosting service, register a domain, continious integration of CI/CD pipelines and setup SSL certification to enables HTTPS.

6. Post deployment- maintainance / Review
- Monitor performance
- Bug fixing
- Updates
- Regular Backups
- Ongoing maintainance

Review project success, gather feedbacks from stakeholders and users.

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Web Team:

Web team is a group of professionals with diverse skills working together to create, develop, maintain web projects.

examples-

Project manager : Research
Project owner : Strategies (Technology and Content)
Content Strategist : Abstract Strategy
UI/UX designers : Designing
Developers : Implementation of Technology
~~Project Management / Testing~~
QA Engineer / Tester : Project management and testing.

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Search Engine Optimization (SEO)

1. Introduction to SEO:

What SEO is and Why it matters?
SEO (Search Engine Optimization) is the process of optimizing a website to improve its visibility in search engine results. Effective SEO helps websites attract more organic traffic, which can lead to higher engagement, conversions and revenue. Understanding SEO is crucial for any online presence, as it helps your content to reach the right audiences.

How Search Engine works?
Search engines use algorithms to crawl, index and rank web pages. They analyze various factors such as keywords, site structure, and user engagement to determine the relevance and authority of a page. Knowing how these algorithms work allows you to optimise your content to better align with search engine requirements.

2. Keyword Research and On-page SEO:

Importance of Keywords:
Keywords are the terms used is searches for online. Effective keywords research

identifies high-traffic, low-competition terms to help your content rank higher.

Content Optimization:
On-page SEO involves optimizing title tags, meta description, and headers to make your content more appealing to search engine and users.

Importance of Semantics Tags:
Semantics tags like 'article' and 'section' provide structure and meaning to your content, improving SEO and accessibility.

Formatting Tags:
Tags like 'strong', 'em' and 'blockquote' enhance readability and helps search engines interpret the importance of your content.

3. Off-Page SEO:

Backlink Building:
Backlinks are endorsements from other websites. Building quality backlinks improves your site's authority and search engine rankings.

Role of Social Media in SEO:
Social media helps in increase content visibility and drive traffic, indirectly

supporting your SEO efforts through engagement and brand awareness.

4. Technical SEO:

Website Speed and Mobile Optimization:
Fast loading, mobile-friendly websites rank higher and offer a better user experience, which is crucial for retaining visitors.

Website Architecture and Crawlability:
A well-structured website with clean URLs and a logical hierarchy makes it easier for search engines to crawl and index your content.

5. SEO Analytics and Tools:

Use tools like ~~SEO~~ Google Analytics and Search Console to monitor traffic, user behaviour, and keyword performance, helping you refine your SEO strategy.

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How SEO helps to improve page ranking:

1. Keyword Optimization: Using relevant keywords in content, meta tags, and URLs to signal the page's topic to search engines.

2. Quality Content: Providing valuable, informative content that answer user queries.

3. On-page Optimization: Enhancing page elements title, description and headings for better indexing.

4. Technical SEO: Ensuring fast load times, mobile-friendliness, and a clear site structure.

5. Backlinks: Gathering links from reputable sites to boost credibility.

6. User Experience: Improving site navigation, responsiveness and speed to keep users engaged.

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Page Rank algorithm:

Page Rank is an algorithm used by Google to rank web pages based on their link structure. It works by:

1. Analyzing Links: Evaluating the number and quality of links pointing to a page.
2. Distributing Rank: Distributing a page's rank to the pages it links to.
3. Iterative Calculations: Repeatedly updating ranks until they stabilize.
4. Dumping factor: Adjusting for random jumps to ensure balanced ranking.

These help to calculate final rank which represents relative importance of a webpage.

Higher score represents greater importance and are more likely to appear higher in search results.

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Example based on page rank algorithm:

Let consider three pages with initial ranking=

(A) Home Page : 1
(B) Contact Page : 1
(C) About Us page : 1

Link Structure:

Home Page → Contact page & About Us
Contact Page → About Us page
About Us page → Home page

Dumping factor $(d) = 0.85$

Total pages $(N) = 3$

Formula:

$$PageRank(P) = \frac{1-d}{N} + d\left(\frac{PageRank(Q_1)}{L(Q_1)} + \frac{PageRank(Q_2)}{L(Q_2)} + \cdots \frac{PageRank(Q_N)}{L(Q_N)}\right)$$

$$PageRank(P) = \left(\frac{PageRank(Q_1)}{L(Q_1}\right) + \left(\frac{PageRank}{L(Q_2)}\right) + \cdots$$

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Calculation:

Iter. 1

1. Page A : Home Page

~~PageRank (A) = 1 - 0.85 + 0.85~~
~~3~~

$$\text{Page}^{\text{Rank}}(A) = \left(\frac{\text{PageRank}(B)}{L(B)}\right) + \left(\frac{\text{PageRank}(C)}{L(C)}\right)$$

$$= \frac{1}{1} + \frac{1}{1}$$

$$= 2$$

2. Page B : Contact Page

$$\text{PageRank}(B) = \left(\frac{\text{PageRank}(C)}{L(C)}\right)$$

$$= 1$$

3. Page C : About Page

$$\text{PageRank}(C) = \left(\frac{\text{PageRank}(A)}{L(A)}\right)$$

$$= \frac{1}{2}$$

$$= 0.5$$

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Iter. 2

Page A

$$\text{PageRank}(A) = \frac{1}{1} + \frac{0.5}{1}$$

$$= 1.5$$

Page B

$$\text{PageRank}(B) = \frac{0.5}{1}$$

$$= 0.5$$

Page C

$$\text{PageRank}(C) = \frac{2}{2}$$

$$= 1$$

⋮

Convergence :-

Page A = 1.5
Page B = 1
Page C = 0.75

Ranking : Page A > Page C > Page B

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With formula:

$$PageRank(A) = \frac{1-d}{N} + d\left(\frac{PageRank(B_1)}{L(B_1)} + \frac{PageRank(B_2)}{L(B_2)} + \dots\right)$$

Iter 1.

1. $PageRank(A) = \frac{1-0.85}{3} + 0.85\left(\frac{1}{1} + \frac{1}{1}\right)$

$= \frac{0.15}{3} + 0.85\,(2)$

$= 1.75$

2. $PageRank(B) = \frac{1-0.85}{3} + 0.85\left(\frac{1}{1}\right)$

$= \frac{0.15}{3} + 0.85$

$= 0.9$

3. $PageRank(C) = \frac{1-0.85}{3} + 0.85\left(\frac{1}{2}\right)$

$= \frac{0.15 + 0.85\,(0.5)}{3}$

$= 0.475$

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Iter. 2

Page A : 1.75

Page B : 0.9

Page C : 0.475

$$\text{Page (A)} = \frac{1}{20} + 0.85\left(\frac{0.9}{1} + \frac{0.475}{1}\right)$$

$$= 1.22$$

$$\text{Page (B)} = \frac{1}{20} + 0.85\ (0.475)$$

$$= 0.453$$

$$\text{Page (C)} = \frac{1}{20} + 0.85\ (1.75/2)$$

$$= 0.798$$

Iter. 3

$$\text{Page (A)} = \frac{1}{20} + 0.85\ (0.45 + 0.79)$$

$$= 1.10$$

$$\text{Page (B)} = \frac{1}{20} + 0.85\ (0.79)$$

$$= 0.72$$

$$\text{Page (C)} = \frac{1}{20} + 0.85\ (1.22/2)$$

$$= 0.578$$

~~Ranking : Page A →~~

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Iter. 4 Page (A) = 1.15

Page (B) = 0.53

Page (C) = 0.52

Iter. 5

Page (A) = 0.94

Page (B) = 0.49

Page (C) = 0.538

Ranking: Page A > Page C > Page B

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28/8/2024