INTERNET PROGRAMMING

UNIT-I

Introduction to Internet

The **Internet** is the global system of interconnected computer networks that uses the Internet protocol suite (TCP/IP) to communicate between networks and devices. It is a network of networks.

The Internet is a worldwide network of computer networks that connects university, government, commercial, and other computers in over 150 countries. There are thousands of networks, tens of thousands of computers, and millions of users on the Internet, with the numbers expanding daily.

The Internet helps in transfer of messages through mail, chat, video & audio conference, etc. It has become mandatory for day-to-day activities such as bills payment, online shopping and surfing, tutoring, working, communicating with peers, etc.

Introduction to World Wide Web (WWW)

British computer scientist Tim Berners-Lee invented the World Wide Web in 1991. The basic idea of the WWW was to merge the evolving technologies of computers, data networks and hypertext into a powerful and easy to use global information system.

The World Wide Web (WWW), commonly known as the Web, is an information system where documents and other web resources are identified by Uniform Resource Locators (URLs, such as https://example.com/), which may be interlinked by hypertext, and are accessible over the Internet.

The resources of the Web are transferred via the Hypertext Transfer Protocol (HTTP) and accessed by a software application called a web browser and are published by a software application called a web server.

The World Wide Web is a way of exchanging information between computers on the Internet, tying them together into a vast collection of interactive multimedia resources. **Internet** and **Web** is not the same thing: Web uses internet to pass over the information.

World Wide Web Consortium (W3C)

The World Wide Web Consortium (W3C) is international standards organization for the World Wide Web. It was founded in 1994 and led by **Tim Berners-Lee inventor of** World Wide Web and CEO **Jaffrey Jaffe**. 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 mission is to lead the World Wide Web to its full potential by developing protocols and guidelines that ensure the long-term growth of the Web.

History of Internet

The first workable prototype of the Internet came in the late 1960s with the creation of ARPANET (Advanced Research Projects Agency Network) now known as Defence Advanced Project Research Agency Network (DAPRA) and it was originally funded by the U.S. Department of Defence (DoD). On October 29, 1969, ARPNET delivered its first message.

ARPANET adopted the transmission control protocol (TCP) and Internet protocol (IP) in 1983 and separated out the military network (MILNET), assigning a subset for public research. Launched formally as the National Science Foundation Network (NSFNET) in 1985, engineers designed it to connect university computer science departments across the US (CSNET).

In 1980s the National Science Foundation (NSF) funded at several universities in the United States and provided interconnectivity in 1986 with the NSFNET. International connections to NSFNET provides concepts such as the Domain Name System, and the adoption of TCP/IP begins the Internet, Commercial Internet service providers (ISPs) began to emerge in late 1980s.

In 1989 Tim Berners-Lee of the European Organization for Nuclear Research (CERN) created the hypertext transfer protocol (http), a standard to access the same internet sites. For this reason, Berners-Lee is widely regarded as the father of the World Wide Web (www).

The Mosaic web browser, created in 1993 at the National Centre for Supercomputing Applications (NCSA) was emerged from the NSFNET. Mosaic was the first to show images in line with text, and it offered many other graphical user interface.

History of World Wide Web

Tim Berners-Lee, a British scientist, invented the World Wide Web (WWW) in 1989, while working at CERN. The Web was originally conceived and developed to meet the demand for automated information-sharing between scientists in universities and institutes around the world.

Tim Berners-Lee wrote the first proposal for the World Wide Web in March 1989 and his second proposal in May 1990. He began work using a NeXT computer, one of Steve Jobs' early products.

By October of 1990, Tim had written the three fundamental technologies that remain the foundation of today's web.
- HTML: HyperText Markup Language. The markup (formatting) language for the web.
- URI: Uniform Resource Identifier. A kind of "address" that is unique and used to identify to each resource on the web. It is also commonly called a URL.
- HTTP: Hypertext Transfer Protocol. Allows for the retrieval of linked resources from across the web.

Tim also wrote the first web page editor/browser ("WorldWideWeb.app") and the first web server ("httpd"). By the end of 1990, the first web page was served on the open internet, and in 1991, people outside of CERN were invited to join this new web community. Tim allowed the web for public use without any royalty. Tim-Berners-Lee moved from CERN to MIT to form a World Wide Web Consortium (W3C).

History of SGML

In 1969, Charles Goldfarb was leading an IBM research project along with Edward Mosher and Raymond Lorie he invented the Generalized Markup Language (GML) as a means of allowing the text editing, formatting, and information retrieval subsystems to share documents.

SGML derived from IBM's Generalized Markup Language (GML), which Charles Goldfarb, Edward Mosher, and Raymond Lorie developed in the 1960s. The Standard Generalized Markup Language (SGML; ISO 8879:1986) is a standard for defining generalized markup languages for documents introduced in 1986.

Standard generalized markup language (SGML) is a text markup language that serves as a superset of widely used markup languages like HTML (hypertext markup language) and XML (extensible markup language).

SGML is used for marking up documents. SGML allowed users to work on standardized formatting styles for electronic documents. Another important characteristic of SGML is use of document types, and subsequently it use of document type definition (DTD).

Introduction to HyperText Markup Langauge (HTML)

Hyper Text Markup Language is used for creating web pages and web applications.

Hyper Text: HyperText simply means "Text within Text." A text has a link within it, is a hypertext. Whenever you click on a link which brings you to a new webpage, you have clicked on a hypertext. HyperText is a way to link two or more web pages (HTML documents) with each other.

Markup language: A markup language is a computer language that is used to apply layout and formatting conventions to a text document. Markup language makes text more interactive and dynamic. It can turn text into images, tables, links, etc.

Tim Berners-Lee is known as the father of HTML. The first available description of HTML was a document called "HTML Tags" proposed by Tim in late 1991. The latest version of HTML is HTML5 introduced in 2002.

HTML is widely used language on the web. We can create a static website by HTML only. Technically, HTML is a Markup language rather than a programming language.

Basic Structure of HTML

```
<!DOCTYPE>
<html>
<head>
<title>Web page title</title>
</head>
<body>
<h1>Write Your First Heading</h1>
<p>Write Your First Paragraph</p>
</body>
</html>
```

Description of HTML Example

<!DOCTYPE>: It defines the document type or it instruct the browser about the version of HTML.
<html > : Text between html tag describes the web document. It is a container for all other elements.
<head>: It should be the first element inside the <html> element, which contains the metadata.
<title>: It is used to add title of that HTML page which appears at the top of the browser window.
<body> : Text between body tag describes the body content of the page that is visible to the end user.
<h1> : Text between <h1> tag describes the first level heading of the webpage.
<p> : Text between <p> tag describes the paragraph of the webpage.

Editing HTML

An **HTML editor** is a program for editing HTML, the markup of a web page. Although the HTML markup in a web page can be controlled with any text editor, specialized HTML editors can offer convenience and added functionality.
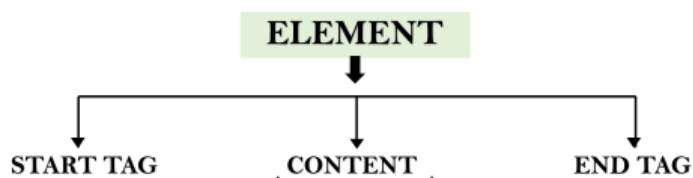
WYSIWYG

WYSIWYG is the acronym for **What You See Is What You Get**. These editors provide an editing interface that shows how the code looks on a working web page. Using WYSIWYG editors does not require any HTML knowledge; therefore, it is much easier to get started for an inexperienced user with no coding experience whatsoever.

Text Editors

There are various types of text editors available but for a beginner, the best text editor is Notepad or TextEdit (Mac). Some other text editors are Sublime, Adobe Dreamweaver. Type your html code in an editor and save the file with extension ".html". Open the html file in a web browser.

Common Elements in HTML

An HTML file is made of elements. An element in HTML usually consist of a start tag <tag name>, close tag </tag name> and content inserted between them. **Technically, an element is a collection of start tag, attributes, end tag, content between them**. In an HTML file, everything written within tags are termed as HTML elements.

```
               ELEMENT
                  ↓
     ┌────────────┼────────────┐
     ↓            ↓            ↓
  START TAG    CONTENT      END TAG
```

Example:

<p> Hello world!!! **</p>**

Void element: All the elements in HTML do not require to have start tag and end tag, some elements does not have content and end tag such elements are known as Void elements or empty elements. **These elements are also called as unpaired tag**. **Some Void elements are <br>, <hr> etc.**

Nested HTML Elements: HTML can be nested, which means an element can contain another element.

Block-level and Inline HTML elements:

For the default display and styling purpose in HTML, all the elements are divided into two categories:

- o Block-level element
- o Inline element

HTML Headers

A HTML header or HTML <h> tag can be defined as a title or a subtitle which you want to display on the webpage. When you place the text within the heading tags <h1>.........</h1>, it is displayed on the browser in the bold format and size of the text depends on the number of heading.

- There are six different HTML headings which are defined with the <h1> to <h6> tags, from highest level h1 (main heading) to the least level h6 (least important heading).
- h1 is the largest heading tag and h6 is the smallest one. So h1 is used for most important heading and h6 is used for least important.

Example: Output:

<h1>Heading no. 1**</h1>**   # Heading no.1

<h2>Heading no. 2**</h2>**   ## Heading no.2

<h3>Heading no. 3**</h3>**   ### Heading no.3

<h4>Heading no. 4**</h4>**   #### Heading no.4

<h5>Heading no. 5**</h5>**   ##### Heading no.5

<h6>Heading no. 6**</h6>**   ###### Heading no.6

HTML Links

The **HTML anchor tag(<a>)** defines a hyperlink that links one page to another page. It can create hyperlink to other web page as well as files, location, or any URL. The "href" attribute is the most important attribute of the HTML a tag. and which links to destination page or URL.

The href attribute is used to define the address of the file to be linked. In other words, it points out the destination page.

Syntax

  Link Text

Example

<a href="second.html">Click for Second Page****

Appearance of HTML anchor tag

- An **unvisited link** is displayed underlined and blue.

- A **visited link** displayed underlined and purple.

- An **active link** is underlined and red.

HTML Images

 In **HTML** images, <**img>** tag is used to display image on the web page. HTML img tag is an empty tag that contains attributes only, closing tags are not used in HTML image element.

Example:

<img src="good_morning.jpg" alt="Good Morning Friends"**/>**

Attributes of HTML img tag

The src and alt are important attributes of HTML img tag. All attributes of HTML image tag are given below.

1) src: It is a necessary attribute that describes the source or path of the image. The location of image may be on the same directory or another server.

2) alt : The alt attribute defines an alternate text for the image, if it can't be displayed.

3) width: It is an optional attribute which is used to specify the width to display the image.

4) height: The height attribute used to specify height of the image to be displayed.

HTML Unordered Lists

In HTML Unordered list, all the list items are marked with bullets. It is also known as bulleted list. The Unordered list starts with <ul> tag and list items start with the <li> tag. We can use circle, disc or square symbols for unordered lists.

Example:

<ul>
**
Aries
**
**
Bingo
**
**
Leo
**
**
Oracle
**
**
**

Output

- Aries
- Bingo
- Leo
- Oracle

Nested and Ordered Lists

In the ordered HTML lists, all the list items are marked with numbers by default. It is known as numbered list also. The ordered list starts with <ol> tag and the list items start with <li> tag.

We can use different types of ordered list using Alphabets, Numbers, and Roman Letters. Both Uppercase and Lowercase attributes are allowed.

Example:
<ol>
**
Aries
**
**
Bingo
**
**
Leo
**
**
Oracle
**
**
**
Output
1. Aries
2. Bingo
3. Leo
4. Oracle

Nested List

A nested list or a sub list is a list within a list. We can create a nested list in html by including ordered list within unordered list or unordered within ordered list.

Example:
```
<ol>
  <li>first item</li>
  <li>second item  <!-- closing </li> tag not here! -->
   <ul type='a'>
     <li>second item first subitem</li>
     <li>second item second subitem</li>
     <li>second item third subitem</li>
   </ol>
  </li>           <!-- Here's the closing </li> tag -->
  <li>third item</li>
</ol>
```

Output:

1. first item
2. second item
    a. second item first subitem
    b. second item second subitem
    c. second item third subitem
3. third item

HTML Tables

HTML table is used to display data in tabular form. There can be many columns in a row. We can create a table in web page using <table> tag, includes sub tags such as <tr>, <td>, and <th> elements.

In Each table, table row is defined by <tr> tag, table header is defined by <th>, and table data is defined by <td> tags.

Example

```
<table>
<tr><th>First_Name</th><th>Last_Name</th><th>Marks</th></tr>
<tr><td>Sonoo</td><td>Jaiswal</td><td>60</td></tr>
<tr><td>James</td><td>William</td><td>80</td></tr>
<tr><td>Swati</td><td>Sironi</td><td>82</td></tr>
<tr><td>Chetna</td><td>Singh</td><td>72</td></tr>
</table>
```

Output:

First_Name	Last_Name	Marks
Sonoo	Jaiswal	60
James	William	80
Swati	Sironi	82
Chetna	Singh	72

HTML Table Attributes

1. HTML Border attribute

You can use border attribute of table tag in HTML to specify border.

Example: <table border="1">

2. Table with Colspan:

If you want to make a cell span more than one column, you can use the colspan attribute.

Example: **<th** colspan="2">Mobile No.**</th>**

2. Table with Rowspan:

If you want to make a cell span more than one row, you can use the rowspan attribute.

Example: <th rowspan="2">Mobile No.**</th>.**

HTML Forms

HTML forms serve the purpose of collecting information provided by the visitors, which is later sent back to the server. For proper operation, it's important that the form provided in HTML is paired with some server-side code, usually called "processing agent", that will be responsible for receiving and processing the information as the author sees fit. This processing may consist of, for example, saving the information received or sending it by e-mail.

A form is basically a container for controls. Each control in a form is thought to collect information input by users, in ways that go from text lines to file uploads, through options, dates, passwords and many more. Once users have filled the form with data, they can submit it back to the server in order to let the processing agent administrate the gathered information.

```
<form>
   [Set of controls]
</form>
```

Single-Line Text Input

A single-line text input, which allows only one line of text to be entered, is one of the many controls that's declared with the `input` element. In this case, the `input` element should present the value "text" in the `type` attribute.

```html
<form action="../form-result.php" target="_blank">
  <p>
    Enter your full name: <input type="text" name="fullname">
    <input type="submit" value="Send data">
  </p>
</form>
```

Enter your full name: [   ] [Send data]

Multi-Line Text Input

A multi-line text control is usually rendered as a box, tall enough to contain more than one line of text at the same time. This representation, usually provides a scrollbar mechanism to allow users to see all entered text, particularly when it's long enough to exceed the box boundaries.

A multi-line text input is inserted with the `textarea` element. Like before, the `name` attribute provides a name for the control.

```html
<form action="../form-result.php" target="_blank">
  <p>Enter your full name: <input type="text" name="fullname"></p>
  <p>
    Leave a message:<br>
    <textarea name="message"></textarea>
  </p>
  <input type="submit" value="Send data">
</form>
```

Enter your full name: [   ]

Leave a message:

[   ]

[Send data]

An HTML form facilitates the user to enter data that is to be sent to the server for processing such as name, email address, password, phone number, etc. HTML forms are required if you want to collect some data from of the site visitor.

Checkboxes

Checkboxes are represented by the `input` element, when it has the value "checkbox" in the `type` attribute. Here the value of the `name` attribute also plays a role, by identifying the option server-side.

```html
<form action="../../form-result.php" target="_blank">
  <p>
    Select your interests:<br>
    <input type="checkbox" name="movies"> Movies<br>
    <input type="checkbox" name="sports"> Sports<br>
    <input type="checkbox" name="videogames"> Videogames
  </p>
  <p><input type="submit" value="Send data"></p></form>
```

Select your interests:
☐ Movies
☐ Sports
☐ Videogames

[Send data]

Radio Buttons

While checkboxes are independent and can be declared on their own, radio buttons are options that need to be grouped in order to have a meaning. Groups of radio buttons have a particularity that plays strong in their behavior: only one option can be selected at a time in all the group. This means, among other things, that when you select one option, the previous selected option gets deselected.

A radio button is also declared with the `input` element, but with the value "radio" in the `type` attribute. Here things get a little different from what happened with checkboxes, because the value of the `name` attribute needs to be shared by all the options in the same group. In other words, this is the mechanism that needs to be used in order to create a group of radio buttons.

```
<form action="../../form-result.php" target="_blank">
  <p>
    Income:<br>
    <input type="radio" name="income" value="lowerthan1000"> Lower than $1,000.00<br>
    <input type="radio" name="income" value="from1000to5000"> From $1,000.00 to
$5,000.00<br>
    <input type="radio" name="income" value="higherthan5000"> Higher than $5,000.00
  </p>
  <p><input type="submit" value="Send data"></p>
</form>
```

Income:
○ Lower than $1,000.00
○ From $1,000.00 to $5,000.00
○ Higher than $5,000.00

[Send data]

Lists

A list of options is a control that can resemble, concerning its mechanics, each of the two controls previously analized, depending on the presence of the boolean attribute `multiple`. This attribute changes radically the behavior of a list, by making possible the selection of only one single option at a time or many.

The structure of a list is composed, mainly, by two elements: `select`, that acts as the container for the options; and `option`, that represents one of the many options the control may present.

When the `multiple` attribute is absent, a list control behaves like a radio button group, where only one option can be selected at a time. The next example reflects this behavior, which fits perfectly with the purpose of the field.

If the `size` attribute has a value of "1" and the `multiple` attribute is absent, browsers usually display this control as a drop-down list box. Otherwise, the control takes the form of a scrollable box.

```
<form action="../../form-result.php" target=" blank">
  <p>
    Gender:
    <select name="gender">
      <option>Male</option>
      <option>Female</option>
    </select>
  </p>
  <p><input type="submit" value="Send data"></p>
</form>
```

Gender:

Send data

```
<form action="../../form-result.php" target="_blank">
  <p>
    Select categories:<br>
    <select multiple name="categories[]">
      <option value="art">Art and entertainment</option>
      <option value="tv">Television and movies</option>
      <option value="kids">Kids and teenagers</option>
      <option value="diy">Do it yourself</option>
    </select>
  </p>
  <p><input type="submit" value="Send data"></p>
</form>
```

Select categories:

Art and entertainment

Send data

Submit Buttons

A submit button has the predefined action of submitting the `form` it belongs to when activated. Unless other mechanisms for form submission are provided, the presence of this button is necessary if there's an intention to allow users to submit the form. We've already seen this control in previous examples, so its behavior should be natural.

Submit buttons are inserted with the `input` element, having the value "submit" in its `type` attribute. The `value` attribute is important in this control, as its value is displayed as a label inside the button. The following example shows a `form` with a text input and a submit button.

```
<form action="../../form-result.php" target="_blank">
  <p>
    Edit your description:
    <input type="text" name="desc">
    <input type="submit" value="Save edits">
  </p>
</form>
```

Edit your description: | Save edits

Reset Buttons

Reset buttons also have a predefined action. But in this case, the predefined action consists in the reset of the the form fields to their initial values. In other words, the state of the fields in a form that's been reset is the same as when the page has loaded. This action removes all changes the user has applied to the values of the controls.

```html
<form action="../../form-result.php" target="_blank">
  <p>Send message: <input type="text" name="message" value="I'm ready!"></p>
  <p>
    <input type="radio" name="when" value="today" checked> Today<br>
    <input type="radio" name="when" value="tomorrow"> Tomorrow
  </p>
  <p><input type="checkbox" name="copy" checked> Send me a copy</p>
  <p>
    <input type="reset" value="Reset the form">
    <input type="submit" value="Send message">
  </p>
</form>
```

Send message: [I'm ready!]

◉ Today
○ Tomorrow

☑ Send me a copy

[Reset the form] [Send message]

Labeling Controls

Almost any control in a `form` can be labeled. Labeling controls is a worthwhile operation that enhances accessibility on many fronts. A label can be assigned with the `label` element. The easiest of the two existing methods for assingning a `label` to a control, consists of declaring both, the text and the control, as content of the `label` element.

```html
<form action="../../form-result.php" target="_blank">
  <p><label>Name: <input type="text" name="fullname"></label></p>
  <p>
    Gender:
    <label><input type="radio" name="gender" value="male"> Male</label>
    <label><input type="radio" name="gender" value="female"> Female</label>
  </p>
  <p><label><input type="checkbox" name="newsletter"> I'd like to receive the
newsletter</label></p>
  <p><input type="submit" value="Send data"></p>
</form>
```

Name: [ ]

Gender: ○ Male ○ Female

☐ I'd like to receive the newsletter

[Send data]

Grouping Controls

Sometimes, when a form is large, segmentation could play a role in the improvement of organization and ease of use. This is why HTML provides the fieldset element, which is a container for controls. With this element, authors can make divisions to the form and organize controls thematically.

A fieldset can also have a title to identify the composition or purpose of the set of controls it contains. This title can be provided with the legend element, which must be declared as the first child of the fieldset. The following example shows a small form divided into two thematic groups.

```
<form action="../../form-result.php" target="_blank">
  <fieldset>
    <legend>Personal information</legend>
    <p><label>Name: <input type="text" name="fullname"></label></p>
    <p><label>Address: <input type="text" name="address"></label></p>
  </fieldset>
  <fieldset>
    <legend>Preferences</legend>
    <p>
      <label><input type="checkbox" name="arts"> Arts</label><br>
      <label><input type="checkbox" name="television"> Television</label><br>
      <label><input type="checkbox" name="videogames"> Videogames</label><br>
      <label><input type="checkbox" name="sports"> Sports</label><br>
    </p>
  </fieldset>
  <input type="submit" value="Send data">
</form>
```

Personal information

Name: [   ]

Address: [   ]

Preferences

☐ Arts
☐ Television
☐ Videogames
☐ Sports

[Send data]

References:

1. Deitel & Deitel, Internet & World Wide Web How to Program, 3rd Edition, Pearson Education India, 2004.