TR-102

MASTERING THE SEMANTIC WEB

DAY-1

❖ Introduction to Semantic Web

Semantic Web is an extension to the World Wide Web. The purpose of the semantic web is to provide structure to the web and data in general.

It emphasizes on representing a web of data instead of web of documents.

It allows computers to intelligently search, combine and process the web content based on the meaning that the content has.

➢ Technologies associated with Semantic Web

1. RDF (Resource Description Framework)
2. OWL (Web Ontology Language)
3. DL (Description Language)

➢ Query languages used are:

1. SPARQL (SPARQL Protocol and RDF query language).
2. SHACL (Shape Constraint Language). SHACL is used for validating the RDF graphs against a set of conditions.

❖ Why Semantic Web is important?

- **Enhanced Search Capabilities**: Semantic technologies enable more precise and context-aware search results by understanding the meaning and relationships between terms, rather than relying solely on keyword matching.

- **Better Data Integration**: By using common ontologies and vocabularies, the Semantic Web facilitates the integration of data from various sources, making it easier to aggregate and analyse information.

- **Automation of Information Retrieval**: With well-defined metadata and ontologies, machines can automatically process and retrieve relevant information, reducing the need for manual intervention.

- **Rich and Linked Data**: The Semantic Web promotes the creation of rich data sets linked across different domains, providing a more comprehensive and interconnected understanding of information.

- **Personalization and Customization**: Semantic technologies enable personalized content delivery by understanding user preferences and contexts, allowing for more targeted and relevant information.

- **Efficient Data Management**: Semantic Web standards support efficient data management practices, including data annotation, metadata management, and data provenance tracking.

❖ Introduction to HTML

➢ What is HTML?

HTML is a markup language, meaning it uses tags to annotate text, images, and other content to be displayed in a web browser. These tags define the structure and layout of a web page, enabling browsers to interpret and render the content appropriately.

➢ Basic Structure of an HTML Document

An HTML document consists of several key components:

- **DOCTYPE Declaration**: Specifies the version of HTML being used. For modern web development, this is typically <!DOCTYPE html>.
- **HTML Tag (<html>)**: Encloses the entire HTML document. It includes two main sections: the head and the body.
- **Head Section (<head>)**: Contains meta-information about the document, such as the title, character set, and links to external resources like stylesheets and scripts.
- **Body Section (<body>)**: Contains the actual content of the web page, such as text, images, links, and other media.

Example:

```
<!DOCTYPE html>
<html lang="en">
<head>
   <meta charset="UTF-8">
   <meta name="viewport" content="width=device-width, initial-scale=1.0">
   <title>Sample HTML Structure</title>
</head>
<body>
   <!- - main content of the webpage-- >
</body>
</html>
```

➢ HTML Elements and Tags

- **HTML Tags**: HTML tags are the building blocks of HTML documents. They define the beginning and end of elements, which are the content and structure of the document.

  Syntax:

  Tags are enclosed in angle brackets (< >). Most tags come in pairs: an opening tag (<tag>) and a closing tag (</tag>).

  Example:

  <p>This is a paragraph. </p>

- **HTML Elements:** HTML elements consist of the opening tag, content, and closing tag. Elements define the structure and content of the webpage.

  Example:

  <p>This is a paragraph. </p>

  In this example:

  a. **<p>** is the opening tag.

  b. "**This is a paragraph**" is the content of the element.

  c. **</p>** is the closing tag.

- **Comments in HTML:** Comments in HTML are notes or annotations added within the HTML code to explain or organize the code. They are not displayed in the browser and do not affect the rendered output of the HTML document. Comments are useful for developers to leave messages, explanations, or reminders within the code.

  Shortcut keys for comments:

  Shortcut keys for adding comments in HTML vary depending on the code editor or integrated development environment (IDE) you are using. For **Visual Studio Code (VS Code):**

  Windows/Linux: 'Ctrl + /'

  Mac: 'Cmd + /'

  Syntax of HTML Comments:

  HTML comments are enclosed within <!-- and -->.

  Example:

  <!-- This is a comment -->

- **Attributes in HTML:** Attributes in HTML provide additional information about HTML elements. They are always included in the opening tag and usually come in name/value pairs like name="value". Attributes modify the default behaviour or appearance of HTML elements and provide metadata about elements.

❖ Common HTML tags and their functions

➢ <html>

- The root element of an HTML document.
- All other HTML elements must be nested within this tag.

Syntax:

```
<html>
   <!-- Other HTML elements -->
</html>
```

➢ <head>

Contains meta-information about the HTML document, such as the title, character set, and links to external resources like CSS and JavaScript files.

Syntax:

```
<head>
   <title>Page Title</title>
</head>
```

➢ <title>

Sets the title of the HTML document, which appears in the browser's title bar or tab.

Syntax:

```
<title>My Web Page</title>
```

➢ <link>

Links external resources, such as stylesheets, to the HTML document.

Syntax:

```
<link rel="stylesheet" href="styles.css">
```

Important attributes:

a. **rel:** Specifies the relationship between the current document and the linked resource.

b. **href:** Specifies the URL of the linked resource (required).

Note:

a. Place <link> tags inside the <head> section of your HTML document.

b. Use relative URLs (href="./styles.css") when linking to resources within the same domain to ensure portability.

➢ <body>

Contains the content of the HTML document, such as text, images, and other elements.

Syntax:

```
<body>
   <!-- Page content goes here -->
</body>
```

➢ Heading Tags

Heading tags in HTML are used to define headings and subheadings on a web page.

These tags help to structure content and make it more readable for both users and search engines.

HTML provides six levels of headings, from **<h1> to <h6>**, with <h1> being the highest (or most important) level and <h6> being the lowest (or least important) level.

Syntax:

```
<h1>Main Heading</h1>
<h2>Subheading</h2>
```

➢ Paragraph Tag

The <p> tag in HTML is used to define a paragraph.

It is a block-level element, which means it starts on a new line and takes up the full width available.

The content inside the <p> tag is typically text, and browsers automatically add some space (margin) before and after each <p> element to separate it from adjacent content.

Syntax:

```
<p>This is a paragraph. </p>
```

➢ <img> tag

The <img> tag in HTML is used to embed images into a webpage. It is an empty tag, meaning it does not have a closing tag. The <img> tag requires specific attributes to function properly.

Syntax:

```
<img src="URL" alt="description">
```

Attributes:

a. **src:** Specifies the path to the image file. This can be a relative URL (relative to the current page) or an absolute URL (linking to an external resource).

b. **alt:** Provides alternative text for the image if it cannot be displayed. This is important for accessibility and for search engines.

c. **width:** Specifies the width of the image. It can be defined in pixels or as a percentage.

d. **height:** Specifies the height of the image. It can be defined in pixels or as a percentage.

➢ Anchor tag

The anchor tag in HTML, <a>, is used to create hyperlinks.

A hyperlink allows users to click on a link and navigate to another web page, a different section of the same page, or any other resource available on the web.

Syntax:

```
<a href="URL">Link Text</a>
```

Attributes:

a. **href:** Specifies the URL of the page the link goes to.

b. **target:** Specifies where to open the linked document.

   1. **_self:** Opens the link in the same window/tab (default).
   2. **_blank:** Opens the link in a new window/tab.
   3. **_parent:** Opens the link in the parent frame.
   4. **_top:** Opens the link in the full body of the window.

❖ FORMS IN HTML

Forms in HTML are essential for collecting user input and sending it to a server for processing. They encompass a variety of elements that allow users to input data, such as text fields, checkboxes, radio buttons, and more. Below is an explanation of forms in HTML, including the important tags used within them.

➢ Basic Structure of an HTML Form

```
<form action="submit_form.php" method="post">
  <!-- Form elements go here -->
```

```
</form>
```

- **<form>:** The container element for the form.
- **action:** Specifies the URL where the form data should be sent.
- **method:** Specifies the HTTP method to use when sending form data (GET or POST).

Important Tags and Elements in an HTML Form

Text Input

Syntax:

```
<input type="text" name="username" placeholder="Enter your name">
```

a. **<input>:** The general input element for various types of data.

b. **type="text":** Specifies a single-line text input field.

c. **name:** The name attribute used to identify the input data when it is sent to the server.

d. **placeholder:** Provides a hint to the user of what can be entered in the field.

Password Input

Syntax:

```
<input type="password" name="password" placeholder="Enter your password">
```

a. **type="password":** Specifies a single-line text input field where the text is obscured for security.

Radio Buttons

Syntax:

```
<input type="radio" name="gender" value="male"> Male
<input type="radio" name="gender" value="female"> Female
```

a. **type="radio":** Allows the user to select one option from a set.

Checkboxes

Syntax:

```
<input type="checkbox" name="subscribe" value="newsletter"> Subscribe to newsletter
```

a. **type="checkbox":** Allows the user to select multiple options from a set.

- ### Submit Button

  Syntax:

  ```
  <input type="submit" value="Submit">
  ```

  a. **type="submit":** Defines a button for submitting the form.

- ### Label tag

  The <label> tag in HTML is used to define labels for input elements. By associating a label with a specific form element, it improves both the accessibility and usability of web forms. Labels help users understand what data is expected in an input field and also make it easier for screen readers to read the form for visually impaired users.

  Syntax:

  ```
  <label for="input_id">Label Text</label>

  <input type="text" id="input_id" name="input_name">
  ```

- ### Fieldset and Legend tag

  The <fieldset> and <legend> tags in HTML are used together to group related elements in a form, providing a semantic grouping that enhances the structure and accessibility of the form.

  <fieldset> Tag

  The <fieldset> tag is used to group related elements within a form. It creates a box around the grouped elements.

  <legend> Tag

  The <legend> tag is used to provide a caption for the <fieldset>. This caption is typically displayed at the top of the box created by the <fieldset>

❖ TABLES IN HTML

➢ Basic Structure of an HTML Table

```
<table>
    <caption>Table Caption</caption>
    <thead>
      <tr>
        <th>Header 1</th>
        <th>Header 2</th>
```

```
        <th>Header 3</th>
      </tr>
    </thead>
    <tbody>
      <tr>
        <td>Data 1.1</td>
        <td>Data 1.2</td>
        <td>Data 1.3</td>
      </tr>
      <tr>
        <td>Data 2.1</td>
        <td>Data 2.2</td>
        <td>Data 2.3</td>
      </tr>
    </tbody>
    <tfoot>
      <tr>
        <td>Footer 1</td>
        <td>Footer 2</td>
        <td>Footer 3</td>
      </tr>
    </tfoot>
  </table>
```

➢ Important Tags used in table

- **<table>:** Defines the table.
- **<caption>:** Defines a caption for the table.
- **<thead>:** Groups the header content in a table.
- **<tbody>:** Groups the body content in a table.
- **<tfoot>:** Groups the footer content in a table.
- **<tr>:** Defines a row in the table.

- **<th>:** Defines a header cell in the table. Header cells are bold and centered by default.
- **<td>:** Defines a standard data cell in the table.

❖ LISTS IN HTML

➢ Unordered Lists (<ul>)

Unordered lists display items with bullet points. Each list item is enclosed in an <li> tag.

Syntax:

```
<ul>
    <li>Item 1</li>
    <li>Item 2</li>
    <li>Item 3</li>
  </ul>
```

➢ Ordered Lists (<ol>)

Ordered lists display items with numbers or letters. Each list item is enclosed in an <li> tag.

Syntax:

```
<ol>
     <li>First item</li>
     <li>Second item</li>
     <li>Third item</li>
   </ol>
```

➢ Important Tags used in lists

- **<ul>:** Defines an unordered list.
- **<ol>:** Defines an ordered list.
- **<li>:** Defines a list item.