Unit - II

2.1 New Elements in HTML5: Canvas, SVG

In HTML5 graphics can be drawn using HTML elements itself. It does not require any third-party component. There are two graphics elements for drawing in HTML, they are.

1. Canvas
2. Scalable Vector Graphics (SVG)

Canvas

Canvas is a container for graphics on the webpage. This uses javascript to draw graphics on the container. Javascript instructs the browser to draw shapes without any plugin.

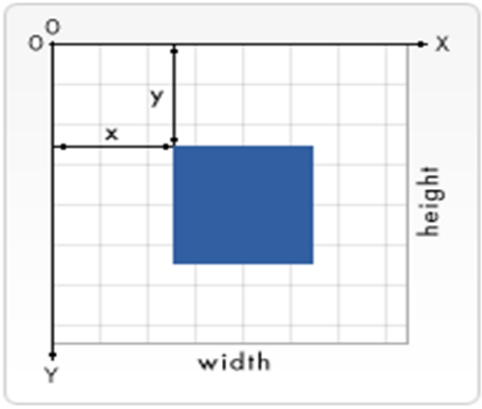
Syntax

<canvas attrib>.....</canvas>

Attributes of the Canvas element are

- id
- width
- height

Drawing in the HTML page uses the grid system with origin (0,0) at Top Left corner. The Grid System is shown below



To draw in a HTML page using Canvas element the following steps are followed.

1. Add <canvas></canvas> tag in the HTML page with proper "id" attribute and "width/height" attributes.

   ```
   <canvas id="myCanvas" width=450px height=300px>
   </canvas>
   ```

2. Using Javascript, get the canvas element.

   ```
   var canvas = document.getElementById('myCanvas');
   ```

3. To draw in the canvas element get the '2D' context of the canvas.

   ```
   var ctx = canvas.getContext('2d');
   ```

4. Using the context variable "ctx", drawing is done on the canvas.

Types of Drawing in Canvas

- Line Drawing
- Rectangle
- Arc
- Text

Line Drawing

Line drawing is performed by using the following commands in JavaScript.

- **beginPath()** - This command is used to start the path for performing line drawing.
- **moveTo(x,y)** - This command is used to move the path to the given point on the canvas.
- **lineTo(x,y)** - This command is used to draw a line to the given point from the current point on the canvas.
- **closePath()** - This command is used to draw a line from the current point to the starting point. This closes the drawing path.
- **lineWidth** - This is used to specify the width of the line.
- **strokeStyle** - This is used to set the color for the stroke.
- **stroke()** - This is used to draw the path defined by moveTo and lineTo commands using the strokeStyle provided. Default color for stroke is black.
- **fillStyle** - This is used to set the color for filling the drawing
- **fill()** - This is used to fill the current drawing. Default color is black.

Example

HTML Tag

```
<canvas id="myCanvas" width=450px height=300px>
</canvas>
```

JavaScript

```
var canvas = document.getElementById('myCanvas');
if (canvas.getContext) {
  var ctx = canvas.getContext('2d');
  ctx.beginPath();
  ctx.moveTo(100,100);
  ctx.lineTo(125,70);
  ctx.lineTo(150,100);
  ctx.closePath();
  ctx.stroke();
  ctx.fillStyle = "GREEN";
  ctx.fill();
 }
 else
   alert("Unable to use Canvas");
```

Output

Rectangle

Rectangle is drawn using JavaScript with the following commands

- **fillRect(x,y,width,height)** - This is used to draw a filled rectangle.
- **strokeRect()x,y,width,height)** - This is used to draw only the outline of the rectangle.
- **clearRect(x,y,width,height)** - This is used to clear the contents within the rectangular area and makes it transparent.

Example

HTML Tag

```
<canvas id="myCanvas" width=450px height=300px>
</canvas>
```

JavaScript

```
var canvas = document.getElementById('myCanvas');
if (canvas.getContext) {
  var ctx = canvas.getContext('2d');
  ctx.fillRect(25, 25, 100, 100);
  ctx.clearRect(40, 40, 70, 70);
  ctx.strokeStyle = "RED";
  ctx.strokeRect(45, 45, 60, 60);
 }
 else
   alert("Unable to use Canvas");
```

Output

SVG-Scalable Vector Graphics

It is an XML based markup language used to describe 2D vector Graphics on a HTML page. It's important feature is the image can be scaled without losing the quality

<svg *attribute*> …….. </svg>

Types of SVG Elements are

- Line
- Rectangle
- Circle
- Text

SVG Line Drawing

<line> element is used to draw lines on the HTML page.

Syntax

<line *attributes*> …….. </line>

Attributes

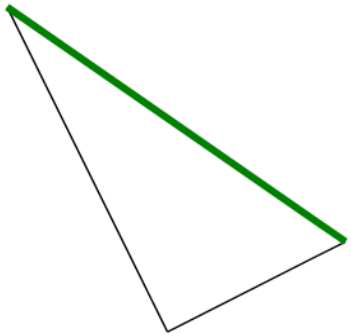
- **x1, y1** - Starting point values
- **x2, y2** - Ending Point Values
- **stroke** - Set color of the line
- **stroke-width** - set width of the line

Example

```
<svg  width=300px height=300px>
  <line  x1="10" y1="20" x2="100" y2="200"  stroke="black" >
  </line>
  <line x1="100" y1="200" x2="200" y2="150" stroke="black" >
  </line>
  <line x1="200" y1="150" x2="10" y2="20" stroke="green"
        stroke-width = "4">
```

```
    </line>
  </svg>
```

Output



SVG Rectangle Drawing

<rect> element is used to draw a rectangle in the HTML page.

Syntax

<rect *attributes*> …….. </rect>

Attributes

- **x, y** - Used to specify the top left corner of the rectangle.
- **width, height** - Used to specify the width and height of the rectangle.
- **rx, ry** - Used to specify rounded corners for the rectangle.
- **style** - Used to specify the line style for the rectangle.

Example

```
<svg  width=300px height=300px>
   <rect x = "30" y = "40" width = "100" height = "50"
         rx = "15" ry = "15" style = "stroke:blue; stroke-width:5px;" >
   </rect>
</svg>
```

Output

Comparison between SVG and Canvas

SVG	Canvas
It is Vector based graphics.	It is Raster based graphics.
It is modified through script and CSS.	It is modified only through script.
It is good for rendering text.	It is poor for rendering text.
Image quality is retained while scaling.	Image quality is lost while scaling.

Media Elements

In HTML5 audio and video elements are termed as media elements. HTML5 allows direct embedding of media elements in the HTML page without use of any plug-in. It is done using the following elements

- audio
- video

Audio

<audio> element is used to embed audio files in an HTML page.

Syntax

```
<audio controls>
        <source src = “” type = “”>
</audio>
```

In the <audio> element “controls” attribute is specified to display the play/pause, seek and volume controls.

<source> element contains the information about the audio files source location and type. Source location is given in “src” attribute and file type is given in “type” attribute. File types supported in <audio> element are

- audio/mp3
- audio/ogg
- audio/wav

Example

```
<audio controls>
  <source src="sample.mp3" type="audio/mp3">
</audio>
```

Video

<video> element is used to embed a video file in the HTML page.

Syntax

```
<video widht=“” height=“” controls>
   <source src=“” type=“”>
</video>
```

In <video> element “width” and “height” attributes are used to specify the width and height of the video. “controls” attribute is specified to display the play/pause, seek and volume controls.

<source> element contains the information about the video files source location and type. Source location is given in “src” attribute and file type is given in “type” attribute. File types supported in <video> element are

- video/mp4
- video/ogg
- video/WebM

Example

```
<video width=450px height=450px controls>
  <source src="sample.mp4" type="video/mp4">
</video>
```

Youtube Video in HTML

A youtube video can be embedded in your HTML page using the <iframe> element.

Syntax

```
<iframe src= “” height= “” width= “” title= “”>
</iframe>
```

The embed link of the youtube video is provided in the “src” attribute.

Example

```
<iframe width=450px height=450px
        src="https://www.youtube.com/embed/salY_Sm6mv4">
</iframe>
```

Links

A Link is a connection from one web source to another source on the internet. It starts at the source and points to the destination. In HTML anchor tag <a> is used to implement links.

Theoretical Link using Link Tag

<link> tag is used to define relationships between the current web page and external resources. It is placed on the head section. It's most commonly used to link to external stylesheets (CSS files) but can also be used for other purposes like a favorite icon.

Syntax

<link rel= “” type= “” href = “”>

- **rel** - Specifies the relationship between the current document and the linked document.
- **type** - Specifies the media type of the linked document.

Example

```
<!DOCTYPE html>
<html>
<head>
   <link rel="stylesheet" type="text/css" href="styles.css">
</head>
<body>
   <!-- Content of the web page -->
</body>
</html>
```

Adding a favicon in HTML

A favicon, short for "favorite icon," is a small image or icon associated with a website or web page. Favicons are displayed in the browser tab to provide a visual representation of the website.

Example

```
<!DOCTYPE html>
<html>
<head>
   <link rel="icon" type="image/x-icon" href="favicon.ico">
</head>
<body>
   <!-- Content of the web page -->
</body>
</html>
```

Hyperlink using Anchor Tag

The <a> tag (anchor tag) in HTML is **used to create a hyperlink on the webpage**. This hyperlink is used to link the webpage to other web pages or some section of the same web page.

Syntax

 Text Link

- **href** - It is used to specify the destination address of the link.
- **target** - It is used to specify the location to open the linked resource. Target attribute has the following values
    - **_self** - Open the link in same window
    - **_blank** - Open the link in a new blank window
    - **_top** - Open the link on top of the current window

- **_parent** - Open the link on the parent of the current window

- **Text Link** - It is the visible part of the link.

Link Properties

The link created using the anchor tag has three properties which enables an user to visualize the state of the link. They are,

- **Unvisited Link** - The link is underlined and blue in color.
- **Visited Link** - The link is underlined and purple in color.
- **Active Link** - The link is underlined and red in color. This state is achieved when clicking the link.

Example

```
<nav>
   <a href = "Audio.html" target= “_self” >Audio</a> |
   <a href = "Video.html" target= “_blank”>Video</a>
 </nav>
```

Link Types

There are two types of links that are used in an anchor tag. They are

1. Internal Link (Relative URL)
   This link points to the resource on the same website.

2. External Link (Absolute URL)
   This link points to the resource on an external website.

Example

```
<nav>
  <!--Internal Link-->
  <a href = "22Audio.html">Audio</a> |
  <a href = "23Video.html">Video</a> |
  <!--External Link-->
  <a href = "https://www.google.com">Google</a>
</nav>
```

Image as a Link

HTML <a> tag can be added to an image or other HTML element. It enables to open the link when the user click on the image or the HTML element

Syntax

```
<a href= “Link Address”>
  <img src= “Image Link”>
</a>
```

Example

```
<a href="https://www.google.com" target="_blank">
   <img src="glogo.png" width="100px" height="100px"/>
</a>
```

This example will show an image on the webpage. When the user clicks the image “Google” website will be opened using the anchor tag.

Output

Lists

A list is a short piece of information written on each line. There are three types of list in HTML

1. Unordered List
2. Ordered List
3. Definition List

Unordered List

This is used to display a list of items without any order. Each item is displayed with a bullet point (a black circle).

Syntax

```
<ul>
    <li>.....</li>
    <li>.....</li>
    <li>.....</li>
</ul>
```

Example

```
<ul>
    <li> Unordered List</li>
    <li> Ordered List</li>
    <li> Definition List</li>
</ul>
```

Output

- Unordered List
- Ordered List
- Definition List

Ordered List

This is used to represent a list of items in a specific sequential order. Each item is displayed with a number or letter.

Syntax

```
<ol type = "" start = "">
    <li>.....</li>
    <li>.....</li>
    <li>.....</li>
</ol>
```

Attributes

- type: Used to specify the list numbering style to be displayed. It can have the values 1, A, a,I, i.
- start: Used to specify the starting value of the list.

Example

```
<ol type="A" start="3">
    <li> Unordered List</li>
    <li> Ordered List</li>
    <li> Definition List</li>
</ol>
```

Output

C. Unordered List
D. Ordered List
E. Definition List

Definition List

This is used to display a list of items each having its own definition. It is created using <dl> which describes the whole list, <dt> which is used to show the list items and <dd> which is used to show the definition of each item.

Syntax

```
<dl>
    <dt>.....</dt>
        <dd>.....</dd>
    <dt>.....</dt>
        <dd>.....</dd>
    <dt>.....</dt>
        <dd>.....</dd>
</dl>
```

Example

```
<dl>
    <dt> Unordered List</dt>
        <dd> List is displayed with black circle</dd>
    <dt> Ordered List</dt>
        <dd> List is displayed with numbers</dd>
    <dt> Definition List</dt>
        <dd> List is displayed with description</dd>
</dl>
```

Output

Unordered List
    List is displayed with black circle
Ordered List
    List is displayed with numbers
Definition List
    List is displayed with description

2.2 Tables and DIV

Tables

A table is a structured set of data displayed as rows and columns. Basic elements that are used to create a table in HTML are given below

- <table>: This defines the entire table structure.
- <tr>: This is “Table Row” which is used to define a row within the table.
- <th>: This is “Table Header” which is used to define a header cell in a table. It is visually distinguished by displaying text in bold and centered.
- <td>: This is “Table Data” which is used to define data cells within a table.

Syntax

```
<table>
    <tr>
        <th>.....</th>
        <th>.....</th>
    </tr>
    <tr>
        <td>.....</td>
        <td>.....</td>
    </tr>
</table>
```

Example

```
<table>
  <tr>
    <th>Reg. No</th>
    <th>Name</th>
  </tr>
```

```
    <tr>
      <td>1001</td>
       <td>Anand</td>
    </tr>
    <tr>
       <td>1002</td>
       <td>Balaji</td>
    </tr>
  </table>
```

Output

Reg. No	Name
1001	Anand
1002	Balaji

Additional Table tags

In addition to the basic tags there are some additional tags that are used in HTML tables.

- caption and colgroup
- thead, tbody and tfoot
- rowspan and colspan
- cell padding, cell spacing, borders and table size.

Caption and colgroup

Caption tag is used to provide title to an HTML table. It is given before the first <tr> tag within the <table> tag.

Syntax

```
  <table>
       <caption>.....</caption>
       <tr><td>.....</td></tr>
       <tr><td>.....</td></tr>
</table>
```

Example

```
  <table>
     <caption>Student Details</caption>
     <tr>
        <th>Reg. No</th>
        <th>Name</th>
     </tr>
     <tr>
       <td>1001</td>
        <td>Anand</td>
     </tr>
     <tr>
        <td>1002</td>
        <td>Balaji</td>
     </tr>
  </table>
```

Output

Student Details	
Reg. No	**Name**
1001	Anand
1002	Balaji

Colgroup tag is used to group one or more columns in a table to provide a specific styling or attributes. <colgroup> tag is used with <col> tag to specify the properties of the columns.

Syntax

```
  <table>
       <colgroup>
          <col>
          <col>
```

```
        </colgroup>
        <tr><td>.....</td></tr>
        <tr><td>.....</td></tr>
    </table>
```

Example

```
    <table>
      <colgroup>
        <col style="background-color: yellow;">
        <col style="background-color: orange;">
      </colgroup>
      <tr>
        <th>Reg. No</th>
        <th>Name</th>
      </tr>
      <tr>
        <td>1001</td>
        <td>Anand</td>
      </tr>
      <tr>
        <td>1002</td>
        <td>Balaji</td>
      </tr>
    </table>
```

Output

Reg. No	Name
1001	Anand
1002	Balaji

thead, tbody and tfoot

<thead>, <tbody> and <tfoot> tags are used to structure and organize the content within a table.

- <thead>: This is used to define the header section of the table. It contains <tr> and <th> tags.
- <tbody>: This is used to group and define the body section of the table. It contains <tr> and <td> tags.
- <tfoot>: This is used to group and define the footer section of a table. It contains <tr> and <td> tags.

Syntax

```
<table>
  <thead>
        <tr><th>.....</th></tr>
  </thead>
  <tbody>
        <tr><td>.....</td></tr>
  </tbody>
  <tfoot>
        <tr><td>.....</td></tr>
  </tfoot>
</table>
```

Example

```
        <table>
          <thead>
              <tr>
                  <th>Subject</th>
                  <th>Mark</th>
              </tr>
          </thead>
          <tbody>
```

```
        <tr>
          <td>Web Fundamentals</td>
          <td>90</td>
        </tr>
        <tr>
          <td>OS and DS</td>
          <td>95</td>
        </tr>
        <tr>
          <td>Python</td>
          <td>95</td>
        </tr>
      </tbody>
      <tfoot>
        <tr>
          <td>Total</td>
          <td>280</td>
        </tr>
      </tfoot>
    </table>
```

Output

Subject	Mark
Web Fundamentals	90
OS and DS	95
Python	95
Total	280

rowspan and colspan

Spanning is the process of merging more than one cell in a table. This allows them to create complex table structures.

- **rowspan**: This attribute is used to specify how many rows in a table should be merged vertically.
- **colspan**: This attribute is used to specify how many columns should be merged horizontally.

Syntax

```
<table>
    <tr>
      <td rowspan= “2”>.....</td>
      <td colspan= “2”>.....</td>
      <td>.....</td>
    </tr>
    <tr>
      <td>.....</td>
      <td>.....</td>
      <td>.....</td>
    </tr>
</table>
```

Example

```
<table border="1">
    <tr>
      <th colspan="3">Web Designing</th>
    </tr>
    <tr>
      <th>Reg. No</th>
      <th>Name</th>
      <th>Sem</th>
    </tr>
    <tr>
      <td>1001</td>
      <td>Anand</td>
```

```
        <td rowspan="2">3rd Sem</td>
      </tr>
      <tr>
        <td>1002</td>
        <td>Balaji</td>
      </tr>
  </table>
```

Output

Web Designing		
Reg. No	**Name**	**Sem**
1001	Anand	3rd Sem
1002	Balaji	

cell padding, cell spacing, borders and table size.

These attributes are used to specify spacing in cells and size of a table. These are added in the <table> tag.

- **cellpadding**: This is used to control the amount of space between the content of a cell and the cell's border.
- **cellspacing**: This is used to control the space between adjacent cells in the table.
- **border**: This is used to specify whether the table should have a border. CSS is used to provide more advanced border styling.
- **width, height**: These are used to set the table size. Width specifies the width of the table. Height specifies the height of the table.

Syntax

```
  <table width= “” height= “” cellpadding = “” cellspacing= “” border= “”>
      <tr><td>.....</td></tr>
      <tr><td>.....</td></tr>
  </table>
```

Example

```
  <table border="1" cellspacing="20" cellpadding="5" width="500"
    height="300">
      <tr>
        <th>Reg. No</th>
        <th>Name</th>
      </tr>
      <tr>
        <td>1001</td>
        <td>Anand</td>
      </tr>
      <tr>
        <td>1002</td>
        <td>Balaji</td>
      </tr>
    </table>
```

Output

Reg. No	Name
1001	Anand
1002	Balaji

DIV

HTML stands for “division”, this tag is a container for other tags. It is a block level tag. It is mainly used for applying styles and layout structure in HTML. Styling is applied using CSS.

Syntax

 ….

Important Uses of DIV

- Used to group related elements.
- It is used for layout and structuring a webpage.
- It is used to create responsive designs using CSS.
- It is used to dynamically manipulate content using JavaScript.
- It is used to create interactive components

Example

```
<p>Image Without DIV</p>
 <img src='glogo.png' width=150px height=150px/>
 <img src='glogo.png' width=150px height=150px/>
<p>Image With DIV</p>
<div>
  <img src='glogo.png' width=150px height=150px/>
</div>
<div>
  <img src='glogo.png' width=150px height=150px/>
</div>
```

Output

Image Without DIV

Image With DIV