Full Stack Web Development with Python and DJango

DOM

Study Material

Full Stack Web Development with Python and DJango

Document Object Model (DOM)

DOM acts as interface between JavaScript and HTML, CSS.
i.e By using DOM, javascript can communicate/connect with HTML and CSS.

Diagram

Browser will construct DOM.All HTML tags will be stored as JavaScript objects.

Eg:

demo.html:

```
1)  <!DOCTYPE html>
2)  <html>
3)   <head>
4)    <title>This is My Titile</title>
5)   </head>
6)   <body>
7)    <h1>This is DOM Demo</h1>
8)    <a href="#">HeperlinkText</a>
9)   </body>
10) </html>
```

The corresponding DOM Structure is:

Diagram

To display Document to the console:

just type on javascript console: document
Then we will get total HTML Page/Document.

To Display DOM objects on the console:

console.dir(document)

Observe that Root element of DOM is document.

How to grab HTML Elements from the DOM:

Important DOM Attributes:

1. document.URL===>This is original URL of the website
2. document.body===>It returns everything inside body
3. document.head===>It returns head of the page
4. document.links===>It resturns list of all links of the pagae

Important methods of DOM:

DOM defines the following methods to grab HTML elements

1. document.getElementById()
Returns element with the specified id

2. document.getElementsByClassName()
Returns list of all elements belongs to the specified class

3. document.getElementsByTagName()
Returns list of all elements with the specified tag

4. document.querySelector()
Returns the first object matching CSS style selector

5. document.querySelectorAll()
Returns all objects Matches the CSS Style Selector

Demo Application:

demo.html:

```
1)  <!DOCTYPE html>
2)  <html lang="en" dir="ltr">
3)    <head>
4)      <meta charset="utf-8">
5)      <title></title>
6)    </head>
7)    <body>
8)      <h1>DOM important Methods and Attributes</h1>
9)      <p>Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor inci
        didunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitati
        on ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in repre
        henderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaec
        at cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.</p
        >
```

```
10)   <h2>Favourite Food:</h2>
11)   <ul>
12)    <li class="first">Chicken</li>
13)    <li>Mutton</li>
14)    <li>Fish</li>
15)    <li id="special">Any animal including Human being</li>
16)   </ul>
17)
18)   <h2>Favourite Drink:</h2>
19)   <ul>
20)    <li class="first">KingFisher</li>
21)    <li>KnockOut</li>
22)    <li>Milk</li>
23)    <li>Thumsup</li>
24)   </ul>
25)   <a href="http://youtube.com/durgasoftware">View Profile</a>
26)  </body>
27) <script type="text/javascript" src="demo.js"></script>
28) </html>
```

on the Javascript developer's console:

1. document.URL
2. document.body
3. document.header
4. document.links

5. document.getElementById('special')
6. document.getElementsByClass('first')
7. document.getElementsByTagName('h2')
8. document.querySelector('#special')
9. document.querySelectorAll('.first')

querySelector() vs querySelectorAll():

If the specified CSS mapped with only one html element then we should use querySelector() method. If multiple html elements matched, then querySelector() method returns only first matched element.

We can use querySelectorAll() method to grab all matched html elements. If multiple html elements are there then we can use this method.

Q. Write DOM based Javascript code to change color of h1 tag.

```
var myh1=document.querySelector('h1');
myh1.style.color='red';
```

Demo application to grap html elements into javascript:

```
1)  <!DOCTYPE html>
2)  <html lang="en" dir="ltr">
3)   <head>
4)    <meta charset="utf-8">
5)    <title></title>
6)   </head>
7)   <body>
8)    <h1>This is h1 Tag Data</h1>
9)    <p id='first' class="special">This is First Paragraph Data</p>
10)   <p class="special">This is Second Paragraph Data</p>
11)   <p>This is Third Paragraph Data</p>
12)   <p id='last'>This is Fourth Paragraph Data</p>
13)  </body>
14)  </html>
```

The following are various possible ways to grab first paragraph

1. document.getElementById('first')
2. document.getElementsByClassName('special')
3. document.getElementsByClassName('special')[0]
4. document.getElementsByTagName('p')
5. document.getElementsByTagName('p')[0]
6. document.querySelector('#first')
7. document.querySelectorAll('.special')[0]
8. document.querySelector('h1+p')

Color Changer Application:

To generate Random number from 0 to 15 java code is:

```
1)  class Test
2)  {
3)    public static void main(String[] args)
4)    {
5)      System.out.println((int)(Math.random()*16));
6)      System.out.println((int)(Math.random()*16));
7)      System.out.println((int)(Math.random()*16));
8)      System.out.println((int)(Math.random()*16));
9)      System.out.println((int)(Math.random()*16));
10)     System.out.println((int)(Math.random()*16));
11)     System.out.println((int)(Math.random()*16));
12)     System.out.println((int)(Math.random()*16));
13)   }
14) }
```

demo.html:

```html
1) <!DOCTYPE html>
2) <html lang="en" dir="ltr">
3)   <head>
4)     <meta charset="utf-8">
5)     <title></title>
6)   </head>
7)   <body>
8)     <h1>DOM important Methods and Attributes</h1>
9)     <p>Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor inci
       didunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitati
       on ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in repre
       henderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaec
       at cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.</p
       >
10)    <h2>Favourate Food:</h2>
11)    <ul>
12)      <li class="first">Chicken</li>
13)      <li>Mutton</li>
14)      <li>Fish</li>
15)      <li id="special">Any animal including Human being</li>
16)    </ul>
17)
18)    <h2>Favourate Drink:</h2>
19)    <ul>
20)      <li class="first">KingFisher</li>
21)      <li>KnockOut</li>
22)      <li>Milk</li>
23)      <li>Thumsup</li>
24)    </ul>
25)
26)    <a href="http://youtube.com/durgasoftware">View Profile</a>
27)  </body>
28) <script type="text/javascript" src="demo.js"></script>
29) </html>
```

demo.js:

```javascript
1)  var h1=document.querySelector('h1')
2)  var p=document.querySelector('p')
3)  var h2=document.querySelector('h2')
4)  var ul=document.querySelector('ul')
5)
6)  function getRandomColor(){
7)    var letters='0123456789ABCDEF';
8)    var color='#';
9)    for (var i = 0; i < 6; i++) {
10)     var r=Math.floor(Math.random()*16);
```

```
11)    color=color+letters[r]
12) }
13) return color
14) }
15) function changeColor(){
16)   var rc=getRandomColor()
17)   h1.style.color=rc;
18)   p.style.color=getRandomColor();
19)   h2.style.color=getRandomColor();
20)   ul.style.color=getRandomColor();
21) }
22) setInterval(changeColor,1000)
```

DOM: Content Interaction:

By using DOM, we can change Text,HTML Code and attributes.

How to Change Text:

```
var h1=document.querySelector('h1')
h1.textContent="This is Modified Content"
```

How to change HTML Code:

If we use textContent property then HTML changes won't be effected.Hence we have to use innerHTML property

```
var p= document.querySelector('p')
```

```
p.textContent='<strong><em>'+p.textContent+'</em></strong>'//invalid
p.innerHTML='<strong><em>'+p.textContent+'</em></strong>' //valid
```

How to change Attributes:

We can use the following methods

element.getAttribute('attributeName')
    returns the value associated with specified attribute

element.setAttribute('attributeName','attributeValue')
    To set new value to the attribute

Eg:
```
var a=document.querySelector('a')
// console.log(a.getAttribute('href'))
a.setAttribute('href','https://facebook.com')
```

Demo Application:

demo.html:

```
1)  <!DOCTYPE html>
2)  <html lang="en" dir="ltr">
3)    <head>
4)      <meta charset="utf-8">
5)      <title></title>
6)    </head>
7)    <body>
8)      <h1>This h1 text can be replaced</h1>
9)      <p>This data can be converted into bold</p>
10)     <a href="http://youtube.com/durgasoftware">View Profile</a>
11)   </body>
12)   <script type="text/javascript" src="demo.js"></script>
13) </html>
```

demo.js:

```
1)  var h1=document.querySelector('h1')
2)  h1.textContent="This is Modified Content"
3)
4)  var p= document.querySelector('p')
5)  p.innerHTML='<strong><em>'+p.textContent+'</em></strong>'
6)
7)  var a=document.querySelector('a')
8)  // console.log(a.getAttribute('href'))
9)  a.setAttribute('href','https://facebook.com')
```

Changing All Links Properties of google.com:

```
1)  var links=document.querySelectorAll('a');
2)  for(link of links){
3)  link.style.background='green';
4)  link.style.color='white';
5)  link.setAttribute('href','http://durgasoftonline.com');
6)  link.textContent='Sunny Leone';
7)  }
```

To replace google logo without customized logo:

```
1)  var logo=document.querySelector('#hplogo');
2)  logo.setAttribute('src','http://www.durgasoftonline.com/wp-
    content/uploads/logo_durgasoft_online-1.png')
```

Event Handling by using DOM:

In our web application there may be a chance of occuring several events like mouse hover,single click and double click etc

Whenever a particular event occurs if we want to perform certain operation automatically then we should go for Listeners.

Listener listens events and will perform certain operation automatically.

How to implement event handling:

element.addEventListener(event,function);

Eg: myh1.addEventListener('click',colorChanger)

To change color of h1 on single click operation:
```
var myh1=document.querySelector('h1')
myh1.addEventListener('click',changeColor)
```

To change color of h1 on double click operation:
```
var myh1=document.querySelector('h1')
myh1.addEventListener('dblclick',changeColor)
```

To change color of h1 on mouse over operation:
```
var myh1=document.querySelector('h1')
myh1.addEventListener('mouseover',changeColor)
```

To change color of h1 on mouse out operation:
```
var myh1=document.querySelector('h1')
myh1.addEventListener('mouseout',changeColor)
```

To change content and color as blue on mouse over operation:

```
1)  var myh1=document.querySelector('h1')
2)  myh1.addEventListener('mouseover',function(){
3)      myh1.textContent='HYDERABAD';
4)      myh1.style.color='blue';
5)    });
6)
7)  myh1.addEventListener('mouseout',function(){
8)      myh1.textContent='BANGALORE';
9)      myh1.style.color='red';
10)   });
```

Body Color Changer Application:

demo.html:

```html
1)  <!DOCTYPE html>
2)  <html lang="en" dir="ltr">
3)    <head>
4)     <meta charset="utf-8">
5)     <title></title>
6)    </head>
7)    <body>
8)    <h1>Body Color Changer Application</h1>
9)    <button type="button" name="button">Click Here to change Body Color</button>
10)
11)  </body>
12)  <script type="text/javascript" src="demo.js"></script>
13) </html>
```

demo.dss:

```javascript
1)  function getRandomColor(){
2)    var letters='0123456789ABCDEF';
3)    var color='#';
4)    for (var i = 0; i < 6; i++) {
5)      var r=Math.floor(Math.random()*16);
6)      color=color+letters[r]
7)    }
8)    return color
9)  }
10) var b=document.querySelector('button');
11) b.addEventListener('click',function(){
12)   document.body.style.background=getRandomColor();
13) });
```

Demo Application:

demo.html:

```html
1)  <!DOCTYPE html>
2)  <html lang="en" dir="ltr">
3)    <head>
4)     <meta charset="utf-8">
5)     <title></title>
6)    </head>
7)    <body>
8)    <h1>Event Hanling by using DOM</h1>
9)    </body>
10) <script type="text/javascript" src="demo.js"></script>
```

```
11) </html>
```

demo.js:

```javascript
1)  function getRandomColor(){
2)    var letters='0123456789ABCDEF';
3)    var color='#';
4)    for (var i = 0; i < 6; i++) {
5)      var r=Math.floor(Math.random()*16);
6)      color=color+letters[r]
7)    }
8)    return color
9)  }
10) function changeColor(){
11)   var rc=getRandomColor()
12)   h1.style.color=rc;
13)   p.style.color=getRandomColor();
14)   h2.style.color=getRandomColor();
15)   ul.style.color=getRandomColor();
16) }
17) var h1=document.querySelector('h1')
18) h1.addEventListener('mouseover',changeColor)
19) h1.addEventListener('mouseout',changeColor)
```

Demo Application for Random Names and Random Colors:

demo.html

```html
1)  <!DOCTYPE html>
2)  <html lang="en" dir="ltr">
3)    <head>
4)      <meta charset="utf-8">
5)      <title></title>
6)    </head>
7)    <body>
8)      <h1>Event Hanling by using DOM</h1>
9)    </body>
10) <script type="text/javascript" src="demo.js"></script>
11) </html>
```

demo.js:

```javascript
1)  var myh1=document.querySelector('h1')
2)  function getRandomColor(){
3)    var letters='0123456789ABCDEF';
4)    var color='#';
5)    for (var i = 0; i < 6; i++) {
6)      var r=Math.floor(Math.random()*16);
```

```
7)    color=color+letters[r]
8)  }
9)  return color
10) }
11)
12) function getRandomName(){
13)  var names=['SUNNY LEONE','MALLIKA','VENNA','KATRINA','PRIYANKA','DEEPIKA','KAREE
     NA'];
14)  var r=Math.floor(Math.random()*7);
15)  return names[r];
16) }
17)
18) myh1.addEventListener('mouseover',function(){
19)    myh1.textContent=getRandomName();
20)    myh1.style.color=getRandomColor();
21)    });
22)    myh1.addEventListener('mouseout',function(){
23)     myh1.textContent=getRandomName();
24)       myh1.style.color=getRandomColor();
25)      });
```

Q. Names should be displayed with the specified color only like Katrina always with red color etc

TIC TAC TOE Implementation:

1. Create html,css,js files
2. Add css,bootstrap links to html inside head part
3. Add javascript file to html at bottom of Body tag
4. Add Jumbotron to the html

```
1)    <div class="container">
2)      <div class="jumbotron">
3)       <h1>Welcome to DURGASOFT TIC TAC TOE Game!!!</h1>
4)       <p>Be Ready To play to improve logical thinking...</p>
5)       <button id="b" type="button" class="btn btn-primary btn-
     lg" name="button">Restart Game!!!</button>
6)      </div>
7)    </div>
```

5. Define Jumbotron related styles in css file

```
1)    .container .jumbotron{
2)  background: green;
1)  color:white;
```

6. Add table after jumbotron inside container

```
1)  <table>
2)      <tr>
3)        <td></td>
4)        <td></td>
5)        <td></td>
6)      </tr>
7)      <tr>
8)        <td></td>
9)        <td></td>
10)       <td></td>
11)     </tr>
12)     <tr>
13)       <td></td>
14)       <td></td>
15)       <td></td>
16)     </tr>
17) </table>
```

7. Define Table related styles in css file

```
1)  td{
2)    height: 150px;
3)    width: 150px;
4)    border: 5px solid blue;
5)    text-align: center;
6)    font-size: 100px;
7)  }
```

8. Implementing Restart button functionality inside js file

```
1)  var restartb=document.querySelector('#b')
2)  var cells=document.querySelectorAll('td')
3)  function clearAllCells(){
4)    for (var i = 0; i < cells.length; i++) {
5)      cells[i].textContent="
6)    }
7)  }
8)  restartb.addEventListener('click',clearAllCells)
```

9. Add content change functionality of the cells inside javascript file

```
1)  function changeContent(){
2)    if (this.textContent==='') {
3)      this.textContent='X'
4)    }
5)    else if (this.textContent=='X') {
6)      this.textContent='O'
```

```
7)   }
8)     else {
9)       this.textContent="
10)  }
11) }
12) for (var i = 0; i < cells.length; i++) {
13)   cells[i].addEventListener('click',changeContent)
14) }
```

ttt.html:

```
1)  <!DOCTYPE html>
2)  <html lang="en" dir="ltr">
3)    <head>
4)      <link rel="stylesheet" href="ttt.css">
5)      <!-- Latest compiled and minified CSS -->
6)  <link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/boots
    trap.min.css" integrity="sha384-
    BVYiiSIFeK1dGmJRAkycuHAHRg32OmUcww7on3RYdg4Va+PmSTsz/K68vbdEjh4u" crossori
    gin="anonymous">
7)      <meta charset="utf-8">
8)      <title>Tic Tac Toe Game</title>
9)    </head>
10)   <body>
11)    <div class="container">
12)      <div class="jumbotron">
13)        <h1>Welcome to DURGASOFT TIC TAC TOE Game!!!</h1>
14)        <p>Be Ready To play to improve logical thinking...</p>
15)        <button id="b" type="button" class="btn btn-primary btn-
    lg" name="button">Restart Game!!!</button>
16)      </div>
17)      <table>
18)       <tr>
19)        <td></td>
20)        <td></td>
21)        <td></td>
22)       </tr>
23)       <tr>
24)        <td></td>
25)        <td></td>
26)        <td></td>
27)       </tr>
28)       <tr>
29)        <td></td>
30)        <td></td>
31)        <td></td>
32)       </tr>
33)      </table>
34)
```

```
35)    </div>
36)    <script src="ttt.js"></script>
37)    </body>
38) </html>
```

ttt.css:

```
1)   .container .jumbotron{
2)     background: green;
3)     color:white;
4)   }
5)   td{
6)     height: 150px;
7)     width: 150px;
8)     border: 5px solid blue;
9)     text-align: center;
10)   font-size: 100px;
11) }
```

ttt.js:

```
1)   var restartb=document.querySelector('#b')
2)   var cells=document.querySelectorAll('td')
3)   function clearAllCells(){
4)     for (var i = 0; i < cells.length; i++) {
5)       cells[i].textContent="
6)     }
7)   }
8)   restartb.addEventListener('click',clearAllCells)
9)
10) function changeContent(){
11)   if (this.textContent==="") {
12)     this.textContent='X'
13)   }
14)   else if (this.textContent=='X') {
15)     this.textContent='O'
16)   }
17)   else {
18)     this.textContent="
19)   }
20) }
21) for (var i = 0; i < cells.length; i++) {
22)   cells[i].addEventListener('click',changeContent)
23) }
```