9.1 Document Object Model(DOM): document object

With the HTML DOM, JavaScript can access and change all the elements of an HTML document.

With the object model, JavaScript gets all the power it needs to create dynamic HTML:

- JavaScript can change all the HTML elements in the page
- JavaScript can change all the HTML attributes in the page
- JavaScript can change all the CSS styles in the page
- JavaScript can remove existing HTML elements and attributes
- JavaScript can add new HTML elements and attributes
- JavaScript can react to all existing HTML events in the page
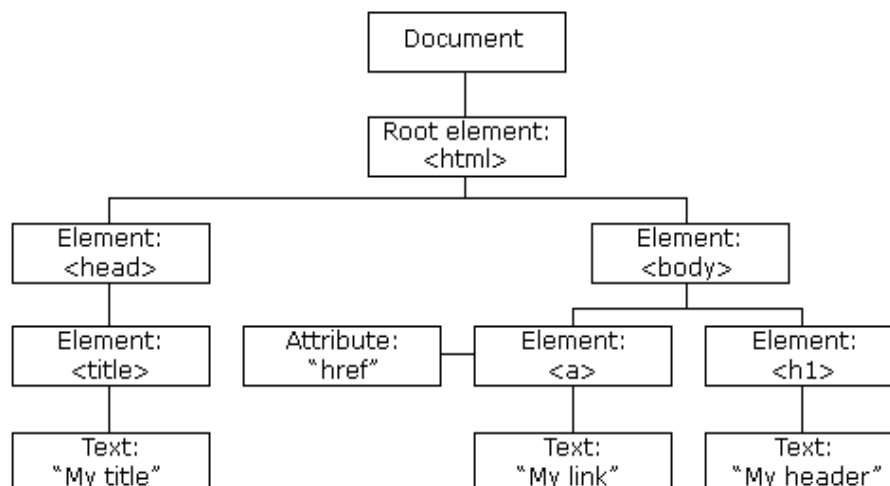- JavaScript can create new HTML events in the page

What is the HTML DOM?

The HTML DOM is a standard object model and programming interface for HTML. It defines:

- The HTML elements as objects
- The properties of all HTML elements
- The methods to access all HTML elements
- The events for all HTML elements

In other words: The HTML DOM is a standard for how to get, change, add, or delete HTML elements.

The HTML DOM Tree of Objects

DOM Methods: write(), getElementById(), getElementsByClassName(), getElementsByTagName()

Example

```html
<html>

<body>

        <p id="demo"></p>

        <script type="text/javascript" language="javascript">

        document.getElementById("demo").innerHTML = "Hello World!";

        </script>

</body>

</html>
```

Output

Hello World!

Note: <script> should be after <p> tag, since id is defined in <p> tag.

The getElementById Method

The most common way to access an HTML element is to use the id of the element.In the example above the getElementById method used id="demo" to find the element.

The innerHTML Property

The easiest way to get the content of an element is by using the innerHTML property. The innerHTML property is useful for getting or replacing the content of HTML elements. The innerHTML property can be used to get or change any HTML element, including <html> and <body>.

Method	Description
document.getElementById(*id*)	Find an element by element id
document.getElementsByTagName(*name*)	Find elements by tag name
document.getElementsByClassName(*name*)	Find elements by class name

Traversing and Modifying DOM Tree: innerHTML, attribute, setting style

Changing HTML Elements

Property	Description
element.innerHTML = *new html content*	Change the inner HTML of an element
element.attribute = new value	Change the attribute value of an HTML element
element.style.*property = new style*	Change the style of an HTML element

Method	Description
element.setAttribute*(attribute, value)*	Change the attribute value of an HTML element

Example

```html
<html>
    <head>
        <script type="text/javascript">
            function cls()
            {
                cl = document.getElementsByTagName("p");
                for(i=0; i<cl.length;i++)
                {
                    cl[i].innerHTML = "Changed text";
                    cl[i].style.color = "red";
                    cl[i].style.backgroundColor = "cyan";
                }
            }
        </script>
    </head>
    <body>
        <p>P1 tag</p>
        <p>P2 tag</p>
        <p>P3 tag</p>
        <input type="button" onclick="cls();" value="CLICK"/>
    </body>
</html>
```

Output

P1 tag | Changed text

P2 tag | Changed text

P3 tag | Changed text

CLICK   CLICK

Example

```html
<html>
    <head>
        <script type="text/javascript">
            function cls()
            {
                cl = document.getElementsByClassName("same");
                for(i=0; i<cl.length;i++)
                {
                    cl[i].innerHTML = "Changed text";
                    cl[i].style.color = "red";
                    cl[i].style.backgroundColor = "cyan";
                }
            }
        </script>
    </head>
    <body>
        <h1 class="same">H1 tag<h1>
        <p class="same">P tag</p>
        <pre class="same">Pre tag</pre>
        <input type="button" onclick="cls();" value="CLICK"/>
    </body>
</html>
```

Output

Example

```html
<html>
    <head>
        <script type="text/javascript">
            function upr()
            {
                cl = document.getElementsByTagName("p");
                for(i=0; i<cl.length;i++)
                {
                    cl[i].style.textTransform = "upperCase";
                }
            }
            function lwr()
            {
                cl = document.getElementsByTagName("p");
                for(i=0; i<cl.length;i++)
                {
                    cl[i].style.textTransform = "lowerCase";
                }
            }
        </script>
    </head>
    <body>
        <p>Hello Stranger</p>
        <input type="button" onclick="upr();" value="UPPER"/>
        <input type="button" onclick="lwr();" value="LOWER"/>
    </body>
</html>
```

Output

Hello Stranger

UPPER LOWER

HELLO STRANGER

UPPER LOWER

hello stranger

UPPER LOWER

9.2 Event Handling with Javascript, Form Processing: How to fetch form elements?, Various Mouse and Key Events: onclick, onblur, onchange, onfocus, onmouseover, onmouseout, onkeyup, onkeydown, onkeypress, onsubmit event of form Event Object and This

A JavaScript can be executed when an event occurs, like when a user clicks on an HTML element.

Examples of HTML events:

- When a user clicks the mouse
- When a web page has loaded
- When an image has been loaded
- When the mouse moves over an element
- When an input field is changed
- When an HTML form is submitted
- When a user strokes a key

Example(onclick)

```html
<html>
	<head>
		<script type="text/javascript">
			function change(id)
			{
				id.innerHTML = "Done";
			}
		</script>
	</head>
	<body>
		<h1 onclick="change(this)">CLICK ON ME</h1>
	</body>
</html>
```

Output

CLICK ON ME

After Clicking

Done

Example(onchange, onfocus)

```html
<html>
        <head>
        </head>
        <body>
                <script type="text/javascript">
                        function upper(id)
                        {
                                id.value=id.value.toUpperCase();
                        }
                </script>
                <input type="text" value="hello" onchange="upper(this)"/>
                <input type="text" value="hello"
onfocus="this.style.backgroundColor='yellow'"/>
        </body>
</html>
```

Output

hello	hello

After click and focus

HELLO	hello

Example(onmouseout, onmouseover)

```html
<html>
    <head>
    </head>
    <body>
        <script type="text/javascript">
            function fun(id)
            {
                id.innerHTML = "mouse moved";
            }
            function fun2(id)
            {
                id.innerHTML = "mouse out";
            }
        </script>
        <div onmouseover="fun(this)" onmouseout="fun2(this)" style="width:50%;
height:40%; background-color:cyan; border:2px solid green;"/>
    </body>
</html>
```
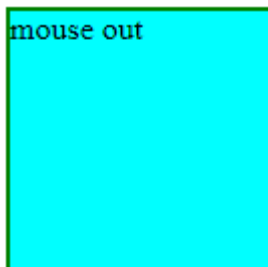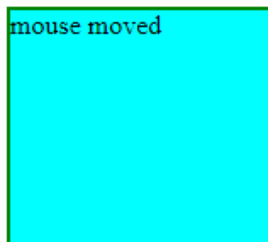
Output

Example: Write a Js to check which mouse button is clicked(right, left or middle)

```html
<html>
      <head>
      <script type="text/javascript">
                  function fun(e)
                  {
                  val = e.button;
                  switch(val)
                  {
                          case 0: alert("left click");
                                          break;
                          case 1: alert("middle click");
                                          break;
                          case 2: alert("right click");
                                          break;
                  }
                  }
            </script>
      </head>
            <body>
                          <div style="width:50%;height:50%; border:2px solid pink;" onmousedown="fun(event)"></div>
            </body>
</html>
```

Example(onkeyup, onkeypress, onkeydown)

```html
<html>
	<head>
	<script type="text/javascript">
			function fun(id)
			{
					id.bgColor="blue";
			}
			function fun2(e)
			{
					alert(e.keyCode);
			}
			function fun3(id)
			{
					id.bgColor="red";
			}
		</script>
	</head>
	<body onkeyup="fun(this)" onkeypress="fun2(event)" onkeydown="fun3(this)">
	</body>
</html>
```

Example: Write JS to handle following key events

1) **Give keycode for the key pressed**
2) **Script should give message "vowel is pressed" on pressing vowel key**
3) **Background color should change to red after releasing the pressed key**

```html
<html>
    <head>
    <script type="text/javascript">
                function fun2(e)
                {
                c= (e.key);
                 if(c=='a' || c=='e' || c=='i' || c=='o' || c=='u' || c=='A' || c=='E' || c=='T' ||
c=='O' || c=='U')
                 {
                 document.write("vowel is entered "+e.keyCode+" "+ e.key));
                 }
                 else
                 {
                 document.write(e.keyCode+" "+ e.key);
                 }
                }
                function fun3(id)
                {
                        id.bgColor="red";
                }
        </script>
    </head>
            <body onkeypress="fun2(event)" onkeyup="fun3(this)">
            </body>
</html>
```

Example: Write JS to handle following mouse events

1) **If mouse is over heading should turn yellow, If mouse goes out then it should turn black.**
2) **If find time button is clicked then show date and time information.**
3) **If button named "red" is clicked then background color should turn red, and button named "green" is clicked then background color should turn green**

```
<html>

    <head>

    <script type="text/javascript">


            function fun(id)

            {

                    id.style.color = "yellow";

            }

            function fun2(id)

            {

                    id.style.color = "black";

            }

            function fun3(id)

            {

                    d = new Date();

                    document.getElementById("demo").innerHTML = d;

            }

            function fun4()

            {

                    id=document.getElementById("bd");

                    id.bgColor = "red";

            }

            function fun5()

            {

                    id=document.getElementById("bd");

                    id.bgColor = "green";

            }
```

```html
        </script>
    </head>
    <body id="bd">
        <h1 onmouseover="fun(this)" onmouseout="fun2(this)">Hello</h1>
        <input type="submit" value="Find Time" onclick="fun3(this)"/>
        <p id="demo"></p>
        <input type="submit" value="red" onclick="fun4()"/>
        <input type="submit" value="green" onclick="fun5()"/>

    </body>
</html>
```

Ways to access form elements

obj = document.forms["form_name"]["element_name"].value;

or

obj = document. form_name. element_name.value;

Example(onsubmit)

```
<html>
	<head>
	<script type="text/javascript">
		function fun()
		{
			obj2 = document.f1.t1.value;
			document.write(obj2);
		}
	</script>
	</head>
	<body>
			<form name="f1" onsubmit="fun()">
				<input type="text" name="t1"/>
				<input type="password"/>
				<input type="submit"/>
				<input type="reset"/>
			</form>
	</body>
</html>
```

```html
<html>
    <head>
    <script type="text/javascript">
        function fun()
        {
            obj3 = document.forms["f1"]["t1"].value;
            document.write(obj3);
        }
    </script>
    </head>
    <body>
            <form name="f1" onsubmit="fun()">
                <input type="text" name="t1"/>
                <input type="password"/>
                <input type="submit"/>
                <input type="reset"/>
            </form>
    </body>
</html>
```

```html
<html>
    <head>
    <script type="text/javascript">
        function fun()
        {
            obj = document.forms["f1"];
            alert(obj.length);
        }
    </script>
    </head>
    <body>
        <form name="f1" onsubmit="fun()">
            <input type="text" name="t1"/>
            <input type="password"/>
            <input type="submit"/>
            <input type="reset"/>
        </form>
    </body>
</html>
```

```html
<html>
	<head>
	</head>
	<body>
		<script type="text/javascript">
			function fun(id)
			{
				val=id.t1.value;
				if(val=="")
				{
					alert("Enter something");
					return false;
				}
			alert(val);
			}
		</script>
		<form action="#" onsubmit="return fun(this)">
			<input type="text" maxlength="10" placeholder="enter Name" id="t1"/>
			<input type="submit" value="submit"/>
		</form>
	</body>
</html>
```

```html
<html>
    <head>
    </head>
    <body>
        <script type="text/javascript">
            function fun()
            {
                val=document.getElementById("t1").value;
                if(val=="")
                {
                    alert("Enter something");
                    return false;
                }
                alert(val);
            }

        </script>
        <form action="#">
            <input type="text" maxlength="10" placeholder="enter Name" id="t1"/>
            <input type="submit" value="submit" onclick="fun()"/>
        </form>
    </body>
</html>
```

9.3 Javascript Validation, Regular Expression: Notations to Create R.E., test() method to compare R.E. & string, R.E. for specifying Special Character, Length of Field, Numeric Value, Email ID

Regular Expression

A regular expression is a pattern of characters.

test() : This method is called using pattern object and returns true if string is a part of pattern.

Example

```
<html>
        <head>
        <script type="text/javascript">
                function fun()
                {
                        pat = /abc/;
                        u = document.getElementById("t1").value;

                        if(pat.test(u))
                        {
                                alert("PERFECT");
                        }
                }
        </script>
        </head>
        <body>
                <input type="text" id="t1"/>
                <input type="submit" onclick="fun()"/>
        </body>
</html>
```

abc   Submit

This page says

PERFECT

OK

Notations to Create R.E.

1. Modifiers

Modifiers are used to perform case-insensitive and global searches

Modifier	Description
i	Perform case-insensitive matching

Example

```html
<html>
    <head>
    <script type="text/javascript">
        function fun()
        {
            pat = /abc/i;
            u = document.getElementById("t1").value;
            if(pat.test(u))
            {
                alert("PERFECT");
            }
        }
    </script>
    </head>
    <body>
        <input type="text" id="t1"/>
        <input type="submit" onclick="fun()"/>
    </body>
</html>
```

ABC   Submit

This page says
PERFECT

OK

2. Brackets

Brackets are used to find a range of characters

Expression	Description
[abc]	Find any character between the brackets
[^abc]	Find any character NOT between the brackets
[0-9]	Find any character between the brackets (any digit)
[^0-9]	Find any character NOT between the brackets (any non-digit)
(x|y)	Find any of the alternatives specified

Example

```
<html>
        <head>
        <script type="text/javascript">
                function fun()
                {
                        pat = /[abc]/;
                        u = document.getElementById("t1").value;
                        if(pat.test(u))
                        {
                                alert("PERFECT");
                        }
                }
        </script>
        </head>
        <body>
                <input type="text" id="t1"/>
                <input type="submit" onclick="fun()"/>
        </body>
</html>
```

| a | Submit |

This page says

PERFECT

OK

Example

```
<html>
    <head>
    <script type="text/javascript">
        function fun()
        {
            pat = /[^abc]/;
            u = document.getElementById("t1").value;
            if(pat.test(u))
            {
                alert("PERFECT");
            }
        }
    </script>
    </head>
    <body>
        <input type="text" id="t1"/>
        <input type="submit" onclick="fun()"/>
    </body>
</html>
```

Example

```
<html>
    <head>
    <script type="text/javascript">
            function fun()
            {
                    pat = /[0-9]/;
                    u = document.getElementById("t1").value;
                    if(pat.test(u))
                    {
                            alert("PERFECT");
                    }
            }
    </script>
    </head>
    <body>
            <input type="text" id="t1"/>
            <input type="submit" onclick="fun()"/>
    </body>
</html>
```

| 1234 | Submit |

This page says
PERFECT

OK

Example

```
<html>
    <head>
    <script type="text/javascript">
        function fun()
        {
            pat = /[^0-9]/;
            u = document.getElementById("t1").value;
            if(pat.test(u))
            {
                alert("PERFECT");
            }
        }
    </script>
    </head>
    <body>
        <input type="text" id="t1"/>
        <input type="submit" onclick="fun()"/>
    </body>
</html>
```

123zb   Submit

This page says

PERFECT

OK

Example

```html
<html>
    <head>
    <script type="text/javascript">
            function fun()
            {
                    pat = /(x|y)/;
                    u = document.getElementById("t1").value;
                    if(pat.test(u))
                    {
                            alert("PERFECT");
                    }
            }
    </script>
    </head>
    <body>
        <input type="text" id="t1"/>
        <input type="submit" onclick="fun()"/>
    </body>
</html>
```

Metacharacters

Metacharacter	Description
^A	String must start with 'A'
*	Zero or more occurence
$	Matches with end of input
\d	Find a digit
\D	Find a non-digit character
\w	Find a word character
\W	Find a non-word character

Example

```
<html>
    <head>
    <script type="text/javascript">
        function fun()
        {
            pat = /^A/;
            u = document.getElementById("t1").value;
            if(pat.test(u))
            {
                alert("PERFECT");
            }
        }
    </script>
    </head>
    <body>
        <input type="text" id="t1"/>
        <input type="submit" onclick="fun()"/>
    </body>
</html>
```

Example

```html
<html>
    <head>
    <script type="text/javascript">
        function fun()
        {
            pat = /bo*/;
            u = document.getElementById("t1").value;
            if(pat.test(u))
            {
                alert("PERFECT");
            }
        }
    </script>
    </head>
    <body>
        <input type="text" id="t1"/>
        <input type="submit" onclick="fun()"/>
    </body>
</html>
```

born | Submit

This page says
PERFECT

OK

Example

```html
<html>
    <head>
    <script type="text/javascript">
            function fun()
            {
                    pat = /t$/;
                    u = document.getElementById("t1").value;
                    if(pat.test(u))
                    {
                            alert("PERFECT");
                    }
            }
    </script>
    </head>
    <body>
            <input type="text" id="t1"/>
            <input type="submit" onclick="fun()"/>
    </body>
</html>
```

Example

```
<html>
      <head>
      <script type="text/javascript">
            function fun()
            {
                  pat = /\d/;
                  u = document.getElementById("t1").value;
                  if(pat.test(u))
                  {
                        alert("PERFECT");
                  }
            }
      </script>
      </head>
      <body>
            <input type="text" id="t1"/>
            <input type="submit" onclick="fun()"/>
      </body>
</html>
```

12abc   Submit

This page says
PERFECT

OK

Example

```html
<html>
    <head>
    <script type="text/javascript">
            function fun()
            {
                    pat = /\D/;
                    u = document.getElementById("t1").value;
                    if(pat.test(u))
                    {
                            alert("PERFECT");
                    }
            }
    </script>
    </head>
    <body>
            <input type="text" id="t1"/>
            <input type="submit" onclick="fun()"/>
    </body>
</html>
```

xyz   [Submit]

This page says
PERFECT
                                    OK

Example

```
<html>
      <head>
      <script type="text/javascript">
            function fun()
            {
                  pat = /\w/;
                  u = document.getElementById("t1").value;
                  if(pat.test(u))
                  {
                        alert("PERFECT");
                  }
            }
      </script>
      </head>
      <body>
            <input type="text" id="t1"/>
            <input type="submit" onclick="fun()"/>
      </body>
</html>
```

A_a10   Submit

This page says
PERFECT

OK

Example

```html
<html>
	<head>
	<script type="text/javascript">
		function fun()
		{
			pat = /\W/;
			u = document.getElementById("t1").value;
			if(pat.test(u))
			{
				alert("PERFECT");
			}
		}
	</script>
	</head>
	<body>
		<input type="text" id="t1"/>
		<input type="submit" onclick="fun()"/>
	</body>
</html>
```

Example: Design a login form using JS. Following validation in password field, Minimum length of password must be of 8 letters and it must have some special characters.

```html
<html>
    <head>
    <script type="text/javascript">
        function fun()
        {
            pat=/\W/;
            u = document.getElementById("p1").value;
            document.write(u.length);
            if(u.length<8)
            {
                alert("Password must be strong...length>=8");
            }
            else if(pat.test(u)==0)
            {
                alert("Password must be strong...add one sp.char");
            }
            else
            {
                alert("Password is strong");
            }
        }
    </script>
    </head>
    <body>
        <input type="password" id="p1"/>
        <input type="submit" onclick="fun()"/>
    </body>
</html>
```

[········] [Submit]

This page says
Password is strong

[OK]

Example: Write a JS to validate username and password.

Password: Length must be of 6 to 12 characters.

Username: Should not start with _, @ and any number.

Both must not be blank

```
<html>
        <head>
        <script type="text/javascript">
                function fun()
                {
                        pat=/^_|^@|^\d/;
                        u = document.getElementById("t1").value;


                        v = document.getElementById("p1").value;



                        //v==" " || u==" "
                        if(v.length==0 || u.length==0)
                        {
                                alert("Both must not be blank");
                        }

                        else if(v.length<6 || v.length>12)
                        {
                                alert("Password length must be between 8 to 12");
                        }
                        else
                        {
                                alert("Password is strong");
                        }

                        if(pat.test(u))
                        {
```

```
                    alert("Enter valid username");

                }


            }
    </script>
    </head>
    <body>
            NAME <input type="text" id="t1"/>
            PASS <input type="password" id="p1"/>
            <input type="submit" onclick="fun()"/>
    </body>
</html>
```

NAME [_____] PASS [_____] [Submit]

This page says
Both must not be blank

[OK]

Example: Write HTML form accepting an integer having four digits. Input should not accept characters of letters and special symbols.

```html
<html>
    <head>
    <script type="text/javascript">
            function fun()
            {
                    pat=/^\d+$/;
                    u = document.getElementById("t1").value;
                    if(u.length!=4)
                    {
                            alert("username must be of 4 chars");
                    }
                    if(!(pat.test(u)))
                    {
                            alert("username must not contain chars");

                    }
            }
    </script>
    </head>
    <body>
            NAME <input type="text" id="t1"/>

            <input type="submit" onclick="fun()"/>
    </body>
</html>
```

NAME 12345   Submit

This page says

username must be of 4 chars

OK

Example: Show validation using JS on fields like name, phone number and email id

RE for Username: /^[A-z]+$/;

RE for Phone number: /^\d{10}$/;

RE for email: /^\w+([\.-]?\w+)*@\w+([\.-]?\w+)*(\.\w{2,3})+$/;