5.1 Regular Expression

Q. What is regular expression? Explain with example.

A regular expression is a sequence of characters that forms a specific search pattern. This search pattern can be used for operations like text search, text replace and string validations. When you search for specific character or a string in a text, you can use this search pattern to describe what you are searching for. A regular expression can be a single character, a string or a more complex pattern. There are various functions of regular expression present to perform operations such as for searching search() function is used, for replacing a string replace() function is used, for checking the availability of a string test() function is used.

Syntax :

```
/pattern/modifiers;
```

Where,

- ***pattern*** – is a string that states the pattern of the regular expression or it can be an another regular expression.
- ***modifiers*** – it is an optional filed which may contain any of the "g", "i", and "m" attributes that provide global, case-insensitive, and multi-line matches, respectively.

```
Ex. var p = /student/i;
```

- **/student/i** is a regular expression.
- **student** is a pattern to be used for searching within text.
- ***I*** is a modifier that modifies the search to be case-insensitive i.e. it ignore the case of the letters to search the string based on pattern.

Program 1:

```
<!DOCTYPE html>
<html>
<head>
<title> Validation Example </title>
<script language="javascript" type="text/javascript">

var p = /student/i;
function testMatch()
{
var str=t1.value;
if(p.test(str))
alert("The string contains given pattern");
else
alert("The string does not contain given pattern");
}
</script>
</head>
<body>
Enter String: <input type="text" id="t1"/><br><br>

<input type="button" value="Check" onclick="testMatch()"/>
</body>
</html>
```

5.1.1 Language of Regular Expression

Q. Explain the language of regular expression.

A set of words that can be derived by using the regular expression is known as language of that regular expression. Each and every word of that language can be defined by the set of alphabets of that present in the pattern of the regular expression.

There are many special characters are available which is used to define a regular expression as given below.

5.1.1.1 Brackets

Q Explain the significance of '[]' square brackets of regular expression.

Brackets ([]) have a special meaning when used in the context of regular expressions. They are used to find a range of characters.

Sr. No.	Expression	Description
1	[...]	It specifies to find any one character between the brackets.
2	[^...]	It specifies to find any one character not between the brackets.
3	[0-9]	It specifies to find any decimal digit from 0 through 9.
4	[a-z]	It specifies to find any character from lowercase a through lowercase z.
5	[A-Z]	It specifies to find any character from uppercase A through uppercase Z.
6	[a-Z]	It specifies to find any character from lowercase a through uppercase Z.

The ranges shown above are general. We can also use the range like [3-7] to match any decimal digit ranging from 3 through 7, or the range [e-p] to match any lowercase character ranging from e through p.

5.1.1.2 Qualifiers

Q. Explain the use of qualifiers in regular expression.

Qualifiers are used to find the sequence characters contain in text. The frequency of character sequences can be denoted by a special character. Each special character has a specific meaning. The special characters such as +, *, ?, and $ are used.

Sr. No.	Expression	Description
1	p+	It specifies to find any string containing one or more p's.
2	p*	It specifies to find any string containing zero or more p's.
3	p?	It specifies to find any string containing at most one p.

Sr. No.	Expression	Description
4	p{N}	It specifies to find any string containing a sequence of N p's
5	p{2,3}	It specifies to find any string containing a sequence of two or three p's.
6	p{2, }	It specifies to find any string containing a sequence of at least two p's.
7	p$	It specifies to find any string with p at the end of it.
8	^p	It specifies to find any string with p at the beginning of it.

5.1.1.3 Metacharacters

Q. Explain the use of Metacharacters in regular expression.

A metacharacter is an alphabetic character followed by a backslash. Each combination of alphabetic character with backslash has unique meaning as shown in table.

Sr. No.	Character	Description
1	±	Find a single character, except newline or line terminator
2	\s	Find a whitespace character (space, tab, newline)
3	\S	non-whitespace character
4	\d	a digit (0-9)
5	\D	a non-digit
6	\w	a word character (a-z, A-Z, 0-9, _)
7	\W	a non-word character
8	\b	Find a match at the beginning/end of a word, beginning like this: \bHI, end like this: HI\b
9	\B	Find a match, but not at the beginning/end of a word
10	\0	Find a NUL character
11	\n	Find a new line character
12	\t	Find a tab character

5.1.1.4 RegExp Functions

Q. Explain the use of RegExp functions in regular expression.

The RegExp consist of following functions to perform operation related to regular expression :

Sr. No.	Method	Description
1	compile()	Deprecated in version 1.5. Compiles a regular expression
2	exec()	Tests for a match in a string. Returns the first match
3	test()	Tests for a match in a string. Returns true or false
4	toString()	Returns the string value of the regular expression

Program 2: Finding non-matching characters

```
<!DOCTYPE html>
<html>
<head>
<title> Validation Example </title>
<script language="javascript" type="text/javascript">

var p = /[^abc]/;
function testMatch()
{
var str=t1.value;
if(p.test(str))
alert("The string contains characters other than a,b,c");
else
alert("The string contains a,b,c characters ");
}
</script>
</head>
<body>
Enter String: <input type="text" id="t1"/><br><br>

<input type="button" value="Check" onclick="testMatch()"/>
</body>
</html>
```

Program 3: Range of characters

```
<!DOCTYPE html>

<html>

<head>

<title> Validation Example </title>

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


var p = /[a-z]/;

function testMatch()

{

var str=t1.value;

if(p.test(str))

alert("The string contains characters in range a-z");

else

alert("The string does not contain characters in range a-z");

}

</script>

</head>

<body>

Enter String: <input type="text" id="t1"/><br><br>


<input type="button" value="Check" onclick="testMatch()"/>

</body>

</html>
```

Program 4: Matching digits

```
<!DOCTYPE html>

<html>

<head>

<title> Validation Example </title>

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


var p = /\d/;

function testMatch()

{

var str=t1.value;

if(p.test(str))

alert("The string contains digits");

else

alert("The string does not contain digits");

}

</script>

</head>

<body>

Enter String: <input type="text" id="t1"/><br><br>


<input type="button" value="Check" onclick="testMatch()"/>

</body>

</html>
```

Program 5: Matching non-digits

```
<!DOCTYPE html>
<html>
<head>
<title> Validation Example </title>
<script language="javascript" type="text/javascript">

var p = /\D/;
function testMatch()
{
var str=t1.value;
if(p.test(str))
alert("The string contains non-digits");
else
alert("The string does not contain non-digits");
}
</script>
</head>
<body>
Enter String: <input type="text" id="t1"/><br><br>

<input type="button" value="Check" onclick="testMatch()"/>
</body>
</html>
```

5.1.5 Matching Punctuations and Symbols

Q. How to match punctuations and symbols?

To match punctuation or symbols we can create a pattern containing all symbols. Thus the pattern for finding symbol in given string will look like:

```
/[-!$%^&*()_+|~=`{}\[\]:";'<>?,.\/]/
```

The hyphen is a special character in character classes, so it needs to be first. The hyphen is special because it can be used to represent a range of characters. This same character class can be simplified with ranges to this:

```
/[$-/:-?{-~!"^_`\[\]]/
```

There are three ranges. '$' to '/', ':' to '?', and '{' to '~'. the last string of characters can't be represented more simply with a range: !"^_`[].

5.1.6 Matching Words

Q. How to match words? Explain with example.

The match() function is used to match a word in given string.

For ex.

```
var a = "I am a student.";
var pat = a.match(/ent/g);
```

The g modifier is present with pattern in match() to perform global search. If the regular expression does not contain the ***g*** modifier, the match() function will return only the first match in the given string.

Program 6: Matching word using match()

```
<!DOCTYPE html>

<html>

<head>

<title> Validation Example </title>

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


function testMatch()

{

var str=t1.value;

var i=str.match(/student/g);

if(i!=null)

alert("The string contains student");

else

alert("The string does not contain student");

}

</script>

</head>

<body>

Enter String: <input type="text" id="t1"/><br><br>


<input type="button" value="Check" onclick="testMatch()"/>

</body>

</html>
```

Program 6: Replace a text

```
<!DOCTYPE html>
<html>
<head>
<title> Validation Example </title>
<script language="javascript" type="text/javascript">


function testMatch()
{
var str="Student has PHP textbook";
var r=str.replace("PHP", "Javascript");
document.write("Replaced Statement: "+r);
}
</script>
</head>
<body>
<p> Original Statement: Student has PHP textbook </p>
<input type="button" value="Replace" onclick="testMatch()"/>
</body>
</html>
```

5.1.8 Returning a Matched Character

There are two functions which return the matched character. One is match() function of string and other is exec() function of RegExp.

5.1.8.1 match()

String.*match*(pattern);

String has match() function, so that we can invoke match() function on string object. It is used to match a text with invoking string.

5.1.8.2 exec()

pattern.exec(string);

RegExp has exec() function so that we can invoke the exec() function on regular expression i.e. pattern. It is used to match pattern with the given string.

Both function searches a string for a match against a regular expression, and returns the matches, as an Array object otherwise it will return null.

Program 7: exec() Example

```
<!DOCTYPE html>

<html>

<head>

<title> Validation Example </title>

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

function testMatch()

{

var str=t1.value;

var patt=/student/g;

var i=patt.exec(str);

if(i!=null)

alert("The string contains student");

else

alert("The string does not contain student");

}

</script>

</head>

<body>

Enter String: <input type="text" id="t1"/><br><br>

<input type="button" value="Check" onclick="testMatch()"/>


</body>

</html>
```

5.1.9 Regular Expression and Object Properties

A regular expression (RegExp) is an object that describes a pattern of characters. Regular expressions are used to perform pattern-matching and "search-and-replace" functions on text.

Syntax :

```
/pattern/modifiers;
```

Where,

pattern – A string that states the pattern of the regular expression or it can be an another regular expression.

modifiers – it is an optional filed which may contain any of the "g", "i", and "m" attributes that provide global, case-insensitive, and multi-line matches, respectively.

5.1.9.1 RegExp Object Properties

Sr. No.	Property	Description
1	constructor	Returns the function that created the RegExp object's prototype
2	global	Checks whether the "g" modifier is set
3	ignoreCase	Checks whether the "i" modifier is set
4	lastIndex	Specifies the index at which to start the next match
5	Multiline	Checks whether the "m" modifier is set
6	source	Returns the text of the RegExp pattern

Program 8:

```
<!DOCTYPE html>

<html>

<head>

<title> Validation Example </title>

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


function testMatch()

{

var str=t1.value;

var re = new RegExp( "student", "g" );

var i=str.match(re);

if(i!=null)

alert("The string contains student");

else

alert("The string does not contain student");

}

</script>

</head>

<body>

Enter String: <input type="text" id="t1"/><br><br>


<input type="button" value="Check" onclick="testMatch()"/>

</body>

</html>
```

5.2 Frame

Q. What is Framer? How to create a framer? Explain with example.

HTML document can be divided into multiple parts by using frame. If we want to display different information in different parts of webpage, then it can be possible by defining that information in a different frame. By using frame we can define the multiple views. With the help of multiple views we can keep specific information visible while at the same time other information will be invisible i.e. it may be hide, scrolled or replaced. For example, if we have to set the title, description, navigation bar, advertisements, contact details and notification sections in the webpage, then title is placed in one frame, description is placed in one frame, navigation bar is placed in one frame, advertisements placed in one frame, contact is placed in one frame and notification section is placed in one frame. The multiple frames can be set in one webpage as follows:

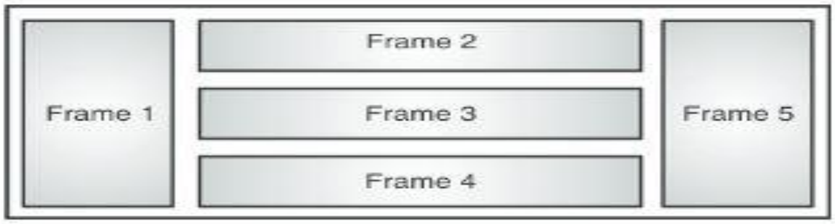


Fig. 5.2.1 : Webpage containing multiple frames

5.2.1 Create a Frame

Q. What is rollover? How to create rollover? Explain with example.

To define a frame we use <frame> tag within <frameset> tag. Each <frame> in a <frameset> may have different attributes, such as scrolling, border, resize, etc.

5.2.1.1 Attributes of <frameset>

Sr. No.	Attribute	Value	Description
1	cols	Values of this attribute can be pixels, percentage and '*'.	It specifies the number and size of column in frameset.
2	rows:	Values of this attribute can be pixels, percentage and '*'.	It specifies the number and size of rows in frameset.

5.2.1.2 Attribute of <frame>

Sr. No.	Attribute	Value	Description
1	frameborder	0 or 1	1 states that the frame with border, 0 states that f without border
2	name	Any name	States the name of frame
3	src	URL	It specifies the path of the html file.

To define a frameset we use a <frameset> tag. The <frameset> element holds one or more frames. Each <frame> element may contain a separate document.The <frameset> element defines the number of columns or rows present in the frameset, and value of percentage/pixels of space will occupy each of them.

Program 1:

```
<!DOCTYPE html>

<html>

<head>

            <title>Frame tag</title>

</head>

  <frameset cols="25%,50%,25%">

            <frame >

            <frame >

            <frame >

  </frameset>

</html>
```

Program 2:

```
<!DOCTYPE html>

<html>

<head>

            <title>Frame tag</title>

</head>

  <frameset rows="50%,25%,25%">

            <frame >

            <frame >

            <frame >

  </frameset>

</html>
```

Program 3:

```
<!DOCTYPE html>

<html>

<head>

            <title>Frame tag</title>

</head>

  <frameset cols="25%,50%,25%">

            <frame style="background-color:red">

            <frame style="background-color:blue">

            <frame style="background-color:green">

  </frameset>

</html>
```

Program 4:

```
<!DOCTYPE html>

<html>

<head>

        <title>Frame tag</title>

</head>

  <frameset rows="50%,25%,25%" cols="30%,70%>

        <frame style="background-color:red">

        <frame style="background-color:blue">

        <frame style="background-color:green">

        <frame style="background-color:red">

        <frame style="background-color:blue">

        <frame style="background-color:green">

  </frameset>

</html>
```

Program 5: To load webpages in each frame

frame_1.html

```
<!DOCTYPE html>

<html>

<body>

        <h4>Frame 1</h4>

</body>



</html>
```

frame_2.html

```
<!DOCTYPE html>

<html>

<body>

        <h4>Frame 2</h4>

</body>



</html>
```

frame_3.html

```
<!DOCTYPE html>

<html>

<body>

        <h4>Frame 3</h4>

</body>



</html>
```

frame_main.html

```
<!DOCTYPE html>

<html>

<head>

        <title>Frame tag</title>

</head>

  <frameset cols="25%,50%,25%">

        <frame src="file:///F:\\CSS & CPP\\CSS\\CSS PPTs_Notes\\PPTs\\frame 5\\frame_1.html">

        <frame src="file:///F:\\CSS & CPP\\CSS\\CSS PPTs_Notes\\PPTs\\frame 5\\frame_2.html">

        <frame src="file:///F:\\CSS & CPP\\CSS\\CSS PPTs_Notes\\PPTs\\frame 5\\frame_3.html">

  </frameset>

</html>


  </frameset>

</html>
```

Program 5: Invisible borders of frame

```
<!DOCTYPE html>

<html>

<head>

            <title>Frame tag</title>

</head>

  <frameset cols="25%,50%,25%">

            <frame src="file:///F:\\CSS & CPP\\CSS\\CSS PPTs_Notes\\PPTs\\frame 5\\frame_1.html"
frameborder="0" border="0">

            <frame src="file:///F:\\CSS & CPP\\CSS\\CSS PPTs_Notes\\PPTs\\frame 5\\frame_2.html"
frameborder="0" border="0">

            <frame src="file:///F:\\CSS & CPP\\CSS\\CSS PPTs_Notes\\PPTs\\frame 5\\frame_3.html"
frameborder="0" border="0">

  </frameset>

</html>



  </frameset>

</html>
```

Program 6: calling a child window

frame_1.html

```
<!DOCTYPE html>
<html>
<script language="javascript" type="text/javascript">
function display()
{
document.write("This function is called from Frame 1");
}
</script>
</head>
<body>
        <h4>Frame 1</h4>
<input type="button" name="button1" value="Click" onclick="display()"/>
</body>
</html>
```

frame_2.html

```
<!DOCTYPE html>
<html>
<head>
<script language="javascript" type="text/javascript">
function display()
{
document.write("This function is called from Frame 2");
}
</script>
</head>
<body>
        <h4>Frame 2</h4>
<input type="button" name="button2" value="Click" onclick="display()"/>
</body>
</html>
```

frame_main.html

```
<!DOCTYPE html>
<html>
<head>
        <title>Frame tag</title>
</head>
  <frameset cols="25%,75%">
        <frame name ="left" src="file:///F:\\CSS & CPP\\CSS\\CSS PPTs_Notes\\PPTs\\child window\\frame_1.html">
        <frame name ="right" src="file:///F:\\CSS & CPP\\CSS\\CSS PPTs_Notes\\PPTs\\child window\\frame_2.html">

  </frameset>
</html>
```

Program 7: Changing the content & focus of child window

frame_1.html

```
<!DOCTYPE html>
<html>
<head>
<script language="javascript" type="text/javascript">
function display()
{
parent.right.location.href="file:///F:\\CSS & CPP\\CSS\\CSS
PPTs_Notes\\PPTs\\content\\frame_3.html";
}
</script>
</head>


<body>
            <h4>Frame 1</h4>
<input type="button" name="button1" value="Click" onclick="display()"/>
</body>


</html>
```

frame_2.html

```
<!DOCTYPE html>
<html>

<body>
        <h4>Frame 2</h4>
</body>
</html>
```

frame_3.html

```
!DOCTYPE html>
<html>
<body>
        <h4>Frame 3</h4>
</body>
</html>
```

frame_main.html

```
<!DOCTYPE html>
<html>
<head>
	<title>Frame tag</title>
</head>

  <frameset cols="25%,75%">
	<frame name ="left" src="file:///F:\\CSS & CPP\\CSS\\CSS PPTs_Notes\\PPTs\\content\\frame_1.html">
	<frame name ="right" src="file:///F:\\CSS & CPP\\CSS\\CSS PPTs_Notes\\PPTs\\content\\frame_2.html">

  </frameset>

</html>
```

Program 8: Accessing Elements of other child window

frame_1.html

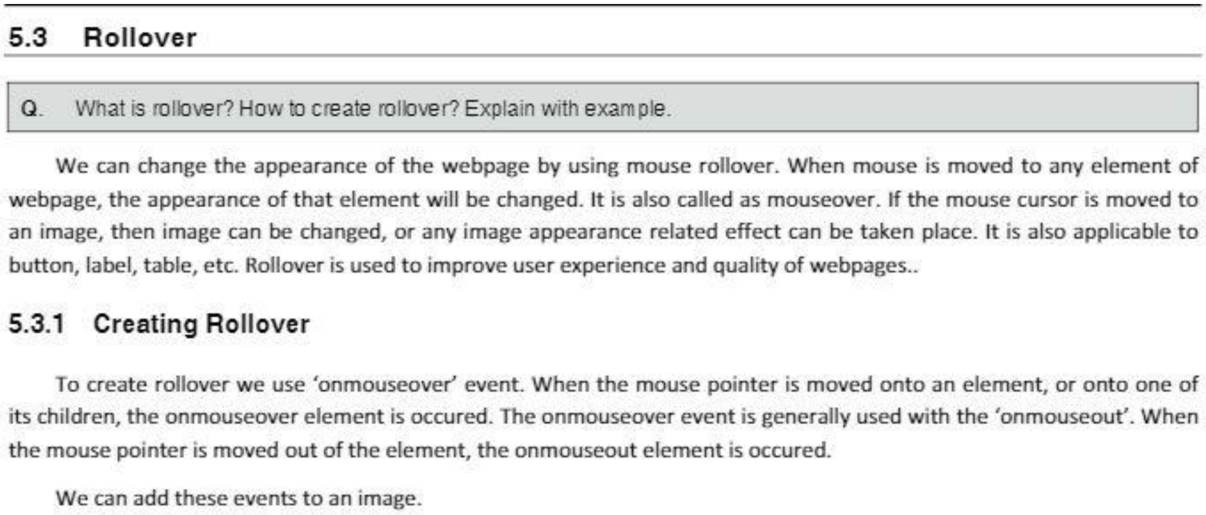
```
<!DOCTYPE html>
<html>
<head>
<script language="javascript" type="text/javascript">
function display()
{
document.getElementById("para1").innerHTML="Frame 1 content modified";
parent.right.document.getElementById("para2").innerHTML="Frame 2 is accessed from Frame 1";
}
</script>
</head>

<body>
        <h4>Frame 1</h4>
<p id="para1"> Frame 1 Content </p>
<input type="button" name="button1" value="Click" onclick="display()"/>
</body>

</html>
```

frame_2.html

```
<!DOCTYPE html>

<html>

<body>


        <h4>Frame 2</h4>

<p id="para2"> Frame 2 Content </p>

</body>

</html>
```

frame_main.html

```
<!DOCTYPE html>

<html>

<head>

        <title>Frame tag</title>

</head>


  <frameset cols="25%,75%">

        <frame name ="left" src="file:///F:\\CSS & CPP\\CSS\\CSS PPTs_Notes\\PPTs\\element\\frame_1.html">

        <frame name ="right" src="file:///F:\\CSS & CPP\\CSS\\CSS PPTs_Notes\\PPTs\\element\\frame_2.html">


  </frameset>

</html>
```



5.3 Rollover

Q. What is rollover? How to create rollover? Explain with example.

We can change the appearance of the webpage by using mouse rollover. When mouse is moved to any element of webpage, the appearance of that element will be changed. It is also called as mouseover. If the mouse cursor is moved to an image, then image can be changed, or any image appearance related effect can be taken place. It is also applicable to button, label, table, etc. Rollover is used to improve user experience and quality of webpages..

5.3.1 Creating Rollover

To create rollover we use 'onmouseover' event. When the mouse pointer is moved onto an element, or onto one of its children, the onmouseover element is occured. The onmouseover event is generally used with the 'onmouseout'. When the mouse pointer is moved out of the element, the onmouseout element is occured.

We can add these events to an image.

Program 1: Image rollover

```
<!DOCTYPE html>

<html>

<body>

        <h4>Image Rollover</h4>



 <a> <img src='file:///F:\\CSS & CPP\\CSS\\CSS PPTs_Notes\\PPTs\\rollover\\apple.jpg'


 onmouseover="src='file:///F:\\CSS & CPP\\CSS\\CSS PPTs_Notes\\PPTs\\rollover\\pineapple.jpg'"


onmouseout="src='file:///F:\\CSS & CPP\\CSS\\CSS PPTs_Notes\\PPTs\\rollover\\apple.jpg'"> <a>


 </body>

</html>
```

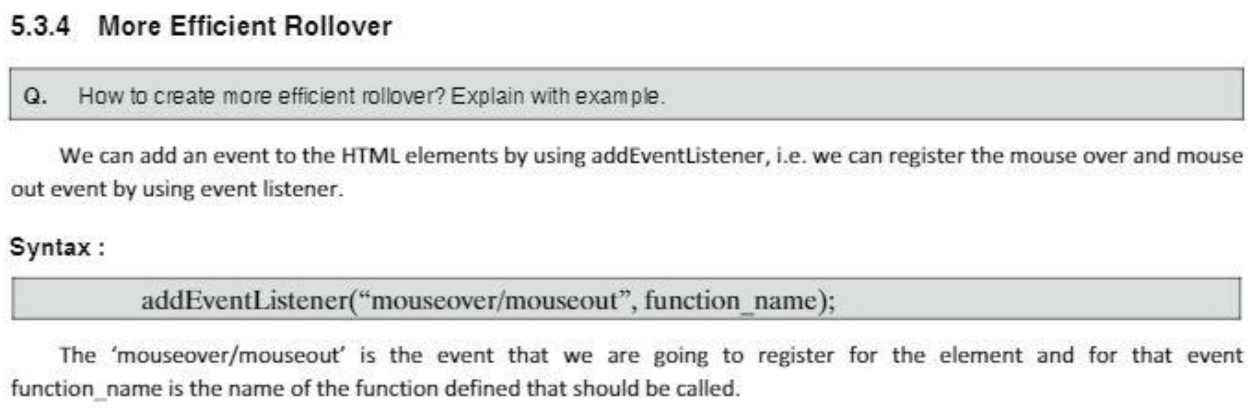
Program 2: Text rollover

```
<!DOCTYPE html>

<html>

<body>

        <h2>Text Rollover</h2>



  <a onmouseover="document.fruit.src='file:///F:\\CSS & CPP\\CSS\\CSS 
PPTs_Notes\\PPTs\\rollover\\apple.jpg'">

<h3>Apple</h3>

</a>


<a onmouseover="document.fruit.src='file:///F:\\CSS & CPP\\CSS\\CSS 
PPTs_Notes\\PPTs\\rollover\\pineapple.jpg'">

<h3>Pineapple</h3>

</a>


  <a> <img src='file:///F:\\CSS & CPP\\CSS\\CSS PPTs_Notes\\PPTs\\rollover\\apple.jpg' name="fruit">
</a>


</body>

</html>
```

Program 3: Multiple actions using rollover

```
<!DOCTYPE html>
<html>
<head>
<script language="javascript" type="text/javascript">
function display1()
{
document.fruit.src='file:///F:\\CSS & CPP\\CSS\\CSS PPTs_Notes\\PPTs\\rollover\\apple.jpg';

document.getElementById("para").innerHTML="Trees of Apple are larger than trees of Pineapple";
}

function display2()
{
document.fruit.src='file:///F:\\CSS & CPP\\CSS\\CSS PPTs_Notes\\PPTs\\rollover\\pineapple.jpg';

document.getElementById("para").innerHTML="Trees of Pineapple are smaller than trees of Apple";
}
</script>
</head>

<body>
        <h2>Multiaction Rollover</h2>
```

```
  <a onmouseover="display1()">

<h3>Apple</h3>

</a>


<a onmouseover="display2()">

<h3>Pineapple</h3>

</a>


  <a> <img src='file:///F:\\CSS & CPP\\CSS\\CSS PPTs_Notes\\PPTs\\rollover\\apple.jpg' name="fruit"> </a>


<p id="para"> Trees of Apple are larger than trees of Pineapple </p>


</body>

</html>
```



5.3.4 More Efficient Rollover

Q. How to create more efficient rollover? Explain with example.

We can add an event to the HTML elements by using addEventListener, i.e. we can register the mouse over and mouse out event by using event listener.

Syntax :

```
addEventListener("mouseover/mouseout", function_name);
```

The 'mouseover/mouseout' is the event that we are going to register for the element and for that event function_name is the name of the function defined that should be called.

Program 4: Efficient rollover

```
<!DOCTYPE html>

<html>

<body>

<p > Efficient mouseover by using addEventListener</p>

<h1> <p id="para"> Change Style by Mouseover </p> </h1>

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


document.getElementById("para").addEventListener("mouseover", mouseOver);

document.getElementById("para").addEventListener("mouseout", mouseOut);

function mouseOver()

{

document.getElementById("para").style.color="blue";

}

function mouseOut()

{

document.getElementById("para").style.color="black";

}
```

```
</script>

</body>

</html>
```