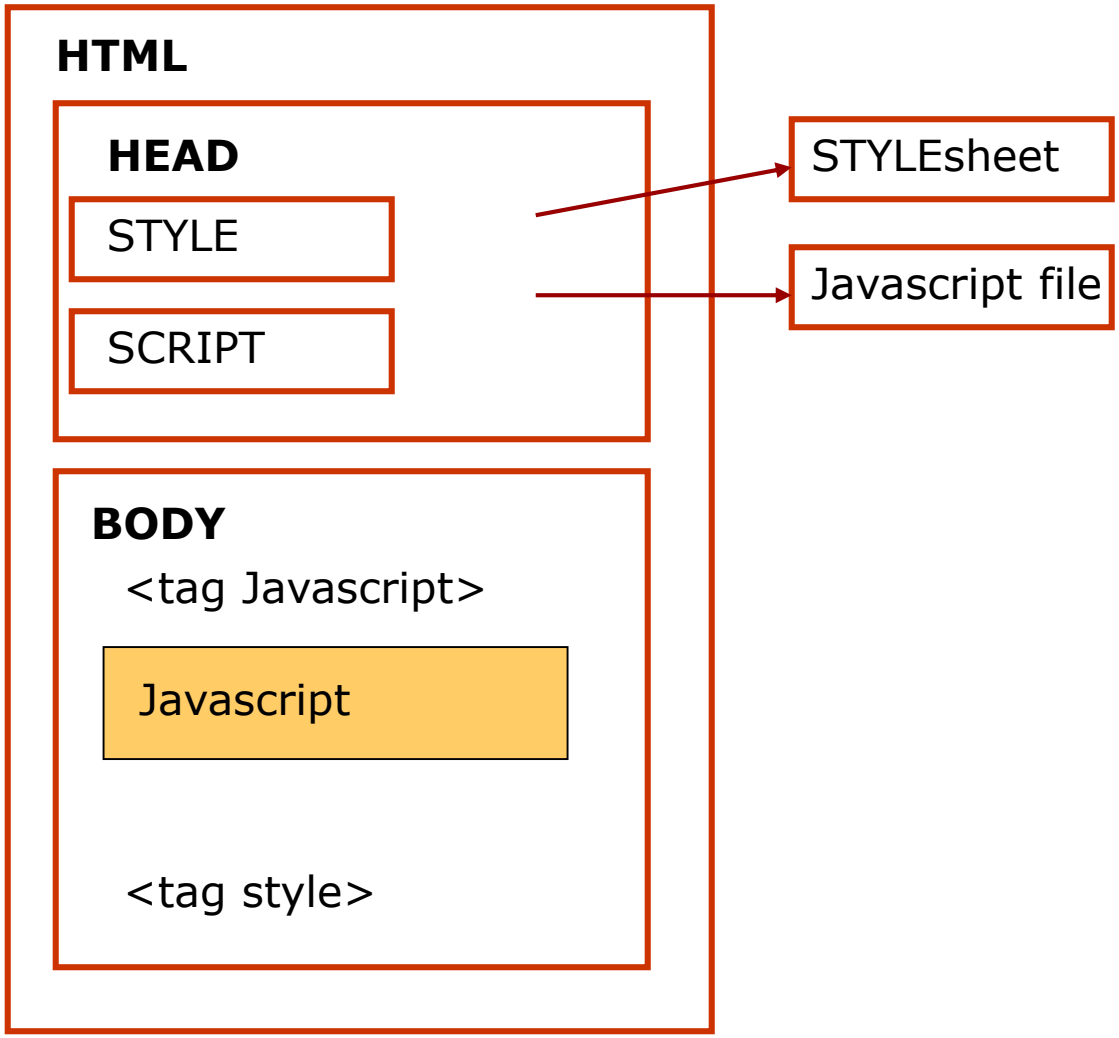
Client side web programming

Introduction to JavaScript

Jaana Holvikivi, School of ICT

Helsinki Metropolia University of Applied Sciences

Javascript on HTML pages



Javascript on an HTML page

```
<html>
<head>
        <title>Javascript basics</title>
</head>

<body>
<p>
    <form>
    <input value="Press" type="button" onClick="alert('HELLO')">
    </form> </p>
<p>
    <script language="JavaScript">
    document.write(”Updated:");
    document.write(document.lastModified);
    </script> </p>
</body>
</html>
```

Javascript on an HTML page

```
<html>
<head>
        <title>Javascript basics</title>
</head>
<body>
<p>
    <a href="http://www.metropolia.fi"
    onMouseOver="window.status=' click here '; return true"
    onMouseOut="window.status=' '; ">
    Click the link about Metropolia</a>
    </p>

</body>
</html>
```

Javascript on an html page

```
<html>
<head>
        <title>Javascript and DOM</title>
        <script type="text/javascript" >
                var date=new Date();
                var hour=date.getHours();
                if (hour>=22 || hour<=5)
                        document.write("You should go to sleep");
                else
                        document.write("Hello, world!");
        </script>
</head>
<body>
</body>
</html>
```

External code file

jsdom.js:

```
var date=new Date();
var hour=date.getHours();
if (hour>=22 || hour<=5)
document.write("You should go to sleep");
else
document.write("Hello, world!");
```

```
<html>
<head>
<title>Javascript and DOM</title>
<script type="text/javascript" src="jsdom.js"></script>
</head>
<body>
I love you!
</body>
</html>
```

Hello, world! I love you!

Programming language features

- Data types
- Constants
- Variables
- Expressions
- Statements
- Operators
- Statements: conditional, loops
- Functions
- Methods
- Events

Variables and values

```
var i=0, result = 0;          // = assingment statement
   for (i = 0; i <= 10; i++) {
   result += i;
   document.write(i + ": " + result + "<br/>");
   }
```

var i = 0 declares a variable and sets the value to 0 (assignment statement)

; statement terminator

Var a, A;

JavaScript is case sensitive

A declared variable is local

Reserved words cannot be used as variable names

Data types in JavaScript

- Numbers 0.44
- Strings
  document.write (”greeting"+mj);

  in quotations (' or ")

  <input value="Press" type="button" onClick="alert('HELLO')">
- Null ”empty"
- String literals
  alert("I am an alert box!! \n\t Man!");
  when HTML is not in use, adds a new line and a tab

- Boolean values
  true, false

Character strings

- Methods to operate on strings;
  mj = "kissa"; other ="la"

mj.length	value 5
mj.toUpperCase()	KISSA
mj.charAt(0)	k
mj.substr(0,3)	kiss

concatenation:

mj + other	kissala

Arrays

blocks = [8, 4, 7, 6, 15]
blocks.length gets value 5
blocks[0] contains number 8
novel = blocks.sort()
Contains array [4,6,7,8,15]

Arrays can contain different types of data
document.images[0].src = pics [frame].src

Expressions

i <= 10 conditional expression: true or false

String operation:
”result is" + summa

Statement:

timerID = setTimeout(’alternate()', 800);
; statement terminator

Operators

Assignment Operators

+	addition
x+=y	is the same as x=x+y
x++	same as x=x+1
-	Subtraction
*	Multiplication
/	Division
%	remainder

Comparison Operators, true or false

==	is equal to	
!=	is not equal	5!=8 returns true
<	less than	
>	Greater than	
>=	Greater than or equal	
<=	less than or equal	

Operators

Logical Operators

&& AND

|| OR

! NOT

			RESULT
AND	0	0	0
	1	0	0
	0	1	0
	1	1	1
OR	0	0	0
	1	0	1
	0	1	1
	1	1	1
NOT	1		0
	0		1

Conditional statements

```
if ( !Math.random ) // here you check existense of a function
{
document.write('<em> -- weather called off due to rain --</em>');
}
else if ( Math.floor((Math.random()*2)) == 0 )
{
document.write ("<b>It's just awful. </b>");
}
else
{
document.write ("<em>How wonderful it is!</em>");
}
```

Loops

```
for (i = 0; i <= 10; i++)
    {
    result += i;
    document.write(i + ": " + result + "<br/>");
    }
    document.write("<p></p>");
```

- Increment i=i+1 or
  i++

Loops

```
var x = 1;
var result = 0;

while ( x <= 10 ) { // the loop is repeated until x>10
result += x;
x++;

}
alert ("The result is " + result + " and x is " + x );
```

Nesting loops

```
var heads = 0, tails  = 0;
var i, j;
   for (j = 0; j <= 5;  j++)
   {
        for (i = 0; i < 100;  i++)
        {
        if ( Math.floor ((Math.random()*2)) == 1 )
          heads = heads + 1;
        else
          tails = tails + 1;
        }
        document.write ("Heads:  "+heads+ </br>
        "Tails  :  " +tails+ " "<p>");
        heads= 0; tails = 0;
   }
```

Functions

User defined

Predefined

- alert
- prompt

parsInt	converts variable into an integer
parseFloat	converts variable into a number
Math.sqrt	square root
Math.floor	rounding to the lower integer
Math.round	rounding

Functions: user defined

```
<html>
<head>
<script type="text/javascript">
function disp_alert()
    {
        alert("I am an alert box!!")
    }
</script>
</head>

<body>
<form>
<input type="button" onclick="disp_alert()" value="Display
    alert box">
</form>
</body>
</html>
```

Functions: user defined

```
function Capitalize(mjono)
//returns a string that starts with a capital letter
    {
    var firstletter, reststring, cap;
    firstletter = mjono.charAt(0);
    reststring = mjono.substring(1, mjono.length);
    cap= firstletter.toUpperCase() + reststring.toLowerCase()

    return cap;
}
```

Functions: user defined

Printing to an HTML page in textarea.

```
<head>
<script>
function countdown()
{
     var count;
     count = document.getElementById("countBox").value;
     document.getElementById("tulostusta").value ="";
     while (count > 1){
     document.getElementById("tulostusta").value =
     document.getElementById("tulostusta").value + count + "\n";
     count = count -1;
}
     document.getElementById("tulostusta").value =
            document.getElementById("tulostusta").value + "hep!";}
</script>
</head>
<body>
     <p>Give the number to start countdown!
     <input type ="text" id ="countBox" size = "3" value= "19"/>
     </p>
<p><input type ="button" value= ”Start countdown" onClick ="countdown();"/>
     </p>
<p>
     <textarea  id="tulostusta" rows="20" cols="8">
     </textarea>
</p>
</body>
```

Methods

close()	Closes an output stream opened with the document.open() method, and displays the collected data
getElementById()	Returns a reference to the first object with the specified id
getElementsByName()	Returns a collection of objects with the specified name
getElementsByTagName()	Returns a collection of objects with the specified tagname
open()	Opens a stream to collect the output from any document.write() method
document.write()	Writes HTML expressions or JavaScript code to a document

Event handlers

onabort	Loading of an image is interrupted
onblur	An element loses focus
onchange	The user changes the content of a field
onclick	Mouse clicks an object
ondblclick	Mouse double-clicks an object
onerror	An error occurs when loading a document or an image
onfocus	An element gets focus
onkeypress	A keyboard key is pressed or held down
onload	A page or an image is finished loading
onmousedown	A mouse button is pressed
onmouseout	The mouse is moved off an element
onmouseover	The mouse is moved over an element
onreset	The reset button is clicked
onresize	A window or frame is resized
onselect	Text is selected
onsubmit	The submit button is clicked
onunload	The user exits the page

setTimeout(), clearTimeout() timer is activated

Event: onload() & getElementById

```
function process()
{           var string;
            string="<ul>"
                        + "<li>Black</li>"
                        + "<li>Red</li>"
                        + "<li>Blue</li>"
                        + "</ul>";
            var myDiv=document.getElementById("Hook");
            myDiv.innerHTML=string;
}
```

ESIMERKIKSI: <div id=”Hook">stories and <h2>headings</h2>

Hook has an innerHTML-property stories and <h2>headings</h2>
Hook has an outerHTML-property
 stories and <h2>headings</h2>

..onload()

```
<html>
        <head>
                <title>AJAX Foundations: javascript and DOM</title>
                <script type="text/javascript" src="morejsdom.js"></script>
        </head>
        <body onload="process()">
                Hello! Here is a cool list of colors for you:
                <br/>
                <div id="Hook" />
        </body>
</html>
```

DOM Document Object Model

- document.form1.text1.value

```
<form name="form1">
<input type="text" name="text1">
</form>
```

- parent.location = word1 + word2 + ".html"

Javascript as a programming language

- Object-oriented:
  - Instead of writing procedural programs, write class libraries to encapsulate behaviors
  - DOM is not a collection of dumb elements but a hierarchy of types
  - Styles are properties of objects
  - Complete OO code with error handling, instance methods, static methods and type hierarchies
  - Versatile use of functions
  - A large number of object-oriented libraries
- Used to create User Interfaces