CLIENT-SIDE SCRIPTING: JAVASCRIPT, AND JQUERY

Jonathan R. Engelsma, Ph.D.

JavaScript   jQuery
write less, do more.

LIMITATIONS OF HTML

- HTML by itself (or even with CSS) provides instructions to the browser on how to render content on the screen.

- This rendering is *static*.

- e.g. the page won't change until an action occurs that forces the browser to load a new page from the server.

PRIMITIVE ATTEMPTS

- Dynamic page refreshing:

```
<META http-equiv="Refresh" content="5;url=http://example.com/refresh.cgi">
```

-or, set an HTTP header-

```
Content-Type: text/html
Refresh: 5;url=http://example.com/refresh.cgi
```

WHAT IS DYNAMIC HTML?

- Def: umbrella term for a collection of technologies used together to create interactive websites. (source: wikipedia.org)

  - HTML, CSS, Javascript, DOM

- Goal: improve web app usability by adding interactivity.

WHAT IS AJAX?

- Def: **A**synchronous **Ja**vascript and **X**ML: a group of interrelated web dev techniques used on the client-side in which data can be sent/retrieved to/from a server in the background without interfering with the display and behavior of the existing page. (source: wikipedia.org)

DYNAMIC HTML

- Differentiated from AJAX in that a DHTML page is still request/reload based.

- The term DHTML has fallen out of use in recent years as it was associated with practices and conventions that tended to not work across browsers. (DOM Scripting)

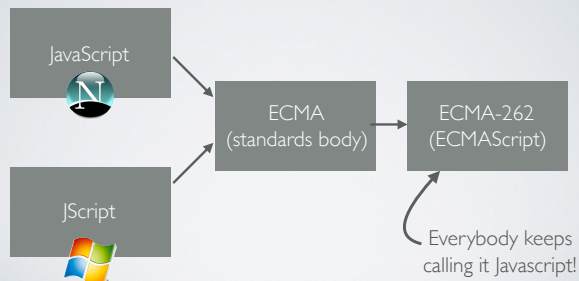- Technologies like JQuery have eliminated much of the difficulties in cross-browser DOM manipulation.

DOCUMENT OBJECT MODEL

- def: DOM is a cross-platform, language independent convention for representing and interacting with objects in HTML, XHTML, and XML.

- public DOM interface defined as an API.

- standardized by the W3C.

JAVASCRIPT

- Scripting language originally introduced by Netscape in 1995.

- Reference to "Java" is purely marketing related (Netscape bundled the Java run-time in their browser the same time they announced their scripting language.)

- Standardized version known as ECMAScript by the European Computer Manufacturing Association.

JAVASCRIPT HISTORY

JavaScript

JScript

ECMA
(standards body)

ECMA-262
(ECMAScript)

Everybody keeps calling it Javascript!

> "ECMAScript was always an unwanted trade name that sounds like a skin disease."
>
> **Brendan Eich, creator of JavaScript**

JAVASCRIPT: THE LANGUAGE

- Dynamic

- Multi-paradigms:

  - C pedigree

  - functional: first class functions, closures

  - Self: prototype-based

JAVASCRIPT: THE LANGUAGE

- Historically used in the context of web browsers to allow web content to programmatically alter the document content displayed via the DOM interface. (client-side scripting)

- In recent years, Node.js has also popularized JavaScript on the server side.

JAVASCRIPT SYNTAX

```
1  var x = 10;
2  var y = "10";
3  if ( x == y ) {
4      // code goes here
5  }
6  if ( x === y ) {
7      // code goes here
8  }
9
10 var a = [ 1, 2, 3 ];
11 for (var i in a) {
12     alert(a[i]);
13 }
14
15 function name(param1, param2)
16 {
17     // code goes here  ...
18 }
```

https://jsfiddle.net/jengelsma/gq6b47ms/

"ANONYMOUS" FUNCTIONS

```
1  var f = function(x) { alert(x); }
2  var g = f;
3
4  g(3);
5
```

https://jsfiddle.net/jengelsma/hr2p1n85/

JAVASCRIPT OBJECTS

```
1  var person= {};
2  person.firstname="John";
3  person.lastname="Doe";
4  person.age=50;
5  person.eyecolor="blue";
6  document.write(person.firstname + " is "  + person.age + " years old.");
```

https://jsfiddle.net/jengelsma/zuxnb7uo/

USING A CONSTRUCTOR

```javascript
function person(firstname,lastname,age,eyecolor)
{
    this.firstname=firstname;
    this.lastname=lastname;
    this.age=age;
    this.eyecolor=eyecolor;
}

myFather=new person("John","Doe",50,"blue");

document.write(myFather.firstname + " is " +  myFather.age + " years old.");
```

https://jsfiddle.net/jengelsma/qq6fg9cp/

ADDING JAVASCRIPT TO HTML

• Inline:

```html
<script type="text/javascript">

// Javascript goes here.

</script>
```

• External

```html
<script src="filename.js"></script>
```

TOP OR BOTTOM

• Common to put JavaScript in the <head> element.

• Can also place JavaScript at the very bottom of the body.

  • Faster page loads (scripts block parallel downloads)

JAVASCRIPT HELLO WORLD

```html
1  <html>
2    <body>
3      <script type="text/javascript">
4        document.write("Hello, World");
5      </script>
6    </body>
7  </html>
```

https://jsfiddle.net/jengelsma/6ep1vy4q/

WORKING WITH THE DOM

- DOM: Document Object Model

- Represents the currently rendered HTML page as a tree structure.

- Allows navigation and updating of the document by navigating and updating the DOM tree.

FINDING ELEMENTS TO CHANGE

- document.getElementById("someid")

- document.getElementsByTagName("a");

- document.getElementsByClassName("classname");

CHANGING HTML CONTENT

```html
1   <h1 id="intro">Hello</h1>
2
3   <script>
4     // This...
5     var i = document.getElementById("intro");
6     i.innerHTML = "World";
7
8     // or this..
9     document.getElementById("intro").innerHTML = "World";
10  </script>
```

https://jsfiddle.net/jengelsma/jmygfjv8/

HELLO WORLD V2

```html
1   <html>
2    <head>
3     <script type="text/javascript">
4     function sayHello() {
5        document.getElementById("hi").innerHTML = "Hello, World";
6     }
7     </script>
8    </head>
9
10   <body onload="sayHello()">
11    <p id="hi"></p>
12   </body>
13  </html>
```

https://jsfiddle.net/jengelsma/hjoko7oz/

HELLO WORLD V3

```html
1   <html>
2    <body>
3     <p id="hi"></p>
4    </body>
5    <script type="text/javascript">
6     document.getElementById("hi").innerHTML = "Hello, World";
7    </script>
8   </html>
```

https://jsfiddle.net/jengelsma/rn2h6zda/

CHANGING ATTRIBUTES

```
1  <img id="image" src="someImage.gif">
2
3  <script>
4    document.getElementById("image").src=
5      "https://upload.wikimedia.org/wikipedia/en/a/a9/Example.jpg";
6  </script>
```

https://jsfiddle.net/jengelsma/at2297pc/

CHANGING STYLE

```
1  <p id="p2">Hello World!</p>
2
3  <script>
4    document.getElementById("p2").style.color = "blue";
5  </script>
```

https://jsfiddle.net/jengelsma/fycnvqkn/

EVENT HANDLERS

- onchange
- onclick
- onfocus
- onload
- onmouseover/onmouseout
- onsubmit

```
1  <h1 onclick="this.innerHTML='Thanks!'">
2  Click on this text!
3  </h1>
```

https://jsfiddle.net/jengelsma/9b7fbj5l/

EVENT HANDLING FUNCTIONS

```
1  <h1 onclick="thanks(this)">
2  Click on this text!</h1>
3
4  <script>
5    function thanks(elem)
6    {
7      elem.innerHTML = "Thanks!";
8    }
9  </script>
```

https://jsfiddle.net/jengelsma/85wpc60y/

EVENT HANDLING FUNCTIONS

```
1   <h1 id="header">Click on this text!</h1>
2
3   <script>
4     function thanks(elem)
5     {
6       elem.innerHTML = "Thanks!";
7     }
8
9     document.getElementById("header").onclick = function() { thanks(this); }
10  </script>
```

https://jsfiddle.net/jengelsma/j0yw4zrg/

FORM VALIDATION

```
<html>
<body>

<form id="myForm">
 <p>
 <input type="text" id="name" />
 <span id="textMsg">Required. Max 10
 characters.</span>
 </p>
 <p>
 <input type="text" id="phone" />
 <span id="phoneMsg">7 numbers</span>
 </p>
 <input type="submit" value="Submit" />
</form>

<script type="text/javascript">

document.getElementById("myForm").onsubmit
 = function() { return validate(); };

function validate() {
 var s1 = validateName();
 var s2 = validatePhone();
 return s1 && s2;
 }
```

```
function validateName() {
   var eName = document.getElementById("name");
   eName.style.color = "black";
   if ( eName.value.length > 10 ||
     eName.value.length == 0 ) {
     eName.style.color = "red";
     eName.focus();
     return false;
   }
   return true;
 }

function validatePhone() {
   var ePhone =  document.getElementById("phone");
   ePhone.style.color = "black";
   if ( ePhone.value.length != 7 ) {
     ePhone.style.color = "red";
     ePhone.focus();
     return false;
   }
   return true;
 }
</script>
</body>
</html>
```

https://jsfiddle.net/jengelsma/00h1mLr1/

ES6

Classes

```
1   class User {
2     constructor(name) {
3       this.name = name
4     }
5
6     sayHi() {
7       alert(this.name);
8     }
9   }
10
11  let user = new User("John");
12  user.sayHi();
```

https://jsfiddle.net/jengelsma/am511vj5/

Arrow Functions

```
1   var nums = [1,2,3,5,10];
2   var fives = [];
3
4   // ES5
5   nums.forEach(function (v) {
6     if (v % 5 === 0)
7       fives.push(v);
8   });
9
10  fives = [];
11
12  // ES6
13  nums.forEach(v => {
14    if (v % 5 === 0)
15      fives.push(v)
16  });
```

https://jsfiddle.net/jengelsma/zeqdf2yj/

JQUERY

- A JavaScript library.

- Designed to make JavaScript development tasks much easier.

- Open source.

jQuery
write less, do more.

JQUERY FEATURES

- easy element selection

- cross browser support

- customizable plugins

- very popular / vibrant community

"INSTALLING" JQUERY

```
<script src="https://ajax.googleapis.com/ajax/
libs/jquery/3.3.1/jquery.min.js"></script>

<script>
   $(document).ready( function() {
      // jQuery code goes here
   } );
</script>
```

JQUERY SELECTORS

- Basic syntax is: $(selector).action()
  - selector is CSS selector
  - action() is some function to perform
- Examples:
  - $(this)
  - $("p")
  - $(".someClass")
  - $("#someId")
  - $("p.someClass)
  - $("li a")
- See http://api.jquery.com/category/selectors/

EVENTS

- Same as JavaScript events without the "on" prefix.

```
$("p").click( function() {
  alert("Click");
} );
```

- See http://api.jquery.com/category/events/

http://jsfiddle.net/jengelsma/nXgK3/

EFFECTS

- hide(), show(), toggle()

- fadeIn(), fadeOut(), fadeToggle()

- slideUp(), slideDown(), slideToggle()

EFFECTS EXAMPLE (1)

```
<p>If you click me I will disappear.</p>

$(document).ready(function(){
  $("p").click(function(){
    $(this).hide();
  });
});
```

http://jsfiddle.net/jengelsma/kHu9W/

EFFECTS EXAMPLE (2)

```
<p id="showme"> I'm hiding something ... click me to
see it. </p>
<p id="secret" style="display:none">Here's the secret I
was hiding <p>


$("#showme").click(function() {
    $("#secret").slideDown("slow");
});
```

http://jsfiddle.net/jengelsma/9Gk53/

ACCESSING CONTENT

- text([str]) - gets/sets plain text content

- html([str]) - gets/sets HTML markup content

- val([str])) - gets/sets form input value

- attr(attribute[, value]) - gets/sets attribute

CONTENT EXAMPLE

```
<button>Change content of all p elements</button>
<div id="replaceMe"><p>Boring HTML</p></div>

<script>
$(document).ready(function(){
  $("button").click(function(){
    $("div#replaceMe").html("<p><b>Bold HTML</b></p>");
  });
});
</script>
```

http://jsfiddle.net/jengelsma/r7B4s/

FORM EXAMPLE

```
<p>Name: <input id="name" type="text" name="user"></p>
<p>Age: <input id="age" type="text" name="age"></p>
<button>Set form vals</button>

<script>
$(document).ready(function(){
  $("button").click(function(){
    $("input:text#name").val("Glenn Gould");
    $("input:text#age").val("35");
  });
});
</script>
```

http://jsfiddle.net/jengelsma/4Ancc/

ADDING NEW HTML CONTENT

- append() - inserts content at the end of the selected elements

- prepend() - inserts content at the beginning of the selected elements

- after() - inserts content after the selected elements

- before() - inserts content before the selected elements

ADDING CONTENT

```
<b id="something">Hello</b>

$("#something").before("<i>Before</i>");
$("#something").after("<i>After</i>");
$("#something").prepend("Prepend");
$("#something").append("Append");
```

http://jsfiddle.net/jengelsma/eaZ46/

DELETING CONTENT

- remove() - removes an element and its children

- empty() - removes all child elements

CHANGING STYLE

- addClass() - sets a class attribute

- removeClass() - removes a class attribute.

- toggleClass() - toggles between adding/removing.

- css() - sets or returns the style attribute

SIZING

- width()
- height()
- innerWidth() - includes padding
- innerHeight()
- outerWidth() - includes margin
- outerHeight()

JQUERY DIMENSIONS
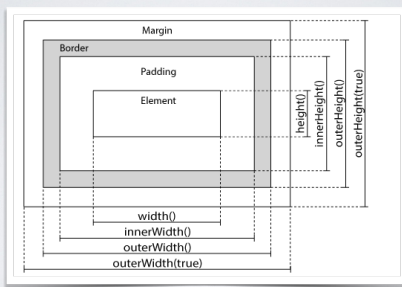
SIZING EXAMPLE

```
<div id="div1" style="height:10px;width:10px;background-
color:blue;"></div>
<br>
<button>Resize Box</button>

<script>
$(document).ready(function(){
  $("button").click(function(){
    $("#div1").width(200).height(200);
  });
});
</script>
```

http://jsfiddle.net/jengelsma/Fa7NB/

READING ASSIGNMENT

- Complete online JavasScript/jQuery tutorials as needed.

  - https://www.w3schools.com/js/default.asp

  - https://www.w3schools.com/jquery/default.asp