Web Development

Technical Summer School 2018, IIT Bombay – Varun Patil

Part 3 – JavaScript

w3schools.com

A great reference, the following heavily influenced from here

JavaScript

- **HTML** to define the content of web pages
- **CSS** to specify the layout of web pages
- **JavaScript** to program the behavior of web pages

"

Java and Javascript are similar like Car and Carpet are similar.

"

Greg Hewgill - https://stackoverflow.com/a/245068

Semantics

- A real programming language
- Scripting, interpreted language – evaluated by line
- Weakly typed or Untyped language
- Syntax similar to C
- Semicolon not necessary, but should be used
- Single and double inverted commas interchangeable
- Use === instead of == for strict comparison
- Case Sensitive

Events - onclick and onmouseover

- onclick – Primary mouse button click
- onmouseover – On hovering over element
- Value of attribute – JavaScript to execute
- https://www.w3schools.com/Jsref/dom_obj_event.asp

alert(message)

- void
- Displays a message box
- How the message box looks – depends on browser
- Cannot be customized
- Blocking call

Events - Some Examples

```html
<button onclick="alert('Hello from Javascript');">
    Hey
</button>

<button onclick="alert(2 + 5);">
    Two Plus Five
</button>

<button onclick="alert(new Date().toDateString());">
    What is the date?
</button>

<button onclick="document.getElementById('image').src = 'pic.png';">
    Show me!
</button> <br>
<img id="image">
```

Syntax - Functions

```
function myFunction(p1, p2) {
    return p1 * p2;
}
myFunction(9, 7) === 63

function toCelsius (fahrenheit) {
    return (5/9) * (fahrenheit - 32);
}
var x = 25 + toCelsius(77);
```

Separating Scripts

```
<head>
    <script>
        function sayHey() {
            alert("Hello World");
        }
    </script>
</head>

<button onclick="sayHey()"> Hey </button>
```

Separating Scripts

```html
<script>
    function sayHey(username) {
        alert("Hello " + username + "!");
    }
</script>

<button onclick="sayHey('IIT Bombay Student')">
    Hey Student
</button>

<button onclick="sayHey(document.getElementById('name').value)">
    Hey
</button>

<input type="text" id="name">
```

Separating Scripts

```html
<script>
    function getName() {
        return document.getElementById('name').value;
    }

    function sayHey() {
        alert("Hello " + getName() + "!");
    }
</script>

<button onclick="sayHey()">
    Hey
</button>

<input type="text" id="name">
```

JavaScript Files

```html
<!-- index.html -->
<head>
    <script type="text/javascript" src="hello.js"> </script>
</head>
```

```javascript
/* hello.js */
function getName() {
    return document.getElementById('name').value;
}

function sayHey() {
    alert("Hello " + getName() + "!");
}
```

Syntax - Variables

```javascript
var x, y;            // How to declare variables
x = 5; y = 6;        // How to assign values
z = x + y;           // How to compute values
```

Syntax - Strings

```
var x, y;
x = "Alice";
y = "Bob";

var z = x + " " + y;
```

Syntax – Operators

```
(5 + 6) * 10
var y = x * 10

+, -, *, /, %, ++, --

=, +=, -=, *=, /=, %=
```

Syntax - Data Types

```javascript
var length = 16;                              // Number
var lastName = "Johnson";                     // String
var x = {firstName:"John", lastName:"Doe"};   // Object


var x;                     // Now x is undefined
x = 5;                     // Now x is a Number
x = "John";                // Now x is a String
```

Syntax - Objects and Arrays

```javascript
var cars = ["Saab", "Volvo", "BMW"];

var person = {
    firstName:"John",
    lastName:"Doe",
    age:50,
    eyeColor:"blue"
};

cars[1] === "Volvo"; person.age === 50;
```

Syntax - Functions

```
function myFunction(p1, p2) {
    return p1 * p2;
}
myFunction(9, 7) === 63

function toCelsius (fahrenheit) {
    return (5/9) * (fahrenheit - 32);
}
var x = 25 + toCelsius(77);
```

Syntax – Functions (aliter)

```
var myFunction = function(p1, p2) {
    return p1 * p2;
}
myFunction(9, 7) === 63
```

Syntax - this keyword

```javascript
var person = {
    firstName: "John",
    lastName : "Doe",
    id       : 5566,
    fullName : function() {
        return this.firstName + " " + this.lastName;
    }
};

Person.fullName() === "John Doe"
```

Syntax – variable scope

```
// code here can not use carName

function myFunction() {
    var carName = "Volvo";

    // code here can use carName

}
```

Syntax – Comparisons/Conditions

- ==, ===, !=, !==, >, <, >=, <=

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

```
if (age >= 18) {
    alert("You may vote");
} else {
    alert("Too young!");
}
```

Syntax - Conditions

```
if (time < 10) {
    greeting = "Good morning";
} else if (time < 20) {
    greeting = "Good day";
} else {
    greeting = "Good evening";
}
```

Syntax – Multiple Conditions

```javascript
if (animal === "dog" && color === "brown") {
  alert("I have a brown doggie");
} else {
  alert("Don't have a brown doggie");
}
```

Syntax - Booleans

```
warm = true;
fresh = false;

if (warm || fresh) {
    // Food is warm or fresh or both
}
```

Syntax – For Loop

```
cars = [
    "Mercedes", "Volvo", "Suzuki",
    "Hyundai", "Ford", "Ferrari"
]

var names = "";
names += cars[0] + " "; names += cars[1] + " ";
names += cars[2] + " "; names += cars[3] + " ";
names += cars[4] + " "; names += cars[5] + " ";
```

Syntax – For Loop

```
cars = [
    "Mercedes", "Volvo", "Suzuki",
    "Hyundai", "Ford", "Ferrari"
]

var names = "";
var i;
for (i = 0; i < cars.length; i++) {
    names += cars[i] + " ";
}
```

Syntax – While Loop

```
var i = 0;

while (i < 10) {
    toshow += "The number is " + i;
    i++;
}
```

Syntax - Other

- **break** in loop

- **continue** in loop

- typeof "John"   // Returns "string"

JavaScript Object Notation

```
var companyData = {
    "employees": [
        {"firstName":"John", "lastName":"Doe"},
        {"firstName":"Anna", "lastName":"Smith"}
    ],
    "employers": [
        {"name":"Bill Gates", "pos":"Chairman"}
    ]
}
```

`document.getElementById(id)`

- Gets an element by its id
- Returns a **native element**

Exercise – Say Hello!

- `document.getElementById('name')`
- `input` HTML tag
- Native element property `value`
- String concatenation - `'One' + 'Two' === 'OneTwo'`

Exercise - MyOwnCalculator

- `document.getElementById('name')`
- `input` HTML tag
- Native element property `value`
- Only numbers allowed as input
- Weakly typed JavaScript – use `Number()`
- Native element property `innerHTML`

Changing Styles

```
document.getElementById("result").innerHTML = "White Text in Red";
document.getElementById("result").style.color = "white";
document.getElementById("result").style.backgroundColor = "red";


        var elem = document.getElementById("result");
        elem.innerHTML = "White Text in Red";
        elem.style.color = "white";
        elem.style.backgroundColor = "red";
```

window

```javascript
var elem = document.getElementById("name");
var input = elem.value.toLowerCase();

if (input === "google") {
    window.location = "https://google.com";
} else if (input === "facebook") {
    window.open("https://fb.com");
} else {
    alert("Unknown website " + input);
}
```

Creating DOM Elements

```javascript
var para = document.createElement("p");

var node = document.createTextNode("This is new.");
para.appendChild(node);

var elem = document.getElementById("result");
elem.appendChild(para);

// elem.removeChild(para);
```

Accessing by tag

```
var x = document.getElementsByTagName("p");
y = x[1];
y.innerHTML = "changed";
```

Libraries

- Reuse code
- Verbose JavaScript API
- Things already done for you

jQuery

```html
<!-- index.html -->
<head>
    <script type="text/javascript"
            src="https://ajax.googleapis.com/ajax/libs/jquery/3.3.1/jquery.min.js">
    </script>
</head>
```

```javascript
document.getElementById("result").innerHTML = "changed";

$("#result").html("changed");
```

jQuery Examples

```
$("#hide").click(function() {
    $("p").hide();
});

$("#show").click(function(){
    $("p").show();
});

$(".fader").click(function(){
    $("#div1").fadeIn();
    $("#div2").fadeIn(3000);
});
```

jQuery Examples

```
var elem = $("#result");

elem.html("changed");
elem.hide();
elem.css("background-color", "green");
elem.fadeIn(3000);
```

Thank You!