JavaScript: Introduction

PV219, spring 2023

Agenda

Agenda

- JS JSON
- JS Functions
- JS Operators
- JS Inspect Elements (Chrome, Firefox, IE)
- JQuery
- DEMO

Introduction

- JavaScript is the world's most popular programming language. It is the language for HTML and the web, for servers, PCs, laptops, tablets, smart phones, and more.
- A scripting language is a lightweight programming language.
- JavaScript is programming code that can be inserted into HTML pages.
- JavaScript inserted into HTML pages, can be executed by all modern web browsers.
- JavaScript is easy to learn.

How TO

- JavaScripts in HTML must be inserted between <script> and </script> tags.

```
<script>
alert("My First JavaScript");
</script>
```

- JavaScript can be put in the <body> and in the <head> section of an HTML page.

```
<script>
document.write("<h1>This is a heading</h1>");
document.write("<p>This is a paragraph</p>");
</script>
```

OUTPUT

- JavaScript is typically used to manipulate HTML elements.

```
<p id="demo">My First Paragraph</p>
<script>
document.getElementById("demo").innerHTML="
My First JavaScript";
</script>
```

Statements

- JavaScript is a sequence of statements to be executed by the browser.
- JavaScript statements are "commands" to the browser.
- The purpose of the statements is to tell the browser what to do.
- JavaScript code (or just JavaScript) is a sequence of JavaScript statements.
- Each statement is executed by the browser in the sequence they are written.

Statements

- Semicolon ;
  - Semicolon separates JavaScript statements.
  - Normally you add a semicolon at the end of each executable statement.
  - Using semicolons also makes it possible to write many statements on one line.

```
document.getElementById("demo").innerHTML="
Hello Dolly";
document.getElementById("myDIV").innerHTML=
"How are you?";
```

Statements

- JavaScript is Case Sensitive
  - Watch your capitalization closely when you write JavaScript statements:
    - A function getElementById is not the same as getElementbyID.
    - A variable named myVariable is not the same as MyVariable.

Statements

- Block Statement

```
{
   statement_1;
   statement_2;
   .
   .
   .
   statement_n;
}
```

- Example

```
while (x < 10){
  x++;
}
```

Statements

- Conditional Statements
  - if...else Statement
  - switch Statement

```
if (condition)
  statement_1
[else
  statement_2]
```

```
switch (expression) {
   case label_1:
      statements_1
      [break;]
   case label_2:
      statements_2
      [break;]
   ...
   default:
      statements_def
      [break;]
}
```

Statements

- LOOPS
  - for Statement
  - do...while Statement
  - while Statement
  - break Statement
  - continue Statement

Statements

- Object Manipulation Statements
  - for...in Statement

```
var obj = {make:"BMW", model:"2013"}
function dump_props(obj, obj_name) {
   var result = "";
   for (var i in obj) {
      result += obj_name + "." + i + " = "
+ obj[i] + "<br>";
   }
   return result;
}
document.write(dump_props(obj,"obj"));
```

Comments

- Comments will not be executed by JavaScript.
- Comments can be added to explain the JavaScript, or to make the code more readable.
- Single line comments start with //.
- Multi line comments start with /* and end with */.

Comments

```
// Write to a heading
document.getElementById("myH1").innerHTML="Welcome to my
Homepage";

/*
The code below will write
to a heading and to a paragraph,
and will represent the start of
my homepage:
*/
document.getElementById("myH1").innerHTML="Welcome to my
Homepage";

var x=5;    // declare x and assign 5 to it
```

Variables

- JavaScript variables are "containers" for storing information.
- As with algebra, JavaScript variables can be used to hold values (x=5) or expressions (z=x+y).
- Variable can have short names (like x and y) or more descriptive names (age, sum, totalvolume).
  - Variable names must begin with a letter
  - Variable names can also begin with $ and _ (but we will not use it)
  - Variable names are case sensitive (y and Y are different variables)

```
var money;
var name;
```

Variables

- JavaScript Data Types

```
var name = "Ali";
var money;
money = 2000.50;
```

- Global & Local Variables

```
var myVar = "global"; // Declare a global variable
function checkscope( ) {
   var myVar = "local";  // Declare a local variable
   document.write(myVar);
}
```

Variables

- One Statement, Many Variables

```
var lastname=”Ahmad", age=30,
job="carpenter";

var lastname=”Mohammad",
age=30,
job=”Engineer";
```

- Value = undefined
  - In computer programs, variables are often declared without a value. The value can be something that has to be calculated, or something that will be provided later, like user input. Variable declared without a value will have the value undefined.

```
var lastname;
```

Data Types

- String, Number, Boolean, Array, Object, Null, Undefined.
- JavaScript has dynamic types. This means that the same variable can be used as different types:

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

Data Types

- JavaScript Booleans
  - Booleans can only have two values: true or false.

```
var x=true;
var y=false;
```

- JavaScript Arrays

```
var arr = new Array();
arr[0] = ”item 1";
arr[1] = ”item 2";

var arr = new Array(”item1",”item2”);
var arr = [“item1", “item2"];
```

Data Types

- JavaScript Objects
  - An object is delimited by curly braces. Inside the braces the object's properties are defined as name and value pairs (name : value). The properties are separated by commas:

```
var person={firstname:”James",
lastname:”Bond", id:9999};

var person={
firstname : ”James",
lastname  : ”Bond",
id        :  9999
};
```

Objects

- JavaScript is designed on a simple object-based paradigm. "Everything" in JavaScript is an Object: a String, a Number, an Array, a Date....
- In JavaScript, an object is data, with properties and methods.
  - Properties are values associated with objects.
  - Methods are actions that objects can perform.

Objects

- Accessing Object Properties

```
objectName.propertyName
```

- Accessing Object Methods

```
objectName.methodName()
```

Objects

- Objects in JavaScript, just as many other programming languages, can be compared to objects in real life.

```
var myCar = new Object();
myCar.make = "Ford";
myCar.model = "Mustang";
myCar.year = 1969;
```

```
myCar.make
myCar[“make”]
```

Objects

```
var myCar = {make:"BMW",model:"s2013",year:"2013"}

function showProps(obj, objName) {
  var result = "";
  for (var i in obj) {
    if (obj.hasOwnProperty(i)) {
        result += objName + "." + i + " = " + obj[i] +
"\n";
    }
  }
  return result;
}

alert(showProps(myCar,"myCar"))
```

Arrays

- The JavaScript Array global object is a constructor for arrays, which are high-level, list-like objects.
- Arrays are list-like objects that come with a several built-in methods to perform traversal and mutation operations. Neither the size of a JavaScript array nor the types of its elements are fixed. Since an array's size can grow or shrink at any time, JavaScript arrays are not guaranteed to be dense.

Arrays

```
<!DOCTYPE html>
<html>
<head>
</head>
<body>
<script>
var years = [1950, 1960, 1970, 1980, 1990, 2000, 2010];
console.log(years[0]);
</script>
</body>
</html>
```

JSON

- JSON is a subset of the object literal notation of JavaScript. Since JSON is a subset of JavaScript, it can be used in the language

```
var myJSONObject = {"bindings": [
        {"ircEvent": "PRIVMSG", "method":
"newURI", "regex": "^http://.*"},
        {"ircEvent": "PRIVMSG", "method":
"deleteURI", "regex": "^delete.*"},
        {"ircEvent": "PRIVMSG", "method":
"randomURI", "regex": "^random.*"}
    ]
};
```

```
myJSONObject.bindings[0].method    // "newURI"
```

Functions

- Function is a "subprogram" that can be called by code external (or internal in the case of recursion). Like the program itself, a function is composed of a sequence of statements called the function body. Values can be passed to a function, and the function can return a value.
- Every function in JavaScript is actually a Function object.

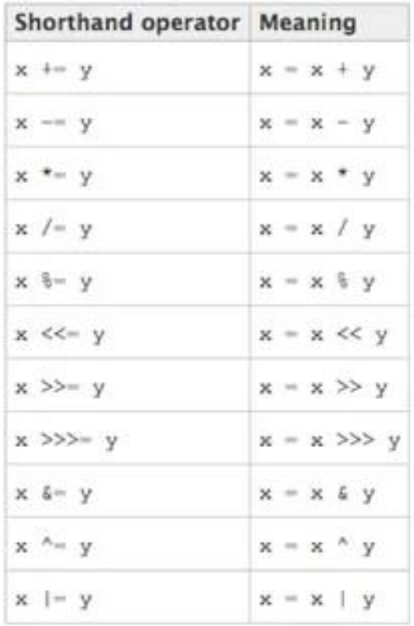
Functions

```
/* Declare the function 'myFunc' */
 function myFunc(theObject)
 {
   theObject.brand = "Toyota";
 }

 /*
  * Declare variable 'mycar';
  * create and initialize a new Object;
  * assign reference to it to 'mycar'
  */
 var mycar = {
   brand: "Honda",
   model: "Accord",
   year: 1998
 };

 /* Shows 'Honda' */
 window.alert(mycar.brand);

 /* Pass object reference to the function */
 myFunc(mycar);

 /*
  * Shows 'Toyota' as the value of the 'brand' property
  * of the object, as changed to by the function.
  */
 window.alert(mycar.brand);
```

Operators

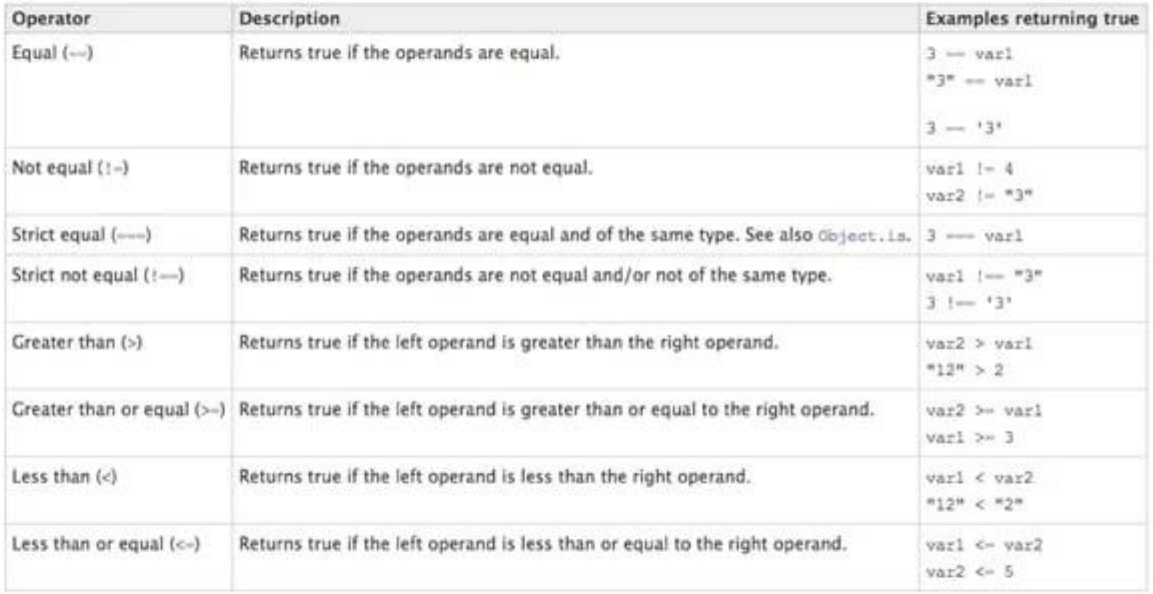
- Assignment operators
- Comparison operators
- Arithmetic operators
- Bitwise operators
- Logical operators
- String operators
- Special operators

Operators: Assignment



Shorthand operator	Meaning
x += y	x = x + y
x -= y	x = x - y
x *= y	x = x * y
x /= y	x = x / y
x %= y	x = x % y
x <<= y	x = x << y
x >>= y	x = x >> y
x >>>= y	x = x >>> y
x &= y	x = x & y
x ^= y	x = x ^ y
x |= y	x = x | y

Operators: Comparison



Operator	Description	Examples returning true

Equal (`==`)	Returns true if the operands are equal.	`3 == var1`
		`"3" == var1`
		`3 == '3'`

Not equal (`!=`)	Returns true if the operands are not equal.	`var1 != 4`
		`var2 != "3"`

Strict equal (`===`)	Returns true if the operands are equal and of the same type. See also `Object.is`.	`3 === var1`

Strict not equal (`!==`)	Returns true if the operands are not equal and/or not of the same type.	`var1 !== "3"`
		`3 !== '3'`

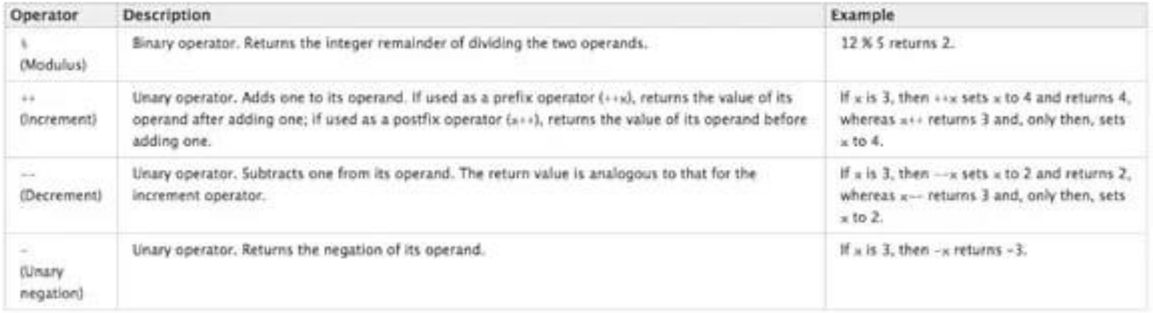
Greater than (`>`)	Returns true if the left operand is greater than the right operand.	`var2 > var1`
		`"12" > 2`

Greater than or equal (`>=`)	Returns true if the left operand is greater than or equal to the right operand.	`var2 >= var1`
		`var1 >= 3`

Less than (`<`)	Returns true if the left operand is less than the right operand.	`var1 < var2`
		`"12" < "2"`

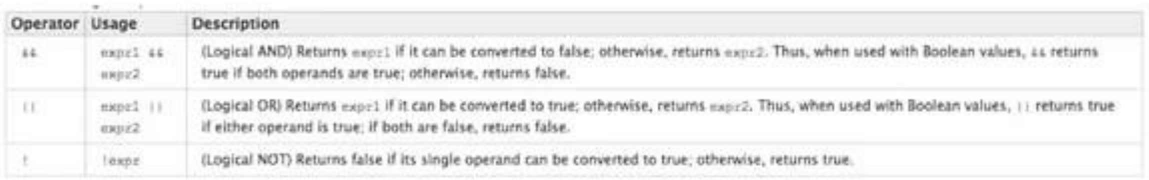
Less than or equal (`<=`)	Returns true if the left operand is less than or equal to the right operand.	`var1 <= var2`
		`var2 <= 5`

Operators: Arithmetic



Operator	Description	Example
% (Modulus)	Binary operator. Returns the integer remainder of dividing the two operands.	12 % 5 returns 2.
++ (Increment)	Unary operator. Adds one to its operand. If used as a prefix operator (++x), returns the value of its operand after adding one; if used as a postfix operator (x++), returns the value of its operand before adding one.	If x is 3, then ++x sets x to 4 and returns 4, whereas x++ returns 3 and, only then, sets x to 4.
-- (Decrement)	Unary operator. Subtracts one from its operand. The return value is analogous to that for the increment operator.	If x is 3, then --x sets x to 2 and returns 2, whereas x-- returns 3 and, only then, sets x to 2.
- (Unary negation)	Unary operator. Returns the negation of its operand.	If x is 3, then -x returns -3.

Operators: Logical



Operator	Usage	Description
`&&`	`expr1 && expr2`	(Logical AND) Returns `expr1` if it can be converted to false; otherwise, returns `expr2`. Thus, when used with Boolean values, `&&` returns true if both operands are true; otherwise, returns false.
`||`	`expr1 || expr2`	(Logical OR) Returns `expr1` if it can be converted to true; otherwise, returns `expr2`. Thus, when used with Boolean values, `||` returns true if either operand is true; if both are false, returns false.
`!`	`!expr`	(Logical NOT) Returns false if its single operand can be converted to true; otherwise, returns true.