

The JavaScript Language

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Language Elements

- Variables
- Literals
- Operators
- Control Structures
- Functions
- Objects

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Javascript Variables

- Untyped!
- Can be declared with var keyword:
`var foo;`
- Can be created automatically by assigning a value:
`foo=1; blah="Hi Dave";`

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Variables (cont.)

- Using `var` to declare a variable results in a *local* variable (inside a function).
- If you don't use `var` – the variable is a global variable.

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Literals

- The typical bunch:
 - Numbers `17` `123.45`
 - Strings `"Hello Dave"`
 - Boolean: `true` `false`
 - Arrays: `[1, "Hi Dave", 17.234]`


Arrays can hold anything!

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Arrays

- We will look at Arrays in more detail a bit later.
- Arrays are actually Javascript Objects.
- The only thing special in the language to support arrays is the syntax for literals...

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Operators

- Arithmetic, comparison, assignment, bitwise, boolean (pretty much just like C++).

`+ - * / % ++ -- == != > <`
`&& || ! & | << >>`

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Different than C++

- The + operator is used for addition (if both operands are numbers)

-or-

- The + operator means string concatenation (if either one of the operands is not a number)

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Control Structures

- Again – pretty much just like C:
`if if-else ?: switch`

`for while do-while`

- And a few not in C
`for (var in object)`

`with (object)`

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Javascript Functions

- The keyword **function** is used to define a function (subroutine):

```
function add(x,y) {  
    return(x+y);  
}
```

- No type is specified for arguments!

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Quiz: What is the value of:

```
add(3,4)           7  
add("3","4")      7  
add("Hi","Dave")  "HiDave"  
add(3,"Hi")       "3Hi"  
add("2.13blah",3.14) "2.13blah3.14"
```

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Javascript program to make sure

```
<SCRIPT>  
function add(x,y) {  
    return(x+y);  
}  
  
document.write("add(3,4) is " + add(3,4) + "<BR>");  
document.write("add(\"3\", \"4\") is " + add("3","4") +  
    "<BR>");  
document.write("add(\"Hi\", \"Dave\") is " +  
    add("Hi","Dave") + "<BR>");  
document.write("add(3, \"Hi\") is " + add(3,"Hi") +  
    "<BR>");  
document.write("add(\"2.13blah\", 3.14) is " +  
    add("2.13blah", 3.14));  
</SCRIPT>
```

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Recursion is supported

```
function factorial(x) {  
  // use <= 0 instead of < 0  
  // to avoid problems with neg numbers  
  
  if (x<=0)  
    return(1);  
  else  
    return( x * factorial(x-1));  
}  
  
document.write("<H3>11! = " +  
  factorial(11) + "</H3>");
```

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Objects

- Objects have attributes and methods.
- Many pre-defined objects and object types.
- Using objects follows the syntax of C++/Java:
`objectname.attributename`
`objectname.methodname()`

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The **document** object

- Many attributes of the current document are available via the **document** object:

Title	Referrer
URL	Images
Forms	Links
Colors	

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document Methods

- `document.write()` like a print statement – the output goes into the HTML document.
- `document.writeln()` adds a newline after printing.

```
document.write("My title is" +  
document.title);
```

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Example

```
<HEAD>  
<TITLE>JavaScript is Javalicious</TITLE>  
</HEAD>  
<BODY>  
<H3>I am a web page and here is my  
name:</H3>  
<SCRIPT>  
document.write(document.title);  
</SCRIPT>  
<HR>
```

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The navigator Object

- Represents the browser. Read-only!
- Attributes include:

```
appName  
appVersion  
platform
```

*often used to determine
what kind of browser is
being used
(Netscape vs. IE)*

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navigator Example

```
if (navigator.appName ==  
    "Microsoft Internet Explorer") {  
    document.writeln("<H1>This page  
requires Netscape!</H1>");  
}
```

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The window Object

- Represents the current window.
- There are possible many objects of type **Window**, the predefined object **window** represents the current window.
- Access to, and control of, a number of properties including position and size.

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window attributes

- **document**
- **name**
- **status** the status line
- **parent**

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some **window** methods

```
alert()  
close()  
prompt()  
moveTo()  moveBy()  
open()  
scroll()  scrollTo()  
resizeBy()  resizeTo()
```

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The **Math** Object

- Access to mathematical functions and constants.
- Constants: **Math.PI**
- Methods:
Math.abs(), **Math.sin()**,
Math.log(), **Math.max()**,
Math.pow(), **Math.random()**,
Math.sqrt(), ...

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Math object in use

```
// returns an integer between 1 and 6  
function roll() {  
  var x = Math.random();  
  
  // convert to range [0,6.0)  
  x = x * 6;  
  // add 1 and convert to int  
  return parseInt(1+x );  
}  
  
document.writeln("Roll is " + roll() );
```

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Array Objects

- Arrays are supported as objects.
- Attribute **length**
- Methods include:
`concat join pop push reverse sort`

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Some similarity to C++

- Array indexes start at 0.
- Syntax for accessing an element is the same:

```
a[3]++;  
blah[i] = i*72;
```

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New Stuff (different than C++)

- Arrays can grow dynamically – just add new elements at the end.
- Arrays can have *holes*, elements that have no value.
- Array elements can be anything – numbers, strings, or arrays!

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Creating Array Objects

- With the **new** operator and a size:
`var x = new Array(10);`
- With the new operator and an initial set of element values:
`var y = new Array(18,"hi",22);`
- Assignment of an *array literal*
`var x = [1,0,2];`

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Arrays and Loops

```
var a = new Array(4);

for (i=0;i<a.length;i++) {
  a[i]=i;
}

for (j in a) {
  document.writeln(j);
}
```

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Another Example

```
var colors = [ "blue",
               "green",
               "yellow"];

var x = window.prompt("enter a
number");

window.bgColor = colors[x];
```

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Array of Arrays

- Javascript does not support 2-dimensional arrays (as part of the language).
- BUT – each array element can be an array.
- Resulting syntax looks like C++!

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Array of Arrays Example

```
var board = [ [1,2,3],  
              [4,5,6],  
              [7,8,9] ];
```

```
for (i=0;i<3;i++)  
  for (j=0;j<3;j++)  
    board[i][j]++;
```

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