



Understanding JavaScript and Coding Essentials

Vyacheslav Koldovskyy
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Agenda

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- How to include JS Code into HTML
- Comments
- Variables
- Data Types
- Type Casting
- Functions in JS
- Input and Output
- JS Code Processing
- Declaration and Expression

Basic Information about JavaScript

Basic information

JavaScript – dynamic computer programming language.

It is most commonly used as part of **web browsers**, whose implementations allow **client-side** to interact with the user, control the browser and asynchronously communicate with server-side.

JavaScript syntax was influenced by **C**.

Basic information

JS take many names and naming conventions from **Java**, but the two languages are otherwise unrelated and have very different semantics. [1]

JavaScript is a **prototype-based** scripting language with dynamic typing. [2]

JS supported object-oriented, imperative and functional programming styles. [3]

How to include JS Code into HTML

Including of JavaScript

Exist three ways to include script into HTML page:

- **Inline in HTML** [1]
- **Inside tag <script>** [2]
- **In separate file** [3]

Inline including

```
<button onclick = "f();" >... </button>
```

Unfortunately, this is the worst solution. Holistic code will be broken into smaller parts. Such parts are difficult to test and maintain. :(

Inside tag <script>

```
<script>  
  f() ;  
</script>
```

Sometimes it makes sense.

But in the general case, page size will be increased and, as a result, its performance reduced.

In separate file

```
<script src = "somewhere.js"></script>
```

This is the best way.

Code is holistic. It's easy to test and maintain.

In addition, separated files are cached by the browser.

This improves performance. :)

Comments

Comments

Comments - part of the program text which will be ignored by language interpreter [1]

- The `/*` characters, followed by any sequence of characters (including new lines), followed by the `*/` characters. [2]
- The `//` characters, followed by any sequence of characters, but only in current line. Therefore, it is commonly called a "single-line comment." [3]

Variables

Variables

Variable – symbolic name associated with a value and whose associated value may be changed. [1]

Declaration – process of variable's specifying. Usually declaration consist of defining: type, name and default value of variable. [2]

A process in which a variable is set to its first value is called **initialization**. [3]

Declaration and initialization

var – special keyword for declaration of variables [1]
In JavaScript

```
var variable; //declaration [2]  
variable = 10; //initialization
```

Or quickly

```
var variable = 10; [3]
```

Global and local

JavaScript has two types of variables:

- **global** – exist in memory and is available at all times of the program. In JS it's a variables of page. [1]
- **local** – exist in memory and is available only in block when variable is defined. In JS it's defined in function variables. [2]

Data Types

Data types

JavaScript have 6 base data types:

- **Number** – scalar type for integer and real digits
- **Boolean** – scalar type for logical values
- **String** – special type for work with text information
- **Undefined** – special type for uninitialized variables
- **Null** – special type for "cleaning" of variables
- **Object** – complex type for service and user needs

Number, Boolean and String

```
var n = 10; or var n = Number(10);  
//number values for example: -1, 10, 3.14, Nan, Infinity
```

[1]

```
var b = true; or var b = Boolean(true);  
//boolean values: true and false
```

[2]

```
var s = "text"; or var s = String("text");  
//string values for example: "", "text", 'text'
```

[3]

Null and Undefined

```
var n = null;  
//null variables can have only null value
```

```
var u;  
// created and uninitialized
```

[1]

And **Object** type... but it will be reviewed in future :)

Type Casting

Type casting

Exist two types of casting:

```
var a, b, c;  
a = 10;  
b = true;  
c = a + b;
```

[1] Explicit 

 Implicit [2]

```
var a, b, c;  
a = 10;  
b = true;  
c = a + Number(b);
```

But both ways given **c =11** as a result! [3]

Type casting

Base rules of typing casting:

- [1] ▪ All scalar types try to convert itself to largest scalar type: *Boolean* to *Number*, *Number* to *String*.
- [2] ▪ If *Boolean* converted to *String* it at first converted to *Number* and after them *Number* to *String*.
- [3] ▪ In mathematical operations (excluding $+$) *String* should be converted to *Number*.
- [4] ▪ *Null* and *Undefined* converted to *String* as “null” and “undefined”, and to *Number* as a 0 and NaN

Functions in JS

Basic Information

In mathematics:

Function is a relation between a set of inputs and a set of permissible outputs. [1]

$$y = f(x)$$

[2]

In classical programming

Function is a named part of a code that performs a distinct service. [3]

Example

```
var i, base, power, result;      [1]
base = 2; power = 2; result = 1; [2]
for(i = 0; i < power; i++) {    [3]
    result *= base;
}
console.log(result);           [4]
base = 3; power = 4; result = 1;
for(i = 0; i < power; i++) {    [5]
    result *= base;
}
console.log(result);
```

Declaration of function

function is a special keyword for creation of function in JavaScript. [1]

```
function name () {  
    body; [2]  
}
```

Example

```
var i, base, power, result;
```

```
base = 2; power = 2; result = 1;
```

```
for(i = 0; i < power; i++) {
```

```
    result *= base;
```

```
}
```

```
console.log(result);
```

```
base = 3; power = 4; result = 1;
```

```
for(i = 0; i < power; i++) {
```

```
    result *= base;
```

```
}
```

```
console.log(result);
```

Example

```
function pow () {  
    result = 1;  
    for (var i = 0; i < power; i++) {  
        result *= base;  
    }  
}
```

Function call

Call – operation for execution of function. [1]

() – operator for this action. [2]

Usually function can be **called** by name. [3]

Example

```
var base, power, result;

base = 2; power = 2;
pow();
console.log(result);

base = 3; power = 4;
pow();
console.log(result);

function pow () {
    result = 1;
    for(var i = 0; i < power; i++) {
        result *= base;
    }
}
```

Input and Output

Input and Output

```
function name (a, b) {  
    return a + b; [1]  
}
```

* you can return one value only [2]

* **return** always interrupts the execution. [3]

* place your **return** at the end of a function

[3]

Example

```
function pow () {  
    result = 1;  
    for (var i = 0, i < power; i++) {  
        result *= base;  
    }  
}
```

Example

```
function pow (base, power) {  
    var result = 1;  
    for (var i = 0, i < power; i++) {  
        result *= base;  
    }  
    return result;  
}
```

Example

```
var out;  
  
out = pow(2, 2);  
console.log(out);  
  
out = pow(3, 4);  
console.log(out);  
  
function pow (base, power) {  
    var result = 1;  
    for(var i = 0; i < power; i++) {  
        result *= base;  
    }  
    return result;  
}
```

JS Code Processing

Code processing

```
var a = 10;  
test();  
function test () {  
    a = 30;  
    var b = 40;  
}  
var b = 20;  
console.log(a, b);
```

Code processing

```
var a = 10;  
test();
```

```
1. function test () {
```

```
    a = 30;
```

```
    var b = 40;
```

```
}
```

```
var b = 20;
```

```
console.log(a, b);
```

Code processing

2. `var a = 10;`

`test();`

1. `function test () {`

`a = 30;`

`var b = 40;`

`}`

3. `var b = 20;`

`console.log(a, b);`

Code processing

2. `var a = 10;`

4. `test();`

1. `function test () {`

`a = 30;`

5. `var b = 40;`

`}`

3. `var b = 20;`

6. `console.log(a, b);`

Code processing

2. `var a = 10;`

4. `test();`

1. `function test () {`

`a = 30; 5.2`

5. `var b = 40; 5.1`
`}`

3. `var b = 20;`

6. `console.log(a, b);`

Declaration and Expression

Declaration and Expression

```
function name () {  
    body;  
}
```

[1]

```
var name = function () {  
    body;  
};
```

[2]

Additional Facts About Functions

Functions in JavaScript are Objects.

[1]

As a result, functions are accessible by reference.

[2]

Functions can be used as a parameter in other function.

[3]

References to functions can be saved in any other variable.

[4]

Practice Task

Contacts

Europe Headquarters

52 V. Velykoho Str.
Lviv 79053, Ukraine

Tel: +380-32-240-9090

Fax: +380-32-240-9080

E-mail: info@softserveinc.com

Website: www.softserveinc.com

US Headquarters

12800 University Drive, Suite 250
Fort Myers, FL 33907, USA

Tel: 239-690-3111

Fax: 239-690-3116

Thank You!