



Introduction to JavaScript



Functions

JavaScript Functions



A JavaScript function is a block of code designed to perform a particular task.

A JavaScript function is executed when "something" invokes it (calls it).

Inside the function, the arguments are used as local variables.

```
functionName (parameter1, parameter2, parameter3) {  
    code to be executed  
}
```

JavaScript Functions

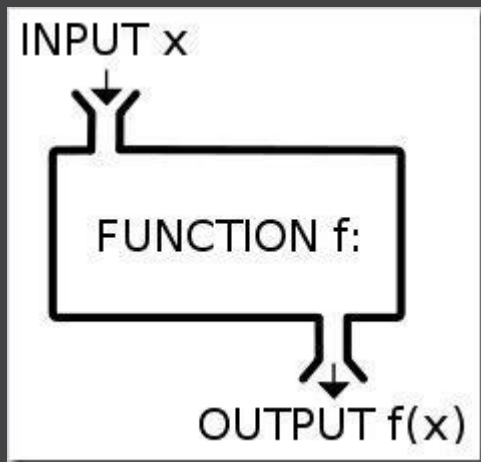


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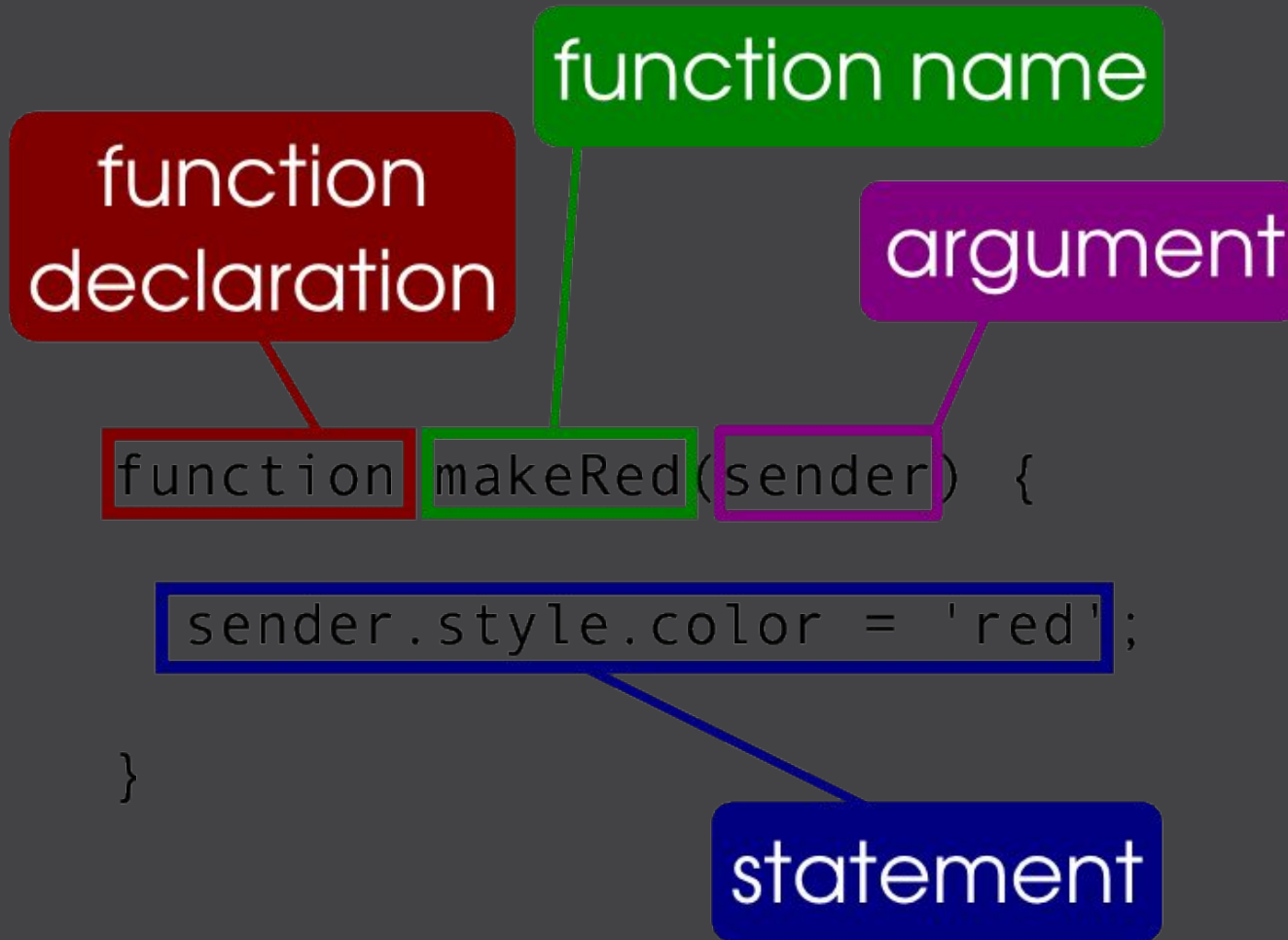
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functionName (parameter1, parameter2, parameter3) {  
    code to be executed  
}
```



```
function myFunction (p1, p2) {  
    return p1 * p2;  
}
```

```
var x = myFunction (5, 10);  
console.log (x);
```

Functions



Functions



Invocation:

- When an **event occurs** (when a user clicks a button)
- When it is invoked (called) **from JavaScript code**
- Automatically (**self invoked**)

Functions



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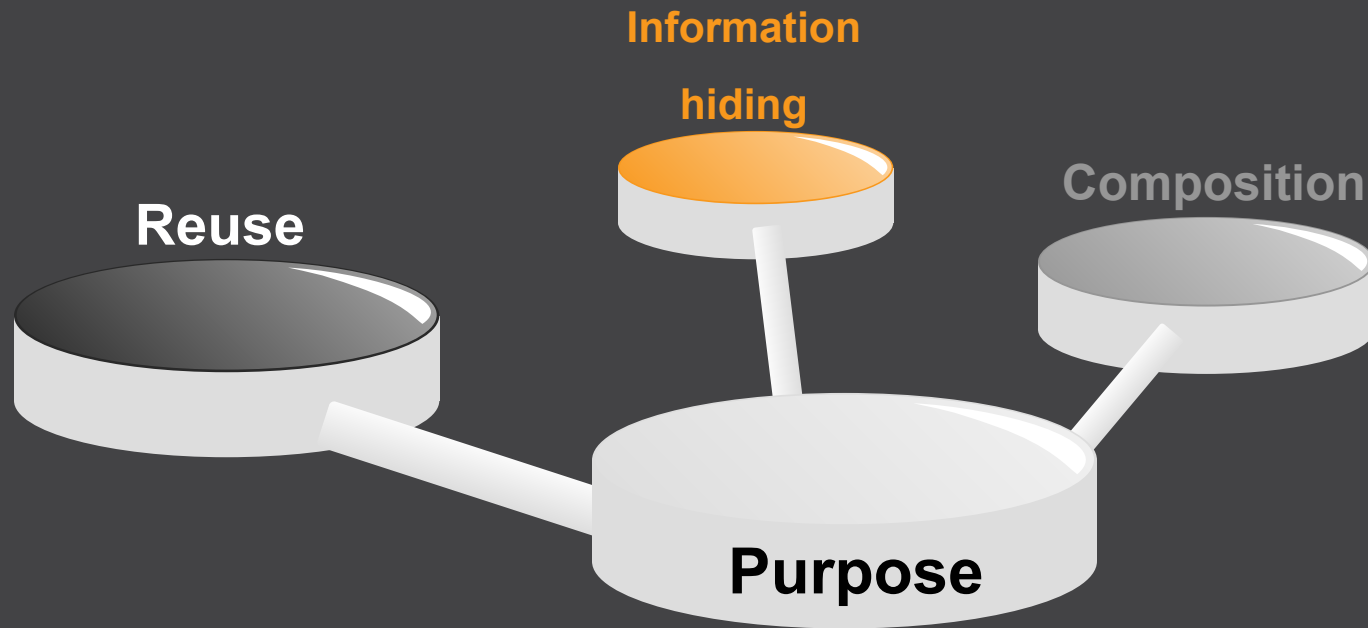
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Return:

When JavaScript reaches a **return statement**, the function will stop executing.

The return value is "returned" back to the "caller".

Function Purpose



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JavaScript functions are **defined** with the **function** keyword.

You can use a function **declaration** or a function **expression**.

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A function expression can be stored in a variable:

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You can use a function **declaration** or a function **expression**.

A function expression can be stored in a variable:

```
var x = function (a, b) {return a * b};
```

After a function expression has been stored in a variable, the variable can be used as a function:

```
var z = x(4, 3);
```

The function above is actually an **anonymous function** (a function without a name).

Function Definition



The Function() Constructor:

```
var myFunction = new Function("a", "b", "return a * b");
```

```
// the same
```

```
var myFunction = function (a, b) {return a * b};
```

Function Definition



The Function() Constructor: Anti-pattern



Function Definition



Try:

```
// v 1.1
function foo (a, b) {
  return a * b;
}
var z = foo (4, 3);
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```
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function foo (a, b) {
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}
console.log(z);
```


Function Definition



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function foo (a, b) {
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}
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```

```
// v 1.3
var x = function (a, b) {return a * b};
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Function Definition



Try:

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```

```
// v 1.4
var z = x(4, 3);
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```

Function Definition



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WTF?

Hoisting



Hoisting is JavaScript's default behavior of moving **declarations** to the top of the current scope.

```
x = 5; // Assign 5 to x
elem = document.getElementById("demo");
elem.innerHTML = x;
var x; // Declare x
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JavaScript only hoists declarations, not initializations.

```
var x = 5; // Initialize x
elem = document.getElementById("demo");
elem.innerHTML = x + " " + y;
var y = 7; // Initialize y
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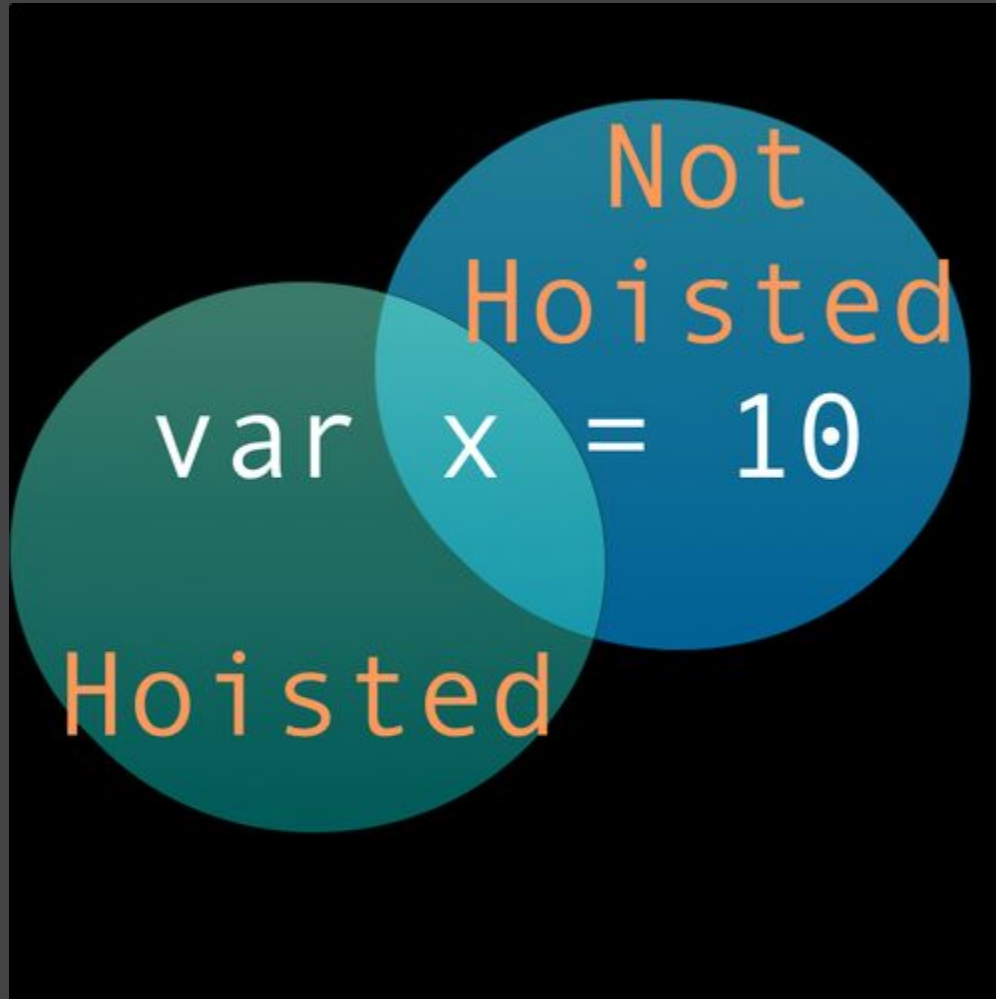
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```

To avoid bugs, always declare all variables at the beginning of every scope!!!

Hoisting



Self-Invoking Functions



You have to add parentheses around the function to indicate that it is a function expression:

```
(function () {  
    console.log("Hello!!");    // I will invoke myself  
})();
```


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WHAT FOR:

- precompute
- create scope

Function Parameters



Function **parameters** are the **names** listed in the function definition.

Function **arguments** are the real **values** passed to (and received by) the function.

```
functionName (parameter1, parameter2, parameter3) {  
    code to be executed  
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```
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    code to be executed  
}
```

Parameter Rules:

- JavaScript function definitions **do not specify data types** for parameters.
- JavaScript functions **do not perform type checking** on the passed arguments.
- JavaScript functions **do not check the number of arguments** received.

Function Parameters



If a function is called with **missing arguments** (less than declared), the missing values are set to: **undefined**

Assign a default value to the parameter:

```
function myFunction(x, y) {  
    y = y || 0;  
    console.log(x, y);  
}
```

Function Parameters



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Assign a default value to the parameter:

```
function myFunction(x, y) {  
    y = y || 0;  
    console.log(x, y)  
}
```

If a function is called with **too many arguments** (more than declared), these arguments cannot be referred, because they don't have a name. They can only be reached in the **arguments object**.

Arguments Object



The argument object contains an array of the arguments used when the function was called (invoked).

```
x = sumAll(1, 123, 500, 115, 44, 88);
```

```
function sumAll() {  
    var i, sum = 0;  
    for (i = 0; i < arguments.length; i++) {  
        sum += arguments[i];  
    }  
    return sum;  
}
```

Arguments Object



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```

```
function sumAll() {  
    var i, sum = 0;  
    for (i = 0; i < arguments.length; i++) {  
        sum += arguments[i];  
    }  
    return sum;  
}
```

Arguments is not really an array. It is an array-like object. arguments has a length property, but it lacks all of the array methods.

Function Invocation



Invoking a function suspends the execution of the current function, passing control and parameters to the new function. In addition to the declared parameters, every **function receives** two additional parameters: **this** and **arguments**.

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In JavaScript, the thing called **this**, is the object that **"owns" the current code**.

*Note that **this** is not a variable. It is a keyword.

Function Invocation



Invoking a function suspends the execution of the current function, passing control and parameters to the new function. In addition to the declared parameters, every **function receives** two additional parameters: **this** and **arguments**.

In JavaScript, the thing called **this**, is the object that "owns" the current code.

*Note that **this** is not a variable. It is a keyword.

When a function is **called without an owner object**, the value of **this** becomes the **global object**.

Invoking a Function as a Method



When a function is stored as a property of an object, we call it a **method**.

The binding of this to the object happens at invocation time. This very late binding makes functions that use this highly reusable.

```
var myObject = {
  firstName: "Bilbo",
  lastName: "Baggins",
  fullName: function () {
    return this.firstName + " " + this.lastName;
  },
  getContext: function () {
    return this;
  }
}
myObject.fullName();
myObject.getContext();
```

Invoking a Function as a Function



The function does not belong to any object. In a browser the page object is the browser window.

The function automatically becomes a window function.

```
function myFunction(a, b) {  
    return a * b;  
}  
myFunction(10, 2);           // myFunction(10, 2) will return 20  
  
window.myFunction(10, 2);   // window.myFunction(10, 2) will also  
return 20
```

Invoking a Function as a Function



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return 20
```

```
function myFunction() {  
    return this;  
}  
myFunction();               // Will return the window object
```

Invoking a Function as a Function



!!! A method cannot employ an inner function to help it to work with object's properties because the inner function does not share the method's access to the object as its `this` is bound to the wrong value.

```
var add = function (a, b) {
    return a + b;
};

var myObject = {
    value: 10
}

myObject.double = function () {
    var helper = function () {
        this.value = add(this.value, this.value);
    };

    helper();    // Invoke helper as a function.
};

// Invoke double as a method.

myObject.double();
console.log(myObject.value);
```

Invoking a Function as a Function



Fortunately, there is an easy workaround.

```
var add = function (a, b) {
    return a + b;
};

var myObject = {
    value: 10
}

myObject.double = function () {
    var that = this;

    var helper = function () {
        that.value = add(that.value, that.value);
    };

    helper();    // Invoke helper as a function.
};

// Invoke double as a method.

myObject.double();
console.log(myObject.value);
```

Invoking a Function with a Function Constructor



If a function invocation is preceded with the **new** keyword, it is a **constructor** invocation. It looks like you create a new function, but since JavaScript functions are objects you actually **create a new object**:

```
// This is a function constructor:
function myFunction (arg1, arg2) {
    this.firstName = arg1;
    this.lastName  = arg2;
}

// This creates a new object
var x = new myFunction ("Bilbo", "Baggins");
x.firstName;
```


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x.firstName;
```

The new prefix also changes the behavior of the return statement.

Invoking a Function with a Function Method



In JavaScript, functions are objects. JavaScript functions have properties and methods. **call()** and **apply()** are predefined JavaScript function methods. Both methods can be used to invoke a function, and both methods must have the owner object as first parameter. The only difference is that **call()** takes the function arguments separately, and **apply()** takes the function arguments in an array.

```
var array = [3, 4];  
var sum = add.apply(null, array);
```

Invoking a Function with a Function Method



```
// Create a constructor function called Quo. It makes an object with a status property.
var Quo = function (string) {
    this.status = string;
};

// Give all instances of Quo a public method called get_status.
Quo.prototype.get_status = function ( ) {
    return this.status;
};

// Make an instance of Quo.
var myQuo = new Quo("confused");
console.log(myQuo.get_status()); // confused
```

Invoking a Function with a Function Method



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// Make an instance of Quo.
var myQuo = new Quo("confused");
console.log(myQuo.get_status()); // confused

// Make an object with a status member.
var statusObject = {
    status: 'OK'
};

// statusObject does not inherit from Quo.prototype, but we can invoke the get_status
method on statusObject even though statusObject does not have a get_status method.

var status = Quo.prototype.get_status.apply(statusObject);
// status is 'OK'
```

Good night, folks!

