Javascript, The Swiss Army Knife of Programming Languages

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About me

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Features

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- Object literal notation

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Features

ECMAScript

The standard that defines JavaScript is the third edition of *ECMAScript Programming Language*.

Hello World

index.html

```
<html>
  <head>
    <script>
      document.writeln(‘‘Hello, world!’’);
    </script>
  </head>
  <body>
  </body>
</html>
```

Syntax

Comments

Block comments formed with /* */ and line-ending comments starting with //. Example:

```
/*
  We are learning Javascript and comments are very important
*/
document.writeln(‘‘Hello World!’’); // Output: Hello World!
```

Syntax

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```

Names

Starts with a letter or underscore and optionally followed by on or more letters, digits or underscores. Beware of some reserved words.

```
bullet           // valid     _mana             // valid
3force           // invalid   lucky42           // valid
rocket-launcher  // invalid   grenade_launcher  // valid
```

Syntax

Numbers

Single number type represented internally as 64-bit floating point.

```
42
3.141516
10e5
1/0 // Output: Infinity
0/0 // Output: NaN
```

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```

Strings

Can be wrapped in single quotes or double quotes. It can contains 0 or more characters. All characters in Javascript are 16 bits wide.

```
‘‘Hello World’’
’Hello World’
‘‘This is\n a multiline string’’
’You can write ‘‘ on single quotes string’
```

Syntax

Functions

```
function helloWorld (name) {
    console.log('Hello ' + name + '!');
}

helloWorld('David'); // Output 'Hello David!'

var myFunction = function () {
    console.log('Hi there!');
};

myFunction(); // Output: 'Hi there!'
```

Syntax

Variables

Use the `var` keyword followed by a name to declare a variable. When used inside of a function, the `var` statement defines the function's private variables.

```
var player; // variable player declared on a global scope

function test() {
    var enemy; // Scoped to function test
}
```

Syntax

Strict (in)equality

```
10 == '10' // Output: true, auto type coercion
10 === '10' // Output: false strict equality
10 != '10' // Output: false, auto type coercion
10 !== '10' // Output: true strict inequality
```

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Strict (in)equality

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```

null and undefined

```
console.log(mario); // Error: mario is not defined

function exists (mario) {
  console.log(mario);
}

exists(); // Output undefined

console.log(null == undefined) // Output: true
console.log(null === undefined) // Output: false
```

Syntax

if, else

```
var testOk = true;

if (testOk) {
    console.log(‘‘Captain obvious’’);
} else {
    console.log(‘‘I’m bored’’);
}
```

Here are the *falsy* values:

- `false`
- `null`
- `undefined`
- The empty string
- The number 0
- The number NaN

All other values are *truthy*.

Syntax

switch

```
var weapon = ‘‘rocketlauncher’’;

switch(weapon) {
    case ‘‘pistol’’:
        console.log(‘‘piu piu’’);
        break;
    case ‘‘shotgun’’:
        console.log(‘‘paaam!’’);
        break;
    case ‘‘rocketlauncher’’
        console.log(‘‘BOOOOM!’’);
        break;
    default:
        console.log(‘‘falcon punch!’’);
        break;
}
```

Syntax

while, do while

```
var counter = 0;
while (counter < 10) { // Ends when counter is equal to 10
    console.log(counter);
    counter += 1;
}

do {
    console.log(counter);
    i -= 1;
} while(counter > 0); // Ends when counter is equal to 0
```

Syntax

while, do while

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    counter += 1;
}

do {
    console.log(counter);
    i -= 1;
} while(counter > 0); // Ends when counter is equal to 0
```

for

```
var i;

for (i = 0; i < 10; i += 1)
    console.log(i);
}
```

Objects

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`Prototype`

All objects created from object literals are linked to `Object.prototype`. If we try to retrieve a property value from an object, and if the object lacks the property name, then Javascript attempts to retrieve the property value from the prototype object.

Objects

Object.create

```
var soldier = {
    hp: 10,
    strength: 5,
    weapon: 'Pistol'
};

var knight = Object.create(soldier);
knight.weapon = 'Sword';
knight.shield = true;

console.log(knight.hp); // Output: 10
console.log(knight['weapon']); // Output: 'Sword'
console.log(knight.shield); // Output: true
```

Visit http://www.objectplayground.com/ for a graphical explanation

Objects

hasOwnProperty

```
knight.hasOwnProperty('hp'); // Output: false
knight.hasOwnProperty('shield'); // Output: true
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```

for in

```
for (attr in knight) {
    if(knigth.hasOwnProperty(attr)) {
        console.log('Knight property ' + attr + ' with value ' +
            knight[attr]);
    }
}
// Output: Knight property shield with value true
```

Objects

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knight.hasOwnProperty('hp'); // Output: false
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    if(knigth.hasOwnProperty(attr)) {
        console.log('Knight property ' + attr + ' with value ' +
            knight[attr]);
    }
}
// Output: Knight property shield with value true
```

delete

```
console.log(knight.weapon); // Output: 'Sword'
delete knight.weapon;
console.log(knight.weapon); // Output: 'Pistol'
```

Functions

Functions are the **fundamental modular unit** of Javascript. They are used for code reuse, information hiding, and composition.
The thing that is special about functions is that they can be invoked.

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Function.prototype and constructor

Functions are objects linked to Function.prototype. Every function object is also created with a prototype property. Its value is an object with a constructor property whose value is the function.

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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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Invocation (1/4): Method invocation pattern

```
var enemy = {
    hp: 5,
    rage: 0,
    attack: function () {
        this.rage += 1;
    }
};

enemy.attack();
console.log(enemy.rage); // Output: 1
```

Functions

Invocation (2/4): Function invocation pattern

```
physicsManager.collisionsDetected = 0;

physicsManager.checkCollision = function (entity1, entity2) {
    var bbCollision = function (bb1, bb2) {
        var collision = false;
        // Collision code skipped
        if (collision) {
            // WARNING: 'this' is the global object and not 'physicsManager'
            this.collisionsDetected += 1;
        }
        return collision;
    };

    bbCollision(entity1.getBB(), entity2.getBB());
};

if (physicsManager.checkCollision(enemy, player)) {
    player.takeDamage(enemy.strength);
}
```

Functions

Invocation (2/4): Function invocation pattern (workaround)

```
physicsManager.collisionsDetected = 0;

physicsManager.checkCollision = function (entity1, entity2) {
    var that = this;

    var bbCollision = function (bb1, bb2) {
        var collision = false;
        // Collision code skipped
        if (collision) {
            that.collisionsDetected += 1;
        }
        return collision;
    };

    bbCollision(entity1.getBB(), entity2.getBB());
};

if (physicsManager.checkCollision(enemy, player)) {
    player.takeDamage(enemy.strength);
}
```

Functions

Invocation (3/4): Constructor invocation pattern

```
var Player = function (name) {
    this.name = name;
    this.lives = 3;
};

Player.prototype.sayMyName = function () {
    console.log('My name is ' + this.name);
};

var david = new Player('David');
david.sayMyName(); // Output: 'My name is David'
```

Functions

Invocation (3/4): Constructor invocation pattern (without new)

```
var Player = function (name) {
    this.name = name;
    this.lives = 3;
};

Player.prototype.sayMyName = function () {
    console.log('My name is ' + this.name);
};

var david = Player('David'); // oops
david.sayMyName(); // raise an error because david is undefined

// Global variables feast
console.log(name); // Output: 'David'
console.log(lives); // Output: 3
```

Functions

Invocation (4/4): Apply invocation pattern

```
var enemy = {
    rage: 0,
    attack: function () {
        this.rage += 1;
    }
};

var anotherEnemy = {
    rage: 10
};

enemy.attack.apply(anotherEnemy, []);

console.log(anotherEnemy.rage); // Output: 11
```

Functions

Arguments

```
function doActions() {
    var i, l;

    // WARNING: arguments is an Array-like object
    for (i = 0, l = arguments.length; i < l; i += 1) {
        console.log('Doing action ' + arguments[i]);
    }
}

doActions('jump', 'attack');
/*
    Output:
    'Doing action jump'
    'Doing action attack'
*/
```

Functions

Closure

Javascript does have function scope. That means that the parameters and variables defined in a function are not visible outside of the function, and that a variable defined anywhere within a function is visible everywhere within the function.

```
var playe = new Player();

function isGameOver() {
    var enemy = new Enemy();

    function checkHit() {
        return enemy.hit(player);
    }

    return checkHit();
}

isGameOver();
```

Functions

Module pattern

```
var physicsModule = (function () { // IIEF pattern
   var detectedCollisions = 0;

   function checkBBCollision(bb1, bb2) {
      var collision = false;
      // collision code skipped
      if (collision) {
          detectedCollisions += 1;
      }
      return collision;
   }

   function checkCollision(entity1, entity2) {
      checkBBCollision(entity1.getBB(), entity2.getBB());
   }

   return {
      checkCollision: checkCollision
   };
}());
```

Inheritance

Javascript provides a much richer set of code reuse patterns. It can ape the classical pattern, but it also supports other patterns that are more expressive.

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Javascript is a class-free language

In classical languages, objects are instances of classes, and a class can inherit from another class. Javascript is a prototypal language, which means that objects inherit directly from other objects.

Inheritance

Pseudoclassical pattern

```
var Alien = function (name) {
    this.name = name;
};

Alien.prototype.talk = function () {
    console.log('%?saf? ' + this.name);
};

var SmartAlien = function (name) {
    this.name = name;
};

SmartAlien.prototype = new Alien();

SmartAlien.prototype.speech = function () {
    this.talk();
    console.log('...I mean, my name is ' + this.name);
};

var enemy = new SmartAlien('Roger');
enemy.speech();
// Output: '%?saf? Roger
//          ...I mean, my name is Roger'
```

Inheritance

Prototypal pattern

```
var alien = {
    name: '%?&789',
    talk: function () {
        console.log('%&7?_% ' + this.name);
    }
};

var smartAlien = Object.create(alien);
smartAlien.speech = function () {
    this.talk();
    console.log('...I mean, my name is ' + this.name);
};

var enemy = Object.create(smartAlien);
enemy.name = 'Roger';
enemy.speech();
// Output: '%?saf? Roger
//          ...I mean, my name is Roger'
```

Inheritance

Functional pattern

```
var alien = function (spec) {
    var that = {};

    var killHumans = function () { // Private access
      console.log('*Using ' + spec.weapon + '*');
    };

    that.talk = function () {
        console.log('%&78 ' + spec.name);
        if (spec.weapon) {
            killHumans();
        }
    };

    return that;
};

var enemy = smartAlien({ name: 'Roger' });
enemy.speech();
// Output: '%?saf? Roger
//          ...I mean, my name is Roger'
//
// ...killing humans on the process
```

```
var smartAlien = function (spec) {
    spec.weapon = 'Pistol'; // Private access
    var that = alien(spec);

    that.speech = function () {
        that.talk();
        console.log('...I mean, my name is ' +
          spec.name);
    };
    return that;
};
```

Arrays

Arrays doesn't exist

Javascript provides an object that has some array-like characteristics. It converts array subscripts into strings that are used to make properties.

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Arrays literals

```
var enemies = [];

console.log(enemies[9999]); // Output: undefined

enemies[0] = 'Sigma';
console.log(enemies[0]); // Output: 'Sigma'

enemies[1] = 9000; // We can mix different types
console.log(enemies[1]); // Output: 9000
```

Arrays

Remove elements

```
var enemies = ['Grassman', 'Bowser', 'Sephirot'],
    players = ['David', 'Manfred', 'Joanmi'];

delete enemies[1]; // Bad idea
console.log(enemies[1]); // Output: undefined
console.log(enemies.length); // Output: 3

players.splice(1, 1); // Yeah!
console.log(players[1]); // Output: 'Joanmi'
console.log(players.length); // Output: 2
```

What is Node.js

Website definition

Node.js is a platform built on Chrome's JavaScript runtime for easily building fast, scalable network applications. Node.js uses an event-driven, non-blocking I/O model that makes it lightweight and efficient, perfect for data-intensive real-time applications that run across distributed devices.