

Programming Javascript for Web and Mobile

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Plan for today

Today we will:

- Learn the basics of Javascript

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Today we will:

- Learn the basics of Javascript
- Understand how Javascript is use in web development

What's Javascript

Javascript is a dynamic programming language, multiparadigm, and with weak typing.

What's Javascript

JS has become ubiquitous because it's the only web-native programming language.

Differences with Python

- 1 Indentation doesn't matter (although is better to indent your code). Blocks are delimited by curly brackets `{}`
- 2 functions are declared with **function**, not **def**.
- 3 variables are declared using **let**.
- 4 Convention to use **camelCase** instead of **under_score** for naming

JS is NOT Java

JS is **not** Java. The creators of JS decided to prefix it with Java as a marketing trick.

Not only in the browser

Although it initially was developed to be run on the browser, currently JS runs on several different platforms:

- Browser
- Natively (using **Node JS**, **GraalVM**)
- JVM (using **Rhino**)
- On Mobile phones (using **React native**)

Using JS

As with CSS there are several ways to include JS in a webpage

Using JS

We can use a **<script>** tag and inline the JS code inside.

See **inline-js.html**

We can also include external JS files in our web page.

See **external-js.html**

Variables

Variables are created in JS using the **let** keyword:

```
let age = 28;  
let name = "Pepe";  
let lastName = "García";
```

Variables

Variables whose value never changes are called constants, and they're created with the **const** keyword:

```
const gravityAcceleration = 9.8;  
gravityAcceleration = 33;  
// Uncaught TypeError: Assignment to constant variable.
```

Functions

Functions are created in JS using the **function** keyword.

```
function <name> (<params>) {  
    // do stuff  
    return <return value>;  
}
```

Functions

```
function areaTriangle(b, h) {  
    return b * h / 2;  
}
```

Arrow functions

```
const areaTriangle = (b, h) => b * h / 2;
```

There's also a shorthand in Javascript for declaring **anonymous functions**, using **arrow functions**.

Conditionals

As in Python, we use conditionals in JS to do different things in our program depending on a value.

Conditionals

```
if (<condition>) {  
    // do stuff  
} else if(<other condition>) {  
    // do something else  
} else {  
    // to this otherwise  
}
```

Boolean operators

| Python | JS |
|--------|-----|
| == | === |
| != | !== |
| and | && |
| or | |
| not | ! |

Arrays

arrays or **lists** are used to store collections of values in JS

```
let elements = [1,2,3];  
elements[0] = 22;  
let copyOfElements = elements.slice();
```

Array.push

We add an element to the end of an array using the **push method**

```
let elements = [1,2,3];  
elements.push(4);
```

Array.pop

We remove an element in the given position of an array with the pop method.

```
let elements = [1,2,3];  
elements.pop(0);
```

Objects

Objects are key-value pairs. We create them using curly brackets:

```
let beatles = {  
  drummer: "Ringo",  
  guitarist: "George",  
  bassist: "Paul",  
  singer: "John"  
}
```

Objects

We can access the values of the object as if they were **properties** or using the **key**:

```
beatles["drummer"]
```

```
beatles.drummer
```


Loops

As in Python, we can loop using **while** and **for** loops.

While loops

```
while(<condition>) {  
    <body>  
}
```

For loops

The for loop a bit different from the one in Python.

It receives some config, in which we specify three different sections separated by semicolons (;):

- 1 The creation of the *loop variable*. It can be something like **let i = 0**.
- 2 The condition that needs to be truthy for the loop to keep iterating. **i < 33**.
- 3 The update we do to the *loop variable* on every iteration. **i++**.

For loops

- 1 The creation of the *loop variable*. It can be something like **let i = 0**.
- 2 The condition that needs to be truthy for the loop to keep iterating. **i < 10**.
- 3 The update we do to the *loop variable* on every iteration. **i++**.

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

For loops

One can also use loops in a way similar to Python using the shorthand syntax:

```
for (let value in elements) {  
    <body>;  
}
```

For loops

Let's do the exercises on **loops.js**

Exercise

Create a function to check if a given array is *palindromic*.

Keep in mind that you'll need to implement a function to check if arrays are equal.

The DOM

The DOM (**Document Object Model**) is the representation of the HTML of a webpage that we have available in Javascript. We can modify/access/create/delete HTML elements directly from Javascript, and we do it using the DOM.

changing inner HTML

The DOM

changing inner HTML

document

```
.querySelector("h1")  
.innerHTML = "potato";
```

document points to the root of the DOM

querySelector is a method that we use to obtain the first element that matches a CSS selector

innerHTML is the attribute that represents the HTML inside an element

The DOM

```
document
  .querySelector("h1")
  .classList.add("my-class");
```

classList is an attribute of HTML elements with which we can manage its classes

Adding classes

The DOM

```
const parent = document
    .querySelector("div");

const child = document
    .createElement("div");

child.innerText = "this is the inner text";

parent.appendChild(child);
```

creating new elements

We can create new elements with **document.createElement**

We can add them later to other elements with
parent.appendChild(child)

Exercises

```
const bands = [  
  {  
    name: "The Beatles",  
    instruments: {  
      John: "voice",  
      Paul: "bass",  
      Ringo: "drums",  
      George: "guitar"  
    }  
  },  
  {  
    name: "The Ramones",  
    instruments: {  
      Johnny: "voice",  
      Joey: "guitar",  
      Marky: "drums",
```

Events are at the very heart of JS. Some even say that it's an **event oriented language**. With events we can handle how a webpage reacts to certain actions.

Examples of events

- **click in a button**
- **scroll**
- **change the contents of a text field**
- **a timer expires**
- **data from the server arrives**

Handling events

When handling events in JS we'll need to:

- select the element
- add the handler function
- add the event listener

Handling events

```
// select the element  
const button = document.querySelector('.button-clicky');  
  
// create a handler  
const showAlert = () => console.log('button clicked!');  
  
// add the listener  
button.addEventListener('click', showAlert);
```

Handling events

see **events.js**

Exercises

Add four buttons to your previous web page, one saying voice, other saying bass, other saying drums, and other saying guitar.

Make sure that, when a button is clicked, the member that plays the given instrument in all bands gets highlighted.

<https://books.adalab.es/materiales-front-end-e>

Homework

Exercise 1

Create a simple webpage in which, when a button is clicked, all the links change their background to blue and their text color to white.

Exercise 2

Investigate the functional methods on array. Namely **map**, **filter**, **forEach**, and **reduce**.

Try to apply them to the following cases:

- given an array of numbers, return only the **even ones**
- given an array of numbers, return its **sum**
- given an array of numbers, **log all** in the console
- given an array of numbers, return a new array with **all elements squared**

Exercise 3

Investigate about forms in HTML.

Create a **simple** web page in which the user can write the name of a song in an **input** field and get the lyrics of that song.

You'll also need to investigate how to do HTTP requests from Javascript (https://developer.mozilla.org/en-US/docs/Web/API/Fetch_API/Using_Fetch).

This is the API you'll need to use

<https://lyricsovh.docs.apiary.io/#reference/0/lyrics-of-a-song/search?console=1>