

Web Engineering Front-end Pt. 3

# 1. JavaScript: Introduction I





# Course Introduction



## Learning outcomes



1. Understand the difference between static and dynamic websites
2. Understand the basics of JavaScript, including operators, variables, strings, conditions, arrays, objects, iterations, troubleshooting etc.
3. Setting up an environment to develop a complete, dynamic website with HTML5, CSS3 and JavaScript

# Contents



1. Static vs Dynamic Websites
2. What is JavaScript?
3. Advantages and Disadvantages of JavaScript
4. Basics of JavaScript
5. Outputting JavaScript

## 1.1 Static vs Dynamic Websites



# Types of websites



- Websites come in two different types: static and dynamic.
- Both have their pros and cons.

## Static websites



- Fixed content, appears the same to every user.
- Written only using HTML and CSS.
  - + Easy to make
  - May be too simple for some use cases

## Static website use cases



- Simple information pages (e.g. “About us”, contact information).
- Websites where the information stays relevant for a long time.

## Static website example



<https://hellohappy.org/beautiful-web-type/>

- Does a website that showcases fonts need to be updated regularly?
- Is this website less attractive or useful because it is static and not dynamic?

## Dynamic websites



- Dynamic content, can display customized content for different users
- Includes server-side code, database integration.
  - + Interactive, easy to update, user friendly
  - Requires more technical knowledge

## Dynamic websites use cases



- Websites with user accounts
- Pages where information may change regularly
- Pages which reference data from external sources (e.g. Stock prices)

## Dynamic website examples



Social media websites:

- Facebook, Instagram, Reddit

The content of these websites change regularly, including real-time user uploaded content.

## From static to dynamic



The websites you have been building so far have all been static. Now we will add more interactivity and functionality to them by adding JavaScript.

## 1.2 What is JavaScript?



## What is JavaScript?



JavaScript is a programming language for implementing complex functions on web pages.

## Why learn JavaScript?



3 must learn web development languages:

1. HTML to define the content of web pages ✓
2. CSS to specify the layout of web pages ✓
3. JavaScript to program the behaviour of web pages

## History of JavaScript



- Created by Brendan Eich in 1995.
- Developed for Netscape Navigator 2, an early web browser.
- Became the ECMA-262 standard in 1997.
- ES1 (1997) -> ES2 (1998) -> ES3 (1999) -> ES5 (2008) -> ES6 (2015)



## What can JavaScript do?



JavaScript can...

- Change HTML content and attributes dynamically
- Control multimedia
- Create animations

and much more!

## Activity 1



Go to one of your favourite websites and try to find elements where JavaScript is being used.

## 1.3 Advantages and Disadvantages of JavaScript



## Advantages of using JavaScript



### 1. Speed

JavaScript code is very fast to run because it is client-based. As long as no outside resources are required, it runs almost immediately.

## Advantages of using JavaScript



### 2. Easy to learn

JavaScript syntax is based on Java and is relatively easier to learn than other popular languages such as C++.

## Advantages of using JavaScript



### 3. Better user interfaces

JavaScript can improve the user experience through increasing interactivity. (e.g. sliders instead of an input box, collapsible sections)

## Advantages of using JavaScript



### 4. Popularity

JavaScript is by far the most popular programming language for web engineering. There are many resources out there for JavaScript developers to utilize.

## Disadvantages of using JavaScript



### 1. Security

Because JavaScript is run on the client-side, vulnerabilities can be exploited for malicious purposes.

## Disadvantages of using JavaScript



### 2. Browser compatibility

Less of an issue nowadays, but some older browser versions may have limited JavaScript support.

## Discussion: Disabling JavaScript



Many people disable JavaScript on their browser because of security reasons. Do you agree despite knowing what it can do?

## 1.4 JavaScript Basics



## Where to put JavaScript?



In an HTML file, JavaScript should be inserted between <script> tags.

```
<script>
|   document.getElementById("demo").innerHTML = "Hi!";
</script>
```

## Where to put JavaScript?



1. In the <head> tag
2. In the <body> tag
3. In an external file ("filename.js")

You can place however many scripts in an HTML file as you want but try to keep them all in one place.

## JavaScript in <head>



```
1  <!DOCTYPE html>
2  <html>
3
4  <head>
5      <script>
6          function demo() {
7              document.getElementById("demo").innerHTML = "Hi!";
8          }
9      </script>
10     </head>
11
12
13    <body>
14        <p id="demo"></p>
15        <button type="button" onclick="demo()">Say hi!</button>
16    </body>
17
18  </html>
```

# JavaScript in <body>



```
1  <!DOCTYPE html>
2  <html>
3
4  <head>
5  </head>
6
7
8  <body>
9    <p id="demo"></p>
10   <button type="button" onclick="demo()">Say hi!</button>
11   <script>
12     function demo() {
13       document.getElementById("demo").innerHTML = "Hi!";
14     }
15   </script>
16 </body>
17
18 </html>
```

## JavaScript in an external file



```
1  <!DOCTYPE html>
2  <html>
3
4  <head>
5  </head>
6
7
8  <body>
9    <p id="demo"></p>
10   <button type="button" onclick="demo()">Say hi!</button>
11   <script src="demo.js"></script>
12 </body>
13
14 </html>
```

## Best practice



Try to place your <script> tag at the end of the <body> tag, for better performance.

## Internal vs external JavaScript



- In most cases external is recommended, but for simplicity you can write it in the HTML file for now.
- External provides better maintainability and performance but is generally not worth it for a few lines of code.

## Practice: Adding <script> tags



Spend some time trying to add JavaScript to an HTML file using all 3 methods.

## 1.5 Outputting JavaScript



# Outputting JavaScript



4 main methods:

1. Writing into an existing HTML element
2. Writing directly to the webpage
3. Writing into an alert box
4. Writing into the browser console

## Writing into an existing HTML element



Using the document.getElementById method, an HTML element from the page can be selected and modified.

# Writing into an existing HTML element



```
<body>
<h3>Demo</h3>
<p id="demo"></p>
<script>
document.getElementById("demo").innerHTML = 3 + 4;
</script>
</body>
```

Output:

**Demo**

7

## Writing directly to the webpage



Use document.write display data directly onto the end of the page, mostly used for testing purposes.

# Writing directly to the webpage



```
<body>
<p>Demo</p>
<p>...</p>
<script>
document.write("testing");
</script>
</body>
```

Output:

**Demo**

...

**testing**

## Writing into an alert box



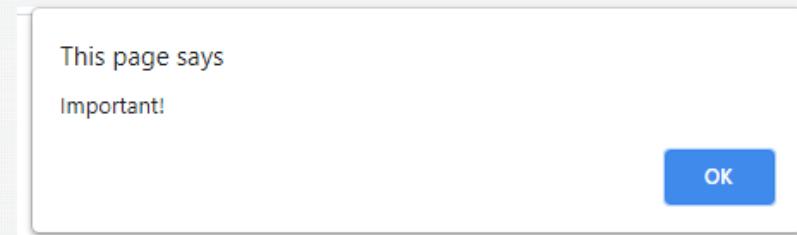
window.alert displays a small pop-up alert box on top of the webpage, which requires the user to manually close. Useful for making sure the message is read.

## Writing into an alert box



```
<body>  
<script>  
window.alert("Important!");  
</script>  
</body>
```

Output:



## Writing into the browser console



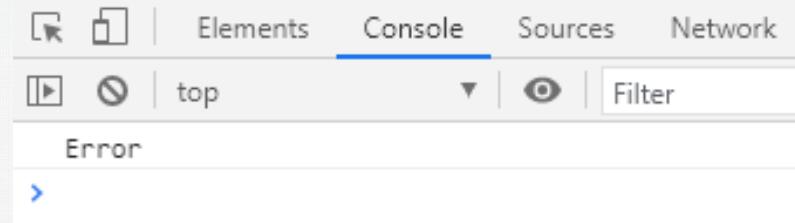
Use `console.log` to display data onto the browser console. Useful for debugging your code.

## Writing into the browser console



```
<body>  
<script>  
console.alert("Error");  
</script>  
</body>
```

Output:



## Writing into the browser console



For upcoming lessons, we will be working in the console most of the time.

To open the console, press **Ctrl+Shift+J** (Chrome, Firefox, Edge).

## “Hello, World!” exercise



Time to write your first program. Try using the 4 JavaScript output methods to display “Hello, World!” on your browser.



# The End



Reference 1: W3 Schools JavaScript Tutorial <https://www.w3schools.com/js/default.asp>

Reference 2: freeCodeCamp Advantages and Disadvantages of JavaScript

<https://www.freecodecamp.org/news/the-advantages-and-disadvantages-of-javascript/>

Reference 3: Brendan Eich official photograph (Slide 15)

[https://en.wikipedia.org/wiki/Brendan\\_Eich#/media/File:Brendan\\_Eich\\_Mozilla\\_Foundation\\_official\\_photo.jpg](https://en.wikipedia.org/wiki/Brendan_Eich#/media/File:Brendan_Eich_Mozilla_Foundation_official_photo.jpg)