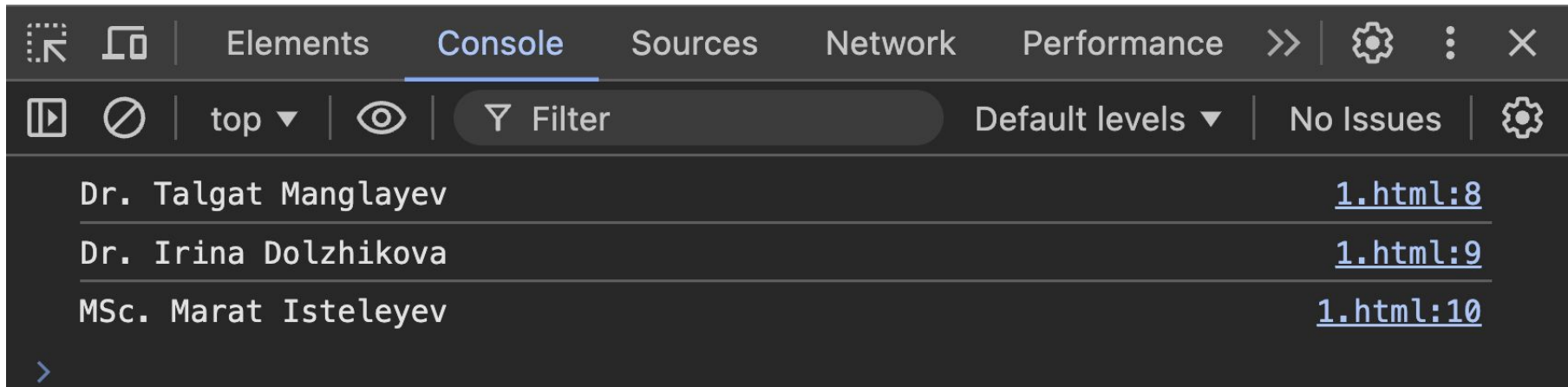




CSCI-111 Web Programming and Problem Solving

Part II Introduction to Programming using JavaScript

week-6-lecture JavaScript Basics



Content

Introduction

Variables

Types

Operators

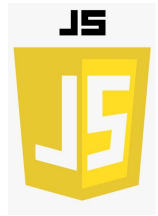
Arrays

Objects

```
1. <!DOCTYPE html>
2. <html lang="en">
3. <head>
4.     <meta charset="UTF-8">
5.     <title>Document</title>
6.     <script>
7.         console.log("Dr. Talgat Manglayev")
8.         console.log("Dr. Irina Dolzhikova")
9.         console.log("MSc. Marat Isteleyev")
10.    </script>
11. </head>
12. <body>
13. <h1>CSCI-111 Web Programming and Problem Solving</h1>
14. <h2>Part II Introduction to Programming using JavaScript</h2>
15. <h3>week-6-lecture JavaScript Basics</h3>
16. </body>
17. </html>
```

HTML, CSS, JavaScript

- **Hyper-Text Markup Language (HTML)** is the standard markup language for documents designed to be displayed in a web browser.
 - It describes the structure of the web page
- **Cascading Style Sheets (CSS)** is a stylesheet language used to describe the presentation of a document written in HTML.
 - It describes the style of the web page
- **JavaScript (JS)** is a lightweight and interpreted programming (or scripting) language for Web pages.
 - It adds **behavior** to the web page



Brief History

Brendan Eich (/ˈaɪk/), born July 4, 1961,

cofounder of the Mozilla project,

CEO of Brave Software,

created the JavaScript language in 1995.

ECMAScript (ES) is a JavaScript standard intended to ensure the interoperability of web pages across different browsers.

ECMA 262, ..., ES5, **ES6**, ..., ES2022



What is JavaScript used for?

- Change the behavior of the web application:
 - Change HTML content
 - Change HTML attribute values
 - Change HTML styles (CSS)
 - Hide/Show HTML elements
- Do other computations

How to use JavaScript ?

Browsers understand JavaScript by default, so there is no need to install anything

To incorporate your JavaScript program in your web page:

1. wrap it with `<script>` tag in the `<head>` or `<body>` sections

2. link it as an external file in the `<head>` section:

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

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How to see the output?

Programs can output the intermediate results or other information to users (e.g. debugging):

To the browser's console using `console.log()` function

```
>>> console.log("Hello, World!")
```

Directly into HTML, using `innerHTML` property

```
>>> document.getElementById("demo").innerHTML = "Hello, World!"
```

In pop up message using `alert()` function

```
>>> alert("Hello, World!")
```


Variables

Variables are store data values of the program

- They can be declared automatically or using keywords **let**, **const** or **var** (outdated)
- They must have **unique names (identifiers)**
 - Names can contain letters, digits, underscores, and dollar signs.
 - Names must begin with a letter.
 - Names can also begin with \$ and _ (but we will not use it in this tutorial).
 - Names are case sensitive (y and Y are different variables).
 - Reserved words (like JavaScript keywords) cannot be used as names.

Variables

Variable declarations:

```
var x = 3 + 2;           // x is 5  
let y = 10;              // y is 10  
const PI = 3.14; // PI is “3.14”  
msg = “Hello!”; // z is 15
```

Variables declared with let and const cannot be redeclared.

Data types

There are six **primitive** data types:

[in JavaScript data types are not declared in code]

- **Number**: integer or decimal numbers `a = 20, b = 3.5`
- **String**: some text `s = "Hello, World!"` or empty string `t = ""`
- **Boolean**: **true** or **false** `y = true`
- **undefined**: a variable which is declared but doesn't contain value `let x;`
- **null**: a variable with **no value** assigned to it `p = null`
- **Symbol**: unique symbolic value (not covering here)

Operators

There are different types of operators:

- **Assignment** Operators

```
let name = "Tom"; x = 3; y = name;
```

- **Arithmetic** Operators

```
a = 2 + 3; b = 4 * 5 / 2 - 1; x = "Hello"; y = "World"; z = x + y;
```

- **Comparison** Operators

```
a > 0; a < 0; a == 0;
```

SELF STUDY: increment, decement, remainder, exponentiation

Arrays

Array is a data type to store ordered values (possibly different).

To create an array, use square brackets:

```
const array = ["David Malan", "Harvard CS 50", 2024]
```

Arrays

Elements in the array are indexed by numbers (starting from **0**):

```
let x = array[0] // x stores "David Malan"
```

Arrays

Changing values in the array:

```
array[0] = "David J Malan"
```

```
//array = ["David J Malan", "Harvard CS 50", 2024]
```

Arrays

Adding new element in the array:

```
array.push ("https://www.youtube.com/watch?v=4vU4a  
EFmTSo&list=PLhQjrBD2T381WAHyx1pq-sBfykqMBI7V4&in  
dex=3") ;
```

or

```
array[7] = "12 Lectures"
```


Arrays

The number of elements:

```
let n = array.length  
const k = array[n - 1]
```

Objects

Object



Properties

`car.name = Fiat`

`car.model = 500`

`car.weight =
850kg`

`car.color = white`

Methods

`car.start()`

`car.drive()`


`car.brake()`

`car.stop()`

Objects

Complex data type which stores values by their **keys**.

The objects may have **properties** and **methods**.

Object	Properties	Methods
	car.name = Fiat	car.start()
	car.model = 500	car.drive()
	car.weight = 850kg	car.brake()
	car.color = white	car.stop()

Objects

To create an object, use curly brackets and key:value pairs:

```
const car =  
{  
  name: "Fiat",      // note ending comma  
  color: "white"  
}
```

example-10.html

https://www.w3schools.com/js/js_objects.asp

Objects

To access properties, use **dot notation** or **square brackets**:

```
let x = car.name;  
car["color"] = "black";
```

example-10.html

https://www.w3schools.com/js/js_objects.asp

Summary

- There are several ways to **output** data and info
- **Variables** are used to store values in program
- There are six primitive data types
- **Operators** can be used to manipulate data
- **Arrays** can store ordered list of values
- **Objects** can store values by their keys

bonus info