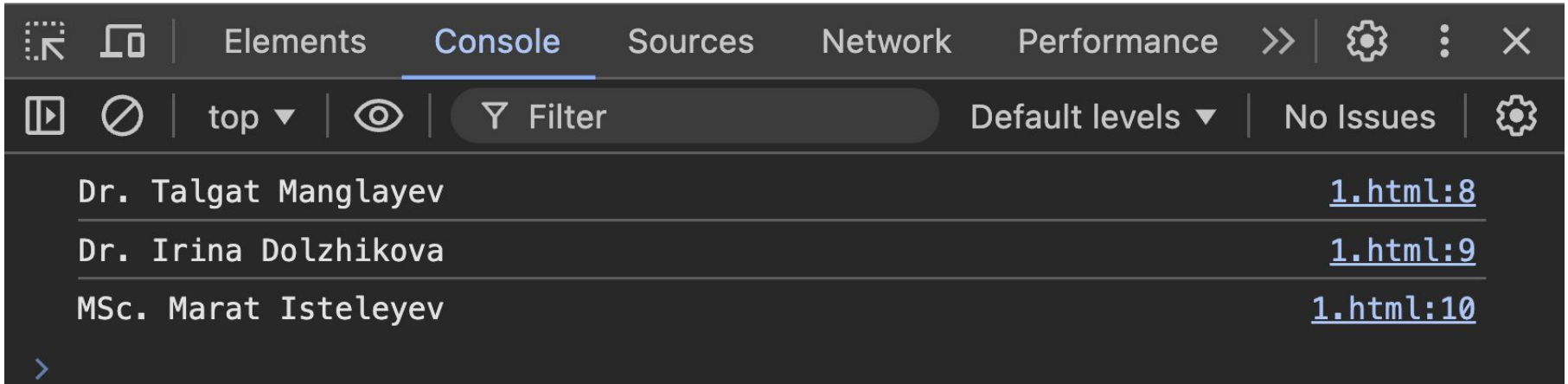
CSCI-111 Web Programming and Problem Solving

Part II Introduction to Programming using JavaScript

week-6-lecture JavaScript Basics



```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Document</title>
    <script>
        console.log("Dr. Talgat Manglayev")
        console.log("Dr. Irina Dolzhikova")
        console.log("MSc. Marat Isteleyev")
    </script>
</head>
<body>
<h1>CSCI-111 Web Programming and Problem Solving</h1>
<h2>Part II Introduction to Programming using JavaScript</h2>
<h3>week-6-lecture JavaScript Basics</h3>
</body>
</html>
```

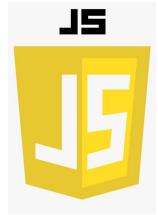
Content

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>`

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>`

example-1.html and example-1.js

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!"))
```

example-2.html and example-2.js

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.

example-3.html and example-3.js

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!”;           // msg is “Hello!”
```

Variables declared with let and const cannot be redeclared.

example-5.html, example-6.html

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)

example-7.html

Operators

Assignment Operators

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

SELF STUDY: increment, decrement, remainder, exponentiation

example-8.html

Operators

Arithmetic Operators

```
a = 2 + 3;

b = 4 * 5 / 2 - 1;

x = "Hello";

y = "World";

z = x + y;
```

example-8.html

Operators

Comparison Operators

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

example-8.html

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]
```

example-9.html

Arrays

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

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

example-9.html

Arrays

Changing values in the array:

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

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

example-9.html

Arrays

Adding new element in the array:

```
array.push("https://www.youtube.com/watch?v=4vU4aEFmTSo&list=PLhQjrBD2T381WAHyx1pq-sBfykqMBI7V4&index=3");
```

or

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

example-9.html

Arrays

The number of elements:

```
let n = array.length

const k = array[n -1]
```

example-9.html

Objects

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

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

Objects

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

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

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

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

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