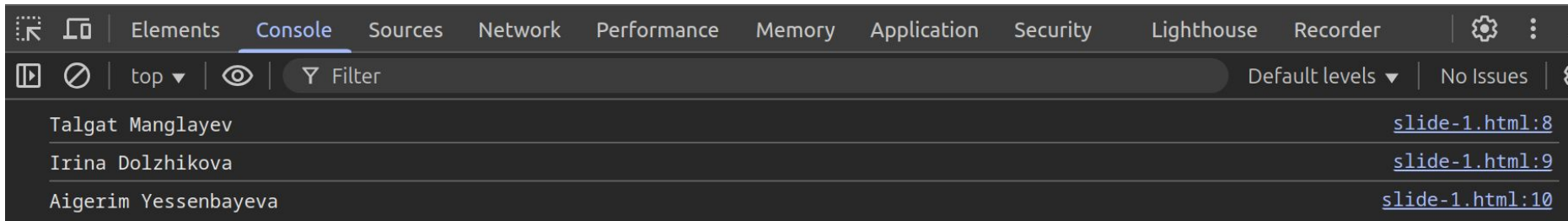


weeks [6-11]

# CSCI-111 Web Programming and Problem Solving

## Part II Introduction to Programming using JavaScript

### week-6-lecture JavaScript Basics



# Content

## Introduction

## Variables

## Types

## Operators

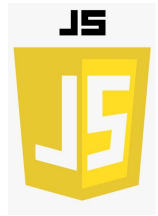
## Arrays

## Objects

```
1. <!DOCTYPE html>
2. <html lang="en">
3. <head>
4.     <meta charset="UTF-8">
5.     <title>Document</title>
6.     <script>
7.         console.log("Talgat Manglayev")
8.         console.log("Irina Dolzhikova")
9.         console.log("Aigerim Yessenbayeva")
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!";         // msg is "Hello!"
```

**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 = ""` CSCI-111
- **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

## 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;
```

# Operators

## Comparison Operators

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

# 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

## Methods



`car.name = Fiat`

`car.start()`

`car.model = 500`

`car.drive()`

`car.weight =  
850kg`

`car.brake()`


`car.stop()`

`car.color = white`

# Objects

**C**omplex 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](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](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