Penn Engineering

ONLINE LEARNING

Video 2.2
Chris Murphy

JavaScript Basics

- Like many other programming languages, JavaScript includes:
  - variables, arrays, and objects
  - loops and conditional statements
  - functions

- Even if you know Java, there are still some important differences
  - defining functions and objects
  - interacting with HTML

Declaring a Variable

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- If using a `<script>` section in a HTML file, or an external .js file, **`document.write(`*`var`*`)`** will display a variable's value in the HTML

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   var age = 12;
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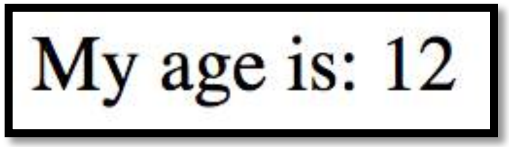
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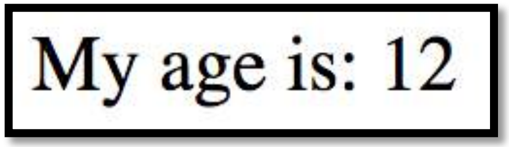
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- However, this approach is discouraged
- We will see better alternatives later!

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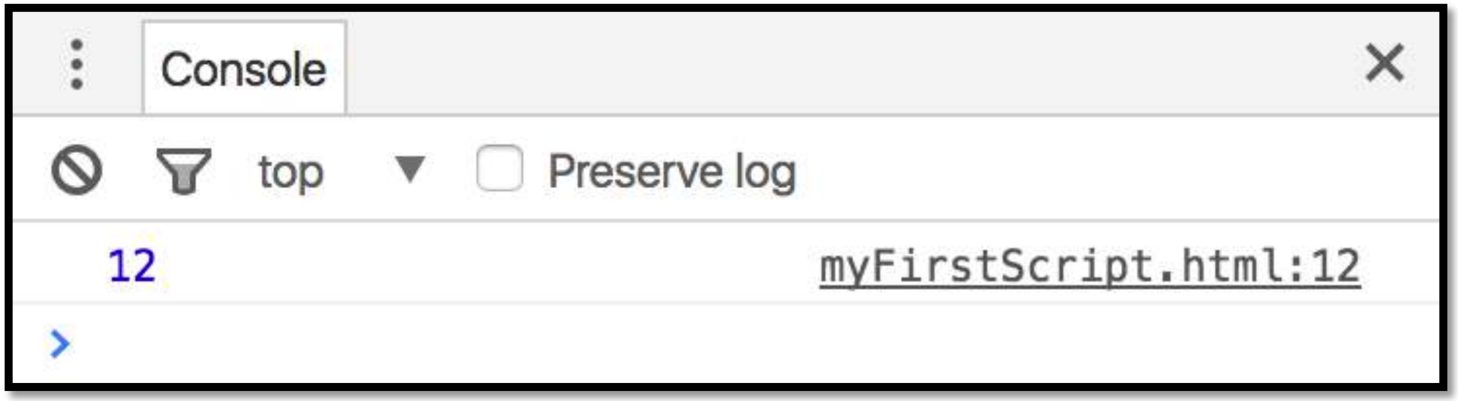

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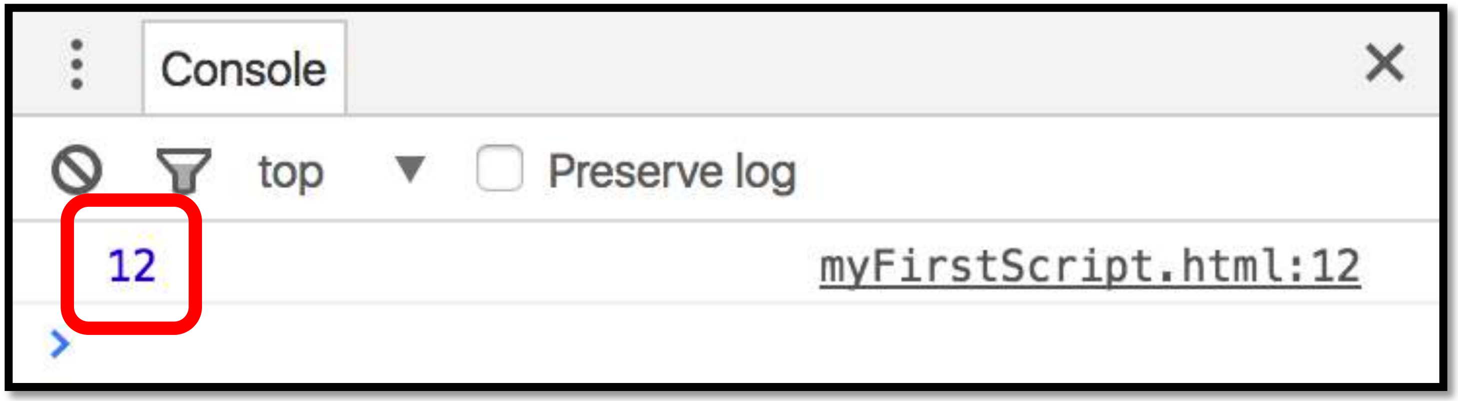

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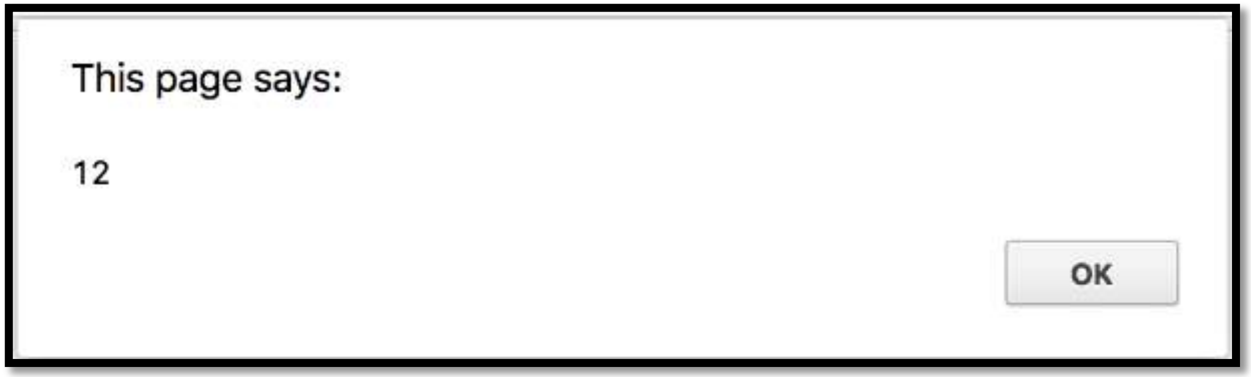
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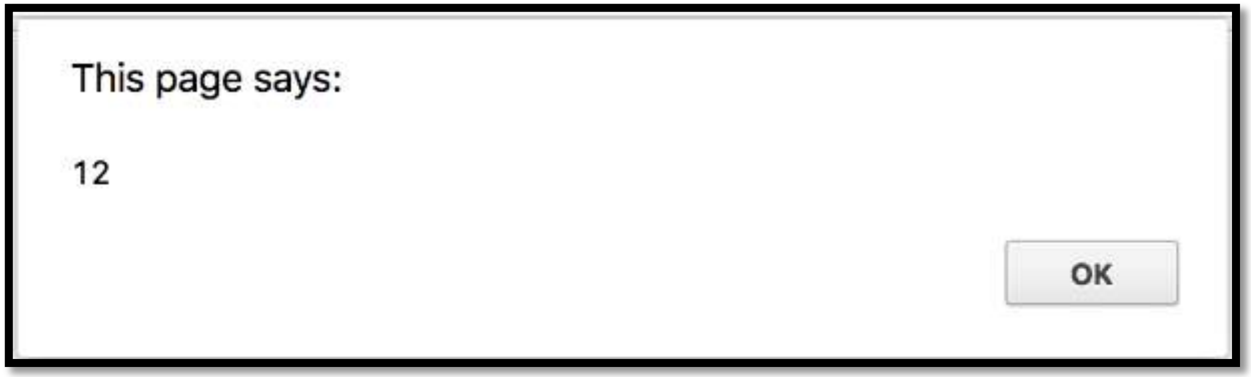
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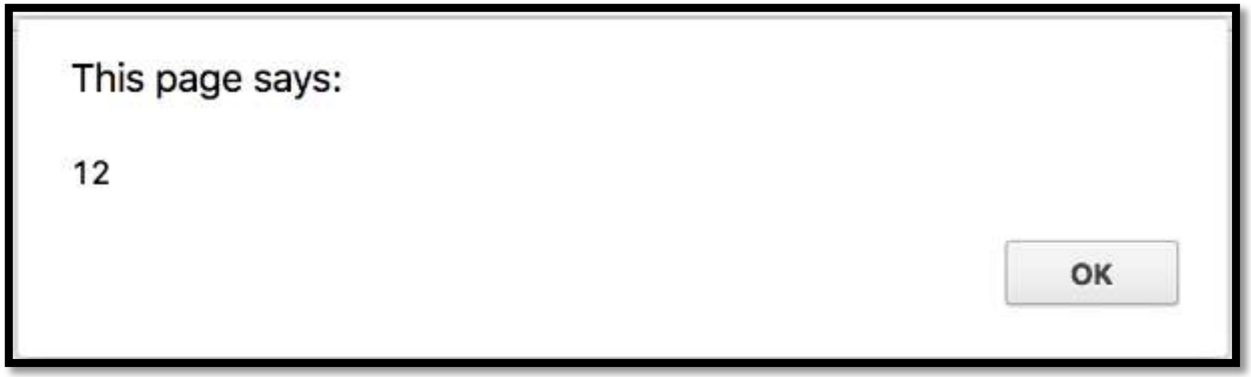

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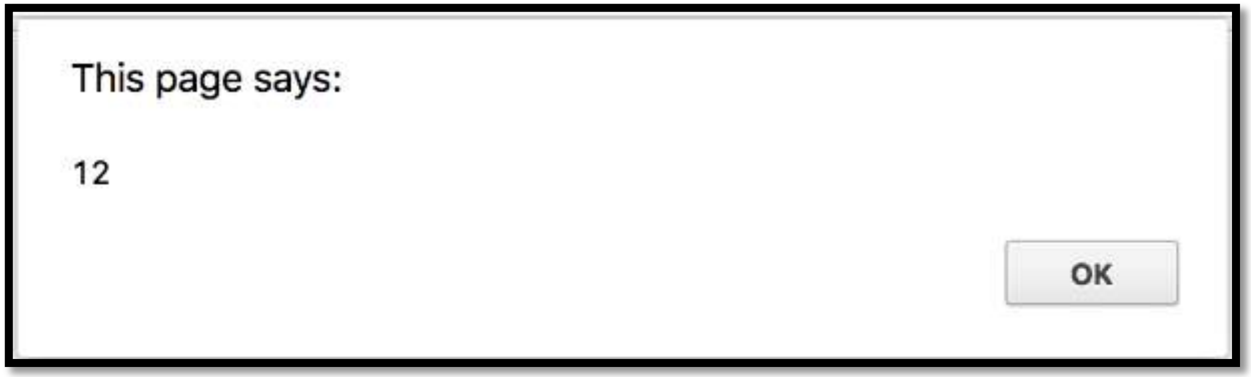
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Changing a variable’s type

- The type of each variable does not need to be specified and can be changed at any time.

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var id = 33.2;

id = ‘secret’;
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Primitive Types

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String	`‘hello’`
Boolean	`true, false`
Null	`null`
Undefined	`undefined`

Numbers

- All JavaScript numbers are stored using floating-point notation
  - i.e. 5 is stored internally as 0.5e1
- `+infinity` represents all numbers greater than `Number.MAX_VALUE` (around 10^{308})
- `-infinity` represents all numbers less than `Number.MIN_VALUE` (around 10^{-324})
- `NaN` represents any non-number value
  - `Number('tree')` would return `NaN`

Number Operations

- Basic arithmetic (+, -, *, /, %) can be used on JavaScript numbers
- Precedence will follow MDAS unless parentheses are used
- ++ and -- can be used to increment/decrement JavaScript numbers

```
var a = 4;
a++;                    // a = 5
var c = a - 3;          // 2
var d = c + 3 * a;      // 17
var e = ( c + 3 ) * a;  // 25
```

Strings

- JavaScript strings are series of 16-bit unsigned integers, each integer representing a character
- Convention is to use single quotes for strings unless single quotes exist within the string
  - `‘I am a dolphin’` vs. `“I’m a dolphin”`
- Escape characters use backslash: `‘\n \t \\’`
- All JavaScript strings are immutable
  - Any manipulation results in a new string

String Functions

- `+` or `.concat(`*`otherString`*`)` can be used to concatenate strings (add them together)

```
var firstName = ‘John’;
var lastName = ‘doe’;
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var firstName = ‘John’;
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var fullName= firstName.concat(‘ ’, lastName); // ‘John doe’
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var greeting = 'HELLO, ' + fullName;
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- `.toUpperCase()` and `.toLowerCase()` change the case of every character in a string

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var fullName= firstName.concat(' ', lastName); // 'John doe'
var greeting = 'HELLO, ' + fullName;

console.log(greeting.toUpperCase());     // 'HELLO, JOHN DOE'
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- *`var`*`.length` gets the length of a string

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console.log(greeting.length);            // 15
```

Booleans

- Booleans are logical values that can only be `true` or `false`

- Any value can be used as a boolean in JavaScript
  - "Falsy" values: `null, undefined, 0, NaN, ''`
  - "Truthy" values: `'cow', 'false', 5,` etc...

- Any variable type can become a boolean when used with logical operators

Null and Undefined

- **Null** is a value that can be assigned to variables to represent "no value"

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var occupation = null;
console.log(occupation); // null
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- **Undefined** means that a variable was declared but no value has been assigned

```
var salary;
console.log(salary);  // undefined
```

Summary

- JavaScript variables do not need to have their types specified when they are declared
- Variable types are allowed to change
- Five primitive types: number, string, boolean, null, undefined