Intro to Web Programming

Clarissa Littler

October 29, 2016

What we'll be covering?

- A short review of HTML and CSS
- A bare bones introduction to JavaScript
- Examples of how to use JavaScript to alter web sites

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What we won't cover

- Most of JavaScript
- How to write a server
- How HTML and CSS work
- How to use frameworks to build a site

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The point of this course

- Start you on the right track
- Give a taste for what web-programming is
- Explain the basic pieces

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Client and server

Two pieces that talk to each other to make a site

Server

- Sends data to the browser
- Saves information for long term use
- Receives requests from the client

Client

- Receives data from the server
- Renders server data into a usable page
- Handles the user interface

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How do you share a site?

- You can load a site locally in your browser
- To share a site you need a server to host
- Free hosting option: `neocities.org`

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HTML

What does HTML do?

HTML describes the content of the page, but not how it looks

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What is HTML?

HyperText Markup Language

- HyperText
- Markup

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HTML in summary

HyperText Markup Language (HTML) is a language that uses *nested tags* to denote what elements a page has and what it should mean

Common tags

Tags we'll need

- `<h1>` ... `<h6>`
- `<ol>`, `<ul>`, `<li>`
- `<p>`
- `<button>`
- `<input>`
- `<script>`
- `<style>`

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CSS

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CSS properties

Example properties

color	text color
background-color	color of the background
display	visibility and whether elements are displayed as block or inline
font-weight	the boldness of the text

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CSS Entries

The shape of CSS

```
selector {
    property: value;
    property: value;
    property: value;
}
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    property: value;
}
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Class

```
.aclass {
    color: red;
    display: inline;
}
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}
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Id

```
#mybutton {
    font-weight: bold;
}
```

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Tag type

```
p {
    width: 300px;
}
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HTML review exercise

Let's try making a simple web page ourselves!

- Open notepad++
- Type along the instructions
- Save the file in the F drive (end the file in .html)
- Right click and open in the browser

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<html>
 <body>
  <h1>This is our heading</h1>
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<html>
 <body>
  <h1>This is our heading</h1>
  <p>Here is our text.</p>
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</html>
```

CSS review exercise

Let's use CSS

- Open a new file in the text editor
- Copy the template on this slide
- Fill in the style element within the <head> tags
- Turn the middle heading green

```
<!doctype html>
<html>
  <head>
    <style>
      fill this in
    </style>
  </head>
  <body>
    <h1 id="heading1">First</h1>
    <h2 id="heading2">Second</h2>
    <h3 id="heading3">Third</h3>
  </body>
</html>
```

Putting them together

Write a simple page that uses

1. At least two CSS selectors
2. At least three different tags

A template

```
<!doctype html>
<html>
  <head>
    <style>
     put your CSS here
    </style>
  </head>
  <body>
   put your HTML here
  </body>
</html>
```

What is the Document Object Model?

The Document Object Model (DOM) gives you the ability to write code that changes the web page dynamically

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What does the DOM do?

- Change CSS classes
- Create and remove HTML elements
- Respond to user interface events

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What is JavaScript?

JavaScript is a programming language that runs in the browser

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What are programming languages?

A programming language is...

- a formal language with rules and grammar
- that has meaning as computation
- and can be used to talk to a computer

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Script tag

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  <head>
    <script>
      ...
    </script>
  </head>
  <body>
    ...
  </body>
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```

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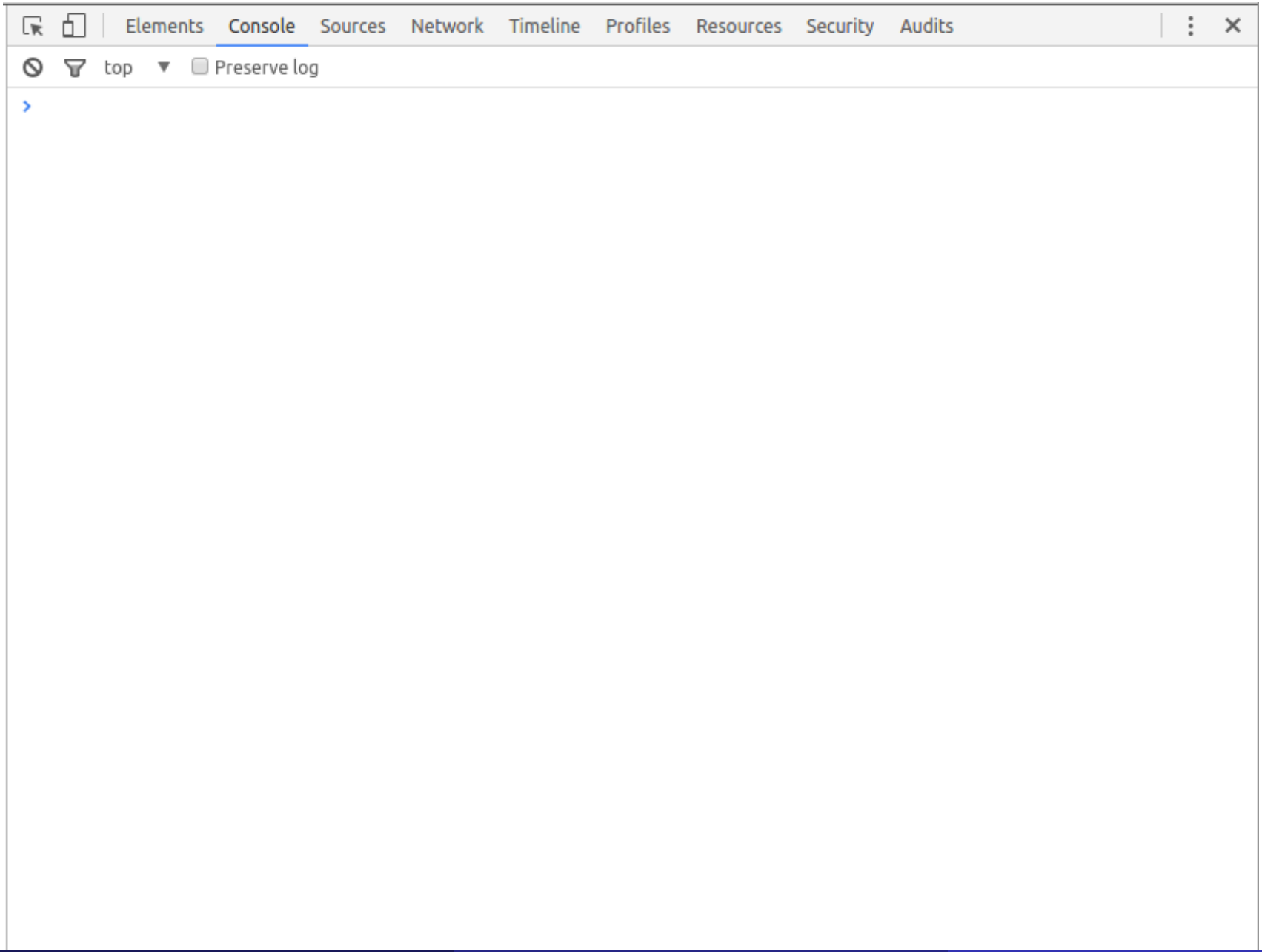
JavaScript console



Basic programming constructs

Data

- Numbers
- Text
- Lists
- Dictionaries

Actions

- Arithmetic
- Creating and using storage
- Performing actions multiple times
- Making choices about what to do
- Naming routine tasks to easily perform them again

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Strings

Strings are text-as-data, useful for:

- error messages
- writing output

```
"this is a string"
'this is also a string'
"even this 'is a string'"
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Strings exercise

Type the following into the console:

- `"hi there everybody"`
- `"it's such a 'nice' day"`
- `"I'm in this class" + " and I'm typing"`

Variables and Storage

Variables...

- are names given to data
- are storage containers
- can change in value

Type along

```
var thisVariable="a string"
thisVariable
thisVariable = 10
thisVariable
```

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Lists and Arrays

In JavaScript, the data type for lists are called arrays

Arrays

- have a beginning and end
- are in order
- can be accessed by index

Type along

```
var myArr = [1,2,3]
myArr
myArr[0]
myArr[1]
myArr[2]
myArr[0] = 20
myArr[0]
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Objects and Dictionaries

Objects...

- are like dictionaries
- associate names and data
- are used to collect information

Type along

```
var obj = {names : "chicken",
           petSpecies : "dog",
           age : 10}
obj.names
obj.petSpecies
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- associate names and data
- are used to collect information

Type along

```
var obj = {names : "chicken",
           petSpecies : "dog",
           age : 10}
obj.names
obj.petSpecies
obj.age = 10
obj.age
```

Objects and Dictionaries

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Functions

Functions...

- are code that can be used again and again
- are data that can be assigned to variables
- use the keyword `return` to give back a value
- are made up of arguments and a body

```
function () {
//this function doesn't have a name
   var x = 10;
   return x + x;
}

function thisFun (x,y) {
//but this function does
   return (x + y);
}
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From here on, we'll be presenting examples of JavaScript interacting with the DOM and practice more JavaScript from there

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What is the Document Object Model?

The DOM

The document object model (DOM) is the representation of the web page *as JavaScript objects*

Putting the document in DOM

The document object

`document` is the object that holds most of the important methods for controlling web pages

Our first example

In our first example we'll

- create an HTML element in JavaScript
- create text to put inside the element
- insert the HTML element in the web page

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When to load code

```
window.onload = function () {
    ...
};
```

Creating elements

Relevant functions

- `document.createElement`
- `document.createTextNode`
- `element.appendChild`
- `document.body`

Creating elements

```
<!doctype html>

<html>
  <head>
    <script>
      window.onload = function () {
        var elm = document.createElement("p");
        var text = document.createTextNode("this is text");
        elm.appendChild(text);
        document.body.appendChild(elm);
      }
    </script>
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  <body>
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Your turn

- Create a new html file
- Leave the body empty
- Create two elements and put them in the body

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Getting existing elements

- `document.getElementById`
- `document.getElementsByTagName`
- `element.firstChild`
- `node.nodeValue`

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getElementById

```
<body>
  <ol id="list1">
    <li>This is a list</li>
  </ol>
  <ol id="list2">
    <li>This is our second list</li>
  </ol>
</body>
```

getElementById

```
window.onload = function () {
    var newItem =
      document.createElement("li");
    var newText =
        document
        .createTextNode("item in the second list");
    newItem.appendChild(newText);
    var secondList = document.getElementById("list2");
    secondList.appendChild(newItem);
};
```

Your turn

- Create a new html file
- Follow the template to the right
- Add an element to the list

```
<!doctype html>
<html>
  <head>
    <script>
      window.onload = function () {
        ...
      }
    </script>
  </head>
  <body>
    <ol id="list">
    </ol>
  </body>
</html>
```

Changing CSS properties

Important properties and methods

- `elm.style`
- `elm.classList`
- `elm.classList.add`
- `elm.classList.remove`

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Changing CSS properties

```
<!doctype html>
<html>
  <head>
    <script>
      window.onload = function () {
        var h = document.getElementById("heading");
        h.style.color = "red";
      }
    </script>
  </head>
  <body>
    <h1 id="heading">This is a heading!</h1>
  </body>
</html>
```

Changing the CSS class

```
<head>
  <style>
    .reddish {
      color: red;
    }
  </style>
  <script>
    window.onload = function () {
       var h = document.getElementById("heading");
       h.classList.add("reddish");
    };
  </script>
</head>
```

Events

What are events?

Events connect user interfaces to code

- Mouse clicks
- Keys pressed
- Moving your cursor
- Focusing on an element

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Listening for events

- `elem.addEventListener`
- `elem.removeEventListener`

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- `elem.addEventListener`
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Listening to events

```
<head>
  <script>
    window.onload = function () {
       var h = document.getElementById("heading");
       h.addEventListener("mouseover", function () {
          this.style.color = "red";
       });
       h.addEventListener("mouseleave", function () {
          this.style.color = "black";
       });
    };
  </script>
</head>
<body>
  <h1 id="heading">This is our heading!</h1>
</body>
```

Collapsing list

```
<body>
  <div id="content">
    <h3>Our list is below here</h3>
    <ol id="list">
      <li>First item</li>
      <li>Second item</li>
      <li>Third item</li>
      <li>Fourth item</li>
    </ol>
  </div>
</body>
```

Collapsing list

```
window.onload = function () {
    var list = document.getElementById("list");
    var div = document.getElementById("content");
    div.addEventListener("mouseover", function () {
        list.style.display = "block";
    });
    div.addEventListener("mouseleave", function () {
        list.style.display = "none";
    });
};
```

To-do list

```
<body>
  <h1>Welcome to your to-do list</h1>
  <ol id="list">
  </ol>
  <input id="input" type="text"></input>
  <button id="add">Add element</button>
</body>
```

To-do list

```
var inputElement = document.getElementById("input");
var todoList = document.getElementById("list");
var addButton = document.getElementById("add");

addButton.addEventListener("click", function () {
  var itemText = document.createTextNode(inputElement.value);
  var newItem = document.createElement("li");
  newItem.appendChild(itemText);
  todoList.appendChild(newItem);
  inputElement.value = "";
});
```

To-do list

```
inputElement.addEventListener("focus", function () {
    inputElement.style.fontWeight = "bold";
});

inputElement.addEventListener("blur", function () {
    inputElement.style.fontWeight = "normal";
});
```

What's left

- A lot more JavaScript
- Frameworks
- Servers
- Experimenting

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