Intro to Web Programming

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What we'll be covering?

- A short review of HTML and CSS

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- A short review of HTML and CSS
- A bare bones introduction to JavaScript

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

What we won't cover

- All of JavaScript

What we won't cover

- All of JavaScript
- How to write a server

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- All of JavaScript
- How to write a server
- How HTML and CSS work

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

The point of this course

- Start you on the right track

The point of this course

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

The point of this course

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

This lecture and other resources

- This talk
- Tutorial for these lectures
- Intro to programming tutorial

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

Basics of HTML

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>`
- `<button>`
- `<input>`
- `<script>`
- `<style>`

What is CSS

Cascading Style Sheets

CSS provides information on the look and layout of a site

CSS properties

- `color`
- `background-color`
- `display`
- `font-weight`

Class

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

Id

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

Tag type

```
p {
    font-weight: 900;
}
```

Programming

Programming is

What are programming languages?

A programming language is...

- a formal language with rules and grammar

What are programming languages?

A programming language is...

- a formal language with rules and grammar
- that has meaning as computation

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

JavaScript in the browser

JavaScript and browsers have a special relationship

Script tag

Direct code

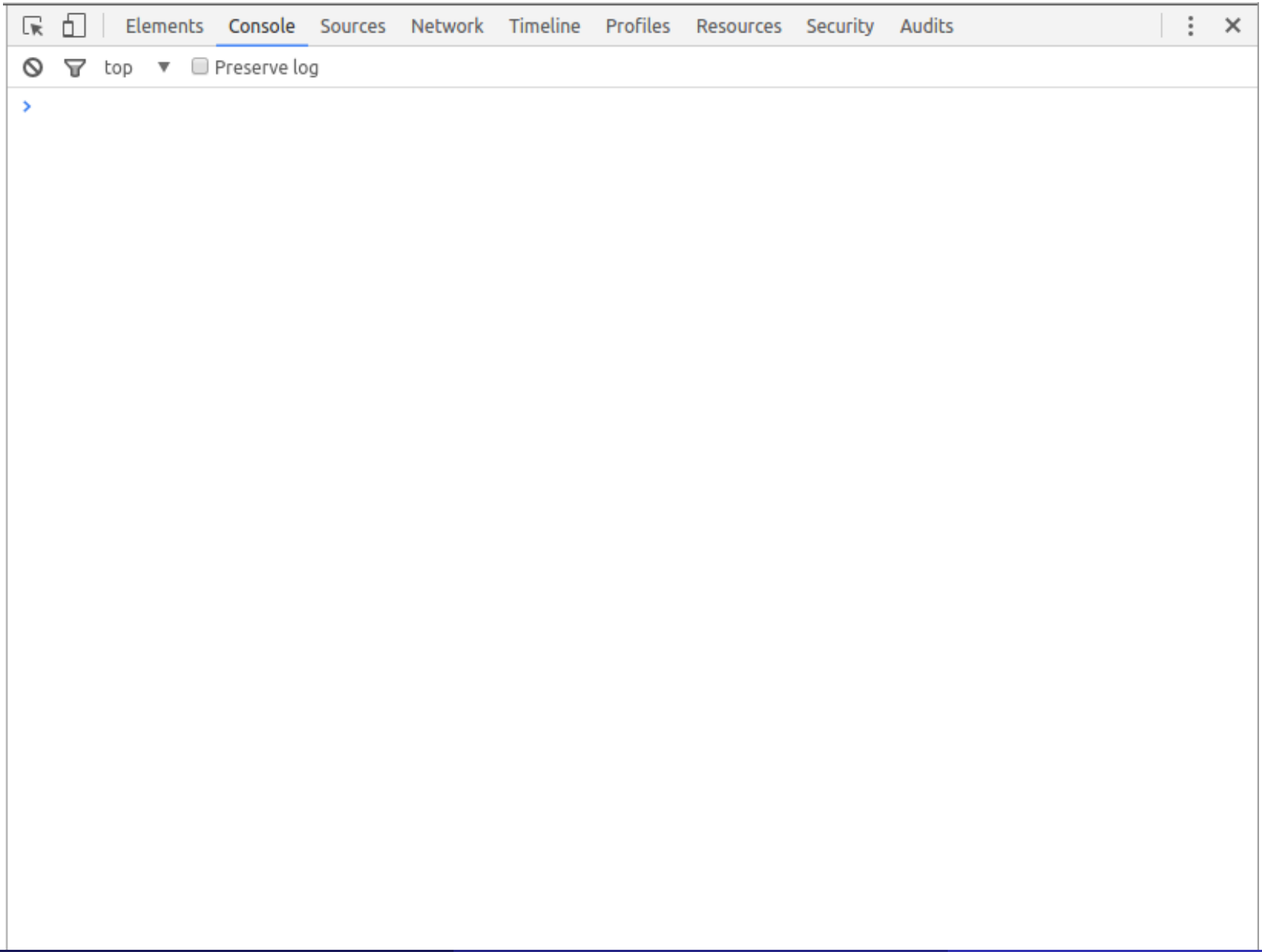
```
<!doctype html>

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

Script tag

Including code

```
<html>
  <head>
    <script src="..."></script>
  </head>
  <body>
    ...
  </body>
</html>
```

JavaScript console



What do we need to know?

- Bare bones JavaScript

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- Arithmetic

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What do we need to know?

- Bare bones JavaScript
- Arithmetic
- Strings
- Variables
- Objects
- Arrays
- Functions
- Iteration

Arithmetic

Numbers

- 1
- 0.5
- -20
- ...

Operations

- +
- -
- *
- ...

Strings

Strings are text-as-data

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

Variables

I have a friend, let's call her "Cassandra"...

Variables function both as storage containers and pronouns

Creating Variables

```
var nameOfVariable = initialValueInIt;
var numberOfToes = 10;
```

Assigning variables

```
var musicalsThatShouldExist = "The Walking Dead on Ice";
musicalsThatShouldExist = "Werner Herzog Sings The Blues";
```

Sequencing code

```
10 + 10;
20 + 20;
var these = "that";
```

Functions

Functions in math

$$f(x) = x + 10$$

Functions

Functions in JavaScript

```
function f(x) {
    return x + 10;
}
```

Using functions

`console.log`

```
console.log("chicken");
console.log("fish");
console.log(10 + 20);
```

Multi-argument functions

```
function moreFun (anArgument,anotherArgument) {
    console.log(anArgument);
    console.log(anotherArgument);
}

console.log(moreFun("one potato", "two potato"));
```

Objects

- Phone books

Objects

- Phone books
- Contact lists

Objects

- Phone books
- Contact lists
- Mall directories

Objects

- Phone books
- Contact lists
- Mall directories
- Dictionaries

Making Objects

```
var obj = {prop1 : 0, prop2 : 1};
var otherObject = {};
```

Objects

```
var obj = {prop1 : 0, prop2 : 1, prop3 : "thing"};

console.log(obj);
console.log(obj.prop1);
console.log(obj.prop2);
console.log(obj.prop3);
```

Objects

```
var obj = {};
console.log(obj.numberOfChickens);
obj.numberOfChickens = 2;
console.log(obj.numberOfChickens);
```

Arrays

- to-do lists

Arrays

- to-do lists
- book shelves

Arrays

- to-do lists
- book shelves
- instructions

Arrays

```
var list = [10,11,12];
console.log(list[0]);
console.log(list[1]);
console.log(list[2]);
list[0] = 20;
console.log(list[0]);
console.cog(list.length);
```

For

- Doing something multiple times

For

- Doing something multiple times
- Walk five blocks

For

- Doing something multiple times
- Walk five blocks
- Cut three onions

For

```
for(var i = 0; i < 10; i = i + 1){
    console.log(i);
}
```

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

`document` is the object that holds most of the important methods

When to load code

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

Creating elements in code

Creating elements in code

- `document.createElement`

Creating elements in code

- `document.createElement`
- `document.createTextNode`

Creating elements in code

- `document.createElement`
- `document.createTextNode`
- `document.body`

Creating elements in code

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

Creating elements

```
<!doctype html>
<html>
  <head>
    <script>
      window.onload = function () {
          var newHeadline = document.createElement("h1");
          var textNode = document
            .createTextNode("This is a headline!");
          newHeadline.appendChild(textNode);
          document.body.appendChild(newHeadline);
      };
    </script>
  </head>
  <body>
  </body>
</html>
```

Finding elements

Finding elements

- `document.getElementById`

Finding elements

- `document.getElementById`
- `document.getElementsByTagName`

Finding elements

- `document.getElementById`
- `document.getElementsByTagName`
- `*element*.firstChild`

Finding elements

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

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);
};
```

getElementsByTagName

```
<!doctype html>
<html>
  <head>
    <script src="getElementsByTagName.js"></script>
  </head>
  <body>
    <ol id="list1">
      <li>This is a list</li>
    </ol>
    <ol id="list2">
      <li>This is our second list</li>
    </ol>
  </body>
</html>
```

getElementsByTagName

```
window.onload = function () {
    var lists = document.getElementsByTagName("ol");

    for(var i = 0; i < lists.length; i = i + 1){
        var list = lists[i];
        var newItem = document.createElement("li");
        var newText = document.createTextNode("new element");
        newItem.appendChild(newText);
        list.appendChild(newItem);
    }
};
```

Changing CSS properties

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

Changing the CSS class

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

Events

Events

Events connect user interfaces to code

Listening to events

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

What's left

- A lot more JavaScript
- Frameworks

What's left

- A lot more JavaScript
- Frameworks
- Servers

What's left

- A lot more JavaScript
- Frameworks
- Servers
- Experimenting