GENERAL ASSEMBLY

JAVASCRIPT DEVELOPMENT

Sasha Vodnik, Instructor

HELLO!

1. Pull changes from the `svodnik/JS-SF-14-resources` repo to your computer
2. Open the `06-json-dom` > `starter-code` folder in your code editor

JAVASCRIPT DEVELOPMENT

JSON & INTRO TO THE DOM

LEARNING OBJECTIVES

At the end of this class, you will be able to

- Implement and interface with JSON data
- Identify differences between the DOM and HTML.
- Use vanilla JavaScript methods and properties to create and modify DOM nodes.

AGENDA

- JSON
- Lab: Work with JSON
- Intro to the DOM
- Getting and setting DOM elements

WEEKLY OVERVIEW

WEEK 4	Slack Bot Lab / JSON & Intro to DOM
WEEK 5	DOM & jQuery / Events & jQuery
WEEK 6	Ajax & APIs / Asynchronous JS & callbacks

EXIT TICKET QUESTIONS

1. Where is the best place to test heroku or slackbot? On command line or slack direct message?
2. What is the difference between Heroku and GitHub?

BOTS — GROUP CHECKIN

EXERCISE

TYPE OF EXERCISE

- Class

TIMING

3 min

1. Share
   - What you're planning for your bot to do
   - How far you've gotten
   - An outstanding question or challenge
2. As a group, brainstorm possible next steps for each challenge described by a group member.

JSON

JSON IS A DATA FORMAT BASED ON JAVASCRIPT

object

```
let instructor = {
  firstName: ‘Sasha’,
  lastName: ‘Vodnik’,
  city: ‘San Francisco’,
  classes: [
    ‘JSD’, ‘FEWD’
  ],
  classroom: 7,
  launched: true,
  dates: {
    start: 20181113,
    end: 20190131
  },
};
```

JSON

```
{
  “firstName”: “Sasha”,
  “lastName”: “Vodnik”,
  “city”: “San Francisco”,
  “classes”: [
    “JSD”, “FEWD”
  ],
  “classroom": 7,
  “launched”: true,
  “dates”: {
    “start”: 20181113,
    “end”: 20190131
  }
}
```

JSON

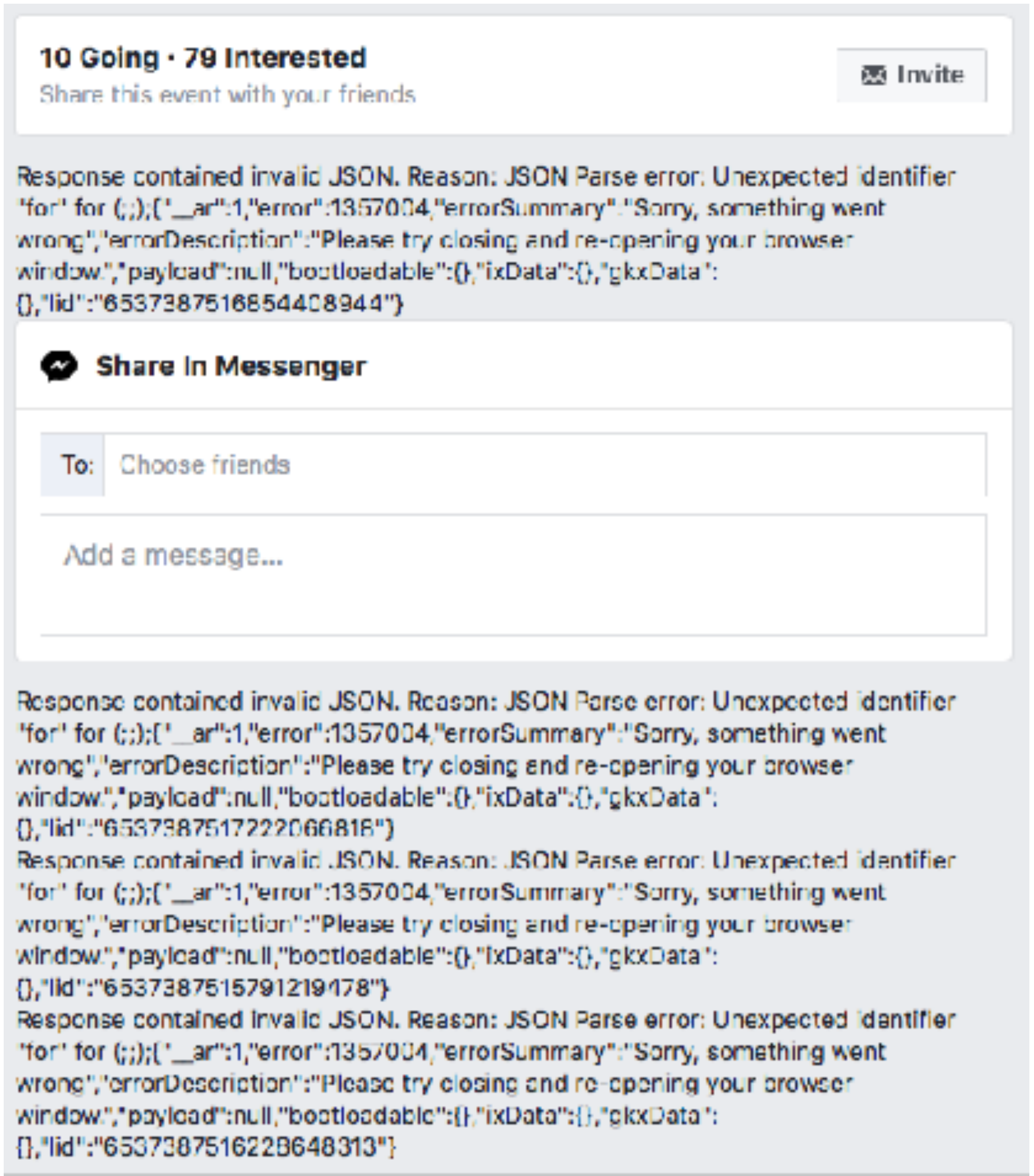
- Easy for humans to read and write
- Easy for programs to parse and generate

```
{
  “firstName”: “Sasha”,
  “lastName”: “Vodnik”,
  “city”: “San Francisco”,
  “classes”: [
    “JSD”, “FEWD”
  ],
  “classroom": 7,
  “launched”: true,
  “dates”: {
    “start”: 20181113,
    “end”: 20190131
  }
}
```

JSON IS NOT JAVASCRIPT-SPECIFIC

- Used across the web by programs written in many languages

JSON IS EVERYWHERE!



```
Response contained invalid JSON. Reason: JSON Parse error: Unexpected identifier
"for" for (;;);{"__ar":1,"error":1357004,"errorSummary":"Sorry, something went
wrong","errorDescription":"Please try closing and re-opening your browser
window.","payload":null,"bootloadable":{},"ixData":{},"gkxData":
{},"lid":"6537387516854408944"}
```

```
Response contained invalid JSON. Reason: JSON Parse error: Unexpected identifier
"for" for (;;);{"__ar":1,"error":1357004,"errorSummary":"Sorry, something went
wrong","errorDescription":"Please try closing and re-opening your browser
window.","payload":null,"bootloadable":{},"ixData":{},"gkxData":
{},"lid":"6537387517222066816"}
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wrong","errorDescription":"Please try closing and re-opening your browser
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{},"lid":"6537387515791219478"}
Response contained invalid JSON. Reason: JSON Parse error: Unexpected identifier
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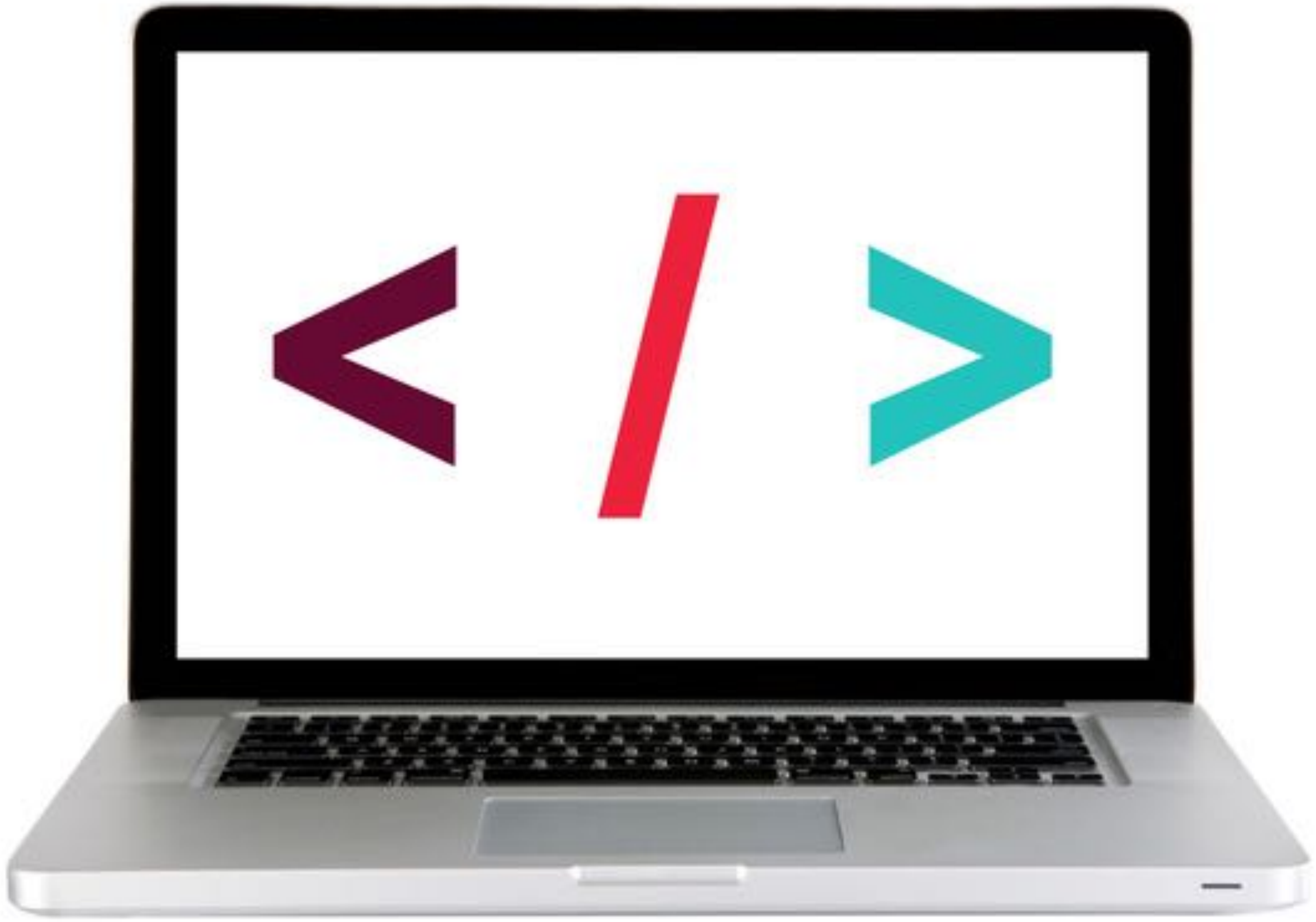
wrong","errorDescription":"Please try closing and re-opening your browser
window.","payload":null,"bootloadable":{},"ixData":{},"gkxData":
{},"lid":"6537387516228648313"}
```

LET'S TAKE A LOOK



JSON RULES

- Property names must be double-quoted strings.
- Trailing commas are forbidden.
- Leading zeroes are prohibited.
- In numbers, a decimal point must be followed by at least one digit.
- Most characters are allowed in strings; however, certain characters (such as ', ", \, and newline/tab) must be 'escaped' with a preceding backslash (\ ) in order to be read as characters (as opposed to JSON control code).
- All strings must be double-quoted.
- No comments!

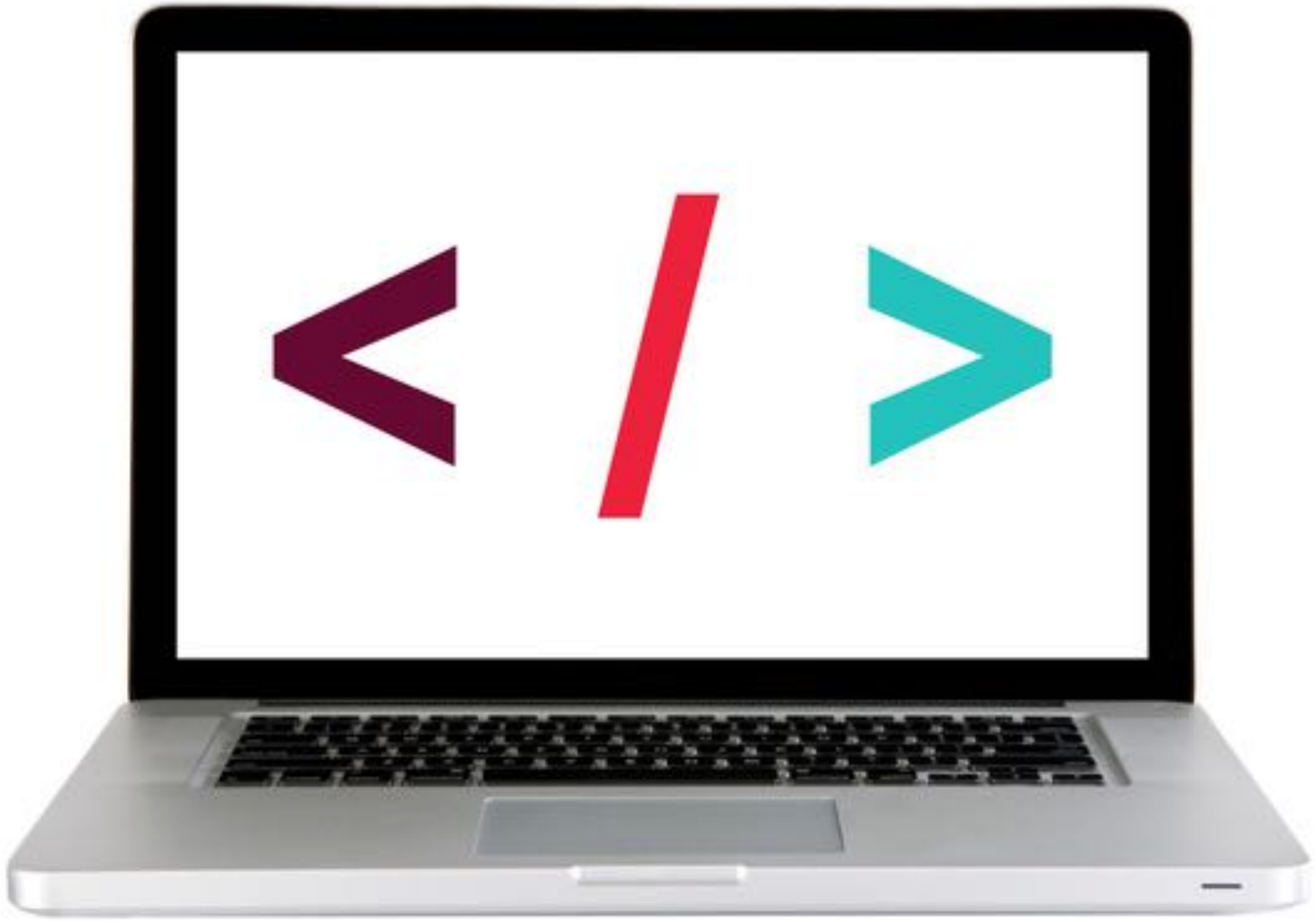
TO CONVERT AN OBJECT TO JSON

```
JSON.stringify(object);
```

TO CONVERT JSON TO AN OBJECT

```
JSON.parse(json);
```

LET'S TAKE A LOOK



EXERCISE — JSON

EXERCISE

KEY OBJECTIVE

- Implement and interface with JSON data

TYPE OF EXERCISE

- Pairs

TIMING

3 min

1. Write JSON code that contains an error.
2. Write your code on the wall.
3. When everyone’s code is done, we will look at the code together as a class and practice identifying errors.

LAB — JSON

KEY OBJECTIVE

- Implement and interface with JSON data

TYPE OF EXERCISE

- Individual or pair

TIMING

10 min

1. Open `starter-code > 1-json-exercise > app.js` in your editor.
2. Follow the instructions to write code that produces the stated output.

WORKING WITH NESTED DATA STRUCTURES

YAY, I GOT SOME DATA!

```
let person = '{"firstName":
"Sasha","lastName": "Vodnik","city":
"San Francisco","classes": ["JSD",
"FEWD"],"classroom": 7,”launched":
true,"dates": {"start": 20181113,"end":
20190131}}’;
```

WAIT, WHAT?!

WORKING WITH NESTED DATA STRUCTURES

1. PARSE THE JSON TO A JAVASCRIPT OBJECT (OR ARRAY!)
2. VIEW THE RESULTING DATA STRUCTURE
3. LOCATE THE DATA YOU WANT TO REFERENCE
4. IDENTIFY THE DATA TYPE OF THE TOP LEVEL, THEN WRITE CODE TO REFERENCE IT
5. IF NECESSARY, MOVE DOWN A LEVEL, THEN REPEAT PREVIOUS STEP

WORKING WITH NESTED DATA STRUCTURES

1. PARSE THE JSON TO A JAVASCRIPT OBJECT (OR ARRAY!)

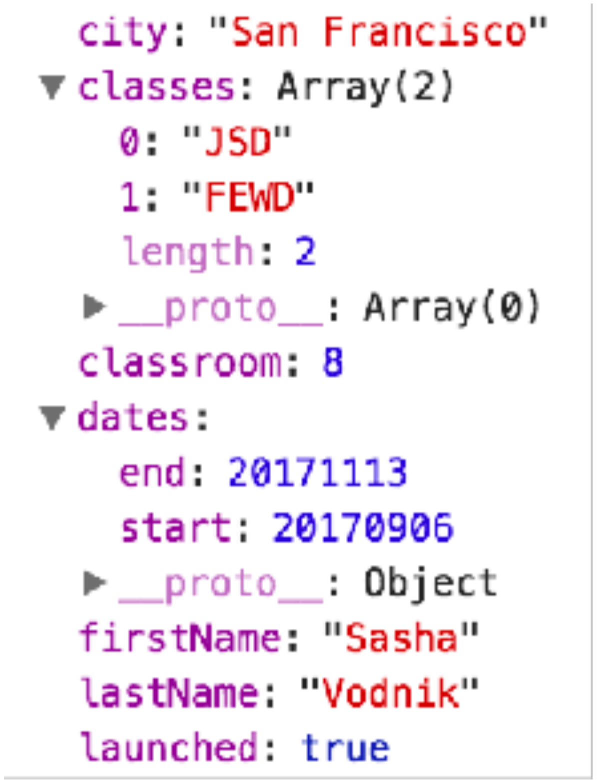
```
let person = '{"firstName":
"Sasha","lastName": "Vodnik","city":
"San Francisco","classes": ["JSD",
"FEWD"],"classroom": 7,"launched":
true,"dates": {"start": 20181113,"end":
20190131}}’;
```

```
let personObject = JSON.parse(person);
```

WORKING WITH NESTED DATA STRUCTURES

2. VIEW THE RESULTING DATA STRUCTURE

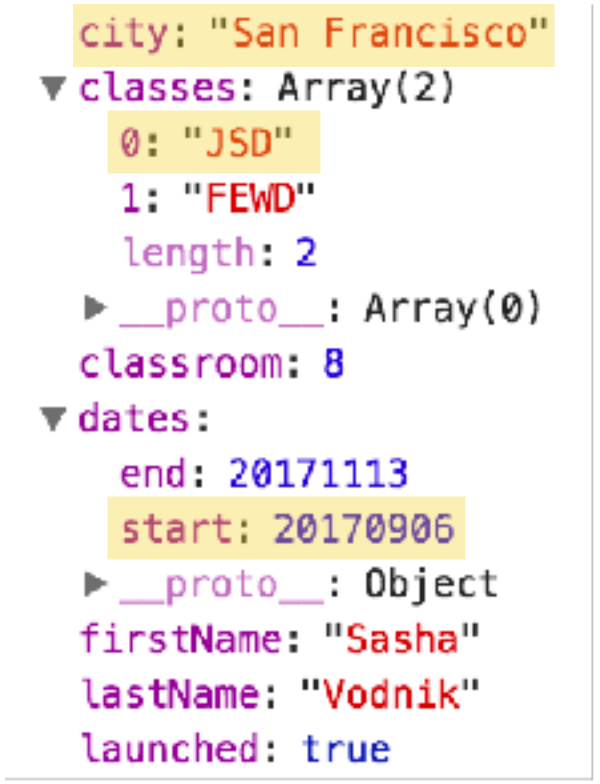
```
let personObject = JSON.parse(person);
console.log(personObject);
>
```



```
  city: "San Francisco"
▼ classes: Array(2)
    0: "JSD"
    1: "FEWD"
    length: 2
  ▶ __proto__: Array(0)
  classroom: 8
▼ dates:
    end: 20171113
    start: 20170906
  ▶ __proto__: Object
  firstName: "Sasha"
  lastName: "Vodnik"
  launched: true
```

WORKING WITH NESTED DATA STRUCTURES

3. LOCATE THE DATA YOU WANT TO REFERENCE



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  city: "San Francisco"
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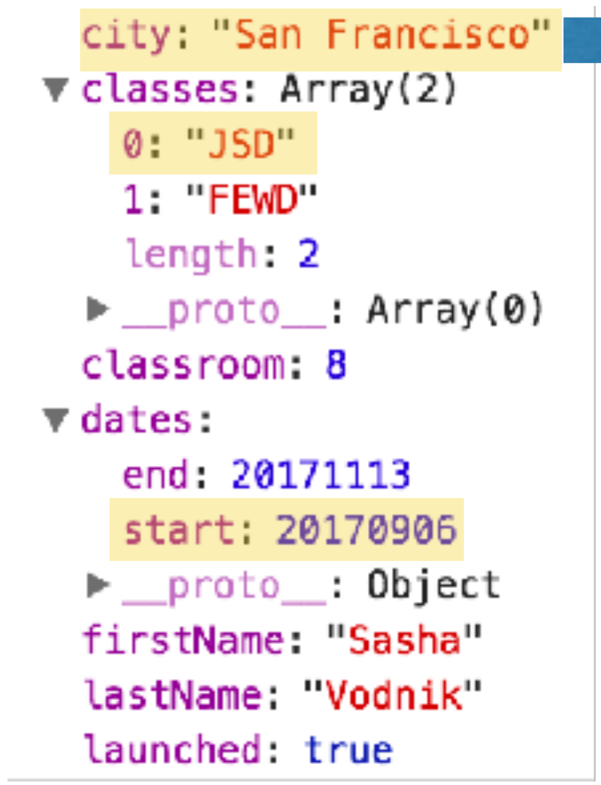
    1: "FEWD"
    length: 2
  ▶ __proto__: Array(0)
  classroom: 8
▼ dates:
    end: 20171113
    start: 20170906
  ▶ __proto__: Object
  firstName: "Sasha"
  lastName: "Vodnik"
  launched: true
```

WORKING WITH NESTED DATA STRUCTURES

4. IDENTIFY THE DATA TYPE OF THE TOP LEVEL, THEN WRITE CODE TO REFERENCE IT



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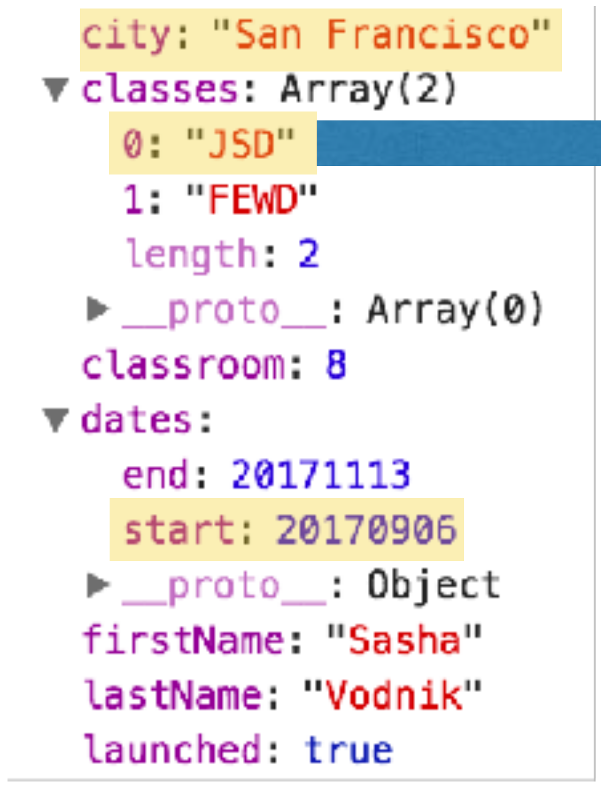
  city: "San Francisco"
▼ classes: Array(2)
    0: "JSD"
    1: "FEWD"
    length: 2
  ▶ __proto__: Array(0)
  classroom: 8
▼ dates:
    end: 20171113
    start: 20170906
  ▶ __proto__: Object
  firstName: "Sasha"
  lastName: "Vodnik"
  launched: true
```

direct property:

```
console.log(personObject.city);
> “San Francisco”
```

WORKING WITH NESTED DATA STRUCTURES

4. IDENTIFY THE DATA TYPE OF THE TOP LEVEL, THEN WRITE CODE TO REFERENCE IT
5. IF NECESSARY, MOVE DOWN A LEVEL, THEN REPEAT PREVIOUS STEP



```
  city: "San Francisco"
▼ classes: Array(2)
    0: "JSD"
    1: "FEWD"
    length: 2
  ▶ __proto__: Array(0)
  classroom: 8
▼ dates:
    end: 20171113
    start: 20170906
  ▶ __proto__: Object
  firstName: "Sasha"
  lastName: "Vodnik"
  launched: true
```

direct property > array element

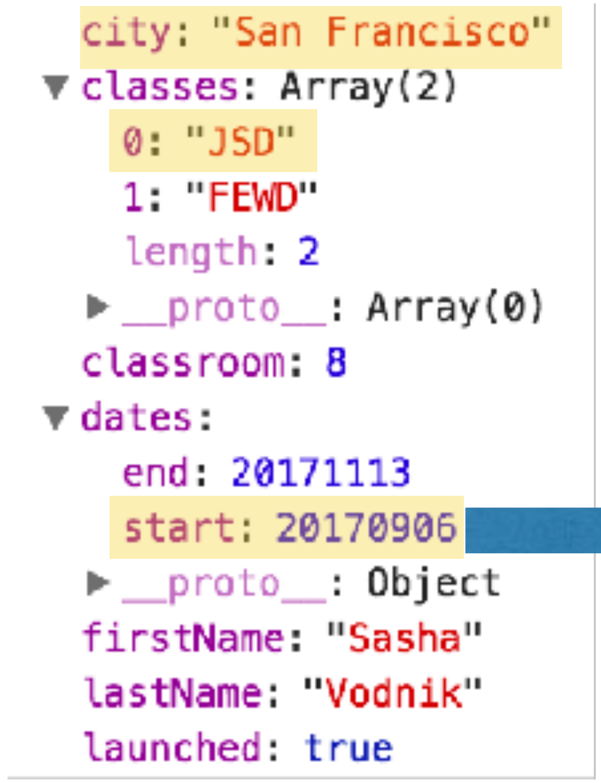
```
console.log(personObject.classes);
> [“JSD”,”FEWD”]

console.log(personObject.classes[0]);
> “JSD”
```

WORKING WITH NESTED DATA STRUCTURES

4. IDENTIFY THE DATA TYPE OF THE TOP LEVEL, THEN WRITE CODE TO REFERENCE IT

5. IF NECESSARY, MOVE DOWN A LEVEL, THEN REPEAT PREVIOUS STEP



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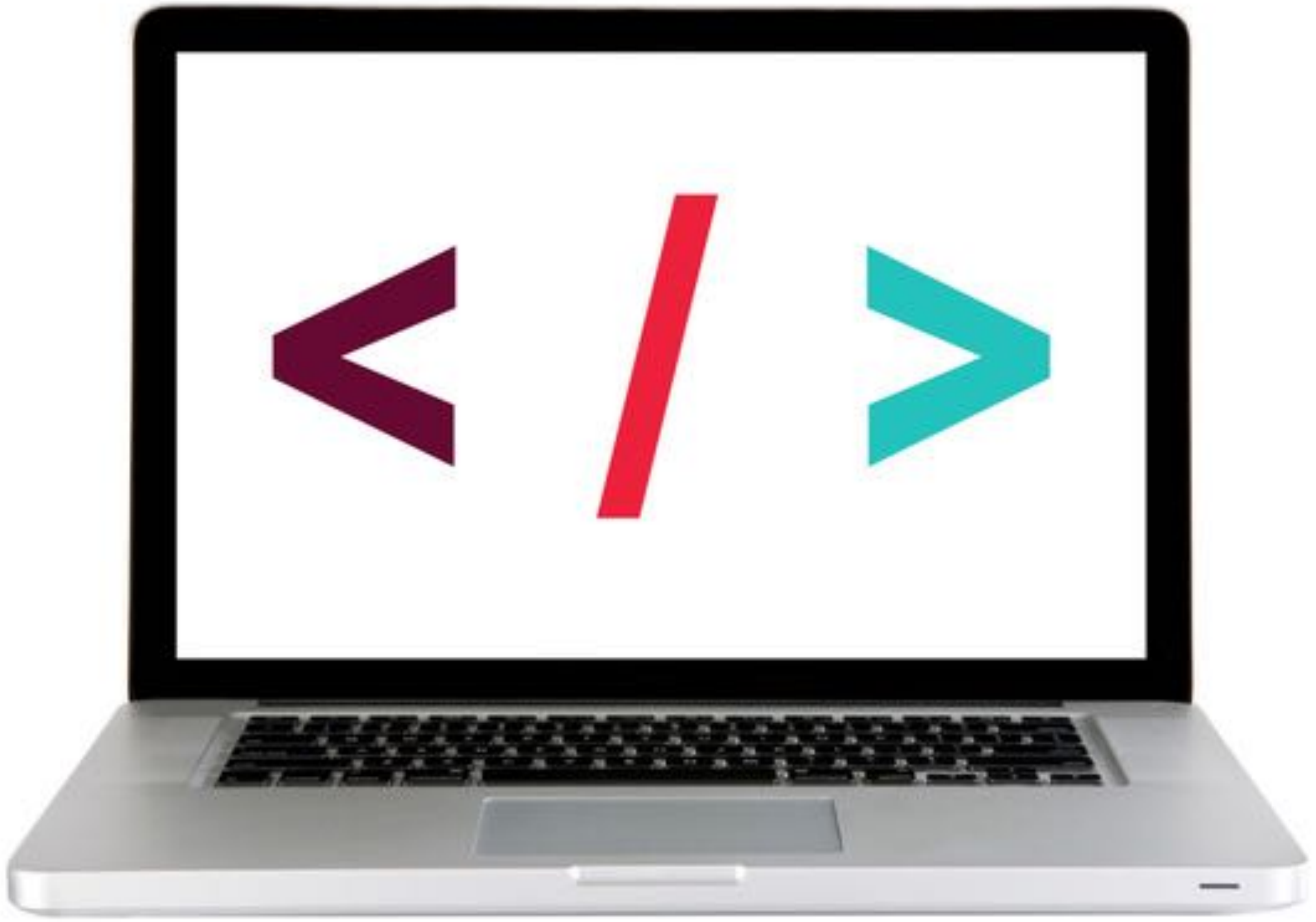
  city: "San Francisco"
▼ classes: Array(2)
    0: "JSD"
    1: "FEWD"
    length: 2
  ▶ __proto__: Array(0)
  classroom: 8
▼ dates:
    end: 20171113
    start: 20170906
  ▶ __proto__: Object
  firstName: "Sasha"
  lastName: "Vodnik"
  launched: true
```

direct property > nested object property

```
console.log(personObject.dates);
> {end:20171113,start:20170906}

console.log(personObject.dates.start);
> 20170906
```

LET'S TAKE A LOOK



LAB — JSON

LAB

KEY OBJECTIVE

- Implement and interface with JSON data

TYPE OF EXERCISE

- Individual or pair

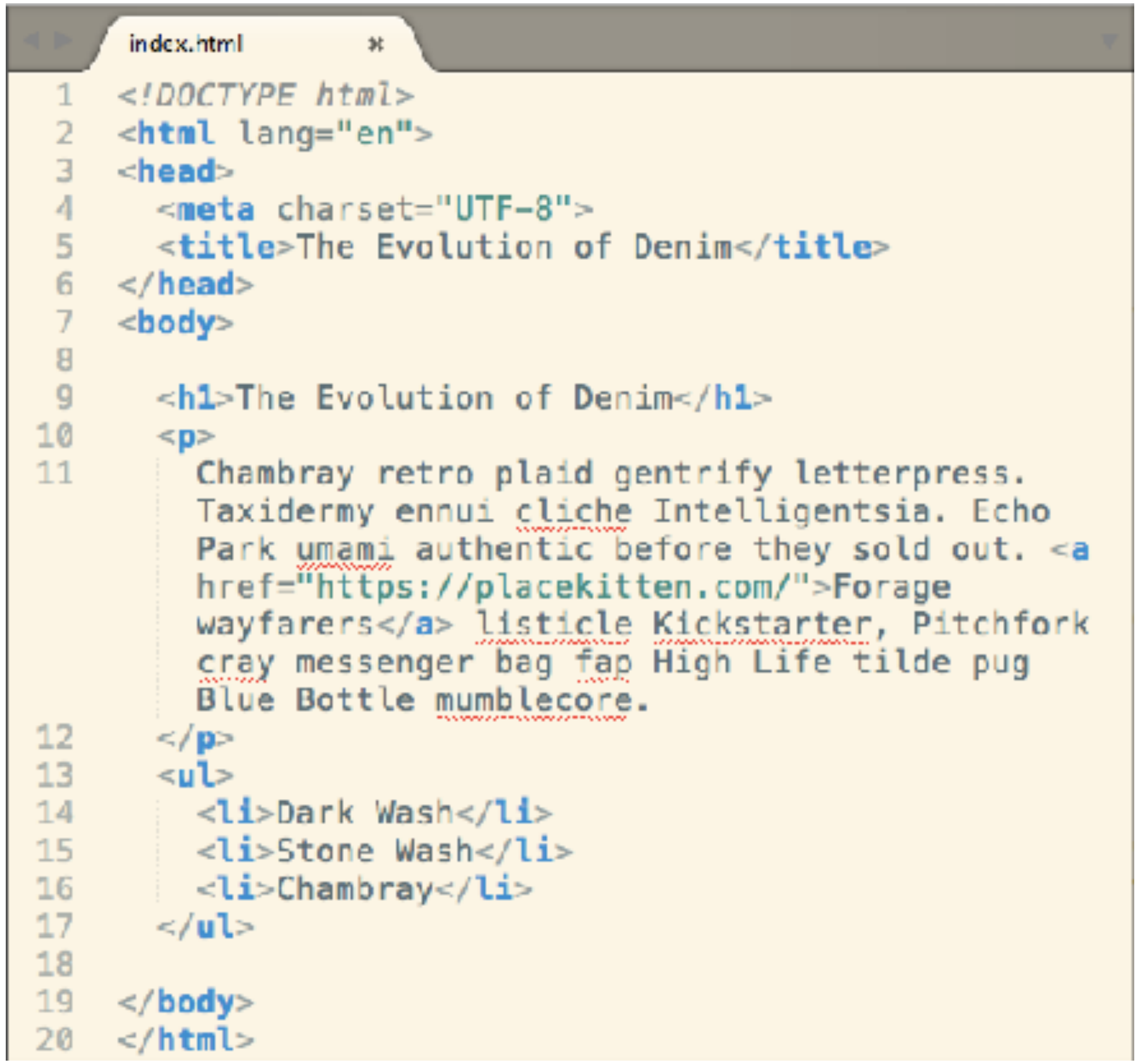
TIMING

10 min

1. Open `starter-code > 2-data-structure—exercise > app.js` in your editor.
2. Follow the instructions to write code that produces the stated output.

THE DOCUMENT OBJECT MODEL (DOM)

DOM TREE — HTML FILE



index.html

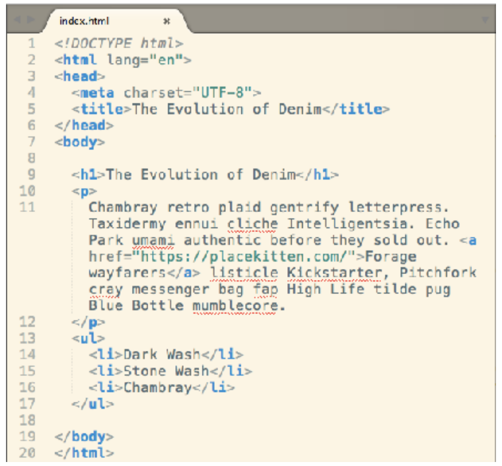
```html
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <title>The Evolution of Denim</title>
</head>
<body>

  <h1>The Evolution of Denim</h1>
  <p>
    Chambray retro plaid gentrify letterpress.
    Taxidermy ennui cliche Intelligentsia. Echo
    Park umami authentic before they sold out. <a
    href="https://placekitten.com/">Forage
    wayfarers</a> listicle Kickstarter, Pitchfork
    cray messenger bag fap High Life tilde pug
    Blue Bottle mumblecore.
  </p>
  <ul>
    <li>Dark Wash</li>
    <li>Stone Wash</li>
    <li>Chambray</li>
  </ul>

</body>
</html>
```

DOM TREE

- The browser pulls in this HTML document, analyzes it, and creates an *object model* of the page in memory.
- This model is called the *Document Object Model (DOM)*.
- The DOM is structured like a tree, a DOM Tree, like in the model below:



```html
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <title>The Evolution of Denim</title>
</head>
<body>

  <h1>The Evolution of Denim</h1>
  <p>
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    href="https://placekitten.com/">Forage
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    cray messenger bag fap High Life tilde pug
    Blue Bottle mumblecore.
  </p>
  <ul>
    <li>Dark Wash</li>
    <li>Stone Wash</li>
    <li>Chambray</li>
  </ul>

</body>
</html>
```
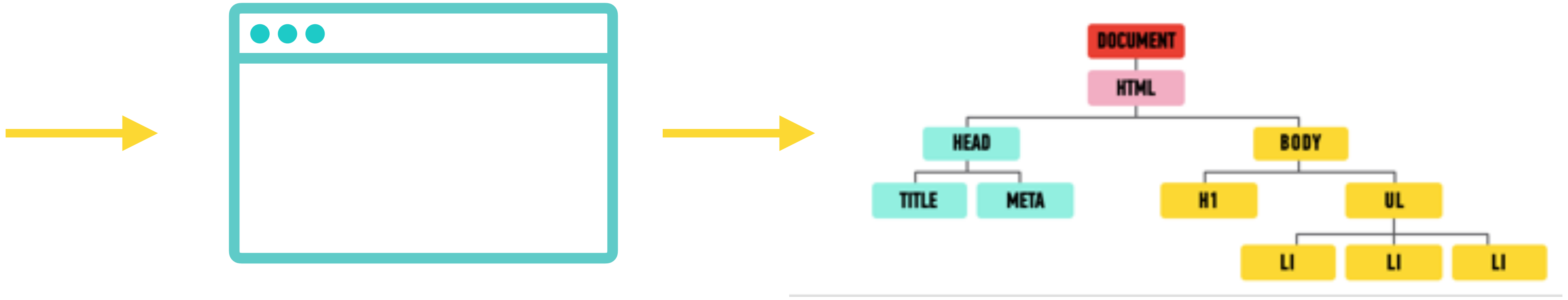
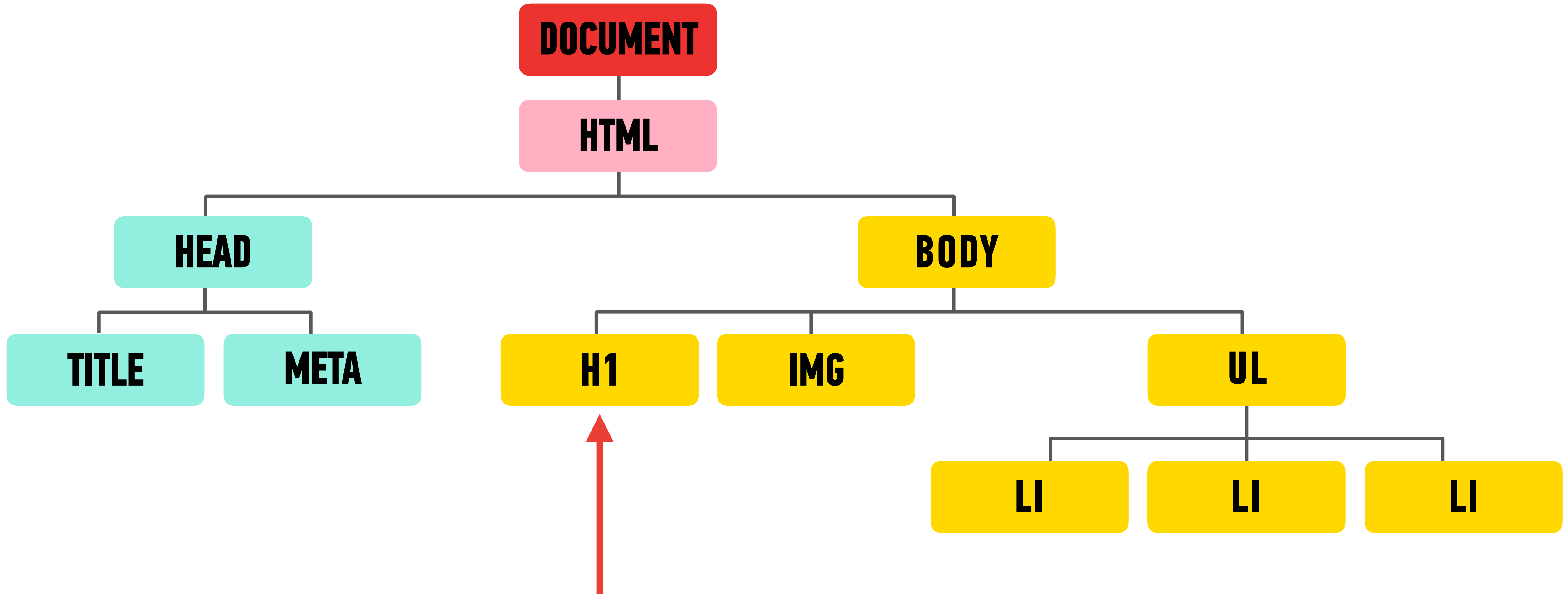



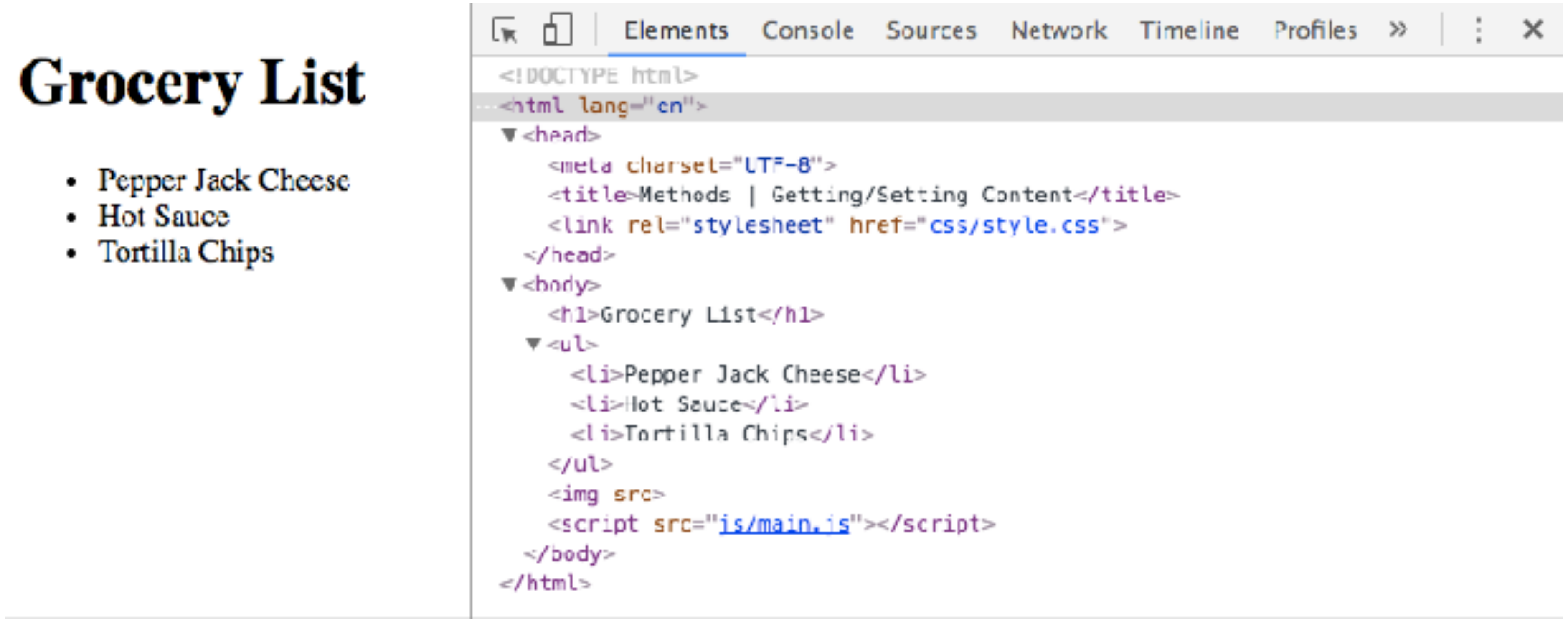
DOM TREE



- Each element in the HTML document is represented by a *DOM node*.
- You can think of a node as a live object that you can access and change using JavaScript.
- When the model is updated, those changes are reflected on screen.

DOM TREE

- In Chrome, you can go to View > Developer > Developer Tools and click on the Elements panel to take a look at the DOM tree.

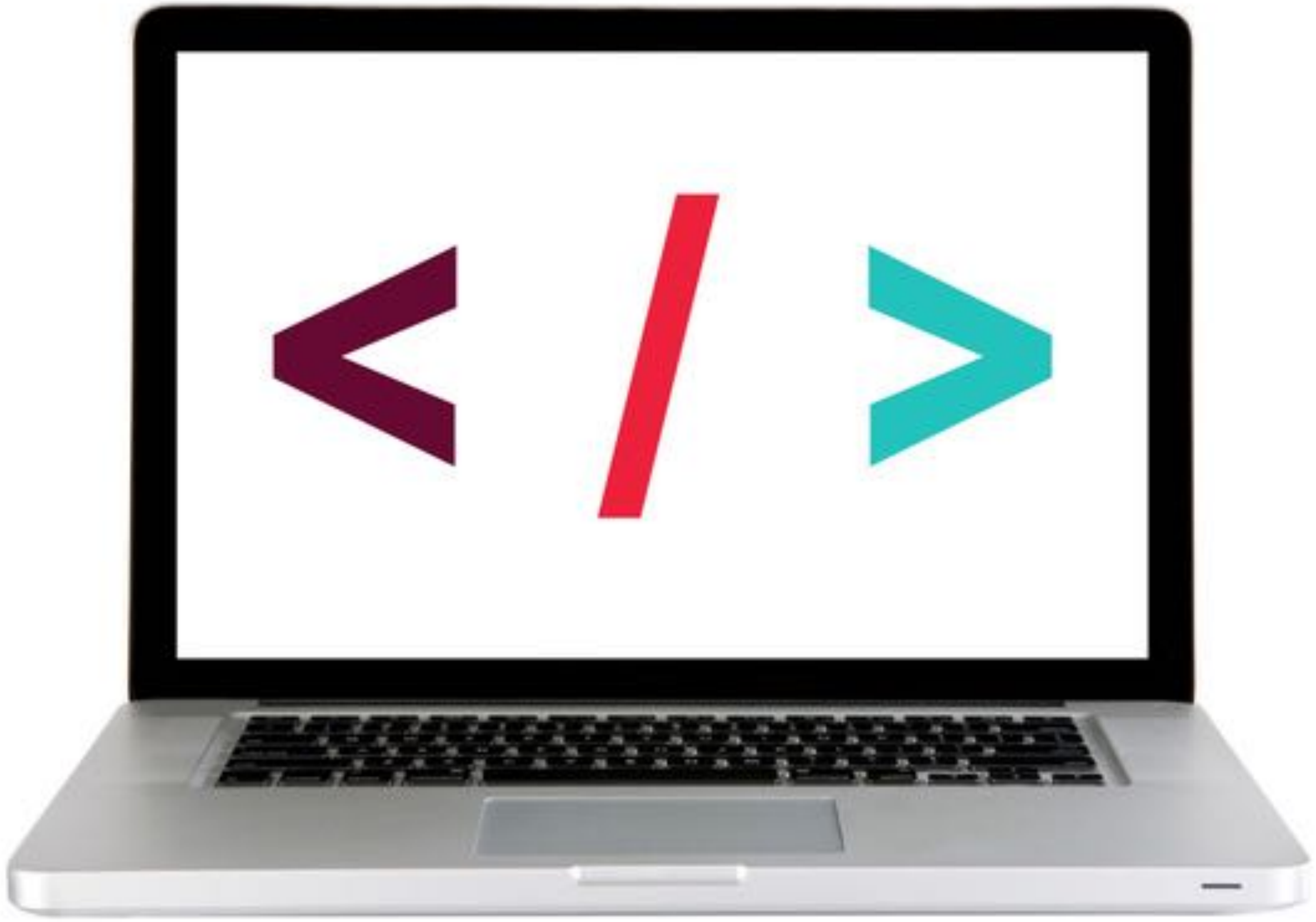


Grocery List

- Pepper Jack Cheese
- Hot Sauce
- Tortilla Chips

```
<!DOCTYPE html>
<html lang="en">
▼<head>
    <meta charset="UTF-8">
    <title>Methods | Getting/Setting Content</title>
    <link rel="stylesheet" href="css/style.css">
  </head>
▼<body>
    <h1>Grocery List</h1>
  ▼<ul>
      <li>Pepper Jack Cheese</li>
      <li>Hot Sauce</li>
      <li>Tortilla Chips</li>
    </ul>
    <img src>
    <script src="js/main.js"></script>
  </body>
</html>
```

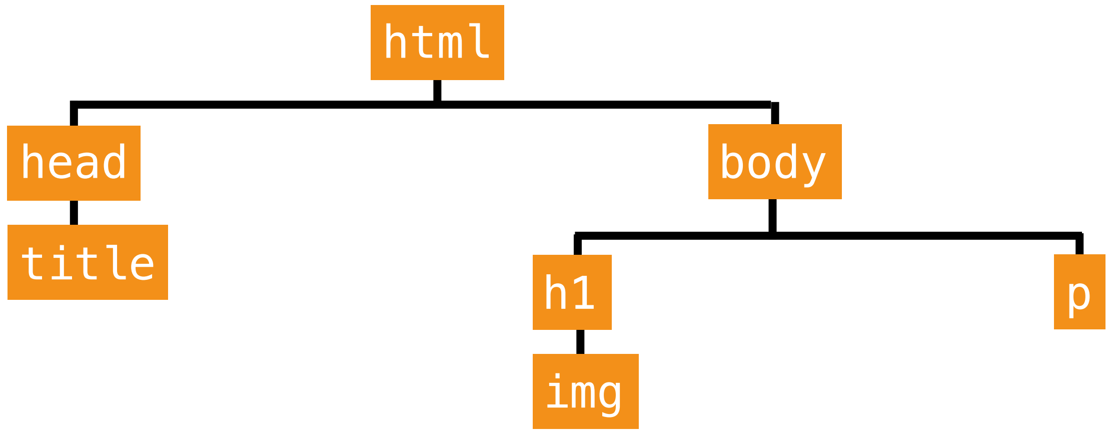
LET'S TAKE A LOOK



Web page elements

```
<html>
  <head>
    <title>JavaScript Basics</title>
  </head>
  <body>
    <h1>
      <img src="logo.png" alt="JS Basics">
    </h1>
    <p>First, master HTML and CSS.</p>
  </body>
</html>
```

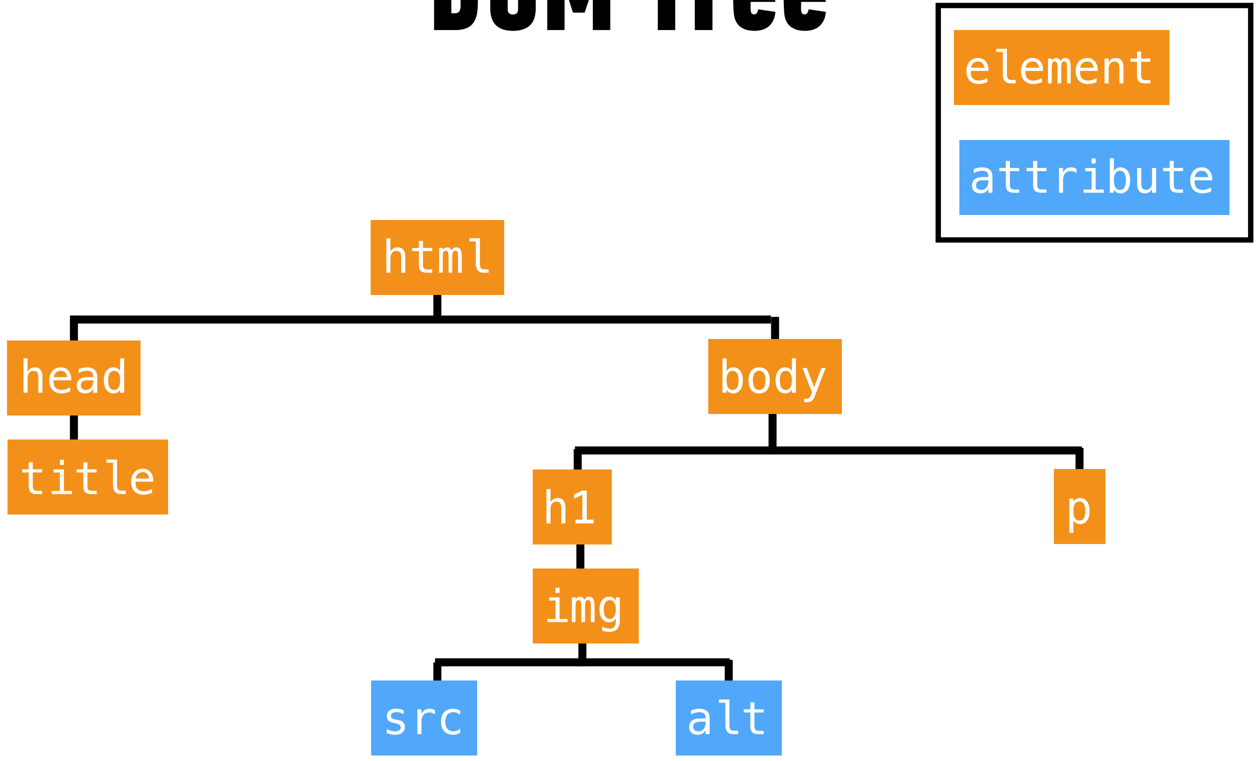
DOM Tree



Web page elements

```
<html>
  <head>
    <title>JavaScript Basics</title>
  </head>
  <body>
    <h1>
      <img src=“logo.png” alt=“JS Basics”>
    </h1>
    <p>First, master HTML and CSS.</p>
  </body>
</html>
```

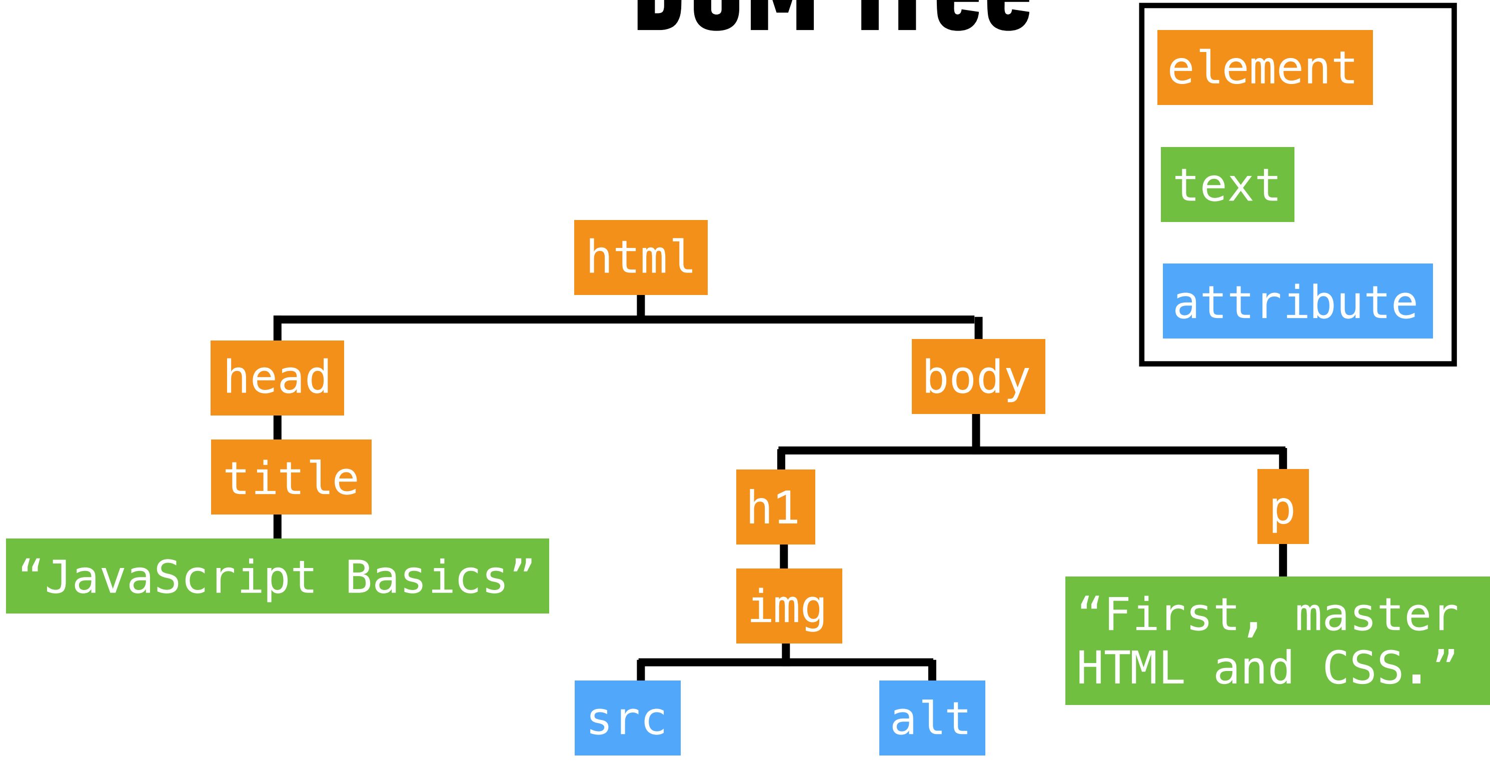
DOM Tree



Web page elements

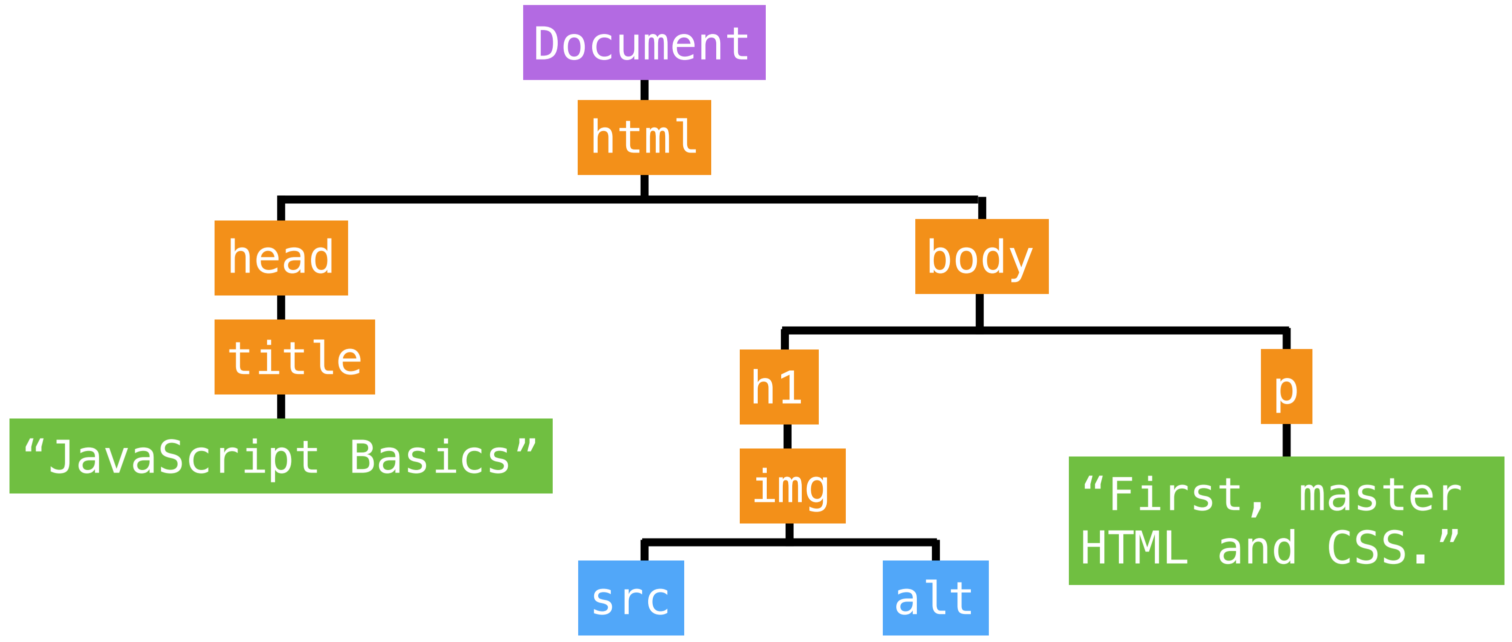
```
<html>
  <head>
    <title>JavaScript Basics</title>
  </head>
  <body>
    <h1>
      <img src=“logo.png” alt=“JS Basics”>
    </h1>
    <p>First, master HTML and CSS.</p>
  </body>
</html>
```

DOM Tree



The Document object

- Created by the browser
- Contains all web page elements as descendant objects
- Also includes its own properties and methods



EXERCISE

EXERCISE

KEY OBJECTIVE

- Identify differences between the DOM and HTML

TYPE OF EXERCISE

- Pairs

TIMING

2 min 1. Discuss how the DOM is different from a page’s HTML

DOM MANIPULATION

Selecting an element in the DOM

- `getElementById()`
- `getElementsByClassName()`
- `getElementsByTagName()`
- `querySelector()`
- `querySelectorAll()`

Let us select DOM elements using CSS selector syntax

CSS SELECTORS

Select all paragraph elements and list item elements

```
'p li'
```

Select all paragraph elements and list item elements

```
'p, li'
```

Select unordered lists within divs

```
'ul div'
```

Select unordered lists within divs

```
'div ul'
```

Select the element with the ID value ‘main’

```
'main'
```

Select the element with the ID value ‘main’

```
'#main'
```

Select the elements with the class value ‘col3’

```
':col3'
```

Select the elements with the class value ‘col3’

```
'.col3'
```

querySelector()

- Takes a single argument, a string containing CSS selector

HTML

```
<body>
  …
  <p id="main">Lorem ipsum</p>
  …
</body>
```

JavaScript

```
document.querySelector('#main');
```

querySelector()

- Selects the **first** DOM element that matches the specified CSS selector

```
<body>
  …
  <ul>
    <li>Lorem ipsum</li>
    <li>Lorem ipsum</li>
    <li>Lorem ipsum</li>
  </ul>
…
</body>
```

JavaScript

```
document.querySelector('li');
```

querySelectorAll()

- Takes a single argument, a string containing CSS selector
- Selects all DOM elements that match this CSS selector
- Returns a NodeList, which is similar to an array

```html
<body>
  …
  <ul>
    <li>Lorem ipsum</li>
    <li>Lorem ipsum</li>
    <li>Lorem ipsum</li>
  </ul>
…
</body>
```

JavaScript

```javascript
document.querySelectorAll(‘li’);
```

What can we do with a selected element?

- Get and set the HTML within it with the `innerHTML` property
- Get and set its attribute values by referencing them directly (`id`, `src`, etc.)

innerHTML

- Gets the existing content of an element, including any nested HTML tags
- Sets new content in an element

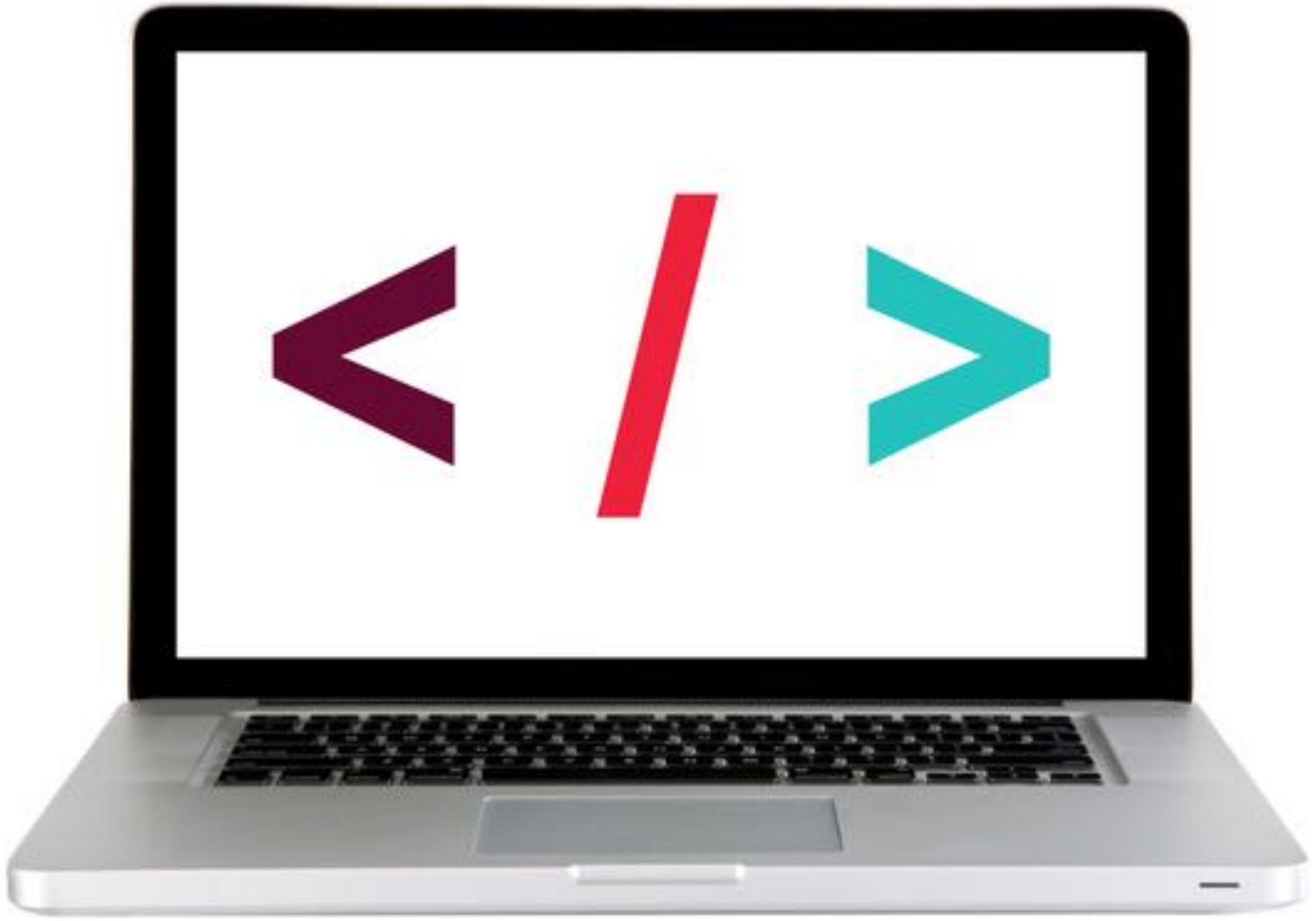
```
var item = document.querySelector(‘li’);

console.log(item.innerHTML) // Gets value: “Lorem ipsum”

item.innerHTML = ‘Apples’ // Sets value: ‘Apples’
```

`className` property

- Gets/sets an element's `class` attribute value
- CSS style sheet contains a style rule for each class
  - Appearance of element changes based on which class is applied
  - This is the best practice.

```
var item = document.querySelector('li');

console.log(item.className) // Gets value: 'default'

item.className = 'selected'
// Sets value: 'selected'
```

LET'S TAKE A LOOK



LAB — JSON

KEY OBJECTIVE

- Use vanilla JavaScript methods and properties to create and modify DOM nodes.

TYPE OF EXERCISE

- Individual or pair

TIMING

5 min

1. Open `starter-code > 4-dom-exercise > app.js` in your editor.
2. Follow the instructions to write code that selects and modifies the indicated elements and content.

LAB — JSON

LAB

KEY OBJECTIVE

- Use vanilla JavaScript methods and properties to create and modify DOM nodes.

TYPE OF EXERCISE

- Individual or pair

TIMING

5 min

1. Open `starter-code > 5-dom-attributes-exercise > app.js` in your editor.
2. Follow the instructions to write code that selects and modifies the indicated elements and content.

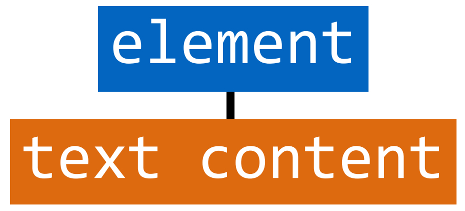
Adding content to the DOM

1. create a new element with `document.createElement()`

`element`

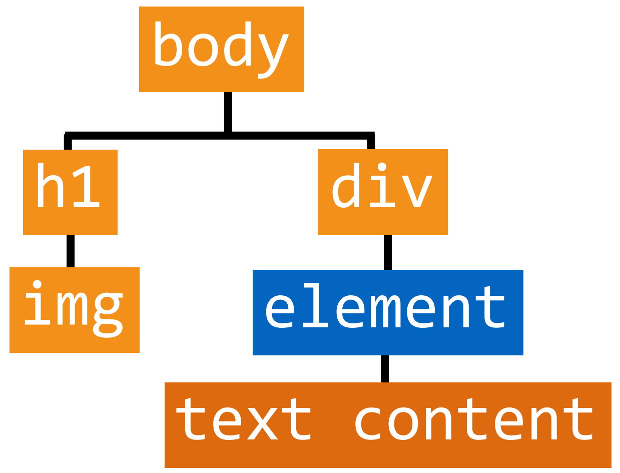
Adding content to the DOM

1. create a new element with `document.createElement()`
2. add text content to that element with the `innerHTML` property



Adding content to the DOM

1. create a new element with `document.createElement()`
2. add text content to that element with the `innerHTML` property
3. attach the new element to the DOM with `appendChild()`



createElement()

- Creates a new element

```
document.createElement(‘li’); // creates an li element
```

- Created element isn’t attached to DOM
  - assign variable when creating so you can reference later

```
let item1 = document.createElement(‘li’);
let item2 = document.createElement(‘li’);
```

innerHTML

- Specifies text content of an element
- May include nested HTML tags

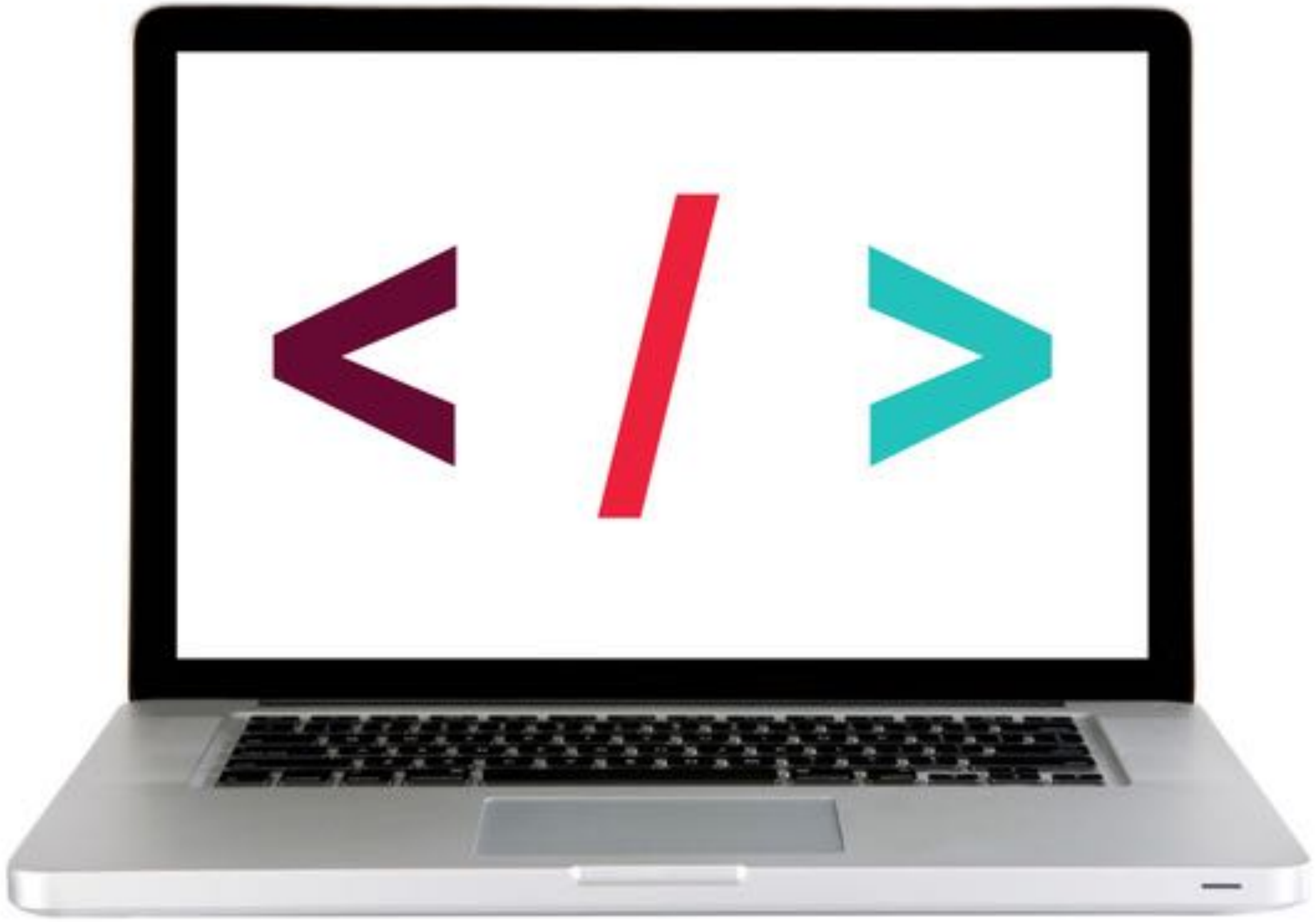
```
item1.innerHTML =’banana’;
item2.innerHTML =‘apple’;
```

appendChild()

- Attaches element or node as child of specified element
  - Attaching to a DOM element makes it part of the DOM
- Syntax:
  parent.appendChild(*child*);

```
let list = document.querySelector(‘ul’); // selects ul element
list.appendChild(item1);    // adds item1 li to list ul
list.appendChild(item2);    // adds item2 li to list ul
```

LET'S TAKE A LOOK



EXERCISE

EXERCISE

KEY OBJECTIVE

- Explain and use JavaScript methods for DOM manipulation.

TYPE OF EXERCISE

- Pairs

TIMING

2 min

1. Work together to create and complete a list of the four steps in DOM manipulation.
2. For each step in your list, add the method used.

EXERCISE – ADD CONTENT TO A WEB PAGE USING JAVASCRIPT

EXERCISE

LOCATION

▸ `starter-code > Homework-3 > create-append-homework`

TIMING

until 9:20

1. Open preview.png. Your task is to use DOM manipulation to build the sidebar shown in the image and add it to the blog.html web page.
2. Open app.js in your editor, then follow the instructions to create and the “About us” heading and the 2 paragraphs of text to the sidebar.
3. BONUS 1: Open preview-bonus.png, then write JavaScript code to add the image shown to the sidebar. (Filename and location in app.js.)
4. BONUS 2: Create and append the “Recent issues” heading and list.

Exit Tickets!

(Class #6)

LEARNING OBJECTIVES - REVIEW

- Implement and interface with JSON data
- Identify differences between the DOM and HTML.
- Use vanilla JavaScript methods and properties to create and modify DOM nodes.

NEXT CLASS PREVIEW

Intro to jQuery

- Select DOM elements and properties using jQuery.
- Manipulate the DOM by using jQuery selectors and functions.
- Create DOM event handlers using jQuery.

Q&A