Client-Side Web Programming: JavaScript (Part 1)

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Objectives

- We will cover:
    - JavaScript in browsers
    - The browser DOM
    - Browser event handling

Agenda

- **JavaScript in browsers**
- The browser DOM
- Browser events

JavaScript in Browsers

- To run JavaScript code in browsers:
  - Embed it into HTML
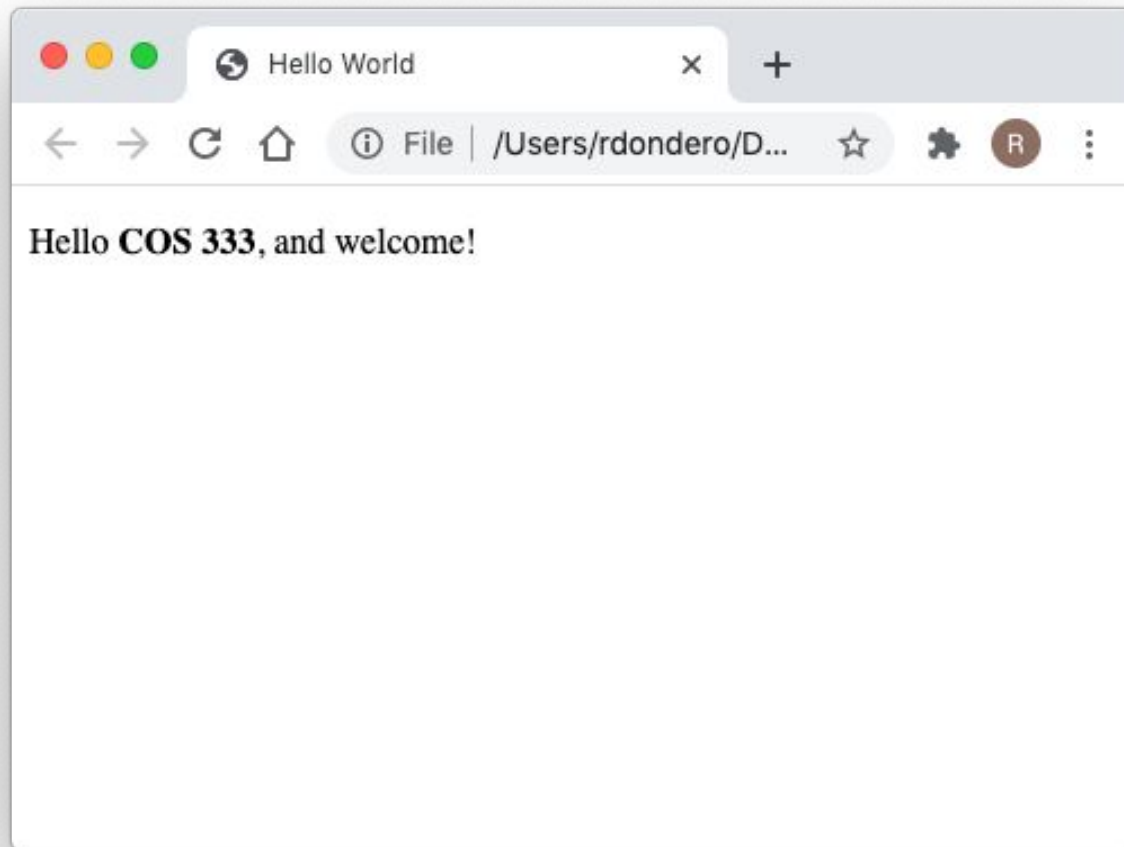- To embed **someJavaScriptCode** into HTML:

```
<script>someJavaScriptCode</script>
```

```
<script src="someURL"></script>
```

Where *someJavaScriptCode* resides at *someURL*

JavaScript in Browsers
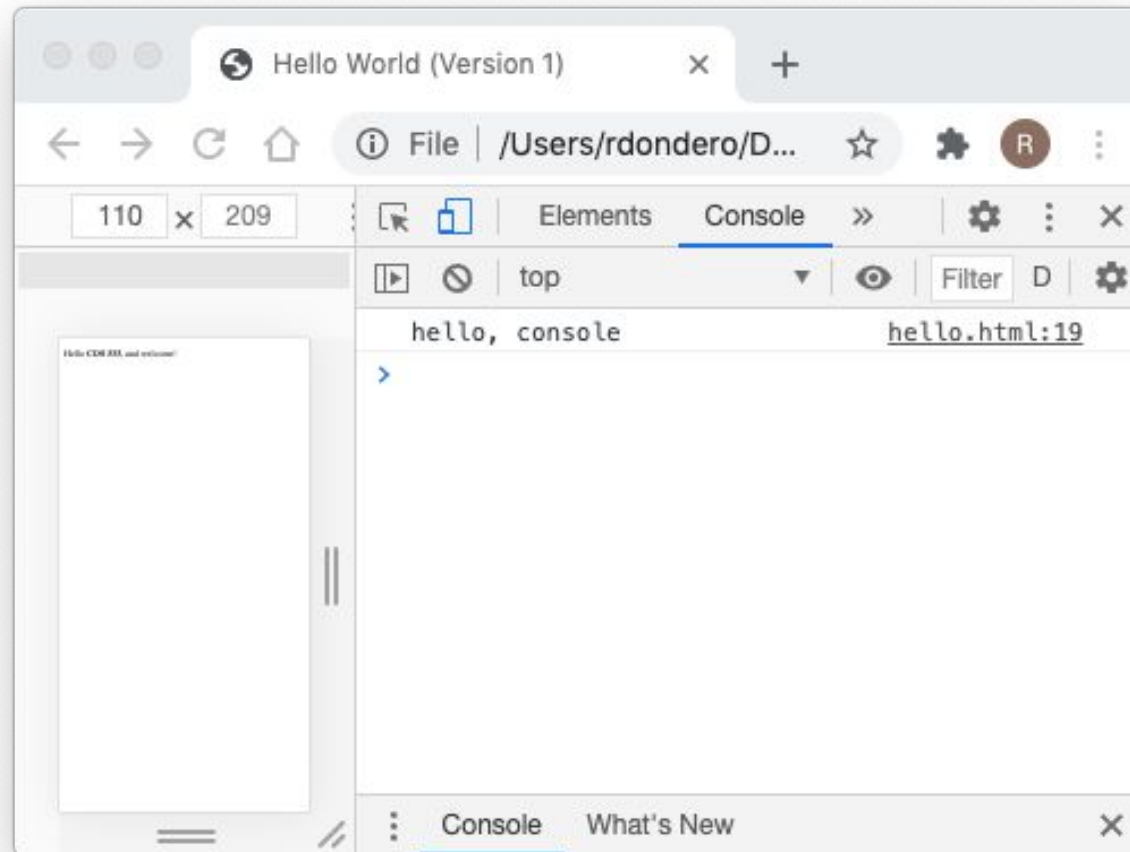
- See **hello.html**

JavaScript in Browsers

- Accessing the browser console
  - Menu
    - **Chrome**: More Tools → Developer Tools → Console
    - **Firefox**: More Tools → Web Developer tools → Web Console
    - **Safari**: Develop → Show JavaScript console
  - Keyboard shortcut:
    - **Linux**: Ctrl-Shift-i
    - **MS Windows**: Ctrl-Shift-i
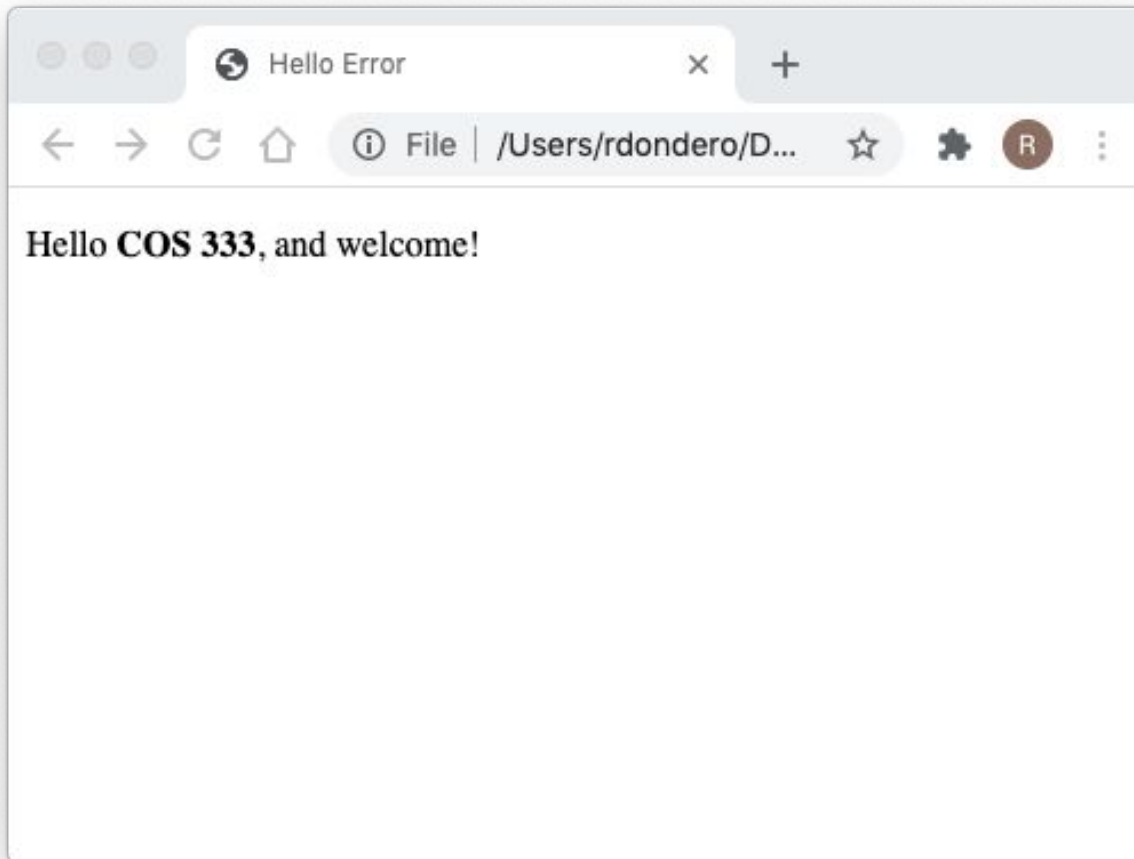   - **Mac**: Cmd-Option-i

JavaScript in Browsers
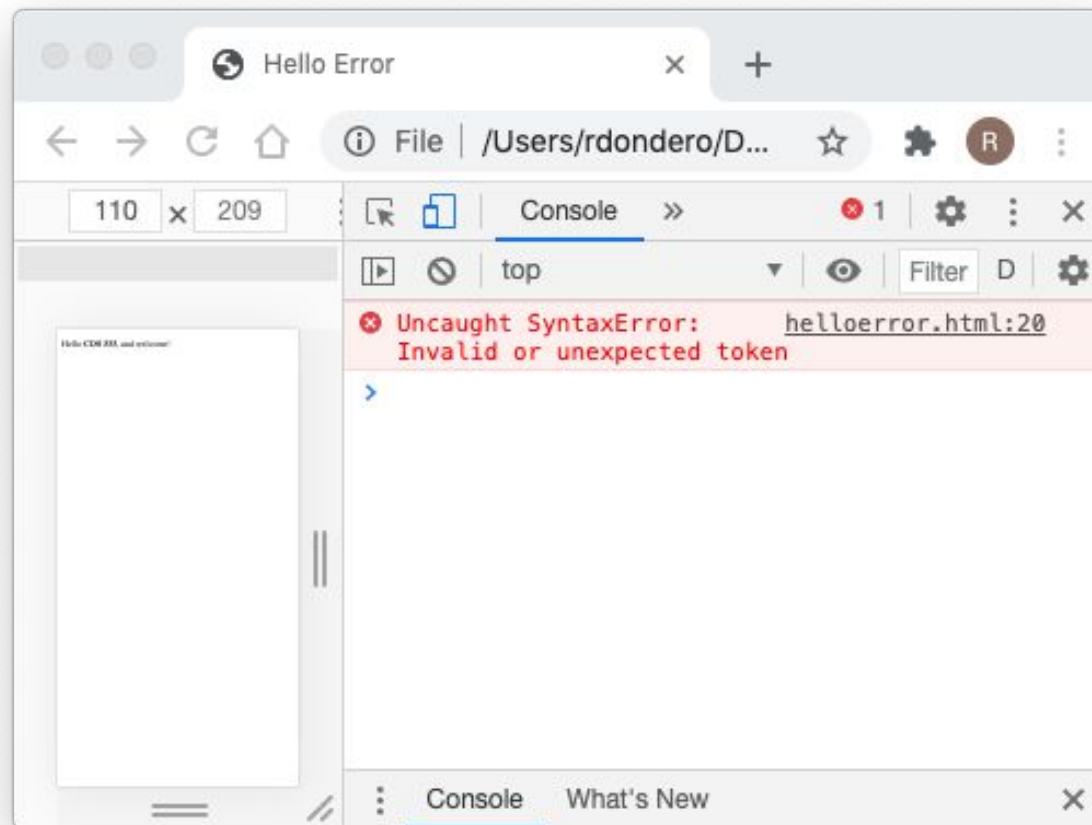
- See **hello.html** (cont.)

JavaScript in Browsers

- See **helloerror.html**

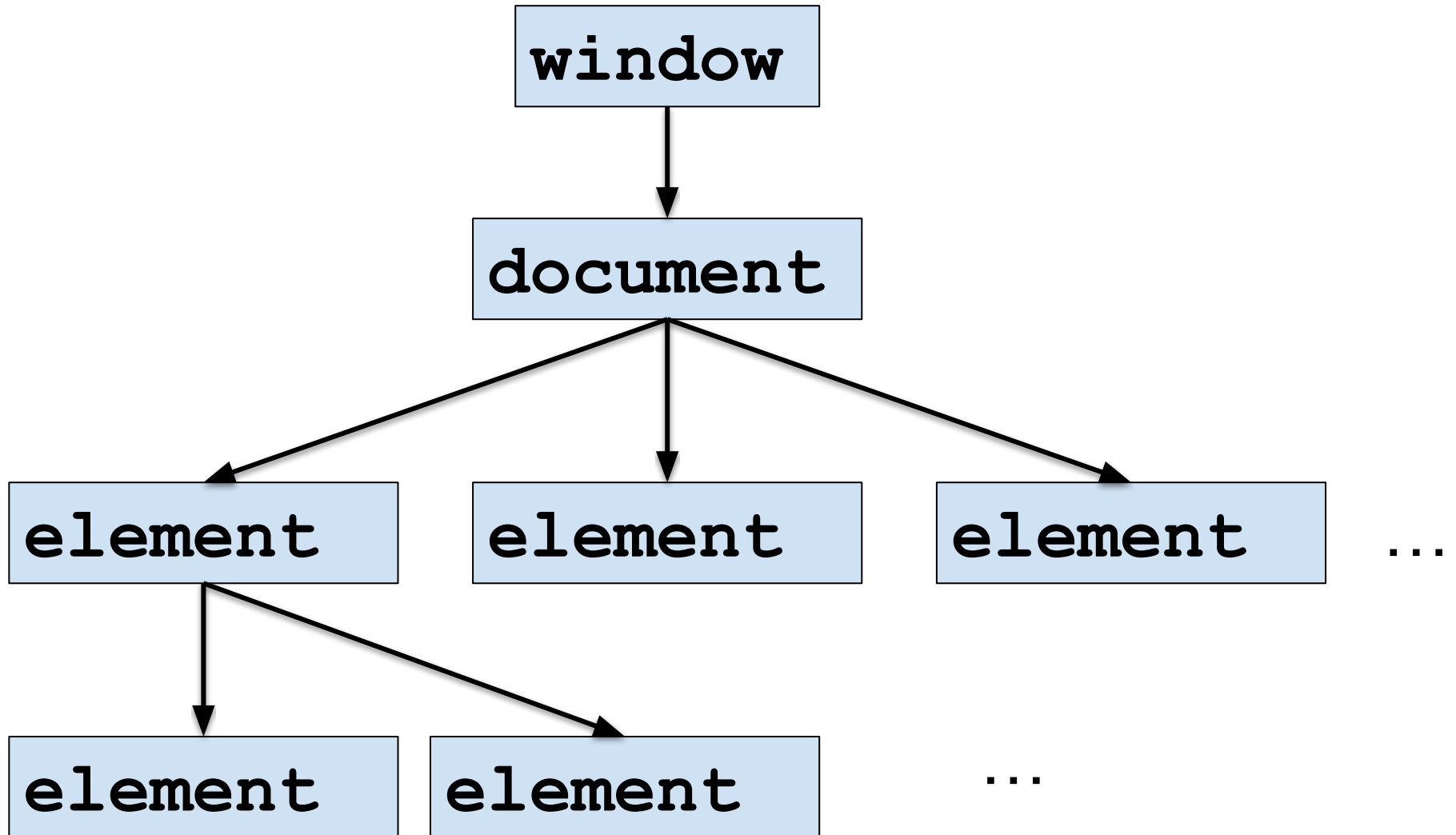# JavaScript in Browsers

- See **helloerror.html** (cont.)

Agenda

- JavaScript in browsers
- **The browser DOM**
- Browser events

Browser DOM

- *Document Object Model (DOM)*
  - A programmatic **model** of the current HTML **document**
  - A data structure representing the current HTML document
    - Each HTML element is represented as an object
    - Each object is the node of a tree
  - Standardized by *World Wide Web Consortium (W3C)*
    - Some old browsers don't observe
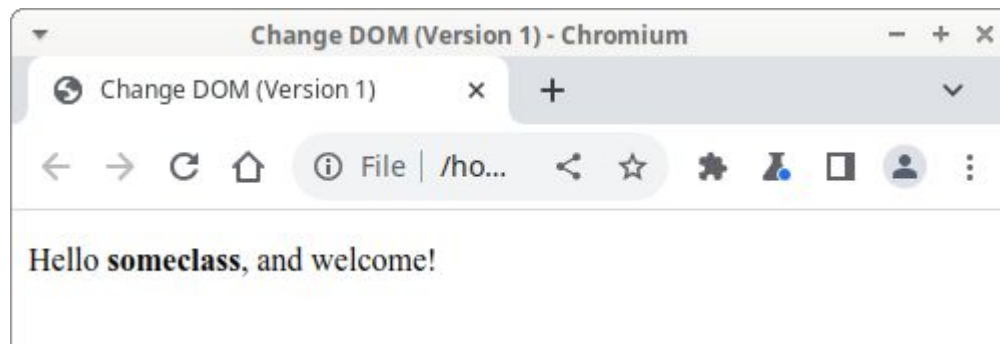
Browser DOM

Browser DOM

- ***window*** node
  - Represents the browser window
- ***document*** node
  - Represents the current document
  - Important property: `childNodes[]`
  - Important property: `getElementById()`

Browser DOM

- ***element*** node
  - Represents an HTML element (`<body>`, `<p>`, `<hr>`, …)
  - May contain attribute nodes
  - Important property: `attributes[]`
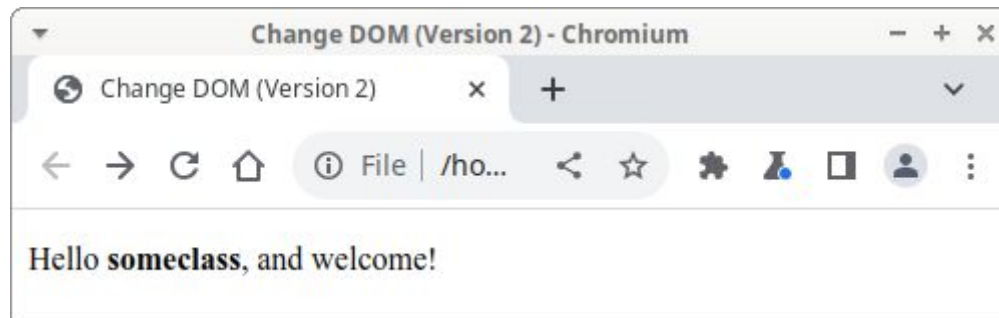 - Important property: `childNodes[]`
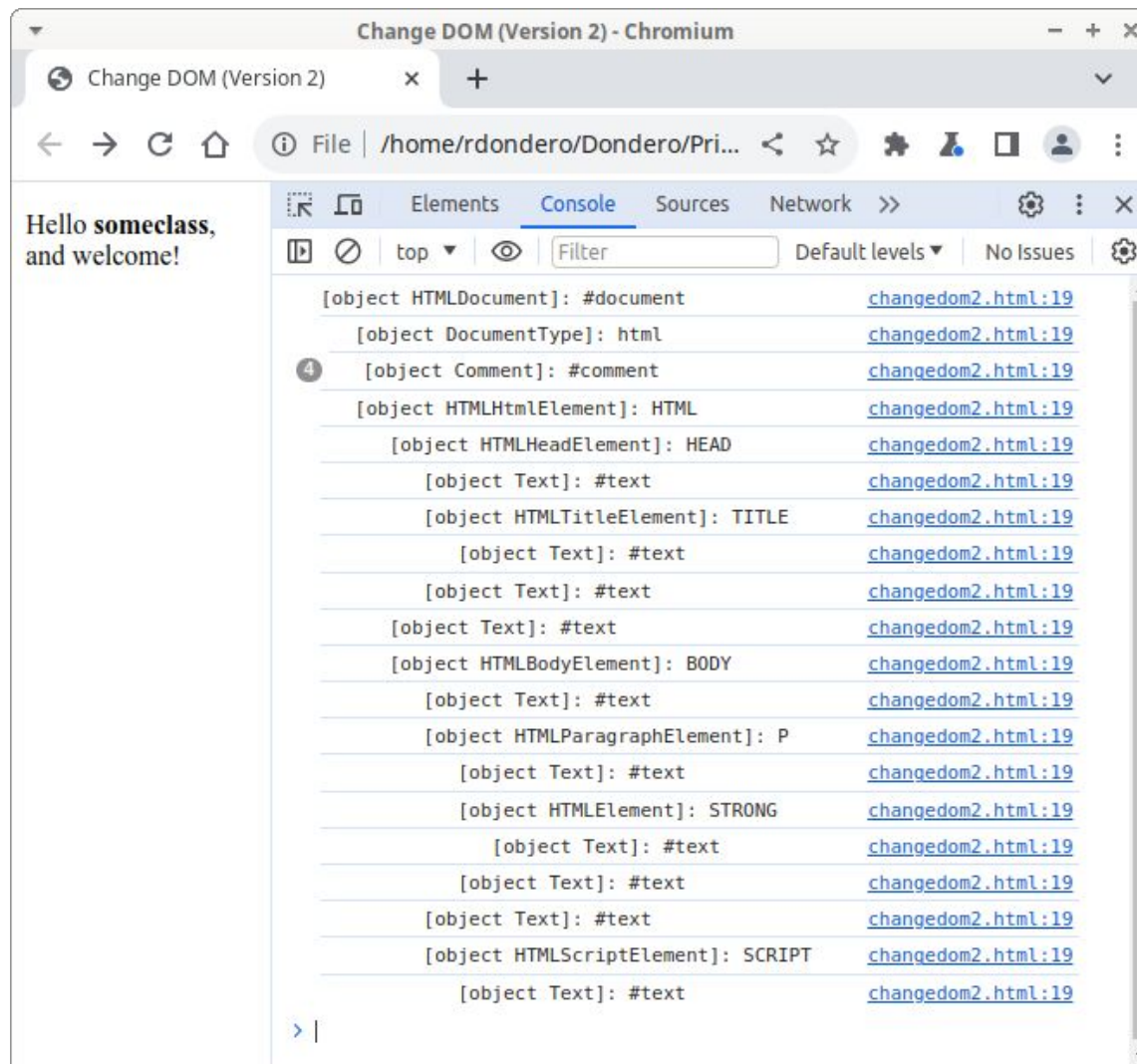 - Important property: `innerHTML`

Browser DOM

- See **changedom1.html**

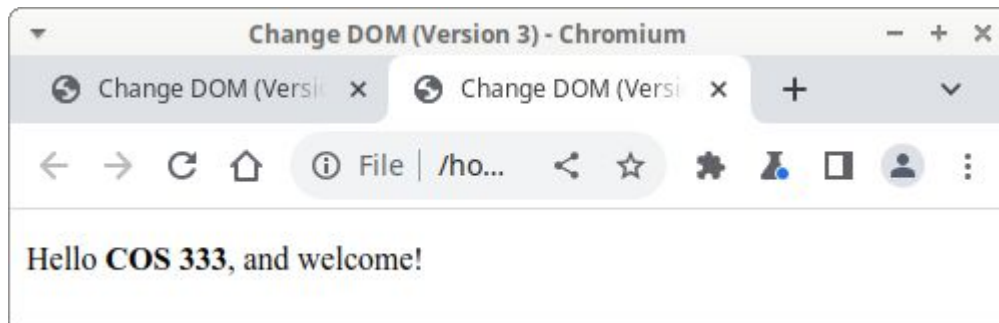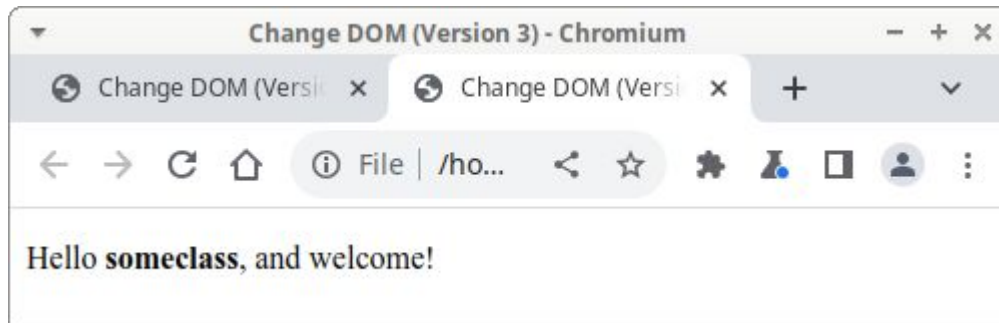# Browser DOM

- See **changedom2.html**

Browser DOM

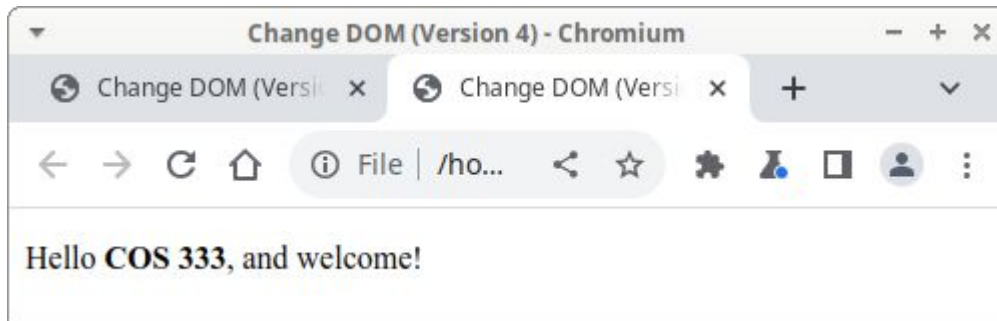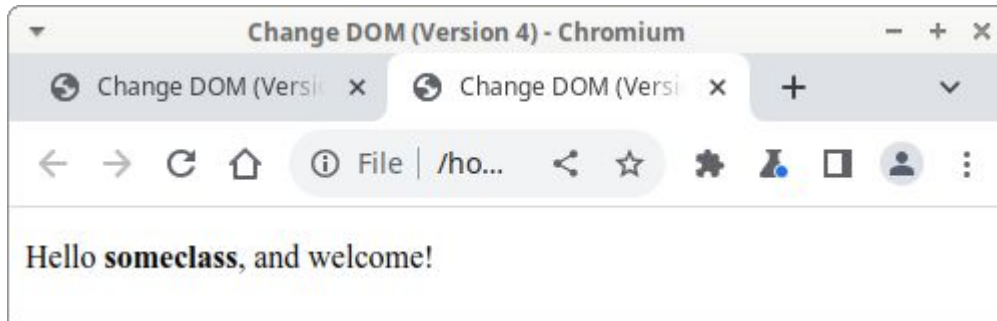- See **changedom2.html** (cont.)

Browser DOM

- See **changedom3.html**

Browser DOM

- See **changedom4.html**

Agenda

- JavaScript in browsers
- The browser DOM
- **Browser events**

Browser Events
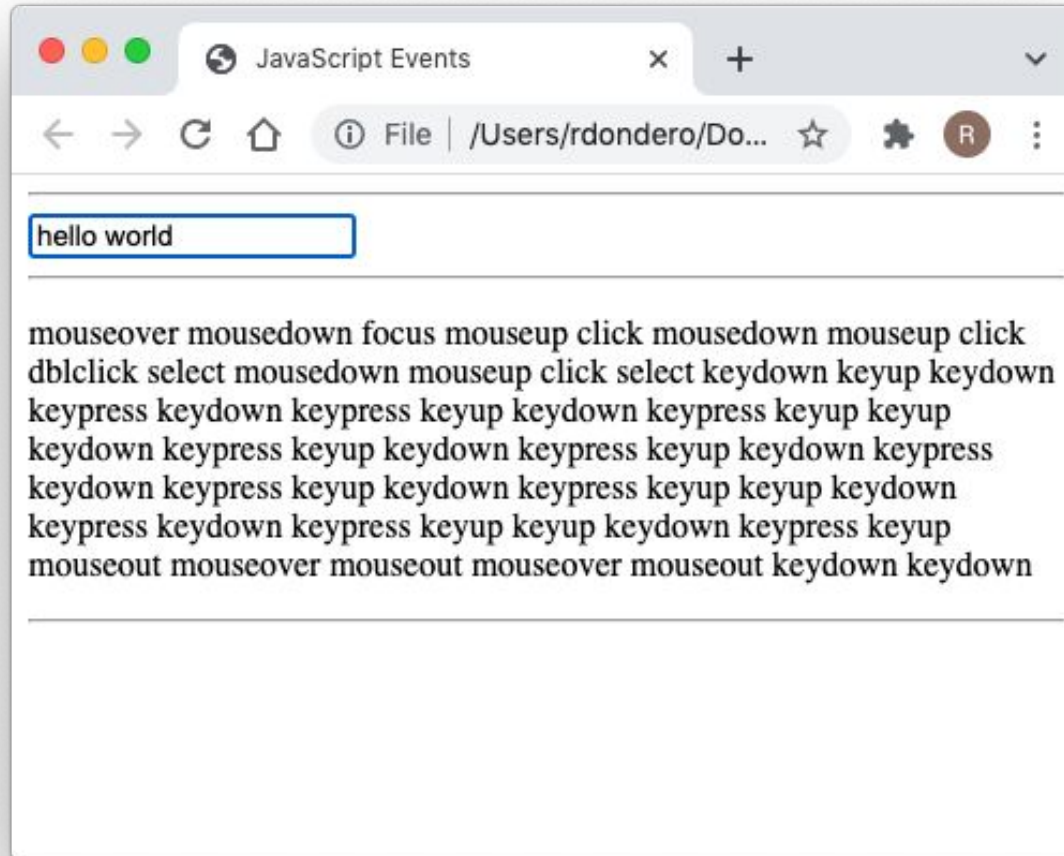
- *Event*
  - An occurrence on a particular element
- *Event handler*
  - JavaScript code
  - Installed on a particular element for a particular event

Browser Events

- **Question**: How to install event handlers on an element?
- **Answer 1**: In HTML via the element's attributes
- **Answer 2**: In JavaScript via addEventListener()
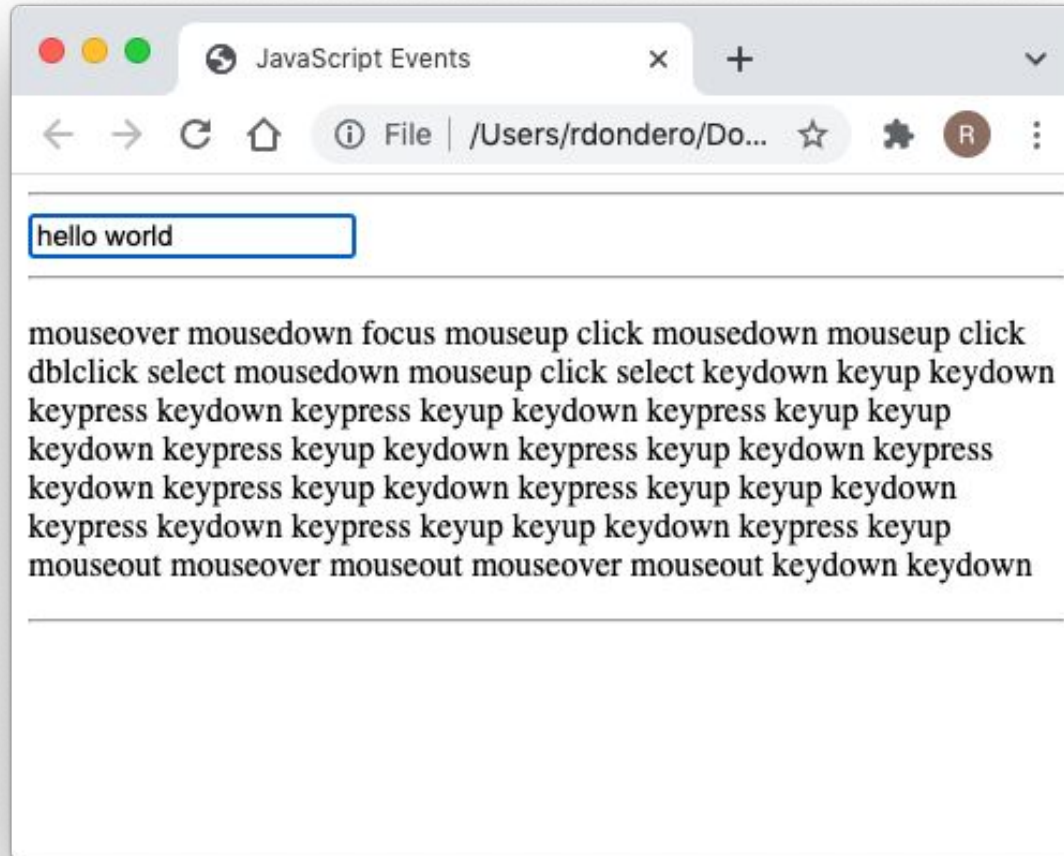
Browser Events

- See **events1.html**

Browser Events

- **Question**: How to install event handlers on an element?

- **Answer 1**: In HTML via the element's attributes

- **Answer 2**: In JavaScript via addEventListener()

Browser Events

- See **events2.html**

Browser Events

- Which is better, events1.html or events2.html?
    - **events1.html**: more succinct
    - **events2.html**: better separation of concerns

Browser Events

- Browser events

  - https://www.w3schools.com/jsref/dom_obj_event.asp

JavaScript in Browsers Summary

- To use JavaScript in browsers:
    - Embed JavaScript code in HTML in `<script>` elements
    - For element ELEMENT1, associate event EVENT1 with an event handler (JavaScript code)
    - Then…

JavaScript in Browsers Summary

- To use JavaScript in browsers (cont.):
  - When EVENT1 occurs on ELEMENT1, browser places event on JS Event Queue to execute event handler
  - JS Engine (when ready) removes event from JS event queue, and executes event handler
  - Event handler reads from and/or writes to the DOM; writing to the DOM changes the rendered page

Summary

- We have covered:
    - JavaScript in browsers
    - The browser DOM
    - Browser event handling