

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:

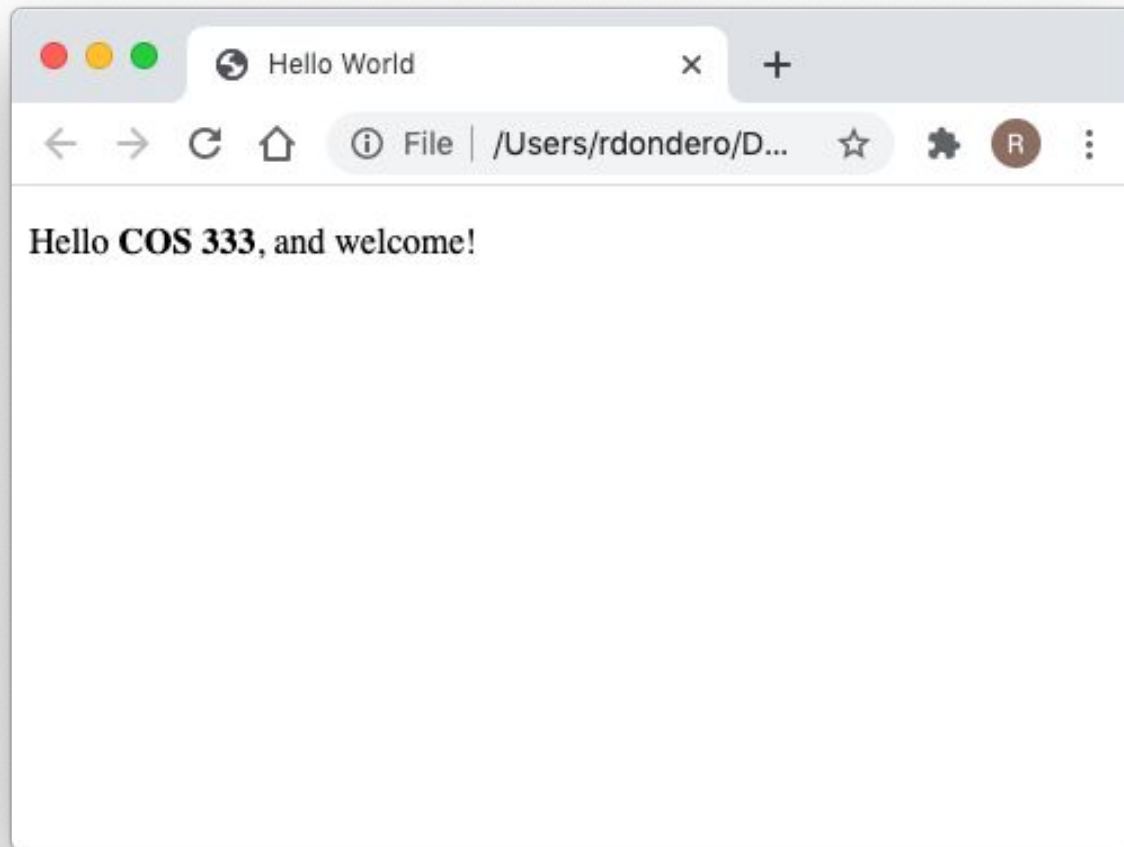
```
<script>someJavaScriptCode</script>
```

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

*Where someJavaScriptCode
resides at someURL*

JavaScript in Browsers

- See **hello.html**

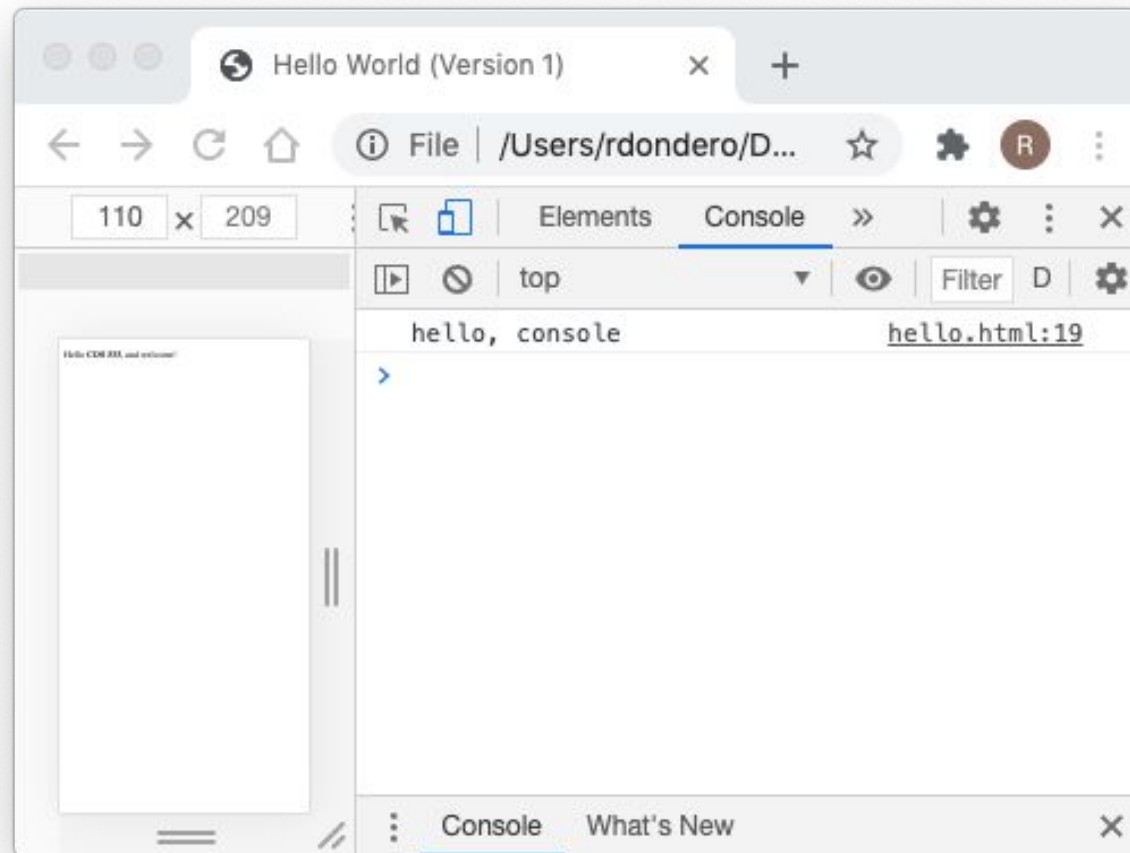


JavaScript in Browsers

- 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

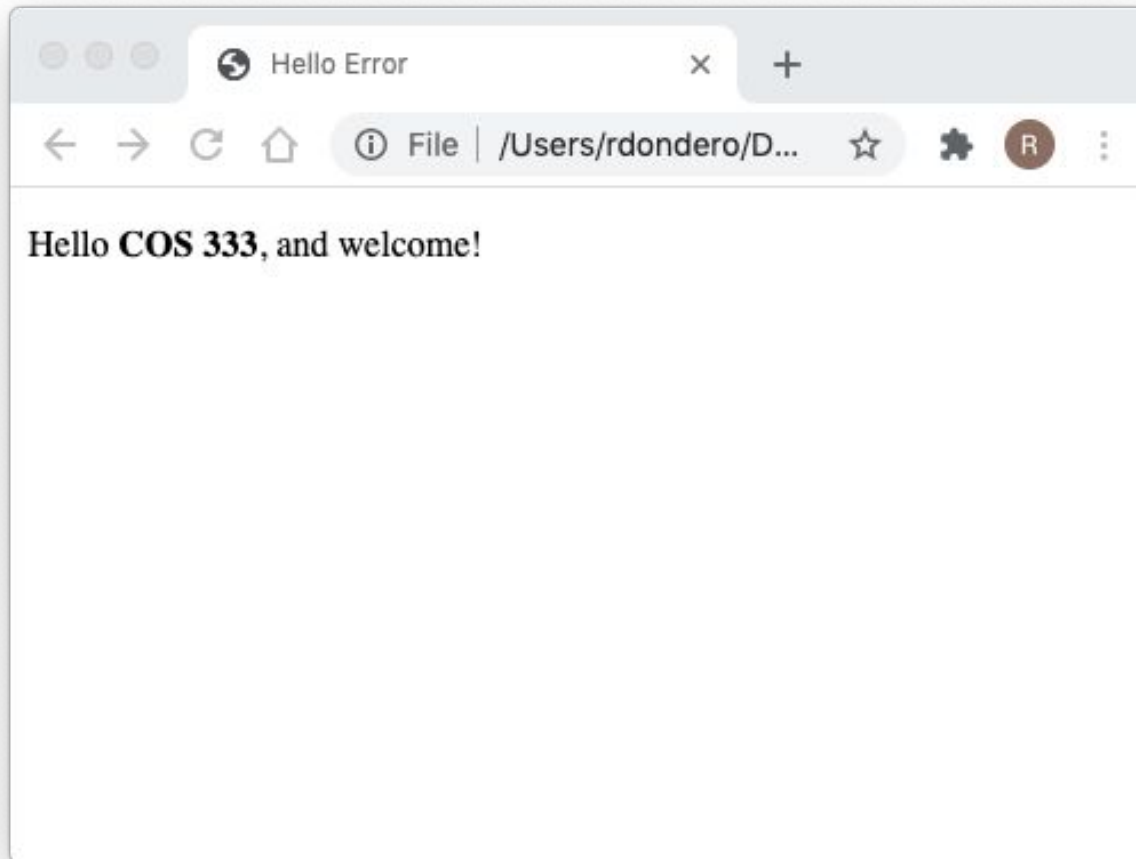
JavaScript in Browsers

- See [hello.html](#) (cont.)



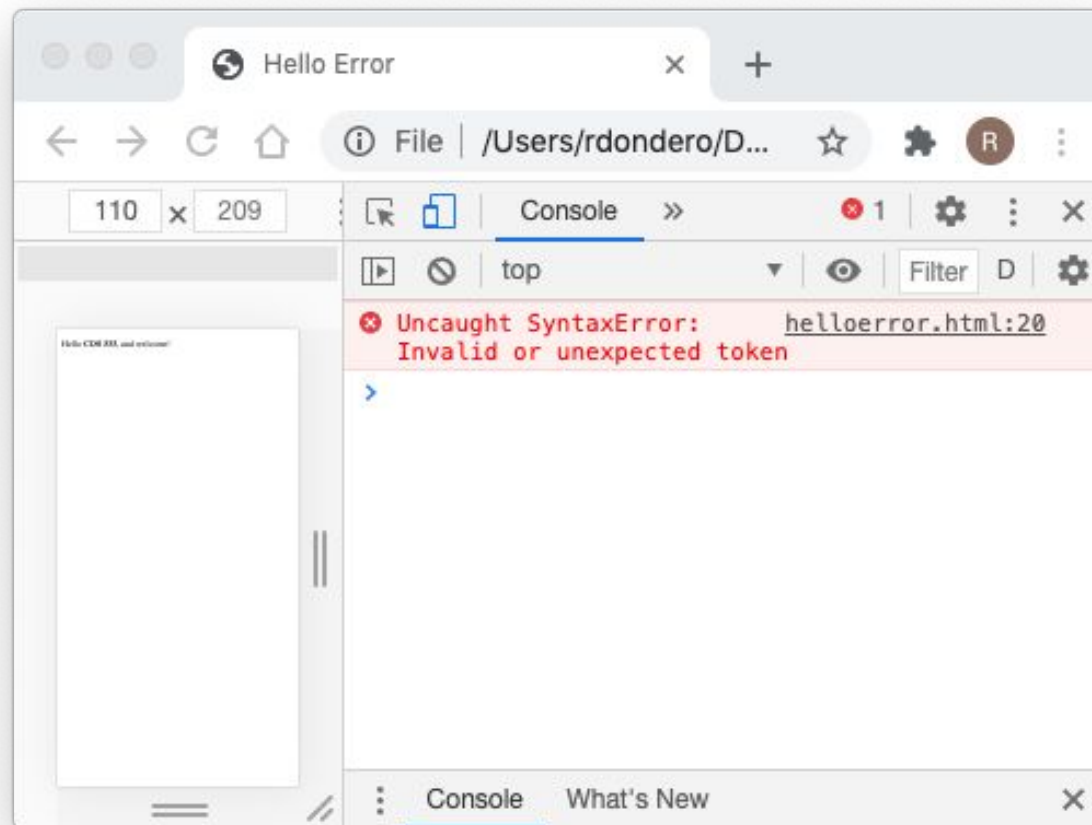
JavaScript in Browsers

- See **helloerror.html**



JavaScript in Browsers

- See [helloerror.html](#) (cont.)



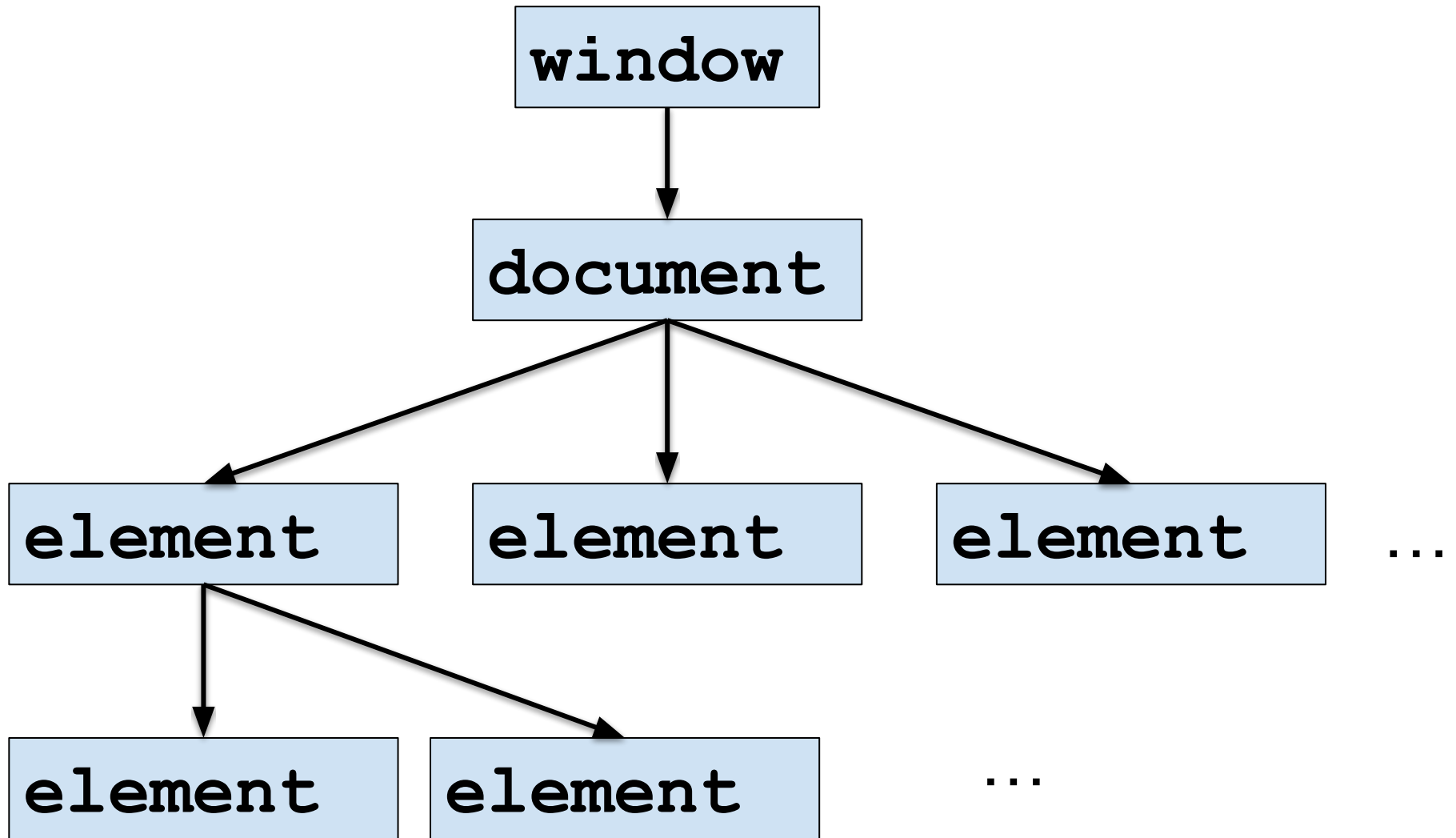
Agenda

- 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

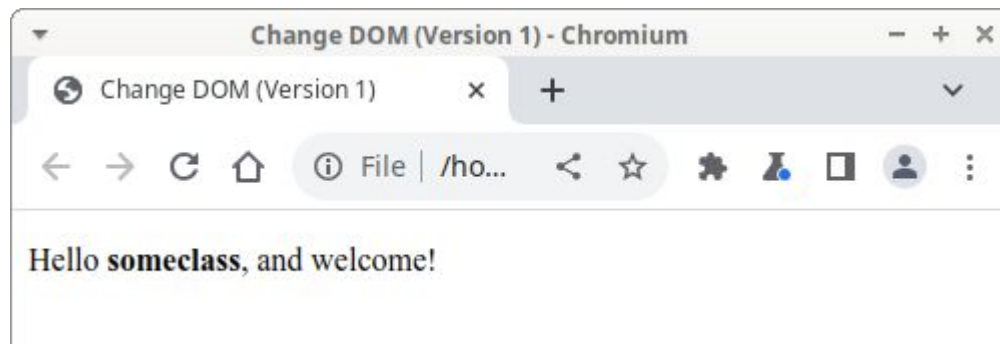
- *window* node
 - Represents the browser window
- *document* node
 - Represents the current document
 - Important property: `childNodes[]`
 - Important property: `getElementById()`

Browser DOM

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

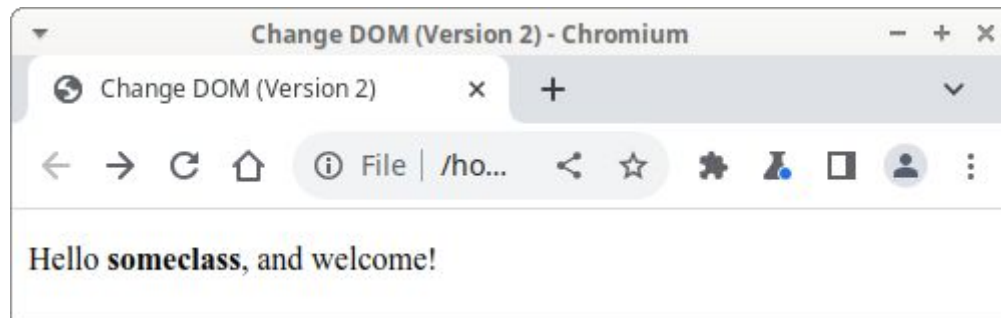
Browser DOM

- See [changedom1.html](#)



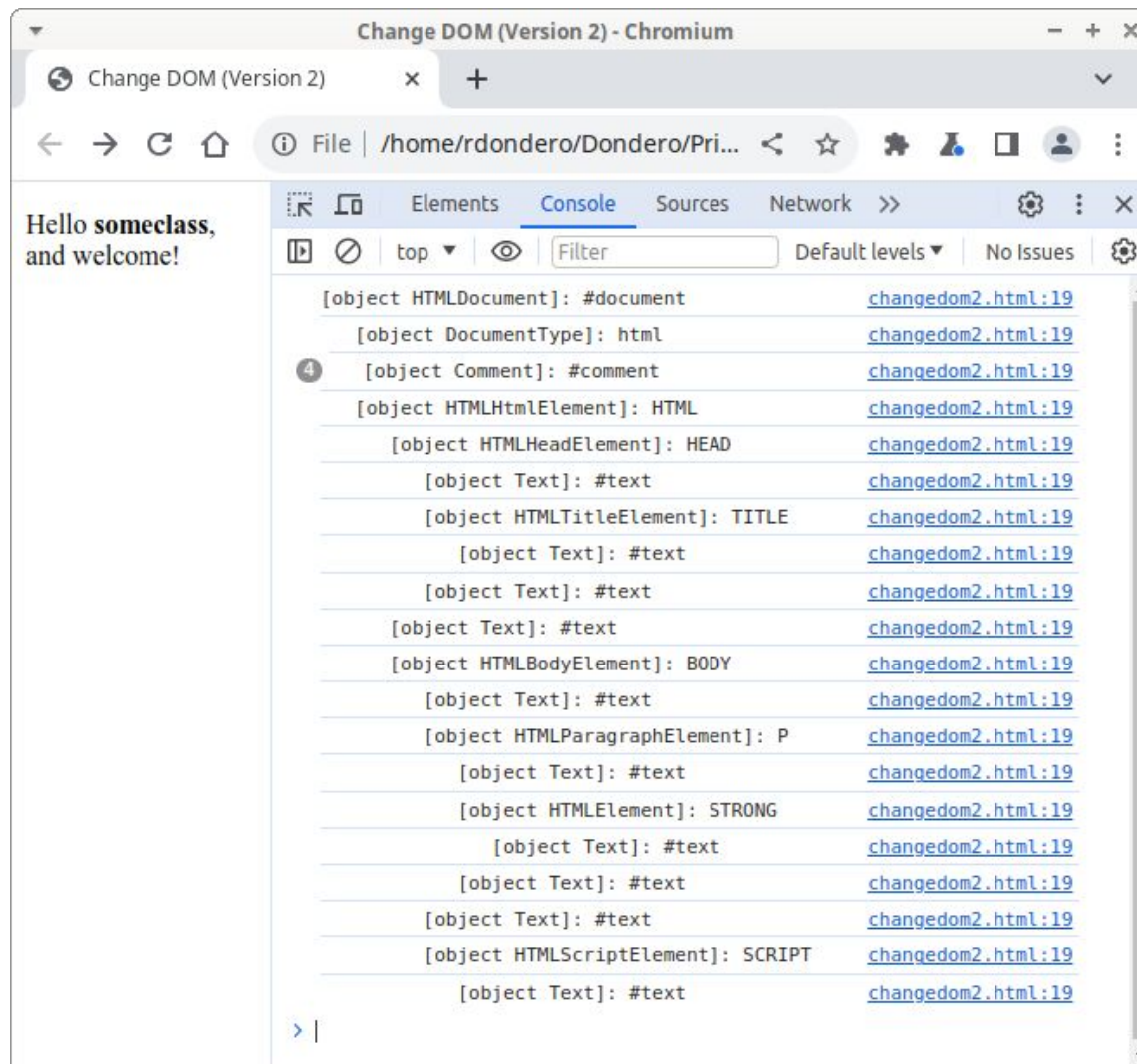
Browser DOM

- See **changedom2.html**



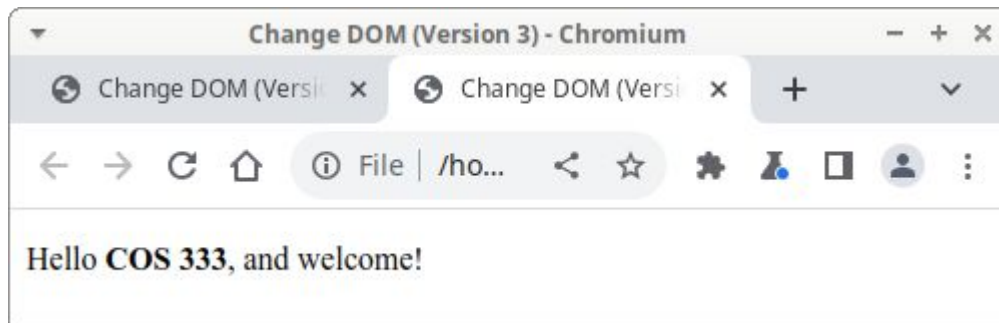
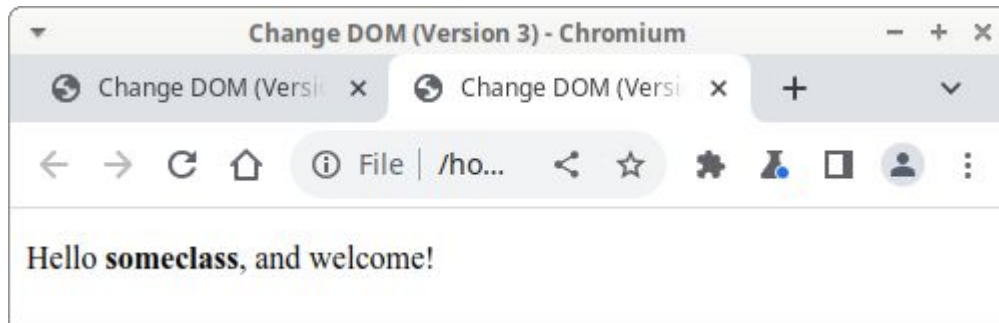
Browser DOM

- See [changedom2.html](#) (cont.)



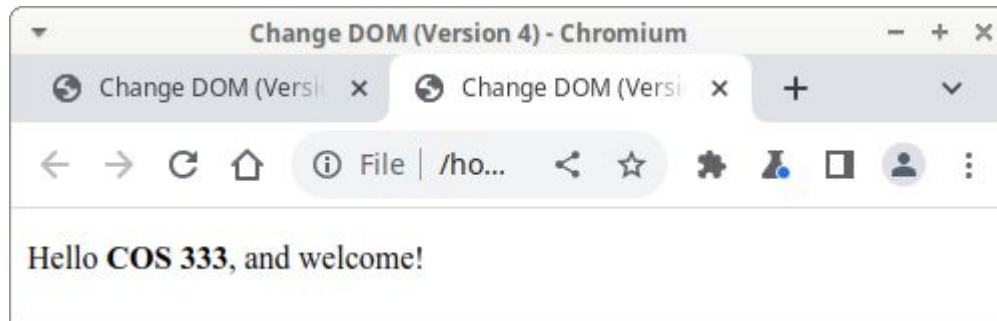
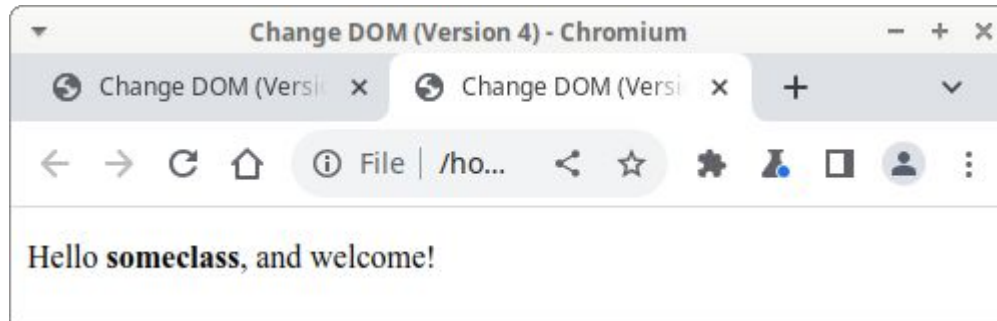
Browser DOM

- See [changedom3.html](#)



Browser DOM

- See [changedom4.html](#)



Agenda

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

Browser Events

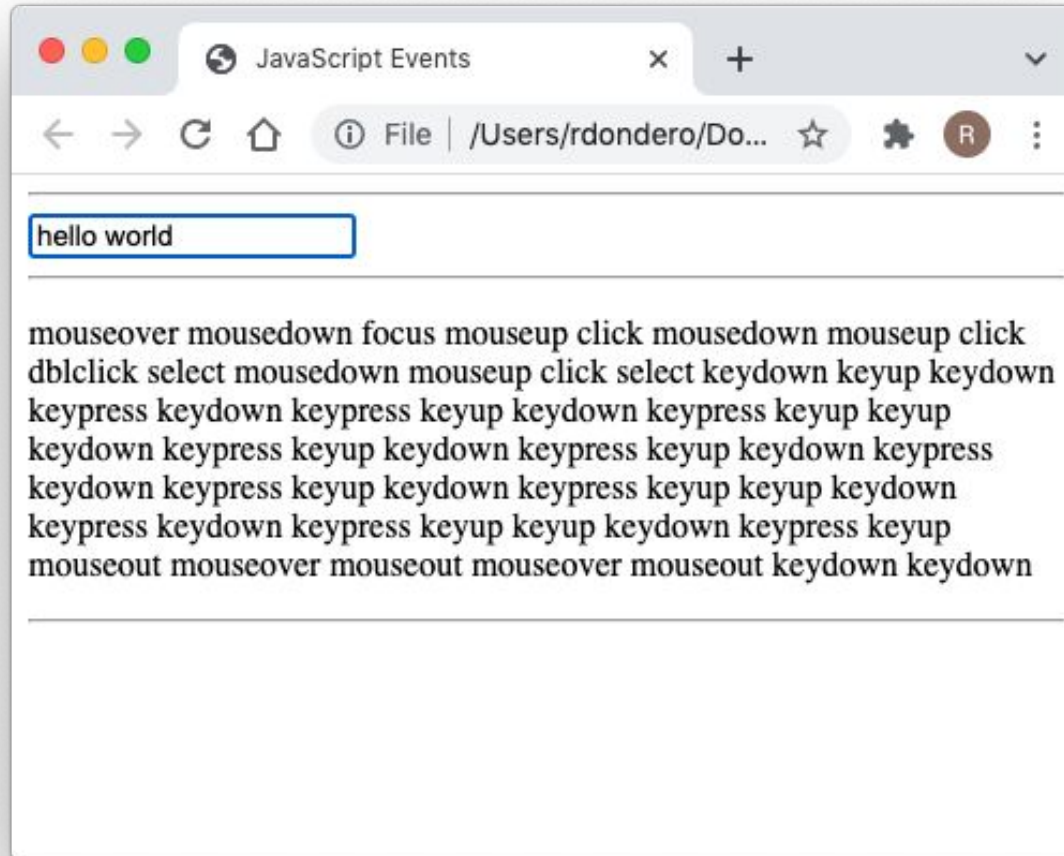
- ***Event***
 - An occurrence on a particular element
- ***Event handler***
 - A JavaScript function
 - Installed on a particular element for a particular event

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](#)

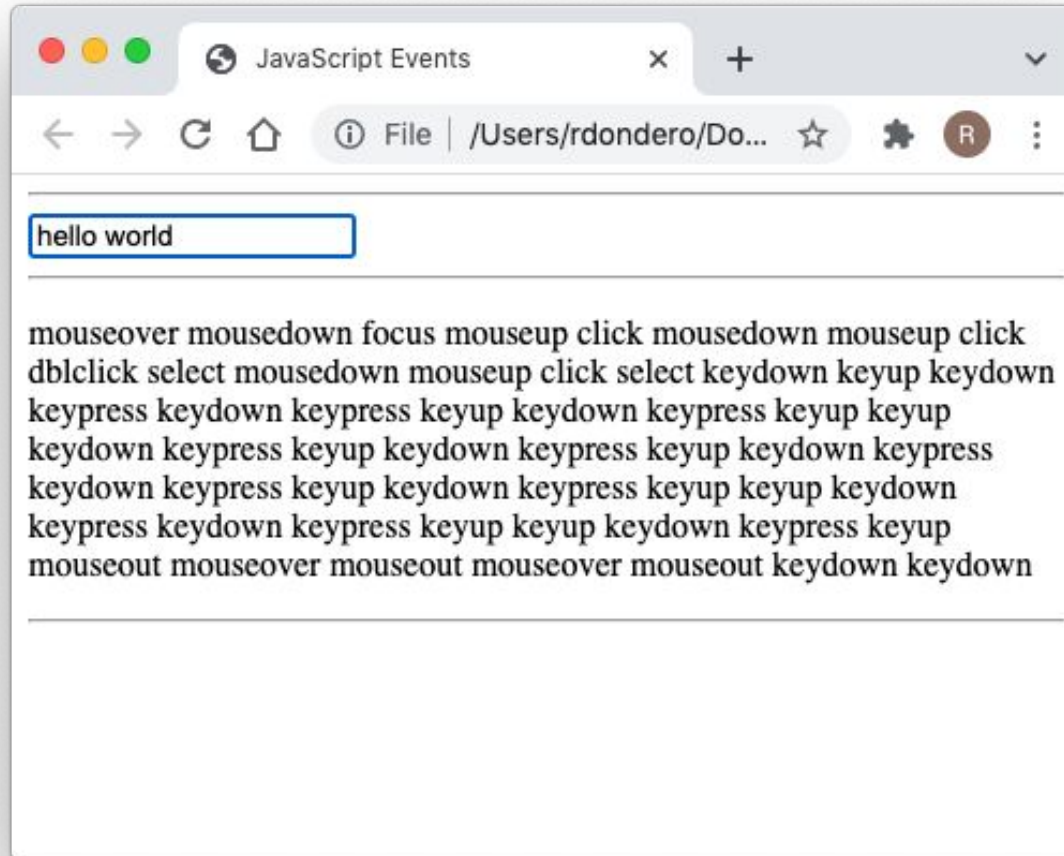


Browser Events

- **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
 - Either directly or indirectly
 - For element `ELEMENT1`, associate event `EVENT1` with an event handler (a JavaScript function)
 - Then...

JavaScript in Browsers Summary

- To use JavaScript in browsers (cont.):
 - When EVENT1 occurs on ELEMENT1, browser inserts a call of the event-handler function into JS Event Queue
 - JS Engine (when ready) removes event-handler function call from JS Event Queue, and calls the function
 - Event-handler function 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