CS/COE 1520

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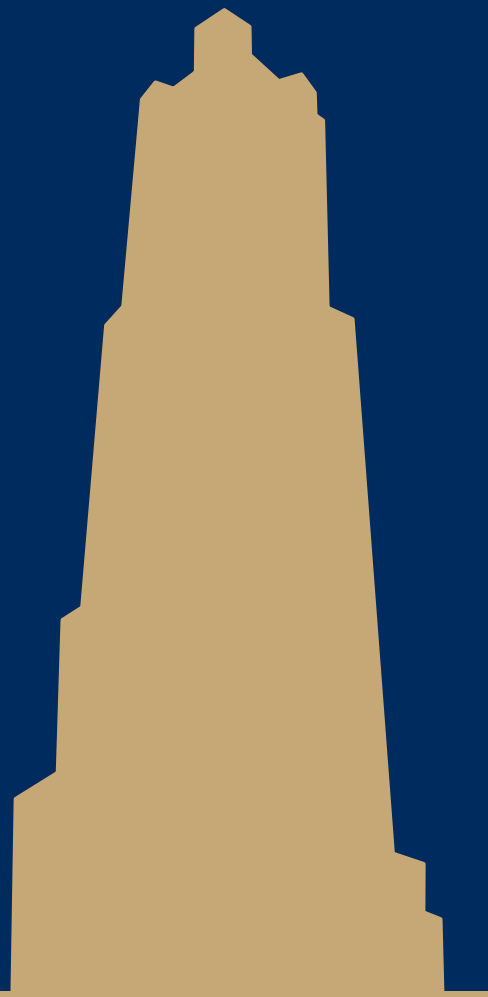
The DOM and event-driven programming



document.write() adds to the HTML being rendered

- Very handy
  - The JS console log is a bit more out of the way to get to
  - Plus this allows us display output to the user via JS!
    - It is a bit unwieldy, though…
      - Newlines added to the document, not the rendered page
      - Need to write HTML to the document
  - How would you apply it to a detailed web page?
    - I.e., not just a blank document

HTML is very carefully structured

- If only we could access specific HTML elements and alter their properties…
  - This is exactly the goal of the Document Object Model (DOM)
    - Built up in an ad-hoc manner over the 1990s by Netscape and Microsoft (independently) to help JS interact with the HTML document being rendered
      - Known now as "Legacy DOM", or DOM Level 0
    - First standard (DOM Level 1) published in 1998
      - Followed by DOM Level 2 in 2000, DOM Level 3 in 2004
      - Latest DOM Level 4 recommendation was published in Nov 2015

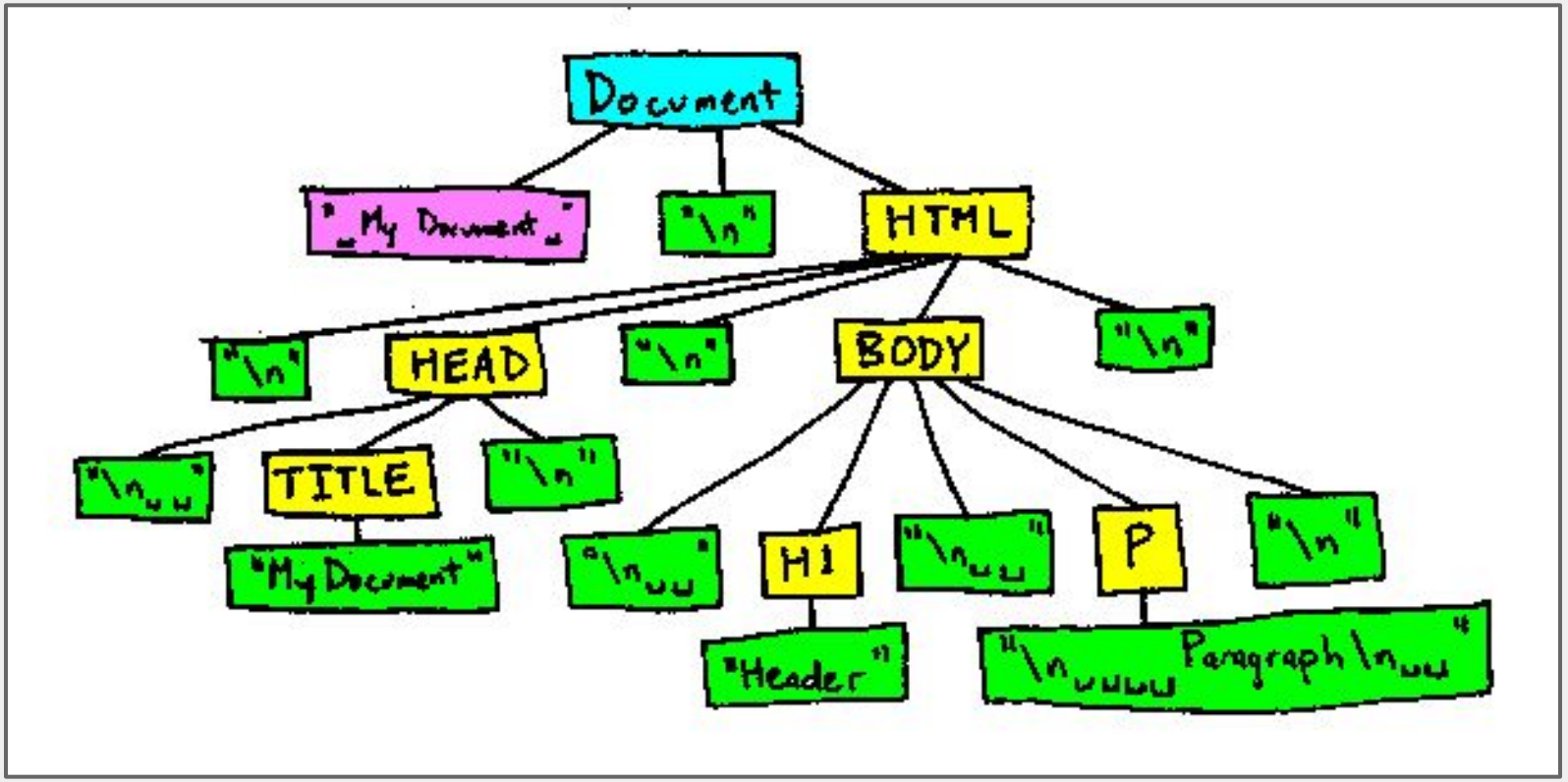
The DOM

- Consider the following HTML:

```
<!-- My document -->
<html>
<head>
  <title>My Document</title>
</head>
<body>
  <h1>Header</h1>
  <p>
    Paragraph
  </p>
</body>
</html>
```

What does the DOM do to help us edit this document as its being rendered?

DOM representation



document

- Object representing the document as a whole
- `document.children` provides a list of the Elements that are a direct child of the document
- `document.body` will reference the <body> element of an HTML document
- `document.createElement(`*`tagname`*`)` can be used to create a new Element with a specified tagname
  - To be rendered, the newly created Element must be appended to the document as a child of some Node
    - An HTMLElement is an Element
      - An Element is a Node
- `document.getElementById(`*`id`*`)` allows us to quickly locate the Element with a given value for the id attribute

DOM Nodes

- `Node.childNodes` will provide a list of the children of a given node
  - Nodes and Elements, unlike document.children
  - A NodeList, not an array!
    - Though it can still be indexed
- `Node.appendChild(`*`node`*`)` adds a new Node into the document
- `Node.removeChild(`*`child`*`)` removes child from the document
- `Node.replaceChild(`*`new_node, old_child`*`)` replaces old_child with new_node in the document

Alot of alerts in that js8 example...

- Would have been nice to be able to see the base page and then trigger the alerts somehow…
  - Maybe a click
  - Or even hovering the mouse over a portion of the page
- This is the basic idea of event-driven programming
  - The flow of the program is determined by user actions
    - Our applications with *listen* for events to occur, and then run specified functions when they do

Seems tricky to find elements in the document

- Either traverse the entire structure or use an ID
- CSS has an easy way to select elements from the document
  - CSS selectors!
- JQuery is a very popular JS library that provided a way to use CSS selectors to select elements from the document
  - Also abstracted away a lot of DOM code and cross-browser support
  - How is it imported?

```
<script src="https://code.jquery.com/jquery-3.4.1.min.js"
integrity="sha256-CSXorXvZcTkaix6Yvo6HppcZGetbYMGWSFlBw8HfCJo="
crossorigin="anonymous"></script>
```

Current use

- Including JQuery has a cost
- While almost necessary a few years ago, can be avoided now for more lightweight options
  - `document.querySelector(selector)`
  - `document.querySelectorAll(selector)`

… What was the third parameter in addEventListener()?

- E.g., `elt.addEventListener('click',clickTheBox, false);`
  - useCapture parameter
- Consider table entries (td elements).
  - They're contained within table rows
    - Which are contained within tables
      - Which are contained within the body of the document
- What happens when you want to handle click events on the body of the document, a table within that body, and an element within that table?
  - What order should the events fire in?
    - Use the structure of the DOM to determine!

useCapture = true

useCapture = false