WEB230: JavaScript 1

Module 5: The Document Object Model

Document Object Model (DOM)

- browser downloads the HTML text file
- parses it
- builds a model of the document structure
- uses it to draw on the screen
- we can modify this model from JavaScript

Document Structure

DOM Structure

- the DOM follows the same structure
- objects inside of objects, inside of objects
- we can interact with these objects to:
    - get information
    - add or change information
    - add events
- global variable `document` contains the DOM

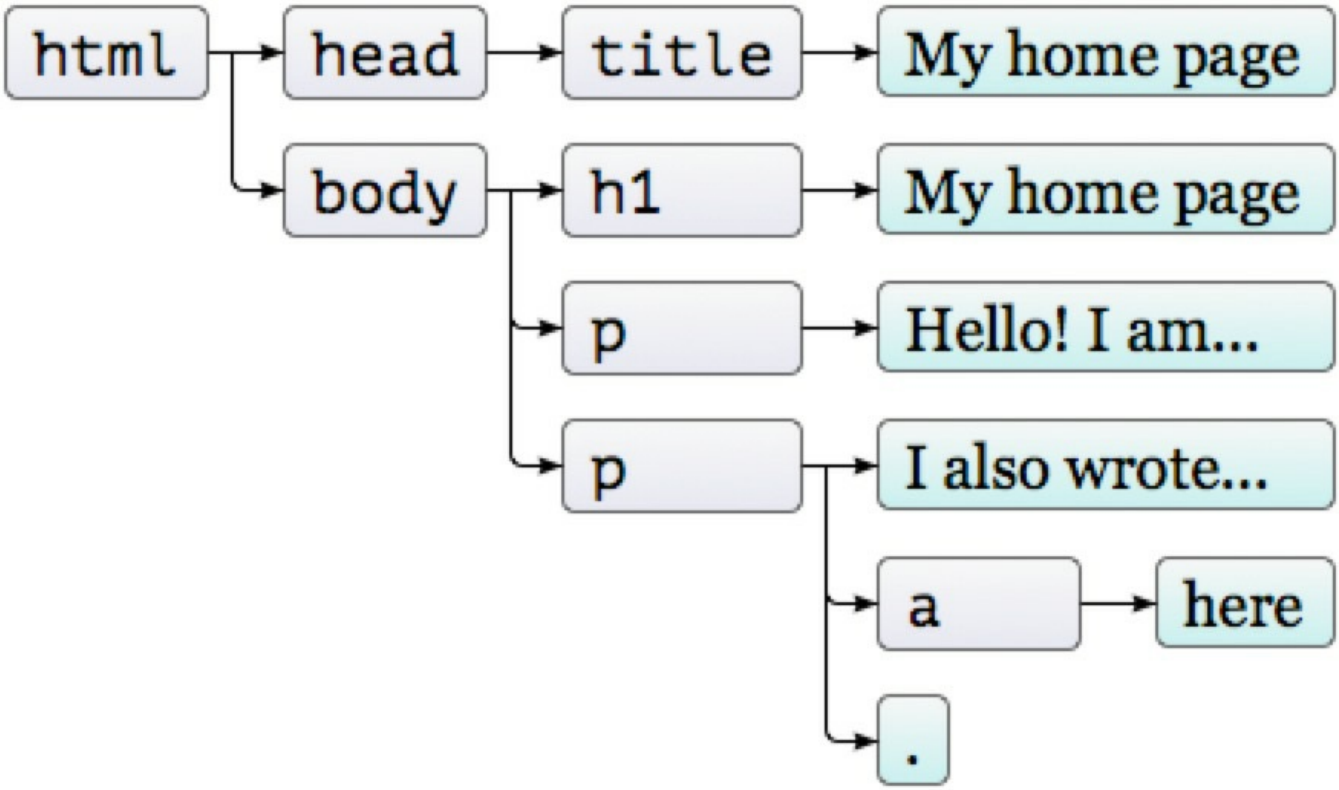
Trees

- this data structure is called a **tree**
- there are nodes for elements
    - represent HTML tags
    - determine the structure
- can have children
    - other elements
    - leaf nodes such as text content, comments, etc.

Trees (continued)

- each node object has a `nodeType`
    - elements nodes are `1`
    - JS has constants such as `document.ELEMENT_NODE` to make this easier

Trees (continued)



Finding Elements

- we can find element directly
- `document.getElementsByTagName("a")`
- `document.getElementsByClassName("selected")`
    - these return an array like object called an HTMLCollection
- `document.getElementById("gertrude")`
    - returns a single element

Finding Elements - New Way

- new methods in JavaScript (IE9+) make selecting elements even easier
- use CSS selectors to select elements
- with these two, you don't need any of the previous methods
    - `document.querySelector()` - returns the first matching element
    - `document.querySelectorAll()` - returns an array like object, a NodeList, of all matching elements

Static vs Live

- some methods return live lists that will update if the DOM changes
- `.getElementsByTagName()` and `.getElementsByClassName()` return a live list
    - it will be updated if the DOM changes
- `.querySelectorAll()` returns a static list
    - it will not change as elements are added or removed

Converting to an Array

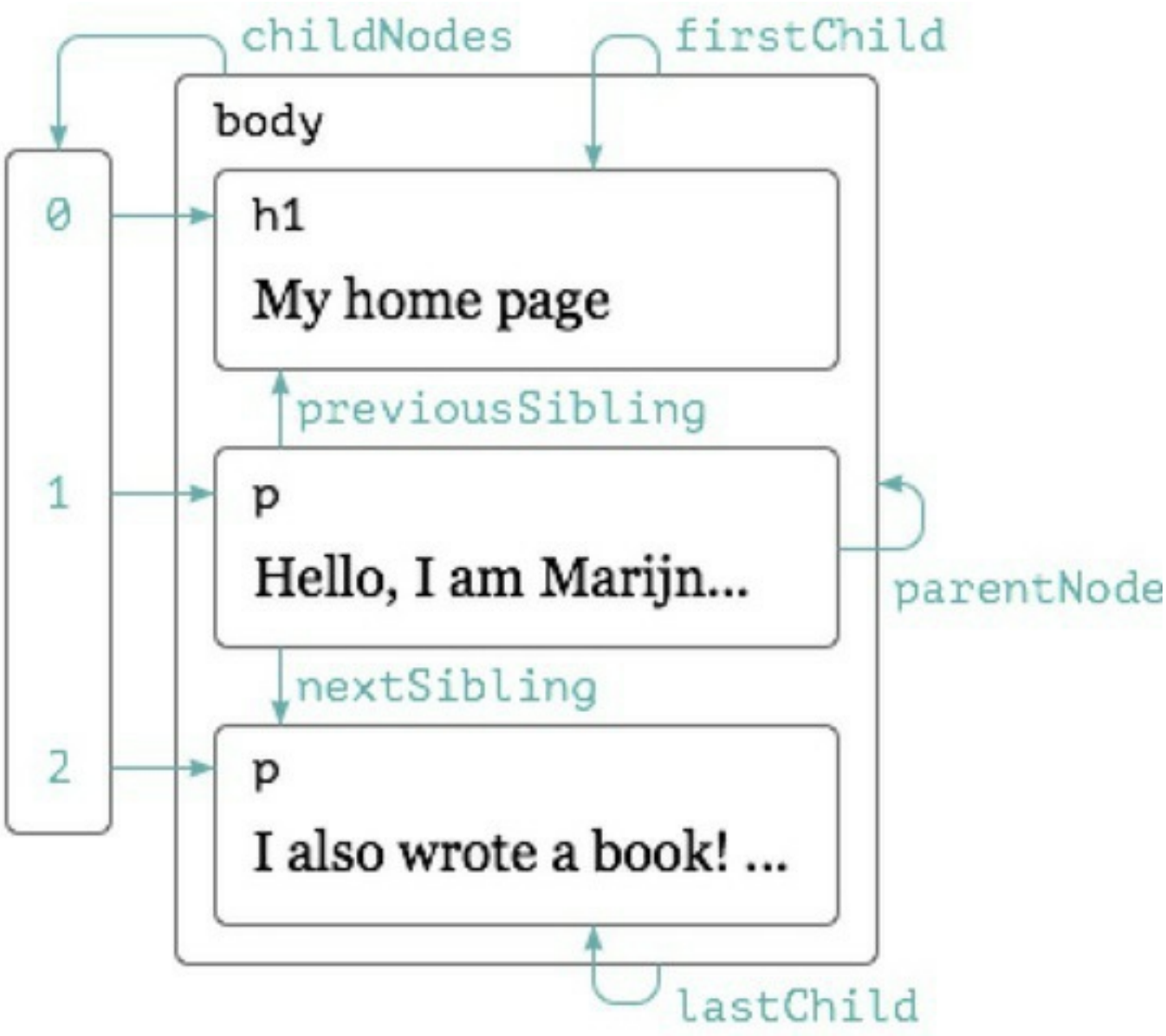
- `Array.from()` is a new method for making an array from an array like object
    - not supported in Internet Explorer
- Simplest form, just takes one argument:

```
let arrayish = { 0: 'one', 1: 'two', length: 2 };
let array = Array.from(arrayish);
```

- can also take a second argument that acts like a `.map()` callback

Moving Through the Tree

- nodes have properties for moving around the tree



These are different than the textbook but only select elements, skipping other nodes.

- .children
- .firstElementChild
- .lastElementChild
- .nextElementSibling
- .previousElementSibling
- .parentElement

Changing the Document

- almost everything in the DOM can be changed
- some methods:
    - .removeChild()
    - .replaceChild()
    - .appendChild()

    - .insertBefore()

Working with Content

To make it easier to work with the content of elements we have two properties:

- .textContent - only gets or sets text content of the element
- .innerHTML - contained elements are represented as tags

Creating Nodes

- can create new text and element nodes
    - document.createElement()
    - document.createTextNode()

Attributes

- most common attributes can be accessed as properties of the DOM element
    - eg. href is .href, id is .id
- others accessed through methods:
    - getAttribute()
    - setAttribute()
- if you create your own attributes, prefix with data-

class Attribute

- class is a reserved word in JavaScript
- use the property name className instead
- browsers also have an array like property classList
    - has methods for dealing with classes .add(), .remove(), .toggle(), .contains()

Styling

- style property contains properties for every possible style

```
const para = document.getElementById('para');
console.log(para.style.color);
para.style.color = 'magenta';
```

- some style names contain dashes
- use camel case instead:
- font-family becomes fontFamily

Cascading Styles

- the style property applies directly to the element
- it has the highest precedence
- will over-rule stylesheets or inherited styles

Summary

- JavaScript programs can inspect and change the page

- the data structure of the page is called the DOM and is accessed by the variable `document`
- the DOM is organized like a tree
- we can select, read, and modify element and text in the DOM
- styles can influence the way elements are displayed