WEB230: JavaScript 1

Module 5: The Document Object Model

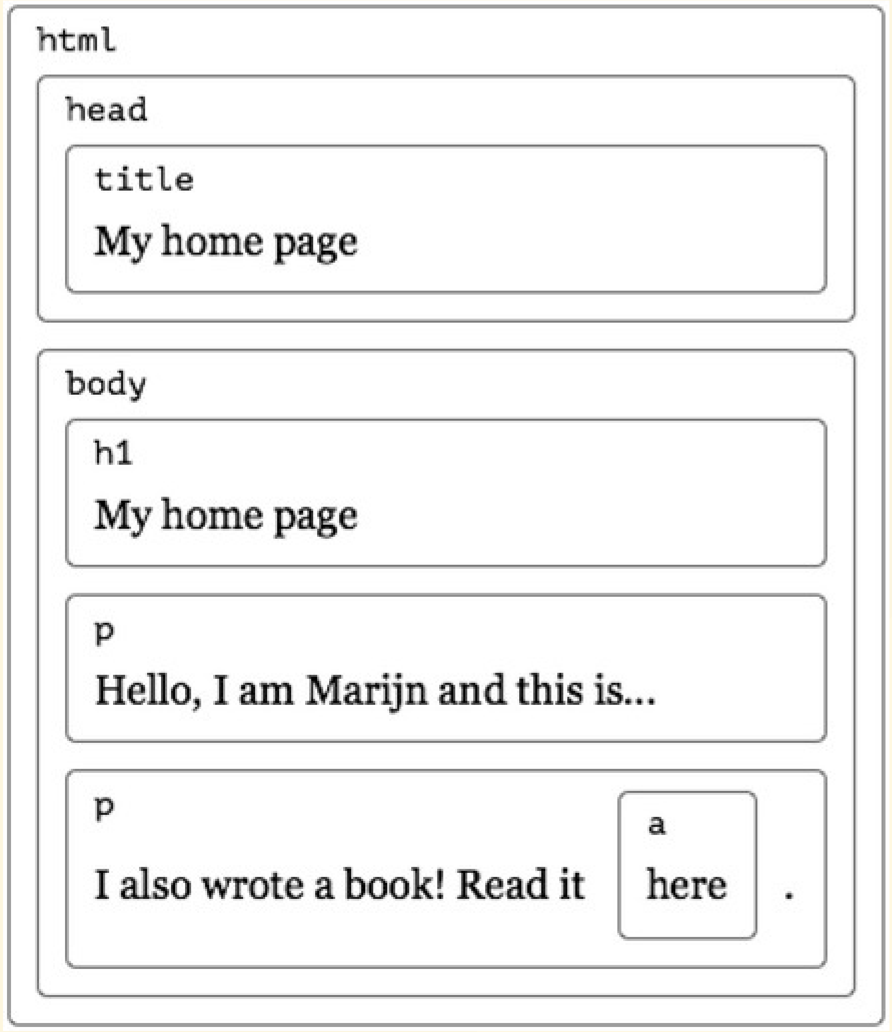
Document Object Model (DOM)

- 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

```html
<!DOCTYPE html>
<html>
   <head>
      <title>My home page</title>
   </head>
   <body>
      <h1>My home page</h1>
      <p>Hello, I am Marijn and this is my home page.</p>
      <p>
         I also wrote a book! Read it
         <a href="http://eloquentjavascript.net">here</a>.
      </p>
   </body>
</html>
```

Document Structure


html
head
title
My home page
body
h1
My home page
p
Hello, I am Marijn and this is...
p
I also wrote a book! Read it
a
here
.

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

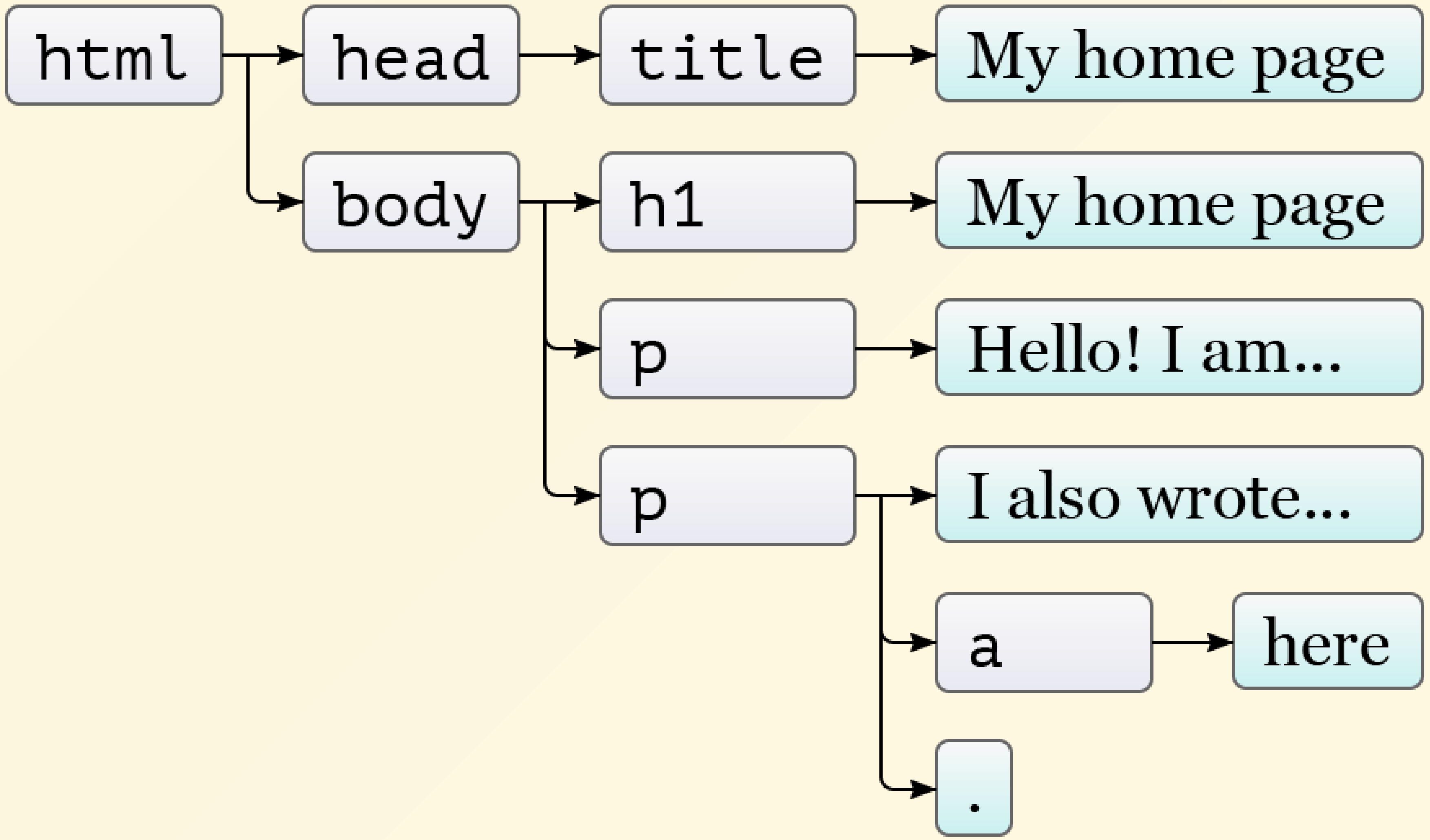
Trees

- 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

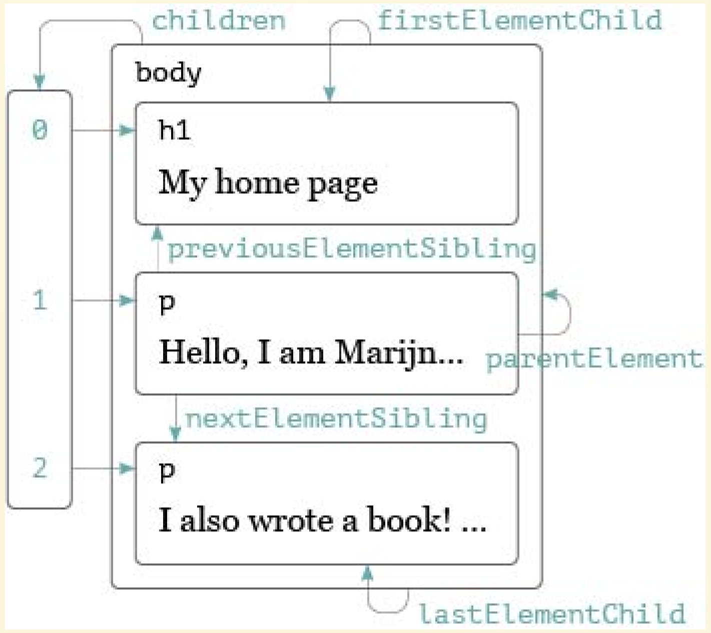
Converting to an Array

- `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);
```

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:
  - `.remove()`
  - `.replaceWith()`
  - `.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