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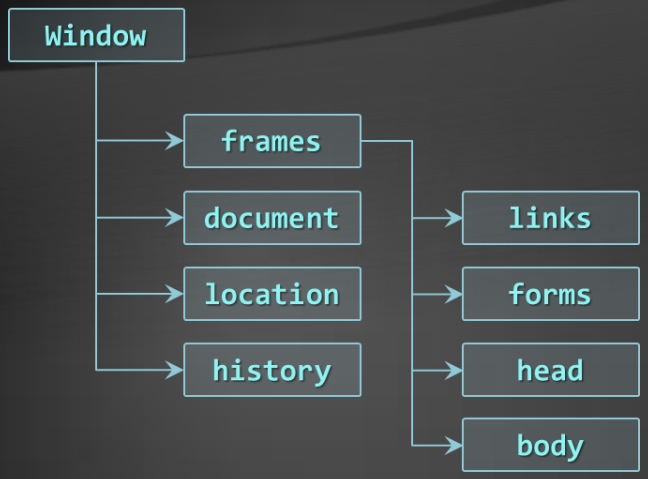

Document Object Model

The True power of dynamic web pages

Telerik Software Academy
Learning & Development Team
http://academy.telerik.com

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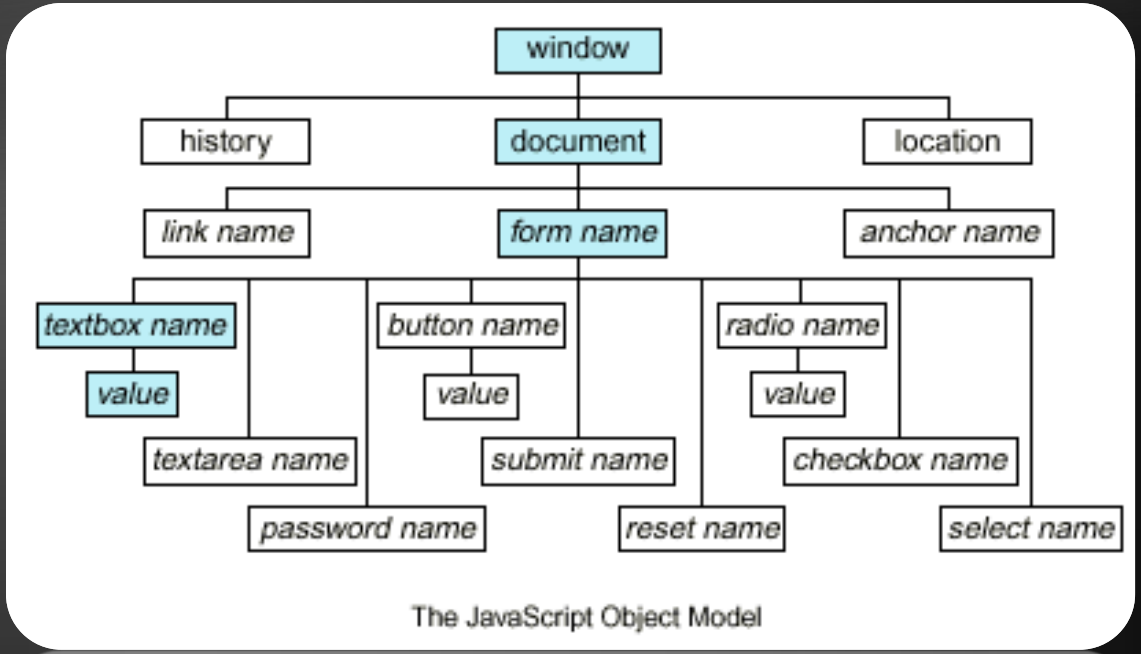

The JavaScript Object Model

Document Object Model (DOM)

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Document Object Model

- The Document Object Model is an API for HTML and XML documents
  - Provides a structural representation of the document
  - Enables developers to modify the content and visual presentation of a web page

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Document Object Model (2)

- The Document Object Model consists of many objects to manipulate a web page
  - All the properties, methods and events are organized into objects
  - Those objects are accessible through programming languages and scripts
- How to use the DOM of an HTML page?
  - Write JavaScript to interact with the DOM
    - JavaScript uses the DOM API (native implementation for each browser)

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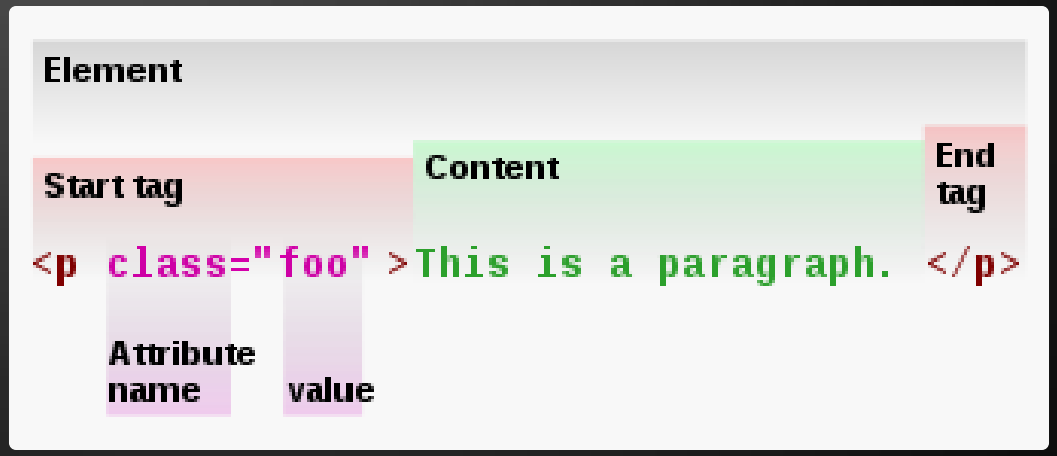
DOM API



DOM API

- The DOM API consist of objects and methods to interact with the HTML page
  - Can add or remove HTML elements
  - Can apply styles dynamically
  - Can add and remove HTML attributes
- DOM introduces objects that represent HTML elements and their properties
  - `document.documentElement` is `<html>`
  - `document.body` is the body of the page

DOM Objects

- Each of the HTML elements have corresponding DOM object types
  - `HTMLLIElement` represents `<li>`
  - `HTMLAudioElement` represents `<audio>`
- Each of these objects have the appropriate properties
  - `HTMLAnchorElement` has `href` property
  - `HTMLImageElement` has `src` property
- The `document` object is a special object
  - It represents the entry point for the DOM API

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HTML Elements

- HTML elements have properties that correspond to the their attributes
  - id, className, draggable, style, onclick, etc…
- Different HTML elements have their specific attributes
  - HTMLImageElement has property src
  - HTMLInputElement has property value
  - HTMLAnchorElement has property href

HTML Elements (2)

- HTML elements also have properties corresponding to their content
  - `innerHTML`
    - Returns as a string the content of the element, without the element
  - `outerHTML`
    - Returns as a string the content of the element, with the element
  - `innerText` / `textContent`
    - Returns as a string the text content of the element, without the tags

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DOM Objects

Live Demo

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Selecting DOM Elements

Selecting HTML Elements

- HTML elements can be found and cached into variables using the DOM API
  - Select single element

```
var header = document.getElementById('header');
var nav = document.querySelector('#main-nav');
```

  - Select a collection of elements

```
var inputs = document.getElementsByTagName('li');
var radiosGroup = document.getElementsByName('genders[]');
var header = document.querySelectorAll('#main-nav li');
```

  - Using predefined collections of elements

```
var links = document.links;
var forms = document.forms;
```

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Using getElementsBy Methods

- DOM API contains methods for selecting elements based on some characteristic
  - By Id

```
var header = document.getElementById('header');
```

  - By Class

```
var posts = document.getElementsByClassName('post-item');
```

  - By Tag Name

```
var sidebars =document.getElementsByTagName('sidebar');
```

  - By Name

```
var gendersGroup = document.getElementsByName('genders[]');
```

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document.getElementsBy...

Live Demo

```
var nav = document.getElementById("main-nav");
var navItems = nav.getElementsByClassName("nav-item");

var navButtons = [];
for (var i = 0, len = navItems.length; i < len; i++) {
    navButtons[i] = navItems[i].getElementsByTagName("a")[0];
}

for (var i = 0; i < navButtons.length; i++) {
    navButtons[i].onclick = onNavButtonClick;
}
```

```
<nav id="main-nav">
    <ul>
        <li><a href="#home">Home</a></li>
        <li><a href="#home">News</a></li>
        <li><a href="#home">Careers</a></li>
        <li><a href="#home">Contacts</a></li>
        <li><a href="#home">About us</a></li>
    </ul>
</nav>
```

QuerySelector

- The DOM API has methods that use CSS-like selectors to find and select HTML elements
  - `querySelector` returns the first element that matches the selector
  - `querySelectorAll` returns a collection of all elements that match the selector
  - Not supported in older browsers (below IE 8)
- Both methods take as a string parameter
  - The CSS selector of the element

```
var header = document.querySelector('#header');
//the element with id="header"
var navItems = document.querySelectorAll('#main-nav li');
//li elements contained in element with id=main-nav
```

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QuerySelector

Live Demo

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Selecting Elements Inside Other Elements

- The DOM API can be used to select elements that are inside other elements
  - Select all divs that are inside an element with id "wrapper"

```
var wrapper = document.getElementById('wrapper');
var divsInWrapper = wrapper.getElementsByTagName('div');
```

- All methods can be used on HTML elements
  - Except getElementById()

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Selecting Inner Elements

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NodeLists

NodeLists

- A NodeList is a collection returned by the DOM selector methods:
  - getElementsByTagName(tagName)
  - getElementsByName(name)
  - getElementsByClassName(className)
  - querySelectorAll(selector)

```
var divs = document.getElementsByTagName('div');
var queryDivs = document.querySelectorAll('div');
for(var i=0; i< divs.length; i++){
   //do stuff with divs[i]…
}
```

NodeLists (2)

- NodeList looks like an array, but is not
  - It's an object with properties similar to array
    - Has length and indexer
  - Traversing an array with for-in loop works unexpected:

```
for (var i in divs) {
   console.log('divs[' + i + '] = ' + divs[i]);
}
//divs[0] = ...
//divs[1] = ...
//divs[length] = ...
//divs[item] = ...
```

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NodeList

Live Demo

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Static NodeList and Live NodeList

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Static and Live NodeLists

- There are two kinds of NodeLists
  - getElementsBy…() return a LiveNodeList
  - querySelectorAll() returns a StaticNodeList
- Live lists keep track of the selected elements
  - Even when changes are made to the DOM
  - While static list contain the elements as they were at the execution of the method
- Keep in mind that LiveNodeList is slower that regular array
  - Need to cache its length for better performance

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Static NodeListand Live NodeList

Live Demo

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DOM and DOM Manipulation

Questions?

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Homework (2)

1. Write a script that selects all the div nodes that are directly inside other div elements
   - Create a function using querySelectorAll()
   - Create a function using getElementsByTagName()
2. Create a function that gets the value of <input type="text"> ands prints its value to the console
3. Create a function that gets the value of <input type="color"> and sets the background of the body to this value
4. *Write a script that shims querySelector and querySelectorAll in older browsers