Web Design & Programming

JavaScript and AJAX

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History

- The JavaScript language was created by Brendan Eich, working at Netscape Communication Corp. in 1995.
- The goal was to add scripting and interactivity to static web pages. The language creation was influenced by Java and other programming languages, but it is a distinct language of its own.
- The formal specification of JavaScript is ECMAScript, standardized by the European Computer Manufacturers Association (ECMA). Various web browsers and vendors have their own implementation.

JavaScript as a language

- Interpreted, not compiled
- Case sensitive
- Variables are weakly typed
- General syntax close to C/C++/Java
- Object-oriented

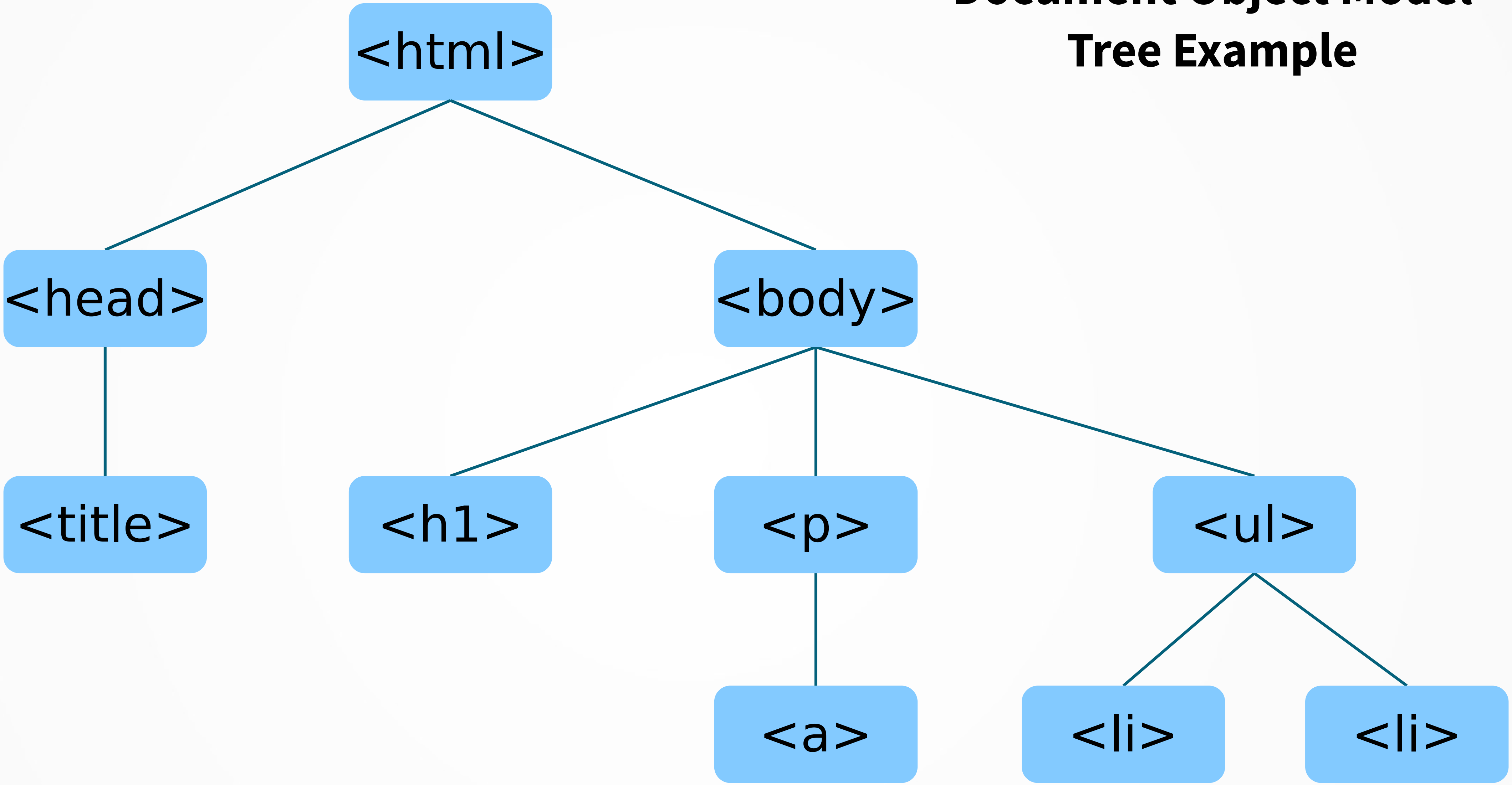
Using JavaScript

- Scripts can be declared:
  - inline, in a `<script>` block, in the head or body of a HTML document
  - in an external file (.js) included in a HTML document
- The second solution is the most common, either with one or multiple files used for an entire website.

The Document Object Model

- The DOM provides an interface to manipulate HTML elements in a page.
- Elements are organized in a tree, with different types of nodes:
  - element nodes
  - attribute nodes
  - text nodes
- Node properties can be modified, nodes can be selected, modified, added or removed by using different methods.

Document Object Model Tree Example



Libraries and Frameworks

- In general few developers are using “vanilla” JavaScript, many web applications are based on a library or on a framework:
  - Angular
  - Jquery
  - React
  - Vue.js

JavaScript on the Server Side

- Node.js is a JavaScript library that can be used to generate web content on the server side (outside of a web browser).
- The advantages are the execution speed (using non-blocking functions) and the language unicity between the front end and the back end.

JSON

- JavaScript Object Notation
- Standardized text-based file, human readable used to store and exchange information.
- Used with JavaScript and many other programming languages.
- Doesn’t allow comments.
- File extension: .json

Asynchronous JavaScript and XML

- AJAX is used to create asynchronous communication between a web browser and a server; this allow the web browser to receive pieces of information without reloading a whole web page.
- This is used to bring more interactivity into web applications; the user-experience is closer to what regular applications provides. This also helps with network bandwidth usage.

Implementation

- The original AJAX implementation was using Microsoft ActiveX; as of today JavaScript is used instead.
- Using the *XMLHttpRequest* object you can create a new request (targeting a file on the web server), tracking its progress and processing the result.
- Despite his name, XMLHttpRequst is not limited to XML files, other files can be used (HTML, JSON, …).

The XMLHttpRequest Object

- Properties
  - **onreadystatechange**: used to call a function when the status of the object changes
  - **readyState**: specify the status of the object (0/1/2/3/4, from ‘unsent’ to ‘done’)
  - **responseText**: data returned by the server
  - **status**: HTTP status code
- Methods
  - **open**: define the HTTP Request
  - **send**: initiate the HTTP Request
- Reference: https://xhr.spec.whatwg.org/

JavaScript Code

```
var request = new XMLHttpRequest();
request.open("GET", "data.html");
request.onreadystatechange = function()
{
  if (this.readyState === 4 && this.status === 200)
  {
    document.getElementById("targetElement").innerHTML = this.responseText;
  }
};
request.send();
```