AJAX

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1

What is AJAX

AJAX

- **AJAX** stands for "Asynchronous JavaScript And XMLHttpRequest"
- **AJAX** is a web development technique for creating interactive web applications
- **AJAX** is a set of Web development techniques using many Web technologies on the client side to create asynchronous Web applications.
- **AJAX** is also not a new technology, or another different language, just existing technologies used in new ways.

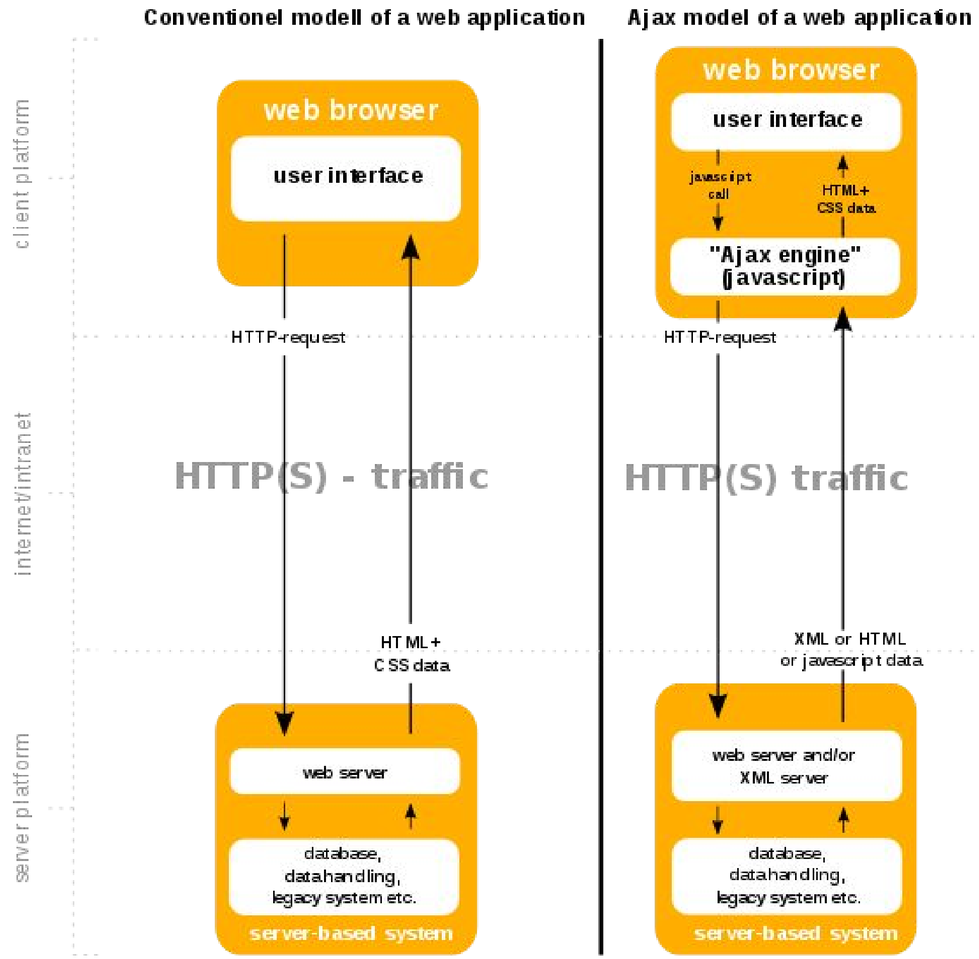
2

Why AJAX

Why AJAX

- Web applications can send and retrieve data from a server asynchronously (in the background) without interfering with the display and behavior of the existing page.
- AJAX decouples the data interchange layer from the presentation layer
- Allows for Web pages to change content dynamically without the need to reload the entire page.

AJAX vs Standard Form



3

AJAX Family

AJAX Family

AJAX cannot work independently. It is used in combination with other technologies to create interactive webpages.

JavaScript

- Loosely typed scripting language.
- JavaScript function is called when an event occurs in a page.
- Glue for the whole AJAX operation.

AJAX Family

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DOM

- API for accessing and manipulating structured documents.
- Represents the structure of XML and HTML documents.

CSS

- Allows for a clear separation of the presentation style from the content and may be changed programmatically by JavaScript

AJAX Family

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XMLHttpRequest

- JavaScript built-in object that performs asynchronous interaction with the server.

3

AJAX Steps

AJAX Steps

- A client event occurs.
- An XMLHttpRequest object is created.
- The XMLHttpRequest object is configured.
- The XMLHttpRequest object makes an asynchronous request to the Webserver.
- The Webserver returns the result containing XML document.
- The XMLHttpRequest object calls the callback() function and processes the result.
- The HTML DOM is updated.

AJAX Steps

A Client Event Occurs

- A JavaScript function is called as the result of an event.
- Example − *validateUserId()* JavaScript function is mapped as an event handler to an *onkeyup* event on input form field whose id is set to *"userid"*

<input type = "text" size = "20" id = "userid" name = "id" onkeyup = "validateUserId();">.

AJAX Steps

The XMLHttpRequest Object is Created

```
var ajaxRequest;

function ajaxFunction() {
   try {
      // Opera 8.0+, Firefox, Safari
      ajaxRequest = new XMLHttpRequest();
   } catch (e) {

      // Internet Explorer Browsers
      try {
         ajaxRequest = new ActiveXObject("Msxml2.XMLHTTP");
      } catch (e) {

         try {
            ajaxRequest = new ActiveXObject("Microsoft.XMLHTTP");
         } catch (e) {
                  alert("Your browser broke!");
            return false;
         }
      }
   }
}
```

AJAX Steps

XMLHttpRequest Object is Configured

Function that will be triggered by the client event and a callback function processRequest() will be registered.

```
function validateUserId() {
   ajaxFunction();

   // Here processRequest() is the callback function.
   ajaxRequest.onreadystatechange = processRequest;

   if (!target) target = document.getElementById("userid");
   var url = "validate?id=" + escape(target.value);

   ajaxRequest.open("GET", url, true);
   ajaxRequest.send(null);
}
```

AJAX Steps

Making Asynchronous Request to the Webserver

This is all being done using the XMLHttpRequest object *ajaxRequest*.

```
function validateUserId() {
   ajaxFunction();

   // Here processRequest() is the callback function.
   ajaxRequest.onreadystatechange = processRequest;

   if (!target) target = document.getElementById("userid");
   var url = "validate?id = " + escape(target.value);

   ajaxRequest.open("GET", url, true);
   ajaxRequest.send(null);
}
```

AJAX Steps

Webserver Returns the Result Containing XML Document

- Get a request from the client.
- Parse the input from the client.
- Do required processing.
- Send the output to the client.

```
public void doGet(HttpServletRequest request,
   HttpServletResponse response) throws IOException, ServletException {
   String targetId = request.getParameter("id");

   if ((targetId != null) && !accounts.containsKey(targetId.trim())) {
      response.setContentType("text/xml");
      response.setHeader("Cache-Control", "no-cache");
      response.getWriter().write("<valid>true</valid>");
   } else {
      response.setContentType("text/xml");
      response.setHeader("Cache-Control", "no-cache");
      response.getWriter().write("<valid>false</valid>");
   }
}
```

AJAX Steps

Callback Function processRequest() is Called

- The XMLHttpRequest object was configured to call the processRequest() function when there is a state change to the *readyState* of the *XMLHttpRequest* object. This function will receive the result from the server and will do the required processing.
- It sets a variable message on true or false based on the returned value from the Webserver.

```
function processRequest() {
   if (req.readyState == 4) {
      if (req.status == 200) {
         var message = ...;
...
}
```

AJAX Steps

The HTML DOM is Updated

Final step - HTML page will be updated.

- JavaScript gets a reference to any element in a page using DOM API.
- The recommended way to gain a reference to an element is to call.

```
document.getElementById("userIdMessage"),
// where "userIdMessage" is the ID attribute
// of an element appearing in the HTML document
```

4

XMLHttpRequest Object

XMLHttpRequest Object

- XMLHttpRequest object is the key to AJAX.
- XMLHttpRequest (XHR) is an API that can be used by JavaScript, JScript, VBScript, and other web browser scripting languages to transfer and manipulate XML data to and from a webserver using HTTP
- Establishes an independent connection channel between a webpage Client-Side and Server-Side.
- Data returned from XMLHttpRequest calls will be provided by back-end databases.
- XMLHttpRequest can be used to fetch data in other formats (JSON or plain text.)

XMLHttpRequest Object

XMLHttpRequest Methods

- abort() - Cancels the current request.
- getAllResponseHeaders() - Returns the complete set of HTTP headers as a string.
- getResponseHeader(headerName) - Returns the value of the specified HTTP header.
- open(method, URL)
- open(method, URL, async)
- open(method, URL, async, userName)

XMLHttpRequest Object

XMLHttpRequest Methods

- open(method, URL, async, userName, password) -
  - Specifies the method, URL, and other optional attributes of a request.
  - method - can have a value of "GET", "POST", or "HEAD".
  - async - specifies whether the request should be handled asynchronously or not.
- send(content) - Sends the request.
- setRequestHeader(label, value) - Adds a label/value pair to the HTTP header to be sent.

XMLHttpRequest Object

XMLHttpRequest Properties

- **onreadystatechange** - An event handler for an event that fires at every state change.
- **readyState** - Defines the current state of the XMLHttpRequest object.

XMLHttpRequest Object

- **readyState**

  = 0 - After create the XMLHttpRequest object, but before call the open() method.

  = 1 - After call the open() method, but before call send().

  = 2 - After call send().

  = 3 - After the browser has established a communication with the server, but before the server has completed the response.

  = 4 - After the request has been completed, and the response data has been completely received from the server.

XMLHttpRequest Object

- **responseText** - Returns the response as a string.
- **responseXML** - Returns the response as XML. Returns an XML document object, which can be examined and parsed using the W3C DOM node tree methods and properties.
- **status** - Returns the status as a number (e.g., 404 for "Not Found" and 200 for "OK").
- **statusText** - Returns the status as a string (e.g., "Not Found" or "OK").

5

AJAX Drawbacks

AJAX Drawbacks

- **Complexity is increased**
  - Server-side developers will need to understand that presentation logic will be required in the HTML client pages as well as in the server-side logic.
  - Page developers must have JavaScript technology skills.

- **AJAX-based applications can be difficult to debug, test, and maintain**
  - JavaScript is hard to test - automatic testing is hard.
  - Weak modularity in JavaScript.

AJAX Drawbacks

- **No support of XMLHttpRequest in old browsers**
  - Iframe will help.

- **JavaScript technology dependency and incompatibility**
  - Must be enabled for applications to function.
  - Still some browser incompatibilities exist.

- **JavaScript code is visible to a hacker**

a. Poorly designed JavaScript code can invite security problems.

Thanks!

Any questions?