

Ajax – Asynchronous JavaScript And XML

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Ajax is not an acronym

- It's just Ajax
- James Garrett coined the term
- He said it wasn't meant to be an acronym
- The technology has been around for several years
- Until "Ajax" was coined it didn't garner much attention
- Google really put this on the map :)

No more page reloads

- Build internet applications that are more:
 - interactive
 - responsive
 - easy to use
- PHP/MySQL requests are still sent to the server
- JavaScript handles the page updates

No more waiting around

- A = **Asynchronous**
- Don't wait around for a response
- Continue to interact with the page
- Just the portion of the page that needs to be updated is changed

Examples – Purchase Order

[Non-Ajax version](#) (live system)

[Ajax version](#)

Let's get started

[Example1](#) (non-Ajax) [Example2](#) (Ajax)

Two tables: USER & SCHOOL

Dropdown list box: Select user

Process the request via PHP/MySQL

Refresh the page with school information

Change to Ajax

- Requests use a JavaScript object and NOT a form submit
- Requests & responses are handled by the browser
 - Not directly by the JavaScript code
- Once the browser gets a response it will "call back" the JavaScript to handle screen updates

HTML – changes

- Change the <select> line
`<select name="uid" size="4" id="uid" onchange="getDistrictInfo();" >`
- id: JS needs to retrieve value
- onchange: call a JS function

HTML – changes (2)

- Add a tag

School:

- Identify the section to be changed

JS – User selection has changed

```
function getDistrictInfo() {
    var uid = document.getElementById("uid").value;
    var url = "proc-with.php?uid=" + uid;
    createRequest();
    request.open("GET", url, true);
    request.onreadystatechange = updatePage;
    request.send(null);
}
```

Explanation

```
open("GET", url, true);
```

- Sets up a new request to a server.
- The last parameter makes this an asynchronous request

```
readyState
```

- Provides the current status of the request

```
send(null);
```

- Sends a request to a server
- The parameter is the data to send
- In this example the data is included in the URL

PHP – Process the request

```
$uid = $_GET['uid'];
if ($uid == "NA")
    $name = "";
else {
    $sql = "SELECT s.name "
        ."FROM school s, user u "
        ."WHERE u.userid=$uid AND "
        ."u.schoolid=s.schoolid";
    $rtl = db_select($sql);
    $name = $rtl['name'];
}
print $name;
```

JS – Update the page

```
function updatePage() {
    if (request.readyState == 4) {
        var sch_name = request.responseText;
        var sch_id = document.getElementById("school");
        replaceText(sch_id, sch_name);
    }
}
```

Explanation

readyState == 4

0: The request is uninitialized (before you've called open())

1: The request is set up, but hasn't been sent (before you've called send())

2: The request was sent and is being processed

3: The request is being processed; some partial data is available from the response, but the server hasn't finished with its response

4: The response is complete; you can get the server's response and use it

responseText

- Data from the PHP script

- In this case, a single string element

replaceText(sch_id, sch_name)

- Function in 'text-utils.js'

Request object

- Most modern browsers provide a method for client side JavaScript to make HTTP requests. Thus, is created an oddly named object with few admirers. It has blossomed to be the core technology in something called Ajax.
- The Object makes many things easier and neater than they other would be, and introduces some things that were otherwise impossible. It makes your scripting options more flexible allowing for requests without having the page change.
- From the W3C:
 - The XMLHttpRequest Object specification defines an API* that provides scripted client functionality for transferring data between a client and a server.

* Application Programming Interface

Create a 'request object'

```
var request = null;
```

```
function createRequest() {
  try {
    request = new XMLHttpRequest();
  } catch (trymicrosoft) {
    try {
      request = new ActiveXObject("Msxml2.XMLHTTP");
    } catch (othermicrosoft) {
      try {
        request = new ActiveXObject("Microsoft.XMLHTTP");
      } catch (failed) {
        request = null;
      }
    }
  }
  if (request == null)
    alert("Error creating request object!");
}
```

Request object code explained

Declare a variable:

```
var request = null;
```

Not declared inside any function

It is a global variable

Request object code explained (2)

```
function createRequest();
```

Try to create request object:

```
XMLHttpRequest
```

Works on most browsers (not IE 5 & 6)

Request object code explained (3)

Internet Explorer?

Create request object:

```
Msxml2.XMLHTTP
```

Works on most versions of IE (pre v7)

Request object code explained (4)

Really old MS browser?

Create request object:

```
Microsoft.XMLHTTP
```

Request object code explained (5)

```
catch (failed) {request = null}
```

Houston, we have a problem!

Note: IE5 on a Mac won't work with any of these

Web app development

Beginning PHP/MySQL programmers:

Add Ajax

Also need:

- JavaScript
- Document Object Model (DOM)

Web design

Three components of web design:

Content – HTML

- mark up your page into various elements

Display – CSS

- style & position the elements

Behaviour – JavaScript (DOM)

- manipulate elements & styles on the fly

JavaScript

- Have you avoided JavaScript on principle?
- JavaScript has nothing to do with Java
 - Language developed by Sun Microsystems
 - “JavaScript” was chosen as the name of this language to make it sound like it was in good company
- More confusing than enlightening

JavaScript

- Many of the tutorials available in books or on the web deal with some of the less savory features:
 - pop-ups
 - scrolling text
 - interactive ad banners
 - security issues
- Many people choose to disable scripting

JavaScript

- JavaScript is a scripting language. Unlike a program that does everything itself, JavaScript tells the browser what to do.
- Since browsers aren't always compatible (IE vs. Firefox), you will often have to write "defensively"
 - write multiple versions of code that will work on disparate browsers

JavaScript

- Thousands of downloadable scripts available that you can use to spice up your pages:
 - calendars
 - calculators
 - menus
 - etc.

Document Object Model (DOM)

- A platform- and language-neutral interface that will allow programs and scripts to dynamically access and update the content, structure and style of documents.
 - W3C definition

DOM

D = Document

- the web page you create is the document

O = Object

- host objects provided by the browser

M = Model

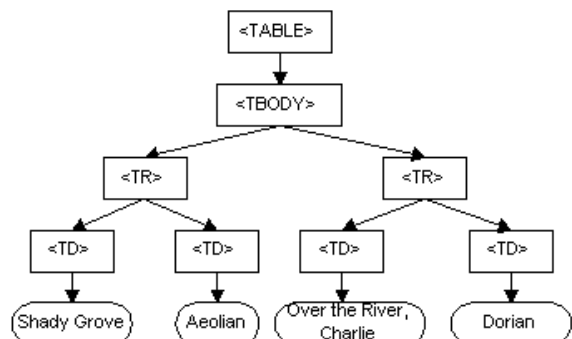
- a map of the web page
- a tree

DOM scripting

- DOM scripting is a way to describe the manipulation of documents & style sheets
- DOM scripting can be used in conjunction with any marked-up document using any language that supports the DOM API
- The ubiquity of JavaScript makes it a good choice

DOM – Example

```
<table>
  <tbody>
    <tr>
      <td>Shady Grove</td>
      <td>Aeolian</td>
    </tr>
    <tr>
      <td>Over the River, Charlie</td>
      <td>Dorian</td>
    </tr>
  </tbody>
</table>
```



Add another row

Identify object in HTML

```
<tbody id="tbody">
```

JavaScript

```
var tbody = document.getElementById("tbody");
var tr = document.createElement("tr");
tbody.appendChild(tr);
// Add a cell
var td = document.createElement("td");
var txt = document.createTextNode("something");
td.appendChild(txt);
tr.appendChild(td);
```

Exercise?

- Generate an entire table utilizing nothing but DOM scripting
- Even better...
- Generate an entire web page!
- You can generate entire web site with DOM scripting
 - However, that would be foolish.

Multiple responses

- How can we handle multiple data items returned from the PHP script

```
var txt = request.responseText;
```
- Option: concatenate all data with known delimiting character
 - 7;4;Now is the time
 - JavaScript must then parse this string in the update function
- This will work for relatively short strings but can become unwieldy

XML = eXtensible Markup Language

- What's so good about XML?
 - It's a recognized standard of the W3C
- Can't I use my own format?
 - Self defined formats can cause problems later on
- However, I have found another format that I prefer

JSON – JavaScript Object Notation

- Another option for returning data from PHP script
- The data format is JavaScript
- PHP doesn't "speak" JavaScript
- As of PHP 5.2.0, the JSON extension is bundled into PHP
- Earlier versions of PHP must use an include file
 - download: <http://mike.teczno.com/json.html>
- Problem – **AJAJ** is really hard to pronounce

PHP script to generate

```
// for PHP pre 5.2.0
require_once('json.php');
// generate result set as an array
$json = new Services_JSON();
$return = $json->encode($data_array);
print $return;
```

JSON is JavaScript

- JSON is a way to represent the data as a JavaScript array
- You don't have to write a routine to parse
- Convert from text to JavaScript object using **eval ()** function

```
var data = eval('(' + responseText + `)`);
```

prototype.js

- Prototype framework enables you to deal with Ajax calls more easily
- The biggest part of the Prototype framework are its DOM extensions
- Examples:

`$("#first_name")` replaces `document.getElementById("first_name")`

`$F("last")` replaces `document.getElementById("last").value`

- Download from <http://www.prototypejs.org/>

References

Head Rush Ajax

Brett McLaughlin, O'Reilly Media Inc.

- quirky but really good as a tutorial

DOM Scripting

Jeremy Keith, Friends of ED

Final [example](#)

- Let's reverse our program from before where you select a user & get the school.
- This time we will select a school & get all the associated users displayed in a table.