AJAX Programming Skills (1)

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Outline

- **AJAX Introduction**
- **Hidden Frame**
- **XHR** (XMLHttp Requests)

Jesse James Garrett

Jesse James Garrett

- An information architect

- Founder of Adaptive Path

- Co-founder of
  Information Architecture Institute(IAI)

- Author of
  The Elements of User Experience

- Coined the term AJAX in February, 2005

JJG

What is AJaX?

- A name given to an existing approach to building dynamic web applications

- Web pages use JavaScript to make asynchronous calls to web-based services that typically return XML
  - allows user to continue interacting with web page while waiting for data to be returned
  - page can be updated without refreshing browser
  - results in a better user experience
  - there are AJaX libraries that reduce the amount of JavaScript code that must be written

- Uses a JavaScript class called **XMLHttpRequest**

A Good Acronym?

- A is for "asynchronous"
  - requests can be made asynchronously or synchronously
  - both techniques allow a web page to be updated without refreshing it
  - anything useful the user can do while processing request?
    - if yes then use asynchronous, otherwise use synchronous
- J is for "JavaScript"
  - typically JavaScript is used on the client-side (in the browser)
  - can use any language on server-side that can accept HTTP requests and return HTTP responses
    - Java servlets, Ruby servlets, CGI scripts, …
- X is for "XML"
  - request and response messages can contain XML
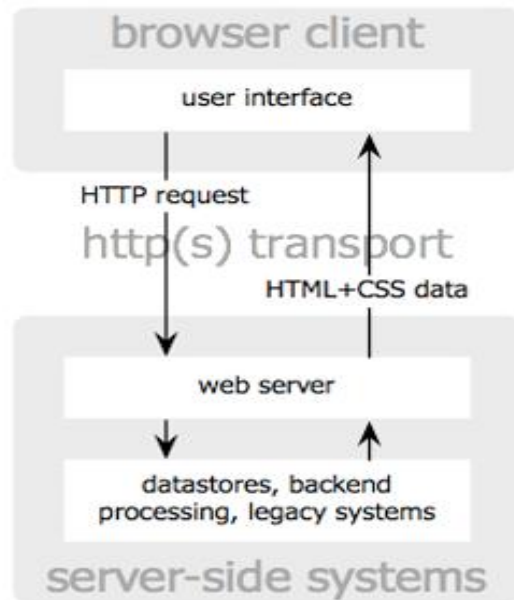 - can really contain any text (single text value, delimited text, …)

Why Ajax?

- **HTML and HTTP are weak**
  - Non-interactive
  - Coarse-grained updates
- **Everyone wants to use a browser**
  - Not a custom application
- **"Real" browser-based active content**
  - Failed: Java Applets
    - Not universally supported; can't interact with the HTML
  - Serious alternative: Flash (and Flex)
    - Not yet universally supported; limited power
  - New and unproven
    - Microsoft Silverlight
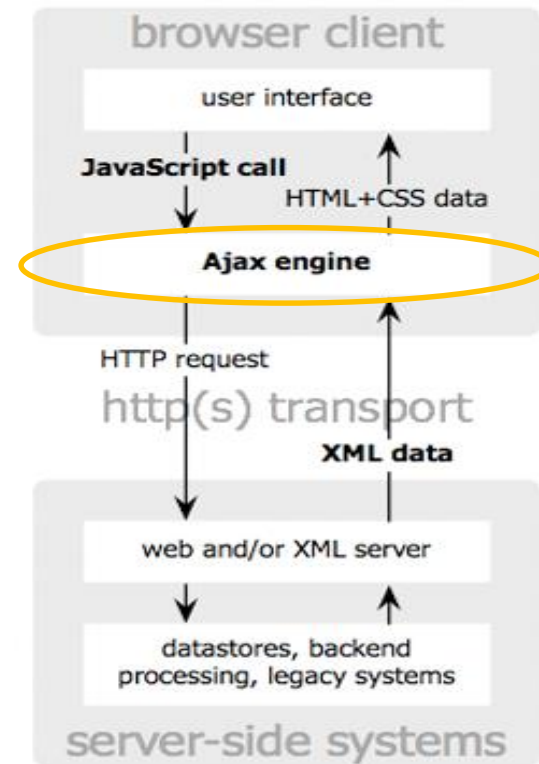   - JavaFX
    - Adobe Apollo

Uses For AJaX

- Asynchronous
  - examples
    - Google Maps – http://maps.google.com
      - asynchronously loads graphic tiles to support map scrolling
    - Google Suggest – http://www.google.com/suggest
      - asynchronously updates list of possible topic matches based on what has been typed so far

- Synchronous
  - even when there is nothing useful for the user to do after a request is submitted to a server, AJaX can be used to retrieve data and **update selected parts of the page** without refreshing the entire page
    - better user experience

AJAX vs. Traditional Web

classic
web application model

Jesse James Garrett / adaptivepath.com

Ajax
web application model

JJG

AJaX Process via Hidden Frame
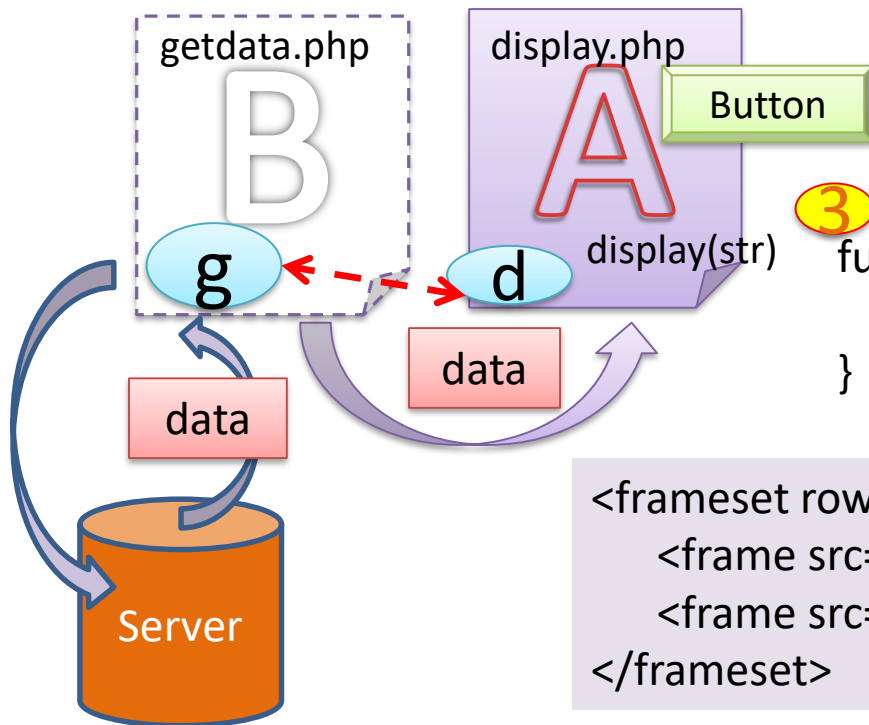
[Ex]: `ajax1-1-hidden-frame.htm`

② Onload=function(){
    var str =document.getElementById('g')
    top.frames['A'].display(str);
}

① Onclick=function(){
    top.frames['B'].location="getdata.php"
}

③ function display(str){
    docment.getElementById("d").innerHTML=str
}

getdata.php

B

display.php

A

Button

g

d

display(str)

data

data

Server

```
<frameset rows="100%,0" style="border: 0px>
    <frame src="display.php" name="A" noresize>
    <frame src="about:blank" name="B" noresize>
</frameset>
```

XMLHttp Requests (XHR)

- **JavaScript** [Ex]: `ajax1-2-XHR.htm`

  - Define an object for sending HTTP requests
  - Initiate request
    - Get request object
    - Designate a response handler function
      - Supply as onreadystatechange attribute of request
    - Initiate a GET or POST request
    - Send data
  - Handle response
    - Wait for readyState of 4 and HTTP status of 200
    - Extract return text with responseText or responseXML
    - Do something with result

- **HTML**

  - Loads JavaScript
  - Designates control that initiates request
  - Gives ids to input elements that will be read by script

- readyState
  - 0: not open
  - 1: not request
  - 2: request (send)
  - 3: receive data
  - 4: complete

GET Requests (XHR)

- [Ex]: **ajax1-2-XHR.htm**

```
var oXHR=new XMLHttpRequest();
para= "key1=value1&key2=value2";
oXHR.open("GET","get.php?"+para, true);
oXHR.onreadystatechange= function(){
        if(oXHR. readyState==4 &&(oXHR.status==200||oXHR.status==304)){
                var r=document.getElementById("re");
                r.innerHTML=oXHR.responseText;
        }
}
oXHR.send();
```

POST Requests (XHR)

```javascript
var oXHR=new XMLHttpRequest();  //IE5相容性問題未解決
para= "key1=value1&key2=value2";   // encodeURIComponent(para); URL編碼
oXHR.open("POST","post.php",true);
oXHR.setRequestHeader("Content-type", "application/x-www-form-urlencoded");
oXHR.onreadystatechange=  function() {
      if (oXHR. readyState==4 &&(oXHR.status==200||oXHR.status==304)) {
            var r=document.getElementById("re");
            r.innerHTML=oXHR.responseText;
      }
}
oXHR.send(para);
```
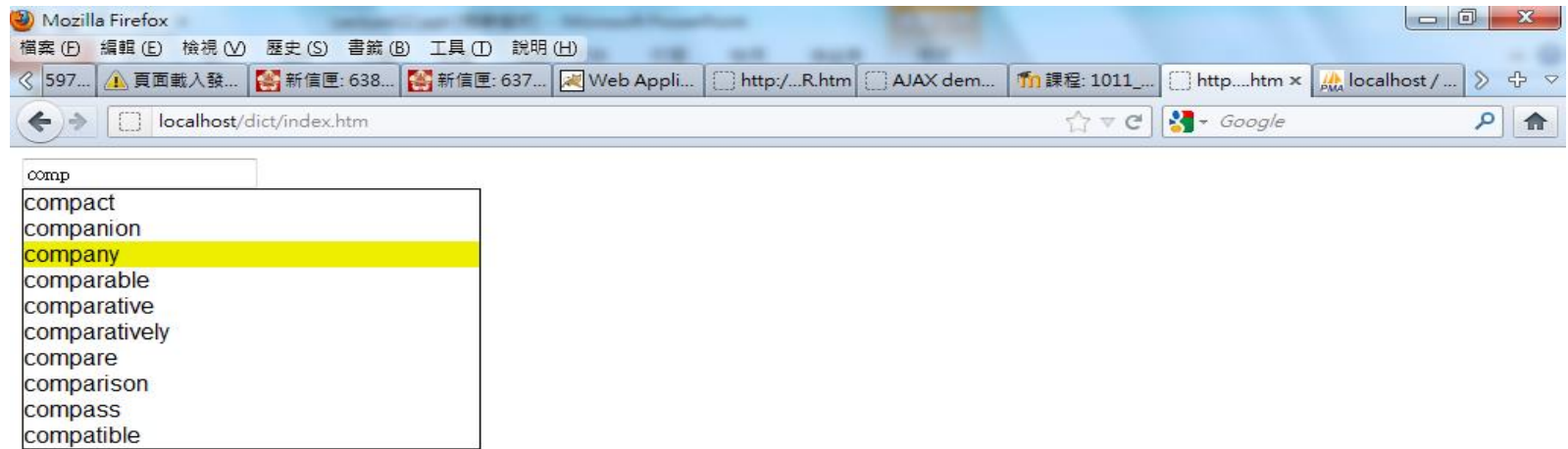
XHR vs. Hidden Frame

- XHR's advantage: simple
- XHR's disadvantage: lack historical records in browsers

XHR Application: Google suggestion (1)

- [Ex: remotehost]: **Google suggestion**
- [Ex: localhost]: **Google suggestion**


```
<INPUT type="text" id="search" onblur="dis();Focus=0;" onfocus="Focus=1;" onkeydown="bb(event)"><br/>
<div id="list"></div>
<div id="main"></div>
```

```javascript
function bb(event){
          var listN=document.getElementById("list").children.length;
          switch( event.keyCode){
                      case 40:
                        var current=(selectI+listN)%listN;
                                      var next=(selectI+listN+1)%listN;
                                      document.getElementById("SG"+current).className="";
                                      document.getElementById("SG"+next).className="hlight";
                                      selectI=next;
                                      break;
                      case 38:

                                      if(selectI==-1) selectI=0;
                                      var current=(selectI+listN)%listN;
                                      var next=(selectI+listN-1)%listN;
                                      document.getElementById("SG"+current).className="";
                                      document.getElementById("SG"+next).className="hlight";
                                      selectI=next;
                                      break;
                      case 13:

                                      clearTimeout(ti);
                                      at(13);
                                      break;
                      default:

                                      clearTimeout(ti);
                                      ti=setTimeout(aa,500);
          }
}
function aa(){
          var current_input =document.getElementById("search").value;
          if (pre!= current_input){
                      pre=current_input;
                      changeSet(current_input);
          }
```

```
function changeSet (current_input){
        ……..
        var par=document.getElementById("list");
        for(var i=par.children.length;i>0;i--)
                par.removeChild(par.children[i-1]);
        var oXHR=new XMLHttpRequest();//相容性問題未解決
        para= "q="+current_input;
        oXHR.open("GET","q.php?"+para,true);
        oXHR.onreadystatechange= function(){
                if (oXHR.readyState==4 &&(oXHR.status==200||oXHR.status==304)){
                        var similarE=oXHR.responseText.split("|");
                        var par=document.getElementById("list");
                        for (var i=0;i<similarE.length;i++){
                                if (current_input == similarE[i])   { return;  }
                                var newobj= document.createElement("div");
                                  // 建一新物件，這個物件是放一個單字，整個物件視為一項
                                newobj.id= "SG"+i;  //設定ID，以方便在滑鼠移動與鍵盤操作時運算
                                newobj.onmouseover= mouseO;  //設定新物件移過去呼叫之函式
                                newobj.onmousedown= at;  //設定新物件點下去呼叫之函式
                                newobj.innerHTML= similarE[i];  //新物件的內容設為英文單字
                                par.appendChild(newobj);  //把新物件加到列表中
                        }
                        ……….
                }
        }
        oXHR.send();
}
```

```
function at(enter_key){
            if (enter_key == 13) {current_input= document.getElementById("search").value;}
            else {
               var current_input=document.getElementById("SG"+selectI).innerHTML;
               document.getElementById("search").value=current_input;
            }
            var oXHR=new XMLHttpRequest();//相容性問題未解決
            para= "q="+current_input;
            oXHR.open("GET","main.php?"+para,true);
            oXHR.onreadystatechange= function(){
                        if (oXHR.readyState==4 &&(oXHR.status==200||oXHR.status==304)){
                            dis();
                            document.getElementById("main").innerHTML=oXHR.responseText;
                        }
            }
            oXHR.send();
}
</script>
```

Main.php

```php
<?php
include_once "./config.inc.php";
$result=mysql_query("SELECT * FROM `dict` WHERE eng LIKE '$_GET[q]%'
LIMIT 1",$link);
while($rows=mysql_fetch_array($result,MYSQL_ASSOC)){
        print "Chinese translation: <br/>".$rows[ch];
//        print "english: ".$rows[eng]."<br/>".$rows[ch];
}
?>
```