Client side web programming

Dynamic Applications

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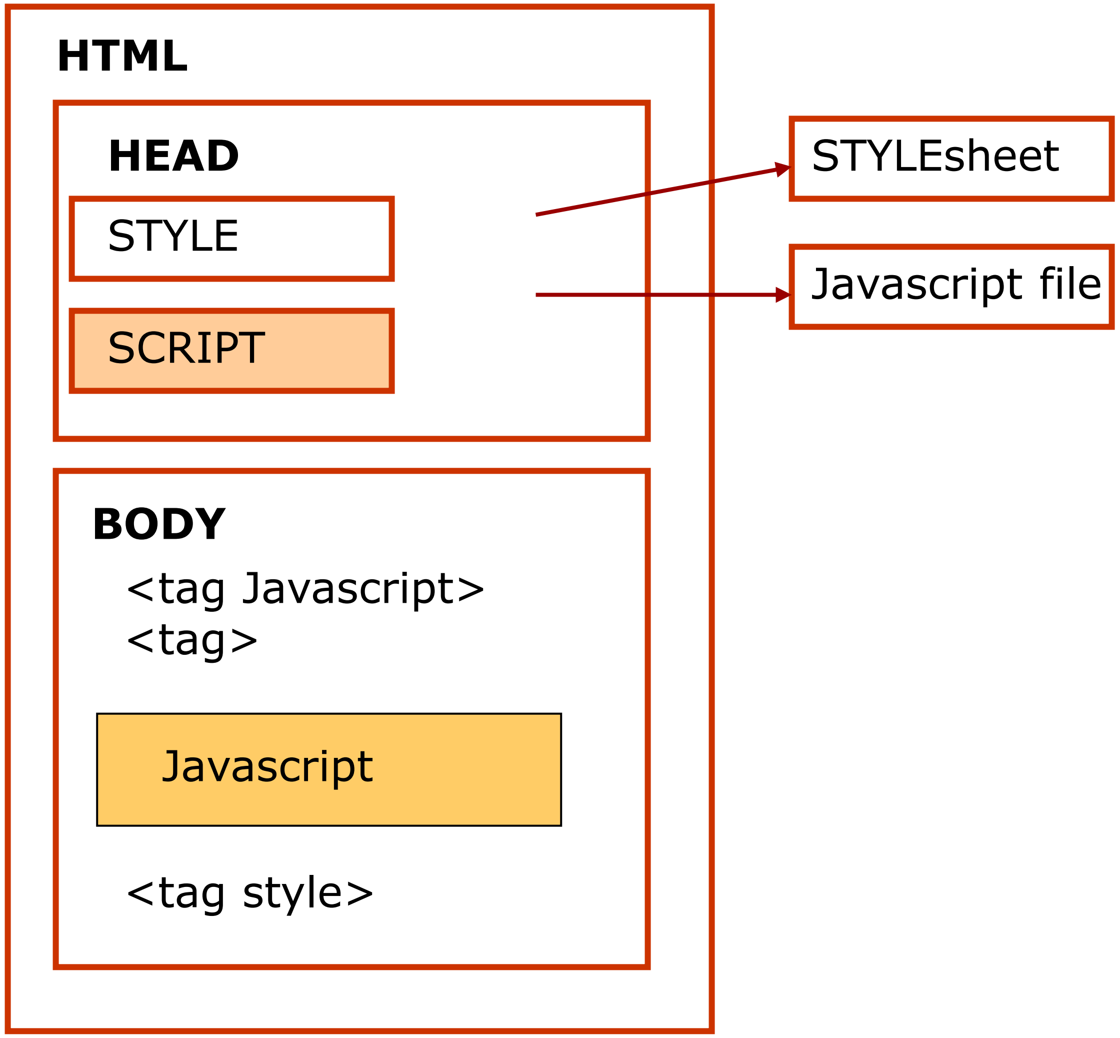
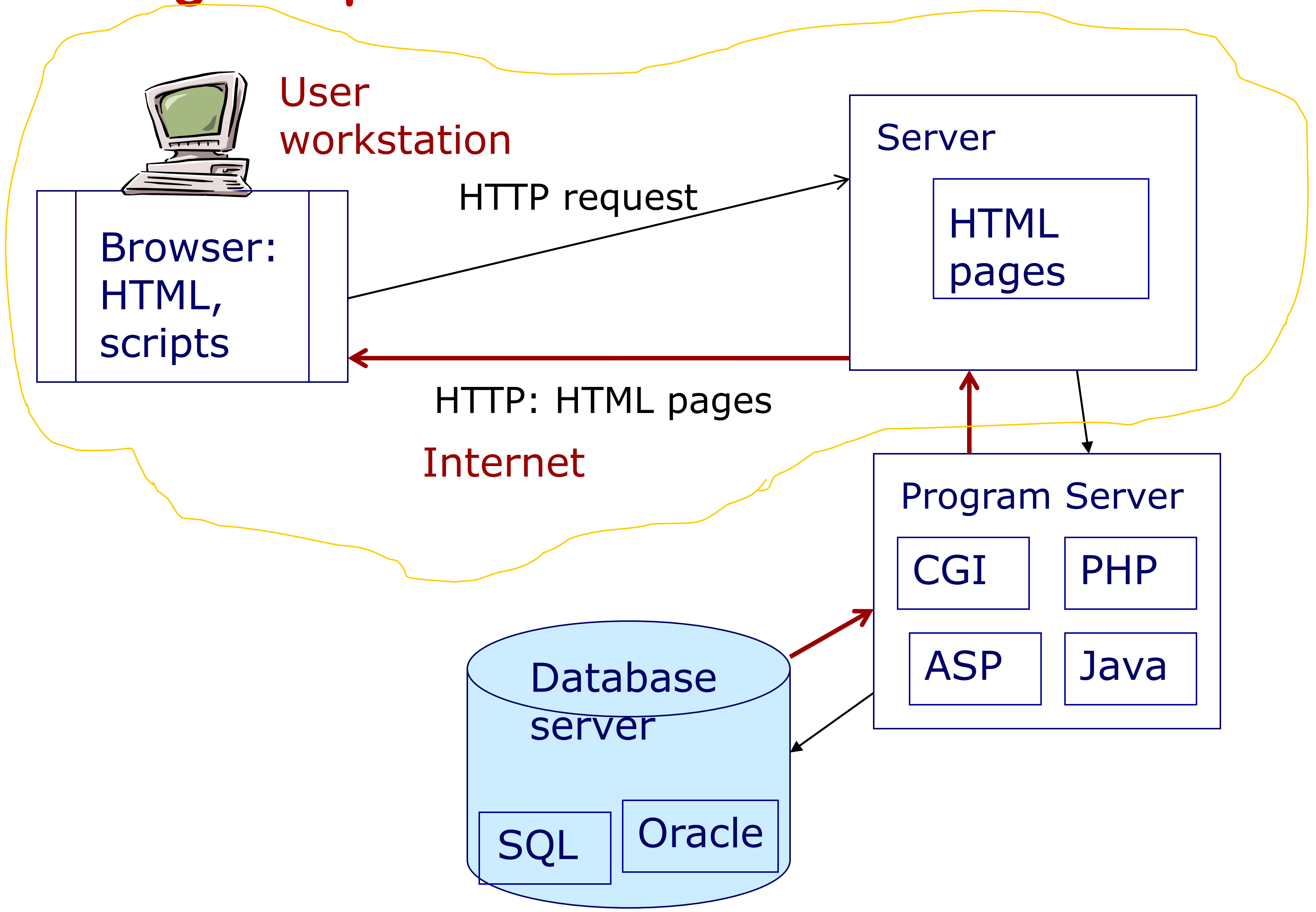
Scripts and styles on an HTML page



Page requests on the Web



HTTP requests

GET /index.html HTTP/1.1
Host: www.evtek.fi
Accept: www/source
Accept: text/html
Accept: image/gif
User-Agent: Mozilla/5.0 (Windows; U; Windows NT 5.1; en-US; rv:1.8.1.3) Gecko/20070309 Firefox/2.0.0.3
a blank line *

- The client lists the Multipurpose Internet Mail Extension (MIME) types it will accept in return.
- Finally, the client sends a blank line indicating it has completed its request.

HTTP server response

```
HTTP/1.1 200 OK
Date: Mon, 09 Apr 2007 12:39:22 GMT
   Server: Apache/1.3.27 (Unix) (Red-Hat/Linux)
Set-Cookie: fe_typo_user=4f74f6c85b; path=/;
   domain=www.evtek.fi
   Last-Modified: Wed, 08 Jan 2007 23:11:55 GMT
Etag: "3f80f-1b6-3e1cb03b"
Accept-Ranges: bytes
Content-Length: 438
Connection: close
Content-Type: text/html; charset=UTF-8
```

GET and POST methods

The difference between these two methods is in the way of sending data to the page:

- GET method sends data using URL (size limit),

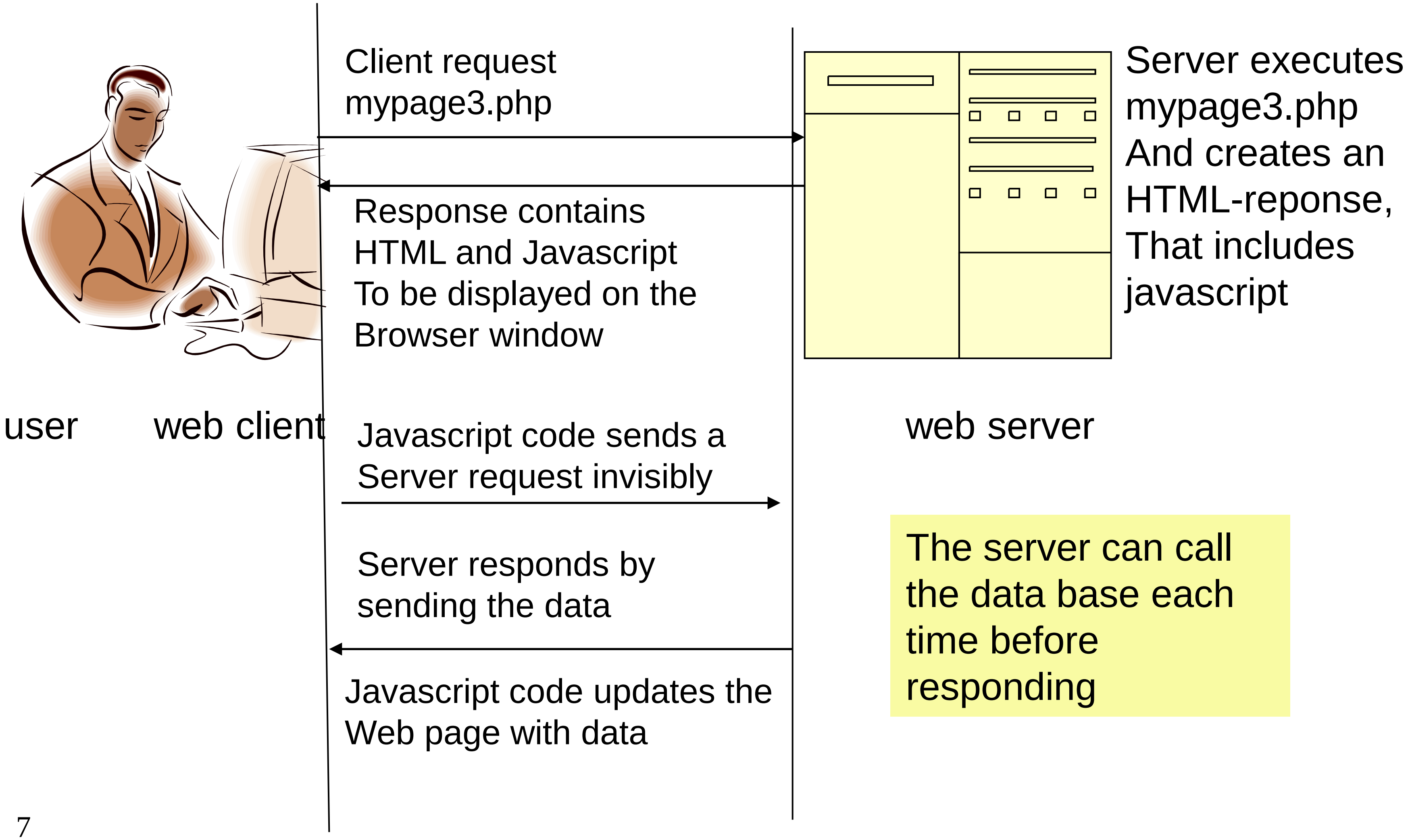
  <form method="GET" action="prog2.html">

http://www.google.com/search?sourceid=gmail&q=get%20method

- POST method sends data through a standard entrance

<form method="post" action="http://www.school.fi/cgi-bin/post-query">

A Client request with AJAX



Client request
mypage3.php

Response contains
HTML and Javascript
To be displayed on the
Browser window

Server executes
mypage3.php
And creates an
HTML-reponse,
That includes
javascript

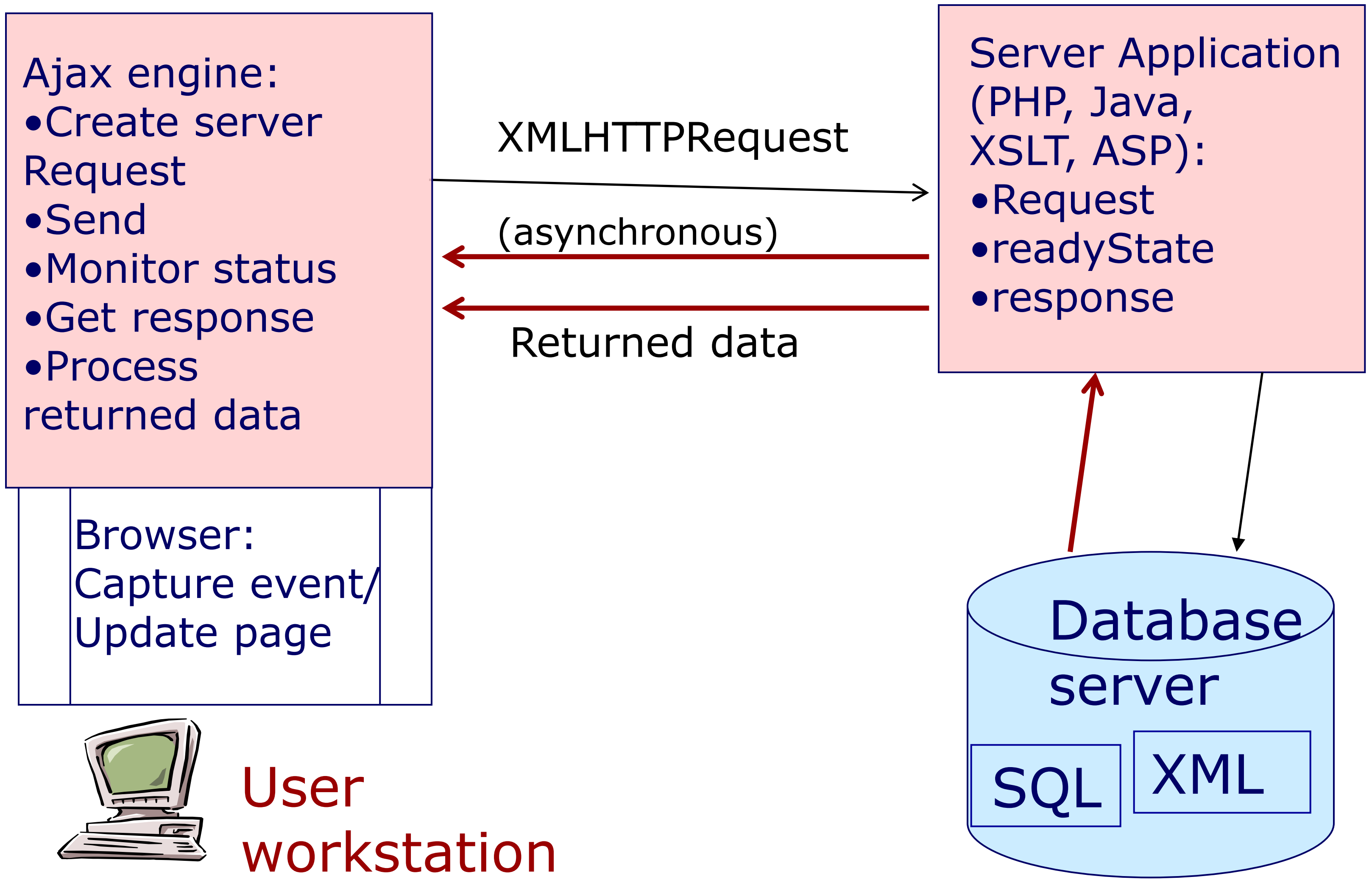
Javascript code sends a
Server request invisibly

Server responds by
sending the data

Javascript code updates the
Web page with data

The server can call
the data base each
time before
responding

Page requests: XMLHTTPRequest



Ajax components

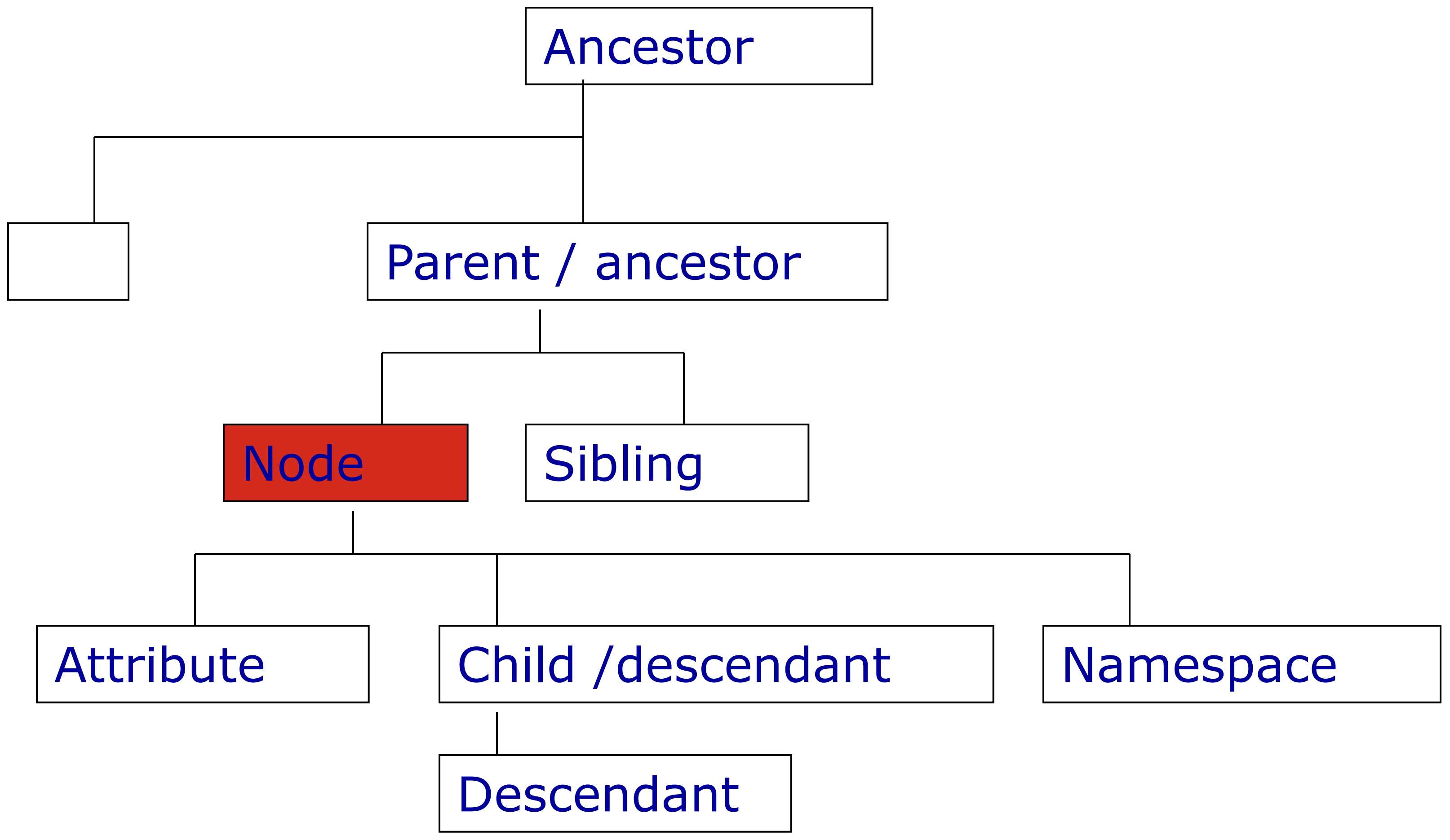
- Modern browsers
- Javascript & libraries
- XMLHttpRequest
- XHTML & CSS
- DOM
- XML
- Server side programs

Document Object Model (DOM)

- Used by many programming languages (php, Java, C#, C++, Javascript…)
- and understood by browsers (Firefox, IE, Chrome, Safari)

- XML -document is a collection of nodes that make a hierarchical tree structure
- The hierarchy is used in navigating the tree to locate information
- Inefficient use of memory: the tree structure is created in the memory
- DOM enables adding, moving, deleting and changing of nodes

Document tree



Processing of the tree

- Start with the root node (document-object)
- Element properties
  - firstChild
  - lastChild
  - nextSibling
  - parentNode
- Methods to navigate the tree
  - getElementByID(id)
  - getElementsByName(name)
  - getElementsByTagName(name)
  - getAttribute(name)

XML DOM

Note.xml

```
<note>
<to>Tove</to>
<from>Jani</from>
<heading>Reminder</heading>
<body>Don't forget me this
weekend!</body>
</note>
```

From http://www.w3schools.com

```
<html><head>
<script type="text/javascript">
var xmlDoc;
function loadXML()
{
//load xml file
// code for IE6
if (window.ActiveXObject)
{
    xmlDoc=new ActiveXObject("Microsoft.XMLDOM");
    xmlDoc.async=false;
    xmlDoc.load("note.xml");
    getmessage();
}
// code for Firefox, Opera, IE7+, Chrome, Safari
else if (document.implementation &&
    document.implementation.createDocument)
{
    xmlDoc=document.implementation.createDocument("","",null);
    xmlDoc.load("note.xml");
    xmlDoc.onload=getmessage;
}
else
{
    alert('Your browser cannot handle this script');
}
}
```

continues

```
function getmessage()
{
document.getElementById("to").innerHTML=xmlDoc.getElementsByTagNa
    me("to")[0].childNodes[0].nodeValue;
document.getElementById("from").innerHTML=xmlDoc.getElementsByTag
    Name("from")[0].childNodes[0].nodeValue;
document.getElementById("message").innerHTML=xmlDoc.getElementsB
    yTagName("body")[0].childNodes[0].nodeValue;
}
</script>
</head>

<body onload="loadXML()">
<h1>W3Schools Internal Note</h1>
<p><b>To:</b> <span id="to"></span><br />
<b>From:</b> <span id="from"></span><br />
<b>Message:</b> <span id="message"></span>
</p>
</body>
</html>
```

XMLHttpRequest

- XMLHttpRequest-object
  - Creation
  - Methods
  - Properties
- Server response handling
- Errors

Ajax request

- Client requests an event handler e.g. onclick=startaReq();
- XMLHttpRequest-object is created on client
- Callback handler is registered
- Start of request
  - httpReq.open(”GET”, stringA, true);
- Sending request
  - httpReq.send(null);
- Server executes the request and returns data to the client
- Client takes either text or xml response
  - httpReq.responseText
  - httpReq.responseXML

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Creation of XMLHttpRequest

- Internet Explorer

```
if (window.ActiveXObject) {
        request = new ActiveXObject("Microsoft.XMLHTTP");
```

- Other browsers

```
if (window.XMLHttpRequest) {
        request = new XMLHttpRequest();
```

XMLHttpRequest properties

onreadystatechange	set up of callbackfunction
readystate	returns status of request:

- 0 = uninitialized
- 1 = loading
- 2 = loaded
- 3 = interactive
- 4 = complete

responseText	server response string
responseXML	server response XML document
Status	response status code
statusText	response status text

Document parsing error

```
function handleServerResponse()
{
  // read the message from the server
  var xmlResponse = xmlHttp.responseXML;
 // IE ja Opera
  if (!xmlResponse || !xmlResponse.documentElement)
           throw(”Invalid XML structure:\n”+xmlHttp.responseText);

// Firefox
  var rootNodeName = xmlResponse.documentElement.nodeName;
  if (rootNodeName == ”parsererror”)
           throw (”Invalid XML structure:\n”+xmlHttp.responseText);
  // obtain the XML's document element
  xmlRoot = xmlResponse.documentElement;
```

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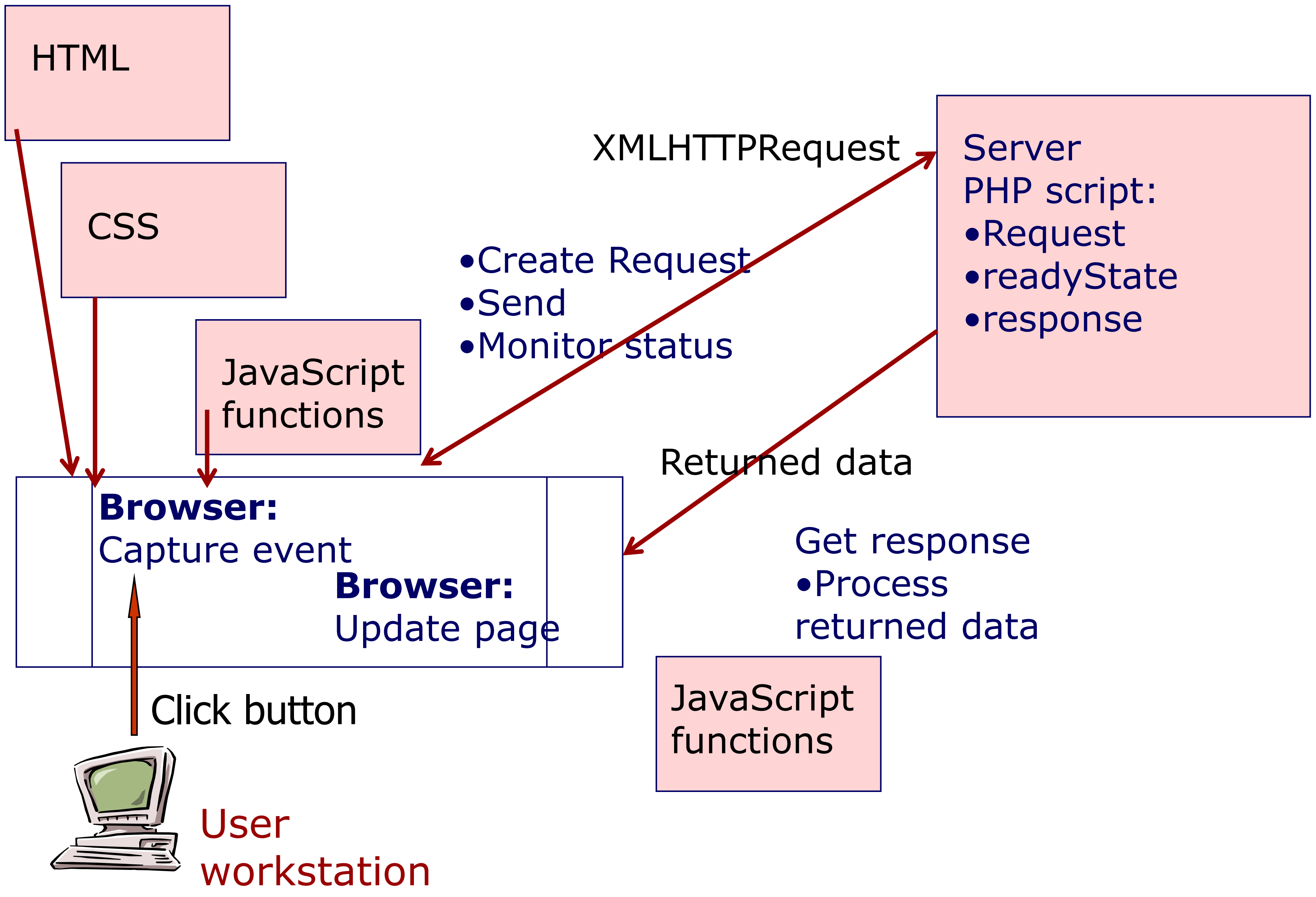
The browser in control



More Javascript

User defined functions

```
function Capitalize(mjono)
//return a string that has first capital letter
    {
    var firstletter, reststring, cap;
    firstletter = mjono.charAt(0);
    reststring = mjono.substring(1, mjono.length);
    cap= firstletter.toUpperCase() + reststring.toLowerCase()

    return cap;
}
```

Running this function gives the value of cap to mjono.

User defined functions

Printing output to an HTML-page:

```
<head>
<script>
function countdown()
{
    var count;
    count = document.getElementById("countBox").value;
    document.getElementById(“printing").value ="";
    while (count > 1){
    document.getElementById(“printing").value =
    document.getElementById(“printing").value + count + "\n";
    count = count -1;
}
    document.getElementById(“printing").value =
            document.getElementById(" printing ").value + "hep!";}
</script>
</head>
<body>
    <p>Give starting number for countdown:
    <input type ="text" id ="countBox" size = "3" value= "19"/>
    </p>
<p><input type ="button" value= ”Start countdown" onClick ="countdown();"/>
    </p>
<p>
    <textarea  id="printing" rows="20" cols="8">
    </textarea>
</p>
</body>
```

Loops: for

```
for (i = 0; i <= 10; i++)
{
    result += i;
    document.write(i + ": " + result + "<br/>");
}
```

Increment

    i=i+1 or   i++

Loops: while

```
var x = 1;
var result = 0;

while ( x <= 10 ) // repeated until x>10
{
result += x;
x++;
}

alert ("The result is " + result + " and x is " + x );
```

Nesting loops

```
var heads = 0, tails  = 0;
var i, j;
    for (j = 0; j <= 5;  j++)
    {
           for (i = 0; i < 100;  i++)
           {
           if ( Math.floor ((Math.random()*2)) == 1 )
             heads = heads + 1;
           else
             tails = tails + 1;
           }
           document.write ("Heads:  "+heads+ </br>
           "Tails  :  " +tails+ " "<p>");
           heads= 0; tails = 0;
    }
```