

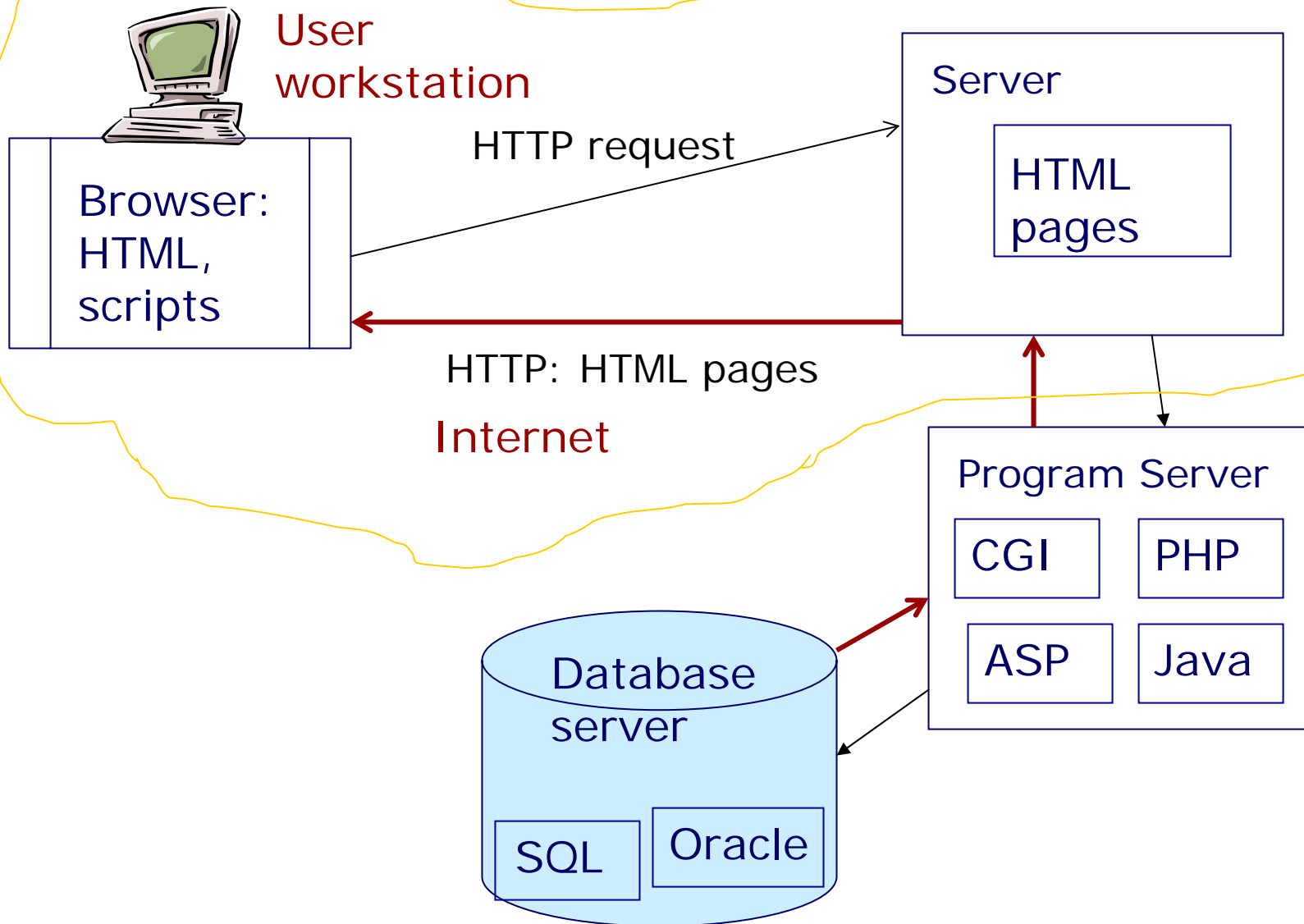
Ajax & scripts

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Outline

- Client - server communication and Ajax applications
- Javascript in HTML and events
- DOM
- Ajax components
- XMLHttpRequest request
- Ajax use

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

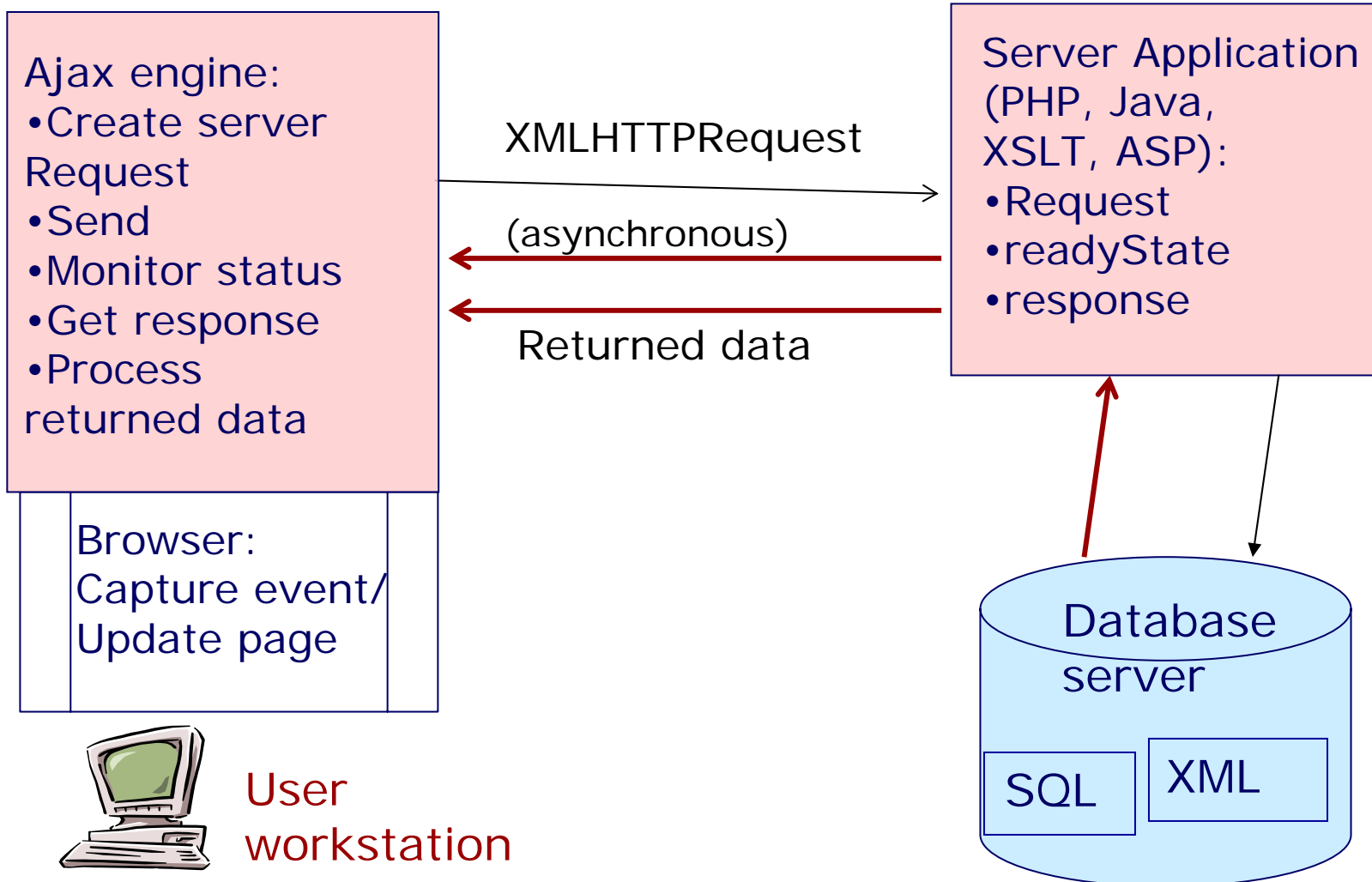
```
<form method="post"
```

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

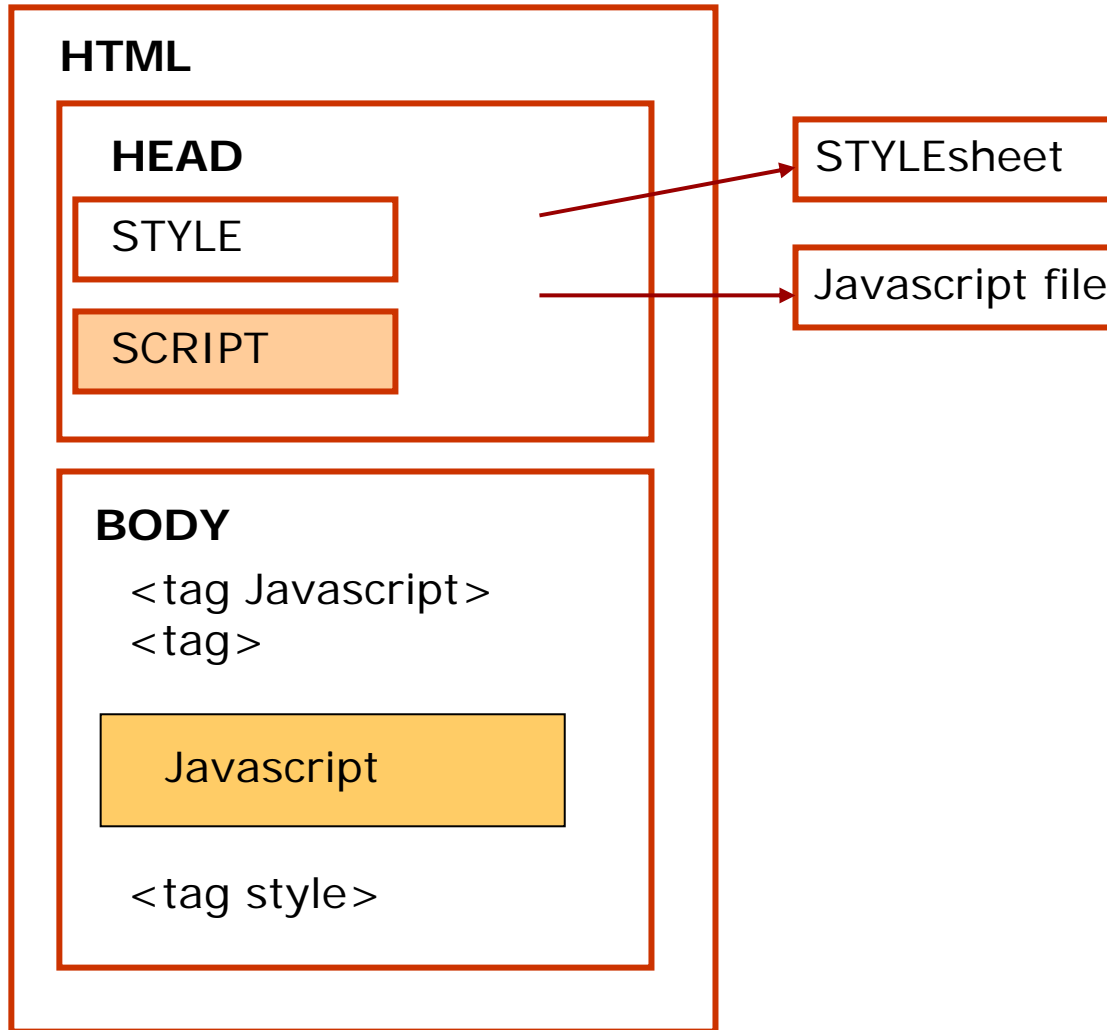
Ajax components

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

Page requests: XMLHttpRequest



Scripts and styles on an HTML page



Javascript

- Javascript is always downloaded from the server to the client
 - Either as a file reference
 - Or embedded in HTML
- Javascript is executed on client side.
 - Less load on server
 - Example: checks on form input (numeric fields, dates, required fields)
- Javascript understands the structure of the HTML page (document); DOM

What do we get with Ajax?

- Interactivity in Web user interface
 - Scrolling and zooming maps without Java applets
 - Interaction on forms (automatic completion, checking of input, getting assistance, hints, tips)
 - Update checking (mails)
 - Customization of pages on-the -fly
- Imagination and creativity

Who is using Ajax?

- <http://www.google.com/webhp?complete=1>
Google suggest
- Amazon: a9.com
multiple search options
- Yahoo!News
- Gmail
- Google Maps: tiles, dragging, zooming, push pins

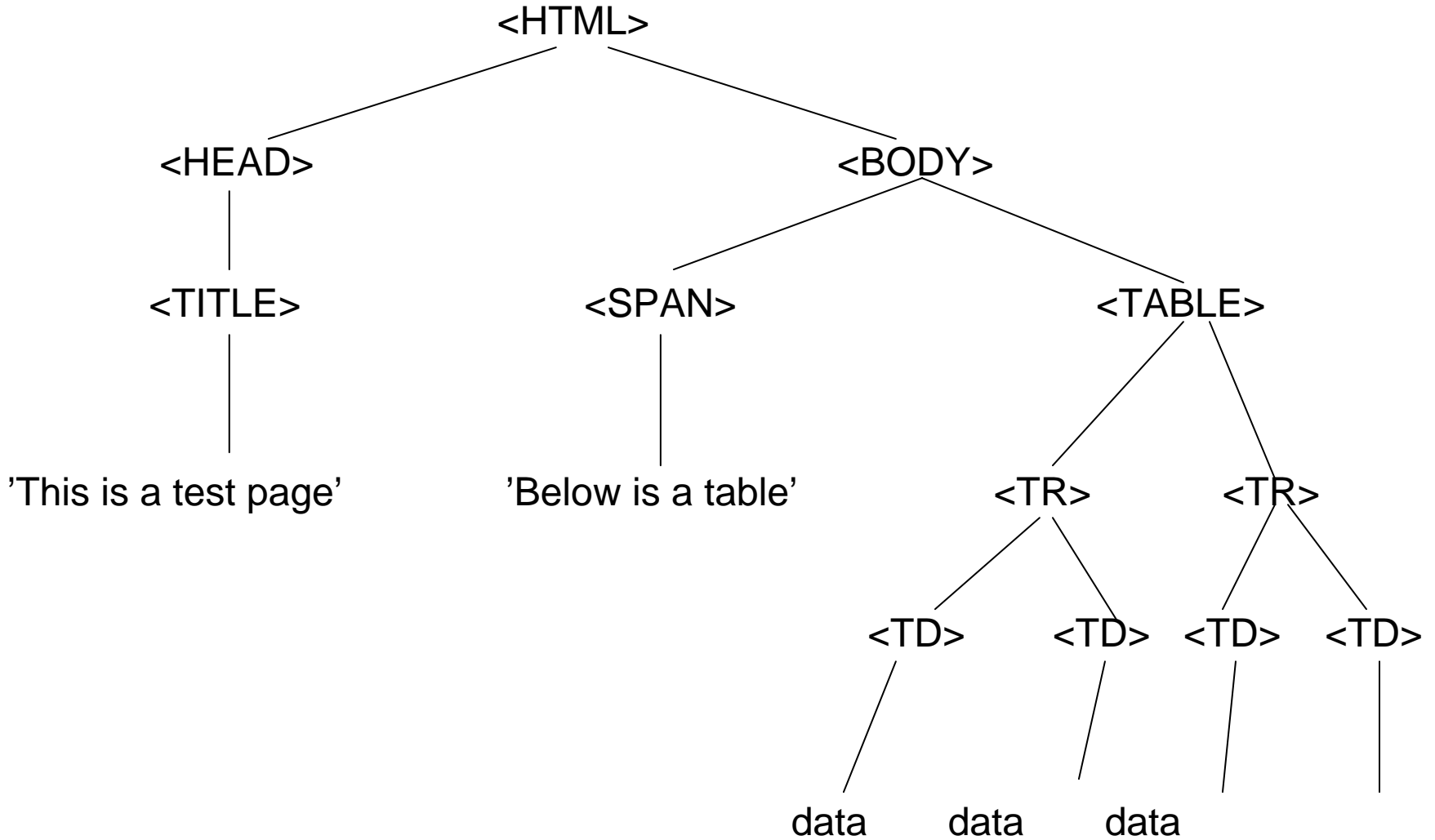
Javascript and document structure

HTML document

- Javascript can recognize the tree structure

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">
<HTML>
  <HEAD>
    <TITLE>This is a test page</TITLE>
  </HEAD>
  <BODY ID="trunk">
    <SPAN>Below is a table... </SPAN>
    <TABLE BORDER=1>
      <TR>
        <TD>Row 1 Cell 1</TD>
        <TD>Row 1 Cell 2</TD>
      </TR>
      <TR>
        <TD>Row 2 Cell 1</TD>
        <TD>Row 2 Cell 2</TD>
      </TR>
    </TABLE>
  </BODY>
</HTML>
```

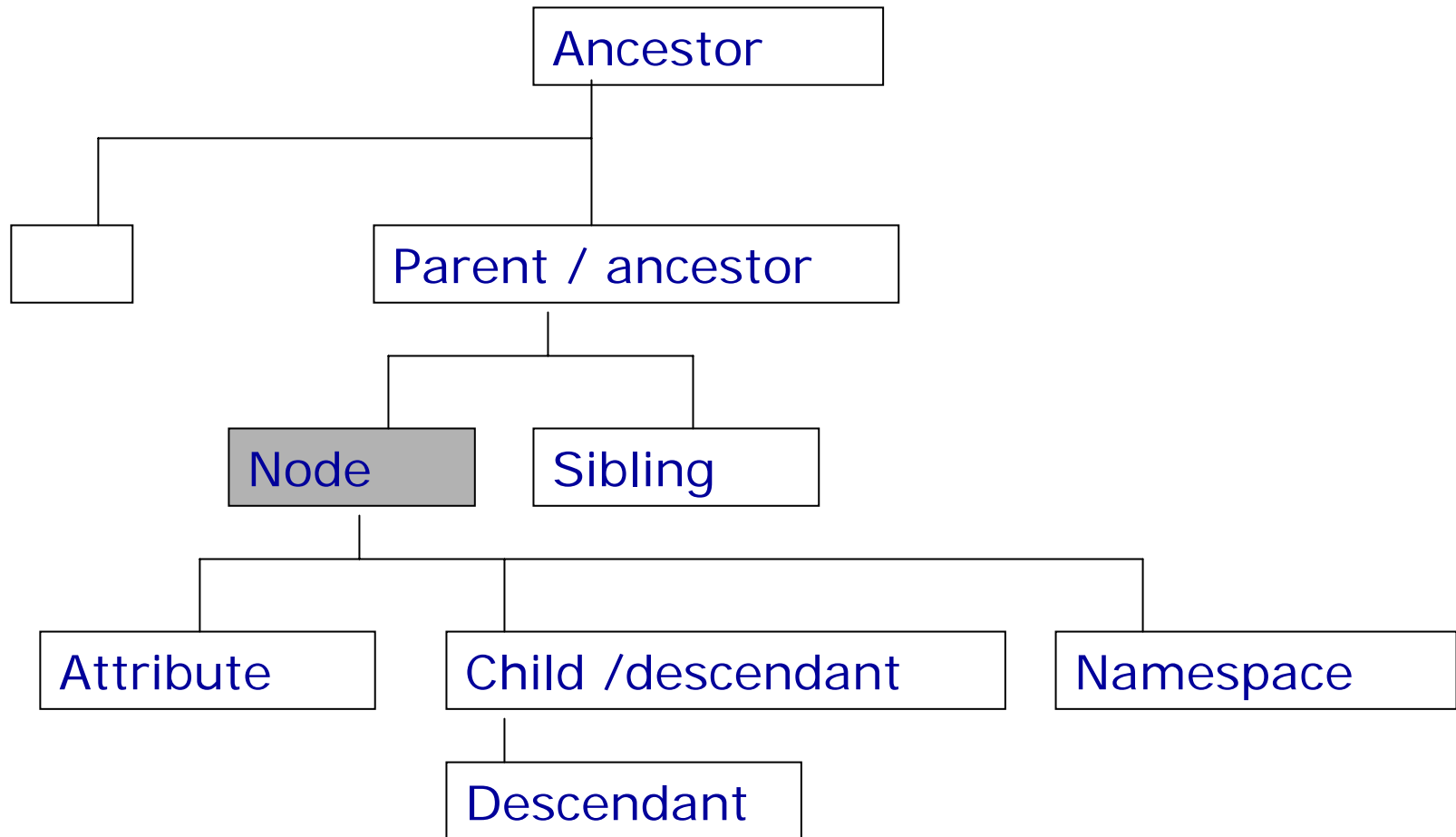
Tree of the page



Document Object Model (DOM)

- Used by many programming languages (php, java, c#, c++, Javascript...)
- And understood by browsers (Mozilla, IE, Opera, 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)
 - getElementsByTagName(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 IE
if (window.ActiveXObject)
{
    xmlDoc=new ActiveXObject("Microsoft.XMLDOM");
    xmlDoc.async=false;
    xmlDoc.load("note.xml");
    getmessage();
}
// code for Mozilla, Firefox, Opera, etc.
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

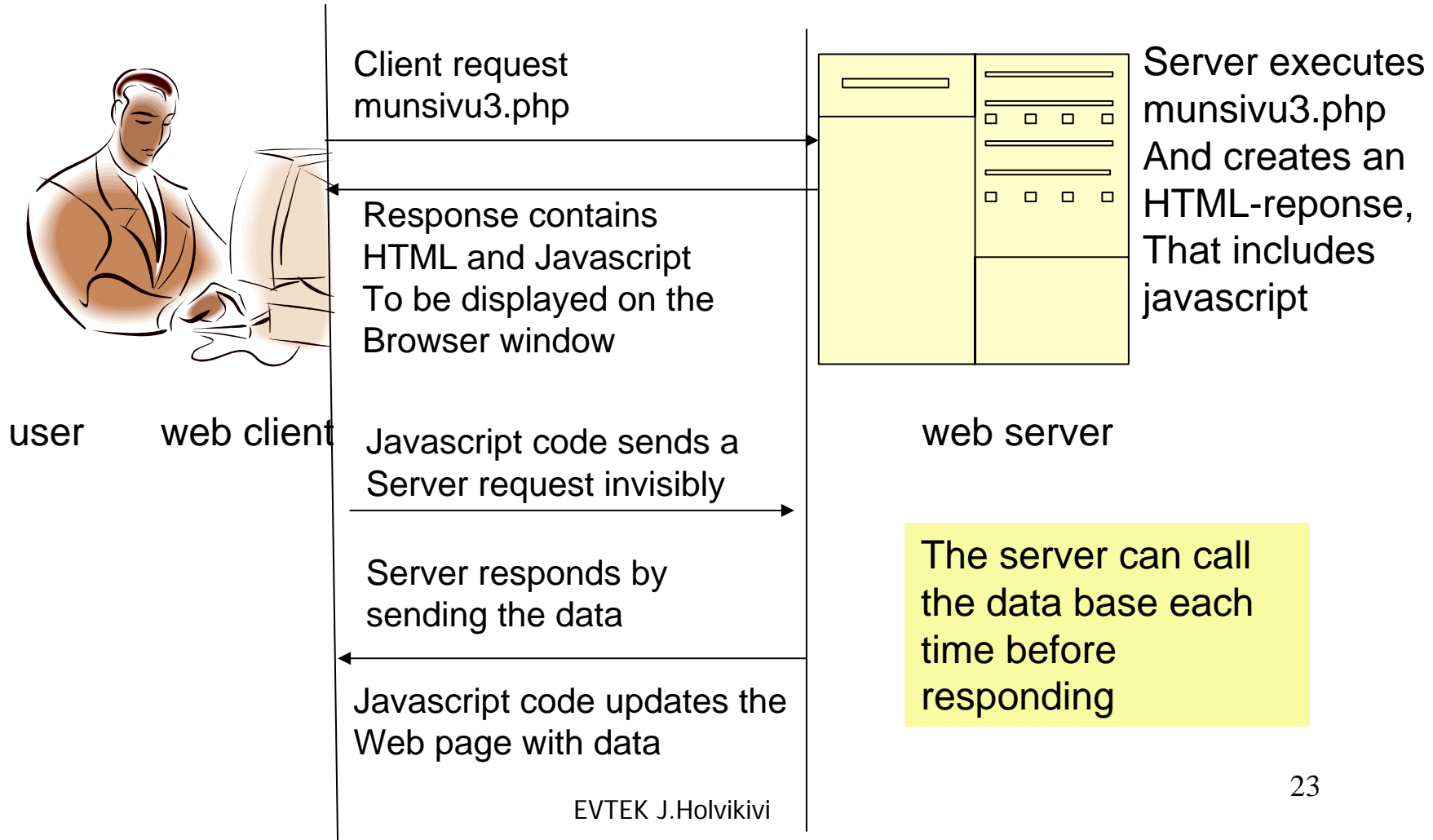
```
function getmessage()
{
document.getElementById("to").innerHTML=xmlDoc.getElementsByTagName("to")[0].childNodes[0].nodeValue;
document.getElementById("from").innerHTML=xmlDoc.getElementsByTagName("from")[0].childNodes[0].nodeValue;
document.getElementById("message").innerHTML=xmlDoc.getElementsByTagName("body")[0].childNodes[0].nodeValue;
}
</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>
```

What Ajax is?

- Javascript
 - CSS
 - XMLHttpRequest-object
 - DOM
-
- Ajax (Asynchronous Javascript + XML) is basically a new combination of known technologies
 - The XMLHttpRequest -object contacts the server without user control
 - Ajax technologies are included in browser functions!
 - no Java installation

A Client request with AJAX



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`

XMLHttpRequest

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

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;
```

The browser in control

