ECAP472

Web Technologies

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Learning Outcomes

After this lecture, you will be able to

- understand what is AJAX and why it is used?
- understand why AJAX is used in JavaScript?

AJAX

- Ajax (also AJAX "Asynchronous JavaScript and XML")is a set of web development techniques that uses various web technologies on the client-side to create asynchronous web applications.
- With 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

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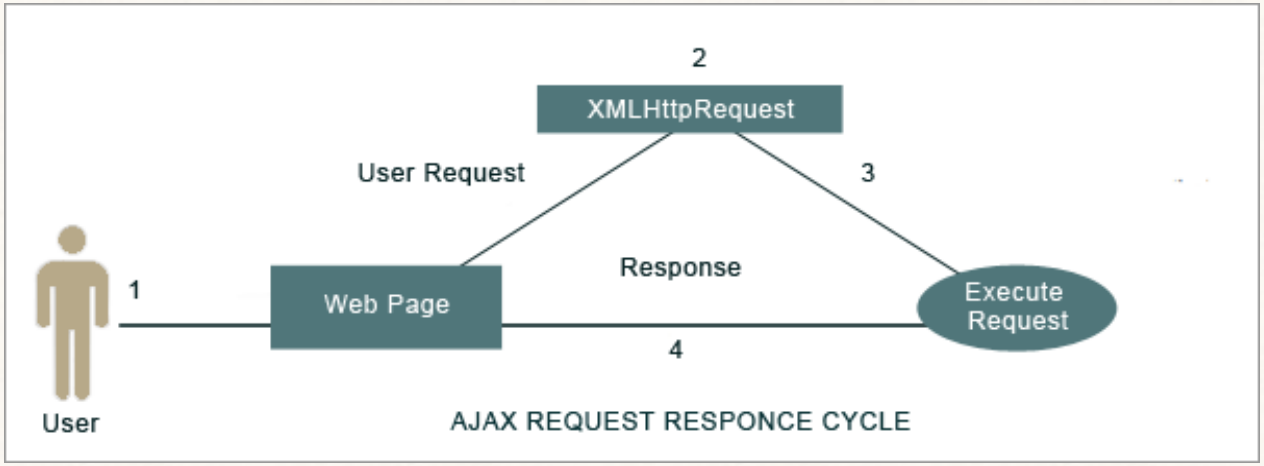

By decoupling the data interchange layer from the presentation layer, Ajax allows web pages and, by extension, web applications, to change content dynamically without the need to reload the entire page. In practice, modern implementations commonly utilize JSON instead of XML.

AJAX is not a Technology

Ajax is not a technology, but rather a programming concept. HTML and CSS can be used in combination to mark up and style information. The webpage can be modified by JavaScript to dynamically display—and allow the user to interact with the new information.

AJAX is not a Technology

XMLHttpRequest object is used to execute Ajax on webpages, allowing websites to load content onto the screen without refreshing the page. Ajax is not a new technology, nor is it a new language. Instead, it is existing technologies used in a new way

AJAX is a Developer's Dream,

Update a web page without reloading the page

- Request data from a server - after the page has loaded
- Receive data from a server - after the page has loaded
- Send data to a server - in the background

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What is AJAX?

- AJAX = Asynchronous JavaScript And XML.
- AJAX is not a programming language.
- AJAX just uses a combination of:
- A browser built-in XMLHttpRequest object (to request data from a web server)
- JavaScript and HTML DOM (to display or use the data)

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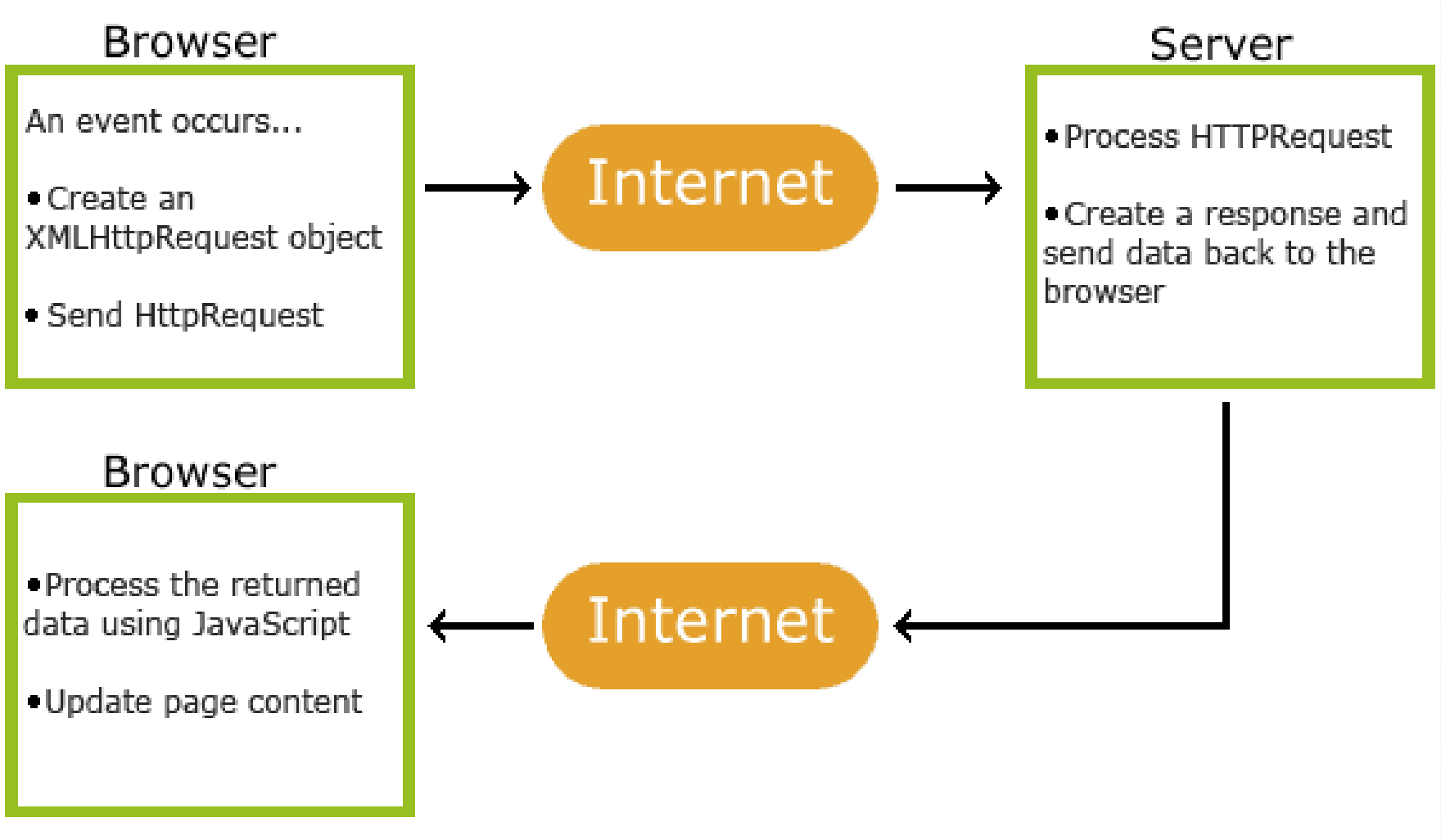
What is AJAX?

AJAX allows web pages to be updated asynchronously by exchanging data with a web server behind the scenes. This means that it is possible to update parts of a web page, without reloading the whole page

How AJAX Works



How AJAX Works

1. An event occurs in a web page (the page is loaded, a button is clicked)
2. An XMLHttpRequest object is created by JavaScript
3. The XMLHttpRequest object sends a request to a web server
4. The server processes the request

How AJAX Works

5. The server sends a response back to the web page
6. The response is read by JavaScript
7. Proper action (like page update) is performed by JavaScript

AJAX - The XMLHttpRequest Object

- The keystone of AJAX is the XMLHttpRequest object.
- All modern browsers support the XMLHttpRequest object.
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Create an XMLHttpRequest Object

All modern browsers (Chrome, Firefox, Edge (and IE7+), Safari, Opera) have a built-in XMLHttpRequest object.

Syntax for creating an XMLHttpRequest object:

variable = new XMLHttpRequest();

Example

```
var xhttp = new XMLHttpRequest();
```

XMLHttpRequest Object Methods

Method	Description
new XMLHttpRequest()	Creates a new XMLHttpRequest object
abort()	Cancels the current request
getAllResponseHeaders()	Returns header information
getResponseHeader()	Returns specific header information

XMLHttpRequest Object Properties

Property	Description
onreadystatechange	Defines a function to be called when the readyState property changes
readyState	Holds the status of the XMLHttpRequest. 0: request not initialized 1: server connection established 2: request received 3: processing request 4: request finished and response is ready

XMLHttpRequest Object Properties

responseText	Returns the response data as a string
responseXML	Returns the response data as XML data
status	Returns the status-number of a request 200: "OK" 403: "Forbidden" 404: "Not Found" For a complete list go to the Http Messages Reference
statusText	Returns the status-text (e.g. "OK" or "Not Found")

AJAX - Send a Request To a Server

- The XMLHttpRequest object is used to exchange data with a server.
- To send a request to a server, we use the open() and send() methods of the XMLHttpRequest object:

```
xhttp.open("GET", "ajax_info.txt", true);
xhttp.send();
```

AJAX - Send a Request To a Server

Method	Description
open(*method, url, async*)	Specifies the type of request *method*: the type of request: GET or POST *url*: the server (file) location *async*: true (asynchronous) or false (synchronous)
send()	Sends the request to the server (used for GET)
send(*string*)	Sends the request to the server (used for POST)

GET or POST?

- GET is simpler and faster than POST, and can be used in most cases.
- However, always use POST requests when:
- A cached file is not an option (update a file or database on the server).
- Sending a large amount of data to the server (POST has no size limitations).
- Sending user input (which can contain unknown characters), POST is more robust and secure than GET.

The onreadystatechange Property

- The ready State property holds the status of the XMLHttpRequest.
- The onreadystatechange property defines a function to be executed when the readyState changes.
- The status property and the statusText property holds the status of the XMLHttpRequest object.

The onreadystatechange Property

Property	Description
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Why to Learn AJAX?

- AJAX stands for **A**synchronous **Ja**vaScript and **X**ML. AJAX is a new technique for creating better, faster, and more interactive web applications with the help of XML, HTML, CSS, and Java Script.
- Ajax uses XHTML for content, CSS for presentation, along with Document Object Model and JavaScript for dynamic content display.

Why to Learn AJAX?

- Conventional web applications transmit information to and from the server using synchronous requests. It means you fill out a form, hit submit, and get directed to a new page with new information from the server.

Why to Learn AJAX?

- With AJAX, when you hit submit, JavaScript will make a request to the server, interpret the results, and update the current screen. In the purest sense, the user would never know that anything was even transmitted to the server.
- XML is commonly used as the format for receiving server data, although any format, including plain text, can be used.

Why to Learn AJAX?

- AJAX is a web browser technology independent of web server software.
- A user can continue to use the application while the client program requests information from the server in the background.
- Intuitive and natural user interaction. Clicking is not required, mouse movement is a sufficient event trigger.
- Data-driven as opposed to page-driven.

Rich Internet Application Technology

AJAX is the most viable Rich Internet Application (RIA) technology so far. It is getting tremendous industry momentum and several tool kit and frameworks are emerging.

AJAX Technology

- 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 Technology

- 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 by JavaScript

AJAX Technology

XMLHttpRequest

- JavaScript object that performs asynchronous interaction with the server.

Few Issues that AJAX Currently Suffers From

- 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.

Few Issues that AJAX Currently Suffers From

- AJAX-based applications can be difficult to debug, test, and maintain
- JavaScript is hard to test - automatic testing is hard.
- Weak modularity in JavaScript.
- Lack of design patterns or best practice guidelines yet.

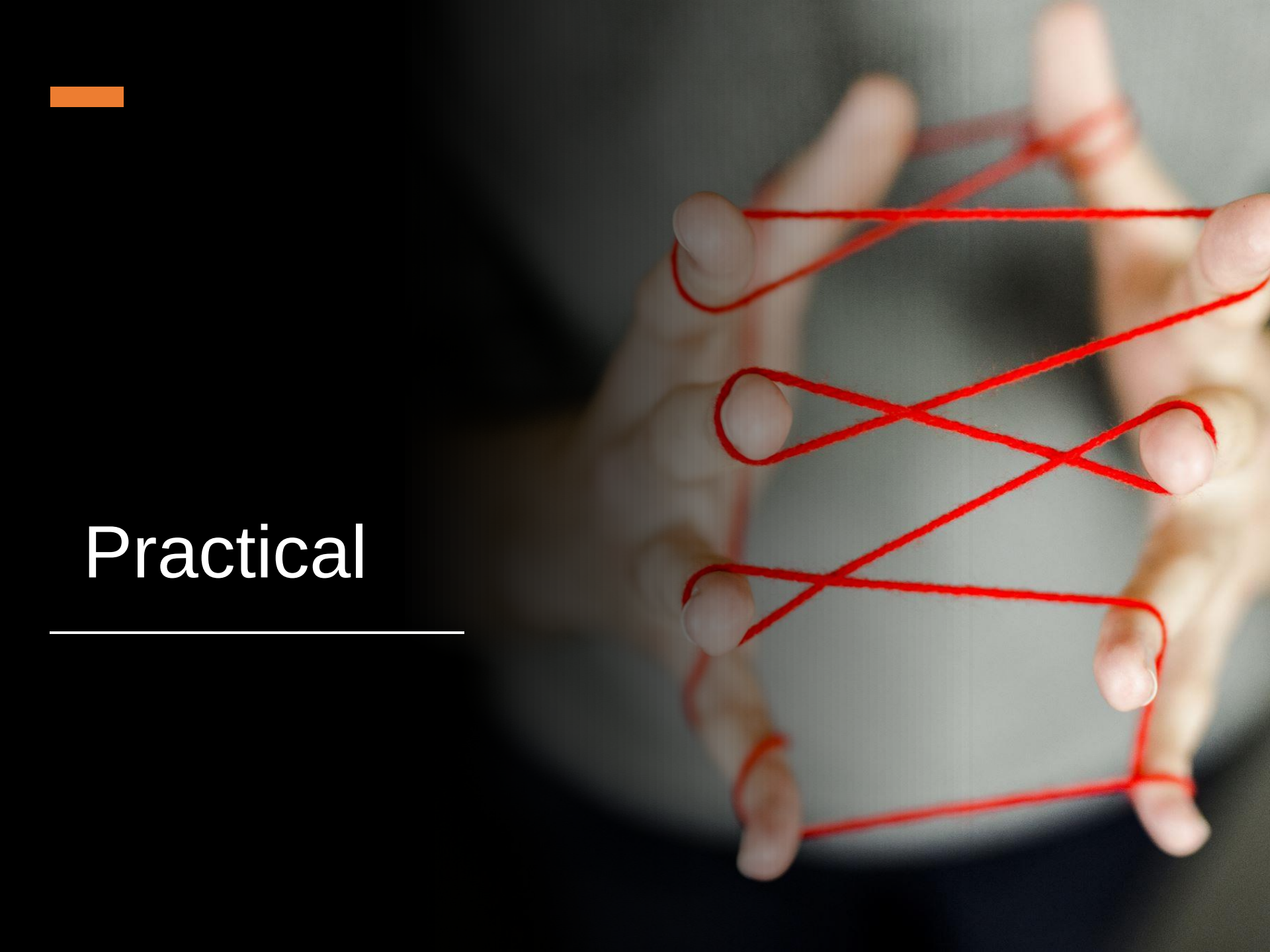
Few Issues that AJAX Currently Suffers From

- Toolkits/Frameworks are not mature yet
- Most of them are in beta phase.
- No standardization of the XMLHttpRequest yet
- No support of XMLHttpRequest in old browsers

Few Issues that AJAX Currently Suffers From

- JavaScript technology dependency and incompatibility
- Must be enabled for applications to function.
- Still some browser incompatibilities exist.
- JavaScript code is visible to a hacker
- Poorly designed JavaScript code can invite security problems.

Practical



That’s all for now…