Chapter Five
Using Ajax Technology in web page

1. What is Ajax?
2. Understanding Synchronous vs Asynchronous
3. AJAX Technologies
4. Understanding XMLHttpRequest
5. How AJAX works?
6. Ajax Example
7. Bootstrap

1. What is Ajax?

- AJAX is a technique for send and receive data from server without reloading the page.
- AJAX stands for Asynchronous JavaScript And XML.
- You can update a part of webpage using AJAX.
- It is not a programming language.
- The main purpose of using AJAX is to avoid page reload and do multiple work on a same page.
- AJAX allows you to send only important information to the server not the entire page. So only valuable data from the client side is routed to the server side. It makes your application interactive and faster.
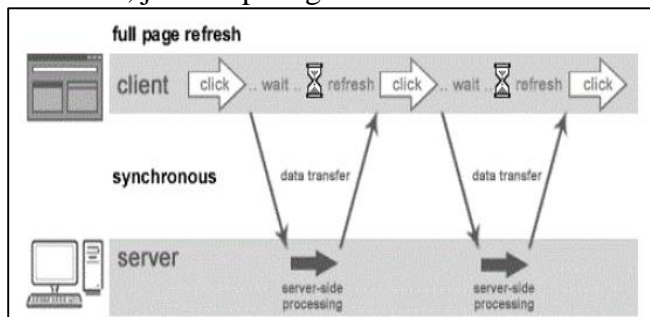
Where it is used?
There are too many web applications running on the web that are using ajax technology like gmail, facebook,twitter, google map, youtube etc.

2. Understanding Synchronous vs Asynchronous
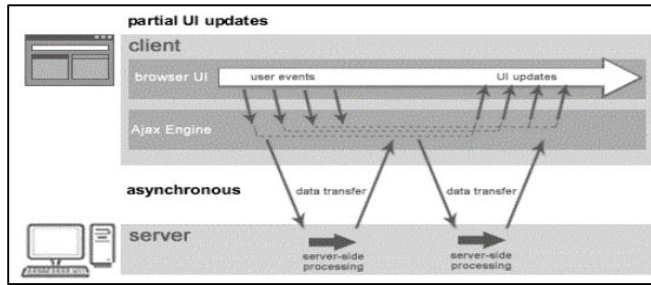
Synchronous (Classic Web-Application Model)
A synchronous request blocks the client until operation completes i.e. browser is unresponsive. In such case, javascript engine of the browser is blocked.

As you can see in the above image, full page is refreshed at request time and user is blocked until request completes.

Asynchronous (AJAX Web-Application Model)
An asynchronous request doesn't block the client i.e. browser is responsive. At that time, user can perform another operations also. In such case, javascript engine of the browser is not blocked.

As you can see in the above image, full page is not refreshed at request time and user gets response from the ajax engine.

3. AJAX Technologies

Ajax is not a technology but group of inter-related technologies. Ajax technologies includes:

- HTML/XHTML and CSS (used for displaying content and style. It is mainly used for presentation)
- DOM (It is used for dynamic display and interaction with data)
- XML or JSON (For carrying data to and from server)
- XMLHttpRequest (For asynchronous communication between client and server)
- JavaScript

4. Understanding XMLHttpRequest

1. XMLHttpRequest
2. Properties of XMLHttpRequest
3. Methods of XMLHttpRequest

An object of XMLHttpRequest is used for asynchronous communication between client and server. It performs following operations:

1. Sends data from the client in the background
2. Receives the data from the server
3. Updates the webpage without reloading it.
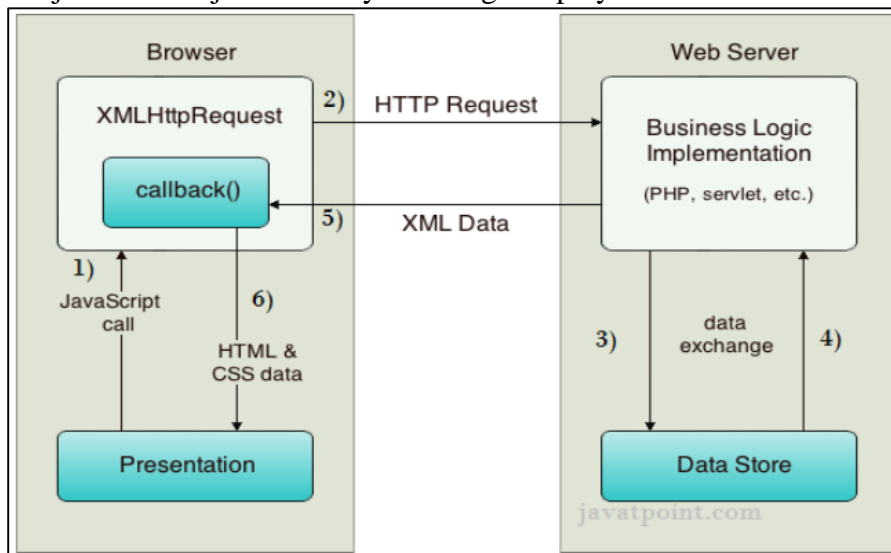
Properties of XMLHttpRequest object

Property	Description
onReadyStateChange	It is called whenever readystate attribute changes. It must not be used with synchronous requests.
readyState	represents the state of the request. It ranges from 0 to 4.
	0 UNOPENED open() is not called.
	1 OPENED open is called but send() is not called.
	2 HEADERS_RECEIVED send() is called, and headers and status are available.
	3 LOADING Downloading data; responseText holds the data.
	4 DONE The operation is completed fully.
reponseText	returns response as text.
responseXML	returns response as XML

Methods of XMLHttpRequest object

Method	Description
void open(method, URL)	opens the request specifying get or post method and url.
void open(method, URL, async)	same as above but specifies asynchronous or not.
void open(method, URL, async, username, password)	same as above but specifies username and password.
void send()	sends get request.
void send(string)	send post request.
setRequestHeader(header,value)	it adds request headers.

5. How AJAX works?

AJAX communicates with the server using XMLHttpRequest object. Let's try to understand the flow of ajax or how ajax works by the image displayed below.

As you can see in the above example, XMLHttpRequest object plays a important role.

- User sends a request from the UI and a javascript call goes to XMLHttpRequest object.
- HTTP Request is sent to the server by XMLHttpRequest object.
- Server interacts with the database using JSP, PHP, Servlet, ASP.net etc.
- Data is retrieved.
- Server sends XML data or JSON data to the XMLHttpRequest callback function.
- HTML and CSS data is displayed on the browser.

6. Ajax Example
ajax_info.txt

```
<h1>AJAX</h1>
<p>AJAX is not a programming language.</p>
<p>AJAX is a technique for accessing web servers from a web page.</p>
<p>AJAX stands for Asynchronous JavaScript And XML.</p>
```

Ajax.html

```
<html>
<body>
<div id="demo">
<h1>The XMLHttpRequest Object</h1>
<button type="button" onclick="loadDoc()">Change Content</button>
</div>
<script>
```

```
function loadDoc() {
  var xhttp = new XMLHttpRequest();
  xhttp.onreadystatechange = function() {
    if (this.readyState == 4 && this.status == 200) {
      document.getElementById("demo").innerHTML=this.responseText;
    }
  };
  xhttp.open("GET", "ajax_info.txt", true);
  xhttp.send();
}
</script>
</body>
</html>
```

----

data.js

```
<script>
for( i=1;i<=10;i++)
document.write(i+"<br>");
</script>
```

Ajaxload.html

```
<html>
<head>
<title>jQuery load() Demo</title>
<script src="jquery.min.js"></script>
<script>
$(document).ready(function(){
    $("button").click(function(){
        $("#box").load("data.js");
    });
});
</script>
</head>
<body>
<div id="box">
<h2>Click button to load new content inside DIV box</h2>
 </div>
 <button type="button">Load Content</button>
</body>
</html>
```

Dropdownajax.html

```
<html>
<head>
    <script src="jquery.min.js"></script>
</head>
<body>
 <p>
    <input type="button" value="Fill SELECT Dropdown List with JSON" id="bt" />
    </p>
    <select id="sel">
        <option value="">-- Select --</option>
    </select>

    <p id="msg"></p>
</body>
<script>
    $(document).ready(function () {
        $('#bt').click(function () {

            var url = "sample.json";
            $.getJSON(url, function (data) {
                $.each(data, function (index, value) {
                    // APPEND OR INSERT DATA TO SELECT ELEMENT.
```

```
              $('#sel').append('<option value="' + value.ID + '">' + value.Name
                  + '</option>');
          });
      });
  });

      // SHOW SELECTED VALUE.
      $('#sel').change(function () {
        $('#msg').text('Selected Item:'+this.options[this.selectedIndex].text);
      });
  });
</script>
</html>
```

----

sample.json

```
[
    {
        "ID": "001",
        "Name": "United States"
        },
    {
        "ID": "002",
        "Name": "Canada"
        },
    {
        "ID": "003",
        "Name": "Mexico"
        },
    {
        "ID": "004",
        "Name": "Russia"
        },
    {
        "ID": "005",
        "Name": "China"
        }
]
```

----

jQuery ajax() Method
The jQuery ajax() method provides core functionality of Ajax in jQuery. It sends asynchronous
HTTP requests to the server.
Syntax: $.ajax(url);

```
<!DOCTYPE html>
<html lang="en">
<head>
  <title>Bootstrap Example</title>
   <script src="bootstrap-3.4.1-dist/bootstrap-3.4.1-dist/js/jquery.min.js"></script>
  </head>
  <script>
    $(document).ready(function(){
      $("button").click(function(){
        $.ajax({url: "demo_test_get.txt", success: function(result){
          $("#div1").html(result);
      }});
    });
  });
    </script>
    </head>
    <body>
     <div id="div1"><h2>Let jQuery AJAX Change This Text</h2></div>
    <button>Get External Content</button></body></html>
```

7. Bootstrap

1). What is Bootstrap?

- o Bootstrap is the most popular HTML, CSS and JavaScript framework for developing a responsive and mobile friendly website.
- o It is absolutely free to download and use.
- o It is a front-end framework used for easier and faster web development.
- o It includes HTML and CSS based design templates for typography, forms, buttons, tables, navigation, modals, image carousels and many others.
- o It can also use JavaScript plug-ins.
- o It facilitates you to create responsive designs.

2). Why use Bootstrap?

Following are the main advantage of Bootstrap:

- It is very easy to use. Anybody having basic knowledge of HTML and CSS can use Bootstrap.
- It facilitates users to develop a responsive website.
- A website is called responsive website which can automatically adjust itself to look good on all devices, from smart phones to desktops etc.
- It is compatible on most of browsers like Chrome, Firefox, Internet Explorer, Safari and Opera etc.

3). What Bootstrap package contains

Scaffolding: Bootstrap provides a basic structure with Grid System, link styles, and background.

CSS: Bootstrap comes with the feature of global CSS settings, fundamental HTML elements style and an advanced grid system.

Components: Bootstrap contains a lot of reusable components built to provide iconography, dropdowns, navigation, alerts, pop-overs, and much more.

JavaScript Plugins: Bootstrap also contains a lot of custom jQuery plugins. You can easily include them all, or one by one.

Download Bootstrap : `https://getbootstrap.com/docs/3.4/getting-started/`

Select : Download Bootstrap

4). Bootstrap Example
button.html

```
<!DOCTYPE html>
<html lang="en">
 <head>
  <title>Job</title>
   <link rel="stylesheet" href="file:///C:/bootstrap/css/bootstrap.min.css"/>
  </head>
  <body>
    <h1>Button Example!</h1>
<button class="btn btn-default">default</button>
<button class="btn btn-primary">primary</button>
<button class="btn btn-danger">danger</button>
<button class="btn btn-success">success</button>
<button class="btn btn-info">info</button>
<button class="btn btn-warning">warning</button>
<button class="btn btn-link">Link</button>
</body>
</html>
```
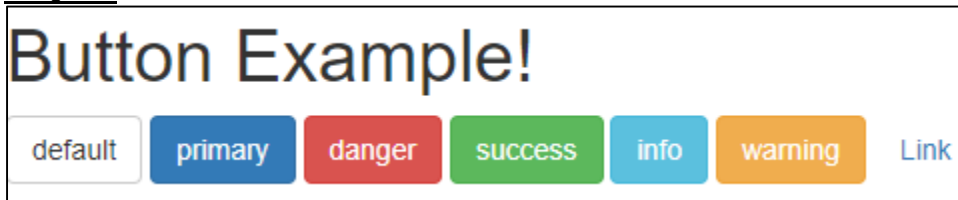
Output:

Bootstrap Grid Example

BootstrapGrid.html

```
<!DOCTYPE html>
<html lang="en">
<head>
  <title>Bootstrap Example</title>
  <link rel="stylesheet" href="file:///C:/bootstrap/css/bootstrap.min.css"/>
 </head>
<body>
<div class="container-fluid">
  <h2>Three equal-width columns</h2>
  <div class="row">
    <div class="col" style="background-color:lavender;">.col</div>
    <div class="col" style="background-color:orange;">.col</div>
    <div class="col" style="background-color:lavender;">.col</div>
  </div>
</div>
</body>
</html>
```

Table Example
TableExample.html

```html
<!DOCTYPE html>
<html lang="en">
  <head>
   <title>Job</title>
   <link rel="stylesheet"
   <link rel="stylesheet" href="file:///C:/bootstrap/css/bootstrap.min.css"/>
  </head>
  <body>
<div class="container">
   <h1>Bordered Table Example</h1>
<table class="table table-striped table-bordered">
   <tr><th>Id</th><th>Name</th><th>Age</th></tr>
   <tr><td>101</td><td>Rahul</td><td>23</td></tr>
   <tr><td>102</td><td>Umesh</td><td>22</td></tr>
   <tr><td>103</td><td>Max</td><td>29</td></tr>
   <tr><td>104</td><td>Ajeet</td><td>21</td></tr>
</table>
</div>
</body>
</html>
```
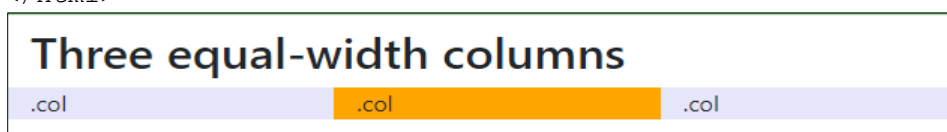
Bordered Table Example

Id	Name	Age
101	Rahul	23
102	Umesh	22
103	Max	29
104	Ajeet	21

Form Example
FormExample.html

```html
<!DOCTYPE html>
<html lang="en">
  <head>
   <title>Bootstrap example</title>
   <link rel="stylesheet"
     <link rel="stylesheet" href="file:///C:/bootstrap/css/bootstrap.min.css"/>
  </head>
  <body>
<div class="container">
   <h1>Vertical Form Example</h1>
<form style="width:300px">
   <div class="form-group">
     <label for="exampleInputEmail1">Email address</label>
     <input type="email" class="form-control" id="exampleInputEmail1"
        placeholder="Email">
   </div>
   <div class="form-group">
     <label for="exampleInputPassword1">Password</label>
     <input type="password" class="form-control" id="exampleInputPassword1"
        placeholder="Password">
   </div>
   <button type="submit" class="btn btn-default">Login</button>
 </form>
 </div>
 </body>
 </html>
```

Vertical Form Example

Email address

[Email]

Password

[Password]

[Login]

Bootstrap Pagination Example

PaginationExample.html

```
<html lang="en">
<head>
  <title>Bootstrap Example</title>
    <link rel="stylesheet" href="file:///C:/bootstrap/css/bootstrap.min.css"/>
</head>
<body>
<div class="container">
  <h2>A basic pagination example:</h2>
  <p>The .pagination class provides pagination links:</p>
  <ul class="pagination">
    <li><a href="#">1</a></li>
    <li><a href="#">2</a></li>
    <li><a href="#">3</a></li>
    <li><a href="#">4</a></li>
    <li><a href="#">5</a></li>
  </ul>
</div>
</body>
</html>
```

A basic pagination example:

The .pagination class provides pagination links:

| 1 | 2 | 3 | 4 | 5 |

BootStrap Dropdown Example

DropdownExample.html

```
<!DOCTYPE html>
<html>
<head>
 <meta name="viewport" content="width=device-width, initial-scale=1">
 <link rel="stylesheet"
  href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.6/css/bootstrap.min.css">
</head>
<body>
<div class="container">
  <h2>Dropdowns</h2>
  <p>The .dropdown class is used to indicate a dropdown menu.</p>
  <div class="dropdown">
  <button class="btn btn-primary dropdown-toggle"type="button"
      data-toggle="dropdown">Dropdown Example
    <span class="caret"></span></button>
    <ul class="dropdown-menu">
      <li><a href="#">HTML</a></li>
      <li><a href="#">CSS</a></li>
      <li><a href="#">JavaScript</a></li>
    </ul>
  </div>
</div>
<script src="https://ajax.googleapis.com/ajax/libs/jquery/1.12.0/jquery.min.js">
</script>
<script
src="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.6/js/bootstrap.min.js">
</script>
</body>
</html>
```

Dropdowns

The .dropdown class is used to indicate a dropdown menu.

Dropdown Example ▾

Modal

Use Bootstrap's JavaScript modal plugin to add dialogs to your site for lightboxes, user notifications, or completely custom content.

```
<!DOCTYPE html>
<html lang="en">
<head>
  <title>Bootstrap Example</title>
  <meta charset="utf-8">
  <meta name="viewport" content="width=device-width, initial-scale=1">
  <link rel="stylesheet" href="bootstrap-3.4.1-dist/bootstrap-3.4.1-
dist/css/bootstrap.min.css">
  <script src="bootstrap-3.4.1-dist/bootstrap-3.4.1-dist/js/jquery.min.js"></script>
  <script src="bootstrap-3.4.1-dist/bootstrap-3.4.1-dist/js/bootstrap.min.js"></script>
</head>
<body>

<div class="container">
  <h2>Modal Example</h2>
  <!-- Trigger the modal with a button -->
  <button type="button" class="btn btn-info btn-lg" data-toggle="modal" data-
target="#myModal">Open Modal</button>

  <!-- Modal -->
  <div class="modal fade" id="myModal" role="dialog">
    <div class="modal-dialog">

      <!-- Modal content-->
      <div class="modal-content">
        <div class="modal-header">
          <button type="button" class="close" data-dismiss="modal">&times;</button>
          <h4 class="modal-title">Modal Header</h4>
        </div>
        <div class="modal-body">
          <p>Some text in the modal.</p>
        </div>
        <div class="modal-footer">
          <button type="button" class="btn btn-default" data-dismiss="modal">Close
            </button>
        </div>
      </div>
    </div>
  </div>
</div>
</body>
</html>
```

To trigger the modal window, you need to use a button or a link.

Then include the two data-* attributes:

- data-toggle="modal" opens the modal window
- data-target="#myModal" points to the id of the modal

The "Modal" part:

The parent <div> of the modal must have an ID that is the same as the value of the data-target attribute used to trigger the modal ("myModal").

The **.modal class** identifies the content of <div> as a modal and brings focus to it.

The **.fade class** adds a transition effect which fades the modal in and out. Remove this class if you do not want this effect.

The attribute **role="dialog"** improves accessibility for people using screen readers.

The **.modal-dialog** class sets the proper width and margin of the modal.

The "Modal content" part:

The <div> with **class="modal-content"** styles the modal (border, background-color, etc.). Inside this <div>, add the modal's header, body, and footer.

The **.modal-header** class is used to define the style for the header of the modal. The <button> inside the header has a **data-dismiss="modal"** attribute which closes the modal if you click on it.
The **.close** class styles the close button, and the .modal-title class styles the header with a proper line-height.

The **.modal-body** class is used to define the style for the body of the modal. Add any HTML markup here; paragraphs, images, videos, etc.

The **.modal-footer** class is used to define the style for the footer of the modal. Note that this area is right aligned by default.

Navigation Bars
A navigation bar is a navigation header that is placed at the top of the page:

```
<!DOCTYPE html>
<html lang="en">
<head>
  <title>Bootstrap Example</title>
  <meta charset="utf-8">
  <meta name="viewport" content="width=device-width, initial-scale=1">
  <link rel="stylesheet" href="bootstrap-3.4.1-dist/bootstrap-3.4.1-
dist/css/bootstrap.min.css">
  <script src="bootstrap-3.4.1-dist/bootstrap-3.4.1-dist/js/jquery.min.js"></script>
  <script src="bootstrap-3.4.1-dist/bootstrap-3.4.1-dist/js/bootstrap.min.js"></script>
</head>
    <body>

        <nav class="navbar navbar-default">
          <div class="container-fluid">
            <div class="navbar-header">
              <a class="navbar-brand" href="#">True Hope</a>
            </div>
            <ul class="nav navbar-nav">
              <li class="active"><a href="#">HTML</a></li>
              <li><a href="#">CSS</a></li>
              <li><a href="#">JavaScript</a></li>
              <li><a href="#">Bootstrap</a></li>
            </ul>
          </div>
        </nav>

        <div class="container">
          <h3>Basic Navbar Example</h3>
          <p>A navigation bar is a navigation header that is placed at the top of the
page.</p>
        </div>
        </body>
        </html>
```