AJAX and jQuery AJAX

AJAX Concepts, XMLHttpRequest,
jQuery AJAX: $.ajax(), $.get(), $.post()

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Technical Trainers

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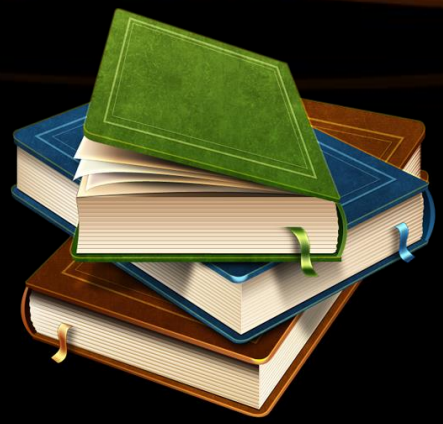


What is AJAX?

- AJAX == Asynchronous JavaScript And XML
  - Technique for background loading of dynamic content / data
  - Web pages / apps load data from the Web server and render it
- Two types of AJAX
  - **Partial page rendering**
    - Load HTML fragment + show it in a `<div>`
  - **JSON service**
    - Load JSON object and display it with JavaScript / jQuery

AJAX: Workflow

Web Client

1. HTTP request (initial page load)

2. HTTP response (HTML page)

UI Interaction

AJAX request

AJAX handler

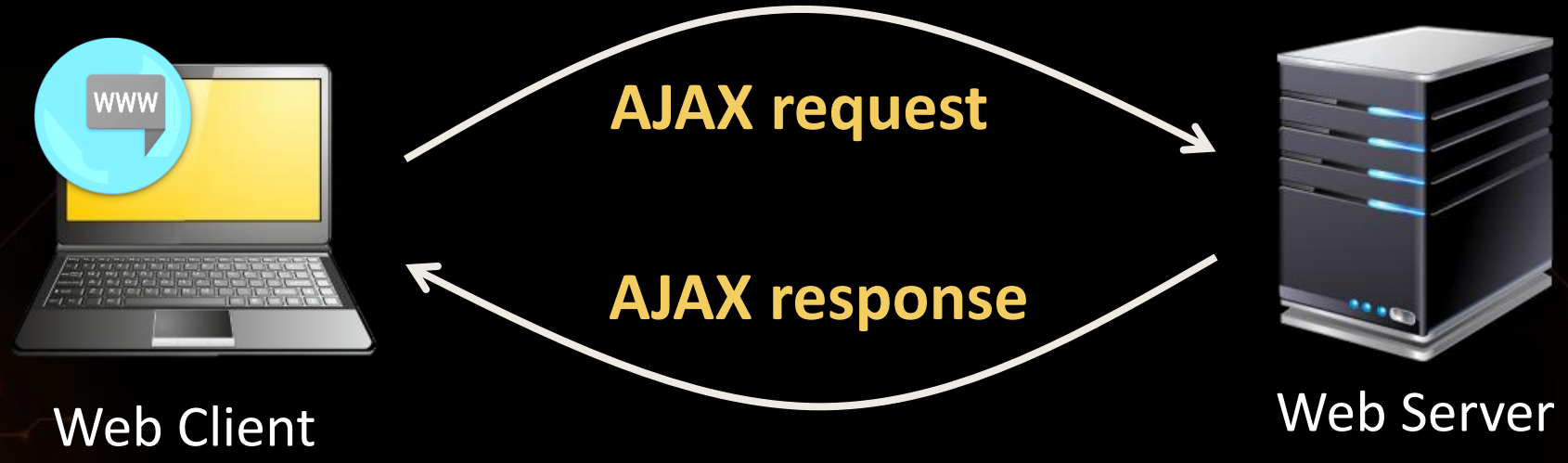
AJAX response (asynchronous)

Returns data as JSON / HTML

Modify the page DOM

Web Server

XMLHttpRequest



Using the XMLHttpRequest Object

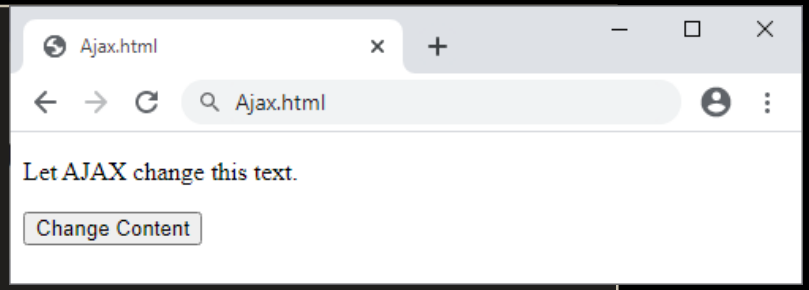
XMLHttpRequest – Standard API for AJAX

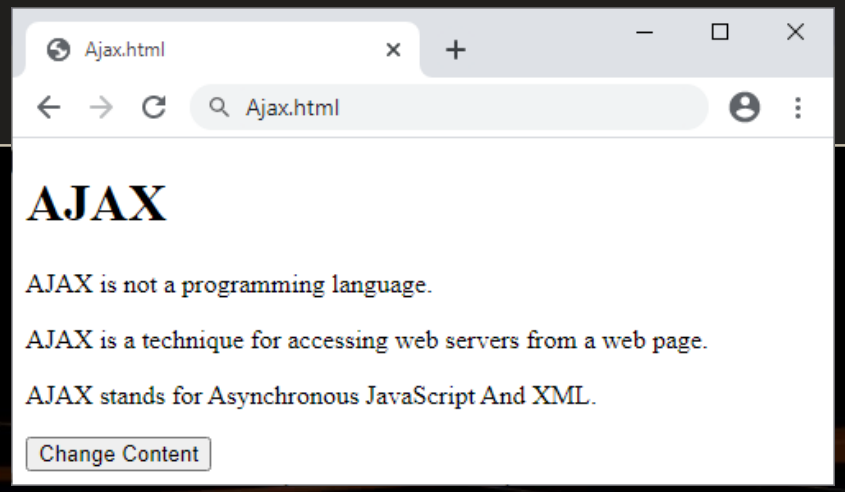
```
<p id="demo">Let AJAX change this text.</p>
<button type="button" onclick="loadDoc()">Change Content</button>
```

```
function loadDoc() {
  let req = new XMLHttpRequest();
  req.onreadystatechange = function() {
    if (this.readyState == 4 && this.status == 200)
      document.getElementById("demo").innerHTML =
        this.responseText; };
  req.open("GET","https://www.w3schools.com/js/ajax_info.txt", true);
  req.send();
}
```

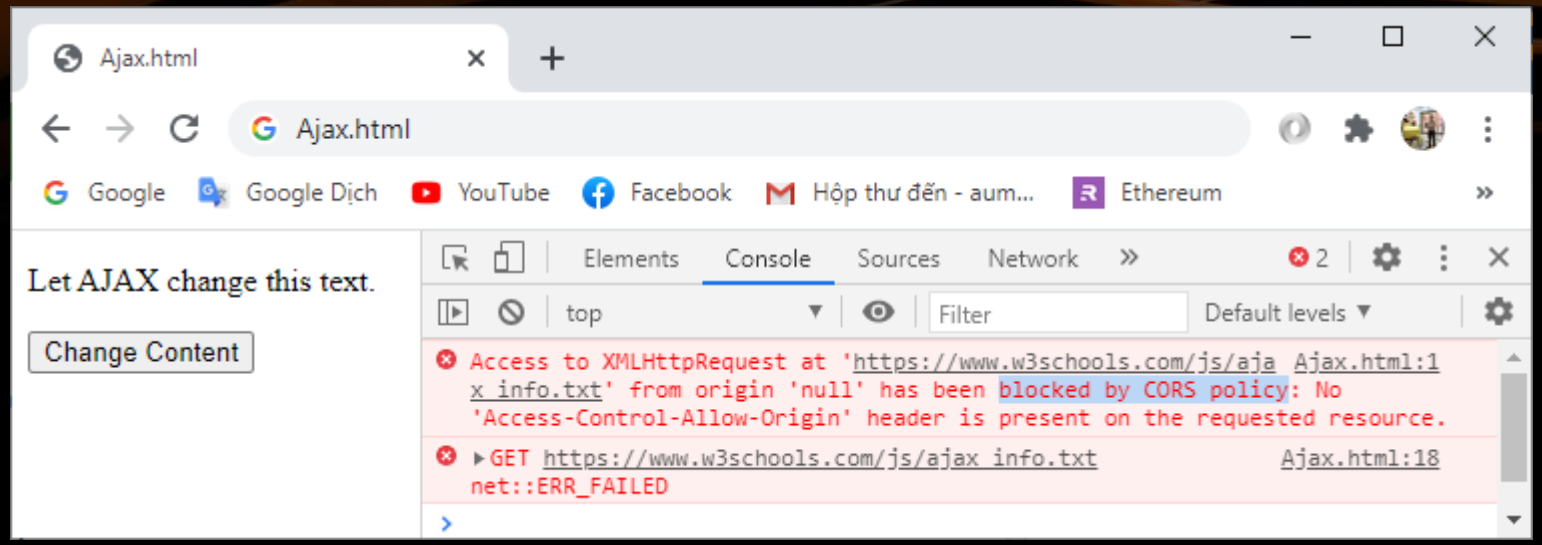
executed when the readyState changes

Server Response





XMLHttpRequest – blocked by CORS policy



How to fix?

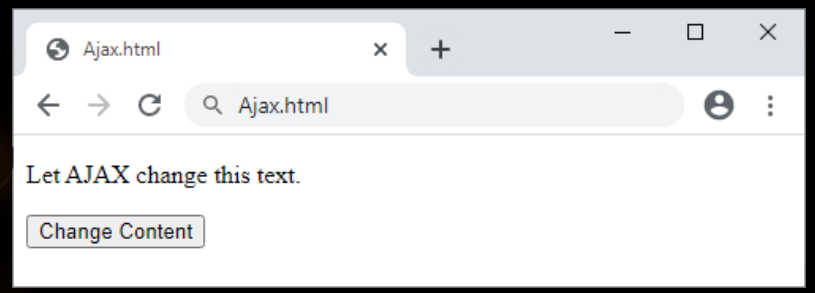
```
Window: "C:\Program Files (x86)\Google\Chrome\Application\chrome.exe" --disable-web-security --disable-gpu --user-data-dir=~/chromeTemp
```

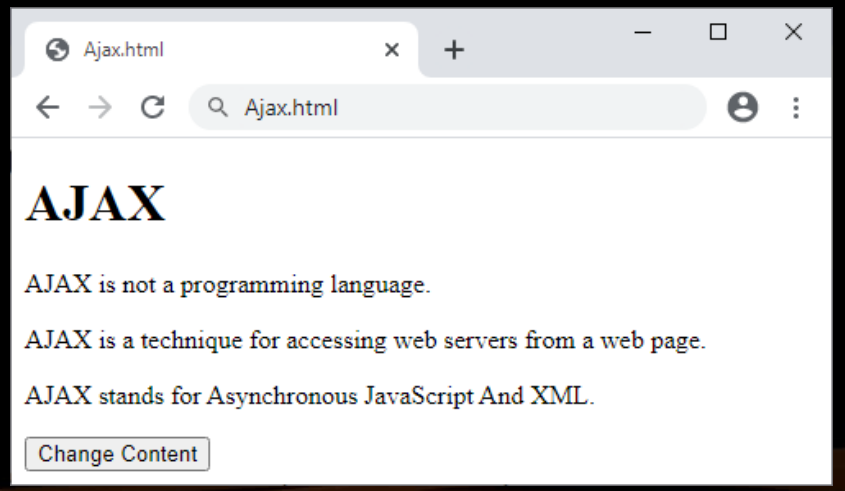
```
OSX: open -n -a /Applications/Google\ Chrome.app/Contents/MacOS/Google\ Chrome --args --user-data-dir="/tmp/chrome_dev_test" --disable-web-security
```

XMLHttpRequest – Synchronous Request

```
<p id="demo">Let AJAX change this text.</p>
<button type="button" onclick="loadDoc()">Change Content</button>
```

```
function loadDoc() {
  let req = new XMLHttpRequest();
  req.open("GET", "https://www.w3schools.com/js/ajax_info.txt", false);
  req.send();
}
```





AJAX XML Example (1)

```
function loadDoc() {
  var xhttp = new XMLHttpRequest();
  xhttp.onreadystatechange = function() {
    if (this.readyState == 4 && this.status == 200) {
      myFunction(this);
    }
  };
  xhttp.open("GET", "https://www.w3schools.com/js/cd_catalog.xml", true);
  xhttp.send();
}
```

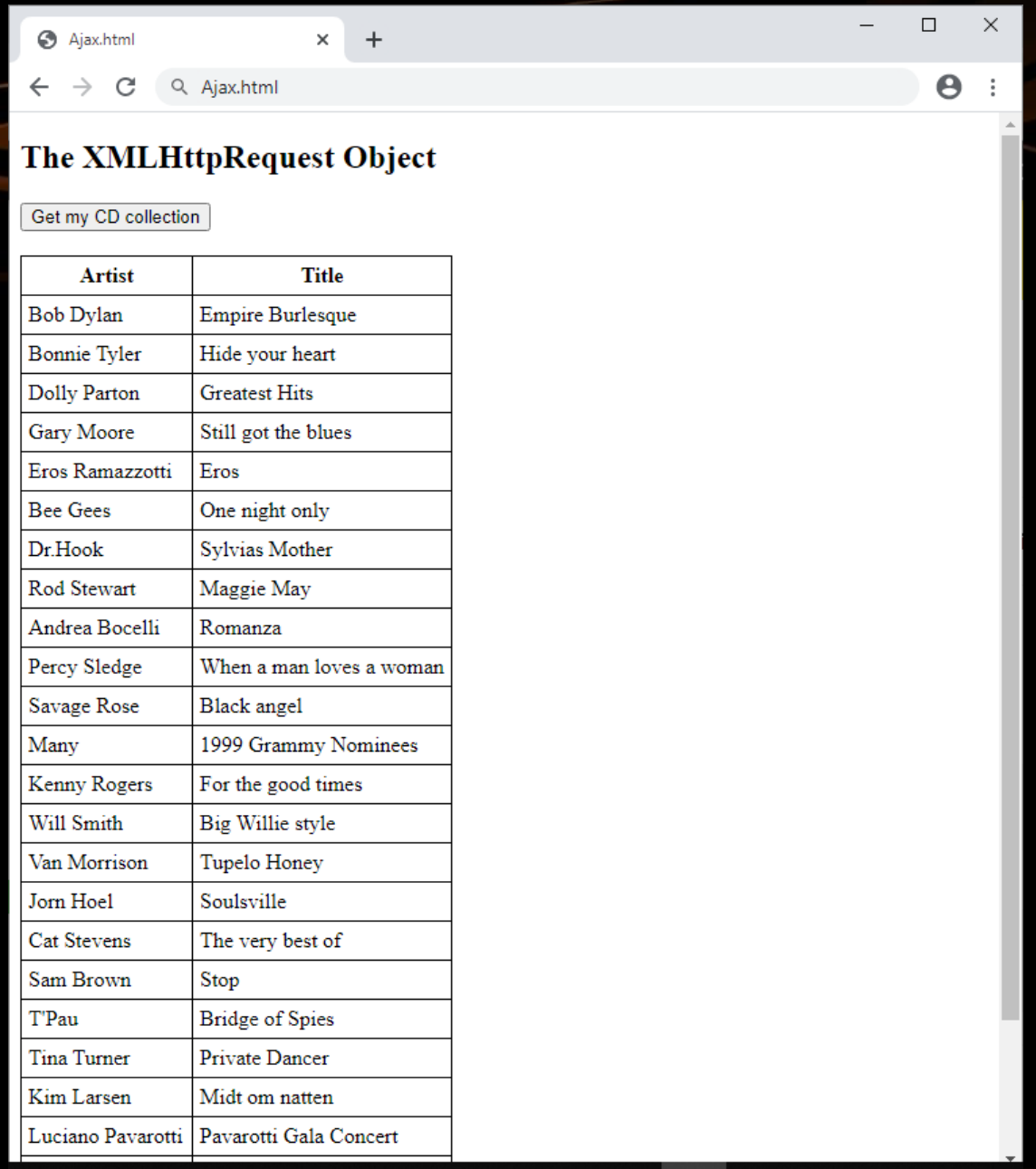
AJAX XML Example (2)

```
function myFunction(xml) {
  var i;
  var xmlDoc = xml.responseXML;
  var table="<tr><th>Artist</th><th>Title</th></tr>";
  var x = xmlDoc.getElementsByTagName("CD");
  for (i = 0; i <x.length; i++) {
    table += "<tr><td>" +
    x[i].getElementsByTagName("ARTIST")[0].childNodes[0].nodeValue +
    "</td><td>" +
    x[i].getElementsByTagName("TITLE")[0].childNodes[0].nodeValue +
    "</td></tr>";
  }
  document.getElementById("demo").innerHTML = table;
}
```

AJAX XML Example (3)

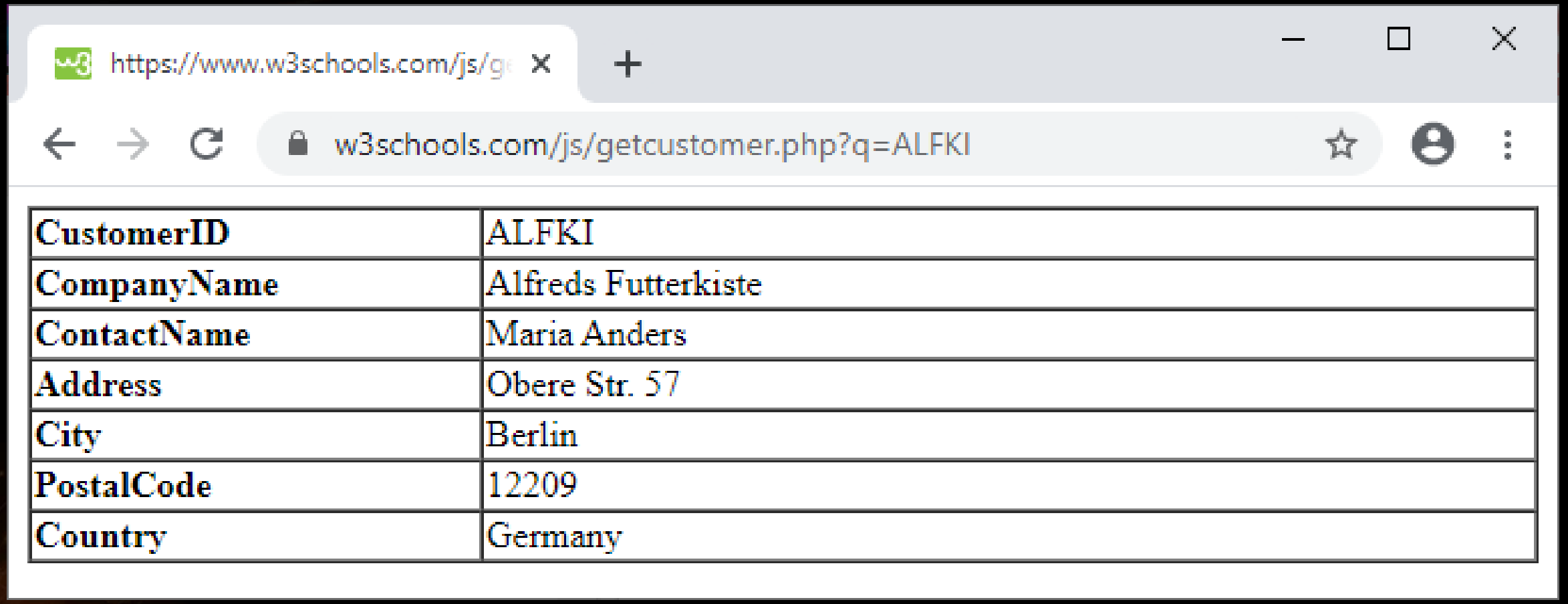
```
<h2>The XMLHttpRequest Object</h2>
<button type="button"
onclick="loadDoc()">Get my CD
collection</button><br><br>
<table id="demo"></table>
```

```
<style>
table,th,td {
  border : 1px solid black;
  border-collapse: collapse;
}
th,td {
  padding: 5px;
}
</style>
```



AJAX Database Example (1)

```
Link: https://www.w3schools.com/js/getcustomer.php?q=ALFKI
```



CustomerID	ALFKI
CompanyName	Alfreds Futterkiste
ContactName	Maria Anders
Address	Obere Str. 57
City	Berlin
PostalCode	12209
Country	Germany

AJAX Database Example (2)

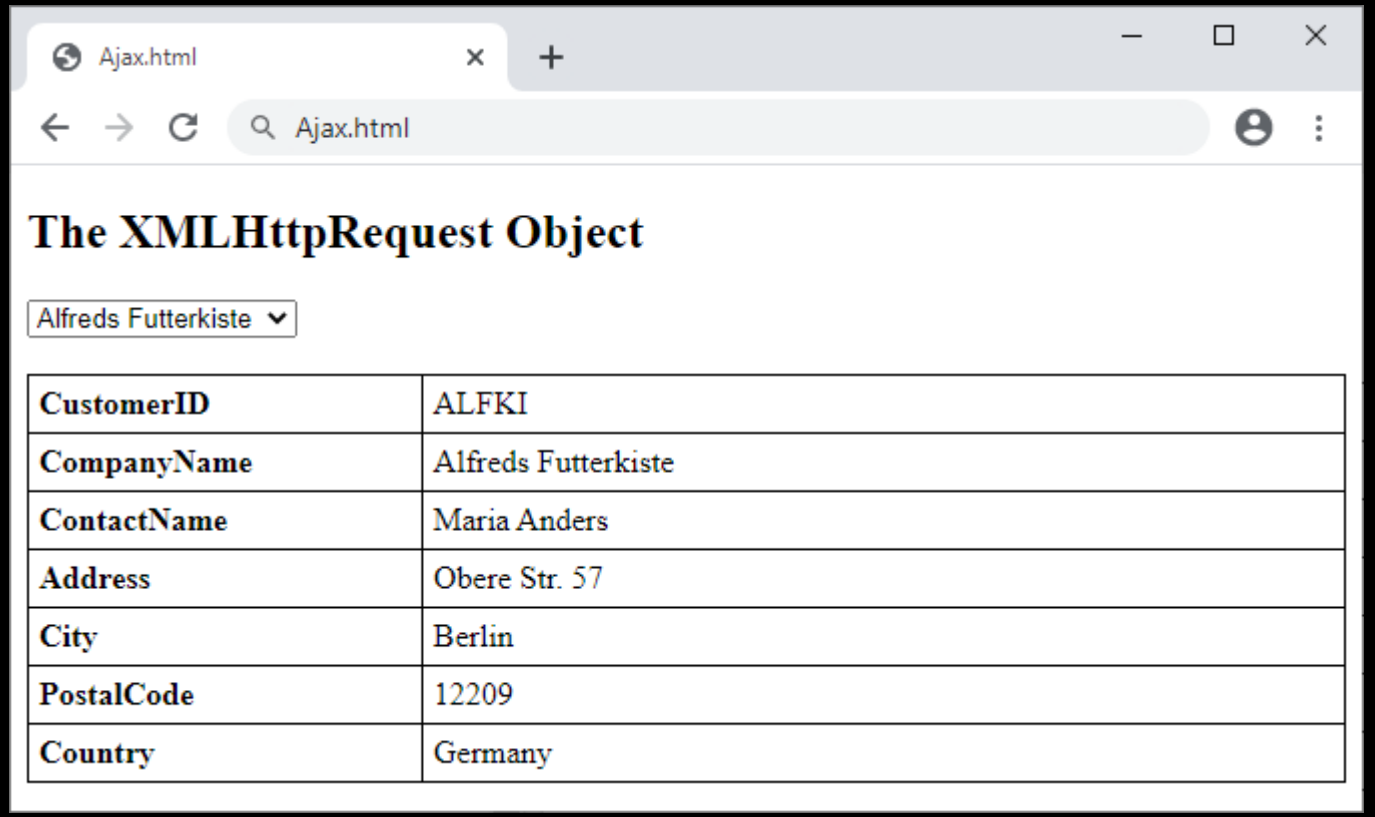
```
function showCustomer(str) {
  var xhttp;
  if (str == "") {
    document.getElementById("txtHint").innerHTML = "";
    return;
  }
  xhttp = new XMLHttpRequest();
  xhttp.onreadystatechange = function() {
    if (this.readyState == 4 && this.status == 200) {
      document.getElementById("txtHint").innerHTML = this.responseText;
    }
  };
  xhttp.open("GET", "https://www.w3schools.com/js/getcustomer.php?q="+str,
true);
  xhttp.send();
}
```

AJAX Database Example (3)

```
<h2>The XMLHttpRequest Object</h2>
<form action="">
  <select name="customers" onchange="showCustomer(this.value)">
    <option value="">Select a customer:</option>
    <option value="ALFKI">Alfreds Futterkiste</option>
    <option value="NORTS">North/South</option>
    <option value="WOLZA">Wolski Zajazd</option>
  </select>
</form>
<br>
<div id="txtHint">Customer info will be listed here...</div>
```

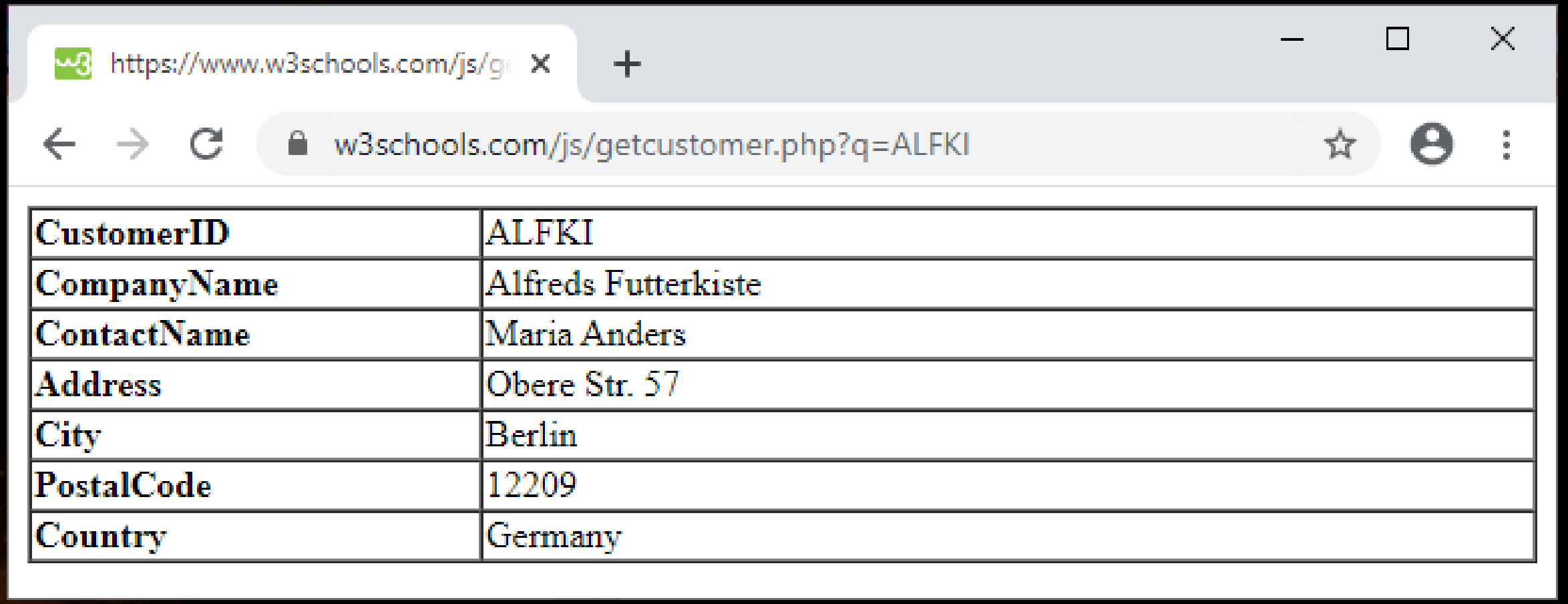
AJAX Database Example (4)

```
<style>
table,th,td {
  border : 1px solid black;
  border-collapse: collapse;
}
th,td {
  padding: 5px;
}
</style>
```



JQUERY AJAX Database Example (1)

Link: https://www.w3schools.com/js/getcustomer.php?q=ALFKI



CustomerID	ALFKI
CompanyName	Alfreds Futterkiste
ContactName	Maria Anders
Address	Obere Str. 57
City	Berlin
PostalCode	12209
Country	Germany

AJAX Database Example (2)

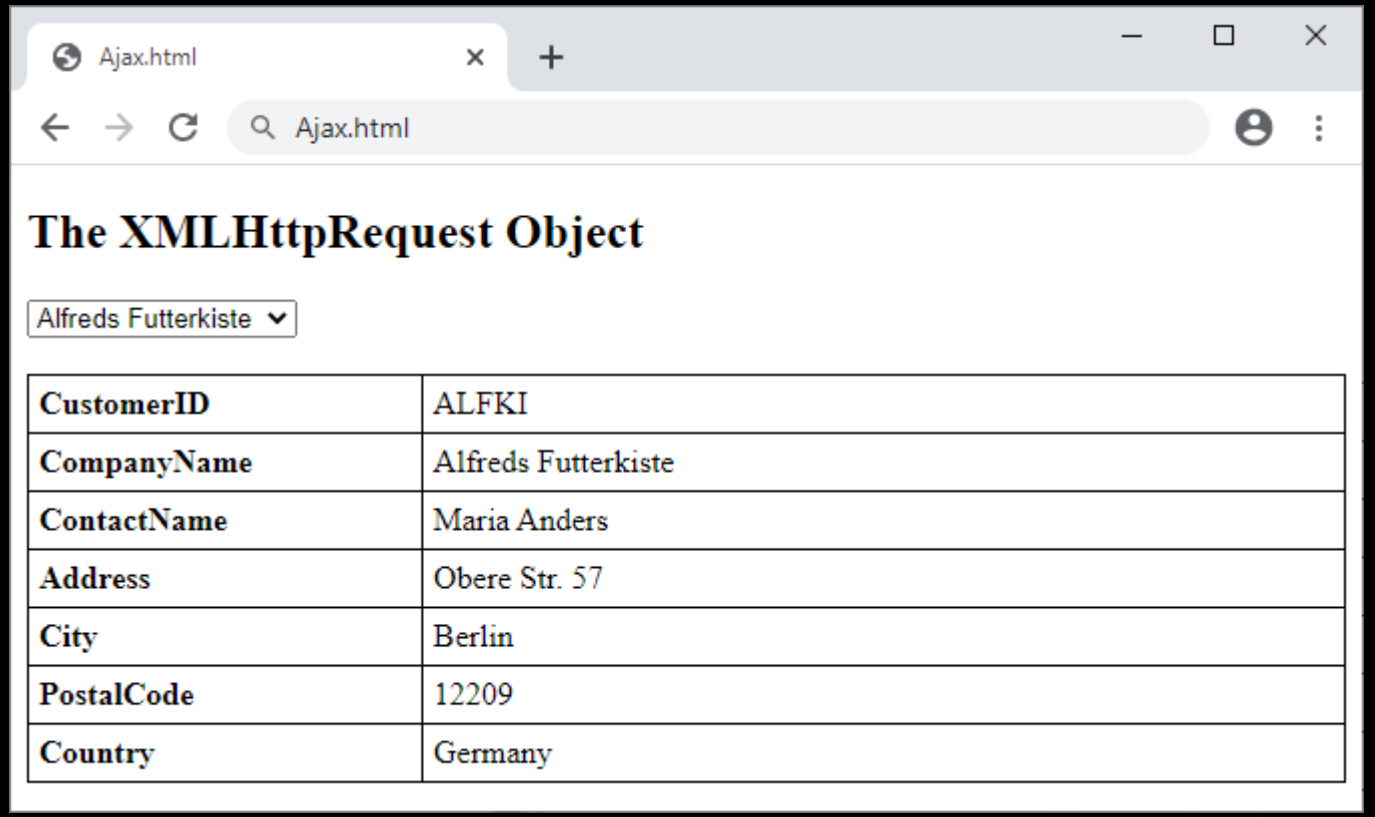
```
<script
src="https://ajax.googleapis.com/ajax/libs/jquery/3.5.1/jquery.min.js"></s
cript>
<script>
$(document).ready(function(){
  $("select").change(function(){
  console.log($(this).text())
    $.get("https://www.w3schools.com/js/getcustomer.php?q="+$(this).val(),
function(data, status){
      document.getElementById("txtHint").innerHTML = data;
    });
  });
});
</script>
```

AJAX Database Example (3)

```
<h2>The XMLHttpRequest Object</h2>
<form action="">
  <select name="customers" onchange="showCustomer(this.value)">
    <option value="">Select a customer:</option>
    <option value="ALFKI">Alfreds Futterkiste</option>
    <option value="NORTS">North/South</option>
    <option value="WOLZA">Wolski Zajazd</option>
  </select>
</form>
<br>
<div id="txtHint">Customer info will be listed here...</div>
```

AJAX Database Example (4)

```
<style>
table,th,td {
  border : 1px solid black;
  border-collapse: collapse;
}
th,td {
  padding: 5px;
}
</style>
```

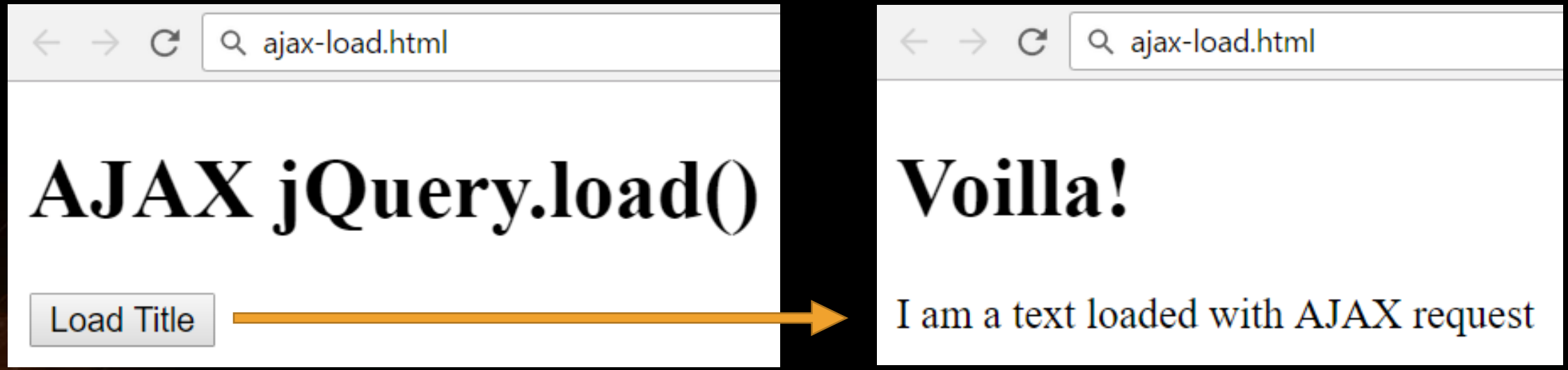


jQuery AJAX

Simplified AJAX Calls with jQuery

jQuery AJAX

- jQuery dramatically simplifies how developer make AJAX calls
- Problem: create a page holding a button
  - Clicking the button should load a html fragment and display it inside a **`div`**



Solution: jQuery.load()

ajax-load.html

```
<div id="text">
  <h1>AJAX jQuery.load()</h1>
  <button onclick="loadTitle()">Load Title</button>
</div>
```

ajax-load.js

```
function loadTitle() {
  $('#text').load("text.html");
}
```

text.html

```
<h1>Voilla!</h1>
<p>I am a text loaded
with AJAX request</p>
```

Handling Errors

- Scripts can execute AJAX requests
  - Either to their origin (same-origin policy)
  - Or when the remote server explicitly allows AJAX calls via CORS

Uses a special HTTP header:
Access-Control-Allow-Origin

```
$(document).ajaxError(function(event, req, settings) {
  $('#text').text(`Error loading data: ${req.status}
    (${req.statusText})`);
});
function loadTitle() {
  $('#text').load("http://dir.bg");
}
```

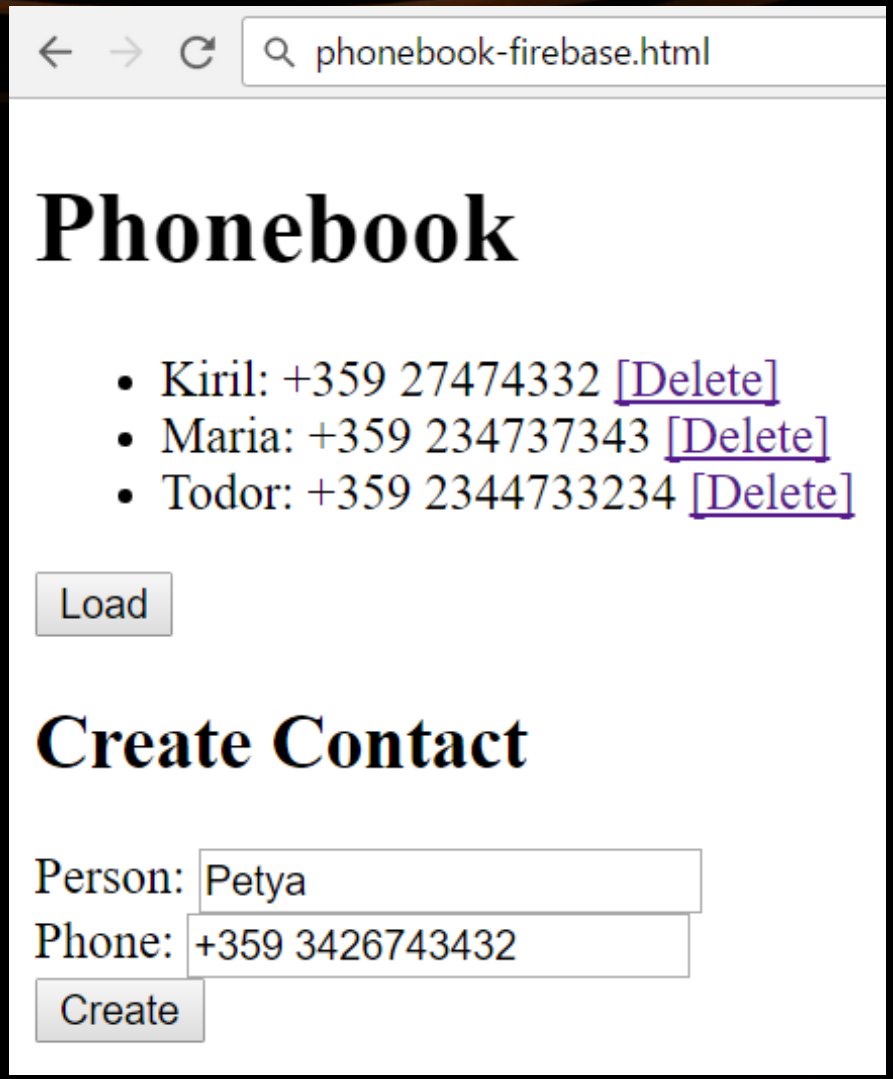
This cross-origin AJAX request will fail due to missing CORS headers

AJAX – Examples

Using jQuery to Access REST APIs

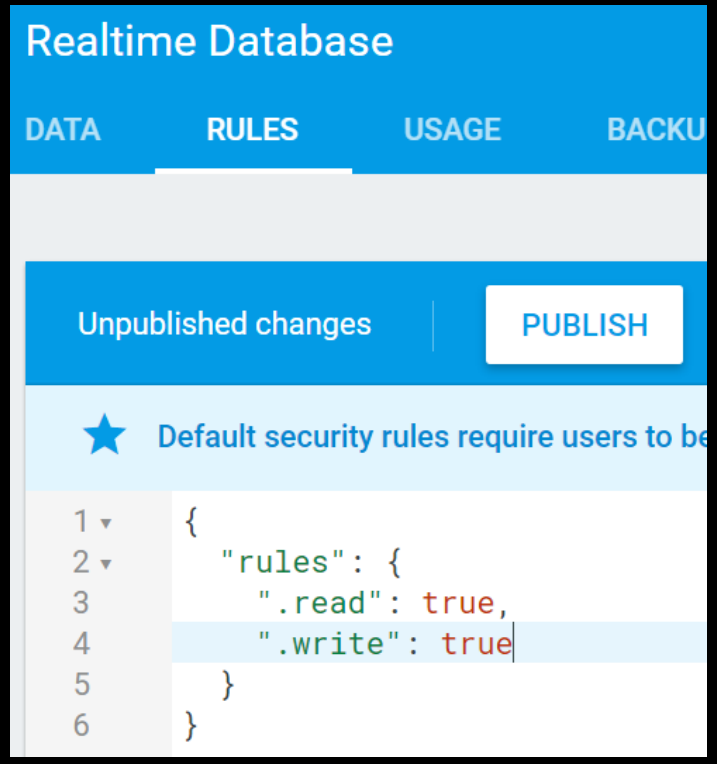
Problem: Phonebook App in Firebase

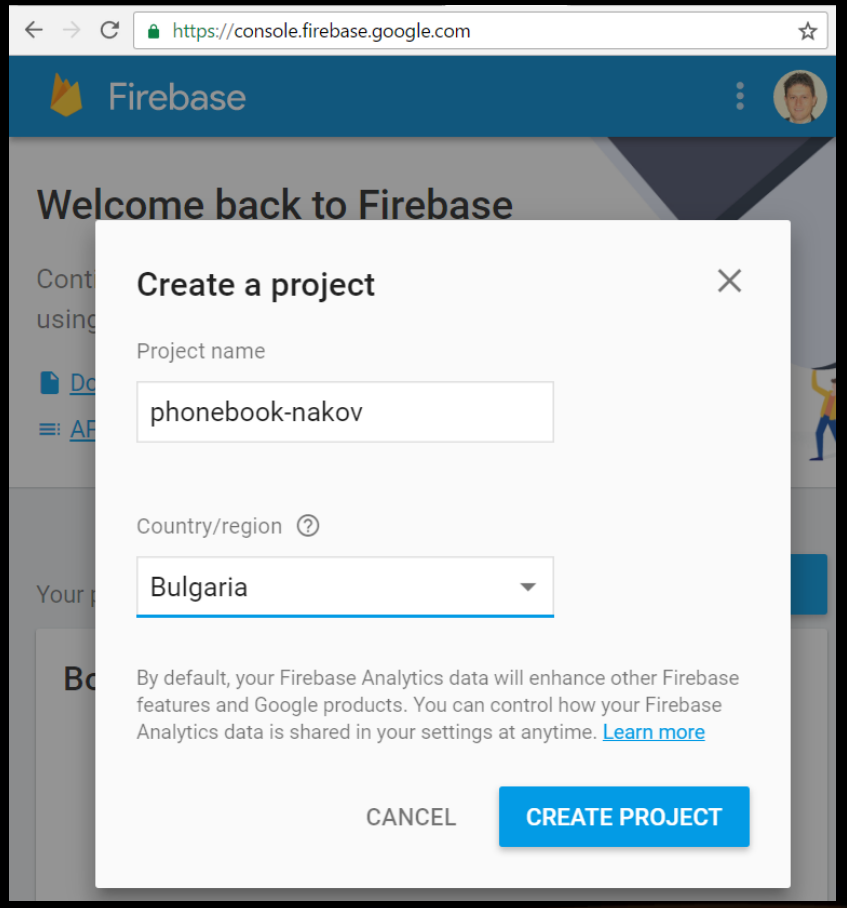
- Create a mini phonebook JS front-end app
  - Hold your data in Firebase
    - Disable the authentication to simplify your work
  - Implement "list phones", "add phone", "delete phone"



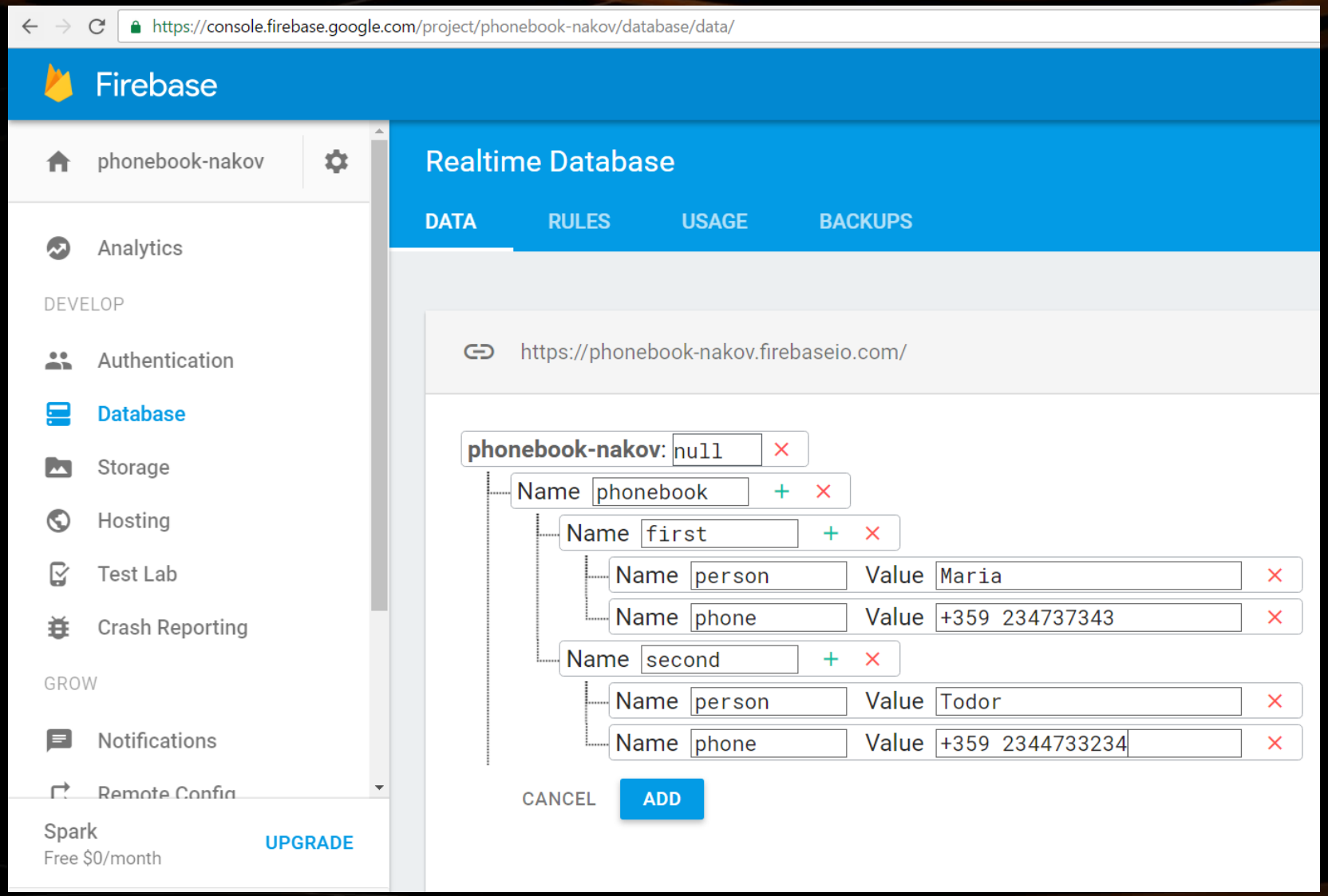
Solution: Setup a Firebase DB

- Open https://console.firebase.google.com/
- Create a new project
- Enable public read / write access

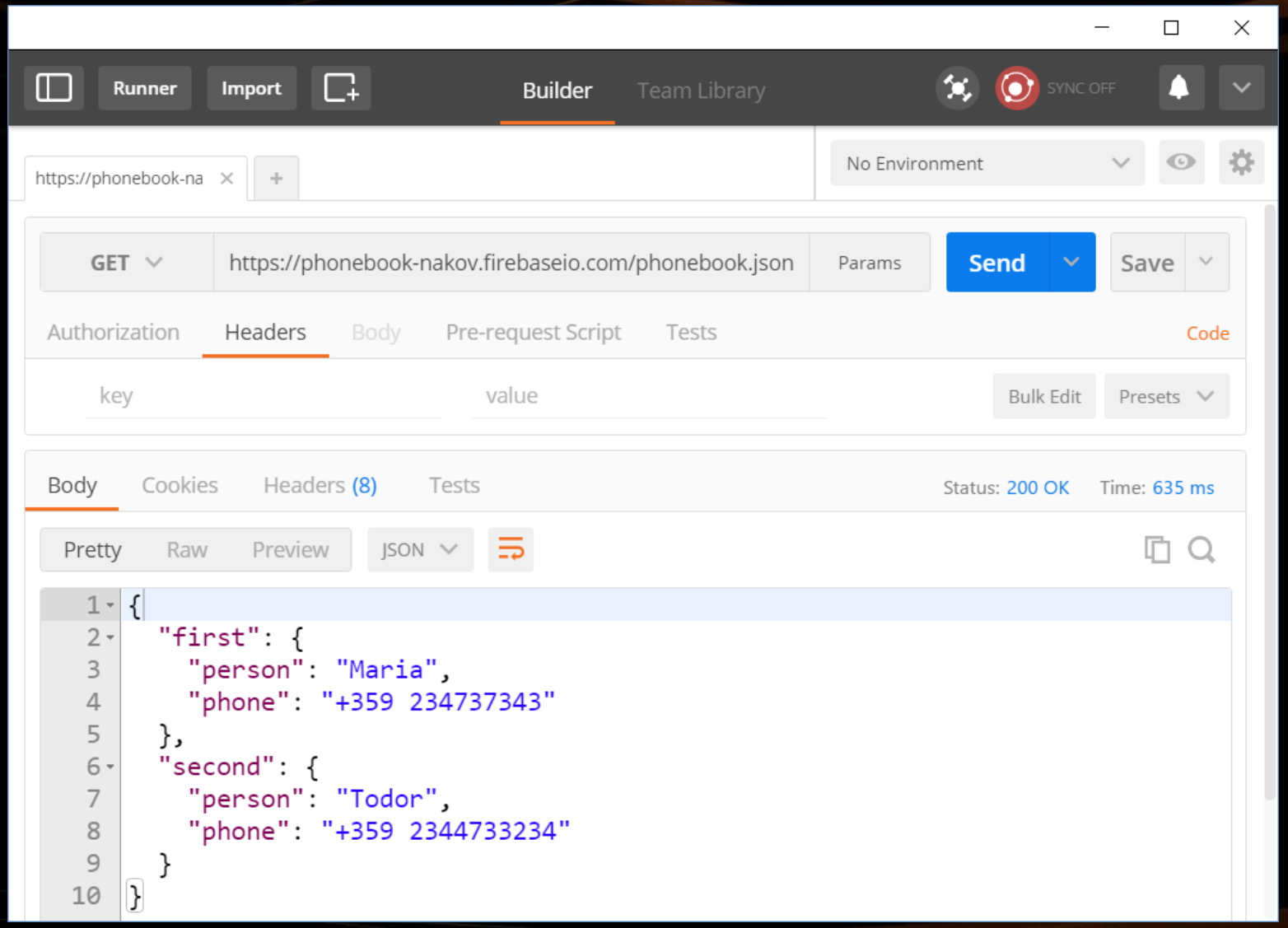




Solution: Add Sample Data in Firebase



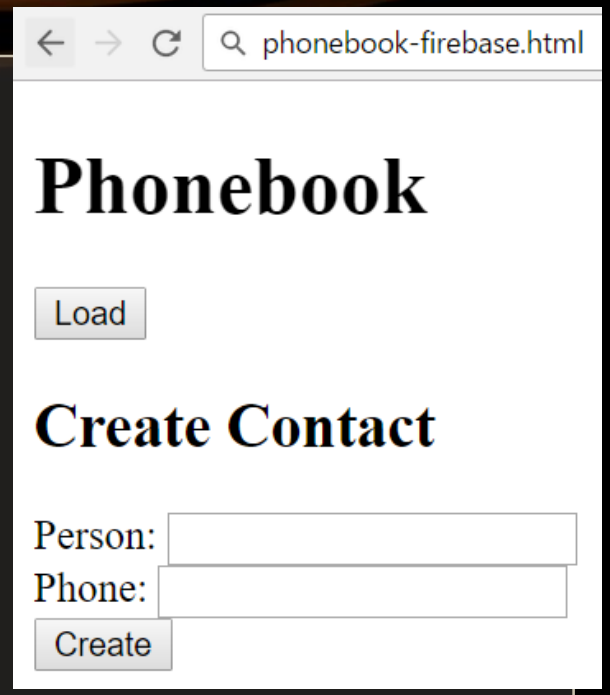
Solution: Test Your REST Service



Solution: Phonebook in Firebase – HTML

```
<h1>Phonebook</h1>
<ul id="phonebook"></ul>
<button id="btnLoad">Load</button>

<h2>Create Contact</h2>
Person: <input type="text" id="person" />
<br>
Phone: <input type="text" id="phone" />
<br>
<button id="btnCreate">Create</button>
```



Solution: Phonebook in Firebase – JS Code

```
$(function () {
  $('#btnLoad').click(loadContacts);
  $('#btnCreate').click(createContact);
  let baseServiceUrl =
    'https://phonebook-nakov.firebaseio.com/phonebook';
  function loadContacts() { … }
  function displayContacts(contacts) { … }
  function displayError(err) { … }
  function createContact() { … }
  function deleteContact(key) { … }
});
```

Solution: Phonebook in Firebase – JS Code

```
function loadContacts() {
  $("#phonebook").empty();
  $.get(baseServiceUrl + '.json')
    .then(displayContacts)
    .catch(displayError);
}

function displayError(err) {
  $("#phonebook").append($("<li>Error</li>"));
}
```

Solution: Phonebook in Firebase – JS Code

```
function displayContacts(contacts) {
  for (let key in contacts) {
    let person = contacts[key]['person'];
    let phone = contacts[key]['phone'];
    let li = $("<li>");
    li.text(person + ': ' + phone + ' ');
    $("#phonebook").append(li);
    li.append($("<button>Delete</button>")
      .click(deleteContact.bind(this, key)));
  }
}
```

Bind the event handler with the current key

Solution: Phonebook in Firebase – JS Code

```
function createContact() {
  let newContactJSON = JSON.stringify({
    person: $('#person').val(),
    phone: $('#phone').val()
  });
  $.post(baseServiceUrl + '.json', newContactJSON)
    .then(loadContacts)
    .catch(displayError);
  $('#person').val('');
  $('#phone').val('');
}
```

Solution: Phonebook in Firebase – JS Code

```
function deleteContact(key) {
  let request = {
    method: 'DELETE',
    url: baseServiceUrl + '/' + key + '.json'
  };
  $.ajax(request)
    .then(loadContacts)
    .catch(displayError);
}
```

The correct contact key will come as parameter (due to binding)

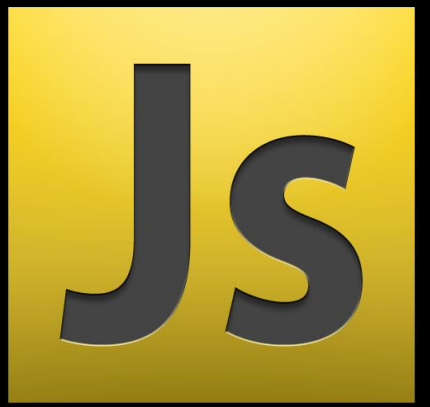
Summary

- AJAX sends asynchronous HTTP requests from JS
- jQuery simplifies how developers use AJAX


```
$.ajax({ url, method: 'GET',
  success: displayRepos,
  error: displayError
});

function displayRepos(respos) { … }

function displayError(err) { … }
}
```



AJAX and jQuery AJAX

Questions?