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JAVASCRIPT2

Install

- Visual Studio Code
  https://code.visualstudio.com/

- Node.js
  https://nodejs.org/en/

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JAVASCRIPT2

Subjects / Code examples

- ECMASCRIPT
- var / const / let
- Classes / Inheritance
- Arrow functions
- Modules
- Arrays
- Callback functions
- Promises
- Async / Await
- Closures
- Module pattern
- Scope
- This

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JavaScript Projects

- SinglePageApplication

Frontend project

https://github.com - code_simple_SPA

- JSONServer

Backend REST project

https://github.com - code_jsonserver_with_errors

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JavaScript Array Filter Callback Function

Create arrays

```
const names1 = ["Franco", "Alberto", "Miguel", "Jose", "Fernando", "Pepe", "Manuel"];
const names2 = ["Franco", "Alberto", "Miguel", "Jose", "Fernando", "Pepe"];
```

Implement myFilter(array, callback)

Implement filter callback function

Return element

If name is longer than 4 letters OR name position in array is even OR number of names in array is even

Test myFilter with array and filter callback function / Test array.filter(callback)

Correct output should be…

Names1 ---> ['Franco', 'Alberto', 'Miguel', 'Fernando', 'Manuel']

Names2 ---> ['Franco', 'Alberto', 'Miguel', 'Jose', 'Fernando', 'Pepe']

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JAVASCRIPT2

JavaScript Array Filter Callback Function

```
const names1 = ["Franco", "Alberto", "Miguel", "Jose", "Fernando", "Pepe", "Manuel"];
const names2 = ["Franco", "Alberto", "Miguel", "Jose", "Fernando", "Pepe"];
function myFilter(array, callback)
{
    let arrayFiltered = [];
    for(let index = 0; index < array.length; index++)
    {
        if(callback(array[index],index,array))
        {
            arrayFiltered.push(array[index]);
        }
    }
    return arrayFiltered;
}
const filter1 = (element, index, array) => {
    if (element.length > 4 || index % 2 == 0 || array.length % 2 == 0)
    {
        return true;
    }
    else
    {
        return false;
    }
};
console.log(myFilter(names1, filter1));
console.log(names1.filter(filter1));
console.log(myFilter(names2, filter1));
console.log(names2.filter(filter1));
```

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JSON

JavaScript Object Notation

- JSON stands for **J**ava**S**cript **O**bject **N**otation
- JSON is a lightweight data-interchange format
- JSON is language independent *
- JSON is "self-describing" and easy to understand
- JSON evaluates to JavaScript Object

```
var text = '{"name":"John Johnson","street":"Oslo West 16","phone":"555 1234567"}';
var obj = JSON.parse(text);
document.getElementById(”Person").innerHTML = obj.name;
```

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JSON / XML

Differences / Similarities

Much Like XML Because

- Both JSON and XML is "self describing" (human readable)
- Both JSON and XML is hierarchical (values within values)
- Both JSON and XML can be parsed and used by lots of programming languages
- Both JSON and XML can be fetched with an XMLHttpRequest

Much Unlike XML Because

- JSON doesn't use end tag
- JSON is shorter
- JSON is quicker to read and write
- JSON can use arrays
- The biggest difference is:
- XML has to be parsed with an XML parser, JSON can be parsed by a standard JavaScript function.

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JSON / XML

Advantages

Why JSON?
For AJAX applications, JSON is faster and easier than XML:

Using XML
- Fetch an XML document
- Use the XML DOM to loop through the document
- Extract values and store in variables

Using JSON
- Fetch a JSON string
- JSON.Parse the JSON string

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JSON Rules

Syntax rules

JSON Syntax Rules

JSON syntax is derived from JavaScript object notation syntax:

- Data is in name/value pairs
- Data is separated by commas
- Curly braces hold objects
- Square brackets hold arrays

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JSON Conversion

String from Object

```
const employees = { employees: [
        {firstName:"John",lastName:"Doe"},
        {firstName:"Anna",lastName:"Smith"},
        {firstName:"Peter",lastName:"Jones"},
]};
const text = JSON.stringify(employees);
console.log(text);
```

Object from string

```
const text = '{ "employees" : [' +
'{ "firstName":"John" , "lastName":"Doe" },' +
'{ "firstName":"Anna" , "lastName":"Smith" },' +
'{ "firstName":"Peter" , "lastName":"Jones" } ]}';
const obj = JSON.parse(text);
console.log(obj.employees[1].firstName + " " + obj.employees[1].lastName);
```

Older browsers / No JSON.parse() support

```
const text = '{ "employees" : [' +
'{ "firstName":"John" , "lastName":"Doe" },' +
'{ "firstName":"Anna" , "lastName":"Smith" },' +
'{ "firstName":"Peter" , "lastName":"Jones" } ]}';
const obj = eval ("(" + text + ")");
console.log(obj.employees[1].firstName + " " + obj.employees[1].lastName);
```

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AJAX

XML

- AJAX = Asynchronous JavaScript and XML.
- AJAX is not a programming language, but a way to use existing standards.
- AJAX is the art of exchanging data with a server, and updating parts of a web page - without reloading the whole page.
- AJAX is a technique for creating fast and dynamic web pages.
- AJAX allows web pages to be updated asynchronously by exchanging small amounts of data with the server behind the scenes. This means that it is possible to update parts of a web page, without reloading the whole page.
- The XMLHttpRequest object is used to exchange data with a server.

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XMLHttpRequest object

Asynchronous

TRUE

- Execute other scripts while waiting for server response
- Deal with the response when the response ready

FALSE

- Will NOT continue to execute, until the server response is ready. If the server is busy or slow, the application will hang or stop.

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Server response

responseText

- get the response data as a string

responseXML

- get the response data as XML data

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Events

onreadystatechange

The onreadystatechange event is triggered every time the readyState changes.
The readyState property holds the status of the XMLHttpRequest.

Property	Description
onreadystatechange	Stores a function (or the name of a function) to be called automatically each time the readyState property changes
readyState	Holds the status of the XMLHttpRequest. Changes from 0 to 4: 0: request not initialized 1: server connection established 2: request received 3: processing request 4: request finished and response is ready
status	200: "OK" 404: Page not found

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AJAX Basic

```
const ajaxBasic = () => {
    const request = new XMLHttpRequest();
    request.onreadystatechange = () => {
        console.log('State: ' + request.readyState + ' Status: ' + request.status);
        if (request.readyState === 4 && request.status === 200) {
            console.log(JSON.parse(request.responseText));
        }
    }
    request.open('GET', 'http://localhost:3333/api/users', true);
    request.send();
}
ajaxBasic();
```

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AJAX General

```
const ajaxGeneral = (url, cb) => {
    const request = new XMLHttpRequest();
    request.onreadystatechange = () => {
        if (request.readyState == 4 && request.status == 200) {
            cb(JSON.parse(request.responseText));
        }
    }
    request.open("GET", url, true);
    request.send();
}
ajaxGeneral('http://localhost:3333/api/users', (json) => {
    console.log(json);
});
```

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FETCH Basic

```
const fetchBasic = () => {
fetch('http://localhost:3333/api/users')
    .then(function (response) {
        return response.json();
    })
    .then(function (json) {
        console.log(json);
    });
}
fetchBasic();
```

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FETCH General

```
const fetchGeneral = (url, cb) => {
    fetch(url)
        .then(function (response) {
            return response.json();
        }).then(function (json) {
            cb(json);
        }).catch(function (error) {
            console.log('Error: ' + error);
        });
}
fetchGeneral('http://localhost:3333/api/users', json
=> {
    console.log(json);
});
```

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FETCH Options

```
function makeOptions(requestType, body) {
    return {
        method: requestType,
        headers: {
            'Accept': 'application/json',
            'Content-Type': 'application/json'
        },
        body: JSON.stringify(body)
    };
}
```

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FETCH Pattern

```
function handleHttpErrors(response) {
    if (!response.ok) {
        return Promise.reject({ status: response.status, error: response.json() })
    }
    return response.json();
}
const url1 = 'http://localhost:3333/api/users';
const data1 = { age: 34, name: "Anton Benson", gender: "female", email: "ab@ab.com" };
const options1 = makeOptions("POST", data1);
fetch(url1, options1)
    .then(handleHttpErrors)
    .then(json => console.log(json))
    .catch(error => {
        if (error.status)
        {
            error.error.then(e => console.log(e))
        }
        else
        {
            console.log("Network error");
        }
    });
```

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FETCH Final

```
const fetchJson = async (url, options) => {
    try {
        const response = await fetch(url, options);
        const json = await response.json();
        if (!response.ok) {
            return Promise.reject({ status: response.status, json: json });
        }
        return Promise.resolve({ json: json });
    }
    catch (error) {
        return Promise.reject({ error: 'Network error' });
    }
}
const url2 = 'http://localhost:3333/api/users';
const data2 = { age: 34, name: "Anton Benson", gender: "male", email: "ab@ab.com" };
const options2 = makeOptions("POST", data2);
fetchJson(url2, options2)
    .then((resolve) => console.log(resolve.json))
    .catch((reject) => console.log(reject.json));
```

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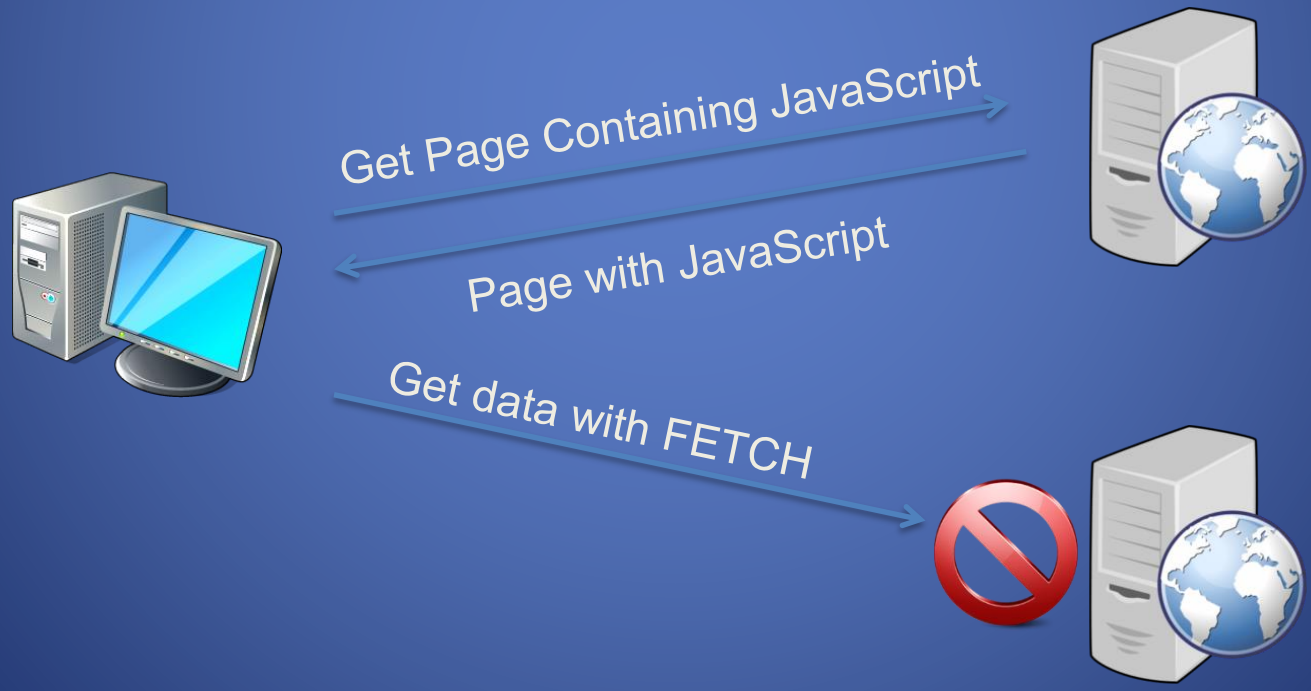
Same Origin Policy

Problem: External servers disallowed



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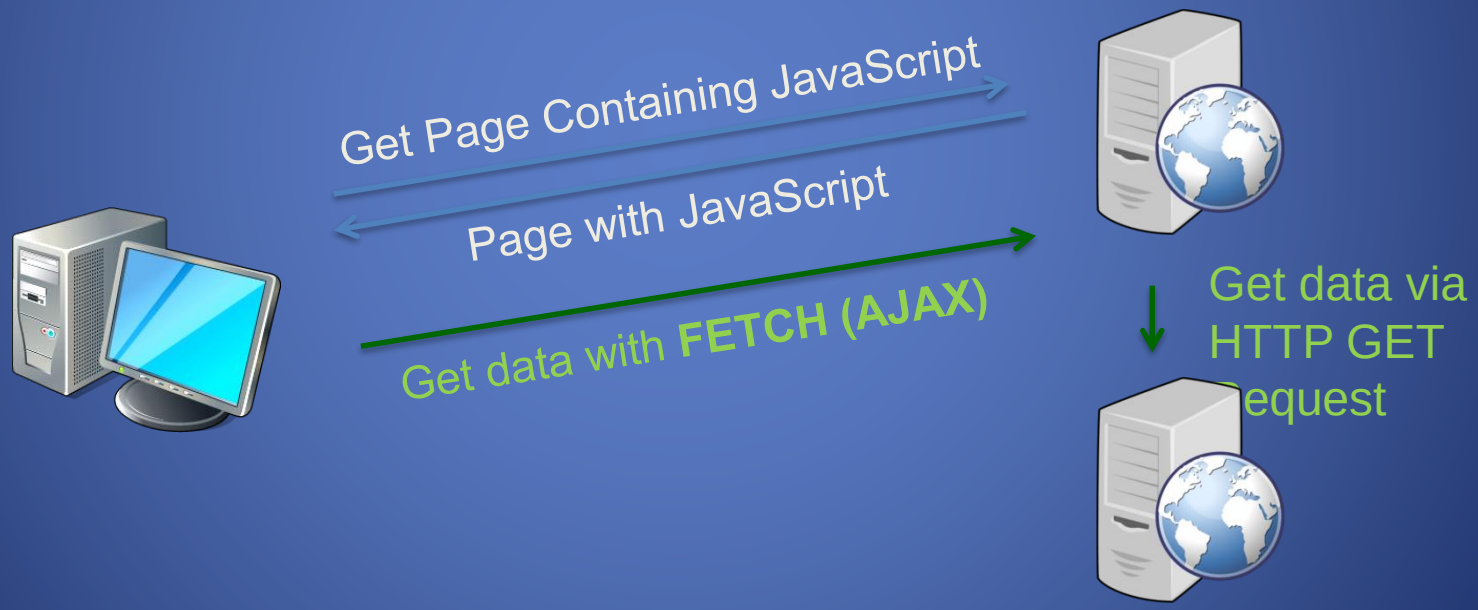
Same Origin Policy

Solution. Proxy server



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CORS

Cross Origin Ressource Sharing

Solution 1 (If not own server) - Technique for proxying requests

```
URL url = new URL("http://ip.jsontest.com/?alloworigin=false");
HttpURLConnection conn = (HttpURLConnection) url.openConnection();
conn.setRequestMethod("GET");
conn.setRequestProperty("User-Agent", "");

StringBuilder result = new StringBuilder();
BufferedReader br = new BufferedReader(new InputStreamReader(conn.getInputStream()));
String line = "";

while ((line = br.readLine()) != null)
{
   result.append(line);
}

br.close();

return Response.ok(result.toString()).build();
```

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CORS

Cross Origin Ressource Sharing

Solution 2 (If own server) - Technique for relaxing the same-origin policy

```
return Response
        .ok("{\"success\":true}")
        .header("Access-Control-Allow-Origin", "*")
        .header("Access-Control-Allow-Methods", "GET, POST, PUT, DELETE")
        .build();
```

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CORS

Cross Origin Ressource Sharing

Solution 3 (If own server) – Set up response filters

```
@Provider
@PreMatching
public class CORSResponseFilter implements ContainerResponseFilter
{
   @Override
   public void filter(ContainerRequestContext requestCtx, ContainerResponseContext res) throws IOException
   {
      System.out.println("RESPONSE HEADER ADDED...");

      res.getHeaders().add("Access-Control-Allow-Origin", "*");
      res.getHeaders().add("Access-Control-Allow-Methods", "GET, POST, PUT, DELETE");
      res.getHeaders().add("Access-Control-Allow-Credentials", "true");
      res.getHeaders().add("Access-Control-Allow-Headers", "Origin, Accept, Content-Type");
   }
}
```

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CORS

Cross Origin Ressource Sharing

Set up request filters

```
@Provider
@PreMatching
public class CORSRequestFilter implements ContainerRequestFilter
{
   @Override
   public void filter(ContainerRequestContext requestCtx) throws IOException
   {
      if (requestCtx.getRequest().getMethod().equals("OPTIONS"))
      {
         System.out.println("REQUEST WITH METHOD OPTIONS DETECTED...");

         requestCtx.abortWith(Response.status(Response.Status.METHOD_NOT_ALLOWED).build());
      }
   }
}
```

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DEPLOYMENT

Single Page Application

Deploy backend to Digital Ocean
Deploy frontend to Surge.sh