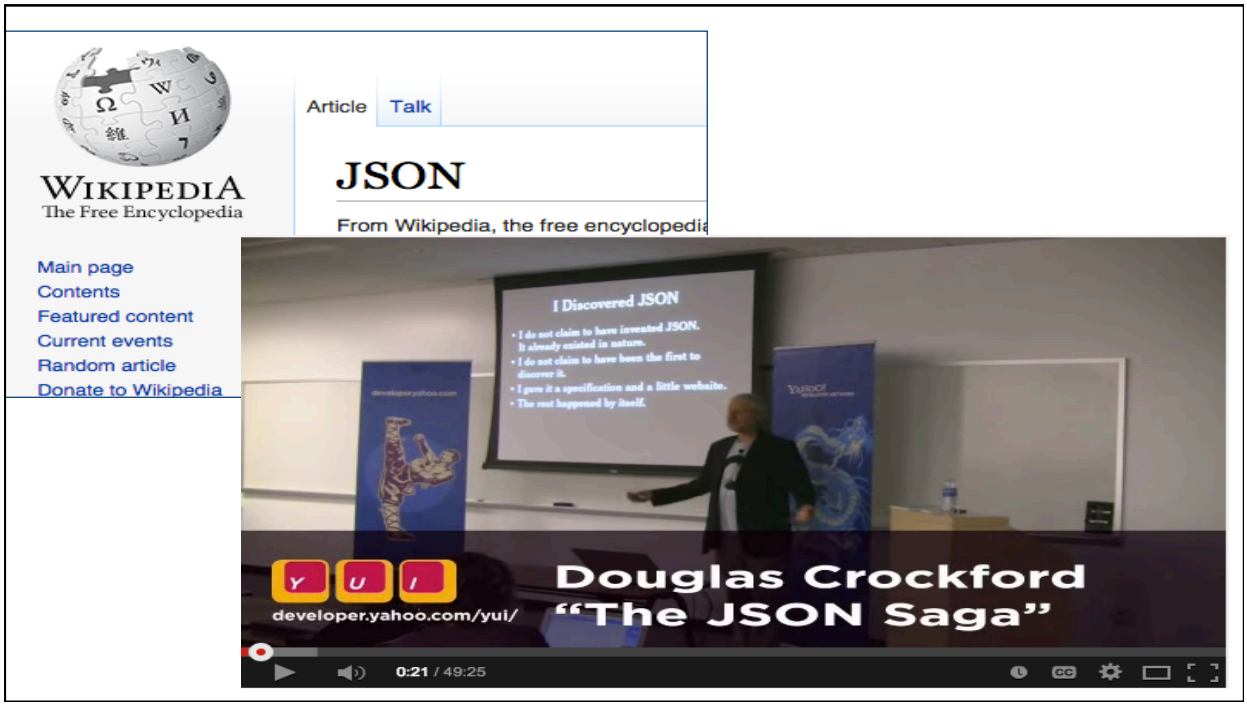
Ajax

Talking with the server

tl;dr

- Ajax is transferring data between two computers
- JSON is the favorite format for Ajax
- XMLHttpRequest object is the heart of Ajax requests
- The fetch API is great for making Ajax requests because it is easy and supported by all modern browsers with no libraries

json


WIKIPEDIA
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developer.yahoo.com/yui/
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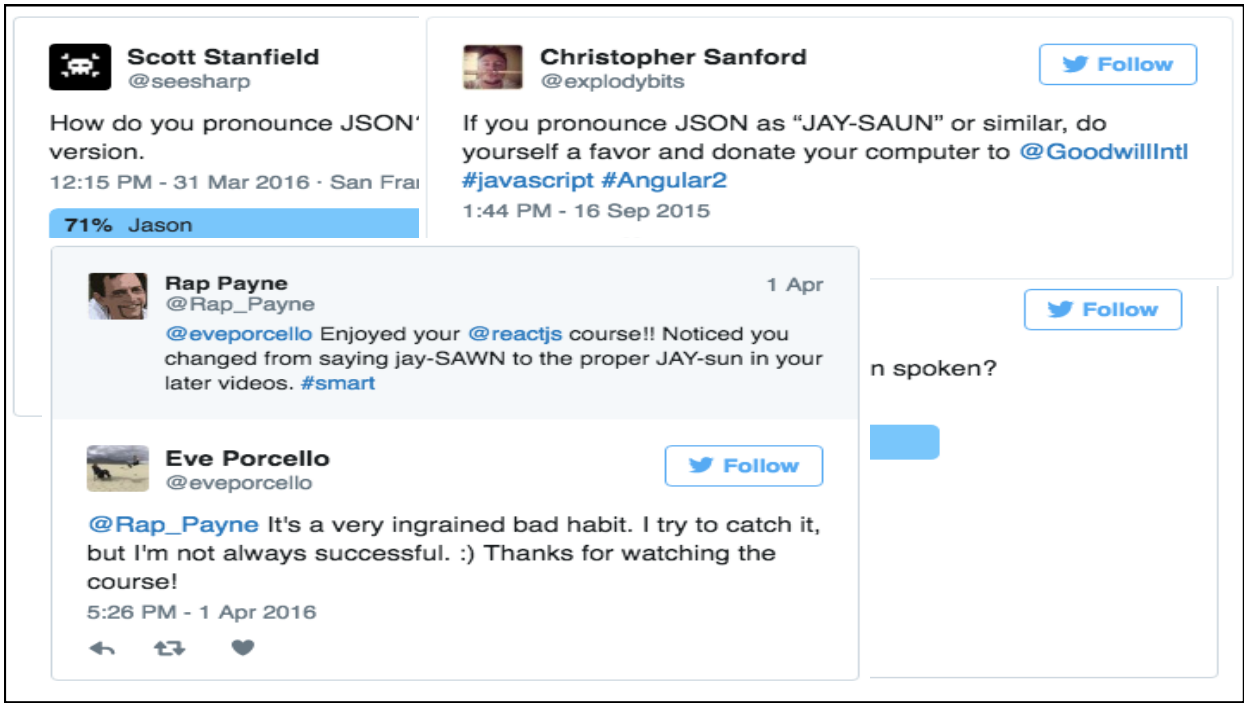


JSON is simply a way to represent an object

- Like a person object whose
- First name is "Cal"
- Last name is "Naughton"
- Nickname is "Magic Man"
- Car number is 47

```
{
  firstname: "Cal",
  lastname: "Naughton",
  nickname: "Magic Man",
  carNumber: 47
}
```

Note the syntax:

- The object is bounded by curly braces
- Entries are comma-separated
- Keys & values are colon-separated

Sounds like XML. Why not just use XML?

```
<person>
  <firstname>
    Cal
  </firstname>
  <lastname>
    Naughton
  </lastname>
  <nickname>
    Magic Man
  </nickname>
  <carNumber>
    47
```

126 BYTES

```
{
  firstname: "Cal",
  lastname: "Naughton",
  nickname: "Magic Man",
  carNumber: 47
}
```

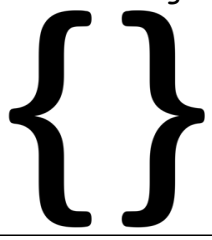
73 BYTES

String to Object

```
var driver = getDriver(123);   // This returns a string.
console.log(typeof driver);    // "string"
console.log(driver);           // '{"firstName":"Ricky"}'
console.log(driver.firstName); // undefined
```

- driver is a string, but we need to get JSON data!

```
var obj = JSON.parse(driver); // *Now* obj is an object
console.log(obj.firstName);   // "Ricky"
```



Object to String

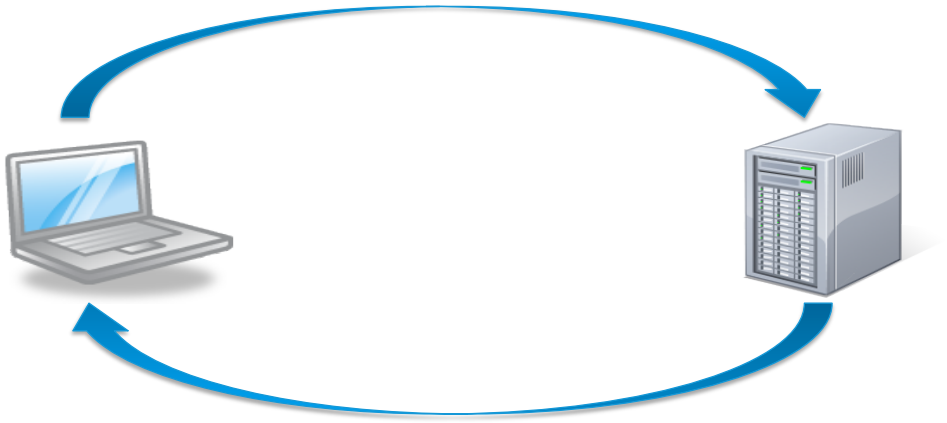
- Great for serializing an object.

```
console.log(typeof obj);      // 'object'
console.log(obj.firstName);   // 'Ricky'
var str = JSON.stringify(obj);
console.log(str); // '{"firstName":"Ricky"}'
```

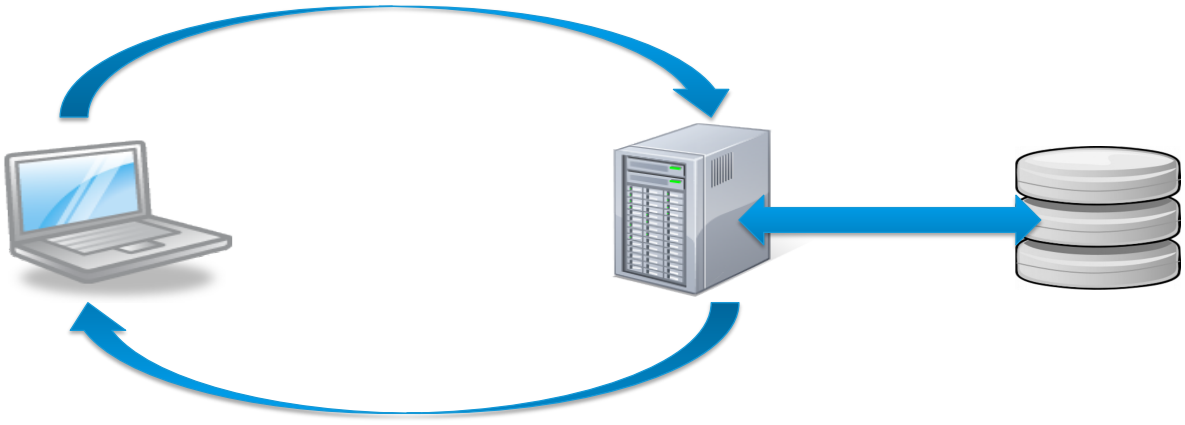
Introduction to Ajax

Making Ajax calls at the lowest possible level

Remember that the web is a thin-client technology



So we clearly need some way to tell the server we want to send data to it and a way to receive data from it.



If only we could send a request while the page remains loaded and displayed

- Precondition – a page is loaded

1. The page sends a request for some data
2. The page listens for a response while the user continues to work (asynchronous)
3. It receives a response
4. It runs a callback function which usually processes the data and injects it into the DOM

- Postcondition – the same page is loaded but has new data

So we use JavaScript to send an XML request asynchronously and process the XML response

We call this technology …

JXAA!

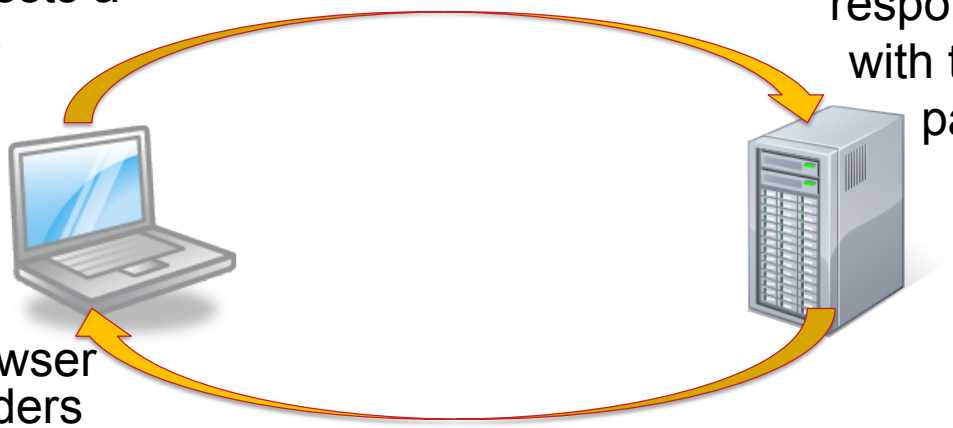
No, wait …

Ajax

Here's how Ajax works

1. Browser requests a page

2. Server responds with that page

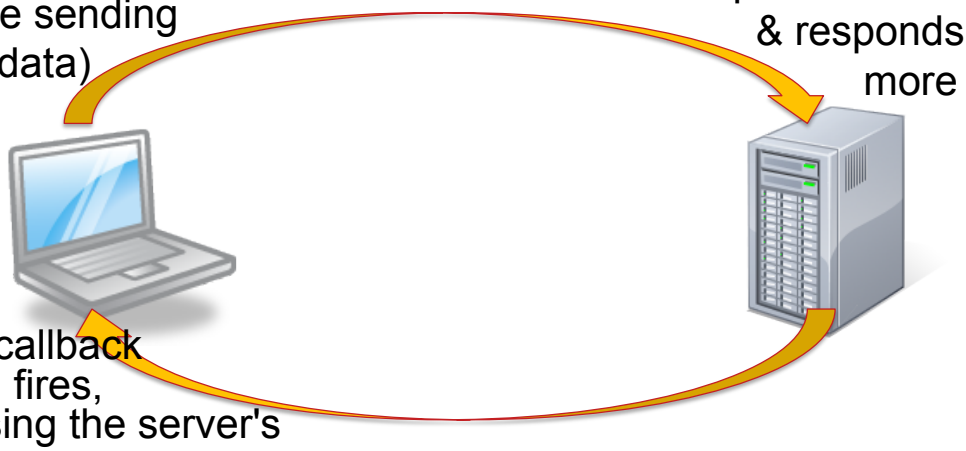


3. Browser renders the page

Here's how Ajax works

4. An Ajax call requests *data* (maybe sending some data)

5. Server process that data & responds with more *data*



6. Ajax callback function fires, processing the server's response

XMLHttpRequest

The OG of Ajax requests

The XMLHttpRequest* object's API

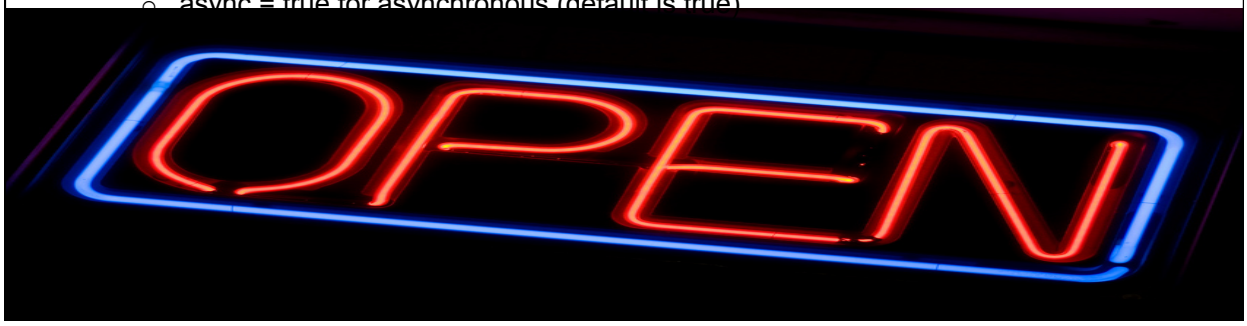
Methods	Properties	Events
open(httpMethod, url, async)	readyState	onreadystatechange
setRequestHeader(header, value)	status	
send(string)	statusText	
getResponseHeader(header)	responseText	
abort()	responseXML	

*The XMLHttpRequest object is often abbreviated "xhr"

The open() method prepares the Ajax call

```
xhr.open(httpMethod, url, async)
```

- where
  - httpMethod = "GET" or "POST" or "PUT" or "DELETE"
  - url = address we're hitting
  - async = true for asynchronous (default is true)



send() instructs the system to make the actual call

- send() usually has no arguments

```
xhr.send();
```

- You can pass in form/querystring data using send …

```
xhr.send('Artist=CeeLo');
```

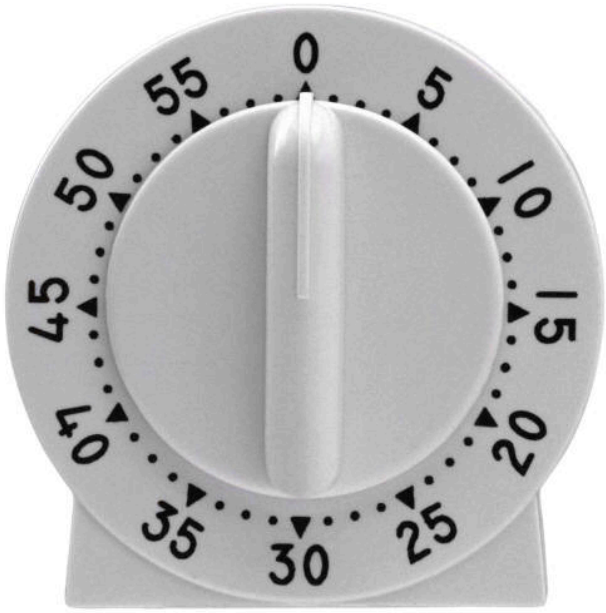
Are we ready? readyState knows!

- xhr.readyState holds a number between 0 and 4

Value	Meaning
0	Request not initialized
1	We are connected to the server
2	The request was received
3	The server is processing the request
4	Request is finished and the response has been sent back

The xhr.status is like the http response state

- 100 Informational only
- 200 OK
- 300 Moved
- 400 Bad request
- 500 Server error



So, when xhr.status is 200 and xhr.readyState is 4, we know that the request is ready

readystatechange points to a function that fires when the readyState changes

- We can use this to determine when a response comes back from the server.
- Then we test it to see if readyState=4 and status=200

Next, we process the response

xhr.responseText	xhr.responseXML
• For JSON	• For XML

But xhr.responseText is just a string and we need it to be an object. So ...

```
const data = JSON.parse(xhr.responseText);
```

First, let's create a page with all the hooks built in

```
<html>
<head>
  <script src='SayHello.js'></script>
</head>
<body>
  <input id="personId" />
  <button onclick='getPerson()'>Go!</button>
  <div id='pDiv'>
    <p>Hello there!</p>
  </div>
</body>
</html>
```

Next, we'll create the server-side program

```
<?php
$person= get_person($_GET['personId']);
echo($person);
?>
```

Then we write the call to the service

```
function getPerson() {
  const personId =
    document.getElementById('personId').value;
  xhr = new XMLHttpRequest();
  xhr.open('GET','GetPerson.php', true);
  xhr.addEventListener('readystatechange',
    changePersonInfo);
  xhr.send('personId=' + personId);
}
```

And we write the callback function

```
function changePersonInfo() {
 if (xhr.readyState===4 && xhr.status===200) {
   const p = JSON.parse(xhr.responseText);
   document.getElementById('pDiv')
     .innerHTML = `<p>Person: ${p.first}
                   ${p.last}</p>`;
  }
}
```

Piece of cake, right?

The fetch API

A more modern way to handle Ajax

fetch receives a URL and returns a promise

```
fetch("http://us.com/api/people/123").then(
  (res) => { /* do something *},
  (err) => { /* handle the error */}
);
```

That response object has an API also. It has ...

- status - 100 - 599
- statusText - "OK" or "Not found" or "No content"
- ok - shorthand for a 200-series return
- json() - Convert it from a json string to an object.
- blob() - Convert it to a raw object
- text() - Read it as a string.

A more full example

```
const out = document.getElementById('out');

fetch('/api/people/123')
 .then( res => res.json())
 .then( person => {
   out.textContent = `
     ${person.name.first}
     ${person.name.last}`;
});
```

What if it's not that simple?

```
const headers = new Headers();
headers.set("content-type","application/json");
headers.set('accept','application/json');
const payload = {
  headers: headers,
  body: '{"givenName":"Jose"}',
  method: "PATCH",
  mode: "CORS"
};
fetch(url, payload).then(
  // Handle as before
);
```

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