GENERAL ASSEMBLY

JAVASCRIPT DEVELOPMENT

Sasha Vodnik, Instructor

HELLO!

1. Pull changes from the `svodnik/jsd6` repo to your computer
2. Open the `starter-code` folder in your code editor

AJAX & APIS

LEARNING OBJECTIVES

At the end of this class, you will be able to

- Identify all the HTTP verbs & their uses.
- Describe APIs and how to make calls and consume API data.
- Access public APIs and get information back.
- Implement an Ajax request with vanilla JS.
- Implement a jQuery Ajax client for a simple REST service.
- Describe the benefits of separation of concerns – API vs. Client.

AGENDA

- APIs
- HTTP
- Ajax & JavaScript codealong
- Ajax & JavaScript lab
- Ajax & jQuery codealong
- Ajax & jQuery lab

Checkin and questions

- The **most significant thing I learned** about the DOM and jQuery is _____.
- My **biggest outstanding question** about the DOM and jQuery is _____.

What kinds of data are available online?

- Think about how you could use one or more sources of web data in an app.
- Describe or sketch a schematic of your app on your desk.

APIs

WEB SERVICE

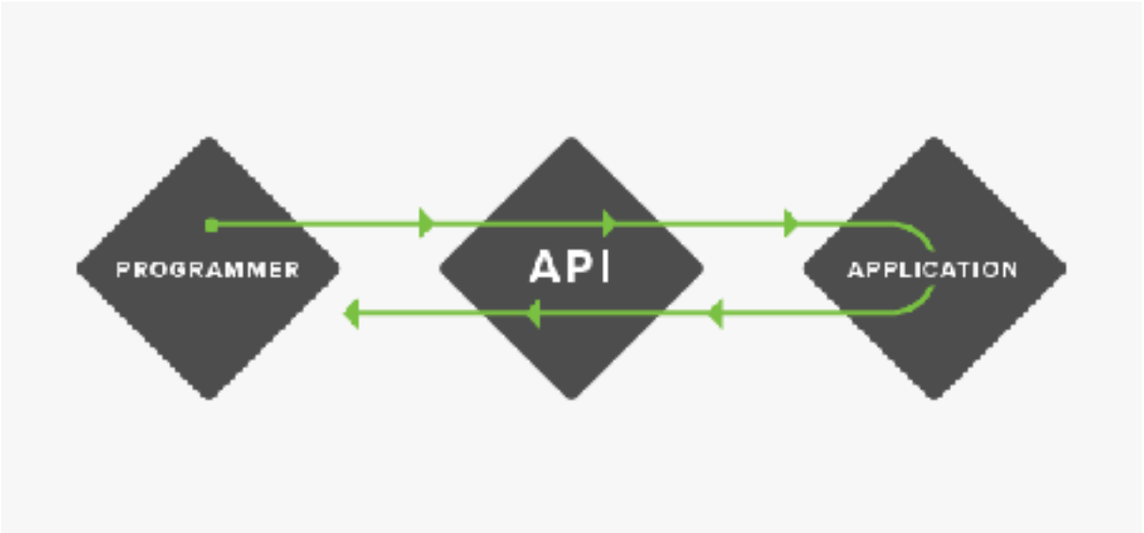
- An online source of data
- Communicate using HTTP, but instead of markup we receive data
- We can use multiple services in a single app
- This makes separation of concerns (DOM logic and data) even more important

API = application programming interface

- Each service has an API, which is a predefined set of objects, properties, and methods anyone can use to access that service
- Any service we access online through our apps will have an API
- Intermediary; allows different pieces of software to communicate

APIS IN THE REAL WORLD

- Most APIs are unique, like separate languages
- API for devices (iPhone); for operating systems (macOS); for JavaScript libraries (jQuery API)



HOW WE WILL USE APIS

- We will focus on web-based APIs (for web services)
- Use HTTP to request/receive structured data from endpoints on a server
- **Endpoints** are addresses (URLs) that will return data (JSON) instead of markup (HTML)

WHAT WE NEED TO KNOW TO USE AN API

- Its terms of service (paid service? limit on usage?)
- How to make a request (URL and parameters)
- What kind of data is returned and how to parse it

HOW MIGHT A SERVICE REQUEST BE DIFFERENT THAN USING OUR OWN DATA?

- May need to authenticate when requesting data
- May be a lag, requiring user notification
- Request may result in an error

REST (representational state transfer)

- architectural style of web applications
- transfers a representation of the state of a server resource to the client

RESTful API

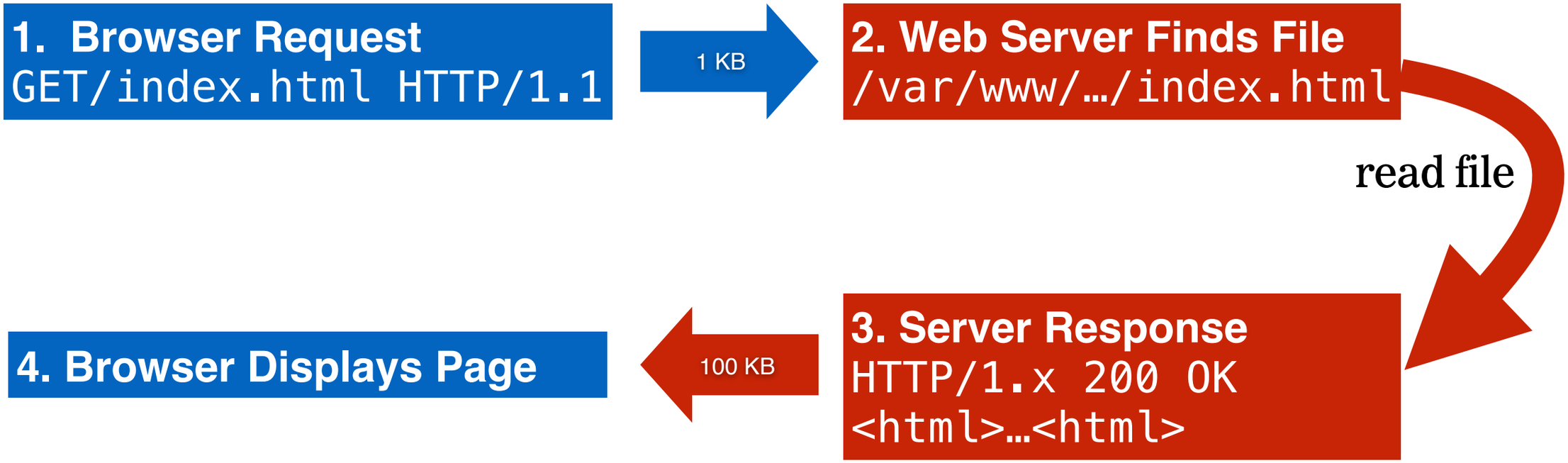
- adheres to REST architecture
- uses
  - a base URL
  - an Internet media type (such as JSON)
  - standard HTTP methods

HTTP

HTTP (hypertext transfer protocol)

- System of rules for how web pages are transmitted between computers
- Defines the format of messages passed between HTTP clients and HTTP servers
- A client sends a **request** to a server.
- A server sends a **response** back to a client.

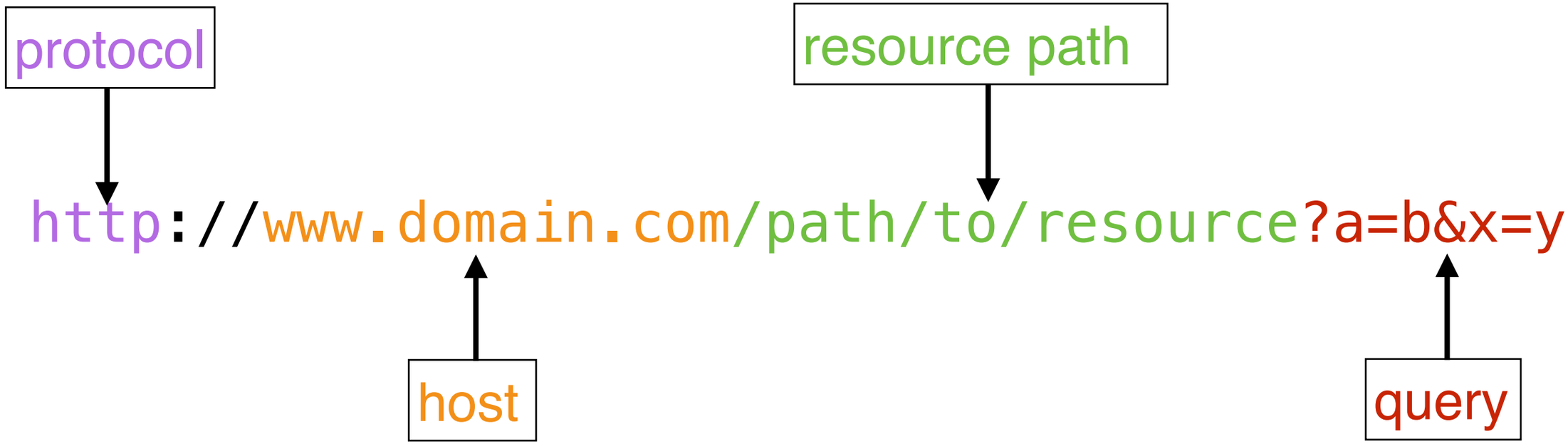
HTTP REQUEST AND RESPONSE



HTTP (hypertext transfer protocol)

- HTTP clients are generally web browsers (Chrome, Firefox, Safari, Edge, etc.)
- HTTP servers are web servers (Apache, Nginx, etc.)
- **Web applications** are programs that plug into a web server, process the HTTP requests that the server receives, and generate HTTP responses

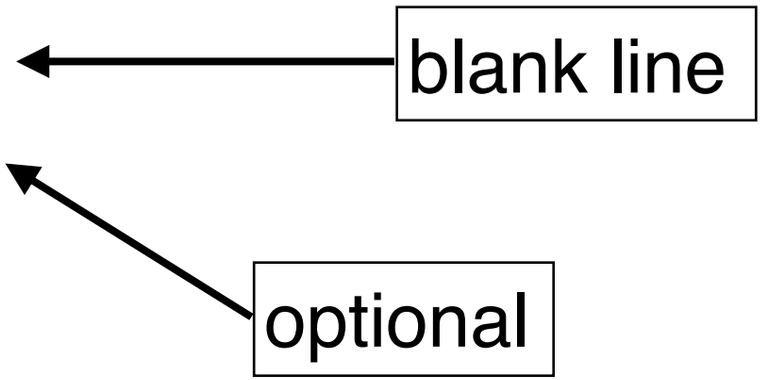
HTTP REQUESTS IN EVERYDAY LIFE



HTTP REQUEST STRUCTURE

```
[http request method] [URL] [http version]
[list of headers]

[request body]
```

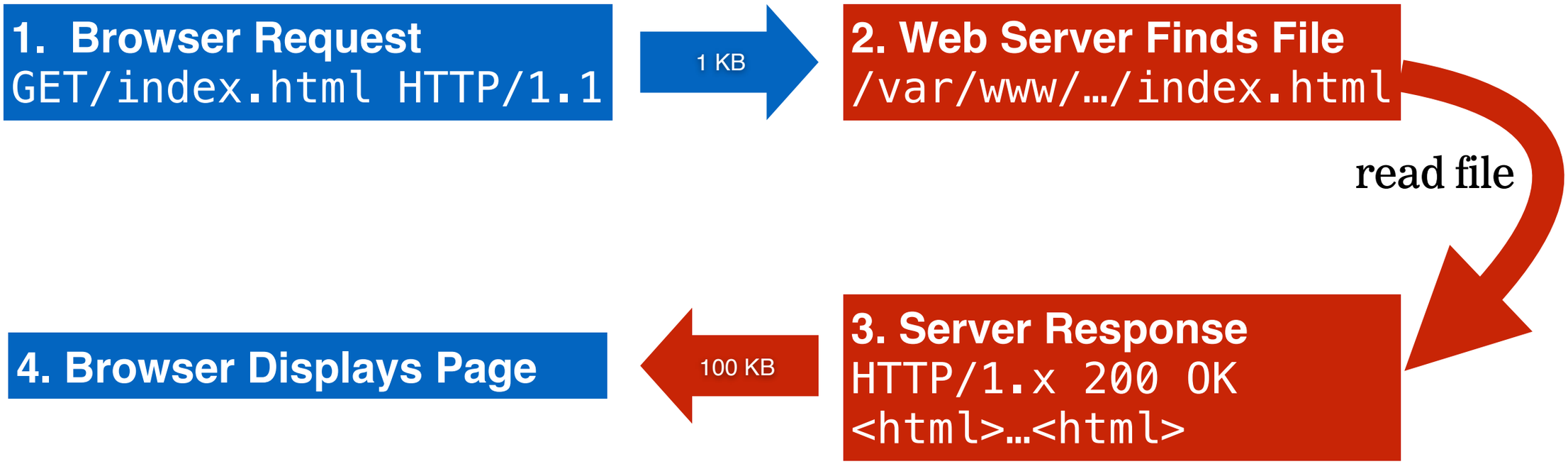


HTTP REQUEST METHODS ("HTTP VERBS")

`GET`	Retrieve a resource
`POST`	Create a resource
`PATCH`	Update an existing resource (same as `PUT`, but `PATCH` is recommended)
`DELETE`	Delete a resource
`HEAD`	Retrieve the headers for a resource

Most widely used

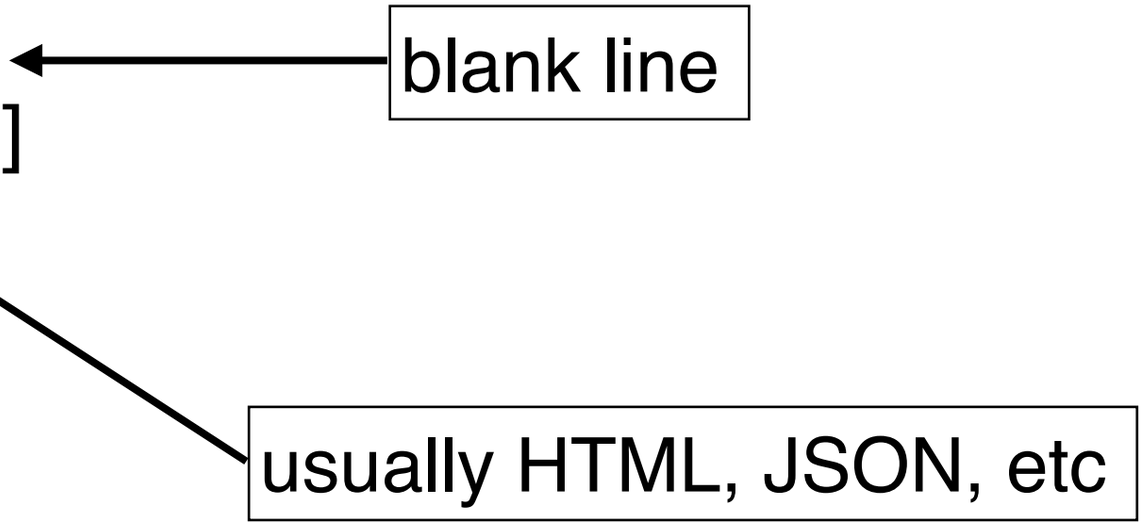
HTTP REQUEST AND RESPONSE



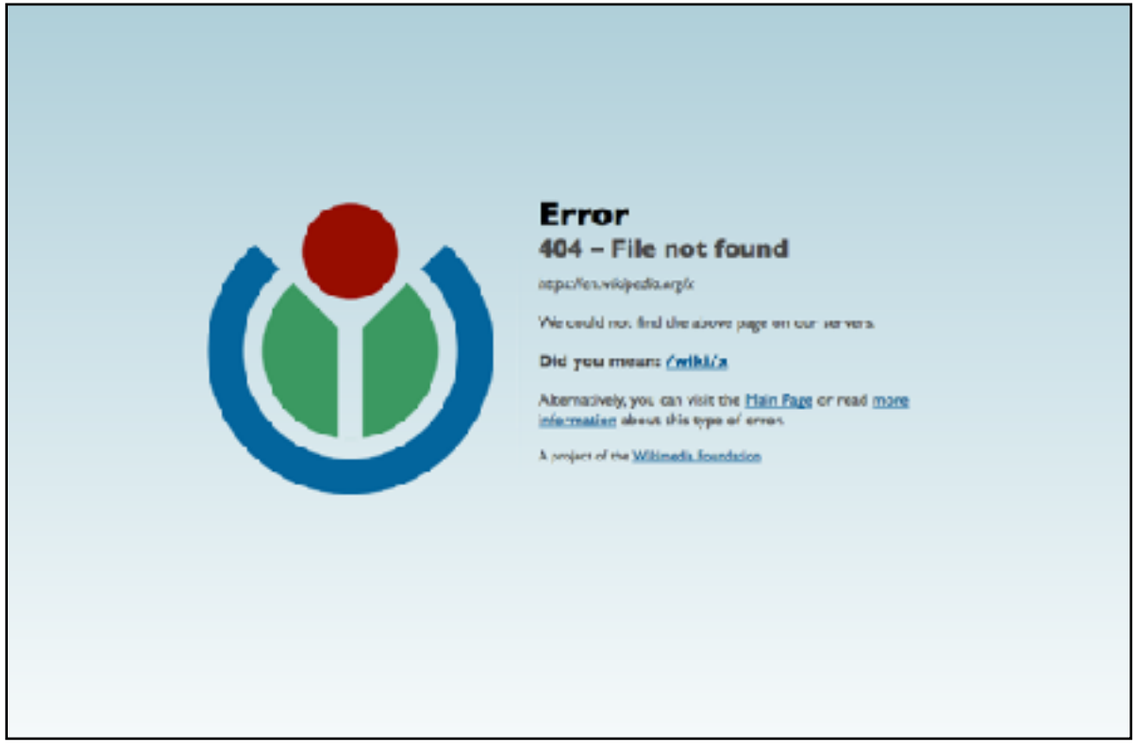
HTTP RESPONSE STRUCTURE

```
[http version] [status] [reason]
[list of headers]

[response body]
```



HTTP STATUS CODES



HTTP STATUS CODES

200	Okay
301	Moved permanently
302	Moved temporarily
400	Bad request
403	Forbidden
404	Not found
500	Internal server error

Ajax

Ajax

- Originally AJAX (Asynchronous JavaScript and XML)
- XML is a format for data interchange that's derived from the same markup language that HTML comes from.
- Since JSON was codified, it's become the standard for data interchange on the web, so Ajax is no longer functionally an acronym.

What does Ajax let us do?

- Communicate with servers from within our apps
- Make the communication asynchronous (in the background)
- We can update interfaces and content without refreshing the page

XMLHttpRequest

- Standard object that we create an instance of for an HTTP request

method	description
`onreadystatechange`	we assign a custom function that specifies how we want to handle the HTTP response
`open`	opens HTTP connection; we specify request type and URL as parameters
`send`	sends request; generally no parameters needed

XMLHttpRequest.readyState

- Property that stores the state of the request

value	state	description
0	UNSENT	Client has been created. open() not called yet.
1	OPENED	open() has been called.
2	HEADERS_RECEIVED	send() has been called, and headers and status are available.
3	LOADING	downloading; responseText holds partial data.
4	DONE	The operation is complete.

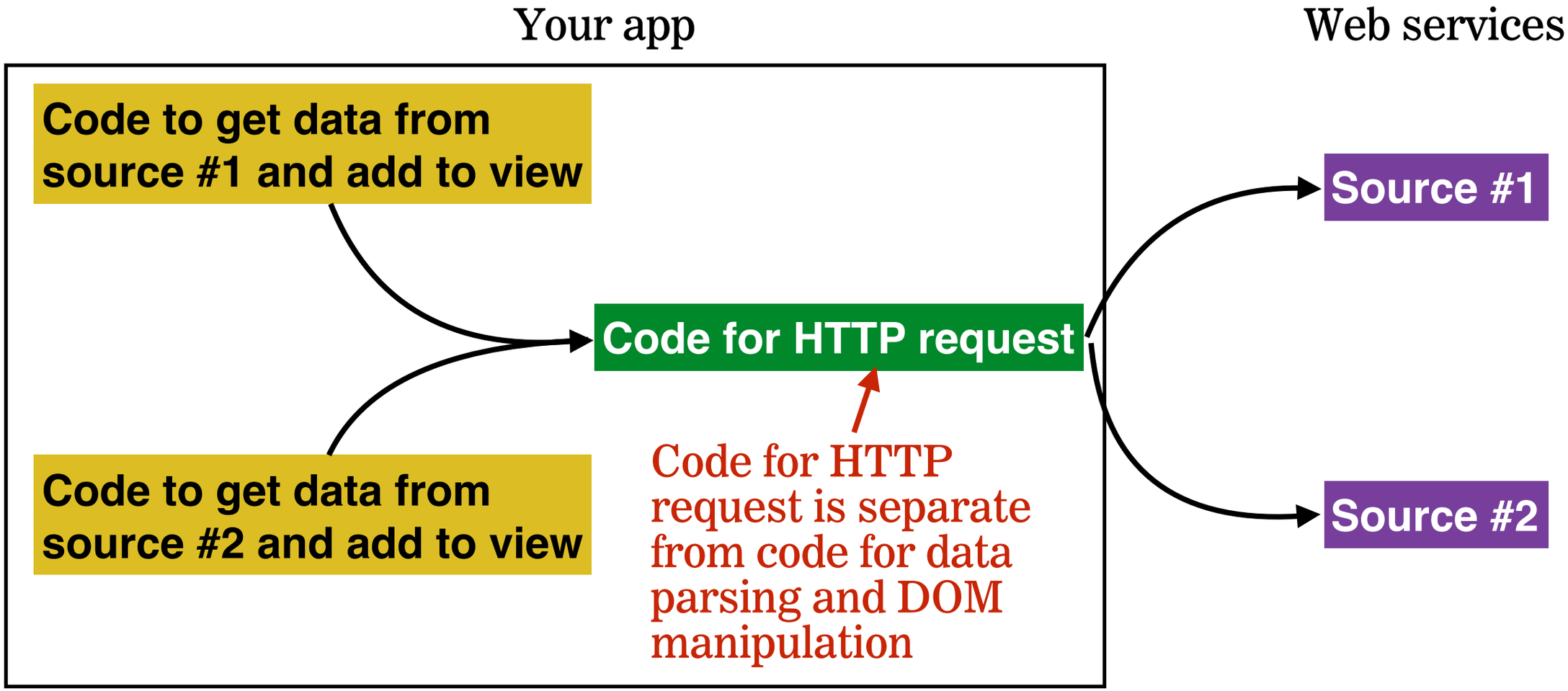
SEPARATION OF CONCERNS

- Programming principle of keeping different aspects (or **concerns**) of an application separate
- Many ways to do this
- One common separation is between data (the information we're presenting) and view (the code that determines how data is presented)
- We should be able to change the code for one concern without affecting the code for the other

SEPARATION OF CONCERNS - HTTP

- For HTTP code, the code for the client should be abstracted from the code for the HTTP request
- You should be able to reuse your code for multiple APIs/services, rather than making custom code for each one

SEPARATION OF CONCERNS - HTTP



jQuery Ajax

Using Ajax with jQuery

method	description
`$.get()`	loads data from a server using an HTTP GET request
`$.ajax()`	performs an Ajax request based on parameters you specify

LEARNING OBJECTIVES - REVIEW

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NEXT CLASS PREVIEW

Asynchronous JavaScript and Callbacks

- Store and use anonymous functions in variables.
- Pass functions as arguments to functions that expect them.
- Write functions that take other functions as arguments.
- Return functions from functions.

Exit Tickets!

Q&A