GENERAL ASSEMBLY

# JAVASCRIPT DEVELOPMENT

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# HELLO!

1. Pull changes from the `svodnik/JS-SF-10-resources` repo to your computer
2. Open the `11-async-callbacks > starter-code` folder in your code editor

# ASYNCHRONOUS JAVASCRIPT & CALLBACKS

# LEARNING OBJECTIVES

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

- Describe what asynchronous means in relation to JavaScript
- Pass functions as arguments to functions that expect them.
- Write functions that take other functions as arguments.
- Build asynchronous program flow using promises and Fetch

# AGENDA

- Asynchronous code
- Functions as callbacks
- Promises & Fetch

# WEEKLY OVERVIEW

| | |
|---|---|
| **WEEK 7** | Ajax & APIs / Asynchronous JavaScript & Callbacks |
| **WEEK 8** | Advanced APIs / Project 2 Lab |
| **WEEK 9** | Closures & the module pattern / CRUD & Firebase |

# EXIT TICKET QUESTIONS

1. How do I deploy my app using API without exposing my API key in public? For example, in my own online portfolio or github while it stays functional.
2. How complicated do applications get in reality?
3. Can you expand upon AJAX? What are the advantages of AJAX - apart from shorter, more concise code..
4. where to assign body information in a fetch request
5. when to use ajax vs get

# Asynchronous programming

# WHAT WOULD YOU SEE IN THE CONSOLE?

```
let status;
function doSomething() {
    for (let i = 0; i < 1000000000; i++) {
      numberArray.push(i);
    }
    status = “done”;
    console.log(“First function done”);
}
function doAnotherThing() {
    console.log(“Second function done”);
}
function doSomethingElse() {
    console.log(“Third function: ” + status);
}

doSomething();
doAnotherThing();
doSomethingElse();
```

# WHAT WOULD YOU SEE IN THE CONSOLE?

```
let status;
function doSomething() {
    for (let i = 0; i < 1000000000; i++) {
      numberArray.push(i);
    }
    status = “done”;
    console.log(“First function done”);
}
function doAnotherThing() {
    console.log(“Second function done”);
}
function doSomethingElse() {
    console.log(“Third function: ” +
status);
}
```

```
doSomething();
doAnotherThing();
doSomethingElse();

// result in console:
> “Second function done”
> “Third function: undefined”
> “First function done”
```

# JAVASCRIPT IS ASYNCHRONOUS

- Code execution is independent of the main program flow
- Statements are executed concurrently
- Program does not block program flow to wait for results

https://en.wikipedia.org/wiki/Asynchrony_(computer_programming)

# ASYNCHRONOUS PROGRAM FLOW

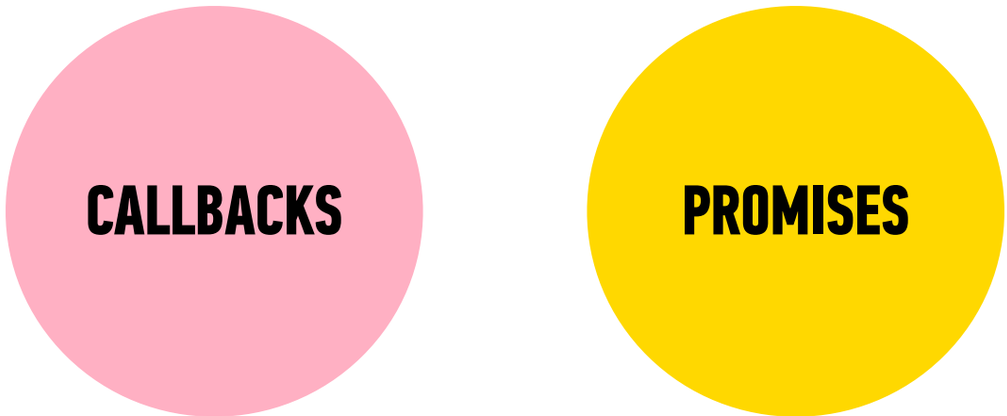
```
function doSomething() {
    // do something
}
function doAnotherThing() {
    // do another thing
}
function doSomethingElse() {
    // do one more thing
}
```

```
$('button').on('click', doSomething);
```

```
$.get(url, function(data) {
  doAnotherThing(data);
});
```

```
fetch(url).then(function(response) {
  if (response.ok) {
    return response.json();
  } else {
   console.log('There was a problem.');
  }
}).then(doSomethingElse(data));
```

# APPROACHES TO ASYNCHRONOUS PROGRAM FLOW

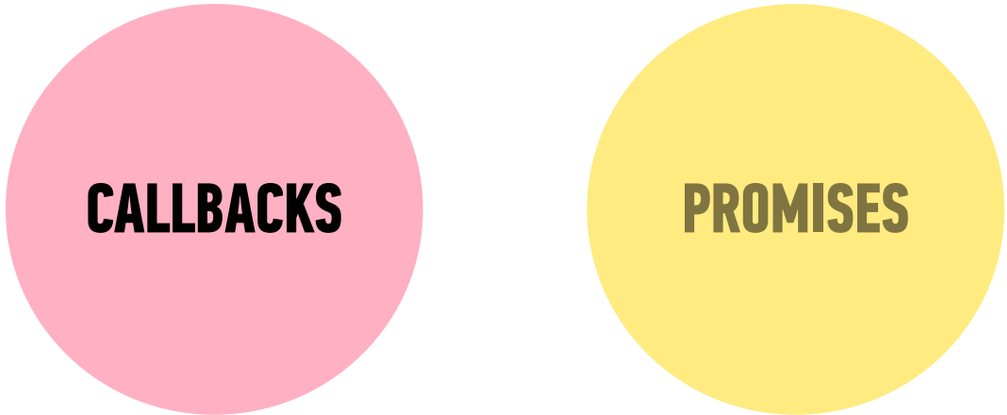


# Functions & callbacks

# HOW MANY ARGUMENTS IN THIS CODE?

```
button.addEventListener('click', function() {
  // your code here
}, false);
```

# APPROACHES TO ASYNCHRONOUS PROGRAM FLOW



# FUNCTIONS ARE FIRST-CLASS OBJECTS

- Functions can be used in any part of the code that strings, arrays, or data of any other type can be used
  - ➡store functions as variables
  - ➡pass functions as arguments to other functions
  - ➡return functions from other functions
  - ➡run functions without otherwise assigning them

# HIGHER-ORDER FUNCTION

- A function that takes another function as an argument, or that returns a function

# HIGHER-ORDER FUNCTION — EXAMPLE

`setTimeout()`

```
setTimeout(function, delay);
```

where

- `function` is a function (reference or anonymous)
- `delay` is a time in milliseconds to wait before the first argument is called

# SETTIMEOUT WITH ANONYMOUS FUNCTION ARGUMENT

```
setTimeout(function(){
  console.log("Hello world");
}, 1000);
```

# SETTIMEOUT WITH NAMED FUNCTION ARGUMENT

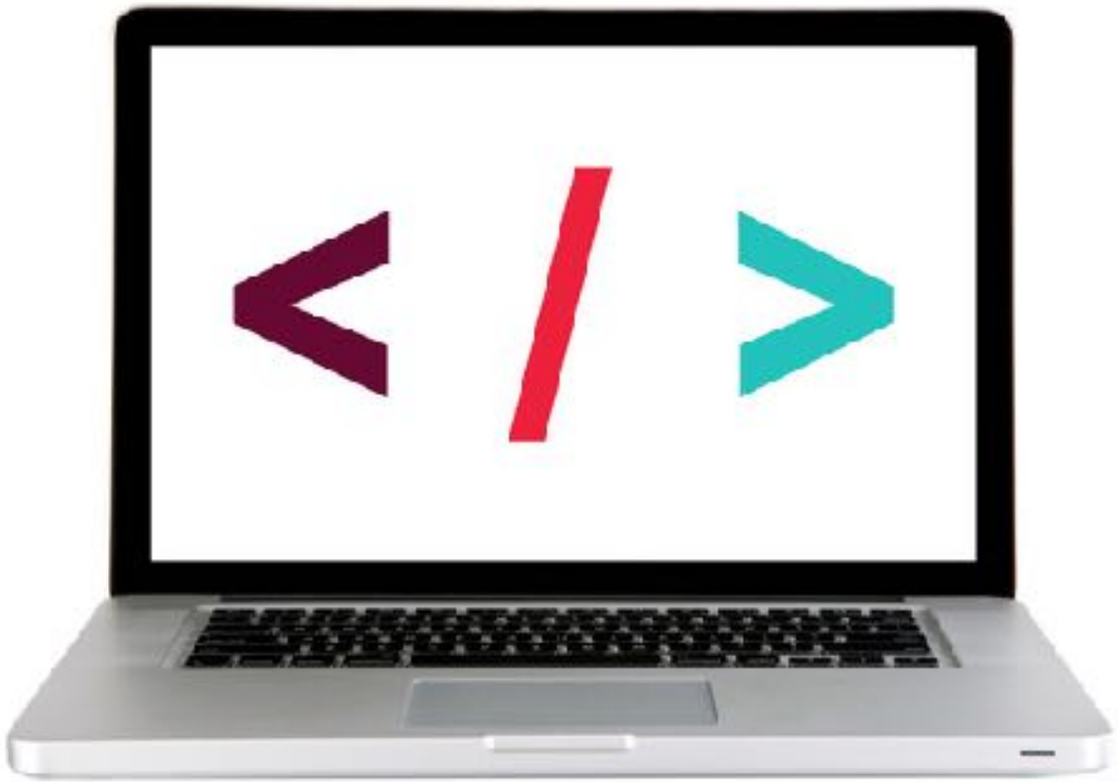
```
function helloWorld() {
  console.log("Hello world");
}

setTimeout(helloWorld, 1000);
```

# CALLBACK

- A function that is passed to another function as an argument, and that is then called from within the other function
- A callback function can be anonymous (as with `setTimeout()` or `forEach()`) or it can be a reference to a function defined elsewhere

# LET'S TAKE A CLOSER LOOK



# EXERCISE - CREATING A CALLBACK FUNCTION, PART 1


## LOCATION

- `starter-code > 1-callback-exercise`

## TIMING

*10 min*

1. In your editor, open script.js.
2. Follow the instructions in Part 1 to create the add, process, and subtract functions, and to call the process function using the add and subtraction functions as callbacks.
3. Test your work in the browser and verify that you get the expected results.
4. BONUS: Comment out your work and recreate using arrow functions (see https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Functions/Arrow_functions)

# EXERCISE - CREATING A CALLBACK FUNCTION, PART 2


## LOCATION

- `starter-code > 1-callback-exercise`

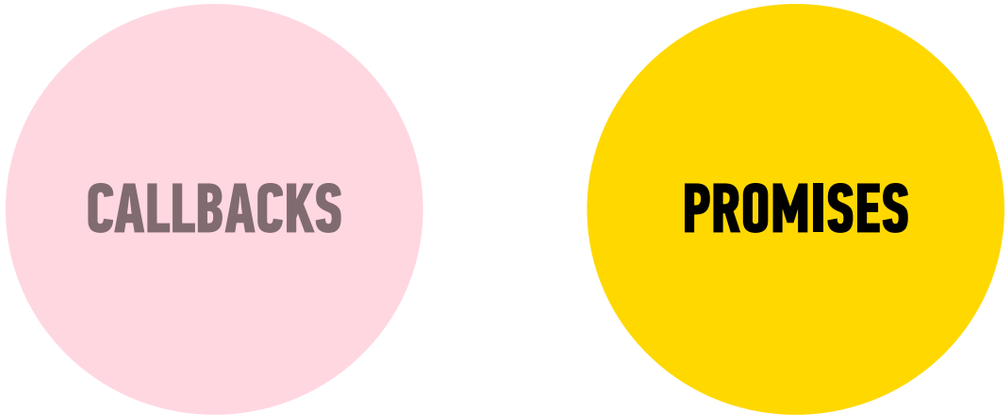
## TIMING

*10 min*

1. In your editor, return to script.js.
2. Follow the instructions in Part 2 to allow the process function to accept values as additional parameters, and to pass those values when calling the callback function.
3. Test your work in the browser and verify that you get the expected results.
4. BONUS: Make the same changes to your code that uses arrow functions.

# Promises & Fetch

# APPROACHES TO ASYNCHRONOUS PROGRAM FLOW



# PROMISES

traditional callback:

```
doSomething(successCallback, failureCallback);
```

callback using a promise:

```
doSomething().then(
  // work with result
).catch(
  // handle error
);
```

# MULTIPLE CALLBACKS — TRADITIONAL CODE

```
doSomething(function(result) {
  doSomethingElse(result, function(newResult) {
    doThirdThing(newResult, function(finalResult) {
      console.log('Got the final result: ' + finalResult);
    }, failureCallback);
  }, failureCallback);
}, failureCallback);
```

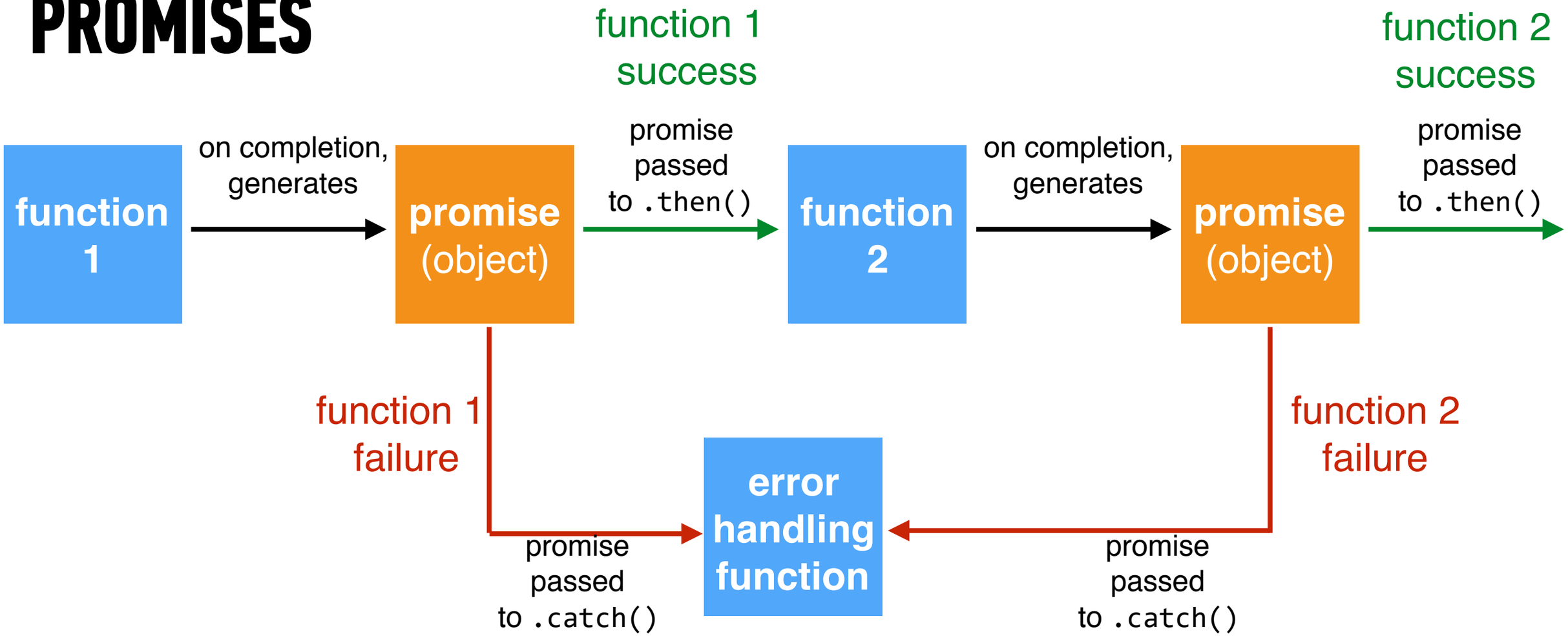
# MULTIPLE CALLBACKS WITH PROMISES

```
doSomething().then(function(result) {
  return doSomethingElse(result);
})
.then(function(newResult) {
  return doThirdThing(newResult);
})
.then(function(finalResult) {
  console.log('Got the final result: ' + finalResult);
})
.catch(function(error) {
  console.log(‘There was an error');
});
```

# ERROR HANDLING WITH PROMISES

```
doSomething().then(function(result) {
  return doSomethingElse(result);
})
.then(function(newResult) {
  return doThirdThing(newResult);
})
.then(function(finalResult) {
  console.log('Got the final result: ' + finalResult);
})
.catch(function(error) {
  console.log(‘There was an error');
});
```

# PROMISES


function 1 success
function 2 success
function 1
on completion, generates
promise (object)
promise passed to .then()
function 2
on completion, generates
promise (object)
promise passed to .then()
function 1 failure
function 2 failure
error handling function
promise passed to .catch()
promise passed to .catch()

# FETCH

```
fetch(url).then(function(response) {
  if(response.ok) {
    return response.json();
  } else {
  throw 'Network response was not ok.’;
  }
}).then(function(data) {
  // DOM manipulation
}).catch(function(error) {
  // handle lack of data in UI
});
```

### Fetch

```
fetch(url).then(function(res) {
  if(res.ok) {
    return res.json();
  } else {
    throw ‘problem';
  }
}).then(function(data) {
  // DOM manipulation

}).catch(function(error) {
  // handle lack of data in UI
});
```

### jQuery .get()

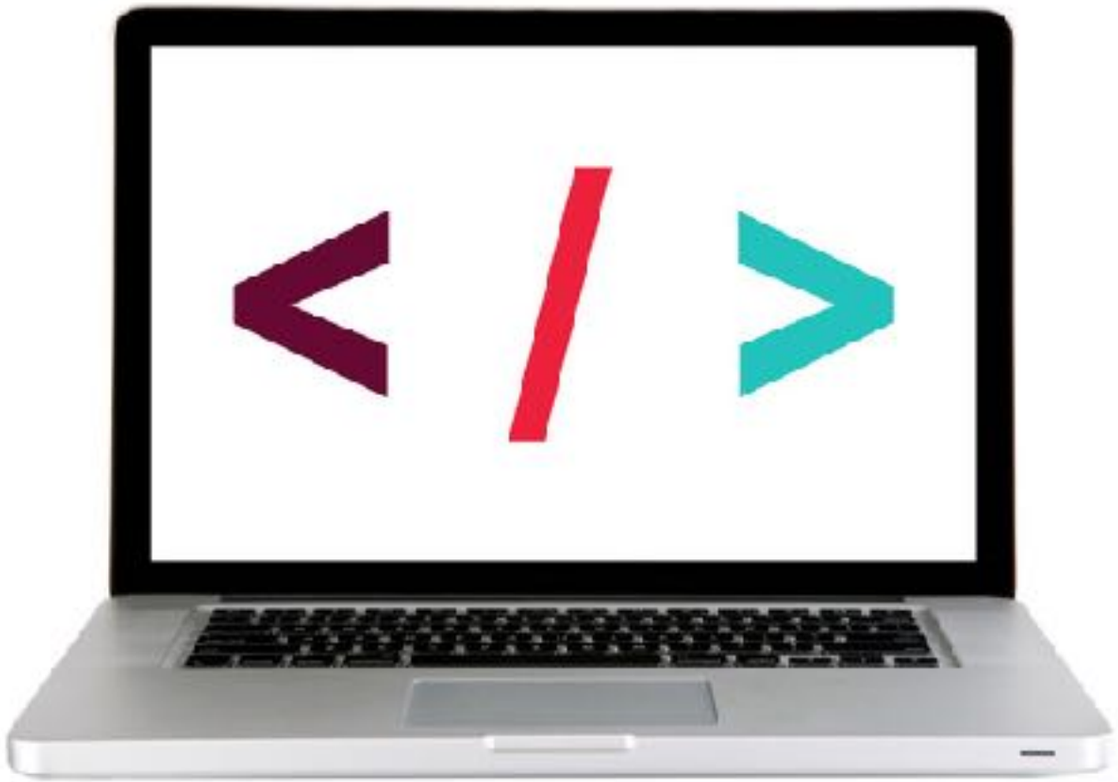
```
$.get(url).done(function(data) {
  // DOM manipulation
})

.fail(function(error) {
  // handle lack of data in UI
});
```

# ERROR HANDLING FOR INITIAL FETCH REQUEST

```
fetch(url).then(function(response) {
  if(response.ok) {
    return response.json();
  }
  throw 'Network response was not ok.';
}).then(function(data) {
  // DOM manipulation
}).catch(function(error) {
  // handle lack of data in UI
});
```

# LET'S TAKE A CLOSER LOOK



# EXERCISE - FETCH


## LOCATION

- `starter-code > 3-async-exercise`

## TIMING

*until 9:20*

1. In your editor, open script.js.
2. Follow the instructions to add a Fetch request for weather data that uses the results of the existing zip code lookup.

# Exit Tickets!

## (Class #11)

# LEARNING OBJECTIVES - REVIEW

- Describe what asynchronous means in relation to JavaScript
- Pass functions as arguments to functions that expect them.
- Write functions that take other functions as arguments.
- Build asynchronous program flow using promises and Fetch

# NEXT CLASS PREVIEW

## Advanced APIs

- Generate API specific events and request data from a web service.
- Implement a geolocation API to request a location.
- Process a third-party API response and share location data on your website.
- Make a request and ask another program or script to do something.
- Search documentation needed to make and customize third-party API requests.

# Q&A