GENERAL ASSEMBLY

JAVASCRIPT DEVELOPMENT

Sasha Vodnik, Instructor

HELLO!

1. Pull changes from the `svodnik/JS-SF-9-resources` repo to your computer:
   - Open the terminal
   - `cd` to the `~/Documents/JSD/JS-SF-9-resources` directory
   - Type **`git pull`** and press **return**
2. In your code editor, open the following folder: `JS-SF-9-resources/04-functions-scope/starter-code`

JAVASCRIPT DEVELOPMENT

FUNCTIONS & SCOPE

LEARNING OBJECTIVES

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

- Describe how parameters and arguments relate to functions
- Create and call a function that accepts parameters to solve a problem
- Define and call functions defined in terms of other functions
- Return a value from a function using the `return` keyword
- Define and call functions with argument-dependent return values
- Determine the scope of local and global variables
- Create a program that hoists variables

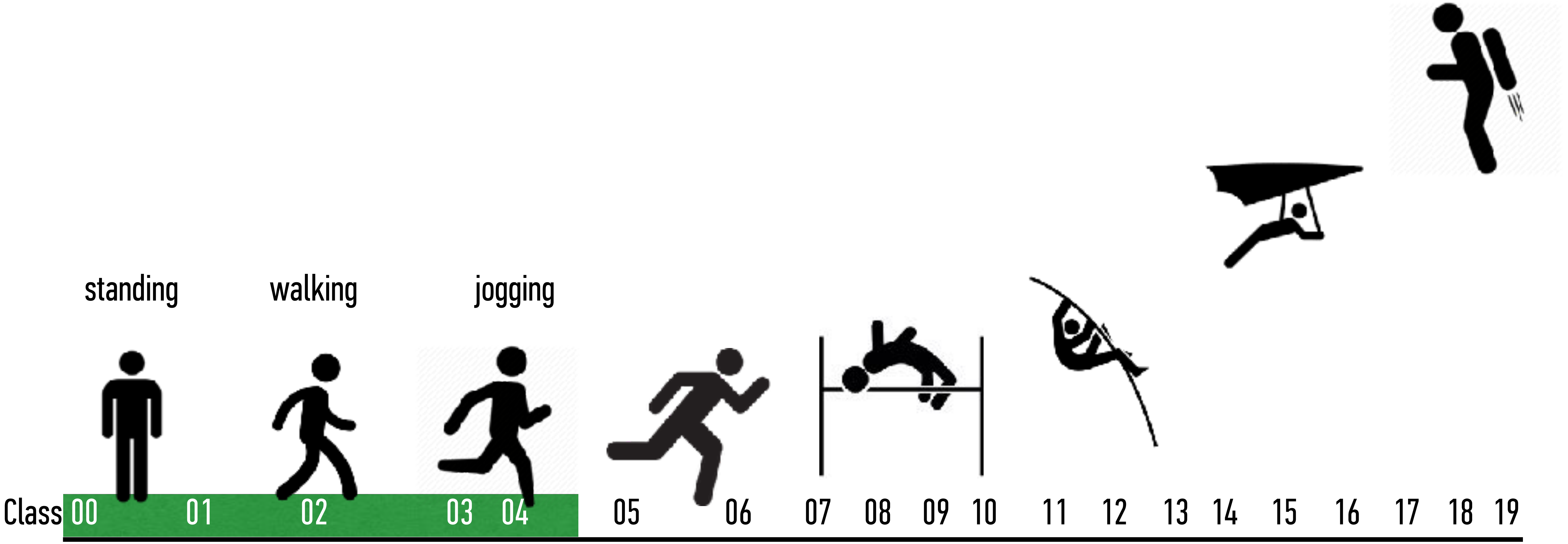
AGENDA

- Functions
- Variable scope
- The `var`, `let`, and `const` keywords
- Hoisting

WEEKLY OVERVIEW

WEEK 3	Functions & scope / (holiday)
WEEK 4	Slackbot Lab / Objects & JSON
WEEK 5	Intro to the DOM / Intro to jQuery

Where we are


standing
walking
jogging
Class 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19

HOMEWORK REVIEW

HOMEWORK — GROUP DISCUSSION

EXERCISE

TYPE OF EXERCISE

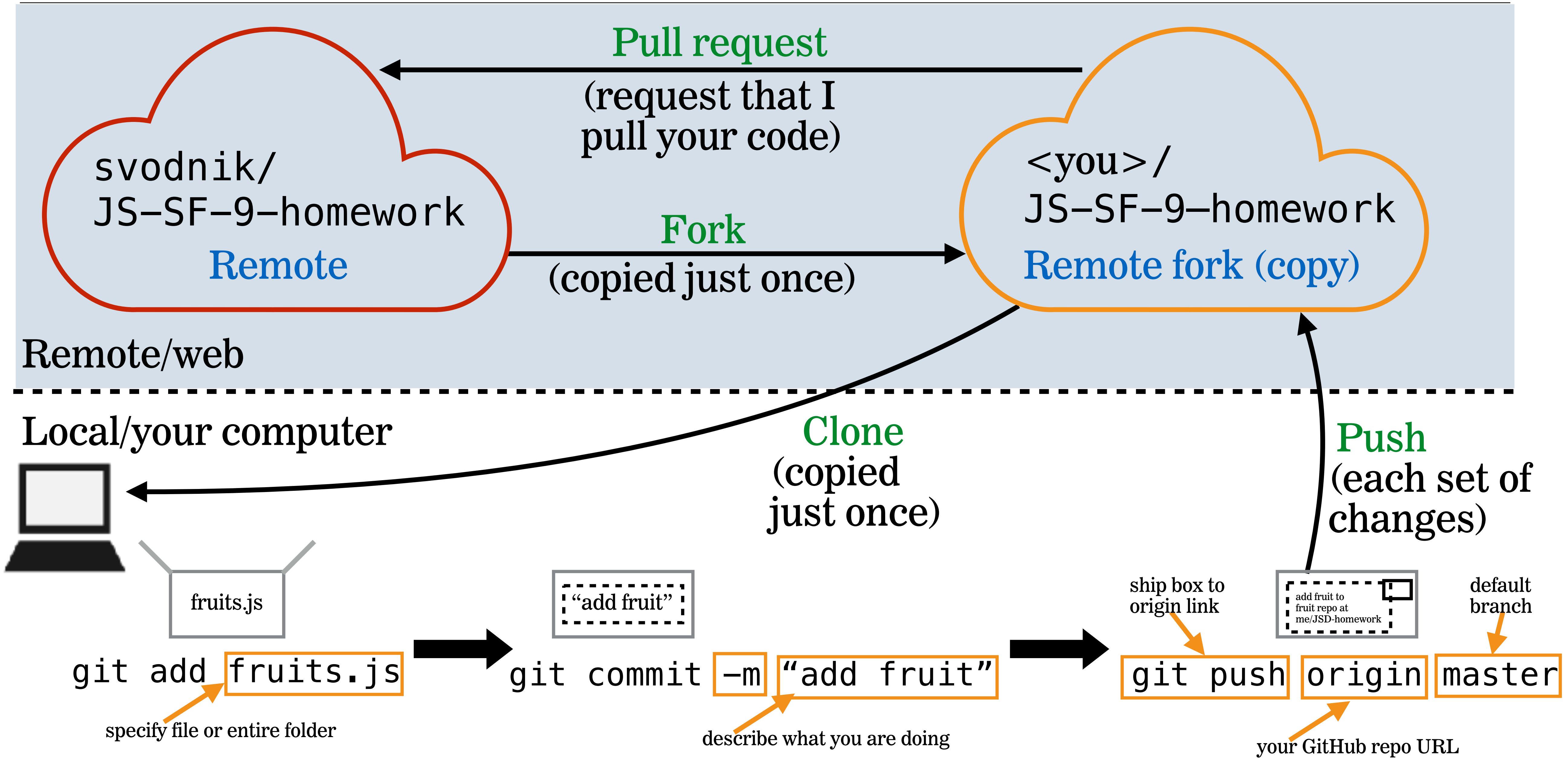
- Groups of 3

TIMING

10 min

1. Take turns showing and explaining your code.
2. Share 1 thing you’re excited about being able to accomplish.
3. Have each person in the group note 1 thing they found challenging for the homework. Discuss as a group how you think you could solve each problem.
4. Did you work on the Random Address Generator bonus exercise? Show your group what you did!

USING THE JS-SF-9-HOMEWORK REPO

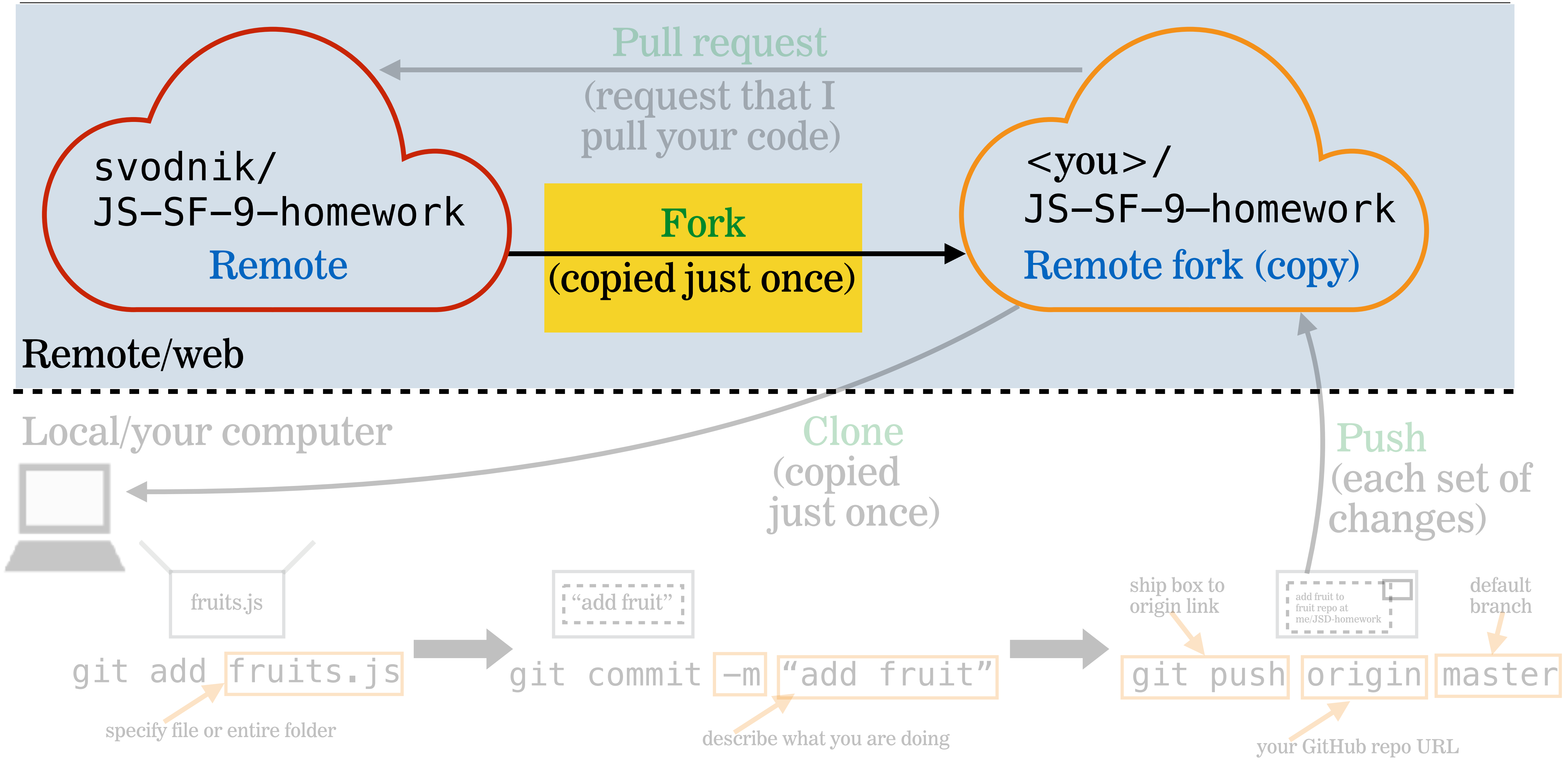


SUBMIT HOMEWORK: SETUP (ONE TIME ONLY)

On github.com:

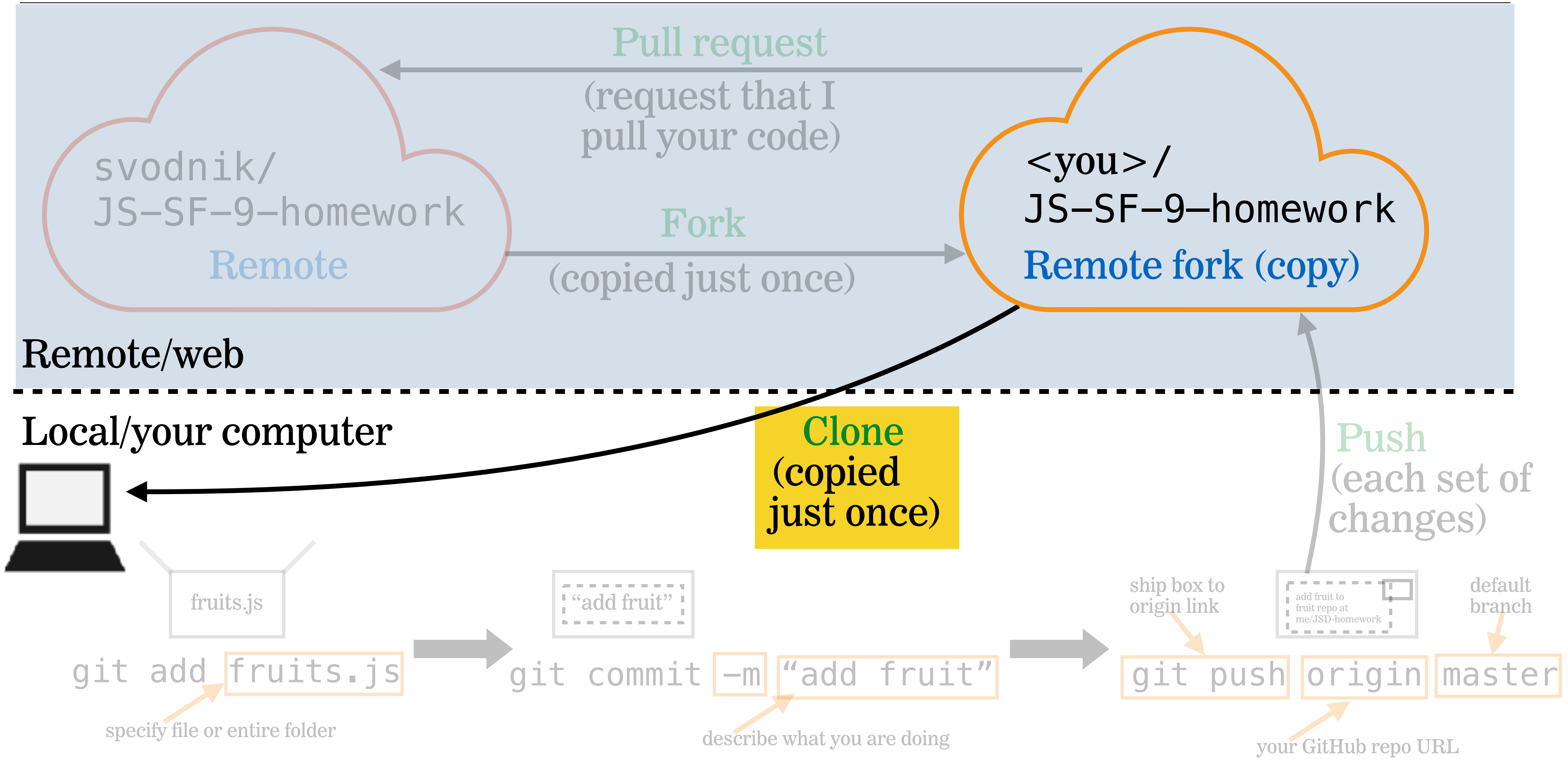
- Open https://github.com/svodnik/JS-SF-9-homework
- Fork this repo to your GitHub account
- Clone your fork to your computer, within your JSD folder

USING THE JS-SF-9-HOMEWORK REPO



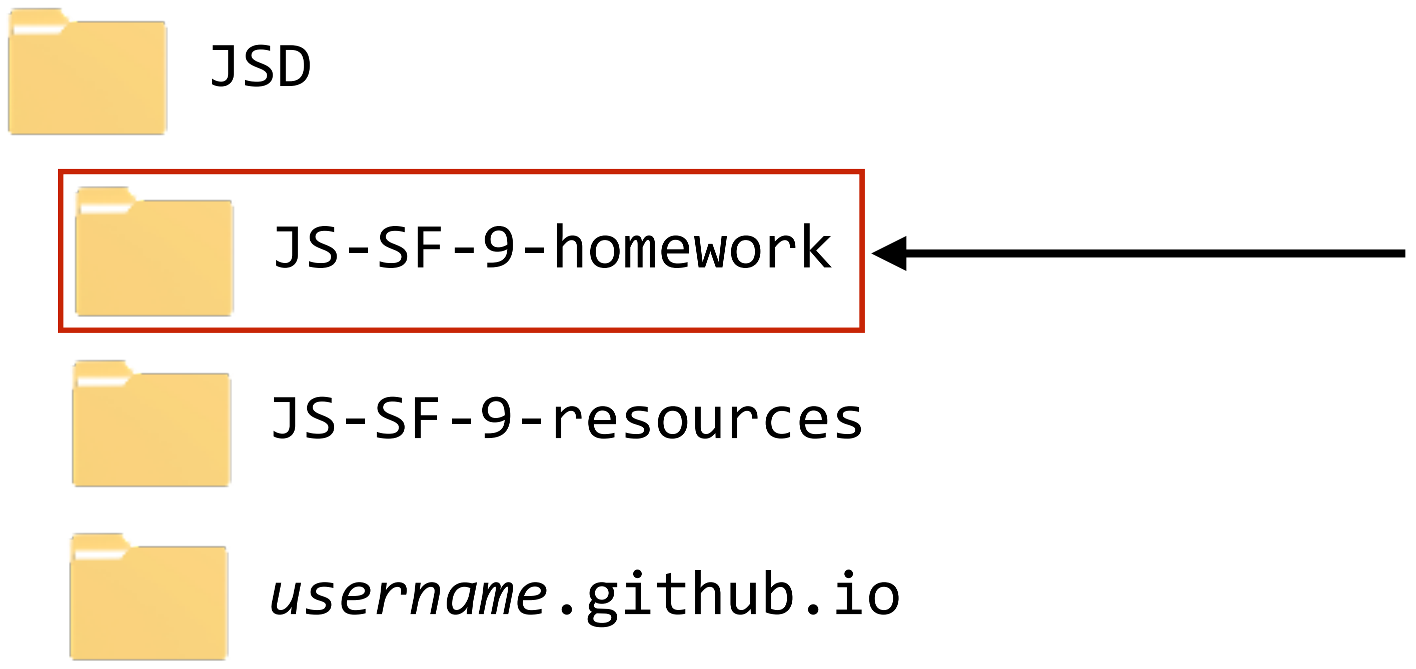
```
git add fruits.js
git commit -m "add fruit"
git push origin master
```

USING THE JS-SF-9-HOMEWORK REPO



```
git add fruits.js
git commit -m "add fruit"
git push origin master
```

HOMEWORK FOLDER LOCATION

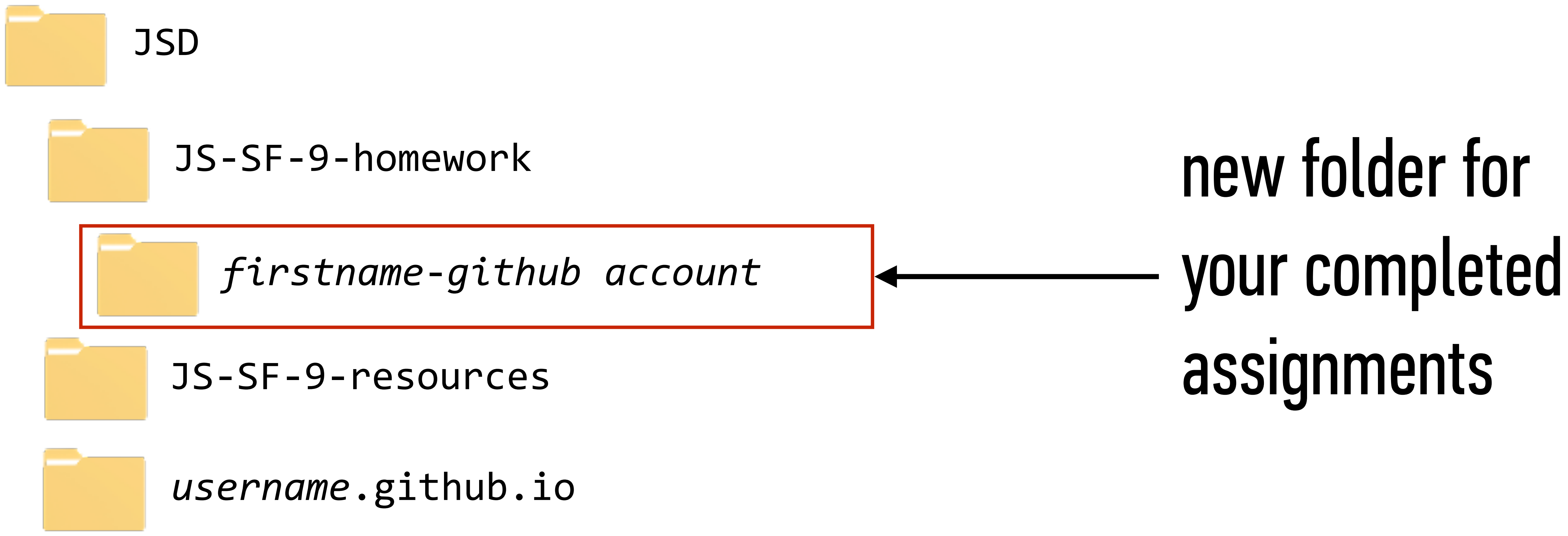


new folder for your clone of the homework repo

SUBMIT HOMEWORK: SETUP (CONTINUED)

- Within your new `JS-SF-9-homework` folder, create a new subfolder and name it your first name, a hyphen, and your github name. For instance, Sasha's folder would be `Sasha-svodnik`.

PERSONAL ASSIGNMENTS FOLDER LOCATION


JSD
JS-SF-9-homework
firstname-github account
JS-SF-9-resources
username.github.io
new folder for your completed assignments

SETUP DONE!

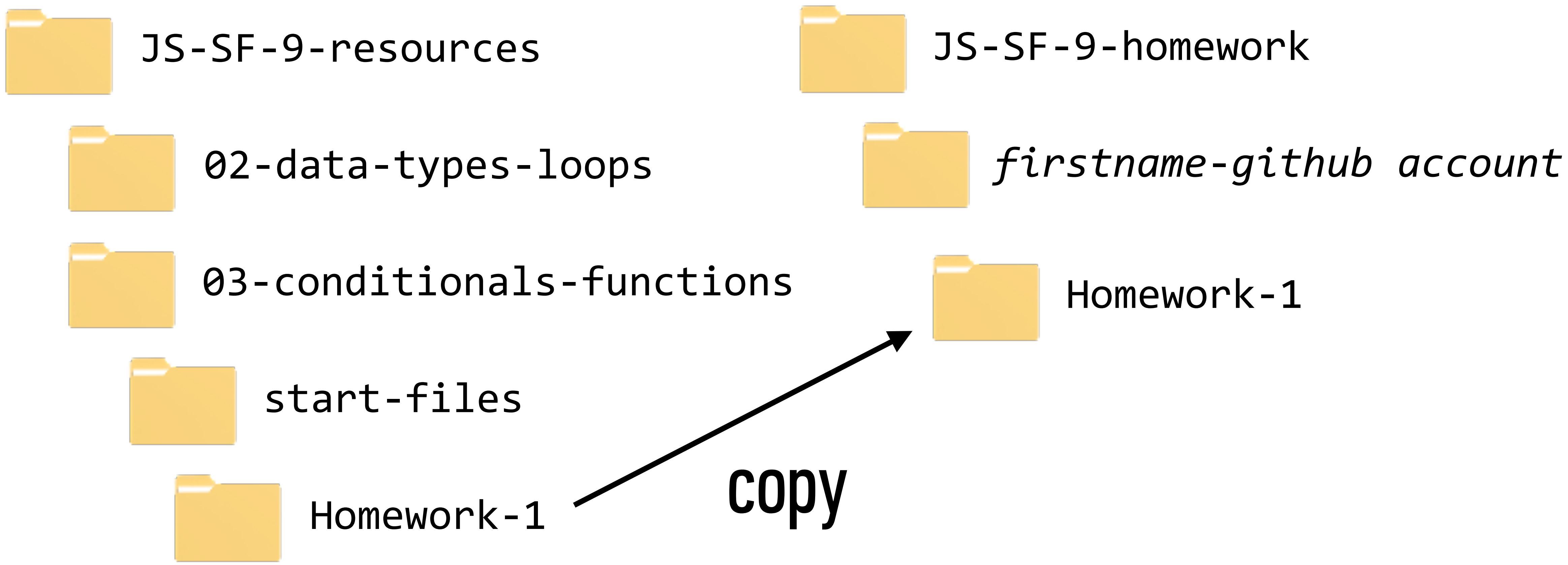
- Reminder: Now that you've completed the preceding setup, you never have to do it again!
- Each time you submit homework for the rest of this course, you'll repeat only the steps that follow.

SUBMIT HOMEWORK: STEP 1

In Finder:

- navigate to *`firstname-username`* folder (example: `Sasha-svodnik`)
- copy your completed `Homework-1` folder from last Thursday into your *`firstname-username`* folder.

SUBMIT HOMEWORK: STEP 1 ILLUSTRATION

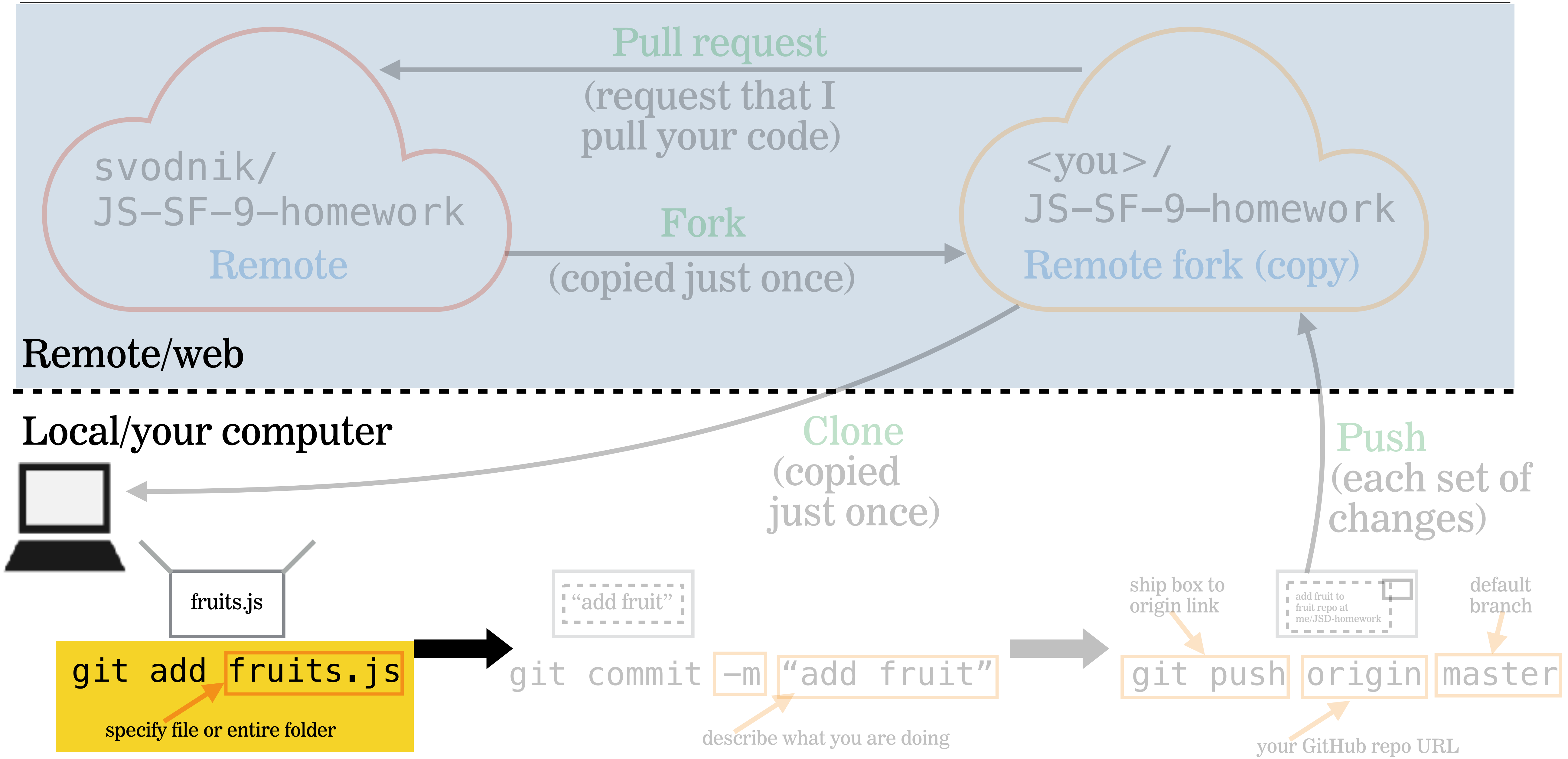


SUBMIT HOMEWORK: STEP 2

In Terminal:

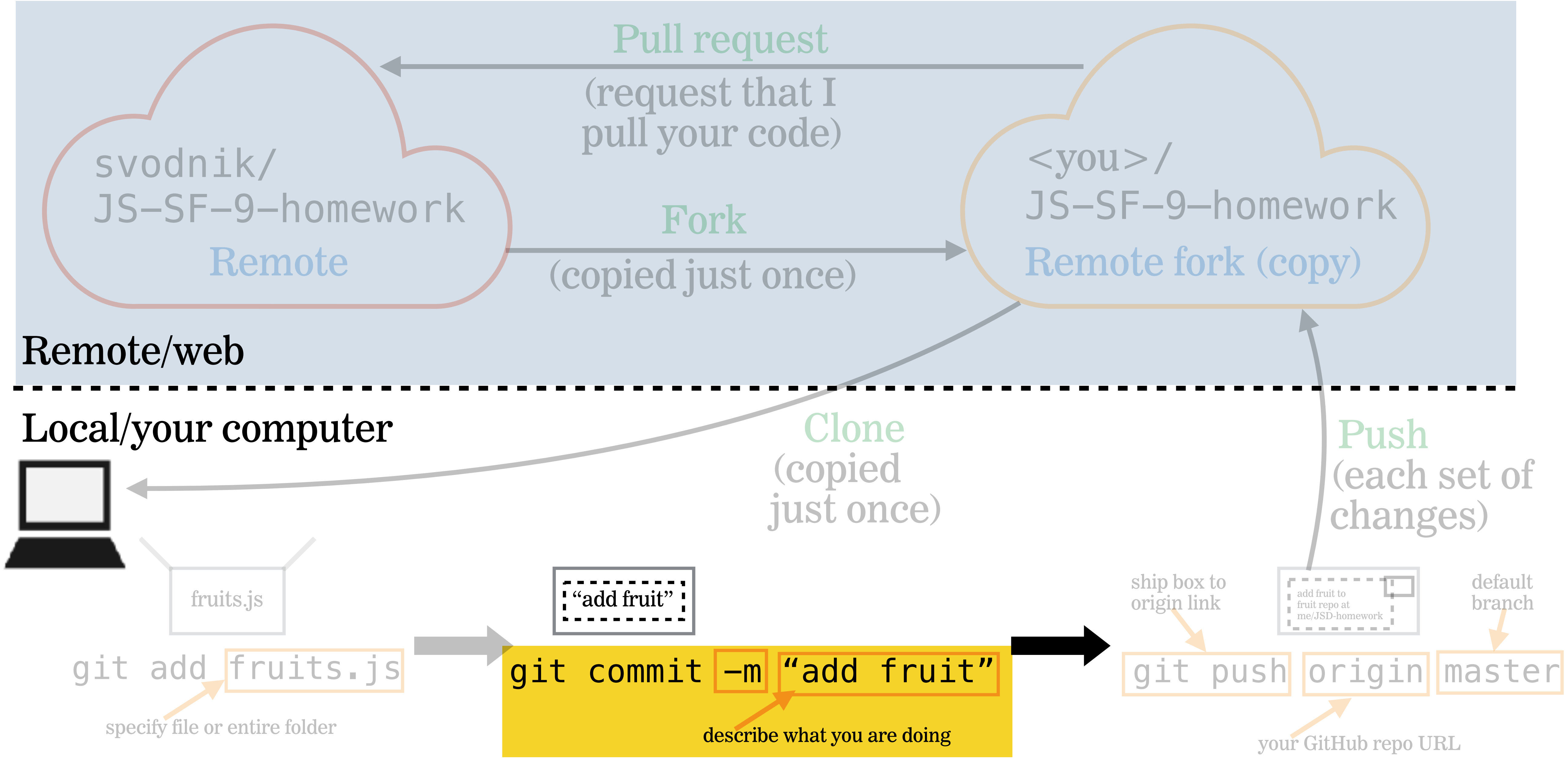
- navigate to *`firstname-username`* folder
- `git add .`
- `git commit -m “submitting Homework 1”`
- `git push origin master`

USING THE JS-SF-9-HOMEWORK REPO

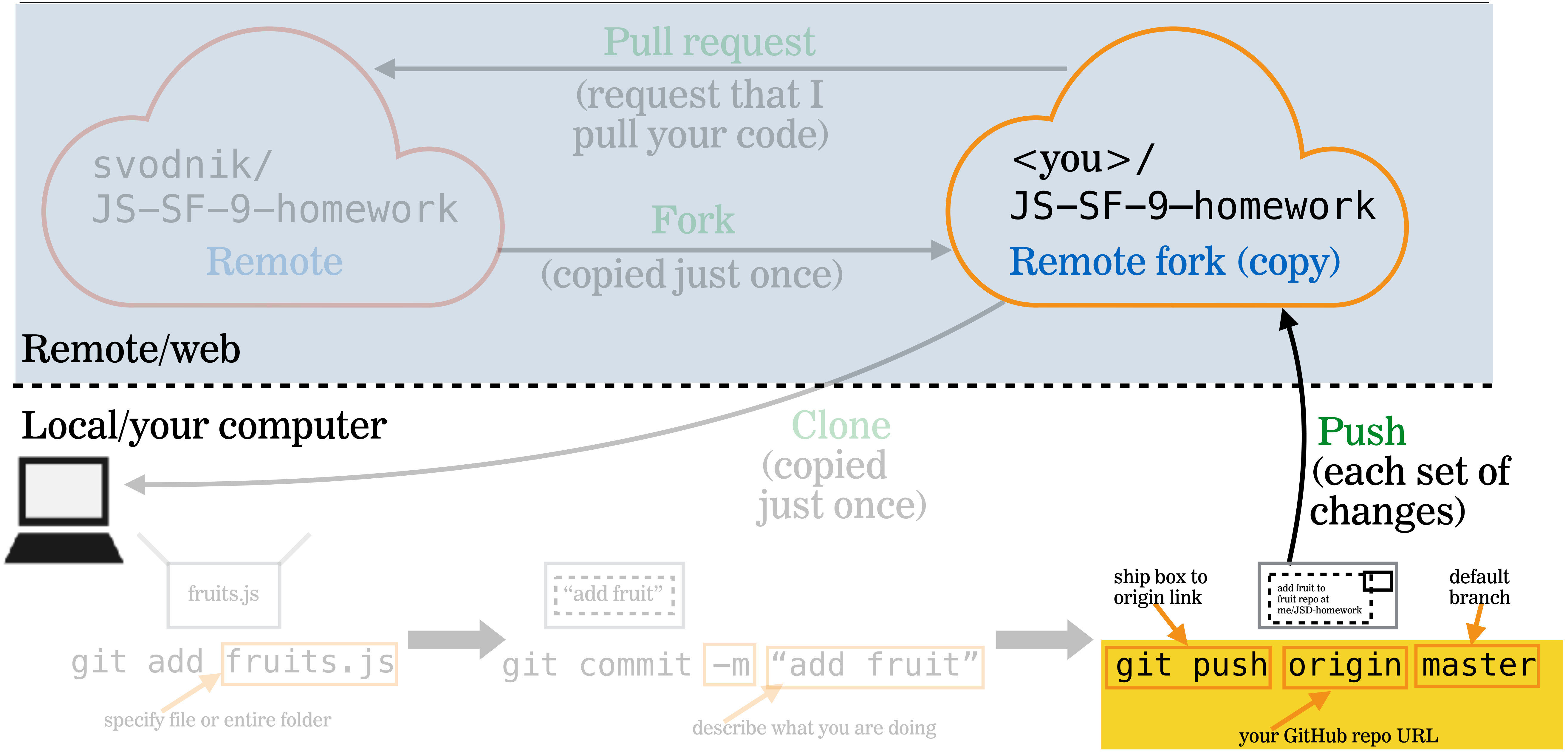


```
git add fruits.js
git commit -m "add fruit"
git push origin master
```

USING THE JS-SF-9-HOMEWORK REPO



USING THE JS-SF-9-HOMEWORK REPO



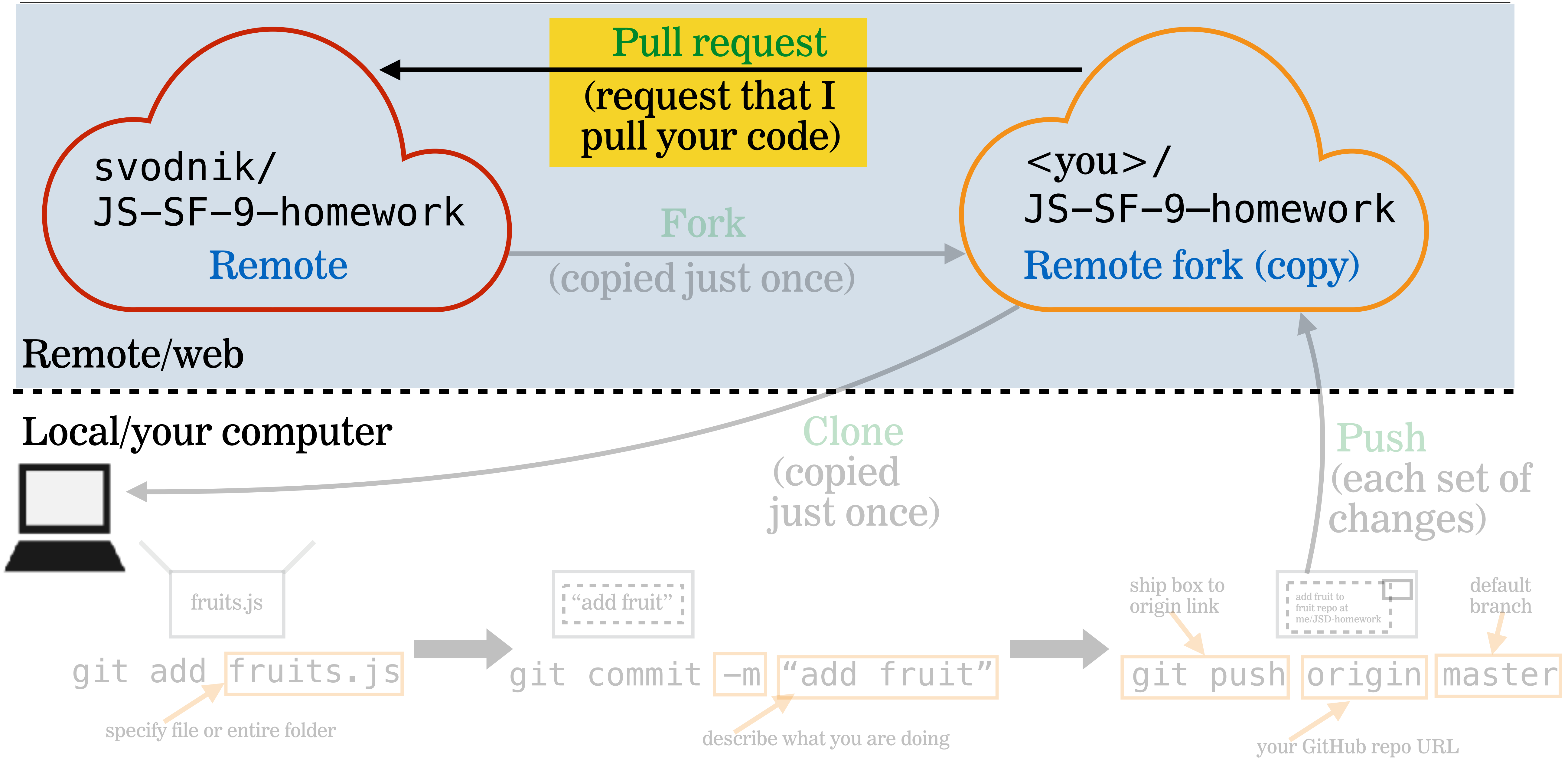
```
git add fruits.js
git commit -m "add fruit"
git push origin master
```

SUBMIT HOMEWORK: STEP 3

In Browser:

- Go to your fork of `JS-SF-9-homework` on github.com
- click **New pull request**
- click **Create pull request**
- click **Create pull request** (again)

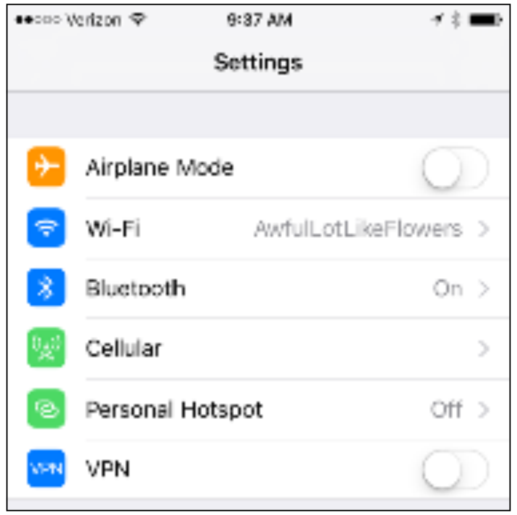
USING THE JS-SF-9-HOMEWORK REPO



```
git add fruits.js
git commit -m "add fruit"
git push origin master
```

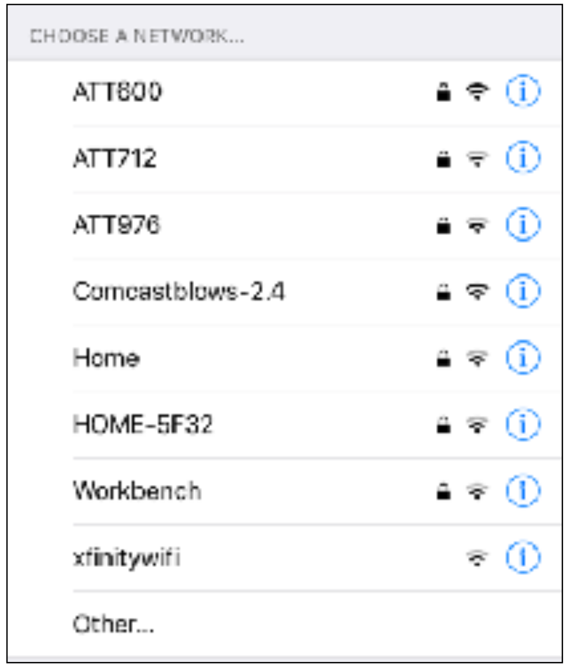
Why do we use different networks to connect to the Internet when we're in different places?

- home
- GA
- in a car
- on BART/MUNI


●●○○○ Verizon 9:37 AM

Settings

Airplane Mode	
Wi-Fi	AwfulLotLikeFlowers >
Bluetooth	On >
Cellular	>
Personal Hotspot	Off >
VPN	


CHOOSE A NETWORK...

ATT800
ATT712
ATT976
Comcastblows-2.4
Home
HOME-5F32
Workbench
xfinitywifi
Other...

FUNCTIONS

FUNCTIONS

GROUP STEPS

Allow us to group a series of statements together to perform a specific task

REUSABLE

We can use the same function multiple times

STORE STEPS

Not always executed when a page loads. Provide us with a way to 'store' the steps needed to achieve a task.

DRY =
DON'T
REPEAT
YOURSELF

FUNCTION DECLARATION SYNTAX

```
function name(parameters) {
  // do something
}
```

FUNCTION DECLARATION EXAMPLE

```
function speak() {
  console.log(“Hello!”);
}
```

FUNCTION EXPRESSION SYNTAX

```
let name = function(parameters) {
  // do something
};
```

FUNCTION EXPRESSION EXAMPLE

```
let speak = function() {
  console.log(“Hello!”);
};
```

ARROW FUNCTION SYNTAX

```
let name = (parameters) => {
  // do something
};
```

ARROW FUNCTION EXAMPLE

```
let speak = () => {
  console.log(“Hello!”);
};
```

CALLING A FUNCTION

```
function pickADescriptiveName() {
    // do something
}
```

To run the function, we need to *call* it. We can do so like this:

```
pickADescriptiveName();
```

$\underbrace{\texttt{pickADescriptiveName();}}_{\text{Function name + parentheses}}$

EXERCISE — WRITING FUNCTIONS

EXERCISE

KEY OBJECTIVE

- Practice defining and executing functions

TYPE OF EXERCISE

- Individual/paired

LOCATION

- `starter-code > 0-functions-exercise` (part 1)

EXECUTION

4 min 1. Follow the instructions under Part 1

FUNCTION EXPRESSION VS FUNCTION DECLARATION

- Function expressions define functions that can be used anywhere in the scope where they're defined.
- You can call a function that is defined using a function declaration before the part of the code where you actually define it.
- Function expressions must be defined before they are called.

PARAMETERS

DOES THIS CODE SCALE?

```
function helloVal () {
  console.log('hello, Val');
}

function helloOtto () {
  console.log('hello, Otto')
}
```

USING A PARAMETER

parameter

```
function sayHello(name) {
  console.log('Hello ' + name);
}
```

argument

```
sayHello('Val');
=> 'Hello Val'

sayHello('Otto');
=> 'Hello Otto’
```

USING MULTIPLE PARAMETERS

multiple parameter names separated by commas

```
function sum(x, y, z) {
  console.log(x + y + z)
}

sum(1, 2, 3);
=> 6
```

USING DEFAULT PARAMETERS

default value to set for parameter if no argument is passed when the function is called

```
function multiply(x, y = 2) {
  console.log(x * y)
}

multiply(5, 6);
=> 30 // result of 5 * 6 (both arguments)
multiply(4);
=> 8 // 4 (argument) * 2 (default value)
```

EXERCISE — READING FUNCTIONS

EXERCISE

KEY OBJECTIVE

- Given a function and a set of arguments, predict the output of a function

TYPE OF EXERCISE

- Groups of 2 - 3

LOCATION

- `starter-code > 0-functions-exercise` (part 2)

EXECUTION

3 min

1. Look at Part 2 A and B. Predict what will happen when each function is called.

EXERCISE — READING FUNCTIONS

EXERCISE

KEY OBJECTIVE

- Create and call a function that accepts parameters to solve a problem

TYPE OF EXERCISE

- Groups of 2 - 3

LOCATION

- `starter-code > 0-functions-exercise` (part 3)

EXECUTION

8 min

1. See if you can write one function that takes some parameters and combines the functionality of the *makeAPizza* and *makeAVeggiePizza* functions.
2. BONUS: Create your own function with parameters. This function could do anything!

EXERCISE — FUNCTIONS

EXERCISE

KEY OBJECTIVE

- Describe how parameters and arguments relate to functions

TYPE OF EXERCISE

- Turn and Talk

EXECUTION

1 min

1. Summarize why we would use functions in our programs. What purpose do they serve?
2. What is a parameter? What is an argument? How are parameters and arguments useful?

THE `return` STATEMENT

`return` STATEMENT

- Ends function’s execution
- Returns a value — the result of running the function

`return` STOPS A FUNCTION'S EXECUTION

```
function speak(words) {
  return words;

  // The following statements will not run:
  let x = 1;
  let y = 2;
  console.log(x + y);
}
```

`console.log()` vs `return`

`console.log()`

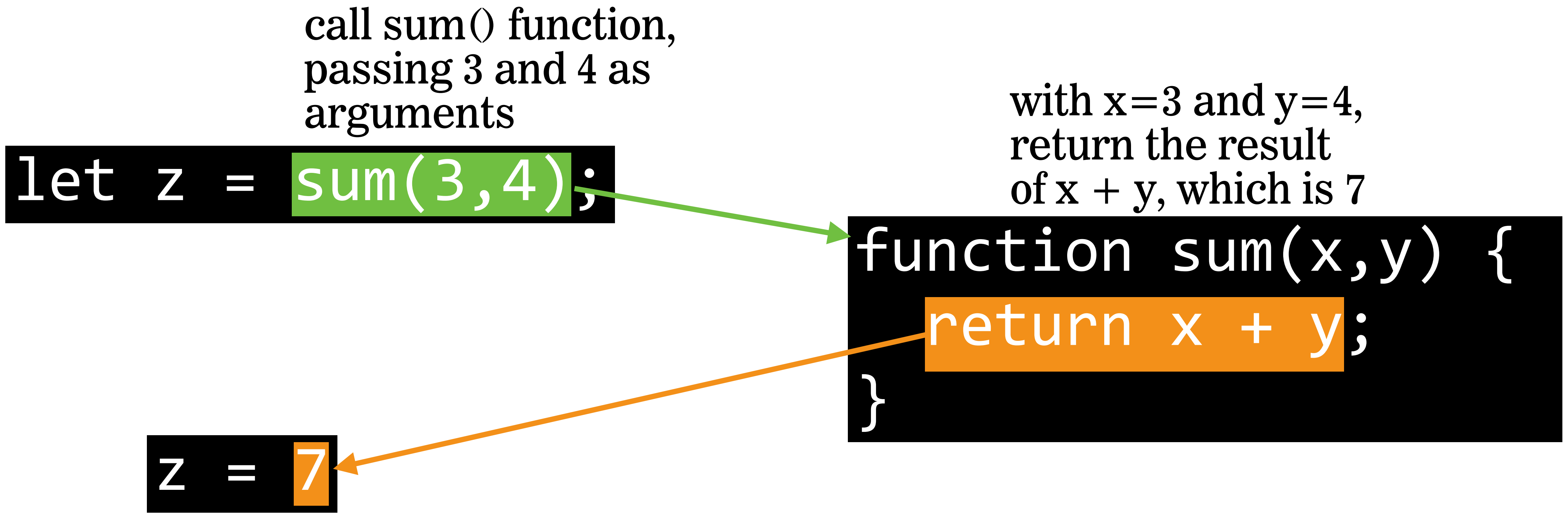
vs

`return`

- Write a value at any point in a program to the browser console
- Helpful for developer in debugging
- Not seen by user or used by app

- Sends a value back wherever the current statement was triggered
- Can use a function to get a value and then use that value elsewhere in your app
- Does not appear in the console unless you're executing commands there

return in action



call sum() function, passing 3 and 4 as arguments

```
let z = sum(3,4);
```

with x=3 and y=4, return the result of x + y, which is 7

```
function sum(x,y) {
  return x + y;
}
```

```
z = 7
```

EXERCISE — FUNCTIONS AND PARAMETERS

EXERCISE

KEY OBJECTIVE

- Create and call a function that accepts parameters to solve a problem

TYPE OF EXERCISE

- Individual or pairs

LOCATION

- `starter-code > 1-functions-lab`

EXECUTION

10 min

1. Write code to to calculate a customer's total cost in dollars based on product price, tax rate, shipping cost, and the currency they're using for the purchase (dollars or euros)
2. BONUS: Convert your function to assume a currency of "dollar" by default.

SCOPE

SCOPE

- Describes the set of variables you have access to

GLOBAL SCOPE

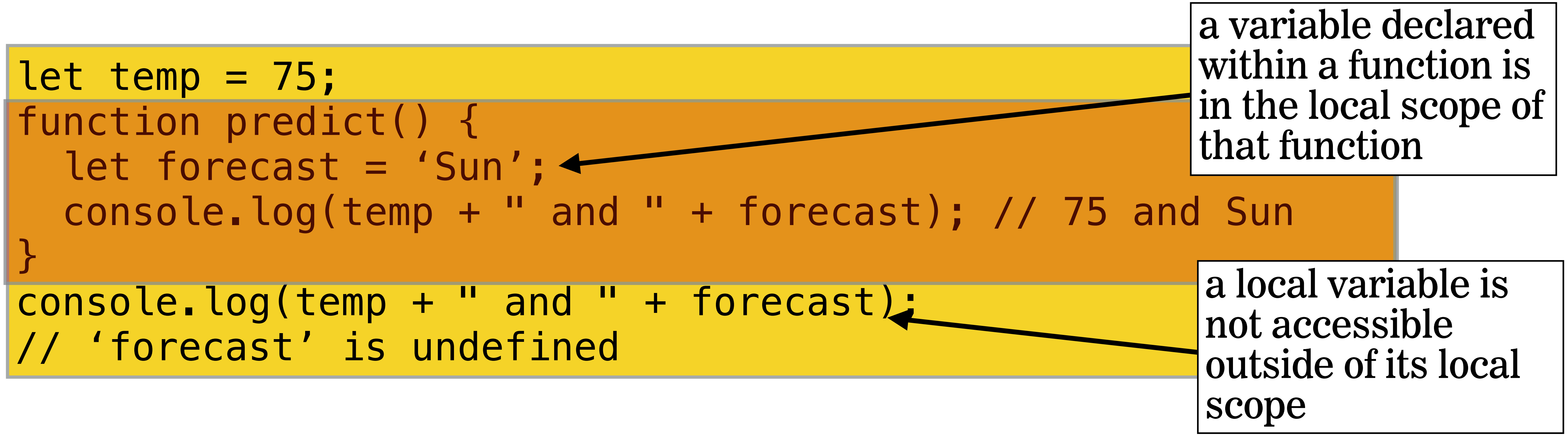
- A variable declared outside of a function is accessible everywhere, even within functions. Such a variable is said to have **global scope**.

a variable declared outside of the function is in the global scope

```
let temp = 75;
function predict() {
  console.log(temp); // 75
}
console.log(temp); // 75
```

LOCAL SCOPE

- A variable declared within a function is not accessible outside of that function. Such a variable is said to have **local scope**.



```
let temp = 75;
function predict() {
  let forecast = ‘Sun’;
  console.log(temp + " and " + forecast); // 75 and Sun
}
console.log(temp + " and " + forecast);
// ‘forecast’ is undefined
```

a variable declared within a function is in the local scope of that function
a local variable is not accessible outside of its local scope

BLOCK SCOPE

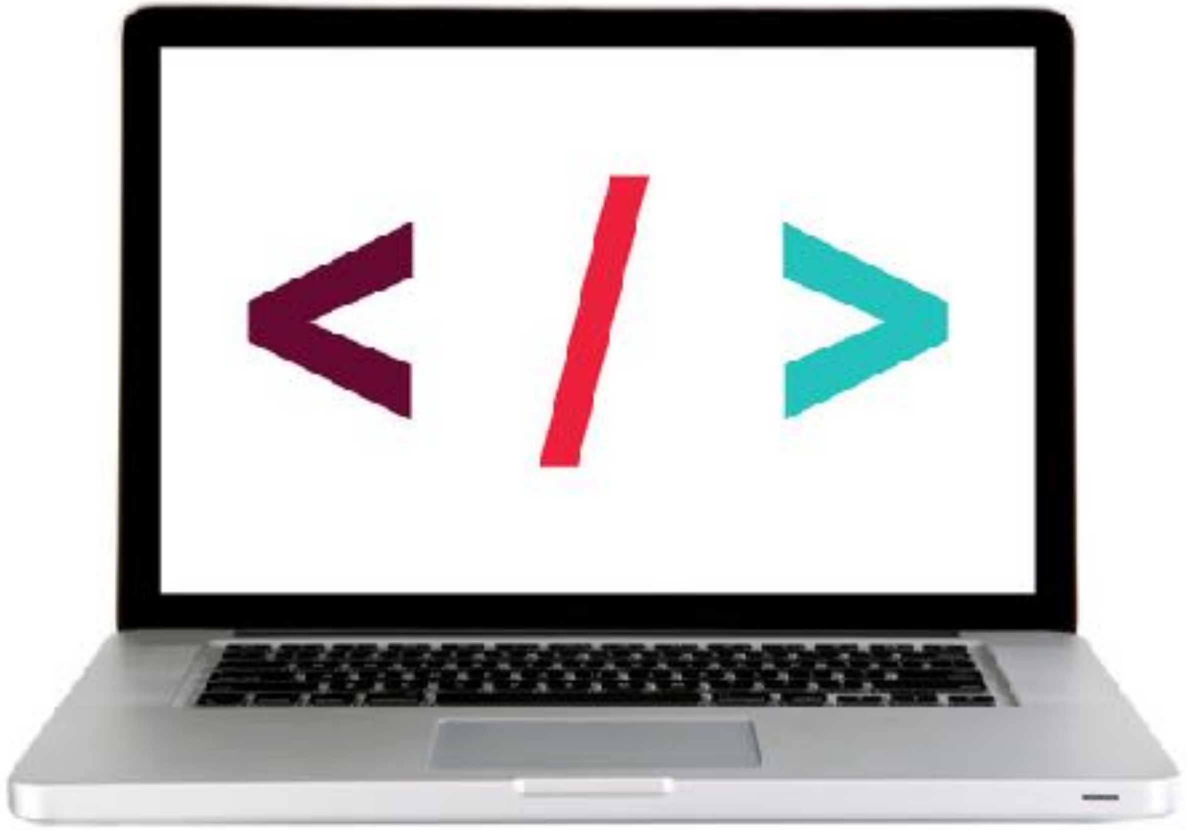
- A variable created with `let` or `const` creates local scope within any block, including blocks that are part of loops and conditionals.
- This is known as **block scope**.

`let` creates a local variable within any block, such as an `if` statement

```
let temp = 75;
if (temp > 70) {
  let forecast = ‘It’s gonna be warm!’;
  console.log(temp + “! ” + forecast); // 75! It’s gonna be warm!
}
console.log(temp + “! " + forecast); // ‘forecast’ is undefined
```

a variable with block scope is not accessible outside of its block

LET'S TAKE A CLOSER LOOK



EXERCISE — SCOPE

EXERCISE

KEY OBJECTIVE

- Determine the scope of local and global variables

TYPE OF EXERCISE

- Turn and Talk

EXECUTION

3 min

1. Describe the difference between global and local scope
2. Collaborate to write code that includes at least one variable with local scope and one variable with global scope

LAB — SCOPE

KEY OBJECTIVE

- Determine the scope of local and global variables

TYPE OF EXERCISE

- Pairs

LOCATION

- `starter code > 3-scope-lab`

EXECUTION

5 min

1. Open the index.html file in your browser, view the console, and examine the error.
2. Follow the instructions in `js > main.js` to complete parts A and B.

`var`, `let`, `const`, AND SCOPE

- `var` obeys the scoping rules we've just seen
  - "generic" way to create variables
- `let` and `const` are newer keywords with different scoping rules
  - local scope within functions **and** within any block (including loops and conditionals)

`var`

- creates local scope only within functions

```
let results = [0,5,2];
```

`let`

- used in the same situations as `var`, but with different scoping rules for code blocks

```
let results = [0,5,2];
```

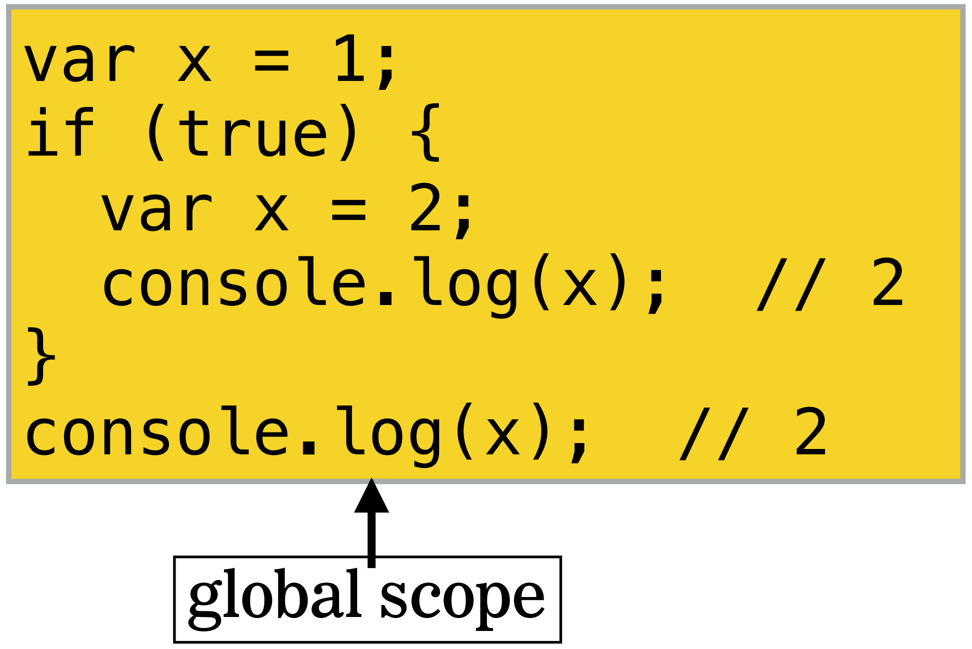
`const`

- used to declare constants
  - **immutable**: once you've declared a value using `const`, you can't change the value in that scope
  - by contrast, variables declared with `var` or `let` are **mutable**, meaning their values can be changed
- some developers use all capital letters for constant names, but this is not required

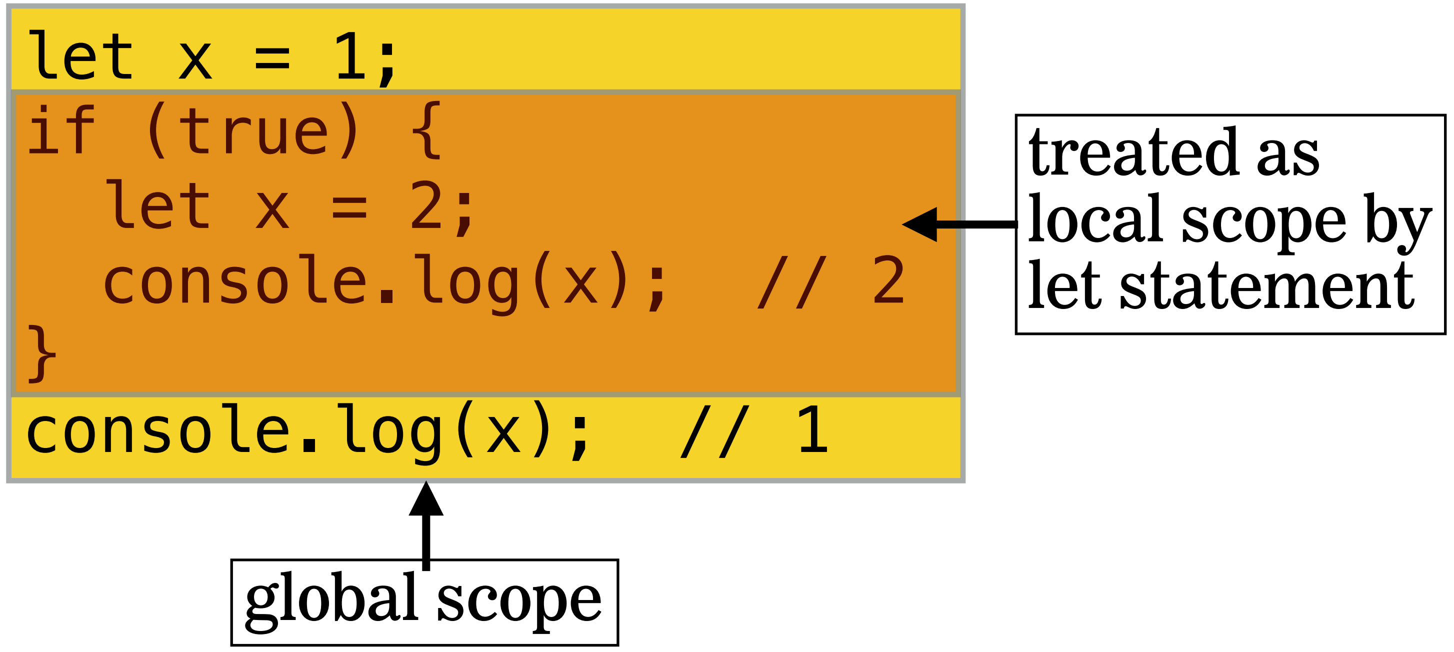
```
const SALESTAX = 0.0875;
```

`let/const vs var`

- `let` & `const` create local scope within any block (including loops and conditionals) but `var` does not



```
var x = 1;
if (true) {
  var x = 2;
  console.log(x);  // 2
}
console.log(x);  // 2
```

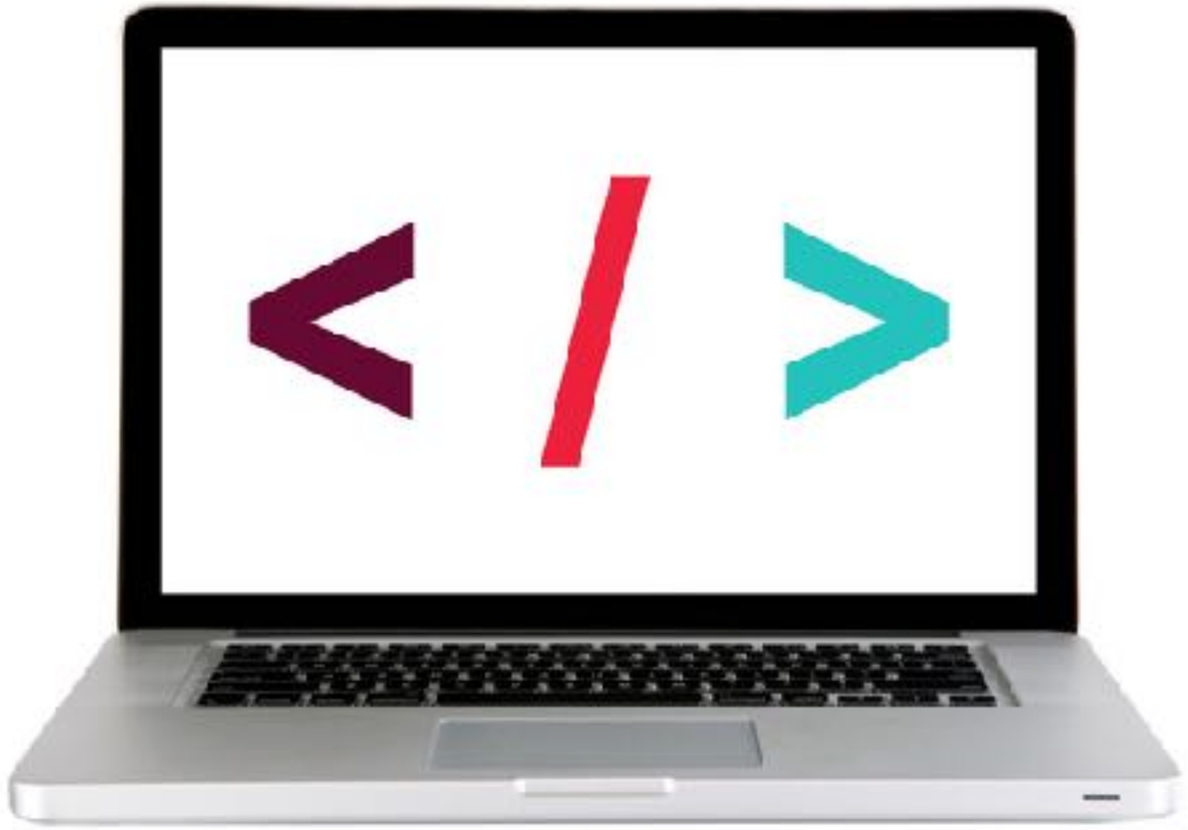


```
let x = 1;
if (true) {
  let x = 2;
  console.log(x);  // 2
}
console.log(x);  // 1
```

`var`, `let`, `const`, AND BROWSER SUPPORT

- `let` and `const` are not supported by older browsers
  - see caniuse.com, search on `let`
- babel.js (babeljs.io) allows you to transpile newer code into code that works with older browsers as well
- we will rely on `const` and `let` in class

LET'S TAKE A CLOSER LOOK



EXERCISE — VAR, LET, AND CONST

EXERCISE

KEY OBJECTIVE

- Distinguish between `var`, `let`, and `const`

TYPE OF EXERCISE

- Individual or pairs

EXECUTION

2 min

1. Draw the table shown on the whiteboard, which compares a few aspects of `var`, `let`, and `const` usage.
2. Complete the table.

`var`, `let`, AND `const`

keyword	local scope	can you change the value in the current scope?	browser support
`var`	within the code block of a **function** only	yes	all browsers
`let`	within any code block	yes	**only modern browsers**
`const`	within any code block	**no**	**only modern browsers**

LAB — LET, VAR, AND CONST

KEY OBJECTIVE

- Determine the scope of local and global variables

TYPE OF EXERCISE

- Pairs

LOCATION

- `starter code > 4-let-var-const-lab`

EXECUTION

5 min

1. Open the index.html file in your browser, view the console, and examine the error.
2. Follow the instructions in `js > app.js` to complete parts A and B.

HOISTING

- JavaScript’s behavior of moving declarations to the top of a scope.
- This means that you are able to use a function or a variable before it has been declared.
- Variables declared with `var` are hoisted
- Variables declared with `let` and `const` are not hoisted

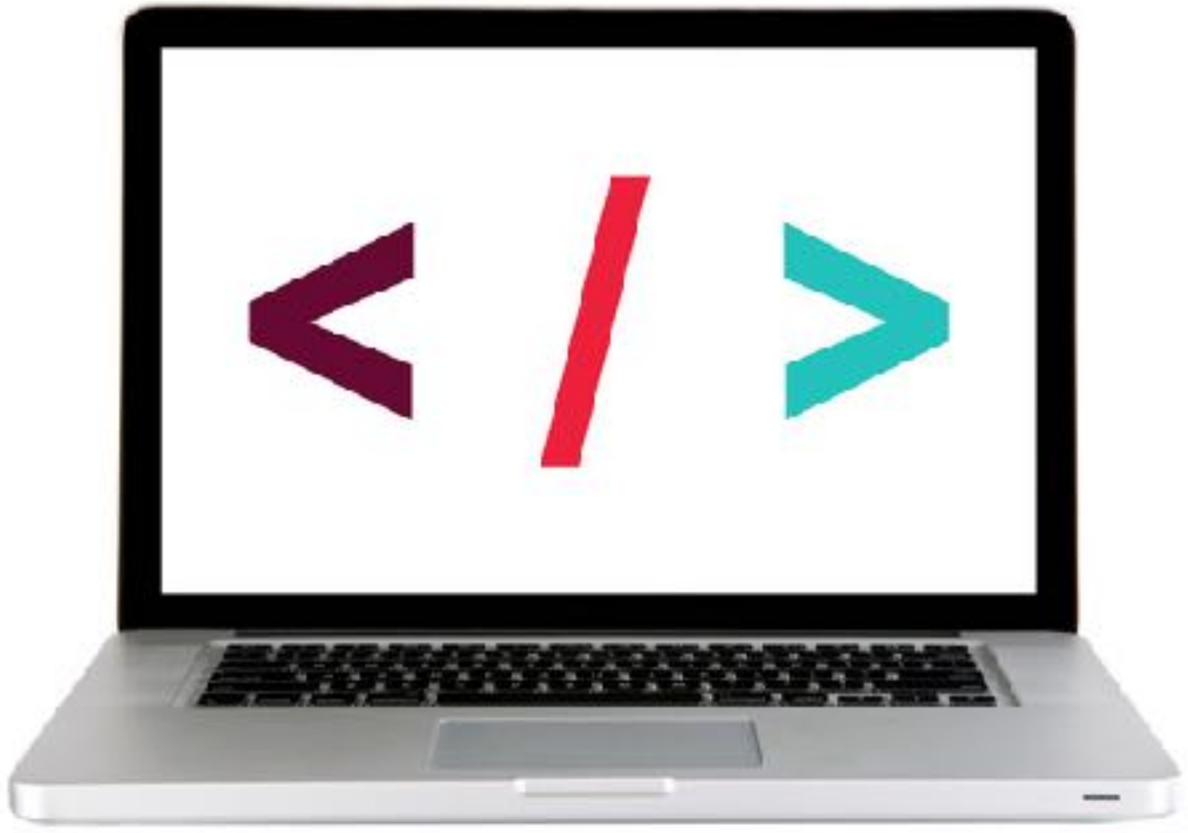
FUNCTIONS AND HOISTING

- Function expressions are treated like other variables
  - when declared with `var`, only the name is hoisted, not the value
  - when declared with `let`, they are not hoisted
- Function declarations are treated differently
  - the code for the entire function is hoisted along with a function declaration

FUNCTIONS AND HOISTING

function type	function name hoisted?	function content hoisted?
function declaration	yes	yes
function expression using `let`	no	no
function expression using var	yes	no

LET'S TAKE A CLOSER LOOK



EXERCISE — HOISTING

EXERCISE

KEY OBJECTIVE

- Create a program that hoists variables

TYPE OF EXERCISE

- Groups of 3

EXECUTION

2 min

1. Examine the code on the whiteboard.
2. Discuss with your group which parts of the code are hoisted.
3. Predict the result of each of the first four statements.

Exit Tickets!

(Class #4)

LEARNING OBJECTIVES – REVIEW

- Describe how parameters and arguments relate to functions
- Create and call a function that accepts parameters to solve a problem
- Define and call functions defined in terms of other functions
- Return a value from a function using the `return` keyword
- Define and call functions with argument-dependent return values
- Determine the scope of local and global variables
- Create a program that hoists variables

NEXT CLASS PREVIEW

Hubot Lab

- Install and configure all utilities needed to run a Hubot
- Write scripts that allow your Hubot to interact with users of the class Slack organization

Q&A