

JAVASCRIPT DEVELOPMENT

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HELLO!

1. Pull changes from the `svodnik/JS-SF-13-resources` repo to your computer
2. Open the `14-closures-this` folder in your code editor

JAVASCRIPT DEVELOPMENT

CLOSURES & this

LEARNING OBJECTIVES

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

- › Understand and explain closures.
- › Instantly invoke functions.
- › Implement the module pattern in your code.
- › Understand and explain Javascript context.

AGENDA

- Closures
- IIFEs
- Module pattern
- `this`

CLOSURES & THIS

WEEKLY OVERVIEW

WEEK 9

Closures & this / CRUD & Firebase

WEEK 10

Deploying your app / Final project lab

WEEK 11

React / Final Project Presentations

CLOSURES & THIS

HOMEWORK REVIEW

ACTIVITY



EXERCISE

KEY OBJECTIVE

- Review Feedr project and show off your work

TYPE OF EXERCISE

- Pairs

TIMING

10 min

1. Open Feedr sites on laptops and display them proudly!
2. Give feedback to your peers: "I like" and "I wish/wonder"
3. Share a challenge you ran into in your project and discuss how other group members may have worked with it.
4. Did you incorporate template literals in your project? Show your group how you did it!

ACTIVITY



EXERCISE

KEY OBJECTIVE

- Check in on final projects

TYPE OF EXERCISE

- Pairs

TIMING

6 min

1. Share what you have done so far on your final project (notes/outline, wireframe, pseudocode, basic functionality...)
2. Share your next step. If you're not sure, share where you are right now and brainstorm with your group what next steps might look like.

Exit Ticket Questions

1. What's going on with starting with `$(function() {` to check if the DOM is ready?
2. I noticed that in `$.each`, if I pass a function in with `function() {}` vs. the compact notation `() => {}` then this has different meaning! I would like to try and understand why that is
3. Is it a good idea to learn the `class` syntax? Or do most apps avoid it for compatibility reasons?

THE MODULE PATTERN



**OBJECT-
ORIENTED
CODE**



CLOSURES



IIFES

CLOSURES

THE MODULE PATTERN



**OBJECT-
ORIENTED
CODE**


CLOSURES

IIFES

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

CLOSURES

- A **closure** is an inner function that has access to the outer (enclosing) function's variables.

```
function getTemp() {  
  let temp = 75;  
  let tempAccess = function() {  
    console.log(temp);  
  }  
  return tempAccess;  
}
```

the tempAccess()
function is a
closure

outer function
getTemp() returns
a reference to the
inner function
tempAccess()

BUILDING BLOCKS OF CLOSURES

1. nested functions

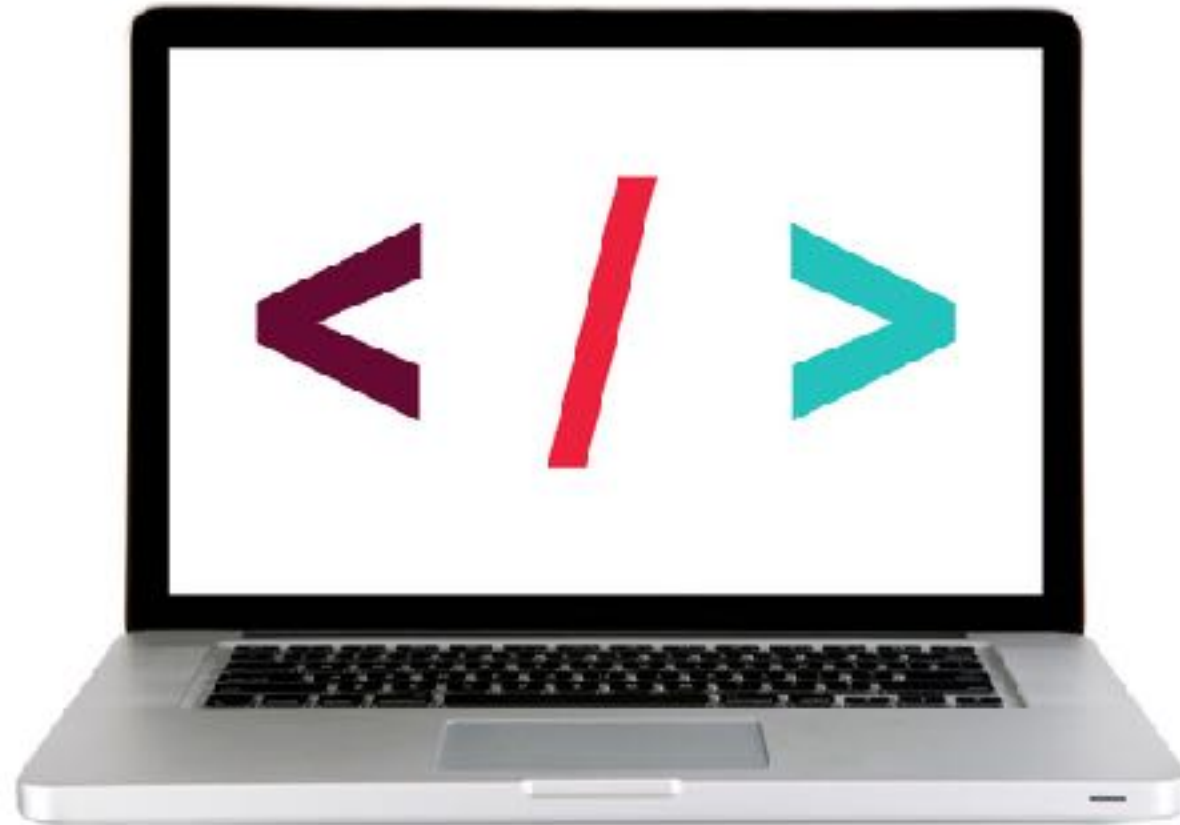
2. scope

inner function has access to outer function's variables

3. return statements

outer function returns reference to inner function

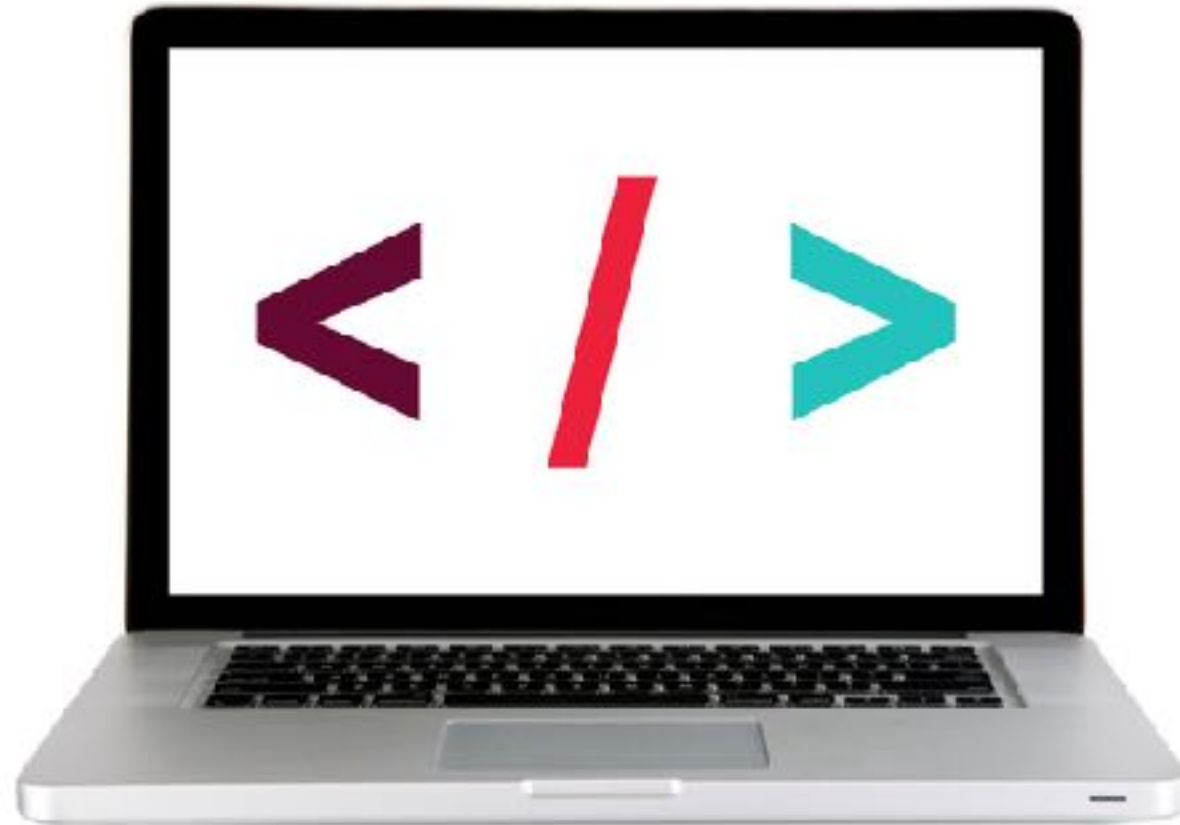
LET'S TAKE A CLOSER LOOK



CLOSURES — KEY POINTS

- Closures have access to the outer function's variables (including parameters) **even after the outer function returns.**
- Closures store **references** to the outer function's variables, not the actual values.

LET'S TAKE A CLOSER LOOK



WHAT ARE CLOSURES USED FOR?

- Turning an outer variable into a private variable
- Namespacing private functions

LAB — CLOSURES



KEY OBJECTIVE

- Understand and explain closures

TYPE OF EXERCISE

- Pairs

LOCATION

- `starter-code > 1-closures-lab`

EXECUTION

15 min

1. Follow the instructions in `app.js` to build and test code that uses a closure.

Immediately-invoked function expressions

THE MODULE PATTERN



**OBJECT-
ORIENTED
CODE**



CLOSURES



IIFES

Immediately-invoked function expression (IIFE)

- A function expression that is executed as soon as it is declared
- Pronounced “iffy”

IIFE based on a function expression

- Make a function expression into an IIFE by adding `()` to the end (before the semicolon)

```
let countdown = function() {  
  let counter;  
  for(counter = 3; counter > 0; counter--) {  
    console.log(counter);  
  }  
}();
```

IIFE based on a function expression

- Make a function expression into an IIFE by adding `()` to the end (before the semicolon)

```
let countdown = function() {  
  let counter;  
  for(counter = 3; counter > 0; counter--) {  
    console.log(counter);  
  }  
}();
```

IIFE based on a function declaration

- Make a function declaration into an IIFE by adding
(at the start and
)(); to the end

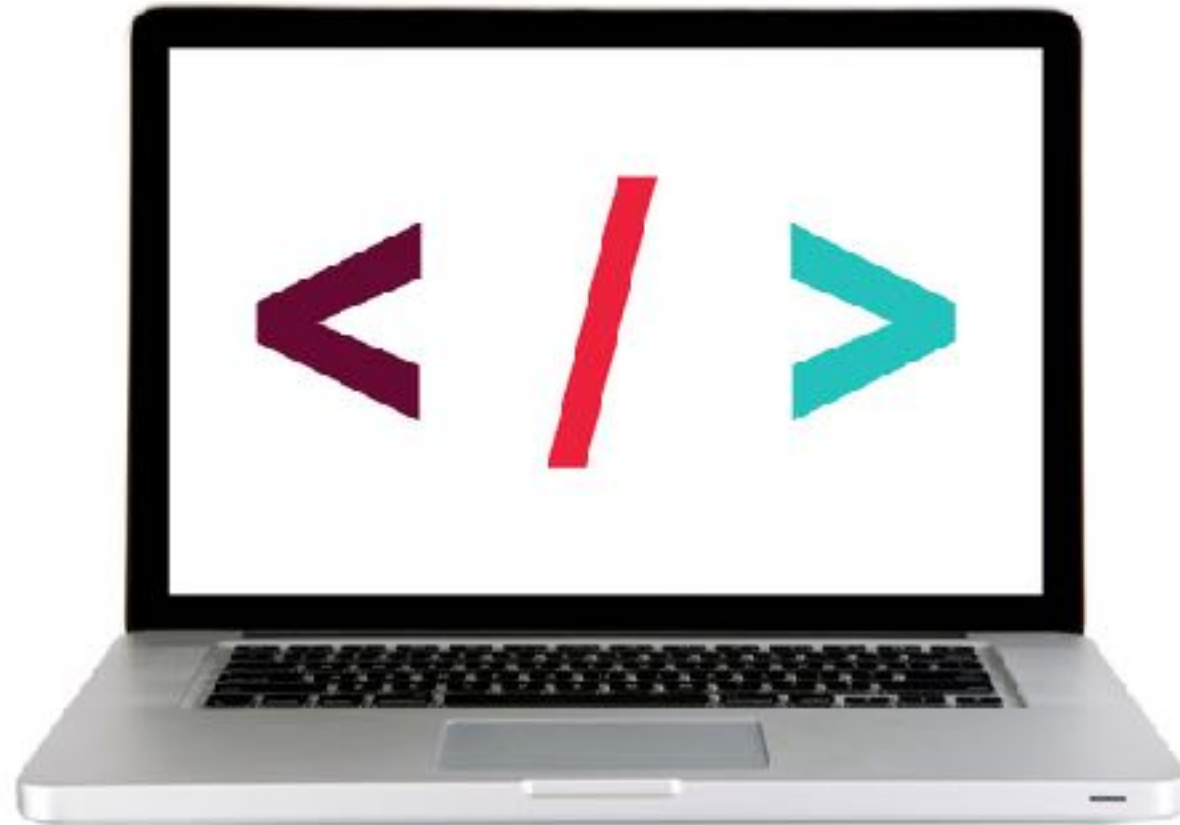
```
(function countdown() {  
  let counter;  
  for(counter = 3; counter > 0; counter--) {  
    console.log(counter);  
  }  
})();
```

IIFE based on a function declaration

- Make a function declaration into an IIFE by adding
(at the start and
)(); to the end

```
(function countdown() {  
  let counter;  
  for(counter = 3; counter > 0; counter--) {  
    console.log(counter);  
  }  
})();
```

LET'S TAKE A CLOSER LOOK



THE MODULE PATTERN

CLOSURES & THIS

PUTTING IT ALL TOGETHER!



**OBJECT-
ORIENTED
CODE**



CLOSURES



IIFES

THE MODULE PATTERN

- Using an IIFE to return an object literal
- The methods of the returned object can access the private properties and methods of the IIFE (closures!), but other code cannot do this
- This means specific parts of the IIFE are not available in the global scope

BUILDING A MODULE

```
let counter = function() {  
  let count = 0;  
  return {  
    reset: function() {  
      count = 0;  
    },  
    get: function() {  
      return count;  
    },  
    increment: function() {  
      count++;  
    }  
  };  
}();
```

returning an
object literal

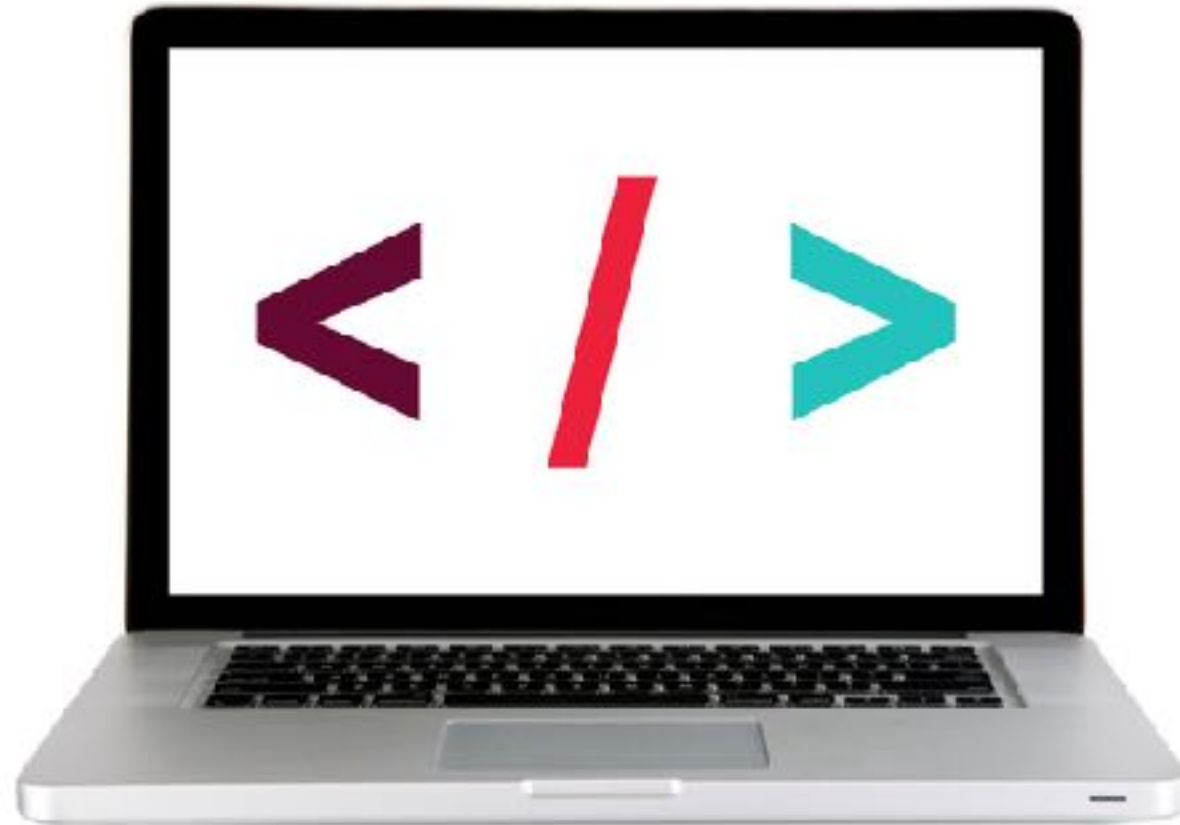
from an IIFE

containing closures

BENEFITS OF THE MODULE PATTERN

- Keeps some functions and variables private
- Avoids polluting the global scope
- Organizes code into objects

LET'S TAKE A CLOSER LOOK



EXERCISE — CREATE A MODULE



EXERCISE

TYPE OF EXERCISE

‣ Pair

LOCATION

‣ start files > 4-modules-exercise

TIMING

10 min

1. In app.js, complete the module so it exports methods for the behaviors described in the comment at the top of the file.
2. When your code is complete and works properly, the statements at the bottom of the file should all return the expected values in the console.
3. BONUS: Add a "tradeIn" method that lets you change the make of the car and refuels it. Be sure the getMake method still works after doing a tradeIn.

this

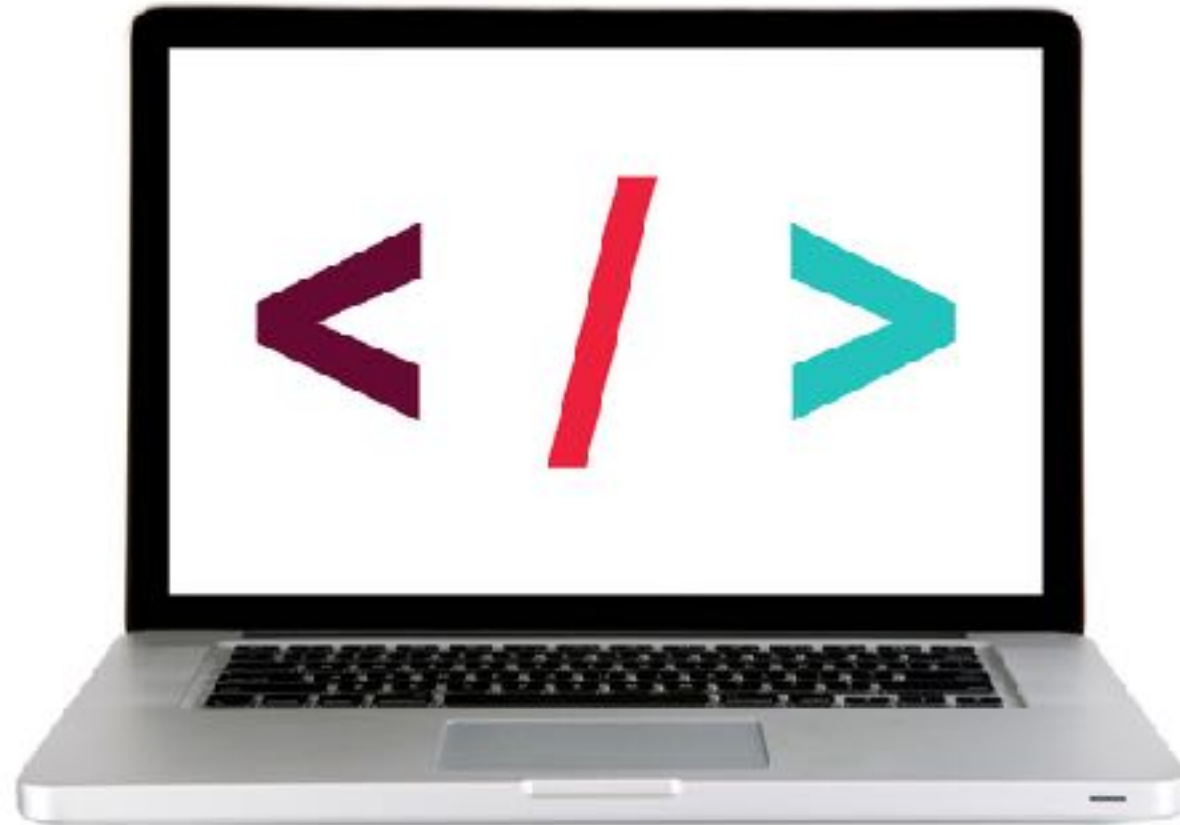
HOW IS CONTEXT DECIDED?

- At runtime
- Based on how the function is called

CONTEXT RULES

situation	what this maps to
method invocation	the object that owns the method
constructor function	the newly created object
event handler	the element that the event was fired from
function invocation	the global object (window)
function invocation (strict mode)	undefined
arrow function	the context of the caller

LET'S TAKE A CLOSER LOOK



EXERCISE — PREDICT CONTEXT



EXERCISE

TYPE OF EXERCISE

▸ Pairs

LOCATION

▸ `start files > 8-this-exercise`

TIMING

5 min

1. In `app.js`, read through the code without running it.
2. Predict the results of the two `console.log` statements.
3. Run the code and check the results against your predictions. If the results were different, identify why.

EXERCISE - CLOSURES LAB



EXERCISE

LOCATION

► starter-code > 9-closures-lab

TIMING

until 9:20

1. In your editor, open app.js and read the instructions.
2. Create the createTaxCalculator function described in the instructions.
3. Create 2 variables that call the function you created with different argument values.
4. Check the console output and verify that you get the expected results.

Exit Tickets!

(Class #14)

LEARNING OBJECTIVES – REVIEW

- Understand and explain closures.
- Instantly invoke functions.
- Implement the module pattern in your code.
- Understand and explain Javascript context.

NEXT CLASS PREVIEW

In-class lab: Intro to CRUD and Firebase

- Explain what CRUD is. (**Preview:** Create, Read, Update, Delete)
- Explain the HTTP methods associated with CRUD.
- Implement Firebase in an application.
- Build a full-stack app.

Q&A