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08 Asynchronous JavaScript: Promises, Async/Await and AJAX

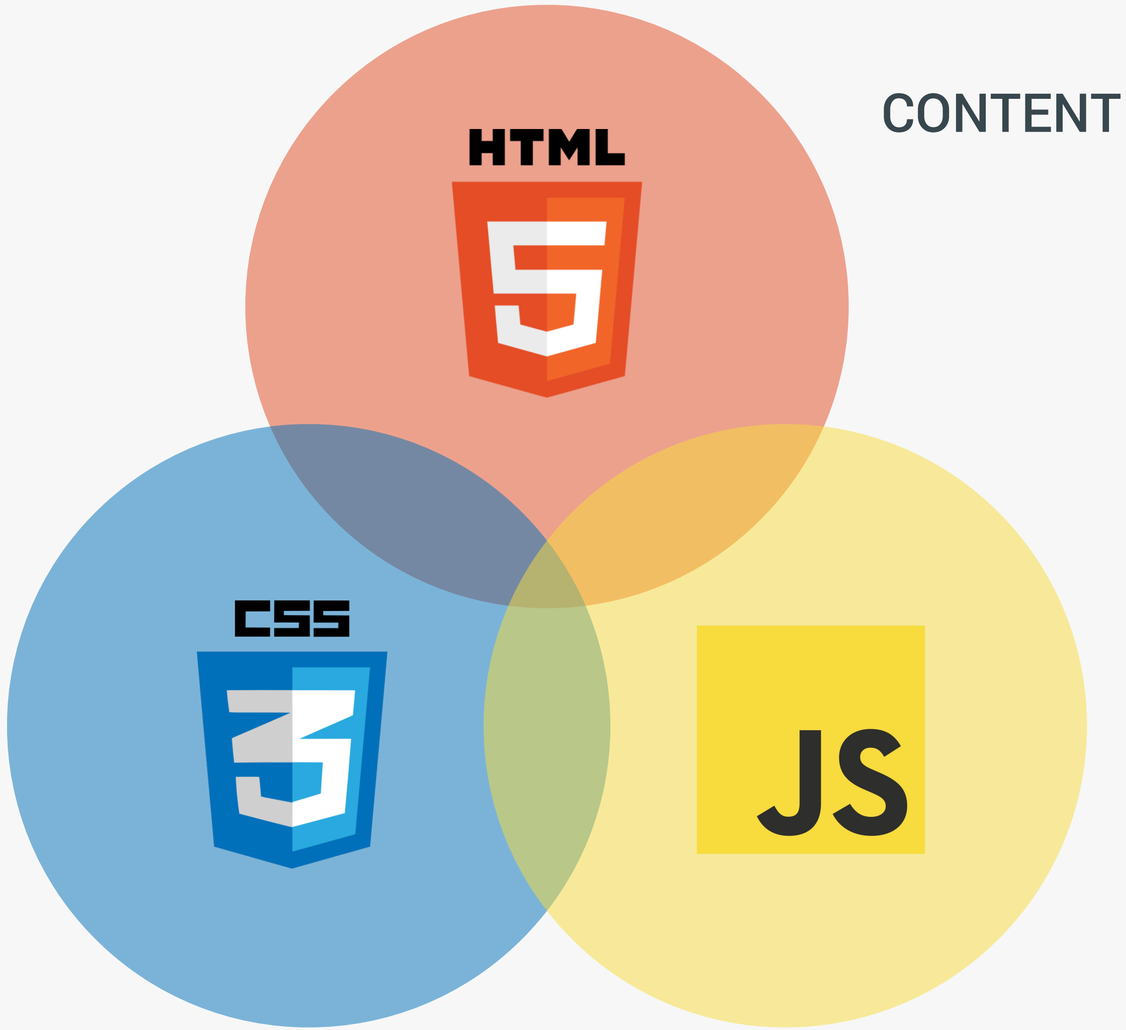
09 Modern JavaScript: Using ES6, NPM, Babel and Webpack

# SECTION 2 — JS LANGUAGE BASICS

# WHAT IS JAVASCRIPT?

- JavaScript is a lightweight, cross-platform, object-oriented computer programming language 😅
- JavaScript is one of the three core technologies of web development
- Today, JavaScript can be used in different places:
  - **Client-side: JavaScript was traditionally only used in the browser**
  - Server-side: Thanks to node.js, we can use JavaScript on the server as well
- Javascript is what made modern web development possible:
  - Dynamic effects and interactivity
  - Modern web applications that we can interact with
- **Frameworks/libraries like React and Angular are 100% based on JavaScript: you need to master JavaScript in order to use them!**

# THE ROLE OF JAVASCRIPT IN WEB DEVELOPMENT




CONTENT

PRESENTATION

DYNAMIC EFFECTS/
PROGRAMMING

# NOUNS, ADJECTIVES AND VERBS


CONTENT


PRESENTATION


DYNAMIC EFFECTS/
PROGRAMMING

**NOUNS**

`<p></p>`

means “paragraph”

**ADJECTIVES**

```
p {color: red;}
```

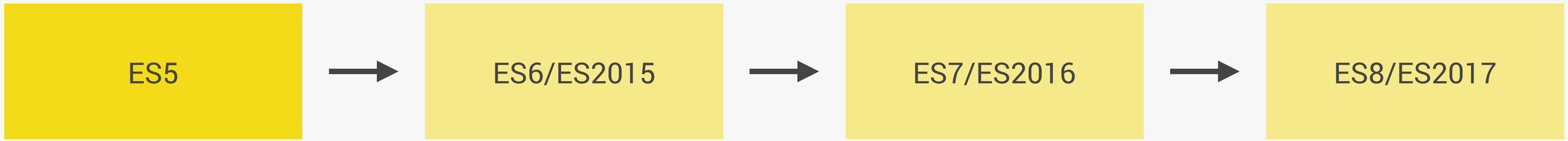
means “the paragraph text is red”

**VERBS**

```
p.hide();
```

means “hide the paragraph”

# JAVASCRIPT VERSIONS... (MORE ABOUT THIS LATER)



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## SECTION

JAVASCRIPT LANGUAGE BASICS

## LECTURE

VARIABLES AND DATA TYPES

# PRIMITIVE JAVASCRIPT DATA TYPES

1. **Number:** Floating point numbers, for decimals and integers
2. **String:** Sequence of characters, used for text
3. **Boolean:** Logical data type that can only be `true` or `false`
4. **Undefined:** Data type of a variable that does not have a value yet
5. **Null:** Also means ‘non-existent’

**JavaScript has dynamic typing:** data types are **automatically** assigned to variables

# BASIC BOOLEAN LOGIC: NOT, AND & OR

var A

| var B | AND | TRUE | FALSE |
|---|---|---|---|
| | TRUE | TRUE | FALSE |
| | FALSE | FALSE | FALSE |

var A

| var B | OR | TRUE | FALSE |
|---|---|---|---|
| | TRUE | TRUE | TRUE |
| | FALSE | TRUE | FALSE |

- `AND (&&)` => `true` if **ALL** are `true`
- `OR (||)` => `true` if **ONE** is `true`
- `NOT (!)` => inverts `true`/`false` value

```
var age = 16;

age >= 20;     // => false
age < 30;      // => true
!(age < 30);   // => false

age >= 20 && age < 30; // =>
age >= 20 || age < 30; // =>
```

# A (VERY) SHORT HISTORY OF JAVASCRIPT

- **1996:** Changed from LiveScript to JavaScript to attract Java developers. **JavaScript has almost nothing to do with Java** ☝️
- **1997:** ES1 (ECMAScript 1) became the first version of the JavaScript language standard:
  - ECMAScript: The language standard;
  - JavaScript: The language in practice.
- **2009:** ES5 (ECMAScript 5) was released with lots of new features.
- **2015:** ES6/ES2015 (ECMAScript 2015) was released: **the biggest update to the language ever!**
- **2015:** Changed to an **annual release cycle** 🙏
- **2016/2017/2018/2019/…:** Release of ES2016/ES2017/ES2018/ES2019/…

# JAVASCRIPT TODAY: WHICH VERSION TO USE?

ES5

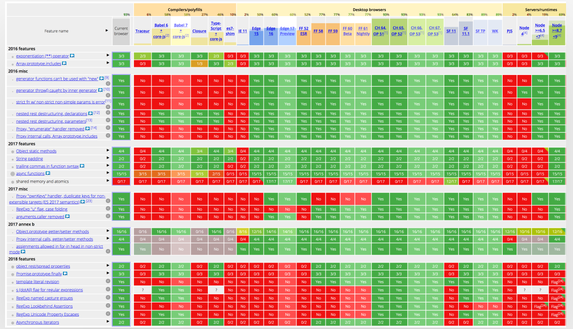
- Fully supported in all browsers;
- Ready to be used today 👍

ES6/ES2015

ES7/ES2016

ES8/ES2017

- Well supported in all **modern** browsers
- No support in older browsers;
- Can use **most** features in production with transpiling and polyfilling (converting to ES5) 😃



http://kangax.github.io/compat-table

ES9/ES2018

ES10/ES2019

- Future versions, together called ESNext;
- Some features supported in modern browsers;
- Can already use **some** features in production with transpiling and polyfilling 😊

(As of mid-2018)

# WE USE ES5 AND ES6 IN THIS COURSE: WHY?

ES5

- JavaScript fundamentals
- How the language works
- DOM manipulation project
- Advanced language features
- Huge real project

ES6+

- ES6/ES2015 introduction
- Asynchronous JavaScript
- AJAX and API calls
- Modern dev setups (Webpack and Babel)
- Huge real project

- You will have to understand ES5 today and in the future;
- Many tutorials and code you find online today are still in ES5;
- When working on older codebases, these will be written in ES5;
- It’s better and easier to learn the fundamentals in ES5, and then update to ES6+.

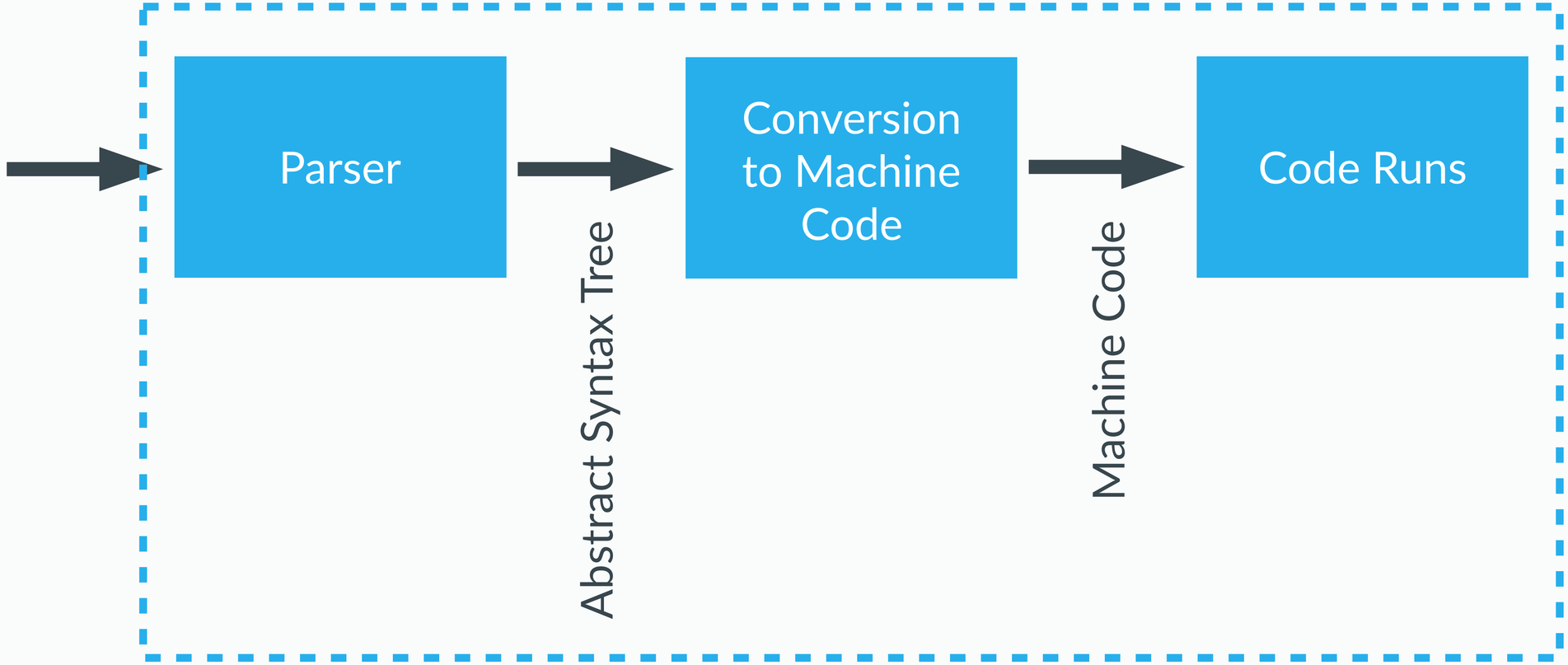
# SECTION 3 — HOW JAVASCRIPT WORKS BEHIND THE SCENES

# WHAT HAPPENS TO OUR CODE?

## OUR CODE

```
function calculateAge(yearOfBirth) {
    return 2016 - yearOfBirth;
}

var johnsAge = calculateAge(1990);

function yearsUntilRetirement(name, yearOfBirth) {
    var age = calculateAge(yearOfBirth);
    var retirement = 65 - age;
    if (retirement >= 0) {
        console.log(name + ' retires in ' + retirement + ' years.');
    } else {
        console.log(name + ' is already retired.');
    }
}

yearsUntilRetirement('John', 1990);
```

## JAVASCRIPT ENGINE



# EXECUTION CONTEXTS

**Execution Context**

(A box, a container, or a wrapper which stores variables and in which a piece of our code is evaluated and executed)

```
function calculateAge(yearOfBirth) {
    return 2016 - yearOfBirth;
}

var johnsAge = calculateAge(1990);

function yearsUntilRetirement(name, yearOfBirth) {
    var age = calculateAge(yearOfBirth);
    var retirement = 65 - age;
    if (retirement >= 0) {
        console.log(name + ' retires in ' + retirement + ' years.');
    } else {
        console.log(name + ' is already retired.');
    }
}

yearsUntilRetirement('John', 1990);
```

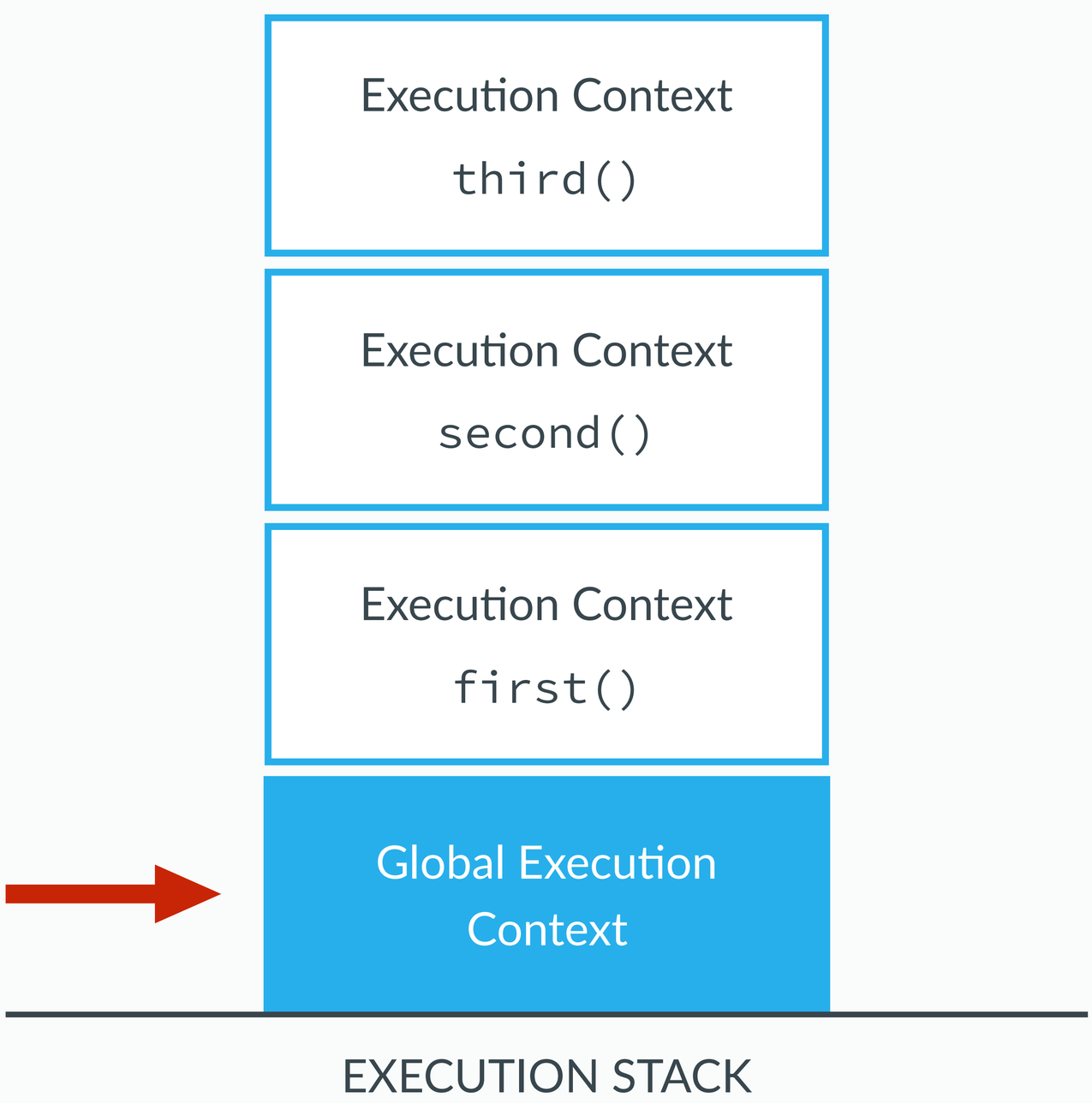
## THE DEFAULT

Global Execution Context

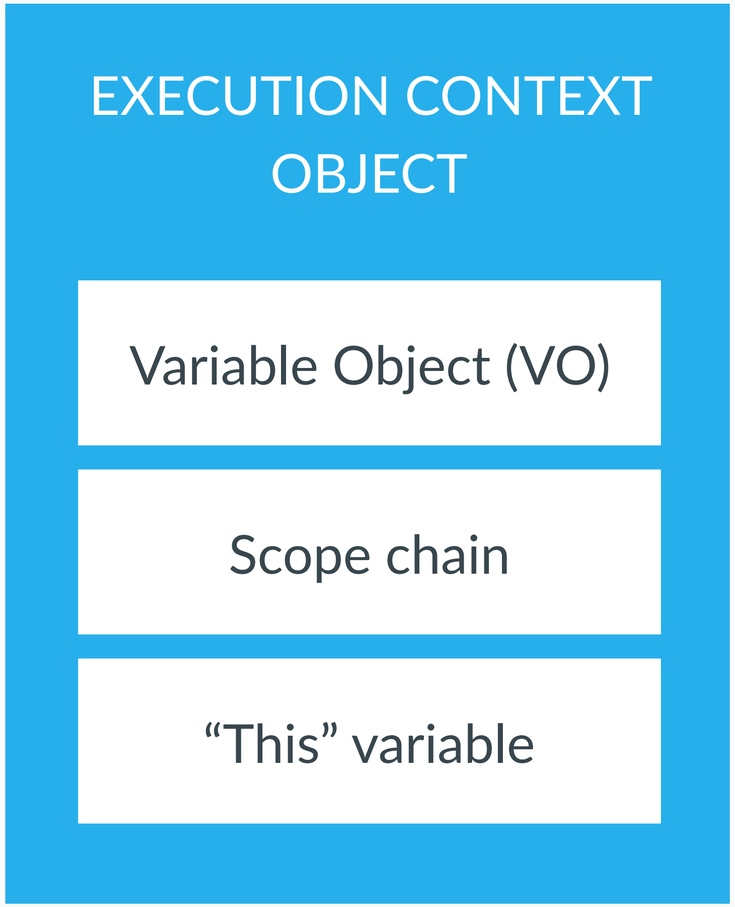
- Code that is **not inside any function**
- Associated with the **global object**
- In the browser, that's the `window` object

```
lastName === window.lastName
// true
```

```
var name = 'John';

function first() {
    var a = 'Hello!';
    second();
    var x = a + name;
}

function second() {
    var b = 'Hi!';
    third();
    var z = b + name;
}

function third() {
    var c = 'Hey!';
    var z = c + name;
}

first();
```



# THE EXECUTION CONTEXT IN DETAIL




**1.** Creation phase

**A)** Creation of the Variable Object (VO)

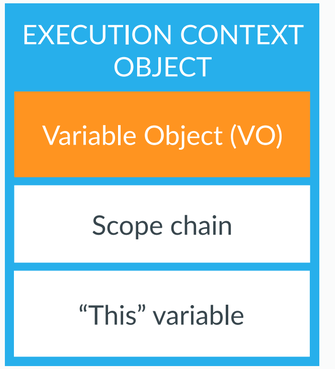
**B)** Creation of the scope chain

**C)** Determine value of the ‘this’ variable

**2.** Execution phase

The code of the function that generated the current execution context is ran line by line

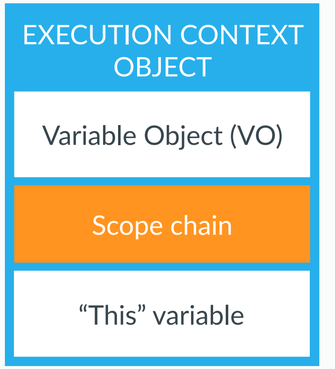
# THE VARIABLE OBJECT



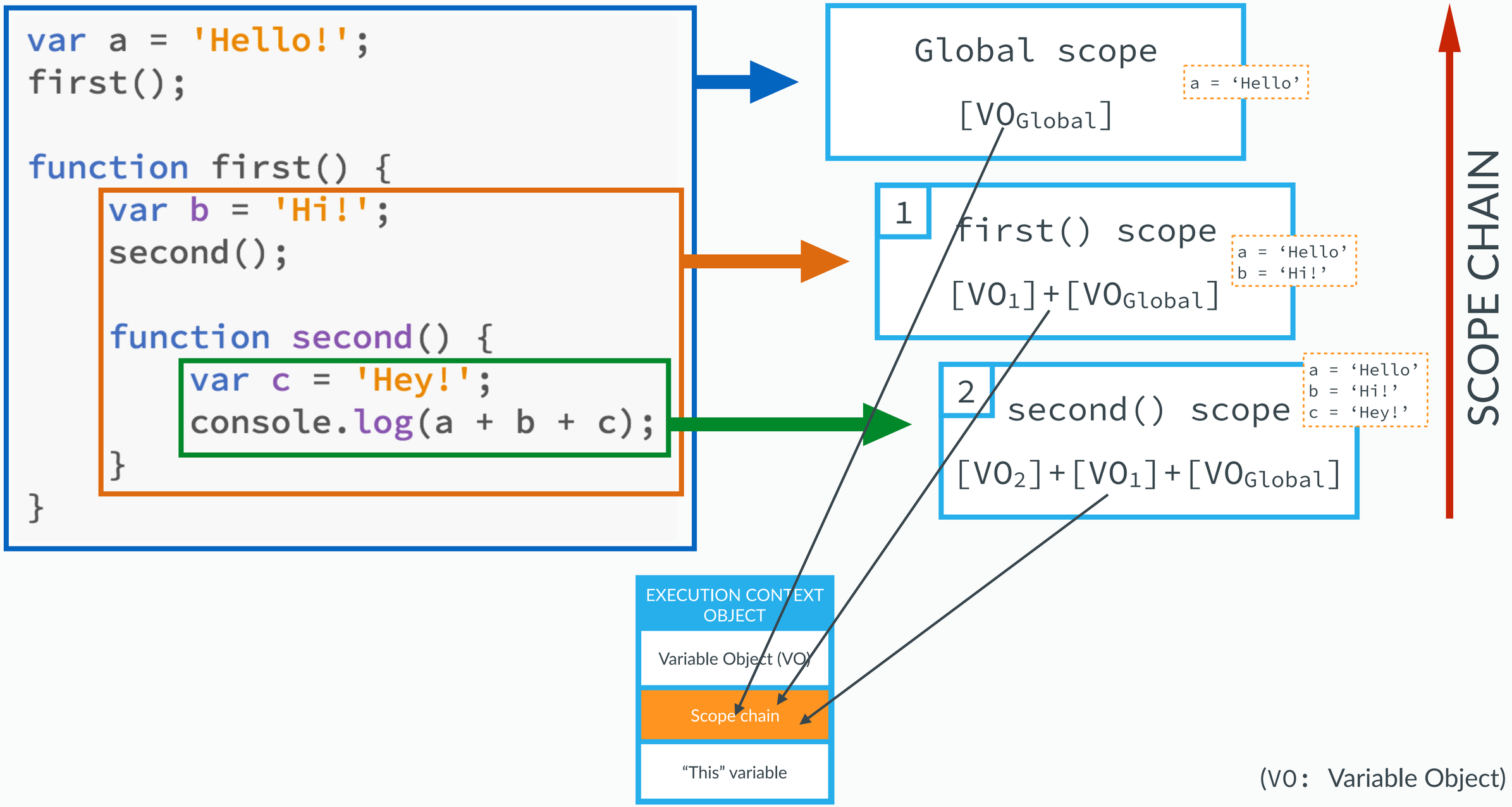

- The `argument` object is created, containing all the arguments that were passed into the function.
- Code is scanned for **function declarations**: for each function, a property is created in the Variable Object, **pointing to the function**.
- Code is scanned for **variable declarations**: for each variable, a property is created in the Variable Object, and set to `undefined`.

HOISTING

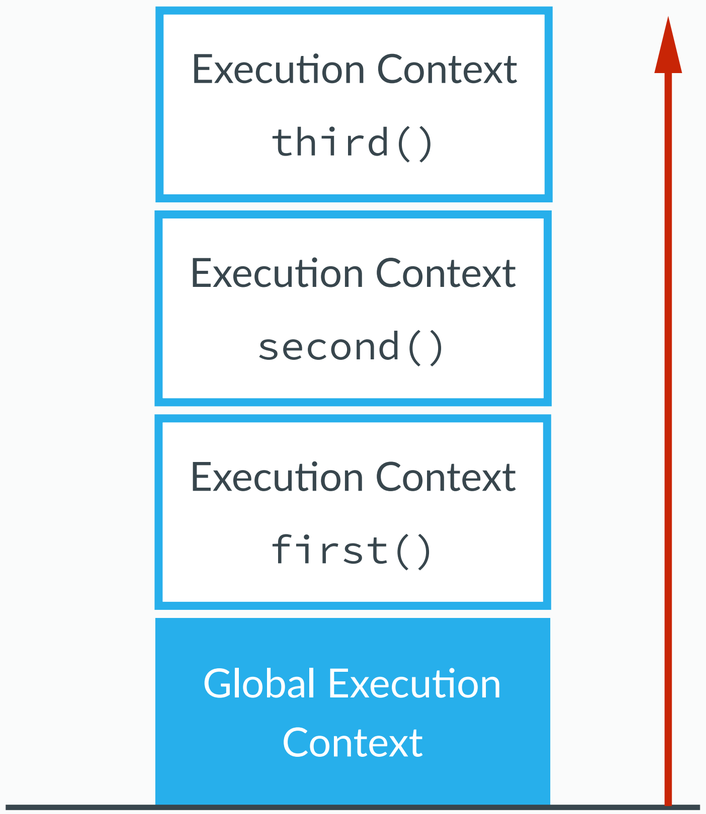
# SCOPING IN JAVASCRIPT



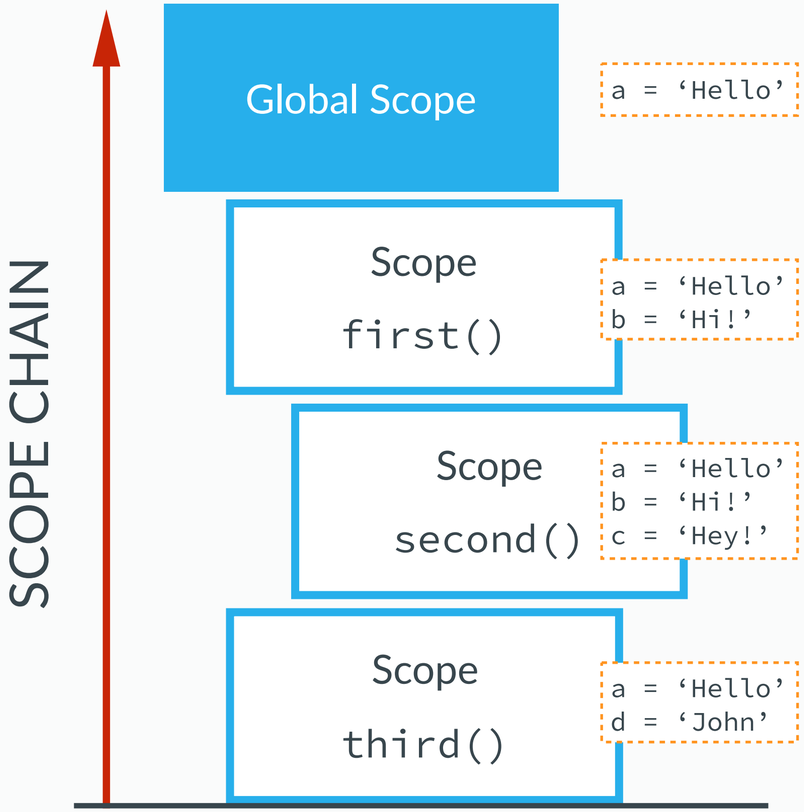

- Scoping answers the question “where can we access a certain variable?”
- **Each new function creates a scope**: the space/environment, in which the variables it defines are accessible.
- **Lexical scoping**: a function that is lexically within another function gets access to the scope of the outer function.


var a = 'Hello!';
first();
function first() {
var b = 'Hi!';
second();
function second() {
var c = 'Hey!';
console.log(a + b + c);
}
}
Global scope
[VOGlobal]
a = ‘Hello’
1
first() scope
[VO1]+[VOGlobal]
a = ‘Hello’
b = ‘Hi!’
2
second() scope
[VO2]+[VO1]+[VOGlobal]
a = ‘Hello’
b = ‘Hi!’
c = ‘Hey!’
SCOPE CHAIN
EXECUTION CONTEXT OBJECT
Variable Object (VO)
Scope chain
“This” variable
(VO: Variable Object)

# EXECUTION STACK VS SCOPE CHAIN




```
var a = 'Hello!';
first();

function first() {
    var b = 'Hi!';
    second();

    function second() {
        var c = 'Hey!';
        third()
    }
}

function third() {
    var d = 'John';
    console.log(a + b + c + d);
}
```

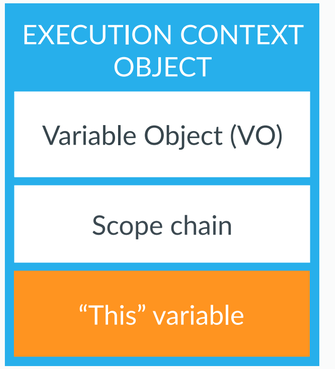



Order in which functions are **called**

≠

Order in which functions are **written lexically**

# THE ‘THIS’ VARIABLE



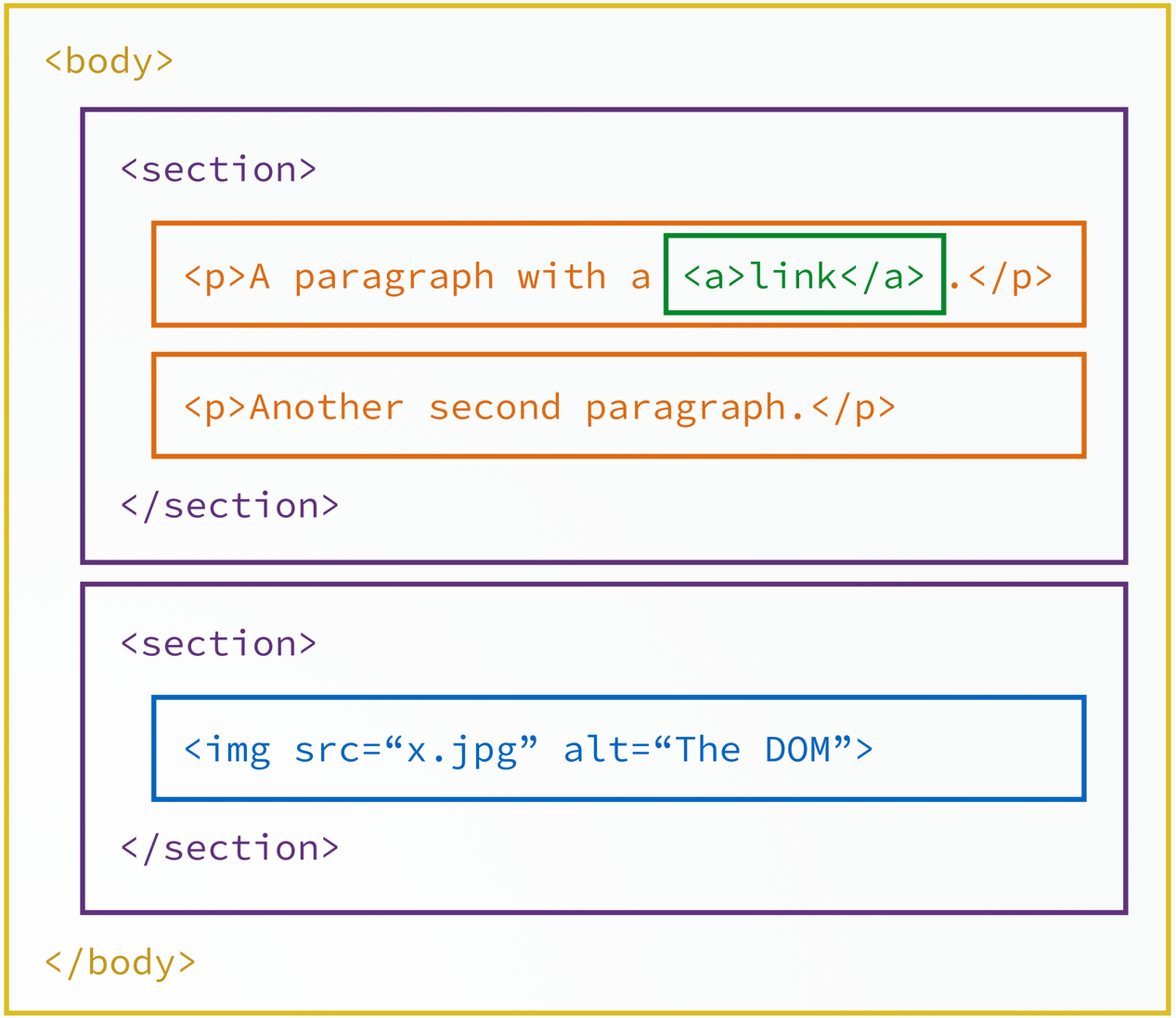

- **Regular function call**: the `this` keyword points at the global object, (the `window` object, in the browser).
- **Method call**: the `this` variable points to the object that is calling the method.

- *The `this` keyword is not assigned a value until a function where it is defined is actually called.*

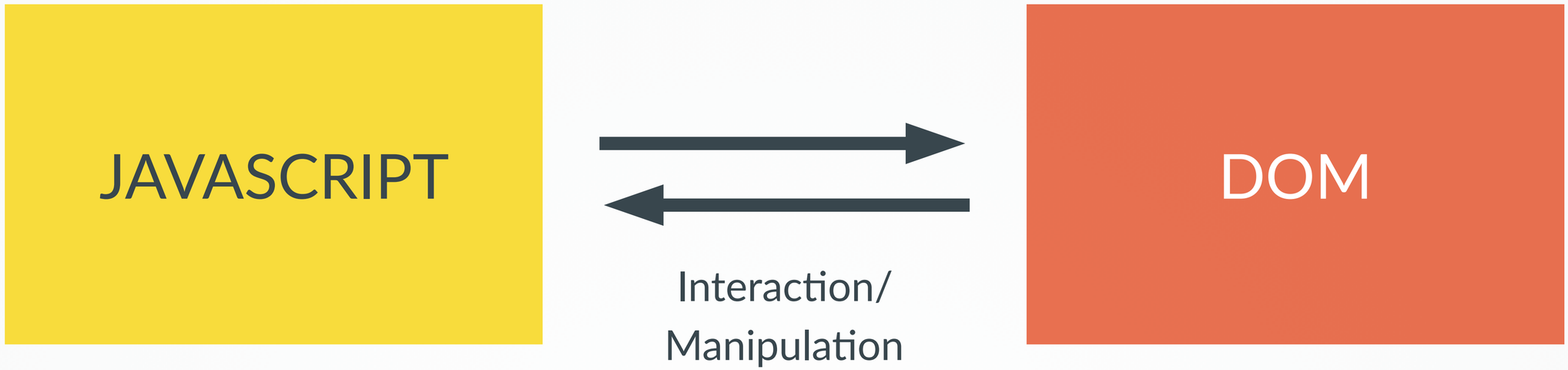
# SECTION 4 — JAVASCRIPT IN THE BROWSER: DOM MANIPULATION AND EVENTS

# THE DOCUMENT OBJECT MODEL

- **DOM:** Document Object Model;
- Structured representation of an HTML document;
- The DOM is used to connect webpages to scripts like JavaScript;
- For each HTML box, there is an object in the DOM that we can access and interact with.

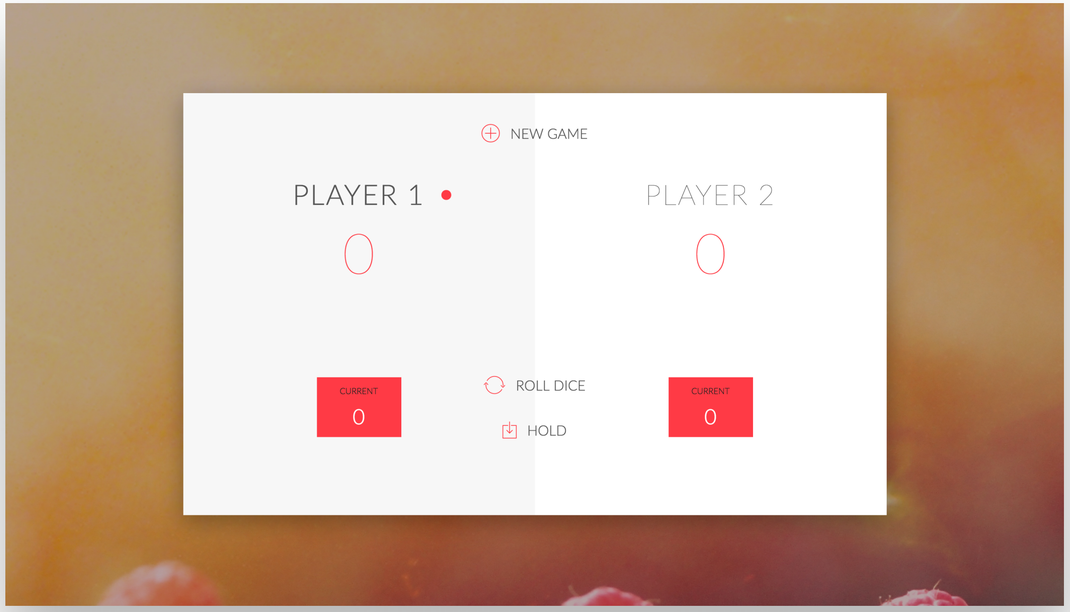


# DOM MANIPULATION



# WHAT YOU WILL LEARN IN THIS LECTURE

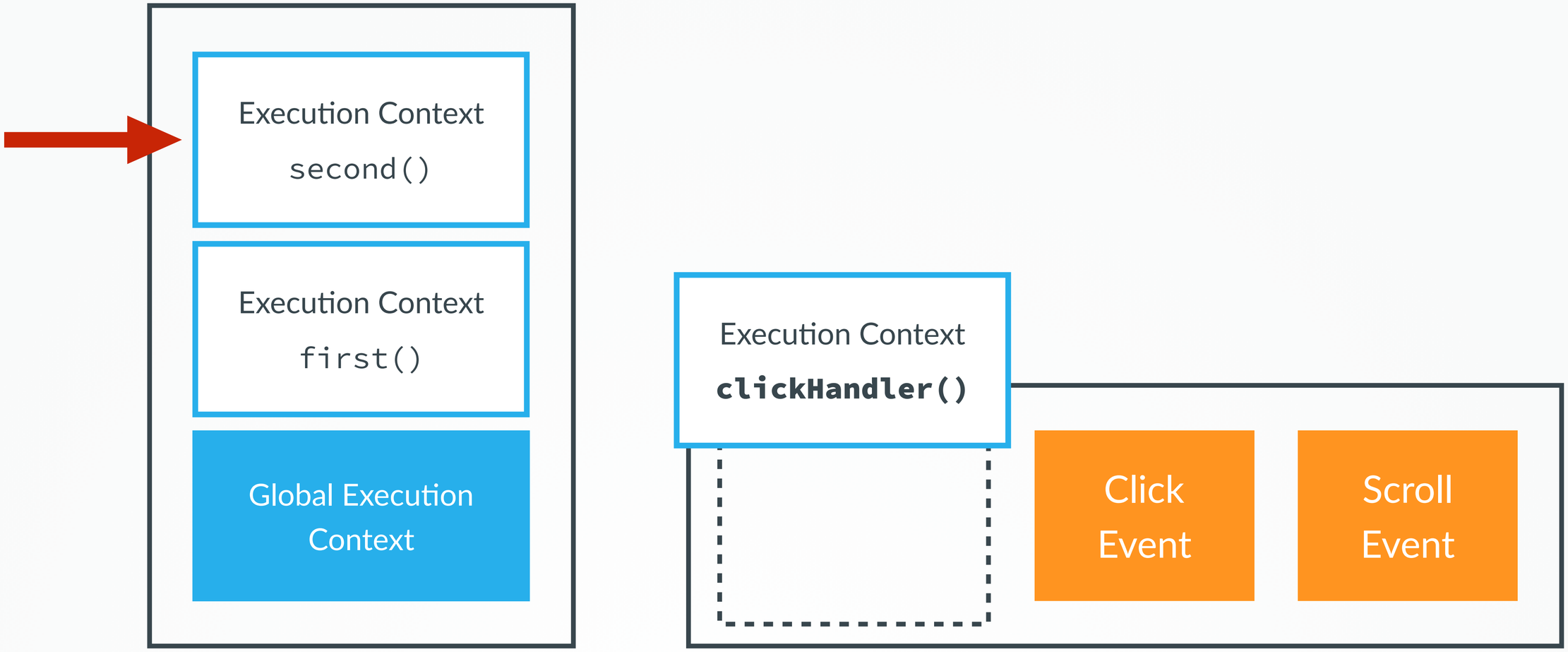
- How to create our fundamental game variables;
- How to generate a random number;
- How to manipulate the DOM;
- How to read from the DOM;
- How to change CSS styles.



# WHAT ARE EVENTS?

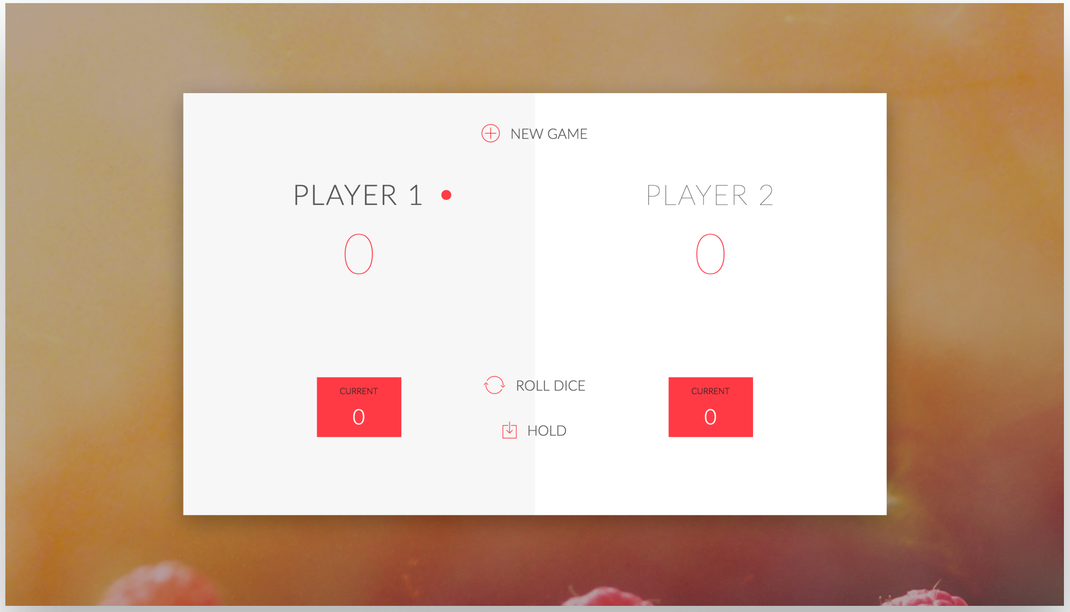
- **Events:** Notifications that are sent to notify the code that something happened on the webpage;
- Examples: clicking a button, resizing a window, scrolling down or pressing a key;
- **Event listener:** A function that performs an action based on a certain event. It waits for a specific event to happen.

# HOW EVENTS ARE PROCESSED



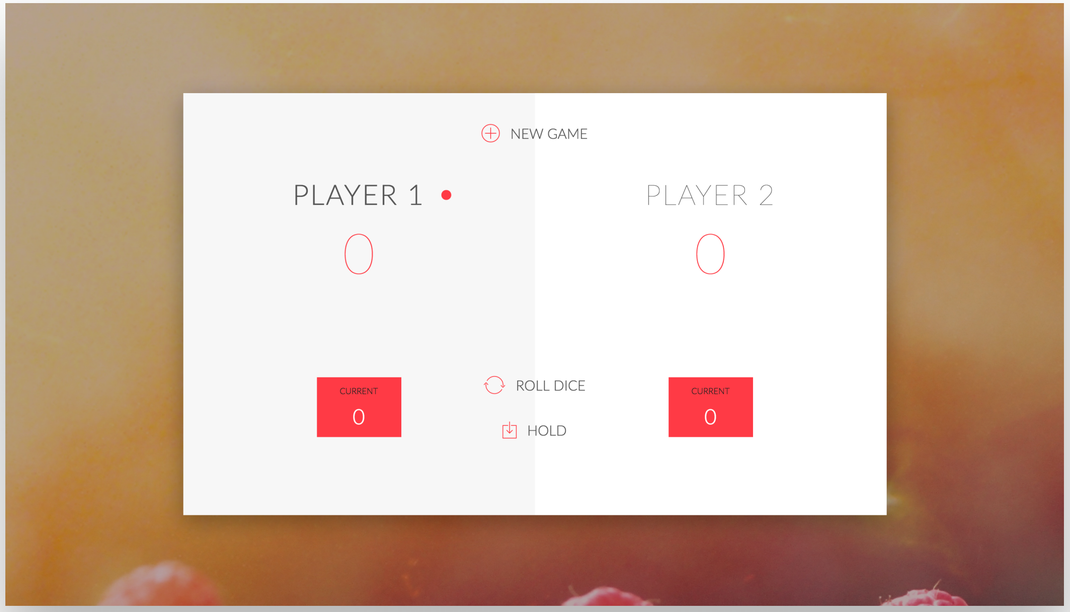
# WHAT YOU WILL LEARN IN THIS LECTURE

- How to set up an event handler;
- What a callback function is;
- What an anonymous function is;
- Another way to select elements by ID;
- How to change the image in an `<img>` element.



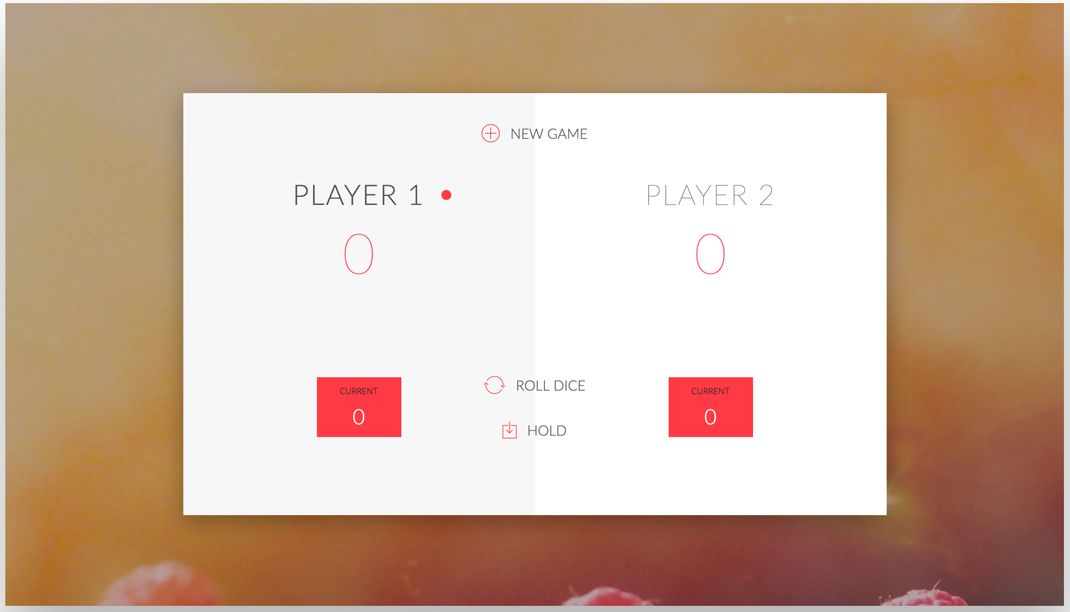
# WHAT YOU WILL LEARN IN THIS LECTURE

- What the ternary operator is;
- How to add, remove and toggle HTML classes.



# WHAT YOU WILL LEARN IN THIS LECTURE

- How to use functions to correctly apply the DRY principle;
- How to think about the game logic like a programmer.



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## SECTION

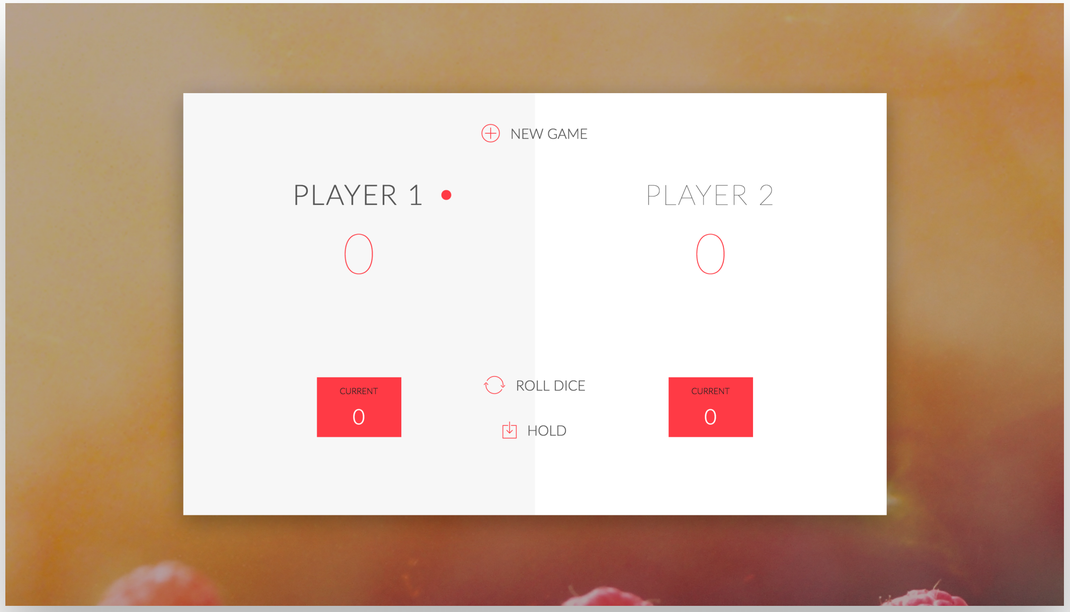
JAVASCRIPT IN THE BROWSER: DOM MANIPULATION AND EVENTS

## LECTURE

CREATING A GAME INITIALIZATION FUNCTION

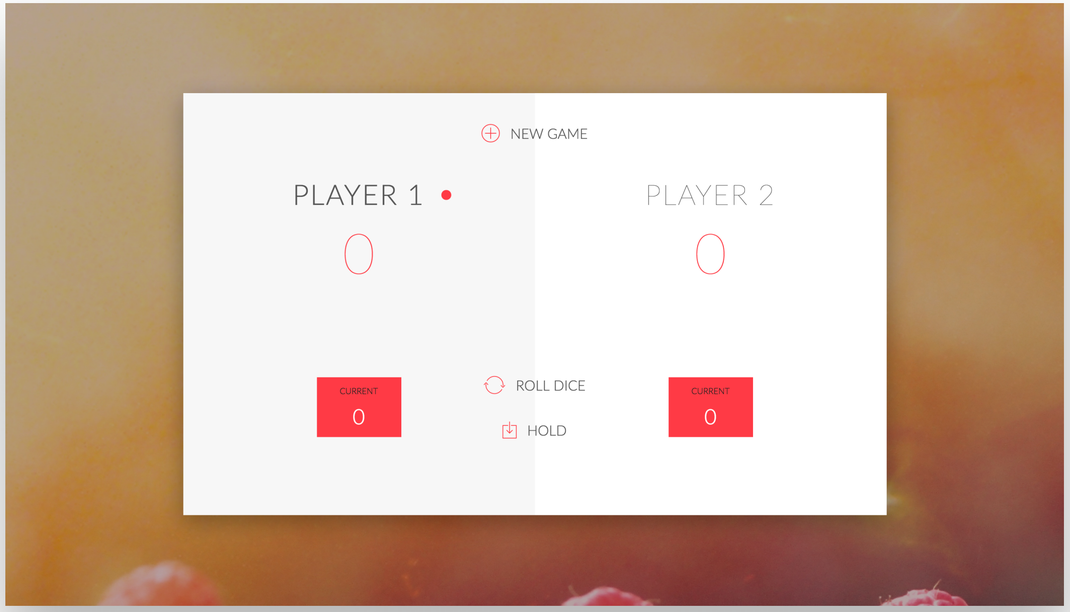
# WHAT YOU WILL LEARN IN THIS LECTURE

- Practice, practice, practice…



# WHAT YOU WILL LEARN IN THIS LECTURE

- What a state variable is, how to use it and why



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## SECTION

JAVASCRIPT IN THE BROWSER: DOM MANIPULATION AND EVENTS

## LECTURE

CODING CHALLENGE

# SECTION 5 — ADVANCED JAVASCRIPT: OBJECTS AND FUNCTIONS

# OBJECTS IN JAVASCRIPT

*Everything is an object.*

(Well, almost everything)

PRIMITIVES

- Numbers
- Strings
- Booleans
- Undefined
- Null

EVERYTHING ELSE ...

- Arrays
- Functions
- Objects
- Dates
- Wrappers for Numbers, Strings, Booleans

... IS AN OBJECT

# THE OBJECT ORIENTED PARADIGM

## OBJECT-ORIENTED PROGRAMMING

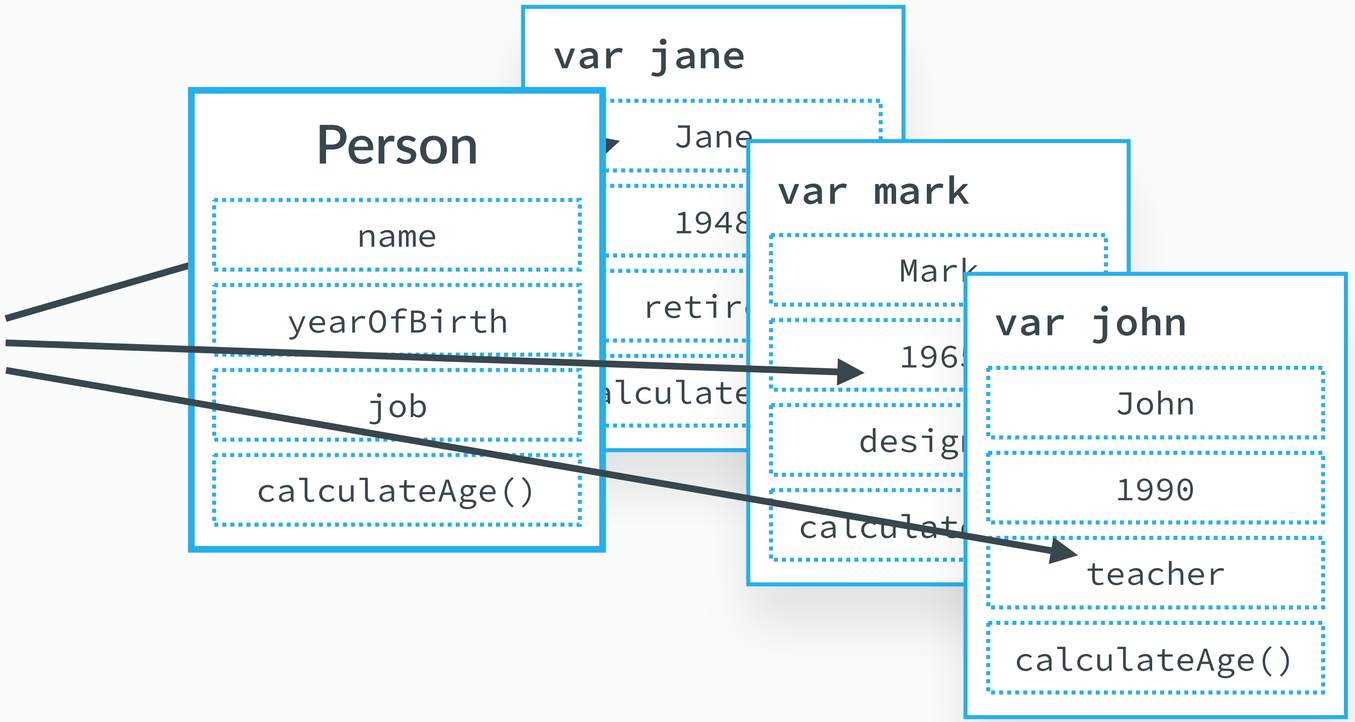
- Objects interacting with one another through methods and properties;
- Used to store data, structure applications into modules and keeping code clean.

```
var john = {
    name: 'John',
    yearOfBirth: 1990,
    isMarried: false
};
```

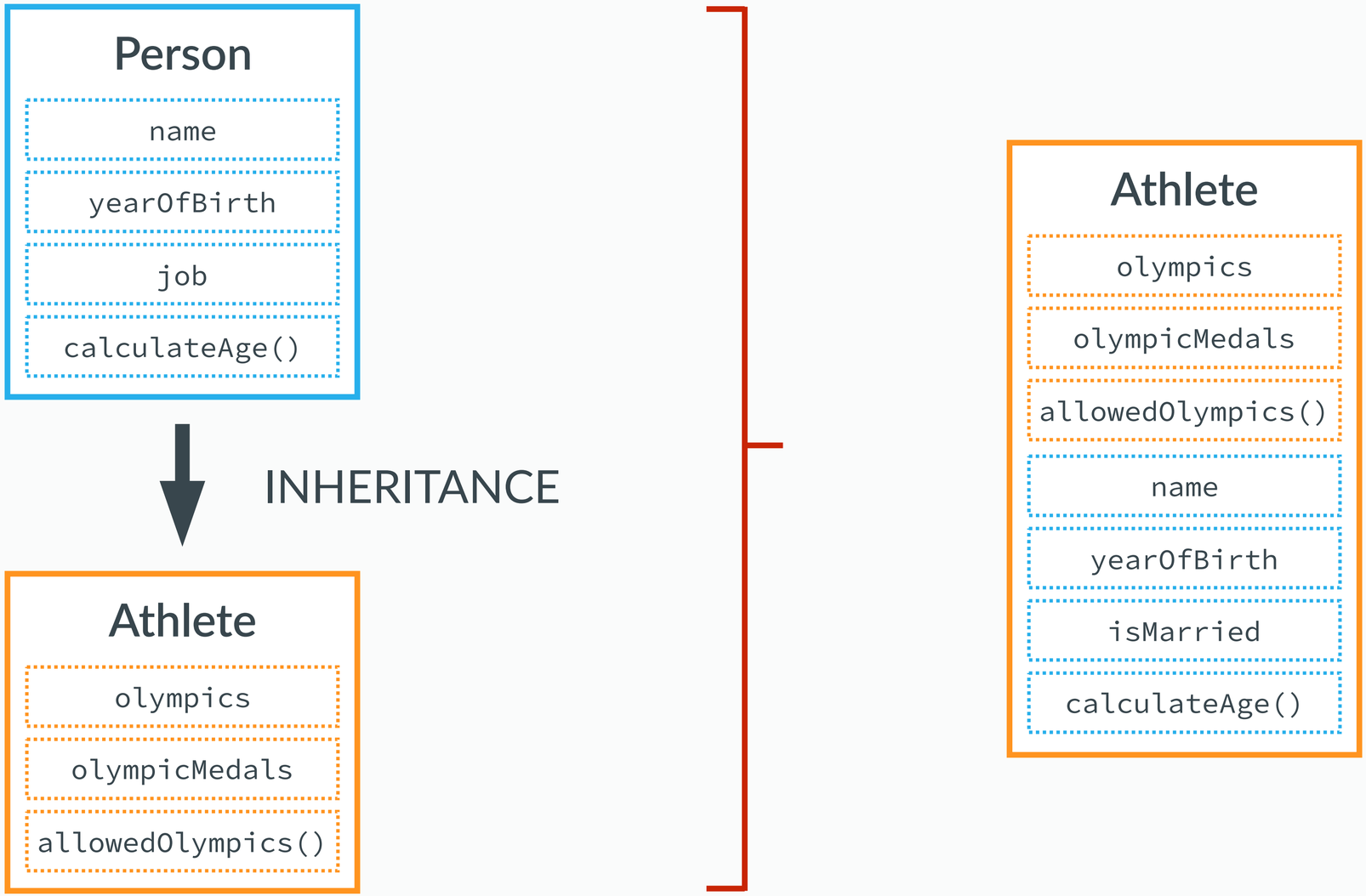
```
var jane = {
    name: 'Jane',
    yearOfBirth: 1969,
    isMarried: true
};
```

```
var mark = {
    name: 'Mark',
    yearOfBirth: 1948,
    isMarried: true
};
```

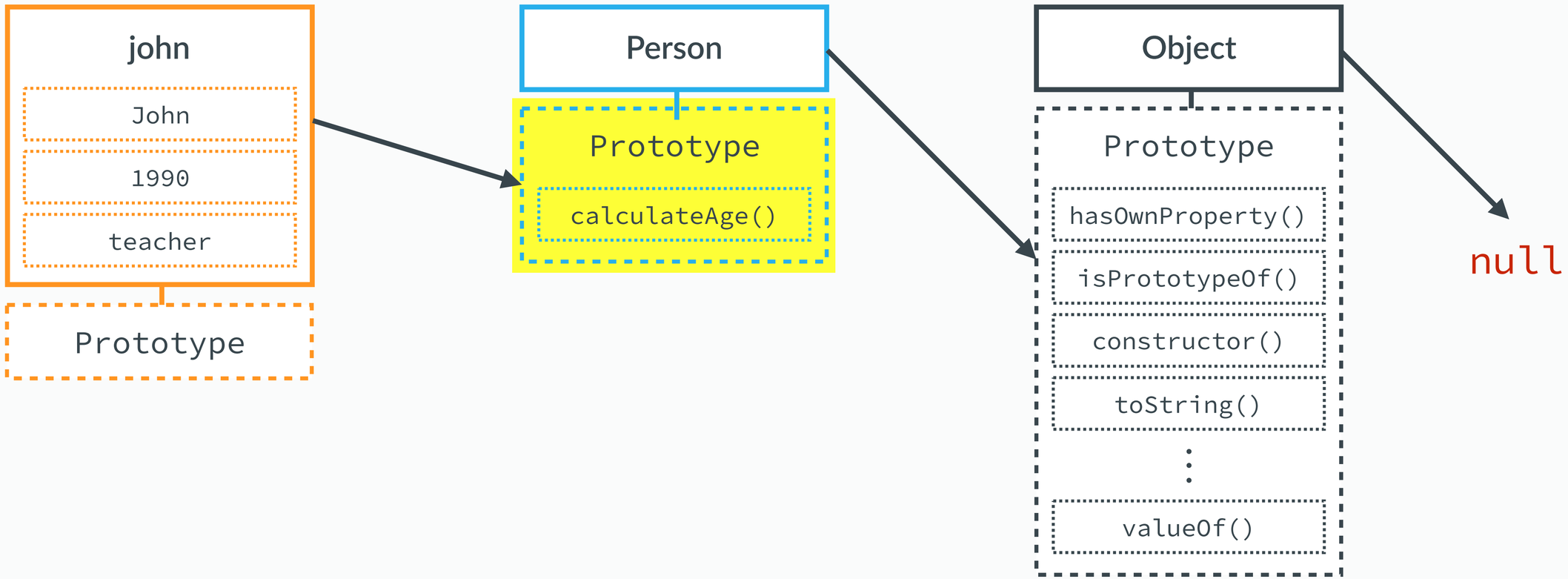
# CONSTRUCTORS AND INSTANCES IN JAVASCRIPT



# INHERITANCE IN GENERAL



# INHERITANCE IN JAVASCRIPT: PROTOTYPES AND PROTOTYPE CHAINS



# SUMMARY

- Every JavaScript object has a **prototype property**, which makes inheritance possible in JavaScript;
- The prototype property of an object is where we put methods and properties that we want **other objects to inherit**;
- The Constructor's prototype property is **NOT** the prototype of the Constructor itself, it's the prototype of **ALL** instances that are created through it;
- When a certain method (or property) is called, the search starts in the object itself, and if it cannot be found, the search moves on to the object's prototype. This continues until the method is found: **prototype chain**.

# FUNCTIONS ARE ALSO OBJECTS IN JAVASCRIPT

- A function is an instance of the Object type;
- A function behaves like any other object;
- We can store functions in a variable;
- We can pass a function as an argument to another function;
- We can return a function from a function.

FIRST-CLASS FUNCTIONS

# CLOSURES

## CLOSURES SUMMARY

*An inner function has always access to the variables and parameters of its outer function, even after the outer function has returned.*

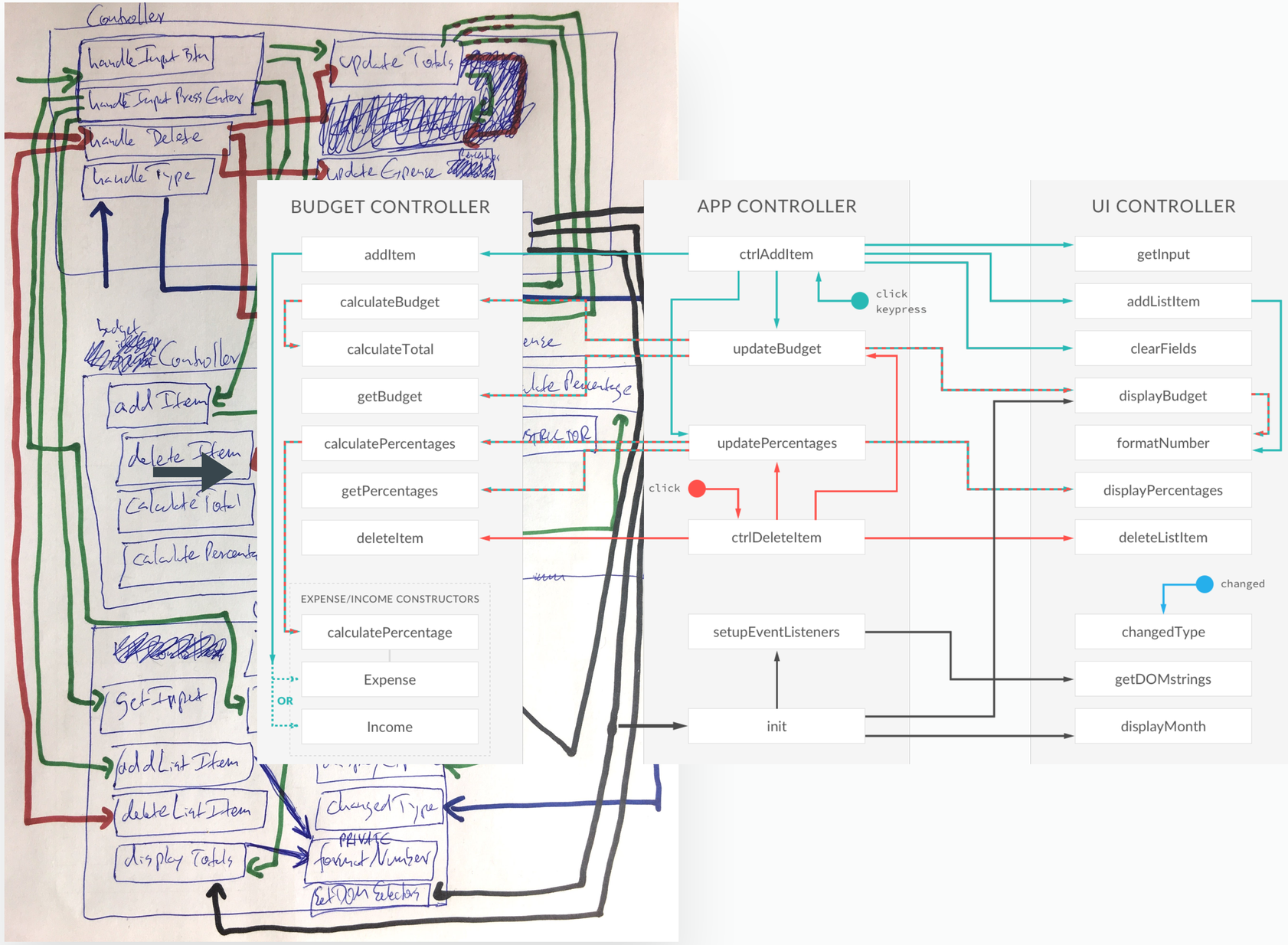
# HOW CLOSURES WORK

# CLOSURES

## CLOSURES SUMMARY (AGAIN :)

*An inner function has always access to the variables and parameters of its outer function, even after the outer function has returned.*

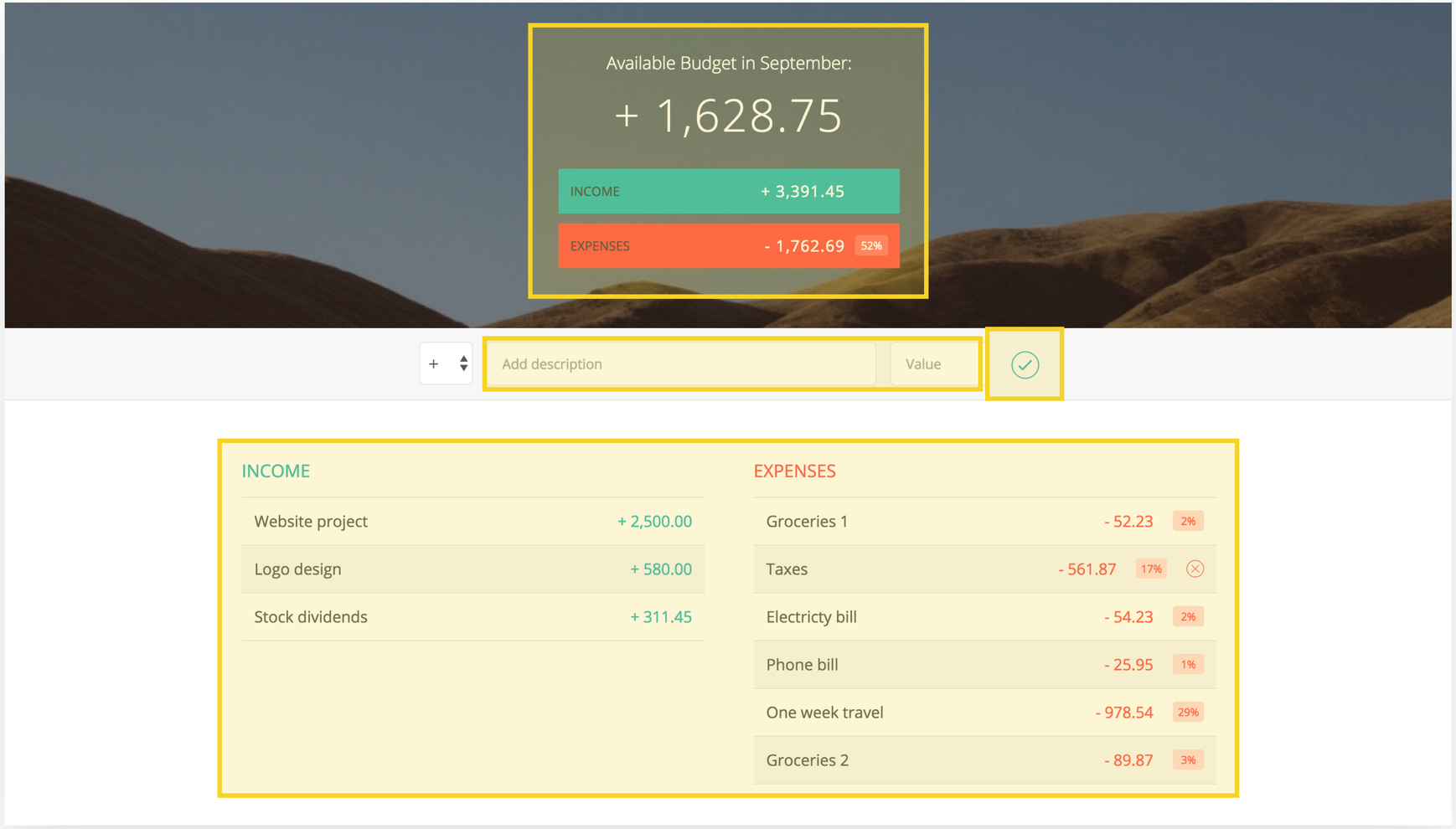
# SECTION 6 — PUTTING IT ALL TOGETHER: THE BUDGET APP PROJECT


BUDGET CONTROLLER
addItem
calculateBudget
calculateTotal
getBudget
calculatePercentages
getPercentages
deleteItem
EXPENSE/INCOME CONSTRUCTORS
calculatePercentage
Expense
OR
Income
APP CONTROLLER
ctrlAddItem
click
keypress
updateBudget
updatePercentages
click
ctrlDeleteItem
setupEventListeners
init
UI CONTROLLER
getInput
addListItem
clearFields
displayBudget
formatNumber
displayPercentages
deleteListItem
changed
changedType
getDOMstrings
displayMonth

# NOT SO FAST...

(LET'S THINK TOGETHER)

# PLANNING: STEP 1




## TO-DO LIST

- Add event handler
- Get input values
- Add the new item to our data structure
- Add the new item to the UI
- Calculate budget
- Update the UI

# STRUCTURING OUR CODE WITH MODULES

## MODULES

- Important aspect of any robust application's architecture;
- Keep the units of code for a project both cleanly separated and organized;
- Encapsulate some data into privacy and expose other data publicly.

# STRUCTURING OUR CODE WITH MODULES

UI MODULE

DATA MODULE

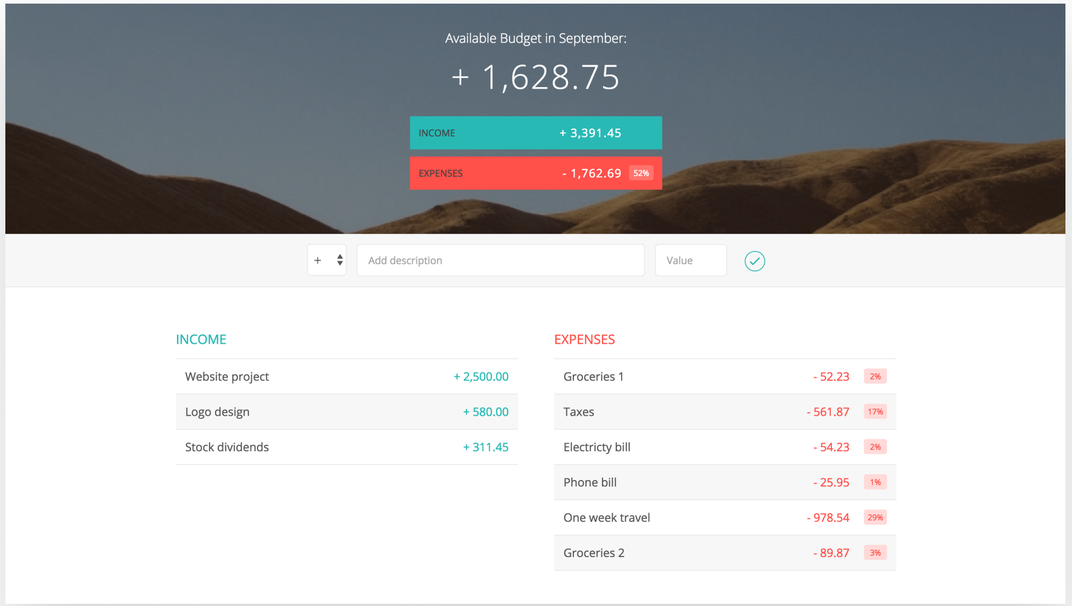
CONTROLLER MODULE

## TO-DO LIST

- Add event handler
- Get input values
- Add the new item to our data structure
- Add the new item to the UI
- Calculate budget
- Update the UI

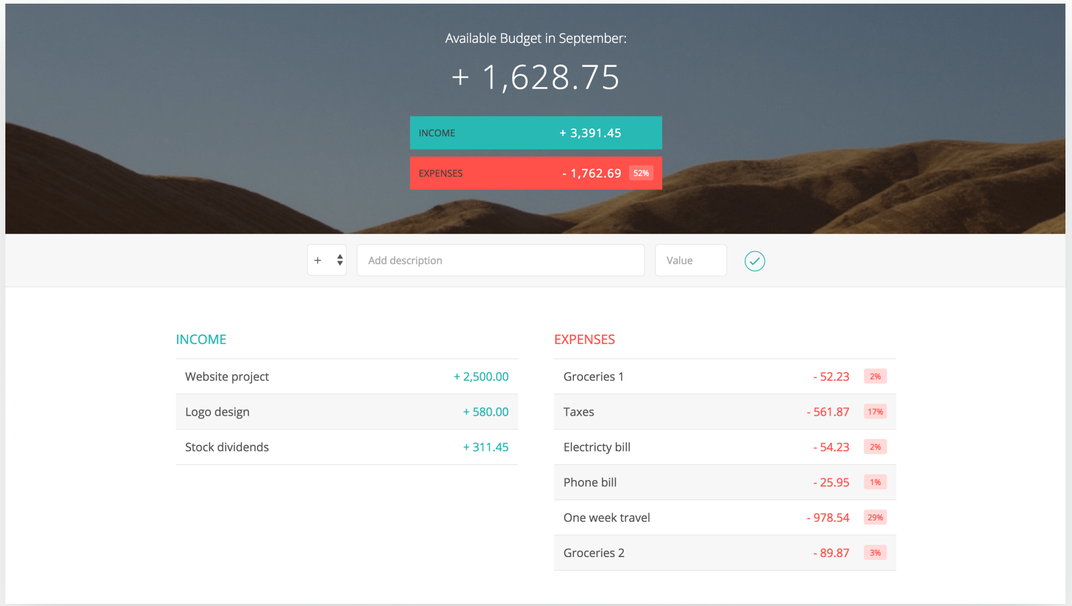
# WHAT YOU WILL LEARN IN THIS LECTURE

- How to use the module pattern;
- More about private and public data, encapsulation and separation of concerns.



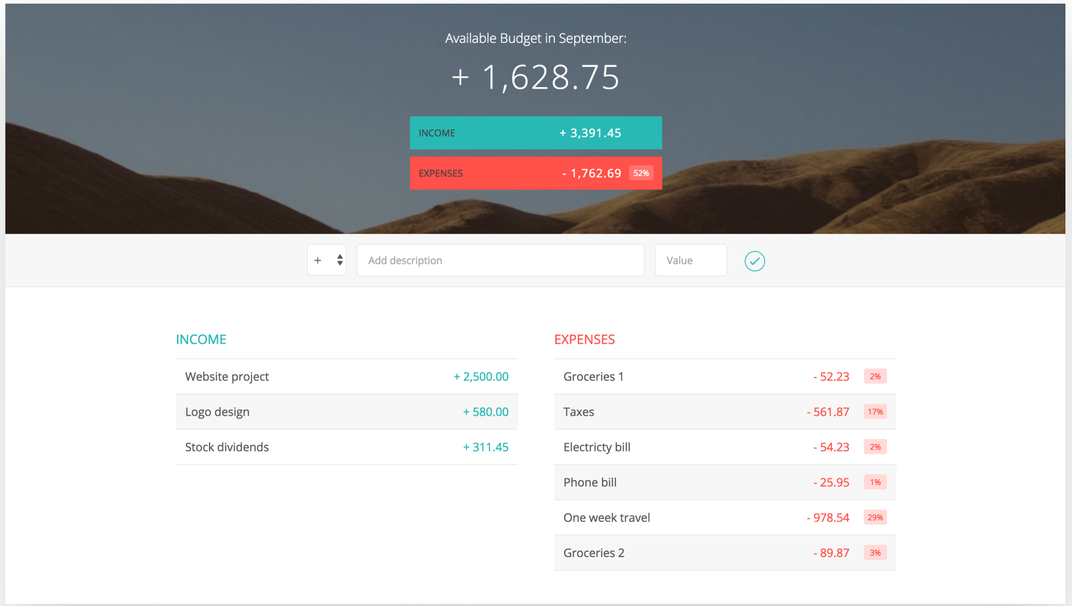
# WHAT YOU WILL LEARN IN THIS LECTURE

- How to set up event listeners for keypress events;
- How to use event object.



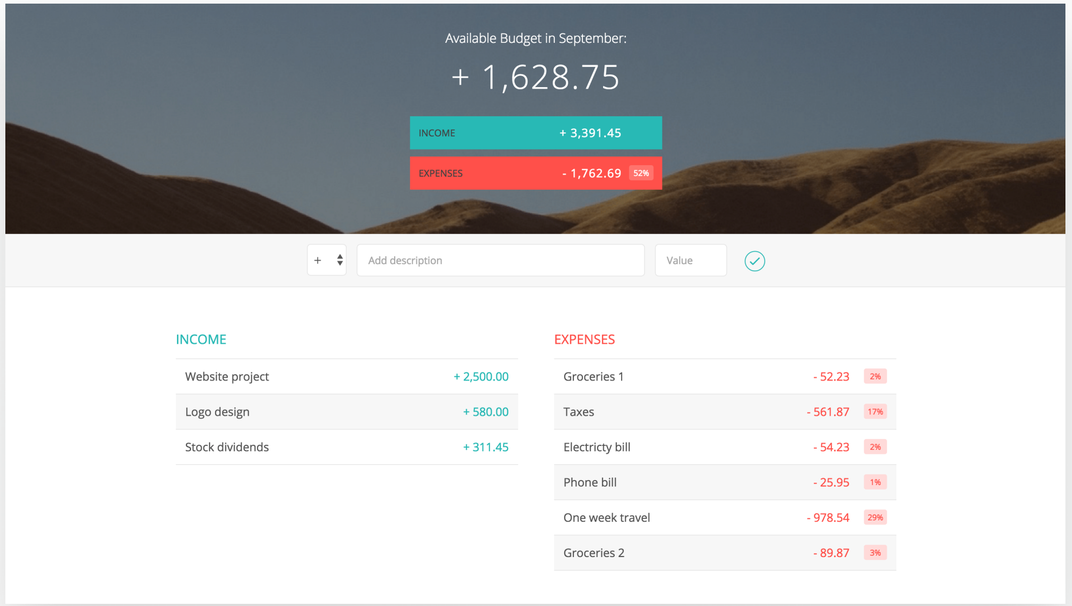
# WHAT YOU WILL LEARN IN THIS LECTURE

- How to read data from different HTML input types.



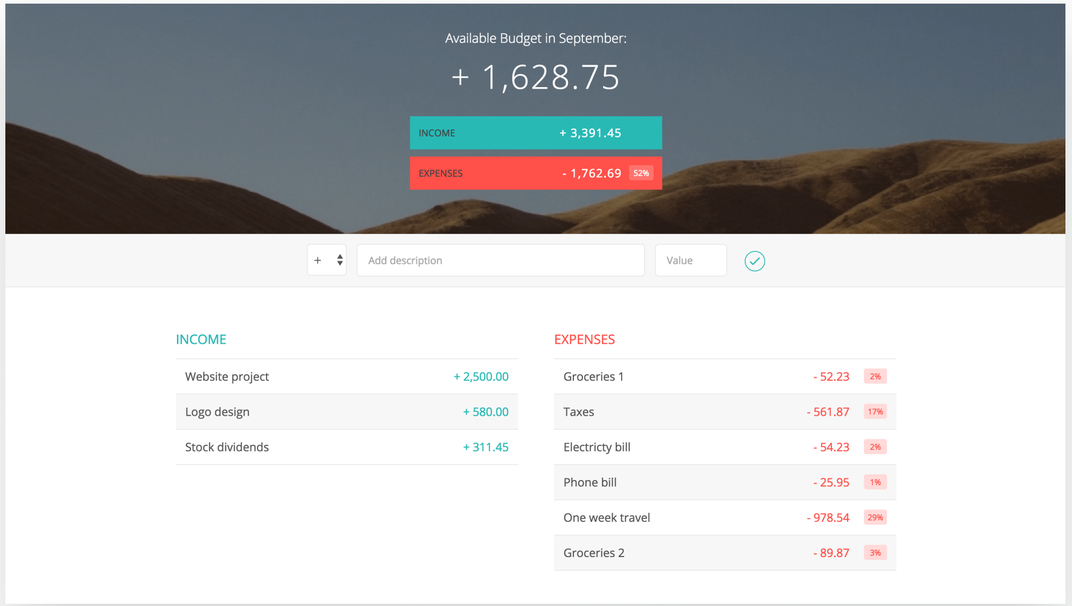
# WHAT YOU WILL LEARN IN THIS LECTURE

- How and why to create an initialization function.



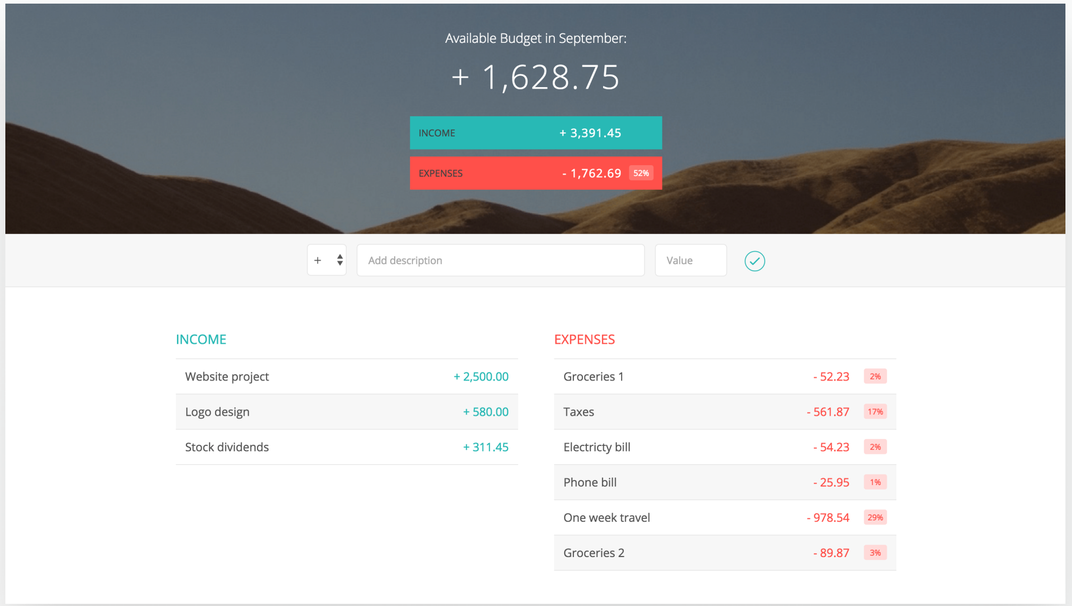
# WHAT YOU WILL LEARN IN THIS LECTURE

- How to choose function constructors that meet our application's needs;
- How to set up a proper data structure for our budget controller.



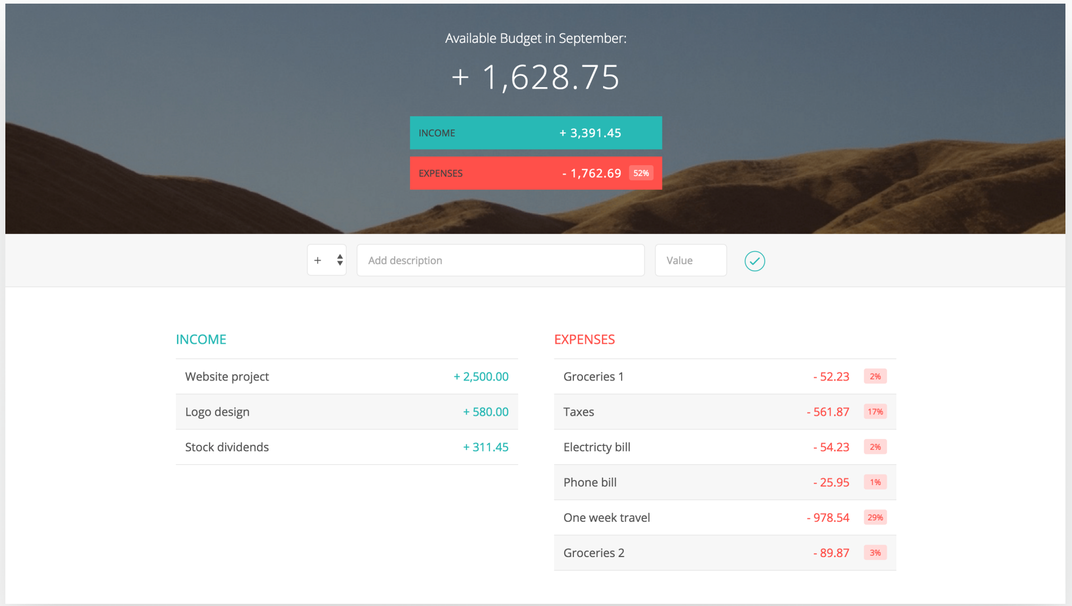
# WHAT YOU WILL LEARN IN THIS LECTURE

- How to avoid conflicts in our data structures;
- How and why to pass data from one module to another.



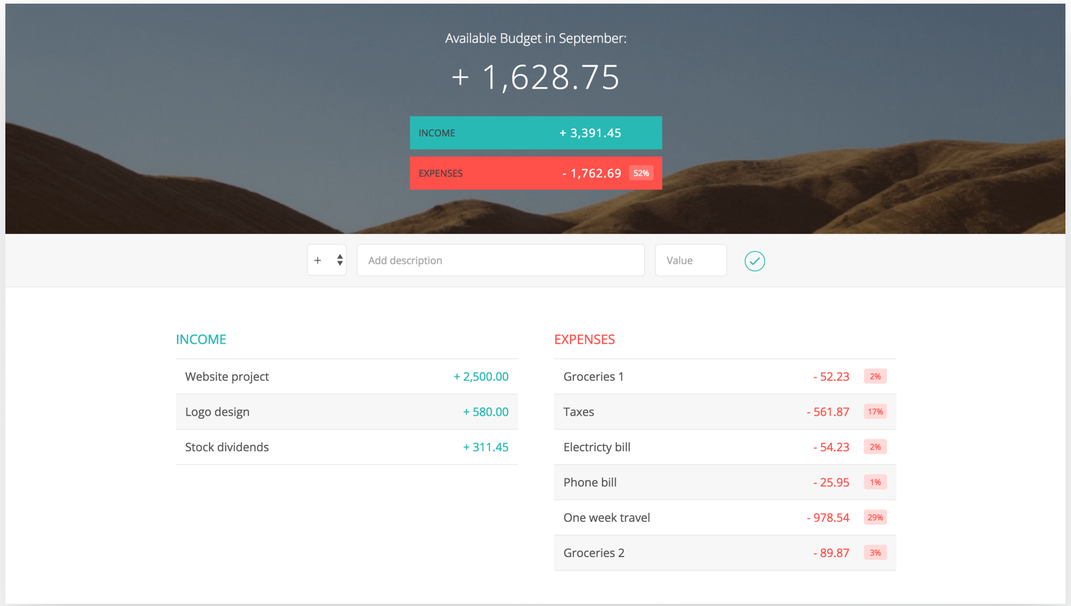
# WHAT YOU WILL LEARN IN THIS LECTURE

- A technique for adding big chunks of HTML into the DOM;
- How to replace parts of strings;
- How to do DOM manipulation using the `insertAdjacentHTML` method.



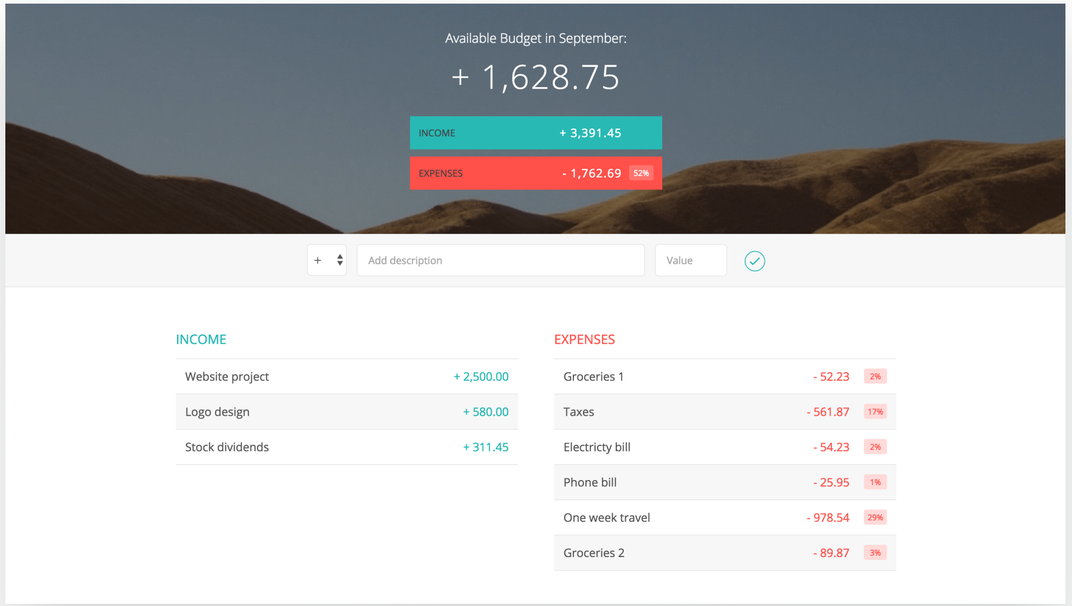
# WHAT YOU WILL LEARN IN THIS LECTURE

- How to clear HTML fields;
- How to use `querySelectorAll`,
- How to convert a list to an array;
- A better way to loop over an array then `for` loops: `foreach`.



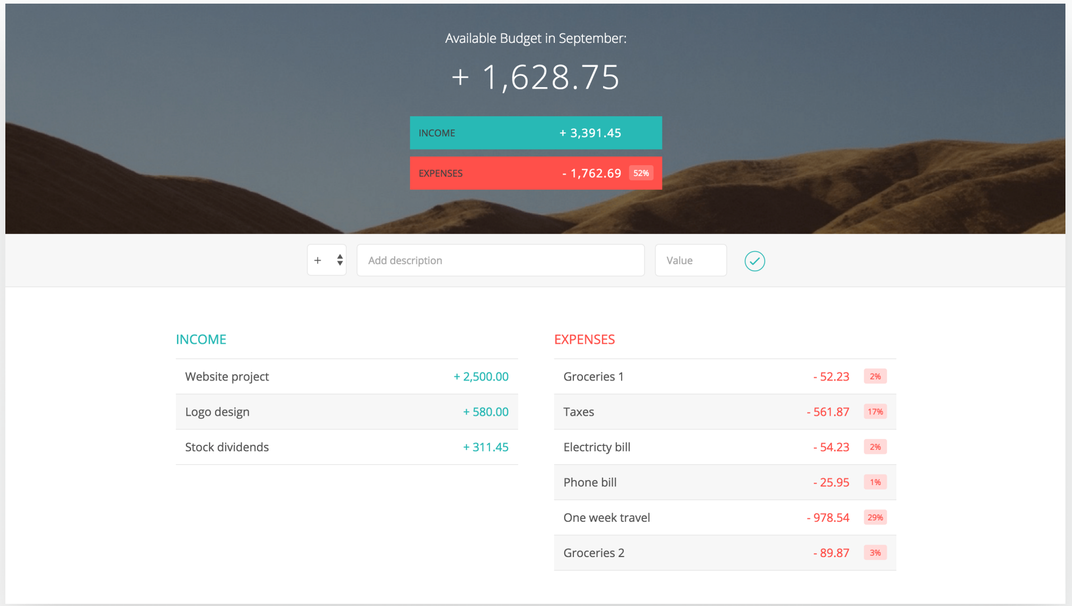
# WHAT YOU WILL LEARN IN THIS LECTURE

- How to convert field inputs to numbers;
- How to prevent false inputs.



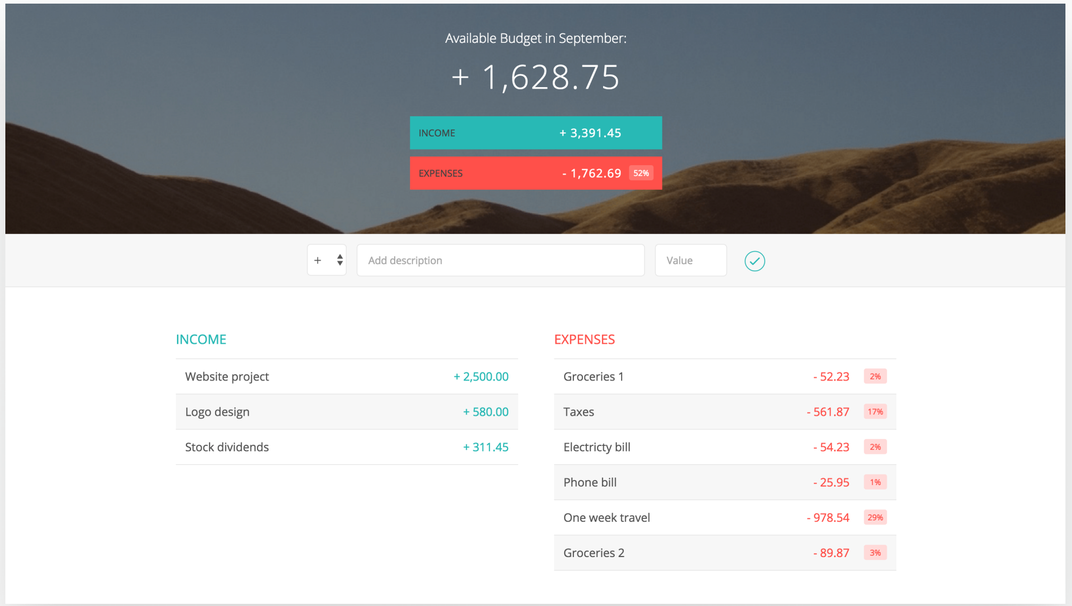
# WHAT YOU WILL LEARN IN THIS LECTURE

- How and why to create simple, reusable functions with only one purpose;
- How to sum all elements of an array using the `forEach` method.

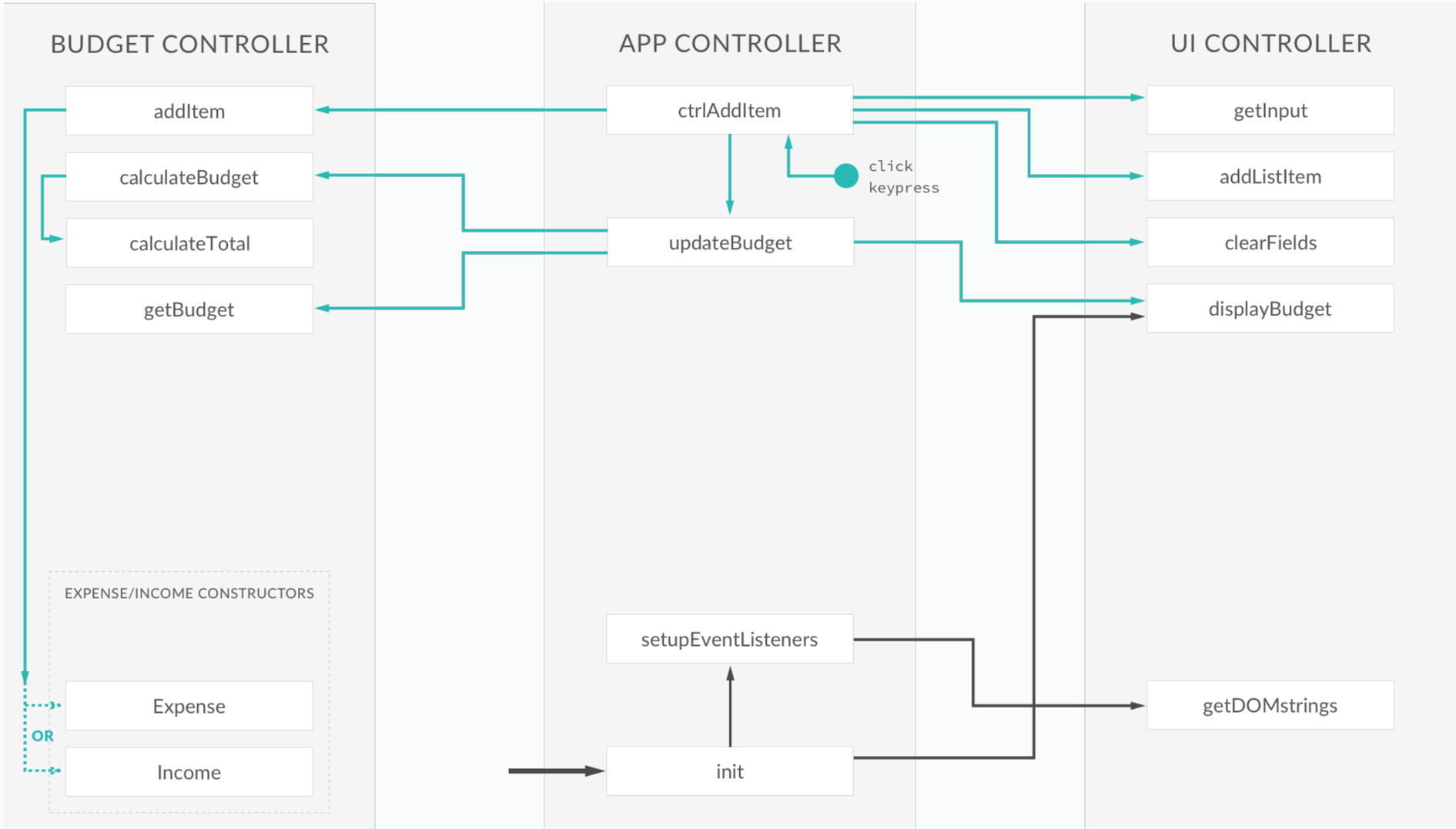


# WHAT YOU WILL LEARN IN THIS LECTURE

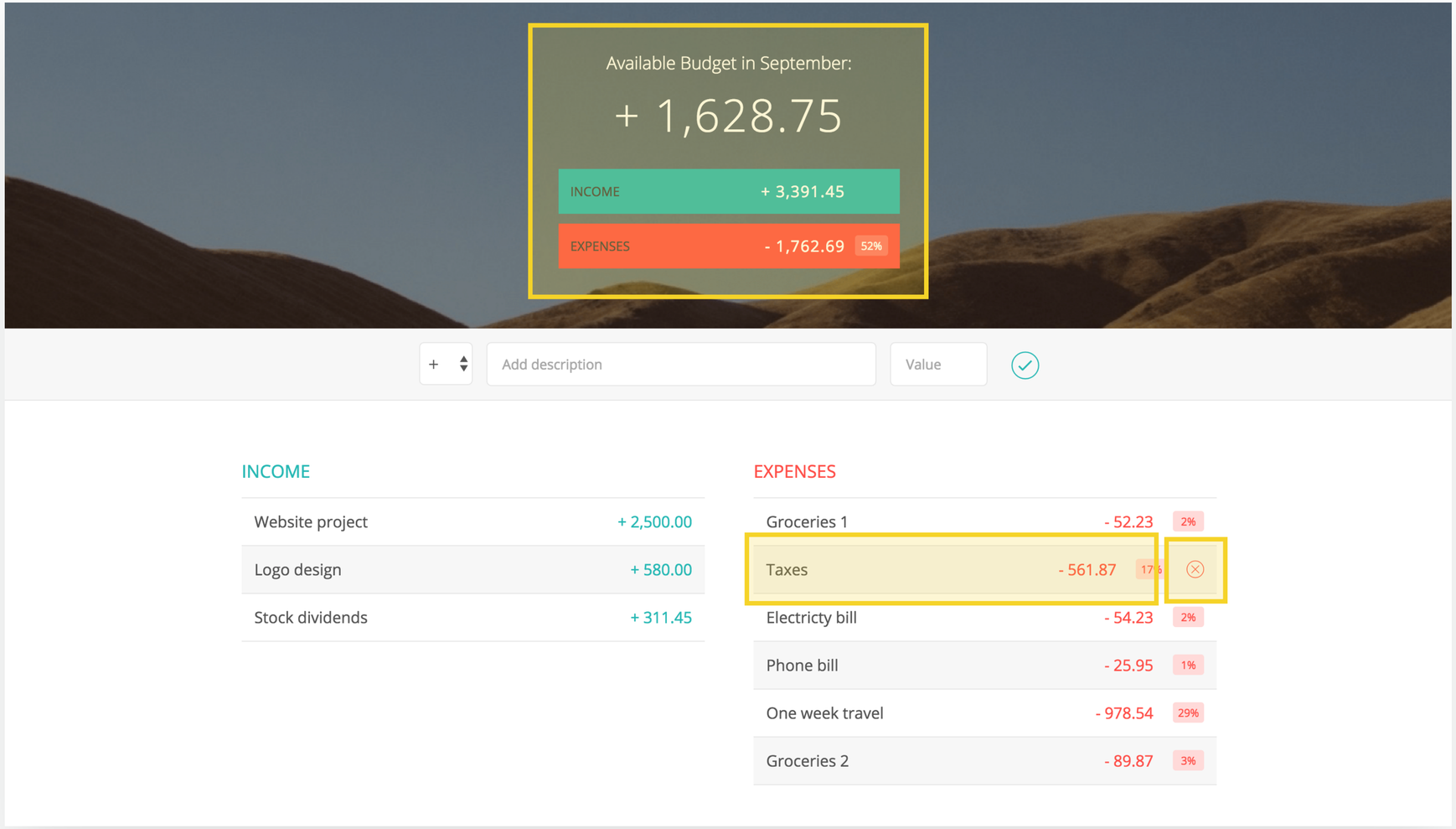
- Practice DOM manipulation by updating the budget and total values.



# AFTER STEP 1... (THAT WE JUST COMPLETED)



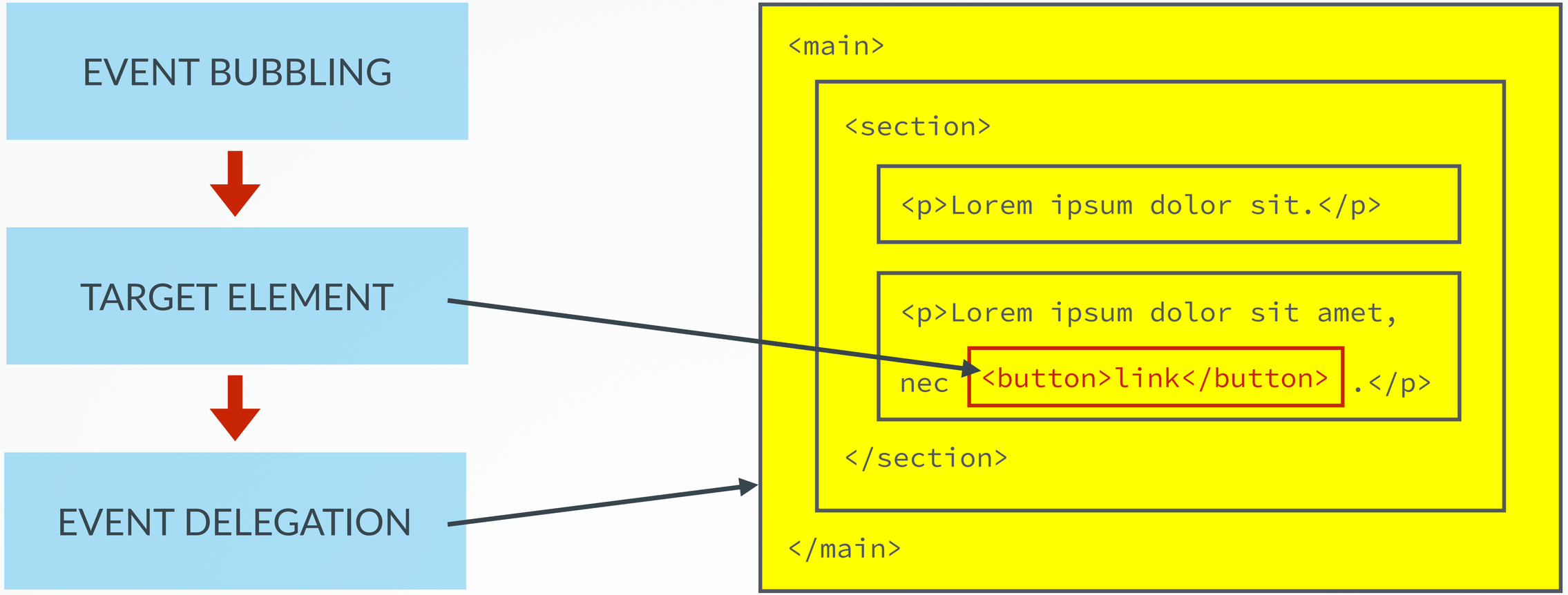
# PLANNING: STEP 2




## TO-DO LIST

- Add event handler
- Delete the item from our data structure
- Delete the item to the UI
- Re-calculate budget
- Update the UI

# EVENT BUBBLING, TARGET ELEMENT AND EVENT DELEGATION



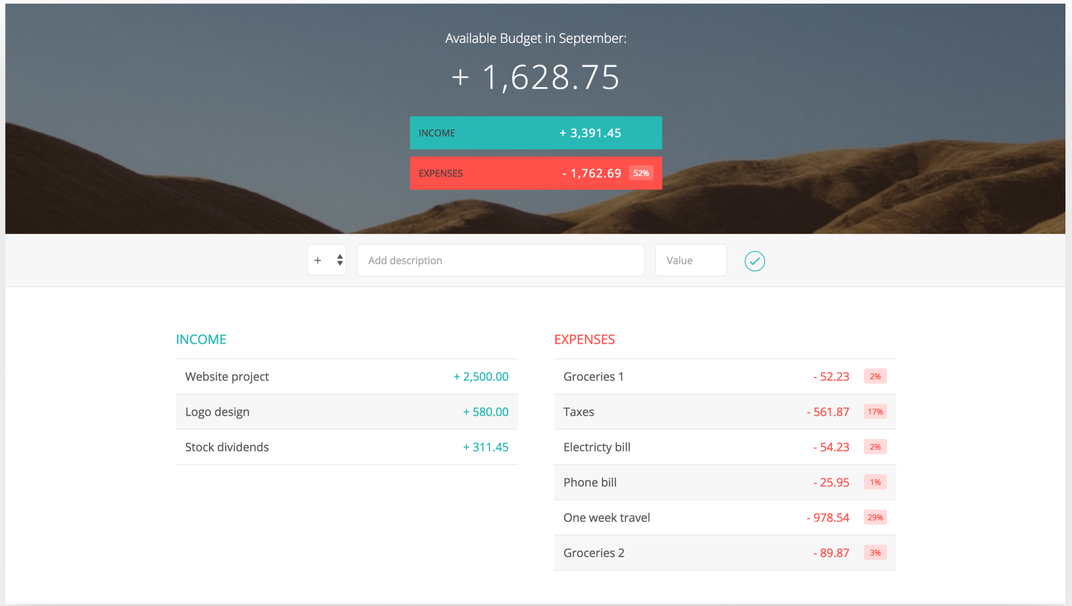
# WHEN TO USE EVENT DELEGATION

## USE CASES FOR EVENT DELEGATION

1. When we have an element with lots of child elements that we are interested in;
2. When we want an event handler attached to an element that is not yet in the DOM when our page is loaded.

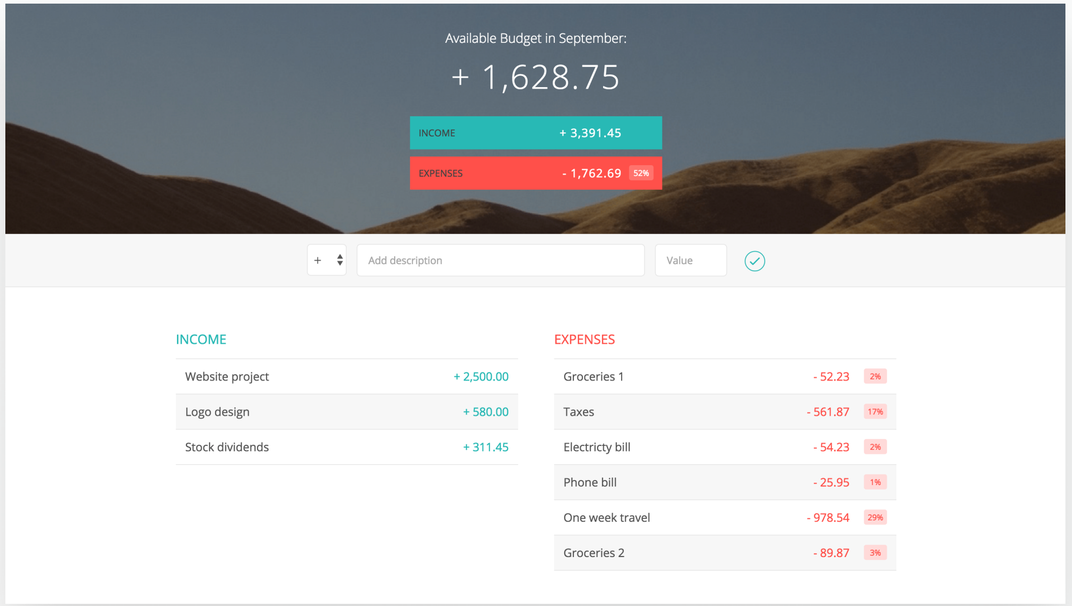
# WHAT YOU WILL LEARN IN THIS LECTURE

- How to use event delegation in practice;
- How to use IDs in HTML to connect the UI with the data model;
- How to use the `parentNode` property for DOM traversing.



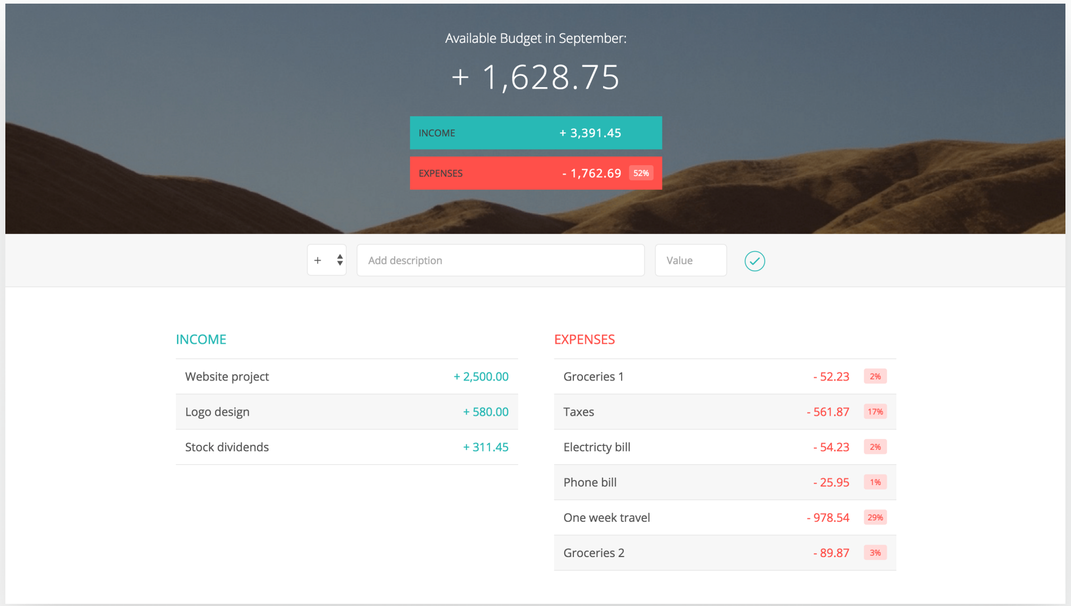
# WHAT YOU WILL LEARN IN THIS LECTURE

- Yet another method to loop over an array: `map`;
- How to remove elements from an array using the `splice` method.

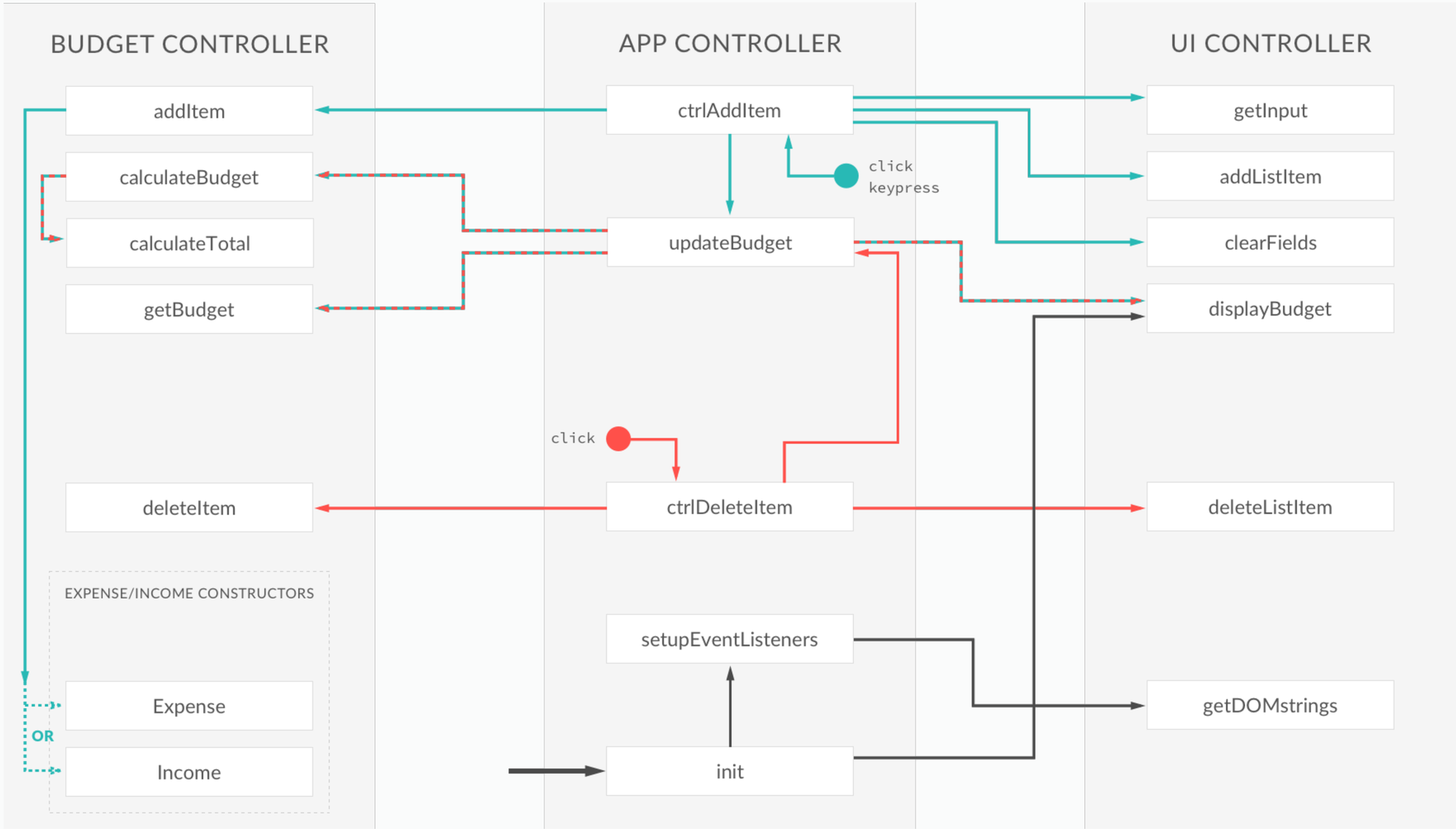


# WHAT YOU WILL LEARN IN THIS LECTURE

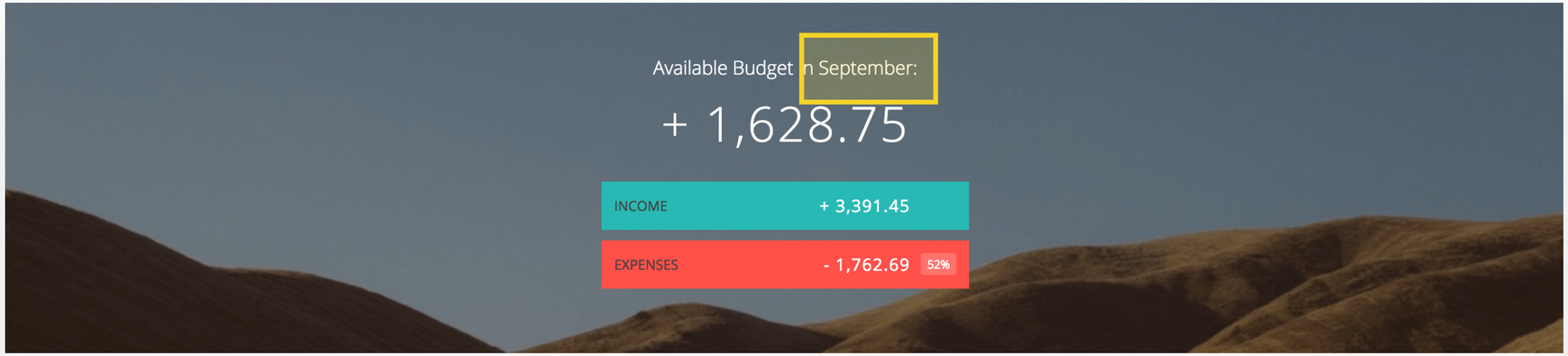
- More DOM manipulation: how to remove an element from the DOM.



# AFTER STEP 2... (THAT WE JUST COMPLETED)



# PLANNING: STEP 3




+ | Add description | Value

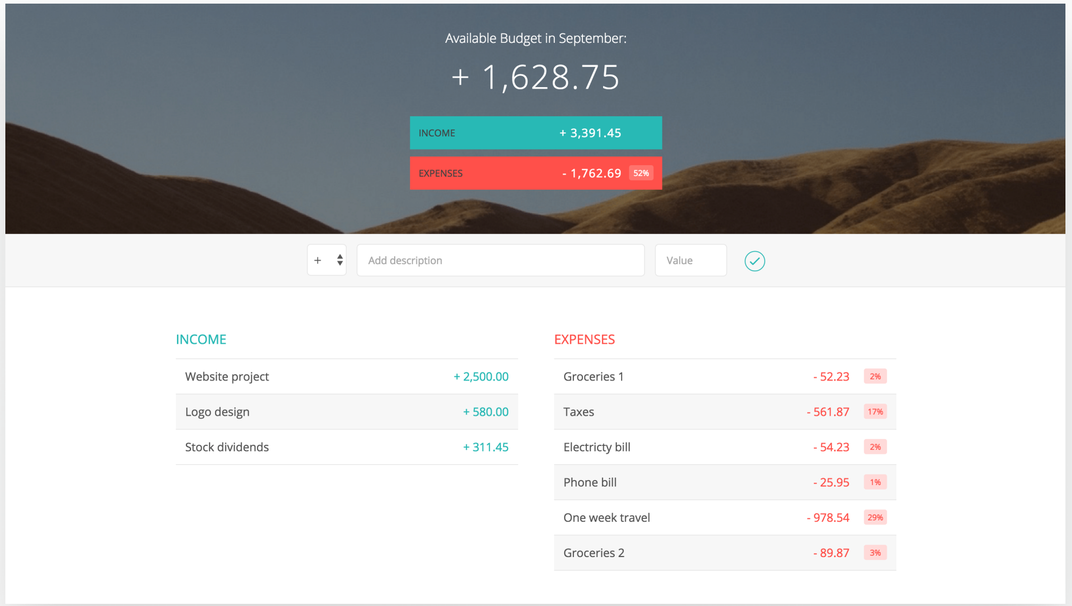
| INCOME | | EXPENSES | | |
|---|---|---|---|---|
| Website project | + 2,500.00 | Groceries 1 | - 52.2 | 2% |
| Logo design | + 580.00 | Taxes | - 561.87 | 1 % |
| Stock dividends | + 311.45 | Electricty bill | - 54.2 | 2% |
| | | Phone bill | - 25.9 | 1% |
| | | One week travel | - 978.5 | 29% |
| | | Groceries 2 | - 89.8 | 3% |

## TO-DO LIST

- Calculate percentages
- Update percentages in UI
- Display the current month and year
- Number formatting
- Improve input field UX

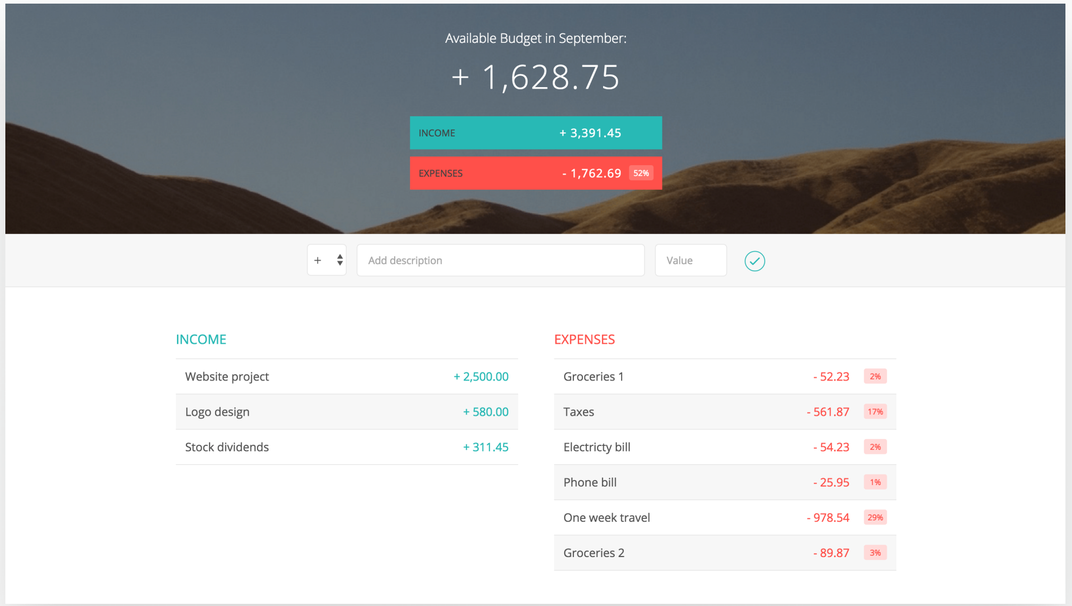
# WHAT YOU WILL LEARN IN THIS LECTURE

- Reinforcing the concepts and techniques we have learned so far.



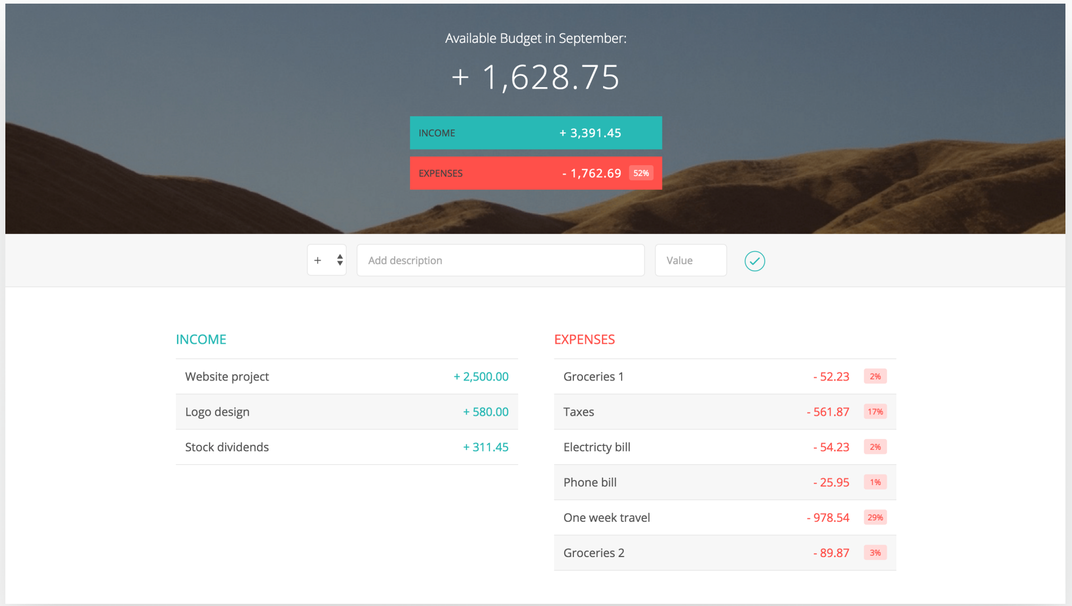
# WHAT YOU WILL LEARN IN THIS LECTURE

- How to make our budget controller interact with the Expense prototype.



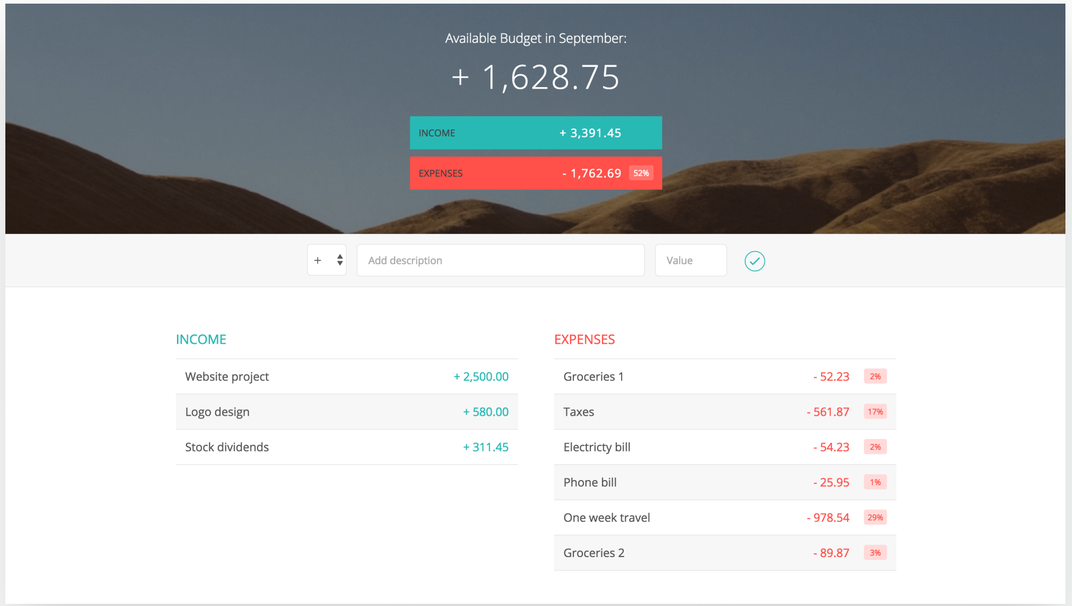
# WHAT YOU WILL LEARN IN THIS LECTURE

- How to create our own `forEach` function but for nodeLists instead of arrays.



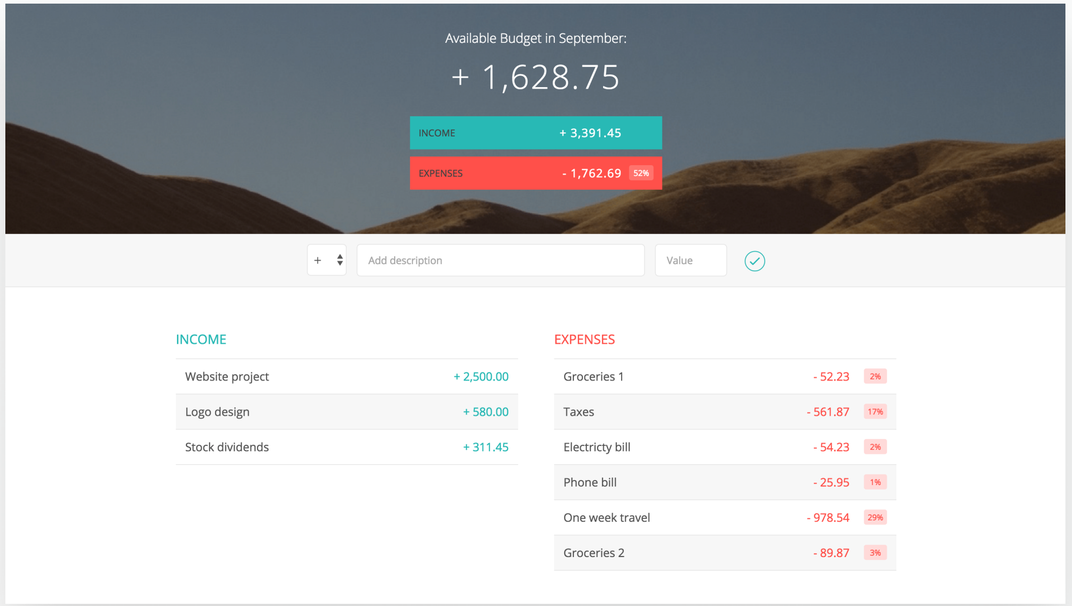
# WHAT YOU WILL LEARN IN THIS LECTURE

- How to use different String methods to manipulate strings.



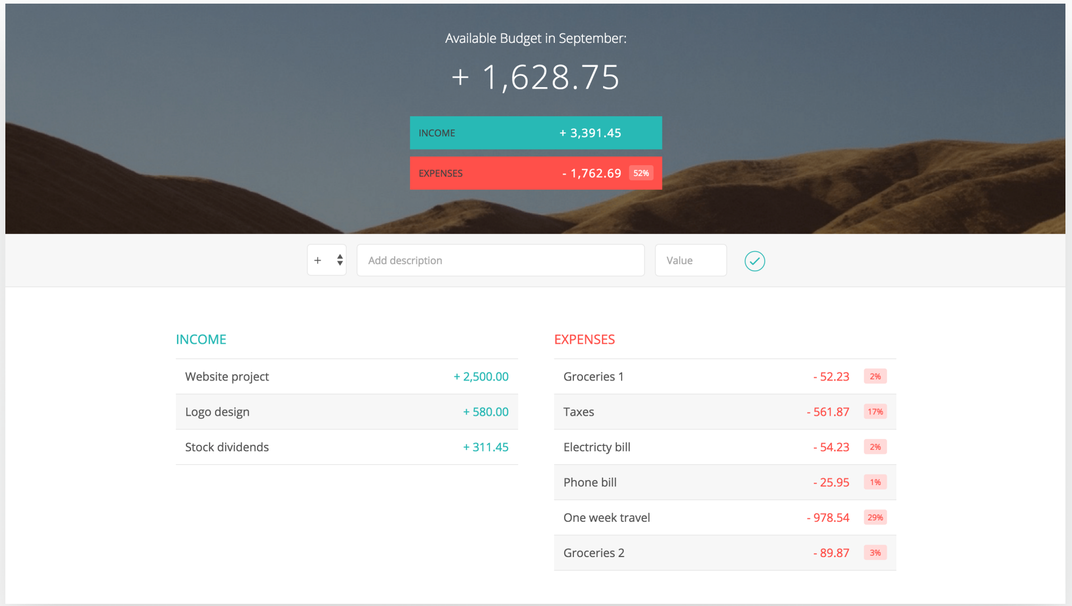
# WHAT YOU WILL LEARN IN THIS LECTURE

- How to get the current date by using the `Date` object constructor.

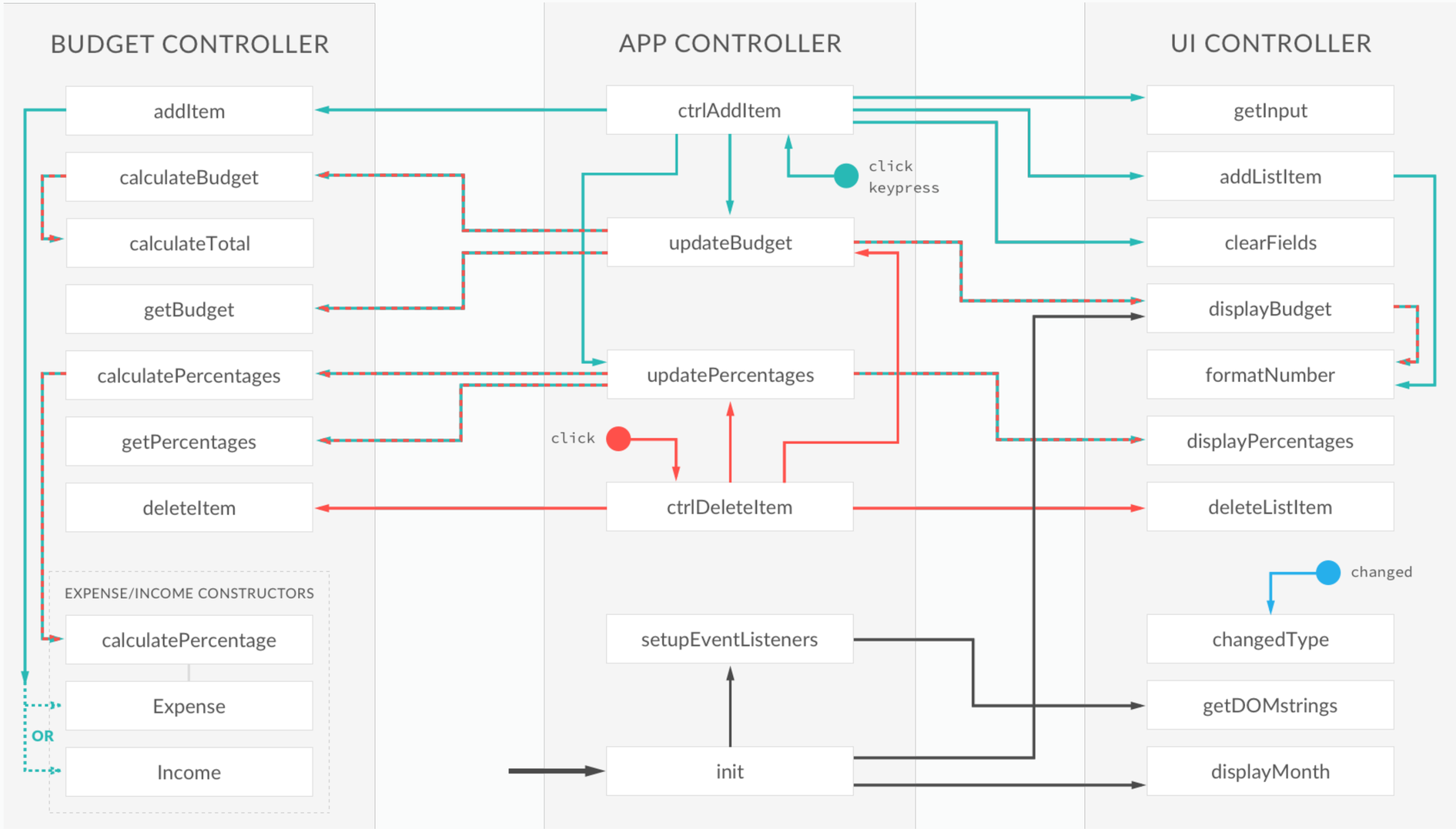


# WHAT YOU WILL LEARN IN THIS LECTURE

- How and when to use 'change' events.



# OUR FINAL ARCHITECTURE



# SECTION 7 — GET READY FOR THE FUTURE: ECMASCRIPT2015

# JAVASCRIPT VERSIONS: QUICK RECAP

ES6/ES2015

ES7/ES2016

ES8/ES2017

- Well supported in all **modern** browsers
- No support in older browsers;
- Can use **most** features in production with transpiling and polyfilling (converting to ES5) 😃

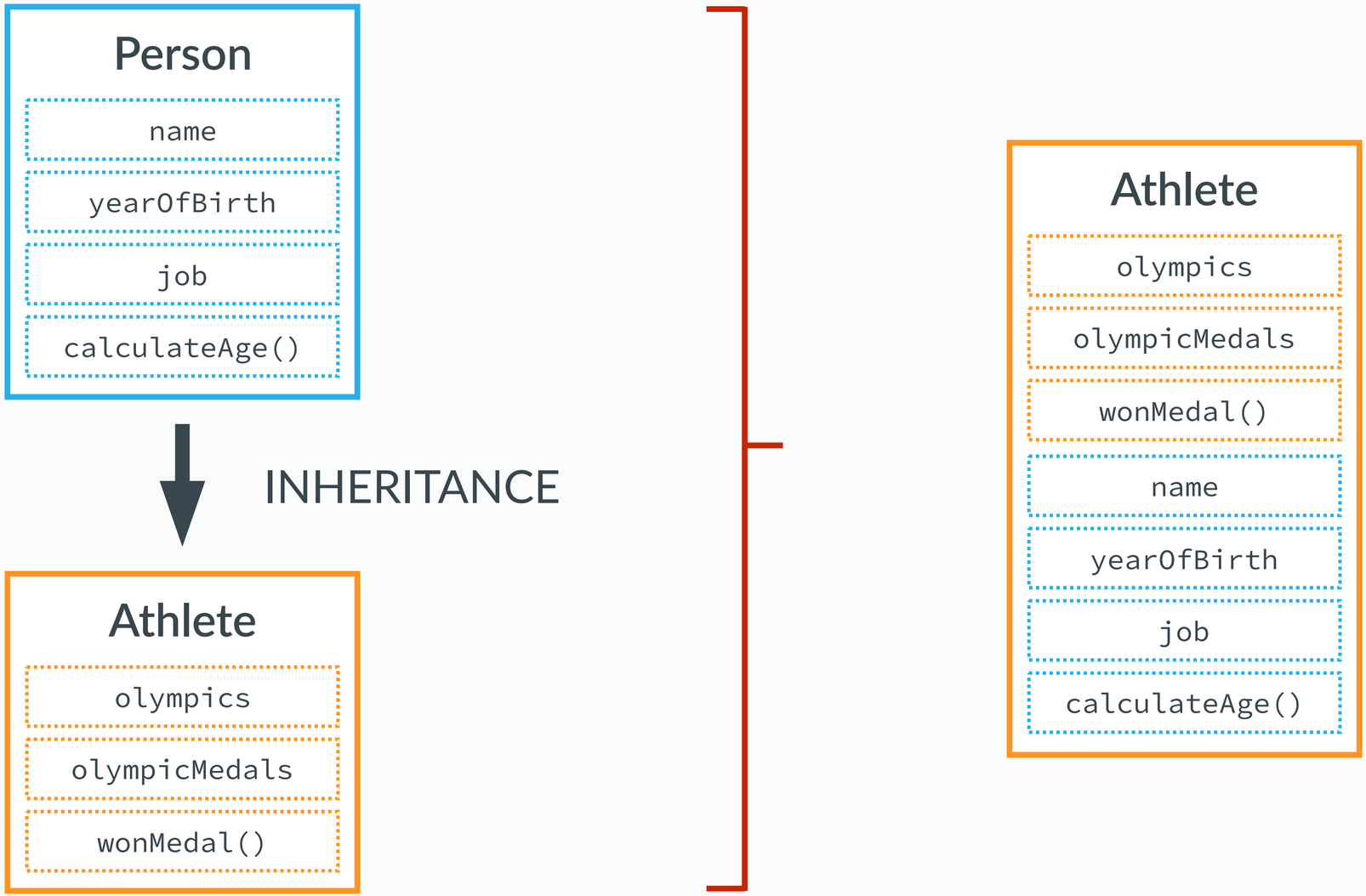
# NEW ES6 FEATURES WE'LL COVER IN THIS SECTION

- Variable Declarations with `let` and `const`
- Blocks and IIFEs
- Strings
- Arrow Functions
- Destructuring
- Arrays
- The Spread Operator
- Rest and Default Parameters
- Maps
- Classes and subclasses

LATER...

- Promises
- Native modules

# INHERITANCE IN GENERAL



# SECTION 8 — ASYNCHRONOUS JAVASCRIPT

# SYNCHRONOUS VS. ASYNCHRONOUS

## SYNCHRONOUS

```
const second = () => {
    console.log('How are you doing?');
};

const first = () => {
    console.log('Hey There!');
    second();
    console.log('The end');
};

first();
```

## ASYNCHRONOUS

```
const second = () => {
    setTimeout(() => {
        console.log('Async Hey There!');
    }, 2000);
};

const first = () => {
    console.log('Hey There!');
    second();
    console.log('The end');
};

first();
```

# SYNCHRONOUS VS. ASYNCHRONOUS

## SYNCHRONOUS

```
const second = () => {
    console.log('How are you doing?');
};

const first = () => {
    console.log('Hey There!');
    second();
    console.log('The end');
};

first();
```

## ASYNCHRONOUS

```
const image = document.getElementById('img').src;

processLargeImage(image, () => {
    console.log('Image processed!');
});
```

- Allow asynchronous functions to run in the “background”;
- We pass in callbacks that run once the function has finished its work;
- Move on immediately: Non-blocking!

# THE EVENT LOOP

## EXECUTION STACK

Executi
setT

timer
(2s)

callback
function

Execution Context
log()

Execution Context
timer callback

Global Execution
Context

## WEB APIS

setTimeout()

DOM events

XMLHttpRequest()

...

## CONSOLE

“Hey There!”

“The end”

“Async Hey There!”

## MESSAGE QUEUE

EVENT LOOP

```
const second = () => {
    setTimeout(() => {
        console.log('Async Hey There!');
    }, 2000);
};

const first = () => {
    console.log('Hey There!');
    second();
    console.log('The end');
};

first();
```

# WHAT ARE PROMISES?

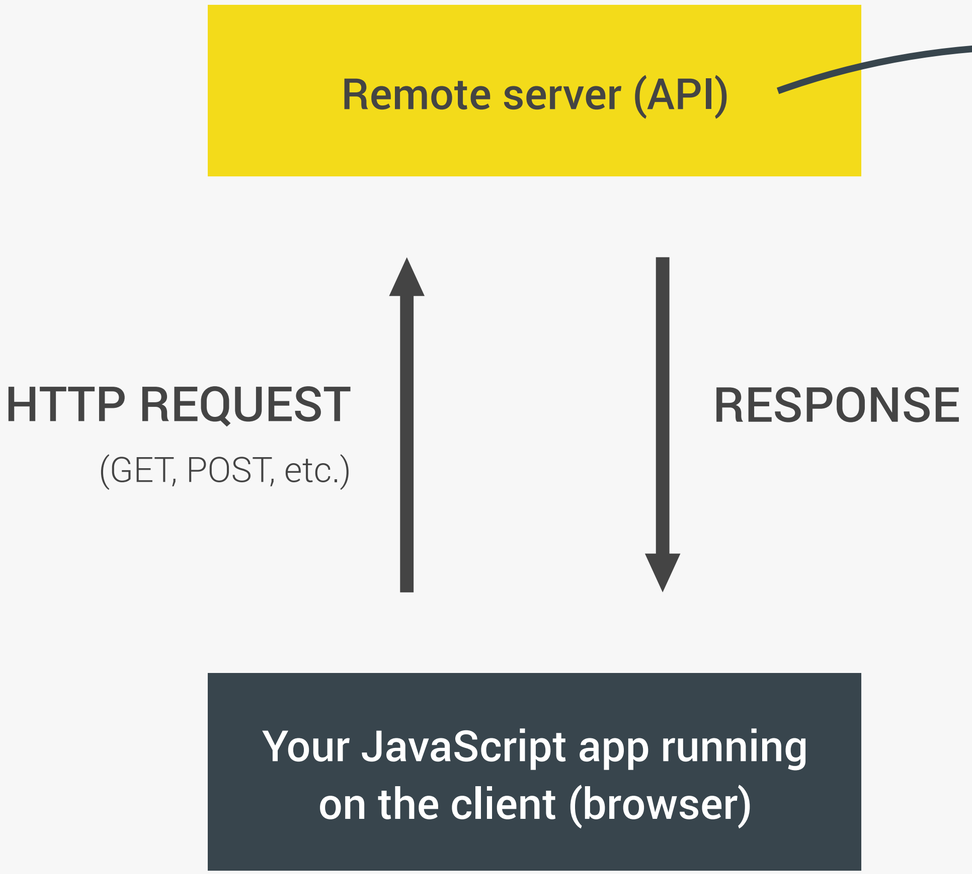
PROMISE

- Object that keeps track about whether a certain event has happened already or not;
- Determines what happens after the event has happened;
- Implements the concept of a future value that we're expecting

# PROMISE STATES

# WHAT ARE AJAX AND APIS?

**A**SYNCHRONOUS **J**AVASCRIPT **A**ND **X**ML




**A**PPLICATION **P**ROGRAMMING **I**NTERFACE

- Your own API, for data coming from your own server
- 3rd-party APIs:
  - Google Maps
  - Embed Youtube videos
  - Weather data
  - Movies data
  - Send email or SMS
  - Thousands of possibilities...

# SECTION 9 — MODERN JAVASCRIPT

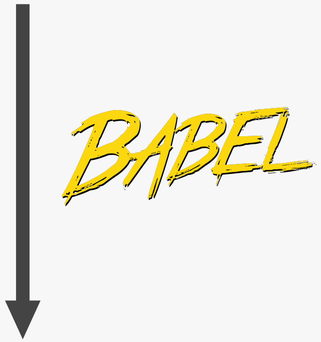
# MODERN JAVASCRIPT: A BRIEF OVERVIEW

3rd-party packages



— Libraries/frameworks
— Development tools

ES6/ESNext



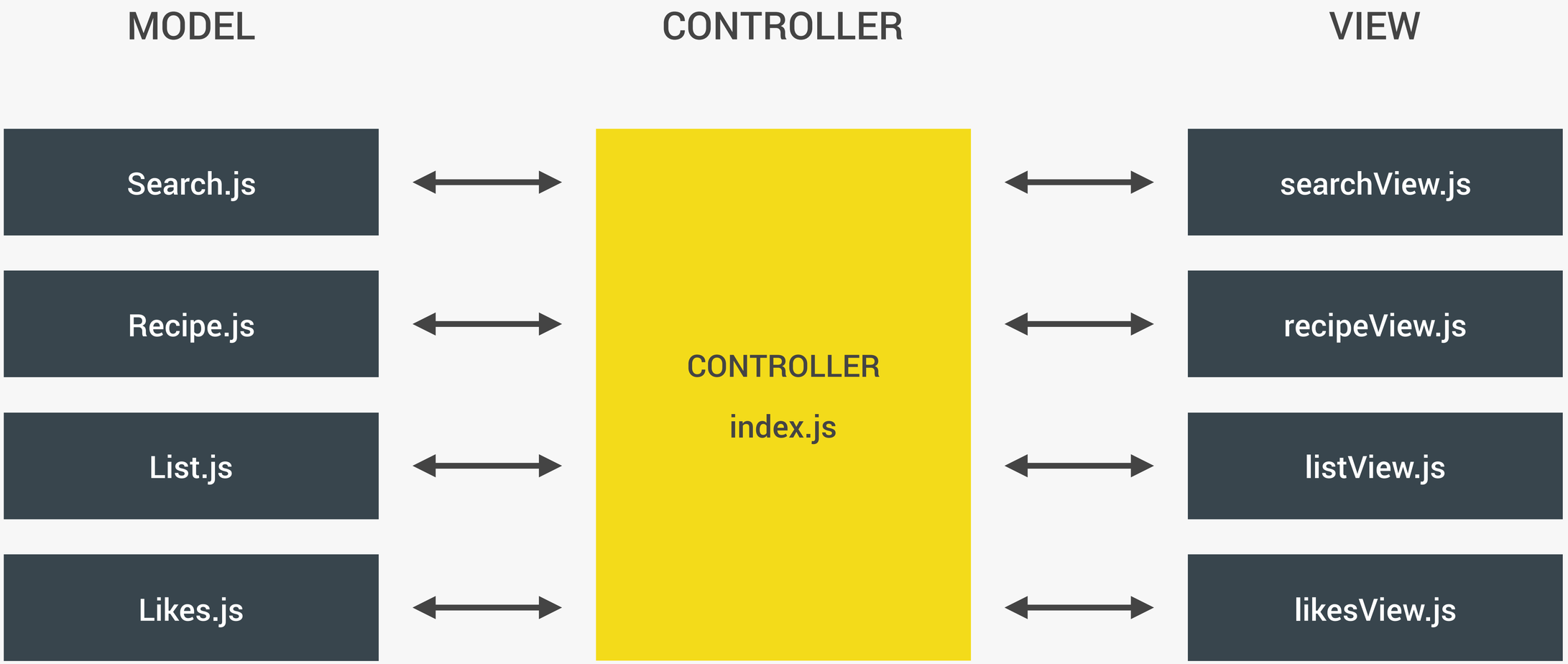

ES5

ES6 Modules


Bundle

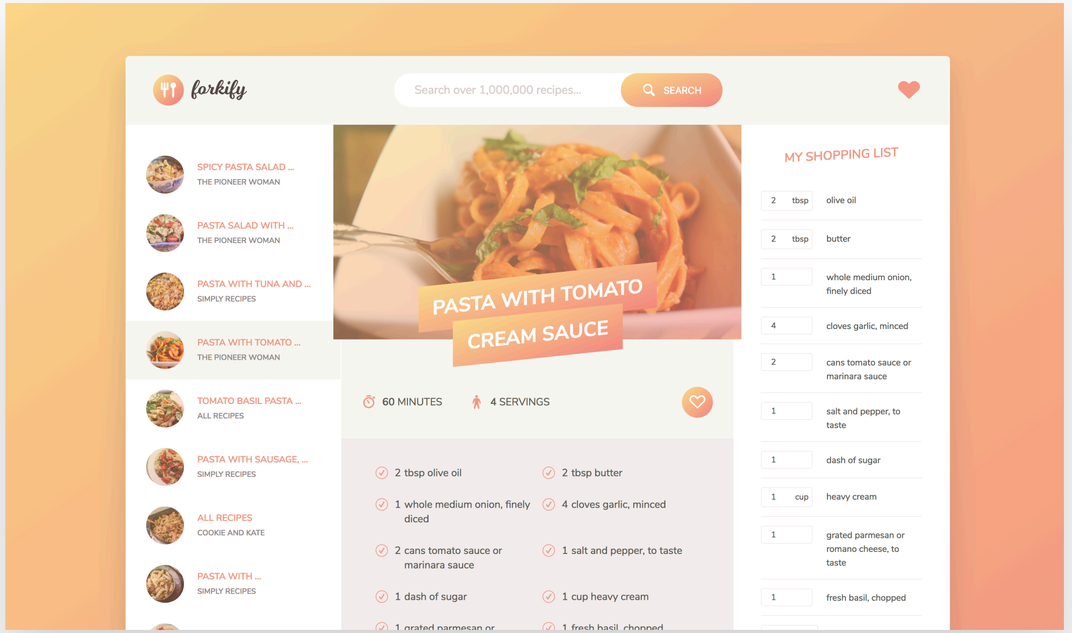
Putting it all together with an automated development setup powered by npm scripts

# OUR MODEL-VIEW-CONTROLLER ARCHITECTURE (MVC)



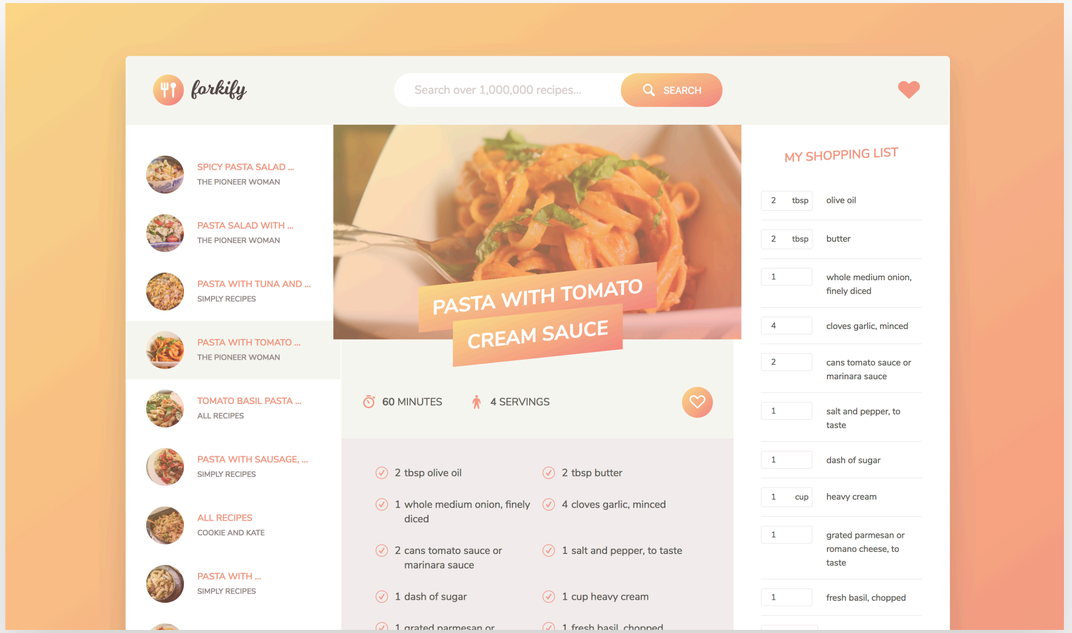
# WHAT YOU WILL LEARN IN THIS LECTURE

- How to use ES6 modules;
- Default and named exports and imports.



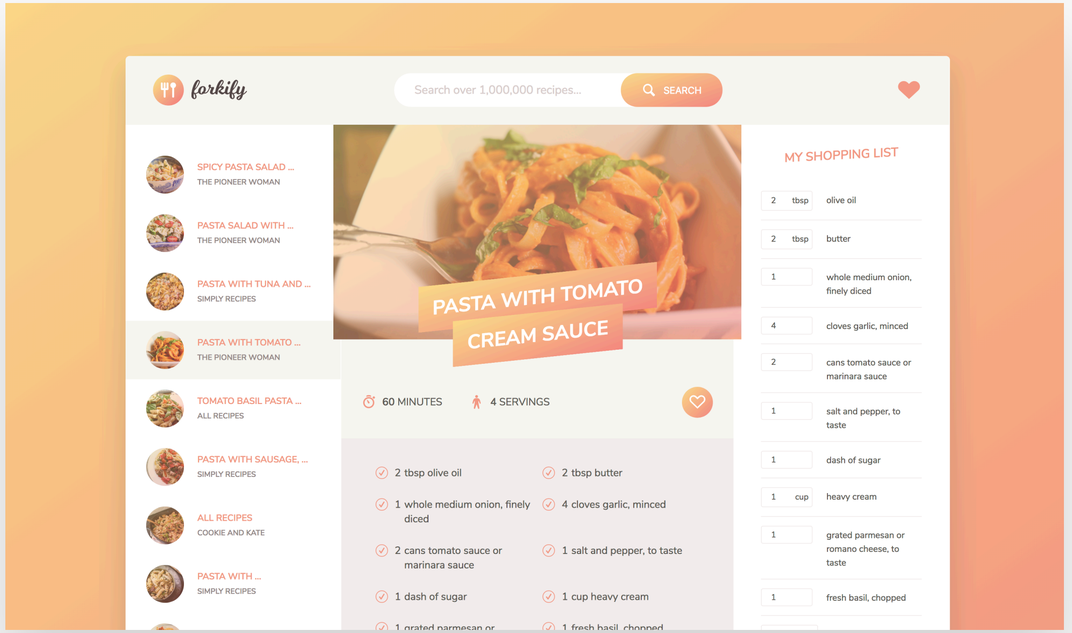
# WHAT YOU WILL LEARN IN THIS LECTURE

- How to use a real-world API;
- What API keys are and why we need them.



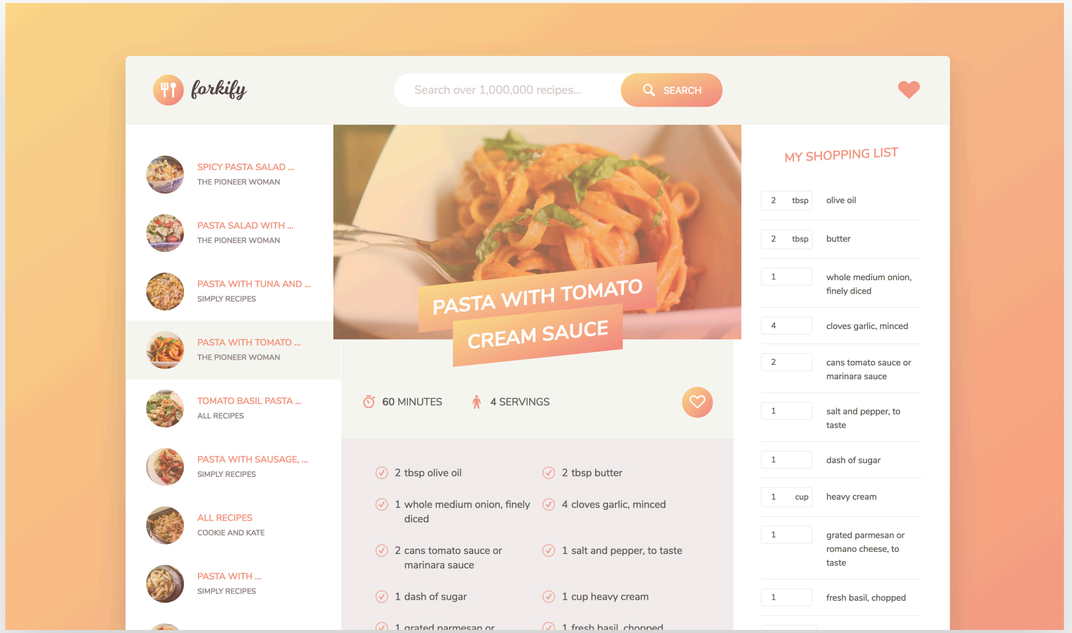
# WHAT YOU WILL LEARN IN THIS LECTURE

- How to build a simple data model using ES6 classes.



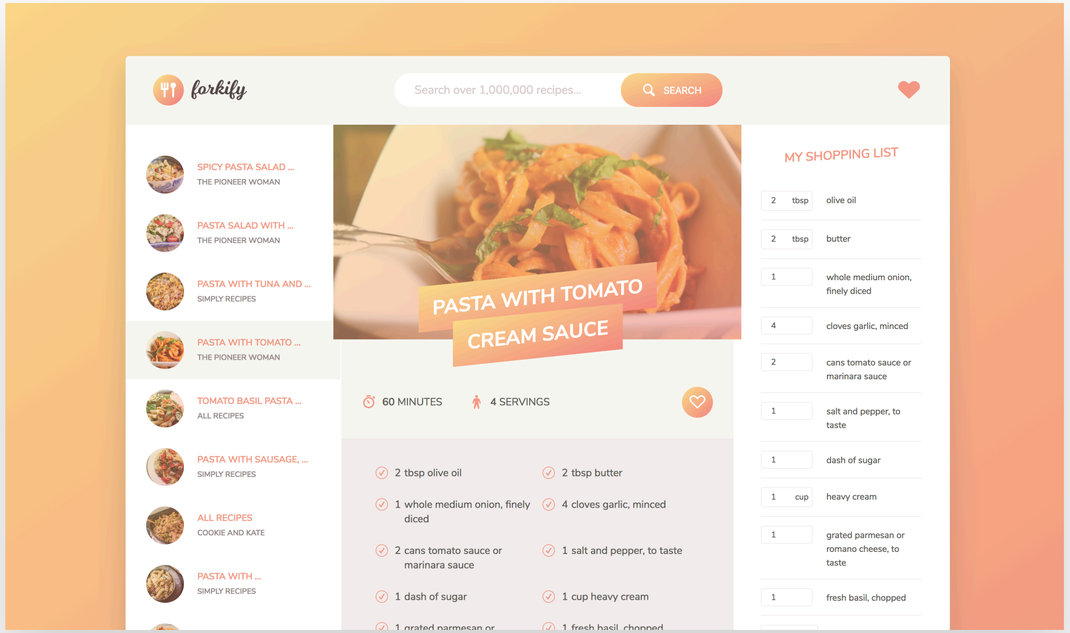
# WHAT YOU WILL LEARN IN THIS LECTURE

- The concept of application state;
- A simple way of implementing state.



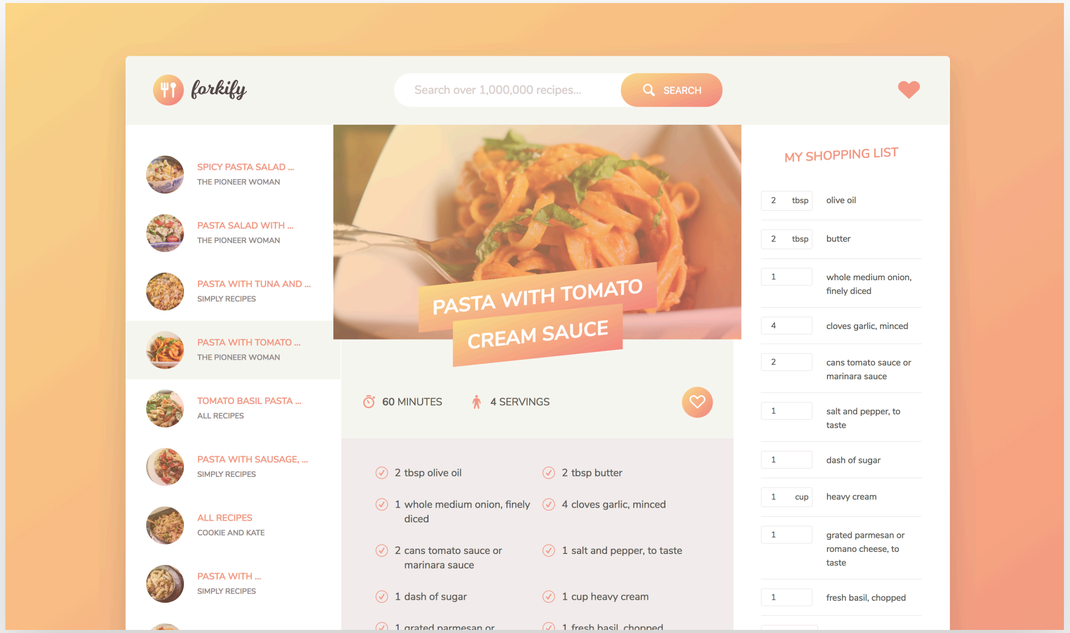
# WHAT YOU WILL LEARN IN THIS LECTURE

- Advanced DOM manipulation techniques;
- How to use ES6 template stings to render entire HTML components;
- How to create a loading spinner.



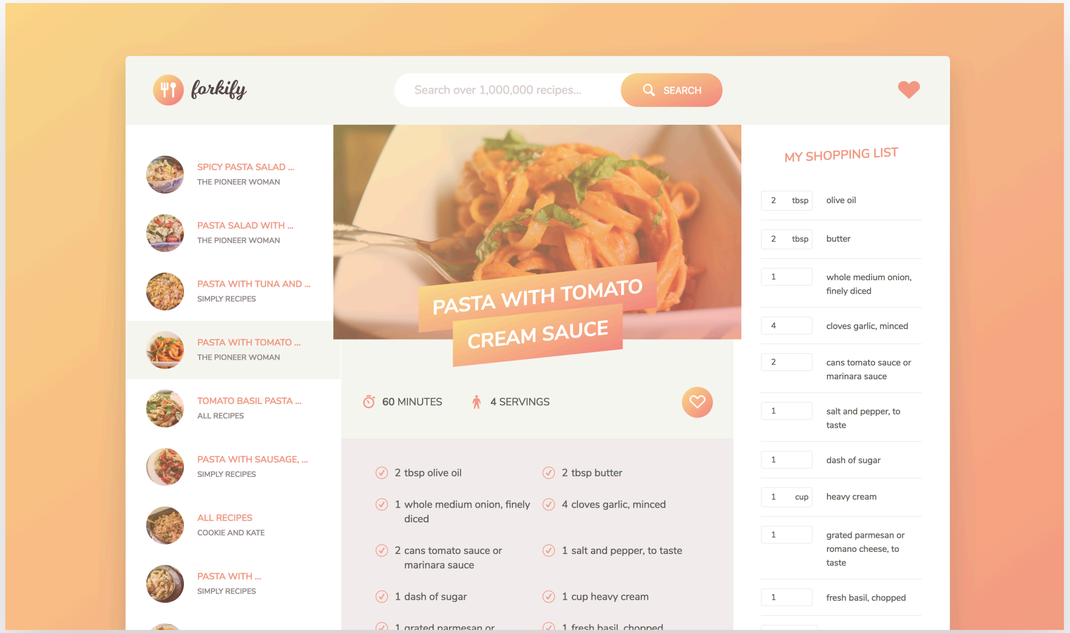
# WHAT YOU WILL LEARN IN THIS LECTURE

- How to use the `.closest` method for easier event handling;
- How and why to use `data-*` attributes in HTML5.



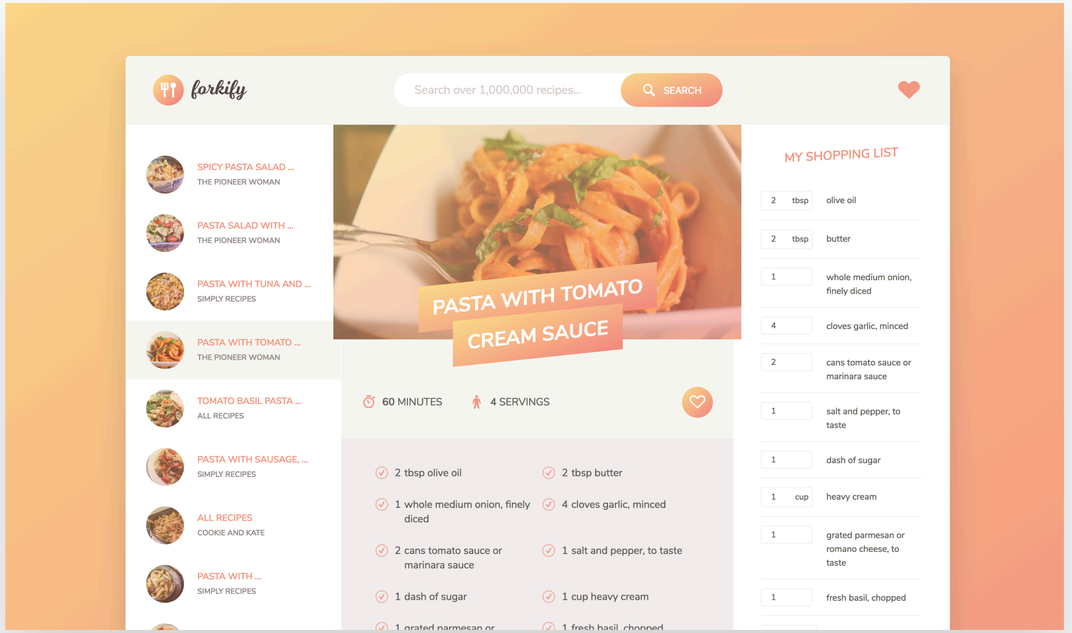
# WHAT YOU WILL LEARN IN THIS LECTURE

- How to read data from the page URL;
- How to respond to the hashchange event;
- How to add the same event listener to multiple events.



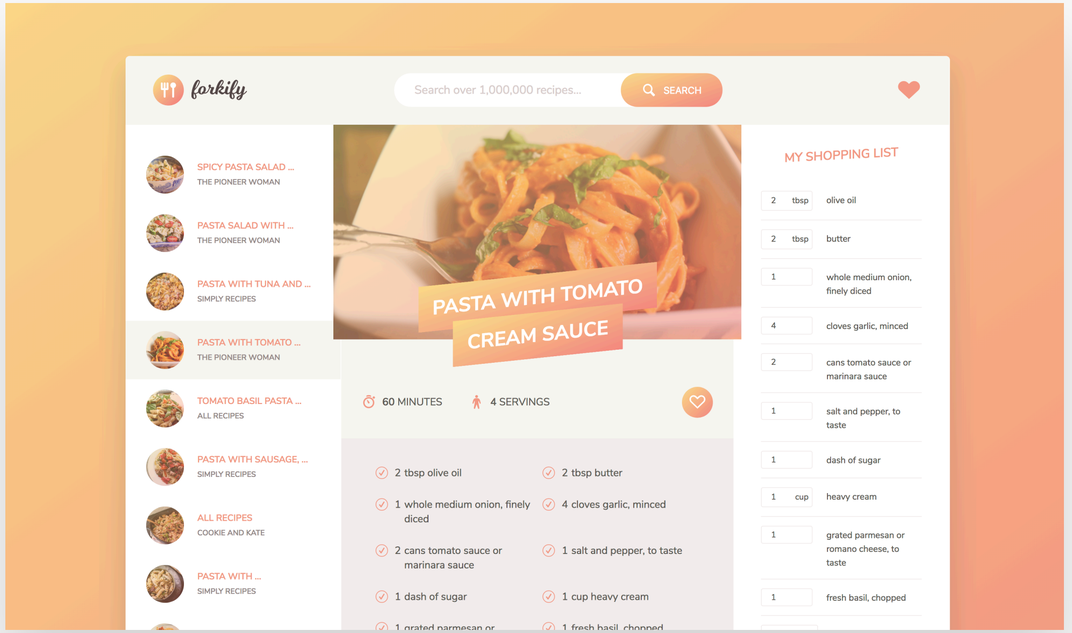
# WHAT YOU WILL LEARN IN THIS LECTURE

- Use array methods like `map`, `slice`, `findIndex` and `includes`;
- How and why to use `eval()`.



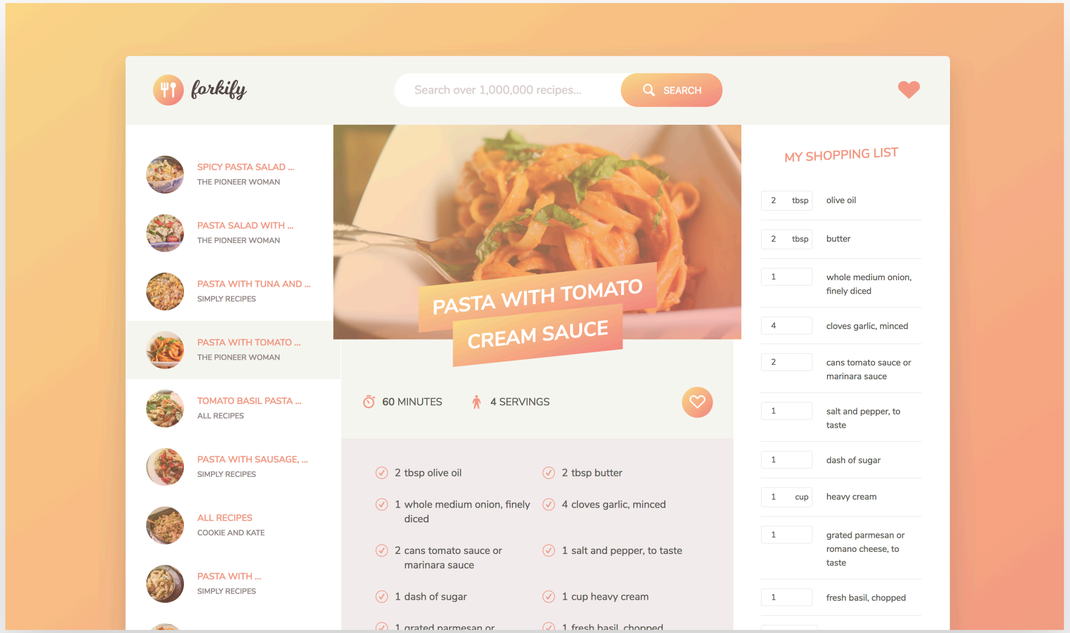
# WHAT YOU WILL LEARN IN THIS LECTURE

- Yet another way of implementing event delegation: `.matches`.



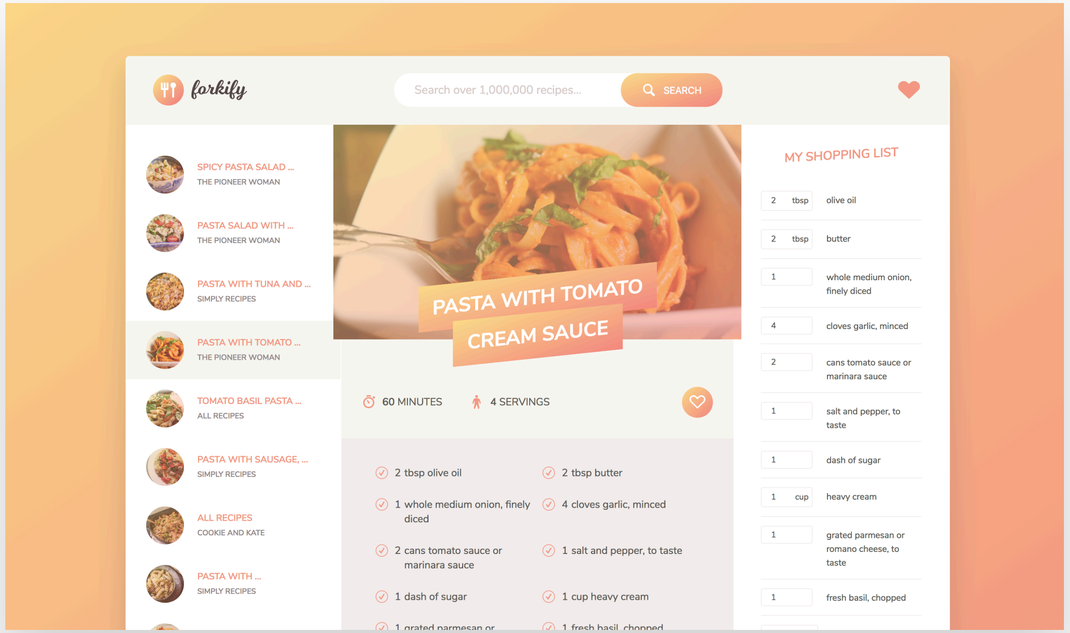
# WHAT YOU WILL LEARN IN THIS LECTURE

- How and why to create unique IDs using an external package;
- Difference between `Array.slice` and `Array.splice`;
- More uses cases for `Array.findIndex` and `Array.find`.



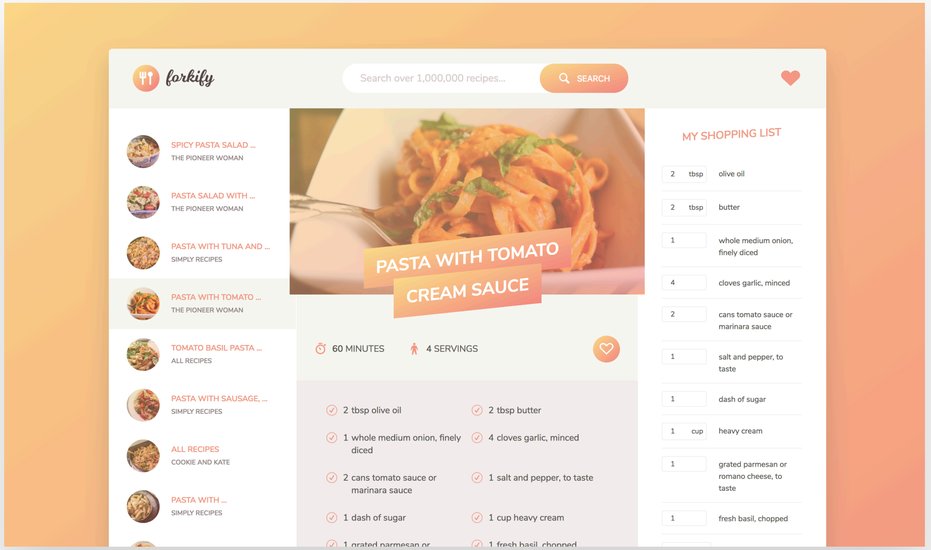
# WHAT YOU WILL LEARN IN THIS LECTURE

- How to use the `localStorage` API;
- How to set, get and delete items from local storage.



# MAKE THE PROJECT EVEN BETTER 💪

- Implement button to delete all shopping list items;
- Implement functionality to manually add items to shopping list;
- Save shopping list data in local storage;
- Improve the ingredient parsing algorithm;
- Come up with an algorithm for calculating the amount of servings;
- Improve error handling.



END