

Functional Programming with JavaScript (ES6)

CHEAT SHEET

Functional programming is a style that treats computation as the evaluation of mathematical functions and avoids changing-state and mutable data.

Arrow Functions (Fat Arrows)

Arrow functions create a concise expression that encapsulates a small piece of functionality. Additionally, arrows retain the scope of the caller inside the function eliminating the need of `self = this`.

Example

```
// const multiply = function(x,y) {  
//   return x * y;  
// }  
  
// Can be rewritten as:  
// const multiply = (x, y) => { return x * y };  
  
// Since the function is a single expression return and braces are not  
// needed.  
const multiply = (x, y) => x * y;  
  
console.log(multiply(5,10)) //50
```

[To the editor \(stackblitz.com\)](#)

Function Delegates

Function delegates encapsulate a method allowing functions to be composed or passed as data.

Example

```
const isZero = n => n === 0;

const a = [0,1,0,3,4,0];
console.log(a.filter(isZero).length); // 3
```

[To the editor \(stackblitz.com\)](#)

Expressions Instead of Statements

Statements define an action and are executed for their side effect. Expressions produce a result without mutating state.

Statement

```
const getSalutation = function(hour) {
  var salutation; // temp value
  if (hour < 12) {
    salutation = "Good Morning";
  }
  else {
    salutation = "Good Afternoon"
  }
  return salutation; // mutated value
}
```

Expression

```
const getSalutation = (hour) => hour < 12 ?
  "Good Morning" : "Good Afternoon";

console.log(getSalutation(10)); // Good Morning
```

[To the editor \(stackblitz.com\)](#)

Higher Order Functions

A function that accepts another function as a parameter, or returns another function.

Example

```
function mapConsecutive(values, fn) {
  let result = [];
  for(let i=0; i < values.length -1; i++) {
    result.push(fn(values[i], values[i+1]));
  }
  return result;
}

const letters = ['a','b','c','d','e','f','g'];
let twoByTwo = mapConsecutive(letters, (x,y) => [x,y]);
console.log(twoByTwo);
// [[a,b], [b,c], [c,d], [d,e], [e,f], [f,g]]
```

[To the editor \(stackblitz.com\)](#)

Currying

Currying allows a function with multiple arguments to be translated into a sequence of functions. Curried functions can be tailored to match the signature of another function.

Example

```
const convertUnits = (toUnit, factor, offset = 0) => input =>
  ((offset + input) * factor).toFixed(2).concat(toUnit);

const milesToKm = convertUnits('km', 1.60936, 0);
const poundsToKg = convertUnits('kg', 0.45460, 0);
const fahrenheitToCelsius = convertUnits('degrees C', 0.5556, -32);

milesToKm(10); //"16.09 km"
poundsToKg(2.5); //"1.14 kg"
fahrenheitToCelsius(98); //"36.67 degrees C"

const weightsInPounds = [5,15.4,9.8, 110];
```

```
// without currying
// const weightsInKg = weightsInPounds.map(x => convertUnits('kg', 0.45460,
0)(x));

// with currying
const weightsInKg = weightsInPounds.map(poundsToKg);
// 2.27kg, 7.00kg, 4.46kg, 50.01kg
```

[To the editor \(stackblitz.com\)](#)

Array Manipulation Functions

Array Functions are the gateway to functional programming in JavaScript. These functions make short work of most imperative programming routines that work on arrays and collections.

[].every(fn)

Checks if all elements in an array pass a test.

[].some(fn) | [].includes(fn)

Checks if any of the elements in an array pass a test.

[].find(fn)

Returns the value of the first element in the array that passes a test.

[].filter(fn)

Creates an array filled with only the array elements that pass a test.

[].map(fn)

Creates a new array with the results of a function applied to every element in the array.

[].reduce(fn(accumulator, currentValue))

Executes a provided function for each value of the array (from left-to-right). Returns a single value, the accumulator.

[].sort(fn(a,b)) *warning, mutates state!*

Modifies an array by sorting the items within an array. An optional compare function can be used to customize sort behavior. Use the spread operator to avoid mutation. `[...arr].sort()`

[].reverse() *warning, mutates state!*

Reverses the order of the elements in an array. Use the spread operator to avoid mutation. `[...arr].reverse()`

[To the editor \(stackblitz.com\)](#)

Method Chaining

Method chains allow a series of functions to operate in succession to reach a final result. Method chains allow function composition similar to a pipeline.

Example

```
let cart = [{name: "Drink", price: 3.12},
            {name: "Steak", price: 45.15},
            { name: "Drink", price: 11.01}];

let drinkTotal = cart.filter(x=> x.name === "Drink")
                  .map(x=> x.price)
                  .reduce((t,v) => t +=v)
                  .toFixed(2);

console.log(Total Drink Cost ${drinkTotal}); // Total Drink Cost $14.13
```

[To the editor \(stackblitz.com\)](#)

Pipelines

A pipeline allows for easy function composition when performing multiple operations on a variable. Since JavaScript lacks a Pipeline operator, a design pattern can be used to accomplish the task.

Example

```
const pipe = functions => data => {
  return functions.reduce(
    (value, func) => func(value),
    data
  );
};

let cart = [3.12, 45.15, 11.01];
const addSalesTax = (total, taxRate) => (total * taxRate) + total;

const tally = orders => pipe([
  x => x.reduce((total, val) => total + val), // sum the order
  x => addSalesTax(x, 0.09),
  x => `Order Total = ${x.toFixed(2)}` // convert to text
])(orders); // Order Total = 64.62
```

[To the editor \(stackblitz.com\)](#)

Author
Ed Charbeneau

Ed is a Microsoft MVP and an internationally recognized online influencer, speaker, writer, a Developer Advocate for Progress, and expert on all things web development. Ed enjoys geeking out to cool new tech, brainstorming about future technology, and admiring great design.



This resource is brought to you by Kendo UI

Kendo UI allows you to quickly build eye-catching, high-quality, high-performance responsive web-based apps integrated into your technology of choice (jQuery, Angular, React, or Vue). Kendo UI offers a large library of popular components from sophisticated grids and charts to basic buttons and menus. Access 70+ customizable UI components to speed up your development time by up to 50%.



Try Kendo UI

Worldwide Headquarters

Progress, 14 Oak Park, Bedford, MA 01730 USA

Tel: +1 781 280-4000 Fax: +1 781 280-4095

On the Web at: www.progress.com

Find us on  facebook.com/progresssw  twitter.com/progresssw  youtube.com/progresssw

For regional international office locations and contact information, please go to www.progress.com/worldwide

Progress and Kendo UI are trademarks or registered trademarks of Progress Software Corporation and/or one of its subsidiaries or affiliates in the U.S. and/or other countries. Any other trademarks contained herein are the property of their respective owners.

© 2018 Progress Software Corporation and/or its subsidiaries or affiliates. All rights reserved.
Rev 2018/03 | RITM0016138