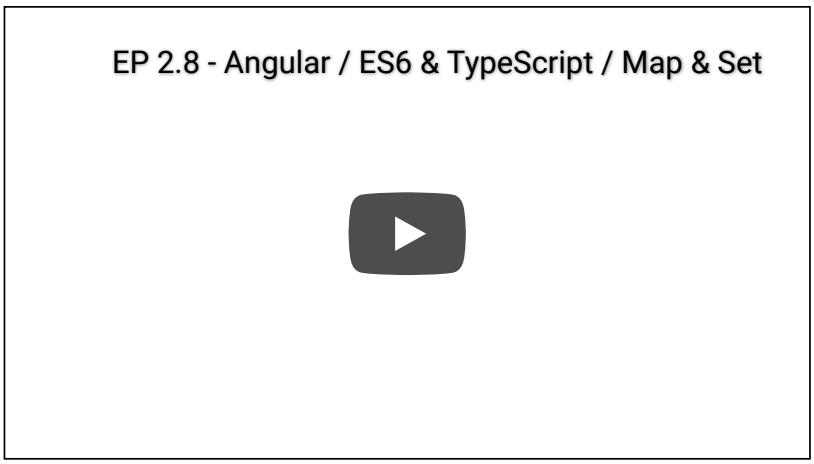
Map & Set



In this video I'm using an online editor called Plunker (https://plnkr.co/) to write and run Angular code. The book and code has since been updated to use StackBlitz (https://stackblitz.com) instead. To understand more about why and the differences between read this (/courses/angular/quickstart/overview/#_plunker_vs_stackblitz).

‹ FOR OF (/COURSES/ANGULAR/ES6-TYPESCRIPT/FOR-OF/) PROMISES ›

Using Object as a Map

In ES5 and below the only data structure we had to map keys to values was an `Object`, like so:

```TypeScript
let obj = {key: "value", a: 1}
console.log(obj.a); // 1
console.log(obj['key']); // "value"
```

However it does have a few pitfalls.

Inherited Objects

Looping over objects with `for-in` also iterated over the inherited properties as well as the objects own properties, like so:

```TypeScript
let base = {a:1,b:2};
let obj = Object.create(base);
obj[c] = 3;
for (prop in obj) console.log(prop)
// a
// b
// c
```

> **Tip**
>
> `Object.create` creates a new objects who's *prototype* points to the passed in `base` object. If it can't find a requested property on `obj`, JavaScript then tries to search the `base` object for the same property.

Perhaps this is the behaviour you want? Or perhaps you only want to print out the keys that belong to the current object?

With ES5 JavaScript to ensure you were looking at a property of the current object we need to use the `hasOwnProperty` function, like so:

```TypeScript
let base = {a:1,b:2};
let obj = Object.create(base);
obj[c] = 3;
for (prop in obj) {
    if (obj.hasOwnProperty(prop)) {
        console.log(prop)
    }
}
// c
```

Overriding Functions

If we are using Object as a dictionary then we could theoretically store a key of `hasOwnProperty` which then leads to the code in the example above failing, like so:

```TypeScript
let obj = {hasOwnProperty: 1};
obj.hasOwnProperty("test");
// TypeError: Property 'hasOwnProperty' is not a function
```

proto Property

proto holds a special meaning with respect to an objects prototype chain so we can't use it as the name of a key.

```TypeScript
let base = {__proto__:1,b:2};
for (prop in obj) console.log(prop)
// b
```

Map

Map is a new data structure introduced in ES6 which lets you map keys to values without the drawbacks of using Objects.

Creating, Getting and Setting

We create a map using the `new` keyword, like so

```TypeScript
let map = new Map();
```

We can then add entries by using the `set` method, like so:

```TypeScript
let map = new Map();
map.set("A",1);
map.set("B",2);
map.set("C",3);
```

The set method is also chainable, like so:

TypeScript

```
let map = new Map()
    .set("A",1)
    .set("B",2)
    .set("C",3);
```

Or we could initialise the `Map` with a an array of key–value pairs, like so:

TypeScript

```
let map = new Map([
    [ "A", 1 ],
    [ "B", 2 ],
    [ "C", 3 ]
]);
```

We can extract a value by using the `get` method:

TypeScript

```
map.get("A");
// 1
```

We can check to see if a key is present using the `has` method:

TypeScript

```
map.has("A");
// true
```

We can delete entries using the `delete` method:

TypeScript

```
map.delete("A");
// true
```

We can check for the size (number of entries) using the `size` property:

TypeScript

```
map.size
// 2
```

We can empty an entire `Map` by using the `clear` method:

TypeScript

```
map.clear()
map.size
// 0
```

Looping over a Map

We use the `for-of` looping operator to loop over entries in a Map.

There are a couple of different method we can employ, we'll go over each one using the below map as the example:

```typescript
let map = new Map([
    [ "APPLE", 1 ],
    [ "ORANGE", 2 ],
    [ "MANGO", 3 ]
]);
```

Using `keys()`

The `keys` method returns the keys in the map as an array which we can loop over using `for-of` like so:

```typescript
for (let key of map.keys()) {
    console.log(key);
}
// APPLE
// ORANGE
// MANGO
```

Using `values()`

The `values` method returns the values in the map as an array which we can loop over using `for-of` like so:

```typescript
for (let value of map.values()) {
    console.log(value);
}
// 1:
// 2
// 3
```

Using `entries()`

The `entries` method returns the [key,value] pairs in the map as an array which we can loop over using `for-of` like so:

```typescript
for (let entry of map.entries()) {
    console.log(entry[0], entry[1]);
}
// "APPLE" 1
// "ORANGE" 2
// "MANGO" 3
```

Using *destructuring* we can access the keys and values directly, like so:

```typescript
for (let [key, value] of map.entries()) {
    console.log(key, value);
}
// "APPLE" 1
// "ORANGE" 2
// "MANGO" 3
```

Looping over key-value pairs via `entries` is so common that this is the default for a Map.

Therefore we don't even need to call `entries()` on a map instance, like so:

```typescript
for (let [key, value] of map) {
    console.log(key, value);
}
// "APPLE" 1
// "ORANGE" 2
// "MANGO" 3
```

> **Important**
>
> A distinction between Object and Map is that Maps record the *order in which elements are inserted*. It then replays that order when looping over keys, values or entries.

Set

Sets are a bit like maps but they only store keys not key–value pairs.

They are common in other programming languages but are a new addition to JavaScript in ES6.

Creating, Getting and Setting

We create a Set using the `new` keyword, like so

```typescript
let set = new Set();
```

We can then add entries by using the `add` method, like so:

```typescript
```

```
let set = new Set();
set.add('APPLE');
set.add('ORANGE');
set.add('MANGO');
```

The `add` method is *chainable*, like so:

TypeScript

```
let set = new Set()
    .add('APPLE')
    .add('ORANGE')
    .add('MANGO');
```

Or we can initialise the Set with an array, like so:

TypeScript

```
let set = new Set(['APPLE', 'ORANGE', 'MANGO']);
```

We can check to see if a value is in a set like so:

TypeScript

```
set.has('APPLE')
// true
```

We can delete a value from the set:

TypeScript

```
set.delete('APPLE')
```

We can count the number of entries in the set like so:

TypeScript

```
set.size
// 2
```

We can empty the entire set with the `clear` method:

TypeScript

```
set.clear();
set.size
// 0
```

Sets can only store *unique* values, so adding a value a second time has no effect:

TypeScript

```
let set = new Set();
set.add('Moo');
set.size
// 1
set.add('Moo');
set.size
// 1
```

Looping over a Set

We can use the `for-of` loop to loop over items in our set, like so:

TypeScript Copy

```
let set = new Set(['APPLE', 'ORANGE', 'MANGO']);
for (let entry of set) {
    console.log(entry);
}
// APPLE
// ORANGE
// MANGO
```

> **Important**
>
> Similar to Maps, Sets also record the *order in which elements are inserted*, it then replays that order when looping.

Summary

Map and Set are great additions to JavaScript in ES6.

We no longer have to deal with Map and Sets *poor cousin* the Object and it's many drawbacks.

Listing

Listing 1. main.ts

TypeScript

```
'use strict';

// Map
let map = new Map();
map.set("A", 1);
map.set("B", 2);
map.set("C", 3);

let map2 = new Map()
  .set("A", 1)
  .set("B", 2)
  .set("C", 3);

let map3 = new Map([
  ["A", 1],
  ["B", 2],
  ["C", 3]
]);

for (let [key, value] of map) {
  console.log(key, value);
}

console.log(map.get("A"));
console.log(map.has("A"));
console.log(map.size);

map.delete("A");
console.log(map.size);

map.clear();
console.log(map.size);


// Set
let set = new Set();
set.add('APPLE');
set.add('ORANGE');
set.add('MANGO');


let set2 = new Set()
  .add('APPLE')
  .add('ORANGE')
  .add('MANGO');

let set3 = new Set(['APPLE', 'ORANGE', 'MANGO']);

console.log(set.has('APPLE'));

set.delete('APPLE');

console.log(set.size);
```

```
set.clear();
console.log(set.size);


let set4 = new Set();
set3.add('Moo');
console.log(set3.size);
// 1
set4.add('Moo');
console.log(set4.size);
// 1

for (let entry of set2) {
  console.log(entry);
}
```

Caught a mistake or want to contribute to the book? Edit this page on GitHub! (https://github.com/codecraft-tv/angular-course/tree/current/2.es6-typescript/8.mapset/index.adoc)

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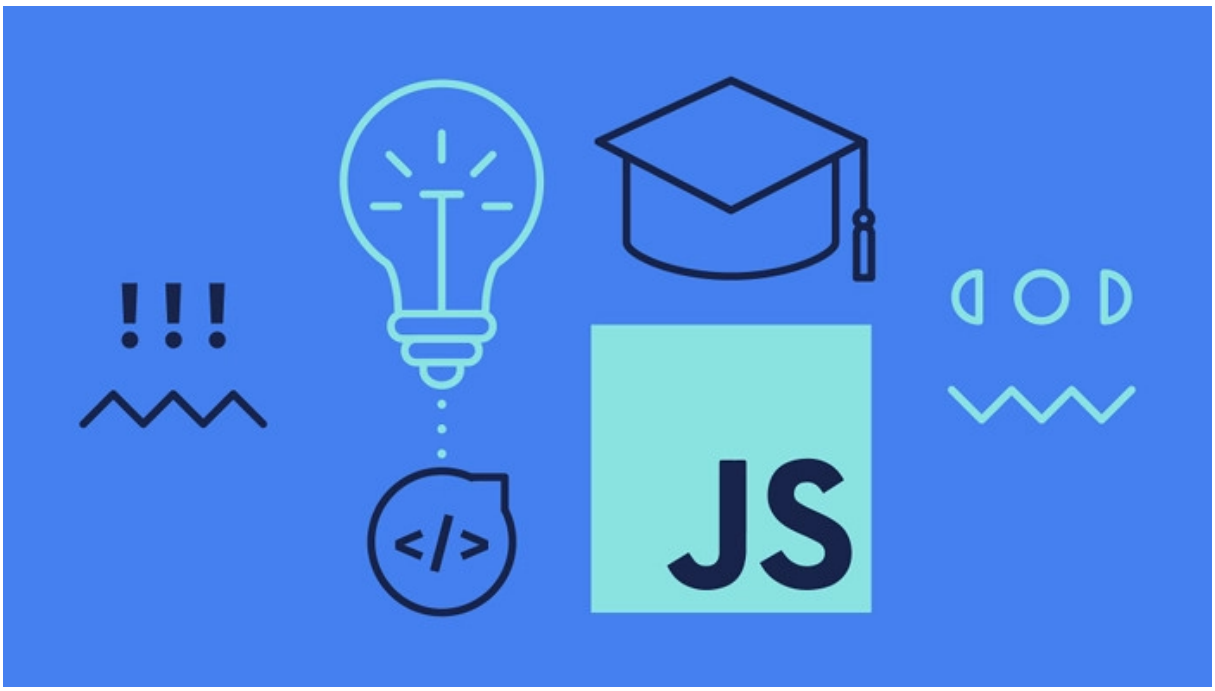

```
[🌲,🌳,🌴].push(🌲)
```