JavaScript and TypeScript

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Today Topics

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1. Single Page Applications
2. JS Ecosystem
   I. Node
   II. Npm
      I. Init project
      II. Dependencies
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      V. Carrets and tildes
      VI. Upgrading packages
3. Javascript ES6+ & Typescript
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   II. Variables using let&const
   III. String templates, null asserts
   IV. Arrow functions
   V. Modules, Exports and default exports
   VI. Classes, abstract classes, interfaces
   VII. Spread and rest operator, object destructuring

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4. Basic functions

I. Array iterations

II. Fetching data

III. Parsing JSON

IV. Working with dates

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Chapter 1

Single Page Applications

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What is SPA?

Most logic living on FE

Written or transpiled to JS

Reactive application with no blick

High level of control over app

Decoupled from backend

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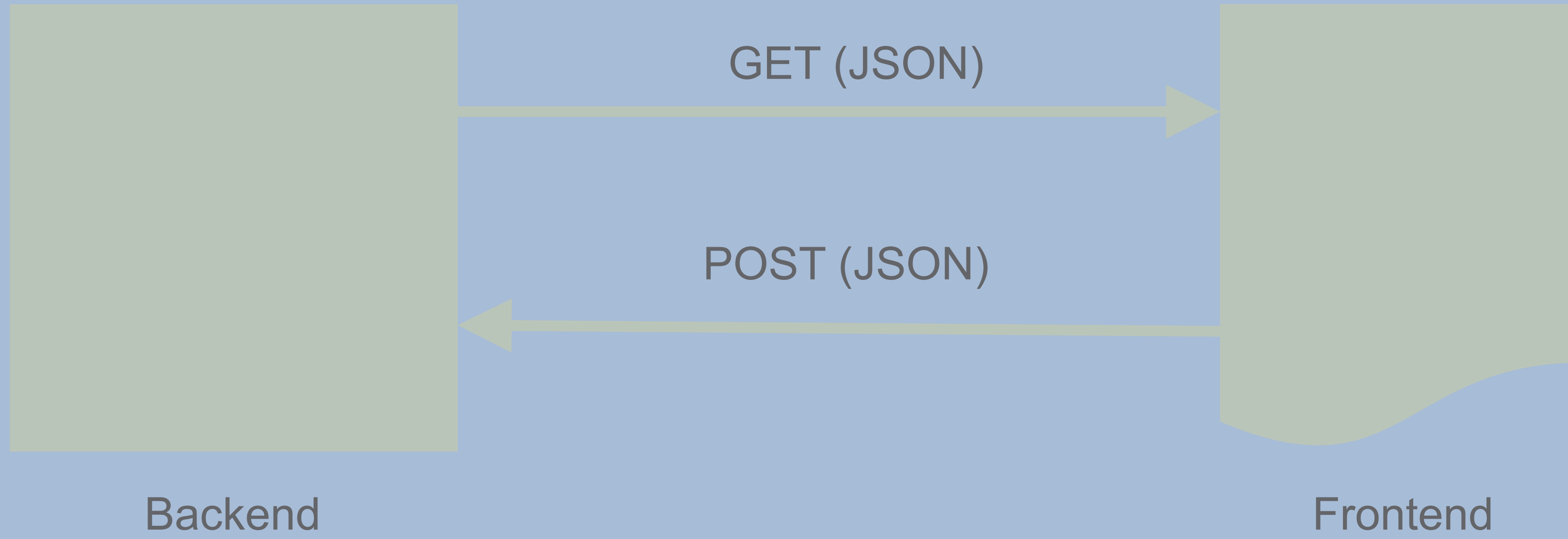

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Chapter 2

Javascript Ecosystem

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Node.js

As an asynchronous event driven JavaScript runtime, Node is designed to build scalable network applications.

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npm

is the package manager for JavaScript and the world's largest software registry.

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Initiate npm project

```
npm init
```

- Creates package.json
- Package.json contains:
  - Project description
  - Dependencies
  - Runnable commands

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Depencencies

```
npm install --save-dev typescript

npm i -D typescript
```

- *Dev packages only available during develepoment*

```
npm install --save react react-dom

npm i -S typescript react react-dom
```

- *Regular dependencies also in dist package*

- Adds entry to package.json
- Creates/updates lock file

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Global depencencies

```
npm install --global --save typescript
```

- Installed in node folder
- Available as cmd app
- In most cases not recommended

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Lock file

- When packege was installed one day in version 1 on other machine next day could be installed in version 2
- Lock prevents it
- Also guarants installation order. Npm packages are not necessarily installed in the same order and this caused problems sometimes.

```
npm install package-a@3.0.0 --package-lock-only
```

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Carret and tilde

```
"*"
"^1.4.3" -> match any major 4.x.x
"3.4.1"
"~4.2.1" -> match any minor 4.2.x
```

- You can you `install` or `update` for updating packages
- Please not update is not updating dev dependencies unless you add –dev flag

```
npm install express@latest --save --force
```

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Carret and tilde

```
{ "name": "my-project", "version": "1.0", // install update
"dependencies": { // ------------------
"already-installed-versionless-module": "*", // ignores "1.0" -> "1.1"
"already-installed-semver-module": "^1.4.3" // ignores "1.4.3" -> "1.5.2"
"already-installed-versioned-module": "3.4.1" // ignores ignores
"not-yet-installed-versionless-module": "*", // installs installs
"not-yet-installed-semver-module": "~4.2.1" // installs installs
"not-yet-installed-versioned-module": "2.7.8" // installs installs
} }
```

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Chapter 3

Javascript ES6+ & Typescript

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What‘s the difference? (JS vs TS)

Typescript is superset of Javascript.
It compiles Javascript but also give you option to use strong typing, additional syntax sugar and transpiles to supported JS.

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Using let and const

```
console.log(a); // what value is a here?
a = 5;
var a;
```

- vars are hoisted and therefore should be avoided
- is replaced by
  - mutable **let**
  - immutable **const**

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Using let and const

- let and const both keep their scope since declaration

```
const a = 5;
let b = 6;
```

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String templates (string interpolation)

- you don‘t have to concatenate strings if you need to add variable content into the text
- you can add any JS expression
- you can use also quotes there

```
let text = `string text ${expression} string text`;
```

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Null assertion

- there is nice syntax to check for null and undefined and get value

```
function(input: any) { // we expect some object with value prop
   let num: number? = input && input.value;
}
```

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Arrow functions („lambda“)

- shorter function syntax
- no problems with `this` and binding it

```
function(input: number) {
   return input * 5;
}

// can be rewritten to
(input: number): number => ({ input * 5});
```


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Modules

- basic structuring concept of JavaScript code
- you can use function from other files or packages – `import` / `export`

```
import { ZipCodeValidator as ZCV } from "./ZipCodeValidator";


// or later
const validator = await import { ZipCodeValidator } from "./ZipCodeValidator";
```

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Exports

- Export allows to use a function in another file
- default export gives you fallback or exports a single function

```
export function add(a: number, b: number): number {
   return a + b;
}
export default function substract(a: number, b: number): number {
   return a - b;
}

// or export default {add};
```

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Classes

- Shall I introduce you to basic OOP concepts?

```
class Greeter {
    greeting: string;
    constructor(message: string) {
        this.greeting = message;
    }
    greet() {
        return "Hello, " + this.greeting;
    }
}
let greeter = new Greeter("world");
```

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Abstract classes

- they can‘t be instantiated.

```
abstract class Greeter {
  // same code as previous example
}
let greeter = new Greeter("world"); // can‘t do this!!!

class MyGreeter extends Greeter {
  // some additional code
}
let greeter = new MyGreeter("world"); // possible now
```

Interfaces

- You define variables and DECLARE functions.
- Used either for polymorphism or as a „structures“

```
interface IGreeter {
        greeting: string;
        greet();
}
I
class Greeter implements IGreeter { }
```

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Abstract or interface?

Mostly use interfaces

Avoid abstract classes

One has functional code other not

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Class inheritance?

Try to avoid it

Also avoid base classes in most cases

Try to use aggregates

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Spread operator

- Used on arrays, objects or functions
- Copy object, change props immutably, merge arrays…

```
var obj1 = { foo: 'bar', x: 42 };
var obj2 = { foo: 'baz', y: 13 };

var clonedObj = { ...obj1 };
// Object { foo: "bar", x: 42 }


var mergedObj = { ...obj1, ...obj2 };
// Object { foo: "baz", x: 42, y: 13 }
```

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Destructuring

- Same operator as spread
- It gets variables from same structure/object

```
var o = {p: 42, q: true};
var {p: foo, q: bar} = o;
console.log(foo); // 42
console.log(bar); // true
```

```
var {a = 10, b = 5} = {a: 3};
console.log(a); // 3
console.log(b); // 5
```

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Chapter 4

Basic functions

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Iterating arrays

- Use `map()` / `every()` / `filter()` / `find()` / `findIndex()` / `reduce()` / `some()` / ... to iterate over arrays, and `Object.keys()` / `Object.values()` / `Object.entries()` to produce arrays so you can iterate over objects.

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Before we fetch some data

What are promisses?

How do we handle them?

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Fetching data

```
fetch('http://example.com/movies.json‘)
        .then(function(response) { return response.json(); })
                .then(function(myJson) { console.log(JSON.stringify(myJson));
});
```

Fetching data

```
fetch(url, {
        method: "POST", // *GET, POST, PUT, DELETE, etc.
        mode: "cors", // no-cors, cors, *same-origin cache:
        "no-cache", // *default, no-cache, reload, force-cache, only-if-cached
        credentials: "same-origin", // include, same-origin, *omit
        headers: { "Content-Type": "application/json; charset=utf-8",
        // "Content-Type": "application/x-www-form-urlencoded", },
        redirect: "follow", // manual, *follow, error
        referrer: "no-referrer", // no-referrer, *client
        body: JSON.stringify(data), // body data type must match "Content-Type" header
}) .then(response => response.json()); // parses response to JSON
```

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