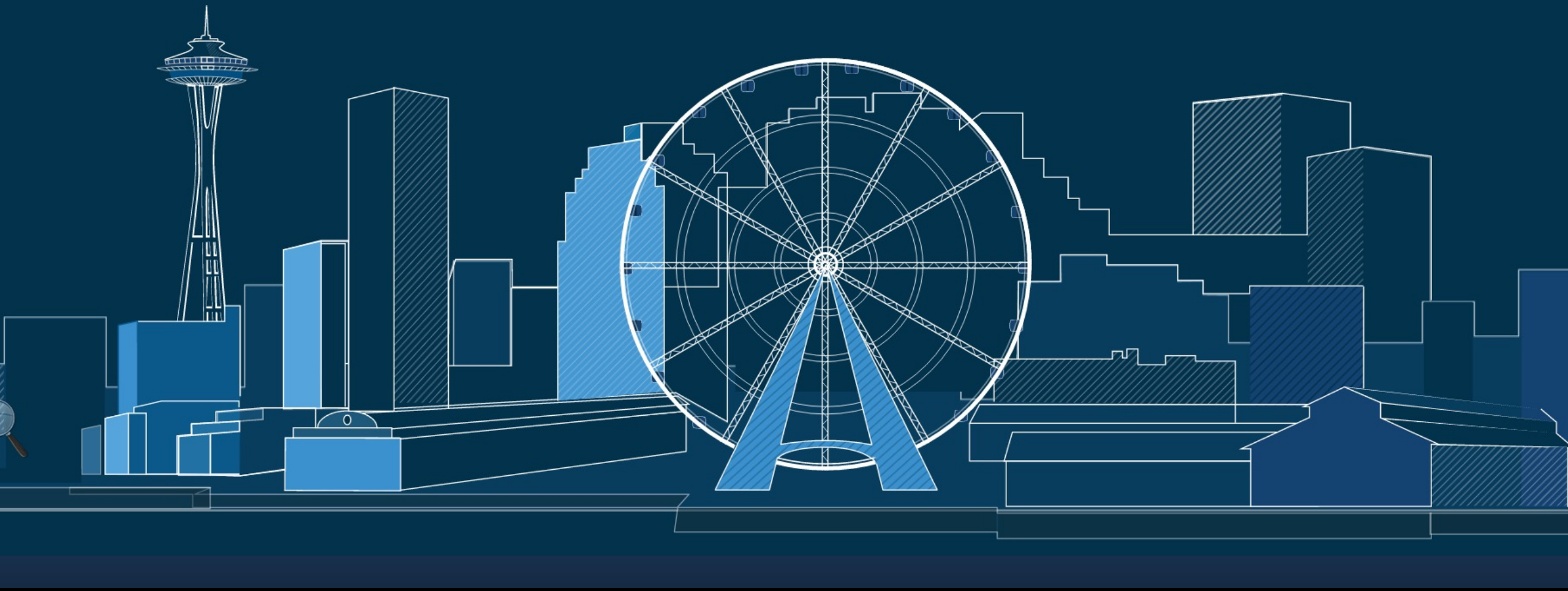


Motivation TypeScript

Alex Thalhammer

Outlook

- Overview & Motivation TypeScript

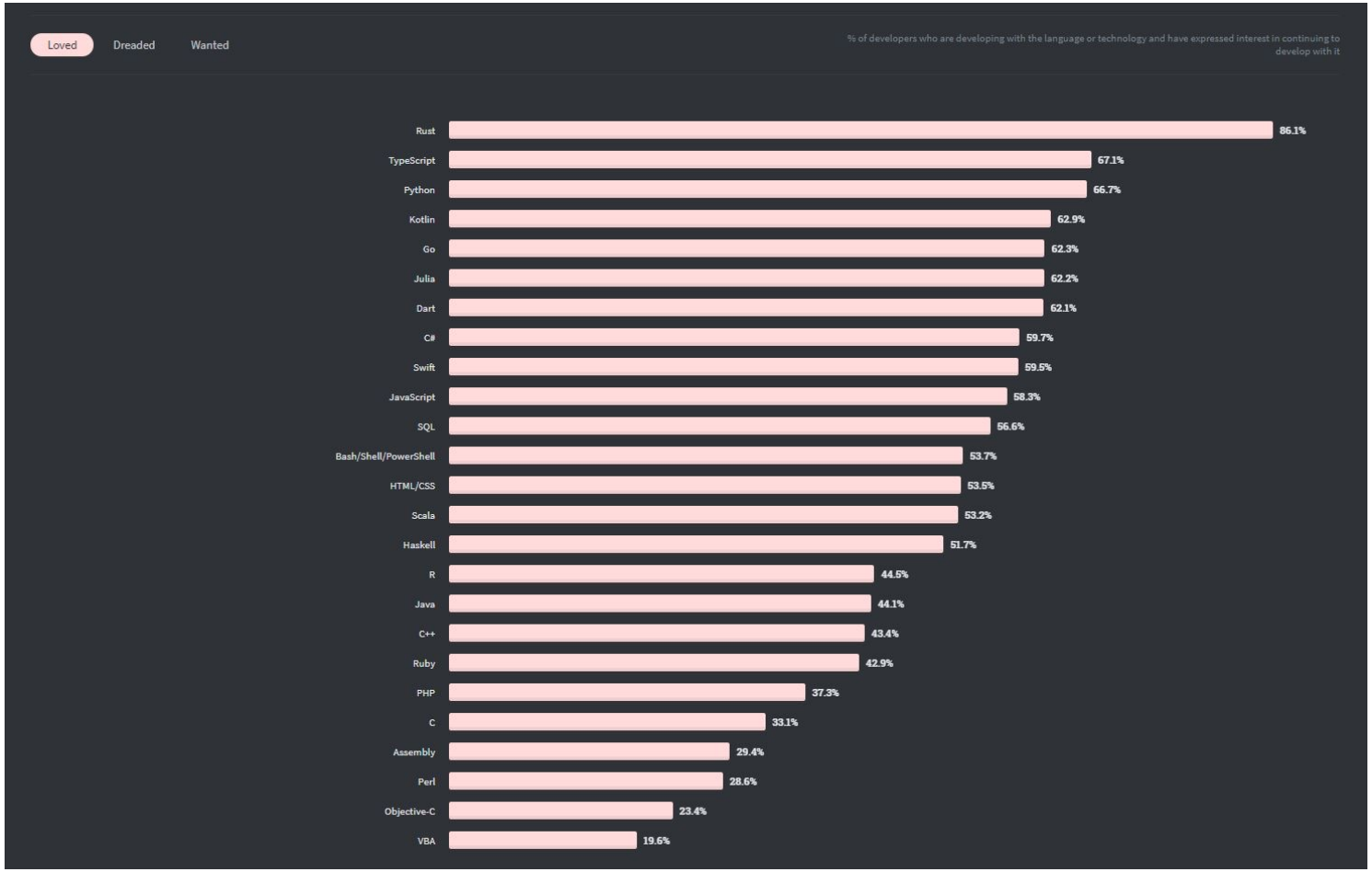
- Overview & Motivation Angular

Overview

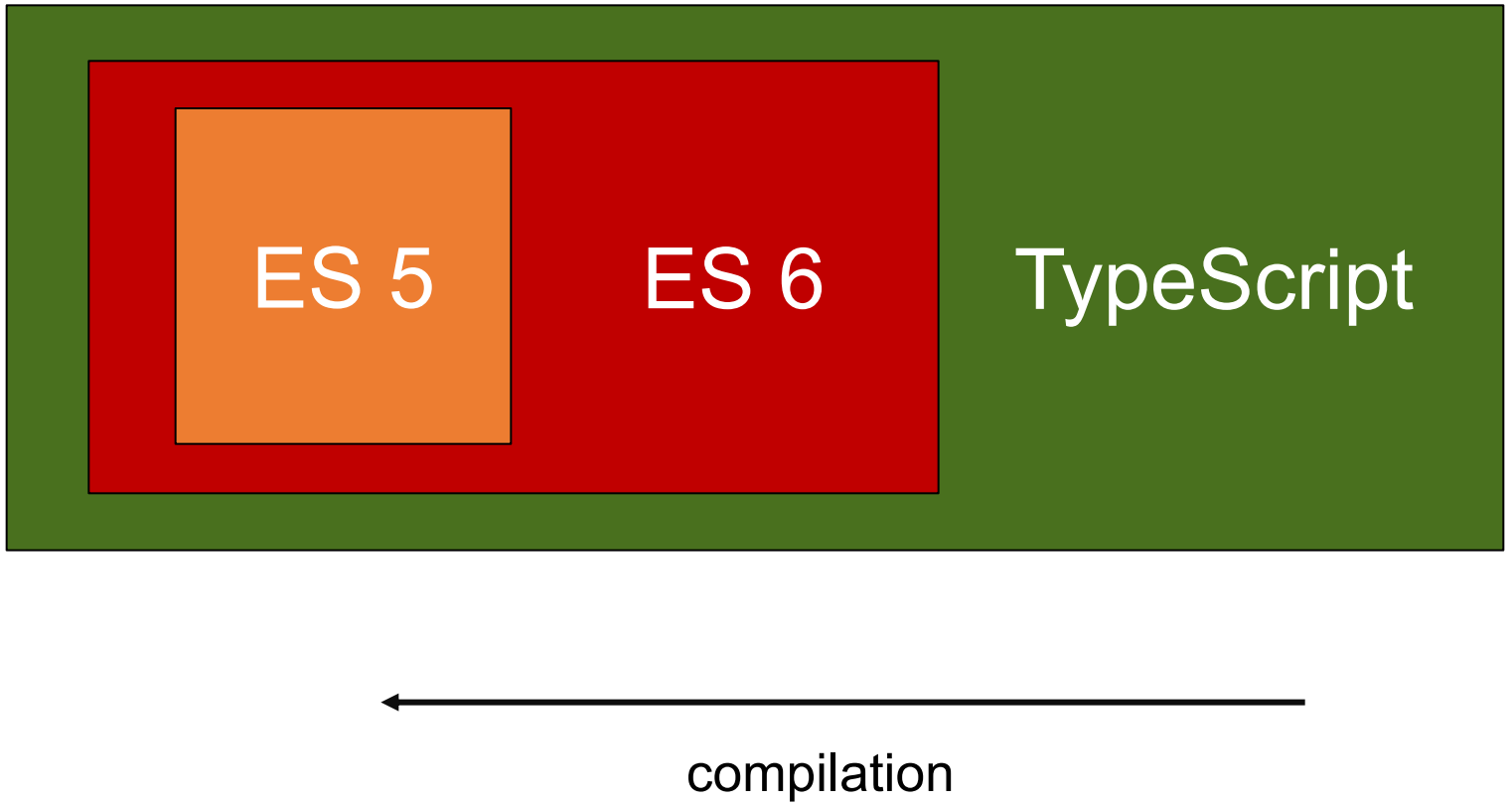
What is TypeScript?

- Superset of EcmaScript 6+ (2015+)
- Compiles to EcmaScript 6 (2015) or 5 (→ Differential loading for IE11)
- Introduces static typing (like known from C++, Java and others)
- Advantages
- **Handy Code Completion (IDE)**
- **Makes Refactoring Easier**

Devs <3 TypeScript (StackOverflow Survey‘20)



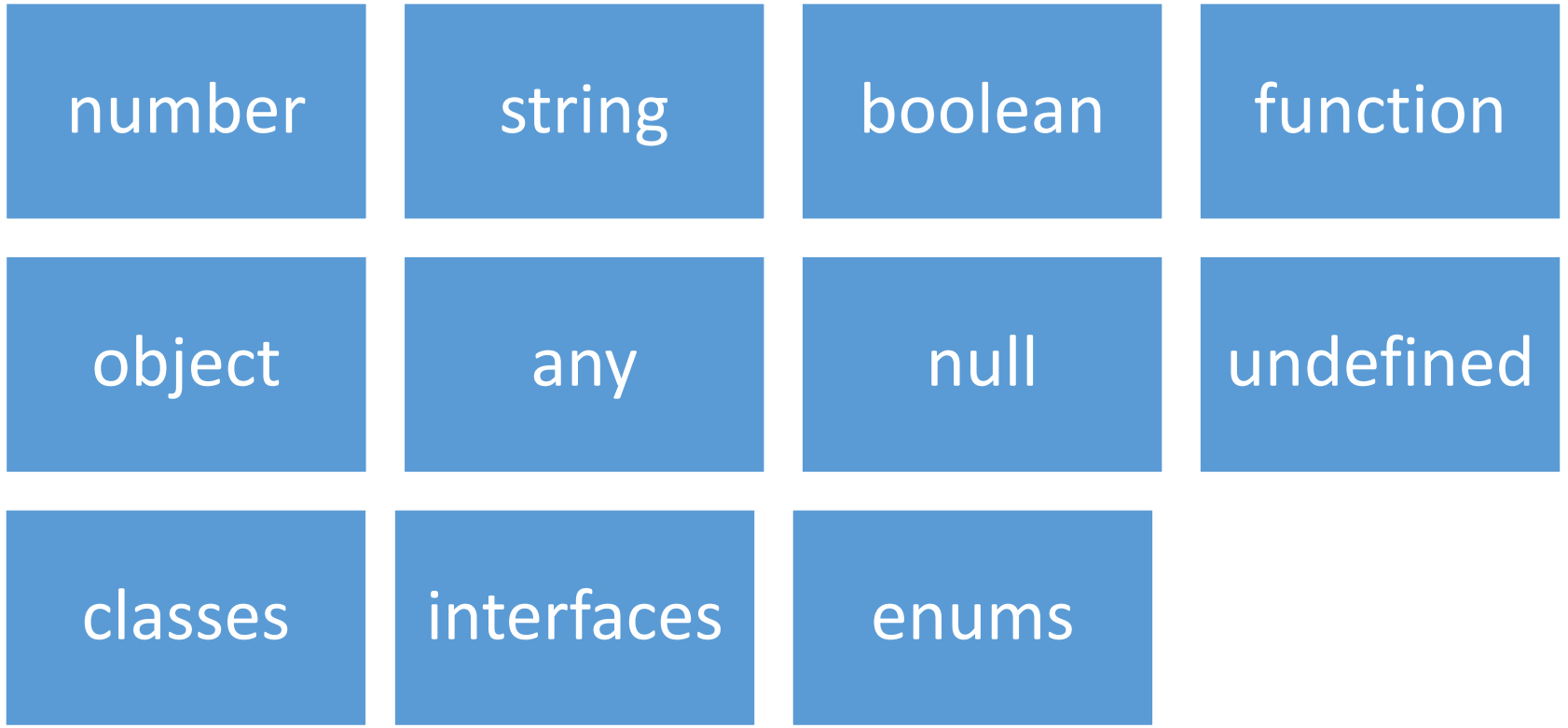
TypeScript & ES6



How can we use TypeScript?

- Compiler in terminal / shell
- Integration in VS Code or WebStorm
  - http://www.typescriptlang.org/
- Framework support
  - Angular
  - React
  - VueJS

Data types



Access Modifier

public

protected

private

readonly

public is standard

A small example

A small example

```
export class Flight {

    constructor(id: number) {
        this.id = id;
    }

    public id: number; // int + double
    protected from: string;
    private to: string;
    readonly date: string; // ISO date
}
```

A small example

```
export class Flight {

    constructor(public id: number) {
       this.id = id;
    }

    public id: number; // int + double
    protected from: string;
    private to: string;
    readonly date: string; // ISO date
}
```

A small example

```
export class Flight {

    constructor(public id: number) {}

    protected from: string;
    private to: string;
    readonly date: string; // ISO date
}
```

Another example

```
// flight-manager.ts
import { Flight } from './flight';

export class FlightManager {

    constructor(private cache: Array<Flight>) {}

    search(from: string, to: string): Flight[] { [...] }

    get count(): number { return this.cache.length; }
    get flights(): Flight[] { return this.cache; }
    set flights(c: Flight[]): void {  this.cache = c; }
}
```

Inheritance

```
export class ExtendedFlugManager extends FlugManager {

    constructor(cache: Flight[]) {
        super(cache);
    }

    // Overwrite methods
    search() {
        […]

        return super.search();
    }

}
```

Optionally

Project setup & ecosystem

Typical projekt structur

src	• Source code (TypeScript, HTML, SCSS)
dist	• Dist
node_modules	• Libs
package.json	• Pointer to Libs and Scripts
tsconfig.json	• Config of TypeScript-Compiler
webpack.config.js	• Config of Bundler (webpack)

Webpack

What is webpack?

- Build tool, bundling solution
- De facto Standard
  - Angular CLI, React, Vue
- Supports Node packages (→ de facto Standard)
- We need to customize webpack to support our MFE (more later)

webpack.dev.config

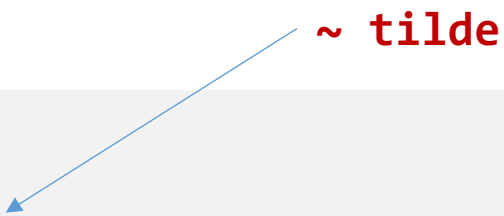
```
const commonConfig = require('./webpack.common.js');

module.exports = webpackMerge(commonConfig, {

    devtool: 'cheap-module-source-map',

    plugins: [
        new DefinePlugin({
            'ENV': '"development"'
        })
    ],

    devServer: {
      port: 8080
    }

});
```

NPM or Yarn & package.json

package.json

```
{
    "dependencies": {
        "@angular/common": "2.0.0",
        […]
    },
    […]
}
```

package.json




```
{
    "dependencies": {
        "@angular/common": "~2.0.0",
        […]
    },
    […]
}
```

package.json

```
{
    "dependencies": {
        "@angular/common": "~2.0.0",
        […]
    },
    […]
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```
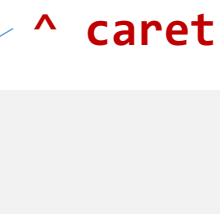

package.json




```
{
    "dependencies": {
        "@angular/common": "^2.0.0",
        […]
    },
    […]
}
```

package.json

```
{
    "dependencies": {
        "@angular/common": "^2.0.0",
        […]
    },
    […]
}
```

package.json

```
{
    "dependencies": {
        "@angular/common": "^2.0.0",
        […]
    },
    "devDependencies": {
       "webpack": "^1.12.9",
       "webpack-dev-server": "^1.14.0",
        […]
    },
    […]
}
```

package.json

```
{
    "dependencies": {
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        […]
    },
    "devDependencies": {
       "webpack": "^1.12.9",
       "webpack-dev-server": "^1.14.0",
        […]
    },
    "scripts": {
        "webpack": "webpack"
        "start": "webpack-dev-server",
    },
    […]
}
```

package.json

```
{
    "dependencies": {
        "@angular/common": "^2.0.0",
        […]
    },
    "devDependencies": {
       "webpack": "^1.12.9",
       "webpack-dev-server": "^1.14.0",
        […]
    },
    "scripts": {
        "webpack": "webpack --config webpack.dev.js"
        "start": "webpack-dev-server",
    },
    […]
}
```

package.json

```
{
    "dependencies": {
        "@angular/common": "^2.0.0",
        […]
    },
    "devDependencies": {
       "webpack": "^1.12.9",
       "webpack-dev-server": "^1.14.0",
        […]
    },
    "scripts": {
        "webpack": "webpack"
        "start": "webpack-dev-server",
    },
    […]
}
```

npm install

npm run webpack

npm start

TypeScript Speedrun ;-)

Types

Types

```
let name: string = "Max Muster";

let plz: number = 12345;

let autor: boolean = true;
```

Implicit types

let name = "Max Muster"; // **string**

let plz = 12345; // **number**

let autor = true; // **boolean**

Only these 3 types!

Any

```
let website2: any = "http://www.softwarearchitekt.at";
website2 = 1;
```

Try to avoid as much as possible!

Union-Types

```
let nameOrNumber: string | number;

nameOrNumber = "Max";

nameOrNumber = 17;
```

Union-Types as parameter

```
function showItem(speed: number | string) {
    if (typeof speed === 'number') {
        […]
    }
    else if (typeof speed === 'string') {
        […]
    }
}
```

Lambda statements

```
function filter(input: number[], callback: (item: number) => boolean):  number[] {

    const result: number[] = []; // new Array<number>();

    for (let i: number = 0; i < input.length; i++) {
        if (callback(objs[i])) result.push(input[i]);
    }

    return result;
}

let result = filter([1, 2, 3, 4, 5, 6], (item: number) => item % 2 === 0);
```

Type Assertions

ANGULAR
ARCHITECTS
INSIDE KNOWLEDGE

SOFTWARE
ARCHITECT

Type Assertions

```
let k: Contact = new Client(123, "Max Muster", "Essen");
```

Type Assertions

```
let k: Contact = new Client(123, "Max Muster", "Essen");


[…]
let art = k.clientAttr;  // won‘t work
```

Type Casting

```
let k: Contact = new Client(123, "Max Muster", "Essen");


[…]
let client = k as Client;
let art = client.clientAttr;  // OK
```

Type Casting (Alternative)

```
let k: Contact = new Client(123, "Max Muster", "Essen");


[…]
let client = <Client>k;
let art = client.clientAttr;  // OK
```

Interfaces

```
interface IContact {
        id: number;
        name: string;
        location?: string;
        plz: number;
        date: any;
        getInfo(): string;
}
```

```
class Contact implements IContact {
        […]
}
```

Generics

```
class ReadOnly<T> {
    private data: T;
    constructor(data: T) {
        this.data = data;
    }
    public getData(): T {
        return this.data;
    }
}

let readOnlyNumber = new ReadOnly<number>(42);
console.debug(readOnlyNumber.getData());
```

ANGULAR ARCHITECTS
INSIDE KNOWLEDGE

SOFTWARE ARCHITECT

Functions

Functions

```
function sayHello(name: string = "noname"): void {
    console.debug("Hallo " + name);
}

sayHello("Max");
sayHello();
```

Optional Parameters

```
function sayHello(name?: string): void {
    if (name) {
        console.debug("Hallo " + name);
    } else {
        console.debug("Hallo!");
    }
}
```

Enums

Enums

- enum Direction { UP, DOWN, LEFT, RIGHT }
  let d = Direction.UP;
- enum Direction { UP = 7, DOWN, LEFT, RIGHT }
- type Direction = 'UP' | 'DOWN' | 'LEFT' | 'RIGHT';
  let d: Direction = 'UP';

Recommendations on TypeScript

Use prettier!

Use ESLint (standard since NG 11)

- Avoid any!
- Use strict typing!
- Except implicit types ☺
- Also for functions params and return types!

Now you know TypeScript

- Use it and you’re gonna love it
  - If you have used JS before

- Any questions left over?