JS and TypeScript deep dive

What is TypeScript

TypeScritp is a typed superset of JavaScript that compiles to plain JavaScript.

Installation

```
npm install -g typescript
touch index.ts
tsc index.ts
```

You should have a file called `index.js` in your directory.

For comfort, from now own run

```
tsc index.ts && node index.js
```

Basic Types

TypeScript has basic types.

```
let decimal: number = 6;
let amItrue: boolean = true;
let myName: string = "";
```

Notice that `number` isn't `Number`

```
let name:string;
name = 10; // this should fail.
```

Arrays

You can define typed arrays.

```
let someNumbers: number[] = [1,2,3]
```

or

```
let someNumbers: Array<number> = [1,2,3]
```

Enum

And enum is a way of giving more friendly names to sets of numeric values.

```
enum Difficulty {Easy, Normal, Hard};
let gameplay : Difficulty = Difficulty.Easy;

console.log(gameplay); // 0
console.log(Difficulty[0]); // easy
```

Any

The type `any` is similar to the type `Object` in Java, but not to the type
`Object` in JS.

```
let notSure: any = 4;
notSure.ifItExists();
notSure.toFixed();

let prettySure: Object = 4;
prettySure.toFixed(); // Error
```

Functions

In JS:

```
const add = (a, b) => a + b;
```

In TS

```
const add = (a: number, b: number): number => a + b;
```

Function as Types

A variable can be typed as a very specific function with typed parameters.

```
let add: (a: number, b: number) => number;

add = (a: number, b: number): number => return a + b;

console.log(2, 3); // 5
```

Optional Parameters

A flexible tool in JS are default parameters as well as optional ones.

```
const happyBirthday = (name: string, age?: number): void => {
  if (!age) {
    console.log(`Happy Birthday, ${name}`);
  } else {
    console.log(`Happy ${age} Birthday, ${name}`);
  }
};

happyBirthday("Jesus", 33); // Happy 33 Birthday, Jesus
happyBirthday("Mark"); // Happy Birthday, Mark
```

Classes

```
class Animal {
    private name: string;
    constructor(theName: string) { this.name = theName; }
}

class Rhino extends Animal {
    constructor() { super("Rhino"); }
}

class Employee {
    private name: string;
    constructor(theName: string) { this.name = theName; }
}

let animal = new Animal("Goat");
let rhino = new Rhino();

animal = rhino;
```

Private Methods

```
class Duck {
    private name: string;
    constructor(theName: string) {
      this.name = theName;
    }

    cuack():void {
      console.log(
        `${this.name} says: I am a humanoid. I do not bow nor quack!`
      );
    }
}

let duck = new Duck("Donald");
duck.cuack();
// Donald says: I am a humanoid. I do not bow nor quack!
```

Interfaces

One of TypeScript's core principles is that type-checking focuses on the shape that values have.

This is sometimes called "duck typing" or "structural subtyping

Describing Objects

```
interface Config {
  environment: string,
  pwd: string,
  timeout: number,
  port?: number,
}
```

You could also add

```
[ propName : string]: any
```

for extra options.

Describing Functions

```
interface Search {
    (source: string, subString: string): boolean;
}

let finder = (
  subString: string,
  content: string,
  algorithm: Search
): boolean => algorithm(subString, content);
```

Some high-end JavaScript

Spread Syntax with Arrays

Spread syntax allows an iterable such as an array expression or string to be expanded.

```
const salad: string[] = ['lettuce', 'tomato', 'onions'];
const burger: string[] = ['meat', 'bread', ...salad];
console.log(burger);
// [ 'meat', 'bread', 'lettuce', 'tomato', 'onions' ]
```

Spread Syntax with Objects

```
const config: object = {env: 'prod', path: '/'};
const extendedConfig: object = {port: 9000, ...config};

console.log(extendedConfig);
// { port: 9000, env: 'prod', path: '/' }
```

This is the best thing since sliced 🍞 and will be super useful as we move forward.

Destructuing Assignment

Is a JavaScript expression that makes it possible to unpack values from arrays, or properties from objects, into distinct variables.

```
// from
const port: number = config.port
const env: string = config.env

//to
const {port, env} = config
```

Destructuring Assignment with Arrays

```
const [meat, bread, ...vegan] = [
  'meat',
  'bread',
  'lettuce',
  'tomato',
  'onions'
];
console.log(meat); // meat
console.log(bread); // bread
console.log(vegan); // [ 'lettuce', 'tomato', 'onions' ]
```

Object Shorthands

Don't do this

```
const obj = {a: a, b: b, c: c}; // 😢
```

Do this!

```
const obj = {a, b, c}; // 😊
```

== vs ===

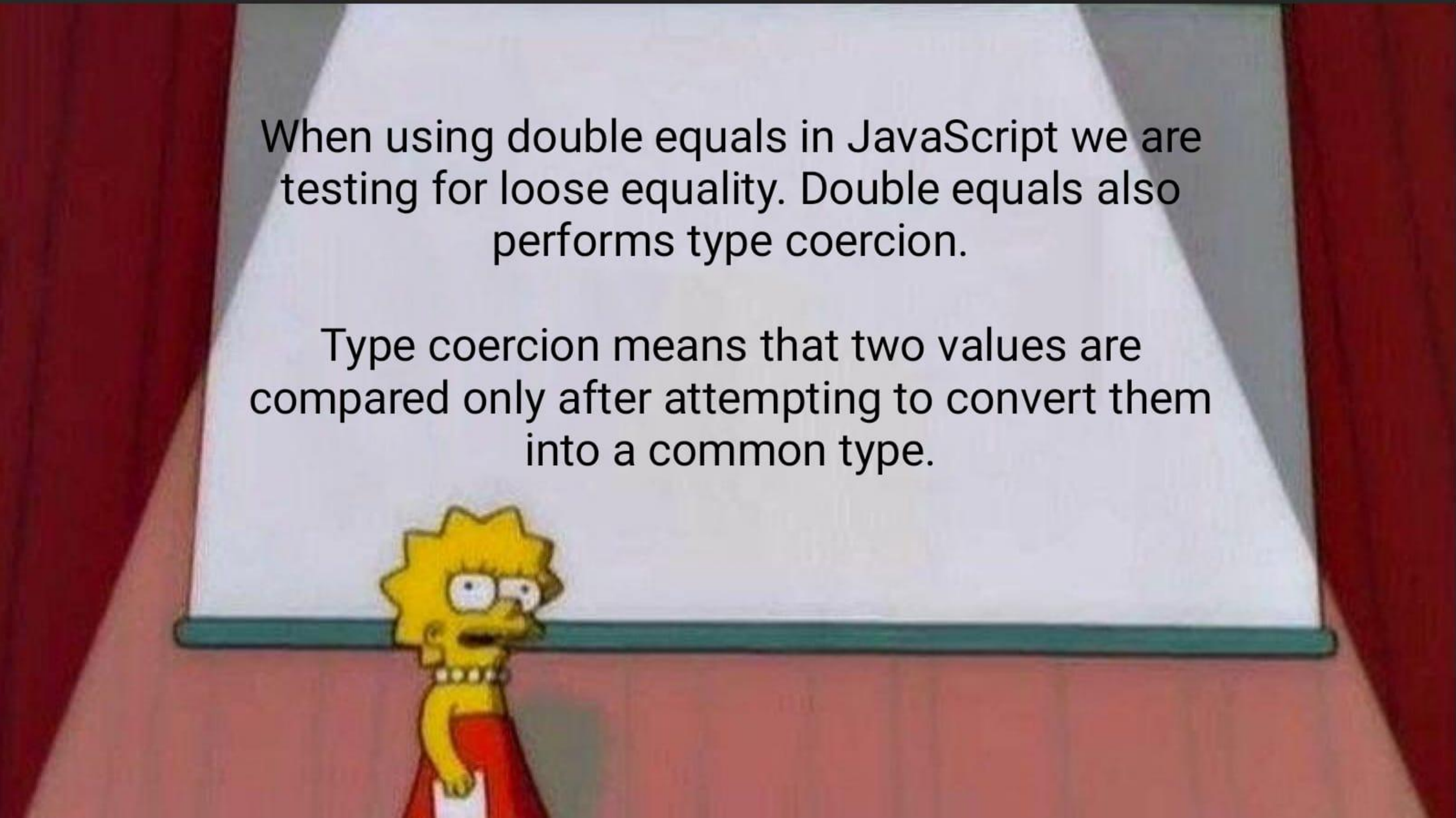
Always use ===, why?

```
"0" == 0 // true
null == undefined  // true

"0" === 0 // false
null === undefined  // false
```

When using double equals in JavaScript we are testing for loose equality. Double equals also performs type coercion.

Type coercion means that two values are compared only after attempting to convert them into a common type.



Exports

Any declaration can be exported by adding the export keyword.

```
export const numberRegexp = /^[0-9]+$/;

export class ZipCodeValidator {
    isAcceptable(s: string) {
        return s.length === 5 && numberRegexp.test(s);
    }
}
// exports {numberRegexp: /^[0-9]+$/, ZipCodeValidator: class ZipCodeValidator}
```

Named Exports

You don't have to be constrained by your implementation's naming conventions.

```
const numberRegexp = /^[0-9]+$/;

class ZipCodeValidator {
    isAcceptable(s: string): boolean => s.length === 5 && numberRegexp.test(s)
}

export {ZipCodeValidator as Validator}

// this will export {Validator: class ZipCodeValidator}
```

Default Exports

You don't have to be constrained by your implementation's naming conventions.

```
const numberRegexp = /^[0-9]+$/;

export default class ZipCodeValidator {
    isAcceptable(s: string) {
        return s.length === 5 && numberRegexp.test(s);
    }
}

// this will export the class ZipCodeValidator
```

Importing Modules

Import a single export from a module

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FIN / Questions?