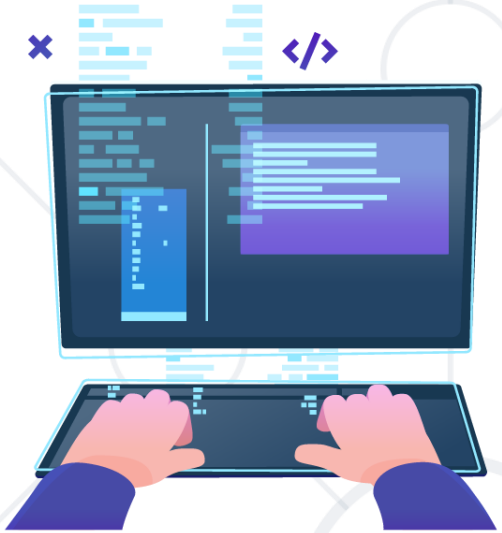
Decorators



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#Typescript

Decorators Overview

Definition

- Used in frameworks like **Angular**, **MobX** and others
- They are used to extend a functionality or add meta-data
- Use the form **@example** where **example** must evaluate to function that will be called at runtime

```
function example(target) {
  //some code logic
}
```

Decorate

- We can decorate **five** different **things**:
  - Class definitions, properties, methods, accessors, parameters
- The function that we implement is **dependent** on the **thing** we are **decorating**
- The **arguments** required to **decorate a class** are different to the **arguments** required **to decorate a method**

Enable decorators

- In the **tsconfig.json** file:

```
"target": "ES5",
"experimentalDecorators": true
```

- In the **command line**:

```
tsc --target ES5 --experimentalDecorators
```

- Note: Decorators are still stage 2 proposal for JavaScript and only experimental in TypeScript

Decorator evaluation

- There is well **defined order** to how decorators are applied:
  - **Parameter Decorators**, followed by **Method**, **Accessor**, or **Property Decorators** are applied for each **instance member**
  - **Parameter Decorators**, followed by **Method**, **Accessor**, or **Property Decorators** are applied for each **static member**
  - **Parameter Decorators** are applied for the **constructor**
  - **Class Decorators** are applied for the **class**

Class Decorators

Definition

- **Class Decorator** is **added just before** the class declaration
- The Class Decorator is applied to the **constructor** of the class
- Used to **observe**, **modify** or **replace** a class definition
- If the Class Decorator **returns a value**, it will **replace** the class declaration with the **provided constructor function**

Example: Class Decorator

```
function Frozen(construtor: Function) {
    Object.freeze(construtor);
    Object.freeze(construtor.prototype);
}

@Frozen class Person {
    constructor(private name: string) { }
}
```

@Frozen is a class decorator

Decorators and inheritance

- Subclasses do not inherit the decorations of the super class
- Every subclass needs to be decorated on its own

```
@ClassDecorator class Person {
    constructor(public name: string) { }
    @enumerable(false) greet() {
        return `Hello ${this.name}`
    }
}
class Teacher extends Person {
    constructor(private subject: string, name: string) {
        super(name);
    }
    introduce() {
      //some code logic
}
```

The Teacher class does not inherit the decorator

Decorator Factories

Definition

- **Function** that **returns** the **decorator** function **itself**
- Gives the flexibility to pass **custom data** when needed
- Mainly used in **method** and **property decoration**

```
function enumerable(value: boolean) {
    return function (target: Object, propertyKey:
string, descriptor: PropertyDescriptor) {
        descriptor.enumerable = value;
    };
}
```

Multiple Decorators

- Decorators are **composable**
- We can chain **multiple decorators** for each class declaration, method, property, accessor or parameter
- In those cases the decorators are applied from **top to bottom**

```
@Frozen
@Configurable
@OtherDecorator
class Person {
    constructor(private name: string) { }
}
```

Method Decorators

Definition

- The decorator function takes **three** arguments:
  - **target** - the parent **class**
  - **key** - the **name** of the function
  - **descriptor** - the actual **function** itself

```
function enumerable(value: boolean) {
    return function (target: Object,
                     key: string,
                     descriptor: PropertyDescriptor) {
        descriptor.enumerable = value;
    };
}
```

Example: Method Decorator

```
function Confirmable(message: string) {
    return function (target: Object,
     key: string,
     descriptor: PropertyDescriptor) {
        const original = descriptor.value;
        descriptor.value = function (...args: any[]) {
            const allow = confirm(message);
            if (allow) {
                const result = original.apply(this, args);
                return result;
            } else { return null; }
        };
        return descriptor;
    };
}
```

Accessor Decorators

Definition

- TypeScript **does not allow** to decorate **both** the **getter** and the **setter**
- The **Property Descriptor** combines **both get** and **set** not each declaration separately
- Takes the following three arguments:
  - Either the **constructor function of the class** for a static member, or the **prototype of the class** for an instance member
  - The **name** of the member
  - The **Property Descriptor** for the member

Example: Accessor Decorator

```
class Point {
    private _x: number;
    private _y: number;
    constructor(x: number, y: number) {
        this._x = x;
        this._y = y;
    }

    @configurable(false)
    get x() { return this._x; }

    @configurable(false)
    get y() { return this._y; }
}
```

Property Decorators

Definition

- Property decorator can only be used to **observe** that a property of a specific name has been declared for a class
- Takes the following **two** arguments:
  - Either the **constructor function** of the class for a static member, or the **prototype** of the class for an instance member
  - The **name** of the member

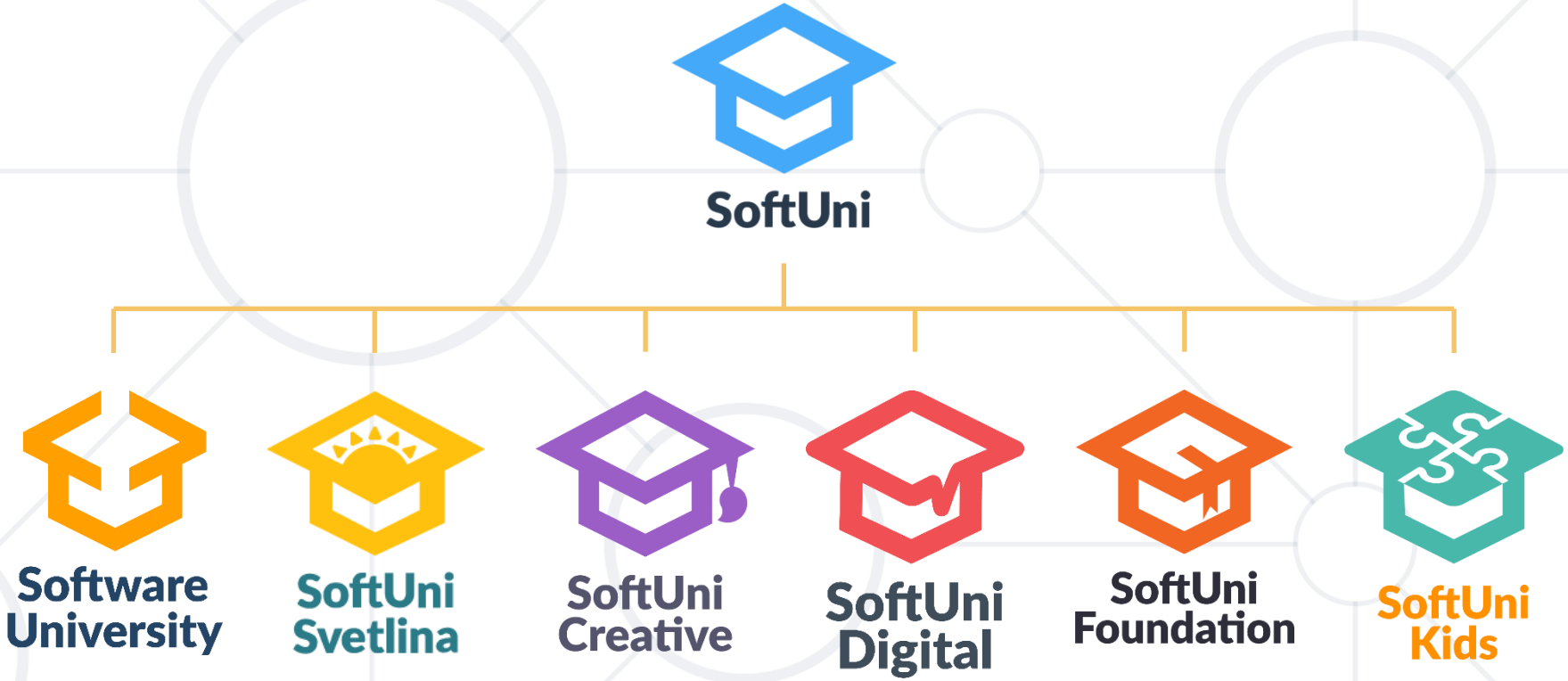
Example: Accessor Decorator

```
class Greeter {
    @format("Hello, %s")
    greeting: string;

    constructor(message: string) {
        this.greeting = message;
    }

    greet() {
      let formatString = getFormat(this, "greeting");
      return formatString
            .replace("%s",   this.greeting);
    }
}
```

Summary

- Decorators are basically **functions**
- Add **additional functionalities** to a class or class members
- We can decorate **class declaration**, **methods**, **accessors**, **properties** and **parameters**
- To decorate different classes or class members the decorator functions takes **different arguments**

Questions?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