# part 5

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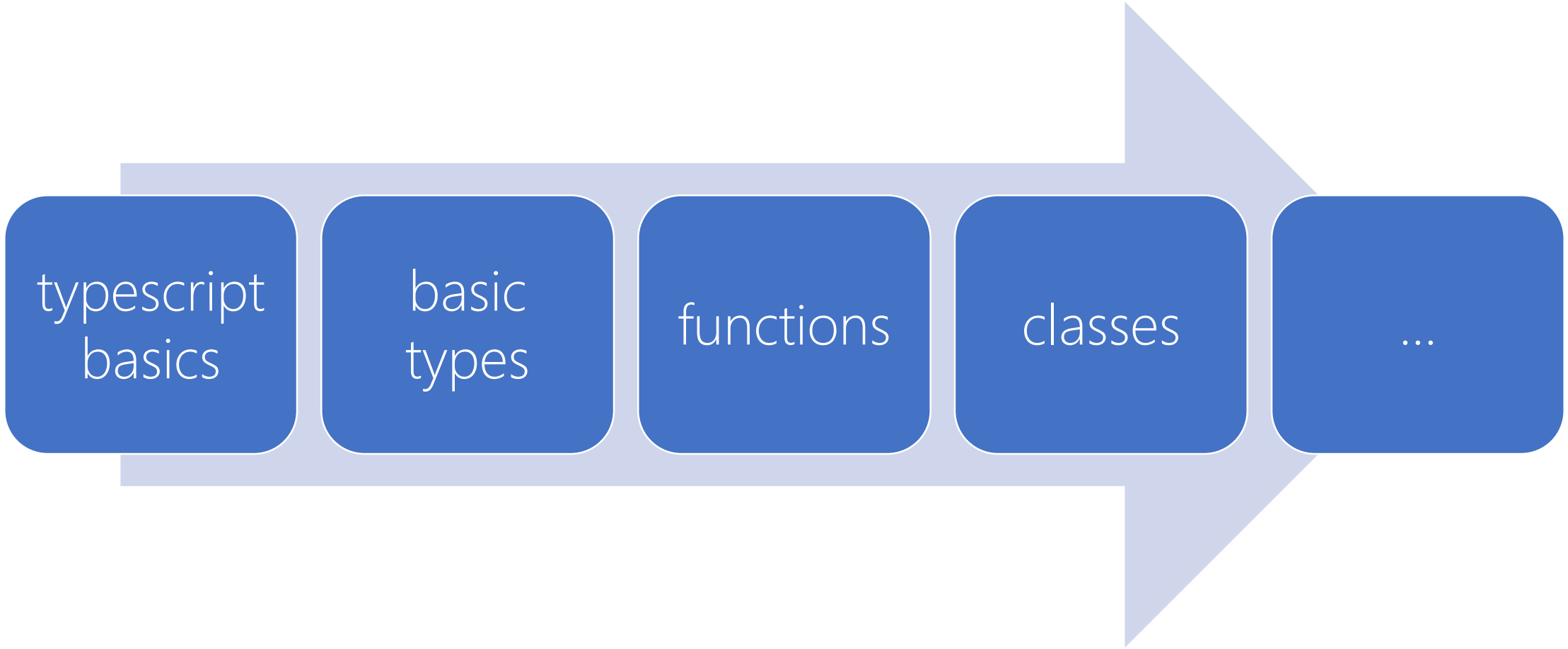
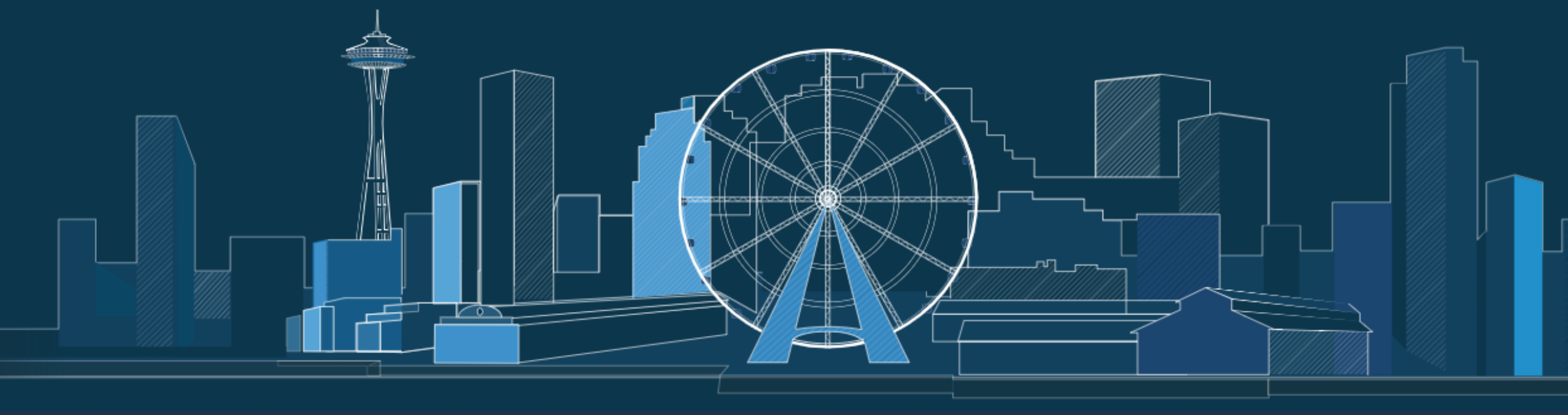
# plan





# TypeScript

## JavaScript that scales.

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

Any browser. Any host. Any OS. Open source.

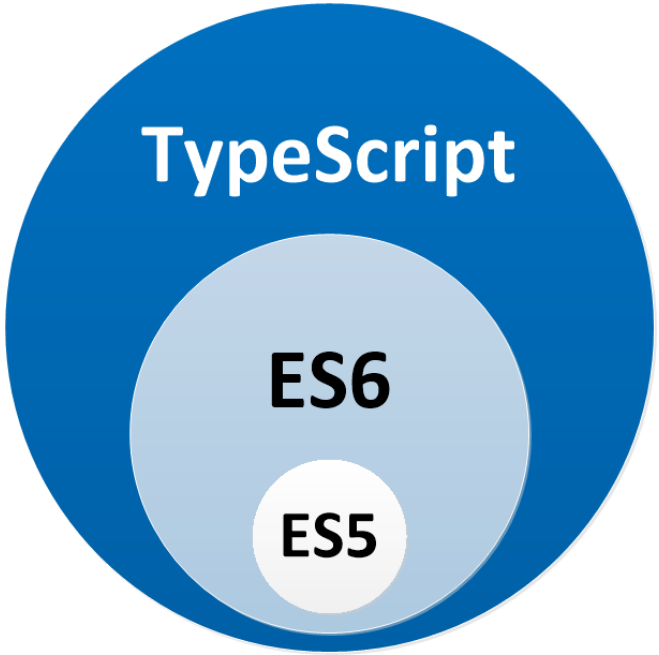
Download Documentation

# typescript

- code transpiled into js
- decorators (~annotations) - allow us to decorate classes with annotations and properties as well as meta-functionality

**TS = ES6 + Types + Annotations**

http://www.typescriptlang.org/



# typescript

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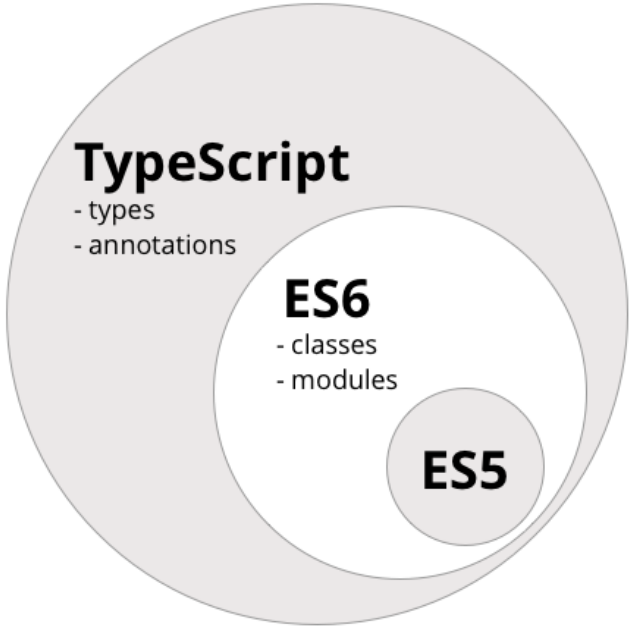
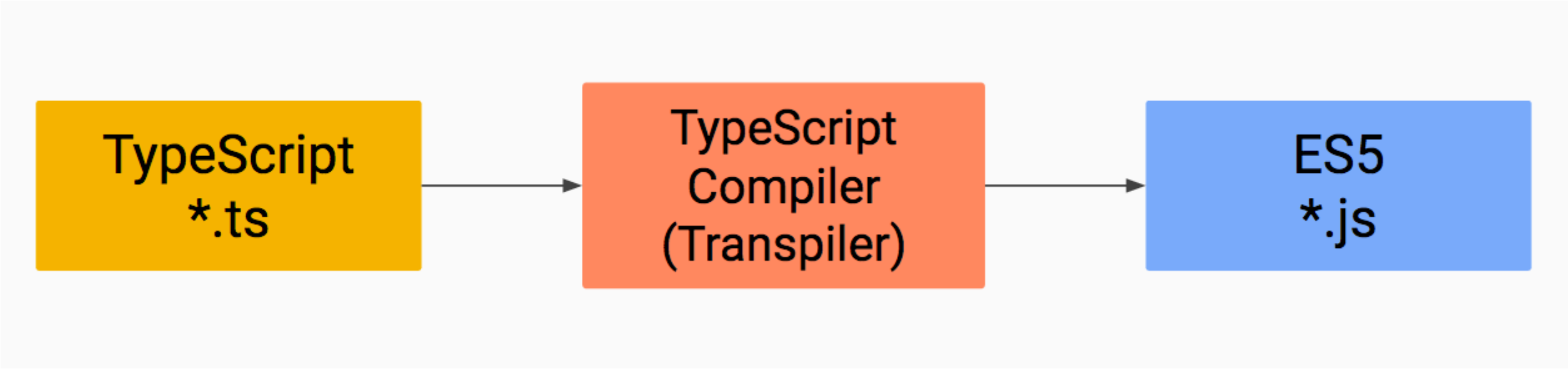


# typescript transpilation



# typescript vs javascript

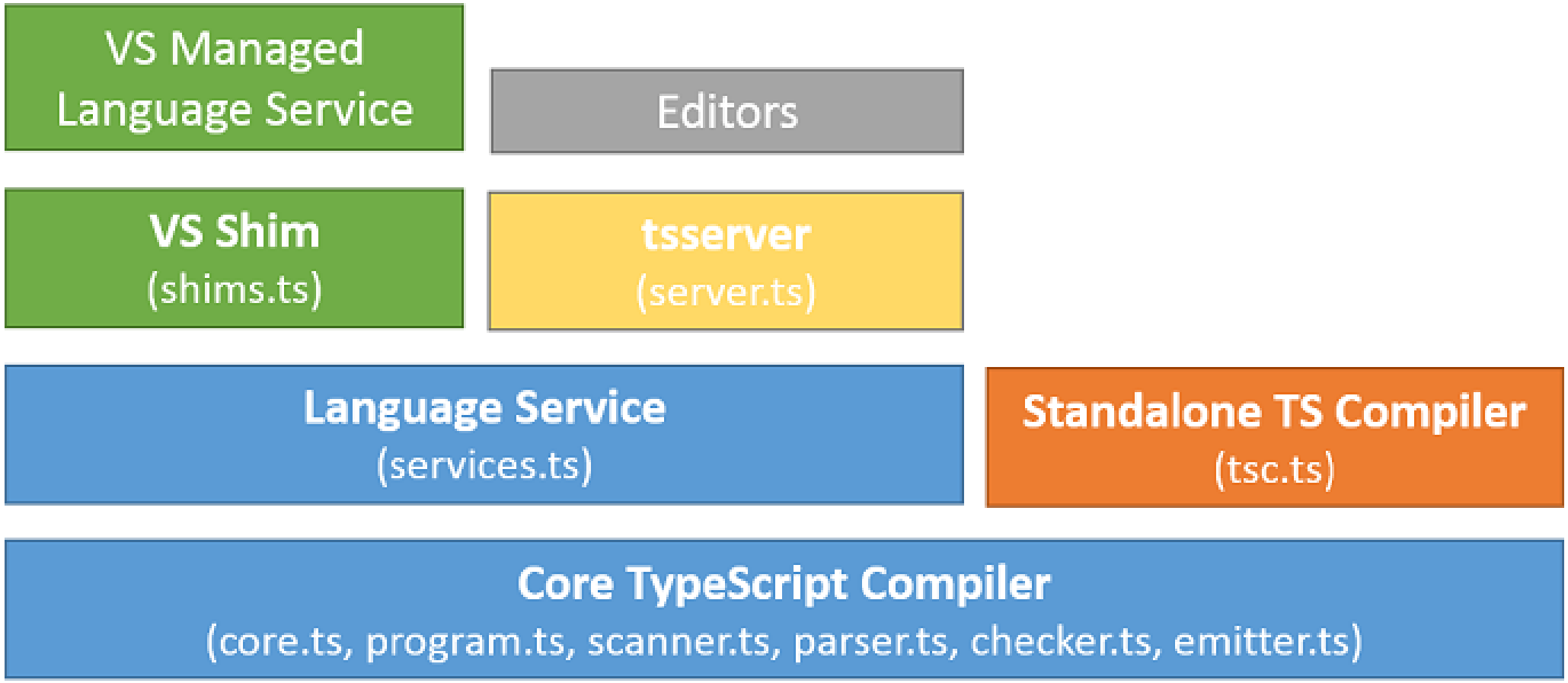
TS

```ts
class Greeter {
  greeting: string;
  constructor(message: string) {
   this.greeting = message;
  }

  greet() {
    return "Hello, " + this.greeting;
  }
}

let greeter = new Greeter("world");
```

JS

```js
var Greeter = /** @class */
(function () {
  function Greeter(message) {
    this.greeting = message;
  }

  Greeter.prototype.greet
   = function () {
    return "Hello, " + this.greeting;
  };

  return Greeter;
}());
var greeter = new Greeter("world");
```

# architectural overview



# cli

files + options >> tsc >> core compiler >> js files

use:

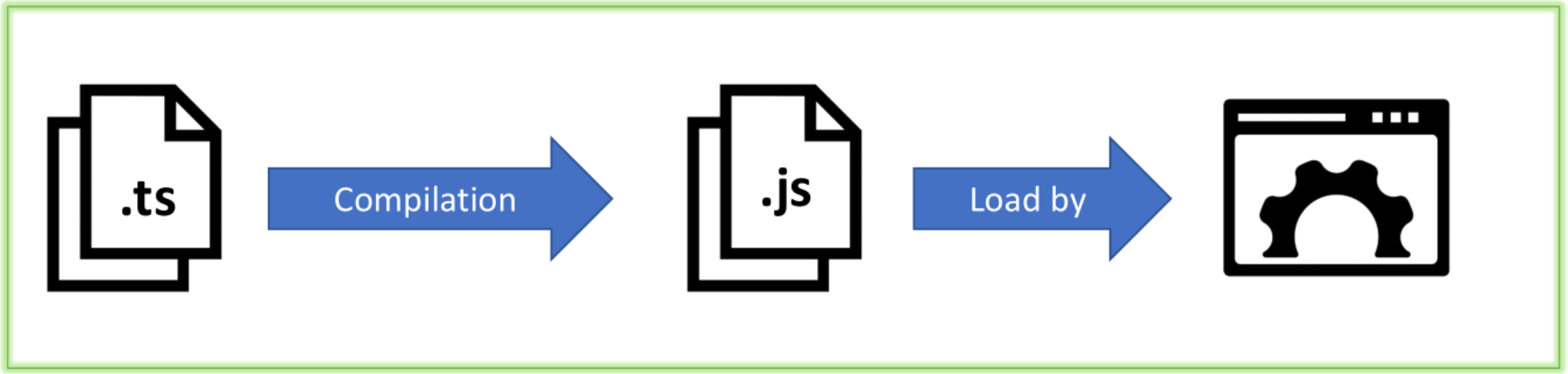
- cmd:

```
tsc **/*.ts --target=es5 --sourcemap=true
```

- tsconfig.json:

```
{
  "compileOnSave": false,
  "compilerOptions": {
    "baseUrl": "./",
    "outDir": "./dist/out-tsc",
    "sourceMap": true,
    "declaration": false,
```

# transpilation vs polyfill




# typescript basic types

```typescript
// boolean
var isTrue: boolean = true;

//number
var num: number = 1;

//string
var name: string = "CodingDefined";

//array
var arr: number[] = [3, 4, 5];
```

# typescript basic types

```
// Number

let decimal: number = 6;
let hex: number = 0xf00d;
let binary: number = 0b1010;
let octal: number = 0o744;
```

# typescript basic types

```
// String

let color: string = "blue";
color = 'red';

let fullName: string = `Bob Bobbington`;
let age: number = 37;
let sentence: string = `Hello, my name is ${ fullName }.

I'll be ${ age + 1 } years old next month.`;
```

# typescript basic types

```
// Array

let list: number[] = [1, 2, 3];
let list2: Array<number> = [1, 2, 3];

// Enum

enum Color {Red = 1, Green, Blue}
let c: Color = Color.Green;
```

# typescript basic types

```
// any

let notSure: any = 4;
notSure.ifItExists(); // okay, …might exist at runtime
notSure.toFixed(); // okay, …exists (but the compiler
doesn't check)

let prettySure: Object = 4;
prettySure.toFixed(); // Error: Property 'toFixed'
doesn't exist on type 'Object'.
```

# typescript basic types

```
// Void
function warnUser(): void {
    console.log('This is my warning message');
}

// Not much else we can assign to these variables!
let u: undefined = undefined; // --strictNullChecks
let n: null = null; // --strictNullChecks
```

# typescript basic types

```
// Function returning never must have unreachable end point
function error(message: string): never {
      throw new Error(message);
}

// Function returning never must have unreachable end point
function infiniteLoop(): never {
      while (true) {
      }
}
```

# type assertions

```
let someValue: any = "this is a string";
let strLength: number =
     (<string>someValue).length;

let someValue: any = "this is a string";
let strLength: number =
     (someValue as string).length;
```

# union types

```
let data: string | number;

data = 10;
data = 'John';
```

# functions

- arrow functions
- this keyword
- optional and default parameters
- can be overloaded

# functions

```
function Book(title: string, length?: number) { …
}

function Book(title: string, length: number = 300) {
…
}

function School (name: string, ...id: number[]) { …
}
```

# function overloads

```
function getCustomer(name: string): string;
function getCustomer(id: number): string;
function getCustomer(property: any): string {
      if (typeof property === 'string') {
            // return customer info based on customer name
      } else if(typeof property === 'number') {
            // return customer info based on customer id
      }
      return 'customer';
};
```

# classes in typescript

Inheritance

Polymorphism

Encapsulation

Abstraction

# class definition

```
class Book {
	public author: string;
	public title: string;
	public length: number;
	getFullTitle(): string {
		return `${this.title} by ${this.author}`;
	}
}

let typeScript = new Book();
typeScript.title = 'TypeScript';
typeScript.author = Someone';
typeScript.length = 300;
```

# class definition

```
class Book {
	public author: string;
	public title: string;
	public length: number;
	constructor(author: string, title: string, length:
	number) {
		this.author = author;
		this.title = title;
		this.length = length;
	}
}
```

# class definition

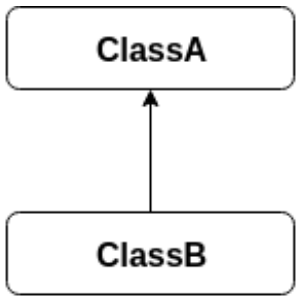
```
class Book {
    constructor(
        public author: string,
        public title: string,
        public length: number) {
    }
}
```

# properties

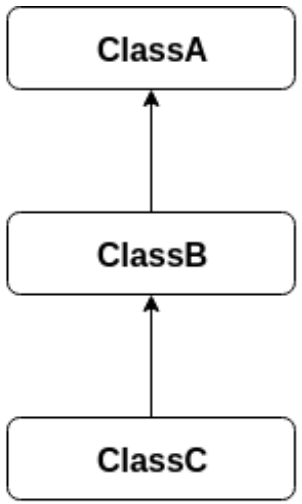
```
class Book {
	private _title: string;

	get title(): string { return this._title; }
	set title(value: string) {
		if (value !== '') {
			this._title = value;
		}
	}
}

let typeScript = new Book();
typeScript.title = 'TypeScript';
```

# inheritance

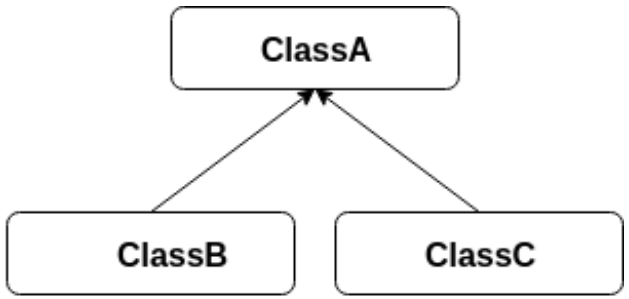
- single
- multilevel
- hierarchical



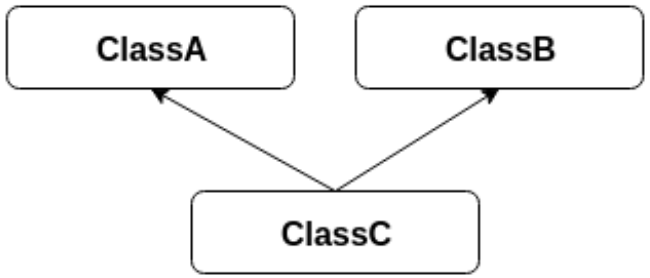

Single Inheritance



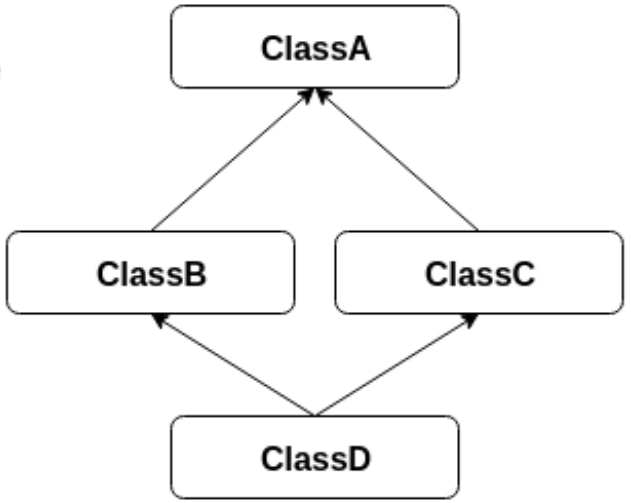

Multilevel Inheritance




Hierarchical Inheritance




Multiple Inheritance




Hybrid Inheritance

# stuff

- types unions & intersections
- type aliases
- interfaces
- generics
- …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#slack

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