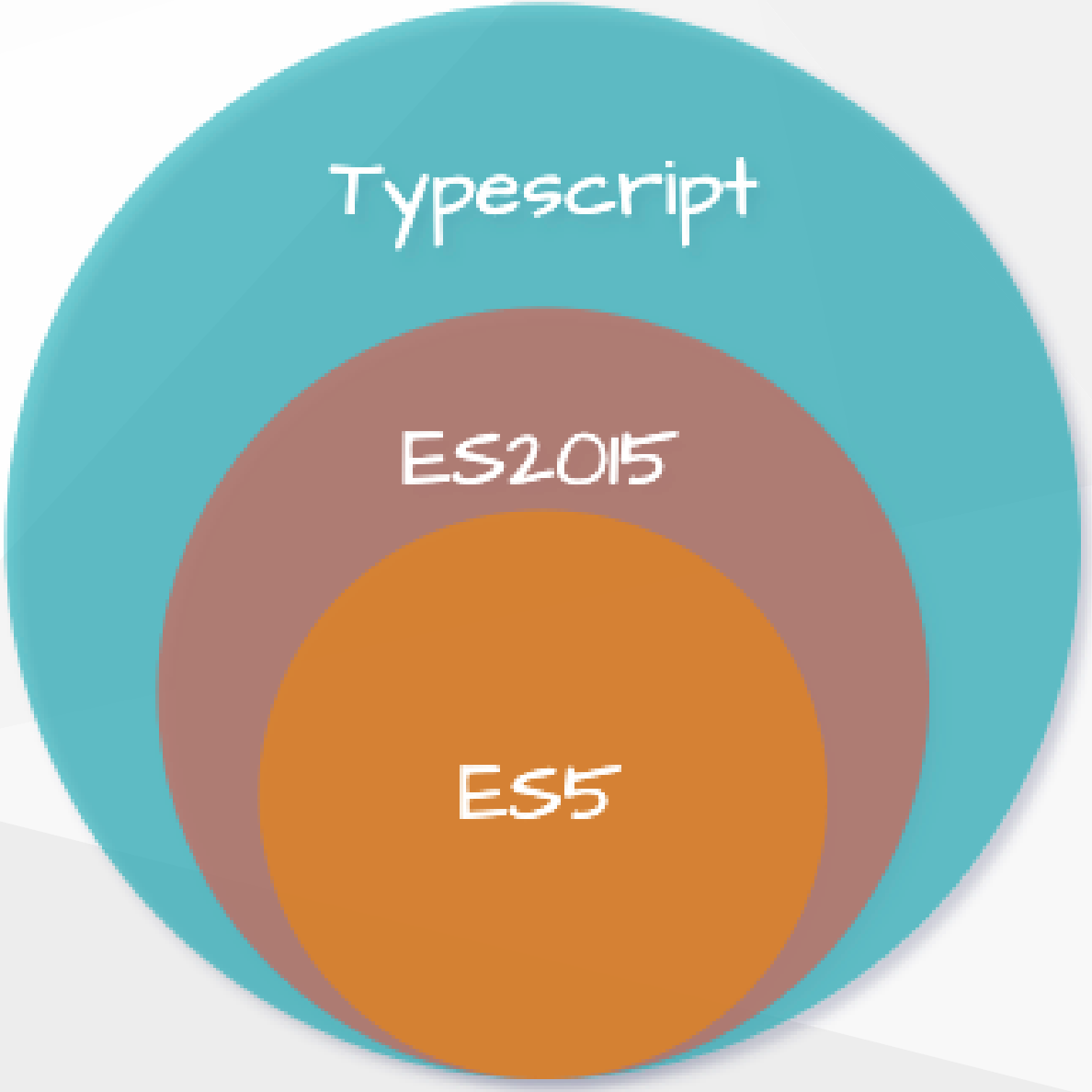
Typescript

- What is Typescript?
- Why Typescript?
- Typescript vs. Javascript

What is Typescript?

- Typescript is a superset of Javascript
- Typescript is a strongly typed language
- Typescript is compiled to Javascript



Why Typescript?

why-typescript.js why-typescript.ts

- Type safety
- Better tooling
- Improved scalability
- Improved maintainability
- Compatibility with Javascript

Typescript vs. Javascript

Typescript	Javascript
Compiled	Interpreted
Static typing	Dynamic typing
Compile-time errors	Runtime errors
Transpiled to Javascript	Direct use in browser
More verbose	Less verbose

Install Typescript

```
npm install -g typescript
```

Compile Typescript

```
tsc <filename>.ts
```

Typescript Types

- Boolean
- Number
- String
- Array
- Tuple
- Enum
- Object
- Any
- Unknown
- Void
- Null and Undefined
- Never

Types Union and Intersection

union-intersection.ts

- Union: `type1 | type2`
  - Narrowing down the type
- Intersection: `type1 & type2`

Type Aliases

alias-interface.ts

- `type` keyword

```ts
type Point = {
  x: number;
  y: number;
};
```

Type Interface

alias-interface.ts

- `interface` keyword

```
interface Point {
  x: number;
  y: number;
}
```

- Type alias vs. Type interface

Type Assertion

assertion.ts

- `as` keyword

```
const message = "Hello World";
const length = (message as string).length;
```

Type Guard

type-guard.ts

- `typeof` keyword
- `number`, `string`, `boolean`, `symbol`

```
const message = "Hello World";
if (typeof message === "string") {
  const length = message.length;
}
```

- `instanceof` keyword

```
class Point {
  x: number;
  y: number;
}
const point = new Point();

if (point instanceof Point) {
  const x = point.x;
}
```

Discriminated Union

discriminated-union.ts

```
interface Shape {
  kind: "circle" | "square";
  radius?: number;
  sideLength?: number;
}
```

Typescript Functions

- Function type expression
- Constructor type expression
- Generic function
- Optional and default parameters

Guidances for writing generics

1. Use multiple type parameters to describe all the types of a function's arguments
2. Use `extends` keyword to constrain the type parameters
3. Use `keyof` keyword to describe index types
4. Use mapped types to describe generic objects
5. Use type parameters to describe relationships between arguments
6. Use type parameters to enforce relationships between return types and argument types
7. Use type parameters to describe the shape of callbacks

Optional and Default Parameters

```
function log(message: string, userId?: string): void {
  const time = new Date().toLocaleTimeString();
  console.log(time, message, userId || "Not signed in");
}
```

```
function log(message = 'logging', userId?: string): void {
  const time = new Date().toLocaleTimeString();
  console.log(time, message, userId || "Not signed in");
}
```

Function Overloading

overloading.ts

- Function overloading is a way to provide multiple function signatures for the same function name
- Function overloading is *not* supported in Javascript

Object Types

object-types.ts

- Optional properties
- Readonly properties
- Excess property checks
- Index signatures
- Extending object types

Classes

classes.ts

- Class members
- Constructor
- Inheritance
- Member Visibility
- Generic classes

Utility Types

utility-types.ts

- `Partial<T>`
- `Readonly<T>`
- `Record<K, T>`
- `Pick<T, K>`
- `Omit<T, K>`
- `Exclude<T, U>`
- `Extract<T, U>`
- `ReturnType<T>`

...