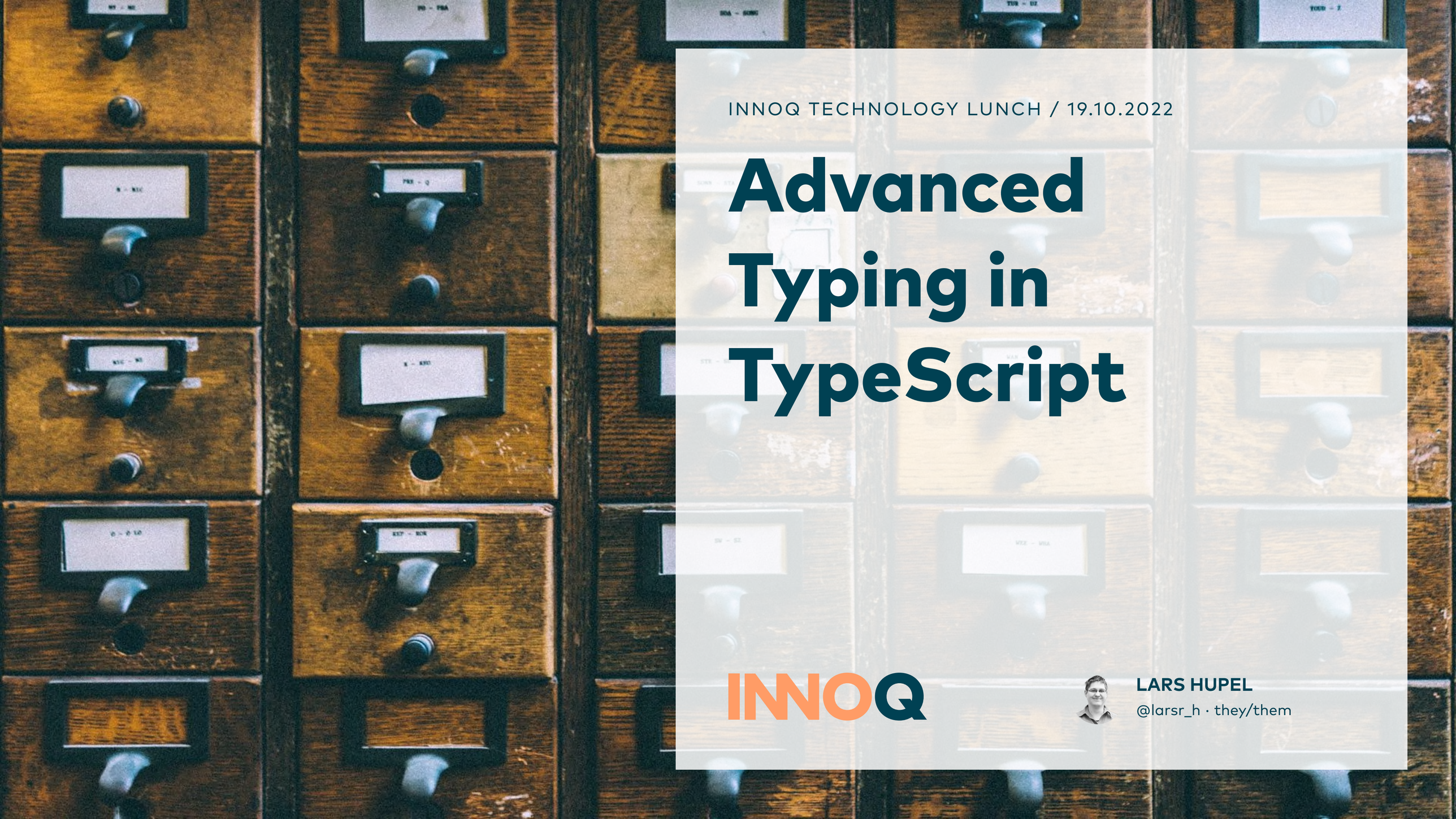

INNOQ TECHNOLOGY LUNCH / 19.10.2022

Advanced Typing in TypeScript

INNOQ

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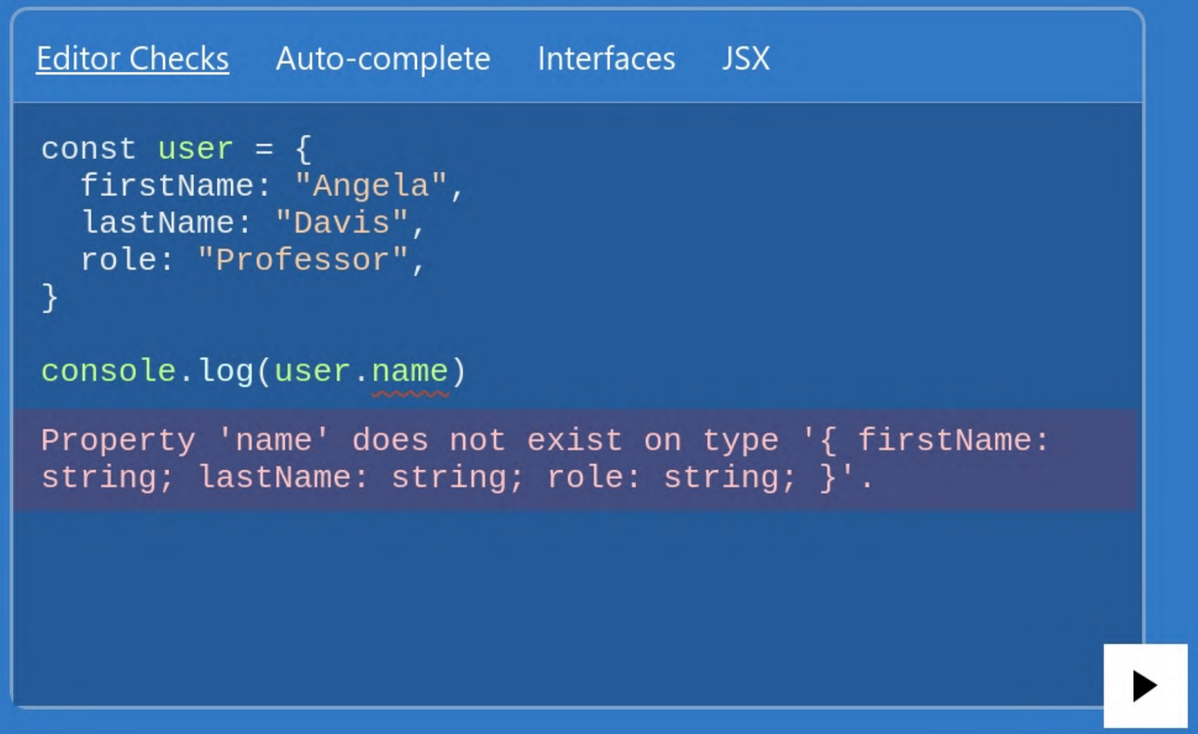
@larsr_h · they/them

TypeScript is **JavaScript with syntax for types.**

TypeScript is a strongly typed programming language that builds on JavaScript, giving you better tooling at any scale.

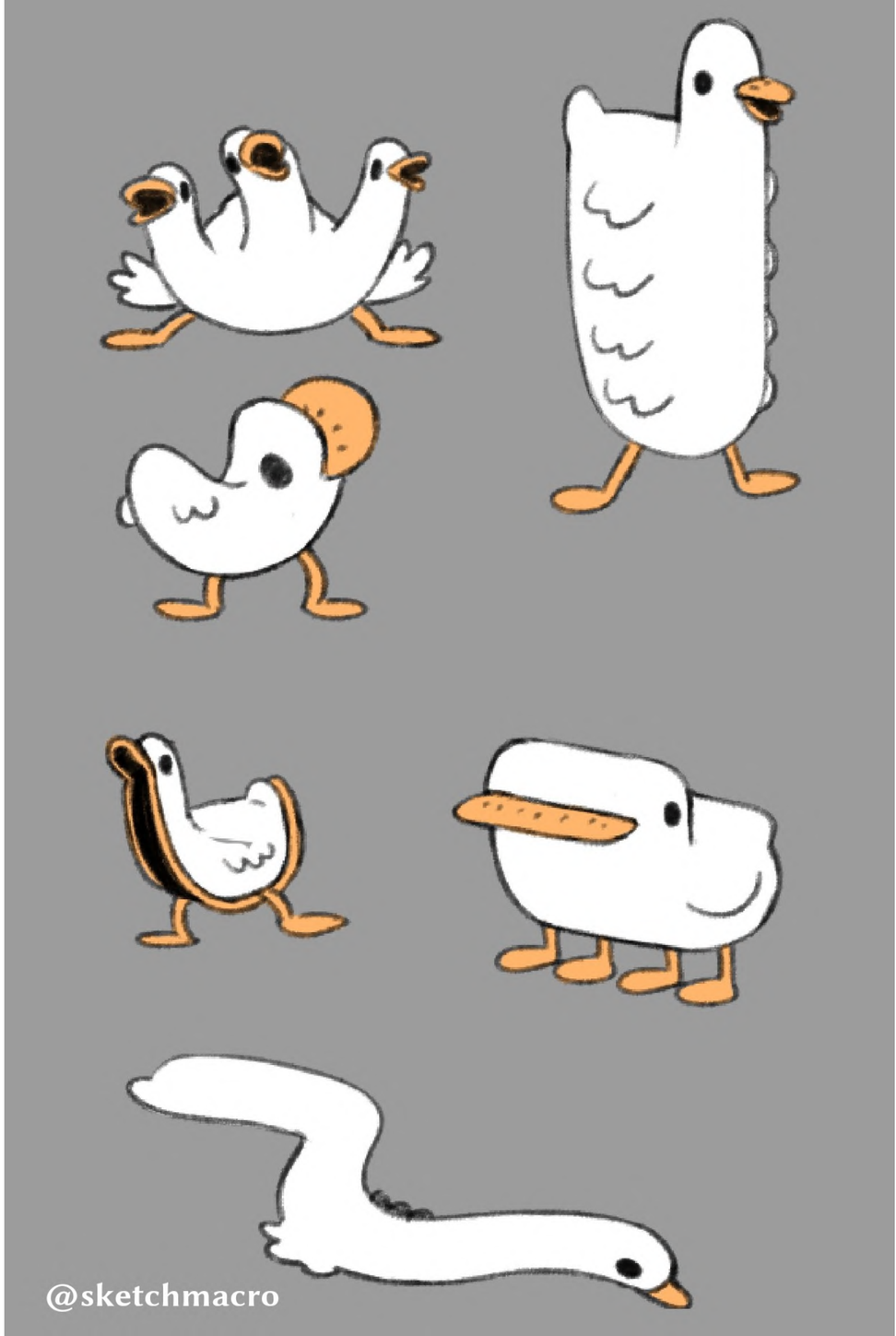
Try TypeScript Now
Online or via npm



https://www.typescriptlang.org/

Core tenets

- JavaScript + X
- Environment independence
- Structural typing (aka "duck typing")
- Type inference
- Support of wonky JavaScript patterns

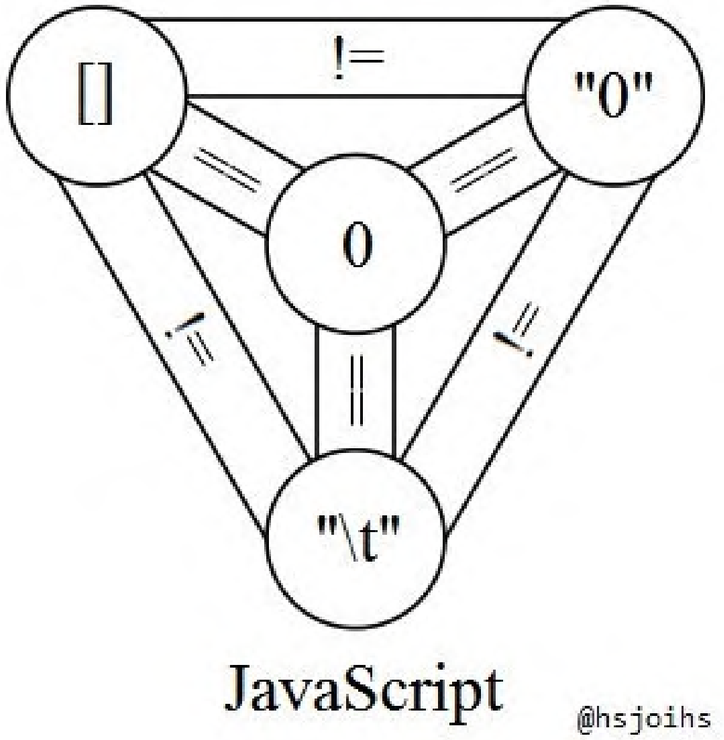


Chapter 1

What is JS?

JS does not stop you from ...

- adding arrays to objects
- multiplying objects with numbers
- comparing 🍎 with 🍊



TypeScript set out to fix this.

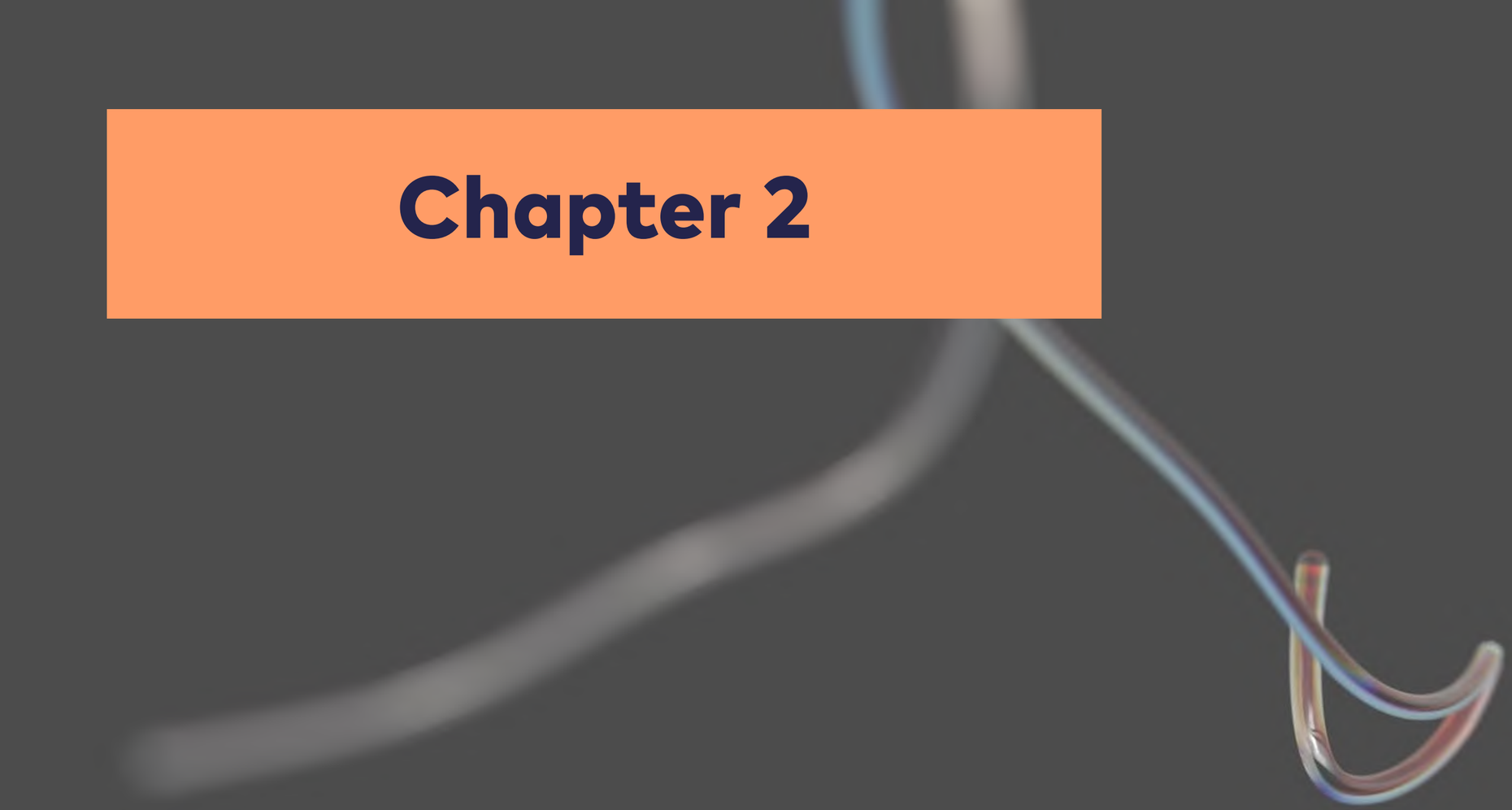
... and fixing they did

What JS devs asked for

What JS devs got

"Types are a sign of defeat. You lost control of your life and then you just use types to program JavaScript."

Chapter 2

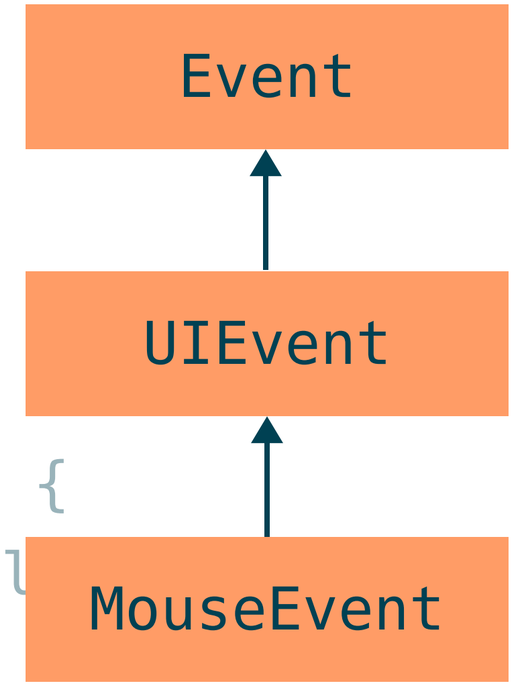


Typing the DOM

```
addEventListener(type, listener);
addEventListener(type, listener, options);
addEventListener(type, listener, useCapture);
```

```
button.addEventListener('click', event => {
  console.log(`Click count: ${event.detail}`);
});
```

```
button.addEventListener('click', event => {
  console.log(`Click count: ${event.detail}`);
});
```



```ts
interface GlobalEventHandlersEventMap {
  "abort": UIEvent;
  "animationcancel": AnimationEvent;
  // ...
  "click": MouseEvent;
  // ...
}
```

```ts
interface GlobalEventHandlers {
  addEventListener<K extends keyof GlobalEventHandlersEventMap>(
    type: K,
    listener: (ev: GlobalEventHandlersEventMap[K]) => any,
    options?: boolean | AddEventListenerOptions
  ): void;
}
```

```ts
interface GlobalEventHandlersEventMap {
  "abort": UIEvent;
  "animationcancel": AnimationEvent;
  // ...
  "click": MouseEvent;
  // ...
}
```

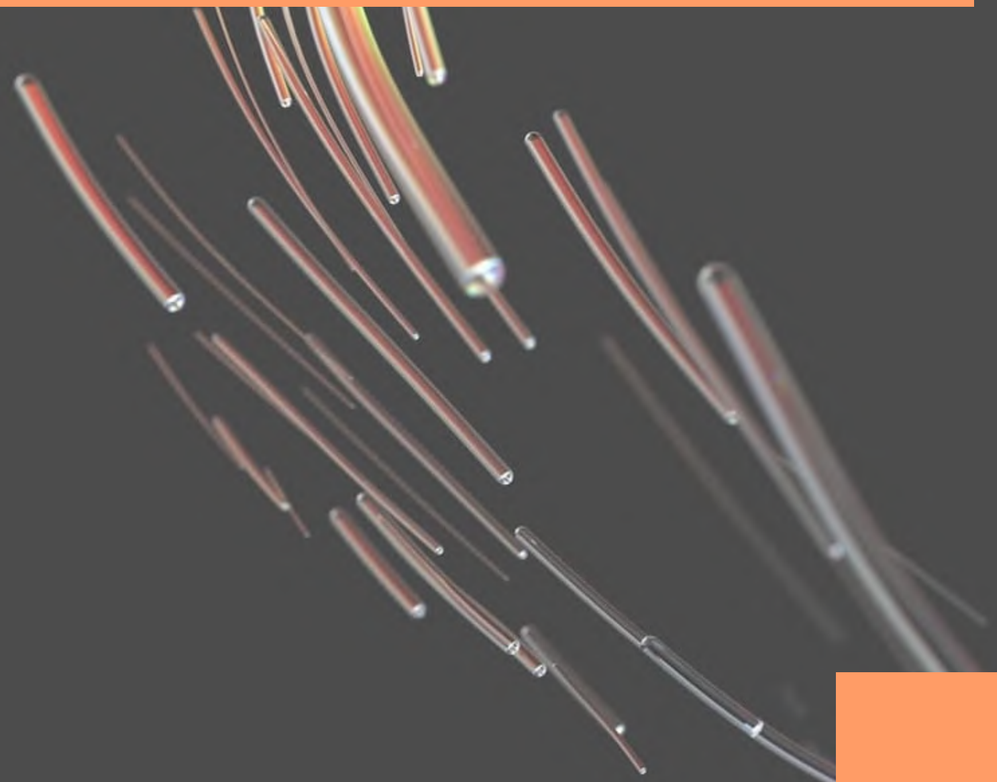
```ts
"abort" | "animationcancel" | "click" | /* … */
```

```ts
interface GlobalEventHandlers {
  addEventListener<K extends keyof GlobalEventHandlersEventMap>(
    type: K,
    listener: (ev: GlobalEventHandlersEventMap[K]) => any,
    options?: boolean | AddEventListenerOptions
  ): v
}
```

```ts
GlobalEventHandlersEventMap["click"]
```

same thing for Node ...

Chapter 3



Dataframes! 🐼

Data analysis

- Data Science™ is basically just tables, right?
- CSV is a great format for tables
- … but what do we do with them?

Typical operations

- access row *i* at column c
- filter rows by predicate
- drop columns
- add new column
- aggregate & group by column

```
operation(table: Table): Table
```

```
operation(table: Table): Table
```

```
operation(table: Table<ColsIn>): Table<ColsOut>
```

```
operation(table: Table<ColsIn>): Table<ColsOut>
```


```
operation(table: Table<ColsIn>): Table<ColsOut>
```

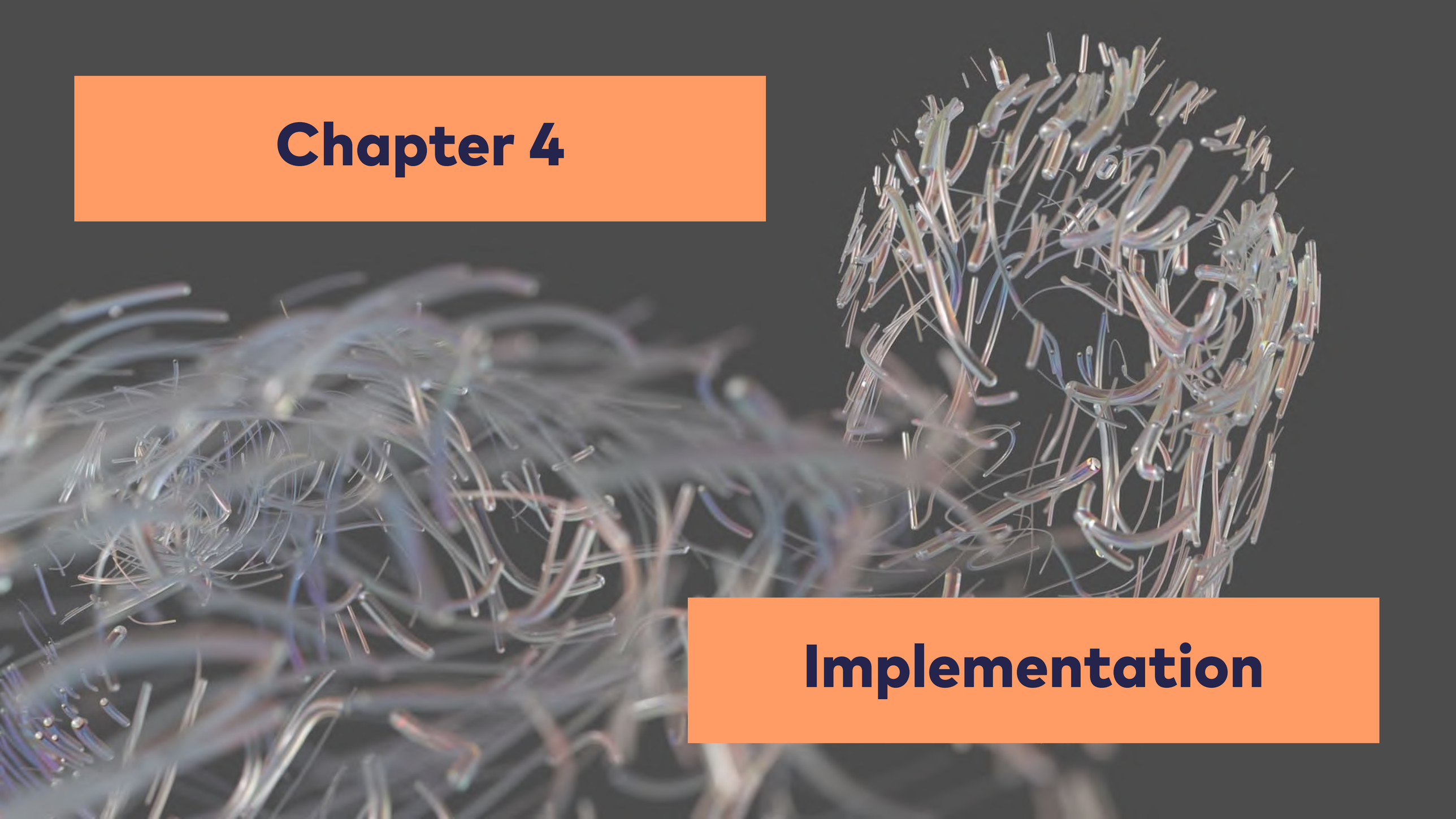
```
interface Table<
  Cols extends Record<string, any>
>
```

#	Order ID	Item	Qty	Price
1	ABC	Apple	5	10
2	ABC	Pear	2	3
3	DEF	Apple	1	8

#	Order ID	Item	Qty	Price
1	ABC	Apple	5	10
2	ABC	Pear	2	3
3	DEF	Apple	1	8

```
Table<{
  orderId: string;
  item: string;
  qty: number;
  price: number;
}>
```

Chapter 4



Implementation

```ts
interface Series<Elem> {
  get length(): number;
  at(n: number): Elem;
}
```

```ts
interface Table<Index, Cols extends Record<string, any>> {
  get index(): Series<Index>
  select<Col extends keyof Cols>(col: Col): Series<Cols[Col]>
  lookup(index: Index): Row<Index, Cols> | undefined
}
```

Demo

Q&A

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