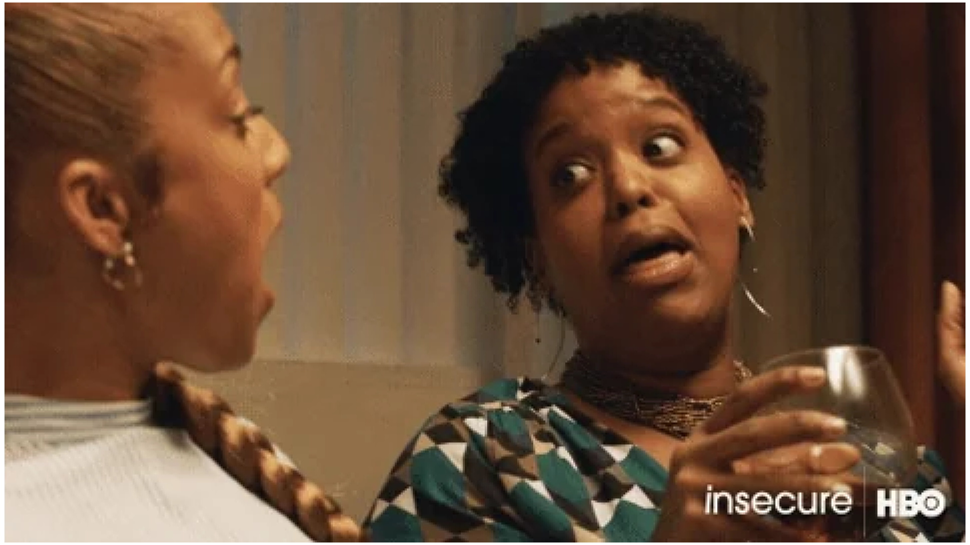
Intro to Typescript and React

A brief introduction

Per Enström – 2025-01-14

What you will know after these 30 minutes

- Everything about Typescript
- Everything about React


insecure
HBO

What you will know after these 30 minutes

- Some basics about Typescript
- Some basics about React
- Where to learn more

Typescript

Typescript

- Official documentation can be found at www.typescriptlang.org/docs
- For experimentation, use the playground at www.typescriptlang.org/play/

Typescript

- Builds on un-typed Javascript, extending it with types
- Transpiles (compiles) down to plain Javascript

```typescript
const myString: string = "hello";

const myFunction = (input: string) => {
   console.log(input);
}

myFunction(myString);
```

compiles to

```javascript
"use strict";
const myString = "hello";
const myFunction = (input) => {
    console.log(input);
};
myFunction(myString);
```

Typescript

- Types are sets of types, not necessarily a single type

```typescript
type MySingleType = string;
type MyUnionType = string | number;
```

Typescript

- Typescript’s job is to prevent runtime javascript errors
- If Javascript doesn’t care, Typescript won’t care
- Structural typing
- So-called duck-typing (if it quacks and looks like a duck, it’s a duck)
- Don’t need to specify types that can be inferred

```typescript
interface Pointlike {
  x: number;
  y: number;
}
interface Named {
  name: string;
}

function logPoint(point: Pointlike) {
  console.log("x = " + point.x + ", y = " + point.y);
}

function logName(x: Named) {
  console.log("Hello, " + x.name);
}

const obj = {
  x: 0,
  y: 0,
  name: "Origin",
};

logPoint(obj);
logName(obj);
```

Typescript

- Common to feel worked against by TS
- Libraries often come with very advanced TS patterns
  - Sometimes helpful to 'cmd-click' into a bundled type
- Error messages are hard to understand
  - Read from bottom up
  - Install VS Code extension "Pretty TypeScript Errors"

Typescript

- Don’t use the escape hatch `any`
  - Completely disables typechecking
  - When starting out, tempting to sprinkle `any` everywhere just to get past a problem
  - There’s always a reason you get an error

React

React

- Official documentation can be found at react.dev/learn

React

- Made up of *components*
- A component is a UI piece, with logic and appearance
- Small as a button, or large as a page
- Most of the time nested within each other
- All components are just javascript functions which return markup (JSX)
- Components are named with a capital letter
- Most often one component per file (.tsx)

React

Button component:

```
function MyButton() {
  return (
    <button>I'm a button</button>
  );
}
```

Page component:

```
function MyApp() {
  return (
    <div>
      <h1>Welcome to my app</h1>
      <MyButton />
    </div>
  );
}
```

React

- JSX is stricter than HTML
  - You have to close all tags, even self-closing (`<br />` instead of `<br>`)
  - A React function can only return a single root tag (you can solve this by using fragments)
  - Some conflicting html properties are renamed (`class` becomes `className`, `for` becomes `htmlFor`)

```jsx
function AboutPage() {
  return (
    <>
      <h1>About</h1>
      <p>Hello there.<br />How do you do?</p>
    </>
  );
}
```

`<>` *is just shorthand syntax for* `<React.Fragment>`

React

- JSX lets you 'go back' to a Javascript expression by using `{}`
- This is evaluated as a single expression, so cannot contain statements like `if` / `else`

```
return (
  <img
    className="avatar"
    src={user.imageUrl}
  />
);
```

React

- Conditional rendering is often done by using `?` or `&&` operators

```
<div>
  {isLoggedIn ? (
    <AdminPanel />
  ) : (
    <LoginForm />
  )}
</div>
```

> *if* `isLoggedIn` *then* render `<AdminPanel />` *else* render `<LoginForm />`

```
<div>
  {isLoggedIn && <AdminPanel />}
</div>
```

React

- Components can hold *state*, and pass down *state* to children components as *props*. Children can affect parent component by calling functions that has been passed to them as *props*.
- State only flows downwards in the component tree, never up
- React will re-render a component whenever its state or props change

React

State

```
import { useState } from 'react';

function MyButton() {
  const [count, setCount] = useState(0);

  return (
    <>
      Count is: {count}
      <button>Increment</button>
    </>
  )
}
```

> Here the type of `count` is inferred to be a number based on the default value, without us having to explicitly type it

React

Handlers

```jsx
import { useState } from 'react';

function MyButton() {
  const [count, setCount] = useState(0);

  function handleClick() {
    setCount(count + 1);
  }

  return (
    <>
      Count is: {count}
      <button onClick={handleClick}>Increment</button>
    </>
  )
}
```

React

Moving state up

- A common pattern when you want components to share some piece of data is to move that data up to the nearest common parent.

React

Moving state up

- A common pattern when you want components to share some piece of data is to move that data up to the nearest common parent.

```
function MyApp() {
  const [count, setCount] = useState(0);

  function handleClick() {
    setCount(count + 1);
  }

  return (
    <div>
      <h1>Counters that update together</h1>
      <MyButton count={count} onClick={handleClick} />
      <MyButton count={count} onClick={handleClick} />
    </div>
  );
}
```

```
function MyButton(props) {
  return (
    <button onClick={props.onClick}>
      Clicked {props.count} times
    </button>
  );
}
```

Let’s get coding!