Step 1 - NextJS Intro, Pre-requisites

Pre-requisites

You need to understand basic Frontend before proceeding to this track.

You need to know what `React` is and how you can create a simple application in it

NextJS Intro

NextJS was a framework that was introduced because of some `minor inconviniences` in React

1. In a React project, you have to maintain a separate Backend project for your API routes
2. React does not provide out of the box routing (you have to use react-router-dom)
3. React is not SEO Optimised
    1. not exactly true today because of React Server components
    2. we'll discuss soon why
4. Waterfalling problem

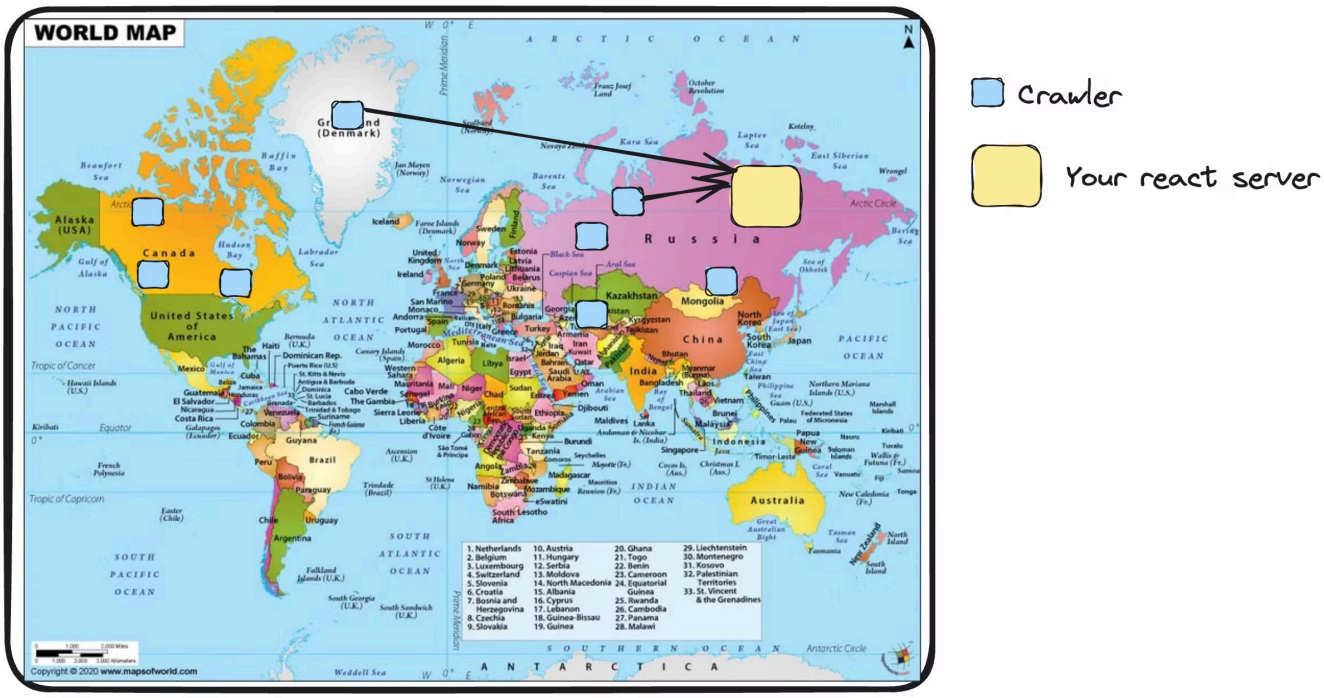
Let's discuss some of these problems in the next slides

Step 2 - SEO Optimisation

Google/Bing has a bunch of `crawlers` that hit websites and figure out what the website does.

It ranks it on `Google` based on the HTML it gets back

The crawlers `DONT` usually run your JS and render your page to see the final output.

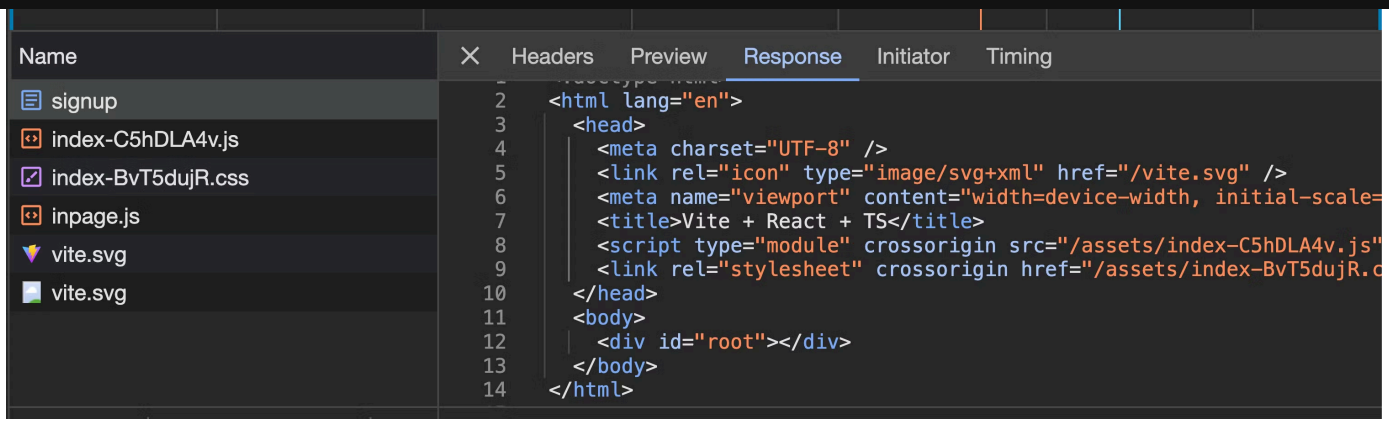


> 💡 While Googlebot can run JavaScript, `dynamically generated` content is harder for the scraper to index

Try visiting a react website

What does the `Googlebot` get back when they visit a website written in react?

Try visiting https://blog-six-tan-47.vercel.app/signup

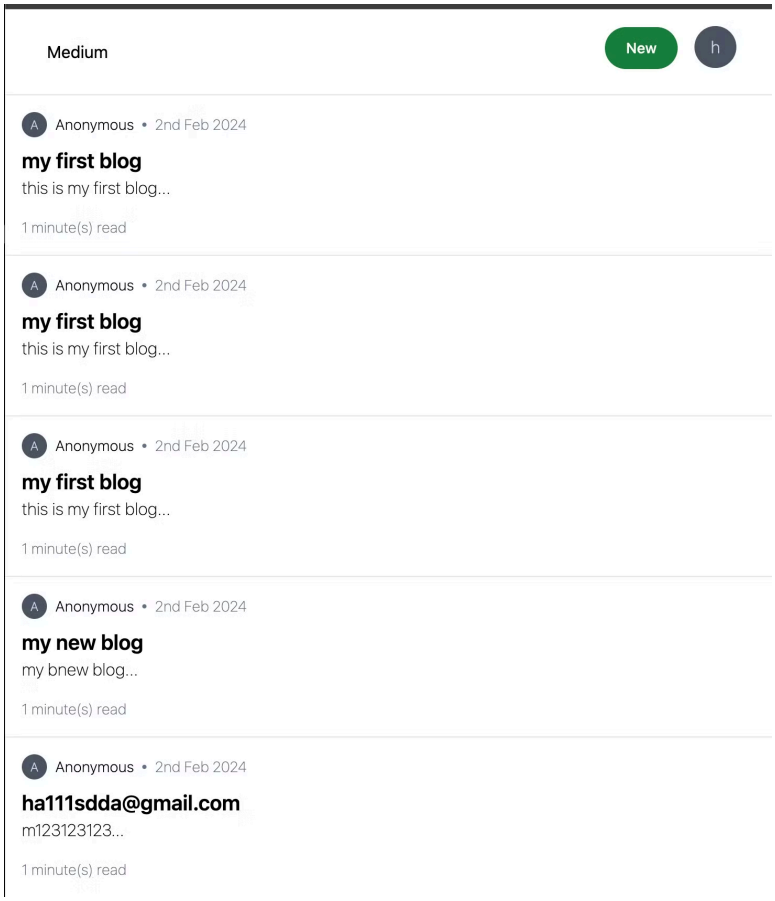


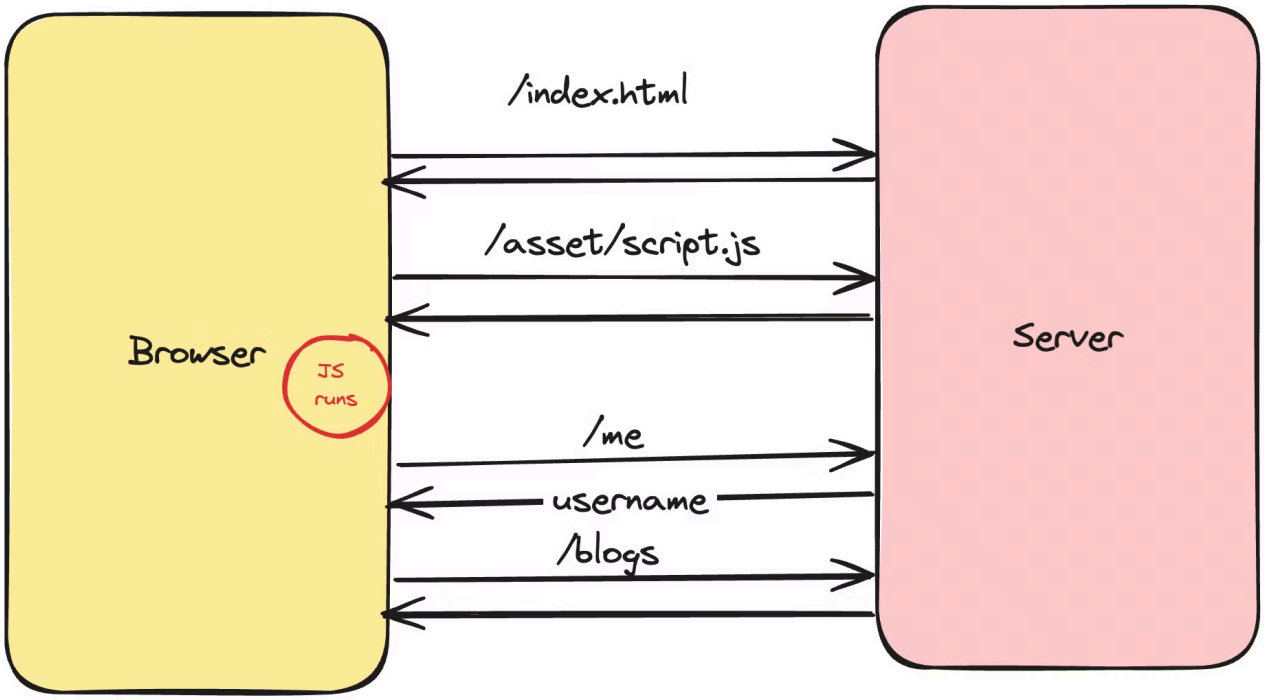
Googlebot has no idea on what the project is. It only sees `Vite + React + TS` in the original HTML response.

Ofcourse when the JS file loads eventually, things get rendered but the `Googlebot` doesn't discover this content very well.

Step 3 - Waterfalling problem

Let's say you built a blogging website in react, what steps do you think the `request cycle` takes?





1. Fetching the index.html from the CDN
2. Fetching script.js from CDN
3. Checking if user is logged in (if not, redirect them to /login page)
4. Fetching the actual blogs

There are 4 round trips that happen one after the other (sequentially)

> 💡 The "waterfalling problem" in React, and more broadly in web development, refers to a scenario where data fetching operations are chained or dependent on each other in a way that leads to inefficient loading behavior.

What does nextjs provide you?

Step 4 - Next.js offerings

Next.js provides you the following `upsides` over React

1. Server side rendering - Get's rid of SEO problems
2. API routes - Single codebase with frontend and backend
3. File based routing (no need for react-router-dom)
4. Bundle size optimisations, Static site generation
5. Maintained by the Vercel team

Downsides -

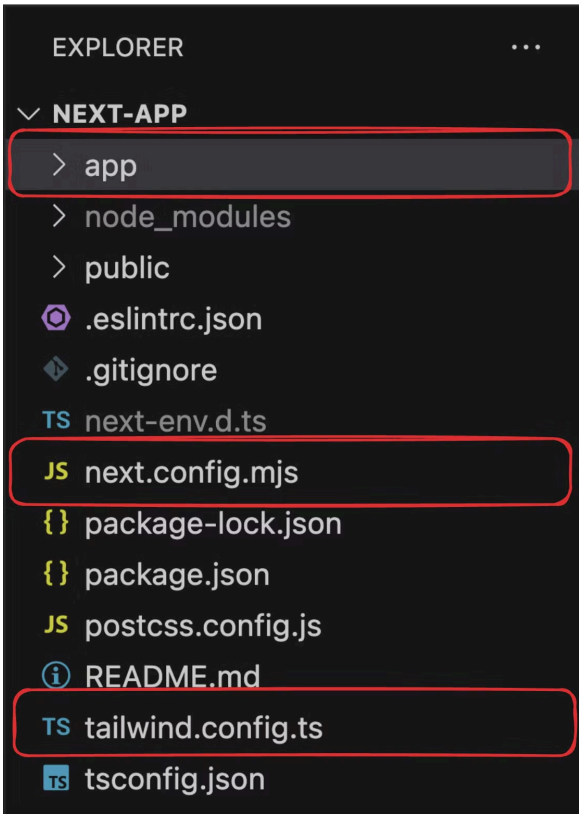
1. Can't be distributed via a CDN, always needs a server running that does `server side rendering` and hence is expensive
2. Very opinionated, very hard to move out of it

Step 5 - Let’s bootstrap a simple Next app

```
npx create-next-app@latest
```

```
➜  Projects npx create-next-app@latest
Need to install the following packages:
create-next-app@14.1.1
Ok to proceed? (y) y
✔ What is your project named? … next-app
✔ Would you like to use TypeScript? … No / Yes
✔ Would you like to use ESLint? … No / Yes
✔ Would you like to use Tailwind CSS? … No / Yes
✔ Would you like to use `src/` directory? … No / Yes
✔ Would you like to use App Router? (recommended) … No / Yes
✔ Would you like to customize the default import alias (@/*)? … No / Yes
Creating a new Next.js app in /Users/harkiratsingh/Projects/next-app.

Using npm.

Initializing project with template: app-tw


Installing dependencies:
- react
- react-dom
- next

Installing devDependencies:
- typescript
- @types/node
- @types/react
- @types/react-dom
- autoprefixer
- postcss
- tailwindcss
- eslint
- eslint-config-next
```

File structure



1. next.config.mjs - Nextjs configuration file
2. tailwind.config.js - Tailwind configuration file
3. app - Contains all your code/components/layouts/routes/apis

Bootstrap the project

1. Remove everything from `app/page.tsx` and return an empty div
2. Remove the css bits (not the tailwind headers) from the `global.css` file

Step 6 - Understanding routing in Next

Routing in React

https://blog-six-tan-47.vercel.app/signup

```
function App() {

  return (
    <>
      <BrowserRouter>
        <Routes>
          <Route path="/signup" element={<Signup />} />
          <Route path="/signin" element={<Signin />} />
          <Route path="/blog/:id" element={<Blog />} />
        </Routes>
      </BrowserRouter>
    </>
  )
}
```

Routing in Next.js

Next.js has a `file based router` (https://nextjs.org/docs/app/building-your-application/routing/defining-routes)

This means that the way you create your files, describes what renders on a route

1. Let's add a new folder in `app` called `signup`

2. Let's add a file called `page.tsx` inside `app/signup`

▼ page.tsx

```
export default function Signup() {
    return (
      <div>
        hi from the signup page
      </div>
    );
  }
```

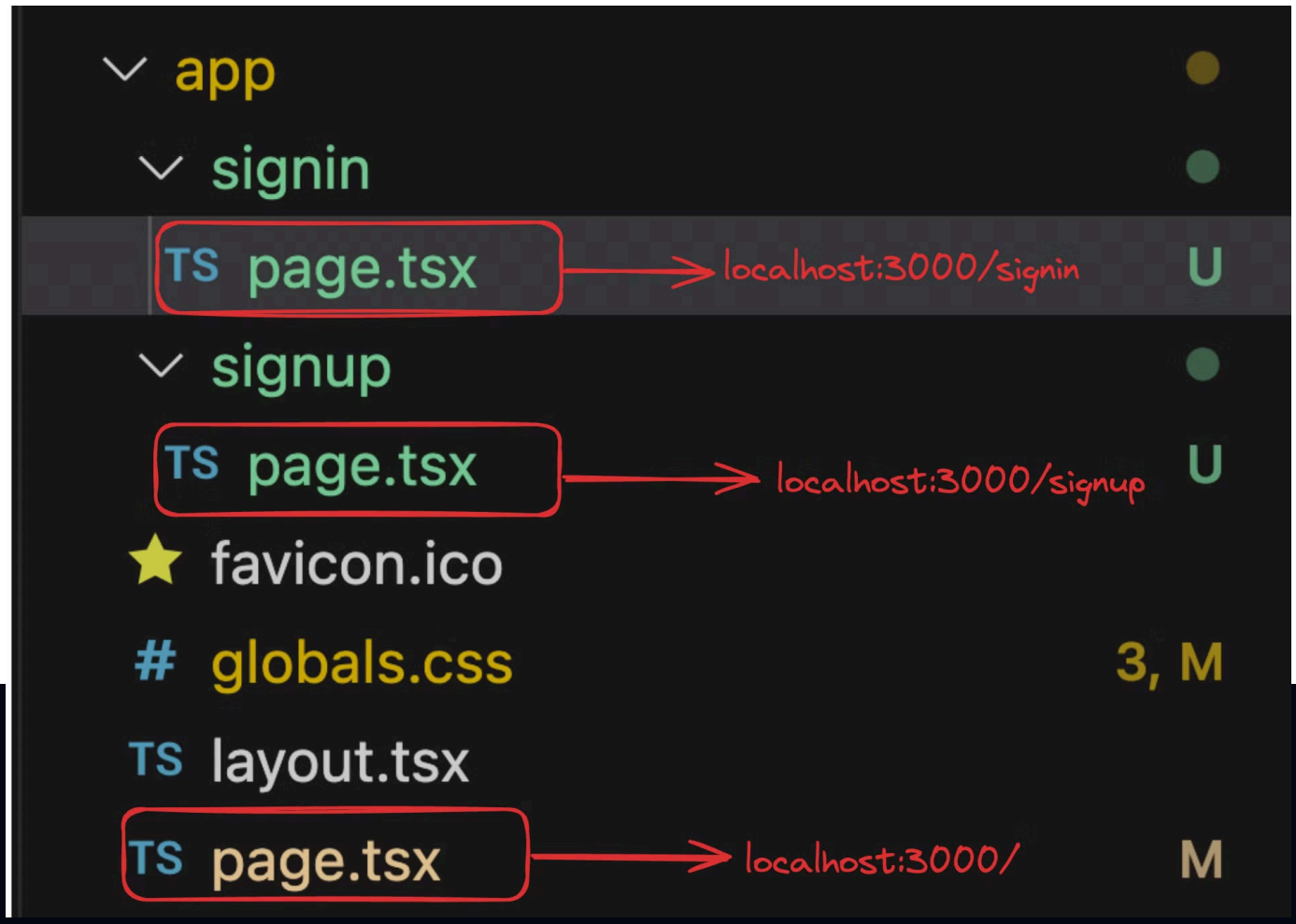
1. Start the application locally

```
npm run dev
```

hi from the signup page

Final folder structure

Assignment - Can you add a `signin` route?



Step 7 - Prettify the signin page

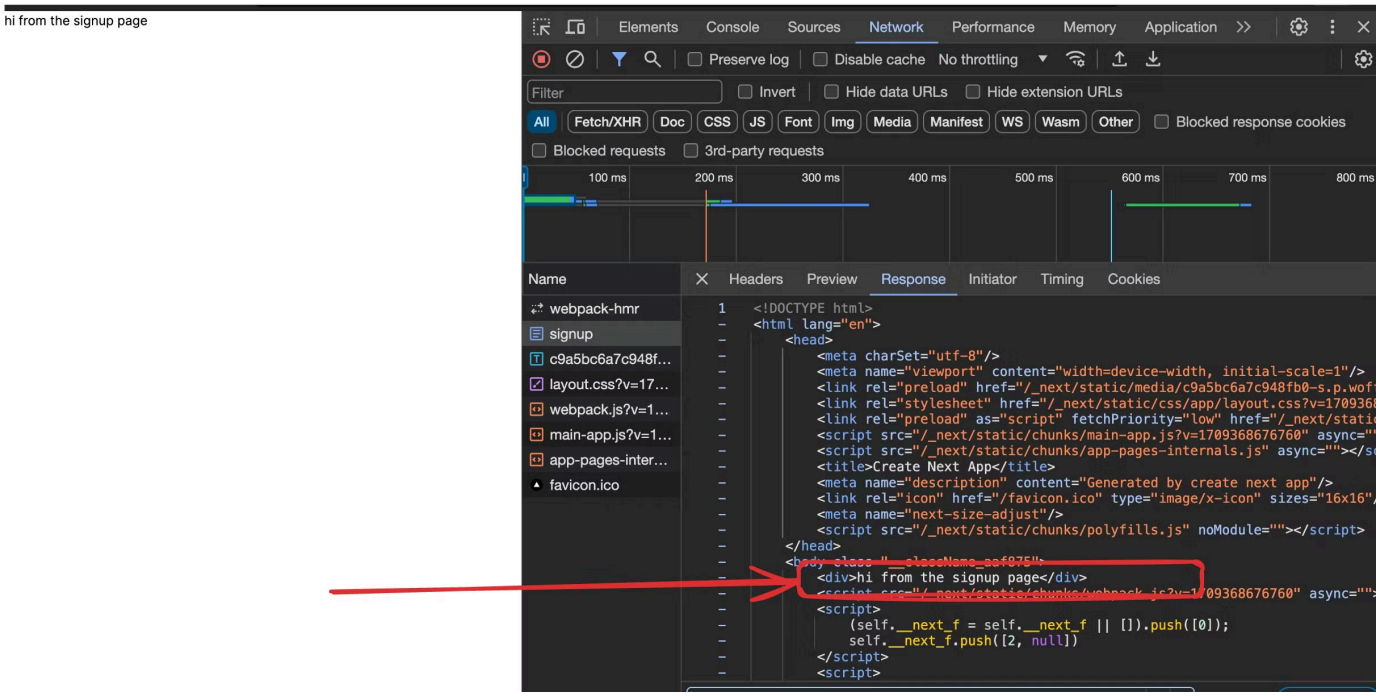
Let’s replace the signup page with a prettier one

```tsx
export default function Signin() {
    return <div className="h-screen flex justify-center flex-col">
        <div className="flex justify-center">
        <a href="#" className="block max-w-sm p-6 bg-white border border-gray-20
                <div>
                    <div className="px-10">
                        <div className="text-3xl font-extrabold">
                            Sign in
                        </div>
                    </div>
                    <div className="pt-2">
                        <LabelledInput label="Username" placeholder="harkirat@gm
                        <LabelledInput label="Password" type={"password"} placeh
                        <button type="button" className="mt-8 w-full text-white
                    </div>
                </div>
            </a>
        </div>
    </div>
}

interface LabelledInputType {
    label: string;
    placeholder: string;
    type?: string;
}

function LabelledInput({ label, placeholder, type }: LabelledInputType) {
    return <div>
        <label className="block mb-2 text-sm text-black font-semibold pt-4">{lab
        <input type={type || "text"} id="first_name" className="bg-gray-50 borde
    </div>
}
```

Step 8 - Server side rendering

Let's try exploring the response from the server on the `/signup` route

1. Run `npm run dev`
2. Visit `http://localhost:3000/signup`
3. Notice the response you get back in your HTML file



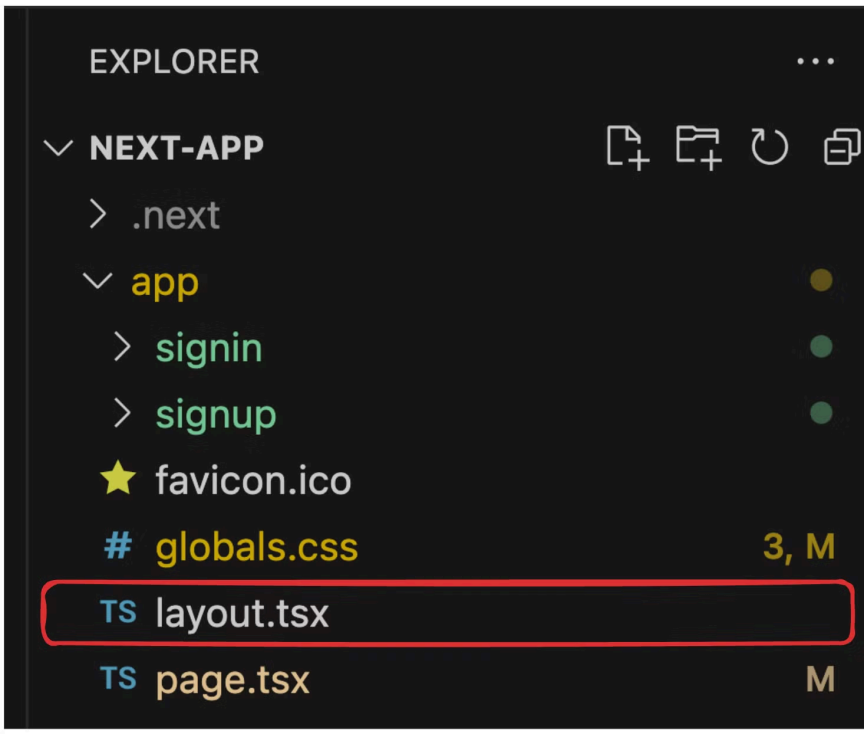
Now if `GoogleBot` tries to scrape your page, it'll understand that this is a `signup page` without running any Javascript.

The first `index.html` file it get's back will have context about the page since it was `server side rendered`

Step 9 - Layouts

You'll notice a file in your `app` folder called `layout.tsx`

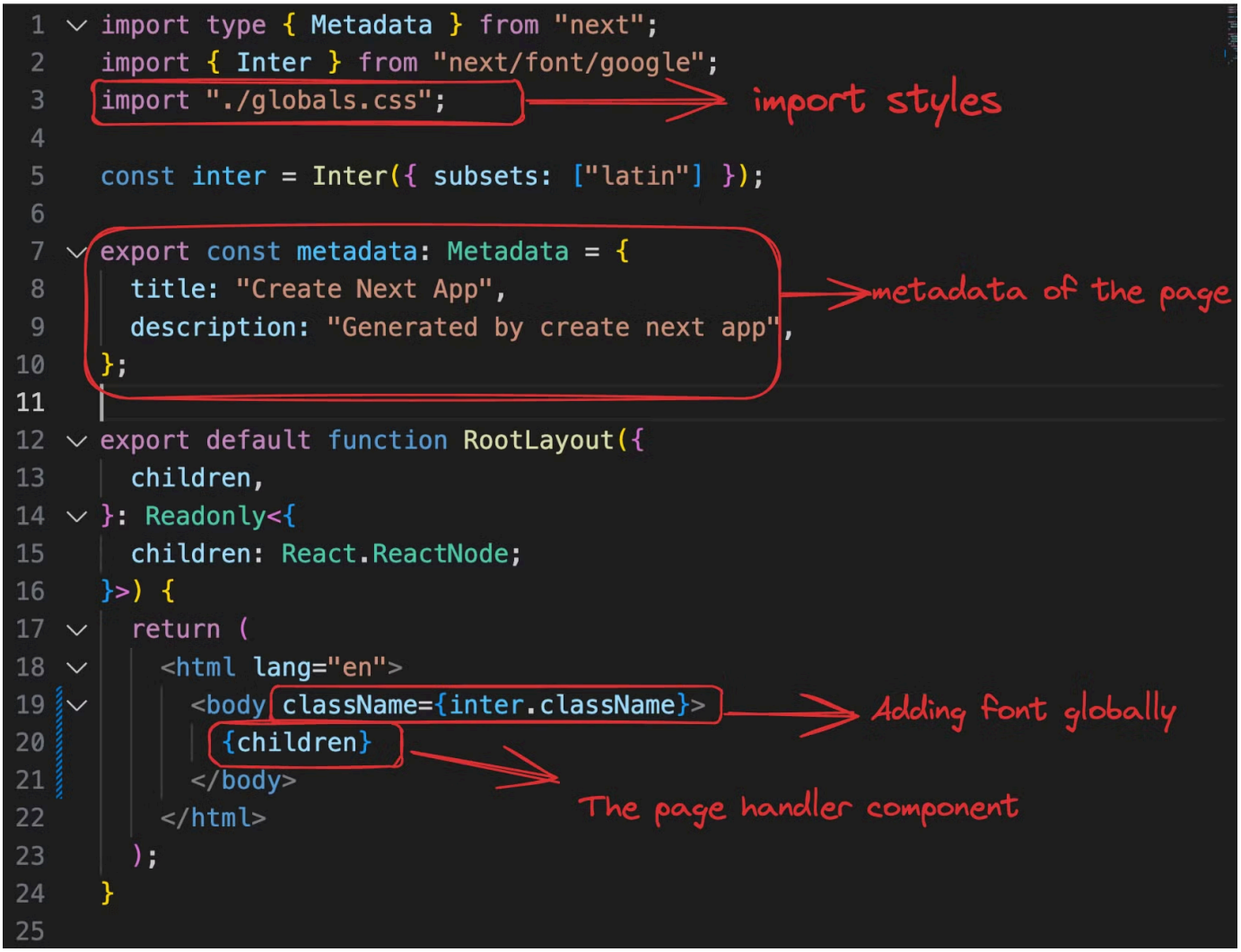
Let's see what this does (Ref https://nextjs.org/docs/app/building-your-application/routing/pages-and-layouts)



What are layouts

Layouts let you `wrap` all child `pages` inside some logic.

Let's explore `layout.tsx`

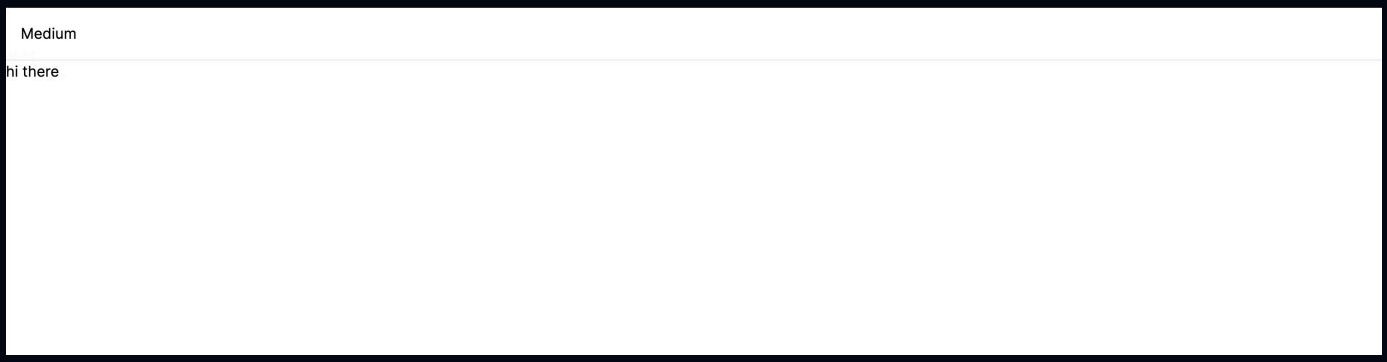



```tsx
import type { Metadata } from "next";
import { Inter } from "next/font/google";
import "./globals.css";

const inter = Inter({ subsets: ["latin"] });

export const metadata: Metadata = {
  title: "Create Next App",
  description: "Generated by create next app",
};

export default function RootLayout({
  children,
}: Readonly<{
  children: React.ReactNode;
}>) {
  return (
    <html lang="en">
      <body className={inter.className}>
        {children}
      </body>
    </html>
  );
}
```

Assignment

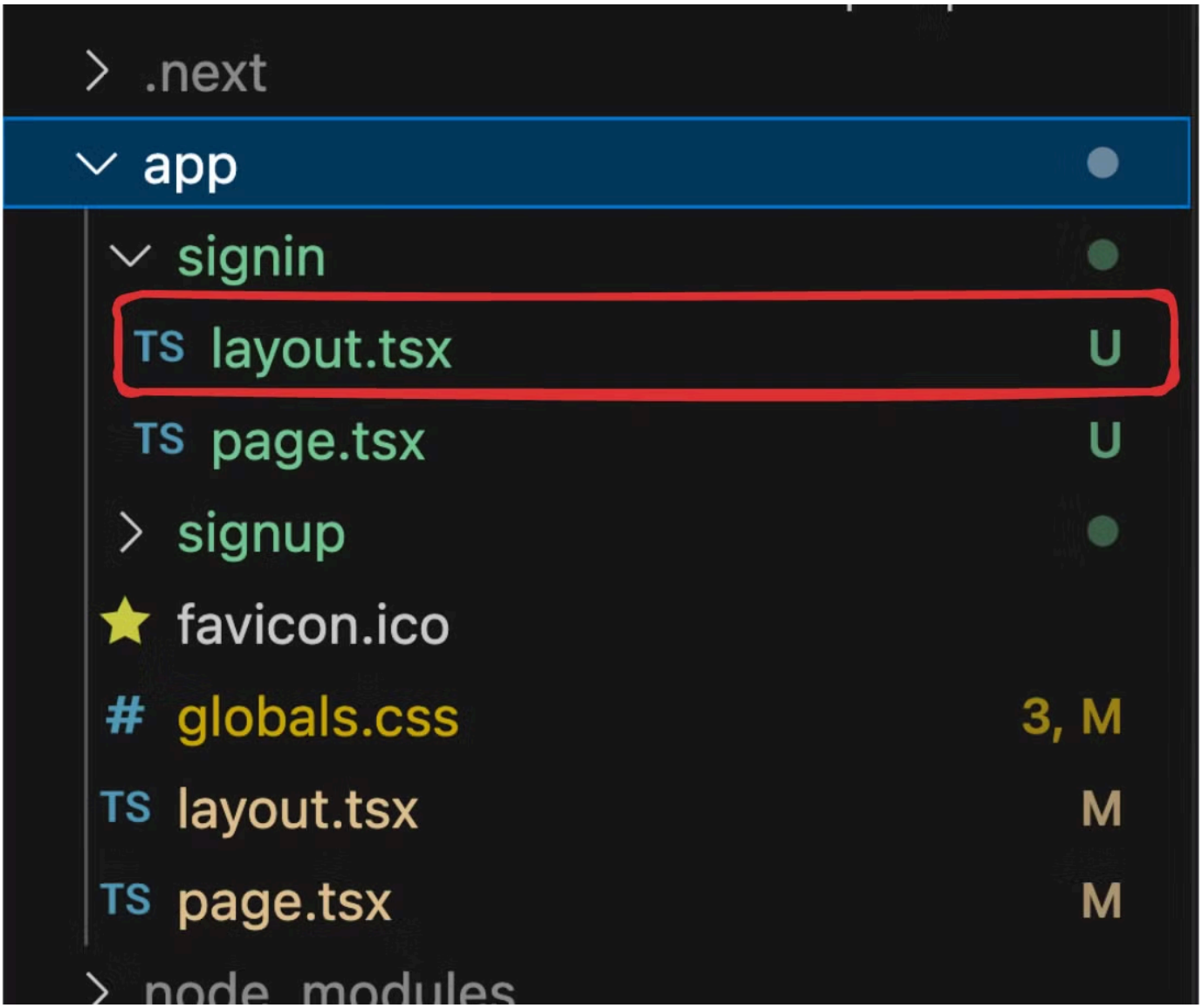
Try adding a simple `Appbar`

```
return (
  <html lang="en">
    <body className={inter.className}>
      <div className="p-4 border-b">
        Medium
      </div>
      {children}
    </body>
  </html>
);
```



Step 10 - Layouts in sub routes

What if you wan't all routes that start with `/signin` to have a `banner` that says `Login now to get 20% off`



Step 11 - Merging routes

What if you wan't to get the banner in both `signup` and `signin`?

Approach #1

Move both the `signin` and `signup` folder inside a `auth` folder where we have the layout

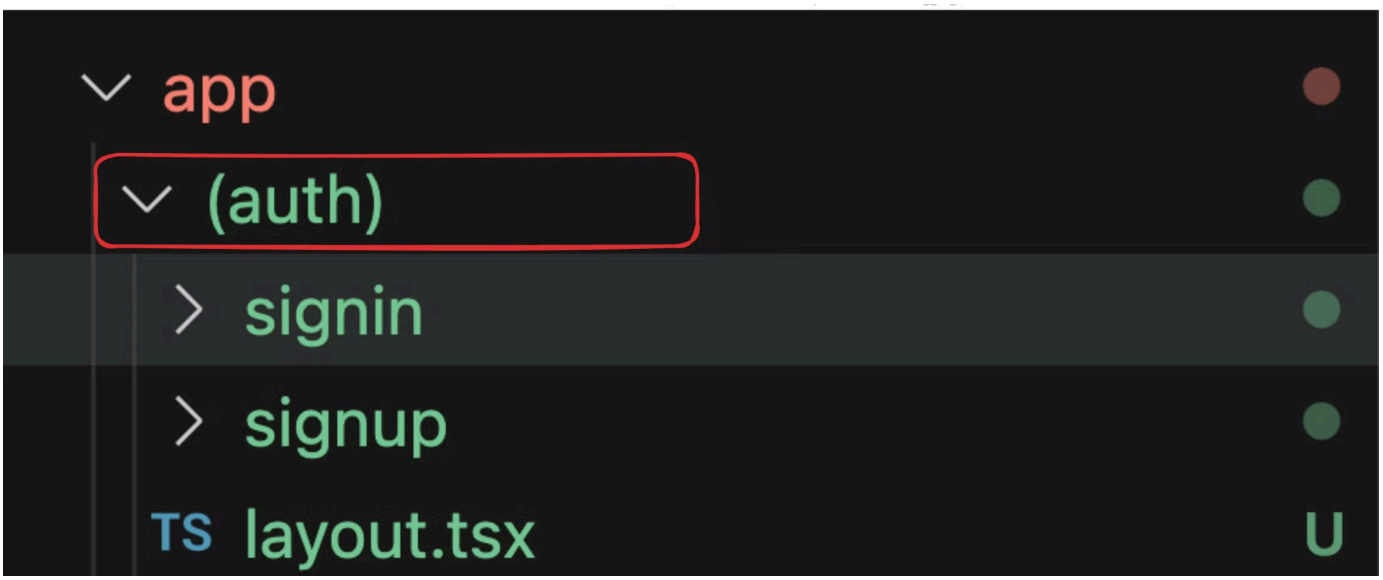
You can access the routes at

`http://localhost:3000/auth/signup` and `http://localhost:3000/auth/signin`

Approach #2

You can use create a new folder with `()` around the name.

This folder is `ignored` by the router.



You can access the routes at

`http://localhost:3000/signup` and `http://localhost:3000/signin`

Step 12 - `components` directory

You should put all your `components` in a `components` directory and use them in the `app routes` rather than shoving everything in the route handler

1. Create a new folder called `components` in the root of the project
2. Add a new component there called `Signin.tsx`
3. Move the signin logic there
4. Render the `Signin` component in `app/(auth)signin/page.tsx`

Solution

▼ `components/Signin.tsx`

```
export function Signin() {
    return <div className="h-screen flex justify-center flex-col">
        <div className="flex justify-center">
        <a href="#" className="block max-w-sm p-6 bg-white border border-gray-
                <div>
                    <div className="px-10">
                        <div className="text-3xl font-extrabold">
                            Sign in
                        </div>
                    </div>
                    <div className="pt-2">
                        <LabelledInput label="Username" placeholder="harkirat@
                        <LabelledInput label="Password" type={"password"} plac
                        <button type="button" className="mt-8 w-full text-whit
                    </div>
                </div>
            </a>
        </div>
    </div>
}

interface LabelledInputType {
```

```
    label: string;
    placeholder: string;
    type?: string;
}

function LabelledInput({ label, placeholder, type }: LabelledInputType) {
    return <div>
        <label className="block mb-2 text-sm text-black font-semibold pt-4">{l
        <input type={type || "text"} id="first_name" className="bg-gray-50 bor
    </div>
}
```

▼ app/(auth)/Signin.tsx

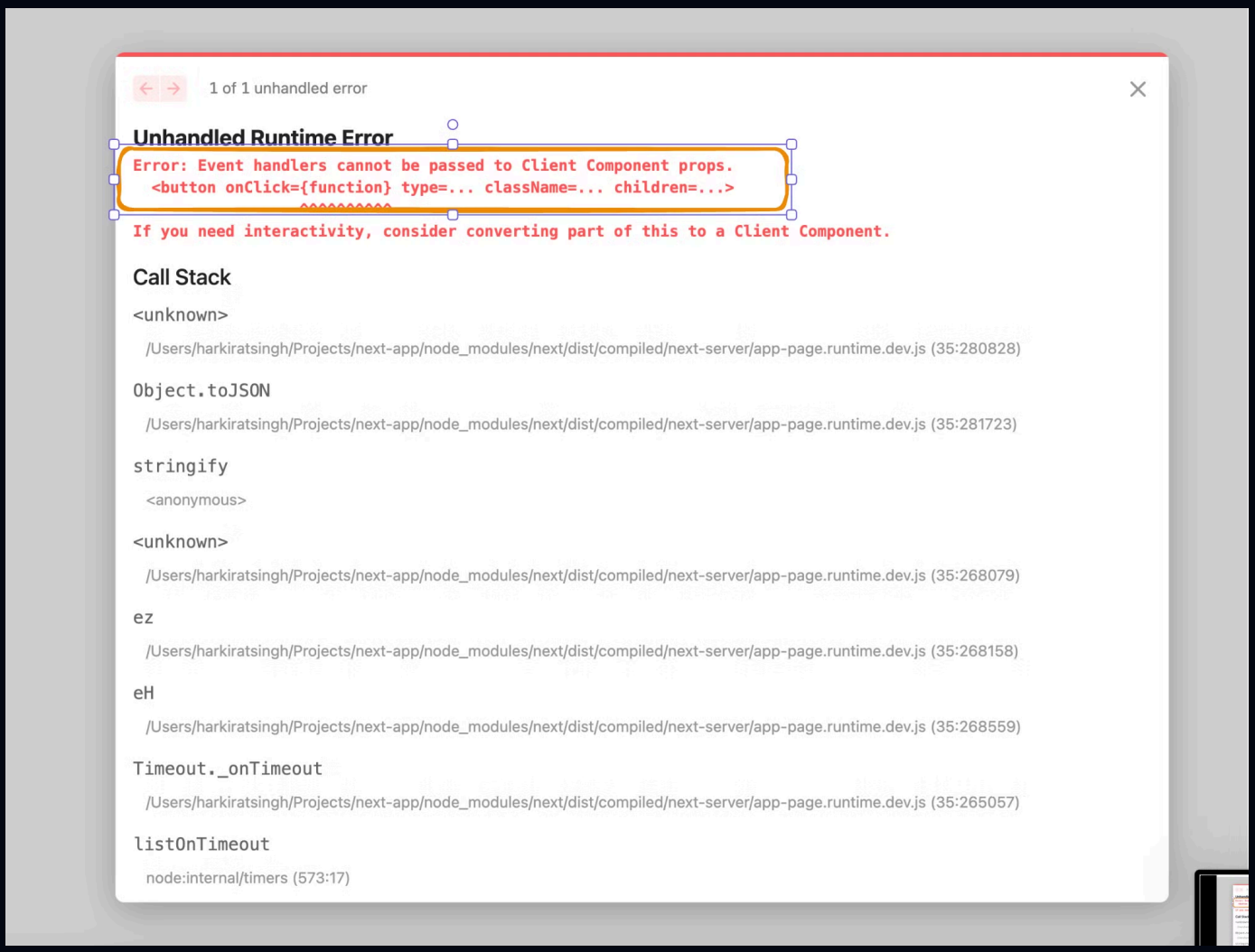
```
import { Signin as SigninComponent } from "@/components/Signin";

export default function Signin() {
    return <SigninComponent />
}
```

Step 13 - Add a button onclick handler

Now try adding a `onclick` handler to the `button` on the signin page

```
<button onClick={() => {
    console.log("User clicked on signin")
}} type="button" className="mt-8 w-full text-white bg-gray-800 focus:ring-4 focu
```

You will notice an error when you open the page



What do you think is happening here? Let's explore in the next slide

Step 14 - Client and server components

Ref - https://nextjs.org/learn/react-foundations/server-and-client-components

NextJS expects you to identify all your components as either `client` or `server`

As the name suggests

1. Server components are rendered on the server
2. Client components are pushed to the client to be rendered

By default, all components are `server` components.

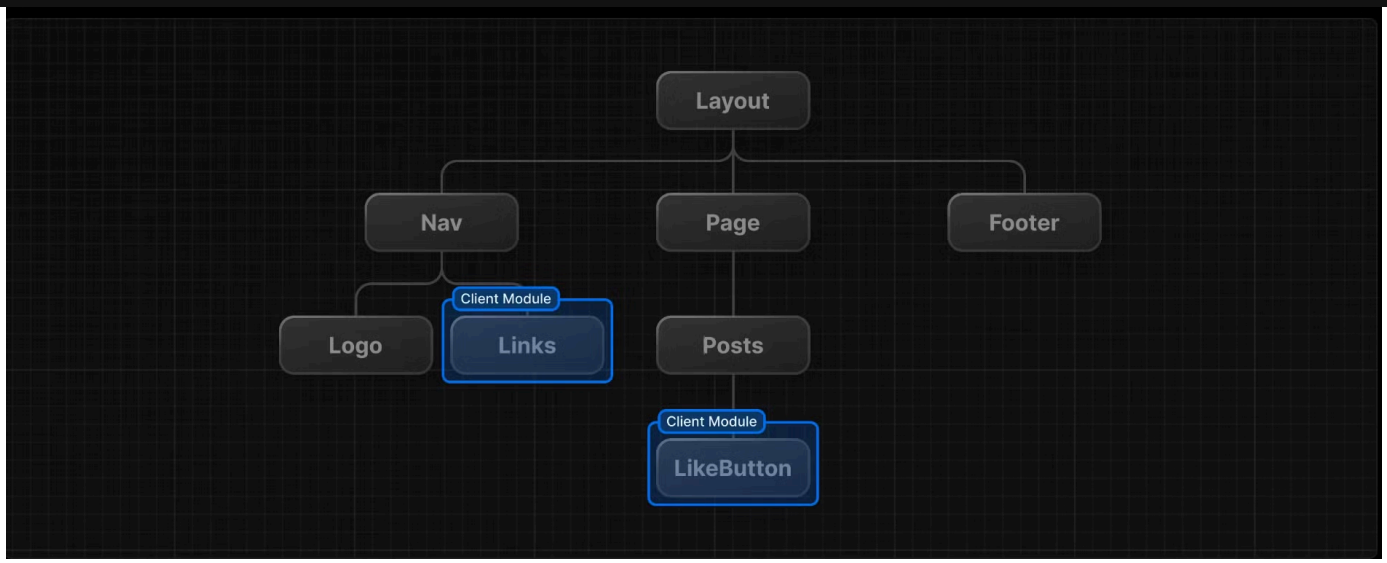
If you wan't to mark a component as a `client` component, you need to add the following to the top of the component -

```
"use client"
```

When should you create `client components` ?

1. Whenever you get an error that tells you that you need to create a client component
2. Whenever you're using something that the server doesn't understand (useEffect, useState, onClick...)

Rule of thumb is to defer the client as much as possible



Assignment

Try updating `components/Signin.tsx` to make it a client component

You will notice that the error goes away

Some nice readings -

https://github.com/vercel/next.js/discussions/43153