Fullstack application with Next.js, tRPC and DrizzleORM

Agenda

- Setup
- The Stack
- Single Page Applications
- Important Concepts
- React
- Next.js
- tRPC
- DrizzleORM
- Practical Work

Please start building the docker container now :)

It may take some time

1. Clone our GitHub repo: `git clone https://github.com/sebivenlo/ESD-2023-Full-Stack`
2. cd into the cloned repo: `cd ESD-2023-Full-Stack`
3. Run `docker-compose up –d`
4. Meanwhile please open a new VSCode window and search for the extension called `Dev Containers`
5. CMD/CTRL + SHIFT + P -> ‘Developer reload windows’
6. CMD/CTRL + SHIFT + P -> ‘Dev Containers: Attach to Running Container…’
7. Choose Path ‘/usr/src/app’

The STACK

- Next.js
- tRPC
- DrizzleORM

Image source(s): https://nextjs.org/, https://trpc.io/, https://orm.drizzle.team/

Single Page Application

- Only loads the document once and then updates it dynamically without loading new pages
- Has to download all the html, CSS and JS in the beginning
- High initial load time
- Can be laggy when the app becomes more complex

Important concepts

Client-Side

- Rendering happens in the user's browser
- Requires more client-based processing power
- Search engines does not see full content -> not perfect for SEO

Server-Side

- Rendering occurs on the server before page is sent to the user
- Reduces client-side processing
- Better for SEO, because search engines can crawl the full content

React

- Built by facebook
- One of the biggest webframeworks (~ 42% marketshare [2])
- Open-source frontend javascript framework for building interactive userinterfaces out of components

```
function MyOwnComponent() {
  return (
    <>
      <h1 style={{ color: "green" }}>Hello World!</h1>
      <button onClick={() => console.log("Button clicked")}>
        Increase count
      </button>
    </>
  );
}
```

```tsx
type MyOwnComponentProps = {
  color: "red" | "blue" | "green";
};

function MyOwnComponent({ color }: MyOwnComponentProps) {
  return (
    <>
      <h1 style={{ color: color }}>Hello World!</h1>
      <button onClick={() => console.log("Button clicked")}>
        Increase count
      </button>
    </>
  );
}
```

```tsx
type MyOwnComponentProps = {
  color: "red" | "blue" | "green";
};

function MyOwnComponent({ color }: MyOwnComponentProps) {
  return (
    <>
      <h1 style={{ color: color }}>Hello World!</h1>
      <button onClick={() => console.log("Button clicked")}>
        Increase count
      </button>
    </>
  );
}

function MainPage() {
  return (
    <>
      <MyOwnComponent color="red" />;
    </>
  );
}
```

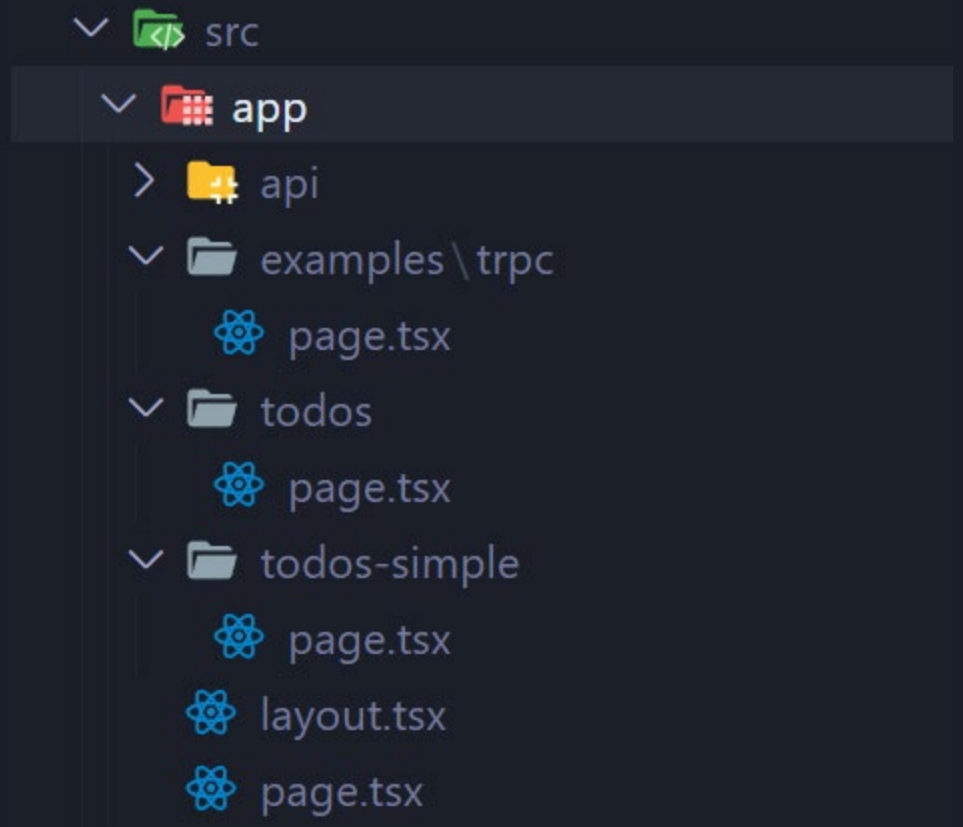
```jsx
import { useState } from "react";

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

  return (
    <>
      <h1>Current count {count}</h1>
      <button onClick={() => setCount(count + 1)}>
          Increase count
      </button>
    </>
  );
}
```

```jsx
import { useEffect, useState } from "react";

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

  useEffect(() => {
    console.log("Count has been increased");
  }, [count]);

  return (
    <>
      <h1>Current count {count}</h1>
      <button onClick={() => setCount(count + 1)}>
          Increase count
      </button>
    </>
  );
}
```

Next.JS

- Built on top of react
- Enables easy Client- and Server-side Rendering (SSR)
- Build in routing (app router)

App router


src
app
api
examples \ trpc
page.tsx
todos
page.tsx
todos-simple
page.tsx
layout.tsx
page.tsx

Next.JS

- Built on top of react
- Enables easy Client- and Server-side Rendering (SSR)
- Build in router
- Dynamic HTML streaming
- Built in optimizations
- Can run on the edge

tRPC

- Ensures type safety
- Automatically generate TypeScript types
- Automatic Serialization/Deserialization
- React integration (Hooks for the API using Tanstack Query)

DrizzleORM

- SQL-like query APIs
- Lightweight and Performant
- Type Safe
- Flexible and Serverless ready
- Support for multiple databases

```ts
import { boolean, pgTable, text, timestamp, uuid } from "drizzle-orm/pg-core";

export const todos = pgTable("todo", {
  id: uuid("id").primaryKey().notNull().defaultRandom(),
  description: text("description"),
  isComplete: boolean("is_complete").notNull().default(false),
  createdAt: timestamp("created_at").defaultNow().notNull(),
  updatedAt: timestamp("updated_at").defaultNow().notNull(),
});
```

```ts
const todosResult = await ctx.db
  .select()
  .from(todos)
  .orderBy(desc(todos.createdAt))
  .execute();

// TypeScript Infered Type
const todosResult: {
  id: string;
  description: string | null;
  isComplete: boolean;
  createdAt: Date;
  updatedAt: Date;
}[]
```

The STACK

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Image source(s): https://nextjs.org/, https://trpc.io/, https://orm.drizzle.team/

Practical uses cases

- If Server-Side Rendering is required (SEO)
- Faster initial page reload
- Next.js is gaining in popularity
- Companies that uses NEXT.JS

Image source(s): https://www.netflix.com/ , https://binance.com/ , https://github.com/ , https://www.airbnb.de/

Practical work – TODO App

Practical work – TODO App

1. Basic project setup and structure
2. Creating a react component
3. Routing in Nextjs
4. Using tRPC and drizzle to create a backend API
5. Implement the web UI

Sources

[1]

[2] https://www.statista.com/statistics/1124699/worldwide-developer-survey-most-used-frameworks-web/

[3] https://nextjs.org/showcase

[4] https://medium.com/@devsenior2000/stop-using-next-js-on-production-12cc60201525#:~:text=One%20of%20the%20biggest%20drawbacks,render%20the%20pages%20from%20scratch.