Intro To React (Day 1)

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Contents

1 Why We Need Framework And What is The Advantage of The Web Over Desktop?

- **Framework** is a collection of libraries and tools that help you to build a web application.
- More interactive and responsive and structured
- SPA (Single Page Application) is a web application that interacts with the user by dynamically rewriting the current page rather than loading entire new pages from a server.

1.1 Desktop App Vs Web App

- **Desktop App** is a software program that can be run on a single computer and doesn't require an internet connection.
- **Web App** is a software program that can be accessed through any web browser.
- **Advantages of Web App**:
  - **Cross-Platform**: Web apps can be accessed from any device with a web browser.
  - **No Installation**: Web apps don't require installation.
  - **Easy to Update**: Web apps can be updated easily.
  - **Cost-Effective**: Web apps are cost-effective.
  - **Easy to Maintain**: Web apps are easy to maintain.
  - **Easy to Scale**: Web apps are easy to scale.
- We will talk bout 3 Points That make Web App Better Than Desktop App:
  - **Cross-Platform** , **Accessibility**: Web apps can be accessed from any device with a web browser.
  - **No Installation**: Web apps don't require installation and i don't even need a System Requirement to run the app or a server to host the app because the server has this Requirement not the client.
  - **Easy to Update**: Web apps can be updated easily.

1.2 Desktop App even with these Advantages in Web App Still have some Advantages:

- it still will win the Wep App in UX (User Experience) and Performance.
- So We Use The SPA (Single Page Application) to make the Web App more interactive and responsive and structured, Which i can make a web site work with zero loading time and i can make the web site work offline.

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2 What is SPA (Single Page Application)?

- When i open the Youm Sab3 site for ex , when i move from page to another it start to load the page again and again and this is not a good user experience.

2.1 Why The reload is Done ?!

- Because the server is sending the whole page again and again.

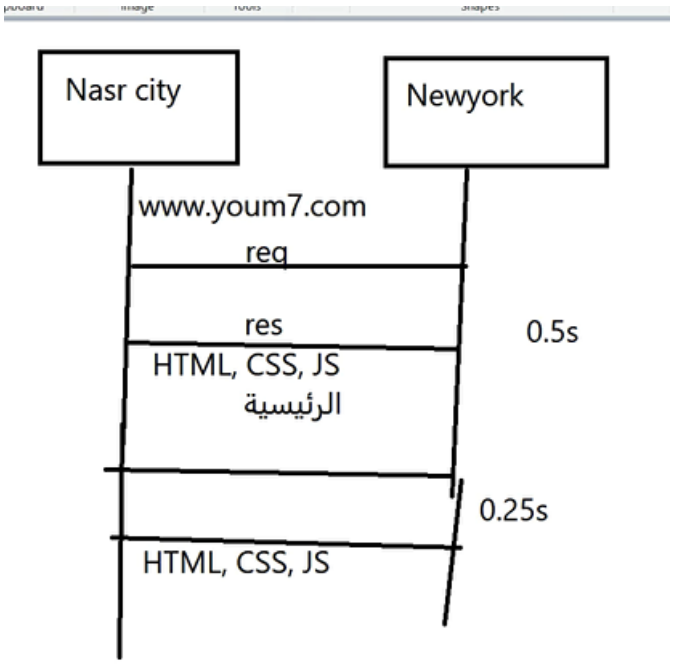

Figure 1: Traditional Web App

- Nasr City is my laptop and the Newyork is the server and the internet is the road between them.
- My Browser send a request to the server to get the page and the server send the page to the browser and the browser render the page and show it to me.
- The response isn't a json object or a string it's a whole page (HTML, CSS, JS).
- if i move to another page the browser will send a request to the server to get the new page and the server will send the new page to the browser and the browser will render the new page and show it to me.
- so the reload must be done to make the reflect of the new page (respond so the new page must be loaded).
- This is called **Traditional Web App**.

2.2 What is SPA (Single Page Application)?

- SPA is a web application that interacts with the user by dynamically rewriting the current page rather than loading entire new pages from a server.
- With the first request the server will send the whole pages (all HTML, all CSS, all JS) and i will control the appearance of the page by JS.

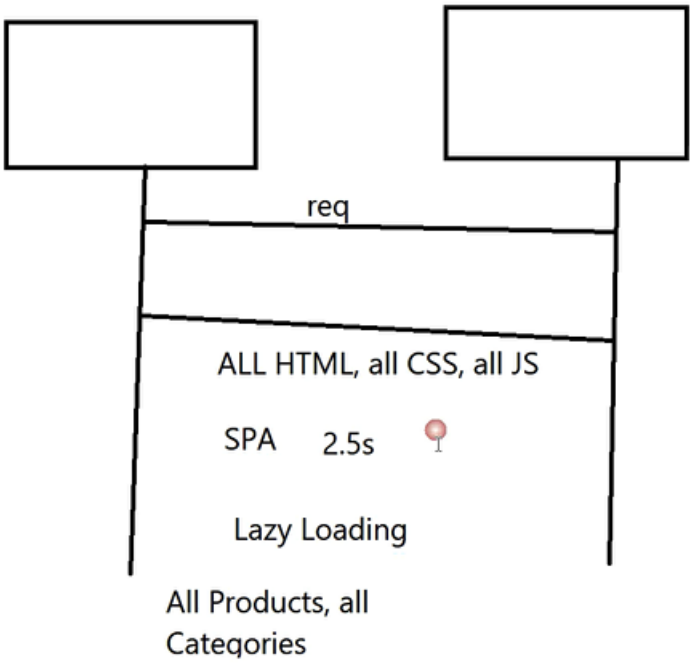

Figure 2: SPA

- The first request will take a long time but the next requests will be faster because i will not load the whole page again and again.
- The Advantages of SPA is the next requests will be faster because i will not load the whole page again and again.
- The Disadvantage of SPA is the first request will take a long time rather than the Traditional Web App.
- so there is a concept that appear to solve this problem called Lazy Loading.

2.3 What is Lazy Loading?

- Lazy Loading is a concept that defers the loading of non-essential resources at page load time.
- Lazy Loading Concept : i will load the page in parts not all the page in the first request.
- for ex (E-Commerce Site) i will load the header and the footer and the main content and the sidebar and the products in the main content and the footer and the sidebar and the products will be loaded in parts.

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3 Modern Websites Use SPA (Single Page Application)

- Modern Websites use SPA (Single Page Application) to make the web site more interactive and responsive and structured.
- like : Facebook, Twitter, Instagram, Google Maps, Gmail, Youtube, Netflix, Amazon, Udemy.
- The Advantages of SPA (Single Page Application) :

  - **Faster**: SPA is faster than Traditional Web App.
  - **Responsive**: SPA is more responsive than Traditional Web App.
  - **Interactive**: SPA is more interactive than Traditional Web App.
  - **Structured**: SPA is more structured than Traditional Web App.

- The Disadvantages of SPA (Single Page Application) :
  - **First Request**: The first request will take a long time.
  - **SEO**: SEO (Search Engine Optimization) is harder in SPA than Traditional Web App.
  - **Security**: Security is harder in SPA than Traditional Web App.

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4 What is React and Comparison Between React and Angular?

React	Angular
Library invented by Facebook	Framework invented by Google
Uses Virtual DOM	Uses Real DOM
One-way data binding	Two-way data binding
JSX (JavaScript XML) for templating	HTML and TypeScript(TS) for templating
Focuses on UI components	Full-fledged MVC framework
Easier to learn	Steeper learning curve
More flexible	More opinionated
Repeated Interactions	Single Interactions

- one-way data binding: is a technique that allows the data to flow in one direction, from the model to the view.
  - Explain : if i change the data in the model it will reflect in the view but if i change the data in the view it will not reflect in the model.
- two-way data binding: is a technique that allows the data to flow in two directions, from the model to the view and from the view to the model.
  - Explain : if i change the data in the model it will reflect in the view and if i change the data in the view it will reflect in the model.
- what is view and model ?
  - **Model**: is the data of the application.
  - **View**: is the UI of the application.s

4.1 Deferent between Library and Framework:

- **Library**: is a collection of functions and classes that you can call to perform specific actions.

- **Framework**: is a collection of libraries and tools that help you to build a web application.
- React => React Project With some Advanced Topics.
  - APIs => by Js ==> Fetch or AJAX (old way)
  - Library => axios, another Libraries
  - Validations ==> regex (old way)
  - Library => yup, joi Libraries
  - React is More Flexible than Angular.
- Framework => Angular Project With some Advanced Topics.
  - APIs => by Angular
  - Angular HttpClient Class
  - Validations => by Angular
  - Angular Forms or validators
- **React** ==> React-Native ==> (framework) ==> Cross-Platform Mobile App

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5 How To Create React Project (CRA, Vite, Next.js)?

- CRA (Create React App) is a tool to create a new React project

Figure 3: RIP CRA

- RIP CRA (Create React App) because it's not supported anymore, Because it's not updated anymore.
- Vite is a tool to create a new React project.
- Next.js is a tool to create a new React project.

5.1 Vite

- Vite is a "tool" to create a new React project.
- Vite is a modern build tool that significantly improves the frontend development experience.
- Vite is a French word that means "Fast or Quick".
- Vite : Support Multiple Frameworks (React, Vue, vanilla JS (Pure Js)).

1. Performance
2. Speed

- Vite has a configuration file called `vite.config.js`.
  - Configurations file is a file that contains the configurations of the project , like the port of the server and the plugins that i will use in the project.
- Vite has a built-in support for Js, JSX , TS, TSX , SCSS (Sass) and i can add more plugins to support more languages.
  - Vite has 2 Modules ==> 1. Rollup 2. Esbuild
  - They are used to bundle the project.
  - Vite uses Rollup in the development mode and Esbuild in the production mode.
- Dev. Server (Development Server) of Vite => has (HMR) Hot Module Replacement.
  - HMR is a feature that updates the browser when the source code changes without reloading the page, and this is better performance.

5.1.1 Rollup and Esbuild Modules

- They Bundled the only part needed
- **Rollup** is a module that is used to bundle the project.
- **Esbuild** is a module that is used to bundle the project.
- **Rollup** is used in the development mode.
- **Esbuild** is used in the production mode.

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6 Main Gate of React (How To Create React Project)?

- **Vite** is a tool to create a new React project.
- open the terminal and write the following command:

```
npm create vite@latest

- write the name of the project (ex: my-react-app)

- choose the framework (React)

- select the variant (Js)

- Change the directory to the project directory (cd my-react-app)

- npm install (to install the dependencies)

- npm run dev (to run the project)
```

6.1 Some Important Terminologies

- **Node.js**: is a JavaScript runtime built on Chrome's V8 JavaScript engine.
- **NPM (Node Package Manager)**: is a package manager for JavaScript programming language.
- **React** : Component Based Architecture
- **Component**: is a reusable piece of code that defines the appearance and behavior of a part of a web page (Page or sub-page) , Component is scalable and reusable.
    - like : Header, Footer, Sidebar, Products, Product, Cart, Checkout, Payment, Profile, Settings, Notifications, Messages, Chat, Friends, Groups, Posts, Comments, Likes, Shares, Follow, Unfollow, Block, Report, Delete, Edit, Save, Cancel, Search, Filter, Sort, Pagination, Load More, Lazy Loading, Infinite Scrolling, Dark Mode, Light Mode, Responsive, Interactive, Structured, "all of these are components".
- Component in react may be a function or a class.
- React in past used to use Class Components because functions was stateless(static) components.
    - stateless components are components that don't have a state, and they are static components.
- Now: React 16.8 => Hooks => Functional Components.
- Functional components are a simple function But MUST:
    1. Start with Capital Letter.
    2. Return Your HTML Code and must be one parent element(until we update this keyword).
- Ex of Functional Component:

```
function Home() {
  let x = 10;
  console.log(x);
  return (
    <div>
      <h1>Home Page</h1>
      <p>Welcome to the Home Page</p>
    </div>
  );
}

# Explanation:

- The function name is Home.

- The function is a simple function.

- The function returns the HTML code.

- The HTML code must be wrapped in a parent element.
```

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7 Folder Structure of React Project

- **vite.config.js**: is a configuration file that contains the configurations of the project.
- **README.md**: is a file that contains the documentation of the project.
- **package.json**: is a file that contains the dependencies of the project and dev dependencies of the project.
    - **Dependencies**: are the libraries that are required to run the project.
    - **Dev Dependencies**: are the libraries that are required to develop the project.
- **.gitignore**: is a file that contains the files and directories that are ignored by Git.
- **.eslintignore**: is a file that contains the files and directories that are ignored by ESLint.
    - **ESLint**: is a tool that is used to find and fix problems in the JavaScript code.
    - **.eslintrc.js**: is a file that contains the configurations of ESLint.
- **index.html**: is a file that contains the HTML code of the project.
- **node_modules**: is a directory that contains the libraries that are required to run the project.
- **public**: is a directory that contains the public files of the project.
- **src**: is a directory that contains the source files of the project.
    - **index.js**: is a file that contains the JavaScript code of the project.
    - **App.js**: is a file that contains the components of the project.
    - **App.css**: is a file that contains the styles of the project.
    - **main.jsx**: is a file that contains the main code of the project.

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8 Discussing The Two JSX files (main.jsx, App.jsx)

- **main.jsx**: is a file that contains the main code of the project.
- **main.jsx** : Is The Main JS File, This is the "Entry Point" of The Project and this is the only file linked to the index.html file.
- **main.jsx**: Map => Link Your main Component with your HTML code.
- **App.jsx**: is a file that contains the components of the project (Parent (Main) Component).

8.1 App.jsx

- i use export with the function to make the function available to other files, so i can import the function in other files.

```
export function App() {
  let x = 30;
  console.log("Hello", x);

  return <h1> Hello React </h1>;
  // This line prove that this is a function component.
}
```

8.2 main.jsx

```
import ReactDom from "react-dom/client";
import { App } from "./App";

// document.querySelector("#root").innerHTML = "<h1>Hello World</h1>";

// 1. React has its own DOM (virtual DOM), you will find the react-dom in
↪  the package.json file (dependencies).
// - React has its own Object => ReactDOM , ReactDOM has a method called
↪  render.

const element = document.querySelector("#root");
const reactRootElement = ReactDom.createRoot(element);
reactRootElement.render(<App />);

// - CreateRoot => Create a new root in the DOM, The main element that
↪  will contain the components.
// it will return a root object.

// - render => Render the component in the root, it means display the
↪  component in the root.

// - <App /> => The component that will be displayed in the root.

// - To Render any Component => you must render it using it's "selector"
↪  (id, class, tag, etc).

// Selector in react => Component name in Empty Tag.
// - <App /> => App Component Name.
```

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9 Creating Our component and Extension for snippets

- To Make a perfect structure .. i will create a new folder called “Components” and i will put all the components in this folder.
- Every component will be a folder that contain the component file and the style file.
  - like : src => Components => Home (folder) => Home.jsx, Home.css

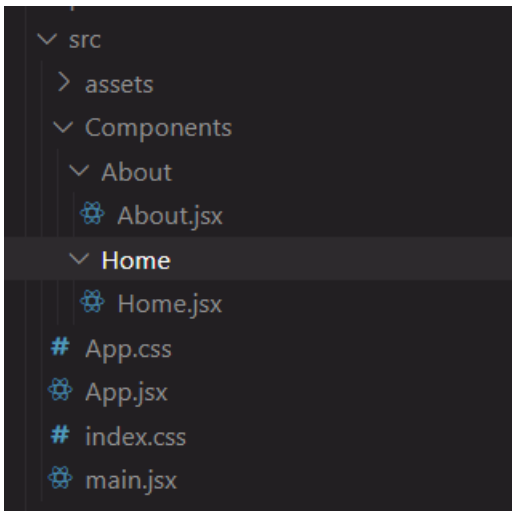

Figure 4: Components Structure

- rfc code snippet => React Functional Component
- rcc code snippet => React Class Component

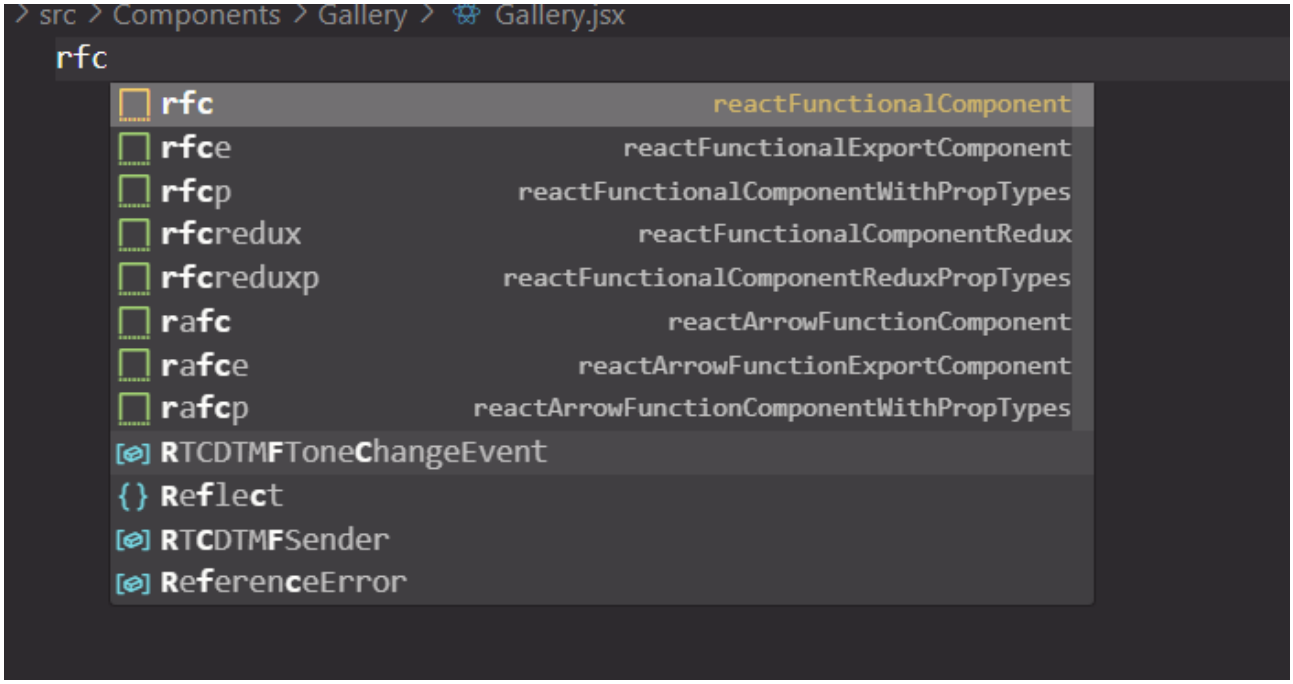

Figure 5: rfc snippet

- The Code will be like this:

```
// import React from "react";

export default function Gallery() {
  return (
    <div>
      <h3>Gallery</h3>
      <p>Welcome to the Gallery</p>
    </div>
  );
```

```
}

// () => to be able to return the HTML code and to write the code with
↪  spaces and new lines without being unreachable code.
```

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10 React Handles SPA (Single Page Application) Concept

- render => it render only one Component.
- Main Component => render only the App Component.
- App Component => render the other Components (it will be the parent component and it has contain (bysheeeel) the entire application).
- so All the Entire Application will be rendered in the App Component.
- if i have a lot of components i will render them in the App Component.

```
//Main Component
import { Home } from "./Components/Home/Home";
import { About } from "./Components/About/About";
import { Gallery } from "./Components/Gallery/Gallery";

// App (Parent) Component
export function App() {
  return (
    <div>
      <Home />
      <About />
      <Gallery />
    </div>
  );
}
```

- Main Component => render only the App Component.

```
import ReactDom from "react-dom/client";
import { App } from "./App";

const element = document.querySelector("#root");
const reactRootElement = ReactDom.createRoot(element);
reactRootElement.render(<App />);
```

- So we made all of this to handle the SPA (Single Page Application) Concept.
- i have only one page (index.html) and i will render the components in this page.
- i select the root element and i render the App Component in this element.

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11 JSX (JavaScript XML)

- JSX is a syntax extension for JavaScript.
- Any Code After return (

```
<h3>Gallery</h3>
<p>Welcome to the Gallery</p>
```

);

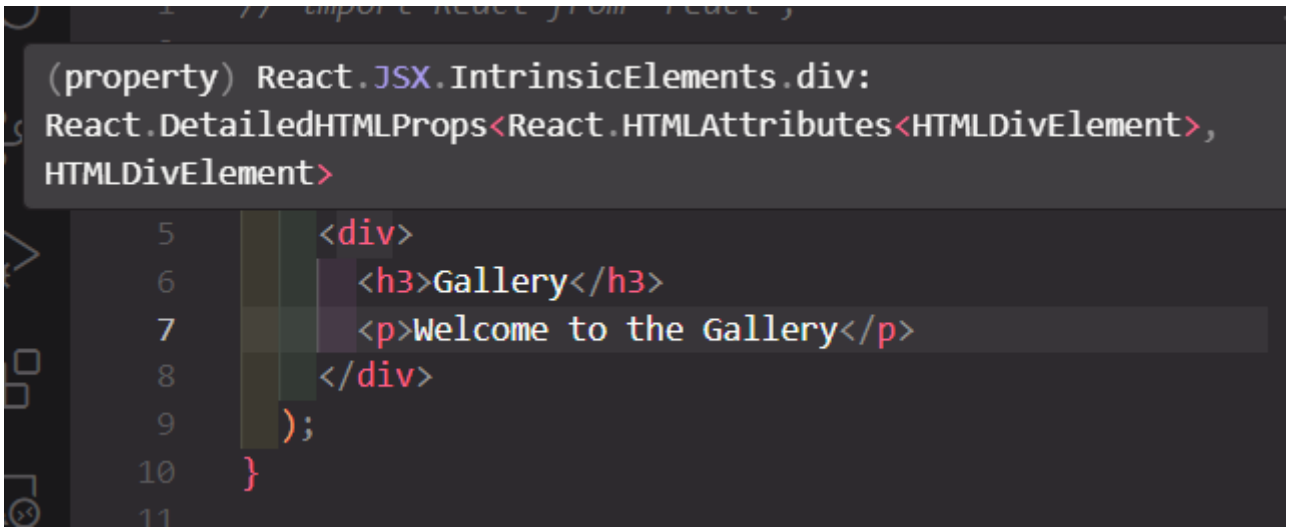

Figure 6: JSX Code

- This code(any code after) isn't an HTML code, it's a JSX code.

```
export default function Gallery() {
  return (
    <div>
      <h3 classNAme="" id="">
        Gallery
      </h3>
      <p>Welcome to the Gallery</p>
    </div>
  );
}

# Class in HTMl => className in JSX
```

- I can't render any Component outside any jsx scope.

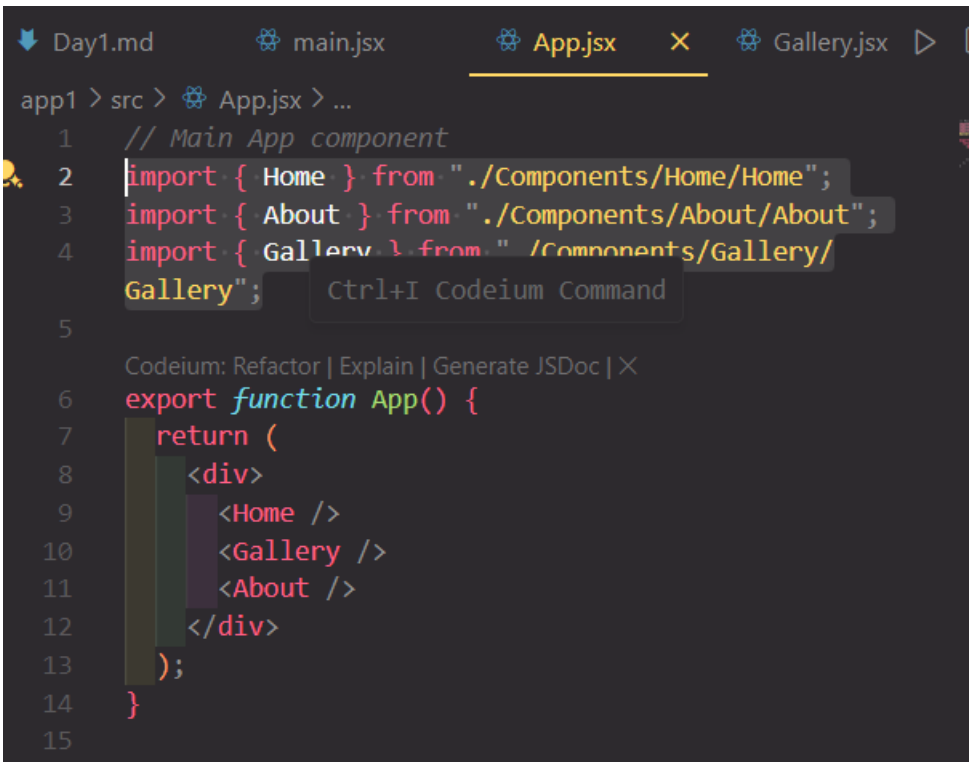

Figure 7: JSX Scope

```
import { Home } from "./Components/Home/Home";
import { About } from "./Components/About/About";
import { Gallery } from "./Components/Gallery/Gallery";

export function App() {
  return (
    <div>
      <Home /> # This is a JSX Element
      </h2> Hello </h2> # This is a JSX Element
      <Gallery />
      <About />
    </div>
  );
}
```

11.1 Import React from "react"

- React is an "Object"
- In This React , There is a <React.Fragment></React.Fragment> that is used to wrap Multi components without any parent element.

```
import React from "react";

export default function Gallery() {
  return (
    <React.Fragment>
      <h3>Gallery</h3>
```

```
      <h3>Gallery</h3>
      <p>Welcome to the Gallery</p>
      <p>Welcome to the Gallery</p>
    </React.Fragment>
  );
}
```

- If You don't want to use React.Fragment you can use the empty tag <> </> to wrap the multi components without any parent element.

```
export default function Gallery() {
  return (
    <>
      <h3>Gallery</h3>
      <h3 className="test">Gallery</h3>
      <p>Welcome to the Gallery</p>
      <p>Welcome to the Gallery</p>
    </>
  );
}
```

11.2 Why i do the file in jsx file ?

- Because i will be able to use the JSX syntax and i will be able to apply the shortcuts and the snippets.
- JSX Class => className

Figure 8: JSX Class

- HTML Class => class

Figure 9: HTML Class

11.3 Modules in React

- Module is the one who convert the JSX code to the HTML code because the browser can't understand the JSX code but it can understand the HTML code.

    - Like :
        1. Rollup
        2. Esbuild

- Not All the attributes are different in JSX and HTML.
    - Like :
        1. class => className
        2. for => htmlFor
            * label for="name" => label htmlFor="name"
        3. tabindex => tabIndex

- if i use the Class instead of className the code will work but i will get a warning in the console by the eslint.
    - because the class is a reserved word in JS.

Figure 10: Warning