

## **React Router DOM**

- React Router (RR) is a library that is used to create routes in your React application.
- React Router is a JavaScript framework that lets us handle client and server-side routing in React applications. It enables the creation of single-page web or mobile apps that allow navigating without refreshing the page. It also allows us to use browser history features while preserving the right application view.
- React router is a client-side routing for react application. It is very easy to understand and use. It is also by far the most popular among react developers.
- React router is a standard library that enables you to navigate between the different pages without reloading your whole page. It keeps the browser URL in sync with UI (data that will be displayed on the web page). It is mainly used for building single-page web applications.
- React Router is powerful and efficient because it has features that allow you to load your code lazily, dynamic route matching, location transition building, route nesting, index routing etc.
- The latest version of React Router is v6.

## **Features of React Router DOM**

- Single Page Apps.
- Dynamic Routing.
- Lazy Loading and Code Splitting.

## **Advantages of React Router DOM**

- Routing between components is fast as the amount of data that renders is less. The rest of the data is rendered by the DOM, and even when there's tons of HTML and CSS to render, the DOM handles that part in the blink of an eye. Using lazy loading, any delay in rendering HTML is compensated for.
- For better user experience, animations and transitions can be easily implemented when switching between different components.
- It gives a real sense of a single-page application in action. No separate pages are rendered, and the current page doesn't refresh to load a new view.

## **"React Router DOM" Packages**

React contains three different packages for routing. These are :-

- "react-router" --> It provides the core routing components and functions for the React Router applications.
- "react-router-native" --> It is used for mobile applications.
- "react-router-dom" --> It is used for web applications design.

## **Difference between v5 and v6**

### **React Router Dom v5**

- Contains <Switch/> Component.
- Contains <History/> and <Redirect/> Component.
- To display Component we have "component" prop in <Route/> Component.
- Large in size.

### **React Router Dom v6**

- Contains <Routes/> Component.
- Contains <Navigate/> Component.
- To display Component we have "element" prop in <Route/> Component.
- Small in size.

## **React Router DOM Environmental Setup**

Pre-requisites / Software / Packages Requirement

- NodeJS
- VSCode
- React App

### **Installation**

Command 1 -- "npm i react-router-dom / yarn add react-router-dom"

Command 2 -- "npm i react-router-dom@latest / yarn add react-router-dom@latest"

Command 3 -- "npm i react-router-dom@6 / yarn add react-router-dom@6"

Command 4 -- "npm i react-router-dom@next / yarn add react-router-dom@next"

### **VSCode Extension**

React Router Snippets -- "NicholasHsiang"

## React Router Useful Concepts to know

### React Router Route Components

- In React Router DOM, there are several routers that are available depending on the environment your app is running in.
- React Router DOM consists the following route component :-

#### a) **BrowserRouter Component**

A `<BrowserRouter>` stores the current location in the browser's address bar using clean URLs and navigates using the browser's built-in history stack.

#### b) **MemoryRouter Component**

A `<MemoryRouter>` stores its locations internally in an array. Unlike `<BrowserHistory>` and `<HashHistory>`, it isn't tied to an external source, like the history stack in a browser. This makes it ideal for scenarios where you need complete control over the history stack, like testing.

#### c) **HashRouter Component**

`<HashRouter>` is for use in web browsers when the URL should not (or cannot) be sent to the server for some reason. This may happen in some shared hosting scenarios where you do not have full control over the server. In these situations, `<HashRouter>` makes it possible to store the current location in the hash portion of the current URL, so it is never sent to the server.

#### d) **NativeRouter Component**

`<NativeRouter>` is the recommended interface for running React Router in a React Native app.

#### e) **StaticRouter Component**

`<StaticRouter>` is used to render a React Router web app in node. Provide the current location via the location prop.

**f) createBrowserRouter() Method**

This is the recommended router for all React Router web projects. It uses the DOM History API to update the URL and manage the history stack.

**g) createMemoryRouter() Method**

Instead of using the browsers history a memory router manages it's own history stack in memory. It's primarily useful for testing and component development tools like Storybook, but can also be used for running React Router in any non-browser environment.

**h) createHashRouter() Method**

This router is useful if you are unable to configure your web server to direct all traffic to your React Router application. Instead of using normal URLs, it will use the hash (#) portion of the URL to manage the "application URL".

## **Navigation Components**

- BrowserRouter
- Routes
- Route
- Link
- Outlet
- Navigate

## **React Router Hooks**

- useParams()
- useLocation()
- useNavigate()

## **React Router DOM**

### **Installation**

Command 1 -- "npm i react-router-dom / yarn add react-router-dom"

Command 2 -- "npm i react-router-dom@latest / yarn add react-router-dom@latest"

Command 3 -- "npm i react-router-dom@6 / yarn add react-router-dom@6"

Command 4 -- "npm i react-router-dom@next / yarn add react-router-dom@next"

Or you can use

```
npm install react-router-dom
```

### **VSCode Extension**

React Router Snippets -- "NicholasHsiang"

## Example

### App.js

```
import {BrowserRouter, Routes, Route} from 'react-router-dom';
const App = () => {
  return (
    <BrowserRouter>
      <Routes>
        <Route path="/" element={<div>First Page</div>}> </Route>
      </Routes>
    </BrowserRouter>
  );
};
export default App;
```

## Example

### App.js

```
import {BrowserRouter, Routes, Route} from 'react-router-dom';
const App = () => {
  return (
    <BrowserRouter>
      <Routes>
        <Route path="/" element={<div>First Page</div>}> </Route>
        <Route path="/test" element={<div>Test Page</div>}> </Route>
        <Route path="guide" element={<div> Not necessary to use '/' while
defining path</div>}> </Route>
      </Routes>
    </BrowserRouter>
  );
};
export default App;
```



## Example : working with page components

### App.js

```
import {BrowserRouter, Routes, Route} from 'react-router-dom';
import HomePage from './HomePage';
import AboutPage from './AboutPage';
import ContactPage from './ContactPage';

const App = () => {
  return (
    <BrowserRouter>
      <Routes>
        <Route path="/" element={<HomePage />}></Route>
        <Route path="/about" element={<AboutPage />}></Route>
        <Route path="/contact" element={<ContactPage />}></Route>
      </Routes>
    </BrowserRouter>
  );
};

export default App;
```

### HomePage.js

```
import React from 'react'

function HomePage() {
  return (
    <div>
      HomePage
    </div>
  )
}

export default HomePage
```

### AboutPage.js

```
import React from 'react'

function AboutPage() {
  return (
    <div>
      About us page
    </div>
  )
}

export default AboutPage
```

### ContactPage.js

```
import React from 'react'

function ContactPage() {
  return (
    <div>
      Contact us page
    </div>
  )
}

export default ContactPage
```

## Link Component

### HomePage.js (simple UI)

```
import React from 'react'
function HomePage() {
  return (
    <>
      <nav>
        <ul>
          <li>homepage</li>
          <li>aboutus</li>
          <li>contactus</li>
        </ul>
      </nav>
    </>
  )
}

export default HomePage
```

### Creating links for routes using <Link/> component

- When we use a simple "<a href='\"abc.com\"'>Some Link</a>" for navigating it leads to refreshing of the webpage. To avoid this React Router provides a <Link> element.
- A <Link> is an element that lets the user navigate to another page by clicking or tapping on it.
- It has a prop "to" where we provide the path to which it should navigate.
- We are having a few navigation links, which are defined using the Link component. The 'to' property will determine the URL to which the user needs to be navigated.

To create link, we need to use Link from react-router-dom

### HomePage.js

```
import React from 'react'
import { Link } from 'react-router-dom'

function HomePage() {
  return (
    <>
      <nav>
        <ul>
          <li><Link to="/">homepage</Link> </li>
          <li><Link to="/about">aboutus</Link> </li>
          <li><Link to="/contact">contactus</Link> </li>
        </ul>
      </nav>
    </>
  )
}

export default HomePage
```

## Example : Single Page Application

### App.js

```
import {BrowserRouter, Routes, Route} from 'react-router-dom';
import HomePage from './HomePage';
import AboutPage from './AboutPage';
import ContactPage from './ContactPage';
const App = () => {
  return (
    <BrowserRouter>
      <Routes>
        <Route path="/" element={<HomePage />}> </Route>
        <Route path="/about" element={<AboutPage />}> </Route>
        <Route path="/contact" element={<ContactPage />}> </Route>
      </Routes>
    </BrowserRouter>
  );
};

export default App;
```

### HomePage.js

```
import React from 'react'
import { Link } from 'react-router-dom'

function HomePage() {
  return (
    <>
      <header>
        <nav>
          <ul>
            <li> <Link to="/"> homepage </Link> </li>
            <li> <Link to="/about"> aboutus </Link> </li>
            <li> <Link to="/contact"> contactus </Link> </li>
          </ul>
        </nav>
      </header>
    </>
  )
}
```

```

    <section>
      <p>Here is the homepage</p>
    </section>
  </>
)
}

```

```
export default HomePage
```

### AboutPage.js

```

import React from 'react'
import { Link } from 'react-router-dom'

function AboutPage() {
  return (
    <>
      <header>
        <nav>
          <ul>
            <li><Link to="/">homepage</Link> </li>
            <li><Link to="/about">aboutus</Link> </li>
            <li><Link to="/contact">contactus</Link> </li>
          </ul>
        </nav>
      </header>
      <section>
        <p>Here is the about-us page</p>
      </section>
    </>
  )
}

```

```
export default AboutPage
```

## ContactPage.js

```
import React from 'react'
import { Link } from 'react-router-dom'

function ContactPage() {
  return (
    <>
    <header>
      <nav>
        <ul>
          <li> <Link to="/">homepage</Link> </li>
          <li> <Link to="/about">aboutus</Link> </li>
          <li> <Link to="/contact">contactus</Link> </li>
        </ul>
      </nav>
    </header>
    <section>
      <p>Here is the contact-us page</p>
    </section>
    </>
  )
}

export default ContactPage
```

## Example : Passing Data through Links

### App.js

```
import {BrowserRouter, Routes, Route} from 'react-router-dom';
import HomePage from './HomePage';
import AboutPage from './AboutPage';
import ContactPage from './ContactPage';
import './App.css';

const App = () => {
  return (
    <BrowserRouter>
      <Routes>
        <Route path="/" element={<HomePage />}> </Route>
        <Route path="/about" element={<AboutPage />}> </Route>
        <Route path="/contact" element={<ContactPage />}> </Route>
      </Routes>
    </BrowserRouter>
  );
};

export default App;
```

### App.css

```
.menu a{
  color: gray;
  margin-left: 15px;
  text-decoration: none;
}

.menu a:hover {
  color: red;
  font-size: 20px;
}
```



### NavBar.js

```
import React from 'react';
import { Link } from 'react-router-dom';
import './App.css';

const NavBar = () => {
  return (
    <>
    <div className="menu">
    <ul>
      <li><Link to="/">homepage</Link> </li>
      <li><Link to="/about" state={{name:"Learn 2 Earn
Labs",email:"learn2earnlabs@gmail.com"}}>Aboutus</Link> </li>
      <li><Link to="/contact">contactus</Link> </li>
    </ul>
    </div>
    </>
  );
}
export default NavBar;
```

### HomePage.js

```
import React from 'react'
import NavBar from './NavBar'

function HomePage() {
  return (
    <>
    <NavBar/>
    <section>
      <p>Here is the homepage</p>
    </section>
    </>
  )
}
export default HomePage
```

### AboutPage.js

```
import React from 'react'
import { useLocation } from "react-router-dom"
import NavBar from './NavBar'

function AboutPage() {
  const { state } = useLocation()
  return (
    <>
      <NavBar/>
      <section>
        <div>
          <h1>About</h1>
          <p>Hello {state?.name} </p>
          <p>your email is {state?.email}</p>
        </div>
      </section>
    </>
  )
}
export default AboutPage
```

### ContactPage.js

```
import React from 'react'
import NavBar from './NavBar'

function ContactPage() {
  return (
    <>
      <NavBar/>
      <section>
        <p>Here is the contact-us page</p>
      </section>
    </>
  )
}
export default ContactPage
```

## NavLink Component

- `<Link>` and `<NavLink>` are very similar and the only difference is that `NavLink` knows whether or not it is active.
- This is useful when you want to apply a style to the link which is active.

### Example

#### App.js

```
import {BrowserRouter, Routes, Route} from 'react-router-dom';
import HomePage from './HomePage';
import AboutPage from './AboutPage';
import ContactPage from './ContactPage';
import './App.css';

const App = () => {
  return (
    <BrowserRouter>
      <Routes>
        <Route path="/" element={<HomePage />} ></Route>
        <Route path="/about" element={<AboutPage />} ></Route>
        <Route path="/contact" element={<ContactPage />} ></Route>
      </Routes>
    </BrowserRouter>
  );
};

export default App;
```

#### App.css

```
.active{
  color:red;
  font-size: 20px;
}
```

## HomePage.js

```
import React from 'react'
import { NavLink } from 'react-router-dom'

function HomePage() {
  return (
    <>
    <header>
      <nav>
        <ul>
          <li> <NavLink to="/"
style={{textDecoration:'none'}}>homepage </NavLink> </li>
          <li> <NavLink to="/about"
style={{textDecoration:'none'}}>aboutus </NavLink> </li>
          <li> <NavLink to="/contact"
style={{textDecoration:'none'}}>contactus </NavLink> </li>
        </ul>
      </nav>
    </header>
    <section>
      <p>Here is the homepage</p>
    </section>
  </>
)
}

export default HomePage
```

## AboutPage.js

```
import React from 'react'
import { NavLink } from 'react-router-dom'

function AboutPage() {
  return (
    <>
    <header>
```

```

    <nav>
      <ul>
        <li> <NavLink to="/"
style={{textDecoration:'none'}}>homepage</NavLink> </li>
        <li> <NavLink to="/about"
style={{textDecoration:'none'}}>aboutus</NavLink> </li>
        <li> <NavLink to="/contact"
style={{textDecoration:'none'}}>contactus</NavLink> </li>
      </ul>
    </nav>
  </header>
  <section>
    <p>Here is the about-us page</p>
  </section>
</>
)
}

```

export default AboutPage

### ContactPage.js

```

import React from 'react'
import {NavLink } from 'react-router-dom'

function ContactPage() {
  return (
    <>
      <header>
        <nav>
          <ul>
            <li> <NavLink to="/"
style={{textDecoration:'none'}}>homepage</NavLink> </li>
            <li> <NavLink to="/about"
style={{textDecoration:'none'}}>aboutus</NavLink> </li>

```

```
        <li> <NavLink to="/contact"
style={{textDecoration:'none'}}>contactus</NavLink> </li>
    </ul>
</nav>
</header>
<section>
    <p>Here is the contact-us page</p>
</section>
</>
)
}
```

```
export default ContactPage
```

## Example : Reusable Component

### App.js

```
import {BrowserRouter, Routes, Route} from 'react-router-dom';
import HomePage from './HomePage';
import AboutPage from './AboutPage';
import ContactPage from './ContactPage';
import './App.css';

const App = () => {
  return (
    <BrowserRouter>
      <Routes>
        <Route path="/" element={<HomePage />}> </Route>
        <Route path="/about" element={<AboutPage />}> </Route>
        <Route path="/contact" element={<ContactPage />}> </Route>
      </Routes>
    </BrowserRouter>
  );
};

export default App;
```

### App.css

```
.active{
  color:red;
  font-size: 20px;
}
```

### HomePage.js

```
import React from 'react'
import Header from './component/Header'

function HomePage() {
  return (
    <>
      <Header/>
      <section>
        <p>Here is the homepage</p>
      </section>
    </>
  )
}

export default HomePage
```

### ContactPage.js

```
import React from 'react'
import Header from './component/Header'

function ContactPage() {
  return (
    <>
      <Header />
      <section>
        <p>Here is the contact-us page again</p>
      </section>
    </>
  )
}

export default ContactPage
```



### AboutPage.js

```
import React from 'react'
import Header from './component/Header'
function AboutPage() {
  return (
    <>
    <Header/>
    <section>
      <p>Here is the about-us page</p>
    </section>
    </>
  )
}

export default AboutPage
```

### Header.js

```
import { NavLink } from "react-router-dom";
function Header(){
  return(
    <>
    <nav>
    <ul>
      <li><NavLink to="/"
style={{textDecoration:'none'}}>homepage</NavLink> </li>
      <li><NavLink to="/about"
style={{textDecoration:'none'}}>aboutus</NavLink> </li>
      <li><NavLink to="/contact"
style={{textDecoration:'none'}}>contactus</NavLink> </li>
    </ul>
    </nav>
    </>
  )
}

export default Header
```

## Error Page

- The Error Page is very useful in order to display a fallback content / message, if the any of the route won't match.
- If you want to display an error page or 404 page when the path does not match with any of the routes then you can define a route with path as \*.

### Example

#### App.js

```
import {BrowserRouter, Routes, Route} from 'react-router-dom';
import HomePage from './HomePage';
import AboutPage from './AboutPage';
import ContactPage from './ContactPage';
import ErrorPage from './ErrorPage';
import './App.css';

const App = () => {
  return (
    <BrowserRouter>
      <Routes>
        <Route path="/" element={<HomePage />}> </Route>
        <Route path="/about" element={<AboutPage />}> </Route>
        <Route path="/contact" element={<ContactPage />}> </Route>
        <Route path="*" element={<ErrorPage />}> </Route>
      </Routes>
    </BrowserRouter>
  );
};

export default App;
```

## ErrorPage.js

```
import React from 'react'
import {NavLink } from 'react-router-dom'
import Header from './component/Header'

function ErrorPage() {
  return (
    <>
    <Header />
    <section>
      <p>Error 404 : Forbidden</p>
    </section>
    </>
  )
}

export default ErrorPage
```

## Example

### App.js

```
import React from 'react';
import {BrowserRouter, Routes, Route} from 'react-router-dom';
import NavBar from './NavBar';
import HomePage from './pages/HomePage';
import AboutPage from './pages/AboutPage';
import ContactPage from './pages/ContactPage';
import ErrorPage from './pages/ErrorPage';
const App = () => {
  return (
    <BrowserRouter>
      <div>
        <NavBar />
        <Routes>
          <Route path="/" element={<HomePage />}> </Route>
          <Route path="/about" element={<AboutPage />}> </Route>
          <Route path="/contact" element={<ContactPage />}> </Route>
          <Route path="*" element={<ErrorPage />}> </Route>
        </Routes>
      </div>
    </BrowserRouter>
  );
};
export default App;
```

### ErrorPage.js

```
import React from 'react'
function ErrorPage() {
  return (
    <div>
      <h1>Error 404 Forbidden </h1>
    </div>
  )
}
export default ErrorPage
```

### HomePage.js

```
import React from 'react'
function HomePage() {
  return (
    <div>
      <h1>Homepage </h1>
    </div>
  )
}
export default HomePage
```

### AboutPage.js

```
import React from 'react'
function AboutPage() {
  return (
    <div>
      <h1>About page </h1>
    </div>
  )
}
export default AboutPage
```

### ContactPage.js

```
import React from 'react'
function ContactPage() {
  return (
    <div>
      <h1>contact us </h1>
    </div>
  )
}
export default ContactPage
```

## NavBar.js

```
import React from 'react';
import { Link } from 'react-router-dom';
import './App.css';

const NavBar = () => {
  return (
    <div className="navbar">
      <div className="logo">
        <img src={process.env.PUBLIC_URL + '/test.jpg'} alt="Logo!!" />
        React Solutions
      </div>
      <div className="menu">
        <Link to="/">Home</Link>
        <Link to="/about">About</Link>
        <Link to="/contact">Contact</Link>
      </div>
    </div>
  );
};

export default NavBar;
```

## App.css

```
/* src/App.css */
.navbar {
  display: flex;
  justify-content: space-between;
  align-items: center;
  padding: 10px;
  background-color: #333;
  color: white;
  text-decoration: none;
}

.logo {
  font-size: 1.5rem;
}

.logo img {
  max-width: 40px; /* Adjust the maximum width as needed */
}

.menu a{
  color: white;
  margin-left: 15px;
  text-decoration: none;
}

.menu a:hover {
  color: red;
}
```