

Theory assignment

Question 1: What is React Router? How does it handle routing in single-page applications?

Answer : 1. Client-Side Routing with History API

React Router uses components like `<BrowserRouter>`, `<Routes>`, and `<Route>` to map URL paths to React components. When the URL changes (via clicks on `<Link>` or programmatic methods), React Router:

- Updates the browser's address bar without reloading.
 - Renders the matching React component within the SPA container [geeksforgeeks.org](https://www.geeksforgeeks.org).
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2. Navigation via `<Link>` and Programmatic APIs

- `<Link>` replaces `<a>` tags to trigger client-side navigations.
 - Hooks like `useNavigate()` (or older `useHistory()` / `history.push`) allow redirections in response to events (e.g., button clicks after login) .
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3. Static vs Dynamic vs Nested Routes

- **Static Routes:** Fixed paths, e.g. `<Route path="/about" element={<About/>}/>`.
 - **Dynamic Routes** store parameters in URLs (e.g. `<Route path="/product/:id" .../>`) which can be accessed via `useParams()` blog.seancoughlin.me+8medium.com+8reddit.com+8.
 - **Nested Routes** render child components within parent ones using `<Outlet>`, enabling hierarchical layouts like `dashboard/profile/settings` medium.com.
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4. Declarative Routing

Routes are declared in JSX, eliminating manual event listeners or URL checks. Components like `<Routes>` and `<Route>` make it clear which component responds to which path .

5. No Full Page Reload – Still a SPA

All your JS, CSS and initial HTML bundle is loaded once. React Router swaps components based on client-side navigation, so the user stays on **one HTML page**, but sees different views—classic SPA behavior

blog.seancoughlin.me+6reddit.com+6medium.com+6.

Summary Table

Concept	Description
React Router	Library for client-side routing in React SPAs en.wikipedia.org+3geeksforgeeks.org+3medium.com+3
BrowserRouter	Top-level component enabling History API usage
Routes & Route	Map path → component declaratively
Link / NavLink	Navigate without refresh
useNavigate / history	Navigate programmatically
Dynamic & Nested Routes	Handle URL params and hierarchical layouts
SPA Loading	All code served once; transitions handled client-side

In a nutshell, React Router transforms a single-page React app into a multi-view experience, managing path-based component rendering seamlessly in the

browser—all without full page reloads. Let me know if you'd like code samples or examples of more advanced features!

Question 2: Explain the difference between BrowserRouter, Route, Link, and Switch components in React Router?

- Answer : Wraps your application to enable **client-side routing** via the HTML5 History API.
 - Manages the URL changes (pushState, replaceState) without full page reloads [medium.com+6geeksforgeeks.org+6stackoverflow.com+6](#).
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Route

- Defines a **mapping from a URL path to a React component**.
- Example:

jsx

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```
<Route path="/about" element={<About />} />
```

Renders the <About /> component when the path matches /about
[reddit.com+2geeksforgeeks.org+2syncfusion.com+2](#).

Link

- A replacement for <a> tags to enable **client-side navigation** without reloading the page.
- Use the to prop to specify the target path:

jsx

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<Link to="/profile">Profile</Link>

Keeps things fast and SPA-like [geeksforgeeks.org](https://www.geeksforgeeks.org).

Switch (React Router v5) / Routes (v6)

- **Switch** (v5): Renders only the **first matching** <Route> among its children, preventing multiple matches
[geeksforgeeks.org+7stackoverflow.com+7syncfusion.com+7](https://www.geeksforgeeks.org/react-router-switch-vs-routes/).
 - **Routes** (v6): The updated version of Switch, with enhanced matching logic and new API [reddit.com+1stackoverflow.com+1](https://www.reddit.com/r/reactjs/comments/10j0k0l/react_router_v6_is_here/).
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Component Roles at a Glance

Component	Purpose
BrowserRouter	Top-level router; enables History API and client-side URL handling
Route	Maps URL path to a specific React component
Link	Provides declarative navigation without full page reloads
Switch / Routes	Ensures only one Route is rendered at a time

Quick Example (v5 syntax)

jsx

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```
import { BrowserRouter, Switch, Route, Link } from 'react-router-dom';
```

```
function App() {  
  return (  
    <BrowserRouter>  
      <nav>  
        <Link to="/">Home</Link>  
        <Link to="/about">About</Link>  
      </nav>  
      <Switch>  
        <Route exact path="/" component={Home}/>  
        <Route path="/about" component={About}/>  
      </Switch>  
    </BrowserRouter>  
  );  
}
```

- <Link> handles navigation,
- <BrowserRouter> manages the history,
- <Switch> picks the first match,
- <Route> renders the corresponding component.

In React Router v6, use <Routes> instead of <Switch>, and pass components via the element prop instead of component.