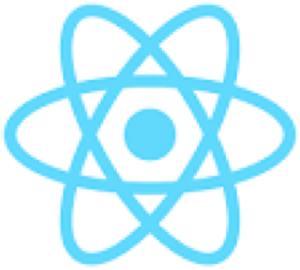


Navigation

(Continued - See Archive from week 5 for code samples.)

Alternative <Route> API.

- **To-date:** *<Route path={…URL path…} component={ ComponentX} />*
- **Disadv.: We cannot pass props to the component.**
- **Alternative:**

  <Route path={…URL path…} render={…function….}>

  – **where** *function* **return a component.**

- **EX.: See** /src/sample5/**.**

  Objective: Pass usage data to the <Stats> **component from** sample4**..**

```
<Route path={`/inbox/:userId/statistics`} component={Stats} />
```

Alternative <Route> API.

```
<Route
  path={`/inbox/:id/statistics`}
  render={ (props) => {
    return <Stats {...props} usage={[5.4, 9.2]} />;
  }}
/>
```

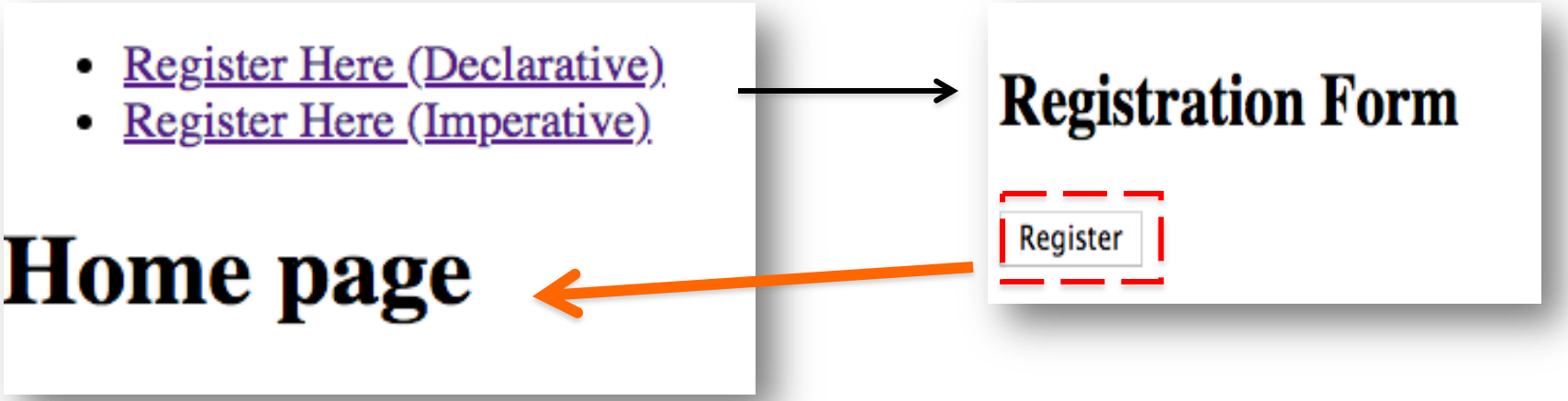
- **The** <Route> **component's own** props **object is the default parameter for the render function.**

```
const Stats = (props) => {
  return (
    <>
      <h3>Statistical data for user: {props.match.params.id}</h3>
      <h4>Emails sent (per day) = {props.usage[0]} </h4>
      <h4>Emails received (per day) = {props.usage[1]} </h4>
    </>
  );
};
```

Programmatic Navigation.

- **Performing navigation in JavaScript.**
- **Two options:**
  1. **Declarative – requires state; use** <Redirect />.
  2. **Imperative – requires** withRouter**() ; use** this,props.history

- **EX.: See** /src/sample7/**.**



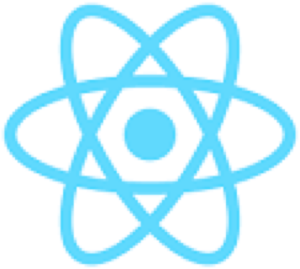
Summary

- **React Router (version 4) adheres to React principles:**
  - **Declarative.**
  - **Component composition.**
  - **The event → state change → re-render**

- **Main components - <BrowserRouter>, <Route>, <Redirect>, <Link>**

- **The** withRouter() **higher order component.**

- **Additional props:**
  - **props.match.params**
  - **props.history**
  - **props.location**



Design Patterns

(Continued)

Reusability.

- **Techniques to make cods reusable:**
  1. **Inheritance**
  2. **Composition**

- **React favors composition.**
- **Core React composition Patterns:**
  1. **Containers**
  2. **Render Props**
  3. **Higher Order Components.**

The Render Props pattern

- **Use the pattern to share logic between components.**
- **Dfn**.: "a component with a render prop takes a function that returns a React element and calls it instead of implementing its own render logic."

```
const SharedComponent = () => {
  return (
    <div className='classX'>
      {this.props.render()}
    </div>
  )
};
const SayHello = () => {
  return (
    <SharedComponent render={() => (
      <span>hello!</span>
    )} />
  )
}
```

```
<div className='classX'>
    <span>hello!</span>
</div>
```

- SharedCoomponent **receives its render logic from the consumer, i.e.** SayHello.
- Prop name is arbitrary.

The Render Props - Sample App.

- **A React app for viewing blog posts.**
  - **Suppose its views include:**
    1. **A view to display a post text followed by related comments.**
    2. **A view to display a post text followed by links to related / matching posts.**

Without Render Props pattern

```
const CommentList = (props) => {
  return (
    <div className='classX'>
      . . . map over comments array
    </div>
  )
};

const BlogPostAndComments = (props) => {
  . . . hooks and other logic . . .
  return (
    <>
      <TextBlock text={...} />
      <CommentList  />
    </>
  )
}
const BlogPostAndMatches = (props) => {
  . . . hooks and other logic . . .
  return (
    <>
      <TextBlock text={...} />
      <BlogMatches />
    </>
  )
}
```

Violates the DRY principle

With Render Props pattern

```
const BlogPost = (props) => {
  . . . hooks and other logic . . .
  return (
    <>
      <TextBlock text={} />
      {this.props.render()}
    </>
  )
}

const BlogPostAndComments = (props) => {
  return (
    <>
      <BlogPost
        render={() => <CommentList /> } />
    </>
  )
}

const BlogPostAndMatches = (props) => {
  return (
    <>
      <BlogPost
        render={() => <PostMatches /> } />
    </>
  )
}
```

BlogPost told what to render after the blog text

The Render Props pattern

- Render prop function can be parameterized

```
const SharedComponent = (props) => {
  . . . get person data from API . . .
  return (
    <div className='classX'>
      {this.props.render(person.name)}
  </div>
  )
};
const SayHello = (props) => {
  return (
    <SharedComponent render={(name) => (
    <span>hello! {name}</span>
    )} />
  )
}
```

- SharedCoomponent **generates the parameters required by the render prop function.**

Reusability.

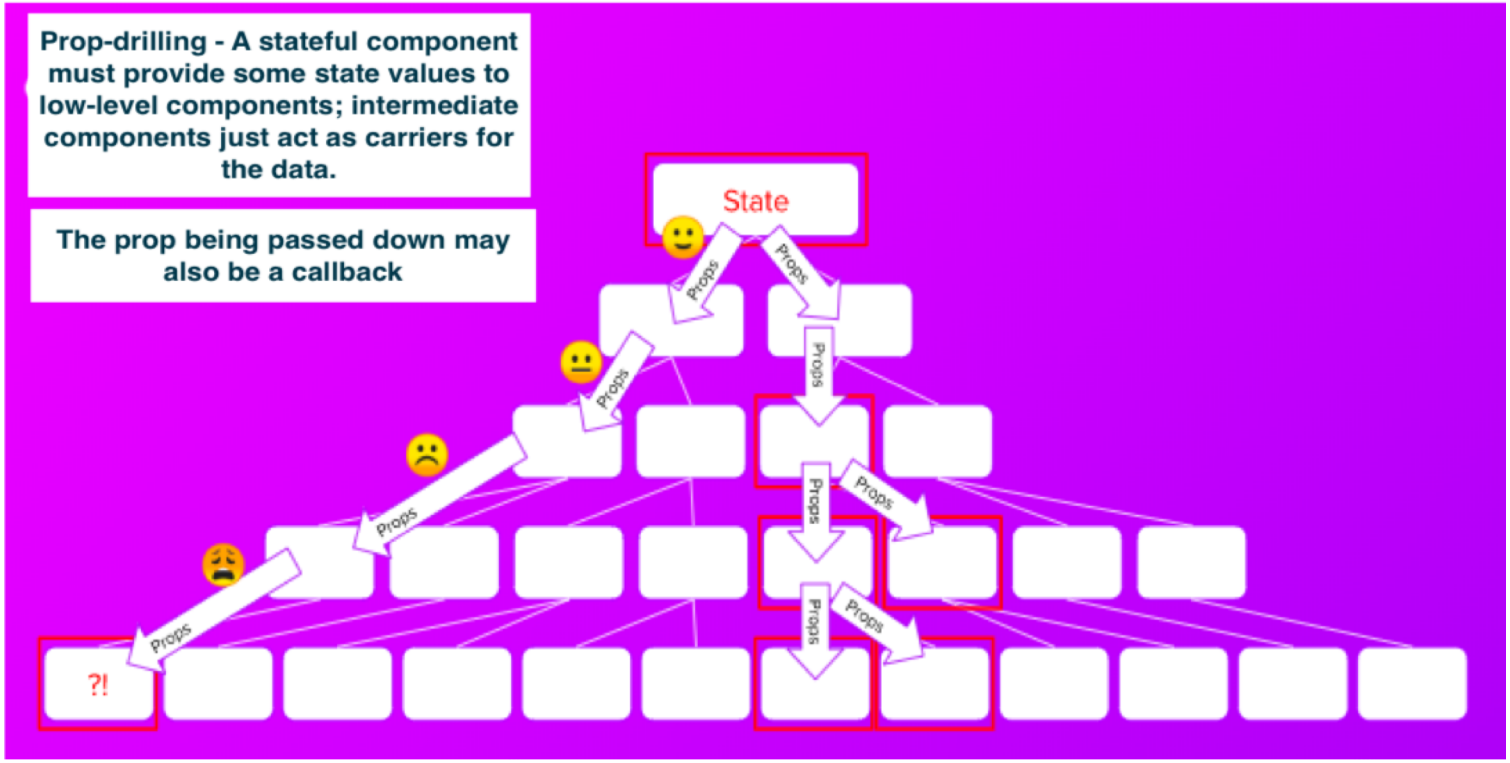
- **Core React composition Patterns:**
  1. **Containers**
  2. **Render Props**
  3. **Higher Order Components.**

- **HOC is a function that takes a component and returns an enhanced version of it.**
  - **Enhancements include:**
    - **Statefulness**
    - **Props**
    - **UI**
- **Ex –** withRouter **function.**

The Provider pattern

The Provider pattern – When?

- **Use the pattern for:**
  - **Sharing global state, e.g. Web API data.**
  - **To avoid prop-drilling.**

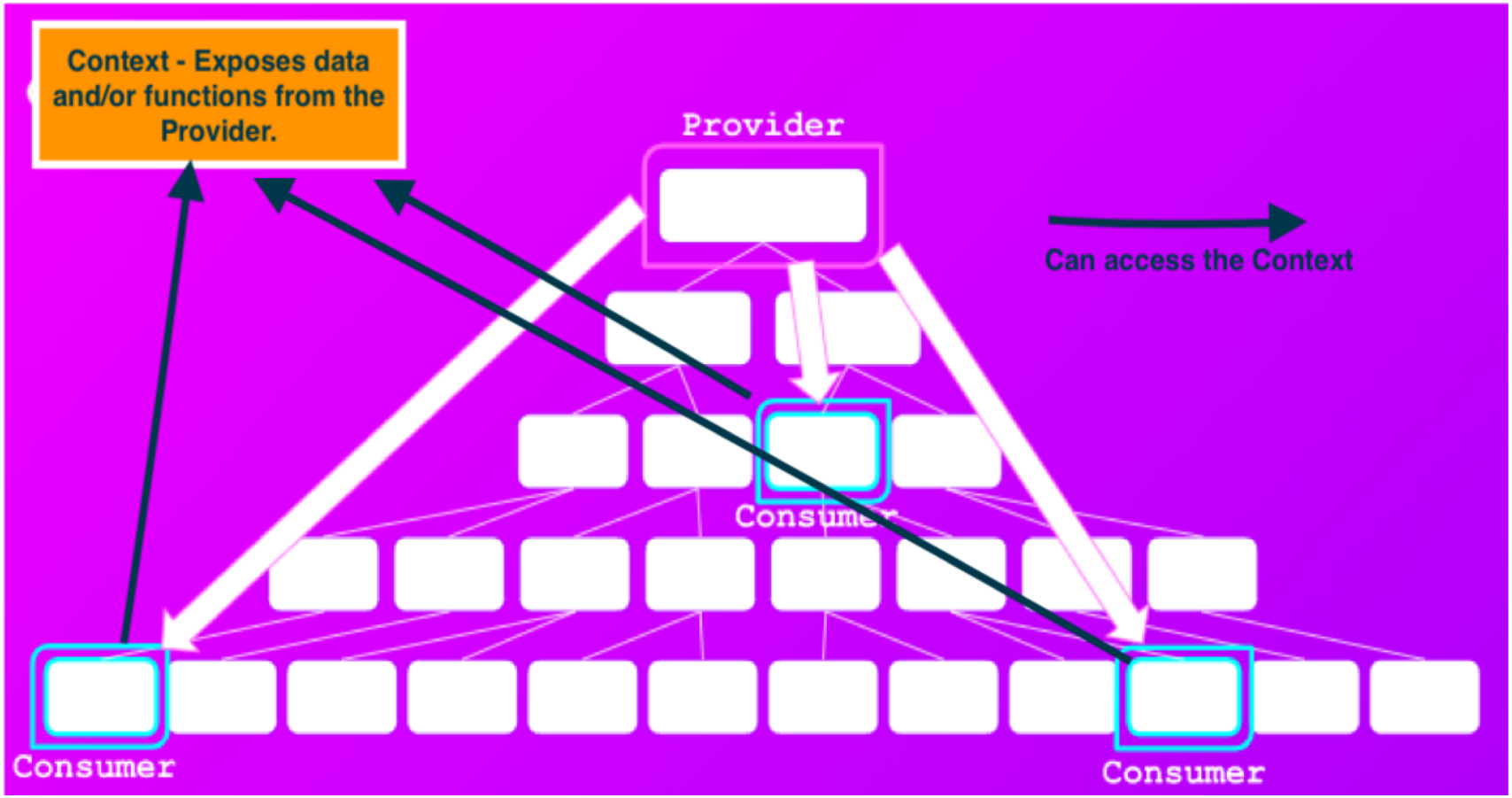


The Provider pattern – How?

- **React Implementation steps:**
  1. **Declare a component for managing global state – the Provider component.**
  2. **Make the state accessible by other components.**
     - **Using a** Context **in React.**
  3. **Use component composition to integrate the Provider with consumer components.**
  4. **Consumer uses** useContext **hook to access Provider's** Context**.**

- **A** Context **provides a way to pass data through the component tree without having to pass props down manually at every level.**

The Provider pattern – React Contexts.



The Provider pattern – Implementation

- **Declare the Provider component:**

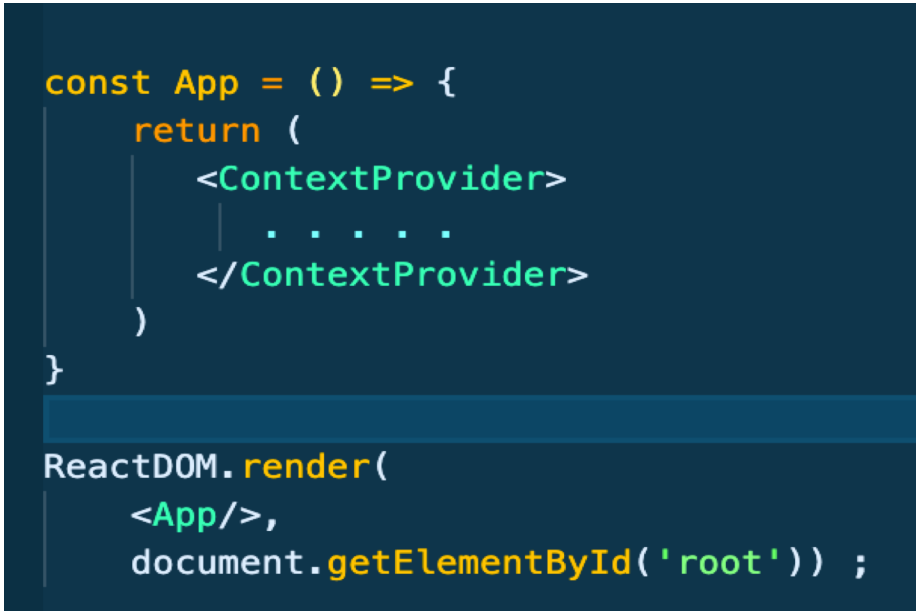
```
export const SomeContext = React.createContext(null)

const ContextProvider = props => {
  . . . Use useState and useEffect hooks to
  . . . initialize global state variables
  return (
    <SomeContext.Provider
          value={{ key1: value1,. . . . }} >
      {props.children}
    </SomeContext.Provider>
  );
};
export default ContextProvider
```

- **We associate the** Context **with the** Provider **component using** <contextName.Provider>.
- **The** values object **declare what is accessible by consumer.**
  - **Functions as well as state data can be values.**

The Provider pattern – Implementation.

- **Integrate (Compose) the Provider with the rest of the app**



```
const App = () => {
    return (
        <ContextProvider>
            . . . . .
        </ContextProvider>
    )
}

ReactDOM.render(
    <App/>,
    document.getElementById('root')) ;
```

- **The Provider's children will now be able to access the shared context.**

The Provider pattern – Implementation.

- **The Consumer accesses the context with** useContext **hook.**

```
import React, { useContext } from "react";
import {SomeContext} from '......'

const ConsumerComponent = props => {
  const context = useContext(SomeContext);

  . . . access context values with 'context.keyX'

};
```

- **The context keys match those of the** values **object exposed by the Provider component.**

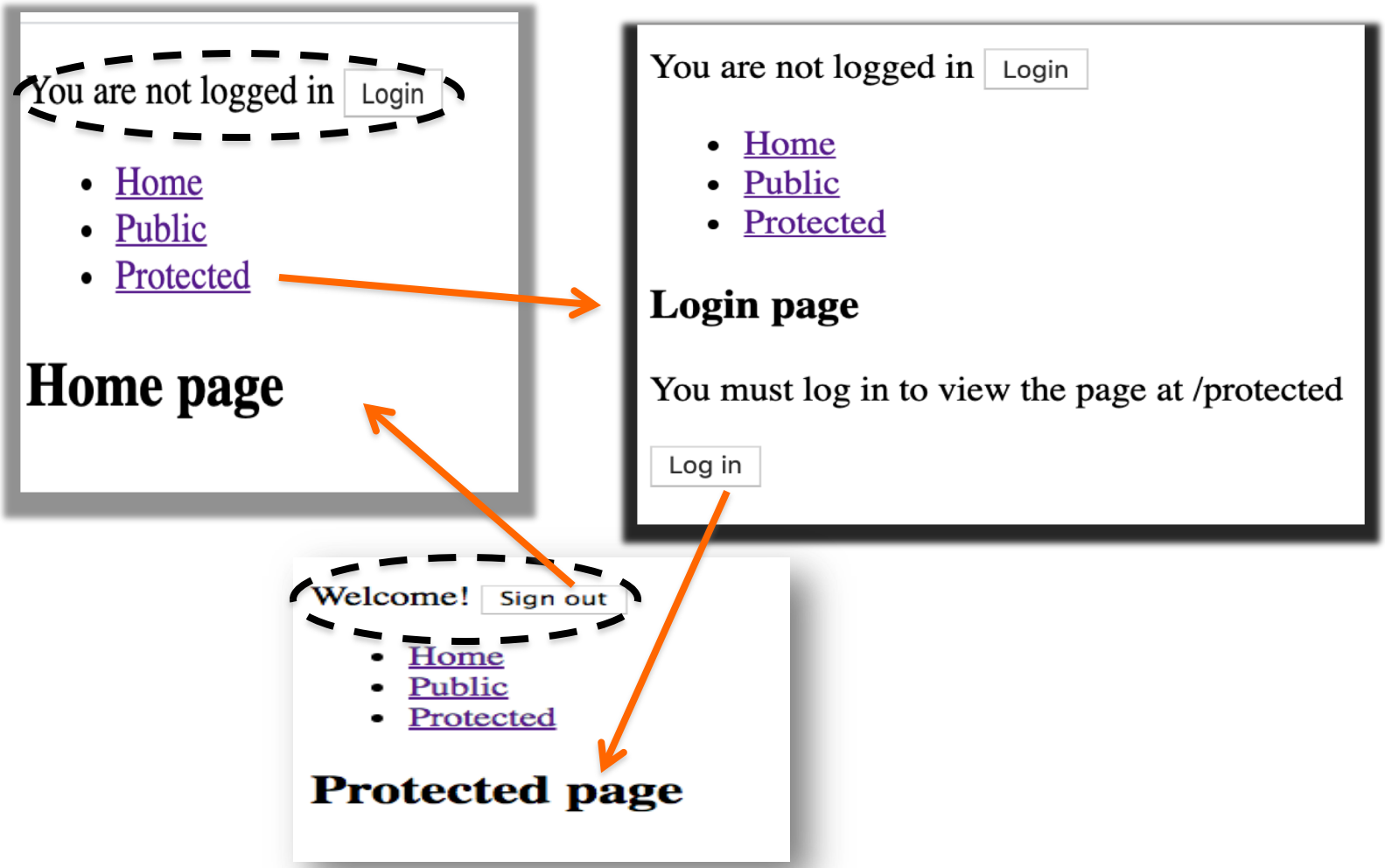
The Provider pattern.

- **When not to use Contexts:**
  1. **Don't use Context to avoid drilling props down just one or two layers. Prop drilling is faster for a couple of layers.**
  2. **Avoid using Context to save state that should be kept locally, e.g. web form inputs should be in local state.**
  3. **If you pass an object as your context value, monitor performance and refactor as necessary.**

Authentication and Protected Routes

(See archive for full source code)

Objective


You are not logged in
Login
Home
Public
Protected
Home page
You are not logged in
Login
Home
Public
Protected
Login page
You must log in to view the page at /protected
Log in
Welcome!
Sign out
Home
Public
Protected
Protected page

Protected Routes.

- **Not native to React Router.**
- **We need a custom solution:**
- **Solution elements:**
  1. **Clear, declarative style for declare views/pages requiring authentication:**

```
<Switch>
    <Route path='/public' component={ PublicPage } />
    <Route path='/login' component={ LoginPage } />
    <Route exact path='/' component={ HomePage } />
    <PrivateRoute path='/protected' component={ ProtectedPage } />
    <Redirect from='*' to='/' />
</Switch>
```

Declarative

Protected Routes

- **Solution elements (Contd.):**

2. **Toggle the app's authentication status header based on login status:**

```
5   const BaseAuthHeader = props => {
6     const { history } = props;
7     const signOutHandler = () => authenticator.signout(() => history.push("/"));
8     return authenticator.isAuthenticated ? (
9       <p>
10        Welcome! <button onClick={signOutHandler}>Sign out</button>
11      </p>
12    ) : (
13      <p>
14        You are not logged in{" "}
15        <button onClick={() => history.push("/login")}>Login</button>
16      </p>
17    );
18  };
19  export default withRouter(BaseAuthHeader);
```

Protected Routes

- **Solution elements (Contd.):**
  3. **<LoginPage> – For a valid login it redirects to the protected view the user tried to access pre-authentication (**props.location.state**); otherwise it redisplays the Login page:**

```
5   const LoginPage = props => {
6     const [loggedInStatue, setLoggedInStatus] = useState(false);
7     const login = () => {
8       authenticator.authenticate("user1", "pass1", status =>
9         setLoggedInStatus(status)
10      );
11    };
12    const { from } = props.location.state || { from: { pathname: "/" } };
13    if (loggedInStatue === true) {
14      return <Redirect to={from} />;
15    }
16    return (
17      <>
18        . . . . . .
19        <button onClick={login}>Log in</button>
```

Protected Routes

- **Solution elements (Contd.):**
  4. **Authenticator – checks submitted credentials and performs appropriate action (callback parameter), if successful.**

```
1   class Authenticator {
2     constructor() {
3       this.isAuthenticated = false;
4 >     this.users = [⋯
7       ];
8     }
9
10    authenticate(username, password, cb) {
11      setTimeout(() => {
12        const validUser = this.users.find(
13          u => u.username === username && u.password === password
14        )
15        this.isAuthenticated = validUser ? true : false
16        cb(this.isAuthenticated);
17      }, 100);
18    }
19
```

Protected Routes

- **Solution elements (Contd.):**
  5. **<PrivateRoute> – checks the user's authentication status:**
     - **Authenticated – Returns a normal <Route> component.**
     - **Unauthenticated – Returns a <Redirect> to the login page.**

```
<PrivateRoute path='/protected' component={ ProtectedPage } />
```

```
5   const PrivateRoute = props => {
6     const { component: Component, ...rest } = props;
7     return authenticator.isAuthenticated === true ? (
8       <Route {...rest} render={props => <Component {...props} />} />
9     ) : (
10      <Redirect
11        to={{
12          pathname: "/login",
13          state: { from: props.location }
14        }}
15      />
16    );
17  };
18
19  export default PrivateRoute
```

Protected Routes

- **Recommendation – Store the current user in a** context.