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Context

The Foundations of React

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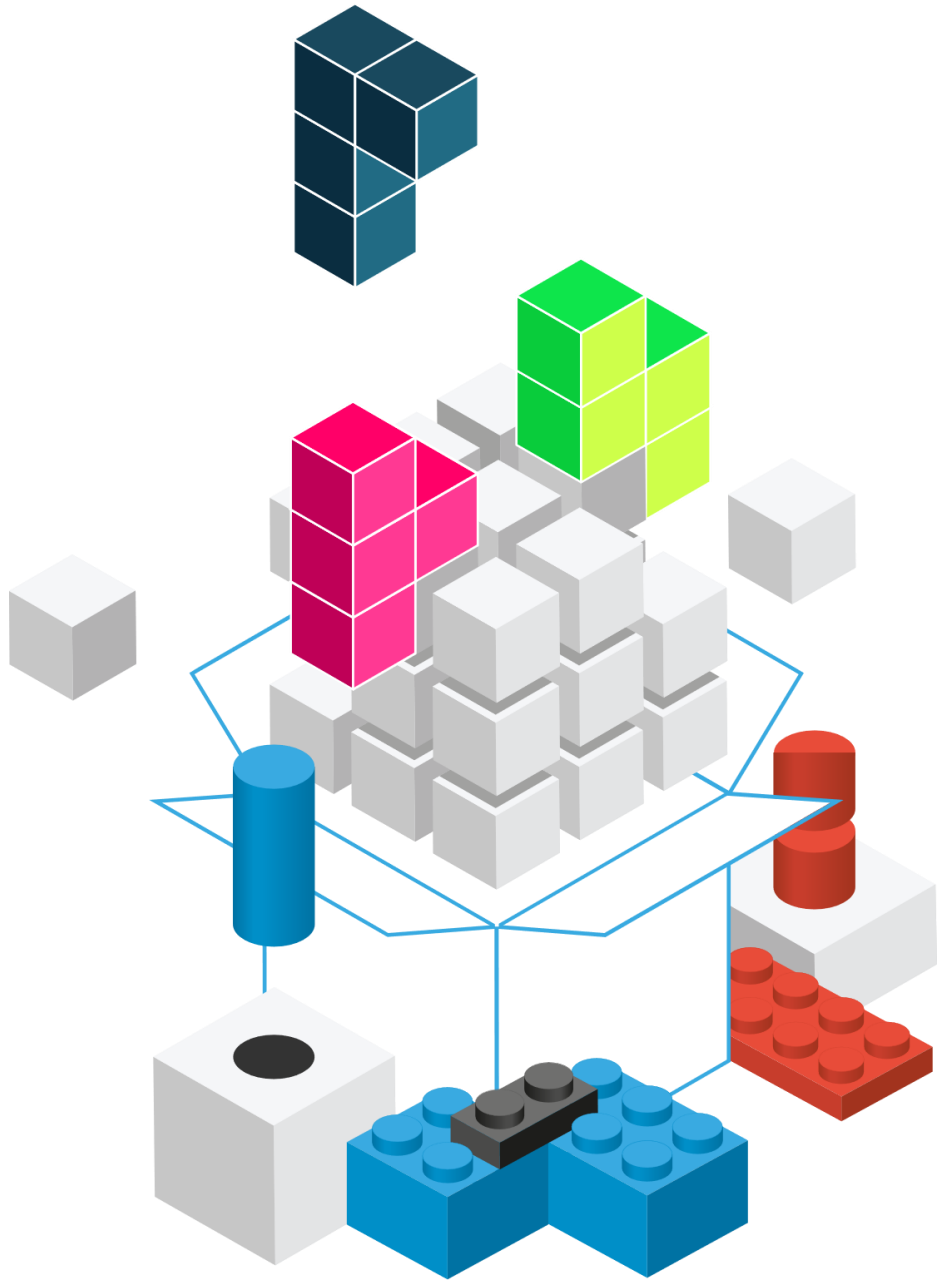


https://reactjs.org/docs/context.html

Full Stack React, Chapter “Advanced Component Configuration with props, state, and children”

React Handbook, Chapter “Context API”

Sort-of Globally Available Props (to avoid props drilling)

CONTEXT, USECONTEXT HOOK

Context

Unidirectional information flow +

Functional components =

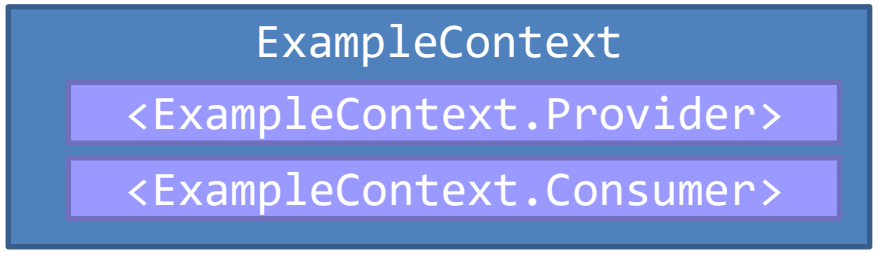
Must pass every prop to the component that needs it, and sometimes it means “drilling through” many components with several props

- Solution: the Context API offers a “global” set of props that are “automatically” available to lower components
  - Without declaring them explicitly at every level
- “Props teleporting”

Examples

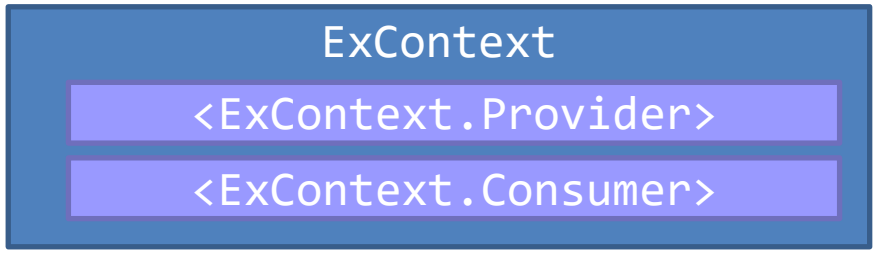
- The current visual theme for the whole page (e.g., dark, light, …)
  - Needed by most visual components (towards the bottom of the tree)
  - Not needed by any container component
- Logged in/logged out status (and basic user information)
  - Needed to enable/disable large portions of the page
  - Needed to provide user info in various parts of the page (e.g., avatar)
  - Needed to call remote APIs with user-related queries
- Shared data cache

Context Ingredients



- Context definition
  - `const ExampleContext = React.createContext()`
  - Defines a context object and stores it into the ExampleContext reference
- Context provider
  - `<ExampleContext.Provider value=...>` component
  - Injects the context `value` into all nested components
- Context consumer *(two possible equivalent techniques)*
  - `<ExampleContext.Consumer>`
    - Renders a function that receives the context current `value` as a parameter
  - `useContext(ExampleContext)`
    - Uses a *hook* to access the context current `value`

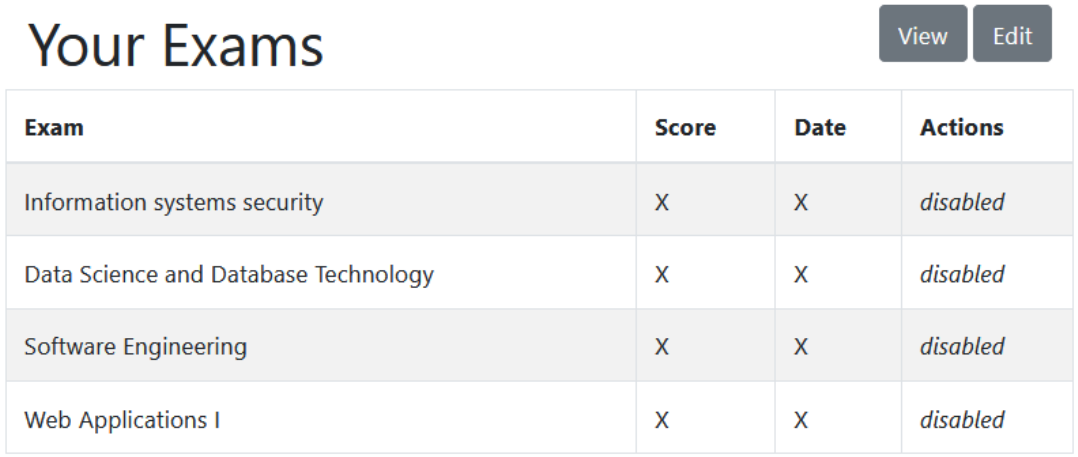
Context Definition



- `const ExContext = React.createContext(defaultValue)`
- Creates a new Context object
  - Contains *ExContext*.`Provider` and *ExContext*.`Consumer`
  - Represents the value of one object
    - May be a complex object with many properties/functions
  - The *ExContext* identifier is used in value propagation
- Components may subscribe (consume) to this context
  - The provided value comes from the closest *Provider* ancestor
    - If no provider is found, the defaultValue is used
    - In all other cases, defaultValue **is ignored**

Example

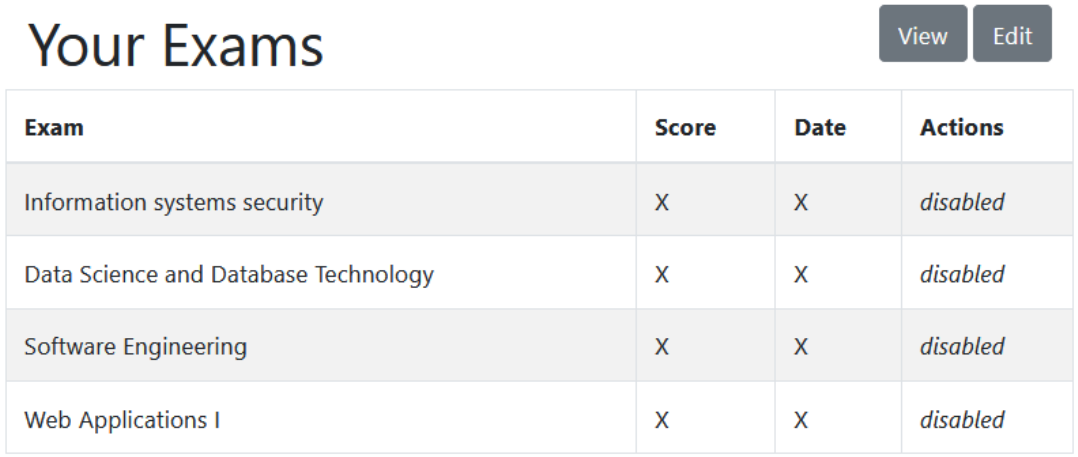
- Add two toggle buttons to the «React Scores» application
  - View/Hide: shows or hides the sensitive data (score and date)
  - Edit/Read: switch between read-only or editable mode



Example

App.js

```
function App() {
  const [privacy, setPrivacy] = useState(true);
  const [editable, setEditable] = useState(false);

  return (
    <Container className="App">
      <Row>
        <Title />
        <Col align='right'>
          <Button variant='secondary'
             onClick={() => setPrivacy(p => !p)}>
                {privacy ? 'View' : 'Hide'}
          </Button> 
          <Button variant='secondary'
             onClick={() => setEditable(p => !p)}>
                {editable ? 'Read' : 'Edit'}
          </Button>
        </Col>
      </Row>
      . . .
```



Example

App.js

```
import { PrivacyMode, EditMode }
    from './createContexts';
```

createContexts.js

```
import React from 'react';

const PrivacyMode = React.createContext();
const EditMode = React.createContext();

export { PrivacyMode, EditMode } ;
```

Context Provider

- A component *`ExContext`*`.Provider` is *automatically created* for each new Context
- The component specifies a `value` prop, that is available to all nested "consumer" components (even if deeply nested)
  - Consumers MUST be nested inside the provider
  - Providers may be anywhere (assuming the context object is visible)
- Providers may be *nested*: each level may override the previous `value`
- When the Provider's `value` changes, all consumers will re-render

Example

App.js

```
function App() {
  . . .
  return (
    <Container className="App">
      . . .
      <Row>
        <PrivacyMode.Provider value={privacy}>
          <EditMode.Provider value={editable}>
            <ExamTable
              courses={fakeCourses}
              exams={fakeExams} />
          </EditMode.Provider>
        </PrivacyMode.Provider>
      </Row>
    </Container>
  );
}
```

createContexts.js

```
import React from 'react';

const PrivacyMode = React.createContext();
const EditMode = React.createContext();

export { PrivacyMode, EditMode } ;
```

Context Consumer (as a component)

- The *automatically created* component <*ExContext*.Consumer> may be used in the render function/method
- You must provide a *callback function* that
  - Receives the context value (from the closest provider, or defaultValue if no provider is found)
  - Returns the React Element to be rendered

```
<ExContext.Consumer>
  {value => /* render something
                based on the context value */}
</ExContext.Consumer>
```

Example

App.js

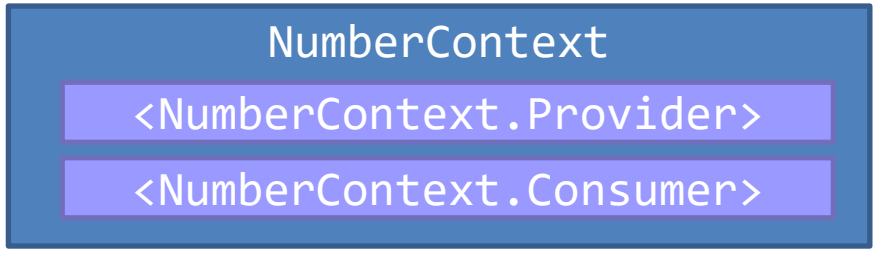
```
function App() {
  . . .
  return (
    <Container className="App">
      . . .
      <Row>
        <PrivacyMode.Provider value={privacy}>
          <EditMode.Provider value={editable}>
            <ExamTable
              courses={fakeCourses}
              exams={fakeExams} />
          </EditMode.Provider>
        </PrivacyMode.Provider>
      </Row>
    </Container>
  );
}
```

examComponents.js

```
import { PrivacyMode, EditMode } from './createCon
texts';

function ExamRow(props) {
    return (<tr>
        <ExamInfo {...props} />
        <EditMode.Consumer>
            {editable => editable ?
                <ExamControls
                    exam={props.exam}
                    deleteExam={props.deleteExam}/>
                : <td><i>disabled</i></td>}
        </EditMode.Consumer>
    </tr>
    );
}
```

Accessing Context With Hooks

- The `useContext` hook allows the current component to *consume* the context
- The argument is a Context object
  - Must have been created by `React.createContext()`
- The value depends on the closest enclosing provider
  - Must be nested inside `<MyContext.Provider>`

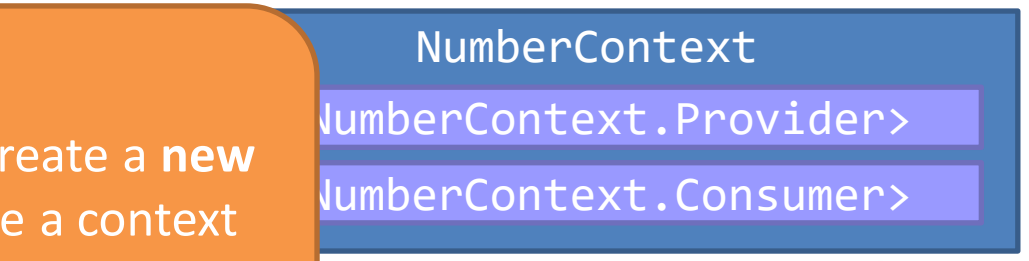



```
function Display() {

  const value = useContext(NumberContext);

  return <div>The answer is {value}.</div>;
}
```

Accessing Context With Hooks

- The `useContext` hook allows the current compo… *consume* the conte…
- The argument is a C…
  - Must have been cre… `React.createContext();`
- The value depends on the closest enclosing provider
  - Must be nested inside `<MyContext.Provider>`

There is no way to create a **new** context, or to create a context **provider**, with Hooks




```
…splay() {

  const value = useContext(NumberContext);

  return <div>The answer is {value}.</div>;
}
```

Example

App.js

```
function App() {
  . . .
  return (
    <Container className="App">
      . . .
      <Row>
        <PrivacyMode.Provider value={privacy}>
          <EditMode.Provider value={editable}>
            <ExamTable
              courses={fakeCourses}
              exams={fakeExams} />
          </EditMode.Provider>
        </PrivacyMode.Provider>
      </Row>
    </Container>
  );
}
```

examComponents.js

```
import { PrivacyMode, EditMode } from './createCon
texts';

function ExamInfo(props) {
  let privacyMode = useContext(PrivacyMode)
  return (<>
    <td>{props.examName}</td>
    <td>{privacyMode? "X" : props.exam.score}</td>
    <td>{privacyMode? "X" : props.exam.date
       .format('DD MMM YYYY')}</td>
  </>)
}
```

Accessing Multiple Contexts

- May call `useContext` more than once
- All the context variables will be available
- No need to nest components

```
function HeaderBar() {
  const user = useContext(CurrentUser);
  const notif = useContext(Notifications);

  return (
    <header>
      Welcome back, {user.name}!
      You have {notif.length} notifications.
    </header>
  );
}
```

https://daveceddia.com/usecontext-hook/

Accessing Multiple Contexts

```
function HeaderBar() {
  return (
    <CurrentUser.Consumer>
      {user =>
        <Notifications.Consumer>
          {notif =>
            <header>
              Welcome back, {user.name}!
              You have {notif.length}
              notifications.
            </header>
          }
        </Notifications.Consumer>
      }
    </CurrentUser.Consumer>
  );
}
```

Consumer Component

```
function HeaderBar() {
  const user = useContext(CurrentUser);
  const notif = useContext(Notifications);

  return (
    <header>
      Welcome back, {user.name}!
      You have {notif.length} notifications.
    </header>
  );
}
```

useContext Hook

Changing Context Values

- When a Consumer child needs to update the context value, the Provider must provide a function callback to perform the update
  - As a prop (by drilling the nesting levels)
  - As part of the context value
- Remember: the **state** is part of the component containing the Provider
  - Not in the provider itself
  - Not in the context object

Caveats

- Don’t put everything into Context
  - Defeats component portability
  - Reduces “purity” of functional components
- Don’t use it for programming laziness
  - Explicit parameter passing is also a good documentation practice
- Don’t use it to correct design errors
  - Often, a refactoring of the component tree (and props/state lifting) may be a cleaner solution

Before You Consider Context…

- Passing a component as a prop (inversion of control)
  - When a nested components needs many props from and upper component
  - The upper component defines JSX of the element (using the available info)
  - The component itself is passed as a prop (just one prop, that will be passed and rendered)
- Use “render props”
  - Callback functions as props (https://reactjs.org/docs/render-props.html)
  - The lower component will call the “render prop” at render time, that has access to the upper component’s props and state
- Use Children Components

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