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2023

Context

The Foundations of React

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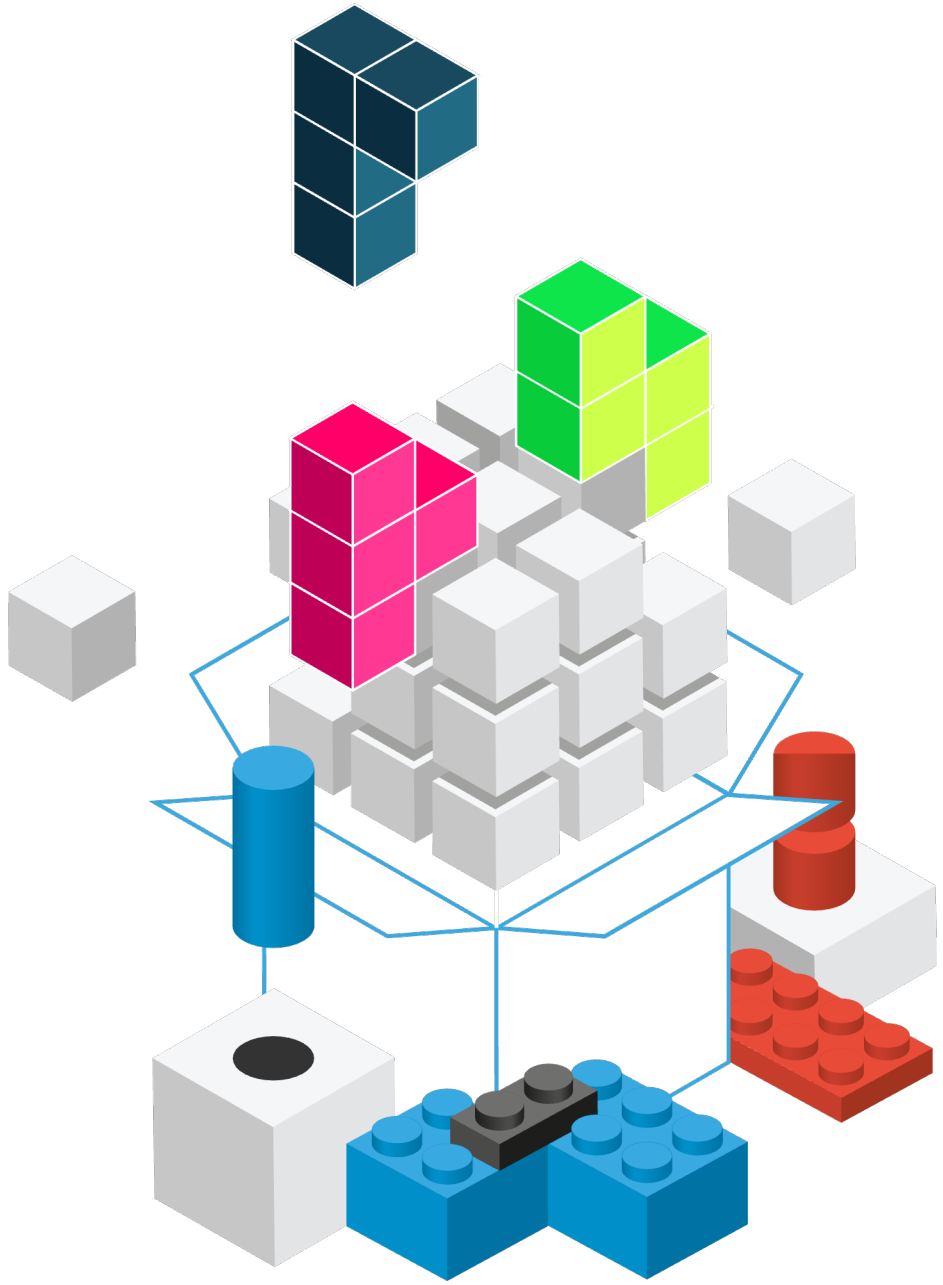


https://react.dev/learn/passing-data-deeply-with-context

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 =

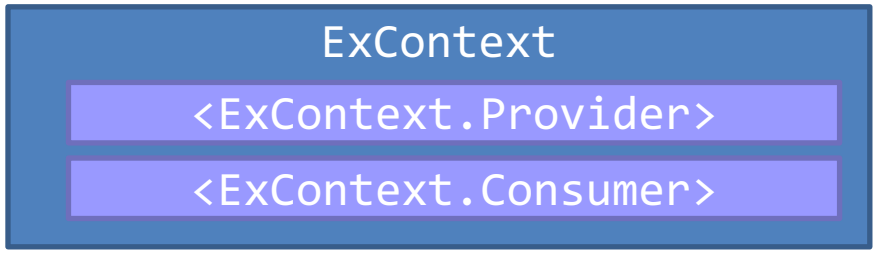
Must pass every prop to the component that needs it, and sometimes it means “drilling through” many components with several props

- 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

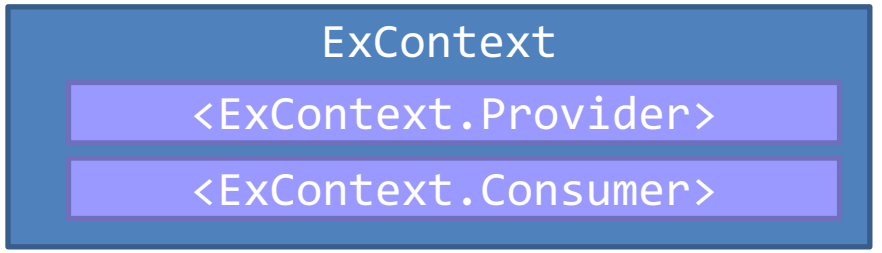
- The current visual theme for the whole page (e.g., dark, light, …)
  - Needed by most visual components (towards the bottom of the tree)
  - Not needed by any container component
- Logged in/logged out status (and basic user information)
  - Needed to enable/disable large portions of the page
  - Needed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

Context Ingredients



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

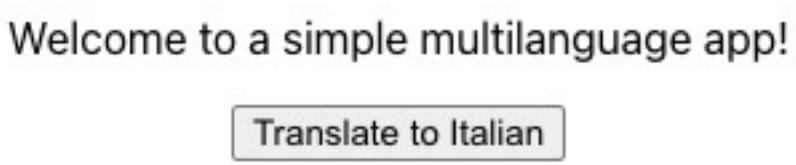
Example

- Create a (very) simple multi-language application
  - Italian and English
  - with a toggle button to change the entire application language

Example

App.jsx

```
 . . .
function App() {
  const [language, setLanguage] = useState('english'
);

  function toggleLanguage() {
    setLanguage((language) => (language ===
'english' ? 'italian' : 'english'));
  }


  return (
    <div className="App">
      <Welcome />
      <Button toggleLanguage={toggleLanguage} />
    </div>
  . . .
```



Example

App.jsx

```
import LanguageContext
    from './languageContext';
```

languageContext.jsx

```
import React from 'react';

const LanguageContext = React.createContext();

export default LanguageContext;
```

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.jsx

```jsx
import LanguageContext from './languageContext';
. . .

function App() {
  . . .
  return (
    <div className="App">
      <LanguageContext.Provider value={language}>
        <Welcome />
        <Button toggleLanguage={toggleLanguage} />
      </LanguageContext.Provider>
    </div>
  );
}
. . .
```

languageContext.jsx

```jsx
import React from 'react’;

const LanguageContext = React.createContext();

export default LanguageContext;
```

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.jsx

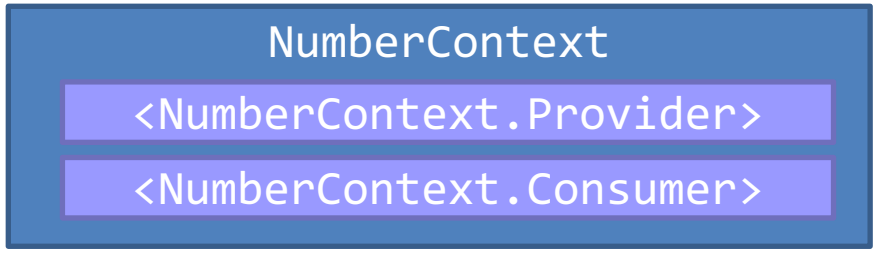
```jsx
import LanguageContext from './languageContext';
. . .

function App() {
  . . .
  return (
    <div className="App">
      <LanguageContext.Provider value={language}>
        <Welcome />
        <Button toggleLanguage={toggleLanguage} />
      </LanguageContext.Provider>
    </div>
  );
}
. . .
```

Components.jsx

```jsx
import LanguageContext from './languageContext';
import translations from './translations';

function Button(props) {
    return (
       <LanguageContext.Consumer>
            {language =>
              <button
                onClick={props.toggleLanguage}>
                {translations[language]['button']}
              </button>
        </LanguageContext.Consumer>
    );
}

function Welcome() {
    return (
       <LanguageContext.Consumer>
            {language =>
              <p> {translations[language]['welcome']} </p>
        </LanguageContext.Consumer>
    );
}
```

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>`

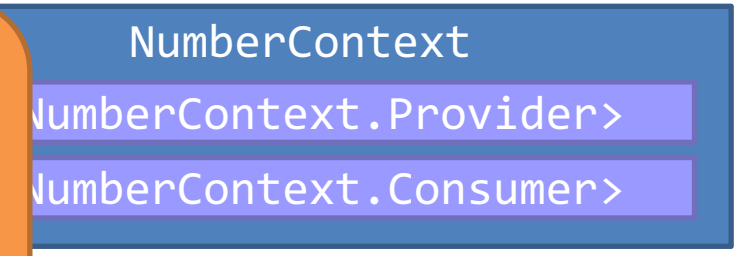



```
function Display() {

  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.jsx

```jsx
import LanguageContext from './languageContext';
. . .

function App() {
  . . .
  return (
    <div className="App">
      <LanguageContext.Provider value={language}>
        <Welcome />
        <Button toggleLanguage={toggleLanguage} />
      </LanguageContext.Provider>
    </div>
  );
}
. . .
```

Components.jsx

```jsx
import { useContext } from 'react';
import LanguageContext from './languageContext';
import translations from './translations';

function Button(props) {
    const language = useContext(LanguageContext);

     return (
        <button onClick={props.toggleLanguage}>
          {translations[language]['button']}
        </button>
    );
}

function Welcome() {
    const language = useContext(LanguageContext);

    return (
       <p> {translations[language]['welcome']} </p>
    );
}
```

Accessing Multiple Contexts

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

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

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

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

Accessing Multiple Contexts: Component vs. Hook

```
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

- Do not 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

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