Context

The Foundations of React

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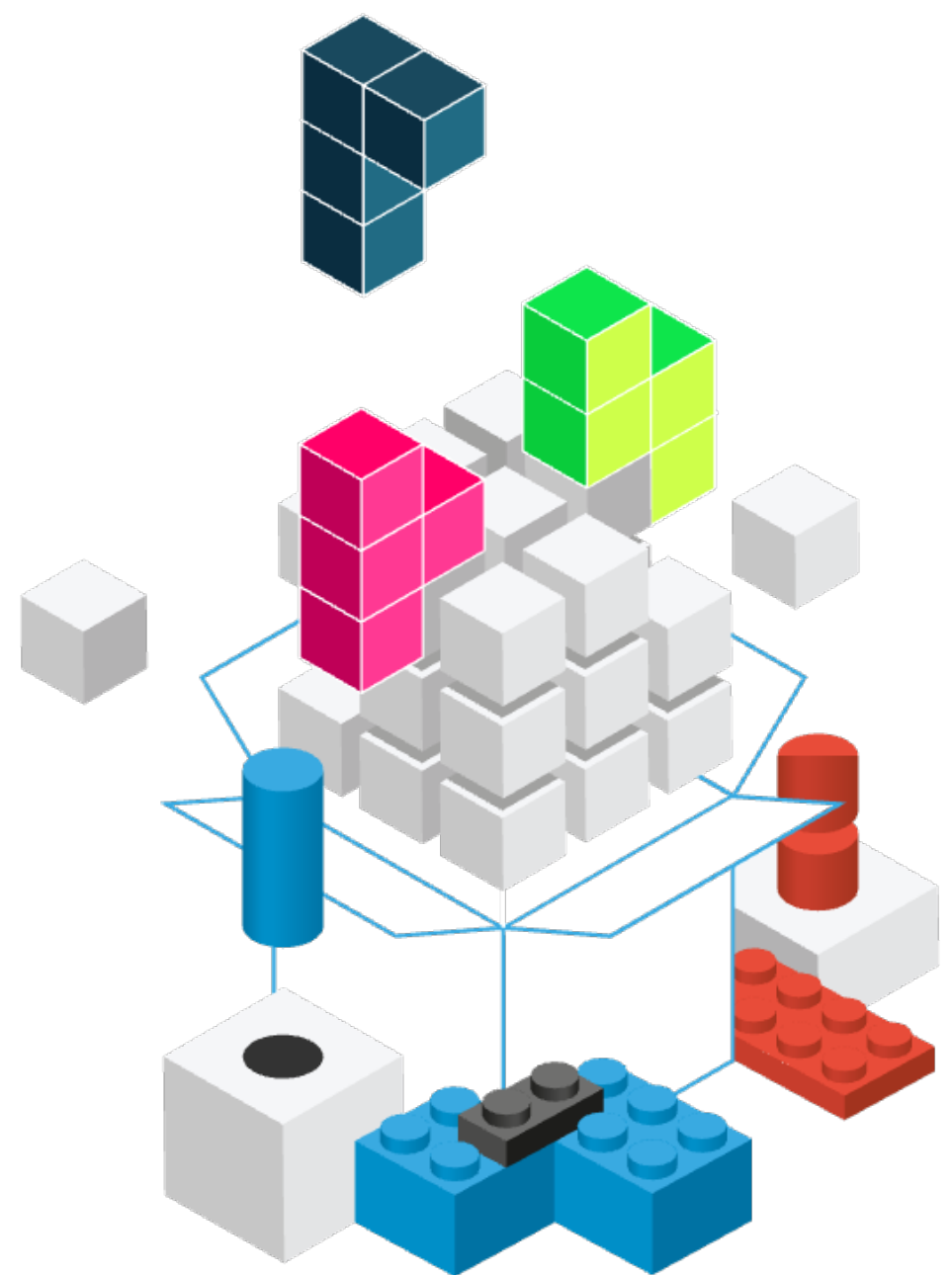
Sort-of Globally Available Props (to avoid props drilling)

CONTEXT, useContext HOOK

Context

Unidirectional information flow +

Functional components =

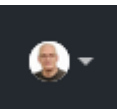--

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

3 Context Ingredients
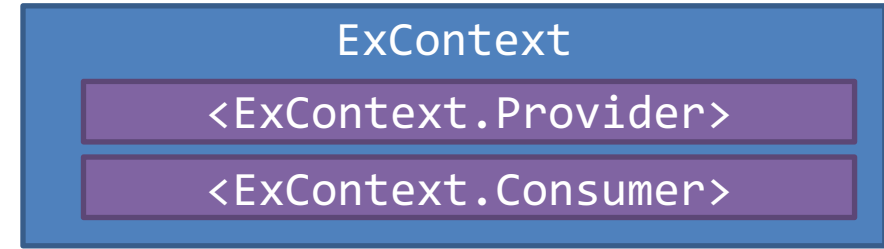
ExContext
`<ExContext.Provider>`
`<ExContext.Consumer>`

- 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
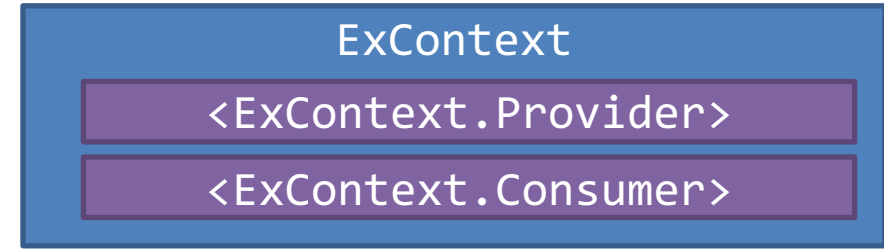
ExContext
`<ExContext.Provider>`
`<ExContext.Consumer>`

`const ExContext = React.createContext(defaultValue)`

- Creates a new Context object
  - Contains 2 properties: *ExContext*.Provider and *ExContext*.Consumer
  - Represents the **value** of one state 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

Welcome to a simple multilanguage app!

Translate to Italian

Benvenuti in una semplice applicazione multi-lingua!

Traduci in inglese

Example

```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>
    . . .
```

Welcome to a simple multilanguage app!

Translate to Italian

Example

App.jsx

languageContext.js

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

```js
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

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

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

```js
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

Components.jsx

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


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

```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> );
}
```
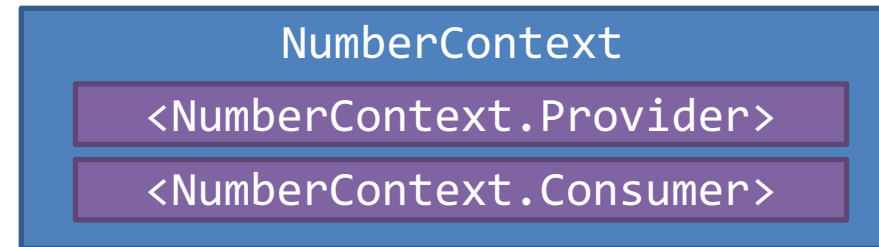
Accessing Context With Hooks

- 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>`

```
NumberContext
  <NumberContext.Provider>
  <NumberContext.Consumer>
```

```
function Display() {

    const value = useContext(NumberContext);

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

Accessing Context With Hooks

- The `useContext` hook allows the current compon... 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 object, or to create a context **provider**, with Hooks

NumberContext

NumberContext.Provider>

NumberContext.Consumer>

```
...play() {

  const value = useContext(NumberContext);

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

Example

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

function App() {
  . . .

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

```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

```
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

```jsx
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

```jsx
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
    - Example: `{ language: 'English', toggleLanguage : toggleLanguage }`
- 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

- Do NOT use it for programming laziness
  - Explicit parameter passing is also a good documentation practice

- Do NOT 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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