Announcements

- 🏆 **MILESTONE 2** due next Wednesday, Jan 24 at 6 PM SHARP
- 🌆 **HACKATHON** TONIGHT 7 PM - 1 AM in 32-082 YAY
    - There will be food and drinks! 🍕 🥤
    - Nick will also give a mini lecture on how to get started on your project!
- 🤓 **Homework 3: Setting up Render** required for deployment
    - Let us know if you didn't receive an email with a Render code
- 🎥 **Lecture recordings** are up at weblab.is/recordings
- 💖 **Subject Evaluations** are open Monday-Friday next week!
    - Special stickers for ppl who fill out their subject evals 👉👈 (take a screenshot of your completion page heh)

State Management

Mark Tabor and Jay Hilton

State in React

- useState(initialValue) -> (state, setState)
    - After setState called, components using state re-render

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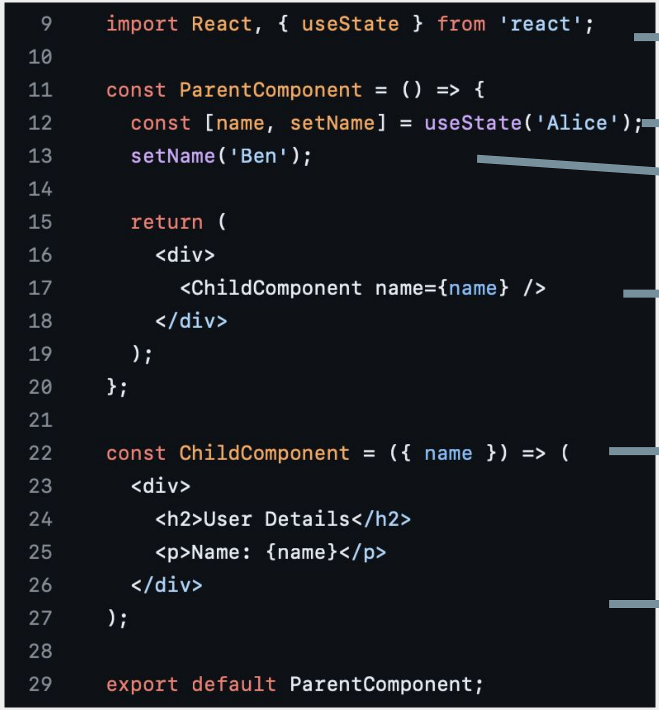
    - Have to pass it through many components
    - We’re sad…
- Is there a better way?

A Concrete Example



```
import React, { useState } from 'react';

const ParentComponent = () => {
  const [name, setName] = useState('Alice');
  setName('Ben');

  return (
    <div>
      <ChildComponent name={name} />
    </div>
  );
};

const ChildComponent = ({ name }) => (
  <div>
    <h2>User Details</h2>
    <p>Name: {name}</p>
  </div>
);

export default ParentComponent;
```

Import useState

Create State and setState

setState to ‘Ben’

Pass state as prop

ChildComponent has user as state and renders

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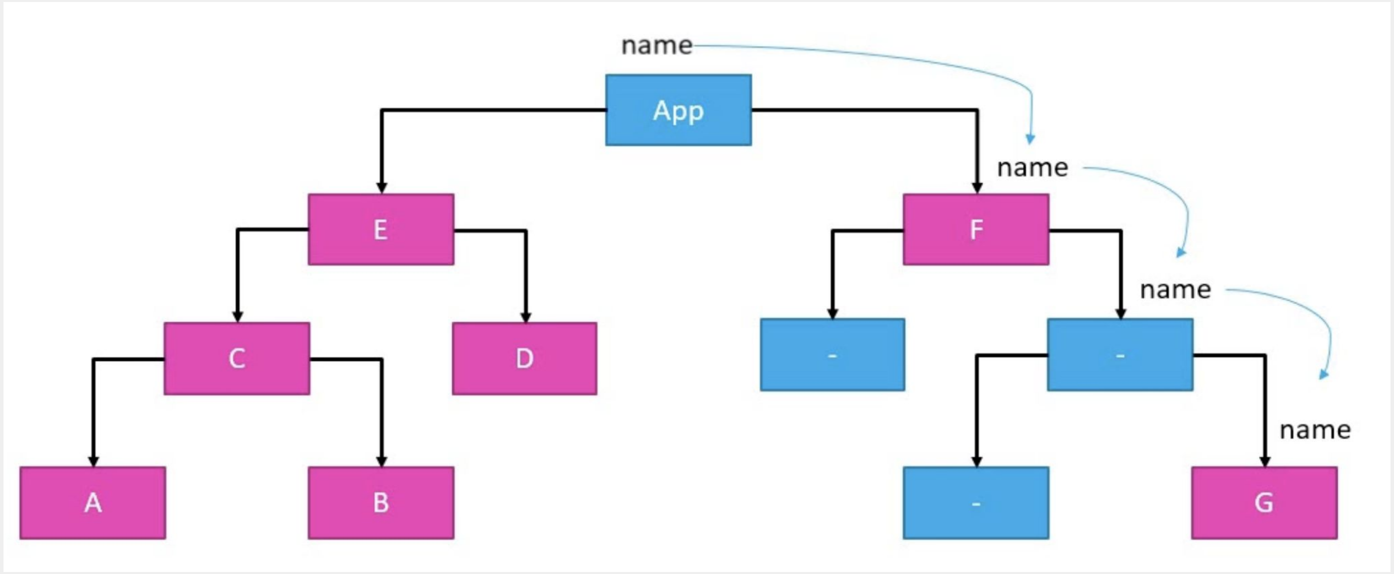

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This is a form of dependency injection, if you've heard of it.

If not, that's okay too!

Examples

useContext Example 1

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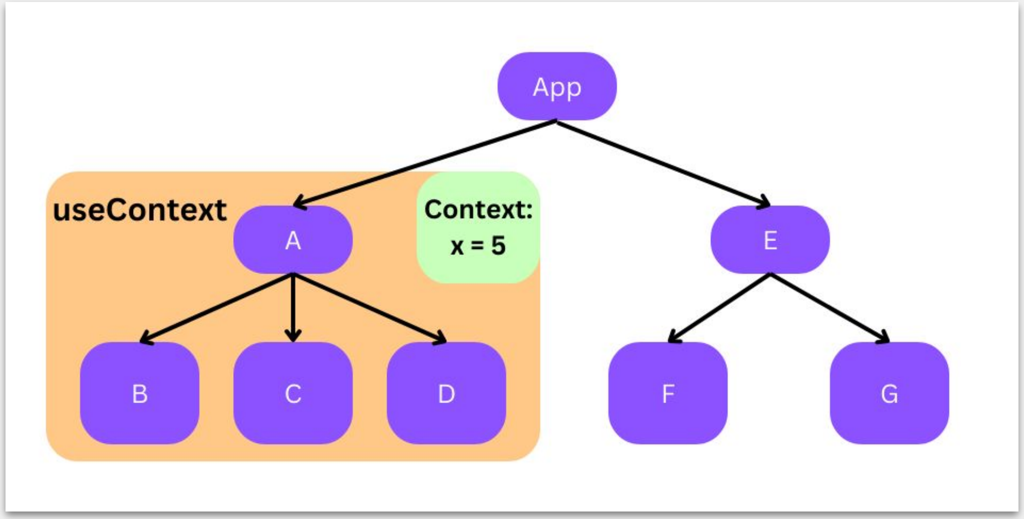

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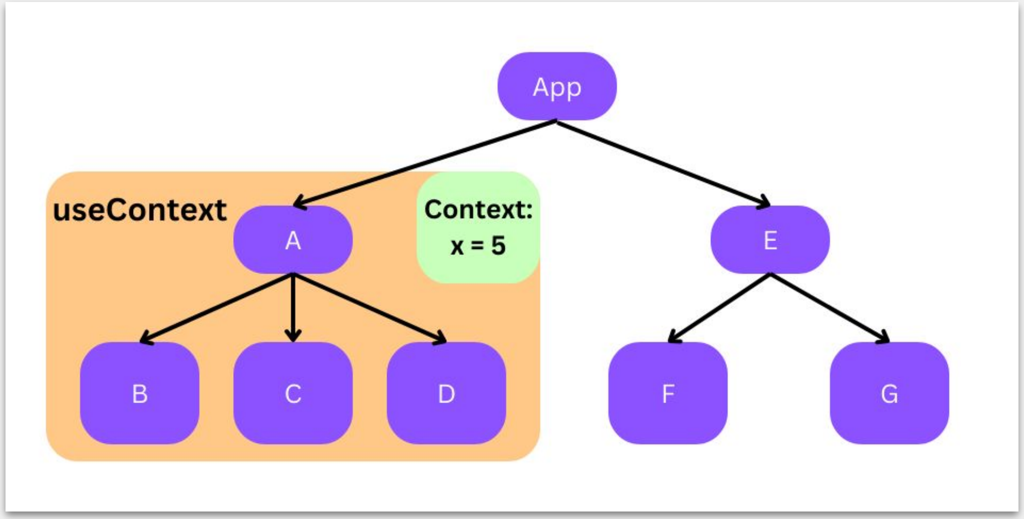

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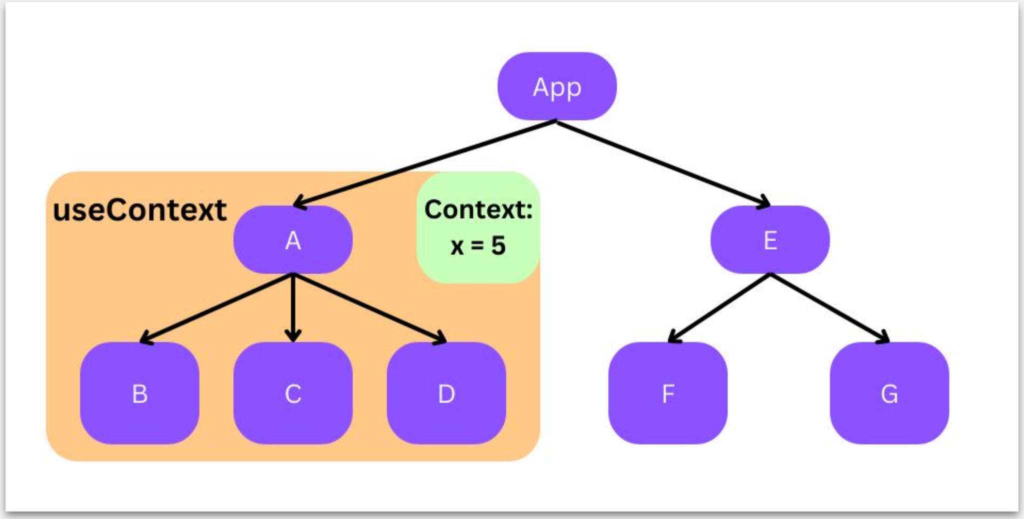

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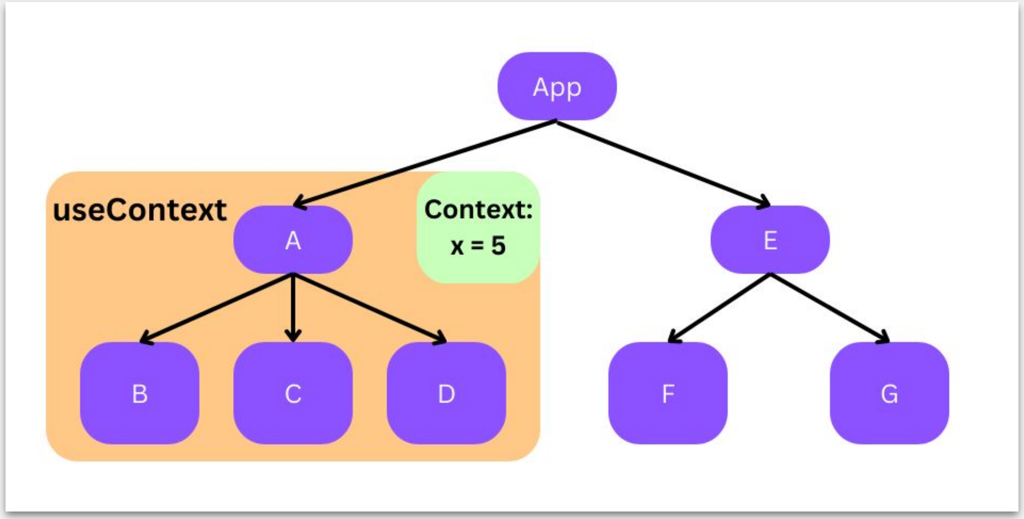

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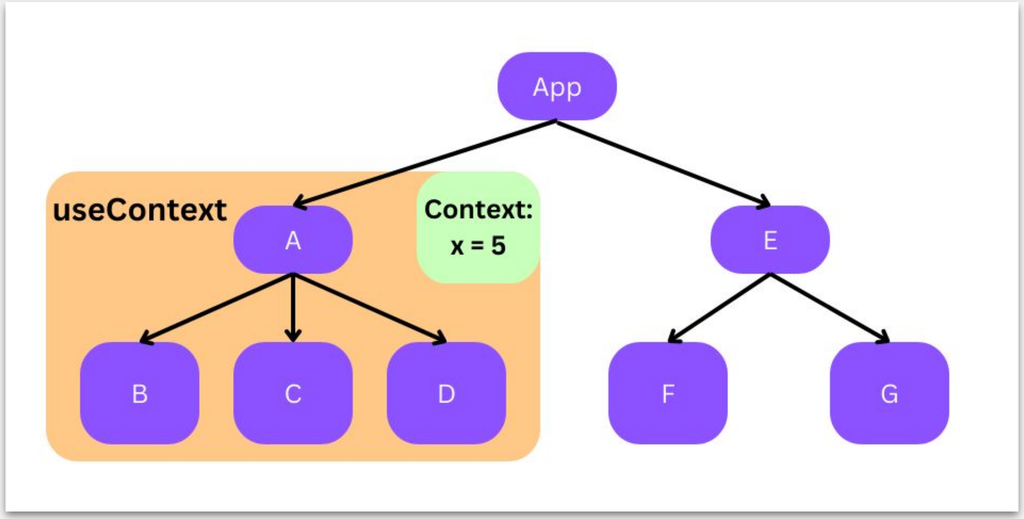

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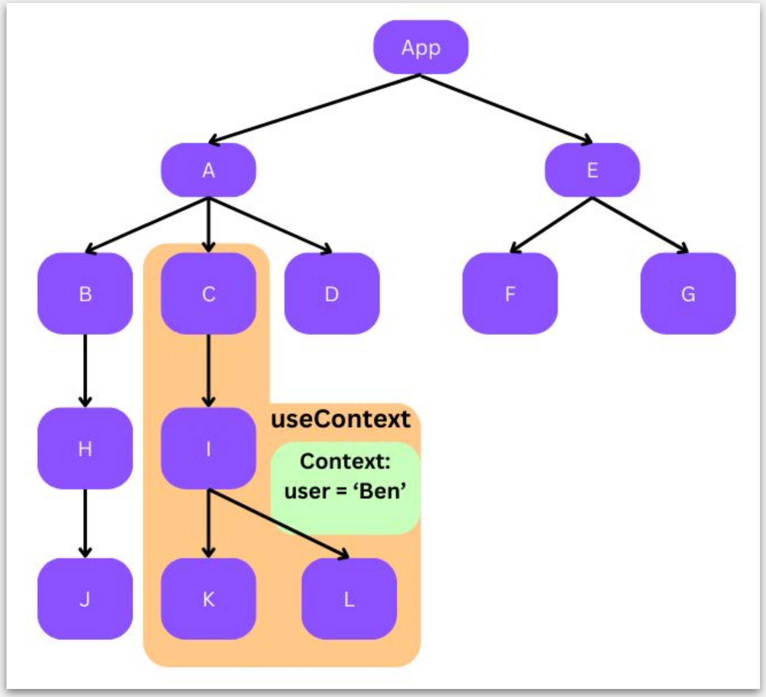

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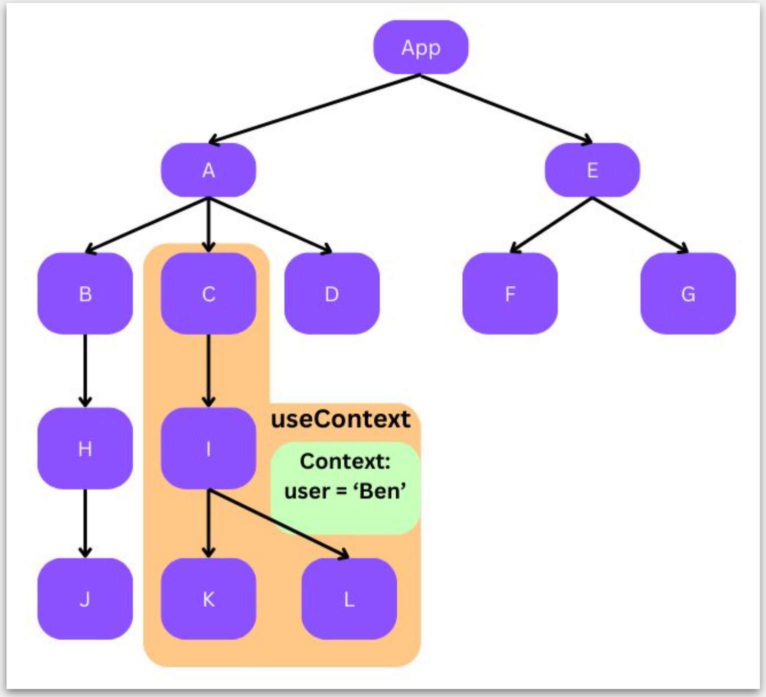

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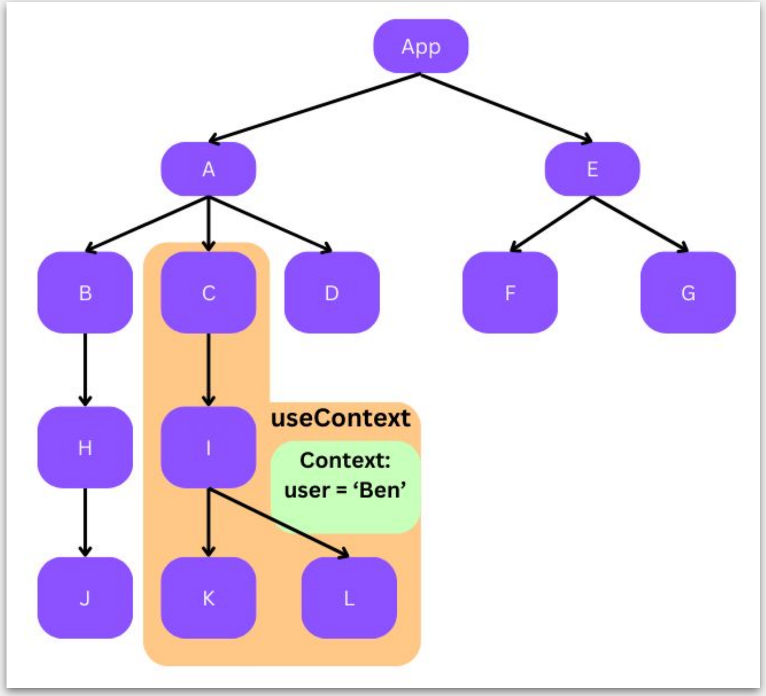

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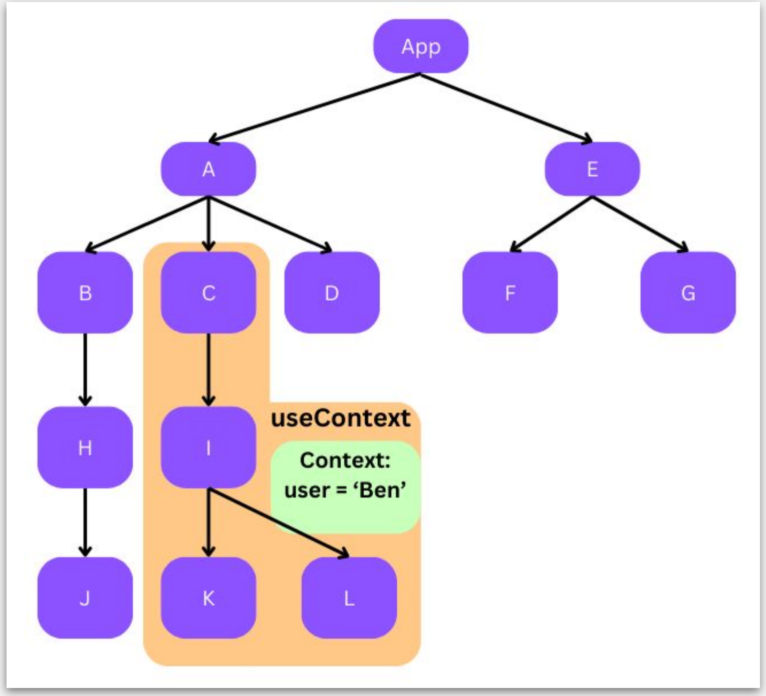

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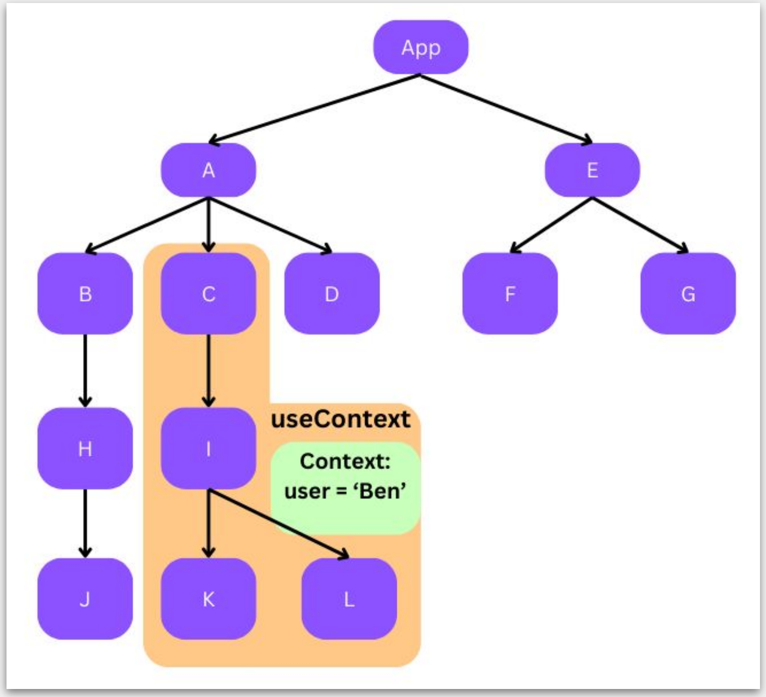

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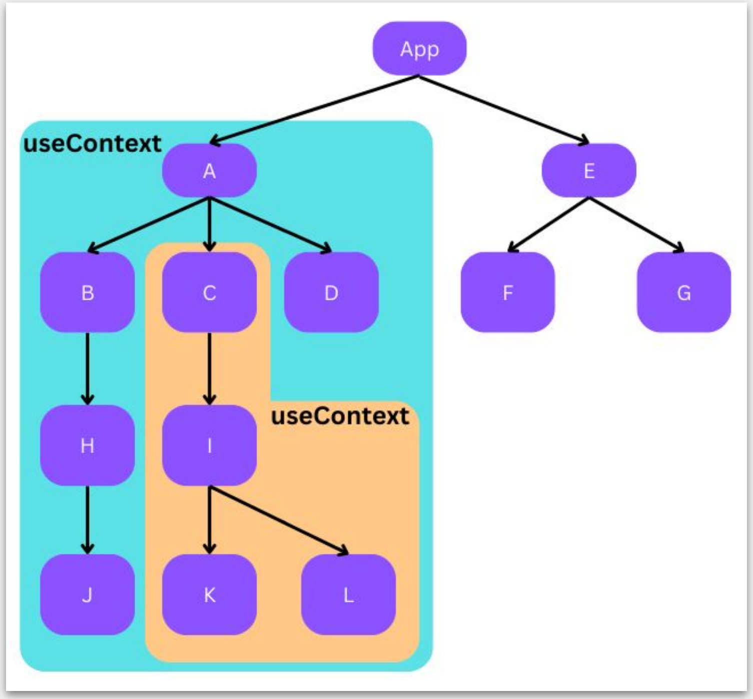

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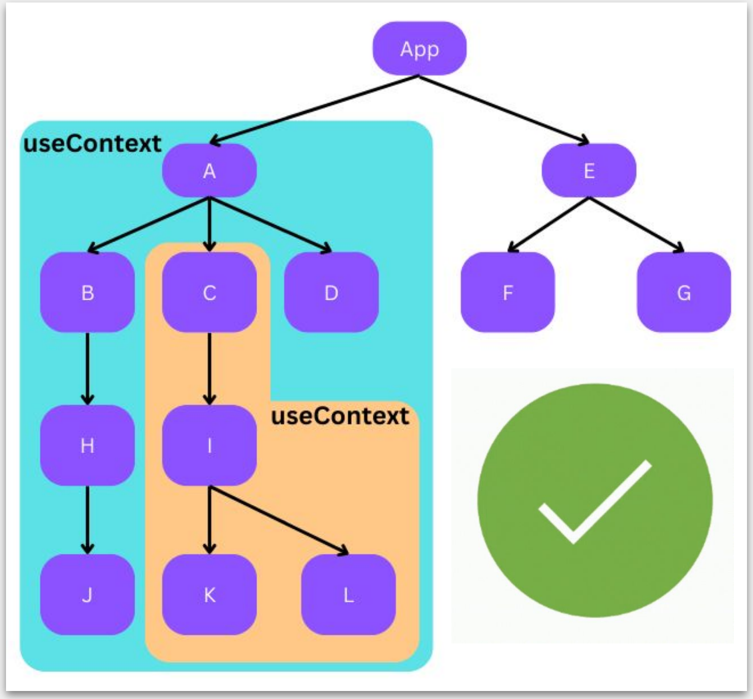

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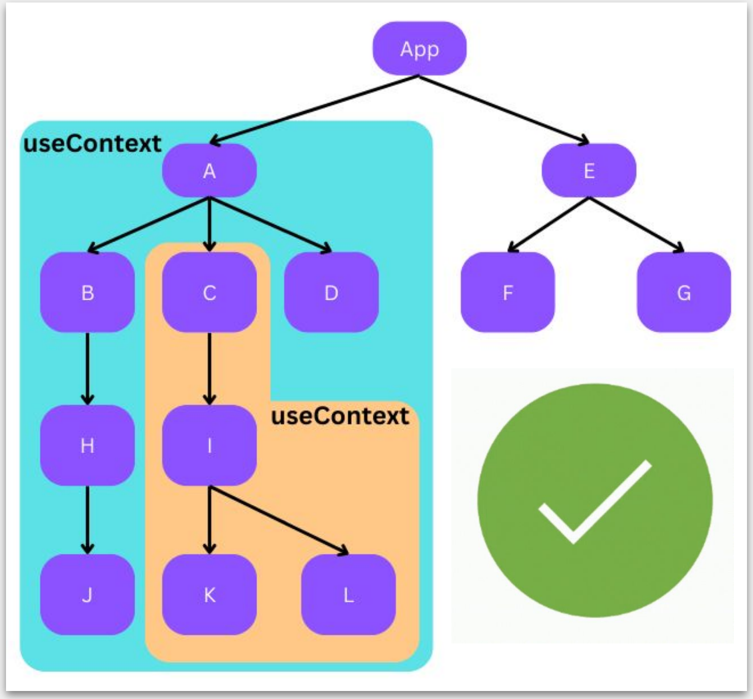

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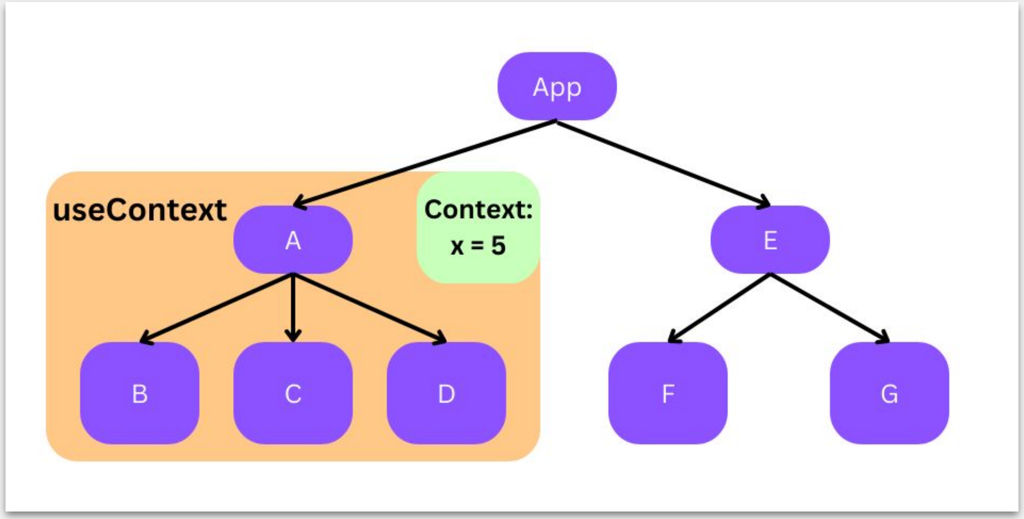

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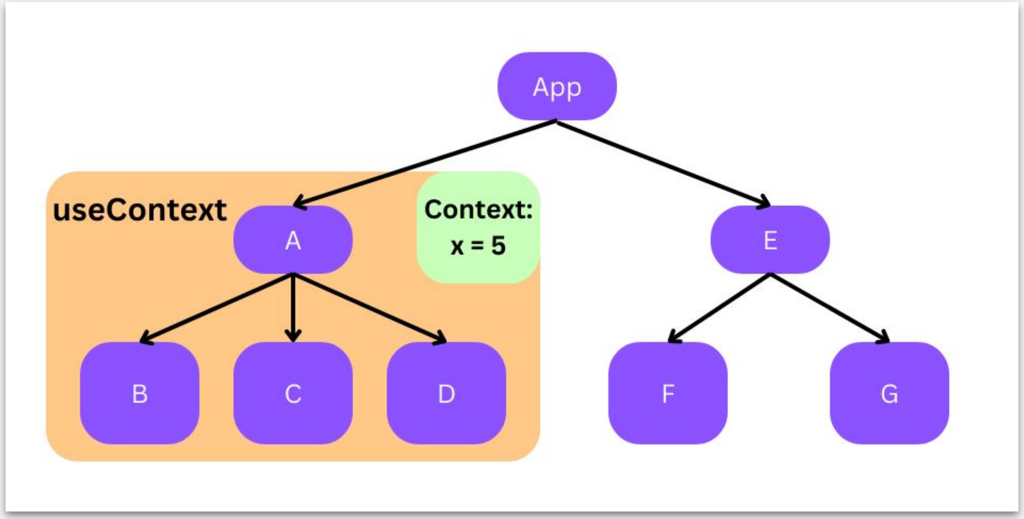

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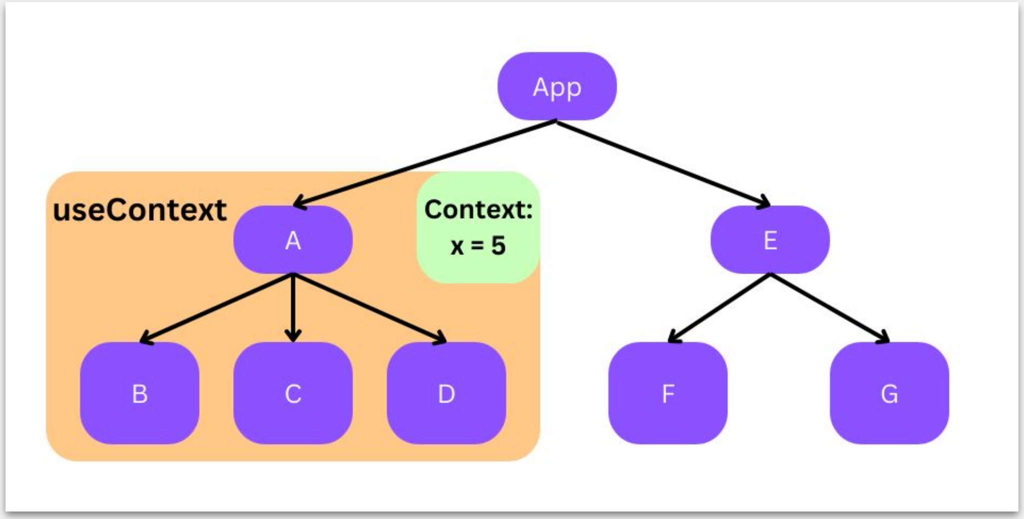

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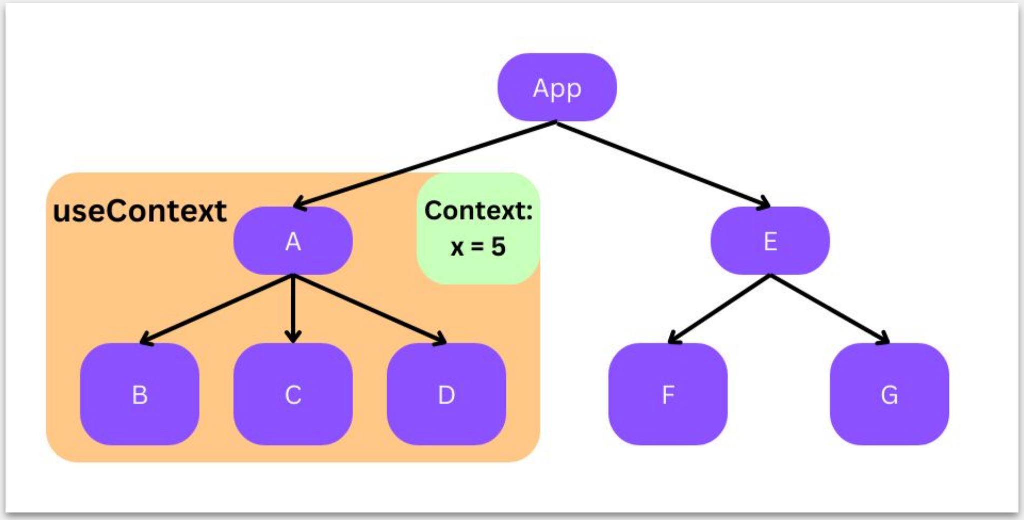

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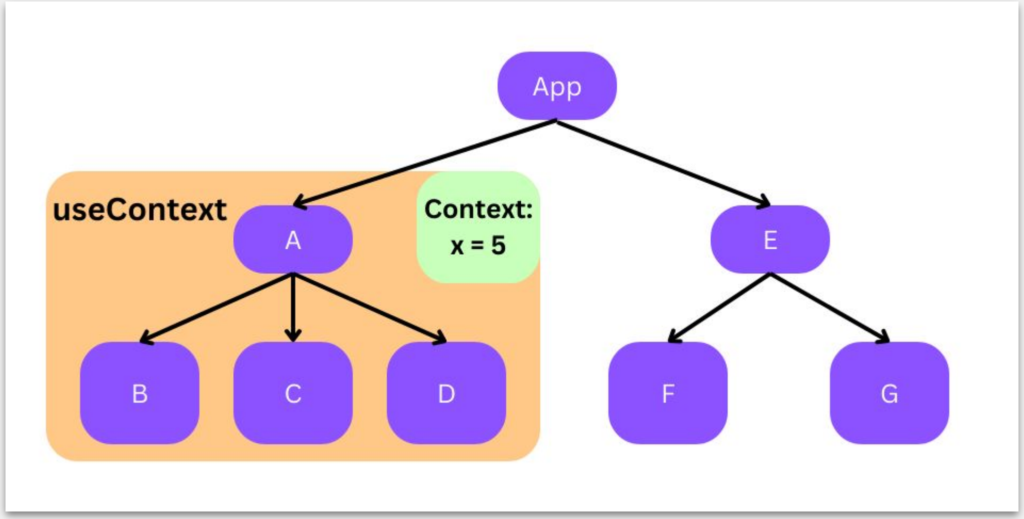

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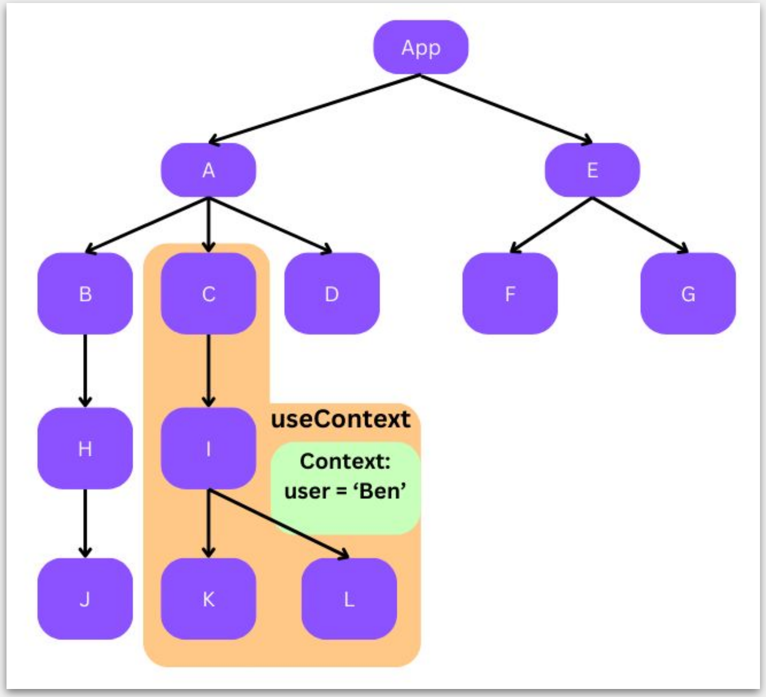

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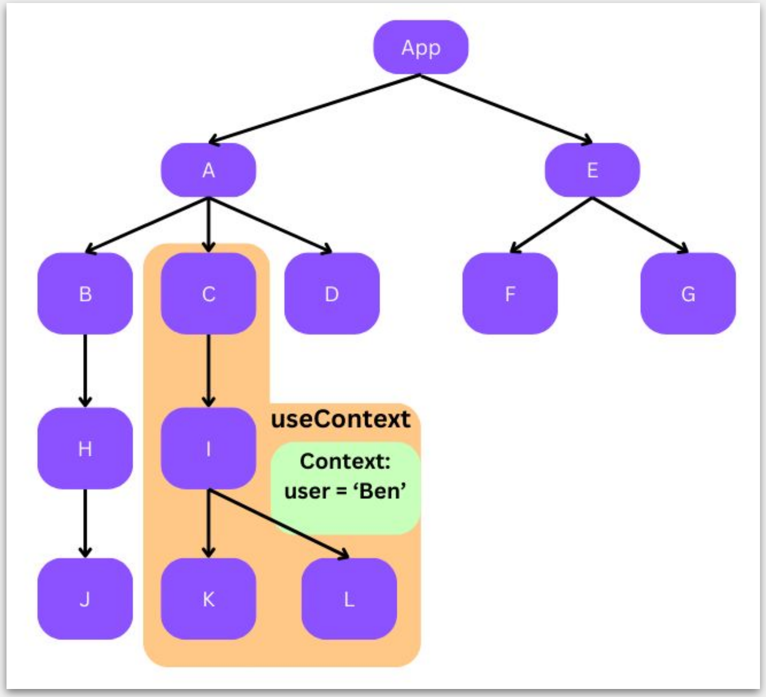

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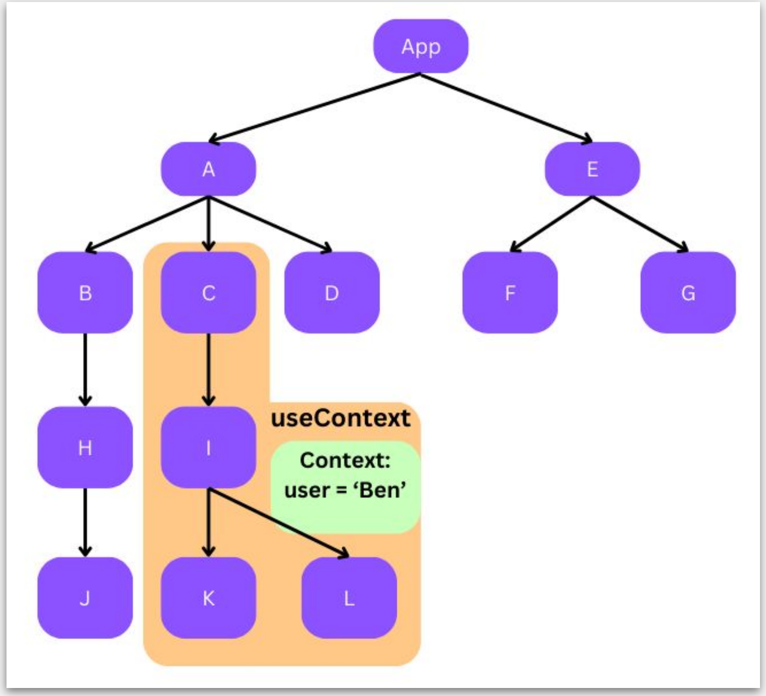

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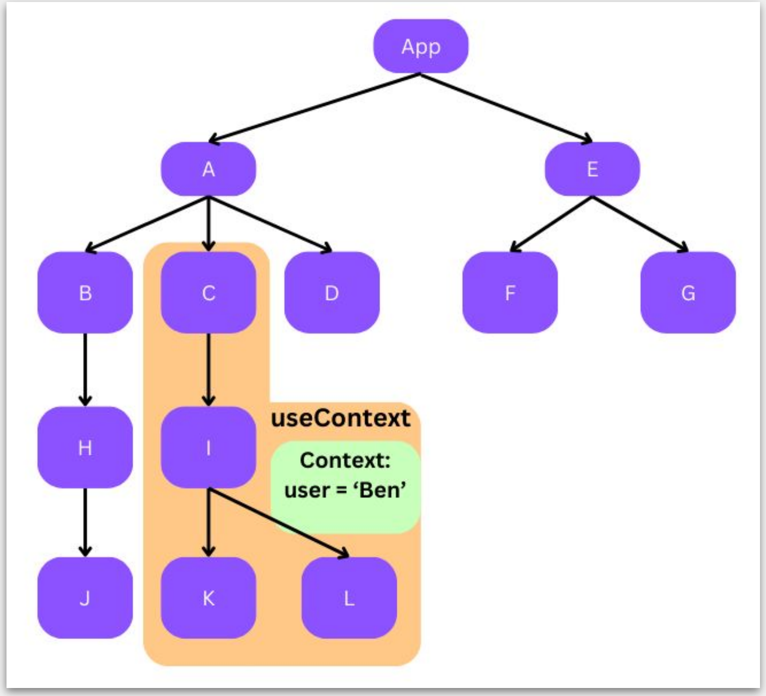

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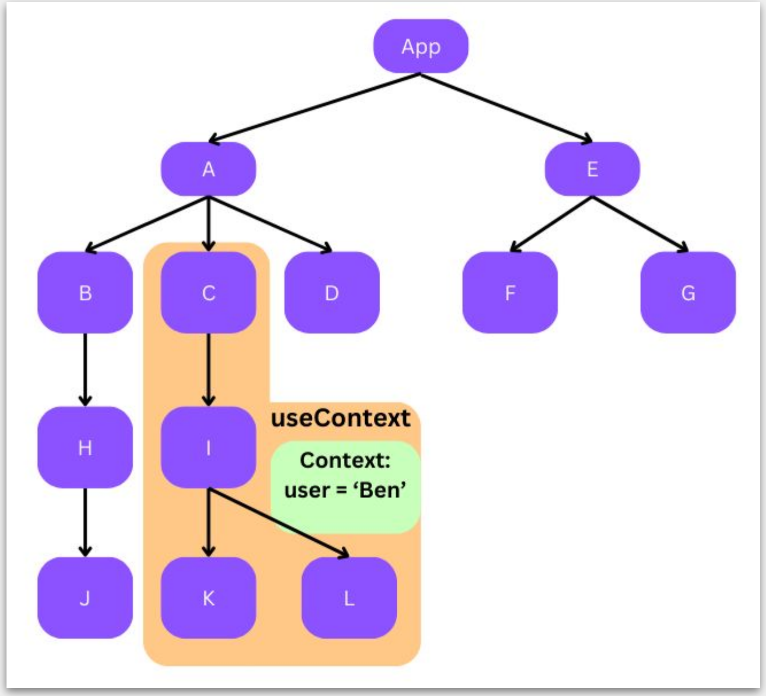

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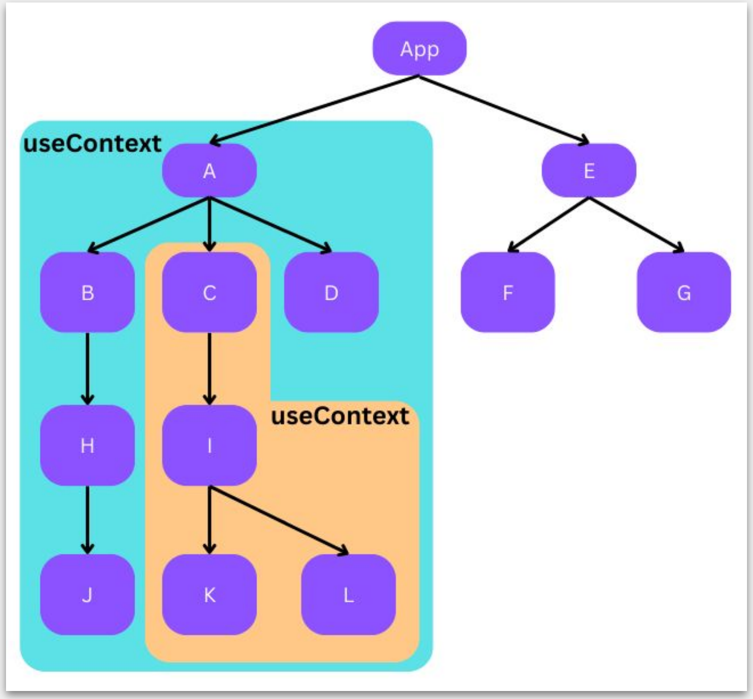

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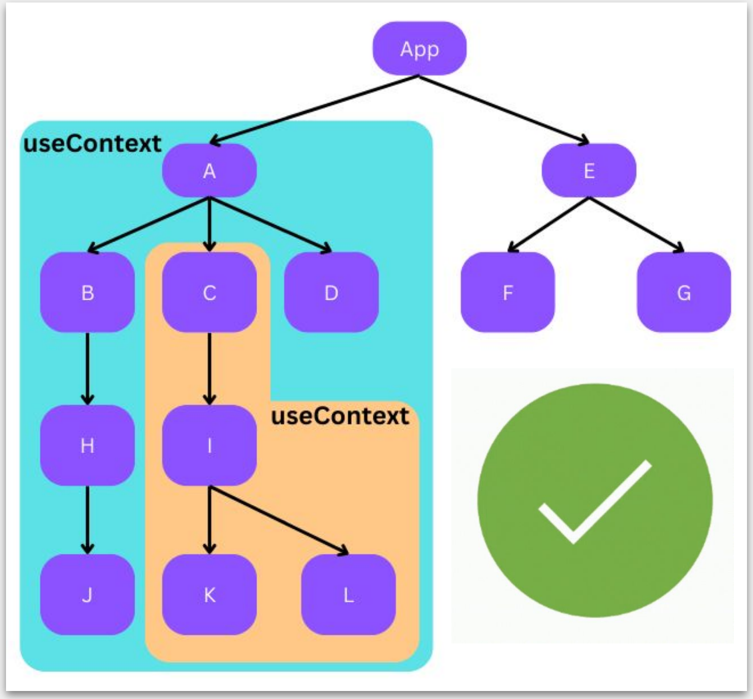

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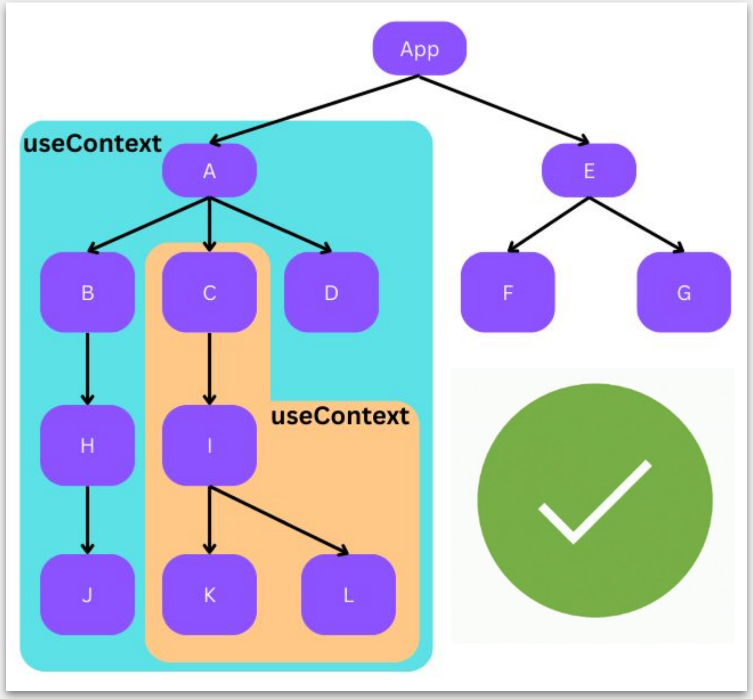

Questions?

State Machines

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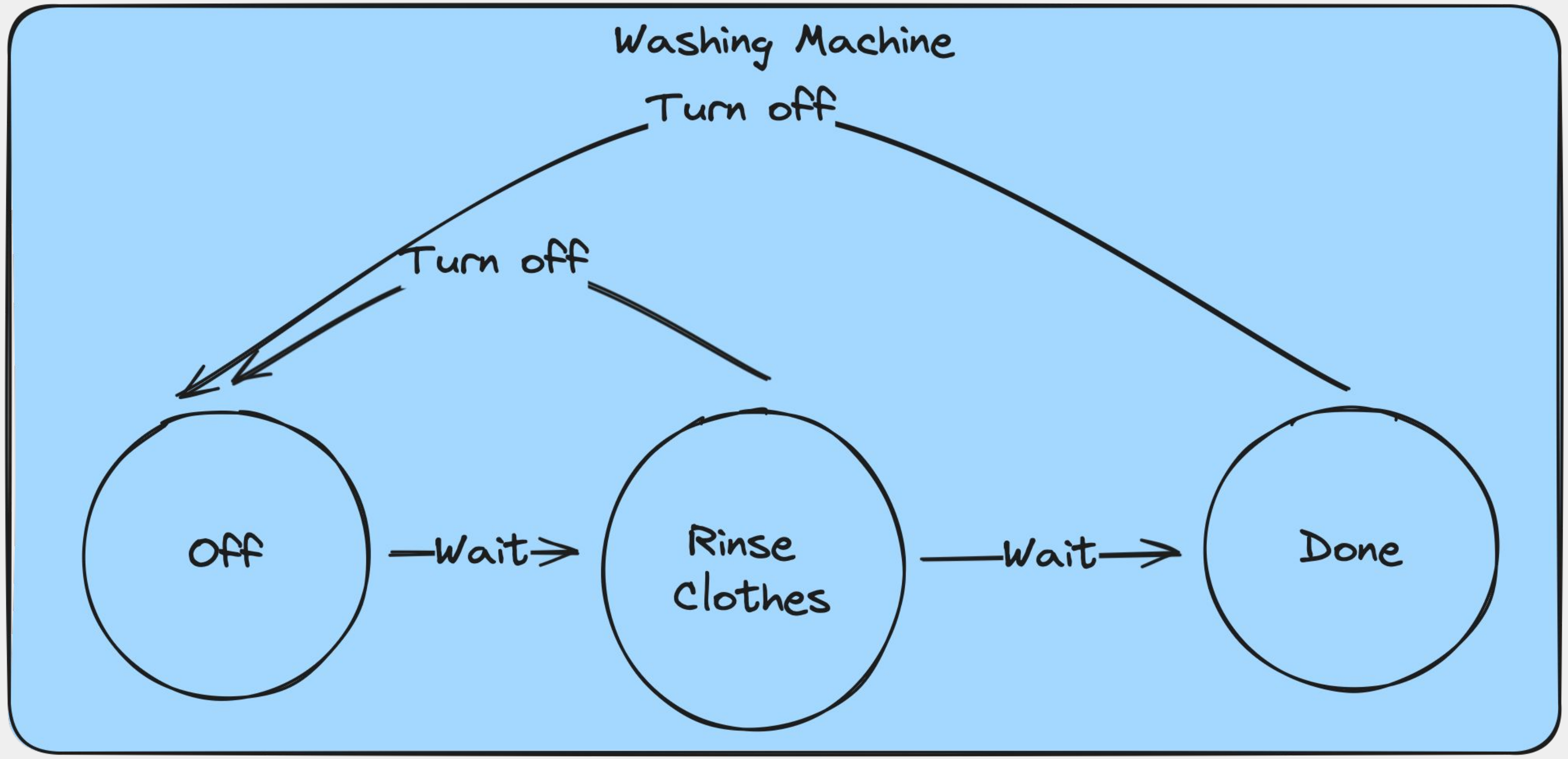

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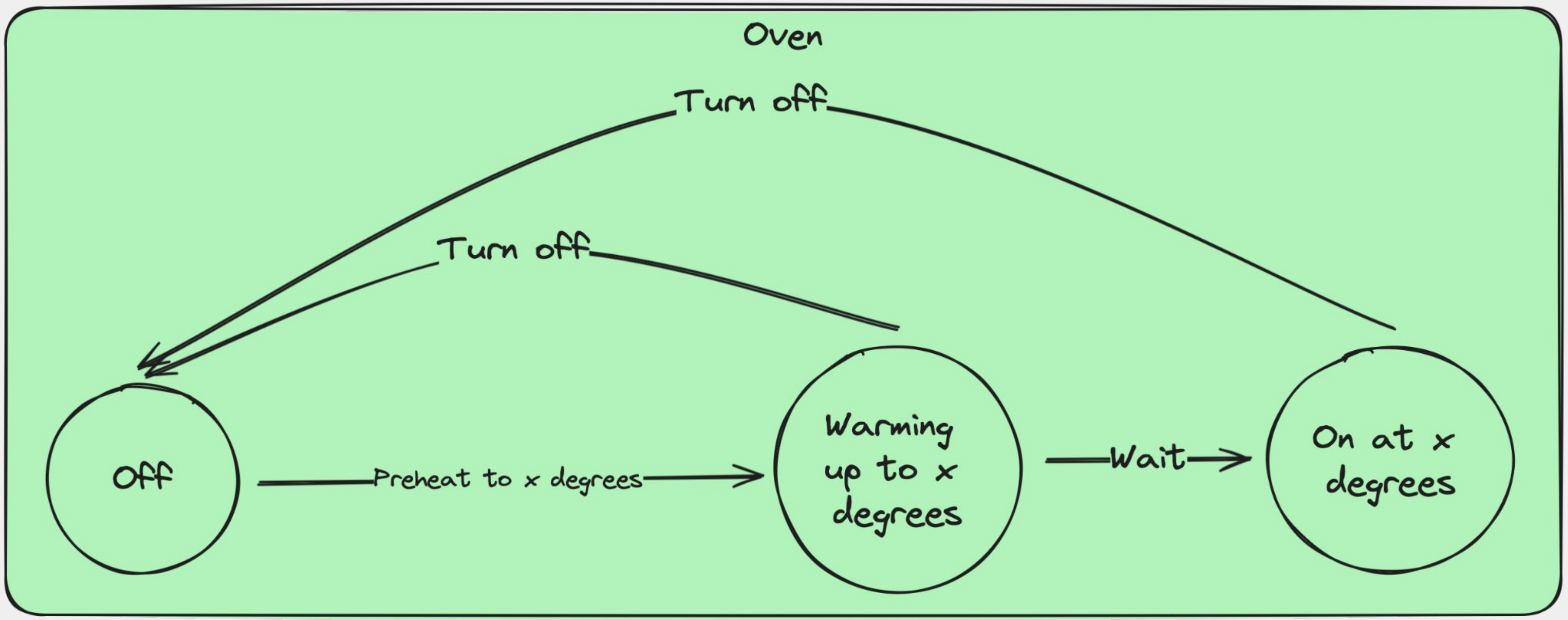

Reducers

~~Contexts~~ Reducers to the Rescue!

- Reducer: f(state, action) -> newState
  - Some initial state
  - Don’t mutate state, just return the new state
    - Mutating makes it hard to see the past state
    - Seeing past state is nice for logging and debugging

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- Why might this be better?
    - We can keep the update logic in one place!
    - Only worry about dispatching the right actions
    - Atomic updates: an action happens all at once if it’s not async

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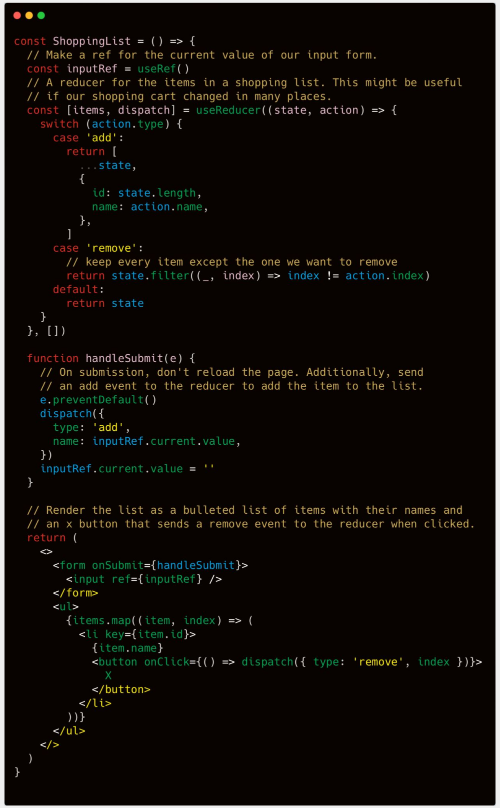
- Why might this be better?
  - We can keep the update logic in one place!
  - Only worry about dispatching the right actions
  - Atomic updates: an action happens all at once if it's not async
- Why are they named that?
  - Similar to Array.reduce
    - `Array.reduce((previousState, newItem) => { const nextState = f(previousState, newItem); return nextState });`
    - The function we use as a reducer is like the function we pass to Array.reduce

Questions?

Some Example Reducer Code

*don't worry if the code is small, we'll talk about each part in detail



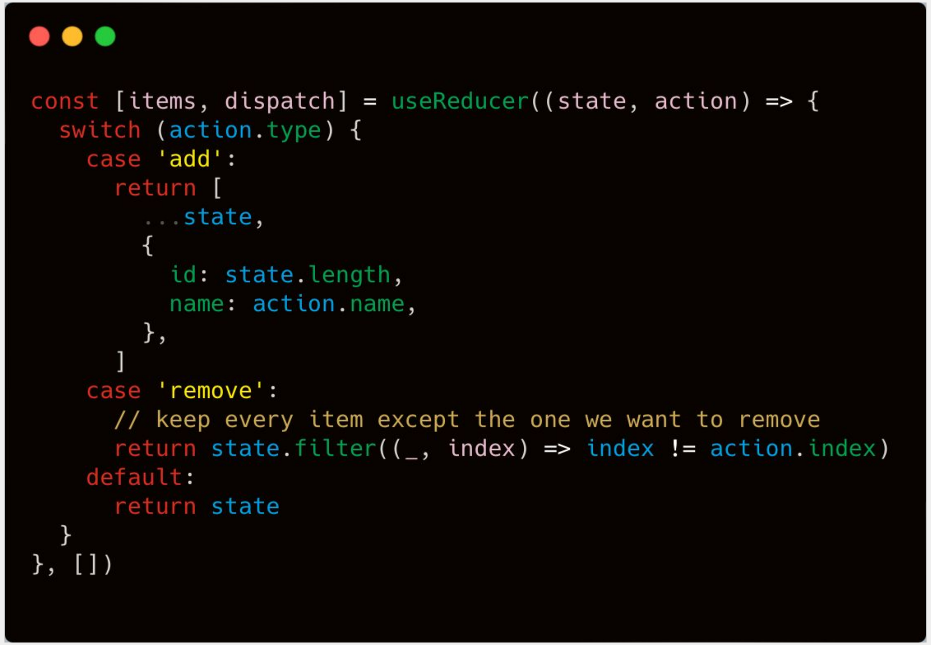
```
const ShoppingList = () => {
  // Make a ref for the current value of our input form.
  const inputRef = useRef()
  // A reducer for the items in a shopping list. This might be useful
  // if our shopping cart changed in many places.
  const [items, dispatch] = useReducer((state, action) => {
    switch (action.type) {
      case 'add':
        return [
          ...state,
          {
            id: state.length,
            name: action.name,
          },
        ]
      case 'remove':
        // keep every item except the one we want to remove
        return state.filter((_, index) => index != action.index)
      default:
        return state
    }
  }, [])

  function handleSubmit(e) {
    // On submission, don't reload the page. Additionally, send
    // an add event to the reducer to add the item to the list.
    e.preventDefault()
    dispatch({
      type: 'add',
      name: inputRef.current.value,
    })
    inputRef.current.value = ''
  }

  // Render the list as a bulleted list of items with their names and
  // an x button that sends a remove event to the reducer when clicked.
  return (
    <>
      <form onSubmit={handleSubmit}>
        <input ref={inputRef} />
      </form>
      <ul>
        {items.map((item, index) => (
          <li key={item.id}>
            {item.name}
            <button onClick={() => dispatch({ type: 'remove', index })}>
              X
            </button>
          </li>
        ))}
      </ul>
    </>
  )
}
```

Some Example Reducer Code

- Here's what a reducer looks like!
- switch is like an if statement here
    - If the type is add, add the item
    - If the type is remove, remove the item
    - For anything else, leave the state unchanged
- The state can be read with items
- But how do we use this code?



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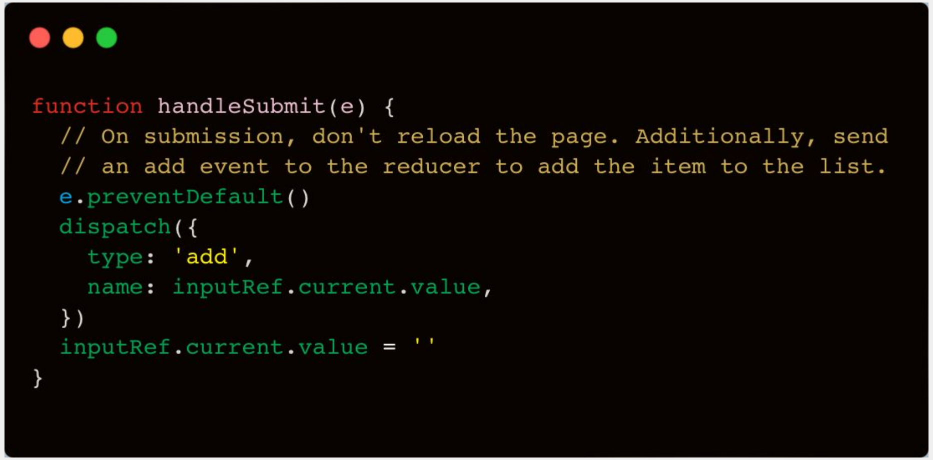
Some Example Reducer Code

- This function, when called, will dispatch an add event
- Adds current value stored in input box to the list
    - inputRef was created earlier



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  inputRef.current.value = ''
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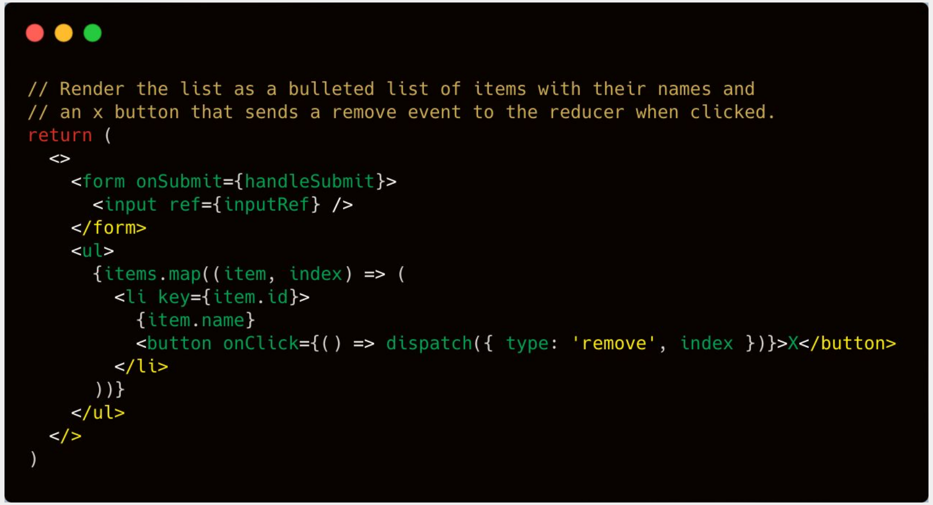
Some Example Reducer Code

- When the form is submitted, call handleSubmit
    - Adds value in input box to list
- When the button next to an item is clicked, remove it from the list
    - Button has an x inside



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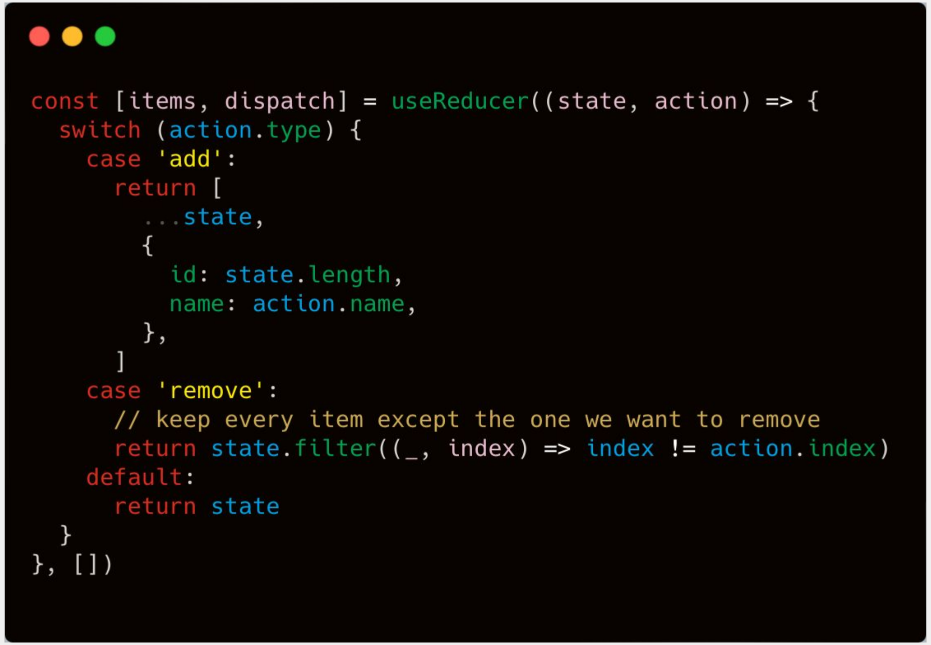
A Reducer Example

- { type: “add”, name: “cheese” }
- [{id: 0, name: “cheese”}]



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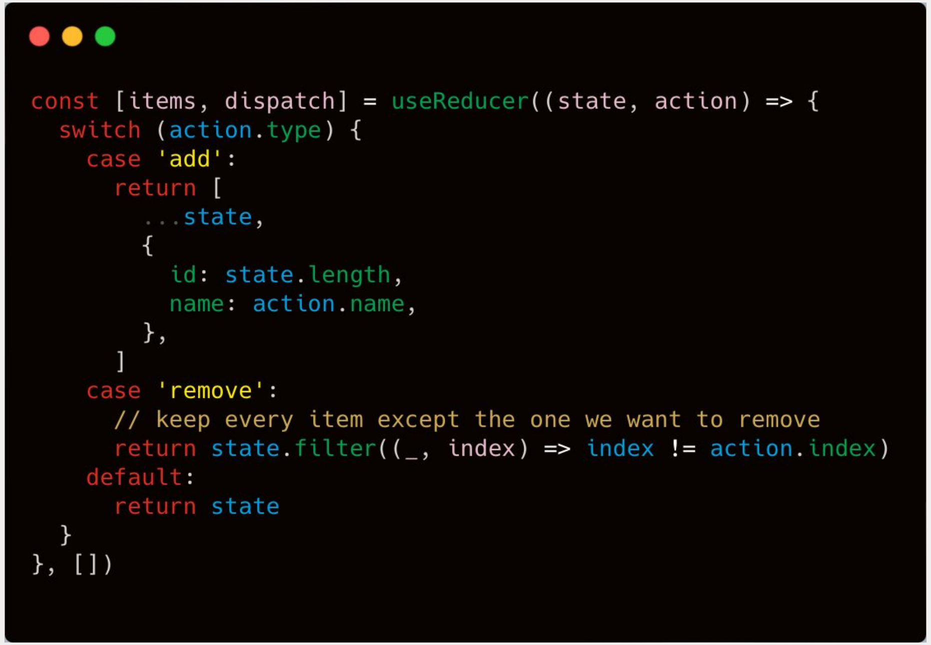

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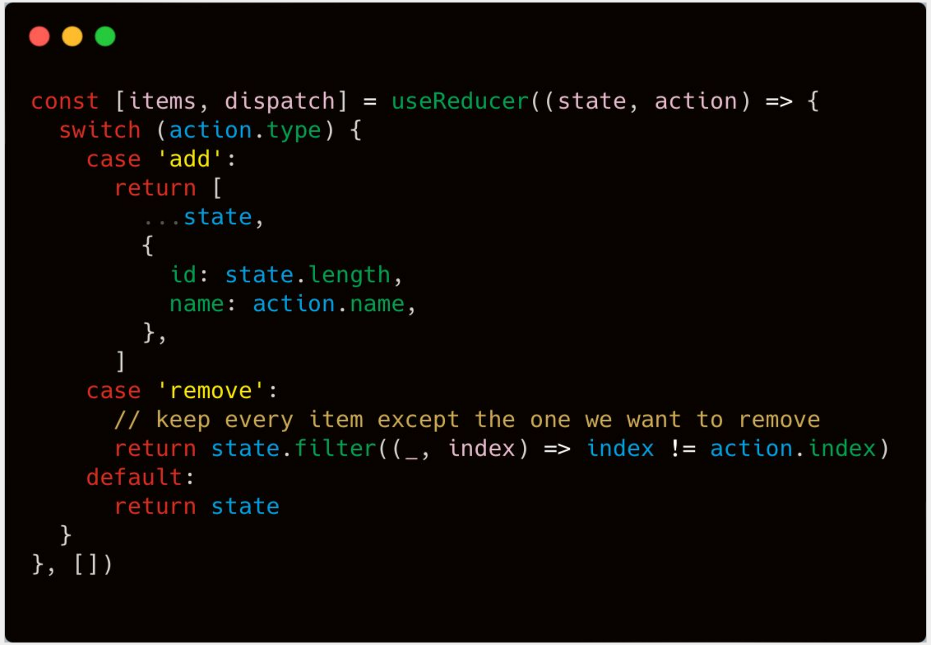

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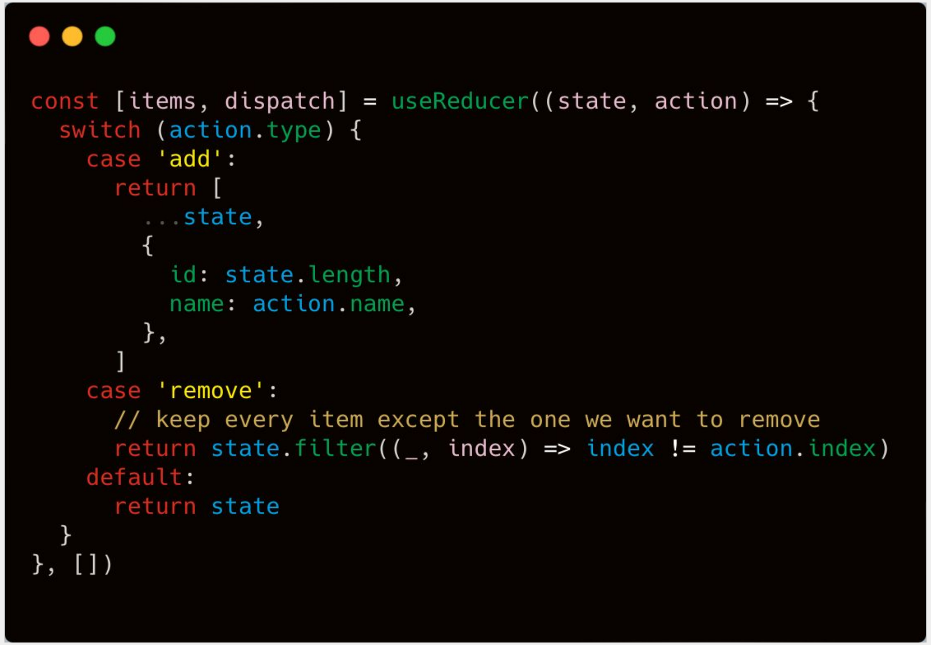

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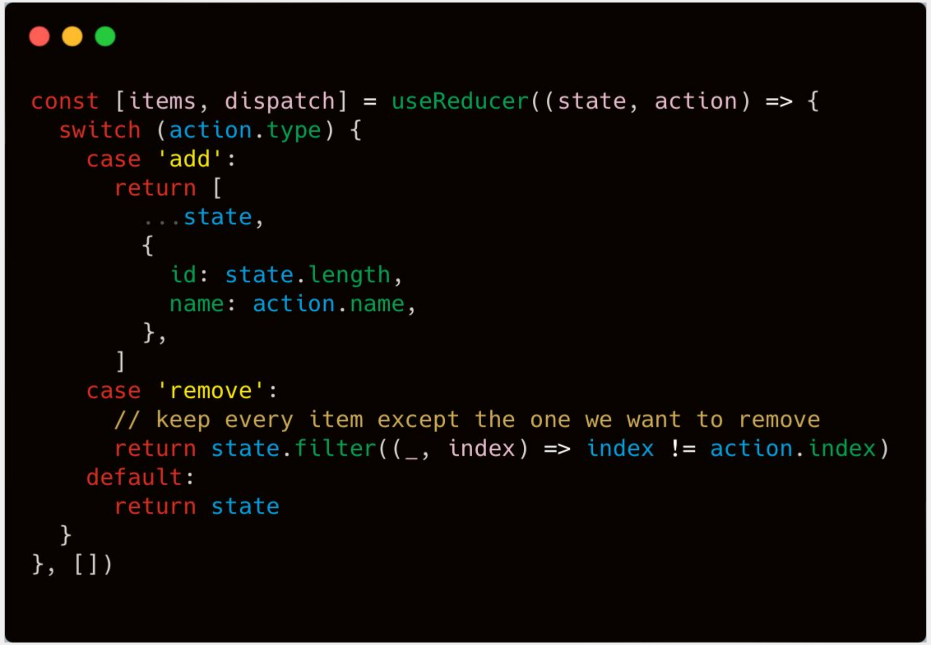

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Questions?

But how can we share reducer values?

- useContext!
  - Share the value with useContext
- Export the dispatch function from one central place
  - Ex: dispatch.js
  - We can just import it then!

State Management

- useContext / useReducer: simple state management
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    - Easier to change how we handle updates if logic changes

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    - Time travel debugging
        - Replay the actions emitted and watch state change!
    - Can easily log actions to see what’s going on in the app

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    - Single global data structure that reducers are looked up in

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- Adds even more complexity than useContext/useReducer

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- Example 3: Large e-Commerce platform with a shopping cart, user authentication, and various product pages
    - Redux!

Wrap-up

- There's a lot more that we haven't said
  - Redux is complicated
  - Interesting performance optimizations
    - Re-render only when relevant state changes
- State management adds complexity
  - Can make code more maintainable and easier to understand
- Maybe it's a good idea for your project!
- Questions?