FULLSTACK DEVELOPMENT (MMT-B2018)

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CODE SOLUTION TO YESTERDAYS EXERCISE TOGETHER

FORMS IN REACT

CONTROLLED VS UNCONTROLLED COMPONENTS

CONTROLLED COMPONENTS

- HTML form elements maintain own state
  - eg. input, textarea, ...
- React usually keeps state in their own components
  - component state/HTML state can get out of sync
- in controlled components react is the single source of truth

CONTROLLED COMPONENTS

» React has ownership of state

  » result: typing in the component does not have any effect

```
const Input = () => {
  return <input name="username" value="" />
  //                           ^^^^^^^^
  // if value is defined input becomes controlled
}
```

CONTROLLED COMPONENTS

```
const Input = () => {
  const [username, setUsername] = useState('')
  return <input
    name="username"
    onChange={(evt) => setUsername(evt.target.value)}
    //                 ^^^^^^^^^^^^
    // 1) whenever onChange setUsername is called with new value
    value={ username }
    // 2) setUsername triggers a rerender with the new username
  />
}
```

UNCONTROLLED COMPONENTS

» the browser keeps ownership of form state

```
const Input = () => {
  return <input name="username" />
  //                ^^^^^^^^
  // if no value attribute is defined on an input
  // the state is uncontrolled and managed by the
  // browser
}
```

HANDLE ERRORS IN COMPONENTS

```
const SignUpForm = ({ onSubmit }) => {
  const [username, setUsername] = useState('')

  return (
    <form>
      <input
        name="username"
        onChange={(evt) => setUsername(evt.target.value)}
        value={ username }
      />
      { username.length === 0 && ( // when username is 0 display error
        <span>Username can't be blank</span>
      )}
      <button type="submit">Sign up</button>
    <form/>
  )
}
```

TASK (15 MINUTES)

- adapt your sign-up form
  - convert your components to controlled components
  - display error messages when username or password is blank
- Do you find any issues in your code?

DO YOU SEE ANY ISSUES WITH THE CODE

```
const SignUpForm = ({ onSubmit }) => {
  const [username, setUsername] = useState('')

  return (
    <form>
      <input
        name="username"
        onChange={(evt) => setUsername(evt.target.value)}
        value={ username }
      />
      { username.length === 0 && (
        <span>Username can't be blank</span>
      )}
      <button type="submit">Sign up</button>
    <form/>
  )
}
```

DO YOU SEE ANY ISSUES WITH THE CODE

 DON'T SPOIL YOURSELF AND LOOK AT THE NEXT SLIDES 

DO YOU SEE ANY ISSUES WITH THE CODE

I MEAN REALLY, STOP HERE 😄

DO YOU SEE ANY ISSUES WITH THE CODE

 SERIOUSLY 

DO YOU SEE ANY ISSUES WITH THE CODE

- errors are shown even if a user didn't focus the input
- form can be submitted even if it contains errors
  - sign-in button is not disabled
- adding complex validations is tedious

FORM LIBRARIES WHICH MAKE YOUR LIFE EASIER

- there are multiple libraries which help with validation
  - formik
  - react-hook-form
  - react final form

FORMIK

» Form library which can be used with hooks

» uses controlled components

» npm install formik yup

FORMIK
EXAMPLE

```
import { useFormik } from "react-hook-form";

const SignInForm = () => {
  const formik = useFormik({
    initialValues: { username: '' },
    onSubmit: values => console.log(values),
  });

  return (
    <form onSubmit={formik.handleSubmit}>
      <input
        name="username"
        onChange={formik.handleChange}
        value={formik.values.username}
      />
      {/* ... */}
    </form>
  )
}
```

FORMIK
WITH ERRORS

```
import { useFormik } from "react-hook-form";
import {object, string} from 'yup'

const validationSchema = object({
  username: string().min(3)
})

const SignInForm = () => {
  const formik = useFormik({
    initialValues: { username: '' },
    validationSchema: validationSchema,
    // verify form with schema  ^^^^^^^^^^

  });

  return (
    <form onSubmit={formik.handleSubmit}>
      <input
        name="username"
        onChange={formik.handleChange}
        value={formik.values.username}
      />
      { formik.errors.username }
      {/* display the error */}
    </form>
  )
}
```

TASK 20 MINUTES

» convert your Sign Up form to use react hooked forms

OTHER HOOKS

USEEFFECT [4]

```
// Executed on every rerender
useEffect(() => {})

// Executed when component rendered initially
useEffect(() => {}, [])

// Executed when component rendered initially
// and when variable changes.
useEffect(() => {}, [variable])

// Cleanup when component unmounts (eg. eventHandlers, setInterval/setTimeout)
useEffect(() => {
  // do something fancy
  return () => { console.log('cleanup') }
}, [variable])
```

[4] this will be covered in more detail in the side effect lecture

PREVIOUS EXAMPLE

```
const useCounter = () => {
  const [count, setCount] = useState(0);
  const handleIncrement = () => setCount(count + 1);
  return { count, handleIncrement };
}

const App = () => {
  const {count,handleIncrement} = useCounter();

  return (
    <div>
      <div>{count}</div>
      <button onClick={handleIncrement}>Increment by 1</button>
    </div>
  );
}
```

UPDATE TITLE WITH COUNTER

```
const useCounter = () => {
  const [count, setCount] = useState(0);
  const handleIncrement = () => setCount(count + 1);
  return { count, handleIncrement };
}

const App = () => {
  const {count,handleIncrement} = useCounter();

  // Is executed when component is rendered for the first time
  // And when the counter variable changes.
  useEffect(() => {
    document.title = `Counter clicked ${count} times`;
  }, [count]);

  return (
    <div>
      <div>{count}</div>
      <button onClick={handleIncrement}>Increment by 1</button>
    </div>
  );
}
```

EXTRACT TO CUSTOM HOOK

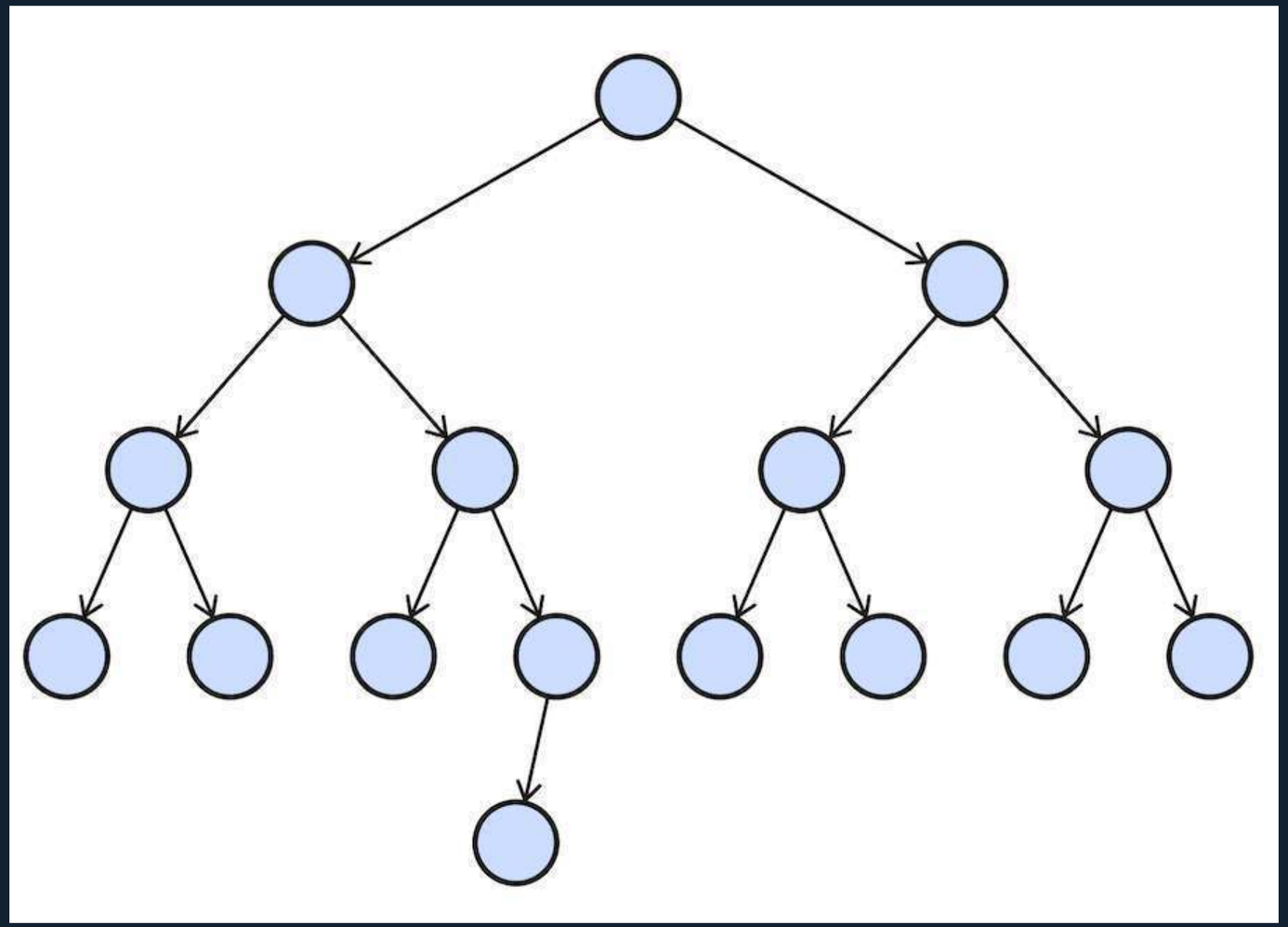
```
const useCounter = () => {
  const [count, setCount] = useState(0);
  const handleIncrement = () => setCount(count + 1);
  useEffect(() => {
    document.title = `Counter clicked ${count} times`;
  }, [count]);
  // ^^^^^^ moved to hook

  return { count, handleIncrement };
}

const App = () => {
  const {count,handleIncrement} = useCounter();

  return (
    <div>
      <div>{count}</div>
      <button onClick={handleIncrement}>Increment by 1</button>
    </div>
  );
}
```

REACT.MEMO

“Memoizing a function makes it faster by trading space for time. It does this by caching the return values of the function in a table. [7]”

[7] https://metacpan.org/pod/Memoize

REACT.MEMO



REACT.MEMO

» Caches the rendered component

» Only rerenderes when one of the props changes

  » shallow comparison

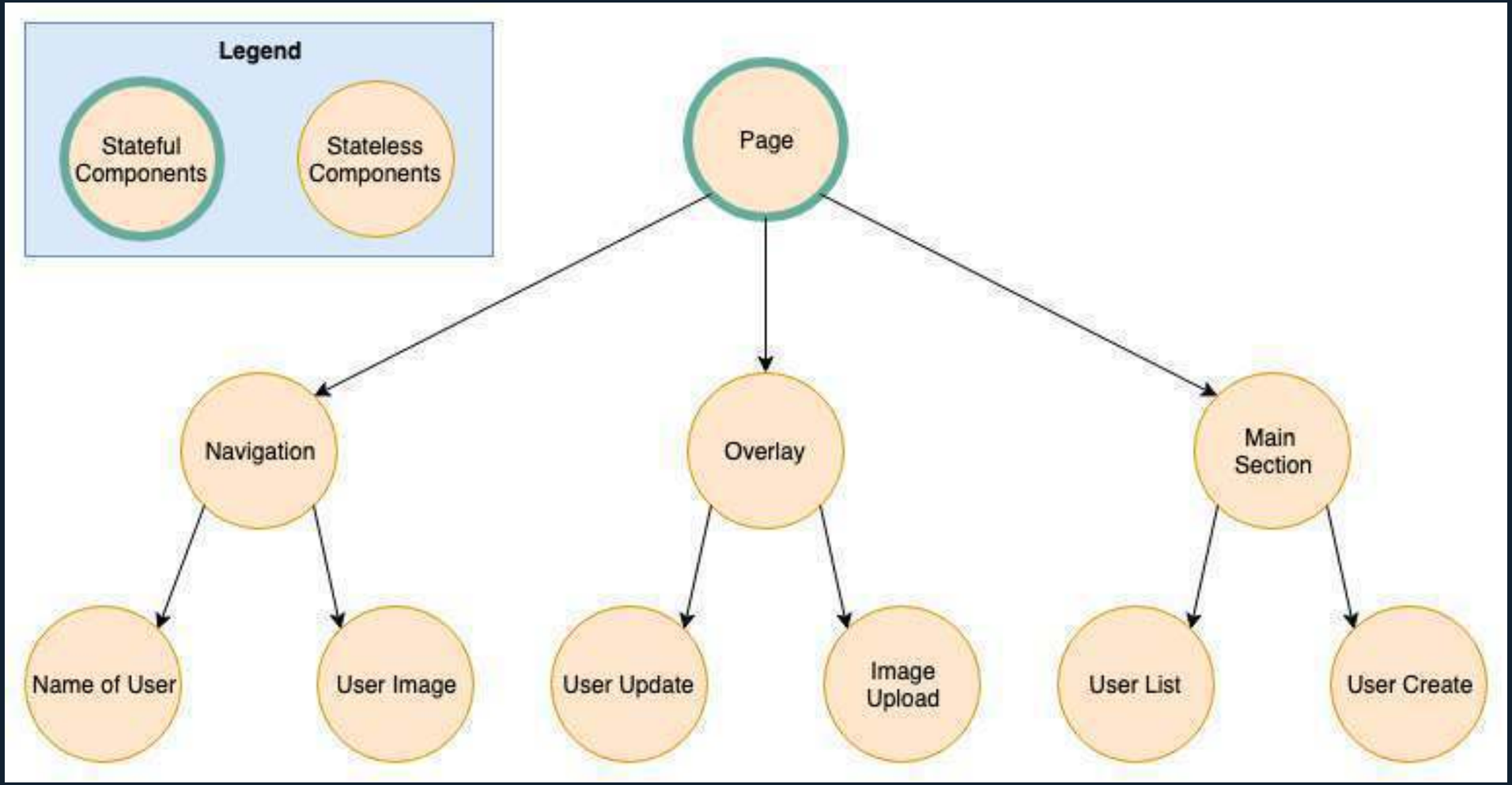
```
const MyComponent = React.memo(function MyComponent(props) {
  /* render using props */
});
```

REACT CONTEXT API

» Available since the beginning of React

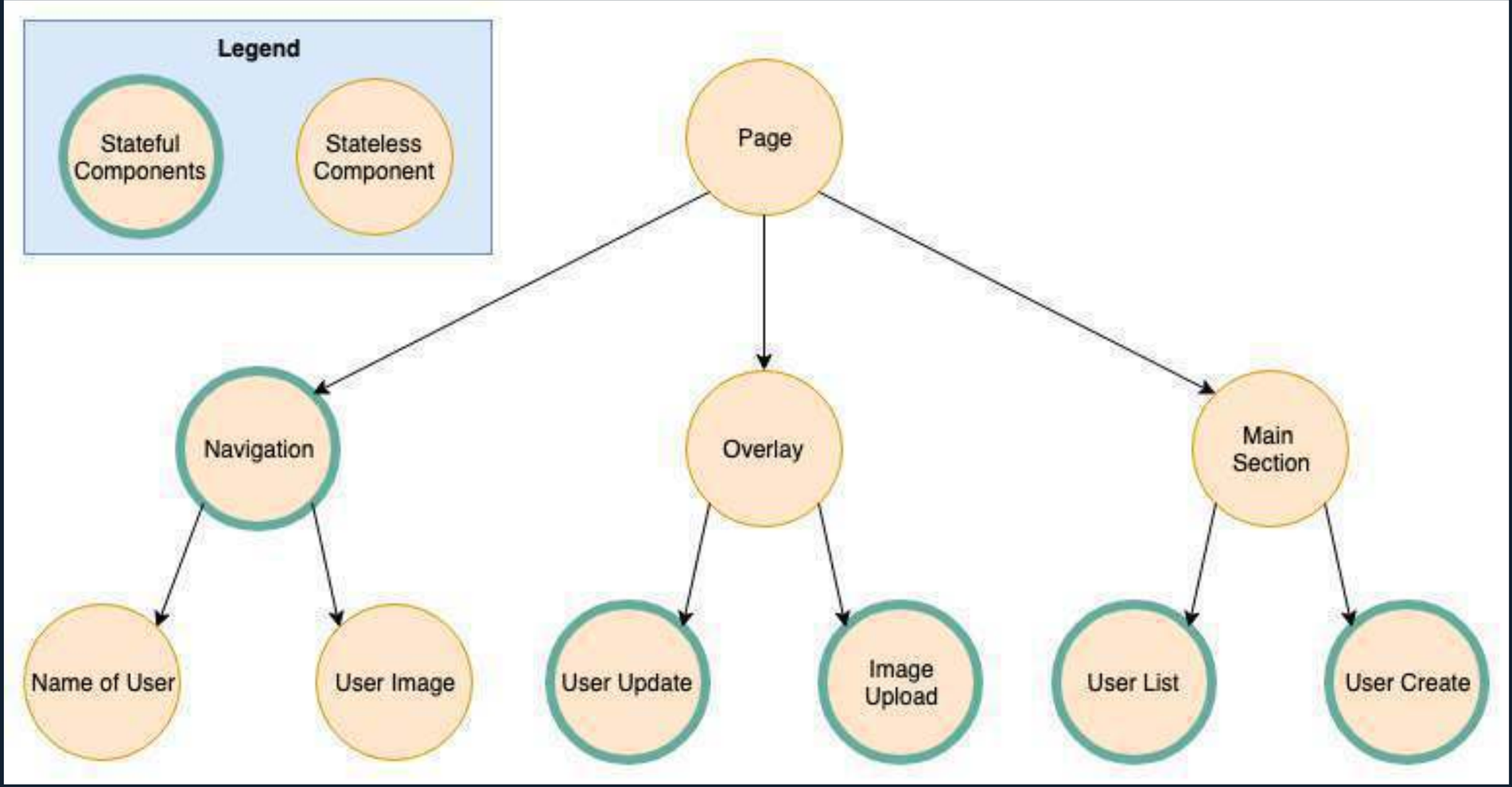
» Prevent "prop drilling"

REACT CONTEXT API



REACT CONTEXT API

REACT CONTEXT API

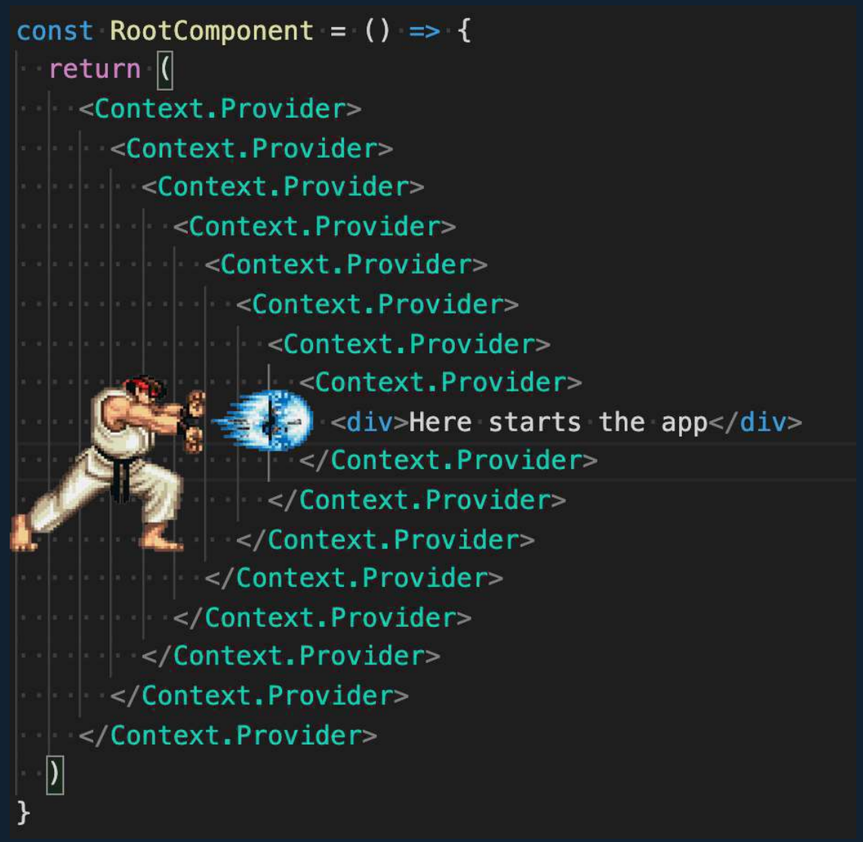


CREATING A CONTEXT

```
const DEFAULT_VALUE = 1
const MyContext = React.createContext(DEFAULT_VALUE)

const RootComponent = () => {
  return (
    <MyContext.Provider value={2}>
      <ANestedComponent />
    </MyContext.Provider>
  )
}

const ANestedComponent = () => {
  const value = useContext(MyContext)
  return (
    <h1>The value from context is {value}</h1>
  )
}
```

PITFALLS 1

» fine granular context



```
const RootComponent = () => {
  return (
    <Context.Provider>
      <Context.Provider>
        <Context.Provider>
          <Context.Provider>
            <Context.Provider>
              <Context.Provider>
                <Context.Provider>
                  <Context.Provider>
                    <div>Here starts the app</div>
                  </Context.Provider>
                </Context.Provider>
              </Context.Provider>
            </Context.Provider>
          </Context.Provider>
        </Context.Provider>
      </Context.Provider>
    </Context.Provider>
  )
}
```

PITFALLS/TIPS

- Prefer passing props down to components
  - prefer explicit (pass down) vs implicit (context)
- only use when multiple components need to access same data
  - if possible pass data down
- don't overuse

OTHER HOOKS

- API Reference
  - useReducer
  - useCallback
  - useMemo
  - useRef
  - useImperativeHandle
  - useLayoutEffect

TASK ADVANCED HOOKS TASK

- build a clock component
  - component displays current time in seconds
  - automatically updates itself
  - remove setInterval when component unmounts
- You'll need
  - useEffect, useState
  - setInterval or setTimeout

ROUTING

REACT ROUTER

» dynamic routing library for

» react native

» react web

» Documentation

INSTALLATION

```
npm install react-router-dom --save
```

USAGE

```
import { BrowserRouter as Router, Route, Switch, Redirect } from "react-router-dom";
import Homepage from './components/homepage'
import SignIn from './components/sign-in'

const App = () => {
  return (
    <Router> { /* creates a new routing context */ }
      <Switch> { /* render only one route */ }
        { /* define routes and pass component as prop to the route */ }
        <Route path="/sign-in" component={SignIn}>
        <Route path="/" component={Homepage}>
        { /* if no route matches redirect to 'Homepage' */ }
        <Redirect to='/'>
      </Switch>
    </Router>
  );
}
```

ROUTE PRIORITY (WITHOUT EXACT)

```
// path === "/" => renderes Homepage
// path === "/sign-in" => renderes Homepage
const Routes = () => (
    <Switch>
      <Route path='/' component={Homepage} />
      <Route path='/sign-in' component={SignIn} />
    </Switch>
)
```

ROUTE PRIORITY (WITHOUT EXACT)

```
// path === "/" => renderes Homepage
// path === "/sign-in" => renderes SignIn
const Routes = () => (
    <Switch>
      <Route path='/sign-in' component={SignIn} />
      <Route path='/' component={Homepage} />
    </Switch>
)
```

ROUTE PRIORITY (WITH EXACT)

```
// path === "/" => renderes Homepage
// path === "/sign-in" => renderes sign-in
const Routes = () => (
    <Switch>
      <Route exact path='/' component={Homepage} />
      <Route exact path='/sign-in' component={SignIn} />
    </Switch>
)
```

ADD LINKS FROM HTML

```
import { Link } from 'react-router-dom'

const Routes = () => (
  <nav>
    <Link to='/'>Home</Link>
    <Link to='/sign-in'>Sign in</Link>
  </nav>
)
```

ADD REDIRECTS FROM JS

```
import { withRouter } from 'react-router-dom'

const SignIn = withRouter(({ history }) => {
  const onSubmit = (evt) => {
    evt.preventDefault()
    history.push('/')
  }

  return (
    <form onSubmit={onSubmit}>
      {/* ... */}
    </form>
  )
})
```

TASK 20 MINUTES

- Start the application npm run start
  - npm install react-router-dom
  - add 2 routes
  - sign-up/
    - renders the SignUp component
  - sign-in/
    - renders a SignIn component (needs to be built)

HOMEWORK

HOMEWORK 1

- Build the following components in Storybook
  - UserSignIn -> onSubmit => { username, password }
  - UserSignUp -> onSubmit => { username, password }
  - MoneyTransactionCreate
  - users => { id, name }
  - onSubmit => { debitorId, creditorId, amount }
  - MoneyTransactionList (Lists all Money

HOMEWORK 2

- You probably need the following core components
  - `<TextInput {...} />`
  - `<DecimalInput {...} />`
  - `<SelectInput {...} />`
  - `<Button {...} />`
  - ...

HOMEWORK 3

» Allowed to use CSS Frameworks

» Not allowed to use Component Libraries

» You can use as a starting point https://github.com/webpapaya/fhs-react-redux-starter-kit

» Mock Data for the API https://gist.github.com/webpapaya/ba25ac39138b6f6a50a04f2b0820cf65

HOMEWORK 4

- Add the following routes
  - /sign-in
  - Sign-In component is rendered
  - /sign-up
  - Sign-Up component is rendered
  - /money-transactions
  - money-transactions-create component is rendered

HOMEWORK 5

- No need to connect to the backend
- Form submissions (just log to the screen or alert them)
- Don't update UI on form submissions
  - eg.: when creating a transaction the list doesn't need to update
  - we'll do this together next time

FEEDBACK

» Questions: tmayrhofer.lba@fh-salzburg.ac.at

» https://de.surveymonkey.com/r/8TW92LL