

# **FULLSTACK DEVELOPMENT (MMT-B2018)**

# **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<sup>4</sup>

```
// 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])
```

<sup>4</sup> 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();

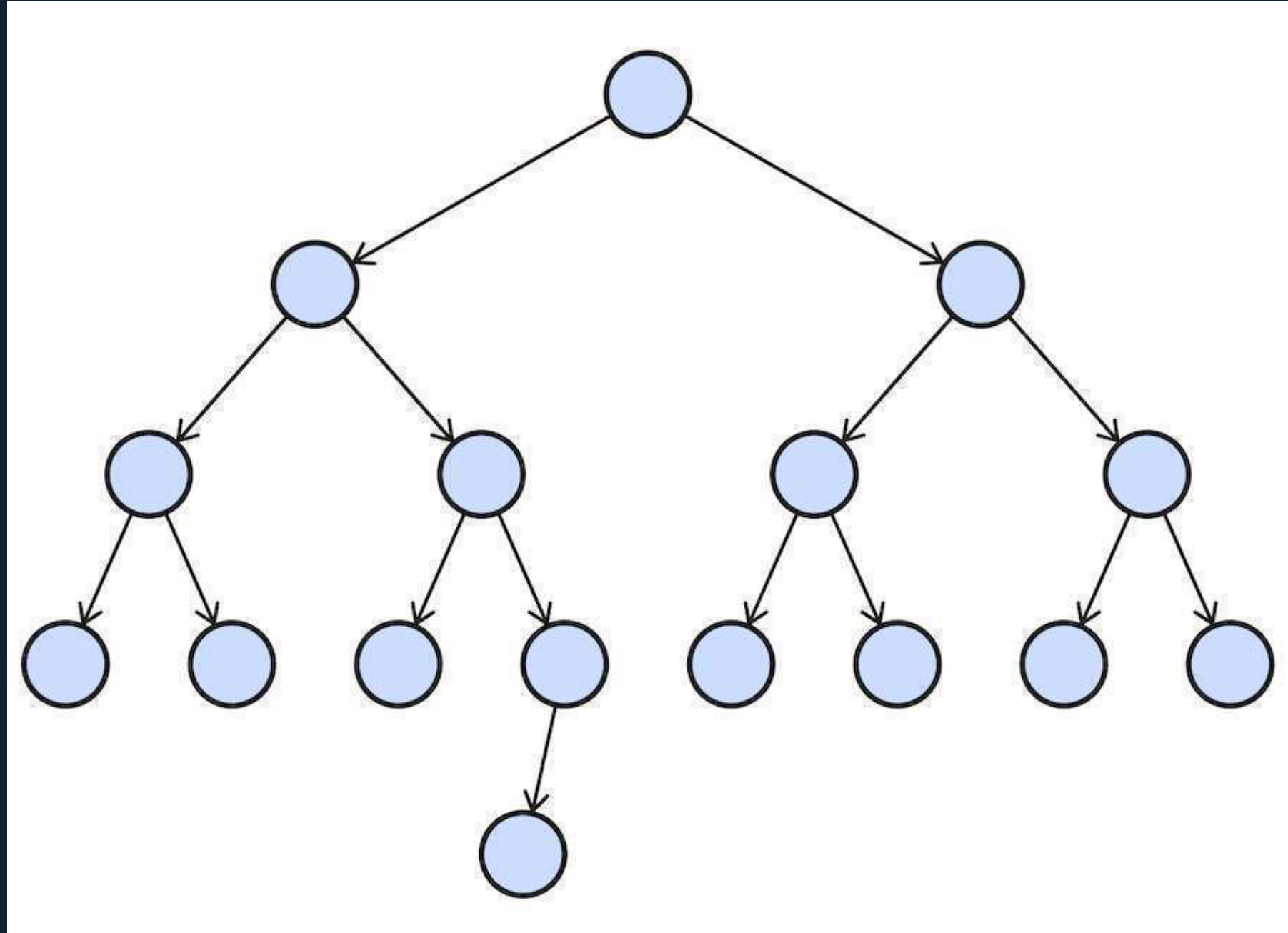
  return (
    <div>
      <div>{count}</div>
      <button onClick={handleIncrement}>Increment by 1</button>
    </div>
  );
}
```

# 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.”<sup>7</sup>

<sup>7</sup> <https://metacpan.org/pod/Memoize>

# REACT.MEMO



# REACT.MEMO

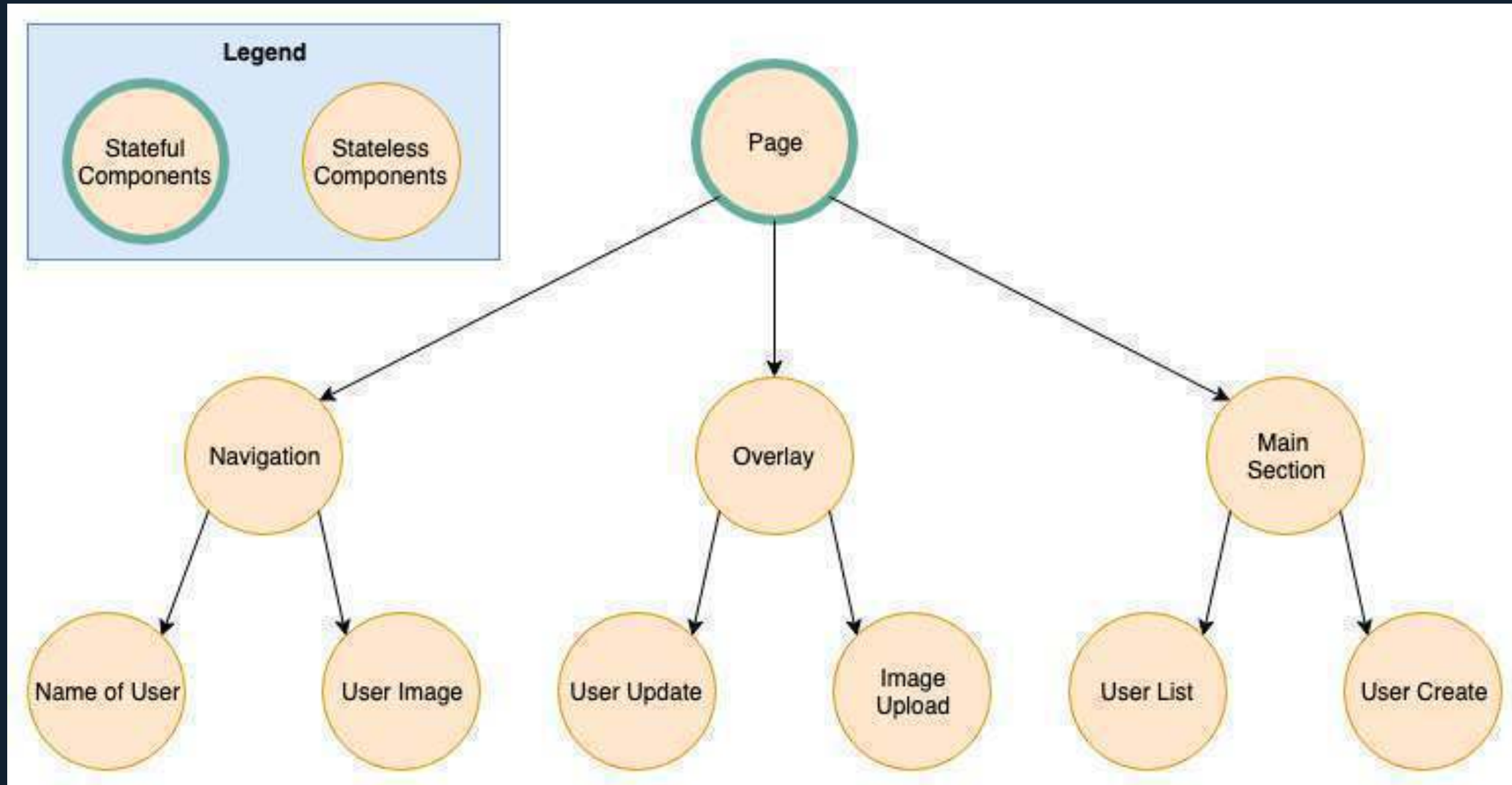
- » Caches the rendered component
- » Only rerenders when one of the props changes
  - » shallow comparison

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

# REACT CONTEXT API

- » Available since the beginning of React
- » Prevent "prop drilling"

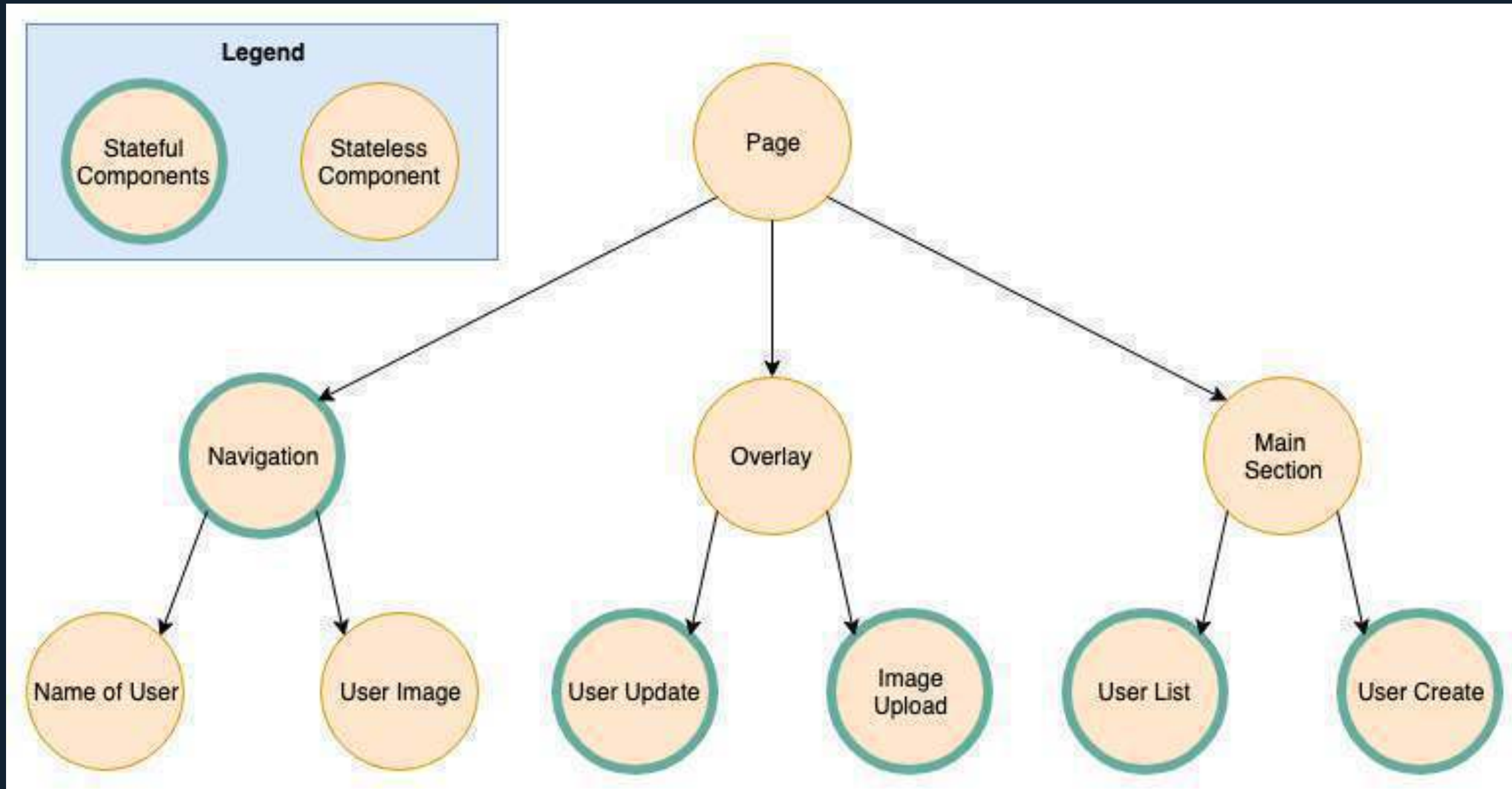
# REACT CONTEXT API



# REACT CONTEXT API

```
▼ <R>
  ▼ <View pointerEvents="box-none" style={281}>
    ▼ <div className="css-1dbjc4n r-13awgt0 r-12vffkv">
      ▼ <View key="1" pointerEvents="box-none" style={281}>
        ▼ <div className="css-1dbjc4n r-13awgt0 r-12vffkv">
          ▼ <t isNightMode={false}>
            ▼ <t>
              ▼ <R>
                ▼ <Context.Consumer>
                  ▼ <Context.Provider>
                    ▼ <Connect(t)>
                      ▼ <t language="de" loggedInUserId="253431163">
                        ▼ <t>
                          ▼ <Router.Consumer.Provider>
                            ▼ <withRouter(n)>
                              ▼ <t>
                                ▼ <Router.Consumer.Consumer>
                                  ▼ <Router.Consumer.Provider>
                                    ▼ <n>
                                      ▼ <t>
                                        ▼ <Router.Consumer.Consumer>
                                          ▼ <t>
                                            ▼ <Router.Consumer.Consumer>
                                              ▼ <Router.Consumer.Provider>
                                                ▼ <Unknown>
                                                  ▼ <t>
                                                    ▼ <withRouter(t)>
                                                      ▼ <t>
                                                        ▼ <Router.Consumer.Consumer>
                                                          ▼ <Router.Consumer.Provider>
                                                            ▼ <t>
                                                              ▼ <Connect(t)>
                                                                ▼ <t scale="normal">
                                                                  ▼ <t>
                                                                    ▼ <t showReload={true}>
                                                                      ▶ <SideEffect(t) title="Twitter">...</SideEffect(t)>
                                                                      ▶ <withRouter(Connect(t))>...</withRouter(Connect(t))>
                                                                      ▶ <t zIndex={1}>...</t>
                                                                    ▼ <View>
                                                                      ▼ <div className="css-1dbjc4n r-1pi2tsx r-sa2ff0 r-13qz1uu r-417010">
                                                                        ▶ <withRouter(Connect(i))>...</withRouter(Connect(i))>
                                                                        ▼ <@twitter/Responsive>
                                                                          ▼ <View accessibilityRole="main" style={245}>
                                                                            ▼ <main role="main" className="css-1dbjc4n r-16y2uox r-1wbh5a2">
                                                                              ▼ <View style={248}>
```

# 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 => { debtorId, 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`