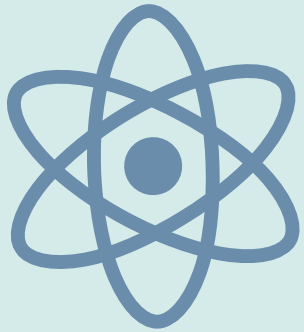
EINSTIEG IN



React

http://nilshartmann.net/react-talk

OLIVER ZEIGERMANN & NILS HARTMANN | ENTERJS | JUNI 2016

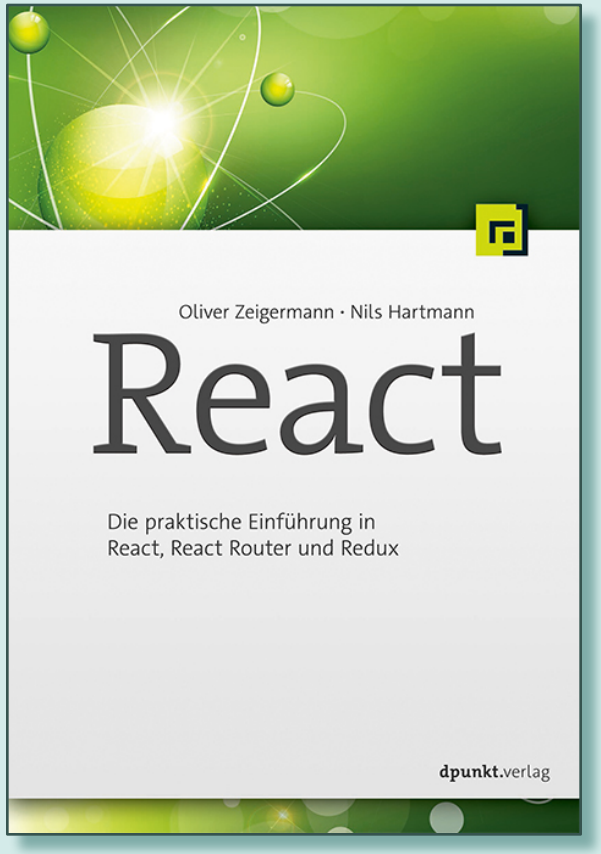
NILS HARTMANN

@NILSHARTMANN

OLIVER ZEIGERMANN

@DJCORDHOSE

HTTP://NILSHARTMANN.NET/REACT-TALK



HTTP://REACTBUCH.DE

SINGLE PAGE APPLICATIONS

React

OPEN SOURCE VON FACEBOOK

https://facebook.github.io/react

React

0.3

05 | 2013 – OPEN SOURCE

0.14.8

v 15.0

05 | 2016 – NEUE VERSIONIERUNG

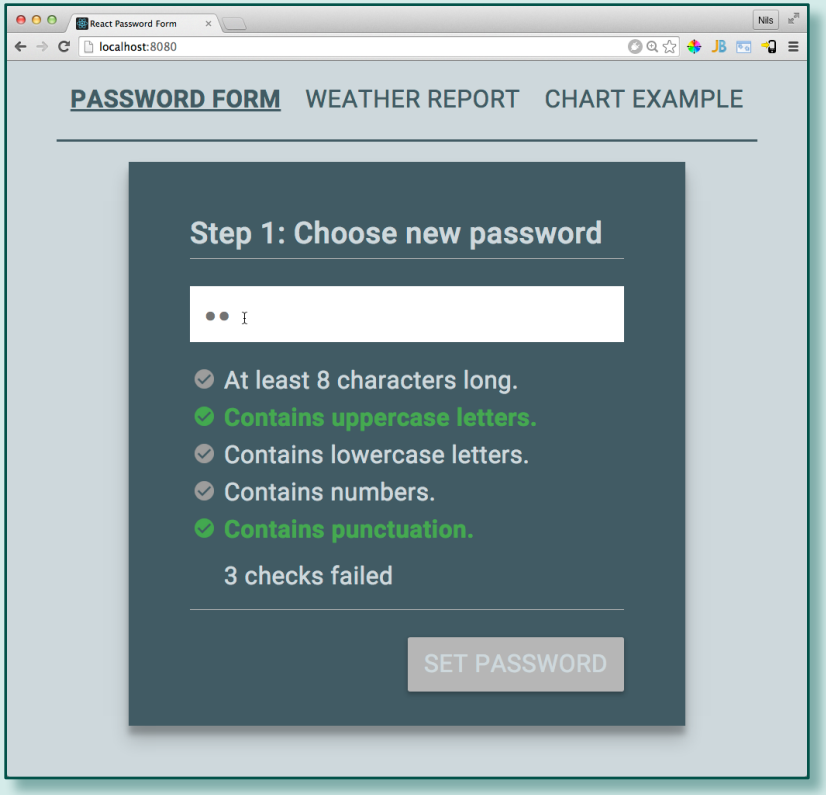
AKTUELLE VERSION

V in MVC

NUR VIEW-SCHICHT

ES6+

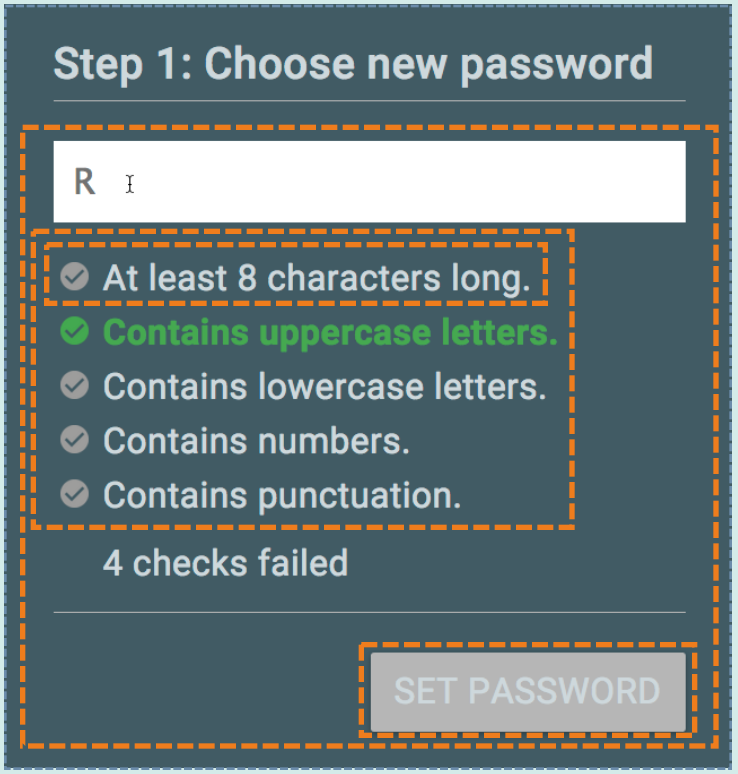
ECMASCRIPT 2015



Code: https://github.com/nilshartmann/react-example-app

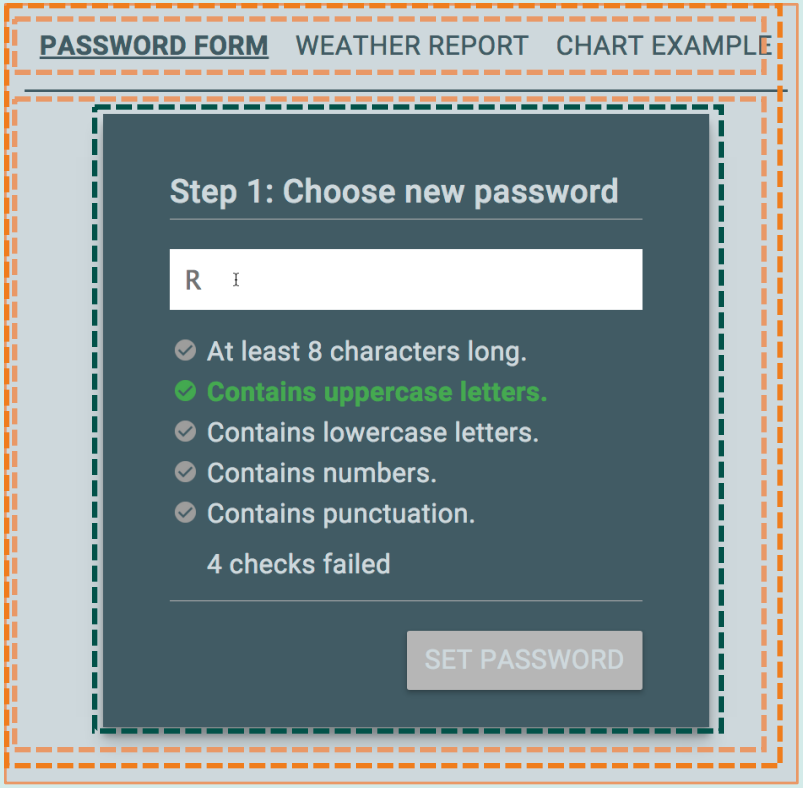
Demo: https://nilshartmann.github.io/react-example-app/

BEISPIEL ANWENDUNG




```
<PasswordView>
  <PasswordForm>
    <input />
    <CheckLabelList>
      <CheckLabel />
      <CheckLabel />
    </CheckLabelList>
    <Label />
    <Button />
  </PasswordForm>
</PasswordView>
```

WIEDERVERWENDBARE KOMPONENTEN



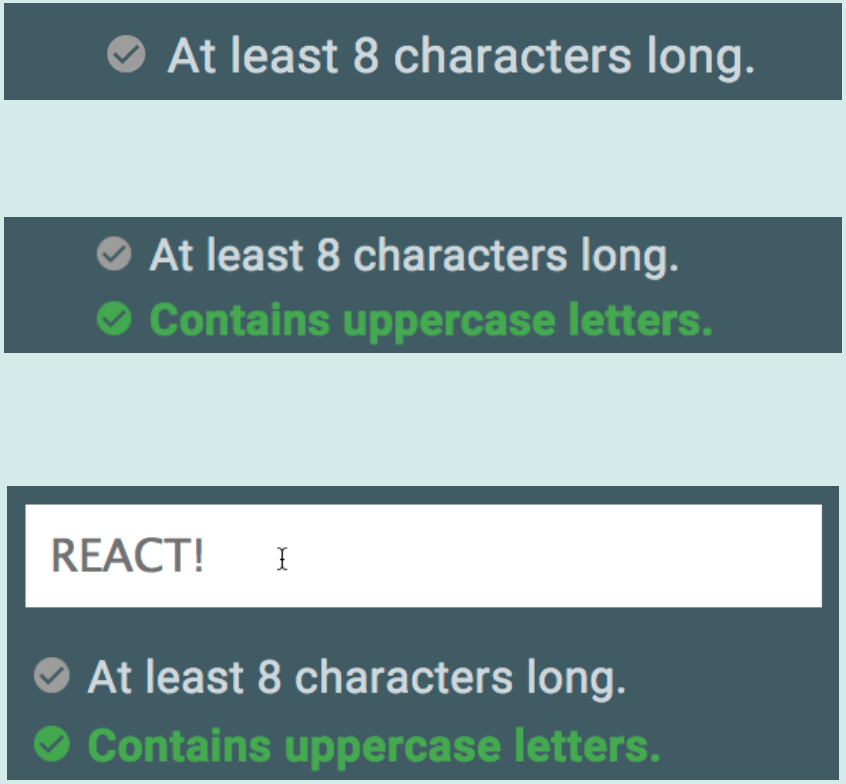

```
<Application>
  <Navigation />
  <ViewContainer>
    <PasswordView>
      . . .
      . . .
    </PasswordView>
  </ViewContainer>
</Application>
```

ANWENDUNGEN AUS KOMPONENTEN KOMPONIERT

React-Komponenten

- werden deklarativ beschrieben
- bestehen aus Logik und UI
- keine Templatesprache
- werden immer komplett gerendert

- können auf dem Server gerendert werden


At least 8 characters long.
At least 8 characters long.
Contains uppercase letters.
REACT!
At least 8 characters long.
Contains uppercase letters.

DIE JSX SPRACHERWEITERUNG

Anstatt einer Template Sprache: HTML in JavaScript integrieren

- Erlaubt Schreiben von HTML-artigen Ausdrücken im JavaScript-Code
- Wird zu regulärem JavaScript Code compiliert (z.B. Babel, TypeScript)
- Optional

JSX

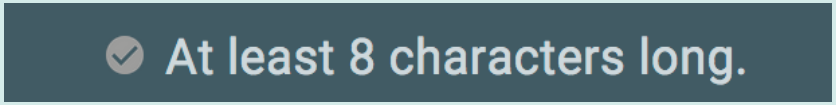
```
const name = 'Lemmy';
const greeting = <h1>Hello, {name}</h1>;
```

Übersetztes JavaScript

```
var name = 'Lemmy';
var greeting = React.createElement('h1', null, 'Hello, ', name);
```

EINE REACT KOMPONENTE: ALS FUNKTION

Komponente CheckLabel

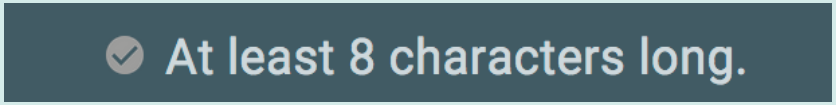


Komponentenfunktion

JSX

```
function CheckLabel() {
  return <div
    className="CheckLabel-unchecked">
    At least 8 characters long.
  </div>;
}
```

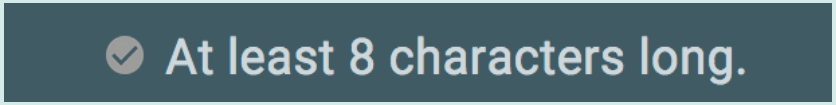
KOMPONENTE EINBINDEN



index.html

```
<html>
  <head>. . .</head>
  <body>
    <div id="mount"></div>
  </body>
  <script src="dist/dist.js"></script>
</html>
```

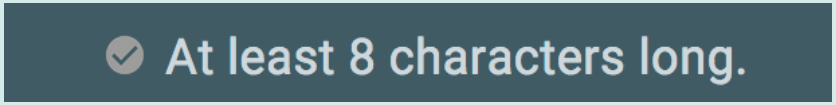
KOMPONENTE EINBINDEN



app.js

```
import React from 'react';
import ReactDOM from 'react-dom';

import CheckLabel from './CheckLabel';

ReactDOM.render(
  <CheckLabel />,
  document.getElementById('mount')
);
```

KOMPONENTEN: PROPERTIES

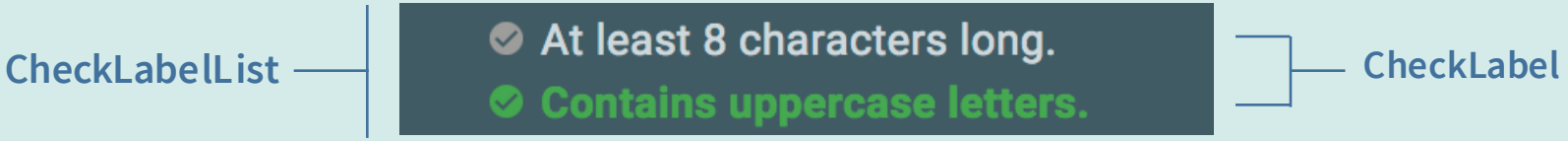



```
{
 checked: false,
 label: 'At least 8 characters long.'
}
```

```
function CheckLabel(props) {
  return <div
    className=
   {props.checked?'CheckLabel-checked':'CheckLabel-unchecked'}>
    {label}
  </div>;
}
```

KOMPONENTEN VERWENDEN

- Komponenten sind zusammensetzbar




```
function CheckLabelList() {
  return <div>
    <CheckLabel checked={false}
       label='At least 8 characters long' />
    <CheckLabel checked={true}
       label='Contains uppercase letters.' />
  </div>;
}

function CheckLabel(props) {
  // . . .
}
```

KOMPONENTEN KLASSEN

ECMAScript 2015 Klasse

Properties über Konstruktor (optional)

Lifecycle Methoden (optional)

Render-Methode (pflicht)

Properties über **props** Objekt

```
class CheckLabelList extends React.Component {
  constructor(props) {
    super(props);
  }

  componentDidMount() { . . . }
  componentWillReceiveProps() { . . . }
  shouldComponentUpdate() { . . . }

  render() {
    return <div>
      {this.props.checks.map(c => <CheckLabel . . ./>)}
   </div>;
  }
}
```

ZUSTAND VON KOMPONENTEN

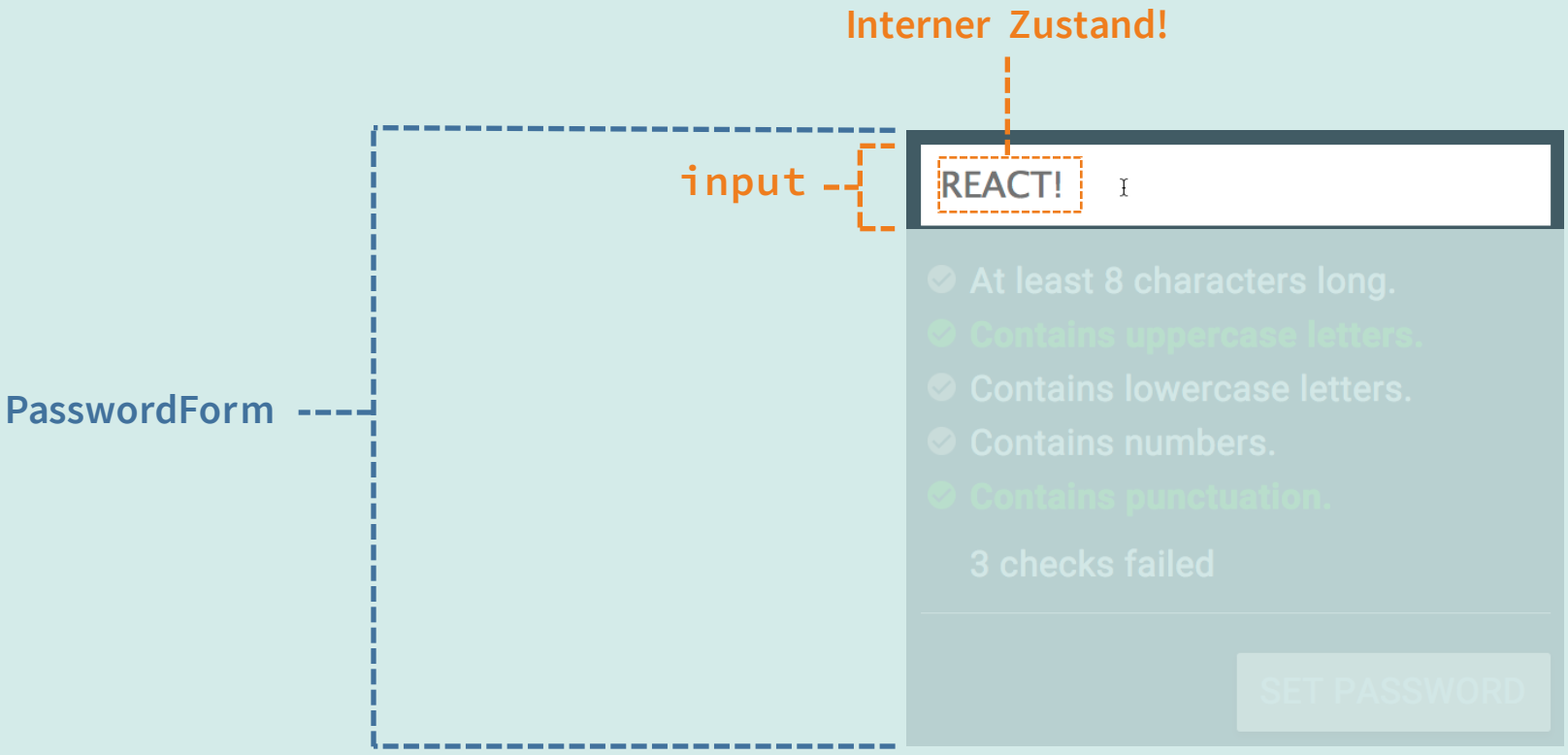
Zustand („state“): Komponenten-intern

- Beispiel: Inhalt von Eingabefeld, Antwort vom Server
- Objekt mit Key-Value-Paaren
- Werte üblicherweise immutable
- Zugriff über this.state / this.setState()
- Nur in Komponenten-Klassen verfügbar
- **this.setState() triggert erneutes Rendern**
    - auch alle Unterkomponenten

Zum Vergleich: Properties

- Von außen übergeben
- Unveränderlich
- Zugriff über this.props (Key-Value-Paare)

BEISPIEL: EINGABEFELD



BEISPIEL: EINGABEFELD

1. Input mit Wert aus State befüllen
2. Event Listener

```
class PasswordForm extends React.Component {
  render() {
   return <div>
     <input
       value={this.state.password}
       onChange={e=>this.onPasswordChange(e.target.value)}
     />
     . . .
   </div>;
  }

  onPasswordChange(newPassword) {
    this.setState({password: newPassword});
  }
}
```

ZUSTAND: EINGABEFELD

1. Input mit Wert aus State befüllen
2. Event Listener

```
class PasswordForm extends React.Component {
  render() {
   return <div>
     <input
       value={this.state.password}
       onChange={e=>this.onPasswordChange(e.target.value)}
     />
     . . .
   </div>;
  }
```

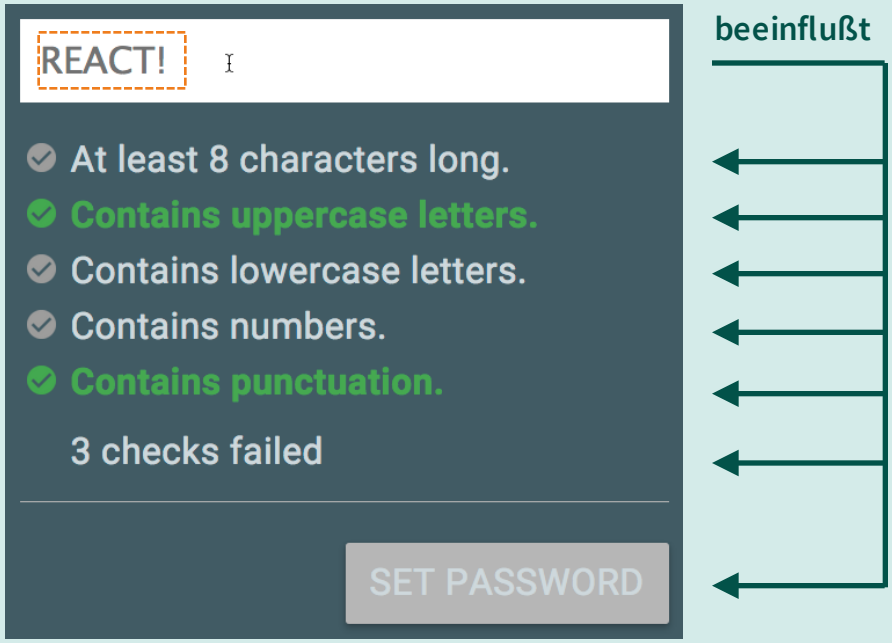
Neu rendern

Event

3. Zustand neu setzen

```
  onPasswordChange(newPassword) {
    this.setState({password: newPassword});
  }
}
```

Beispiel: Password Formular

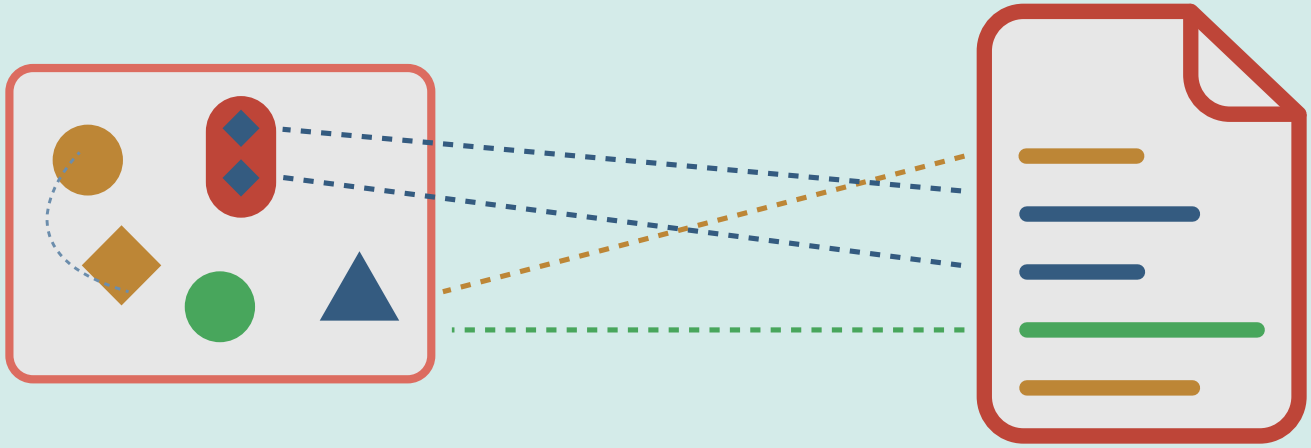


„KLASSISCHE“ OBSERVER LÖSUNG

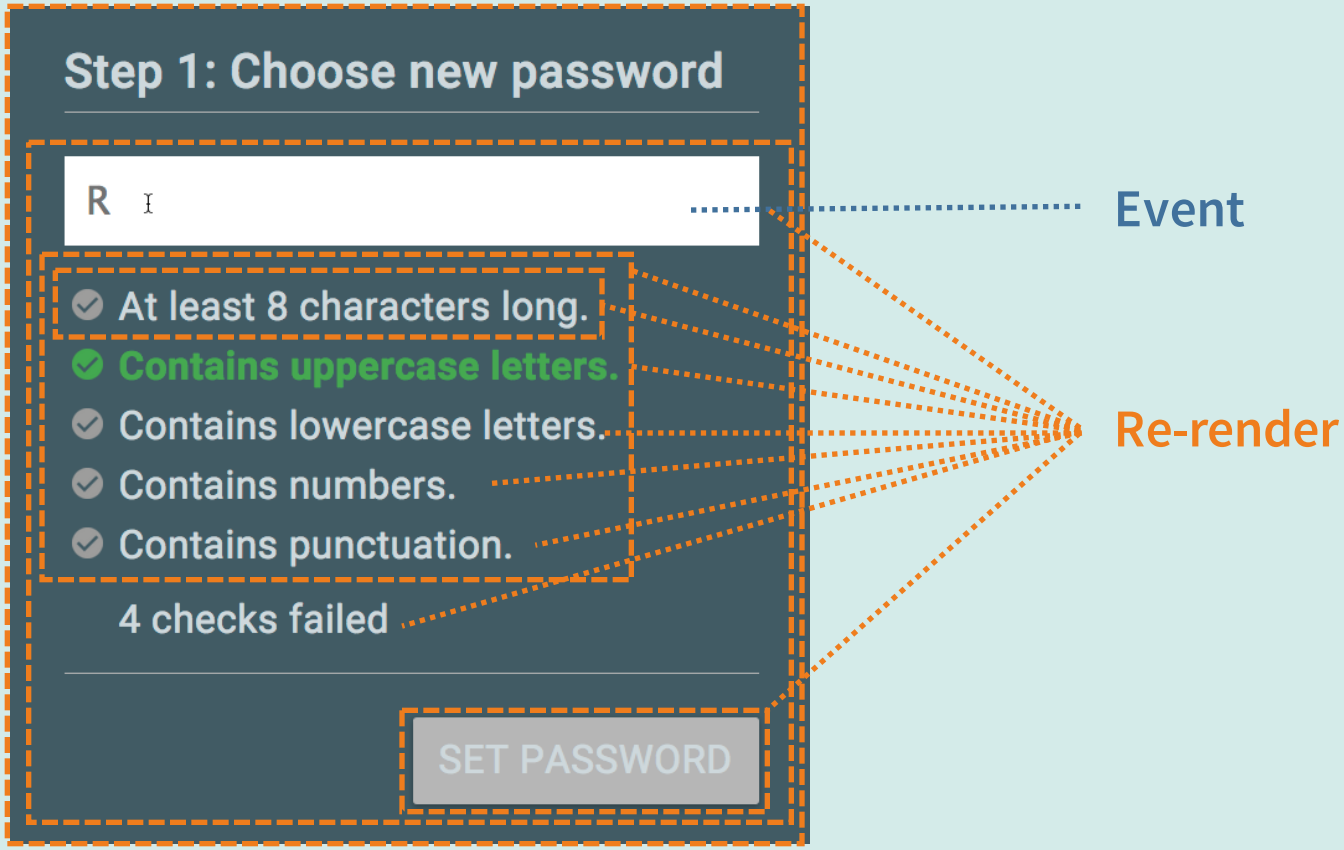
Verbinden von Model und View

- Wann wird was gebunden?
- Wie genau funktioniert das Binding?
    - Zum Beispiel: Element in Liste oder ganze Liste
- Reihenfolge von Events

Wird schnell komplex, schwer zu durchschauen



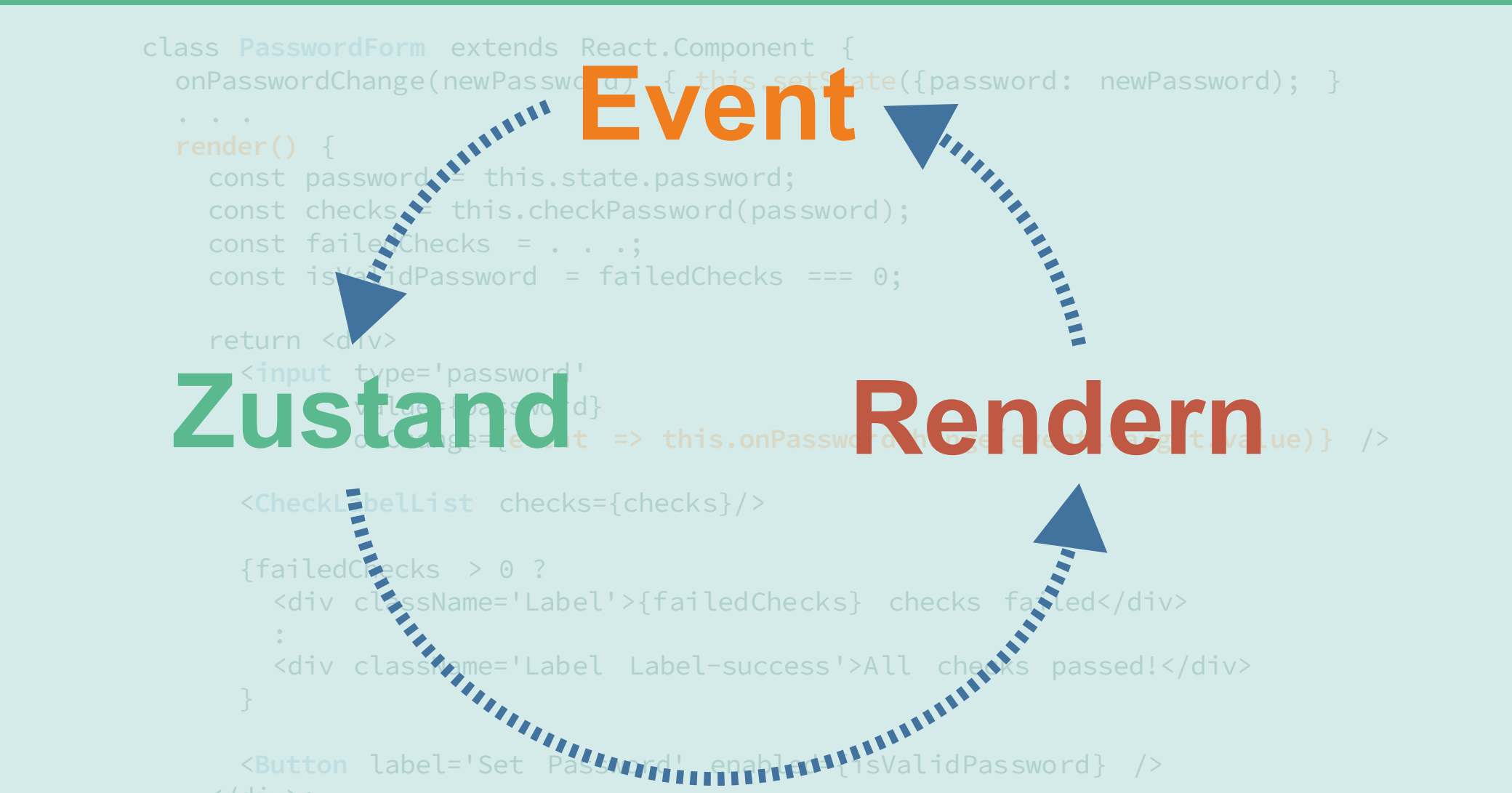
GANZ EINFACH: ALLES RENDERN



BEISPIEL 1: PASSWORD FORMULAR

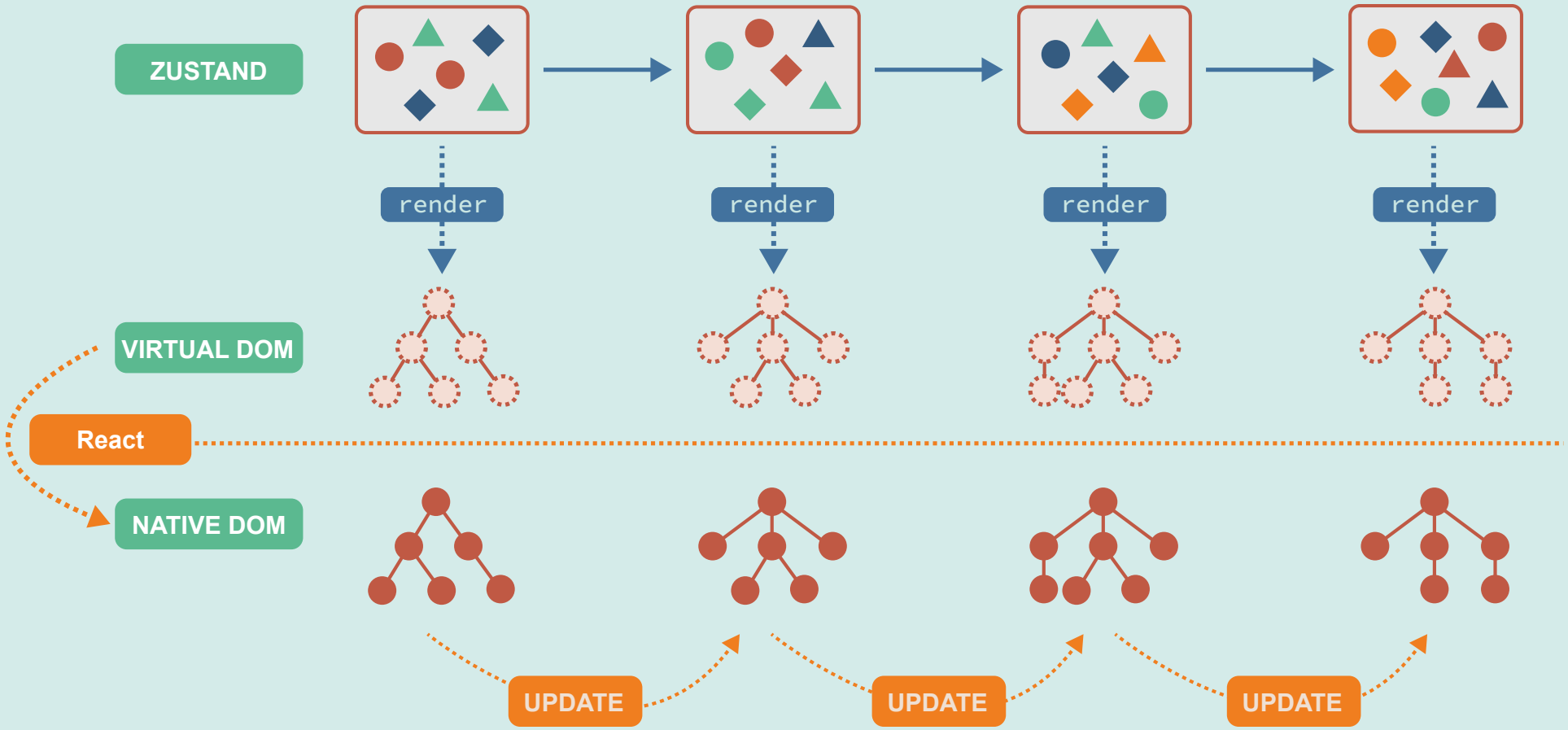
```
class PasswordForm extends React.Component {
  onPasswordChange(newPassword) { this.setState({password: newPassword); }
  . . .
  render() {
    const password = this.state.password;
    const checks = this.checkPassword(password);
    const isValidPassword = checks.failedChecks;

    return <div>
      <input type='password'
             value={password}
             onChange={event => this.onPasswordChange(event.target.value)} />

      <CheckLabelList checks={checks}/>

      . . .

      <Button label='Set Password' enabled={isValidPassword} />
    </div>;
  }
}
```

REACT: UNI DIRECTIONAL DATAFLOW



RESPOND TO EVENTS & RENDER UI

HINTERGRUND: VIRTUAL DOM



HINTERGRUND: VIRTUAL DOM

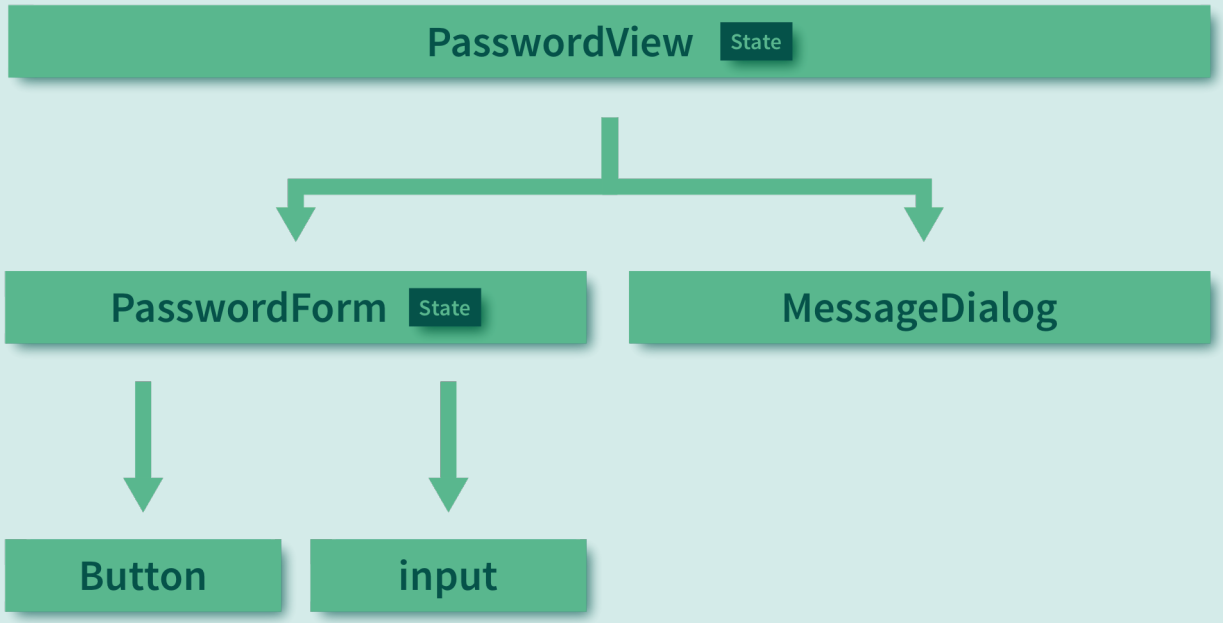
Virtual DOM

- React.createElement() liefert ein virtuelles DOM-Objekt zurück
- DOM Events sind gewrappt
- Trennung von Darstellung und Repräsentation

Vorteile

- Erlaubt performantes neu rendern der Komponente
- Ausgabe in andere Formate (z.B. String) möglich
- Kann auf dem Server gerendert werden (Universal Webapps)
- Kann ohne DOM/Browser getestet werden

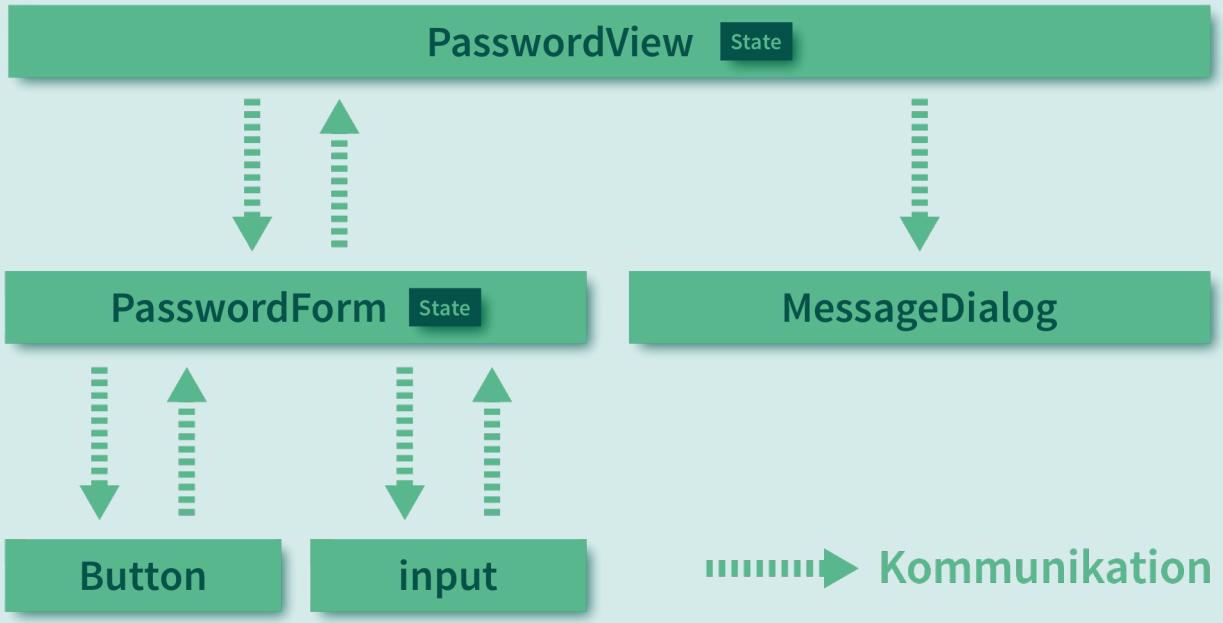
KOMPONENTENHIERARCHIEN



Typische React Anwendungen: Hierarchisch aufgebaut

- State möglichst weit oben („Container Komponenten“)
- Mehrere Komponenten mit State möglich
  - Beim neu rendern bleibt State erhalten

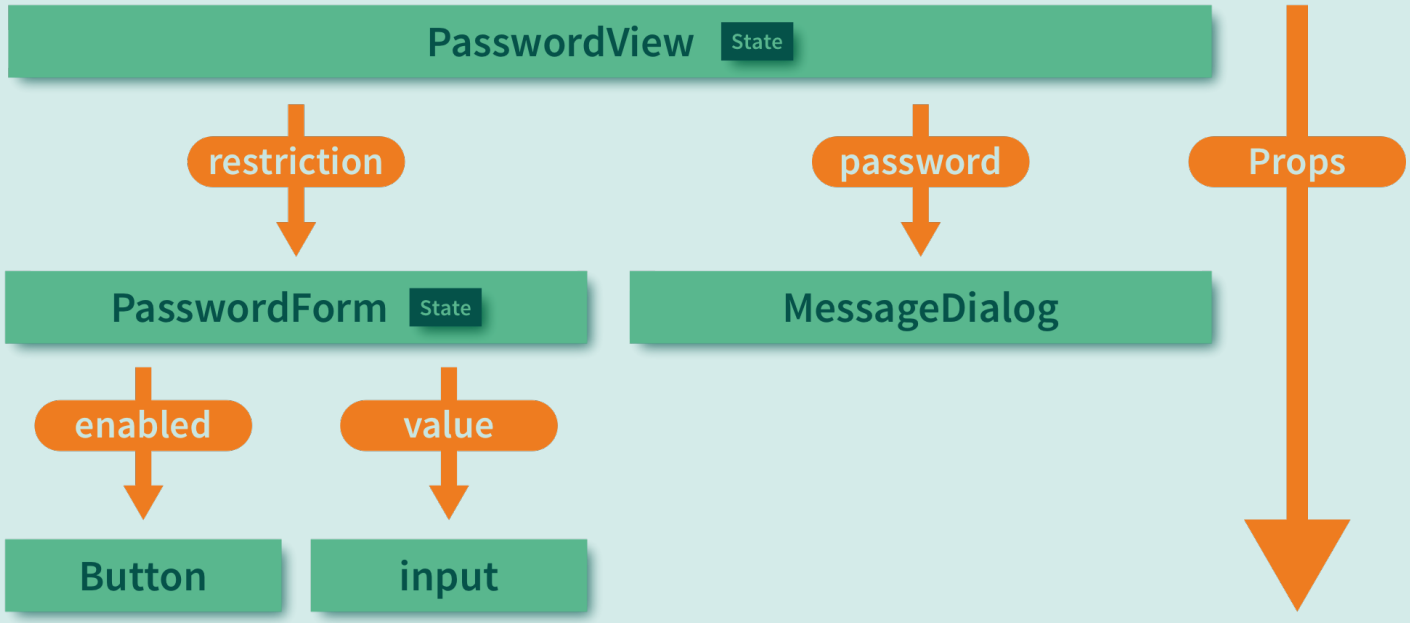
KOMMUNIKATION ZWISCHEN KOMPONENTEN



Typische React Anwendungen: Hierarchisch aufgebaut

- State möglichst weit oben („Container Komponenten“)
- Mehrere Komponenten mit State möglich
  - Beim neu rendern bleibt State erhalten
- Wie wird kommuniziert?

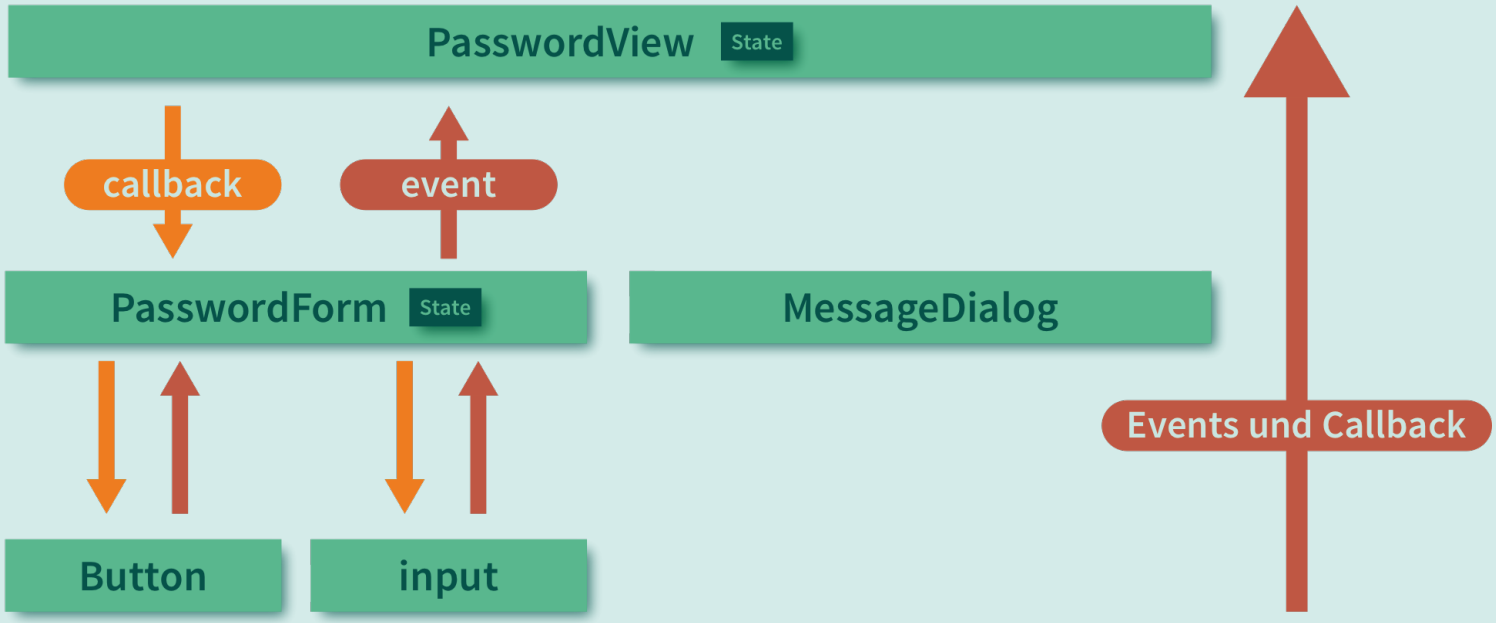
KOMMUNIKATION: PROPERTIES



Von oben nach unten: Properties

```
<Button enabled={. . . }>Set Password</Button>
```

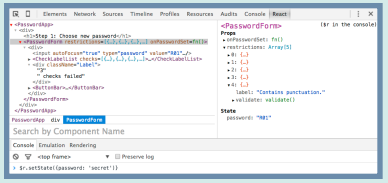
KOMMUNIKATION: EVENTS



Von unten nach oben: Events und Callbacks

- Callback-Funktion als Property
- Event: Aufruf der Callback-Funktion

ÖKOSYSTEM

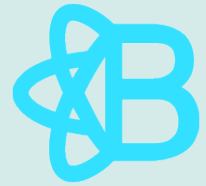


Developer Tools

material-design

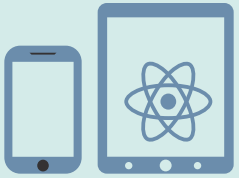
Flux Architekturpattern

Bootstrap



GraphQL & Relay

React Router



React Native

Fertige Komponenten

ZUSAMMENFASSUNG

React

- Nur View-Schicht (Komponenten)
  - Gut integrierbar mit anderen Frameworks
  - Einfache Migrationspfade möglich

- JSX statt Templatesprache („HTML in JavaScript“)

- Deklarative UI
  - Komponenten werden immer komplett gerendert
  - Kein 2-Wege-Databinding
  - Komponenten typischerweise organisiert in Hierarchien

Vielen Dank!

http://nilshartmann.net/react-talk

Fragen?

AUSBLICK

Zur Erinnerung: Rendern auf dem Client

```
import React from 'react';
import ReactDOM from 'react-dom';

import PasswordView from './components/PasswordView';

ReactDOM.render(
  <PasswordView />,
  document.getElementById('mount')
);
```

Rendern auf dem Server (vereinfacht)

```
import React from 'react';
import ReactDOMServer from 'react-dom/server';

import PasswordView from './components/PasswordView';

const html = ReactDOMServer.renderToString(<PasswordView />);

const page = `<html>
  <head>. . . </head>
  <body><div id='mount'>${html}</div></body>
</html>`;

// page an Client senden
```

BEISPIEL: UNIT TESTS (OHNE DOM)

„Shallow rendering“

```
import { expect } from 'chai';
import TestUtils from 'react-addons-test-utils';

describe('CheckLabel', () => {
 it('should render a "checked" label', () => {

  const renderer = TestUtils.createRenderer();
  renderer.render(
   <CheckLabel label='My Label' checked={true}/>
  );

  const tree = renderer.getRenderOutput();
  expect(tree.type).to.equal('div');
  expect(tree.props.className).to.equal('CheckLabel-checked');
  expect(tree.props.children).to.equal('My Label');
 });
});
```

BEISPIEL: UNIT TESTS (MIT DOM)

```
import { expect } from 'chai';
import jsdom from 'mocha-jsdom';
import { . . . } from 'react-addons-test-utils';

describe('PasswordForm', () => {
  jsdom();

  it('updates button', () => {
    const tree = renderIntoDocument(
      <PasswordForm restrictions={. . .} onPasswordSet={. . .} />
    );

    expect(isCompositeComponentWithType(tree, PasswordForm)).to.be.true;
    const inputField = findRenderedDOMComponentWithTag(tree, 'input');
    const btn = findRenderedDOMComponentWithTag(tree, 'button');

    Simulate.change(inputField, {target: {value: 'xxx'}});
    expect(setPasswordButton.disabled).to.be.true;
  });
});
```

BEISPIEL: INITIALISIERUNG UND LEBENSZYKLUS

Zustand initialisieren

Initiales laden auslösen

```
class WeatherView extends React.Component {
 constructor() {
  this.state = { city: 'Hamburg' };
 }

 componentDidMount() { this.fetchWeather(); }

 fetchWeather() {
  fetch(`http://api.w.org/${this.state.city}`)
    .then(response => response.json())
    .then(weather => this.setState({weather}))
  ;
 }

 render() {
  return <div>
  <Button label='Load' onClick={() => this.fetchWeather()} />
  <input type='text' value={this.state.city}
    onChange={e => this.setState({city: e.target.value})} />
  <WeatherPanel weather={this.state.weather} />
  </div>;
 }
}
```