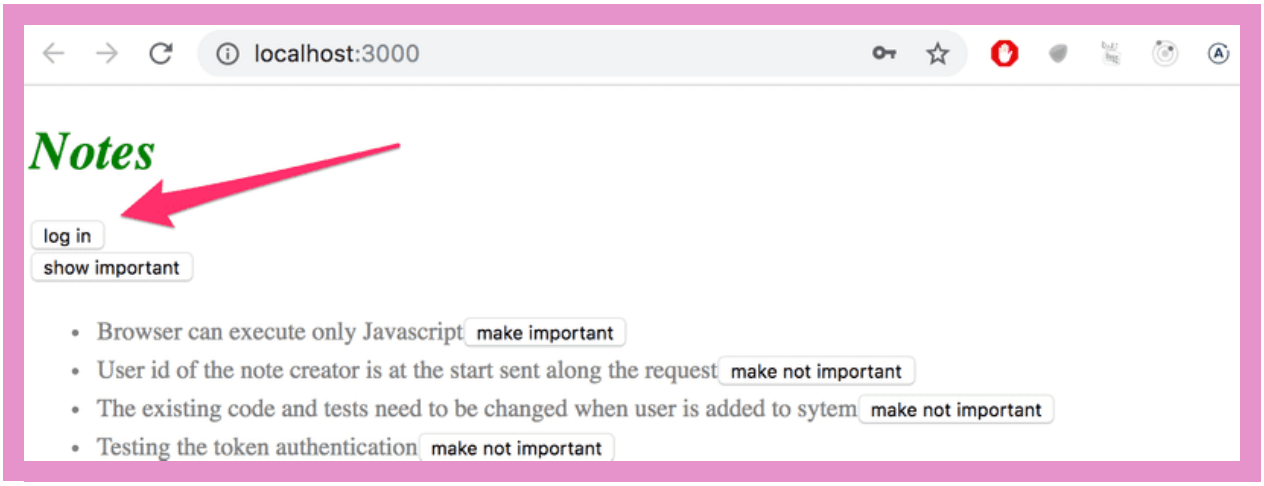
b props.children and proptypes

Displaying the login form only when appropriate

Let's modify the application so that the login form is not displayed by default:



The login form appears when the user presses the *login* button:

The user can close the login form by clicking the *cancel* button.

Let's start by extracting the login form into its own component:

```
import React from 'react'

const LoginForm = ({
   handleSubmit,
   handleUsernameChange,
   handlePasswordChange,
   username,
   password
  }) => {
  return (
    <div>
      <h2>Login</h2>

      <form onSubmit={handleSubmit}>
        <div>
          username
          <input
            value={username}
            onChange={handleUsernameChange}
          />
        </div>
        <div>
          password
          <input
            type="password"
            value={password}
            onChange={handlePasswordChange}
          />
      </div>
        <button type="submit">login</button>
      </form>
    </div>
  )
}

export default LoginForm
```

The state and all the functions related to it are defined outside of the component and are passed to the component as props.

Notice that the props are assigned to variables through *destructuring*, which means that instead of writing:

```
const LoginForm = (props) => {
  return (
    <div>
      <h2>Login</h2>
```

```
      <form onSubmit={props.handleSubmit}>
        <div>
          username
          <input
            value={props.username}
            onChange={props.handleChange}
            name="username"
          />
        </div>
        // ...
        <button type="submit">login</button>
      </form>
    </div>
  )
}
```

where the properties of the `props` object are accessed through e.g. `props.handleSubmit`, the properties are assigned directly to their own variables.

One fast way of implementing the functionality is to change the `loginForm` function of the *App* component like so:

```
const App = () => {
  const [loginVisible, setLoginVisible] = useState(false)

  // ...

  const loginForm = () => {
    const hideWhenVisible = { display: loginVisible ? 'none' : '' }
    const showWhenVisible = { display: loginVisible ? '' : 'none' }

    return (
      <div>
        <div style={hideWhenVisible}>
          <button onClick={() => setLoginVisible(true)}>log in</button>
        </div>
        <div style={showWhenVisible}>
          <LoginForm
            username={username}
            password={password}
            handleUsernameChange={({ target }) => setUsername(target.value)}
            handlePasswordChange={({ target }) => setPassword(target.value)}
            handleSubmit={handleLogin}
          />
          <button onClick={() => setLoginVisible(false)}>cancel</button>
        </div>
      </div>
    )
  }

  // ...
```

```
}
```

The *App* components state now contains the boolean *loginVisible*, that defines if the login form should be shown to the user or not.

The value of loginVisible is toggled with two buttons. Both buttons have their event handlers defined directly in the component:

```
<button onClick={() => setLoginVisible(true)}>log in</button>

<button onClick={() => setLoginVisible(false)}>cancel</button>
```

The visibility of the component is defined by giving the component an inline style rule, where the value of the display property is *none* if we do not want the component to be displayed:

```
const hideWhenVisible = { display: loginVisible ? 'none' : '' }
const showWhenVisible = { display: loginVisible ? '' : 'none' }

<div style={hideWhenVisible}>
  // button
</div>

<div style={showWhenVisible}>
  // button
</div>
```

We are once again using the "question mark" ternary operator. If `loginVisible` is *true*, then the CSS rule of the component will be:

```
display: 'none';
```

If `loginVisible` is *false*, then *display* will not receive any value related to the visibility of the component.

The components children, aka. props.children

The code related to managing the visibility of the login form could be considered to be its own logical entity, and for this reason it would be good to extract it from the *App* component into its own separate component.

Our goal is to implement a new *Togglable* component that can be used in the following way:

```
<Togglable buttonLabel='login'>
  <LoginForm
    username={username}
    password={password}
    handleUsernameChange={({ target }) => setUsername(target.value)}
    handlePasswordChange={({ target }) => setPassword(target.value)}
    handleSubmit={handleLogin}
  />
</Togglable>
```

The way that the component is used is slightly different from our previous components. The component has both opening and closing tags which surround a *LoginForm* component. In React terminology *LoginForm* is a child component of *Togglable*.

We can add any React elements we want between the opening and closing tags of *Togglable*, like this for example:

```
<Togglable buttonLabel="reveal">
  <p>this line is at start hidden</p>
  <p>also this is hidden</p>
</Togglable>
```

The code for the *Togglable* component is shown below:

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

const Togglable = (props) => {
  const [visible, setVisible] = useState(false)

  const hideWhenVisible = { display: visible ? 'none' : '' }
  const showWhenVisible = { display: visible ? '' : 'none' }

  const toggleVisibility = () => {
    setVisible(!visible)
  }

  return (
    <div>
      <div style={hideWhenVisible}>
        <button onClick={toggleVisibility}>{props.buttonLabel}</button>
      </div>
      <div style={showWhenVisible}>
        {props.children}
        <button onClick={toggleVisibility}>cancel</button>
      </div>
    </div>
```

```
    )
}

export default Togglable
```

The new and interesting part of the code is `props.children`, that is used for referencing the child components of the component. The child components are the React elements that we define between the opening and closing tags of a component.

This time the children are rendered in the code that is used for rendering the component itself:

```
<div style={showWhenVisible}>
  {props.children}
  <button onClick={toggleVisibility}>cancel</button>
</div>
```

Unlike the "normal" props we've seen before, *children* is automatically added by React and always exists. If a component is defined with an automatically closing `/>` tag, like this:

```
<Note
  key={note.id}
  note={note}
  toggleImportance={() => toggleImportanceOf(note.id)}
/>
```

Then *props.children* is an empty array.

The *Togglable* component is reusable and we can use it to add similar visibility toggling functionality to the form that is used for creating new notes.

Before we do that, let's extract the form for creating notes into its own component:

```
const NoteForm = ({ onSubmit, handleChange, value}) => {
  return (
    <div>
      <h2>Create a new note</h2>

      <form onSubmit={onSubmit}>
        <input
          value={value}
          onChange={handleChange}
        />
        <button type="submit">save</button>
      </form>
```

```
    </div>
  )
}
```

Next let's define the form component inside of a *Togglable* component:

```
<Togglable buttonLabel="new note">
  <NoteForm
    onSubmit={addNote}
    value={newNote}
    handleChange={handleNoteChange}
  />
</Togglable>
```

You can find the code for our current application in its entirety in the *part5-4* branch of this github repository.

State of the forms

The state of the application currently is in the `App` component.

React documentation says the following about where to place the state:

> *Often, several components need to reflect the same changing data. We recommend lifting the shared state up to their closest common ancestor.*

If we think about the state of the forms, so for example the contents of a new note before it has been created, the `App` component does not actually need it for anything. We could just as well move the state of the forms to the corresponding components.

The component for a note changes like so:

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

const NoteForm = ({ createNote }) => {
  const [newNote, setNewNote] = useState('')

  const handleChange = (event) => {
    setNewNote(event.target.value)
  }

  const addNote = (event) => {
    event.preventDefault()
    createNote({
      content: newNote,
      important: Math.random() > 0.5,
```

```
      })

      setNewNote('')
    }

    return (
      <div>
        <h2>Create a new note</h2>

        <form onSubmit={addNote}>
          <input
            value={newNote}
            onChange={handleChange}
          />
          <button type="submit">save</button>
        </form>
      </div>
    )
}

export default NoteForm
```

The *newNote* state attribute and the event handler responsible for changing it have been moved from the `App` component to the component responsible for the note form.

There is only one prop left, the `createNote` function, which the form calls when a new note is created.

The `App` component becomes simpler now that we have got rid of the *newNote* state and its event handler. The `addNote` function for creating new notes receives a new note as a parameter, and the function is the only prop we send to the form:

```
const App = () => {
  // ...
  const addNote = (noteObject) => {
    noteService
      .create(noteObject)
      .then(returnedNote => {
        setNotes(notes.concat(returnedNote))
      })
  }
  // ...
  const noteForm = () => (
    <Togglable buttonLabel='new note'>
      <NoteForm createNote={addNote} />
    </Togglable>
  )

  // ...
}
```

We could do the same for the log in form, but we'll leave that for an optional exercise.

The application code can be found from github, branch *part5-5*.

References to components with ref

Our current implementation is quite good, it has one aspect that could be improved.

After a new note is created, it would make sense to hide the new note form. Currently the form stays visible. There is a slight problem with hiding the form. The visibility is controlled with the *visible* variable inside of the *Togglable* component. How can we access it outside of the component?

There are many ways to implement closing the form from the parent component, but let's use the ref mechanism of React, which offers a reference to the component.

Let's make the following changes to the *App* component:

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

const App = () => {
  // ...
  const noteFormRef = useRef()

  const noteForm = () => (
    <Togglable buttonLabel='new note' ref={noteFormRef}>
      <NoteForm createNote={addNote} />
    </Togglable>
  )
```

```
  // ...
}
```

The `useRef` hook is used to create a *noteFormRef* ref, that is assigned to the *Togglable* component containing the creation note form. The *noteFormRef* variable acts as a reference to the component. This hook ensures the same reference (ref) is kept throughout re-renders of the component.

We also make the following changes to the *Togglable* component:

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

const Togglable = React.forwardRef((props, ref) => {
  const [visible, setVisible] = useState(false)

  const hideWhenVisible = { display: visible ? 'none' : '' }
  const showWhenVisible = { display: visible ? '' : 'none' }

  const toggleVisibility = () => {
    setVisible(!visible)
  }

  useImperativeHandle(ref, () => {
    return {
      toggleVisibility
    }
  })

  return (
    <div>
      <div style={hideWhenVisible}>
        <button onClick={toggleVisibility}>{props.buttonLabel}</button>
      </div>
      <div style={showWhenVisible}>
        {props.children}
        <button onClick={toggleVisibility}>cancel</button>
      </div>
    </div>
  )
})

export default Togglable
```

The function that creates the component is wrapped inside of a `forwardRef` function call. This way the component can access the ref that is assigned to it.

The component uses the `useImperativeHandle` hook to make its *toggleVisibility* function available

outside of the component.

We can now hide the form by calling *noteFormRef.current.toggleVisibility()* after a new note has been created:

```
const App = () => {
  // ...
  const addNote = (noteObject) => {
    noteFormRef.current.toggleVisibility()
    noteService
      .create(noteObject)
      .then(returnedNote => {
        setNotes(notes.concat(returnedNote))
      })
  }
  // ...
}
```

To recap, the `useImperativeHandle` function is a React hook, that is used for defining functions in a component which can be invoked from outside of the component.

This trick works for changing the state of a component, but it looks a bit unpleasant. We could have accomplished the same functionality with slightly cleaner code using "old React" class-based components. We will take a look at these class components during part 7 of the course material. So far this is the only situation where using React hooks leads to code that is not cleaner than with class components.

There are also other use cases for refs than accessing React components.

You can find the code for our current application in its entirety in the *part5-6* branch of this github repository.

One point about components

When we define a component in React:

```
const Togglable = () => ...
  // ...
}
```

And use it like this:

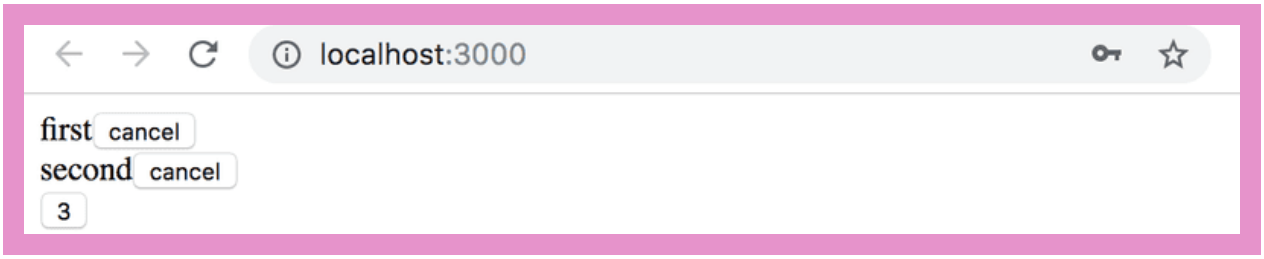
```
<div>
  <Togglable buttonLabel="1" ref={togglable1}>
    first
```

```
    </Togglable>

    <Togglable buttonLabel="2" ref={togglable2}>
      second
    </Togglable>

    <Togglable buttonLabel="3" ref={togglable3}>
      third
    </Togglable>
  </div>
```

We create *three separate instances of the component* that all have their own separate state:



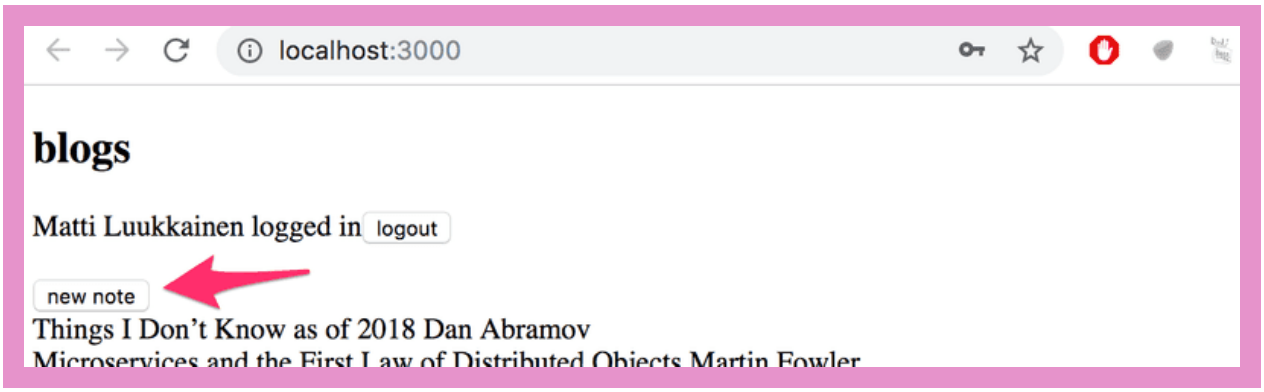
The *ref* attribute is used for assigning a reference to each of the components in the variables *togglable1*, *togglable2* and *togglable3*.

Exercises 5.5.-5.10.

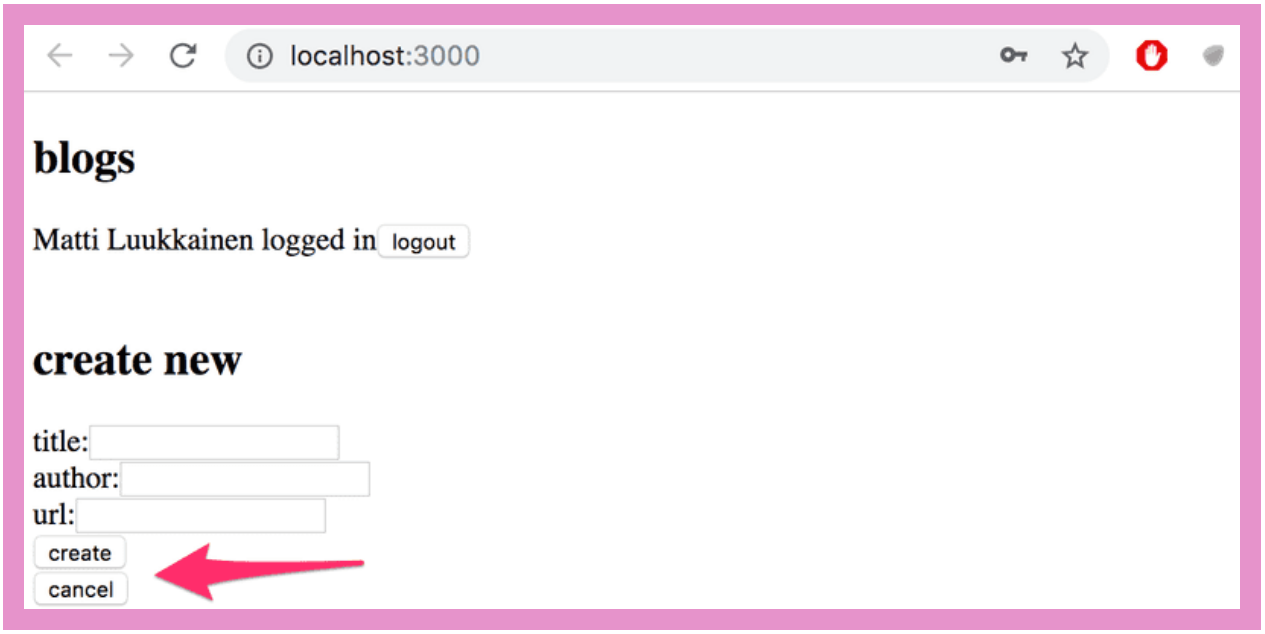
5.5 Blog list frontend, step5

Change the form for creating blog posts so that it is only displayed when appropriate. Use functionality similar to what was shown earlier in this part of the course material. If you wish to do so, you can use the *Togglable* component defined in part 5.

By default the form is not visible



It expands when button *new note* is clicked



The form closes when a new blog is created.

5.6 Blog list frontend, step6

Separate the form for creating a new blog into its own component (if you have not already done so), and move all the states required for creating a new blog to this component.

The component must work like the *NoteForm* component from the material of this part.

5.7* Blog list frontend, step7

Let's add a button to each blog, which controls whether all of the details about the blog are shown or not.

Full details of the blog open when the button is clicked.

And the details are hidden when the button is clicked again.

At this point the *like* button does not need to do anything.

The application shown in the picture has a bit of additional CSS to improve its appearance.

It is easy to add styles to the application as shown in part 2 using inline styles:

```
const Blog = ({ blog }) => {
  const blogStyle = {
    paddingTop: 10,
    paddingLeft: 2,
    border: 'solid',
    borderWidth: 1,
    marginBottom: 5
  }

  return (
    <div style={blogStyle}>
      <div>
        {blog.title} {blog.author}
      </div>
      // ...
  </div>
)}
```

NB: even though the functionality implemented in this part is almost identical to the functionality provided by the *Togglable* component, the component can not be used directly to achieve the desired behavior. The easiest solution will be to add state to the blog post that controls the displayed form of the blog post.

5.8*: Blog list frontend, step8

Implement the functionality for the like button. Likes are increased by making an HTTP `PUT` request to the unique address of the blog post in the backend.

Since the backend operation replaces the entire blog post, you will have to send all of its fields in the request body. If you wanted to add a like to the following blog post:

```
{
  _id: "5a43fde2cbd20b12a2c34e91",
  user: {
    _id: "5a43e6b6c37f3d065eaaa581",
    username: "mluukkai",
    name: "Matti Luukkainen"
  },
  likes: 0,
  author: "Joel Spolsky",
  title: "The Joel Test: 12 Steps to Better Code",
```

```
  url: "https://www.joelonsoftware.com/2000/08/09/the-joel-test-12-steps-to-better-code/"
},
```

You would have to make an HTTP PUT request to the address */api/blogs /5a43fde2cbd20b12a2c34e91* with the following request data:

```
{
  user: "5a43e6b6c37f3d065eaaa581",
  likes: 1,
  author: "Joel Spolsky",
  title: "The Joel Test: 12 Steps to Better Code",
  url: "https://www.joelonsoftware.com/2000/08/09/the-joel-test-12-steps-to-better-code/"
}
```

One last warning: if you notice that you are using async/await and the `then` -method in the same code, it is almost certain that you are doing something wrong. Stick to using one or the other, and never use both at the same time "just in case".

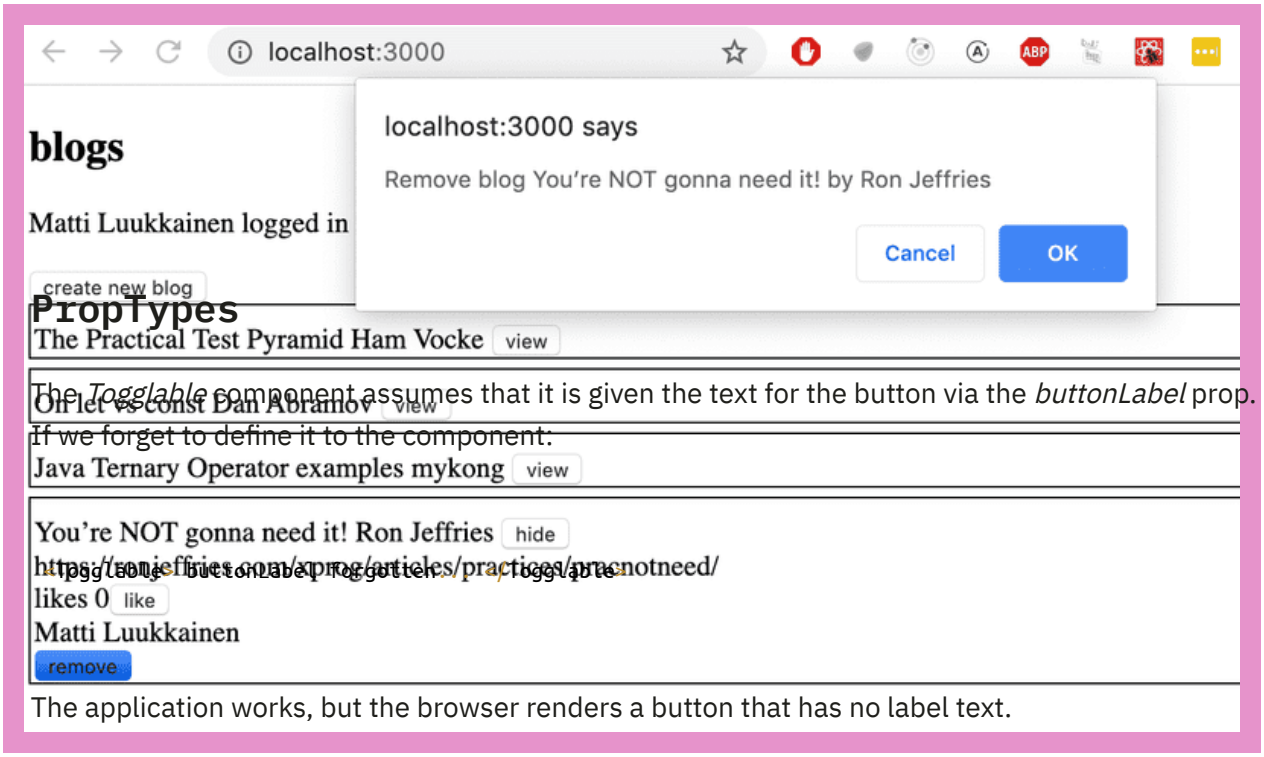
5.9*: Blog list frontend, step9

Modify the application to list the blog posts by the number of *likes*. Sorting the blog posts can be done with the array `sort` method.

5.10*: Blog list frontend, step10

Add a new button for deleting blog posts. Also implement the logic for deleting blog posts in the backend.

Your application could look something like this:



The application works, but the browser renders a button that has no label text.

We would like to enforce that when the *Togglable* component is used, the button label text prop must be given a value.

The *Togglable* component assumes that it is given the text for the button via the *buttonLabel* prop. If we forget to define it to the component:

```
<Togglable buttonLabel="">
  ...
</Togglable>
```

The confirmation dialog for deleting a blog post is easy to implement with the window.confirm function.

The expected and required props of a component can be defined with the prop-types package. Let's install the package:

```
npm install prop-types
```

Show the button for deleting a blog post only if the blog post was added by the user.

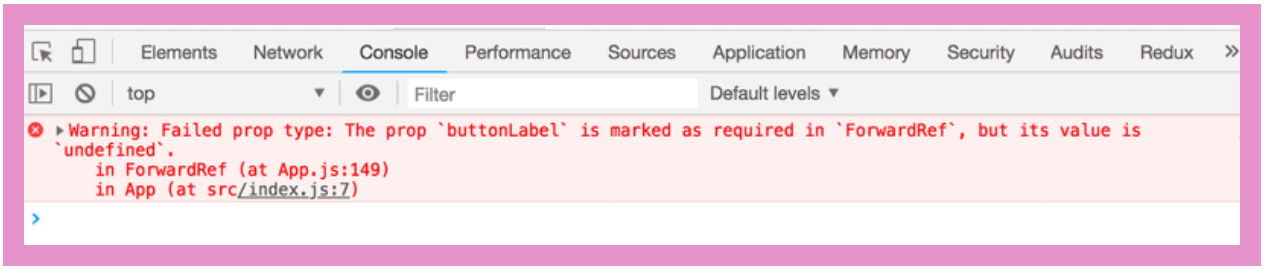
We can define the *buttonLabel* prop as a mandatory or *required* string-type prop as shown below:

```
import PropTypes from 'prop-types'

const Togglable = React.forwardRef((props, ref) => {
  // ..
})

Togglable.propTypes = {
  buttonLabel: PropTypes.string.isRequired
}
```

The console will display the following error message if the prop is left undefined:



The application still works and nothing forces us to define props despite the PropTypes definitions. Mind you, it is extremely unprofessional to leave *any* red output to the browser console.

Let's also define PropTypes to the *LoginForm* component:

```
import PropTypes from 'prop-types'

const LoginForm = ({
   handleSubmit,
   handleUsernameChange,
   handlePasswordChange,
   username,
   password
  }) => {
    // ...
  }

LoginForm.propTypes = {
  handleSubmit: PropTypes.func.isRequired,
  handleUsernameChange: PropTypes.func.isRequired,
  handlePasswordChange: PropTypes.func.isRequired,
  username: PropTypes.string.isRequired,
  password: PropTypes.string.isRequired
}
```

If the type of a passed prop is wrong, e.g. if we try to define the *handleSubmit* prop as a string, then this will result in the following warning:

ESlint

In part 3 we configured the ESlint code style tool to the backend. Let's take ESlint to use in the frontend as well.

Create-react-app has installed ESlint to the project by default, so all that's left for us to do is to define our desired configuration in the *.eslintrc.js* file.

`NB:` do not run the `eslint --init` command. It will install the latest version of ESlint that is not compatible with the configuration file created by create-react-app!

Next, we will start testing the frontend and in order to avoid undesired and irrelevant linter errors we will install the eslint-plugin-jest package:

```
npm install --save-dev eslint-plugin-jest
```

Let's create a *.eslintrc.js* file with the following contents:

```
/* eslint-env node */
module.exports = {
  "env": {
      "browser": true,
      "es6": true,
      "jest/globals": true
  },
  "extends": [
      "eslint:recommended",
      "plugin:react/recommended"
  ],
  "parserOptions": {
      "ecmaFeatures": {
          "jsx": true
      },
      "ecmaVersion": 2018,
      "sourceType": "module"
  },
  "plugins": [
      "react", "jest"
  ],
  "rules": {
      "indent": [
          "error",
          2
      ],
      "linebreak-style": [
          "error",
          "unix"
      ],
      "quotes": [
          "error",
          "single"
      ],
      "semi": [
          "error",
```

```
            "never"
        ],
        "eqeqeq": "error",
        "no-trailing-spaces": "error",
        "object-curly-spacing": [
            "error", "always"
        ],
        "arrow-spacing": [
            "error", { "before": true, "after": true }
        ],
        "no-console": 0,
        "react/prop-types": 0
    },
    "settings": {
      "react": {
        "version": "detect"
      }
    }
}
```

NOTE: If you are using Visual Studio Code together with ESLint plugin, you might need to add additional workspace setting for it to work. If you are seeing `Failed to load plugin react: Cannot find module 'eslint-plugin-react'` additional configuration is needed. Adding the line `"eslint.workingDirectories": [{ "mode": "auto" }]` to settings.json in the workspace seems to work. See here for more information.

Let's create .eslintignore file with the following contents to the repository root

```
node_modules
build
.eslintrc.js
```

Now the directories `build` and `node_modules` will be skipped when linting.

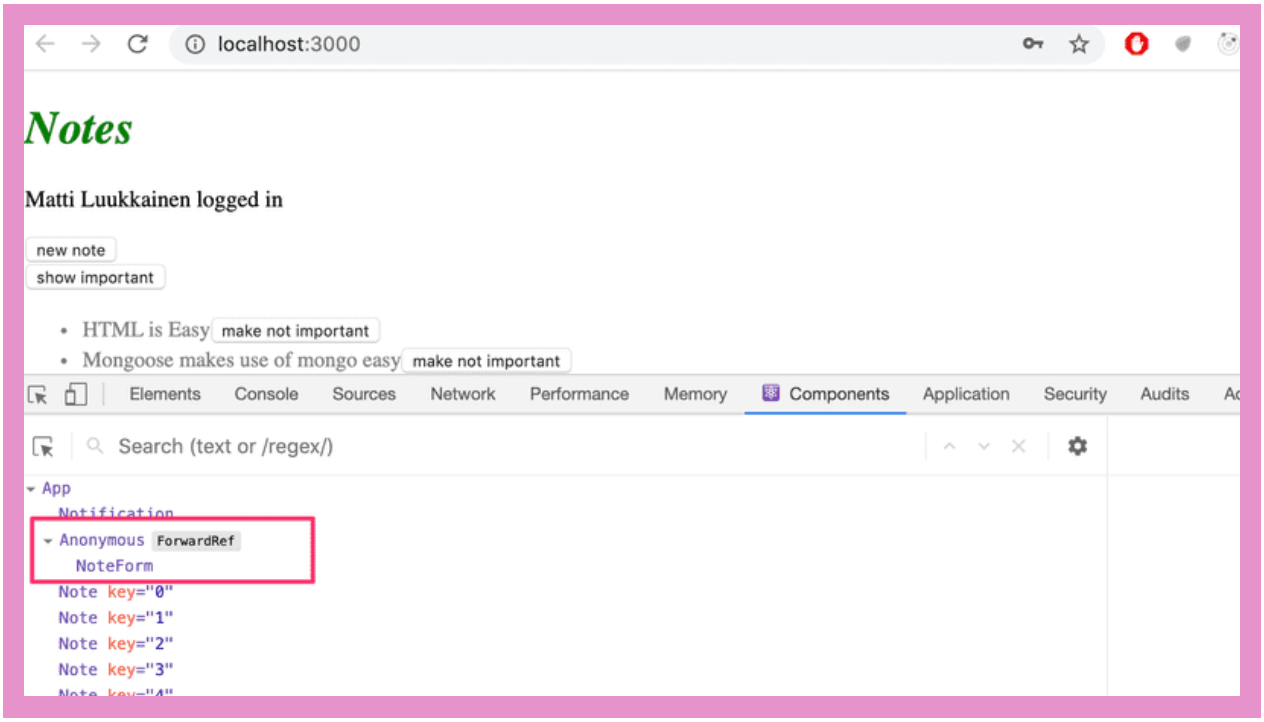
Let us also create a npm script to run the lint:

```
{
  // ...
  {
    "scripts": {
    "start": "react-scripts start",
    "build": "react-scripts build",
    "test": "react-scripts test",
    "eject": "react-scripts eject",
    "server": "json-server -p3001 db.json",
    "eslint": "eslint ."
  },
```

```
  // ...
}
```

Component `Togglable` causes a nasty looking warning *Component definition is missing display name*:

The react-devtools also reveals that the component does not have name:



Fortunately this is easy to fix

```
import React, { useState, useImperativeHandle } from 'react'
import PropTypes from 'prop-types'

const Togglable = React.forwardRef((props, ref) => {
  // ...
})

Togglable.displayName = 'Togglable'
```

```
export default Togglable
```

You can find the code for our current application in its entirety in the *part5-7* branch of this github repository.

About course

Exercises 5.11.-5.12.

Course contents

5.11: Blog list frontend, step11

FAQ

Define PropTypes for one of the components of your application.

Partners

5.12: Blog list frontend, step12

Challenge

Add ESlint to the project. Define the configuration according to your liking. Fix all of the linter errors.

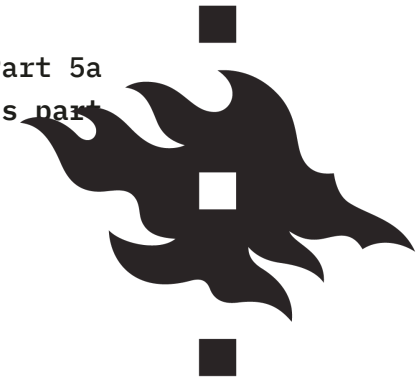
Create-react-app has installed ESlint to the project by default, so all that's left for you to do is to define your desired configuration in the *.eslintrc.js* file.

`NB:` do not run the `eslint --init` command. It will install the latest version of ESlint that is not compatible with the configuration file created by create-react-app!

Propose changes to material

Part 5a
Previous part

Part 5c
Next part



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