Input and Validation

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Early web app input: HTTP form tag

```html
<form action="/product/update" method="post">
  Product: <input type="text" name="product" /><br />
  Deluxe: <input type="checkbox" name="delux" /><br />
  <input type="submit" value="Submit" />
</form>

- **method="get"** - Encode form properties as query params
  HTTP GET product/update?product=foobar&delux=on

- **method="post"** - Encode form properties as query params in message body
  HTTP POST product/update
  Content-Type: application/x-www-form-urlencoded
  product=foobar&delux=on
Rails input pattern using form POST

- GET Page containing form
  - Contains a method="post" form to a POST Page

- POST Page - Validate and perform operation (typically create or update)
  - If successful, redirect to a "done" page (possibly another GET Page) if successful
  - If failed validation, redirect page to the GET Page with incorrect fields highlighted
  - If error, redirect to some oops page
Validation requirements in web applications

- Protect integrity of storage (required fields, organization, security, etc.)
  - Can not let HTTP request either from web app or generated out the web app damage us
  - Need to enforce at web server API

- Provide a good user experience
  - Don't let users make mistakes or warn them as soon as possible
  - Pushing validation closer to the user is helpful

- Validation in JavaScript frameworks (ReactJS)
  - Rule #1: Still need server-side validation to protect storage system integrity
  - Rule #2: Let user know about validity problems as early as possible
Input in ReactJS: familiar HTML form/input model

- ReactJS uses HTML form elements: `<input>`, `<textarea>`, and `<select>`

```jsx
render() {
    return (
        <form onSubmit={this.handleSubmit}>
            <label>
                Name: <input type="text" value={this.state.inputValue} onChange={this.handleChangeInput} /> 
            </label>
            <label>
                Essay: <textarea value={this.state.textValue} onChange={this.handleChangeText} /> 
            </label>
            <label>
                <select value={this.state.selValue} onChange={this.handleChangeSelect}>
                    <option value="yes">Yes</option>
                    <option value="no">No</option>
                    <option value="maybe">Maybe</option>
                </select>
            </label>
            <input type="submit" value="Submit" />
        </form>
    );
}
```
Input in ReactJS handling events

class MyForm extends React.Component {
  constructor(props) {
    super(props);
    this.state = { }; 
    this.handleChange = this.handleChange.bind(this); 
    this.handleSubmit = this.handleSubmit.bind(this); 
  }

  handleChange(event) {
    this.setState({value: event.target.value}); // Common approach to push into component state 
  }

  handleSubmit(event) {
    // Process submit from this.state 
    event.preventDefault(); // Need to stop DOM from generating a POST 
  }
}
JSX and this handling - No ideal way

- Specifying a method as DOM event callback doesn't work:
  
  ```jsx
  <form onSubmit={this.formSubmit}> ...  // Wrong! Calls with this undefined
  ```

- Arrow function embedded in JSX render: Can call instance method
  
  ```jsx
  <form onSubmit={(event) => this.formSubmit(event)}> ... 
  ```

- Redefine method function in instance to have correct this in constructor:
  
  ```jsx
  this.formSubmit = this.formSubmit.bind(this);  // In component constructor
  ```

- Use new JavaScript class fields:
  ```jsx
  class Foo {
    fieldName = value;
  }
  ```
Validation in ReactJS

- Opinionated! Lots of different packages
  - Example: Formik - Build forms in React, without tears.
  - Handles specifying form, validation methods, form error reporting, etc.

- Flexible: Can do validation anyway you want

```javascript
handleChange(event) {
  if (this.validateIt(event.target.value, this.state)) {
    this.setState({renderValidationError: true});
  }
  this.setState({value: event.target.value});
}
```

Arbitrary JavaScript can look at event.target.value and this.state and use setState causing render() be called again.
Asynchronous validation

- Can in background communicate with web server to validate input
  - Example: username already taken

- Example: Autocomplete with React-AutoSuggest

  ```
  <Autosuggest
    suggestions={suggestions}
    onSuggestionsFetchRequested={this.onSuggestionsFetchRequested}
    onSuggestionsClearRequested={this.onSuggestionsClearRequested}
    getSuggestionValue={getSuggestionValue}
    renderSuggestion={renderSuggestion}
    inputProps={inputProps}
  />
  ```

- Trend towards using recommendation systems for input guidance
Single Page App Input

- Rather than POST with redirect you can do a XMLHttpRequest POST/PUT
- React: Unopinionated - Many options to choose from.
  - Example: Axios - Promise based HTTP client for the browser and node.js
    
    ```javascript
    axios.get(url)
    axios.delete(url)
    axios.post(url, body)
    axios.put(url, body)
    ```
Axios Model fetch

```javascript
axios.get(URLpath)
  .then((response) => {
    // response.status - HTTP response status (eg 200)
    // response.statusText - HTTP response status text (eg OK)
    // response.data - Response body object (JSON parsed)
  })
  .catch((err) => {
    // err.response.{status, data, headers} - Non-2xx status HTTP response
    // if !err.response - No reply, can look at err.request
  });
```
Axios Model fetch - Alternative Error Handling

axios.get(URLpath)
  .then((response) => {
    // response.status - HTTP response status (eg 200)
    // response.statusText - HTTP response status text (eg OK)
    // response.data - Response body object (JSON parsed)
  },
  (err) => {
    // err.response.{status, data, headers} - Non-2xx status HTTP response
    // if !err.response - No reply, can look at err.request
  });
Axios Model uploading

axios.post(URLpath, objectWithParameters)
  .then((response) => {
    // response.status - HTTP response status (eg 200)
    // response.statusText - HTTP response status text (eg OK)
    // response.data - Response body object (JSON parsed)
  })
  .catch((err) => {
    // err.response.{status, data, headers} - Non-2xx status HTTP response
    // if !err.response - No reply, can look at err.request
  });
Server-side validation

- Regardless of validation in browser server needs to check everything
  - Easy to directly access server API bypassing all browser validation checks

- Mongoose allows validator functions

```javascript
var userSchema = new Schema({
  phone: { type: String,
    validate: {
      validator: function(v) {
        return /d{3}-d{3}-d{4}/.test(v);
      },
      message: '{VALUE} is not a valid phone number!' 
    }
  }
});
```
Some integrity enforcement requires special code

- Maintaining relationship between objects
- Resource quotas
- Examples related to our Photo App
  - Only author and admin user can delete a photo comment.
  - A user can only upload 50 photos unless they have a premium account.