Fundamentals of Web Development

Third Edition by Randy Connolly and Ricardo Hoar

Chapter 7

Working with Databases

Part 2: CRUD

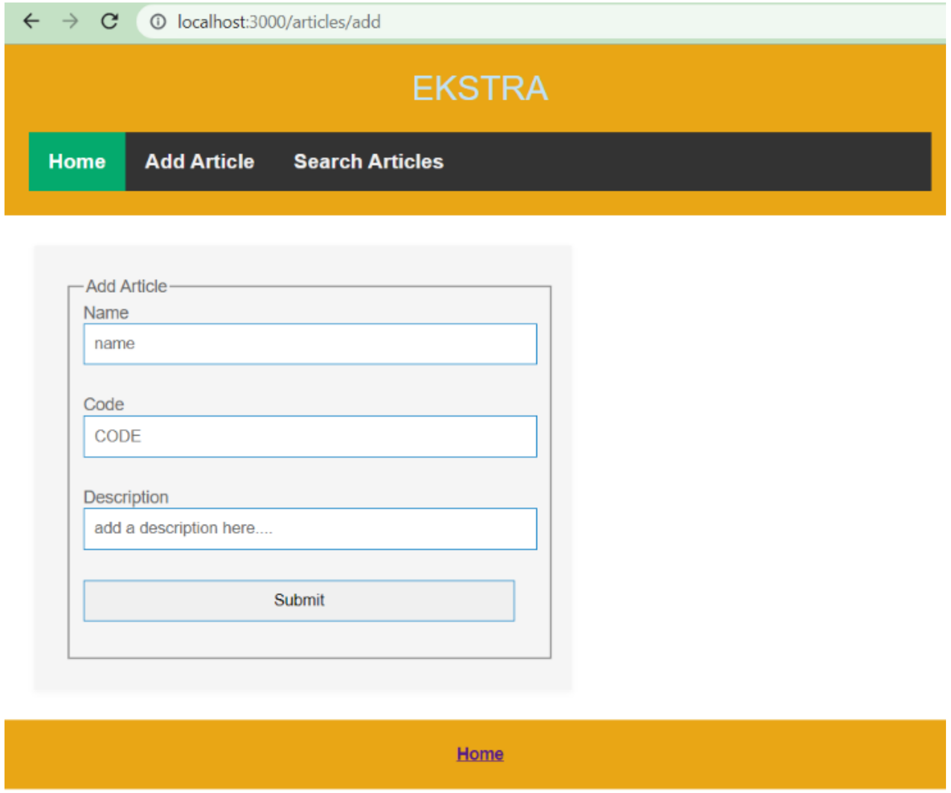
Which HTTP method to use: What is CRUD?

- In HTTP we have different request methods that should be used for the corresponding database operation:

Database operation	HTTP method	express function
Create	POST is used to create new data in the backend (in the database for example).	app.post()
Read	By default, GET is used, GET is used to get a resource from the server (webpage, css file, image, data, etc.)	app.get()
Update	PUT is used to update existing data in the backend.	app.put()
Delete	DELETE is used to delete data	app.delete()

Our case study

- We will start by creating the structure of a complete express MVC application.
- The goal is to create:
  - a form to add articles to the database.
  - A table to show retrieved data.
  - a button that allows us to delete an item.
  - An update button on the form to update data.



Source code: chapter07/03_simple_CRUD

Design the API endpoints

Operation	Route	HTTP Method
To open the home page To open the form page	/ /v1/**articles/page**	GET
To retrieve articles	/v1/**articles** /v1/**articles**/id/:id /v1/**articles**/category/:category	GET
To add a new article	/v1/**articles**/code/:code/name/:name/desc/:desc	POST
To update an article	/v1/**articles**/id/:id/code/:code/name/:name/desc/:desc	PUT
To delete an article	/v1/**articles**/id/:id	DELETE

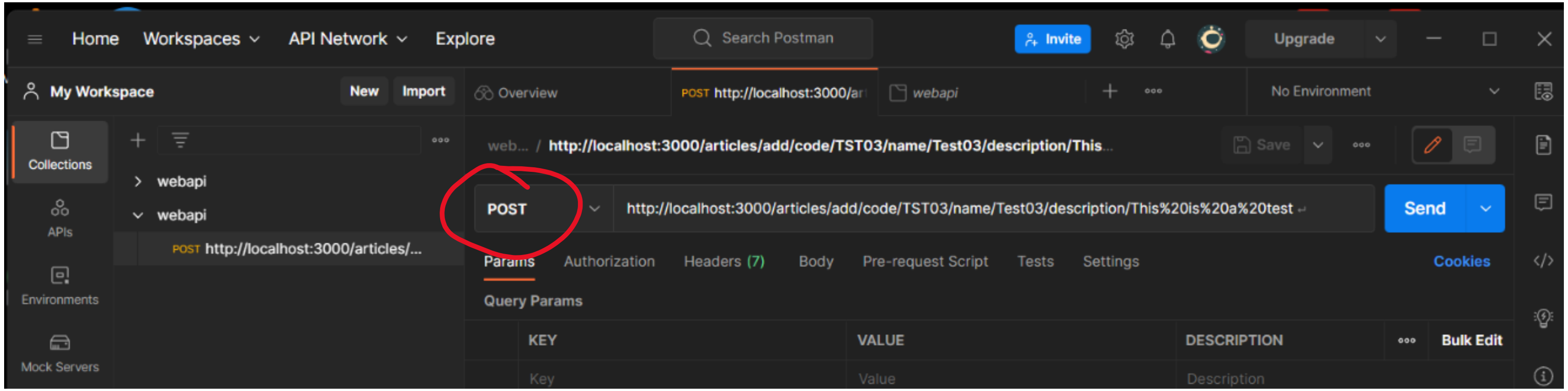
These two routes return web pages

These routes return json data only

- By using /v1/**articles** with all operations related to articles, we can create a router that handles only articles operations -> better modularity in our code

How to test a web API

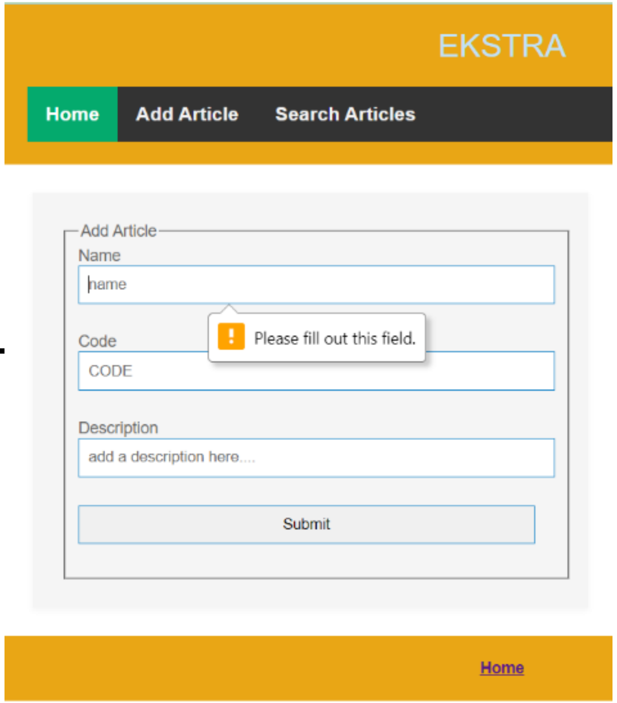
- Using the browser we can send GET requests through the address bar.
- How to test POST, PUT, DELETE requests?
- Postman is a web API testing tool



http://localhost:3000/articles/add/code/TST03/name/Test03/description/This%20is%20a%20test

Add a new article

- First, we need a form with method="post" and the correct route as the form action.
- We can add basic HTML5 validation.



```
<form method="post" action="/v1/articles/">
  <fieldset class="add_article_form">
  <legend>Add Article</legend>
    <p><label>Name</label>
      <input type="text" name="name" placeholder="name" required>
    </p>
    <p><label>Code</label>
      <input type="text" name="code" placeholder="CODE" required>
    </p>
    <p><label>Description</label>
      <input type="text" name="description" placeholder="add a description here....">
    </p>
    <input type="submit">
  </fieldset>
</form>
```

Source code: chapter07/03_simple_CRUD

Server-side input validation

- We need to validate the input coming from the client before executing the insertion operation. For example:
  - name is a string of at least 3 characters
  - email is a real email
  - age is a number, between 0 and 110
- In Express, we can use the express-validator module:

➢ npm install express-validator   // to install it

```
const express = require('express’);
const app = express();

app.use(express.json());

app.post('/form', (req, res) => {
        const name = req.body.name
        const email = req.body.email
        const age = req.body.age
})
```

Then, we need to import it :

```
const { check, validationResult } = require('express-validator');
```

Server-side input validation (2)

- We pass an array of check() calls as the second argument of the post()

- call. Every check() call accepts the parameter name as argument. Then we

- call validationResult() to verify there were no validation errors.

```
app.post('/form’, [ check('name').isLength({ min: 3 }),
                                  check('email').isEmail(),
                                  check('age').isNumeric()
                                 ],
                     (req, res) => {
                       const errors = validationResult(req);
                       if (!errors.isEmpty()) {
                         return res.status(422).json({ errors: errors.array() });
                       }
                       const name = req.body.name;
                       const email = req.body.email;
                       const age = req.body.age;
                       ….
                   });
```

Validation methods

- In the previous example, we used isEmail, is Numeric, etc. These are defined in **validator.js** which has been imported behind the scenes by **express-validator**
- Here are other methods from validator.js:
- All those checks can be combined:

```
check('name').isAlpha().isLength({ min: 10 })
```

contains()	equals()	isAlphanumeric()
isBoolean()	isCurrency()	isDecimal()
isEmpty()	isFloat()	isIP()
isInt()	isJSON()	isLowercase()
isPostalCode()	isURL()	isUppercase()

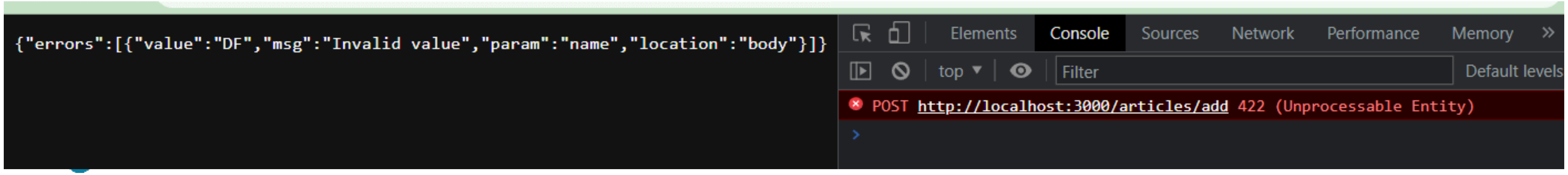
Validating our form input

- In the router, we have to pass check calls as a middleware to the post function.
- Here, we consider that the name needs to contain at least 3 characters, the code at least two, but the description is not validated.

```
// in articlesRoutes.js
// First we only import the check function
const { check } = require('express-validator’);

// Then, we pass two checks as a middleware to the post method
router.post('/add', [ check('name').isLength({ min: 3 }),
                      check('code').isLength({ min: 2 }) ]
                    , articlesController.add_article
              );
```

- Then, if we try to add an article with a name ‘DF’, we will get this response:



```
{"errors":[{"value":"DF","msg":"Invalid value","param":"name","location":"body"}]}
```

```
POST http://localhost:3000/articles/add 422 (Unprocessable Entity)
```

Validating our form input (2)

- In the controller, we check the results of the validation first.

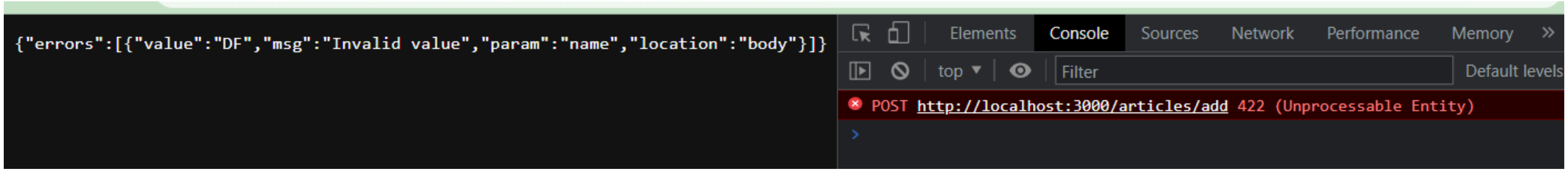
```
const add_article = (request, response) => {
  const errors = validationResult(request);
  if (!errors.isEmpty()) {
     return response.status(422).json({ errors: errors.array() });
  }

  let name = request.body.name;
  let code = request.body.code;
  let description = request.body.description;

  let art = new Article({ name: name, code: code, description: description });
  art.save()
    .then((data) => {
      console.log(`Article saved to database: id -> ${data._id}`);
      response.redirect('/v1/articles/add');  // redirect to the same page (empty form)
    })
    .catch((err) => { console.log(err) });
};
```

Why return a 422 HTTP error message?

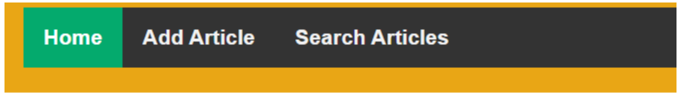
- The 422 HTTP error message means that the server understands the content type of the request entity, and the syntax of the request entity is correct (thus a 400 Bad Request status code is inappropriate) but was unable to process the contained instructions.



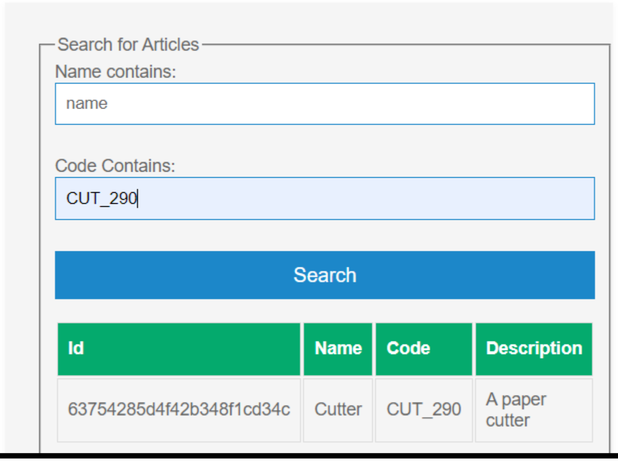
```
{"errors":[{"value":"DF","msg":"Invalid value","param":"name","location":"body"}]}
```

```
POST http://localhost:3000/articles/add 422 (Unprocessable Entity)
```

Search articles form



- We want to search for articles that have the name or code containing the given string with case insensitivity.


Search for Articles

Name contains:

name

Code Contains:

CUT_290

Id	Name	Code	Description
63754285d4f42b348f1cd34c	Cutter	CUT_290	A paper cutter

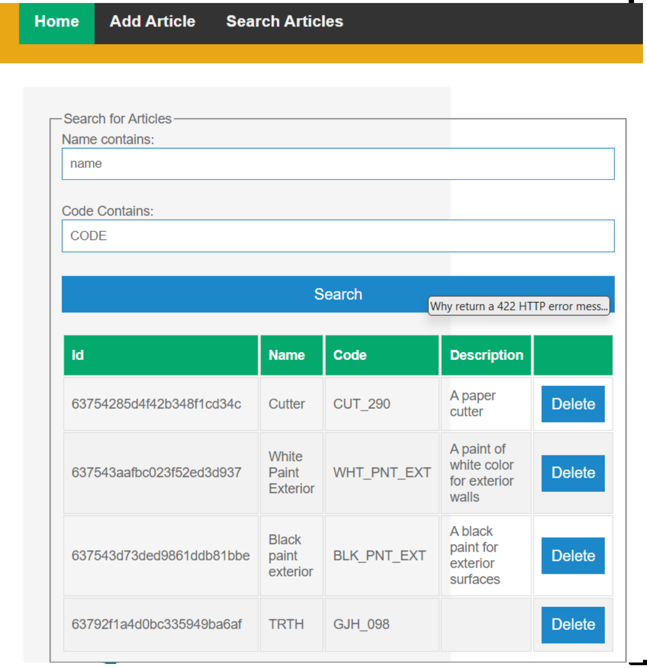
```
<form id="search-form" method="get" action="/v1/articles/">
  <fieldset class="form-article">
  <legend>Search for Articles</legend>
    <p><label>Name contains:</label>
      <input type="text" name="name" placeholder="name" ></p>
    <p><label>Code Contains:</label>
      <input type="text" name="code" placeholder="CODE" ></p>
    <button type="submit" form="search-form" value="Submit">Search</button>
  </fileldset>
</form>
```

Search articles form

```
const find_articles = (request, response) => {
  let name = request.query.name;
  let code = request.query.code;
  let nameRegex = (name.length > 0)? new RegExp(name, 'i') : null;
  let codeRegex = (code.length > 0)? new RegExp(code, 'i') : null;
  let search = {};
  if( nameRegex != null && codeRegex != null){
    search = { $or: [ { 'name': { "$regex": nameRegex } },
                      { 'code': { "$regex": codeRegex } }
                    ]};
  } else if(codeRegex != null){
    search = { 'code': { "$regex": codeRegex } };
  } else if(nameRegex != null){
    search = { 'name': { "$regex": nameRegex } };
  } else { response.status(204).end(); }    // no data, send no data HTTP code
  Article.find(search)
    .then((data) => {
      if(response._closed == false)         // response was not already sent
        response.render('search_articles', {title: "Search Articles", articles: data});
    })
    .catch((err) => { console.log(err) })
};
```

Delete an article

We need to send a fetch request to delete an element:



Search for Articles

Name contains: name

Code Contains: CODE

Search

Why return a 422 HTTP error mess...

Id	Name	Code	Description	
63754285d4f42b348f1cd34c	Cutter	CUT_290	A paper cutter	Delete
637543aafbc023f52ed3d937	White Paint Exterior	WHT_PNT_EXT	A paint of white color for exterior walls	Delete
637543d73ded9861ddb81bbe	Black paint exterior	BLK_PNT_EXT	A black paint for exterior surfaces	Delete
63792f1a4d0bc335949ba6af	TRTH	GJH_098		Delete

```
<article id="articles_table">
  <% if( articles != undefined && articles != null ){ %>
    <script>
      const deleteArt = (e) => {
        let delete_promise = fetch('/v1/articles/' + e.id, { method: 'DELETE'})
        delete_promise.then(response => response.json())
                           .then( data => {
                              window.location = data.redirect;
                           })
          .catch((reject) => {
            document.getElementById("message_delete").textContent = reject;
          });
      }
    </script>
    <table>
      <thead>
        <tr><th>Id<th>Name<th>Code<th>Description<th></th>
      <tbody>
        <% if(articles.length > 0){ %>
          <% articles.forEach((article) => { %>
            <tr>
              <td><%= article.id %>
              <td><%= article.name %>
              <td><%= article.code %>
              <td><%= article.description %>
              <td><button id="<%= article.id %>" onclick="deleteArt(this)" data>
                                                   Delete</button></td>

            <% }) %>
    </table>
  <% }} %>
</article>
```

Delete an article (2)

- On the server-side, we need to handle the delete requet by the router.
- Then, in the controller, we need to use the findByIdAndDelete.
- Finally, we cannot redirect from the server with the fetch call, so we can send back a redirect string in a json object, and the client-side fetch will redirect to the given route.

```
// in the routes.js
router.delete('/:id', articlesController.delete_article);



// in the controller.js
const delete_article = (request, response) => {
  let id = request.params.id;

  Article.findByIdAndDelete(id)
    .then((result) => {
      console.log(`Article deleted from database: id -> ${result._id}`);
      response.json({ redirect: ‘/v1/articles/search'});
    })
    .catch((err) => { console.log(err) });
};
```

Pearson

Update an article

- To update an article, we should use the findOneAndUpdate mongoose function. The function returns the old copy of the object if the update succeed:

```
const filter = { id: '637543aafbc023f52ed3d937' };
const update = { name: 'NEW_NAME' };

let doc = await Article.findOneAndUpdate(filter, update);

doc.name; // 'OLD_NAME' is returned
```