EXPERIMENT 10

AIM: Database connectivity (MongoDB) – CRUD operations using Express and Node js.

Here are the steps to install MongoDB on different operating systems:

For Windows:

Step 1: Download MongoDB Installer

- Go to the MongoDB Download Center and select Windows as your operating system.
- Download the latest MongoDB Community Server (choose the MSI package for easy installation).

Step 2: Install MongoDB

- 1. Run the downloaded MSI file.
- 2. During installation:
 - Select Complete setup.
 - Check the box for Install MongoDB as a Service.
 - Leave other options as default (install MongoDB Compass, choose default paths).
- 1. Click Install to begin the installation.

Step 3: Add MongoDB to System Path (Optional)

MongoDB is typically added to your system path automatically, but if it's not, you can do it manually:

- 1. Go to Control Panel > System and Security > System.
- 2. Click on Advanced system settings > Environment Variables.
- 3. Under System variables, find Path, click Edit, and add the path where MongoDB is installed.

4. By default, it is:

C:\Program Files\MongoDB\Server\<version>\bin

Step 4: Run MongoDB

Open Command Prompt and start MongoDB by running: Run the command in root also run under express-mongodb-crud directory.

mongod

If the service was installed, it should start automatically when Windows boots.

Here are the steps to install Postman on different operating systems:

For Windows:

Step 1: Download Postman

- Go to the official Postman download page.
- Select Windows as your operating system and download the latest version of Postman.

Step 2: Install Postman

- 1. Once the download is complete, run the .exe installer.
- Follow the prompts to install Postman on your system (installation is automatic and simple).
- 3. After installation, Postman will launch automatically.

Step 3: Sign In or Create an Account

- After installation, Postman will ask you to sign in. You can either:
- Sign in using an existing Postman account (using email, Google, or GitHub).
- Skip signing in (Postman will work offline without an account but with limited features).

To create a Node.js and Express application with MongoDB connectivity and CRUD (Create, Read, Update, Delete) operations, follow these steps.

Steps to Create the Project:

Initialize Node.js Project: Run these commands in your terminal:

mkdir express-mongodb-crud cd express-mongodb-crud npm init -y

Install Dependencies: You'll need to install **Express** and **Mongoose** (for MongoDB connection):

npm install express mongoose

Install Nodemon (optional, for easier development): Install Nodemon to automatically restart the server when code changes:

npm install -g nodemon

Set up MongoDB:

- Make sure you have MongoDB installed locally or you can use MongoDB Atlas (cloud-based MongoDB).
- If you're using MongoDB locally, ensure the MongoDB service is running.

Project Structure:

1. app.js (Main Application)

This file will set up the Express app and connect to the MongoDB database using Mongoose:

```
const express = require('express');
const mongoose = require('mongoose');
const bodyParser = require('body-parser');
// Import routes
const userRoutes = require('./routes/userRoutes');
// Initialize express app
const app = express();
// Middleware to parse request body
app.use(bodyParser.json());
// Connect to MongoDB
mongoose.connect('mongodb://127.0.0.1:27017/usersDB', { useNewUrlParser: true,
useUnifiedTopology: true })
 .then(() => console.log("Connected to MongoDB"))
 .catch((err) => console.log("Error connecting to MongoDB:", err));
// Routes
app.use('/api/users', userRoutes);
// Start the server
const PORT = 3000;
app.listen(PORT, () => {
 console.log(`Server is running on http://localhost:${PORT}`);
});
2. models/user.js (User Schema)
This file defines the Mongoose schema for a user:
const mongoose = require('mongoose');
const userSchema = new mongoose.Schema({
 name: {
  type: String,
```

```
required: true,
},
email: {
  type: String,
  required: true,
  unique: true,
},
age: {
  type: Number,
  required: true,
},
}, { timestamps: true });
const User = mongoose.model('User', userSchema);
module.exports = User;
```

3. routes/userRoutes.js (CRUD Operations)

This file defines the Express routes for performing CRUD operations:

```
const express = require('express');
const User = require('../models/user');
const router = express.Router();
// Create a new user (POST)
router.post('/', async (req, res) => {
    try {
      const { name, email, age } = req.body;
      const newUser = new User({ name, email, age });
      await newUser.save();
      res.status(201).json(newUser);
    } catch (err) {
      res.status(400).json({ message: err.message });
    }
});
```

```
// Get all users (GET)
router.get('/', async (req, res) => {
 try {
  const users = await User.find();
  res.status(200).json(users);
 } catch (err) {
  res.status(500).json({ message: err.message });
});
// Get a single user by ID (GET)
router.get('/:id', async (req, res) => {
 try {
  const user = await User.findById(req.params.id);
  if (!user) return res.status(404).json({ message: 'User not found' });
  res.status(200).json(user);
 } catch (err) {
  res.status(500).json({ message: err.message });
 }
});
// Update a user by ID (PUT)
router.put('/:id', async (req, res) => {
 try {
  const { name, email, age } = req.body;
  const updatedUser = await User.findByIdAndUpdate(
   req.params.id,
    { name, email, age },
    { new: true, runValidators: true }
  );
  if (!updatedUser) return res.status(404).json({ message: 'User not found' });
  res.status(200).json(updatedUser);
 } catch (err) {
```

```
res.status(400).json({ message: err.message });
}
});
// Delete a user by ID (DELETE)
router.delete('/:id', async (req, res) => {
    try {
      const user = await User.findByIdAndDelete(req.params.id);
      if (!user) return res.status(404).json({ message: 'User not found' });
      res.status(200).json({ message: 'User deleted' });
    } catch (err) {
      res.status(500).json({ message: err.message });
    }
});
module.exports = router;
```

4. Run the Application:

1. Start MongoDB locally (or make sure your MongoDB Atlas cluster is set up).

Run the following command to start your server:

nodemon app.js

Now, your server should be running on http://localhost:3000.

To test CRUD (Create, Read, Update, Delete) operations on an API, you can use Postman or other API testing tools. Here's a detailed guide on how to execute and test CRUD operations using Postman.

CRUD Operations Overview:

- 1. **Create** (POST): Add new data to the database.
- 2. Read (GET): Retrieve data from the database.
- 3. Update (PUT or PATCH): Modify existing data.

4. Delete (DELETE): Remove data from the database.

Setup for Testing:

Before testing, ensure that:

• Your backend API is running.

• You have installed **Postman** on your machine.

• You have an API that handles CRUD operations (e.g., the Node.js and MongoDB

application we discussed earlier).

We will assume you have the following API endpoints for users:

• POST /api/users – Create a new user.

• GET /api/users – Get all users.

• GET /api/users/:id – Get a specific user by ID.

• PUT /api/users/:id – Update a specific user.

• DELETE /api/users/:id – Delete a specific user.

Detailed Steps to Execute CRUD Operations Using Postman:

1. Create a New User (POST Request)

Endpoint: POST /api/users

Goal: To create a new user.

Steps:

1. **Open Postman** and click on **New** to create a new request.

2. Set the request type to **POST**.

In the URL bar, enter your API endpoint:

http://localhost:3000/api/users

1. Go to the **Body** tab, select **raw**, and choose **JSON** as the format.

In the body, provide the JSON data for the new user. For example:

{
 "name": "Alice",
 "email": "alice@example.com",
 "age": 25

- 1. Add other other examples with different data. No copy paste from given document.
- 2. Click Send.
- 3. Check the Response:
 - If successful, you should receive a response with the created user data, including an auto-generated ID, timestamps, etc.
 - Status code: 201 Created

Expected Response:

```
"_id": "615fbcf4bf1a1c001c6015a6",

"name": "Alice",

"email": "alice@example.com",

"age": 25,

"createdAt": "2023-10-10T12:00:00.000Z",

"updatedAt": "2023-10-10T12:00:00.000Z",

"__v": 0
```

2. Read All Users (GET Request)

Endpoint: GET /api/users

Goal: To retrieve a list of all users from the database.

Steps:

1. In **Postman**, create a new request and set it to **GET**.

In the **URL** bar, enter the endpoint:

http://localhost:3000/api/users

- 1. Click Send.
- 2. Check the Response:
 - You should receive an array of user objects.
 - Status code: 200 OK

Expected Response:

```
[

"_id": "615fbcf4bf1a1c001c6015a6",

"name": "Alice",

"email": "alice@example.com",

"age": 25,

"createdAt": "2023-10-10T12:00:00.000Z",

"updatedAt": "2023-10-10T12:00:00.000Z",

"__v": 0

},

{

"_id": "615fbcd9bf1a1c001c6015a5",

"name": "Bob",
```

```
"email": "bob@example.com",

"age": 30,

"createdAt": "2023-10-09T12:00:00.000Z",

"updatedAt": "2023-10-09T12:00:00.000Z",

"__v": 0
}
```

3. Read a Single User by ID (GET Request)

Endpoint: GET /api/users/:id

Goal: To retrieve a specific user by their unique ID.

Steps:

1. In **Postman**, create a new request and set it to **GET**.

In the **URL** bar, enter the endpoint with the user's ID:

http://localhost:3000/api/users/615fbcf4bf1a1c001c6015a6

- 1. Click Send.
- 2. Check the Response:
 - You should receive the user object with the given ID.
 - Status code: 200 OK
 - If the user doesn't exist, the API may return a 404 Not Found status.

Expected Response:

```
{
"_id": "615fbcf4bf1a1c001c6015a6",
"name": "Alice",
"email": "alice@example.com",
```

```
"age": 25,

"createdAt": "2023-10-10T12:00:00.000Z",

"updatedAt": "2023-10-10T12:00:00.000Z",

"__v": 0
}
```

4. Update a User (PUT Request)

Endpoint: PUT /api/users/:id

Goal: To update a user's information.

Steps:

1. In **Postman**, create a new request and set it to **PUT**.

In the URL bar, enter the endpoint with the user's ID:

http://localhost:3000/api/users/615fbcf4bf1a1c001c6015a6

1. Go to the **Body** tab, select **raw**, and choose **JSON** as the format.

Provide the updated data. For example, changing Alice's age:

```
{
  "name": "Alice",
  "email": "alice@example.com",
  "age": 26
}
```

- 1. Click Send.
- 2. Check the Response:
 - You should receive the updated user object.

• Status code: 200 OK

Expected Response:

```
{
    "_id": "615fbcf4bf1a1c001c6015a6",
    "name": "Alice",
    "email": "alice@example.com",
    "age": 26,
    "createdAt": "2023-10-10T12:00:00.000Z",
    "updatedAt": "2023-10-11T12:00:00.000Z",
    "__v": 0
}
```

5. Delete a User (DELETE Request)

Endpoint: DELETE /api/users/:id

Goal: To delete a user by their unique ID.

Steps:

1. In **Postman**, create a new request and set it to **DELETE**.

In the **URL** bar, enter the endpoint with the user's ID:

http://localhost:3000/api/users/615fbcf4bf1a1c001c6015a6

- 1. Click Send.
- 2. Check the Response:
 - If successful, you should receive a confirmation message.
 - Status code: 200 OK

Expected Response:

```
{
    "message": "User deleted"
}
```

Key Points:

- HTTP Methods: Each CRUD operation uses a specific HTTP method:
 - POST for creating.
 - GET for reading.
 - PUT for updating.
 - DELETE for deleting.
- **API Endpoints:** You need to provide the correct endpoint for each operation. Dynamic IDs should be replaced with actual values (e.g., :id should be replaced with a real user ID).
- **Request Body:** For POST and PUT requests, the body must be in JSON format and should match the expected structure of the API (e.g., name, email, age).

Output Screenshots:

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ment has been set up for using Node.js 18.2.0 (x64) and
         "name": "express-crud",

'version": "1.0.0",

'description": "",

"main": "index.js",

Scriptis":

"test": "echo \"Error: no test specified\" && exit 1"
         },
"keywords": [],
"author": "",
"license": "ISC"
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run `npm fund` for details
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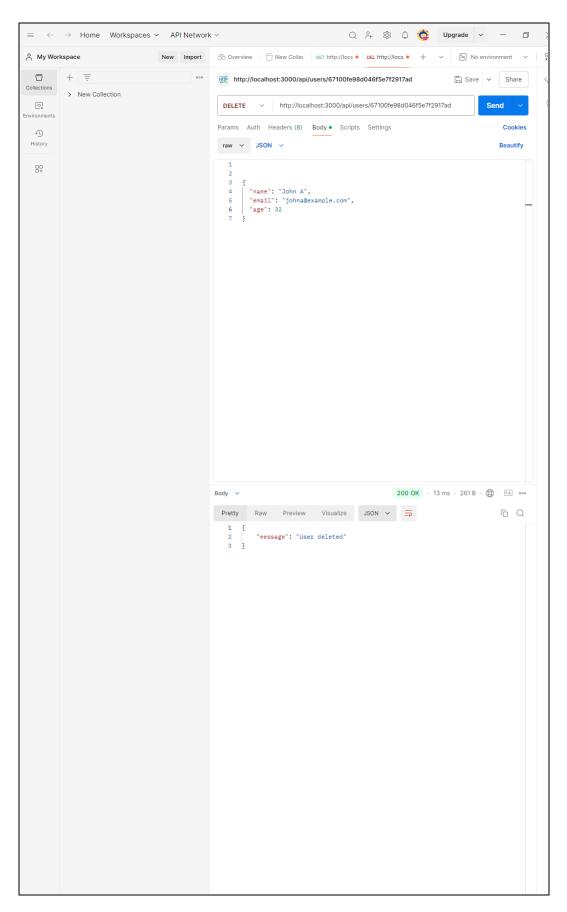
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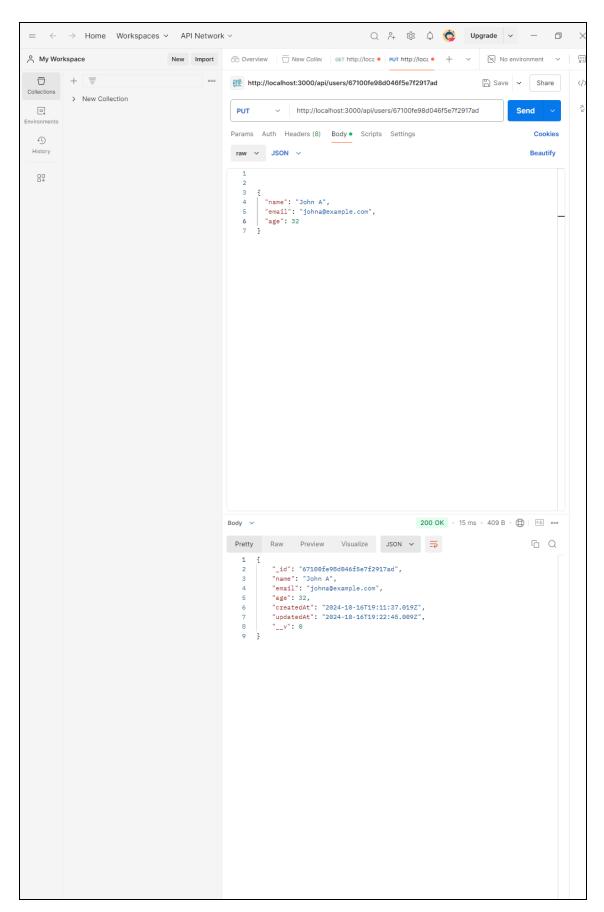
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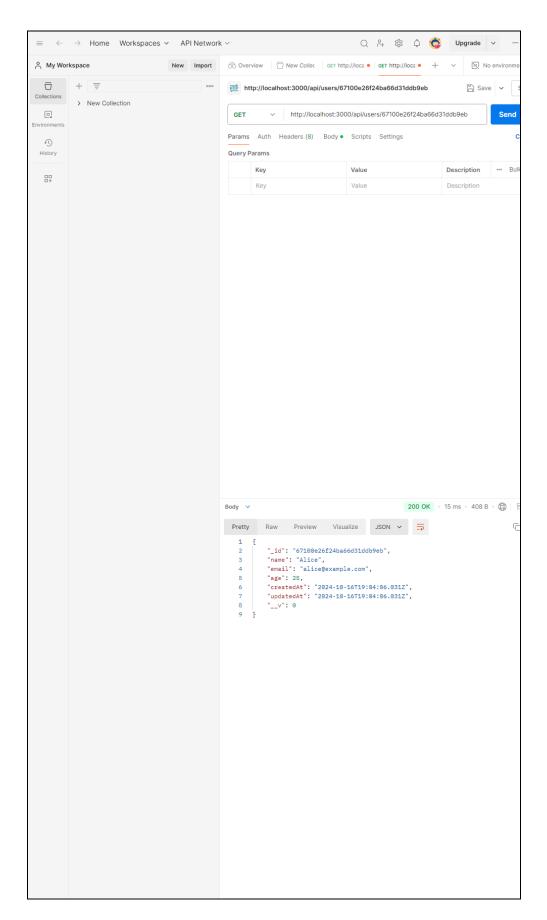
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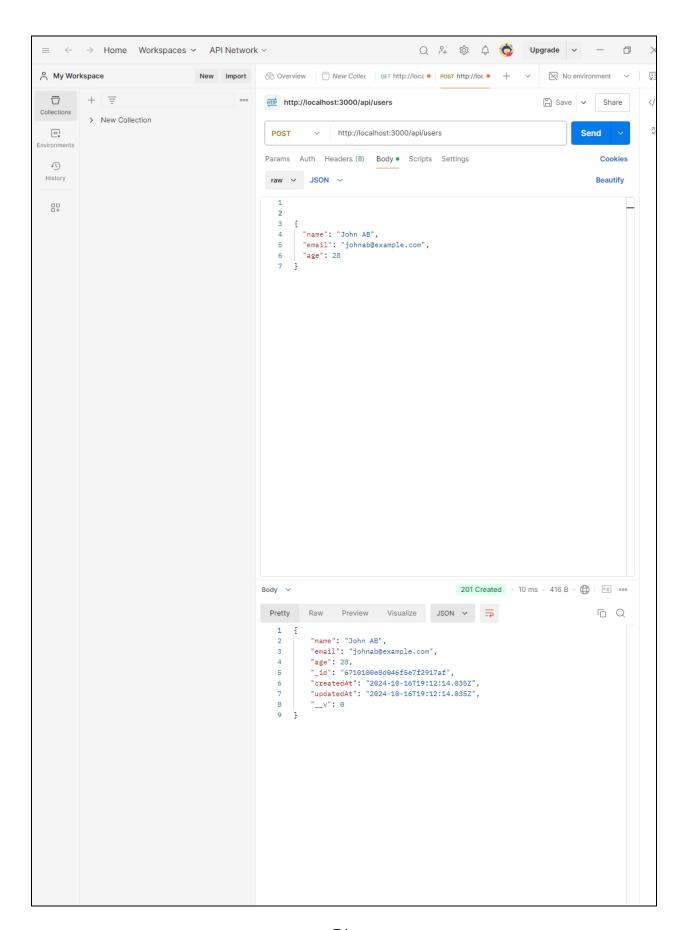
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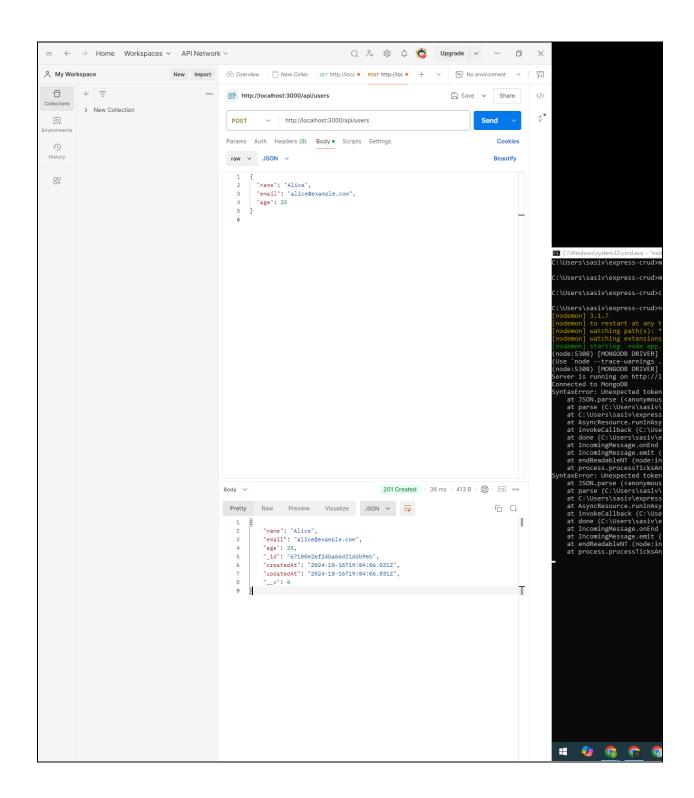


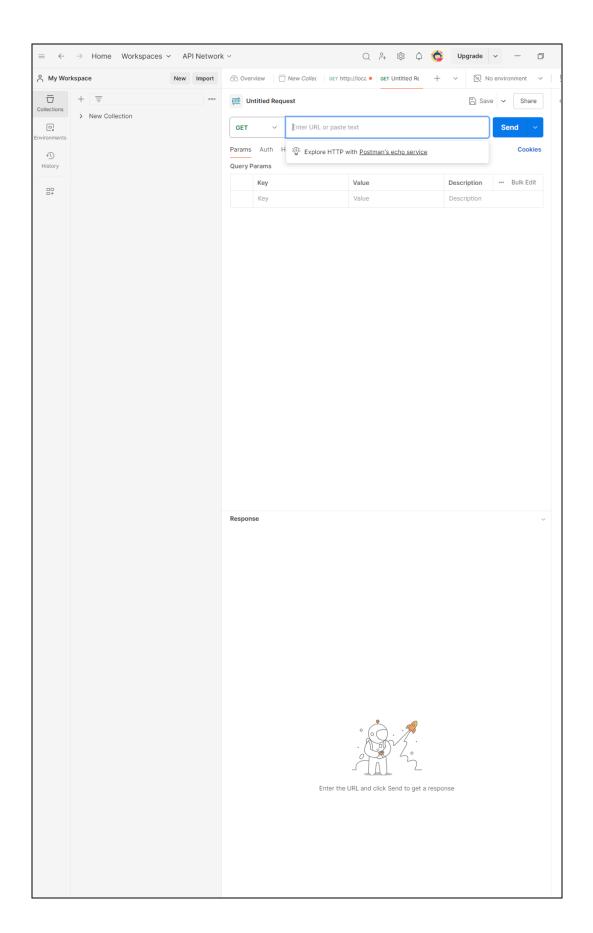




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"email": "john@example.com",
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"email": "Alice@example.com",
"age": 25,
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"updatedAt": "2024-10-16T19:04:06.031Z",
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    "name": "John A",
    "email": "johna@example.com",
    "age": 22,
    "createdAt": "2024-10-16T19:11:37.019Z",
    "updatedAt": "2024-10-16T19:11:37.019Z",
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"email": "johnab@example.com",
"age": 28,
"createdAt": "2024-10-16719:12:14.0352",
"updatedAt": "2024-10-16719:12:14.0352",
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                                                               const User = require('../models/user');
const router = express.Router();
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        > node_modules
        JS userRoutes.js
       JS app.js
                                                                    const { name, email, age } = req.body;
const newUser = new User({ name, email, age });
       {} package-lock.json
       {} package.json
                                                                    res.status(400).json({ message: err.message });
                                                                // Get all users (GET)
router.get('/', async (req, res) => {
                                                                   const users = await User.find();
                                                                     res.status(500).json({ message: err.message });
                                                                router.get('/:id', async (req, res) => {
                                                                    const user = await User.findById(req.params.id);
                                                                    if (!user) return res.status(404).json({ message: 'User not found' })
                                                                     res.status(200).json(user);
                                                                     res.status(500).json({ message: err.message });
                                                                // Update a user by ID (PUT)
router.put('/:id', async (req, res) => {
                                                                    const { name, email, age } = req.body;
const updatedUser = await User.findByIdAndUpdate(
                                                                       req.params.id,
                                                                       { name, email, age },
{ new: true, runValidators: true }
                                                                     if (!updatedUser) return res.status(404).json({ message: 'User not fo
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                                                                // Delete a user by ID (DELETE)
router.delete('/:id', async (req, res) => {
                                                                    const user = await User.findByIdAndDelete(req.params.id);
                                                                    if (!user) return res.status(404).json({ message: 'User not found' })
res.status(200).json({ message: 'User deleted' });
                                                                    res.status(500).json({ message: err.message });
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                                                  const mongoose = require('mongoose');

✓ models

                                                   const userSchema = new mongoose.Schema({
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                                                       unique: true,
                                                       required: true,
                                                   },
}, { timestamps: true });
                                                   const User = mongoose.model('User', userSchema);
```

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✓ EXPRESS-CRUD

                                                                Js app.js > ...
                                                                       const express = require('express');
const mongoose = require('mongoose');
const bodyParser = require('body-parser');

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                                                                       // Import routes
const userRoutes = require('./routes/userRoutes');
         JS userRoutes.js
        {} package-lock.json
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        {} package.json
                                                                        mongoose.connect('mongodb://127.0.0.1:27017/usersDB', { useNewUrlParser:
                                                                         .then(() => console.log("Connected to MongoDB"))
.catch((err) => console.log("Error connecting to MongoDB:", err));
                                                                                                                                                                                            app.use('/api/users', userRoutes);
                                                                        // Start the server
const PORT = 3000;
                                                                        app.listen(PORT, () => {
  console.log(`Server is running on http://localhost:${PORT}`);
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