EXPERIMENT NO.4.1

Aim

To implement **CRUD (Create, Read, Update, Delete)** operations on a product database using **Mongoose** in Node.js, demonstrating how MongoDB can be used for managing product-related information.

Theory

- **CRUD Operations** are the fundamental operations used in database management:
    1. **Create** → Add new product records.
    2. **Read** → Retrieve product data from the database.
    3. **Update** → Modify existing product records.
    4. **Delete** → Remove product records.
- **Mongoose** is an **ODM (Object Data Modeling)** library for MongoDB in Node.js. It provides:
    1. Schema-based modeling of data.
    2. Query building, validation, and hooks.
    3. Easy handling of MongoDB documents in a structured way.
- **Product Database Example**:
  Each product may contain fields such as:
    1. `name` (String)
    2. `price` (Number)
    3. `category` (String)
    4. `inStock` (Boolean)

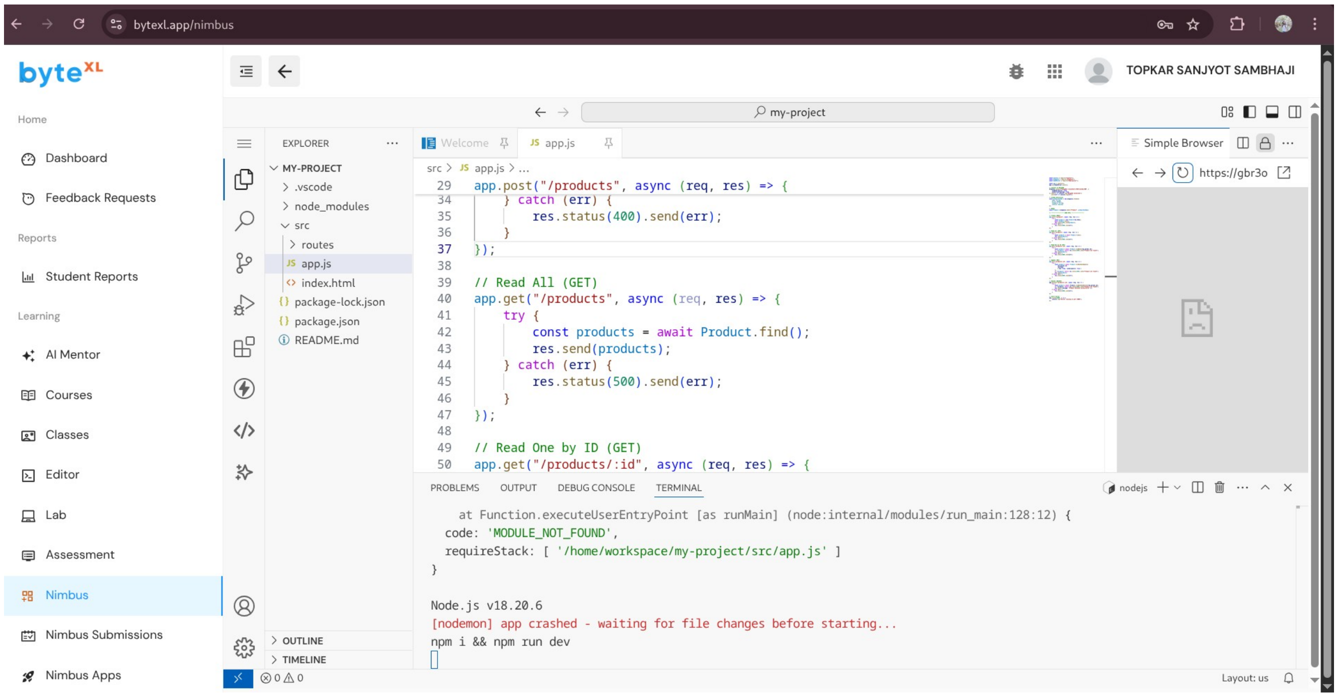
Code

1. Setup Project

```
mkdir product-crud
cd product-crud
npm init -y
npm install express mongoose body-parser
```

2. `index.js` – Main Server File

```
const express = require("express");
const mongoose = require("mongoose");
const bodyParser = require("body-parser");

const app = express();
app.use(bodyParser.json());

// Connect to MongoDB
mongoose.connect("mongodb://localhost:27017/productDB", {
    useNewUrlParser: true,
    useUnifiedTopology: true,
}).then(() => console.log("MongoDB Connected"))
  .catch(err => console.log(err));

// Schema Definition
const productSchema = new mongoose.Schema({
    name: String,
    price: Number,
    category: String,
    inStock: Boolean
});

// Model
const Product = mongoose.model("Product", productSchema);

// ------------------ CRUD APIs ------------------

// Create (POST)
app.post("/products", async (req, res) => {
    try {
        const product = new Product(req.body);
        await product.save();
        res.status(201).send(product);
    } catch (err) {
        res.status(400).send(err);
    }
});

// Read All (GET)
app.get("/products", async (req, res) => {
    try {
        const products = await Product.find();
        res.send(products);
    } catch (err) {
        res.status(500).send(err);
    }
});

// Read One by ID (GET)
app.get("/products/:id", async (req, res) => {
    try {
        const product = await Product.findById(req.params.id);
        if (!product) return res.status(404).send("Product not found");
        res.send(product);
    } catch (err) {
        res.status(500).send(err);
    }
});

// Update (PUT)
app.put("/products/:id", async (req, res) => {
    try {
        const product = await Product.findByIdAndUpdate(
            req.params.id,
            req.body,
            { new: true, runValidators: true }
        );
        if (!product) return res.status(404).send("Product not found");
        res.send(product);
    } catch (err) {
        res.status(400).send(err);
    }
});

// Delete (DELETE)
app.delete("/products/:id", async (req, res) => {
    try {
        const product = await Product.findByIdAndDelete(req.params.id);
        if (!product) return res.status(404).send("Product not found");
        res.send({ message: "Product deleted successfully" });
    } catch (err) {
        res.status(500).send(err);
    }
});

// Start Server
app.listen(3000, () => {
    console.log("Server running on port 3000");
});
```



```javascript
app.post("/products", async (req, res) => {
    } catch (err) {
        res.status(400).send(err);
    }
});

// Read All (GET)
app.get("/products", async (req, res) => {
    try {
        const products = await Product.find();
        res.send(products);
    } catch (err) {
        res.status(500).send(err);
    }
});

// Read One by ID (GET)
app.get("/products/:id", async (req, res) => {
```

```
    at Function.executeUserEntryPoint [as runMain] (node:internal/modules/run_main:128:12) {
  code: 'MODULE_NOT_FOUND',
  requireStack: [ '/home/workspace/my-project/src/app.js' ]
}

Node.js v18.20.6
[nodemon] app crashed - waiting for file changes before starting...
npm i && npm run dev
```

Learning Outcomes

After completing this experiment, students will be able to:

1. Understand the concept of **CRUD operations** in databases.
2. Implement a **MongoDB schema** using Mongoose.
3. Build a simple **RESTful API** in Express.js for product management.
4. Perform database operations like **insert, fetch, update, and delete** records.
5. Gain practical exposure to **backend development** with Node.js, Express, and MongoDB.
