**Spring Boot and React Project Configuration Guide**

**1. Spring Boot Project Setup**

**Q1: How to set up a Spring Boot project?**

* **Step 1:** Install Java Development Kit (JDK) 11 or later.
  + Download and install from [Oracle JDK](https://www.oracle.com/java/technologies/javase-jdk11-downloads.html).
  + Set JAVA\_HOME and PATH environment variables.
* **Step 2:** Create a Spring Boot project using Spring Initializr or Spring Tools.
  + Open Spring Initializr: <https://start.spring.io/>
  + Select:
    - Project: Maven Project
    - Language: Java
    - Spring Boot Version: Latest stable version
    - Group: com.example
    - Artifact: studentapp
    - Dependencies: Spring Web, Spring Data JPA, MySQL Driver, Spring Boot DevTools, Lombok
  + Click "Generate" to download the project and unzip it.
* **Step 3:** Open the project in your IDE (e.g., VS Code, IntelliJ IDEA).

**Q2: How to configure MySQL database in Spring Boot?**

* **Step 1:** Install MySQL and create a new database (studentdb).
* **Step 2:** Add MySQL configuration in application.properties:
  + Set spring.datasource.url, spring.datasource.username, and spring.datasource.password to connect to your MySQL database.
* **Step 3:** Install necessary dependencies like spring-boot-starter-data-jpa and mysql-connector-java in your pom.xml (if not already added by Spring Initializr).

**2. Frontend (React) Project Setup**

**Q3: How to set up a React project for the frontend?**

* **Step 1:** Install Node.js and npm (Node Package Manager) from <https://nodejs.org/>.
  + Verify installation by running the following commands:

bash

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node -v

npm -v

* **Step 2:** Create a new React app using create-react-app:

bash

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npx create-react-app student-frontend

* **Step 3:** Install Axios to make HTTP requests to the Spring Boot backend:

bash

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npm install axios

* **Step 4:** Navigate to the project folder:

bash

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cd student-frontend

**3. Spring Boot Backend API Development**

**Q4: How to implement API endpoints in Spring Boot for student management?**

* **Step 1:** Create a Student model class with required fields like id, name, email, and age.
* **Step 2:** Create a repository interface extending JpaRepository for CRUD operations.
* **Step 3:** Create a StudentController to handle HTTP requests for GET, POST, PUT, and DELETE operations.
* **Step 4:** Configure CORS in the backend to allow requests from the React frontend running on http://localhost:3000.

**4. React Frontend Development**

**Q5: How to interact with the Spring Boot API from the React frontend?**

* **Step 1:** Create a StudentApp component in React for listing, adding, and deleting student records.
* **Step 2:** Use Axios to make API calls to the backend for the following actions:
  + Fetch all students (GET request)
  + Add a new student (POST request)
  + Delete a student (DELETE request)
* **Step 3:** Display student records in a list and provide form inputs to add a new student.

**5. CORS Configuration**

**Q6: How to handle CORS in Spring Boot for a React frontend?**

* **Step 1:** Add CORS mapping in Spring Boot to allow http://localhost:3000 (React frontend) to make requests to http://localhost:8080 (Spring Boot backend).
* **Step 2:** Ensure that the backend sends appropriate headers like Access-Control-Allow-Origin, Access-Control-Allow-Methods, and Access-Control-Allow-Headers.
* **Step 3:** Test the application in the browser to ensure CORS is properly handled.

**6. Running the Application**

**Q7: How to run the Spring Boot backend?**

* **Step 1:** Navigate to the backend directory and run the Spring Boot application using the following command:

bash

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mvn spring-boot:run

* **Step 2:** The Spring Boot application will start on http://localhost:8080.
* **Step 3:** Open Postman or the browser to test API endpoints.

**Q8: How to run the React frontend?**

* **Step 1:** Navigate to the frontend directory (student-frontend) and run:

bash

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npm start

* **Step 2:** The React app will be served at http://localhost:3000.

**7. Common Errors and Troubleshooting**

**Q9: How to fix CORS issues between Spring Boot and React?**

* **Fix 1:** Ensure that allowedOrigins in the CorsRegistry of the backend is correctly set to http://localhost:3000.
* **Fix 2:** Allow the necessary HTTP methods like GET, POST, PUT, and DELETE in the CORS configuration.
* **Fix 3:** If the error persists, ensure the Spring Boot backend is running, and the React app is correctly making HTTP requests to http://localhost:8080.

**Q10: How to resolve Axios errors?**

* **Fix 1:** Ensure that the correct API endpoint is being called with the correct HTTP method.
* **Fix 2:** Check if the backend is running and accessible by testing the endpoints with Postman.

**8. Build and Deployment**

**Q11: How to build the React app for production?**

* **Step 1:** Run the following command to create a production build:

bash

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npm run build

* **Step 2:** Deploy the build/ folder to your preferred hosting service, such as Netlify, Vercel, or a custom server.

**Q12: How to package the Spring Boot app for production?**

* **Step 1:** Run the following command to create a production-ready JAR file:

bash

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mvn clean package

* **Step 2:** Deploy the JAR file to your server, ensuring MySQL is properly configured.