**Customer Management System Requirements**

**Basic Requirements**

1. **User Management:**
   * **User Registration:**
     + Allow new users to register.
     + Validate user input (e.g., email format, password strength).
     + Store user information securely.
   * **User Login:**
     + Allow registered users to log in.
     + Authenticate user credentials.
     + Log successful and failed login attempts.
2. **Customer Data Management:**
   * **Create Customer:**
     + Add new customer records.
     + Validate customer input (e.g., mandatory fields, correct formats).
   * **Read Customer:**
     + View customer details.
     + List all customers with pagination and sorting.
   * **Update Customer:**
     + Edit existing customer details.
   * **Delete Customer:**
     + Remove customer records from the system.
3. **Logging:**
   * **Log Integration:**
     + Integrate logging using Logback or Log4j.
   * **Log Configuration:**
     + Configure logging levels (INFO, DEBUG, ERROR) for different environments (development, production).
     + Configure different appenders (e.g., console, file) for logging outputs.
   * **Application Layer Logging:**
     + **Controller Layer:**
       - Log incoming HTTP requests and outgoing responses.
       - Log important events such as user registration and login attempts.
     + **Service Layer:**
       - Log service method calls and important business logic execution points.
     + **Repository Layer:**
       - Log database operations such as CRUD operations.
   * **Log Details:**
     + Include timestamps, log levels, logger names, thread names, and messages in log entries.

**Extensions**

1. **Advanced User Management:**
   * **Role-Based Access Control (RBAC):**
     + Implement user roles (e.g., admin, user).
     + Restrict access to certain functionalities based on user roles.
2. **Customer Data Features:**
   * **Search and Filter:**
     + Allow searching customers by name, email, or phone number.
   * **Bulk Operations:**
     + Enable bulk operations such as bulk delete or bulk update.

**Technologies and Tools**

* **Backend:** Spring Boot, Spring Security, Spring Data JPA
* **Database:** MySQL,
* **Logging:** Logback, Log4j
* **Build Tool:** Maven
* **Testing:** JUnit, Mockito
* **Version Control:** Git

**Project Structure**

1. **Controller Layer:** Handles HTTP requests and responses.
2. **Service Layer:** Contains business logic.
3. **Repository Layer:** Manages database operations.
4. **Security Layer:** Manages authentication and authorization.
5. **Configuration Layer:** Contains configuration classes (e.g., logging, security).