**📘 Problem Statement: CRBT System with Logging, Security, and Exception Handling Using AOP**

**🎯 Objective:**

Build a modular CRBT (Caller Ring Back Tone) application using **Spring Boot + Maven** that allows users to:

* Subscribe/unsubscribe to caller tunes
* Choose from available tunes
* Automatically log all actions
* Perform basic validations using **Spring AOP**

**🧩 Modules to Implement:**

**1. Tune Management**

* Add new CRBT tunes
* List available tunes

**2. Customer Management**

* Register customers
* View subscribed customers

**3. CRBT Subscription**

* Subscribe to a CRBT tune
* Unsubscribe
* Replace an existing tune

**🧪 Cross-Cutting Concerns (handled with AOP):**

| **Concern** | **Description** | **AOP Advice** |
| --- | --- | --- |
| **Logging** | Log each customer’s action (subscribe, unsubscribe, add tune, etc.) | @Before, @AfterReturning |
| **Exception Handling** | Catch and log exceptions globally with tune or customer operations | @AfterThrowing |
| **Validation** | Validate input parameters like customer ID, tune ID | @Around |

**🔧 Tech Stack:**

* **Java 8+**
* **Spring Boot**
* **Spring AOP**
* **Maven**
* (Optional) H2 / MySQL (if persistence is needed)

**🗃️ Sample Classes:**

**🎵 TuneService**

java

CopyEdit

void addTune(String tuneId, String tuneName);

List<String> listTunes();

**👤 CustomerService**

java

CopyEdit

void registerCustomer(String customerId);

List<String> getAllCustomers();

**🎧 CRBTService**

java

CopyEdit

void subscribe(String customerId, String tuneId);

void unsubscribe(String customerId);

void changeTune(String customerId, String newTuneId);

**💡 Example Scenarios:**

**✅ Valid Operation**

* Customer C123 subscribes to tune T001
* Logs show:
  + Method start
  + Parameters
  + Success message
  + Method end

**❌ Invalid Tune ID**

* Throws custom TuneNotFoundException
* Logs the exception using @AfterThrowing

**📦 Expected Maven Structure:**

bash

CopyEdit

crbt-aop/

├── src/

│ ├── main/

│ │ ├── java/com/crbt/

│ │ │ ├── model/

│ │ │ ├── service/

│ │ │ ├── aspect/

│ │ │ └── CrbtApplication.java

│ │ └── resources/

│ └── test/

├── pom.xml

**🏁 Deliverables:**

1. **Working Maven project**
2. **Aspect class** for:
   * Logging
   * Input validation
   * Exception handling
3. **Service classes** implementing business logic
4. **Main app class**
5. (Optional) JUnit test cases