Unit Testing Guide

1. Test Location

```
src/test/java/com/example/kafkaap/wrapper/test/
│
├── AESUtilTest.java
└── ChecksumUtilTest.java
```

These classes validate the behavior of the **utility layer** — ensuring encryption, decryption, and checksum generation are correct and consistent.

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2. AESUtilTest.java

Purpose:
Verifies the correctness of AES encryption and decryption functions.

Key Tests:

- ✅ `testEncryptDecrypt_Success()` — Ensures encryption → decryption returns the original string.
- ✅ `testDecrypt_InvalidCipher()` — Confirms that invalid ciphertext throws an exception.
- ✅ `testEncrypt_NotNull()` — Validates that encryption never returns null or the same input.

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3. ChecksumUtilTest.java

Purpose:
Tests the MD5 checksum generator for reliability and uniqueness.

Key Tests:

- ✅ `testChecksum_Consistency()` — Same input should always generate the same checksum.
- ✅ `testChecksum_DifferentInputs()` — Different inputs should yield different checksum values.

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4. How to Run Tests

In your project root, execute:

```
mvn test
```

Expected Output:

```
--------------------------------------------------------
 T E S T S
--------------------------------------------------------
Running com.example.kafkaap.wrapper.test.AESUtilTest
Running com.example.kafkaap.wrapper.test.ChecksumUtilTest
Tests run: 5, Failures: 0, Errors: 0, Skipped: 0
--------------------------------------------------------
BUILD SUCCESS
--------------------------------------------------------
```

Current Working Test Cases (from your existing code)

🔹 AESUtilTest.java

You currently have **3 test cases**:

1. `testEncryptDecrypt_Success()` – verifies encrypt → decrypt consistency
2. `testDecrypt_InvalidCipher()` – ensures invalid ciphertext throws exception

3. `testEncrypt_NotNull()` – confirms encrypted text isn’t null or same as input

➡️ **Total: 3 tests**

🔹 ChecksumUtilTest.java

You currently have **2 test cases**:

1. `testChecksum_Consistency()` – same input → same checksum
2. `testChecksum_DifferentInputs()` – different input → different checksum

➡️ **Total: 2 tests**