Digital Nuture Program

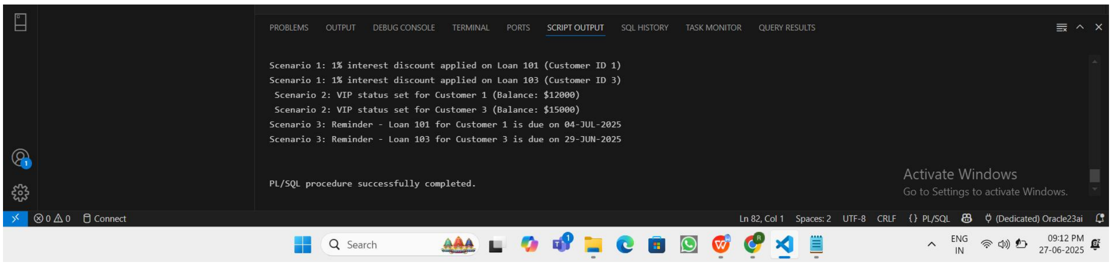
Week 2 - Mandatory Hands - On
PL/SQL,JUnit_Basic Testing,Mockito exercises &

SL4 Logging

1) Control Structures

```
SET SERVEROUTPUT ON;
BEGIN
  EXECUTE IMMEDIATE 'DROP TABLE loans';
EXCEPTION WHEN OTHERS THEN NULL;
END;
/
BEGIN
  EXECUTE IMMEDIATE 'DROP TABLE customers';
EXCEPTION WHEN OTHERS THEN NULL;
END;
/
CREATE TABLE customers (
  cust_id   NUMBER PRIMARY KEY,
  age       NUMBER,
  balance   NUMBER,
  vip_flag  VARCHAR2(5)
);
CREATE TABLE loans (
  loan_id   NUMBER PRIMARY KEY,
  cust_id   NUMBER,
  int_rate  NUMBER,
  due_on    DATE,
  FOREIGN KEY (cust_id) REFERENCES customers(cust_id)
);
INSERT INTO customers VALUES (1, 65, 12000, 'FALSE');
INSERT INTO customers VALUES (2, 45, 8000, 'FALSE');
INSERT INTO customers VALUES (3, 70, 15000, 'FALSE');

INSERT INTO loans VALUES (101, 1, 10, TO_DATE('04-JUL-2025','DD-MON-YYYY'));
INSERT INTO loans VALUES (102, 2, 9,  TO_DATE('01-SEP-2025','DD-MON-YYYY'));
INSERT INTO loans VALUES (103, 3, 8,  TO_DATE('29-JUN-2025','DD-MON-YYYY'));
COMMIT;
BEGIN

  FOR loan_rec IN (
    SELECT l.loan_id, l.cust_id, l.int_rate
    FROM loans l
    JOIN customers c ON l.cust_id = c.cust_id
    WHERE c.age > 60
  )
  LOOP
    UPDATE loans
    SET int_rate = int_rate - 1
    WHERE loan_id = loan_rec.loan_id;

    DBMS_OUTPUT.PUT_LINE(
      'Scenario 1: 1% interest discount applied on Loan ' || loan_rec.loan_id ||
      ' (Customer ID ' || loan_rec.cust_id || ')'
    );
  END LOOP;
  FOR cust_rec IN (
    SELECT cust_id, balance FROM customers
    WHERE balance > 10000
  )
  LOOP
    UPDATE customers
    SET vip_flag = 'TRUE'
    WHERE cust_id = cust_rec.cust_id;

    DBMS_OUTPUT.PUT_LINE(
      ' Scenario 2: VIP status set for Customer ' || cust_rec.cust_id ||
      ' (Balance: $' || cust_rec.balance || ')'
    );
  END LOOP;
  FOR due_rec IN (
    SELECT loan_id, cust_id, due_on
    FROM loans
    WHERE due_on BETWEEN SYSDATE AND SYSDATE + 30
  )
  LOOP
    DBMS_OUTPUT.PUT_LINE(
      'Scenario 3: Reminder - Loan ' || due_rec.loan_id ||
      ' for Customer ' || due_rec.cust_id ||
      ' is due on ' || TO_CHAR(due_rec.due_on, 'DD-MON-YYYY')
    );
  END LOOP;
  COMMIT;
END;
/
```

Output

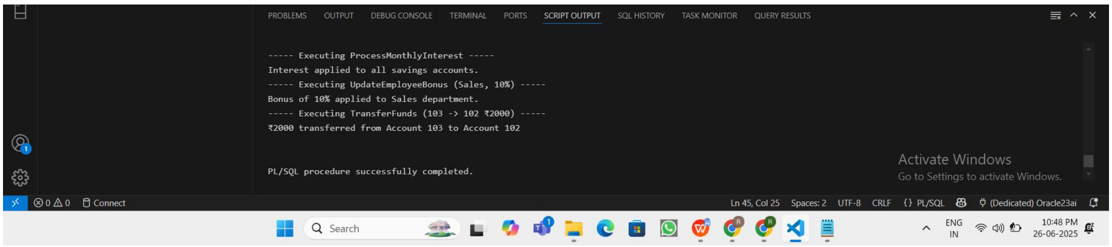


```
Scenario 1: 1% interest discount applied on Loan 101 (Customer ID 1)
Scenario 1: 1% interest discount applied on Loan 103 (Customer ID 3)
 Scenario 2: VIP status set for Customer 1 (Balance: $12000)
 Scenario 2: VIP status set for Customer 3 (Balance: $15000)
Scenario 3: Reminder - Loan 101 for Customer 1 is due on 04-JUL-2025
Scenario 3: Reminder - Loan 103 for Customer 3 is due on 29-JUN-2025


PL/SQL procedure successfully completed.
```

2) Stored Procedures

```
SET SERVEROUTPUT ON;
BEGIN
  EXECUTE IMMEDIATE 'DROP TABLE accounts';
EXCEPTION WHEN OTHERS THEN NULL;
END;
/
BEGIN
  EXECUTE IMMEDIATE 'DROP TABLE employees';
EXCEPTION WHEN OTHERS THEN NULL;
END;
/
CREATE TABLE accounts (
  account_id    NUMBER PRIMARY KEY,
  customer_id   NUMBER,
  balance       NUMBER,
  account_type  VARCHAR2(20)
);

CREATE TABLE employees (
  emp_id     NUMBER PRIMARY KEY,
  name       VARCHAR2(50),
  department VARCHAR2(50),
  salary     NUMBER
);

INSERT INTO accounts VALUES (101, 1, 10000, 'SAVINGS');
INSERT INTO accounts VALUES (102, 2, 15000, 'CURRENT');
INSERT INTO accounts VALUES (103, 3, 20000, 'SAVINGS');
INSERT INTO employees VALUES (1, 'Ravi',   'Sales',    40000);
INSERT INTO employees VALUES (2, 'Sneha',  'Finance',  45000);
INSERT INTO employees VALUES (3, 'Ajith',  'Sales',    42000);

COMMIT;
CREATE OR REPLACE PROCEDURE ProcessMonthlyInterest IS
BEGIN
  UPDATE accounts
  SET balance = balance + (balance * 0.01)
  WHERE UPPER(account_type) = 'SAVINGS';

  DBMS_OUTPUT.PUT_LINE('Interest applied to all savings accounts.');
  COMMIT;
END;
/

CREATE OR REPLACE PROCEDURE UpdateEmployeeBonus (
  p_dept       IN VARCHAR2,
  p_bonus_pct  IN NUMBER
) IS
BEGIN
  UPDATE employees
  SET salary = salary + (salary * p_bonus_pct / 100)
  WHERE LOWER(department) = LOWER(p_dept);

  DBMS_OUTPUT.PUT_LINE('Bonus of ' || p_bonus_pct || '% applied to ' || p_dept
|| ' department.');
  COMMIT;
END;
/

CREATE OR REPLACE PROCEDURE TransferFunds (
  p_from_account IN NUMBER,
  p_to_account   IN NUMBER,
  p_amount       IN NUMBER
) IS
  v_balance NUMBER;
BEGIN

  SELECT balance INTO v_balance
  FROM accounts
  WHERE account_id = p_from_account;

  IF v_balance < p_amount THEN
    RAISE_APPLICATION_ERROR(-20001, 'Not enough balance in source account.');
  END IF;

  UPDATE accounts
  SET balance = balance - p_amount
  WHERE account_id = p_from_account;

  UPDATE accounts
  SET balance = balance + p_amount
  WHERE account_id = p_to_account;

  DBMS_OUTPUT.PUT_LINE('₹' || p_amount || ' transferred from Account ' ||
p_from_account || ' to Account ' || p_to_account);
  COMMIT;
END;
/
BEGIN
  DBMS_OUTPUT.PUT_LINE('----- Executing ProcessMonthlyInterest -----');
  ProcessMonthlyInterest;

  DBMS_OUTPUT.PUT_LINE('----- Executing UpdateEmployeeBonus (Sales, 10%) -----');
  UpdateEmployeeBonus('Sales', 10);


  DBMS_OUTPUT.PUT_LINE('----- Executing TransferFunds (103 -> 102 ₹2000) -----');
  TransferFunds(103, 102, 2000);
END;
```

Output



```
----- Executing ProcessMonthlyInterest -----
Interest applied to all savings accounts.
----- Executing UpdateEmployeeBonus (Sales, 10%) -----
Bonus of 10% applied to Sales department.
----- Executing TransferFunds (103 -> 102 ₹2000) -----
₹2000 transferred from Account 103 to Account 102


PL/SQL procedure successfully completed.
```

3) Setting Up JUnit

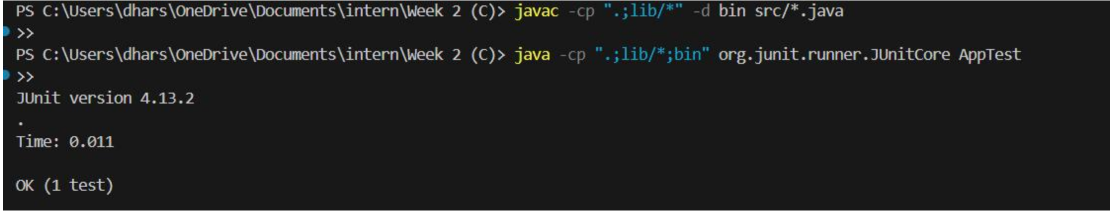
App.java

```
public class App {
    public int add(int a, int b) {
        return a + b;
    }

    public static void main(String[] args) {
        App app = new App();
        int result = app.add(5, 3);
        System.out.println("Sum: " + result); // Output: Sum: 8
    }
}
```

AppTest.java

```
import org.junit.Test;
import static org.junit.Assert.assertEquals;

public class AppTest {

    @Test
    public void testAddition() {
        App app = new App();
        int result = app.add(2, 3);
        assertEquals(5, result);
    }
}
```

Output



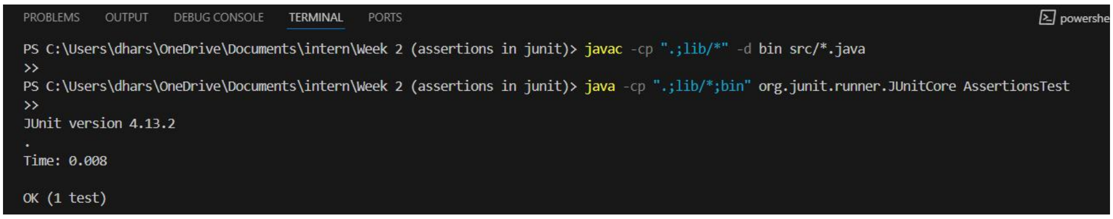
```
PS C:\Users\dhars\OneDrive\Documents\intern\Week 2 (C)> javac -cp ".;lib/*" -d bin src/*.java
>>
PS C:\Users\dhars\OneDrive\Documents\intern\Week 2 (C)> java -cp ".;lib/*;bin" org.junit.runner.JUnitCore AppTest
>>
JUnit version 4.13.2
.
Time: 0.011

OK (1 test)
```

4) Assertions in JUnit

AssertionsTest.java

```
import org.junit.Test;
import static org.junit.Assert.*;

public class AssertionsTest {

    @Test
    public void testAssertions() {
        assertEquals(5, 2 + 3);
        assertTrue(5 > 3);
        assertFalse(5 < 3);
        assertNull(null);
        assertNotNull(new Object());
    }
}
```

Output



```
PS C:\Users\dhars\OneDrive\Documents\intern\Week 2 (assertions in junit)> javac -cp ".;lib/*" -d bin src/*.java
>>
PS C:\Users\dhars\OneDrive\Documents\intern\Week 2 (assertions in junit)> java -cp ".;lib/*;bin" org.junit.runner.JUnitCore AssertionsTest
>>
JUnit version 4.13.2
.
Time: 0.008

OK (1 test)
```

5) Arrange-Act-Assert (AAA) Pattern, Test Fixtures, Setup and Teardown Methods in JUnit

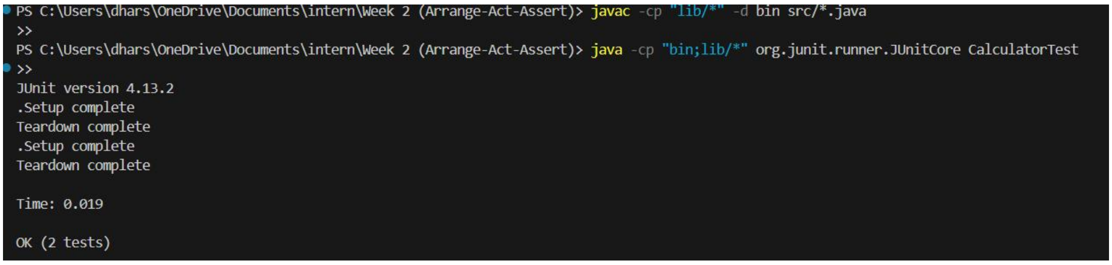
Calculator.java

```
public class Calculator {
    public int add(int a, int b) {
        return a + b;
    }

    public int multiply(int a, int b) {
        return a * b;
    }
}
```

CalculatorTest.java

```
import org.junit.Before;
import org.junit.After;
import org.junit.Test;
import static org.junit.Assert.*;

public class CalculatorTest {

    private Calculator calculator;

    @Before
    public void setUp() {
        calculator = new Calculator();
        System.out.println("Setup complete");
    }

    @After
    public void tearDown() {
        calculator = null;
        System.out.println("Teardown complete");
    }

    @Test
    public void testAddition() {
        int result = calculator.add(5, 3);
        assertEquals(8, result);
    }

    @Test
    public void testMultiplication() {
        int result = calculator.multiply(4, 6);
        assertEquals(24, result);
    }
}
```

Output



```
PS C:\Users\dhars\OneDrive\Documents\intern\Week 2 (Arrange-Act-Assert)> javac -cp "lib/*" -d bin src/*.java
>>
PS C:\Users\dhars\OneDrive\Documents\intern\Week 2 (Arrange-Act-Assert)> java -cp "bin;lib/*" org.junit.runner.JUnitCore CalculatorTest
>>
JUnit version 4.13.2
.Setup complete
Teardown complete
.Setup complete
Teardown complete

Time: 0.019

OK (2 tests)
```

6) Mocking and Stubbing

ExternalApi.java

```
public interface ExternalApi {
    String getData();
}
```

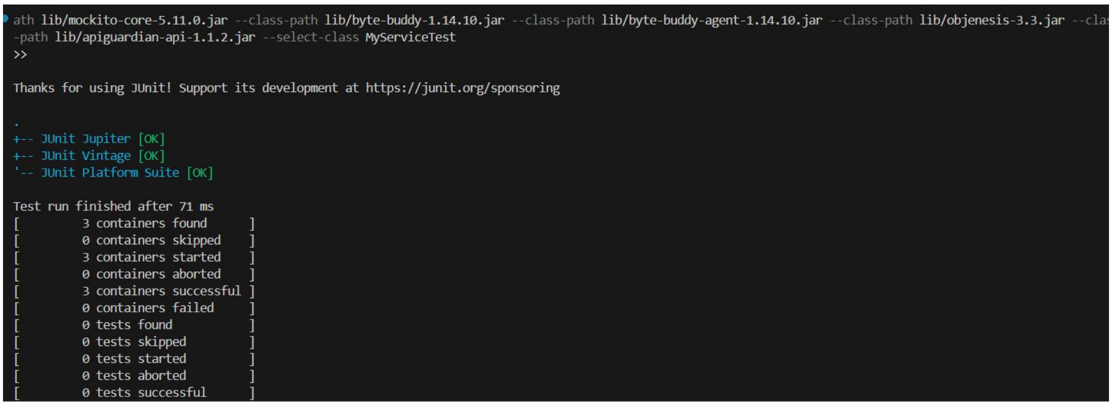
MyService.java

```
public class MyService {
    private ExternalApi api;

    public MyService(ExternalApi api) {
        this.api = api;
    }
    public String fetchData() {
        return api.getData();
    }
}
```

MyServiceTest.java

```
import static org.mockito.Mockito.*;

public class MyServiceTest {
    @Test
    public void testExternalApi() {
        ExternalApi mockApi = mock(ExternalApi.class);
        when(mockApi.getData()).thenReturn("Mock Data");

        MyService service = new MyService(mockApi);
        String result = service.fetchData();

        assertEquals("Mock Data", result);
    }

    private void assertEquals(String string, String result) {

        throw new UnsupportedOperationException("Unimplemented
method 'assertEquals'");
    }
}
```

Output



```
ath lib/mockito-core-5.11.0.jar --class-path lib/byte-buddy-1.14.10.jar --class-path lib/byte-buddy-agent-1.14.10.jar --class-path lib/objenesis-3.3.jar --cla
-path lib/apiguardian-api-1.1.2.jar --select-class MyServiceTest
>>

Thanks for using JUnit! Support its development at https://junit.org/sponsoring

.
+-- JUnit Jupiter [OK]
+-- JUnit Vintage [OK]
'-- JUnit Platform Suite [OK]

Test run finished after 71 ms
[         3 containers found      ]
[         0 containers skipped    ]
[         3 containers started    ]
[         0 containers aborted    ]
[         3 containers successful ]
[         0 containers failed     ]
[         0 tests found           ]
[         0 tests skipped         ]
[         0 tests started         ]
[         0 tests aborted         ]
[         0 tests successful      ]
```

7) Verifying Interactions

ApiClient.java

```
public interface ApiClient {
   void retrieve();
}
```

DataFetcher.java

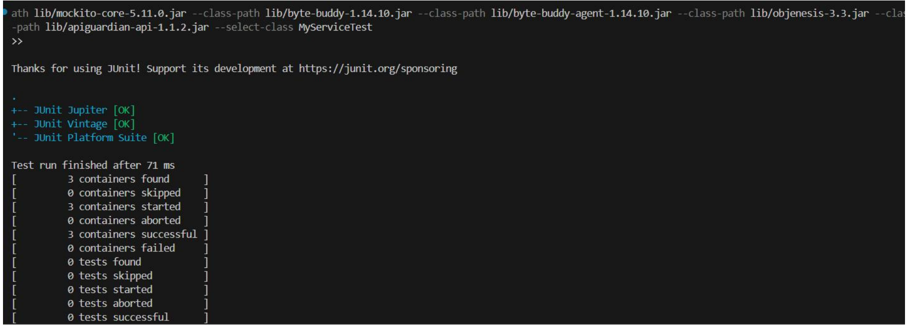
```
public class DataFetcher {
   private ApiClient api;

   public DataFetcher(ApiClient api) {
      this.api = api;
   }

   public void loadData() {
      api.retrieve();
   }
}
```

DataFetcherTest.java

```
public class DataFetcherTest {

   @Test
   public void testMethodCallWithCorrectArgument() {
      ApiClient mockApi = mock(ApiClient.class); // Step 1
      DataFetcher fetcher = new DataFetcher(mockApi); // Step 2
      fetcher.loadData(); // Step 2
      verify(mockApi).retrieve(); // Step 3
   }

   private ApiClient verify(ApiClient mockApi) {

      throw new UnsupportedOperationException("Unimplemented
method 'verify'");
   }
```

```
    private ApiClient mock(Class<ApiClient> class1) {

        throw new UnsupportedOperationException("Unimplemented method 'mock'");
    }
}
```

Output



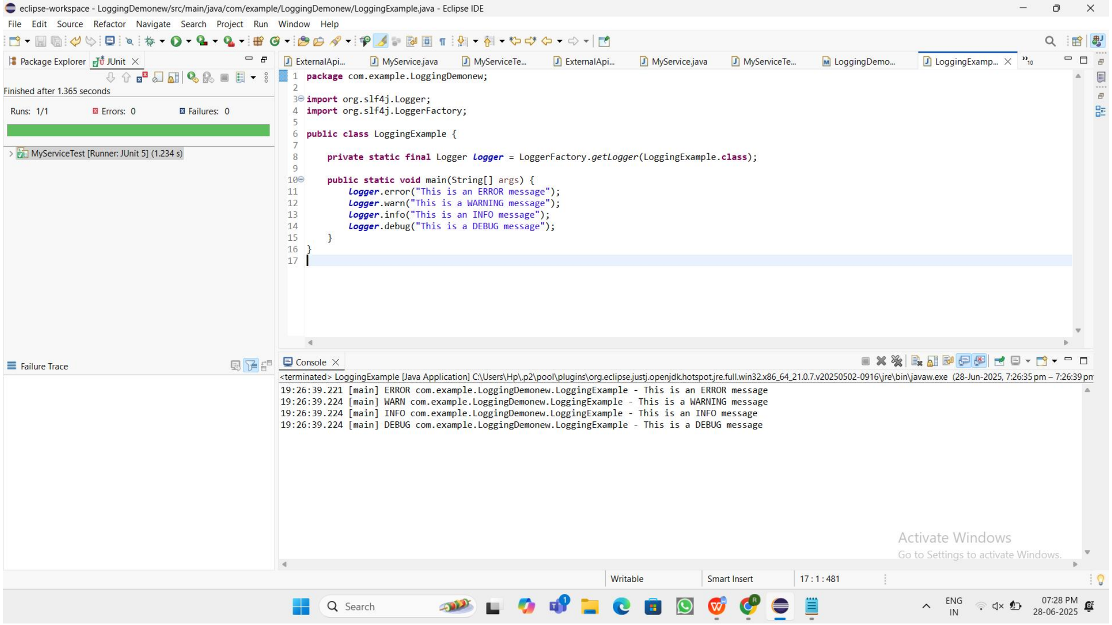
```
ath lib/mockito-core-5.11.0.jar --class-path lib/byte-buddy-1.14.10.jar --class-path lib/byte-buddy-agent-1.14.10.jar --class-path lib/objenesis-3.3.jar --cla
-path lib/apiguardian-api-1.1.2.jar --select-class MyServiceTest
>>

Thanks for using JUnit! Support its development at https://junit.org/sponsoring

.
+-- JUnit Jupiter [OK]
+-- JUnit Vintage [OK]
'-- JUnit Platform Suite [OK]

Test run finished after 71 ms
[         3 containers found      ]
[         0 containers skipped    ]
[         3 containers started    ]
[         0 containers aborted    ]
[         3 containers successful ]
[         0 containers failed     ]
[         0 tests found           ]
[         0 tests skipped         ]
[         0 tests started         ]
[         0 tests aborted         ]
[         0 tests successful      ]
```

8) Logging Error Messages and Warning Levels

LoggingExample.java

```
package com.example.LoggingDemonew;

import org.slf4j.Logger;

import org.slf4j.LoggerFactory;

public class LoggingExample {

    private static final Logger logger =

LoggerFactory.getLogger(LoggingExample.class);

    public static void main(String[] args) {

        logger.error("This is an ERROR message");

        logger.warn("This is a WARNING message");

        logger.info("This is an INFO message");

        logger.debug("This is a DEBUG message");

    }

}
```

Output



eclipse-workspace - LoggingDemonew/src/main/java/com/example/LoggingDemonew/LoggingExample.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
JUnit
Finished after 1.365 seconds
Runs: 1/1
Errors: 0
Failures: 0
MyServiceTest [Runner: JUnit 5] (1.234 s)
Failure Trace
ExternalApi...
MyService.java
MyServiceTe...
LoggingDemo...
LoggingExamp...
Console
Writable
Smart Insert
17 : 1 : 481
Activate Windows
Go to Settings to activate Windows.
Search
ENG
IN
07:28 PM
28-06-2025

```java
package com.example.LoggingDemonew;

import org.slf4j.Logger;
import org.slf4j.LoggerFactory;

public class LoggingExample {

    private static final Logger logger = LoggerFactory.getLogger(LoggingExample.class);

    public static void main(String[] args) {
        logger.error("This is an ERROR message");
        logger.warn("This is a WARNING message");
        logger.info("This is an INFO message");
        logger.debug("This is a DEBUG message");
    }
}
```

```
<terminated> LoggingExample [Java Application] C:\Users\Hp\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_21.0.7.v20250502-0916\jre\bin\javaw.exe  (28-Jun-2025, 7:26:35 pm – 7:26:39 pm
19:26:39.221 [main] ERROR com.example.LoggingDemonew.LoggingExample - This is an ERROR message
19:26:39.224 [main] WARN com.example.LoggingDemonew.LoggingExample - This is a WARNING message
19:26:39.224 [main] INFO com.example.LoggingDemonew.LoggingExample - This is an INFO message
19:26:39.224 [main] DEBUG com.example.LoggingDemonew.LoggingExample - This is a DEBUG message
```