PL SQL PROGRAMMING

Exercise 1: Control Structures

1: Apply 1% Discount to Customers Above 60:

```
BEGIN
  FOR customer_rec IN (
    SELECT CustomerID, Age, LoanInterestRate
    FROM Customers
    WHERE Age > 60
  ) LOOP
    UPDATE Customers
    SET LoanInterestRate = LoanInterestRate - 1
    WHERE CustomerID = customer_rec.CustomerID;
  END LOOP;

  COMMIT;
  DBMS_OUTPUT.PUT_LINE('1% discount applied to senior customers.');
END;
/
```

OUTPUT:

```
1% discount applied to senior customers.
```

2: Promote Customers to VIP Based on Balance

```
BEGIN
  FOR customer_rec IN (
    SELECT CustomerID, Balance
    FROM Customers
    WHERE Balance > 10000
  ) LOOP
    UPDATE Customers
    SET IsVIP = 'TRUE'
    WHERE CustomerID = customer_rec.CustomerID;
  END LOOP;

  COMMIT;
  DBMS_OUTPUT.PUT_LINE('VIP status updated for eligible customers.');
```

```
END;
/
```

OUTPUT:

```
VIP status updated for eligible customers.
```

3: Send Reminders for Loans Due in 30 Days

```
BEGIN
  FOR loan_rec IN (
    SELECT CustomerID, LoanDueDate
    FROM Loans
    WHERE LoanDueDate BETWEEN SYSDATE AND SYSDATE + 30
  ) LOOP
    DBMS_OUTPUT.PUT_LINE('Reminder: Customer ID ' ||
loan_rec.CustomerID ||
                         ' has a loan due on ' || TO_CHAR(loan_rec.LoanDueDate, 'DD-
Mon-YYYY'));
  END LOOP;
END;
/
```

OUTPUT:

```
Reminder: Customer ID 101 has a loan due on 15-Jul-2025
Reminder: Customer ID 104 has a loan due on 20-Jul-2025
Reminder: Customer ID 110 has a loan due on 05-Aug-2025
```

Exercise 2: Implementing the Factory Method Pattern

1: Process Monthly Interest for Savings Accounts

```
CREATE OR REPLACE PROCEDURE ProcessMonthlyInterest IS
BEGIN
  FOR acc IN (
    SELECT AccountID, Balance
    FROM Accounts
    WHERE AccountType = 'Savings'
  ) LOOP
    UPDATE Accounts
```

```
    SET Balance = Balance + (Balance * 0.01)
    WHERE AccountID = acc.AccountID;
  END LOOP;
  COMMIT;
  DBMS_OUTPUT.PUT_LINE('Monthly interest processed for savings
accounts.');
END;
```

OUTPUT:

```
Monthly interest processed for savings accounts.
```

2: Update Employee Bonus by Department

```
CREATE OR REPLACE PROCEDURE UpdateEmployeeBonus(
  dept_id IN NUMBER,
  bonus_percent IN NUMBER
) IS
BEGIN
  UPDATE Employees
  SET Salary = Salary + (Salary * bonus_percent / 100)
  WHERE DepartmentID = dept_id;

  COMMIT;
  DBMS_OUTPUT.PUT_LINE('Bonus applied for Department ID: ' || dept_id);
END;
/
```

OUTPUT:

```
Bonus applied for Department ID: 101
```

3: Transfer Funds Between Accounts

```
CREATE OR REPLACE PROCEDURE TransferFunds(
  from_account IN NUMBER,
  to_account IN NUMBER,
  amount IN NUMBER
) IS
  from_balance NUMBER;
BEGIN
```

```
  SELECT Balance INTO from_balance
  FROM Accounts
  WHERE AccountID = from_account
  FOR UPDATE;

  IF from_balance < amount THEN
    DBMS_OUTPUT.PUT_LINE('Insufficient balance in source account.');
  ELSE

    UPDATE Accounts
    SET Balance = Balance - amount
    WHERE AccountID = from_account;


    UPDATE Accounts
    SET Balance = Balance + amount
    WHERE AccountID = to_account;

    COMMIT;
    DBMS_OUTPUT.PUT_LINE('Transferred ' || amount || ' from Account ' ||
from_account || ' to Account ' || to_account);
  END IF;
END;
/
```

OUTPUT:

```
Transferred 500 from Account 2001 to Account 2002
```

Junit Basic Testing Exercises

Exercise 1: Setting Up JUnit

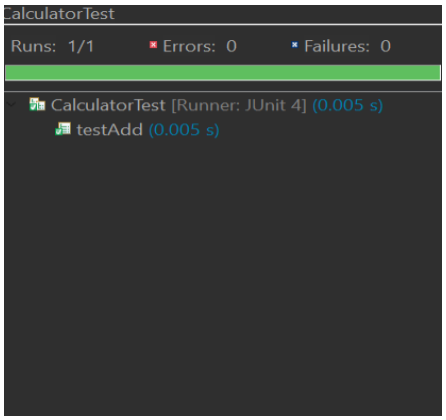
Calculator Class

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

CalculatorTest Class

```
import org.junit.Test;
import static org.junit.Assert.assertEquals;
public class CalculatorTest {
    @Test
    public void testAdd() {
        Calculator calc = new Calculator();
        int result = calc.add(10, 5);
        assertEquals(15, result);
    }
}
```

OUTPUT:

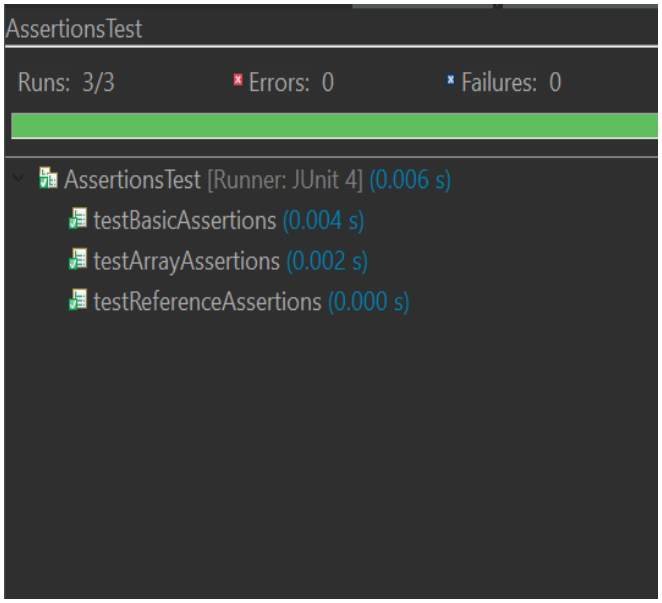


Exercise 3: Assertions in JUnit

```
import org.junit.Test;
import static org.junit.Assert.*;
public class AssertionExamplesTest {
    @Test
    public void testBasicAssertions() {
        assertEquals("Should return 10", 10, 5 + 5);
        assertTrue("Should be true", 3 < 5);
        assertFalse("Should be false", 10 < 5);
        Object obj = null;
        assertNull("Object should be null", obj);
        Object obj2 = new Object();
        assertNotNull("Object should not be null", obj2);
    }

    @Test
    public void testReferenceAssertions() {
        String str1 = "JUnit";
        String str2 = str1;
        String str3 = new String("JUnit");
        assertSame("Should refer to same object", str1, str2);
        assertNotSame("Should refer to different objects", str1, str3);
    }

    @Test
    public void testArrayAssertions() {
        int[] expected = {1, 2, 3};
        int[] actual = {1, 2, 3};
        assertArrayEquals("Arrays should be equal", expected, actual);
```

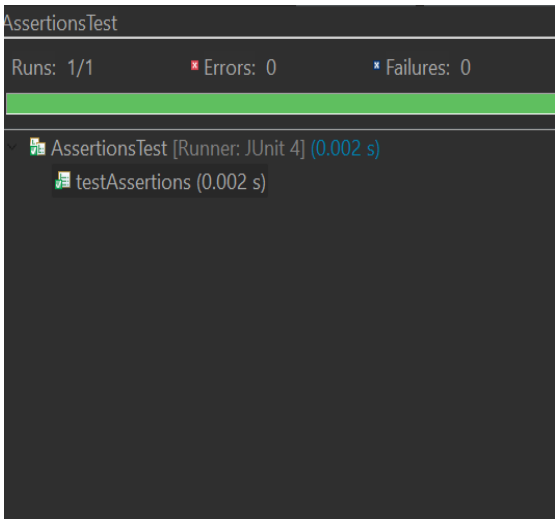
```
    }
}
```

OUTPUT:




```
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:



Exercise 4: Arrange-Act-Assert (AAA) Pattern, Test Fixtures, Setup and Teardown Methods in JUnit

Calculator class:

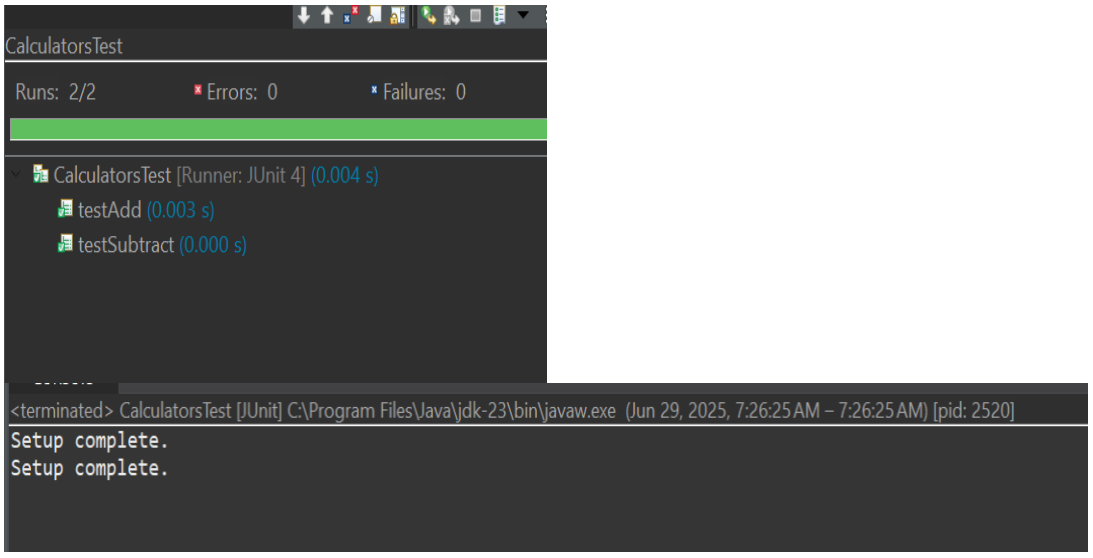
```
public class Calculator {
    public int add(int a, int b) {
        return a + b;
    }

    public int subtract(int a, int b) {
        return a - b;
    }
}
```

CalculatorTest Class:

```
import org.junit.After;
import org.junit.Before;
import org.junit.Test;
import static org.junit.Assert.*;
public class CalculatorTest {
    private Calculator calculator;
    @Before
    public void setUp() {
        calculator = new Calculator(); // Arrange: Create test object
        System.out.println("Setup complete.");
    }

    @After
```

```
    public void tearDown() {
        calculator = null;  // Clean up
        System.out.println("Teardown complete.");
    }

    @Test
    public void testAdd() {
        int result = calculator.add(10, 5);
        assertEquals("Addition should return 15", 15, result);
    }

    @Test
    public void testSubtract() {
        int result = calculator.subtract(10, 5);
        assertEquals("Subtraction should return 5", 5, result);
    }
}
```

OUTPUT:



Mockito exercises

Exercise 1: Mocking and Stubbing

1: External API Interface

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

2: Service That Uses the External API

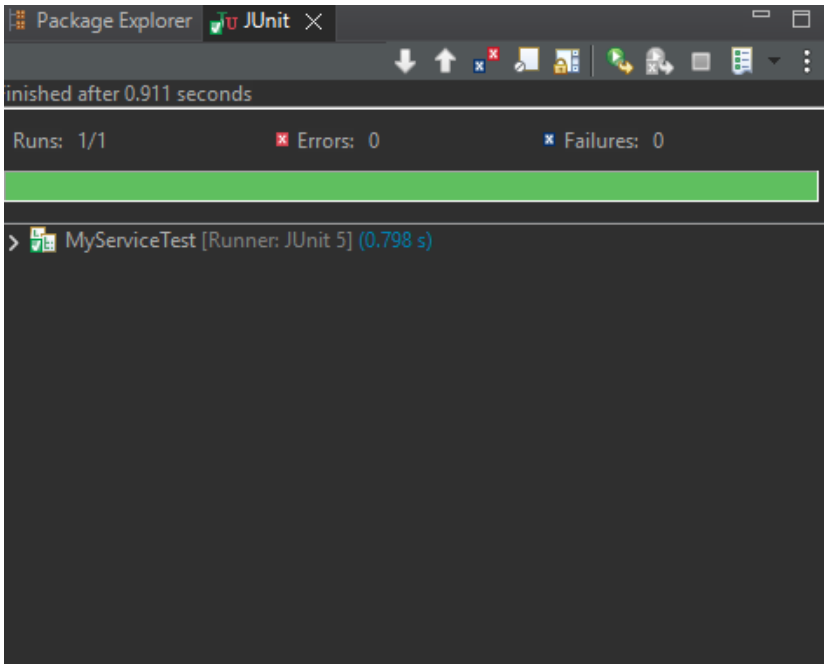
```
public class MyService {
   private ExternalApi api;
   public MyService(ExternalApi api) {
      this.api = api;
   }
   public String fetchData() {
      return api.getData();
   }
}
```

3: Test Class Using Mockito

```
import static org.mockito.Mockito.*;
import static org.junit.jupiter.api.Assertions.*;
import org.junit.jupiter.api.Test;
import org.mockito.Mockito;
public class MyServiceTest {
   @Test
```

```
    public void testExternalApi() {
        ExternalApi mockApi = Mockito.mock(ExternalApi.class);
        when(mockApi.getData()).thenReturn("Mock Data");
        MyService service = new MyService(mockApi);
        String result = service.fetchData();
        assertEquals("Mock Data", result);
    }
}
```

OUTPUT



Exercise 2: Verifying Interactions

1: External API Interface

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

2: Service That Uses the External API

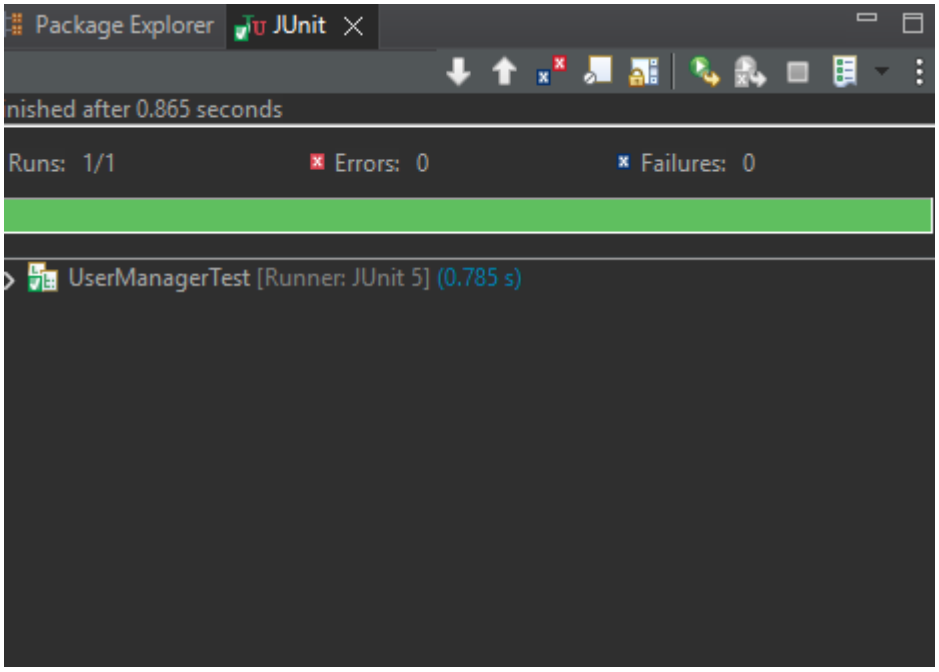
```
public class MyService {
    private ExternalApi api;
    public MyService(ExternalApi api) {
        this.api = api;
    }
```

```
    public String fetchData() {
        return api.getData();
    }
}
```

3. Test Class with Mockito Verification:

```
import static org.mockito.Mockito.*;
import static org.junit.jupiter.api.Assertions.*;
import org.junit.jupiter.api.Test;
import org.mockito.Mockito;
public class MyServiceTest {
    @Test
    public void testVerifyInteraction() {
        ExternalApi mockApi = Mockito.mock(ExternalApi.class);
        MyService service = new MyService(mockApi);
        service.fetchData();
        verify(mockApi).getData();
    }
}
```

OUTPUT:



Logging using SLF4J

Exercise 1: Logging Error Messages and Warning Levels

```
package com. sai. maven. maven_handson;
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");
	}
}
```

OUTPUT:

```
This is an error message
This is a warning message
```