**Unit Testing**

**TrainTest.java**

import org.junit.jupiter.api.Test;

import static org.junit.jupiter.api.Assertions.\*;

class TrainTest {

@Test

void testAddPassenger() {

Train train = new Train("T123", "New York", 100);

Passenger passenger = new Passenger("Alice", "T123");

train.addPassenger(passenger);

assertEquals(1, train.getPassengers().size());

}

@Test

void testRemovePassenger() {

Train train = new Train("T123", "New York", 100);

Passenger passenger = new Passenger("Alice", "T123");

train.addPassenger(passenger);

train.removePassenger(passenger);

assertEquals(0, train.getPassengers().size());

}

@Test

void testIncreaseCapacity() {

Train train = new Train("T123", "New York", 100);

train.increaseCapacity(50);

assertEquals(150, train.getCapacity());

}

@Test

void testDecreaseCapacity() {

Train train = new Train("T123", "New York", 100);

train.decreaseCapacity(50);

assertEquals(50, train.getCapacity());

}

@Test

void testFullCapacity() {

Train train = new Train("T123", "New York", 1);

Passenger passenger1 = new Passenger("Alice", "T123");

Passenger passenger2 = new Passenger("Bob", "T123");

train.addPassenger(passenger1);

assertThrows(IllegalStateException.class, () -> train.addPassenger(passenger2));

}

}

**PassengerTest.java**

import org.junit.jupiter.api.Test;

import static org.junit.jupiter.api.Assertions.\*;

class PassengerTest {

@Test

void testPassengerCreation() {

Passenger passenger = new Passenger("Alice", "T123");

assertEquals("Alice", passenger.getName());

assertEquals("T123", passenger.getTrainNumber());

}

}

**StationTest.java**

import org.junit.jupiter.api.Test;

import static org.junit.jupiter.api.Assertions.\*;

class StationTest {

@Test

void testStationCreation() {

Station station = new Station("NY", "New York Penn Station", "New York City");

assertEquals("NY", station.getStationCode());

assertEquals("New York Penn Station", station.getStationName());

assertEquals("New York City", station.getLocation());

}

}

**TrainSystemManagerTest.java**

import org.junit.jupiter.api.Test;

import static org.junit.jupiter.api.Assertions.\*;

class TrainSystemManagerTest {

@Test

void testAddTrain() {

TrainSystemManager manager = new TrainSystemManager();

Train train = new Train("T123", "New York", 100);

manager.addTrain(train);

assertEquals(1, manager.getTrains().size());

}

@Test

void testRemoveTrain() {

TrainSystemManager manager = new TrainSystemManager();

Train train = new Train("T123", "New York", 100);

manager.addTrain(train);

assertTrue(manager.removeTrain("T123"));

assertEquals(0, manager.getTrains().size());

}

@Test

void testAddPassenger() {

TrainSystemManager manager = new TrainSystemManager();

Train train = new Train("T123", "New York", 100);

manager.addTrain(train);

Passenger passenger = new Passenger("Alice", "T123");

manager.addPassenger(passenger);

assertEquals(1, manager.getPassengers().size());

}

@Test

void testAddStation() {

TrainSystemManager manager = new TrainSystemManager();

Station station = new Station("NY", "New York Penn Station", "New York City");

manager.addStation(station);

assertEquals(1, manager.getStations().size());

}

}