# 14.SimpleInterestProgramwithSeniorCitizenRate(White-BoxTesting)

Aim:

To write a Java program that calculates simple interest based on different interest rates for seniorcitizens(12%)andnon-seniorcitizens(10%).Theprogramwillusewhite-boxtesting with JUnit to verify the correctness of the logic.

Algorithm:

1. **Step1:**Acceptinputsforprincipalamount,rateofinterest,timeperiod,andwhether the customer is a senior citizen.
2. **Step2:**Determinetherateof interest:
   * Ifthe customerisaseniorcitizen(age≥60), applyarateof12%.
   * Otherwise,applyarateof10%.
3. **Step3:**Calculatesimpleinterestusingthe formula:

SimpleInterest=P×R×T100\text{SimpleInterest}=\frac{{P\timesR\times T}}{100}Simple Interest=100P×R×T Where:

* + PPP=Principal amount
  + RRR =Rate ofinterest
  + TTT=Timeperiodinyears

1. **Step4:**WriteaJUnittesttovalidatethatthecorrectinterestiscalculatedbasedonthe provided input.

**Coding:**

**Step 1:SimpleInterestCal.java**

**package** ex4.SimpleInterestCalculator;

**publicclass** SimpleInterestCalc {

**publicstaticdouble** calculateSimpleInterest(**double**principal, **int**timeInYears, **boolean**isSeniorCitizen) {

**if** (principal< 0 || timeInYears< 0) {

**thrownew** IllegalArgumentException("Principal and time must be non-negative.");

}

**double**rate = isSeniorCitizen ? 12.0 : 10.0;

**return** (principal \* rate \* timeInYears) / 100;

}

}

**Step 2:SimpleInterestCalTest.java**

**package** ex4.SimpleInterestCalculator;

**importstatic** org.junit.jupiter.api.Assertions.\*;

**import** org.junit.jupiter.api.Test;

**class** SimpleInterestCalcTest {

// Test Case 1

@Test

**publicvoid** testSeniorCitizenSmallAmount() {

**double**result = SimpleInterestCalc.*calculateSimpleInterest*(1000, 2, **true**);

*assertEquals*(240.0, result, 0.001, "Expected interest for senior citizen with principal 1000 and time 2 years");

}

// Test Case 2

@Test

**publicvoid** testNonSeniorCitizenSmallAmount() {

**double**result = SimpleInterestCalc.*calculateSimpleInterest*(1000, 2, **false**);

*assertEquals*(200.0, result, 0.001, "Expected interest for non-senior citizen with principal 1000 and time 2 years");

}

// Test Case 3

@Test

**publicvoid** testZeroPrincipal() {

**double**result = SimpleInterestCalc.*calculateSimpleInterest*(0, 5, **true**);

*assertEquals*(0.0, result, 0.001, "Expected zero interest for zero principal");

}

// Test Case 4

@Test

**publicvoid** testSeniorCitizenLargeAmount() {

**double**result = SimpleInterestCalc.*calculateSimpleInterest*(100000, 10, **true**);

*assertEquals*(120000.0, result, 0.001, "Expected interest for senior citizen with large principal and long duration");

}

}

Sample Input:

# TestCase1:

* + Principal:1000
  + Time:2years
  + SeniorCitizen:true
  + ExpectedOutput: 240.0 (12%forseniorcitizens)

# TestCase2:

* + Principal:1000
  + Time:2years
  + SeniorCitizen:false
  + ExpectedOutput: 200.0 (10%fornon-seniorcitizens)

# TestCase3:

* + Principal:0
  + Time:5years
  + SeniorCitizen:true
  + ExpectedOutput:0.0(Zero principal)

# TestCase4:

* + Principal:100000
  + Time: 10years
  + SeniorCitizen:true
  + ExpectedOutput: 120000.0(12%forseniorcitizenswith alargeamount)

SampleOutput:

# TestCase1:

* + Input:Principal=1000,Time=2,SeniorCitizen=true
  + Output:240.0

# TestCase2:

* + Input: Principal=1000,Time=2,SeniorCitizen=false
  + Output:200.0

# TestCase3:

* + Input: Principal=0,Time=5,SeniorCitizen=true
  + Output:0.0

# TestCase4:

* + Input: Principal=100000,Time=10,SeniorCitizen =true
  + Output:120000.0

Results:

* **TestCase1:**Theprogramcorrectlycalculatedtheinterestforaseniorcitizen(12%) with a principal of 1000 and a time of 2 years, resulting in an interest of 240.0.
* **TestCase 2:**Theprogramcorrectly calculatedtheinterestfor anon-seniorcitizen (10%) with the same principal and time, resulting in an interest of 200.0.
* **TestCase3:**Whentheprincipalis0,theprogramcorrectlyreturned0.0interest, regardless of the time or senior citizen status.
* **Test Case 4:** For a large principal (100000) and a long time (10 years), the program correctlycalculatedtheinterestattheseniorcitizenrate(12%),resultingin120000.0.



