

JUnit automated test suite

@author Anastasiia Ryzhkova

Id G00426061

Refactoring

The source code InsuranceProgram.java has been refactored with the aim to make the code suitable for creation and running of the automated test suite.

The following classes have been added:

- InsuranceCalculator.java which is base class for insurance calculation with shared logic for both age groups
- Under25InsuranceCalculator.java which performs calculation for individuals under 25 with specific logic
- Over25InsuranceCalculator.java which performs calculation for individuals 25 and older with specific logic
- InsuranceConstants.java which contains constants related to insurance calculations
- Runner.java class to run the application

Also the age validation has been added with assumption that valid age range is 16-99, with specific logic for under 25 and 25 and over age groups. Validation ensures that user inputs valid age 16-99 and prompts user in case user enters invalid age (e.g. sixteen or age <16 and >99). The invalid age and blank age are tested for correct exceptions in InsuranceCalculatorTest.class.

Test Suite

Test design has been performed using Boundary Value Analysis and Equivalence Partitioning techniques. The decision tables for test cases below.

No accidents

Age	# of accidents	Test	Age	# of accidents	Test
16	0	Under25InsuranceCalculator Test.class Method: testCalculateInsurance	26	0	Over25InsuranceCalculator Test.class Method: testCalculateInsuranceWith NoAccidents
17	0		98	0	
24	0		99	0	
Decision			Decision		
Surcharge 100. Total amount to pay 600.			No surcharge. Total amount to pay 500.		

Under 25 age group 1-5 accidents

Age	# of accidents	Age	# of accidents	Age	# of accidents	Age	# of accidents	Age	# of accidents	Test
16	1	16	2	16	3	16	4	16	5	Under25InsuranceCalculatorTest.class Method: testCalculateInsurance
17	1	17	2	17	3	17	4	17	5	
24	1	24	2	24	3	24	4	24	5	
Decision										
Surcharge 150. Total amount to pay 650.		Surcharge 225. Total amount to pay 725.		Surcharge 325. Total amount to pay 825.		Surcharge 475. Total amount to pay 975.		Surcharge 675. Total amount to pay 1175.		

Under 25 age group 6 accidents

Age	# of accidents	Test
16	6	InsuranceCalculatorTest.class Method: Method: testCalculateInsurance
17	6	
24	6	
Decision		
No insurance		

Over 25 age group 1-5 accidents

Age	# of accidents	Age	# of accidents	Age	# of accidents	Age	# of accidents	Age	# of accidents	Test
25	1	25	2	25	3	25	4	25	5	Over25InsuranceCalculatorTest.class Method: testCalculateInsuranceWithAccidents
26	1	26	2	26	3	26	4	26	5	
98	1	98	2	98	3	98	4	98	5	
99	1	99	2	99	3	99	4	99	5	
Decision										
Surcharge 50. Total amount to pay 550.		Surcharge 125. Total amount to pay 625.		Surcharge 225. Total amount to pay 725.		Surcharge 375. Total amount to pay 875.		Surcharge 575. Total amount to pay 1075.		

Over 25 age group 6 accidents

Age	# of accidents	Test
25	6	InsuranceCalculatorTest.class Method: Method: testCalculateInsurance
26	6	
98	6	
99	6	
No insurance		

Test cases for exceptions implemented in InsuranceCalculatorTest.class

Coverage

The coverage is 78.9 %

Element		Coverage	Covered Instructions	Missed Instructions	Total Instructions
InsuranceProgramTest		78.9 %	396	106	502
src		78.9 %	396	106	502
ie.atu.dip		78.9 %	396	106	502
InsuranceCalculator.java		86.8 %	112	17	129
InsuranceCalculatorTest.java		92.2 %	94	8	102
InsuranceConstants.java		0.0 %	0	3	3
Over25InsuranceCalculator.java		100.0 %	12	0	12
Over25InsuranceCalculatorTest.java		100.0 %	91	0	91
Runner.java		0.0 %	0	75	75
TestSuite.java		0.0 %	0	3	3
Under25InsuranceCalculator.java		100.0 %	26	0	26
Under25InsuranceCalculatorTest.java		100.0 %	61	0	61

To Run

Application can be run from Eclipse by Running TestSuite.class or by selecting Coverage as JUnit Test.

Test run results from VM below

Finished after 1.564 seconds	
Runs: 100/100	Errors: 0
Failures: 0	
Under25InsuranceCalculatorTest [Runner: JUnit 5] (0.301 s)	
Calculate Insurance with 0-5 Accidents (0.301 s)	
Age: 16, Accidents: 0, Surcharge: 100, Total Amount: 600 (0.010 s)	
Age: 17, Accidents: 0, Surcharge: 100, Total Amount: 600 (0.010 s)	
Age: 24, Accidents: 0, Surcharge: 100, Total Amount: 600 (0.005 s)	
Age: 16, Accidents: 1, Surcharge: 150, Total Amount: 650 (0.070 s)	
Age: 17, Accidents: 1, Surcharge: 150, Total Amount: 650 (0.027 s)	
Age: 24, Accidents: 1, Surcharge: 150, Total Amount: 650 (0.011 s)	
Age: 16, Accidents: 2, Surcharge: 225, Total Amount: 725 (0.014 s)	
Age: 17, Accidents: 2, Surcharge: 225, Total Amount: 725 (0.079 s)	
Age: 24, Accidents: 2, Surcharge: 225, Total Amount: 725 (0.046 s)	
Age: 16, Accidents: 3, Surcharge: 325, Total Amount: 825 (0.063 s)	
Age: 17, Accidents: 3, Surcharge: 325, Total Amount: 825 (0.046 s)	
Age: 24, Accidents: 3, Surcharge: 325, Total Amount: 825 (0.019 s)	
Age: 16, Accidents: 4, Surcharge: 475, Total Amount: 975 (0.004 s)	
Age: 17, Accidents: 4, Surcharge: 475, Total Amount: 975 (0.009 s)	
Age: 24, Accidents: 4, Surcharge: 475, Total Amount: 975 (0.005 s)	
Age: 16, Accidents: 5, Surcharge: 675, Total Amount: 1175 (0.008 s)	
Age: 17, Accidents: 5, Surcharge: 675, Total Amount: 1175 (0.005 s)	
Age: 24, Accidents: 5, Surcharge: 675, Total Amount: 1175 (0.005 s)	
Over25InsuranceCalculatorTest [Runner: JUnit 5] (0.039 s)	
InsuranceCalculatorTest [Runner: JUnit 5] (0.031 s)	
TestSuite [Runner: JUnit 5] (0.180 s)	

Finished after 1.564 seconds

Runs: 100/100

Errors: 0

Failures: 0

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Under25InsuranceCalculatorTest [Runner: JUnit 5] (0.301 s)

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Over25InsuranceCalculatorTest [Runner: JUnit 5] (0.039 s)

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Calculate Insurance with 0 Accidents (0.011 s)

Age: 25, Accidents: 0, Surcharge: 0, Total Amount: 500 (0.011 s)

Age: 26, Accidents: 0, Surcharge: 0, Total Amount: 500 (0.004 s)

Age: 98, Accidents: 0, Surcharge: 0, Total Amount: 500 (0.006 s)

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Calculate Insurance with 1-5 Accidents (0.008 s)

Age: 25, Accidents: 1, Surcharge: 50, Total Amount: 550 (0.008 s)

Age: 26, Accidents: 1, Surcharge: 50, Total Amount: 550 (0.004 s)

Age: 98, Accidents: 1, Surcharge: 50, Total Amount: 550 (0.004 s)

Age: 99, Accidents: 1, Surcharge: 50, Total Amount: 550 (0.007 s)

Age: 25, Accidents: 2, Surcharge: 125, Total Amount: 625 (0.009 s)

Age: 26, Accidents: 2, Surcharge: 125, Total Amount: 625 (0.007 s)

Age: 98, Accidents: 2, Surcharge: 125, Total Amount: 625 (0.004 s)

Age: 99, Accidents: 2, Surcharge: 125, Total Amount: 625 (0.002 s)

Age: 25, Accidents: 3, Surcharge: 225, Total Amount: 725 (0.003 s)

Age: 26, Accidents: 3, Surcharge: 225, Total Amount: 725 (0.002 s)

Age: 98, Accidents: 3, Surcharge: 225, Total Amount: 725 (0.004 s)

Age: 99, Accidents: 3, Surcharge: 225, Total Amount: 725 (0.005 s)

Age: 25, Accidents: 4, Surcharge: 375, Total Amount: 875 (0.003 s)

Age: 26, Accidents: 4, Surcharge: 375, Total Amount: 875 (0.003 s)

Age: 98, Accidents: 4, Surcharge: 375, Total Amount: 875 (0.006 s)

Age: 99, Accidents: 4, Surcharge: 375, Total Amount: 875 (0.007 s)

Age: 25, Accidents: 5, Surcharge: 575, Total Amount: 1075 (0.004 s)

Age: 26, Accidents: 5, Surcharge: 575, Total Amount: 1075 (0.006 s)

Age: 98, Accidents: 5, Surcharge: 575, Total Amount: 1075 (0.003 s)

Age: 99, Accidents: 5, Surcharge: 575, Total Amount: 1075 (0.005 s)

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InsuranceCalculatorTest [Runner: JUnit 5] (0.031 s)

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Test Exception for Invalid Age (0.006 s)

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Calculate No Insurance (0.003 s)

Age: 16, Accidents: 6 (0.003 s)

Age: 17, Accidents: 6 (0.001 s)

Age: 24, Accidents: 6 (0.002 s)

Age: 25, Accidents: 6 (0.001 s)

Age: 26, Accidents: 6 (0.001 s)

Age: 98, Accidents: 6 (0.000 s)

Age: 99, Accidents: 6 (0.001 s)

Test Exception for Blank Age (0.002 s)

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TestSuite [Runner: JUnit 5] (0.180 s)

Failure Trace

