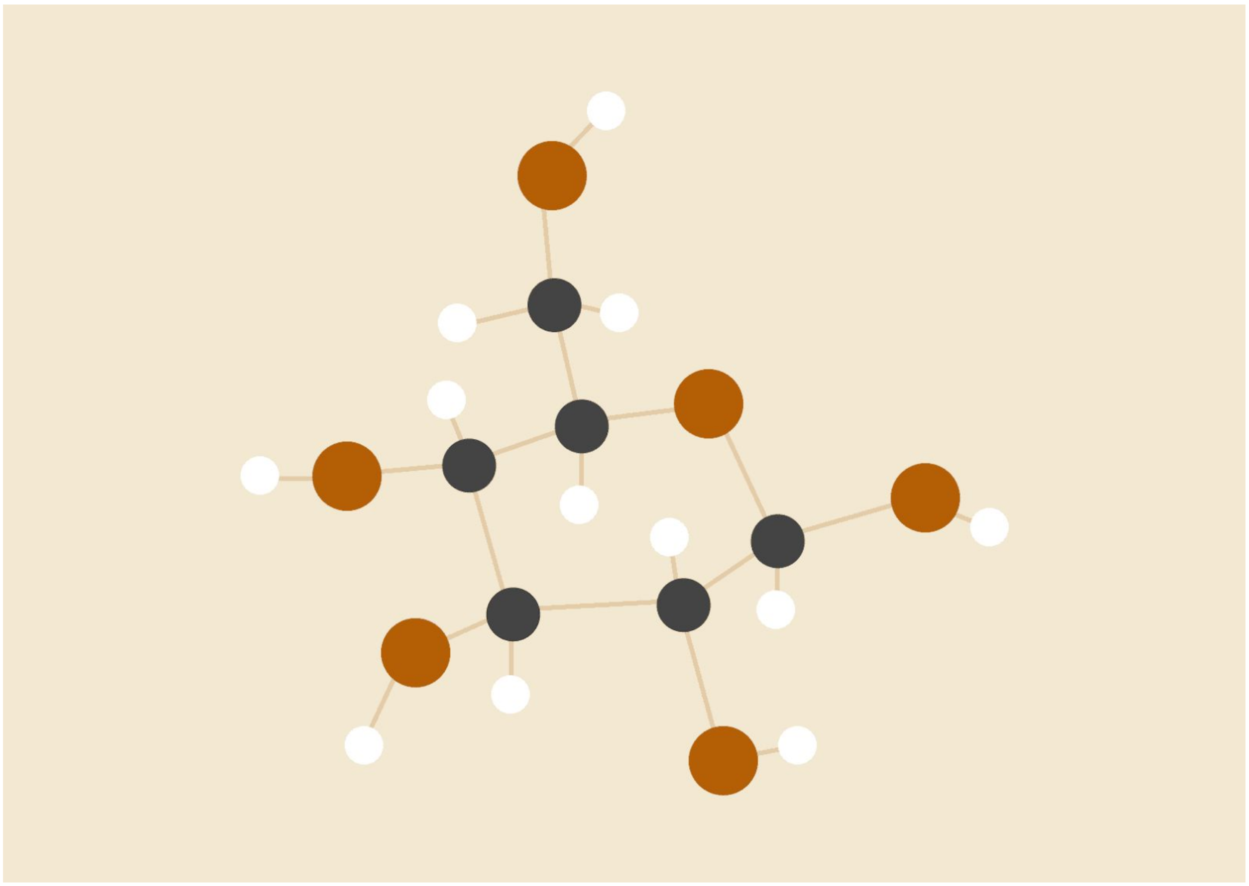
Software Quality and Testing Assignment

Software and Testing Pair Programming



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16.03.2018

Software Development L7

Code Implementation

GitHub Repository: https://github.com/eimutisgenys/SoftwareTesting

CODE:

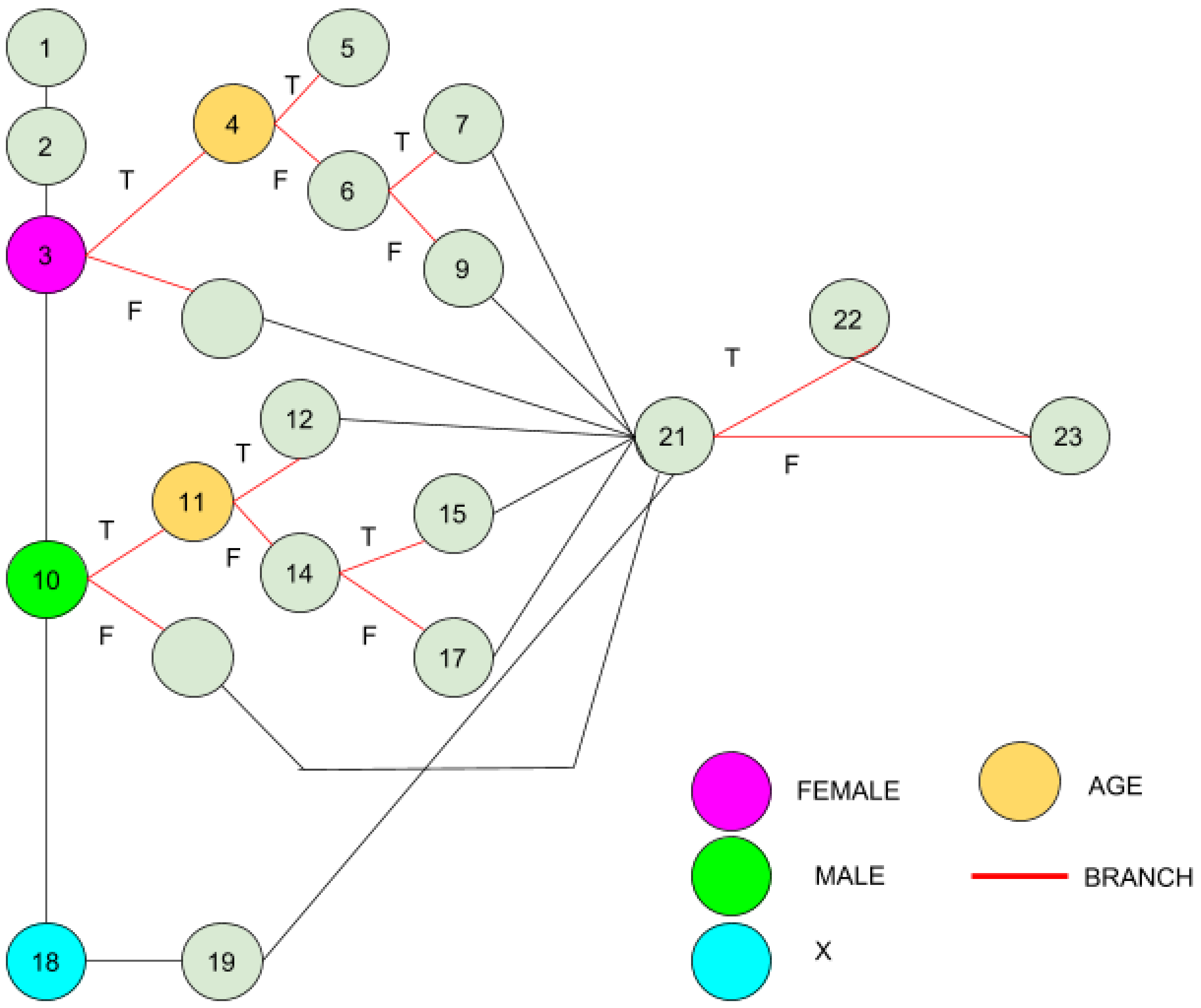
```
public float CalcPremium(int age, string gender) {
        float premium;

        if (gender == “female”)
                if ((age > = 18) && (age <= 30))
                        premium = 5.0;
                else if (age >= 31)
                        premium = 2.50;
                else
                        premium = 0.0;
        else if (gender == “male”)
                if ((age > = 18) && (age <= 35))
                        premium = 6.0;
                else
                         if (age >= 36)
                                premium = 5.0;
                        else
                                premium = 0.0;
        else
                premium = 0.0;


         if (age >= 50)
                premium = premium * 0.15;
        return premium;
  }
```

Flow Chart

Flow chart designed based on the code.



Cyclomatic Complexity

Formula: Edges - Nodes + 2 ⇒ 23 Edges - 17 Nodes + 2 = 8

Predicate nodes + 1 = 7 + 1 = 8

Zones: 8

That means that our code has a cyclomatic complexity of 8 and is easy to maintain.

White box testing

Statement coverage

We wrote tests to achieve 100% statement coverage.

TC 1: gender: female 20	TC 4: gender: male 20
TC 2: gender: female 35	TC 5: gender: male 40
TC 3: gender: female 16	TC 6: gender: female 16
TC 7: gender: x 16	TC 8: gender: x 56

$$\text{SC} = \frac{No\ of\ excuted\ statements}{Total\ Number\ of\ statements} * 100\%$$

With these tests we covered 16 executed statements/16 total statements giving 100% Statement Coverage.

Branch coverage

We wrote tests to get 100% branch coverage.

GENDER	AGE
FEMALE	20
FEMALE	57
FEMALE	16
MALE	20
MALE	57
MALE	16
X	16
X	56

$$BC = \frac{No\ of\ excuted\ branches}{Total\ Number\ of\ branches} * 100\%$$

With these tests we covered 14 executed branches/ 14 total branches so 100% Branch Coverage.

Path coverage

We wrote tests to get 100% path coverage.

GENDER	AGE
FEMALE	20
FEMALE	57
FEMALE	16
FEMALE	“ ”
MALE	20
MALE	57
MALE	16
MALE	“ ”
X	56
X	16

$$\text{PC} = \frac{No\ of\ excuted\ paths}{Total\ Number\ of\ paths} * \ 100\%$$

With these tests we covered 18 executed paths/ 18 total paths so 100% PathCoverage.

Black Box Tests

Variable	Valid Equivalence Class	Rep Value Class	Rep BV	Invalid Class	Rep Value
GENDER	MALE	Male	Male	Not Male	asb
	FEMALE	Female	Female	Not Female	123
	X	x	x	Blanck	“ ”
AGE	1-17	9	-1, 0, 1, 17, 18	<1	-30
	18-30	25	19, 30, 31	letters	asdada
	31-35	33	32, 35, 36	blanck	“ ”
	36-49	40	37, 49, 50	>100	134
	50+	56	51		

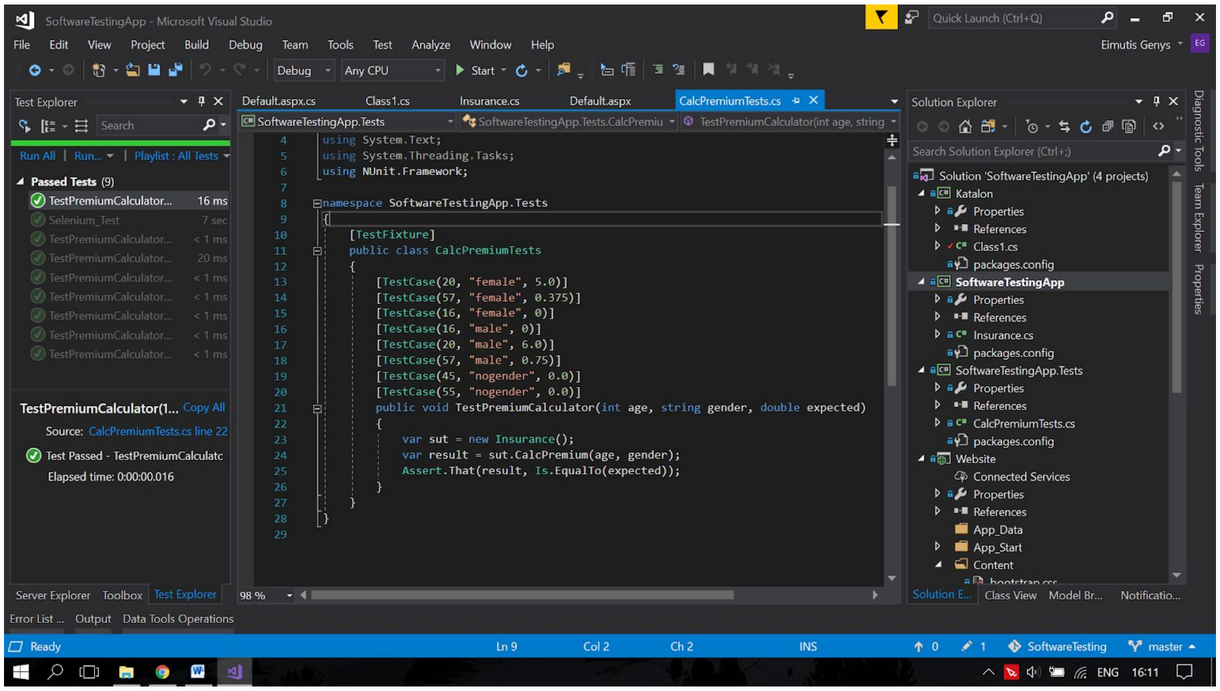
Test Case

Test Case Number	Data	Expected Result	Actual Result	FAIL/ PASS
1	FEMALE , 20	5	5	**PASS**
2	FEMALE , 57	2.5	2.5	**PASS**
3	FEMALE , 16	0	0	**PASS**

4	MALE , 20	6	6	**PASS**
5	MALE , 57	5	5	**PASS**
6	MALE , 16	0	0	**PASS**
7	X , 16	0	0	**PASS**
8	X , 56	0	0	**PASS**

Tests

NUnit Tests


SoftwareTestingApp - Microsoft Visual Studio
File Edit View Project Build Debug Team Tools Test Analyze Window Help
Debug Any CPU Start
Test Explorer
Run All | Run... | Playlist : All Tests
Default.aspx.cs Class1.cs Insurance.cs Default.aspx CalcPremiumTests.cs
Solution Explorer
Quick Launch (Ctrl+Q)
Eimutis Genys
Server Explorer Toolbox Test Explorer
Error List ... Output Data Tools Operations
Ready Ln 9 Col 2 Ch 2 INS
SoftwareTesting master

Passed Tests (9)

```
TestPremiumCalculator...   16 ms
Selenium_Test              7 sec
TestPremiumCalculator...   < 1 ms
TestPremiumCalculator...   20 ms
TestPremiumCalculator...   < 1 ms
TestPremiumCalculator...   < 1 ms
TestPremiumCalculator...   < 1 ms
TestPremiumCalculator...   < 1 ms
TestPremiumCalculator...   < 1 ms
```

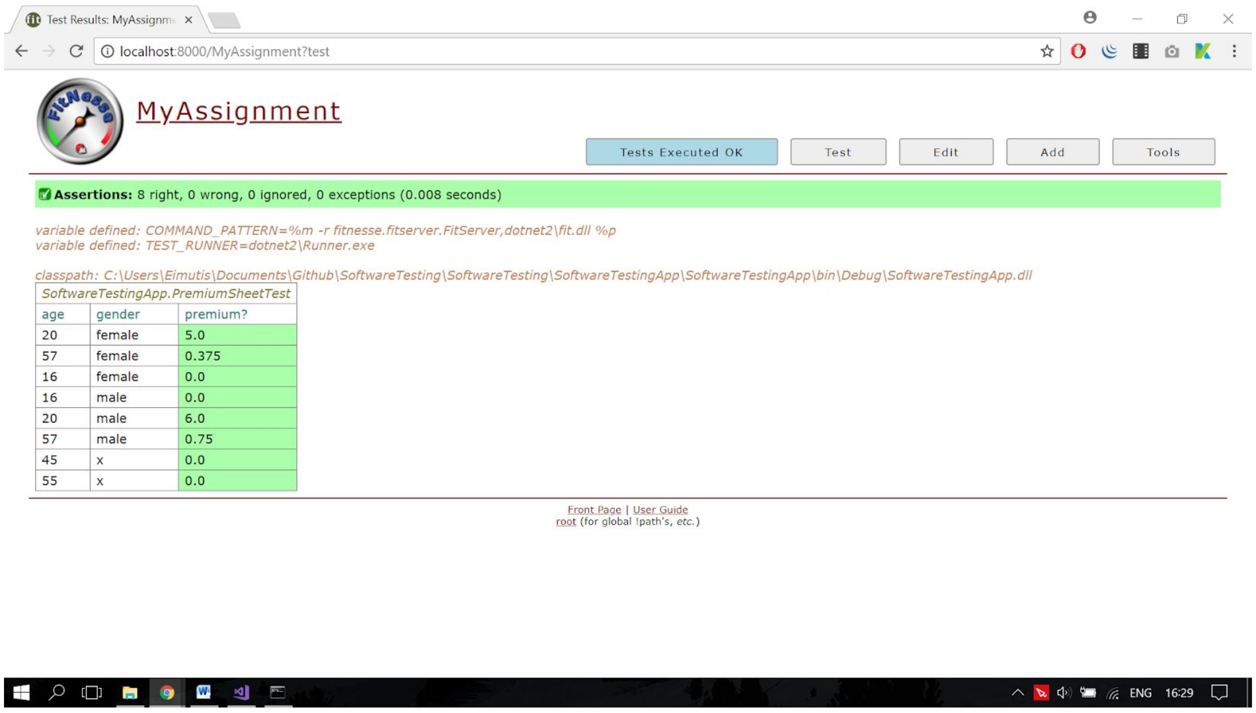
TestPremiumCalculator(1... Copy All
Source: CalcPremiumTests.cs line 22
Test Passed - TestPremiumCalculatc
Elapsed time: 0:00:00.016

```csharp
using System.Text;
using System.Threading.Tasks;
using NUnit.Framework;

namespace SoftwareTestingApp.Tests
{
    [TestFixture]
    public class CalcPremiumTests
    {
        [TestCase(20, "female", 5.0)]
        [TestCase(57, "female", 0.375)]
        [TestCase(16, "female", 0)]
        [TestCase(16, "male", 0)]
        [TestCase(20, "male", 6.0)]
        [TestCase(57, "male", 0.75)]
        [TestCase(45, "nogender", 0.0)]
        [TestCase(55, "nogender", 0.0)]
        public void TestPremiumCalculator(int age, string gender, double expected)
        {
            var sut = new Insurance();
            var result = sut.CalcPremium(age, gender);
            Assert.That(result, Is.EqualTo(expected));
        }
    }
}
```

```
Solution 'SoftwareTestingApp' (4 projects)
  Katalon
    Properties
    References
    Class1.cs
    packages.config
  SoftwareTestingApp
    Properties
    References
    Insurance.cs
    packages.config
  SoftwareTestingApp.Tests
    Properties
    References
    CalcPremiumTests.cs
    packages.config
  Website
    Connected Services
    Properties
    References
    App_Data
    App_Start
    Content
```

Fitnesse Tests



Assertions: 8 right, 0 wrong, 0 ignored, 0 exceptions (0.008 seconds)

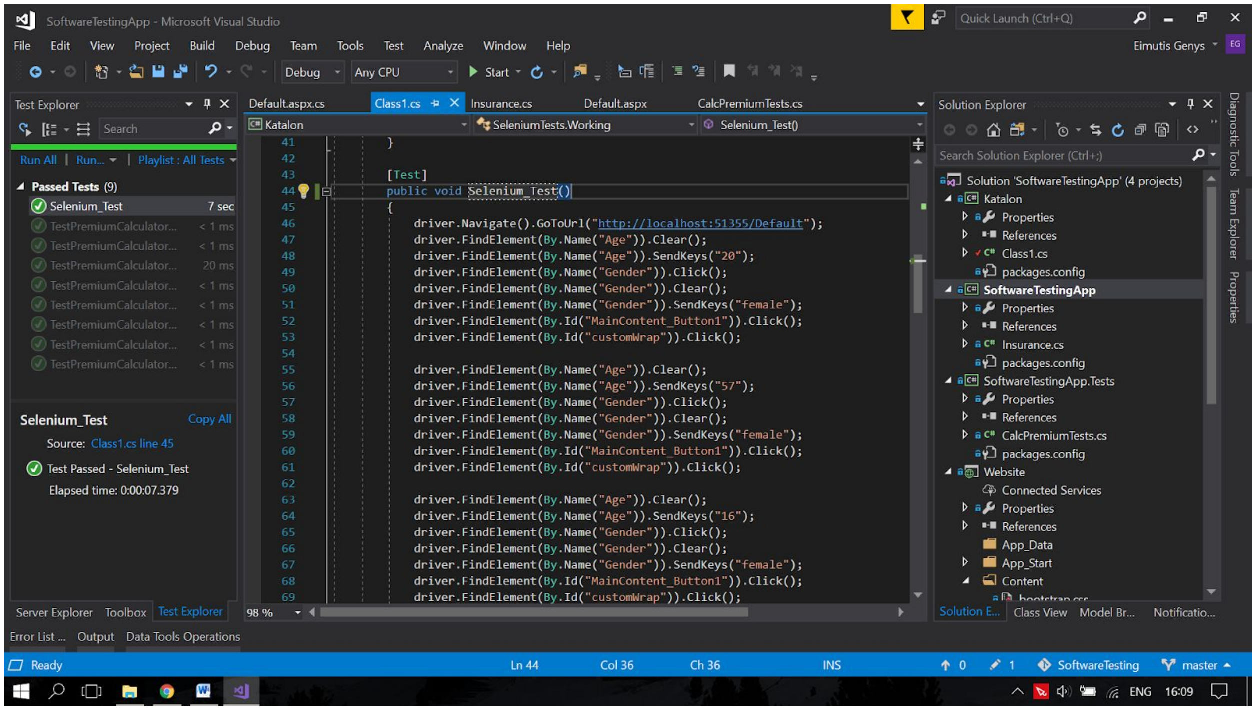
variable defined: COMMAND_PATTERN=%m -r fitnesse.fitserver.FitServer,dotnet2\fit.dll %p
variable defined: TEST_RUNNER=dotnet2\Runner.exe

classpath: C:\Users\Eimutis\Documents\Github\SoftwareTesting\SoftwareTesting\SoftwareTestingApp\SoftwareTestingApp\bin\Debug\SoftwareTestingApp.dll

SoftwareTestingApp.PremiumSheetTest		
age	gender	premium?
20	female	5.0
57	female	0.375
16	female	0.0
16	male	0.0
20	male	6.0
57	male	0.75
45	x	0.0
55	x	0.0

Front Page | User Guide
root (for global !path's, etc.)

Selenium Tests



Test Explorer

Passed Tests (9)

```
Selenium_Test                 7 sec
TestPremiumCalculator...    < 1 ms
TestPremiumCalculator...    < 1 ms
TestPremiumCalculator...     20 ms
TestPremiumCalculator...    < 1 ms
TestPremiumCalculator...    < 1 ms
TestPremiumCalculator...    < 1 ms
TestPremiumCalculator...    < 1 ms
TestPremiumCalculator...    < 1 ms
```

Selenium_Test — Copy All
Source: Class1.cs line 45
Test Passed - Selenium_Test
Elapsed time: 0:00:07.379

```csharp
        }

        [Test]
        public void Selenium_Test()
        {
            driver.Navigate().GoToUrl("http://localhost:51355/Default");
            driver.FindElement(By.Name("Age")).Clear();
            driver.FindElement(By.Name("Age")).SendKeys("20");
            driver.FindElement(By.Name("Gender")).Click();
            driver.FindElement(By.Name("Gender")).Clear();
            driver.FindElement(By.Name("Gender")).SendKeys("female");
            driver.FindElement(By.Id("MainContent_Button1")).Click();
            driver.FindElement(By.Id("customWrap")).Click();

            driver.FindElement(By.Name("Age")).Clear();
            driver.FindElement(By.Name("Age")).SendKeys("57");
            driver.FindElement(By.Name("Gender")).Click();
            driver.FindElement(By.Name("Gender")).Clear();
            driver.FindElement(By.Name("Gender")).SendKeys("female");
            driver.FindElement(By.Id("MainContent_Button1")).Click();
            driver.FindElement(By.Id("customWrap")).Click();

            driver.FindElement(By.Name("Age")).Clear();
            driver.FindElement(By.Name("Age")).SendKeys("16");
            driver.FindElement(By.Name("Gender")).Click();
            driver.FindElement(By.Name("Gender")).Clear();
            driver.FindElement(By.Name("Gender")).SendKeys("female");
            driver.FindElement(By.Id("MainContent_Button1")).Click();
            driver.FindElement(By.Id("customWrap")).Click();
```

Solution Explorer

```
Solution 'SoftwareTestingApp' (4 projects)
  Katalon
    Properties
    References
    Class1.cs
    packages.config
  SoftwareTestingApp
    Properties
    References
    Insurance.cs
    packages.config
  SoftwareTestingApp.Tests
    Properties
    References
    CalcPremiumTests.cs
    packages.config
  Website
    Connected Services
    Properties
    References
    App_Data
    App_Start
    Content
```