IT Assignment Coversheet

Course:	PROG8170 – Software Quality Assurance Techniques
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Assignment #:	1
Assignment Type:	■ Individual ☐ Pair ☐ Team
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PROG8170

Software Quality Assurance Techniques

Assignment #1: Rubric

#	Mark	Weight	Criteria
			Rectangle Class
1.		**1**	Rectangle class created as a separate file
2.		**1**	Rectangle class length and width attributes are private
3.		**2**	Default and Non-Default constructor created and working properly
4.		**6**	Six required methods created and working properly
			Console Application
5.		**3**	Initial rectangle created as described, incorrect input handled.
6.		**3**	Menu option 1 works as described
7.		**3**	Menu option 2 works as described
8.		**3**	Menu option 3 works as described
9.		**3**	Menu option 4 works as described
10.		**5**	Menu option 5 works as described
11.		**5**	Menu option 6 works as described
12.		**3**	Menu option 7 works as described
			Unit Tests
13.		**3**	Unit test for GetLength() method
14.		**3**	Unit test for SetLength() method
15.		**3**	Unit test for GetWidth() method
16.		**3**	Unit test for SetWidth() method
17.		**3**	Unit test for GetPerimeter() method
18.		**3**	Unit test for GetArea() method
19.		**1**	Screenshot of completed unit tests run successfully
			Git
20.		**3**	Screenshot showing Git repository log and required commits
		-0.50 each	**Programming standards deductions.**
		-12	**Failure to present deduction.**
		-12	**Late submission (per day)**
		-6	**Missing documentation from hard copy printout or not in correct order**
		60	**Total Marks**

Source Code

Program.cs

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace Assignment1
{
    class Program
    {
        static void Main(string[] args)
        {
            //get user input of length and width
            int[] attributes = GetRectangleAttributes();

            /*create an instance of the rectangle with the attributes provided by the user
             * attributes[0] = length
             * attributes[1] = width
            */
            Rectangle rectangle = new Rectangle(attributes[0],attributes[1]);

            //Call method to run menu section
            Menu(rectangle);

            Console.ReadKey();

        }

        private static int[] GetRectangleAttributes()
        {
            int length = 0;
            int width = 0;

            //get length of the rectangle
            length = GetLengthFromUser();

            //get the width of the rectangle
            width = GetWidthFromUser();

            return new int[] {length,width};
        }

        private static int GetWidthFromUser()
        {
            int width = 0;

            do
            {
                try
                {
                    //get the width of the rectangle
                    Console.Write("\nEnter the width of the rectangle :");
                    width = Int32.Parse(Console.ReadLine());

                    //check if the user has entered 0
                    if (width <= 0)
                    {
                        throw new Exception();
                    }
                    break;
                }
                catch (Exception e)   //something unexpected happened
                {
                    Console.Write("\nPlease enter a positive integer value greater than 0 less than  2,147,483,648\n\n");
```

```
        }
    } while (true);

    return width;
}

private static int GetLengthFromUser()
{
    int length = 0;

    do
    {
        try
        {
            //get the length of the rectangle
            Console.Write("\nEnter the length of the rectangle :");
            length = Int32.Parse(Console.ReadLine());

            //check if the user has entered 0
            if (length <= 0)
            {
                throw new Exception();
            }

            break;
        }
        catch (Exception e)            //something unexpected happened
        {
            Console.Write("\nPlease enter a positive integer value greater than 0 less than  2,147,483,648\n\n");
        }
    } while (true);

    return length;
}

public static void Menu(Rectangle rectangle)
{
    int choice = 0;

    string[] options = {
                        "Get Rectangle Length",
                        "Change Rectangle Length",
                        "Get Rectangle Width",
                        "Change Rectangle Width",
                        "Get Rectangle Perimeter",
                        "Get Rectangle Area",
                        "Exit"
                        };
    while(true)
    {
        ShowMenu(options);
        try
        {
            Console.Write("\n\nEnter a valid choice - ");

            //get the user input
            choice = Int32.Parse(Console.ReadLine());

            //check if user has entered a valid input
            if (choice <= 0 || choice > options.Length)
            {
                throw new Exception();
            }

            //show output according to user input
            ShowOutput(rectangle,choice);
        }
        catch(Exception e)
        {
            Console.Write("\n\nPlease enter a valid choice!");
```

```
            }
        }
    }

    private static void ShowOutput(Rectangle rectangle, int choice)
    {
        //give output according to the input provided
        switch (choice)
        {
            case 1: Console.Write("\n\nLength of Rectangle : " + rectangle.GetLength());
                    break;
            case 2: int length = rectangle.SetLength(GetLengthFromUser());
                    Console.Write("\n\nRectangle's length set to : " + length);
                    break;
            case 3: Console.Write("\n\nWidth of Rectangle : " + rectangle.GetWidth());
                    break;
            case 4: int width = rectangle.SetWidth(GetWidthFromUser());
                    Console.Write("\n\nRectangle's width set to : " + width);
                    break;
            case 5: Console.Write("\n\nPerimeter of the rectangle : " + rectangle.GetPerimeter());
                    break;
            case 6: Console.Write("\n\nArea of the rectangle " + rectangle.GetArea());
                    break;
            case 7: Environment.Exit(0);
                    break;
        }
    }

    private static void ShowMenu(string[] options)
    {
        Console.Write("\n\n Menu: \n");

        //show the menu to the user
        for (int i =0;i<options.Length;i++)
        {
            Console.WriteLine(i+1 + "." + options[i]);
        }
    }
  }
}
```

Rectangle.cs

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace Assignment1
{
    public class Rectangle
    {
        //variables to store attributes of a rectangle
        private int length;
        private int width;

        //default constrcutor
        public Rectangle()
        {
            length = 1;
            width = 1;
        }

        //parametarised constructor
        public Rectangle(int length, int width)
        {
            this.length = length;
            this.width = width;
        }

        //getters

        public int GetLength()
        {
            return this.length;
        }
        public int GetWidth()
        {
            return this.width;
        }

        //setters

        public int SetLength(int length)
        {
            this.length = length;
            return this.length;
        }
        public int SetWidth(int width)
        {
            this.width = width;
            return this.width;
        }

        //member functions

        //get the perimeter of the rectangle
        public int GetPerimeter()
        {
            return 2 * (this.length + this.width);
        }

        //get the area of the retangle
        public int GetArea()
        {
            return this.length * this.width;
        }
    }
}
```

RectangleTest.cs

```
using NUnit.Framework;
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace Assignment1.Tests
{
    [TestFixture]
    class RectangleTest
    {
        Rectangle rectangle;

        /*Test cases for GetPerimeter() method*/

        /*Test case 1
         * Revision : 1.0
         * Description : To test whether the perimeter function is returning the correct value
         * Input : Default => length = 1, width = 1
         * Expected : 4
         */
        [Test]
        public void TestGetPerimeter_InputDefault_Output4()
        {
            rectangle = new Rectangle();
            int perimeter = rectangle.GetPerimeter();
            Assert.AreEqual(4,perimeter);
        }

        /*Test case 2
         * Revision : 1.0
         * Description : To test whether the perimeter function is returning the correct value
         *               when length = 0
         * Input : length = 0, width = 5
         * Expected : 10
         */
        [Test]
        public void TestGetPerimeter_Input0_5_Output10()
        {
            rectangle = new Rectangle(0,5);
            int perimeter = rectangle.GetPerimeter();
            Assert.AreEqual(10,perimeter);
        }

        /*Test case 3
         * Revision : 1.0
         * Description : To test whether the perimeter function is returning
         *             the correct value when passed with engative values
         * Input : length = -5, width = 0
         * Expected : -2
         */
        [Test]
        public void TestGetPerimeter_Input_neg1_0__Output_neg2()
        {
            rectangle = new Rectangle(-1,0);
            int perimeter = rectangle.GetPerimeter();
            Assert.AreEqual(-2,perimeter);
        }

        /*Test cases for GetArea() method*/

        /*Test case 1
         * Revision : 1.0
         * Description : To test whether the area function is returning the correct value
         *             when user isn't entering anything
```

```
     * Input : Default => length = 1, width = 1
     * Expected : 1
     */
    [Test]
    public void TestGetArea_InputDefault_Output1()
    {
        rectangle = new Rectangle();
        int area = rectangle.GetArea();
        Assert.AreEqual(1, area);
    }

    /*Test case 2
     * Revision : 1.0
     * Description : To test whether the area function is returning the correct value
     *               when the length = 0
     * Input :length = 0, width = 1
     * Expected : 0
     */
    [Test]
    public void TestGetArea_Input0_1_Output0()
    {
        rectangle = new Rectangle(0,1);
        int area = rectangle.GetArea();
        Assert.AreEqual(0, area);
    }

    /*Test case 3
     * Revision : 1.0
     * Description : To test whether the area function is returning the correct value
     *               when negative values are passed
     * Input : length = -2, width = 1
     * Expected : -2
     */
    [Test]
    public void TestGetArea_Input_neg2_1_Output_neg2()
    {
        rectangle = new Rectangle(-2,1);
        int area = rectangle.GetArea();
        Assert.AreEqual(-2, area);
    }

    /*Test cases for SetLength() method*/

    /*Test case 1
     * Revision : 1.0
     * Description : To test whether the SetLength() method is working fine or not by passing positive value
     * Input : length = 2
     * Expected : 2
     */
    [Test]
    public void TestSetLength_Input2_Output2()
    {
        rectangle = new Rectangle();
        int lengthSet = rectangle.SetLength(2);
        Assert.AreEqual(2, lengthSet);
    }

    /*Test case 2
     * Revision : 1.0
     * Description : To test whether the SetLength() method is working fine or not by passing negative value
     * Input :  length = -5
     * Expected : -5
     */
    [Test]
    public void TestSetLength_Input_neg2_Output_neg2()
    {
        rectangle = new Rectangle();
        int lengthSet = rectangle.SetLength(-5);
        Assert.AreEqual(-5, lengthSet);
    }
```

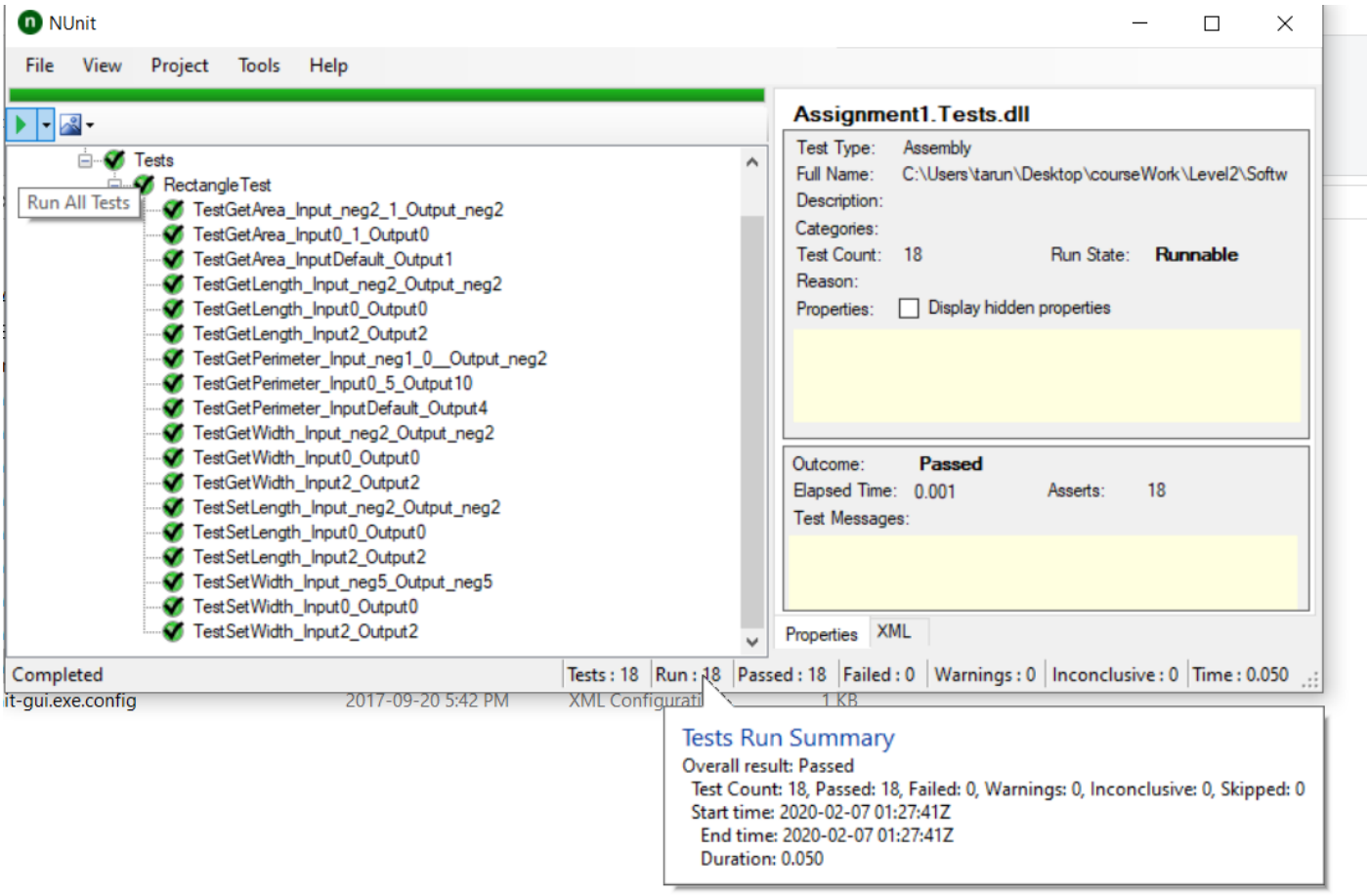
```
/*Test case 3
 * Revision : 1.0
 * Description : To test whether the SetLength() method is working fine or not by passing 0
 * Input :length = 0
 * Expected : 0
 */
[Test]
public void TestSetLength_Input0_Output0()
{
    rectangle = new Rectangle();
    int lengthSet = rectangle.SetLength(0);
    Assert.AreEqual(0, lengthSet);
}

/*Test cases for SetWidth() method*/

/*Test case 1
 * Revision : 1.0
 * Description : To test whether the SetWidth() method is working fine or not by passing positive value
 * Input : width = 2
 * Expected : 2
 */
[Test]
public void TestSetWidth_Input2_Output2()
{
    rectangle = new Rectangle();
    int widthSet = rectangle.SetWidth(2);
    Assert.AreEqual(2, widthSet);
}

/*Test case 2
 * Revision : 1.0
 * Description : To test whether the SetWidth() method is working fine or not by passing negative value
 * Input :  width = -5
 * Expected : -5
 */
[Test]
public void TestSetWidth_Input_neg5_Output_neg5()
{
    rectangle = new Rectangle();
    int widthSet = rectangle.SetWidth(-5);
    Assert.AreEqual(-5, widthSet);
}

/*Test case 3
 * Revision : 1.0
 * Description : To test whether the SetWidth() method is working fine or not by passing 0
 * Input :width = 0
 * Expected : 0
 */
[Test]
public void TestSetWidth_Input0_Output0()
{
    rectangle = new Rectangle();
    int widthSet = rectangle.SetWidth(0);
    Assert.AreEqual(0, widthSet);
}

/*Test cases for GetLength() method*/

/*Test case 1
 * Revision : 1.0
 * Description : To test whether the GetLength() method is working fine or not by passing positive value
 * Input : length = 2
 * Expected : 2
 */
[Test]
public void TestGetLength_Input2_Output2()
{
```

```
    rectangle = new Rectangle();
    rectangle.SetLength(2);
    int length = rectangle.GetLength();
    Assert.AreEqual(2, length);
}

/*Test case 2
 * Revision : 1.0
 * Description : To test whether the GetLength() method is working fine or not by passing negative value
 * Input : length = -2
 * Expected : -2
 */
[Test]
public void TestGetLength_Input_neg2_Output_neg2()
{
    rectangle = new Rectangle();
    rectangle.SetLength(-2);
    int length = rectangle.GetLength();
    Assert.AreEqual(-2, length);
}

/*Test case 3
 * Revision : 1.0
 * Description : To test whether the GetLength() method is working fine or not by passing 0
 * Input : length = 0
 * Expected : 0
 */
[Test]
public void TestGetLength_Input0_Output0()
{
    rectangle = new Rectangle();
    rectangle.SetLength(0);
    int length = rectangle.GetLength();
    Assert.AreEqual(0, length);
}


/*Test cases for GetWidth() method*/

/*Test case 1
 * Revision : 1.0
 * Description : To test whether the GetWidth() method is working fine or not by passing positive value
 * Input : width = 2
 * Expected : 2
 */
[Test]
public void TestGetWidth_Input2_Output2()
{
    rectangle = new Rectangle();
    rectangle.SetWidth(2);
    int width = rectangle.GetWidth();
    Assert.AreEqual(2, width);
}

/*Test case 2
 * Revision : 1.0
 * Description : To test whether the GetWidth() method is working fine or not by passing negative value
 * Input : length = -2
 * Expected : -2
 */
[Test]
public void TestGetWidth_Input_neg2_Output_neg2()
{
    rectangle = new Rectangle();
    rectangle.SetWidth(-2);
    int width= rectangle.GetWidth();
    Assert.AreEqual(-2, width);
}

/*Test case 3
```

```
        * Revision : 1.0
        * Description : To test whether the GetWidth() method is working fine or not by passing 0
        * Input : length = 0
        * Expected : 0
        */
       [Test]
       public void TestGetWidth_Input0_Output0()
       {
          rectangle = new Rectangle();
          rectangle.SetWidth(0);
          int width = rectangle.GetWidth();
          Assert.AreEqual(0, width);
       }

   }
}
```

Screenshots

- **NUnit GUI with unit test cases**



- **Git log**