# Aspect Oriented Programming in .Net

## Introduction

[Aspect Oriented Programming (AOP)](https://en.wikipedia.org/wiki/Aspect-oriented_programming) is very powerful approach to avoid boilerplate code and archive better modularity. The main idea is to add behavior (advice) to the existing code without making any changes in the code itself. In Java, this idea implemented in [AspectJ](https://eclipse.org/aspectj/) and [Spring](https://spring.io/) frameworks. There are [PostSharp](https://www.postsharp.net/) (not free) or [NConcern](https://github.com/Virtuoze/NConcern) and some other frameworks (not very popular and easy to use) to do almost the same in .Net.

It is also possible to use RealProxy class to implement AOP:

[Example1](https://msdn.microsoft.com/en-us/magazine/dn574804.aspx)

[Example2](https://msdn.microsoft.com/en-us/library/system.runtime.remoting.messaging.returnmessage(v=vs.110).aspx)

Unfortunately, these examples have some significant drawbacks. Example1 does not support out parameters. To use Example2 class should be inherited from MarshalByRefObject. Also, both examples do not support asynchronous functions. Ok, technically it is supported. But I’m expecting “after” code execution AFTER task completion, and if “after” code tries to get value of Result property (for example during result serialization) it makes asynchronous code synchronous (not cool ☹).

I tried to fix first example.

## Solution

This solution is an example of logging implementation.

Differences with original code:

1. Constructor was made private. Static function Create create class instance and returns TransparentProxy (instance of this class is useless).
2. LoggingAdvice receive actions to log function calls and errors, and function to serialize complex type values as parameters.
3. TaskSchedule was added as an optional parameter to support task results logging using different task scheduler. TaskScheduler.FromCurrentSynchronizationContext()will be used by default.
4. If result value of the function is Task, result will be logged after task completion.
5. Added output parameters support.

Extension to log exception

using System;

using System.Text;

namespace AOP

{

public static class Extensions

{

public static string GetDescription(this Exception e)

{

var builder = new StringBuilder();

AddException(builder, e);

return builder.ToString();

}

private static void AddException(StringBuilder builder, Exception e)

{

builder.AppendLine($"Message: {e.Message}");

builder.AppendLine($"Stack Trace: {e.StackTrace}");

if (e.InnerException != null)

{

builder.AppendLine("Inner Exception");

AddException(builder, e.InnerException);

}

}

}

}

Logging Advice.

using System;

using System.Linq;

using System.Reflection;

using System.Runtime.Remoting.Messaging;

using System.Runtime.Remoting.Proxies;

using System.Text;

using System.Threading.Tasks;

namespace AOP

{

public class LoggingAdvice<T> : RealProxy

{

private readonly T \_decorated;

private readonly Action<string> \_logInfo;

private readonly Action<string> \_logError;

private readonly Func<object, string> \_serializeFunction;

private readonly TaskScheduler \_loggingScheduler;

private LoggingAdvice(T decorated, Action<string> logInfo, Action<string> logError,

Func<object, string> serializeFunction, TaskScheduler loggingScheduler)

: base(typeof(T))

{

if (decorated == null)

{

throw new ArgumentNullException(nameof(decorated));

}

\_decorated = decorated;

\_logInfo = logInfo;

\_logError = logError;

\_serializeFunction = serializeFunction;

\_loggingScheduler = loggingScheduler ?? TaskScheduler.FromCurrentSynchronizationContext();

}

public static T Create(T decorated, Action<string> logInfo, Action<string> logError,

Func<object, string> serializeFunction, TaskScheduler loggingScheduler = null)

{

var advice = new LoggingAdvice<T>(decorated, logInfo, logError, serializeFunction, loggingScheduler);

return (T)advice.GetTransparentProxy();

}

public override IMessage Invoke(IMessage msg)

{

var methodCall = msg as IMethodCallMessage;

if (methodCall != null)

{

var methodInfo = methodCall.MethodBase as MethodInfo;

if (methodInfo != null)

{

try

{

try

{

LogBefore(methodCall, methodInfo);

}

catch (Exception ex)

{

//Do not stop method execution if exception

LogException(ex);

}

var args = methodCall.Args;

var result = typeof(T).InvokeMember(

methodCall.MethodName,

BindingFlags.InvokeMethod | BindingFlags.Public | BindingFlags.Instance, null, \_decorated, args);

if (result is Task)

{

((Task)result).ContinueWith(task =>

{

if (task.Exception != null)

{

LogException(task.Exception.InnerException ?? task.Exception, methodCall);

}

else

{

object taskResult = null;

if (task.GetType().IsGenericType && task.GetType().GetGenericTypeDefinition() == typeof(Task<>))

{

var property = task.GetType().GetProperties()

.FirstOrDefault(p => p.Name == "Result");

if (property != null)

{

taskResult = property.GetValue(task);

}

}

LogAfter(methodCall, methodCall.Args, methodInfo, taskResult);

}

},

\_loggingScheduler);

}

else

{

try

{

LogAfter(methodCall, args, methodInfo, result);

}

catch (Exception ex)

{

//Do not stop method execution if exception

LogException(ex);

}

}

return new ReturnMessage(result, args, args.Length,

methodCall.LogicalCallContext, methodCall);

}

catch (Exception ex)

{

if (ex is TargetInvocationException)

{

LogException(ex.InnerException ?? ex, methodCall);

return new ReturnMessage(ex.InnerException ?? ex, methodCall);

}

}

}

}

throw new ArgumentException(nameof(msg));

}

private string GetStringValue(object obj)

{

if (obj == null)

{

return "null";

}

if (obj.GetType().IsPrimitive || obj.GetType().IsEnum || obj is string)

{

return obj.ToString();

}

try

{

return \_serializeFunction?.Invoke(obj) ?? obj.ToString();

}

catch

{

return obj.ToString();

}

}

private void LogException(Exception exception, IMethodCallMessage methodCall = null)

{

try

{

var errorMessage = new StringBuilder();

errorMessage.AppendLine($"Class {\_decorated.GetType().FullName}");

errorMessage.AppendLine($"Method {methodCall?.MethodName} threw exception");

errorMessage.AppendLine(exception.GetDescription());

\_logError?.Invoke(errorMessage.ToString());

}

catch (Exception)

{

// ignored

//Method should return original exception

}

}

private void LogAfter(IMethodCallMessage methodCall, object[] args, MethodInfo methodInfo, object result)

{

var afterMessage = new StringBuilder();

afterMessage.AppendLine($"Class {\_decorated.GetType().FullName}");

afterMessage.AppendLine($"Method {methodCall.MethodName} executed");

afterMessage.AppendLine("Output:");

afterMessage.AppendLine(GetStringValue(result));

var parameters = methodInfo.GetParameters();

if (parameters.Any())

{

afterMessage.AppendLine("Parameters:");

for (var i = 0; i < parameters.Length; i++)

{

var parameter = parameters[i];

var arg = args[i];

afterMessage.AppendLine($"{parameter.Name}:{GetStringValue(arg)}");

}

}

\_logInfo?.Invoke(afterMessage.ToString());

}

private void LogBefore(IMethodCallMessage methodCall, MethodInfo methodInfo)

{

var beforeMessage = new StringBuilder();

beforeMessage.AppendLine($"Class {\_decorated.GetType().FullName}");

beforeMessage.AppendLine($"Method {methodCall.MethodName} executing");

var parameters = methodInfo.GetParameters();

if (parameters.Any())

{

beforeMessage.AppendLine("Parameters:");

for (var i = 0; i < parameters.Length; i++)

{

var parameter = parameters[i];

var arg = methodCall.Args[i];

beforeMessage.AppendLine($"{parameter.Name}:{GetStringValue(arg)}");

}

}

\_logInfo?.Invoke(beforeMessage.ToString());

}

}

}

## Example

var decoratedInstance = LoggingAdvice<IInstanceInteface>.Create(

instance,

s => Console.WriteLine(s),

s => Console.WriteLine(s),

o => o?.ToString());

## Tests

NUnit and NSubstitute is used to write Unit Tests.

CurrentThreadTaskScheduler allows to schedule tasks in current thread in test project.

using System;

using System.Collections.Generic;

using System.Threading;

using System.Threading.Tasks;

using NSubstitute;

using NUnit.Framework;

namespace AOP.Tests

{

[TestFixture]

public class LoggingAdviceTests

{

private TaskScheduler \_taskScheduler;

public class Data

{

public string Prop { get; set; }

}

public interface ITestClass

{

string Property { get; set; }

void MethodWithVoidResult();

string MethodWithStringResultAndIntParameter(int intParam);

Data MethodWithClassResultAndClassParameter(Data dataParam);

int MethodWithOutParameter(out string stringParam);

int MethodWithRefParameter(ref string stringParam);

int MethodWithOutParameter(out int intParam);

int MethodWithRefParameter(ref int intParam);

int MethodWithMixedParameter(ref int refParam, out string outParam, bool param);

Task MethodWithTaskResult();

Task<string> MethodWithTaskStringResult();

}

[SetUp]

public void SetUp()

{

SynchronizationContext.SetSynchronizationContext(new SynchronizationContext());

\_taskScheduler = new CurrentThreadTaskScheduler();

}

[Test]

public void ThrowException\_WhenDecoratedClassNull()

{

Assert.Throws<ArgumentNullException>(() =>

{

var decorated = LoggingAdvice<ITestClass>.Create(

null,

s => { },

s => { },

o => o?.ToString());

});

}

[Test]

public void LogInfo()

{

var testClass = Substitute.For<ITestClass>();

var errorMassages = new List<string>();

var infoMassages = new List<string>();

var decorated = LoggingAdvice<ITestClass>.Create(

testClass,

s => infoMassages.Add(s),

s => errorMassages.Add(s),

o => o?.ToString());

decorated.MethodWithVoidResult();

testClass.Received().MethodWithVoidResult();

Assert.AreEqual(2, infoMassages.Count);

Assert.IsTrue(infoMassages[0].Contains("MethodWithVoidResult"));

Assert.IsTrue(infoMassages[1].Contains("MethodWithVoidResult"));

Assert.AreEqual(0, errorMassages.Count);

}

[Test]

public void DoNotStop\_WhenLogInfoThrowsException()

{

var testClass = Substitute.For<ITestClass>();

var errorMassages = new List<string>();

var decorated = LoggingAdvice<ITestClass>.Create(

testClass,

s => { throw new Exception(); },

s => errorMassages.Add(s),

o => o?.ToString());

decorated.MethodWithVoidResult();

testClass.Received().MethodWithVoidResult();

Assert.AreEqual(2, errorMassages.Count);

}

[Test]

public void LogInfo\_WhenClassResultAndClassParameter()

{

var testClass = Substitute.For<ITestClass>();

testClass.MethodWithClassResultAndClassParameter(Arg.Any<Data>()).Returns(new Data { Prop = "Result12345" });

var errorMassages = new List<string>();

var infoMassages = new List<string>();

var decorated = LoggingAdvice<ITestClass>.Create(

testClass,

s => infoMassages.Add(s),

s => errorMassages.Add(s),

o => ((Data)o).Prop);

var result = decorated.MethodWithClassResultAndClassParameter(new Data { Prop = "Parameter12345"});

testClass.Received().MethodWithClassResultAndClassParameter(Arg.Any<Data>());

Assert.AreEqual("Result12345", result.Prop);

Assert.AreEqual(2, infoMassages.Count);

Assert.IsTrue(infoMassages[0].Contains("dataParam:Parameter12345"));

Assert.IsTrue(infoMassages[1].Contains("dataParam:Parameter12345"));

Assert.IsTrue(infoMassages[1].Contains("Result12345"));

Assert.AreEqual(0, errorMassages.Count);

}

[Test]

public void LogInfo\_WhenParameters()

{

var testClass = Substitute.For<ITestClass>();

testClass.MethodWithStringResultAndIntParameter(Arg.Any<int>()).Returns("Result12345");

var errorMassages = new List<string>();

var infoMassages = new List<string>();

var decorated = LoggingAdvice<ITestClass>.Create(

testClass,

s => infoMassages.Add(s),

s => errorMassages.Add(s),

o => o?.ToString());

var result = decorated.MethodWithStringResultAndIntParameter(12345);

testClass.Received().MethodWithStringResultAndIntParameter(Arg.Any<int>());

Assert.AreEqual("Result12345", result);

Assert.AreEqual(2, infoMassages.Count);

Assert.IsTrue(infoMassages[0].Contains("intParam:12345"));

Assert.IsTrue(infoMassages[1].Contains("Result12345"));

Assert.IsTrue(infoMassages[1].Contains("intParam:12345"));

Assert.AreEqual(0, errorMassages.Count);

}

[Test]

public void DoNotStop\_WhenSerializerThrowsException()

{

var testClass = Substitute.For<ITestClass>();

testClass.MethodWithClassResultAndClassParameter(Arg.Any<Data>()).Returns(new Data { Prop = "Result12345" });

var errorMassages = new List<string>();

var infoMassages = new List<string>();

var decorated = LoggingAdvice<ITestClass>.Create(

testClass,

s => infoMassages.Add(s),

s => errorMassages.Add(s),

o => { throw new Exception();});

Data result = null;

Assert.DoesNotThrow(() => result = decorated.MethodWithClassResultAndClassParameter(new Data { Prop = "Parameter12345"}));

testClass.Received().MethodWithClassResultAndClassParameter(Arg.Any<Data>());

Assert.AreEqual("Result12345", result?.Prop);

Assert.AreEqual(2, infoMassages.Count);

Assert.IsTrue(infoMassages[0].Contains("Data"));

Assert.IsTrue(infoMassages[1].Contains("Data"));

Assert.AreEqual(0, errorMassages.Count);

}

[Test]

public void LogError()

{

var testClass = Substitute.For<ITestClass>();

testClass.When(t => t.MethodWithVoidResult()).Do(info => { throw new Exception(); });

var errorMassages = new List<string>();

var infoMassages = new List<string>();

var decorated = LoggingAdvice<ITestClass>.Create(

testClass,

s => infoMassages.Add(s),

s => errorMassages.Add(s),

o => o?.ToString());

Assert.Throws<Exception>(() => decorated.MethodWithVoidResult());

testClass.Received().MethodWithVoidResult();

Assert.AreEqual(1, infoMassages.Count);

Assert.IsTrue(infoMassages[0].Contains("MethodWithVoidResult"));

Assert.AreEqual(1, errorMassages.Count);

Assert.IsTrue(errorMassages[0].Contains("MethodWithVoidResult"));

}

[Test]

public void DoNotStop\_WhenLogErrorThrowsException()

{

var testClass = Substitute.For<ITestClass>();

testClass.When(t => t.MethodWithVoidResult()).Do(info => { throw new Exception(); });

var infoMassages = new List<string>();

var decorated = LoggingAdvice<ITestClass>.Create(

testClass,

s => infoMassages.Add(s),

s => { throw new ArgumentNullException(); },

o => o?.ToString());

Assert.Throws<Exception>(() => decorated.MethodWithVoidResult());

testClass.Received().MethodWithVoidResult();

Assert.AreEqual(1, infoMassages.Count);

}

[Test]

public void LogInfo\_WhenTaskMethodCall()

{

var testClass = Substitute.For<ITestClass>();

testClass.MethodWithTaskResult().Returns(Task.CompletedTask);

var errorMassages = new List<string>();

var infoMassages = new List<string>();

var decorated = LoggingAdvice<ITestClass>.Create(

testClass,

s => infoMassages.Add(s),

s => errorMassages.Add(s),

o => o?.ToString(),

\_taskScheduler);

decorated.MethodWithTaskResult().Wait();

ReleaseContext();

testClass.Received().MethodWithTaskResult();

Assert.AreEqual(2, infoMassages.Count);

Assert.AreEqual(0, errorMassages.Count);

}

[Test]

public void LogInfo\_WhenTaskMethodCallWithException()

{

var testClass = Substitute.For<ITestClass>();

testClass.MethodWithTaskResult().Returns(Task.FromException(new Exception("ERROR!!!!")));

var errorMassages = new List<string>();

var infoMassages = new List<string>();

var decorated = LoggingAdvice<ITestClass>.Create(

testClass,

s => infoMassages.Add(s),

s => errorMassages.Add(s),

o => o?.ToString(),

\_taskScheduler);

Assert.Throws<AggregateException>(() => decorated.MethodWithTaskResult().Wait());

ReleaseContext();

testClass.Received().MethodWithTaskResult();

Assert.AreEqual(1, infoMassages.Count);

Assert.AreEqual(1, errorMassages.Count);

Assert.IsTrue(errorMassages[0].Contains("ERROR!!!!"));

}

[Test]

public void LogInfo\_WhenTaskHasResult()

{

var testClass = Substitute.For<ITestClass>();

testClass.MethodWithTaskStringResult().Returns("String result");

var errorMassages = new List<string>();

var infoMassages = new List<string>();

var decorated = LoggingAdvice<ITestClass>.Create(

testClass,

s => infoMassages.Add(s),

s => errorMassages.Add(s),

o => o?.ToString(),

\_taskScheduler);

var result = decorated.MethodWithTaskStringResult().Result;

ReleaseContext();

Assert.AreEqual("String result", result);

testClass.Received().MethodWithTaskStringResult();

Assert.AreEqual(2, infoMassages.Count);

Assert.IsTrue(infoMassages[1].Contains("String result"));

Assert.AreEqual(0, errorMassages.Count);

}

[Test]

public void LogInfo\_WhenTaskWithResultThrowException()

{

var testClass = Substitute.For<ITestClass>();

testClass.MethodWithTaskStringResult().Returns(Task.FromException<string>(new Exception("ERROR!!!!")));

var errorMassages = new List<string>();

var infoMassages = new List<string>();

var decorated = LoggingAdvice<ITestClass>.Create(

testClass,

s => infoMassages.Add(s),

s => errorMassages.Add(s),

o => o?.ToString(),

\_taskScheduler);

Assert.Throws<AggregateException>(() => decorated.MethodWithTaskStringResult().Wait());

ReleaseContext();

testClass.Received().MethodWithTaskStringResult();

Assert.AreEqual(1, infoMassages.Count);

Assert.AreEqual(1, errorMassages.Count);

Assert.IsTrue(errorMassages[0].Contains("ERROR!!!!"));

}

[Test]

public void LogInfo\_WhenOutParameter()

{

var testClass = Substitute.For<ITestClass>();

var val = "s2";

testClass.MethodWithOutParameter(out val)

.Returns(x =>

{

x[0] = "s5";

return 25;

});

var errorMassages = new List<string>();

var infoMassages = new List<string>();

var decorated = LoggingAdvice<ITestClass>.Create(

testClass,

s => infoMassages.Add(s),

s => errorMassages.Add(s),

o => o?.ToString());

var result = decorated.MethodWithOutParameter(out val);

var val2 = "s2";

testClass.Received().MethodWithOutParameter(out val2);

Assert.AreEqual(0, errorMassages.Count);

Assert.AreEqual(2, infoMassages.Count);

Assert.AreEqual(25, result);

Assert.AreEqual("s5", val);

Assert.IsTrue(infoMassages[1].Contains("25"));

Assert.IsTrue(infoMassages[1].Contains("stringParam:s5"));

}

[Test]

public void LogInfo\_WhenRefParameter()

{

var testClass = Substitute.For<ITestClass>();

var val = "s2";

testClass.MethodWithRefParameter(ref val)

.Returns(x =>

{

x[0] = "s5";

return 25;

});

var errorMassages = new List<string>();

var infoMassages = new List<string>();

var decorated = LoggingAdvice<ITestClass>.Create(

testClass,

s => infoMassages.Add(s),

s => errorMassages.Add(s),

o => o?.ToString());

var result = decorated.MethodWithRefParameter(ref val);

var val2 = "s2";

testClass.Received().MethodWithRefParameter(ref val2);

Assert.AreEqual(0, errorMassages.Count);

Assert.AreEqual(2, infoMassages.Count);

Assert.AreEqual(25, result);

Assert.AreEqual("s5", val);

Assert.IsTrue(infoMassages[0].Contains("stringParam:s2"));

Assert.IsTrue(infoMassages[1].Contains("25"));

Assert.IsTrue(infoMassages[1].Contains("stringParam:s5"));

}

[Test]

public void LogInfo\_WhenOutParameterOfValueType()

{

var testClass = Substitute.For<ITestClass>();

var val = 2;

testClass.MethodWithOutParameter(out val)

.Returns(x =>

{

x[0] = 5;

return 25;

});

var errorMassages = new List<string>();

var infoMassages = new List<string>();

var decorated = LoggingAdvice<ITestClass>.Create(

testClass,

s => infoMassages.Add(s),

s => errorMassages.Add(s),

o => o?.ToString());

var result = decorated.MethodWithOutParameter(out val);

var val2 = 2;

testClass.Received().MethodWithOutParameter(out val2);

Assert.AreEqual(0, errorMassages.Count);

Assert.AreEqual(2, infoMassages.Count);

Assert.AreEqual(25, result);

Assert.AreEqual(5, val);

Assert.IsTrue(infoMassages[1].Contains("25"));

Assert.IsTrue(infoMassages[1].Contains("intParam:5"));

}

[Test]

public void LogInfo\_WhenRefParameterOfValueType()

{

var testClass = Substitute.For<ITestClass>();

var val = 2;

testClass.MethodWithRefParameter(ref val)

.Returns(x =>

{

x[0] = 5;

return 25;

});

var errorMassages = new List<string>();

var infoMassages = new List<string>();

var decorated = LoggingAdvice<ITestClass>.Create(

testClass,

s => infoMassages.Add(s),

s => errorMassages.Add(s),

o => o?.ToString());

var result = decorated.MethodWithRefParameter(ref val);

var val2 = 2;

testClass.Received().MethodWithRefParameter(ref val2);

Assert.AreEqual(0, errorMassages.Count);

Assert.AreEqual(2, infoMassages.Count);

Assert.AreEqual(25, result);

Assert.AreEqual(5, val);

Assert.IsTrue(infoMassages[0].Contains("intParam:2"));

Assert.IsTrue(infoMassages[1].Contains("25"));

Assert.IsTrue(infoMassages[1].Contains("intParam:5"));

}

[Test]

public void LogInfo\_WhenMixedParameters()

{

var testClass = Substitute.For<ITestClass>();

var refParam = 0;

var outParam = "s2";

testClass.MethodWithMixedParameter(ref refParam, out outParam, true)

.Returns(x =>

{

x[0] = 5;

x[1] = "s5";

return 25;

});

var errorMassages = new List<string>();

var infoMassages = new List<string>();

var decorated = LoggingAdvice<ITestClass>.Create(

testClass,

s => infoMassages.Add(s),

s => errorMassages.Add(s),

o => o?.ToString());

var result = decorated.MethodWithMixedParameter(ref refParam, out outParam, true);

var refParam2 = 0;

var outParam2 = "s2";

testClass.Received().MethodWithMixedParameter(ref refParam2, out outParam2, true);

Assert.AreEqual(0, errorMassages.Count);

Assert.AreEqual(2, infoMassages.Count);

Assert.AreEqual(25, result);

Assert.AreEqual(5, refParam);

Assert.AreEqual("s5", outParam);

Assert.IsTrue(infoMassages[0].Contains("refParam:0"));

Assert.IsTrue(infoMassages[0].Contains("outParam:s2"));

Assert.IsTrue(infoMassages[0].Contains("param:True"));

Assert.IsTrue(infoMassages[1].Contains("25"));

Assert.IsTrue(infoMassages[1].Contains("refParam:5"));

Assert.IsTrue(infoMassages[1].Contains("outParam:s5"));

Assert.IsTrue(infoMassages[1].Contains("param:True"));

}

[Test]

public void LogInfoWithProperClassName()

{

var testClass = new TestClass2();

var errorMassages = new List<string>();

var infoMassages = new List<string>();

var decorated = LoggingAdvice<ITestClass2>.Create(

testClass,

s => infoMassages.Add(s),

s => errorMassages.Add(s),

o => o?.ToString());

decorated.Method();

Assert.AreEqual(2, infoMassages.Count);

Assert.IsTrue(infoMassages[0].Contains("Class AOP.Tests.TestClass2"));

Assert.IsTrue(infoMassages[1].Contains("Class AOP.Tests.TestClass2"));

Assert.AreEqual(0, errorMassages.Count);

}

[Test]

public void LogInfoWithProperStackTrace()

{

var testClass = new TestClass2();

var errorMassages = new List<string>();

var infoMassages = new List<string>();

var decorated = LoggingAdvice<ITestClass2>.Create(

testClass,

s => infoMassages.Add(s),

s => errorMassages.Add(s),

o => o?.ToString());

Assert.Throws<Exception>(() => decorated.MethodWithException());

Assert.AreEqual(1, infoMassages.Count);

Assert.IsTrue(infoMassages[0].Contains("Class AOP.Tests.TestClass2"));

Assert.AreEqual(1, errorMassages.Count);

Assert.IsTrue(errorMassages[0].Contains("Class AOP.Tests.TestClass2"));

//Only original Exception should be logged

Assert.IsFalse(errorMassages[0].Contains("LoggingAdvice.cs"));

Assert.IsTrue(errorMassages[0].Contains("LoggingAdviceTests.cs"));

}

[Test]

public void LogInfoWithProperStackTrace\_WhenTask()

{

var testClass = new TestClass2();

var errorMassages = new List<string>();

var infoMassages = new List<string>();

var decorated = LoggingAdvice<ITestClass2>.Create(

testClass,

s => infoMassages.Add(s),

s => errorMassages.Add(s),

o => o?.ToString(),

\_taskScheduler);

Assert.Throws<AggregateException>(() => decorated.AsyncMethodWithException().Wait());

Assert.AreEqual(1, infoMassages.Count);

Assert.IsTrue(infoMassages[0].Contains("Class AOP.Tests.TestClass2"));

Assert.AreEqual(1, errorMassages.Count);

Assert.IsTrue(errorMassages[0].Contains("Class AOP.Tests.TestClass2"));

//Only original Exception should be logged

Assert.IsFalse(errorMassages[0].Contains("LoggingAdvice.cs"));

Assert.IsTrue(errorMassages[0].Contains("LoggingAdviceTests.cs"));

}

[Test]

public void LogInfo\_WhenPropertySet()

{

var testClass = Substitute.For<ITestClass>();

var errorMassages = new List<string>();

var infoMassages = new List<string>();

var decorated = LoggingAdvice<ITestClass>.Create(

testClass,

s => infoMassages.Add(s),

s => errorMassages.Add(s),

o => o?.ToString());

decorated.Property = "Str1";

testClass.Received().Property = "Str1";

Assert.AreEqual(2, infoMassages.Count);

Assert.IsTrue(infoMassages[0].Contains("set\_Property"));

Assert.IsTrue(infoMassages[1].Contains("set\_Property"));

Assert.AreEqual(0, errorMassages.Count);

}

[Test]

public void LogInfo\_WhenPropertyGet()

{

var testClass = Substitute.For<ITestClass>();

testClass.Property.Returns("Str1");

var errorMassages = new List<string>();

var infoMassages = new List<string>();

var decorated = LoggingAdvice<ITestClass>.Create(

testClass,

s => infoMassages.Add(s),

s => errorMassages.Add(s),

o => o?.ToString());

var value = decorated.Property;

var tmp = testClass.Received().Property;

Assert.AreEqual("Str1", value);

Assert.AreEqual(2, infoMassages.Count);

Assert.IsTrue(infoMassages[0].Contains("get\_Property"));

Assert.IsTrue(infoMassages[1].Contains("get\_Property"));

Assert.AreEqual(0, errorMassages.Count);

}

/// <summary>

/// Call to process scheduled tasks

/// </summary>

protected void ReleaseContext()

{

Task.Delay(1).Wait();

}

}

public interface ITestClass2

{

void Method();

void MethodWithException();

Task AsyncMethodWithException();

}

public class TestClass2 : ITestClass2

{

public void Method()

{

}

public void MethodWithException()

{

throw new Exception();

}

public Task AsyncMethodWithException()

{

return Task.Factory.StartNew(() => { throw new Exception(); });

}

}

}

