Objects Comparer

[Project URL](https://github.com/ValeraT1982/ObjectsComparer)

# Introduction

Objects Comparer is an object-to-object comparer, which allows you to compare objects recursively member by member and define custom comparison rules for certain properties, fields or types.

Objects comparer can be considered as ready to use framework or as an idea for similar solutions. This article is mostly focused on using framework than on implementation. If you will be interested in implementation, modification or you will have any ideas how to make this framework better feel free to contact me in any way.

# Installation

Install-Package ObjectsComparer

# Basic Example

public class ClassA

{

public string StringProperty { get; set; }

public int IntProperty { get; set; }

# }

var a1 = new ClassA { StringProperty = "String", IntProperty = 1 };

var a2 = new ClassA { StringProperty = "String", IntProperty = 1 };

var comparer = new Comparer<ClassA>();

var isEqual = comparer.Compare(a1, a2);

Debug.WriteLine("a1 and a2 are " + (isEqual ? "equal" : "not equal"));

a1 and a2 are equal

var a1 = new ClassA { StringProperty = "String", IntProperty = 1 };

var a2 = new ClassA { StringProperty = "String", IntProperty = 2 };

var comparer = new Comparer<ClassA>();

IEnumerable<Difference> differenses;

var isEqual = comparer.Compare(a1, a2, out differenses);

var differensesList = differenses.ToList();

Debug.WriteLine("a1 and a2 are " + (isEqual ? "equal" : "not equal"));

if (!isEqual)

{

Debug.WriteLine("Differences:");

Debug.WriteLine(string.Join(Environment.NewLine, differensesList));

}

a1 and a2 are not equal

Differences:

Difference: MemberPath='IntProperty', Value1='1', Value2='2'

# Comparison Settings

Framework provides some useful comparison settings.

RecursiveComparison. True by default.

EmptyAndNullEnumerablesEqual. False by default.

Comparison Settings class allows to store custom values that can be used in custom comparers.

SetCustomSetting<T>(T value, string key = null)

GetCustomSetting<T>(string key = null)

# Overriding comparison rules

Comparer should be inherited from AbstractValueComparer<T> or should implement IValueComparer<T>

public class MyComparer: AbstractValueComparer<string>

{

public override bool Compare(string obj1, string obj2, ComparisonSettings settings)

{

return obj1 == obj2; //Implement comparison logic here

}

# }

Type comparison rule override.

comparer.AddComparerOverride<string>(new MyComparer());

Field comparison rule override could be done in 3 different ways.

comparer.AddComparerOverride(() => new ClassA().StringProperty, new MyComparer());

comparer.AddComparerOverride(

() => new ClassA().StringProperty,

(s1, s2, parentSettings) => s1 == s2,

s => s.ToString());

comparer.AddComparerOverride(

() => new ClassA().StringProperty,

(s1, s2, parentSettings) => s1 == s2);

# Factory

Factory should implement IComparersFactory or should be inherited from ComparersFactory.

public class MyComparersFactory: ComparersFactory

{

public override IComparer<T> GetObjectsComparer<T>(ComparisonSettings settings = null, IBaseComparer parentComparer = null)

{

if (typeof(T) == typeof(ClassA))

{

var comparer = new Comparer<ClassA>(settings, parentComparer, this);

comparer.AddComparerOverride<Guid>(new MyCustomGuidComparer());

return (IComparer<T>)comparer;

}

return base.GetObjectsComparer<T>(settings, parentComparer);

}

}

# Non-generic comparer

var comparer = new Comparer<ClassA>();

var isEqual = comparer.Compare(a1, a2);

This comparer creates generic implementation of comparer for each comparison.

# Useful Value Comparers

There are some custom comparers that can be useful.

DoNotCompareValueComparer. Use it to skip some fields/types. There is singleton implementation (DoNotCompareValueComparer.Instance).

DynamicValueComparer<T>. Receives comparison rule as a constructor parameter.

NulableStringsValueComparer. Null and empty strings are equal.

# Examples

There are some examples how Objects Comparer can be used.

NSubstitute is used for developing unit tests.

## Example 1: Expected Message

Challenge: Check if received message equal to the expected message.

public class Error

{

public int Id { get; set; }

public string Messgae { get; set; }

}

public class Message

{

public string Id { get; set; }

public DateTime DateCreated { get; set; }

public int MessageType { get; set; }

public int Status { get; set; }

public List<Error> Errors { get; set; }

public override string ToString()

{

return $"Id:{Id}, Date:{DateCreated}, Type:{MessageType}, Status:{Status}";

}

}

[TestFixture]

public class Example1Tests

{

private IComparer<Message> \_comparer;

[SetUp]

public void SetUp()

{

\_comparer = new Comparer<Message>(

new ComparisonSettings

{

//Null and empty error lists are equal

EmptyAndNullEnumerablesEqual = true

});

//Do not compare DateCreated

\_comparer.AddComparerOverride<DateTime>(DoNotCompareValueComparer.Instance);

//Do not compare Id

\_comparer.AddComparerOverride(() => new Message().Id, DoNotCompareValueComparer.Instance);

//Do not compare Message Text

\_comparer.AddComparerOverride(() => new Error().Messgae, DoNotCompareValueComparer.Instance);

}

[Test]

public void EqualMessagesWithoutErrorsTest()

{

var expectedMessage = new Message

{

MessageType = 1,

Status = 0,

};

var actualMessage = new Message

{

Id = "M12345",

DateCreated = DateTime.Now,

MessageType = 1,

Status = 0,

};

var isEqual = \_comparer.Compare(expectedMessage, actualMessage);

Assert.IsTrue(isEqual);

}

[Test]

public void EqualMessagesWithErrorsTest()

{

var expectedMessage = new Message

{

MessageType = 1,

Status = 1,

Errors = new List<Error>

{

new Error { Id = 2 },

new Error { Id = 7 }

}

};

var actualMessage = new Message

{

Id = "M12345",

DateCreated = DateTime.Now,

MessageType = 1,

Status = 1,

Errors = new List<Error>

{

new Error { Id = 2, Messgae = "Some error #2" },

new Error { Id = 7, Messgae = "Some error #7" },

}

};

var isEqual = \_comparer.Compare(expectedMessage, actualMessage);

Assert.IsTrue(isEqual);

}

}

## Example 2: Persons comparison

Challenge: Compare persons from different sources.

public class Person

{

public Guid PersonId { get; set; }

public string FirstName { get; set; }

public string LastName { get; set; }

public string MiddleName { get; set; }

public string PhoneNumber { get; set; }

public override string ToString()

{

return $"{FirstName} {MiddleName} {LastName} ({PhoneNumber})";

}

}

Phone number can have different formats. Let’s compare only digits.

public class PhoneNumberComparer: AbstractValueComparer<string>

{

public override bool Compare(string obj1, string obj2, ComparisonSettings settings)

{

return ExtractDigits(obj1) == ExtractDigits(obj2);

}

private string ExtractDigits(string str)

{

return string.Join(

string.Empty,

(str ?? string.Empty)

.ToCharArray()

.Where(char.IsDigit));

}

}

Factory allows not to configure comparer every time we need to create it.

public class MyComparersFactory: ComparersFactory

{

public override IComparer<T> GetObjectsComparer<T>(ComparisonSettings settings = null, IBaseComparer parentComparer = null)

{

if (typeof(T) == typeof(Person))

{

var comparer = new Comparer<Person>(settings, parentComparer, this);

//Do not compare PersonId

comparer.AddComparerOverride<Guid>(DoNotCompareValueComparer.Instance);

//Sometimes MiddleName can be skipped. Compare only if property has value.

comparer.AddComparerOverride(

() => new Person().MiddleName,

(s1, s2, parentSettings) => string.IsNullOrWhiteSpace(s1) || string.IsNullOrWhiteSpace(s2) || s1 == s2);

comparer.AddComparerOverride(

() => new Person().PhoneNumber,

new PhoneNumberComparer());

return (IComparer<T>)comparer;

}

return base.GetObjectsComparer<T>(settings, parentComparer);

}

}

[TestFixture]

public class Example2Tests

{

private MyComparersFactory \_factory;

private IComparer<Person> \_comparer;

[SetUp]

public void SetUp()

{

\_factory = new MyComparersFactory();

\_comparer = \_factory.GetObjectsComparer<Person>();

}

[Test]

public void EqualPersonsTest()

{

var person1 = new Person

{

PersonId = Guid.NewGuid(),

FirstName = "John",

LastName = "Doe",

MiddleName = "F",

PhoneNumber = "111-555-8888"

};

var person2 = new Person

{

PersonId = Guid.NewGuid(),

FirstName = "John",

LastName = "Doe",

PhoneNumber = "(111) 555 8888"

};

IEnumerable<Difference> differenses;

var isEqual = \_comparer.Compare(person1, person2, out differenses);

Assert.IsTrue(isEqual);

Debug.WriteLine($"Persons {person1} and {person2} are equal");

}

[Test]

public void DifferentPersonsTest()

{

var person1 = new Person

{

PersonId = Guid.NewGuid(),

FirstName = "Jack",

LastName = "Doe",

MiddleName = "F",

PhoneNumber = "111-555-8888"

};

var person2 = new Person

{

PersonId = Guid.NewGuid(),

FirstName = "John",

LastName = "Doe",

MiddleName = "L",

PhoneNumber = "222-555-9999"

};

IEnumerable<Difference> differenses;

var isEqual = \_comparer.Compare(person1, person2, out differenses);

var differensesList = differenses.ToList();

Assert.IsFalse(isEqual);

Assert.AreEqual(3, differensesList.Count);

Assert.IsTrue(differensesList.Any(d => d.MemberPath == "FirstName" && d.Value1 == "Jack" && d.Value2 == "John"));

Assert.IsTrue(differensesList.Any(d => d.MemberPath == "MiddleName" && d.Value1 == "F" && d.Value2 == "L"));

Assert.IsTrue(differensesList.Any(d => d.MemberPath == "PhoneNumber" && d.Value1 == "111-555-8888" && d.Value2 == "222-555-9999"));

Debug.WriteLine($"Persons {person1} and {person2}");

Debug.WriteLine("Differences:");

Debug.WriteLine(string.Join(Environment.NewLine, differensesList));

}

}

Persons John F Doe (111-555-8888) and John Doe ((111) 555 8888) are equal

Persons Jack F Doe (111-555-8888) and John L Doe (222-555-9999)

Differences:

Difference: MemberPath='FirstName', Value1='Jack', Value2='John'.

Difference: MemberPath='MiddleName', Value1='F', Value2='L'.

Difference: MemberPath='PhoneNumber', Value1='111-555-8888', Value2='222-555-9999'.

# Contributing

Any useful changes are welcomed. Feel free to report any defects or ideas how this framework can be improved.

Create an issue, contact me directly or fork the code and submit a pull request!