

## LinksPlatform's Platform.Converters Class Library

### 1.1 ./csharp/Platform.Converters/CachingConverterDecorator.cs

```
1 using System.Collections.Generic;
2 using System.Runtime.CompilerServices;
3 using Platform.Collections;
4
5 #pragma warning disable CS1591 // Missing XML comment for publicly visible type or member
6
7 namespace Platform.Converters
8 {
9     /// <summary>
10    /// <para>
11    /// Represents the caching converter decorator.
12    /// </para>
13    /// <para></para>
14    /// </summary>
15    /// <seealso cref="IConverter{TSource, TTarget}"/>
16    public class CachingConverterDecorator<TSource, TTarget> : IConverter<TSource, TTarget>
17    {
18        private readonly IConverter<TSource, TTarget> _baseConverter;
19        private readonly IDictionary<TSource, TTarget> _cache;
20
21        /// <summary>
22        /// <para>
23        /// Initializes a new <see cref="CachingConverterDecorator"/> instance.
24        /// </para>
25        /// <para></para>
26        /// </summary>
27        /// <param name="baseConverter">
28        /// <para>A base converter.</para>
29        /// <para></para>
30        /// </param>
31        /// <param name="cache">
32        /// <para>A cache.</para>
33        /// <para></para>
34        /// </param>
35        [MethodImpl(MethodImplOptions.AggressiveInlining)]
36        public CachingConverterDecorator(IConverter<TSource, TTarget> baseConverter,
37            ↪ IDictionary<TSource, TTarget> cache) => (_baseConverter, _cache) = (baseConverter,
38            ↪ cache);
39
40        /// <summary>
41        /// <para>
42        /// Initializes a new <see cref="CachingConverterDecorator"/> instance.
43        /// </para>
44        /// <para></para>
45        /// </summary>
46        /// <param name="baseConverter">
47        /// <para>A base converter.</para>
48        /// <para></para>
49        /// </param>
50        [MethodImpl(MethodImplOptions.AggressiveInlining)]
51        public CachingConverterDecorator(IConverter<TSource, TTarget> baseConverter) :
52            ↪ this(baseConverter, new Dictionary<TSource, TTarget>()) { }
53
54        /// <summary>
55        /// <para>
56        /// Converts the source.
57        /// </para>
58        /// <para></para>
59        /// </summary>
60        /// <param name="source">
61        /// <para>The source.</para>
62        /// <para></para>
63        /// </param>
64        /// <returns>
65        /// <para>The target</para>
66        /// <para></para>
67        /// </returns>
68        [MethodImpl(MethodImplOptions.AggressiveInlining)]
69        public TTarget Convert(TSource source) => _cache.GetOrAdd(source,
70            ↪ _baseConverter.Convert);
71    }
72 }
```

### 1.2 ./csharp/Platform.Converters/CheckedConverter.cs

```
1 using System;
2 using System.Runtime.CompilerServices;
```

```

3 using Platform.Reflection;
4
5 #pragma warning disable CS1591 // Missing XML comment for publicly visible type or member
6
7 namespace Platform.Converters
8 {
9     /// <summary>
10    /// <para>
11    /// Represents the checked converter.
12    /// </para>
13    /// <para></para>
14    /// </summary>
15    /// <seealso cref="ConverterBase{TSource, TTarget}"/>
16    public abstract class CheckedConverter<TSource, TTarget> : ConverterBase<TSource, TTarget>
17    {
18        /// <summary>
19        /// <para>
20        /// Gets the default value.
21        /// </para>
22        /// <para></para>
23        /// </summary>
24        public static CheckedConverter<TSource, TTarget> Default
25        {
26            [MethodImpl(MethodImplOptions.AggressiveInlining)]
27            get;
28        } = CompileCheckedConverter();
29        [MethodImpl(MethodImplOptions.AggressiveInlining)]
30        private static CheckedConverter<TSource, TTarget> CompileCheckedConverter()
31        {
32            var type = CreateTypeInheritedFrom<CheckedConverter<TSource, TTarget>>();
33            EmitConvertMethod(type, il => il.CheckedConvert<TSource, TTarget>());
34            return (CheckedConverter<TSource,
35                ↪ TTarget>)Activator.CreateInstance(type.CreateTypeInfo());
36        }
37    }

```

### 1.3 ./csharp/Platform.Converters/ConverterBase.cs

```

1 using System;
2 using System.Reflection;
3 using System.Reflection.Emit;
4 using System.Runtime.CompilerServices;
5 using Platform.Reflection;
6
7 #pragma warning disable CS1591 // Missing XML comment for publicly visible type or member
8
9 namespace Platform.Converters
10 {
11     /// <summary>
12     /// <para>Represents a base implementation for IConverter interface with the basic logic
13     ↪ necessary for value converter from the <typeparamref name="TSource"/> type to the
14     ↪ <typeparamref name="TTarget"/> type.</para>
15     /// <para>Представляет базовую реализацию для интерфейса IConverter с основной логикой
16     ↪ необходимой для конвертера значений из типа <typeparamref name="TSource"/> в тип
17     ↪ <typeparamref name="TTarget"/>.</para>
18     /// </summary>
19     /// <typeparam name="TSource"><para>Source type of conversion.</para><para>Исходный тип
20     ↪ конверсии.</para></typeparam>
21     /// <typeparam name="TTarget"><para>Target type of conversion.</para><para>Целевой тип
22     ↪ конверсии.</para></typeparam>
23     public abstract class ConverterBase<TSource, TTarget> : IConverter<TSource, TTarget>
24     {
25         /// <summary>
26         /// <para>Converts the value of the <typeparamref name="TSource"/> type to the value of
27         ↪ the <typeparamref name="TTarget"/> type.</para>
28         /// <para>Конвертирует значение типа <typeparamref name="TSource"/> в значение типа
29         ↪ <typeparamref name="TTarget"/>.</para>
30         /// </summary>
31         /// <param name="source"><para>The <typeparamref name="TSource"/> type
32         ↪ value.</para><para>Значение типа <typeparamref name="TSource"/>.</para></param>
33         /// <returns><para>The converted value of the <typeparamref name="TTarget"/>
34         ↪ type.</para><para>Значение конвертированное в тип <typeparamref
35         ↪ name="TTarget"/>.</para></returns>
36         [MethodImpl(MethodImplOptions.AggressiveInlining)]
37         public abstract TTarget Convert(TSource source);
38     }

```

```

29  /// <para>Generates a sequence of instructions using <see cref="ILGenerator"/> that
    → converts a value of type <see cref="System.Object"/> to a value of type
    → <typeparamref name="TTarget"/>.</para>
30  /// <para>Генерирует последовательность инструкций при помощи <see cref="ILGenerator"/>
    → выполняющую преобразование значения типа <see cref="System.Object"/> к значению типа
    → <typeparamref name="TTarget"/>.</para>
31  /// </summary>
32  /// <param name="il"><para>An <see cref="ILGenerator"/> instance.</para><para>Экземпляр
    → <see cref="ILGenerator"/>.</para></param>
    [MethodImpl(MethodImplOptions.AggressiveInlining)]
33  protected static void ConvertFromObject(ILGenerator il)
34  {
35      var returnDefault = il.DefineLabel();
36      il.Emit(OpCodes.Brfalse_S, returnDefault);
37      il.LoadArgument(1);
38      il.Emit(OpCodes.Castclass, typeof(IConvertible));
39      il.Emit(OpCodes.Ldnull);
40      il.Emit(OpCodes.Callvirt, GetMethodForConversionToTargetType());
41      il.Return();
42      il.MarkLabel(returnDefault);
43      LoadDefault(il, typeof(TTarget));
44  }
45
46  /// <summary>
47  /// <para>Gets a new unique name of an assembly.</para>
48  /// <para>Возвращает новое уникальное имя сборки.</para>
49  /// </summary>
50  /// <returns><para>A new unique name of an assembly.</para><para>Новое уникальное имя
    → сборки.</para></returns>
51  [MethodImpl(MethodImplOptions.AggressiveInlining)]
52  protected static string GetNewName() => Guid.NewGuid().ToString("N");
53
54  /// <summary>
55  /// <para>Converts the value of the source type (TSource) to the value of the target
    → type.</para>
56  /// <para>Конвертирует значение исходного типа (TSource) в значение целевого типа.</para>
57  /// </summary>
58  /// <param name="source"><para>The source type value (TSource).</para><para>Значение
    → исходного типа (TSource).</para></param>
59  /// <returns><para>The value is converted to the target type
    → (TTarget).</para><para>Значение ковертированное в целевой тип
    → (TTarget).</para></returns>
60  [MethodImpl(MethodImplOptions.AggressiveInlining)]
61  protected static TypeBuilder CreateTypeInheritedFrom<TBaseClass>()
62  {
63      var assemblyName = new AssemblyName(GetNewName());
64      var assembly = AssemblyBuilder.DefineDynamicAssembly(assemblyName,
    → AssemblyBuilderAccess.Run);
65      var module = assembly.DefineDynamicModule(GetNewName());
66      var type = module.DefineType(GetNewName(), TypeAttributes.Public |
    → TypeAttributes.Class | TypeAttributes.Sealed, typeof(TBaseClass));
67      return type;
68  }
69
70  /// <summary>
71  /// <para>Converts the value of the source type (TSource) to the value of the target
    → type.</para>
72  /// <para>Конвертирует значение исходного типа (TSource) в значение целевого типа.</para>
73  /// </summary>
74  /// <param name="source"><para>The source type value (TSource).</para><para>Значение
    → исходного типа (TSource).</para></param>
75  /// <returns><para>The value is converted to the target type
    → (TTarget).</para><para>Значение ковертированное в целевой тип
    → (TTarget).</para></returns>
76  [MethodImpl(MethodImplOptions.AggressiveInlining)]
77  protected static void EmitConvertMethod(TypeBuilder typeBuilder, Action<ILGenerator>
    → emitConversion)
78  {
79      typeBuilder.EmitFinalVirtualMethod<Converter<TSource,
    → TTarget>>(nameof(IConverter<TSource, TTarget>.Convert), il =>
80      {
81          il.LoadArgument(1);
82          if (typeof(TSource) == typeof(object) && typeof(TTarget) != typeof(object))
83          {
84              ConvertFromObject(il);
85          }
86      }

```

```

87         else if (typeof(TSource) != typeof(object) && typeof(TTarget) == typeof(object))
88         {
89             il.Box(typeof(TSource));
90         }
91         else
92         {
93             emitConversion(il);
94         }
95         il.Return();
96     });
97 }
98
99 /// <summary>
100 /// <para>Converts the value of the source type (TSource) to the value of the target
101   ↳ type.</para>
102 /// <para>Конвертирует значение исходного типа (TSource) в значение целевого типа.</para>
103 /// </summary>
104 /// <param name="source"><para>The source type value (TSource).</para><para>Значение
   ↳ исходного типа (TSource).</para></param>
105 /// <returns><para>The value is converted to the target type
   ↳ (TTarget).</para><para>Значение конвертированное в целевой тип
   ↳ (TTarget).</para></returns>
106 [MethodImpl(MethodImplOptions.AggressiveInlining)]
107 protected static MethodInfo GetMethodForConversionToTargetType()
108 {
109     var targetType = typeof(TTarget);
110     var convertibleType = typeof(IConvertible);
111     var typeParameters = Types<IFormatProvider>.Array;
112     if (targetType == typeof(bool))
113     {
114         return convertibleType.GetMethod(nameof(IConvertible.ToBoolean), typeParameters);
115     }
116     else if (targetType == typeof(byte))
117     {
118         return convertibleType.GetMethod(nameof(IConvertible.ToByte), typeParameters);
119     }
120     else if (targetType == typeof(char))
121     {
122         return convertibleType.GetMethod(nameof(IConvertible.ToChar), typeParameters);
123     }
124     else if (targetType == typeof(DateTime))
125     {
126         return convertibleType.GetMethod(nameof(IConvertible.ToDateTime),
127           ↳ typeParameters);
128     }
129     else if (targetType == typeof(decimal))
130     {
131         return convertibleType.GetMethod(nameof(IConvertible.ToDecimal), typeParameters);
132     }
133     else if (targetType == typeof(double))
134     {
135         return convertibleType.GetMethod(nameof(IConvertible.ToDouble), typeParameters);
136     }
137     else if (targetType == typeof(short))
138     {
139         return convertibleType.GetMethod(nameof(IConvertible.ToInt16), typeParameters);
140     }
141     else if (targetType == typeof(int))
142     {
143         return convertibleType.GetMethod(nameof(IConvertible.ToInt32), typeParameters);
144     }
145     else if (targetType == typeof(long))
146     {
147         return convertibleType.GetMethod(nameof(IConvertible.ToInt64), typeParameters);
148     }
149     else if (targetType == typeof(sbyte))
150     {
151         return convertibleType.GetMethod(nameof(IConvertible.ToSByte), typeParameters);
152     }
153     else if (targetType == typeof(float))
154     {
155         return convertibleType.GetMethod(nameof(IConvertible.ToSingle), typeParameters);
156     }
157     else if (targetType == typeof(string))
158     {
159         return convertibleType.GetMethod(nameof(IConvertible.ToString), typeParameters);
160     }
161 }

```

```

159     else if (targetType == typeof(ushort))
160     {
161         return convertibleType.GetMethod(nameof(IConvertible.ToInt16), typeParameters);
162     }
163     else if (targetType == typeof(uint))
164     {
165         return convertibleType.GetMethod(nameof(IConvertible.ToInt32), typeParameters);
166     }
167     else if (targetType == typeof(ulong))
168     {
169         return convertibleType.GetMethod(nameof(IConvertible.ToInt64), typeParameters);
170     }
171     else
172     {
173         throw new NotSupportedException();
174     }
175 }
176
177 /// <summary>
178 /// <para>Converts the value of the source type (TSource) to the value of the target
179   ↳ type.</para>
180 /// <para>Конвертирует значение исходного типа (TSource) в значение целевого типа.</para>
181 /// </summary>
182 /// <param name="source"><para>The source type value (TSource).</para><para>Значение
183   ↳ исходного типа (TSource).</para></param>
184 /// <returns><para>The value is converted to the target type
185   ↳ (TTarget).</para><para>Значение конвертированное в целевой тип
186   ↳ (TTarget).</para></returns>
187 [MethodImpl(MethodImplOptions.AggressiveInlining)]
188 protected static void LoadDefault(ILGenerator il, Type targetType)
189 {
190     if (targetType == typeof(string))
191     {
192         il.Emit(OpCodes.Ldsfld, targetType.GetField(nameof(string.Empty),
193   ↳ BindingFlags.Static | BindingFlags.Public));
194     }
195     else if (targetType == typeof(DateTime))
196     {
197         il.Emit(OpCodes.Ldsfld, targetType.GetField(nameof(DateTime.MinValue),
198   ↳ BindingFlags.Static | BindingFlags.Public));
199     }
200     else if (targetType == typeof(decimal))
201     {
202         il.Emit(OpCodes.Ldsfld, targetType.GetField(nameof(decimal.Zero),
203   ↳ BindingFlags.Static | BindingFlags.Public));
204     }
205     else if (targetType == typeof(float))
206     {
207         il.LoadConstant(0.0F);
208     }
209     else if (targetType == typeof(double))
210     {
211         il.LoadConstant(0.0D);
212     }
213     else if (targetType == typeof(long) || targetType == typeof(ulong))
214     {
215         il.LoadConstant(0L);
216     }
217     else
218     {
219         il.LoadConstant(0);
220     }
221 }
222 }
223 }
224 }
225 }
226 }

```

#### 1.4 ./csharp/Platform.Converters/IConverter[TSource, TTarget].cs

```

1 namespace Platform.Converters
2 {
3     /// <summary>
4     /// <para>Defines a value converter from the <typeparamref name="TSource"/> type to the
5     ↳ <typeparamref name="TTarget"/> type.</para>
6     /// <para>Определяет конвертер значений из типа <typeparamref name="TSource"/> в тип
7     ↳ <typeparamref name="TTarget"/>.</para>
8     /// </summary>
9     /// <typeparam name="TSource"><para>Source type of conversion.</para><para>Исходный тип
10    ↳ конверсии.</para></typeparam>

```

```

8  /// <typeparam name="TTarget"><para>Target type of conversion.</para><para>Целевой тип
   ↳ конверсии.</para></typeparam>
9  public interface IConverter<in TSource, out TTarget>
10 {
11     /// <summary>
12     /// <para>Converts the value of the <typeparamref name="TSource"/> type to the value of
   ↳ the <typeparamref name="TTarget"/> type.</para>
13     /// <para>Конвертирует значение типа <typeparamref name="TSource"/> в значение типа
   ↳ <typeparamref name="TTarget"/>.</para>
14     /// </summary>
15     /// <param name="source"><para>The <typeparamref name="TSource"/> type
   ↳ value.</para><para>Значение типа <typeparamref name="TSource"/>.</para></param>
16     /// <returns><para>The converted value of the <typeparamref name="TTarget"/>
   ↳ type.</para><para>Значение конвертированное в тип <typeparamref
   ↳ name="TTarget"/>.</para></returns>
17     TTarget Convert(TSource source);
18 }
19 }

```

### 1.5 ./csharp/Platform.Converters/IConverter[T].cs

```

1  namespace Platform.Converters
2  {
3      /// <summary>
4      /// <para>Defines a converter between two values of the same <typeparamref name="T"/>
   ↳ type.</para>
5      /// <para>Определяет конвертер между двумя значениями одного типа <typeparamref
   ↳ name="T"/>.</para>
6      /// </summary>
7      /// <typeparam name="T"><para>The type of value to convert.</para><para>Тип преобразуемого
   ↳ значения.</para></typeparam>
8      public interface IConverter<T> : IConverter<T, T>
9      {
10     }
11 }

```

### 1.6 ./csharp/Platform.Converters/UncheckedConverter.cs

```

1  using System;
2  using System.Runtime.CompilerServices;
3  using Platform.Reflection;
4
5  #pragma warning disable CS1591 // Missing XML comment for publicly visible type or member
6
7  namespace Platform.Converters
8  {
9      /// <summary>
10     /// <para>
11     /// Represents the unchecked converter.
12     /// </para>
13     /// <para></para>
14     /// </summary>
15     /// <seealso cref="ConverterBase{TSource, TTarget}"/>
16     public abstract class UncheckedConverter<TSource, TTarget> : ConverterBase<TSource, TTarget>
17     {
18         /// <summary>
19         /// <para>
20         /// Gets the default value.
21         /// </para>
22         /// <para></para>
23         /// </summary>
24         public static UncheckedConverter<TSource, TTarget> Default
25         {
26             [MethodImpl(MethodImplOptions.AggressiveInlining)]
27             get;
28             } = CompileUncheckedConverter();
29         [MethodImpl(MethodImplOptions.AggressiveInlining)]
30         private static UncheckedConverter<TSource, TTarget> CompileUncheckedConverter()
31         {
32             var type = CreateTypeInheritedFrom<UncheckedConverter<TSource, TTarget>>();
33             EmitConvertMethod(type, il => il.UncheckedConvert<TSource, TTarget>());
34             return (UncheckedConverter<TSource,
   ↳ TTarget>)Activator.CreateInstance(type.CreateTypeInfo());
35         }
36     }
37 }

```

## 1.7 ./csharp/Platform.Converters/UncheckedSignExtendingConverter.cs

```
1 using System;
2 using System.Runtime.CompilerServices;
3 using Platform.Reflection;
4
5 #pragma warning disable CS1591 // Missing XML comment for publicly visible type or member
6
7 namespace Platform.Converters
8 {
9     /// <summary>
10    /// <para>
11    /// Represents the unchecked sign extending converter.
12    /// </para>
13    /// <para></para>
14    /// </summary>
15    /// <seealso cref="ConverterBase{TSource, TTarget}"/>
16    public abstract class UncheckedSignExtendingConverter<TSource, TTarget> :
17        ⇨ ConverterBase<TSource, TTarget>
18    {
19        /// <summary>
20        /// <para>
21        /// Gets the default value.
22        /// </para>
23        /// <para></para>
24        /// </summary>
25        public static UncheckedSignExtendingConverter<TSource, TTarget> Default
26        {
27            [MethodImpl(MethodImplOptions.AggressiveInlining)]
28            get;
29        } = CompileUncheckedConverter();
30        [MethodImpl(MethodImplOptions.AggressiveInlining)]
31        private static UncheckedSignExtendingConverter<TSource, TTarget>
32        ⇨ CompileUncheckedConverter()
33        {
34            var type = CreateTypeInheritedFrom<UncheckedSignExtendingConverter<TSource,
35                ⇨ TTarget>>();
36            EmitConvertMethod(type, il => il.UncheckedConvert<TSource, TTarget>(extendSign:
37                ⇨ true));
38            return (UncheckedSignExtendingConverter<TSource,
39                ⇨ TTarget>)Activator.CreateInstance(type.CreateTypeInfo());
40        }
41    }
42 }
```

## 1.8 ./csharp/Platform.Converters.Tests/ConverterTests.cs

```
1 using System;
2 using Xunit;
3
4 namespace Platform.Converters.Tests
5 {
6     public static class ConverterTests
7     {
8         [Fact]
9         public static void SameTypeTest()
10        {
11            var result = UncheckedConverter<ulong, ulong>.Default.Convert(2UL);
12            Assert.Equal(2UL, result);
13            result = CheckedConverter<ulong, ulong>.Default.Convert(2UL);
14            Assert.Equal(2UL, result);
15        }
16
17        [Fact]
18        public static void Int32ToUInt64Test()
19        {
20            var result = UncheckedConverter<int, ulong>.Default.Convert(2);
21            Assert.Equal(2UL, result);
22            result = CheckedConverter<int, ulong>.Default.Convert(2);
23            Assert.Equal(2UL, result);
24        }
25
26        [Fact]
27        public static void SignExtensionTest()
28        {
29            var result = UncheckedSignExtendingConverter<byte, long>.Default.Convert(128);
30            Assert.Equal(-128L, result);
31            result = UncheckedConverter<byte, long>.Default.Convert(128);
32            Assert.Equal(128L, result);
33        }
34    }
35 }
```

```

35 [Fact]
36 public static void ObjectTest()
37 {
38     TestObjectConversion("1");
39     TestObjectConversion(DateTime.UtcNow);
40     TestObjectConversion(1.0F);
41     TestObjectConversion(1.0D);
42     TestObjectConversion(1.0M);
43     TestObjectConversion(1UL);
44     TestObjectConversion(1L);
45     TestObjectConversion(1U);
46     TestObjectConversion(1);
47     TestObjectConversion((char)1);
48     TestObjectConversion((ushort)1);
49     TestObjectConversion((short)1);
50     TestObjectConversion((byte)1);
51     TestObjectConversion((sbyte)1);
52     TestObjectConversion(true);
53 }
54 private static void TestObjectConversion<T>(T value) => Assert.Equal(value,
55     ↪ UncheckedConverter<object, T>.Default.Convert(value));
56 }

```



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