```
LinksPlatform's Platform RegularExpressions Transformer CSharpToCpp Class Library
     ./Platform.RegularExpressions.Transformer.CSharpToCpp/CSharpToCppTransformer.cs
   using System;
   using System.Collections.Generic;
using System.Ling;
2
   using System. Text. Regular Expressions;
4
   #pragma warning disable CS1591 // Missing XML comment for publicly visible type or member
   namespace Platform.RegularExpressions.Transformer.CSharpToCpp
        public class CSharpToCppTransformer : Transformer
10
11
            public static readonly IList<ISubstitutionRule> FirstStage = new List<SubstitutionRule>
12
13
14
                //
15
                (new Regex(0"(\r?\n)?[\t]+//+.+"), "", null, 0),
16
                // #pragma warning disable CS1591 // Missing XML comment for publicly visible type
                    or member
18
                (new Regex(0"^\s*?\pragma[\sa-zA-Z0-9]+$"), "", null, 0),
19
                // \{ n \in \mathbb{N} 
                // {
                (new Regex(0"{\s+[\r\n]+"), "{" + Environment.NewLine, null, 0),
22
                // Platform.Collections.Methods.Lists
                // Platform::Collections::Methods::Lists
                (new Regex(0"(namespace[\rrimn]+?)\.([\rrimn]+?)"), "$1::$2", null, 20),
25
                // out TProduct
26
                // TProduct
27
                (new Regex(0"(?<before>(<|, ))(in|out)</pre>
2.8
                    (?<typeParameter>[a-zA-Z0-9]+)(?<after>(>|,))"),
                    "${before}${typeParameter}${after}", null, 10),
                // public abstract class
2.9
                // class
30
                (new Regex(0"(public abstract|static) class"), "class", null, 0),
31
                // class GenericCollectionMethodsBase {
32
                // class GenericCollectionMethodsBase {
                                                          public:
33
                (new Regex(0"class ([a-zA-Z0-9]+)(\s+){"}, "class $1$2{"} + Environment.NewLine + "
                     public:", null, 0),
                // class GenericCollectionMethodsBase<TElement> {
35
                // template <typename TElement> class GenericCollectionMethodsBase { public:
36
                (\text{new Regex}(@"class}([a-zA-Z0-9]+)<([a-zA-Z0-9]+)>([^{1}+)^{1}), "template < typename $2>
                    class $1$3{" + Environment.NewLine + "
                                                                public:", null, 0),
                // static void
                    TestMultipleCreationsAndDeletions<TElement>(SizedBinaryTreeMethodsBase<TElement>
                    tree, TElement* root)
                // template<typename T> static void
39
                    TestMultipleCreationsAndDeletions<TElement>(SizedBinaryTreeMethodsBase<TElement>
                   tree, TElement* root)
                 (\text{new Regex}(0"\text{static }([a-zA-Z0-9]+) ([a-zA-Z0-9]+)<([a-zA-Z0-9]+)>\\(([^{\})\r\n]+)\\)"), 
40
                    "template <typename $3> static $1 $2($4)", null, 0),
                // interface IFactory<out TProduct> {
                // template <typename TProduct> class IFactory { public:
42
                (new Regex(@"interface (?<interface>[a-zA-Z0-9]+)<(?<typeParameters>[a-zA-Z0-9
43
                    ,]+\dot{}>(?<whitespace>[^{]+){"}, "template <typename...> class ${interface};
                    template <typename ${typeParameters}> class
                    ${interface}<${typeParameters}>${whitespace}{" + Environment.NewLine + "
                    public:", null, 0),
                // template <typename TObject, TProperty, TValue>
                // template <typename TObject, typename TProperty, TValue>
45
                (new Regex(0"(?<before>template <((, )?typename [a-zA-Z0-9]+)+,</pre>
46
                    )(?<typeParameter>[a-zA-Z0-9]+)(?<after>(,|>))"), "${before}typename
                    $\{\typeParameter\}\{\text{after}\", \text{null, 10}\},
                // (this
47
                (new Regex(0"\(this "), "(", null, 0),
49
                // public static readonly EnsureAlwaysExtensionRoot Always = new
50
                    EnsureAlwaysExtensionRoot();
                // inline static EnsureAlwaysExtensionRoot Always;
                (new Regex(0"public static readonly (?<type>[a-zA-Z0-9]+) (?<name>[a-zA-Z0-9]+) =
                 \rightarrow new \k<type>\(\);"), "inline static ${type} ${name};", null, 0),
                // public static readonly string ExceptionContentsSeparator = "---"
53
                // inline static const char* ExceptionContentsSeparator = "---";
54
                (new Regex(0"public static readonly string (?<name>[a-zA-Z0-9_]+) =
                    ""(?<string>(\""|[^""\r\n])+)"";"), "inline static const char* ${name} =
                    \"${string}\";", null, 0),
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// private const int MaxPath = 92;
                 // static const int MaxPath = 92;
                (new Regex(@"private (const|static readonly) ([a-zA-Z0-9]+) ([_a-zA-Z0-9]+) =
                     ([^; \r]^+);"), "static const $2 $3 = $4;", null, 0),
                     ArgumentNotNull(EnsureAlwaysExtensionRoot root, TArgument argument) where
                     TArgument : class
                     ArgumentNotNull(EnsureAlwaysExtensionRoot root, TArgument* argument)
                 (\text{new Regex}(@"(?<\text{before} [a-zA-Z]+)(([a-zA-Z *,]+, |))(?<type>[a-zA-Z]+)(?<after>(|)
61
                     [a-zA-Z *,]+)))[ \r\n]+where \k<type> : class"), "${before}${type}*${after}",
                    null, 0),
                   protected virtual
62
                // virtual
                 (new Regex(0"protected virtual"), "virtual", null, 0),
                // protected abstract TElement GetFirst();
65
                // virtual TElement GetFirst() = 0;
66
                (new Regex(@"protected abstract ([^;\r\n]+);"), "virtual $1 = 0;", null, 0),
                // TElement GetFirst();
68
                // virtual TElement GetFirst() = 0;
69
                 (\text{new Regex}(@"([\r\n]+[ ]+)((?!\text{return})[a-zA-Z0-9]+ [a-zA-Z0-9]+\([^\)\r\n]*\))(;[
70
                    ]*[\rvert r\n]+)"), "$1virtual $2 = 0$3", null, 1),
                // public virtual
                // virtual
72
                 (new Regex(@"public virtual"), "virtual", null, 0),
73
                // protected readonly
7.5
                //
                (new Regex(@"protected readonly "), "", null, 0),
76
                // protected readonly TreeElement[] _elements;
// TreeElement _elements[N];
77
78
                (new Regex(@"(protected|private) readonly ([a-zA-Z<>0-9]+)([\[\]]+)
79
                     ([_a-zA-Z0-9]+);"), "$2 $4[N];", null, 0),
                // protected readonly TElement Zero;
80
                // TElement Zero;
                 (new Regex(0"(protected|private) readonly ([a-zA-Z<>0-9]+) ([_a-zA-Z0-9]+);"), "$2
82
                    $3;", null, 0),
                // private
83
84
                 (new Regex(@"(\W)(private|protected|public|internal) "), "$1", null, 0),
                // static void NotImplementedException(ThrowExtensionRoot root) => throw new
                    NotImplementedException();
                // static void NotImplementedException(ThrowExtensionRoot root) { return throw new
                    NotImplementedException(); }
                 (\text{new Regex}(@"(^\s+)(\text{template }<[^>\r\n]+\))?(\text{static })?(\text{override })?([a-zA-Z0-9]+\)
                     ([a-zA-Z0-9]+)(([^{(r\n]*)}))
                    throw$8; }", null, 0),
                // SizeBalancedTree(int capacity) => a = b;
89
                // SizeBalancedTree(int capacity) { a = b;
90
                 (new Regex(@"(^\s+)(template \<[^>\r\n]+\>)?(static )?(override )?(void
                     )?([a-zA-Z0-9]+)(([^((r\n]*)))s+=>s+([^;\r\n]+);"), "$1$2$3$4$5$6($7) { $8;}
                    }", null, 0),
                // int SizeBalancedTree(int capacity) => a;
                // int SizeBalancedTree(int capacity) { return a; }
93
                (new Regex(0"(^\s+)(template \<[^>\r\n]+\>)?(static )?(override )?([a-zA-Z0-9]+
94
                    )([a-zA-Z0-9]+)\(([^\(\r\n]*)\)\s+=>\s+([^;\r\n]+);"), "$1$2$3$4$5$6($7) { return $8; }", null, 0),
                // () => Integer<TElement>.Zero,
                // () { return Integer<TElement>.Zero; }
96
                 (new Regex(0"\(\)\s+=>\s+([^,;\r\n]+?),"), "() { return $1; },", null, 0),
                // => Integer<TElement>.Zero;
98
                // { return Integer<TElement>.Zero; }
99
                 (new Regex(0"\)\s+=>\s+([^;\r\n]+?);"), ") { return $1; }", null, 0),
100
                // () { return avlTree.Count; }
                // [&]()-> auto { return avlTree.Count; }
102
                (new Regex(0", \(\) { return ([^;\r\n]+); }"), ", [&]()-> auto { return $1; }",
103
                    null, 0)
                // Count => GetSizeOrZero(Root);
                // GetCount() { return GetSizeOrZero(Root); }
105
                (new Regex(@"(\W)([A-Z][a-zA-Z]+)\s+=>\s+([^;\r\n]+);"), "$1Get$2() { return $3; }",
106
                    null, 0),
                // Func<TElement> treeCount
107
                 // std::function<TElement()> treeCount
                (new Regex(@"Func<([a-zA-Z0-9]+)> ([a-zA-Z0-9]+)"), "std::function<$1()> $2", null,
109
                    0).
                // Action<TElement> free
110
                // std::function<void(TElement)> free
111
                 (new Regex(0"Action<([a-zA-Z0-9]+)> ([a-zA-Z0-9]+)"), "std::function<void($1)> $2",
                 \rightarrow null, 0),
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// Predicate<TArgument> predicate
// std::function<bool(TArgument)> predicate
(new Regex(@"Predicate<([a-zA-Z0-9]+) > ([a-zA-Z0-9]+)"), "std::function<br/>bool($1)>
        $2", null, 0),
// var
// auto
(new Regex(0"(\W)var(\W)"), "$1auto$2", null, 0),
// unchecked
(new Regex(0"[\r\n]{2}\s*?unchecked\s*?$"), "", null, 0),
// "
(new Regex(@"\$"""), "\"", null, 0),
// Console.WriteLine("...")
// printf("...\n")
(new Regex(@"Console\.WriteLine\(""([^""\r\n]+)""\)"), "printf(\"$1\\n\")", null, 0),
    / throw new InvalidOperationException
// throw std::runtime_error
(new Regex(@"throw new (InvalidOperationException|Exception)"), "throw
        std::runtime_error", null, 0),
// void RaiseExceptionIgnoredEvent(Exception exception)
// void RaiseExceptionIgnoredEvent(const std::exception& exception)
(new Regex(@"(\(|, ))(System\.Exception|Exception)( |\))"), "$1const
        std::exception&$3", null, 0),
// EventHandler<Exception>
// EventHandler<std::exception>
(new Regex(@"(\W)(System\.Exception|Exception)(\W)"), "$1std::exception$3", null, 0),
// override void PrintNode(TElement node, StringBuilder sb, int level)
// void PrintNode(TElement node, StringBuilder sb, int level) override
(new Regex(0"override ([a-zA-Z0-9 \*\+]+)(\([^{n})\r\n]+?\))"), "$1$2 override", null,
 \rightarrow 0),
// string
// char*
(new Regex(@"(\W)string(\W)"), "$1char*$2", null, 0),
// sbyte
// std::int8_t
(new Regex(@"(\W)sbyte(\W)"), "$1std::int8_t$2", null, 0),
// uint
// std::uint32_t
(new Regex(0"(\W)uint(\W)"), "$1std::uint32_t$2", null, 0),
     char*[] args
// char* args[]
(\text{new Regex}(\bar{0}"([_a-zA-ZO-9:\*]?)\[\] ([_a-zA-ZO-9]+)"), "$1 $2[]", null, 0),
// @object
// object
(new Regex(0"0([_a-zA-Z0-9]+)"), "$1", null, 0),
// using Platform.Numbers;
(\text{new Regex}(@"([\r\n]_{2}|^))\s*?using [\.a-zA-ZO-9]+;\s*?$"), "", null, 0),
// struct TreeElement { }
// struct TreeElement { };
(new Regex(@"(struct|class) ([a-zA-Z0-9]+)(\s+){([\sa-zA-Z0-9;:_]+?)}([^;])"), "$1
        $2$3{$4};$5", null, 0),
// class Program { }
]*)?)\{([\S\s]+?[\r\n]+\k<indentLevel>)\}([^;]|$)"), "$1 $2$3{$4};$5", null, 0),
// class SizedBinaryTreeMethodsBase : GenericCollectionMethodsBase
// class SizedBinaryTreeMethodsBase : public GenericCollectionMethodsBase
(new Regex(@"class ([a-zA-Z0-9]+) : ([a-zA-Z0-9]+)"), "class $1 : public $2", null,
 \rightarrow 0),
// class IProperty : ISetter<TValue, TObject>, IProvider<TValue, TObject>
// class IProperty : public ISetter<TValue, TObject>, IProvider<TValue, TObject>
(\text{new Regex}(@"(?<\text{before}>\text{class } [a-zA-Z0-9]+: ((\text{public } [a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-9]+(<[a-zA-Z0-2]+(<[a-zA-Z0-9]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-zA-Z0-2]+(<[a-z
        ,]+>)?, )+)?)(?<inheritedType>(?!public)[a-zA-Z0-9]+(<[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(>[a-zA-Z0-9]+(-[a-zA-Z0-9]+(-[a-zA-Z0-9]+(-[a-zA-Z0-9]+(-[a-zA-Z0-9]+(-[a-zA-Z0-9]+(-[a-zA-Z0-9]+(-[a-zA-Z0-9]+(-[a-zA-Z0-9]+(-[a-zA-Z0-9]+(-[a-zA-Z0-9]+(-[a-zA-Z0-9]+(-[a-zA-Z0-9]+(-[a-zA-Z0-9]+(-[a-zA-Z0-9]+(-[a-zA-Z0-9]+(-[a-zA-Z0-9]+(-[a-zA-Z0-9]+(-[a-zA-Z0-9]+(-[a-zA-Z0-9]+(-[a-zA-Z0-9]+(-[a-zA-Z0-9]+(-[a-zA-Z0-9]+(-[a-zA-Z0-9]+(-[a-zA-Z0-2]+(-[a-zA-Z0-2]+(-[a-zA-Z0-2]+(-[a-zA-Z0-2]+(-[a-z
         ,]+>)?)(<after>(, [a-zA-Z0-9]+(?!>)|[ \r\n]+))"), "${before}public
         ${inheritedType}${after}", null, 10),
// Insert scope borders.
     ref TElement root
// ~!root!~ref TElement root
(\text{new Regex}(@"(?<\text{definition}>(?<= |\setminus()(\text{ref }[a-zA-Z0-9]+|[a-zA-Z0-9]+(?<!\text{ref})))))
          0),
// Inside the scope of ~!root!~ replace:
// root
// *root
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(\text{new Regex}(@"(?<\text{definition}^{?}!(?<\text{pointer}=a-zA-Z0-9]+)!^{ref}[a-zA-Z0-9]+
                      \k<pointer>(?=\)|, | =))(?<before>((?<!~!\k<pointer>!~)(.|\n))*?)(?<prefix>(\W
                      "${definition}${before}${prefix}*${pointer}${suffix}", null, 70),
                  // Remove scope borders.
                  // ~!root!~
179
                  //
180
                  (new Regex(0"~!(?<pointer>[a-zA-Z0-9]+)!~"), "", null, 5),
                  // ref auto root = ref
182
                  // ref auto root
183
                  (\text{new Regex}(@"\text{ref}([a-zA-Z0-9]+)([a-zA-Z0-9]+) = \text{ref}(\W)"), "$1* $2 =$3", null, 0),
184
                  // *root = ref left;
                  // root = left;
186
                  (\text{new Regex}(@")*([a-zA-Z0-9]+) = \text{ref}([a-zA-Z0-9]+)(\W)"), "$1 = $2$3", null, 0),
187
                  // (ref left)
                  // (left)
189
                  (new Regex(0"\(ref ([a-zA-Z0-9]+)(\)|\(|,)"), "($1$2", null, 0),
190
                      ref TElement
191
                  // TElement*
192
                  (new Regex(0"( |\cdot|)ref ([a-zA-Z0-9]+) "), "$1$2* ", null, 0),
193
                  // ref sizeBalancedTree.Root
194
                  // &sizeBalancedTree->Root
                  (\text{new Regex}(@"\text{ref}([a-zA-Z0-9]+)\.([a-zA-Z0-9]*]+)"), "&$1->$2", null, 0),
196
                  // ref GetElement(node).Right
197
                  // &GetElement(node)->Right
198
                  (new Regex(0"ref ([a-zA-\bar{Z}0-9]+)\(([a-zA-\bar{Z}0-9\*]+)\)\.([a-zA-\bar{Z}0-9]+)"),
199
                      "&$1($2)->$3", null, 0),
                  // GetElement(node).Right
200
                  // GetElement(node)->Right
201
                  (\text{new Regex}(@"([a-zA-Z0-9]+))(([a-zA-Z0-9]*)+))).([a-zA-Z0-9]+)"), "$1($2)->$3",
                  \rightarrow null, 0),
                  // [Fact]\npublic static void SizeBalancedTreeMultipleAttachAndDetachTest()
203
                  // TEST_METHOD(SizeBalancedTreeMultipleAttachAndDetachTest)
204
                  (new Regex(0"\[Fact\][\s\n]+(static)?void ([a-zA-Z0-9]+)\(\)"), "TEST_METHOD($2)",
205
                  → null, 0),
// class TreesTests
                  // TEST_CLASS(TreesTests)
207
                  (new Regex(@"class ([a-zA-Z0-9]+)Tests"), "TEST_CLASS($1)", null, 0),
208
                  // Assert.Equal
209
                  // Assert::AreEqual
                  (new Regex(0"Assert\.Equal"), "Assert::AreEqual", null, 0),
211
                     TElement Root;
212
                  // TElement Root = 0;
213
                  (\text{new Regex}(@"(\r?\n[\t]+)([a-zA-Z0-9:_]+(?<!\text{return})) ([_a-zA-Z0-9]+);"), "$1$2 $3 =
214
                      0;", null, 0),
                  // TreeElement _elements[N];
215
                  // TreeElement _elements[N] = { {0} };
216
                  (new Regex(0"(\r?\n[\t]+)([a-zA-Z0-9]+) ([_a-zA-Z0-9]+)\[([_a-zA-Z0-9]+)\];"),
                     "$1$2 $3[$4] = { {0} }; ", null, 0),
                  // auto path = new TElement[MaxPath];
218
                  // TElement path[MaxPath] = { {0} }
219
220
                  (\text{new Regex}(0"(\r?\n[\t]+)[a-zA-Z0-9]+([a-zA-Z0-9]+) = \text{new})
                      ([a-zA-Z0-9]+)\setminus[([a-zA-Z0-9]+)\setminus];"), "$1$3 $2[$4] = { {0} };", null, 0),
                  // Insert scope borders.
                  // auto added = new HashSet<TElement>();
222
                  // ~!added!~std::unordered_set<TElement> added;
223
                  (new Regex(@"auto (?<variable>[a-zA-Z0-9]+) = new
                      HashSet < (? < element > [a-zA-Z0-9] +) > ( ( ); " ),
                  "~!${variable}!~std::unordered_set<${element}> ${variable};", null, 0),
// Inside the scope of ~!added!~ replace:
225
                  // added.Add(node)
                  // added.insert(node)
227
                  (\text{new Regex}(0"(?<\text{scope}^*!(?<\text{variable}|a-zA-Z0-9]+)!^*)(?<\text{separator}.|\n)(?<\text{before}((?<)|))
228
                      !^*[\k<\text{variable}]^*(.|\n))*?)\k<\text{variable}\. Add(((?<\text{argument}>[a-zA-Z0-9]+)))"),
                      "${scope}${separator}${before}${variable}.insert(${argument})", null, 10),
                  // Inside the scope of ~!added!~ replace:
                  // added.Remove(node)
230
                  // added.erase(node)
231
                  (new Regex(@"(?<scope>~!(?<variable>[a-zA-Z0-9]+)!~)(?<separator>.|\n)(?<before>((?<_</pre>
232
                      !~!\k<variable>!~)(.|\n))*?)\k<variable>\.Remove\((?<argument>[a-zA-Z0-9]+)\)"),
                      "${scope}${separator}${before}${variable}.erase(${argument})", null, 10),
                  // if (added.insert(node)) {
                  // if (!added.contains(node)) { added.insert(node);
234
```

```
(\text{new Regex}(@"if \setminus ((?<\text{variable}=a-zA-ZO-9]+) \setminus (?<\text{argument}=a-zA-ZO-9]+) \setminus) (?_{\perp}
235
                                                      \operatorname{separator}[\t] *[\r\n] +) (? \operatorname{sindent}[\t] *) {"}, "if
                                                      (!${variable}.contains(${argument}))${separator}${indent}{" +
                                                      Environment.NewLine + "${indent}
                                                                                                                                                      ${variable}.insert(${argument});", null, 0),
                                           // Remove scope borders.
                                           // ~!added!~
237
238
                                           (new Regex(@"~!(?<pointer>[a-zA-Z0-9]+)!~"), "", null, 5),
                                           // Insert scope borders.
240
                                           // auto random = new System.Random(0);
241
                                           // std::srand(0);
242
                                           (new Regex(@"[a-zA-Z0-9]] + ([a-zA-Z0-9]] + ) = new
                                                      (System\.)?Random\(([a-zA-Z0-9]+)\);"), "~!$1!~std::srand($3);", null, 0),
                                           // Inside the scope of "!random!" replace:
244
                                           // random.Next(1, N)
245
                                           // (std::rand() % N) + 1
246
                                           (new Regex(0"(?<scope>~!(?<variable>[a-zA-Z0-9]+)!~)(?<separator>.|\n)(?<br/>before>((?<|
                                                      ${from}", null, 10),
                                           // Remove scope borders.
                                           // ~!random!
249
                                           //
250
                                           (new Regex(@"~!(?<pointer>[a-zA-Z0-9]+)!~"), "", null, 5),
                                           // Insert method body scope starts.
252
                                                  void PrintNodes(TElement node, StringBuilder sb, int level)
253
                                           // void PrintNodes(TElement node, StringBuilder sb, int level) {/*method-start*/
254
                                            (new Regex(@"(?<start>\r?\n[\t]+)(?<prefix>((virtual))?[a-zA-Z0-9:_]+
                                                      )?) (?<method>[a-zA-Z] [a-zA-Z0-9]*)\((?<arguments>[^\)]*)\) (?<override>(
                                                      override)?)(?\langle separator\rangle[ \t\r\n]*)\{(?\langle end\rangle[^{-}])"), "$\{start\}$\{prefix\}$\{method\}_{\n}$$
                                                      ($\arguments})$\{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mathref{\mat
                                             \hookrightarrow
                                                      0),
                                           // Insert method body scope ends.
256
                                           // {/*method-start*/...}
257
                                           // {/*method-start*/.../*method-end*/}
                                           (\text{new Regex}(@''_{/\star}) | (?<\text{body}((?<\text{bracket})) | (?<-\text{bracket})) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) | (?(.)) |
259
                                                     \}"), "{/*method-start*/${body}/*method-end*/}", null,
                                                     0),
                                           // Inside method bodies replace:
260
                                           // GetFirst(
                                           // this->GetFirst(
262
                                           //(\text{new Regex}(0"(?<\text{separator})((|, |([]W]) | \text{return }))(?<!(->|)*
263
                                                      ))(?<method>(?!sizeof)[a-zA-Z0-9]+)\((?!\)\{)"),
                                                      "${separator}this->${method}(", null, 1),
                                           (\texttt{new Regex}(@"(?<scope>/\*method-start/*/)(?<before>((?<!//*method-end/*/)(.|\n))*?)(|
                                                      ?<separator>[\\\](?<!(::|\.|->)))(?<method>(?!sizeof)[a-zA-Z0-9]+)\((?!\)
                                                      \{\}(?<after>(.|\n)*?)(?<scopeEnd>/\*method-end\*/)"),
                                                      "${scope}${before}${separator}this->${method}(${after}${scopeEnd}", null, 100),
                                           // Remove scope borders.
265
                                           // /*method-start*/
267
                                           (new Regex(@"/\*method-(start|end)\*/"), "", null, 0),
268
                                           // throw new ArgumentNullException(argumentName, message);
269
                                           // throw std::invalid_argument(((std::string)"Argument
                                                     ").append(argumentName).append(" is null: ").append(message).append("."));
                                           (new Regex(@"throw new
271
                                                     ArgumentNullException\((?<argument>[a-zA-Z]*[Aa]rgument[a-zA-Z]*),
                                                      (?\langle message \rangle [a-zA-Z] * [Mm] essage [a-zA-Z] *) \rangle;"), "throw"
                                                    std::invalid_argument(((std::string)\"Argument \").append(${argument}).append(\"
                                                     is null: \").append(${message}).append(\".\"));", null, 0),
272
                                           // throw new ArgumentException(message, argumentName);
                                           // throw std::invalid_argument(((std::string)"Invalid
                                                     ").append(argumentName).append(" argument: ").append(message).append("."));
                                            (new Regex(@"throw new ArgumentException\(((?<message>[a-zA-Z]*[Mm]essage[a-zA-Z]*),
274
                                                       (?\langle argument \rangle [a-zA-Z] * [Aa] rgument [a-zA-Z] *) \rangle); "\check{)}, "throw "in the content of the c
                                                     std::invalid_argument(((std::string)\"Invalid \").append(${argument}).append(\"
                                                      argument: \").append(${message}).append(\".\"));", null, 0),
                                           // throw new NotSupportedException();
275
                                           // throw std::logic_error("Not supported exception.");
                                           (new Regex(@"throw new NotSupportedException\(\);"), "throw std::logic_error(\"Not
277
                                                    supported exception.\");", null, 0),
                                           // throw new NotImplementedException();
278
                                           // throw std::logic_error("Not implemented exception.");
279
                                            (new Regex(@"throw new NotImplementedException\(\);"), "throw std::logic_error(\"Not

→ implemented exception.\");", null, 0),
```

```
}.Cast<ISubstitutionRule>().ToList();
282
283
             public static readonly IList<ISubstitutionRule> LastStage = new List<SubstitutionRule>
285
                   ICounter<int, int> c1;
286
                 // ICounter<int, int>* c1;
287
                 (new Regex(0"(?<abstractType>I[A-Z][a-zA-Z0-9]+(<[^>\r\n]+>)?)
                     (?<variable>[_a-zA-Z0-9]+);"), "${abstractType}* ${variable};", null, 0),
                 // (expression)
289
                 // expression
290
                 (\text{new Regex}(@"(\(| )(([a-zA-Z0-9_{*:}]+))(,| |;|))"), "$1$2$3", null, 0),
291
                 // (method(expression))
292
                 // method(expression)
293
                 (new Regex(0"(?<firstSeparator>(\()
294
                     ))\((?\mode{a-zA-Z0-9}\->\*:]+)\((?\mode{a-zA-Z0-9}\->\*:]+)
                     hesis > \) | [a-zA-Z0-9_\->\*:]*)+) (?(parenthesis)(?!)) \) (?<lastSeparator>(,)
                 → |;|\)))"), "${firstSeparator}${method}(${expression})${lastSeparator}", null, 0),
// return ref _elements[node];
                 // return &_elements[node];
296
                 (new Regex(@"return ref ([_a-zA-Z0-9]+)\[([_a-zA-Z0-9\*]+)\];"), "return &$1[$2];",
297
                    null, 0),
                 // null
298
                 // NULL
                 (new Regex(@"(\W)null(\W)"), "$1NULL$2", null, 0),
300
301
                 // default
302
                 (new Regex(0"(\W)default(\W)"), "${1}0$2", null, 0),
303
                 // #region Always
304
305
                 (\text{new Regex}(@"(^|\r?^n)[ \t]*\t(\text{region}|\text{endregion})[^\r\n]*(\r?^n|\$)"), "", null, 0),
                 // //#define ENABLE_TREE_AUTO_DEBUG_AND_VALIDATION
307
308
                 (new Regex(0"\/\/[ \t]*\#define[ \t]+[_a-zA-ZO-9]+[ \t]*"), "", null, 0),
                 // #if USEARRAYPOOL\r\n#endif
310
311
                 (new Regex(0"#if [a-zA-Z0-9]+\s+\#endif"), "", null, 0),
312
                 // [Fact]
                 //
314
                 (new Regex(0"(?<firstNewLine>\r?\n|\A)(?<indent>[\t
315
                     ]+)\[[a-zA-Z0-9]+(\((?<expression>((?<parenthesis>\())|(?<-parenthesis>\))|[^()\r<sub>|</sub>
                     \n]*)+)(?(parenthesis)(?!)))))?\][ \t]*(\r?\n\k<indent>)?"),
                     "${firstNewLine}${indent}", null, 5),
                 // \n ... namespace
316
                 // namespace
317
                 (new Regex(0"(S[\r\n]{1,2})?[\r\n]+namespace"), "$1namespace", null, 0),
318
                 // \n ... class
319
                 // class
                 (new Regex(0"(\S[\r\n]{1,2})?[\r\n]+class"), "$1class", null, 0),
321
             }.Cast<ISubstitutionRule>().ToList();
322
323
             public CSharpToCppTransformer(IList<ISubstitutionRule> extraRules)
324
                base(FirstStage.Concat(extraRules).Concat(LastStage).ToList()) { }
             public CSharpToCppTransformer() : base(FirstStage.Concat(LastStage).ToList()) { }
326
        }
327
328
      ./Platform.RegularExpressions.Transformer.CSharpToCpp.Tests/CSharpToCppTransformerTests.cs
1.2
    using Xunit;
    namespace Platform.RegularExpressions.Transformer.CSharpToCpp.Tests
 3
 4
        public class CSharpToCppTransformerTests
 5
 6
             [Fact]
             public void HelloWorldTest()
                 const string helloWorldCode = @"using System;
10
    class Program
11
12
        public static void Main(string[] args)
13
14
             Console.WriteLine(""Hello, world!"");
15
16
    }";
17
                 const string expectedResult = @"class Program
18
19
        public:
20
```

```
static void Main(char* args[])
{
    printf(""Hello, world!\n"");
    }
};";

var transformer = new CSharpToCppTransformer();
    var actualResult = transform(helloWorldCode, new Context(null));
    Assert.Equal(expectedResult, actualResult);
}

Assert.Equal(expectedResult, actualResult);
```

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