

## 1.1 ./Platform.RegularExpressions.Transformer.CSharpToCpp/CSharpToCppTransformer.cs

```

1  using System;
2  using System.Collections.Generic;
3  using System.Linq;
4  using System.Text.RegularExpressions;
5
6  #pragma warning disable CS1591 // Missing XML comment for publicly visible type or member
7
8  namespace Platform.RegularExpressions.Transformer.CSharpToCpp
9  {
10     public class CSharpToCppTransformer : Transformer
11     {
12         public static readonly IList

```

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58 (new Regex(@"private (const|static readonly) ([a-zA-Z0-9]+) ([_a-zA-Z0-9]+) =
    ↳ ([~;]+);"), "static const $2 $3 = $4;", null, 0),
59 // protected virtual
60 // virtual
61 (new Regex(@"protected virtual"), "virtual", null, 0),
62 // protected abstract TElement GetFirst();
63 // virtual TElement GetFirst() = 0;
64 (new Regex(@"protected abstract ([~;]+);"), "virtual $1 = 0;", null, 0),
65 // TElement GetFirst();
66 // virtual TElement GetFirst() = 0;
67 (new Regex(@"([\r\n]+[ ]+)((?!return)[a-zA-Z0-9]+ [a-zA-Z0-9]+\([~\)]*\))([
    ↳ ]*[\r\n]+)"), "$1virtual $2 = 0$3", null, 1),
68 // public virtual
69 // virtual
70 (new Regex(@"public virtual"), "virtual", null, 0),
71 // protected readonly
72 //
73 (new Regex(@"protected readonly "), "", null, 0),
74 // protected readonly TreeElement[] _elements;
75 // TreeElement _elements[N];
76 (new Regex(@"(protected|private) readonly ([a-zA-Z<>0-9]+)([\\[\\]]+
    ↳ ([_a-zA-Z0-9]+);"), "$2 $4[N];", null, 0),
77 // protected readonly TElement Zero;
78 // TElement Zero;
79 (new Regex(@"(protected|private) readonly ([a-zA-Z<>0-9]+) ([_a-zA-Z0-9]+);"), "$2
    ↳ $3;", null, 0),
80 // private
81 //
82 (new Regex(@"(\W)(private|protected|public|internal) "), "$1", null, 0),
83 // SizeBalancedTree(int capacity) => a = b;
84 // SizeBalancedTree(int capacity) { a = b; }
85 (new Regex(@"(^s+)(override )?(void )?([a-zA-Z0-9]+\(((~\(|*)~\)s+=>s+([~;]+);"),
    ↳ "$1$2$3$4($5) { $6; }", null, 0),
86 // int SizeBalancedTree(int capacity) => a;
87 // int SizeBalancedTree(int capacity) { return a; }
88 (new Regex(@"(^s+)(override )?([a-zA-Z0-9]+
    ↳ )([a-zA-Z0-9]+\(((~\(|*)~\)s+=>s+([~;]+);"), "$1$2$3$4($5) { return $6; }",
    ↳ null, 0),
89 // () => Integer<TElement>.Zero,
90 // () { return Integer<TElement>.Zero; },
91 (new Regex(@"\(\)\s+=>s+([~\r\n;]+?);"), "()" { return $1; }", null, 0),
92 // => Integer<TElement>.Zero;
93 // { return Integer<TElement>.Zero; }
94 (new Regex(@"\)\s+=>s+([~\r\n;]+?);"), ") { return $1; }", null, 0),
95 // () { return avlTree.Count; }
96 // [&]()-> auto { return avlTree.Count; }
97 (new Regex(@"\(\)\{ return ([~;]+); }"), ", [&]()-> auto { return $1; }", null, 0),
98 // Count => GetSizeOrZero(Root);
99 // GetCount() { return GetSizeOrZero(Root); }
100 (new Regex(@"([A-Z][a-z]+)\s+=>s+([~;]+);"), "Get$1() { return $2; }", null, 0),
101 // var
102 // auto
103 (new Regex(@"(\W)var(\W)"), "$1auto$2", null, 0),
104 // unchecked
105 //
106 (new Regex(@"[\r\n]{2}\s*?unchecked\s*?$"), "", null, 0),
107 // $"
108 // "
109 (new Regex(@"\$"""), "\"", null, 0),
110 // Console.WriteLine(...)
111 // printf("...\n")
112 (new Regex(@"Console\.WriteLine\(\"\"([~\""]+)"\""), "printf(\"$1\\n\")", null, 0),
113 // throw new InvalidOperationException
114 // throw std::exception
115 (new Regex(@"throw new (InvalidOperationException|Exception)"), "throw
    ↳ std::exception", null, 0),
116 // override void PrintNode(TElement node, StringBuilder sb, int level)
117 // void PrintNode(TElement node, StringBuilder sb, int level) override
118 (new Regex(@"override ([a-zA-Z0-9 \*+]+\([~\)]+?~\)")), "$1$2 override", null, 0),
119 // string
120 // char*
121 (new Regex(@"(\W)string(\W)"), "$1char*$2", null, 0),
122 // sbyte
123 // std::int8_t
124 (new Regex(@"(\W)sbyte(\W)"), "$1std::int8_t$2", null, 0),
125 // uint
126 // std::uint32_t

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127 (new Regex(@"(\\W)uint(\\W)"), "$1std::uint32_t$2", null, 0),
128 // char*[] args
129 // char* args[]
130 (new Regex(@"([_a-zA-Z0-9:~*?])\\[\\] ([a-zA-Z0-9]+)"), "$1 $2[]", null, 0),
131 // using Platform.Numbers;
132 //
133 (new Regex(@"([\\r\\n]{2}|^\\s*?using [\\.a-zA-Z0-9]+;\\s*?$")", "", null, 0),
134 // struct TreeElement { }
135 // struct TreeElement { };
136 (new Regex(@"(struct|class) ([a-zA-Z0-9]+)(\\s+){([\\sa-zA-Z0-9;:_]+?)}([~;])")", "$1
    ↪ $2$3{$4};$5", null, 0),
137 // class Program { }
138 // class Program { };
139 (new Regex(@"(struct|class) ([a-zA-Z0-9]+[~\\r\\n]*)([\\r\\n]+(?<indentLevel>[\\t
    ↪ ]*)?)\\{([\\S\\s]+?[\\r\\n]+\\k<indentLevel>)\\}([~;]|$)")", "$1 $2$3{$4};$5", null, 0),
140 // class SizedBinaryTreeMethodsBase : GenericCollectionMethodsBase
141 // class SizedBinaryTreeMethodsBase : public GenericCollectionMethodsBase
142 (new Regex(@"class ([a-zA-Z0-9]+) : ([a-zA-Z0-9]+)"), "class $1 : public $2", null,
    ↪ 0),
143 // class IProperty : ISetter<TValue, TObj>, IProvider<TValue, TObj>
144 // class IProperty : public ISetter<TValue, TObj>, IProvider<TValue, TObj>
145 (new Regex(@"(?<before>class [a-zA-Z0-9]+ : ((public [a-zA-Z0-9]+(<[a-zA-Z0-9
    ↪ ,]+>)?, )+)?)(?<inheritedType>(?!public) [a-zA-Z0-9]+(<[a-zA-Z0-9
    ↪ ,]+>)?)(?<after>(, [a-zA-Z0-9]+(?!>)|[ \\r\\n]+))")", "${before}public
    ↪ ${inheritedType}${after}", null, 10),
146 // Insert scope borders.
147 // ref TElement root
148 // ~!root!~ref TElement root
149 (new Regex(@"(?<definition>(?!<= |\\() (ref [a-zA-Z0-9]+|[a-zA-Z0-9]+(?<!ref))
    ↪ (?<variable>[a-zA-Z0-9]+)(?!<= | | =))")", "~!${variable}!~${definition}", null,
    ↪ 0),
150 // Inside the scope of ~!root!~ replace:
151 // root
152 // *root
153 (new Regex(@"(?<definition>~!(?<pointer>[a-zA-Z0-9]+)!~ref [a-zA-Z0-9]+
    ↪ \\k<pointer>(?!<= | | =)) (?<before>((?!~!\\k<pointer>!~)(.|\\n))*?) (?<prefix>(\\W
    ↪ |\\()\\k<pointer>(?!<suffix>( |\\)|;|,))")",
    ↪ "${definition}${before}${prefix}*${pointer}${suffix}", null, 70),
154 // Remove scope borders.
155 // ~!root!~
156 //
157 (new Regex(@"~!(?<pointer>[a-zA-Z0-9]+)!~")", "", null, 5),
158 // ref auto root = ref
159 // ref auto root =
160 (new Regex(@"ref ([a-zA-Z0-9]+) ([a-zA-Z0-9]+) = ref(\\W)"), "$1* $2 = $3", null, 0),
161 // *root = ref left;
162 // root = left;
163 (new Regex(@"\\*([a-zA-Z0-9]+) = ref ([a-zA-Z0-9]+)(\\W)"), "$1 = $2$3", null, 0),
164 // (ref left)
165 // (left)
166 (new Regex(@"\\(ref ([a-zA-Z0-9]+)(\\)|\\(|,))")", "($1$2", null, 0),
167 // ref TElement
168 // TElement*
169 (new Regex(@"( |\\()ref ([a-zA-Z0-9]+) ")", "$1$2* ", null, 0),
170 // ref sizeBalancedTree.Root
171 // &sizeBalancedTree->Root
172 (new Regex(@"ref ([a-zA-Z0-9]+)\\.([a-zA-Z0-9\\*]+)"), "&$1->$2", null, 0),
173 // ref GetElement(node).Right
174 // &GetElement(node)->Right
175 (new Regex(@"ref ([a-zA-Z0-9]+)\\((([a-zA-Z0-9\\*]+)\\)\\.([a-zA-Z0-9]+)"),
    ↪ "&$1($2)->$3", null, 0),
176 // GetElement(node).Right
177 // GetElement(node)->Right
178 (new Regex(@"([a-zA-Z0-9]+)\\((([a-zA-Z0-9\\*]+)\\)\\.([a-zA-Z0-9]+)"),
    ↪ null, 0),
179 // [Fact]\\npublic static void SizeBalancedTreeMultipleAttachAndDetachTest()
180 // TEST_METHOD(SizeBalancedTreeMultipleAttachAndDetachTest)
181 (new Regex(@"\\[Fact\\][\\s\\n]+(static )?void ([a-zA-Z0-9]+)\\(\\)"), "TEST_METHOD($2)",
    ↪ null, 0),
182 // class TreesTests
183 // TEST_CLASS(TreesTests)
184 (new Regex(@"class ([a-zA-Z0-9]+)Tests")", "TEST_CLASS($1)", null, 0),
185 // Assert.Equal
186 // Assert::AreEqual
187 (new Regex(@"Assert\\.Equal")", "Assert::AreEqual", null, 0),
188 // TElement Root;
189 // TElement Root = 0;

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190 (new Regex(@"(\r?\n[\t ]+)([a-zA-Z0-9:_]+(?<!return)) ([_a-zA-Z0-9]+);"), "$1$2 $3 =
191     ↳ 0;"; null, 0),
192 // TreeElement _elements[N];
193 // TreeElement _elements[N] = { {0} };
194 (new Regex(@"(\r?\n[\t ]+)([a-zA-Z0-9]+) ([_a-zA-Z0-9]+)\([([_a-zA-Z0-9]+)\];"),
195     ↳ "$1$2 $3[$4] = { {0} }"; null, 0),
196 // auto path = new TElement[MaxPath];
197 // TElement path[MaxPath] = { {0} };
198 (new Regex(@"(\r?\n[\t ]+)[a-zA-Z0-9]+ ([a-zA-Z0-9]+) = new
199     ↳ ([a-zA-Z0-9]+)\([([_a-zA-Z0-9]+)\];"), "$1$3 $2[$4] = { {0} }"; null, 0),
200 // Insert scope borders.
201 // auto added = new HashSet<TElement>();
202 // ~!added!~std::unordered_set<TElement> added;
203 (new Regex(@"auto (?<variable>[a-zA-Z0-9]+) = new
204     ↳ HashSet<(?<element>[a-zA-Z0-9]+)>\(\(\);"),
205     ↳ "~!${variable}!~std::unordered_set<${element}> ${variable}"; null, 0),
206 // Inside the scope of ~!added!~ replace:
207 // added.Add(node)
208 // added.insert(node)
209 (new Regex(@"(?<scope>~!(?<variable>[a-zA-Z0-9]+)!~)(?<separator>.\|\\n)(?<before>((?<
210     ↳ !~!\k<variable>!~)(.\|\\n))*?)\k<variable>\.Add\((?<argument>[a-zA-Z0-9]+)\)",
211     ↳ "${scope}${separator}${before}${variable}.insert(${argument})", null, 10),
212 // Inside the scope of ~!added!~ replace:
213 // added.Remove(node)
214 // added.erase(node)
215 (new Regex(@"(?<scope>~!(?<variable>[a-zA-Z0-9]+)!~)(?<separator>.\|\\n)(?<before>((?<
216     ↳ !~!\k<variable>!~)(.\|\\n))*?)\k<variable>\.Remove\((?<argument>[a-zA-Z0-9]+)\)",
217     ↳ "${scope}${separator}${before}${variable}.erase(${argument})", null, 10),
218 // if (added.insert(node)) {
219 // if (!added.contains(node)) { added.insert(node);
220 (new Regex(@"if \(\((?<variable>[a-zA-Z0-9]+)\.insert\(\((?<argument>[a-zA-Z0-9]+)\)\)\)(?
221     ↳ <separator>[\t ]*[\r\n]+)(?<indent>[\t ]*){", "if
222     ↳ (!${variable}.contains(${argument})) ${separator}${indent}{ " +
223     ↳ Environment.NewLine + "${indent}    ${variable}.insert(${argument});", null, 0),
224 // Remove scope borders.
225 // ~!added!~
226 //
227 (new Regex(@"~!(?<pointer>[a-zA-Z0-9]+)!~"), "", null, 5),
228 // Insert scope borders.
229 // auto random = new System.Random();
230 // std::srand(0);
231 (new Regex(@"[a-zA-Z0-9\.] + ([a-zA-Z0-9]+) = new
232     ↳ (System\.)?Random\(\([a-zA-Z0-9]+\)\);"), "~!$1!~std::srand($3);", null, 0),
233 // Inside the scope of ~!random!~ replace:
234 // random.Next(1, N)
235 // (std::rand() % N) + 1
236 (new Regex(@"(?<scope>~!(?<variable>[a-zA-Z0-9]+)!~)(?<separator>.\|\\n)(?<before>((?<
237     ↳ !~!\k<variable>!~)(.\|\\n))*?)\k<variable>\.Next\(\((?<from>[a-zA-Z0-9]+),
238     ↳ (?<to>[a-zA-Z0-9]+\)\)", "${scope}${separator}${before}(std::rand() % ${to}) +
239     ↳ ${from}"; null, 10),
240 // Remove scope borders.
241 // ~!random!~
242 //
243 (new Regex(@"~!(?<pointer>[a-zA-Z0-9]+)!~"), "", null, 5),
244 // Insert method body scope starts.
245 // void PrintNodes(TElement node, StringBuilder sb, int level) {
246 // void PrintNodes(TElement node, StringBuilder sb, int level) { /*method-start*/
247 (new Regex(@"(?<start>\r?\n[\t ]+)(?<prefix>((virtual)?[a-zA-Z0-9:_]+
248     ↳ )?)(?<method>[a-zA-Z][a-zA-Z0-9]*)\(\((?<arguments>[^\)]*)\)(?<override>(
249     ↳ override)?)(?<separator>[\t\r\n]*)\{(?<end>[^\}])", "${start}${prefix}${method}
250     ↳ (${arguments})${override}${separator}{ /*method-start*/${end}"; null,
251     ↳ 0),
252 // Insert method body scope ends.
253 // { /*method-start*/...}
254 // { /*method-start*/... /*method-end*/}
255 (new Regex(@"\{\/\*method-start\*\/(?<body>((?<bracket>\{)|(?<-bracket>\})|[\^\{\}]*))+
256     ↳ \}"), "{ /*method-start*/${body} /*method-end*/", null,
257     ↳ 0),
258 // Inside method bodies replace:
259 // GetFirst(
260 // this->GetFirst(
261 (new Regex(@"(?<separator>(\(|\|([\W])|return ))(?<!(-->|\\*
262     ↳ ))(?<method>(?!sizeof)[a-zA-Z0-9]+\)\((?!\\) \{)"),
263     ↳ "${separator}this->${method}(", null, 1),

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(new Regex(@"(?<scope>/\*method-start\*/)(?<before>((?!/\*method-end\*/)(.|\n))*?)(
    ↪ ?<separator>[\W](?!(:|\.|->)))(?<method>(?!sizeof)[a-zA-Z0-9]+)\((?!\\
    ↪ \{)(?<after>(.\n)*?)(?<scopeEnd>/\*method-end\*/)"),
    ↪ "${scope}${before}${separator}this->${method}(${after}${scopeEnd}", null, 100),
// Remove scope borders.
// /*method-start*/
//
(new Regex(@"/*method-(start|end)\*/"), "", null, 0),
}.Cast<ISubstitutionRule>().ToList();

public static readonly IList<ISubstitutionRule> LastStage = new List<SubstitutionRule>
{
    // (expression)
    // expression
    (new Regex(@"(\(|\)|\((([a-zA-Z0-9_~*:]*)\)|(| |;|\\))")", "$1$2$3", null, 0),
    // (method(expression))
    // method(expression)
    (new Regex(@"(?<firstSeparator>(\(|
    ↪ ))\((?<method>[a-zA-Z0-9_~*:]*)\((?<expression>((?<parenthesis>\(|(?<-parent
    ↪ hesis>))|[a-zA-Z0-9_~*:]*)\)(?<parenthesis>(?!))\)\)(?<lastSeparator>(|
    ↪ |;|\\))")", "${firstSeparator}${method}(${expression})${lastSeparator}", null, 0),
    // return ref _elements[node];
    // return &_elements[node];
    (new Regex(@"return ref ([_a-zA-Z0-9]+\|([_a-zA-Z0-9_~*~*])\|);")", "return &1[$2];",
    ↪ null, 0),
    // default
    // 0
    (new Regex(@"(\W)default(\W)"), "${1}0$2", null, 0),
    // //define ENABLE_TREE_AUTO_DEBUG_AND_VALIDATION
    //
    (new Regex(@"\\\/[ \t]*\#define[ \t]+[a-zA-Z0-9_~*~*][ \t]*")", "", null, 0),
    // #if USEARRAYPOOL\r\n#endif
    //
    (new Regex(@"\#if [a-zA-Z0-9_~*~*]\s+\#endif")", "", null, 0),
    // [Fact]
    //
    (new Regex(@"(?<firstNewLine>\r?\n|\A)(?<indent>[\t ]+)\[([a-zA-Z0-9_~*~*]+\((?<expressio
    ↪ n>((?<parenthesis>\(|(?<-parenthesis>))|[\^()]*+)\)(?<parenthesis>(?!))\)\)?\][
    ↪ \t]*\(\r?\n\k<indent>?)")", "${firstNewLine}${indent}", null, 5),
    // \n ... namespace
    // namespace
    (new Regex(@"(\\S[\\r\\n]{1,2})?[\\r\\n]+namespace")", "$1namespace", null, 0),
    // \n ... class
    // class
    (new Regex(@"(\\S[\\r\\n]{1,2})?[\\r\\n]+class")", "$1class", null, 0),
}.Cast<ISubstitutionRule>().ToList();

public CSharpToCppTransformer(IList<ISubstitutionRule> extraRules) :
    ↪ base(FirstStage.Concat(extraRules).Concat(LastStage).ToList()) { }

public CSharpToCppTransformer() : base(FirstStage.Concat(LastStage).ToList()) { }

```

1.2 ./Platform.RegularExpressions.Transformer.CSharpToCpp.Tests/CSharpToCppTransformerTests.cs

```

3 namespace Platform.RegularExpressions.Transformer.CSharpToCpp.Tests
4 {
5     public class CSharpToCppTransformerTests
6     {
7         [Fact]
8         public void HelloWorldTest()
9         {
10             const string helloWorldCode = @"using System;
11 class Program
12 {
13     public static void Main(string[] args)
14     {
15         Console.WriteLine(""Hello, world!"");
16     }
17 }";
18             const string expectedResult = @"class Program
19 {
20     public:
21     static void Main(char* args[])
22     {
23         printf(""Hello, world!\n"");

```

```
24     }  
25 };"  
26  
27     var transformer = new CSharpToCppTransformer();  
28     var actualResult = transformer.Transform(helloWorldCode, new Context(null));  
29     Assert.Equal(expectedResult, actualResult);  
30 }  
31 }
```

## Index

./Platform.RegularExpressions.Transformer.CSharpToCpp.Tests/CSharpToCppTransformerTests.cs, 5  
./Platform.RegularExpressions.Transformer.CSharpToCpp/CSharpToCppTransformer.cs, 1