

## 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

```

```

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

```

```

132 // ref TElement root
133 // ~!root!~ref TElement root
134 (new Regex(@"(?<definition>(?!<= |\\() (ref [a-zA-Z0-9]+|[a-zA-Z0-9]+(?<!ref))
    ↳ (?<variable>[a-zA-Z0-9]+)(?!<= |\\()|, | =))"), "~!${variable}!~${definition}", null,
    ↳ 0),
135 // Inside the scope of ~!root!~ replace:
136 // root
137 // *root
138 (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),
139 // Remove scope borders.
140 // ~!root!~
141 //
142 (new Regex(@"~!(?!<pointer>[a-zA-Z0-9]+)!~"), "", null, 5),
143 // ref auto root = ref
144 // ref auto root =
145 (new Regex(@"ref ([a-zA-Z0-9]+) ([a-zA-Z0-9]+) = ref(\\W)"), "$1* $2 =$3", null, 0),
146 // *root = ref left;
147 // root = left;
148 (new Regex(@"\\*([a-zA-Z0-9]+) = ref ([a-zA-Z0-9]+)(\\W)"), "$1 = $2$3", null, 0),
149 // (ref left)
150 // (left)
151 (new Regex(@"\\(ref ([a-zA-Z0-9]+)(\\) |\\(|,)", "($1$2", null, 0),
152 // ref TElement
153 // TElement*
154 (new Regex(@"( |\\()ref ([a-zA-Z0-9]+) "), "$1$2* ", null, 0),
155 // ref sizeBalancedTree.Root
156 // &sizeBalancedTree->Root
157 (new Regex(@"ref ([a-zA-Z0-9]+)\\.([a-zA-Z0-9\\*]+)"), "&$1->$2", null, 0),
158 // ref GetElement(node).Right
159 // &GetElement(node)->Right
160 (new Regex(@"ref ([a-zA-Z0-9]+)\\((([a-zA-Z0-9\\*]+)\\)\\.([a-zA-Z0-9]+)"),
    ↳ "&$1($2)->$3", null, 0),
161 // GetElement(node).Right
162 // GetElement(node)->Right
163 (new Regex(@"([a-zA-Z0-9]+)\\((([a-zA-Z0-9\\*]+)\\)\\.([a-zA-Z0-9]+)"), "$1($2)->$3",
    ↳ null, 0),
164 // [Fact]\\npublic static void SizeBalancedTreeMultipleAttachAndDetachTest()
165 // TEST_METHOD(SizeBalancedTreeMultipleAttachAndDetachTest)
166 (new Regex(@"\\[Fact\\]\\s\\n+(static )?void ([a-zA-Z0-9]+)\\(\\)"), "TEST_METHOD($2)",
    ↳ null, 0),
167 // class TreesTests
168 // TEST_CLASS(TreesTests)
169 (new Regex(@"class ([a-zA-Z0-9]+)Tests"), "TEST_CLASS($1)", null, 0),
170 // Assert.Equal
171 // Assert::AreEqual
172 (new Regex(@"Assert\\.Equal"), "Assert::AreEqual", null, 0),
173 // TElement Root;
174 // TElement Root = 0;
175 (new Regex(@"(\\r?\\n[\\t ]+)([a-zA-Z0-9:_]+(?<!return)) ([_a-zA-Z0-9]+);"), "$1$2 $3 =
    ↳ 0;", null, 0),
176 // TreeElement _elements[N];
177 // TreeElement _elements[N] = { {0} };
178 (new Regex(@"(\\r?\\n[\\t ]+)([a-zA-Z0-9]+) ([_a-zA-Z0-9]+)\\((([_a-zA-Z0-9]+)\\)");
    ↳ "$1$2 $3[$4] = { {0} };", null, 0),
179 // auto path = new TElement[MaxPath];
180 // TElement path[MaxPath] = { {0} };
181 (new Regex(@"(\\r?\\n[\\t ]+)[a-zA-Z0-9]+ ([a-zA-Z0-9]+) = new
    ↳ ([a-zA-Z0-9]+)\\((([_a-zA-Z0-9]+)\\)");
    ↳ "$1$3 $2[$4] = { {0} };", null, 0),
182 // Insert scope borders.
183 // auto added = new HashSet<TElement>();
184 // ~!added!~std::unordered_set<TElement> added;
185 (new Regex(@"auto (?<variable>[a-zA-Z0-9]+) = new
    ↳ HashSet<(?<element>[a-zA-Z0-9]+)>\\(\\)");
    ↳ "~!${variable}!~std::unordered_set<${element}> ${variable};", null, 0),
186 // Inside the scope of ~!added!~ replace:
187 // added.Add(node)
188 // added.insert(node)
189 (new Regex(@"(?<scope>~!(?!<variable>[a-zA-Z0-9]+)!~)(?!<separator>\\.|\\n)(?!<before>((?!<
    ↳ !~!\\k<variable>!~)(.|\\n))*?)\\k<variable>\\.Add\\((?!<argument>[a-zA-Z0-9]+)\\)");
    ↳ "${scope}${separator}${before}${variable}.insert(${argument})", null, 10),
190 // Inside the scope of ~!added!~ replace:
191 // added.Remove(node)
192 // added.erase(node)

```

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193 (new Regex(@"(?<scope>~!(?<variable>[a-zA-Z0-9]+)!~)(?<separator>.\|\\n)(?<before>((?<
    ↳ !~!\\k<variable>!~)(.\\n))*?)\\k<variable>\\.Remove\\((?<argument>[a-zA-Z0-9]+)\\)",
    ↳ "${scope}${separator}${before}${variable}.erase(${argument})", null, 10),
194 // if (added.insert(node)) {
195 // if (!added.contains(node)) { added.insert(node);
196 (new Regex(@"if \\((?<variable>[a-zA-Z0-9]+)\\.insert\\((?<argument>[a-zA-Z0-9]+)\\)\\)(?
    ↳ <separator>[\\t ]*[\\r\\n]+)(?<indent>[\\t ]*){", "if
    ↳ (!${variable}.contains(${argument}))${separator}${indent}{ " +
    ↳ Environment.NewLine + "${indent}    ${variable}.insert(${argument});", null, 0),
197 // Remove scope borders.
198 // ~!added!~
199 //
200 (new Regex(@"~!(?<pointer>[a-zA-Z0-9]+)!~"), "", null, 5),
201 // Insert scope borders.
202 // auto random = new System.Random();
203 // std::srand(0);
204 (new Regex(@"[a-zA-Z0-9\\.]+ ([a-zA-Z0-9]+) = new
    ↳ (System\\.)?Random\\((([a-zA-Z0-9]+)\\);", "~!$!~std::srand($$);", null, 0),
205 // Inside the scope of ~!random!~ replace:
206 // random.Next(1, N)
207 // (std::rand() % N) + 1
208 (new Regex(@"(?<scope>~!(?<variable>[a-zA-Z0-9]+)!~)(?<separator>.\|\\n)(?<before>((?<
    ↳ !~!\\k<variable>!~)(.\\n))*?)\\k<variable>\\.Next\\((?<from>[a-zA-Z0-9]+),
    ↳ (?<to>[a-zA-Z0-9]+)\\)", "${scope}${separator}${before}(std::rand() % ${to}) +
    ↳ ${from}", null, 10),
209 // Remove scope borders.
210 // ~!random!~
211 //
212 (new Regex(@"~!(?<pointer>[a-zA-Z0-9]+)!~"), "", null, 5),
213 // Insert method body scope starts.
214 // void PrintNodes(TElement node, StringBuilder sb, int level) {
215 // void PrintNodes(TElement node, StringBuilder sb, int level) { /*method-start*/
216 (new Regex(@"(?<start>\\r?\\n[\\t ]+)(?<prefix>((virtual )?[a-zA-Z0-9:_.]+
    ↳ )?)(?<method>[a-zA-Z][a-zA-Z0-9_]*)\\((?<arguments>[~\\])*\\)(?<override>(
    ↳ override)?)(?<separator>[\\t\\r\\n]*)\\{(?<end>[~\\])", "${start}${prefix}${method}
    ↳ ${arguments}${override}${separator}{ /*method-start*/${end}", null,
    ↳ 0),
217 // Insert method body scope ends.
218 // { /*method-start*/...}
219 // { /*method-start*/... /*method-end*/}
220 (new Regex(@"\\{\\/\\*method-start\\*/(?<body>((?<bracket>\\{)|(?!<-bracket>\\})|[^\\{\\}]*)+)
    ↳ \\}", "{ /*method-start*/${body} /*method-end*/", null,
    ↳ 0),
221 // Inside method bodies replace:
222 // GetFirst(
223 // this->GetFirst(
224 // (new Regex(@"(?<separator>(\\(| |([\\W]) |return ))(?<!(?!<->|\\*
    ↳ )))(?<method>(?!sizeof)[a-zA-Z0-9]+)\\((?!\\) \\{)",
    ↳ "${separator}this->${method}(", null, 1),
225 (new Regex(@"(?<scope>\\/\\*method-start\\*/)(?<before>((?!\\/\\*method-end\\*/)(.\\n))*?) (
    ↳ ?<separator>[\\W] (?<!(?!<:|\\.|->)))(?<method>(?!sizeof)[a-zA-Z0-9]+)\\((?!\\)
    ↳ \\{)(?<after>(\\.\\n)*?)(?<scopeEnd>\\/\\*method-end\\*/)",
    ↳ "${scope}${before}${separator}this->${method}(${after}${scopeEnd}", null, 100),
226 // Remove scope borders.
227 // /*method-start*/
228 //
229 (new Regex(@"\\/\\*method-(start|end)\\*/"), "", null, 0),
230 }.Cast<ISubstitutionRule>().ToList();
231
232 public static readonly IList<ISubstitutionRule> LastStage = new List<SubstitutionRule>
233 {
234 // (expression)
235 // expression
236 (new Regex(@"\\((| )\\((([a-zA-Z0-9_\\*:]*)\\)(,| |;|\\))")", "$1$2$3", null, 0),
237 // (method(expression))
238 // method(expression)
239 (new Regex(@"(?<firstSeparator>(\\(|
    ↳ ))\\((?<method>[a-zA-Z0-9_\\*:]*)\\((?<expression>((?<parenthesis>(\\(|(?<-parent
    ↳ hesis>\\))|[a-zA-Z0-9_\\*:]*)\\)(?(parenthesis)(?!))\\)\\)(?<lastSeparator>(,|
    ↳ |;|\\)))")", "${firstSeparator}${method}(${expression})${lastSeparator}", null, 0),
240 // return ref _elements[node];
241 // return &elements[node];
242 (new Regex(@"return ref ([a-zA-Z0-9]+)\\([([a-zA-Z0-9_\\*:]*)\\];", "return &$1[$2];",
    ↳ null, 0),
243 // default
244 // 0

```

```

245         (new Regex(@"(\\W)default(\\W)", "${1}0$2", null, 0),
246         // //define ENABLE_TREE_AUTO_DEBUG_AND_VALIDATION
247         //
248         (new Regex(@"\\/[ \t]*#define[ \t]+[_a-zA-Z0-9]+[ \t]*"), "", null, 0),
249         // #if USEARRAYPOOL\r\n#endif
250         //
251         (new Regex(@"#if [a-zA-Z0-9]+\s#endif"), "", null, 0),
252         // [Fact]
253         //
254         (new Regex(@"(?<firstNewLine>\r?\n|\\A)(?<indent>[ \t ]+)\\[ [a-zA-Z0-9]+(\(((?<expression>
↪ n>((?<parenthesis>\(|(?<-parenthesis>\)|[^\(\)]*))?(?<parenthesis>(?!))\))?\] [
↪ \t]*\\(r?\n|k<indent>)?")", "${firstNewLine}${indent}", null, 5),
255         // \n ... namespace
256         // namespace
257         (new Regex(@"(\\S[\\r\\n]{1,2})?[\\r\\n]+namespace)", "$1namespace", null, 0),
258         // \n ... class
259         // class
260         (new Regex(@"(\\S[\\r\\n]{1,2})?[\\r\\n]+class)", "$1class", null, 0),
261     }.Cast<ISubstitutionRule>().ToList();
262
263     public CSharpToCppTransformer(IList<ISubstitutionRule> extraRules) :
↪     base(FirstStage.Concat(extraRules).Concat(LastStage).ToList()) { }
264
265     public CSharpToCppTransformer() : base(FirstStage.Concat(LastStage).ToList()) { }
266 }
267 }

```

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

```

1 using Xunit;
2
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             var transformer = new CSharpToCppTransformer();
27             var actualResult = transformer.Transform(helloWorldCode, new Context(null));
28             Assert.Equal(expectedResult, actualResult);
29         }
30     }
31 }

```

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