

## 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

```

```

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
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]+)", "$1($2)->$3",
→ 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;
190 (new Regex(@"(\\r?\\n[\\t ]+)([a-zA-Z0-9:_]+(?<return>)) ([_a-zA-Z0-9]+);", "$1$2 $3 =
→ 0;", null, 0),

```

```

191 // TreeElement _elements[N];
192 // TreeElement _elements[N] = { {0} };
193 (new Regex(@"(\\r?\\n[\\t ]+)([a-zA-Z0-9]+) ([_a-zA-Z0-9]+)\\([([_a-zA-Z0-9]+)\\];") ,
194     ↳ "$1$2 $3[$4] = { {0} };", null, 0),
195 // auto path = new TElement[MaxPath];
196 // TElement path[MaxPath] = { {0} };
197 (new Regex(@"(\\r?\\n[\\t ]+)[a-zA-Z0-9]+ ([a-zA-Z0-9]+) = new
198     ↳ ([a-zA-Z0-9]+)\\([([_a-zA-Z0-9]+)\\];") , "$1$3 $2[$4] = { {0} };", null, 0),
199 // Insert scope borders.
200 // auto added = new HashSet<TElement>();
201 // ~!added!~std::unordered_set<TElement> added;
202 (new Regex(@"auto (?<variable>[a-zA-Z0-9]+) = new
203     ↳ HashSet<(?<element>[a-zA-Z0-9]+)>\\(\\);") ,
204     ↳ "~!${variable}!~std::unordered_set<${element}> ${variable};", null, 0),
205 // Inside the scope of ~!added!~ replace:
206 // added.Add(node)
207 // added.insert(node)
208 (new Regex(@"(?<scope>~!(?<variable>[a-zA-Z0-9]+)!~)(?<separator>\\.|\\n)(?<before>((?<
209     ↳ !~!\\k<variable>!~)(\\.|\\n))*?)\\k<variable>\\.Add\\((?<argument>[a-zA-Z0-9]+)\\)",
210     ↳ "${scope}${separator}${before}${variable}.insert(${argument})", null, 10),
211 // Inside the scope of ~!added!~ replace:
212 // added.Remove(node)
213 // added.erase(node)
214 (new Regex(@"(?<scope>~!(?<variable>[a-zA-Z0-9]+)!~)(?<separator>\\.|\\n)(?<before>((?<
215     ↳ !~!\\k<variable>!~)(\\.|\\n))*?)\\k<variable>\\.Remove\\((?<argument>[a-zA-Z0-9]+)\\)",
216     ↳ "${scope}${separator}${before}${variable}.erase(${argument})", null, 10),
217 // if (added.insert(node)) {
218 // if (!added.contains(node)) { added.insert(node);
219 (new Regex(@"if \\((?<variable>[a-zA-Z0-9]+)\\.insert\\((?<argument>[a-zA-Z0-9]+)\\)\\)(?
220     ↳ <separator>[\\t ]*[\\r\\n]+)(?<indent>[\\t ]*){") , "if
221     ↳ (!${variable}.contains(${argument}))${separator}${indent}{ " +
222     ↳ Environment.NewLine + "${indent}    ${variable}.insert(${argument});", null, 0),
223 // Remove scope borders.
224 // ~!added!~
225 //
226 (new Regex(@"~!(?<pointer>[a-zA-Z0-9]+)!~") , "", null, 5),
227 // Insert scope borders.
228 // auto random = new System.Random(0);
229 // std::srand(0);
230 (new Regex(@"[a-zA-Z0-9\\.]+ ([a-zA-Z0-9]+) = new
231     ↳ (System\\.)?Random\\((([a-zA-Z0-9]+)\\);") , "~!$1!~std::srand($3);", null, 0),
232 // Inside the scope of ~!random!~ replace:
233 // random.Next(1, N)
234 // (std::rand() % N) + 1
235 (new Regex(@"(?<scope>~!(?<variable>[a-zA-Z0-9]+)!~)(?<separator>\\.|\\n)(?<before>((?<
236     ↳ !~!\\k<variable>!~)(\\.|\\n))*?)\\k<variable>\\.Next\\((?<from>[a-zA-Z0-9]+) ,
237     ↳ (?<to>[a-zA-Z0-9]+)\\)", "${scope}${separator}${before}(std::rand() % ${to}) +
238     ↳ ${from}", null, 10),
239 // Remove scope borders.
240 // ~!random!~
241 //
242 (new Regex(@"~!(?<pointer>[a-zA-Z0-9]+)!~") , "", null, 5),
243 // Insert method body scope starts.
244 // void PrintNodes(TElement node, StringBuilder sb, int level) {
245 // void PrintNodes(TElement node, StringBuilder sb, int level) { /*method-start*/
246 (new Regex(@"(?<start>\\r?\\n[\\t ]+)(?<prefix>((virtual )?[a-zA-Z0-9:_]+
247     ↳ )?) (?<method>[a-zA-Z][a-zA-Z0-9]*)\\((?<arguments>[~\\])*\\) (?<override>(
248     ↳ override)?)(?<separator>[\\t\\r\\n]*)\\{(?<end>[~\\])") , "${start}${prefix}${method}
249     ↳ (${arguments})${override}${separator}{ /*method-start*/${end}" , null,
250     ↳ 0),
251 // Insert method body scope ends.
252 // { /*method-start*/...}
253 // { /*method-start*/... /*method-end*/}
254 (new Regex(@"{ /*method-start*/ (?<body>((?<bracket>\\{) | (?<-bracket>\\}) | [^\\{\\}]*)+ )
255     ↳ \\}" , "{ /*method-start*/ ${body} /*method-end*/", null,
256     ↳ 0),
257 // Inside method bodies replace:
258 // GetFirst(
259 // this->GetFirst(
260 // (new Regex(@"(?<separator>\\(| |([\\W]) |return ))(?<!(\\->|\\*
261     ↳ )) (?<method>(?!sizeof) [a-zA-Z0-9]+)\\((?!\\) \\{") ,
262     ↳ "${separator}this->${method}(", null, 1),
263 (new Regex(@"(?<scope>\\/*method-start*/)(?<before>((?<!(\\/*method-end*/)(\\.|\\n))*?) (
264     ↳ ?<separator>[\\W] (?<!(\\:|\\.|->))) (?<method>(?!sizeof) [a-zA-Z0-9]+)\\((?!\\)
265     ↳ \\{) (?<after>(\\.|\\n))*?) (?<scopeEnd>\\/*method-end*/)",
266     ↳ "${scope}${before}${separator}this->${method}(${after}${scopeEnd}", null, 100),

```

```

241 // Remove scope borders.
242 // /*method-start*/
243 //
244 (new Regex(@"\/\*method-(start|end)\*/"), "", null, 0),
245 }.Cast<ISubstitutionRule>().ToList();
246
247 public static readonly IList<ISubstitutionRule> LastStage = new List<SubstitutionRule>
248 {
249     // (expression)
250     // expression
251     (new Regex(@"(\(|\)|((([a-zA-Z0-9_\\*:]*)\\(|\;|\\))"), "$1$2$3", null, 0),
252     // (method(expression))
253     // method(expression)
254     (new Regex(@"(?<firstSeparator>\\(|
    ↪   ))\\((?<method>[a-zA-Z0-9_\\*:]*)\\((?<expression>((?<parenthesis>\\(|(?<-parent
    ↪   hesis>\\)|[a-zA-Z0-9_\\*:]*)\\((?<parenthesis>(?!))\\))\\(?<lastSeparator>\\(|
    ↪   \\;|\\))"))", "${firstSeparator}${method}${expression}${lastSeparator}", null, 0),
255     // return ref _elements[node];
256     // return &elements[node];
257     (new Regex(@"return ref ([_a-zA-Z0-9]+)\\([[_a-zA-Z0-9\\*]+]\\;");", "return &$1[$2];",
    ↪   null, 0),
258     // default
259     // 0
260     (new Regex(@"(\\W)default(\\W)"), "${1}0$2", null, 0),
261     // //define ENABLE_TREE_AUTO_DEBUG_AND_VALIDATION
262     //
263     (new Regex(@"\\\/[ \t]*\\#define[ \t]+[_a-zA-Z0-9]+[ \t]*")", "", null, 0),
264     // #if USEARRAYPOOL\\r\\n#endif
265     //
266     (new Regex(@"#if [a-zA-Z0-9]+\\s+\\#endif")", "", null, 0),
267     // [Fact]
268     //
269     (new Regex(@"(?<firstNewLine>\\r?\\n|\\A)(?<indent>[ \t ]+)\\([_a-zA-Z0-9]+(\\((?<expressio
    ↪   n>((?<parenthesis>\\(|(?<-parenthesis>\\)|\\^([ \t])*)\\((?<parenthesis>(?!))\\))?)\\[
    ↪   \t]*\\(\\r?\\n\\k<indent>)?")", "${firstNewLine}${indent}", null, 5),
270     // \\n ... namespace
271     // namespace
272     (new Regex(@"(\\S[\\r\\n]{1,2})?[\\r\\n]+namespace")", "$1namespace", null, 0),
273     // \\n ... class
274     // class
275     (new Regex(@"(\\S[\\r\\n]{1,2})?[\\r\\n]+class")", "$1class", null, 0),
276 }.Cast<ISubstitutionRule>().ToList();
277
278 public CSharpToCppTransformer(IList<ISubstitutionRule> extraRules) :
    ↪   base(FirstStage.Concat(extraRules).Concat(LastStage).ToList()) { }
279
280 public CSharpToCppTransformer() : base(FirstStage.Concat(LastStage).ToList()) { }
281 }
282 }

```

## 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 }
```

## Index

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