

1.1 ./csharp/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 : TextTransformer
11     {
12         public static readonly IList

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58 //
59 (new Regex(@"r?\n[^\n]+bool operator !=\(((?<type>[^\n]+) (?<left>[a-zA-Z0-9]+),
    ↳ \k<type> (?<right>[a-zA-Z0-9]+)\) => !\((\k<left>|\k<right>) ==
    ↳ (\k<left>|\k<right>)\);"), "", 10),
60 // public override bool Equals(object obj) => obj is Range<T> range ? Equals(range)
    ↳ : false;
61 //
62 (new Regex(@"r?\n[^\n]+override bool Equals\((System\.)?[Oo]bject
    ↳ (?<this>[a-zA-Z0-9]+)\) => \k<this> is [^\n]+ (?<other>[a-zA-Z0-9]+) \?
    ↳ Equals\(\k<other>\) : false;"), "", 10),
63 // out TProduct
64 // TProduct
65 (new Regex(@"(?<before><|, ))(in|out)
    ↳ (?<typeParameter>[a-zA-Z0-9]+)(?<after>>|,))"),
    ↳ "${before}${typeParameter}${after}", 10),
66 // public ...
67 // public: ...
68 (new Regex(@"(?<newLineAndIndent>r?\n?[
    ↳ \t]*) (?<before>[^\{\\(\r\n)*) (?<access>private|protected|public) [ \t]+(?![^\{\\(\r
    ↳ \n]*((?<=\\s)|\\W) (interface|class|struct) (\\W) [^\{\\(\r\n)*[\\{\\(\r\n)]"),
    ↳ "${newLineAndIndent}${access}: ${before}", 0),
69 // public: static bool CollectExceptions { get; set; }
70 // public: inline static bool CollectExceptions;
71 (new Regex(@"(?<access>(private|protected|public): ) (?<before>(static )? [^\r\n]+
    ↳ ) (?<name>[a-zA-Z0-9]+) {[~;]}*(?<=\\W) get; [~;]}*(?<=\\W) set; [~;]}*"),
    ↳ "${access}inline ${before}${name}";", 0),
72 // public abstract class
73 // class
74 (new Regex(@"((public|protected|private|internal|abstract|static)
    ↳ )*(?<category>interface|class|struct)", "${category}", 0),
75 //class GenericCollectionMethodsBase<TElement> {
76 // template <typename TElement> class GenericCollectionMethodsBase {
77 (new Regex(@"(?<before>r?\n) (?<indent>[ \t]*) (?<type>class|struct)
    ↳ (?<typeName>[a-zA-Z0-9]+)<(?<typeParameters>[a-zA-Z0-9
    ↳ ,]+)> (?<typeDefinitionEnding>[^\{]+){", "${before}${indent}template <typename
    ↳ ...> ${type} ${typeName};" + Environment.NewLine + "${indent}template <typename
    ↳ ${typeParameters}> ${type}
    ↳ ${typeName}<${typeParameters}>${typeDefinitionEnding}{", 0),
78 // static void
    ↳ TestMultipleCreationsAndDeletions<TElement>(SizedBinaryTreeMethodsBase<TElement>
    ↳ tree, TElement* root)
79 // template<typename T> static void
    ↳ TestMultipleCreationsAndDeletions<TElement>(SizedBinaryTreeMethodsBase<TElement>
    ↳ tree, TElement* root)
80 (new Regex(@"static ([a-zA-Z0-9]+) ([a-zA-Z0-9]+)<([a-zA-Z0-9]+)>\\(((\\r\\n)+)\\)",
    ↳ "template <typename $3> static $1 $2($4)", 0),
81 // interface IFactory<out TProduct> {
82 // template <typename...> class IFactory; \ntemplate <typename TProduct> class
    ↳ IFactory<TProduct>
83 (new Regex(@"(?<before>r?\n) (?<indent>[ \t]*) interface
    ↳ (?<interface>[a-zA-Z0-9]+)<(?<typeParameters>[a-zA-Z0-9
    ↳ ,]+)> (?<typeDefinitionEnding>[^\{]+){", "${before}${indent}template <typename
    ↳ ...> class ${interface};" + Environment.NewLine + "${indent}template <typename
    ↳ ${typeParameters}> class
    ↳ ${interface}<${typeParameters}>${typeDefinitionEnding}{", 0),
    ↳ "public:", 0),
84 // template <typename TObject, TProperty, TValue>
85 // template <typename TObject, typename TProperty, typename TValue>
86 (new Regex(@"(?<before>template <((, )?typename [a-zA-Z0-9]+)+,
    ↳ ) (?<typeParameter>[a-zA-Z0-9]+) (?<after>(,|>))"), "${before}typename
    ↳ ${typeParameter}${after}", 10),
87 // Insert markers
88 // private: static void BuildExceptionString(this StringBuilder sb, Exception
    ↳ exception, int level)
89 // /*~extensionMethod~BuildExceptionString~*/private: static void
    ↳ BuildExceptionString(this StringBuilder sb, Exception exception, int level)
90 (new Regex(@"private: static [^\r\n]+ (?<name>[a-zA-Z0-9]+)\\(this [^\r\n]+\\)",
    ↳ "/*~extensionMethod~${name}~*/$0", 0),
91 // Move all markers to the beginning of the file.
92 (new Regex(@"\A(?<before>[^\r\n]+\r?\n(.|\n)+) (?<marker>\/\*~extensionMethod~(?<name>
    ↳ [a-zA-Z0-9]+)~\*/)", "${marker}${before}",
    ↳ 10),
93 // /*~extensionMethod~BuildExceptionString~*/...sb.BuildExceptionString(exception.In_
    ↳ nerException, level +
    ↳ 1);

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94 // /*~extensionMethod~BuildExceptionString~*/...BuildExceptionString(sb,
    ↳ exception.InnerException, level + 1);
95 (new Regex(@"(?<before>/\/*~extensionMethod~(?<name>[a-zA-Z0-9]+)~\*/(.\|\\n)+\\W)(?<var_
    ↳ iable>[_a-zA-Z0-9]+)\\.\\k<name>\\("), "${before}${name}${{variable}}, ",
    ↳ 50),
96 // Remove markers
97 // /*~extensionMethod~BuildExceptionString~*/
98 //
99 (new Regex(@"/*~extensionMethod~[a-zA-Z0-9]+~\*/"), "", 0),
100 // (this
101 // (
102 (new Regex(@"\\(this "), "("), 0),
103 // private: static readonly Disposal _emptyDelegate = (manual, wasDisposed) => { };
104 // private: inline static std::function<Disposal> _emptyDelegate = [](auto manual,
    ↳ auto wasDisposed) { };
105 (new Regex(@"(?<access>(private|protected|public): )?static readonly
    ↳ (?<type>[a-zA-Z][a-zA-Z0-9]*) (?<name>[a-zA-Z_][a-zA-Z0-9_]*) =
    ↳ \\((?<firstArgument>[a-zA-Z_][a-zA-Z0-9_]*)
    ↳ (?<secondArgument>[a-zA-Z_][a-zA-Z0-9_]*)\\) => {\\s*};"), "${access}inline static
    ↳ std::function<${type}> ${name} = [](auto ${firstArgument}, auto
    ↳ ${secondArgument}) { };", 0),
106 // public: static readonly EnsureAlwaysExtensionRoot Always = new
    ↳ EnsureAlwaysExtensionRoot();
107 // public: inline static EnsureAlwaysExtensionRoot Always;
108 (new Regex(@"(?<access>(private|protected|public): )?static readonly
    ↳ (?<type>[a-zA-Z0-9]+(<[a-zA-Z0-9]+>?)) (?<name>[a-zA-Z0-9_]+) = new
    ↳ \\k<type>\\(\\);"), "${access}inline static ${type} ${name};", 0),
109 // public: static readonly Range<int> SByte = new
    ↳ Range<int>(std::numeric_limits<int>::min(), std::numeric_limits<int>::max());
110 // public: inline static Range<int> SByte =
    ↳ Range<int>(std::numeric_limits<int>::min(), std::numeric_limits<int>::max());
111 (new Regex(@"(?<access>(private|protected|public): )?static readonly
    ↳ (?<type>[a-zA-Z0-9]+(<[a-zA-Z0-9]+>?)) (?<name>[a-zA-Z0-9_]+) = new
    ↳ \\k<type>\\(\\((?<arguments>[\\n]+)\\);"), "${access}inline static ${type} ${name} =
    ↳ ${type}${{arguments}};", 0),
112 // public: static readonly string ExceptionContentsSeparator = "---";
113 // public: inline static std::string ExceptionContentsSeparator = "---";
114 (new Regex(@"(?<access>(private|protected|public): )?(const|static readonly) string
    ↳ (?<name>[a-zA-Z0-9_]+) = ""(?<string>(\\\\"|\\r\\n)+)"";"), "${access}inline
    ↳ static std::string ${name} = \\\"${string}\\\";", 0),
115 // private: const int MaxPath = 92;
116 // private: inline static const int MaxPath = 92;
117 (new Regex(@"(?<access>(private|protected|public): )?(const|static readonly)
    ↳ (?<type>[a-zA-Z0-9]+) (?<name>[_a-zA-Z0-9]+) = (?<value>[~;\\r\\n]+);"),
    ↳ "${access}inline static const ${type} ${name} = ${value};", 0),
118 // ArgumentNotNull(EnsureAlwaysExtensionRoot root, TArgument argument) where
    ↳ TArgument : class
119 // ArgumentNotNull(EnsureAlwaysExtensionRoot root, TArgument* argument)
120 (new Regex(@"(?<before> [a-zA-Z]+\\((([a-zA-Z *],+), |))(?<type>[a-zA-Z]+)(?<after>(\\
    ↳ [a-zA-Z *,]+)\\)) [\\r\\n]+where \\k<type> : class"), "${before}${type}*${after}",
    ↳ 0),
121 // protected: abstract TElement GetFirst();
122 // protected: virtual TElement GetFirst() = 0;
123 (new Regex(@"(?<access>(private|protected|public): )?abstract
    ↳ (?<method>[~;\\r\\n]+);"), "${access}virtual ${method} = 0;", 0),
124 // TElement GetFirst();
125 // virtual TElement GetFirst() = 0;
126 (new Regex(@"(?<before>[\\r\\n]+ [ ]+)(?<methodDeclaration>(?!return) [a-zA-Z0-9]+
    ↳ [a-zA-Z0-9]+\\(([^\\)\\r\\n]*\\))(?<after>;[ ]*[\\r\\n]+)"), "${before}virtual
    ↳ ${methodDeclaration} = 0${after}", 1),
127 // protected: readonly TreeElement[] _elements;
128 // protected: TreeElement _elements[N];
129 (new Regex(@"(?<access>(private|protected|public): )?readonly
    ↳ (?<type>[a-zA-Z<>0-9]+)(\\[\\]]+) (?<name>[_a-zA-Z0-9]+);"), "${access}${type}
    ↳ ${name}[N];", 0),
130 // protected: readonly TElement Zero;
131 // protected: TElement Zero;
132 (new Regex(@"(?<access>(private|protected|public): )?readonly
    ↳ (?<type>[a-zA-Z<>0-9]+) (?<name>[_a-zA-Z0-9]+);"), "${access}${type} ${name};",
    ↳ 0),
133 // internal
134 //
135 (new Regex(@"(\\W)internal\\s+"), "$1", 0),
136 // static void NotImplementedException(ThrowExtensionRoot root) => throw new
    ↳ NotImplementedException();

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137 // static void NotImplementedException(ThrowExtensionRoot root) { return throw new
    ↳ NotImplementedException(); }
138 (new Regex(@"(^s+)(private|protected|public)?(: )?(template \<[^>\r\n]+\> )?(static
    ↳ )?(override)?([a-zA-Z0-9]+
    ↳ )([a-zA-Z0-9]+\(((^\\(\\r\\n)*)\\)\s+=>\s+throw([~;\r\n]+);"),
    ↳ "$1$2$3$4$5$6$7$8($9) { throw$10; }", 0),
139 // SizeBalancedTree(int capacity) => a = b;
140 // SizeBalancedTree(int capacity) { a = b; }
141 (new Regex(@"(^s+)(private|protected|public)?(: )?(template \<[^>\r\n]+\> )?(static
    ↳ )?(override)?(void)?([a-zA-Z0-9]+\(((^\\(\\r\\n)*)\\)\s+=>\s+([~;\r\n]+);"),
    ↳ "$1$2$3$4$5$6$7$8($9) { $10; }", 0),
142 // int SizeBalancedTree(int capacity) => a;
143 // int SizeBalancedTree(int capacity) { return a; }
144 (new Regex(@"(^s+)(private|protected|public)?(: )?(template \<[^>\r\n]+\> )?(static
    ↳ )?(override)?([a-zA-Z0-9]+
    ↳ )([a-zA-Z0-9]+\(((^\\(\\r\\n)*)\\)\s+=>\s+([~;\r\n]+);"), "$1$2$3$4$5$6$7$8($9) {
    ↳ return $10; }", 0),
145 // OnDispose = (manual, wasDisposed) =>
146 // OnDispose = [&](auto manual, auto wasDisposed)
147 (new Regex(@"(?<variable>[a-zA-Z_][a-zA-Z0-9_]*) (?<operator>\s*[\+=\s*])\(((?<firstArg_
    ↳ ument>[a-zA-Z_][a-zA-Z0-9_]*) ,
    ↳ (?<secondArgument>[a-zA-Z_][a-zA-Z0-9_]*)\\)\s*=>"),
    ↳ "$${variable}$$operator [&](auto $${firstArgument}, auto $${secondArgument})", 0),
148 // () => Integer<TElement>.Zero;
149 // () { return Integer<TElement>.Zero; },
150 (new Regex(@"\\(\\)\s+=>\s+(?<expression>[^() ,;\\r\\n]+(\\(((?<parenthesis>\\(|(?<-parent_
    ↳ hesis>\\)|[^() ,;\\r\\n]*)*?\\))?(^() ,;\\r\\n*) (?<after>,|\\);)"), "() { return
    ↳ $${expression}; }$${after}", 0),
151 // ~DisposableBase() => Destruct();
152 // ~DisposableBase() { Destruct(); }
153 (new Regex(@"~(?<class>[a-zA-Z_][a-zA-Z0-9_]*)\\(\\)\s+=>\s+([~;\r\n]+?);"),
    ↳ "~$${class}() { $1; }", 0),
154 // => Integer<TElement>.Zero;
155 // { return Integer<TElement>.Zero; }
156 (new Regex(@"\\)\s+=>\s+([~;\r\n]+?);"), ") { return $1; }", 0),
157 // () { return avlTree.Count; }
158 // [&]() -> auto { return avlTree.Count; }
159 (new Regex(@"(?<before>, |\\()\\(\\) { return (?<expression>[^;\r\n]+); }"),
    ↳ "$${before} [&]() -> auto { return $${expression}; }", 0),
160 // Count => GetSizeOrZero(Root);
161 // Count() { return GetSizeOrZero(Root); }
162 (new Regex(@"(\\W)([A-Z][a-zA-Z]+)\\s+=>\s+([~;\r\n]+);"), "$1$2() { return $3; }", 0),
163 // public: T Object { get; }
164 // public: const T Object;
165 (new Regex(@"(?<before>[~\\r\\r?\\n[ \\t]*) (?<access>(private|protected|public):
    ↳ )?(?<type>[a-zA-Z_][a-zA-Z0-9_:<]*)
    ↳ (?<property>[a-zA-Z_][a-zA-Z0-9_]*) (?<blockOpen>[\\n\\s]*{[\\n\\s]*}\\([\\^\\n]+\\)[\\n\\s_
    ↳ ]*)?get; (?<blockClose>[\\n\\s]*}) (?<after>[\\n\\s]*")", "$${before}$$access}const
    ↳ $${type} $${property};$${after}", 2),
166 // public: bool IsDisposed { get => _disposed > 0; }
167 // public: bool IsDisposed() { return _disposed > 0; }
168 (new Regex(@"(?<before>[~\\r\\r?\\n[ \\t]*) (?<access>(private|protected|public):
    ↳ )?(?<virtual>virtual )?bool
    ↳ (?<property>[a-zA-Z_][a-zA-Z0-9_]*) (?<blockOpen>[\\n\\s]*{[\\n\\s]*}\\([\\^\\n]+\\)[\\n\\s_
    ↳ ]*)?get\\s*=>\\s*(?<expression>[^\\n]+); (?<blockClose>[\\n\\s]*}[\\n\\s]*")",
    ↳ "$${before}$$access}$$virtual}bool $${property}()$${blockOpen}return
    ↳ $${expression};$${blockClose}", 2),
169 // protected: virtual std::string ObjectName { get => GetType().Name; }
170 // protected: virtual std::string ObjectName() { return GetType().Name; }
171 (new Regex(@"(?<before>[~\\r\\r?\\n[ \\t]*) (?<access>(private|protected|public):
    ↳ )?(?<virtual>virtual )?(?<type>[a-zA-Z_][a-zA-Z0-9_:<]*)
    ↳ (?<property>[a-zA-Z_][a-zA-Z0-9_]*) (?<blockOpen>[\\n\\s]*{[\\n\\s]*}\\([\\^\\n]+\\)[\\n\\s_
    ↳ ]*)?get\\s*=>\\s*(?<expression>[^\\n]+); (?<blockClose>[\\n\\s]*}[\\n\\s]*")",
    ↳ "$${before}$$access}$$virtual}$$type} $${property}()$${blockOpen}return
    ↳ $${expression};$${blockClose}", 2),
172 // ArgumentInRange(string message) { string messageBuilder() { return message; }
173 // ArgumentInRange(string message) { auto messageBuilder = [&]() -> string { return
    ↳ message; };
174 (new Regex(@"(?<before>\\W[_a-zA-Z0-9]+\\(\\(\\^\\)\\n\\s*)\\[\\s\\n\\s]*{[\\s\\n\\s]*(\\^{}|\\n)*?(\\r?\\n)
    ↳ ?[ \\t]*} (?<returnType>[_a-zA-Z0-9*:] +[_a-zA-Z0-9*:] *)
    ↳ (?<methodName>[_a-zA-Z0-9]+)\\(\\(\\(\\^\\)\\n\\s*)\\)\\s*{(?<body>("[^""\\n]+""|
    ↳ [~}\\n]+)?})", "$${before}auto $${methodName} = [&]() -> $${returnType}
    ↳ { $${body} };", 10),
175 // Func<TElement> treeCount
176 // std::function<TElement()> treeCount
177 (new Regex(@"Func<([a-zA-Z0-9]+)> ([a-zA-Z0-9]+)", "std::function<$1()> $2", 0),

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178 // Action<TElement> free
179 // std::function<void(TElement)> free
180 (new Regex(@"Action<([a-zA-Z0-9]+)> ([a-zA-Z0-9]+)", "std::function<void($1)> $2",
    → 0),
181 // Action<TPPrimary, TAuxiliary> action
182 // std::function<void(TPrimary, TAuxiliary)> action
183 (new Regex(@"Action<([a-zA-Z0-9]+), ([a-zA-Z0-9]+)> ([a-zA-Z0-9]+)",
    → "std::function<void($1, $2)> $3", 0),
184 // , Action<TPPrimary, TAuxiliary>>
185 // , std::function<void(TPrimary, TAuxiliary)>>
186 (new Regex(@"(, )Action<([a-zA-Z0-9]+), ([a-zA-Z0-9]+)>(>)",
    → "$1std::function<void($2, $3)>$4", 0),
187 // Action action
188 // std::function<void()> action
189 (new Regex(@"Action ([a-zA-Z0-9]+)", "std::function<void()> $1", 0),
190 // , Action>
191 // ,std::function<void()>>
192 (new Regex(@"(, )Action(>)", "$1std::function<void()>$2", 0),
193 // Predicate<TArgument> predicate
194 // std::function<bool(TArgument)> predicate
195 (new Regex(@"Predicate<([a-zA-Z0-9]+)> ([a-zA-Z0-9]+)", "std::function<bool($1)>
    → $2", 0),
196 // var
197 // auto
198 (new Regex(@"(\W)var(\W)", "$1auto$2", 0),
199 // unchecked
200 //
201 (new Regex(@"[\r\n]{2}\s*?unchecked\s*?$"), "", 0),
202 // throw new
203 // throw
204 (new Regex(@"(\W)throw new(\W)", "$1throw$2", 0),
205 // void RaiseExceptionIgnoredEvent(Exception exception)
206 // void RaiseExceptionIgnoredEvent(const std::exception& exception)
207 (new Regex(@"(\(|, )(System\.Exception|Exception)( |\))", "$1const
    → std::exception&$3", 0),
208 // EventHandler<Exception>
209 // EventHandler<std::exception>
210 (new Regex(@"(\W)(System\.Exception|Exception)(\W)", "$1std::exception$3", 0),
211 // override void PrintNode(TElement node, StringBuilder sb, int level)
212 // void PrintNode(TElement node, StringBuilder sb, int level) override
213 (new Regex(@"override ([a-zA-Z0-9 \*+]+)(\([^\\r\n]+?\))", "$1$2 override", 0),
214 // return (range.Minimum, range.Maximum)
215 // return {range.Minimum, range.Maximum}
216 (new Regex(@"(?<before>return\s*)(\((?<values>[^\n]+\))\)(?! \() (?<after>\W)",
    → "${before}${values}${after}", 0),
217 // string
218 // std::string
219 (new Regex(@"(?<before>\W)(?<!:)string(?<after>\W)",
    → "${before}std::string${after}", 0),
220 // System.ValueTuple
221 // std::tuple
222 (new Regex(@"(?<before>\W)(System\.)?ValueTuple(?:\s*=\| \() (?<after>\W)",
    → "${before}std::tuple${after}", 0),
223 // sbyte
224 // std::int8_t
225 (new Regex(@"(?<before>\W)((System\.)?SB|sbyte(?:\s*=\| \() (?<after>\W)",
    → "${before}std::int8_t${after}", 0),
226 // short
227 // std::int16_t
228 (new Regex(@"(?<before>\W)((System\.)?Int16|short)(?! \s*=\| \() (?<after>\W)",
    → "${before}std::int16_t${after}", 0),
229 // int
230 // std::int32_t
231 (new Regex(@"(?<before>\W)((System\.)?I|i)nt(32)?(?:\s*=\| \() (?<after>\W)",
    → "${before}std::int32_t${after}", 0),
232 // long
233 // std::int64_t
234 (new Regex(@"(?<before>\W)((System\.)?Int64|long)(?! \s*=\| \() (?<after>\W)",
    → "${before}std::int64_t${after}", 0),
235 // byte
236 // std::uint8_t
237 (new Regex(@"(?<before>\W)((System\.)?Byte|byte)(?! \s*=\| \() (?<after>\W)",
    → "${before}std::uint8_t${after}", 0),
238 // ushort
239 // std::uint16_t

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240 (new Regex(@"(?<before>\W)((System\.)?UInt16|ushort)(?!\\s*=\|\\)(?<after>\W)",
241     ↳ "${before}std::uint16_t${after}", 0),
242 // uint
243 // std::uint32_t
244 (new Regex(@"(?<before>\W)((System\.)?UI|ui)nt(32)?(?!\\s*=\|\\)(?<after>\W)",
245     ↳ "${before}std::uint32_t${after}", 0),
246 // ulong
247 // std::uint64_t
248 (new Regex(@"(?<before>\W)((System\.)?UInt64|ulong)(?!\\s*=\|\\)(?<after>\W)",
249     ↳ "${before}std::uint64_t${after}", 0),
250 // char*[] args
251 // char* args[]
252 (new Regex(@"([_a-zA-Z0-9:\*]?)\\[\\] ([a-zA-Z0-9]+)", "$1 $2[]", 0),
253 // float.MinValue
254 // std::numeric_limits<float>::lowest()
255 (new Regex(@"(?<before>\W)(?<type>std::[a-z0-9_]+|float|double)\\.MinValue(?<after>\W|
256     ↳ )"), "${before}std::numeric_limits<${type}>::lowest()${after}",
257     ↳ 0),
258 // double.MaxValue
259 // std::numeric_limits<float>::max()
260 (new Regex(@"(?<before>\W)(?<type>std::[a-z0-9_]+|float|double)\\.MaxValue(?<after>\W|
261     ↳ )"), "${before}std::numeric_limits<${type}>::max()${after}",
262     ↳ 0),
263 // using Platform.Numbers;
264 //
265 (new Regex(@"([\\r\\n]{2}|^\\s*?using [\\.a-zA-Z0-9]+;\\s*?${$})", "", 0),
266 // struct TreeElement { }
267 // struct TreeElement { };
268 (new Regex(@"(struct|class) ([a-zA-Z0-9]+)(\\s+){([\\sa-zA-Z0-9;:_]+?)}([^;])", "$1
269     ↳ $2$3$4;$5", 0),
270 // class Program { }
271 // class Program { };
272 (new Regex(@"(?<type>struct|class)
273     ↳ (?<name>[a-zA-Z0-9]+[\\r\\n]*) (?<beforeBody>[\\r\\n]+(?<indentLevel>[\\t
274     ↳ ]*)?) { (?<body>[\\S\\s]+? [\\r\\n]+\\k<indentLevel>) } { (?<afterBody>[^;]|$) }", "${type}
275     ↳ ${name}${beforeBody}${body}${afterBody}", 0),
276 // class SizedBinaryTreeMethodsBase : GenericCollectionMethodsBase
277 // class SizedBinaryTreeMethodsBase : public GenericCollectionMethodsBase
278 (new Regex(@"(struct|class) ([a-zA-Z0-9]+)(<[a-zA-Z0-9 ,]+>)? : ([a-zA-Z0-9]+)",
279     ↳ "$1 $2$3 : public $4", 0),
280 // class IProperty : ISetter<TValue, TObject>, IProvider<TValue, TObject>
281 // class IProperty : public ISetter<TValue, TObject>, public IProvider<TValue,
282     ↳ TObject>
283 (new Regex(@"(?<before>(struct|class) [a-zA-Z0-9]+ : ((public
284     ↳ [a-zA-Z0-9]+(<[a-zA-Z0-9 ,]+>)?,
285     ↳ )+)? (?<inheritedType>(?!public) [a-zA-Z0-9]+(<[a-zA-Z0-9 ,]+>)? (?<after>(,
286     ↳ [a-zA-Z0-9]+(?!)| [\\r\\n]+))", "${before}public ${inheritedType}${after}", 10),
287 // Insert scope borders.
288 // ref TElement root
289 // ~!root!~ref TElement root
290 (new Regex(@"(?<definition>(?!= |\\)(ref [a-zA-Z0-9]+|[a-zA-Z0-9]+(?<ref>
291     ↳ (?<variable>[a-zA-Z0-9]+)(?=\\|, | =))", "~!${variable}!~${definition}", 0),
292 // Inside the scope of ~!root!~ replace:
293 // root
294 // *root
295 (new Regex(@"(?<definition>~!(?<pointer>[a-zA-Z0-9]+)!~ref [a-zA-Z0-9]+
296     ↳ \\k<pointer>(?!=\\|, | =)) (?<before>((?!~!\\k<pointer>!~)(.|\\n))*?) (?<prefix>(\\W
297     ↳ |\\(|)\\k<pointer>(?!<suffix>( |\\(|;|,|)))",
298     ↳ "${definition}${before}${prefix}*${pointer}${suffix}", 70),
299 // Remove scope borders.
300 // ~!root!~
301 //
302 (new Regex(@"~!(?<pointer>[a-zA-Z0-9]+)!~"), "", 5),
303 // ref auto root = ref
304 // ref auto root =
305 (new Regex(@"ref ([a-zA-Z0-9]+) ([a-zA-Z0-9]+) = ref(\\W)", "$1* $2 =$3", 0),
306 // *root = ref left;
307 // root = left;
308 (new Regex(@"\\*([a-zA-Z0-9]+) = ref ([a-zA-Z0-9]+)(\\W)", "$1 = $2$3", 0),
309 // (ref left)
310 // (left)
311 (new Regex(@"\\(ref ([a-zA-Z0-9]+)(\\)|\\(|,)", "($1$2", 0),
312 // ref TElement
313 // TElement*
314 (new Regex(@"( |\\(|)ref ([a-zA-Z0-9]+) ", "$1$2* ", 0),
315 // ref sizeBalancedTree.Root

```

```

296 // &sizeBalancedTree->Root
297 (new Regex(@"ref ([a-zA-Z0-9]+)\.([a-zA-Z0-9\*]+)", "&$1->$2", 0),
298 // ref GetElement(node).Right
299 // &GetElement(node)->Right
300 (new Regex(@"ref ([a-zA-Z0-9]+)\((([a-zA-Z0-9\*]+)\)\.([a-zA-Z0-9]+)",
    ↳ "&$1($2)->$3", 0),
301 // GetElement(node).Right
302 // GetElement(node)->Right
303 (new Regex(@"([a-zA-Z0-9]+)\((([a-zA-Z0-9\*]+)\)\.([a-zA-Z0-9]+)", "$1($2)->$3", 0),
304 // [Fact]npublic: static void SizeBalancedTreeMultipleAttachAndDetachTest()
305 // public: TEST_METHOD(SizeBalancedTreeMultipleAttachAndDetachTest)
306 (new Regex(@"\[Fact\] \[s\n\]+(public: )?(static )?void ([a-zA-Z0-9]+)\(\)", "public:
    ↳ TEST_METHOD($3)", 0),
307 // class TreesTests
308 // TEST_CLASS(TreesTests)
309 (new Regex(@"class ([a-zA-Z0-9]+Tests)", "TEST_CLASS($1)", 0),
310 // Assert.Equal
311 // Assert::AreEqual
312 (new Regex(@"(?<type>Assert)\. (?<method>(Not)?Equal)", "${type}::Are${method}", 0),
313 // Assert.Throws
314 // Assert::ExpectException
315 (new Regex(@"(Assert)\.Throws", "$1::ExpectException", 0),
316 // Assert.True
317 // Assert::IsTrue
318 (new Regex(@"(Assert)\.(True|False)", "$1::Is$2", 0),
319 // $"Argument {argumentName} is null."
320 // std::string("Argument
    ↳ ").append(Platform::Converters::To<std::string>(argumentName)).append(" is
    ↳ null.")
321 (new Regex(@"\$" "(?<left>(\\" | [^"\r\n])*) { (?<expression>[_a-zA-Z0-9]+) } { (?<right>(\\"
    ↳ \\" | [^"\r\n])*) """,
    ↳ "std::string(\$\" \"${left}\").append(Platform::Converters::To<std::string>(${expres
    ↳ sion})).append(\$\" \"${right}\")",
    ↳ 10),
322 // $"
323 // "
324 (new Regex(@"\$""", "\"", 0),
325 // std::string(std::string("[").append(Platform::Converters::To<std::string>(Minimum
    ↳ )),append(",
    ↳ )),append(Platform::Converters::To<std::string>(Maximum)).append("]")
326 // std::string("[").append(Platform::Converters::To<std::string>(Minimum)).append(",
    ↳ ").append(Platform::Converters::To<std::string>(Maximum)).append("]")
327 (new Regex(@"std::string\(((?<begin>std::string\(\"\"(\\" | [^"\r\n])*)*\\" )\.\append\((Platf
    ↳ orm::Converters::To<std::string>\((~)\n)+\| [^]\n)+\))\)\.\append()",
    ↳ "${begin}.append", 10),
328 // Console.WriteLine("...")
329 // printf("...\n")
330 (new Regex(@"Console\.WriteLine\(\"\"([^"\r\n]+)\"\" )", "printf(\$\" \"$1\n\" )", 0),
331 // TElement Root;
332 // TElement Root = 0;
333 (new Regex(@"(?<before>\r?\n[\t ]+)(?<access>(private|protected|public)(:
    ↳ ))?(?<type>[a-zA-Z0-9:_]+(?<!return>)) (?<name>[a-zA-Z0-9]+);",
    ↳ "${before}${access}${type} ${name} = 0;", 0),
334 // TreeElement _elements[N];
335 // TreeElement _elements[N] = { {0} };
336 (new Regex(@"(\r?\n[\t ]+)(private|protected|public)?(: )?([a-zA-Z0-9]+)
    ↳ ([a-zA-Z0-9]+)\[([a-zA-Z0-9]+\];", "$1$2$3$4 $5[$6] = { {0} };", 0),
337 // auto path = new TElement[MaxPath];
338 // TElement path[MaxPath] = { {0} };
339 (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} };", 0),
340 // bool Equals(Range<T> other) { ... }
341 // bool operator ==(const Key &other) const { ... }
342 (new Regex(@"(?<before>\r?\n[^\n]+bool )Equals\(((?<type>[^\n]+\))
    ↳ (?<variable>[a-zA-Z0-9]+\)\) (?<after>(\s|\n)*{)", "${before}operator ==(const
    ↳ ${type} &${variable}) const${after}", 0),
343 // Insert scope borders.
344 // class Range { ... public: override std::string ToString() { return ...; }
345 // class Range { /*~Range<T>~*/ ... public: override std::string ToString() { return
    ↳ ...; }
346 (new Regex(@"(?<classDeclarationBegin>\r?\n(?<indent>[\t ]*)template <typename
    ↳ (?<typeParameter>[^\<>\n]+\> (struct|class)
    ↳ (?<type>[a-zA-Z0-9]+\<k<typeParameter>>) (\s*:\s*[^\n]+)?[\t ]*(\r?\n)?[\t
    ↳ ]*(?<middle>((?!class|struct).|\n)+?) (?<toStringDeclaration>(?(access>(private|
    ↳ protected|public): )override std::string ToString\(\)\))",
    ↳ "${classDeclarationBegin}/~${type}~*/${middle}${toStringDeclaration}", 0),

```



```

347 // Inside the scope of ~!Range!~ replace:
348 // public: override std::string ToString() { return ...; }
349 // public: operator std::string() const { return ...; }\n\npublic: friend
    ↳ std::ostream & operator <<(std::ostream &out, const A &obj) { return out <<
    ↳ (std::string)obj; }
350 (new Regex(@"(?<scope>/\s*(?<type>[_a-zA-Z0-9<>:]+\s*/)(?<separator>.\n)(?<before>
    ↳ ((?!/\s*\k<type>\s*/)(.\n))*?(?<toStringDeclaration>\r?\n(?<indent>[
    ↳ \t]*)?(?<access>(private|protected|public): )override std::string ToString\(\)
    ↳ (?<toStringMethodBody>{\[~\]\n}+))"), "${scope}${separator}${before}" +
    ↳ Environment.NewLine + "${indent}${access}operator std::string() const
    ↳ ${toStringMethodBody}" + Environment.NewLine + Environment.NewLine +
    ↳ "${indent}${access}friend std::ostream & operator <<(std::ostream &out, const
    ↳ ${type} &obj) { return out << (std::string)obj; }", 0),
351 // Remove scope borders.
352 // /*~Range~*/
353 //
354 (new Regex(@"/\s*[_a-zA-Z0-9<>:]+\s*/"), "", 0),
355 // private: inline static ConcurrentBag<std::exception> _exceptionsBag;
356 // private: inline static std::mutex _exceptionsBag_mutex; \n\n private: inline
    ↳ static std::vector<std::exception> _exceptionsBag;
357 (new Regex(@"(?<begin>\r?\n?(?<indent>[ \t]+))(?<access>(private|protected|public):
    ↳ )?inline static ConcurrentBag<(?(argumentType>[~;\r\n]+)>
    ↳ (?(name>[_a-zA-Z0-9]+);)", "${begin}private: inline static std::mutex
    ↳ ${name}_mutex;" + Environment.NewLine + Environment.NewLine +
    ↳ "${indent}${access}inline static std::vector<${argumentType}> ${name};", 0),
358 // public: static IReadOnlyCollection<std::exception> GetCollectedExceptions() {
    ↳ return _exceptionsBag; }
359 // public: static std::vector<std::exception> GetCollectedExceptions() { return
    ↳ std::vector<std::exception>(_exceptionsBag); }
360 (new Regex(@"(?<access>(private|protected|public): )?static
    ↳ IReadOnlyCollection<(?(argumentType>[~;\r\n]+)> (?(methodName>[_a-zA-Z0-9]+)\(\)
    ↳ { return (?(fieldName>[_a-zA-Z0-9]+); })", "${access}static
    ↳ std::vector<${argumentType}> ${methodName}() { return
    ↳ std::vector<${argumentType}>(${fieldName}); }", 0),
361 // public: static event EventHandler<std::exception> ExceptionIgnored =
    ↳ OnExceptionIgnored; ... };
362 // ... public: static inline Platform::Delegates::MulticastDelegate<void(void*,
    ↳ const std::exception&> ExceptionIgnored = OnExceptionIgnored; };
363 (new Regex(@"(?<begin>\r?\n(\r?\n)?(?<halfIndent>[
    ↳ \t]+)\k<halfIndent>)(?<access>(private|protected|public): )?static event
    ↳ EventHandler<(?(argumentType>[~;\r\n]+)> (?(name>[_a-zA-Z0-9]+) = (?(defaultDele
    ↳ gate>[_a-zA-Z0-9]+); (?(middle>(. \n)+?) (?(end>\r?\n\k<halfIndent>};)")),
    ↳ "${middle}" + Environment.NewLine + Environment.NewLine +
    ↳ "${halfIndent}${halfIndent}${access}static inline
    ↳ Platform::Delegates::MulticastDelegate<void(void*, const ${argumentType}&>
    ↳ ${name} = ${defaultDelegate};${end}", 0),
364 // public: event Disposal OnDispose;
365 // public: Platform::Delegates::MulticastDelegate<Disposal> OnDispose;
366 (new Regex(@"(?<begin>(?(access>(private|protected|public): )?(static )?)event
    ↳ (?(type>[_a-zA-Z][:_a-zA-Z0-9]+) (?(name>[_a-zA-Z][_a-zA-Z0-9]+);)",
    ↳ "${begin}Platform::Delegates::MulticastDelegate<${type}> ${name};", 0),
367 // Insert scope borders.
368 // class IgnoredExceptions { ... private: inline static std::vector<std::exception>
    ↳ _exceptionsBag;
369 // class IgnoredExceptions {/*~_exceptionsBag~*/ ... private: inline static
    ↳ std::vector<std::exception> _exceptionsBag;
370 (new Regex(@"(?<classDeclarationBegin>\r?\n(?<indent>[\t ]*)class [~{\r\n]+\r\n[\t
    ↳ ]*(?<middle>((?!class).\n)+?) (?(vectorFieldDeclaration>(?(access>(private|pro
    ↳ tected|public): )inline static std::vector<(?(argumentType>[~;\r\n]+)>
    ↳ (?(fieldName>[_a-zA-Z0-9]+);)")),
    ↳ "${classDeclarationBegin}/*~${fieldName}~*/${middle}${vectorFieldDeclaration}",
    ↳ 0),
371 // Inside the scope of ~!_exceptionsBag!~ replace:
372 // _exceptionsBag.Add(exception);
373 // _exceptionsBag.push_back(exception);
374 (new Regex(@"(?<scope>/\s*(?<fieldName>[_a-zA-Z0-9]+\s*/)(?<separator>.\n)(?<befor
    ↳ e>((?!/\s*\k<fieldName>\s*/)(.\n))*?\k<fieldName>\.Add")
    ↳ "${scope}${separator}${before}${fieldName}.push_back", 10),
375 // Remove scope borders.
376 // /*~_exceptionsBag~*/
377 //
378 (new Regex(@"/\s*[_a-zA-Z0-9]+\s*/"), "", 0),
379 // Insert scope borders.
380 // class IgnoredExceptions { ... private: static std::mutex _exceptionsBag_mutex;
381 // class IgnoredExceptions {/*~_exceptionsBag~*/ ... private: static std::mutex
    ↳ _exceptionsBag_mutex;

```



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382 (new Regex(@"(?<classDeclarationBegin>\r?\n(?<indent>[\t ]*)class [^{\r\n}+\r\n[\t
    ↳ ]*)(?<middle>((?!class)\.|\n)+?)(?<mutexDeclaration>private: inline static
    ↳ std::mutex (?<fieldName>[_a-zA-Z0-9]+)_mutex;)" ),
    ↳ "${classDeclarationBegin}/*~${fieldName}~*/${middle}${mutexDeclaration}", 0),
383 // Inside the scope of ~!exceptionsBag!~ replace:
384 // return std::vector<std::exception>(_exceptionsBag);
385 // std::lock_guard<std::mutex> guard(_exceptionsBag_mutex); return
    ↳ std::vector<std::exception>(_exceptionsBag);
386 (new Regex(@"(?<scope>/\s*(?<fieldName>[_a-zA-Z0-9]+)~\s*/)(?<separator>.\s\n)(?<before>
    ↳ e>((?!/\s*\k<fieldName>~\s*/)(\s\n))*?){(?<after>((?!lock_guard)[^{};\r\n])*k<f
    ↳ ieldName>[~;}\r\n]*;)" ), "${scope}${separator}${before}{
    ↳ std::lock_guard<std::mutex> guard(${fieldName}_mutex);${after}", 10),
387 // Inside the scope of ~!exceptionsBag!~ replace:
388 // _exceptionsBag.Add(exception);
389 // std::lock_guard<std::mutex> guard(_exceptionsBag_mutex); \r\n
    ↳ _exceptionsBag.Add(exception);
390 (new Regex(@"(?<scope>/\s*(?<fieldName>[_a-zA-Z0-9]+)~\s*/)(?<separator>.\s\n)(?<before>
    ↳ e>((?!/\s*\k<fieldName>~\s*/)(\s\n))*?){(?<after>((?!lock_guard)([~{};]\s\n))*?r
    ↳ ?\n(?<indent>[\t ]*)\k<fieldName>[~;}\r\n]*;)" ),
    ↳ "${scope}${separator}${before}{
    ↳ " + Environment.NewLine +
    ↳ "${indent}std::lock_guard<std::mutex> guard(${fieldName}_mutex);${after}", 10),
391 // Remove scope borders.
392 // /*~_exceptionsBag~*/
393 //
394 (new Regex(@"/\s*~[_a-zA-Z0-9]+\s*/"), "", 0),
395 // Insert scope borders.
396 // class IgnoredExceptions { ... public: static inline
    ↳ Platform::Delegates::MulticastDelegate<void(void*, const std::exception&)>
    ↳ ExceptionIgnored = OnExceptionIgnored;
397 // class IgnoredExceptions {/*~ExceptionIgnored~*/ ... public: static inline
    ↳ Platform::Delegates::MulticastDelegate<void(void*, const std::exception&)>
    ↳ ExceptionIgnored = OnExceptionIgnored;
398 (new Regex(@"(?<classDeclarationBegin>\r?\n(?<indent>[\t ]*)class [^{\r\n}+\r\n[\t
    ↳ ]*)(?<middle>((?!class)\.|\n)+?)(?<eventDeclaration>(?(<access>(private|protected
    ↳ |public): )static inline
    ↳ Platform::Delegates::MulticastDelegate<(?(<argumentType>[~;\r\n]+)>
    ↳ (?(<name>[_a-zA-Z0-9]+) = (?(<defaultDelegate>[_a-zA-Z0-9]+);)" ),
    ↳ "${classDeclarationBegin}/*~${name}~*/${middle}${eventDeclaration}", 0),
399 // Inside the scope of ~!ExceptionIgnored!~ replace:
400 // ExceptionIgnored.Invoke(NULL, exception);
401 // ExceptionIgnored(NULL, exception);
402 (new Regex(@"(?<scope>/\s*(?<eventName>[_a-zA-Z0-9]+)~\s*/)(?<separator>.\s\n)(?<before>
    ↳ >((?!/\s*\k<eventName>~\s*/)(\s\n))*?)\k<eventName>\.Invoke)",
    ↳ "${scope}${separator}${before}${eventName}", 10),
403 // Remove scope borders.
404 // /*~ExceptionIgnored~*/
405 //
406 (new Regex(@"/\s*~[_a-zA-Z0-9]+\s*/"), "", 0),
407 // Insert scope borders.
408 // auto added = new StringBuilder();
409 // /*~sb~*/std::string added;
410 (new Regex(@"(auto|(System\.\Text\.)?StringBuilder) (?(<variable>[_a-zA-Z0-9]+) = new
    ↳ (System\.\Text\.)?StringBuilder\(\);)" ), "/*~${variable}~*/std::string
    ↳ ${variable};", 0),
411 // static void Indent(StringBuilder sb, int level)
412 // static void Indent(/*~sb~*/StringBuilder sb, int level)
413 (new Regex(@"(?<start>, \|() (System\.\Text\.)?StringBuilder
    ↳ (?(<variable>[_a-zA-Z0-9]+)(?<end>, \|))" ), "${start}/*~${variable}~*/std::string&
    ↳ ${variable}${end}", 0),
414 // Inside the scope of ~!added!~ replace:
415 // sb.ToString()
416 // sb
417 (new Regex(@"(?<scope>/\s*(?<variable>[_a-zA-Z0-9]+)~\s*/)(?<separator>.\s\n)(?<before>
    ↳ ((?!/\s*\k<variable>~\s*/)(\s\n))*?)\k<variable>\.ToString\(\);)" ),
    ↳ "${scope}${separator}${before}${variable}", 10),
418 // sb.AppendLine(argument)
419 // sb.append(Platform::Converters::To<std::string>(argument)).append(1, '\n')
420 (new Regex(@"(?<scope>/\s*(?<variable>[_a-zA-Z0-9]+)~\s*/)(?<separator>.\s\n)(?<before>
    ↳ ((?!/\s*\k<variable>~\s*/)(\s\n))*?)\k<variable>\.AppendLine\((?(<argument>[~\
    ↳ r\n]+)\)\);)" ),
    ↳ "${scope}${separator}${before}${variable}.append(Platform::Converters::To<std::s
    ↳ tring>(${argument})).append(1, '\\n')",
    ↳ 10),
421 // sb.Append('\t', level);
422 // sb.append(level, '\t');

```

```

423 (new Regex(@"(?<scope>/\~*(?<variable>[a-zA-Z0-9]+)~\*/)(?<separator>.\|\\n)(?<before>
↳ (((?!/\~*\k<variable>~\*/)(.\|\\n))*?)\k<variable>\.Append\('(?(character>[^\r\n]
↳ +)', (?(count>[^\|,\\r\\n]+)\\)\"),
↳ "${scope}${separator}${before}${variable}.append(${count}, '${character}')", 10),
424 // sb.Append(argument)
425 // sb.append(Platform::Converters::To<std::string>(argument))
426 (new Regex(@"(?<scope>/\~*(?<variable>[a-zA-Z0-9]+)~\*/)(?<separator>.\|\\n)(?<before>
↳ (((?!/\~*\k<variable>~\*/)(.\|\\n))*?)\k<variable>\.Append\(((?<argument>[^\|,\\r\\n]
↳ +)\\)\"),
↳ "${scope}${separator}${before}${variable}.append(Platform::Converters::To<std::s
↳ tring>(${argument}))",
↳ 10),
427 // Remove scope borders.
428 // /*~sb~*/
429 //
430 (new Regex(@"/*~[a-zA-Z0-9]+~\*/"), "", 0),
431 // Insert scope borders.
432 // auto added = new HashSet<TElement>();
433 // ~!added!~std::unordered_set<TElement> added;
434 (new Regex(@"auto (?<variable>[a-zA-Z0-9]+) = new
↳ HashSet<(?<element>[a-zA-Z0-9]+)>\\(\\)\"),
↳ "~!${variable}!~std::unordered_set<${element}> ${variable};", 0),
435 // Inside the scope of ~!added!~ replace:
436 // added.Add(node)
437 // added.insert(node)
438 (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})", 10),
439 // Inside the scope of ~!added!~ replace:
440 // added.Remove(node)
441 // added.erase(node)
442 (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(${argument})", 10),
443 // if (added.insert(node)) {
444 // if (!added.contains(node)) { added.insert(node);
445 (new Regex(@"if \\(((?<variable>[a-zA-Z0-9]+)\\.insert\\(((?<argument>[a-zA-Z0-9]+)\\)\\)(?
↳ <separator>[\\t ]*[\\r\\n]+)(?<indent>[\\t ]*){\"", "if
↳ (!${variable}.contains(${argument}))${separator}${indent}{\" +
↳ Environment.NewLine + "${indent}    ${variable}.insert(${argument});", 0),
446 // Remove scope borders.
447 // ~!added!~
448 //
449 (new Regex(@"~![a-zA-Z0-9]+!~"), "", 5),
450 // Insert scope borders.
451 // auto random = new System.Random(0);
452 // std::srand(0);
453 (new Regex(@"[a-zA-Z0-9\\.]+ ([a-zA-Z0-9]+) = new
↳ (System\\.)?Random\\((([a-zA-Z0-9]+)\\)\"), "~!$1!~std::srand($3);", 0),
454 // Inside the scope of ~!random!~ replace:
455 // random.Next(1, N)
456 // (std::rand() % N) + 1
457 (new Regex(@"(?<scope>~!(?<variable>[a-zA-Z0-9]+)!~)(?<separator>.\|\\n)(?<before>((?<
↳ !~!\k<variable>!~)(.\|\\n))*?)\k<variable>\.Next\\(((?<from>[a-zA-Z0-9]+),
↳ (?<to>[a-zA-Z0-9]+)\\)\"), "${scope}${separator}${before}(std::rand() % ${to}) +
↳ ${from}", 10),
458 // Remove scope borders.
459 // ~!random!~
460 //
461 (new Regex(@"~![a-zA-Z0-9]+!~"), "", 5),
462 // Insert method body scope starts.
463 // void PrintNodes(TElement node, StringBuilder sb, int level) {
464 // void PrintNodes(TElement node, StringBuilder sb, int level) {/*method-start*/
465 (new Regex(@"(?<start>\\r\\n[\\t ]+)(?<prefix>((private|protected|public): )?(virtual
↳ )?[a-zA-Z0-9:_.]+
↳ )?(?<method>[a-zA-Z][a-zA-Z0-9_]*)((?<arguments>[^\|\\]*)\\)(?<override>(
↳ override)?)(?<separator>[\\t\\r\\n]*)\\{((?<end>[^\|\\]*)\\)\"), "${start}${prefix}${method}
↳ (${arguments})${override}${separator}{/*method-start*/${end}\"",
↳ 0),
466 // Insert method body scope ends.
467 // {/*method-start*/...}
468 // {/*method-start*/.../*method-end*/}
469 (new Regex(@"\\{\\/\\*method-start\\*/((?<body>((?<bracket>\\{)|(?!-bracket>\\})|[^\\{\\}]*))+
↳ \\}\"), \"/*method-start*/${body}/*method-end*/\",
↳ 0),
470 // Inside method bodies replace:

```

```

471 // GetFirst(
472 // this->GetFirst(
473 (new
    Regex(@"(?<scope>/\*method-start\*/)(?<before>((?<!\/*method-end\*/)(.|\n))*?)(?
    ↪ <separator>[\W](?!(:|\.|->|throw\s+)))(?<method>(?!sizeof)[a-zA-Z0-9]+\((?!\\
    ↪ \{)(?<after>(.|\n))*?)(?<scopeEnd>/\*method-end\*/)"),
    ↪ "${scope}${before}${separator}this->${method}(${after}${scopeEnd}", 100),
474 // Remove scope borders.
475 // /*method-start*/
476 //
477 (new Regex(@"/*method-(start|end)\*/"), "", 0),
478 // Insert scope borders.
479 // const std::exception& ex
480 // const std::exception& ex/*~ex~*/
481 (new Regex(@"(?<before>\(|\s)(?<variableDefinition>(const)?(std::)?exception&
    ↪ (?<variable>[_a-zA-Z0-9]+\s)(?<after>\W)"),
    ↪ "${before}${variableDefinition}/*~${variable}~*/${after}", 0),
482 // Inside the scope of ~!ex!~ replace:
483 // ex.Message
484 // ex.what()
485 (new Regex(@"(?<scope>/\*~(?<variable>[_a-zA-Z0-9]+\s)~\*/)(?<separator>.\|\n)(?<before>
    ↪ >((?<!\/*~\k<variable>~\*/)(.|\n))*?)(Platform::Converters::To<std::string>\(\k<
    ↪ variable>\.Message\)\|\k<variable>\.Message)"),
    ↪ "${scope}${separator}${before}${variable}.what()", 10),
486 // Remove scope borders.
487 // /*~ex~*/
488 //
489 (new Regex(@"/*~[_a-zA-Z0-9]+\s~\*/"), "", 0),
490 // throw ObjectDisposedException(objectName, message);
491 // throw std::runtime_error(std::string("Attempt to access disposed object
    ↪ ").append(objectName).append(": ").append(message).append("."));
492 (new Regex(@"throw ObjectDisposedException\((?<objectName>[a-zA-Z][_a-zA-Z0-9_]*)
    ↪ (?<message>[a-zA-Z0-9_]*[Mm]essage[a-zA-Z0-9_]*\(\(\)\)?|[a-zA-Z][_a-zA-Z0-9_]*)\)\)
    ↪ ;"), "throw std::runtime_error(std::string("Attempt to access disposed object
    ↪ [\\").append("${objectName}").append("\\"): \").append("${message}").append("\\.\\");",
    ↪ 0),
493 // throw ArgumentNullException(argumentName, message);
494 // throw std::invalid_argument(std::string("Argument
    ↪ ").append(argumentName).append(" is null: ").append(message).append("."));
495 (new Regex(@"throw
    ↪ ArgumentNullException\((?<argument>[a-zA-Z]*[Aa]rgument[a-zA-Z]*),
    ↪ (?<message>[a-zA-Z]*[Mm]essage[a-zA-Z]*\(\(\)\)?\);"), "throw
    ↪ std::invalid_argument(std::string("Argument \").append("${argument}").append("\\
    ↪ is null: \").append("${message}").append("\\.\\");", 0),
496 // throw ArgumentException(message, argumentName);
497 // throw std::invalid_argument(std::string("Invalid ").append(argumentName).append("
    ↪ argument: \").append(message).append("."));
498 (new Regex(@"throw
    ↪ ArgumentException\((?<message>[a-zA-Z]*[Mm]essage[a-zA-Z]*\(\(\)\)?),
    ↪ (?<argument>[a-zA-Z]*[Aa]rgument[a-zA-Z]*\)\);"), "throw
    ↪ std::invalid_argument(std::string("Invalid \").append("${argument}").append("\\
    ↪ argument: \").append("${message}").append("\\.\\");", 0),
499 // throw ArgumentOutOfRangeException(argumentName, argumentValue, messageBuilder());
500 // throw std::invalid_argument(std::string("Value
    ↪ ").append(Platform::Converters::To<std::string>(argumentValue)).append("] of
    ↪ argument [").append(argumentName).append("] is out of range:
    ↪ ").append(messageBuilder()).append("."));
501 (new Regex(@"throw ArgumentOutOfRangeException\((?<argument>[a-zA-Z]*[Aa]rgument[a-z
    ↪ A-Z]*([Nn]ame[a-zA-Z]*)?),
    ↪ (?<argumentValue>[a-zA-Z]*[Aa]rgument[a-zA-Z]*([Vv]alue[a-zA-Z]*)?),
    ↪ (?<message>[a-zA-Z]*[Mm]essage[a-zA-Z]*\(\(\)\)?\);"), "throw
    ↪ std::invalid_argument(std::string("Value
    ↪ [\\").append(Platform::Converters::To<std::string>("${argumentValue}")).append("\\
    ↪ of argument [\\").append("${argument}").append("\\] is out of range:
    ↪ \").append("${message}").append("\\.\\");", 0),
502 // throw NotSupportedException();
503 // throw std::logic_error("Not supported exception.");
504 (new Regex(@"throw NotSupportedException\(\);"), "throw std::logic_error("Not
    ↪ supported exception.\");", 0),
505 // throw NotImplementedException();
506 // throw std::logic_error("Not implemented exception.");
507 (new Regex(@"throw NotImplementedException\(\);"), "throw std::logic_error("Not
    ↪ implemented exception.\");", 0),
508 // Insert scope borders.
509 // const std::string& message

```

```

510 // const std::string& message/*~message~/
511 (new Regex(@"(?<before>\(| )(?<variableDefinition>(const )?(std::)?string&?|char\*)
    ↳ (?<variable>[_a-zA-Z0-9]+))(?<after>\W)",
    ↳ "${before}${variableDefinition}/*~${variable}~*/${after}", 0),
512 // Inside the scope of /*~message~/ replace:
513 // Platform::Converters::To<std::string>(message)
514 // message
515 (new Regex(@"(?<scope>/\*~(?<variable>[_a-zA-Z0-9]+)~\*/)(?<separator>.\|\\n)(?<before>
    ↳ >((?!/\*~\k<variable>~\*/)(.\\n))*?)Platform::Converters::To<std::string>\(\\k<v
    ↳ ariable>\\")", "${scope}${separator}${before}${variable}",
    ↳ 10),
516 // Remove scope borders.
517 // /*~ex~/
518 //
519 (new Regex(@"/*~[_a-zA-Z0-9]+~\*/"), "", 0),
520 // Insert scope borders.
521 // std::tuple<T, T> tuple
522 // std::tuple<T, T> tuple/*~tuple~/
523 (new Regex(@"(?<before>\(| )(?<variableDefinition>(const )?(std::)?tuple<[^\\n]+>&?
    ↳ (?<variable>[_a-zA-Z0-9]+))(?<after>\W)",
    ↳ "${before}${variableDefinition}/*~${variable}~*/${after}", 0),
524 // Inside the scope of ~!ex!~ replace:
525 // tuple.Item1
526 // std::get<1-1>(tuple)
527 (new Regex(@"(?<scope>/\*~(?<variable>[_a-zA-Z0-9]+)~\*/)(?<separator>.\|\\n)(?<before>
    ↳ >((?!/\*~\k<variable>~\*/)(.\\n))*?)\k<variable>\\.Item(?<itemNumber>\\d+)(?<afte
    ↳ r>\\W)",
    ↳ "${scope}${separator}${before}std::get<${itemNumber}-1>(${variable})${after}",
    ↳ 10),
528 // Remove scope borders.
529 // /*~ex~/
530 //
531 (new Regex(@"/*~[_a-zA-Z0-9]+~\*/"), "", 0),
532 // Insert scope borders.
533 // class Range<T> {
534 // class Range<T> { /*~type~Range<T>~/
535 (new Regex(@"(?<classDeclarationBegin>\\r?\\n(?<indent>[\\t ]*)(template\\s*<[^<>\\n]*>
    ↳ )?(struct|class)
    ↳ (?<fullType>(?!<typeName>[_a-zA-Z0-9]+)(<[^\\n]*>)?)(\\s*:\\s*[~\\n]+)?[\\t
    ↳ ]*(\\r?\\n)?[\\t ]*{)"),
    ↳ "${classDeclarationBegin}/*~type~${typeName}~${fullType}~*/", 0),
536 // Inside the scope of /*~type~Range<T>~/ insert inner scope and replace:
537 // public: static implicit operator std::tuple<T, T>(Range<T> range)
538 // public: operator std::tuple<T, T>() const { /*~variable~Range<T>~/
539 (new Regex(@"(?<scope>/\*~type~(?<typeName>[~\\n\\*]+)~(?<fullType>[~\\n\\*]+)~\*/)(?<
    ↳ separator>.\|\\n)(?<before>((?!/\*~type~\k<typeName>~\k<fullType>~\*/)(.\\n))*?) (
    ↳ ?<access>(private|protected|public): )static implicit operator
    ↳ (?<targetType>[~\\(\\n]+)\\((?<argumentDeclaration>\k<fullType>
    ↳ (?<variable>[_a-zA-Z0-9]+))\\)(?<after>\\s*\n?\\s*{)"),
    ↳ "${scope}${separator}${before}${access}operator ${targetType}()
    ↳ const${after}/*~variable~${variable}~*/", 10),
540 // Inside the scope of /*~type~Range<T>~/ replace:
541 // public: static implicit operator Range<T>(std::tuple<T, T> tuple) { return new
    ↳ Range<T>(std::get<1-1>(tuple), std::get<2-1>(tuple)); }
542 // public: Range(std::tuple<T, T> tuple) : Range(std::get<1-1>(tuple),
    ↳ std::get<2-1>(tuple)) { }
543 (new Regex(@"(?<scope>/\*~type~(?<typeName>[~\\n\\*]+)~(?<fullType>[~\\n\\*]+)~\*/)(?<
    ↳ separator>.\|\\n)(?<before>((?!/\*~type~\k<typeName>~\k<fullType>~\*/)(.\\n))*?) (
    ↳ ?<access>(private|protected|public): )static implicit operator
    ↳ (\\k<fullType>|\\k<typeName>)\\((?<arguments>[~\\{\\n]+)\\)(\\s|\\n)*{(\\s|\\n)*return
    ↳ (new )?(\\k<fullType>|\\k<typeName>)\\((?<passedArguments>[~\\n\\*]+)\\)(\\s|\\n)*{)"),
    ↳ "${scope}${separator}${before}${access}${typeName}(${arguments}) :
    ↳ ${typeName}(${passedArguments}) { }", 10),
544 // Inside the scope of /*~variable~range~/ replace:
545 // range.Minimum
546 // this->Minimum
547 (new Regex(@"(?<scope>{ /*~variable~(?<variable>[~\\n\\*]+)~\*/)(?<separator>.\|\\n)(?<be
    ↳ fore>(?!<beforeExpression>(?!<bracket>{) | (?<-bracket>}) | [~\\{\\} | \\n]*?)\\k<variable>\\.
    ↳ (?<field>[_a-zA-Z0-9]+)(?<after>(, | ; | } |
    ↳ |\\)) (?<afterExpression>(?!<bracket>{) | (?<-bracket>}) | [~\\{\\} | \\n]*?)")",
    ↳ "${scope}${separator}${before}this->${field}${after}", 10),
548 // Remove scope borders.
549 // /*~ex~/
550 //
551 (new Regex(@"/*~[~\\n]+~[~\\n]+~\*/"), "", 0),
552 // Insert scope borders.

```

```

553 // namespace Platform::Ranges { ... }
554 // namespace Platform::Ranges { /*~start~namespace~Platform::Ranges~*/ ...
    ↳ /*~end~namespace~Platform::Ranges~*/ }
555 (new Regex(@"(?<namespaceDeclarationBegin>\r?\n(?<indent>[\t ]*)namespace
    ↳ (?<namespaceName>(?<namePart>[a-zA-Z][a-zA-Z0-9]+)(?<nextNamePart>::[a-zA-Z][a-z
    ↳ A-Z0-9]+)+)(\s|\n)*{(?<middle>(\.|\n)*)(?<end>(?!<=\\r?\\n\\k<indent>)(?!;))"),
    ↳ "{$namespaceDeclarationBegin}/*~start~namespace~${namespaceName}~*/${middle}/*~e
    ↳ nd~namespace~${namespaceName}~*/${end}",
    ↳ 0),
556 // Insert scope borders.
557 // class Range<T> { ... };
558 // class Range<T> { /*~start~type~Range<T>~T~*/ ... /*~start~type~Range<T>~T~*/ };
559 (new Regex(@"(?<classDeclarationBegin>\r?\n(?<indent>[\t ]*)template <typename
    ↳ (?<typeParameter>[^\n]+)> (struct|class)
    ↳ (?<type>[a-zA-Z0-9]+<\k<typeParameter>>)(\s*:\s*[^\n]+)?[\t ]*(\r?\n)?[\t
    ↳ ]*{(?<middle>(\.|\n)*)(?<endIndent>(?!<=\\r?\\n\\k<indent>)(?<end>;))"),
    ↳ "{$classDeclarationBegin}/*~start~type~${type}~${typeParameter}~*/${middle}${end
    ↳ Indent}/*~end~type~${type}~${typeParameter}~*/${end}",
    ↳ 0),
560 // Inside scopes replace:
561 // /*~start~namespace~Platform::Ranges~*/ ... /*~start~type~Range<T>~T~*/ ...
    ↳ public: override std::int32_t GetHashCode() { return {Minimum,
    ↳ Maximum}.GetHashCode(); } ... /*~start~type~Range<T>~T~*/ ...
    ↳ /*~end~namespace~Platform::Ranges~*/
562 // /*~start~namespace~Platform::Ranges~*/ ... /*~start~type~Range<T>~T~*/ ...
    ↳ /*~start~type~Range<T>~T~*/ ... /*~end~namespace~Platform::Ranges~*/ namespace
    ↳ std { template <typename T> struct hash<Platform::Ranges::Range<T>> {
    ↳ std::size_t operator()(const Platform::Ranges::Range<T> &obj) const { return
    ↳ {Minimum, Maximum}.GetHashCode(); } }; }
563 (new Regex(@"(?<namespaceScopeStart>\/\~start~namespace~(?<namespace>[^\n\*]+)\~\*/)
    ↳ (?<betweenStartScopes>(\.|\n)+)(?<typeScopeStart>\/\~start~type~(?<type>[^\n\*]+)
    ↳ )~(?<typeParameter>[^\n\*]+)\~\*/)(?<before>(\.|\n)+)?(?<hashMethodDeclaration>\r
    ↳ ?\n[ \t]*(?<access>(private|protected|public): )override std::int32_t
    ↳ GetHashCode\(\) (\s|\n)*{\s*(?<methodBody>[^\s][^\n]+[^\s])\s*\s*(?<after>(\.|\n
    ↳ )+)?(?<typeScopeEnd>\/\~end~type~\k<type>~\k<typeParameter>~\*/)(?<betweenEndSco
    ↳ pes>(\.|\n)+)(?<namespaceScopeEnd>\/\~end~namespace~\k<namespace>~\*/)}\r?\n"),
    ↳ "{$namespaceScopeStart}${betweenStartScopes}${typeScopeStart}${before}${after}${
    ↳ typeScopeEnd}${betweenEndScopes}${namespaceScopeEnd}" + Environment.NewLine +
    ↳ Environment.NewLine + "namespace std" + Environment.NewLine + "{" +
    ↳ Environment.NewLine + "    template <typename ${typeParameter}>" +
    ↳ Environment.NewLine + "    struct hash<${namespace}::${type}>" +
    ↳ Environment.NewLine + "    {" + Environment.NewLine + "        std::size_t
    ↳ operator()(const ${namespace}::${type} &obj) const" + Environment.NewLine + "
    ↳ {" + Environment.NewLine + "
    ↳ /*~start~method~*/${methodBody}/*~end~method~*/" + Environment.NewLine + "
    ↳ }" + Environment.NewLine + "    };" + Environment.NewLine + "}" +
    ↳ Environment.NewLine, 10),
564 // Inside scope of /*~start~method~*/ replace:
565 // /*~start~method~*/ ... Minimum ... /*~end~method~*/
566 // /*~start~method~*/ ... obj.Minimum ... /*~end~method~*/
567 (new Regex(@"(?<methodScopeStart>\/\~start~method~\*/)(?<before>.+({|,
    ↳ ))(?<name>[a-zA-Z][a-zA-Z0-9]+)(?<after>[^\n\.\(a-zA-Z0-9]((?!\/\~end~method~\*/)
    ↳ ) [^\n]+)(?<methodScopeEnd>\/\~end~method~\*/)",
    ↳ "{$methodScopeStart}${before}obj.${name}${after}${methodScopeEnd}", 10),
568 // Remove scope borders.
569 // /*~start~type~Range<T>~T~*/
570 //
571 (new Regex(@"\/\~[^\n\*]+(\~[^\n\*]+)*~\*/"), "", 0),
572 }.Cast<ISubstitutionRule>().ToList();
573
574 public static readonly IList<ISubstitutionRule> LastStage = new List<SubstitutionRule>
575 {
576     // ICounter<int, int> c1;
577     // ICounter<int, int>* c1;
578     (new Regex(@"(?<abstractType>I[A-Z][a-zA-Z0-9]+(<[^\r\n]+>)?)
    ↳ (?<variable>[_a-zA-Z0-9]+)(?<after> = null)?;"), "{$abstractType}*
    ↳ ${variable}${after};", 0),
    ↳ // (expression)
    ↳ // expression
579     (new Regex(@"(\\(|)\\(((a-zA-Z0-9_\\*[:]+)\\)(,| |;|\\)"))", "$1$2$3", 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}", 0),
585 // .append(".")
586 // .append(1, '.');
587 (new Regex(@"\.(append\\(\"([^\\""]|\\\"")\"\\)\")", ".append(1, '$1')", 0),
588 // return ref _elements[node];
589 // return &_elements[node];
590 (new Regex(@"return ref ([_a-zA-Z0-9]+)\([([_a-zA-Z0-9*]+)\];"), "return &$1[$2];",
    ↪ 0),
591 // ((1, 2))
592 // ({1, 2})
593 (new Regex(@"(?<before>\(|,)\((?<first>[^\n()]+),
    ↪ (?<second>[^\n()]+)\)(?<after>\)|,)", "${before}${{first},
    ↪ ${second}}${after}", 10),
594 // {1, 2}.GetHashCode()
595 // Platform::Hashing::Hash(1, 2)
596 (new Regex(@"{((?<first>[^\n{]+), (?<second>[^\n{]+))}\.GetHashCode\\(\")",
    ↪ "Platform::Hashing::Hash(${first}, ${second})", 10),
597 // range.ToString()
598 // Platform::Converters::ToStd::string>(range).data()
599 (new Regex(@"(?<before>\W)(?<variable>[_a-zA-Z][_a-zA-Z0-9]+)\.ToString\\(\")",
    ↪ "${before}Platform::Converters::ToStd::string>(${variable}).data()", 10),
600 // new
601 //
602 (new Regex(@"(?<before>\r?\n[^\r\n]*(\"(\\\"|\"[^\r\n]*)\"[^\r\n]*)*)?(?<=\\W)new\\
    ↪ s+\""), "${before}",
    ↪ 10),
603 // x == null
604 // x == nullptr
605 (new Regex(@"(?<before>\r?\n[^\r\n]*(\"(\\\"|\"[^\r\n]*)\"[^\r\n]*)*)?(?<=\\W)(?<v
    ↪ ariable>[_a-zA-Z][_a-zA-Z0-9]+)(?<operator>s*(==|!=)\s*)null(?<after>\W)",
    ↪ "${before}${variable}${operator}nullptr${after}", 10),
606 // null
607 // {}
608 (new Regex(@"(?<before>\r?\n[^\r\n]*(\"(\\\"|\"[^\r\n]*)\"[^\r\n]*)*)?(?<=\\W)null
    ↪ (?<after>\W)", "${before}-{${after}",
    ↪ 10),
609 // default
610 // 0
611 (new Regex(@"(?<before>\r?\n[^\r\n]*(\"(\\\"|\"[^\r\n]*)\"[^\r\n]*)*)?(?<=\\W)defa
    ↪ ult(?<after>\W)", "${before}0${after}",
    ↪ 10),
612 // object x
613 // void *x
614 (new Regex(@"(?<before>\r?\n[^\r\n]*(\"(\\\"|\"[^\r\n]*)\"[^\r\n]*)*)?(?<=\\W)(?<!
    ↪ @)(object|System\\.Object) (?<after>\w)", "${before}void *${after}",
    ↪ 10),
615 // <object>
616 // <void*>
617 (new Regex(@"(?<before>\r?\n[^\r\n]*(\"(\\\"|\"[^\r\n]*)\"[^\r\n]*)*)?(?<=\\W)(?<!
    ↪ @)(object|System\\.Object) (?<after>\W)", "${before}void*${after}",
    ↪ 10),
618 // @object
619 // object
620 (new Regex(@"@([_a-zA-Z0-9]+)", "$1", 0),
621 // this->GetType().Name
622 // typeid(this).name()
623 (new Regex(@"(this)->GetType\\(\\"\\).Name)", "typeid($1).name()", 0),
624 // ArgumentNullException
625 // std::invalid_argument
626 (new Regex(@"(?<before>\r?\n[^\r\n]*(\"(\\\"|\"[^\r\n]*)\"[^\r\n]*)*)?(?<=\\W)(Sys
    ↪ tem\\.)?ArgumentNullException(?<after>\W)",
    ↪ "${before}std::invalid_argument${after}", 10),
627 // InvalidOperationException
628 // std::runtime_error
629 (new Regex(@"(\\W)(InvalidOperationException|Exception)(\\W)",
    ↪ "$1std::runtime_error$3", 0),
630 // ArgumentException
631 // std::invalid_argument
632 (new Regex(@"(\\W)(ArgumentException|ArgumentOutOfRangeException)(\\W)",
    ↪ "$1std::invalid_argument$3", 0),
633 // template <typename T> struct Range : IEquatable<Range<T>>
634 // template <typename T> struct Range {

```



```

635 (new Regex(@"(?<before>template <typename (?<typeParameter>[^\n]+)> (struct|class)
    ↳ (?<type>[a-zA-Z0-9]+<[^\n]+)) : (public
    ↳ )?IEquatable<k<type>>(?(after>(\s|\n)*{") , "${before}${after}" , 0) ,
636 // public: delegate void Disposal(bool manual, bool wasDisposed);
637 // public: delegate void Disposal(bool, bool);
638 (new Regex(@"(?<before>(?(access>(private|protected|public): )delegate
    ↳ (?<returnType>[a-zA-Z] [a-zA-Z0-9:]+)
    ↳ (?<delegate>[a-zA-Z] [a-zA-Z0-9:]+)\(((?<leftArgumentType>[a-zA-Z] [a-zA-Z0-9:]+) ,
    ↳ *) (?<argumentType>[a-zA-Z] [a-zA-Z0-9:]+)
    ↳ (?<argumentName>[a-zA-Z] [a-zA-Z0-9:]+) (?(after>( ,
    ↳ (?<rightArgumentType>[a-zA-Z] [a-zA-Z0-9:]+)
    ↳ (?<rightArgumentName>[a-zA-Z] [a-zA-Z0-9:]+))*\);)") ,
    ↳ "${before}${argumentType}${after}" , 20) ,
639 // public: delegate void Disposal(bool, bool);
640 // using Disposal = void(bool, bool);
641 (new Regex(@"(?<access>(private|protected|public): )delegate
    ↳ (?<returnType>[a-zA-Z] [a-zA-Z0-9:]+)
    ↳ (?<delegate>[a-zA-Z] [a-zA-Z0-9:]+)\(((?<argumentTypes>[^\(\)\n]*\)\);)") , "using
    ↳ ${delegate} = ${returnType}(${argumentTypes});" , 20) ,
642 // #region Always
643 //
644 (new Regex(@"(~|\r?\n)[ \t]*#(region|endregion)[^\r\n]*(\r?\n|$)") , "" , 0) ,
645 // // #define ENABLE_TREE_AUTO_DEBUG_AND_VALIDATION
646 //
647 (new Regex(@"\\\/[ \t]*#define[ \t]+[_a-zA-Z0-9]+[ \t]*") , "" , 0) ,
648 // #if USEARRAYPOOL\r\n#endif
649 //
650 (new Regex(@"#if [a-zA-Z0-9]+\s+endif") , "" , 0) ,
651 // [Fact]
652 //
653 (new Regex(@"(?<firstNewLine>\r?\n|\A) (?<indent>[ \t
    ↳ ]+)[\[[a-zA-Z0-9]+\(((?<expression>((?<parenthesis>\(|(?<-parenthesis>\)|[^\(\r\
    ↳ \n])*)) (?<parenthesis>(?!\)|\))\)?\][ \t]*(\r?\n\k<indent>)?") ,
    ↳ "${firstNewLine}${indent}" , 5) ,
654 // \A \n ... namespace
655 // \Anamespace
656 (new Regex(@"(\A)(\r?\n)+namespace") , "$1namespace" , 0) ,
657 // \A \n ... class
658 // \Aclass
659 (new Regex(@"(\A)(\r?\n)+class") , "$1class" , 0) ,
660 // \n\n\n
661 // \n\n
662 (new Regex(@"\r?\n[ \t]*\r?\n[ \t]*\r?\n") , Environment.NewLine +
    ↳ Environment.NewLine , 50) ,
663 // {\n\n
664 // {\n
665 (new Regex(@"{[ \t]*\r?\n[ \t]*\r?\n") , "{" + Environment.NewLine , 10) ,
666 // \n\n}
667 // \n}
668 (new Regex(@"\r?\n[ \t]*\r?\n(?<end>[ \t]*)") , Environment.NewLine + "${end}" , 10) ,
669 }.Cast<ISubstitutionRule>().ToList();
670
671 public CSharpToCppTransformer(IList<ISubstitutionRule> extraRules) :
    ↳ base(FirstStage.Concat(extraRules).Concat(LastStage).ToList()) { }
672
673 public CSharpToCppTransformer() : base(FirstStage.Concat(LastStage).ToList()) { }
674 }
675 }

```

1.2 ./csharp/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 EmptyLineTest()
9         {
10             // This test can help to test basic problems with regular expressions like incorrect
            ↳ syntax
11             var transformer = new CSharpToCppTransformer();
12             var actualResult = transformer.Transform("");
13             Assert.Equal("", actualResult);
14         }
15
16         [Fact]

```

```
17         public void HelloWorldTest()
18     {
19         const string helloWorldCode = @"using System;
20 class Program
21 {
22     public static void Main(string[] args)
23     {
24         Console.WriteLine("Hello, world!");
25     }
26 }";
27         const string expectedResult = @"class Program
28 {
29     public: static void Main(std::string args[])
30     {
31         printf("Hello, world!\n");
32     }
33 };";
34         var transformer = new CSharpToCppTransformer();
35         var actualResult = transformer.Transform(helloWorldCode);
36         Assert.Equal(expectedResult, actualResult);
37     }
38 }
39 }
```

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