

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,
95   ↳ exception.InnerException, level + 1);
96 (new Regex(@"(?<before>/\/*~extensionMethod~(?<name>[a-zA-Z0-9]+)~\*/(.\|\\n)+\\W)(?<var_
97   ↳ iable>[_a-zA-Z0-9]+)\\.\\k<name>\\("), "${before}${name}${{variable}}, ",
98   ↳ 50),
99 // Remove markers
100 // /*~extensionMethod~BuildExceptionString~*/
101 //
102 (new Regex(@"\/*~extensionMethod~[a-zA-Z0-9]+~\*/"), "", 0),
103 // (this
104 // (
105 (new Regex(@"\((this ", "(", 0),
106 // private: static readonly Disposal _emptyDelegate = (manual, wasDisposed) => { };
107 // private: inline static std::function<Disposal> _emptyDelegate = [](auto manual,
108   ↳ auto wasDisposed) { };
109 (new Regex(@"(?<access>(private|protected|public): )?static readonly
110   ↳ (?<type>[a-zA-Z][a-zA-Z0-9]*) (?<name>[a-zA-Z_][a-zA-Z0-9_]*) =
111   ↳ \((?<firstArgument>[a-zA-Z_][a-zA-Z0-9_]*)
112   ↳ (?<secondArgument>[a-zA-Z_][a-zA-Z0-9_]*)\)) => {\s*};"), "${access}inline static
113   ↳ std::function<${type}> ${name} = [](auto ${firstArgument}, auto
114   ↳ ${secondArgument}) { };", 0),
115 // public: static readonly EnsureAlwaysExtensionRoot Always = new
116   ↳ EnsureAlwaysExtensionRoot();
117 // public: inline static EnsureAlwaysExtensionRoot Always;
118 (new Regex(@"(?<access>(private|protected|public): )?static readonly
119   ↳ (?<type>[a-zA-Z0-9]+(<[a-zA-Z0-9]+>?)) (?<name>[a-zA-Z0-9_]+) = new
120   ↳ \\k<type>\\(\\);"), "${access}inline static ${type} ${name};", 0),
121 // public: static readonly Range<int> SByte = new
122   ↳ Range<int>(std::numeric_limits<int>::min(), std::numeric_limits<int>::max());
123 // public: inline static Range<int> SByte =
124   ↳ Range<int>(std::numeric_limits<int>::min(), std::numeric_limits<int>::max());
125 (new Regex(@"(?<access>(private|protected|public): )?static readonly
126   ↳ (?<type>[a-zA-Z0-9]+(<[a-zA-Z0-9]+>?)) (?<name>[a-zA-Z0-9_]+) = new
127   ↳ \\k<type>\\((?<arguments>[^\n]+)\\);"), "${access}inline static ${type} ${name} =
128   ↳ ${type}${{arguments}};", 0),
129 // public: static readonly string ExceptionContentsSeparator = "---";
130 // public: inline static std::string ExceptionContentsSeparator = "---";
131 (new Regex(@"(?<access>(private|protected|public): )?(const|static readonly) string
132   ↳ (?<name>[a-zA-Z0-9_]+) = ""(?<string>(\\\\"|\\r\\n)+)"";"), "${access}inline
133   ↳ static std::string ${name} = \\\"${string}\\\";", 0),
134 // private: const int MaxPath = 92;
135 // private: inline static const int MaxPath = 92;
136 (new Regex(@"(?<access>(private|protected|public): )?(const|static readonly)
137   ↳ (?<type>[a-zA-Z0-9]+) (?<name>[_a-zA-Z0-9]+) = (?<value>[^\r\n]+);"),
138   ↳ "${access}inline static const ${type} ${name} = ${value};", 0),
139 // ArgumentNotNull(EnsureAlwaysExtensionRoot root, TArgument argument) where
140   ↳ TArgument : class
141 // ArgumentNotNull(EnsureAlwaysExtensionRoot root, TArgument* argument)
142 (new Regex(@"(?<before> [a-zA-Z]+\\((([a-zA-Z *,]+, |))?(?<type>[a-zA-Z]+)(?<after>(\\
143   ↳ [a-zA-Z *,]+)\\)) [ \\r\\n]+where \\k<type> : class"), "${before}${type}*${after}",
144   ↳ 0),
145 // protected: abstract TElement GetFirst();
146 // protected: virtual TElement GetFirst() = 0;
147 (new Regex(@"(?<access>(private|protected|public): )?abstract
148   ↳ (?<method>[^\r\n]+);"), "${access}virtual ${method} = 0;", 0),
149 // TElement GetFirst();
150 // virtual TElement GetFirst() = 0;
151 (new Regex(@"(?<before>[\\r\\n]+ [ ]+)(?<methodDeclaration>(?!return) [a-zA-Z0-9]+
152   ↳ [a-zA-Z0-9]+\\(([^\\r\\n]*\\))?(?<after>;[ ]*[\\r\\n]+)"), "${before}virtual
153   ↳ ${methodDeclaration} = 0${after}", 1),
154 // protected: readonly TreeElement[] _elements;
155 // protected: TreeElement _elements[N];
156 (new Regex(@"(?<access>(private|protected|public): )?readonly
157   ↳ (?<type>[a-zA-Z<>0-9]+)(\\[\\]]+ ) (?<name>[_a-zA-Z0-9]+);"), "${access}${type}
158   ↳ ${name}[N];", 0),
159 // protected: readonly TElement Zero;
160 // protected: TElement Zero;
161 (new Regex(@"(?<access>(private|protected|public): )?readonly
162   ↳ (?<type>[a-zA-Z<>0-9]+) (?<name>[_a-zA-Z0-9]+);"), "${access}${type} ${name};",
163   ↳ 0),
164 // internal
165 //
166 (new Regex(@"(\\W)internal\\s+"), "$1", 0),
167 // static void NotImplementedException(ThrowExtensionRoot root) => throw new
168   ↳ NotImplementedException();

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137 // static void NotImplementedException(ThrowExtensionRoot root) { return throw new
138     ↳ NotImplementedException(); }
139 (new Regex(@"(^s+)(private|protected|public)?(: )?(template \<[^r\n]+\> )?(static
140     ↳ )?(override)?([a-zA-Z0-9]+
141     ↳ )([a-zA-Z0-9]+\((([^\r\n]*)\)\s+=>\s+throw([^\r\n]+);"),
142     ↳ "$1$2$3$4$5$6$7$8($9) { throw$10; }", 0),
143 // SizeBalancedTree(int capacity) => a = b;
144 // SizeBalancedTree(int capacity) { a = b; }
145 (new Regex(@"(^s+)(private|protected|public)?(: )?(template \<[^r\n]+\> )?(static
146     ↳ )?(override)?(void)?([a-zA-Z0-9]+\((([^\r\n]*)\)\s+=>\s+([^\r\n]+);"),
147     ↳ "$1$2$3$4$5$6$7$8($9) { $10; }", 0),
148 // int SizeBalancedTree(int capacity) => a;
149 // int SizeBalancedTree(int capacity) { return a; }
150 (new Regex(@"(^s+)(private|protected|public)?(: )?(template \<[^r\n]+\> )?(static
151     ↳ )?(override)?([a-zA-Z0-9]+
152     ↳ )([a-zA-Z0-9]+\((([^\r\n]*)\)\s+=>\s+([^\r\n]+);"), "$1$2$3$4$5$6$7$8($9) {
153     ↳ return $10; }", 0),
154 // OnDispose = (manual, wasDisposed) =>
155 // OnDispose = [&](auto manual, auto wasDisposed)
156 (new Regex(@"(?<variable>[a-zA-Z_][a-zA-Z0-9_]*) (?<operator>\s*[\+=\s*])\(((?<firstArg_
157     ↳ ument>[a-zA-Z_][a-zA-Z0-9_]*) ,
158     ↳ (?<secondArgument>[a-zA-Z_][a-zA-Z0-9_]*)\)\s*=>"),
159     ↳ "$${variable}${operator}[&](auto ${firstArgument}, auto ${secondArgument})", 0),
160 // () => Integer<TElement>.Zero;
161 // () { return Integer<TElement>.Zero; }
162 (new Regex(@"\(\)\s+=>\s+(?<expression>[^\(\); \r\n]+(\(((?<parenthesis>\(|(?<-parent_
163     ↳ hesis>\)|[^\(\); \r\n]*)*)?)[^\(\); \r\n]*(?<after>,|;))"), "() { return
164     ↳ ${expression}; }${after}", 0),
165 // ~DisposableBase() => Destruct();
166 // ~DisposableBase() { Destruct(); }
167 (new Regex(@"~(?<class>[a-zA-Z_][a-zA-Z0-9_]*)\(\)\s+=>\s+([^\r\n]+?);"),
168     ↳ "~${class}() { $1; }", 0),
169 // => Integer<TElement>.Zero;
170 // { return Integer<TElement>.Zero; }
171 (new Regex(@"\)\s+=>\s+([^\r\n]+?);"), ") { return $1; }", 0),
172 // () { return avlTree.Count; }
173 // [&]()-> auto { return avlTree.Count; }
174 (new Regex(@"(?<before>, |)\(\)\s+{ return (?<expression>[^\r\n]+); }"),
175     ↳ "$${before}[&]()-> auto { return ${expression}; }", 0),
176 // Count => GetSizeOrZero(Root);
177 // Count() { return GetSizeOrZero(Root); }
178 (new Regex(@"(\\W)([A-Z][a-zA-Z_])\s+=>\s+([^\r\n]+);"), "$1$2() { return $3; }", 0),
179 // public: T Object { get; }
180 // public: const T Object;
181 (new Regex(@"(?<before>[^\r]\r?\n[ \t]*) (?<access>(private|protected|public):
182     ↳ )?(?<type>[a-zA-Z_][a-zA-Z0-9_:<]*)
183     ↳ (?<property>[a-zA-Z_][a-zA-Z0-9_]*) (?<blockOpen>[\n\s]*{[\n\s]*)(\[[^\n]+\][\n\s]
184     ↳ ]*)?get; (?<blockClose>[\n\s]*}) (?<after>[\n\s]*)"), "$${before}${access}const
185     ↳ ${type} ${property};${after}", 2),
186 // public: bool IsDisposed { get => _disposed > 0; }
187 // public: bool IsDisposed() { return _disposed > 0; }
188 (new Regex(@"(?<before>[^\r]\r?\n[ \t]*) (?<access>(private|protected|public):
189     ↳ )?(?<virtual>virtual )?bool
190     ↳ (?<property>[a-zA-Z_][a-zA-Z0-9_]*) (?<blockOpen>[\n\s]*{[\n\s]*)(\[[^\n]+\][\n\s]
191     ↳ ]*)?get\s*=>\s*(?<expression>[^\n]+); (?<blockClose>[\n\s]*){[\n\s]*}"),
192     ↳ "$${before}${access}${virtual}bool ${property}() ${blockOpen}return
193     ↳ ${expression};${blockClose}", 2),
194 // protected: virtual std::string ObjectName { get => GetType().Name; }
195 // protected: virtual std::string ObjectName() { return GetType().Name; }
196 (new Regex(@"(?<before>[^\r]\r?\n[ \t]*) (?<access>(private|protected|public):
197     ↳ )?(?<virtual>virtual )?(?<type>[a-zA-Z_][a-zA-Z0-9_:<]*)
198     ↳ (?<property>[a-zA-Z_][a-zA-Z0-9_]*) (?<blockOpen>[\n\s]*{[\n\s]*)(\[[^\n]+\][\n\s]
199     ↳ ]*)?get\s*=>\s*(?<expression>[^\n]+); (?<blockClose>[\n\s]*){[\n\s]*}"),
200     ↳ "$${before}${access}${virtual}${type} ${property}() ${blockOpen}return
201     ↳ ${expression};${blockClose}", 2),
202 // ArgumentInRange(string message) { string messageBuilder() { return message; }
203 // ArgumentInRange(string message) { auto messageBuilder = [&]() -> string { return
204     ↳ message; };
205 (new Regex(@"(?<before>\\W[_a-zA-Z0-9]+\((([^\n])\n)*\)[\s\n]*{[\s\n]*([^\}])|\n)*?(\\r?\n)
206     ↳ ?[ \t]*) (?<returnType>[_a-zA-Z0-9*:] +[_a-zA-Z0-9*:] *)
207     ↳ (?<methodName>[_a-zA-Z0-9]+\((([^\n])\n)*\)\s*{(?<body>("[^"\\n]+""|
208     ↳ [^}]|\n)+?)}"), "$${before}auto ${methodName} = [&]() -> ${returnType}
209     ↳ {${body}};", 10),
210 // Func<TElement> treeCount
211 // std::function<TElement()> treeCount
212 (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(<(?<typeParameters>[a-zA-Z0-9]+(,
    ↳ ([a-zA-Z0-9]+))*>)?(?<after>>| (?<variable>[a-zA-Z0-9]+))"),
    ↳ "std::function<void(${typeParameters})>${after}", 0),
181 // Predicate<TArgument> predicate
182 // std::function<bool(TArgument)> predicate
183 (new Regex(@"Predicate(<[a-zA-Z0-9]+> ([a-zA-Z0-9]+)"), "std::function<bool($1)>
    ↳ $2", 0),
184 // var
185 // auto
186 (new Regex(@"(\\W)var(\\W)"), "$1auto$2", 0),
187 // unchecked
188 //
189 (new Regex(@"[\\r\\n]{2}\\s*?unchecked\\s*?$"), "", 0),
190 // throw new
191 // throw
192 (new Regex(@"(\\W)throw new(\\W)"), "$1throw$2", 0),
193 // void RaiseExceptionIgnoredEvent(Exception exception)
194 // void RaiseExceptionIgnoredEvent(const std::exception& exception)
195 (new Regex(@"(\\(| ) (System\\.Exception|Exception) (|\\))"), "$1const
    ↳ std::exception&$3", 0),
196 // EventHandler<Exception>
197 // EventHandler<std::exception>
198 (new Regex(@"(\\W) (System\\.Exception|Exception) (\\W)"), "$1std::exception$3", 0),
199 // override void PrintNode(TElement node, StringBuilder sb, int level)
200 // void PrintNode(TElement node, StringBuilder sb, int level) override
201 (new Regex(@"override ([a-zA-Z0-9 \\*\\+]+) (\\(\\^\\|\\r\\n\\|+?\\))"), "$1$2 override", 0),
202 // return (range.Minimum, range.Maximum)
203 // return {range.Minimum, range.Maximum}
204 (new Regex(@"(?<before>return\\s*)\\((?<values>[\\^\\|\\n\\|+)+)\\) (?!\\(|) (?<after>\\W)",
    ↳ "${before}${values}${after}", 0),
205 // string
206 // std::string
207 (new Regex(@"(?<before>\\W) (?<!!::)string(?<after>\\W)",
    ↳ "${before}std::string${after}", 0),
208 // System.ValueTuple
209 // std::tuple
210 (new Regex(@"(?<before>\\W) (System\\.)?ValueTuple(?!\\s*=|\\(|) (?<after>\\W)",
    ↳ "${before}std::tuple${after}", 0),
211 // sbyte
212 // std::int8_t
213 (new Regex(@"(?<before>\\W) ((System\\.)?SB|sb)yte(?!\\s*=|\\(|) (?<after>\\W)",
    ↳ "${before}std::int8_t${after}", 0),
214 // short
215 // std::int16_t
216 (new Regex(@"(?<before>\\W) ((System\\.)?Int16|short) (?!\\s*=|\\(|) (?<after>\\W)",
    ↳ "${before}std::int16_t${after}", 0),
217 // int
218 // std::int32_t
219 (new Regex(@"(?<before>\\W) ((System\\.)?I|i)nt(32)? (?!\\s*=|\\(|) (?<after>\\W)",
    ↳ "${before}std::int32_t${after}", 0),
220 // long
221 // std::int64_t
222 (new Regex(@"(?<before>\\W) ((System\\.)?Int64|long) (?!\\s*=|\\(|) (?<after>\\W)",
    ↳ "${before}std::int64_t${after}", 0),
223 // byte
224 // std::uint8_t
225 (new Regex(@"(?<before>\\W) ((System\\.)?Byte|byte) (?!\\s*=|\\(|) (?<after>\\W)",
    ↳ "${before}std::uint8_t${after}", 0),
226 // ushort
227 // std::uint16_t
228 (new Regex(@"(?<before>\\W) ((System\\.)?UInt16|ushort) (?!\\s*=|\\(|) (?<after>\\W)",
    ↳ "${before}std::uint16_t${after}", 0),
229 // uint
230 // std::uint32_t
231 (new Regex(@"(?<before>\\W) ((System\\.)?UI|ui)nt(32)? (?!\\s*=|\\(|) (?<after>\\W)",
    ↳ "${before}std::uint32_t${after}", 0),
232 // ulong
233 // std::uint64_t
234 (new Regex(@"(?<before>\\W) ((System\\.)?UInt64|ulong) (?!\\s*=|\\(|) (?<after>\\W)",
    ↳ "${before}std::uint64_t${after}", 0),
235 // char*[] args
236 // char* args[]
237 (new Regex(@"([_a-zA-Z0-9:\\*]?)[\\|\\|] ([a-zA-Z0-9]+)", "$1 $2[]", 0),
238 // float.MinValue

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239 // std::numeric_limits<float>::lowest()
240 (new Regex(@"(?<before>\W)(?<type>std::[a-z0-9_]+\float|double)\.MinValue(?<after>\W|
    ↳  )"), "${before}std::numeric_limits<${type}>::lowest()${after}",
    ↳  0),
241 // double.MaxValue
242 // std::numeric_limits<float>::max()
243 (new Regex(@"(?<before>\W)(?<type>std::[a-z0-9_]+\float|double)\.MaxValue(?<after>\W|
    ↳  )"), "${before}std::numeric_limits<${type}>::max()${after}",
    ↳  0),
244 // using Platform.Numbers;
245 //
246 (new Regex(@"([\r\n]{2}|~)\s*?using [\.\a-zA-Z0-9_+;\s*?${")", "", 0),
247 // class SizedBinaryTreeMethodsBase : GenericCollectionMethodsBase
248 // class SizedBinaryTreeMethodsBase : public GenericCollectionMethodsBase
249 (new Regex(@"(struct|class) ([a-zA-Z0-9_+](<[a-zA-Z0-9_+>)? : ([a-zA-Z0-9_+])",
    ↳  "$1 $2$3 : public $4", 0),
250 // System.IDisposable
251 // System::IDisposable
252 (new Regex(@"(?<before>System::[a-zA-Z_]\w*)*)\. (?<after>[a-zA-Z_]\w*)"),
    ↳  "${before}::${after}", 20),
253 // class IProperty : ISetter<TValue, TObject>, IProvider<TValue, TObject>
254 // class IProperty : public ISetter<TValue, TObject>, public IProvider<TValue,
    ↳  TObject>
255 (new Regex(@"(?<before>(interface|struct|class) [a-zA-Z_]\w* : ((public
    ↳  [a-zA-Z_][\w:]*(<[a-zA-Z0-9_+>)?,
    ↳  )+)?(?<inheritedType>(?!public)[a-zA-Z_][\w:]*(<[a-zA-Z0-9_+>)?(?<after>(,
    ↳  [a-zA-Z_][\w:]*(!>)|[\r\n]+))"), "${before}public ${inheritedType}${after}",
    ↳  10),
256 // interface IDisposable {
257 // class IDisposable { public:
258 (new Regex(@"(?<before>\r?\n)(?<indent>[ \t]*)interface
    ↳  (?<interface>[a-zA-Z_]\w*)(?<typeDefinitionEnding>[~{]+){")",
    ↳  "${before}${indent}class ${interface}${typeDefinitionEnding}{ " +
    ↳  Environment.NewLine + "      public:", 0),
259 // struct TreeElement { }
260 // struct TreeElement { };
261 (new Regex(@"(struct|class) ([a-zA-Z0-9_+](\s+){([\sa-zA-Z0-9;:_+]?)([~;])", "$1
    ↳  $2$3{$4};$5", 0),
262 // class Program { }
263 // class Program { };
264 (new Regex(@"(?<type>struct|class)
    ↳  (?<name>[a-zA-Z0-9_+][~\r\n]*) (?<beforeBody>[\r\n]+(?<indentLevel>[ \t
    ↳  ]*)?)\{(?<body>[ \S\s]+?[ \r\n]+\k<indentLevel>)\}(?<afterBody>[~;]|$)", "${type}
    ↳  ${name}${beforeBody}${body}};${afterBody}", 0),
265 // Insert scope borders.
266 // ref TElement root
267 // ~!root!~ref TElement root
268 (new Regex(@"(?<definition>(?!<= | \() (ref [a-zA-Z0-9_+]| [a-zA-Z0-9_+](?!ref))
    ↳  (?<variable>[a-zA-Z0-9_+](?=\)|, | =))", "~!${variable}!~${definition}", 0),
269 // Inside the scope of ~!root!~ replace:
270 // root
271 // *root
272 (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}", 70),
273 // Remove scope borders.
274 // ~!root!~
275 //
276 (new Regex(@"~!(?<pointer>[a-zA-Z0-9_+])!~"), "", 5),
277 // ref auto root = ref
278 // ref auto root =
279 (new Regex(@"ref ([a-zA-Z0-9_+]) ([a-zA-Z0-9_+]) = ref(\W)"), "$1* $2 =$3", 0),
280 // *root = ref left;
281 // root = left;
282 (new Regex(@"*([a-zA-Z0-9_+]) = ref ([a-zA-Z0-9_+](\W)"), "$1 = $2$3", 0),
283 // (ref left)
284 // (left)
285 (new Regex(@"\ (ref ([a-zA-Z0-9_+])(\)| \(|,)", "($1$2", 0),
286 // ref TElement
287 // TElement*
288 (new Regex(@"( | \() ref ([a-zA-Z0-9_+]) ", "$1$2* ", 0),
289 // ref sizeBalancedTree.Root
290 // &sizeBalancedTree->Root
291 (new Regex(@"ref ([a-zA-Z0-9_+])\. ([a-zA-Z0-9_+]*+)", "&$1->$2", 0),
292 // ref GetElement(node).Right

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

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

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(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),  
→ // Inside the scope of ~!exceptionsBag!~ replace:  
→ // return std::vector<std::exception>(_exceptionsBag);  
→ // std::lock_guard<std::mutex> guard(_exceptionsBag_mutex); return  
→ std::vector<std::exception>(_exceptionsBag);  
(new Regex(@"(?<scope>/\s*(?<fieldName>[_a-zA-Z0-9]+)~\s*/) (?<separator>.\|\n) (?<before>  
→ e>((?!/\s*\k<fieldName>~\s*/)(.\|n))*?) { (?<after>((?!lock_guard)[^{};\r\n])*k<f  
→ ieldName>[~;}\r\n]*;)", "{$scope}${separator}${before}{  
→ std::lock_guard<std::mutex> guard(${fieldName}_mutex);${after}", 10),  
→ // Inside the scope of ~!exceptionsBag!~ replace:  
→ // _exceptionsBag.Add(exception);  
→ // std::lock_guard<std::mutex> guard(_exceptionsBag_mutex); \r\n  
→ _exceptionsBag.Add(exception);  
(new Regex(@"(?<scope>/\s*(?<fieldName>[_a-zA-Z0-9]+)~\s*/) (?<separator>.\|\n) (?<before>  
→ e>((?!/\s*\k<fieldName>~\s*/)(.\|n))*?) { (?<after>((?!lock_guard)([~{};\|n])*?r  
→ ?\n(?<indent>[\t ]*)\k<fieldName>[~;}\r\n]*;)",  
→ "{$scope}${separator}${before}{\" + Environment.NewLine +  
→ \"${indent}std::lock_guard<std::mutex> guard(${fieldName}_mutex);${after}\"", 10),  
→ // Remove scope borders.  
→ // /*~_exceptionsBag~*/  
→ //  
(new Regex(@"/\s*~[_a-zA-Z0-9]+\s*/"), "", 0),  
→ // Insert scope borders.  
→ // class IgnoredExceptions { ... public: static inline  
→ Platform::Delegates::MulticastDelegate<void(void*, const std::exception&>  
→ ExceptionIgnored = OnExceptionIgnored;  
→ // class IgnoredExceptions { /*~ExceptionIgnored~*/ ... public: static inline  
→ Platform::Delegates::MulticastDelegate<void(void*, const std::exception&>  
→ ExceptionIgnored = OnExceptionIgnored;  
(new Regex(@"(?<classDeclarationBegin>\r?\n(?<indent>[\t ]*)class [^{\r\n}+\r\n[\t ]*(?<middle>((?!class)\.|\n)+?) (?<eventDeclaration>(?!<access>(private|protected|  
→ |public): )static inline  
→ Platform::Delegates::MulticastDelegate<(?<argumentType>[~;\r\n]+)>  
→ (?<name>[_a-zA-Z0-9]+) = (?<defaultDelegate>[_a-zA-Z0-9]+);)",  
→ "{$classDeclarationBegin}/*~${name}~*/${middle}${eventDeclaration}", 0),  
→ // Inside the scope of ~!ExceptionIgnored!~ replace:  
→ // ExceptionIgnored.Invoke(NULL, exception);  
→ // ExceptionIgnored(NULL, exception);  
(new Regex(@"(?<scope>/\s*(?<eventName>[_a-zA-Z0-9]+)~\s*/) (?<separator>.\|\n) (?<before>  
→ >((?!/\s*\k<eventName>~\s*/)(.\|n))*?) \k<eventName>\.Invoke)",  
→ "{$scope}${separator}${before}${eventName}", 10),  
→ // Remove scope borders.  
→ // /*~ExceptionIgnored~*/  
→ //  
(new Regex(@"/\s*~[_a-zA-Z0-9]+\s*/"), "", 0),  
→ // Insert scope borders.  
→ // auto added = new StringBuilder();  
→ // /*~sb~*/std::string added;  
(new Regex(@"(auto|(System\.\Text\.)?StringBuilder) (?<variable>[_a-zA-Z0-9]+) = new  
→ (System\.\Text\.)?StringBuilder\\(\\);)", "/*~${variable}~*/std::string  
→ ${variable};", 0),  
→ // static void Indent(StringBuilder sb, int level)  
→ // static void Indent(/*~sb~*/StringBuilder sb, int level)  
(new Regex(@"(?<start>, \|() (System\.\Text\.)?StringBuilder  
→ (?<variable>[_a-zA-Z0-9]+) (?<end>, \|))", "${start}/*~${variable}~*/std::string&  
→ ${variable}${end}", 0),  
→ // Inside the scope of ~!added!~ replace:  
→ // sb.ToString()  
→ // sb  
(new Regex(@"(?<scope>/\s*(?<variable>[_a-zA-Z0-9]+)~\s*/) (?<separator>.\|\n) (?<before>  
→ ((?!/\s*\k<variable>~\s*/)(.\|n))*?) \k<variable>\.ToString\\(\\)",  
→ "{$scope}${separator}${before}${variable}", 10),  
→ // sb.AppendLine(argument)  
→ // sb.append(Platform::Converters::To<std::string>(argument)).append(1, '\\n')  
(new Regex(@"(?<scope>/\s*(?<variable>[_a-zA-Z0-9]+)~\s*/) (?<separator>.\|\n) (?<before>  
→ ((?!/\s*\k<variable>~\s*/)(.\|n))*?) \k<variable>\.AppendLine\\((?!<argument>[~\\), \\  
→ r\n]+)\\)",  
→ "{$scope}${separator}${before}${variable}.append(Platform::Converters::To<std::s  
→ tring>(${argument})).append(1, '\\n')",  
→ 10),  
→ // sb.Append('\\t', level);  
→ // sb.append(level, '\\t');
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417 (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),
418 // sb.Append(argument)
419 // sb.append(Platform::Converters::To<std::string>(argument))
420 (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),
421 // Remove scope borders.
422 // /\~sb~*/
423 //
424 (new Regex(@"/\~*[a-zA-Z0-9]+~\*/"), "", 0),
425 // Insert scope borders.
426 // auto added = new HashSet<TElement>();
427 // ~!added!~std::unordered_set<TElement> added;
428 (new Regex(@"auto (?<variable>[a-zA-Z0-9]+) = new
    ↳ HashSet<(?<element>[a-zA-Z0-9]+)>\(\(\);"),
    ↳ "~!${variable}!~std::unordered_set<${element}> ${variable};", 0),
429 // Inside the scope of ~!added!~ replace:
430 // added.Add(node)
431 // added.insert(node)
432 (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),
433 // Inside the scope of ~!added!~ replace:
434 // added.Remove(node)
435 // added.erase(node)
436 (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),
437 // if (added.insert(node)) {
438 // if (!added.contains(node)) { added.insert(node);
439 (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),
440 // Remove scope borders.
441 // ~!added!~
442 //
443 (new Regex(@"~![a-zA-Z0-9]+!~"), "", 5),
444 // Insert scope borders.
445 // auto random = new System::Random(0);
446 // std::srand(0);
447 (new Regex(@"[a-zA-Z0-9\.]+ ([a-zA-Z0-9]+) = new
    ↳ (System::)?Random\((([a-zA-Z0-9]+)\)");, "~!$1!~std::srand($3);", 0),
448 // Inside the scope of ~!random!~ replace:
449 // random.Next(1, N)
450 // (std::rand() % N) + 1
451 (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),
452 // Remove scope borders.
453 // ~!random!~
454 //
455 (new Regex(@"~![a-zA-Z0-9]+!~"), "", 5),
456 // Insert method body scope starts.
457 // void PrintNodes(TElement node, StringBuilder sb, int level) {
458 // void PrintNodes(TElement node, StringBuilder sb, int level) {/*method-start*/
459 (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*/${end}"}",
    ↳ 0),
460 // Insert method body scope ends.
461 // {/*method-start*/...}
462 // {/*method-start*/.../*method-end*/}
463 (new Regex(@"\{/\~*method-start\*/((?<body>((?<bracket>\{)|(?<-bracket>\})|[\^\{\}]*))+
    ↳ \}"), "{/*method-start*/${body}/*method-end*/}",
    ↳ 0),
464 // Inside method bodies replace:

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465 // GetFirst(
466 // this->GetFirst(
467 (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),
468 // Remove scope borders.
469 // /*method-start*/
470 //
471 (new Regex(@"/*method-(start|end)\*/"), "", 0),
472 // Insert scope borders.
473 // const std::exception& ex
474 // const std::exception& ex/*~ex~*/
475 (new Regex(@"(?<before>\(|\s)(?<variableDefinition>(const)?(std::)?exception&
    ↪ (?<variable>[_a-zA-Z0-9]+\s)(?<after>\W)"),
    ↪ "${before}${variableDefinition}/*~${variable}~*/${after}", 0),
476 // Inside the scope of ~!ex!~ replace:
477 // ex.Message
478 // ex.what()
479 (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),
480 // Remove scope borders.
481 // /*~ex~*/
482 //
483 (new Regex(@"/*~[_a-zA-Z0-9]+\s~\*/"), "", 0),
484 // throw ObjectDisposedException(objectName, message);
485 // throw std::runtime_error(std::string("Attempt to access disposed object
    ↪ ").append(objectName).append(": ").append(message).append("."));
486 (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),
487 // throw ArgumentException(argumentName, message);
488 // throw std::invalid_argument(std::string("Argument
    ↪ ").append(argumentName).append(" is null: ").append(message).append("."));
489 (new Regex(@"throw
    ↪ ArgumentException\((?<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),
490 // throw ArgumentException(message, argumentName);
491 // throw std::invalid_argument(std::string("Invalid ").append(argumentName).append("
    ↪ argument: \").append(message).append("."));
492 (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),
493 // throw ArgumentOutOfRangeException(argumentName, argumentValue, messageBuilder());
494 // 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("."));
495 (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),
496 // throw NotSupportedException();
497 // throw std::logic_error("Not supported exception.");
498 (new Regex(@"throw NotSupportedException\(\);"); "throw std::logic_error("Not
    ↪ supported exception.\");";", 0),
499 // throw NotImplementedException();
500 // throw std::logic_error("Not implemented exception.");
501 (new Regex(@"throw NotImplementedException\(\);"); "throw std::logic_error("Not
    ↪ implemented exception.\");";", 0),
502 // Insert scope borders.
503 // const std::string& message

```

```

504 // const std::string& message/*~message~/
505 (new Regex(@"(?<before>\(| )(?<variableDefinition>(const )?(std::)?string&?|char\*)
    ↳ (?<variable>[_a-zA-Z0-9]+))(?<after>\W)",
    ↳ "${before}${variableDefinition}/*~${variable}~*/${after}", 0),
506 // Inside the scope of /*~message~/ replace:
507 // Platform::Converters::To<std::string>(message)
508 // message
509 (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),
510 // Remove scope borders.
511 // /*~ex~*/
512 //
513 (new Regex(@"/*~[_a-zA-Z0-9]+~\*/") , "", 0),
514 // Insert scope borders.
515 // std::tuple<T, T> tuple
516 // std::tuple<T, T> tuple/*~tuple~/
517 (new Regex(@"(?<before>\(| )(?<variableDefinition>(const )?(std::)?tuple<[^\n]+>&?
    ↳ (?<variable>[_a-zA-Z0-9]+))(?<after>\W)",
    ↳ "${before}${variableDefinition}/*~${variable}~*/${after}", 0),
518 // Inside the scope of ~!ex!~ replace:
519 // tuple.Item1
520 // std::get<1-1>(tuple)
521 (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),
522 // Remove scope borders.
523 // /*~ex~*/
524 //
525 (new Regex(@"/*~[_a-zA-Z0-9]+~\*/") , "", 0),
526 // Insert scope borders.
527 // class Range<T> {
528 // class Range<T> { /*~type~Range<T>~/
529 (new Regex(@"(?<classDeclarationBegin>\r?\n(?<indent>[\t ]*)(template\s*<[^\<>\n]*>
    ↳ )?(struct|class)
    ↳ (?<fullType>(?(type)<type>[_a-zA-Z0-9]+)(<[^\n]*>)?)(\s*:\s*[^\n]+)?[\t
    ↳ ]*(\r?\n)?[\t ]*{)") ,
    ↳ "${classDeclarationBegin}/*~type~${typeName}~${fullType}~*/" , 0),
530 // Inside the scope of /*~type~Range<T>~/ insert inner scope and replace:
531 // public: static implicit operator std::tuple<T, T>(Range<T> range)
532 // public: operator std::tuple<T, T>() const { /*~variable~Range<T>~/
533 (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),
534 // Inside the scope of /*~type~Range<T>~/ replace:
535 // 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)); }
536 // public: Range(std::tuple<T, T> tuple) : Range(std::get<1-1>(tuple),
    ↳ std::get<2-1>(tuple)) { }
537 (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),
538 // Inside the scope of /*~variable~range~/ replace:
539 // range.Minimum
540 // this->Minimum
541 (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),
542 // Remove scope borders.
543 // /*~ex~*/
544 //
545 (new Regex(@"/*~[^\n\*]+~[^\n\*]+~\*/") , "", 0),
546 // Insert scope borders.

```

```

547 // namespace Platform::Ranges { ... }
548 // namespace Platform::Ranges { /*~start~namespace~Platform::Ranges~*/ ...
    ↳ /*~end~namespace~Platform::Ranges~*/ }
549 (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}~*/${end}" ,
    ↳ 0),
550 // Insert scope borders.
551 // class Range<T> { ... };
552 // class Range<T> { /*~start~type~Range<T>~T~*/ ... /*~end~type~Range<T>~T~*/ };
553 (new Regex(@"(?<classDeclarationBegin>\r?\n(?<indent>[\t ]*)template <typename
    ↳ (?<typeParameter>[^\n]+)> (struct|class)
    ↳ (?<type>[a-zA-Z0-9]+<\k<typeParameter>>)(\s*:\s*[^\n]+)?[\t ]*(\r?\n)?[\t
    ↳ ]*{(?<middle>(\.|\n)*)(?<endIndent>(?!<=\\r?\\n\\k<indent>)(?<end>};)")) ,
    ↳ "{$classDeclarationBegin}/*~start~type~${type}~${typeParameter}~*/${middle}${end
    ↳ Indent}/*~end~type~${type}~${typeParameter}~*/${end}" ,
    ↳ 0),
554 // Inside scopes replace:
555 // /*~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~*/
556 // /*~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(); } }; }
557 (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),
558 // Inside scope of /*~start~method~*/ replace:
559 // /*~start~method~*/ ... Minimum ... /*~end~method~*/
560 // /*~start~method~*/ ... obj.Minimum ... /*~end~method~*/
561 (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}${methodScopeEnd}" , 10),
562 // Remove scope borders.
563 // /*~start~type~Range<T>~T~*/
564 //
565 (new Regex(@"\/\~\~\*\n+(\~\~\*\n+)*~\*/") , "" , 0),
566 // class Disposable<T> : public Disposable
567 // class Disposable<T> : public Disposable<>
568 (new Regex(@"(?<before>(struct|class) (?<type>[a-zA-Z][a-zA-Z0-9]*)<[^\>\n]+> :
    ↳ (?<access>(private|protected|public) )?\k<type>)(?<after>\b(?:!<))") ,
    ↳ "{$before}<>${after}" , 0),
569 // Insert scope borders.
570 // class Disposable<T> : public Disposable<> { ... };
571 // class Disposable<T> : public Disposable<>
    ↳ { /*~start~type~Disposable~Disposable<T>~Disposable~Disposable<>~*/ ...
    ↳ /*~start~type~Disposable~Disposable<T>~Disposable~Disposable<>~*/ };

```

[illegible]


```

610 (new Regex(@"(?<before>\(|,)\((?<first>[^\n()]+),
    ↳ (?<second>[^\n()]+\)\)(?<after>\(|,)\)", "${before}${first},
    ↳ ${second}${after}", 10),
611 // {1, 2}.GetHashCode()
612 // Platform::Hashing::Hash(1, 2)
613 (new Regex(@"{(?<first>[^\n{]+), (?<second>[^\n{]+)}\}.GetHashCode\\(\")",
    ↳ "Platform::Hashing::Hash(${first}, ${second})", 10),
614 // range.ToString()
615 // Platform::Converters::To<std::string>(range).data()
616 (new Regex(@"(?<before>\W)(?<variable>[_a-zA-Z][_a-zA-Z0-9]+\).ToString\\(\")",
    ↳ "${before}Platform::Converters::To<std::string>(${variable}).data()", 10),
617 // new
618 //
619 (new Regex(@"(?<before>\r?\n[~""\r\n]*(""\\""|["~""\r\n])*["~""\r\n]*)(?<=\W)new\_|
    ↳ s+)", "${before}",
    ↳ 10),
620 // x == null
621 // x == nullptr
622 (new Regex(@"(?<before>\r?\n[~""\r\n]*(""\\""|["~""\r\n])*["~""\r\n]*)(?<=\W)(?<v
    ↳ ariable>[_a-zA-Z][_a-zA-Z0-9]+)(?<operator>s*(==|!=)\s*)null(?<after>\W)",
    ↳ "${before}${variable}${operator}nullptr${after}", 10),
623 // null
624 // {}
625 (new Regex(@"(?<before>\r?\n[~""\r\n]*(""\\""|["~""\r\n])*["~""\r\n]*)(?<=\W)null\_|
    ↳ (?<after>\W)", "${before}-${after}",
    ↳ 10),
626 // default
627 // 0
628 (new Regex(@"(?<before>\r?\n[~""\r\n]*(""\\""|["~""\r\n])*["~""\r\n]*)(?<=\W)defa
    ↳ ult(?<after>\W)", "${before}0${after}",
    ↳ 10),
629 // object x
630 // void *x
631 (new Regex(@"(?<before>\r?\n[~""\r\n]*(""\\""|["~""\r\n])*["~""\r\n]*)(?<=\W)(?!
    ↳ @)(object|System\.Object)(?<after>\w)", "${before}void *${after}",
    ↳ 10),
632 // <object>
633 // <void*>
634 (new Regex(@"(?<before>\r?\n[~""\r\n]*(""\\""|["~""\r\n])*["~""\r\n]*)(?<=\W)(?!
    ↳ @)(object|System\.Object)(?<after>\W)", "${before}void*${after}",
    ↳ 10),
635 // @object
636 // object
637 (new Regex(@"@([_a-zA-Z0-9]+)", "$1", 0),
638 // this->GetType().Name
639 // typeid(this).name()
640 (new Regex(@"(this)->GetType\\(\)\.Name)", "typeid($1).name()", 0),
641 // ArgumentException
642 // std::invalid_argument
643 (new Regex(@"(?<before>\r?\n[~""\r\n]*(""\\""|["~""\r\n])*["~""\r\n]*)(?<=\W)(Sys
    ↳ tem\.)?ArgumentNullException(?<after>\W)",
    ↳ "${before}std::invalid_argument${after}", 10),
644 // InvalidOperationException
645 // std::runtime_error
646 (new Regex(@"\\W(InvalidOperationException|Exception)\\W)",
    ↳ "$1std::runtime_error$3", 0),
647 // ArgumentException
648 // std::invalid_argument
649 (new Regex(@"\\W(ArgumentException|ArgumentOutOfRangeException)\\W)",
    ↳ "$1std::invalid_argument$3", 0),
650 // template <typename T> struct Range : IEquatable<Range<T>>
651 // template <typename T> struct Range {
652 (new Regex(@"(?<before>template <typename (?<typeParameter>[^\n]+)> (struct|class)
    ↳ (?<type>[_a-zA-Z0-9]+<[^\n]+>)) : (public
    ↳ )?IEquatable<\k<type>>(?(after>\\s|\\n)*{)\"", "${before}${after}", 0),
653 // public: delegate void Disposal(bool manual, bool wasDisposed);
654 // public: delegate void Disposal(bool, bool);
655 (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),
656 // public: delegate void Disposal(bool, bool);

```

```

657 // using Disposal = void(bool, bool);
658 (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),
659 // <4-1>
660 // <3>
661 (new Regex(@"(?<before><)4-1(?<after>>)", "${before}3${after}", 0),
662 // <3-1>
663 // <2>
664 (new Regex(@"(?<before><)3-1(?<after>>)", "${before}2${after}", 0),
665 // <2-1>
666 // <1>
667 (new Regex(@"(?<before><)2-1(?<after>>)", "${before}1${after}", 0),
668 // <1-1>
669 // <0>
670 (new Regex(@"(?<before><)1-1(?<after>>)", "${before}0${after}", 0),
671 // #region Always
672 //
673 (new Regex(@"(^\r?\n)[ \t]*#(region|endregion)[^\r\n]*(\r?\n|$)", "", 0),
674 // //define ENABLE_TREE_AUTO_DEBUG_AND_VALIDATION
675 //
676 (new Regex(@"\\\/[ \t]*#define[ \t]+[_a-zA-Z0-9]+[ \t]*")", "", 0),
677 // #if USEARRAYPOOL\r\n#endif
678 //
679 (new Regex(@"#if [a-zA-Z0-9]+\s+#endif)", "", 0),
680 // [Fact]
681 //
682 (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),
683 // \A \n ... namespace
684 // \Anamespace
685 (new Regex(@"(\A)(\r?\n)+namespace)", "$inamespace", 0),
686 // \A \n ... class
687 // \Aclass
688 (new Regex(@"(\A)(\r?\n)+class)", "$1class", 0),
689 // \n\n\n
690 // \n\n
691 (new Regex(@"\r?\n[ \t]*\r?\n[ \t]*\r?\n")", Environment.NewLine +
    ↳ Environment.NewLine, 50),
692 // {\n\n
693 // {\n
694 (new Regex(@"{[ \t]*\r?\n[ \t]*\r?\n")", "{" + Environment.NewLine, 10),
695 // \n\n}
696 // \n}
697 (new Regex(@"\r?\n[ \t]*\r?\n(?<end>[ \t]*)")", Environment.NewLine + "${end}", 10),
698 }.Cast<ISubstitutionRule>().ToList();
699
700 public CSharpToCppTransformer(IList<ISubstitutionRule> extraRules) :
    ↳ base(FirstStage.Concat(extraRules).Concat(LastStage).ToList()) { }
701
702 public CSharpToCppTransformer() : base(FirstStage.Concat(LastStage).ToList()) { }
703 }
704 }

```

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
28     const string expectedResult = @"class Program
29 {
30     public: static void Main(std::string args[])
31     {
32         printf("Hello, world!\n");
33     }
34 };";
35
36     var transformer = new CSharpToCppTransformer();
37     var actualResult = transformer.Transform(helloWorldCode);
38     Assert.Equal(expectedResult, actualResult);
39 }
```

Index

./csharp/Platform.RegularExpressions.Transformer.CSharpToCpp.Tests/CSharpToCppTransformerTests.cs, 16
./csharp/Platform.RegularExpressions.Transformer.CSharpToCpp/CSharpToCppTransformer.cs, 1