

# LinksPlatform's Platform.RegularExpressions.Transformer.CSharpToCpp Class Library

## 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     /// <summary>
11     /// <para>
12     /// Represents the sharp to cpp transformer.
13     /// </para>
14     /// <para></para>
15     /// </summary>
16     /// <seealso cref="TextTransformer"/>
17     public class CSharpToCppTransformer : TextTransformer
18     {
19         /// <summary>
20         /// <para>
21         /// The to list.
22         /// </para>
23         /// <para></para>
24         /// </summary>
25         public static readonly IList<ISubstitutionRule> FirstStage = new List<SubstitutionRule>
26         {
27             // // ...
28             //
29             (new Regex(@"(\r?\n)?[ \t]+//+.+"), "", 0),
30             // #pragma warning disable CS1591 // Missing XML comment for publicly visible type
31             // or member
32             //
33             (new Regex(@"^\\s*?\\#pragma[\\sa-zA-Z0-9]+$"), "", 0),
34             // {
35             // {
36             (new Regex(@"{\\s+[\\r\\n]+"), "{" + Environment.NewLine, 0),
37             // Platform.Collections.Methods.Lists
38             // Platform::Collections::Methods::Lists
39             (new Regex(@"(namespace[\\r\\n]+?)\\.([\\r\\n]+?)"), "$1::$2", 20),
40             // nameof(numbers)
41             // "numbers"
42             (new
43             → Regex(@"(?<before>\\W)nameof\\(((\\r\\n)+\\.)?(?<name>[a-zA-Z0-9_]+)([\\r\\n]+)?\\)"),
44             → $"{before}\\${name}\\", 0),
45             // Insert markers
46             // EqualityComparer<T> _equalityComparer = EqualityComparer<T>.Default;
47             // EqualityComparer<T> _equalityComparer =
48             → EqualityComparer<T>.Default; /*~_comparer~*/
49             (new Regex(@"(?<declaration>EqualityComparer<(?<type>[\\r\\n]+)>
50             → (?<comparer>[a-zA-Z0-9_]+) = EqualityComparer<k<type>>\\.Default;)" ),
51             → $"{declaration}/*~${comparer}~*/", 0),
52             // /*~_equalityComparer~*/..._equalityComparer.Equals(Minimum, value)
53             // /*~_equalityComparer~*/...Minimum == value
54             (new Regex(@"(?<before>/\\*~(?<comparer>[a-zA-Z0-9_]+)~*/(\\.|\\n)+\\W)\\k<comparer>\\.Equj
55             → als\\((?<left>[\\r\\n]+), (?<right>[\\r\\n]+)\\)"), $"{before}${left} == ${right}",
56             → 50),
57             // Remove markers
58             // /*~_equalityComparer~*/
59             //
60             (new Regex(@"\\r?\\n[\\r\\n]+/\\*~[a-zA-Z0-9_]+~*/"), "", 10),
61             // Insert markers
62             // Comparer<T> _comparer = Comparer<T>.Default;
63             // Comparer<T> _comparer = Comparer<T>.Default; /*~_comparer~*/
64             (new Regex(@"(?<declaration>Comparer<(?<type>[\\r\\n]+)> (?<comparer>[a-zA-Z0-9_]+) =
65             → Comparer<k<type>>\\.Default;)" ), $"{declaration}/*~${comparer}~*/", 0),
66             // /*~_comparer~*/..._comparer.Compare(Minimum, value) <= 0
67             // /*~_comparer~*/...Minimum <= value
68             (new Regex(@"(?<before>/\\*~(?<comparer>[a-zA-Z0-9_]+)~*/(\\.|\\n)+\\W)\\k<comparer>\\.Comj
69             → pare\\((?<left>[\\r\\n]+),
70             → (?<right>[\\r\\n]+)\\)\\s*(?<comparison>[<=>]=?)\\s*(?<after>\\D)" ),
71             → $"{before}${left} ${comparison} ${right}${after}", 50),
72             // Remove markers
73             // private static readonly Comparer<T> _comparer =
74             → Comparer<T>.Default; /*~_comparer~*/
75             //
76             //
77             //
78             //
79             //
80             //
81             //
82             //
83             //
84             //
85             //
86             //
87             //
88             //
89             //
90             //
91             //
92             //
93             //
94             //
95             //
96             //
97             //
98             //
99             //
100            //
101            //
102            //
103            //
104            //
105            //
106            //
107            //
108            //
109            //
110            //
111            //
112            //
113            //
114            //
115            //
116            //
117            //
118            //
119            //
120            //
121            //
122            //
123            //
124            //
125            //
126            //
127            //
128            //
129            //
130            //
131            //
132            //
133            //
134            //
135            //
136            //
137            //
138            //
139            //
140            //
141            //
142            //
143            //
144            //
145            //
146            //
147            //
148            //
149            //
150            //
151            //
152            //
153            //
154            //
155            //
156            //
157            //
158            //
159            //
160            //
161            //
162            //
163            //
164            //
165            //
166            //
167            //
168            //
169            //
170            //
171            //
172            //
173            //
174            //
175            //
176            //
177            //
178            //
179            //
180            //
181            //
182            //
183            //
184            //
185            //
186            //
187            //
188            //
189            //
190            //
191            //
192            //
193            //
194            //
195            //
196            //
197            //
198            //
199            //
200            //
201            //
202            //
203            //
204            //
205            //
206            //
207            //
208            //
209            //
210            //
211            //
212            //
213            //
214            //
215            //
216            //
217            //
218            //
219            //
220            //
221            //
222            //
223            //
224            //
225            //
226            //
227            //
228            //
229            //
230            //
231            //
232            //
233            //
234            //
235            //
236            //
237            //
238            //
239            //
240            //
241            //
242            //
243            //
244            //
245            //
246            //
247            //
248            //
249            //
250            //
251            //
252            //
253            //
254            //
255            //
256            //
257            //
258            //
259            //
260            //
261            //
262            //
263            //
264            //
265            //
266            //
267            //
268            //
269            //
270            //
271            //
272            //
273            //
274            //
275            //
276            //
277            //
278            //
279            //
280            //
281            //
282            //
283            //
284            //
285            //
286            //
287            //
288            //
289            //
290            //
291            //
292            //
293            //
294            //
295            //
296            //
297            //
298            //
299            //
300            //
301            //
302            //
303            //
304            //
305            //
306            //
307            //
308            //
309            //
310            //
311            //
312            //
313            //
314            //
315            //
316            //
317            //
318            //
319            //
320            //
321            //
322            //
323            //
324            //
325            //
326            //
327            //
328            //
329            //
330            //
331            //
332            //
333            //
334            //
335            //
336            //
337            //
338            //
339            //
340            //
341            //
342            //
343            //
344            //
345            //
346            //
347            //
348            //
349            //
350            //
351            //
352            //
353            //
354            //
355            //
356            //
357            //
358            //
359            //
360            //
361            //
362            //
363            //
364            //
365            //
366            //
367            //
368            //
369            //
370            //
371            //
372            //
373            //
374            //
375            //
376            //
377            //
378            //
379            //
380            //
381            //
382            //
383            //
384            //
385            //
386            //
387            //
388            //
389            //
390            //
391            //
392            //
393            //
394            //
395            //
396            //
397            //
398            //
399            //
400            //
401            //
402            //
403            //
404            //
405            //
406            //
407            //
408            //
409            //
410            //
411            //
412            //
413            //
414            //
415            //
416            //
417            //
418            //
419            //
420            //
421            //
422            //
423            //
424            //
425            //
426            //
427            //
428            //
429            //
430            //
431            //
432            //
433            //
434            //
435            //
436            //
437            //
438            //
439            //
440            //
441            //
442            //
443            //
444            //
445            //
446            //
447            //
448            //
449            //
450            //
451            //
452            //
453            //
454            //
455            //
456            //
457            //
458            //
459            //
460            //
461            //
462            //
463            //
464            //
465            //
466            //
467            //
468            //
469            //
470            //
471            //
472            //
473            //
474            //
475            //
476            //
477            //
478            //
479            //
480            //
481            //
482            //
483            //
484            //
485            //
486            //
487            //
488            //
489            //
490            //
491            //
492            //
493            //
494            //
495            //
496            //
497            //
498            //
499            //
500            //
501            //
502            //
503            //
504            //
505            //
506            //
507            //
508            //
509            //
510            //
511            //
512            //
513            //
514            //
515            //
516            //
517            //
518            //
519            //
520            //
521            //
522            //
523            //
524            //
525            //
526            //
527            //
528            //
529            //
530            //
531            //
532            //
533            //
534            //
535            //
536            //
537            //
538            //
539            //
540            //
541            //
542            //
543            //
544            //
545            //
546            //
547            //
548            //
549            //
550            //
551            //
552            //
553            //
554            //
555            //
556            //
557            //
558            //
559            //
560            //
561            //
562            //
563            //
564            //
565            //
566            //
567            //
568            //
569            //
570            //
571            //
572            //
573            //
574            //
575            //
576            //
577            //
578            //
579            //
580            //
581            //
582            //
583            //
584            //
585            //
586            //
587            //
588            //
589            //
590            //
591            //
592            //
593            //
594            //
595            //
596            //
597            //
598            //
599            //
600            //
601            //
602            //
603            //
604            //
605            //
606            //
607            //
608            //
609            //
610            //
611            //
612            //
613            //
614            //
615            //
616            //
617            //
618            //
619            //
620            //
621            //
622            //
623            //
624            //
625            //
626            //
627            //
628            //
629            //
630            //
631            //
632            //
633            //
634            //
635            //
636            //
637            //
638            //
639            //
640            //
641            //
642            //
643            //
644            //
645            //
646            //
647            //
648            //
649            //
650            //
651            //
652            //
653            //
654            //
655            //
656            //
657            //
658            //
659            //
660            //
661            //
662            //
663            //
664            //
665            //
666            //
667            //
668            //
669            //
670            //
671            //
672            //
673            //
674            //
675            //
676            //
677            //
678            //
679            //
680            //
681            //
682            //
683            //
684            //
685            //
686            //
687            //
688            //
689            //
690            //
691            //
692            //
693            //
694            //
695            //
696            //
697            //
698            //
699            //
700            //
701            //
702            //
703            //
704            //
705            //
706            //
707            //
708            //
709            //
710            //
711            //
712            //
713            //
714            //
715            //
716            //
717            //
718            //
719            //
720            //
721            //
722            //
723            //
724            //
725            //
726            //
727            //
728            //
729            //
730            //
731            //
732            //
733            //
734            //
735            //
736            //
737            //
738            //
739            //
740            //
741            //
742            //
743            //
744            //
745            //
746            //
747            //
748            //
749            //
750            //
751            //
752            //
753            //
754            //
755            //
756            //
757            //
758            //
759            //
760            //
761            //
762            //
763            //
764            //
765            //
766            //
767            //
768            //
769            //
770            //
771            //
772            //
773            //
774            //
775            //
776            //
777            //
778            //
779            //
780            //
781            //
782            //
783            //
784            //
785            //
786            //
787            //
788            //
789            //
790            //
791            //
792            //
793            //
794            //
795            //
796            //
797            //
798            //
799            //
800            //
801            //
802            //
803            //
804            //
805            //
806            //
807            //
808            //
809            //
810            //
811            //
812            //
813            //
814            //
815            //
816            //
817            //
818            //
819            //
820            //
821            //
822            //
823            //
824            //
825            //
826            //
827            //
828            //
829            //
830            //
831            //
832            //
833            //
834            //
835            //
836            //
837            //
838            //
839            //
840            //
841            //
842            //
843            //
844            //
845            //
846            //
847            //
848            //
849            //
850            //
851            //
852            //
853            //
854            //
855            //
856            //
857            //
858            //
859            //
860            //
861            //
862            //
863            //
864            //
865            //
866            //
867            //
868            //
869            //
870            //
871            //
872            //
873            //
874            //
875            //
876            //
877            //
878            //
879            //
880            //
881            //
882            //
883            //
884            //
885            //
886            //
887            //
888            //
889            //
890            //
891            //
892            //
893            //
894            //
895            //
896            //
897            //
898            //
899            //
900            //
901            //
902            //
903            //
904            //
905            //
906            //
907            //
908            //
909            //
910            //
911            //
912            //
913            //
914            //
915            //
916            //
917            //
918            //
919            //
920            //
921            //
922            //
923            //
924            //
925            //
926            //
927            //
928            //
929            //
930            //
931            //
932            //
933            //
934            //
935            //
936            //
937            //
938            //
939            //
940            //
941            //
942            //
943            //
944            //
945            //
946            //
947            //
948            //
949            //
950            //
951            //
952            //
953            //
954            //
955            //
956            //
957            //
958            //
959            //
960            //
961            //
962            //
963            //
964            //
965            //
966            //
967            //
968            //
969            //
970            //
971            //
972            //
973            //
974            //
975            //
976            //
977            //
978            //
979            //
980            //
981            //
982            //
983            //
984            //
985            //
986            //
987            //
988            //
989            //
990            //
991            //
992            //
993            //
994            //
995            //
996            //
997            //
998            //
999            //
1000           //

```

```

63 (new Regex(@"\r?\n[^\n]+\/*~[a-zA-Z0-9_]+~\*/"), "", 10),
64 // Comparer<TArgument>.Default.Compare(maximumArgument, minimumArgument) < 0
65 // maximumArgument < minimumArgument
66 (new Regex(@"Comparer<[^>]\n+\.Default\.Compare\\(\\s*(?<first>[^\n]+),\\s*(?<second>
  ↳ >[^\n]+)\\s*)\\s*(?<comparison>[<=>=?)\\s*0(?<after>\\D)", "${first}
  ↳ ${comparison} ${second}${after}", 0),
67 // public static bool operator ==(Range<T> left, Range<T> right) =>
  ↳ left.Equals(right);
68 //
69 (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>)\\.Equals\\((\\k<left>|\\k<right>)\\);"), "", 10),
70 // public static bool operator !=(Range<T> left, Range<T> right) => !(left == right);
71 //
72 (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>)\\.Equals\\(\\k<other>\\) : false;"), "", 10),
73 // public override bool Equals(object obj) => obj is Range<T> range ? Equals(range)
  ↳ : false;
74 //
75 (new Regex(@"\r?\n[^\n]+override bool Equals\\((System\\.)?[0o]bject
  ↳ (?<this>[a-zA-Z0-9]+)\\) => \\k<this> is [^\n]+ (?<other>[a-zA-Z0-9]+) \\?
  ↳ Equals\\(\\k<other>\\) : false;"), "", 10),
76 // out TProduct
77 // TProduct
78 (new Regex(@"(?<before><|, ))(in|out)
  ↳ (?<typeParameter>[a-zA-Z0-9]+)(?<after>>|,)",
  ↳ "${before}${typeParameter}${after}", 10),
79 // public ...
80 // public: ...
81 (new Regex(@"(?<newLineAndIndent>\\r?\\n?[
  ↳ \\t]*) (?<before>[^\{\\(\\r\\n]*) (?<access>private|protected|public) [ \\t]+(?![^\{\\(\\r\\n]
  ↳ \\n)*((?<=\\s)\\W)(interface|class|struct)(\\W)[^\{\\(\\r\\n]*[\\{\\(\\r\\n)]"),
  ↳ "${newLineAndIndent}${access}: ${before}", 0),
82 // public: static bool CollectExceptions { get; set; }
83 // public: inline static bool CollectExceptions;
84 (new Regex(@"(?<access>(private|protected|public): )(?<before>(static )?[^\r\n]+
  ↳ )(?<name>[a-zA-Z0-9]+) {[;]}*(?<=\\W)get;[;]}*(?<=\\W)set;[;]}*"),
  ↳ "${access}inline ${before}${name};", 0),
85 // public abstract class
86 // class
87 (new Regex(@"((public|protected|private|internal|abstract|static)
  ↳ )*(?<category>interface|class|struct)", "${category}", 0),
88 // class GenericCollectionMethodsBase<TElement> {
89 // template <typename TElement> class GenericCollectionMethodsBase {
90 (new Regex(@"(?<before>\\r?\\n)(?<indent>[ \\t]*) (?<type>class|struct)
  ↳ (?<typeName>[a-zA-Z0-9]+)<(?!<typeParameters>[a-zA-Z0-9
  ↳ ,]+)>(?!<typeDefinitionEnding>[^\{]+){", "${before}${indent}template <typename
  ↳ ...> ${type} ${typeName};" + Environment.NewLine + "${indent}template <typename
  ↳ ${typeParameters}> ${type}
  ↳ ${typeName}<${typeParameters}>${typeDefinitionEnding}{", 0),
91 // static void
  ↳ TestMultipleCreationsAndDeletions<TElement>(SizedBinaryTreeMethodsBase<TElement>
  ↳ tree, TElement* root)
92 // template<typename T> static void
  ↳ TestMultipleCreationsAndDeletions<TElement>(SizedBinaryTreeMethodsBase<TElement>
  ↳ tree, TElement* root)
93 (new Regex(@"static ([a-zA-Z0-9]+) ([a-zA-Z0-9]+)<<([a-zA-Z0-9]+)>>\\(((\\r\\n)+)\\)"),
  ↳ "template <typename $3> static $1 $2($4)", 0),
94 // interface IFactory<out TProduct> {
95 // template <typename...> class IFactory;\\ntemplate <typename TProduct> class
  ↳ IFactory<TProduct>
96 (new Regex(@"(?<before>\\r?\\n)(?<indent>[ \\t]*)interface
  ↳ (?<interface>[a-zA-Z0-9]+)<(?!<typeParameters>[a-zA-Z0-9
  ↳ ,]+)>(?!<typeDefinitionEnding>[^\{]+){", "${before}${indent}template <typename
  ↳ ...> class ${interface};" + Environment.NewLine + "${indent}template <typename
  ↳ ${typeParameters}> class
  ↳ ${interface}<${typeParameters}>${typeDefinitionEnding}{", 0),
  ↳ " public:", 0),
97 // template <typename TObject, TProperty, TValue>
98 // template <typename TObject, typename TProperty, typename TValue>
99 (new Regex(@"(?<before>template <((, )?typename [a-zA-Z0-9]+)+,
  ↳ )(?<typeParameter>[a-zA-Z0-9]+)(?<after>(,|>))"), "${before}typename
  ↳ ${typeParameter}${after}", 10),
100 // Insert markers

```

```

101 // private: static void BuildExceptionString(this StringBuilder sb, Exception
102   ↳ exception, int level)
103 // /*~extensionMethod~BuildExceptionString~*/private: static void
104   ↳ BuildExceptionString(this StringBuilder sb, Exception exception, int level)
105 (new Regex(@"private: static [^\r\n]+ (?<name>[a-zA-Z0-9]+)\(this [^\]\r\n+\)",
106   ↳ "/*~extensionMethod~${name}~*/$0", 0),
107 // Move all markers to the beginning of the file.
108 (new Regex(@"\A(?<before>[^\r\n]+\r?\n(?:\n+)(?<marker>/\/*~extensionMethod~(?<name>
109   ↳ [a-zA-Z0-9]+)~\*/)"), "${marker}${before}",
110   ↳ 10),
111 // /*~extensionMethod~BuildExceptionString~*/...sb.BuildExceptionString(exception.In
112   ↳ nerException, level +
113   ↳ 1);
114 // /*~extensionMethod~BuildExceptionString~*/...BuildExceptionString(sb,
115   ↳ exception.InnerException, level + 1);
116 (new Regex(@"(?<before>/\/*~extensionMethod~(?<name>[a-zA-Z0-9]+)~\*/(?:\n+)\W(?<var
117   ↳ iable>[_a-zA-Z0-9]+)\. \k<name>\("), "${before}${name}(${variable})",
118   ↳ 50),
119 // Remove markers
120 // /*~extensionMethod~BuildExceptionString~*/
121 //
122 (new Regex(@"/\/*~extensionMethod~[a-zA-Z0-9]+~\*/"), "", 0),
123 // (this
124 // (
125 (new Regex(@"\((this ", "(", 0),
126 // private: static readonly Disposal _emptyDelegate = (manual, wasDisposed) => { };
127 // private: inline static std::function<Disposal> _emptyDelegate = [](auto manual,
128   ↳ auto wasDisposed) { };
129 (new Regex(@"(?<access>(private|protected|public): )?static readonly
130   ↳ (?<type>[a-zA-Z][a-zA-Z0-9]*) (?<name>[a-zA-Z][a-zA-Z0-9_]*) =
131   ↳ \((?<firstArgument>[a-zA-Z][a-zA-Z0-9_]*)
132   ↳ (?<secondArgument>[a-zA-Z][a-zA-Z0-9_]*)\) => {\s*};"); "${access}inline static
133   ↳ std::function<${type}> ${name} = [](auto ${firstArgument}, auto
134   ↳ ${secondArgument}) { };"; 0),
135 // public: static readonly EnsureAlwaysExtensionRoot Always = new
136   ↳ EnsureAlwaysExtensionRoot();
137 // public: inline static EnsureAlwaysExtensionRoot Always;
138 (new Regex(@"(?<access>(private|protected|public): )?static readonly
139   ↳ (?<type>[a-zA-Z0-9]+(<[a-zA-Z0-9]+>)? (?<name>[a-zA-Z0-9_]+) = new
140   ↳ \k<type>\(\);"); "${access}inline static ${type} ${name};"; 0),
141 // public: static readonly Range<int> SByte = new
142   ↳ Range<int>(std::numeric_limits<int>::min(), std::numeric_limits<int>::max());
143 // public: inline static Range<int> SByte =
144   ↳ Range<int>(std::numeric_limits<int>::min(), std::numeric_limits<int>::max());
145 (new Regex(@"(?<access>(private|protected|public): )?static readonly
146   ↳ (?<type>[a-zA-Z0-9]+(<[a-zA-Z0-9]+>)? (?<name>[a-zA-Z0-9_]+) = new
147   ↳ \k<type>\(\((?<arguments>[^\n]+\)\);"); "${access}inline static ${type} ${name} =
148   ↳ ${type}(${arguments});"; 0),
149 // public: static readonly string ExceptionContentsSeparator = "---";
150 // public: inline static std::string ExceptionContentsSeparator = "---";
151 (new Regex(@"(?<access>(private|protected|public): )?(const|static readonly) string
152   ↳ (?<name>[a-zA-Z0-9_]+) = ""(?<string>(\\"|"[^\r\n]+)"";"); "${access}inline
153   ↳ static std::string ${name} = \"${string}\";"; 0),
154 // private: const int MaxPath = 92;
155 // private: inline static const int MaxPath = 92;
156 (new Regex(@"(?<access>(private|protected|public): )?(const|static readonly)
157   ↳ (?<type>[a-zA-Z0-9]+) (?<name>[_a-zA-Z0-9]+) = (?<value>[^\r\n]+);");
158   ↳ "${access}inline static const ${type} ${name} = ${value};"; 0),
159 // ArgumentNotNull(EnsureAlwaysExtensionRoot root, TArgument argument) where
160   ↳ TArgument : class
161 // ArgumentNotNull(EnsureAlwaysExtensionRoot root, TArgument* argument)
162 (new Regex(@"(?<before> [a-zA-Z]+(\([a-zA-Z *,,]+, |)) (?<type>[a-zA-Z]+) (?<after>(
163   ↳ [a-zA-Z *,,]+)\)) [ \r\n]+where \k<type> : class"); "${before}${type}*${after}",
164   ↳ 0),
165 // protected: abstract TElement GetFirst();
166 // protected: virtual TElement GetFirst() = 0;
167 (new Regex(@"(?<access>(private|protected|public): )?abstract
168   ↳ (?<method>[^\r\n]+);"); "${access}virtual ${method} = 0;"; 0),
169 // TElement GetFirst();
170 // virtual TElement GetFirst() = 0;
171 (new Regex(@"(?<before>[ \r\n]+ [ ]+)(?<methodDeclaration>(?!return) [a-zA-Z0-9]+
172   ↳ [a-zA-Z0-9]+(\([^\]\r\n]*\)) (?<after>; [ ]*[\r\n]+)"); "${before}virtual
173   ↳ ${methodDeclaration} = 0${after}"; 1),
174 // protected: readonly TreeElement[] _elements;
175 // protected: TreeElement _elements[N];

```

```

142 (new Regex(@"(?<access>(private|protected|public): )?readonly
    ↳ (?<type>[a-zA-Z<>0-9]+)([\\[]+) (?<name>[_a-zA-Z0-9]+);"), "{$access}$type}
    ↳ ${name}[N];", 0),
143 // protected: readonly TElement Zero;
144 // protected: TElement Zero;
145 (new Regex(@"(?<access>(private|protected|public): )?readonly
    ↳ (?<type>[a-zA-Z<>0-9]+) (?<name>[_a-zA-Z0-9]+);"), "{$access}$type} ${name};",
    ↳ 0),
146 // internal
147 //
148 (new Regex(@"(\\W)internal\\s+"), "$1", 0),
149 // static void NotImplementedException(ThrowExtensionRoot root) => throw new
    ↳ NotImplementedException();
150 // static void NotImplementedException(ThrowExtensionRoot root) { return throw new
    ↳ NotImplementedException(); }
151 (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),
152 // SizeBalancedTree(int capacity) => a = b;
153 // SizeBalancedTree(int capacity) { a = b; }
154 (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),
155 // int SizeBalancedTree(int capacity) => a;
156 // int SizeBalancedTree(int capacity) { return a; }
157 (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 $10; }", 0),
158 // OnDispose = (manual, wasDisposed) =>
159 // OnDispose = [&] (auto manual, auto wasDisposed)
160 (new Regex(@"(?<variable>[a-zA-Z_][a-zA-Z0-9_]*)(?<operator>\\s*\\+?=\\s*)\\(((?<firstArg_
    ↳ ument>[a-zA-Z_][a-zA-Z0-9_]*),
    ↳ (?<secondArgument>[a-zA-Z_][a-zA-Z0-9_]*))\\s*=>"),
    ↳ "{$variable}$operator [&] (auto ${firstArgument}, auto ${secondArgument})", 0),
161 // () => Integer<TElement>.Zero,
162 // () { return Integer<TElement>.Zero; },
163 (new Regex(@"\\(\\)\\s+>\\s+(?<expression>[^() ; \\r\\n]+(\\(((?<parenthesis>\\(|(?<-parent_
    ↳ hesis>\\)|[^() ; \\r\\n]*?\\)?)?[^() ; \\r\\n]*)(?<after>,|\\);)"), "() { return
    ↳ ${expression}; }${after}", 0),
164 // ~DisposableBase() => Destruct();
165 // ~DisposableBase() { Destruct(); }
166 (new Regex(@"~(?<class>[a-zA-Z_][a-zA-Z0-9_]*)(\\)\\s+>\\s+([~;\\r\\n]+?);"),
    ↳ "~${class}() { $1; }", 0),
167 // => Integer<TElement>.Zero;
168 // { return Integer<TElement>.Zero; }
169 (new Regex(@"\\)\\s+>\\s+([~;\\r\\n]+?);"), ") { return $1; }", 0),
170 // () { return avlTree.Count; }
171 // [&]() -> auto { return avlTree.Count; }
172 (new Regex(@"(?<before>, |\\)\\(\\) { return (?<expression>[~;\\r\\n]+); }"),
    ↳ "${before} [&] () -> auto { return ${expression}; }", 0),
173 // Count => GetSizeOrZero(Root);
174 // Count() { return GetSizeOrZero(Root); }
175 (new Regex(@"(\\W)([A-Z][a-zA-Z]+)\\s+>\\s+([~;\\r\\n]+);"), "$1$2() { return $3; }", 0),
176 // Insert scope borders.
177 // interface IDisposable { ... }
178 // interface IDisposable { /*~start~interface~IDisposable~*/ ...
    ↳ /*~end~interface~IDisposable~*/ }
179 (new Regex(@"(?<classDeclarationBegin>\\r?\\n(?<indent>[\\t ]*)interface[\\t
    ↳ ]*(?<type>[a-zA-Z_][a-zA-Z0-9_]*(\\<[^<>\\n*>?) [~{}]*{) (?<middle>(\\.|\\n)*)(?<beforeE_
    ↳ nd>(?!<=\\r?\\n)\\k<indent>)(?<end>}"),
    ↳ "${classDeclarationBegin}/*~start~interface~$type~*/${middle}${beforeEnd}/*~en_
    ↳ d~interface~$type~*/${end}",
    ↳ 0),
180 // Inside the scope replace:
181 // /*~start~interface~IDisposable~*/ ... bool IsDisposed { get; } ...
    ↳ /*~end~interface~IDisposable~*/
182 // /*~start~interface~IDisposable~*/ ... virtual bool IsDisposed() = 0;
    ↳ /*~end~interface~IDisposable~*/
183 (new Regex(@"(?<before>(?!<typeScopeStart>/\\*~start~interface~(?<type>[~\\n\\*]+)~\\*/)
    ↳ (\\.|\\n)+?) (?<propertyDeclaration>(?!<access>(private|protected|public):
    ↳ )?(?!<propertyType>[a-zA-Z_][a-zA-Z0-9_:<>]*) (?<property>[a-zA-Z_][a-zA-Z0-9_]*
    ↳ )(?<blockOpen>[\\n\\s]*{[\\n\\s]*)(\\[[^\\n]+\\][\\n\\s]*)?get;(?!<blockClose>[\\n\\s]*)) (?<
    ↳ after>(\\.|\\n)+?(?!<typeScopeEnd>/\\*~end~interface~\\k<type>~\\*/))"),
    ↳ "${before}virtual ${propertyType} ${property}() = 0;${after}", 20),

```

```

184 // Remove scope borders.
185 // /*~start~interface~IDisposable~*/
186 //
187 (new Regex(@"\/\*~[~*\n]+(~[~*\n]+)*~\/\*/", "", 0),
188 // public: T Object { get; }
189 // public: const T Object;
190 (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\s]*
  → }*)?get; (?<blockClose>[\n\s]*})(?<after>[\n\s]*)", "${before}${access}const
  → ${type} ${property};${after}", 2),
191 // public: bool IsDisposed { get => _disposed > 0; }
192 // public: bool IsDisposed() { return _disposed > 0; }
193 (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\s]*
  → }*)?get\s*=>\s*(?<expression>[^\n]+); (?<blockClose>[\n\s]*}{[\n\s]*)",
  → "${before}${access}${virtual}bool ${property}() ${blockOpen}return
  → ${expression};${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):
  → )?(?<virtual>virtual )?(?<type>[a-zA-Z_][a-zA-Z0-9_:<>]*)
  → (?<property>[a-zA-Z_][a-zA-Z0-9_]*)(?<blockOpen>[\n\s]*{[\n\s]*}\{[\n\s]*
  → }*)?get\s*=>\s*(?<expression>[^\n]+); (?<blockClose>[\n\s]*}{[\n\s]*)",
  → "${before}${access}${virtual}${type} ${property}() ${blockOpen}return
  → ${expression};${blockClose}", 2),
197 // ArgumentInRange(string message) { string messageBuilder() { return message; }
198 // ArgumentInRange(string message) { auto messageBuilder = [&]() -> string { return
  → message; };
199 (new Regex(@"(?<before>\W[_a-zA-Z0-9]+\((~\)\n)*[\s\n]*{[\s\n]*{[~}|~\n)*?(\r?\n)
  → ?[ \t]* (?<returnType>[_a-zA-Z0-9*:] +[_a-zA-Z0-9*:] *)
  → (?<methodName>[_a-zA-Z0-9+]\((?<arguments>[^\)\n]*)\)\s*{(?<body>("[~""\n]+""|
  → [~]|~\n)+?)}"), "${before}auto ${methodName} = [&]() -> ${returnType}
  → {${body}};", 10),
200 // Func<TElement> treeCount
201 // std::function<TElement()> treeCount
202 (new Regex(@"Func<([a-zA-Z0-9+])> ([a-zA-Z0-9+])", "std::function<$1()> $2", 0),
203 // Action<TElement> free
204 // std::function<void(TElement)> free
205 (new Regex(@"Action<(?<typeParameters>[a-zA-Z0-9]+(,
  → ([a-zA-Z0-9+])*)>)?(?<after>>| (?<variable>[a-zA-Z0-9+]))",
  → "std::function<void(${typeParameters})>${after}", 0),
206 // Predicate<TArgument> predicate
207 // std::function<bool(TArgument)> predicate
208 (new Regex(@"Predicate<([a-zA-Z0-9+])> ([a-zA-Z0-9+])", "std::function<bool($1)>
  → $2", 0),
209 // var
210 // auto
211 (new Regex(@"(\W)var(\W)", "$1auto$2", 0),
212 // unchecked
213 //
214 (new Regex(@"[\r\n]{2}\s*?unchecked\s*?$"), "", 0),
215 // throw new
216 // throw
217 (new Regex(@"(\W)throw new(\W)", "$1throw$2", 0),
218 // void RaiseExceptionIgnoredEvent(Exception exception)
219 // void RaiseExceptionIgnoredEvent(const std::exception& exception)
220 (new Regex(@"(\(|\ )(System\.Exception|Exception)( |\))", "$1const
  → std::exception&$3", 0),
221 // EventHandler<Exception>
222 // EventHandler<std::exception>
223 (new Regex(@"(\W)(System\.Exception|Exception)(\W)", "$1std::exception$3", 0),
224 // override void PrintNode(TElement node, StringBuilder sb, int level)
225 // void PrintNode(TElement node, StringBuilder sb, int level) override
226 (new Regex(@"override ([a-zA-Z0-9 \*+])\((~\)\r\n+?)\)", "$1$2 override", 0),
227 // return (range.Minimum, range.Maximum)
228 // return {range.Minimum, range.Maximum}
229 (new Regex(@"(?<before>return\s*)\((?<values>[^\)\n]+)\)(?!()\ (?<after>\W)",
  → "${before}${values}${after}", 0),
230 // string
231 // std::string
232 (new Regex(@"(?<before>\W)(?!::)string(?<after>\W)",
  → "${before}std::string${after}", 0),
233 // System.ValueTuple
234 // std::tuple

```

```

235 (new Regex(@"(?<before>\W) (System\.)?ValueTuple(?:\s*=\|() (?<after>\W)"),
    ↪ "${before}std::tuple${after}", 0),
236 // sbyte
237 // std::int8_t
238 (new Regex(@"(?<before>\W) ((System\.)?SB|sb)yte(?:\s*=\|() (?<after>\W)"),
    ↪ "${before}std::int8_t${after}", 0),
239 // short
240 // std::int16_t
241 (new Regex(@"(?<before>\W) ((System\.)?Int16|short) (?!\s*=\|() (?<after>\W)"),
    ↪ "${before}std::int16_t${after}", 0),
242 // int
243 // std::int32_t
244 (new Regex(@"(?<before>\W) ((System\.)?I|i)nt(32)?(?:\s*=\|() (?<after>\W)"),
    ↪ "${before}std::int32_t${after}", 0),
245 // long
246 // std::int64_t
247 (new Regex(@"(?<before>\W) ((System\.)?Int64|long) (?!\s*=\|() (?<after>\W)"),
    ↪ "${before}std::int64_t${after}", 0),
248 // byte
249 // std::uint8_t
250 (new Regex(@"(?<before>\W) ((System\.)?Byte|byte) (?!\s*=\|() (?<after>\W)"),
    ↪ "${before}std::uint8_t${after}", 0),
251 // ushort
252 // std::uint16_t
253 (new Regex(@"(?<before>\W) ((System\.)?UInt16|ushort) (?!\s*=\|() (?<after>\W)"),
    ↪ "${before}std::uint16_t${after}", 0),
254 // uint
255 // std::uint32_t
256 (new Regex(@"(?<before>\W) ((System\.)?UI|ui)nt(32)?(?:\s*=\|() (?<after>\W)"),
    ↪ "${before}std::uint32_t${after}", 0),
257 // ulong
258 // std::uint64_t
259 (new Regex(@"(?<before>\W) ((System\.)?UInt64|ulong) (?!\s*=\|() (?<after>\W)"),
    ↪ "${before}std::uint64_t${after}", 0),
260 // char*[] args
261 // char* args[]
262 (new Regex(@"([\_a-zA-Z0-9:\*]?)\[\] ([\_a-zA-Z0-9]+)", "$1 $2[]", 0),
263 // float.MinValue
264 // std::numeric_limits<float>::lowest()
265 (new Regex(@"(?<before>\W) (?<type>std::[\_a-z0-9_]+|float|double)\.MinValue(?<after>\W)"),
    ↪ "${before}std::numeric_limits<${type}>::lowest()${after}",
    ↪ 0),
266 // double.MaxValue
267 // std::numeric_limits<float>::max()
268 (new Regex(@"(?<before>\W) (?<type>std::[\_a-z0-9_]+|float|double)\.MaxValue(?<after>\W)"),
    ↪ "${before}std::numeric_limits<${type}>::max()${after}",
    ↪ 0),
269 // using Platform.Numbers;
270 //
271 (new Regex(@"([\r\n]{2}|~)\s*using [\_a-zA-Z0-9]+;\s*?${$)", "", 0),
272 // class SizedBinaryTreeMethodsBase : GenericCollectionMethodsBase
273 // class SizedBinaryTreeMethodsBase : public GenericCollectionMethodsBase
274 (new Regex(@"(struct|class) ([\_a-zA-Z0-9]+)(<[\_a-zA-Z0-9 ,]+>)? : ([\_a-zA-Z0-9]+)",
    ↪ "$1 $2$3 : public $4", 0),
275 // System.IDisposable
276 // System::IDisposable
277 (new Regex(@"(?<before>System(?:[\_a-zA-Z_]\w*)*)\. (?<after>[\_a-zA-Z_]\w*)"),
    ↪ "${before}::${after}", 20),
278 // class IProperty : ISetter<TValue, TObject>, IProvider<TValue, TObject>
279 // class IProperty : public ISetter<TValue, TObject>, public IProvider<TValue,
    ↪ TObject>
280 (new Regex(@"(?<before>(interface|struct|class) [\_a-zA-Z_]\w* : ((public
    ↪ [\_a-zA-Z_][\w:]*(<[\_a-zA-Z0-9 ,]+>)?,
    ↪ )+)? (?<inheritedType>(?!public) [\_a-zA-Z_][\w:]*(<[\_a-zA-Z0-9 ,]+>)? (?<after>(,
    ↪ [\_a-zA-Z_][\w:]*(!>)|[\r\n]+))", "${before}public ${inheritedType}${after}",
    ↪ 10),
281 // interface IDisposable {
282 // class IDisposable { public:
283 (new Regex(@"(?<before>\r?\n) (?<indent>[ \t]*)interface
    ↪ (?<interface>[\_a-zA-Z_]\w*) (?<typeDefinitionEnding>[^\{+]{})",
    ↪ "${before}${indent}class ${interface}${typeDefinitionEnding}{ " +
    ↪ Environment.NewLine + "      public:", 0),
284 // struct TreeElement { }
285 // struct TreeElement { };
286 (new Regex(@"(struct|class) ([\_a-zA-Z0-9]+) (\s+){([\_sa-zA-Z0-9;:_]+?)}([^\;])", "$1
    ↪ $2$3{$4};$5", 0),

```

```

287 // class Program { }
288 // class Program { };
289 (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>[^\r\n]*;)" ), "${type}
  ↳ ${name}${beforeBody}${body}${afterBody}", 0),
290 // Insert scope borders.
291 // ref TEElement root
292 // ~!root!~ref TEElement root
293 (new Regex(@"(?<definition>(?!<= |\) (ref [a-zA-Z0-9]+|[a-zA-Z0-9]+(?<!ref)))
  ↳ (?<variable>[a-zA-Z0-9]+)(?<=\\|,| =)" ), "~!${variable}!~!${definition}", 0),
294 // Inside the scope of ~!root!~ replace:
295 // root
296 // *root
297 (new Regex(@"(?<definition>~!(?<pointer>[a-zA-Z0-9]+)!~ref [a-zA-Z0-9]+
  ↳ \k<pointer>(?!<=\\|,| =)) (?<before>((?!~!\k<pointer>!~)(.|\\n))*?) (?<prefix>(\\
  ↳ |\\()\\k<pointer>(?!<suffix>( |\\)|;|,))" ),
  ↳ "${definition}${before}${prefix}*${pointer}${suffix}", 70),
298 // Remove scope borders.
299 // ~!root!~
300 //
301 (new Regex(@"~!(?<pointer>[a-zA-Z0-9]+)!~"), "", 5),
302 // ref auto root = ref
303 // ref auto root =
304 (new Regex(@"ref ([a-zA-Z0-9]+) ([a-zA-Z0-9]+) = ref(\\W)" ), "$1* $2 =$3", 0),
305 // *root = ref left;
306 // root = left;
307 (new Regex(@"\\*( [a-zA-Z0-9]+ ) = ref ([a-zA-Z0-9]+)(\\W)" ), "$1 = $2$3", 0),
308 // (ref left)
309 // (left)
310 (new Regex(@"\\(ref ([a-zA-Z0-9]+)(\\|\\(|,))" ), "($1$2)", 0),
311 // ref TEElement
312 // TEElement*
313 (new Regex(@"( |\\()ref ([a-zA-Z0-9]+) " ), "$1$2* ", 0),
314 // ref sizeBalancedTree.Root
315 // &sizeBalancedTree->Root
316 (new Regex(@"ref ([a-zA-Z0-9]+)\\.([a-zA-Z0-9\\*]+)" ), "&$1->$2", 0),
317 // ref GetElement(node).Right
318 // &GetElement(node)->Right
319 (new Regex(@"ref ([a-zA-Z0-9]+)\\(( [a-zA-Z0-9\\*]+ )\\)\\.([a-zA-Z0-9]+)" ),
  ↳ "&$1($2)->$3", 0),
320 // GetElement(node).Right
321 // GetElement(node)->Right
322 (new Regex(@"( [a-zA-Z0-9]+ )\\(( [a-zA-Z0-9\\*]+ )\\)\\.([a-zA-Z0-9]+)" ), "$1($2)->$3", 0),
323 // [Fact] \\npublic: static void SizeBalancedTreeMultipleAttachAndDetachTest()
324 // public: TEST_METHOD(SizeBalancedTreeMultipleAttachAndDetachTest)
325 (new Regex(@"\\[Fact\\] \\s\\n+(public:)?(static)?void ([a-zA-Z0-9]+)\\(\\)" ), "public:
  ↳ TEST_METHOD($3)", 0),
326 // class TreesTests
327 // TEST_CLASS(TreesTests)
328 (new Regex(@"class ([a-zA-Z0-9]+Tests)" ), "TEST_CLASS($1)", 0),
329 // Assert.Equal
330 // Assert::AreEqual
331 (new Regex(@"(?<type>Assert)\\. (?<method>(Not)?Equal)" ), "${type}::Are${method}", 0),
332 // Assert.Throws
333 // Assert::ExpectException
334 (new Regex(@"(Assert)\\.Throws" ), "$1::ExpectException", 0),
335 // Assert.True
336 // Assert::IsTrue
337 (new Regex(@"(Assert)\\. (True|False)" ), "$1::Is$2", 0),
338 // $"Argument {argumentName} is null."
339 // std::string("Argument
  ↳ ").append(Platform::Converters::To<std::string>(argumentName)).append(" is
  ↳ null.")
340 (new Regex(@"\\$"" (?<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),
341 // $"
342 // "
343 (new Regex(@"\\$"""), "\\\"", 0),
344 // std::string(std::string("[").append(Platform::Converters::To<std::string>(Minimum)
  ↳ ).append(",
  ↳ ").append(Platform::Converters::To<std::string>(Maximum)).append("]")
  ↳ ).append(Platform::Converters::To<std::string>(Minimum)).append(",
  ↳ ").append(Platform::Converters::To<std::string>(Maximum)).append("]")
345

```

```

346 (new Regex(@"std::string\((?<begin>std::string\(\"\\\"|\"[\"]*)\"\\)\.\append\((Platf
    ↪ orm::Converters::To<std::string>\([^\n]+\)|[^\n]+\))\)\.\append"),
    ↪ "${begin}.append", 10),
347 // Console.WriteLine("...")
348 // printf("...\n")
349 (new Regex(@"Console.WriteLine\(\"([^\r\n]+)\""), "printf(\"$1\\n\")", 0),
350 // TElement Root;
351 // TElement Root = 0;
352 (new Regex(@"(?<before>\r?\n[\t ]+)(?<access>(private|protected|public):
    ↪ )?)?(?<type>[a-zA-Z0-9:_]+(?<!return)) (?<name>[_a-zA-Z0-9]+);"),
    ↪ "${before}${access}${type} ${name} = 0;", 0),
353 // TreeElement _elements[N];
354 // TreeElement _elements[N] = { {0} };
355 (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),
356 // auto path = new TElement[MaxPath];
357 // TElement path[MaxPath] = { {0} };
358 (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),
359 // bool Equals(Range<T> other) { ... }
360 // bool operator ==(const Key &other) const { ... }
361 (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),
362 // Insert scope borders.
363 // class Range { ... public: override std::string ToString() { return ...; }
364 // class Range { /*~Range<T>~/ ... public: override std::string ToString() { return
    ↪ ...; }
365 (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),
366 // Inside the scope of ~!Range!~ replace:
367 // public: override std::string ToString() { return ...; }
368 // public: operator std::string() const { return ...; } \n\npublic: friend
    ↪ std::ostream & operator <<(std::ostream &out, const A &obj) { return out <<
    ↪ (std::string)obj; }
369 (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
    ↪ ${type} &obj) { return out << (std::string)obj; }", 0),
370 // Remove scope borders.
371 // /*~Range~/
372 //
373 (new Regex(@"/\s*~[_a-zA-Z0-9<>:]+~/\s*"/), "", 0),
374 // private: inline static ConcurrentBag<std::exception> _exceptionsBag;
375 // private: inline static std::mutex _exceptionsBag_mutex; \n\n private: inline
    ↪ static std::vector<std::exception> _exceptionsBag;
376 (new Regex(@"(?<begin>\r?\n?(?<indent>[\t ]+)(?<access>(private|protected|public):
    ↪ )?inline static ConcurrentBag<(?(argumentType>[^\r\n]+)>
    ↪ (?<name>[_a-zA-Z0-9]+);"), "${begin}private: inline static std::mutex
    ↪ ${name}_mutex;" + Environment.NewLine + Environment.NewLine +
    ↪ "${indent}${access}inline static std::vector<${argumentType}> ${name};", 0),
377 // public: static IReadOnlyCollection<std::exception> GetCollectedExceptions() {
    ↪ return _exceptionsBag; }
378 // public: static std::vector<std::exception> GetCollectedExceptions() { return
    ↪ std::vector<std::exception>(_exceptionsBag); }
379 (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),
380 // public: static event EventHandler<std::exception> ExceptionIgnored =
    ↪ OnExceptionIgnored; ... };
381 // ... public: static inline Platform::Delegates::MulticastDelegate<void(void*,
    ↪ const std::exception>)> ExceptionIgnored = OnExceptionIgnored; };

```



```

382 (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),
383 // public: event Disposal OnDispose;
384 // public: Platform::Delegates::MulticastDelegate<Disposal> OnDispose;
385 (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}> ${name};", 0),
386 // Insert scope borders.
387 // class IgnoredExceptions { ... private: inline static std::vector<std::exception>
    ↳ _exceptionsBag;
388 // class IgnoredExceptions {/*~_exceptionsBag~/ ... private: inline static
    ↳ std::vector<std::exception> _exceptionsBag;
389 (new Regex(@"(?<classDeclarationBegin>\r?\n(?<indent>[\t ]*)class [^{\r\n}]+\r\n[\t
    ↳ ]*(?(middle>((?!class)\.|\n)+?)(?(vectorFieldDeclaration>(?(access>(private|pro_
    ↳ tected|public): )inline static std::vector<(?(argumentType>[~;\r\n]+)>
    ↳ (?(fieldName>[_a-zA-Z0-9]+);)");",
    ↳ "${classDeclarationBegin}/*~${fieldName}~*/${middle}${vectorFieldDeclaration}",
    ↳ 0),
390 // Inside the scope of ~!_exceptionsBag!~ replace:
391 // _exceptionsBag.Add(exception);
392 // _exceptionsBag.push_back(exception);
393 (new Regex(@"(?<scope>/\~*(?(fieldName>[_a-zA-Z0-9]+)\~*/)(?(separator>.\|\n)(?(befor_
    ↳ e>((?!/\~*\k<fieldName>\~*/)(.\|\n))*?)\k<fieldName>\.Add"),
    ↳ "${scope}${separator}${before}${fieldName}.push_back", 10),
394 // Remove scope borders.
395 // /*~_exceptionsBag~/
396 //
397 (new Regex(@"/\~*[_a-zA-Z0-9]+\~*/"), "", 0),
398 // Insert scope borders.
399 // class IgnoredExceptions { ... private: static std::mutex _exceptionsBag_mutex;
400 // class IgnoredExceptions {/*~_exceptionsBag~/ ... private: static std::mutex
    ↳ _exceptionsBag_mutex;
401 (new Regex(@"(?<classDeclarationBegin>\r?\n(?<indent>[\t ]*)class [^{\r\n}]+\r\n[\t
    ↳ ]*(?(middle>((?!class)\.|\n)+?)(?(mutexDeclaration>private: inline static
    ↳ std::mutex (?(fieldName>[_a-zA-Z0-9]+)_mutex;)",
    ↳ "${classDeclarationBegin}/*~${fieldName}~*/${middle}${mutexDeclaration}", 0),
402 // Inside the scope of ~!_exceptionsBag!~ replace:
403 // return std::vector<std::exception>(_exceptionsBag);
404 // std::lock_guard<std::mutex> guard(_exceptionsBag_mutex); return
    ↳ std::vector<std::exception>(_exceptionsBag);
405 (new Regex(@"(?<scope>/\~*(?(fieldName>[_a-zA-Z0-9]+)\~*/)(?(separator>.\|\n)(?(befor_
    ↳ e>((?!/\~*\k<fieldName>\~*/)(.\|\n))*?){(?(after>((?!lock_guard)[^{};\r\n])*\k<f_
    ↳ ieldName>[~;}\r\n]*);)", "${scope}${separator}${before}{
    ↳ std::lock_guard<std::mutex> guard(${fieldName}_mutex);${after}", 10),
406 // Inside the scope of ~!_exceptionsBag!~ replace:
407 // _exceptionsBag.Add(exception);
408 // std::lock_guard<std::mutex> guard(_exceptionsBag_mutex); \r\n
    ↳ _exceptionsBag.Add(exception);
409 (new Regex(@"(?<scope>/\~*(?(fieldName>[_a-zA-Z0-9]+)\~*/)(?(separator>.\|\n)(?(befor_
    ↳ e>((?!/\~*\k<fieldName>\~*/)(.\|\n))*?){(?(after>((?!lock_guard)([~{};]|\n))*?\r_
    ↳ ?\n(?<indent>[\t ]*)\k<fieldName>[~;}\r\n]*);)",
    ↳ "${scope}${separator}${before}{
    ↳ "${indent}std::lock_guard<std::mutex> guard(${fieldName}_mutex);${after}", 10),
410 // Remove scope borders.
411 // /*~_exceptionsBag~/
412 //
413 (new Regex(@"/\~*[_a-zA-Z0-9]+\~*/"), "", 0),
414 // Insert scope borders.
415 // class IgnoredExceptions { ... public: static inline
    ↳ Platform::Delegates::MulticastDelegate<void(void*, const std::exception&)>
    ↳ ExceptionIgnored = OnExceptionIgnored;
416 // class IgnoredExceptions {/*~ExceptionIgnored~/ ... public: static inline
    ↳ Platform::Delegates::MulticastDelegate<void(void*, const std::exception&)>
    ↳ ExceptionIgnored = OnExceptionIgnored;
417 (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),

```

```

418 // Inside the scope of ~!ExceptionIgnored!~ replace:
419 // ExceptionIgnored.Invoke(NULL, exception);
420 // ExceptionIgnored(NULL, exception);
421 (new Regex(@"(?<scope>/\*~(?<eventName>[a-zA-Z0-9]+)~\*/)(?<separator>.\|\n)(?<before>
  ↳ >((?!/\*~\k<eventName>~\*/)(.\|\n))*?)\k<eventName>\.Invoke"),
  ↳ "${scope}${separator}${before}${eventName}", 10),
422 // Remove scope borders.
423 // /*~ExceptionIgnored~/
424 //
425 (new Regex(@"/*~[a-zA-Z0-9]+~\*/"), "", 0),
426 // Insert scope borders.
427 // auto added = new StringBuilder();
428 // /*~sb~/std::string added;
429 (new Regex(@"(auto|(System\.Text\.)?StringBuilder) (?<variable>[a-zA-Z0-9]+) = new
  ↳ (System\.Text\.)?StringBuilder\(\);"), "/*~${variable}~/std::string
  ↳ ${variable};", 0),
430 // static void Indent(StringBuilder sb, int level)
431 // static void Indent(/*~sb~/StringBuilder sb, int level)
432 (new Regex(@"(?<start>, \\\() (System\.Text\.)?StringBuilder
  ↳ (?<variable>[a-zA-Z0-9]+)(?<end>, \\\)"), "${start}/*~${variable}~/std::string&
  ↳ ${variable}${end}", 0),
433 // Inside the scope of ~!added!~ replace:
434 // sb.ToString()
435 // sb
436 (new Regex(@"(?<scope>/\*~(?<variable>[a-zA-Z0-9]+)~\*/)(?<separator>.\|\n)(?<before>
  ↳ ((?!/\*~\k<variable>~\*/)(.\|\n))*?)\k<variable>\.ToString\(\)"),
  ↳ "${scope}${separator}${before}${variable}", 10),
437 // sb.AppendLine(argument)
438 // sb.append(Platform::Converters::To<std::string>(argument)).append(1, '\n')
439 (new Regex(@"(?<scope>/\*~(?<variable>[a-zA-Z0-9]+)~\*/)(?<separator>.\|\n)(?<before>
  ↳ ((?!/\*~\k<variable>~\*/)(.\|\n))*?)\k<variable>\.AppendLine\((?<argument>[^\], \
  ↳ r\n)+\)"),
  ↳ "${scope}${separator}${before}${variable}.append(Platform::Converters::To<std::s
  ↳ tring>(${argument})).append(1, '\n')",
  ↳ 10),
440 // sb.Append('\t', level);
441 // sb.append(level, '\t');
442 (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),
443 // sb.Append(argument)
444 // sb.append(Platform::Converters::To<std::string>(argument))
445 (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),
446 // Remove scope borders.
447 // /*~sb~/
448 //
449 (new Regex(@"/*~[a-zA-Z0-9]+~\*/"), "", 0),
450 // Insert scope borders.
451 // auto added = new HashSet<TElement>();
452 // ~!added!~std::unordered_set<TElement> added;
453 (new Regex(@"auto (?<variable>[a-zA-Z0-9]+) = new
  ↳ HashSet<(?!<element>[a-zA-Z0-9]+)>\(\);"),
  ↳ "~!${variable}!~std::unordered_set<${element}> ${variable};", 0),
454 // Inside the scope of ~!added!~ replace:
455 // added.Add(node)
456 // added.insert(node)
457 (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),
458 // Inside the scope of ~!added!~ replace:
459 // added.Remove(node)
460 // added.erase(node)
461 (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),
462 // if (added.insert(node)) {
463 // if (!added.contains(node)) { added.insert(node);

```

```

464 (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),
465 // Remove scope borders.
466 // ~!added!~
467 //
468 (new Regex(@"~![a-zA-Z0-9]+!~"), "", 5),
469 // Insert scope borders.
470 // auto random = new System::Random(0);
471 // std::srand(0);
472 (new Regex(@"[a-zA-Z0-9\.]+ ([a-zA-Z0-9]+) = new
    ↪ (System::)?Random\((([a-zA-Z0-9+])\)\);", "~!$!~std::srand($3);", 0),
473 // Inside the scope of ~!random!~ replace:
474 // random.Next(1, N)
475 // (std::rand() % N) + 1
476 (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),
477 // Remove scope borders.
478 // ~!random!~
479 //
480 (new Regex(@"~![a-zA-Z0-9]+!~"), "", 5),
481 // Insert method body scope starts.
482 // void PrintNodes(TElement node, StringBuilder sb, int level) {
483 // void PrintNodes(TElement node, StringBuilder sb, int level) {/*method-start*/
484 (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*/${end}",
    ↪ 0),
485 // Insert method body scope ends.
486 // {/*method-start*/...}
487 // {/*method-start*/.../*method-end*/}
488 (new Regex(@"{\/*method-start\*/(?<body>((?<bracket>\{) | (?<-bracket>\}) | [^\{\}]*)+)"
    ↪ \}"}", "{/*method-start*/${body}/*method-end*/}",
    ↪ 0),
489 // Inside method bodies replace:
490 // GetFirst(
491 // this->GetFirst(
492 (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),
493 // Remove scope borders.
494 // /*method-start*/
495 //
496 (new Regex(@"/\*method-(start|end)\*/"), "", 0),
497 // Insert scope borders.
498 // const std::exception& ex
499 // const std::exception& ex/*~ex~*/
500 (new Regex(@"(?<before>\(| )(?<variableDefinition>(const )?(std::)?exception&?
    ↪ (?<variable>[_a-zA-Z0-9+])(?<after>\W)",
    ↪ "${before}${variableDefinition}/*~${variable}~*/${after}", 0),
501 // Inside the scope of ~!ex!~ replace:
502 // ex.Message
503 // ex.what()
504 (new Regex(@"(?<scope>\/*~(?<variable>[_a-zA-Z0-9+])~\*/)(?<separator>.\|\\n)(?<before"
    ↪ >((?!/\*~\k<variable>~\*/)(.\|\\n))*?) (Platform::Converters::To<std::string>\(\k<
    ↪ variable>\.Message\)|\k<variable>\.Message)",
    ↪ "${scope}${separator}${before}${variable}.what()", 10),
505 // Remove scope borders.
506 // /*~ex~*/
507 //
508 (new Regex(@"/\*~[_a-zA-Z0-9+~\*/"), "", 0),
509 // throw ObjectDisposedException(objectName, message);
510 // throw std::runtime_error(std::string("Attempt to access disposed object
    ↪ ").append(objectName).append(": ").append(message).append("."));
511 (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),

```

```

512 // throw ArgumentNullException(argumentName, message);
513 // throw std::invalid_argument(std::string("Argument
514 → ").append(argumentName).append(" is null: ").append(message).append("."));
(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),
515 // throw ArgumentException(message, argumentName);
516 // throw std::invalid_argument(std::string("Invalid ").append(argumentName).append("
→ argument: ").append(message).append("."));
517 (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),
518 // throw ArgumentOutOfRangeException(argumentName, argumentValue, messageBuilder());
519 // 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("."));
520 (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),
521 // throw NotSupportedException();
522 // throw std::logic_error("Not supported exception.");
523 (new Regex(@"throw NotSupportedException\(\);"), "throw std::logic_error(\"Not
→ supported exception.\");");, 0),
524 // throw NotImplementedException();
525 // throw std::logic_error("Not implemented exception.");
526 (new Regex(@"throw NotImplementedException\(\);"), "throw std::logic_error(\"Not
→ implemented exception.\");");, 0),
527 // Insert scope borders.
528 // const std::string& message
529 // const std::string& message/*~message~/
530 (new Regex(@"(?<before>\(| )(?<variableDefinition>(const )?(std::)?string&?|char\*)
→ (?<variable>[_a-zA-Z0-9]+)(?<after>\W)"),
→ "${before}${variableDefinition}/*~${variable}~/${after}", 0),
531 // Inside the scope of /*~message~/ replace:
532 // Platform::Converters::To<std::string>(message)
533 // message
534 (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),
535 // Remove scope borders.
536 // /*~ex~/
537 //
538 (new Regex(@"\/\*~[_a-zA-Z0-9]+~\*/"), "", 0),
539 // Insert scope borders.
540 // std::tuple<T, T> tuple
541 // std::tuple<T, T> tuple/*~tuple~/
542 (new Regex(@"(?<before>\(| )(?<variableDefinition>(const )?(std::)?tuple<[\n]+>&?
→ (?<variable>[_a-zA-Z0-9]+)(?<after>\W)"),
→ "${before}${variableDefinition}/*~${variable}~/${after}", 0),
543 // Inside the scope of ~!ex!~ replace:
544 // tuple.Item1
545 // std::get<1-1>(tuple)
546 (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),
547 // Remove scope borders.
548 // /*~ex~/
549 //
550 (new Regex(@"\/\*~[_a-zA-Z0-9]+~\*/"), "", 0),
551 // Insert scope borders.
552 // class Range<T> {
553 // class Range<T> {/*~type~Range<T>~/

```

```

554 (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),
555 // Inside the scope of /*~type~Range<T>~*/ insert inner scope and replace:
556 // public: static implicit operator std::tuple<T, T>(Range<T> range)
557 // public: operator std::tuple<T, T>() const /*~variable~Range<T>~*/
558 (new Regex(@"(?<scope>/\s*~type~(?<typeName>[^\n\*]+)~(?<fullType>[^\n\*]+)~\s*/)(?<
    ↳ separator>.\n)(?<before>((?!/\s*~type~\k<typeName>~\k<fullType>~\s*/)(.\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),
559 // Inside the scope of /*~type~Range<T>~*/ replace:
560 // 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)); }
561 // public: Range(std::tuple<T, T> tuple) : Range(std::get<1-1>(tuple),
    ↳ std::get<2-1>(tuple)) { }
562 (new Regex(@"(?<scope>/\s*~type~(?<typeName>[^\n\*]+)~(?<fullType>[^\n\*]+)~\s*/)(?<
    ↳ separator>.\n)(?<before>((?!/\s*~type~\k<typeName>~\k<fullType>~\s*/)(.\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),
563 // Inside the scope of /*~variable~range~*/ replace:
564 // range.Minimum
565 // this->Minimum
566 (new Regex(@"(?<scope>{/s*~variable~(?<variable>[^\n\*]+)~\s*/)(?<separator>.\n)(?<be
    ↳ fore>(?!<beforeExpression>(?!<bracket>{) | (?<-bracket>}) | [^\n\*]{})\k<variable>\.
    ↳ (?<field>[_a-zA-Z0-9]+)(?<after>(, | ; | |
    ↳ | \)) (?<afterExpression>(?!<bracket>{) | (?<-bracket>}) | [^\n\*]{})?)" ),
    ↳ "$${scope}${separator}${before}this->${field}${after}", 10),
567 // Remove scope borders.
568 // /*~ex~*/
569 //
570 (new Regex(@"/*~[^\n\*]+~[^\n\*]+~*/", "", 0),
571 // Insert scope borders.
572 // namespace Platform::Ranges { ... }
573 // namespace Platform::Ranges /*~start~namespace~Platform::Ranges~*/ ...
    ↳ /*~end~namespace~Platform::Ranges~*/
574 (new Regex(@"(?<namespaceDeclarationBegin>\r?\n(?<indent>[\t ]*)namespace
    ↳ (?<namespaceName>(?!<namePart>[a-zA-Z][a-zA-Z0-9]+)(?!<nextNamePart>::[a-zA-Z][a-z
    ↳ A-Z0-9]+)\s*\n)*)(?<middle>(.\n)*)(?<end>(?!<br?>\n)\k<indent>{?!;})"),
    ↳ "$${namespaceDeclarationBegin}/*~start~namespace~${namespaceName}~*/${middle}/*~e
    ↳ nd~namespace~${namespaceName}~*/${end}",
    ↳ 0),
575 // Insert scope borders.
576 // class Range<T> { ... };
577 // class Range<T> /*~start~type~Range<T>~T~*/ ... /*~end~type~Range<T>~T~*/;
578 (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>(?!<br?>\n)\k<indent>{?!;})"),
    ↳ "$${classDeclarationBegin}/*~start~type~${type}~${typeParameter}~*/${middle}${end}
    ↳ Indent}/*~end~type~${type}~${typeParameter}~*/${end}",
    ↳ 0),
579 // Inside the scope replace:
580 // /*~start~namespace~Platform::Ranges~*/ ... /*~start~type~Range<T>~T~*/ ...
    ↳ public: override std::int32_t GetHashCode() { return {Minimum,
    ↳ Maximum}.GetHashCode(); } ... /*~end~type~Range<T>~T~*/ ...
    ↳ /*~end~namespace~Platform::Ranges~*/
581 // /*~start~namespace~Platform::Ranges~*/ ... /*~start~type~Range<T>~T~*/ ...
    ↳ /*~end~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(); } }; }

```

```

(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>~\*/)(?<betweenEndScop
  ↪ es>(.|\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),
// Inside scope of /*~start~method~*/ replace:
// /*~start~method~*/ ... Minimum ... /*~end~method~*/
// /*~start~method~*/ ... obj.Minimum ... /*~end~method~*/
(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}${methodScopeEnd}", 10),
// Remove scope borders.
// /*~start~type~Range<T>~*/
//
(new Regex(@"/*~[~\*~\n]+(~[~\*~\n]+)*~\*/", "", 0),
// class Disposable<T> : public Disposable
// class Disposable<T> : public Disposable<>
(new Regex(@"(?<before>(struct|class) (?<type>[a-zA-Z][a-zA-Z0-9]*)<[~<>\n]+> :
  ↪ (?<access>(private|protected|public) )?\k<type>)(?<after>\b(?:<))"),
  ↪ "${before}<>${after}", 0),
// Insert scope borders.
// class Disposable<T> : public Disposable<> { ... };
// class Disposable<T> : public Disposable<>
  ↪ /*~start~type~Disposable~Disposable<T>~Disposable~Disposable<>~*/ ...
  ↪ /*~end~type~Disposable~Disposable<T>~Disposable~Disposable<>~*/;
(new Regex(@"(?<classDeclarationBegin>\r?\n(?<indent>[\t ]*)template[\t
  ↪ ]*(?<typeParameters>[~\n\*])>[\t ]*(struct|class)[\t
  ↪ ]+(?<fullType>(?(type>[a-zA-Z][a-zA-Z0-9]*)<[~<>\n]*>)?)[\t ]*:[\t
  ↪ ]*(?<access>(private|protected|public) [\t
  ↪ ]+)?(?(fullBaseType>(?(baseType>[a-zA-Z][a-zA-Z0-9]*)<[~<>\n]*>)?)[\t
  ↪ ]*(\r?\n)?[\t
  ↪ ]*(?<middle>(.|\n)*)(?<beforeEnd>(?(=\r?\n)\k<indent>)(?<end>);)"),
  ↪ "${classDeclarationBegin}/*~start~type~${type}~${fullType}~${baseType}~${fullBas
  ↪ eType}~*/${middle}${beforeEnd}/*~end~type~${type}~${fullType}~${baseType}~${full
  ↪ BaseType}~*/${end}",
  ↪ 0),
// Inside the scope replace:
// /*~start~type~Disposable~Disposable<T>~Disposable~Disposable<>~*/ ... ) : base(
  ↪ ... /*~end~type~Disposable~Disposable<T>~Disposable~Disposable<>~*/
// /*~start~type~Disposable~Disposable<T>~Disposable~Disposable<>~*/ ... ) :
  ↪ Disposable<>( /*~end~type~Disposable~Disposable<T>~Disposable~Disposable<>~*/
(new Regex(@"(?<before>(?(typeScopeStart>/\*~start~type~(?<types>(?(type>[~\n\*]+)~
  ↪ )(?<fullType>[~\n\*]+)~\k<type>~(?(fullBaseType>[~\n\*]+)~\k<types>~\*/)(.|\n)+?)\s*:\s)
  ↪ )base(?<after>\((.|\n)+?(?<typeScopeEnd>/\*~end~type~\k<types>~\*/))"),
  ↪ "${before}${fullBaseType}${after}", 20),
// Inside the scope replace:
// /*~start~type~Disposable~Disposable<T>~X~X<>~*/ ... ) : base( ...
  ↪ /*~end~type~Disposable~Disposable<T>~X~X<>~*/
// /*~start~type~Disposable~Disposable<T>~X~X<>~*/ ... ) : X(
  ↪ /*~end~type~Disposable~Disposable<T>~X~X<>~*/
(new Regex(@"(?<before>(?(typeScopeStart>/\*~start~type~(?<types>(?(type>[~\n\*]+)~
  ↪ )(?<fullType>[~\n\*]+)~(?(baseType>[~\n\*]+)~(?(fullBaseType>[~\n\*]+)~\k<types>~\*/)(.|\n)+?)\s*:\s)
  ↪ base(?<after>\((.|\n)+?(?<typeScopeEnd>/\*~end~type~\k<types>~\*/))"),
  ↪ "${before}${baseType}${after}",
  ↪ 20),
// Inside the scope replace:
// /*~start~type~Disposable~Disposable<T>~X~X<>~*/ ... public: Disposable(T object)
  ↪ { Object = object; } ... public: Disposable(T object) : Disposable(object) { }
  ↪ ... /*~end~type~Disposable~Disposable<T>~X~X<>~*/
// /*~start~type~Disposable~Disposable<T>~X~X<>~*/ ... public: Disposable(T object)
  ↪ { Object = object; } /*~end~type~Disposable~Disposable<T>~X~X<>~*/

```

```

609 (new Regex(@"(?<before>(?(typeScopeStart>/\*~start~type~(?<types>(?(type>[~\n\*]+)~
    (?<fullType>[~\n\*]+)~(?<baseType>[~\n\*]+)~(?<fullBaseType>[~\n\*]+))~\*/)(.
    ↪ |\n)+?(?(constructor>(?(access>(private|protected|public):[\t
    ↪ ]*)?(k<type>\((?(arguments>[~()\n]+)\)\s*{[~{}]\n}+))(.|\n)+?)?(?<duplicateConstru
    ↪ ctor>(?(access>(private|protected|public):[\t
    ↪ ]*)?(k<type>\(k<arguments>\)\s*:[~{}]\n]+\s*{[~{}]\n}+))?(?<after>(.\n)+?(?(typeS
    ↪ copeEnd>/\*~end~type~k<types>~\*/))"), "${before}${after}",
    ↪ 20),
610 // Remove scope borders.
611 // /*~start~type~Disposable~Disposable<T>~Disposable~Disposable<>~*/
612 //
613 (new Regex(@"/*~[~\*\n]+(~[~\*\n]+)*~\*/"), "", 0),
614 // Insert scope borders.
615 // private: inline static const AppDomain _currentDomain = AppDomain.CurrentDomain;
616 // private: inline static const AppDomain _currentDomain =
    ↪ AppDomain.CurrentDomain; /*~app-domain~_currentDomain~*/
617 (new Regex(@"(?<declaration>(?(access>(private|protected|public):[\t ]*)?(inline[\t
    ↪ ]+)?(static[\t ]+)?(const[\t ]+)?AppDomain[\t
    ↪ ]+(?(field>[a-zA-Z_][a-zA-Z0-9_]*)[\t ]*=[\t ]*AppDomain\.CurrentDomain;))),
    ↪ "${declaration}/*~app-domain~${field}~*/", 0),
618 // Inside the scope replace:
619 // /*~app-domain~_currentDomain~*/ ... _currentDomain.ProcessExit += OnProcessExit;
620 // /*~app-domain~_currentDomain~*/ ... std::atexit(OnProcessExit);
621 (new Regex(@"(?<before>(?(fieldScopeStart>/\*~app-domain~(?<field>[~\n\*]+)~\*/)(.|\n)
    ↪ )+?)k<field>\.ProcessExit[\t ]*\+=[\t
    ↪ ]*(?(eventHandler>[a-zA-Z_][a-zA-Z0-9_]*)"); "${before}std::atexit(${eventHandl
    ↪ er}); /*~process-exit-handler~${eventHandler}~*/",
    ↪ 20),
622 // Inside the scope replace:
623 // /*~app-domain~_currentDomain~*/ ... _currentDomain.ProcessExit -= OnProcessExit;
624 // /*~app-domain~_currentDomain~*/ ... /* No translation. It is not possible to
    ↪ unsubscribe from std::atexit. */
625 (new Regex(@"(?<before>(?(fieldScopeStart>/\*~app-domain~(?<field>[~\n\*]+)~\*/)(.|\n)
    ↪ )+?)r?\n[\t ]*\k<field>\.ProcessExit[\t ]*\-=[\t
    ↪ ]*(?(eventHandler>[a-zA-Z_][a-zA-Z0-9_]*)"); "${before}/* No translation. It is
    ↪ not possible to unsubscribe from std::atexit. */", 20),
626 // Inside the scope replace:
627 // /*~process-exit-handler~OnProcessExit~*/ ... static void OnProcessExit(void
    ↪ *sender, EventArgs e)
628 // /*~process-exit-handler~OnProcessExit~*/ ... static void OnProcessExit()
629 (new Regex(@"(?<before>(?(fieldScopeStart>/\*~process-exit-handler~(?<handler>[~\n\
    ↪ ]*)~\*/)(.|\n)+?static[\t ]+void[\t ]+\k<handler>\(\([~()\n]+\)\)"), "${before}",
    ↪ 20),
630 // Remove scope borders.
631 // /*~app-domain~_currentDomain~*/
632 //
633 (new Regex(@"/*~[~\*\n]+(~[~\*\n]+)*~\*/"), "", 0),
634 // AppDomain.CurrentDomain.ProcessExit -= OnProcessExit;
635 // /* No translation. It is not possible to unsubscribe from std::atexit. */
636 (new Regex(@"AppDomain\.CurrentDomain\.ProcessExit -= ([a-zA-Z_][a-zA-Z0-9_]*)");
    ↪ "/* No translation. It is not possible to unsubscribe from std::atexit. */", 0),
637 }.Cast<ISubstitutionRule>().ToList();
638
639 /// <summary>
640 /// <para>
641 /// The to list.
642 /// </para>
643 /// <para></para>
644 /// </summary>
645 public static readonly IList<ISubstitutionRule> LastStage = new List<SubstitutionRule>
646 {
647     // IDisposable disposable)
648     // IDisposable &disposable)
649     (new Regex(@"(?<argumentAbstractType>I[A-Z][a-zA-Z0-9]+(<[~>\r\n]+>)?
    ↪ (?<argument>[_a-zA-Z0-9]+)(?<after>,|\))"), "${argumentAbstractType}
    ↪ &${argument}${after}", 0),
650     // ICounter<int, int> c1;
651     // ICounter<int, int>* c1;
652     (new Regex(@"(?<abstractType>I[A-Z][a-zA-Z0-9]+(<[~>\r\n]+>)?
    ↪ (?<variable>[_a-zA-Z0-9]+)(?<after> = null)?"); "${abstractType}
    ↪ *${variable}${after}"; 0),
653     // (expression)
654     // expression
655     (new Regex(@"(\(|\)|\((([a-zA-Z0-9_]*:)+)\)|\)|\))"), "$1$2$3", 0),
656     // (method(expression))
657     // method(expression)

```

```

658 (new Regex(@"(?<firstSeparator>\(|
    ↪ )\((?<method>[a-zA-Z0-9_\->\*:]+)\)((?<expression>((?<parenthesis>\(|(?<-parent
    ↪ hesis>)\)|[a-zA-Z0-9_\->\*:]*)+)(?(parenthesis)(?!))\)\)((?<lastSeparator>(,|
    ↪ |;|\))")", "${firstSeparator}${method}${expression}${lastSeparator}", 0),
659 // .append(".")
660 // .append(1, '.');
661 (new Regex(@"\.\append\"("([^\\""]|\\\\"")"\""), ".append(1, '$1')", 0),
662 // return ref _elements[node];
663 // return &_elements[node];
664 (new Regex(@"return ref ([_a-zA-Z0-9]+)\([([_a-zA-Z0-9\*]+)\];)", "return &$1[$2];",
    ↪ 0),
665 // ((1, 2))
666 // ({1, 2})
667 (new Regex(@"(?<before>\(| )\((?<first>[^\n()]+),
    ↪ (?<second>[^\n()]+\)\)(?<after>\)|, )", "${before}${{first},
    ↪ ${second}}${after}", 10),
668 // {1, 2}.GetHashCode()
669 // Platform::Hashing::Hash(1, 2)
670 (new Regex(@"{(?<first>[^\n{}]+), (?<second>[^\n{}]+)}\.\GetHashCode\\(\\""),
    ↪ "Platform::Hashing::Hash${first}, ${second})", 10),
671 // range.ToString()
672 // Platform::Converters::To<std::string>(range).data()
673 (new Regex(@"(?<before>\W)(?<variable>[_a-zA-Z][_a-zA-Z0-9]+)\.\ToString\\(\\""),
    ↪ "${before}Platform::Converters::To<std::string>(${variable}).data()", 10),
674 // new
675 //
676 (new Regex(@"(?<before>\r?\n[^\r\n]*(\"(\\\"|\"[^\r\n]*)\"[^\r\n]*)*) (?<=\W)new\\
    ↪ s+)", "${before}",
    ↪ 10),
677 // x == null
678 // x == nullptr
679 (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),
680 // null
681 // {}
682 (new Regex(@"(?<before>\r?\n[^\r\n]*(\"(\\\"|\"[^\r\n]*)\"[^\r\n]*)*) (?<=\W>null\\
    ↪ (?<after>\W)", "${before}-{}${after}",
    ↪ 10),
683 // default
684 // 0
685 (new Regex(@"(?<before>\r?\n[^\r\n]*(\"(\\\"|\"[^\r\n]*)\"[^\r\n]*)*) (?<=\W)defa
    ↪ ult(?<after>\W)", "${before}0${after}",
    ↪ 10),
686 // object x
687 // void *x
688 (new Regex(@"(?<before>\r?\n[^\r\n]*(\"(\\\"|\"[^\r\n]*)\"[^\r\n]*)*) (?<=\W)(?!
    ↪ )@(\b|System\.Object) (?<after>\w)", "${before}void *${after}",
    ↪ 10),
689 // <object>
690 // <void*>
691 (new Regex(@"(?<before>\r?\n[^\r\n]*(\"(\\\"|\"[^\r\n]*)\"[^\r\n]*)*) (?<=\W)(?!
    ↪ )@(\b|System\.Object) (?<after>\W)", "${before}void*${after}",
    ↪ 10),
692 // @object
693 // object
694 (new Regex(@"@([_a-zA-Z0-9]+)", "$1", 0),
695 // this->GetType().Name
696 // typeid(this).name()
697 (new Regex(@"(this->GetType\\(\\"\\).Name)", "typeid($1).name()", 0),
698 // ArgumentNullException
699 // std::invalid_argument
700 (new Regex(@"(?<before>\r?\n[^\r\n]*(\"(\\\"|\"[^\r\n]*)\"[^\r\n]*)*) (?<=\W)(Sys
    ↪ tem\.)?ArgumentNullException(?<after>\W)",
    ↪ "${before}std::invalid_argument${after}", 10),
701 // InvalidOperationException
702 // std::runtime_error
703 (new Regex(@"(\W)(InvalidOperationException|Exception)(\W)",
    ↪ "$1std::runtime_error$3", 0),
704 // ArgumentException
705 // std::invalid_argument
706 (new Regex(@"(\W)(ArgumentException|ArgumentOutOfRangeException)(\W)",
    ↪ "$1std::invalid_argument$3", 0),
707 // template <typename T> struct Range : IEquatable<Range<T>>
708 // template <typename T> struct Range {

```



```

709 (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),
710 // public: delegate void Disposal(bool manual, bool wasDisposed);
711 // public: delegate void Disposal(bool, bool);
712 (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),
713 // public: delegate void Disposal(bool, bool);
714 // using Disposal = void(bool, bool);
715 (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),
716 // <4-1>
717 // <3>
718 (new Regex(@"(?<before><)4-1(?(after>>)", "${before}3${after}", 0),
719 // <3-1>
720 // <2>
721 (new Regex(@"(?<before><)3-1(?(after>>)", "${before}2${after}", 0),
722 // <2-1>
723 // <1>
724 (new Regex(@"(?<before><)2-1(?(after>>)", "${before}1${after}", 0),
725 // <1-1>
726 // <0>
727 (new Regex(@"(?<before><)1-1(?(after>>)", "${before}0${after}", 0),
728 // #region Always
729 //
730 (new Regex(@"(^\r?\n)[ \t]*#(region|endregion) [^\r\n]*(\r?\n|$)", "", 0),
731 // //define ENABLE_TREE_AUTO_DEBUG_AND_VALIDATION
732 //
733 (new Regex(@"\\\/[ \t]*#define[ \t]+[a-zA-Z0-9]+[ \t]*"), "", 0),
734 // #if USEARRAYPOOL\r\n#endif
735 //
736 (new Regex(@"#if [a-zA-Z0-9]+\s+#endif", "", 0),
737 // [Fact]
738 //
739 (new Regex(@"(?<firstNewLine>\r?\n|\A) (?<indent>[ \t
↳ ]+)\[[a-zA-Z0-9]+\(\((?<expression>((?<parenthesis>\()|(?<-parenthesis>\))|~()\r
↳ \n)*\)(?(parenthesis)(?!))\)\)?\][ \t]*\(\r?\n<kindent>?)",
↳ "${firstNewLine}${indent}", 5),
740 // \A \n ... namespace
741 // \Anamespace
742 (new Regex(@"(\A)(\r?\n)+namespace"), "$1namespace", 0),
743 // \A \n ... class
744 // \Aclass
745 (new Regex(@"(\A)(\r?\n)+class"), "$1class", 0),
746 // \n\n\n
747 // \n\n
748 (new Regex(@"\r?\n[ \t]*\r?\n[ \t]*\r?\n"), Environment.NewLine +
↳ Environment.NewLine, 50),
749 // {\n\n
750 // {\n
751 (new Regex(@"{[ \t]*\r?\n[ \t]*\r?\n"), "{" + Environment.NewLine, 10),
752 // \n\n}
753 // \n}
754 (new Regex(@"\r?\n[ \t]*\r?\n(?<end>[ \t]*)"), Environment.NewLine + "${end}", 10),
755 }.Cast<ISubstitutionRule>().ToList();
756
757 /// <summary>
758 /// <para>
759 /// Initializes a new <see cref="CSharpToCppTransformer"/> instance.
760 /// </para>
761 /// </summary>
762 /// </summary>
763 /// <param name="extraRules">
764 /// <para>A extra rules.</para>
765 /// </para></param>
766 /// </param>
767 public CSharpToCppTransformer(IList<ISubstitutionRule> extraRules) :
↳ base(FirstStage.Concat(extraRules).Concat>LastStage).ToList() { }

```

```

768
769     /// <summary>
770     /// <para>
771     /// Initializes a new <see cref="CSharpToCppTransformer"/> instance.
772     /// </para>
773     /// <para></para>
774     /// </summary>
775     public CSharpToCppTransformer() : base(FirstStage.Concat(LastStage).ToList()) { }
776 }
777 }

```

## 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
11             // ↪ syntax
12             var transformer = new CSharpToCppTransformer();
13             var actualResult = transformer.Transform("");
14             Assert.Equal("", actualResult);
15         }
16
17         [Fact]
18         public void HelloWorldTest()
19         {
20             const string helloWorldCode = @"using System;
21 class Program
22 {
23     public static void Main(string[] args)
24     {
25         Console.WriteLine("Hello, world!");
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             var transformer = new CSharpToCppTransformer();
36             var actualResult = transformer.Transform(helloWorldCode);
37             Assert.Equal(expectedResult, actualResult);
38         }
39 }

```

## Index

./csharp/Platform.RegularExpressions.Transformer.CSharpToCpp.Tests/CSharpToCppTransformerTests.cs, 18

./csharp/Platform.RegularExpressions.Transformer.CSharpToCpp/CSharpToCppTransformer.cs, 1