1.1 ./csharp/Platform.RegularExpressions.Transformer/FileTransformer.cs

```
using System;
using System.Collections.Generic;
using System.Diagnostics;
using System.IO;
using System.Runtime.CompilerServices;
using System.Text;
using System.Threading.Tasks;

#pragma warning disable CS1591 // Missing XML comment for publicly visible type or member

namespace Platform.RegularExpressions.Transformer
{
    public class FileTransformer : IFileTransformer
    {
        protected readonly ITextTransformer _textTransformer;

        public string SourceFileExtension
        {
            [MethodImpl(MethodImplOptions.AggressiveInlining)]
            get;
            [MethodImpl(MethodImplOptions.AggressiveInlining)]
            private set;
        }

        public string TargetFileExtension
        {
            [MethodImpl(MethodImplOptions.AggressiveInlining)]
            get;
            [MethodImpl(MethodImplOptions.AggressiveInlining)]
            private set;
        }

        public IList<ISubstitutionRule> Rules
        {
            [MethodImpl(MethodImplOptions.AggressiveInlining)]
            get => _textTransformer.Rules;
        }

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public FileTransformer(ITextTransformer textTransformer, string sourceFileExtension,
        ↪  string targetFileExtension)
        {
            _textTransformer = textTransformer;
            SourceFileExtension = sourceFileExtension;
            TargetFileExtension = targetFileExtension;
        }

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public void Transform(string sourcePath, string targetPath)
        {
            var defaultPath = Path.GetFullPath(".");
            if (string.IsNullOrEmpty(sourcePath))
            {
                sourcePath = defaultPath;
            }
            if (string.IsNullOrEmpty(targetPath))
            {
                targetPath = defaultPath;
            }
            var sourceDirectoryExists = DirectoryExists(sourcePath);
            var sourceDirectoryPath = LooksLikeDirectoryPath(sourcePath);
            var sourceIsDirectory = sourceDirectoryExists || sourceDirectoryPath;
            var targetDirectoryExists = DirectoryExists(targetPath);
            var targetDirectoryPath = LooksLikeDirectoryPath(targetPath);
            var targetIsDirectory = targetDirectoryExists || targetDirectoryPath;
            if (sourceIsDirectory && targetIsDirectory)
            {
                // Folder -> Folder
                if (!sourceDirectoryExists)
                {
                    return;
                }
                TransformFolder(sourcePath, targetPath);
            }
            else if (!(sourceIsDirectory || targetIsDirectory))
            {
                // File -> File
                EnsureSourceFileExists(sourcePath);
```

```
                EnsureTargetFileDirectoryExists(targetPath);
                TransformFile(sourcePath, targetPath);
            }
            else if (targetIsDirectory)
            {
                // File -> Folder
                EnsureSourceFileExists(sourcePath);
                EnsureTargetDirectoryExists(targetPath, targetDirectoryExists);
                TransformFile(sourcePath, GetTargetFileName(sourcePath, targetPath));
            }
            else
            {
                // Folder -> File
                throw new NotSupportedException();
            }
        }

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        protected virtual void TransformFolder(string sourcePath, string targetPath)
        {
            if (CountFilesRecursively(sourcePath, SourceFileExtension) == 0)
            {
                return;
            }
            EnsureTargetDirectoryExists(targetPath);
            var directories = Directory.GetDirectories(sourcePath);
            for (var i = 0; i < directories.Length; i++)
            {
#if NETSTANDARD2_1
                var relativePath = Path.GetRelativePath(sourcePath, directories[i]);
#else
                var relativePath =
                    directories[i].Replace(sourcePath.TrimEnd(Path.DirectorySeparatorChar) +
                    Path.DirectorySeparatorChar, "");
#endif
                var newTargetPath = Path.Combine(targetPath, relativePath);
                TransformFolder(directories[i], newTargetPath);
            }
            var files = Directory.GetFiles(sourcePath);
            Parallel.For(0, files.Length, i =>
            {
                var file = files[i];
                if (FileExtensionMatches(file, SourceFileExtension))
                {
                    TransformFile(file, GetTargetFileName(file, targetPath));
                }
            });
        }

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        protected virtual void TransformFile(string sourcePath, string targetPath)
        {
            if (File.Exists(targetPath))
            {
                var applicationPath = Process.GetCurrentProcess().MainModule.FileName;
                var targetFileLastUpdateDateTime = new FileInfo(targetPath).LastWriteTimeUtc;
                if (new FileInfo(sourcePath).LastWriteTimeUtc < targetFileLastUpdateDateTime &&
                    new FileInfo(applicationPath).LastWriteTimeUtc <
                    targetFileLastUpdateDateTime)
                {
                    return;
                }
            }
            var sourceText = File.ReadAllText(sourcePath, Encoding.UTF8);
            var targetText = _textTransformer.Transform(sourceText);
            File.WriteAllText(targetPath, targetText, Encoding.UTF8);
        }

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        protected string GetTargetFileName(string sourcePath, string targetDirectory) =>
            Path.ChangeExtension(Path.Combine(targetDirectory, Path.GetFileName(sourcePath)),
            TargetFileExtension);

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        private static long CountFilesRecursively(string path, string extension)
        {
            var files = Directory.GetFiles(path);
            var directories = Directory.GetDirectories(path);
```

```
            var result = 0L;
            for (var i = 0; i < directories.Length; i++)
            {
                result += CountFilesRecursively(directories[i], extension);
            }
            for (var i = 0; i < files.Length; i++)
            {
                if (FileExtensionMatches(files[i], extension))
                {
                    result++;
                }
            }
            return result;
        }

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        private static bool FileExtensionMatches(string file, string extension) =>
        ↪  file.EndsWith(extension, StringComparison.OrdinalIgnoreCase);

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        private static void EnsureTargetFileDirectoryExists(string targetPath)
        {
            if (!File.Exists(targetPath))
            {
                EnsureDirectoryIsCreated(targetPath);
            }
        }

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        private static void EnsureTargetDirectoryExists(string targetPath) =>
        ↪  EnsureTargetDirectoryExists(targetPath, DirectoryExists(targetPath));

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        private static void EnsureTargetDirectoryExists(string targetPath, bool
        ↪  targetDirectoryExists)
        {
            if (!targetDirectoryExists)
            {
                Directory.CreateDirectory(targetPath);
            }
        }

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        private static void EnsureSourceFileExists(string sourcePath)
        {
            if (!File.Exists(sourcePath))
            {
                throw new FileNotFoundException("Source file does not exists.", sourcePath);
            }
        }

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        private static void EnsureDirectoryIsCreated(string targetPath) =>
        ↪  Directory.CreateDirectory(Path.GetDirectoryName(targetPath));

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        private static bool DirectoryExists(string path) => Directory.Exists(path) &&
        ↪  File.GetAttributes(path).HasFlag(FileAttributes.Directory);

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        private static bool LooksLikeDirectoryPath(string path) =>
        ↪  path.EndsWith(Path.DirectorySeparatorChar.ToString()) ||
        ↪  path.EndsWith(Path.AltDirectorySeparatorChar.ToString());
    }
}
```

1.2 ./csharp/Platform.RegularExpressions.Transformer/IFileTransformer.cs

```
using System.Runtime.CompilerServices;

#pragma warning disable CS1591 // Missing XML comment for publicly visible type or member

namespace Platform.RegularExpressions.Transformer
{
    public interface IFileTransformer : ITransformer
    {
        string SourceFileExtension
        {
            [MethodImpl(MethodImplOptions.AggressiveInlining)]
```

```
            get;
        }

        string TargetFileExtension
        {
            [MethodImpl(MethodImplOptions.AggressiveInlining)]
            get;
        }

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        void Transform(string sourcePath, string targetPath);
    }
}
```

1.3 ./csharp/Platform.RegularExpressions.Transformer/ISubstitutionRule.cs

```
using System.Runtime.CompilerServices;
using System.Text.RegularExpressions;

#pragma warning disable CS1591 // Missing XML comment for publicly visible type or member

namespace Platform.RegularExpressions.Transformer
{
    public interface ISubstitutionRule
    {
        Regex MatchPattern
        {
            [MethodImpl(MethodImplOptions.AggressiveInlining)]
            get;
        }

        string SubstitutionPattern
        {
            [MethodImpl(MethodImplOptions.AggressiveInlining)]
            get;
        }

        int MaximumRepeatCount
        {
            [MethodImpl(MethodImplOptions.AggressiveInlining)]
            get;
        }
    }
}
```

1.4 ./csharp/Platform.RegularExpressions.Transformer/ITextTransformer.cs

```
using System.Runtime.CompilerServices;

#pragma warning disable CS1591 // Missing XML comment for publicly visible type or member

namespace Platform.RegularExpressions.Transformer
{
    public interface ITextTransformer : ITransformer
    {
        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        string Transform(string sourceText);
    }
}
```

1.5 ./csharp/Platform.RegularExpressions.Transformer/ITextTransformerExtensions.cs

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Runtime.CompilerServices;
using Platform.Collections;

#pragma warning disable CS1591 // Missing XML comment for publicly visible type or member

namespace Platform.RegularExpressions.Transformer
{
    public static class ITextTransformerExtensions
    {
        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public static IList<ITextTransformer> GenerateTransformersForEachRule(this
        ↪  ITextTransformer transformer)
        {
            var transformers = new List<ITextTransformer>();
            for (int i = 1; i <= transformer.Rules.Count; i++)
            {
                transformers.Add(new TextTransformer(transformer.Rules.Take(i).ToList()));
            }
```

```
            return transformers;
        }

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public static IList<string> GetSteps(this ITextTransformer transformer, string
        ↪  sourceText)
        {
            if (transformer != null && !transformer.Rules.IsNullOrEmpty())
            {
                var steps = new List<string>();
                var steppedTransformer = new TextSteppedTransformer(transformer.Rules,
                ↪  sourceText);
                while (steppedTransformer.Next())
                {
                    steps.Add(steppedTransformer.Text);
                }
                return steps;
            }
            else
            {
                return Array.Empty<string>();
            }
        }

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public static void WriteStepsToFiles(this ITextTransformer transformer, string
        ↪  sourceText, string targetPath, bool skipFilesWithNoChanges)
        {
            if (transformer != null && !transformer.Rules.IsNullOrEmpty())
            {
                targetPath.GetPathParts(out var directoryName, out var targetFilename, out var
                ↪  targetExtension);
                Steps.DeleteAllSteps(directoryName, targetFilename, targetExtension);
                var lastText = "";
                var steppedTransformer = new TextSteppedTransformer(transformer.Rules,
                ↪  sourceText);
                while (steppedTransformer.Next())
                {
                    var newText = steppedTransformer.Text;
                    Steps.WriteStep(transformer, directoryName, targetFilename, targetExtension,
                    ↪  steppedTransformer.Current, ref lastText, newText,
                    ↪  skipFilesWithNoChanges);
                }
            }
        }
    }
}
```

1.6 ./csharp/Platform.RegularExpressions.Transformer/ITextTransformersListExtensions.cs

```
using System;
using System.Collections.Generic;
using System.Runtime.CompilerServices;
using Platform.Collections;

#pragma warning disable CS1591 // Missing XML comment for publicly visible type or member

namespace Platform.RegularExpressions.Transformer
{
    public static class ITextTransformersListExtensions
    {
        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public static IList<string> TransformWithAll(this IList<ITextTransformer> transformers,
        ↪  string source)
        {
            if (!transformers.IsNullOrEmpty())
            {
                var steps = new List<string>();
                for (int i = 0; i < transformers.Count; i++)
                {
                    steps.Add(transformers[i].Transform(source));
                }
                return steps;
            }
            else
            {
                return Array.Empty<string>();
            }
        }
```

```

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public static void TransformWithAllToFiles(this IList<ITextTransformer> transformers,
        ↪  string sourceText, string targetPath, bool skipFilesWithNoChanges)
        {
            if (!transformers.IsNullOrEmpty())
            {
                targetPath.GetPathParts(out var directoryName, out var targetFilename, out var
                ↪  targetExtension);
                Steps.DeleteAllSteps(directoryName, targetFilename, targetExtension);
                var lastText = "";
                for (int i = 0; i < transformers.Count; i++)
                {
                    var transformer = transformers[i];
                    var newText = transformer.Transform(sourceText);
                    Steps.WriteStep(transformer, directoryName, targetFilename, targetExtension,
                    ↪  i, ref lastText, newText, skipFilesWithNoChanges);
                }
            }
        }
    }
}
```

1.7 ./csharp/Platform.RegularExpressions.Transformer/ITransformer.cs

```
using System.Collections.Generic;
using System.Runtime.CompilerServices;

#pragma warning disable CS1591 // Missing XML comment for publicly visible type or member

namespace Platform.RegularExpressions.Transformer
{
    public interface ITransformer
    {
        IList<ISubstitutionRule> Rules
        {
            [MethodImpl(MethodImplOptions.AggressiveInlining)]
            get;
        }
    }
}
```

1.8 ./csharp/Platform.RegularExpressions.Transformer/LoggingFileTransformer.cs

```
using System.IO;
using System.Runtime.CompilerServices;
using System.Text;

#pragma warning disable CS1591 // Missing XML comment for publicly visible type or member

namespace Platform.RegularExpressions.Transformer
{
    public class LoggingFileTransformer : FileTransformer
    {
        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public LoggingFileTransformer(ITextTransformer textTransformer, string
        ↪  sourceFileExtension, string targetFileExtension) : base(textTransformer,
        ↪  sourceFileExtension, targetFileExtension) { }

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        protected override void TransformFile(string sourcePath, string targetPath)
        {
            base.TransformFile(sourcePath, targetPath);
            // Logging
            var sourceText = File.ReadAllText(sourcePath, Encoding.UTF8);
            _textTransformer.WriteStepsToFiles(sourceText, targetPath, skipFilesWithNoChanges:
            ↪  true);
        }
    }
}
```

1.9 ./csharp/Platform.RegularExpressions.Transformer/RegexExtensions.cs

```
using System;
using System.Runtime.CompilerServices;
using System.Text.RegularExpressions;

#pragma warning disable CS1591 // Missing XML comment for publicly visible type or member

namespace Platform.RegularExpressions.Transformer
{
```

```
    public static class RegexExtensions
    {
        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public static Regex OverrideOptions(this Regex regex, RegexOptions options, TimeSpan matchTimeout)
        {
            if (regex == null)
            {
                return null;
            }
            return new Regex(regex.ToString(), options, matchTimeout);
        }
    }
}
```

1.10 ./csharp/Platform.RegularExpressions.Transformer/Steps.cs

```
using Platform.IO;
using System.Runtime.CompilerServices;

#pragma warning disable CS1591 // Missing XML comment for publicly visible type or member

namespace Platform.RegularExpressions.Transformer
{
    public static class Steps
    {
        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public static void DeleteAllSteps(string directoryName, string targetFilename, string targetExtension)
        {
            FileHelpers.DeleteAll(directoryName, $"{targetFilename}.*.rule.txt");
            FileHelpers.DeleteAll(directoryName, $"{targetFilename}.*{targetExtension}");
        }

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public static void WriteStep(ITransformer transformer, string directoryName, string targetFilename, string targetExtension, int currentStep, ref string lastText, string newText, bool skipFilesWithNoChanges)
        {
            if (!(skipFilesWithNoChanges && string.Equals(lastText, newText)))
            {
                lastText = newText;
                newText.WriteToFile(directoryName,
                    $"{targetFilename}.{currentStep}{targetExtension}");
                var ruleString = transformer.Rules[currentStep].ToString();
                ruleString.WriteToFile(directoryName,
                    $"{targetFilename}.{currentStep}.rule.txt");
            }
        }
    }
}
```

1.11 ./csharp/Platform.RegularExpressions.Transformer/StringExtensions.cs

```
using System.IO;
using System.Runtime.CompilerServices;
using System.Text;

#pragma warning disable CS1591 // Missing XML comment for publicly visible type or member

namespace Platform.RegularExpressions.Transformer
{
    internal static class StringExtensions
    {
        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public static void GetPathParts(this string path, out string directoryName, out string targetFilename, out string targetExtension) => (directoryName, targetFilename, targetExtension) = (Path.GetDirectoryName(path), Path.GetFileNameWithoutExtension(path), Path.GetExtension(path));

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public static void WriteToFile(this string text, string directoryName, string targetFilename) => File.WriteAllText(Path.Combine(directoryName, targetFilename), text, Encoding.UTF8);
    }
}
```

1.12 ./csharp/Platform.RegularExpressions.Transformer/SubstitutionRule.cs

```
using System;
using System.Runtime.CompilerServices;
using System.Text;
using System.Text.RegularExpressions;

#pragma warning disable CS1591 // Missing XML comment for publicly visible type or member

namespace Platform.RegularExpressions.Transformer
{
    public class SubstitutionRule : ISubstitutionRule
    {
        public static readonly TimeSpan DefaultMatchTimeout = TimeSpan.FromMinutes(5);
        public static readonly RegexOptions DefaultMatchPatternRegexOptions =
        ↪  RegexOptions.Compiled | RegexOptions.Multiline;

        public Regex MatchPattern
        {
            [MethodImpl(MethodImplOptions.AggressiveInlining)]
            get;
            [MethodImpl(MethodImplOptions.AggressiveInlining)]
            set;
        }

        public string SubstitutionPattern
        {
            [MethodImpl(MethodImplOptions.AggressiveInlining)]
            get;
            [MethodImpl(MethodImplOptions.AggressiveInlining)]
            set;
        }

        public Regex PathPattern
        {
            [MethodImpl(MethodImplOptions.AggressiveInlining)]
            get;
            [MethodImpl(MethodImplOptions.AggressiveInlining)]
            set;
        }

        public int MaximumRepeatCount
        {
            [MethodImpl(MethodImplOptions.AggressiveInlining)]
            get;
            [MethodImpl(MethodImplOptions.AggressiveInlining)]
            set;
        }

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public SubstitutionRule(Regex matchPattern, string substitutionPattern, int
        ↪  maximumRepeatCount, RegexOptions? matchPatternOptions, TimeSpan? matchTimeout)
        {
            MatchPattern = matchPattern;
            SubstitutionPattern = substitutionPattern;
            MaximumRepeatCount = maximumRepeatCount;
            OverrideMatchPatternOptions(matchPatternOptions ?? matchPattern.Options,
            ↪  matchTimeout ?? matchPattern.MatchTimeout);
        }

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public SubstitutionRule(Regex matchPattern, string substitutionPattern, int
        ↪  maximumRepeatCount, bool useDefaultOptions) : this(matchPattern,
        ↪  substitutionPattern, maximumRepeatCount, useDefaultOptions ?
        ↪  DefaultMatchPatternRegexOptions : (RegexOptions?)null, useDefaultOptions ?
        ↪  DefaultMatchTimeout : (TimeSpan?)null) { }

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public SubstitutionRule(Regex matchPattern, string substitutionPattern, int
        ↪  maximumRepeatCount) : this(matchPattern, substitutionPattern, maximumRepeatCount,
        ↪  true) { }

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public SubstitutionRule(Regex matchPattern, string substitutionPattern) :
        ↪  this(matchPattern, substitutionPattern, 0) { }

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public static implicit operator SubstitutionRule(ValueTuple<string, string> tuple) =>
        ↪  new SubstitutionRule(new Regex(tuple.Item1), tuple.Item2);

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
```

```
69          public static implicit operator SubstitutionRule(ValueTuple<Regex, string> tuple) => new
            ↪  SubstitutionRule(tuple.Item1, tuple.Item2);
70
71          [MethodImpl(MethodImplOptions.AggressiveInlining)]
72          public static implicit operator SubstitutionRule(ValueTuple<string, string, int> tuple)
            ↪  => new SubstitutionRule(new Regex(tuple.Item1), tuple.Item2, tuple.Item3);
73
74          [MethodImpl(MethodImplOptions.AggressiveInlining)]
75          public static implicit operator SubstitutionRule(ValueTuple<Regex, string, int> tuple)
            ↪  => new SubstitutionRule(tuple.Item1, tuple.Item2, tuple.Item3);
76
77          [MethodImpl(MethodImplOptions.AggressiveInlining)]
78          public void OverrideMatchPatternOptions(RegexOptions options, TimeSpan matchTimeout) =>
            ↪  MatchPattern = MatchPattern.OverrideOptions(options, matchTimeout);
79
80          [MethodImpl(MethodImplOptions.AggressiveInlining)]
81          public void OverridePathPatternOptions(RegexOptions options, TimeSpan matchTimeout) =>
            ↪  PathPattern = PathPattern.OverrideOptions(options, matchTimeout);
82
83          [MethodImpl(MethodImplOptions.AggressiveInlining)]
84          public override string ToString()
85          {
86              var sb = new StringBuilder();
87              sb.Append('"');
88              sb.Append(MatchPattern.ToString());
89              sb.Append('"');
90              sb.Append(" -> ");
91              sb.Append('"');
92              sb.Append(SubstitutionPattern);
93              sb.Append('"');
94              if (PathPattern != null)
95              {
96                  sb.Append(" on files ");
97                  sb.Append('"');
98                  sb.Append(PathPattern.ToString());
99                  sb.Append('"');
100             }
101             if (MaximumRepeatCount > 0)
102             {
103                 if (MaximumRepeatCount >= int.MaxValue)
104                 {
105                     sb.Append(" repeated forever");
106                 }
107                 else
108                 {
109                     sb.Append(" repeated up to ");
110                     sb.Append(MaximumRepeatCount);
111                     sb.Append(" times");
112                 }
113             }
114             return sb.ToString();
115         }
116     }
117 }
```

1.13 ./csharp/Platform.RegularExpressions.Transformer/TextSteppedTransformer.cs

```
1  using System;
2  using System.Collections.Generic;
3  using System.Runtime.CompilerServices;
4
5  #pragma warning disable CS1591 // Missing XML comment for publicly visible type or member
6
7  namespace Platform.RegularExpressions.Transformer
8  {
9      public class TextSteppedTransformer : ITransformer
10     {
11         public IList<ISubstitutionRule> Rules
12         {
13             [MethodImpl(MethodImplOptions.AggressiveInlining)]
14             get;
15             [MethodImpl(MethodImplOptions.AggressiveInlining)]
16             set;
17         }
18
19         public string Text
20         {
21             [MethodImpl(MethodImplOptions.AggressiveInlining)]
22             get;
23             [MethodImpl(MethodImplOptions.AggressiveInlining)]
```

```
            set;
        }

        public int Current
        {
            [MethodImpl(MethodImplOptions.AggressiveInlining)]
            get;
            [MethodImpl(MethodImplOptions.AggressiveInlining)]
            set;
        }

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public TextSteppedTransformer(IList<ISubstitutionRule> rules, string text, int current)
        ↪  => Reset(rules, text, current);

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public TextSteppedTransformer(IList<ISubstitutionRule> rules, string text) =>
        ↪  Reset(rules, text);

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public TextSteppedTransformer(IList<ISubstitutionRule> rules) => Reset(rules);

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public TextSteppedTransformer() => Reset();

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public void Reset(IList<ISubstitutionRule> rules, string text, int current)
        {
            Rules = rules;
            Text = text;
            Current = current;
        }

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public void Reset(IList<ISubstitutionRule> rules, string text) => Reset(rules, text, -1);

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public void Reset(IList<ISubstitutionRule> rules) => Reset(rules, "", -1);

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public void Reset(string text) => Reset(Rules, text, -1);

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public void Reset() => Reset(Array.Empty<ISubstitutionRule>(), "", -1);

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public bool Next()
        {
            var current = Current + 1;
            if (current >= Rules.Count)
            {
                return false;
            }
            var rule = Rules[current];
            var matchPattern = rule.MatchPattern;
            var substitutionPattern = rule.SubstitutionPattern;
            var maximumRepeatCount = rule.MaximumRepeatCount;
            var replaceCount = 0;
            var text = Text;
            do
            {
                text = matchPattern.Replace(text, substitutionPattern);
                replaceCount++;
            }
            while ((maximumRepeatCount == int.MaxValue || replaceCount <= maximumRepeatCount) &&
            ↪  matchPattern.IsMatch(text));
            Text = text;
            Current = current;
            return true;
        }
    }
}
```

1.14 ./csharp/Platform.RegularExpressions.Transformer/TextTransformer.cs

```
using System.Collections.Generic;
using System.Runtime.CompilerServices;

#pragma warning disable CS1591 // Missing XML comment for publicly visible type or member

namespace Platform.RegularExpressions.Transformer
```

```
{
    public class TextTransformer : ITextTransformer
    {
        public IList<ISubstitutionRule> Rules
        {
            [MethodImpl(MethodImplOptions.AggressiveInlining)]
            get;
            [MethodImpl(MethodImplOptions.AggressiveInlining)]
            private set;
        }

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public TextTransformer(IList<ISubstitutionRule> substitutionRules)
        {
            Rules = substitutionRules;
        }

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public string Transform(string source)
        {
            var baseTrasformer = new TextSteppedTransformer(Rules);
            baseTrasformer.Reset(source);
            while (baseTrasformer.Next());
            return baseTrasformer.Text;
        }
    }
}
```

1.15 ./csharp/Platform.RegularExpressions.Transformer/TransformerCLI.cs

```
using System.Runtime.CompilerServices;
using Platform.Collections.Arrays;

#pragma warning disable CS1591 // Missing XML comment for publicly visible type or member

namespace Platform.RegularExpressions.Transformer
{
    public class TransformerCLI
    {
        private readonly IFileTransformer _transformer;

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public TransformerCLI(IFileTransformer transformer) => _transformer = transformer;

        [MethodImpl(MethodImplOptions.AggressiveInlining)]
        public void Run(string[] args)
        {
            var sourcePath = args.GetElementOrDefault(0);
            var targetPath = args.GetElementOrDefault(1);
            _transformer.Transform(sourcePath, targetPath);
        }
    }
}
```

1.16 ./csharp/Platform.RegularExpressions.Transformer.Tests/FileTransformerTests.cs

```
using System.IO;
using Xunit;

namespace Platform.RegularExpressions.Transformer.Tests
{
    public class FileTransformerTests
    {
        [Fact]
        public void FolderToFolderTransfomationTest()
        {
            var tempPath = Path.GetTempPath();
            var sourceFolderPath = Path.Combine(tempPath,
            ↪  "FileTransformerTestsFolderToFolderTransfomationTestSourceFolder");
            var targetFolderPath = Path.Combine(tempPath,
            ↪  "FileTransformerTestsFolderToFolderTransfomationTestTargetFolder");

            var baseTransformer = new TextTransformer(new SubstitutionRule[]
            {
                ("a", "b"),
                ("b", "c")
            });
            var fileTransformer = new FileTransformer(baseTransformer, ".cs", ".cpp");

            // Delete before creation (if previous test failed)
            if (Directory.Exists(sourceFolderPath))
```

```
            {
                Directory.Delete(sourceFolderPath, true);
            }
            if (Directory.Exists(targetFolderPath))
            {
                Directory.Delete(targetFolderPath, true);
            }

            Directory.CreateDirectory(sourceFolderPath);
            Directory.CreateDirectory(targetFolderPath);

            File.WriteAllText(Path.Combine(sourceFolderPath, "a.cs"), "a a a");
            var aFolderPath = Path.Combine(sourceFolderPath, "A");
            Directory.CreateDirectory(aFolderPath);
            Directory.CreateDirectory(Path.Combine(sourceFolderPath, "B"));
            File.WriteAllText(Path.Combine(aFolderPath, "b.cs"), "b b b");
            File.WriteAllText(Path.Combine(sourceFolderPath, "x.txt"), "should not be
            ↪  translated");

            fileTransformer.Transform(sourceFolderPath,
            ↪  $"{targetFolderPath}{Path.DirectorySeparatorChar}");

            var aCppFile = Path.Combine(targetFolderPath, "a.cpp");
            Assert.True(File.Exists(aCppFile));
            Assert.Equal("c c c", File.ReadAllText(aCppFile));
            Assert.True(Directory.Exists(Path.Combine(targetFolderPath, "A")));
            Assert.False(Directory.Exists(Path.Combine(targetFolderPath, "B")));
            var bCppFile = Path.Combine(targetFolderPath, "A", "b.cpp");
            Assert.True(File.Exists(bCppFile));
            Assert.Equal("c c c", File.ReadAllText(bCppFile));
            Assert.False(File.Exists(Path.Combine(targetFolderPath, "x.txt")));
            Assert.False(File.Exists(Path.Combine(targetFolderPath, "x.cpp")));

            Directory.Delete(sourceFolderPath, true);
            Directory.Delete(targetFolderPath, true);
        }
    }
}
```

1.17 ./csharp/Platform.RegularExpressions.Transformer.Tests/MarkovAlgorithmsTests.cs

```
using System.Text.RegularExpressions;
using Xunit;

namespace Platform.RegularExpressions.Transformer.Tests
{
    public class MarkovAlgorithmsTests
    {
        /// <remarks>
        /// Example is from https://en.wikipedia.org/wiki/Markov_algorithm.
        /// </remarks>
        [Fact]
        public void BinaryToUnaryNumbersTest()
        {
            var rules = new SubstitutionRule[]
            {
                ("1", "0|", int.MaxValue),     // "1" -> "0|" repeated forever
                // | symbol should be escaped for regular expression pattern, but not in the
                ↪  substitution pattern
                (@"\|0", "0||", int.MaxValue), // "\|0" -> "0||" repeated forever
                ("0", "", int.MaxValue),       // "0" -> "" repeated forever
            };
            var transformer = new TextTransformer(rules);
            var input = "101";
            var expectedOutput = "|||||";
            var output = transformer.Transform(input);
            Assert.Equal(expectedOutput, output);
        }
    }
}
```

1.18 ./csharp/Platform.RegularExpressions.Transformer.Tests/SubstitutionRuleTests.cs

```
using System.Text.RegularExpressions;
using Xunit;

namespace Platform.RegularExpressions.Transformer.Tests
{
    public class SubstitutionRuleTests
    {
```

```
        [Fact]
        public void OptionsOverrideTest()
        {
            SubstitutionRule rule = (new Regex(@"^\s*?\#pragma[\sa-zA-Z0-9\/]+$"), "", 0);
            Assert.Equal(RegexOptions.Compiled | RegexOptions.Multiline,
            ↪  rule.MatchPattern.Options);
        }
    }
}
```

1.19 ./csharp/Platform.RegularExpressions.Transformer.Tests/TextTransformerTests.cs

```
using System.IO;
using System.Text;
using System.Text.RegularExpressions;
using Xunit;

namespace Platform.RegularExpressions.Transformer.Tests
{
    public class TextTransformerTests
    {
        [Fact]
        public void DebugOutputTest()
        {
            var sourceText = "aaaa";
            var firstStepReferenceText = "bbbb";
            var secondStepReferenceText = "cccc";

            var transformer = new TextTransformer(new SubstitutionRule[] {
                (new Regex("a"), "b"),
                (new Regex("b"), "c")
            });

            var steps = transformer.GetSteps(sourceText);

            Assert.Equal(2, steps.Count);
            Assert.Equal(firstStepReferenceText, steps[0]);
            Assert.Equal(secondStepReferenceText, steps[1]);
        }

        [Fact]
        public void DebugFilesOutputTest()
        {
            var sourceText = "aaaa";
            var firstStepReferenceText = "bbbb";
            var secondStepReferenceText = "cccc";

            var transformer = new TextTransformer(new SubstitutionRule[] {
                (new Regex("a"), "b"),
                (new Regex("b"), "c")
            });

            var targetFilename = Path.GetTempFileName();

            transformer.WriteStepsToFiles(sourceText, $"{targetFilename}.txt",
            ↪  skipFilesWithNoChanges: false);

            CheckAndCleanUpTwoRulesFiles(firstStepReferenceText, secondStepReferenceText,
            ↪  transformer, targetFilename);
        }

        private static void CheckAndCleanUpTwoRulesFiles(string firstStepReferenceText, string
        ↪  secondStepReferenceText, TextTransformer transformer, string targetFilename)
        {
            var firstStepReferenceFilename = $"{targetFilename}.0.txt";
            var firstStepRuleFilename = $"{targetFilename}.0.rule.txt";
            var secondStepReferenceFilename = $"{targetFilename}.1.txt";
            var secondStepRuleFilename = $"{targetFilename}.1.rule.txt";

            Assert.True(File.Exists(firstStepReferenceFilename));
            Assert.True(File.Exists(firstStepRuleFilename));
            Assert.True(File.Exists(secondStepReferenceFilename));
            Assert.True(File.Exists(secondStepRuleFilename));

            Assert.Equal(firstStepReferenceText, File.ReadAllText(firstStepReferenceFilename,
            ↪  Encoding.UTF8));
            Assert.Equal(transformer.Rules[0].ToString(),
            ↪  File.ReadAllText(firstStepRuleFilename, Encoding.UTF8));
            Assert.Equal(secondStepReferenceText, File.ReadAllText(secondStepReferenceFilename,
            ↪  Encoding.UTF8));
```

```
63              Assert.Equal(transformer.Rules[1].ToString(),
                ↪  File.ReadAllText(secondStepRuleFilename, Encoding.UTF8));
64
65              File.Delete(firstStepReferenceFilename);
66              File.Delete(firstStepRuleFilename);
67              File.Delete(secondStepReferenceFilename);
68              File.Delete(secondStepRuleFilename);
69          }
70
71          [Fact]
72          public void FilesWithNoChangesSkipedTest()
73          {
74              var sourceText = "aaaa";
75              var firstStepReferenceText = "bbbb";
76              var thirdStepReferenceText = "cccc";
77
78              var transformer = new TextTransformer(new SubstitutionRule[] {
79                  (new Regex("a"), "b"),
80                  (new Regex("x"), "y"),
81                  (new Regex("b"), "c")
82              });
83
84              var targetFilename = Path.GetTempFileName();
85
86              transformer.WriteStepsToFiles(sourceText, $"{targetFilename}.txt",
                ↪  skipFilesWithNoChanges: true);
87
88              CheckAndCleanUpThreeRulesFiles(firstStepReferenceText, thirdStepReferenceText,
                ↪  transformer, targetFilename);
89          }
90
91          private static void CheckAndCleanUpThreeRulesFiles(string firstStepReferenceText, string
            ↪  thirdStepReferenceText, TextTransformer transformer, string targetFilename)
92          {
93              var firstStepReferenceFilename = $"{targetFilename}.0.txt";
94              var firstStepRuleFilename = $"{targetFilename}.0.rule.txt";
95              var secondStepReferenceFilename = $"{targetFilename}.1.txt";
96              var secondStepRuleFilename = $"{targetFilename}.1.rule.txt";
97              var thirdStepReferenceFilename = $"{targetFilename}.2.txt";
98              var thirdStepRuleFilename = $"{targetFilename}.2.rule.txt";
99
100             Assert.True(File.Exists(firstStepReferenceFilename));
101             Assert.True(File.Exists(firstStepReferenceFilename));
102             Assert.False(File.Exists(secondStepReferenceFilename));
103             Assert.False(File.Exists(secondStepRuleFilename));
104             Assert.True(File.Exists(thirdStepReferenceFilename));
105             Assert.True(File.Exists(thirdStepRuleFilename));
106
107             Assert.Equal(firstStepReferenceText, File.ReadAllText(firstStepReferenceFilename,
                ↪  Encoding.UTF8));
108             Assert.Equal(transformer.Rules[0].ToString(),
                ↪  File.ReadAllText(firstStepRuleFilename, Encoding.UTF8));
109             Assert.Equal(thirdStepReferenceText, File.ReadAllText(thirdStepReferenceFilename,
                ↪  Encoding.UTF8));
110             Assert.Equal(transformer.Rules[2].ToString(),
                ↪  File.ReadAllText(thirdStepRuleFilename, Encoding.UTF8));
111
112             File.Delete(firstStepReferenceFilename);
113             File.Delete(firstStepRuleFilename);
114             File.Delete(secondStepReferenceFilename);
115             File.Delete(secondStepRuleFilename);
116             File.Delete(thirdStepReferenceFilename);
117             File.Delete(thirdStepRuleFilename);
118         }
119
120         [Fact]
121         public void DebugOutputUsingTransformersGenerationTest()
122         {
123             var sourceText = "aaaa";
124             var firstStepReferenceText = "bbbb";
125             var secondStepReferenceText = "cccc";
126
127             var transformer = new TextTransformer(new SubstitutionRule[] {
128                 (new Regex("a"), "b"),
129                 (new Regex("b"), "c")
130             });
131
```

```
132             var steps =
                ↪  transformer.GenerateTransformersForEachRule().TransformWithAll(sourceText);
133
134             Assert.Equal(2, steps.Count);
135             Assert.Equal(firstStepReferenceText, steps[0]);
136             Assert.Equal(secondStepReferenceText, steps[1]);
137         }
138
139         [Fact]
140         public void DebugFilesOutputUsingTransformersGenerationTest()
141         {
142             var sourceText = "aaaa";
143             var firstStepReferenceText = "bbbb";
144             var secondStepReferenceText = "cccc";
145
146             var transformer = new TextTransformer(new SubstitutionRule[] {
147                 (new Regex("a"), "b"),
148                 (new Regex("b"), "c")
149             });
150
151             var targetFilename = Path.GetTempFileName();
152
153             transformer.GenerateTransformersForEachRule().TransformWithAllToFiles(sourceText,
                ↪  $"{targetFilename}.txt", skipFilesWithNoChanges: false);
154
155             CheckAndCleanUpTwoRulesFiles(firstStepReferenceText, secondStepReferenceText,
                ↪  transformer, targetFilename);
156         }
157
158         [Fact]
159         public void FilesWithNoChangesSkipedWhenUsingTransformersGenerationTest()
160         {
161             var sourceText = "aaaa";
162             var firstStepReferenceText = "bbbb";
163             var thirdStepReferenceText = "cccc";
164
165             var transformer = new TextTransformer(new SubstitutionRule[] {
166                 (new Regex("a"), "b"),
167                 (new Regex("x"), "y"),
168                 (new Regex("b"), "c")
169             });
170
171             var targetFilename = Path.GetTempFileName();
172
173             transformer.GenerateTransformersForEachRule().TransformWithAllToFiles(sourceText,
                ↪  $"{targetFilename}.txt", skipFilesWithNoChanges: true);
174
175             CheckAndCleanUpThreeRulesFiles(firstStepReferenceText, thirdStepReferenceText,
                ↪  transformer, targetFilename);
176         }
177     }
178 }
```

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