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Chapter 13. Strings and Text Processing

1. Describe the strings in C#. What is typical for the string type? Explain which the most important methods of the string class are.

String eshte nje sekuence karakteresh qe ze vend te caktuar ne memorie. Metoda kryesore e classes string eshte System.String.

2. Write a program that reads a string, reverse it and prints it to the console. For example: "introduction" à "noitcudortni".

```
using System;

namespace ex2
{
   class Program
   {
      static void Main(string[] args)
      {
         Console.Write("Enter a word : ");
         string word = Console.ReadLine();
         char[] wordArr = word.ToCharArray();
         for(int i = word.Length -1 ; i >= 0; i--)
         {
            Console.Write("{0} ", wordArr[i]);
         }
         Console.ReadKey();
      }
   }
}
```

3. Write a program that checks whether the parentheses are placed correctly in an arithmetic expression. Example of expression with correctly placed brackets: ((a+b)/5-d). Example of an incorrect expression:)(a+b)).

```
using System;

namespace ex3
{
   class Program
   {
      static void Main(string[] args)
      {
         bool correct = true;
         Console.Write("Enter an expression : ");
         string exp =  Console.ReadLine();
         char[] arr = exp.ToCharArray();
         for(int i = 0; i < exp.Length; i++)
         {
            if (arr[0] == ')') correct = false;
            else if (arr[i] == '(' && arr[i + 1] == ')') correct = false;
            else correct = true;
         }
         if (correct == true) Console.WriteLine("\n expression is correct");
         else Console.WriteLine("\n expression is npt correct");

         Console.ReadKey();
      }
   }
}
```

4. How many backslashes you must specify as an argument to the method Split(…) in order to split the text by a backslash.

Example: one\two\three.
Note: In C# backslash is an escaping character.

```
using System;

namespace ex4
{
   class Program
   {
      static void Main(string[] args)
      {
         Console.Write("Enter a random text : ");
         string txt = Console.ReadLine();

         string[] arr = txt.Split('\\');

         for(int i = 0; i < arr.Length; i++)
         {
            Console.WriteLine(arr[i]);
         }
         Console.ReadKey();
      }
   }
}
```

5. Write a program that detects how many times a substring is contained in the text. For example, let's look for the substring "in" in the text:

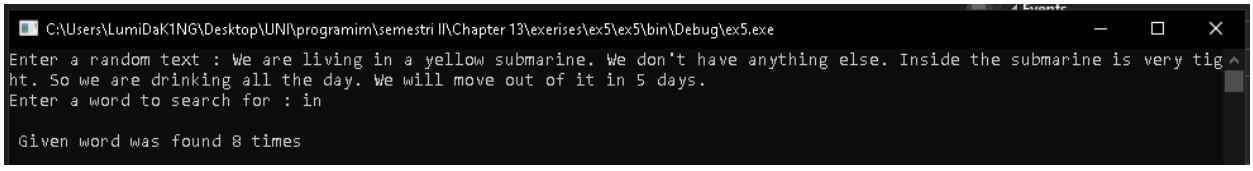
```
using System;

namespace ex5
{
   class Program
   {
      static void Main(string[] args)
      {
         int count = 0;
         Console.Write("Enter a random text : ");
         string txt = Console.ReadLine();
         char[] txtArr = txt.ToCharArray();

         Console.Write("Enter a word to search for : ");
         string word = Console.ReadLine();
         char[] wordArr = word.ToCharArray();

         for (int i = 0; i < txt.Length - 1; i++)
         {
            for (int j = 0; j < wordArr.Length - 1; j++)
            {
               if (txtArr[i] == wordArr[j])
                  if (txtArr[i + 1] == wordArr[j + 1])count++;
            }
         }

         /*for (int i = 0; i < txt.Length; i++)
         {
            if (txtArr[i] == wordArr[0])
               if (txtArr[i + 1] == wordArr[1]) count++;
         }*/
         Console.WriteLine("\n Given word was found {0} times", count);
         Console.ReadKey();
      }
   }
}
```



6. A text is given. Write a program that modifies the casing of letters to uppercase at all places in the text surrounded by <upcase> and </upcase> tags. Tags cannot be nested.

Example:
We are living in a <upcase>yellow submarine</upcase>. We don't have <upcase>anything</upcase> else.
Result:
We are living in a YELLOW SUBMARINE. We don't have ANYTHING else.

```
using System;
using System.Text;

class GFG{

  // Method to convert characters
  // of a string to opposite case
  static void convertOpposite(StringBuilder str)
  {
    int ln = str.Length;

    // Conversion according to ASCII values
    for (int i=0; i<ln; i++)
    {
      if (str[i]>='a' && str[i]<='z')

        //Convert lowercase to uppercase
        str[i] = (char)(str[i] - 32);

      else if(str[i]>='A' && str[i]<='Z')

        //Convert uppercase to lowercase
        str[i] = (char)(str[i] + 32);
    }
  }

  // Driver code
  public static void Main()
  {
    StringBuilder str = new StringBuilder("GeEkSfOrGeEkS");
    // Calling the Method
    convertOpposite(str);
    Console.WriteLine(str);
    }
}
```

7. Write a program that reads a string from the console (20 characters maximum) and if shorter complements it right with "*" to 20 characters.

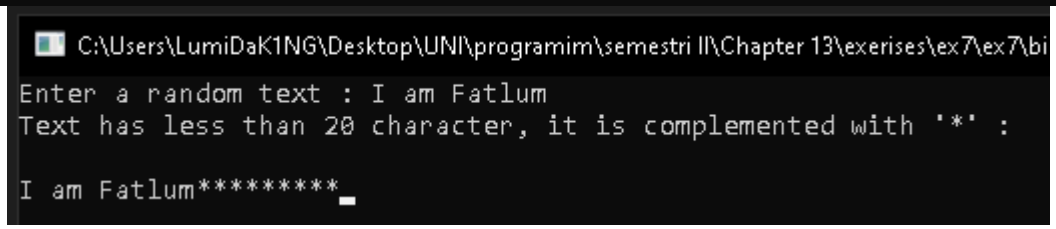
```
using System;

namespace ex7
{
   class Program
   {
      static void Main(string[] args)
      {
         Console.Write("Enter a random text : ");
         string txt = Console.ReadLine();

         char[] arr = txt.ToCharArray();

         string comp = "*";


         if(arr.Length < 20)
         {
            Console.WriteLine("Text has less than 20 character, it is complemented with '*' : \n");
            for (int i = 0; i < arr.Length; i++)
            {
               Console.Write("{0}", arr[i]);
            }
            for (int i = arr.Length + 1; i < 21; i++)
            {
               Console.Write("{0}", comp);
            }
         }
         else Console.WriteLine("\n Text has more than 20 characters");
         Console.ReadKey();
      }  }  }
```



8. Write a program that converts a given string into the form of array of Unicode escape sequences in the format used in the C# language. Sample input: "Test". Result: "\u0054\u0065\u0073\u0074".

```
public class Program
{
	public static void Main()
	{
		string given = "Test";
		StringBuilder sb = new StringBuilder();

		foreach (char character in given)
		{
			sb.Append(Convert.ToInt16(character) + " ");
		}
		Console.WriteLine(sb);
	}
}
```

9. Write a program that encrypts a text by applying XOR (excluding or) operation between the given source characters and given cipher code. The encryption should be done by applying XOR between the first letter of the text and the first letter of the code, the second letter of the text and the second letter of the code, etc. until the last letter of the code, then goes back to the first letter of the code and the next letter of the text. Print the result as a series of Unicode escape characters \xxxx.

Sample source text: "Test". Sample cipher code: "ab". The result should be the following: "\u0035\u0007\u0012\u0016".

```
using System;

public class XOREncryption
{
   static String encryptDecrypt(String inputString)
   {
      char xorKey = 'P';

      String outputString = "";

      int len = inputString.Length;

      for (int i = 0; i < len; i++)
      {
         outputString = outputString +
         char.ToString((char) (inputString[i] ^ xorKey));
      }

      Console.WriteLine(outputString);
      return outputString;
   }


   public static void Main(String[] args)
   {
      String sampleString = "Universum";

      Console.WriteLine("Encrypted String");
      String encryptedString = encryptDecrypt(sampleString);

      Console.WriteLine("Decrypted String");
      encryptDecrypt(encryptedString);
   }
}
```

10. Write a program that extracts from a text all sentences that contain a particular word. We accept that the sentences are separated from each other by the character "." and the words are separated from one another by a character which is not a letter. Sample text:

We are living in a yellow submarine. We don't have anything else. Inside the submarine is very tight. So we are drinking all the day. We will move out of it in 5 days.
Sample result:
We are living in a yellow submarine.
We will move out of it in 5 days.

```
using System;
class GFG
{
   public static void printWords(String s)
   {
      foreach (String val in s.Split(" "))


         Console.WriteLine(val);
   }

   static public void Main()
   {
      Console.WriteLine("Jepni nje tekst");

      String Str = Console.ReadLine();
      printWords(Str);
   }
}
```

11. A string is given, composed of several "forbidden" words separated by commas. Also a text is given, containing those words. Write a program that replaces the forbidden words with asterisks. Sample text.

```
using System;
using System.Text;
using System.Text.RegularExpressions;
public class Program
{
        public static string StarReplacer(string text)
        {
                StringBuilder temp = new StringBuilder();
                foreach (char letter in text)
                {
                        temp.Append("*");
                }
                string replaced = temp.ToString();
                return replaced;
        }

        public static void Main()
        {
                string text = "Microsoft announced its next generation C# compiler today. It
uses advanced parser and special optimizer for the Microsoft CLR.";
                string forbidden = "C#,CLR,Microsoft";
                char separator = ',';
                string[] array = forbidden.Split(separator);
                StringBuilder sb = new StringBuilder(text);

                foreach (string word in array)
                {
                        int index = 0;
                        string replacer = StarReplacer(word);
                        while (index != -1)
                        {

                                sb.Replace(word, replacer);
                                index = text.IndexOf(word+1);
                        }
                }

                Console.WriteLine(sb);
        }
}
```

12. Write a program that reads a number from console and prints it in 15-character field, aligned right in several ways: as a decimal number, hexadecimal number, percentage, currency and exponential (scientific) notation.

```
using System;
using System.Threading;

class Number
{
   static void Main(string[] args)
   {
      Thread.CurrentThread.CurrentCulture = new System.Globalization.CultureInfo("bg-BG");
      int num = int.Parse(Console.ReadLine());

      // decimal
      Console.WriteLine("{0,15:D}", num);
      // hexadecimal
      Console.WriteLine("{0,15:X}", num);
      // percent
      Console.WriteLine("{0,15:P}", num);
      // currency
      Console.WriteLine("{0,15:C}", num);
      // scientific notation
      Console.WriteLine("{0,15:E}", num);
   }
}
```

13. Write a program that parses an URL in following format:

[protocol]://[server]/[resource]
It should extract from the URL the protocol, server and resource parts. For example, when http://www.cnn.com/video is passed, the result is:
[protocol]="http"
[server]="www.cnn.com"
[resource]="/video"

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

namespace URLAnalyzer
{
   class Program
   {
      const string UrlPattern = @"\b(?<protocol>[a-zA-Z]*)://(?<domain>[-a-zA-Z0-9.]+)(?<resource>/[-a-zA-Z0-9+&@#/%=~_|!:,.;]*)?";

      static void Main(string[] args)
      {
         string url = Console.ReadLine();

         Regex regex = new Regex(UrlPattern);
         Match match = regex.Match(url);

         if (!match.Success)
         {
            Console.WriteLine("ERROR");
         }
         else
         {
            string protocol = match.Groups["protocol"].ToString();
            string domain = match.Groups["domain"].ToString();
            string resource = match.Groups["resource"].ToString();

            Console.WriteLine("[protocol]={0}", protocol);
            Console.WriteLine("[domain]={0}", domain);
            Console.WriteLine("[resource]={0}", resource);
         }
      }
   }
}
```

14. Write a program that reverses the words in a given sentence without changing punctuation and spaces. For example: "C# is not C++ and PHP is not Delphi" à "Delphi not is PHP and C++ not is C#".

```
using System;
using System.Linq;
using System.Text;

class ReverseSentance
{
   static void Main(string[] args)
   {
      string sentance = Console.ReadLine(); ;

      char[] punctuationChars = { ' ', '-', ',', ':', ';' };

      StringBuilder result = new StringBuilder();
      string[] words = sentance.Split(punctuationChars, StringSplitOptions.RemoveEmptyEntries);

      for (int i = words.Length - 1; i >= 0; i--)
      {
         result.Append(words[i]);

         // remove word from sentance
         sentance = sentance.Remove(sentance.Length - words[i].Length);

         // store punctuation chars between current word, and the next one
         StringBuilder punctuaction = new StringBuilder();
         while (sentance.Length > 0 && punctuationChars.Contains(sentance[sentance.Length - 1]))
         {
            punctuaction.Append(sentance[sentance.Length - 1]);
            sentance = sentance.Remove(sentance.Length - 1);
         }

         // reverse punctuation chars, so we can keep puct. chars in original order
         for (int j = punctuaction.Length - 1; j >= 0; j--)
         {
            result.Append(punctuaction[j]);
         }
      }

      Console.WriteLine(result);
   }
}
```

15. A dictionary is given, which consists of several lines of text. Each line consists of a word and its explanation, separated by a hyphen:

.NET – platform for applications from Microsoft
CLR – managed execution environment for .NET
namespace – hierarchical organization of classes

Write a program that parses the dictionary and then reads words from the console in a loop, gives an explanation for it or writes a message on the console that the word is not into the dictionary.

```
using System;
using System.Collections.Generic;
using System.Linq;

namespace Dictionary
{
   class Program
   {
      private const string EndString = "End";
      static void Main(string[] args)
      {
         int n = int.Parse(Console.ReadLine());

         Dictionary<string, string> dictionary = new Dictionary<string, string>();

         string currentLine = string.Empty;
         for (int i = 0; i < n; i++)
         {
            currentLine = Console.ReadLine();
            KeyValuePair<string, string> pair = Parse(currentLine);
            if (!dictionary.ContainsKey(pair.Key))
            {
               dictionary.Add(pair.Key, pair.Value);
            }
         }

         string currentCommand = Console.ReadLine();
         while (currentCommand != EndString)
         {
            if (dictionary.ContainsKey(currentCommand))
            {
               Console.WriteLine("{0} - {1}", currentCommand, dictionary[currentCommand]);
            }
            else
            {
               Console.WriteLine("\"{0}\" not found!", currentCommand);
            }
            currentCommand = Console.ReadLine();
```

```
        }
      }

      private static KeyValuePair<string, string> Parse(string currentLine)
      {
        string[] tokens = currentLine.Split('-');
        string word = tokens[0].Trim();
        string description = tokens[1].Trim();
        KeyValuePair<string, string> pair = new KeyValuePair<string, string>(word, description);
        return pair;
      }
    }
}
```

16. Write a program that replaces all hyperlinks in a HTML document consisting of … and hyperlinks in "forum" style, which look like [URL=…]…[/URL].

Sample text:
Please visit our site to choose a training course. Also visit our forum to discuss the courses.

Sample result:
Please visit [URL=https://softuni.bg]our site[/URL] to choose a training course. Also visit [URL=www.devbg.org]our forum[/URL] to discuss the courses.

```
using System;
using System.Text;

class HtmlTag
{
   static void Main(string[] args)
   {
      string text = Console.ReadLine();

      StringBuilder result = new StringBuilder();
      int i = 0;
      while (i >= 0 && text.Substring(i).Contains("<a href="))
      {
         // append the text before "<a href="
         int lenght = text.IndexOf("<a href=", i) - i;
         result.Append(text, i, lenght);

         result.Append("[URL=");

         i = text.IndexOf("<a href=", i);
         lenght = text.IndexOf('>', i) - i - 10;
         // append the url
         result.Append(text, i + 9, lenght);

         result.Append(']');

         i = text.IndexOf('>', i) + 1;
      }

      result.Append(text.Substring(i));
      result.Replace("</a>", "[/URL]");

      Console.WriteLine(result);
   }
}
```

16. Write a program that reads two dates entered in the format "day.month.year" and calculates the number of days between them.

Enter the first date: 27.02.2006
Enter the second date: 3.03.2006
Distance: 4 days

```
using System;
using System.Globalization;

namespace DateDistance
{
   class DateDistance
   {
      static void Main(string[] args)
      {
         CultureInfo provider = CultureInfo.InvariantCulture;
         string format = "dd.mm.yyyy";
         string firstDateStr = Console.ReadLine();
         string secondDateStr = Console.ReadLine();

         try
         {
            DateTime firstDate = DateTime.ParseExact(firstDateStr, format, provider);
            DateTime secondDate = DateTime.ParseExact(secondDateStr, format, provider);
            TimeSpan distance = firstDate - secondDate;
            Console.WriteLine(Math.Abs(distance.Days));
         }
         catch (FormatException)
         {
            Console.WriteLine("ERROR");
         }
      }
   }
}
```

17. Write a program that reads the date and time entered in the format "day.month.year hour:minutes:seconds" and prints the date and time after 6 hours and 30 minutes in the same format.

```
using System;
using System.Globalization;

class After6h30min
{
   static void Main(string[] args)
   {
      string input = Console.ReadLine();

      DateTime date = DateTime.ParseExact(input, "d.M.yyyy HH:mm:ss",
                  CultureInfo.InvariantCulture);

      date = date.AddHours(6);
      date = date.AddMinutes(30);

      Console.WriteLine("{0:dd.MM.yyyy HH:mm:ss}", date);
   }
}
```

19. Write a program that extracts all e-mail addresses from a text. These are all substrings that are limited on both sides by text end or separator between words and match the shape <sender>@<host>…<domain>. Sample text:

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Text.RegularExpressions;

namespace EmailExtractor
{
   class EmailExtractor
   {
      private static string[] ExtractEmails(string input)
      {
         string pattern = @"(\b[A-Z0-9._-]+)@[A-Z0-9][A-Z0-9.-]{0,61}[A-Z0-9]\.[A-Z.]{2,6}\b";

         MatchCollection matches = Regex.Matches(input, pattern, RegexOptions.IgnoreCase);

         string[] emails = new string[matches.Count];

         int i = 0;
         foreach (var match in matches)
         {
            emails[i] = match.ToString();
            i++;
         }

         return emails;
      }

      static void Main(string[] args)
      {
         string text = Console.ReadLine();

         string[] emails = ExtractEmails(text);
         foreach (string email in emails)
         {
            Console.WriteLine(email);
         }
      }
   }
}
```

20. Write a program that extracts from a text all dates written in format DD.MM.YYYY and prints them on the console in the standard format for Canada. Sample text:

I was born at 14.06.1980. My sister was born at 3.7.1984. In 5/1999 I graduated my high school. The law says (see section 7.3.12) that we are allowed to do this (section 7.4.2.9).
Extracted dates from the sample text:
14.06.1980
3.7.1984

```
using System;
using System.Globalization;
using System.Text.RegularExpressions;
using System.Threading;
using System.Text;

class Dates
{
   static void Main(string[] args)
   {
      string text = Console.ReadLine();

      Regex dateRegex = new Regex(@"(0?[1-9]|[12][0-9]|3[01])[.](0?[1-9]|1[012])[.]\d{4}");

      MatchCollection dates = dateRegex.Matches(text);

      Thread.CurrentThread.CurrentCulture = new CultureInfo("en-CA");

      StringBuilder output = new StringBuilder();
      foreach (var date in dates)
      {
         output.AppendLine(date.ToString());
      }

      Console.WriteLine(output);
   }
}
```

21. Write a program that extracts from a text all words which are palindromes, such as ABBA", "lamal", "exe".

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

namespace PalindromeExtractor
{
   class PalindromeExtractor
   {
      private static bool IsPalindrome(string word)
      {
         for (int i = 0; i < word.Length; i++)
         {
            if (word[i] != word[word.Length - i - 1])
            {
               return false;
            }
         }

         return true;
      }

      static void Main(string[] args)
      {
         string text = Console.ReadLine();
         char[] separators = { '.', ',', ' ', '!', '?', '-', '_' };
         string[] words = text.Split(separators, StringSplitOptions.RemoveEmptyEntries);
         foreach (string word in words)
         {
            if (IsPalindrome(word))
            {
               Console.WriteLine(word);
            }
         }
      }
   }
}
```

22. Write a program that extracts from a text all words which are palindromes, such as ABBA", "lamal", "exe".

```
using System;

class LettersCount
{
   static void Main(string[] args)
   {
      string text = Console.ReadLine();

      int[] lettersCount = new int[52];

      foreach (var c in text)
      {
         if (c >= 'a' && c <= 'z')
         {
            int index = (c - 'a') * 2;
            lettersCount[index]++;
         }
         else if (c >= 'A' && c <= 'Z')
         {
            int index = ((c - 'A') * 2) + 1;
            lettersCount[index]++;
         }
      }

      bool upCase = false;
      for (int i = 0; i < lettersCount.Length; i++)
      {
         if (lettersCount[i] > 0)
         {
            char charA = upCase ? 'A' : 'a';
            char letter = (char)(i / 2 + charA);
            Console.WriteLine("{0}: {1}", letter, lettersCount[i]);
         }
         upCase = !upCase;
      }

   }
}
```

23. Write a program that reads a string from the console and prints in alphabetical order all letters from the input string and how many times each one of them occurs in the string.

```
using System;

class LettersCount
{
   static void Main(string[] args)
   {
      string text = Console.ReadLine();

      int[] lettersCount = new int[52];

      foreach (var c in text)
      {
         if (c >= 'a' && c <= 'z')
         {
            int index = (c - 'a') * 2;
            lettersCount[index]++;
         }
         else if (c >= 'A' && c <= 'Z')
         {
            int index = ((c - 'A') * 2) + 1;
            lettersCount[index]++;
         }
      }

      bool upCase = false;
      for (int i = 0; i < lettersCount.Length; i++)
      {
         if (lettersCount[i] > 0)
         {
            char charA = upCase ? 'A' : 'a';
            char letter = (char)(i / 2 + charA);
            Console.WriteLine("{0}: {1}", letter, lettersCount[i]);
         }
         upCase = !upCase;
      }

   }
}
```

24. Write a program that reads a string from the console and prints in alphabetical order all words from the input string and how many times each one of them occurs in the string.

```
using System;
using System.Collections.Generic;

namespace WordCounter
{
   class WordCounter
   {
      static void Main(string[] args)
      {
         string text = Console.ReadLine();
         char[] separators = { ' ', ',', '.', '?', '!' };
         string[] wordArray = text.Split(separators, StringSplitOptions.RemoveEmptyEntries);
         SortedDictionary<string, int> words = new SortedDictionary<string, int>();

         foreach (string word in wordArray)
         {
            if (words.ContainsKey(word))
            {
               words[word]++;
            }
            else
            {
               words.Add(word, 1);
            }
         }

         foreach (var word in words)
         {
            Console.WriteLine("{0} -> {1}", word.Key, word.Value);
         }
      }
   }
}
```

25. Write a program that reads a string from the console and replaces every sequence of identical letters in it with a single letter (the repeating letter). Example: "aaaaabbbbbcdddeeeedssaa" à "abcdedsa".

```
using System;
using System.Text;

class ConsecutiveLetters
{
   static void Main(string[] args)
   {
      string input = Console.ReadLine();

      StringBuilder result = new StringBuilder(input);

      for (int i = 1; i < result.Length; i++)
      {
         bool isLatinLetter =
            result[i] >= 'a' && result[i] <= 'z' ||
            result[i] >= 'A' && result[i] <= 'Z';

         if (result[i] == result[i - 1] && isLatinLetter)
         {
            result.Remove(i, 1);
            i--;
         }
      }

      Console.WriteLine(result);
   }
}
```

26. Write a program that reads a list of words separated by commas from the console and prints them in alphabetical order (after sorting).

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;

namespace WordSorter
{
   class WordSorter
   {
      private static string[] separators = { "," };
      static void Main(string[] args)
      {
         string str = Console.ReadLine();
         string[] words = str.Split(separators, StringSplitOptions.RemoveEmptyEntries);

         for (int i = 0; i < words.Length; i++)
         {
            words[i] = words[i].Trim();
         }

         Array.Sort(words);
         foreach (string word in words)
         {
            Console.WriteLine(word);
         }
      }
   }
}
```

27. Write a program that extracts all the text without any tags and attribute values from an HTML document.

Sample text:

```
<html>
  <head><title>News</title></head>
  <body><p><a href="https://softuni.bg">Telerik
    Academy</a>aims to provide free real-world practical
    training for young people who want to turn into
    skillful software engineers.</p></body>
</html>
```

Sample result:
News
Telerik Academy aims to provide free real-world practical training for young people who want to turn into skillful software engineers.

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

class HtmlTagRemove
{
   static void Main(string[] args)
   {
      const string TITLE_OPEN_TAG = "<title";
      const string TITLE_CLOSE_TAG = "</title>";

      StringBuilder input = new StringBuilder();
      string line;
      do
      {
         line = Console.ReadLine();
         input.Append(line.Trim() + ' ');
      }
      while (line != "</html>");

      StringBuilder output = new StringBuilder();

      // title
      int indexOfTitle = input.ToString().IndexOf(TITLE_OPEN_TAG);
      int startIndex = input.ToString().IndexOf('>', indexOfTitle) + 1;
      int lenght = input.ToString().IndexOf(TITLE_CLOSE_TAG) - startIndex;

      string title = input.ToString().Substring(startIndex, lenght);
      input = input.Remove(0, startIndex + lenght);
      output.AppendLine("Title: " + title);
```

```
        // body
        Regex tag = new Regex(@"<(?![!/]?[ABIU][>\s])[^>]*>");
        string body = tag.Replace(input.ToString(), "");
        output.AppendLine("Body:");
        output.Append(body.Trim());

        Console.WriteLine(output);
    }
}
```