Aufgabe 1 - (De-)Kompression von Dateien

Lösungsidee:
Das inputfile zeilenweise lesen und je nachdem die compress oder decompress funktion auf diese zeile anwenden und die geänderte zeile dann je nachdem auf die console oder in das outputfile schreiben.

Für die compress Funktion gehe ich über alle chars der zeile drüber und falls ein char mehr als 3 mal in folge vorkommt schreib ich statt dem gegebenen die RLE schreibweise. Für decompress das gleiche nur umgekehrt.

Zeitaufwand: 1h 30min

Code:

```
program RLE;

uses SysUtils;

type
  OperationType = (compress, decompress);
  OutputType = (toFile, toConsole);

function CompressString(str: string): string;
var
  i, j: integer;
  currChar: char;
  compressed: string;

  // inner procedure to avoid code duplication because this has to be run
inside the loop and after the loop
  procedure Update;
  begin
    if j > 2 then
      compressed := Concat(compressed, currChar, IntToStr(j))
    else if j = 2 then
      compressed := Concat(compressed, currChar, currChar)
    else
      compressed := Concat(compressed, currChar);
    j := 1;
  end;
begin
  compressed := '';
  j := 1;
  i := 1;
  currChar := str[i];
  for i := 2 to Length(str) do
    if str[i] = currChar then
```

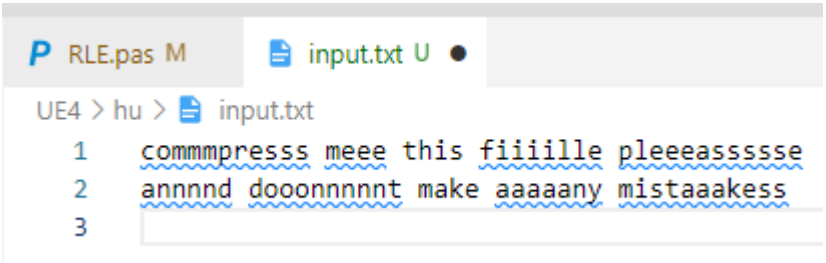
```
      Inc(j)
    else
    begin
      Update();
      currChar := str[i];
    end;

  Update();
  CompressString := compressed;
end;

function DecompressString(str: string): string;
var
  i, j: integer;
  decompressed: string;
begin
  decompressed := '';
  i := 1;
  while i <= Length(str) do
  begin
    if (str[i] in ['0'..'9']) then
    begin
      if(i = 1) then break;
      for j := 2 to StrToInt(str[i]) do
        decompressed := Concat(decompressed, str[i-1]);
    end else decompressed := Concat(decompressed, str[i]);
    Inc(i);
  end;

  DecompressString := decompressed;
end;

procedure RunRLE(operation: OperationType; outputType: OutputType; const
inFileName: string; const outFileName: string);
var
  line: STRING;
  inFile, outFile: TEXT;
begin
  Assign(inFile, inFileName);
  Reset(inFile);
  if(outputType = toFile) then
  begin
    Assign(outFile, outFileName);
    Rewrite(outFile);
  end;

  while(not Eof(inFile)) do
  begin
```

```
    ReadLn(inFile, line);

    if(operation = compress) then
      line := CompressString(line)
    else if(operation = decompress) then
      line := DecompressString(line);

    if(outputType = toFile) then
      writeln(outFile, line)
    else
      writeln(line);
  end;

  Close(inFile);
  if(outputType = toFile) then
    Close(outFile);
end;

var
  Command: string;
  InFileName, OutFileName: string;
  outType: OutputType;
begin
  if ParamCount > 0 then
    Command := ParamStr(1)
  else begin
    write('enter if you want to compress (-c) or decompress (-d) > ');
    ReadLn(Command);
  end;
  if (Command <> '-c') and (Command <> '-d') then
  begin
    WriteLn('Error: Unkowm Command - ', Command);
    writeln;
    Halt(1);
  end;

  if ParamCount > 1 then
    InFileName := ParamStr(2)
  else begin
    write('enter infilename > ');
    ReadLn(InFileName);
  end;
  if not FileExists(InFileName) then
  begin
    WriteLn('Error: input file does not exist - ', InFileName);
    writeln;
    Halt(1);
  end;
```

```
  outType := toFile;
  if ParamCount > 2 then
    OutFileName := ParamStr(3)
  else outType := toConsole;
  if ((outType = toFile) and (inFilename = outFilename)) then
  begin
    WriteLn('Error: output file can not be the same as input file - ',
InFileName);
    writeln;
    Halt(1);
  end;

  if Command = '-c' then
    RunRLE(compress, outType, InFileName, OutFileName)
  else
    RunRLE(decompress, outType, InFileName, OutFileName);
end.
```

Tests:

Inputfile used for those tests:



Test without any params:

```
enter if you want to compress (-c) or decompress (-d) > -c
enter infilename > input.txt
com3pres3 me3 this fi4lle ple3as5e
an4d do3n5t make a5ny mista3kess
Heap dump by heaptrc unit of C:\_data\fh-repos\2023SS_ADF\UE4\hu\RLE.exe
135 memory blocks allocated : 3168/3536
135 memory blocks freed     : 3168/3536
0 unfreed memory blocks : 0
True heap size : 163840 (96 used in System startup)
True free heap : 163744
```

Test compression with output file:

```
C:\_data\fh-repos\2023SS_ADF\UE4\hu>RLE -c input.txt compressed.txt
```

RLE.pas M compressed.txt U

UE4 > hu > compressed.txt

```
1  com3pres3 me3 this fi4lle ple3as5e
2  an4d do3n5t make a5ny mista3kess
3
```

Test decompression:

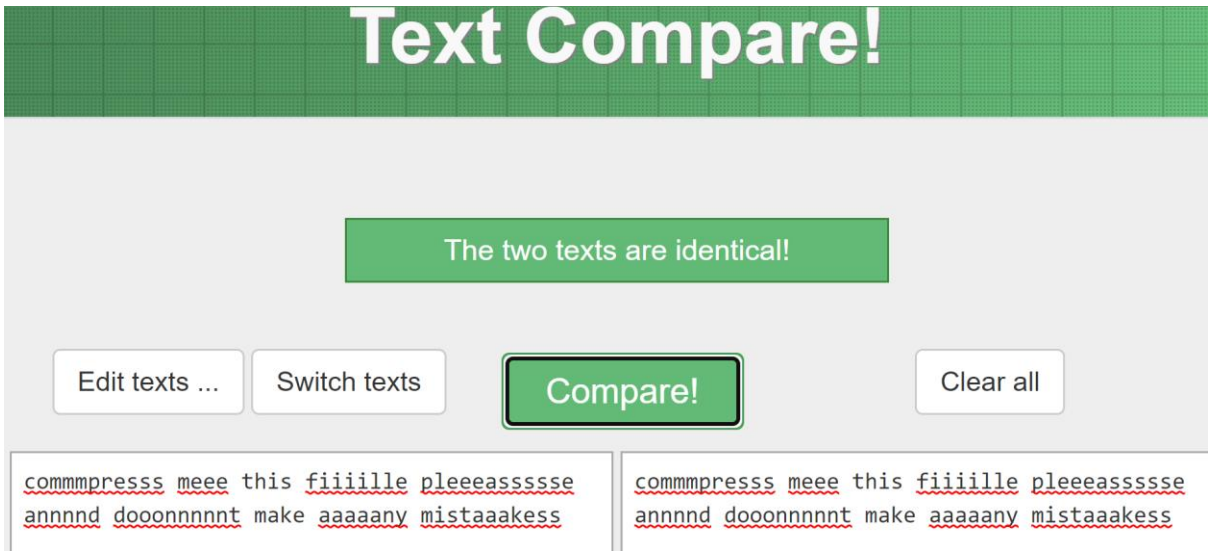
```
C:\_data\fh-repos\2023SS_ADF\UE4\hu>RLE -d compressed.txt decompressed.txt
```

RLE.pas M decompressed.txt U

UE4 > hu > decompressed.txt

```
1  commmpresss meee this fiiiille pleeeasssse
2  annnnd dooonnnnnt make aaaaany mistaaakess
3
```

Test Conclusion: as we can see the compressed and again decompressed file equals the initial input.txt



Src: https://text-compare.com/