ADF2x & PRO2x — Übungen zu Fortgeschrittenen Algorithmen & Datenstrukturen und OOP — SS 24, Übung 3

Abgabetermin: Sa, 27.04.2024

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1. Skalieren von einfachen Computergrafiken (24 Punkte)

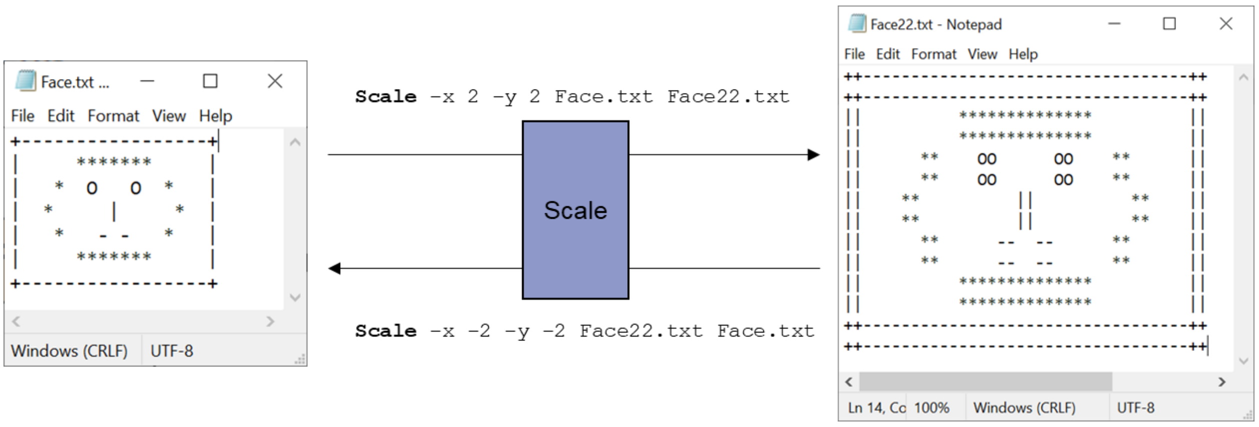
In Textdateien kann man nicht nur Texte, sondern auch sehr einfache Computergrafiken, wie zum Beispiel ASCII-Art (siehe https://www.asciiart.eu/) speichern. Entwickeln Sie ein Programm *Scale*, das den Inhalt einer Textdatei einliest, in horizontaler (*x*) und vertikaler (*y*) Richtung skaliert und das Ergebnis in einer weiteren Datei speichert. Der Skalierungsfaktor für die *x*- und *y*-Richtung soll über die Kommandozeile angegeben werden: Positive Werte im Bereich 2 bis 9 bewirken eine Vergrößerung. Negative Werte im Bereich -2 bis -9 bewirken eine Verkleinerung, wobei der Wert -2 die Größe auf die Hälfte reduziert, -3 auf ein Drittel usw. Ihr Programm muss folgende Aufrufmöglichkeiten von der Kommandozeile bieten (die Metasymbole […] kennzeichnen optionale Parameter):

```
Scale [-x sx] [-y sy] inFile outFile
```

Bedeutung der Parameter:

`-x sx`	der Skalierungsfaktor `sx` in x-Richtung (Standardwert 1),
`-y sy`	der Skalierungsfaktor `sy` in y-Richtung (Standardwert 1),
`inFile`	Name der Eingabedatei und
`outFile`	Name der Ausgabedatei.

Beispiel:



```
+-----------------+
|     *******     |
|   *  0   0  *   |
|  *     |     *  |
|   *   - -   *   |
|     *******     |
+-----------------+
```

```
Scale -x 2 -y 2 Face.txt Face22.txt
Scale -x -2 -y -2 Face22.txt Face.txt
```

```
++----------------------------------++
++----------------------------------++
||          **************          ||
||          **************          ||
||      **    00      00    **      ||
||      **    00      00    **      ||
||    **          ||          **    ||
||    **          ||          **    ||
||      **      --  --      **      ||
||      **      --  --      **      ||
||          **************          ||
||          **************          ||
++----------------------------------++
++----------------------------------++
```

Bei der Verkleinerung hängt das Ergebnis davon ab, welches Zeichen in *x*-Richtung und welche Zeile in *y*-Richtung aus dem Original ausgewählt und in den verkleinerten Bereich übertragen wird. Soll z.B. der Inhalt der Datei *Face22.txt* um den Faktor 1/3 in *x*-Richtung verkleinert werden, könnte man aus den ersten drei Zeichen der ersten Zeile `++-` das Zeichen `+` oder `–` auswählen. Für diese Aufgabe genügt eine einfache Strategie, die beispielsweise immer das erste Zeichen auswählt. Dies gilt sinngemäß auch für die Verkleinerung in *y*-Richtung.

Hinweise:

1. Geben Sie für alle Ihre Lösungen immer eine „Lösungsidee“ an.
2. Dokumentieren und kommentieren Sie Ihre Algorithmen.
3. Bei Programmen: Geben Sie immer auch Testfälle ab, an denen man erkennen kann, dass Ihr Programm funktioniert, und dass es auch in Fehlersituation entsprechend reagiert.

ADF2/PRO2 UE02

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24. April 2024, Hagenberg

Inhaltsverzeichnis

1 Skalieren von einfachen Computergrafiken

1.1 Lösungsidee

Ein LineBuffer wird erstellt, der alle hinzugefügten *STRINGS* mithilfe einer verketteten Liste hintereinander hängt. Zuerst wäre eine Trennung der hinzugefügten *STRINGS*, um den Platz des Buffers optimal auszunutzen, vorgesehen. Da aber durch das Read() eines Files 255 Zeichen lange *STRINGS* gelesen werden, mit der einzigen Ausnahmen am Ende einer Zeile, und da die Implementierung noch Fehler beinhaltete, wurde diese Behandlung wieder gestrichen.

Beim Lesen der Datei wird jede Zeile zuerst in den LineBuffer eingelesen und dann beim Schreiben skaliert, indem entweder jedes x-te Zeichen geschrieben wird oder jedes Zeichen x-mal geschrieben wird.

Die Skalierung in Y Richtung funktioniert ähnlich, nur statt Zeichen werden ganze Zeilen ansgelassen oder vervielfacht.

Eingabe Parameter werden durchlaufen und mit mehreren Verzweigungen überprüft um die Optionalität und Reihenfolge der einzelnen Parametern zu gewärleisten. Falls das Programm falsch aufgerufen wird, wird eine Help Ausgabe angezeigt um den User über die richtige Verwendung zu informieren.

Die Tests sind in einem shell Script geschrieben und mit folgendem Befehl ausgeführt.

```
./TestScale.sh &> ./TestScaleOutput.txt
```

Durch die 9-fache Skalierung entstehen leider sehr große und unübersichtliche Ergebnisse, welche dennoch in diesem Dokument sind, um alle Ergebnisse zu zeigen.

1.2 Souce Code

1.2.1 ULineBuffer.pas

```

UNIT ULineBuffer;

INTERFACE

TYPE
  LineBufferPrt = ^LineBufferNode;
  LineBufferNode = RECORD
    buffer : STRING;
    next : LineBufferPrt;
  END;
  LineBuffer = ^LineBufferNode;

PROCEDURE InitLineBuffer(VAR lb: LineBuffer);
PROCEDURE DisposeLineBuffer(VAR lb: LineBuffer);
PROCEDURE ClearLineBuffer(VAR lb: LineBuffer);
PROCEDURE AppendToLineBuffer(VAR lb: LineBuffer; line: STRING);
PROCEDURE WriteLineBuffer(VAR outFile: TEXT; VAR lb: LineBuffer; scale:
 ↪  INTEGER);

IMPLEMENTATION

PROCEDURE InitLineBuffer(VAR lb: LineBuffer);
BEGIN (* InitLineBuffer *)
  NEW(lb);
  lb^.buffer := '';
  lb^.next := NIL;
END; (* InitLineBuffer *)

PROCEDURE DisposeLineBuffer(VAR lb: LineBuffer);
VAR
  next: LineBufferPrt;
BEGIN (* DisposeLineBuffer *)
  WHILE (lb <> NIL) DO
    BEGIN (* WHILE *)
      next := lb^.next;
      DISPOSE(lb);
      lb := next;
    END; (* WHILE *)
END; (* DisposeLineBuffer *)

PROCEDURE ClearLineBuffer(VAR lb: LineBuffer);
VAR
  temp, next: LineBufferPrt;
```

```
BEGIN (* ClearLineBuffer *)
  temp := lb^.next;

  WHILE (temp <> NIL) DO
    BEGIN (* WHILE *)
      next := temp^.next;
      DISPOSE(temp);
      temp := next;
    END; (* WHILE *)

  lb^.buffer := '';
  lb^.next := NIL;
END; (* ClearLineBuffer *)

PROCEDURE AppendToLineBuffer(VAR lb: LineBuffer; line: STRING);
VAR
  prev, newNode: LineBufferPrt;
BEGIN (* AppendToLineBuffer *)
  prev := lb;

  WHILE (prev^.next <> NIL) DO
    BEGIN (* WHILE *)
      prev := prev^.next;
    END; (* WHILE *)

  IF (prev^.buffer = '') THEN
    BEGIN (* IF *)
      prev^.buffer := line;
    END (* IF *)
  ELSE
    BEGIN (* ELSE *)
      NEW(newNode);
      newNode^.next := NIL;
      newNode^.buffer := line;
      prev^.next := newNode;
    END; (* ELSE *)
END;

PROCEDURE WriteScaledLine(VAR outFile: TEXT; line: STRING; scale:
 ↪  INTEGER; VAR countModScale: INTEGER);
VAR
  i, j: INTEGER;
BEGIN (* WriteScaledLine *)
  FOR i := 1 TO Length(line) DO
    BEGIN (* FOR *)
      IF (scale > 0) THEN
        BEGIN (* IF *)
```

```
          FOR j := 1 TO scale DO
            BEGIN (* FOR *)
              write(outFile, line[i]);
            END; (* FOR *)
        END (* IF *)
      ELSE
        IF ((countModScale MOD scale) = 0) THEN
          BEGIN (* ELSE IF *)
            write(outFile, line[i]);
          END; (* ELSE IF *)

      countModScale := (countModScale + 1) MOD scale;
    END; (* FOR *)
END; (* WriteScaledLine *)

PROCEDURE WriteLineBuffer(VAR outFile: TEXT; VAR lb: LineBuffer; scale: INTEGER);
VAR
  temp: LineBufferPrt;
  countModScale: INTEGER;
BEGIN (* WriteLineBuffer *)
  temp := lb;
  countModScale := 0;

  WHILE (temp <> NIL) DO
    BEGIN (* WHILE *)
      IF (scale = 1) THEN
        BEGIN (* IF *)
          write(outFile, temp^.buffer);
        END (* IF *)
      ELSE
        BEGIN (* ELSE *)
          WriteScaledLine(outFile, temp^.buffer, scale, countModScale)
        END; (* ELSE *)

      temp := temp^.next;
    END; (* WHILE *)

  writeln(outFile);
END; (* WriteLineBuffer *)

END.
```

1.2.2 Scale.pas

```
PROGRAM Scale;

USES
```

```pascal
ULineBuffer;

PROCEDURE ScaleFile(VAR inFile, outFile: TEXT; scaleX, scaleY: INTEGER);
VAR
  lb: LineBuffer;
  s: STRING;
  countModScale, i: INTEGER;
BEGIN (* ScaleFile *)
  countModScale := 0;
  InitLineBuffer(lb);

  WHILE NOT EOF(inFile) DO
    BEGIN (* WHILE *)
      WHILE NOT EOLN(inFile) DO
        BEGIN (* WHILE *)
          Read(inFile, s);
          AppendToLineBuffer(lb, s);
        END;

      IF (scaleY > 0) THEN
        BEGIN (* IF *)
          FOR i := 1 TO scaleY DO
            BEGIN (* FOR *)
              WriteLineBuffer(outFile, lb, scaleX);
            END; (* FOR *)
        END (* IF *)
      ELSE
        IF (countModScale MOD scaleY = 0) THEN
          BEGIN (* ELSE IF *)
            WriteLineBuffer(outFile, lb, scaleX);
          END; (* ELSE IF *)

      ClearLineBuffer(lb);
      ReadLn(inFile);
      countModScale := (countModScale + 1) MOD scaleY;
    END; (* WHILE *)

  DisposeLineBuffer(lb);
END; (* ScaleFile *)

PROCEDURE ShowHelp;
BEGIN (* ShowHelp *)
  WriteLn('Usage: Scale [OPTION] inFile outFile');
  WriteLn('   inFile: input file.');
  WriteLn('   outFile: output file.');
  WriteLn('   -x sx: scale in the x direction. Default 1. Allowed values:
   ↪  -9 to -2, 2 to 9.');
  WriteLn('   -y sy: scale in the y direction. Default 1. Allowed values: -9 to -2, 2 to 9.');
  WriteLn('   --help: display this help and exit.');
END; (* ShowHelp *)

PROCEDURE GetParameters(VAR scaleX, scaleY: INTEGER; VAR inFileName, outFileName: STRING);
VAR
  xSet, ySet, inFileSet, outFileSet: BOOLEAN;
  i, errorCode: INTEGER;
BEGIN (* GetParameters *)
  scaleX := 1;
  scaleY := 1;
  xSet := FALSE;
  ySet := FALSE;
  inFileSet := FALSE;
  outFileSet := FALSE;
  i := 1;

  IF (ParamCount < 2) OR (ParamStr(1) = '--help') THEN
    BEGIN (* IF *)
      ShowHelp();
      HALT(1);
    END; (* IF *)

  WHILE (i <= ParamCount) DO
    BEGIN (* WHILE *)
      IF ((NOT xSet) AND ((i + 1) < ParamCount) AND (ParamStr(i) = '-x')) THEN
        BEGIN (* IF *)
          Val(ParamStr(i + 1), scaleX, errorCode);

          IF ((errorCode <> 0) OR (scaleX < -9) OR (scaleX > 9) OR (scaleX = 0)) THEN
            BEGIN (* IF *)
              WriteLn(StdErr, 'Invalid scale value for x direction.');
              ShowHelp();
              HALT(1);
            END; (* IF *)

          xSet := TRUE;
          i := i + 2;
        END (* IF *)
      ELSE
        IF ((NOT ySet) AND ((i +1) < ParamCount) AND (ParamStr(i) = '-y')) THEN
          BEGIN (* ELSE IF *)
```

```
            Val(ParamStr(i + 1), scaleY, errorCode);

            IF ((errorCode <> 0) OR (scaleY < -9) OR (scaleY > 9) OR
            ↪  (scaleY = 0)) THEN
              BEGIN (* IF *)
                WriteLn(StdErr, 'Invalid scale value for y direction.');
                ShowHelp();
                HALT(1);
              END; (* IF *)

            ySet := TRUE;
            i := i + 2;
          END (* ELSE IF *)
      ELSE
        IF ((NOT inFileSet) AND (ParamStr(i) <> '-x') AND (ParamStr(i) <>
        ↪  '-y')) THEN
          BEGIN (* ELSE IF *)
            inFileName := ParamStr(i);
            inFileSet := TRUE;
            i := i + 1;
          END (* ELSE IF *)
      ELSE
        IF ((NOT outFileSet) AND (ParamStr(i) <> '-x') AND (ParamStr(i)
        ↪  <> '-y')) THEN
          BEGIN (* ELSE IF *)
            outFileName := ParamStr(i);
            outFileSet := TRUE;
            i := i + 1;
          END (* ELSE IF *)
      ELSE
        BEGIN (* ELSE *)
          ShowHelp();
          HALT(1);
        END; (* ELSE *)
    END;

  IF ((NOT inFileSet) OR (NOT outFileSet)) THEN
    BEGIN (* IF *)
      ShowHelp();
      HALT(1);
    END; (* IF *)
END; (* GetParameters *)

VAR
  inFile, outFile: TEXT;
  errorCode: WORD;
  scaleX, scaleY: INTEGER;
```

```pascal
  inFileName, outFileName: STRING;
BEGIN (* Scale *)
  GetParameters(scaleX, scaleY, inFileName, outFileName);

  Assign(inFile, inFileName);
  {$I-}
  Reset(inFile);
  {$I+}
  errorCode := IOResult;

  IF (errorCode <> 0) THEN
    BEGIN (* IF *)
      writeln(StdErr, 'Error while opening input file.');
      writeln(StdErr, 'Error code: ', errorCode);
      HALT(1);
    END; (* IF *)

  Assign(outFile, outFileName);
  {$I-}
  Rewrite(outFile);
  {$I+}
  errorCode := IOResult;

  IF (errorCode <> 0) THEN
    BEGIN (* IF *)
      writeln(StdErr, 'Error while opening output file.');
      writeln(StdErr, 'Error code: ', errorCode);
      HALT(1);
    END; (* IF *)

  ScaleFile(inFile, outFile, scaleX, scaleY);

  WriteLn('File scaled successfully.');

  Close(inFile);
  Close(outFile);
END. (* Scale *)
```

1.3 Tests

1.3.1 Testskript

```
echo "No parameters"
bin/Scale

echo ""
echo "No optional parameters"
bin/Scale TestFiles/baseAsciiArt.txt ResultFiles/scaledAsciiArt.txt

echo ""
echo "X optional parameter"
bin/Scale -x 1 TestFiles/baseAsciiArt.txt ResultFiles/scaledAsciiArt.txt

echo ""
echo "Y optional parameter"
bin/Scale -y 1 TestFiles/baseAsciiArt.txt ResultFiles/scaledAsciiArt.txt

echo ""
echo "X and Y optional parameters"
bin/Scale -x 1 -y 1 TestFiles/baseAsciiArt.txt
↪ ResultFiles/scaledAsciiArt.txt

echo ""
echo "Y and X optional parameters"
bin/Scale -y 1 -x 1 TestFiles/baseAsciiArt.txt
↪ ResultFiles/scaledAsciiArt.txt

echo ""
echo "X and Y optional parameters with different signs"
bin/Scale -y +1 -x -1 TestFiles/baseAsciiArt.txt
↪ ResultFiles/scaledAsciiArt.txt

echo ""
echo "Wrong optional parameter"
bin/Scale -z 1 TestFiles/baseAsciiArt.txt ResultFiles/scaledAsciiArt.txt

echo ""
echo "Too many optional parameters"
bin/Scale -x 1 -y 1 -x 1 TestFiles/baseAsciiArt.txt
↪ ResultFiles/scaledAsciiArt.txt

echo ""
echo "No file parameters"
bin/Scale -x 1 -y 1

echo ""
echo "One file parameter"
bin/Scale -x 1 -y 1 ResultFiles/baseAsciiArt.txt

echo ""
echo "Invalid input file"
bin/Scale -x 1 -y 1 invalidFile ResultFiles/scaledAsciiArt.txt

echo ""
echo "X = 0"
bin/Scale -x 0 TestFiles/baseAsciiArt.txt ResultFiles/scaledAsciiArt.txt

echo ""
echo "X = 10"
bin/Scale -x 10 TestFiles/baseAsciiArt.txt ResultFiles/scaledAsciiArt.txt

echo ""
echo "X = -10"
bin/Scale -x -10 TestFiles/baseAsciiArt.txt
 ↪  ResultFiles/scaledAsciiArt.txt

echo ""
echo "Y = 0"
bin/Scale -y 0 TestFiles/baseAsciiArt.txt ResultFiles/scaledAsciiArt.txt

echo ""
echo "Y = 10"
bin/Scale -y 10 TestFiles/baseAsciiArt.txt ResultFiles/scaledAsciiArt.txt

echo ""
echo "Y = -10"
bin/Scale -y -10 TestFiles/baseAsciiArt.txt
 ↪  ResultFiles/scaledAsciiArt.txt

echo ""
echo "X = 1, Y = 1"
bin/Scale TestFiles/testfile2.txt ResultFiles/resultfile2.txt

echo ""
echo "X = 2, Y = 1"
bin/Scale -x 2 TestFiles/testfile2.txt ResultFiles/resultfile2+x.txt

echo ""
echo "X = 1, Y = 2"
bin/Scale -y 2 TestFiles/testfile2.txt ResultFiles/resultfile2+y.txt

echo ""
echo "X = 2, Y = 2"
```

```
bin/Scale -x 2 -y 2 TestFiles/testfile2.txt ResultFiles/resultfile2+xy.txt

echo ""
echo "Y = 2, X = 2"
bin/Scale -y 2 -x 2 TestFiles/testfile2.txt ResultFiles/resultfile2+yx.txt

echo ""
echo "X = -2, Y = 1"
bin/Scale -x -2 TestFiles/testfile2.txt ResultFiles/resultfile2-x.txt

echo ""
echo "X = 1, Y = -2"
bin/Scale -y -2 TestFiles/testfile2.txt ResultFiles/resultfile2-y.txt

echo ""
echo "X = -2, Y = -2"
bin/Scale -x -2 -y -2 TestFiles/testfile2.txt ResultFiles/resultfile2-xy.txt

echo ""
echo "Y = -2, X = -2"
bin/Scale -y -2 -x -2 TestFiles/testfile2.txt ResultFiles/resultfile2-yx.txt

echo ""
echo "X = 2, Y = -2"
bin/Scale -x 2 -y -2 TestFiles/testfile2.txt ResultFiles/resultfile2+x-y.txt

echo ""
echo "X = -2, Y = 2"
bin/Scale -x -2 -y 2 TestFiles/testfile2.txt ResultFiles/resultfile2-x+y.txt

echo ""
echo "Y = 2, X = -2"
bin/Scale -y 2 -x -2 TestFiles/testfile2.txt ResultFiles/resultfile2+y-x.txt

echo ""
echo "Y = -2, X = 2"
bin/Scale -y -2 -x 2 TestFiles/testfile2.txt ResultFiles/resultfile2-y+x.txt

echo ""
echo "Scale by -9"
bin/Scale -x -9 -y -9 TestFiles/testfile9.txt
 ↪  ResultFiles/resultfile-9.txt

echo ""
echo "Scale by -8"
bin/Scale -x -8 -y -8 TestFiles/testfile8.txt
 ↪  ResultFiles/resultfile-8.txt

echo ""
echo "Scale by -7"
bin/Scale -x -7 -y -7 TestFiles/testfile7.txt
 ↪  ResultFiles/resultfile-7.txt

echo ""
echo "Scale by -6"
bin/Scale -x -6 -y -6 TestFiles/testfile6.txt
 ↪  ResultFiles/resultfile-6.txt

echo ""
echo "Scale by -5"
bin/Scale -x -5 -y -5 TestFiles/testfile5.txt
 ↪  ResultFiles/resultfile-5.txt

echo ""
echo "Scale by -4"
bin/Scale -x -4 -y -4 TestFiles/testfile4.txt
 ↪  ResultFiles/resultfile-4.txt

echo ""
echo "Scale by -3"
bin/Scale -x -3 -y -3 TestFiles/testfile3.txt
 ↪  ResultFiles/resultfile-3.txt

echo ""
echo "Scale by 3"
bin/Scale -x 3 -y 3 TestFiles/testfile3.txt ResultFiles/resultfile3.txt

echo ""
echo "Scale by 4"
bin/Scale -x 4 -y 4 TestFiles/testfile4.txt ResultFiles/resultfile4.txt

echo ""
echo "Scale by 5"
bin/Scale -x 5 -y 5 TestFiles/testfile5.txt ResultFiles/resultfile5.txt

echo ""
echo "Scale by 6"
bin/Scale -x 6 -y 6 TestFiles/testfile6.txt ResultFiles/resultfile6.txt

echo ""
echo "Scale by 7"
bin/Scale -x 7 -y 7 TestFiles/testfile7.txt ResultFiles/resultfile7.txt

echo ""
echo "Scale by 8"
bin/Scale -x 8 -y 8 TestFiles/testfile8.txt ResultFiles/resultfile8.txt

echo ""
echo "Scale by 9"
bin/Scale -x 9 -y 9 TestFiles/testfile9.txt ResultFiles/resultfile9.txt

echo ""
echo "BIG FILE"
bin/Scale -x 9 -y 9 TestFiles/reallyBigFile.txt
 ↪  ResultFiles/reallyBigFile.txt
```

1.3.2 baseAsciiArt.txt

Listing 1: baseAsciiArt.txt

```
##################################################################################
                                                    .--.
                                                    `.  \
                                                      \  \
                                                       .  \
                                                       :   .
                                                       |    .
                                                       |    :
                                                       |    |
   ..._   ___                                          |    |
  `."".`''''""--..___                                  |    |
 ,-\  \             ""-...__         _________________/     |
 / ` " '                    `""""""""                       .
 \                                                           L
 (>                                                            \
/                                                               \
\_    ___..---.                                                  L
  `--'         '.                                                 \
                 .                                                  \_
                _/`.                                                   `.._
              .'    -.
`.
            /     __.-Y     /''''''-...___,...--------.._
|
           /   _."    |    /                '  .     \   '---..._
|
          /   /      /    /               _,.   '    ,/
|   |
          \_,'     _.'   /              /''     _,-'             _|
|
                  '     /               `-----"                  /
|
                  `...-'                                         `...-'
##################################################################################
```

1.3.3 testfile2.txt

Listing 2: testfile2.txt

```
X.X.X.X.X.X.X.
 . . . . . . . . . . . . . .
X.X.X.X.X.X.X.
 . . . . . . . . . . . . . .
X.X.X.X.X.X.X.
 . . . . . . . . . . . . . .
```

```
X.X.X.X.X.X.X.
..............
X.X.X.X.X.X.X.
..............
X.X.X.X.X.X.X.
..............
X.X.X.X.X.X.X.
..............
```

1.3.4 testfile3.txt

Listing 3: testfile3.txt

```
X..X..
......
......
X..X..
......
......
```

1.3.5 testfile4.txt

Listing 4: testfile4.txt

```
X...X...
........
........
........
X...X...
........
........
........
```

1.3.6 testfile5.txt

Listing 5: testfile5.txt

```
X....X....
..........
..........
..........
..........
X....X....
..........
..........
..........
..........
```

1.3.7 testfile6.txt

Listing 6: testfile6.txt

```
X.....X.....
```

```
............
............
............
............
............
X.....X.....
............
............
............
............
............
```

1.3.8 testfile7.txt

Listing 7: testfile7.txt

```
X......X......
..............
..............
..............
..............
..............
..............
X......X......
..............
..............
..............
..............
..............
..............
```

1.3.9 testfile8.txt

Listing 8: testfile8.txt

```
X.......X.......
................
................
................
................
................
................
................
X.......X.......
................
................
................
................
................
................
```

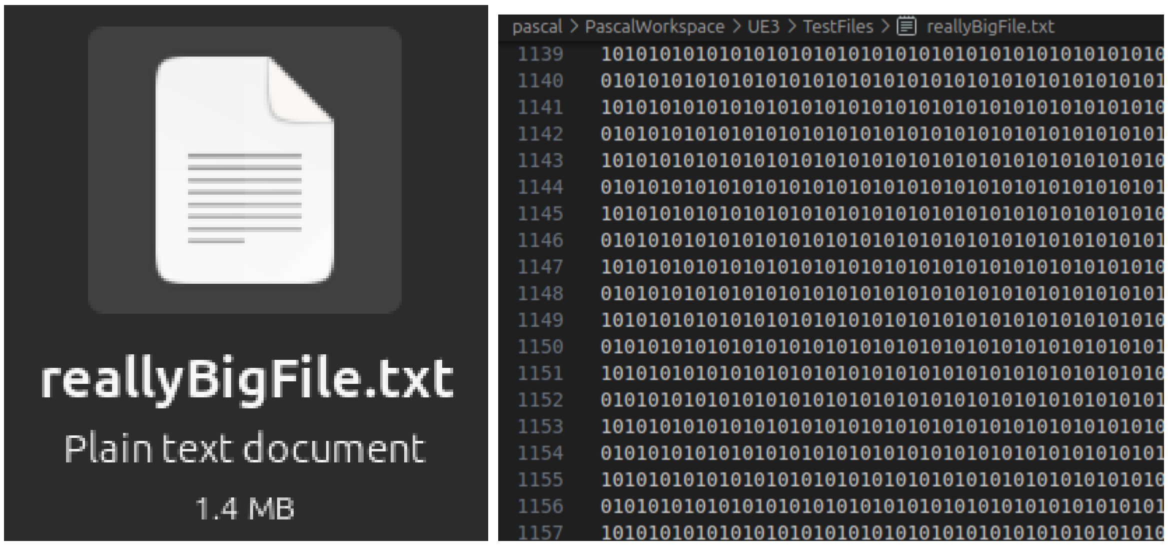
```
.................
```

1.3.10 testfile9.txt

Listing 9: testfile9.txt

```
X........X........
..................
..................
..................
..................
..................
..................
..................
..................
X........X........
..................
..................
..................
..................
..................
..................
..................
..................
```

1.3.11 reallyBigFile.txt



reallyBigFile.txt
Plain text document
1.4 MB

pascal > PascalWorkspace > UE3 > TestFiles > reallyBigFile.txt

```
101010101010101010101010101010101010101010101010
010101010101010101010101010101010101010101010101
101010101010101010101010101010101010101010101010
010101010101010101010101010101010101010101010101
101010101010101010101010101010101010101010101010
010101010101010101010101010101010101010101010101
101010101010101010101010101010101010101010101010
010101010101010101010101010101010101010101010101
101010101010101010101010101010101010101010101010
010101010101010101010101010101010101010101010101
101010101010101010101010101010101010101010101010
010101010101010101010101010101010101010101010101
101010101010101010101010101010101010101010101010
010101010101010101010101010101010101010101010101
101010101010101010101010101010101010101010101010
010101010101010101010101010101010101010101010101
101010101010101010101010101010101010101010101010
010101010101010101010101010101010101010101010101
101010101010101010101010101010101010101010101010
```

Abbildung 1: Ausschnitt der Testdatei "reallyBigFile.txt"

1.4 Testergebnisse

1.4.1 Ausgabe des Testskripts

Listing 10: TestScaleOutput.txt

```
No parameters
Usage: Scale [OPTION] inFile outFile
   inFile: input file.
   outFile: output file.
   -x sx: scale in the x direction. Default 1. Allowed values: -9 to -2, 2
   -y sy: scale in the y direction. Default 1. Allowed values: -9 to -2, 2
   --help: display this help and exit.

No optional parameters
File scaled successfully.

X optional parameter
File scaled successfully.

Y optional parameter
File scaled successfully.

X and Y optional parameters
File scaled successfully.

Y and X optional parameters
File scaled successfully.

X and Y optional parameters with different signs
File scaled successfully.

Wrong optional parameter
Usage: Scale [OPTION] inFile outFile
   inFile: input file.
   outFile: output file.
   -x sx: scale in the x direction. Default 1. Allowed values: -9 to -2, 2
   -y sy: scale in the y direction. Default 1. Allowed values: -9 to -2, 2
   --help: display this help and exit.

Too many optional parameters
Usage: Scale [OPTION] inFile outFile
   inFile: input file.
   outFile: output file.
   -x sx: scale in the x direction. Default 1. Allowed values: -9 to -2, 2
   -y sy: scale in the y direction. Default 1. Allowed values: -9 to -2, 2
   --help: display this help and exit.
```

```
No file parameters
Usage: Scale [OPTION] inFile outFile
   inFile: input file.
   outFile: output file.
   -x sx: scale in the x direction. Default 1. Allowed values: -9 to -2, 2
   -y sy: scale in the y direction. Default 1. Allowed values: -9 to -2, 2
   --help: display this help and exit.

One file parameter
Usage: Scale [OPTION] inFile outFile
   inFile: input file.
   outFile: output file.
   -x sx: scale in the x direction. Default 1. Allowed values: -9 to -2, 2
   -y sy: scale in the y direction. Default 1. Allowed values: -9 to -2, 2
   --help: display this help and exit.

Invalid input file
Error while opening input file.
Error code: 2

X = 0
Usage: Scale [OPTION] inFile outFile
   inFile: input file.
   outFile: output file.
   -x sx: scale in the x direction. Default 1. Allowed values: -9 to -2, 2
   -y sy: scale in the y direction. Default 1. Allowed values: -9 to -2, 2
   --help: display this help and exit.
Invalid scale value for x direction.

X = 10
Usage: Scale [OPTION] inFile outFile
   inFile: input file.
   outFile: output file.
   -x sx: scale in the x direction. Default 1. Allowed values: -9 to -2, 2
   -y sy: scale in the y direction. Default 1. Allowed values: -9 to -2, 2
   --help: display this help and exit.
Invalid scale value for x direction.

X = -10
Usage: Scale [OPTION] inFile outFile
   inFile: input file.
   outFile: output file.
   -x sx: scale in the x direction. Default 1. Allowed values: -9 to -2, 2
   -y sy: scale in the y direction. Default 1. Allowed values: -9 to -2, 2
   --help: display this help and exit.
Invalid scale value for x direction.
```

```
Y = 0
Usage: Scale [OPTION] inFile outFile
   inFile: input file.
   outFile: output file.
   -x sx: scale in the x direction. Default 1. Allowed values: -9 to -2, 2
   -y sy: scale in the y direction. Default 1. Allowed values: -9 to -2, 2
   --help: display this help and exit.
Invalid scale value for y direction.

Y = 10
Usage: Scale [OPTION] inFile outFile
   inFile: input file.
   outFile: output file.
   -x sx: scale in the x direction. Default 1. Allowed values: -9 to -2, 2
   -y sy: scale in the y direction. Default 1. Allowed values: -9 to -2, 2
   --help: display this help and exit.
Invalid scale value for y direction.

Y = -10
Usage: Scale [OPTION] inFile outFile
   inFile: input file.
   outFile: output file.
   -x sx: scale in the x direction. Default 1. Allowed values: -9 to -2, 2
   -y sy: scale in the y direction. Default 1. Allowed values: -9 to -2, 2
   --help: display this help and exit.
Invalid scale value for y direction.

X = 1, Y = 1
File scaled successfully.

X = 2, Y = 1
File scaled successfully.

X = 1, Y = 2
File scaled successfully.

X = 2, Y = 2
File scaled successfully.

Y = 2, X = 2
File scaled successfully.

X = -2, Y = 1
File scaled successfully.

X = 1, Y = -2
File scaled successfully.
```

```
X = −2, Y = −2
 File scaled successfully.

Y = −2, X = −2
 File scaled successfully.

X = 2, Y = −2
 File scaled successfully.

X = −2, Y = 2
 File scaled successfully.

Y = 2, X = −2
 File scaled successfully.

Y = −2, X = 2
 File scaled successfully.

 Scale by −9
 File scaled successfully.

 Scale by −8
 File scaled successfully.

 Scale by −7
 File scaled successfully.

 Scale by −6
 File scaled successfully.

 Scale by −5
 File scaled successfully.

 Scale by −4
 File scaled successfully.

 Scale by −3
 File scaled successfully.

 Scale by 3
 File scaled successfully.

 Scale by 4
 File scaled successfully.

 Scale by 5
```

```
File scaled successfully.

Scale by 6
File scaled successfully.

Scale by 7
File scaled successfully.

Scale by 8
File scaled successfully.

Scale by 9
File scaled successfully.
```

BIG FILE

```
File scaled successfully.
```

1.4.2 scaledAsciiArt.txt

Listing 11: scaledAsciiArt.txt

```
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|
                   '     /               `-----"                /
|
                   `..-'                                        `..-'
###########################################################################
```

1.4.3 resultfile2.txt

Listing 12: resultfile2.txt

```
X.X.X.X.X.X.X.
 . . . . . . .
X.X.X.X.X.X.X.
 . . . . . . .
X.X.X.X.X.X.X.
 . . . . . . .
```

```
X.X.X.X.X.X.X.
..............
X.X.X.X.X.X.X.
..............
X.X.X.X.X.X.X.
..............
X.X.X.X.X.X.X.
..............
```

1.4.4 resultfile2+x.txt

Listing 13: resultfile2+x.txt

```
XX..XX..XX..XX..XX..XX..XX..
............................
XX..XX..XX..XX..XX..XX..XX..
............................
XX..XX..XX..XX..XX..XX..XX..
............................
XX..XX..XX..XX..XX..XX..XX..
............................
XX..XX..XX..XX..XX..XX..XX..
............................
XX..XX..XX..XX..XX..XX..XX..
............................
XX..XX..XX..XX..XX..XX..XX..
............................
```

1.4.5 resultfile2+y.txt

Listing 14: resultfile2+y.txt

```
X.X.X.X.X.X.X.
X.X.X.X.X.X.X.
..............
..............
X.X.X.X.X.X.X.
X.X.X.X.X.X.X.
..............
..............
X.X.X.X.X.X.X.
X.X.X.X.X.X.X.
..............
..............
X.X.X.X.X.X.X.
X.X.X.X.X.X.X.
..............
..............
X.X.X.X.X.X.X.
X.X.X.X.X.X.X.
```

```
..............
..............
X.X.X.X.X.X.X.
X.X.X.X.X.X.X.
..............
..............
X.X.X.X.X.X.X.
X.X.X.X.X.X.X.
..............
..............
```

1.4.6 resultfile2+xy.txt

Listing 15: resultfile2+xy.txt

```
XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
............................
............................
XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
............................
............................
XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
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XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
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XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
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XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
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XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
............................
............................
```

1.4.7 resultfile2+yx.txt

Listing 16: resultfile2+yx.txt

```
XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
```

```
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............................
XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
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XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
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XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
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XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
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XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
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XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
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```

1.4.8 resultfile2-x.txt

Listing 17: resultfile2-x.txt

```
XXXXXXX
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XXXXXXX
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XXXXXXX
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XXXXXXX
.......
XXXXXXX
.......
XXXXXXX
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XXXXXXX
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```

1.4.9 resultfile2-y.txt

Listing 18: resultfile2-y.txt

```
X.X.X.X.X.X.X.
X.X.X.X.X.X.X.
X.X.X.X.X.X.X.
X.X.X.X.X.X.X.
X.X.X.X.X.X.X.
X.X.X.X.X.X.X.
X.X.X.X.X.X.X.
```

1.4.10 resultfile2-xy.txt

Listing 19: resultfile2-xy.txt

```
XXXXXXX
XXXXXXX
XXXXXXX
XXXXXXX
XXXXXXX
XXXXXXX
XXXXXXX
```

1.4.11 resultfile2-yx.txt

Listing 20: resultfile2-yx.txt

```
XXXXXXX
XXXXXXX
XXXXXXX
XXXXXXX
XXXXXXX
XXXXXXX
XXXXXXX
```

1.4.12 resultfile2+x-y.txt

Listing 21: resultfile2+x-y.txt

```
XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
```

1.4.13 resultfile2-x+y.txt

Listing 22: resultfile2-x+y.txt

```
XXXXXXX
XXXXXXX
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XXXXXXX
XXXXXXX
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```

1.4.14 resultfile2+y-x.txt

Listing 23: resultfile2+y-x.txt

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XXXXXXX
XXXXXXX
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XXXXXXX
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XXXXXXX
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XXXXXXX
XXXXXXX
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1.4.15 resultfile2-y+x.txt

Listing 24: resultfile2-y+x.txt

```
XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
XX..XX..XX..XX..XX..XX..XX..
```

1.4.16 resultfile-9.txt

Listing 25: resultfile-9.txt

```
XX
XX
```

1.4.17 resultfile-8.txt

Listing 26: resultfile-8.txt

```
XX
XX
```

1.4.18 resultfile-7.txt

Listing 27: resultfile-7.txt

```
XX
XX
```

1.4.19 resultfile-6.txt

Listing 28: resultfile-6.txt

```
XX
XX
```

1.4.20 resultfile-5.txt

Listing 29: resultfile-5.txt

```
XX
XX
```

1.4.21 resultfile-4.txt

Listing 30: resultfile-4.txt

```
XX
XX
```

1.4.22 resultfile-3.txt

Listing 31: resultfile-3.txt

```
XX
XX
```

1.4.23 resultfile3.txt

Listing 32: resultfile3.txt

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XXX......XXX......
XXX......XXX......
XXX......XXX......
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XXX......XXX......
XXX......XXX......
XXX......XXX......
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1.4.24 resultfile4.txt

Listing 33: resultfile4.txt

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1.4.25 resultfile5.txt

Listing 34: resultfile5.txt

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XXXXX....................XXXXX....................
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1.4.26 resultfile6.txt

Listing 35: resultfile6.txt

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1.4.27 resultfile7.txt

Listing 36: resultfile7.txt

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1.4.28 resultfile8.txt

Listing 37: resultfile8.txt

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1.4.29 resultfile9.txt

Listing 38: resultfile9.txt

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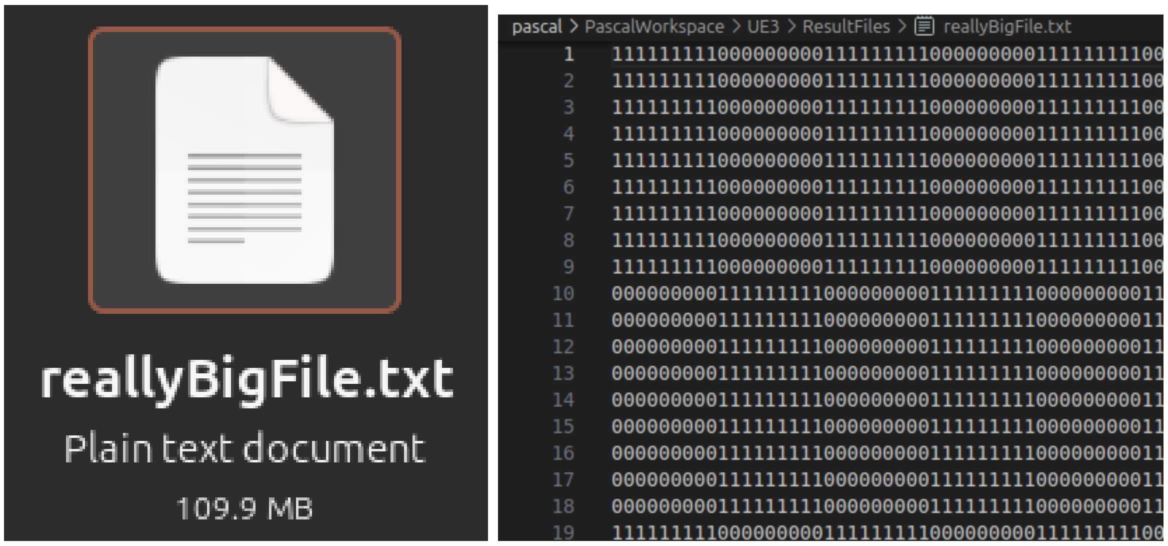
```

1.4.30 reallyBigFile.txt


reallyBigFile.txt
Plain text document
109.9 MB
pascal > PascalWorkspace > UE3 > ResultFiles > reallyBigFile.txt

```
11111111100000000011111111100000000011111111100
11111111100000000011111111100000000011111111100
11111111100000000011111111100000000011111111100
11111111100000000011111111100000000011111111100
11111111100000000011111111100000000011111111100
11111111100000000011111111100000000011111111100
11111111100000000011111111100000000011111111100
11111111100000000011111111100000000011111111100
11111111100000000011111111100000000011111111100
00000000011111111100000000011111111100000000011
00000000011111111100000000011111111100000000011
00000000011111111100000000011111111100000000011
00000000011111111100000000011111111100000000011
00000000011111111100000000011111111100000000011
00000000011111111100000000011111111100000000011
00000000011111111100000000011111111100000000011
00000000011111111100000000011111111100000000011
00000000011111111100000000011111111100000000011
11111111100000000011111111100000000011111111100
```

Abbildung 2: Ausschnitt der Ergebnisdatei "reallyBigFile.txt"