Barcode generator

About

This program generates a Code 39 barcode for a given string. In other words, it draws the appropriate sequences of bars and spaces into a bmp file. Additionally, the barcode contains a checksum.

Details of the task can be found in `task.pdf` file.

How to run

Put all the files in one folder. Run `Mars4_5.jar` program. Given that you have Java installed on your computer, MARS should launch.

1. Click `F3` to assemble and `F5` to run the program.
2. In the `Run I/O` window type the inputs requested.
3. A barcode will be generated in the `output.bmp` file.

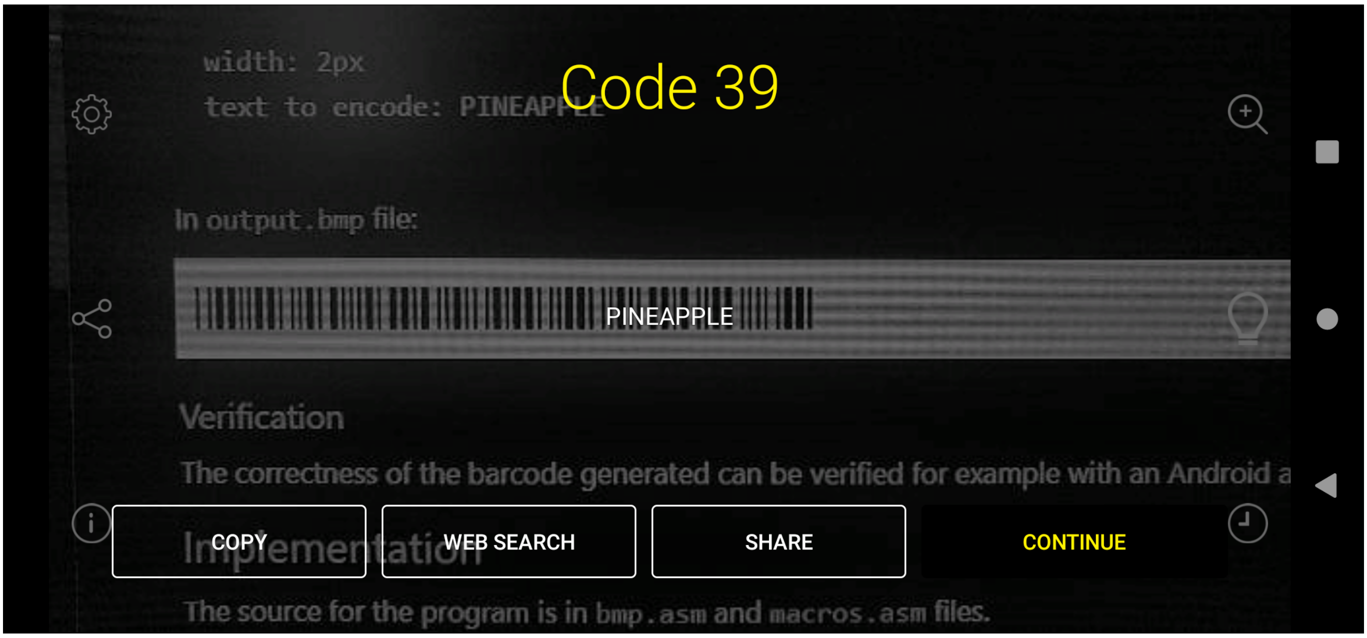
Sample run

Inputs:

```
width: 2px
text to encode: PINEAPPLE
```

In `output.bmp` file:

The correctness of the barcode generated can be verified for example with an Android app:



```
width: 2px
text to encode: PINEAPPLE
```

In output.bmp file:

PINEAPPLE

Verification

The correctness of the barcode generated can be verified for example with an Android a

Implementation

The source for the program is in bmp.asm and macros.asm files.

The `checksum` option must be enabled in a barcode scanner in order for the decoding to occur properly.

Implementation

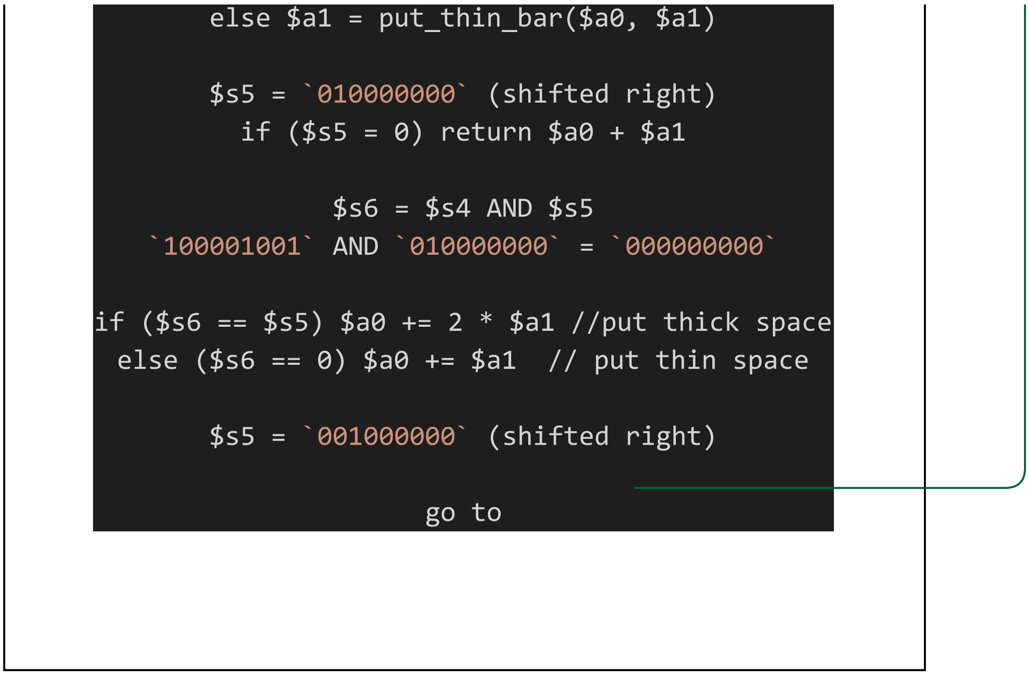
The source for the program is located in `bmp.asm` and `macros.asm` file and is written in Mips assembly language. The simplified logic of the core functions in pseudocode:

```
main

  $s1 - width of  narrowest bar

  text - text to encode

  for each character invoke the put_char function
```

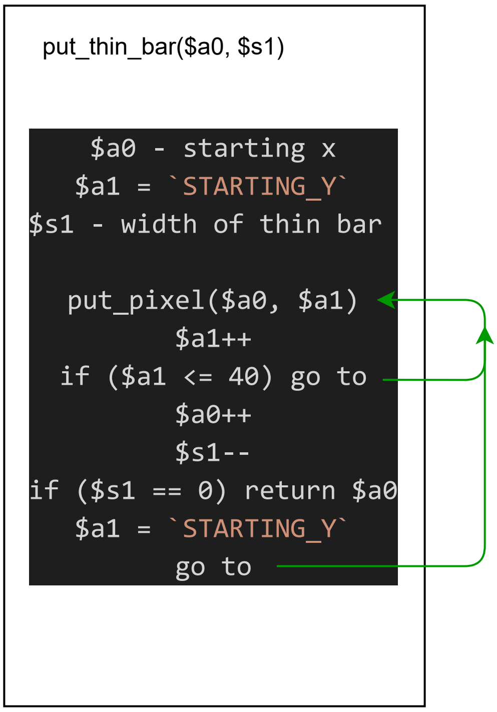
put_char ($a0, $a1, $a2)   draws bars and spaces for a given character

Algorithm with exemplary values

```
$a0 - starting x cordinate
$a1 - width of thin bar
$a2 - character to put

For example, when we want to put A:
in register $s4 we put sequence: `100001001`

$s3 - address of sequence of bits
$s4 = `100001001`
$s5 = `100000000`

$s6 = $s4 AND $s5
`100001001` AND `100000000` = `100000000`

if ($s6 == $s5) $a1 = put_thick_bar($a0, $a1)
```

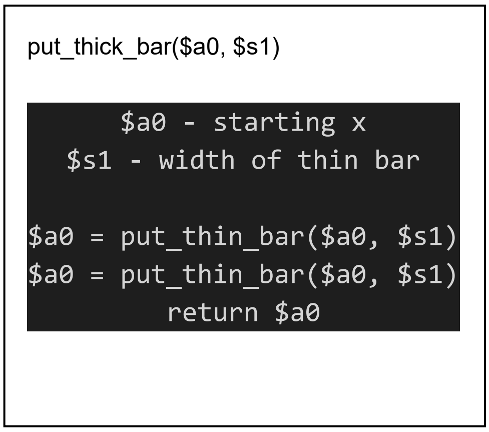


```
else $a1 = put_thin_bar($a0, $a1)

$s5 = `010000000` (shifted right)
  if ($s5 = 0) return $a0 + $a1

        $s6 = $s4 AND $s5
`100001001` AND `010000000` = `000000000`

if ($s6 == $s5) $a0 += 2 * $a1 //put thick space
 else ($s6 == 0) $a0 += $a1  // put thin space

$s5 = `001000000` (shifted right)

            go to
```



put_thin_bar($a0, $s1)

```
   $a0 - starting x
  $a1 = `STARTING_Y`
$s1 - width of thin bar

  put_pixel($a0, $a1)
        $a1++
  if ($a1 <= 40) go to
        $a0++
        $s1--
if ($s1 == 0) return $a0
  $a1 = `STARTING_Y`
        go to
```



put_thick_bar($a0, $s1)

```
    $a0 - starting x
  $s1 - width of thin bar

$a0 = put_thin_bar($a0, $s1)
$a0 = put_thin_bar($a0, $s1)
        return $a0
```