Programming 2 – Lab 6

Your task is to implement class **Picture** and a hierarchy of classes **Brush, ColorBrush** and **ColorPatternBrush**. Class **Picture** contains dynamically allocated array of strings. The picture itself is implemented as an array of strings – a single string represents a single line of an ASCII picture. All lines printed in a column one by one create a full picture. Example:

string arr1[] = {“ABC”, “DEF”};

string arr2[] = {“XOXO”, “OXOX”, “XOXO”, “OXOX”};

when printed should make:

ABC
DEF

XOXO
OXOX
XOXO
OXOX

Do not reimplement code unnecessarily, override only selected methods (in proper way).

Part 1 (2 points)

Implement the following in the **Picture** class:

- private method *void init(int, string*)* that allocates and initializes memory. First parameter indicates the size of the array to be allocated, second is an address of the array containing strings that need to be allocated. Do not make constructors etc.
- constructor – fills the height/description fields and initializes the array
- copy constructor
- operator=
- destructor
- operator<< -- prints the info about the picture (not the picture itself)

Constructors and operator= have to use the init method, do not repeat the code.

Part 2 (2 points)

Implement the following in the **Picture** class:

- operator[] – returns appropriate element of the signs string array depending on the parameter

Implement the following in the **Brush** class:

- constructor – fills the object with *name* and *picture*

- operator<< -- prints the info about the brush **and** the picture – use the already implemented picture operator
- *void paint()* – prints the picture string array to the console (match the example console output). Use the implemented index operator.

Part 3 (1 point)

Derive the class **ColorBrush** from **Brush** and implement the following in the **ColorBrush** class:

- constructor – set the *color* field and all the derived ones with base class constructor.
- *void getColor()* -- simple getter that returns the color field
- *void paint()* – prints the picture string array to the console with the specified color. Use the already implemented *void useColor(short)* method to set the color before printing and then use *void resetColor()* to set the color back to default after printing the picture

Part 4 (3 points)

Derive the class **ColorPatternBrush** from **ColorBrush** and implement the following in the **ColorPatternBrush** class:

- constructor – set the *alternateColor* and pattern fields (pattern is defined by two integers – *colorLength* and *alternateColorLength*) and all the derived ones with base class constructor.
- *void getAlternateColor()* -- simple getter that returns the other color field
- *void paint()* – prints the picture string array to the console with the specified color pattern. Use the same methods to set the console color. The pattern works as following: a number of signs (given in *colorLength*) is printed with the first *color*, then another number of signs (given in *alternateColorLength*) is printed with the *alternateColor* and then repeat the process. Example:

  picture: *string arr2[] = {"XOXO", "OXOX", "XOXO", "OXOX"};*
  color: *4* (blue)
  alternateColor: *2* (green)
  colorLength: *2*
  alternateColorLength: *1*

  Printing that array with the brush declared above should produce a pattern of 2 blue signs, and then 1 green sign:

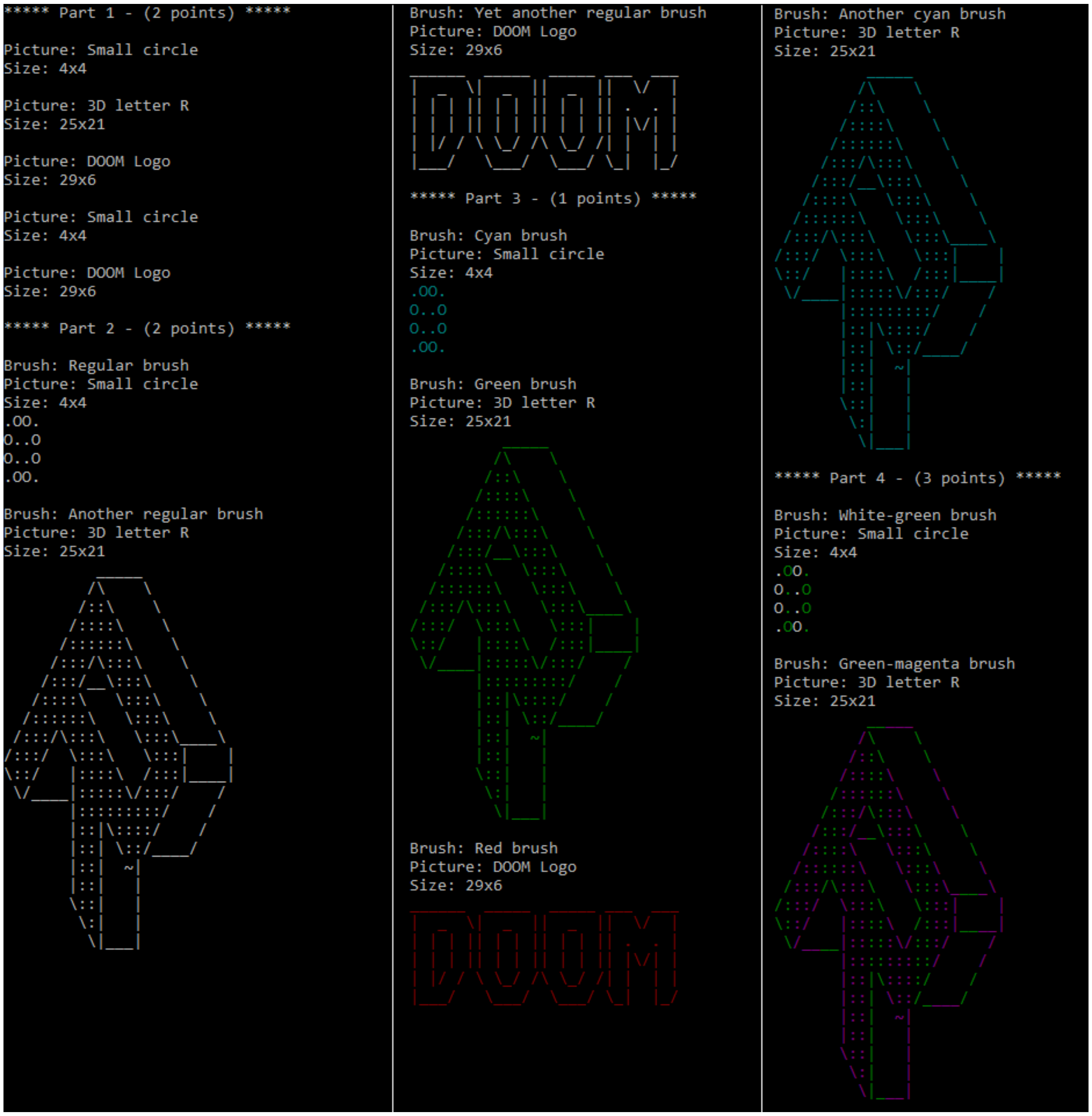
```
XOXO
OXOX
XOXO
OXOX
```

Additionally, implement the following in the **Brush** class:

- *void setPicture()*– changes the *picture* field of a brush. Note that it should work for all derived classes as well.

Please check the example output on the next pages of this document and make sure your program matches the output.

Example output



```
***** Part 1 - (2 points) *****

Picture: Small circle
Size: 4x4

Picture: 3D letter R
Size: 25x21

Picture: DOOM Logo
Size: 29x6

Picture: Small circle
Size: 4x4

Picture: DOOM Logo
Size: 29x6

***** Part 2 - (2 points) *****

Brush: Regular brush
Picture: Small circle
Size: 4x4
.OO.
O..O
O..O
.OO.

Brush: Another regular brush
Picture: 3D letter R
Size: 25x21
          _____
         /\    \
        /::\    \
       /::::\    \
      /::::::\    \
     /:::/\:::\    \
    /:::/__\:::\    \
   /::::\   \:::\    \
  /::::::\   \:::\    \
 /:::/\:::\   \:::\____\
/:::/  \:::\   \:::|    |
\::/   |::::\  /:::|____|
 \/____|:::::\/:::/    /
       |:::::::::/    /
       |::|\::::/    /
       |::| \::/____/
       |::|  ~|
       |::|   |
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        \:|   |
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Brush: Yet another regular brush
Picture: DOOM Logo
Size: 29x6
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|  _  \|  _  ||  _  ||  \/  |
| | | || | | || | | || .  . |
| | | || | | || | | || |\/| |
| |/ / \ \_/ /\ \_/ /| |  | |
|___/   \___/  \___/ \_|  |_/

***** Part 3 - (1 points) *****

Brush: Cyan brush
Picture: Small circle
Size: 4x4
.OO.
O..O
O..O
.OO.

Brush: Green brush
Picture: 3D letter R
Size: 25x21
          _____
         /\    \
        /::\    \
       /::::\    \
      /::::::\    \
     /:::/\:::\    \
    /:::/__\:::\    \
   /::::\   \:::\    \
  /::::::\   \:::\    \
 /:::/\:::\   \:::\____\
/:::/  \:::\   \:::|    |
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       |:::::::::/    /
       |::|\::::/    /
       |::| \::/____/
       |::|  ~|
       |::|   |
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        \:|   |
         \|___|

Brush: Red brush
Picture: DOOM Logo
Size: 29x6
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|  _  \|  _  ||  _  ||  \/  |
| | | || | | || | | || .  . |
| | | || | | || | | || |\/| |
| |/ / \ \_/ /\ \_/ /| |  | |
|___/   \___/  \___/ \_|  |_/

Brush: Another cyan brush
Picture: 3D letter R
Size: 25x21
          _____
         /\    \
        /::\    \
       /::::\    \
      /::::::\    \
     /:::/\:::\    \
    /:::/__\:::\    \
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***** Part 4 - (3 points) *****

Brush: White-green brush
Picture: Small circle
Size: 4x4
.OO.
O..O
O..O
.OO.

Brush: Green-magenta brush
Picture: 3D letter R
Size: 25x21
          _____
         /\    \
        /::\    \
       /::::\    \
      /::::::\    \
     /:::/\:::\    \
    /:::/__\:::\    \
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```

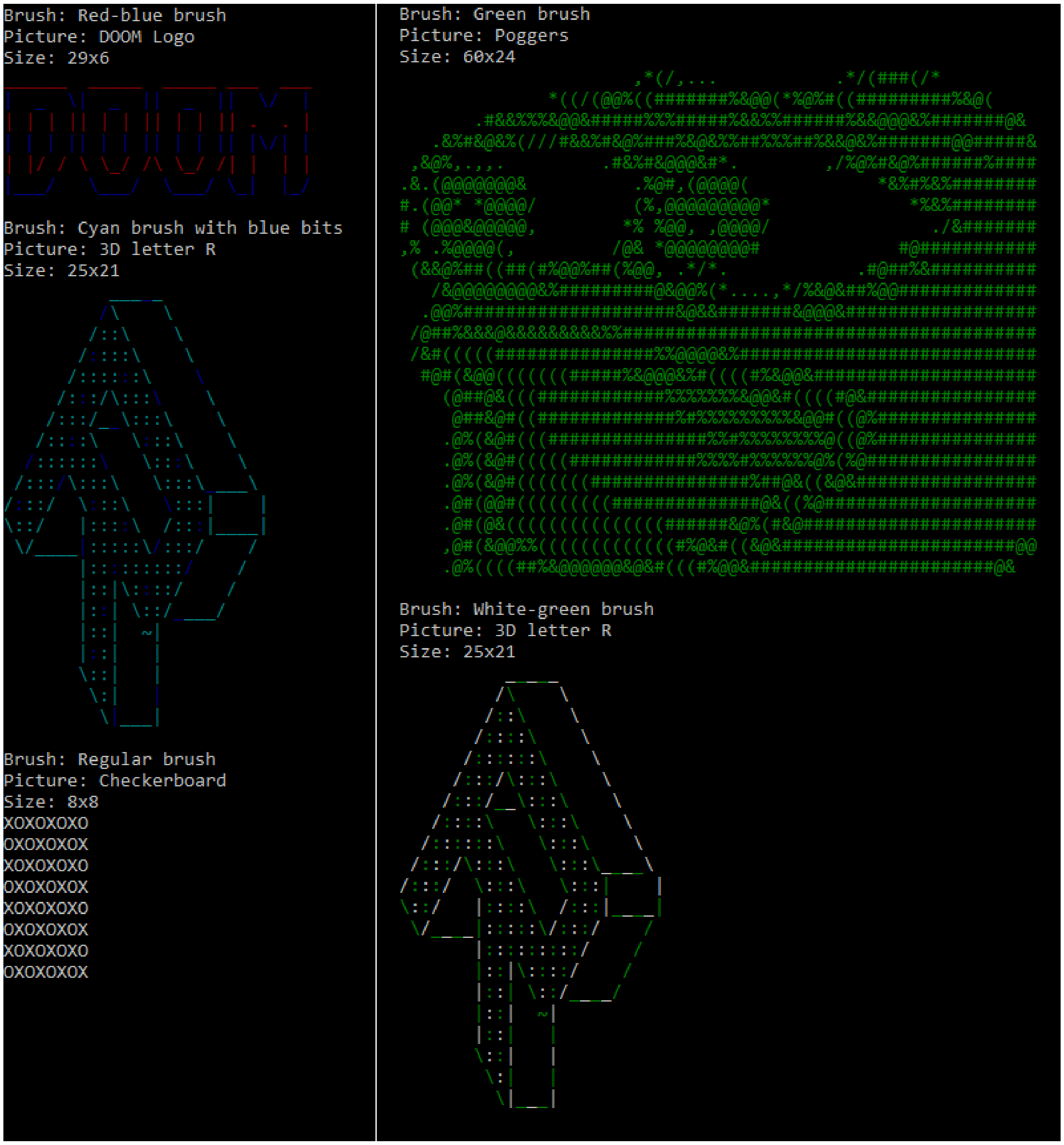

```
Brush: Red-blue brush
Picture: DOOM Logo
Size: 29x6
______  _____  _____ ___  ___
|  _  \|  _  ||  _  ||  \/  |
| | | || | | || | | || .  . |
| | | || | | || | | || |\/| |
| |/ / \ \_/ /\ \_/ /| |  | |
|___/   \___/  \___/ \_|  |_/

Brush: Cyan brush with blue bits
Picture: 3D letter R
Size: 25x21
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         /\    \
        /::\    \
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      /::::::\    \
     /:::/\:::\    \
    /:::/__\:::\    \
   /::::\   \:::\    \
  /::::::\   \:::\    \
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/:::/  \:::\   \:::|    |
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       |::| \::/____/
       |::|  ~|
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       \::|   |
        \:|   |
         \|___|

Brush: Regular brush
Picture: Checkerboard
Size: 8x8
XOXOXOXO
OXOXOXOX
XOXOXOXO
OXOXOXOX
XOXOXOXO
OXOXOXOX
XOXOXOXO
OXOXOXOX
```

```
Brush: Green brush
Picture: Poggers
Size: 60x24
                      ,*(/,...           .*/(###(/*
              *((/(@@%((#######%&@@(*%@%#((#########%&@(
       .#&&%%%&@@&#####%%#####%&&%%######%&&@@@&%########@&
   .&%#&@&%(///#&&%#&@%###%&@&%%##%%%##%&&@&%######@@######&
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   /&@@@@@@@@@&%#########@&@@%(*....,*/%&@&##%@@############
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    ,@#(&@@%%(((((((((((((#%@&#((&@&######################@@
    .@%((((##%&@@@@@@@&@&#(((#%@@&######################@&

Brush: White-green brush
Picture: 3D letter R
Size: 25x21
          _____
         /\    \
        /::\    \
       /::::\    \
      /::::::\    \
     /:::/\:::\    \
    /:::/__\:::\    \
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```