**PROGRAMMING FUNDAMENTALS**

**PROJECT REPORT**

MINI PROJECT 2



Date of Submission: 08/05/19

Time:

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| Class | Programming Fundamentals CSC103 (**BCE-2B**) |
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**Mini Project 2: Conway’s Game of Life**

**Purpose**

To develop a game using 2-Dimentional Arrays, Pointers and user defined Functions. The details are as under: -

* The Arrays can be **M**x**M** or any **M**x**N** 2-Dimentional Character Arrays.
* We can only fill the Array with 2 characters, either a space or an Asterix.
* User has the option to either Randomly generate an array having space or asterisk stored at each index or the user can manually enter the values in each index either a space or an asterisk.
* The Initial Generation is User generated or Randomly generated as the user desires.

**Rules of the Game for generating Next Generation.**

The Rules of the Game are as follows: -

* Any live cell with fewer than two live neighbors dies, as if by underpopulation.
* Any live cell with two or three live neighbors lives on to the next generation.
* Any live cell with more than three live neighbors dies, as if by overpopulation.
* Any dead cell with exactly three live neighbors becomes a live cell, as if by reproduction.

**Project Description**

1. In this Project, **Pointers, Functions, Arrays, if / else** Statements have been used.

2. Initially I created two 2-D Arrays, and filled one array with either a space or an asterisk, from user input or randomly, the second array is kept empty and is later used for next generation.

3. Both the arrays declared are given the same dimensions ‘m’ rows and ‘n’ columns which are user input.

4. I have filled the first array with either an asterisk or a space, using nested for loop in both the cases, i.e. Randomly generating or User input, I have used the ASCII of character space and asterisk in my code, space is 32 and asterisk is represented by 42.

5. Now after filling the first array, I created a function

‘void **next\_tick (char \* ptr\_prev, char \*ptr\_next, int m, int n)** ‘

to generate the next generation,

in my main program, I assigned the first index of my first array to the function, so that the ‘**char\*ptr\_prev’** points to the first index of my first array that is filled.

Here, **‘char\*ptr\_next’** points to the first index of the second array declared in the main function, **int m** is the number of rows the user gives and **int n** will be number of columns.

6. In my function I used **if/else** statements and **for loops** to calculate the number of asterisk that are in the neighborhood of each index, I have then checked the value in the index whose neighbors are calculated and then depending upon if the selected index whose neighbor are calculated is an **asterisk (live cell)** or a **space(dead cell)** then the rules using if/else statement are implemented and on the same index of the Second array that I declared in the main function, the new value of the next generation is stored, we add the new value to the second array using the pointer **“char\* ptr\_next”** that points to the second array in the main function.

7. Now when our function is completely run the first time, the values stored in the **Second Array** of the function are our new generation, now we will print the **Second Array** in our main function, after printing the **Second Array**, I have **swapped the values stored in second array to the values stored in First array,**

so that when the next time a new generation is to be calculated, the previous generation is the one which was the last generated generation.

8. Afterwards I have used asked the user to press **‘N’** or **‘n’** for printing next generation, and to end the simulation the user should press **‘q’** or **‘Q’**

9. As instructed in the Project pdf I have placed my Function in **“conways.c”** file and its prototype in **“conways.h”**, both the files are included in the zip folder.

10. I have also added the complete working program of my game in the folder, given there is an issue in running the **conways.c** or **conways.h** file.

**Working Program file is also inside the folder.**

**THE END**