Lab Report

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**Program Statement**

The goal of the programming assignment is to make a 2-dimensional array with several functions. The important functions are initializing array and flood fill. For flood fill, recursive should be used. The inputs to the program are numbers of columns rows, and character for initializing array. First output should print array from reading input.txt file. Afterwards, positions that flood fill occurred prints out. The array with flood occurred prints out. After user input, output should come out new size of array filled with new empty character. Error handling was not required at this assignment.

**Design**

First, starts with make a skeleton. Declare with board class. Constructor and destructor comes first. For get\_functions, there are get\_rows, get\_cols, get\_empty, and get\_board. For get\_board, it return to a value at specific position. For set function, there is a set\_board which after setting rows,cols and empty character, sets a whole array. For other major functions, print\_board,read\_board,write\_borad,initialize\_borad, and flood\_fill was written. For the private value, there are int Max\_rows and cols for maximum number for rows and columns. Int row and col declared for number of rows and columns for array. Char empty and char value was declared for empty character and value character that will be filled in empty. For last, 2-d array board with maximum number of rows and cols was delclared.

**Implementation**

After declaring class for board in header files, regarding cpp file was written next. For get functions, it returns to each Rows, Cols and Empty which were declared in private. For get\_board, two parameters were included to get a specific position regarding with parameters. For print functions, printing number of rows, cols and empty character was placed. For printing board, two for loop were used that one is inside of another. Cout was used for returning value from get\_board. Reading\_board and writing board was used with parameter of string filename. Fstream was used for both. getting in and getting out value from infile and outfile were similar to two for loop in print function. For initialize\_board function, parameter was included with number of rows and cols for new size of array and new empty character. Error checking was placed first. If the user input was bigger that maximum value that was declared in private, it returns. If not, private value for rows,cols and empty were equaled to parameter value. Two for loop was placed for setting new array. For last, flood function was written. For flood function, five parameter was included. Int row and col for recursive, irow and icol for initial place that flood started first. Char number was declared also for character for flood. Private Value was made equal to char number for flood character. Double radius was declared with 7, which is same as professor’s flood circle. For next, big If statement was used for checking whether the current recursived position is inside of circle. To do that, equation ((row - irow)^2) +((col - icol)^2) < (radius)^2 was used. For square, pow function was used. inside this loop, another if loop was used for terminating condition. If current position is equal to not empty, then it returns. After statement and setting board, four recursive function were placed. For going right and left, col was changed with col+1 for right, col -1 for left. For going top and bottom, row was changed with row+1 for top, row-1 for bottom.

**Testing**

First I started with reading file. after changing name other than input.txt, reading function returned correctly with proper cout statement. For flood function, it tested if flood was occurred with correct range of circle. If there is wall which is not empty character, flood returned correctly. If the flood occurring position is out of array, it did not occur anything. For testing initializing, I put number over 100 to check if it goes over maximum rows and cols. It returned correctly with printing initializing failed. Writing file was tested with different name other than output.txt. it failed to read with corred

**Conclusion**

The overall result of the assignment came out with correct output with few statements. Project worked successful. I want to try to make this assignment with coloring.