Engineering Computing

(CS3001)

Course Project

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Problem Statement:

Create board game and understand the problem-solving strategies.

Introduction:

The 15-puzzle (also called Gem Puzzle, Boss Puzzle, Game of Fifteen, Mystic Square and many others) is a sliding puzzle that consists of a frame of numbered square tiles in random order with one tile missing. The puzzle also exists in other sizes, particularly the smaller 8-puzzle. If the size is 3×3 tiles, the puzzle is called the 8-puzzle or 9-puzzle, and if 4×4 tiles, the puzzle is called the 15-puzzle or 16-puzzle named, respectively, for the number of tiles and the number of spaces. The object of the puzzle is to place the tiles in order by making sliding moves that use the empty space.

In this version I made 4×4 grid Game.

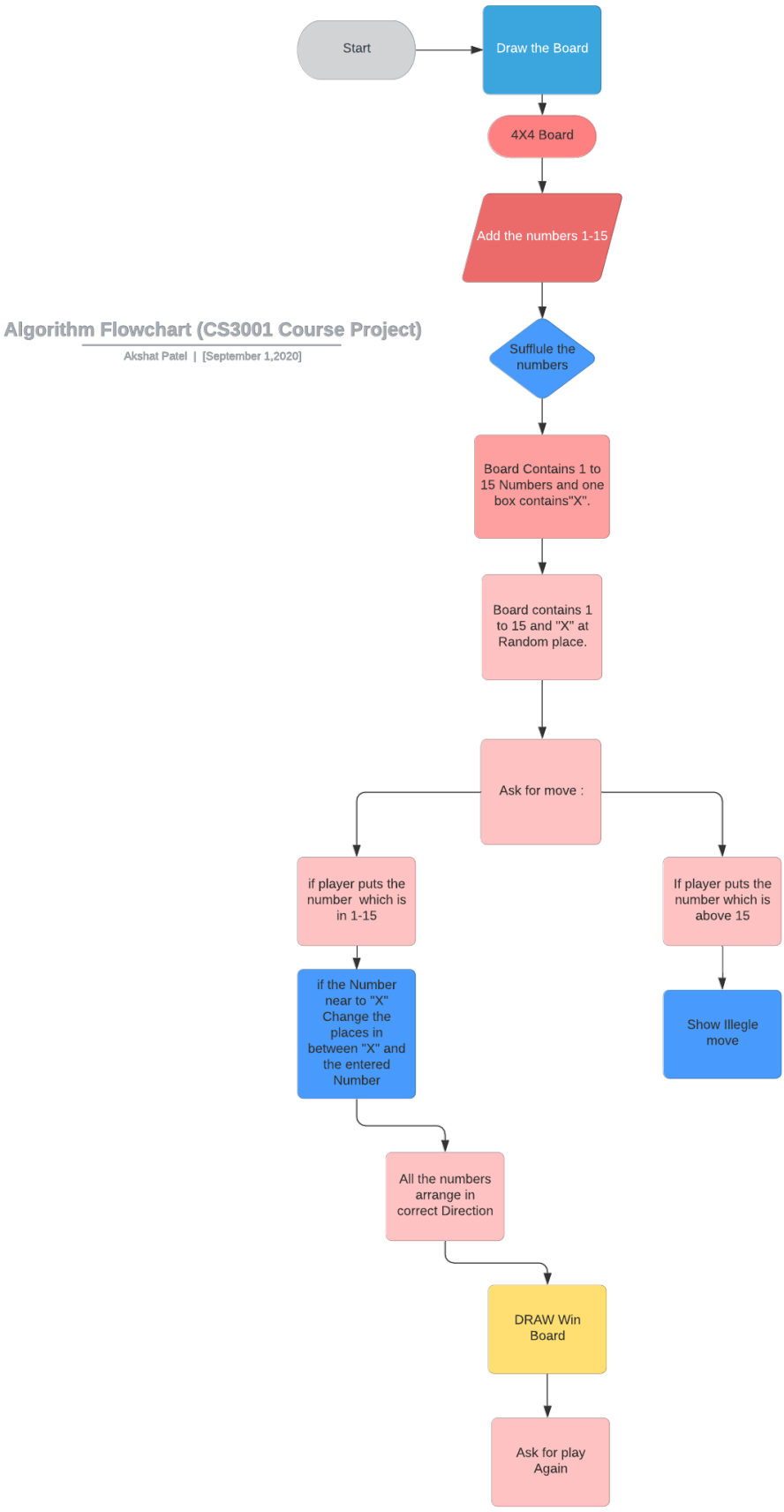
GitHub Link:

https://github.com/Akshat5129/Course-Project-CS3001-Number-Sliding-Game-

Task Performed:

1. Decide the Game
2. Find the Problems and Algorithm to make the Game.
3. Decide Algorithm and make flowchart for it.
4. Start the Coding and tried to make the Game.
5. Use different Steps to make the Game.

- **ALGORITHM FLOW CHART FOR THEGAME:**



Game Output:

```
+-------+-------+-------+-------|
|  03   |  05   |  07   |  13
+-------+-------+-------+-------|
|  09   |  XX   |  14   |  01
+-------+-------+-------+-------|
|  04   |  15   |  08   |  10
+-------+-------+-------+-------|
|  06   |  02   |  11   |  12
+-------+-------+-------+-------|
```

```
please type the number of the piece to move : ( q ) to quit
```

```
+-------+-------+-------+-------|
|  XX   |  11   |  03   |  15
+-------+-------+-------+-------|
|  05   |  10   |  07   |  12
+-------+-------+-------+-------|
|  06   |  14   |  02   |  08
+-------+-------+-------+-------|
|  13   |  04   |  09   |  01
+-------+-------+-------+-------|
```

```
please type the number of the piece to move : ( q ) to quit  11

you have made  1 moves so far
```

```
+-------+-------+-------+-------|
|  11   |  XX   |  03   |  15
+-------+-------+-------+-------|
|  05   |  10   |  07   |  12
+-------+-------+-------+-------|
|  06   |  14   |  02   |  08
+-------+-------+-------+-------|
|  13   |  04   |  09   |  01
+-------+-------+-------+-------|
```

```
please type the number of the piece to move : ( q ) to quit  03

you have made  2 moves so far
```

```
+-------+-------+-------+-------|
|  03   |  05   |  07   |  13
+-------+-------+-------+-------|
|  09   |  XX   |  14   |  01
+-------+-------+-------+-------|
|  04   |  15   |  08   |  10
+-------+-------+-------+-------|
|  06   |  02   |  11   |  12
+-------+-------+-------+-------|
```

```
please type the number of the piece to move : ( q ) to quit  22
illegal move , try again
```

```
+-------+-------+-------+-------|
|  03   |  05   |  07   |  13
+-------+-------+-------+-------|
|  09   |  XX   |  14   |  01
+-------+-------+-------+-------|
|  04   |  15   |  08   |  10
+-------+-------+-------+-------|
|  06   |  02   |  11   |  12
+-------+-------+-------+-------|
```

```
please type the number of the piece to move : ( q ) to quit
```

```
please type the number of the piece to move : ( q ) to quit  03

you have made  2 moves so far
```

```
        +-------+-------+-------+-------|
        |  11   |  03   |  XX   |  15
        +-------+-------+-------+-------|
        |  05   |  10   |  07   |  12
        +-------+-------+-------+-------|
        |  06   |  14   |  02   |  08
        +-------+-------+-------+-------|
        |  13   |  04   |  09   |  01
        +-------+-------+-------+-------|
```

```
please type the number of the piece to move : ( q ) to quit  01
illegal move , try again
```

```
        +-------+-------+-------+-------|
        |  11   |  03   |  XX   |  15
        +-------+-------+-------+-------|
        |  05   |  10   |  07   |  12
        +-------+-------+-------+-------|
        |  06   |  14   |  02   |  08
        +-------+-------+-------+-------|
        |  13   |  04   |  09   |  01
        +-------+-------+-------+-------|
```

```
please type the number of the piece to move : ( q ) to quit  q


game over
```

Source Code:

```
import random, sys


def board():
    '''Make matrix board of random numbers'''
    list1 = [0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15]
    random.shuffle(list1)
    matrix = []
    while list1 !=[]:
        matrix.append(list1[:4])
        list1 = list1[4:]
    return matrix
def zero(board):
    '''function to find where the zero is'''
    empty_space = None
    for x,item in enumerate(board):
        for y,item in enumerate(board):
            if board[x][y] == 0:
                empty_space = (x,y)
    return empty_space
def draw_board(board):
    '''function to draw the board'''
    print('\n\t+-------+-------+-------+-------|')
    for x,item in enumerate(board):
        for y,item in enumerate(board):
            if board[x][y] == 0:
                print('\t|  XX' , end='')
            else:
                 print('\t|  ' + '{:02d}' .format(board[x][y]), end=' ')
        print('\n\t+-------+-------+-------+-------|')
def ask_number(board):
    ''' function to ask for the number to move'''
    num = input('\nplease type the number of the piece to move : ( q ) to quit  ')
    if num in ['q','Q']:
        print('\n\ngame over  ')
```

```
        sys.exit()
    num = int(num)
    piece = ()
    for i,item in enumerate(board):
        for j,item in enumerate(board):
            if num == board[i][j]:
                piece = (i,j)
    return piece , num
def game():
    '''Run the game logic'''
    matrix = board()
    empty_space = zero(matrix)
    game_on = True
    move = 0
    while game_on:
        draw_board(matrix)
        piece,num = ask_number(matrix)
        if num > 15:
            print('illegal move , try again  ')
        else:
            if(empty_space==(piece[0]-1,piece[1]))\
              or(empty_space==(piece[0]+1,piece[1]))\
              or(empty_space==(piece[0],piece[1]-1))\
              or(empty_space==(piece[0],piece[1]+1)):
                matrix[empty_space[0]][empty_space[1]]=num
                matrix[piece[0]][piece[1]]=0
                empty_space=(piece[0],piece[1])
                move = move +1
                print()
                print('you have made ',move , 'moves so far ')
                print(2*'\n')
            else:
                print('illegal move , try again ')
if __name__ == '__main__':
    game()
```