


National University of Computer and Emerging Sciences, Lahore Campus

	Lab No 10		
	Course Name:	Programming Fundamentals	Course Code: CS 188
	Program:	BS(SE)	Semester: Fall 2020
	Duration:	2.5 hours	Total Points: 30 + 20
	Lab Date:	Saturday, December 7, 2020	Weight: 3%
	Section:	SE-1A and SE-1B	Page(s):

Instruction/Notes: Cheating during the lab will result in negative marks

We are developing a board game in which the game is represented as a 10x10 character array.

Clock-wise **circular-rotation** of a **rectangular ring within the board** is one of the major operation/function a player can perform in our game.

Two examples describing some possible circular-rotation are shown in figure below. In the figure, all the highlighted letters forming a rectangular ring are rotated in a clock-wise direction.

In the first example the **top left** coordinates of the rectangle are **(2, 4)** and **bottom right** coordinates are **(4, 7)** and the characters in the ring are **rotated** by a **step size of 1** where as in the second example the **top left** coordinates of the rectangle are **(3, 4)** and bottom right coordinates are **(3, 7)** and the characters are rotated by **step size** of **2**; The step size can be any positive number

Before										After circular rotate									
0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9
1	A	S	f	h	y	J	o	h	K	1	A	S	f	h	y	J	o	h	k
2	B	F	j	8	m	5	k	f	F	2	B	F	j	y	8	M	5	f	f
3	y	F	h	y	j	O	z	z	Z	3	y	F	h	q	j	O	K	z	z
4	F	B	8	q	4	T	r	t	Y	4	y	J	o	4	t	R	z	t	Y
5	h	L	2	s	f	H	y	j	O	5	m	5	k	s	f	H	y	j	O
6	N	S	d	D	r	D	r	r	D	6	j	O	z	D	r	D	r	r	D
7	c	R	r	r	R	D	d	s	S	7	c	R	r	r	R	D	d	s	S

In our game the board is represented as a **struct** containing a private 2D characters array of size 10 x 10 and a player can select any rectangular ring by specifying the **top**, **left**, **bottom**, **right** coordinates and a **step size** to make the circular rotation.

The skeleton code contains the struct definition along with some of the required functions needed to play the game.

Your Major task in this problem is to complete all the empty functions provided in the skeleton code. The purpose of each function is specified in the code.

You must also write the **main** function that declares a variable of type struct and must demonstrate each function by providing a menu. The main function must provide the functionality of loading characters in the structure text file provided along with the skeleton code must also perform the options as specified in the comments within the code.