# ITCS 6114 – Algorithms and Data Structures
## Programming Project – 2

**The project is due before midnight on Saturday, November 10. It should be submitted on canvas.**

**Instructions:**

- You can use any Programming language to solve the questions,
- Your submission should include entire source code of all the problems
- Submit a single zip file on canvas, do not submit 2 answers separately.
- All the inputs should be taken from console.
- Your submission must include all your source code and a READ ME file. Your read me file should have a brief description about techniques and data structures you used in your program, your read me file must also include information about how to execute/run your program.

**Question 1:**

Write a program that has 7 operations, your program should run until exit operation is selected. The 7 operations are

1. Create a **Balanced Binary Search Tree** using the input Strings entered from console.
2. Find the length of the Balanced Binary Search Tree.
3. Add an element to BST
4. Delete an element from BST.
5. Print Elements of the BST.
6. Check if BST is Max Binary Heap or not.
7. Find the number of Anagrams for each input string in the BST.
8. Exit

Every time an Input String is entered, the input should be added to the BST and BST should be updated to make it balanced and when an element is deleted the tree should be updated to make it balanced.

**Input**:

["king", "ingk", "rook", "Bishop", "pawn","wnap"]

**Output**:

**Balanced BST:** ["king", "ingk", "rook", "Bishop", "pawn"," wnap"]

**Length**: 2

**Anagrams Count:**

King – 1

ingk – 1

rook – 0

Bishop - 0

Pawn – 1

Wnap - 1

**Question 2:**

Write a chess solver: a program that, given a chess piece type and a position, will list which board positions are possible for that piece to move to. The program should store previous pieces entered and factor those into its answer for the next piece.

When executed your program output should look similar to the below output.

The chess board in the program is assumed to be named as follows

All the 8 rows are named using numbers [1-8]

All the 8 columns are named using albhabets [a-h]

The positions are named as 1a, 1b , 1c , 1d, 1e, 1f, 1g, 1h

The positions are named as 2a, 2b , 2c , 2d, 2e, 2f, 2g, 2h

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The positions are named as 8a, 8b , 8c , 8d, 8e, 8f, 8g, 8h

 ******** Let's start the game now ********

You can Select one chess piece from the following : 1. Rook. 2. Knight. 3. Bishop. 4.Queen. 5.King. 6.Pawn

Enter the piece name

pawn

Enter the position of the pawn
3a
Posible Position: 0
3 b
Posible Position: 1
4 a
Posible Position: 2
4 b

Select the position number ( 0 - 2 ) you want the pawn to move to
1

finally selected row details row: 4 column: a

Do you want to continue [yes/no]
yes

Enter the piece name

pawn

Enter the position of the pawn
3a
Posible Position: 0
3 b
Posible Position: 1
4 b

Select the position number ( 0 - 1 ) you want the pawn to move to
0

finally selected row details row: 3 column: b

Do you want to continue [yes/no]
yes

Enter the piece name
pawn

Enter the position of the pawn
3b

This position is filled. Please select a different position

Enter the piece name
rook

Enter the position of the rook
5b
Posible Position: 0
4 b
Posible Position: 1
6 b
Posible Position: 2
7 b
Posible Position: 3
8 b
Posible Position: 4
5 a
Posible Position: 5
5 c
Posible Position: 6
5 d
Posible Position: 7
5 e
Posible Position: 8
5 f
Posible Position: 9
5 g
Posible Position: 10
5 h

Select the position number ( 0 — 10 ) you want the rook to move to
10

finally selected row details row: 5 column: h

Do you want to continue [yes/no]
no

Hope you enjoyed playing the game

Thank you