Al Alamein International University
Faculty of Computer Science and Engineering

CSE111 Data Structures

Assignment 3

This is a group assignment; you can form a group of two. Submit your java file on MS Teams, make sure your write group members' IDs and names, and task allocation matrix.

Task1) [80 marks] Provide an ADT java class for one-dimension arrays named "MyArray" that supports the following functionalities:

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1) **[20 marks]** InsertionSort // sort the array using insertion sort algorithm
2) **[20 marks]** MergeSort. // sort the array using merge sort algorithm
3) **[20 marks]** BinarySearch for value// apply binary search algorithm to search for a value
4) **[20 marks] AVL**Search // use AVLs to search for a value, using existing library, do not write AVL ADT code

Hints.

- Create the proper data members, methods signatures, and proper class interface.
- Use the clean code rules indicated in class. Use refactoring and follow OODP.
- Create the proper test cases that show that your code is working correctly for every method
- Use comments in your code

Task2) [20 marks]

Consider the following records, with the corresponding hash key values.

Key	$hash\ key$
a	0000
b	0001
c	0010
d	0011
e	0100
f	0110
g	1000

a) **[10 marks]** Assume we have a file of **3 buckets of size 3**, and **(key mod 2)** is used hash function. Show how such block keys will be organized within the hash file when open addressing method is used.

b) **[10 marks]** Suggest a double hashing function that ensures we have 0 collision for the above keys.