

COMP3600/COMP6466 in 2016 – Tutorial Four (Week 8)

Question 1.

Insert the keys 5, 2, 8, 9, 1, 6, 3 into a max-heap that was initially empty once a time, then remove the key in the root repeatedly until the heap is empty. What is the time complexity of sorting in this fashion?

Question 2.

In the open addressing schema of Hash table, three probing techniques have been introduced, they are **linear probing**, **quadratic probing**, and **double hashing**. Can you point out how many different probing sequences for each of the schemes? Compare the advantages and disadvantages among the techniques.

Question 3.

Design a hash function for the open addressing schema such that no primary and secondary clustering problems occur. In addition, the number of probing sequences derived from this function is no less than $O(m^3)$, assuming that there are m slots in the hash table.

Question 4.

Almost all analysis of binary search trees assumes that the keys are distinct. Suppose the definition of the binary search tree ordering is changed to: for each node if its key is K , then:

- the key in its left child (if any) is $\leq K$
- the key in its right child (if any) is $> K$

Redesign the insertion algorithm so that all insertions create a new node, even if the key is already present. Explain how to search in such a tree.