Data Structures and Algorithms – (COMP SCI 2C03)
Winter 2021
Tutorial - 4

Feb 22, 2021

1. Which of the symbol-table implementations in this section would you use for an application that does 10^3 put() operations and 10^6 get() operations, randomly intermixed? Justify your answer.

2. List 3 pros and cons of the lazy delete approach in an unordered symbol table implementation.

3. Suppose you have the following sorted list [3, 5, 6, 8, 11, 12, 14, 15, 17, 18] and are using the binary search algorithm given on slide #11 in C3P1.pdf. Give the sequences of elements examined to find the key 8.

4. Write the running time recurrence relation $T(n)$ for the binary search program, and prove that $T(n) \in O(\log n)$.

5. Write the binary search algorithm for a sorted array in decreasing order.

6. Does binary search have an effect on its running time when the array consists of duplicates?

7. Suppose you have an array A of length 1000 and its elements are in the range [1..100]. Clearly, it must have 900 duplicates. How would you perform efficient search on this array? The array elements are fixed and you can copy elements of A to another array for efficiency.

8. Local minimum of an array. Write a program that, given an array $a[]$ of N distinct integers, finds a local minimum: an index i such that $a[i-1] < a[i] < a[i+1]$. Your program should use approximately

$2 \log_2 N$ compares in the worst case.