COSC 2123/1285 Algorithms and Analysis
Tutorial 8
Space and Time Tradeoffs

Objective

Students who complete this tutorial should:

- Be familiar with concepts of space and time tradeoffs in algorithm design.
- Be able to use hashing as a way to implement a dictionary.

Questions

7.1.1 Is it possible to exchange numeric values of two variables, say, u and v , without using any extra storage?

7.1.3 Assuming that the set of possible list values is a, b, c, d sort the following list in alphabetical order by the distribution counting algorithm:

$$b, c, d, c, b, a, a, b$$

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7.3.1 For the input 30, 20, 56, 75, 31, 19 and hash function $h(K) = K \bmod 11$

a construct the *open* hash table (separate chaining hashing).

b find the largest number of key comparisons in a successful search in this table.

c find the average number of key comparisons in a successful search in this table.

7.3.2 For the input 30, 20, 56, 75, 31, 19 and hash function $h(K) = K \bmod 11$

a construct the *closed* hash table (open address hashing).

b find the largest number of key comparisons in a successful search in this table.

c find the average number of key comparisons in a successful search in this table.

7.3.3 Why is it not a good idea for a hash function to depend on just one letter (say the first one) of a natural language word?

7.3.6 Answer the following questions for the separate-chaining (open hash table) version of hashing:

a Where would you insert keys if you know that all the keys in the dictionary are distinct? which dictionary operations, if any, would benefit from this modification?

b We could keep keys of the same linked list sorted. Which of the dictionary operations would benefit from this modification? How could we take advantage of this if all the keys stored in the entire table need to be sorted?

