Algorithms
Fall 2014
HomeWork#3

Problem#1
State weather the following statements are True or false:

1. If you use chaining to resolve collisions, you never have to resize the hash table, as long as you are willing to take a hit in performance.

2. A major advantage of resolving collisions via chaining, instead of open addressing, is that there is no way to support element deletions under open addressing without rehashing the entire table every time a single element is deleted.

3. Consider a partially filled hash table T that uses double hashing to implement open addressing. Suppose that the following two operations are performed, in order:

(Step 1) A key k is searched for in T, and the search is unsuccessful.

(Step 2) The same key k is then inserted into T.

Then, true or false: The number of key comparisons performed during step 2 is greater than the number of key comparisons performed during step 1.

4. When you double the size of a hash table, you can keep using the same hash function.

Problem#2
Suppose that the universe U of possible keys is U $\{1\ldots\ldots n^{2}\text{-}\ 1\}$. For a hash table of size n, what is the greatest number of distinct keys the table can hold with each of these collision resolution strategies?

I. Chaining

II. Linear probing

III. Quadratic probing

Problem#3

What is clustering?

Problem#4

Demonstrate the insertion of the keys 4,27,18,14,19,32,11,16 into a hash table with collisions resolved by linear probing. Assume that the table has 9 slots and that the hash function is h(k) = k mod 9. Draw the state of the hash table after all insertions.

Propose strategies other than linear probing for handling collisions in a hash table. Are they better, worse?

Problem#5

Propose at least two strategies other than chaining for handling collisions in a hash table. Give their advantages and disadvantages.