

CSE 332: Data Structures and Parallelism

Exercises (Hashing)

Directions: *Submit your solutions on Gradescope. You must submit a pdf file.*

EX09. Hshg (20 points)

In this problem, you will think about how lazy deletion is handled in open addressing hash tables. Refer to [slide 13 on Jan 31](#) for a description of lazy deletion. You should NOT assume that any changes other than those specifically stated are made to the hashtable (e.g. find and insert still work exactly the same way as we discussed in lecture).

This Note Added on 2/5/2018: Part a) and Part b) both describe a change to how lazy deletion would be normally handled. For both part a) and Part b) we are asking you to compare to how lazy deletion would normally work.

(a) [10 Points] Consider the following situation:

- We have an open addressing hash table with a cell X marked as “deleted”.
- The next successful find hits and moves past this cell and finds a key in cell Y .
- Then, we move the found key to cell X , mark cell X as “no longer deleted”, and mark cell Y as “open” (e.g., as if it had never had a value in it).

If we used this policy for every find, would the resulting hash table work better or worse than if we had just not modified the table? Explain your answer.

(b) [10 Points]

Suppose that instead of marking cell Y as “open” in the previous exercise, you mark it as “deleted” (it contains no value, but we treat it as a collision), and then we use this new policy for every find. Would the resulting hash table work better or worse than if we had not modified the table? [Note: we are NOT asking you to compare to part a, we are comparing to regular lazy deletion.] Explain your answer.