

Homework 8

Dushan Terzikj

due 23 April, 2018, 23:55 hours

Problem 1

- a) Given the sequence $\langle 3, 10, 2, 4 \rangle$, apply the double-hashing strategy for open addressing to store the sequence in the given order in a hash table of size $m = 5$ with hash functions $h1(k) = k \bmod 5$ and $h2(k) = (7k) \bmod 8$. Document all collisions and how they are resolved (provide computations).

Solution:

Please check out file *solution_1a.txt*.

- b) Implement a hash table that supports insertion and querying with open addressing using linear probing.

Solution:

Please check out file *hashtable.py*.

Problem 2

- a) Show that a greedy algorithm for the activity-selection problem that makes the greedy choice of selecting the activity with shortest duration may fail at producing a globally optimal solution.

Solution:

Imagine if we have the start-finish intervals in the following fashion: $[(1, 5), (4, 6), (5, 12)]$. If we take the activity with the shortest duration, we pick only $(4, 6)$. Next in line is $(1, 5)$, but we cannot pick it, since it overlaps with $(4, 6)$. The same case is for $(5, 12)$. Therefore, our result is only 1 activity. This is not a globally optimal solution, since the solution $[(1, 5), (5, 12)]$ is globally optimal solution.

- b) Assuming an unsorted sequence of activities, derive a greedy algorithm for the activity-selection problem that selects the activity with the final starting time. Your solution should not simply sort the activities and then select the activity.

Solution:

Please check out file *2b.py*.