

Homework 9 : Algorithms and Data Structures

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Problem 9.1

Hash Tables

- (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 $h_1(k) = k \bmod 5$ and $h_2(k) = 7k \bmod 8$. Document all collisions and how they are resolved. Write down your computations.

Here we have the sequence $\langle 3, 10, 2, 4 \rangle$

We have hash functions:

$$h_1(k) = k \bmod 5$$

$$h_2(k) = 7k \bmod 8$$

So now :

Inserting 3:

We have :

$$h_1(3) = 3 \bmod 5 = 3.$$

Status \implies No collision

0	1	2	3	4
			3	

Inserting 10:

We have :

$$h_1(10) = 10 \bmod 5 = 0.$$

Status \implies No collision

0	1	2	3	4
10			3	

Inserting 2:

We have :

$$h_1(2) = 2 \bmod 5 = 2.$$

Status \implies No collision

0	1	2	3	4
10		2	3	

Inserting 4:

We have :

$$h_1(4) = 4 \bmod 5 = 4.$$

Status \implies No collision

0	1	2	3	4
10		2	3	4

Hence no collisions occurred in during Hashing.

- (b) The implemented code is attached as HashTable within the folder HashTables.

The implementation is in HashTable.py

```
$ : make HashTable
or
$ : make all
```

Problem 9.2

Greedy Algorithms

!! NOTE !!

Implementation of different algorithms are in different folders.

- (a) Considering the list of activities such that :
[$A_a(1, 7)$, $A_b(9, 20)$, $A_c(6, 10)$]
with the greedy approach for selection of activity, the greedy algorithm would select A_c as it is the Activity with shortest time span.
But the optimal solution for the Selection of the activity would be A_a and A_b with two activities.
- (b) The implemented code is attached as VeryGreedyActivity.py within the folder Greedy Algorithm.

The implementation is in VeryGreedyActivity.py

```
$ : make all
```

or

```
$ : make VeryGreedyActivity
```

References :

Cormen, T. H., Leiserson, C. E., Rivest, R. L., Stein, C. (n.d.). Introduction to algorithms. Greedy Algorithms : <https://www.geeksforgeeks.org/greedy-algorithms/>
Discussion with friends for the Greedy Algorithms