

## CS 130A Data Struc &amp; Alg 1

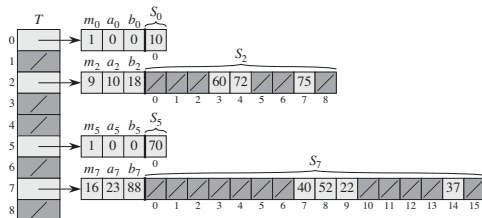
- Given the hash function  $h(x) = x \bmod 17$ , and the following set of numbers as input:  $\{133, 148, 164, 206, 96, 102, 300, 517, 8, 793, 736\}$ , show the resulting:
  - Separate chaining hash table.
  - Open addressing hash table with linear probing.
  - Open addressing hash table with quadratic probing.
- Given input  $\{4371, 1323, 6173, 4199, 4344, 9679, 1989\}$  and a hash function  $h(x) = x \bmod 10$ , show the resulting:
  - Separate chaining hash table.
  - Hash table using linear probing.
  - Hash table using quadratic probing.
  - Hash table with second hash function  $h_2(x) = 7 - (x \bmod 7)$ .

- Consider the following hash function  $h(x) = x \bmod 11$  with linear probing as the collision handling strategy, and the current table as

0	1	2	3	4	5	6	7	8	9	10
	1	24	14	12	16	28	7		31	

Do the following:

- Insert  $x = 9$  into the hash table. Show the steps.
  - Insert  $x = 42$  into the hash table. Show the steps.
  - Find  $x = 9$  in the hash table. Show the steps.
  - Find  $x = 42$  in the hash table. Show the steps.
  - Delete  $x = 9$  from the hash table using *lazy deletion*. Show the steps.
  - Find  $x = 42$  in the hash table. Show the steps.
  - Explain what would happen if  $x = 9$  was deleted by leaving an empty cell, instead of lazy deletion (leaving a mark). Can we find  $x = 42$  if this was the case?
- Consider the perfect hash scheme given in our class notes (05universal.pdf), and the current state of the hash tables as below:



Show the steps of the following operations (in the given order): Insert(49), Find(60), Find(61), Delete(52), Delete(75), Insert(52)

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Deliver the assignment via Gradescope. Late submissions are not accepted.