EECS 233 SI Session 12
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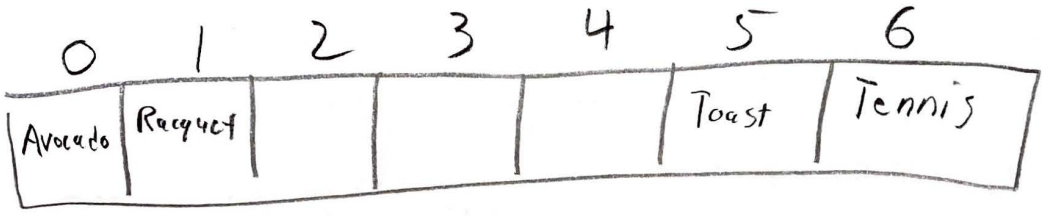
October 27, 2019

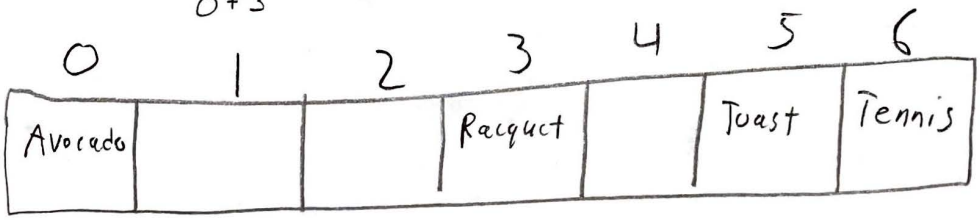
Objectives:
Upon completion of this SI session, participants will be able to:
1. Determine what hashing operations will do to an array
2. Recognize hash terminology

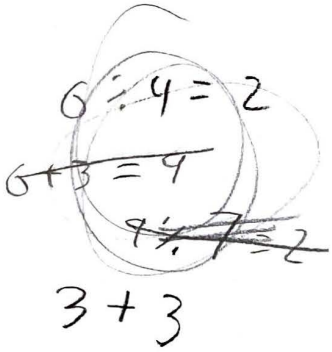
Foundations:
1. What is a hash function? What is a load factor?
   HF = the function that determines where items are stored
   LF = the # of keys in hashtable / capacity

2. Using a hash function of string length % 7, draw the array after inserting "Avocado", "Toast", "Racquet", "Tennis". If a collision happens, use linear probing.

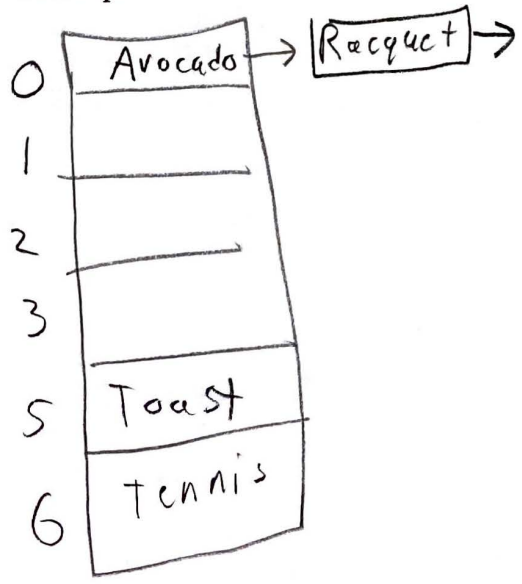


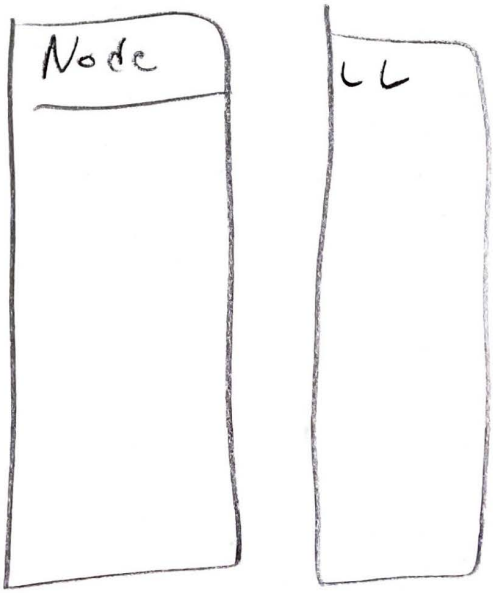
3. Draw the array after inserting the same input as above but use double hashing.
   h(key) = length % 7 and h_2(key) = key % 4





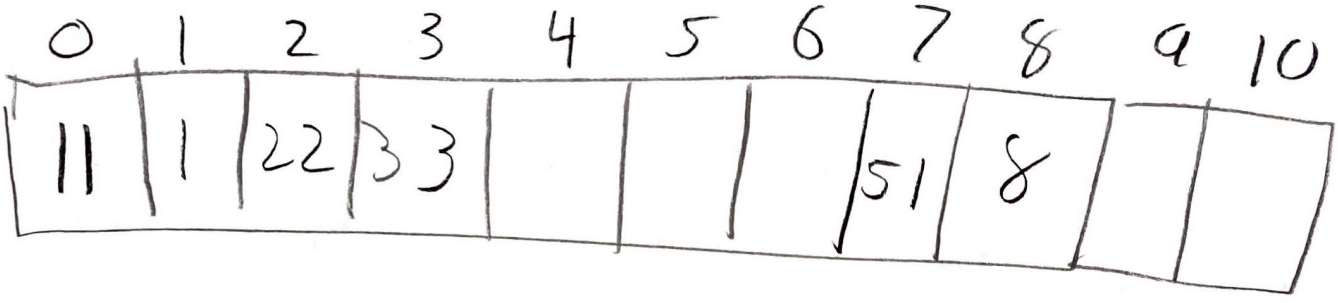
4. Solve question 2 with chaining.



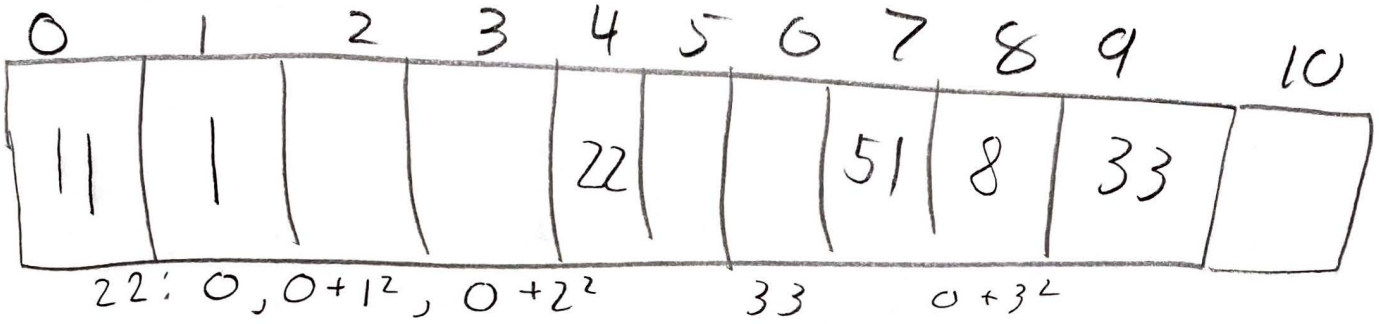


Exercises:

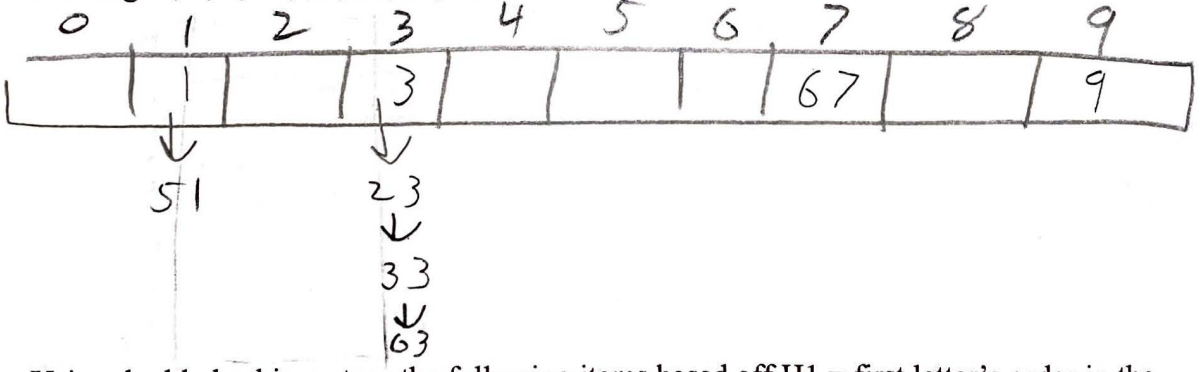
5. ! Using linear probing and a hash function of key % 11, draw the hash table after inserting: 11, 1, 8, 22, 33, 51



6. Using quadratic probing and hash function h1= key % 11, draw the hash table after inserting: 11, 1, 8, 22, 33, 51

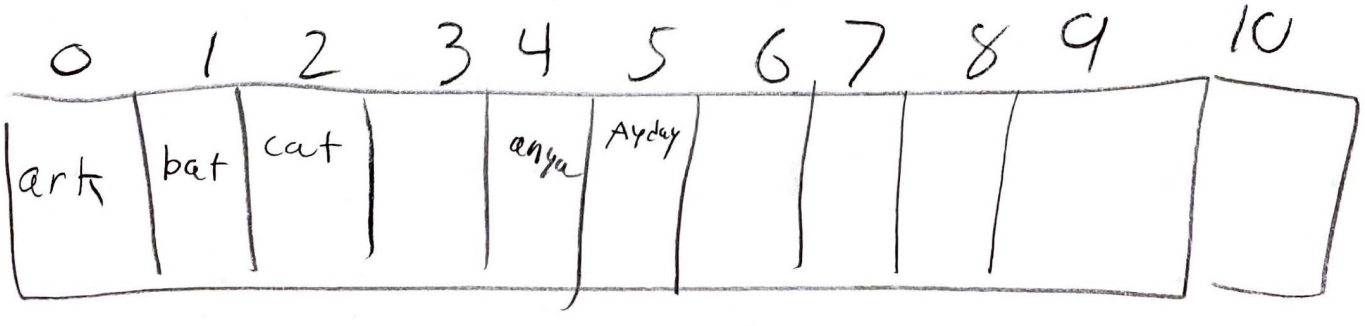


7. Using chain hashing to deal with collisions and h1= key%10, draw the hash table after inserting: 9, 1, 3, 67, 23, 33, 51, 63



8. Using double hashing, store the following items based off H1 = first letter's order in the alphabet (a=0, b=1, c=2, etc) and H2 = string length. Use an array of length 11

ark, ayday, cat, bat, anya



9. Suppose there is a hash table that uses linear probing with h1 = first letter's order in the alphabet (a=0, b=1, c=2, etc). Given the following table, can we find boat? Keep in mind, the table may not have been installed correctly. The booleans are if the item has been deleted

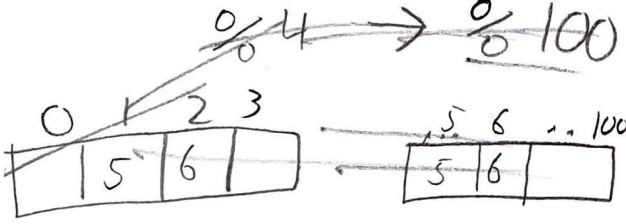
0	1	2	3	4	5	6
Apple F	Bear F	Bat T	Boat F		Baron F	Goof F

yes

6, 5

10. Can we find baron?

No



Summary

11. Assume you've been hashing for a while and deleted many items. You notice that the items are much less than the amount of free space and searching is taking a while. What could be a possible solution to lower the search time? Would our load factor be high or low?

rehash

LF high (depending on real definition)

you'll never need to worry about this in practice

12. The Library of Congress wants to store books. The Library of Congress is the largest library in the United States. What kind of hash function could we use?

ISBN unique

~~me~~

~~date, title~~

345910 ~ 345910

0, 1, 2 ~ 345910

Upcoming Events and Suggestions for Further Study:

Events:

- Next SI session is Thursday from 6:00 to 7:30 at Sears 336

Further Study:

- bigocheatsheet.com
  - A great graph that visualizes the big o complexity chart. It also has the big O time of data structures and algorithms that we will cover in the future.
- https://www.geeksforgeeks.org/hashing-set-1-introduction/
  - A nice alternative look at hashing. It uses a different double hashing implantation, but it is just as valid