## CSE 332: Data Structures and Parallelism

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## Section 5: Hashing & Sorting

# 1. Hash... Browns?

For the following scenarios, insert the following elements in this order: 7, 9, 48, 8, 37, d57. For each table, TableSize = 10, and you should use the primary hash function *h(k) = k*.

a) Linear Probing - Insertion

| | |
|---|---|
| 0 | |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |

Linear Probing - Delete 37, 7, 57

| | |
|---|---|
| 0 | |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |

b) Quadratic Probing

| | |
|---|---|
| 0 | |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |

c) Separate chaining hash table - Use an unsorted linked list for each slot.

| | |
|---|---|
| 0 | |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |

## Section 5: Hashing & Sorting

# 2. Double Double Toil and Trouble

a) Describe double hashing.

b) List 2 cons of quadratic probing and describe how one of those is fixed by using double hashing.

c) Compare open addressing and separate chaining.

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# 3. Clash of the Hashes!

For each of the following questions, choose the correct collision resolution option!

a) You are implementing a hash table on hardware with low memory and low computational power. Thankfully, your hash function almost always spreads keys out evenly and the items you are hashing take up a small amount of memory (e.g. integers or shorts). Which collision resolution is best?

Linear Probing  Quadratic Probing  Double Hashing  Separate Chaining

a) Now you are working on creating a hash table specifically for Strings. The issue is these strings are all extremely long! The Strings are so long that the process of hashing them (which includes iterating through every char) affects the runtime. Which collision resolution is best?

Linear Probing  Quadratic Probing  Double Hashing  Separate Chaining

b) You are designing a hash table with your CSE 332 TA. However, the initial hash function that they designed causes items to cluster and they are adamant about keeping it. Which collision resolution is best?

Linear Probing  Quadratic Probing  Double Hashing  Separate Chaining