

Review HASH TABLES

1.

(A). A collision occurs when a hashing algorithm produces an address for an insertion key and that address is already occupied. True/False

(B). Also known as division remainder, the modulo-division method divides the key by the array size and uses the remainder for the address.

(C). Hashing is an address-to-key mapping process.

(D). Synonyms are table entries whose keys transform into the same index of the hash table.

2.

(A). The algorithm used to search a list depends to a large extent on the ____.

- a. Structure of the list
- b. Operating system being used
- c. Programming language used to implement it
- d. Data type of the keys.

(B). The memory that contains all of the home addresses is known as the ____.

- a. home area
- b. prime area
- c. home address
- d. collision area

(C). As data are added to a list and collisions are resolved, some hashing algorithms tend to cause data to group within the list. This tendency of data to build up unevenly across a hashed list is known as ____.

- a. grouping
- b. collision tendency
- c. clustering
- d. collision factor

(D). Under reasonable assumptions, the expected time to search for an element in a hash table is

- a. $O(n)$
- b. $O(\log_2(n))$
- c. $O(1)$
- d. $O(n^2)$

3.

According to D. Knuth, a good hash function should satisfy two requirements:

(A).

(B).

 First Name

 Last Name

 First Name

 Last Name

 First Name

 Last Name

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4.

(A) Using the modulo division method and linked list collision resolution, store the keys shown below in an array of 10 elements (numbered from 0 to 9).

92, 40, 53, 37, 15, 70, 42, 20

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

(B) What is the load factor (density) of the list after all keys have been inserted?

5.

(A) Using the modulo division method and linear probe collision resolution, store the keys shown below in an array of 10 elements (numbered from 0 to 9).

92, 40, 53, 37, 15, 70, 42, 20

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

(B) What is the load factor (density) of the list after all keys have been inserted?

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6. What's wrong with the following hash function?

```
int hash( int index, int listSize, int *address )  
{  
    int key;  
  
    key = index / (listSize - 1);  
    *address = key;  
    return key;  
}
```

(A)

(B)

(C)

(D)

7. The following algorithm is searching a hash array. Linear probe was used to solve collisions. As a team leader, would you accept this algorithm? Why? Why not?

Algorithm searchHash (hashAry, size, targetKey, location)

This algorithm searches a hash array...

Pre: ary, size, targetKey

Post: location – index where targetKey is being stored

Return: found or not found

```
i = 0  
loop(i < size)  
    if( hashAry[i].key is equal to targetKey)  
        location = i  
        return TRUE  
    end if  
    i = i + 1  
end loop  
return FALSE  
end searchHash
```