CSE208: Data Structure and Algorithms II Sessional

Offline 5: Hash Table

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Overview:

The purpose of a hash table is to store key value pairs and search them in constant time using a good hash function. In this report we will use the two types of collision resolution methods used in hashing:

- Closed Addressing: The Separate chaining method
- Open Addressing: Double hashing and Custom probing method

The objective is to log the number of collisions while inserting and the average probes needed while searching empirically with varying size of the hash table and using two different hash function.

Hash functions:

The hash functions executed in the code are presented below:

HASH 1

```
static int Hash1(String k){
    int hash=5381;
    for (int i = 0; i < k.length(); i++) {
        hash= abs(((hash<<5)+hash))+k.charAt(i);
    }

    return hash ;
}
```

HASH 2

```
static int Hash2(String k){
    int hash=0;
    for (int i = 0; i < k.length(); i++) {
        hash= k.charAt(i)+abs((hash<<6)+(hash<<16)-hash);
    }
    return hash ;
}
```

AUXILIARY HASH FUNCTION:

```
static int auxHash(String k){
    int hash=0;
    for (int i = 0; i < k.length(); i++) {
        hash+=k.charAt(i);
    }
    return hash ;
}
```

Data table:

Data were retrieved for varying table sizes:

Number of inputs: 10000
Number of successful searches: 1000

Table size: 10007 (The prime immediately larger than 1.0 * number of inputs)

	Hash 1		Hash 2	
	Collisions	Average Probes	Collisions	Average Probes
Separate Chaining	3699	0.519	3673	0.492
Double Hashing	61196	5.188	60434	5.785
Custom Probing	62608	4.969	57758	7.957

Table size: 15013 (The prime immediately larger than 1.5 * number of inputs)

	Hash 1		Hash 2	
	Collisions	Average Probes	Collisions	Average Probes
Separate Chaining	3729	0.515	3664	0.456
Double Hashing	6497	0.628	6405	0.614
Custom Probing	6557	0.697	6476	0.635