

CS2023 - Inclass Lab

Week 9 - Hash tables

Submission by: Sajeev Kugarajah (210554M)

Section 1 : Implementing basic hash table

Expected submission

1. Complete *hashfunc*, *insert*, *hash lookup*

[completed code file has been uploaded to the GitHub repository.](#)

2. Insert your name as user name and your index number as password. Print hash table and take screenshot.

```
PS C:\Users\sajeev\OneDrive - University of Moratuwa\Academics\2nd Sem\University of Moratuwa\Academics\2nd Sem\CS2023 - DSA\3 - lecs&labs\week 09\lab 0> .\hashtable_basics }
0
Type command: 1
Enter user name: Sajeev
Enter password to be saved: 210554M
User added
Type command: 4
[0]-->
[1]-->
[2]-->210554M
[3]-->
Type command: █
```

3. Add 3 more user names and passwords. Print hash table and take screenshot.

```
PS C:\Users\sajeev\OneDrive - University of Moratuwa\Academics\2nd Sem\University of Moratuwa\Academics\2nd Sem\CS2023 - DSA\3 - lecs&labs\week 09\lab 0> .\hashtable_basics }
0
Type command: 1
Enter user name: Sajeev
Enter password to be saved: 210554M
User added
Type command: 1
Enter user name: Abineyan
Enter password to be saved: 210017V
User added
Type command: 1
Enter user name: Mamta
Enter password to be saved: 210365J
User added
Type command: 1
Enter user name: Kheen
Enter password to be saved: 210123A
Slot is not empty
Type command: 1
Enter user name: Thulaja
Enter password to be saved: 210765S
User added
Type command: 4
[0]-->210365J
[1]-->210765S
[2]-->210554M
[3]-->210017V
Type command: █
```

4. Delete your user name. Print hash table and take screenshot

```
PS C:\Users\sajee\OneDrive - University of Moratuwa\Academics\2nd Sem\CS2023 - DSA\University of Moratuwa\Academics\2nd Sem\CS2023 - DSA\3 - lecs&labs\week 09\lab 09\lab ma
.\hashtable_basics }
0
Type command: 1
Enter user name: Sajeev
Enter password to be saved: 210554M
User added
Type command: 1
Enter user name: Abineyan
Enter password to be saved: 210017V
User added
Type command: 1
Enter user name: Mamta
Enter password to be saved: 210365J
User added
Type command: 1
Enter user name: Kheen
Enter password to be saved: 210123A
Slot is not empty
Type command: 1
Enter user name: Thulaja
Enter password to be saved: 210765S
User added
Type command: 4
[0]-->210365J
[1]-->210765S
[2]-->210554M
[3]-->210017V
Type command: 2
Enter item to be deleted: Sajeev
User deleted
Type command: 4
[0]-->210365J
[1]-->210765S
[2]-->
[3]-->210017V
Type command: █
```

5. What is issue when using a simple hash table like this and how can we change it, explain your answer.

Having a potential for collisions is the major issue in using simple hash tables like this. Collision is when more than one hash keys are assigned to same index. Hash functions we use, load factor of the hash table are the major factors which affect the probability of collision. And a hash table must have the ability to resolve the issue when collision occurs. To overcome this issues we can use several techniques such as separate chaining, open addressing and more.

For example let's talk about separate chaining.

Chaining is a technique where each key-value pairs of a hash table is stored as a linked list. When collision occurs with same hash codes, simply a new lined list created and appended to the existing array. Chaining is effective technique but the performance will be affected as the length of the linked list grows.

Section 2 : Implementing hash table with chaining

Expected submission

1. Complete *hash lookup*

[completed code file has been uploaded to the GitHub repository.](#)

2. Insert your name as user name and your index number as password(do it two times). Print hash table and take screenshot.

```
PS C:\Users\sajee\OneDrive - University of Moratuwa\Academics\2nd Sem\CS2023 - DSA\3 - lecs&
sity of Moratuwa\Academics\2nd Sem\CS2023 - DSA\3 - lecs&labs\week 09\lab 09\lab materials\l
} ; if ($?) { .\hashtable_with_chaining }
0
Type command: 1
Enter user name: Sajeev
Enter password to be saved: 210554M
Type command: 3
[0]-->[]
[1]-->[]
[2]-->[Sajeev, ]
[3]-->[]
Type command: 1
Enter user name: Sajeev
Enter password to be saved: 210554M
Type command: 3
[0]-->[]
[1]-->[]
[2]-->[Sajeev, Sajeev, ]
[3]-->[]
Type command: 2
Enter user name to look up password:Sajeev
210554M
Type command: █
```

3. Add 3 more user names and passwords. Print hash table and take screenshot.

```
PS C:\Users\sajee\OneDrive - University of Moratuwa\Academics\2nd Sem\CS2023 - DSA\
sity of Moratuwa\Academics\2nd Sem\CS2023 - DSA\3 - lecs&labs\week 09\lab 09\lab ma
} ; if ($?) { .\hashtable_with_chaining }
0
Type command: 1
Enter user name: Sajeev
Enter password to be saved: 210554M
Type command: 1
Enter user name: Sajeev
Enter password to be saved: 210554M
Type command: 1
Enter user name: Abineyan
Enter password to be saved: 210017V
Type command: 1
Enter user name: Zaky
Enter password to be saved: 210023K
Type command: 1
Enter user name: Mamta
Enter password to be saved: 210365J
Type command: 3
[0]-->[Mamta, ]
[1]-->[]
[2]-->[Sajeev, Sajeev, ]
[3]-->[Abineyan, Zaky, ]
Type command: █
```