CS2023 - Data Structures and Algorithms

In Class Lab Exercise

Week 09

Index Number: 200105F

GitHub Link: https://github.com/UlinduP/CS2023/tree/main/In%20Class%20Labs/Lab%209

Section 1: Implementing basic Hash Table

2.


```
PROBLEMS    OUTPUT    DEBUG CONSOLE    TERMINAL    SERIAL MONITOR
i' '--stderr=Microsoft-MIEngine-Error-tzfmx4ts.bjy' '--pid=Microsoft-MIEngine-Pid-wabv4gmt.21a' '--dbgExe=C:\msys64\mingw64\bin\gdb.exe' '--interpreter=m
i'
0
Type command: 1
Enter user name: Ulindu
Enter password to be saved: 200105F
User added successfully
Type command: 4
[0]-->
[1]-->200105F
[2]-->
[3]-->
Type command:
```

3.


```
Windows PowerShell
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Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows
Type command: 4
[0]-->789456
[1]-->200105F
[2]-->321
[3]-->123
Type command:
```

4.


```
[0]-->789456
[1]-->200105F
[2]-->321
[3]-->123
Type command: 2
Enter item to be deleted: Ulindu
User deleted
Type command: 4
[0]-->789456
[1]-->
[2]-->321
[3]-->123
Type command:
```

5. This uses a fixed size array to store the passwords. This means that there is a limit on the number of passwords it can store. If the limit is reached, the program will not be able to store passwords anymore. Another issue is that the hash function used here may not distribute the passwords evenly across the array which can lead to collisions, where two different passwords end up being hashed to the same array index, where one password overwrites the other.

To address these issues, a more robust hash table implementation can be used that employs techniques such as dynamic resizing of the array and a more sophisticated hash function. For example, instead of using a fixed size array, a dynamically resizing hash table can be used that increases the size of the array when it starts to fill up.

Section 2: Implementing Hash Table with chaining

2.

```
ls-1.15.4-win32-x64\debugAdapters\bin\WindowsDebugLauncher.exe' '--stdin=Microsoft-MIEngine-In-ndf5q5ow.uto' '--stdout=Microsoft-MIEngine-Out-egdsahyt.w
h' '--stderr=Microsoft-MIEngine-Error-ar4v4sw3.zbc' '--pid=Microsoft-MIEngine-Pid-oy2syhd0.fqo' '--dbgExe=C:\msys64\mingw64\bin\gdb.exe' '--interpreter=
i'
0
Type command: 1
Enter user name: Ulindu
Enter password to be saved: 200105F
Type command: 3
[0]-->[]
[1]-->[Ulindu, ]
[2]-->[]
[3]-->[]
Type command:
```

3.

```
Enter password to be saved: 123
Type command: 1
Enter user name: John
Enter password to be saved: 564
Type command: 1
Enter user name: Mathew
Enter password to be saved: 658956
Type command: 3
[0]-->[Josh, ]
[1]-->[Ulindu, ]
[2]-->[Mathew, ]
[3]-->[John, ]
Type command:
```