HASHING

In computing, a hash table (hash map) is a data structure that implements an associative array abstract data type, a structure that can map keys to values. A hash table uses a hash function to compute an index, also called a hash code, into an array of buckets or slots, from which the desired value can be found.

Hash tables are good in situations where you have enormous amounts of data from which you would like to quickly search and retrieve information. One possible use for a hash table is to store computer user login usernames and passwords.

For this lab, you will need to implement a program to check if username and password are correct on login.

There are two major steps to this program:

1. The program will load username/password sets from the file `user.txt` and insert them into the hash table until the end of file is reached on `user.txt`. The `user.txt` file will look something like this with one username/password set per line, (up to 1.000.000 lines):

user.txt
alice password1 bob pass2 jane thisIsmyPas za_s #How2Do hacksth @Anoy!Test test01 YesPass123

Note:

- *Username cannot be longer than 15 character. A username can only contain alphanumeric characters (letters a-z, number 0-9) with the exception of underscores. The usernames in user.text file do not contain any symbols, dashes or spaces.*
- *Password must contain character categories among the following:*
    - *Uppercase characters (A-Z)*
    - *Lowercase characters (a-z)*
    - *Digits (0-9)*
    - *Special charactores (~!@#$%^&*_-+=\|\(){}[]:;"'<>,.?/)*
2. The program will then present a login prompt, read one username, represent a password prompt, and after looking up the username's password in the hash table, will print either "Authentication successful" or "Authentication failure". The output might look something like this:

```
Username: alice
Password: password1
Authentication successful

Username: bob
Password: pass1
Authentication failure

Username: za_s
Password: IdontKnow
Authentication failure
```

Step 2 will be repeated until the end of the input data (EOF) is reached on the console input stream (cin). The EOF character on the Windows is the Ctrl + Z; on Linux systems and OS X is Ctrl + D.