

AP-AB Hashing Class

Your hash function should be determined by mapping the capital letters 'A' through 'Z' to the integers 1 - 26 (the NULL character is mapped to 0) for the **last three** letters of any string. There are different 27^3 combinations ('A' thru 'Z' and the Null make 27 different characters) which is 19,683, therefore it is possible to fit any combination of three capital letters into an integer by doing the following:

$$\text{"XYZ"} = X*27^2 + Y*27^1 + Z*27^0 = \text{Integer Value 0 to 19,682}$$

"XYZ" are the last three letters of the string to be hashed. If there are not three letters to hash, compute the integer value from right to left, that is the right most character is the 27^0 place value. The hash function to place the integer value into the correct array location is:

$$(\text{Integer Value} \% 1000) = \text{Hash Value}$$

If a collision occurs, use linear probing to resolve it. Here are some strings and their hashed values:

"X"	hashes to: 24
"AM"	hashes to: 40
"LOVE"	hashes to: 534
"HATE"	hashes to: 274
"LAJOLLA"	hashes to: 73

From the given formula we should see that the maximum size of the hash table to store the values in is 1000. Set a constant to this value, and use this constant for all computations.

You will be creating a "Hashing Class" to perform the functions listed below. You should use an enumerated type indicating the status of cell location. This enumerated type should be declared in the private section of the class. What the other type and functions should be declared in the private section? What functions should be public?

- Write a function to store a value in the hash table.
- Overload the << operator so that it displays all non-empty locations in the hash table. If the location is in use display the value stored there and it's location, if the location is a deleted value, display "DELETED". Have the display show only one entry per line.
- Write function to search for a value in the hash table. The function should return whether it was found or not, and the location if found in the hash table.
- Write a function to delete a value from the hash table. The function should return true if the value was found and deleted, or return false if the value to be deleted was not found in the hash table.
- Write function to clean up the hash table. Remove all deleted items and move appropriate items.

Your output must use the following input in the order indicated.

1. Input the following values in your hash table:
"DMV", "AIR", "FJ", "KEN", "TCSS", "KYZ", "QLB", "PRR", "APF", "RAR", "QVL",
"UYO", "QVN", "A", "FE", and "ZQ"
2. Display the hash table.
3. Search for the following values in your hash table:
"QVN", "A", "QLB", "KGB", "KEM" and "UYO"
4. Delete the following values from your hash table:
"APF", "ZQ" and "UYO"
5. Display the hash table.
6. Search for the following values in your hash table:
"APF", "FE", "ZQ", "QLB", "UYO" and "QVN"
7. Cleanup your hash table.
8. Display the hash table.