Basic Hash Maps

4 min

Now that we have all of the main ingredients for a hash map, let's put them all together. First, we need some sort of associated data that we're hoping to preserve. Second, we need an array of a fixed size to insert our data into. Lastly, we need a hash function that translates the keys of our array into indexes into the array. The storage location at the index given by a hash is called the *hash bucket*.

Let's use the following example for our hash map:

Key: Album Name	**Value: Release Year**
The Low End Theory	1991
Midnight Marauders	1993
Beats, Rhymes and Life	1996
The Love Movement	1998

Our map here relates to several A Tribe Called Quest studio albums with the year they were produced in. We'll need an array of at least size 4 to contain all of these elements. And a way to turn each album name into an index into that array.

For each album name, find that album's hash by performing the following calculation:

hash_value = ((# of lowercase 'a's in album name) + (# of number of lowercase 'e's in album name))

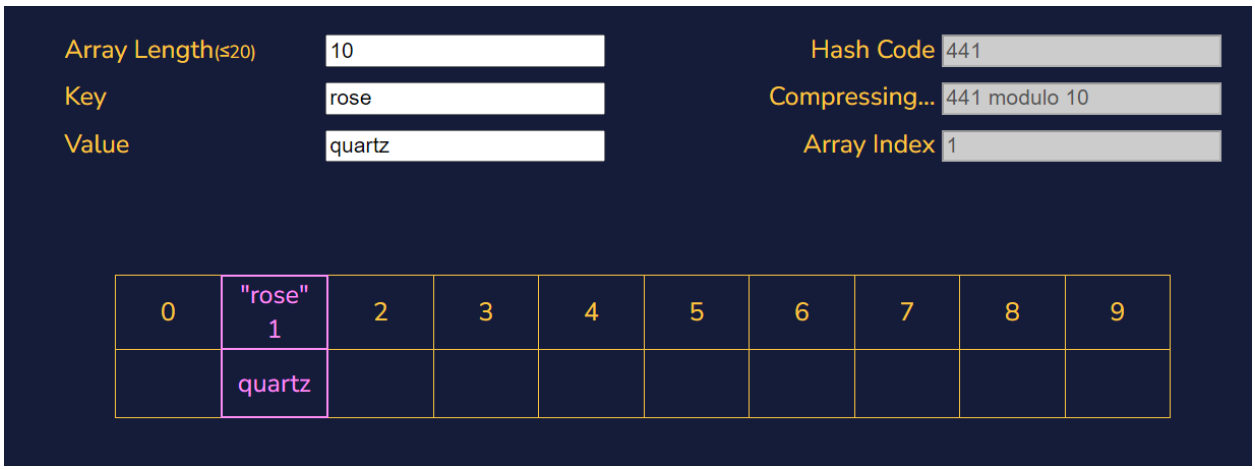
And then take that hash and calculate an array index by performing hash_value mod 4. Following these steps we get the following schema:

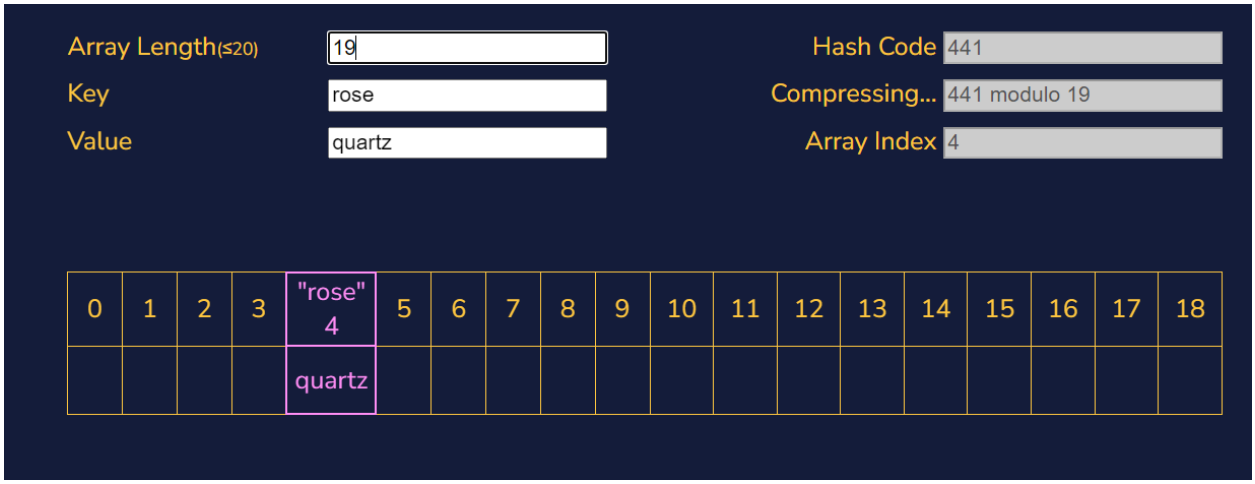
Album Name	**Hash**	**Hash mod 4**	**Release Year**
The Low End Theory	2	2	1991
Midnight Marauders	3	3	1993
Beats, Rhymes and Life	5	1	1996
The Love Movement	4	0	1998

First, the key is translated into the hash using our hashing function. Then, our hash map performs modulo arithmetic to turn the hash into an array index.

Instructions

Where would you save the value for a given key? It depends on the length of the array and the key itself. Update the values for those two to see how different keys and array lengths change the place a key is saved.


Array Length(≤20)
10
Key
rose
Value
quartz
Hash Code
441
Compressing...
441 modulo 10
Array Index
1
0
"rose"
1
2
3
4
5
6
7
8
9
quartz


Array Length(≤20)
19
Key
rose
Value
quartz
Hash Code
441
Compressing...
441 modulo 19
Array Index
4
0
1
2
3
"rose"
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
quartz