

Lab 3

Github Link

https://github.com/rusuraluca/lftc/tree/main/lftc_lab2

Docs

`class Node` for storing key-value pairs in the hash table

- `key`
 - key associated with the value
 - `value`
 - value associated with the key
 - `next`
 - reference to the next `Node` object in the linked list
 - used for handling collisions in the hash table
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`class HashTable` for representing the hash table data structure

- `capacity`: number
 - current capacity of the hash table, which starts with an initial capacity of 10
- `elmnt_no`: number
 - number of elements (key-value pairs) stored in the hash table
- `elmnt_list` = array<Node>
 - list used to store elements, with each index potentially holding a linked list of Node objects

`__init__`

- we initialize a hash table and set the `capacity` initially to 10, `elmnt_no` is 0 and `elmnt_list` is formed of 10 positions of None

`__str__`

- returns a string representation of the hash table

`hash(value)`

- calculates the hash code for a given value (key)
 - if the value is an integer, it calculates the hash code as the remainder of the integer when divided by the current capacity
 - if the value is a string, it calculates the hash code as the sum of the ASCII values of its characters, divided by the current capacity

`insert(key, value)`

- to insert a key-value pair into the hash table
 - if the load factor (ratio of elements to capacity) is greater than or equal to 2, it triggers a resize and rehash operation
 - it calculates the hash for the key and inserts the new `Node` into the appropriate position in the linked list at that index

`get(key)`

- retrieves the value associated with a given key
- it calculates the hash for the key, searches the linked list at that index, and returns the value if the key is found, if not found, it returns `None`

`resize_and_rehash()`

- called when the load factor exceeds 2
 - doubles the hash table capacity
 - it creates a deep copy of the existing element list, resets the element list with the new capacity, and reinserts the elements using the `insert` method

`get_position(key):`

- returns the index of the list where the key-value pair with the given key is stored