**Programming Project Report**

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**Academic Integrity Statement:** I pledge that I have neither given nor received unauthorized help on this programming assignment.

**Problem Statement:**

The goal of this programming assignment was for us to gain experience with the implementation and use of hash tables. The program inputs were the menu selection, the txt file being read into the linked list array, and also if the user wanted to insert a node, different parameters were prompted. The outputs consisted of printing out the nodes the user was looking for, or the whole list altogether. The only error handling required was with prompting GPA, and making sure it wasn’t negative and making sure that the menu selection was within the bounds 1-6.

**Design:**

I used a hash table and a linked list of consisting of StudentNode objects. I used the hashing algorithm to convert the name (key) into an index in the hash table. I also used linked list traversal to go through the nodes for the difference functions. Lastly, I also used input validation in the update function. This hashing was simple to implement and easy to understand. However, it still resulted in collisions for some input strings with the same sum. A pro of the input validation was that it was simple and effective to implement, but it would break if a string were to be inputted.

**Implementation:**

There was no sample code to start with. However, I began with the StudentNode class. Then I worked on the StudentList class. Next, the HashTable class. Next, the readFile function for the main. I used the print function to make sure the data was being read in properly. Then, I worked on the functions incrementally, beginning with the insertion, and search functions. Then the delete and update functions. Lastly, I added error checking after I made sure that the functions did what I wanted.

**Testing:**

First I tested the program with the basic input data that was reminiscent of the ones found in the given in the txt file. I made sure to check for the special cases for the menu and make sure that only 1-6 worked for the menu. Next, I made sure any entered GPA would be positive. Also, I needed the functions to print out a “Student not found” message if the node didn’t exist in the list. Everything worked as expected.

This is some sample input/output.

Homework 6 Menu:

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1. Insert

2. Delete

3. Update

4. Search

5. Print

6. Exit

Enter your choice (1-6):

* -5

Invalid choice. Please enter a number between 1 and 6.

Homework 6 Menu:

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1. Insert

2. Delete

3. Update

4. Search

5. Print

6. Exit

Enter your choice (1-6):

* 10

Invalid choice. Please enter a number between 1 and 6.

Homework 6 Menu:

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1. Insert

2. Delete

3. Update

4. Search

5. Print

6. Exit

Enter your choice (1-6):

* 2

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Deletion selected.

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Enter the name:

* Sankalp Pandey

Student not found

**Conclusions:**

The overall result of this assignment to gain experience with the implementation and use of hash tables. The programming project was a success. I could experiment with a more sophisticated hash function next time. Overall, the project took around 3 hours to complete.