Lab 10

Data Structures

Gabe Imes, Joe Schnizer, Eric Bridgens

The objectives covered in this lab was to create, modify, and use hash tables to store data. Hash tables are important because it creates a way to search for data with a time complexity of O(1). This data structure is very useful for a career in CS because when dealing with very large amounts of data a hash table makes searching for the data more efficient. They are also useful for when the number of items in a data structure is unknown. Instead of searching through the entire structure, hash tables allow you to find data based on the hash value that was created from that data’s value.

For task 2 we developed a hash table to store each part and used the SKU number for that part to create a hash key. To get the SKU number, we needed to include the “Part.h” header file in the header files for each hash table.

For task 3 we had to modify the test program from Lab 8 by changing the SKU from an int to a string to make it more compatible with the hash table. We also had to modify the user options in the menu.

Another objective of the lab was to compare the difference between linear probing and a chained hash table. Chained hash tables only require “n” comparisons when inserting an item, and only requires “n” number of items in the table. Whereas linear probing can have more comparisons than the number of elements in the list and requires additional empty spots in the hash table to avoid collisions. However, linear probing is easier to implement. Our results showed that linear probing required a substantially larger number of comparisons than chaining. We believe this is because chaining does not require any additional steps when there is a collision.

**Task 5 Results**

|  |  |  |
| --- | --- | --- |
| **Size of Hash Table** | Linear Probing | Chaining |
| 100 | 689 | 50 |
| 150 | 563 | 50 |
| 200 | 587 | 50 |
| 250 | 607 | 50 |

**Test Program**

Text

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