CSP2348 Data Structures

Tutorial 07: Hash Table Data Structures

Related Objectives from Unit Outline:

- Describe (arrays, linked lists, binary trees, and hash tables) data structures and analyse the complexity and performance of their associated algorithms.

Objectives:

1. To become familiar with the general properties of hash tables and their specific properties in Java;
2. To demonstrate the awareness of the principles of algorithms in hash table insertion, deletion, searching, merging, and sorting.

Tasks:

Complete the following.

Task 1: Consider a CBHT in which the keys are student identifiers (string of 6 digits). Assume the following number of buckets and hash function:

m = 100; *hash(id)* = first two digits of *id*

(a) Starting with an empty hash table, show the effect of successively adding the following student identifiers: 000014, 990021, 990019, 970036, 000015, 970012, 970023.

(b) What is the average number of comparisons when the resulting hash table is searched for each of these keys?

(c) Show the effect of deleting 000014 from the hash table.

(d) Discuss whether the given hash function is a right choice or not.

Task 2: Repeat Task 1 with an OBHT with double hashing, with the following second hash function

step(id) = last digits of *id*;

Task 3: Test the Java program WS0601 (Download the Java code from Blackboard).

a. Analyse the hash function given in the program;
b. Execute this program;
c. Draw sketches of OBHT and CBHT to show the executed result. Draw the search path as well if any collision occurs.

Task 4: Test the Java program WS0602 (Download the Java code from Blackboard).

a. Execute this program;
b. Discuss why there is no collision occurred in this program.