LAB SESSION 6
BUCKET HASHING

1. OBJECTIVE
The objectives of Lab 6 are to get students practice on a certain hashing method: bucket hashing.

2. INTRODUCTION
One implementation for closed hashing groups hash table slots into buckets. The $M$ slots of the hash table are divided into $B$ buckets, with each bucket consisting of $M/B$ slots. The hash function assigns each record to the first slot within one of the buckets. If this slot is already occupied, then the bucket slots are searched sequentially until an open slot is found. If a bucket is entirely full, then the record is stored in an overflow bucket of infinite capacity at the end of the table. All buckets share the same overflow bucket. A good implementation will use a hash function that distributes the records evenly among the buckets so that as few records as possible go into the overflow bucket.

When searching for a record, the first step is to hash the key to determine which bucket should contain the record. The records in this bucket are then searched. If the desired key value is not found and the bucket still has free slots, then the search is complete. If the bucket is full, then it is possible that the desired record is stored in the overflow bucket. In this case, the overflow bucket must be searched until the record is found or all records in the overflow bucket have been checked. If many records are in the overflow bucket, this will be an expensive process.

3. EXPERIMENTS AND EXERCISES
Examine the initial code given in files HashTable.h and HashTable.cpp. Accomplish the following tasks:

3.1. There are three hash functions mentioned in the code. Currently, only the modulo hash function is fully implemented. Implement the incomplete methods of midSquare and pseudoRandom. (Students can choose randomly two prime integers for the pseudoRandom).

3.2. In the initial code, the insert and search methods are just partiall implemented. They just simply process the first slot of the hashed bucket. Accomplish these methods as described in Section 2. Once done, try to insert and search some values to observe the results.