FAST NATIONAL UNIVERSITY OF COMPUTER & EMERGING SCIENCES

PESHAWAR CAMPUS

Data Structures Lab

Lab Task : Hashing

Q1: Implement Functions of Hashing using C++

You are tasked with designing and implementing a simple hash table in C++ to manage a library's book inventory. The library needs to efficiently store, retrieve, and delete information about the books, such as their titles and unique ISBN numbers. To do this, you'll use a hash table with separate chaining to handle collisions.

Problem Statement:

The library has a collection of books, each identified by a unique ISBN number. Choose a suitable initial size for the hash table. Your goal is to implement a hash table that can efficiently handle the following operations:

1. **Insert Book Information**: Add a new book to the library's inventory.
2. **Search for a Book**: Retrieve the details of a book using its ISBN number.
3. **Delete a Book**: Remove a book from the inventory using its ISBN number.

Requirements:

1. **Class Definition**:
    - Define a Book class with attributes isbn (string), title (string), and any other relevant information.
    - Define a HashTable class to manage the hash table operations.
2. **Hash Function**:
    - Implement a suitable hash function to map ISBN numbers to table indices. Consider using a simple string hashing technique that converts the ISBN into an integer and then uses modulo division.
3. **Collision Handling**:
    - Implement separate chaining to handle collisions. Use a linked list at each index to store books with the same hash value.
4. **Functions**:
    - void insert(Book book): Insert a new book into the hash table.
    - Book* search(string isbn): Search for a book by its ISBN and return a pointer to the Book object if found, otherwise return nullptr.
    - void deleteBook(string isbn): Delete a book from the hash table using its ISBN.