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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 7_COD_Question 1

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

Ravi is building a basic hash table to manage student roll numbers for quick lookup. He decides to use Linear Probing to handle collisions.

Implement a hash table using linear probing where:

The hash function is: index = roll_number % table_sizeOn collision, check subsequent indexes (i+1, i+2, ...) until an empty slot is found.

You need to:

Insert a list of n student roll numbers into the hash table.Print the final state of the hash table. If a slot is empty, print -1.

Input Format

The first line of the input contains two integers n and table_size, where n is the

number of roll numbers to be inserted, and table_size is the size of the hash table.

The second line contains n space-separated integers — the roll numbers to insert into the hash table.

Output Format

The output should print a single line with table_size space-separated integers representing the final state of the hash table after all insertions.

If any slot remains unoccupied, it should be represented as -1.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 4 7
50 700 76 85

Output: 700 50 85 -1 -1 -1 76

Answer

```
#include <stdio.h>

#define MAX 100

// You are using GCC


void initializeTable(int table[], int size) {
    for (int i = 0; i < size; i++) {
        table[i] = -1; // Initialize all slots to -1 (empty)
    }
}

int linearProbe(int table[], int size, int num) {
    int index = num % size; // Calculate initial index using hash function
    int originalIndex = index; // Store original index for loop control

    // Loop until we find an empty slot or return to the original index
    while (table[index] != -1) {
```

```
        index = (index + 1) % size; // Move to the next index
        if (index == originalIndex) {
            // If we looped back to the original index, the table is full
            return -1; // Indicate that the table is full
        }
    }
    return index; // Return the index of the empty slot
}

void insertIntoHashTable(int table[], int size, int arr[], int n) {
    for (int i = 0; i < n; i++) {
        int index = linearProbe(table, size, arr[i]);
        if (index != -1) {
            table[index] = arr[i]; // Insert the roll number at the found index
        }
    }
}

void printTable(int table[], int size) {
    for (int i = 0; i < size; i++) {
        printf("%d ", table[i]); // Print each slot in the hash table
    }
    printf("\n"); // New line at the end
}


int main() {
    int n, table_size;
    scanf("%d %d", &n, &table_size);

    int arr[MAX];
    int table[MAX];

    for (int i = 0; i < n; i++)
        scanf("%d", &arr[i]);

    initializeTable(table, table_size);
    insertIntoHashTable(table, table_size, arr, n);
    printTable(table, table_size);

    return 0;
}
```

Status : Correct *Marks : 10/10*