PIMPRI CHINCHWAD EDUCATION TRUST's.

PIMPRI CHINCHWAD COLLEGE OF ENGINEERING

(An Autonomous Institute)

Class : SY BTech **Acad. Yr. 2025-26** **Semester : I**

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Department: Computer Engineering **Division : A**

Course Name : Data Structures Laboratory **Code:BCE23PC02**

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Assignment No. 12

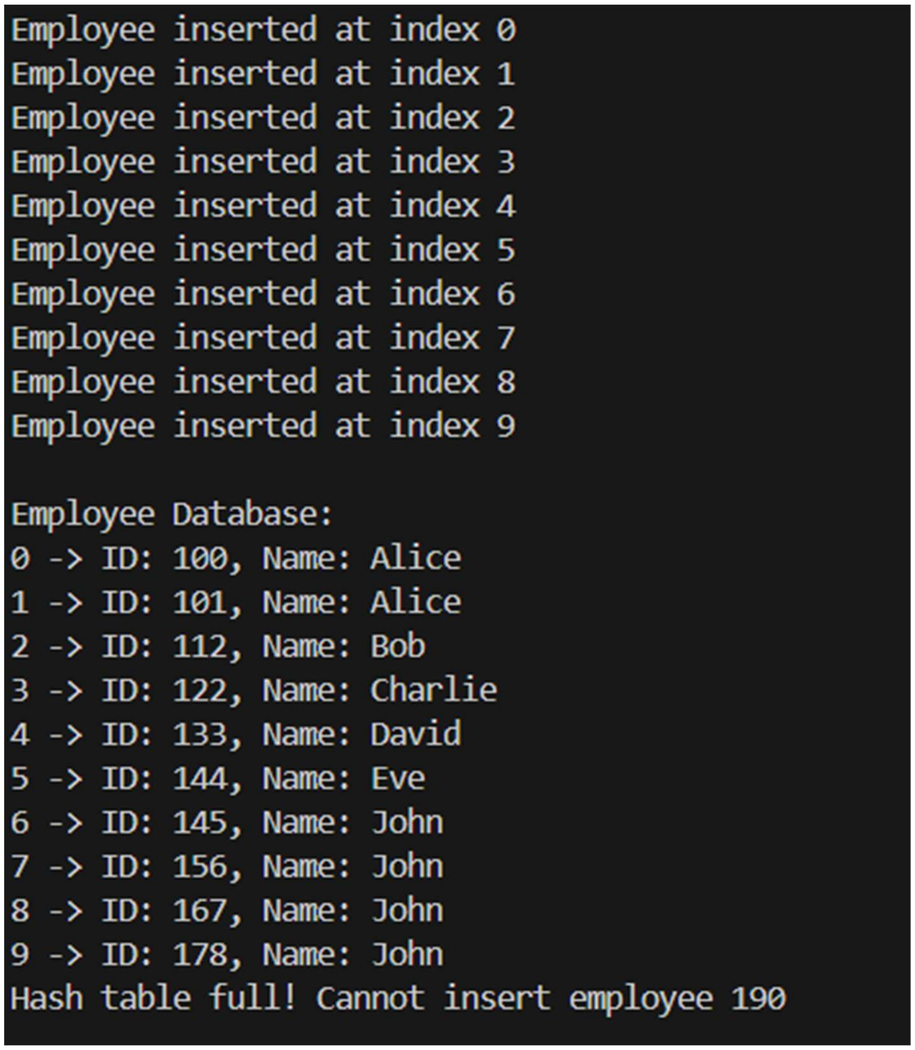
Problem Statement: Consider an employee database of N employees considering emp Id and name as data members. Make use of a hash table implementation to quickly look up the employer's id number. Implement above scenario using hashing and linear probing.

Source Code :

```
#include <iostream>
#include <string>
using namespace std;

#define SIZE 10 // Size of hash table

class Employee
{
   int empID;
   string name;

public:
   Employee()
   {
      empID = -1; // -1 indicates empty slot
      name = "";
   }

   void setEmployee(int id, const string &n)
   {
      empID = id;
      name = n;
```

```
    }

    int getID() const
    {
        return empID;
    }

    string getName() const
    {
        return name;
    }

    bool isEmpty() const
    {
        return empID == -1;
    }
};

class HashTable
{
    Employee table[SIZE];
    bool occupied[SIZE]; // to track filled slots

public:
    HashTable()
    {
        for (int i = 0; i < SIZE; i++)
            occupied[i] = false;
    }

    int hash(int key)
    {
        return key % SIZE;
    }

    void insert(int empID, const string &name)
    {
        int index = hash(empID); // empID%SIZE;
        int startIndex = index;

        while (occupied[index])
        {
            index = (index + 1) % SIZE;
            if (index == startIndex)
            {
                cout << "Hash table full! Cannot insert employee " << empID << endl;
                return;
            }
        }

        table[index].setEmployee(empID, name);
        occupied[index] = true;
        cout << "Employee inserted at index " << index << endl;
    }

    void display()
    {
        cout << "\nEmployee Database:\n";
        for (int i = 0; i < SIZE; i++)
        {
            if (occupied[i])
            {
                cout << i << " -> ID: " << table[i].getID()
                     << ", Name: " << table[i].getName() << endl;
            }
            else
                cout << i << " -> Empty" << endl;
        }
    }
};

int main()
{
    HashTable ht;
    ht.insert(100, "Alice");
    ht.insert(101, "Alice");
    ht.insert(112, "Bob");
    ht.insert(122, "Charlie");
    ht.insert(133, "David");
    ht.insert(144, "Eve");

    //  ht.display();
    ht.insert(145, "John");
    ht.insert(156, "John");
    ht.insert(167, "John");
    ht.insert(178, "John");

    ht.display();
    ht.insert(190, "John");
    return 0;
}
```

Screen Shot of Output :



```
Employee inserted at index 0
Employee inserted at index 1
Employee inserted at index 2
Employee inserted at index 3
Employee inserted at index 4
Employee inserted at index 5
Employee inserted at index 6
Employee inserted at index 7
Employee inserted at index 8
Employee inserted at index 9

Employee Database:
0 -> ID: 100, Name: Alice
1 -> ID: 101, Name: Alice
2 -> ID: 112, Name: Bob
3 -> ID: 122, Name: Charlie
4 -> ID: 133, Name: David
5 -> ID: 144, Name: Eve
6 -> ID: 145, Name: John
7 -> ID: 156, Name: John
8 -> ID: 167, Name: John
9 -> ID: 178, Name: John
Hash table full! Cannot insert employee 190
```

Conclusion: Hence we have implemented an Employee database using hashtable