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PRN : 123B1B234
Batch : D-1

Assignment No.11

Consider an employee database of N employees. Make use of a hash table implementation to quickly look up the employer's id number.

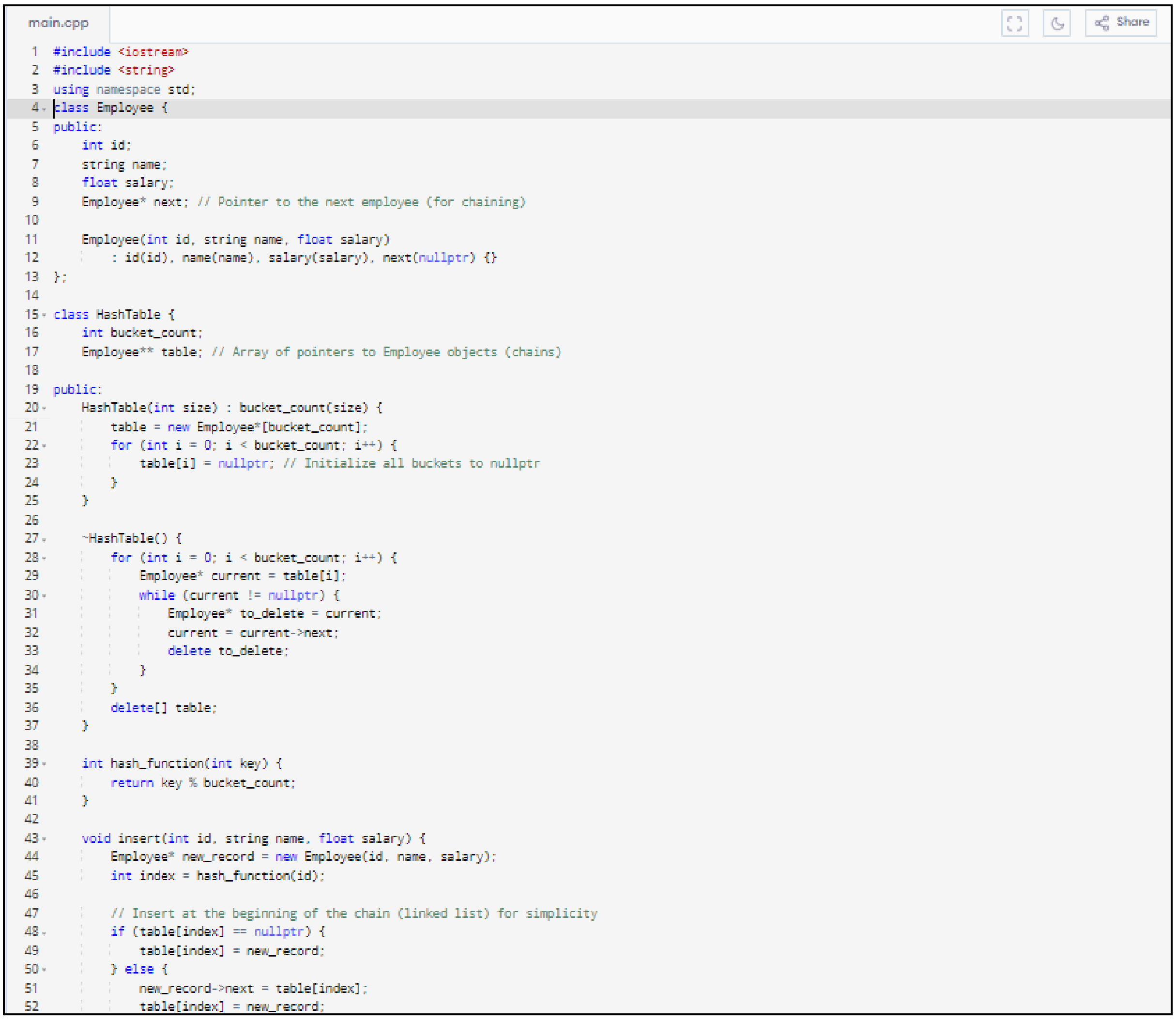
Code :

```
#include <iostream>
#include <string>
using namespace std;
class Employee {
public:
   int id;
   string name;
   float salary;
   Employee* next; // Pointer to the next employee (for chaining)

   Employee(int id, string name, float salary)
      : id(id), name(name), salary(salary), next(nullptr) {}
};

class HashTable {
   int bucket_count;
   Employee** table; // Array of pointers to Employee objects (chains)

public:
   HashTable(int size) : bucket_count(size) {
      table = new Employee*[bucket_count];
      for (int i = 0; i < bucket_count; i++) {
         table[i] = nullptr; // Initialize all buckets to nullptr
      }
   }

   ~HashTable() {
      for (int i = 0; i < bucket_count; i++) {
         Employee* current = table[i];
         while (current != nullptr) {
            Employee* to_delete = current;
            current = current->next;
```

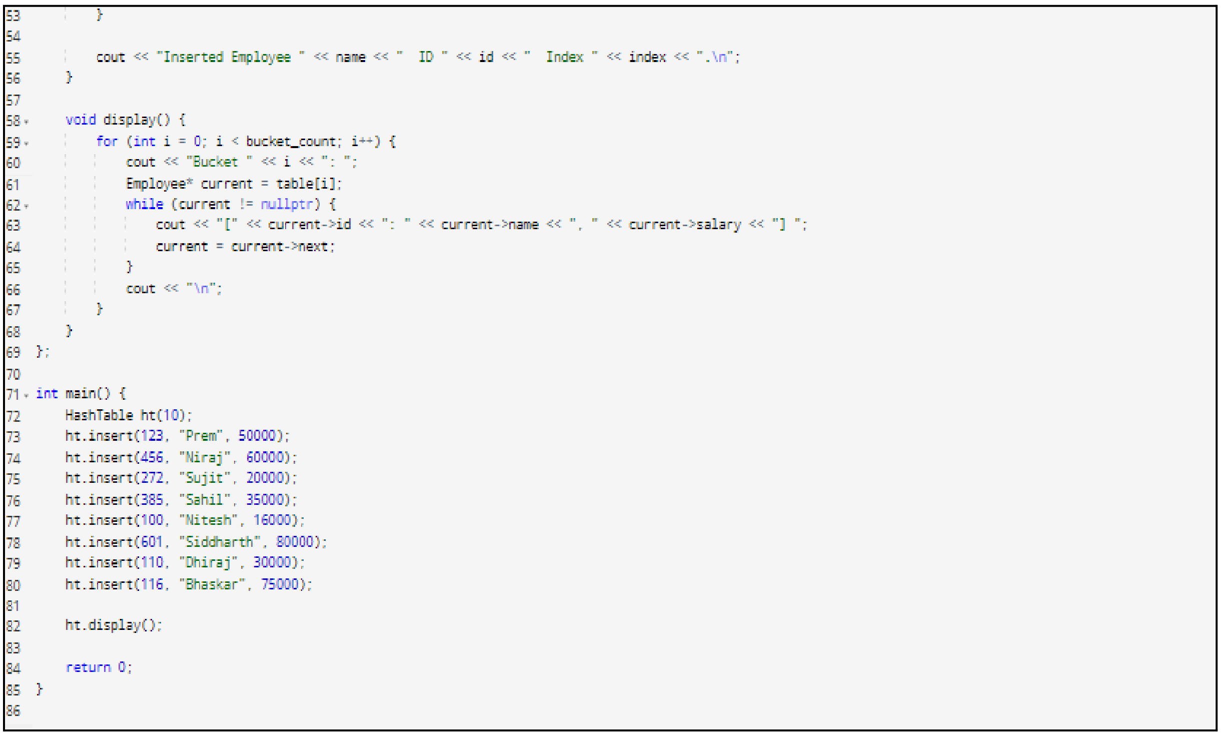
```
                delete to_delete;
            }
        }
        delete[] table;
    }

    int hash_function(int key) {
        return key % bucket_count;
    }

    void insert(int id, string name, float salary) {
        Employee* new_record = new Employee(id, name, salary);
        int index = hash_function(id);

        // Insert at the beginning of the chain (linked list) for simplicity
        if (table[index] == nullptr) {
            table[index] = new_record;
        } else {
            new_record->next = table[index];
            table[index] = new_record;
        }

        cout << "Inserted Employee " << name << "  ID " << id << "  Index " << index <<
".\n";
    }

    void display() {
        for (int i = 0; i < bucket_count; i++) {
            cout << "Bucket " << i << ": ";
            Employee* current = table[i];
            while (current != nullptr) {
                cout << "[" << current->id << ": " << current->name << ", " <<
current->salary << "] ";
                current = current->next;
            }
            cout << "\n";
        }
    }
};

int main() {
    HashTable ht(10);
    ht.insert(123, "Prem", 50000);
    ht.insert(456, "Niraj", 60000);
    ht.insert(272, "Sujit", 20000);
    ht.insert(385, "Sahil", 35000);
    ht.insert(100, "Nitesh", 16000);
    ht.insert(601, "Siddharth", 80000);
    ht.insert(110, "Dhiraj", 30000);
    ht.insert(116, "Bhaskar", 75000);

    ht.display();

    return 0;
}
```

Output :

```
Inserted Employee Prem  ID 123  Index 3.
Inserted Employee Niraj  ID 456  Index 6.
Inserted Employee Sujit  ID 272  Index 2.
Inserted Employee Sahil  ID 385  Index 5.
Inserted Employee Nitesh  ID 100  Index 0.
Inserted Employee Siddharth  ID 601  Index 1.
Inserted Employee Dhiraj  ID 110  Index 0.
Inserted Employee Bhaskar  ID 116  Index 6.
Bucket 0: [110: Dhiraj, 30000] [100: Nitesh, 16000]
Bucket 1: [601: Siddharth, 80000]
Bucket 2: [272: Sujit, 20000]
Bucket 3: [123: Prem, 50000]
Bucket 4:
Bucket 5: [385: Sahil, 35000]
Bucket 6: [116: Bhaskar, 75000] [456: Niraj, 60000]
Bucket 7:
Bucket 8:
Bucket 9:
```



```cpp
#include <iostream>
#include <string>
using namespace std;
class Employee {
public:
    int id;
    string name;
    float salary;
    Employee* next; // Pointer to the next employee (for chaining)

    Employee(int id, string name, float salary)
        : id(id), name(name), salary(salary), next(nullptr) {}
};

class HashTable {
    int bucket_count;
    Employee** table; // Array of pointers to Employee objects (chains)

public:
    HashTable(int size) : bucket_count(size) {
        table = new Employee*[bucket_count];
        for (int i = 0; i < bucket_count; i++) {
            table[i] = nullptr; // Initialize all buckets to nullptr
        }
    }

    ~HashTable() {
        for (int i = 0; i < bucket_count; i++) {
            Employee* current = table[i];
            while (current != nullptr) {
                Employee* to_delete = current;
                current = current->next;
                delete to_delete;
            }
        }
        delete[] table;
    }

    int hash_function(int key) {
        return key % bucket_count;
    }

    void insert(int id, string name, float salary) {
        Employee* new_record = new Employee(id, name, salary);
        int index = hash_function(id);

        // Insert at the beginning of the chain (linked list) for simplicity
        if (table[index] == nullptr) {
            table[index] = new_record;
        } else {
            new_record->next = table[index];
            table[index] = new_record;
```



```cpp
        }

        cout << "Inserted Employee " << name << "  ID " << id << "  Index " << index << ".\n";
    }

    void display() {
        for (int i = 0; i < bucket_count; i++) {
            cout << "Bucket " << i << ": ";
            Employee* current = table[i];
            while (current != nullptr) {
                cout << "[" << current->id << ": " << current->name << ", " << current->salary << "] ";
                current = current->next;
            }
            cout << "\n";
        }
    }
};

int main() {
    HashTable ht(10);
    ht.insert(123, "Prem", 50000);
    ht.insert(456, "Niraj", 60000);
    ht.insert(272, "Sujit", 20000);
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    ht.insert(110, "Dhiraj", 30000);
    ht.insert(116, "Bhaskar", 75000);

    ht.display();

    return 0;
}
```

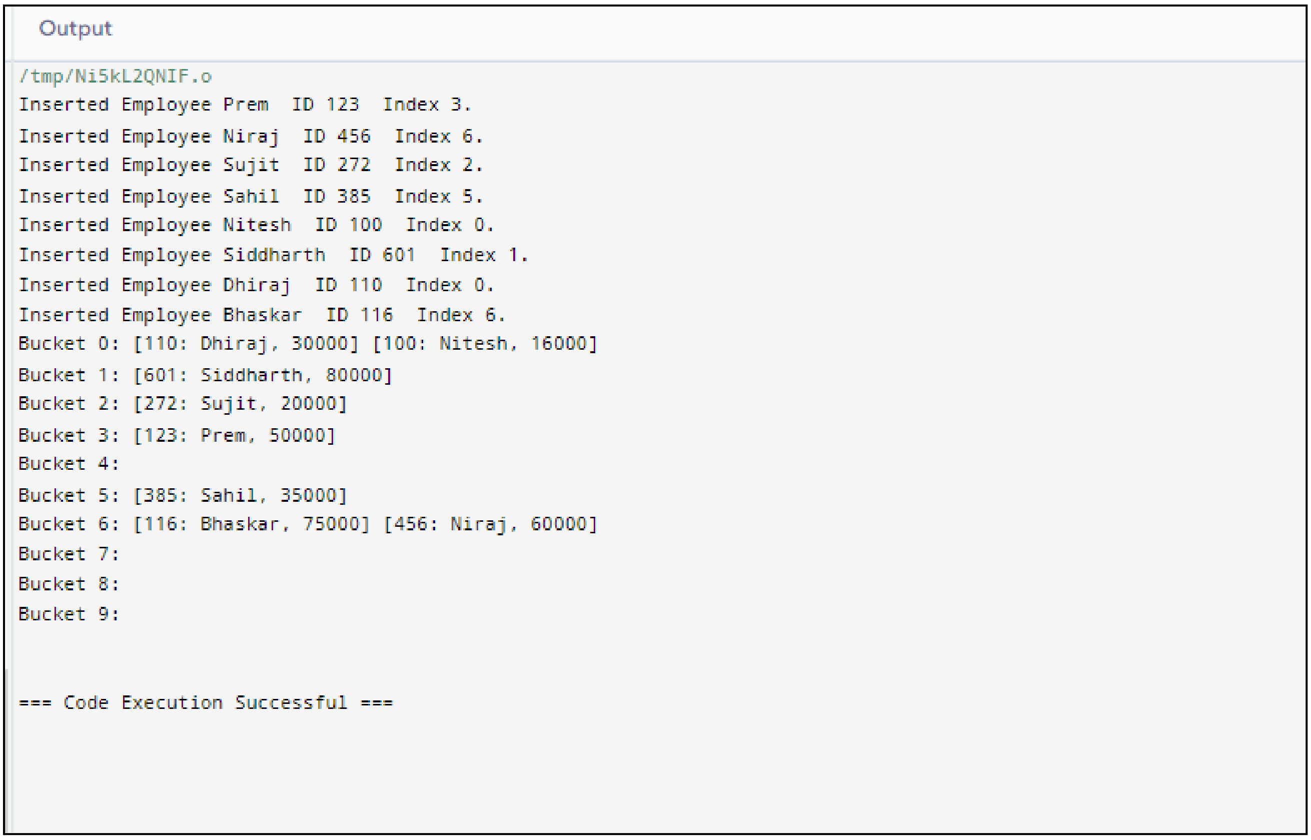

```
/tmp/Ni5kL2QNIF.o
Inserted Employee Prem  ID 123  Index 3.
Inserted Employee Niraj  ID 456  Index 6.
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Bucket 0: [110: Dhiraj, 30000] [100: Nitesh, 16000]
Bucket 1: [601: Siddharth, 80000]
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Bucket 3: [123: Prem, 50000]
Bucket 4:
Bucket 5: [385: Sahil, 35000]
Bucket 6: [116: Bhaskar, 75000] [456: Niraj, 60000]
Bucket 7:
Bucket 8:
Bucket 9:


=== Code Execution Successful ===
```