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EX NO16

IMPLEMENTATION OF COLLISION RESOLUTION TECHNIQUE

```
#include <stdio.h>
#include <stdlib.h>
#include <stdbool.h>

#define SIZE 10 // Size of the hash table

// Structure to represent a node in the hash table
struct Node {
    int key;
    int value;
};

// Structure to represent the hash table
struct HashTable {
    struct Node* array[SIZE];
};

// Function to create a new node
struct Node* createNode(int key, int value) {
    struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));
    newNode->key = key;
    newNode->value = value;
    return newNode;
}

// Function to create a hash table
struct HashTable* createHashTable() {
    struct HashTable* hashTable = (struct HashTable*)malloc(sizeof(struct HashTable));
    for (int i = 0; i < SIZE; i++) {
        hashTable->array[i] = NULL;
    }
    return hashTable;
}

// Function to calculate the hash index
int hash(int key) {
    return key % SIZE;
}
```

```
// Function to perform open addressing (linear probing) for collision resolution
```

```
void linearProbing(struct HashTable* hashTable, int key, int value) {  
    int index = hash(key);  
    while (hashTable->array[index] != NULL) {  
        index = (index + 1) % SIZE; // Linear probing  
    }  
    hashTable->array[index] = createNode(key, value);  
}
```

```
// Function to perform closed addressing (chaining) for collision resolution
```

```
void chaining(struct HashTable* hashTable, int key, int value) {  
    int index = hash(key);  
    struct Node* newNode = createNode(key, value);  
    if (hashTable->array[index] == NULL) {  
        hashTable->array[index] = newNode;  
    } else {  
        // Adding to the end of the linked list at the index  
        struct Node* temp = hashTable->array[index];  
        while (temp->next != NULL) {  
            temp = temp->next;  
        }  
        temp->next = newNode;  
    }  
}
```

```
// Function to display the hash table
```

```
void display(struct HashTable* hashTable) {  
    for (int i = 0; i < SIZE; i++) {  
        printf("%d: ", i);  
        struct Node* temp = hashTable->array[i];  
        while (temp != NULL) {  
            printf("(%d, %d) ", temp->key, temp->value);  
            temp = temp->next;  
        }  
        printf("\n");  
    }  
}
```

```
int main() {  
    struct HashTable* hashTable_linear = createHashTable();  
    struct HashTable* hashTable_chaining = createHashTable();
```

```
    // Inserting elements using linear probing
```

```
linearProbing(hashTable_linear, 10, 20);
linearProbing(hashTable_linear, 21, 30);
linearProbing(hashTable_linear, 22, 40);
linearProbing(hashTable_linear, 23, 50);
linearProbing(hashTable_linear, 33, 60);

// Inserting elements using chaining
chaining(hashTable_chaining, 10, 20);
chaining(hashTable_chaining, 21, 30);
chaining(hashTable_chaining, 22, 40);
chaining(hashTable_chaining, 23, 50);
chaining(hashTable_chaining, 33, 60);

printf("Hash Table with Linear Probing:\n");
display(hashTable_linear);

printf("\nHash Table with Chaining:\n");
display(hashTable_chaining);

return 0;
}
```