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**COURSE NAME: DATA STRUCTURES FOR MODERN COMPUTING SYSTEMS**

**COURSE CODE: CSA0302**

Experiment 22 : Hashing – Separate Chaining

Code:

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

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

```
#define SIZE 10 // Hash table size
```

```
struct Node {
```

```
    int data;
```

```
    struct Node* next;
```

```
};
```

```
struct Node* hashTable[SIZE];
```

```
// Function to create a new node
```

```
struct Node* createNode(int data) {
```

```
    struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));
```

```
    newNode->data = data;
```

```
    newNode->next = NULL;
```

```
    return newNode;
```

```
}
```

```
// Hash function
```

```
int hashFunction(int key) {
```

```
    return key % SIZE;
```

```
}
```

```
// Insert an element
```

```
void insert(int key) {  
    int index = hashFunction(key);  
    struct Node* newNode = createNode(key);  
    if (hashTable[index] == NULL) {  
        hashTable[index] = newNode;  
    } else {  
        struct Node* temp = hashTable[index];  
        while (temp->next != NULL)  
            temp = temp->next;  
        temp->next = newNode;  
    }  
    printf("%d inserted at index %d\n", key, index);  
}
```

```
// Search for an element
```

```
void search(int key) {  
    int index = hashFunction(key);  
    struct Node* temp = hashTable[index];  
    while (temp != NULL) {  
        if (temp->data == key) {  
            printf("%d found at index %d\n", key, index);  
            return;  
        }  
        temp = temp->next;  
    }  
    printf("%d not found in hash table\n", key);  
}
```

```
// Display hash table
```

```

void display() {
    printf("\n--- Hash Table ---\n");
    for (int i = 0; i < SIZE; i++) {
        printf("[%d] -> ", i);
        struct Node* temp = hashTable[i];
        while (temp != NULL) {
            printf("%d -> ", temp->data);
            temp = temp->next;
        }
        printf("NULL\n");
    }
}

```

// Main menu

```

int main() {
    int choice, key;

    while (1) {
        printf("\n--- Hashing (Separate Chaining) Menu ---\n");
        printf("1. Insert\n2. Search\n3. Display\n4. Exit\n");
        printf("Enter your choice: ");
        scanf("%d", &choice);

        switch (choice) {
            case 1:
                printf("Enter value to insert: ");
                scanf("%d", &key);
                insert(key);
                break;
            case 2:
                printf("Enter value to search: ");

```

```
        scanf("%d", &key);
        search(key);
        break;
    case 3:
        display();
        break;
    case 4:
        exit(0);
    default:
        printf("Invalid choice!\n");
    }
}

return 0;
}
```

Output:

```
--- Hashing (Separate Chaining) Menu ---
1. Insert
2. Search
3. Display
4. Exit
Enter your choice: 1
Enter value to insert: 49
49 inserted at index 9

--- Hashing (Separate Chaining) Menu ---
1. Insert
2. Search
3. Display
4. Exit
Enter your choice: 3

--- Hash Table ---
[0] -> NULL
[1] -> NULL
[2] -> 22 -> NULL
[3] -> NULL
[4] -> NULL
[5] -> 25 -> 15 -> NULL
[6] -> 66 -> NULL
[7] -> NULL
[8] -> NULL
[9] -> 49 -> NULL
```