```c
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
// Linked List node
struct node
{
    // key is string
    char *key;
    // value is also string
    char *value;
    struct node *next;
};
// like constructor
void setNode(struct node *node, char *key, char *value)
{
    node->key = key;
    node->value = value;
    node->next = NULL;
    return;
};
struct hashMap
{
    // Current number of elements in hashMap
    // and capacity of hashMap
    int numOfElements, capacity;
    // hold base address array of linked list
    struct node **arr;
};
// like constructor
void initializeHashMap(struct hashMap *mp)
{
    // Default capacity in this case
    mp->capacity = 100;
    mp->numOfElements = 0;
    // array of size = 1
    mp->arr = (struct node **)malloc(sizeof(struct node *) * mp->capacity);
    return;
}
int hashFunction(struct hashMap *mp, char *key)
{
    int bucketIndex;
    int sum = 0, factor = 31;
    for (int i = 0; i < strlen(key); i++)
    {
        // sum = sum + (ascii value of
        // char * (primeNumber ^ x))...
        // where x = 1, 2, 3....n
        sum = ((sum % mp->capacity) + (((int)key[i]) * factor) % mp->capacity) % mp->capacity;
        // factor = factor * prime
        // number....(prime
        // number) ^ x
        factor = ((factor % __INT16_MAX__) * (31 % __INT16_MAX__)) % __INT16_MAX__;
    }
    bucketIndex = sum;
    return bucketIndex;
}
void insert(struct hashMap *mp, char *key, char *value)
{
    // Getting bucket index for the given
    // key - value pair
    int bucketIndex = hashFunction(mp, key);
    struct node *newNode = (struct node *)malloc(
        // Creating a new node
        sizeof(struct node));
    // Setting value of node
    setNode(newNode, key, value);
    // Bucket index is empty....no collision
    if (mp->arr[bucketIndex] == NULL)
    {
        mp->arr[bucketIndex] = newNode;
    }
    // Collision
    else
    {
        // Adding newNode at the head of
```

```
        // linked list which is present
        // at bucket index....insertion at
        // head in linked list
        newNode->next = mp->arr[bucketIndex];
        mp->arr[bucketIndex] = newNode;
    }
    return;
}
void delete(struct hashMap *mp, char *key)
{
    // Getting bucket index for the
    // given key
    int bucketIndex = hashFunction(mp, key);
    struct node *prevNode = NULL;
    // Points to the head of
    // linked list present at
    // bucket index
    struct node *currNode = mp->arr[bucketIndex];
    while (currNode != NULL)
    {
        // Key is matched at delete this
        // node from linked list
        if (strcmp(key, currNode->key) == 0)
        {
            // Head node
            // deletion
            if (currNode == mp->arr[bucketIndex])
            {
                mp->arr[bucketIndex] = currNode->next;
            }
            // Last node or middle node
            else
            {
                prevNode->next = currNode->next;
            }
            free(currNode);
            break;
        }
        prevNode = currNode;
        currNode = currNode->next;
    }
    return;
}
char *search(struct hashMap *mp, char *key)
{
    // Getting the bucket index
    // for the given key
    int bucketIndex = hashFunction(mp, key);
    // Head of the linked list
    // present at bucket index
    struct node *bucketHead = mp->arr[bucketIndex];
    while (bucketHead != NULL)
    {
        // Key is found in the hashMap
        if (bucketHead->key == key)
        {
            return bucketHead->value;
        }
        bucketHead = bucketHead->next;
    }
    // If no key found in the hashMap
    // equal to the given key
    char *errorMssg = (char *)malloc(sizeof(char) * 25);
    errorMssg = "Oops! No data found.\n";
    return errorMssg;
}
// Drivers code
int main()
{
    // Initialize the value of mp
    struct hashMap *mp = (struct hashMap *)malloc(sizeof(struct hashMap));
    initializeHashMap(mp);
    insert(mp, "Yogaholic", "Anjali");
    insert(mp, "pluto14", "Vartika");
    insert(mp, "elite_Programmer", "Manish");
```

```
    insert(mp, "GFG", "BITS");
    insert(mp, "decentBoy", "Mayank");
    printf("%s\n", search(mp, "elite_Programmer"));
    printf("%s\n", search(mp, "Yogaholic"));
    printf("%s\n", search(mp, "pluto14"));
    printf("%s\n", search(mp, "decentBoy"));
    printf("%s\n", search(mp, "GFG"));
    // Key is not inserted
    printf("%s\n", search(mp, "randomKey"));
    printf("\nAfter deletion : \n");
    // Deletion of key
    delete (mp, "decentBoy");
    printf("%s\n", search(mp, "decentBoy"));
    return 0;
}
```