BCSE202P -
Data Structures and Algorithms

Digital Assignment – 2

Name: Dhruv Rajeshkumar Shah
Registration No – 21BCE0611

1 . Write a menu driven program to perform following functions in a singly linked list.

i) Insertion in the beginning of the list

ii) Insertion at the end of the list

iii) Insertion in a particular location of the list

iv) Deletion based on a particular value

v) Deletion based on a particular location

vi) Deleting an element at the beginning

vii) Deleting an element at the end of the list

viii) Search an element

ix) Reverse the list

x) Count the number of even and odd numbers in the list

xi) Display the contents of the list

CODE

```c
// DSA
// DA-2
// Dhruv Rajeshkumar Shah
// 21BCE0611

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

// Linkedlist node
struct node
{
    int value;
    struct node *next;
};

// Function to create a new node
struct node *newNode(int value)
{
    struct node *new_node = (struct node *)malloc(sizeof(struct node));
    new_node->value = value;
    new_node->next = NULL;
    return new_node;
}

// Function to insert a new node at the beginning of the linkedlist
```

```c
struct node *insertAtBeginning(struct node *head, int value)
{
    struct node *new_node = newNode(value);
    new_node->next = head;
    head = new_node;
    return head;
}

// Function to insert a new node at the end of the linkedlist
struct node *insertAtEnd(struct node *head, int value)
{
    struct node *new_node = newNode(value);
    if (head == NULL)
    {
        head = new_node;
        return head;
    }
    struct node *temp = head;
    while (temp->next != NULL)
    {
        temp = temp->next;
    }
    temp->next = new_node;
    return head;
}

// Function to insert a new node at the given position of the linkedlist
struct node *insertAtPosition(struct node *head, int value, int position)
{
    struct node *new_node = newNode(value);
    if (position == 1)
    {
        new_node->next = head;
        head = new_node;
        return head;
    }
    struct node *temp = head;
    for (int i = 1; i < position - 1; i++)
    {
        temp = temp->next;
    }
    new_node->next = temp->next;
    temp->next = new_node;
    return head;
}

// Function to delete a node for a given value
struct node *deleteNode(struct node *head, int value)
```

```
{
    struct node *temp = head;
    if (temp->value == value)
    {
        head = temp->next;
        free(temp);
        return head;
    }
    while (temp->next->value != value)
    {
        temp = temp->next;
    }
    struct node *temp2 = temp->next;
    temp->next = temp->next->next;
    free(temp2);
    return head;
}

// Function to delete a node for a given position
struct node *deleteNodeAtPosition(struct node *head, int position)
{
    struct node *temp = head;
    if (position == 1)
    {
        head = temp->next;
        free(temp);
        return head;
    }
    for (int i = 1; i < position - 1; i++)
    {
        temp = temp->next;
    }
    struct node *temp2 = temp->next;
    temp->next = temp->next->next;
    free(temp2);
    return head;
}

// Function to delete a node at the beginning of the linkedlist
struct node *deleteAtBeginning(struct node *head)
{
    struct node *temp = head;
    head = temp->next;
    free(temp);
    return head;
}

// Function to delete a node at the end of the linkedlist
```

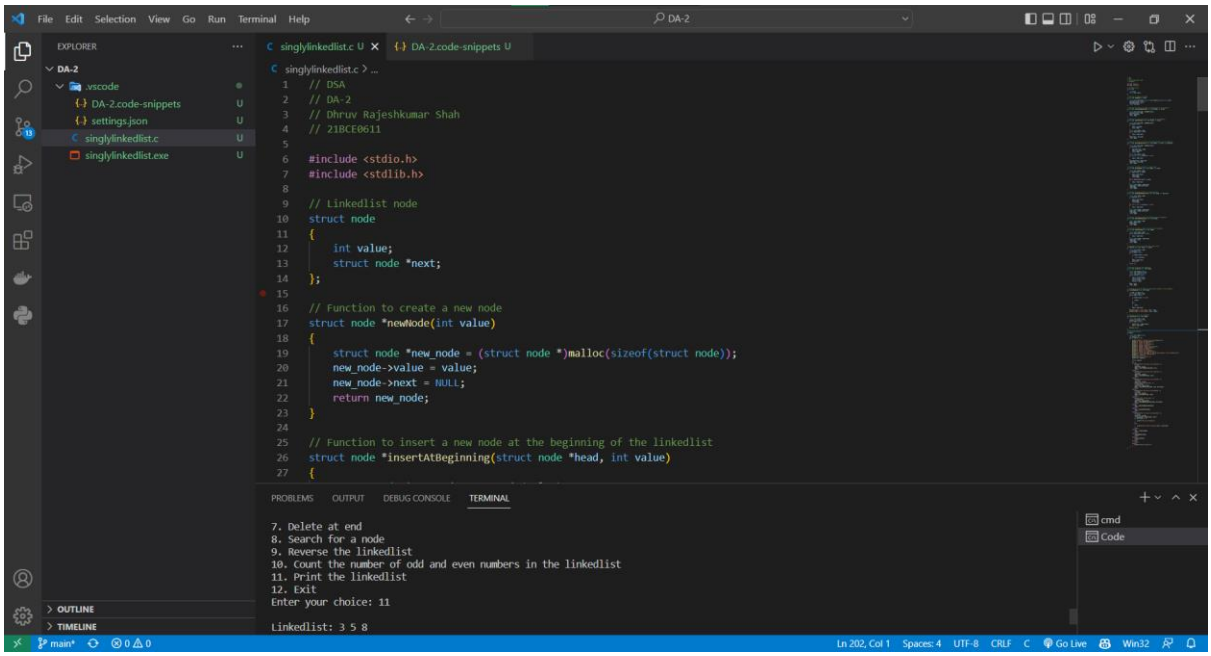
```c
struct node *deleteAtEnd(struct node *head)
{
    struct node *temp = head;
    while (temp->next->next != NULL)
    {
        temp = temp->next;
    }
    struct node *temp2 = temp->next;
    temp->next = NULL;
    free(temp2);
    return head;
}

// Function to search for a node with a given value
int search(struct node *head, int value)
{
    struct node *temp = head;
    int position = 1;
    while (temp != NULL)
    {
        if (temp->value == value)
        {
            return position;
        }
        temp = temp->next;
        position++;
    }
    return -1;
}

// Function to reverse the linkedlist
struct node *reverse(struct node *head)
{
    struct node *prev = NULL;
    struct node *current = head;
    struct node *next = NULL;
    while (current != NULL)
    {
        next = current->next;
        current->next = prev;
        prev = current;
        current = next;
    }
    head = prev;
    return head;
}

// Function to count the number of odd and even numbers in the linkedlist
```

```c
void countOddEven(struct node *head)
{
    int odd = 0, even = 0;
    struct node *temp = head;
    while (temp != NULL)
    {
        if (temp->value % 2 == 0)
        {
            even++;
        }
        else
        {
            odd++;
        }
        temp = temp->next;
    }
    printf("Number of odd numbers: %d\n", odd);
    printf("Number of even numbers: %d\n", even);
}

// Function to print the linkedlist
void printList(struct node *head)
{
    struct node *temp = head;
    printf("\nLinkedlist: ");
    while (temp != NULL)
    {
        printf("%d ", temp->value);
        temp = temp->next;
    }
    printf("\n\n");
}

// Menu driven program
int main()
{
    struct node *head = NULL;
    int choice = 0;
    while (choice != 12)
    {
        printf("\nEnter a choice from the following:\n");
        printf("1. Insert at beginning\n");
        printf("2. Insert at end\n");
        printf("3. Insert at position\n");
        printf("4. Delete a node\n");
        printf("5. Delete a node at position\n");
        printf("6. Delete at beginning\n");
        printf("7. Delete at end\n");
```

```
        printf("8. Search for a node\n");
        printf("9. Reverse the linkedlist\n");
        printf("10. Count the number of odd and even numbers in the
linkedlist\n");
        printf("11. Print the linkedlist\n");
        printf("12. Exit\n");
        printf("Enter your choice: ");
        scanf("%d", &choice);

        switch (choice)
        {
        case 1:
            printf("Enter the value to be inserted: ");
            int val;
            scanf("%d", &val);
            head = insertAtBeginning(head, val);
            break;
        case 2:
            printf("Enter the value to be inserted: ");
            int val2;
            scanf("%d", &val2);
            head = insertAtEnd(head, val2);
            break;
        case 3:
            printf("Enter the value to be inserted: ");
            int val3;
            scanf("%d", &val3);
            printf("Enter the position: ");
            int position3;
            scanf("%d", &position3);
            head = insertAtPosition(head, val3, position3);
            break;
        case 4:
            printf("Enter the value to be deleted: ");
            int val4;
            scanf("%d", &val4);
            head = deleteNode(head, val4);
            break;
        case 5:
            printf("Enter the position: ");
            int position5;
            scanf("%d", &position5);
            head = deleteNodeAtPosition(head, position5);
            break;
        case 6:
            head = deleteAtBeginning(head);
            break;
        case 7:
```

```
            head = deleteAtEnd(head);
            break;
        case 8:
            printf("Enter the value to be searched: ");
            int val8;
            scanf("%d", &val8);
            int position8 = search(head, val8);
            if (position8 == -1)
            {
                printf("Value not found\n");
            }
            else
            {
                printf("Value found at position %d\n", position8);
            }
            break;
        case 9:
            head = reverse(head);
            break;
        case 10:
            countOddEven(head);
            break;
        case 11:
            printList(head);
            break;
        case 12:
            break;
        default:
            printf("Invalid choice\n");
        }
    }
}
```

SCREENSHOT OF CODE



OUTPUT

```
C:\Dhruv\VIT\Semester-3\DSA\Lab\DA-2>cd "c:\Dhruv\VIT\Semester-3\DSA\Lab\DA-2\" && gcc singlylinkedlist.c -o singlylinkedlist && "
IT\Semester-3\DSA\Lab\DA-2\"singlylinkedlist

Enter a choice from the following:
1. Insert at beginning
2. Insert at end
3. Insert at position
4. Delete a node
5. Delete a node at position
6. Delete at beginning
7. Delete at end
8. Search for a node
9. Reverse the linkedlist
10. Count the number of odd and even numbers in the linkedlist
11. Print the linkedlist
12. Exit
Enter your choice: 1
Enter the value to be inserted: 5

Enter a choice from the following:
1. Insert at beginning
2. Insert at end
3. Insert at position
4. Delete a node
5. Delete a node at position
6. Delete at beginning
7. Delete at end
8. Search for a node
9. Reverse the linkedlist
10. Count the number of odd and even numbers in the linkedlist
11. Print the linkedlist
12. Exit
Enter your choice: 2
Enter the value to be inserted: 9

Enter a choice from the following:
1. Insert at beginning
2. Insert at end
3. Insert at position
4. Delete a node
5. Delete a node at position
6. Delete at beginning
7. Delete at end
8. Search for a node
9. Reverse the linkedlist
```

```
10. Count the number of odd and even numbers in the linkedlist
11. Print the linkedlist
12. Exit
Enter your choice: 3
Enter the value to be inserted: 0
Enter the position: 1

Enter a choice from the following:
1. Insert at beginning
2. Insert at end
3. Insert at position
4. Delete a node
5. Delete a node at position
6. Delete at beginning
7. Delete at end
8. Search for a node
9. Reverse the linkedlist
10. Count the number of odd and even numbers in the linkedlist
11. Print the linkedlist
12. Exit
Enter your choice: 11

Linkedlist: 0 5 9


Enter a choice from the following:
1. Insert at beginning
2. Insert at end
3. Insert at position
4. Delete a node
5. Delete a node at position
6. Delete at beginning
7. Delete at end
8. Search for a node
9. Reverse the linkedlist
10. Count the number of odd and even numbers in the linkedlist
11. Print the linkedlist
12. Exit
Enter your choice: 1
Enter the value to be inserted: 8

Enter a choice from the following:
1. Insert at beginning
2. Insert at end
3. Insert at position
```

```
4. Delete a node
5. Delete a node at position
6. Delete at beginning
7. Delete at end
8. Search for a node
9. Reverse the linkedlist
10. Count the number of odd and even numbers in the linkedlist
11. Print the linkedlist
12. Exit
Enter your choice: 2
Enter the value to be inserted: 3

Enter a choice from the following:
1. Insert at beginning
2. Insert at end
3. Insert at position
4. Delete a node
5. Delete a node at position
6. Delete at beginning
7. Delete at end
8. Search for a node
9. Reverse the linkedlist
10. Count the number of odd and even numbers in the linkedlist
11. Print the linkedlist
12. Exit
Enter your choice: 11

Linkedlist: 8 0 5 9 3


Enter a choice from the following:
1. Insert at beginning
2. Insert at end
3. Insert at position
4. Delete a node
5. Delete a node at position
6. Delete at beginning
7. Delete at end
8. Search for a node
9. Reverse the linkedlist
10. Count the number of odd and even numbers in the linkedlist
11. Print the linkedlist
12. Exit
Enter your choice: 10
Number of odd numbers: 3
```

```
Number of even numbers: 2

Enter a choice from the following:
1. Insert at beginning
2. Insert at end
3. Insert at position
4. Delete a node
5. Delete a node at position
6. Delete at beginning
7. Delete at end
8. Search for a node
9. Reverse the linkedlist
10. Count the number of odd and even numbers in the linkedlist
11. Print the linkedlist
12. Exit
Enter your choice: 4
Enter the value to be deleted: 0

Enter a choice from the following:
1. Insert at beginning
2. Insert at end
3. Insert at position
4. Delete a node
5. Delete a node at position
6. Delete at beginning
7. Delete at end
8. Search for a node
9. Reverse the linkedlist
10. Count the number of odd and even numbers in the linkedlist
11. Print the linkedlist
12. Exit
Enter your choice: 11

Linkedlist: 8 5 9 3


Enter a choice from the following:
1. Insert at beginning
2. Insert at end
3. Insert at position
4. Delete a node
5. Delete a node at position
6. Delete at beginning
7. Delete at end
8. Search for a node
```

```
9. Reverse the linkedlist
10. Count the number of odd and even numbers in the linkedlist
11. Print the linkedlist
12. Exit
Enter your choice: 8
Enter the value to be searched: 5
Value found at position 2

Enter a choice from the following:
1. Insert at beginning
2. Insert at end
3. Insert at position
4. Delete a node
5. Delete a node at position
6. Delete at beginning
7. Delete at end
8. Search for a node
9. Reverse the linkedlist
10. Count the number of odd and even numbers in the linkedlist
11. Print the linkedlist
12. Exit
Enter your choice: 9

Enter a choice from the following:
1. Insert at beginning
2. Insert at end
3. Insert at position
4. Delete a node
5. Delete a node at position
6. Delete at beginning
7. Delete at end
8. Search for a node
9. Reverse the linkedlist
10. Count the number of odd and even numbers in the linkedlist
11. Print the linkedlist
12. Exit
Enter your choice: 11

Linkedlist: 3 9 5 8


Enter a choice from the following:
1. Insert at beginning
2. Insert at end
3. Insert at position
```

```
4. Delete a node
5. Delete a node at position
6. Delete at beginning
7. Delete at end
8. Search for a node
9. Reverse the linkedlist
10. Count the number of odd and even numbers in the linkedlist
11. Print the linkedlist
12. Exit
Enter your choice: 5
Enter the position: 2

Enter a choice from the following:
1. Insert at beginning
2. Insert at end
3. Insert at position
4. Delete a node
5. Delete a node at position
6. Delete at beginning
7. Delete at end
8. Search for a node
9. Reverse the linkedlist
10. Count the number of odd and even numbers in the linkedlist
11. Print the linkedlist
12. Exit
Enter your choice: 11

Linkedlist: 3 5 8


Enter a choice from the following:
1. Insert at beginning
2. Insert at end
3. Insert at position
4. Delete a node
5. Delete a node at position
6. Delete at beginning
7. Delete at end
8. Search for a node
9. Reverse the linkedlist
10. Count the number of odd and even numbers in the linkedlist
11. Print the linkedlist
12. Exit
Enter your choice: 6
```

```
Enter a choice from the following:
1. Insert at beginning
2. Insert at end
3. Insert at position
4. Delete a node
5. Delete a node at position
6. Delete at beginning
7. Delete at end
8. Search for a node
9. Reverse the linkedlist
10. Count the number of odd and even numbers in the linkedlist
11. Print the linkedlist
12. Exit
Enter your choice: 11

Linkedlist: 5 8


Enter a choice from the following:
1. Insert at beginning
2. Insert at end
3. Insert at position
4. Delete a node
5. Delete a node at position
6. Delete at beginning
7. Delete at end
8. Search for a node
9. Reverse the linkedlist
10. Count the number of odd and even numbers in the linkedlist
11. Print the linkedlist
12. Exit
Enter your choice: 7

Enter a choice from the following:
1. Insert at beginning
2. Insert at end
3. Insert at position
4. Delete a node
5. Delete a node at position
6. Delete at beginning
7. Delete at end
8. Search for a node
9. Reverse the linkedlist
10. Count the number of odd and even numbers in the linkedlist
11. Print the linkedlist
12. Exit
Enter your choice: 11

Linkedlist: 5


Enter a choice from the following:
1. Insert at beginning
2. Insert at end
3. Insert at position
4. Delete a node
5. Delete a node at position
6. Delete at beginning
7. Delete at end
8. Search for a node
9. Reverse the linkedlist
10. Count the number of odd and even numbers in the linkedlist
11. Print the linkedlist
12. Exit
Enter your choice: 12
```

2 . Write a menu driven program to perform following functions in a doubly linked list.

i) Insertion in the beginning of the list

ii) Insertion at the end of the list

iii) Insertion in a particular location of the list

iv) Deletion based on a particular value

v) Display the contents of the list

CODE

```
// DSA
// DA-2
// Dhruv Rajeshkumar Shah
// 21BCE0611

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

// Doubly linkedlist node
struct node
{
    int value;
    struct node *next;
    struct node *prev;
};

// Function to create a new node
struct node *newNode(int value)
{
    struct node *new_node = (struct node *)malloc(sizeof(struct node));
    new_node->value = value;
    new_node->next = NULL;
    new_node->prev = NULL;
    return new_node;
}

// Function to insert a new node at the beginning of the linkedlist
struct node *insertAtBeginning(struct node *head, int value)
{
    struct node *new_node = newNode(value);
    if (head == NULL)
    {
        head = new_node;
        return head;
    }
    new_node->next = head;
    head->prev = new_node;
```

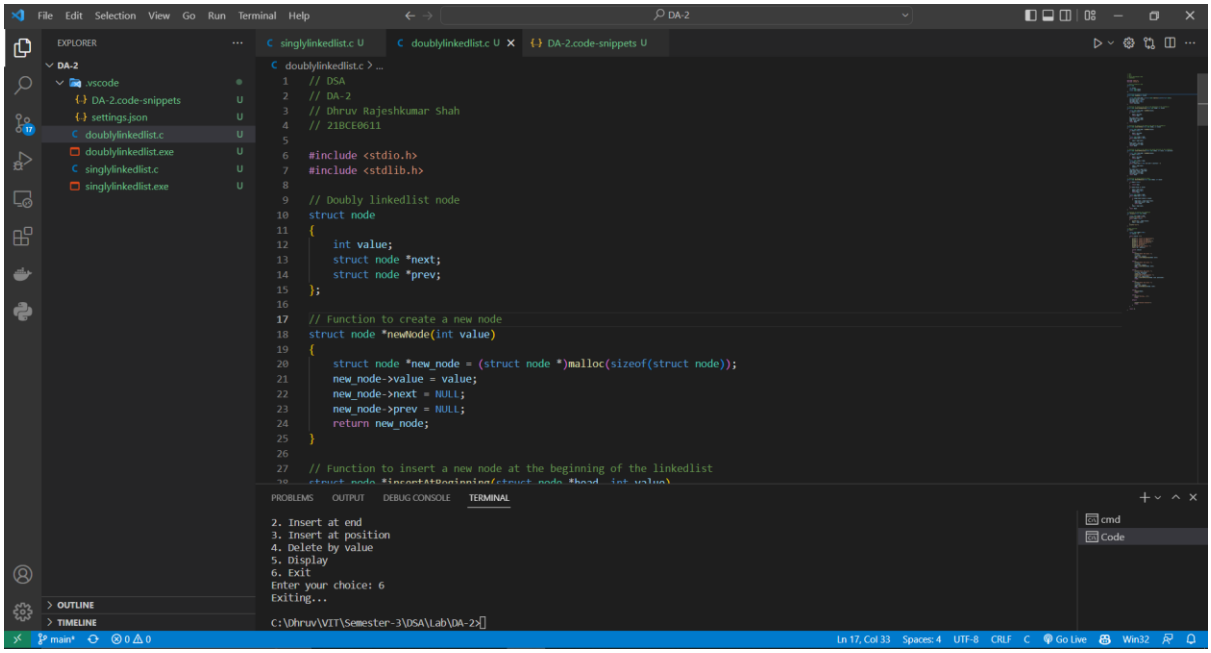
```c
    head = new_node;
    return head;
}

// Function to insert a new node at the end of the linkedlist
struct node *insertAtEnd(struct node *head, int value)
{
    struct node *new_node = newNode(value);
    if (head == NULL)
    {
        head = new_node;
        return head;
    }
    struct node *temp = head;
    while (temp->next != NULL)
    {
        temp = temp->next;
    }
    temp->next = new_node;
    new_node->prev = temp;
    return head;
}

// Function to insert a new node at the given position of the linkedlist
struct node *insertAtPosition(struct node *head, int value, int position)
{
    struct node *new_node = newNode(value);
    if (head == NULL)
    {
        head = new_node;
        return head;
    }
    struct node *temp = head;
    int count = 1;
    while (temp->next != NULL && count < position - 1)
    {
        temp = temp->next;
        count++;
    }
    new_node->next = temp->next;
    temp->next->prev = new_node;
    temp->next = new_node;
    new_node->prev = temp;
    return head;
}

// Function to delete based on value
struct node *deleteByValue(struct node *head, int value)
```

```c
{
    if (head == NULL)
    {
        return head;
    }
    if (head->value == value)
    {
        head = head->next;
        head->prev = NULL;
        return head;
    }
    struct node *temp = head;
    while (temp->next != NULL)
    {
        if (temp->next->value == value)
        {
            temp->next = temp->next->next;
            temp->next->prev = temp;
            return head;
        }
        temp = temp->next;
    }
    return head;
}

// Function to display the linkedlist
void display(struct node *head)
{
    struct node *temp = head;
    printf("\nLinked list: ");
    while (temp != NULL)
    {
        printf("%d ", temp->value);
        temp = temp->next;
    }
    printf("\n\n");
}

// Main function
int main()
{
    struct node *head = NULL;
    int choice = 0;

    while (choice != 6)
    {
        printf("1. Insert at beginning\n");
        printf("2. Insert at end\n");
```

```
        printf("3. Insert at position\n");
        printf("4. Delete by value\n");
        printf("5. Display\n");
        printf("6. Exit\n");
        printf("Enter your choice: ");
        scanf("%d", &choice);

        switch (choice)
        {
        case 1:
            printf("Enter the value: ");
            int val1;
            scanf("%d", &val1);
            head = insertAtBeginning(head, val1);
            break;

        case 2:
            printf("Enter the value: ");
            int val2;
            scanf("%d", &val2);
            head = insertAtEnd(head, val2);
            break;

        case 3:
            printf("Enter the value: ");
            int val3, position3;
            scanf("%d", &val3);
            printf("Enter the position: ");
            scanf("%d", &position3);
            head = insertAtPosition(head, val3, position3);
            break;

        case 4:
            printf("Enter the value: ");
            int val4;
            scanf("%d", &val4);
            head = deleteByValue(head, val4);
            break;

        case 5:
            display(head);
            break;

        case 6:
            printf("Exiting...\n");
            break;

        default:
```

```
            printf("Invalid choice\n");
            break;
        }
    }

    return 0;
}
```

SCREENSHOT



OUTPUTS

```
C:\Dhruv\VIT\Semester-3\DSA\Lab\DA-2>cd "c:\Dhruv\VIT\Semester-3\DSA\Lab\DA-2\" && gcc doublylinkedlist.c -o doublylinkedlist && "c:\Dhruv\V
IT\Semester-3\DSA\Lab\DA-2\"doublylinkedlist
1. Insert at beginning
2. Insert at end
3. Insert at position
4. Delete by value
5. Display
6. Exit
Enter your choice: 1
Enter the value: 5
1. Insert at beginning
2. Insert at end
3. Insert at position
4. Delete by value
5. Display
6. Exit
Enter your choice: 2
Enter the value: 8
1. Insert at beginning
2. Insert at end
3. Insert at position
4. Delete by value
5. Display
6. Exit
Enter your choice: 5

Linked list: 5 8

1. Insert at beginning
2. Insert at end
3. Insert at position
4. Delete by value
5. Display
6. Exit
Enter your choice: 3
Enter the value: 1
Enter the position: 1
1. Insert at beginning
2. Insert at end
3. Insert at position
4. Delete by value
5. Display
6. Exit
Enter your choice: 4
Enter the value: 5
1. Insert at beginning
2. Insert at end
3. Insert at position
4. Delete by value
5. Display
6. Exit
Enter your choice: 5

Linked list: 1 8

1. Insert at beginning
2. Insert at end
3. Insert at position
4. Delete by value
5. Display
6. Exit
Enter your choice: 6
Exiting...
```

3. Write a menu driven program to perform following functions in a circularly singly linked list.

i) Insertion in the beginning of the list

ii) Insertion at the end of the list

iii) Deletion from the beginning of the list

iv) Deletion from the end of the list.

CODE

```c
// DSA
// DA-2
// Dhruv Rajeshkumar Shah
// 21BCE0611

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

// Circularly linkedlist node
struct node
{
    int value;
    struct node *next;
};

// Function to create a new node for circularly linkedlist
struct node *newNode(int value)
{
    struct node *new_node = (struct node *)malloc(sizeof(struct node));
    new_node->value = value;
    new_node->next = NULL;
    return new_node;
}

// Function to insert a new node at the beginning of the circularly linkedlist
struct node *insertAtBeginning(struct node *head, int value)
{
    struct node *new_node = newNode(value);
    if (head == NULL)
    {
        head = new_node;
        head->next = head;
        return head;
    }
    struct node *temp = head;
    while (temp->next != head)
    {
```

```
        temp = temp->next;
    }
    temp->next = new_node;
    new_node->next = head;
    head = new_node;
    return head;
}

// Function to insert a new node at the end of the circularly linkedlist
struct node *insertAtEnd(struct node *head, int value)
{
    struct node *new_node = newNode(value);
    if (head == NULL)
    {
        head = new_node;
        head->next = head;
        return head;
    }
    struct node *temp = head;
    while (temp->next != head)
    {
        temp = temp->next;
    }
    temp->next = new_node;
    new_node->next = head;
    return head;
}

// Function to delete a node from the beginning of the circularly linkedlist
struct node *deleteFromBeginning(struct node *head)
{
    if (head == NULL)
    {
        printf("Linkedlist is empty\n");
        return head;
    }
    struct node *temp = head;
    while (temp->next != head)
    {
        temp = temp->next;
    }
    temp->next = head->next;
    free(head);
    head = temp->next;
    return head;
}

// Function to delete a node from the end of the circularly linkedlist
```

```c
struct node *deleteFromEnd(struct node *head)
{
    if (head == NULL)
    {
        printf("Linkedlist is empty\n");
        return head;
    }
    struct node *temp = head;
    while (temp->next->next != head)
    {
        temp = temp->next;
    }
    free(temp->next);
    temp->next = head;
    return head;
}

// Function to print the circularly linkedlist
void printCircularlyLinkedList(struct node *head)
{
    if (head == NULL)
    {
        printf("Linkedlist is empty\n");
        return;
    }
    struct node *temp = head;
    while (temp->next != head)
    {
        printf("%d ", temp->value);
        temp = temp->next;
    }
    printf("%d ", temp->value);
    printf("\n\n");
}

// Main function
int main()
{
    struct node *head = NULL;
    int choice = 0, value;
    while (choice != 6)
    {
        printf("1. Insert at beginning of the circularly linkedlist\n");
        printf("2. Insert at end of the circularly linkedlist\n");
        printf("3. Delete from beginning of the circularly linkedlist\n");
        printf("4. Delete from end of the circularly linkedlist\n");
        printf("5. Print the circularly linkedlist\n");
        printf("6. Exit\n");
```

```
        printf("Enter your choice: ");
        scanf("%d", &choice);

        switch (choice)
        {
        case 1:
            printf("Enter the value: ");
            scanf("%d", &value);
            head = insertAtBeginning(head, value);
            break;

        case 2:
            printf("Enter the value: ");
            scanf("%d", &value);
            head = insertAtEnd(head, value);
            break;

        case 3:
            head = deleteFromBeginning(head);
            break;

        case 4:
            head = deleteFromEnd(head);
            break;

        case 5:
            printCircularlyLinkedList(head);
            break;

        case 6:
            printf("Exiting...\n");
            break;

        default:
            printf("Invalid choice\n");
            break;
        }

        printf("\n");
    }

    return 0;
}
```

SCREENSHOT

```
C:\Dhruv\VIT\Semester-3\DSA\Lab\DA-2>cd "c:\Dhruv\VIT\Semester-3\DSA\Lab\DA-2\" && gcc circularlysinglylinkedlist.c -o ci
dlist && "c:\Dhruv\VIT\Semester-3\DSA\Lab\DA-2\"circularlysinglylinkedlist
1. Insert at beginning of the circularly linkedlist
2. Insert at end of the circularly linkedlist
3. Delete from beginning of the circularly linkedlist
4. Delete from end of the circularly linkedlist
5. Print the circularly linkedlist
6. Exit
Enter your choice: 1
Enter the value: 2

1. Insert at beginning of the circularly linkedlist
2. Insert at end of the circularly linkedlist
3. Delete from beginning of the circularly linkedlist
4. Delete from end of the circularly linkedlist
5. Print the circularly linkedlist
6. Exit
Enter your choice: 1
Enter the value: 9

1. Insert at beginning of the circularly linkedlist
2. Insert at end of the circularly linkedlist
3. Delete from beginning of the circularly linkedlist
4. Delete from end of the circularly linkedlist
5. Print the circularly linkedlist
6. Exit
Enter your choice: 2
Enter the value: 4

1. Insert at beginning of the circularly linkedlist
2. Insert at end of the circularly linkedlist
3. Delete from beginning of the circularly linkedlist
4. Delete from end of the circularly linkedlist
5. Print the circularly linkedlist
6. Exit
Enter your choice: 5
9 2 4


1. Insert at beginning of the circularly linkedlist
2. Insert at end of the circularly linkedlist
3. Delete from beginning of the circularly linkedlist
4. Delete from end of the circularly linkedlist
5. Print the circularly linkedlist
6. Exit
Enter your choice: 3

1. Insert at beginning of the circularly linkedlist
2. Insert at end of the circularly linkedlist
3. Delete from beginning of the circularly linkedlist
4. Delete from end of the circularly linkedlist
5. Print the circularly linkedlist
6. Exit
Enter your choice: 4

1. Insert at beginning of the circularly linkedlist
2. Insert at end of the circularly linkedlist
3. Delete from beginning of the circularly linkedlist
4. Delete from end of the circularly linkedlist
5. Print the circularly linkedlist
6. Exit
Enter your choice: 5
2


1. Insert at beginning of the circularly linkedlist
2. Insert at end of the circularly linkedlist
3. Delete from beginning of the circularly linkedlist
4. Delete from end of the circularly linkedlist
5. Print the circularly linkedlist
6. Exit
Enter your choice: 6
Exiting...
```

4. Create linked list to enroll the students who wish to participate for a gaming event by taking details like Name, Register No., Age, Phone number. Ensure that no more than five members are there in the list with same age. Perform insertion(), deletion() and display() operations on the Linked List

CODE

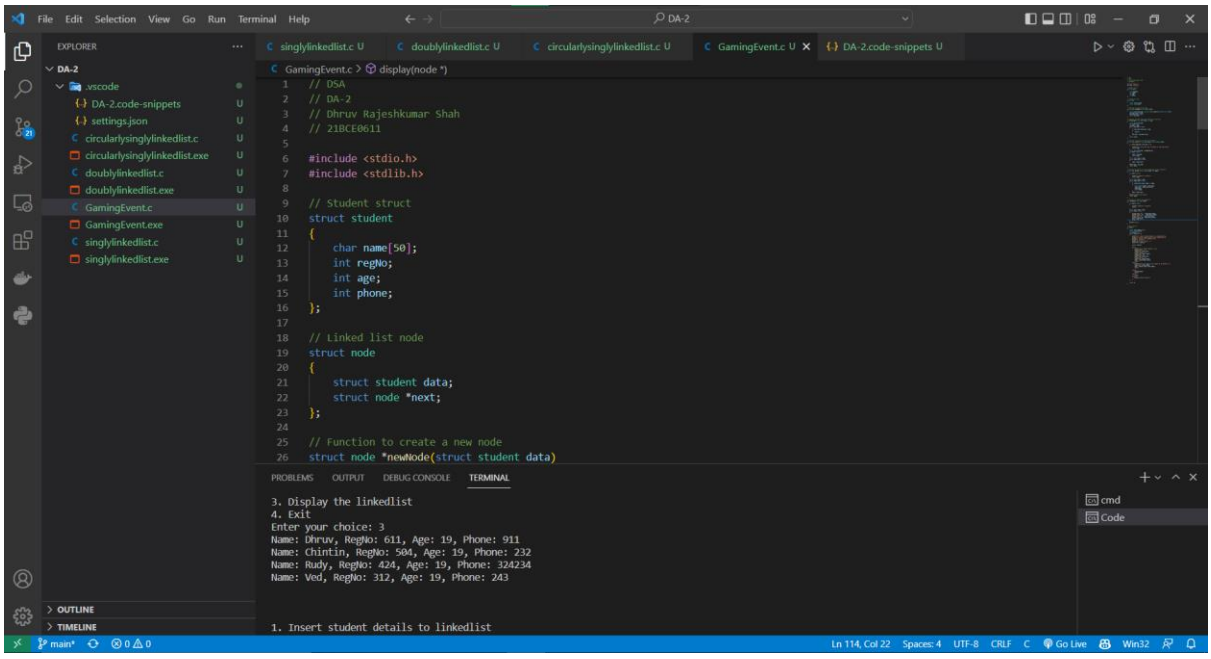
```
// DSA
// DA-2
// Dhruv Rajeshkumar Shah
// 21BCE0611

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

// Student struct
struct student
{
    char name[50];
    int regNo;
    int age;
    int phone;
};

// Linked list node
struct node
{
    struct student data;
    struct node *next;
};

// Function to create a new node
struct node *newNode(struct student data)
{
    struct node *new_node = (struct node *)malloc(sizeof(struct node));
    new_node->data = data;
    new_node->next = NULL;
    return new_node;
}

// Function to count number of students with same age
int check_age(struct node *head, int age)
{
    struct node *new_node;
    int count = 0;
    new_node = head;
    while (new_node != NULL)
    {
        if (new_node->data.age == age)
```

```
        {
            count++;
        }
        new_node = new_node->next;
    }
    return count;
}

// Function to insert a new node to linkedlist
struct node *insert(struct node *head, struct student data)
{
    if (check_age(head, data.age) >= 5)
    {
        printf("Can't have more than 5 students of same age!\n\n");
        return head;
    }
    struct node *new_node = newNode(data);
    if (head == NULL)
    {
        head = new_node;
        return head;
    }
    struct node *temp = head;
    while (temp->next != NULL)
    {
        temp = temp->next;
    }
    temp->next = new_node;
    return head;
}

// Function to delete a not at the beginning of the linkedlist
struct node *delete (struct node *head, int regNo)
{
    if (head == NULL)
    {
        printf("Linkedlist is empty");
        return head;
    }
    struct node *temp = head;
    while (temp->next != NULL)
    {
        if (temp->next->data.regNo == regNo)
        {
            struct node *temp2 = temp->next;
            temp->next = temp->next->next;
            free(temp2);
            return head;
```

```
        }
        temp = temp->next;
    }
    printf("Student not found");
    return head;
}

// Function to display the linkedlist
void display(struct node *head)
{
    if (head == NULL)
    {
        printf("Linkedlist is empty");
        return;
    }
    struct node *temp = head;
    while (temp != NULL)
    {
        printf("Name: %s, ", temp->data.name);
        printf("RegNo: %d, ", temp->data.regNo);
        printf("Age: %d, ", temp->data.age);
        printf("Phone: %d", temp->data.phone);
        temp = temp->next;
        printf("\n");
    }
    printf("\n\n");
}

// Main function
int main()
{
    struct node *head = NULL;
    struct student data;
    int choice = 0;
    while (choice != 4)
    {
        printf("\n1. Insert student details to linkedlist\n");
        printf("2. Delete student details from linkedlist\n");
        printf("3. Display the linkedlist\n");
        printf("4. Exit\n");
        printf("Enter your choice: ");
        scanf("%d", &choice);

        switch (choice)
        {
        case 1:
            printf("Enter student details: \n");
            printf("Name: ");
```

```
            scanf("%s", data.name);
            printf("RegNo: ");
            scanf("%d", &data.regNo);
            printf("Age: ");
            scanf("%d", &data.age);
            printf("Phone: ");
            scanf("%d", &data.phone);
            head = insert(head, data);
            break;
        case 2:
            printf("Enter the regNo of the student to be deleted: ");
            scanf("%d", &data.regNo);
            head = delete (head, data.regNo);
            break;

        case 3:
            display(head);
            break;
        case 4:
            break;
        default:
            printf("Invalid choice");
        }
    }

    return 0;
}
```

SCREENSHOT



OUTPUT

```
C:\Dhruv\VIT\Semester-3\DSA\Lab\DA-2>cd "c:\Dhruv\VIT\Semester-3\DSA\Lab\DA-2\" && gcc GamingEvent.c -o GamingEv
r-3\DSA\Lab\DA-2\"GamingEvent

1. Insert student details to linkedlist
2. Delete student details from linkedlist
3. Display the linkedlist
4. Exit
Enter your choice: 1
Enter student details:
Name: Dhruv
RegNo: 0611
Age: 19
Phone: 911

1. Insert student details to linkedlist
2. Delete student details from linkedlist
3. Display the linkedlist
4. Exit
Enter your choice: 1
Enter student details:
Name: Chintin
RegNo: 504
Age: 19
Phone: 232

1. Insert student details to linkedlist
2. Delete student details from linkedlist
3. Display the linkedlist
4. Exit
Enter your choice: 1
Enter student details:
Name: Rudy
RegNo: 424
Age: 19
Phone: 324234

1. Insert student details to linkedlist
2. Delete student details from linkedlist
3. Display the linkedlist
4. Exit
Enter your choice: 1
Enter student details:
Name: Ved
RegNo: 312
Age: 19
```

```
Phone: 243

1. Insert student details to linkedlist
2. Delete student details from linkedlist
3. Display the linkedlist
4. Exit
Enter your choice: 1
Enter student details:
Name: Bagel
RegNo: 728
Age: 19
Phone: 412

1. Insert student details to linkedlist
2. Delete student details from linkedlist
3. Display the linkedlist
4. Exit
Enter your choice: 1
Enter student details:
Name: Namo
RegNo: 313
Age: 19
Phone: 348
Can't have more than 5 students of same age!


1. Insert student details to linkedlist
2. Delete student details from linkedlist
3. Display the linkedlist
4. Exit
Enter your choice: 3
Name: Dhruv, RegNo: 611, Age: 19, Phone: 911
Name: Chintin, RegNo: 504, Age: 19, Phone: 232
Name: Rudy, RegNo: 424, Age: 19, Phone: 324234
Name: Ved, RegNo: 312, Age: 19, Phone: 243
Name: Bagel, RegNo: 728, Age: 19, Phone: 412



1. Insert student details to linkedlist
2. Delete student details from linkedlist
3. Display the linkedlist
4. Exit
Enter your choice: 2
Enter the regNo of the student to be deleted: 728

1. Insert student details to linkedlist
2. Delete student details from linkedlist
3. Display the linkedlist
4. Exit
Enter your choice: 3
Name: Dhruv, RegNo: 611, Age: 19, Phone: 911
Name: Chintin, RegNo: 504, Age: 19, Phone: 232
Name: Rudy, RegNo: 424, Age: 19, Phone: 324234
Name: Ved, RegNo: 312, Age: 19, Phone: 243



1. Insert student details to linkedlist
2. Delete student details from linkedlist
3. Display the linkedlist
4. Exit
```