2.WAP to Implement doubly link list with primitive operations

I.Create a doubly linked list.

II. Insert a new node to the left of the node.

III. Delete the node based on a specific value

IV. Display the contents of the list

Shashank Patel C J

1BM22CS255

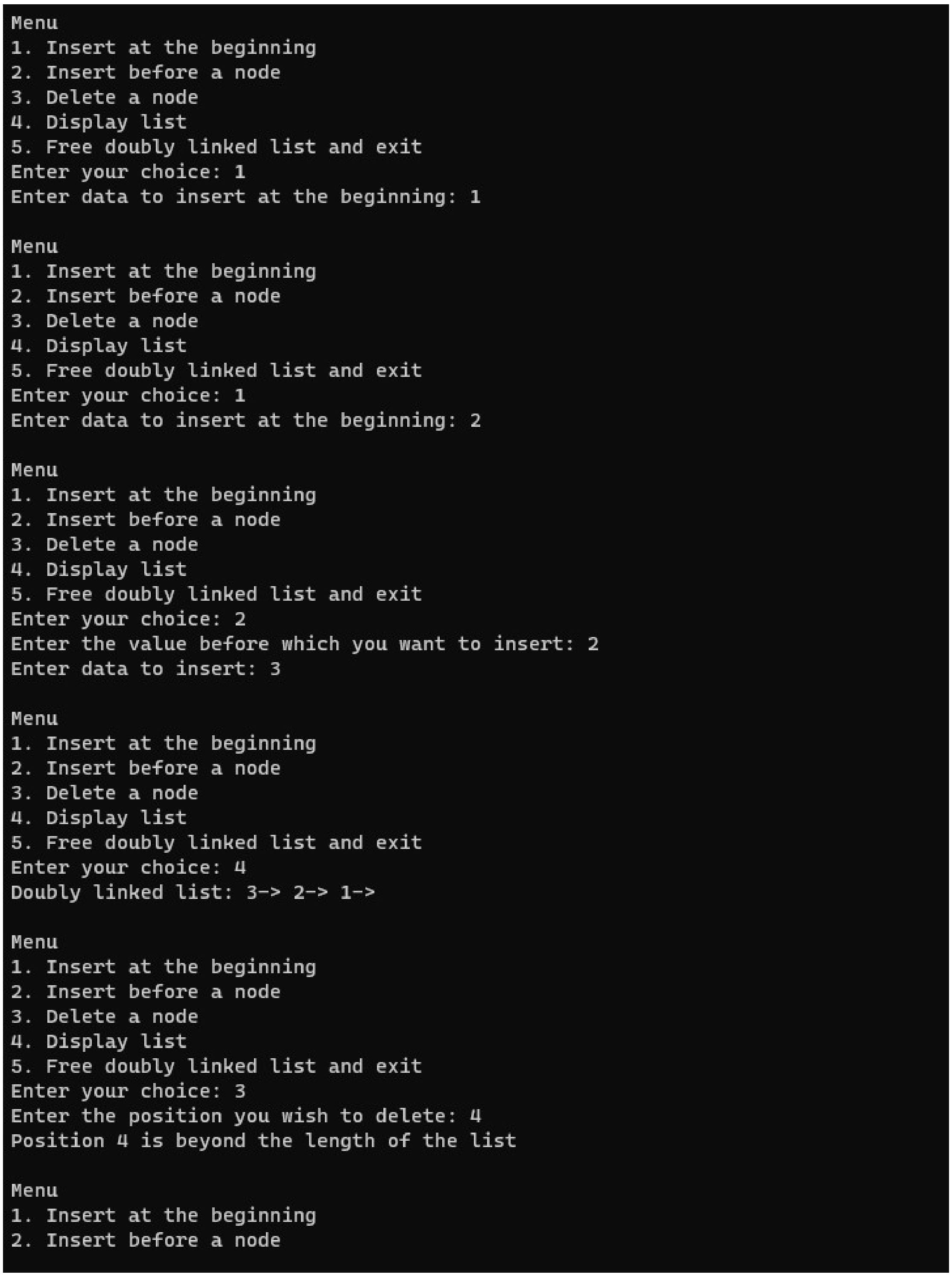
```
#include <stdio.h>

#include <stdlib.h>


struct Node {

   int data;

   struct Node* prev;

   struct Node* next;

};


struct Node* createNode(int data) {

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

   if (newNode == NULL) {

      printf("Memory allocation failed\n");

      exit(EXIT_FAILURE);

   }

   newNode->data = data;

   newNode->prev = NULL;

   newNode->next = NULL;
```

```
    return newNode;
}


void insertAtBeginning(struct Node** head, int data) {
    struct Node* newNode = createNode(data);


    if (*head == NULL) {
        *head = newNode;
    } else {
        newNode->next = *head;
        (*head)->prev = newNode;
        *head = newNode;
    }
}
void insertBeforeNode(struct Node** head, int key, int data) {
    if (*head == NULL) {
        printf("List is empty\n");
        return;
    }


    struct Node* newNode = createNode(data);
    struct Node* current = *head;


    while (current) {
        if (current->data == key) {
            if (current->prev) {
                current->prev->next = newNode;
                newNode->prev = current->prev;
            } else {
                *head = newNode;
            }

            newNode->next = current;
            current->prev = newNode;
            return;
        }
        current = current->next;
    }

    printf("Key not found in the list\n");
}


void deleteNode(struct Node** head, int pos) {
    if (*head == NULL) {
        printf("List is empty\n");
        return;
    }

    struct Node* current = *head;
    int count = 1;

    while (current && count < pos) {
        current = current->next;
        count++;
    }

    if (current == NULL) {
        printf("Position %d is beyond the length of the list\n", pos);
        return;
    }

    if (current->prev) {
        current->prev->next = current->next;
    } else {
        *head = current->next;
    }

    if (current->next) {
        current->next->prev = current->prev;
    }

    free(current);
    printf("Node at position %d deleted\n", pos);
}
```

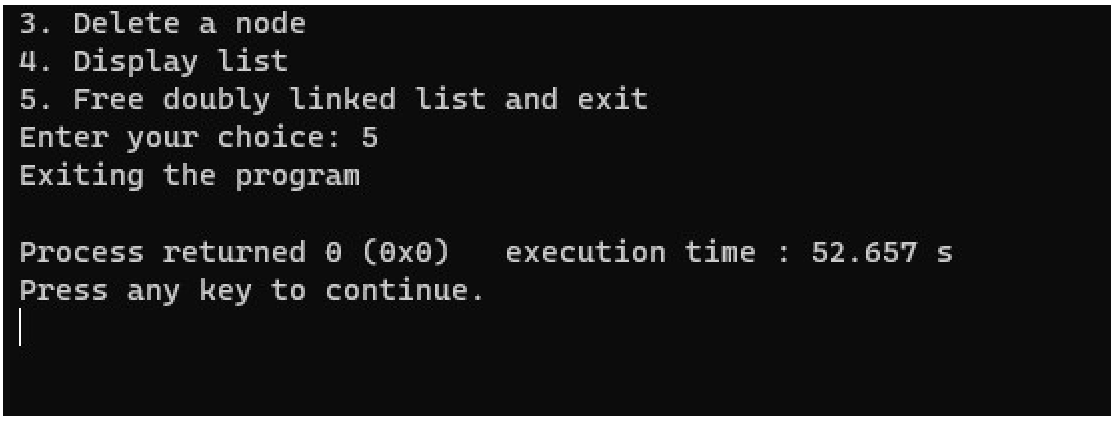
```
void displayList(struct Node* head) {
    if (head == NULL) {
        printf("List is empty\n");
        return;
    }

    struct Node* current = head;

    while (current) {
        printf("%d-> ", current->data);
        current = current->next;
    }
    printf("\n");
}

void freeList(struct Node* head) {
    struct Node* current = head;
    struct Node* nextNode;

    while (current) {
        nextNode = current->next;
        free(current);
        current = nextNode;
    }
```

```
}

int main() {
    struct Node* head = NULL;
    int ch, newData, pos, key;

    while (1) {
        printf("\nMenu\n");
        printf("1. Insert at the beginning\n");
        printf("2. Insert before a node\n");
        printf("3. Delete a node\n");
        printf("4. Display list\n");
        printf("5. Free doubly linked list and exit\n");
        printf("Enter your choice: ");
        scanf("%d", &ch);

        switch (ch) {
            case 1:
                printf("Enter data to insert at the beginning: ");
                scanf("%d", &newData);
                insertAtBeginning(&head, newData);
                break;

            case 2:
                printf("Enter the value before which you want to insert: ");
                scanf("%d", &key);

                printf("Enter data to insert: ");

                scanf("%d", &newData);

                insertBeforeNode(&head, key, newData);

                break;


            case 3:

                printf("Enter the position you wish to delete: ");

                scanf("%d", &key);

                deleteNode(&head, key);

                break;


            case 4:

                printf("Doubly linked list: ");

                displayList(head);

                break;


            case 5:

                freeList(head);

                printf("Exiting the program\n");

                return 0;


            default:

                printf("Invalid choice\n");

        }
        }


        return 0;
}
```

Output:



```
Menu
1. Insert at the beginning
2. Insert before a node
3. Delete a node
4. Display list
5. Free doubly linked list and exit
Enter your choice: 1
Enter data to insert at the beginning: 1

Menu
1. Insert at the beginning
2. Insert before a node
3. Delete a node
4. Display list
5. Free doubly linked list and exit
Enter your choice: 1
Enter data to insert at the beginning: 2

Menu
1. Insert at the beginning
2. Insert before a node
3. Delete a node
4. Display list
5. Free doubly linked list and exit
Enter your choice: 2
Enter the value before which you want to insert: 2
Enter data to insert: 3

Menu
1. Insert at the beginning
2. Insert before a node
3. Delete a node
4. Display list
5. Free doubly linked list and exit
Enter your choice: 4
Doubly linked list: 3-> 2-> 1->

Menu
1. Insert at the beginning
2. Insert before a node
3. Delete a node
4. Display list
5. Free doubly linked list and exit
Enter your choice: 3
Enter the position you wish to delete: 4
Position 4 is beyond the length of the list

Menu
1. Insert at the beginning
2. Insert before a node
```



```
3. Delete a node
4. Display list
5. Free doubly linked list and exit
Enter your choice: 5
Exiting the program

Process returned 0 (0x0)   execution time : 52.657 s
Press any key to continue.
```