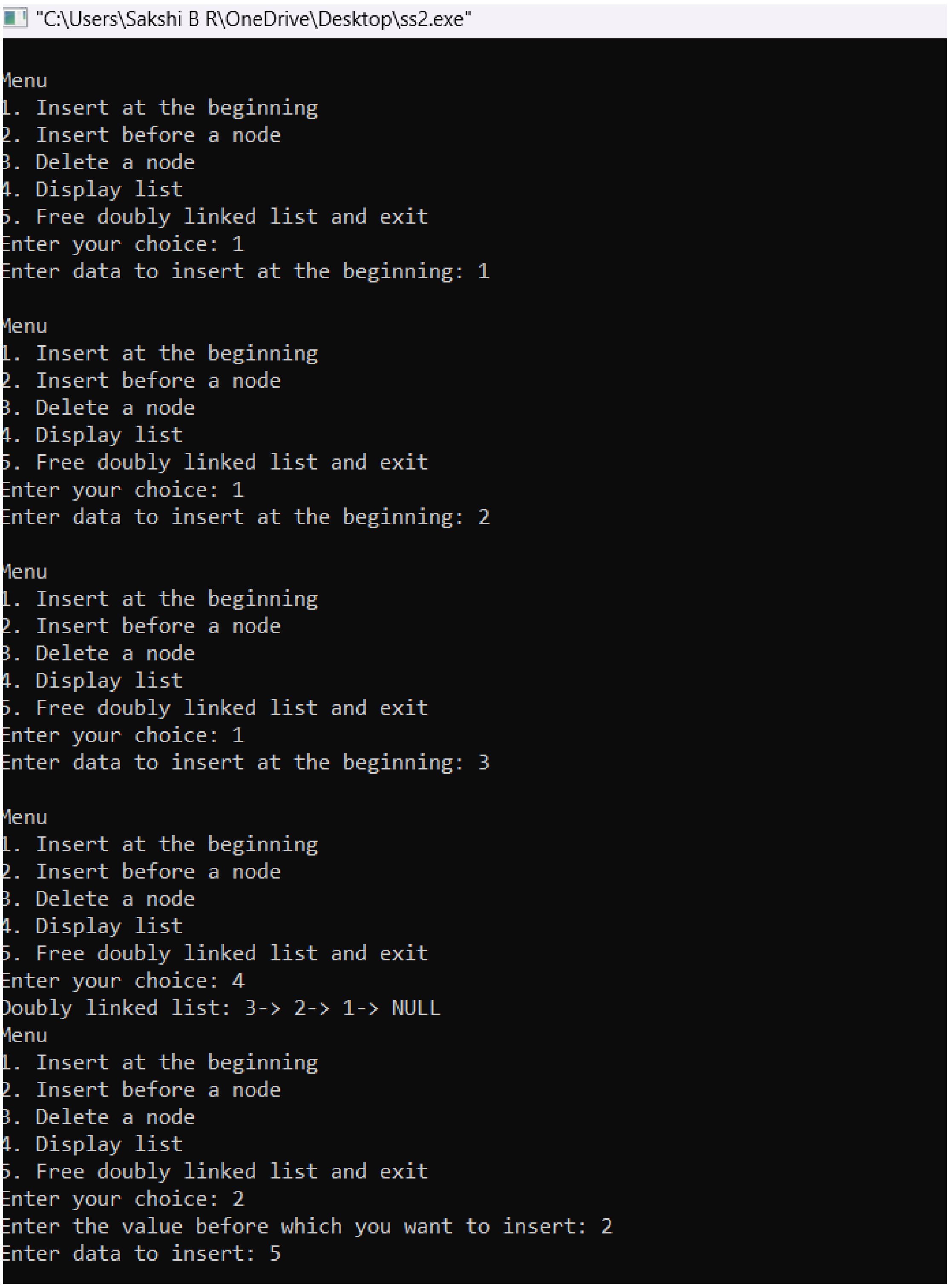
Lab 7

```
#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");

        return NULL;

    }

    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);
```

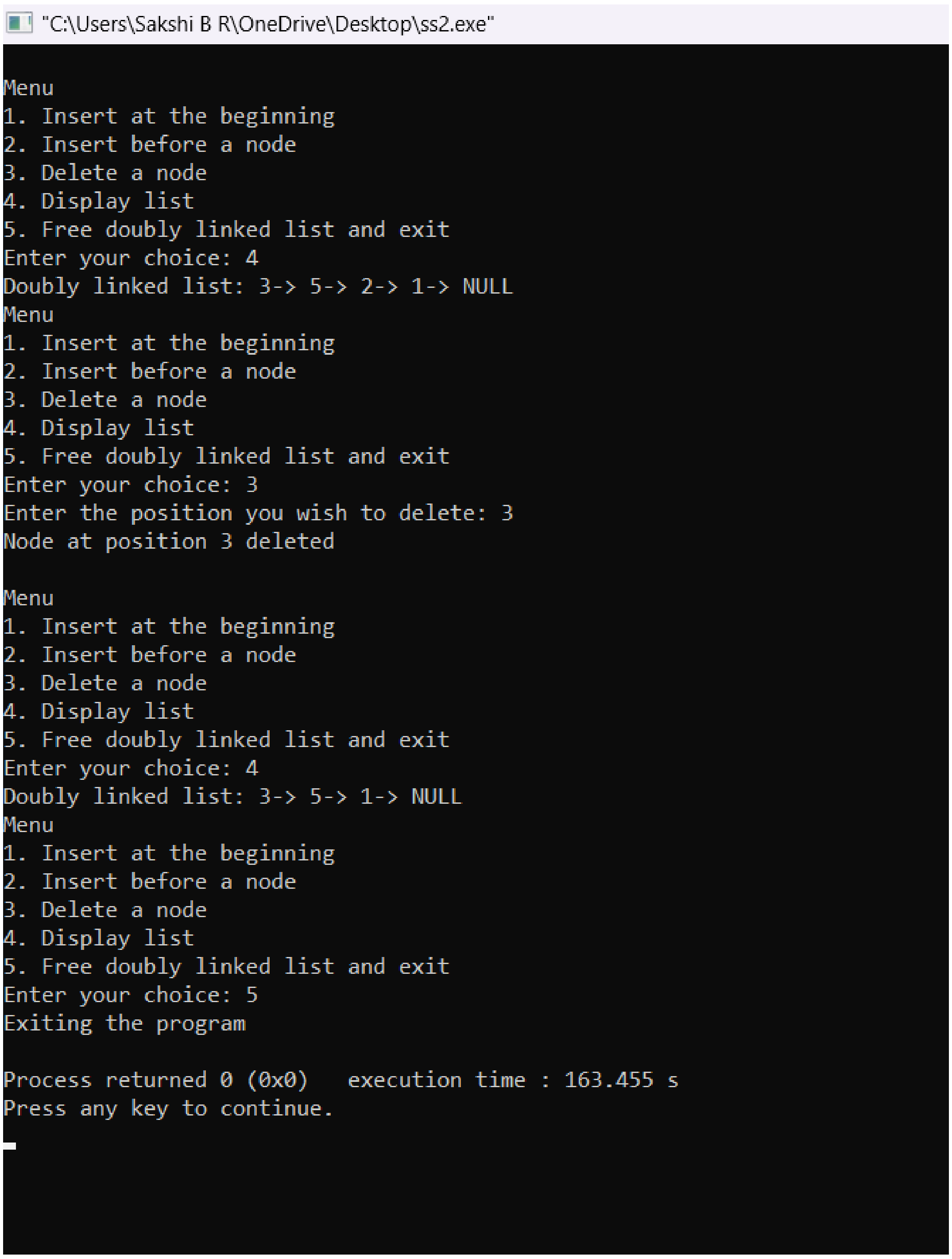
```
}

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("NULL");
}

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;
```

```c
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;
}
```



"C:\Users\Sakshi B R\OneDrive\Desktop\ss2.exe"

```
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: 1
Enter data to insert at the beginning: 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-> NULL
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: 5
```



"C:\Users\Sakshi B R\OneDrive\Desktop\ss2.exe"

```
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-> 5-> 2-> 1-> NULL
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: 3
Node at position 3 deleted

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-> 5-> 1-> NULL
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 : 163.455 s
Press any key to continue.
```