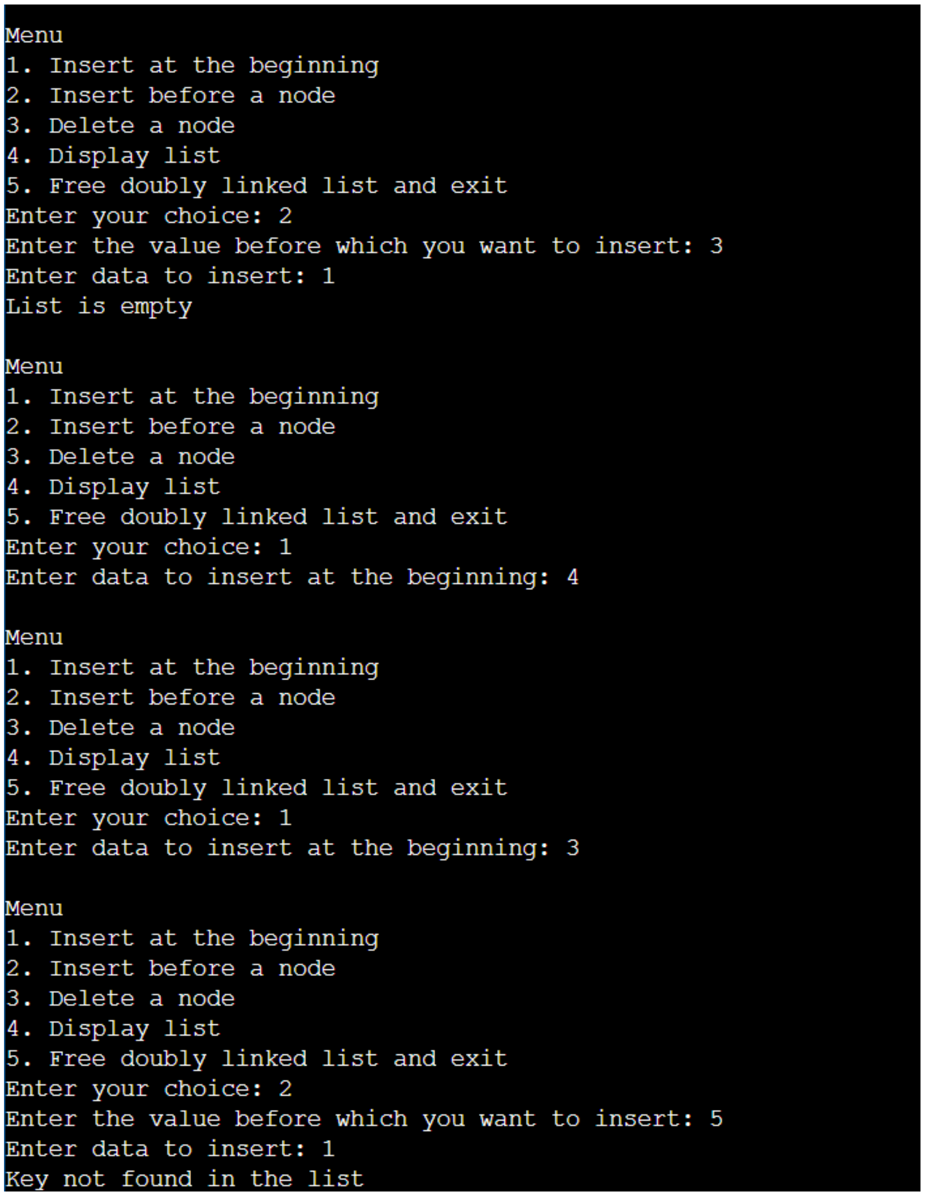
WAP to Implement doubly link list with primitive operations
I.Create a doubly linked list.
II. Insert a new node to the left of the node.
III. Delete the node based on a specific value
IV. Display the contents of the list

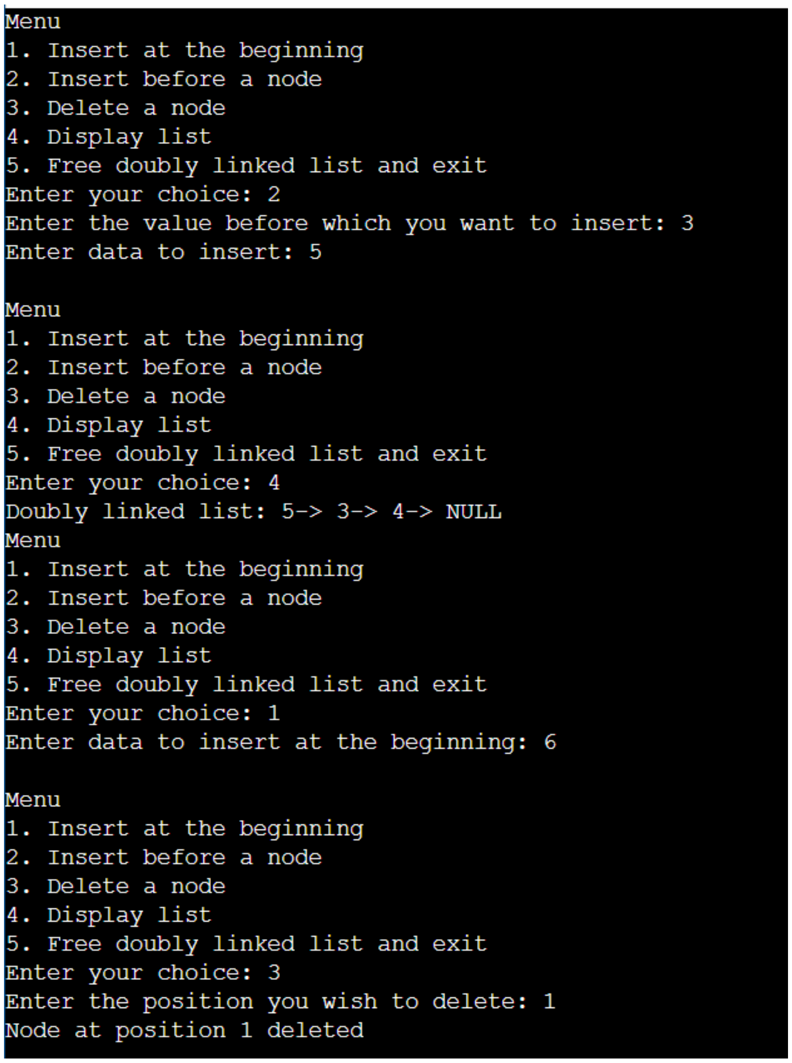
Code:

```
#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;

    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;
}
```

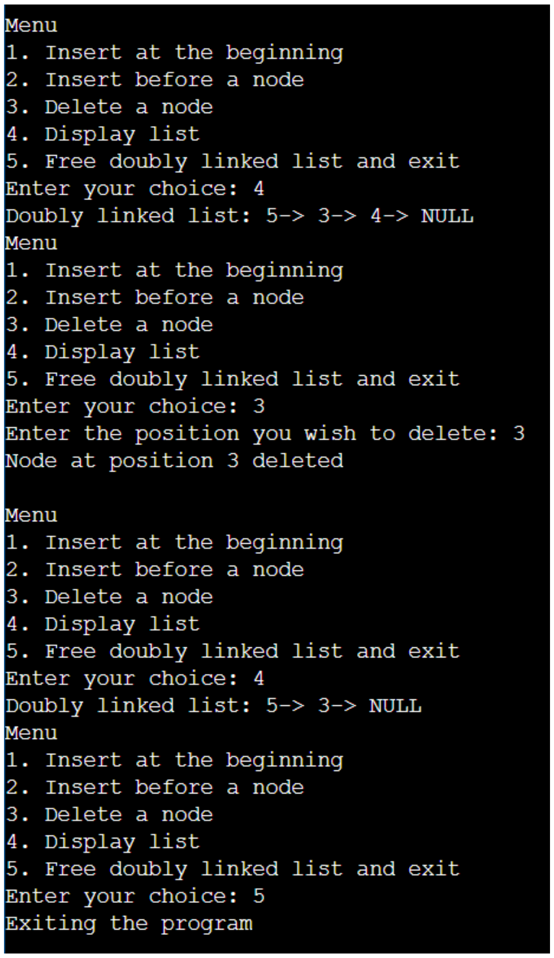
Output:



```
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: 2
Enter the value before which you want to insert: 3
Enter data to insert: 1
List is empty

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: 4

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: 2
Enter the value before which you want to insert: 5
Enter data to insert: 1
Key not found in 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: 2
Enter the value before which you want to insert: 3
Enter data to insert: 5

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: 5-> 3-> 4-> 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: 1
Enter data to insert at the beginning: 6

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: 1
Node at position 1 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: 5-> 3-> 4-> 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: 5-> 3-> 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
```