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#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) {

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        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");
}

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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;
    }
}

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    }

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

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

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    struct Node* current = head;

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

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

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

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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. exit\n");
        printf("Enter your choice: ");
    }
}

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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. exit

Enter your choice: 1

Enter data to insert at the beginning: 21

Menu

1. Insert at the beginning
2. Insert before a node
3. Delete a node
4. Display list
5. exit

Enter your choice: 1

Enter data to insert at the beginning: 32

Menu

1. Insert at the beginning
2. Insert before a node
3. Delete a node
4. Display list
5. exit

Enter your choice: 1

Enter data to insert at the beginning: 43

Menu

1. Insert at the beginning
2. Insert before a node
3. Delete a node
4. Display list
5. exit

Enter your choice: 1

Enter data to insert at the beginning: 33

Menu

1. Insert at the beginning
2. Insert before a node
3. Delete a node
4. Display list
5. exit

Enter your choice: 4

Doubly linked list: 33-> 43-> 32-> 21->

Menu

1. Insert at the beginning
2. Insert before a node
3. Delete a node
4. Display list

Menu

1. Insert at the beginning
2. Insert before a node
3. Delete a node
4. Display list
5. exit

Enter your choice: 2

Enter the value before which you want to insert: 11

Enter data to insert:

2

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. exit

Enter your choice: 2

Enter the value before which you want to insert: 32

Enter data to insert: 55

Menu

1. Insert at the beginning
2. Insert before a node
3. Delete a node
4. Display list
5. exit

Enter your choice: 4

Doubly linked list: 33-> 43-> 55-> 32-> 21->

Menu

1. Insert at the beginning
2. Insert before a node
3. Delete a node
4. Display list
5. exit

Enter your choice: 3

Enter the position you wish to delete: 2

Node at position 2 deleted

Menu

1. Insert at the beginning
2. Insert before a node
3. Delete a node
4. Display list
5. exit

Enter your choice: 4

Doubly linked list: 33-> 55-> 32-> 21->