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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 2_COD_Question 5

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

Ashwin is tasked with developing a simple application to manage a list of items in a shop inventory using a doubly linked list. Each item in the inventory has a unique identification number. The application should allow users to perform the following operations:

Create a List of Items: Initialize the inventory with a given number of items. Each item will be assigned a unique number provided by the user and insert the elements at end of the list.

Delete an Item: Remove an item from the inventory at a specific position.

Display the Inventory: Show the list of items before and after deletion.

If the position provided for deletion is invalid (e.g., out of range), it should display an error message.

Input Format

The first line contains an integer n, representing the number of items to be initially entered into the inventory.

The second line contains n integers, each representing the unique identification number of an item separated by spaces.

The third line contains an integer p, representing the position of the item to be deleted from the inventory.

Output Format

The first line of output prints "Data entered in the list:" followed by the data values of each node in the doubly linked list before deletion.

If p is an invalid position, the output prints "Invalid position. Try again."

If p is a valid position, the output prints "After deletion the new list:" followed by the data values of each node in the doubly linked list after deletion.

Refer to the sample output for the formatting specifications.

Sample Test Case

```
Input: 4
1 2 3 4
5
Output: Data entered in the list:
 node 1 : 1
 node 2 : 2
 node 3 : 3
 node 4 : 4
Invalid position. Try again.
```

Answer

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

```
// Define node structure
typedef struct Node {
   int data;
   struct Node* prev;
   struct Node* next;
} Node;

// Create a new node
Node* createNode(int data) {
   Node* newNode = (Node*)malloc(sizeof(Node));
   newNode->data = data;
   newNode->prev = newNode->next = NULL;
   return newNode;
}

// Append to end
void append(Node** head, Node** tail, int data) {
   Node* newNode = createNode(data);
   if (*head == NULL) {
      *head = *tail = newNode;
   } else {
      (*tail)->next = newNode;
      newNode->prev = *tail;
      *tail = newNode;
   }
}

// Display the list
void displayList(Node* head) {
   int pos = 1;
   Node* temp = head;
   while (temp != NULL) {
      printf(" node %d : %d ", pos, temp->data);
      temp = temp->next;
      pos++;
   }
   printf("\n");
}

// Delete node at a given position
void deleteAtPosition(Node** head, Node** tail, int position, int count) {
   if (position < 1 || position > count) {
      printf("Invalid position. Try again.\n");
      return;
   }

   Node* temp = *head;
   int current = 1;

   // Traverse to the node at the given position
   while (current < position && temp != NULL) {
      temp = temp->next;
      current++;
   }

   // If it's the only node
   if (*head == *tail) {
      *head = *tail = NULL;
   }
   // If it's the head
   else if (temp == *head) {
      *head = temp->next;
      (*head)->prev = NULL;
   }
   // If it's the tail
   else if (temp == *tail) {
      *tail = temp->prev;
      (*tail)->next = NULL;
   }
   // In the middle
   else {
      temp->prev->next = temp->next;
      temp->next->prev = temp->prev;
   }

   free(temp);

   printf("After deletion the new list:");
   displayList(*head);
}

int main() {
   int n;
   scanf("%d", &n);
   Node* head = NULL;
   Node* tail = NULL;

   for (int i = 0; i < n; i++) {
      int value;
      scanf("%d", &value);
      append(&head, &tail, value);
   }

   int p;
   scanf("%d", &p);

   printf("Data entered in the list:");
   displayList(head);

   deleteAtPosition(&head, &tail, p, n);

   return 0;
}
```

Status : Correct ***Marks : 10/10***