DS/dlinkedlist.c

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//implement doubly linked list datastructure in c using structure.
#include <stdio.h>
#include <stdlib.h>

typedef struct doubly_linked_list{
   int data;
   struct doubly_linked_list* next;
   struct doubly_linked_list* prev;
}dl_list;
int isEmpty(dl_list *head){
   if(!head){
      return 1;
   }
   return 0;
}
int len(dl_list *head){
   int count = 0;
   while(head){
      count++;
      head = head->next;
   }
   return count;
}
void push(dl_list **head, int new_data, int index){
   int l = len(*head);
   if(index > l || index < 0){
      printf("Index out of range.\n");
      return;
   }
   dl_list *new_node = (dl_list*)malloc(sizeof(dl_list));
   new_node->data = new_data;
   if(index == 0){
      new_node->prev = NULL;
      new_node->next = *head;
      if(*head){
         (*head)->prev = new_node;
      }
      *head = new_node;
      return;
   }
   int i = 0;
   dl_list *temp = *head, *prev;
   while(i < index && temp){
      prev = temp;
      temp = temp->next;
      i++;
   }
   prev->next = new_node;
   new_node->prev = prev;
   if(!temp){
      new_node->next = NULL;
      return;
   }
   new_node->next = temp;
   temp->prev = new_node;
}

int pop_at(dl_list **head, int index){
   if(!*head){
      printf("No Element Found.\n");
      return -1;
   }
```

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    int l = len(*head);
    if(l <= index || index < 0){
        printf("Index Out of Range.\n");
        return -1;
    }

    dl_list *temp = *head, *prev;
    int i = 0;
    int data;
    if(i == index){
        data = temp->data;
        *head = temp->next;
        (*head)->prev = NULL;
        free(temp);
        return data;
    }
    while(i < index){
        prev = temp;
        temp = temp->next;
        i++;
    }
    if(index == l-1){
        prev->next = NULL;
    }else{
        prev->next = temp->next;
        temp->next->prev = prev;
    }
    data = temp->data;
    free(temp);
    return data;
}
void display(dl_list *head) {
    if(!head){
        printf("NULL\n");
        return;
    }
    while (head) {
        printf("%d", head->data);
        head = head->next;
        if(head){
            printf(" <-> ");
        }
    }
    printf("\n");
}
void main(){
    dl_list *ll1 = NULL, *ll2 = NULL;
    for(int i = 19; i > 0; i--){
        push(&ll1,i,0);
    }
    push(&ll1, 10,10);
    printf("the len of this doubly linked list is %d\n",len(ll1));
    display(ll1);
}
```

OUTPUT

```
PS S:\WorkSpace\CollegeWork\DataStructure> gcc .\dlinkedlist.c
PS S:\WorkSpace\CollegeWork\DataStructure> ./a
the len of this doubly linked list is 20
1 <-> 2 <-> 3 <-> 4 <-> 5 <-> 6 <-> 7 <-> 8 <-> 9 <-> 10 <-> 10 <-> 11 <-> 12 <-> 13 <-> 14 <-> 15 <-> 16 <-> 17 <-> 18 <-> 19
PS S:\WorkSpace\CollegeWork\DataStructure>
```