Department of Information Science and Engineering

DATA STRUCTURES WITH C (19IS3PCDSC) (AY 2021-22)

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Question:

Simulate the online booking of movie tickets. The application should show the venue, show timings, movie details, available number of seats, exact available slots. The user should be able to reserve a given number of seats and the total ticket cost should be generated.

Assumptions:

- 5 movies are there for booking
- 5 movies are presented in different screens at the same time

Data Structure Used:

- Single Linked List
- Header node

Justification of the Data Structure selected:

- A **Singly linked list** is a type of linked list that **is unidirectional**, that is, it can be traversed in only one direction from head to the last node (tail). Each element in a linked list is called a node. A single node contains data and a pointer to the next node which helps in maintaining the structure of the list.

In this program the list consists of seat numbers in ascending order.

- **Header node** is helpful in keeping a count of number of nodes in the linked list. It is the first node of the Linked list and exist even when there are no nodes.

In this program header node stores the data of number of seats available.

Algorithm used:

In this program we have used the concept of Linked List with header node. Where we have created 5 Linked List each storing the seat numbers in an ascending order. When the seat is booked the seat number is displayed as 0.

Header node, which is the foremost node of the Linked List keeps the count of the number of seats available. When the seat is booked the number of seats in header node is decreased and when cancelled the number of seats in header node is increased.Thus, helping in providing available seats without counting the whole list.

In this program, we performed operations on the list created i.e.,

- Creating the seats list for each movie(create_ll) — Creating linked list
- Displaying the seats list for each movie(display) — Displaying linked list.
- Displaying the Ticket Booked(tickets_booking)
- Booking a seat for each movie(delete_pos) — Deleting the node at a given position i.e., storing the seat number as 0.
- Searching and adding the booked seat after it is cancelled(searching) — Inserting at a given position i.e., changing the data in the the given node from 0 to its respective seat number.

Code:

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

struct node *start1 = NULL;
struct node *start2 = NULL;
struct node *start3 = NULL;
struct node *start4 = NULL;
struct node *start5 = NULL;
struct node *header1;
struct node *header2;
struct node *header3;
struct node *header4;
struct node *header5;

struct node
{
    int seat;
    struct node *next;
};

//Creating a Linked List (Creating Seats for each movie)
struct node *create_ll(struct node *start,int data,struct node *header)
{
         struct node *new_node, *ptr;

new_node = (struct node*)malloc(sizeof(struct node));
new_node -> seat=data;
if(start==NULL)
{
    header->next=new_node;
    header->seat++;
    new_node -> next = NULL;
    start = new_node;
}
else
{
    header->next=start;
    header->seat++;
    ptr=start;
    while(ptr->next!=NULL)
    ptr=ptr->next;
    ptr->next = new_node;
    new_node->next=NULL;
}

return start;
}

//Displaying the linked list(Displaying the number of seats Available)
struct node *display(struct node *start,struct node *header)
{
struct node *ptr;
ptr = start;
    printf("\n--------------------Screen--------------------\n");
    for(int i=1;i<=10;i++)
    {
        for(int j=1;j<=10;j++)
        {
            printf("\t %d", ptr -> seat);
            ptr = ptr -> next;
        }
        printf("\n");
    }
    printf("-----------------------------------------------\n");
    printf("\nSeats Available= %d\n",header->seat);

return start;
}

//Displaying the movie ticket booked
void tickets_booking(int arr[],int len,char film[])
{
    char name[10];
    long phone,id=7572;
    printf("Enter your name\n");
    scanf("%s",name);
    printf("Enter phone number\n");
    scanf("%ld",&phone);
    printf("\n\n***************************************\n");
    printf("-------------------Movie Ticket-------------------\n");
    printf("\t\t%s\n",film);
    printf("Booking id = AB%ld\t\t\t\t",id);
    printf("Number of seats = %d\n",len);

    printf("Name = %s\t\t\t\t",name);
    printf("Seat numbers = ");
    for(int i=0;i<len;i++)
        printf("%d ",arr[i]);
    printf("\n");

    printf("Phone number = %ld\t\t",phone);
    printf("Price = Rs %d\n",(len*300));
    printf("Timing = 7:30 p.m\n");
    printf("Date = 1/2/2022\n");
    printf("Venue = PVR Koramangala,Gold Cinemas,Bangalore\n");

    printf("********************************************\n");
}

//Delete at a given position(Booking seat)
struct node *delete_pos(struct node *start,struct node *header,char moviearr[])
{
    struct node *ptr;
    int pos,x=1,len=0,seats;
    ptr=start;

    printf("Enter the number of seats to be booked\n");
    scanf("%d",&seats);
    int seat[seats];

    while(ptr!=NULL)
    {
        len++;
        ptr=ptr->next;
    }

    for(int k=0;k<seats;k++)
    {
        pos=0;
        x=1;
        ptr=start;
    printf("Enter the position at which the seat is to be taken\n");
    scanf("%d",&pos);
        seat[k]=pos;

     if(pos>len || pos<0)
        printf("Invalid position \n");
    else
    {
    while(x!=pos)
    {
        ptr=ptr->next;
        x++;
    }

        ptr->seat='\0';
        header->seat--;
    }
    }
    if(seats>0)
    tickets_booking(seat,seats,moviearr);

    return start;
}



//Searching a key element in the list(Re adding the seat when its cancelled)
struct node *searching(struct node *start,struct node *header)
{
    struct node *ptr;
    int key=0,pos=1;
    if(start!=NULL)
    {
    ptr=start;
    printf("Enter the seat number to cancel\n");
    scanf("%d",&key);
    while(pos!=key)
    {
        ptr=ptr->next;
        pos++;
    }
        if(ptr->seat==0)
        {
            ptr->seat=key;
        printf("Refund is initiated\n");
        }
           else
            printf("This Seat is not booked\n");
    }
    return start;
}

//Main function
int main()
{

    header1=(struct node *)malloc(sizeof(struct node));
    header2=(struct node *)malloc(sizeof(struct node));
    header3=(struct node *)malloc(sizeof(struct node));
    header4=(struct node *)malloc(sizeof(struct node));
    header5=(struct node *)malloc(sizeof(struct node));

    header1->seat=0;
    header1->next=NULL;
    header2->seat=0;
    header2->next=NULL;
    header3->seat=0;
    header3->next=NULL;
    header4->seat=0;
    header4->next=NULL;
    header5->seat=0;
    header5->next=NULL;

    int i;
    char movie[][30]={"Avengers Endgame","Thor","Iron man","Captain America","Spiderman - No
way home"};

    for(i=1;i<101;i++)
    {
        start1=create_ll(start1,i,header1);
        start2=create_ll(start2,i,header2);
        start3=create_ll(start3,i,header3);
        start4=create_ll(start4,i,header4);
        start5=create_ll(start5,i,header5);
    }

    int ch,ch1,ch2;
    printf("*****Tickets Booking Menu*****\n");
    printf("1.Movie Details\n");
    printf("2.Number of Seats Avaliable\n");
    printf("3.Book ticket\n");
    printf("4.Cancel Ticket\n");

    printf("0.Exit\n");
    printf("Enter your choice\n");
    scanf("%d",&ch);
    while(ch!=0)
    {
    switch (ch)
    {
        case 1 : printf("*****Movie Details*****\n");
            printf("1.Avengers Endgame\n");
            printf("After Thanos, an intergalactic warlord, disintegrates half of the universe, the
Avengers must reunite and assemble again to reinvigorate their trounced allies and restore
balance.\n\n");

            printf("2.Thor\n");
            printf("The Thor film series is a run of four movies (so far) set in the Marvel Cinematic
Universe consisting of Thor, Thor: The Dark World, Thor: Ragnarok and the currently-in-
development Thor: Love and Thunder. The series is anchored by Chris Hemsworth as Thor, Tom
Hiddleston as Loki and Natalie Portman as Jane Foster.\n\n");

            printf("3.Iron Man\n");
            printf("When Tony Stark, an industrialist, is captured, he constructs a high-tech armoured
suit to escape. Once he manages to escape, he decides to use his suit to fight against evil forces
to save the world.\n\n");
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      printf("4.Captain America\n");
      printf("During World War II, Steve Rogers decides to volunteer in an experiment that
transforms his weak body. He must now battle a secret Nazi organisation headed by Johann
Schmidt to defend his nation.\n\n");

      printf("5.Spiderman - No way home\n");
      printf("With Spider-Man's identity now revealed, our friendly neighborhood web-slinger is
unmasked and no longer able to separate his normal life as Peter Parker from the high stakes of
being a superhero. When Peter asks for help from Doctor Strange, the stakes become even more
dangerous, forcing him to discover what it truly means to be Spider-Man.\n\n");
      break;

    case 2 : printf("\n*****Number of Seats Avaliable*****\n");
      printf("1.Avengers Endgame\n");
      printf("2.Thor\n");
      printf("3.Iron Man\n");
      printf("4.Captain America\n");
      printf("5.Spiderman - No way home\n");
      printf("Enter your choice\n");
      scanf("%d",&ch1);
      switch(ch1)
      {
        case 1 : printf("Seats Available = %d\n",header1->seat);
          break;
        case 2 : printf("Seats Available = %d\n",header2->seat);
          break;
        case 3 : printf("Seats Available = %d\n",header3->seat);
          break;
        case 4 : printf("Seats Available = %d\n",header4->seat);
          break;
        case 5 : printf("Seats Available = %d\n",header5->seat);
          break;
        default : printf("Wrong choice\n");
      }
      break;

    case 3 : printf("\n*****Book Tickets*****\n");
      printf("1.Avengers Endgame\n");
      printf("2.Thor\n");
      printf("3.Iron Man\n");
      printf("4.Captain America\n");
      printf("5.Spiderman - No way home\n");
      printf("Enter your choice\n");
      scanf("%d",&ch2);
      switch(ch2)
      {
        case 1 : start1=display(start1, header1);
          start1=delete_pos(start1, header1,movie[0]);
          break;
        case 2 : start2=display(start2, header2);
          start2=delete_pos(start2, header2,movie[1]);
          break;
        case 3 : start3=display(start3, header3);
          start3=delete_pos(start3, header3,movie[2]);
          break;
        case 4 : start4=display(start4, header4);
          start4=delete_pos(start4, header4,movie[3]);
          break;
        case 5 : start5=display(start5, header5);
          start5=delete_pos(start5, header5,movie[4]);
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```
                    break;
            }
            break;

                case 4 : printf("\n*****Cancel Tickets*****\n");
                    printf("1.Avengers Endgame\n");
                    printf("2.Thor\n");
                    printf("3.Iron Man\n");
                    printf("4.Captain America\n");
                    printf("5.Spiderman - No way home\n");
                    printf("Enter your choice\n");
                    scanf("%d",&ch2);
                    switch(ch2)
                    {
                        case 1 :  start1=searching(start1, header1);
                            break;
                        case 2 :  start2=searching(start2, header2);
                            break;
                        case 3 :  start3=searching(start3, header3);
                            break;
                        case 4 :  start4=searching(start4, header4);
                            break;
                        case 5 :  start5=searching(start5, header5);
                            break;
                        default : printf("Invalid choice\n");
                    }

    }
        printf("\n*****Tickets Booking Menu*****\n");
        printf("1.Movie Details\n");
        printf("2.Number of Seats Avaliable\n");
        printf("3.Book ticket\n");
        printf("4.Cancel Ticket\n");

        printf("0.Exit\n");
        printf("Enter your choice\n");
        scanf("%d",&ch);
    }

    return 0;
}
```