**MINI-PROJECT REPORT**

**DATA STRUCTURES**

**TITLE:**

**TOLL TAX COLLECTION SYSTEM**

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**TOLL TAX COLLECTION SYSTEM**

**PROBLEM DEFINATION:**

Today due to increase in the vehicles, there is lot of gathering of traffic at the toll booths.

The main reason of the traffic is manual working of the toll tax collection at the booths. Each vehicle will require about a minute to complete payment and taking receipt.

So we decided to make a system which will reduce the manual work and increase the speed of work. Employee at the toll booth just have to enter type of vehicle and its number the system will automatically generate the bill receipt.

**MODULES:**

* Entry of particular vehicle
* Bill payment
* Displaying Passed Vehicles
* Searching passed vehicle
* Collection of All Day

**JUSTIFICATION:**

We had used Linked list in this system as a data structure

* linked list have ‘n’ number of nodes so we can used it for n number of vehicles. While if we had used array then its size is limited
* Traversal Using Linked list is Easy as Compared to other Data Structure
* Fo accessing any node in circular linked list we start traversing from the first node.
* If we are at any node in the middle of the list then it is not possible to access nodes that preceed the given node. This is why circular linked list is the best way to execute the program.
* Also the time complexity reduces.

**ALGORITHMS:**

We can use the following steps to insert a new node at end of the circular linked list...

* **Step 1:** Create a **newNode** with given value.
* **Step 2:** Check whether list is **Empty** (**head** == **NULL**).
* **Step 3:** If it is **Empty** then, set **head** = **newNode** and **newNode → next** = **head**.
* **Step 4:** If it is **Not Empty** then, define a node pointer **temp** and initialize with **head**.
* **Step 5:** Keep moving the **temp** to its next node until it reaches to the last node in the list (until **temp → next** == **head**).
* **Step 6:** Set **temp → next** = **newNode** and **newNode → next** = **head**.

We can use the following steps to display the elements of a circular linked list...

* **Step 1:** Check whether list is **Empty** (**head** == **NULL**)
* **Step 2:** If it is **Empty**, then display **'List is Empty!!!'** and terminate the function.
* **Step 3:** If it is **Not Empty** then, define a Node pointer **'temp'** and initialize with **head**.
* **Step 4:** Keep displaying **temp → data** with an arrow (**--->**) until **temp** reaches to the last node
* **Step 5:** Finally display **temp → data** with arrow pointing to **head → data**.

We can use the following steps to search the elements of a circular linked list...

* **Step 1:** Check whether list is **Empty** (**head** == **NULL**) and take variable **x** to be searched
* **Step 2:** If it is **Empty**, then display **'List is Empty!!!'** and terminate the function.
* **Step 3:** If it is **Not Empty** then, define a Node pointer **'temp'** and initialize with **head**.
* **Step 4:** Keep traversing **temp → data** with an arrow (**--->**) until **temp** reaches to the **x**
* **Step 5:** Finally display **temp → data**.

**PROGRAM:**

#include<stdio.h>

#include<stdlib.h>

struct car

{

struct car \*next;

int data;

};

struct car \*head;

struct truck

{

struct truck \*nextt;

int datat;

};

struct truck \*headt;

struct bus

{

struct bus \*nextb;

int datab;

};

struct bus \*headb;

int create()

{

int nc=0,journey;

struct car \*new,\*temp;

new=(struct car \*)malloc(sizeof(struct car));

new->next=NULL;

printf("Enter car number\n");

scanf("%d",&new->data);

if(head==NULL)

{

head=new;

new->next=head;

}

else

{

temp=head;

while(temp->next!=head)

{

temp=temp->next;

}

new->next=head;

temp->next=new;

}

printf("Enter 1 for Single journey & 2 for Return\n");

scanf("%d",&journey);

if(journey==1)

{

printf("Toll = 140 Rs.\n");

nc=nc+1;

}

else

{

printf("Toll = 280 Rs.\n");

nc=nc+2;

}

return nc;

}

void search(int ele)

{

struct car \*new,\*temp;

int c=1,flag=0;

if(head==NULL)

{

printf("No car has passed today\n");

}

else

{

temp=head;

do

{

if(temp->data==ele)

{

flag=1;

break;

}

temp=temp->next;

c++;

}while(head->next!=NULL);

if(flag==1)

{

printf("Vehicle found at Position %d\n",c);

}

else

{

printf("Vehicle not found\n");

}

}

}

void display()

{

struct car \*temp;

if(head==NULL)

{

printf("No car has passed\n");

exit(0);

}

else

{

temp=head;

do

{

printf("\t<%d>",temp->data);

temp=temp->next;

}while(temp!=head);

}

}

//truck//

int create1()

{

int nt=0,journey;

struct truck \*newt,\*tempt;

newt=(struct truck \*)malloc(sizeof(struct truck));

newt->nextt=NULL;

printf("Enter number\n");

scanf("%d",&newt->datat);

if(headt==NULL)

{

headt=newt;

newt->nextt=headt;

}

else

{

tempt=headt;

while(tempt->nextt!=headt)

{

tempt=tempt->nextt;

}

newt->nextt=headt;

tempt->nextt=newt;

}

printf("Enter 1 for Single journey & 2 for Return\n");

scanf("%d",&journey);

if(journey==1)

{

printf("Toll = 200 Rs.\n");

nt=nt+1;

}

else

{

printf("Toll = 400 Rs.\n");

nt=nt+2;

}

return nt;

}

void search1(int ele1)

{

struct truck \*tempt;

int t=1,flag=0;

if(headt==NULL)

{

printf("No truck has passed today\n");

}

else

{

tempt=headt;

do

{

if(tempt->datat==ele1)

{

flag=1;

break;

}

tempt=tempt->nextt;

t++;

}while(headt->nextt!=NULL);

if(flag==1)

{

printf("Vehicle found at Position: %d\n",t);

}

else

{

printf("Vehicle not found\n");

}

}

}

void display1()

{

struct truck \*tempt;

if(headt==NULL)

{

printf("No Truck has passed\n");

exit(0);

}

else

{

tempt=headt;

do

{

printf("\t<%d>",tempt->datat);

tempt=tempt->nextt;

}while(tempt!=headt);

}

}

//bus//

int create2()

{

int nb=0,journey;

struct bus \*newb,\*tempb;

newb=(struct bus \*)malloc(sizeof(struct bus));

newb->nextb=NULL;

printf("Enter number\n");

scanf("%d",&newb->datab);

if(headb==NULL)

{

headb=newb;

newb->nextb=headb;

}

else

{

tempb=headb;

while(tempb->nextb!=headb)

{

tempb=tempb->nextb;

}

newb->nextb=headb;

tempb->nextb=newb;

}

printf("Enter 1 for Single journey & 2 for Return\n");

scanf("%d",&journey);

if(journey==1)

{

printf("Toll = 170 Rs.\n");

nb=nb+1;

}

else

{

printf("Toll = 340 Rs.\n");

nb=nb+2;

}

return nb;

}

void search2(int ele2)

{

struct bus \*tempb;

int b=1,flag=0;

if(headb==NULL)

{

printf("No bus has passed today\n");

}

else

{

tempb=headb;

do

{

if(tempb->datab==ele2)

{

flag=1;

break;

}

tempb=tempb->nextb;

b++;

}while(headb->nextb!=NULL);

if(flag==1)

{

printf("Vehicle found at Position:%d \n",b);

}

else

{

printf("Vehicle not found\n");

}

}

}

void display2()

{

struct bus \*tempb;

if(headb==NULL)

{

printf("No Bus has passed\n");

exit(0);

}

else

{

tempb=headb;

do

{

printf("\t<%d>",tempb->datab);

tempb=tempb->nextb;

}while(tempb!=headb);

}

}

void main()

{

int choice,n,n1,n2,n3,n4,c1,c2,c3,t1,t2,t3,tot;

c1=c2=c3=t1=t2=t3=0;

do

{

printf(" \n");

printf(" ================================================== \n");

printf(">>>>>>>>>> WELCOME TO MUMBAI TOLL PLAZA <<<<<<<<<<<<<<\n");

printf(" =================================================== \n");

printf(" \n");

printf("Enter 1 for Car\n");

printf("Enter 2 for Truck\n");

printf("Enter 3 for Bus\n");

printf("\nEnter 4 to Search the car passed\n");

printf("Enter 5 to Search the truck passed\n");

printf("Enter 6 to Search the bus passed\n");

printf("\nEnter 7 to Display the car passed\n");

printf("Enter 8 to Display the truck passed\n");

printf("Enter 9 to Display the bus passed\n");

printf("Enter 10 for total collection\n");

printf("Enter 11 to Exit\n");

printf("\nEnter Your choice\n");

scanf("%d",&choice);

switch(choice)

{

case 1:

t1=create();

c1=c1+t1;

break;

case 2:

t2=create1();

c2=c2+t2;

break;

case 3:

t3=create2();

c3=c3+t3;

break;

case 4:

printf("Enter car number to be Searched\n");

scanf("%d",&n2);

search(n2);

break;

case 5:

printf("Enter truck number to be Searched\n");

scanf("%d",&n3);

search1(n3);

break;

case 6:

printf("Enter bus number to be Searched\n");

scanf("%d",&n4);

search2(n4);

break;

case 7:

display();

break;

case 8:

display1();

break;

case 9:

display2();

break;

case 10: printf("\nTotal Car Fare collected:\t%d\n\n",(140\*c1));

printf("\nTotal TruckFare collected:\t%d\n\n",(200\*c2));

printf("\nTotal Bus Fare collected:\t%d\n\n",(170\*c3));

printf("\nTotal Fare collected:\t\t%d\n\n",(140\*c1+200\*c2+170\*c3));

break;

case 11: exit(1);

break;

}

}while(1);

}

/\***OUTPUT**

mandar@mandar-Inspiron-5570:~/Desktop$ gcc 11.c -o 11

mandar@mandar-Inspiron-5570:~/Desktop$ ./11

==================================================

>>>>>>>>>> WELCOME TO MUMBAI TOLL PLAZA <<<<<<<<<<<<<<

===================================================

Enter 1 for Car

Enter 2 for Truck

Enter 3 for Bus

Enter 4 to Search the car passed

Enter 5 to Search the truck passed

Enter 6 to Search the bus passed

Enter 7 to Display the car passed

Enter 8 to Display the truck passed

Enter 9 to Display the bus passed

Enter 10 for total collection

Enter 11 to Exit

Enter Your choice

1

Enter car number

1234

Enter 1 for Single journey & 2 for Return

1

Toll = 140 Rs.

==================================================

>>>>>>>>>> WELCOME TO MUMBAI TOLL PLAZA <<<<<<<<<<<<<<

===================================================

Enter 1 for Car

Enter 2 for Truck

Enter 3 for Bus

Enter 4 to Search the car passed

Enter 5 to Search the truck passed

Enter 6 to Search the bus passed

Enter 7 to Display the car passed

Enter 8 to Display the truck passed

Enter 9 to Display the bus passed

Enter 10 for total collection

Enter 11 to Exit

Enter Your choice

2

Enter number

3456

Enter 1 for Single journey & 2 for Return

2

Toll = 400 Rs.

==================================================

>>>>>>>>>> WELCOME TO MUMBAI TOLL PLAZA <<<<<<<<<<<<<<

===================================================

Enter 1 for Car

Enter 2 for Truck

Enter 3 for Bus

Enter 4 to Search the car passed

Enter 5 to Search the truck passed

Enter 6 to Search the bus passed

Enter 7 to Display the car passed

Enter 8 to Display the truck passed

Enter 9 to Display the bus passed

Enter 10 for total collection

Enter 11 to Exit

Enter Your choice

3

Enter number

7890

Enter 1 for Single journey & 2 for Return

2

Toll = 340 Rs.

==================================================

>>>>>>>>>> WELCOME TO MUMBAI TOLL PLAZA <<<<<<<<<<<<<<

===================================================

Enter 1 for Car

Enter 2 for Truck

Enter 3 for Bus

Enter 4 to Search the car passed

Enter 5 to Search the truck passed

Enter 6 to Search the bus passed

Enter 7 to Display the car passed

Enter 8 to Display the truck passed

Enter 9 to Display the bus passed

Enter 10 for total collection

Enter 11 to Exit

Enter Your choice

10

Total Car Fare collected: 140

Total TruckFare collected: 400

Total Bus Fare collected: 340

Total Fare collected: 880

==================================================

>>>>>>>>>> WELCOME TO MUMBAI TOLL PLAZA <<<<<<<<<<<<<<

===================================================

Enter 1 for Car

Enter 2 for Truck

Enter 3 for Bus

Enter 4 to Search the car passed

Enter 5 to Search the truck passed

Enter 6 to Search the bus passed

Enter 7 to Display the car passed

Enter 8 to Display the truck passed

Enter 9 to Display the bus passed

Enter 10 for total collection

Enter 11 to Exit

Enter Your choice

7

<1234>

==================================================

>>>>>>>>>> WELCOME TO MUMBAI TOLL PLAZA <<<<<<<<<<<<<<

===================================================

Enter 1 for Car

Enter 2 for Truck

Enter 3 for Bus

Enter 4 to Search the car passed

Enter 5 to Search the truck passed

Enter 6 to Search the bus passed

Enter 7 to Display the car passed

Enter 8 to Display the truck passed

Enter 9 to Display the bus passed

Enter 10 for total collection

Enter 11 to Exit

Enter Your choice

8

<3456>

==================================================

>>>>>>>>>> WELCOME TO MUMBAI TOLL PLAZA <<<<<<<<<<<<<<

===================================================

Enter 1 for Car

Enter 2 for Truck

Enter 3 for Bus

Enter 4 to Search the car passed

Enter 5 to Search the truck passed

Enter 6 to Search the bus passed

Enter 7 to Display the car passed

Enter 8 to Display the truck passed

Enter 9 to Display the bus passed

Enter 10 for total collection

Enter 11 to Exit

Enter Your choice

9

<7890>

==================================================

>>>>>>>>>> WELCOME TO MUMBAI TOLL PLAZA <<<<<<<<<<<<<<

===================================================

Enter 1 for Car

Enter 2 for Truck

Enter 3 for Bus

Enter 4 to Search the car passed

Enter 5 to Search the truck passed

Enter 6 to Search the bus passed

Enter 7 to Display the car passed

Enter 8 to Display the truck passed

Enter 9 to Display the bus passed

Enter 10 for total collection

Enter 11 to Exit

Enter Your choice

4

Enter car number to be Searched

1234

Vehicle found at Position 1

==================================================

>>>>>>>>>> WELCOME TO MUMBAI TOLL PLAZA <<<<<<<<<<<<<<

===================================================

Enter 1 for Car

Enter 2 for Truck

Enter 3 for Bus

Enter 4 to Search the car passed

Enter 5 to Search the truck passed

Enter 6 to Search the bus passed

Enter 7 to Display the car passed

Enter 8 to Display the truck passed

Enter 9 to Display the bus passed

Enter 10 for total collection

Enter 11 to Exit

Enter Your choice

5

Enter truck number to be Searched

3456

Vehicle found at Position: 1

==================================================

>>>>>>>>>> WELCOME TO MUMBAI TOLL PLAZA <<<<<<<<<<<<<<

===================================================

Enter 1 for Car

Enter 2 for Truck

Enter 3 for Bus

Enter 4 to Search the car passed

Enter 5 to Search the truck passed

Enter 6 to Search the bus passed

Enter 7 to Display the car passed

Enter 8 to Display the truck passed

Enter 9 to Display the bus passed

Enter 10 for total collection

Enter 11 to Exit

Enter Your choice

6

Enter bus number to be Searched

7890

Vehicle found at Position:1

==================================================

>>>>>>>>>> WELCOME TO MUMBAI TOLL PLAZA <<<<<<<<<<<<<<

===================================================

Enter 1 for Car

Enter 2 for Truck

Enter 3 for Bus

Enter 4 to Search the car passed

Enter 5 to Search the truck passed

Enter 6 to Search the bus passed

Enter 7 to Display the car passed

Enter 8 to Display the truck passed

Enter 9 to Display the bus passed

Enter 10 for total collection

Enter 11 to Exit

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