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DSA Lab 7 (Session 4)

Q1) Implement a queue using singly linked list without header node.

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

typedef struct node{
	int data;
	struct node * next;
} * NODE;

NODE enqueue(NODE first, int ele){
	NODE temp = (NODE)malloc(sizeof(struct node));
	temp->data = ele;
	if(first == NULL){
		return temp;
	}
	else{
		NODE m = first;
		while(m->next != NULL){
			m=m->next;
		}
		m->next = temp;
		return first;
	}
}

NODE dequeue(NODE first){
	if(first == NULL){
		printf("\nQueue empty\n");
		return NULL;
	}
	else if(first->next == NULL){
		printf("\nDequeue:\t%d\n",first->data);
		free(first);
		return NULL;
	}
	else{
		NODE temp = first;
		first = first->next;
		printf("\nDequeue\t%d\n",temp->data);
		free(temp);
		return first;
	}
}

void display(NODE first){
	if(first == NULL){
		printf("\nQueue empty\n");
```

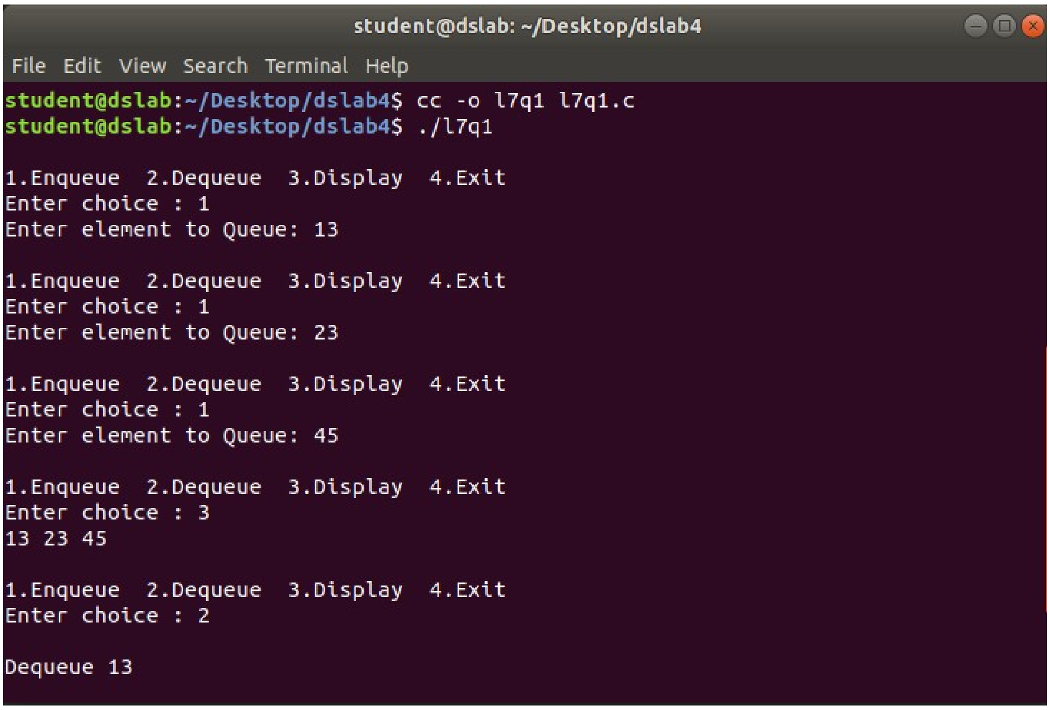
```
        }
        else{
                NODE temp = first;
                while(temp->next != NULL){
                        printf("%d ",temp->data);
                        temp=temp->next;
                }
                printf("%d\n",temp->data);
        }
}

int main(){
        NODE first = NULL;
        int ch,ele;
        while(1){
                printf("\n1.Enqueue  2.Dequeue  3.Display  4.Exit\nEnter choice : ");
                scanf("%d",&ch);
                switch(ch){
                        case 1: printf("Enter element to Queue: ");
                                        scanf("%d",&ele);
                                        first = enqueue(first,ele);
                                        break;

                        case 2: first = dequeue(first);
                                        break;

                        case 3: display(first);
                                        break;

                        case 4: printf("\nExiting...");
                                        return 0;
                }
        }
}
```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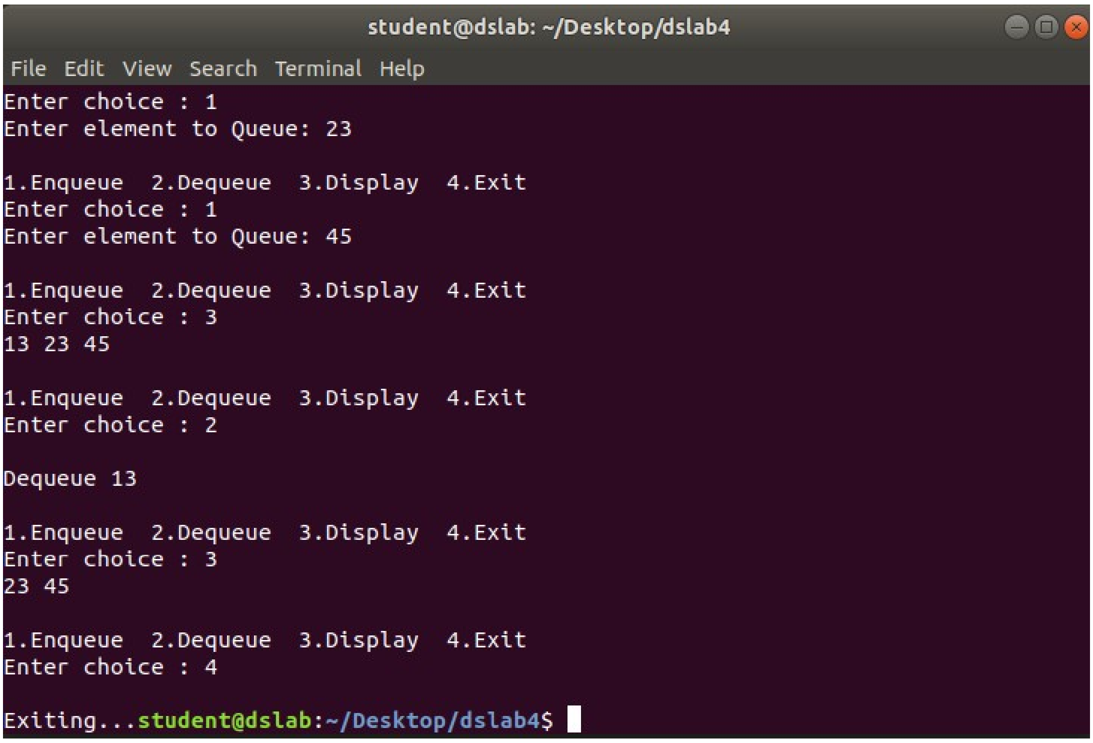
```
student@dslab:~/Desktop/dslab4$ cc -o l7q1 l7q1.c
student@dslab:~/Desktop/dslab4$ ./l7q1

1.Enqueue  2.Dequeue  3.Display  4.Exit
Enter choice : 1
Enter element to Queue: 13

1.Enqueue  2.Dequeue  3.Display  4.Exit
Enter choice : 1
Enter element to Queue: 23

1.Enqueue  2.Dequeue  3.Display  4.Exit
Enter choice : 1
Enter element to Queue: 45

1.Enqueue  2.Dequeue  3.Display  4.Exit
Enter choice : 3
13 23 45

1.Enqueue  2.Dequeue  3.Display  4.Exit
Enter choice : 2

Dequeue 13
```



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```
Enter choice : 1
Enter element to Queue: 23

1.Enqueue  2.Dequeue  3.Display  4.Exit
Enter choice : 1
Enter element to Queue: 45

1.Enqueue  2.Dequeue  3.Display  4.Exit
Enter choice : 3
13 23 45

1.Enqueue  2.Dequeue  3.Display  4.Exit
Enter choice : 2

Dequeue 13

1.Enqueue  2.Dequeue  3.Display  4.Exit
Enter choice : 3
23 45

1.Enqueue  2.Dequeue  3.Display  4.Exit
Enter choice : 4

Exiting...student@dslab:~/Desktop/dslab4$
```

Q2) Perform UNION and INTERSECTION set operations on singly linked lists with header node.

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

typedef struct node{
        int data;
        struct node * next;
} * NODE;

NODE insert(NODE head,int ele){
        NODE first = head->next;
        NODE temp = (NODE)malloc(sizeof(struct node));
        temp->data = ele;
        temp->next = NULL;
        if(first == NULL){
                head->next = temp;
                return head;
        }
        else if(first->next == NULL){
                if(first->data > ele){
                        temp->next = first;
                        head->next = temp;
                        return head;
                }
                else if(first->data < ele){
                        first->next = temp;
                }
                else{
```

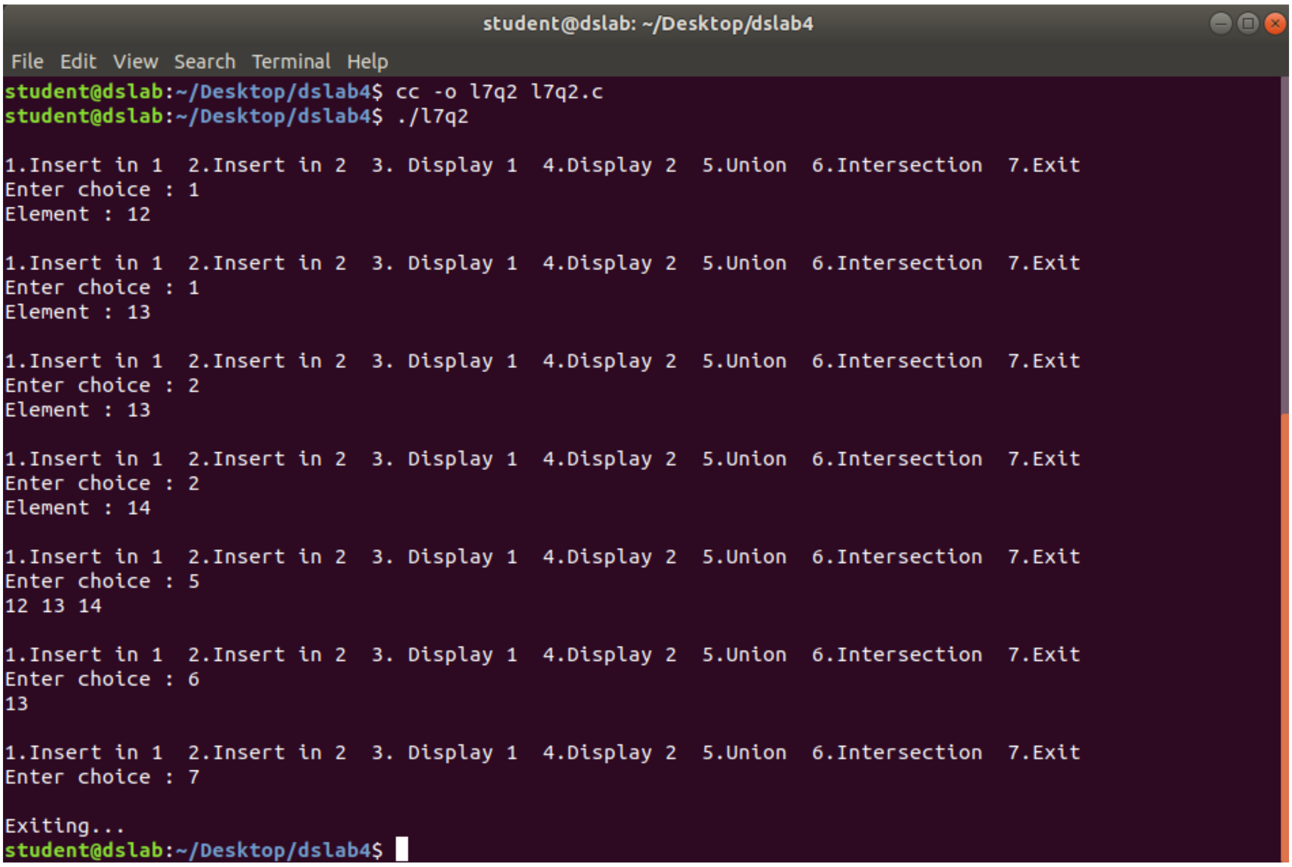
```
                printf("\nElement already exists in set.\n");
                free(temp);
            }
            return head;
        }
        else{
            NODE m = first;
            while(m->next != NULL && m->next->data <= ele){
                m=m->next;
            }
            if(m->data != ele){
                temp->next = m->next;
                m->next = temp;
            }
            else{
                printf("\nElement already exists in the set.\n");
                free(temp);
            }
            return head;
        }
}

NODE UNION(NODE l1, NODE l2){
        NODE uni =(NODE)malloc(sizeof(struct node));
        NODE pl1 = l1->next;
        NODE pl2 = l2->next;
        uni->data = 0;
        while(pl1 != NULL && pl2 != NULL){
            if(pl1->data < pl2->data){
                uni = insert(uni,pl1->data);
                pl1 = pl1->next;
            }
            else if(pl1->data > pl2->data){
                uni = insert(uni,pl2->data);
                pl2 = pl2->next;
            }
            else{
                uni = insert(uni,pl1->data);
                pl1 = pl1->next;
                pl2 = pl2->next;
            }
        }
        while(pl1!=NULL){
            uni = insert(uni,pl1->data);
            pl1 = pl1->next;
        }
        while(pl2!=NULL){
            uni = insert(uni,pl2->data);
            pl2 = pl2->next;
        }
        return uni;
}
```

```
NODE INTERSECTION(NODE l1, NODE l2){
        NODE inter = (NODE)malloc(sizeof(struct node));
        NODE pl1 = l1->next;
        inter->data=0;
        while(pl1!=NULL){
                NODE pl2 = l2->next;
                while(pl2!=NULL){
                        if(pl1->data == pl2->data){
                                inter = insert(inter,pl1->data);
                                break;
                        }
                        pl2=pl2->next;
                }
                pl1=pl1->next;
        }
        return inter;
}

void display(NODE head){
        NODE first = head->next;
        if(first == NULL){
                printf("\nList empty\n");
        }
        else{
                NODE temp = first;
                while(temp->next!=NULL){
                        printf("%d ",temp->data);
                        temp=temp->next;
                }
                printf("%d\n",temp->data);
        }
}

int main(){
        NODE first = (NODE)malloc(sizeof(struct node));
        NODE second = (NODE)malloc(sizeof(struct node));
        NODE uni = (NODE)malloc(sizeof(struct node));
        NODE inter = (NODE)malloc(sizeof(struct node));
        int ch,ele;
        first->data = 0;
        second->data = 0;
        uni->data = 0;
        inter->data = 0;
        while(1){
                printf("\n1.Insert in 1  2.Insert in 2  3. Display 1  4.Display 2  5.Union  6.Intersection
7.Exit\nEnter choice : ");
                scanf("%d",&ch);
                switch(ch){
                        case 1: printf("Element : ");
                                        scanf("%d",&ele);
                                        first = insert(first,ele);
                                        break;
                        case 2: printf("Element : ");
                                        scanf("%d",&ele);
                                        second = insert(second,ele);
                                        break;
                        case 3: display(first);
                                        break;
                        case 4: display(second);
                                        break;
                        case 5: uni = UNION(first,second);
                                        display(uni);
                                        break;
                        case 6: inter = INTERSECTION(first,second);
                                        display(inter);
                                        break;
                        case 7: printf("\nExiting...\n");
                        return 0;
                }
        }
}
```


student@dslab: ~/Desktop/dslab4
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```
student@dslab:~/Desktop/dslab4$ cc -o l7q2 l7q2.c
student@dslab:~/Desktop/dslab4$ ./l7q2

1.Insert in 1  2.Insert in 2  3. Display 1  4.Display 2  5.Union  6.Intersection  7.Exit
Enter choice : 1
Element : 12

1.Insert in 1  2.Insert in 2  3. Display 1  4.Display 2  5.Union  6.Intersection  7.Exit
Enter choice : 1
Element : 13

1.Insert in 1  2.Insert in 2  3. Display 1  4.Display 2  5.Union  6.Intersection  7.Exit
Enter choice : 2
Element : 13

1.Insert in 1  2.Insert in 2  3. Display 1  4.Display 2  5.Union  6.Intersection  7.Exit
Enter choice : 2
Element : 14

1.Insert in 1  2.Insert in 2  3. Display 1  4.Display 2  5.Union  6.Intersection  7.Exit
Enter choice : 5
12 13 14

1.Insert in 1  2.Insert in 2  3. Display 1  4.Display 2  5.Union  6.Intersection  7.Exit
Enter choice : 6
13

1.Insert in 1  2.Insert in 2  3. Display 1  4.Display 2  5.Union  6.Intersection  7.Exit
Enter choice : 7

Exiting...
student@dslab:~/Desktop/dslab4$
```