Rajalakshmi Engineering College

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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 4_MCQ_Updated

Attempt : 1
Total Mark : 20
Marks Obtained : 18

Section 1 : MCQ

1. Which operations are performed when deleting an element from an array-based queue?

Answer

Dequeue

Status : Correct ***Marks : 1/1***

2. A normal queue, if implemented using an array of size MAX_SIZE, gets full when

Answer

Front = (rear + 1)mod MAX_SIZE

Status : Wrong ***Marks : 0/1***

3. What will be the output of the following code?

```
#include <stdio.h>
#define MAX_SIZE 5
typedef struct {
   int arr[MAX_SIZE];
   int front;
   int rear;
   int size;
} Queue;

void enqueue(Queue* queue, int data) {
   if (queue->size == MAX_SIZE) {
      return;
   }
   queue->rear = (queue->rear + 1) % MAX_SIZE;
   queue->arr[queue->rear] = data;
   queue->size++;
}
int dequeue(Queue* queue) {
   if (queue->size == 0) {
      return -1;
   }
   int data = queue->arr[queue->front];
   queue->front = (queue->front + 1) % MAX_SIZE;
   queue->size--;
   return data;
}
int main() {
   Queue queue;
   queue.front = 0;
   queue.rear = -1;
   queue.size = 0;
   enqueue(&queue, 1);
   enqueue(&queue, 2);
   enqueue(&queue, 3);
   printf("%d ", dequeue(&queue));
   printf("%d ", dequeue(&queue));
   enqueue(&queue, 4);
```

```
    enqueue(&queue, 5);
    printf("%d ", dequeue(&queue));
    printf("%d ", dequeue(&queue));
    return 0;
}
```

Answer

1 2 3 4

Status : Correct ***Marks : 1/1***

4. Front and rear pointers are tracked in the linked list implementation of a queue. Which of these pointers will change during an insertion into the EMPTY queue?

Answer

Both front and rear pointer

Status : Correct ***Marks : 1/1***

5. What will be the output of the following code?

```
#include <stdio.h>
#include <stdlib.h>
#define MAX_SIZE 5
typedef struct {
    int* arr;
    int front;
    int rear;
    int size;
} Queue;
Queue* createQueue() {
    Queue* queue = (Queue*)malloc(sizeof(Queue));
    queue->arr = (int*)malloc(MAX_SIZE * sizeof(int));
    queue->front = -1;
    queue->rear = -1;
    queue->size = 0;
    return queue;
}
int isEmpty(Queue* queue) {
   return (queue->size == 0);
}
int main() {
   Queue* queue = createQueue();
   printf("Is the queue empty? %d", isEmpty(queue));
   return 0;
}
```

Answer

Is the queue empty? 1

Status : Correct ***Marks : 1/1***

6. What does the front pointer in a linked list implementation of a queue contain?

Answer

The address of the first element

Status : Correct ***Marks : 1/1***

7. Insertion and deletion operation in the queue is known as

Answer

Enqueue and Dequeue

Status : Correct ***Marks : 1/1***

8. In linked list implementation of a queue, the important condition for a queue to be empty is?

Answer

FRONT is null

Status : Correct ***Marks : 1/1***

9. When new data has to be inserted into a stack or queue, but there is no available space. This is known as

Answer

overflow

Status : Correct ***Marks : 1/1***

10. What are the applications of dequeue?

Answer

All the mentioned options

Status : Correct ***Marks : 1/1***

11. Which of the following properties is associated with a queue?

Answer

First In First Out

Status : Correct ***Marks : 1/1***

12. In what order will they be removed If the elements “A”, “B”, “C” and “D” are placed in a queue and are deleted one at a time

Answer

ABCD

Status : Correct ***Marks : 1/1***

13. Which one of the following is an application of Queue Data Structure?

Answer

All of the mentioned options

Status : Correct ***Marks : 1/1***

14. What will the output of the following code?

```
#include <stdio.h>
#include <stdlib.h>
typedef struct {
   int* arr;
   int front;
   int rear;
   int size;
} Queue;
Queue* createQueue() {
   Queue* queue = (Queue*)malloc(sizeof(Queue));
   queue->arr = (int*)malloc(5 * sizeof(int));
   queue->front = 0;
   queue->rear = -1;
   queue->size = 0;
   return queue;
}
int main() {
   Queue* queue = createQueue();
   printf("%d", queue->size);
   return 0;
}
```

Answer

0

Status : Correct ***Marks : 1/1***

15. In a linked list implementation of a queue, front and rear pointers are tracked. Which of these pointers will change during an insertion into a non-empty queue?

Answer

Only rear pointer

Status : Correct ***Marks : 1/1***

16. After performing this set of operations, what does the final list look to contain?

```
InsertFront(10);
InsertFront(20);
InsertRear(30);
DeleteFront();
InsertRear(40);
InsertRear(10);
DeleteRear();
InsertRear(15);
display();
```

Answer

10 30 40 15

Status : Correct ***Marks : 1/1***

17. Which of the following can be used to delete an element from the front end of the queue?

Answer

public Object deleteFront() throws emptyDEQException{if(isEmpty())throw new emptyDEQException("Empty");else{Node temp = head.getNext();Node cur = temp.getNext();Object e = temp.getEle();head.setNext(cur);size--;return e;}}

Status : Correct ***Marks : 1/1***

18. What is the functionality of the following piece of code?

```
public void function(Object item)
{
   Node temp=new Node(item,trail);
   if(isEmpty())
   {
      head.setNext(temp);
      temp.setNext(trail);
   }
```

```
    else
    {
        Node cur=head.getNext();
        while(cur.getNext()!=trail)
        {
            cur=cur.getNext();
        }
        cur.setNext(temp);
    }
    size++;
}
```

Answer

Insert at the rear end of the dequeue

Status : Correct ***Marks : 1/1***

19. The process of accessing data stored in a serial access memory is similar to manipulating data on a

Answer

Stack

Status : Wrong ***Marks : 0/1***

20. The essential condition that is checked before insertion in a queue is?

Answer

Overflow

Status : Correct ***Marks : 1/1***

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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 4_COD_Question 1

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

Imagine a bustling coffee shop, where customers are placing their orders for their favorite coffee drinks. The cafe owner Sheeren wants to efficiently manage the queue of coffee orders using a digital system. She needs a program to handle this queue of orders.

You are tasked with creating a program that implements a queue for coffee orders. Each character in the queue represents a customer's coffee order, with 'L' indicating a latte, 'E' indicating an espresso, 'M' indicating a macchiato, 'O' indicating an iced coffee, and 'N' indicating a nabob.

Customers can place orders and enjoy their delicious coffee drinks.

Input Format

The input consists of integers corresponding to the operation that needs to be performed:

Choice 1: Enqueue the coffee order into the queue. If the choice is 1, the following input is a space-separated character ('L', 'E', 'M', 'O', 'N').

Choice 2: Dequeue a coffee order from the queue.

Choice 3: Display the orders in the queue.

Choice 4: Exit the program.

Output Format

The output displays messages according to the choice and the status of the queue:

If the choice is 1:

1. Insert the given order into the queue and display "Order for [order] is enqueued." where [order] is the coffee order that is inserted.
2. If the queue is full, print "Queue is full. Cannot enqueue more orders."

If the choice is 2:

1. Dequeue a character from the queue and display "Dequeued Order: " followed by the corresponding order that is dequeued.
2. If the queue is empty without any orders, print "No orders in the queue."

If the choice is 3:

1. The output prints "Orders in the queue are: " followed by the space-separated orders present in the queue.
2. If there are no orders in the queue, print "Queue is empty. No orders available."

If the choice is 4:

1. Exit the program and print "Exiting program"

If any other choice is entered, the output prints "Invalid option."

Refer to the sample output for the exact text and format.

Sample Test Case

```
Input: 1 L
1 E
1 M
1 O
1 N
1 O
3
2
3
4
Output: Order for L is enqueued.
Order for E is enqueued.
Order for M is enqueued.
Order for O is enqueued.
Order for N is enqueued.
Queue is full. Cannot enqueue more orders.
Orders in the queue are: L E M O N
Dequeued Order: L
Orders in the queue are: E M O N
Exiting program
```

Answer

```c
// You are using GCC
#include<stdio.h>
#include<stdlib.h>
#define MAX_SIZE 5
typedef struct{
   char items[MAX_SIZE];
   int front;
   int rear;
   int size;

}Queue;
void initialize(Queue *q){
   q->front=0;
```

```
    q->rear=-1;
    q->size=0;
}
int isFull(Queue *q){
    return q->size==MAX_SIZE;
}
int isEmpty(Queue *q){
    return q->size==0;
}
void enqueue(Queue *q,char order){
    if(isFull(q)){
        printf("Queue is full.Cannot enqueue more orders.\n");
        return;
        }
        q->rear=(q->rear+1)%MAX_SIZE;
        q->items[q->rear]=order;
        q->size++;
        printf("order for %c is enqueued.\n",order);
}
char dequeue(Queue *q){
    if(isEmpty(q)){
        printf("No orders in the queue.\n");
        return '\0';
    }
    char order=q->items[q->front];
    q->front=(q->front+1)%MAX_SIZE;
    q->size--;
    printf("Dequeued Order: %c\n",order);
    return order;
}
void display(Queue *q){
    if(isEmpty(q)){
        printf("Queue is empty.No orders available.\n");
        return;
    }
    printf("Orders in the queue are: ");
    int i=q->front;
    int count=0;
    while(count<q->size){
        printf("%c",q->items[i]);
        if(count<q->size-1)
        printf(" ");
        i=(i+1)%MAX_SIZE;
        count++;
    }
    printf("\n");
}
int main(){
    Queue coffeeQueue;
    initialize(&coffeeQueue);
    int choice;
    char order;
    while(1){
        scanf("%d",&choice);
        switch (choice){
            case 1:
            scanf(" %c",&order);
            enqueue(&coffeeQueue,order);
            break;
            case 2:
            dequeue(&coffeeQueue);
            break;
            case 3:
            display(&coffeeQueue);
            break;
            case 4:
            printf("Exiting program\n");
            exit(0);
            default:
            printf("Invalid option.\n");
        }
    }
    return 0;
}
```

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

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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 4_COD_Question 2

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

In a bustling IT department, staff regularly submit helpdesk tickets to request technical assistance. Managing these tickets efficiently is vital for providing quality support.

Your task is to develop a program that uses an array-based queue to handle and prioritize helpdesk tickets based on their unique IDs.

Implement a program that provides the following functionalities:

Enqueue Helpdesk Ticket: Add a new helpdesk ticket to the end of the queue. Provide a positive integer representing the ticket ID for the new ticket.Dequeue Helpdesk Ticket: Remove and process the next helpdesk ticket from the front of the queue. The program will display the ticket ID of the processed ticket.Display Queue: Display the ticket IDs of all the helpdesk tickets currently in the queue.

Input Format

The input consists of integers corresponding to the operation that needs to be performed:

Choice 1: Enqueue the ticket ID into the queue. If the choice is 1, the following input is a space-separated integer, representing the ticket ID to be enqueued into the queue.

Choice 2: Dequeue a ticket from the queue.

Choice 3: Display the ticket IDs in the queue.

Choice 4: Exit the program.

Output Format

The output displays messages according to the choice and the status of the queue:

If the choice is 1:

1. Insert the given ticket ID into the queue and display "Helpdesk Ticket ID [id] is enqueued." where [id] is the ticket ID that is inserted.
2. If the queue is full, print "Queue is full. Cannot enqueue."

If the choice is 2:

1. Dequeue a ticket ID from the queue and display "Dequeued Helpdesk Ticket ID: " followed by the corresponding ID that is dequeued.
2. If the queue is empty without any elements, print "Queue is empty."

If the choice is 3:

1. The output prints "Helpdesk Ticket IDs in the queue are: " followed by the space-separated ticket IDs present in the queue.
2. If there are no elements in the queue, print "Queue is empty."

If the choice is 4:

1. Exit the program and print "Exiting the program"

If any other choice is entered, print "Invalid option."

Refer to the sample output for formatting specifications.

Sample Test Case

```
Input: 1 101
1 202
1 203
1 204
1 205
1 206
3
2
3
4
Output: Helpdesk Ticket ID 101 is enqueued.
Helpdesk Ticket ID 202 is enqueued.
Helpdesk Ticket ID 203 is enqueued.
Helpdesk Ticket ID 204 is enqueued.
Helpdesk Ticket ID 205 is enqueued.
Queue is full. Cannot enqueue.
Helpdesk Ticket IDs in the queue are: 101 202 203 204 205
Dequeued Helpdesk Ticket ID: 101
Helpdesk Ticket IDs in the queue are: 202 203 204 205
Exiting the program
```

Answer

```
#include <stdio.h>
#define MAX_SIZE 5

int ticketIDs[MAX_SIZE];
int front = -1;
int rear = -1;

void initializeQueue() {
   front = -1;
   rear = -1;
}
```

```
// You are using GCC
int isEmpty() {
   //Type your code here
   return front==-1;
}

int isFull() {
   //Type your code here
   return (rear+1)%MAX_SIZE==front;
}

int enqueue(int ticketID) {
   //Type your code here
   if(isFull()){
      printf("queue is full.Cannot enqueue.\n");
      return 0;
   }
   if(isEmpty()){
      front=rear=0;
   }
   else{
      rear=(rear+1)%MAX_SIZE;
   }
   ticketIDs[rear]=ticketID;
   printf("Helpdesk Ticket ID %d is enqueued.\n",ticketID);
   return 1;
}


int dequeue(int* ticketID) {
   //Type your code here
   if(isEmpty()){
      return 0;

   }
   *ticketID=ticketIDs[front];
   if(front==rear){
      front=rear=-1;
   }
   else{
      front=(front+1)%MAX_SIZE;
   }
```

```
    return 1;
}

void display() {
    //Type your code here
    if(isEmpty()){
        printf("Queue is empty.\n");
        return;
    }
    printf("Helpdesk Ticket IDs in the queue are: ");
    int i=front;
    do{
        printf("%d",ticketIDs[i]);
        if(i!=rear)
        printf(" ");
        i=(i+1)%MAX_SIZE;
    }
    while(i!=(rear+1)%MAX_SIZE);
    printf("\n");
}

int main() {
    int ticketID;
    int option;
    initializeQueue();
    while (1) {
        if (scanf("%d", &option) == EOF) {
            break;
        }
        switch (option) {
            case 1:
                if (scanf("%d", &ticketID) == EOF) {
                    break;
                }
                if (enqueue(ticketID)) {
                }
                break;
            case 2:
                if (dequeue(&ticketID)) {
                    printf("Dequeued Helpdesk Ticket ID: %d\n", ticketID);
                } else {
                    printf("Queue is empty.\n");
                }
                break;
            case 3:
                display();
                break;
            case 4:
                printf("Exiting the program\n");
                return 0;
            default:
                printf("Invalid option.\n");
                break;
        }
    }
    return 0;
}
```

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

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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 4_COD_Question 3

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

Write a program to implement a queue using an array and pointers. The program should provide the following functionalities:

Insert an element into the queue.Delete an element from the queue.Display the elements in the queue.

The queue has a maximum capacity of 5 elements. If the queue is full and an insertion is attempted, a "Queue is full" message should be displayed. If the queue is empty and a deletion is attempted, a "Queue is empty" message should be displayed.

Input Format

Each line contains an integer representing the chosen option from 1 to 3.

Option 1: Insert an element into the queue followed by an integer representing the element to be inserted, separated by a space.

Option 2: Delete an element from the queue.

Option 3: Display the elements in the queue.

Output Format

For option 1 (insertion):-

1. The program outputs: "<data> is inserted in the queue." if the data is successfully inserted.
2. "Queue is full." if the queue is already full and cannot accept more elements.

For option 2 (deletion):-

1. The program outputs: "Deleted number is: <data>" if an element is successfully deleted and returns the value of the deleted element.
2. "Queue is empty." if the queue is empty no elements can be deleted.

For option 3 (display):-

1. The program outputs: "Elements in the queue are: <element1> <element2> ... <elementN>" where <element1>, <element2>, ..., <elementN> represent the elements present in the queue.
2. "Queue is empty." if the queue is empty no elements can be displayed.

For invalid options, the program outputs: "Invalid option."

Refer to the sample output for the formatting specifications.

Sample Test Case

Input: 1 10

```
3
5
Output: 10 is inserted in the queue.
Elements in the queue are: 10
Invalid option.
```

Answer

```
// You are using GCC
#include<stdio.h>
#define MAX_SIZE 5
typedef struct{
   int data[MAX_SIZE];
   int *front;
   int *rear;
   int count;

}Queue;
void initialize(Queue *q){
   q->front=NULL;
   q->rear=NULL;
   q->count=0;
}
int isFull(Queue *q){
   return q->count==MAX_SIZE;
}
int isEmpty(Queue *q){
   return q->count==0;
}
void enqueue(Queue *q,int val){
   if(isFull(q)){
      printf("Queue is full.\n");
      return;
   }
   if(isEmpty(q)){
      q->front=q->data;
      q->rear=q->data;
   }
   else{
      q->rear++;
      if(q->rear==q->data+MAX_SIZE){
         q->rear=q->data;
      }
```

```
    }
    *q->rear=val;
    q->count++;
    printf("%d is inserted in the queue.\n",val);
}
void dequeue(Queue *q){
    if(isEmpty(q)){
        printf("Queue is empty.\n");
        return;
    }
    printf("Deleted number is: %d\n",*q->front);
    if(q->front==q->rear){
        q->front=NULL;
        q->rear=NULL;
    }
    else{
        q->front++;
        if(q->front==q->data+MAX_SIZE){
        q->front=q->data;
    }
}
q->count--;
}
void display(Queue *q){
    if(isEmpty(q)||q->front==NULL){
        printf("Queue is empty.\n");
        return;
    }
    printf("Elements in the queue are: ");
    int *curr=q->front;
    int printed=0;
    while(printed<q->count){
        printf("%d ",*curr);
        curr++;
        if(curr==q->data+MAX_SIZE){
            curr=q->data;
        }
        printed++;
    }
        printf("\n");

}
```

```
int main(){
   Queue q;
   initialize(&q);
   int op,val;
   while(1){
      if(scanf("%d ",&op)!=1)
      break;
      switch(op){
         case 1:
         if(scanf("%d",&val)==1){
            enqueue(&q,val);
         }
         break;
         case 2:
         dequeue(&q);
         break;
         case 3:
         display(&q);
         break;
         default:
         printf("Invalid option.\n");
         //while(getchar()!='\n');
         break;
      }
   }
   return 0;
}
```

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

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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 4_COD_Question 4

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

In an office setting, a print job management system is used to efficiently handle and process print jobs. The system is implemented using a queue data structure with an array.

The program provides the following operations:

Enqueue Print Job: Add a print job with a specified number of pages to the end of the queue.Dequeue Print Job: Remove and process the next print job in the queue.Display Queue: Display the print jobs in the queue

The program should ensure that print jobs are processed in the order they are received.

Input Format

The input consists of integers corresponding to the operation that needs to be performed:

Choice 1: Enqueue the print job into the queue. If the choice is 1, the following input is a space-separated integer, representing the pages to be enqueued into the queue.

Choice 2: Dequeue a print job from the queue.

Choice 3: Display the print jobs in the queue.

Choice 4: Exit the program.

Output Format

The output displays messages according to the choice and the status of the queue:

If the choice is 1:

1. Insert the given page into the queue and display "Print job with [page] pages is enqueued." where [page] is the number of pages that are inserted.
2. If the queue is full, print "Queue is full. Cannot enqueue."

If the choice is 2:

1. Dequeue a page from the queue and display "Processing print job: [page] pages" where [page] is the corresponding page that is dequeued.
2. If the queue is empty without any elements, print "Queue is empty."

If the choice is 3:

1. The output prints "Print jobs in the queue: " followed by the space-separated pages present in the queue.
2. If there are no elements in the queue, print "Queue is empty."

If the choice is 4:

1. Exit the program and print "Exiting program"

If any other choice is entered, the output prints "Invalid option."

Refer to the sample output for the formatting specifications.

Sample Test Case

Input: 1
10
1
20
1
30
1
40
1
50
1
60
3
2
3
4
Output: Print job with 10 pages is enqueued.
Print job with 20 pages is enqueued.
Print job with 30 pages is enqueued.
Print job with 40 pages is enqueued.
Print job with 50 pages is enqueued.
Queue is full. Cannot enqueue.
Print jobs in the queue: 10 20 30 40 50
Processing print job: 10 pages
Print jobs in the queue: 20 30 40 50
Exiting program

Answer

```
// You are using GCC
#include<stdio.h>
#define MAX_SIZE 5
typedef struct{
   int pages[MAX_SIZE];
   int front;
```

```
    int rear;
    int size;
}print;
void init(print *q){
    q->front=0;
    q->rear=-1;
    q->size=0;
}
int isFull(print *q){
    return q->size==MAX_SIZE;
}
int isEmpty(print *q){
    return q->size==0;
}
void enqueue(print *q,int page){
    if(isFull(q)){
        printf("Queue is full.Cannot enqueue.\n");
        return;
    }
    q->rear=(q->rear+1)%MAX_SIZE;
    q->pages[q->rear]=page;
    q->size++;
    printf("Print job with %d pages is enqueued.\n",page);
}
void dequeue(print *q){
    if(isEmpty(q)){
        printf("Queue is empty.\n");
        return;
    }
    int page=q->pages[q->front];
    q->front=(q->front+1)%MAX_SIZE;
    q->size--;
    printf("Processing print job: %d pages\n",page);
}
void display(print *q){
    if(isEmpty(q)){
        printf("Queue is empty.\n");
        return;
    }
    printf("Print jobs in the queue: ");
    int i=q->front;
    int count=0;
    while(count<q->size){
        printf("%d ",q->pages[i]);
        i=(i+1)%MAX_SIZE;
        count++;
    }
    printf("\n");
}
int main(){
    print queue;
    init(&queue);
    int ch,page;
    while(1){
        scanf("%d",&ch);
        switch(ch){
            case 1:
            scanf("%d",&page);
            enqueue(&queue,page);

            break;
            case 2:
            dequeue(&queue);
            break;
            case 3:
            display(&queue);
            break;
            case 4:
            printf("Exiting program\n");
            return 0;
            default:
            printf("Invalid option.\n");
            while(getchar()!='\n');
        }
    }
    return 0;
}
```

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

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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 4_COD_Question 5

Attempt : 1
Total Mark : 10
Marks Obtained : 10

Section 1 : Coding

1. Problem Statement

You are tasked with implementing basic operations on a queue data structure using a linked list.

You need to write a program that performs the following operations on a queue:

Enqueue Operation: Implement a function that inserts an integer element at the rear end of the queue.Print Front and Rear: Implement a function that prints the front and rear elements of the queue. Dequeue Operation: Implement a function that removes the front element from the queue.

Input Format

The first line of input consists of an integer N, representing the number of elements to be inserted into the queue.

The second line consists of N space-separated integers, representing the queue elements.

Output Format

The first line prints "Front: X, Rear: Y" where X is the front and Y is the rear elements of the queue.

The second line prints the message indicating that the dequeue operation (front element removed) is performed: "Performing Dequeue Operation:".

The last line prints "Front: M, Rear: N" where M is the front and N is the rear elements after the dequeue operation.

Refer to the sample output for the formatting specifications.

Sample Test Case

Input: 5
12 56 87 23 45

Output: Front: 12, Rear: 45
Performing Dequeue Operation:
Front: 56, Rear: 45

Answer

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

struct Node {
   int data;
   struct Node* next;
};

struct Node* front = NULL;
struct Node* rear = NULL;

// You are using GCC
void enqueue(int d) {
   //Type your code here
   Node* newNode=(Node*)malloc(sizeof(Node));
```

```
    newNode->data=d;
    newNode->next=NULL;
    if(rear==NULL){
        front=rear=newNode;
    }
    else{
        rear->next=newNode;
        rear=newNode;
    }
}

void printFrontRear() {
    //Type your code here
    if(front==NULL){
        printf("Front: -1,Rear: -1\n");
    }
    else{
        printf("Front: %d,Rear: %d\n",front->data,rear->data);
    }
}

void dequeue() {
    //Type your code here
    if(front==NULL)
    return;
    Node* temp=front;
    front=front->next;
    if(front==NULL)
    rear=NULL;
    free(temp);
}

int main() {
    int n, data;
    scanf("%d", &n);
    for (int i = 0; i < n; i++) {
        scanf("%d", &data);
        enqueue(data);
    }
    printFrontRear();
    printf("Performing Dequeue Operation:\n");
    dequeue();
    printFrontRear();
    return 0;
}
```

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

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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 4_CY

Attempt : 1
Total Mark : 30
Marks Obtained : 30

Section 1 : Coding

1. Problem Statement

A customer support system is designed to handle incoming requests using a queue. Implement a linked list-based queue where each request is represented by an integer. After processing the requests, remove any duplicate requests to ensure that each request is unique and print the remaining requests.

Input Format

The first line of input consists of an integer N, representing the number of requests to be enqueued.

The second line consists of N space-separated integers, each representing a request.

Output Format

The output prints space-separated integers after removing the duplicate requests.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 5
2 4 2 7 5

Output: 2 4 7 5

Answer

```
// You are using GCC
#include<stdio.h>
#include<stdlib.h>
typedef struct node{
   int data;
   struct node* next;

}
node;
typedef struct {
   node* front;
   node* rear;
}queue;
void init(queue* q){
   q->front=q->rear=NULL;
}
void enqueue(queue* q,int val){
   node* newnode=(node*)malloc(sizeof(node));
   newnode->data=val;
   newnode->next=NULL;
   if(q->rear==NULL)
   q->front=q->rear=newnode;
   else{
      q->rear->next=newnode;
      q->rear=newnode;
   }
}
int dequeue(queue* q){
   if(q->front==NULL)
   return -1;
   node* temp=q->front;
   int val=temp->data;
   q->front=q->front->next;
   if(q->front==NULL)
   q->rear=NULL;
   free(temp);
   return val;
}
void dup(queue* q,int n){
   int seen[101]={0};
   node* curr=q->front;
   while(curr!=NULL){
      if(!seen[curr->data]){
          printf("%d",curr->data);
          seen[curr->data]=1;
      }
      curr=curr->next;
   }
   printf("\n");
}
void fre(queue* q){
   node* curr=q->front;
   while(curr!=NULL){
      node* temp=curr;
      curr=curr->next;
      free(temp);
   }
   q->front=q->rear=NULL;
}
int main(){
   int n,val;
   queue q;
   init(&q);
   scanf("%d",&n);
   for(int i=0;i<n;++i){
      scanf("%d",&val);
      enqueue(&q,val);
   }
   dup(&q,n);
   fre(&q);
   return 0;
}
```

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

2. Problem Statement

Fathima has been tasked with developing a program to manage a queue of customers waiting in line at a service center. Help her write a program simulating a queue data structure using a linked list.

Here is a description of the scenario and the required operations:

Enqueue: Add a customer to the end of the queue.Dequeue: Remove and discard a customer from the front of the queue.Display waiting customers: Display the front and rear customer IDs in the queue.

Write a program that enqueues all the customers into the queue, performs a dequeue operation, and prints the front and rear elements.

Input Format

The first input line consists of an integer N, representing the number of customers to be inserted into the queue.

The second line consists of N space-separated integers, representing the customer IDs.

Output Format

The output prints "Front: X, Rear: Y" where X is the front element and Y is the rear element, after performing the dequeue operation.

Refer to the sample output for the exact text and format.

Sample Test Case

Input: 5
112 104 107 116 109
Output: Front: 104, Rear: 109

Answer

```
// You are using GCC
#include<stdio.h>
#include<stdlib.h>
typedef struct node{
    int data;
    struct node* next;
}node;
typedef struct{
    node* front;
    node* rear;
}queue;
void init(queue* q){
    q->front=q->rear=NULL;
}
void enqueue(queue* q,int val){
    node* newnode=(node*)malloc(sizeof(node));
    newnode->data=val;
    newnode->next=NULL;
    if(q->rear==NULL){
        q->front=q->rear=newnode;
    }
    else{
        q->rear->next=newnode;
        q->rear=newnode;
    }
}
void dequeue(queue* q){
    if(q->front==NULL)
    return;
    node* temp=q->front;
    q->front=q->front->next;
    if(q->front==NULL)
    q->rear=NULL;
    free(temp);
}
void display(queue* q){
    if(q->front==NULL)
    printf("Front:None,Rear:None\n");
    else
    printf("Front:%d,Rear:%d\n",q->front->data,q->rear->data);
}
```

```
void fre(queue* q){
   node* curr=q->front;
   while(curr!=NULL){
      node* temp=curr;
      curr=curr->next;
      free(temp);
   }
   q->front=q->rear=NULL;
}
int main(){
   int n,val;
   queue q;
   init(&q);
   scanf("%d",&n);
   for(int i=0;i<n;++i){
      scanf("%d",&val);
      enqueue(&q,val);
   }
      dequeue(&q);
      display(&q);
      fre(&q);
      return 0;

}
```

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

3. Problem Statement

Saran is developing a simulation for a theme park where people wait in a queue for a popular ride.

Each person has a unique ticket number, and he needs to manage the queue using a linked list implementation.

Your task is to write a program for Saran that reads the number of people in the queue and their respective ticket numbers, enqueue them, and then calculate the sum of all ticket numbers to determine the total ticket value present in the queue.

Input Format

The first line of input consists of an integer N, representing the number of people in the queue.

The second line consists of N space-separated integers, representing the ticket numbers.

Output Format

The output prints an integer representing the sum of all ticket numbers.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 5
2 4 6 7 5

Output: 24

Answer

```
// You are using GCC
#include<stdio.h>
#include<stdlib.h>
typedef struct node{
   int data;
   struct node* next;
}node;
typedef struct {
   node* front;
   node* rear;
}queue;
void init(queue* q){
   q->front=q->rear=NULL;
}
void enqueue(queue* q,int val){
   node* newnode=(node*)malloc(sizeof(node));
   newnode->data=val;
   newnode->next=NULL;
   if(q->rear==NULL)
   q->front=q->rear=newnode;
```

```
    else{
        q->rear->next=newnode;
        q->rear=newnode;
    }
}
int sum(queue* q){
    int s=0;
    node* curr=q->front;
    while(curr!=NULL){
        s+=curr->data;
        curr=curr->next;
    }
    return s;
}
void fre(queue* q){
    node* curr=q->front;
    while(curr!=NULL){
        node* temp=curr;
        curr=curr->next;
        free(temp);
    }
    q->front=q->rear=NULL;
}
int main(){
    int n,val;
    queue q;
    init(&q);
    scanf("%d",&n);
    for(int i=0;i<n;++i){
        scanf("%d",&val);
        enqueue(&q,val);
    }
    int tot=sum(&q);
    printf("%d\n",tot);
    fre(&q);
    return 0;
}
```

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

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NeoColab_REC_CS23231_DATA STRUCTURES

REC_DS using C_Week 4_PAH

Attempt : 2
Total Mark : 50
Marks Obtained : 50

Section 1 : Coding

1. Problem Statement

Amar is working on a project where he needs to implement a special type of queue that allows selective dequeuing based on a given multiple. He wants to efficiently manage a queue of integers such that only elements not divisible by a given multiple are retained in the queue after a selective dequeue operation.

Implement a program to assist Amar in managing his selective queue.

Example

Input:

5

10 2 30 4 50

5

Output:

Original Queue: 10 2 30 4 50

Queue after selective dequeue: 2 4

Explanation:

After selective dequeue with a multiple of 5, the elements that are multiples of 5 should be removed. Therefore, only 10, 30, and 50 should be removed from the queue. The updated Queue is 2 4.

Input Format

The first line contains an integer n, representing the number of elements initially present in the queue.

The second line contains n space-separated integers, representing the elements of the queue.

The third line contains an integer multiple, representing the divisor for selective dequeue operation.

Output Format

The first line of output prints "Original Queue: " followed by the space-separated elements in the queue before the dequeue operation.

The second line prints "Queue after selective dequeue: " followed by the remaining space-separated elements in the queue, after deleting elements that are the multiples of the specified number.

Refer to the sample output for the formatting specifications.

Sample Test Case

Input: 5
10 2 30 4 50
5
Output: Original Queue: 10 2 30 4 50
Queue after selective dequeue: 2 4

Answer

```
// You are using GCC
#include<stdio.h>
#include<stdlib.h>
typedef struct node{
   int data;
   struct node* next;
}node;
typedef struct{
   node* front;
   node* rear;

}queue;
void init(queue* q){
   q->front=q->rear=NULL;
}
void enqueue(queue *q,int data){
   node* newnode=(node*)malloc(sizeof(struct node));
   newnode->data=data;
   newnode->next=NULL;
   if(q->rear==NULL){
      q->front=q->rear=newnode;
   }
   else{
      q->rear->next=newnode;
      q->rear=newnode;
   }
}
int dequeue(queue*q){
   if(q->front==NULL)return -1;
   node* temp=q->front;
   int data=temp->data;
   q->front=q->front->next;
   if(q->front==NULL)
   q->rear=NULL;
   free(temp);
   return data;
}
void print(queue*q){
   node* curr=q->front;
   while(curr){
      printf("%d ",curr->data);
```

```
        curr=curr->next;
    }
    printf("\n");
}
void freequeue(queue*q){
    while(q->front){
        dequeue(q);
    }
}
int main(){
    int n,mul,val;
    queue q,filtered;
    init(&q);
    init(&filtered);
    scanf("%d",&n);
    for(int i=0;i<n;i++){
        scanf("%d",&val);
        enqueue(&q,val);

    }
    scanf("%d",&mul);
    printf("Original Queue:");
    print(&q);
    node* curr=q.front;
    while(curr){
        if(curr->data%mul!=0){
            enqueue(&filtered,curr->data);
        }
        curr=curr->next;
    }
    printf("Queue after selective dequeue:");
    print(&filtered);
    freequeue(&q);
    freequeue(&filtered);
    return 0;
}
```

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

2. Problem Statement

Sharon is developing a queue using an array. She wants to provide the functionality to find the Kth largest element. The queue should support the addition and retrieval of the Kth largest element effectively. The maximum capacity of the queue is 10.

Assist her in the program.

Input Format

The first line of input consists of an integer N, representing the number of elements in the queue.

The second line consists of N space-separated integers.

The third line consists of an integer K.

Output Format

For each enqueued element, print a message: "Enqueued: " followed by the element.

The last line prints "The [K]th largest element: " followed by the Kth largest element.

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 5
23 45 93 87 25
4

Output: Enqueued: 23
Enqueued: 45
Enqueued: 93
Enqueued: 87
Enqueued: 25
The 4th largest element: 25

Answer

```
// You are using GCC
```

```
#include<stdio.h>
#include<stdlib.h>
#define MAX 10
void sort(int arr[],int n){
   for(int i=0;i<n-1;i++){
      for(int j=i+1;j<n;j++){
         if(arr[i]<arr[j]){
            int temp=arr[i];
            arr[i]=arr[j];
            arr[j]=temp;
         }
      }
   }
}
int main(){
   int queue[MAX];
   int n,k;
   scanf("%d",&n);
   if(n>MAX)
   n=MAX;
   for(int i=0;i<n;i++){
      scanf("%d",&queue[i]);
      printf("Enqueued: %d\n",queue[i]);
   }
   scanf("%d",&k);
   int temp[MAX];
   for(int i=0;i<n;i++){
      temp[i]=queue[i];
   }
      sort(temp,n);
      if(k<=n)
      printf("The %dth largest element : %d\n",k,temp[k-1]);
      else
      printf("The %dth largest element:Not available\n",k);
      return 0;

}
```

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

3. Problem Statement

You've been assigned the challenge of developing a queue data structure using a linked list.

The program should allow users to interact with the queue by enqueuing positive integers and subsequently dequeuing and displaying elements.

Input Format

The input consists of a series of integers, one per line. Enter positive integers into the queue.

Enter -1 to terminate input.

Output Format

The output prints the space-separated dequeued elements.

Refer to the sample output for the exact text and format.

Sample Test Case

Input: 1
2
3
4
-1
Output: Dequeued elements: 1 2 3 4

Answer

```
// You are using GCC
#include<stdio.h>
#include<stdlib.h>
struct node{
   int data;
   struct node* next;
};
struct queue{
   struct node* front;
   struct node* rear;
};
```

```
void init(struct queue* q){
   q->front=q->rear=NULL;
}
void enqueue(struct queue*q,int data){
   struct node* newnode=(struct node*)malloc(sizeof(struct node));
   newnode->data=data;
   newnode->next=NULL;
   if(q->rear==NULL){
      q->front=q->rear=newnode;
   }
   else{
      q->rear->next=newnode;
      q->rear=newnode;
   }
}
int dequeue(struct queue*q){
   if(q->front==NULL)
   return -1;
   struct node* temp=q->front;
   int data=temp->data;
   q->front=q->front->next;
   if(q->front==NULL)q->rear=NULL;
   free(temp);
   return data;
}
void freequeue(struct queue*q){
   while(q->front){
      dequeue(q);
   }
}
int main(){
   struct queue q;
   init(&q);
   int val;
   while(1){
      scanf("%d",&val);
      if(val==-1)break;
      enqueue(&q,val);
   }
   printf("Dequeued elements:");
   int f=1;
   while(q.front!=NULL){
        int d=dequeue(&q);
        if(f){
            printf("%d ",d);
            f=0;
        }
        else{
            printf("%d ",d);
        }
    }
    printf("\n");
    freequeue(&q);
    return 0;
}
```

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

4. Problem Statement

Guide Harish in developing a simple queue system for a customer service center. The customer service center can handle up to 25 customers at a time. The queue needs to support basic operations such as adding a customer to the queue, serving a customer (removing them from the queue), and displaying the current queue of customers.

Use an array for implementation.

Input Format

The first line of the input consists of an integer N, the number of customers arriving at the service center.

The second line consists of N space-separated integers, representing the customer IDs in the order they arrive.

Output Format

After serving the first customer in the queue, display the remaining customers in the queue.

If a dequeue operation is attempted on an empty queue, display "Underflow".

If the queue is empty, display "Queue is empty".

Refer to the sample output for formatting specifications.

Sample Test Case

Input: 5
101 102 103 104 105

Output: 102 103 104 105

Answer

```
// You are using GCC
#include<stdio.h>
#define MAX 25
int main(){
   int queue[MAX];
   int front=0,rear=-1;
   int n;
   scanf("%d",&n);
   if(n==0){
      printf("Underflow\n");
      printf("Queue is empty\n");
      return 0;
   }
   for(int i=0;i<n;i++){
      scanf("%d",&queue[++rear]);
   }
      front++;
      if(front>rear)
      printf("Queue is empty\n");
      else{
         for(int i=front;i<=rear;i++){
            printf("%d ",queue[i]);
         }
         printf("\n");
      }
      return 0;
   }
```

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

5. Problem Statement

You are tasked with developing a simple ticket management system for a customer support department. In this system, customers submit support tickets, which are processed in a First-In-First-Out (FIFO) order. The system needs to handle the following operations:

Ticket Submission (Enqueue Operation): New tickets are submitted by customers. Each ticket is assigned a unique identifier (represented by an integer). When a new ticket arrives, it should be added to the end of the queue.

Ticket Processing (Dequeue Operation): The support team processes tickets in the order they are received. The ticket at the front of the queue is processed first. After processing, the ticket is removed from the queue.

Display Ticket Queue: The system should be able to display the current state of the ticket queue, showing the sequence of ticket identifiers from front to rear.

Input Format

The first input line contains an integer n, the number of tickets submitted by customers.

The second line consists of a single integer, representing the unique identifier of each submitted ticket, separated by a space.

Output Format

The first line displays the "Queue: " followed by the ticket identifiers in the queue after all tickets have been submitted.

The second line displays the "Queue After Dequeue: " followed by the ticket identifiers in the queue after processing (removing) the ticket at the front.

Refer to the sample output for the exact text and format.

Sample Test Case

Input: 6
14 52 63 95 68 49
Output: Queue: 14 52 63 95 68 49
Queue After Dequeue: 52 63 95 68 49

Answer

```
// You are using GCC
#include<stdio.h>
#define MAX 20
int main(){
    int queue[MAX];
    int n;
    scanf("%d",&n);
    for(int i=0;i<n;i++){
        scanf("%d",&queue[i]);
    }
    printf("Queue: ");
    for(int i=0;i<n;i++){
        printf("%d ",queue[i]);
    }
    printf("\n");
    printf("Queue After Dequeue:");
    for(int i=1;i<n;i++){
        printf("%d ",queue[i]);
    }
    printf("\n");
    return 0;
}
```

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