Assignment No: 06

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Title: Coffee Shop Line (Simple Queue):
Arrival: Customers arrive at the coffee shop and stand in line. Order Processing: The first customer in line gets their order taken, and the barista starts making the coffee. Serving: Once the first customer is served, they leave the queue, and the next customer in line moves forward to be served. Write a program to implement a simple queue.

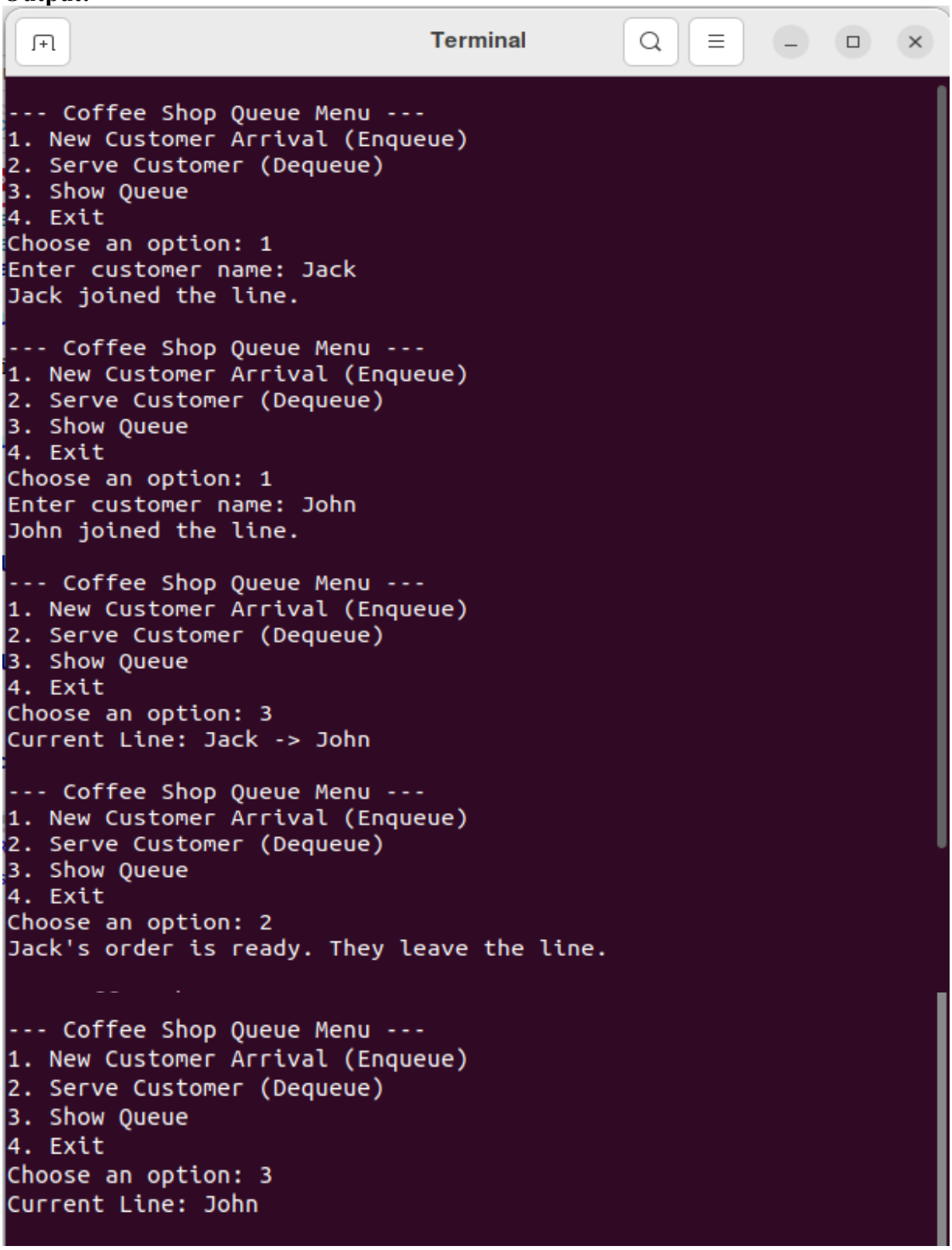
Program:

```
#include <iostream>
#include <string>
using namespace std;
#define MAX 10
class Queue
{
   string arr[MAX];
   int front, rear;
public:
   Queue()
   {
      front = 0;
      rear = -1;
   }
   bool isFull()
   {
      return (rear == MAX - 1);
   }
   bool isEmpty()
   {
      return (front > rear);
   }
   void enqueue(string name)
   {
      if (isFull())
      {
         cout << "Queue is full. Cannot add more customers.\n";
      }
      else
      {
         rear++;
         arr[rear] = name;
```

```
            cout << name << " joined the line.\n";
        }
    }
    void dequeue()
    {
        if (isEmpty())
        {
            cout << "No customers in line.\n";
        }
        else
        {
            cout << arr[front] << "'s order is ready. They leave the line.\n";
            front++;
        }
    }
    void display()
    {
        if (isEmpty())
        {
            cout << "The line is empty.\n";
        } else {
            cout << "Current Line: ";
            for (int i = front; i <= rear; i++)
            {
                cout << arr[i];
                if (i < rear) cout << " -> ";
            }
            cout << endl;
        }
    }
};
int main()
{
    Queue q;
    int choice;
    string name;
    do
    {
        cout << "\n--- Coffee Shop Queue Menu ---\n";
        cout << "1. New Customer Arrival (Enqueue)\n";
        cout << "2. Serve Customer (Dequeue)\n";
        cout << "3. Show Queue\n";
        cout << "4. Exit\n";
        cout << "Choose an option: ";
        cin >> choice;
        switch (choice)
```

```
        {
            case 1:
                cout << "Enter customer name: ";
                cin >> name;
                q.enqueue(name);
                break;
            case 2:
                q.dequeue();
                break;
            case 3:
                q.display();
                break;
            case 4:
                cout << "Exiting... Thank you!\n";
                break;
            default:
                cout << "Invalid option. Try again.\n";
        }
    } while (choice != 4);
    return 0;
}
```

Output:


Terminal
--- Coffee Shop Queue Menu ---
1. New Customer Arrival (Enqueue)
2. Serve Customer (Dequeue)
3. Show Queue
4. Exit
Choose an option: 1
Enter customer name: Jack
Jack joined the line.
--- Coffee Shop Queue Menu ---
1. New Customer Arrival (Enqueue)
2. Serve Customer (Dequeue)
3. Show Queue
4. Exit
Choose an option: 1
Enter customer name: John
John joined the line.
--- Coffee Shop Queue Menu ---
1. New Customer Arrival (Enqueue)
2. Serve Customer (Dequeue)
3. Show Queue
4. Exit
Choose an option: 3
Current Line: Jack -> John
--- Coffee Shop Queue Menu ---
1. New Customer Arrival (Enqueue)
2. Serve Customer (Dequeue)
3. Show Queue
4. Exit
Choose an option: 2
Jack's order is ready. They leave the line.
--- Coffee Shop Queue Menu ---
1. New Customer Arrival (Enqueue)
2. Serve Customer (Dequeue)
3. Show Queue
4. Exit
Choose an option: 3
Current Line: John

Title: Printer Spooler (Circular Queue):
In a multi-user environment, printers often use a circular queue to manage print jobs. Each print job is added to the queue, and the printer processes them in the order they arrive. Once a print job is completed, it moves out of the queue, and the next job is processed, efficiently managing the flow of print tasks. Implement the Printer Spooler system using a circular queue without using built-in queues.

Program:

```
#include <iostream>
#include <string>
using namespace std;
class Circular
{
   string a[10];
   int front, rear;
   const int max = 10;

   public:
   Circular()
   {
      front = -1;
      rear = -1;
   }

   void insertJob(string val)
   {
      if ((rear + 1) % max == front)
      {
         cout << "You cannot insert new job, the spooler is full.\n";
         return;
      }
      if (front == -1 && rear == -1)
      {
         front = rear = 0;
      }
      else
      {
         rear = (rear + 1) % max;
      }
      a[rear] = val;
      cout << "Print job \"" << val << "\" added to the spooler.\n";
   }

   void deleteJob()
   {
      if (front == -1 && rear == -1)
```

```
        {
            cout << "The spooler is empty, cannot process any job.\n";
            return;
        }
        cout << "Processing and removing print job \"" << a[front] << "\" from the spooler.\n";
        if (front == rear)
        {
            front = rear = -1;
        }
        else
        {
            front = (front + 1) % max;
        }
    }
    void display()
    {
        if (front == -1 && rear == -1)
        {
            cout << "Cannot display jobs because spooler is empty.\n";
            return;
        }
        cout << "Current print jobs in spooler: ";

        for (int i = front;; i = (i + 1) % max)
        {
            cout << a[i];
            if (i == rear)
                break;
            cout << " -> ";
        }
            cout << endl;
    }
};
int main()
{
    Circular q;
    int choice;
    string name;
    do
    {
        cout << "\n--- Printer Spooler Menu ---\n";
        cout << "1. Add Print Job\n";
        cout << "2. Process Print Job\n";
        cout << "3. Show All Print Jobs\n";
        cout << "4. Exit\n";
        cout << "Choose an option: ";
```

```
        cin >> choice;
        switch (choice)
        {
        case 1:
            cout << "Enter Print Job name: ";
            cin >> name;
            q.insertJob(name);
            break;
        case 2:
            q.deleteJob();
            break;
        case 3:
            q.display();
            break;
        case 4:
            cout << "Exiting... Thank you!\n";
            break;
        default:
            cout << "Invalid option. Try again.\n";
        }
    }
    while (choice != 4);
    return 0;
}
```

Output:

```
--- Printer Spooler Menu ---
1. Add Print Job
2. Process Print Job
3. Show All Print Jobs
4. Exit
Choose an option: 1
Enter Print Job name: Resume
Print job "Resume" added to the spooler.

--- Printer Spooler Menu ---
1. Add Print Job
2. Process Print Job
3. Show All Print Jobs
4. Exit
Choose an option: 1
Enter Print Job name: Bill
Print job "Bill" added to the spooler.

--- Printer Spooler Menu ---
1. Add Print Job
2. Process Print Job
3. Show All Print Jobs
4. Exit
Choose an option: 3
Current print jobs in spooler: Resume -> Bill

--- Printer Spooler Menu ---
1. Add Print Job
2. Process Print Job
3. Show All Print Jobs
4. Exit
Choose an option: 2
Processing and removing print job "Resume" from the spooler.

--- Printer Spooler Menu ---
1. Add Print Job
2. Process Print Job
3. Show All Print Jobs
4. Exit
Choose an option: 3
Current print jobs in spooler: Bill
```