

QUESTION:

Make a report on the real time scenario queue management. Write the scheduling algorithms used and explain their implementation.

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“BAKERY SHOP CUSTOMERS QUEUE”

INTRODUCTION:

This report is generally about the BAKERY SHOP customers queue during their billing of products. Organizations with heavy flow of customers should choose the path of customer queue management as this will minimize the visitor's long lines. This will improve the efficiency of the appointment area as there will be no crowd therefore the function will be smoothly followed. We have considered the scenario of scheduling customers in a bakery shop. These customers put their shopping products in a cart. It is assumed that the customer knows the total number of products and approximate cost when he/she comes for billing. There are different cases of customers. Depending upon these cases we have designed respective algorithms. Algorithms are also explained with the help of gantt charts. Flowchart is also given showing the customer has paid the bill and receipt is given to the customer by the cashier.

OBJECTIVES:

Following are the objectives of this document:

- No frustration among the customers.
- Improved performance of the staff.
- Satisfaction of customers resulting in growth of profit.
- At times customers walk away while observing the long queues; therefore by opting this system customer's will not avoid your service.
- Usage of hardware and software therefore this will reduce the waiting time as there will be no chance of confusion.
- Because of the smooth operates there will be an improvement in the working of the environment.

STANDARD ALGORITHMS:

Following are some scenarios of customers depending upon which different algorithms are used.

➤ **First Come First Serve (FCFS) Scheduling Algorithm:**



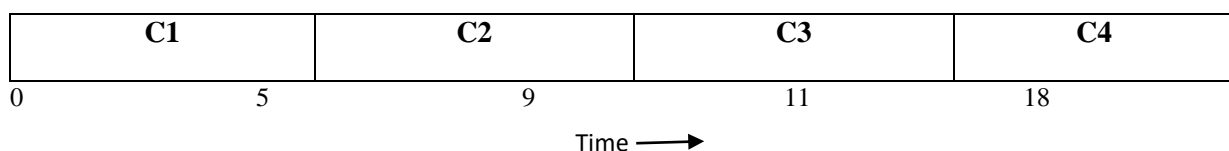
FCFS is a scheduling algorithm in which all the customers are scheduled in the order of their arrival in the billing queue. Once a customer is done with the billing and receipt after that the next customer in the queue is scheduled. The waiting time and turnaround time for FCFS depends solely on the order of arrival of customers. No priority is assigned to any customer. The first come customer will be handled first.

Example: Let there be 4 customers in queue with details as follows:

Customers ID	No. Of Products	Arrival Time	Burst Time	Complete Time	Turnaround Time	Waiting Time	Response Time
C1	30	0	5	5	5	0	0
C2	20	1	4	9	8	4	4
C3	10	3	2	11	8	6	6
C4	50	5	7	18	13	6	6

Given table shows that there are 4 customers in a queue with their respective number of items. Arrival time is the number in which the customer comes in a queue. Burst time is the taken by each customer until he pays the bill the receipt is given to him. Complete time is the time in which the customer is done with his billing process. Waiting time is the time the customer has to wait until his billing process is complete. Turnaround time and the waiting time are calculated accordingly.

Gantt Chart:



As C1 is arrived first, so C1 will be the first one to in the queue. After that C2 comes and he will be able to pay the bill and the receipt will be given to him and so on. As this is the first come and first serve case so the customer who comes first will be in the queue first. Average waiting time and turnaround time is given below:

Average waiting time: $16/4 = 4$

Average turnaround time: $34/4 = 8.5$

➤ **Shortest Job First (SJF) Scheduling Algorithm:**

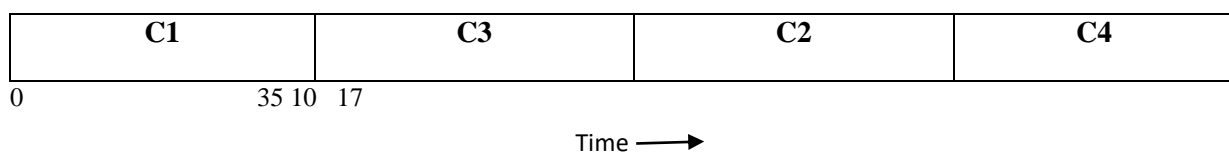


SJF is a scheduling algorithm in which customers with less number of products are scheduled first irrespective of their arrival time. And the customers with the greater number of products are handled later after the completion of customers having fewer products. This leads to minimizing the average waiting time and turnaround time.

Example: Let there be 4 customers in queue with details as follows:

Customers ID	No. Of Products	Arrival Time	Burst Time	Complete Time	Turnaround Time	Waiting Time	Response Time
C1	20	0	3	3	3	0	0
C2	30	2	5	10	8	3	3
C3	10	1	2	5	4	2	2
C4	50	4	7	17	13	6	6

Gantt Chart:



As C1 is arrived first, so C1 will be the first one to in the queue although it has greater number of products as compared to C3 according to their burst time. After that C3 will be given the bill receipt because it has less number of products as compared to C2 and C4. After that C2 will be in the queue and lastly C4 will pay the bill and the receipt will be given to him. As this is the short job first algorithm so the customer having the less number of products will be the first ones in the queue. Average waiting time and turnaround time is given below:

Average waiting time: $11/4 = 2.75$

Average turnaround time: $28/4 = 7$

➤ **Priority Scheduling Algorithm:**

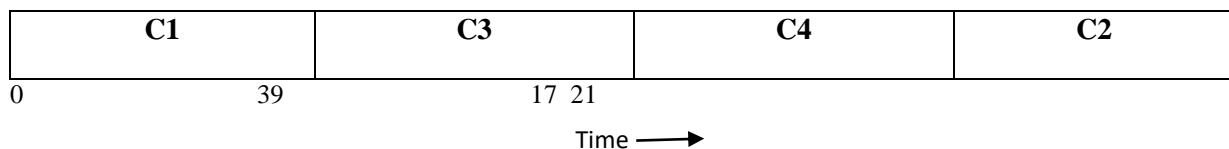


In Priority scheduling each task is given a priority number. In this, the customers who have greater number of products i.e high prices of their items are given high priority as compared to the customers who have less number of products because that will cause the more profit to the shop. The customers are then scheduled in the order of their priority, scheduling highest priority customers first irrespective of their arrival time.

Example:Let there be 4 customers in queue with details as follows:

Customers ID	Products Price	Arrival Time	Burst Time	Complete Time	Turnaround Time	Waiting Time	Response Time
C1	1000	0	3	3	3	0	0
C2	2000	1	4	21	20	16	2
C3	4000	2	6	9	7	1	7
C4	5000	4	8	17	13	5	13

Gantt Chart:



As C1 is arrived first, so C1 will be first one to be lined in the queue irrespective of its less cost price of the products. After that C3 will be given the priority for the billing process because it has the highest product price as compared to C2 and C4 for the given time and will be in the queue for its respective burst time. And then C4 will be in the queue because of its priority and lastly the C2 will be lined in the queue for the billing process and the receipt. Average waiting time and turnaround time is given below:

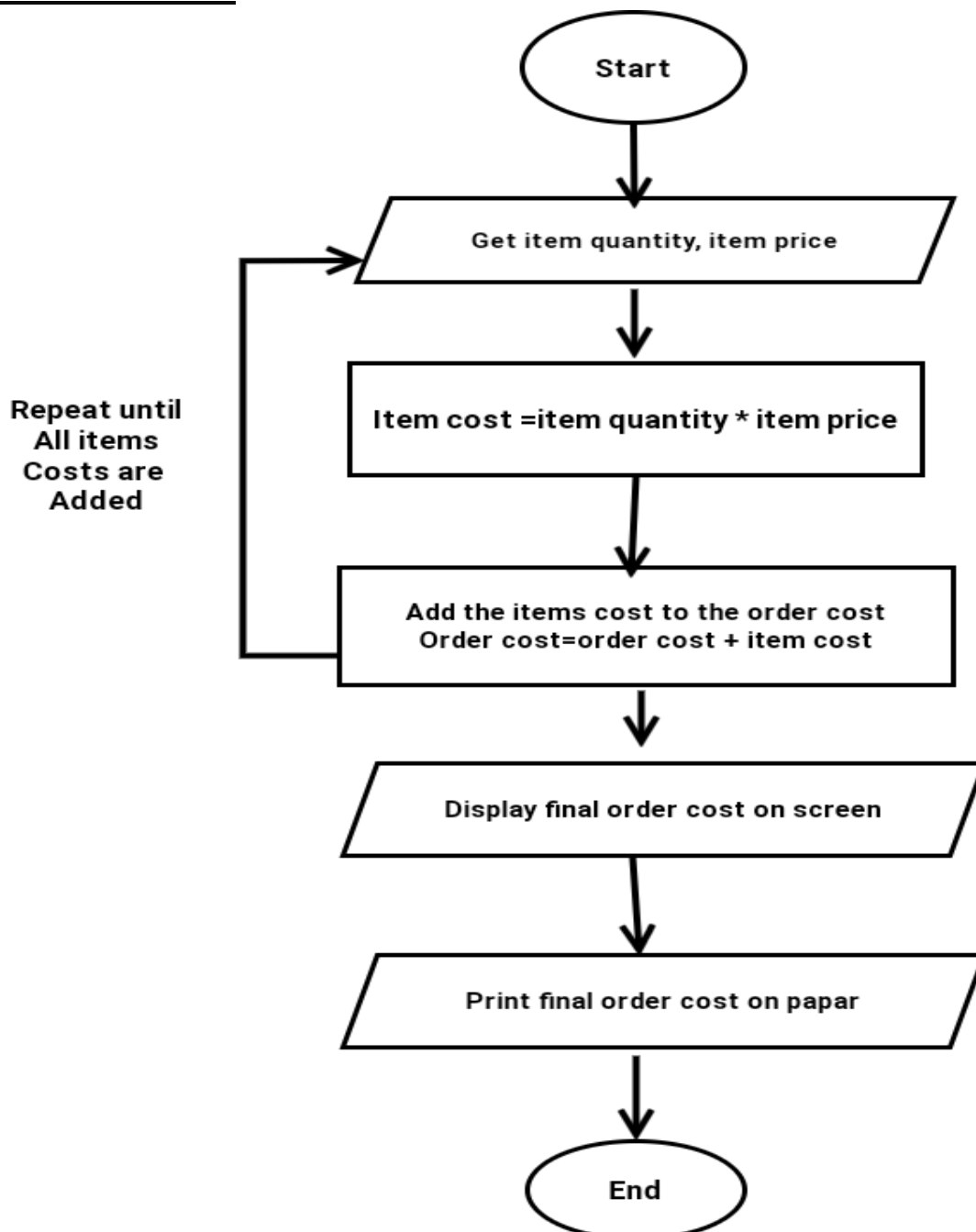
Average waiting time: $22/4 = 5.5$

Average turnaround time: $43/4 = 10.75$

ALGORITHM FOR PRINTING RECEIPT:

1. Start.
2. Read the quantity of the item;
3. Read the price of the item (or unit price)
4. Find the item cost = item quantity * price;
5. Add item cost to order cost (order cost = order cost + item cost) ;
6. Repeat steps 2,3,4 and 5 until all items are calculated;
7. Display final order cost on the screen and print the receipt.
8. Give the final receipt to the customer.
9. End.

FLOWCHART:



CONCLUSION:

Standard scheduling algorithms like FCFS, SJF and Priority are used in process management. These algorithms could also be applied to the real life scenarios as we did for the bakery shop customer queue. When FCFS was analyzed the probability of loss of customers with higher billing amount was more. Whereas, when priority scheduling was applied the loss of higher amount customers was minimum but it increased the waiting time of lower amount customers. However, the proposed algorithm has shown marked improvements in terms of profits earned by reducing probability of loss of customers with higher billing amount. We have also tried to avoid the more waiting time of the customers with lower billing prices. Thus by us these scheduling algorithms the organizations can work efficiently as it will help them to manage the long customers queue in efficient way so that customers are not frustrated and they do not walk away because of the long queues.