

Analysis of Automated Food Ordering System with Scheduling Algorithms

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1 Introduction

The Automated Food Ordering System is a software application designed to optimize the process of food ordering and cooking by employing various scheduling algorithms. This report aims to analyze the system's functionality, its implementation using Shortest-Job First (SJF), Shortest-Remaining Time First (SRTF), and Priority Scheduling algorithms, and its effectiveness in minimizing customer waiting time and turnaround time.

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<<<<< WELCOME TO AUTOMATED FOOD ORDERING SYSTEM (SJF, SRTF, PRIORITY) >>>>>

System's Purposes:
i.    To minimize customer waiting time and turnaround time by using different algorithms of process scheduling
ii.   To discover the best efficient algorithm among this three process scheduling algorithms.

Menu
[1] Shortest-Job First Scheduling
[2] Shortest-Remaining Time First
[3] Priority Scheduling
[4] Exit
Choice (1-4): 2
```

Figure 1: Automated Food Ordering System

2 System Overview

The system allows users to input details of food orders including arrival time and cooking time. Based on this information, it employs different scheduling algorithms to efficiently manage the cooking process and minimize waiting time for customers.

3 Implementation

3.1 Main Functionality

- The system offers three scheduling algorithms: SJF, SRTF, and Priority Scheduling.
- Users can choose among these options through a menu interface.

3.2 SJF (Shortest-Job First) Algorithm

- Orders are sorted based on their cooking time (burst time) in ascending order.
- If orders have the same cooking time, they are then sorted based on arrival time.
- The system calculates turnaround time, waiting time, and completion time for each order.

3.3 SRTF (Shortest-Remaining Time First) Algorithm

- Orders are processed based on the remaining cooking time, ensuring the order with the shortest remaining time is served next.
- Similar to SJF, the system tracks order details such as start time, completion time, waiting time, and turnaround time.

3.4 Priority Scheduling Algorithm

- Orders are prioritized based on a specified priority value.
- Lower priority values indicate higher priority.
- The system calculates waiting time and turnaround time for each order.

4 Analysis of Results

4.1 SJF

- This algorithm prioritizes shorter cooking times, leading to reduced waiting and turnaround times for orders.

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Shortest-Job First Scheduling Food Ordering System

Enter the Total Number of Orders: 6

Enter Arrival Time of Order 1: 3
Enter Cooking Time of Order 1 (in minutes): 10

Enter Arrival Time of Order 2: 5
Enter Cooking Time of Order 2 (in minutes): 8

Enter Arrival Time of Order 3: 8
Enter Cooking Time of Order 3 (in minutes): 15

Enter Arrival Time of Order 4: 10
Enter Cooking Time of Order 4 (in minutes): 10

Enter Arrival Time of Order 5: 2
Enter Cooking Time of Order 5 (in minutes): 3

Enter Arrival Time of Order 6: 10
Enter Cooking Time of Order 6 (in minutes): 8

#Order ID      Arrival Time    Cooking Time    Completion Time    TurnAround Time    Waiting Time
O[1]           3              10             13                10                0
O[2]           5              8              21                16                8
O[3]           8              15             54                46                31
O[4]          10              10             39                29                19
O[5]           2              3              3                 3                 0
O[6]          10              8              29                19                11

Average Waiting Time = 11.50 (min)
Average Turnaround Time = 20.50 (min)
indusri@indusri-ASUS-TUF-Gaming-A15-FA506ICB-FA506ICB:~$

```

Figure 2: Shortest-Job First

4.2 SRTF

- By dynamically selecting orders with the shortest remaining time, SRTF further reduces waiting and turnaround times, especially for orders with varying cooking durations.

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<<<< WELCOME TO AUTOMATED FOOD ORDERING SYSTEM (SJF, SRTF, PRIORITY) >>>>>

System's Purposes:
i. To minimize customer waiting time and turnaround time by using different algorithms of process scheduling.
ii. To discover the best efficient algorithm among this three process scheduling algorithms.

Menu
[1] Shortest-Job First Scheduling
[2] Shortest-Remaining Time First
[3] Priority Scheduling
[4] Exit
Choice (1-4): 2

Shortest-Remaining Time First Food Ordering System

Enter Total number of Orders: 5

Enter Arrival Time of Order 1: 4
Enter Cooking Time of Order 1 (in minutes): 9

Enter Arrival Time of Order 2: 10
Enter Cooking Time of Order 2 (in minutes): 10

Enter Arrival Time of Order 3: 5
Enter Cooking Time of Order 3 (in minutes): 8

Enter Arrival Time of Order 4: 8
Enter Cooking Time of Order 4 (in minutes): 13

Enter Arrival Time of Order 5: 4
Enter Cooking Time of Order 5 (in minutes): 12

#Order ID      Arrival Time    Cooking Time    Start Time      Completion Time    Turnaround Time    Waiting Time
O[1]           4              9              4              13              9              0
O[2]           10             10             21             31             21             11
O[3]           5              8              13             21             16             8
O[4]           8              13             43             56             48             35
O[5]           4              12             31             43             39             27

Average Waiting Time = 16.20 (min)
Average Turnaround Time = 26.60 (min)
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```

Figure 3: Shortest-Remaining Time First

4.3 Priority Scheduling

- Allows users to assign priority to orders based on their importance.
- This algorithm can be useful for handling urgent orders or special requests.

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<<<< WELCOME TO AUTOMATED FOOD ORDERING SYSTEM (SJF, SRTF, PRIORITY) >>>>>

System's Purposes:
i. To minimize customer waiting time and turnaround time by using different algorithms of process scheduling.
ii. To discover the best efficient algorithm among this three process scheduling algorithms.

Menu
[1] Shortest-Job First Scheduling
[2] Shortest-Remaining Time First
[3] Priority Scheduling
[4] Exit
Choice (1-4): 3

Priority Scheduling Food Ordering System

Enter Total Number of Orders: 5

Enter Cooking Time and Priority

Order[1]
Cooking Time (in minutes): 2
Priority: 4

Order[2]
Cooking Time (in minutes): 6
Priority: 3

Order[3]
Cooking Time (in minutes): 8
Priority: 1

Order[4]
Cooking Time (in minutes): 15
Priority: 5

Order[5]
Cooking Time (in minutes): 3
Priority: 1

#Order ID      Cooking Time      Waiting Time      Turnaround TimePriority
O[3]           8                0                8                1
O[5]           3                8                11               1
O[2]           6                11               17               3
O[1]           2                17               19               4
O[4]          15                19               34               5

Average Waiting Time = 11.00 (min)
Average Turnaround Time = 17.80 (min)
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```

Figure 4: Priority Scheduling

5 Conclusion

The Automated Food Ordering System effectively demonstrates the utilization of scheduling algorithms to optimize food preparation processes. Each algorithm offers unique advantages, with SJF and SRTF being particularly effective in minimizing waiting and turnaround times. Priority Scheduling provides flexibility in managing orders based on their priority levels. Overall, the system contributes to enhancing customer satisfaction by reducing waiting times and improving order processing efficiency.

6 Future Enhancements

- Integration of additional scheduling algorithms for comparison and evaluation.
- Implementation of a graphical user interface (GUI) for a more user-friendly experience.
- Incorporation of real-time order tracking and notifications for customers.
- Integration with a database for storing order history and analytics for further optimization.

7 Acknowledgments

The development of this system and analysis would not have been possible without the support and guidance of the development team and stakeholders involved.

8 References