AUTOMATED FOOD ORDERING SYSTEM BY PROCESS SCHEDULING SJF, SRTF, PRIORITY

SEE WEN XIANG
School of Computing, Faculty of Engineering, Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia.
wxsee@graduate.utm.my

AIMAN ARRIADY BIN AZMAN
School of Computing, Faculty of Engineering, Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia.
arriady2018@graduate.utm.my

ABU SAYED KHUDRI ROMAN
School of Computing, Faculty of Engineering, Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia.
sayedkhudri@graduate.utm.my

Abstract

The main objective of this project is to develop a program for shortest job first scheduling Shortest Remaining Time First and Priority scheduling which helps to improve the Food Ordering process. There are many algorithms available for CPU scheduling. But we cannot implement in a real-time operating system because of high context switch rates, large waiting time, large response time, large turnaround time, and less throughput (Sabrina, Nguyen, D & F, 2005). The proposed program improves all the drawbacks of simple shortest job first scheduling Shortest Remaining Time First and Priority scheduling architecture. The project has also given a comparative analysis of the proposed shortest job first scheduling Shortest Remaining Time First and Priority scheduling algorithm. Therefore, we strongly feel that the proposed program solves all the problems encountered while doing manually calculate the waiting time, turnaround time, or burst time.

1 Introduction

In this modern era, people are more and more particular about the concept of eating. Hence, restaurants need to pursue orders for delicious food in a shorter time. However, most of the restaurant faces the problem of scheduling the food order. In order to solve the problem of restaurant, our team write this proposal to propose a program system which can help the restaurant to manage food order.

Operating system is the most important software that runs on the computer. It acts as a bridge between the software and hardware of the computer (Li & Ierapetritou, 2008). Furthermore, it manages the computer's resources include the central processing unit (CPU), memory, storage, I/O devices and network connections. In addition to that, operating system also includes process manager that handles task such as scheduling. A process scheduler schedules different processes to be assigned to the CPU based on a particular scheduling algorithm.

Shortest Job First (SJF) is a non-preemptive scheduling algorithm that is commonly found in a batch system (javatpoint, 2011). SJF scheduling primarily works based on the CPU burst time or known as process duration. In SJF scheduling, the process with the lowest burst time is given priority to be executed first among the list of available processes in the ready queue. With

this, the algorithm can achieve the maximum throughput as well as minimum average waiting time and turnaround time. On the other hand, SJF algorithm may also cause starvation problems where the lower priority process will never be executed as the high priority process keeps arriving in the queue. In addition to that, the exact burst time for a process cannot really be known in advance, hence it is very hard to implement this algorithm.

Shortest Time Remaining First (SRTF) is a method of scheduling that applies the pre-emptive version of SJF algorithm (javatpoint, 2011). In SRTF, a process can be stopped or paused from execution after a certain amount of time. The reason is that the **short-term scheduler** has scheduled the arrival of every process based on the least remaining burst time. For example, the execution of process A will be stopped when a new process arrives with a shorter burst time. This will allocate space in the CPU for the shorter process to take place. Once all the processes are available in the ready queue, there is no pre-emption to be done and the algorithm will work as per normal SJF scheduling algorithm. A Process Control Block (PCB) is also used to save the context of the process when the process is removed from the CPU execution. With that said, the PCB is accessed again to continue the previous process when the pre-empted process ends.

Priority scheduling is a technique of scheduling processes based on the priority . (techopedia, 2021). The process with high importance which is **high priority** will be executed first. In this scheduling algorithm, all process involve with the priority assignment and processes with higher priority will be carried out first, if the tasks process with equal importance priority, then first-come first served (FCFS) or round robin will be implemented.

2 Problem Statement

In this project, we are going to propose a system called the Automated Food Ordering System. The system will be implemented using scheduling algorithms for preparing the customer's food. The algorithms are the Shortest Job First (SJF), Shortest Remaining Time First (SRTF), and lastly priority scheduling. Furthermore, the type of customers are dine-in customer, take-away customer, and home delivery customer. In the real world, the most important factors that ensure the success of the restaurant is the customer's satisfaction. Therefore, the **number of completed orders** and **the customer's serving time** has to be tracked. Once seated, the customer should be served no more than 20 minutes from ordering.

For the first scenario of problems, which is the Shortest Job First (SJF) algorithm. It will be applied to the home delivery customers. Orders will be prepared based on the delivery address of the customer. For example, the customer that has the shortest distance to the delivery address will have their order prepared first. On the other hand, customers with a farther delivery address will be put in the waiting list. Since the SJF is not pre-emptive, the current orders will have to be finished first before proceeding with the other orders.

Moving to the second scenario of problems, we will be implementing the Shortest Remaining Time First (SRTF) algorithm in increasing the efficiency of food preparation. The scenario begins when there are orders arriving at one time from two **different** customers. For example, when the restaurant has finished preparing one dish from customer A, the restaurant will then stop preparing the next dishes in the order list and start preparing a dish from customer B that takes less time to complete. This is directly related with the principle of SRTF which means that current processes were pre-empted in order for the next process that has less burst time to take place.

Finally, the third algorithm that we are going to implement in the system is the priority scheduling. This method is fairly simple because food preparation will be based on the type of

customers. For example, order preparation for multiple customers with the **same orders** will be based on the customers' type. A take-away customer should get the priority the highest, followed by dine in and lastly the home delivery customer.

3 Research Objectives

To specific the objective of this research include:

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.

4 Scope of Research

To improve the food order processing speed and maximize the throughput as well as minimize the waiting time when implementing CPU scheduling in food ordering system.

i. This research targeted the restaurant in Malaysia.
ii. A simple coding application interface will be conducted for testing purpose.

5 Significance of the Research

The finding of the research will contribute to the scheduling algorithm about the better way to improve the CPU scheduling.

i. This proposal will help to increase the efficiency of the food ordering system of restaurant.
ii. This proposal may also identify the other systems in the restaurant like food delivery systems.

6 Research Methodology

A better extensive exploration research improves the nature of any research project. It assists specialists with overseeing research steps organized appropriately. Each progression of the interaction has its own expectations and aides the specialists to certainly move to the following stages of the research.

This research consisted of 7phases:

- Phase 1: Research & Literature Review
- Phase 2: Requirement Analysis
- Phase 3: Rapid Prototyping
- Phase 4: Testing
- Phase 5: Bug Report & Correctness
- Phase 6: Converted into Deliverable
- Phase 7: Integrated Testing and Maintenance

7 Conclusion

Understanding process scheduling is extremely vital in operating system. Given that there could be hundreds of programs that needed to run, process scheduling will allocate resources among all the competing processes. For example, it will determine which process will own the CPU for execution while another process is still on hold. This will allow us to obtain the maximum utilization of the CPU with multi-programming. Hence, an increase in efficiency resulted in the user able to get the minimum response time for the execution of programs.

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