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APPLICATION OF FIFO ALGORITHM (FIRST IN FIRST OUT) TO SIMULATION QUEUE

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ABSTRACT

In everyday life, many activities are found. One of them is waiting in line. Queuing is a boring thing. Moreover, the arrangement of the queues is not organized and the officers do not pay attention to who is the first to queue. So it is not uncommon to cause complications and even angry. Therefore, to handle problems in the queue, the simulation is implemented using the first in first out algorithm. With this algorithm, it can help determine who will be served first. Simulation is a way that is done to apply a more realistic system estimate. In this case, the authors use the first in first out algorithm. First in first out algorithm, i.e. first in, first out. In this case who is the first to wait in line, he will be served first and finish first. In this way, it is hoped that this will help determine who will be served first.
Keywords: FIFO, queue, simulation

1. Introduction

In modern times all are demanded to be fast-paced. This is due to the increasing number of population in the world and the influence of technological developments. Increased competition that leads to meeting the demands of consumer needs both in quantity and quality causes the business world, especially the retail world must continue to strive to improve services and flexibility to be able to adapt and innovate quickly and accurately. One thing that is striking in a direct service to consumers is the service at the customer service center. The various services available at the customer service center include creating new members, taking vouchers, and information centers. In the service requires the customer to wait in a queue. But the queue service at the existing customer service center has not found the best quality. So that the guards often experience problems determining the front and back row in the queue. So that officers have difficulty in determining the order of people to be served. This is because there are still many people who do not appreciate queuing culture and always want to be selfish, want to overtake others, and get the fastest service.

Moreover, having to queue in a long queue. So that many cause complaints and not infrequently the customer is angry in public. In determining the order of customers who are queuing for a variety of services is very difficult, especially on holidays and weekends that have several customers more than normal days. With the development of information technology in various service fields, it can be used as a supporter of public services and even becomes an important point as a value-added service quality, and can also be used to overcome various problems that are often experienced by an agency or company. Referring to this matter, it can utilize information technology as one of the solutions to overcome queuing problems at the customer service center.

2. Literature Riview

2.1 Definition of Simulation

Definition of simulation is the process of designing a model of a real system and carrying out experiments with this model to understand the behavior of the system or to formulate a strategy (within a limit set by one or several criteria) in connection with the operating system The simulation model is a device trials that apply several important aspects, including past data, in providing alternative actions that support decision making. Simulation is a technique that mimics operations or processes that occur in a system with the help of a computer device and is based on certain assumptions so that the system can be studied scientifically. Simulation is the right tool to use, especially if you are required to conduct experiments to find the best comments from system components. This is because it is very expensive and requires a long time if the experiment is tried. By conducting a simulation study in a short time the right decision can be determined and the cost is not too large because everything is enough to do with a computer.

The purpose of simulation is to study the behavior of the system, develop an understanding of the interaction of parts of a system, and understanding of the system as a whole. The simulation approach begins

with building a real system model. The model must show how the various components in the system interact with each other so that it truly describes the behavior of the system. After the model is created, the model is transformed into a computer program to enable the model to be simulated [1]–[4]

Table 1: Scheduling logins

Process	Burst Time
P1	24
P2	3
P3	3

For example the order of entry process: P1, P2, P3 then the Gantt Chart for scheduling is:
0 24 27 30
In general, to calculate waiting times for a process, the formula is end time - start time - burst time.

a. Waiting time for P1 = 0; P2 = 24 ms; P3 = 27 ms, so that
b. Average Waiting time: (0 + 24+ 27) / 3 = 17 ms
   Meanwhile, if the order of entry is: P2, P3, P1, then the Gantt Chart for scheduling is: 0 3 6 30
c. Waiting time for P1 = 6 ms; P2 = 0; P3 = 3 ms, so that
d. Average waiting time. (6 + 0 + 3) / 3 = 3 ms [5]

This average waiting time is better than before even though the burst time of each process is the same. The difference here is that a shorter process is placed in front of the queue. The FIFO (First In First Out) algorithm page that is replaced is the page that has been in memory the longest or the earliest allocated. As the picture below illustrates an example of the FIFO page replacement algorithm. After the allocation of pages 7, 0, 1, the frame becomes full. For the next page allocation, which is 2, what is sacrificed is page 7 that is allocated the first time. Then for the next page 0, no new allocation is needed, because page 0 is already in the memory frame. Pay attention to the next page which is page 3 so the frame that is sacrificed is the frame occupied by page 0, even though page 0 has just been accessed. This is because the FIFO algorithm does not see whether a page has been recently accessed or not, but rather based on how long the page has been in the memory frame[6]–[10]

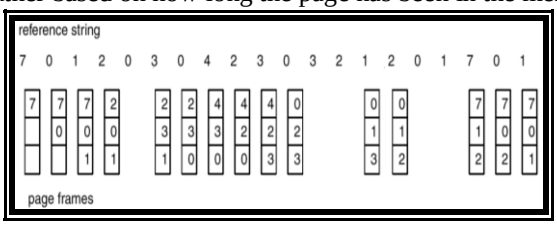

Figure 1. Algoritthm FIFO

3. Discussion

3.2 Queue and Service Procedures At

In providing services to customers, Medan uses the manual queuing system as follows:

1. Customers who want to make member cards, issued vouchers and information will enter the customer service center area.
2. The clerk will welcome and invite the customer to sit, while other customers waiting in the queue to be served after the previous customer has finished serving. But in this case the officer will invite the customer to be seen without knowing who is already in line. And not infrequently this raises a complication from the customer regarding who first queued.
3. The clerk will ask the customer's needs, whether he wants to make a card, issued a voucher or an information.
4. After the customer has finished serving, the clerk will call the next customer who has queued up.

3.2 Analysis of Application of First In First Out Algorithm

After conducting research and analyzing how the queue happened, three officers were confronted with a solid and undirected queue. The officer has difficulty in calling the customer who will be served next. For this reason, observations were made by recording each arrival, waiting time, time served, and exit time. So that it can be with the following data. By doing a queue simulation design for various services using the Single Queue Multi-Server model using the First In First Out algorithm, the following calculations can be made:

Table 2: Scheduling Data

Customer	Time arrival	Time service	Time out	Time wait	time in the queue	Server
A	8.2	2	10.2	0	2	1
B	10.2	5	15.2	0	5	2
C	11.5	6	20.2	3.7	9.7	3
D	16	7	28.2	5.2	12.2	1
E	18.2	5	33.2	10	15	3
F	20	4	37.2	13.2	17.2	2
G	25	5	42.2	12.2	17.2	1
H	30	4	46.2	12.2	16.2	3
I	40	7	53.2	6.2	13.2	2
J	50	7	60.2	3.2	10.2	1

The problem can be anything, with a note for each problem, there are initial conditions criteria that must be met before running the algorithm. The following is a queue simulation algorithm using the first in first out algorithm. This is listed in the main menu display in the FIFO (first in first out) menu.
Read B, C, D, E, F
If (D1> B2) and (D1 <B2) then
D = D2 + C2
D = B2 + C2
Else
If (D1> B2) then
E = B1-B2, 0
Else
F = C + E
Endif
Endif
Write (D, E, F)
Information :
A = customer name column
B = column time arrived
C = service time column
D = exit time column
E = waiting time column
F = time column in the system

3.3 System Implementation

Implementation is an action or implementation of a plan that has been prepared carefully and in detail. Implementation is usually done after the planning is considered complete. The implementation of this decision support system consists of various requirements as follows:

1. Main Menu Display

Following is the appearance of the main menu of the queue simulation using the first in first out algorithm. In the main menu there is a first in first out menu which is a form to fill in the assumptions of each schedule.

Figure 2: Display Main Menu of Queue Simulation

2. Display the Queue Simulation Form Using the First In First Out Algorithm

Berikut merupakan tampilan dari form simulasi yang berfungsi untuk melakukan proses perhitungan asumsi penjadwalan

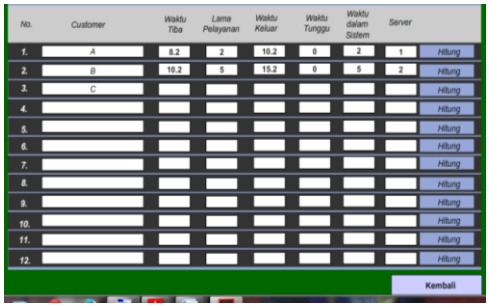

Figure 3: Scheduling Display

4. Conclusion

The formation of a single multi-server queue model in a queue simulation is to have one entry point but have many servers in using the system, the first in first out algorithm is applied to the queue number queuing simulation. It will be seen who will be called first to be served, the design of this queuing simulation is designed with the algorithm first in first out, so it can be proven that the first-coming customers will first come out based on that algorithm.

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