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APPLICATION OF AUTOMATIC QUEUING MODELS FOR VISITING PILGRIMAGE

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Abstract: -

Pilgrimage in the Indian is growing consistently and is an important attraction and destination for both foreign and domestic. Queuing for an explicit service according to the needs of venerator in the process of moving to a specific sequence. This can be done by a queue-based scheduler. This paper focuses on a system revered place and the average waiting time of venerator service is the revered place that different queuing algorithms. The purpose of this paper is to develop queuing system for organizing sacred place to build automated queue status analyzes and to service the venerator. New queuing design model test results and the average waiting time varies according to factors that can switch between scheduling algorithms. The main novelty of this work is the average waiting time modeling that gives the best average waiting time scheduling algorithm with the process of switching in addition, concerns have taken in processing.

Keywords: *Shrine, Queuing System, Management, Scheduling algorithms, Shortest Process First, Random number generation, Simulation*

I. INTRODUCTION

Pilgrimage destinations are the places where the need of queue management always remains in focus due to the time based journey of visitors. Since, long back many researchers are trying to achieve the technology through which venerator satisfaction could be increased. Therefore, an active research has focused on its operations and optimum lined waiting time for analysis and to reduce the venerator waiting[1,2,3] This paper focuses on the sacred place system and the different queuing algorithms that used in sacred place to serve the venerator. Most sacred place used standard queuing models. To avoid standing in a queue for a long time or in a wrong line, The aim of this paper is to decrease venerator waiting time by building a homogenous way that analyze the queue status and take decisions about which venerator to serve by using the appropriate scheduling algorithm. The study consists of the salient features of queuing systems, the most common scheduling algorithms and queue models after that proposed queuing system model. Experimental results and brief conclusions and suggestions for future work.

II. Queuing Systems

A queuing system consists of one or more servers that provide services to arriving venerator. Figure 1 depicts the characteristics of queuing system [4]. The population of venerator may be finite (in closed systems) or infinite (in open systems). The arrival process describes how venerator enters into the system. The venerator arrived to the sacred place in a random fashion. And the Queue represents a certain number of venerator waiting for services. The capacity of a queue is either limited or unlimited. The service is an activity requested by a venerator, where each service consumes a specific time. The scheduling algorithm is used to arrange the venerator in systematic queue and to choose the next venerator from the queue. The most common scheduling algorithms are:

(A) First come first service: The venerator is served in the order of their arrival, which is most visibly fair because all venerator think of themselves as equal.

(B) For RSS service: In this algorithm randomly venerator are selected for each venerator service therefore whether it is engaged in the service of his arrival.

(C) PRI (Priority service): Venerator some external factors are divided into sections according to priority. The venerator which has highest priority is firstly served.

(D) SPF algorithm that considers service time is known in advance (at least the first processed). Many venerators are waiting in line SPF algorithm takes at least service.

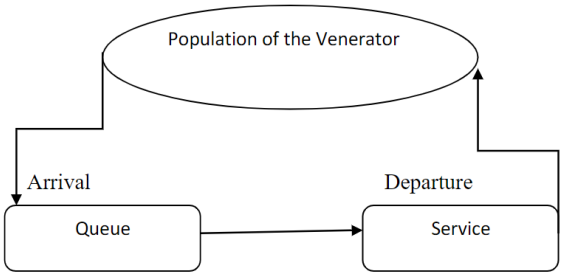


Figure1: Representation of Simplest Queuing System

There are many types of queue models such as [5, 6]. Some such types of queue models are defined as follows:

(A) SQ (Single Queue): In this model each venerator waits till the service point is ready to take them for servicing.

(B) MQ (Multiple Queues): In this model each venerator tries to choose the shortest queue from a number of possible individual queues.

(C) DQ (Diffuse Queue): In this model each venerator obtains a ticket. After the registration of his/her place in the queue by a ticket he/she will monitor the ticket number being served. The venerator cannot estimate when they will be served

III. The Proposed Queuing System Model

Queue Management System for revered place the technology makes an automatic. DQ conditions such as queuing system to test and already during a specific period of time to be served the next venerator to select such systems as defined in FCFS and SPF that is more than a reasonable algorithm which can choose between scheduling algorithms of the queuing system. Scheduling algorithm selects the best time for all the available venerator those are waiting to be served. To achieve this goal we have added additional components into the traditional queuing management system as shown in figure 2.

The suggested queuing system primarily consists of the following components:

(a) Venerator area: In venerator area the venerator selects a service via ticket, and waits until his/her ticket number shown in a vision and/or audio notice for servicing.

(b) Queuing area: In queuing area the system uses the queuing algorithm that is chosen by the testing area to select one of the waiting venerator.

(c) Testing area: In testing area the system tests the status of the system according to the existing algorithms from the algorithms database and compares between all the result for the expected waiting and response time then selects the algorithm that gives the best waiting time.

(d) Scheduling Algorithms Database area: All the needed scheduling algorithms, the testing result, and the venerator

numbers, are stored in the scheduling algorithms database area. The testing result and the venerator's numbers are saved temporarily for further implications.

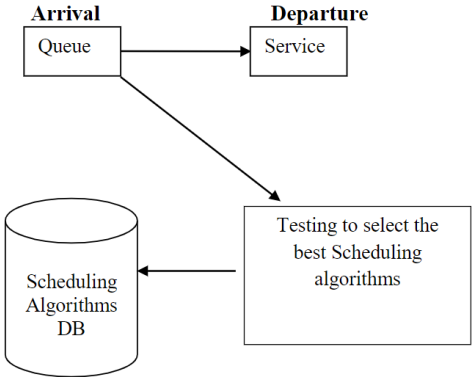


Figure 2: Representation of the new queuing system.

(e) Service area: In service area the system serves the venerator according to the different services as a revered place offer like as visit pilgrimage with family for worshipping, visit pilgrimage alone for worshiping and only visiting of pilgrimage and each service needs a specific time to be provides.

IV. Experimental Results

Simulation to test the performance of the new proposed system has been made. Databases of two standard scheduling algorithms have analyses to systematically evaluate the proposed system.

For the purpose of illustrations, a comparison between the new system and the ordinary system (FCFS) that is used usually in most of the shrine queuing systems. That simple system (FCFS) for a comparison between. In the proposed system, there are two scheduling algorithms used (FCFS, SPF). For the purpose of calculation and reality check a random number generation is used to generate a sequence of venerator's arrival time and to choose randomly between three different services: visit pilgrimage with family for worshipping, visit pilgrimage alone for worshiping and only visiting of pilgrimage, with different period of time for each service: 120, 60, and 10 respectively. The proposed system will test the queuing system using testing algorithm every specific period of time; let's consider it 120 time unit, to select the appropriate scheduling algorithm i.e. either FCFS or SPF according to the average waiting time.

After executing the random generator, a simulation snapshot for the queuing system is generated, the result of 16 venerators with different arrival time starting from zero, and different service time as shown in table 1. After implementing the ordinary queuing system and the proposed queuing system on the above snapshot, the resulted Gantt chart for the ordinary queuing system that uses only FCFS algorithm, as shown in figure 3. The new queuing system calculates the waiting time for each venerator, then calculates the total waiting time and the average waiting time according to the two algorithms (FCFS, SPF) each 120 time unit as shown in figure 4, it can switch between the algorithms at the end of the time unit by selecting the algorithm with the minimum average waiting time.

Table 1: A Snapshot for the Generated Queuing System

Venerator	Arrival Time	Service Time	Service Type
C1	0	10	Type 1
C2	5	60	Type 2
C3	8	120	Type 3
C4	10	10	Type 1
C5	12	120	Type 3
C6	14	10	Type 1
C7	20	10	Type 1
C8	24	120	Type 3
C9	28	60	Type 2
C10	30	120	Type 3
C11	34	120	Type 3
C12	38	10	Type 1
C13	40	10	Type 1
C14	43	120	Type 3
C15	45	60	Type 2
C16	50	10	Type 1

Figure 3: Representation of ordinary queuing system Gantt chart

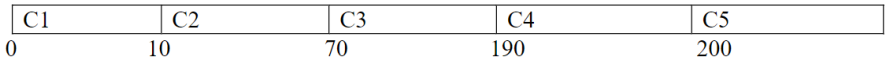
FCFS

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16

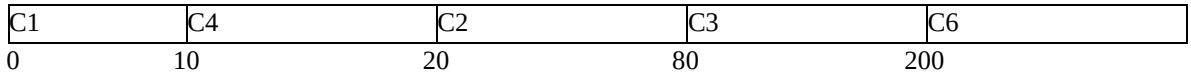
0 10 70 190 200 320 330 340 460 520 640 760 770 780 900 960 970

(a) Testing 1st group using the two scheduling algorithms

FCFS

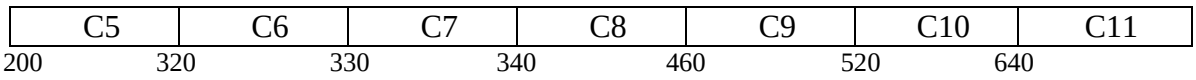


SPF

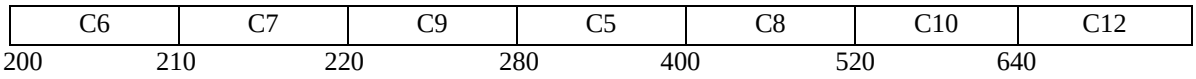


(b) Testing the 2nd group using the two scheduling algorithms

FCFS

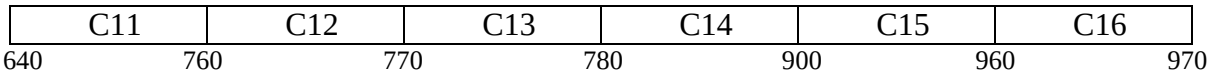


SPF



(c) Testing 3rd group using the two scheduling algorithms

FCFS



SPF

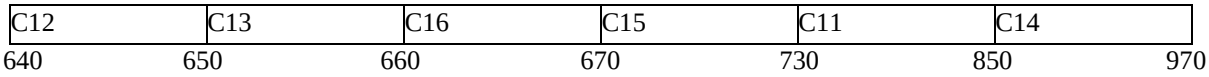


Figure 4: The new queueing system Gantt chart (a) (b) (c)

Through the extensive experiments conducted, the primary goal is to determine the ability of the new queuing system against the ordinary queuing system. Figure 5 show that the new approach decreases the average waiting time, compared with the ordinary queuing system. Equation 1 was used to calculate the waiting time for each venerator [7]:

$$CWTi = SSTCi - ATCi \quad (1)$$

Where
CWT is a Venerator Waiting Time, SSTC is Start Serving Time for a Venerator ATC is Arrival Time for a Venerator i is the i^{th} Venerator number. The average waiting time for each group of venerator is calculated by using equation 2.

$$AWT = (\Sigma CWTi) / TN \quad (2)$$

Where:
AWT is Average Waiting Time CWT is a Venerator Waiting Time
TN is total number of venerator served

i is the number of venerator

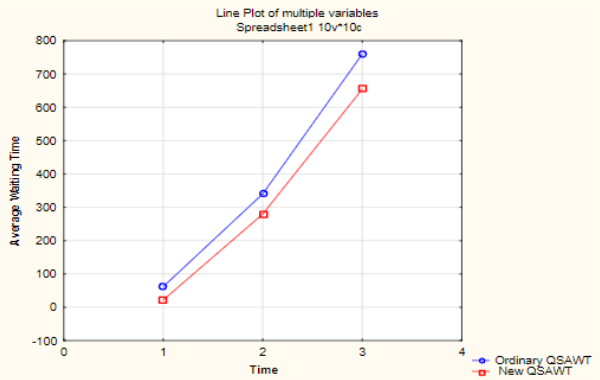


Figure 5: The difference between the ordinary queueing system and the new queueing system

Table 2: Comparison between ordinary queuing system and the new automatic queuing system on the basis of average waiting time

Time Slice	Ordinary Queuing System Average Waiting Time and Algorithm	New Automatic Queuing System Average Waiting Time and Algorithm	The Difference Between Ordinary and New Algorithm
1stGroup	61.75	21.75	14.00
2ndGroup	340.34	279.67	60.67
3rdGroup	760.00	655.00	105.00
Total average waiting time	380.37	318.80	59.89

V. Conclusion And Future Work

In a queue system, the balance between dealing with all venerator fairly and the performance of the system is very important. Sometimes the performance of the system is more important than dealing with the venerator fairly. In this paper, we have presented a new technique for queuing system called automatic queuing system. The proposed technique showed improvements in average waiting time. It will be more effective to add more factors in testing to take the right decision for choosing one of the available scheduling algorithms, such as throughput, utilization, and response time. Also adding more scheduling algorithms to the system database will be useful.

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