Automatic Queuing Model for Banking Applications

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Abstract—Queuing is the process of moving customers in a specific sequence to a specific service according to the customer need. The term scheduling stands for the process of computing a schedule. This may be done by a queuing based scheduler.

This paper focuses on the banks lines system, the different queuing algorithms that are used in banks to serve the customers, and the average waiting time. The aim of this paper is to build automatic queuing system for organizing the banks queuing system that can analyses the queue status and take decision which customer to serve. The new queuing architecture model can switch between different scheduling algorithms according to the testing results and the factor of the average waiting time. The main innovation of this work concerns the modeling of the average waiting time is taken into processing, in addition with the process of switching to the scheduling algorithm that gives the best average waiting time.

Keywords-Queuing Systems; Queuing System models; Queuing System Management; Scheduling Algorithms.

I. INTRODUCTION

Today banks are one of the most important units of the public. Since the foundational work of banks, many researchers try to get full advantage of any new technology to increase customer satisfaction. Therefore an active research has focused on analyzing the queues to optimize their operations and to reduce waiting time for customers [1,2,3].

This paper focuses on the bank lines system and the different queuing algorithms that used in banks to serve the customers. Most banks used standard queuing models. To avoid standing in a queue for a long time or in a wrong line, most banks use automatic queue system to give tickets to all customers. The customer can push a specific button in a tickets supplier device according to their needs.

The aim of this paper is to decrease customers waiting time by building a homogenous way that analyze the queue status and take decisions about which customer to serve by using the appropriate scheduling algorithm.

The rest of this paper is organized as follows. Section 2 consists of queuing systems characteristics, most common scheduling algorithms, and the queue models. Then our proposed queuing system model is shown in section 3. Experimental results are shown in section 4, followed by brief conclusions and suggestions for future work are shown in section 5. Then the references are shown in section 6.

II. QUEUING SYSTEMS

A queuing system consists of one or more servers that provide service to arriving customers. Figure 1 shows the characteristics of queuing system [4].

The population of customers may be finite (closed systems) or infinite (open systems). The arrival process describes how customers enter the system. The customers arrive to the service center in a random fashion.

Queue represents a certain number of customers waiting for service. The capacity of a queue is either limited or unlimited. Bank is an example of unlimited queue length.

The service is an activity requested by a customer, where each service takes a specific time. The scheduling algorithm is used to order the customers and to choose the next customer from the queue. The most common scheduling algorithms are [4,5]:

a) *FCFS (First Come First Serve): The customers are served in the order of their arrival, which is most visibly fair because all customers think of themselves as equal.*

b) *RSS (Random Selection for Service): In this algorithm, customers are selected for service at random, so each customer in the queue has the same probability of being selected for service irrespective of his/her arrival in the service system.*

c) *PRI (Priority Service): The customers are grouped in priority classes according to some external factors. The customer with the highest priority is served first.*

d) *SPF (Shortest Processed First): The algorithm assumes that the service times are known in advance. When several customers are waiting in the queue, the SPF algorithm picks the shortest service time first.*

The departure represents the way customers leave the system.

Figure 1 : Simplest Queuing System

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Application of Queuing Model in a Banking Service in PNG. Brian Billy,Joe Paru,Lui Masti,Herod Malo,Mirzi Betasolo,2019 Queuing is a common sight in the service industry such as bank transactions of employees receiving their wages at the end of a fortnight and other customers working in private or sector Customers and service providers place differing values of the time Those who have access to privileges with a fee passes the queue while those who can t remain in the line The paradigm shift in technology and ICT has created a new brand of society that considers queuing as a thing of the past The use of mobile fund transfer or online banking relieves the challenges The paper uses the method Queuing model or waiting for line model which is the one mathematical model used to study and analyze long queues in the service industries This paper will demonstrate how well queuing models can be used to analyze and understand the behavior of the queues particular in the banking industry using the QM for Windows software The result shows a better understanding of how time is valued and is discussed in the paper presentation **Queueing Theory and Network Applications** Wuyi Yue,Quan-Lin Li,Shunfu Jin,Zhanyou Ma,2017-11-22 This book constitutes the proceedings of the 12th International Conference on Queueing Theory and Network Applications QTNA 2017 held in Qinhuangdao China in August 2017 The 19 full papers included in this volume were carefully reviewed and selected from 65 initial submissions They deal with queueing models queueing applications and network models Applications of Queueing Theory C. Newell,2013-03-09 The literature on queueing theory is already very large It contains more than a dozen books and about a thousand papers devoted exclusively to the subject plus many other books on probability theory or operations research in which queueing theory is discussed Despite this tremendous activity queueing theory as a tool for analysis of practical problems remains in a primitive state perhaps mostly because the theory has been motivated only superficially by its potential applications People have devoted great efforts to solving the wrong problems Queueing theory originated as a very practical subject Much of the early work was motivated by problems concerning telephone traffic Erlang in particular made many important contributions to the subject in the early part of this century Telephone traffic remained one of the principle applications until about 1950 After World War II activity in the fields of operations research and probability theory grew rapidly Queueing theory became very popular particularly in the late 1950s but its popularity did not center so much around its applications as around its mathematical aspects With the refine ment of some clever mathematical tricks it became clear that exact solutions could be found for a large number of mathematical problems associated with models of queueing phenomena The literature grew from solutions looking for a problem rather than from problems looking for a solution

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