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Analysis of the results of analytical and simulation With the network model and dynamic priority Unchecked Buffer

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ABSTRACT: The problem of choosing optimal parameters for dynamic priorities in the case of the various types of service requests with linearly decreasing function of priorities, The results of analytical and simulation models of distributed computer networks with dynamic priorities and unlimited buffer residence time requirements of the network is limited. The network constraint violation results in a loss requirements. In this paper A comparative analysis of the results of analytical and simulation models are conducted with the purpose to verify the adequacy of the analytical models.
General Terms: Dynamic Analysis, Priority in the Service, Unchecked Buffer
***Keywords**:* Service, dynamic priorities, Unchecked Buffer, unlimited buffer, Priority.

INTRODUCTION

The processes for managing distributed computer networks with dynamic requirements and priorities unchecked buffer. Such services are used in the service system, in which subscribers are in moving vehicles. Under the service is understood pretreatment coordinate information and vehicle speed. The time between the arrival of the requirements of the system and the end of the service is limited to a certain value, and if this time exceeds this value, the requirements will be lost. This information received too late for the consumer, so it is useless [1-3]. In [4] studied the process of managing distributed computer networks with dynamic priorities, requirements and unlimited buffer, and it is shown that the lower limit of total losses achieved with a finite value of the queue length. Using these results solved the problem of determining the optimal characteristics of the service process in a distributed computer networks, and often it is to some extent complicates the operating system. However, the development of more advanced algorithms for the organization of the service process may allow to reduce the loss of requirements, accompanied by the growth performance of the network service. A feature of the algorithmic approach is to minimize the loss of the requirements by removing the preventive part of them, without waiting for the service.A feature of these networks is to minimize the loss of claims due to the preventive removal of some of them, without waiting for the service. In order to study the functioning of such a network, it can be considered as models of queuing systems (QS).It is necessary to solve the problem of optimization of parameters determining the nature of the preventive removal requirements, resulting in minimizing their losses. It should be noted that in order to confirm adekvtnosti analytical models developed in [5], it is necessary to develop simulation models of such networks and services to compare the results of both models.

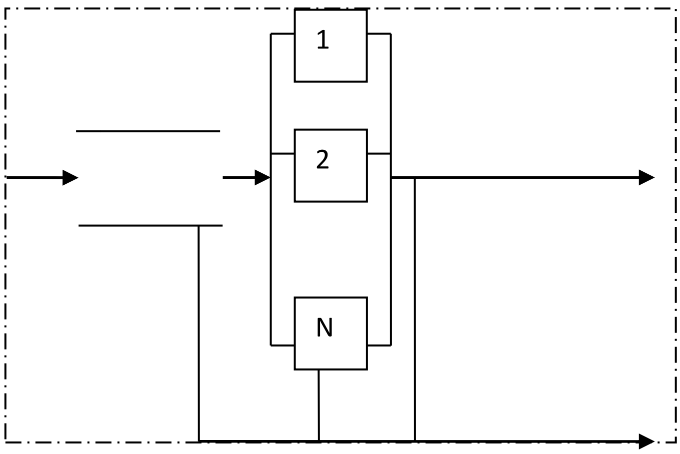


Figure.1. QS with unlimited queue

Solution of the problem

The input stage of the QS (Figure. 1) enters the flow requirements. Because of the requirements of the queue defined by some rule, come with equal probability for all serviceable and free from computer maintenance.

After leaving the service requirements of the system. Service assumes a uniform input stream with the requirements of equal a priori priorities. In the process of dynamic priority service requirements may vary depending on the situation. The service time of all claims distributed according to the same law. The network operation is possible if the situation changes in two places: in the queue and service. Stay requirement system consists of two phases: the expectations and service, and the total residence time requirements of the system must not exceed the maximum allowable value, ie. After leaving the service requirements of the system. Service assumes a uniform input stream with the requirements of equal a priori priorities. In the process of dynamic priority service requirements may vary depending on the situation. The service time of all claims distributed according to the same law. The network operation is possible if the situation changes in two places: in the queue and service. Stay requirement system consists of two phases: the expectations and service, and the total residence time requirements of the system must not exceed the maximum allowable value, ie. τ_s^* On standby phase requirement is not satisfying this condition and can be removed from the system via a certain rule, and therefore there are losses in the first-order p_1 In the maintenance phase (or immediately after its completion) requirement can be removed from the system, if it stays in the system exceeds τ_s^* , and these requirements are the losses of the second kind p_2 ,In general, the purpose of this rule is to choose a removal pending and served the requirements under which minimize the mathematical expectation value of the total loss of both Kinds, that is;

$$M[P(p_1, p_2)] \rightarrow \min \qquad (1)$$

$$\tau_s \leq \tau_s^* \; L_q \leq m \qquad (2)$$

Where $\tau_s, L_q, \tau_s^*, m -$ values residence time requirements of the system, queue length, the maximum value of the residence time requirements of the system, the maximum value of the number of seats in the waiting queue. Optimal queuing and service to achieve maximum efficiency of the system by removing from the system before or during maintenance of those requirements which do not fulfill the conditions of $\tau_s \leq \tau_s^*$. For the organization of service system in this paper based on the following two versions of the algorithm of interaction of queuing and service received results of analytical and simulation models, in which can be used for software development of such systems for various purposes:

- The line is not limited to $L_q = \infty$, and optionally measuring the residence time requirements of the system. The system has the ability to measure the residence time requirements of the system, and when servicing is not. Therefore, in the algorithm we set limit on the waiting time in the queue $\tau_q \leq \tau_q^*$, and the fact of exceeding the allowable residence time requirements of the system in the algorithm just as in the first embodiment may be detected after the maintenance.
- The line is not limited to $L_q = \infty$ and in both phases is possible to measure the residence time requirements of the system. Therefore, the fact of exceeding the acceptable residence time requirements of the system $\tau_s \leq \tau_s^*$ detected at either of the two phases, i.e. at the time of its occurrence.

For an exponential service time value L_q can be defined as follows [4]: $L_q = P\rho/(N-\rho)$

In this formula, depending on the nature of the object, you can use the system to allow the following approximations:

In $\rho << 1$ $L_q \longrightarrow \rho^{N+1}/N^2$

In $\lambda/\mu N \rightarrow 1$ $L_q \longrightarrow \rho/(N-\rho)$

When famous L_q can also be defined latency requirements in the queue τ_q , the residence time requirements in the τ_s ,the expected number of claims in the systems

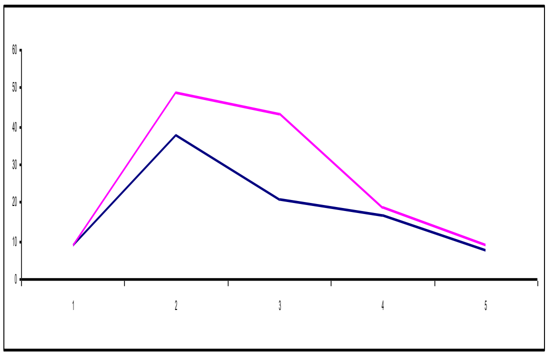
L_s :

$\tau_q = L_q / \lambda$; $\tau_s = L_s / \lambda$; $\lambda / \mu N < 1$; $L_s = L_q + \rho$ It should be noted that the considered options for interaction and queuing services correspond to different technical systems and they describe different in terms of effectiveness and possible interactions queuing and servicing should be noted that if the maintenance requirements and check the condition of $\tau_s \leq \tau_s^*$ produced in different computers (the first option) then there is no possibility to stop service requirements, even if the condition is violated $\tau_s \leq \tau_s^*$.This is the case in the first version of the algorithm (in the service has no way of measuring time τ_s).

In the case of service requirements and check the conditions of $\tau_s \leq \tau_s^*$ produced in the same network home computers, demand detained and system longer than τ_s^* is removed from it, without waiting for the service. This situation occurs in the second embodiment (of service is possible to measure the time τ_s).These variants of the algorithm have unlimited number of locations al $L_q = \infty$ and removing them from the queue is made by the criterion of the residence time in $\tau_s \leq \tau_s^*$ (it is possible to maintain the time dimension Feeder τ_s).An option that allows you to exclude from the system of "hopeless" requirement before another course is more efficient and "intelligent." Furthermore, it should be noted that each embodiment interaction queuing and service depending on the level of degradation of the system must be adjusted delete rule.

For the $m = 10$ $\tau_s^* = 100$ and $(\lambda = 0.001 - 0.005, \mu = 0{,}010 - 0.022)$ $\rho = 0.1 - 0{,}9$,conducted voluminous computational experiments and numerical results are obtained. On the basis of these results the following were built according to $L_q(L_S) = f(\rho)$, $\tau_q(\tau_S) = f(\lambda)$ $P = f(N)$ shown in Fig. 1-3.

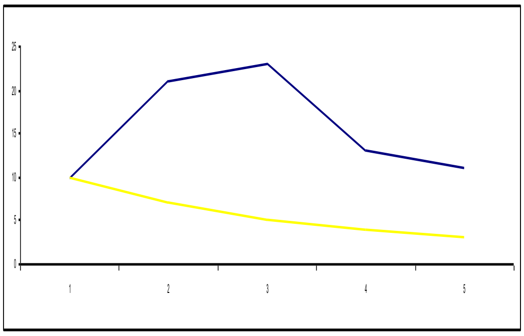
$L_q(L_S)$



ρ

Figure.2. Dependencies $L_q(L_S) = f(\rho)$

$\tau_q(\tau_S)$



λ

Figure.3. Dependencies $\tau_q(\tau_S) = f(\lambda)$

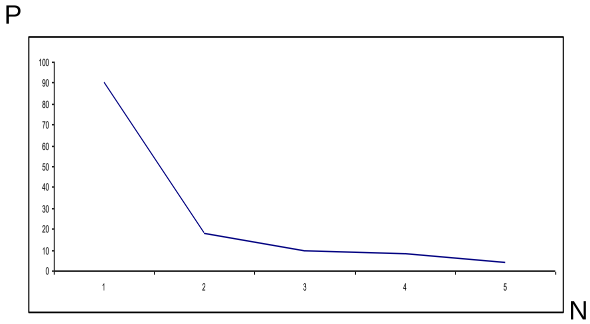


Figure 4. Dependence $P = f(N)$

The analysis of these dependences shows that the value of the queue length and the number of customers in the system are reduced at $\rho = 0.3$ The value of the waiting time in the queue τ_q requirements, the residence time requirements in the τ_s reach its minimum value at $\lambda = 0.004$, and hence the minimum value of total data loss is achieved with $N \geq 3$.
As already noted, in order to confirm the adequacy of the analytical (A) model of the language GPSS (General purpose simulation system) developed model (I), run the simulation model with the following results [6-7-8-9].

GPSS World Simulation Report - Untitled Model 1.1.2

```
START  TIME                  END  TIME    BLOCKS
FACILITIES  STORAGES
0.000          354.120    20       1         0

FACILITY            ENTRIES   UTIL.    AVE. TIME
AVAIL. OWNER PEND INTER RETRY DELAY
SYSTEM              1    0.957     0.021  1        0    0
0    0     0
USER  CHAIN             SIZE  RETRY   AVE.CONT
ENTRIES  MAX     AVE.TIME
LINE                    2     0    0.00012          3      3
131.252
CEC XN    PRI           M1       ASSEM   CURRENT
NEXT  PARAMETER    VALUE
4    0        238.769     4    10      4
TSRV        31.225
FEC XN    PRI          BDT       ASSEM   CURRENT
NEXT  PARAMETER    VALUE
5    0        379.643     5     0      1
```

The results of this model shows that the utilization rate of the service channel is 0.957, the average queue length is 0.00012, taking into account all TRANSACT average waiting time of 0.021. Based on the results of both models and compare the results based on a formula determined by $\Delta = [|\dot{I} - A| / A] \times 100\%$. Deviation of these results. The result revealed that the deviation of these results is that confirm the adequacy of the analytical model. It should be noted that these results can be used in the construction of distributed service networks for various purposes.

CONCLUSION

This paper analyzes the results of analytical and simulation models of distributed networks with dynamic priorities and unlimited buffer residence time requirements of the network is limited. The network constraint violation results in a loss requirements. Comparative analysis of the results of analytical and simulation methods for the problem of minimizing the loss of claims due to the preventive removal of some of them, without waiting for the service adequacy of the analytical results.These models cover a wide class of advanced networks for different purposes. I is shown that the length of the class is always advisable to forcibly remove some of the requirements of the pending queue, thus reducing the load on the serving equipment, and ultimately minimizing the total loss of both Kinds.

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