ON THE RELIABILITY OF QUEUEING SYSTEMS

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The main object of this research is reliability of queueing systems and its latest tendencies. Distributed, service-oriented software systems within companies or on the web are constantly evolved due to new customer requirements, failure reports, or technology updates. Such evolution scenarios require architectural changes, for which there are often multiple alternatives [6]. To begin with, we will briefly review the latest achievements in the field of reliability of queueing systems after the year of 2005. A good example of studying reliability of queueing systems and predicting systems' failure scenarios is provided in [6], where a novel model-driven prediction method on a large-scale process control systems is presented. Actually, there are many examples investigating reliability of queueing systems. A good example showing the problem of structural control for a wide class of any multi-component queueing systems, consisting of unreliable elements, is presented in [3]. Another interesting appraoch by the same author is presented in [4], where mathematical models for interaction of degradation and its compensation processes are proposed and their possible applications are partially analysed. These models represent mixed type queueing systems for two parallel maintenance operations: replacements and repairs.
Extensive experiments, verifying the performance of grid systems, and a method which, significantly improves the accuracy of reliability evaluation in presence of dynamic workload, are presented in [10]. Another familiar approach about reliability in distributed queueing systems is presented in [1], where stochastic regeneration is used to obtain renewal equations to characterize the service reliability. The model is later applied to develop optimal load-balancing policies for a two-node distributed queueing system.
A framework for the analysis of failures and production processes in the flexible manufacturing systems is presented in [8]. The author states that in general, computing dependability measures by using either analytical or numerical methods with constant failure and repair processes is difficult. As a solution, two alternative methods to approximate the performance of queuing characteristics of a GI/M/1 system are presented in [5]. The first method is non-parametric, using only the first three moments of the arrival distribution. The second method approximates the arrival distribution to a mixture of two exponential distributions.
One interesting approach investigating large-scale systems reliability is presented in [2], where system steady states corresponding to the number of failed components are obtained by analysing the transition probabilities between states.
It must be mentioned, that the topic of reliability analysis is often too disturbing to the most computer engineers and researchers dealing with network security. A unique model, called attack-obstacle model, is proposed in [9] for analyzing systems with immunity growth features. The author presents some methods which can be useful in identifying models, their assumptions and practical parameters for estimating the reliability of threatened systems and for assessing the performance of recovery facilities.
Finally, interesting findings of queueing systems' performance workshop are presented in [7]. The author propose a modeling framework, based on queuing networks, where the aim is to maximize operational availability of the production system by reducing the sojourn time of failed equipment.

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