SMART REACH
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Performance and Availability Modeling of ITSystems with Data Backup and Restore

Abstract:

In modern IT systems, data backup and restore operations are essential for providing protection against data loss from both natural and man-made incidents. On the other hand, data backup and restore operations can be resource-intensive and lead to performance degradation, or may require the system to be offline entirely. Therefore, it is important to properly choose backup and restore techniques and policies to ensure adequate data protection while minimizing the impact on system availability and performance. In this paper, we present an analytical modeling approach for such a purpose. We study a file service system that undergoes periodic data backups, and investigate metrics concerning system availability, data loss and rejection of user requests. To obtain the metrics, we combine a variety of model types, including Markov chains, queuing networks and Stochastic Reward Nets, to construct a set of analytical models that capture the operational details of the system. We then compute the metrics of interest under different backup/restore techniques, policies, and workload scenarios. The numerical results allow us to compare the effects of different backup/restore techniques and policies in terms of the tradeoff between protective power and impact on system performance and availability.