Proactive Software Rejuvenation Solution with Enhanced VM Migration Decision in IT Infrastructure

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Abstract

The availability of IT infrastructures is still a huge challenge nowadays. As server virtualization is used as an essential software infrastructure of various software services in IT environment and it is emerging as a technique to increase system reliability and availability. To prevent system failures caused by software aging, software rejuvenation can be applied in virtualized environment. Software aging of virtual machine monitors (VMMs) is becoming critical because performance degradation or crash failure of a VMM affects all virtual machines (VMs) on it. Live VM migration enables a running VM on a host server to move onto the other host server with very small interruption of the execution. VM migration depends on a variety of criteria and efficient decision support is required. The work presented in this paper aims to offer the high availability against software aging of virtualized server system by providing VM migration based VMM software rejuvenation solution. First, we present the resource usage as accepting as many services as in virtualized environment which support of VM migration. Second, we present migration based VMM rejuvenation analytic model and evaluate the steady-state system availability based on familiar Markovian analysis through the use of numerical analysis.

Keywords: A**vailability, Proactive software rejuvenation, Software Aging, Stochastic modeling, Virtualization.**

1. Introduction

Availability of information and services all the time and from everywhere is today a growing common requirement. One of the possible definitions of availability is the quality of being at hand when needed [10]. Virtualization is a rapidly growing new technology that is transforming the world of IT. Virtualization has proved to be a successful tool for the management of complex IT environments and it is emerging as a technique to increase system reliability and availability [5, 7]. Server virtualization becomes an essential software component of system infrastructure of various software services in IT environment. It is well known that, currently, computer system outages are more often due to software failure than hardware failure. Several studies [2, 3, 6, 12] have reported that one of the causes of the unplanned software outages is the software aging phenomena. Software aging will affect the performance of the application and eventually cause it to fail. Software aging has also been observed in widely used communication software like Internet Explorer, Netscape as well as commercial operating systems and middleware.

Recently, software aging of VMMs is becoming critical. Many VMs run on top of a VMM in one machine consolidating multiple servers and aging of the VMM directly affects all the VMs. Software rejuvenation is a preventive and proactive maintenance policy that is particularly useful for counteracting the software aging. One of the promises of