MASTER'S PROJECT (SPRING 2016)

TOPIC: *Real-Time Reliability Monitoring of a Cloud-Based System for Software Rejuvenation*

PRESENTER: Harini Pughazhendi

ADVISOR: Dr. Haiping Xu

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COMMITTEE MEMBERS: Dr. David Koop and Dr. Shelley Zhang

ABSTRACT

In a cloud-based system, the ever-increasing workload will inevitably lead to software aging problems due to multiple factors such as memory bloating, memory leaks, unterminated threads, and fragmentation in storage space. Software rejuvenation has been proposed as a proactive approach to dealing with the software aging phenomenon and maintaining a reliable cloud-based system. One efficient way to achieve software rejuvenation in a cloud-based system is to replace a cloud-based server that causes the aging problem by a newly deployed cold spare one. In this project, we developed a prototype e-commerce application, and deployed the application at Amazon Web Services (AWS). The prototype consists of an application server and a database server. To enhance the system reliability, two hot spare servers are set up for the application server and the database server, respectively, which are ready to take over the workload once the primary ones fail. In addition, there is a proxy server that monitors the reliability of each server as well as the whole system, and notifies the system administrator when the system reliability falls below a predefined threshold value. To rejuvenate the cloud-based system, the system administrator activates cold spare servers, which are undeployed Virtual Machine (VM) images, to substitute the primary and hot spare servers. Once the servers have been replaced by the activated cold spare ones, they are destroyed, and the new servers start to function immediately. The simulation shows that the system reliability can be effectively boosted to its initial value using software rejuvenation technique, where the whole rejuvenation process is transparent to the users.