World Academy of Science, Engineering and Technology
International Journal of Computer and Information Engineering
Vol:14, No:10, 2020

Providing Reliability, Availability and Scalability Support for Quick Assist Technology Cryptography on the Cloud

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Abstract : Hardware accelerator has been a promising solution to reduce the cost of cloud data centers. This paper investigates the QoS enhancement of the acceleration of an important datacenter workload: the webserver (or proxy) that faces high computational consumption originated from secure sockets layer (SSL) or transport layer security (TLS) procession in the cloud environment. Our study reveals that for the accelerator maintenance cases—need to upgrade driver/firmware or hardware reset due to hardware hang; we still can provide cryptography services by switching to software during maintenance phase and then switching back to accelerator after maintenance. The switching is seamless to server application such as Nginx that runs inside a VM on top of the server. To achieve this high availability goal, we propose a comprehensive fallback solution based on Intel® QuickAssist Technology (QAT). This approach introduces an architecture that involves the collaboration between physical function (PF) and virtual function (VF), and collaboration among VF, OpenSSL, and web application Nginx. The evaluation shows that our solution could provide high reliability, availability, and scalability (RAS) of hardware cryptography service in a 7x24x365 manner in the cloud environment.

Keywords : accelerator, cryptography service, RAS, secure sockets layer/transport layer security, SSL/TLS, virtualization fallback architecture
Conference Title : ICCPCC 2020 : International Conference on Cyber Physical Cloud Computing
Conference Location : London, United Kingdom
Conference Dates : October 22-23, 2020