

BATCH NO: 6

PROJECT TITLE: ENHANCING SECURITY AND RESOURCE ALLOCATION IN SERVERLESS MULTICLOUD EDGE COMPUTING THROUGH DEEP REINFORCEMENT LEARNING

ABSTRACT:

The resource usage of various physical machines (PM) and virtual machines (VM) in the cloud datacenter fluctuates over time, which can cause SLO violations and thus impair application performance. Load balancing moves virtual machines (VMs) from overloaded PMs to under loaded PMs dynamically in order to reduce the likelihood of SLO violation. Long-term load balance cannot be achieved with previous load balancing techniques. In order to tackle this issue, we provide various load balancing techniques in this study and assess their effectiveness based on multiple criteria. To anticipate the resource utilization of VM and PM in the future, we employ the long short term memory (LSTM) machine learning model and the Fast Fourier Transform (FFT) approach, which is an upgraded FFT method that takes into account more frequencies in FFT. The best prediction performance in a prediction may always be obtained with LSTM. Using the ML technique, we then provide two methods to build the VM migration plan in the datacenter: one based on heuristics and the other on reinforcement learning (RL) and ML workload prediction. According to the experimental findings, workload prediction enhances load balancing performance in a datacenter by lowering the SLO violation rate and/or the number of migrations. Additionally, in a system with high load, the RL-based VM migration approach works better than the heuristic-based method; nevertheless, in a system with low load, it does not clearly exhibit advantages.

Keywords: Deep Reinforcement Learning, Virtual Machine, Cloud Server, Database