Bachelor Thesis Topic

Title: Evaluating the Admission of Virtual Machines and containers on a Edge Server Using a PID Controller: An Analysis Under Diverse Settings and Load Benchmarks.

Abstract: In this thesis, the student will evaluate the use of Proportional-Integral-Derivative (PID) controllers for admission control of virtual machines (VMs) and containers in diverse edge computing setups. The edge servers in question are tasked with running latency-sensitive applications, which must perform optimally. The PID controller's role will be to manage the resource allocation on these servers carefully, ensuring that they are utilized effectively without becoming oversaturated and negatively impacting application performance.

Introduction:

The study involves,

1. Understanding PID Controllers: A detailed review of PID controllers, their principles, and operations, particularly in the context of system resource management.

2. Server Setup: Configuration of a server environment where multiple VMs/containers can be hosted. This involves setting up a virtualized environment, baremetal etc, using popular tools like VMware, Hyper-V, or KVM depending upon the server configuration.

3. PID Controller Integration: Integrating a PID controller to manage VM admissions. The student will be provided with a PID controller, which they will integrate into the server.

4. Different Settings and Load Benchmarks: Testing the system under various settings and load conditions. This includes varying the number of VM requests, changing resource availability, introducing different types of workloads on the VMs, and utilizing different hypervisors.

5. Performance and competitive Analysis: Analyzing how the PID controller responds to different scenarios. Key performance indicators might include latency, resource utilization efficiency, and system stability.

Recommendations and Future Work: Based on the findings, providing recommendations for using PID controllers in VM and containers admissions, and telling the feasibility of using PID controllers in this setup with the edge computing scenario. Furthermore, suggesting potential areas for future research.