Assignment 1

Part A

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Subject

CSCI 5410 (Serverless Data Processing)

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Synopsis of Performance Comparison between Container-based and VM-based Services

The primary goal of this research paper is to study and analyze the differences in performances of deploying services using virtual machines and Docker containers. The author chose the Amazon Web Services (AWS) cloud platform, and further they focused on how to evaluate the performance of web services by using AWS EC2 Container Service and AWS Elastic Cloud Compute (EC2) for container-based deployment and VM-based deployment in the Amazon AWS taxonomy respectively.

This study contributed a methodology and experimental setup for evaluating the performance of container-based and virtual machine-based services in various cloud environments. In addition, they presented a detailed comparative study and outcomes for various types of web service configurations. Furthermore, they proved that the effectiveness of VM-based web services was significantly better than that of container-based series. Sections II and III provide a brief overview of microservices, virtual machines, Docker containers, and their desired outputs, as well as an explanation of how methodology involves test system configuration and techniques. The understandings for the experimental performance metrics obtained from the test scenarios are presented in the following section.

Following an experimental evaluation, Amazon was chosen as the cloud platform to analyse and make a comparison of container-based services versus VM-based services. Amazon Web Services (AWS) is an Infrastructure as a Service (IaaS) provider that provides a variety of functionalities and fine-grained deployment options. Performance metrics are reported, analysed, and compared for each scenario. Outcome curves are plotted as the user base sending requests changes. The test was completed in 20 seconds according to the setup. EC2 is faster at handling incoming requests because it has a shorter response time than ECS, which took 26.3 percent longer than EC2.This study compares the performance of ECS and EC2 web services to Average CPU Utilization, Average Throughput Requests, and Average Response Time.

The experimental results revealed that the presence of the EC2 VM's hypervisor layer resulted in a significant productivity overhead. The performance of container-based services has suffered significantly because of Amazon's deployment mechanism (ECS). The use of EC2 in the AWS cloud over ECS is highly recommended for deploying applications with robust standards requirements, as the experiment shows a 125 percent increase in growth. The prominent reason for the performance drop is that containers in the Amazon cloud are run on top of EC2 VMs rather than directly on bare-metal physical hosts.

References

[1] T. Salah, M. J. Zemerly, C. Y. Yeun, M. Al-Qutayri, and Y. Al-Hammadi, "Performance comparison between container-based and VM-based services," in 2017 20th Conference on Innovations in Clouds, Internet, and Networks (ICIN), 2017, pp. 185–190, doi: 10.1109/ICIN.2017.7899408