DALHOUSIE UNIVERSITY

CSCI 5410
Serverless Data Processing

Assignment 2
Part A
Performance Evaluation of Distributed Systems in Multiple Clouds using Docker Swarm: Summary

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Summary: Performance Evaluation of Distributed Systems in Multiple Clouds using Docker Swarm [1]

The author of this paper highlights the multi cloud infrastructure which contains the distributed systems across multiple clouds, and it has been experiencing a surge in popularity because of its several advantages such as vendor lock-in, reduced the data loss and downtime but it has also some difficulties regarding to the technologies and services such as configuration, complex provisioning, compatibility, and interoperability. To overcome these issues, author presents the developed Docker Swarm-based distributed system in this paper because this system can easily be replicated or deployed into another clouds which are supported by docker and also mentions its several attributes such as high availability and fault tolerance, automatic scalability, load balancing and maintainability of services, and scalability of large clusters.[1]

The author addresses the issue is about the minimizing the resource requirements and utilizing lightweight virtual machine while comparing it with the traditional virtual machine in virtualization. So, author discusses a container-based technology namely Docker container which provides an isolated environment without using the virtual hardware emulation. Docker containers consists of all the binary and library files which are necessary to run the application and Docker container share the same OS-level virtualization where all the containers can be created on single host.it address the issues such as minimizing the resources requirements and lightweight virtual machine. In addition, author also discusses the Docker, a cluster management and orchestration as it addresses the issue of designing distributed system in multiple clouds and it also facilitates the many attributes such as availability, reliability, fault tolerance, maintainability, and scalability. [1]

In this paper, author discussed conducted research on the scalability performance between Docker Swarm and other containers. So experiment was done on Docker Swarm and Google Kubernetes on the basis of large cluster size. In this experiment, a fully loaded cluster with 1000 nods running 30000 containers including five breakpoints such as 10%,50%,90%,99% and 100% is used to measure start up time and system responsiveness under the load. After performing this experiment 1000 times, it is concluded that Docker Swarm is five times faster in terms of container start up time and seven times faster in terms of system responsiveness under the load. [1]

In this paper, author analyzed that Google Kubernetes and Docker Swarm have their own attributes, and which can be used under different circumstances. Author also mentions performance evaluation that Docker Swarm is suitable for smaller deployments, Kubernetes excels in handling the complexities of large-scale workloads. Moreover, author also finalises that docker can be useful to perform an evaluation on a large Docker Swarm cluster as per its easy-to-use functionality, its inbuilt attributes and compatibility with virtual and cloud environments. [1]

Scope of Improvement

I reviewed the research paper and I believe it gives Significant contribution in the cloud filed. This paper discusses the uses of multi-cloud infrastructure, benefits, and difficulties. But I believe there are some areas where paper could be improved. It would be advantageous to give more details on the difficulties faced in multi-cloud infrastructure and gives more analysis of different distributed system frameworks. Apart from this, it would be good to include the limitation of the experiment and suggestions for future research directions.

References

[1] N. Naik, "Performance Evaluation of Distributed Systems in Multiple Clouds using Docker Swarm," 2021 IEEE International Systems Conference (SysCon), Vancouver, BC, Canada, 2021, pp. 1-6, doi: 10.1109/SysCon48628.2021.9447123. [Accessed: 3rd July 2023].