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SMART CONTAINER ALLOCATION (SCA) USING HEURISTICS AND SMART LEARNING APPROACH

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ABSTRACT

Cloud containers become a very popular technology in the current scenario. Allocating the resources in the cloud plays a major role due to its versatility and operational expenses. The Containers, is the talk of the day due to their low overhead and ease of use. Containers use a resource allocation methodology that can dynamically or statically allocate the available pool of resources for its users. Though it is very popular, there have been less container scheduling techniques. This paper suggests a method SCA that allocates the containers based on the source from where the data comes using an effective learning method. This method is found to have a better performance when compared to the existing methods.

Keywords: Cloud computing, Containers, Transfer learning

INTRODUCTION

Recent years have witnessed a massive increase in the usage of cloud. It provides valuable services to the organizations and as well to the individuals [1]. The rising popularity of micro-services [2], the advantages of autonomous vehicles [3], the real time applications of smart infrastructures [4] have added to the growth of cloud.

The containers are gaining popularity in the recent time [5] due to their virtualization approach and these are also replacing the traditional virtual machines (VMs) [6]. These containers use a sandbox to encapsulate the dependencies. These improve portability and the productivity [7]. There are several container technologies like Docker, LXC, and Kubernetes [8].The containers are software packages of software that have all of the needed components to run in any given environment. Thus, containers virtualize the operating system and can run anywhere. This includes the place from a private data centre to a public cloud.

Containers provide a standard way to package your application's code, configurations, and dependencies into a single object. Containers share an operating system installed on the server and run as resource-isolated processes, ensuring quick, reliable, and consistent deployments, regardless of environment.

The containerization allows the development teams to go ahead fast, deploy the software in an efficient manner, and operate at an unprecedented scale. The benefits of containers can be listed as follows:

a) Separation of responsibility
b) Workload portability

c) Application isolation

RELATED WORK

Many challenges are faced by the cloud containers due to their enormous usage. One such research challenge has been in the scheduling during the run time. The Container scheduling can use any approach depending on the underlying technology. The figure 1 gives the generalized block diagram of container scheduling. Researchers have set forth many state-of-the art scheduling algorithms to achieve various performances.

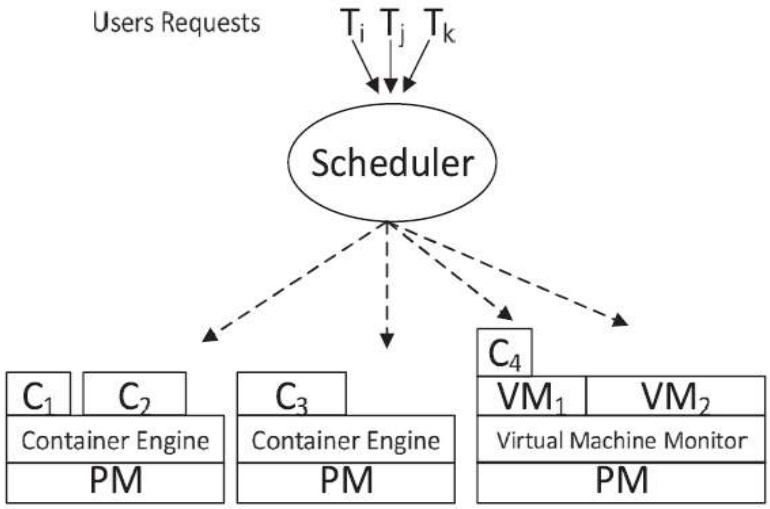

Figure 1 Generalized block diagram of container scheduling

The container scheduling problem is an NP-hard problem, and hence there is no polynomial complexity algorithm to find optimal schedule when the size of the problem is large. Machine learning has a lot of success in a wide range of applications. This includes a wider discipline [9]. As a big data set is available, the Machine learning algorithms are successful.

PROPOSED SYSTEM

The cloud server offers its services to the customers or the users based on the pay-as-you-use policy. The tasks that are received by the cloud are executed by them using the resources available to them. The containers are used by the cloud services to allocate the resources to the jobs at hand. The proposed system SCA makes use of a smart container allocation based on the source of the request.

There are a number of named networks and a few of them are taken and used as a case study for the proposed SCA system.

(i) Internet of Things (IoT)
(ii) VANET
(iii) MANET

Each of the networks generates a different type of datasets. The acquired data from these networks will be different. The structure of the data and the handling of the data will be different for each of the network. Hence, the proposed SCA model uses the concept of Transfer learning to process the request.

Transfer learning

The proposed SCA system is being developed using the technique of Transfer learning (TL). This, is a research problem in machine learning (ML) that focuses on storing knowledge gained while solving one problem and applying it to a different but related problem.In transfer learning, a machine exploits the knowledge gained from a previous task to improve generalization about another. For example, in training a classifier to predict whether an image contains food, you could use the knowledge it gained during training to recognize drinks.

When a task or job comes in requesting for a container, the SCA checks if there is a previous history for such a request. If so, it is used and the request is granted. If there are no previous history for responding to such a kind of request the system automatically makes a decision based on the previously acquired knowledge. Hence, the system automatically makes a decision without a manual intervention. This reduces the cost and conserves time.

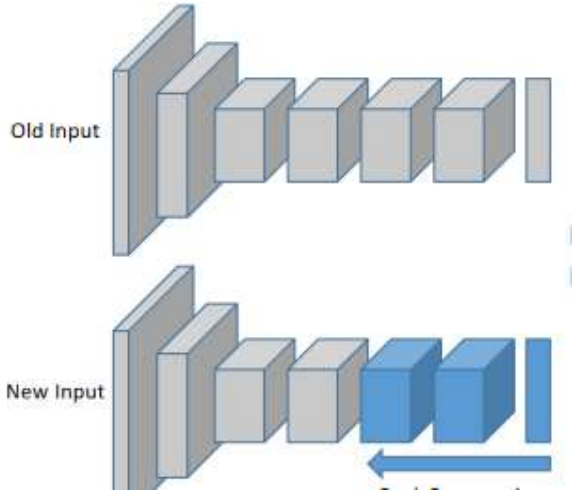

Figure 2 Allocation of tasks based on transfer learning

Figure 2 depicts the allocation of tasks based on transfer learning. The old input refers to the tasks that requested the containers. And the containers were allocated, and when a new kind of input or task comes in, the decision is done based on the previous allocation. Thus, the system makes a decision automatically. This decision is learnt by the system and is added to the learnt list maintained. Thus, the SCA method follows a dynamic approach and makes a decision automatically if a need arises.

RESULT ANALYIS

The proposed SCA method is compared with the other existing method. The performance of the methods is used as the parameter for the comparison. Figure 3gives the graph comparing the proposed SCA with existing methods. The proposed SCA method uses the smart learning approach of transfer learning whereby it increases its knowledge in a continuous manner.

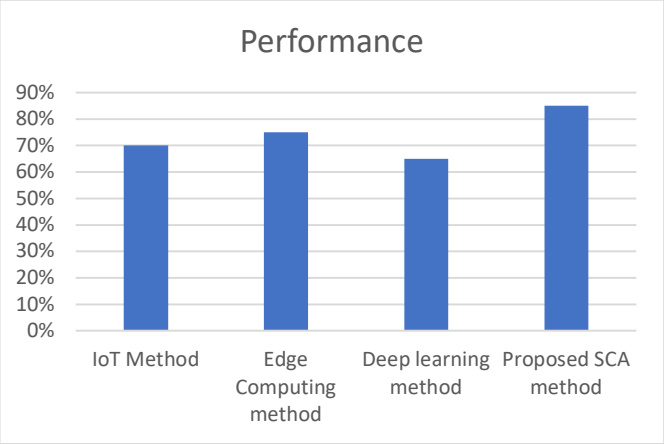

Figure 3 Graph comparing the proposed SCA with existing methods

CONCLUSION

The paper proposed a method to allocate the containers to the job requests. A transfer learning technique was used. Due to this there is continuous learning process and the system makes a decision automatically. The time is reduced as the system need not wait for a human interaction to make the decision.

REFERENCES

[1]Varghese, B., Buyya, R., 2018. "Next generation cloud computing: New trends andresearch directions". Future Generation Computing System 79, 849–861.

[2] Jamshidi, P., Pahl, C., Mendonça, N.C., Lewis, J., Tilkov, S., 2018. Microservices: Thejourney so far and challenges ahead. IEEE Softcomputing. 35 (3), 24–35.

[3] Wang, Y., Bao, Q., 2019. Adapting a container infrastructure for autonomous vehicle development.Journal of Grid Computing. 16(1), 113–135.

[4] Jaiswal, K., Sobhanayak, S., Turuk, A.K., Bibhudatta, S.L., Mohanta, B.K., Jena, D.,2018. An iot-cloud based smart healthcare monitoring system using container based virtual environment in edge device. In: 2018 International Conference on Emerging Trends and Innovations In Engineering And Technological Research (ICETIETR). IEEE, pp. 1–7.

[5] Pahl, C., Brogi, A., Soldani, J., Jamshidi, P., 2017. Cloud container technologies: a state-of-the-art review. IEEE Trans. Cloud Comput. 7 (3), 677–692.

[6] Chen, F., Zhou, X., Shi, C., 2019. The container scheduling method based on the minminin edge computing. In: Proceedings of the 2019 4th International Conference on Big Data and Computing, pp. 83–90

[7] Watada, J., Roy, A., Kadikar, R., Pham, H., Xu, B., 2019. Emerging trends, techniques and open issues of containerization: A review. IEEE Access 7, 152443–152472.

[8] Bernstein, D., 2014. Containers and cloud: From lxc to docker to kubernetes. IEEE Cloud Computing. 1 (3), 81–84.

[9] Pouyanfar, S., Sadiq, S., Yan, Y., Tian, H., Tao, Y., Reyes, M.P., Shyu, M.-L., Chen, S.-C., Iyengar, S., 2018. A survey on deep learning: Algorithms, techniques, and applications. ACM Comput. Surv. (CSUR) 51 (5), 1–36.