East African Scholars Journal of Engineering and Computer Sciences
Abbreviated Key Title: East African Scholars J Eng Comput Sci
ISSN: 2617-4480 (Print) & ISSN: 2663-0346 (Online)
Published By East African Scholars Publisher, Kenya
Volume-4 | Issue-10 | Dec-2021 | DOI: 10.36349/easjecs.2021.v04i10.003

OPEN ACCESS

Review Article

Resource Management in Distributed Computing

Sushil Kumar Garg[1*], Amanpreet Kaur[2], Yadwinder Singh[2], Yogesh Kumar[2]

[1]Professor of BGIET, CSE Department, Sangrur, Punjab, India
[2]Assistant Professor of BGIET, CSE Department, Sangrur, Punjab, India

Article History
Received: 21.11.2021
Accepted: 25.12.2021
Published: 30.12.2021

Journal homepage:
https://www.easpublisher.com

Quick Response Code

Abstract: Distributed computing is a computing in which different components and objects comprising an application can be located on different computers connected to a network. For example, a word processing application might consist of an editor component on one computer, a spell-checker object on a second computer, and a thesaurus on a third computer. In some distributed computing systems, each of the three computers could even be running a different operating system. Cloud computing has become a new age technology that has got huge potentials in enterprises and markets. Clouds can make it possible to access applications and associated data from anywhere. Companies are able to rent resources from cloud for storage and other computational purposes so that their infrastructure cost can be reduced significantly. Further they can make use of company 'swide access to applications, based on pay-as-you-go model. Hence there is no need for getting licenses for individual products. However one of the major pitfalls in cloud computing is related to optimizing the resources being allocated. Because of the uniqueness of the model, resource allocation is performed with the objective of minimizing the costs associated with it. The other challenges of resource allocation are meeting customer demands and application requirements. Here, various resource allocation strategies and their challenges are discussed in detail. It is believed that this thesis would benefit both cloud users and researchers in overcoming the challenges faced.

Keywords: Distributed computing, Resource Management.

INTRODUCTION

Distributed computing is a computing that allows different computers that are located far from each other; participate in solving a computational problem or to process or access information.

The term distributed computing refers to distributed client-server computing environments in which processes are located at appropriate locations for business or administrative purposes and are accessed by different users at their personal computer that provide an interface to the resource in question. Thus financial or accounting information, or database records may be stored and processed at single location, but the information may be accessed and amended by users working at remote computers.

Distributed systems offer many benefits over centralized systems, including the following:

- **Scalability -** The system can easily be expanded by adding more machines as needed.
- **Redundancy -** Several machines can provide the same services, so if one is unavailable, work does not stop. Additionally, because many smaller machines can be used, this redundancy does not need to be prohibitively expensive.

Cloud Computing

Cloud computing often referred to as simply "the cloud," is the delivery of on-demand computing resources—everything from applications to data centers—over the Internet on a pay-for-use basis.

Cloud Computing Services

- **SaaS (Software as a service)-** Cloud-based applications—or software as a service (SaaS)—run on distant computers "in the cloud" that are owned and operated by others and that connect to users' computers via the Internet and, usually, a web browser.
- **PaaS (Platform as a service)-** Platform as a service provides a cloud-based environment with everything required to support the complete

***Corresponding Author:** Sushil Kumar Garg

lifecycle of building and delivering web-based (cloud) applications—without the cost and complexity of buying and managing the underlying hardware, software, provisioning and hosting.

- **IaaS (Infrastructure as a service)-** Infrastructure as a service provides companies with computing resources including servers, networking, storage, and data center space on a pay-per-use basis.

Resource Management

The term resource management refers to the operations used to control how capabilities provided by Cloud resources and services are made available to other entities, whether users, applications, services.

On Cloud provider's view

- Provision resources on both HPC batch-job request and advanced reservation request on the same system.
- Energy efficient resource management in Data Centers.

On Cloud service provider's view

- Renting cheapest resources on performance constraints.
- QoS to their cloud users.

On Cloud user's view

- Renting cheapest resources on performance constraints.
- Cloud provider guarantees Service Level Agreement.

Resource allocation Strategies (RAS)

RAS is all about integrating cloud provider activities for utilizing and allocating scarce resources within the limit of cloud environment so as to meet the needs of the cloud application. It requires the type and amount of resources needed by each application in order to complete a user job. The order and time of allocation of resources are also an input for an optimal RAS.

An optimal RAS should avoid the following criteria as follows:

1. **Resource Contention:** Resource contention arises when two applications try to access the same resource at the same time.
2. **Resource Fragmentation:** Resource Fragmentation arises when the resources are isolated. There would be enough resources but cannot allocate it to the needed application due to fragmentation.
3. **Scarcity:** Scarcity of resources arises when there are limited resources and the demand for resources is high. The multiple applications needed different types of resources such as Central Processing Unit (CPU), I/O devices, memory and the techniques should satisfy that request.
4. **Over Provisioning:** Over provisioning of resources arises when the application gets surplus resources than the demanded ones. To satisfy these criteria's input is required from both the users and providers.

LITERATURE REVIEW

Gunho Lee (May 10, 2012) in "Resource Allocation and Scheduling in heterogeneous Cloud Environments" states that there has been a drastic increase in the popularity of cloud computing systems that provides computing resources on the demand of user and charge on a pay-as-you-go basis. These cloud computing environments provide an appearance of infinite computing resources to cloud users so that they can increase or decrease their resource consumption rate according to the demands. At the same time, the cloud environment presents a number of challenges. Two players in cloud computing environments, cloud providers and cloud users with different goals; providers want to maximize income by achieving high resource utilization, while users want to minimize expenses/cost while meeting their performance requirements. However, it is difficult to allocate resources in a mutually optimal way due to the lack of information sharing between them. Moreover, ever-increasing heterogeneity and variability of the environment produce even harder challenges for both parties.

In this he addressed the "cloud resource management problem", which is to allocate and schedule computing resources in a way that providers achieve high resource utilization and users meet their applications' performance requirements with minimum expenditure. The problem was approached from various aspects, using Map Reduce as a target application. From provider's perspective and evaluated a topology aware resource placement solution to overcome the lack of information sharing between providers and users. From user's point of view, a resource allocation scheme is used to maintain a pool of leased resources in a cost-effective way and a progress share-based job scheduling algorithm that achieves high performance and fairness simultaneously in a heterogeneous cloud environment. To deal with variability in resource capacity and application performance in the Cloud, he developed a method to predict the job completion time distribution that is applicable to making sophisticated trade-off decisions in resource allocation and scheduling. The solutions are based on the current abstraction of interaction between providers and users that limits both parties' ability to exploit the fullpotential of the Cloud. He visualizes that reconstruction of the abstraction will open up the possibility to solve the problem in a fundamental way.

Pinal Salot'sin "Survey of Various Scheduling Algorithm in Cloud Computing Environment" states that Cloud computing is known as a provider of

locomotive services using very large scalable and virtualized resources over the Internet. Due to innovation of cloud computing field, there are many standard task scheduling algorithm used in cloud environment. Mainly in cloud, there is a high communication cost that prevents well known task schedulers to be applied in large scale distributed environment. In now days, investigators attempt to build job scheduling algorithms that are appropriate and applicable in cloud computing environment Job scheduling is most important task in cloud computing environment because user have to pay for resources used based upon time. Hence effective usage of resources must be important and for that scheduling plays a vital role to get maximum benefit from the resources. In this paper there are various scheduling algorithms and issues related to them in cloud computing. The author concludes that Scheduling is one of the most important tasks in cloud computing environment. Here various scheduling algorithm and tabulated various parameter are analyzed. It is noticed that disk space management is critical issue in virtual environment. Existing scheduling algorithm gives excessive throughput and cost effective but they do not consider reliability and availability. So here is a need of algorithm that improves availability and reliability in cloud computing environment.

CONCLUSION

This paper presents a systematic review and analytical comparisons of existing surveys, resource allocation strategies and resource scheduling in cloud computing. Further, discussion on open research issues, current status and future research directions in the field of cloud resource management.

REFERENCES

- Ghonge, M. M., Mane, S., & Pradhan, D. (2022). Demystifying the Role of Blockchain Technology in Healthcare and Transaction. In *Blockchain Technologies and Applications for Digital Governance*, (pp. 60-84). IGI Global.
- GunhoLee in a survey of "Resource Allocation and Scheduling in heterogeneous Cloud Environments" under Electrical Engineering and Computer Sciences University of California at Berkeley, May 10 2012.
- Haji, L. M., Zeebaree, S. R., Ahmed, O. M., Sallow, A. B., Jacksi, K., & Zeabri, R. R. (2020). Dynamic Resource allocation for Distributed Systems and Cloud Computing. *TEST Engineering & Management*, 83(May/June 2020), 22417–22426.
- Huang, Y. F., & Chao, B. W. (2001). A priority-based resource allocation strategy in distributed computing networks. *J System Software*, 58(3), 221–233.
- Pradhan, D., & Priyanka, K. C. (2021). Green-Cloud Computing (G-CC) data center and its architecture toward efficient usage of energy. In *Future Trends in 5G and 6G* (pp. 163-182). CRC Press.
- Ra'afat Abu-Rukba's "Decentralized Resource Scheduling in Grid/Cloud Computing Auctions" in the The School of Graduate and Postdoctoral Studies The University of Western Ontario London, Ontario, Canada, 2013.
- Salot, P. (2013). A survey of various scheduling algorithm in cloud computing environment. *International Journal of Research in Engineering and Technology*, *2*(2), 131-135.
- Toporkov, V., Yemelyanov, D. (2018). Optimization of resources selection for jobs scheduling in heterogeneous distributed computing environments. In: Shi, Y., Fu, H., Tian, Y., Krzhizhanovskaya, V.V., Lees, M.H., Dongarra, J., Sloot, P.M.A. (eds.) ICCS 2018. LNCS, vol. 10861, pp. 574–583. Springer, Cham.

Cite This Article: Sushil Kumar Garg *et al* (2021). Resource Management in Distributed Computing. *East African Scholars J Eng Comput Sci*, *4*(10), 143-145.