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A Survey on Resource Allocation Techniques in Cloud Computing

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Abstract:
Cloud is an important and emerging technology utilized by various fields for storing, processing and retrieving of data anywhere and anytime without any interruption. Cloud is now acting as a platform for many companies for storing and other computational purposes to reduce infrastructure and maintenance cost similarly they can utilize their application widely based on pay per use. To make available of data to all cloud users Resource Allocation (RA) is mandatory process. In cloud hardware, software and platform are the resources utilized to satisfy user needs hence sharing these resources according to users need is a difficult task. Cloud service provider and cloud service consumer plays the major role in RA. The parameters under resource allocation, its issues and challenges are needed to be analyzed deeply before implementing any optimizing approach in RA. Hence in this work various resource allocation methods have been studied and issues in it is analyzed and presented as a survey. This work is useful for both cloud users and researchers in overcoming the challenges faced in RA.

Keywords: Resource allocation techniques, cloud computing, issues and solution.

I. INTRODUCTION

The next phase of computation is cloud computing. The cloud may eventually provide everyone with everything they require. The rise of on-demand information technology services and products has led naturally to cloud computing. A new computing technology called cloud computing is quickly solidifying as the next major step in the creation and implementation of an expanding number of distributed applications. By providing a range of resources, cloud computing has grown fairly popular in recent years among a community of cloud users. Developers can distribute programmes among machines hosted by a central organisation using cloud computing platforms from companies like Microsoft, Amazon, Google, IBM, and Hewlett-Packard. These programmes have access to a huge network of computer resources that a cloud computing provider has established and is in charge of. Developers may benefit from a managed computing platform without spending money on designing, constructing, and maintaining the network [1].

1.1 Types of cloud computing

Cloud services may be set up in one of three different ways: on a public cloud, a private cloud, or a hybrid cloud. Each has benefits and drawbacks, and your decision will be influenced by your data as well as the amount of protection and administration you require:

Public Cloud: Companies that offer computing resources like servers and storage over the Internet include Google Cloud Platform (GCP), Amazon Web Services (AWS), and Microsoft Azure, to name a few.

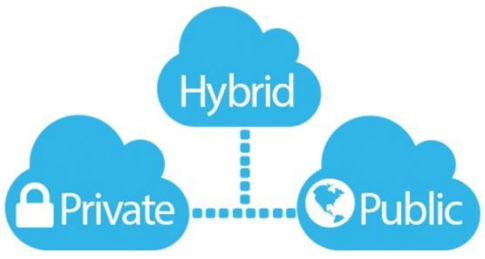

Figure 1: Types of cloud computing

Each piece of infrastructure (hardware, software, etc.) used by the cloud provider is owned and managed by it. Using a web browser, one may access these services and control their own account.

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Private Cloud: With private clouds, a single entity controls, owns, and manages all computer resources. In a private cloud, the infrastructure and services are maintained on a secure network.

Public and private clouds are combined to create a hybrid cloud. Your company has additional flexibility and deployment options thanks to a hybrid cloud, which also helps to improve your current infrastructure's security and compliance.

1.2 Resource allocation:

The procedures used by the resource allocation strategies allow resources to be used productively in order to meet customer needs. When developing resource allocation techniques, there are some crucial factors that should be taken into account from the perspectives of both cloud service providers (cost, resource utilisation, energy, workload, SLA, QoS) and cloud service consumers (execution time, response time, user satisfaction, SLA, QoS) [2].

- Resource optimization (efficient use of resources),
- satisfying customer requests (allocating resources based on user request),
- scheduling tasks (task optimization), and
- power management are some categories for resource allocation strategies (better resource allocation with less power consumption)

The four categories described above are the key factors in resource allocation. The next portion of this article discusses solutions to the problems with resource allocation based on these criteria.

II. ISSUES AND CHALLENGES

In this section the issues and challenges faced during resource allocation in cloud computing from the past five years and solution for it has been analyzed and presented it as a survey for future research.

Year 2016:

When users need a service from the cloud, they send requests. When a request is received in the cloud, a user is given the appropriate resource and service. The virtualization idea is typically utilised to lighten the burden on cloud servers. The load balancing technique-based allocation strategy must be effective enough to ensure maximum resource usage and throughput [3]. Then, while distributing resources to them, the user-inserted parameters will be taken into account. Since the demand for each of these resources might vary from user to user, they are distributed in a flexible manner. The data centre broker maintains resource matrices that contain details about VMs with various parameters [4]. Cloud brokers maintain data on different service providers and the services they provide, and they deliver the best services based on their understanding of cloud architecture and applications. An technique based on cloud brokers for cloud analysts that chooses service providers based on quality of services while taking into account minimal response time and cost [5].

Year 2017:

Devices and applications running on IoT cloud platforms may securely connect and communicate with other devices as well as cloud applications. IoT broker services provide safe connections to the devices and applications in a typical IoT cloud. The broker service SLA provided takes simply into account the number of messages sent over a period of time and is not reliant on application traffic patterns [6]. The technology of virtual machines has been used for resource provisioning. As a result, VM are assigned to the user according on the requirements of the position. The execution of the high priority tasks shouldn't be delayed by the low priority tasks. In this situation, low and high priority jobs compete for resources to access the resources [7]. A cost-based resource allocation strategy that gives priority to tasks depending on the price the user has paid the service provider for the resource being utilized. This strategy will reduce execution time and overall completion time, as well as boost provider profit and user happiness. In this method, the virtual machine is moved from one real host (physical machine) to another in order to prevent the host from becoming overloaded or under loaded [8].

Year 2018:

This approach reconstructs the sequence of resource requests according to users' priorities and levels of emergency in order to distribute resources sooner for urgent needs. Additionally, a mathematical model of resource allocation with multiple objectives is developed with the objectives of minimizing the performance gap between virtual machines and physical machines (PMs), as well as the quantity of PMs that must be substituted by virtual machines [9]. Fog computing is the most practical way to address the issues with the deployment of distributed neural networks on cloud and edge devices. When requests come in, this fog layer determines whether it can handle them on its own or with assistance from other fog nodes. Because of the decreased traffic between the cloud and the user, queue waits are eliminated [10]. The decision-making process used to decide where to assign resources in a fog-cloud system in order to carry out an application's responsibilities is crucial. Resource allocation in infrastructure made up of cooperative fogs and clouds using Gaussian Process Regression for Fog-Cloud Allocation (GPRFCA). In order to prevent blocking of requests,

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particularly delay-sensitive ones, it uses a Gaussian Process Regression to forecast upcoming needs [11].

Year 2019:

On-demand plans are more expensive but are accessible for short or long periods of time, whereas reserved plans offer cheaper resources for long-term commitments. The two-phase approach meets quality of service requirements while presenting each phase as an optimization issue to reduce the overall deployment cost [12]. There is a chance that cloud resources won't be used effectively and might experience both excess and underuse. It was suggested to use an autonomous resource allocation method that would automatically supply (and de-provision) the necessary computer resources in accordance with the load [13]. Prior until now, task requirements were used to determine how to assign resources from the multi-cloud environment. Before assigning to the desired activities, it is crucial to examine the current resource availability status and resource capabilities. Allocating resources while taking into account their status, location, bandwidth, and job needs is done using the bat optimization method and the particle swarm optimization algorithm [14].

Year 2020:

Since resources are paid for as they are utilized, it might be difficult for cloud providers to guarantee a higher standard of service. When heterogeneous resources are managed dynamically, a major issue known as QOS occurs. Multi-Objective Symbiotic Organism Search Algorithm (MOSOS), a novel technique, enabling job assignment to virtual machines while limiting the make span and cost [15]. However, while distributing resources to the cloud infrastructures, Cloud Service Providers (CSPs) should take the majority of the quality factors into account to provide better customer service. Through a few features and indicators, the trust of a CSP is statistically measured [16]. Setting up the execution environment, communication overhead, and queuing up result in a large amount of latency, which dramatically lowers the QoS and usability of such systems. To define and study the Cloudlet's hybrid migration-based and partition-based offloading behaviors, a queue-based offloading framework is created [17].

Year 2021:

Resource allocation in the cloud that is based on bargaining or negotiation results in efficient resource consumption and rapid completion of multiple jobs. These discussions are held between CSU and CSP for a certain set of services and over a defined amount of time. It is evident from this that low priority assignments could not be handled by negotiation [18]. A trial-and-catch resource allocation system based on genetic algorithms is suggested. Virtual machines are used to anticipate workload, and resource allocation is carried out as a result [19]. Although automating cloud resource management processes has always been a desirable objective, it has also proven to be difficult. Self-configurable resource allocation only delivers a tolerable degree of availability and dependability, not a high level of performance [20].

2.1 TABLE OF VARIOUS PAPER ANALYSIS

Title	Used methodology	Utilized resource	Implementation	Performance
Design and Analysis of Resource Allocation Techniques in Cloud Partitions	Virtualization concept based load balancing.	The term "virtualization" describes the division of a physical system's resources (system storage, network, and memory) into numerous virtual resources.	(i) User request from various forms are collected and distributed to multiple resources. (ii) in case of any resource failure this load balancer will reroute the request to available resource. (iii) load balancer act as single server with high computation capacity.	These algorithms result in greater efficiency, maximum resource utilization and Minimum response time.
Optimum Resource Allocation Approach in Cloud	An optimal resource allocation approach (ORAA)	Different types of resources (virtual machine) are allocated by taking three parameters into consideration: processing element, main	(i)During cloudlet submission user are requested to submit the needed resource. (ii) The utilization of VMs depends upon the type of cloudlets received and the jobs of a	This algorithm takes O (m*n) time and O (n2) space complexity to process all the cloudlets on virtual cloud

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		memory, and network band width.	user can vary in size. (iii) The space-shared policy enables a virtual machine to support only one task at a time.	thereby making it an Uncomplicated approach.
Optimal Resource Allocation Approach in Cloud Computing Environment	Priority based round robin policy	(Infrastructure as a Service) IaaS service providers on basis of on demand and pay as per usage.	(i) Processing speed, less VM cost, data transfer and storage cost of different data centers are calculated. (ii) Based on these parameter data center will be ranked. (iii) With respect to user request cloud broker will allocate resource with less energy consumption and high performance.	Availability of data to user request from different region achieves user satisfaction.
Resource Allocation for IoT Applications in Cloud Environments	The broker service SLA provided only takes into account the volume of messages sent over a given period of time and is not dependent on application traffic patterns.	A resource allocation mechanism (that uses buffering, scheduling and rate limiting) to meet the SLA	(i) During SLA a set of instruction are followed to allocate the resource. (ii) in case if arrival of user request is high then enforcement time is extended in this method.	Even in case of excess traffic our solution achieves conformance within a fixed additional enforcement time period
Cloud Computing Through Dynamic Resource Allocation Scheme	The priority-based preemption policy	Priority based VM allocation. Job deadline is major factor focused in allocation VM.	(i)based on the deadline of the job and priority the VM is allocated. (ii)if VM is free and job enters for processing it will automatically allocated. (iii) if low priority job(LPJ) is running (deadline is high) and new job enters with high priority(HPJ) (deadline is low) then LPJ will be preempted to run HPJ.	Comparing this method to the creation of new VMs, the overhead for completing all the jobs is lower.
Cost based resource allocation strategy For the cloud computing environment	cost based resource allocation strategy	Allocation of VM based on cost	(i)the resource allocation is carried out based on time and size of the resource utilized by user. (ii)the most important parameter considered here is cost. The amount paid by user for resource is considered and based on that task is migrated to complete.	Cloud is working in the concept of pay-per use depending on user cost resource were allocated and task were scheduled.

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A Cloud Resource Allocation Method Supporting Sudden and Urgent Demands	A multiple-objective optimization algorithm	Allocate various resources timely and optimally for urgent resource demands	(i)based on user requested resources, or based on cost, job priority task will be allocated or handles. (ii)in case of emergency demand arrives in a queue then priority should be modified and resources are allocated according to that.	The results demonstrate that our method has a certain advantage in reducing resource usage and fragments and improving CPU utilization.
Machine Learning Approaches for Resource Allocation in the Cloud: Critical Reflections	Distributed neural network (DNN)	RAS attempts to automate this labor-intensive process automatic, i.e., integrating cloud activities to utilize and allocate resources.	(i) When requests come in, this fog layer determines whether it can handle them on its own or with assistance from other fog nodes. (ii) to reduce traffic and to avoid queue delays DNN will analyze the user request. (iii) The fog layer can, however, send the request back to the cloud for normal processing if it is too large.	Process user request quickly and avoids traffic.
Resource Allocation Mechanism for a Fog-Cloud Infrastructure	Gaussian Process Regression for Fog-Cloud Allocation (GPRFCA)	CPU and RAM memory are considered allocable resources by the mechanism.	(i) based on past arrivals, forecast the arrival of upcoming requests. To lessen blockage and increase overall utilization, such prediction aids in the supply of resources to upcoming requests, particularly real-time ones that can only be handled in the fog.	Predict the arrival of user incoming request.
Dynamic Cloud Resource Allocation Considering Demand Uncertainty	A stochastic optimization approach	A hybrid method to allocate cloud resources according to the dynamic user demands	(i) a two-phase algorithm that consists of reservation and dynamic provision phases. (ii) a stochastic optimization approach by modeling user demands as random variables.	Instead of static and dynamic resource allocation based on user demand resource is allocated and achieves better result.
Autonomic Resource Allocation Mechanism for Service-based Cloud Applications	an autonomous resource allocation mechanism	The virtual resource utilization and response time	(i)To avoid over and under provisioning this paper proposed autonomous resource allocation mechanism. (ii)it allocate and de allocate the resources as per load. (iii) Response time and resource utilization has improved.	Compared to existing methods virtual resource utilization and response time was improved.
A Hybrid Optimized	bat optimization algorithm and	Consider the task requirements, bandwidth,	(i) Before allocating to the requested tasks, it is crucial to	The performance of the proposed

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Resource Allocation Modelfor Multi-Cloud Environment Using Batand Particle Swarm Optimization Algorithms	particle swarm optimization algorithm	distance, and resource status when allocating the resource.	analyze the current resource availability status and resource capability. (ii) multi cloud based resource allocation reduces deadline missed tasks.	model was evaluated in terms of resource requirements, energy consumption, SLA violations, and allocation time and this proposed system achieves better result.
Dynamic resource allocation method based on Symbiotic Organism Search algorithm in cloud computing	Multi-Objectives Symbiotic Organism Search algorithm (MOSOS)	The VMs consist of two types of resource RAM and CPU	(i) To determine the availability of the cloud system; it is required to be aware of the resource's availability during each round of resource allocation. (ii) For each round, the task set is formed according to the arrival time of tasks and resource availability. (iii) Thus, SOS simulates the symbiotic interactions within a paired organism relationships that are used to search for the fittest organism	Results show that MOSOS gives a better result and more stability compared to FCFS, PSO, MOGA, and PBACO algorithms.
A Resource Allocation Model Based on Trust Evaluation in Multi-Cloud Environments	Joint optimization model combines the previous credentials of the CSPs and the present resource constraints	optimizing cost and resource utilization or maximizing any quality parameters.	(i)Few metric parameters are considered to evaluate trust of resource allocation. (ii) availability is calculated based on rate of total request and accepted request respectively. (iii)Reliability is calculated based on rate of hardware and software failures. (iv) efficiency is calculated based on average execution and waiting time.	The proposed evaluation model will attract more users as it estimates the trust of the cloud more accurately. This type of evaluation model will be of high importance to both service providers and customers.
Novel Sustainable and Heterogeneous Offloading Management Techniques in Proactive Cloudlets	SARIMA-based load prediction model is designed	offloading energy and execution efficiency	(i) A queue-based Off-loading framework is developed to formulate and analyze the mixed migration-based and partition-based offloading behaviors in the Cloudlet. (ii) It can coordinate with Cloud resources and perform partition-based	Cloudlet-based mixed offloading process is implemented. Achieves better performance in energy efficiency and execution.

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			offloading and migration-based offloading dynamically and simultaneously, according to the task load and QoS.	
Negotiation based resource allocation in cloud computing scenarios	Negotiation based resource allocation	Resource negotiation between CSP and CSU.	(i)bargaining or negotiation in cloud resource for completing user request will achieve efficient use of resource utilization. (ii)an optimal analysis should be needed to identify entering task completion process for bargaining resources in CSP.	Large amount of user request are processed without delay. Efficient user of resource.
Resource Allocation based on Genetic Algorithm for Cloud Computing	Genetic algorithm	Load balancing and reduces cloud processing time	(i)an prediction is done using virtual machine and workload analysis is done. (ii) based on the analysis optimal solution for resource allocation is implemented.	Trial and catch process reduces unwanted delay. Achieves efficient resource utilization and reduces cloud processing time.
A Self-Configurable Model for Cloud Resource Allocation	A self configurable resource allocation	Resource allocation based on request in self configurable manner.	(i)errors and failures in cloud will leads to lose of trust among cloud users. (ii) self resource allocation method has been implemented which needs more efficiency to achieve better results.	Does not achieve better results it achieves only acceptable level of availability and reliability.

III. DISCUSSION:

Resource allocation in cloud computing is an important and mandatory process now days for efficient computation and processing. As we discussed in above session around 6 years of resource allocation papers were taken and analyzed the issues in those papers and the way how their proposed method achieves better solution for the identified issues. The major focus is resource allocation and various methods were implemented to achieve better results. From this study the analyzed view of resource allocation is,

Resources of cloud should be utilized maximum but the processing or response time should minimum. The resources are allocated based on incoming user request, priority of job arrived, user demand based resource allocation. These are major area focused in resource allocation and method implemented for this process is as follows.

(a) For incoming request particular time period is calculated and allocated for particular resource in addition to this enforcement time should calculated and added to that particular task to avoid traffic and issues in response time (delay).
(b) Various tasks will be received with different deadline (Low priority job and high priority job). While processing LPJ and if a HPJ is entering then running process is preempted to run HPJ.
(c) Similarly a queue is fully arranged and running in a process and in case of emergency a job is arrived then current running queue should modified based on emergency.
(d) General way of resource allocation is based on user request or demand, resource should allocate. Here, before allocating the resource the availability and capability of resource should be calculated and based on that resources must allocated to avoid unnecessary delay in response.

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(e) Another resource is cost, as per user paid cost the resource should be processed quickly without any priority, deadline or emergency.

(f) If allocated resource is utilized efficiently then it achieves better performance in case it is not utilized efficiently then it must be de allocated as per load.

(g) Bargaining is another method implemented in cloud resource allocation, if incoming request in HPJ and it does not have sufficient resource then negotiation is deployed in case of any resource are idle that will allocate for new requested one.

(h) Fog layer based cloud resource allocation also implemented here user requested are collected and resources are allocated according to that. In addition based on user interest and request, prediction of user request also deployed.

(i) Like a trial and catch method workload is analyzed based on virtual machine (VM), and then resources are allocated according to incoming request.

(j) Availability, reliability and efficiency are calculated based on certain parameters and completed tasks. Based on these a trust will be created and utilized for resource allocation for completion of new request.

(k) However n number of methods is implemented for resource allocation a paper suggest self allocation of resource but it does not achieve better performance. Instead it achieves only accepted level of availability and reliability.

IV. CONCLUSION:

This survey has covered around last 6 years papers of resource allocation methods, issues and solution. It is clear that resource allocation process is available before from past decade itself but still the modification and performance improvement is needed that's the reason for research work process in cloud resource allocation. Task based, priority based, user request based n number of research works were implemented. Self resource allocation also deployed that does not achieve better solution. The analysis shows that resource allocation needs an efficient method to achieve better performance in the parameters of performance, user satisfaction, and resource utilization. Current technology utilizes Artificial Intelligence (AI) in many fields and achieves better solution similarly AI implementation in resource allocation achieves better performance in terms of above parameter.

REFERENCES

[1]. Ronak Patel, Sanjay Patel, "Survey on Resource Allocation Strategies in Cloud Computing" International Journal of Engineering Research & Technology (IJERT) Vol. 2 Issue 2, February- 2013 ISSN: 2278-018.

[2]. Muhammad Faraz Manzoor, Adnan Abid, Muhammad Shoaib Farooq, Naeem A. Nawaz, Uzma Farooq, "Resource Allocation Techniques in Cloud Computing: A Review and Future Directions" ELEKTRONIKA IR ELEKTROTECHNIKA, ISSN 1392-1215, VOL. 26, NO. 6, 2020 http://dx.doi.org/10.5755/j01.eie.26.6.25865.

[3]. S. T. Ukande and R. C. Dharmik, "Design and analysis of resource allocation techniques in cloud partitions," 2016 World Conference on Futuristic Trends in Research and Innovation for Social Welfare (Startup Conclave), 2016, pp. 1-5, doi: 10.1109/STARTUP.2016.7583979.

[4]. S. Singh and B. Singh, "Optimum resource allocation approach in cloud," 2016 International Conference on Advanced Communication Control and Computing Technologies (ICACCCT), 2016, pp. 600-605, doi: 10.1109/ICACCCT.2016.7831711.

[5]. Pawan Kumar; Rakesh Kumar, "Optimal resource allocation approach in cloud computing environment" International Conference on Next Generation Computing Technologies (NGCT) 16 March 2017 DOI: 10.1109/NGCT.2016.7877400.

[6]. A. Singh and Y. Viniotis, "Resource allocation for IoT applications in cloud environments," 2017 International Conference on Computing, Networking and Communications (ICNC), 2017, pp. 719-723, doi: 10.1109/ICCNC.2017.7876218.

[7]. P. Gupta, M. Samvatsar and U. Singh, "Cloud computing through dynamic resource allocation scheme," 2017 International conference of Electronics, Communication and Aerospace Technology (ICECA), 2017, pp. 544-548, doi: 10.1109/ICECA.2017.8212723.

[8]. M. Pandey and S. K. Verma, "Cost based resource allocation strategy for the cloud computing environment," 2017 8th International Conference on Computing, Communication and Networking Technologies (ICCCNT), 2017, pp. 1-7, doi: 10.1109/ICCCNT.2017.8204170.

[9]. J. Chen, "A Cloud Resource Allocation Method Supporting Sudden and Urgent Demands," 2018 Sixth International Conference on Advanced Cloud and Big Data (CBD), 2018, pp. 66-70, doi: 10.1109/CBD.2018.00021.

[10]. A. Murali, N. N. Das, S. S. Sukumaran, K. Chandrasekaran, C. Joseph and J. P. Martin, "Machine Learning Approaches for Resource Allocation in the Cloud: Critical Reflections," 2018 International Conference on Advances in Computing, Communications and Informatics (ICACCI), 2018, pp. 2073-2079, doi: 10.1109/ICACCI.2018.8554703.

[11]. R. A. C. da Silva and N. L. S. d. Fonseca, "Resource Allocation Mechanism for a Fog-Cloud Infrastructure," 2018 IEEE International Conference on Communications (ICC), 2018, pp. 1-6, doi: 10.1109/ICC.2018.8422237.

[12]. S. Mireslami, L. Rakai, M. Wang and B. H. Far, "Dynamic Cloud Resource Allocation Considering Demand Uncertainty," in IEEE Transactions on Cloud Computing, vol. 9, no. 3, pp. 981-994, 1 July-Sept. 2021, doi: 10.1109/TCC.2019.2897304.

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[13]. T. Bhardwaj, H. Upadhyay and S. C. Sharma, "Autonomic Resource Allocation Mechanism for Service-based Cloud Applications," 2019 International Conference on Computing, Communication, and Intelligent Systems (ICCCIS), 2019, pp. 183-187, doi: 10.1109/ICCCIS48478.2019.8974515.

[14]. D. Selvapandian, R. Santhosh, "A Hybrid Optimized Resource Allocation Model for Multi-Cloud Environment Using Bat and Particle Swarm Optimization Algorithms" Advanced Optimization Methods for Uncertainties in Intelligent Industrial Systems 2022, doi: 10.24423/cames.405.

[15]. A. Belgacem, K. Beghdad-Bey and H. Nacer, "Dynamic resource allocation method based on Symbiotic Organism Search algorithm in cloud computing," in IEEE Transactions on Cloud Computing, doi: 10.1109/TCC.2020.3002205.

[16]. A. B. M. B. Alam, Z. M. Fadlullah and S. Choudhury, "A Resource Allocation Model Based on Trust Evaluation in Multi-Cloud Environments," in IEEE Access, vol. 9, pp. 105577-105587, 2021, doi: 10.1109/ACCESS.2021.3100316.

[17]. S. Guan, A. Boukerche and A. Loureiro, "Novel Sustainable and Heterogeneous Offloading Management Techniques in Proactive Cloudlets," in IEEE Transactions on Sustainable Computing, vol. 6, no. 2, pp. 334-346, 1 April-June 2021, doi: 10.1109/TSUSC.2020.2980847.

[18]. P. Bharti and R. Ranjan, "Negotiation Based Resource Allocation in Cloud Computing Scenarios," 2021 International Conference on Innovative Practices in Technology and Management (ICIPTM), 2021, pp. 99-102, doi: 10.1109/ICIPTM52218.2021.9388337.

[19]. Y. -L. Chen, S. -Y. Huang, Y. -C. Chang and H. -C. Chao, "Resource Allocation based on Genetic Algorithm for Cloud Computing," 2021 30th Wireless and Optical Communications Conference (WOCC), 2021, pp. 211-212, doi: 10.1109/WOCC53213.2021.9603125.

[20]. A. Bazghandi, "A Self-Configurable Model for Cloud Resource Allocation," 2021 11th International Conference on Computer Engineering and Knowledge (ICCKE), 2021, pp. 55-61, doi: 10.1109/ICCKE54056.2021.9721523.