A REVIEW ON OPTIMIZATION TECHNIQUE IMPLEMENTED ALGORITHMS IN CLOUD COMPUTING

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ABSTRACT

Cloud Computing emphasizes the distributive environment that enhances sharable computing such as applications, software, network, security, storage area, processing power and many other services over the internet. The dynamically demanded requests can be satisfied by virtualized shared resources with internet support. All the features can be attained by various virtualization techniques. The shared resources can be utilized by the customers from resource pooling on pay per use basis. Even more and more services are provided by cloud, still there are some issues arises while resource sharing, security issues at sharing the data, virtual machine migration etc. Those issues can be identified and resolved to assure the better service quality in computing environment. Balancing the workload is major constrain in cloud environment, because it ensures the reliability, efficiency and availability. In this paper, we specify the considered Quality-of-Service metrics, merits and demerits on each optimized algorithms used for load balancing.

KEYWORDS

1. INTRODUCTION

Cloud computing is an Internet based computing, which allows to access the sharable resources such as hardware, application, memory, databases, storage and network to the customer based on their requirements, which are dynamically changed. Resources availability can be achieved by means of virtualization techniques implemented on various levels [1]. Cloud Service Providers (CSP) supports three categories of services for clients in cloud environment such as SaaS (Software-as-a-Service), PaaS (Platform-as-a-Service), and IaaS (Infrastructure-as-a-Service). CSP receives a request from client; they must establish required number of virtual machines and needed resources to support the customer [2]. Two ways of provisioning can be supported. CSP provides all the services and resources in advance and the client pay the fixed fee or monthly basis payment, this one is called Advance Provisioning. CSP supports the dynamically changed requests of clients and billed on pay-per-use basis is called Dynamic provisioning [3].

Cloud environment have some specialized features such as virtualization, heterogeneity, elasticity, resource pooling and measurable services. Because of those unique features, Cloud faces many challenging issues such as fault tolerance, security, scalability, reliability and scheduling the resources etc. Service Provider’s goals are to attain maximum profit and return investment [4]. Similarly the customer also demands cheapest, reliable and more securable services. Resource sharing emphasizes the solution for both side expectations.

Because of concurrent geographic channels, different client requests can be assigned to various cloud providers, sometimes unequal assignment of workload for a node can be occurred. Some of the nodes in the network are overloaded and other nodes may be under loaded [5]. This surely degrades the performance of cloud environment. To handle that problem, appropriate load balancing algorithms is most essential. In this paper, different load balancing approaches are discussed.
2. LOAD BALANCING

Load balancing is a distributive service fully defined and managed by software. It’s free from hardware so no need to maintain the physical infrastructure for cloud. Load balancer has predefined functions to distribute the workloads across networks and servers [6]. Load balancer handles the customer requests with the support of many instances of our applications. It monitors the customer demand and workload traffic across the network. To satisfy the client requirements it enhances the multiple server support across the network [7].

![Simple Load Balancing](image)

Figure 1. Simple Load Balancing

Load Balancing (LB) can be performed by means of load balancing algorithms. LB algorithms perform the following functions [8].

- Client requests are distributed across multiple servers.
- Ensures reliability and availability of servers to requests send by user.
- Grow or shrink the number of servers based on user’s dynamic requirement.

Different approaches of load balancing are

- **Static Approach:** If the workload is assigned to any one node, we can’t change the load to any other node. It is on non-preemptive approach. It concentrates more about the information on the node and negotiates the state of that node [9].
- **Dynamic Approach:** It majorly concentrates the present state of the node and distributes the load among the nodes. So it is preemptive approach. Single node can handle the state of the system and distribution work then that is stated as Centralized Approach [10].

Main aim of load balancer is enhance the performance of the system. To determine the system performance, various qualitative measures are considered [11]. Some of the most considerable measures are specified as follows.

- **Throughput:** Number of tasks completed its execution with in specified time. System should attain high throughput.
- **Fault Tolerance:** Any failure occurs on that system, it could be able to handle the fault and maintain the system in good state.
- **Migration Time:** Time taken to transfer the task from one node to another node in a system. System attains better performance, if the system utilizes less migration time.

- **Response Time:** Time taken for first response to task from the system. Minimal response time should attain better performance.
- **Scalability:** System should support the dynamic requests from customers. System should handle increased workload and required number of resources.
- **Makespan:** Time taken to finish all the allocated process for that node. By means of efficient load balancer, we can attain less makespan.
- **Energy Consumption:** Service provider effectively handles all the machine workload and all resources energy consumption.
- **Resource Utilization:** All resources should be maximally utilized.

3. REVIEW OF DIFFERENT LOAD BALANCING ALGORITHMS

Cloud Computing attains distributed computing by means of various technologies such as virtualization and interoperability. Main goal of cloud is to get better system performance with heterogeneous type of resources. Load balancing algorithms are partitioned into three types such as heuristic approach algorithms, metaheuristic approach algorithms and hybrid approach algorithms [12].

**Heuristic Approach Load Balancing Algorithms**

Heuristic approach has group of constraints that determines the best solution for any specific problem. Constraints are designed and developed based on the problem and it provides a way to get better solution with minimal time. These algorithms can be of static type or dynamic type.

**Metaheuristic Approach Load balancing Algorithms**

All the metaheuristic algorithms are dynamic in nature. These algorithms require more time than heuristic load balancing algorithms to execute and find the solution for any problem. Time requires developing the solution based on the problem nature, their requirements and method we prefer to design the solution. All types of swarm intelligence algorithms are belong to this metaheuristic approach. Various metaheuristic approach algorithms are discussed with its considered measures, merits and its limitations.
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<td>Practical implementation of algorithm</td>
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### Improved PSO-based Task Scheduling Algorithm

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<th>Resource</th>
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<th>GA, SA, ACO, IPSO</th>
<th>Increased resource utilization and task handling.</th>
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### Integer-PSO: a discrete PSO Algorithm

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<th>Resource</th>
<th>Utilization</th>
<th>GA, ACO, ABC, and PSO</th>
<th>Algorithm finds optimal or near optimal solutions.</th>
<th>Workflow and performance of the algorithm will be explored.</th>
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### Improved Ant Colony Optimization Algorithm

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<th>Resource</th>
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<th>High convergence speed with less completion time.</th>
<th>Identify the failure cloud node and its recovery strategy to perform quantitative analysis.</th>
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### Grey wolf optimization algorithm

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<th>Dynamic load balancing will be implemented on dependent tasks.</th>
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### Hybrid of Firefly and IPSO algorithm

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<th>Resource</th>
<th>Utilization</th>
<th>FCFS, Round Robin, Genetic Algorithm, SJF, Improved PSO and firefly</th>
<th>Rapid convergence is more effective and efficient.</th>
<th>Concentrate on other metrics.</th>
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## 4. CONCLUSION

Cloud environment engaged the requests received by both industries and academics. Major aim of cloud is to satisfy both the clients as well as service providers. Even many merits exist in cloud, some flaws are there in load balancing, migration of VM and server utilization. This paper presents various optimized variants, it’s considered metrics, developed environment, merits attained through each algorithm and challenges on cloud environment. Among multiple issues, load balancing seems as major issue. Variety of techniques and algorithms are implemented to attain the better service quality and effective utilization in minimal cost and complexity. In future, we will develop a method for Dynamic optimized load balancing and resource handling in well effective manner.

## REFERENCES


