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Enhancing and Optimization the Load Balancing Approach for Cloud Computing

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ABSTRACT: For the improvement of load efficiency in cloud computing various researcher and cloud designer used swarm based job and task scheduling technique. The swarm based task scheduling technique is very efficient in compassion of old and traditional technique such and FCFS and round robin technique. In this dissertation we used the particle swarm optimization for the reduce load balancing mechanism in cloud computing and reduce the load than traditional methods, here we define fitness constraints function partially allocated job for dedicate machine and the distribution of job according to the process job scheduler. For the evaluation of performance used cloud simulator software such is called cloud analyst. The cloud analysis software is bag of composition of cloud environment and load balancing policy.

KEYWORDS: Cloud, Interface, Optimization, Load Balancing

I. INTRODUCTION

Cloud Computing is an attracting technology in the field of computer science. Cloud Computing involves sharing of resources. Cloud Computing is made up by aggregating two terms in the field of technology, First term is Cloud and the second term is computing [1]. Cloud is a pool of heterogeneous resources. It is a mesh of huge infrastructure and has no relevance with its name Cloud. Infrastructure refers to both the applications delivered to end users as services over the Internet and the hardware and system software in data centers that is responsible for providing those services. Computation in cloud is done with the aim to achieve maximum resource utilization with higher availability at minimized cost. Cloud is a collection of heterogeneous resources and requirements of these resources can change dynamically [2]. Cloud providers are always interested in maximizing the resources utilization and the associated revenues, by trimming down energy consumption and operational expenses, while on the other hand cloud users are interested in minimizing response time and optimizing overall application throughput [3]. The cloud offers computing facilities on-demand, served over a network from a shared pool of resources, typically residing in a large data center. Cloud computing offers a new approach to the way applications are written and deployed. One of the primary benefits of cloud computing is elasticity, whereby resources can be automatically expanded during demand spikes, or contracted during demand lulls; thereby improving user experience and system utilization [4].

Currently Cloud computing is an emerging concept which efficiently combining many fields of computing. Cloud computing provides us various services and software and processing capacity over the internet [5]. The biggest advantage of cloud computing is that it is capable of handling a huge amount of growing work in a predestined manner for the usage of the business customers.

Here in cloud computing the main concept for cloud computing is virtualization which generalizes the physical infrastructure and makes it easy to use and managed [6].

II. RESOURCE ALLOCATION

Resource provisioning is the task of mapping of the resources to different entities of cloud on demand basis [7]. Resources must be allocated in such a manner that no node in the cloud is overloaded and all the available resources in

the cloud do not undergo any kind of wastage (wastage of bandwidth or processing core or memory etc.) [8]. Mapping of resources to cloud entities is done at two levels:

VM Mapping onto the Host

Virtual machines reside on the host (physical servers). More than one instance of VM can be mapped onto a single host subject to its availability and capabilities. Host is responsible for assigning processing cores to VM. Provisioning policy define the basis of allocating processing cores to VM on demand. Allocation policy or algorithm must ensure that critical characteristics of Host and VM do not mismatch [8].

Application or Task Mapping onto VM

Applications or tasks are actually executed on VM. Each application requires certain amount of processing power for their completion. VM must provide required processing power to the tasks mapped onto it and these tasks must be mapped onto appropriate VM based upon its configuration and availability [9].

III. LOAD BALANCING

In the event of processing many jobs, the load balancing becomes essential for efficient operation and to improve user satisfaction [10]. The purpose of load balancing is to make every processor or machine to perform the same amount of work throughout the network which helps in increasing the throughput, minimizing the response time and reducing the number of job rejection. The scalability of network is generally marked by efficient usage of the resources available [11]. This could only be achieved Load balancing in cloud computing provides an efficient solution to various issues residing in cloud computing environment set-up and usage.

Load balancing must take into account two major tasks, one is the resource provisioning or resource allocation and other is task scheduling in distributed environment [12]. Efficient provisioning of resources and scheduling of resources as well as tasks will ensure:

- Resources are easily available on demand.
- Resources are efficiently utilized under condition of high/low load.
- Energy is saved in case of low load (i.e. when usage of cloud resources is below certain threshold).
- Cost of using resources is reduced.

For measuring the efficiency and effectiveness of Load Balancing algorithms simulation environment are required [13]. Cloud Sim is the most efficient tool that can be used for modelling of Cloud. During the lifecycle of a Cloud, Cloud Sim allows VMs to be managed by hosts which in turn are managed by datacenters. Cloud sim provides architecture with four basic entities. These entities allow user to set-up a basic cloud computing environment and measure the effectiveness of Load Balancing algorithms [14].

Datacenters entity has the responsibility of providing Infrastructure level Services to the Cloud Users. They act as a home to several Host Entities or several instances hosts' entities aggregate to form a single Datacenter entity. Hosts in Cloud are Physical Servers that have pre-configured processing capabilities. Host is responsible for providing Software level service to the Cloud Users. Hosts have their own storage and memory. Processing capabilities of hosts is expressed in MIPS (million instructions per second). They act as a home to Virtual Machines or several instances of Virtual machine entity aggregate to form a Host entity. Virtual Machine allows development as well as deployment of custom application service models. They are mapped to a host that matches their critical characteristics like storage, processing, memory, software and availability requirements. Thus, similar instances of Virtual Machine are mapped to same instance of a Host based upon its availability. Application and System software are executed on Virtual Machine on-demand [15]. Load Balancing is an important aspect of cloud computing environment. Efficient load balancing scheme ensures efficient resource utilization by provisioning of resources to cloud user's on-demand basis in pay-as-you-say-manner. Load Balancing may even support prioritizing users by applying appropriate scheduling criteria.

IV. PROPOSED METHODOLOGY

There can be number of users in the system. Each user is having an application and there will be a request from each application. All requests are sent to cloud service provider. Cloud service provider forwards these requests to cloud

manager. Cloud manager contains load balancer which services each request which is stored in task queue based on task attribute associated with that request. Task attributes are task ID, Instruction Volume in MI, Data Volume in Mb and type of task which may be either Information processing task or entertainment related task or computational task. Based on these things, load balancer will assign tasks to particular virtual machines (nodes). There will be monitoring agent in node which will compute load whenever required.

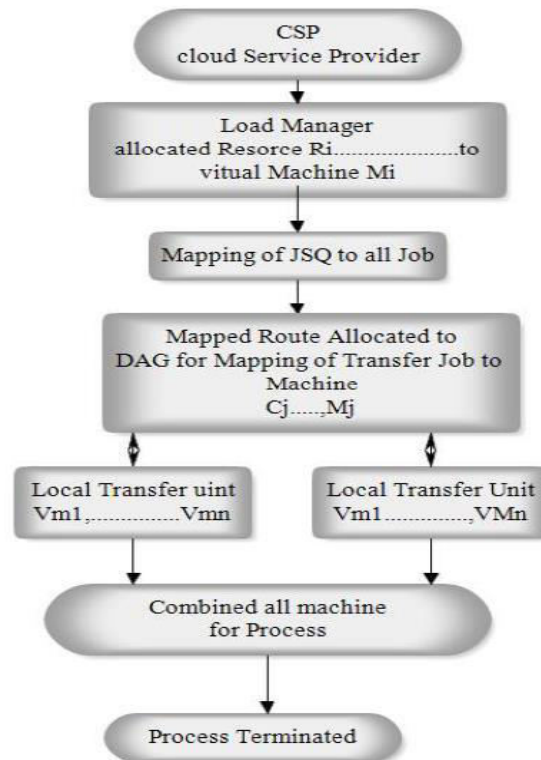


Figure 1: Proposed model of cloud load balancing based on JSQ algorithm

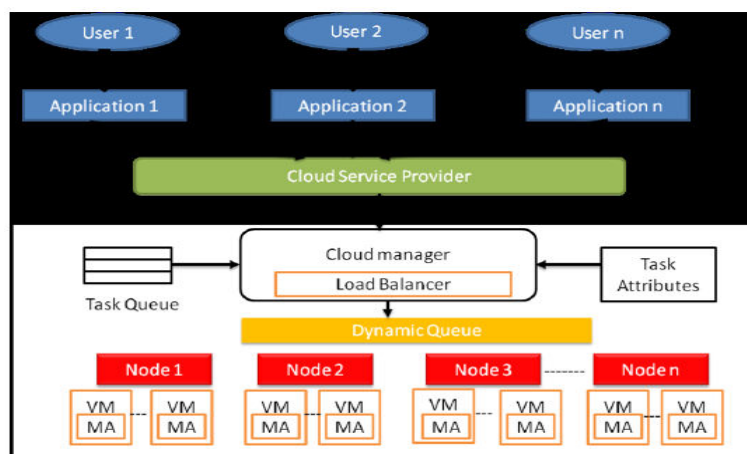


Figure 2: Load balancing architecture with virtual machine

Round Robin is one of the easiest scheduling techniques that work on the concept of time slices. In this, the time is divided into multiple slices and each node is given a specific time slice or time interval i.e. it uses the time-shared scheduling strategy. The node will perform its task in the time quantum allotted to it. The client gets the

needed resources of the service provider on the basis of this time slice. The following figure shows the working of round robin. It shows that each user request is served by every processor within a given time interval. After the time slice gets over, the next user request in queue will get the processor. In case of the completion of request within time quantum, user does not need to wait, otherwise user have to wait for its next slot to get served.

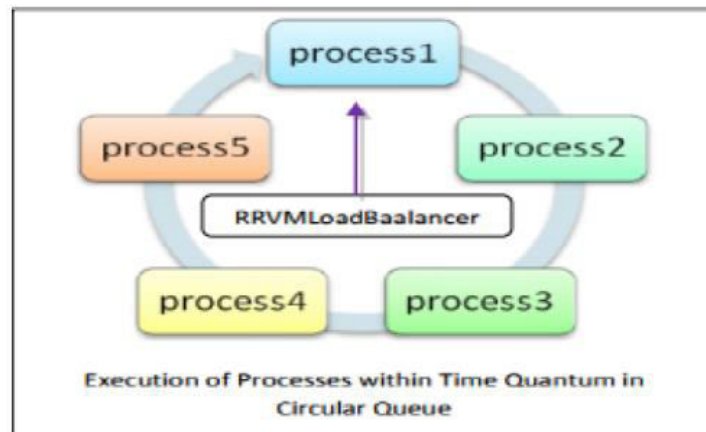


Figure 3: Round Robin processing

V. SIMULATION RESULT

NetBeans is a sophisticated integrated development environment that aims to help us to build any type of application. NetBeans is a Java-based integrated development environment (IDE). The term also refers to the IDE's underlying application platform framework. The IDE is designed to limit coding errors and facilitate error correction with tools such as the NetBeans Find-Bugs to locate and fix common Java coding problems and Debugger to manage complex code with field watches, breakpoints and execution monitoring. Although the NetBeans IDE is designed specifically for Java developers, it also supports C/C++, PHP, Groovy, and HTML5 in addition to Java, JavaScript and JavaFX. Tools and capabilities of the NetBeans IDE include a featurerich text editor with refactoring tools and code templates, high level and granular views of applications, a drag and drop GUI design, and versioning using out-of-the-box integration with tools such as GIT. The NetBeans IDE can run on any operating system that supports a compatible JVM including Linux, Windows and OS X. The underlying NetBeans platform supports creation of new applications and further development of existing applications using modular software components. As an application running on the NetBeans Platform, the NetBeans IDE itself is extensible and can be extended to support new languages. The IDE and Platform were converted to open source by Sun Microsystems in 2000. Oracle continues to sponsor the NetBeans project since acquiring Sun in 2010.

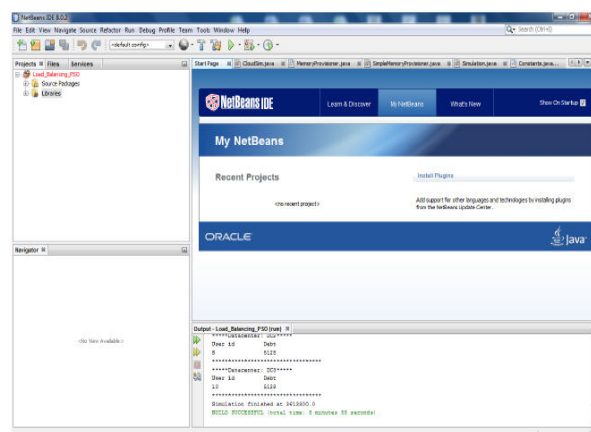


Figure 4: Shows the input page for analysis of database in Cloud Computing Environment

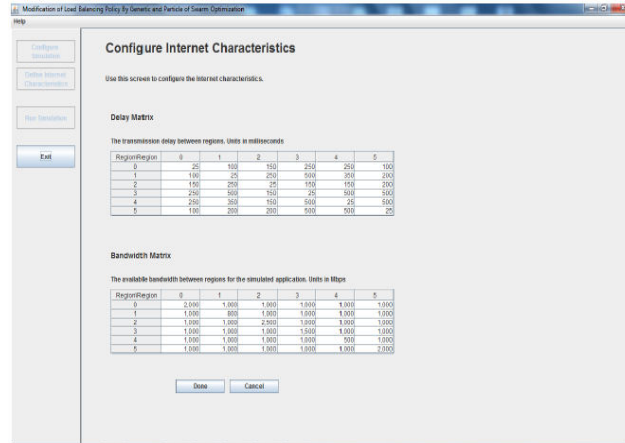


Figure 5: Shows the Internet Characteristics and its configuration in Cloud Computing Environment

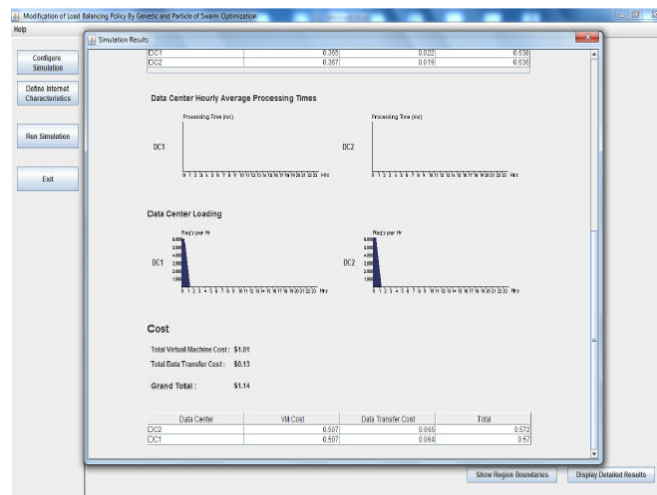


Figure 6: Shows the loading of data on Data Center for PSO Method in Cloud Computing Environment

Table 1: Shows the Response Time Average and Processing Time analysis for Round Robin Method

Data Set	Method Name	Overall Response Time		Data Center Processing Time	
UB1 DC1	Round Robin Method	Average	280.256	Average	0.458
		Minimum	340.253	Minimum	0.124
		Maximum	390.456	Maximum	0.656

Table 2: Shows the Response Time and Processing Time analysis for ESCEL Method

Data Set	Method Name	Overall Response Time		Data Center Processing Time	
		Average	300.785	Average	0.456
UB1 DC1	ESCEL	Minimum	250.236	Minimum	0.226
		Maximum	350.423	Maximum	0.785

Table 3: Shows the Response Time and Processing Time analysis for PSO Method

Data Set	Method Name	Overall Response Time		Data Center Processing Time	
		Average	612.879	Average	0.367
UB5 DC5	PSO Method	Minimum	539.368	Minimum	0.154
		Maximum	684.589	Maximum	0.486

VI. CONCLUSION

The efficiency of cloud based infrastructure based on load balancing factor of different component of cloud computing. The load balancer plays a major role in cloud based services.

The cloud based services interact with user and dedicated cloud infrastructure. The interaction of user and cloud operation request to transfer the load to virtual machine and other resources. For the improvement of load efficiency in cloud computing various researcher and cloud designer used swarm based job and task scheduling technique. The swarm based task scheduling technique is very efficient in compassion of old and traditional technique such and FCFS and round robin technique.

In this dissertation we used the particle swarm optimization for the reduce load balancing mechanism in cloud computing and reduce the load than traditional methods, here we define fitness constraints function partially allocated job for dedicate machine and the distribution of job according to the process job scheduler. For the evaluation of performance used cloud simulator software such is called cloud analyst. The cloud analysis software is bag of composition of cloud environment and load balancing policy.

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