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EVALUATION OF DATA CENTER PROCESSING TIME USING MULTIPLE DATA CENTER IN CLOUD COMPUTING

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Abstract: **The construct of cloud computing has not only remolded the field of distributed system but also essentially changed how business potentiality expand today. In late furtherance, cloud computing applications are allow for as servicing to end- users. The applications services hosted under Cloud computing role model have composite provisioning, configuration, and deployment essentials. How to utilize Cloud computing resources expeditiously and attain the uttermost winnings and efficient usage of resources is one of the Cloud computing service supplier ultimate goals. Repetitious valuation of the performance of Cloud provisioning policies, application workload framework, and resources performance frameworks in active system are difficult to accomplish and instead a time consuming and costly approach. To defeat this challenge, cloud analyst simulator based on CloudSim has been projected which enables the modeling and simulation in cloud atmosphere. The aim of this paper is to prove that the choice of VM Scheduling Policy in Cloud computing frame work importantly improves the application performance under resource and service demand fluctuation. Hence We will discuss different Virtual. Machine (VM) Scheduling Policies implemented and their performance analysis in virtual environment of cloud computing in order to achieve better Quality of Service(QoS).**

Keywords: **CloudSim, Cloud Analyst. Scheduling Policies and virtual Machine.**

I. INTRODUCTION

Cloud computing is a model for permitting suitable, on-demand network access to a share a pool of configurable computing resources (e.g., servers, storage, networks, applications and services) that can be rapidly provisioned and released by minimizing the efforts of management or service provider interaction. Cloud computing provides infrastructure, software and platform, as a services, which are made available as subscription- based services in a pay-as-you-go model to consumers. These services in industry are often referred to as Infrastructure as a Service (IaaS), Platform as a Service (Pass), and Software as a Service (SaaS). "Cloud computing, is the long- held dream of computing as a utility, and it has the potential to completely shape a large part of the IT industry, making software even more attractive as the services".

The main aim of the Cloud computing is to boost the next generation data centers by planning them as a network of virtual services(hardware, database, user-interface, application logic) so that users are able to deploy and access application from every corner of the world on demand at cut-throat costs depending upon user's QoS (Quality of Service) requirements. Developers having innovative ideas for new internet services are no longer required to have large capital outlays in the hardware and software infrastructure to use their services and human expense to make it operational. It delivers significant benefit to IT companies by freeing them from the low level task of setting up basic hardware and software infrastructure and thus empowering more focus on innovation and creation of business ideas.

Some of conventional Cloud-based applications comprises social networking, web hosting, content delivery and real time instrumented data processing. Each one of these application types has different configuration, composition, and utilizing requirements. Quantifying these performances of scheduling and allocation policies on Cloud infrastructures for different applications and service models under fluctuating load, energy performance, and size of system is an extremely challenging problem to handle.

Cloud computing has four different characteristics: elasticity and the ability to scale up and down, application programming interfaces (APIs),self-service provisioning , automatic provisioning billing and metering of service usage. Various utilizations provided by the cloud computing are shown below:

Cloud Computing Applications

II. CLOUDSIM

Cloudsim is a model formulate by the GRID laboratory of University of Melbourne which enables seamless modeling, simulation on designing Cloud computing Cloud computing infrastructures [3]. It provides basic classes for distinguish data centers, virtual machine, applications, computational resources, users, and policies for management of various parts of the system. It provides features for modeling and creating the data center. By using CloudSim, developers can focus on particular system design issue of the infrastructure of cloud system, without getting into the lower level details related to Cloud-based infrastructure and services.

Cloudism use SimJava as the simulation engine that support various functions of cloud system entities (services, host, data center, broker, VMs) such as queuing and processing of events & communication between components.

III. CLOUD ANALYST

Cloud- Analyst is an open source toolkit that enables us to brace and determine the performance of cloud services. As already discussed, a good tool is necessary for the simulated world, consequently selection of a good tool has become a critical choice for simulating the large scale applications. It has become apparent to choose a tool which is easy to use in any environment which enables the develop to focus mainly on the simulation rather than diverting itself in the complexity of programming. The cloud Analyst helps setting location of nodes that are creating the application and also the location of the nodes centers. In this different configuration parameters can be adjust like number of nodes, number of processors, amount of storage, number of generated requests per user per hour, number of virtual machines, network bandwidth and other necessary parameters. According these parameters the tool computes the simulated results that show them in a graphical form. The output obtained from the simulating kit is more appropriate and understandable as it is in the form of graphical representation which can be examined by developer and researchers in more precise form. Due to this feature, it can quickly highlight the problem with the performance and accuracy of simulation results.

IV. SIMULATION PARAMETERS

Users:

A User Base models are a group of users which is considered as a one unit in the simulation and its major job is to control the traffic for the process. A single user base representing thousands of user but is works as a single unit and the traffic controlled in simultaneous bursts as the leader of the size of the user base. One may decide to use a user base to specify a single user, but similarly a user base should must be used to represent a huge number of users for the efficiency of whole stimulation process.

Region:

In the Cloud Analyst the world is classified into 6 ‘Regions’ that interacts with the 6 main continents in the World. The other main entities such as User Bases and Data Centers belong to only a single region. This geographical classification helps us to control the level of realistic simplicity for the large scaled simulation processes being done in the Cloud Analyst.

Internet:

Internet can be understood as the abstraction for the real world internet, utilizing only the features that are compulsory to the simulation. It explains the characteristics of the internet that are deploys during the simulation, including the latencies and available bandwidth in between the regions, the working traffic levels, and running performance level information to the data centers. It is introduced to model the realistically data transmission across internet with network delays and bandwidth restrictions. Hence the simulation is defined by time period. In cloud-sim, the process takes place based on the pre-defined events. Here, in Cloud- Analyst, there is a need to generate events until the set time- period expires.

Internet Cloudlet:

It is explained as grouping of requests from the users. The more the number of requests grouped into one Internet Cloudlet. It includes the information such as the number of requests, size of input and output files, the size of a request execution command, the originator and target application id that is used for internet routing.

SAN Storage:

This class models a storage area network that is commonly available to Cloud-based data centers for storing large chunks of data. SAN storage implements a simple interface that can be used to simulate storage and retrieval of any amount of data, at any time subject to the availability of network bandwidth. Accessing files in a SAN at run time incurs additional delays for task until execution, due to time elapsed for transferring the required data files through the data center internal network.

Data Center Controller:

Data Center Controller helps in controlling data center processes like VM creation and destruction and completes routing of request received from user bases by the internet to the VMs database is a template. The Data Center Controllers is precisely the most important entity in the Cloud Analyst. A Data Center Controllers is mapped to a single cloudsim. Data Center object and controls the data center managements activities such as VM creation and destruction and does the routing the user requests received from user bases via the internet to VMs. This can also be viewed as the faced used by the Cloud Analyst to access the heart of CloudSim toolkit functionality.

V. SERVICE BROKER POLICIES

***A.* Following are three default service broker policies:**

1). Closest data center-The smallest path to the data centre from the user base, depending on the network latency is checked and in accordance to that, the service broker paths the traffic to the nearest data by taking transmission latency into consideration. Hence, the routing policy service broker selects the shortest path from the user base to the data center, and it depends on the network latency and on the basis of which, routes the traffic to the closest data center with the consideration of transmission latency.

2). Optimized response time-In this type of routing policy, service broker actively controls the performance of all data centers, and depending on that, it directs traffic to the data centre with best response time.

3). Reconfigure dynamically-This is an extension to proximity based routing, where the routing logic is similar, but the service broker has one more responsibility of scaling the application deployment depending on the current load it faces. This policy increases and decreases the no. of virtual machines allocated in the data centers. This will be done taking under consideration the current processing times and best processing time ever achieved.

***B.* VM allocation using load balancing algorithms:**

VM allocation is the procedure of creating VM instances on hosts that check the characteristics like storage, memory, & configuration like software environment and requirements like availability zone of the SaaS provide [5].

The infrastructure- level services (IaaS) related to the clouds can be simulated by expanding the data center entity of CloudSim. The data center entity manages a number of hosts' entities. The hosts are assigned to one or more VM based on a VM allocation policy that should be defined by the Cloud service provider. In this context, VM policy stands for the operations control policies related to VM life cycle such as provisioning of a host to a VM, VM creation, VM destruction, and VM migration. Similarly one or more application services can be provisioned within a single VM instance, referred to as application provisioning in the context of Cloud computing. We used following methods to allocate VM's to host for balancing the load:

1). Round - robin Load Balancer-It takes a simple round-robin algorithm to allocate VMs. The Round-robin is the basic and least complicate scheduling algorithm. It is based on time quantum and every processor takes time quantum for allotted time.

2). Active Monitoring Load Balancer-This load balancer balances the load of job among available VM's thus allowing incoming requests to wait till its free VM's are processing pending actions.

3). Throttled Load Balancer- This takes into account only a pre-defined Internet Cloudlets which are allocated to a single VM at any allotted time. Suppose if more request groups are present than available VM's at a data centre, some of the actions will have to be queued until the next VM becomes free. Hence Throttled load balancing algorithm maintains index of virtual machines and their states, which are either available or busy [6].

VI. VIRTUAL MACHINE SCHEDULING POLICIES

Virtual Machine Scheduling Policy evaluates the sharing of existing resources among various cloudlets. CloudSim mapped scheduling of CPU's available resources at two levels: Host and VM. The host shares some parts of each processor element (PE) to every VM working on it. Because resources are distributes among VMs, this scheduler is called VM Scheduler.

In the VM level, each virtual machine shares the resources that comes from the host Cloudlets running on it. Though in this level resources are shared through Cloudlets, this scheduler is called Cloudlet Scheduler, whereas the VM Scheduler models the nature of scheduling at virtual machine level like VMMs such as Xen and VMware. Hence, if you want to model behavior of this type of software regarding sharing of resources among VMs working in the similar host, this is the situation where your new policy should be implemented.

In both levels, there are two default policies available:

a) SpaceShared: In this type of policy when there are more working VM's or Cloudlets than available PEs, the end elements to arrive must have to wait on a queue until enough resources are free. The form of either VM Scheduler Space Shared or Cloudlet Scheduler Space Shared, which means that there are more working VM's or Cloudlets than available PEs on the system, the rearmost elements to arrive have to wait on a queue till the working resources become idle.

b) Timeshared: In this policy a small part of available PEs is distributed among running elements. All the elements run simultaneously. Even VM Scheduler Time Shared fraction of present PEs is distributed throughout the working elements, and almost every element run simultaneously

VII. BENEFITS OF CLOUD COMPUTING

a) Flexibility:

The second a company requires more bandwidth than usually used , a cloud-based service can simultaneously matches the demand due to the very wide capacity of the service's remote servers. In fact, this flexibility is so vulnerable that 65% of respondents to an InformationWeek survey said "the ability to quickly matches business demands" was a compulsory reason to move to cloud computing.

b) Disaster Recovery:

When companies start depending on cloud-based services, they have no longer requirements of complex disaster recovery maps. Cloud computing companies take care of most issues, and they do it very quickly and that too with ease.

c) Cap Ex-Free:

Cloud computing functions are basically pay as you go, so there's no requirement for the capital expenditure at all. And due to this reason cloud computing is much faster to apply, businesses have reduced project start-up expenses and predictable ongoing operating expenses.

d) Increased Collaboration:

Cloud computing extends collaboration by allowing all employees – wherever they are – to sync up with them and work on shared documents and shared apps effectively, and follow colleagues and records to receive critical updates in real time.

e) Work from anywhere:

As the employees have internet access, they can work from every corner of the world. This flexibility directly affects knowledge worker's work-life balance and productivity. One research found that 53% of working adults give up some of their salary if they could telecommute, and on average they would take a 9% payout.

f) Document Control:

If a company is not using the cloud, workers need to send files back over email, it means that only one person can work on a file at a given time and the same document has thousands of names and different formats. Cloud computing helps in keeping all the files in one central library, and everyone works off of one central copy. Employees can even chat to one another while making changes together. This whole process makes collaboration stronger, which increases efficiency and improves a company's bottom line. In which protecting the data and system is an important part of business continuity planning. Whether you experience a natural disaster, power failure or crisis, having your data stored in cloud ensures it is backed up in a secure and safe location. We able to access data again quickly.

g) Security:

A survey shows that 900,000 laptops are lost each year from airports only. This have some serious monetary implications, but when every type of documents and other data is stored in the cloud, data can still be accessed no matter what happens to a machine.

h) Environment Friendly:

Businesses employees that are using cloud computing only use the server space they need, which decreases their carbon footprint. Using the cloud results in at least 40% less energy usage and carbon emissions than using on-site servers. And again, SMEs get the most applications: for small firms, the reductions in energy use and carbon emissions is likely to be 80%.

VIII. OPPORTUNITIES AND CHALLENGES

The benefits of the cloud provides a number of opportunities listed below:

- It permits services to be used without knowing any data of their infrastructure.
- Cloud computing completes its actions by using economies of scale. It reduces the outlay cost and infrastructure for startup companies, as they would no longer need to purchase their own software or servers. Cost would be by on-demand pricing. Vendors and Service providers claim expenses by establishing an ongoing revenue stream.
- Data and services are secured remotely but can be accessible from anywhere in the world.

In parallel there have been some negative things against cloud computing:

- Use of cloud computing means relying totally on others and that could however limit flexibility and new innovations.
- Security issues are also prove to be a big issue. It is still not known that how safe outsourced data is and while using these services ownership of data is not always known.

IX. PERFORMANCE EVALUATION

In order to evaluate different service broker policies are compared on the basis of three algorithm Round Robin, Active Monitoring and Throttled keeping the parameters same. In all the comparison one by one each service broker policy is compared with three algorithms mentioned above. In each case the data center processing time and overall response time is calculated and results obtained.

X. FEATURE OF CLOUD ANALYST

There are several features of cloud analyst that are desirable for a good tool.

1). Ease of setup- During the setup of simulation tool it is necessary for the setup to be installed easily. It requires the graphical user interface (GUI) to be setup with an ease.

2). Flexibility in configuration the cloud environment – In configuration or modeling something complex, the application depends on the various parameters. These parameters must be changed from time to time so that simulation can be repeated easily.

3). Output in graphical form – The output obtained in the graphical form is much easy to comprehend and on the basis of such output comparing parameters such as data transfer cost, cost of virtual machines, internet bandwidth and its various characteristics can be measured conveniently.

***A.* Hosting Applications:**

To perform the simulation some of the parameters are to be set which are displayed below:

Table 1: Simulation Configuration parameters

Parameters		**Values**
Virtual Machine	Image size	1000
	Memory	1GB
	Bandwidth	1000
Application Deployment Configuration	Service Broker policy	Closest Data Center
Data Center	Architecture	x86
	OS	Linux
	VMM	Xen
	No. of machine	2
	Memory per machine	2GB
	Storage per machine	100Tb
	Bandwidth per machine	1000000Mb
	No. of Processor per machine speed	4
	Processor speed	10000Mips
	VM Policy	Time Shared/Space Shared
Grouping factor	User grouping factor	300
	Request grouping factor	200
	Executable instruction length	512

XI. WEB APPLICATION HOSTING

Assuming Web application is deployed using one data center in the region 0 (North America) and 4 user bases are setup across the different continents across the globe i.e. Region 1, Region2, Region3, Region4, Region5 as shown under.

XII. CONCLUSION

This paper provide an insight into Cloud computing, the various approaches and algorithms currently used for VM scheduling in the Cloud environment, and the problems found in these approaches. In this work Comparison of all the three services broker policies have been made with three load balancing algorithms on the two parameters- Overall response time and response time of data centre were compared. After evaluation of all the scenarios it was found that in whenever we compare any one the service broker policy with throttled load balancer the overall processing time of data centre is always greater as compared to other two load balancer. There are same results for the Round Robin and Equally spread current execution load balancer in all the case. So when implemented practically in the live environment Round Robin and equally Spread Current execution load balancer will be giving early response to the requests raised by the userbase or group of users.

REFERENCES

[1] cloudSim: a toolkit for modeling and simulation of cloud computing environments and evaluation of resources provisioning algorithms Rodrigo N.Calheirosl1, Rajiv Ranjan2, Anton Beloglazov1, C' esar A.F. De Rose3 and Rajkumar Buyyal1,

[2] M.Armburst, A.Fox, R. Griffith, A. Joseph, R.Katz,A.Konwinski, G. Lee, D. Patterson, A Rabkin, 1. Stoica,M. Zaharia. Above the Clouds: A Berkeley view of Cloud computing. Technical Report No. UCB/EECS- 2009-28, University of California at Berkley. USA, Feb. 10.2009.

[3] CloudAnalyst: A CloudSim- based Tool for modeling and analysis of Large Scale Cloud Computing Environments.

[4] Howell F, mancnabR.sim java: a discrete evemt simulation library for java, proceedings of the first international conference on web based in modeling and simulation. San Diego, USA:1998.

[5] R.Buyya, and M. Murshed. "GridSim: a toolkit for the modeling and simulation of distributed resources management and scheduling for Grid computing," Concurrency and Computation: Practice and Experience, vol. 14. No. 13-15, pp. 1175-1220, 2002. U. o. E. institute for computing Systems Architecture. "simjava," 15-05-2009;

[6] Amazon Web Service: Overview of Security Processes." AWSCloud Computing Whitepapers.

[7] http://code .google.com/p/cloud/wiki/FAQ

[8] SumitKhurana and Maninder Singh" Performance analysis of VM Load Balancing Polocies (Round Robin and Throttled) in Cloud Computing" (ICAMCE- 2013) 17-18 Jan, 2013.

[9] A. Wiess, "Computing in the Clouds," networker, vol.11, Dec.2007, pp. 16-25.

[10] Quiroz A, Kim H, Parashar M, Gnanasambandam N, Sharma N. Towards autonomic workload provisioning for enterprise grids and clouds. Proceeding of the 10th IEEE/ACM International Conference on Grid Computing (Grid 2009), Banf, AB, Canada, 13-15 October 2009. IEEE Computer Society: Silver Spring, MD, 2009; 50-57.