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SIMULATION FOR ENHANCING THE RESPONSE AND PROCESSING TIME OF DATACENTER

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ABSTRACT

Cloud computing is holding attention of all big organizations who want to utilize their resources like servers, when these are free from their usual activities. This technology sort out said above more economically and more flexibly using the powerful infrastructure services provided by a Cloud service provider on an as-required basis. Now the next factor is coming, cost of Virtual machines on Data centers and response time. So this paper explores the coordination between DC (Data Centers) and UB (user bound) to optimize the application performance and response time on the same cost to the owners by using a tool called Cloud Analyst.

Keywords: Cloud Analyst , Cloud Service Provider, Data Center, User Bound.

1. Introduction

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Cloud computing focuses on delivery of reliable, secure, fault-tolerant, sustainable, and scalable infrastructures for hosting Internet-based application services. With the advancement of the Cloud, there are new possibilities opening up on how applications can be built on the Internet. On one hand there are the cloud service providers who are willing to provide large scaled computing infrastructure at a cheaper price which is often defined on usage, eliminating the high initial cost of setting up an application deployment environment, and provide the infrastructure services in a very flexible manner which the users can scale up or down at will. On the other hand there are large scaled software systems such as social networking sites and e-commerce applications gaining popularity today which can benefit greatly by using such cloud services to minimize costs and improve service quality to the end users. But when bringing these two ends together there are several factors that will impact the net benefit such as the distribution (geographic) of the user bases, the available Internet infrastructure within those geographic areas, the dynamic nature of the usage patterns of the user base and how well the cloud services can adapt or dynamically reconfigure itself, etc. There have been many studies using simulation techniques to investigate behaviour of large scale distributed systems such as the GridSim and CloudSim projects at the University of Melbourne. This project investigates into extending these techniques to study the behaviour of large scaled Internet application in a cloud environment and proposes a new simulation tool “CloudAnalyst” that can be used for simulating this type of large scaled applications along with a novel approach for such studies.

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2. Cloud Analyst

The CloudAnalyst is built on top of CloudSim tool kit, by extending CloudSim functionality with the introduction of concepts that model Internet and Internet Application behaviours.

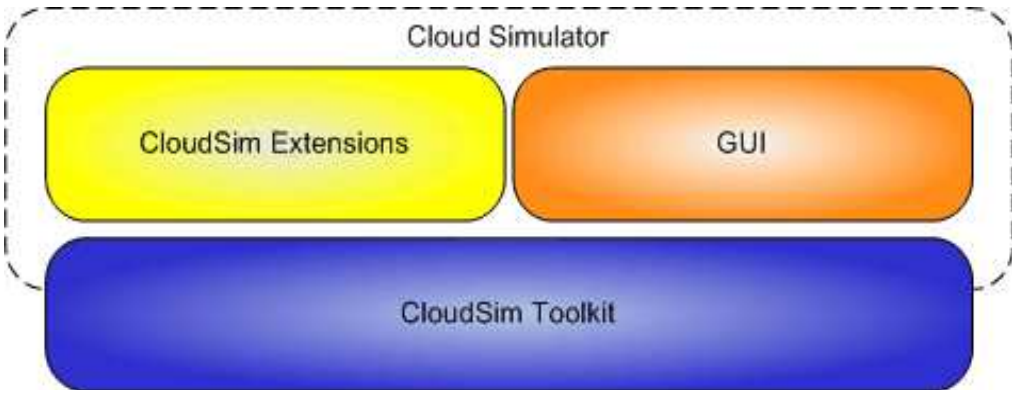

Figure 1: CloudAnalyst built on top of CloudSim toolkit

In the CloudAnalyst the world is divided in to 6 'Regions' that coincide with the 6 main continents in the World. The other main entities such as User Bases and Data Centers belong to one of these regions. The simulator is developed 100% on Java platform, using Java SE 1.6The GUI component is built using Swing components. CloudSim features for modelling data centers is used in CloudAnalyst A User Base

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models a group of users that is considered as a single unit in the simulation and its main responsibility is to generate traffic for the simulation. An InternetCloudlet is a grouping of user requests. The number of requests bundled into a single InternetCloudlet is configurable in CloudAnalyst. The InternetCloudlet carries information such as the size of a request execution command, size of input and output files, the originator and target application id used for routing by the Internet and the number of requests. The Data Center Controller is probably the most important entity in the CloudAnalyst. A single Data Center Controller is mapped to a single cloudsim.DataCenter object and manages the data center management activities such as VM creation and destruction and does the routing of user requests received from User Bases via the Internet to the VMs.

3. Algorithms Used

Basically cloud analyst used three algorithms: VM load balancing ,throttled load balancer and active monitoring load balancer. This simulation use throttled load balancer algorithm.

4. Simulation and Analysis

A typical large scaled application type on the Internet today that could benefit from Cloud is social networking applications. E.g. Facebook, one of the most popular social networking sites has over 200 million registered users world wide Region CloudAnalyst. This paper simulate the $1/5^{th}$ scale of facebook's Overall response time and Data center processing time per hour

5. Parameters Used

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To perform the simulation some of the parameters is to be set and these are following:

Parameter		Values
Virtual Machine	Image Size	10000
	Memory	1Gb
	Bandwidth	1000
Data Center	Architecture	X86
	OS	Linux
	VMM	Xen
	Number of Machines	25
	Memory per Machine	2Gb
	Storage per machine	100000Mb
	Bandwidth per Machine	10000
	Number of processors per machine	5
	Processor Speed	100MIPS
	VM Policy	Time Shared
Grouping Factor	User Grouping Factor	1000
	Request Grouping Factor	100
	Executable Instruction Length	250

Latency Matrix(milliseconds):

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Region/Region	0	1	2	3	4	5
0	25.0	100.0	150.0	250.0	250.0	100.0
1	100.0	25.0	250.0	500.0	350.0	200.0
2	150.0	250.0	25.0	150.0	150.0	200.0
3	250.0	500.0	150.0	25.0	500.0	500.0
4	250.0	350.0	150.0	500.0	25.0	500.0
5	100.0	200.0	200.0	500.0	500.0	25.0

Bandwidth matrix (Mbps):

Region/Region	0	1	2	3	4	5
0	2000.0	1000.0	1000.0	1000.0	1000.0	1000.0
1	1000.0	800.0	1000.0	1000.0	1000.0	1000.0
2	1000.0	1000.0	2500.0	1000.0	1000.0	1000.0
3	1000.0	1000.0	1000.0	1500.0	1000.0	1000.0
4	1000.0	1000.0	1000.0	1000.0	500.0	1000.0
5	1000.0	1000.0	1000.0	1000.0	1000.0	2000.0

6. Web Application Hosting

6.1 On a Single Data Center

Like with most real-world web application let us assume initially the application is deployed in a single location, in Region 0 (North America). After completion of simulation, calculate the Overall response time and data center processing time. The below table show the average, minimum and maximum time.

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	Avg (ms)	**Min (ms)**	**Max (ms)**
Overall response time:	436.49	47.22	27204.27
Data Center processing time:	142.93	0.08	27017.26

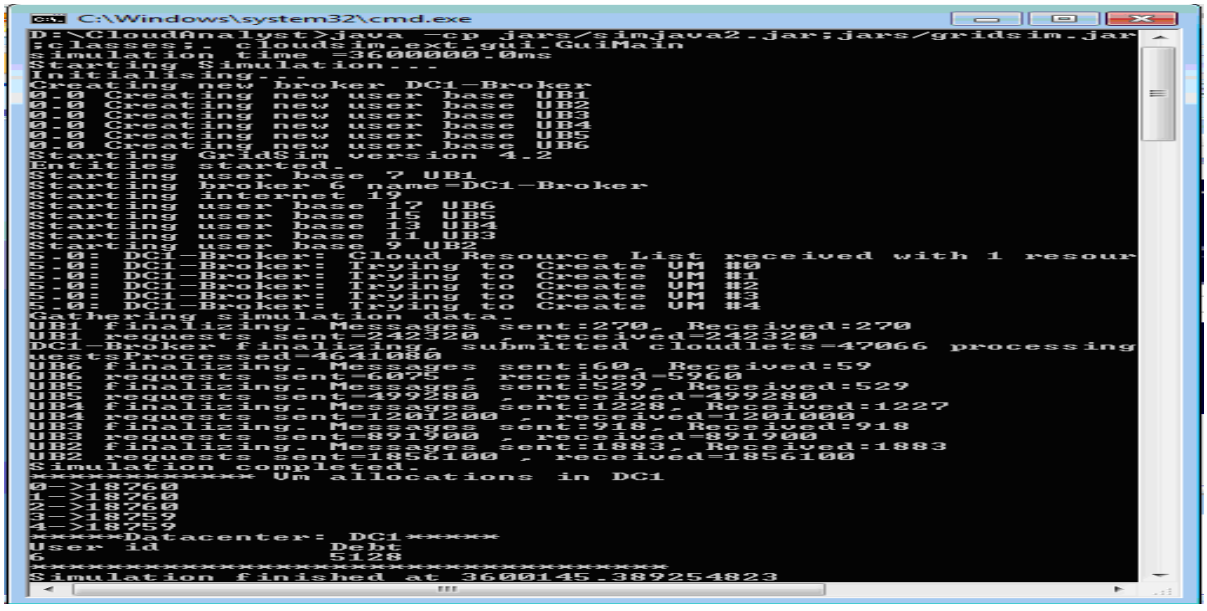

Figure 2: Simulation on console with one DC

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Data Center	VM Cost $	Data Transfer Cost $	Total $
DC1	0.50	44.52	45.02

6.2 On two Data Centers

When applications grow in popularity on the Internet the most common approach to improve service quality is to deploy the application in several locations around the globe. So for the second case, while keeping the user bases the same add one more data center, in region 2 (Europe) with same parameters. Again after completion of second simulation, calculate the Overall response time and data center processing time.

	Avg (ms)	**Min (ms)**	**Max (ms)**
Overall response time:	272.63	41.13	11575.84
Data Center processing time:	72.39	0.04	11354.83

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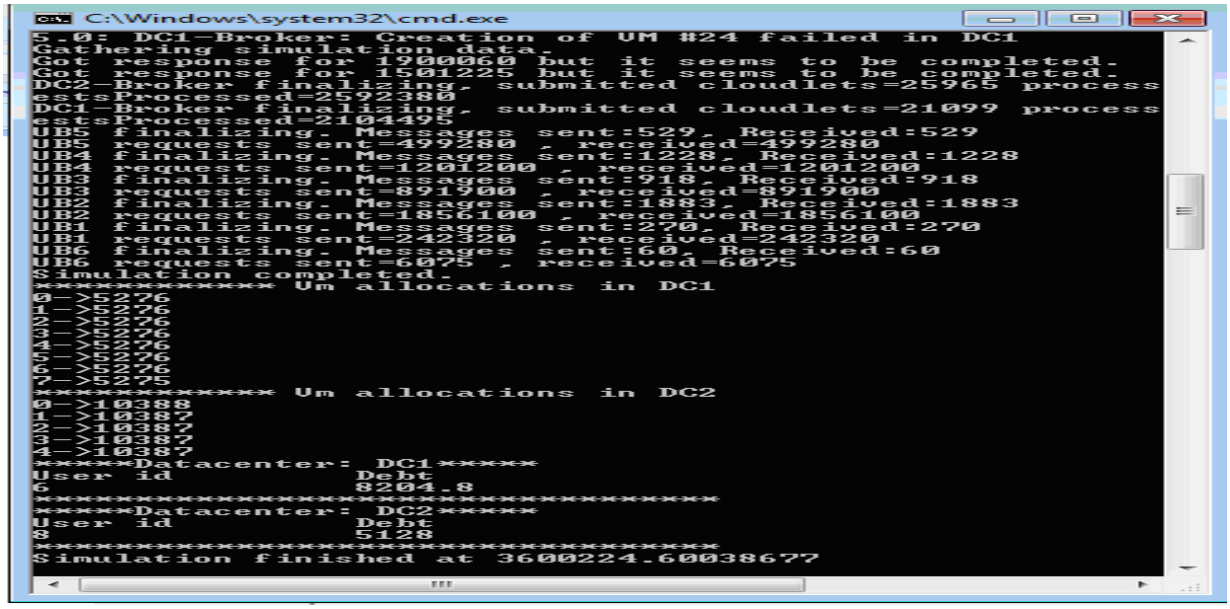

Figure 3: Simulation on console with two DC

Data Center	VM Cost $	Data Transfer Cost $	Total $
DC1	0.80	20.09	20.89
DC2	0.50	24.75	25.25
Total Cost	1.30	44.84	46.14

7. Conclusion

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After the analysis of both cases of simulation, its been noticed that total cost i.e cost of virtual machines and data transfer cost is approximately same but the overall response time and Data center processing time is become half when deploy two DataCenters instead of one.. So it is better that we use two Datacenters despite of one so that response time would become less.

8. Refrences

[1]. Rajkumar Buyya, Chee Shin Yeo, Srikumar Venugopal, James Broberg, and Ivona Brandic, Cloud Computing and Emerging IT Platforms: Vision, Hype, and Reality for Delivering Computing as the 5th Utility, Future Generation Computer Systems, Volume 25, Number 6, Pages: 599-616, ISSN: 0167-739X, Elsevier Science, Amsterdam, The Netherlands, June 2009.

[2]. R. Buyya, and M. Murshed, "GridSim: a toolkit for the modeling and simulation ofdistributed resource management and scheduling for Grid computing," Concurrency ndComputation: Practice and Experience, vol. 14, no. 13-15, pp. 1175-1220, 2002.

[3]. I. Foster and C. Kesselman (editors). *The Grid:Blueprint for a New Computing Infrastructure*.Morgan Kaufmann, 1999.

[4]. M. Armbrust, A. Fox, R. Griffith, A. Joseph, R. Katz, A.Konwinski, G. Lee, D. Patterson, A. Rabkin, I. 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.

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[5]. M. Armbrust, A. Fox, R. Griffith, A. Joseph, R. Katz, A.Konwinski, G. Lee, D. Patterson, A. Rabkin, I. Stoica,M. Zaharia. *Above the Clouds: A Berkeley View of Cloudcomputing*. Technical Report No. UCB/EECS-2009-28,University of California at Berkley, USA, Feb. 10, 2009.

[6]. "Amazon Web Services: Overview of Security Processes," *AWSCloud Computing Whitepapers*, http://d36cz9buwru1tt.cloudfront.net/pdf/AWS_Security_Whitepaper.pdf , 2011.