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Perf ormance Evaluation of Request Processing Time Using Different Services Broker Policies in Cloud Computing

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SUBMITTED BY

Binod Paudel

UNDER THE SUPERVISION OF

Gautam KumarH.O.D

Department of Computer Science and Engineering Swami Devi Dyal Institute of Engineering and Technology

KURUKSHETRA UNIVERSITY(2021-2023)

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 resourcesexpeditiously 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 aimof 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).

Chapter 1 INTRODUCTION

1.1 Cloud Computing

Cloud computing is the interface of hardware, network, storage and services and provide computing as a service. Cloud services include providing software, infrastructure and storage (such as single devices or complete platforms) over the Internet according to user needs. Key natures of cloud computing: flexibility and scalability, self-

Service and automated service providers, application programming interface (API), pricing and Service delivery [8]. A few applications of cloud computing are shown below:

Figure 1.1: Cloud Computing Applications

Service

It provides the following three types of services [2]:

a) Software as a service (SaaS)
"In the cloud," is, on remote computers

b) Platform as a service (PaaS)

Entire life cycles the offering the complexity and simplicity of a configuration.

c) Infrastructure as a service (IaaS)

Networks, storage, and data centers for a one-time payment.

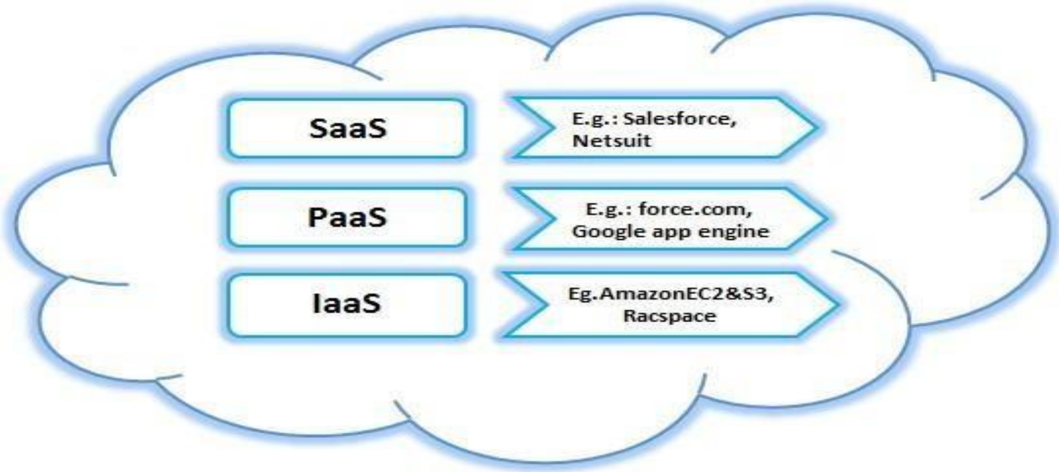

Figure 1.2: Cloud computing services

1.2 Types of Clouds

Public cloud

Service providers provide public cloud applications, storage, and other public services.These services are provided free of charge or for a one-time fee.

Community cloud

The cloud community unites many organizations in one community, whether by internalcontrol or a third party, and with specific concerns (security, compliance, order, etc.) Costs are offered tothe user less than cloud computing

Hybrid cloud

It is a combination still has different organizations but are interconnected and provide the benefits ofdifferent export models. Thanks to the use of the "hybrid cloud" architecture, organizations and individuals can detect crimes and existon-site immediately without the need premises applications. Hybrid cloud provides the security and scalability of cloud- based services and the flexibility of on-premises applications.

Private cloud

A designed specifically an enterprise, managed on-site. Implementing high involvement in virtualized companies available resources. It can be beneficial to the business when completed, but each creates resolved avoid negative consequences.

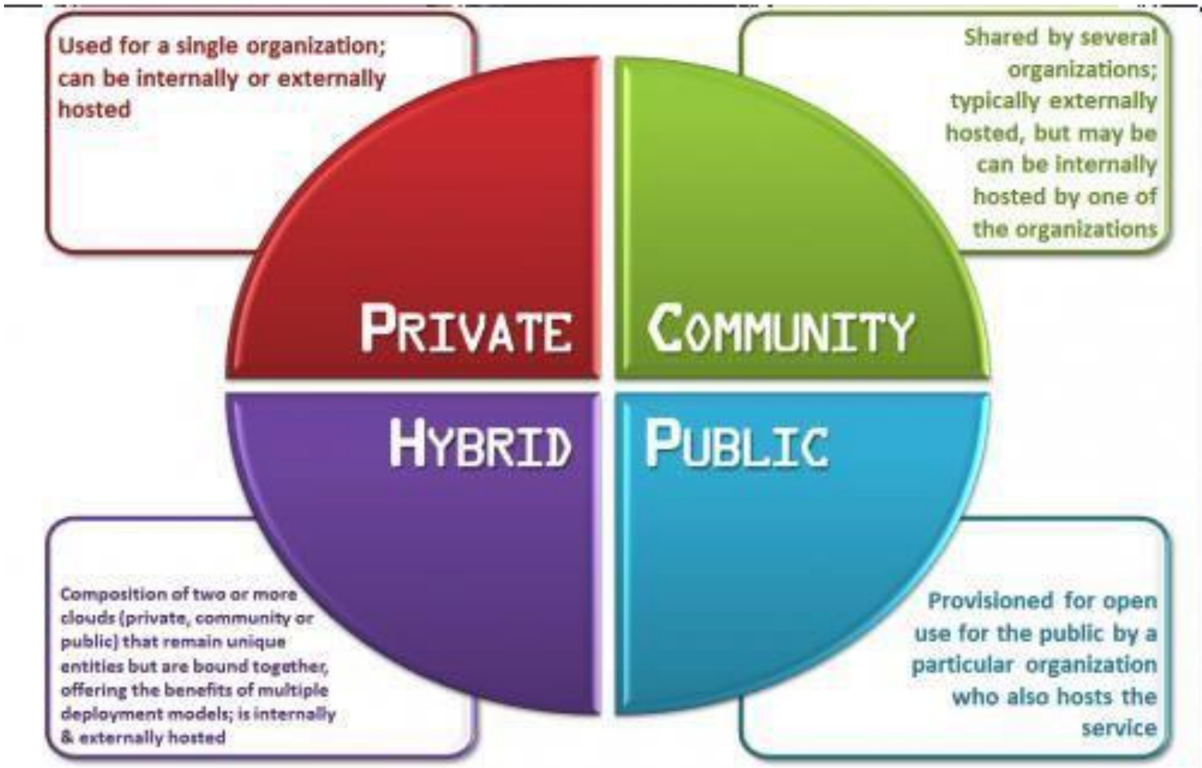

Figure 1.3: Types of cloud

1.3 Cloud Computing Benefits:

Flexible

The air thanks to the large capacity of its remote control, is able to meet this need immediately. This change is so significant to the Business Intelligence Survey cited the "ability to meet business needs quickly" as the primary reason for moving to cloud computing.

Disaster Recovery

When organizations start relying on cloud services, they don't need disaster recovery plans. Cloud service providers take care of most problems, and they do it faster.

Cap Ex-Free

Most fee-based, so you don't have to spend capital. And because cloud computing can be implemented more quickly, companies have startup.

Increased Collaboration

Improves enabling to work simultaneously regardless of location, edit data and shareapplications, and track colleagues and information to receive important updates in a timely manner.

Work from anywhere

Employees can work from anywhere as long as they have Internet access. This change contributes to the work-life balance and productivity of knowledge workers. One study found that 42% of working adults would give up part of their salary if they could use the phone, and onaverage they would accept 6% of their salary.

Work from anywhere

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Document Control

Email documents to each other; this means that only one person can work on a document at a time and the same files have different names and types. With cloud computing, all data is stored in a central location and everyone works on a central copy. Employees can communicate with each other at different levels. Allows collaboration throughout the process, resulting in better performance and a better bottom line for the company.

Security

Every year, about 800,000 laptops are lost at airports alone. This can have serious financial Consequences, but the data is still valid if everything is stored in the cloud, no matter what happen tothe device.

1.4 Opportunities and Challenges

There are many ways to use the cloud [25], which are listed below:

- It allows using the services without knowing the infrastructure.
- Cloud computing works with economies of scale. It lowers the cost for startups as they do not have to buy their own software or servers. Fees are charged on an as-needed basis. Vendors and service providers collect fees through recurring revenue.
- The information and services are stored in a remote location, but can be accessed from anywhere".

However, cloud computing also has its downsides:

- Using cloud computing means relying on others, which can limit change and innovation.
- Security will be a major concern. It is not clear how secure the data received from outside is, and when services are used, it is not always clear who owns the data.

Chapter 2

LOAD BALANCING POLICIES

2.1 VM load balancer

This component creates the equivalent model of the device that service center uses to request services. The default installation policy uses a circular algorithm that distributes all incoming requests sequentially across virtual machines, regardless of the current load on each virtual machine. Additionally, load balancing throttling policies can be used to limit the number of requests processed on each virtual machine to a threshold. When a request is received that causes all available virtual machines to exceed this threshold, the request is scheduled until the virtual machine is available [24].

2.2 Existing VM Load Balancer

A virtual machine supports the hardware abstraction of the workstation and the applications running on it. In the simulator, the internal hardware infrastructure services associated with the cloud are modeled, from data center details to service requests. Theseapplications are application content enclosed in VMs that require a certain amount of computing power to be distributed amongthe data center members.
[23].

a) **Cyclic Load Balancer -** This uses a simple iterative algorithm to allocate VMs

b) **Active Monitoring Load Balancer-** This load balancer balances the workload of existingVMs so that new requests have VMs to handle the existing requests, let themwait.

c) **Throttled Load Balancer**- This ensures that only a certain number of Internet cloudlets are allocated to a single VM at any given time. If there are more request groups than VMs in the datacenter, some requests will have to be deferred until the next VM is available.

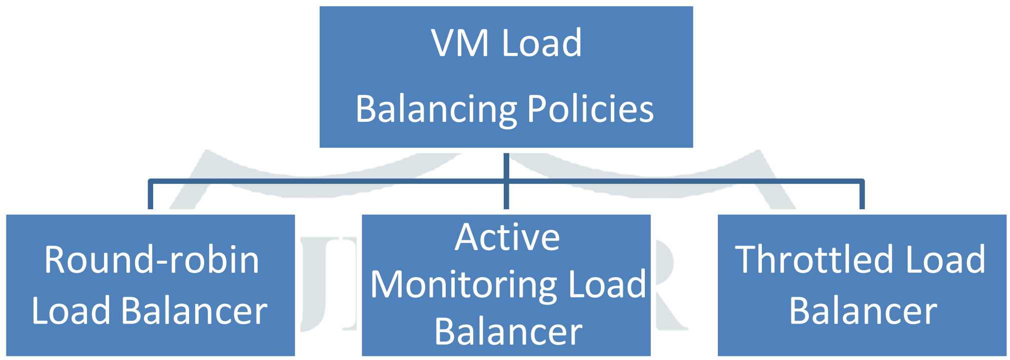

Figure 2.1: VM Load Balancing Policies

2.3 Service broker policies

a) **Closest data centre** - The selection of the nearest site is determined by finding the shortest route across the user group, taking into account the network delay. The program then routes the traffic to the data center that provides the least possible traffic to ensure the best performance.

b) **Optimized response time**- The routing strategy aims to optimize response time through continuous monitoring of all data points by service personnel. Increase the efficiency and speed of the service by measuring the performance of each data center and routing the traffic to the data center with the best response time.

c) **Reconfigure dynamically**- Dynamic reconfiguration is a routing strategy that not only manages traffic, but also dynamically scales the transmitted application based on the current business. This strategy takes time and achieves the best uptime in history, allowing virtual machines to be allocated or deleted as needed in the data center.

2.4 Virtual Machine Scheduling Policy

Virtual machine scheduling policy plays a critical role in resource allocation in a cloud environment. Clouds, a simulation framework, enables modeling of CPU resource scheduling at both the host and virtual machine (VM) levels. At the host level, each VM running on a host is allocated a portion of the available processor points (PE). This resource allocation among VMs ismanaged by a scheduler, the Vm Scheduler.

Resources from CPU and effectively allocates them to VMs running on a host. This schedulerfacilitates resource sharing and allocation and contributes to optimized performance and Resource management within the cloud infrastructure.

At the virtual machine (VM) level, the resources allocated by the host are distributed separately to the individual cloudlets running in each VM. This virtual machine level specific allocation process is managed by a scheduler called Cloudlet Scheduler

Cloudlet Scheduler plays an important role in allocating cloudlet resources in a virtual machine. It improves performance and resource utilization in a virtualized environment by effectively managing resource allocation. models VM-level programming behavior similar to virtual machine monitors (VMMs) such as Xen and VMware.

So if you want to follow the behavior of this software to share resources between VMs running

2.5 CloudAppServiceBroker

This particular product serves as a model for the service provider responsible for managing traffic between user groups and data centers. By default, the traffic policy prioritizes traffic to the data center closest to the user base in terms of network latency. In addition, Cloud Analyst enforces a test proxy policy for maximum performance sharing. This policy aims to distribute data center load to other data centers when legacy data performance is below the threshold.

Service agents play an important role in the efficient and effective functioning of the entire system.

The default routing policy ensures minimal latency by selecting the closest data center, while testing the peak load sharing policy helps maintain performance at critical times by redistributing the workload across multiple data centers.

Chapter 3 LITERATURE SURVEY

In [1], Ambrustet al. discussed the growth of cloud computing. He also focused on needs of application software and infrastructure software.

In their paper [2], Buyya R., Garg S. and Calheiros R. N. point out the need to develop more SLA

-driven strategies for resource allocation.

These strategies should include customer management, risk management, and climate management. The main purpose of these studies is to increase efficiency, reduce SLA violations, and ultimately increase the profitability of the service provider. The authors emphasize the importance of a collaborative approach to meet the changing demands of cloud computing and improve resource allocation based on service level agreements (SLAs)..

In [3], Bernstein et al. discussed the concept of interclub protocols. They focused on the set of common mechanisms that must be present inside the clouds and in between the clouds. The researcher also enumerated a candidate based set of parameters and called the collectively as intercloud root.

In their publications [4], Buyya R., Yeo C.S. and Venugopal S. propose an architecture for business-oriented deployment in cloud environments.

They also mention platform representatives for cloud computing. The authors emphasize the need to add enterprise management to existing cloud technologies. They stress the importance of dialog between users and service providers to establish service level agreements (SLAs) and develop methods and procedures for deploying virtual machines (VMs) to meet SLAs. They also emphasize the importance of managing the risks associated with breaching SLA.

In a report [5], Buyya illustrates the rapid development of cloud technologies and the new need for tools that can effectively study and analyze the benefits of the technology. The authors emphasize the importance of understanding how cloud technologies can best be used for large- scale applications. One particular type of application that can benefit greatly from the flexibility of cloud services is networking.

In [6], Calheiros et al. emphasize that recent efforts in the aviation industry have focused on the development of new systems, policies, and procedures for air quality management. To validate these new designs and ideas, researchers need tools to test hypotheses before deploying them in an environment that allows repeatable testing.

In their paper [7], Dikaiakos et al. solved many factors and problems related to cloud computing facilities. These include infrastructure development and management, application deployment such as Software as a Service (SaaS) and Infrastructure as a Service (IaaS), service and information discovery in the cloud environment, and interface interaction. Despite the progress, some important issues remain, particularly related to quality of service agreements (SLAs), security and privacy, and energy efficiency. In addition, ownership issues, insufficient data transfer, unreliable functions, reliability, and software licensing were identified as problems that could not solve the problem.

The authors also emphasize the importance of developing clear business models for creating Profitable applications in the cloud.

In their paper based on [8], Foster et al. define cloud computing as a distributed computing model that operates at large scale and relies on economies of scale. They explain that cloud computing involves the provision of intangible, virtualized, and dynamically scalable computing capacity, storage, platforms, and services that can be offered to customers outside the on- demand Internet.

Murphy LA, Peter S. and Sachow K. state in their work cited in [10] that the cloud is a connection with many objects, rather than a single object or problem solution by a provider.

They provide simple and unique cloud requirements to meet the needs of commercial organizations. These requirements include scalability, adaptability, scalability and manageability. They also point out that the cloud must have additional capabilities to meet the demanding requirements of enterprises. These include robust security measures, real-time availability and efficiency.

Referring to [12], Oza proposed new ideas that could be integrated into Cloud Analyst and lead to better results and progress. The authors' results suggest that the simulation process can be improved by introducing changes or adding rules such as flow and balance to water flow. The research shows that partnering with a cloud analyst strategy can improve cost efficiency and overall growth.

In the publication referred to as [13], Malhotra M. mentions an interesting analysis of the transfer of information space. Although the total cost includes the virtual machine cost and the replacement cost, it has been shown that the use of two data centers does not reduce the total

Response time and the data center. The data exchange remains the same. Based on this analysis, it is recommended to use two databases instead of one, as this reduces response time and ultimately improves performance.

Moreno I. and Xu J. in their cited paper [14] proposed a method to improve energy efficiency by reducing the waste of resources due to overestimation of customers. The proposed system also aims to reduce the impact of meeting SLA deadlines by implementing a dynamic payment policy. The approach aims to improve resource utilization and reduce energy consumption in the cloud environment by addressing the problem of overestimation.

In addition, a dynamic payment policy has been developed to ensure that SLA times are met while maintaining customer satisfaction and service quality.

In their paper [16], Nurmi et al. presented an open software framework to meet the needs of the research community in the cloud industry. This framework provides important resources for developing user groups for cloud computing research. The authors aim to foster collaboration and innovation among researchers in this field by providing clear solutions.

In [17], Patel discusses two ways to distribute VMs among multiple cloud service providers. First

, resources are allocated to virtual machines, thus increasing the benefits of cloud services. Second, deploy virtual machines to balance the load across multiple data centers in the governmentt cloud.

In [18], Quiroz et al. To determine, weather simulation tools are used to open the possibility ofevaluating

views

In a controlled environment, where you can simply generate the results (use of measurement studies
A simulation-

based approach is useful for IT companies (or anyone considering providing services in the cloud) and allows them to: (i) test their service in an environment that can be built and controlled; Fix system shutdown before actual cloud deployment; (iii) try different tasks.

In [19] Rawat et al. Explain how relative cloud usage can be tested against different load balancing algorithms using cloud simulation tools. The Cloud Analyst tool provides comparative results for simulated configuration scenarios. To deploy applications in the real cloud, we can use simileaction results to determine the best load balancing strategy across VMs in a datacenter. Response e time, data center time cost is reduced with constrained load balancing strategy for best simulation scenario.

[20], Tsai et al. SOCCA, a service-

Oriented cloud computing architecture that allows an application to run in different and interconnected clouds, has been proposed. SOCCA is a 4-

tier architecture that supports SOA and cloud computing. SOCCA supports easy migration of applications from one cloud to another and redeployment of services to different clouds by separating the roles of service logic and hosting/cloud services. It supports an open platform with open models and ontologism.

In [21], Vaquero et al. I think virtualization in the cloud is important because on-demand resource sharing, security isolation, etc. Explain the basis of the features. There is also a significant part of the cloud. There is also a need to improve security

Businesses can rely on it to store sensitive data over the air. He concluded by stating that QoS Availability and virtualization can be applied to networks to simplify their use, improve their scaliability, and allow services as needed.

Chapter-4 PRESENT WORK

4.1 Problem formulation

In the field of cloud computing various techniques finding time single data centre as well as two data centers using different parameters. It has been concluded that that average response time for single data centre is two times in comparison with two data centres. it' centre becoming two Data Centres. [19]. Continuing with this conclusion I am comparing the load balancing policies using multiple data centers considering various parameters. This research is done to find best VM scheduling policy. It assumed that out of three policies one or two will have less data centre processing time as compared to other using same parameters. I will implement the various scheduling policies on the multiple data centres using three reconfiguring manually.

4.2 Objectives

The detailed objectives of this research are mentioned as hereunder.

- Creating virtual environment for simulation of real world entities in cloud computing infrastructure.

- Implementation of scheduling policies.
- Analysis VM scheduling algorithms comparison of their performance.
- To determine best VM scheduling policy by using different service brokerpoliciesusing same parameters with multiple data centres.

4.3 Research Analysis

1. Using java to create a virtual cloud

On a computer with Java 1.6 installed and using a Java IDE such as Devil or Net beans project cloud analyzer, import based cloud analysis as a cloud simulation tool to run the simulator user as defined undefined cloud traffic.

Configure cloud environment using Java

2. **Create** data **centers** and **user groups**

3. **Use** load balancing algorithms

- Round robin load balancer
- **Throttling** load **Active** balancer
- Active monitoring load balancer

4.4 Tools Required

JDK 1.6

In addition to being recognized as the best Java development tool available, Devil's IDEfor Java Developers offers usability, computing, communication, code support, and advance d Javacustomization with XML editor.

Eclipse

The Eclipse IDE for Java Developers contains everything you need to build Java applications. Eclipse IDE for Java Developers is considered by many to be the best Java development tool on the market, offering superior Java editing with validation, incremental compilation, cross- referencing, code assist; an XML editor.

Cloud Sim

A framework for modeling and simulation of cloud computing infrastructures and services. Its main purpose is to provide a comprehensive and comprehensive testing framework that supports nonlinear modeling, simulation, and testing of emerging climate processes and programs [28].

4.5 Test bed Deployment

The various simulation parameters are as follows:

Parameters		Values
Virtual Machine	Image size	1000 Mb
	Memory	1 Gb
	Bandwidth	1000 Mbps
Application DeploymentConfigurat	Service BrokerPolicy	Closest Data Centre
Data Centre	Architecture	x86
	OS	Linux
	VMM	Xen
	No. of machines	2
	Memory per machine	2 Gb
	Storage per machine	100 Tb
	Bandwidth per machine	1000000Mb
	No. of processor per machine	4
	Processor speed	10000 Mips
	VM policy	Time Shared/Space Shared
Grouping factor	User grouping factor	10 users/group
	Request grouping factor	10 users/ data centre
	Executable instruction length	100 bytes

Table4.1: Various simulation parameters

Table 4.1 describes the various simulation parameters used for data center and virtual machine design. Describes a laboratory experiment designed to measure the impact of policies on the response time of a cloud traffic network. The tested was created using the Clouds simulator. Clouds uses SimJava as a cross-experiment simulation engine that supports many important features such as queuing and processing of events, creation of cloud system entities (services, hosts, database children, agents, virtual machines), device communication, and clock control. for simulations.

Table 4.2: Latency Matrix (ms)

Region	0	1	2	3	4	5
0	25	100	150	250	250	100
1	100	25	250	500	350	200
2	150	250	25	150	150	200
3	250	500	150	25	500	500
4	250	350	150	500	25	500
5	100	200	200	500	500	25

Table 4.2 shows the latency matrix which represents the transmission delay(in milliseconds) between the regions. Transmission delay depends upon the distance between data centre and the user base. The transmission delay is less centre and will be more for the user bases situated at a distance from the data centre.

Region	0	1	2	3	4	5
0	2000	1000	1000	1000	1000	1000
1	1000	800	1000	1000	1000	1000
2	1000	1000	2500	1000	1000	1000
3	1000	1000	1000	1500	1000	1000
4	1000	1000	1000	1000	500	1000

5	1000	1000	1000	1000	1000	2000

Userbase(UB)	Region
UB1	1
UB2	2
UB3	3
UB4	4

Table 4.4 represents four UB's representing different countries or regions on world map.

The following screenshot shows the Cloud traffic flow from data centre to nodes, over network

. This scenario is run for different payload sizes.

Figure 4.1: Scenario in running mode

Figure 4.1 describes the running simulation between one Data Centre and six user bases.

Simulation Duration is used to set up the simulation period.

A user base defines the number of user bases with the parameters for requests made toservers along with the peak hour time settings.

Application deployment configuration allows to set service broker policy and data centreVM numbers and memory size.

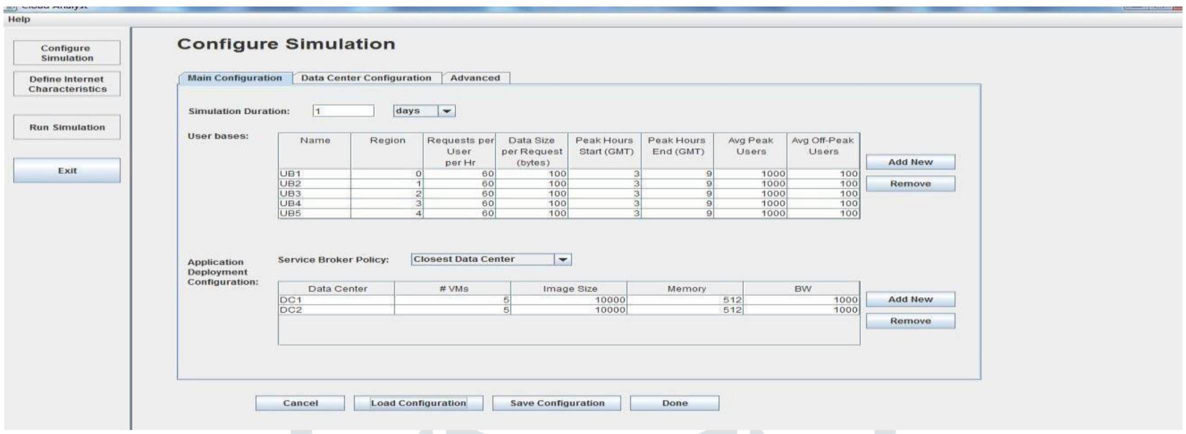

Figure 4.2: Configuring User bases

Figure 4.2 represents the configuration widow user for setting various parameters for User bases and Data centre. Data centre configuration allows setting parameters for VM and cost parameters along with the physical hardware configuration of the data centre.

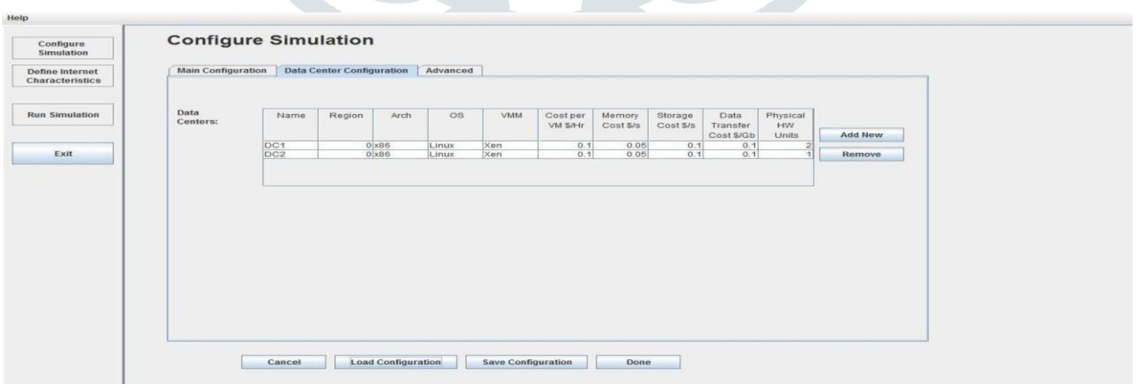

Figure 4.3: Data Centre Configuration Figure 4.3 shows physical hardware details of data centre created.

- The number of users working in a user segment is equal to the number of usersin a user segment.

- A request group for a data center is the number of concurrent requests that anapplication server can support.

Chapter-5

RESULTS & DISCUSSIONS

In this study, service strategies are compared using three algorithms - cyclic monitoring, frequent monitoring, and throttling, with the parameters being the same. In each comparison, each proxy service strategy is compared against the three algorithms above. In each case, the calculation of office time and total response time yields the following results:

5.1 Load balancer used – Round Robin

	Avg (ms)	**Min (ms)**	**Max (ms)**
Overall response time	310.92	36.13	657.64
Data Centre processingtime	0.37	0.01	1.04

5.2 Closest data center with Round Robin

	Avg (ms)	**Min (ms)**	**Max (ms)**
Overall response time	310.92	36.13	657.64
Data Centre processingtime	0.37	0.01	1.04

	Avg (ms)	Min (ms)	Max (ms)
Overall response time	310.92	36.13	657.64
Data Centre processingtime	0.37	0.01	1.04

Table 5.1 represents average, minimum and maximum time taken by data centre to process requests send by five User Bases. In this case data centre processing time is less than overall response time.

Table 5.2: Response Time by Region

Userbase	Avg (ms)	Min (ms)	Max (ms)
UB1	50.19	36.13	65.43
UB2	200.30	143.26	262.14
UB3	300.16	216.14	388.73
UB4	499.92	365.28	650.23
UB5	500.35	362.74	657.64

Table 5.2 shows average, minimum and maximum response time of different User bases.Each user base is representing the different region on world map.

Table 5.3: Data Centre Request ServicingTimes

Data Centre	Avg (ms)	Min (ms)	Max (ms)
DCI	0.36	0.01	1.01
DC2	0.38	0.02	1.04

Data Centre	Avg (ms)	Min (ms)	Max (ms)
DCI	0.36	0.01	1.01
DC2	0.38	0.02	1.04

Table 5.3 represents the Average, minimum and maximum servicing taken by data centre toprocess the requests sent by different User bases from various regions or locations.

5.3 Closed Data Centre with Active Monitoring Load balancer

Table 5.4: Overall Response Time Summary

	Avg (ms)	Min (ms)	Max (ms)
Overall response time	310.95	36.93	662.62
Data Centre processing time	0.37	0.01	1.04

Table 5.4 represents process requests send by six UserBases. In this case data centre processingtime is less than overall response time when round robin allocate the load among various VM's.

Table 5.5: Response time by Region

Userbase	Avg (ms)	Min (ms)	Max (ms)
UB1	50.19	36.93	65.68
UB2	200.23	146.11	258.28
UB3	300.38	210.13	397.77
UB4	500.35	335.12	662.62
UB5	499.91	355.28	655.14

Table 5.5 represents time taken by data centre process requests sent by six User Bases.

Table 5.6: Data Centre Request ServicingTimes

Data Centre	Avg (ms)	Min (ms)	Max (ms)
DCI	0.36	0.01	1.01
DC2	0.38	0.02	1.04

Table 5.6 represents the Average, minimum and maximum servicing taken by data centre toprocess the requests sent by different Userbases from various regions or locations.

5.4 Closest data centre with throttled Load balancer

Table 5.7: Overall Response TimeSummary

Data Centre	Avg (ms)	Min (ms)	Max (ms)
Overall response time	348.42	37.28	35064.75
Data Centre processing time	37.90	0.02	34585.25

Table 5.7 represents to process requests send by six UserBases. In this case data centre processing time is less than overall response time when round robin load balancer is used to allocate the load among various VM's.

Table 5.8: Response Time by Region

Userbase	Avg (ms)	Min (ms)	Max (ms)
UB1	114.26	37.28	22448.00
UB2	244.35	144.41	9325.50
UB3	335.77	217.29	24262.01
UB4	522.57	366.43	35064.75
UB5	521.79	363.91	29128.01

Table 5.8 represents time taken by datacentre process requests sent by six UserBases.

Table 5.9: Data Centre Request ServicingTimes

Data Centre	Avg (ms)	Min (ms)	Max (ms)
DCI	17.43	0.02	5723.04
DC2	58.24	0.02	34585.25

Table 5.9 represents time taken by datacentre process requests sent by six UserBases.

5.5 Load balancer used Equally Spread Current Execution Load

5.6 Closest data centre with Equally Spread Current Execution Load

Table 5.10: Overall Response TimeSummary

Data Centre	Avg (ms)	Min (ms)	Max (ms)
Overall response time	310.92	36.11	657.64
Data Centreprocessing time	0.37	0.01	1.05

Table 5.10 shows the average, minimum, and maximum total response time and data center processing time required for a data center to balance the workload by load balancing with active monitoring; in this case, the provisioning policy is the default policy schedule.

Table 5.11 : Response Time by Region

Userbase	Avg (ms)	Min (ms)	Max (ms)
UB1	50.18	36.11	65.41
UB2	200.32	143.26	262.14
UB3	300.15	216.14	388.73
UB4	499.93	365.28	650.64
UB5	500.33	362.74	657.64

Table 5.11 shows response time of Userbases centre fullfill of UB's. It will be minmimum for nearest UB/region.

Table 5.12 : Data Centre RequestServicing Times

Data Centre	Avg (ms)	Min (ms)	Max (ms)
DCI	0.36	0.01	1.01

DC2	0.38	0.02	1.05

Table 5.12 represents centre to service requests sent by different UB's.

Table 5.13: Overall Response TimeSummary

	Avg (ms)	Min (ms)	Max (ms)
Overall response time	310.95	36.90	662.62
Data Centre processing time	0.37	0.01	1.05

Table 5.13 shows the average, minimum, and maximum total response time and data center processing time required for a data center to balance the workload with a round-robin load balancer, where the splitting policy is the default scheduling policy.

Table 5.14: Response Time by Region

Userbase	Avg (ms)	Min (ms)	Max (ms)
UB1	50.19	36.90	65.71
UB2	200.23	146.11	258.28
UB3	300.36	210.13	397.75
UB4	500.34	335.12	662.62
UB5	499.95	355.26	655.12

Table 5.14 shows response time of User bases UB's. It will be minimum for nearestUB/region.

Table 5.15: Data Centre

Data Centre	Avg (ms)	Min (ms)	Max (ms)
DCI	0.36	0.01	1.10
DC2	0.38	0.02	1.05

Table 5.15 represents centre to service requests sent by different UB's.

5.7 Reconfigure Dynamically with Equally Spread Current Execution Load

Table 5.16: Overall Response TimeSummary

	Avg (ms)	Min (ms)	Max (ms)
Overall response time	318.70	37.28	658.79
Data Centre processing time	8.16	0.02	183.75

Table 5.16 shows the average, minimum and maximum overall response time and data centre processing time taken by the data centre using Throttled Load Balancer to balance the load of tasks while in this case space shared policy is default scheduling policy.

Userbase	Avg (ms)	Min (ms)	Max (ms)
UB1	78.96	37.28	238.26
UB2	204.58	145.66	330.72
UB3	302.39	218.54	389.88
UB4	501.79	366.43	652.63
UB5	502.23	365.16	658.79

Table 5.17 shows response time of User bases. Centre full fill the request of UB's. It will beminimum for nearest UB/region.

Table 5.18: Data Centre Request Servicing Times

Data Centre	Avg (ms)	Min (ms)	Max (ms)
DCI	3.61	0.02	61.79
DC2	12.66	0.03	183.75

Table 5.18 represents centre to service requests sent by different UB's.

5.8 Load balancer used Throttled

5.9 Closest data centre with Throttled

Table 5.19: Overall Response TimeSummary

	Avg (ms)	Min (ms)	Max (ms)
Overall response time	310.92	36.13	657.64
Data Centre processing time	0.37	0.01	1.05

Table 5.19 shows the average, minimum, and maximum total response time and data center processing time required to balance the workload with an active load balancer, where the splitting policy is the default scheduling policy.

Table 5.20: Response Time by Area

User base	Avg (ms)	Min (ms)	Max (ms)
UB1	50.18	36.13	65.41
UB2	200.31	143.26	262.14

UB3	300.18	216.14	388.70
UB4	499.92	365.28	650.20
UB5	500.32	362.76	657.64

Table 5.20 shows response time of User bases. It will be minimum for nearest UB/region.

Data Centre	**Avg (ms)**	**Min (ms)**	**Max (ms)**
DCI	0.36	0.01	0.97
DC2	0.38	0.02	1.03

Table 5.21 represents center to service requests sent by different UB's.

5.10 Optimize Response Time with Throttled

Table 5.22: Overall Response Time Summary

	Avg (ms)	**Min (ms)**	**Max (ms)**
Overall response time	310.95	36.93	662.65
Data Centre processing time	0.37	0.01	1.03

Table 5.22 shows the average, minimum, and maximum total response time andprocessing timeof a data center using a round-robin load balancer to balance workloads.

	Avg (ms)	**Min (ms)**	**Max (ms)**
Overall response time	310.95	36.93	662.65
Data Centre processing time	0.37	0.01	1.03

	Avg (ms)	**Min (ms)**	**Max (ms)**
Overall response time	310.95	36.93	662.65
Data Centre processing time	0.37	0.01	1.03

Data Centre	**Avg (ms)**	**Min (ms)**	**Max (ms)**
DCI	0.36	0.01	0.97
DC2	0.38	0.02	1.03

Table 5.21 represents center to service requests sent by different UB's.

5.11 Optimize Response Time with Throttled

Table 5.22: Overall Response Time Summary

	Avg (ms)	**Min (ms)**	**Max (ms)**
Overall response time	310.95	36.93	662.65
Data Centre processing time	0.37	0.01	1.03

Table 5.22 shows the average, minimum, and maximum total response time andprocessing timeof a data center using a round-robin load balancer to balance workloads.

Table **5.23:** Response Time by **Area**

	Avg (ms)	**Min (ms)**	**Max (ms)**
Overall response time	310.95	36.93	662.65
Data Centre processing time	0.37	0.01	1.03

Userbase	Avg (ms)	Min (ms)	Max (ms)
UB1	50.19	36.93	65.71
UB2	200.22	146.14	258.26
UB3	300.37	210.13	397.75
UB4	500.36	335.12	662.65
UB5	499.92	355.28	655.12

Table 5.23 shows response time of Userbases. It will be minmimum for nearestUB/region.

Table 5.24: Data Centre Request Servicing Times

Data Centre	Avg (ms)	Min (ms)	Max (ms)
DCI	0.36	0.01	0.97
DC2	0.38	0.02	1.03

Table 5.24 represents time taken by centre to service requests sent by different UB's.

Table 5.25: Overall Response TimeSummary

	Avg (ms)	Min (ms)	Max (ms)
Overall response time	318.71	37.28	5650.01
Data Centre processing time	8.17	0.02	5452.01

Table 5.25 shows the average, minimum, and maximum total response time and data center processing time required for a data center to balance the workload using constrained load balancing, where the sharing policy is the default scheduling policy.

Table 5.26: Response Time by Region

Userbase	Avg (ms)	Min (ms)	Max (ms)
UB1	78.96	37.28	215.07
UB2	204.66	144.41	5650.01
UB3	302.38	218.54	389.88
UB4	501.79	366.43	651.38
UB5	502.23	365.16	660.04

Table 5.26 shows response time of User bases

Figure 5.1: overall processing time using Round Robin Load balancer

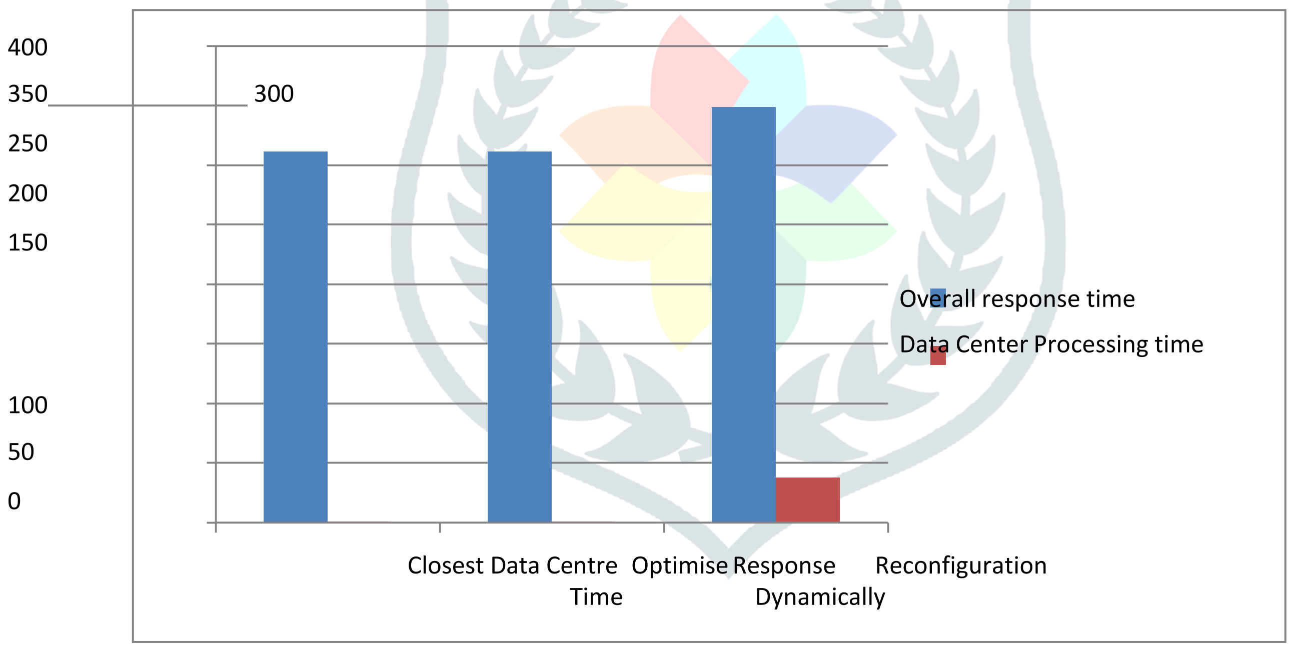

Figure 5.1 Depicts that while taking overall processing time into consideration for assessing it isstated that space shared policy's overall processing time is less than that of time shared policy.

Using Equally Spread Current Execution Load Balancer

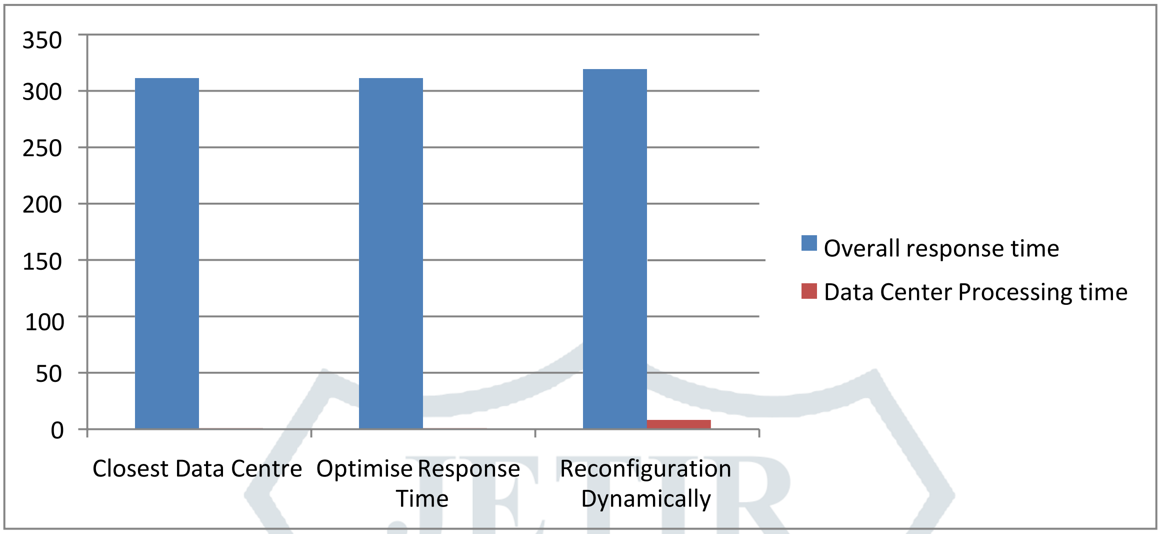

Figure 5.3: Comparison of Overall Response Time using throttled load balancer

Figure 5.3 depicts that throttled load balancer represents that overall response time ofserver isless in case of comparison.

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Chapter6

CONCLUSION

Conclusion

This paper provides information about cloud computing, the different methods and methods currently used for scheduling virtual machines in cloud environments, and the issues that occur with these models. In this study, all three service providers are compared and our financial resources are compared based on two metrics, total response time and data response time. After analyzing all cases, when comparing two load balancers with throttling load balancer versus service policy, it was found that the total uptime of the data center was always higher. However, Round Robin and Eqaully shippers are now equal products. So, while Roud Robin and Equally Spread Now Execution load balancers work well in an environment, they respond early to requests from groups or user groups.

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