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Data Center Processing Time Evaluation of Service Broker Policies In A single Data Center

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Abstract : Cloud Computing is a highly emerging technology which host and deliver internet Services. The power of Cloud Computing is driven by many data centre installed in hundreds to thousands of servers. Due to the increase in clients for cloud services and increasing demand for computing resources, the size and complexity of today's data centre are growing rapidly. This paper evaluates data center processing time of different service broker policies in single data centre .The simulated results provided in this paper are based on the round robin scheduling algorithm when applied on different service broker policies to estimate response time and data center processing time.

Keywords : Cloud computing, Round robin, Cloud, Closest data center, Optimized Response time, Reconfigure dynamically, Load Balancing, Data Center Processing Time,

I. Introduction :

1. Cloud Computing : The term means using the hardware and software resources of computer that are being imparted as a service over the network. It refers to applications delievered as services on the Internet and data centres hardware/systems software which provide such services. Datacenter hardware /software is a Cloud. Cloud computing provides their offers according to several models:

- Infrastructure as a Service (IaaS),
- Platform as a Services (PaaS),
- Software as a Services (SaaS)

a. Infrastructure as a services (IaaS) In IaaS grids clusters, virtualized server, its computational resources- CPU's, memory, network, storage and system software are delivered as a services. Perhaps the best known example is Amazon's Elastic Computer Cloud (EC2) and Simple Storage Service's (S3) which provides (managed and scalable) resources as services to the user.

b. Platform as a Services (PaaS) typically makes use of dedicated API's to control the behaviour of a server hosting engine which executes and replicates the execution according to user request eg. force.com, Google App Engine.

c. Software as a Services (SaaS) standard application software functionality is offered within a cloud. Eg. Google Docs, SAP Bossiness by design Load Balancing is one of prerequisites to utilize the full resource of parallel and distributed systems [1].

The importance of this service is highlighted in a recent report from the University of Berkeley as: "Cloud computing has been the long-held dream of computing as a utility that has the potential to transform a large part of the IT industry and making software more attractive as a service" [2].

A Cloud Computing System has three main components :

1. **Client** : These are the end users which interact with cloud to manage information.These are of further three types :Mobile :Windows mobile smart phone,Blackberry,I Phone.Thin :These don't do any computational work ,merely display information. Thick : These are the devices or computers which use different browsers like Google Chrome,Internet Explorer to connect to different cloud environment.
2. **Datacenter** : It is nothing but collection of different servers hosting different applications.It may exist at a large distance from the clients.
3. **Distributed Server** :It is server which actively monitors the services of their hosts.It is that part of cloud available throughout the internet hosting different applications.[8]

2. Virtual Machine Scheduling Policy **:** Virtual Machine Scheduling Policy determines the sharing of available resources among cloudlets. CloudSim models scheduling of CPU resources at two levels: Host and VM.

At Host level, the host shares fractions of each processor element (PE) to each VM running on it. As resources are shared among many VMs, so this scheduler is known as VmScheduler.

In the VM level, each virtual machine divides the resources received from the host among Cloudlets running on it. As , this level provides sharing of resources among Cloudlets, it is called Cloudlet Scheduler. The VmScheduler models the behavior of scheduling at virtual machine level like VMMs such as Xen and VMware. Therefore, if you want to get behavior of this kind of

software regarding distribution of resources among VMs running at the host which is same, this is the environment where your new policy should be implemented [3].
In both levels, there are two default policies available:
1) Space Shared: In form of either VmScheduler SpaceShared or CloudletScheduler Space Shared. This means that if there are many running VM's or Cloudlets than available PEs, the elements which arrive at last have to wait on a queue until enough resources are free.
2) Time Shared: Either VmScheduler TimeShared or CloudletScheduler TimeShared fractions of available PEs are shared among running elements, and all the elements run simultaneously [3].

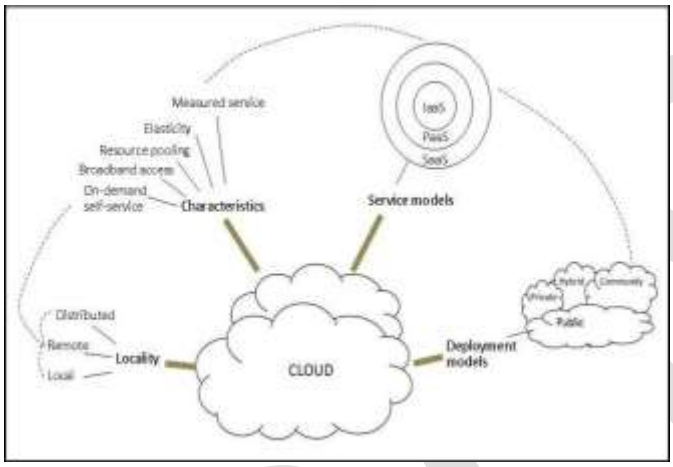

Fig 1 : View of Cloud Computing Environment [8]

3. Types of Cloud
There are different types of clouds that you can subscribe depending upon your needs.
1. Public Cloud: A public cloud can be accessed by any subscriber with an internet connection and access to the cloud space. Being a home user or small business owner, preferably you will use public cloud services.
2. Private Cloud: A private cloud is established for a specific group or organization and limits access to just that group.
3. Community Cloud: A community cloud is shared among two or more organizations that have similar cloud requirements.
4. Hybrid Cloud : A hybrid cloud is essentially a combination of at least two clouds, where the clouds included are a combination of public, private, or community. [4]

II. Service broker policies :

1) Closest data center - The shortest path to the data center from the user base, depending on the network latency is selected and in accordance to that, the service broker routes the traffic to the closest data center with the consideration of transmission latency.
2) Optimized response time - In this routing policy, service broker actively monitors the performance of all data centers and based on that directs traffic to the data center with best response time.
3) Reconfigure dynamically -This router has one more responsibility of scaling the application deployment dependeding on the current load it gets. This policy usually increases and decreases the no. of virtual machines allocated in the data centers. This is done by taking into consideration the current processing times and best processing time ever achieved [6].

III. VM load balancing policy:

VM allocation is the process of creating VM instances on hosts that match the characteristics like storage, memory, configurations such as software environment, and requirements like Availability zone of the SaaS provide [5].In the infrastructure-level services (IaaS) related to the clouds are or can be simulated by extending the data center entity of CloudSim[8].It is the responsibility of data center entity to manage a number of host entities. Using VM allocation policy that must be defined by the Cloud service provider the hosts are assigned to one or more VMs. The VM policy stands for the operations control policies related to VM life cycle such as: provisioning of a host to a VM,Creation of VM , Destruction of VM , and Migration of VM .Similarly, one or more application services can be provisioned within a single VM instance, called as application provisioning in the context of Cloud computing.
1) Round-robin Load Balancer- This uses a simple round-robin algorithm to allocate VMs.
2) Active Monitoring Load Balancer- It balances the load tasks among available VM's.
3) Throttled Load Balancer- This ensures only a pre-defined number of Internet Cloudlets and are allocated to a single VM at any given time. If there are more request groups present than the number of available VM's at a data center, some of the requests have to be queued up until the next VM becomes available , described in AWS Cloud Computing Whitepapers [7].

In this paper evaluation of data center processing time of three service broker policies has been done by using Round Robin approach.

IV. Research Methodology :

1. Creating Virtual Environment for simulating Cloud:
On a computer system with Java 1.6 installed and using a Java IDE such as Eclipse or Netbeans project. Cloud simulator based on JDK and Eclipse toolkit is imported in workspace to run a simulator for analyzing cloud traffic based on user defined parameters.

2 Configuring the cloud environment on simulator :
To set up a Simulation Parameters with the objective of performance analysis between above mentioned three service broker policies.This work for evaluation is done by taking two comaparing two parameters i.e Overall response Time and Data Centre Processing Time of all the three Service Broker Policies.

V. Tool Used - Cloud Analyst :

Firstly selection of good tool is critically important for simulating large scale applications, so apparently users or researchers choose a tool that has easy to use environment .So this tool provides graphical user interface which comes with a Tool Kit by setting up various cloud environment parameters.The output provided by this tool is also in graphical representation which can be easily examined by researchers.[9]Some of the features of this tool are :

1. Easy set up.
2. Flexibility in Configuring the Cloud environment.
3. Output in graphical form

Response Time and data center processing time function as performance evaluation parameter.The results after simulation helps a lot in improving quality of service [11].

Main Components of Cloud Analyst [12]:

1. Region 2.User base 3.Internet 4.Internet Cloudlet 5.Data Center Controller 6.VM Load Balancer 7.Cloud Application Service Broker

VI. Results :

Simulated are conducted to analyze the response time and data center processing time of propose work.

1. Closest Data Center :

Overall Response Time Summary

	Avg (ms)	Min (ms)	Max (ms)
Overall response time:	300.22	210.23	400.69
Data Center processing time:	0.40	0.01	1.05

Cost

Total Virtual Machine Cost ($):	12.00
Total Data Transfer Cost ($):	49.04
Grand Total: ($)	61.04

2. Reconfigure Dynamically:

Overall Response Time Summary

	Avg (ms)	Min (ms)	Max (ms)
Overall response time:	359.00	211.41	5076.01
Data Center processing time:	59.21	0.02	4761.50

Cost

Total Virtual Machine Cost ($):	233.84
Total Data Transfer Cost ($):	49.04
Grand Total: ($)	282.88

3. Optimise Response Time :

Overall Response Time Summary

	Avg (ms)	Min (ms)	Max (ms)
Overall response time:	300.19	201.27	402.12
Data Center processing time:	0.40	0.01	1.10

Cost

Total Virtual Machine Cost ($):	12.00
Total Data Transfer Cost ($):	49.04
Grand Total: ($)	61.04

Below figure shows the graphical representation of the overall response time and data center processing time of three service broker policies .

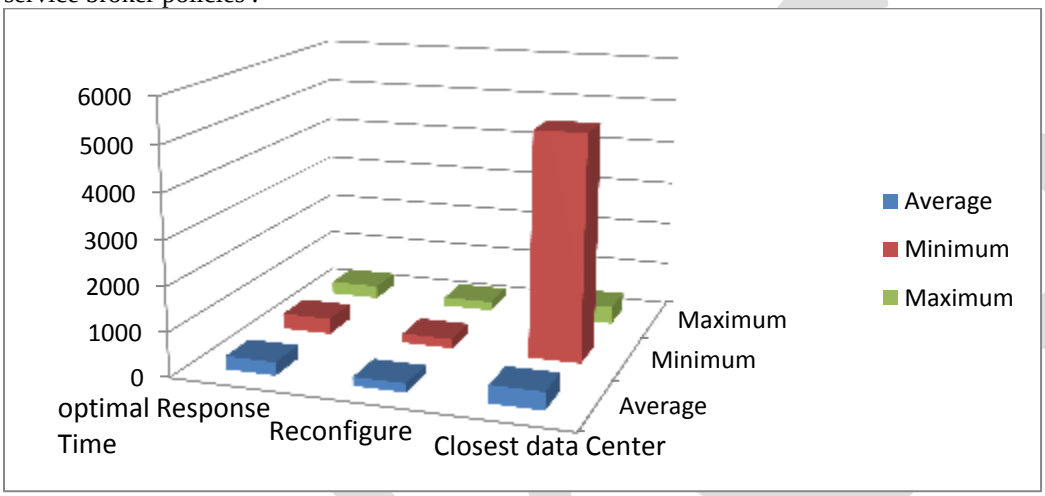

Fig 2- Graphical Representation of Overall Response Time of 3 Policies

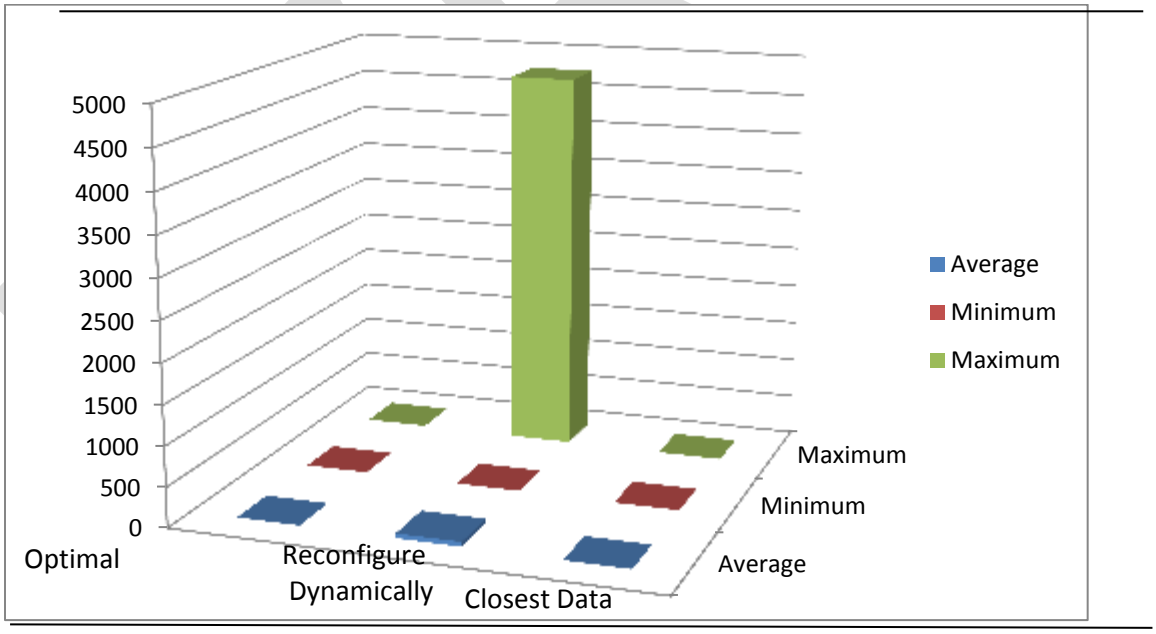

Fig 3 : Grpahical Representation of Data Processing Time of 3 Policies

VII. Conclusions :

After the analysis of the all the three cases of simulation, it has been analysed that total cost i.e cost of virtual machines and data transfer cost is almost same but overall response time and data center processing varies. Out of all three service broker policies, the parameters measured i.e response time and data center processing time is lowest of Closest Data Center Policy. As these

parameters are challenge of every cloud engineer to build the network so that performance can be increased. So this paper tries to give a view on evaluation of all the three service broker policies using round robin approach and concludes closest data center policy best for in a single data center.

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