Modeling Local Broker Policy Based on Workload Profile in Network Cloud

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Abstract: ***In this research paper, we have conducted work on modeling of local broker policy based on workload profile in Network cloud. For this we are using workload based applications. To handle workload based applications, two Scheduling Policies Random Non-overlap and Workload profile based be used. We compare these two scheduling policies based on three parameters Execution (mean) time, Response (mean) time and Waiting (mean) time. Workload based profile policy gave better results than Random-Non overlap policy in terms of time performance parameter.***

Keywords: Cloud computing, Broker Policy, Modeling and Simulation, Data Center, Resource management, Workload Based applications

1. Introduction

Cloud computing is the delivery of computing services over the Internet. Examples of cloud services are online file storage, social networking sites and webmail. By using Cloud computing users can use data and services from around the world in a pay-as-you-go model. Cloud Computing is like a large pool of easily usable and accessible virtualized resources, hardware and development platforms. [1] Cloud Computing offers various benefits. These benefits are On-demand self service, Provide Broad network access , Provide Resource pooling, Rapid elasticity and Measured service, More Flexible, More Storage and Save Money.

In Cloud computing, the precise evaluation of scheduling algorithm for scientific applications, such as message passing parallel applications or multitier web applications modeling of data cenres is required. And we found that there is no broker policy in cloud sim. Which works principally on the concept of workload profile. To overcome this issue we suggest network cloud simulation, by using network cloud simulator basic workflow profile based applications have been implemented. it defines a improved method of Workload based profile. By using this method identifying and priortizing low, medium and high resource intensive cloudlets which needs to be submitted by broker to the datacenter.[2]

In Cloud Computing Workload of different applications be different. Workload can vary from unrelated and independent task to related and structured workflow, which consist of sequence of connected computational or data tasks. Workload need to be managed on cloud.[3]

2. Previous Work

Various Studies have been done on the Workflow scheduling in Cloud. Different Studies showed different results for workflow applications. Some of them are explained below.

In a study by [2] introduced Network cloud Sim, Which is extension of Cloud Sim. In this study Network Cloud Sim , was proposed. Which allows more accurate evaluation of scheduling and resource provisioning policies of a cloud infrasturucture and it also provide support for Workflow applications. The main components of Network Cloud Sim with their functionality and how different parallel applications be modeled was also defined. The evaluation results showed that Network Cloud sim is capable of simulating cloud data center and applications with communicating tasks such as MPI with high degree of reality.

A Study by [4] described comparison of scheduling algorithms in cloud computing environment. This paper aim was practical comparison of four job scheduling algorithm in cloud computing. The algorithm used was Random, Round-Rubin (RR), Random Resource Selection, Opportunistic Load Balancing and Minimum Completion Time. Three metrics for evaluating these job scheduling algorithms be throughput, make span and the total execution cost. Based on the results, it can be also concluded that there is not a single scheduling algorithm that provides superior performance with respect to various types of quality services.

3. Methodology

The methodology comprises of different steps as follows.

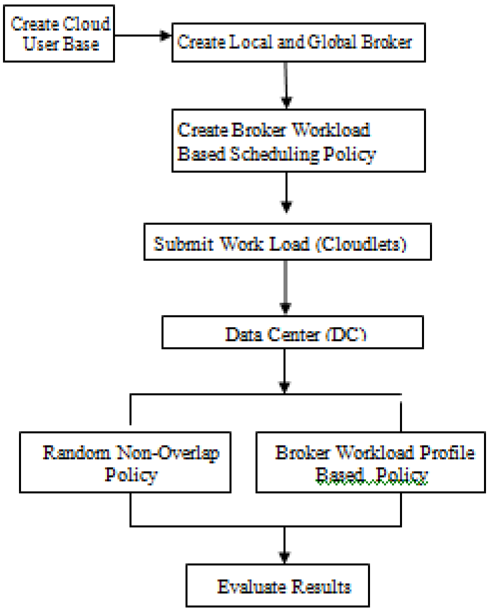
Create Cloud User Base
Create Local and Global Broker
Create Broker Workload Based Scheduling Policy
Submit Work Load (Cloudlets)
Data Center (DC)
Random Non-Overlap Policy
Broker Workload Profile Based Policy
Evaluate Results

Figure 1: Procedure for Modelling Local Broker Policy on Workload Profile in Network Cloud

For defining and modeling of local broker policy based on workload profile in network cloud, various steps be used. Each step briefly described below.

3.1 Create Cloud User Base

A User Base may represent thousands of users but is configured as a single unit and the traffic generated in simultaneous bursts representative of the size of the user base.[5] The User Base entities define the users of the application, their geographic distribution, and other properties such as the number of users, the frequency of usage and the pattern of usage such as peak hours.

3.2) Create Local and Global Broker

After the creation of Cloud user base, we create Broker. To Create Broker it is necessary to understand what is Broker and what the uses of broker are.

3.2.1What is broker

A cloud broker may be a third-party individual that acts as an intermediary between the purchaser of a cloud computing service and the sellers of that service.

Local Broker:- A Local broker is an entity that manages the use, performance and delivery of cloud services and establish relationship between cloud service providers and cloud service consumers [6]

Global Broker: A Global Broker system supports fast provisioning of resource infrastructures needed in service evaluation, system and computational resources, over the multiple clouds.

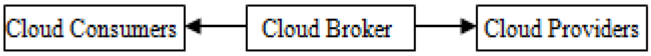

Figure 2: Role of Cloud Broker

3.2.2 Uses of Broker

a) The broker's main role to save the purchaser time by researching services from different vendors.

b) The broker may provide the customer an application program interface (API) and user interface (UI). By using API and UI cloud hides any complexity and allows the customer to work with their cloud services.

c) A cloud broker might also provide the customer with additional services.

d) A cloud broker is a software application that facilitates the distribution of work between different cloud service providers. This type of cloud broker may also be called a cloud agent [7].

3.2.3) How to Create Broker:-

To develop Custom defined broker policy, we must follow. Various steps that are given below. First of initialize broker object with following properties.

a) Broker Type (Local, Global)
b) Type Encryption
c) Type Deduplication
d) Geographic Parameters
e) Number of users
f) Definition of Peak hours
g) Prioritization of workload

3.3 Create Broker workload scheduling policy

The third step is creating broker workload scheduling policy. First we define what workload is.

3.3.1What is Workload (Workflow)

A workflow is an ordered sequence of activities or events, designed to achieve a defined business objective. In Cloud Computing different applications may result in different types of workload. Broker Policy is used for Workload profiling, Screening and scheduling for submission to data center.

3.3.2 Broker Workload Scheduling Policy

In general, scheduling is the process of mapping tasks to available resources on the basis of tasks' characteristics and requirements [8]. In this paper two scheduling policies be used. One is Random –Non overlap Scheduling Policy and another one is Workload Profile Based Scheduling policy.

3.4 Submit Work or Cloudlets

The next step is submitting work. Work is submitted to Data Center (DC). The Cloudlet class has been extended to represent a generalized task with various stages. Each stage can be computation, sending some data or receiving some data [9].

3.5 Data center (DC)

Data Center is the heart of Network Cloud. Data Center process all work, which submitted by various brokers. It consists of array hosts virtualized. Data Center has its own policy of how it will process the submitted work or cloudlets. Data center also consider broker Preferences. Data Center contains hosts virtual machines etc.

3.6 Comparison View of two Policies

In this step comparison of two policies is defined. These policies are Random Non overlap policy And Broker Workload Profile based policy. Broker Workload profile based policy is used against the Random non overlap policy. In Workload profile based policy concept of priority is used. Comparison of these two techniques uses three parameters. These parameters are Waiting (mean) Time, Execution (mean) Time, Response (mean) time.

3.6.1 Execution Time

The execution time of a given task is defined as the time spent by the system executing that task, including the time spent executing run time or system services on its behalf.

3.6.2 Waiting Time: Waiting time is the time when an action is requested or when it occurs.

3.6.3 Response time: Response time of a task is defined as time elapsed between the dispatch (time when task is ready to execute) to the time when it finishes its job.

Table 1: Describe the used parameters & its Mean

Parameters used	*Mean Value*
Execution time	M=Sum of Execution Time of task/ Total no. of task executed
Response Time	M= Sum of Response time of task/ Total no. of tasks for which response is given
Waiting Time	M=Sum of Waiting time of task/ Total no. of task waiting for execution

Table 2: Describe the used parameters & its features

Parameters	*Formula Used*	*Value*	*Characteristics*
Execution Time	Time spent by system execute task +time spent executing run time	Its value be Never Negligible and can never be increasing or decreasing.	Execution time ∞ 1/Performance
Waiting Time	Time of action occurred-time of action requested	Its value be negligible in some cases (When QueueSize is very small).	Waiting Time ∞ Queue Size of tasks
Response Time	Task finishes its job – task is ready to execute next job	In many cases, Its value depends upon Execution time	Response time ∞ 1/ Throughput

4. Results

Since Cloud environment is a complex system which includes the matching between available computation resource and data to be processed. The task execution time is a key component of successful task scheduling and resource allocation in cloud computing environment. Before task is to be executed in data center, we are able to reduce waiting time by building efficient algorithm when work is submitted. We have done fairly, good work in organizing overall schedule of data center. Since our algorithm work on principle of collecting data continuously for doing calculations related to each broker work profile and work submitted by each broker may not follow a linear curve ,as it may increases or decreases due to its own preferences.

Broker Workload Profile = Number of Successful jobs without delay Received / Number of Successful jobs with delay Received + Urgency Number

Urgency Number of each workload representing how urgently work is required by broker.

4.1 Comparison of Random Non Overlap and Workload Profile Based policy based on Execution (mean)Time

First of all both policies be compared based on Execution (mean) Time.

Table 3: Comparison of techniques based on Execution (mean) time

Technique Used	*Execution (mean) Time Value in secs*
Random –Non Overlap Technique	20.4618
Workload Profile Based technique	15.8701

According to the value defined in table be used, the resultant graph be shown below:

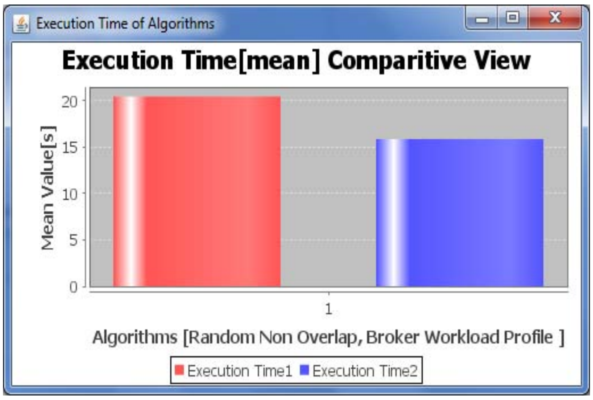

Figure 3: Execution Time [mean] Comparative View

4.2 Comparison of Random Non Overlap and Workload Profile Based policy based on Response (mean) Time

Now both techniques be compared based on Response (mean) Time.

Table 4: Comparison of techniques based on Response (mean) time

Technique Used	*Response (Mean) Time Value in secs*
Random –Non Overlap Technique	1.2401
Workload Profile Based technique	0.7201

Value defined in table and the resultant graph be shown below**.**

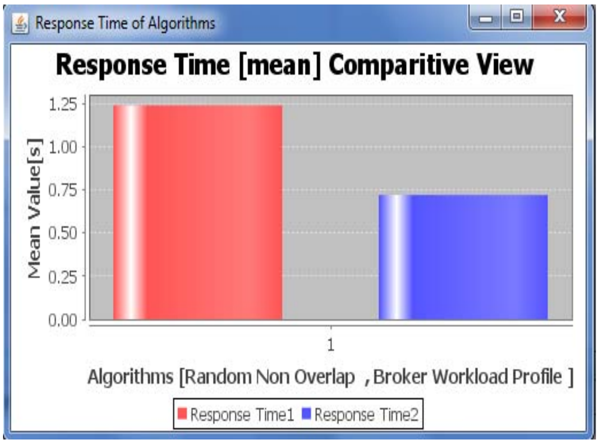

Figure 3: Response Time [mean] Comparative View

4.3 Comparison of Random Overlap and Workload Profile Based Technique based on Waiting (mean) Time

Both techniques be compared based on Waiting (mean) Time.

Table 5: Comparison of techniques based on Response (mean) time

Technique Used	*Waiting (Mean) Time Value in secs*
Random –Non Overlap Technique	0.6010
Workload Profile Based technique	0.0321

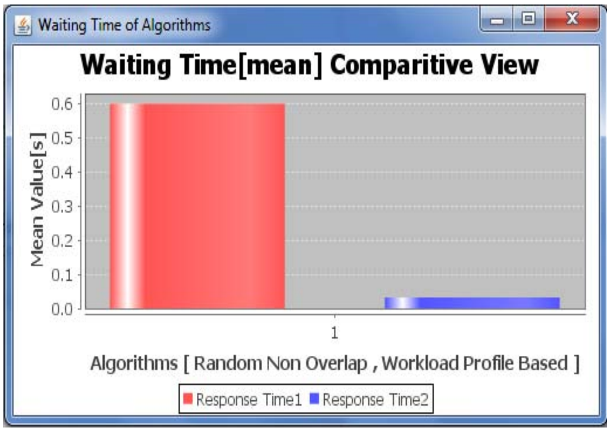

Figure 5: Waiting Time [mean] Comparative View

It is apparent from the above table [3, 4, 5] and fig [3, 4, 5] that by implementing algorithm of calculating the value of time. It helps to schedule the cloudlet with participation of broker policy and results which lead to reduction in over all waiting time and evident from the mean values shown in the table[5], thus this optimization helps the broker get realistic performance from the data center based on how much and what quality of work it is submitting to the data center, it is also evident from the response mean value that the data center is able to respond more efficiently and execution for data center also reduced as more organized ,Prioritized work is received.

5. Conclusion

In this paper, we have used two policies, Random Non overlap policy and Workload Profile based policy for Workload based applications. We compared these two policies based on three parameters Execution (mean) Time, Waiting (mean) Time and Response (mean) Time. The results shown that The value of Workload based profile policy is less than Random non overlap policy in every case. But Workload based Profile policy is better than Random non-overlap policy in terms of time performance parameters.

6. Future Scope

In our paper three parameters were used. Three parameters Execution (mean) time, Response (mean) time and Waiting (mean) Time were applied on Random Non Overlap and Workload Profile Based policy. In Future, we can use other parameters and other policies to make workload applications better.

References

[1] CloudSim: a toolkit for modeling and simulation of cloud computing environments and evaluation of resource provisioning algorithms by Rodrigo N. Calheiros1, Rajiv Ranjan2, Anton Beloglazov1, C´esar A. F. De Rose3 and Rajkumar Buyya1.

[2] NetworkCloudSim: Modelling Parallel Applications in Cloud Simulations by Saurabh Kumar Garg and Rajkumar Buyya.

[3] Workflow Engine for Clouds by Suraj Pandey, Dileban Karunamoorthy and Rajkumar Buyya.

[4] Comparitive Study of Scheduling

[5] Algorithms in Cloud Computing Environment by

[6] Isam Azawi Mohialdeen

[7] Cloud Analyst : A Cloud - Sim- based Tool for Modeling and Analysis of Large Scale Cloud Computing Environments by Bhathiya Wickremasinghe.

[8] Fang Liu, Jin Tong, Jian Mao, Robert Bohn, John Mes

[9] sina, Lee Badger, Dawn Leaf, "NIST Cloud Computing Reference Architecture", NIST Special Publication 500-292, Sept. 2011

[10] A Survey of Cloud Workflow by Huang Hua 1,a, Zhang Yi-Lai 2,b , Zhang Min 3,c1,2,3 Jingdezhen Ceramic Institute, Jingdezhen, Jiangxi

[11] Scheduling Optimization in Cloud Computing by Dr Ajay jangra , Assistant Professor Department of Computer Engg. UIET KUK , India.Tushar Saini Research scholar M.Tech Software Engg ,U.I.E.T KUK, India

[12] CloudSim: A Novel Framework for Modeling and Simulation of Cloud Computing Infrastructures and Services by Rodrigo N. Calheiros1,2, Rajiv Ranjan1, César A. F. De Rose2, and Rajkumar Buyya.

[13] Cost Effective Selection of Data Center in Cloud Environment by Manoranjan Dash, Amitav Mahapatra & Narayan Ranjan Chakraborty.

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