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EFFICIENT JOB SCHEDULING OF VIRTUAL MACHINES IN CLOUD COMPUTING

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Abstract -- Cloud computing is based on the concepts of distributed computing, grid computing, utility computing and virtualization. It is a virtual pool of resources which are provided to users via Internet. Cloud computing service providers one of the goals is to use the resources efficiently and gain maximum profit. This leads to job scheduling as a core and challenging issue in cloud computing. In this research a discussion towards the resource management of virtual machines in cloud and how to make resources more efficiently available to clients is provided. The main focus is on job scheduling. In this present work, a parametric analysis is performed to identify the requirement of process migration and based on this analysis the migration will be performed on these processes. . The effectiveness of the work is identified in terms of successful execution of the processes within the time limits. A comparative study is also done using Matlab.

Keywords – Virtual machines, Matlab, Scheduling, and Migration.

I. INTRODUCTION

Cloud computing is a technology that allows you to access information or application that resides on computer other than your computer or other internet connected device. . The best part of cloud computing is that another company hosts your application. This means that they handle the costs of servers, they manage the software updates, and—depending on how you craft your contract, you pay less for the service. It's also convenient for telecommuters and traveling remote workers, who can simply log in and use their applications wherever they are. The cloud also consists of Server & a Database. Server is also known as Cloud-Provider; while Database is a collection of user-details and applications to be worked upon by users. Computing is the term used for services of cloud. Cloud computing generally provides three types of service models. Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as A Service (SaaS). Cloud can be deployed as public cloud, private Cloud and hybrid cloud and community cloud. Now comes the terms Virtualization and virtual machines. In computing, virtualization is the creation of a virtual (rather than actual) version of something, such as a hardware platform, operating system (OS), storage device, or network resources. It is the technique that removes linking together the hardware and operating system. A virtual machine (VM) is a software implementation of a machine (i.e. a computer) that executes programs like a physical machine. Since cloud computing service provider main aim is to use resource efficiently and gain maximum profit, this lead to job scheduling as a core and challenging issues in cloud computing. In this paper a discussion toward the resource management of virtual machines in cloud and how to make resource more efficiently available to the client is provided. The main focus is on job scheduling. The work is done by creating a virtual environment in Matlab. A comparative study is also done to show the betterment of results.

II. OBJECTIVES

The proposed System will achieve the following objectives

1. Create An Intermediate Architecture that will accept the user request and monitor the cloud servers for their capabilities.
2. Scheduling of the users requests is performed to identify the order of allocation of the processes.
3. Performing the effective resource allocation under defined parameters and the cloud server capabilities.
4. Define a dynamic approach to perform the process migration from one cloud to other.
5. Analysis of work using graph under different parameters.

III. MATLAB

MATLAB (Matrix Laboratory) is a tool to do numerical computation, display information graphically in 2D and 3D, and solve many other problems in engineering and science. Developed by Math Works, MATLAB allows matrix manipulations, plotting of functions and data,

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implementation of algorithms, creation of user interfaces, and interfacing with programs written in other languages, including C, C++, Java, and Fortran.Matlab is an interpreted language for numerical computation. It allows one to perform numerical calculations, and visualize the results without the need for complicated and time consuming programming. MATLAB allows its users to accurately solve problems, produce graphics easily and produce code efficiently. In this present work MATLAB Editor is used for writing the code to implement our algorithm. The result will be shown in the command window of MATLAB.

IV. PROPOSED WORK

There are an increasing number of Cloud Services available in the Internet. Cloud services can be a component of a system and different Cloud Servers that would provide different services. In this present work we have defined a multiple cloud environment. Each cloud server is defined with certain limits in terms of memory and the CPU specifications. Now as the users enter to the system, the user request is performed in terms of processes. To represent the parallel user requests, n number of requests are been generated by the users. All these requests are to be handled by the cloud servers in parallel by using the multiple clouds concept. A middle layer is defined between the cloud servers and the clients' requests that will perform the allocation of the processes to different clouds under overload and under load conditions. As user requests are performed, some parameters are also defines with each requests. These parameters are process time, deadline, input output specifications etc. In the general case, the allocation of the processes is performed in a sequential order. Each process must be executed within the deadline limit. But if more than one processes occur at same time and not get executed before the deadline, in such case the processes is switched from one cloud server to other called the process migration. In this present work, a parametric analysis is performed to identify the requirement of process migration and based on this analysis the migration will be performed on these processes. The effectiveness of the work is identified in terms of successful execution of the processes within the time limits.

V. RESEARCH DESIGN

The proposed system is middle layer architecture to perform the cloud allocation in case of under load and overload conditions. The over load conditions will be handled by using the concepts of process migration. The middle layer will exist between the clouds and the clients. As the request will be performed by the user this request will be accepted by the middle layer and the analysis of the cloud servers is performed by this middle layer. The middle layer is responsible for three main tasks.

1. Scheduling the user requests.
2. Monitor the cloud servers for its capabilities and to perform the process allocation
3. Process Migration in overload conditions.

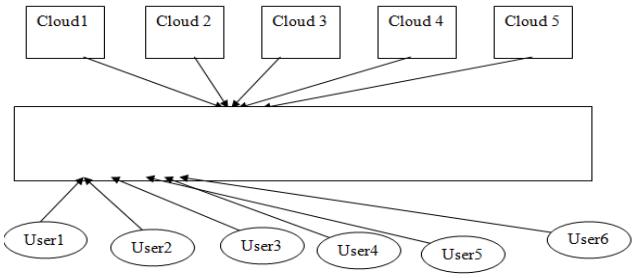

Fig 1 System Design

VI. IMPLEMENTED ALGORITHM

1. Input M number of Clouds with L number of Virtual Machines associated with Each cloud.
2. Define the available memory and load for each virtual machine.
3. Assign the priority to each cloud.
4. Input N number of user process request with some parameters specifications like arrival time, process time, required memory etc.
5. Arrange the process requests in order of memory requirement
6. For i=1 to N
7. {
8. Identify the priority Cloud and Associated VM having load < Capacity
9. Perform the initial allocation of process to that particular VM and the Cloud
10. }
11. For i=1 to N
12. {
13. Identify the Free Time slot on priority cloud to perform the allocation. As the free slot identify, record the starttime, process time, turnaround time and the deadline of the process.
14. }
15. For i=1 to N
16. {
17. If finistime(process(i))>Deadline(Process(i))
18. {
19. Print "Migration Required"
20. Identify the next high priority cloud, that having the free memory and the time slot and perform the migration of the process to that particular cloud and the virtual machine.
21. }
22. }

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VII. RESULTS

To present the work effectively and to accept the user input, a graphical interface is presented in this work in MATLAB. The graphical user interface accept the input parameters related to the clouds as well as to define the number of users

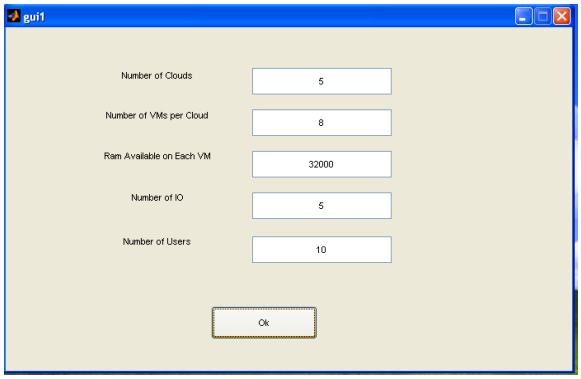

Fig 2. Graphical Interface

A graphical interface is presented to accept the main input parameters to build the cloud environment and to input the user requirement. The input taken here includes the number of clouds in the environment, number of VMs supported by each cloud, memory availability, IO availability for each virtual machine. By using these parameters the clouds server is configured.

User ID	Arrival time	Process time	Deadline	I/O request	memrequest	Typeofservice
1	9	3	18	4	30876	0
2	97	10	112	4	4540	0
3	91	8	109	3	1142	1
4	93	7	108	3	12551	1
5	17	8	26	1	1477	0
6	82	7	93	4	1102	0
7	38	8	54	0	15672	0
8	64	8	80	1	21750	1
9	16	2	23	4	10892	1
10	22	8	33	2	22370	1

Table 1. List of parameters

Table 1 shows the values of Arrival time, Process time, Deadline, I/O request, memrequest and Typeofservice are computed to schedule requests of users.

User ID	Arrival time	Process time	Deadline	I/O request	memrequest	Typeofservice
6	82	7	93	4	1102	0
3	91	8	109	3	1142	1
5	17	8	26	1	1477	0
2	97	10	112	4	4540	0
9	16	2	23	4	10892	1
4	93	7	108	3	12551	1
7	38	8	54	0	15672	0
8	64	8	80	1	21750	1
10	22	8	33	2	22370	1
1	9	3	18	4	30876	0

Table 2. List of parameters(Sorted acc. to memory)

Table 2 shows users process requests are sorted according to memory required.

Cloud no.	Virtual machine no. associated with cloud							
	1	2	3	4	5	6	7	8
1	12847	3777	10250	9630	1124	32000	32000	32000
2	32000	32000	32000	32000	32000	32000	32000	32000
3	32000	32000	32000	32000	32000	32000	32000	32000
4	32000	32000	32000	32000	32000	32000	32000	32000
5	32000	32000	32000	32000	32000	32000	32000	32000

Table 3 Available memory after allocation

Table 3 shows list of available memory after allocation of processes to virtual machines.

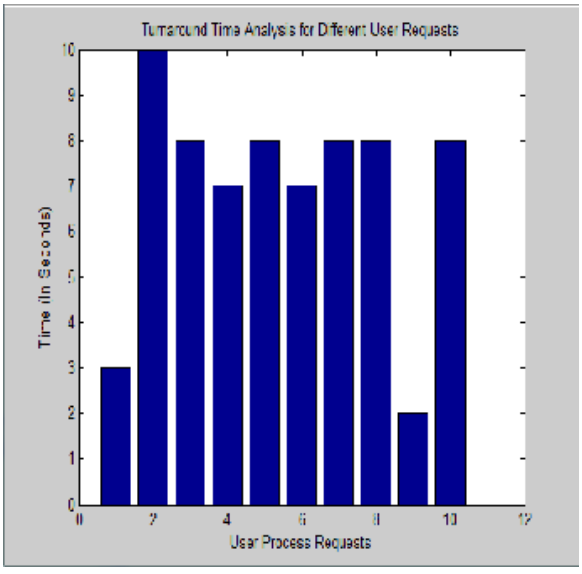

Fig 3 Turnaround time Analysis

Fig 3 shows the turnaround time analysis. Here x -axis represents the number of user requests and y- axis represents

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the time taken by these processes in seconds. The figure is showing the process time required by each process.

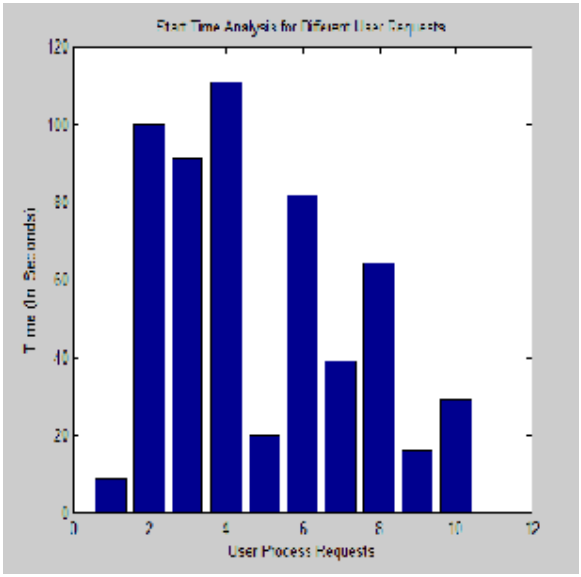

Fig 4 Start time Analysis

Fig 4 shows the start time analysis for 10 processes. Here x-axis represents the number of user requests and y-axis represents the time taken by these processes in seconds. The figure is showing the Start time of each process.

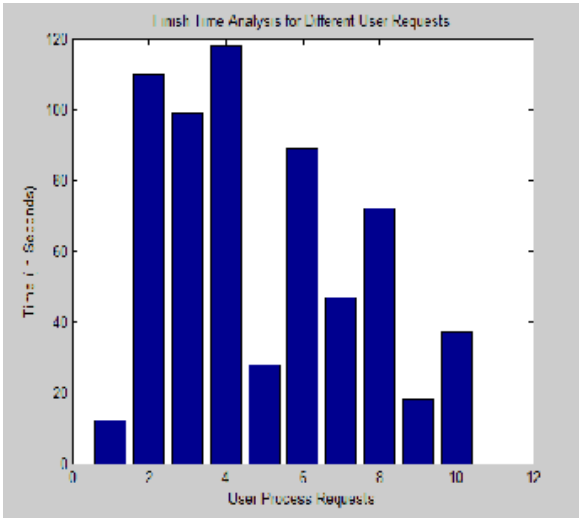

Fig 5 Finish time Analysis

Here figure 5 is showing the Finish Time analysis for 10 processes. Here x-axis represents the number of user requests and y-axis represents the time taken by these processes in seconds.

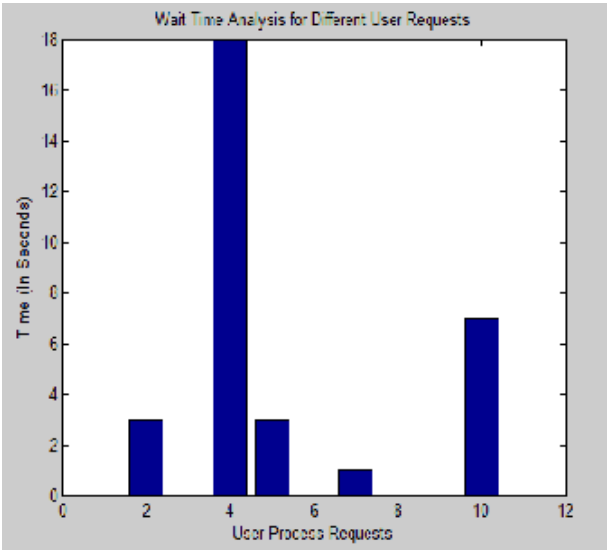

Fig 6 Wait Time Analysis

Here figure 6 is showing the Wait Time analysis for 10 processes. Here x-axis represents the number of user requests and y-axis represents the time taken by these processes in seconds. The figure is showing the wait time of each process. As we can see, most of the processes are executed without any wait. And some are having the nominal wait time.

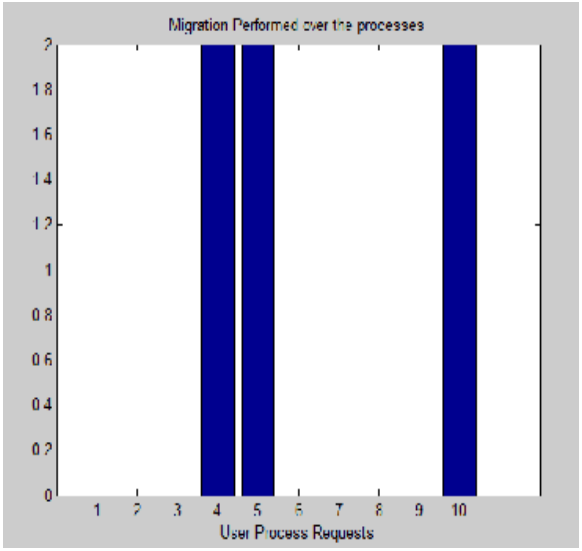

Fig 7 Migrated processes

Here figure 7 is showing the list of migrated processes. Here x-axis represents the number of user requests and y-axis represents the clouds. As we can see, three processes 4, 5 and 10 are migrated to cloud 2

VIII. COMPARATIVE STUDY

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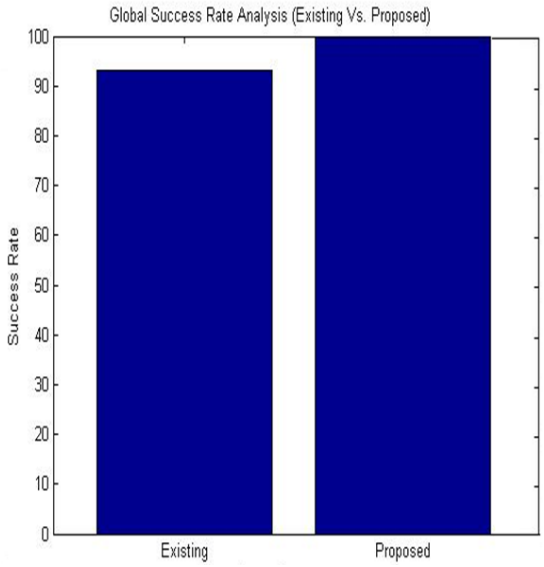

Figure 8 Global Success Rate

Here figure 8 is showing the comparative analysis of presented approach with existing approach in terms of process execution. As we can see, the success ratio of existing approach is 93% and the success ratio of proposed approach is 100%.

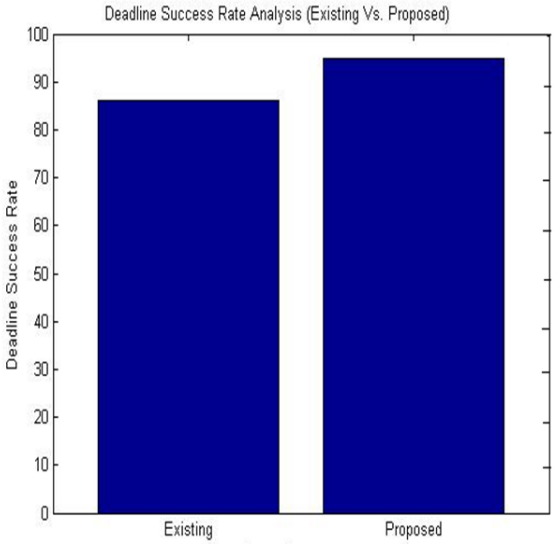

Figure 9 Deadline Success Rate Analysis (Existing Vs. Proposed)

Here figure 9 is showing the comparative analysis of presented

approach with existing approach in terms of process execution before deadline. It means the analysis of number of processes that are executed without job migration. As we can see, the success ratio of existing approach is 86% and the success ratio of proposed approach is 95%.

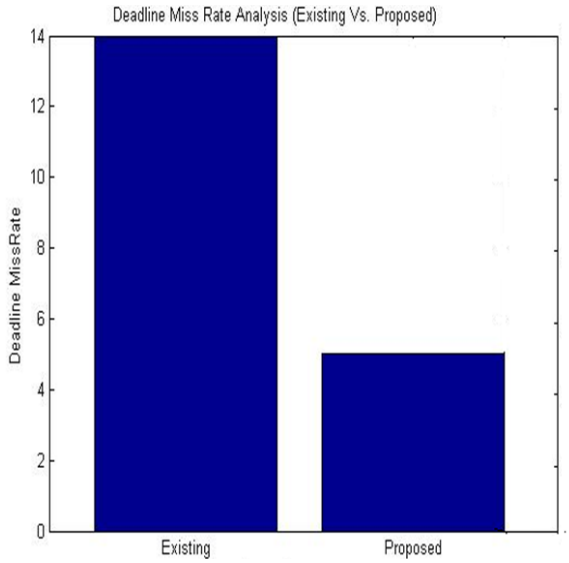

Figure 10 Deadline Miss Rate Analysis (Existing Vs. Proposed)

Here figure10 is showing the comparative analysis of presented approach with existing approach in terms of process execution that are not executed before deadline. It means the analysis of number of processes that are executed on other cloud after job migration. As we can see, the miss ratio of existing approach is 14% and the success ratio of proposed approach is 5%.

IX. CONCLUSION

In this present work, a resource allocation scheme on multiple Clouds in both the under load and the over load conditions is provided. As the request is performed by the user, certain parameters are defined with each user request, these parameters includes the arrival time, process time, deadline and the input output requirement of the processes. The Cloud environment taken in this work is the public cloud environment with multiple clouds. Each Cloud is here defined with some virtual machines. The obtain results shows the successful execution of all the processes within time limit. The work is performed on a generic system that can have n number of Clouds.

X. FUTURE SCOPE

The presented work is about to perform the scheduling and the allocation of the processes to the clouds in case of under load and overload conditions. In case of over load condition, the migration of the processes is performed from one cloud to other. The Future enhancement of the work is possible in the following directions.

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1. The presented work is defined the overload conditions in terms of deadline as well as the memory limit of the Clouds. In future some other parameters can also be taken to decide the migration condition.

2. The presented work is defined for the public Cloud environment, but in future, the work can be extended to private and the hybrid Cloud environment.

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