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Task Oriented Joint Multiple Resource Allocation Method for Cloud Computing Environment

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ABSTRACT

Cloud is a collection of interconnected computers with parallel and distributed system that are energetically presented as one or more unified computing resources. It is based on service-level agreements formed through negotiation between the service provider and consumers. This project work aims at developing an Task Oriented Joint Multiple (TOJM) best fit method of resource allocation for cloud computing environments, assuming that more than one resources are assigned concurrently to each service request, after ranking the tasks to be scheduled. When the cloud computing service provider accepts tasks from users, using comparison matrix. The tasks are then ranked and based on weights assigned to various criteria of resource requirement using a process namely analysis hierarchy process. In this project, the Joint Multiple best fit resource allocation strategy is used for allocating the resources to the ranked tasks. This allocation strategy is based on the best-fit approach. The Joint Multiple strategy first identifies a resource whose requirement is maximum compared to the other resources required for that particular job and designates it as the identified resource. The scheme then finds a virtual machine which best suits the identified resource and checks if all other resources required for the task is also available in that Virtual Machine (VM). If so, all the resources are allocated jointly from that virtual machine. Otherwise, the scheme checks for the next virtual machine. If the available VMs do not satisfy the resource requirements, the task is rejected.

Keywords:
Service level agreements TOJM resource allocation method, Virtual Machine

1.Introduction

This model of cloud encourages availability on-demand self-service, broad network access, resource pooling, rapid elasticity, and measured service. In a cloud computing environment, dynamic resources allotment and reallocation are keys for accommodating unpredictable demands, ultimately, contribute to investmentreturn. [5]6]

Instead of keeping data on the hard drive or updating applications for the needs, a service over the Internet is used, at another location, to store the information or to use the applications. The popularity of cloud computing be obligated to the increase in the network speed, to the reality [8] that virtualization and grid computing technologies have become commercially available[4]. Cloud computing provides the needed computation resources in the needed time so that user can form the information effectively.

The basic structure of a cloud computing environment is illustrated in Figure 1.1. It contains three main layers. [9] The leading layer is one of the resources provider layer, the middle cloud services provider layer and at the bottom the end user or consumer layer. The cloud service provider layer use the resource provided by the resources layer and the virtualization technology to incorporate the cloud services and conditions these services to the end users on request.[10]

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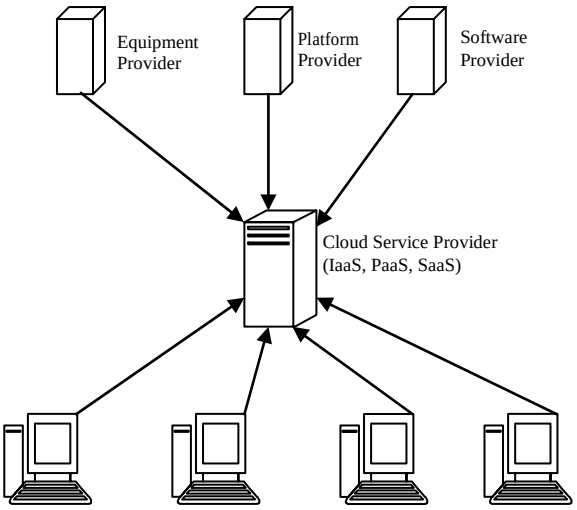

Figure 1.1 Cloud based Computing Architecture

Hence, in a cloud computing environment multiple users may outsource their tasks and the resources required to complete these tasks have to be allocated from the cloud virtual machines in order to efficiently carry out the tasks. Resources allocation in cloud is an important issue because the resources must be allocated dynamically upon the requirements and preferences of consumers. Traditional system-centric resource management architecture cannot process the resource assignment task and dynamically allocate the available resources in a cloud computing environment. [11]

Hence, project work aims at developing allocation of resources model, by first ranking tasks based on user preferences based on a comparison matrix and then allocating the resources assuming that multiple resources. After ranking,the comparison matrix, the resources are allocated using Optimal Joint Multiple resource allocationstrategy.[12]

2. Related Works

In (Rajkumar 2011) Rajkumar et al., have proposed a SLA (Service Level Agreement) oriented resource provisioning in cloud. The resource provisioning with the cloud virtual machines are used to allocate the resources efficiently[1]. The user service demand is sent to SLA person Resource Allocator. In the SLA person Resource Allocator, finding out whether accept or reject request of QoS requirements. It acquires these resources from external sources such as public clouds.

In (Karthik 2011) Karthik et al., have proposed an approach Earliest Deadline First Greedy algorithm for computing clouds. The tasks are ordered based on their deadlines. The tasks are allocated to the Virtual Machines (VM). If these VM‟s are inadequate to complete the task before its target, it selects the lowest set of VM‟s[2]. The greedy algorithm allocates VM‟s for each task separately.

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3. Proposed System

3.1 Proposed Task Oriented Joint Multiple Best FitResource Allocation

After assigning the priorities for the tasks in the task pool the tasks are sorted according to their priorities and resources are assigned to the tasks according to their requirement, starting with the task having the highest priority based on the joint method of -multiple allocation scheme.
It is problem to assign different types of resource at the same time. It is proposed to identify one single resource type which has the largest effect on the resource allocation. Joint multiple resource allocation method reflects only recognized resource in the selection of a center. This approach and aims to reserve as much as possible for future requests that may require a larger size ofprocessing[3].

The resources that proportionate size of resource, comparing the size of required resource with the maximum resource size for each resource type, is first selected as„identified resource‟. Then the center with the least available amount of the identified resource from among k centers is selected. In this case, the units of processing ability and bandwidth are different, being measured in percentage of CPU power and b/s (bits per second)[6].

The sizes of the various resources are compared as in the following things. Guess that the maximum amount of bandwidth in a center is 100Mb/s. A request for 20% of CPU power and 30Mb/s requires 20% of processing ability and 30% of bandwidth [7]. As the amount of required bandwidth is larger than that of required processing ability, bandwidth will be the identified source in this case. The following figure depicts the process of selection of identified resource.
Selection of identified resources are depending upon two things they are processing ability bandwidth. These two things are selected based on minimum condition and compared with one another.If the ability is greater than bandwidth, then identified resource is C otherwise the resource is N. After getting resources, selection of needed resources are done. If resources in selected center is equal to required resources means that is allocated to the center to the current request. Otherwise again request passed to the starting. This is the process of joint method of multiple best fit resource allocation.

The proposed work is to implement a task oriented joint method of multiple resource allocation based on best fit approach for resource allocation in cloud computing environment. Cloud computing enables users to travel their data to a remote location with minimum effect on system performance, but also provides easy gain access to cloud computing environment [5]. In order to assign cloud computing resources, nodes with spare computing power are detected, and network bandwidth, line quality, response time, task costs, and consistency of resource allocation are examined.

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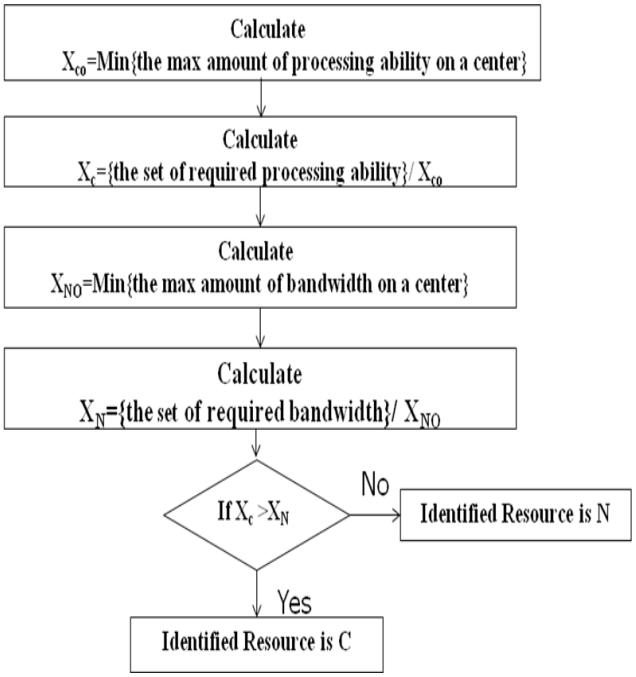

Figure 3.1 Diagram for Selection of Identified Resource

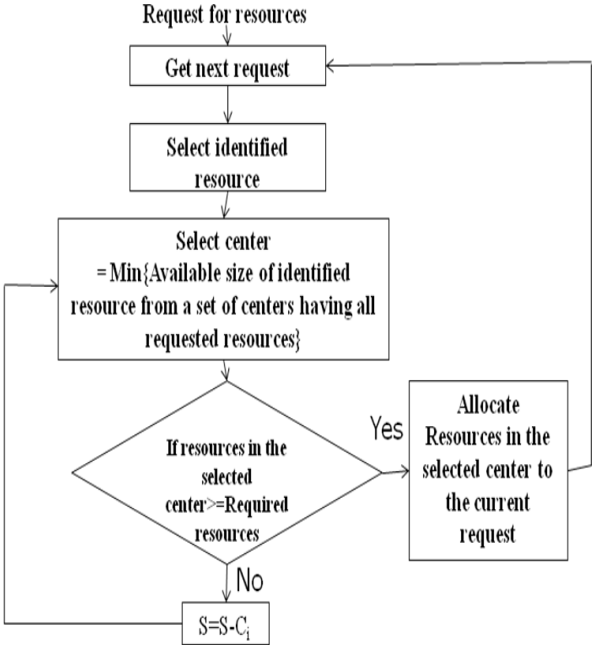

Figure 3.2 Diagram for Joint Multiple Best Fit Resource Allocation

4. Results And Discussion

The cloud environment is emulated in this project work with two virtual machines created using VMware, running windows XP operating system on a physical machine running windows XP operating system. The two VMs created serve as the resource providers and the base machine

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acts as the Cloud Service Provider (CSP). The following figure depicts the VMs which serve as resource providers and the server which serves as the CSP.

Figure 4.1 Screen shots of two VMs over the Server

It is assumed that the tasks are submitted by the clients to the CSP along with their required response time and resource requirements. Figure 4.1 depicts the virtual machines. The CSP then assigns priorities to the tasks by pair-wise comparison and arranges the tasks in descending order of their priorities to form a task pool. The CSP then communicates with the VMs to get their compute power, memory and bandwidth.

It then picks up the first task in the task pool and selects the VM in which the task has to be executed using the joint multiple best fit resource allocation algorithm presented. Evaluations show proposed method enables the fair resource allocation among multiple users without a large decline in resource proficiency. Figures 4.2 and 4.3 depict the memory and CPU effectiveness of the proposed resource allocationalgorithm.

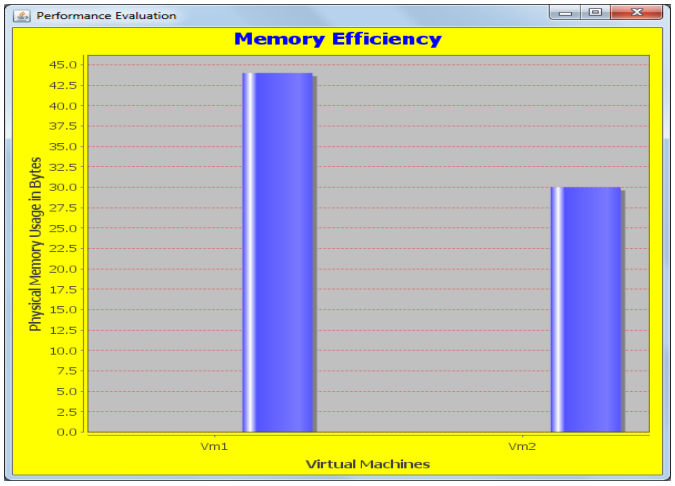

Figure 4.2 Memory Efficiency of VM1 and VM2

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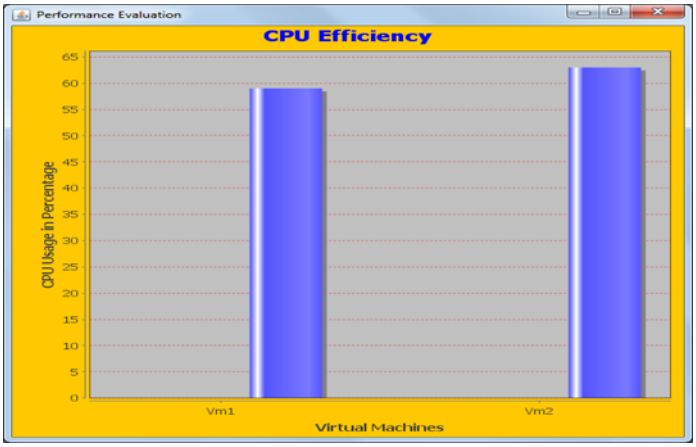
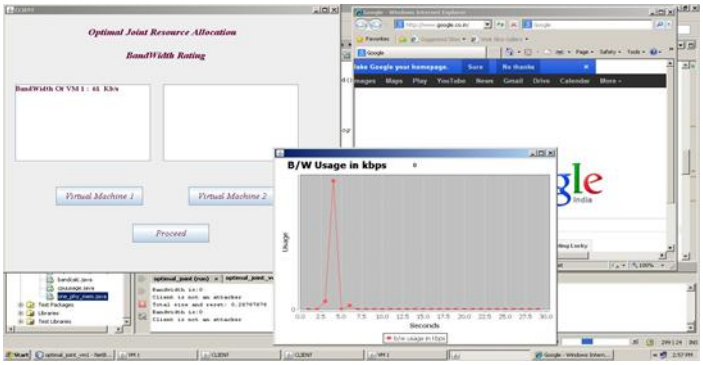


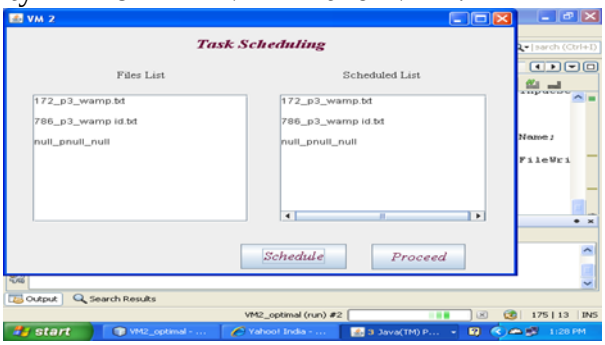
Figure 4.3 CPU Efficiency of VM1 and VM2

5. Sample Screenshots

Bandwidth is calculated for VM1 and the value is stored inserver.
Bandwidth is calculated for VM2 and the value is stored inserver.



The allocated tasks are ranked based on their priority for VM1 and VM2.



The allocated tasks are executed to the particular VM‟s.

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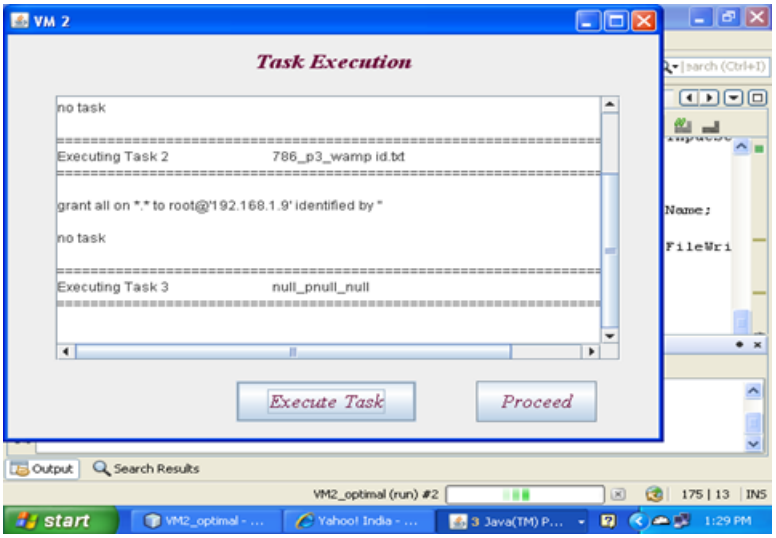
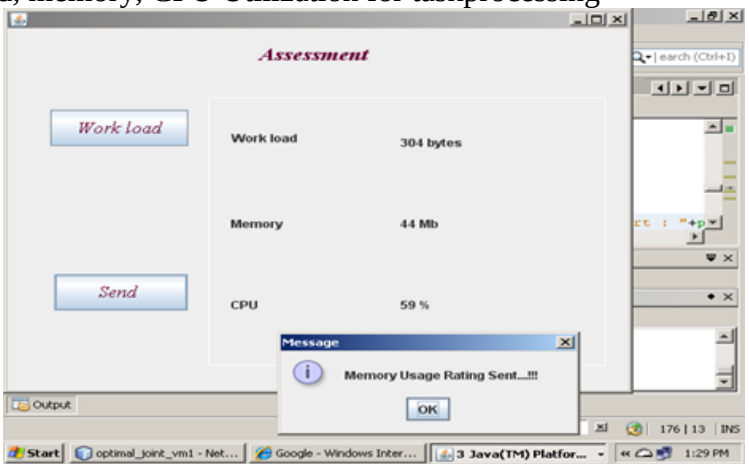
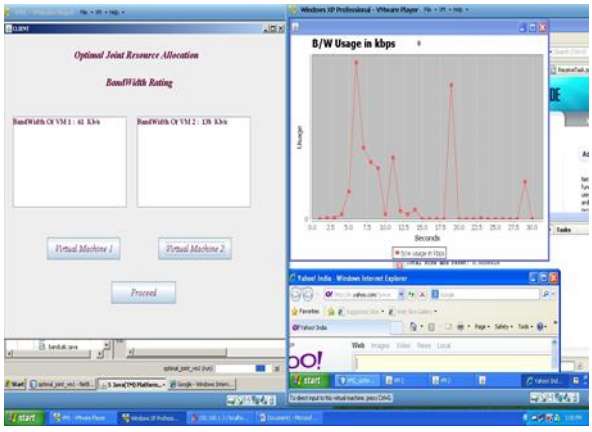


VM1 workload, memory, CPU Utilization for taskprocessing





VM2 workload, memory, CPU Utilization for taskprocessing

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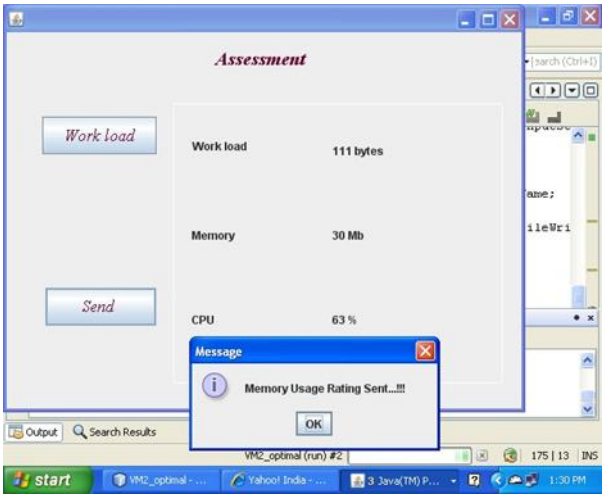
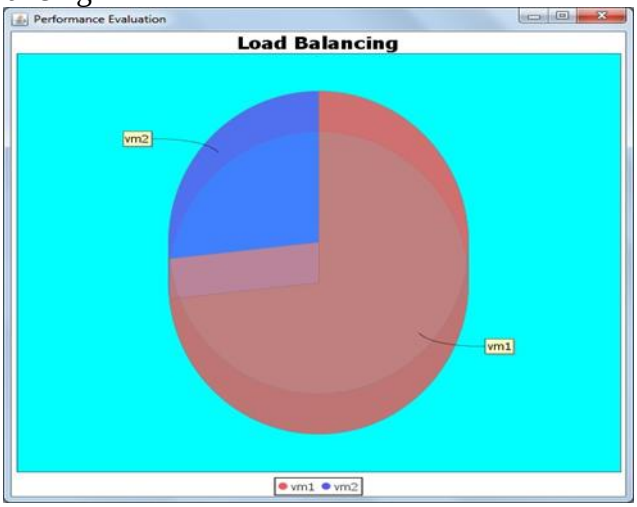


VM1 and VM2 LoadBalancing



6. Conclusion And Future Enhancement

In this project work, multiple resources of VM in cloud are considered for efficient task allocation and task execution. To satisfy the task completion deadline requirements the execution time of the each task is compared with every other task and the tasks are ranked accordingly. Then, to improve the task allocation efficiency, the joint multiple best fit allocation strategy is employed. According to this proposed system all the resources are allocated jointly in the best fitting Virtual Machine. In this method, the percentage resource requirements of every resource required by a task are calculated and the resource which has the highest percentage is designated as the identified resource. Then, the best fit strategy is employed to identify the VM that would best fit the identified resource while at the same time ensuring that this best fit VM. It is eligible for provide other needed requirements. If not next best fitting VM has to be identified. If VMs are not eligibel to satisfy the resource requirements, the task is rejected. The resources considered in this project work are physical free memory, CPU and bandwidth. Through simulation of the proposed system it is noted that the proposed system enables the goodresource allocation among multiple users without a large drop in resourceefficiency.

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This work can be enhanced to handle more number of resources apart from memory, bandwidth and computation power. The ranking of tasks can be done to satisfy user‟s service level agreements also other than task execution time.

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