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Balancing the Virtual Machines Load by Dynamic Move for Cloud Environment

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ABSTRACT: Virtualization reduces the more Physical Machine (PM) requirement by sharing the resources which are utilized in cloud computing. Cloud service providers allocate a Virtual Machine (VM) to end users based on request by sharing the physical resources, but Machine gets overloaded if there is not enough or more VM resources shared to Virtual Machines on the average resources needed for utilizing the servers, shared to be able to handle the additional demand. In order to overcome the system load due to more Virtual Machine resources sharing on a single machine is automated the load balancing of virtual machine system by monitoring the High Load Prediction scheme and Resource Predication scheme. When the Overload identified Virtual Machines are migrated to another available Physical Machine. Load Balance monitoring system can bring down the low utilized or less resource usage Physical Machine by migrating Virtual Machine resources to another physical machine in order to save energy. This energy computing can be applied through low load predication scheme. To maximize the performance profit machine resources to VM should balanced and optimized. This paper proposes and analysis the utilization of the load balancing scheme and energy efficiency scheme for achieving effective optimal performance.

KEYWORDS: Virtualization, cloud computing, resource management, green computing, migration, virtual machine.

I. INTRODUCTION

Cloud computing has revolutionized the IT industry by giving computing resources based on user demands and pay-as-you-go basis which are achieved through virtualization, Service Oriented Architecture (SOA) and Utility Computing. Server virtualization is the masking of server resources for server end users to increase the overall utilization of server[3]. Single Physical Machine can be sliced into various Virtual Machines as shown in Fig 1.1, each VM typically reproduce a physical computing environment, but requests for CPU, memory, hard disk, network and other hardware resources are managed in hypervisor layer which communicate these requests to the underlying physical machine. The aim of the virtualization in cloud computing is to reduce the physical machine requirements, data center risks and maintenances cost[2]. Virtual Machines are created within a hypervisor or a virtualization platform that runs on top of a client or server operating system called as host OS, this virtualization layer is used to create many individual, isolated VM environments.

II. RELATED WORK

Zhen Xiao, Senior Member, Weijia Song, and Qi Chen [1] have stated that load balancing based on processor load. A scheme for centralized utility maximizes process resource usage based on allocation. The authors present an optimal solution under the assumption that the demand of resources can be split over several machines. Their solution has limited applicability in context based multiple resources that need to be allocated on the same machine and the demand for further resources cannot be split on same machines when overloaded.

Anton Beloglazov and RajkumarBuyya [2] Dynamic VM consolidation has been applied to minimize energy consumption in a data center. They explored the energy benefits obtained by consolidating VMs using migration and

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found that the overall energy consumption can be significantly reduced. Problem of dynamic VM consolidation proposed a heuristic that minimizes the data center's power consumption, taking into account the VM migration as shown in Fig 1.2.However, the authors did not apply any algorithm for determining when it is necessary to optimize the VM placement.

Resource allocation for distributed systems are minimizes the migrations over consecutive load control [3]. The study of physical resources and VMs non-stationary and unknown workloads, as observed in Infrastructure as a Service (IaaS) environments, power and performance costs of VM migrations[6][8] and the large scale of Cloud data center infrastructures.

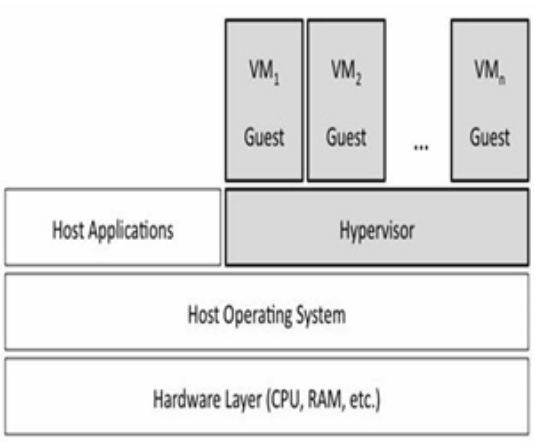

Fig.1. Architecture of Virtualization

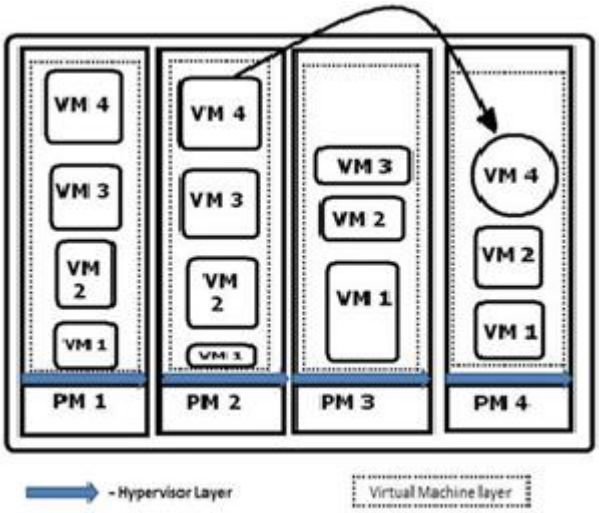

Fig.2. VM Migration Form

III. PROPOSED ALGORITHM

A. *Design Considerations:*

An automated system improves the utilization of server resources, so that reduce the power consumption in virtualization of computing resources. Virtualization brings the hypervisor layer called abstraction layer between an OS and hardware to communicate between VM and PM. Physical resources are sliced into more number of logical slices called Virtual Machines. All Virtual Machine can hold an individual OS created for the users which ensures a view of a dedicated physical resource, so that increases the performance and reduces the failure isolation between VMs sharing with PM. Issue of host overload detection as a part of VM consolidation by dynamic move. Identify which VMs are migrating from an overloaded host for VM consolidation by migrating dynamically which directly improves the resource utilization and Quality of Service delivered to end users.

- Methodology of the module shows the balancing the load based on virtual machine migration when hot spot of the system is overloaded.
- Resource performance also measured to conform the load is peak to initiate the migration to reduce the physical machine load and increase the stability of machine.
- Whenever load is monitored to high VM consolidation raised by dynamic move between another PM which holds the optimal load.

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- Efficiently utilize the machines if the load is below cold spot and less resource usage are consolidated by moving the VM process to another available optimal physical machine and bring down the machine with cold spot load which energize the green computing.

B. *Description of the Proposed Algorithm:*

As virtualization expands deeper into the enterprise to include mission-critical and resource-intensive applications. Virtualization vendors may still be touting the potential of putting more virtual machines (VM) on a single physical machine (PM). But more VM on single PM ratios are dangerous in production environments and can cause performance problems or worse, outages. In ordered to protect the overloaded machine from degrading the performance following load balancer scheme automate the system load and guard the system resource usage. They are

- High Load Prediction Algorithm.
- Resource Prediction Algorithm.
- Low Load Prediction Algorithm.

Step 1: Overload Identification

System gets overloaded if more number of virtual machines is allocated to a single physical machine, so following high load predication algorithm helps to predict the load before machine gets unworkable.

Step 2: High Load Prediction Algorithm

In ordered to identify the high load on physical machine, spot out the hotspot of CPU which are above the threshold value.

Step 3: Resource Prediction Algorithm

Conforming the system load further by checking the Process and Memory load by its percentage of utilization.

IV. PSEUDO CODE

Algorithm: High Load Monitoring
Input:Thermal reading of CPU to file cpu_sensor.txt
Initialization:
Φ defines the maximum hotspot threshold value of CPU load
Ω defines the average value of CPU Thermal reading at every 10 minutes
Output: Decision for migrating VM
Step 1: if average CPU thermal ‘Ω’ >‘Φ‘then
Step 2: Invoke the Resource_Max(φ) usage of the PM
Step 3: ifreturn value ‘φ’ is true then
Step 4: Invoke the Migration module
Step 5: end if
Step 6: return the decision returned by Migration module
Step 7: end if
Step 8: return false.
Algorithm: Resource_Max Monitoring
Input: Process and Memory utilization status
Initialization:
P1 initials the process utilization percent
M1initials the memory usage percent
Output: return the value true if load detects
Step 1: if process P1>overall percent || memory M1 > overall percentthen
Step 2: return true
Step 3: endif
Algorithm: Low Load Monitoring

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Input: Thermal reading of CPU to file cpu_sensor.txt
Initialization:
σ defines the minimum threshold value of CPU load
ρ defines the average value of CPU Thermal reading at every 10 minutes
Output: Decision for migrating VM
Step 1: if average CPU thermal 'ρ' <'σ'then
Step 2: Invoke the Resource_Min(φ) usage of the PM
Step 3: ifreturn value 'φ' is true then
Step 4: Invoke the Migration module
Step 5: end if
Step 6: return the decision returned by Migration module
Step 7: Invoke the Shutdown module
Step 8: end if
Step 9: return false

Every physical machine is checked periodically to predict an overload by detection algorithm to migrate VMs when necessary in order to avoid performance degradation and service level failing. For the host overload detection problem several modules are proposed which identify the load and rectify.

V. CONCLUSION AND FUTURE WORK

In this load balancer system, the analysis of design and implementation of a physical machine resource monitoring system for cloud computing services are proposed. Our system multiplex the virtual machine between physical machines adaptively based on demand necessity. The load prediction algorithm and load balancer module can balance the load by managing the resources dynamically. So our module and algorithm achieves the load balancing and green computing for distributed system resources by dynamic move.

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