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Resource Allocation In Cloud For Energy Minimization Using Agent Cloud Facility

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Abstract:

A very flexible service paradigm by allowing users to require virtual machine (VM) resources on-demand and allows cloud service providers (CSPs) to provide virtual machine resources is Cloud computing. The main aim of this paper is to address the problem of efficiently allocating VM resources to physical machines (PMs) to minimize the energy consumption. Traditional energy efficient virtual machine allocations allocate VMs to PMs using a centralized approach. It does not considering the migration cost in the system. To address these issues decentralized multi-agent based VM allocation approach is used. This approach assign a collective agent to each physical machine for allocating VM resources. Then, an auction-based allocation Strategy is used for allocating virtual machine resources.

Keywords **— Cloud computing systems, energy cost, migration cost, multi-agent (MA), resource allocation.**

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I. INTRODUCTION

A popular service provider that provides services through the Internet is Cloud computing. An effective VM resource allocation should not only deliver services to satisfy several requirements of the user. It also save the consumption of energy, the physical machines (PMs) used for running user's applications for reducing the cost of CSP. The main objective is to develop an energy efficient resource allocation approach to minimize the energy consumption.

The development of energy-efficient PMs is the idea that makes a cloud system energy efficient. An undesirable allocation of allocating large VM to the costly PMs might consume large amount of energy. Many approaches has been proposed to develop an energy efficient resource allocation problem. However, from the existing strategies, two features are to be improved. The resources are allocated in centralized strategy in the existing system. In this approach, the central manager is responsible for managing all the information regarding physical machines and virtual machines. However centralized approach has several advantages like high system performance, its low robustness with a single point of failure creates a vulnerable cloud system. Second, consideration of VM migration cost is vital in cloud computing because cloud systems are dynamic with VMs arrival and departure periodically. When a VM is migrated from one PM to another PM, the migration cost

occurs which is also crucial to the performance of cloud computing systems. However, there is a cause of migration cost in the existing systems due to the transfer of VM resources.

These issues are addressed by allocating resources via decentralized multi-agent (MA).The MA approach allocates the newly submitted VMs to suitable PMs an Auction-Based VM Allocation mechanism. The multi-agent based resource allocation approach allocate VMs to PMs based on an Auction Based VM Allocation.

II. LITERATURE REVIEW

VMs allow the isolation of applications from the hardware and other VMs. To match the requirements of the user, VM made the platform personalized. In addition, the consumers of the organization with global operations require faster response time, and thus time is saved by distributing workload to multiple Clouds in various locations at the same time. This needs the need of building a computing atmosphere for dynamically interconnecting Clouds from multiple domains within and across the organization. There are many challenges involved in creating such Clouds and Cloud interconnections [2].

Three-tier structure is one of the attractive cloud computing environments. It consists of infrastructure vendors, service providers, and consumers. The three parties are also called cluster nodes, cluster managers, and consumers in cluster computing systems, and resource providers, service providers, and clients in grid computing systems. A service provider rents resources from the infrastructure vendors, builds appropriate multiserver systems, and provides various services to users. A consumer submits a service request to a service provider, receives the desired result from the service provider with certain service level agreement, and pays for the service based on the amount of the service and the quality of the service.

The configuration of a multiserver system is characterized by two basic features, i.e., the size of the multiserver system and the speed of the multiserver system. Like all business, the pricing model of service provider in cloud computing is based on two components, namely, the income and the cost [3].

Applications are delivered as services over internet. The hardware and system software in data centers provide those services. Data center hardware and software is called cloud. Utility computing is packaging of computing resources such as storage and services as metered service. Public Cloud is a cloud when a cloud is made available in public. The term Private cloud is used to refer to internal datacenters of a business or other organization, not made available to general public. Regardless of whether a cloud provider sells services at a low level of abstraction like EC2 or a higher level like App Engine, the belief is that computing, storage, and networking must all focus on horizontal scalability of virtualized resources rather than on single node performance [4].

III. EXISTING SYSTEM

A straightforward idea to make a cloud system energy efficient is to develop energy-proportional PMs, i.e., each PM consumes energy in proportion to the VM loads it undertakes. For this purpose, many technologies such as using high-quality power supplies and voltage regulation modules have been developed to achieve PM energy proportional. However, even though equipped with energy-proportional PMs, the cloud system's energy consumption is far from optimal due to inefficient allocation of VMs to PMs. In cloud computing systems, PMs are heterogeneous with various resources and operation costs and VMs are heterogeneous with different resource requirements. An undesirable allocation of allocating large VM loads to the costly PMs might consume tremendous energy. Numbers of approaches have been proposed for energy are resource allocation .However, from these approaches, find there are two aspects that need to improve. First, most of existing approaches assume that there is a central resource manager that can monitor and maintain information about all

PMs and VMs and thus can allocate VMs to PMs in a centralized manner .Although centralization can guarantee high system performance, its low robustness with a single point of failure creates a vulnerable cloud system. Because cloud systems are dynamic, VM live migration is necessary for consolidation of the resources. It occurs when a VM is migrated from one PM to another PM, which is also crucial to the performance of cloud computing systems.

To address the above two issues, this paper introduces a decentralized multi-agent (MA)-based resource allocation approach by dispatching a cooperative agent to each PM to assist the PM in managing resources.

IV. PROPOSED SYSTEM

A decentralized multi-agent (MA) based resource allocation approach by dispatching a cooperative agent to each PM to assist the PM in managing resources is proposed. For a set of VM requests newly submitted to the cloud systems, the MA approach allocates these VMs to suitable PMs by Auction-Based VM Allocation devised for agents to decide which PM hosts which newly submitted VMs. The auction based VM allocation mechanism has a high guarantee on reducing energy cost.

A. Architectural Design

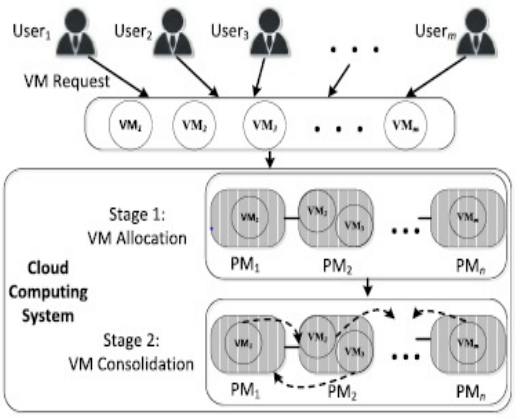

Fig. 1 Architecture of MA Based resource allocation

The above figure depicts the framework of the MA resource allocation approach. It includes mainly an Auction-Based VM Allocation for agents to decide which PM hosts which newly submitted VMs. This paper introduces a decentralized multi-agent (MA) based resource allocation approach by dispatching a cooperative agent to each PM to assist the PM in managing resources. For a set of VM requests newly submitted to the cloud systems, the MA approach allocates these VMs to suitable PMs based on auction based allocation.

B. Algorithm: Auction Based VM Allocation

The auction-based VM allocation mechanism works by modeling agents as bidders and VMs as commodities. Initially, all newly submitted VMs are unallocated. The steps of auction-based resource allocation can be described as follows.

Step 1. Users submit requests and bids.
Step 2. If submission finishes, continue to Step 3. Otherwise repeat Steps 1 and 2.
Step 3. Sort bids.
Step 4. Determine the winner according to the auction model and match the resources to the potential winners.
Step 5. If the auction's termination condition is satisfied, continue to Step 6. Otherwise, repeat step 5. The termination condition, depending on the auction model employed, can be, for example, all resources have been allocated and all requests have been satisfied, etc.
Step 6. The winner pays for the resources; the winning price also depends on the auction model employed.
Step 7. Bind the resources to the winning customer (i.e., the winner).

V. CONCLUSION

A distributed MA-based resource allocation approach is used to minimize cloud system energy cost. The distributed MA-based resource allocation approach is as follows. First, dispatch a cooperative

agent a_i to each PM p_i. These agents are deployed to assist the PMs in managing resources (hereafter, the terms "agent" and "PM" are used interchangeably). And then devise the coordination mechanism for these agents to make decisions on which PMs to host which VMs in pursuit of energy cost minimization.

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