

A VM CONSOLIDATION APPROACH FOR ENERGY EFFICIENT CLOUD

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Abstract—Cloud Computing has become a main source for data processing, data storage and distribution. The storage of data is simple and free to use. In recent years, with the development of cloud computing technology, the size of a data center is expanding rapidly. To minimize the energy consumption of a data center, we propose an energy-efficient virtual resource dynamic integration (VRDI) method. Live migration is a key technique for virtual machine (VM) management in data center networks, which enables flexibility in resource optimization, fault tolerance, and load balancing. Distributed clouds have recently attracted many cloud providers and researchers as a topic of intensive interest. High energy costs and carbon emissions are two significant problems in distributed clouds. A cost and carbon emission-efficient VM placement method (CACEV) considers geographically varying energy prices and carbon emission rates as well as optimizing both network and server resources at the same time. In this paper we develop in the proposed VRDI method, first, by monitoring the load patterns of the physical machines (PMs) and the corresponding thresholds of PMs calculated using the statistical data, we propose a PM selection algorithm to find a set of PMs which should be integrated.

Keywords – VM migration planning, Software-defined Network (SDN), Migration sequence, Minimum migration time, Cloud computing; Green data center; Energy consumption, Genetic algorithm, Dynamic consolidation, VM Allocation, Google Cluster, Energy Efficient; Cloud Computing; Cluster

I. INTRODUCTION

On the Internet, a large amount of data is distributed, heterogeneous, dynamic, and more complex. Every day people are confronted with targeted advertising. A Cloud computing has become a popular paradigm for hosting and delivering services over the internet. As number of user increases who access the services of Cloud the load of the machines in the cloud datacenter also increases. A Virtual machines (VMs) in a data center is an effective way to reduce the energy consumption and improve physical resource utilization. To balance the load efficiently one issue is to find overloaded and under loaded host and second issue is to use efficient method for selection of Virtual Machine from overloaded host and placement of Virtual Machine on proper host.

1.2 Cloud Computing

“Cloud Computing refers to the web-based computing, providing users or devices with shared pool of resources, information or software on demand and pay per-use basis”. It allows end user and small companies to make use of various computational resources like storage, software and processing capabilities provided by other companies such as Amazon or Microsoft.

This cloud model is composed of five essential characteristics, three service models, and four deployment models.” The essential characteristics of cloud computing are on-demand self-service, broad network access, resource pooling, rapid elasticity and measured service. The deployment models of cloud computing are private cloud, community cloud, public cloud and hybrid cloud.

II. RELATED WORKS

Author [1] implemented the virtual resource allocation algorithms by predicting the load of VMs. In the authors used the gray prediction model to predict the future load of a cloud application. They optimized the allocation strategy of the virtual resource according to the predicted load to achieve the load balance and reduce the energy consumption. This algorithm is based on load forecasting and convex optimization theory, and guarantees the QoS of cloud applications. The algorithm in [18] integrated the virtual resources by VM migration, and then closed the idle PMs to achieve the energy savings. In [19], the authors forecasted the load of a cluster using Wiener filtering approach. The results showed that the forecasting result is very accurate for the applications with a stable load, and the method does not apply to dynamically changing cloud applications.

Author [2] focused on improving communication cost between DCs in a distributed clouds. But, unlike this paper, it did not consider server cost, nor VM placement inside DCs. In addition, our current work is different from all mentioned results since we consider not only costs but also carbon emission.

Author[3] proposed for the same but In this paper author focuses on Homomorphic Encryption for secure data mining in cloud. They argue that normally all current issue like traditional system can't be able for storing and large amount of data. So the author provide easy solution in cloud with secure data mining technique. Authors propose a secure K-Means data mining approach on data may be distributed among no of host security and privacy of the data. This paper able for represent the pallier Homomorphic encryption system and perform analysis of K-Means result in cloud computing.

Author [4] work on secure semantic search using Query Keyword. base on keyword co-occurrence probability and semantic relationship library. They proposed scheme for not only match exact files but work on Query keyword. So, author produce architecture using query keyword technique for cloud. (A) Store SRL in private cloud (B) Retrieve index on public cloud We also derive the one to many OPE technique to protect related score and compute total Score.

Author [5] focuses on remotely stored encrypted data store in cloud computing. So, author argue that normally all the traditional searchable encryption. Other Produced method for searchable encrypted data using keyword is contain or not in file using Boolean search method. But this author proposed framework for secure rank keyword search over large amount of encrypted data file in cloud. So, author also define crypto primitive OPSE and one to more order preserving mapping for retrieve efficient data from cloud.

Author [1], Cloud Computing refers to constructed data center or "super computer" by virtualization technology and provides computing and storage resources, as well as the application container environment of software running, to software developers in a manner of free or hiring. Author [2], propose priority-based method to consolidate parallel workloads in the cloud. Author [3], analysis the differentiated QoS requirements of Cloud computing resources users' jobs, we build the corresponding non-preemptive priority M/G/1 queuing model for the jobs. Author [4], describes the important issue of energy conservation for data centers. In cloud computing, a service provider has to guarantee quality of service to offer stable services.

In the cloud computing environment, the structure of node is similar to the traditional servers, however, due to the underlying sever resources can be provided as a service directly to users, its parallel processing, network connectivity and storage performance is generally better.

III. COMPARISON OF VARIOUS RESEARCH SCHEMES

The table-I shows above gives detailed comparison about the various schemes proposed by a researcher. The table gives the description about the basic technique used with the benefits that researcher gets as well as the limitations found in schemes.

Table 1. Comparison study

Criteria Group →	Cloud Computing oriented measures					
Individual Criteria → Providers ↓	Cloud Computing	Efficient Optimization	Energy Efficient	Data Security	VM Migration	Secure Searching
[1]	√	X	√	√	√	√
[2]	√	√	√	√	X	X
[3]	√	√	√	√	√	X
[4]	√	√	√	√	X	X
[5]	√	√	√	√	√	√

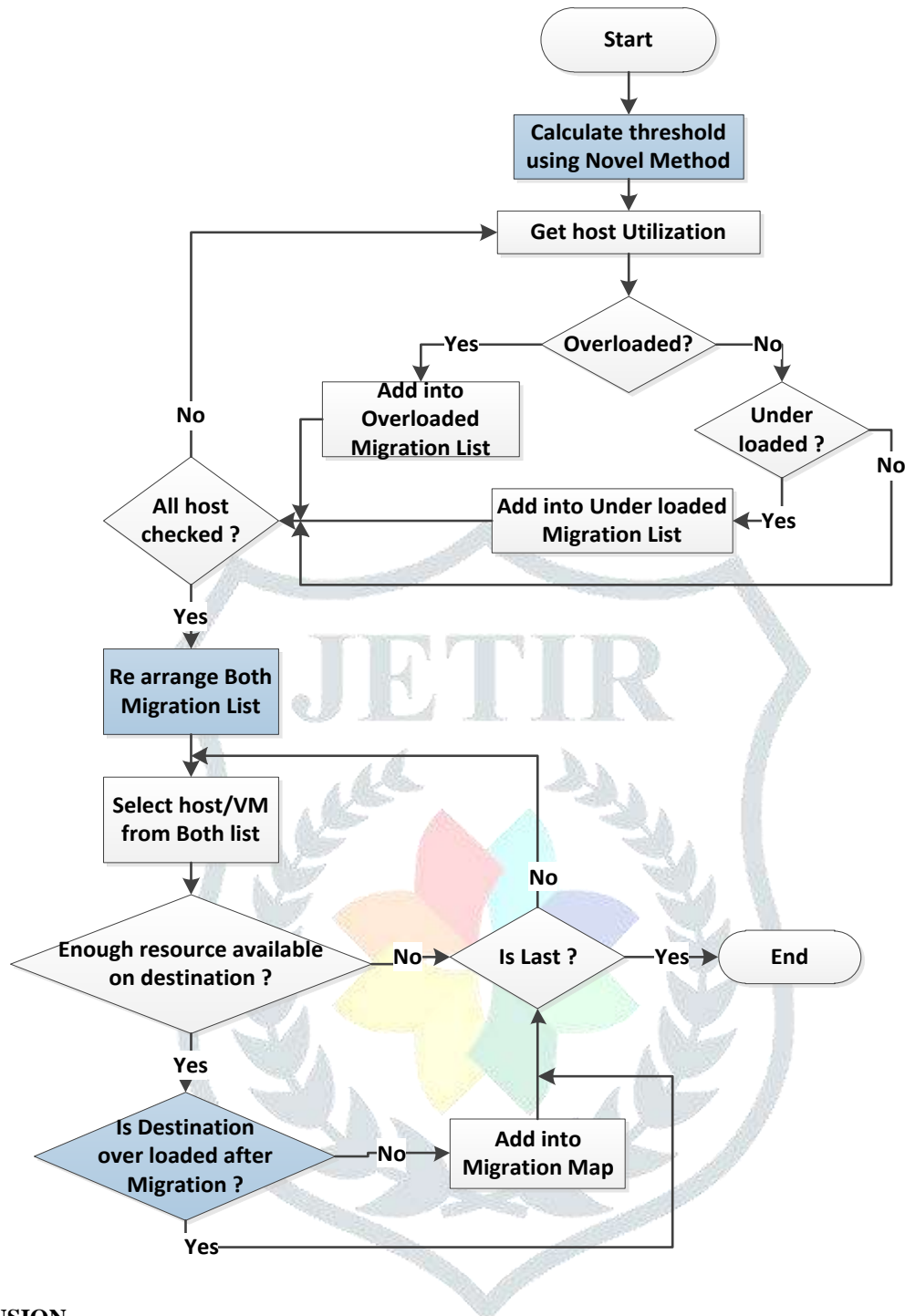
IV. Proposed Methodology

- Calculate the threshold effectively which is the very important consideration.
- Work on dynamic environment where load changes after each iteration.
- Combine two efficient method for selection and placement of VM on for the host.
- Check host which can be shutdown to save the energy.

Algorithm Steps:

- Step 1: Start.
- Step 2: Calculate Threshold Value
- Step 3: Get Host Utilization.
- Step 4: Send details on cloud.
- Step 5: Add to Migration List
- Step 6: If Host is overloaded than add into a Migration List.
- Step 7: If Host is underloaded than add into underloaded Migration List.
- Step 8: Check the Host which is underloaded or overloaded.
- Step 9: Then Re-arrange the Migration List
- Step 10: Select VM Host from both List.
- Step 11: If resource is available on destination than Migration is over loaded
- Step 12: If Destination overloaded than add into Migration Map.
- Step 12: End

Basic Framework



V. CONCLUSION

From all the above analysis we can conclude that...

- Due to Dynamic threshold calculation its become easy to find under loaded and overloaded host.
- Number of migration reduced which save the time.
- By increasing the number of shutdown host reduce energy consumption.
- Cloud customer can get better service as well the provider have better utilization of resources with least power consumption.

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