MONITORING AND LIVE MIGRATION VIRTUAL MACHINES FOR EFFICIENT RESOURCE UTILIZATION

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Abstract

Live migration of virtual machines can be used to implement virtualization. A method to monitor the virtual machines created by KVM (Kernel based Virtual Machine) for each user and perform the live migration for the efficient utilization of resource. A method Infrastructure as a Service, provides with the highest level of flexibility and management control over resources. It focuses on the live migration strategy of multiple virtual machines with different resource utilization.

I. INTRODUCTION

Cloud computing is an internet technology that utilizes internet to manage the data and applications. This technology allows many businesses and users to use the data and application without an installation and can access the information and files at any computer system having an internet connection. A Virtual Machine (VM) is a software implementation of a computing environment in which an operating system (OS) or we can run the program without an installation. Cloud computing has recently received considerable Attention in both academic and industrial community as a new Computing paradigm to provide dynamically scalable and virtualized resource as a service over the Internet. By this means, users will be able to access the resources, such as applications and data, from the cloud anywhere and anytime on demand. Currently, several large companies, such as Amazon, Google, Yahoo!, Microsoft, IBM, and Sun are developing their own cloud platforms for consumers and enterprises to access the cloud resources through services. Recently, with the rapid development of virtualization technology more and more data centers use this technology to build new generation data center to support cloud computing due to the benefits such as server consolidation, live migration, and resource isolation.

Live migration of virtual machines means the virtual machine seems to be responsive all the time during the migration process from the clients' perspective. Compared with traditional suspend/resume migration, live migration holds many benefits such as energy saving, load balancing, and online maintenance. Many live migration methods are proposed to improve the migration efficiency. As the live migration technology widely used in modern

Cloud computing data center, live migration of multiple virtual machines becomes more and more frequent. Different from the single virtual machine migration, the live migration of multiple virtual machines faces many new problems, such as migration failures due to the insufficient resources in target machine, migration conflicts due to the concurrent migrations, and the migration thrashing due to the dynamic changes of virtual machine workloads. All the above issues should be overcome to maximize the migration efficiency in virtualized cloud data center environments. In this paper, we study the live migration efficiency of multiple virtual machines from experimental perspective and investigate different resource reservation methods and

Migration strategies in the live migration process. We first describe the live migration framework of multiple virtual machines with resource reservation technology. Then we

perform a series of experiments to investigate the impacts of different resource reservation methods on the performance of live migration in both source machine and target machine. Additionally, we also analyze the efficiency of parallel migration strategy and workload-aware migration strategy. The metrics such as downtime, total migration time, and workload performance overheads are measured.

II. PROBLEM STATEMENT

With the advent of virtualization it has been possible to provision specified size of infrastructure requirements on demand. For example, in the field of business separate model will be provided for each specification of different IT user. In case there are billions of IT users with different specification it may not be possible to allocate those many number of models to them.

III. EXISTING SOLUTION

Most of the previous work concentrated on the implementation of resource utilization using Amazon Cloud Watch, which lets programmatically retrieve the monitoring data, view graphs, and set alarms to take automated action based on the state of cloud environment.

IV. DEVELOPMENT ARCHITECTURE

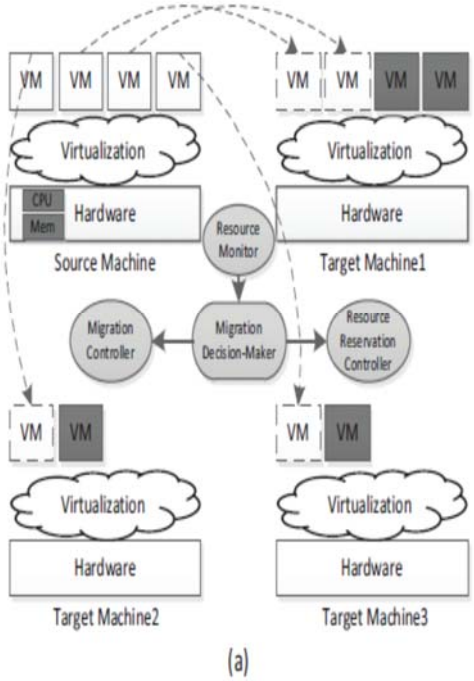

Fig: 1(a)

Fig: 1(b)

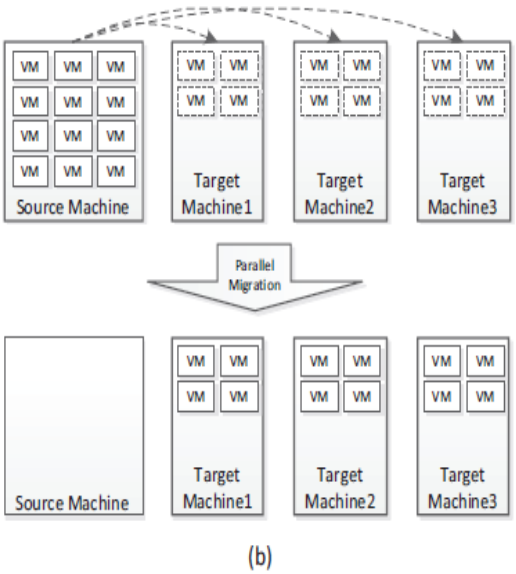

Figure 1(a) illustrates the live migration framework of multiple virtual machines with resource reservation technology. It consists of four main modules: Migration Decision-Maker, Migration Controller, Resource Reservation Controller, and Resource Monitor. The resource reservation in both source machine and target machine are illustrated in the figure. While Figure 1(b) shows an example of parallel live migration of multiple virtual machines.

In this example, the virtual machine workloads in source machine are migrated to target machines simultaneously according to the migration request. After the migration, source machine is vacated for particular purposes such as online maintenance or deployment of new workloads, each target machine holds 4 virtual machines.

Migration Decision-Maker: Is a key module in the live migration framework of multiple virtual machines. It is responsible for making effective migration decision. The effectiveness and efficiency of migration strategies can reflect the quality of this module.

Migration Controller: Controls the real migration process. It will choose the right target machine from the candidate target machine list and trigger the migration at particular.

Resource Reservation Controller: This module is very important in the live migration of multiple virtual machines to avoid migration failures because of the insufficient resources in the target machine for the migrated virtual machine.

Resource Monitor: Is responsible for monitoring the resource status of both virtual machines and physical machines, including the resource utilization, virtual machine configuration

information (workload characteristics, memory size, and image size) which is essential to make migration decisions.

V. EXPECTED RESULTS

The implementation of this scheme will do the live migration for efficient resource utilization and monitoring of virtual machines.

VI. CONCLUSION AND FUTURE WORK

Live migration of virtual machines is an efficient technology used to implement energy saving and load balancing in virtualized cloud computing data center. In this paper, we study the live migration efficiency of multiple virtual machines from experimental perspective and investigate different resource reservation methods in the live migration process as well as other complex migration strategies such as parallel migration and workload-aware migration.

Experimental results show that:

(1) Live migration of virtual machine brings some performance overheads.

(2) The performance overheads of live migration is affected by memory size, CPU resource, and the workload types.

(3) Resource reservation in target machine is necessary to avoid the migration failures.

(4) The adequate system resources in the source machine can make more parallel number of migrations and can obtain better migration efficiency.

(5) The workload-aware migration strategy can efficiently improve the performance of migrated workload. Based on the experimental discoveries, three optimization methods, optimization in the source machine, parallel migration of multiple virtual machines, and workload-aware migration strategy, are proposed to improve the migration efficiency.

Future work will include designing and implementing intelligent live migration mechanism to improve the live migration efficiency in the multiple virtual machines scenario and studying the migration strategies as an optimization problem using mathematical modeling methods.

VII. REFERENCES

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