VIRTUAL MACHINE CONSOLIDATION

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***Abstract*—This electronic document is a study of virtual machine consolidation, its meaning, its usage in the modern world, how it provides great opportunity for energy saving and how it provides better quality of service and performance to the end users.**

I. INTRODUCTION

Virtual Machine Consolidation is one of the most used technology in existence and almost used everywhere for providing better performance.Virtual Machine Consolidation is an emerging solution for energy saving in cloud data centers. Virtualization allows gathering several virtual machines into single physical servers using a techinique called virtual machine consolidaton .It offers on-demand service,broad network access and rapid elasticity at low cost.The main reason behind adoption of cloud is it is secure,reliable, scalable, quick cheap and convenient.

It can provide significant benefits to cloud computing by fascilating better use of the available data center resources. The main reason behind is said to be the security concern. This has been a lot solved by the introduction of virtual machine consolidation.

Virtual Machine Consolidation has live migration which has the ability of transferring a virtual machine between different physical servers within close to zero down time because that's provides an better/efficient way to improve the utilization of resources in cloud data centers. One of the important issues in virtual machine consolidation is to maintain a balance between resource utilization and provides good quality of service.

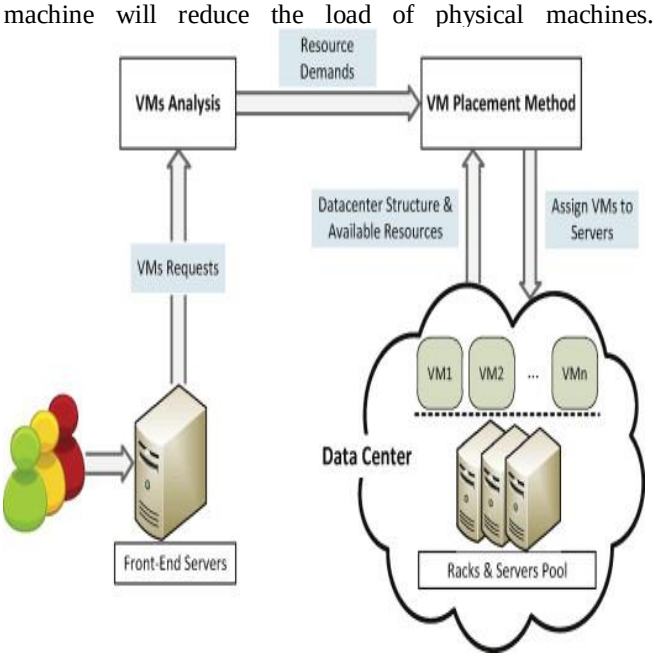
The rest of the article is structured as follows, about the virtual machines consolidation, its applications, assumptions and limitations and benefits.

VIRTUAL MACHINE CONSOLIDATION

Virtual Machine Consolidation (VMC) is a technique for energy-efficient and dynamic resource management in cloud. Sometimes, the running virtual machine may be scattered on several physical machines. Virtual Machine Monitor is a modular architecture that combines various resource monitoring systems and VM packing algorithm. Due to this kind of distribution of virtual machines, some physical machine might be under loaded and other physical machine might be over loaded. . Virtual Machine Consolidation is a modular architecture that combines various resource monitoring systems and VM packing algorithm.

Virtual Machine Consolidation migrates virtual machine from lower utilized physical machines to higher utilized physical machines i.e. consolidates virtual machine in less number of physical machines. For using this, either state of extra physical machines can be changed to power saving mode or these physical machines can be used to serve other customers.

Virtual Machine Consolidation is also used to shift some virtual machine s from over utilized physical machines. The shifting of virtual machine from over utilized physical machine will reduce the load of physical machines.



Above figure shows the Structure-aware online virtual machine consolidation for datacenter energy improvement in cloud computing.

The Server consolidation is a periodic process of the data center. The virtual machine consolidation process involves three steps:

1. Selection of source physical machine from which we can migrate virtual machines.
2. Selection of virtual machine to be migrated from source physical machine.
3. Selection of destination physical machine on which selected virtual machines will be migrated.

APPLICATIONS

The major applications or advantages of Virtual Machine Consolidations are:

Load Balancing

In the cloud data center, there are large numbers of physical and virtual machines. The virtual machines dynamically created, started, stopped and destroyed as per the user requiremnets. At the runtime, it may happen that some physical machines are heavily loaded (more numbers of virtual machines are deployed on them). There may be several physical machines with very few virtualmachines running on them. We can use the concept of virtual machines migration to relocate virtual machines frm heavily loaded physical machines to lightly laded physical machines.

Fault Recovery

Resources are provided in the form of services in cloud environment. Cloud users are billed according to the type of subscribed services and the dration of service usage. Virtual machine play the fundamental role in service provisioning, if any physical machine failure occurs in the data center, virtualmachines running on that physdicalmachie are interrupted. So virtual machines consolidation helps us to recover from faults.

Today organizations are appreciating various cloud services and other technologies which makes them to move beyond traditional network boundaries and the capabilities of their legacy IAM solutions. Identity-as-a-service (IDaaS) is Saas based IAM offerings that allow organizations to use single sign-on [13], and authentication and access controls to provide secure access to the large number of Saas applications. IDanS can be integrated with the existing information store or directory to support customers or the directory services can be taken from cloud based directory.

Virtual Machine Consolidation

The idea behind virtualmachine consolidation is tomae efficient use of cloud resources and toimprove overall resource utilization in the data center. The basic idea behind virtualmachine consolidation is to free lightly loaded physical machines and change their state to power saver mode. The concept of virtual machine migrastion is toused to relocate/move virtual machine fromlightly loaded physical machines.

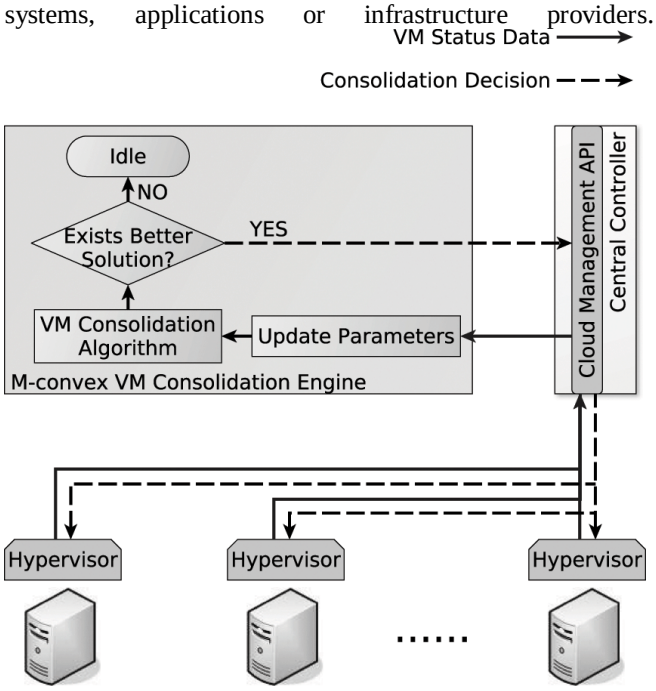
Easy System Maintenance/Upgrade

At some cases, it is required to perform maintainence or up-gradation of physical hardware resources in the data center. During maintainence or system upgrade, physical machines need to be powered off. In this situation, we can use the concept of virtual machine migrastion to relocate running virtualmachine to another physical machines. By the way, the maintainence or up-gradation activity can be performed easily.

Directory-as-a-service (DaaS) which is an implementation yof modern directory services Directory-as-it-service is a cloud-based directory delivered on a software-as-a-service (SaaS) business model Saas solution virtually connects all of the organization s resources, whether those resources are in the cloud or on premise.

Benefits of Virtual Machine Consolidation

The benefits of virtual machine consolidation are that we can limit/reduce the usage of hardware and that can be used to reduce the cost of operating system by 50% and the cost of the usage of energy can be reduce by 80%. The time it takes to provide new servers can be reduced upto 70 percent. You are able to decrease downtime and improve reliability with business continuity and built-in disaster recovery. Delivery IT services on demand, independent of hardware, operating systems, applications or infrastructure providers.



Above picture shows M-Convex virtual machine consolidation: Towards a better virtual machine workload consolidation.

ASSUMPTIONS AND LIMITATIONS

The proposed model for virtual machine consolidation is based on thw certain parameters which are broadly undertaking the usual parameters like average processing time average time per data center, requests related to memory, requests related to I/O or consolidation manager is incorporating all the basics factors involved in cloud computing infrastructure and cloud operformance i.e. CPU load, number of virtual machines, number of physical servers, etc.

Some different/other factors like bandwidth, Random Access Memory(RAM), network traffic and disk storage are assumed to have optimal values, such that they are the most favourable for the cloud computing environment chosen to be studied. In our proposed model all these factors are under consideration while the consolidation manager is maing the decision on the basis of analayzed data.

The security issues and privacy concerns are assumed to be in separate dimension. The network traffic and security parameters are skipped deliberately because these factors are discussed in majority of researches and the conclusions made on their basis lead to differenrt scenarious of cloud workload.

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