Chapter 12
Cloud Computing Challenges and Concerts in VM Migration

J. Keziya Rani and M. Sri Lakshmi

12.1 Introduction

The huge changes in information technology in recent years have made it very difficult to manage IT resources in the cloud. In this regard, virtual machine technologies adopted by organizations to efficiently allocate and manage resources. In this regard, reduce the cost in the operation in turn enhancing the performance of the application along with the reliability. In traditional communication, the process of virtualizing is dividing the physically available resources into logical resources to have a flexible resource allocation. The separation of the logical resources form the physical resources [5], makes it easier to distribute the workload, thus enabling the loads to be executed on the different VM but on same machine and transition of the VM from one system to another. VM migration departments have many parallels to their origin, called process migration, where the migrant wants the process to run from one system to another. The procedure causes the migration of the particular state from one system to another.

Any way the purpose is to choose walking strategies rather than VMs [7]. At some point in the 1980s, political migration was well studied; however, it has never been used in practice because of the problem of maintaining dependency between different modules of the work system. However, virtual machine migration is no longer subject to these restrictions.

With VM migration running and the entire system running, the migration issue is simplified and effectively resolved. Virtual machine migration over the past decade has proven to be an effective approach to many goals, including workload strengthening, workload balancing, reducing power consumption, and

J. K. Rani (✉) · M. S. Lakshmi
Department of Computer Science & Technology, S.K university, Anantapuramu, Andhra Pradesh, India

cellular packet assistance. As a result, in recent years, it has received huge acclaim in the industry. However, virtual machine migration also presents problems specific to service disruption, bandwidth usage, management top-end features, and rapid security breaches. Because VM migration, application development effectively closes the question of re-searching, which has generated tremendous interest in the search network.

This overrides all the roles involved. Virtual machine migration must be carefully applied to cloud management. In this article, we look in detail at virtual machine migration [8] and discuss its benefits and challenges.

12.2   Background

12.2.1   Cloud Management

Many features in managing the cloud are done supporting the migration of VM, which summarizes all the benefits of VM migration and their use in cloud and intracloud management [1]. The main causes of server interruptions are prolonged server interruptions or poor hardware performance. Also material restoration. Load balancing in cloud management is a major issue that can shorten server's life and reduce quality of service. For the time being, the servers are running at a higher capacity with the download effect.

Using direct VM migration credentials, it works consistently across all data center servers based on improved service quality. In addition, by speeding up VM migration on the web, load balancing between different data centers using geospatial space. Server association VMs are tightly built and demolished in the data center. In addition, some may be delayed or inactive. Virtual machines can be ugly if the data center servers are not connected. In a server pool, virtual machines can be routed to a power resolution or declaration decision which is shown in Fig. 12.1.

Hybrid cloud is performed with some benefits, i.e.:

1. Elastic in nature and cost-effective
2. Most suitable with business needs

Service Level Agreements are prime concern sometimes migration from one cloud to other cloud providers has to migrate VMs to cloud datacenters.

12.2.2   VM Migration and Challenges

The challenges and the issues associated with the VM migration are summarized below along with the immigration exit scheme.
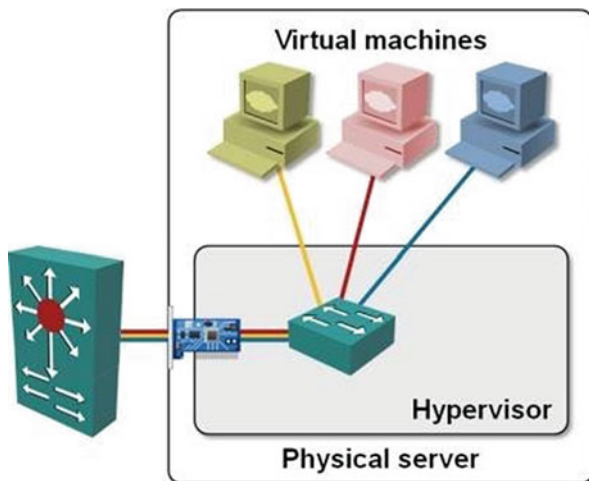
Fig. 12.1 Virtual Machines

VM migration data moves from one location to another. Direct migration is subject to the condition that the migrating VMs should not be suspended for services that are running, but there are no restrictions on dead migration [3].

In overall VM migration aspects, these are the prime challenges:

- Storage data migration
- Memory data migration
- NCC(network connection continuity)

12.2.2.1   Storage Data Migration

VM migration is done on a server storage system; the site is transferred to virtual disks; disk data is available remotely due to high disk I/O latency but violently ALS.

Memory data migration: migrating data to memory, all current reports must be moved to the destination site if they want to run from the temporary virtual machine location after the migration. Status information includes processor states, memory data, device states, and more. Usually current state memory is found in data migration.

12.2.3   NCC

Moving the virtual machine to a new location needs approaches to reach customers. You can also keep open connections for live streaming during migration. Immigrants

have different problems depending on the circumstances. The migration methods are categorized in three angles: methods of migration, migration space, and migration granularity. Virtual machine migration can be classified into two types as: inactive migration and dynamic migration. Inactive migration can stop the virtual machine depending on the service should continue whether after shutdown or before stopping. If the virtual machine is temporarily disabled, the running states are overlaid and moved to the destination site. No open network connections are maintained during migration, and all connections are reconfigured after the virtual machine is restarted [6].

As shown in Fig. 12.2a, in the case of direct migration, data migration from memory and continuity of network connection are two issues that need to be resolved to avoid downtime. The data migration is done on the cases when the source as well as the destination sites lags the common storage facility. Apparently, the migrant virtual machine has severely disrupted services to non-resident migrants. The scope of the cloud data center is dramatically controlled during its 7/7 operation, so most studies focus on direct migration [4].

Migration of LAN restrictions to description in Fig. 12.2b: the source and destination host is similar to a data center connected to a single network and a single storage system.

Figure 12.2c. Source and destination hosts are not part of a single storage system other than an IP address; the system is connected to a low bandwidth network and has high latency in a homogeneous environment.

12.3   Performance Metric and Overhead

Approaches of qualified migration aim in repositioning the virtual machine reducing the further unwanted secondary effects. In this section we summarize the criteria for assessing the effectiveness of a migration strategy. Some immigration policies focus solely on increasing the factor, while others work best on a number of measures [5].

Total migration time: Indicates when the modified virtual machine starts restarting and the rest of the data is stored on the internal site.

Downtime: The migrant VM service is not available. The measurement determines the transparency of the clients of the migrating virtual machine. Dead migration – total duration of migration.

Total network traffic: All data is transmitted while migrating, and this competes the network bandwidth with mileage.

Service degradation: Migration affects a service running on the migrated virtual machine. It is measured by growth changes and response times. Network performance is also measured by using network bandwidth. These metrics can be obtained involving the time of the total migration with the traffic in the network. Time required for total migration is short, and overall network traffic is for specific migration and low network usage.
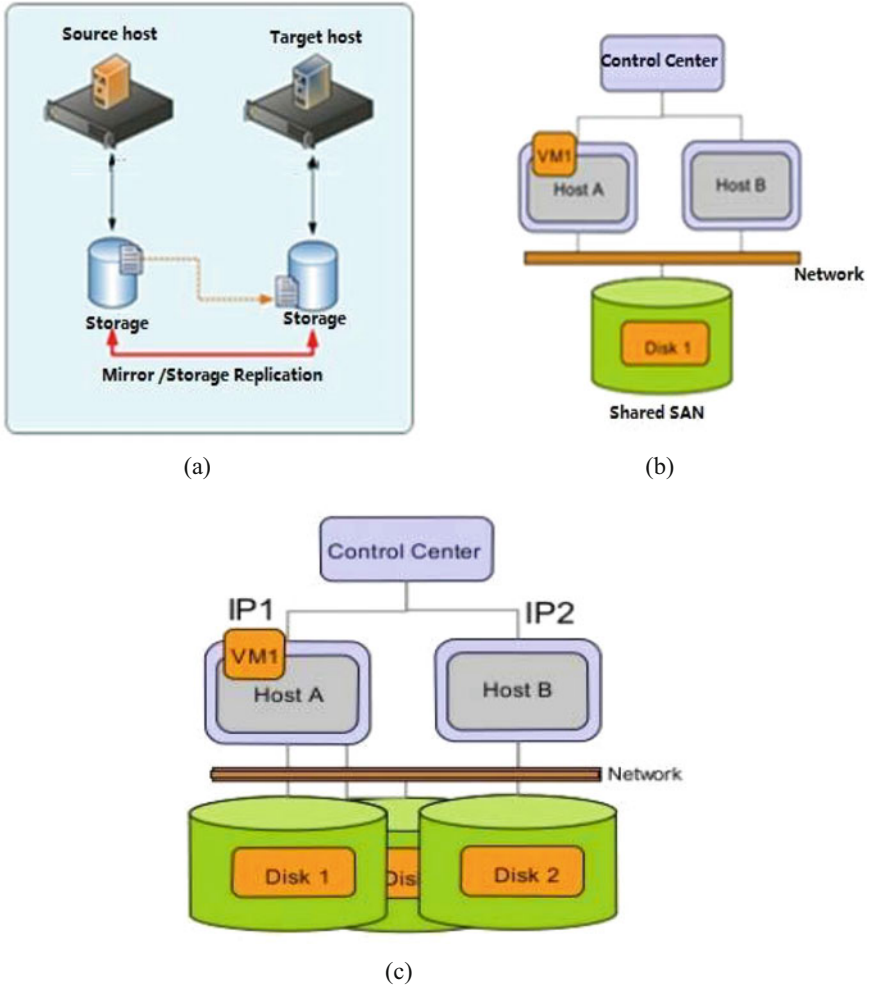
(a)

(b)

(c)

Fig. 12.2 (**a**) Non-live migration. (**b**) Live migration in LAN. (**c**) Live migration in WAN

12.3.1   VM Overheads Are Classified in Three Types

Computational overhead: Migration negotiations are typically conducted with the source and target host VMMs. The migration process replaces certain CPU cycles and memory locations. These two hosts cause interruptions on all virtual machines. When migrating demons run on a migrating virtual machine, certain virtual machine computing resources are consumed. In addition, some migration optimization technologies include data computation, compressing the data.
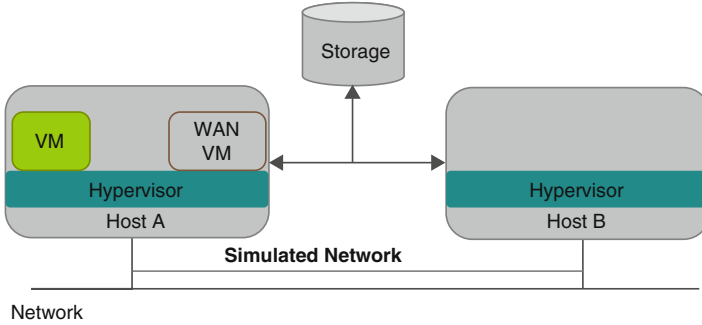
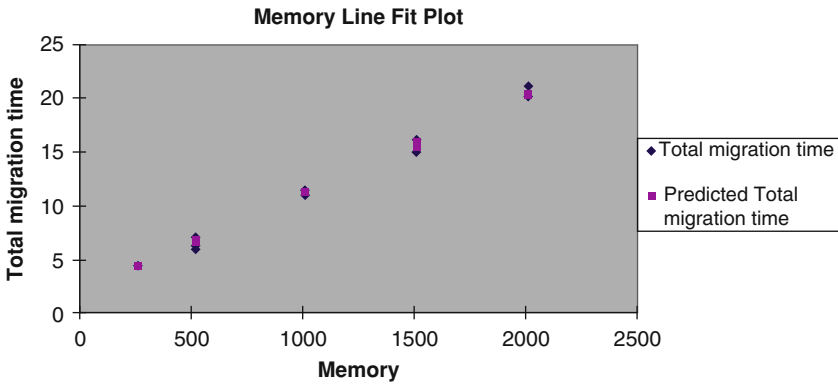**Fig. 12.3** VM Live migration without workload

Fig. 12.4 Memory vs total migration time

Network overhead: The migration of VM is highly tedious on the network. It compares resources available in the network with virtual machines working in both the target and the source hosts. Reads data in the onsite storage of the source and places it on the destination where one of the I/O bandwidths is also used.

Overhead of space: The VM migration works without workloads when compared to the network bandwidth and the cycles.

In Fig. 12.3, the primary goal is to understand the correlation between memory and total migration time.

In Fig. 12.4, it demonstrates that the total migration time linear gathering of memory and its overhead of time.
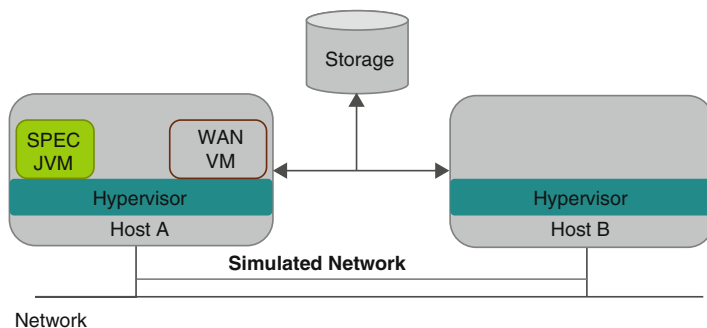
Both effected linearly.

Fig. 12.5 VM live migration with workload

12.3.2   VM Live Migration with Workload [2]

The above Fig. 12.5 distinguishes the impact of migration and benchmark performance.

12.4   Conclusion

Direct migration is a new technology with many benefits that can help cloud service providers and customers. It reflects the foundation of managing the hardware and balancing the load that is termed as the management in cloud. Data center migration can improve VMS compatibility and resolve the vendor lockout issue. When this concept is complete, the virtual machine scrapes to solve many migration presentations. In this article, we mainly provide an outline of the process involved in the migration and the challenges in it. Finally, we conclude with performance evaluation and overheads.

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