

A Study of Virtual Machine Allocation problem in Cloud Computing Environments

Harpal Singh¹ Pawan Kumar²

¹Research Scholar, NIILM University, Kaithal

²Assoc. Professor, NIILM University, Kaithal

Abstract

This paper introduced an extensive analysis and taxonomy of the predictive approaches for VM migration modified for cloud DCs. For this motive, firstly, it has given the main problems with respect to VM migration and categories on the basis of the prediction applied algorithm. It had demonstrated the participation for every technique and explained how the method of prediction is incorporated into the process of VM migration, for making it further effectual. Additionally, this described the applied workloads, evaluation factors, simulator, and hypervisor atmosphere, and the factor forecasted in the studied technique.

Keywords: VM migration, cloud computing.

1.Introduction

The cloud computing architecture was introduced to the world in order to execute the things in a faster manner. The computation architecture preliminarily involved three basic layers of application as follows [1].

- a) Infrastructure as a Service (IaaS)
- b) Platform as a Service (PaaS)
- c) Software as a service (SaaS).

Figure 1.1 shows the basic architecture of cloud computing environment [3]. As per NIST, cloud computing is considered as a model that allows ubiquitous, easy, and on-demand network access for sharing computing resource pools (such as servers, networks, applications, storage, and services) that may instantly allocate and publish or serve with less management effort supplier interaction [4].

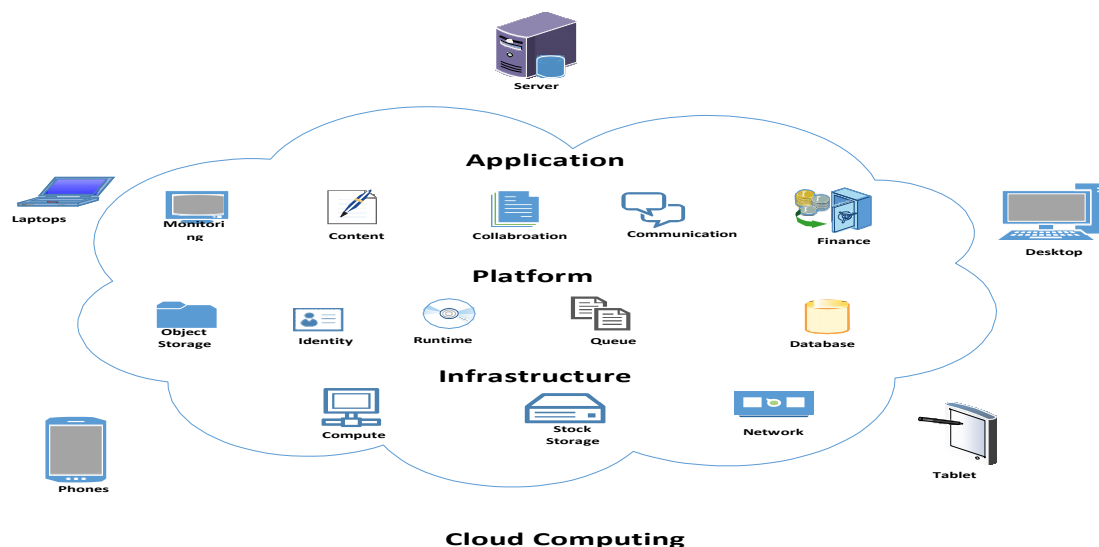


Figure 1.1 Cloud Computing Environment

The IaaS architecture aims to provide services that are related to infrastructure of a computer viz. the hardware elements {Ram, CPU, Storage} etc. The PaaS architecture layer involves the prominence of the platform dependencies and the SaaS architecture is willing to provide necessary software to the users. As for example, if Netflix- a global online content platform, is considered as a cloud service provider, the hardware which is needed to run Netflix and the storage architecture is provided by the Netflix company itself and that makes it a suitable candidate for the IaaS architecture system. In addition to that, the player that runs the displayed content, is also integrated within the Netflix account. It is obvious that a software can not run without a platform software and hence both PaaS and SaaS demands are observed to be satisfied and that makes Netflix a complete contender of Cloud Service provider. A cloud service provider has majorly consisted of three basic elements as follows[2].

- A. Cloud User /Broker
- B. The scheduler
- C. The PM and the VMs[3,4]

The selection of the VM is dependent upon two contrasts namely the selection of the VM from the underutilized PM and the selection of the VM from the overutilized PM. When it comes to the underutilized PM, all the concerned VMs of the PM are to be migrated to other PM and hence

there is no dispute in the selection architecture of the VMs from the underutilized PM. When it comes to migrating the VM from a over-utilized PM, as the PM is already working at its maximum efficiency, it becomes dicey to select the VM from the over-utilized hotspot[5,6].

2.Virtualization

Virtualization is a major service of cloud computing that is accessed by both software resources and hardware resources. This service differentiates cloud computing from other technologies [12]. The principal goal of virtualization is to handle the workload by modifying traditional computing to work in a more scalable, effective, and economical way. Virtualization can be implemented in a wide variety of OS virtualization, hardware-level, and server virtualization. Virtualization scheme is hardware decreasing cost maintenance and energy-efficient technology which is quickly transforming the principle way of computing. By using virtualization, one can improve the utilization of resources accessible to the user to perceive more gains.

3.Virtual Machine Allocation

The virtual machine allocation problem is one of the challenges in cloud computing environments, especially for the private cloud design. In this environment, each virtual machine is mapped into the physical host under the available resource on the host machine. Specifically, quantifying the performance of scheduling and allocation policy on a Cloud infrastructure for different application and service models under varying performance metrics and system requirement is a challenging problem to resolve. Nowadays, Virtual Machine (VM) are used with cloud computing for reducing the server load on the cloud data center. VM allocation is the most important technique that helps to optimize the total energy consumption held in cloud data centers. VM allocation is not an easy task that is performed on cloud computing. It is very difficult and in the current scenario, it has become a big issue in cloud environments. It is very important to map the request of the physical machine with the application that is store in the cloud data center [19].

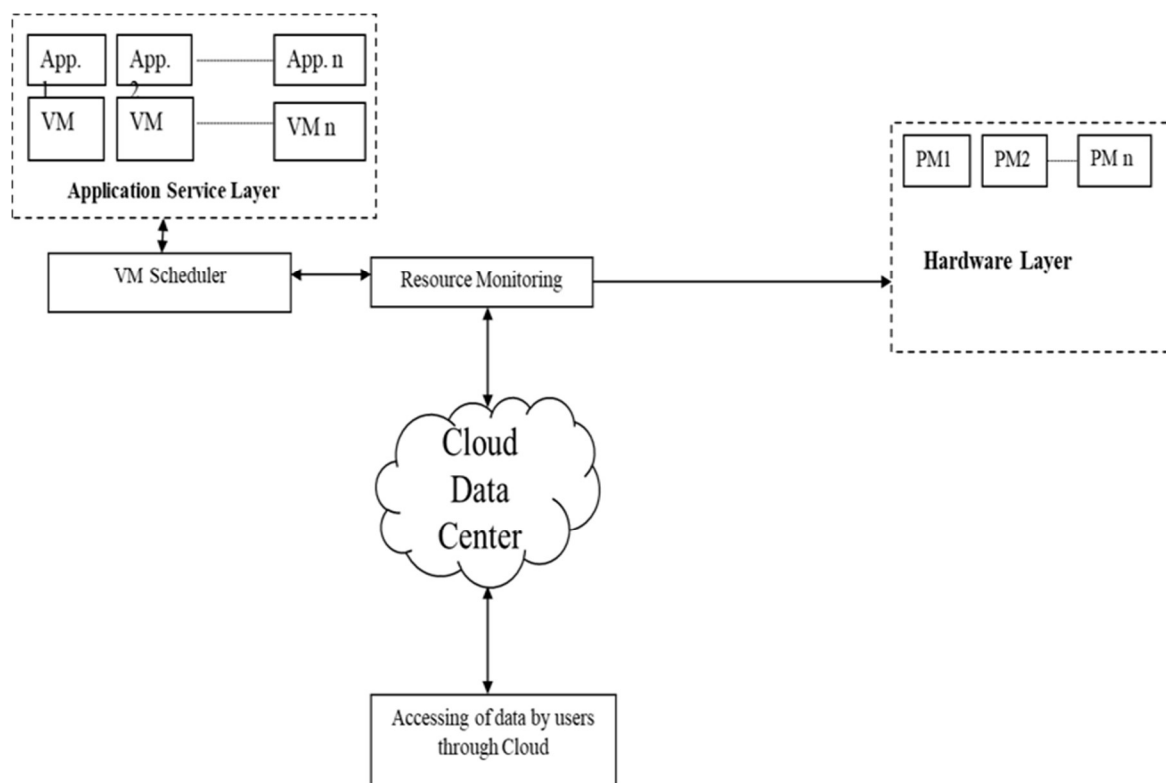


Figure 1.2 Virtual Machine (VM) Allocation

The above figure 1.2 describes the architecture of VM allocation. The architecture is divided into two layers; the Application layer and the Hardware layer. The purpose of the application layer is used to interact the users with the cloud services by using the internet. The hardware layer provides information regarding physical machines. The cloud data center is responsible for responding to each request that is coming from the application layer. The purpose of the VM scheduler is that to arrange the number of requests that arise in the VM.

4.Virtual Machine Migration

Virtual machine migration is the task of moving a virtual machine from one physical hardware environment to another. It is part of managing hardware virtualization systems and is something that providers look at as they offer virtualization services. Virtual machine migration is also known as teleportation.

Once the VMs are allocated to the concerned PM, the simulation takes place where the jobs of the users are executed under specified PMs. After a certain interval of time, the data centre migrates the VMs from under and overloaded VMs. The PM will be set as underloaded if the average CPU utilization of the PM considering all its VM does not satisfy the minimum utilization defined in

the problem formulation. In such a scenario, all the VMs of the concerned PM will be migrated. The VM allocation and the migration problem can be illustrated using the following process diagram as shown in Figure 1.3.

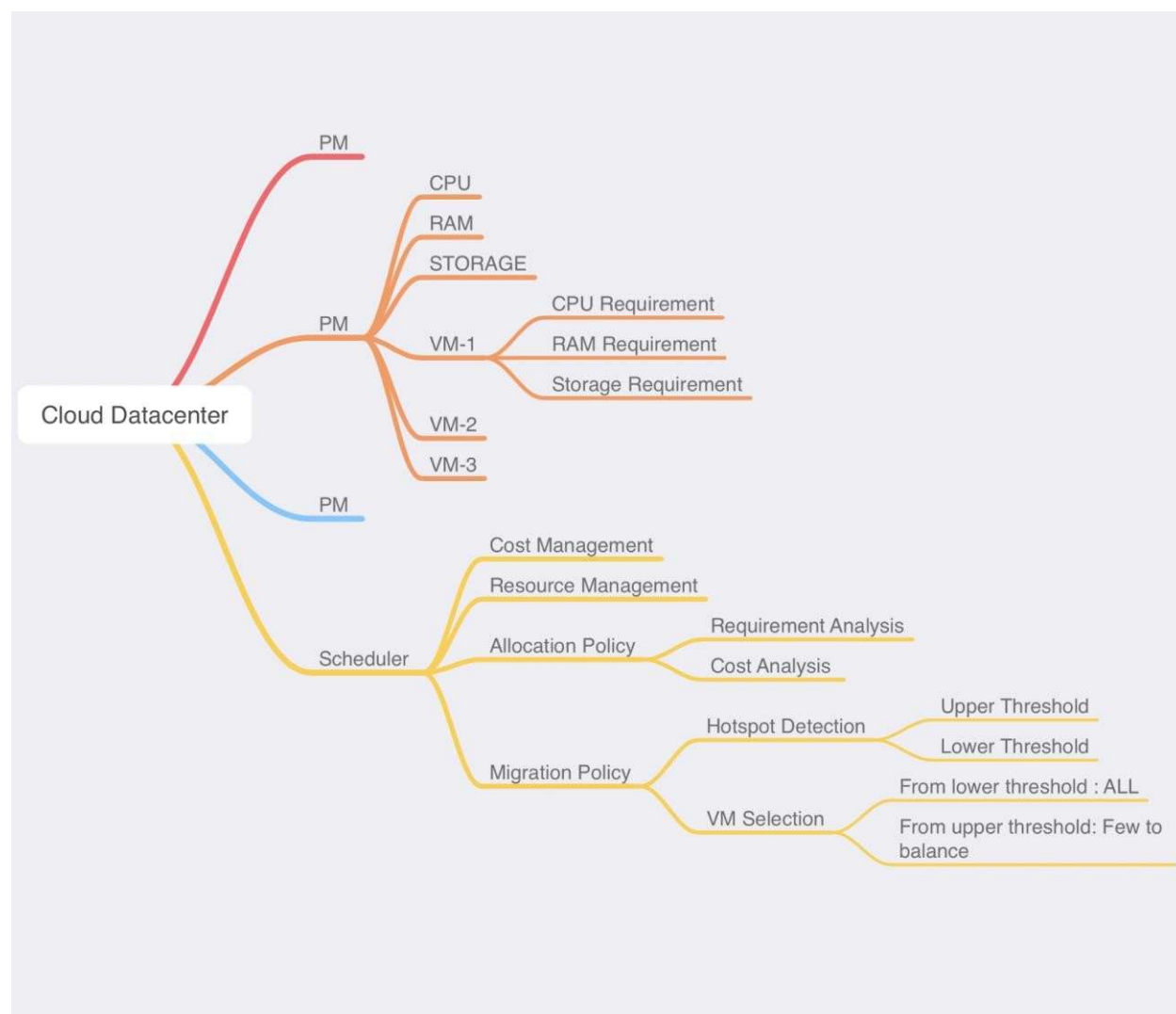


Figure 1.3: The allocation and the migration architecture

The allocation and migration architecture is dependent upon the threshold utilization of the CPU, that is calculated by adding all the utilization of the VMs along with their substituted PM. From the lower threshold, as the PM is not using the resource even on the average basis, all the VMs are migrated and no additional algorithm architecture is required in such a scenario. In case of the overutilized PM, few VMs has to be migration and selection of those VMs grabs the attention of the entire research and industry.

5Conclusion:

Virtualization is a major service of cloud computing that is accessed by both software resources and hardware resources. This service differentiates cloud computing from other technologies. In cloud environment, various operations such as store, maintain, control and access on the data are performed when compared to a local server and personal computer. There are two essential parts such as front end and back end are involved in the architecture of cloud. The front end comprises client/ user, computer, and the applications which utilized for accessing the data on cloud through the user interface such as a web browser. Then, the back end contains various computers, servers and data storage devices.

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