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# REVIEW ON VIRTUAL MACHINE PLACEMENT ALGORITHMS

**Vallari Chandrakar[1], Dr. Punyaban Patel[2], Manojeet Roy[3]**

*[1,2,3]Department of Computer Science and Engineering*
*Chhatrapati Shivaji Institute of Technology, Durg ,(India)*

**ABSTRACT**

*Cloud computing provides computing resources as per user requirement of user. Virtualization provides the services to efficient use of resources such as hardware and software. Virtual machines are applied to satisfy user requirement and it's placed on physical machine of cloud. In cloud computing, there are many strategies used for applying virtual machine (VM) placement. The objectives for VM placement are to reduce the number of physical machines requirement, virtual machine allocation time and to reduce resource and power wastage. In cloud infrastructure management Virtual Machine Placement (VMP) is one of the most challenging issues. In this paper include relevant topics such as Service Level Agreements (SLA) violation, energy-efficiency and carbon dioxide emissions regard these parameters we describe different Virtual machine placement algorithm.*

***Keyword: Cloud Computing, Virtual Machine, Virtual Machine Placement***

## I. INTRODUCTION

Cloud computing is the well known technology in these era, it works as pay-as-you-go model. Cloud computing is also consider as a large scale distributed computing environment, where it provide services such as memory, storage, bandwidth, number of cores etc. as per users demand. Cloud computing basically consists of three service models such as Infrastructure as a Service (IAAS), Platform as a Service (PAAS) and Software as a Service (SAAS). These services are available through virtualization techniques. Users demand is fulfilled by a set of servers hosted on virtual machines. Virtual machines are connected with physical machines that are operated by cloud provider.

Virtual Machine Placement (VMP) is the process of selecting which virtual machines (VM) should be located at which particular physical machine (PM) of a datacenter. In cloud computing the basic problem is providing services to the user, to provide them that services virtualization technique is used in which physical machine (PM), virtual machine (VM) are connected as many to many manner. Virtualization is the technique by which physical machines (PM) are divided into virtual machines (VM). Basically Virtual machines are consider as catalogue which shows user total item of data center and these virtual machines are connected to all the data centers. Cloud services are categorized by NIST in some different categories.

### 1.1 Software as a service (SAAS)

It offers software services to the users on-demand basis. For example MS office 2010, Google Docs etc.

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### 1.2 Infrastructure as a service (IAAS)

It offers resources such as storage, processing power, networking components, CPU, memory, I/O devices. The consumer can control the operating system, storage, deployed applications.

### 1.3 Platform as a service (PAAS)

It offers platform to the cloud service user is to deploy there developed applications onto the cloud infrastructure using platform tools.

## II. REVIEW OF DIFFERENT ALGORITHM

### 2.1 Static Server Allocation Problem (SSAP)

SSAP is basically designed for virtual machine placement by Martin .B et al in [1] In SSAP assigns server manually by VMs. After manual placement of VMs to the server, the capacity of servers is decreased. Bound of VM capacity is categorized by minimum and maximum capacity that a virtual machine can be utilized. Problem with SSAP is, it is not suitable in workload situation when it varies over time.

### 2.2 Dynamic Server Allocation Problem (DSAP)

DSAP is basically used when VMs are migrated to different servers over a time period [1]. It is more suitable for cloud environment and it gives better result to assigning a VM to a particular server. DSAP is worked for dynamic allocation of VMs; this property is more useful when it comes to workload balancing.

### 2.3Multi-objective Ant Colony Optimization (ACO) Algorithm

Fei MA et al [2] proposed a multi-objective ACO algorithm to minimize SLA violation, power wastage in servers and resource wastage. According to multi-objective ACO algorithm, each ant constructs a solution which assigns VM to server. It also supports dynamic property of VM allocation.

### 2.4First Fit Algorithm

First fit algorithm [4] seems as locally optimized algorithm in greedy manner. When a VM request arrives every VM starts scanning from the very first node which is starting node, when it finds a sufficient available resources then it will be selected by the VM. It ignores scanning of already fully loaded physical machines. It has a greedy manner to place the VMs and, by this way, we can achieve a local optimal solution. Physical machines are available with their indices [3]. Average time complexity of this algorithm is O (n/2).

### 2.5 Next Fit Algorithm

This algorithm named next fit algorithm [4] because it uses a variable name called next. Firstly next will considered as null and searching starts from the first node. It searches for physical machine which can satisfy the resource requirement. When search is complete VM starts on that PM and next is allocated by current physical machine. For the next virtual machine search starts from next physical machine, search continues up to coveted physical machine [5].

### 2.6 Random Fit Algorithm

Random fit algorithm [4] is named as that because it starts searching in random manner. This process will continue for every virtual machine [5]. When random selection of a physical machine is done for placing virtual

machine. If physical machine satisfies the resource requirement, then virtual machine starts by that physical machine. If it not satisfied when randomly another physical machine is chosen.

### 2.7 VM Scheduler algorithm

VM scheduler algorithm supports dynamic property of searching techniques. It is basically used for reducing VM allocation time and improves resource utilization [6]. Sameer K.M. et al [7] have designed a VM placement algorithm which represents the list of resources in a binary search tree instead of representing them in a queue. The input for the VM Scheduler algorithm is BST (binary search tree) of VMs and the output is allocated servers. By using binary search tree of server and binary search tree of VM, the VM scheduler algorithm will utilizes VM which has the maximum requirement according to searches for a server which best fit the requirement of VM.

## III. CONCLUSION

Placement of virtual machine is one of the biggest problems in cloud infrastructure. It is surveyed that some algorithm are supports static property and some supports dynamic property. It is seen that in cloud infrastructure dynamic allocation and workload balancing is more required. Dynamic algorithm are better than the static because it gives better performance, less execution time and it very less affect SLA violation.

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