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# Robust Cloud Resource Provision

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**ABSTRACT:** Cloud computing is a large distributed computing environment in which collection of resources is available to user through internet. The user can access the resources by paying the price for the infrastructure they use. At present, Cloud provider can offer two provisioning plans for computing resources namely reservation and on-demand plans. Reservation plan is cheaper than on-demand plan but best advanced reservation is difficult to achieve due to uncertainty of user's future demand and provider's price. Demand and price uncertainty is considered in Optimal Cloud Resource Provisioning (OCRP) algorithm. The OCRP algorithm can provision resources for being in multiple provisioning stages as well as long term plan. OCRB uses Stochastic programming Here a Robust Cloud Resource Provisioning (RCRP) algorithm is used in order to achieve the best advance reservation. Certain uncertainties like demand, price, resource utilization and consumers cost is considered in RCRP. RCRP is proposed to minimize the total provisioning cost by considering the uncertainty. In the proposed system the RCRP algorithm can be implemented at Agent side as opposed to implementation at cloud broker.

**KEYWORDS:** Cloud computing, resource provisioning, virtualization, virtual machine placement.

## I. INTRODUCTION

The leading trend for service infrastructures in the IT domain is called cloud computing, a style of computing that allows consumer to access information services. Virtualization technologies can be used to provide resources to cloud users. Cloud providers trade their services on cloud users for money. The quality of services that the users receive depends on the consumption of the resources. Cloud resources can be anything from infrastructure (CPU, memory, bandwidth, network) to platforms and applications deployed on the infrastructure. The goal of cloud economy is to optimize: (i) user fulfillment and (ii) cloud profit. The cloud enables the users to manage the data of back-end databases in a transparent manner. In cloud computing, a resource provisioning mechanism is required to supply cloud consumers a set of computing resources for processing the jobs and storing the data.

Cloud providers can offer cloud consumers two resource provisioning plans, namely short-term on-demand and long-term reservation plans. Pricing in on-demand plan is charged by pay-per-use basis. For reservation plan, pricing is charged by a onetime fee. With the reservation plan, the price to use resources is cheaper than that of the on-demand plan. But in Reservation plan, underprovisioning problem can occur when the reserved resources are not capable to fully meet the demand due to its uncertainty. Other problem with reservation plan is overprovisioning of resources, where the reserved resources will be more than what actually needed. Hence the resources reserved will not be fully used.

The goal is to achieve an optimal solution for provisioning resource which is the most critical part. In this paper an algorithm is proposed to minimize the underprovisioning and overprovisioning problems under four uncertainties. The uncertainties are demand, price resource utilization and consumers cost. In particular, robust computing resource provisioning (RCRP) algorithm is used. The demand, profit, resource utilization and cost uncertainty are considered to find a robust solution.. To make an optimal decision, the demand, price, idle-time and waiting-time uncertainties are taken into account to adjust the tradeoffs between on-demand and oversubscribed costs.

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## II. RELATED WORK

The OCRP algorithm was proposed in [1].The OCRP algorithm can find an optimal solution for resource provisioning and VM placement. It uses only two uncertainties only viz., demand and price. Here in this paper RCRP algorithm is used which is an extension of OCRP where four uncertainty factors are considered. Grid provides services which are not of desired quality. One of the major drawbacks of grid is single point of failure where one unit on the grid degrades which will cause the entire system to degrade. Hence [2] suggests cloud which is used for adaption of various services. The benefit of cloud is that it will avoid single point of failure and also will decrease hardware cost.

IaaS services which uses both the on demand plan and reservation plan. Provisioning of resources in distributed systems is mentioned in [9], [10], [11], [12], [13], [14], [15].In [9], the on demand service architectures for provisioning resources in grid is specified. The on-demand services are based for virtual machine placement. In [10] Just-In-Time scalability is stated for scaling the cloud applications and to automatically deploy the applications in cloud. Here a profile based approach is used for scaling and deploying applications automatically. Just-In-time scalability is the capability of cloud applications to adjust its architecture. [11] The uncertainty of resource availability is solved by using the concept of resource slot. In [12], a scheme was proposed to increase the revenue and to utilize the resource providers. In [13] for provisioning of resources a framework optimization was developed. This framework is used for finding multiple QoS parameters.

These parameters are considered under resources uncertainty. The online forecasting technique is used for discovering the pattern for the arrival of workloads. In [14] service reservation is proposed for that a heuristic method was introduced. Here the demand can be predicted it is used for defining reservation prices. In [15] reservation is used which is an efficient way for coordinating service demand and supply where a k-nearest-neighbour algorithm was proposed. This algorithm was applied to forecast the demand of resources. In all these papers the price differentiation between reservation and on-demand plans was not measured.

In cloud computing virtualization is a vital technology hence the problem with this technology is based on the placement of virtual machines according to the requirement. Placement of Virtual Machine is the most critical part of virtualization [16], [17], [18], [19], [20].Virtualization provides powerful management of resources. In [16], an algorithm designed for allocating VMs to cloud servers and a broker, agent based architecture was developed. In [17], management of resources based on virtual machine placement and allocation of resources was proposed. In [18] VM placement techniques are used for that features like min, max and shares are proposed. In [19] dynamic consolidation management was developed. Multiple cloud providers are of heterogeneous structure and it is not considered because consolidation mechanism was designed for homogenous structure.

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## III. SYSTEM MODEL

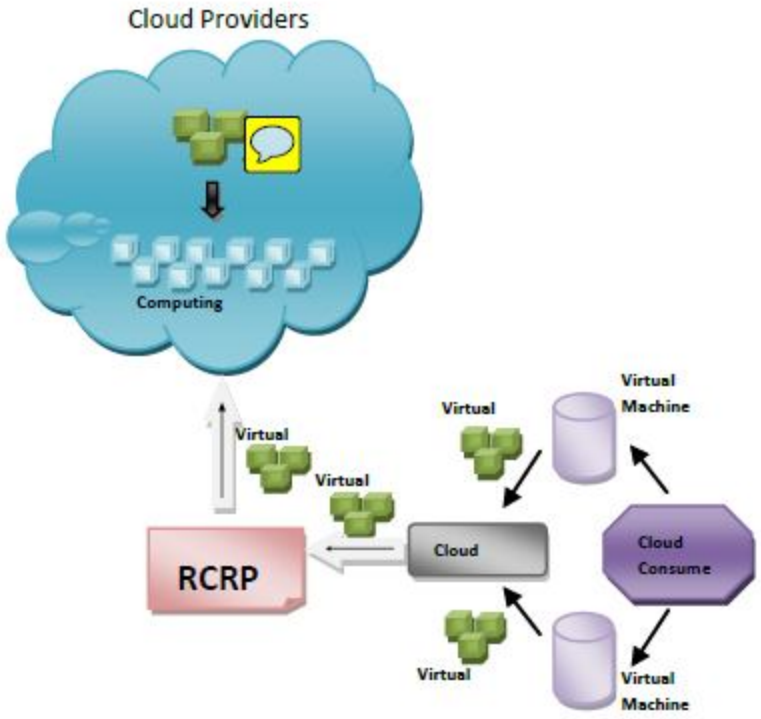


**Fig.1. System model for provisioning cloud resources**

The system model for provisioning cloud resources is shown in figure 1. It consists of mainly four components via, Cloud Consumer, Cloud Provider, Cloud Agent and Virtual Machine Repository. The cloud consumer will request for resources from cloud provider for executing its job. The cloud agent is responsible for allocating computing resources to cloud consumers. The agent will traverse and will go near each consumer. It will then collect the requirements from each cloud consumer. The cloud consumer will have to create VM. The created VM will be integrated with software and it is then stored in VM repository. This VM is used to obtain resources from cloud provider. Inside cloud provider the cloud provider's infrastructure is shown. It consists of computing resources and Virtual Machines. The RCRP algorithm is used to provision resources. This algorithm is implemented in the cloud agent. The cloud agent will collect resources from the repository of each cloud consumer. The VMs which are stored in the VM repository should be allocated to appropriate provider. This is done by the cloud agent. The RCRP uses optimization technique to find the appropriate cloud provider. Optimization is done by calculating four uncertainty parameters viz., wait-time, idle-time, cost and profit.

## IV. CONCLUSION

In this paper, a Robust Cloud Resource Provisioning (RCRP) Algorithm to provision resources offered by multiple cloud providers is proposed. The RCRP algorithm performs optimization to find out the Cloud Provider.The goal of this algorithm is to break down the optimization problem into multiple smaller problems which can be solved independently and parallel. It uses two uncertainty parameters for finding out one of the best node. The best node is allocated the job. The job is allocated by the Cloud Consumer. The agent will accept the job and will perform the algorithm to allocate the job to

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the best node. The best node is nothing but the cloud provider. The agent will allocate the job to the provider who has a free slot. The Cloud Provider will perform the job by selecting the appropriate functions. The result of the process will be send to Cloud Agent. The Cloud agent will provide it back to the Cloud Consumer

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