Survey on Resource Provisioning for Mobile Cloud Computing

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Abstract— The mobile cloud computing brings the mobile users, mobile service providers and also cloud service providers together to carry out their jobs effectively. Resource provisioning is a big challenge for mobile users as they need complete processing of their applications and data in cloud. Not only Mobile users it should provide flexibility for mobile service providers to hold their customers data and their status monitoring for their benefits. This paper provides many solutions for effective resource provisioning by different techniques like Adaptive, Agent based, Game theoretic methods etc … which are feasible for both mobile users and providers.

Keywords: Resource Provisioning, Mobile cloud Computing, Mobile Agent, Adaptive and Game theoretic.

I. INTRODUCTION

Mobile Cloud Computing provides the features of cloud computing to both mobile users and mobile service providers. It makes the computational process of mobile users very easy and manages the data in cloud. The resource provisioning is a process of discovering, allocation and monitoring resources like CPU, Memory, Storage etc in cloud and it is major challenge for mobile users who need their services to be carried out uninterruptedly. The mobile user’s faces different problems of having less battery power, offloading of data because of less memory backup and less processing speed which makes them to depend on the cloud resources. The cloud computing considers the resource provisioning by considering different QoS factors[1] such as availability, throughput, security, response time, reliability and performance.

The resource provisioning is a major challenge for cloud providers who manage SaaS model providing different software as services to users. This SaaS Model depends on PaaS & IaaS for carrying its functionality effectively. The mobile users and providers work in different environments where they download software’s from APP stores and install in their devices and to process any operation and to manage data they approach cloud providers to allocate set of resources available in the cloud this job is normally managed by IaaS [2]. IaaS manages the resource allocation using VM (Virtual Machine) for providing CPU, Memory etc.

In this paper we provide survey on all resource provisioning techniques available for mobile cloud computing. We highlight on Adaptive resource provisioning [1], Agent based [7] and Game theoretic model [3]. Section I discuss about resource discovery schemes, Section II on Resource allocation schemes and Section III on Resource Management Schemes applied using those three techniques. Section IV highlights issues on resource provisioning for MCC.

II. RESOURCE DISCOVERY SCHEMES

The Resource Discovery is a process of finding out the resource by the cloud providers for satisfying the user requirements. Whenever any request comes from the mobile users the cloud providers need to check the required parameters of the user mobile device like his battery power consumption, signal strength of mobile service providers and service requirement specification ie SLA between the mobile service providers and cloud providers. After checking all those requirements the Cloud Providers will allocate the resources on VM for processing the request of the mobile users.

In Adaptive resource provisioning the mobile users request needs to go through admission control system process for finding the resource. In order to avoid any conflicts, users will be prioritized on various factors of their mobile device and then cloud provider will find the VM which can manage the user’s request.

In Game theoretic model the users are treated as players which form a Coalition and request for a resource pool for finding the resources. The cloud providers use the Nash
equilibrium and blocking probability approaches to find the appropriate user for finding the resource.

In Agent based scheme the cloud providers need to check the service level agreements between the mobile service providers and mobile users and then find the resources which satisfy their needs.

III. RESOURCE ALLOCATION SCHEMES

In Adaptive resource provisioning the resource allocation is done based on semi-Markov decision process[8] to achieve the optimal policy for mobile Service providers. For a single request of mobile user it allows multiple cloud resources to get allocated based on their availability and maximize the resource utilization to enhance user experience. It also applies the economic way of achieving good rewards for the use of cloud resources by mobile users.

In Game Theoretic model the resource allocation based on bidding and calculation of utility function for all mobile user requests. The utility function [4] decides the allocation of cloud resources and gives the no of cloud resources assigned to the user. The mobile service providers reserve in advance the computing resources in cloud and all users need to undergo through admission control process for availability of computing resources and then get allocated based on the user requirements.

In agent based approach the each mobile Service provider is treated as mobile agents who have capability for probing request for specific resource on particular cloud host. Once the mobile agent is capable of finding the resource it can clone itself on to multiple cloud hosts and do performance comparison for different hosts and determine the most promising host for specific application and allocate the resources [6].

IV. RESOURCE MONITORING SCHEMES

In agent based approach the cloud directory service is used to update the database of virtual machine instances available for use in cloud. Virtual machine instances in the cloud provide a run time environment for agent based application partitions. They a provide a platform as a service(PaaS) ,rather than Software as a service (SaaS),and the only requirement they need to satisfy is to provide an isolated container(such as a JVM) for each offloaded partition to execute in.

In game theoretic model the resource monitoring is done by an admission control system which uses linear programming formulation for resource sharing and a distributed algorithm which chooses each user as a player who is chosen randomly selected to evaluate its current strategy and they are optimally chose a better strategy for getting allocated.

In Adaptive resource provisioning the resource monitoring is based on semi- Markov decision process in which not only incomes of accepting services, but also the cost resulted from VM occupation in the cloud, other factors like processing time in cloud and mobile device battery consumption is also taken into account.

V. ISSUES OF RESOURCE PROVISIONING IN MCC

In the three reference models there were many issues which need to be resolved for providing efficient cloud services to mobile users through mobile service providers. An efficient resource discovery mechanism need to be introduced which considers all mobile users request along with their location, purpose and general request history made by users. The mobile service providers need to get all the above details of users along with their mobile device status in terms of power consumption, battery backup and signal strength so that appropriate user who needs the cloud resources need to be identified and allocated. Resource discovery not only meant for appropriate user but also finding efficient cloud resource by cloud service provider, there are many schemes like cloud directory service maintaining resources database about their availability and service level agreement between different cloud service providers for managing resources information.

Resource allocation need to consider many factors for mobile users requests and provide optimized way of allocation on demand basis. It should also provide flexibility for mobile users for migrating among different cloud providers for getting cloud resources allocated for their requirement. It needs to provide efficient scheduling schemes for providing lower down waiting time and integrating different cloud resources provided by cloud providers. Knowledge database need to be developed for managing different cloud resources usage for generating future scenario of satisfying user requests to get allocated cloud resources.

Resource monitoring needs fault detection where in any fault resource need to be reallocated automatically. An efficient load balancing schemes is needed to eliminate over or under utilized resources. It also needs to manage a state estimation process for supporting resource discovery and ultimately manage to improve service uptime and eliminate down time of resources.

VI. CONCLUSION

In this paper we just provided basic idea of different resource provisioning techniques for MCC. Finally we highlighted the issues which need to be managed for efficient resource provisioning techniques for mobile users through mobile service providers. We hope this paper motivates researchers to explore and formulate a new mechanism by considering above issues to be resolved for efficient resource provisioning in MCC.

REFERENCES


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