

A Novel Sustainable Cloud Federation

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Abstract—As cloud computing emerged a number of issues such as degradation of services, service interruption also came into existence. In order to deal with such scenarios an interoperable structure in the form of cloud federation was proposed. A cloud federation consists of many autonomic service providers that share resources. In this proposal, we intend to build a stable cloud federation architecture. We propose to formulate an evaluation function that decides if an incoming virtual machine (VM) request is to be placed at the same service provider where the request arrived or it is to be outsourced to some other service provider in the federation. This evaluation function takes into consideration many dynamic parameters associated with the service provider. Further we calculate the cost of placing/outsourcing the VM request. Finally to evaluate the proposed model we also need to add a placement algorithm. To deal with failures we also need to devise a proper migration strategy.

Index Terms—Virtual Machine, Data Center, Cloud Computing, Cloud Federation, Migration.

I. INTRODUCTION

To overcome many current limitations of the cloud computing paradigm such as service interruption, quality of service degradation, etc. researchers were motivated to go for inter cloud solutions. Cloud federation is an inter cloud architecture where many autonomous service providers share their unused resources to obtain economy of scale. This sharing is governed by a set of rules. A cloud federation consists of many service providers that cooperate among themselves to achieve higher revenue and utilize the resources more efficiently. When a service provider receives a virtual machine (VM) request before actually allocating the resources to the VM a service provider performs an evaluation. We propose to build an evaluation function that is carried out based on the current state of the service provider which consists of the amount of resources available, revenue earned etc. Based on output of the evaluation function the service provider takes a decision on either to place the VM in its own data center or to delegate the responsibility of placement to some other service provider in the federation. This evaluation function can become very complex to compute as a number of dynamic factors are associated with its computation. Factors such as resources used, aggregate energy consumption, VM usage pattern at the service providers change dynamically. A federation can have many service providers so a proper selection of a service provider is to be made after the initial service provider decides not to place the VM in its data center.

II. IMPORTANT ISSUES TO BE ADDRESSED

The important aspects of the proposal are as follows:

1. An evaluation model for service providers is to be developed.
2. Cost incurred for intra or inter service provider placement.
3. An optimal VM placement algorithm to place the VMs at the data centers to further reduce the placement cost is also to be developed.
4. A migration model is needed to deal with situations such as quality of service (QoS) violations, hardware and software failures also needs to be developed.

III. PROPOSED APPROACH TO ADDRESS THE ISSUES

The evaluation model helps the service provider to decide if the VM is to be placed in its own data center or outsourced to any other service provider in the federation. A cost model based on the evaluation model is to be devised that helps us calculate the cost the service provider incurred as per the decision taken by the evaluation function. An optimal VM placement algorithm to further reduce the cost incurred at respective service providers by intelligently placing and re-ordering the VMs also can be developed. In order to deal with scenarios such as relocation of VMs, hardware and software failures, load balancing etc. an efficient VM migration strategy can be formulated to reduce the costs incurred in migrating VMs.

IV. EXPECTED OUTCOMES

To build a stable cloud federation where every service provider achieves its objective of entering into a federation. For example service providers who do not have enough resources can borrow resources from the one who have unused resources. The service provider can also earn monetary benefits by smartly out sourcing the VMs to other service providers. We intend to quantify the profit that can be earned by using such an architecture.