Imperial Journal of Interdisciplinary Research (IJIR)
Vol-2, Issue-6, 2016
ISSN: 2454-1362, http://www.onlinejournal.in

Multi Criteria Resource Matching In Multi Cloud Environment

Shifali G[1] & Dr. K. Raghuveer[2]
[1]M.tech Student Department of Information Science and Engineering, The National Institute Of engineering, Mysore, India
[2]Professor & Head Department of Information Science and Engineering, The National Institute Of engineering, Mysore, India

Abstract— *To avoid vendor lockup problem, multi cloud environment is being used in organizations. For users tasks in the enterprises, the best resource in multi cloud is selected and the task is executed to meet the SLA. In this kind of environment, a suitable resource match making algorithm is needed to find the best resource to execute the user task. In this work, we express the capability of the resource dynamically as Trust and based on Trust a suitable resource is selected matching user SLA needs. The trust is our approach is calculated based on multi criteria parameters.*

I. Introduction

Increasingly multi cloud is used in organizations. In case of single cloud provider, enterprisers get into vendor lock up problem. They have to always go with capability and pricing provided by that vendor. However in case of multi cloud, enterprises have the choice to select the best resource at best possible cost among the cloud vendors. This motivates many enterprises to use multi cloud environment.

Now in this multi cloud environment, a brokering system is needed to schedule the user task to suitable resource in multi cloud. The selection must be done based on the SLA requested by the user. To select the best resource in the multi cloud for meeting the user SLA is called as resource match making.

Previously many solutions have been proposed for resource match making which selects the resources based on previous time instance performance, neglecting the historical performance. In our work we differ from this and model the system performance as the continuous over a sampling time and multi criteria parameters aggregated over sampling time. These parameters are then used in a adaptive weighting algorithm to calculate the trust value for each resource. For each resource in cloud, trust is calculated and the sorted. For user task best trust value resource is selected matching his SLA.

The important difference from previous solution is that decision is based not only on current performance of the resource but based on historical performance of the machine is meeting the SLA.

II. Related Work

In this section we survey the current solution is resource matching in cloud environment.

S. M. Habib, S. Ries, and M. Muhlhauser, "Towards a Trust Management System for Cloud Computing",[5]
The main purpose of this paper is to provide an overview of our TM system architecture for cloud computing marketplace. This architecture will reflect the multi-faceted nature of trust assessment by considering multiple attributes, sources and roots of trust. It aims at supporting customers to identify trustworthy services providers as well as trustworthy service providers to stand out.

Cloud computing provides cost-efficient opportunities for enterprises by offering a variety of dynamic, scalable, and shared services. Usually, cloud providers provide assurances by specifying technical and functional descriptions in Service Level Agreements (SLAs) for the services they offer. The descriptions in SLAs are not consistent among the cloud providers even though they offer services with similar functionality. Therefore, customers are not sure whether they can identify a trustworthy cloud provider only based on its SLA. To support the customers in reliably identifying trustworthy cloud providers, we propose a multi-faceted Trust Management (TM) system architecture for a cloud computing marketplace. This system provides means to identify the trustworthy cloud providers in terms of different attributes (e.g., security, performance, compliance) assessed by multiple sources and roots of trust information.
The business market of cloud computing is growing rapidly. New cloud providers are entering the market with huge investments and the established providers are investing millions into new data centres around the

world. At present, it is extremely difficult for cloud customers to tell the difference between a good and poor quality cloud provider.

N. Dragoni, "A Survey on Trust-Based Web Service Provision Approaches"[6]

In this paper author presents an overview of the field of trust-based WS selection. The contributions are threefold. First, we provide a structured classification of all the approaches according to their rationale, so that approaches belonging to a specific class differ only for minor (mostly technical) aspects (Sec. II). Then, for each class we discuss the underlying fundamental idea and we list the various weaknesses with respect to the trust based Web Service selection problem (Sec. III-VI). Finally, we highlight the key limitations of the state of the art and we claim that a soft notion of trust lies behind such weaknesses. As a result, we advocate the need of a new approach based on a stronger (semantics-based) notion of trust.

The basic tenet of Service-Oriented Computing (SOC) is the possibility of building distributed applications on the Web by using Web Services as fundamental building blocks. The proliferation of such services is considered the second wave of evolution in the Internet age, moving the Web from a collection of pages to a collection of services. Consensus is growing that this Web Service "revolution" won't eventuate until we resolve trust-related issues. Indeed, the intrinsic openness of the SOC vision makes crucial to locate useful services and recognize them as trustworthy. In this paper we review the field of trust-based Web Service selection, providing a structured classification of current approaches and highlighting the main limitations of each class and of the overall field. As a result, we claim that a soft notion of trust lies behind such weaknesses and we advocate the need of a new approach based on a stronger (semantics-based) notion of trust.

H. Kim, H. Lee, W. Kim, Y. Kim, "A Trust Evaluation Model for QoS Guarantee in Cloud Systems"[3]

Cloud computing is a new paradigm in which dynamically scalable virtualized computing resources are provided as a service over the Internet. However, since resources are limited, it is very important that cloud providers efficiently provide their resources. This paper presents a trust model for efficient reconfiguration and allocation of computing resources satisfying various user requests.

Our model collects and analyzes reliability based on historical information of servers in a Cloud data center. Then it prepares the best available resources for each service request in advance, providing the best resources to users. We also carried out experiments for reliability analysis with 4 data types, including an all data set, random data set, recent data set, and the data set within a standard deviation. As a result, using our trust model, cloud providers can utilize their resources efficiently and also provide highly trusted resources and services to many users. Our trust model aims to reconfigure servers dynamically and allocate high quality computing resources to users. The proposed trust model in this paper uses the history information of nodes in the Cloud environment. This information consists of each node's spec information, resources usage, and response time. Then the model analyzes this information and prepares suitable resources on each occasion, and then allocates them immediately when user requests. As a result, Cloud system can provide the best resources and high-level services based on the analyzed information and it is possible to utilize resources efficiently.

Ajay Prasad, Prasun Chakrabarti " Having Centralized Monitoring as a Service in Cloud Computing: A Study of Performance Aspects"

A Centralized Monitoring as a Service (CMaaS) is a desired and necessary feature to be included in cloud computing. One of the concerns in having CMaaS from both user and provider's perspectives would be that of performance implications. Carrying out a performance analysis thus, becomes an important task before suggesting a MaaS solution. A straight forward performance study would be to find out whether the inclusion of monitoring processes affects the normal user request processing or not. The paper studies the affects by forming a simulation environment. The studies will also help datacenters in deciding whether to have dedicated VMs allocated for monitoring or to have monitoring processes share the VMs allocated for processing user requests.

In the wake of emerging need of audit ability, long term monitoring is not only advisable but, is necessary. If the monitoring is introduced, it will surely lead to some amount of extra burden on the users as well as providers in terms of performance and cost. One of the performance aspect will be to decide whether to have CMaaS on fully dedicate VMs or to have them share processing power from the allotted VMs to the service providers. As observed in the simulation results, the overall affect of monitoring on to the user processes as well as the overall affect of workloads on the monitor processing are minimal in case of dedicated VMs for monitoring. Topology1 is more promising to be proposed for long term monitoring solution. However, there is a need for doing cost analysis too on these topologies before proceeding. Thus, data centers can introduce CMaaS with fully dedicated resources (especially processing) without worrying much about performance issues.

S. Clayman, A. Galis, C. Chapman, et al., "Monitoring Service Clouds in the Future Internet".[9]

This paper presents the Lattice monitoring framework which can be used as a fundamental part of the management of an Internet scale deployment of Service Clouds. Lattice has been designed for monitoring resources and services in virtualized environments. The monitoring of virtualized resources and services has many features, requirements, and criteria which are not relevant for monitoring systems that are used for traditional fixed network resources. Traditionally, the architecture for monitoring has needed to adapt to an arbitrary network structure, but in a Service Cloud environment the infrastructure is structured as a federation of large clusters of distributed hosts. Consequently, we can design and build a monitoring system those factors in this major difference. In the work presented in this paper we use the Lattice monitoring framework as a real-time feed for the management of a service cloud. Monitoring is a fundamental aspect of Future Internet elements, and in particular for service clouds, where it is used for both the infrastructure and service management

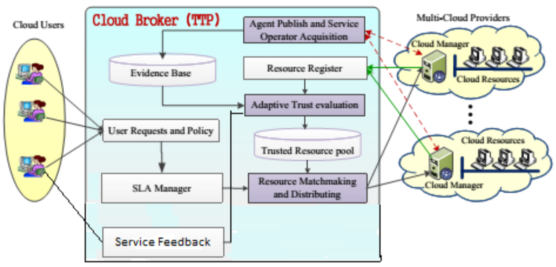
III. PROBLEM DEFINITION

Given a set of cloud providers and resources in them and user are submitting their tasks with SLA, a suitable resource with high trust value must be selected for users task execution which meet the SLA. The trust is based on multiple criteria and must indicate the capability of the resource in executing the jobs within guaranteed SLA in past.

IV. PROPOSED SOLUTION

We propose a Trust based resource match making algorithm.

The architecture of the system is given below



The user interact with Cloud Broker component which handles the multiple clouds. Each cloud provider is registered in the Cloud Broker and cloud broker does resource matching among multi cloud for user's tasks.

The algorithm consists of following parts

1. Data Collection
2. Trust Calculation
3. Resource matching

Data Collection

In each cloud resource a probe is installed and its collects the CPU usage, memory usage, bandwidth usage, response time, task completion ratio periodically. These parameters are stored in the Broker for calculating the Trust.

Trust Calculation

To calculate the trust the historical parameters of CPU usage, memory usage , bandwidth usage, response time , task completion ratio are aggregated over each time window and totally aggregated using weighted average model.

The aggregated values are then multiplied by corresponding weights allocated for each parameters and trust is calculated.

Trust = W1*1/Agg CPU + W2* 1/Agg Mem + W3 * 1/Agg BW + W4 * Ag Res time + W5 * Task Compl

The trust value is then normalized to overall trust of all providers.

Resource Matching

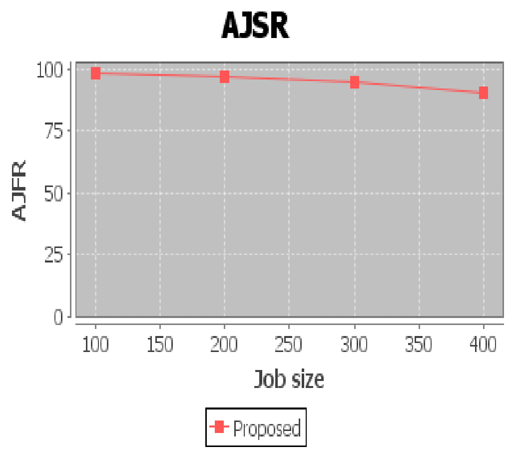
The matching resources are identified for the user task execution in the resource matching step.

Based on the trust all the resources are sorted from higher to lower. The resource with Aggregated response time and completion ratio is searched from higher to lower among the trust calculated to find the best matching resource and the task is scheduled to that resource.

V. RESULTS

We implemented the proposed solution in cloudsim environment and measured the performance of the system is terms of average job success ratio for different number requests with SLA same for all.
AJSR (Average Job Success Rate) measures the ability of the broker in scheduling the tasks such that tasks were executed within their SLA.

The slippage is considered as failure.



VI. CONCLUSION

In this work, we have explained the proposed trust based resource match making and we found through simulation in cloudsim that our solution is having high job success ratio and able to meet schedule most tasks to meet their SLA.

REFERENCES

[1] K. M. Khan, Q. Malluhi, "Establishing Trust in Cloud Computing", IEEE IT Professional, vol. 12, no. 5, 2010, pp. 20-27.
[2] K. Hwang, D. Li, "Trusted Cloud Computing with Secure Resources and Data Coloring", IEEE Internet Computing, vol. 14, no. 5, 2010, pp. 14-22. [3] H. Kim, H. Lee, W. Kim, Y. Kim, "A Trust Evaluation Model for QoS Guarantee in Cloud Systems", International Journal of Grid and Distributed Computing, vol.3, no.1, pp. 1-10, 2010.
[4] P. D. Manuel, S. Thamarai Selvi, M. I. A. E. Barr, "Trust management system for grid and cloud resources", Proc. of the First International Conference on Advanced Computing (ICAC 2009), 2009, 13-15 Dec, pp. 176-181.
[5] S. M. Habib, S. Ries, and M. Muhlhauser, "Towards a Trust Management System for Cloud Computing", Proc. of IEEE TrustCom-11/IEEE ICESS-11/FCST-11, pp. 933-939, 2011.
[6] N. Dragoni, "A Survey on Trust-Based Web Service Provision Approaches", Proc. of the 2010 Third International Conference on Dependability, pp. 83-99, 2010.
[7] Z. Liang and W. Shi, "A reputation-driven scheduler for autonomic and sustainable resource sharing in Grid computing" Journal of Parallel and Distributed Computing, vol. 70, no. 2, pp.111-125, 2010.
[8] S. A. de Chaves, R. B. Uriarte, C. B. Westphall, "Toward an ArchitectureforMonitoringPrivateClouds",IEEECommunications Magazine, vol. 49, no. 2, pp. 130-137, 2011.
[9] S. Clayman, A. Galis, C. Chapman, et al., "Monitoring Service Clouds in the Future Internet". Future Internet Assembly, pp. 115-126, 2010.
[10] RightScale, http://www.rightscale.com/.
[11] SpotCloud, http://www.spotcloud.com/.
[12] L.J. Hoffman, K. Lawson-Jenkins, and J. Blum, "Trust beyond Security: An Expanded Trust Model", Communications of the ACM, vol. 49, no. 7, pp. 95-101, 2006.
[13] K. R. Jackson, K. Muriki, L. Ramakrishnan, et al., "Performance and cost analysis of the Supernova factory on the Amazon AWS cloud". ScientificProgramming, vol. 19, no. 2-3, pp. 107-119, 2011.
[14] D. Ghoshal, R. S. Canon, and L. Ramakrishnan. "I/O performance of virtualized cloud environments". Proc. of the second international workshop on Data intensive computing in the clouds. pp.71-80, 2011.
[15] J. Shafer. "I/O virtualization bottlenecks in cloud computing today". Proc. of the 2nd conference on I/O virtualization, pp. 1-7, 2010.