Cloud Service Negotiation Techniques

Ariya T K, Christophor Paul, Dr S Karthik

Abstract— **Cloud computing is a subscription based service from which the networked storage space and the resources can be obtained. Collaborations in multiple institutions are increasing due to the world wide deployment of more cloud. Cloud uses more resource than the grid. Multiple computing resources from different clouds require in negotiation so resource coallocation is essential for Cloud vision. Resources demand and supply can be dynamic in cloud. Resource negotiation (exchange of trading of resource between clouds) enables cloud participants to face an unstatable requirement environment. Consumer and provider need to agree service-level agreements through negotiation for cloud resource reservation. The aim of this paper is to present a survey of challenges and current state of resource negotiation. In particular we show the different agent based methods for cloud negotiation. The most advanced agent cloud coordinator will able to deliver Quality of Service (QoS) for cloud provider. It allows an increase in performance, reliability and scalability of applications.**

Index Terms— Cloud Computing, Cloud Negotiation, Negotiation Agent, Resource Management.

I. INTRODUCTION

Cloud computing provide illustration of resources. Resource management is done by load balancing and scalability. Key feature of cloud computing is virtualization. Negotiation based on Service Level Agreement (SLA) is an agreement between service providers and service consumers. All resources are rented using cloud computing and utility computing but in cloud computing the company have less knowledge about source of the services. In negotiation mechanism, agents negotiate over both contract price and commitment [3].

Negotiation activities are needed for establishing contracts and resolving difference between consumer and provider in resource allocation [6]. In negotiation mechanism, an agent make contract between provider and consumer for a fixed time interval. Negotiation evaluation is conducted on simulation testbed.

The rest of the paper is structured as follows: Session2 motivates the need for resource negotiation. Session3 present the challenges and current state. Session4 constitute of comparison about the different negotiation mechanism.

Manuscript received Sep 15, 2012.

Ariya T.K, Computer Science and Engineering , SNS College of Technology/Anna University, Coimbatore, Tamil Nadu, India (e-mail: ariya.tk@gamil.com*), 9442822670*

Christophor Paul, Computer Science and Engineering , SNS College of Technology/Anna University, Coimbatore, Tamil Nadu, India
Dr S Karthik, Computer Science and Engineering , SNS College of Technology/Anna University, Coimbatore, Tamil Nadu, India

II. CLOUD RESOURCES

Cloud is environmental friendly and promotes telecommuting techniques. Cloud provides a platform where three elements such as Infrastructure as a service (IaaS), Platform as a Service (PaaS) and Software as a service (SaaS) to provide the requirements of the customer in most efficient manner. In cloud shared resources, software, and information are provided to computers as a metered service.

IaaS providers give a virtual server to start, stop, and access and configure an online storage. This allow a company to pay only as much capacity as needed. PaaS providers host a set of software and product development tools as online infrastructure, to allow the developers the ability to create applications on platform. SaaS provides no investment in servers or software licensing. Desktop as a Service (DaaS) is an emerging service which deals with providing a whole desktop experience over the internet. It is also referred as desktop virtualization [13].

Elasticity means that platform can handle sudden, unanticipated and extraordinary loads. Scalability is a planned level of capacity with ability to scale in a quick and easy manner when need more or less resources. Data integrity is a property that ensures that the data is of high quality, correct, consistent and accessible. Reliability is the ability to perform and maintain its function in routine as well as unexpected circumstances.

Resource allocation is very important for virtualization platform. Resource allocation can be done based on the information from different domains. It depends on bandwidth and time. In the method of weighted allocation, all the domains are of same weight. It provides a better scheduling and performance. Resource allocation considers the factors such as resource cost, resource reliability, execution time and bandwidth. Different type allocation algorithms are used in cloud for allocating resources.

III. CLOUD NEGOTIATION

Cloud computing is powerful, since it does not rely on any one source. Cloud may look like virtualization because it appears that the application is running on a virtual server detached from any connection to a single physical host. Virtualization is part of a physical infrastructure and technique which allow running more than one server on same hardware component.

With cloud computing, the software programs are stored on servers placed elsewhere and it is accessed via the internet. Even if the computer crashes, then software is available for users. In virtualization technique, one physical

1

computer is pretending to be many computing environments whereas in cloud computing, many different computers pretending to be the one computing environment.

The selection of negotiation protocol determines the scope of information flow which in turn influences the changes upon the agreement. The fundamental phases of business transaction are product offers and discovery, negotiation process, payment activities, and the delivery of the product to customers.

A negotiation coordinator is responsible for coordinating the actions taken by its various negotiation phases. An important feature of negotiation model is simultaneous negotiation of many buyer-seller pairs [7]. Accessing several resources by multiple resource providers is a challenging task for consumers. Grid calls for a shared environment on a computer system from multiple administrative domains. Both grid and cloud provide scalability. Cost of deploying is also high. Cloud computing is an abstraction of traditional server hosting applications. Instead of buying server, the server is taken for lease from a vendor to run and manage the system in data center.

Negotiation mechanism differs from auction. Negotiation focus on cooperating to create the value of objects while auction determining the object's unknown value [8]. Negotiation agents play very important role in the mechanism [4]. Agent acts as a bridge between different networks and creates an infrastructure. Business infrastructure coordinates the dealers. Resource management is central to the operations. Conflicting request from multiple cloud participants are hard to manage. In order to achieve high system utilization, the negotiation is conducted [5].

Negotiation among cloud resource providers and cloud applications are unavoidable due to the following reasons:
1. To maximize the selling of providers and minimize the price payment by consumers
2. To balance the market of cloud services [2]
3. To obtain a contract for provisioning of resources

IV. NEGOTIATION AGENT

Provider agent and consumer agent are present in a negotiation environment. Both the agents register in cloud market registry. From the registry users get agent's information. Agents are used for the negotiation mechanism. Provider agents are responsible for giving advertisement of service and consumer agent discovers the services from the tesbed.

Simulations are done periodically. Negotiator manages Service Level Agreement (SLA). Negotiators are the mediators between consumers and providers [9]. Agents concentrated on time, price, market factors such as competition and opportunity [15]. Negotiation protocol for the negotiation mechanism evaluates offers until both agreements will be reached. Customer satisfaction is necessary for cloud computing. Different Quality of Levels

is provided for services. Negotiation fails when agent's deadline expires before reach an agreement.

V. ISSUES OF CLOUD NEGOTIATION MECHANISM

1) Decrement in the cost of resources
2) Dynamic demand for resources
3) Resource availability
4) Reservation of resources

VI. COMPARISONS

A. SLA IN CLOUD SYSTEMS

An SLA is a document that contains an agreement between both the consumer and provider. Service Level Agreement contain the elements such as cloud storage, load balancing, location of data and security. Requirements needed to support negotiation activities are QoS parameters. SLA negotiation is done with multiple cloud providers by a broker in market. SLA monitoring means without violate the agreements increase the utilization of resources by providers.
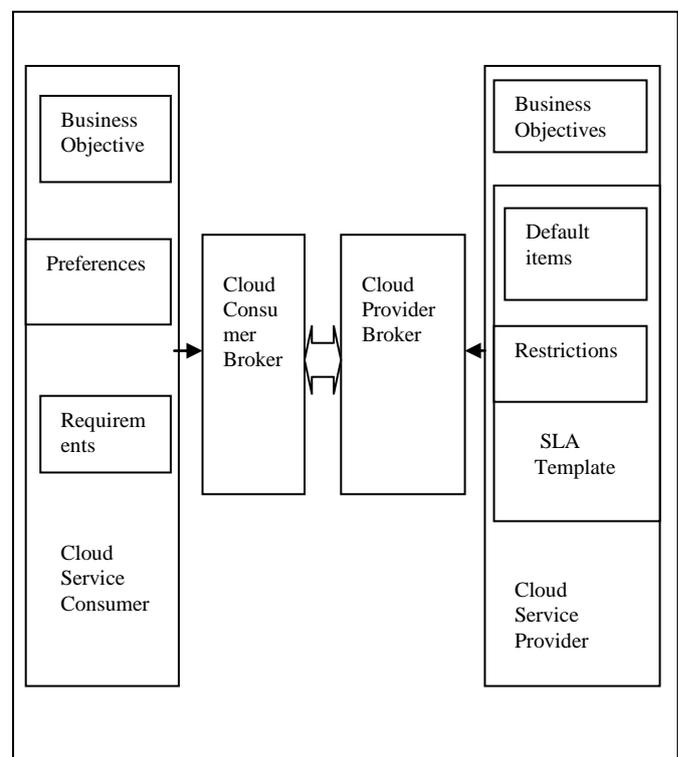

Figure.1 SLA Negotiation Process

ADVANTAGES:
- Automated contract creation
- Identify expectations, clarify responsibilities and make communication between a service provider and consumer.
- Ensure QoS for services

DISADVANTAGES:
Creation of mapping to public SLA template such as price, performance and availability need higher cost.

B. AUTOMATED NEGOTIATION

This paper presents the negotiation mechanism for the problem of dynamic resource allocation. Multiple buyers and sellers are negotiating concurrently with each other. By paying penalty an agent can decommit from the agreement. Here provider and consumer negotiate resource leasing contacts automatically. Each seller has different type of resources. Here only a single set of resources is allowed for each task. By analyzing negotiation history buyer estimate seller's cost and market competition [1].

ADVANTAGES:
- Performs combinatorial auction mechanisms
- Applied in dynamic resource allocation problems

DISADVANTAGES:
- Agent will make decision immediately after receive a message.
- Impossible to make agent's equilibrium strategies in dynamic resource allocation

C. GLOBAL CLOUD EXCHANGE FOR MARKET ORIENTED ARCHITECTURE

Global cloud exchange gives a vision for trading services. Cloud gives chance to providers for select the providers according to their requirements. This is by executing SLAs in advance. The negotiation process ends at the time of SLA formation or withdrawal of participants. The resource management system provides advance reservations. Broker can choose the users depending on their applications [12].

ADVANTAGES:
- Negotiation between users and providers for establish SLAs
- Allocation of Virtual Machine resource to meet SLAs
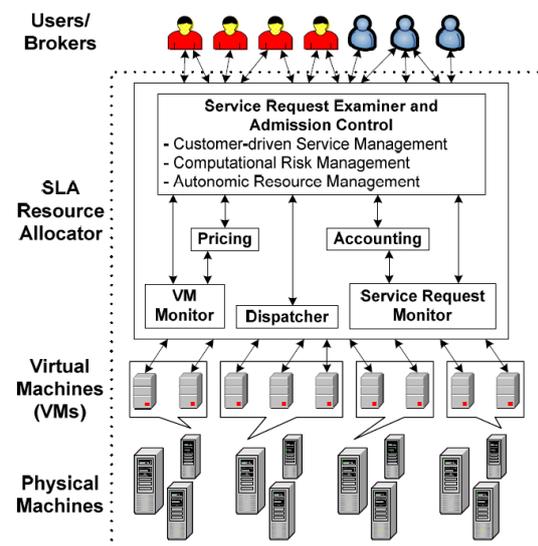- Manage risk associated with the SLA violation

Figure2.High-Level market oriented cloud architecture

D GENERIC MODEL FOR PRICING

This paper gives the definition of dynamic pricing strategies of cloud providers. Due to the simple implementation genetic algorithm is used. For buying the cloud resources client send the request to market. The request which contain the information about resource, QoS and time slot for execute the task. The provider sends reply with price according to the user's needs. Resources with lowest price will be purchased by client. The frequency of client request for resources is dynamic [10].

ADVANTAGES
- Genetic algorithm is very simple.
- It provides best pricing.
- Quicker coverage to best solutions.

DISADVANTAGES:
- It cannot define the more complex parameters relation
- Not yet used in real computing environment.

E. PRICE AND TIME SLOT NEGOTIATION

An agent based cloud test bed act as a market for cloud. Both the consumer and provider agent participate in cloud negotiation through the cloud market registry. The registry is an information repository. Provider agent function as service advertiser and consumer agent discovers the services from environment. Service discovery provide in test bed through the message passing. Periodic simulation controlled by the simulation controller. Cloud status recorder shows the information about the cloud market and negotiation from all negotiation round.

Two algorithm named tradeoff and concession-making algorithm are implemented for PTN. Cloud reservation is doing in memory array. Here single issue and multi issue negotiation is considered [14]. Consider other negotiation issues for quality of services (QoS). Introduce a coordinator which distribute the applications across different data centers which enabling SLA's for improving application's performance, reliability and scalability. Provisioning of virtual machine provide security.

PTN mechanism follows the negotiation protocol is agent make negotiation in alternate rounds. It will accept when both the consumer agent and provider agent reached in an agreement for price and time. The negotiation fails when one of agent's deadlines expires before reach the agreement.

In future work we advocate creation of federated Cloud computing environment (InterCloud) that facilitates just-in-time, reliableand scalable provisioning of application services, and consistently achieving QoS targets under variable workload. It is used to counter the problem such as the inability to predict geographic distribution of users consuming their services. Propose architecture for Cloud Coordinator and an extensible design that allows its adoption in different public and private Clouds.

ADVANTAGES:
- Time and price slot negotiation mechanism used for agent's different level of satisfaction

3

ISSN: 2278 – 1323

International Journal of Advanced Research in Computer Engineering & Technology (IJARCET)
Volume 1, Issue 8, October 2012

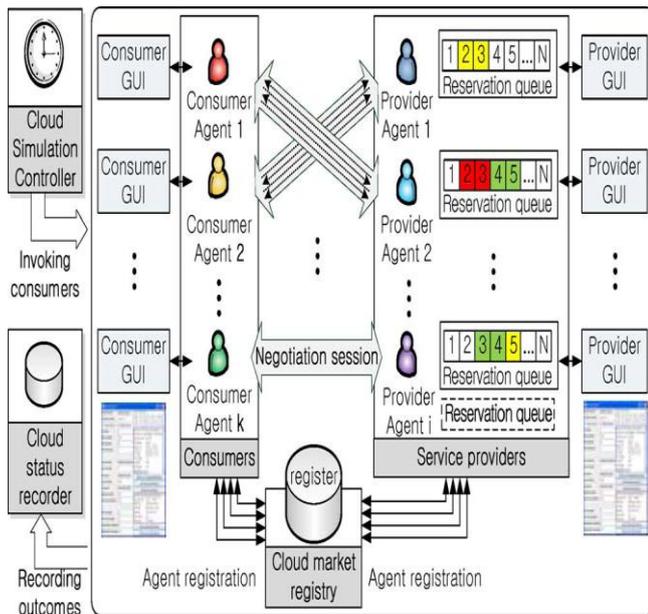- Enhance negotiation speed by using the tradeoff algorithm
- Establish SLA

Figure 3.Agent-Based Cloud Testbed

VII.CONCLUSION

The intention of this paper is to compare the works applies in cloud service reservation to solve cloud resource allocation. This article has provide an overview of cloud computing in which its definition, cloud resources, negotiations and issues are discussed. More than four papers were surveyed regarding the cloud resources negotiation. Various techniques of negotiation are discussed and the problems are identified. In order to provide quality of service and to enhance negotiation, Cloud Coordinator is implemented. Finally, the future research directions have been outlined for providing more quality of services.

ACKNOWLEDGMENT

REFERENCES

[1] Bo An, Victor Lesser, David Irwin,Michael Zink "Automated Negotiation with Decommitment for Dynamic Resource Allocation in Cloud Computing" , Proc. of 9th Int. Conf. on Autonomous Agents and Multiagent System, May, 10–14, 2010

[2] Chris Peiris, Dharmendra Sharma "C2TP: A Service Model for Cloud" CLOUD COMPUTING 2010 : The First International Conference on Cloud Computing, GRIDS, and Virtualization

[3] Divya Jyothi "Ecommerce Dealer Agent Mechanism in Cloud Computing Environment" International Journal of Advanced Research in Computer Science and Electronics Engineering Volume 1, Issue 4, June 2012

[4]DivyJyothi, Madhe ,D.R.Ingle "Dealer Agent based Cloud Ecommerce Framework" ICACACT 2012

[5] Edwin Yaqub, Philipp Wieder, " A Generic Platform for Conducting SLA Negotiations"

[6] Gaurav Raj, Ankit Nischal "Efficient Resource Allocation in Resource provisioning policies over Resource Cloud Communication Paradigm" ICCSA,Vol.2, No.3, June 2012

[7] Kwang Mong Sim "Grid Resource Negotiation:Survey and New Directions" *IEEE TRANSACTIONS ON SYSTEMS, MAN, AND CYBERNETICS—PART C: APPLICATIONS AND REVIEWS*, VOL. 40, NO. 3, MAY 2010 245

[8] Kwang Mong Sim, Senior Member, IEEE, and Benyun Shi "Concurrent Negotiation and Coordination for *Grid Resource* Coallocation" *IEEE TRANSACTIONS ON SYSTEMS, MAN, AND CYBERNETICS: CYBERNETICS*, VOL. 40, NO. 3, JUNE 2010

[9] Mario Macías, J. Oriol Fito and Jordi Guitart "Rule-based SLA Management for Revenue Maximisation in Cloud Computing Markets", CNSM 2010

[10] Mario Macías, Jordi Guitart "A Genetic Model for Pricing in Cloud Computing Markets"

[11] Rabi Prasad Padhy, Dr. Manas Ranjan Patra,Dr. Suresh Chandra Satapathy"SLAs in Cloud Systems: The Business Perspective", InternatIonalJournal ofComputerSCIenCe and technology Vol. 3, ISSue1, Jan. - MarCh2012

[12] Rajkumar Buyya, Chee Shin Yeo and Srikumar Venugopal " Market-Oriented Cloud Computing: Vision, Hype, and Reality for Delivering IT Services as Computing Utilities"

[13] Rajkumar Buyya,Rajiv Ranjan, Rodrigo N.C "InterCloud: Utility-Oriented Federation of Cloud Computing Environments for Scaling of Application Services"

[14] Seokho Son and Kwang Mong Sim "A Price- and-Time-Slot-Negotiation Mechanism for Cloud Service Reservations", *IEEE TRANSACTIONS ON SYSTEMS, MAN, AND CYBERNETICS—PART B: CYBERNETICS*, VOL. 42, NO. 3,JUNE 2012

[15] Vivek Shrivastava, D.S. Bhilare "Algorithms to Improve Resource Utilization and Request Acceptance Rate in IaaS Cloud Scheduling"Int. J. Advanced Networking and Applications 1367 Volume: 03, Issue: 05, Pages: 1367-1374 (2012)

[16] Wang Xiaojing,Tong Wei,Ren Jia,Ding Linjie, Liu Jingning "Weighted Fairness Resource Allocationof Disks in XEN" IJCCSA,Vol.2, No.3,June12

Ariya T.K received the B Tech. degree in Information Technology from Mahatma Gandhi University, Kerala, India in 2009.She is at present doing ME in Computer Science and Technology from Anna University, Chennai, Tamil Nadu, India. Her area of interest includes Cloud Computing and Software Engineering.

CHRISTOPHER PAUL A is an Assistant Professor of Computer Science and Engineering at SNS College of Technology, Anna University. He received a B.E degree in Computer Science and Engineering from Anna University, India in 2008 and M.E degree in Computer Science and Engineering from Anna University of Technology, India in 2011.His research works including Mobile Networks, Distributed Computing and Software Architecture.

Professor Dr.S.Karthik is presently Professor & Dean in the Department of Computer Science & Engineering, SNS College of Technology, affiliated to Anna University- Coimbatore, Tamilnadu, India. He received the M.E degree from the Anna University Chennai and Ph.D degree from Ann University of Technology,

Coimbatore. His research interests include network security, web services and wireless systems. In particular, he is currently working in a research group developing new Internet security architectures and active defense systems against DDoS attacks. Dr.S.Karthik published more than 35 papers in refereed international journals and 25 papers in conferences and has been involved many international conferences as Technical Chair and tutorial presenter. He is an active member of IEEE, ISTE, IAENG, IACSIT and Indian Computer Society.