Cloud Service Negotiation Techniques

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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, CloudNegotiation, 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.

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
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 testbed.

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](image-url)

**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

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, reliable and 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

Figure 2: High-Level market oriented cloud architecture
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.

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