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Intercloud Resource Allocation by Using Agent based Approach

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Abstract - As the interaction and resource allocation of inter-cloud environment is complex because Inter-cloud resources are distributed and controlled by different clouds. The proposed work uses agent based method to enhance inter-cloud resource allocation. The Agent based method takes care of the construction of agents for bolstering discovery, matching, selection, composition, negotiation, scheduling, workflow, and monitoring of Inter-cloud resources.

The proposed method proves advantages of using an agent paradigm for Inter-cloud resource allocation, reviews representative models of agent-based Inter-cloud resource allocation and also provides a comparison among these models.

The agent based method is also compared with non-agent based approach to show enhancement achieved in inter cloud resource allocation.

***Key Words*:** Cloud computing, intercloud, security, data management.

1.INTRODUCTION *(Size 11, Times New roman)*

Cloud computing is a rising computing standard in which assets of the computing framework are given as a service over the Internet. As guaranteeing as it may be, this standard additionally delivers a lot of people new challenges for data security and access control when clients outsource sensitive data for offering on cloud servers, which are not inside the same trusted dominion as data possessors. Numerous services like email, Net banking and so forth are given on the Internet such that customers can utilize them from anyplace at any time. Indeed cloud storage is more adaptable, how the security and protection are accessible for the outsourced data turns into a genuine concern. The three points of this issue are availability, confidentiality and integrity.

Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources. One of the essential aspects of cloud computing is creating the illusion that "infinite" computing resources are available on demand. However, the resources held by a single cloud are usually limited and it may not be able to deal with a sudden surge in user demands. An Inter-cloud is an interconnected global "cloud of clouds" that enables cooperation among clouds. In an Inter-cloud, each cloud can tap into resources of other clouds when it does not have sufficient resources to satisfy consumers' requests. Inter-clouds are classified into federated clouds and ulti-clouds. In a federated cloud, providers voluntarily interconnect their infrastructures to enable sharing and exchange of resources among themselves. Federated clouds are classified into centralized (resource allocation performed by a central entity) and peer - to - peer (no central authority) modes. Clouds interconnected at the same layer (e.g., between two or more IaaS providers) is called a horizontal federation and clouds interconnected at different layers (e.g., between a PaaS provider and an IaaS provider) is called a vertical federation. In a multi-cloud, cloud providers do not necessarily volunteer to interconnect and share their infrastructures, and consumers are responsible for managing resources across multiple clouds. In a broker aggregated service multi - cloud, cloud brokers provide resource selection and aggregation services.

2. Related Work

1. D. Bernstein et al. proposed the concept of interoperability use cases such as these, certain commonalities amongst clouds must be adopted. With the Internet, interoperability foundations were set with the basics of IP addressing, DNS, exchange and routing protocols such as BGP, OSPF, and peering conventions using AS numbering. Clearly, analogous areas in Cloud Computing need to investigated and similar technologies, but for computing, need to be invented.
2. S. Venticinque, L. Tasquier, and B. Di Martino proposed the user is able to discover, allocate, configure and monitor Cloud services at infrastructure level through an approach that is agnostic respect to the specific Cloud vendor or to the Cloud technology.
3. J. O. Gutierrez-Garcia and K. M. Sim, develop the relationship between web services and service providers is modeled using object Petri nets. Both Petri net formalisms are combined to support a design methodology for defining concurrent and parallel service choreographies. This results in the creation of a dynamic agent-based service composition algorithm. The simulation results indicate that service composition is achieved with a linear time complexity despite dealing with interleaving choreographies and synchronization of heterogeneous services.

4. P. Endo et al. this process in the context of distributed clouds, which are seen as systems where application developers can selectively lease geographically distributed resources. This article highlights and categorizes the main challenges inherent to the resource allocation process particular to distributed clouds, offering a stepwise view of this process that covers the initial modeling phase through to the optimization phase.
5. Y. Wei and M. Blake, proposed the authors propose an agent-based framework that provides effective integration of services within clouds. To tackle the dynamism in service operations, an adaptive monitoring algorithm is proposed.
6. S. Son and K. M. Sim, In existing negotiation mechanisms in which a negotiation agent can only make one proposal at a time but brokers in this work are designed to concurrently make multiple proposals in a negotiation round that generate the same aggregated utility, differing only in terms of individual price and time-slot utilities. Another uniqueness of this work is formulating a novel time-slot utility function that characterizes preferences for different time slots.
7. K. M. Sim In this paper, To bolster many-to-many consumer-to-Cloud negotiations, this work devises a novel interaction protocol and a novel negotiation strategy that is characterized by both 1) adaptive concession rate (ACR) and 2) minimally sufficient concession (MSC). Mathematical proofs show that agents adopting the ACR-MSC strategy negotiate optimally because they make minimum amounts of concession and also Mathematical proofs show that these InterCloud coalition formation strategies 1) converge to a subgame perfect equilibrium and 2) result in every Cloud agent in an InterCloud coalition receiving a payoff that is equal to its Shapley value.
8. D. Bernstein, D. Vij, and S. Diamond, we define Cloud Computing as a single logical datacenter which: May be hosted by anyone; an enterprise, a service provider, or a government. Implement a pool of computing resources and services which are shared amongst subscribers. The Intercloud vision, Reference Intercloud topology and elements, Intercloud Trust Management Model This technique is used in cloud.
9. J. Kang and K. M. Sim In this paper, we introduced an enhanced and new cloud ontology which provides more precise similarity reasoning methods. The new and improved cloud ontology consists of a set of cloud concepts, individuals of those concepts, and the relationship among those individuals. It is used for determining the similarity among cloud services with three kinds of reasoning methods consisting of 1 concept similarity reasoning 2 object property similarity reasoning 3 datatype property similarity reasoning.
10. Mohsin Nazir , "Cloud Computing: Overview & Current Research Challenges", This paper shows what cloud computing is, the various cloud models, and the architecture of cloud computing. This research will define the security risk and challenges occurred in these technologies. Various issues defined in this projects like: Platform Management, Data Encryption, Interoperability, Cloud Data Management and security, SLA (Service Level Agreement) and so on. Limitation: Security is one of the major issues which hamper the growth of cloud.
11. Monjur Ahmed, Mohammad Ashraf Hossain, "Cloud Computing And Security Issues In The Cloud", This paper presents a review on the cloud computing concepts as well as security issues inherent within the context of cloud computing and cloud infrastructure. Location transparency is one of the prominent flexibilities for cloud computing, which is a security threat at the same time – without knowing the specific location of data storage, the provision of data protection act for some region might be severely affected and violated. Trust is another problem which raises security concerns to use cloud service for the reason that it is directly related to the credibility and authenticity of the cloud service providers.
12. Victoria Paulsson, Vincent C. Emeakaroha, John Morrison, Theo Lynn "Cloud Service Brokerage: A systematic literature review using a software development lifecycle", The paper aims to provide an overview of CSB research status, and give suggestions on how CSB research should proceed. A descriptive analysis reveals a lack of contributions from the Information Systems discipline. A software development lifecycle analysis uncovers a severe imbalance of research contributions across the four stages of software development: design, develop, deploy, and manage. This paper provides two key contributions to the research community. First, it provides an overview of the CSB research community on how they are evolving. To the best of our knowledge, a systematic review, like this, is the first of its kind on the emerging CSB topic. Second, it highlights areas that future research contributions in the CSB are required, both in Computer Science and Information Systems. Limitation: CSB is clearly a complex software system, in which insights from other disciplines apart from Computer Science and Information Systems, such as economics (e.g. profit maximisation), and law (e.g., service level agreement, and territorial jurisdiction) are required.
13. Ravi Khurana, Rajesh Kumar Baw, "Quality Based Cloud Service Broker for Optimal Cloud Service Provider Selection", Cloud consumers (CC) are confounded while taking the choice of selecting Cloud service provider (CSP) to accomplish Cloud services. Large number of CSPs are present in the market, which provide diverse cloud administrations viz Platform-as-a-Service PaaS, Infrastructure-as-a-Service IaaS and Software-as-a-Service SaaS. CSPs are conveying their Cloud services to CC in light of Service Level Agreement (SLA). In this archive, every one of the transactions have been obviously characterized, what nature of administration will CSP give and what the consumer should pay have been dispassionately characterized. Unfortunately, SLA is not strictly pursued; quality of service is not accomplished. Cloud service broker (CSB) is an entity which can resolve all these issues. They are shifting their sensitive data on the cloud. To get a cloud

service, they have to contact cloud service provider. Now, huge number of providers are available in the market. To locate a perfect provider who can fulfill their need is a skillful job. This job can be accomplished by cloud service broker.

14. Rajesh Pal, Samaresh Mishra and PrasantKu.Patnaik, "Study on Cost Estimation of Service Delivery in Cloud Computing Environment", Cloud computing allowed multiple providers to offer basic computational resources to consumers as a digital service with the benefits of 'on-demand' and 'pay-per-use' characteristics of cloud. Basically Cloud Computing is an internet based distributed computing where user only concentrate on more on their business process rather than spending time the managing process. Here estimating cost is very important for cloud application when it needs remaining a certain services level at the same time interval.Moreover estimating cost of business applications or scientific applications in cloud computing environment, recently a biggest challenge for software developers, when the application has quality of service requirements. Cloud services offer a range of economic benefits to their users and to the economy as a whole. This paper summarizes how the cost estimation occurs in the cloud computing environment and how it will be more efficient to calculate the actual cost of different services with the help of proposed models and techniques.
15. Almomani, "A variable service broker routing policy for data center selection in cloud analyst", proposed a Variable Service Broker Routing Policy, which aims to achieve the minimum response time through considering the communication channel bandwidth, latency and the size of the job. The proposed service broker policy can also reduce the overloading of the data centers by redirecting the user requests to the next data center that yields better response and processing time. Improving the financial cost and power consumption is still to be researched and improved if possible.
16. Srinivasan, "Profit maximization scheme with guaranteed quality of service in cloud computing", To assure the quality of service requests and maximize the profit of cloud service providers, this paper has proposed a novel Double Quality Guaranteed renting scheme for service providers. This scheme combines both short term renting and long term renting, which can reduce the resource waste greatly and adapt to the dynamical demand of computing capacity. Further, we improving the user interface, by having graphs for profit and time taken for handling service request. Profit maximization problem is a heterogeneous cloud environment.
17. Chaturvedi, "Profit Based Data Center Service Broker Policy for Cloud Resource Provisioning", In this paper, the author suggest & propose a Cloud Brokering Framework that supports all the brokering steps along with proposed profit optimization consideration. The simulation scenario is carefully generated to show the effectiveness of algorithm. As a future scope of work, the framework can be extended with more effective policies at each level of lifecycle. The work can be extended for evaluation of Service Level Agreements (SLAs).
18. Buyya, "Revenue Maximization with Optimal Capacity Control in Infrastructure as a Service Cloud Markets", In this paper, the author presented a revenue management framework to tackle the problem of optimal capacity control for allocating resources to customers. The main challenge is that the provider must find an optimal capacity to admit demands from the reservation market such that the expected revenue is maximized. The future direction of this work involves the extension of the revenue management framework with overbooking strategies.
19. Zhang, "Dynamic Resource Allocation for Spot Markets in Cloud Computing Environments", In this paper, we consider the case of a single cloud provider & address the question how to best match customer demand in terms of both supply and price in order to maximize the providers revenue and customer satisfactions while minimizing energy cost. To model this problem as a constrained discrete-time optimal control problem, used Model Predictive Control to find its solution, proposed solution achieves better net income and minimizes the average request waiting time. Further, we are also interested in conducting more extensive experiments using workload datasets that contain price information.

2.1 Open Issues

2.1.1 Problem Statement:

In the existing system, the problem is that if many customers request a large number of cloud services simultaneously, the cloud service broker cannot purchase sufficient cloud services from CSPs to satisfy the demand of all the customers. Then, a peak-demand problem arises in which customers cannot complete their work. Hence, dynamic conditions not only could result in economic problems but also could have a negative impact on the work of customers.

The number of cloud services that can be purchased by the cloud service broker is limited. When the demand of all customers increases greatly and reaches the limit, the peak-demand problem arises, and the demand-response mechanism starts to work.

2.1.2 Existing System solution:

In the existing system, the problem is that if many customers request a large number of cloud services simultaneously, the cloud service broker cannot purchase sufficient cloud services from CSPs to satisfy the demand of all the customers. Then, a peak-demand problem arises in which customers cannot complete their work.

In the proposed system main focus on guaranteed the service quality of all requests, reduce the resource wastage, provide more security and optimize profit maximization. All jobs are

scheduled by the job scheduler and assigned to different VMs in a centralized way. An optimal configuration problem of profit maximization is formulated in which many factors are taken into considerations, such as the market demand, the workload of request, the SLA, the rental cost of services, and so forth.

3. CONCLUSIONS

In this paper, we provide agent based method for Intercloud Resource Allocation. We define Multi cloud environment and Agent-based cloud computing. Inter-cloud resource allocation models provides a comparison between agent-based and non-agent-based approaches and our method enhances the resource allocation which is useful for efficient use of cloud resources.

Our method reduces the complexity involve in Intercloud interaction and management, it can be further extended to provide more efficient use of Intercloud features.

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