Review on Agent based Cloud Computing

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ABSTRACT
Cloud Computing is very important aspect for providing various kinds of services. There are many cloud service providers and cloud service consumers. To interact on behalf of both consumers and providers Agents are required. Basically Agent's work is to negotiate with the providers and provide services as required by the consumers. Also, he has to make decisions on behalf of providers in order to determine which service request to accept. This article studies on surveys on Agent based cloud computing that describe various methodology for negotiating with providers and consumers, thereby providing good services that match consumers various requirements and providers specifications.

Keywords
Cloud computing, agent, service discovery, service composition, service negotiation, resource management

1. INTRODUCTION
Cloud computing provides on-demand services to the customers wherever and whenever they need. To provide services resources such as storage, network applications, software requirements should be made available in rapid way.

These computing services are transformed into a model that is delivered in same manner as that of conventional utilities [7]. In such a model, according to the user's requirements they access services without knowledge of from where these services are delivered and hosted. Now-a-days, internet contents are accessed without knowledge of infrastructure. Infrastructure may include data centers which are monitored and maintained by content providers. Cloud computing has the capabilities of business applications that are uncovered as services that are accessed over a network.

An agent takes some decision on behalf of user and finds out what to do to achieve objective. It also focuses on resource management which consists of resource pooling and resource sharing. For successful communication agent should have ability to coordinate and negotiate with others. When the actions fit in well with one another we call this concept as coordination. Negotiation is when group of agents interacting and coming to a mutually acceptable solution. These agents can monitor service requests that are current and future requests as well so that they can adjust schedules and cost related to continuously changing resource demands; thereby continuously managing the resource reservation process [1]. To manage cloud resources software agents are used. Since agents are capable of doing all above mentioned things, resource allocation and dynamically changing resource demands are adopted.

2. LITERATURE REVIEW
2.1 Agent-based Cloud Commerce
In a business model for Cloud computing, for consumption of their computing capabilities users pay providers. This work proposes an agent-based testbed for strengthening the discovery of Cloud resources and SLA negotiation. In the testbed, provider agents and consumer agents act as mediators between providers and consumers [3].

A Grid is basically collection of resources that are geographically distributed providing sharing and selection of resources dynamically depending on various aspects such as performance, QoS, capability, etc. [3], it adopts the place that many Cloud computing deployments depend on Grids, have autonomic distinctiveness that is self organizing capabilities, and some utilities. The areas that are relevant to work include: agent-based Grid resource discovery and Grid resource negotiation [3].

1. Agent-based Grid resource discovery: arrangement of an algorithm for vigorously assembling agents that are capable of delivering information about distributed networked assets. Each agent occasionally exchanges Grid resource knowledge with other agents.

2. Grid resource negotiation: Followed a relaxed- criteria protocol for Grid resource negotiation among market-driven agents. Negotiation agents take into account the market dynamics in a Grid and are programmed to slightly relax their negotiation criteria to improve negotiation success rates.

This paper reports the ideas, design, and continuing development of an agent-based Cloud resource management testbed, and preliminary experimental results. These results show that

1) The agent-based resource finding approach is generally successful in identical requests to resources according to the preferences of consumers and providers, and Using the relaxed time slot negotiation protocol, consumers are generally successful in negotiating for requested time slots to use resources, and providers generally benefit from achieving superior resource utilization.

2.2 Concurrent Negotiation and Coordination for Grid Resource Co Allocation
In multi-Cloud environments, service composition should coordinate participants with their interest, service assortments should be mechanized, configure distributed services and also should be able to deal with incomplete information related to cloud providers and services provided by them. In order to compose services in various environments of multi-cloud, agent-based approach is used. This paper is one of the early works that take into account a concurrent negotiation mechanism for Grid resource co-allocation [2]. This work consists of concurrent negotiation mechanism together with three classes of commitment management strategies and a utility-oriented coordination strategy for managing multiple concurrent negotiations. This work only presents the experimental results of the negotiation mechanism in balanced

Grid markets [2].

2.3 Cloud Service Composition

Agent-based service composition is automated and supported by agents. It considers semantic aspects of web services through supporting service interaction and handling failures in order to verify and validate service compositions. However, this section is only centered on automated web service composition approaches where agents show self-organization capabilities, reaction to environment's changes, and/or make use of cost-based service selection mechanisms, given their close relation with the present work [5].

There is need for agent paradigm in Cloud computing service composition. Agents are capable of solving problems independently and may collaborate with one another to achieve objectives while at the same time considering individuals goals and constraints. Tools to automate Cloud resource management can be appropriately handled by the agents. This consists of resource mapping and dealing with varying requests of the consumers. Agent-based Cloud computing—the idea of adopting autonomous agents for managing Cloud resources was first introduced and proposed in [3].

The challenges faced in Cloud resource management and some agent-based approaches for solving these problems brought up the idea of agent based Cloud commerce. It proposed a Cloud negotiation model, which includes the negotiation protocols and strategies of agents to facilitate the establishment of service level agreements among Cloud participants [5]. This research is among the earliest efforts, in adopting an agent-based distributed problem solving approach for supporting Cloud service compositions. Cloud service composition may be amplified in two dimensions: Horizontal and vertical. Horizontal service composition deals with the combination and integration of various services, for e.g., storage, compute, etc. Vertical service composition involves the integration of homogenous services, for e.g., by adding new storage data centers to existing one.

Cloud service composition may be carried out in two modalities: One-time and persistent. One-time service compositions consider Cloud resources as functions that receive consumer requirements as input parameters, and return the output accordingly. Once the output is calculated, the link between consumers and providers does not remain [5]. On the other hand, Persistent service compositions create a virtualized service which can be accessed by consumers for a long predefined time. This can be considered in Infrastructure as a Service. Both onetime and persistent service compositions may be amplified in horizontal and vertical dimensions.

2.4 Self-Organizing Agents for Service Composition in Cloud Computing

A multi-Cloud service composition method is presented in [8]. The service composition problem is translated into a combinatorial optimization problem. Then, using artificial intelligence planning techniques, a service composition solution is provided. Another Cloud service composition approach is presented in [9]. Web services are described by interfaces that contain semantic input and output parameters. Afterwards, a semantic matching algorithm links semantically similar outputs to corresponding inputs, obtaining a chain of web services that results in the service composition. Both [9] and [8] are centralized methods and need complete knowledge of all existing web services. In addition, the contracts among consumers and providers, necessary in Cloud service compositions are omitted. In [10], a hierarchical agent architecture with three types of agents: basic, broker, and super broker agents, is proposed. Basic agents represent services, which are interconnected via broker and super broker agents. In addition, a set of protocols to implement self-organization is included. However, the self organization is propagated only to upper layers, i.e., no self organization is designed into agents of a same layer. This causes dependence in higher agents, and thus, the control of the system is partially centralized.

In [11], the service composition is partitioned, and for each partition, a monitoring agent is assigned. These agents monitor and capture the progress of the composition. When an error occurs, this is transmitted to an upper-level central monitor. The central monitor stops the composition and interacts with monitor agents to undo the progress of each partition to the last known correct state. The adopted centralized perspective to handle errors causes that a single fault impedes the development of the entire composition, in addition to considering an initial phase to partition the orchestration specification. This requires having the specification of all the involved services for determining proper partitions. In contrast to [10], this work includes self-organization in the vertical and horizontal layers. Moreover, changes like the promoted by errors are handled in a distributed and local manner in difference to [11, 10].

The novelty and significance of this paper is that distributed and cooperative agent-based problem solving techniques. These techniques include the contract net protocol and acquaintance networks which can be used to create method of self-organizing service composition. This method (to the best of the author's knowledge) is the first work in considering incomplete information about Cloud participants and its combination with dynamic service selection mechanisms. In addition, a test bed that evaluated and demonstrated the advantages of self organizing agents in Cloud service composition was implemented. [12]

2.5 Cloudle: An Agent-based Cloud Search Engine that Consults a Cloud Ontology

This paper focuses on a search engine called as Cloudle that is capable of offering the Cloud services based on consumer's requirements and providers specifications. This can be achieved by consulting Cloud ontology which consists of many concepts defined in it and can also be used for service reasoning [4]. It is specially designed to assist users in finding Cloud services over the internet. Cloud ontology and three kinds of reasoning methods: 1) Similarity reasoning, 2) Compatibility reasoning and 3) Numerical reasoning are also introduced in order to provide the relevant information that approximately matches with the consumer needs. The web interface of Cloudle is also presented. The contributions of this work include by building such search engine it will make easy access for the consumers to get various cloud services in unified format [4]. This also includes that if exact matched is not found it will search relevant concept by using ontology reasoning system.

It is for the first time that agent-based service discovery system is used for retrieving information relevant to Cloud services by consulting ontology [4]. At present, there are few Cloud service providers and there may not be many Cloud services available. However, when Cloud computing is more widely and commonly used in the near future, Cloudle can be

helpful tool for Cloud users for finding Cloud services under their specific preference [4].

3. CONCLUSION

Agent based cloud computing system improves the overall performance of the cloud system. Overhead of consumers and providers are reduced in some sort, as agents will be responsible to take decisions on behalf of them. This paper consists of the work from two perspectives. To manage resources and to discover the cloud services that consists of finding services and negotiating with cloud service providers. This paper has only taken the first step to show that agent-based problem-solving approaches and protocols provide effective methods for managing cloud resources. Basically, agent based paradigm aims at providing appropriate services to the consumers in unified way so as to they will not find difficult to search for services at various locations that are provided by different providers. In future scope, it is intended to extend the agent-based paradigm by providing multiple agents along with multiple service provisioning techniques. This could be extended to complex interrelated markets wherein establishing service level agreements will be a challenge. Algorithms could be more efficiently designed for performance of system. Also, when it comes to matching services, it only considers basis as pricing and time slot matching but Quality of services has not been considered this could be provided in future scope.

4. REFERENCES

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