Multi-Agent based Cloud Services

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ABSTRACT

Cloud computing is one of the booming   Technology. Cloud computing systems provide large-scale infrastructures for high-performance computing that can adapt to user and application needs. They can be integrated with Multi-agent systems (MASs) which is capable of intelligent behavior. So that we can get high-performance and making clouds more flexible and autonomic. This paper deals with the usage of MAS in the cloud computing and how it helps in searching.

Keywords

Multi Agent System (MAS), cloud computing services, search agent, service agent.

1. INTRODUCTION

Cloud computing provide elastic services, high performance and scalable data storage to a large and everyday increasing number of users. Cloud computing enlarged the arena of distributed computing systems by providing advanced Internet services that complement and complete functionalities of distributed computing provided by the Web, Grid computing and peer-to-peer networks. In fact, Cloud computing systems provide large-scale infrastructures for high-performance computing that are dynamically adapt to user and application needs.

2. CLOUD

Cloud computing can be defined on the basis of many aspects like processing, storage resources, the service-oriented interface and the exploitation of virtualization techniques etc. [1] The National Institute of Standards and

Technology (NIST) have given a complete reference definition. NIST defined "*Cloud computing is a pay-per-use model for enabling available, convenient, on- demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.*" Moreover, "*Cloud model promotes availability and is comprised of five key characteristics, three delivery models, and four deployment models.*"

There are three types of services provided by the cloud they are:

• *Infrastructure as a Service* (*IaaS*). A service to the user is to rent computing, storage, networks, and other computing resources where the user is able to deploy and run software like operating systems and/or applications. The user does not manage or control the hardware Cloud infrastructure but has control over operating environments, storage, deployed applications, and possibly select networking components.

• *Platform as a Service* (*PaaS*). The functionality provided to the user is to deploy onto the Cloud infrastructure consumer-created applications using programming languages, compilers and toolkits supported by the provider

• *Software as a Service* (*SaaS*). A service to the consumer is to use the provider's applications running on a Cloud infrastructure and accessible from various client devices through a thin client interface such as a Web browser (e.g., web-based email).

3. INTELLIGENT AGENT

An Intelligent agent is a special software component that can act independent on behalf of its user.   The amount of intelligence in an agent varies depending on the task assigned and the environment where it is used.   An agent is special with its , Autonomy- having its own thread of control, Social-cooperating with other agents, Intelligence- perceives its environment and responding to it, Proactive- exhibiting its goal directed behavior, Learning- the ability to improve performance and decision making over time when interacting with the external environment.
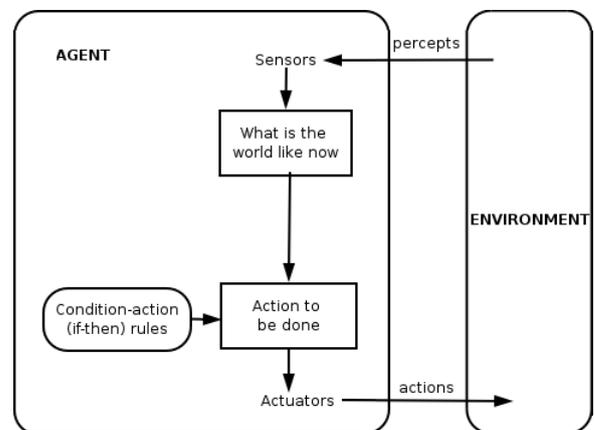

Figure 1. [1]Intelligent agent

3.1 MULTI AGENT

Multi agent system has a group of intelligent agents interacting with the environment and with themselves. From the figure shown below we can understand that a group of agents form a relationship and similarly other groups and they communicate between them. The use of Multi-Agent makes the cloud to service in a better way
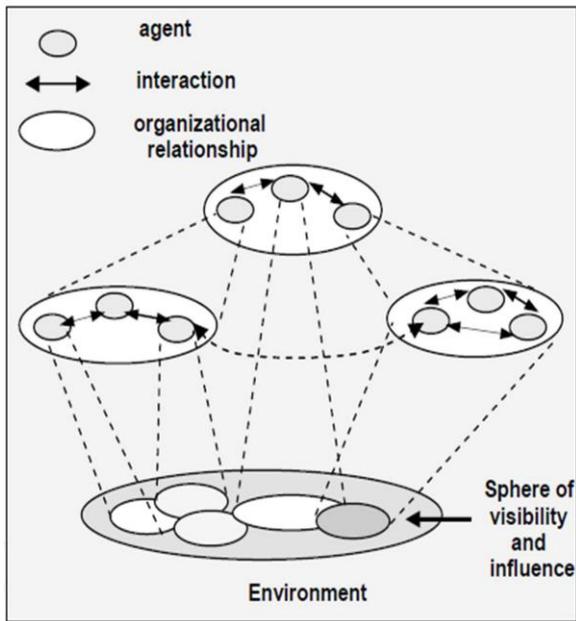
Figure 2. [9] Multi agent System

3.2 AGENT MANAGER

The main role of agent manager is to manage creation, registration, event and deletion of each agent. In addition, agent manager offers knowledge-base to each agent, monitoring the whole agents according to types of usage of social service resources. It includes the ability to control activity of each agent. The function of monitoring is to record event state and value between agents as well as to provide fault data of system to administrators.

4. CLOUD INTELLIGENCE

Architecture of current Cloud Computing mainly targets three layers as said before they are Infrastructure, Platform and Software. These layers can be considered as services for the respective layers above. The infrastructure as a service (IaaS) is provided to the platform layer and the platform becomes a service (PaaS) for the software layer. And finally, the software as a service layer (SaaS) brings the topmost end-user web services to clients

Cloud providers market is already a competitive field. Several big players are currently active in the market. The services of the agent in cloud services are in the scope of this work. In the following sections we introduce a new servicing approach in the cloud.

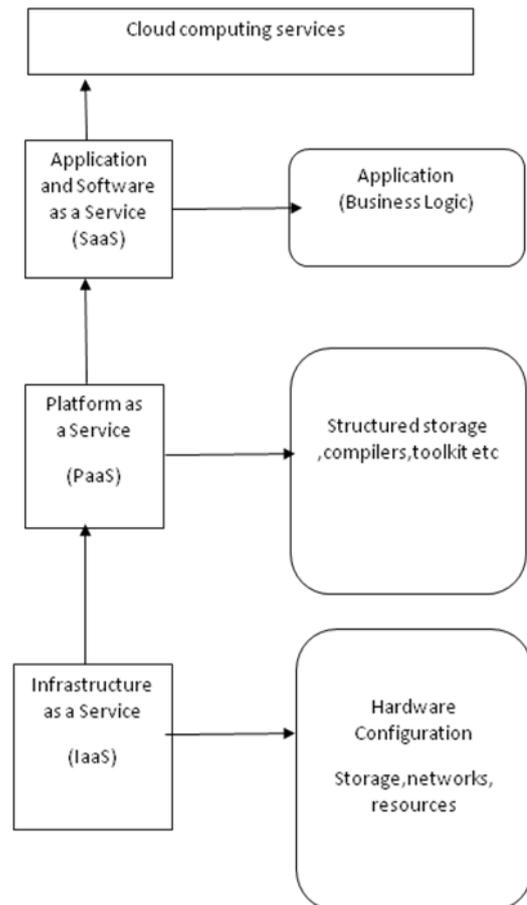The current servicing provided by the cloud is shown in the figure 3

Figure 3. Cloud Computing Service

5. CLOUD USING AGENT

Cloud computing is a novel technology that has been designed and implemented in the past few years, mainly due to industry that was looking to a large-scale scalable computing infrastructure for implementing and selling service-oriented commercial solutions. Whereas much of the effort are devoted for the production of the Cloud infrastructures, technologies for supporting virtualization and data centers. Now little attention has been devoted to introduce innovative methods for users and developers to discover, request, assemble and use Cloud computing resources. Autonomous and flexible agents and MASs are suitable tools for negotiating user access, automating the resource and service discovery, and composition, trading, and harnessing of cloud resources. A new discipline, called *agent-based Cloud computing* must be set for providing agent-based solutions founded on the design and development of software agents for improving Cloud resources and service management and discovery, SLA negotiation, and service composition.

Autonomous agents can make Clouds smarter in the interaction with users and more efficient in allocating processing and storage to applications. In large-scale data centers, agents can search, filter, query and update the massive volumes of data that are stored.cloud agents working on our operating system will provide intelligent data access services, monitoring services processor-to-application assignment strategies, and energy-efficient use of Cloud

computing infrastructures. In Clouds, there also is the need to design and implement techniques and methodologies that adapt to the dynamic behaviors of Cloud computing environments. Autonomic techniques may help providers and users to reach this goal. Multi-agent systems that are able to handle with changing configurations, heterogeneity, and volatility, can provide a promising approach for addressing this requirement. Security and trust are two very critical issues in Cloud computing as data and software are stored, accessed and run on machines that are not owned or directly managed by owners of data and software. Services provided by the cloud computing system can be improved by the use of MAS.

Agent-based models and algorithms for trust and security in Cloud infrastructures also could be very useful. If agent-based solutions will be introduced in the software infrastructure of Clouds we will have an

Intelligent and flexible Cloud services which enhances its usage

6. AGENT-DRIVEN SERVICING IN CLOUD

The services offered by the cloud providers should be flexible and smart enough to handle client-specific model adjustments and configurations. The intelligent agent are capable of responding to the request in an intelligent manner. so on combining this feature with the service provided by the cloud we can get an efficient service from the cloud. When the intelligent search agent are introduced in the cloud, they can search the data based on the user preference in the localized area and will be able to retrieve the most accurate data what the user wants.

The platform service can be moved to the smart proactive agent driven service. Such service should not only be flexible and configurable in accordance with the customers' needs, it should also be prepared to resolve data - and API-level interoperability issues while being integrated with the client software.

Figure 4 shows the agent driven extension in the cloud. From the user perspective the extension is still a service API but it offers an advanced functionality.
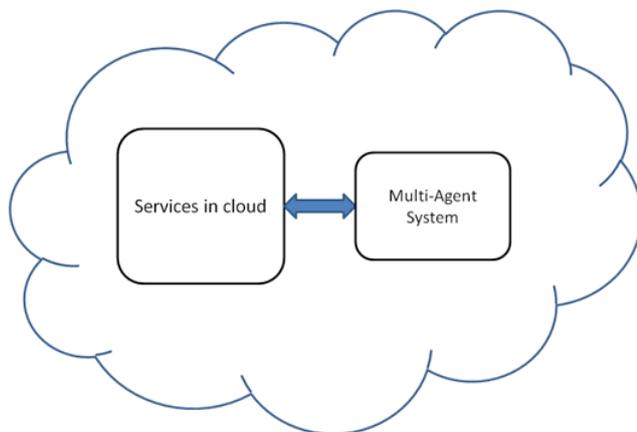

Figure 4 . Multi-Agent in the cloud computing Services

The Agent here is a stand alone middleware platform running either as a cloud facility, as a platform extension.

The agent-driven adapters are software entities are for data sources management. Adapters provide advanced data source connectivity functions (e.g. simplified database connectivity, file formats parsing, sensor data acquisition, etc.). Next, adapters handle the connectivity problem by providing the components for data transformation with configurable mapping functionality. The agent observes its state and takes actions based on the state and environment changes. The actions of the agent may vary from simple fault messaging up to self-reconfiguration when an exceptional or fault situation occurs. This allows the user to run declarative models as services. Agent takes care of proper model functioning (e.g. load balancing and failures in the operation). Service agent may temporarily relocate the service executable code to another virtual machine instance to improve the performance in critical cases, thus the service becomes remote for its own original virtual machine instance. We can also have a local representative agent on each virtual machine, but the service execution is handled by the cloud provider.

7. INTELLIGENCE SEARCH AGENT

Typically while searching for a particular content in a cloud, it results in retrieval of large amount of data, where many is not relevant to the content what we are looking for. This wide coverage makes the user difficult to track his desired data.

Intelligent search agents plays in such a situation. Intelligent agents can utilize the spider technology used by traditional web search engines, but employed in a new way. The agent can be personalized by its owner so that it can build up a picture of individual likes, dislikes and precise information needs. The search agent makes judgments about the likely relevance of material and reduces the displayed information.

Once trained, an agent can then be set free to roam the clouds turning up useful information sources whilst the user gets on with more urgent tasks, or even goes off line. This means that intelligent agents could be left roaming the cloud overnight, or at weekends, and a user could simply pick up search results at whichever is the most convenient time for them.

The efficiency of these intelligent agents can be increased by the frequent usage of these agents. Over a period of time, an agent will build up an accurate picture a period of time, an agent will build up an accurate picture of a users information needs. It will learn from past experiences, as a user will have the option of reviewing search results and rejecting any information sources which aren't relevant or useful. This information will be stored in a user profile which the agent uses when performing a search. So, an agent can also learn from its initial forays into the web, and return with a more tightly defined searching agenda if requested.

8. CONCLUSION

Thus the paper describes about the MAS and discussed with the usage of these intelligent agents in the cloud . Also the usage of the agent in platform and how the intelligent agents can be used for searching purpose in the cloud are also discussed.

9. REFERENCES

[1]   www.nist.gov/itl/cloud, June 2011.

[2] Cloud Computing Expert Group, "The Future of Cloud Computing," Report from European Commission, January 2010.

[3] Kephart, J. O. and Chess, D. M., 2003. The vision of autonomic computing., *IEEE Computer*, 36(1):41–50.

[4] The research paper on " Cloud Computing and Software Agents: Towards Cloud Intelligent Services " by Domenico Talia

[5] The research paper on "IMAV: An Intelligent Multi-Agent Model Based on Cloud Computingfor Resource Virtualization" by Myougnjin Kim, Hanku Lee, Hyogun Yoon, Jee-In Kim and HyungSeok Kim

[6] The research paper on "Intelligent Data Processing Services in the Cloud" by Sergiy Nikitin, Vagan Terziyan, Michal Nagy

[7] M. Armbrust, et al., "A view of cloud computing," Communications of the ACM, vol. 53, no. 4, pp. 50-58, April 2010.

[8] The research paper on "MASTERING INTELLIGENT CLOUDS" by Sergiy Nikitin, Vagan Terziyan, Michal Nagy

[9] Wikipedia.http://en.wikipedia.org/wiki/ multiagent

[10] wikipedia http://en.wikipedia.org/wiki/ intelligent agent http://en.wikipedia.org/wiki/Intelligent_agent]