

Agent-Based Cloud Broker Architecture for Distributed Access Control in the Inter-Cloud Environments

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Inter-Cloud Computing is an emerging paradigm in the Cloud Computing environments where multiple cloud service providers share their virtualization infrastructure and resources to make effective utilization of the resources and thereby delivering better QoS to the cloud customers. In this context of inter-cloud or cloud federation, effective authentication and authorization processes are required to make sure that unauthorized users do not access the inter-cloud resources. In this paper, we analyse the issue of distributed access control in the cloud and inter-cloud environments, discussing the various approaches already adopted in this area considering the advantages and disadvantages. We propose the conceptual model of the agent-based cloud broker architecture for mediating the access requests of cloud customers in the inter-cloud environment, considering the present day requirements of this promising cloud computing paradigm. We also analyze the various issues in the inter-cloud formation, federation prediction and, also the concerns of the cloud service providers and consumers in dealing with the issue of Identity and Access Management in the inter-cloud environment. A few open issues in the area of distributed access control are also discussed.

Keywords : Access Control, Agents, Authentication, Authorization, Cloud Computing, Federation, Inter-Cloud.

1. INTRODUCTION

1.1. Distributed Access Control

In Cloud Computing or Services Computing, users access various resources or services after verification of their identity by the service provider. In open service-oriented systems, in many cases, the service providers and the service consumers are strangers. Since they do not have a pre-established trust value between them, the service provider must be able to authenticate the unfamiliar users and then determine whether the requestors have enough privileges to access the requested services. Trust establishment between consumers, Service Providers and Identity Providers also assumes very high importance in the current scenario.

As the development of the internet is very fast, there are increasing demands to support cooperation among distributed, heterogeneous and autonomous organizations, high-

lighting the need to develop an efficient access control model to facilitate cooperation or collaboration in such a distributed environment. In open distributed systems, secure authentication and authorization processes are required before access privileges are granted to the users.

The issue of access control in the domain of distributed applications, in collaborative, distributed, cooperative environments like cloud computing, where various users access the resources and services, with different access rights, is called the *distributed access control*. Various users have different access rights towards the available resources in the system, which need to be concisely specified and correctly enforced. Access control deals with the specification and enforcement of users' access permissions and access restrictions relative to the resources of a system.

5. ANALYSIS AND RESULTS

We have adopted the agent-based system for mediating the service requests of cloud users in the cloud and the inter-cloud computing scenario, because of the salient features and advantages it offers. It is seen that the establishment of dynamic trust relationship between various CSPs, and also between CSPs and IdPs is an important issue to be considered for active research. Also based on the analysis done, we can see that most of the research works do not give proper solutions for solving policy conflicts in the inter-cloud scenario, which needs to be further explored. In addition to that, an effective break-glass mechanism should be incorporated in the authorization process to handle emergency access requirements of inter-cloud consumers. The agent-based architecture has enough potential for further research as far as a reliable and scalable access control mechanism in this computing paradigm is considered.

6. CONCLUSIONS

In this paper, the issue of distributed access control in the inter-cloud environment is discussed in detail, and the various approaches, mentioning their advantages and drawbacks are analyzed. Distributed Access Control is an important issue in the domain of distributed applications. It is evident that, there is no single efficient solution for distributed access control meeting the needs of the present day distributed applications, which entails further research in this direction. In this paper, we have proposed the conceptual model of the agent-based cloud broker architecture for mediating the access requests of various cloud users in the inter-cloud domain, by considering the requirements of the present cloud computing paradigm. The various issues in the cloud federation formation, federation prediction are analyzed. Also, the issue of Identity and access management in the inter-cloud environment is analyzed and the agent-based approach for the identity and access management is proposed. A few open issues for further research in the areas of distributed access control are also discussed.

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