

# Research on access control model based on user action in cloud computing

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**Abstract.** This paper firstly analyzes the current situation of the security of cloud computing, and analyzes several problems about the security of the cloud, and studies the existing access control model. Combining the characteristics of cloud computing security and the development trend of access control, the action based access control model is introduced into the security management of cloud computing. In cloud computing, the user's rights are dynamically and flexibly managed, so as to provide a feasible and efficient access control model for the cloud computing environment.

## 1. Introduction

Cloud computing access control is an important means to ensure the safety of cloud resources, access control should cover all the entities in the cloud, they include the data owner, end users and service providers. The communication range is different between them and the traditional system. End users have to communicate with the data owners and service providers to obtain their own requested resource operation rights, all the data resources are stored in the service provider, and only the data owners have permission to update these resources.

## 2. The development of access control technology

With the development of information technology and the emergence of distributed computing. Interactive information from the LAN is gradually turning to the wide area network, Only RBAC model can't adapt to the new network environment. In order to ensure the legality, safety and controllability of information access, many factors such as environment and tense should be considered by the access control model. In the open network environment, Classification of access control and management is needed to the users and resources of the information systems. the concept of domain is introduced to the access control model research, Task based access control model, distributed access control model, spatial and temporal access control model appeared. Under the network environment with the characteristics of heterogeneity and diversity, Hierarchical access control technology is developed. The authorization basis begins to face the security of the host and the object gradually. A new type of access control model based on trust, attribute and action is proposed.

### 2.1 Task based access control model

The task based access control model is put forward by Thomas et al in 1997, To establish security model and implement security mechanism from the angle of task. Dynamic real-time security management is provided in the process of task processing. This model can implement different access control policies for different workflows, and it is able to implement different access control policies for different task instances of the same workflow. It is suitable for the distributed access control information processing system.

### 2.2 Domain based access control model

Domain based access control model is also a model for collaborative work in distributed systems. which is mainly used in multi domain application environment for collaborative work among multiple managers. Shafiq et al proposed the domain based access control model, this model is an unified multi

domain heterogeneous RBAC strategy which could be used for global RBAC strategy, and it realizes the integration framework of resource security sharing among different domains.

### 2.3 Action based access control model

With the wide application of mobile internet and mobile computing, communication network system which is integrated by multi network is a heterogeneous, open, distributed and mobile computing network system. The trend is becoming more and more obvious that all kinds of network, information system is connected through the Internet. This determines the way to spread information in an open network environment is diverse. The existing models can not support the mobile computing in open network environment, therefore, the concept of " Action " is put forward in the literature [8]. Role, temporal status and environmental status and other related security information are integrated so Action-Based Access Control (ABAC) model is proposed.

### 3. The principle of access control model based on user action

The action-based access control model refers to that, when users use the cloud computing resources, the model Records the user's operation action and compares it with the user's action authentication set, so as to confirm the process of the credibility of the user's action. This process is a cloud service provider to obtain evidence through interaction with the end user, and then submitted to the user action authentication server, which will store the user action and behavioral evidence in the database authentication set for comparison processing, according to the results of the comparison, to confirm whether the user's action is credible, the user's main body is real. Access control model based on user action is shown in figure 2:

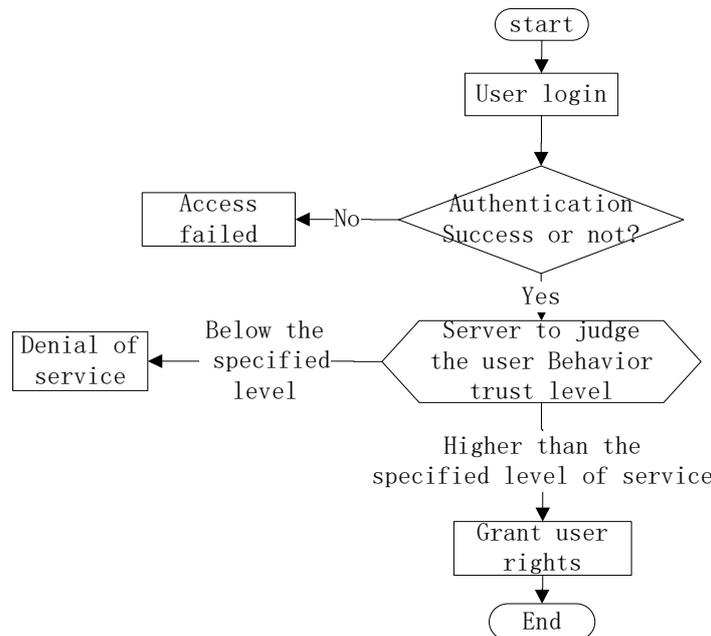


Fig. 2 Access control model based on user action

It is different from the traditional trust based access control model, in this model, the concept of action based authentication and trust threshold is introduced, and two level verification strategy is adopted. Firstly , the user is authenticated, and then verified the user's trust level. whether a user has access to the resources by determining whether the user's identity is greater than the trust threshold. Trust grade system is adopted in the process of certification., the different levels of trust are divided depending on the user's trust value. Users with different levels of trust have different access rights. User access rights are dynamic. Depending on the size of the user's trust value, the different levels of trust are classified, and the access rights of users with different levels of trust are different.

#### 4. User trust level management model

The management process of the user trust level is shown in Figure 3. The user's trust level is dynamically changing according to the user's operating action. The value of the user's trust level is gradually accumulated.

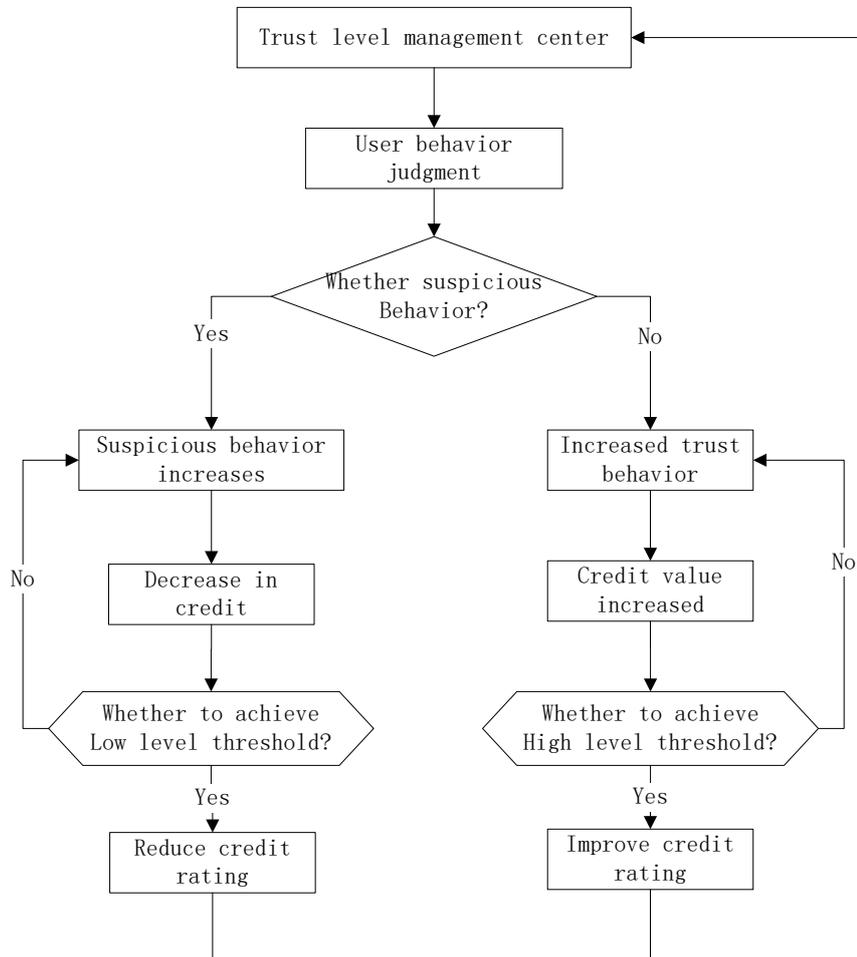


Fig. 3 Flow chart of user's trust level management

In this process:

User's action is monitored by User trust level management center real time. The type of action is determined by testing the user's action.

If the user has not been trusted by the trust center, then the number of suspicious action of the user will accumulate. At the same time the value of the user's credit will be reduced according to the value of the user's action. If the user's credit value reaches a threshold value, the credit rating will fall. Then the system will adjust the user's rights.

If there is no suspicious action during the operation process, the user's safe usage time will increase, then, the credit value will increase, the user's credit rating will increase. The users will be given more access to the system.

#### 5. Summary

At present, the client user authentication technology is mature in the cloud computing, but it does not prevent the identity authentication failure or the destruction of the system by the action of malicious users with legal status. At the same time, because the size control of user action authentication is finer and more specific than identity authentication, and it is a dynamic authentication form, therefore, user action authentication based on cloud computing is a new demand for security applications, it is an important supplement to the current identity authentication. In the

application of cloud computing, it is urgent to study the theory and measures based on user action authentication.

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