Chapter 4
Trust Management in Mobile Cloud Computing

ABSTRACT

Cloud computing provides various computing resources delivered as a service over a network, particularly the Internet. With the rapid development of mobile networking and computing, as well as other enabling technologies, cloud computing is extended into the mobile domain. Mobile cloud computing concerns the usage of cloud computing in combination with mobile devices and mobile networks, in which trust management plays an important role to establish trust relationships in order to offer trustworthy services. This chapter briefly introduces trust management technologies in cloud computing. The authors analyze the basic requirements of trust management in mobile cloud computing by introducing its architecture and distinct characteristics. They further propose a number of schemes in order to realize autonomic data access control based on trust evaluation in a mobile cloud computing environment. Furthermore, the authors discuss unsolved issues and future research challenges in the field of trust management in mobile cloud computing.

1. INTRODUCTION

Cloud computing denotes computing resources delivered as a service over a network (e.g., the Internet). It offers a new way of Information Technology (IT) services by re-arranging various resources (e.g., storage, computing and services) and providing them to users based on their demand. Cloud computing provides a big resource pool by linking network resources together. It has desirable properties, such as scalability, elasticity, fault-tolerance, and pay-per-use. Thus, it becomes a promising service platform, rearranging the structure of IT.

With the rapid growth of mobile communications, networking, and computing, as well as wide usage of mobile devices, cloud computing is extended to mobile domain. People nowadays use

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their mobile devices to perform various activities. Cloud computing provides a most rational way for mobile devices to access services and resources at any time and in any place. Mobile cloud computing concerns the usage of cloud computing in combination with mobile devices and mobile networks, in which trust management plays an important role to establish trust relationships in order to offer trustworthy mobile services.

The same as the Internet based cloud computing, one important issue in mobile cloud computing is trust, which concerns security and privacy, as well as many other factors, such as dependability and usability. For example, personal data should be securely accessed at the data center or the cloud agent of the cloud service provider (CSP). Personal access of some data should not be tracked by unauthorized users. A data owner should have an effective way to audit its data integrity and the fulfillment of service level agreement (SLA) between the data owner and the CSP. In addition, privacy preservation in the utilization (e.g., search and query) of encrypted data outsourced on cloud servers in CSP is a challenge. However, distinct characteristics of mobile cloud computing (e.g., mobility and ubiquity) lead to a number of new challenges. Trustworthy service provision and usability of service consumption are important issues that impact the proliferation of mobile cloud computing. Furthermore, whether it is rational and dependable to provide cloud services in a pervasive manner in mobile domain? What is the concern and challenges with regard to trust management in mobile cloud computing, focusing on usability, security assurance, privacy preservation, autonomic trust establishment and management? All above issues are worth seriously investigating.

In the rest of this chapter, we introduce the basic concept of cloud computing and its foundational trust management technologies. We analyze the challenges of trust management in mobile cloud computing by introducing its architecture and distinct characteristics. We further propose a number of schemes in order to realize autonomic data access control based on trust evaluation in mobile cloud computing environments, which is a useful technique towards autonomic trust management. Furthermore, we discuss the current issues and future research trends in the field of mobile cloud computing trust management.

2. LITERATURE BACKGROUND

2.1. Cloud Computing

2.1.1. Concept and Characteristics

Cloud computing is a general term for anything that involves delivering hosted services over the Internet. What we traditionally mentioned web services (e.g., web emails) fall into the cloud computing. The name cloud computing was inspired by the cloud symbol that is often used to represent the Internet in flowcharts and diagrams. The cloud computing was initially invented by businessmen who would like to create a new business model to offer various digital services based on user demands and by applying a pay-per-use billing model. Like consuming electric power, we only pay cloud services when we consume them. Therefore, the distinct characteristics of cloud computing can be summarized as: 1) sold on demand based on a pay-for-what-you-use model; 2) elastic: a user can have as much or as little of a service as they want at any given time; 3) fully managed by providers: a user need nothing but a personal computer or device with Internet access.

2.1.2. Why Cloud Computing

The cloud computing draws an extensive attention from both academia and industry due to many reasons. First, it consists of significant innovations in virtualization and distributed computing. It provides an easy architecture and model for users to access various services, while no need to take care of or understand the technical details