Chapter 3
A Comprehensive Study of Security in Cloud Computing

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ABSTRACT

Cloud computing is one of the emerging technology in the recent times which has varieties of applications at different fields. It is an Internet dependent technology and it store and maintain the data in a cloud data center. Cloud center usually supports more numbers of user, applications and data. In the same time, it also suffered with numerous challenges. Security is a key requirement for cloud data center. Different security mechanisms are proposed for cloud computing environment. In this chapter, we address the background of cloud computing, security risk, requirements, issues, and some of the security techniques are discussed. We discuss different security issues and focus on some existing solutions.

1. INTRODUCTION

Cloud computing (Ali, Khan, & Vaisilakos, 2015; Raheman & Choo, 2011; Suhasini, & Kavita, 2011; Zhang, Zhang, Chen, & Huo, 2010) is a type of Internet-based computing. It consists of different services like servers, storage and applications. These services are delivered to an organization's computers and devices through the Internet. It uses minimal resources of the computer and also supported with less cost at a high speed. It also provides users with a wide infrastructure and storage of large amount of data, which including the important information. The basic operation and definition is given by National Institute of Standards and Technology (NIST) (Mell, & Grance, 2011). According this NIST, cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources. For example, networks, servers, storage, applications, and services that can be rapidly provisioned and released with minimal management effort. In simple, cloud computing is a computing which enables users to operate or access resources via Internet. Users do not bother about maintenance issues of the original resources. Resources can be accessible at any time and

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from any place of the globe using Internet. It gives promising business concept to one of the fast growing segments of the IT industry. Some example of cloud services are Google apps, Microsoft Share point, and Amazon cloud.

Cloud computing is cheaper than other types of computing models. Minimal cost is involved to maintain data and information can be easily retrieved by the user. Due to its benefits or effectiveness, cloud computing is also known as utility computing, or IT on-demand. The key factor in this computing technology is scalability. It can be achieved through server virtualization. Web-based generation of computing uses remote severs placed in extremely safe and secure data centers for storage of data and management. A typical structure of cloud computing is shown in Figure 1. Cloud computing can be broken to three major segments such as:

1. Applications,
2. Platforms,
3. Infrastructure (Desai, & Mock, 2012; Takabi, Joshi, & Ahn, 2010; Bhatnagar, Raizade, & Saxesena, 2015). This segments use for different purpose based on the requirement.

Now-a-days everyone relies on cloud computing to store different types of data. Due to the rapid growth in cloud computing, one major important point is security (Zunnurhain, & Vrbsky, 2011; Zissis, & Lekkas, 2012; Celesti, Tusa, Villari, & Puliafito, 2015). Security means the client data must be safe in providers "cloud" and examining the utilization of cloud by the cloud computing vendors. Cloud security is a complex requirement, involving with different levels of the cloud, external and internal threats, and challenges from third party. Without appropriate security and privacy solutions the data kept in a cloud can be a major open tasks. Therefore, privacy is considering an important issue. In this paper, we have discussed different issues and challenges in cloud computing. We also discuss some of the secured technologies.

The remaining of this paper is coordinated as follows: the characteristics, service model, and deployment model of cloud computing briefly discussed in Section-II; the security issues and challenges and security techniques are discussed in Section-III; and the conclusion is made in Section-IV.

2. BACKGROUND STUDY ON CLOUD COMPUTING

Cloud computing is one technique which uses the Internet and maintain data as well as application by creating remote servers in cloud. In this computing users have rights to use such applications without getting any installation and by using Internet user can access their data or files from any other computer. It provides fast, wise and better efficient computing by centralized data storage, processing. The objective of this computing is to load, store, create and manipulate data through web based services. This cloud model is composed of five essential characteristics, three service models, and four deployment models. Five necessity characteristics are; on- demand usage, Rapidly Elasticity, Broad network access or Ubiquitous access, measured service and resource pooling, and Measured Service (Chen, Paxson, & Kartz, 2010; Kandukuri, Paturi, & Rakshit, 2009; Popovic, & Hocenski, 2010). Three service models are; Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS) (Sood, 2012; Saikh, & Haidev, 2011). Four deployment models are; Private cloud, Community cloud, Public cloud, and Hybrid cloud (Zhang, Cheng, & Boutaba, 2010; Feng, Zhang, Zhang, 2011; Sabahi, 2011). The background structures of cloud computing are shown in Figure 1.