Chapter 104
Deployment and Optimization for Cloud Computing Technologies in IoT

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ABSTRACT

Cloud computing has proven itself and is accepted in industrial applications. Cloud computing is based on the co-existence and co-working of various technologies and services from different sources that together make cloud computing a success. Over the last few years, the Internet of Things (IoT) has been widely studied and being applied. The blending of these two efficient technologies may provide an intelligent perception about usage of resources on demand and efficient sharing. The adoption of these two different technologies and usage is likely to be more and more pervasive, making them important components of the future internet-based systems. This chapter focuses on the deployment models of cloud computing in relation to IoT. The implications of cloud computing in view of deployment are discussed. The issues for deployment and optimization related to the merger of IoT with cloud computing are raised.

INTRODUCTION

The cloud computing is a platform which originated from the convergence of utility computing, grid computing, and need for software as service. The cloud computing is a way of dealing with the deployment of computing resources externally like processing power, storage, deployed applications as a service (Stanoevska-Slabeva &Wozniak, 2010). Platform as a Service (PaaS), Software as a Service (SaaS), and Infrastructure as a Service (IaaS) are the main three service models categorized for cloud computing. These services are made available to end-user using cloud deployment models. There are four deployment models for cloud services: public cloud, private cloud, community cloud, and hybrid cloud (Victories, 2015). These deployment models are used as shared or dedicated in the organization premises or hosted externally.

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Kevin Ashton in 1999 (Ashton, 2009) coined the term Internet of Things (IoT) for supply chain management environment. The IoT paradigm includes the things (consumer electronic appliances, sensors) as a part of the internet. These intelligent and self-configuring nodes (things) are used to create a global network to fulfill one or more purposes. This way of computation opens up new possibilities for new innovations for the realization of smart cities having best infrastructure and services to enhance the quality of life for humans. The IoT is already being used for some of the very crucial services like logistics, smart cities, and health care etc. The IoT is nowadays working on cloud computing as the IoT services led to increased demands on storage space for data, processing power, and other management services. The cloud services are matured enough in current state and are capable of providing more flexible computing and data management services for IoT. The hybrid is found to be more suitable deployment model for integration of IoT with cloud services. In general, IoT can lead to the virtually unlimited capabilities and its technological constraints are compensated by the availability of resources of cloud. In this chapter, the study of these deployment models and the optimization possibilities in relation to IoT are discussed.

DEPLOYMENT MODELS

The method of providing cloud services to end users is termed as a deployment model. To exploit the full advantages of cloud services in technical and economic respect, the cloud services are to be deployed and implemented successfully. The implementation is an activity of deployment, as only by utilizing cloud services does not make an organization different from other organizations doing business in the same domain. The other same domain organizations can also implement cloud services following as model resulting IT efficiencies. The efficient deployment of cloud services indicates the realization of distinct organizational benefits to differentiate and take competitive advantage from other organizations of the same domain (Garrison, Kim, & Wakefield, 2012). The benefits with IT-oriented success can be categorized as strategic, economic and technological benefits. The strategic benefits refer here to have full focus on organizations core activities by shifting its IT functions to cloud computing provider fully or in part. An economic benefit refers to reduces IT expenses by using cloud computing vendor's expertise and technical resources. Technological benefits refer to reduced risk and cost related to having in-house technological resources by having access to state-of-the-art technology and skilled personnel. The deployment models for the cloud services play an important role for the benefits related to strategy, economic and technological. The organization utilizing cloud services has to use some of its own IT resources and capabilities to have a required control over the resources provided by the cloud vendor. This is treated as optimizing cloud benefits.

The different deployment models for cloud services are identified in the literature (Mell 2009, Zhang 2010):

Private Cloud

This deployment model is best suited for an organization with multiple consumers. In private cloud, the services are available exclusively for a particular organization as shown in Figure 1. These cloud services deployment is owned, managed and controlled by the parent organization. The private cloud deployment is based on a cloud by an organization for its in-house users only with all services under organization's control (instead of Internet). Sometimes these cloud services are deployed by the third party or in col-