# Chapter 4
# Cloud-Based Platforms and Infrastructures:
## Provisioning Physical and Virtual Networks

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## ABSTRACT

*Cloud computing consists of three fundamental service models: infrastructure-as-a-service, platform-as-a service and software-as-a-service. The technology "cloud computing" comprises four deployment models: public cloud, private cloud, hybrid cloud and community cloud. This chapter describes the six cloud service and deployment models, the association each of these services and models have with physical/virtual networks. Cloud service models are designed to power storage platforms, infrastructure solutions, provisioning and virtualization. Cloud computing services are developed to support shared network resources, provisioned between physical and virtual networks. These solutions are offered to organizations and consumers as utilities, to support dynamic, static, network and database provisioning processes. Vendors offer these resources to support day-to-day resource provisioning amid physical and virtual machines.*

## INTRODUCTION

In recent years, cloud computing has transformed the way information technology organizations and consumers conduct business. This technology revolution is attributable to the Information Technology (IT) democratization of physical and virtual platforms or network infrastructure solutions. Cloud computing is a pervasive technology that many organizations and consumers continue to adopt. In the cloud, deployment models are adopted as integrated solution architecture to interface with other cloud- based technologies: virtualization, cyber-physical systems, data analytics, big data, Internet of things, artificial-predictive intelligence, cybersecurity. In this chapter other useful solutions required to make more efficient the production time, enhance productivity and improve operation's performance are discussed. The integration of cloud computing with other technology solutions has improved the consumption of

DOI: 10.4018/978-1-5225-8176-5.ch004

technology services i.e., forecasting, aggregating hardware and software performance for emergency response time, and the adoption of innovative business models. Vendors examine the transformation of traditional IT systems to leading-edge cloud-based, as a complex process for enhancing involved policy implementation. The adoption of cloud solutions is often supported by analytical and practical procedures needed to balance all-inclusive cloud implementation processes (Buyya, Ranjan, Rodrigo, & Calheiros, 2010; Gartner, 2012; Buyya, Ramamohanarao, Leckie, Calheiros, Dastjerdi, & Versteeg). In recent times, the provisioning of cloud service and deployment models has advanced significantly. Despite vendor's adoption of database-as-a-Service/DBaaS, the industry has developed assorted methods to support enterprise IT network infrastructure solutions (Ko, Ahn, & Shehab, 2009; Vozmediano, Montero, & Llorente, 2011). Aside from these developments, more security solutions are developed to protect organizations and consumers' IT resources (Stanton et al., 2005; Ko, Ahn, & Shehab, 2009; Alhazmi, & Shami, 2014). IT experts continue to research on measures to enable the integration of native computer solutions with cloud computing systems i.e., hardware, software, data and user-users (Grance & Mell, 2011; Ross, 2010; Buyya, Ranjan, Rodrigo, & Calheiros, 2010; Ko, Ahn, & Shehab, 2009; Vozmediano, Montero, & Llorente, 2011). The transformation of these solutions is vital for leveraging day-to-day IT operations and provide essential strategies organizations need for adopting, configuring and deploying integrated computer systems (Lease, 2005). The adoption and implementation of cloud-based solutions are key of deploying IT resources for diverse enterprises (Grance & Mell, 2011; Gentry, 2009). In general, Service level agreements (SLAs) are fundamental business methods every organization would require, to assess its economic growth (Alhazmi & Shami, 2014). Lacking proper security standards commonly can affect the adoption/deployment of cloud computing resources. This could also expose network infrastructure solutions to cyber related vulnerabilities (Lease, 2005; Buyya, Ranjan, Rodrigo, & Calheiros, 2010; Gartner, 2012; Gartner, 2009; Alhazmi & Shami, 2014). Vendors must to develop customized solutions, to properly mitigate malicious cyber-attacks. Besides, this chapter aims to emphasize on areas affecting the virtualization and provisioning of cloud-based services. These services comprise: IaaS, SaaS, PaaS, DBaaS, public cloud, private cloud and hybrid cloud. The three NIST certified cloud computing services discussed in this chapter are: PC, PC and HC (Ross, 2010; Gartner, 2012; Amazon, 2012; Bruening & Treacy, 2009; Ko, Ahn, & Shehab, 2009; Alhazmi & Shami, 2014).

## BACKGROUND

For nearly a decade, industry has implemented XaaS or EaaS as "anything/everything-as-a-service" service model. XaaS and/or EaaS is an emerging cloud service model developed to interact with related technology-based services and business processes. This cohesive model is designed to interact with cloud computing services: infrastructure-as-a-service, platform-as-a-service and software-as-a-service. These solutions are carefully selected to interface with the following deployment models: public cloud, private cloud, hybrid cloud and community cloud (Grance & Mell, 2011). The need for industry to adopt XaaS/EaaS is to supplement organization and customer's cloud platform specifications (Grance & Mell, 2011; Toosi, Calheiros, & Buyya, 2014). XaaS/EaaS is defined as a collection of cloud services: IaaS, IaaS and SaaS. This term includes other industry-based cloud services i.e., communication as a service, monitoring-as-a-Service. Vendors have developed software/hardware products and related XaaS capabilities/services to interact with related service-centric solutions (Buyya, Ranjan, Rodrigo, & Calheiros, 2010; Toosi, Calheiros, & Buyya, 2014). This include a variety of capabilities needed to