Chapter 9
Securing Cloud Environment

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ABSTRACT

Cloud Computing has rapidly emerged as a new computing paradigm that arrays massive numbers of computers in centralized and distributed data centers to deliver web-based applications, application platforms, and services via a utility model. Cloud computing technologies include grid computing, utility computing and virtualization. It is very much essential to make computations of the virtual machines confidential and secured. Challenges that cloud computing currently face, when deployed on a large enterprise scale, include self-healing, multi-tenancy, service-orientation, virtualization, scalability and data management. Undoubtedly, any model which involves data assets residing on equipment not within users' immediate control needs to address security and privacy. Securing the cloud environment encompasses many different things, including standard enterprise security policies on access control, activity monitoring, patch management, etc. This paper focuses on the approaches to secure the cloud environment.

1 INTRODUCTION

Cloud computing offers a utility model for IT, enabling users to access applications, middleware and hardware via the Internet as opposed to owning it themselves. It does not require up-front investments, but instead, as an on-demand service, one pays for capacity as needed.

1.1 The Major Delivery Models of Cloud Computing

The different types of cloud delivery models and their service deployment and consumption modalities are:

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SaaS (Software as a Service): The customer is provided the facility to use the provider's applications running on a cloud infrastructure. This facility can be accessed through a thin client interface. The consumer is not bogged down by the responsibility of managing or controlling the underlying infrastructure.

PaaS (Platform as a Service): The consumer is provided the facility to deploy on to the cloud infrastructure consumer created applications using the provider's programming languages and tools. Here again the consumer does not manage or control the underlying infrastructure, but the consumer has control over the deployed applications and the application hosting environment configurations.

IaaS (Infrastructure as a Service): The consumer is provided the facility to rent fundamental computing resources for executing software's. Here again the consumer does not manage or control the underlying infrastructure, but the consumer has control over the operating systems, storage and deployed applications. He can also select networking components.

Narrowing the scope or specific capabilities and functionality within each of the *aaS offerings or employing the functional coupling of services and capabilities across them may yield derivative classifications. Such as "Storage as a Service" is a specific sub-offering with the IaaS "family," "Database as a Service" may be seen as a derivative of PaaS, etc.

Cloud services can be availed based on the on demand need of providing of computing instances/ computing capacity. Table 1 summarizes the cloud service deployment and consumption modalities regardless of the delivery model utilized (SaaS, PaaS, etc).

The vision for the Cloud is one where applications, platforms and infrastructure can all be consumed as and when required. The ability to rapidly scale-up and scale-down is perceived by many and directly leads to cost savings. Characteristics include on demand self-service, ubiquitous network access, location independent resource pooling, rapid elasticity, and pay per use. Cloud environments deliver softwares, platforms or infrastructures as services. 'Cloud nirvana' is a future where cloud service providers utilize the cloud to deliver dynamic capability enhancements; resources are switched on and off like taps, and users can switch suppliers quickly in order to access the best solution on the market.

Major Companies Offering On Demand Software(SaaS): Salesforce.com (CRM), Google (GOOG), NetSuite (N), Taleo (TLEO) Concur Technologies (CNQR) .

Major Companies offering Active platforms(PaaS): Google (GOOG) - Apps Engine,Amazon.com (AMZN) - EC2, Microsoft (MSFT) - Windows Live,Terremark Worldwide (TMRK) - The Enterprise Cloud, Salesforce.com (CRM) - Force.com, NetSuite (N) - Suiteflex, Mosso - Mosso, a division of Rackspace Metrisoft - Metrisoft SaaS Platform

Major companies offering Infrastructure as service (IaaS): Google (GOOG) - Managed hosting, development environment International Business Machines (IBM) - Managed hosting SAVVIS (SVVS) - Managed hosting,Terremark Worldwide (TMRK) - Managed hosting,Amazon.com (AMZN) - Cloud storage

The chapter discusses in detail the cloud architecture and the computing challenges faced in a cloud environment followed by a discussion on the security challenges with an overview of various approaches to security from different perspectives.

2. ARCHITECTURE

Cloud computing gained prominence in 2007 and is picking up momentum. Consumers of the cloud are concerned with services it can provide rather than the underlying technologies used to achieve the requested function. The advancement of grid computing and web services has substantially facilitated the growth of cloud computing.