Chapter 1
Cloud Computing Overview

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ABSTRACT

Cloud Computing is deemed the main trend of IT development for the coming decades, and it is to have a profound impact on the development of the human society and the world economy. In this chapter, the authors examine the history of cloud computing, the technical and business models, and the global implications of cloud computing's development in the near future. Finally, the market demands for cloud computing and the foreseeable developmental stages are explored.

THE HISTORY OF CLOUD COMPUTING

Cloud computing was not born overnight. The concept of the Cloud in reality had encompassed the entire history of business machines and the Internet. In as early as 1961, when the first manned space craft was launched into space, a computer scientist and Turing Award recipient, John McCarthy, predicted: "Like the public telephone networks, the future of computing will be organized in such a way that it will be offered much like public resources and utilities. This will bring about a whole new industry." In 1964, an American inventor, Douglas Engelbart, did

research in the area of human-computer interactions, which brought the rise of computer mice, links and network machines. During the same period, the ARPANet inventor, J.C.R. Licklider, had foreseen grid computing in the form of global network delivery. In the 1990s, grid computing was very popular and extremely similar to cloud computing, in that access for computing power became as easy as plugging into the electricity grid. (Baidu Encyclopedia, 2013)

Microsoft had been quite closely related to cloud computing. It could be said that the Cloud operating system was a Microsoft invention. The former President of Microsoft Platform and Services group, Jim Alchin, while working on

his Ph.D., at the Georgia Institute of Technology, published a paper titled: "An Architecture for Reliable Decentralized Systems," describing the world's first cloud operating system architecture as "the clouds distributed object-oriented operating system."

One major contribution due to the birth of Cloud computing was that it brought the world a brand new business model. Two things that happened in the 1990s were considered landmark initiatives: First in 1991, CERN broadened the use of the Internet from a limited research tool to its popular uses in all walks of life. Secondly in 1995, Microsoft's global Internet data center realized the concept of cloud, by making its applications available to hundreds of millions of users around the world. This "cloud" was the MSN Internet service, and its associated "terminals" were supported by the simultaneous release of the Windows 95 operating system. The core application, connecting this "cloud" and its "terminals," was the IE (Internet Explorer in Windows Plus), where its home page was http://www.msn.com.

In 1997, an American professor of Indian descent, Ramnath Chellappa, who specialized in the area of Information Systems, first coined the term - "Cloud Computing." A cloud shape was generally used to represent the Internet in textbooks and design diagrams. In his lectures, Chellappa defined Cloud Computing as: a computing paradigm where the boundaries of computing will be determined by the economic rationale rather than technical limits alone.

From the economic and business model point of view, Salesforce.com and Amazon were pioneers in cloud computing. In 1999, Saleforce.com introduced the concept of delivering enterprise applications through its web site. In 2002, Amazon launched the Amazon Web Services. The year of 2006 was deemed the first year of the modern cloud computing era: Google Docs appeared in the public view; Amazon's EC2 (Elastic Computing Cloud) started formally providing services for small businesses and individual users, where

client applications were run on the established Amazon website servers; Microsoft launched the Red Dog Cloud platform, a predecessor to Windows Azure. David Cutler, father to Windows NT, developed the Red-Dog OS Kernel from the Windows operating system kernel. In November 2009, Microsoft's Windows Azure cloud platform officially began commercial services after a long trial period.

In 2008, the IT industry had widely recognized that the biggest challenge to Cloud Computing was computing security. Jim Reavis and et al., created a global Cloud Security Alliance (CSA). In January of 2008, Nicholas Carr published the book "The Big Switch: Rewiring the World, from Edison to Google," where he used an example of switching the power station from small to large generators to illustrate the cloud computing concept from the various perspectives of history, economics, technology, development prospects and its impact on society. Numerous articles and publications had come into play to define and give guidance on the subject areas related to cloud computing; the following being some generally recognized classics:

- **Academia:** University of California, Berkeley, "Above the Clouds: A Berkeley View of Cloud Computing." This article gave cloud service providers a profit formula, ten technical challenges and opportunities;

- **The Government:** U.S. National Bureau of Standards (NIST), in "The NIST Definition of Cloud Computing," presented the industry-recognized SPI cloud model, where the cloud computing service models were classified into three categories: IaaS (Infrastructure as a Service), PaaS (platform as a service) and SaaS (software as a service). The cloud computing deployment model was divided into the public, private and hybrid clouds;

- **Industry Associations:** Cloud Security Alliance (CSA), "The Security Guidance

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