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CLOUD COMPUTING BASED TECHNOLOGY INNOVATION

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Abstract

This paper attempts to define the concept of commodity computing. It is essentially about entrepreneurship based on the cloud computing technology. It is about how to build commercialized systems on the top of cloud computing technology (such as Azure) offered by public cloud computing vendors such as Microsoft. Current cloud computing technology has made it practical and financially attractive for an entrepreneurs to develop innovative IT services or products for a third party based on existing cloud computing offerings. A “Cloud Computing Commercialization Model” is proposed in this paper, with aims to build a bridge between the cloud computing technology and the technology-based entrepreneurship. More specifically, this paper explores how to develop customizable enterprise networks with existing technology available in a public cloud; these customizable enterprise networks have the commercial potentials to be delivered to any firm or organizations in many ways similar to a commodity like electricity.

Keywords: Commodity Computing; Cloud Computing based Innovation; Cloud Computing Commercialization

1. INTRODUCTION

A more complete and authoritative definition on cloud computing is made in a report by the National Institute of Standards and Technology (NIST) which defines cloud computing as “A model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction” (Badge et. al, 2012). In the most recent years corporate use of the public cloud, such as Microsoft Azure or Amazon Web Services, is rapidly rising. As a result, traditional data centers or IT are being transformed to the cloud computing based technology. For example, Netflix is in the process of shutting down its last data center during summer 2015; Netflix attempts to become one of the first big companies to run all of its information technology remotely, in what’s known as the public cloud (McMillian and King, 2015).

Many studies have investigated issues facing cloud computing, such as cloud security and privacy concerns, reliability and availability, scalability and deployment, coexistence with the legacy systems, legal compliance, virtualization, and interoperability and portability (Vitti et. al, 2014; Aguiar, Zhang and Blanton, 2014; Sajid and Raza, 2013; Rajnish, 2011). However, innovative utilization of cloud computing, or innovative entrepreneurship based on cloud computing technology, has been lacking.

Cloud computing technology is like a “gold mine” in which new products or services can be developed. For example, Microsoft Azure, which is Microsoft's application platform for the public cloud and is becoming a major player in the cloud computing industry, allows innovative products or services to be developed in a cost effective manner and within a short timeframe.

We need to think strategically like an entrepreneur. The new age of commodity computing is coming, which goes beyond the current mobile computing, cloud computing, and Internet of Things (IoT). Commodity computing is about making use of all of existing or available information and computing resources to create something new and valuable to users or clients, and very importantly, this innovation process can be repeated. For example, when you combine components available in Azure, you can create another Netflix with your own content; when you combine components from Amazon’s AWS, you could create 100 data centers for 100 user organizations with a minimum effort.

2. MULTITUDE CAPABILITY OF CLOUD COMPUTING

Cloud computing is about ubiquitous network access to a vendor’s computing asset to meet a firm’s computing needs. Top cloud computing vendors in US is listed in a table.

Top Cloud Computing Vendors in US	Major Product Name
Microsoft	Azure
Amazon	AWS
IBM	IBM SmartCloud
Oracle	Oracle Public Cloud
Dell	Dell Cloud Solutions
Citrix	Citrix Workspace Cloud
Google	Google Cloud & App Engine

Table 1. A list of the top cloud computing providers in US

In the most recent years, corporate use of the public cloud such as Microsoft Azure or Amazon Web Services is rapidly rising. Traditional data centers or IT are being transformed to the cloud computing based technology. For example, Netflix has become one of the first big companies to run all of its information technology in Amazon's public cloud.

The cloud computing technology as a whole is like a “gold mine”. With the existing cloud computing capacity and capability, many technology solutions become possible and more affordable. In the figure below, a diagram from Microsoft illustrates the multitude technical capabilities of Microsoft Azure.

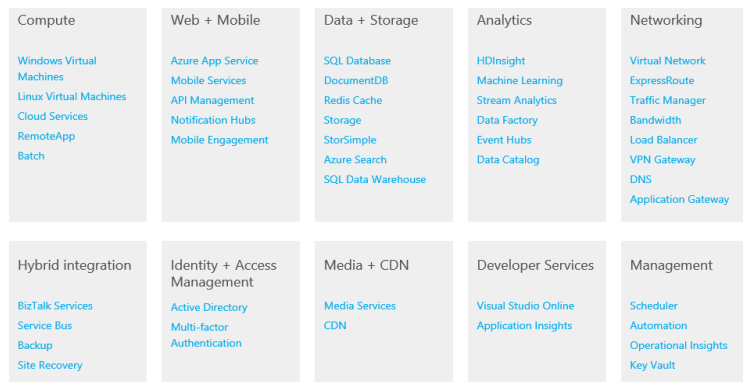


Figure 1. The multitude technical capabilities of Microsoft Azure

3. THE CORE AREA OF INNOVATION CHALLENGE

The potential of this “gold mine” of cloud computing has yet to be realized. For instance, it is challenging and not easy to design and implement an enterprise domain based network in the public cloud from scratch. The key is to know how to innovatively make use of the existing cloud computing technology to create turn-key type of innovative and customized systems and services. Efforts need to be made to make this “gold mine” mining process easier to end-users and organizations.

The core area of innovation is centered on the “Cloud Computing Commercialization Model,” which can be illustrated by the diagram in Figure 3. In this model, the development of the “Commercialization Layer” and the “Customizable Network Configurations Layer” are where the innovations are.

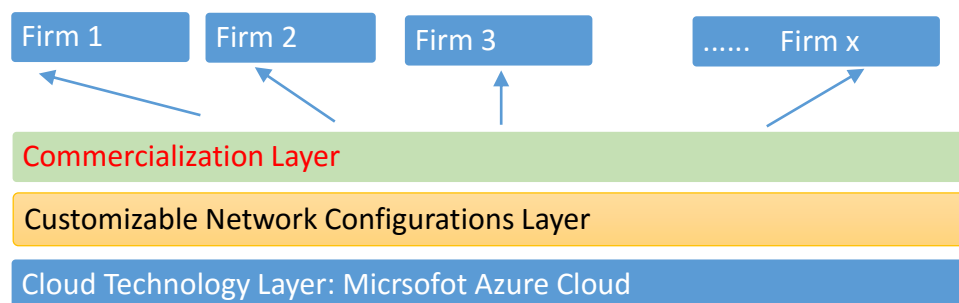


Figure 2. The Cloud Computing Commercialization Model

With the two intermediate layers, i.e., the “Commercialization Layer” and the “Customizable Network Configurations Layer”, many technology solutions that used to be associated to big companies now will become easily customizable and adoptable to companies of any size including small startups.

The following table explains what each layer does.

Name of the layer	What it does
Commercialization Layer	Contains front-end scripts and templates that link a firm's specific data to the network configurations, such as a script that extracts user data from an Excel file or the firm's user database, or templates for a firm's specific security policy settings.
Customizable Network Configurations Layer	Contains back-end apps that link enterprise network roles, such as Active directory and domain controllers, Web service, DNS, file service, domain policy, and storage service.

Table 2. Explanation of Each Layer

4. AN INNOVATION PROCESS MODEL

A recommended innovation process involves two stages: 1) the development stage, and 2) the commercialization stage.

4.1 The Development Stage

In this stage, a cloud computing technology such as Microsoft Azure cloud technology is chosen to develop customizable enterprise networks with common enterprise networking roles such as Active Directory, Domain Naming Service (DNS), Group Policy Objects (GPO), File Service, and Web Service. This involves developing Azure networks with VMs and networking roles, and create customizable network configurations prototypes as well as commercialization prototypes.

The virtual enterprise network can be designed and implemented in Azure with all of the features that a traditional enterprise network has. These enterprise network features include:

- 1) Directory services;
- 2) Infrastructure services; and
- 3) Application services.

In essence, this virtual network will function like a real world domain-based enterprise network where domain wide policy (GPOs) and user management can be implemented.

4.2 The Commercialization Stage

In this component, a real world business (for-profit or non-for-profit; big or small) which needs an enterprise network or needs to upgrade an existing network is identified. The networking data such as DNS database, DHCP database, and Active Directory database will be collected and used to populate the customizable enterprise networks developed in stage 1. In other words, the real identified networking roles and data will be deployed in a public cloud like Microsoft Azure cloud with the network configurations created in the development component.

5. CONCLUSION

Cloud computing offers a broad range of possibilities for entrepreneurs to develop innovative products or services to sell to end users or organizations as commodities. We need to think strategically like an entrepreneur. The new age of commodity computing is coming, which looks into new ways of making use of all of existing information and computing resources to create something new and valuable to users or clients. Very importantly, this innovation process can be repeated.

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