

An Analysis of Spot Cloud in Cloud Computing

Usman Mansoor, Usman Mehmood, Faraz Idris Khan, Ki-Hyung Kim
Ajou University Suwon, Korea
{mansoor, usmanmehmood, fikhan00, kkim86}@ajou.ac.kr

ABSTRACT

Cloud Computing is a fast developing domain in computer system architecture which enables dynamically scalable and virtualized resources to its users. Spot Cloud is the next evolutionary step in this field which allows the cloud computing resources to be treated as a market commodity. Cloud computing vendors will now be able to put their unused computational resources for sale using the singular access platform provided by Spot Cloud. Meanwhile customers will be able to buy/sell these resources according to their requirements. This paper analyzes the idea of Spot Cloud and the anticipated impact it will have on Cloud Computing globally. The paper also presents the risks and inherent barriers associated with this idea and how they might hinder the development of Spot Cloud to its full potential.

I. INTRODUCTION

Cloud Computing has opened new horizons for use of computing power has a utility. According to US National Institute of Standards and Technology “cloud computing provides on demand network access to shared pool of configurable computing resources” [1]. Recently cloud computing has seen tremendous traction in both government and private enterprises. Many enterprises are building their businesses today with cloud computing as their computational spine with the aim of reducing investment in expensive hardware. Customers can tap in the computing resources of Service Provider (SP) and pay accordingly. Recently cloud computing has taken a next step into its evolutionary process. With the advent of Spot Cloud – a buying/selling house for unused cloud resources – Cloud computing has entered an age where it will truly be treated as commodity for trade like oil or gold. Spot Cloud is a first Clearinghouse and Marketplace for Infrastructure-as-a-Service Providers to sell their excess computing resources [2]. This has the potential of changing the dynamics of whole cloud computing industry. Service providers will now be able to sell their unused computing resources through brokerage to customers. Customers meanwhile can secure computing resources for present and future at market rates. But cloud computing is unlike any other traditional commodity. Organizations and investors will have to make a careful assessment of their requirements and risks

from security and financial perspective before going ahead with a purchase. This paper presents an analysis of Spot Cloud along with its workings and barriers which it might face in offering.

The Section II discusses the idea and working of Spot Cloud. III gives the potential risks in Spot Cloud and barriers it face in global market wide acceptance. IV exhibits the market appeal and industrial applications of Spot Cloud followed by Conclusion in section V.

II. IDEA OF SPOT CLOUD (SC)

The concept of charging the customer for providing cloud computing services is not new. There are numerous renowned vendors which specialize in certain sphere of cloud computing. These services can be broadly classified according into SPI (software, platform and infrastructure) as a service.

- 1- SaaS provides the customer with many integrated features with the aim of minimizing local application load. SP is largely responsible for privacy and security. Examples include Salesforce and NetSuite which run vendor-supplied services.
- 2- PaaS allows the developers to build their relevant applications on top of the platforms provided by SP. It gives more authority and control to customer, subsequently protection of applications is handled by customer, while SP is responsible for isolation of customer workspaces. Examples of PaaS clouds include Google App Engine, Microsoft Azure, and Heroku which run application VM programs (for instance, Java Virtual Machine).
- 3- IaaS is the most extensible and flexible option from customer perspective. Customers define and install the operating systems, applications, and content, and are responsible for its security and privacy. The cloud provider only provides low level basic data protection capabilities. Examples include Amazon’s EC2, Rackspace, and Nimbus which run hardware virtual machine (VM) images (for example, a Xen VM image)[1, 4].

Enomaly is one such IaaS vendor. Founded in 2004, it claims to be one of the first companies completely focused on science of cloud computing as their core business entity [5]. Since early 2010 Enomaly has been working on the concept of selling/buying computing resources in real time. In Feb 2011, after internal trials, Spot Cloud was launched. It is a brokerage house where different vendors with unutilized computing resources will be able to sell them to customers for fixed amount of time. Enomaly asserts that Spot Cloud is a central platform for buying or selling unused cloud capacity based on location, cost and quality [6].

The biggest barrier in the success of brokerage system for computing resources is delivery of these resources to customer in an integrated useable interface. Spot Cloud has tried to overcome this barrier by providing a singular point of access. All the seemingly disparate global cloud computing infrastructure networks will be discoverable through this singular access. Fig 1 shows conceptual idea.



Fig 1. The concept of Soft Cloud (The image is taken from Spotcloud.com)

Spot Cloud is built on Google App Engine with Enomaly Elastic Cloud Computing Platform. Potential sellers using third party cloud infrastructure software platforms or services follow set of procedures defined by Enomaly to integrate with the Spot Cloud market [7]. Fig 2 gives the generic communication API for SP Vendors.

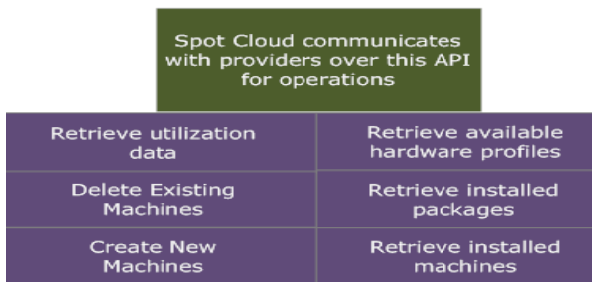


Fig 2.SC Communication API for Service Providers.

Buyers create a SC compatible virtual machine to utilize the capacity and resources on sale. SC uses raw disk image of operating system loaded with applications.

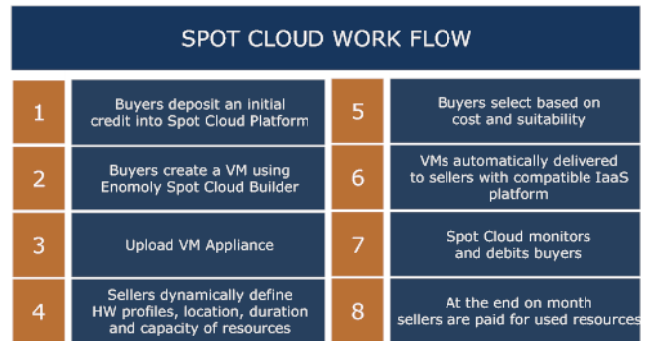


Fig 3. Work Flow Diagram.

Figure 3 shows the generic work flow diagram of SC operations.

III. RISK ANALYSIS AND POTENTIAL THREATS

Cloud computing comes along intrinsic risks of availability and security. For many enterprises cloud computing is a lucrative but risky business. In the drive to maximize revenue, SPs are co locating Virtual Machines from different organizations on same or integrated physical medium. This scenario can open multiple security loop holes and entry points for enterprises sharing the same physical computing resources. Organizations which are directly or indirectly dependent on cloud computing have to concentrate considerable resources on mitigating these risks and are well aware of these vulnerabilities. A survey by Prism Microsystems confirms that 58 percent believe hypervisor which allows multiple OSs to share a single machine is their biggest security concern [8]. Meanwhile they also believe that traditional security models are still prevalent in market. These models do not meet the ever increasing requirements of virtual security.

The security vulnerabilities for cloud computing are well discussed and published [1, 8, 9]. The paper however will focus on the potential threats and barriers to success of Spot Cloud.

a) Service Level Agreements:

To ensure a certain quality of service between a vendor and customer a Service level Agreement (SLA) is signed [3].It gives a legal coverage to the trust which customer puts in service provider. It quantifies the requirements and expectations from the both parties, provide framework for understanding and specifies level of service to be provided by SP. However with the advent of commodity like trading in cloud computing the structure of SLAs will have to be changed to compensate for this new added dimension in the market of cloud computing. With a customer's computing backbone spread over different networks and vendors with possibility of changing SP in short duration, an industry wide standardized SLA framework may be required. At present SLAs are signed after detailed analysis and negotiations. However with Cloud Computing as a dynamic trading commodity a new form SLAs will have to be developed to satisfy the customer and SP requirements. This will most likely keep the large enterprises

and customers with very definite SLA standards off the bay from Spot Clouding.

b) Speculation Driven Market:

Just as in any other brokerage house, speculation will play a pivotal role in setting the price of cloud computing as a commodity. Speculation can cause a market to be erratic and unrealistic. Some argue that market will model itself after power and even financial markets, complete with arbitrage, derivatives and hedging. For example price of Amazon's large Virtual Machine server varied rapidly in Mar 2010 [10]. Refer fig 4.

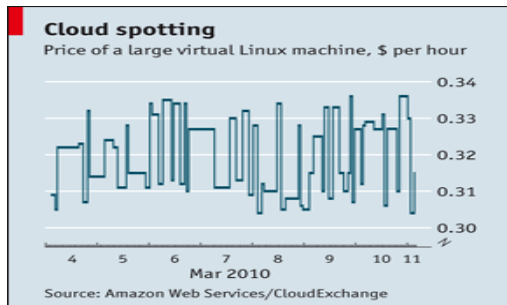


Fig 4. Amazon's VM Price Fluctuations

If the spot cloud computing brokerage becomes highly speculation driven market in the future then brunt of speculation will have to be borne by end user customer. The resulting price hike will damage customer confidence. Therefore standards and policies might have to be defined to check on unpredictable price fluctuations.

c) Information Barriers:

It is easier to move Virtual machines but not the data. This is true not only for technical but also legal and security reasons. For example, national or government enterprises will never utilize cheap computing resources located across the international border at the expense of risk of leaking confidential, sensitive research matters. Big private enterprises are also skeptical of putting their propriety and mission critical data on cloud computing [11]. There are also many legal and national barriers imposed by different governments on flow of information. This hesitation will limit the market appeal of Spot Cloud to small enterprises and non-critical/sensitive computing intensive research.

d) Maintaining Market Monopoly:

Not surprisingly major vendors in cloud computing industry will show reluctance while embracing the idea of Spot Cloud. If cloud computing turns into a true commodity they might be in danger of losing business. Instead they will always try to lock in their customer base while maintaining their separate identity and providing extra features with enhanced services to their customers. Consequently with the less enthusiastic

participation of cloud computing giants, spot cloud might not shine in lime light and may not develop to its full potential.

e) Reputation Factor:

Businesses that are linked to e commerce depend highly on their reputation. Customers are always willing to spend a little extra for services from authentic renowned companies like Google or Amazon, as opposed to unknown companies [12]. This gives air to the fact that cloud computing giants will prefer to advertise themselves as separate entities rather than putting their unutilized resources to sale through the concept of Spot Cloud, or they will participate in a limited manner to maintain their separate identity and core business. This also makes business sense. Since when a customer is only interested in certain SP, it will be economical to make a direct purchase rather than paying commission to in-between brokers. Fig 5 depicts this scenario graphically.

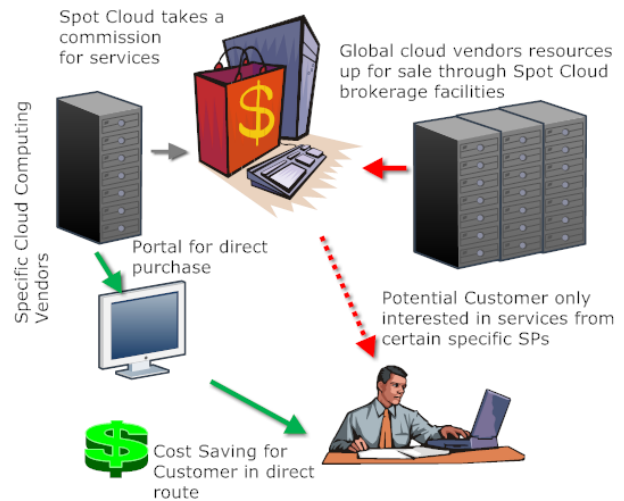


Fig 5. Apparent benefits of direct purchase.

IV. MARKET APPEAL FOR SPOT CLOUD

After carefully analyzing the barriers to success of Spot Cloud and inherent risks in this market it can be deduced that Spot Cloud will have an appeal in the computational intensive market which is non-mission critical for enterprises and organizations. However this is not a small market. It has potential applications in wide range of industrial applications like financial modeling, stress and performance testing, network traffic simulations, image and video processing, large algorithm computing etc. Universities, performance testers and developers will be especially interested in this concept.

International Data Corporation (IDC) predicts that by 2015 cloud computing market will be worth around 56 billion USD with major services being consumed through brokerage [13]. Therefore it is safe to say that Spot Cloud has definitely opened a niche in the market with great potential to evolve and gain mainstream acceptance.

It is also noteworthy that Enomaly is a relatively small player in the world of cloud computing. It's still a gamble that whether its brokerage house will take off. However if the market giants like Google, Microsoft decide to be ambitious on this idea and take an initiative, this conception have the potential to shake the complete industry and its perspective.

V. CONCLUSION

This paper has analyzed the idea of single platform brokerage concept for cloud computing with special focus on Enomaly's recent launch of Spot Cloud. This paper explores the working of Spot Cloud. Further it overviews the inherent barriers that might impede the main stream adoption of Spot Cloud. It also explores shortcomings in this concept as well as its potential market appeal. It is apparent that Spot Cloud is a concept which could bring cheap computing power to interested customers. However it is also evident that it will likely have a limited and specific market base. To abridge, it's an analytical study of the Spot Cloud -the commodity market for Cloud Computing.

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