

THE BUSINESS PERSPECTIVE OF CLOUD COMPUTING FOR SMALL AND MEDIUM ENTERPRISES

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Abstract: *Cloud computing has been described as a technological change brought about by the convergence of a number of new and existing technologies. It enables all businesses to get the best of technology at extremely economical costs. Both perspectives of the Cloud are important to be reviewed, of the provider's side as well as the consumers of the technology. While a lot of research is currently taking place in the technology itself, there is an equally urgent need for understanding the business-related issues surrounding cloud computing. In this paper, we identify the strengths and weaknesses for the Cloud computing. First of all, the Cloud computing has much to offer to the small and medium enterprises. It allows them to run applications that are traditionally too complex or expensive (either because of prohibitive licensing costs or impractical hardware requirements), to outsource the commodity aspects of providing IT services, thus reducing the need for them to maintain the overheads of a dedicated computing facility, such as: small to no capital required, smaller IT staff necessary, increased security and compliance certifications handled outside of the company, access to the right level of compute power (as fast as is needed, and only what is needed), etc. It reduces the need for long start-up times for implementing new services and capabilities as well as the ongoing need for operator training.*

Keywords: CLOUD COMPUTING, SME's, BUSINESS PERSPECTIVE.

1. Introduction

In a dynamic economic environment, the company's survival may depend on the ability to focus on core business and quick adaptation. Yesterday's profitable business model can't be counted on to translate into future growth and profits. As the business adapts to changing government and industry regulations, evaluates new business partnerships and anticipates competitive threats, IT needs to help the business find new ways to respond of such of fast changes. At the same time, plans for change must often be made in the context of limited resources for finances, people, technology, and power [1].

The evolution of Cloud computing over the past few years is potentially one of the major advances in the history of computing. Cloud computing represents a convergence of two major trends in information technology. The first one is the IT efficiency, whereby the power of modern computers is utilized more efficiently through highly scalable hardware and software resources and secondly the business agility, whereby IT can be used as a competitive tool through rapid deployment, parallel batch processing, use of compute-intensive business analytics and mobile interactive applications that respond in real time to user requirements [2,3]. The concept of IT efficiency also embraces the ideas encapsulated in green computing, since not only are the computing resources used more efficiently, but further, the computers can be physically located in geographical areas that have access to cheap electricity while their computing power can be accessed long distances away over the Internet. However, as the term business agility implies, cloud computing is not just about cheap computing, it is also about businesses being able to use computational tools that can be deployed and scaled rapidly, even as it reduces the need for huge upfront investments that characterize enterprise IT setups today [2].

The National Institute of Standards and Technology (NIST) in October of 2009 released a formal definition of cloud computing that has become very soon an accepted standard by many in the field including European Network and Information Security Agency. The current version (v26) follows: "Cloud computing is 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. This

cloud model promotes availability and it is composed of five essential characteristics, three service models, and four deployment models [4]."

In this paper, an attempt has been made to identify the strengths and weaknesses of the Cloud computing as a new IT paradigm. General perception is that Public Clouds can reduce costs for large enterprises as well as SME's. However, the cost advantages for large enterprises may not be as clear as for SMEs, since many large enterprises can reap the benefits of significant economies of scale in their own internal IT operations. Cloud allows to the SME's to run applications that are traditionally too complex or expensive, to outsource the commodity aspects of providing IT services, thus reducing the need for them to maintain the overheads of a dedicated computing facility, such as: small to no capital required, smaller IT staff necessary, increased security and compliance certifications handled outside of the company, access to the right level of compute power, etc.

It reduces the need for long start-up times for implementing new services and capabilities as well as the ongoing need for operator training.

There is no doubt about the paramount potential of Cloud computing, but it is yet to cross its stage of infancy, with only a limited number of takers currently, owing to some of the challenges of its widespread adoption such as security, trust, and vendor lock-in [5,6]. It is estimated that 71% of companies believe that cloud computing is a real technology option, 70% hold that it would make their business more flexible, 62% think that it would help them react quickly to market conditions and 65% that it would help increase focus on core business [7]. Below are given some indicators about readiness for adoption of the Cloud by SME's based on research conducted by OpinionMatters, an independent pan-European market research company. The Easynet Connect commissioned research in UK to determine how seriously SME's were taking the Cloud at 2010 compared to the end of 2008. A trend of steady interest in cloud computing in the end of 2008 (but still 53% said they would never adopt the cloud), was significantly changed by the end of 2010 when half of SME's in the UK confirmed that they will be using cloud computing in some form or another [8].

2. A tour of the Clouds

The basic notion of the Cloud computing refers to the technology infrastructure model that enables several types of computing tasks to be performed over a network. The network can be a local area network or a wide area network like the Internet. As mentioned before, the Cloud computing model promotes availability and it is composed of five essential characteristics, three service models, and four deployment models shown in Table 1 [4]. The network will depend on the deployment models - a Private or Public Cloud computing service.

A Cloud computing infrastructure is composed of several types of hardware components (servers, storage systems, network components, etc.), software application components (programs, services, protocols, etc.), and information as the basic component. If we consider them, it's evident that many are used to perform an organization's daily tasks. Currently networks, servers, applications, and other technology tools are used to develop much of the computing processes in an organization. Hence, quite natural is becoming the question about what is the difference between a traditional computing model and a cloud infrastructure? The infrastructure at the traditional computing model is based on resources such as the hardware components, the applications like *Enterprise Resource Planning* (ERP), *Customer Relationship Management* (CRM) and etc., and the business information, while the infrastructure at the Cloud computing model is based on services. The approach is different, in a traditional computing model all resources interact between and affect the general infrastructure, while at the Cloud computing model the *Service Oriented Architecture* (SOA) creates a more natural separation between two main layers. One is formed by the technology within the Cloud infrastructure (hardware and applications) and the other is formed by information resources. Services can be configured, provisioned or escalated internally without end user intervention or awareness. In a traditional computing model, it is more difficult to achieve the separation between the technical infrastructure and the information resources [9].

Table 1: NIST Cloud computing model

Essential characteristics	Service models	Deployment models
Broad Network Access	Software as a Service (SaaS)	Public
Rapid elasticity	Platform as a Service (PaaS)	Private
Measured service	Infrastructure as a Service (IaaS)	Hybrid
On-demand/ Self-service		Community
Resource pooling		

Hereby, we will mention some of the general features that Cloud computing needs to have:

- Network access is crucial for Clouds to be operative.
- Measured Service as an economical feature of Clouds. The businesses continue to move toward on-demand service models to operate their IT infrastructures and the possibility to use a pay-per-use model or by utility of the service model it is very important. Customers can pay the service based on a fix rate or based on the number of users, usage (time), etc.
- Elasticity or rapid scalability. Resources (hardware and software) are provided without any intervention or awareness from the customer's side. It's all based on consumption demand.
- Resource Pooling. At Clouds this means that the resources serve multiple users by using both virtual and physical means, depends on demands. In this case, the concept of virtualization has great relevance in order to achieve the goal.

3. The key features and characteristics of Cloud Computing (CC)

Many analyses performed showing that Cloud computing has significant efficiency and cost advantages. The most recent one conducted by WSP Environment & Energy for Salesforce.com presents per-transaction emissions reductions averaging 95% for companies that shift to using the cloud. Bellow, potential benefits and drawbacks of the new IT paradigm are given.

CC is sometimes confused with Grid computing, Utility computing or Autonomic computing. The fact is that as of today, many CC concepts depend on grids, bill like utilities, and have autonomic features and characteristics. However, CC is meant to expand the capabilities and services of grids and utilities. Some of CC characteristics are [10]:

- Rapid elasticity
- Cost reduction
- Multi-tenancy
- Security
- Sustainability
- Pay-per-use utility model
- Virtualization
- User friendly
- Broad network access
- Resource pooling
- Automatic adaptation
- Resource optimization
- Service SLA's
- Infrastructure SLA's

3.1 Potential benefits of CC

Clearly, business management is under a lot of pressure to reduce costs while providing a sophisticated level of service to internal and external customers. Customers might want to add a new business application, but lack the money. They might need to increase the amount of storage for various departments. Cloud service providers offer this type of capability at a prorated basis. A cloud service vendor might rent storage on a per-gigabyte basis.

Specifically, Cloud computing offers the following key advantages:

- *Reduced costs, both capital and operating, through economies of scale.* It dramatically lowers the initial cost for the smaller firms trying to benefit from compute-intensive business analytics that were hitherto available only to the largest corporations. These computational exercises typically involve large amounts of computing power for relatively short amounts of time, and cloud computing makes such dynamic provisioning of resources possible. Companies are often challenged to increase the functionality of IT while minimizing capital expenditures. CC can provide an almost immediate access to hardware resources, with no upfront capital investments for users, leading to a faster time to market in many businesses. Treating IT as an operational expense (in industry-speak, employing an 'Op-ex' as opposed to a 'Cap-ex' model) also helps in dramatically reducing the upfront costs in corporate computing.
- *Scalability.* Cloud computing makes it easier for enterprises to scale their services which are increasingly reliant on accurate information, according to the client demand. Since the computing resources are managed through software, they can be deployed very fast as new requirements arise. In fact, the goal of CC is to scale resources up or down dynamically through software API's depending on client load with minimal service provider interaction.
- *Device and location independence.* The Cloud becomes an adaptive infrastructure that can be shared by different end users, each of whom might use it in very different ways. The users are completely separated from each other and the flexibility of the infrastructure allows for computing loads to be balanced on the fly as more users

join the system (the process of setting up the infrastructure has become so standardized that adding computing capacity has become almost as simple as adding building blocks to an existing grid). Cloud computing also makes possible new classes of applications and delivers services that were not possible before. The mobile interactive applications that are location-environment- and context-aware and that respond in real time to information provided by human users, nonhuman sensors (e.g. humidity and stress sensors within a shipping container) or even from independent information services (e.g. worldwide weather data).

- *Cloud computing uses a pay-per-use billing model.* Cloud billing model is very different when compared to traditional IT billing techniques. Typical billing models include per user billing, per GB billing or per-use billing (i.e. an organization is billed on each usage of the computing service).

3.2 Potential downside of CC

Major disadvantages in Cloud computing are found in areas such as organizational, technical and legal.

- *Lack of open standards between CC providers.* The hype around cloud has created a flurry of standards and open source activity leading to market confusion. As important as current standards development efforts are, they are not enough. There is a lack of a customer driven prioritization and focus within the cloud standards development process. The council will separate the hype from the reality on how to leverage what customers have today and how to use open, standards-based cloud computing to extend their organizations. The Cloud Standards Customer Council is an end user advocacy group dedicated to accelerating cloud's successful adoption, and drilling down into the standards, security and interoperability issues surrounding the transition to the cloud. The Council will provide cloud users with the opportunity to drive client requirements into standards development organizations and deliver materials such as best practices and use cases to assist other enterprises. Cloud Standards Customer Council founding enterprise members include IBM, Kaavo, CA Technologies, Rackspace, Software AG, etc. More than 100 of the world's leading organizations including Lockheed Martin, Citigroup, State Street and North Carolina State University have already joined the Council.
- *Vendor lock-in.* In economics, vendor lock-in, also known as proprietary lock-in, or customer lock-in, makes a customer dependent on a vendor for products and services, unable to use another vendor without substantial switching costs. Lock-in costs which create barriers to market entry may result in antitrust action against a monopoly. Four dimensions of the lock-in are distinguished: horizontal lock-in (restricted ability to replace with comparable product), vertical lock-in (solution restricts choice in other levels of the stack), diagonal (of inclined) lock-in (buy other solutions of the same vendor, even if not optimal) and generational lock-in (applies even if no desire to avoid hor./vert./diag. lock-in).
- *Security.* Many organizations are uncomfortable with storing their data and applications on systems they do not control. Migrating workloads to a shared infrastructure increases the potential for unauthorized exposure. Consistency around authentication, identity management, compliance, and access technologies will become increasingly important. To reassure their customers, cloud providers must offer a high degree of transparency into their operations.
- *Freedom of users is limited.* Cloud computing has been criticized for limiting the freedom of users and making them dependent on the cloud computing provider. Many

factors can temporarily disrupt access to the data, such as network outages, denial of service attacks against the service provider, and a major failure of the service provider infrastructure, even if data is securely stored in a cloud. Additional issues are raised around process (methods, functions, transactions, etc.) visibility and transportability given the more complex nature of cloud and web service systems.

4. Conclusion

In the increasingly globalized world, small businesses need an operational communications network to span the geographically dispersed regions of the company. Thus, it is very hard for SME's to compete with larger enterprises that hold seemingly infinite budgets. Nowadays, more than ever, the emergence of multi-tenanted business applications based upon a price-per-user model, or in other words, the Public Cloud has been seeing. This allows of the youthful companies to enjoy enterprise level services, security and products, at a fraction of the cost.

SME's have a history of being sold IT systems that are expensive and unscalable. They would buy proprietary solutions, only to discover that their investment trapped them into using inflexible, antiquated systems. On the other hand, SME's which did not make the investment in back-office IT and opted to do tasks in a more manual fashion incurred higher labour costs. Cloud computing is the answer to these issues. It is an exceedingly complex technology that has great potential benefits. For SME's, Cloud computing can lower the entry cost for powerful IT capabilities by reducing the need for hardware and software ownership costs and a large IT staff resources. The idea of metered services may minimize expenses for SME's, particularly at startup. On-demand elasticity enables rapid scaling of resources as the SME grows and has the potential to provide a competitive advantage.

The next challenge is the SME's to ensure they have a formal strategy in place for adopting the Cloud. While today's installations may not be entirely critical to the business, it is only a matter of time before the core business functions, which typically run on off-the-shelf spreadsheets and databases today, are migrated to Cloud platforms. The success of Salesforce (a cloud based CRM) is one such example of how business-critical functions can so readily migrate to the Cloud. With more core applications moving this way, SME's need to ensure they cover all the bases.

SME's can expect savings of up to 50% after migrating to the Cloud over three years. Cloud services have no upfront fees so capital outlays are turned into operational expenditure. Cloud provides a perfect relationship between user's demand and price – it is perfectly elastic. Fees increase incrementally as users enjoy more utility. But in the long term, cost savings is not a reason to move onto the Cloud, as there is likely to be unforeseen teething problems which may equate to loss in business productivity, and result in a zero net saving. Instead, SME's should focus on the long-term benefits of Cloud computing — *a greater focus on core competency*. Cloud promises to not only free SME's from vendors, but also from daily routines which are not part of their core competency. With vastly less knowledge and in-house resources, SME's can focus on growing their business and outsource back-office roles to service providers.

SME's which fit one of the following profiles are strongly advised to consider Cloud computing in their business planning:

1. Starting a new company or division
2. Large IT investments in upgrades or new resources
3. Decision to outsource a greater number of tasks or
4. Move towards a decentralised workforce.

Cloud is not so beneficial for SME's which have already made substantial investments in IT in the last 3 years.

Cloud is causing an outflow of human capital from the back-offices of SME's to outsourced businesses. SME's will have to become comfortable with not doing business face-to-face.

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