Importance of Cloud Computing in Small and Medium-Sized Businesses

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ABSTRACT

Think of a world where users of computers don't have to run, install or store there applications or data on their own computer; imagine the world where every piece of information is available on all modern devices and not just limited to computers; imagine the world where every piece of information reside on internet or CLOUD. Most businesses don't have ability or resources to have IT professionals on staff, and instead rely on outside IT specialist to help them maintain their communications, setup/troubleshoot computer issues, and support networks and infrastructure. These individuals are indispensable to keeping your business up and running, as well as helping to facilitate growth. They are also the go-to people for making technology purchases and often act in an advisory role for their customers and clients. The bottom line is that they are important to a businessman and business! It is important to note as well as acknowledge here the important role technology plays and more importantly the individuals who provide these services to those in need, who ultimately becomes the trusted advisors and gets integrated into the small and medium-sized businesses.

Many activities in I.T. that were once innovations but more recently have been provided as products (with extensive feature differentiation) have now become so ubiquitous and so well defined that they have become little more than a commodity that is suitable for service provision. It can literally be considered that chunks of the "computing stack" are moving from an "as a Product" to an "as a Service" world. This change requires more than just activities being suitable for utility service provision. It also requires the concept of service provision, the technology to achieve this and a change in business attitude i.e. a willingness of business to adopt these new models. Small and Medium-sized business are no exception and can greatly benefit from this change considering cost, data security and cloud service provider's perspective.

Categories and Subject Descriptors

Cloud Computing, Management of Computing and Information Systems, SMB, PaaS, IaaS, SaaS

1. INTRODUCTION

As a member of the Internet "CLOUD" is a familiar cliché, but when combined with "computing", the meaning gets bigger and confusing. Some analysts and vendors define cloud computing narrowly as an updated version of utility computing: basically virtual servers available over the Internet. Others go very broad, arguing you consume outside the firewall is "in the cloud", including conventional outsourcing. Therefore, before we discuss this term further, a bit of history and background is needed.

1.1 Activity

All business activities undergo a lifecycle; they evolve through distinct stages including:

- the first introduction of a new activity (its innovation)
- the custom built examples replicating this activity (the copying phase)
- the introduction of products which provide that activity (the product stage, including numerous rounds of feature differentiation which are also called product innovation)
- The activity becoming more of a commodity (ubiquitous, well-defined and with no qualitative differentiation). In certain circumstances that commodity can be provided through utility services.

It should be noted that the characteristics of an activity changes as it move through its life-cycle. As a commodity it's of little strategic value (or differentiation) between competitors whereas in its early stages it can often be a source of competitive advantage (a differential).

1.2 Information Technology

At any one moment in time, I.T. consists of a mass of different activities at different stages of their life-cycle. Some of those activities are provided through discrete software applications (an example might be CRM), other activities relate to the use of platforms (developing a new system or provisioning of a large database etc) whilst others relate to the provision of infrastructure (compute resource, storage, networks).

This is categorized into a computing stack of infrastructure, platform and software.

1.3 What is happening in IT today?

Many activities in I.T. that were once innovations but more recently have been provided as products (with extensive feature differentiation) have now become so well defined that they have become little more than a commodity that is suitable for service

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provision. It can be considered that chunks of the "computing stack" are moving from an "as a Product" to an "as a Service" world.

This change is the reason why we have the "Infrastructure as a Service" to "Platform as a Service" to whatever else "as a Service" industries. Of course, there are many higher order layers to the stack (e.g processes) but any confusion around the "as a Service" term generally only occurs because we never used to describe these activities with the "as a Product" term.

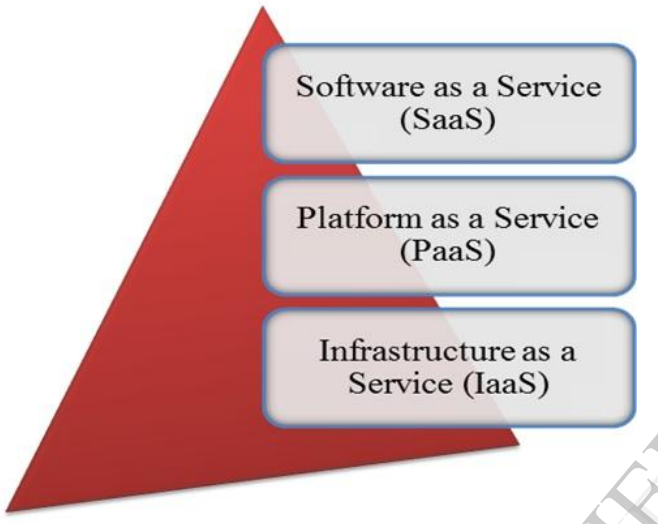

Figure 1: Illustrating three Cloud Service Models

1.4 Why now?

As mentioned earlier in the paper, this change requires more than just activities being suitable for utility service provisioning. It also requires the concept of service provision, the technology to achieve this and a change in business attitude i.e. a willingness of business to adopt these new models. Whilst the concept is **old**, and the technology has been around for some time, both the suitability and change of business attitude are relatively new.

Paul Strassman (in the 90's) and then Nicholas Carr (in the 00's), many business leaders have recognized that not all I.T. is a source of advantage. Instead much of I.T. is a cost of doing business which is ubiquitous and fairly well defined throughout an industry.

During the research done by Salesforce.com, when CIOs of multiple organizations discussed that they spent vast amounts of money maintaining highly customized CRM systems and they were all doing the same thing. These systems provided no strategic value, no differential and in reality what they wanted was standardized, low cost services charged on actual consumption basis for what is essentially a cost of doing business.

This is quite a sea change from a decade ago.

The change from a "as a Product" to an "as a Service" world is happening today because we have the concept, technology, suitability and most importantly this changing business attitude.

1.5 An old Concept

The concept of utility service provision for I.T. is not new but dates back to the 1960's. Douglas Parkhill, in this 1966 book - "The Challenge of the Computer Utility" - described a future where many computing activities would be provided through computer utilities analogous to the electricity industry. These computer utilities would have certain characteristics, they would:

- provide computing resources remotely and online
- charge for the use of the resources on the basis of consumption i.e. a utility basis
- provide elastic & "infinite" supply of resources
- benefit from economies of scale
- be multi-tenanted

Douglas mentioned that these computer utilities would take several forms as per the existing consumption of other utilities. These forms included public, private & government utilities. He also noted that eventually we would see competitive markets of computer utilities where consumers could switch providers, consume resources across multiple providers (i.e. a federated use) and consume all manner of hybrid forms (e.g. private and public combinations)

Utility means a metered service where the charge is based upon consumption. That charge might be financial or it could be in any other currency (e.g. access to your data).

1.6 The Cloud Term

Between 1966 -2007, the general thoughts were:

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I.T. wasn't one thing. Many aspects of I.T. created little or no differential value and were simply a cost of doing business (Strassman, 90s)

There is a correlation between ubiquity of I.T. and its strategic value (differentiation). The more ubiquitous I.T. was, the less strategic value it created. (Nick Carr, '02)

I.T. activities could be categorized into rough groupings such as software, platform and infrastructure (the actual terms used have changed over time but this concept is pre-80's)

Certain I.T. activities would be provided through computer utilities as per other utility industries (Parkhill & McCarthy, 60's)

There were several forms that these computer utilities could take including public, private, government and all manner of combinations in between. (Douglas Parkhill, 1966)

We would see the formation of competitive marketplaces with switching and federation of providers.

These computer utilities had certain common characteristics including utility charging, economies of scale, elastic and "infinite" supply etc.(Douglas Parkhill, 1966)

Whilst all activities have a lifecycle which they evolve along through the process of commoditization, the shift from "as a Product" to an "as a Service" world would require several factors (i.e the concept, the technology to achieve this, the suitability of activities for service provision and a change in business attitude.)

Back between '05'-'07, there was a pretty crystal clear idea of what was going to happen:
A combination of factors (concept, suitability, technology and a change in business attitude) was going to drive those I.T. activities which were common, well defined and a cost of doing business from being provided "as products" to being provided "as services" through large computer utilities. The type of services offered would cover different elements of the computing stack, there would be many different forms of computer utility (public, private & government) and eventually we would see competitive marketplaces with easy switching and consumption across multiple providers.

In '05, James Duncan, Simon Wardley and many others were starting to build Zimki - a computer utility for the provision of a JavaScript based "Platform as a Service" - for precisely these reasons. The concepts of federation, competitive markets, exchanges and brokerages for service provision of a commodity were well understood.

Unfortunately in late '07 / early '08, the term "Cloud" appeared and the entire industry seemed to go into a tailspin of confusion. During '08, the "Cloud" term became so prevalent that if you mentioned "computer utility", people would tell you that they weren't interested but could you please tell them about "this thing called cloud".

1.7 So, what is Cloud?

The best definition for cloud today is NIST's. Using five essential characteristics (include elasticity, measured service etc), three service models (application, platform, infrastructure) and four deployment models (private, public, government etc) it nearly packages all the concepts of computer utility, the shift from product to services and the different categories of the computing stack into one overall term - "cloud".

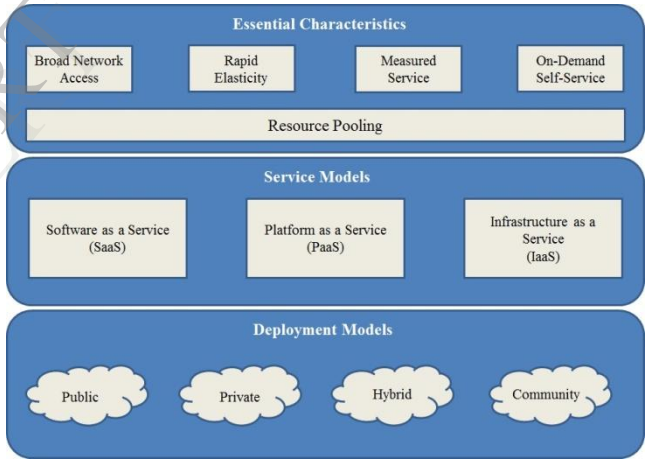

Figure 2: Visual Model of NIST Cloud Definition

Some argue that in the process of providing definition of CLOUD, NIST wiped out all the historical context, train-wrecked the concept of a competitive marketplace with switching and federation, eliminated the principle idea of commoditization and offers no explanation of why now. It appears as a mechanistic definition which helps you call something a cloud without any understanding of why. However, may be it was essential to clean up the old mess.

NIST definition of CLOUD essentially says:

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"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."

1.7.1 Essential Characteristics of Cloud Computing

- On-demand self-service: The ability for an end user to sign up and receive services without the long delays that have characterized traditional IT. Cloud service providers providing on demand self-services include Amazon Web Services (AWS), Rackspace (uses VMware vCloud), Microsoft, Google, IBM and Salesforce.com. New York Times and NASDAQ are examples of companies using AWS (NIST). Gartner describes this characteristic as service based.
- Broad network access: Ability to access the service via standard platforms (desktop, laptop, mobile etc).
- Resource pooling: Resources are pooled across multiple customers using multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand. The resources include storage, processing, memory, network bandwidth, virtual machines and email services. The pooling together of the resource builds economics of scale (Gartner).
- Rapid elasticity: Elasticity is defined as the ability to scale resources both up and down as needed. To the consumer, the cloud appears to be infinite, and the consumer can purchase as much or as little computing power as they need.
- Measured Service: Billing is metered and delivered as a utility service, providing transparency to both the provider and consumer. This implies that just like air time, electricity or municipality water IT services are charged per usage metrics – pay per use. The more you utilize the higher the bill. Just as utility companies sell power to subscribers, and telephone companies sell voice and data services, IT services such as network security management, data center hosting or even departmental billing can now be easily delivered as a contractual service.
- Multi Tenacity: This is the 6th characteristic of cloud computing advocated by the Cloud Security Alliance. It refers to the need for the policy-driven enforcement, segmentation, isolation, governance, service levels, and chargeback/billing models for different consumer constituencies. Consumer might utilize a public cloud provider's service offerings or actually be from same organization, such as different business units rather than distinct organizational entities, but would still share infrastructure.

Therefore, to maximize the benefits that Cloud Computing brings, a true cloud computing solution needs to demonstrate these particular characteristics.

1.7.2 Cloud Service Models

Cloud computing services can be divided into three classes, according to the abstraction level of the capabilities and resources provided and the service model of providers: Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS).

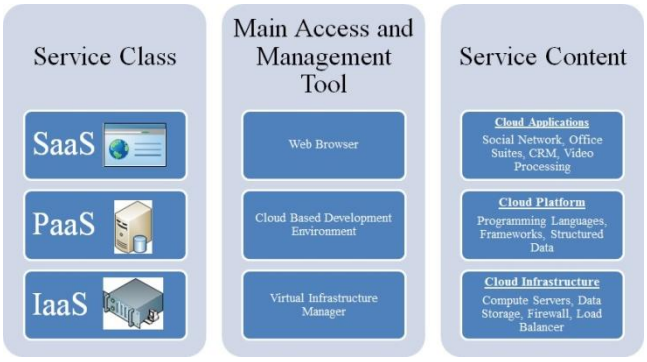

Figure 3: Figure illustrating Cloud Service Models

First layer IaaS is built on top of virtualized compute, storage, and network resources. Second layer PaaS provides cloud development environments, which are built on top of infrastructure services to offer application development and deployment capabilities. Top level SaaS is built at the user application level providing applications and application programming interfaces (APIs).

1.7.2.1 IaaS (Infrastructure as a Service)

The capability provided to the customer of IaaS is raw storage space, computing, or network resources with which the customer can run and execute an operating system, application, or any software that they choose. The cloud customer is not able to control the distribution of the software to a specific hardware platform or change parameters of the underlying infrastructure, but the customer can manage the software deployed (generally from the boot level upward). E.g. Amazon Web Services, Rackspace Cloud.

1.7.2.1.1 Where IaaS Makes Sense

IaaS makes sense in a number of situations and these are closely related to the benefits that Cloud Computing bring. Situations that are particularly suitable for Cloud infrastructure include:

- Where demand is very volatile – any time there are significant spikes and troughs in terms of demand on the infrastructure.
- For new organizations without the capital to invest in hardware.
- Where the organization is growing rapidly and scaling hardware would be problematic.

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- Where there is pressure on the organization to limit capital expenditure and to move to operating expenditure.
- For specific line of business, trial or temporary infrastructural needs

1.7.2.1.2 Where IaaS May Not be the Best Option

While IaaS provides massive advantages for situations where scalability and quick provisioning are beneficial, there are situations where its limitations may be problematic. Examples include:

- Where regulatory compliance makes the offshoring or outsourcing of data storage and processing difficult.
- Where the highest levels of performance are required, and on-premise or dedicated hosted infrastructure has the capacity to meet the organization's needs.

1.7.2.2 PaaS (Platform as a Service)

In the case of PaaS, the cloud provides the hardware, but they also provide a toolkit and a number of supported programming languages to build higher level services (i.e. software application that are made available as part of a specific platform). The users of PaaS are typically software developers who host their application on the platform and provide these applications to the end-users. E.g. Google App-Engine, Microsoft Azure, Cloud Foundry.

1.7.2.2.1 Where PaaS Makes Sense

PaaS is especially useful in any situation where multiple developers will be working on a development project or where other external parties need to interact with the development process. It is invaluable for those who have an existing data source – for example sales information from a customer relationship management tool, and want to create applications which leverage that data. Finally PaaS is useful where developers wish to automate testing and deployment services.

The popularity of agile software development, a group of software development methodologies based on iterative and incremental development, will also increase the uptake of PaaS as it eases the difficulties around rapid development and iteration of software.

Some examples of PaaS include Google App Engine, Microsoft Azure Services, and the Force.com platform.

1.7.2.2.2 Where PaaS May Not be the Best Option

PaaS has the ability to become the predominant approach towards software development. The ability to automate processes, use pre-defined components and building blocks and deploy automatically to production provide us with sufficient information to understand its value. However, there are certain situations where PaaS may not be ideal, examples include:

- Where the application needs to be highly portable in terms of where it is hosted.
- Where proprietary languages or approaches would impact on the development process.
- Where a proprietary language would hinder later moves to another provider – concerns are raised about vendor lock-in.
- Where application performance requires customization of the underlying hardware and software.

1.7.2.3 SaaS (Software as a Service)

The SaaS customer is an end-user of complete application running on a cloud infrastructure and offered on a platform on-demand. The applications are typically accessible through a thin client interface, such as a web browser. The customer does not control either the underlying infrastructure or platform, other than application parameters for specific user settings. E.g. Google-Apps, Salesforce.com CRM, Socialcast.

1.7.2.3.1 Where SaaS Makes Sense

Cloud Computing generally, and SaaS in particular, is a rapidly growing method of delivering technology. That said, organizations considering a move to the Cloud will want to consider which applications they move to SaaS. As such there are particular solutions we consider prime candidate for an initial move to SaaS;

- "Vanilla" offerings where the solution is largely undifferentiated. A good example of a vanilla offering would include email where many times competitors use the same software precisely because this fundamental technology is a requirement for doing business, but does not itself confer an competitive advantage.
- Applications where there is significant interplay between the organization and the outside world. For example, email newsletter campaign software.
- Applications that have a significant need for web or mobile access. An example would be mobile sales management software.
- Software that is only to be used for a short term need. An example would be collaboration software for a specific project
- Software where demand spikes significantly, for example tax or billing software used once a month.

SaaS is widely accepted to have been introduced to the business world by the Salesforce Customer Relationship Management (CRM) product. As one of the earliest entrants it is not surprising that CRM is the most popular SaaS application area, however e-mail, financial management, customer service and expense management have also gotten good uptake via SaaS.

1.7.2.3.2 Where SaaS May Not be the Best Option

While SaaS is a very valuable tool, there are certain situations where we believe it is not the best option for software delivery. Examples where SaaS may not be appropriate include:

- Applications where extremely fast processing of real time data is required.
- Applications where legislation or other regulation does not permit data being hosted externally.
- Applications where an existing on-premise solution fulfills all of the organization's needs.

Software as a Service may be the best known aspect of Cloud Computing, but developers and organizations all around the world are leveraging Platform as a Service, which mixes the simplicity of SaaS with the power of IaaS, to great effect.

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1.7.3 Cloud Deployment Models

Private Cloud: The cloud infrastructure is operated solely for an organization. It may be managed by the organization or a third party and may exist on premise or off premise.

Community Cloud: The cloud infrastructure is shared by several organizations and supports a specific community that has shared concerns (e.g., mission, security requirements, policy, and compliance considerations). It may be managed by the organizations or a third party and may exist on premise or off premise.

Public Cloud: The cloud infrastructure is made available to the general public or a large industry group and is owned by an organization selling cloud services.

Hybrid Cloud: The cloud infrastructure is a composition of two or more clouds (private, community, or public) that remain unique entities but are bound together by standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load-balancing between clouds).

1.8 Small and Medium-sized Businesses (SMBs)

Small and Medium-sized Businesses (SMBs) or Small and Medium Enterprises (SMEs) are companies whose revenue fall below a certain number. In most economies of the world, smaller enterprises outnumber large companies by a large margin. SMBs are also said to be responsible for driving innovation and competition in many economic sectors. SMBs are normally privately owned corporations, partnerships, or sole proprietorships. What constitutes "small" in terms of government support and tax policy varies by country and by industry. In Australia, as per Australian Fair Work Act 2009, a business consisting of 15 or less employees is considered as "small". As per EU, a business with 50 or less employees is considered as small; as per US, a business with less than 500 employees is considered as small.

As mentioned before, classification is just not based on number of employees. In Europe, there are three broad parameters which define SMBs: micro-entities are companies with up to 10 employees; small companies employ up to 50 workers, whilst medium-sized enterprises have up to 250 employees. SMBs are also defined as firms with either revenue (turnover) of €10–50 million or a balance-sheet total of €10–43 million. In the United States, the Small Business Administration sets small business criteria based on industry, ownership structure, revenue and number of employees (which in some circumstances may be as high as 1,500, although the cap is typically 500). Both the US and the EU generally use the same threshold of fewer than 10 employees for small businesses.

In India, SMBs are classified into 3 areas: Micro-enterprise, Small enterprise and Medium enterprise. A micro-enterprise is one where the investment in plant and machinery (their original cost excluding land, building and items specified by the Ministry of Small Scale Industries in its notification No. S.O. 1722(E) dated October 5, 2006) does not exceed Rs.25 lakh. A small enterprise is one where the investment in plant and machinery is more than Rs.25 lakh but does not exceed Rs.5 crore. A medium enterprise is one where the investment in plant and machinery (see above) is more than Rs.5 crore but does not exceed Rs.10 crore.

The definition of MSMEs in the service sector is:

- Micro-enterprise: Investment in equipment does not exceed Rs.10 lakh
- Small enterprise: Investment in equipment is more than Rs.10 lakh but does not exceed Rs.2 crore
- Medium enterprise: Investment in equipment is more than Rs.2 crore but does not exceed Rs.5 crore

The Indian micro- and small-enterprises (MSEs) sector plays a pivotal role in the country's industrial economy. It is estimated that in value, the sector accounts for about 45 percent of manufacturing output and about 40 percent of total exports. In recent years, the MSE sector has consistently registered a higher growth rate than the overall industrial sector. The major advantage of the MSE sector is its employment potential at a low capital cost. According to available statistics (4th Census of MSME Sector), the sector employs an estimated 59.7 million people in 26.1 million enterprises; labor intensity in the MSE sector is estimated to be nearly four times that of large enterprises.

2. Role of IT in SMBs

Most businesses don't have ability or resources to have IT professionals on staff, and instead rely on outside IT specialist to help them maintain their communications, setup/troubleshoot computer issues, and support networks and infrastructure. These individuals are indispensable to keeping your business up and running, as well as helping to facilitate growth. They are also the go-to people for making technology purchases and often act in an advisory role for their customers and clients. The bottom line is that they are important to a businessman and business! As per the survey done using Zoomerang in US, it was concluded that IT department being once sought after to provide support and maintenance only, today they are active participants in revenue generation. Among the SMB respondents, 78% said they have in-house IT support for their organizations; of those, 79% indicated that IT staff members are involved in the company's day-to-day operations. Apparently, this is a growing trend: When asked how the role of IT has changed in the past year, 30% of survey respondents said that these team members are less often sideline players now and have, in fact, become key participants in daily business activities. At the same time, 15% of decision-makers said that in-house IT personnel have become more involved in sales and business development.

As per study done by Zinnov, a leading Globalization and Market Expansion Advisory firm, titled 'Indian SMB ICT Adoption Insights', the current IT spend by SMBs in India is USD 24 billion. 20% of the total 50 million SMBs in India are technology ready today. It also mentions that India's domestic IT spend will reach USD 36 billion by 2015, growing at a CAGR of 12%. IT adoption in SMB segment is growing at 15% and expected to reach USD 15 billion by 2015. SMBs are transforming themselves from the traditional 'pen & paper' business culture to increasing adopting technology for the betterment of their business. Modern SMBs are spending heavily on tools like PCs, internet and website to market themselves and compete in global/domestic markets.

3. CLOUD in SMB's IT

Earlier in this paper we have discussed the benefits Cloud Computing can bring to an organization. These benefits can be summarized as falling into several distinct categories:

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3.1 Virtualization – The ability to increase computing efficiency

Imagine having a traditional server, a noisy thing which is known to do only one thing at a time. It may fill the role of email server, database server or web server but running multiple processes concurrently risks reliability and efficiency so typically severs are operated as single use machines. While this may be a robust way of providing a service, it is inefficient since many times servers have excess processing capacity above what is used by a single application.

Virtualization was developed to overcome this limitation of physical hardware as it enables multiple pseudo-servers to be run on one physical device. This division of a single physical server into multiple "virtual" servers containing multiple sets of segregated data is the backbone of Cloud Computing as it allows for far greater flexibility and resource utilization. Virtualization not only brings efficiency gains in terms of processing power but also saves electric power, space and cooling since the number of physical machines running is greatly reduced. To illustrate this point, studies by Nucleus Research have found that Cloud applications consume 90% less energy than on-premise ones.

3.2 Democratization of Computing – Bringing enterprise scale infrastructure to small and medium-sized businesses

Formerly entrepreneurs who wished to start a business had to invest significant capital into hardware and software licenses. Even the simplest of businesses required expensive software licenses, a server or two and the associated administration cost of keeping it all running. The availability of Cloud Computing solutions has led to a massive shift in the availability of computing power. It is now almost effortless for an entrepreneur to set themselves up with some infrastructure and applications upon which to run their business. With many Cloud Computing providers, a server capable of running many of the most common web or business applications can be rented for around $11/month and the cost is getting low day by day. As per the study done by Github, less than 25% of start-ups are self-hosting there web infrastructure.

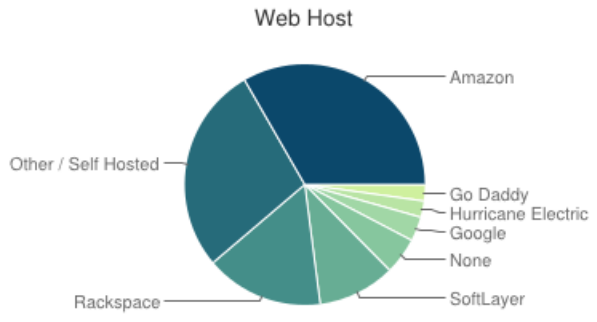

Figure 4: Illustrating study done by Github on web hosting being done by several organizations.

3.3 Scalability and fast provisioning – Bringing web scale IT at a rapid pace

The diagram below indicates the traditional "boom and bust" of infrastructure provisioning.

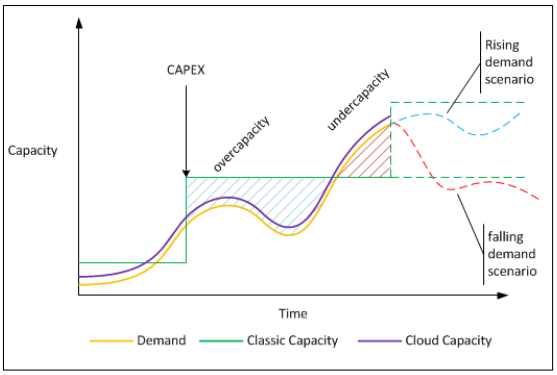

Figure 5: Illustrating over provisioning of servers creating unused capacity. Source: http://www.chades.net/

The above diagram illustrates that an over provision of servers creates unused capacity and hence significantly higher cost per process than is desirable. Also an under provision of servers create significant impact in terms of service levels. Neither of these two situations is desirable as both results in direct economic impacts; either through higher costs or through decreased outputs caused by service degradation.

Cloud Computing enables organizations to maintain infrastructure at required levels at all times. The per unit price from a cloud service provider is potentially high as compared to an owned resource, however, the aggregate cost is reduced by paying only for what is required when it is required.

Having the ability to scale is beneficial, but not when it comes at the cost of significant administration and management. Luckily Cloud Computing also commoditizes infrastructure which frees up IT departments to focus on their key strategic objectives.

3.4 Commoditization of infrastructure – Enabling IT to focus on the strategic aspects of its role

Traditional IT spending of any organization follows a standard 80-20 Rule. 80% of IT expenditure is on maintaining the existing infrastructure and resources, and IT department is only left with 20% of their budget for any innovation or spending in new areas to create more value to the business.

With the advent of Cloud Computing, SMB's IT department's number one priority now is 'Agility'. This has been proven in the recent SandHill report in which it was found that around 50% or the respondent to the survey considered Agility as their primary reason for adopting the cloud. This number one priority is due to the fact the traditional IT used to work (the 80-20 model). There is more and more pressure on IT departments to produce greater outputs, with less resourcing – Cloud Computing lets IT departments to apply resources as, and where, they are needed.

4. SMB's Cloud Move Considerations

The fundamental shift from the way traditional IT used to manage infrastructure and resources, organizations are naturally worried about the potential risks from a move to the Cloud. A study commissioned by EMC Corporation and executed by Zinnov Management Consulting illustrates the private cloud landscape in India. Currently the cloud market in India is estimated at USD 400 million and is expected to reach a market value of USD 4.5 billion

by 2015. The study also estimates that the segment will create 1 lakh jobs by 2015 from 10,000 today.

Study also says that with the overall adoption of SMB's cloud adoption moving fast evolving in India, cloud computing will account for a significant share in the total IT spend of enterprise. Total cloud spend as a percentage of total IT spend is expected to rise from 1.4% in 2010 to 8.2% in 2015. IT/ITeS, telecom, BFSI, manufacturing and government sectors will contribute largest to the cloud market in India, with nearly 78% of the total market. Therefore, given a fundamental shift that Cloud Computing offers, there are key areas that organizations need to look into.

4.1 Technical Considerations

There are a number of technical considerations that need to be clarified by an SMB in order to ensure an efficient and successful move to the cloud.

4.1.1 Which Apps? How to Decide

SMBs are confused about which applications they should move to the cloud. The confusion is mostly due to 2 factors. The traditional IT vendors who were providing IT services till now to the SMBs who have not made a move to the cloud are decrying the move to the cloud and on the other side, the Cloud Computing vendors suggesting that organizations should move all of their applications to the Cloud. Therefore, most fundamentally, organizations should look for applications that:

- Have significant interaction with external applications or services
- Are not a point of differentiation between the organization and its competitors

These type of applications are prime candidates for the move to the Cloud, but there are number of other technical considerations that should be examined.

4.1.2 Security Considerations

SMBs should understand that security is a partnership between the Cloud Computing vendor and SMB user. Therefore, this should be clearly discussed and concluded by both the parties in the beginning about the aspects of security which should be who's responsibility.

4.1.3 Compliance Considerations

Depending on the type of industry SMB is involved in, there are a number of different compliance requirements which may need to be met. Examples of these include PCI, HIPAA, GAAP, SOX, and IFRS. Organizations should fully appraise their own compliance requirements, and to what degree the Cloud Computing vendor meets these requirements. In some instances, only part of an application may be moved to the Cloud due to specific compliance requirements.

4.1.4 Migrations Strategy

SMB should also look into the cost and time it takes to move an existing workload to the Cloud. Specific things to think about here are:

- The bandwidth cost of moving significant amounts of data to the Cloud.
- The time taken to transfer data in the migration process.
- In the case of an application, the business process involved in a migration (downtime, business continuity, training, etc.)

4.1.5 Architecting for the Cloud

SMBs should understand that legacy applications which were used by them were written to take full advantage of legacy systems; hence these legacy applications may not truly leverage the benefits Cloud can bring without significant re-architecting. There are even differences between how much re-architecting is needed from one Cloud Computing provider to the next, so the Cloud provider selection process should include questions about the Cloud provider's technological underpinning, so if re-architecting is needed, it does not come as a surprise.

4.2 External Business Considerations

There are a multiple external business factors which may affect the SMBs decision to move its IT to the Cloud.

4.2.1 Sunk Costs

In business decision making, Sunk Costs are retrospective costs that have already been incurred and cannot be recovered. Classic economics states that Sunk Costs should not affect decision making, however, in SMBs often that is not the case. In such case, it may make sense for an organization to make a gradual move to the cloud. For example, where existing applications and infrastructure are well being utilized, an approach that sees new development and excess capacity delivered from the cloud can be seen as appropriate.

4.2.2 Costs and Capacity Planning for Variability

SMBs should not look at Cloud Computing as a cost saving change, but rather one the more closely aligns expenditure to revenue and allows the organization to be more agile. Cloud Computing may cost higher while subscribing to a Cloud service provider but it should be seen as directly related to bottom line revenue, since compute resources can be turned off when not needed unlike traditional IT investments that continue to be amortized even if sitting idle.

The important point here is, any SMB considering a move to the Cloud should pay attention to their assessments of expected growth in order to truly provide a cost comparison between Cloud and traditional IT. Since most Cloud vendors provide transparent pricing on compute, storage and bandwidth, business forecasting can enable a company to determine their monthly cost for budgeting purposes.

4.2.3 Choosing a Vendor

There are a number of areas an SMB should assess a Cloud Service vendor:

- Support – depending on the particular SMB's business situation and nature of business.
- Billing capabilities – a cloud vendor should provide a flexible billing as per SMB's business profile.
- Fixed costs – Cloud Computing costs should be variable and directly related to usage.
- Minimum charges – SMBs should avoid cloud vendors who seek to set a minimum charge for compute or storage.
- Performance – Cloud vendor should provide Service Level Agreements and performance dashboards which should provide users with certainty and transparency over the availability and performance of their vendor.

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4.3 Internal Business Considerations

Internal business issues are tend to be persistent and therefore are critical to identify and deal with the different issues that Cloud Computing raises for the SMB.

4.3.1 Lack of Formal Training and Qualification

As move to the Cloud gives entrance to new set of applications for the same task which an SMB was using. This becomes a dearth necessity to impart proper training for the new applications. Also, Cloud management requires an SMB to learn about various new software like cloud billing, cloud performance and availability management, etc. Therefore, a good cloud vendor should provide all the necessary trainings and certifications to bridge this gap and achieve successful business for SMB.

4.3.2 Dealing with Objections

As mentioned in the beginning of the paper that move to cloud computing requires change in attitude. Unfortunately there are always a handful of people in every organization who will oppose move to the Cloud for no other reason than their own feelings of being threatened. As in all cases like this, good management practice comes into play here and IT managers need to look at the underlying reasons for the negativity and objections and deal with them at their root cause level. In the instance of technical objections, there is growing body of work that answers practitioners concerns in these areas. If the issues are simply that the individual is reluctant to change, then an SMB organization must work closely with aid of HR policies and achieve employees buy-in.

5. Conclusion

This research paper has tried to understand the importance of Cloud Computing for SMBs. The specific areas researched were what is cloud computing, its similarities with the old concept of utility computing, why now, its importance in SMBs and how SMBs can make decision on moving to the Cloud. Cloud Computing today meets the changing business needs of dynamic changing environment, where a workload can shrink or grow very fast. Previously this kind of business needs was only met by very large enterprises who could afford to spend a lot of money. With Cloud Computing, all the features of expensive computing is now within the reach of SMBs. Companies which used to take many years to set up there IT infrastructure can now achieve the same within a few weeks.

As mentioned in section 4 of this paper, during the research, it was found that for making a decision of moving to the Cloud, there are 3 types of considerations any SMB must account for: Technical Considerations, Internal Considerations and External Considerations. Following are the questions which have been imposed and discussed in length in the paper:

- What kinds of Apps are most suitable to be moved to the Cloud?
- How much security Cloud can offer to an SMB?
- How much compliance Cloud can offer to an SMB?
- How can Cloud vendor help SMB to migrate existing Apps to the Cloud? The migration strategy?
- How should a Cloud solution be architecture for meeting the specific need of an SMB?
- How to deal with Sunk Cost while making a business decision for making a move to the Cloud?
- What factors needs to be considered in terms of cost and capacity for making a move to the Cloud?
- What factors should be kept in mind while making a decision of choosing a vendor?
- What about training SMBs staff about using and managing applications hosted on Cloud?
- With Cloud requiring change in business attitude, how can an SMB deal with internal objections?

Considering all the points discussed within this paper, an SMBs can make a wise and smart decision while deciding to move there workloads to the Cloud. Cloud Computing can bring game changing IT solution to an SMB and can allow SMB to focus on their core business with saving cost and time.

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