The Move of Business Enterprises Towards Using Cloud Computing

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1. Introduction:

Digital technologies are transforming business enterprises, nowadays, from just the manufacture and sale of goods, or offering the services to energy conversation and financial services, business processes across the industry spectrum are being digitalized, infused with unprecedented speed, capacity and intelligence. While such progress creates exciting new business opportunities and paths toward competitive advantage, an enterprise's underlying Information Technology (IT) delivery model must be resilient and flexible enough to support the associated and often dramatic business changes.

Cloud Computing is considered as one possible answer to the need for such flexibility, providing a highly automated, dynamic alternative for acquisition and delivery of information technology services. Today, users are tapping into public and private clouds for computing resources and services without having to address the underlying technology. Business enterprises are leveraging the massive scalability and collaboration capabilities of cloud computing to solve problems in ways just were not possible before. They are deploying new services with great speed and without additional capital investment. As information technology budgets continue to be increased, cloud computing is enabling business enterprises' human resources to do more with less resource. Virtualization, standardization and other fundamental features of cloud are lowering the cost of information technology, simplifying IT services management, and accelerating service delivery.

Such operational efficiency is helping business enterprises to capitalize on globally networked world., as well as enabling their manpower personnel to leverage the infrastructure more effectively to support the business goals of their enterprises. By lessening the drag on data center resources, cloud computing is enabling information technology to stress in on real value creation as regards innovation. Rapid technology-enabled innovation is vital to staying afloat in highly volatile and uncertain economy. Cloud computing provides the p0latform for optimizing operations while creating and delivering the kind of innovative services that differentiate the growth of the business forward.

2. Cloud Computing For Future Work:

Cloud computing offers a compelling alternative to current information technology delivery models, as IT Dept. or Centers are being driven to create cost efficiency while providing an improved user experience. Encouraging by current economics, the proliferation of high-speed Internet connections, and cheaper more powerful computing technology, cloud computing is already supporting thousands of devices from mobile phones to lap top devices. It is increasingly becoming an accepted services delivery model for agile enter-

prise.

In a cloud computing environment, applications and services are not tethered to specific hardware components, instead processing are handled across a distributed globally accessible network of resources, which are disposed on demand as a service.

The availability of a highly dynamic infrastructure enables capture data centers to operate with improved flexibility and scalability, ready to respond quickly to changing business requirements and unexpected opportunities. Such flexibility is essential in the fast-paced, constantly changing, globalized world-and even more so in an economic downturn, where rigid and fragmented infrastructures can severely limit an enterprise's responsibilities.

The cloud computing architecture enables this kind of flexibility via a highly virtualized, automated and service-oriented design. Business enterprises could gain rapid, real-time access to vast computing power, storage and applications, improve their quality of service and bring their core services to market challenges.

It is agility that will be the essential backbone of successful business going forward, and therefore, cloud computing is one way of gaining agility. By enabling this kind of dynamic adoption, cloud computing is helping business enterprises tap into services and information that allow them to work smarter and take advantage of increasing digital, networked world in new ways. The business enterprise provides the resources to its customers for intensive computing analytics, recognizing the significantly grow the business they would need real-time access to high volume computing capacity from anywhere in the world.

Cloud computing provides the enterprise with the needed infrastructure and has fueled a growth rate of more than a hundred percent per year, enabling the enterprise to expand from a national or regional to global enterprise.

Therefore, we could imagine the operational and cost efficiencies to be made possible by cloud computing's fundamental attributes, which include the followings:

* A self-service portal that allows users to request hardware, software and applications from an online catalog with a focus on ease of use,

* Self-managing, automating systems that enable capacity, provisioning and other information technology service management decisions to be made dynamically, without human intervention on increased administrative costs,

* Seamless elasticity to scale computing resources up to down, as required, to fulfill changing needs without service interruption,

* Highly resilient and secure applications, and an underlying infrastructure capable of meeting expected levels of availability, reliability and integrity,

* A highly standardized environment that facilitates simultaneous service deployment and upgrade4s for all users, no matter where they reside.

This is the essence of cloud computing that is enabling enterprises to work more intelligently, more efficiently and more profitably; making technology more affordable and easier to use; and improving the way business gets done.

Therefore, cloud computing helps increase operational efficiency as it relies on a high degree of standardization. Public Clouds, in particular, drive enterprises to standardize by identifying workloads that can be sealed and managed in mess. On the other hand, private clouds offer the added bonus of enabling enterprises to leverage the scale inherent in their existing hardware by dramatically improving asset utilization as shown in the following figure. Rather than deploying and maintaining multiple instances of an application of cloud computing that enables business enterprises to standardize on a single instance. Standardization on this scale significantly reduces labor and other information technology operating expenses while increasing availability. Similarly, cloud computing's highly virtualized infrastructure reduces information technology capital expenses, consolidating data center resources and preventing the need for additional investments in hardware and other facilities.

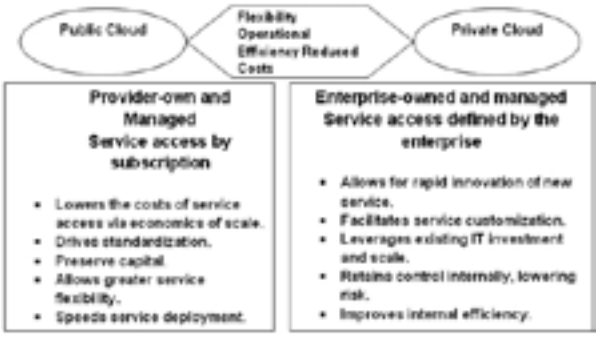

Figure: Public and Private Clouds

This above figure drives both the Public and Private Clouds drive flexibility, operational efficiency and cost reduction while enabling business e3nterprises to meet different business requirements.

Furthermore, cloud computing provides a cohesive platform for more rapid, full-scale adoption of virtualization and other business-enabling initiatives such as service-oriented architecture (SOA), Web 2 and information interpretation. Cloud computing improves their function and capacity by providing the scalability, automation, service management and geographic mobility to make them more robust, such as virtualization for example. In a typical data center environment, virtualization allows computing resources to be shared among various applications and workloads, but it is limited by size and resources of the environment. Cloud computing allows these applications and workloads to draw from a massively scalable pool of resources, beyond the borders of the enterprise's own data center. It can migrate the workload to other

data centers, even in other countries and continents, wherever computing is accessible, less expensive and more efficient.

3. Innovation Geared By Cloud Computing:

In a troubled economy, business enterprises are pushed to increase their efficiency and eliminate waste. As a result, the very education, research and development activities that lead to new, innovative ways of working are often the first to be out from the budget as in most developing countries including Egypt for instance. There is tremendous pressure to conserve cash and limit new capital investments. Needless to say, it can be challenging for top or senior executives to find funding for innovative ideas.

Research works have shown that investment in technological and business innovation can greatly contribute to business and revenue growth while the opposite can severely limit an enterprise's ability to stay competitive in the existing globalization era. Therefore, cloud computing can facilitate innovative activities while conserving cash.

Cloud computing can provide rapid access to computing capacity at a lower cost of ownership, enabling enterprises to perform operations that may have previously been unaffordable or impractical. So, it is no wander that the research and development community is turning to cloud computing for their most data intensive processing, modeling and analytic applications. This includes solving intricate scientific problems like understanding climate change and pinpointing key enzymes in the development of new drug therapies for example. Also, financial services firms or enterprises, as those using cloud computing technology to affordable access the hardware and software required to perform the complex computations in predicting business risk for their customers.

Innovation can most effectively be supported by rapid access to resources, process simplicity and efficiency, and automatic functions that minimize human errors. Cloud computing can also provide am enterprise's innovators with just such an environment in which to develop and test their ideas.

In the information technology organization or the software laboratory, the cloud ecosystem provides automated access to development tools, applica-

tion programming interfaces (APIs) and standardized services that developers can use as the basis for innovation. Instead of having to dole out funds for development server, enterprises of every size can test new applications or prototypes on virtual machines in the cloud architecture, without procurement and provisioning delays. Also, Instead of focusing on logistics of finding and managing resources that enable application development and testing, developers can focus on innovating.

Cloud computing also provides the social network infrastructure for innovators to shape their ideas with the extended business analysts, software developers or entrepreneurs, innovators can collaborate more easily when they are working in a shared cloud computing environment. The connection between collaboration and innovation has been well documented. Collaboration protrudes the energy and emotional support that are critical getting new ideas off the ground and facilitates the back-and-forth dialogue to takes these ideas forward.

With so many enterprises spread across international borders, travel budgets dwindling and more and more personnel working remotely, a shared service can provide an efficient platform for day-to-day collaboration among an enterprise's employees, business partners and customers. For example, a shared application development environment hosted in a cloud world allows access and contributions from any collaborators, or any networked device irrespective of physical location, enabling collaboration across geographic and organizational boundaries. It also eliminates incompatibility by facilitating collaboration on a common platform with common tools.

4. Cloud Infrastructure and Services:

Cloud computing can have a significant impact on enterprise's financial performance, allowing how they operate and enabling them to target new markets and streamline their supply chains. Big enterprises like Google, Amazon.com, etc. are building the future of their businesses with cloud computing, using it to be both sustain growth and bring innovative new services to businesses and customers. Being able to make these kinds of transformational advances, rapidly and before competitors do, can lead to increased market share and higher margins, especially as business development budgets are squeezed.

In the globalization world, differentiation is imperative but increasingly difficult to achieve. It is well known that the altering of the business models, the necessity of capitalizing on new delivery channels made possible by the Internet are among the globalization cloud computing.

Therefore, cloud computing can help with all these things. It enables enterprises to offload non-core computing functions like password management, dynamic provisioning and data partitioning to external partners. IT also enables enterprises to acquire the services or computing capacity needed to enter new markets or cross over into new industries.

5. Path to New Markets:

Acquiring cloud computing services is only half the opportunity. Forward thinking enterprises will deliver cloud computing services as well. Today, the number of private enterprises delivering services from their own cloud or a provider's cloud is growing. Cloud-based service delivery changes the way enterprises interact with their customers, employees, and business partners. It changes the dynamics of the supply chain and enables enterprises to profit from their core competencies in new ways, with new customers.

With business leaders under mounting pressure to compress the time-to-market for new services, cloud's ability to marshal cost-effective, optimized computing resources in a matter of hours or days versus weeks and months is a real advantage. Cloud computing's loosely coupled,

service-based architecture enables enterprises to assemble desired services rapidly in mishaps and composite applications based on specific work needs or market demands. Being able to do this independent of underlying systems invariably improves workforce productivity and market delivery speed.

The availability of affordable resources can also be vital to the speed up service delivery in the aftermath of a natural disaster, when agencies must act quickly to help affected individuals. Cloud computing services could enable insurance providers, for example, to address peak requirements for the resources needed to conduct damage assessments and file claims, while allowing them to pay only for the resources they use when they use them. Cloud computing can also be used preemptively to shift proprietary files for temporary storage, preventing loss and accelerating recovery. In this respect, cloud computing can be an excellent addition to an enterprise business continuity and resiliency strategy.

6. Security in Public and Private Clouds:

Security is a major concern for cloud computing, as it is for any new technology. Reliability, data security and compliance are the most frequently discussed risks. The external nature of public clouds brings additional concerns about loss of control and sharing data outside the firewall. Still, with careful planning and a strong understanding of the security controls and practices built into service provider's cloud offerings, organizations can reduce risk and reap the rewards of cloud based environment.

To determine the appropriate cloud environment for specific business and information technology functions, organizations need to take the time to properly identify the data and workloads that require a higher degree of resiliency, isolation and control. Clearly, private clouds reduce risk by keeping cloud services in-house, while public clouds are an excellent fit where loss of control is not an issue. With both options, organizations have a responsibility to understand how to properly integrate, deploy and manage security.

Security issues are well publicized, and the reality is that there is a difference in the way in which security needs to be administered in the cloud, which it is difficult to physically locate where data is stored. Security processes, once visible, are hidden behind layers of abstraction. The most significant difference stems from sharing of infrastructure on a massive scale. User spanning different enterprises and trust levels often interact with the same set of computing resources. Layer on the top of that the dynamic and transient aspects, the desire to continually load balance and optimize for performance, energy objectives that customers pay attention to and the problem becomes further complicated, creating more opportunities for misconfiguration and malicious conduct. This calls for highly automated end-to-end security across the threat spectrum of information security. Cloud providers will need to provide security at a level comparable to if not better than the levels enterprises can provide for themselves in traditional infrastructure environments.

Interestingly, cloud computing could actually make leading security technologies more accessible, especially for enterprises that already struggle to effectively implement them or justify their cost. In a cloud environment, security can be delivered as a service, at a scale commensurate with both the user's needs and the level of threat, requiring little or no security device investment or maintenance. In the cloud mail security, vulnerability, assessment service 24X7 security event monitoring are same prominent examples. Allowing vendors to leverage purpose built infrastructures and portals to provide security for a wide variety of customers. The result is a more intelligent, enterprise caliber risk management at a much

lower expense for private and public clouds than for traditional infrastructure environments.

7. Environmental Impact on Cloud Computing:

Another compelling reason to consider adopting cloud computing may be its potential to reduce enterprise energy dependency. After years of business driven expansion, it is no surprise that many of today's data centers are overcrowded, consuming a substantial amount of energy resources. Cloud computing employs a high virtualized, shared dynamic infrastructure that will enable enterprises to evolve to a greener, more holistic approach to data center management via greater economies of scale, workload balancing and the integration of information technology services with power and facility management.

Within the data center, workloads can also be dynamically reallocated from hot spots to cool spots. Technologies like Live Partition Mobility and VMotion can shift work automatically between host servers in homogeneous environment, without the disruption of reboot. IBM Tivoli ®. Service automation manager can provide a similar service management function in multivendor and multiplatform environments.

With its focus on resource conservation, cloud computing encourages good service management, which helps keep the volume of active data under control via regular archival and disposed of redundant data. With less data to manage, it is possible for enterprises to increase their processing speeds while decreasing their carbon footprint> That is smart computing to be sure.

Today more than two-thirds of business leaders report using enterprise social responsibility as platform for growth. Contributing to well-being of the societies and environments in which they operate has been shown to have a positive financial return. For example, enterprises and government agencies are using cloud computing to make services and applications accessible and economical for emerging motions - providing the means to improve their agricultural production, healthcare, educational systems and, in short, their way of life. And with mobile devices becoming increasingly ubiquitous in these areas of the world, more people will be able to tap into cloud infrastructures for real-time services and information. The effects on their standard of living and the global economy cloud be considerable.

8. Enterprises' Readiness for Cloud Computing:

With many cloud services available over the Internet, with payment by credit cards, it is easy for individual business units to get some base experience with cloud computing. However, preparing the enterprise to leverage cloud computing as an information technology delivery method for its own services requires a methodological and strategic plan. By taking a measured step-by-step approach to transition, establishing interim milestones and introducing new variables only as appropriate, to derive the migration to cloud computing without putting budgets, projects or personnel at risk. Therefore, it is recommended from our side that enterprises put in place three fundamental prerequisites in order to accelerate enterprise adoption and optimize return on investment: dynamic infrastructure, it service affinity assessment and cloud strategy.

A dynamic infrastructure is foundational to cloud computing. It is the underlying technology that automates and simplifies the information technology to respond with ease to changing business conditions. A dynamic infrastructure integrates capabilities like virtualization, SOA and Web 2.0 with service management automation and standardized system images and processes to radically improve operational efficiency. Certainly, implementing these capabilities alone can transform the information technology operation, but it can also speed the move to cloud while delivering im-

portant near-term benefits like reduced cost and complexity.

Information Technology services really lend themselves to cloud computing, with the potential to be delivered on new levels of standardization, automation and cost. These services can be differentiating for the business, like Web applications or development and testing environments. Or they can be applications like e-mail and collaboration that are highly standardized and, so easily automated. Lastly, there are extremely complex services that demand substantial resource capacity, such as scientific modeling and simulation. These stand to reap the test benefit from cloud computing, which makes their processing more affordable and practical. Enterprises that understand their IT services affinity for cloud computing and can make cloud implementation decisions accordingly have the ability to lower the risk and increase the payoff of cloud computing.

Finally, and above all, it is important to have overarching strategy for cloud computing, a phased, pragmatic approach that provides a business context for the enterprise's cloud investments and anticipated returns.

Since cloud computing is not just about technology, the plan should factor in the role of people, processes and services. The enterprise needs to be prepared culturally and organizationally, as well as technically. Similarly, IT needs to understand all aspects of service delivery; applications and business processes, as well as infrastructure services. Much of the cloud's promise is predicted on a holistic view of delivery and the experience it creates for end users.

Therefore, cloud's ease of use will clearly drive more self-service, help in to increase user satisfaction. For information technology, that will mean a new level of discipline and process standardization across the interrelated services that it currently supports.

As cloud extends the boundaries of the IT operation, it will also demand a new kind of IT accountability. Implementing and managing a hybrid cloud environment, with public clouds for the enterprise's less critical, low risk services and private clouds for mission oriented core applications that define the business, as well as managing cloud, will necessitate a strong governance framework. Governance not only sets the policies and puts the tools in place to manage security, service levels, regulatory compliance and other delivery issues, it also helps ensure alignment between cloud strategy and enterprise strategy as well.

9. Conclusion:

The continuing demand for business expansion, profitability and an enhanced user experience is clearly accelerating the move to cloud computing. Cloud answers the enterprise's need to simplify and use the best resources for the best devices whenever they happen to reside on the network. Therefore, it is an opportunity to reduce operational complexity and focus on delivering greater value to the organization.

Enabled by near ubiquitous network access, cloud computing stands to significantly improve information technology's ability to deliver technologies like SOA, Web 2.0 and virtualization by reducing technical complexities and simplifying deployment. But cloud computing's real potential lies in the opportunities it can create for business. By connecting people to information and vast array of services available to them, it can spark new opportunities for working more intelligent and accelerating innovation. Also by making massive computing resources available and affordable, cloud computing provides a platform for collaboration, business differentiation and sustainability. IT enables business enterprises to focus on their business, not the infrastructure supporting it. It is a tool that should be considered as an important aspect of an organization's IT strategy.