Virtual Enterprises Reach for Cloud Computing

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Abstract: UNCTAD reports that enterprises must be able to make the best use possible of ICTs, as they positively affect productivity in both large and small enterprises. New ITC technologies are a prerequisite for the concept of virtual enterprise. They are instruments companies can use in their search for efficiency. IT managers are under constant pressure to deliver optimal support to growing, fluctuating demands from ever-changing applications, to manage spikes and control costs. Many of them turn to virtualization for better distribution of workload on the hardware support. Server virtualization, or application virtualization are milestones on the way to cloud computing. This brings to the table an intelligent approach to virtualization and a business-mind.

Key-words: virtual enterprise, cloud computing, server virtualization, application virtualization, virtualization solutions

1. Introduction

There are several meanings for the concept of virtual enterprise. On the one hand, it is used to describe a company that uses ITC for its global coverage and globally distributed production sites. It has virtual offices as part of its employees work at home and remotely connect to their work computers. It has virtual factories as components are produced in facilities all over the world. It has virtual research teams as they can work with several universities, or researchers that can share, correlate their findings and brainstorm from different locations. It has virtual meeting rooms as meetings often take place in airport cafes. And it has virtual meetings as they can take place by video calls with people all over the world. It has virtual software as it uses cloud computing.

On the other hand, a virtual company refers to an often temporary network of companies that share their different resources in order to reach a given goal: the creation of a new product, or the entry on a new market.

Why do these companies reach for the clouds and implement cloud computing? Does it make a company virtual? Is the climb so complicated that companies feel like they need magic beans to get there? – these are the questions this article is going to answer, together with a succinct analysis of the cloud computing phenomenon.

2. New ITC Technologies for the Virtual Enterprise

The latest ITC technologies are a prerequisite for the concept of virtual enterprise. The use of the Internet is a minimal requirement for the operations of such entities. However, e-mail and the company web site are implicit to all types of organizations nowadays and do not make a company virtual.

New technologies are neither a must for the existence of the virtual company nor are they sufficient. They represent mere instruments available for all companies that can help our virtual citizen function. Today, the connection between ITC and a company’s efficiency and profitability is widely recognized. UNCTAD’s recommendations to Governments presented in their 2011 Information Economy Report include (UNCTAD, 2011: pp: XIV-XV):

- Promote affordable access to relevant ICTs, taking into consideration what improvements in the ICT infrastructure are required to support private sector activities.
- Enhance investment in, and the use of ICTs by, private firms to reduce the costs of business transactions,
improve business management, and enhance the capacity to get goods and services to the market.

- Include ICT modules in business skills training programmes.
- Adopt regulatory frameworks that help to enhance confidence in the use of new technology or new applications of known technology.
- Make ICT use an integral part of business environment reforms.

Furthermore, UNCTAD says (UNCTAD, 2011: pp XIII): Enterprises face many challenges which reflect the need to make markets work better, to make internal management and production systems more efficient, to facilitate improved access to information, knowledge, financial services and other resources, and to make business environments more transparent and enabling. The effective use of ICTs can help to improve all of these areas and thereby pave the way for more enterprise creation and expansion. [...] enterprises must be able to make the best use possible of ICTs, as they positively affect productivity in both large and small enterprises. Different kinds of ICTs help enterprises to manage their resources more efficiently, access the information needed for better business decision-making, reduce transaction costs, and enhance their ability to bring products and services to customers.

It is therefore a thrive to face new challenges that makes our virtual company reach for cloud computing. Cloud computing, however, has been a confusing concept for years. Eleven Berkley students have published a research in 2009 in which they quote high-end frustration outbursts regarding cloud computing (Ambrust, 2009: pp3): The interesting thing about Cloud Computing is that we’ve redefined Cloud Computing to include everything that we already do. . . . I don’t understand what we would do differently in the light of Cloud Computing other than change the wording of some of our ads.

Larry Ellison, Oracle’s CEO, quoted in the Wall Street Journal, September 26, 2008

A lot of people are jumping on the [cloud] bandwagon, but I have not heard two people say the same thing about it. There are multiple definitions out there of “the cloud.”

Andy Isherwood, HP’s Vice President quoted in ZDnet News, December 11, 2008

3. The milestones to cloud computing

There are several technologies that can be implemented by companies in search for efficiency. We can think of them as a ladder, or layers, or milestones on the road to cloud computing. Each company will choose the optimal position for them.

- At the bottom, we have internal computer networks that link servers, computers, printers
- The next step is an external gateway that gives access to the Internet
- Next we have companies with more than one location with several internal networks linked by secure connections. They can use their own equipment or rented services
- Furthermore, companies can choose to virtualize their networks by using server virtualization and/or application virtualization
- One step further, cloud computing is available for optimal use of IT resources

IT costs are important for all companies and controlling them has become increasingly important. According to Gartner (Gartner, 2011: pp6), the average IT spending as a percent of revenue was 3.6% in 2011. Therefore, IT managers are under constant pressure to reduce costs while offering the best hardware and software support and manage spikes. They have to deal with money, space and resource constraints that grow with the size, dynamics and geographical footprint of the organization. They have to find the point of equilibrium where the company’s resources are just right, where their applications and servers and not under-utilized nor are there many
unmet demands during utilization spikes, where servers do not occupy half of the office space and need half of the companies’ personnel to administrate, where IT costs do not skyrocket and are predictable, where energy is saved. In search for this minimum trade-off configuration, many IT managers decide to undertake virtualization. Virtualization helps separate processes and services from the physical infrastructure. Shared hardware resources are therefore more efficiently used, increasing the often 10% usage of a typical company server with the advantage of encapsulating each virtual machine for security reasons. Virtualization can bring on cost, personnel and energy savings while increasing efficiency. IBM says (IBM, 2008: pp3): Workloads can then be placed dynamically and migrated across a pool of application server resources, allowing infrastructure to adapt and respond to business needs, and requests to be prioritized and intelligently routed to respond to the most critical applications and users.

According to IBM, companies who use virtualization can not only overcome the IT-related challenges they face, but also improve their ROI (IBM, 2011: pp2). IBM presents case studies based on three of their clients in the healthcare, banking and insurance industries who have improved their ROI after application virtualization. In the case of the healthcare client for example, IBM says that the result of the implementation of their services was that the client reduced development costs by 75%, optimized server utilization and therefore enjoyed a smaller server “footprint”, saved money on energy, management and CPU-based licensing costs. Unfortunately, no data was available at the moment this article was published on the bills the company enjoyed from IBM.

Gartner Group estimates that 35 million virtual machines (VMs) are already installed, which is up dramatically from the 10 million in 2009 (Bittman, 2010 quoted in Avaya, 2011: pp1). Gartner further estimates more than 75% of all servers will be virtualized by year-end 2015 (Bittman, 2011 quoted in Avaya, 2011: pp1).

Server virtualization will lift one weight off the IT Manager’s shoulders. It may not be enough. During utilization spikes, the demands of a particular application will increase and the virtual machines that are supporting the application may not be able to handle the changing workload. Application virtualization can be used to better address fluctuating demands. According to IBM (IBM, 2008b: pp3), application virtualization, at its simplest level, is just removing any dependency of an application from the underlying physical architecture. The Java™ Virtual Machine (JVM) and the Python Virtual Machine are good examples of application virtual machines. They are at a higher level, conceptually, than server virtualization, because applications run on servers (or machines). Application virtualization can extend, or complement, server virtualization.

Server virtualization and application virtualization are complementary
concepts. Companies can climb one step further and reach for cloud computing. You can think of cloud computing as virtualization with a purpose, or intelligent virtualization. It is based on the two concepts of server and application virtualization and the only new thing it brings to the table is coherent thinking, strategizing and vision. Companies need to extract from cloud computing the intelligent management of their application requirements. They need an environment that will prioritize applications based on something more than requirements and usage. They need a computer cloud with a business mind. They need the most business critical applications to be given priority. Hurwitz say (Kaufman, 2011: pp4) that server virtualization products can look at system metrics such as memory and CPU usage, but this ignores the differences in the priority of different workloads during spikes. Consequently, critical applications can still suffer from poor performance.

According to Hurwitz, advantages of cloud computing compared to mere virtualization include:
- Application prioritization based on policies defined according to business context and client requirements
- Automation of resource optimization. Each application in an application infrastructure virtualization environment gets the resources it needs based on resource availability and the application’s priority to the business. This customer focused approach to resource allocation dramatically reduces the chance that users or customers will experience performance degradation in mission critical applications and put business revenue at risk. The goal is to optimize the delivery of services to customers while using fewer servers more efficiently and cost effectively.
- Setting policies and rules for high availability. If there are resource limitations, the application with the lowest business priority at that point in time is allocated with the fewest number of resources. To facilitate changing requirements, workloads can be automatically moved to a different server if a server fails.

4. Cloud Outsourcing and Security

Cloud computing is a concept, not a merchandise. It reflects a way of thinking and structuring your architecture. Therefore, a company cannot buy cloud computing, be it private, public or hybrid. A company can buy solutions, or services. Most have been experimenting with some form of cloud-based software as a service (SaaS), infrastructure as a service (IaaS), platform as a service (PaaS) or communications as a service (CaaS) as a way to shift IT complexity, cost and arguably risk out of the enterprise. Certainly most IT vendors are offering various cloud options for their products and services. However, none of these vendors can offer cloud computing. This is something each company can, or needs to build for themselves. Security issues are always present when outsourcing cloud-related services. This is a real concern for companies, with all the no-need-to-worry attitude they get from service vendors. Some of them may choose to build their own private clouds, some to ignore it, some to go both ways. Kirk Skaugen, General Manager of Intel's Data Center Group explained at InterOp in May 2011 how they use software as a process, but not when it comes to a new microprocessor for example due to security and performance concerns (Miller, 2011: pp1).

5. Virtualization Solutions

- IBM and VMware have been working on joint initiatives to provide customers with tested, scalable and optimized combinations of IBM
hardware and software products on VMware Infrastructure. IBM® WebSphere® software platform is one of the most widely deployed application server platforms. By leveraging the power of infrastructure virtualization solutions delivered by VMware and IBM, IBM WebSphere Application Server deployments can be efficiently consolidated, rapidly provisioned and highly optimized in your virtualized datacenter.

- IBM WebSphere Virtual Enterprise is IBM’s solution for application infrastructure virtualization. It provides policy-based workload management capabilities that are intended to provide a greater level of control and consistency to the way organizations manage and improve performance and response times of applications.
- KVM, or Kernel-based Virtual Machine is a full virtualization solution for Linux. Using KVM, one can run multiple virtual machines running unmodified Linux or Windows images. KVM is open source software.
- virtualized Avaya Aura® Unified Communications (UC) applications supported on a virtualized network infrastructure based on Avaya Virtual Enterprise Network Architecture (VENA) – an open virtualization solution.
- Avaya Aura applications including Avaya Modular Messaging, Avaya Conferencing and Avaya Agile Communications Environment® (ACE) software virtualized by Communication Resources Inc.

6. Conclusions

The birth of the "virtual enterprise" took place in the 1980s, brought on by the information technology revolution. Meanwhile, new technologies starting with long-distance communication, computers and then the internet reshaped the business world. Cloud computing, as sometimes vague and complex concept as it is, is a new instrument available to companies who want to deal with IT needs more efficiently. It comes as the natural step in the evolution from classical networks and hardware-based applications to virtualization. It brings to the table an intelligent approach to virtualization and a business-mind. It does not, however, make a company virtual no more than the Internet alone turns companies into dotcoms or the electrical power turns them in energy utilities. Its implementation is difficult as confusion starting with the concept itself and leading on to unregulated vendor and service provider offers and services, to non-specific legislation does sometimes make IT managers wish for a bag of magic beans to help them grow a ladder to the clouds. However, some form of virtualization, be it server virtualization, application virtualization or cloud computing is clearly undertaken by more and more companies today.

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