

CLOUD COMPUTING BASED INFORMATION SYSTEMS - PRESENT AND FUTURE

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Abstract:

The current economic crisis and the global recession have affected the IT market as well. A solution came from the Cloud Computing area by optimizing IT budgets and eliminating different types of expenses (servers, licenses, and so on). Cloud Computing is an exciting and interesting phenomenon, because of its relative novelty and exploding growth. Because of its raise in popularity and usage Cloud Computing has established its role as a research topic. However the tendency is to focus on the technical aspects of Cloud Computing, thus leaving the potential that this technology offers unexplored. With the help of this technology new market player arise and they manage to break the traditional value chain of service provision. The main focus of this paper is the business aspects of Cloud. In particular we will talk about the economic aspects that cover using Cloud Computing (when, why and how to use), and the impacts on the infrastructure, the legalistic issues that come from using Cloud Computing; the scalability and partially unclear legislation.

Key words: cloud computing, information system, implementation, strategies

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INTRODUCTION

There are only a few technologies that have improved their productivity, revolutionising the production and modernizing the business processes more than Information Technology. Productivity growth in the producing industry, as well as the service one would not have happened without process automation through IT.

Thus, it's somewhat surprising that the IT industry is not industrialized. In what processes, procedures and production models are concerned; the IT industry is actually in a pre-industrialized stage: personalized projects are still used, while modular IT portfolios, with a service orientated architecture are still scarce. The standardization and virtualization of IT resources promises to change this status-quo. Cloud services, the processing power, data storage and the applications provided through public or private networks, offer companies the option of moving a large part of their IT from their own computer to the „cloud”, gaining an efficient, flexible, scalable and countable processing power and a new work way. This trend aspires to change the traditional system of IT services suppliers fundamentally, especially in the SMBs area.

The preponderant model used in the IT industry does not appear to be fully industrialized: despite all the attempts to standardize the software development process, the IT projects mostly lead to individual solutions. IT resources, software and hardware alike, are thus associated with customized IT islands, separate both logically and physically. This leads to the mass creation of data centres that are inadequately used and spread and application environments that are separate by complex interdependencies. The maintenance of such a complex IT industry has become a challenge and service based architecture can prove to be really feasible. The simple fact that most companies have IT systems, even those that don't operate in the information technology area, but the production and distribution of consumer goods, shows the lack of industrialization of information technology. At the beginning of the industrial revolution the large production parks had their own power plants. Today such services are being offered by specialized suppliers. This fact is rational taking into consideration that energy production will not offer a concurential advantage on the current market.

Still, even SMBs keep at least at some level a physical infrastructure, a small sized server. This is not usually benefic for the business: the hardware depreciates fast and becomes obsolete very fast. Especially when talking about SMBs, the insufficient use and lack of scalability of IT resources represent an issue. Even without considering the Green Computing debate, this aspect has gained importance: an efficient scalability of IT resources is not only necessary for a quick adjustment of the costs to the demand but also a necessity in order to gain long term sustainability. Local IT systems will thus be replaced with standardized IT services, centralized, supplied through communication networks. Central administrated services, with pay-per-use prices will replace dedicated IT systems. The cost benefits resides in the effective usage of IT resources and the increased flexibility, for instance the option of asking and using resources only when they are really needed.

This creates a rather difficult image for large corporations. The IT resources they have are most of the times heterogeneous and don't come with a standardization of the services, but for SMBs, that have less complex IT systems, Cloud Computing services represent a realistic alternative.

CLOUD COMPUTING – THE NEXT BIG THING OR JUST ANOTHER BUBBLE?

Literature doesn't offer any universally accepted definition or a "founding father" of this topic, there are several approaches of the term.

One of the most frequently used definitions is the one who described cloud computing as a style of computing where massively scalable IT-related capabilities are pro-vided "as a service" across the Internet to multiple external customers (Gartner Research, 2008). This definition presents the cloud computing concept refering to any computing capability that is delivered as a service over the Internet.

National Institute for Standards and Technologies (NIST) (Grance and Mell, 2009) and Cloud Security Alliance (Cloud Security Alliance, 2009) presents cloud computing as 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 approach leads to a consumption basis way of pay for IT services just like it now happens with electricity, gas or water.

Another interpretation explains cloud computing like an on-demand service model for IT provision, often based on virtualization and distributed computing tech-nologies. Cloud computing architectures have: highly abstracted resources; near instant scalability and flexibility; near instantaneous provisioning; shared resources (hardware, database, memory, etc); "service on demand", usually with a "pay as you go" billing system; programmatic management (e.g., through WS API) (ENISA, 2009).

As you could probably deduce by now, cloud compu-ting implies a service oriented architecture (SOA) through offering softwares and platforms as services, reduced information technology overhead for the end-user, great flexibility, reduced total cost of ownership(TCO) and offers on demand services.

Basically, cloud computing represents the IT service, offered via a network, that is designed to be scalable and thus, better adjusted to the customers needs. To conclude cloud computing it's a result of the con-tinuos expansion of the Internet, we are of course refering to the ease of access to both data and applications, and a new concept that the IT market offers.

The Cloud Computing paradigm is a dynamic innovation in the software industry. A Cloud service is defined by three characteristics which differentiates it from the traditional model. First, the service is sold on demand (by the minute, the hour or per user). Also, it is flexible because the user can use the necessary quantity of the service, at any time. Last but not least, the service is managed entirely by the supplier, and the user only needs a PC and Internet access (Everett, 2009).

As it was presented the Cloud Computing concept has a large extent and it refers to the architecture when the services are designed. Though it's difficult to find a precise definition, at the base of this technology lays the idea that applications run in a network whether this means running in an internal corporate network or the Internet.

THE FUTURE OF INFORMATION SYSTEM OF SMBs - CLOUD COMPUTING SOLUTIONS

Cloud Computing technology implies a larger storage capacity than that of private PCs, and on the other hand, the dependency for IT personal for maintaining the system lowers. The main revenue that this technology promises is cost reduction, through the payment made step by step, thus avoiding significant investments in infrastructure, which depreciates quite fast. Still, there are some differences of opinion in what concerns the real cost of the supplied services because it appears that this technology can come with hidden costs, concerning the conversion of the current company system, the integration implementation, training the staff and redesigning the architecture and processes. Though on the short term, or at the start of the business these costs are low, on the medium and long term, these costs can be unpredictable.

Cloud Computing bring some benefits to SMBs that are synthesized in Table 1.

Table 1. The benefits of cloud computing technology for SMBs

Benefit	Description	Implications
Accessibility and Mobility	Allows employees remote access	Telecommuting and Virtual Office
	Access more easily with mobile devices	Remote/mobile employees
	Monitor employee activity during work at home cycle	Reduces need for work stations
Maintenance	Service provider repairs and maintains equipment	Employees are not interrupted by IT upgrades, more productivity
	Track software maintenance plans, schedule upgrades	Important updates made automatically in real-time.
Data Recovery	Data is backed up regularly and is stored in multiple locations	No lost data due to disaster
	Data easily recovered	No time lost; back up is the responsibility of the service provider
Security	Service provider monitors infrastructure 24/7	Less chance that data will be stolen by employees
	Data is stored off-site	Protect against hackers, viruses and intruders
Minimal IT Staff	Service provider manages infrastructure	Less support and management costs
	Service provider end-user support	IT department/others can focus on strategic initiatives
Costs	Service provider takes care of technology	No capital expenditures on servers, networking technology, etc. Reduced electricity/air cooling costs
	Businesses share costs of infrastructure with other organizations	Access to best-in-class technology, service
Flexibility	Easily change number of users/accounts	Cost savings Time savings for IT department
	Add office locations quickly	
	Pay monthly, annually or per transaction	

(source: adapted from *Cloud Computing for Small Business. 8 Reasons to Outsource Your IT to the Cloud*, <http://www.nfib.com/Portals/0/PDF/AllUsers/benefits/webinars/cloudcomputing-nfib-webinar.pdf>.)

One of the main advantages offered is technology mobility because it allows access to the employees to the organization data, wherever they are and the service flexibility enables business development without the appeal to additional infrastructure (Whitton, 2011).

What this technology promises is related with design and implementation of applications infrastructure solutions that are more efficient and cheaper. Still, the main challenges of these applications remain the used platform, which is an unsecure environment: the Internet. Issues like data availability, environment security, performance unpredictability and supplier dependency characterize the Cloud Computing technology.

When talking about data security and confidentiality, there are a lot of disputes and suspicions. Cloud computing implementation in company activity has as main hindrances supplier or middle-man dependency (Internet connection) and the lack of security for the data that are stored in the Cloud, as a service undertaken without the use of physical components.

The companies hesitation is justified when considering that confidential company info are collected, stored and maybe processes by third-party companies, which can be connected to other people contracted which may or may not be interested in these data (ENISA, 2009). Data location can also be a problem considering data confidentiality laws which restricts data access and circulation over borders for certain data categories. These types of restrictions must be taken into consideration given the fact that suppliers are not so clear when referring to data location or supplying some guaranties that these restrictions are complied.

Data protection is nowadays a weak point for Cloud Computing. The technology is still young and thus data safety can't be guaranteed in cloud. Data protection refers to controls and control mean visibility. The main disadvantage of this technology is that the organization can't control what it can't see. Data integrity and confidentiality refers to the reading and modification of data only by authorized personnel. The server location is unknown as well as the data transfer network. Also there is no guarantee that the supplier will react dynamically to the company's demands and expectations (ISACA, 2009).

Because the network and server are in charge of data for thousands of clients there is a risk, because of a wrong authentication, for those data to be accessed by the service supplier personnel or even by somebody from another organization. Still, data lost risk is not specific to this technology, but you can find it even when using your own hard drives, given the fact that these are "rudimentary" computer components, that can break at any time leading to data loss (Fitz-Gerald, 2010).

Despite that it's fair to say that the data of a lot of companies, especially SMBs are a lot more exposed to risk in their own organizational environment rather than in a well-structured and secure Cloud.

Another unsecure territory is the relationship between supplier and company. The loss or theft of information is a sensible aspect, but the fall of the provided service also means loss of business. Using well known suppliers like IBM, Google or Salesforce.com, that have sufficient means of maintaining online security, puts some of the enterprises worries concerning information vulnerability to ease.

The main solutions for the elimination of protection risks and data security are the careful pick of the supplier, the negotiation of an advantageous and well defined contract, a tight collaboration between the two business partners in order to prevent the loss of control (Cambell, 2010).

The Cloud Computing suppliers offer must ensure data security through: supplying access, data and information usage control, protecting the applications against fraudulent usage, error prevention protection, service availability through the reduction of network components (server, network, terminal), information concerning physical infrastructure security and perpetual improvement.

There is talk about a new business era considering informational technology, the accelerate motion of the globalization phenomenon and the world crisis. For SMBs using this solution is a real advantage because it ensures access to a complex infrastructure, avoiding implementing or

administering it directly. Without a constant concern for the updating, expanding or solving the informational systems problems, the company can focus on the perpetual development of the business and on innovation.

Currently the Cloud Computing market for SMB is expanding includes more and more companies, each of them developing the business as much as possible on this area. The main determiner is the increasing popularity of this technology.

One of the pioneer, Amazon supplies many types of Cloud Computing. The most popular is considered Amazon Elastic Compute Cloud 126, also known as Amazon EC2, which allows users to access virtual servers through a web interface. The payment is per-hour according to the number and size of the installed virtual machines, with an extra fee for data transfer. Other Cloud services offered by Amazon include Amazon Simple Storage Service, Cloudfront, Simple DB and Elastic MapReduce. The partner list for Amazon Web Services includes names like: IBM, Oracle, Facebook or Red Hat.

Through applications like Gmail, Google Docs, Google Calendar, Google Maps sau Picasa, Google offers some of the most well-known Cloud Computing services. In order to enter the Cloud Computing landscape IBM launched the Smart Business product and services line. The main advantage that this firm has is its name and omnipresence on the international market. Some of the first clients are companies like: Nedbank from South Africa and Sinochem from China. The Azure services platform from Microsoft brings an operating system based on Cloud, called Windows Azure, which provides storage and infrastructure services that can be remote accessed. This OS, available as an online service offers a scalable and familiar environment to users to host Microsoft Cloud applications and services.

SMBs are starting to become the main component that will benefit from the advantages provided by Cloud. We can't talk now about a matured market for Cloud Computing for SMBs. The fight for this area has only just begun.

KILLING COSTS AND BOOST PRODUCTIVITY - HOLTL RETAIL SOLUTIONS

In order to show how cloud computing can be implemented in a SMB here is an example which shows the impact this change has had. It's about a German company which offers POS systems (Microsoft 2011).

Holtl Retail Solutions represents a German retail company which gained new customers through the implementation of Cloud Computing. POSFlow is the POS system used by more than 50.000 users in a few European countries and it's very popular with SMBs. In order to enlarge the client base for the product and to make POSFlow a more cost effective solution, the company has decided to transfer its program in Cloud, using the Windows Azure platform. The company has developed an easy to use interface with Microsoft Silverlight 3. Prior to this migration a Holtl technician needed 4 hours to install POSFlow and to train the client; now, even the smallest entrepreneur can install it within 4 minutes. Cloud based infrastructure is efficient and still comes with costs, but the flexibility, scalability and reliability will make POSFlow the right POS solution for large retailer chains.

The problem that generated this whole process was the cost. When client updated or installed the new POSFlow system the companies technicians has to go to the clients locations in order to configure it and that leads to the rise of costs and at the same time a waste of time for the client. In order to make the POSFlow solution attractive to smaller retailers Holtl has to find a way to reduce the costs.

The chosen solution was to move POSFlow on Microsoft Azure and changing the interface using Microsoft Silverlight 3, thus making the whole configuration process accessible to clients. The Windows Azure platform was chosen because it's easy to implement and it offers support for web sites and web services, like POSFlow, in Microsoft data centres, which reduces the IT investment. Microsoft Silverlight 3 is a browser plug-in developed under the .NET platform which is compatible with a large number of browser as well as operating systems.

The revenues didn't fail to appear. The client saves time because the implementation of the POS system is done by him, in a matter of minutes, and a cost reduction is present in what concerns installing and maintenance. Through cost reduction new business opportunities appear, scalable, flexible operations are being offered and the interruption impact is minimized.

CONCLUSIONS

In the current economic environment, cloud computing is one of the top technology trends and intends to be the saving solution for optimizing the IT budgets.

Currently, cloud computing is considered the next best thing when it comes to optimize IT budgets in the current economic environment. It's believed that it will become a key technology oriented at sharing in-frastructure, software or business processes. Cloud Computing is a way to serve the needs of computation through the virtualization of some resources through the Internet. It's made of shared services under a virtualized management, accessible to users and other services through the Internet under a "pay per use" payment system.

Nowadays the Cloud Computing market includes more and more companies, each and every one of them developing the business more and more. The main reason is the acceptance and adoption of these revolutionary technologies.

When speaking about Cloud Computing, risk management activities must take place throughout the life cycle of information, and risks should be re-assessed periodically or in case of a change.

Therefore, companies and organizations that have decided to use the services supplied within the Cloud must consider not only the implied savings and cost reductions but also the additional risks. Once risks are identified, a clearer picture will take shape at the level of management, of how cloud services will influence the structure and operations of economic processes.

We can conclude that the future of the XXI century is run, when talking about innovative technologies, by Cloud Computing solutions which will, after going through some stages, fundamentally modify the general perception over the informatics domain.

The changes in the SMB area will be major, in order to survive and prosper, all business must adapt to the realities of the market.

This paper is the starting point for future research work that will focus on the analysis of how Cloud Computing can be the determining factor in terms of growth among SMEs.

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