PERSPECTIVES OF THE CLOUD COMPUTING FOR FINANCIAL INSTITUTIONS

Damir LUCOVIĆ

University of Mostar, Faculty of Economics Mostar, BiH

damir.lucovic@sve-mo.ba

Abstract

From its beginnings, the Internet was shown in graphs in the form of clouds and because of that the "cloud" term began to be used as a name for customer service on the network. Computing in the cloud should be viewed as an overall concept for the case when technology through the Internet offers the possibility of renting a platform, infrastructure and services, while the user does not have to know the technology, take care of maintenance, security and the like. Modern business banking environment requires more applicable and flexible alternative models of service delivery (eBanking, mBanking, ...). Cloud Computing or computing in the cloud, although contested by some skeptics, is increasingly on the list of topics discussed in IT departments of individual banks, or those who, shaken by the crisis, began to lag behind the leaders. There are also those who wish to provide acceleration for the future and who do not want to be the last ones to use the model of exploitation of external resources to meet their needs for IT support in their business.

The aim of this paper is to analyze the importance of the transition to cloud computing technology and the application of appropriate design services from an economic viewpoint. Considering the fact that the cloud is a relatively new phenomenon in the market, clearly there are flaws and security risks which must be given special attention. The paper includes an overview of the advantages and disadvantages of user models in terms of providing services, implementation services, a method for saving and storing data within the cloud with a special emphasis on the safety aspect of the use in the financial sector. The paper will present and compare the indicators that influence the decision about transition to services in the cloud. **Keywords:** cloud computing, services model (IaaS, SaaS, PaaS), service delivery

JEL Classification: D81, L86

1. INTRODUCTION

Every day we can see more frequently supporters of a new approach although this way of using IT model a complete departure from the classic ways of using technology, especially when it comes to banking as a very sensitive area in terms of data security.

Software as a Service or SaaS (Eng. Software as a Service) is application support available to users via the Internet. Platform as a Service or PaaS (eng. Platform as a Service) is a service server by which users are given on rent platform that enables the development, testing and adjustment of own products. Infrastructure as a Service, or IaaS (eng. Infrastructure as a Service) offering users a server, a network organization, memory, processing power and other resources for rent.

"In order to decisively and securely thinking about using the cloud in the banking industry in the future, it is essential that the bank has a clear and consistent strategy based on business and corporate objectives. Given the range of variables that affect the decision of choice public or private cloud, IaaS or BpaaS¹, determination of this way is a complex, but still necessary task"²

The solutions referred to as *Cloud* are increasingly used because the place on which to execute applications and store data are not strictly defined, or it is no longer on computing infrastructure of the company. Any organization or company can choose the extent to which this is done: depending on the business needs of the company, for example, can opt for a private solution or one of the commercial, public services, paying attention to the extent to which their data or applications will be migrated to the cloud.

¹ Business Process as a Service

² Lead IT Magazine, http://www.leaditmagazine.com/corporate/report-says-cloud-computingwill-cecome-critical-for-the-financial-sector/ (pristupano: 20.8.2013.)

2. CLOUD COMPUTING

Cloud computing is a big step towards the future for both users and service providers. The main reason for switching to business through clouds is flexibility in increasing their own capacities without of investment into infrastructure, personnel education or software licensing. Since the service provider locates servers in those parts of the world where it is most cost-effective, and that they are accessed through the Internet or specialized applications, the user becomes completely independent of their physical location. All data can be accessed through any device connected to the Internet.

Though many has fear, from the secure reasons, to move their business into the cloud, everyday examples of successful migration of business in the cloud, show that stability, efficiency, cost effectiveness and reduction of risks can still be reached. Problems that are recently most common, indicates the standardization of services, data security, and speed of Internet access which is directly dependent on access to the cloud. When viewed from one or the other side is very difficult to present organizations or professionals can guarantee such protection to data in their own systems either are stored "locally" or the owners providing the cloud-service providers, regard to more frequently proofs about the possibilities of monitoring traffic in any form by a variety of institutions that care about global security.

In either case, if the user decides to move its operations into the cloud, it is essential to make a detailed analysis of the business and after that select the best provider of cloud services since it is a long-term decision.

This table provides an example which shows improvement in each department of the company that has moved on the business in the cloud.

Table 1. How much do you agree with the above statements relating to the question of how the use of cloud computing has improved business operations?

	Total	Owners / Executives	Finance	Ē	Production	Marketing	Customer service	Human Resources	Logistics
Cloud computing has reduced our IT costs	66 %	60 %	59 %	69 %	64 %	65 %	71 %	84 %	74 %
Cloud computing has enabled investing more money in business	62 %	55 %	56 %	65 %	50 %	65 %	71 %	74 %	63 %
Cloud computing has reduced the costs of infrastructure maintenance and more time to focus on strategy and innovation	60 %	57 %	56 %	61 %	57 %	76 %	62 %	63 %	63 %
Cloud computing has improved response to disturbances and increase business agility	59 %	59 %	55 %	61 %	43 %	59 %	49 %	53 %	58 %
Cloud computing is helping to increase profits	56 %	53 %	53 %	56 %	36 %	65 %	63 %	68 %	68 %
Cloud computing has accelerated It projects and the development and implementation of new applications	54 %	47 %	45 %	58 %	64 %	71 %	57 %	63 %	42 %
Cloud computing has allowed competition with large companies	49 %	47 %	44 %	50 %	21 %	59 %	58 %	53 %	58 %
Cloud computing is a key factor in the growth of our business	49 %	43 %	41 %	50 %	79 %	59 %	63 %	68 %	58 %
Base of respondents	1300	387	64	715	14	17	65	19	19

Source: adapted by the author from Vanson Bourne³

Average cost reduction is 23% with the use of cloud computing, based on the combined data of the analyzed of respondents from the United Kingdom and the United States. Looking further 62% of companies invested the funds that are saved by using a new business model into further development and improvement of services.

It would be great if we can all expenses in life pay the way that we pay for such services and applications located into cloud - according to use, exactly as much as you need and when you need. The concept of cloud computing just that allows you so significantly changes the way companies can build their IT infrastructure and use business applications.

³ http://www.vansonbourne.com/news/news-recent/august-2014/platform-service-why-cloud-platforms-hold-key-faster-business-success/ (accessed: 21.3.2014.)

Most companies is not necessary to have their own infrastructure but their application can be executed on the infrastructure that rent from provider of such services. Not only in this way eliminate a number of operational costs associated with maintaining their own infrastructure and pay the hardware and software, but also the administration, support and development of business applications something we will devote the company where they gave their trust by placing their applications with it. On top of that, the company can then be more closely focus on your core business, and less concern about hardware, software and communications infrastructure, and the general availability of the whole system. And it is clear that taking care of our own business results in competitiveness and better business results.

The biggest changes in the business that brings cloud computing are:

- Very short period initial implementation
- The formation of costs according to the use of IT resources
- Excellent adaptability to changes due to growth and eventual reduction of resources,

thereby creating a comprehensive rounded service that is available to users. At its very beginning cloud computing implied is virtualization of IT resources (infrastructure, platforms, applications and services) based on the current needs of business. The backbone of using makes the Internet as a global network which itself by its concept intended to be a big cloud where communicate with computers connected to various types of communication channels. The specificity of this type of use is practical invisibility of the actual the procedure of storage and data processing.

Existing survey of O'Reilly Media, shows the difference to the costs for internally managing all IT operations, hybrid model or clear cloud infrastructure. It is important to notice, that if you select a service provider cloud that is proven and reliable, gets is quality and availability far beyond the first two approaches. Table 2. The estimated cost of the infrastructure for the standard business model (two application servers and two database servers) between the three business models

	Internal IT	Hibrid model	Cloud
Capital investments	40000	0	0
Costs of implementing	10000	5000	1000
Monthly maintenance	0	4000	2400
Monthly work on the system	3200	0	1000
The cost of operation in three years	149000	129000	106000
Gross savings	0%	13%	29%

Source: O'Reilly Media, George Reese⁴

Most financial institutions faced with the problem of adjusting or setting up the IT infrastructure according to the current volume of business, spending large amounts of cash often unnecessarily, but still well-founded fear of under scaling resources. Bearing in mind the large initial investment when it comes to introducing new technologies related to the IT industry, financial institutions are exploring the possibilities of using the strategic advantages of cloud computing. On the other hand the users of their services are not interested in a technology that is in the background, rather than just a current availability and reliability.

2.1. Legal requirements and recommendations

The service provider is obliged to provide the security infrastructure so that the user data and applications are protected. The user needs to be reviewed with the service a few key points that pose potential risks to security.

When data is processed outside the company that carry the level of risk, as leased services do not provide physical control or staff control i.e. who has access to data and what are the procedures of access control.

Service providers in the cloud are subject to external monitoring and security check and certification.

It is necessary to know the location of the data, ie. Whether the provider is willing to abide by legal guidelines that apply to the location of data placement

⁴ http://broadcast.oreilly.com/2008/10/the-economics-of-cloud-c.html (accessed: 19.8.2013.)

for the client. Some models have the ability to choose the location of the client data storage.

Encryption is essential for safety when the user only uses software as a service so that it does not control the storage of data which is why it is necessary to define the access rights to data.

In cases where data access is necessary to determine the time limit for the withdrawal of backup versions of data, which can provide by other specialized companies.

In case of intrusion into the system for data storage provider is required to provide assistance in the investigation and find the source of the attack as defined according to eDiscovery. It is certainly necessary before concluding the final contract with the provider to make a detailed assessment of the risks. The system of cloud computing works without visible geographical boundaries which is reflected in different interpretations in case of problems that may occur while using the service. The main issue is who has jurisdiction in the event of any dispute over the use of services.

In the US, legislation is a combination of by-laws, standards, and regulation of relations with the signed contract (the laws relevant to this area are the Law on data security data and the Law on Corruption of data).

States adopt acts which regulate this field, for example. Massacuses Agreement of 2010, which provides regular reporting and review of logs and audit trails. (used to process FedRAMP Eng. Federal Risk and Authorization Management Program which access and authenticate products and services in the cloud).

Clients are used to decide on a hybrid or shared cloud, which are more expensive and provide limited benefits to align with the regulations. (An example of the company RackspaceCloud or QuickCloud that met the PCI DSS standard⁵, and Google cloud that meets the additional regulations for FISMA standard⁶).

⁵ Keep your customers safe while they shop: http://www.rackspace.com/ecommerce-hosting/ pci/ (accessed: 19.8.2013.)

⁶ FISMA standards will calm cloud fears: http://fcw.com/articles/2012/03/22/dave-mcclurecloud-security-standards.aspx (accessed: 19.8.2013.)

2.2. What does this mean for the sector of financial institutions

The application of cloud computing greatly changes the nature of relationships in the business attached to financial institutions. Recently considered as the greatest shift in the use of technology, where at present the largest companies in the market that will compete to take the biggest piece of the pie and provide a service that will accept by most, the concept of cloud computing provides a comprehensive set of services from email to web applications and processing and storing large amounts of data.

At first glance, such a concept does not seem to be questionable when it comes to financial service providers, but looking at one of the most important factors of confidence by users, come to the realization that security component still remains a critical point for the non-negotiable transition to this new concept.

Using the cloud can rest on two concepts:

- Private
- Public

Examples show that for common banks the most appropriate first step in cloud computing made through private clouds, where according to some studies 83% transitioning begins just with the private cloud and later to grow the of business transferred to a public cloud, or in some cases remain in private form. In Chart 1 are shown a view of the decision on the acceptance of the model of using the cloud. Switching to a public cloud in most cases there is a limitation of working data center capabilities in the private cloud when there is a exponential growth of business, which is impossible to follow the further development of private infrastructure, as well as in cases where it is necessary for the purpose of spatial (technological obstacles) restrictions engage external service providers.

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Graph 1. Acceptance of the public, private or hybrid clouds (answer the question which business model in the cloud companies are using in their own business)



Source: http://www.datamation.com/cloud-computing/what-is-private-cloud.html

Viewed from the level of infrastructure, financial institutions have a certain level of development of computing resources - processing power, network bandwidth and storage of data within any institution or through service providers with the outside. It creates the impression that the transition, were only partially or in full, mostly going to grow the company in a way that the missing resources are supplied from the outside by creating a new cloudy space in which to continuing operations and still connected with the system infrastructure.

Picture 1. Private	e versus	public	cloud
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Public
• elasticity
 self-service on
request
measurable use
 virtualization
 pooling resources
• security
 handling

Source: http://www.ashoknare.com/2011/08/03/is-private-cloud-an-oxymoron/

As can be observed from the above comparison of the difference is insignificant if it is known that the security that is in the public model doubtful, and in private clouds brought into question. Analyzing some cases when a breakthrough in the cloud and data leakage occurred with the private model leads to the conclusion that the differences are such that over, but economies of scale and savings in resources still more worth it to take the model public clouds.

The best examples of this sort of thing are called STARTUP companies in cases of rapid growth very quickly be adapted depending on the situation without restrictions. An example is a company mint.com who was over their business in a public cloud (about 1.5 million users in 2009) using a model SaaS Software as a Service. According to some research companies can achieve about 50% savings rolled applications in the cloud (Accenture, Bechtel, ...). A good example is the Bank of America using Force.com service which bypasses the limitations of local service providers placing applications on servers. Using the cloud can also significantly reduce the time necessary for the development of new applications and the distribution of the same within all branches if we talk about banks. For this case it is a good example of Suntrust Bank which spent instead of 6-12 months, just two months for the implementation of its new applications for CRM for more than 2,500 employees there. Decision makers do not have to nor would it be expected of them to take for granted the benefits and savings estimates, as indicators of cost-effectiveness using the cloud, rather than should insist upon information illustrated by ROI studies. Hardware is certainly only a small part of what comes under the data center costs of an institution. It should be recognized hidden costs such as management, as well as transition costs that occur only after you start using the service. Therefore, it is necessary to take into account the different models that are offered when the cloud chosen as option.⁷

There are many factors that influence the determination of the extent of the savings will be by using the cloud:

- Adoption of common standards which make it easier to share data
- The use of standards, adequate required level services adapted to current needs
- Application security settings and privacy adequately standardizing the level of protection given to the need

⁷ Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, George Reese, O'Reilly Media, 2009, page.125

- Bypassing the problem of ownership of data related to individual departments within an organization to work could float freely within the organization in order to prompt problem solving
- Maintaining flexibility to avoid dependence on a specific vendor

2.3. WHAT ARE THE ADVANTAGES OF CLOUD OTHER THAN BANK SAVINGS

Although the savings in money and perhaps most important is not negligible, the other side that indicates after deeper analysis of costs reduction. Notably, a number of areas where it enhances business rolled on Clouds computing, ie. We turn on the new business models that are more focused on users, allowing banks to quickly spread to new markets. It also creates is possibility of shortening the time that the bank addresses to customers, as well as solving problems related to the user's location. This provides the capability to have always available expert bank regardless of its current location, which can solve a specific problem occurred in communication with the bank. With the appearance of many competitors to banks in the payment system like Paypal banks are increasingly have to turn to new models as they did like: Twitpay, Zong i Square⁸. A especially pointed out one example of British Zopa⁹ company that proclaims itself as a company that provides service to connect people and lend money to each other bypassing banks.

3. HIGHLIGHTED NEEDS FOR ANALYSIS - THE NEED FOR CLOUDS

Lately more the emphasis has been analysis as a key component that separates the companies that succeed from those that fail. Still most companies do not have the capacity to carry out the analysis of the mass of available data, especially due to the fact that the data are scattered in different locations and that considerable efforts are needed to get all the relevant data to draw conclusions to the site where they will perform their processing and deeper analysis.

⁸ Wired magazine: issue 18.02.2010. http://www.wired.com/magazine/2010/02/ff_futureofmoney/ (accessed: 20.8.2013.)

⁹ http://uk.zopa.com/ (accessed: 20.8.2013.)

Which brings us to Clouds computing because they:

- Cloud allows banks to store large amounts of data that are produced everyday by performing each transaction, as well as to the information that is otherwise "hidden" in conventional operations brought into relation.
- Cloud provides a cost-effective platform for the development of analytical models, reports and manage business intelligence.
- It allows and that the bank does not work just a with data from the past but also to data from the so-called."Realtime" businesses are used quickly and at a very low processing costs and adjustments.

Taking it on the consideration we can say that the use of cloud we have available a realistic picture of all available data, which are the best possible view of the actual situation. In this way it is possible for example rent computing power possessed by big companies like Google, Microsoft or Amazon, in order to analyze the data which were collected for years with the ultimate goal of making decisions about further action. For instance, in the case of portfolio risk budget or forecasting future trends in demand for credit funds. As example of a successful, Zions Bancorporation¹⁰, from Salt Lake City, a banking institution with a value of \$ 51 billion, which found itself in a dilemma as to curb the creation of dozens of data warehouses inside the company. The bank ultimately decided to build their own private cloud based on the platform of San Mateo, which has consolidated all existing warehouses into one centralized, naturally reducing costs in all aspects of maintenance to training new users on various platforms already used.

Visa, credit card company, currently experimenting with free software to Hadoop, which enables the analysis of large amounts of data, and consists of 4000 linked server, with the goal of finding patterns in data fraud attempts in the last two years (73 billion transactions) and 36 terabytes of data. By switching in cloud Visa is shortened processing time these volumes of data from one month to about 13 minutes. Bank recently also use the cloud to predict customer behavior and data mining in order to obtain answers as soon as possible, thereby maximizing return on investment into infrastructure. For example, Maybank Berhad¹¹ recently conducted the survey where the advisory firm Fi-

¹⁰ http://www.banktech.com/management-strategies/john-itokazu-of-zions-bancorporationput/227001118 (accessed: 20.8.2013.)

¹¹ http://www.maybank.com/en/about-us/who-we-are/awards-recognition.page (accessed: 20.8.2013.)

nancial Insights for Innovation and CRM allow the use of advanced data mining tools to analyze, predict and influencing the behavior during the life cycle of the customer.

4. CONCLUSION

Looking toward the future still visible is movement towards that user themselves improve application used by adding functions for which there is a need. Of course the very essence of traditional banking will have a long life despite all of the above, primarily because of legal issues in most countries still remain unresolved, and for good risk of losing control over data despite all better address some most urgent issues of safety aspects. Apparently we will have "cloudy future", but in a positive way in this segment of course with the use of parallelism for some time in those parts that remain in the classic mode until they are resolved dubiousness about legal regulations and the ever-present threat of spying by the world force. How may therefore look like the future of the banking business in the cloud?

Hardly anyone dares to make estimates of what will happen with the application of technology in the future. In this paper, have been explored what are the current trends related to the use of cloud computing when it concerned the banking business. The most important obstacle to the full transition to the new business model is the issue of security. Today banks face specific challenges in field of data protection against unauthorized access, as well as general management of security across multiple platforms that are found in various locations. In general the transition to the cloud brings more consistent approach to the problem, and in any case should be considered as an option, of course with the resolution which model is most appropriate for the specific situation in the market. Most banks have worked out hierarchy of security access to certain information from the lowest level to the highest just a where strategic decisions makers have a look at some of the data from the history of operation of the bank. A similar approach should be applied if a bank transfers to the cloud, at least in part, whether in the private or public of cloud model. Thus, according to all of the above was logical that the data are from the lower level can be in public service providers only protected with a password, and if the data with a high level can be used on private cloud servers inside the company available currently protected by the most advanced technologies available to authenticate users.



Therefore, "Life in the Cloud" is not just a play on words rather than recently the reality of information and, consequently, every other social and economic.¹²

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