
Cloud Computing Technology - Optimal Solution for Efficient Use of Business Intelligence and Enterprise Resource Planning Applications

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Given the current economic climate, cloud technology is an alternative for organizations to provide quality services at low cost.

Business Intelligence (BI) has today an important role in generating current information for strategic and operational decisions, so organizations need to focus on these investments for a better understanding of internal and external forces that influence decision making in order to improve performance.

Because Business Intelligence does not offer ways of planning, management, monitoring and control of the strategic objectives, the organizations need the adoption of enterprise resource planning system (Enterprise Resource Planning - ERP). Using two types of applications offers obvious advantages for daily operations.

For efficient use of BI and ERP applications, Cloud Computing Technology provides the optimal solution; this technology is accessed through the Internet, as a service (SaaS) on a monthly subscription.

Keywords: *Business Intelligence; Enterprise Resource Planning applications; Cloud Computing technology*

General considerations regarding the concept of business intelligence (bi) and enterprise resource planning (erp)

Different authors consider BI to be computer based techniques used in extracting and analysing important business data, such as profit from sales or costs associated with profit. BI objectives include¹:

- Understanding advantages and disadvantages, both at internal and external level;
- Understanding the connection between different data for a better decision making;
- Finding innovation opportunities;
- Cost reduction and optimal use of resources.

„Business Intelligence“ is an umbrella term for various business managing approaches based on well-informed decisions, which lead to a high performance level within organizations (McKnights, W., 2004; Melfert, F., Winter, R., Klesse, M., 2004; Mukles, Z., 2009; Hatch D., Lock M., 2009; Borysowich, C., 2010; Jamaludin, I. A., Mansor, Z., 2011; Mircea M. (ed.), 2012).

Only by optimizing its performance a company can survive and remain a competitor in a changing market, being flexible to new demands (Muntean, M., Cabău, L., 2011). Corporate data represents a valuable asset, one absolutely indispensable for decision makers.

Business Intelligence (BI) can be described as a value proposition that helps organizations in their decision-making processes (Muntean,

¹ <http://www.businessdictionary.com/definition/business-intelligence-BI.html>

M., 2012). BI applications include applications relating to decision making, questioning and reporting, statistics and forecasting².



Figure 1: Business Intelligence (BI) definition

Since BI does not offer any systematic means of planning, monitoring, controlling, managing and implementing strategic business objectives, one also needs to adopt a system for planning the company's resources (Enterprise Resource Planning - ERP). The use of these two types of applications offers visible advantages for a company's activity.

Some of these advantages include:

- Using applications from one single provider – this ensures a common platform and eliminates any possible technical issues which might appear when running applications from different platforms.
- User friendly functioning – the final user is already used to the graphic interface and therefore training for the use of the new applications is simplified.
- The interfaces of the applications allow an easier questioning from the user, since there are expert functions (wizard) which allow this, thus reducing questioning through code lines which

² <http://searchdatamanagement.techtarget.com/definition/business-intelligence>

are difficult, time consuming and cannot be done by all users.

- The integrated use of ERP applications with BI tools leads to reducing the rigidity of predefined reports and allows on the spot reporting.
- The flow of data between different sources is reduced.

Cloud computing technology (cc)

Cloud Computing technology was named after the representation as a cloud, often described on a graphic representation of a network. Its concept on a large scale implies the use of the Internet in order to allow those interested to access virtual resources through which users can manage and control the services they have acquired.

Together with the rising access to IT resources a new technology of high interest was developed – cloud computing. The relationship between Cloud Computing and Outsourcing is better understood if we take into consideration that all clients expect lower costs, service efficiency and flexibility as well as financial flexibility (paying only for what is used).

In the past, in the traditional outsourcing models, physical resources were owned either by customer or provider.

Cloud Computing announces the paradigm of accessing technological capacities without a property entirely on one side or another.

Cloud Computing – general presentation

The term “cloud computing „ defines an IT concept developed in the last years. More precisely, cloud computing refers to a service of renting hardware and software virtual resources. Through this service, the customer does not physically own the servers, on which different

software applications will be installed, but some virtual processing and storing capacities which he can access online.

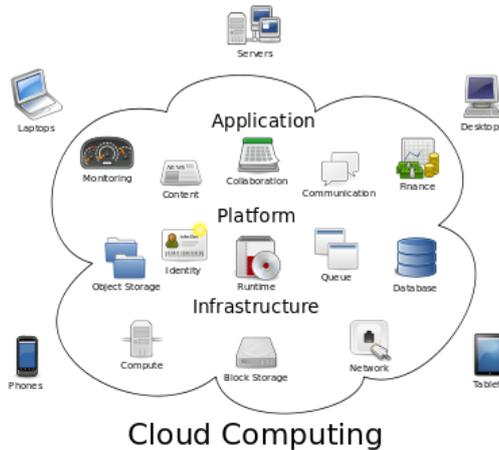


Figure 2: Cloud computing technology

This type of services can be hired according to the computing capacity (millions of operations per second), to the storage capacity (GB) and to the transfer bandwidth used. A potential customer will never be interested in the aspects concerning the physical location of the resources and their maintenance:

- Rent for the place where servers are stored
- Ensuring climatic and electric power supply conditions necessary in a data centre
- Paying the employees which manage the data centre, etc.

For the customer all these aspects are hidden in a cloud, thus the name “cloud computing”. Let us suppose that a customer wants to develop a business of providing multimedia content on the Internet. He does not wish to buy his own servers. What will he do? He will rent computing capacity, storing capacity and bandwidth in a “cloud”. Here he will be able to run the necessary applications in order to provide

multimedia content on the Internet. Some other customer temporarily needs a very large computing capacity in order to break some passwords. He will therefore rent computing capacity in a cloud, this capacity being displayed on a large number of processors, which used in parallel will allow breaking the passwords in a reasonable time at low costs. The customer will never know where the resources he is accessing are kept physically. These can be placed in locations where electric power is very cheap and temperatures are very low in order to reduce costs (this is the case of Google data centres placed as near as possible to the North Pole).

Did you ever have the curiosity of knowing what percentage of the processor's capacity is used when surfing the Internet? Maximum 30%. The resources of a personal computer are used throughout its lifecycle to an extent of maximum 50%. Cloud computing thus optimizes the use of resources and of electric power supply.

Cloud computing services

Cloud Computing is a model of TIC use in which resources are delivered - including hardware and software resources and applications- upon request through a public network in an environment divided among several owners.

The difference between a traditional model and a Cloud infrastructure results from the fact that the traditional model is based on resources such as hardware components and business data, whereas the cloud computing model is based on services.

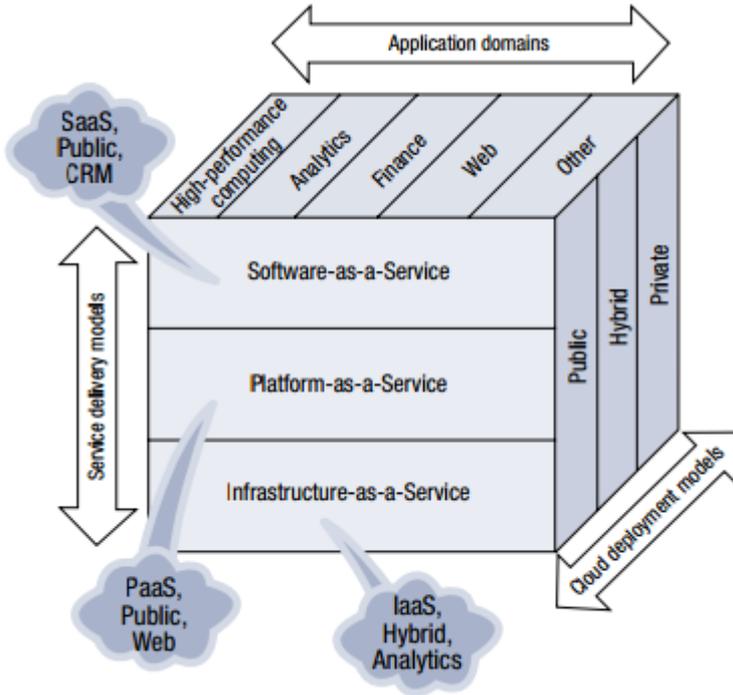


Figure 3: Services offered by a Cloud Computing platform³

From the functionality point of view, “cloud computing” services are devised into three categories:

- Software as a Service (SaaS) – the customer can use the software applications offered by the provider on a cloud type infrastructure – this is the case of web hosting services, email services, etc. The customer cannot configure the parameters of the used infrastructure (bandwidth, servers, operating systems, storage space).

³ http://www.isaca.org/Knowledge-Center/Research/Documents/ITCO_Cloud_SAMPLE_E-book_20July2011.pdf

- Platform as a Service (PaaS) – the customer can install and configure his own software applications on the cloud infrastructure. This could be the case of using the WordPress platform on a hosting server which offers the CPanel interface. The customer can configure the site in the limits set by the WordPress platform.
- Infrastructure as a Service (IaaS) – the customer has the possibility of accessing and configuring the computing resources provided by the cloud infrastructure according to his own needs. He can install any type of software, including operating systems. Also, he can configure to some extent the allocated network resources – firewall, filter spam, etc.

From the point of view of the manner in which they are offered, cloud computing services are classified in:

- Private cloud – the infrastructure is available only inside an organization which comprises more consumers. This could be the case of a retail stores chain. The infrastructure can be owned, configured and used by the respective company or by a third party, or both.
- Community cloud – the infrastructure is used by different entities which share part of the scopes, e.g. emergency services (police, ambulance).
- Public cloud – the infrastructure can be used by the public for academic or governmental purposes. This presupposes the existence of a third party who physically provides the cloud infrastructure.
- Hybrid cloud – the infrastructure is a combination of private, community and public services, which keep their character, but are unified through a technology which ensures the portability of information and of the software applications used.

The approach is different: in a traditional model all resources interact, this influencing the general infrastructure, while the service oriented architecture (**SOA**) of a cloud computing model generates a much more clear separation between two major layers. One of them is formed by the technology within the cloud infrastructure (hardware and applications) and the other one is formed by information resources. Services can be configured, accessed or used

internally without the intervention of the internal user. In the traditional system it is much more difficult to separate between the technic and the functional infrastructure.

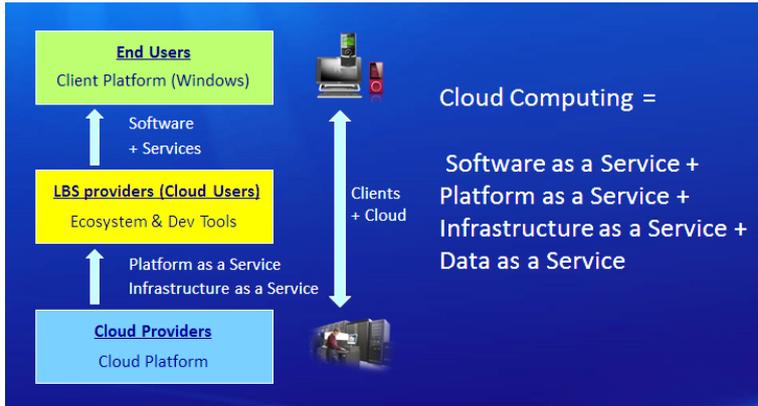


Figure 4: Location-Based Services on the Cloud for Windows platform

Cloud Computing architecture allows a clear division between the technological and the informational infrastructure based on services.

Software as a Service (SaaS) is a model of software delivery that allows companies to deliver solutions to its customers in a hosted environment over the Internet (Joha A., Janssen M., 2012). All major analysts, including IDC, Gartner, and Forrester, predict for the SaaS BI market a major growth throughout 2013 (Neubarth, M., 2011). Nowadays, various Cloud BI initiatives, in fact SaaS approaches, are gaining advantage over the traditional ones, lower costs being the main reason for this phenomena (Reyes, E.P.,2010).

Cloud-Based BI is a BI software solution that runs in the cloud and is accessible via any web browser in a so-called SaaS model.

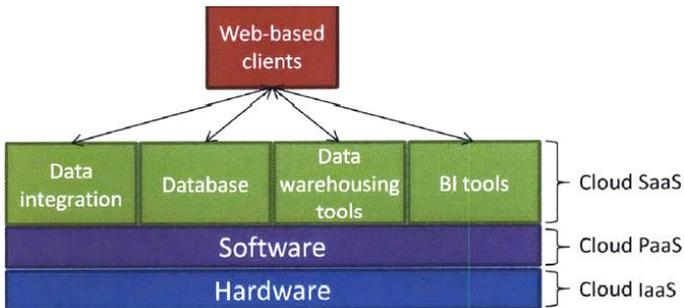


Figure 5: Cloud-Based BI (Reyes, E.P., 2010)

Benefits of Cloud Computing

1. One first advantage consists in the fact that it reduces capital and operational costs, since one:
 - No longer requires to make large up-front capital investment on data centres;
 - Eliminates the need to plan ahead for provisioning;
 - Allows companies to start small and increase their investment resources as needed (pay-as-you-go).
2. A second advantage consists in simplification of application deployment & management through:
 - Common programming model across mobile, browser, client, server, cloud;
 - Access to strong ecosystem of widely deployed applications;
 - Integration with existing IT assets (Software + Services).

Conclusions

Romania is in line with the global trends, as the interest in cloud IT services is growing. Cloud computing thrives to offer the technical basis in order to satisfy the customer's requests at business level.

The base notion of cloud computing refers to the model of technologic infrastructure which allows different types of operations to be executed in the same network. The network can be LAN or WAN, depending on the type of Cloud –private or public. A cloud computing infrastructure is made up of a few types of hardware components (servers, storage systems, network components, etc), software components (programs, services) and information.

The ERP and BI applications offer:

- Easy use
- High visibility of data interpretation
- Clear separation of the useful elements with a high possibility of differentiating information
- Standard for the improvement of activity
- High adaptability and flexibility of use

The ERP applications and BI tools can efficiently run through Cloud Computing technology, which has the following advantages:

- Access to this technology is granted through the Internet as a service on a monthly subscription, one paying only for the services used (SaaS).
- Reducing capital expenditure for software licence acquisition, as this is included in the monthly subscription.
- Reducing costs related to the implementation of applications.
- Since payment is made through a subscription the high price of these applications is no longer a problem; capital expenditures can turn into operational monthly expenditures.
- Reducing expenditures for software update and maintenance, for hardware or network administration, these being the responsibility of the SaaS.
- Reducing exploitation, training and assistance costs, which for a company would mean hiring a high variety of technology experts.

Cloud is a gold mine for medium and small companies and for the centralization of public IT services. The new IT era presupposes IaaS (infrastructure as a service), PaaS (platform as a service) and SaaS (software as a service). IT will become a necessity; therefore we need to be ready to reinvent ourselves.

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