International Journal of Modern Engineering Research (IJMER)
www.ijmer.com Vol. 3, Issue. 5, Sep - Oct. 2013 pp-2992-2995 ISSN: 2249-6645

Cloud in the sky of Business Intelligence

Anamitra Das
IT Specialist, IBM India Pvt Ltd, India

ABSTRACT : *The Modern day business is highly information driven. At one side the volume of data is growing by leaps and bounds and at the other side it is becoming more and more unstructured. Information is not limited to tabular format now. It is in the form of images, MP3 files, videos and social media snippets. To tame this giant we must adopt a more scalable, cheap, and robust way of processing where cloud computing is the answer. Again, the business intelligence is a process which processes raw data to produce information that help in forecasting and decision making. Organizations are striving to become intelligent and achieve competition advantages through the use of Business Intelligence (BI) solutions. The present paper identifies the key factors responsible for evolution of Business Intelligence on the Cloud, the various models available to port BI solution on Cloud, the primary drivers for Cloud BI, the impact of implementing Cloud BI.*

Keywords: *Business Intelligence, Cloud Computing, Cloud Infrastructure, Data warehouse, Return of Investment*

I. INTRODUCTION

Business environment has totally changed today. In this changing world business houses are drifting towards more scalable, robust, flexible information technology architecture. Each organization is thriving to become an intelligent organization and at gaining competition advantage on the market by the use of new and innovative Business Intelligence (BI) solutions. Today, business intelligence (BI) has been under mounting pressure to evolve as an all pervasive information and analytics agent. On the other hand, in the wake of the present economic crisis organizations are reducing IT budget which is practically compelling to have concretized its strategic relationship with business with the reintroduction of grid technology in the form of cloud computing. Popular solutions based on Cloud Computing, called Cloud BI or BI services on demand are increasingly popular.

II. WHAT IS CLOUD COMPUTING

The time you started using Picasa you started using it. The moment you created your account in Facebook and entered the world of social networking you started using it. It, starting with a big 'I' is no other than "Cloud Computing".

Cloud computing refers to the delivery of computing resources over the Internet. The term 'cloud' is analogical to internet. Instead of keeping data on your own hard drive or updating applications for your needs, you use a service over the Internet, at another location, to store your information or use its applications.

It can reduce the cost (isn't it the sufficient reason where every big business house is slashing IT Infrastructure budget?) and complexity of owning and operating computers and networks. Since cloud users do not have to invest in information technology infrastructure, purchase hardware, or buy software licenses, the benefits are low up-front costs, rapid return on investment, rapid deployment, customization, flexible use, and solutions that can make use of new innovations. In addition, cloud providers that have specialized in a particular area (such as e-mail) can bring advanced services that a single company might not be able to afford or develop. Some other benefits to users include scalability and efficiency. Scalability means that cloud computing offers unlimited processing and storage capacity. Cloud computing is often considered efficient because it allows organizations to free up resources to focus on innovation and product development.

2.1 Service Models : What we see is what we get

The bottom-line of the technology is to share resources. Use the unused, release after using so that others can use, and do this seamlessly without heavy management intervention are the basics of cloud computing. Now what are the services available to reuse, which model one can adapt so that it fits the bill? May be I need a book for a lazy evening and my friend has a hamburger to offer? Here we chose from the three service models that are available.

Software as a Service (SaaS) - We can use applications running on a cloud infrastructure from either a thin client interface, such as a web browser, or a program interface without managing or controlling the underlying infrastructure including network, servers, operating systems or storage.

Platform as a Service (PaaS) - We can deploy applications (self created or acquired) onto the cloud infrastructure using programming languages, libraries, services, and tools supported by the provider, without managing network, servers, operating systems, or storage, but have control over the deployed applications and hosting environment.

Infrastructure as a Service (IaaS) - We can use processing, storage, networks, and other fundamental computing resources and deploy or run arbitrary software, which can include operating systems and applications. Consumer has control over operating systems, storage, and deployed applications but does not manage the underlying infrastructure.

2.2 What the infrastructure should guarantee

So we see the backbone is 'Cloud Infrastructure' which has to be managed by the providers and above there are different layers of services that we can use as consumer. It should have the following characteristics.

- Computing capabilities, like network storage, server time should be available automatically when needed without any manual or human interaction with provider. This is what we say **"on-demand self-service"**
- Infrastructure should be built on **"broad network access"**, meaning capabilities are over the network and can be accessed through standard mechanisms like laptops, mobile phones etc.
- **"Resource pooling"** is an essence of cloud computing. Resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand.
- The capabilities available must appear to be unlimited and can be appropriated in any quantity at any time. So the capability must support **"Rapid elasticity"** - it must be elastically provisioned and released between consumers.
- Should support **"Measured service" for** automatically controlling and optimizing resource usage by leveraging a metering facility. This is also required to enable consumer to use and pay for the infrastructure.

III. CLOUD BI – AN OPPORTUNITY UNLEASHED

3.1 Challenges of modern day BI

BI is an umbrella term that includes the applications, infrastructure and tools, and best practices that enable access to and analysis of information to improve and optimize decisions and performance. Roots of business intelligence are found in relational databases, data warehouses and data marts that help organizing historical information in the hands of business analysts to generate reporting that informs executives and senior departmental managers of strategic and tactical trends and opportunities [1].

When we talk about information analysis, it's important to think about where the data actually resides. While the scope of traditional BI is limited to structured data that can be stuffed into columns and rows on a data warehouse, the fact is that over 90% of today's data is unstructured in the form of images, MP3 files, videos and social media snippets. Also, much of the data that organizations need to look at is not necessarily "owned" by them - it exists within various social computing services like Twitter and Facebook, it's hidden within Web logs, sensor output, and call detail records. Finding exactly what you need within such an enormous stream can be like finding a needle in a haystack.

In recent times, business intelligence (BI) has been under enormous pressure to evolve as an all pervasive information and analytics agent. From mass quantities of transactional data, Web data, and growing volumes of "machine-generated" information, such as sensor and log data, volumes are expanding into the petabyte range. As the data center strains under the need for more storage and faster performance (all while keeping costs in check,) cloud computing, open source technologies and other emerging approaches are presenting compelling new ways to manage data and consume IT services [2].

3.2 Cloud BI – An architectural Overview

Cloud BI is the new way to do Business Intelligence: instead of implementing expensive and complex software on-site, the BI software runs in the Cloud. It is accessible via any web browser in a SaaS model. There is no need to install software, or to buy any hardware. And when you're computing needs grow, the system will automatically assign more resources. This elastic scale is what makes Cloud BI so powerful – user pay for what he use as opposed to always paying to provision for peak load. With business intelligence software running in the cloud, it is still possible to make comprehensive integration with back-end systems – both within User Company and in the cloud [3].

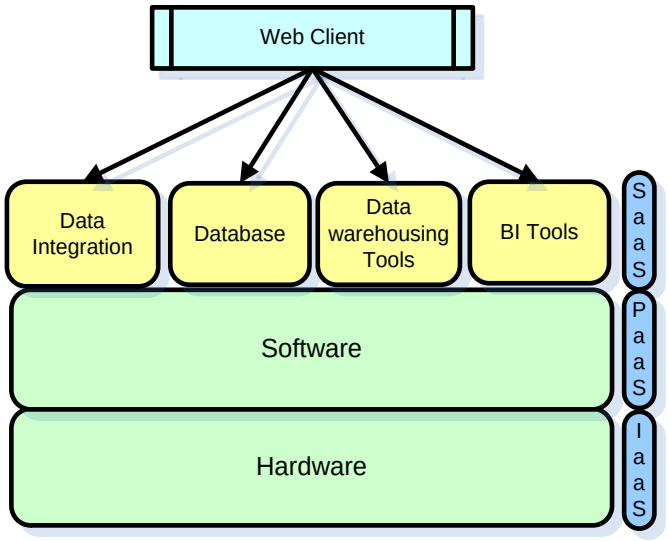

Fig 1 : BI on the Cloud - The Basic Architecture

Hardware : refers to processing, storage, and networks
Software : refers to the operating systems and drivers required to handle the hardware
Data integration : refers to the tools needed to perform the ETL and data cleansing processes
Database : refers to the relational or multidimensional database systems that administer the information
Data warehousing : set of applications that allow the creation and maintenance of the data warehouse
BI tools : are the set of front-end applications that enable the final users to access and analyze the data
Web Client : finally, since all the architecture is going to be accessed through the Internet, there is no need for thick clients or preinstalled applications, because all the content and configuration can be reached through traditional internet browsers

3.3 Why adopt Cloud BI

The small and medium level companies or big houses can leverage the below benefits of cloud BI for reducing implementation and operating IT cost.

Accelerating BI technology adoption: the cloud becoming the default platform for evaluating new software.
Easier evaluation: the cloud enables software companies to make new technology available to evaluators on a self-services basis, avoiding the need to download and set up free software downloads [4].
Increased short-term ad-hoc analysis: avoiding data marts spawned as a result of new business conditions or events. Where short term needs [weeks or months] for BI is required, cloud services are ideal. A data mart can be created in a few hours or days, used for the necessary period, and then the cloud cluster cancelled, leaving behind no redundant hardware or software licenses. The cloud makes short term projects very economical [5].
Increased flexibility: due to the avoidance of long term financial commitments, individual business units will have the flexibility to fund more data mart projects. This is ideal for proof of concept, and ad-hoc analytic data projects on-demand. This agility enables isolated business units to respond to BI needs faster than their competitors and increase the quality of their strategy setting and execution.

The strengths of the cloud model have led many BI vendors to introduce cloud services as a clear and distinctive extension to the on-premise and on-demand BI applications [6]. Companies like Amazon and Google offer unlimited processing power and storage thus allowing any business to cater to its increasing information stack while keeping the IT related costs under control. In addition, a number of innovative SaaS and "cloud-friendly" BI and analytic solutions are cropping up, which means that organizations can take advantage of the cloud to not only store their data, but also crunch it. Depending on the organization's specific requirements, there's more than one flavor of cloud like

Private Cloud - The cloud infrastructure is operated solely for a specific organization, and is managed by the organization or a third party. It offers greater security and control.
Public Cloud - Offered over the Internet and are owned and operated by a cloud provider. It is affordable and highly scalable.
Community Cloud - The service is shared by several organizations and made available only to those groups.
Hybrid Cloud - It is a combination of different methods.
The best approach will ultimately depend on what's most important to the target organization.

IV. ANALYSIS OF THE OPPORTUNITY OF USING A CLOUD BI SOLUTION

By analyzing risks and associated costs and benefits a Cloud BI solution can be evaluated. There are different types of cost-benefit analyses where models are limited mainly to the measurement of costs and savings. The approach proposed in this article provides a perspective on the calculation of ROI (Return of Investment) indicator associated to a BI solution in the Cloud environment, stressing the difference between the traditional practice and Cloud.

$$ROIBI = (TB - TC)/ ITC \quad (1)$$

where *TB* represents the total benefits following implementation of the BI solution, *TC* represents the total costs , and *ITC* – initial total costs of the solution.

$$ROICloudBI = (IPB + DCB - CloudTC)/ CloudTC \quad (2)$$

where *IPB* represents the benefit obtained as a result of increased profit, *DCB* represents the benefit obtained as a result of decreasing costs by the use of a Cloud solution, *CloudTC* represents the total costs generated by the Cloud environment (after [7]).

The benefit reached by decreasing costs through the use of a Cloud BI solution may be calculated according to the formula:

$$DCB = \triangle IHC + \triangle ISC + \triangle IIC \quad (3)$$

where *IHC* represents the initial hardware costs, *ISC* represents initial software costs, and *IIC* initial implementation costs for a traditional BI solution, detailed in [8]. Within these costs an important role is that of decreasing number of hardware equipments, of costs generated by the spaces used and of the license costs.

The benefit obtained as a result of increasing profit following the use of intangible advantages of a Cloud BI solution may be calculated according to the formula:

$$IPB = IAB + ISB + MB + CB + RB + GITB + UTB, \quad (4)$$

where *IAB* represents the benefit obtained by increased agility, *ISB* – same as a result of increased scalability, *MB* – same from reducing the time of response to the market demands , *ISB* – same as a result of increased clients' satisfaction, *CB* – same as a result of focusing business on the main competences, *RB* – same as a result of disaster recovery, *GITB* – same as a result of using Green IT, *UTB* – same as a result of better use of time, detailed in [7].

V. CONCLUSION

Cloud computing is an essential platform for the future Business Intelligence and offers several advantages in terms of cost, flexibility, availability and speed of implementation. It also can be an answer to the challenges of the cost cutting and economic crisis. Organizations – small, medium or large – may consider this consolidation at two levels: onto shared hardware infrastructure and onto shared and standardized platforms, the choice can be driven their by strategies. At the infrastructure level, organizations can consolidate by sharing hardware through virtualization, reaping benefits such as lower hardware, power, cooling and data-center costs. However, to reduce the cost and complexity of the heterogeneous application and data siloes running on top of virtualized servers will require standardization and consolidation at a platform level, creating a single database architecture capable of handling both data warehousing and OLTP workloads across the enterprise. This further boosts IT productivity, agility and responsiveness to business needs and shifting market conditions. Finally, consolidating workloads in the cloud delivers dramatic cost savings by minimizing the human costs of IT systems management. Like consolidating many databases into one reduces IT costs as the organization's need for database administrators, vendor support, and time allocated to upgrades and patches is greatly reduced if not eliminated all together.

REFERENCES

[1] J. Dibbern, T. Goles, R. Hirschheim, and B. Jayatilaka, "Information Systems Outsourcing. A Survey and Analysis of the Literature," 2004.
[2] Don Deloach, *It's a Brave New World for Business Intelligence.* Available: http://cloudcomputing.sys-con.com/node/1927082
[3] M Peter and G Timothy, *The Nist Definition of Cloud Computing (draft) (2011).* National Institute of Standards and Technology Special Publication, 800 -145
[4] R. Buyya, C. S. Yeo, and S. Venugopal, "Market-Oriented Cloud Computing: Vision, Hype and Reality for Delivering IT Services as Computing Utilities." *Future Generation Computer Systems*, vol. 25, pp. 599-616, 2009.
[5] P. Relan and Sibbingz, "Business intelligence for the cloud software stack helps gaming sites quickly adapt to evolving customer needs,"2009.
[6] Bharat Chandra and Meena Iyer, *BI in the Cloud – Defining the Architecture for Quick Wins.* Available: http://www.infosys.com/infosys-labs/publications/Documents/BI-in-a-cloud.pdf
[7] Misra, S.C., Mondal, A. (2010), Identification of a company's suitability for the adoption of cloud computing and modelling its corresponding return on investment, Mathematical and Computer Modelling, doi:10.1016/j.mcm.2010.03.037
[8] Ghilic-Micu, B., Stoica, M., Mircea, M. (2008), A framework for measuring the impact of BI solution, The 9th WSEAS Int. Conf. on Mathematics And Computers In Business And Economics, Bucharest, Romania, ISBN 978-960- 6766-76-3, ISSN 1790-5109, 68-73

.