Cloud Based Business Intelligence Systems – Premise and Promises

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Abstract

With the widespread proliferation of IT applications in business, humongous amount of data is being generated each day. IDC predicts that the volume of world's data is going to double about every year and a half (Webopedia, 2014). Technologies such as RFID, GPS, Social Networks, Website usage logs etc., are enabling rich tail of micro-level data pertaining to employees, suppliers, customers and their behavior. This huge amount of data that is available today, often termed Big Data, is both, presenting many new opportunities for analysis as well as requiring new modes of thinking. A plethora of technologies have emerged to capture, store, analyse big data and to help organisations make the right decisions by providing right information at the right time. However many market leaders believe that the big data technologies are capturing and storing more data than ever before, but the question about how best to achieve the value from this huge data persists. Realizing that turning mountains of data into valuable, practical and actionable business intelligence is not as straightforward as normally projected by the technology vendors, organizations are scrambling to find right software platform and process

to obtain value from their data to get edge over others in the market. The key challenges imposed by business data analytics are related to technological management, characterized by the factors such as volume and variety of data. These challenges are consuming a lot of organizational resources thereby shifting the focus of the organization from harvesting business insights to the technological issues like storage, security, process and retrieval of business information. To address these issues, Cloud based business intelligence solutions have emerged as the most promising solution. This paper after identifying the key players offering the new age Business Intelligence solutions on the cloud, endeavours to explore the essential software capabilities, deployment models used by the BI vendors and other key factors that influence the organisation's decision to subscribe to a particular cloud based BI platform.

Keywords : *Business Intelligence, Big Data, Cloud*

Introduction

"What gets measured, gets managed." - Peter Drucker

With the widespread proliferation of IT applications in business, humongous amount of data is being generated each day. IDC predicts that the volume of world's data is going to double about every year and a half (Webopedia, 2014). Technologies such as RFID, GPS, Social Networks, Website usage logs etc., are enabling rich tail of micro-level data pertaining to employees, suppliers, customers and their behavior. This huge amount of data that is available today, often termed Big Data, is both, presenting many new

opportunities for analysis as well as requiring new modes of thinking. A plethora of technologies have emerged to capture, store, analyse big data and to help organisations make the right decisions by providing right information at the right time. However, many market leaders believe that the big data technologies are capturing and storing more data than ever before, but the question about how best to achieve the value from this huge data persists. Realizing that turning mountains of data into valuable, practical and actionable business intelligence is not as straight forward as normally projected by the technology vendors, organizations are scrambling to find right software platform and process to obtain value from their data to get edge over others in the market. The key challenges imposed by business data analytics are related to technological management, characterized by the factors such as volume and variety of data. These challenges are consuming a lot of organizational resources thereby shifting the focus of the organization from harvesting business insights to the technological issues like storage, security, process and retrieval of business information. To address these issues, Cloud based business intelligence solutions have emerged as the most promising solution.

Objectives of the Study

Cloud based business intelligence platforms are gaining prominence with a growing number of vendors offering a broad range of compelling solutions. According to several studies, cloud based information systems like ERP, CRM etc., have evidenced several benefits that on-premises solutions

sometimes struggle or fail to match. At the same time, deployment of information systems on the cloud have also drawn the attention of the industry to the data security and other related issues. Taking into account both the benefits and concerns related to cloud platform along with the unique requirements for business intelligence solutions, this study endeavors to explore the following:

1. Key players offering the new age Business Intelligence solutions on the cloud.

2. With help of secondary data, enumerate the essential software capabilities, deployment models used by the BI vendors and other key factors that influence the organization's decision to subscribe to a particular cloud based BI platform.

Business Intelligence

The mention of the term "Business Intelligence" in scholarly literature dates back to 1865, wherein Richard Millar Devensin used this term in his work to descri be gaining profit by receiving and acting upon information about the environment. Also, in a 1958 article, IBM researcher Hans Peter Luhn used the term business intelligence to describe it as the ability to apprehend the inter-relationships of presented facts in such a way as to guide action towards a desired goal (Luhn, 1958). Business intelligence as it is understood today is said to have evolved from the Decision Support Systems (DSS) that began in the 1960s and developed throughout the mid-1980s. DSS originated in the computer-aided models created to assist

with decision-making and planning. From DSS, data warehouses, Executive Information Systems, OLAP and business intelligence came into focus beginning in the late 80s. In 1989, Howard Dresner proposed "business intelligence" as an umbrella term to describe "concepts and methods to improve business decision making by using fact-based support systems." (Dssresources, 2014) . The description of BI by Forrester Research is considered to be one of the widely used definition of BI. It defines BI as "A set of methodologies, processes, architectures, and technologies that transform raw data into meaningful and useful information used to enable more effective strategic, tactical, and operational insights and decision-making" .

The present business ecosystem is teeming with digital documents, images, audios, videos, and multiple forms of data that is unstructured or semi-structured in nature. Although conventionally, companies have been making business decisions based on transactional data stored in relational databases, in the recent years, they have realized that the non-traditional, less structured data in the form of weblogs, social media, email, sensors is trove of useful business insights. This phenomenon has fuelled the growth of research and development in Business Intelligence. The current BI technologies are capable of handling large amounts of unstructured data to help identify, develop and create new strategic business opportunities. The goal of BI is to allow easy interpretation of these large volumes of data. Identifying new opportunities and implementing an effective strategy

based on insights can provide businesses with a competitive market advantage and long-term stability (Wikipedia, 2014).

Big Data for Business Intelligence

The term "Big data" was coined by Roger Magoulas from O'Reilly media in 2005. However the first documented use of the term "big data" appeared in a 1997 paper by scientists at NASA, describing the problem they had with visualization (i.e. computer graphics) as "an interesting challenge for computer systems: data sets are generally quite large, taxing the capacities of main memory, local disk, and even remote disk. We call this the problem of big data. When data sets do not fit in main memory (in core), or when they do not fit even on local disk, the most common solution is to acquire more resources." (Forbes, 2014)

In the recent years, "Big data" has become a new ubiquitous term. Big data is transforming science, engineering, medicine, healthcare, finance, business and ultimately society itself (IEEE BigData 2013). According to Jacobs, Big Data is data whose size forces us to look beyond the tried-and-true methods that are prevalent at that time (Jacobs, 2009). Big data has been one of the most promising business trends in the recent times. Most market leaders believe that Big Data is here to stay and will be an increasingly significant arena of competitive differentiation. However being in its nascent stage, many organizations are yet to understand answers for the questions like, How is big data different from what we have been doing ? How big is big data ? Where and how do we begin ? and so on.

Oxford English Dictionary defines big data as “data of a very large size, typically to the extent that its manipulation and management present significant logistical challenges.”

Wikipedia defines big data “an all-encompassing term for any collection of data sets so large and complex that it becomes difficult to process using on-hand data management tools or traditional data processing applications” (Wikipedia).

Big Data refers to various forms of large information sets that require special computational platforms in order to be analysed (Research Trends, 2012). The widely-quoted 2011 big data study by McKinsey highlighted that definitional challenge. Defining big data as “datasets whose size is beyond the ability of typical database software tools to capture, store, manage, and analyze,” the McKinsey researchers acknowledged that “this definition is intentionally subjective and incorporates a moving definition of how big a dataset needs to be in order to be considered big data.”

Gartner analyst Doug Laney defined data growth challenges and opportunities as being three-dimensional, i.e. increasing volume (amount of data), velocity (speed of data in and out), and variety (range of data types and sources). Gartner, and now much of the industry, continue to use this “3Vs” model for describing big data. In 2012, Gartner updated its definition as follows: “Big data is high volume, high velocity, and/or high variety information assets that require new forms of processing to enable enhanced

decision-making, insight discovery and process optimization."

As per several studies conducted by the research community, Big data generally has been referred to traditional enterprize data (customer information from CRM, ERP data, web store transactions), machine generated/ sensor data, equipment logs, social data like customer feedback, micro blogging, social media platforms like Facebook etc., characterized not just by the volume but also by velocity and variety. Therefore, considering that the 3Vs definition of Gartner is all-encompassing, the same definition has been used in the current study.

Business Intelligent Systems

It broadly refers to an Information System that provides business insights for better decision-making. Like all information system, BI systems also have hardware, software, data, procedures and people. The information emanating from BI systems contain information representing patterns, relationships and trends about customers, suppliers, business partners and employees. The key ingredients of BI systems are mining and reporting tools. It provides useful information to users who need it and when they need it. Examples of BI systems include measuring and monitoring key performance indicators, benchmarking and forecasting sales, performing data mining and analysis of customer information to discover new business opportunities, and building enterprize dashboards to integrate and visualize information from various business areas. (Harvard Extension School, 2014)

According to Gartner, BI systems / platforms are software platforms that deliver seventeen capabilities (Gartner, 2014). For the purpose of presenting companies working in the domain of BI as the leaders, challengers etc, the seventeen capabilities have been further classified by Gartner into three categories - Information Delivery, Analysis and Integration. The key capabilities defined by Gartner include – Reporting, Dashboards, Ad hoc query, support for big data sources, data mashup, interactive visualization etc.

Table 1 : Key Characteristics of Current BI Systems.

Sl. No.	Capability	Description
1	Support for Big Data Sources	Ability to support large data sources having semi and unstructured data
2	Management of Metadata	Ability to capture, store and search metadata objects.
3	Online Analytical Processing (OLAP)	Ability to slice, dice and navigate multidimensional drill paths.
4	Data Mashup	Ability to use combinations of different sources of data and to build analytical models with it.
5	Interactive Reporting	Ability to create highly formatted, interactive reports.
6	Dashboards	Reporting system that graphically depicts key performance indicators.
7	Interactive visualization	Facility to explore data via the manipulation of chart images with the colour, size, shape etc of visual objects representing aspects of the dataset being analysed.

Business Intelligence Industry

The market for business intelligence continue to be one of the fastest growing software markets. According to research firm Gartner, the global market for BI which reached around $13 billion in revenue worldwide in 2013, up 7 percent from the previous year is expected to reach over $17 billion by 2016 (CloudTimes, 2014). BI and analytics have grown to become the fourth-largest application software segment as end users continue to prioritize BI and information - centric projects and spending to improve decision - making and analysis. Global market research and consulting company, MarketsandMarkets, anticipate the global BI and analytics market to grow from $13.9 billion in 2013 to $20.8 billion by 2018 – a CAGR (Compound Annual Growth Rate) of 8.3 percent from 2013 to 2018.

There are a number of business intelligence vendors, often categorized as the independent “pure-play” vendors and consolidated “megavendors” that have entered the market through a recent trend of acquisitions in the BI industry. The prominent vendors have been furnished in the Table 2.

Table 2 Prominent BI Vendors

Name of the vendor	Key Features
IBM	IBM offers a complete range of enterprise-grade BI, performance management and advanced analytics platform capabilities, complemented by a deep services organization that is ready to implement them in solutions for any domain, industry or geography.
Oracle	It provides optimized and federated query generation from heterogeneous data sources. It is aggregate-aware, with aggregate navigation determined by manual or automatic metadata configuration. It is often deployed to support large-scale, systems-of-record reporting and dashboard requirements.
Microsoft	Microsoft offers a competitive and expanding set of BI and analytics capabilities, packaging and pricing that appeal to Microsoft developers, independent distributors and to business users. It does so through a combination of enhanced BI and data discovery capabilities in Office (Excel) 2013, data management capabilities in SQL Server, and collaboration, content, and user and usage management capabilities in SharePoint.

SAP	SAP's Business Objects BI Suite delivers a broad range of BI and analytic capabilities through a semantic layer best suited for large IT-managed deployments that require robust governance and administrative capabilities. Companies often choose SAP as their enterprise BI standard, particularly if they also standardize on SAP for ERP applications.
SAS	SAS's analytics portfolio spans platforms for BI, performance management, data warehousing, in memory databases, data integration, data quality, decision management, content and social analytics, with a core strength being advanced analytics. SAS also offers industry and domain specific analytic applications built on its product portfolio.
Information Builders	Information Builders' WebFOCUS BI and analytics platform offers a broad range of analytical capabilities with data integration and application support. It is particularly well suited to operational reporting and dashboards, and to building Web-based analytic applications that require low latency and multiple data sources with production-level scalability in environments without a data warehouse.
Micro Strategy	Micro Strategy offers an enterprise-grade and organically grown end-to-end BI platform that is well suited to large and complex requirements.

Tibco	Tibco Software is one of the early leaders in the field of data discovery, with a flexible, easy-to-use platform for user-driven information exploration and analysis. It is also used for publishing interactive and visual dashboards, building predictive models and authoring analytic applications.
Qlik	QlikView is a self-contained BI platform, based on an in-memory associative search engine and a growing set of information access and query connectors, with a set of tightly integrated BI capabilities.
Tableau	Tableau's highly intuitive, visual-based data discovery, dashboarding, and data mashup capabilities have transformed business users' expectations about what they can discover in data and share without extensive skills or training with a BI platform.

Cloud Based Business Intelligence Systems

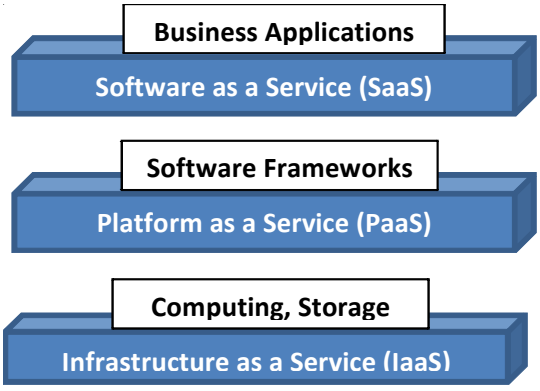
According to the most widely cited definition of Cloud Computing by The National Institute of Standards and Technology (NIST), "Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that

can be rapidly provisioned and released with minimal management effort or service provider interaction".

Cloud computing is a general term for anything that involves delivering hosted services over the Internet. The name cloud computing was inspired by the cloud symbol that is often used to represent the Internet in flowcharts and diagrams (TechTarget, 2014).

The services provided on the cloud are broadly divided into three categories: Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS).

Table 3 : Cloud Services



A cloud service has three distinct characteristics that differentiate it from traditional hosting:

1. It is sold on demand, typically by the minute or the hour.

2. It is elastic — which means that a user can have as much or as little of a service as they want at any given time.

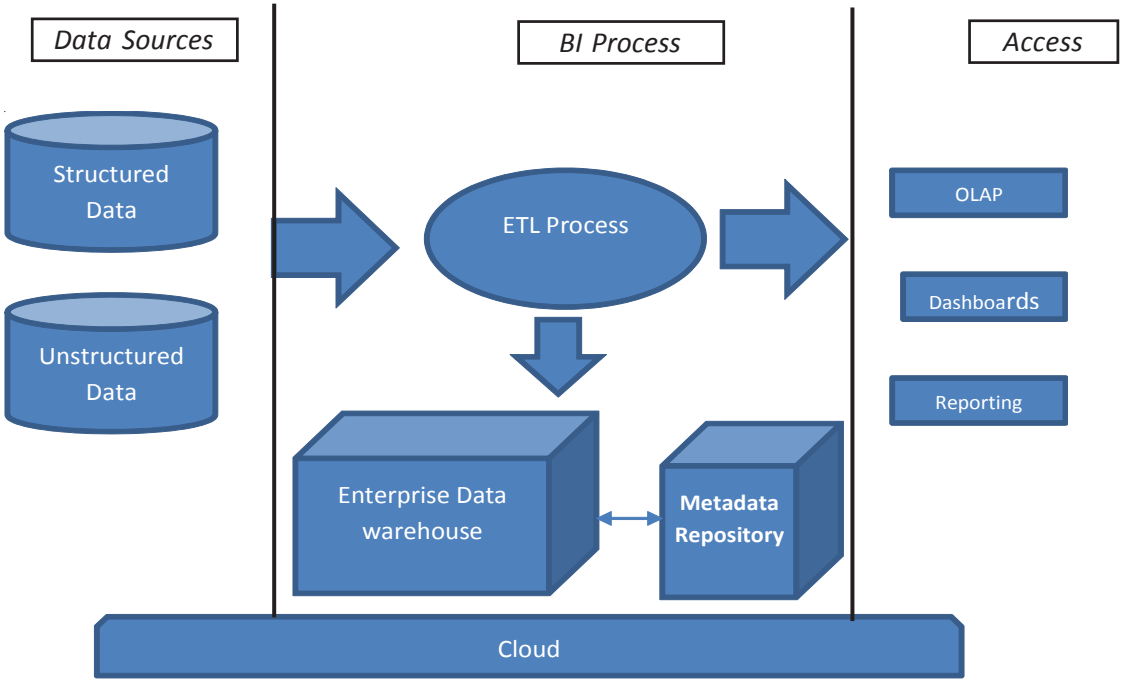
3. The service is fully managed by the provider, and, hence, the consumer needs nothing but a personal computer and Internet access.

Significant innovations in virtualization and distributed computing, as well as improved access to high-speed Internet, have accelerated interest in cloud computing. A cloud can be private or public. A public cloud sells services to anyone on the Internet. (For example, Amazon Web Services) A private cloud is a proprietary network or a data centre that supplies hosted services to a limited number of people. When a service provider uses public cloud resources to create their private cloud, the result is called a virtual private cloud. Private or public, the goal of cloud computing is to provide easy, scalable access to computing resources and IT services. Elasticity, pay-per-use, low upfront investment, low time to market, and transfer of risks are some of the major enabling features that make cloud computing a ubiquitous paradigm for deploying novel

applications which were not economically feasible in a traditional enterprize infrastructure settings. This has seen a proliferation in the number of applications which leverage various cloud platforms, resulting in a tremendous increase in the scale of the data generated as well as consumed by such applications.

Running Business Intelligence applications on the cloud is gaining traction as the underlying infrastructure can meet the extreme demands of scalability. BI environments, require a large capital layout to implement and support the large volumes of data that needs to be analysed to identify trends. It also requires enormous processing power which places pressure on the business resources. Therefore BI vendors can offer their solutions as a Software as a Service (SaaS), facilitating companies to reduce cost of having a BI solution and also having access to the latest software which will give the business an edge on their competition.

Figure 1 : General Architecture of Cloud based Business Intelligence System



Cloud is gradually becoming the favourite deployment model by both old and new Business Intelligence users. In fact, Cloud based BI is giving further impetus to growing BI market. According to computerweekly.com, Cloud business intelligence market will be worth $4bn by 2017. Also, according to Forbes, Cloud-based Business Intelligence (BI) is projected to grow from $.75B in 2013 to $2.94B in 2018, attaining a CAGR of 31%. Considering the anticipated phenomenal growth of this sector, besides new entrants, many established BI on-premise vendors are joining the fray of cloud based business intelligence.

The Drivers for the Growth of Cloud Based BI

- Speed of Implementation: Cloud based BI facilitates Immediate availability of environment without any dependence on the long periods associated with infrastructure procurement, application deployment and the like.

- Elasticity: It leverages the massive computing power available on the Web and facilitates scaling up and scaling down based on changing requirements.

- Focus on Core Strength: Outsourcing the hosting and management of BI apps to professionals, allows organizations to focus on their core capabilities.

- Lower Total Cost of Ownership: Cloud BI allows converting some part of capital expenditure (capex) to operational expenditure (opex) and use cost-effective pricing models, pay per use model and so on.

- On-demand Availability: BI deployed on cloud supports mobile and remote users, allowing them to use and manage business insights anywhere and anytime.

Conclusion

There is probably no other domain of business that is changing as rapidly as our ability to capture and store data at a level that is more granular than ever before. Humongous data is being generated every day, but ironically most organizations are data rich but information poor. Therefore most organisations are scrambling to convert mountains of data available in the organisation into actionable business insights. Business Intelligence is acting as catalyst to meet this goal. However, considering the huge investment involved in on-premise BI systems and the technological issues involved in maintaining those systems, many organizations are not able to afford BI systems. Also, organizations that have procured and deployed it in their organisations are not able to leverage its true potential as majority of their resources are being used in managing BI systems and not in harvesting Business Intelligence. In this context cloud based systems have emerged as a promising solution to help organizations leverage on their Business Intelligence systems both efficiently and economically.

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