

Cloud Business Intelligence: An Empirical study

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Abstract- Over the past decade's Internet, ICT, IoT, and Web-based and integrated services have grown rapidly, effectively implemented by the many organizations which lead to the creation of a huge amount of data. Cloud Business intelligence is one of the recent technological trends in the area of business intelligence technologies that access raw data to process it into purposeful information for the organization to take business benefits from the data. Large volume data, storage capabilities, increased power consumptions by hardware and inadequate analysis are the challenges faced by the organization. To overcome such problems there is a need arises to implement an integrated business intelligence solution. Cloud business intelligence provides a solution to these issues which integrates the capabilities of cloud computing and business intelligence. Concern paper focuses on and reviews current research in Business Intelligence. An objective is to study of a conceptualization of the cloud Business intelligence, benefits, challenges for the organizations.

Key words-Business intelligence, cloud computing, cloud business intelligence, cloud BI.

I. INTRODUCTION

Cloud computing is a new technology that provides a model for on-demand access to hardware and software resources with minimum management efforts. It facilitates the users to access computing power to which they might not otherwise have access due to financial or organizational limitations. (Deshpande and Joshi, 2014; Tamer et al., 2013). Many scholars and industrial persons consider that cloud computing has the potential to transform a large part of the Information Technology industry (Armbrust et al., 2010). Cloud Business intelligence (BI) applications are hosted and operated on virtual networks to provide access to BI-related data such as dashboards, business analytics, OLAP analytics and KPIs by the organizations. Nowadays many organizations are turning to use cloud-based tools such as CRM applications, Salesforce and BI tools; BI tools embraced the agility and accessibility of the cloud platform. Basically, the concept and idea of cloud computing have been evolved and explored for several years; unfortunately, the investigations on cloud BI are only partly addressed or focused by existing research as the technology is the combination of cloud and BI. Concern paper seeks to throw more light on the concept of cloud Business intelligence.

The IT industry has divided it into three categories to understand better and define.

a) Software as a Service (SaaS) – SaaS provides a way of accessing and paying for software. Instead of installing software on your own servers, SaaS companies enable you to rent software that's hosted; it may be charged fees for a monthly or yearly basis. CRM and finance-related tools use SaaS business intelligence and technology.

b) Infrastructure as a Service (IaaS) – It's an infrastructure available on-demand to customers. Computer resources and networking capabilities are owned and hosted by providers.

c) Platform as a Service (PaaS) – it's a broad service that includes application platform, integration, database services, and business process management.

1.1) Cloud computing meets Business intelligence (BI)

Cloud computing and business intelligence provide the ideal technological match. Business intelligence is all about information providing it to the right people at the right time. Cloud computing provides an agile way to access Business Intelligence applications. The advantage of Cloud Business Intelligence applications is that they are accessible on multiple devices and web browsers.

II. CONCEPTUALIZATION AND APPROACH: CLOUD BUSINESS INTELLIGENCE (CLOUD BI)

Business Intelligence solution's based on cloud computing platform is called "cloud Business Intelligence". Cloud computing provides a more accessible platform for BI tools which made easy to access their capabilities by the organizations. Hence Organizations do not need to implement additional hardware infrastructure and support the huge volumes of data and processing power. Cloud BI provides a framework that provides on-demand access to software and hardware resources with minimum management efforts (Tamer et al., 2013). Cloud BI is accessible by using any web browser which is called SaaS. Cloud computing also transforms the economic value of Business Intelligence and provides an opportunity for small size organization to compete in the market by using the insights and results provided by BI (Ouf and Nasr, 2011).

Many traditional and new BI vendors are available in the market, which provides different options on BI functionalities based on different architectures, frameworks, and platforms. Some of them are discussed in the following table.

Table no 1. Architectures, Framework and platforms for cloud BI

platform	Vendors/service provider
SaaS Business Intelligence Solutions	SAP Business OOD, Adaptive Planning, HostAnalytics, Analytix On Demand, BlinkLogic, LiteBI, Good Data, , Indicee, Pivot Link BI.
BI Platform as a Service (PaaS)	IBM Cognos Express on Amazon EC2, AsterData MPP on Amazon EC2, Teradata Express on Amazon EC2.
Data Integration Tools	IBM Infosphere DataStage, IBM CastIron, Informatica Powercenter Cloud Edition, Snaplogic Dataflow, Talend Integration Suite on RightScale Managed Platform

Source Menon L & Rehani B

III. SIGNIFICANCE OF CLOUD IN PRESENT SCENARIO & FUTURE

According to Gartner, Inc worldwide public cloud services market is forecast to grow 17% in 2020 to total \$266.4 billion, up from \$227.8 billion in 2019.

Table no 2. Worldwide Public Cloud Service Revenue Forecast (Billions of U.S. Dollars)

	2018	2019	2020	2021	2022
Cloud Business Process Services (BPaaS)	41.7	43.7	46.9	50.2	53.8
Cloud Application Infrastructure Services (PaaS)	26.4	32.2	39.7	48.3	58.0
Cloud Application Services (SaaS)	85.7	99.5	116.0	133.0	151.1

Cloud Management and Security Services	10.5	12.0	13.8	15.7	17.6
Cloud System Infrastructure Services (IaaS)	32.4	40.3	50.0	61.3	74.1
Total Market	196.7	227.8	266.4	308.5	354.6

Source: Gartner (November 2019)

BPaaS = business process as a service; IaaS = infrastructure as a service; PaaS = platform as a service; SaaS = software as a service

Software as a service.

As per table no 2 analysis shows that (SaaS) will be the largest market segment which grows to \$116. IaaS share second-largest market segment in cloud infrastructure services which will grow to \$50 billion in 2020.

IV. CHALLENGES FOR CLOUD BUSINESS INTELLIGENCE

Security issues & Concerns: - Security risks are always on the top priority of cloud computing because data has been migrated to the cloud for further processing by BI tools. To safeguard and protect the data, an organization should need to choose cloud service providers that provide security management services such as password protection, encryption to the protection of on-premise systems.

Data- latency: - Many organizations prefer to access real-time data & information from the systems. In such a scenario Cloud BI should provide access to real-time data. As a result, the analysis supported data that are often not up-to-date by the time and shared with executives to form decision-making. Hence real-time integration should be there to enhance data.

Lack of expertise: - One of the challenges organizations and companies are facing today. Organizations are moving to clouds and cloud technologies are rapidly getting advance. Due to these factors organizations are having a tough time keeping up with the technologies and faced a lack of expert peoples in the cloud. These challenges can be overcome by training and development of IT staff.

Data integration: - Business Intelligence systems require managing and gathering data across different systems for the organization. So it needs to be configured with the individual systems interface by business units once they adopt their own cloud software. Employees consultate the data manually which is time consuming process. If it has not been integrated properly then managing the data hierarchies becomes difficult and companies won't be able to achieve a consistent and single version of the truth worthy data across multiple on-premise cloud systems.

Control/Governance: - Proper IT governance and control strategies should ensure IT systems and systems are implemented and used according to the policies and procedures should ensure that these IT assets are properly maintained and are supporting the organization's strategy and business goals.

V. ADVANTAGE/BENEFITS OF CLOUD BUSINESS INTELLIGENCE

The overview of the literature concludes many things about cloud computing platforms and the use of business intelligence with it. Researchers conclude that cloud computing transforms the economic value of Business Intelligence which provides an opportunity for organizations to compete in the global market (Gurjar and Rathore, 2013). According to the Gartner survey, which throws light on the fact that almost one-third of the Business Intelligence platform users surveyed are using or planning to move to the cloud (Gartner, Wisdom of Crowds Cloud Business Intelligence, 2012).

Easy to use & operate: - Cloud BI applications to be easier for end-users to operate and set up like other cloud implementation & applications.

Ease of implementation, scalability and elasticity: - The organization can implement cloud BI solutions without buying special infrastructure and hardware, installing software and configuring systems. Cloud BI solutions enable organization to focus on resources, instead of maintenance and support. Cloud BI solutions can accommodate increased demand from end-users as the business grows.

Effective adaptable solutions: - Cloud BI solutions offer unique opportunities to the business units where functions adopted for one business unit can easily be extended on the same platform to other business units of the organization. Cloud products are frequently updated; hence users get access to the new and upgraded functionality.

VI. CONCLUSION

Cloud computing trends are a recent technological advancements that cannot be ignored in the market and have maximum impacts in the arena of Business Intelligence. Cloud Business Intelligence provides a platform to improve the efficiency and productivity of business intelligence. Cloud BI impacts the performance of BI software and organizations positively. It helps the organizations to implement BI with a reduction of cost on applications. There are some challenges, obstacle but they can be removed and overcome. Organizations can take advantage of cloud BI to compete in the global market.

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