Review On Future Of Business Intelligence On Cloud

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ABSTRACT: In current era business organizations are striving to get accurate data to make key decision. The popularity of Business Intelligence (BI) is increasing day by day. Business Intelligence (BI) project are developed under strict budget which overshoot most of the time. There is always the need to evolve with the technological advancement. Cloud BI provides a low cost, sensible solution for high cost Business Intelligence projects. Various new cloud models can be integrated with BI which was not possible before. BI when used with cloud will solve problems associated with implementation. The paper provides a review on future of Business Intelligence.

Keywords: Cloud BI, Cloud Business Intelligence, Business Intelligence, Cloud Computing.

1 INTRODUCTION

IN business environment large amount of data are gathered. These data can play an important role in determining the success of organization. Business Intelligence (BI) encompass the tools and technique to analyze these data which enables the decision maker to make key decisions based on the information from the data of their customers and partners [5]. There is increase in popularity of cloud computing due to reduction in cost of deploying application as compared to on-site deployment which uses expensive hardware and software for implantation. Therefore BI is moving to the cloud. Cloud BI is the culmination of both the technologies [1]. Most organization spent their budgets on software licenses, hardware and networking. As implementation and development of BI projects end most of the budget is consumed on licenses, hardware and software which causes increase in budget. Cloud computing BI provides an excellent alternative by using various service model of cloud computing to implement BI projects [2]. As organization need for information grows with ever increasing data, cloud will allocate more resources for less expense as compared to developing at their own location. Because of cloud computing pay as you go model over expense is avoided [1]. There are still organizations which prefer developing project at their own location due to security concern. Cloud BI is a novel idea to evolve their development and minimize their cost of deployment [3].

2 CLOUD COMPUTING

According to the official definition of National Institute of standards and Technology (NIST) : "Cloud computing is a model for enabling ubiquitous, convenient, on demand network access to a shared pool of configurable computing resources (for example networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management or service provider interaction" [6], [4]. Study conducted by KPMG, 81% of businesses was either evaluating cloud services, planned a cloud implementation or had implemented a cloud strategy [7]. Cloud makes availability of data from anywhere to the authorized user. Cloud computing does not require a person to be at same location of storage device, network and software. The significant feature of cloud is that one can access resources from any remote location through internet connection.

2.1 Deployment Models

i. Private Cloud: A private cloud are used and accessed by an organization. Private cloud hosted application are secured which is sometimes not the case in public cloud. It can be hosted inside or outside an organization which is hosted by a service provider [6], [7].

ii. Public Cloud: Public cloud is available to everyone which is made accessible by service provider. Infrastructure is maintained by service provider. Most common service providers are Google, Microsoft Amazon AWS. Public clouds are vulnerable to attacks [6], [7].

iii. Community cloud: Community cloud is similar to private cloud which is shared between two or more organization. It is cross breed of private and public cloud. Organization access the services like public cloud with privacy and security associated with private cloud [6], [7].

iv. Hybrid cloud: Hybrid cloud is combination of more than one cloud (public, private or community) within same organization. Hybrid cloud allows distribution of workload between two or more clouds [6], [7].

2.2 Service Models

i. Software as a Service (SaaS): In Software as a Service readymade application is provided by the service provider in cloud. Service providers have complete power over the cloud infrastructure such as physical storage devices, network infrastructure, type of operation system, type of servers. Service provider may offer small configuration control over the application being rented [8].

ii. Platform as a Service (PaaS): Organization develops their own software in cloud. Just as SaaS you have no control over the infrastructure but have complete control over the software being used [8].

iii. Infrastructure as a service (IaaS): In this service model cloud vendor equip client with hardware, software, servers, network and organization have complete authority over it [8].

3 BUSINESS INTELLIGENCE (BI)

Gartner defines business intelligence as: "An umbrellas term that includes the application infrastructure and tools, and best practices that enable access to and analysis of information to improve and optimize decisions and performance" [16]. A BI tool collects data from various sources. Business intelligence includes various techniques and technologies such as data mining, data warehousing, DotNET, web services etc. which enables analysis of historical and current data from various data sources. BI helps in decision making, prediction, informing change in business growth, designing user interface, showing key performance indicators etc. Another aspect of BI is competitive intelligence which helps gaining business information by acquiring information about its competitors in industry [10]. Business intelligence generally follows three basic steps of Extraction, Transformation and Loading (ETL).

i. Extraction: As the name suggest is responsible for extracting data from data sources and maintaining the data in standard format of data warehouse.

ii. Transformation: Now the extracted data goes through various changes. Data which is not needed are removed. The data from the original data source are changed to meet the requirement.

iii. Loading: It is the final step in which extracted and transformed data is loaded in data warehouse (DW).ETL process helps in creation of data-model from data sources [14].

4 NEED FOR BI IN CLOUD

4.1 Cost of On-Premise Business intelligence

Most of the BI tool maker does not make their license price public. Almost all the licenses are brought from the sales team which may quote prices higher than the original cost. There may be possibility that someone else may be paying fewer prices for the same license [12]. According to the Mark Madsen: With increase in number of users the cost per user also rises. Every BI tools cost are different, to calculate cost of BI tool small, medium and large user count are considered having same feature [12].

Size	Total Users	Admin Users	Professional Developers	Expert Users	Basic Users
Small	25	1	1	2	21
Medium	100	2	3	10	85
Large	500	3	15	50	432

Fig 4.1.1 *Usage scenario and User Count.*
[Source adapted from [12]]

Mark Madsen states in his study that there are rare cases where BI tools cost declines with increase in user. The Figure below shows how the license cost per user increases with increase in user [12].

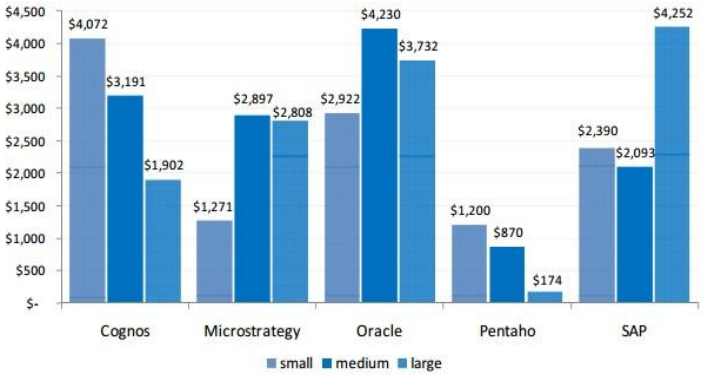

Fig 4.1.2 *Cost of tool Per User.*
[Source adapted from [12]]

Add to the license, cost of support also increases with increase in user according to Mark Madsen which directly increases the cost of implementation [12]. Therefore cloud gives an excellent alternative due to pay as you go model. Apart from license cost it is important to know the total cost of ownership. Low license does not equate to low cost of ownership. Total cost of ownership includes hardware, license, current development cost and cost of hardware not only include servers cost but also cost of employee, electricity, rent, and network etc. [11], [13].

4.2 Cost of BI in cloud

Having a BI tool on the cloud reduces total cost of ownership, cloud also provides readymade infrastructure by providing the hardware, network, software and access to other resources. Jason Bowden stated that cost of labor decreases in cloud BI to 6% and also saves up area needed for hardware and network and stated some prominent service providers like Amazon Web Services (AWS) cloud, Microsoft Azure and Google cloud platform for providing excellent infrastructure for BI in cloud. Amazon web services Cloud provides Amazon Redshift for analytics and Amazon S3 cloud storage infrastructure for BI on cloud for low cost [4], [13]. Readymade BI application (SaaS) can be used with certain tweaks as opposed to developing a BI application which takes a lot of time therefore saving time and cost of deployment.

5 CLOUD BI OPTIONS

BI can be deployed on the cloud using its service model. Following are the Cloud BI deployment options were given by Mike Ferguson in the annual TDWI conference.

i. Public Cloud based IaaS for a BI system : Here Infrastructure such as network, hardware, software, area are provided by the vendor, even the labor cost to manage infrastructure are handled by cloud vendors like Savvis, Amazon, Rackspace, GoGrod, IBM, HP, Cisco etc. And buying own ETL, DBMS and BI software. Vendors are paid based on the infrastructures used [9].

ii. BI/DW (PaaS) on Public Cloud: In this option BI Systems is built on public or externally hosted BI/DW PaaS. There are two options Multi-Vendor or single Vendors.
   a. Multi-Vendor BI PaaS: Example of multi-vendor options is Rightscale/Talend/Vertica PaaS Vendor. Data integration is file based which means when you

upload the data some series of actions are performed on that data to load into the PaaS DW/BI database [9].

b. Single Vendor: Some of the vendors are GoodData, SAP, BusinessObjects On-Demand. Vendor gives only lightweight data integration once data is uploaded [9].

iii. Readymade BI application: This option provides a readymade application. It is an attractive option for small and medium size business. Vendors which provide these options are Cloud9, Analytics, Rosslyn Analytics, Lixto, SAS, IBM Cognos [9].

iv. Public Cloud or externally hosted SaaS BI for operational reporting on cloud based operational data: It is simply a cloud based reporting system on operational data typically from a cloud based transaction processing system such as Salesforce.com. E.g SAP BusinessObjects CrystalReports.com for Salesforce [9].

v. Private clouds BI system: This option is at inception in terms of usage. Cloud based BI system known is IBM's internal Blue Insight which is based on IBM system Z & IBM Cognos 8 BI. Large EDW are unwilling to move to private clouds due to scalability and total cost of ownership of private cloud [9].

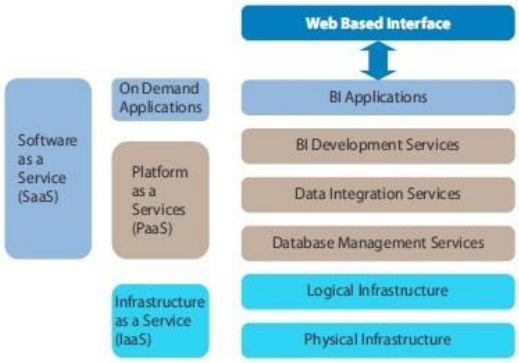

Fig 5.1.1 *Cloud BI Model*
[Source adapted from: 15]

6 CLOUD COMPUTING BENEFITS FOR BI

1. Total Cost of ownership: Most notable advantage of using BI on cloud is reduction in cost of total ownership from inception to final deployment stage [13].

2. Mobility: An organization can access their application anywhere, anytime through internet connection is the most distinct feature of using cloud for BI.

3. Reliability: Cloud vendor are responsible for data storage and its recovery. Vendor uses their own encryption, backups and security to provide reliability [1].

4. Time: The time taken to setup and make application live is decreased as there is need for setting up a new infrastructure [15].

5. Pay as you go: Vendor charge for the services used. These services provided are of very low cost. Therefore deployment can be scaled up to down on requirement [1].

6. Upgrades: When using SaaS upgrades are done by the vendor there is no need to pay extra for upgrades [1].

7. Support: Vendors provide their support in fields of the services being used whenever there is any issue [4].

7 CONCLUSION

Business organizations look for positive figures in every fiscal year. Due to volatile business environment it is difficult to control BI project budget, Cloud BI decreases the total cost of ownership. Using Cloud services and deployment model organization makes BI application mobile from remote locations to make important decisions. On premise development of BI system requires a lot of time as well as cost of ownership is high. Cloud BI gives various options for deploying BI system.

ACKNOWLEDGMENT

We wish to thank our mentor Mrs.Krantee Jamdaade for guiding us and giving us the motivation. The inputs given by our mentor was very valuable in getting the review done.

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