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A Proposed Framework to Use Cloud Computing Power in Business Intelligence

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Abstract

With the increased need for business intelligence processes in organizations for taking key decisions, providing the resources needed to store and process large amounts of information is increasingly considered. In the near future, with the increasing volume of data stored, enabling the provision of appropriate hardware or software in organizations to host these services within the complex would be unjustified. In this article we proposed a framework, called "Business Intelligence as a Service" (BIaaS). In this framework business intelligence software are going to present as a service to organizations with the help of cloud computing. Challenges in the implementation of these systems can be design a framework with high interactivity, flexibility and also provide the resources for the systems in times of need (dynamic allocation). The advantage of this method is continuous access to information (inside or outside the organization) and low infrastructure cost to implement or update. In this article we discuss the software and hardware architecture to build this framework.

Keywords: Business Intelligence, Cloud Computing, Software, Hardware, BIaaS Architecture

Introduction:

Business intelligence (BI) is a set of theories, methodologies, architectures, and technologies that transform raw data into meaningful and useful information for business purposes. BI can handle enormous amounts of unstructured data to help identify, develop and otherwise create new opportunities. BI technologies provide historical, current and predictive views of business operations. Common functions of business intelligence technologies include reporting, online analytical processing (OLAP), analytics, data mining, process mining, complex event processing, business performance management, benchmarking, text mining, predictive analytics and prescriptive analytics. (Ghosh et al, 2015)

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In recent years, relying on the data in organizations is rising. This opportunity in organizations caused creating a variety of business intelligence tools for various platforms, including smartphones and the Internet.

Despite of excellent business utility of BI and OLAP framework, many business owners were compelled to look for its alternative because of uncontrolled increase in computing and storage resource requirements in self hosted environments. At some stage, the cost of maintaining and upgrading the BI and OLAP framework becomes unjustified for a business. (Prestom, 2007)

However, the unique selling points of Cloud computing offer exactly what businesses need to successfully run BI and OLAP frameworks-unlimited resources, resource elasticity (resources on demand), moderate usage costs, high uptime and availability, high security, no hassles of upgrading and maintaining loads of servers and databases, and so on. (Convey, 2010)

In this article we look at transition of business intelligence service to the cloud computing environment, in terms of hardware and software and also examine the challenges on this issue.

Software Layer:

Business Intelligence concept refers to a set of technologies and processes (e.g. online analysis servers, data warehousing, data mining systems, decision support systems, knowledge management systems, etc.) that work together in the form of a structured middle-ware in the name of Business Intelligence.

This middle-ware's tasks could be noted as, ability to aggregate input data from different sources, present data in different ways as well as the ability to manage data in a way that could resolve the various service needs.

In Figure 1, the overall structure of business intelligence software has been introduced. By analyzing this figure we can identify two stages in the process of business intelligence: ETL (Extract–Transform-Load) step and the reporting/data analysis. In the first stage after receiving data in different ways (with various structure and different formats) we enter ETL stage. At this point, after aggregation received data, it's going to be converted to the required system structure. (generally, in business intelligence software the data turns to online analytical processing cubes) ultimately, the created data should be stored in data warehouses.

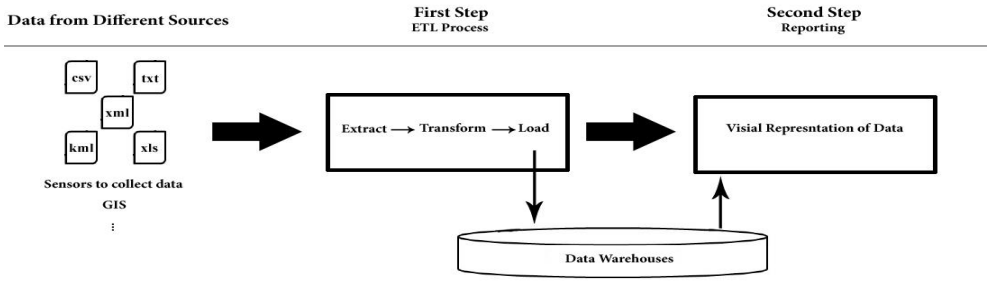

Figure 1 - Data Processing Steps in BI Applications.

In second stage, after preparation the required data, by using reporting tools, periodic reports or momentary reports can be set up. Periodic reports are automatically created in system (e.g. every 12 hours) but the momentary reports are custom-built and going to be prepared on user's demand.

To implement business intelligence software in cloud platform there is a variety of open source or commercial tools available to use. As proposed framework for understanding the basis, based on (Di Sano, 2014) research, we can use Pentaho Community Edition 5.0 software technology that combines business intelligence tools (in regard to implementation needs to take BI in cloud) as below:

- Pentaho BI Server: it is an application server based on Apache/Tomcat, which mounts the BI engine (called Mondrian).
- Pentaho Data Integration: it is the ETL (Extract-Transform-Load) tool. It can be used as stand-alone application to visually design transformations and jobs.
- Pentaho Schema Workbench: it is a visual design interface which allows to create and test Mondrian OLAP cube schemas.
- C*Tools (Community Tools): they emerge in response to market demand for outstanding dashboard user interfaces and data driven requests. It is based on different frameworks (CDF, CDA, CC2, CGG, etc.).
- Saiku Analytics: it is a lightweight OLAP application designed to offer analytics quickly and easily. Moreover, it can be embedded into Pentaho BI server.
- Others (Pentaho Report Designer, Pentaho Aggregation Designer, Pentaho Metadata Editor, Big Data supporting tools, etc.).

Hardware Layer:

Infrastructure of BI software includes an array of software servers and database servers that are connected to the cloud. To find challenges in implementation of this infrastructure, OPNET simulation software used to simulate network architecture and find desire compounds.

The proposed model consists of six corporation each of which has 500 users, in this model 3000 concurrent users are using OLAP servers (4 OLAP servers), requests are sent to an array of database servers (8 RDBMS servers). These servers are contacting each other and cloud network with help of 4-routers. (Al-Aqrabi et al, 2014)

Queries in Online Analytical Processing Software are typically 10 to 12 times heavier than query in the traditional databases. The reason is due to the fact that multi-dimensional data need to be fetched from different tables to prepare OLAP cubes.

Based on the criteria defined in (Al-Aqrabi et al, 2014) research, the main challenges in implementation of cloud BI is as below:

- Compliance of the BI application with web services architectural standards (and the standards defined by the SaaS or PaaS provider, like Google Apps standards).

- Deployment of massively parallel data-warehousing system with evenly distributed query load and even patterns of response times from all database servers.
- The network architecture should be designed in such a way that the query load can be evenly distributed among the servers in an array.

Business intelligence along with Online Analytical Processing cubes needs a lot of resources. The system has a multi-layered architecture including multi-dimensional Online Analytical Processing cubes with multiple matrices, which represents the relationship between different business variables. Implementation of business intelligence systems with large amounts of data in distributed environments (cloud) requires powerful database servers with the ability to evenly distribute load.

Impact of Cloud Computing on BI:

Business intelligence in the context of cloud provides an opportunity to organizations and small businesses so they can speed up the process of developing their company at the lowest cost with BI techniques. The cost of providing infrastructure, update BI's hardware or software in organizations is ongoing hurdles implementing issue.

With transfer business intelligence into cloud platform, In addition to overcoming the enormous costs of maintaining the Intended infrastructure, features including the ability to access information at anytime, anywhere, service scalability capabilities along with high volume processing data with minimal effort, and using every cloud features (e.g. Security protocols, high performance due to the use of cache at different levels, data encryption, ability to share data without any infrastructure within the company, low cost to set up infrastructure and cost of ownership, etc.) can be mentioned.

Conclusion:

In this paper, the idea of Business Intelligence as a Service (BIaaS) were discussed, and gave explanations on the proposed architecture in terms of hardware and software, also at the end, the challenges related to implementation of BI systems were discussed.

Cloud is an important part of the future of BI, it provides advantages in the terms of cost efficiency, flexibility, scalability in development, improve reliability and resource sharing. Cloud computing offers significant computing power and capacity. Because of this BI expected to enter specialized fields, which in traditional BI (host inter-organizational service) were impossible. Software in field of disaster or crisis management in real time, urban management, the global economy are a number of fields due to the processing capabilities of cloud computing can affect in the future.

Size, scale, dynamics, range of matrices and data warehouses in the cloud may exceed the Petabytes limit (Big data challenge) software based on this amount of data can’t use traditional systems and also compliance with security issues in this enormous amount of data will be different and more complex. For this reasons, introducing BIaaS opens new opportunities for researchers.

References:

H. Al-Aqrabi, L. Liu, R. Hill, N. Antonopoulos, Cloud BI: Future of business intelligence in the Cloud, J. Comput. Syst. Sci. 81 (2015) 85–96.

M. Di Sano, (2014) Business Intelligence as a Service: a new approach to manage business processes in the Cloud. WETICE Conference (WETICE), 2014 IEEE 23rd International.

N. Convery, Cloud computing toolkit: guidance for outsourcing information storage to the Cloud, Department of Information Studies, Aberystwyth University, UK and Ireland: Archives and Records Association, pp. 4–70, 2010.

R. Preston, We've yet to even reach the wonder years of BI, in: Information Week, 1–8 January 2007, ABI/INFORM Glob. 1120 (2007) 62.

R. Ghosh, S. Haider, S. Sen, (2015) an integrated approach to deploy data warehouse in business intelligence environment. Computer, Communication, Control and Information Technology (C3IT), 2015 Third International Conference on.