Review Report: Integration of DBMS with Cloud Computing

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ABSTRACT

Cloud computing refers to the provision of computational resources on demand through computer networks. Applications of cloud computing include databases, file services, email, etc. Our article emphasize to look into the current hot field of cloud computing. Basically a cloud based DBMS is a distributed database that delivers computing as a service instead of a product. It is the allocation of resources such as software and information among multiple devices over a network which is mostly the Internet. This is assumed that this number will increase exponentially in near future. A Cloud database management system is a distributed database that brings computing as a service beyond a product. A cloud computing system with database management system is the allocation of required resources, software and information between different devices over a network which is basically on the internet. Further, there is a emerging interest in outsourcing database management tasks to third parties that can provide these tasks for much lower cost due to the economy of scale just like putting it into the cloud. We summarize the concept of cloud computing, the segments of cloud computing is classified into three broad categories, application, storage and connectivity. Each segment serves a different purpose and offers different products for business and individuals around the world.

In this article, we discuss the recent trends in database management system and the possibilities of making it as one of the services offered in the cloud. We also proposed architecture of database management system in the cloud.

Key words: *DBMS, Database Management System, Cloud computing*

1. INTRODUCTION

Cloud computing is a technology that uses the internet and central remote servers to maintain data and applications. Cloud computing allows consumers and businesses to use applications without installation and access their personal files at any computer with internet access. This technology allows for much more efficient computing by centralizing storage, memory, processing and bandwidth.

As a metaphor for the Internet, "the cloud" is a familiar cliché, but when combined with "computing," the meaning gets bigger and fuzzier. Some analysts and vendors define cloud computing narrowly as an updated version of utility computing: basically virtual servers available over the Internet. Others go very broad, arguing anything you consume outside the firewall is "in the cloud," including conventional outsourcing

In recent years, database outsourcing has become an important component of cloud computing. Due to the rapid advancements in a network technology, the cost of transmitting a terabyte of data over long distances has decreased significantly in the past decade. In addition, the total cost of data management is five to ten times higher than the initial acquisition cost.

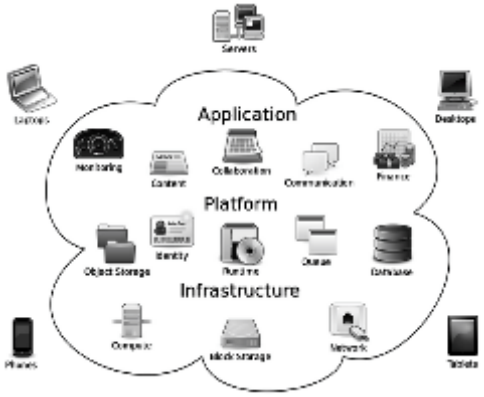

Figure -1. Cloud Computing

As a result, there is a growing interest in outsourcing database management tasks to third parties that can provide these tasks for much lower cost due to the economy of scale. This new outsourcing model has the benefits of reducing the cost for running Database Management System (DBMS) independently. Cloud computing economics leveraging the power of multi-tenancy delivers extremely fast shared storage at a dramatically reduced cost. Virtualization then compounds these advantages by enabling users to scale elastically and to pay only for the resources they use.

The cost/performance advantages have decisively shifted in favor of the shared-disk DBMS. It is just a matter of time before the shared-disk DBMS establishes dominance in the cloud. A Cloud database management system (CDBMS) is a distributed database that delivers computing as a service instead of a product. It is the sharing of resources, software, and information between multiply devices over a network which is mostly the internet.

2. CLOUD COMPUTING

The all advantages of cloud computing are considered by developing an architecture with fetching characteristics such as favored scalability, calculated consumption and self service. And one of the Best advantages of cloud computing is its flexibility in the face of changing conditions. According to the example, during periodic or unanticipated transfix in demand for a product distributed by an e-commerce company or during an integral growth condition for a social networking Website with the computational resources those can be allotted on the fly to control the expanded demand in minor minutes. Furthermore, in this matter, one only gives for what one needs, so entire resources can be received to control pricks in load and then discharged once the spike has diminished. Although, to take initial computational resources is not simple like a magic update to a greater one, the extreme powerful machine on the fly; or, the initial resources are basically gained by allotting additional server instances to a task. So far having DBMS in the cloud will give more advantage in rapid and elastic computing system A Database Management System is a collection of programs that enables you to store, modify, and extract information from a database

2.1. Example of Cloud Computing

A simple example of cloud computing is Yahoo email, Gmail, or Hotmail etc. You don't need software or a server to use them. All a consumer would need is just an internet connection and you can start sending emails. The server and email management software is all on the cloud (internet) and is totally managed by the cloud service provider Yahoo, Google etc. The consumer gets to use the software alone and enjoy the benefits. The analogy is,

2.2. Major cloud computing advantages include:

a) Less maintenance: Hardware, applications and bandwidth are managed by the provider.

b) Continuous availability: Public cloud services are available wherever you are located.

c) Scalability: Pay only for the applications and data storage you need.

d) Elasticity: Private clouds can be scaled to meet your changing IT system demands

e) Expert service: Expedient's cloud computing services are continuously monitored and maintained by our onsite staff of expert data center technicians.

2.3. Requirement of Cloud Computing

Cloud computing comes into focus only when you think about what IT always needs: a way to increase capacity or add capabilities on the fly without investing in new infrastructure, training new personnel, or licensing new software. Cloud computing encompasses any subscription-based or pay-per-use service that, in real time over the Internet, extends its existing capabilities.

Cloud computing is at an early stage, with a

motley crew of providers large and small delivering a slew of cloud-based services, from full-blown applications to storage services to spam filtering. Yes, utility-style infrastructure providers are part of the mix, but so are SaaS (software as a service) providers such as Salesforce.com. Today, for the most part, IT must plug into cloud-based services individually, but cloud computing aggregators and integrators are already emerging.

2.4. Cloud Characteristics

Cloud computing is a sharing of resources to achieve coherence and economies of scale, similar to a utility over a network. The cloud service also focuses on maximizing the effectiveness of the shared resources. The cloud resources are usually shared by multiple users as well as dynamically reallocated per demand.

The cloud characteristics are

a) On-demand self-service: A consumer can gain computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service's provider.

b) Measured service: The cloud systems automatically control and optimize resource use by leveraging a metering capability at some level of abstraction appropriate to the type of service. The resource usage are managed, controlled and reported, providing transparency for both the provider and consumer of the utilized service.

c) Resource pooling capability: The computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and then reassigned according to consumer demand.

d) Broad network access: The capabilities are available over the network and are accessed through standard mechanisms that promote used by heterogeneous thin or thick client platforms (e.g., mobile phones, laptops, and PDAs).

e) Rapid elasticity: The cloud is flexible and scalable to suit your immediate business needs. You can easily remove users, software features, and other resources also.

2.5 Cloud Computing Applications

The applications of cloud computing are practically limitless. With the right middleware, a cloud computing system could execute all the programs a normal computer could run. Potentially, everything from generic word processing software to customized computer programs designed for a specific company could work on a cloud computing system.

Clients would be able to access their applications and data from anywhere at any time. They could access the cloud computing system using any computer linked to the Internet. Data wouldn't be confined to a hard drive on one user's computer or even a corporation's internal network.

It could bring hardware costs down. Cloud computing systems would reduce the need for advanced hardware on the client side. You wouldn't need to buy the fastest computer with the most memory, because the cloud system would take care of those needs for you. Instead, you could buy an inexpensive computer terminal. The terminal could include a monitor, input devices like a keyboard and mouse and just enough processing power to run the middleware necessary to connect to the cloud system. You wouldn't need a large hard drive because you'd store all your information on a remote computer.

Servers and digital storage devices take up space. Some companies rent physical space to store servers and databases because they don't have it available on site. Cloud computing gives these companies the option of storing data on someone else's hardware, removing the need for physical space on the front end.

If the cloud computing system's back end is a grid computing system, then the client could take advantage of the entire network's processing power. Often, scientists and researchers work with calculations so complex that it would take years for individual computers

to complete them. On a grid computing system, the client could send the calculation to the cloud for processing. The cloud system would tap into the processing power of all available computers on the back end, significantly speeding up the calculation.

3. DATABASE MANAGEMENT SYSTEM

A database management system (DBMS) is a software package with computer programs that control the creation, maintenance, and use of a database. It allows organizations to conveniently develop databases for various applications by database administrators (DBAs) and other specialists. A database is an integrated collection of data records, files, and other objects. A DBMS allows different user application programs to concurrently access the same database. DBMSs may use a variety of database models, such as the relational model or object model, to conveniently describe and support applications. It typically supports query languages, which are in fact high-level programming languages, dedicated database languages that considerably simplify writing database application programs.

3.1 DBMS as a Cloud Service

Most DBMS or database management systems are simply software packages that users can acquire to create, maintain or use a database. However, since the introduction of cloud computing, DBMS has morphed into an entirely new type of service with its own unique benefits and task specific advantages. For one thing, any type of cloud service model will have to employ a dedicated cloud DBMS in order to truly provide customers with excellent access to data and databases. Traditional DBMS's are simply not set up or equipped to deal with the demands of cloud computing. And of course, if DBMS was deployed as a service as part of a larger package provided, it would likely be much more efficient in its duties and therefore cheaper in the long run.

The concept of the DBMS has been around since the beginning of commercial computing; such as

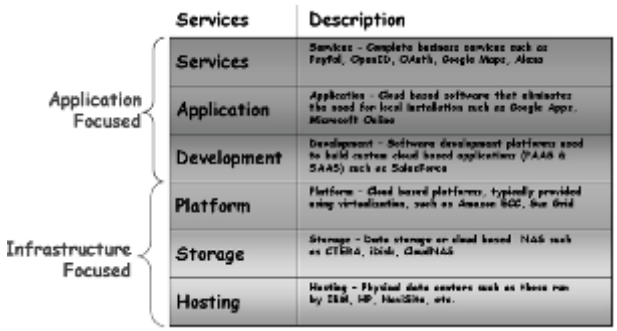

Figure 2.Cloud Computing Service layers

the navigational DBMS of the1960's. Database management systems are one of the oldest integral components of computing, essentially making it possible to scan, retrieve and organize data on hard drives and networks. All DBMS, despite whether traditional or cloud-based, are essentially communicators that function as middlemen between the operating system and the database.

How is a cloud DBMS different a traditional one? For one thing, cloud-based DBMS are extremely scalable. They are able to handle volumes of data and processes that would exhaust a typical DBMS. Despite their scalability however, cloud DBMS are still somewhat lacking in their ability to scale up to extremely large processes; this is expected to be remedied in the coming months and years however. Currently, the use of cloud DBMS's are principally used in the testing and development of new cloud applications and processes. But while a stand-alone DBMS can be used on a cloud infrastructure; most are not designed to take full advantage of cloud resources. DBMS as a cloud service-type models seek to capitalize on the disparity between antiquated DBMS models and their lack of full cloud functionality.

Cloud DBMS may utilize all of these components or may have devised new strategies that combine one or more elements

On the other hand, data management tools are an important part of relational and analytical data management business since business analysts are often not technically advanced and do not feel comfortable interfacing with low-level database software directly. These tools typically

interface with the database using ODBC or JDBC, so database software that want to work these products must accept SQL queries. Therefore, a novel technology to combine DBMS capability with Cloud scale scalability is highly desirable.

3.2. Need of Cloud in DBMS

Database Management Systems as a cloud service are engineered to run as a scalable, elastic service available on a cloud infrastructure. These DBMS are available only as a cloud offering and are not necessarily relational. For example, Microsoft's SQL Azure is fully relational DBMS, while Microsoft's SQL services, Amazon's simple and Google's Big Table is not relational and has different persistence models. Cloud-based DBMS services are provided in a multi-tenancy environment with elastic resources allocation, for use in simple to complex transactions. DBMS as a cloud service excludes those DBMS that will run on the cloud infrastructure, but are not purpose-built as a cloud service. Most of the currently available DBMS engines will run on cloud infrastructure, but are not specifically engineered to take advantage of the cloud. This differentiation is the reason for the change in name from "DBMS in the Cloud" to "DBMS as a cloud Service"; running on cloud infrastructure does not define a DBMS as a cloud service. All currently available cloud DBMS are relatively new. SQL azure, the only fully relational DBMS available, began full production at the beginning of 2012 and still has some size limitations; Microsoft plans to reduce, and eventually lift, these restrictions. Today, DBMS as a cloud service are used primarily for development and testing of applications- where database sizes are small and issues of security and collocation with multiple users are not concern. One big advantages of cloud DBMS is their elasticity: the more you use, the more you pay; the less you use, the less you pay.

3.3 DBMS in Cloud Architecture

Above is a proposed DBMS in Cloud

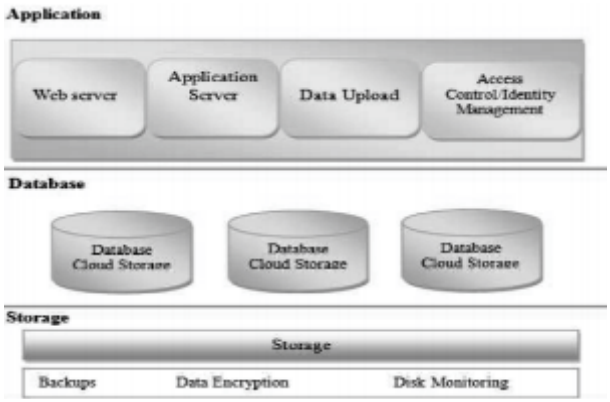

Figure 3.DBMS in the Cloud Infrastructure

Architecture, first layer is the storage, followed by databases and the upper layer is application layer. In terms of performance, it provides efficient data access with a better distribution of values for some data. Stores frequently used SQL statements in memory, avoiding the need for time-consuming recompilation at run-time. Produces a detailed report on each step used for data access, allowing you to accurately implement performance enhancements. Data is encrypted when stored or backed up, without any need for programming to encrypt and decrypt.

4. CONCLUSION

Without a doubt, cloud computing is truly a revolutionary concept for many business organizations. Because of the technology's ease of adoption, significantly lower maintenance costs and greater workflow efficiency, there is no doubt that cloud computing will gain widespread popularity going forward, For managers dealing with the growing demand for IT in their respective organizations, cloud computing presents itself as an all-in-one solution, being able to satisfy the growing IT needs while, at the same time, reducing energy usage- all at an affordable price.

Database Management Systems as a cloud service are engineered to run as a scalable, elastic service available on a cloud infrastructure. Cloud DBMSs will have an impact for vendors desiring a less expensive

platform for development. In this paper, we presented the idea of DBMS in the cloud, the possibilities to be offered as one of the services offered by promising capability of cloud computing, that is to be a DBMS as a Service. In this paper we proposed architecture of DBMS in the cloud.

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