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Cloud Service Based On Database Management System

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ABSTRACT
Cloud database management system is a distributed database that delivers computing as a service. It is sharing of web infrastructure for resources, software and information over a network. The cloud is used as a storage location and database can be accessed and computed from anywhere. The large number of web application makes the use of distributed storage solution in order to scale up. It enables user to outsource the resource and services to the third party server. In this paper, we discuss the recent trend in cloud service based on database management system and offering it as one of the services in cloud. We also proposed an architecture of cloud based on database management system.
Keywords – CDBMS, Cloud computing, DBMS, Database Management System.

I. Introduction

A cloud computing term refer to delivery of computing resources over the internet, that is, we are using the services over internet at another location to store information instead of keeping data on your own hard-disk or application for your need. To use software and hardware resources which are managed by third parties at remote location.

A cloud services reduces the cost and complexity of owning and operating computer networks and provide scalability, reliability and efficiency. In cloud computing the database outsourcing has become very important component nowadays. To the third parties there is very growing interest in outsourcing database management task, which provide task for lower cost due to economy scale [1]. Outsourcing model reduces cost for running DBMS.

II. Background

2.1 DBMS Characteristics

A collection of programs which enables you to store, modify, and to extract information from a database called as DBMS [2]. A database management system (DBMS) is some kind of a software package with computer programs which control the creation, maintenance, and use of a database system. So it is a collection of data records, files and other objects. DBMS generally supports query languages, which are high-level programming languages. The characteristics are [3]:

1) Self-describing nature of a Dbms: Database System contains the database itself as well as the descriptions of data structure and constraints (meta-data).
2) Support multiple views of data: View is a subset of the database which is defined and dedicated for particular users of the system. The Multiple users in the system might have different views of the system.
3) Data sharing: In data sharing the integration of the whole data in an organization has the ability to produce more information from a given amount of data.
4) Data independence: System data are separated from the application programs and changes to the data structure are handled by the DBMS and not embedded in the program.
5) DBMS provides backup as well as recovery facilities: If the computer system fails in the complex update process, the recovery subsystem is restored to the stage it was in before the process started executing.
6) Restricting unauthorized access: The DBMSs should provide a security subsystem to create and control the user accounts.

The examples of database applications are: computerized library systems, automated teller machines, flight reservation systems, computerized parts inventory systems.

2.2 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 [4]:

1) 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.
2) 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.
3) 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.
4) 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).
5) 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.

2.3 CDBMSs

A cloud DBMS (CDBMS) is distributed database that delivers computing as a service instead of product, which allow sharing of resources and information between multiple devices over internet [5]. CDBMS provide managed backup, restore and automated scheduling you may also able to pay little or nothing for unused time. One of the known example of this is SaaS (software as a service), which is an application that delivers through the browser to customers. SaaS also handle all software upgrades and make them promptly. A cloud database management system is a database that typically runs on a cloud computing platform, such as Amazon EC2, GoGrid, Salesforce and Rackspace.

There are two methods to run a database on the cloud [6]:

1) Virtual machine: A cloud platforms allow users to purchase virtual machine instances for a limited time and also possible to run a database on these virtual machines. The users uses their own machine image with a database installed on it as well as use ready-made machine images that already include an optimized installation of a database. For example, an Oracle provides ready-made machine image which have an installation of Oracle Database 11g Enterprise Edition on Amazon EC2.

2) Database as a service: Some of the cloud platforms offer options for using a database as a service but without physically launching a virtual machine instance for the database and this configuration. They do not have to install and maintain the database on their own. The provider which provides database service takes responsibility for installing and maintaining the database also the application owners pay according to their use. For example, Amazon Web Services provides three database services as part of its cloud service, an SQL-based database service with a MySQL interface.

III. Cloud Service In DBMS

The DBMS is a software that user use to create, delete and maintain a database. Due to introduction of cloud computing DBMS has emerged into a new type of a service having its own benefit. A cloud database is a database that involves variety of designing, developing of hardware and software. It is a system in which variety of computers are connected through network such as internet. Traditional DBMS are not well versed to deal with the growing demands of cloud computing. If DBMS is used as service for a larger package, it would likely be effective in its duties and cheaper in long run.

The concept of the DBMS has been around since the beginning of electronic computing. Database management systems are one of the oldest integral components of computing, essentially making it possible and easy to scan, retrieve and organize data on hard drives and networks. All DBMS, whether traditional or cloud-based, act as communicators between the operating system and the database.

How is cloud dbms different from traditional dbms? Cloud based dbms works on large volume of data that would exhaust a classical dbms. However inspite of being scalable cloud dbms are still somewhat lacking to process extreme large data. This is expected to be dealt in the coming years. Currently the cloud dbms are used for testing and development of new cloud processes and application.

Cloud DBMS combines data structures and the data query language and utilize all of dbms components or may devise new strategies that combine one or more elements. Most of the organizations are exploring their choice of working on cloud dbms instead of existing service. This strategy saves time spent on developing cloud DBMS's as well as enhances their overall efficiency, since traditional modeling languages are more than adequate for handling data.

Despite the benefits of cloud- based DBMS, many people still prefers existing system. This is most likely due to the various security issues that

have yet to be dealt with. These security issues involve the fact that cloud DBMS are hard to monitor since they often span across multiple hardware servers and contains variety of data and large amount of information is entered. Security becomes a serious issue with cloud DBMS because most of the services are outsourced to the third party, which makes it difficult to maintain the data security [7].

There is however proposed method for dealing with these issues. The security issues include identity management, computing resources, application security, privacy, legal issues [8]. A network security agent may be unable to handle extremely large and dense volumes of activity / traffic in case of deployment of an autonomous network agent, which rigorously monitor all activities related to database access and computations.

Arguably, the best solution for dealing with security issues is to employ continuous database auditing to deal with security. This will involves setting up a system that will continuously record, analyze and report on all activities regarding database access, specifically suspicious database access. All record information regarding these activities is logged and stored in an extremely remote and secure location with alerts being sent out to cloud agent/management in the critical situations. This will provide the in charge of security with the relevant logs information necessary to determine who is responsible, where the suspicious person is located as well as the specifics of their machine / hardware and diagnose it. While the complete deployment of a dedicated and thorough cloud DBMS hasn't occurred yet, it is under the continuous development. The emergence of a new proposed solution for database management as a cloud service models will open the door to a new era of cloud computing.

Many of the cloud databases are developed to run on a cluster of hundreds to thousands of nodes, and are capable of growing and serving data ranging from hundreds of terabytes to petabytes. Compared with classical relational database server, cloud databases may offer less querying capability and often weaker consistency guarantees, but it provide scalability and elasticity. Unlike traditional database, cloud database data is stored on dynamic server instead of a dedicated server.

IV. Need Of DBMS In Cloud

Database Management Systems as a cloud service are designed to run as a scalable, elastic service available on a cloud platform. Cloud based DBMS are structured only as a cloud offering and are not relational. For example, SQL Azure built by Microsoft is fully relational DBMS, while SQL services by Microsoft, Amazon's simple-db and Google's Big Table solution are distributed database cluster and have different persistence models. Cloud-based DBMS services are dynamic and have distributed environment with elastic resources allocation, for use in simple as well as complex transactions. Most of the currently available DBMS engines will run on cloud infrastructure, but are not specifically structured to take advantage of the cloud. This difference is the reason for the change in name from "DBMS in the Cloud" to "cloud service based on DBMS"; running on cloud infrastructure does not define a cloud service based on DBMS.

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Now a day, 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 people are not concern. One big advantages of cloud DBMS is its elasticity: the less you use, the less you pay; the more you use, the more you pay. Elasticity is a dynamic property that gives permission for a system scale to be increased on demand.

Initially, cloud DBMSs will benefit for vendors desiring a less expensive platform for development. As cloud infrastructure with DBMS gains maturity especially in scalability, elasticity, reliability and security. Cloud infrastructure is used for implementations in short-term projects and rapid development platforms will show marked reductions in cost, compared with implementations within the IT industry. This advantages reinforced by the ability to set up a cloud DBMS environment without the use of expensive IT personnel. The speed of setup will be a primary driver to rapid the deployment of systems without the usual requirements and planning necessary for IT projects within the IT industry. This will also minimize the necessity for IT to respond to short notice and short duration projects, reducing overall costs and saving time in IT department. Data management applications are potential candidates for deployment in the cloud. This is due to on premises enterprise database management system typically comes with a large, sometimes restrictive up-front cost, both in software and hardware. For many small vendors and companies (especially for start-ups and medium-sized businesses), the pay as-you-go cloud computing project, along with having someone else maintaining the hardware. Due to the rapid-increasing need for more analysis over more data in

today's corporate world, along with an architectural match that is currently available deployment options, we conclude that mostly read analytical data management applications are better suited for deployment in the cloud than transactional data management applications. We thus conclude a research agenda for large scale analysis of data in the cloud infrastructure, showing why currently available systems are not ideally-suited for cloud deployment, and arguing that there is a need to design a new DBMS, architected specifically for cloud computing platforms.

V. DBMS In Cloud Architecture

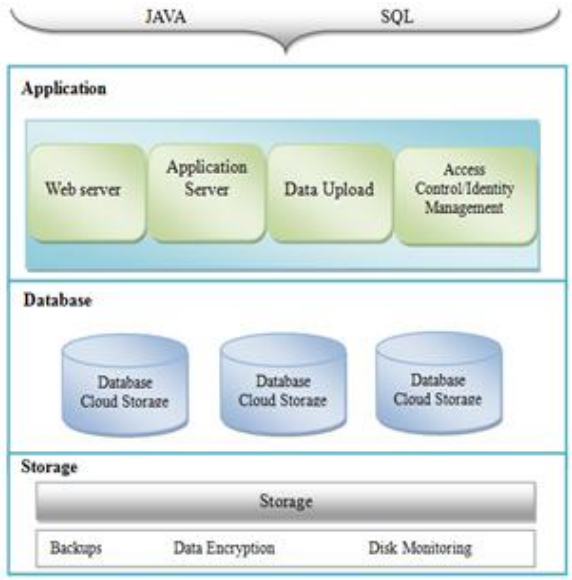

Figure 1: DBMS In Cloud Architecture

Above figure is a DBMS in Cloud Architecture, the first layer contains the storage layer, followed by databases layer and the upper layer is application layer. It provides efficient data access with a better distribution of values for the data. It stores frequently used SQL statements in memory in terms of performance and avoids the need for time-consuming recompilation at run-time. At the storage layer data is encrypted when stored in the database or backed up with no need of programming to encrypt and decrypt the database .The application layer produces a detailed report on each step used for data access and allows to accurately implement the performance enhancements.

VI. Conclusion

As suggested in this paper clouds can be used with distributed database for handling large volume of data. It enhances reliability, elasticity, availability, scalability and all these capabilities are provided at low cost with enhanced performance compared to the dedicated infrastructure. Cloud services based on DBMS are gaining acceptance from vendors desiring low cost of developmental platform. In this paper, we present the idea of cloud service based on DBMS. We also proposed an architecture of cloud based on database management system.

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