Chapter 10

Cloud Database Systems: NoSQL, NewSQL, Hybrid:

Balamurugan Balusamy  
VIT University, India

Nadhiya S  
VIT University, India

Sumalatha N  
VIT University, India

Malathi Velu  
RGM College of Engineering and Technology, India

ABSTRACT

In earlier days, people ran their applications or programs on a physical computer or a server. Cloud computing is a kind of Internet-based computing, where shared resources, data and information are provided to computers and other devices on-demand. Many business organizations were moving towards cloud because it provides flexibility, disaster recovery, security, collaboration etc.,. Relational Databases ruled the IT Industries for almost 40 years. Limitations of relational database lead to the rise of cloud database. A cloud database is a database that typically runs on a cloud computing platform. Cloud databases are on the rise as more and more businesses look to capitalize on the advantages of cloud computing to power their business applications. Cloud databases are mainly used in data mining, data warehousing and business intelligence. This chapter deals with different types of cloud database and how database influence capacity planning.

INTRODUCTION

A Database is a collection of information that is organized so that it can easily be accessed, managed, and updated. Computer databases typically contain aggregations of data records or files. Such as sales transactions, product catalogue, inventories and customer profile. Database Manager provides users with the capabilities of controlling read or write access, to specify report generation and analyzing usage.

A Cloud database is a type of database service that is built, deployed and delivered through a cloud platform. It is primarily a cloud Platform as a Service (Pass) delivery model that allows an organization, end users and their applications to store, manage and retrieve data from the cloud. A cloud database typically works as a standard database solution that is generally implemented through the installation of

a database software on top of computing or infrastructure cloud. It may be directly accessed through a web browser or a vendor provided API for application and service integration. Unlike a typical database, a cloud database may be scaled at run time, in which additional resources of storage and computing may assign instantly. Moreover, a cloud database is also delivered as a service, where the vendor directly manages the back end processes of database installation deployment and resource assignment task.

**LIMITATIONS OF TRADITIONAL DATABASE ARCHITECTURE**

The two specific Areas where the traditional database architecture is particularly limiting is IO and Transaction management.

Let’s start with IO. Bottom Line, there is simply too much of hit! The implicit disk synchronization requirements create bottlenecks. Given the constraints under which the original database architects worked, it was only natural for them to focus on maintaining strict data consistency through many of the locking and latching techniques. Despite recent advances in IO, these patterns simply no longer scale to meet today’s demand patterns.

The limitation is transaction management. From the below data (Figure 1) it is clear that only 12% of the time goes for processing the data request. The remaining time is for managing the buffer, locks and the latches.

The information size has expanded enormously to the scope of petabytes—one petabyte = 1,024 terabytes. RDBMS thinks that it’s testing to handle such enormous information volumes. To address this, RDBMS included more Central Processing Unit (or CPUs) or more memory to the database administration framework to scale up vertically. Most of the information arrives in a semi-organized or unstructured configuration from online networking, sound, video, messages, and messages. Be that as it may, the second issue identified by unstructured information is outside the domain of RDBMS because social databases can’t sort unstructured information. They’re outlined and organized to oblige organized information, for example, weblog sensor and budgetary information. Additionally, “huge information” is created at high speed. RDBMS needs in high speed since it’s intended for relentless information maintenance as opposed to quick development. Regardless of the fact that RDBMS is utilized to handle and store “enormous information,” it will end up being exceptionally costly. Subsequently, the failure of social databases to handle “huge information” prompted the development of innovations.

**CLOUD DATABASE MANAGEMENT ARCHITECTURE**

Five layered architecture for cloud database management is shown in Figure 2. The Five Layers are as follows:

1. External Layer
2. Conceptual Middleware Layer
3. Conceptual Layer
4. Physical Middleware Layer
5. Physical Layer