

Chapter 14

Significance of In-Memory Computing for Real-Time Big Data Analytics

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ABSTRACT

Cloud computing provides online access of users' data anytime, anywhere, any application, and any device. Due to the slower read/write operation of conventional disk resident databases, they are incapable of meeting the real-time, Online Transaction Processing (OLTP) requirements of cloud-based application, specifically e-Commerce application. Since In-Memory database store the database in RAM, In-Memory databases drastically reduce the read/write times leading to high throughput of a cloud-based OLTP systems. This chapter discusses In-Memory real time analytics.

INTRODUCTION

The In-Memory computing has been around since 1990s. Currently, more than 50 software vendors deliver In-Memory technology based solutions. Systems such as Network Routers, low-end Set-top Boxes without consistent storage are the early users of IMDS.

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Since the software used in these systems is running with minimal RAM and simple processor, IMDS or Main Memory Database system (MMDB) accelerated information storage, processing and retrieval storing data in RAM/DRAM. As there is no reading from or writing to secondary storage, transactions can be processed very quickly leading to elimination of processing overhead. In-memory systems can safely remove the buffer management and logging at the expense

of durability. IMDS are intended for distributed and scalable computing environments (VietHiP, n.d.).

Elimination of latency is the key design goal for IMDS. Virtualization, cheaper semiconductor memory and cloud computing altogether has revolutionized the development of advanced database systems. IMDS is having lots of potential for systems where transaction speed is of utmost importance.

Key areas where IMDS delivers business value are:

1. SaaS
2. AaaS (Analytics as a Service)
 - Financial Analysis
 - Performance management
 - ERP applications
 - Business Intelligence (BI)
 - CRM
 - Mobile BI
 - Industrial and business functions like Operational Reporting, strong set of Analytical tools and
3. Optimized integrated modules
4. Social Networking websites
5. Online gaming
6. Real time applications

The growing popularity of big data will compel lots of companies to use IMDS for dealing with very large Structure, Semi-structured, Unstructured and Hybrid data. This chapter discusses the salient features of seven popular In-Memory database systems. The In-database processing is discussed in brief.

REAL TIME ANALYTICS AND IN-MEMORY COMPUTING

Analytics is the term used to define data patterns that provide meaning to a business or an entity. Real-time analytics refers to analytics that is to be accessed as they come into the system. Real-time

analytics necessitate refreshed results such as page views, website navigation, shopping cart use or any other kind of online activity. These kinds of data can be extremely important to businesses for conducting dynamic analysis and reporting in order to quickly respond to trends in user online activities for strategic planning of business activities (Janssen, n.d.).

The exponential growth of cloud computing has resulted the explosion of data sources. The Internet based applications can be easily deployed in the cloud environment simply by starting or stopping members of cluster of web servers as well as application servers. Most of the cloud based solutions are real-time hence In-Memory databases are having lots of prospects for cloud computing applications. Lots of vendors providing database solutions are now coming up with their In-Memory database solutions. By using in-memory database technology, real-time applications for verticals such as financial services, digital advertising, telecom and mobile Web, can gain a number of benefits. The potential users of IMDS are real-time enterprise sector, such as Business Analytics, Capital markets (algorithmic trading, order matching engines, etc.), Real-time cache for e-Commerce and Web-based systems. An increase of 100 μ Sec of waiting time can dramatically reduce the probability that customers will continue to interact or return. In case of e-Commerce application this directly affects the profits.

Big data is all about leveraging information for its total worth i.e. extracting the maximum value from data at various points. The big data real time analytics are likely to be most benefited by IMDS, since In-memory databases are 10 to 100 times faster than conventional databases. Parallel computing techniques such as “MapReduce,” popularized by Hadoop platform has opened up lots of scope for analyzing very large data sets with reduced time, cost, complexity with higher efficiency. Emerging trends of integrating MapReduce analysis with In-memory

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