Chapter 15

Comparison Study of Different NoSQL and Cloud Paradigm for Better Data Storage Technology

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ABSTRACT

Advancements in web-based technology and the proliferation of sensors and mobile devices interacting with the internet have resulted in immense data management requirements. These data management activities include storage, processing, demand of high-performance read-write operations of big data. Large-scale and high-concurrency applications like SNS and search engines have appeared to be facing challenges in using the relational database to store and query dynamic user data. NoSQL and cloud computing has emerged as a paradigm that could meet these requirements. The available diversity of existing NoSQL and cloud computing solutions make it difficult to comprehend the domain and choose an appropriate solution for a specific business task. Therefore, this chapter reviews NoSQL and cloud-system-based solutions with the goal of providing a perspective in the field of data storage technology/ algorithms, leveraging guidance to researchers and practitioners to select the best-fit data store, and identifying challenges and opportunities of the paradigm.

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INTRODUCTION

In recent years, advancements in Web based technology and the proliferation of sensors and mobile devices interacting with Internet have resulted in immense data sets of user generated content triggered by Web 2.0 companies like Facebook, Google and Amazon.com. Even bigger banking firms like J.P Morgan Chase & Co., Goldman Sachs are facing similar issues of managing intense volume of forex trading and historical financial markets data used in compliance stress testing. These organizations are migrating gradually from traditional relational data base management systems (RDBMS) to more efficient and flexible solutions like NoSQL and Cloud computing. NoSQL solves the basic challenge of storage and retrieval of high-volume dynamic and transactional real time data sets whereas Cloud computing compliments the prior with high on-demand network access to a shared pool of computing resources (e.g., network, storage, applications and services) that can be rapidly used with reduced management effort. Despite the ideal characteristics of NoSQL data stores as cloud data management systems, added with cloud computing competence of shared access, it is difficult to choose an appropriate domain suited model due to the high diversity of these solutions available.

In this chapter, we will deliberate upon the characteristics & classification of NoSQL, as a cloud data management system and Cloud Systems, as the processing unit of the data lake for modern Web. The paper is organized to detail the Data Storage Technologies and Algorithms with focus on the driving factors behind the migration from RDBMS to NoSQL in the industry.

INTRODUCTION OF NOSQL DATABASES

Technology Background of NoSQL Databases

NoSQL as a database facilitates a structure around storage and retrieval of data. This data is organised in logical structures different from tabular relations often found in traditional relational databases. NoSQL database are also referred as Not Only SQL, is an methodology to data management and database design that’s useful for fairly large chunks of distributed data. NoSQL can also be called a non SQL or non-relational database. Since the late 1960s, Relational databases have existed but could not gain the title of “NoSQL” till the twenty-first century, emerged by the needs of companies categorised as Web 2.0 such as Amazon, Google and Facebook.

NoSQL databases were triggered due to the exponential growth of the Internet and the rise of traffic generated on web 2.0 applications. Google published the BigTable research in 2006, and Amazon published the Dynamo technical paper in the year 2007. These databases were designed to meet a new generation of enterprise companies.

Conflicting to presumptions caused by its title, NoSQL never prohibited structured query language (SQL). It’s a fact that some NoSQL systems are purely non-relational, while others simply avoid use of relational features such as fixed table schemas and operations on join. For example a NoSQL database might structure data into objects, key/value pairs instead of using traditional tabular relation.

The data arrangement used by NoSQL stores (e.g. wide column, key-value, graph or document) are not similar compared to default in relational databases, making some operations faster in NoSQL. The particular use case suitability of a NoSQL database is dependent on the business case it must solve. Oc-
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