



IJIRCCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 10, Issue 12, December 2022

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.165



9940 572 462



6381 907 438



ijircce@gmail.com



www.ijircce.com

NoSql Cloud Database: Introduction and Services

Shaily Kushwaha¹, Akanksha Kulkarni²

P.G Student, School of Engineering, Ajeenkya D Y Patil University, Pune, Maharashtra, India¹

Faculty, School of Engineering, Ajeenkya D Y Patil University, Maharashtra, India²

ABSTRACT: A cloud database is a type of database designed to operate in a hybrid or public cloud environment and aid in managing, organizing, and storing data for an organization. Cloud databases may be made available as managed databases-as-a-service (DBaaS) or may be operated on a virtual machine (VM) hosted in the cloud and self-managed by an internal IT staff. This research paper discusses the SQL database, NoSQL database and various cloud services which enable the us to use NoSQL databases.

KEYWORDS: NoSQL, SQL, Cloud, Database, Service(s)

I. INTRODUCTION

In this day and age of technological development cloud computing and big data are developing very fast. DBaaS i.e., database as a service is being used in the industry now to provide database cloud services [18,19,23,24]. Different clouds charge differently for the services they provide. They provide us services without us having to worry about the infrastructure, hardware maintenance. We can scale up and down as per our needs and there is an added benefit of adopting services which the Cloud Service Provider (CSP) provides [17].

Similar to a conventional on-premises database, there are two categories of cloud databases [7,8,9]. First off, relational cloud databases let you arrange data in established relationships to comprehend how data is logically related [7,8,9,11]. They are made up of one or more tables with columns and rows. You can query and change data in these databases using the structured query language i.e., SQL, which typically uses a predetermined data schema. They work best when dealing with huge amounts of structured data since they are incredibly reliable and constant. It includes those developed by SQL Server, Oracle, MySQL, PostgreSQL, Spanner, and Cloud SQL, and many more [7,8,9,11].

Second, non-relational cloud databases store and manage unstructured data like documents, surveys, rich media files, sensor data, and unstructured data from emails and mobile messages [7,8,9,11,12]. They let you save and arrange information independently of its format and don't adhere to a definite structure like relational databases. The non-relational databases MongoDB, Redis, Cassandra, Hbase, and Cloud Bigtable are a few examples [9,10,11]. There are four types of NoSQL data models [9,11,12,23]: -

1. Key-Value Stores: It stores hash tables (e.g., Amazon DynamoDB)
2. Document-Oriented Stores: It stores documents of tagged elements (e.g. MongoDB)
3. Column-Oriented Stores: It stores tables by column instead of rows (e.g. Cassandra, HBase)
4. Graph Stores: It stores data with the use of nodes and edges (e.g. Neo4J, OrientDB)

II. AMAZON NOSQL SERVICES

Amazon services which enable you to use NoSQL are: -

A. Amazon DynamoDB



Fig.1 Amazon DynamoDB [2]

Amazon DynamoDB is a non-relational database service which supports NoSQL with document and key-value database [8,2,11]. It also offers in-built security and is serverless, fully managed, and provides continuous backups [2,20].

B. Amazon DocumentDB



Fig.2 Amazon DocumentDB [1]

Amazon DocumentDB is a fully managed NoSQL database, is fast, scalable and uses JSON workloads [1,22]. It is also compatible with MongoDB, provides continuous backup and isolation from network [1,22].

C. Amazon Keyspaces (for Apache Cassandra)



Fig.3 Amazon Keyspaces (for Apache Cassandra) [3]

Amazon Keyspaces is managed with Apache Cassandra is a highly available, scalable service which allows you to encrypt your data by default and you can take backups using point in time recovery [3].

D. Amazon Neptune



Fig.4 Amazon Neptune [4]

It is a serverless graph database service provided by Amazon. It is scalable, highly available, can have six copies of data across three availability zones, provides automated backups and security through encryption and has IAM (Identity and Access Management) support [4].

E. Amazon Timestream



Fig.5 Amazon Timestream [5]

Amazon Timestream is a scalable, fast, serverless time-series database service which can process millions of queries per day, has in-built analytic functions for approximation, smoothing, and interpolation [5].

F. Amazon Quantum Ledger Database (QLDB)



Fig.6 Amazon QLDB [6]

A fully managed ledger database which provides immutable, transparent, and cryptographically verifiable transaction log wherein you don't have to worry about the integrity of the data. It tracks and maintains the history of application data change sequentially using an immutable and transparent journal [6].

III. OTHER SERVICES FOR DATABASES

There are other services for database SQL and NoSql in cloud: -

1. Amazon Relational Database Service (RDS): It is a managed relational database service and supports MySQL, PostgreSQL, MariaDB, Oracle BYOL, or SQL Server [15].
2. Azure SQL Database: It is a relational database service which is flexible, highly available and provides security for the data [13,25].
3. Azure Database for MySQL: It is a fully managed MySQL, cost effective, easy to set up, operate and scale [13, 26].
4. Azure Cosmos DB: It is a fully managed and serverless distributed database supporting open-source MongoDB, PostgreSQL, and Apache Cassandra [13,27].
5. Cloud SQL: It is a fully-managed database service which can be used with MySQL, PostgreSQL and SQL Server [14,30].
6. Cloud Spanner: It is a fully managed relational database with 99.999% availability, strong consistency and unlimited scale [14, 31].
7. Cloud Firestore: It is a scalable serverless document database [14, 29].
8. Oracle NoSQL database: It is a fully managed database service which supports JSON, table and Key-Value datatypes [16,32].

These are the names of a few services provided by GCP, Azure and AWS clouds.

IV. CONCLUSION

There are many database services that are provided in the cloud. As per our need we can use SQL or NoSQL services or the pricing at which they are provided we can choose the cloud service provider.

ACKNOWLEDGMENT

I would like to thank Miss Akanksha Kulkarni for guiding me throughout the process of making of this paper. I would also like to thank my family and friends for the support they provided in the process of making this paper.

REFERENCES

- [1] <https://aws.amazon.com/documentdb/> (Accessed : 20 November 2022)
- [2] https://aws.amazon.com/dynamodb/?trk=1e5631f8-a3e1-45eb-8587-22803d0da70e&sc_channel=ps&s_kwcid=AL!4422!3!536393613268!e!!g!!amazon%20dynamodb&ef_id=EAIAI_QobChMI9s-m6pO9-wIVv5hmAh32yw8ZEAAAYASAAEgJgdfD_BwE:G:s&s_kwcid=AL!4422!3!536393613268!e!!g!!amazon%20dynamodb (Accessed : 20 November 2022)
- [3] <https://aws.amazon.com/blogs/aws/new-amazon-keyspaces-for-apache-cassandra-is-now-generally-available/> (Accessed : 20 November 2022)
- [4] <https://aws.amazon.com/neptune/> (Accessed : 20 November 2022)
- [5] <https://aws.amazon.com/timestream/> (Accessed : 20 November 2022)
- [6] <https://aws.amazon.com/qldb/> (Accessed : 20 November 2022)

- [7] <https://bluexp.netapp.com/blog/aws-cvo-blg-aws-nosql-choosing-the-best-option-for-you> (Accessed : 20 November 2022)
- [8] <https://www.bairesdev.com/blog/sql-and-nosql-databases-in-aws-a-comparison/> (Accessed : 20 November 2022)
- [9] Shareef, Twana Hussein, Karzan Hussein Sharif, and Bilal Najmaddin Rashid. "A Survey of Comparison Different Cloud Database Performance: SQL and NoSQL." *Passer Journal of Basic and Applied Sciences* 4.1 (2022): 45-57.
- [10] Andreoli, Remo, and Tommaso Cucinotta. "Differentiated Performance in NoSQL Database Access for Hybrid Cloud-HPC Workloads." *International Conference on High Performance Computing*. Springer, Cham, 2021.
- [11] Samaraweera, G. Dumindu, and J. Morris Chang. "SEC-NoSQL: Towards Implementing High Performance Security-as-a-Service for NoSQL Databases." *arXiv preprint arXiv:2107.01640* (2021).
- [12] <https://bluexp.netapp.com/blog/azure-cvo-blg-azure-nosql-types-services-and-a-quick-tutorial#:~:text=What%20is%20Azure%20NoSQL%3F,greater%20variety%20of%20unstructured%20data.> (Accessed : 20 November 2022)
- [13] <https://azure.microsoft.com/en-in/products/> (Accessed : 20 November 2022)
- [14] <https://cloud.google.com/products#section-8> (Accessed : 20 November 2022)
- [15] https://aws.amazon.com/free/database/?trk=a049d6a3-611f-4ee9-9d3b-e88a4b66272f&sc_channel=ps&s_kwcid=AL!4422!3!548730527227!e!!g!!aws%20nosql%20database&ef_id=EA!aIQobChMIu-WVnra--wIVryErCh2bbQYhEAAYASAAEgIVMPD BwE:G:s&s_kwcid=AL!4422!3!548730527227!e!!g!!aws%20nosql%20database (Accessed : 20 November 2022)
- [16] <https://docs.oracle.com/en-us/iaas/nosql-database/index.html> (Accessed : 20 November 2022)
- [17] Shahida, B. "Exploring NoSQL Databases and Cloud Computing Security Implementations." *Journal homepage: www.ijrpr.com ISSN 2582* (2022): 7421.
- [18] Hillenbrand, Andrea, et al. "MigCast in Monte Carlo: The Impact of Data Model Evolution in NoSQL Databases." *arXiv preprint arXiv:2104.11787* (2021).
- [19] Zhang, Lei, et al. "JSON-based control model for SQL and NoSQL data conversion in hybrid cloud database." *Journal of Cloud Computing* 11.1 (2022): 1-12.
- [20] Perianayagam, Somasundaram, et al. "Amazon {DynamoDB}: A Scalable, Predictably Performant, and Fully Managed {NoSQL} Database Service." *2022 USENIX Annual Technical Conference (USENIX ATC 22)*. 2022.
- [21] Sicari, Sabrina, Alessandra Rizzardi, and Alberto Coen-Portisini. "Security&privacy issues and challenges in NoSQL databases." *Computer Networks* (2022): 108828.
- [22] <https://docs.aws.amazon.com/documentdb/latest/developerguide/what-is.html> (Accessed : 20 November 2022)
- [23] Matallah, Houcine, Ghalem Belalem, and Karim Bouamrane. "Comparative study between the MySQL relational database and the MongoDB NoSQL database." *International Journal of Software Science and Computational Intelligence (IJSSCI)* 13.3 (2021): 38-63.
- [24] Khan, Wisal, et al. "SQL and NoSQL Databases Software architectures performance analysis and assessments--A Systematic Literature review." *arXiv preprint arXiv:2209.06977* (2022).
- [25] <https://azure.microsoft.com/en-in/products/azure-sql/database/#overview> (Accessed : 20 November 2022)
- [26] <https://azure.microsoft.com/en-in/products/mysql/#overview> (Accessed : 20 November 2022)
- [27] <https://azure.microsoft.com/en-in/products/cosmos-db/> (Accessed : 20 November 2022)
- [28] <https://www.oracle.com/in/database/nosql/technologies/nosql/> (Accessed : 20 November 2022)
- [29] <https://cloud.google.com/firestore> (Accessed : 20 November 2022)
- [30] <https://cloud.google.com/sql/docs> (Accessed : 20 November 2022)
- [31] <https://cloud.google.com/spanner> (Accessed : 20 November 2022)
- [32] <https://www.oracle.com/in/database/nosql/technologies/nosql/> (Accessed : 20 November 2022)



INNO  SPACE
SJIF Scientific Journal Impact Factor

Impact Factor: 8.165

 **doi**[®]
cross **ref**

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

 9940 572 462  6381 907 438  ijircce@gmail.com



www.ijircce.com

Scan to save the contact details