



International Journal of Allied Practice, Research and Review

Website: www.ijaprr.com (ISSN 2350-1294)

NOSQL: The Backbone of Modern Web Applications.

BasitMaqboolMattu

M-Tech C.S.E Student 4th Semester

*Department of Computer Science & Engineering
Ganpati Institute of Technology and Management*

Abstract - The aim of this paper is to study about the NOSQL Databases and their importance towards the modern web applications. Here in this paper we will explain why NOSQL Databases are used as a back-bone for the development of today's web applications. Although it is very difficult to decide that which database is suitable for a design of our application? But if we compare NOSQL Databases with the traditional relational databases like MySQL or Oracle, there are some specific features which make NOSQL most suitable in the use of modern web applications as a back-end database. Nowadays, we only develop the web-based applications for which the need of NOSQL is very essential. Later, in this research paper we will also mention some characteristics which make a huge difference between NOSQL and the traditional databases. Today's applications need to have NOSQL Databases as a kind of back-bone for it since it is also the solution to the Big Data problem.

Keywords: *NOSQL, RDBMS, BASE, CAP, SQL, Big Data.*

1. INTRODUCTION

NOSQL Databases is such a growing technology which has gained a lot of importance in the modern world now. These databases are basically the non-relational databases and they do not use the relational databases. They are opposite of the SQL Databases. The main use of NOSQL is that they are able to manage the problem of Big Data. The Big Data problem is not only in terms of volume but also in variety and velocity also. The NOSQL can store large amounts of the data than the relational databases. The NOSQL are open source databases and are also distributed in nature. The web applications can make use of NOSQL Databases as it helps them overcome many limitations of the traditional relational databases. So we can rightly say that NOSQL Databases are known to be the back-bone of today's modern web applications. The NOSQL Databases are implemented as the back-end databases for the web applications. As we know, that any application cannot function or work properly without the use of the back-end databases. Now the applications are demanding new requirements which require the need of the NOSQL Databases for them. The web applications cannot function

effectively without the back-end support of the NOSQL databases. The NOSQL Databases find a good place for use in today's modern web applications. The NOSQL Databases have simple schema, are less costly, have horizontal scalability, are distributed in nature, can store large amounts of data and are usually open-source. The NOSQL Databases follow the BASE properties which means Basically Available Soft-State Eventually Consistent. This is the main property which makes them differ from the traditional relational databases or SQL. Now we will have a look on some strong reasons which motivate us to use only NOSQL Databases for today's applications.

II. REASONS WHY NOSQL IS BETTER THAN SQL FOR APPLICATIONS.

The big companies like Facebook, Twitter, Amazon, Google use the NOSQL Databases to fulfill all the enterprise requirements. The traditional databases were not able to manage particularly the unstructured data. It could manage only the structured data forms. The traditional databases have many drawbacks which make companies to switch towards NOSQL Databases. These traditional databases are also known as RDBMS. The IT Professionals nowadays want to make use of such databases which meet all the needs of the big enterprises and modern applications now. We can also say that with new data management strategies and growing users make way towards new technologies. The number of users are increasing to about 3 billion which are on daily basis connecting to web. Also, with new modern web applications we need to implement such a technology which could work for 24/7. IT professionals make huge differences between NOSQL and other databases. Now, if we have billions of users available who use web applications, then the database technology should be such which could manage all the users in a very efficient manner.

Let us know some major differences between NOSQL and RDBMS as follows:

1. The main limitation with all the RDBMS like Oracle, MySQL and SQL Server is that they make use of the relational tables which are related to some outcome known as the Schema. The RDBMS databases have the fixed schema structure and this implies to the user to know it in advance. But Big Data applications need a flexible schema structure which is quite efficient in storing the data. The Big data applications which are available today are based on schema-free structure.
2. The RDBMS are usually vertically scalable. The costs associated with implementing and enhancing them is very high in terms of the hardware required.
3. IT professionals need to use many CPU on single servers to increase performance. It is very difficult to manage huge load on the servers in case of the RDBMS. The RDBMS performance is very low in terms of data storage.
4. The RDBMS also support ACID transaction properties which is not better option nowadays as NOSQL support only BASE properties.

The NOSQL technology is fastest growing database technology which overcome many of the RDBMS databases. The main drive for the NOSQL technology were cloud computing, web application

and also very big users. The NOSQL provides horizontal scalability and schema-less features. The NOSQL databases are used by the LinkedIn company to support the increasing demand of the growing number of users. The NOSQL databases have many types like graph databases, key-value pair, column databases etc. Now let us study the main features of the NOSQL in detail as:

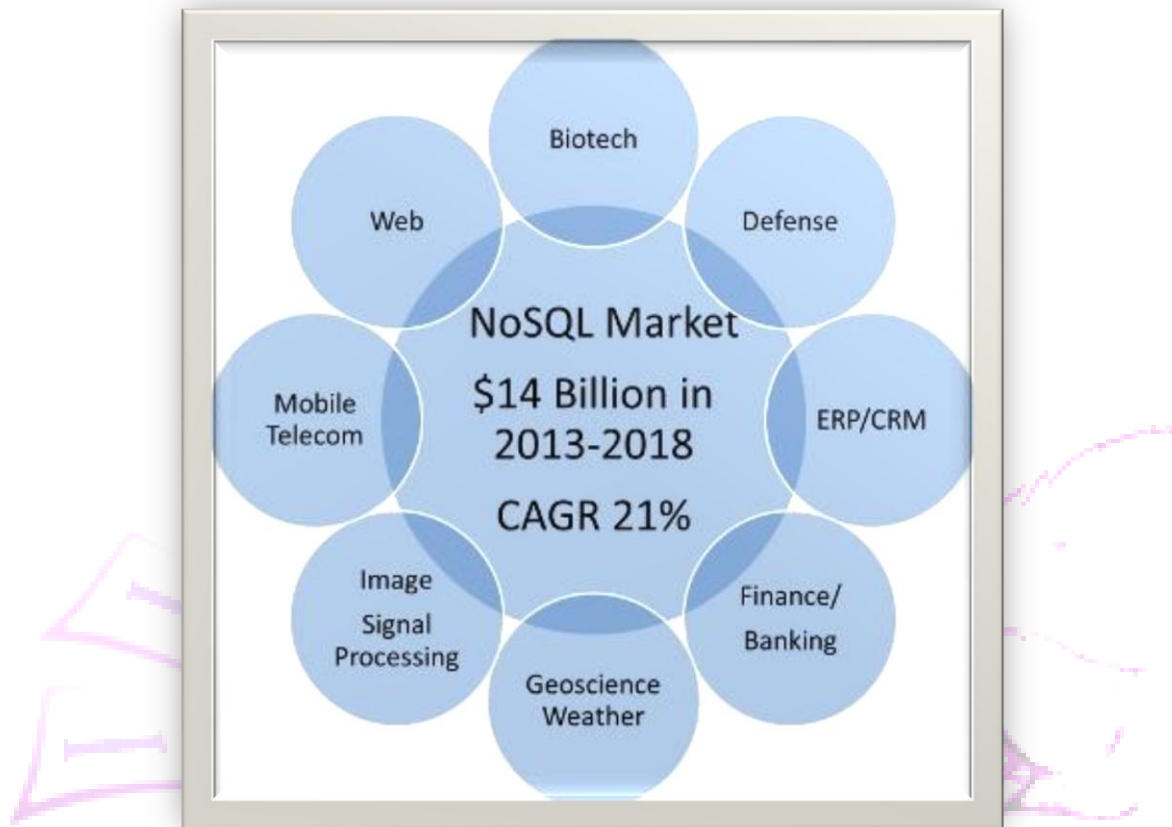


Figure 1: NOSQL Market.

1. Nature of Data and Its Storage- Tables vs Collections: The main point that the enterprises have to decide is that what kind of data should be stored and managed. As we know there are many forms of data such as structured, unstructured and semi-structured. The RDBMS databases could only manage the structured data. But the trend has changed which has led to manage also unstructured and semi-structured data. So the big data applications nowadays have unstructured and semi-structured data also. So we need such a technology which could manage all the forms of the data. The NOSQL databases use schema-free structure and do not use the join operations as well. The NOSQL databases make use of JSON- Javascript Object Notation which is much simple than hierarchy notations. Today, our data is in 3-D forms like that of engineering data, it could not be represented in the 2-D forms. The only way store this data is to make use of NOSQL databases such as CouchBase DB, Mongo DB, Cassandra etc.

These all databases are now increasing demand for the big companies like Amazon, Ebay, Facebook etc.

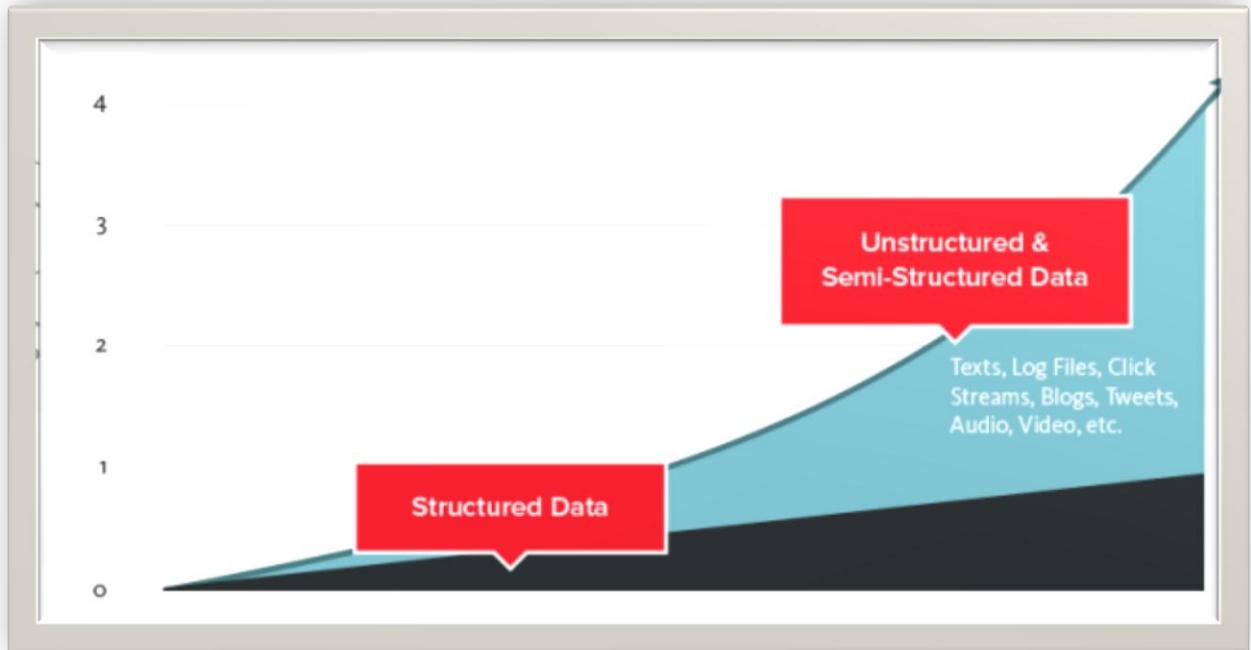


Figure 2:

2. Speed- Normalization Vs Storage Cost: The traditional RDBMS databases store data in the relational tables. But later these tables need to be broken down to reduce the redundant data present in it. The normalization was a technique which we used to carry on to reduce the redundant data in our tables. This process was good, but it has a limitation that it affected the performance factor. The NOSQL overcomes this problem in application, it stores the data in collections rather than tables, in which we hardly need to divide or break the data as whole data is represented as a single entity. So, NOSQL databases are less costly and have a very good performance than RDBMS.

3. Horizontal Scalability Vs Vertical Scalability: This is one of the most important features of the NOSQL databases over the SQL databases. All the NOSQL database technologies like HBase, Cassandra, MongoDB provide and support the feature called Horizontal Scalability. Using this feature in our applications we can manage the large group of users or customers easily. If I am dealing in some company A for example and if I have to manage thousands of customers at a time then I need to change my entire development process. The NOSQL databases make this process easier as it increases the performance by Horizontal Scalability as any number of nodes can be added and even removed at a time. It works in a distributed fashion as it distributes the load to other nodes as well. The NOSQL also provides data in real-time features also which was not possible with SQL databases. By using the Horizontal

Scalability feature the overall performance is increased with the help of the NOSQL Databases.

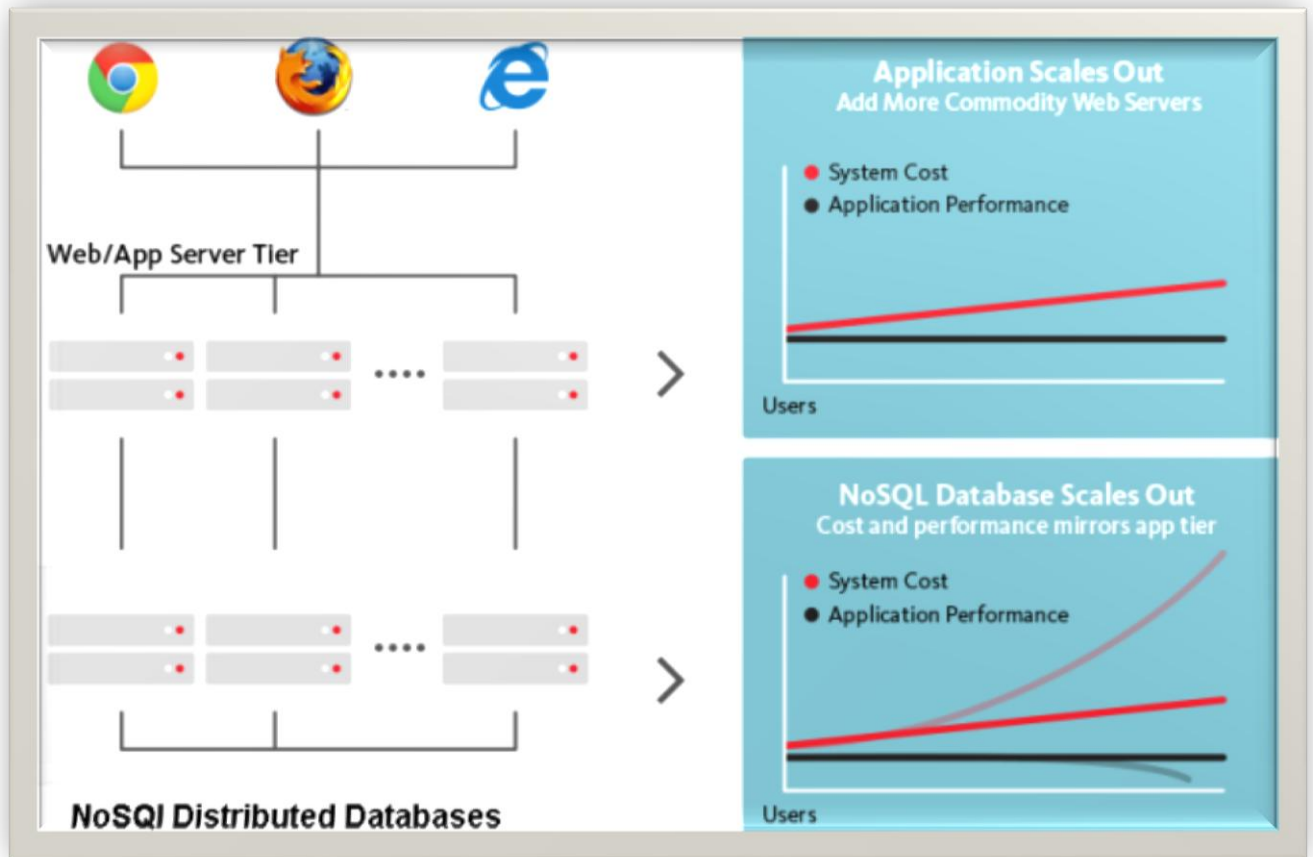


Figure 3:

4. NOSQL vs. SQL/ACID vs. CAP: The RDBMS are using the ACID properties from very beginning and they do not support all the new properties and attributes like NOSQL. It has seen its improvements only in the ACID attributes and most of venders also rely on these properties. The transactions must be non-dividable and usually the changes done to it should be permanent. NOSQL databases on the other hand work on the new concept known as the CAP. This the new theorem fulfilled and satisfied by the NOSQL databases and it is not possible for us to get all the three properties. These three properties are Consistency, Availability and Partition Tolerance. We can only attain at most only two of these properties. The BASE properties can be analyzed as the opposite of ACID as follows:

- B: Basically Available
- A: Available.
- S: Soft State.
- E: Eventually Consistent

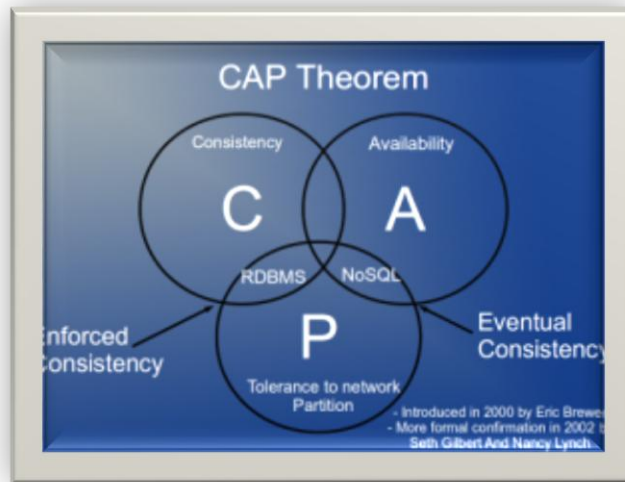


Figure 4:

III. ROLE OF NOSQL DATABASES IN MODERN APPLICATION

There has been huge shift in our choice of the applications. There has been many reasons behind this paradigm shift of the applications. The main reason behind it is the growing web. The increasing demands for the information processing and content analysis are also the major points. This is also known by the name Web 2.0. Now as more and more data is generated so, we need to have new added interactions known as Web 3.0.

There is a shift in the demand of the Web applications due to increasing demands of the rich data. We have to make the data available to all and all the sources must access the data properly. If we take an example of even some sites there also they are dependent on the companies and other third party and also on many data which is important for them. Now let us see how NOSQL plays an important role in their tasks and also the today's applications:

1. NOSQL Allows the Complex Structure: The SQL databases are only structured but they have so many added features like key fields, foreign key etc and also breaks the data in to further details also called as normalization. But the NOSQL can handle all the details efficiently without any normalization and all the data is put into a single entity.
2. NOSQL Aligns Rest-Based architectures: The NOSQL usually supports data in the form of JSON Documents. Thus making the coding of the information very easily. Also, the NOSQL has a feature that it has very efficient data and information processing feature.
3. NOSQL supports Scalability: SQL supports the vertical scalability thus making it very costly as it requires the hardware requirements etc. for it. The NOSQL databases has horizontal scalability

which means it makes adding and removing of the nodes much easier and cost efficient. It works in a distributed fashion and thus the load is equally distributed to the other to decrease the load and always improve the performance.

IV. CONCLUSION

After finishing up writing this paper I want to give my conclusion that before developing any web application, we must understand its basic requirements and its expectations. So we can say that it is only NOSQL now which meets all the requirements now and new trends are fulfilled with its use. We must also take into consideration all the data models drive which is a good choice for the NOSQL databases. The modern web applications can only function efficiently with the support of NOSQL Databases and all its modern requirements are satisfied with the use of the NOSQL Databases. In other words, we can also mention that NOSQL are the back-bone of the today's modern web applications. It has some important features which make them different from the traditional RDBMS or SQL databases

V. ACKNOWLEDGEMENT

I am sincerely thankful to all those people who helped me to write the research paper on this topic in my M-Tech. I want to also thank all those scholars and researchers who either carried some research on it or published some papers on the related topic, with the support of those people I was able to write this research paper on the topic "NOSQL: The Back-Bone of modern Web applications".

VI. REFERENCES

- Ameya Nayak, Anil Poriya, Dikshay Poojary, "**Types of NOSQL Databases and its comparison with the relational databases**" March 2013, International Journal of Applied Information Systems, Volume 5, No. 4, www.ijais.org.
- Vatika Sharma and Meenu Dave, "**SQL And NOSQL Databases**" August 2012, International Journal of Advanced Research in Computer Science and Software Engineering, Volume 2, Issue 8, www.ijarcsse.com.
- Dr K.Chitra and B.JeevaRani, "**Study on Basically Available, Scalable and Eventually Consistent NOSQL Databases**", July 2013, International Journal of Advanced Research in Computer Science and Software Engineering, Volume 3, Issue 7, www.ijarcsse.com
- Trevor Perrier and Fahad Pervaiz, "**NOSQL in a mobile world: Benchmarking Embedded Mobile Databases**".

- Santhosh Kumar Gajendran “ **A Survey on NOSQL Databases**”.
- Uma Bhat and Sharradha Jadhav, “**Moving Towards Non-Relational Databases**”, 2010, International Journal of Computer Applications Volume 1-No.13.
- A B M Moniruzzaman and Syed Akhtar Hossain, “**NOSQL Database: New Era of Databases for Big Data Analytics-Classification, Characteristics, and Comparison**” International Journal of Database theory and Application.
- Rabi Prasad Padhy, Manas Ranjan Patra, and Suresh Chandra Satapathy, “**RDBMS to NOSQL: Reviewing some Next Generation Non-Relational Databases**”, International Journal of Advanced Engineering Sciences and Technologies, Vol. No. 11, Issue No. 1.
- <http://www.wikipedia.com>.

