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**DATABASES – 4 ASSIGNMENT**

**A REPORT ON: -**

**NoSQL v/s Relational Database Systems**

1960’s, the time when the pc industry was only used for Enterprise systems, do help in business but the impact of it absolutely was not that significant. because the data storage capabilities were primitive if compared to today’s abilities. Before relational databases were a thing the industry was acting onnetwork and hierarchical models. CODASYL which is thatthe acronym for Conference/Committee on Data Systems Languages and thereforethe hierarchical model called IMS which is that the acronym for Information Management System. There was yet one more database system which belonged to the ‘Big Blue’ and was the sole commercially successful which was wont to help American Airlines with their reservation’s data, it absolutely was name SABRE acronym for Semi-Automated Business Research Environment. As computers became more and more cheap there was a requirement for an information storage system which was efficient and quick and also cost was a very important factor.

1970, at now of your time within the industry IBM was the largest and most dominant corporation in manufacturing computers for the enterprises. IBM has no competitors and whatever IBM put get in the market became the cornerstone of the industry irrespective of if it absolutely was not up to the mark. Edgar F. Codd was a mathematician working in IBM’s workplace, where he published a paper titled ‘A Relational Model of information for giant Shared Data Banks’ which introduced the globe to the relational databases that weallknow of today. Codd came up with theconcept of relational databases gaining inspiration from the relational calculus of mathematics. He used relational calculus becausethe model for the database. oneamongst themost reasons computerdatabase got popular is thanksto its ease withintheimplementation but as implementation was the boon, lack of efficiency and storage issues were the bane. One question that has always been around is ‘Even with variety of flaws, why has computerdatabase been so dominant?’ duringthis time, as weallknow was thebeginning of thepcindustry, and plenty of individuals had less knowledge about theinfo systems. Firstly, plenty of execs misinterpreted the name ‘Relational Database’ as someone who isn’t fully knowledgeable of the particular structure of the computerdatabase people thought that computerdatabase actually expressed relationships. But thereality was that the relational  
database was data described in grids or tables as we call them now with columns and rows which has their identifiers or name which in point of fact had no true relationship information but using the structure **is** manipulated to derive a relationship whether it's significant or not. As this was the time where non-technical people had plenty of say in technical things the name sounded catchy for business people they related them to relationships in organizations. the increase of relational databases had plenty to try and do with IBM’s dominance within the industry becauseit was thesole legit computer company as Hewlett Packard wasn't a giant player till then, so whatever IBM did became the default industry standard and therefore the best solution for the matter because it had no competitors.

NoSQL is that the industry’s answer to the issues of relational databases. NoSQL because the name suggests was founded on the thought of database engines that don't work on SQL. in concert of the most reasons computerdatabase isn't the simplest its low performance issues and unreliability.

Computer database engines supported SQL provide a primary functionalities of what SQL can perform with some extra additional features. Features like JOIN which isemployed tofeature two tables, TRANSACTION which istinychunk of program an can contain several tasks, LIMIT which returns a limit of records where queried, these set of functions or extra features aren't available in any NoSQL engines as these features are oneamongst themost causes of the performance and reliability issues. It hasto be noted that NoSQL isn't theright alternative of SQL or relational databases normally, employinga NoSQL or SQL system totally depends on th**e** wants of the systems it cannot be argued that NoSQL can provide great service in every scenario but the more rational argument is that NoSQL works better than SQL inan exceedingly lot of giant applications or datasets while SQL fails to stay up with the performance when the quantity is increased significantly. NoSQL as a full isincredibly different from the normal computer database systems as in NoSQL theinformation isn't stored in fixed table schemas. MongoDB is oneamongst theforemost popular NoSQL management systems within the industry and lots of huge companies have implemented it. it had been released in 2009, NoSQL database systems foster to the big scaled web applications as in these scenarios they outdo thenormal computer databasesystems. one amongst the most reasons Mongo does well in these scenarios is that the way it stores database, they needadopted BSON which is an acronym for Binary Encoding of JSON duringthis Mongo stores data as dynamic schemas of JSON like documents. MongoDB aims at four major and important things in new age application development and delivery theprimary one being flexibility, becausetheapplications are growing faster andthereforethe scale ofthose applications andthereforethe reach of thepurchasers is increasing minute by minute a database for such an application hasto be highly scalable andversatile as MongoDB supports replicated servers and also allows us to index it becomes easy for the applying providers to scale the applying with none concerns. The other is power or power of convenience, now is connected to the primary one as business have plenty of issues with this the legacy procurement pattern resultsin undervalue convenience.

MongoDB focuses to resolve this problem and build a full system which works well for the developer and also the customer or the user. the following one is speed, and this one has been related to databases lots as speed has been looked mutually of the first parameter to evaluate a decent management system. The upload and retrieval speed often is that the distinction between good and bad service and as Mongo’s counterpart which the computer database management systems are low on speed once they reach higher volume, speed has been one among the important pillars of MongoDB or NoSQL management systems normally. The last point is simple use, and it one among the foremost effective points because it dictates how the users are visiting interact with management system, it's important for any system to be easy to use for developers and user to implement their applications on.  
MongoDB primarily has ability to just accept great deal of knowledge it's due to the way it's designed once we compare the utmost value size of the 2 database there's a large discrepancy in both of them. Oracle database which is that the prominent computer database management system employed in the retail it to you incorporates a maximum value size of 4 KB while on the opposite hand, MongoDB has the utmost value size of 16 MB as you'll be able to see the beginning point of both the databases are way off and also the computer database is evidently on the lower side. Oracle database uses the integrity model which is known as ACID which is that the acronym for Atomicity, Consistency, Isolation and sturdiness. Where atomicity means, ensuring that the entire transaction takes place without delay or it doesn’t confiscating midway actions as there'll be no incomplete transactions as they will cause discrepancies within the database.

Consistency because the name suggests make sure that the management system is consistent before or after the transaction it can even be noted because the correctness of the database. in a very huge database, the database are often accessed from different services and that they are often called consecutively, Isolation ensures to take care of the consistency of the database in high transaction situations as inconsistency can cause variety of problems or the applying. Durability is one among the key aspects of electronic database management systems it ensures that after the transaction is completed all of the updates and also the modifications to the database are stored in and written to the disk which they reside within the disk whether or not a system failure occurs. The MongoDB works on the bottom properties which is an acronym for Basically Available, Soft State, Eventual Consistency all of those properties stem from the sooner important aspects that were the pillars for the creation of a NoSQL database.

As the time passed by there have been a lot of new NoSQL database management systems that have reached the market, following are some examples

Key – value stores (Distributed Hash Tables):

Major applications: Project Voldemort, Tokyo Cabinet, Riyak, Redis.

BigTable clone(Inspired by Google’s BigTable):

Major applications: HBase, Hypertable, Cassandra.

Document oriented Databases:

Major applications: MongoDB, couchDB.

Graph databases(Inspired by Graph theory):

Major applications: Neo4j, VertexDB, AllegroGraph, InfoGrid

Redis, may be a popular in-memory database system which is employed by lots of giants within the industry the one being Twitter they use Redis to bring new tweets as quick as possible. Key value stores may be employed in variety of places the primary use case that's highly regarded is for caching sessions and Redis has an favourable position over Memcached as Redis offers persistence. one in every of the most features of Redis is its consistent service it can provide a comparatively easy FPC platform and because of the disk persistence provided by Redis there'll be no fluctuations within the request speeds within the application. As mentioned earlier, twitter uses Redis to bring users the most recent tweets it's due to the queuing provided by Redis.

Cassandra, could be unique management system during this list of assorted database systems. it's a culmination of Amazon’s Dynamo’s fully distributed database design with Google’s BigTable’s data model. Cassandra if put in simple words could be a multi-dimensional map. Cassandra has several use cases, but it's also noted that Cassandra can't be employed in any situations because it is meant to perform well in some special situations using it without complete understanding of its plus points won't lead to the simplest performance. Cassandra can work effectively well in tracking applications, and lots of giant companies like Google or Facebook or Amazon use Cassandra on a big level because it ensures great results. Cassandra can even be employed in logging systems as in Cassandra write exceeds the info reads by significantly higher margins.

MongoDB, as mentioned earlier it's a really popular oriented database and its use cases are evident. one amongst the key uses cases is in analytics, the number of knowledge produced and which must be analysed has increased exponentially and because the data is made from various sources and most of them have different schemas the complexity in collaborating all of those styles of schemas becomes a large task and also the basic must perform significant analysis is that the schema of the information should be similar. Here MongoDB provides the right solution, as MongoDB is more flexible and scalable as compared to the standard management systems the collaborations of the information becomes relatively easy the event of analytical tools becomes easier and it may result into more dynamic experiences. MongoDB can even prove effective in Real – Time Data Integration as its core aspects provide the mandatory infrastructure to create on that.

Concluding this comparison, we've got learnt that every sort of database system proves to be effective in certain areas, computer database systems are still used because there are some use cases where they're effective. But NoSQL has been a wildcard during this race, it's evolved rapidly because it has formed itself supported the drawbacks of the sooner one it's been successful in eliminating the known problems and has been successful in providing solutions for various needs of the industry.

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