2.3.6 NOSQL

1. A NoSQL (not only SQL) database provides a mechanism for storage and retrieval of data that is modeled in means other than the tabular relations used in relational databases.
2. NoSQL is schema-free.
3. Relational databases are not designed to scale and change easily to cope up with the needs of the modern industry to be frequently stored and accessed. NoSQL uses distributed architecture and works on multiple processors to give high performance.
4. NoSQL may not provide atomicity, consistency, -isolation, durability (ACID) properties but guarantees eventual consistency, basically available, soft state (BASE/refreshing), by having a distributed and fault-tolerant architecture.

Brewer's theorem

Consistency, Availability, Partition tolerance (CAP) theorem or Brewer's theorem states that it is not possible for a distributed system to provide all three of the following guarantees-simultaneously:

1. Consistency

All storage and their replicated nodes have the same data at the same time.

2. Availability

   Every request is guaranteed to receive a success or failure response.

3. Partition tolerance

   System continues to operate in spite of network failures.

Properties

1. Volume

   The need to horizontal scaling made organizations to move from serial to distributed parallel processing where big data is fragmented and processed using clusters of commodity machines.

2. Velocity

   Queries have to be read and written in real time. Random bursts in web traffic slows down the response for every user in relational databases.

3. Variability

   Uncommon data is frequent.

   Special attributes lead to sparse matrix.

   ALTER TABLE can not be executed when transactions are happening continuously.

4. Agility

   Relational databases have to do multiple joins and handle nested repeated subgroups for complex queries along with object-relational mapping which makes them slow. NoSQL does not require schema, or foreign key and thus costly join can be avoided and can be easily fed to MapReduce for processing queries.