# SNS COLLEGE OF TECHNOLOGY

**Coimbatore-35**
**An Autonomous Institution**

## Department of Information Technology


### 19ITE305 – BIG DATA ANALYTICS

III B.Tech. IT/ VI SEMESTER

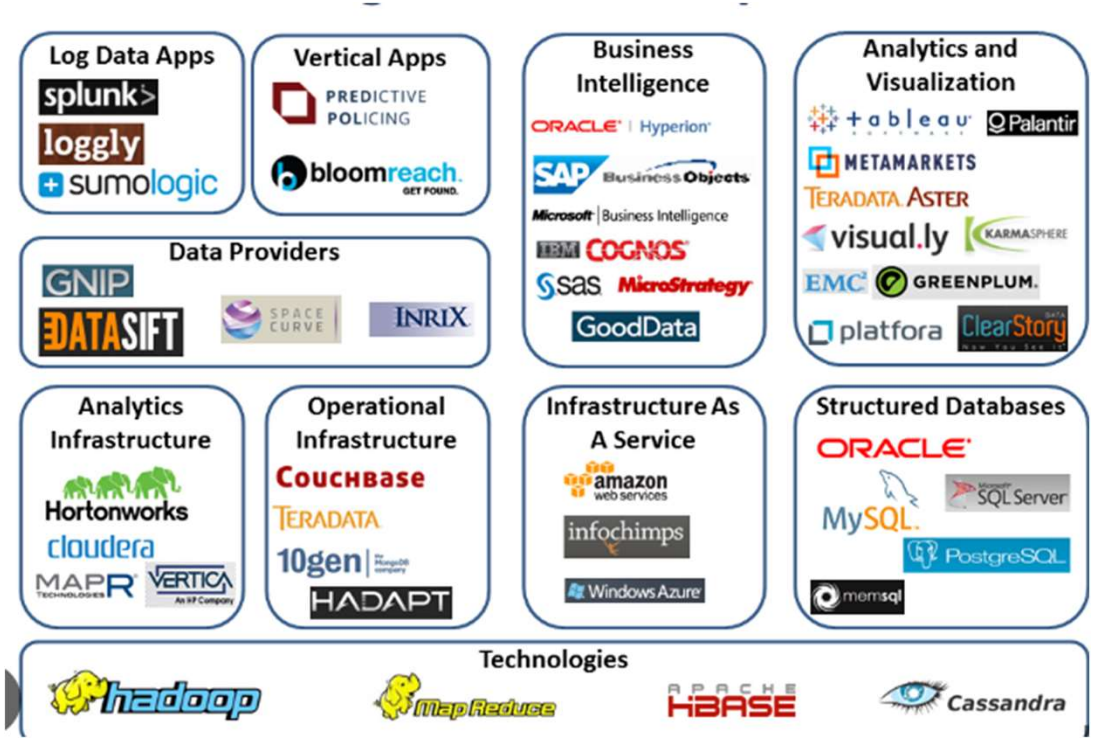
# UNIT II : INTRODUCTION TO TECHNOLOGY LANDSCAPE

**Topic 1 : NoSQL, Comparison of SQL and NoSQL**

NoSQL, Comparison of SQL and NoSQL, Hadoop - RDBMS Versus Hadoop - Distributed Computing Challenges – Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop - Managing Resources and Applications with Hadoop YARN - Interacting with Hadoop Ecosystem

# Big Data Technology Landscape

- NoSQL
- Hadoop



# NoSQL

- NOT ONLY SQL
- First coined by Carlo Strozzi in 1998 – Lightweight, Open Source, Relational database
- Johan Oskarsson - 2009 reintroduced the term NoSQL – Open Source Distributed Network

**Features**

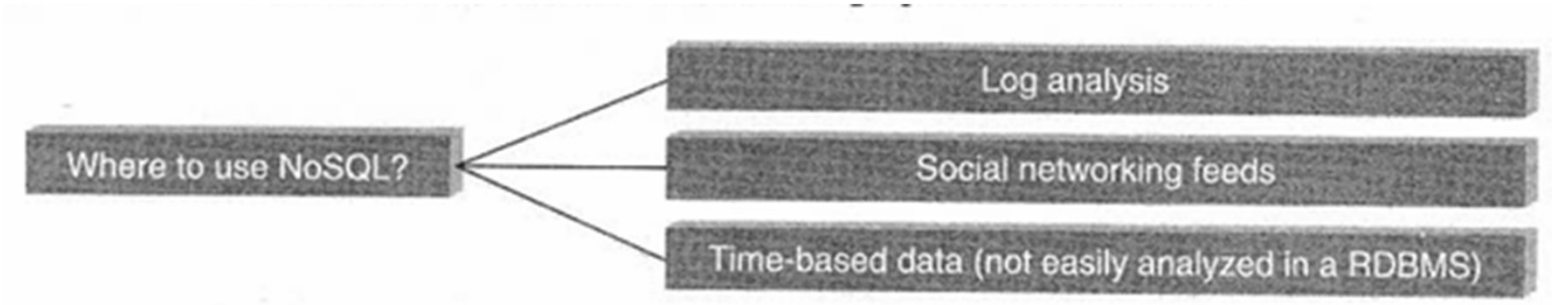
- Open Source
- Mom relational
- Distributed Scheme Less
- Cluster Friendly

It is triggered by the needs of Web 2.0 companies such as Facebook, Google, and Amazon.com.

Most NoSQL databases offer a concept of "eventual consistency" in which database changes are propagated to all nodes "eventually" (typically within milliseconds).

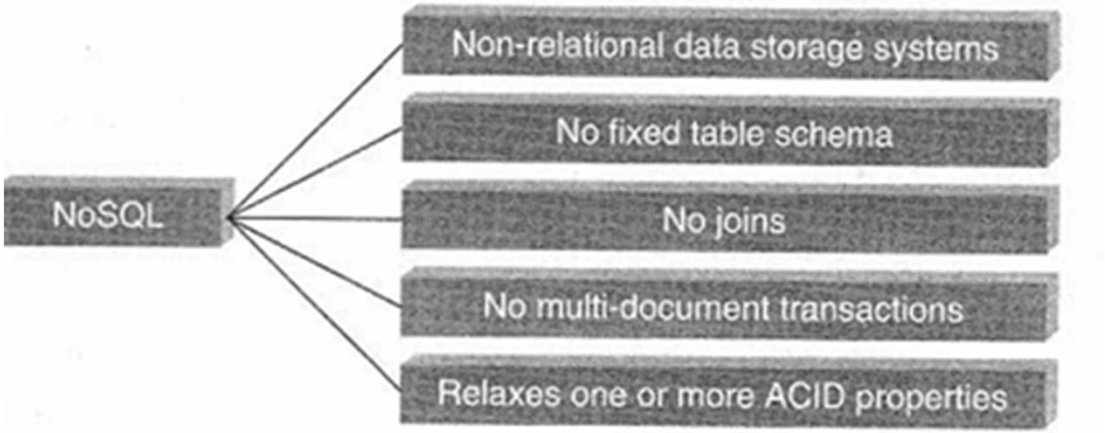
# Where is it used?

- Used in Big data and Real Time Application
- Stock log data which can then be pulled for Analysis
- **Data which cannot be stored and analyzed comfortably in RDBMS**



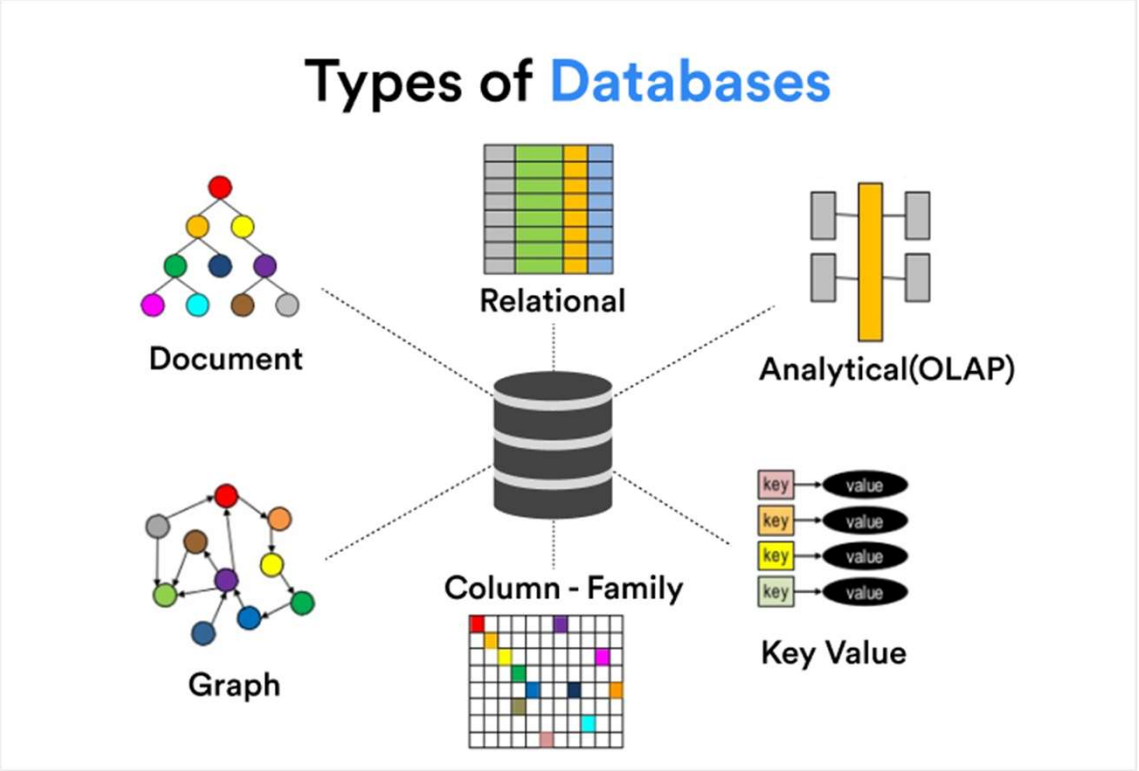
# What is it?

- Stands for NOT ONLY SQL
- Non relational , Opensource, and Distributed Databases
- Dealing with variety of data – Structured, Semi- Structured and Unstructured



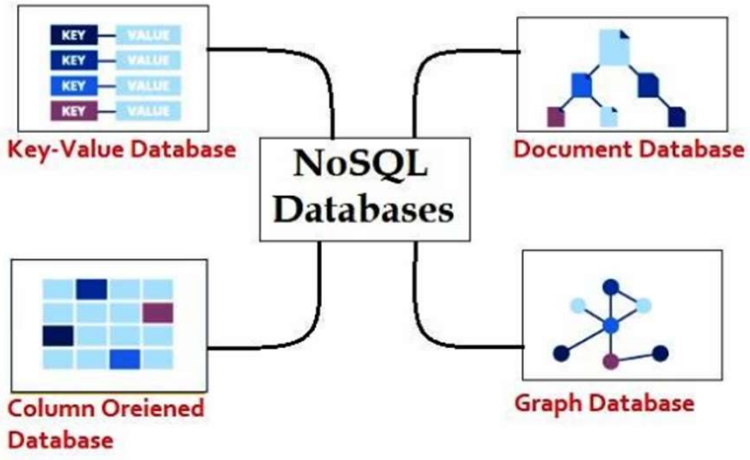
# What is it?

- Non relational
- Data is distributed across several nodes
- No Support of ACID
- No Fixed Table Schema



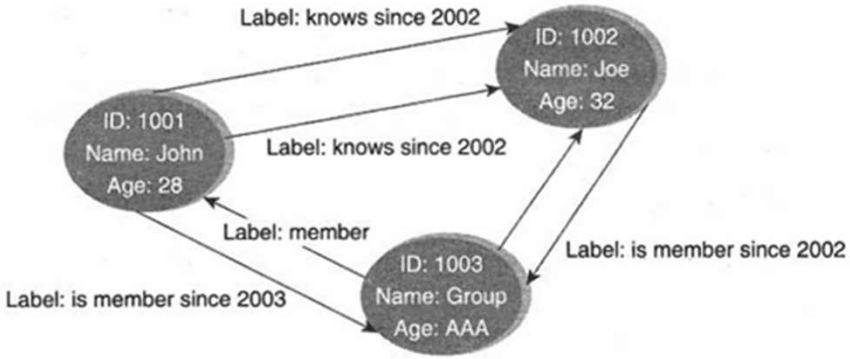
# Types of NoSQL Databases

- Broadly Classified into 2 types
  - Key – value or Big Hash table
  - Schema - Less



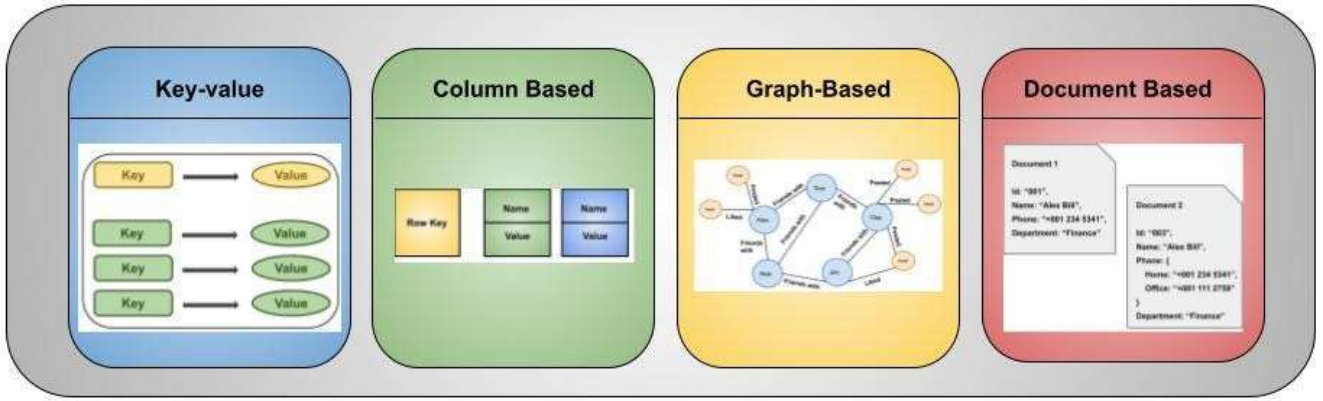

| Key Value | Column Based | Document Database | Graph Database |
|---|---|---|---|
| • In a key-value NoSQL Database, all of the data within consists of an indexed key and a value<br>• *Examples include :*<br>• *DynamoDB*<br>• *Cassandra* | • In Column Based NoSQL Database, DB is designed for storing data tables as sections of columns of data, rather than as rows of data<br>• *Examples include :*<br>• *HBase*<br>• *SAP HANA* | • This NoSQL Database expands the key-value stores where "documents" contain more complex in that they contain data and each document is assigned a unique key, which is used to retrieve the document<br>• *Examples include :*<br>• *MongoDB*<br>• *CouchDB* | • This No SQL database IS designed for data whose relations are well represented as a graph and has elements which are interconnected, with an undetermined number of relations between them<br>• *Examples include :*<br>• *Polyglot*<br>• *Neo4J* |

# Types of NoSQL Databases




*Sample Document in Document Database*

```
{
"Book Name":    "Fundamentals of Business Analytics",
"Publisher":    "Wiley India",
"Year of Publication":    "2011"
}
```



# Popular Schema Less Databases

| Key–Value Data Store | Column-Oriented Data Store | Document Data Store | Graph Data Store |
|---|---|---|---|
| • Riak | • Cassandra | • MongoDB | • InfiniteGraph |
| • Redis | • HBase | • CouchDB | • Neo4j |
| • Membase | • HyperTable | • RavenDB | • AllegroGraph |

# Why NoSQL?

- Scale out Architecture
- Large Volume of Structured, Semi- Structured and Unstructured
- Dynamic Scheme – insert the data without pre defined Schema
- Auto Sharding - Automatically Spread data Across an arbitrary number of nodes
- Replication – high Availability, Fault tolerance, and Disaster Recovery

# Advantage of NoSQL

1. Support elastic scaling:
   a) Cluster scale: It allows distribution of database across 100+ nodes often in multiple data centers.
   b) Performance scale: It sustains over 100,000+ database reads and writes per second.
   c) Data scale: It supports housing of 1 billion+ documents in the database.
2. Doesn't require a pre-defined schema: Does not require any adherence to pre-defined schema and supports flexible schema

# Advantage of NoSQL

3. Cheap and easy to implement and supports benefits of scale, high availability, fault tolerance in low cost.
4. Relaxes the data consistency requirements: Adopts CAP theorem
5. Data can be replicated on multiple nodes and can be distributed:
   a) Sharding: Automatically spread data across an arbitrary number of servers
   b) Replication: Multiple copies of the data across the cluster.

# What we miss with NoSQL?

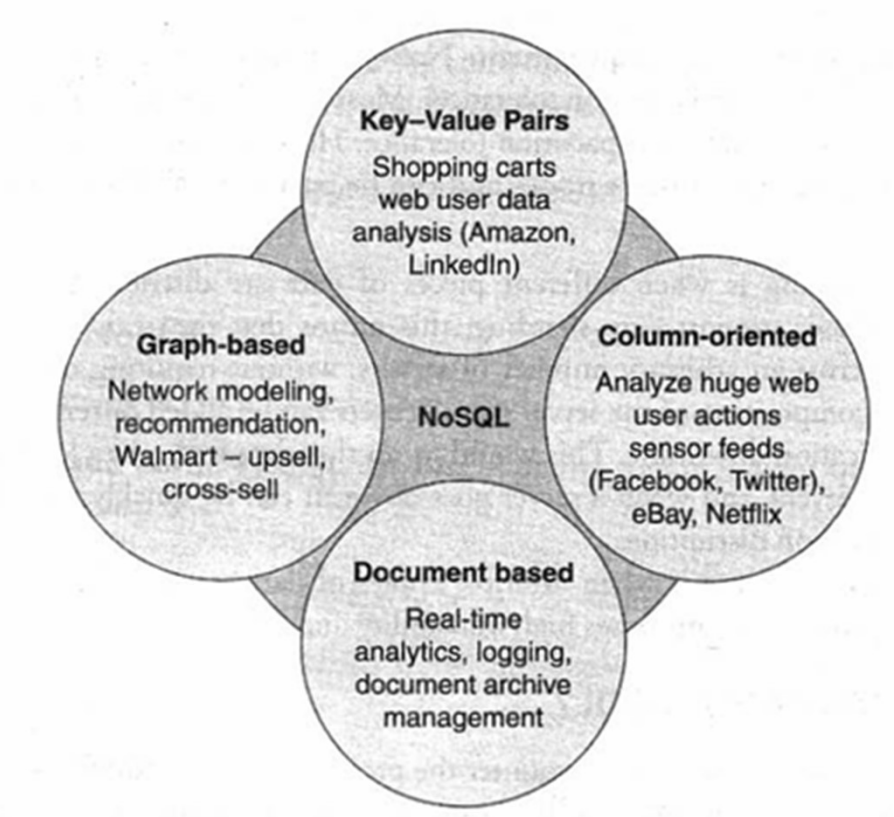
- Does not support Joins.
- Group by
- ACID properties
- Does not have standard SQL interface. But supports MQL and CQL) [M- MongoDB, C- Cassandra]
- Does not support easy integration with other applications that support SQL.

# Use of NoSQL in Industry

NoSQL is being used in varied industries. They are used to support analysis for applications such as:

- Web user data analysis
- Log analysis
- Sensor feed analysis
- Making recommendations for upsell and cross-sell, etc.

# Use of NoSQL in Industry



# NoSQL Vendors

| Company | Product | Most widely used by |
|---|---|---|
| Amazon | DynamoDB | LinkedIn, Mozilla |
| Facebook | Cassandra | Netflix, Twitter, eBay |
| Google | BigTable | Adobe Photoshop |

## TEXT BOOKS

Seema Acharya, Subhashini Chellappan, “Big Data and Analytics”, Wiley Publications, First Edition,2015

## REFERENCES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