1. **NoSQL database:**

NoSQL is an approach to databases that represents a shift away from traditional relational database management systems (RDBMS). Relational databases rely on tables, columns, rows, or schemas to organize and retrieve data. In contrast, NoSQL databases do not rely on these structures and use more flexible data models. NoSQL can mean “not SQL” or “not only SQL.” As RDBMS have increasingly failed to meet the performance, scalability, and flexibility needs that next-generation, data-intensive applications require, NoSQL databases have been adopted by mainstream enterprises. NoSQL is particularly useful for storing unstructured data, which is growing far more rapidly than structured data and does not fit the relational schemas of RDBMS. Example: Riak, Amazon S3 (Dynamo), HBase, Cassandra.

**2. Types of NoSQL databases:**

* **Key-Value Store:** It has a Big Hash Table of keys & values.

Example- Riak, Amazon S3 (Dynamo)

* **Document-based Store:** It stores documents made up of tagged elements.

Example- CouchDB

* **Column-based Store:** Each storage block contains data from only one column.

Example- HBase, Cassandra

* **Graph-based:** A network database that uses edges and nodes to represent and store data. Example- Neo4J

**3. CAP Theorem:**

CAP theorem states that you can only choose 2 out of the 3 properties:

* **Consistency:** Every read would get you the most recent write
* **Availability:** Every node (if not failed) always executes queries
* **Partition-tolerance:** Even if the connections between nodes are down, the other two (A & C) promises are kept.

**4. HBase Architecture:**

Just like in a Relational Database, data in HBase is stored in Tables and these Tables are stored in Regions. When a Table becomes too big, the Table is partitioned into multiple Regions. These Regions are assigned to Region Servers across the cluster. Each Region Server hosts roughly the same number of Regions.

Each Region Server contains a Write-Ahead Log (called HLog) and multiple Regions. Each Region in turn is made up of a MemStore and multiple StoreFiles (HFile). The data lives in these StoreFiles in the form of Column Families. The MemStore holds in-memory modifications to the Store (data).

**5. HBase vs RDBMS**

The differences between RDBMS and HBase are given below.

* Schema/Database in RDBMS can be compared to namespace in Hbase.
* A table in RDBMS can be compared to column family in Hbase.
* A record (after table joins) in RDBMS can be compared to a record in Hbase.
* A collection of tables in RDBMS can be compared to a table in Hbase.