NoSQL Databases – Detailed Review Answers

1. Explain Types of NoSQL

NoSQL databases are designed to store and manage large volumes of unstructured and semi-structured data. They are categorized based on the way data is stored and accessed.

1. Key-Value Stores: These databases store data as key–value pairs. They are highly efficient and fast, commonly used for caching and session management. Examples include Redis and Amazon DynamoDB.

2. Document-Based Databases: Data is stored in documents such as JSON or BSON format. These databases are flexible and schema-less, making them ideal for content management systems. Example: MongoDB.

3. Column-Family Stores: Data is stored in columns rather than rows. They are optimized for large-scale analytical queries. Examples include Apache Cassandra and HBase.

4. Graph Databases: These databases store data in the form of nodes and relationships. They are used where relationships between data are important, such as social networks. Example: Neo4j.

2. Features of NoSQL

- Schema-less or flexible schema design.
- High scalability with horizontal scaling.
- High performance for read and write operations.
- Support for large volumes of structured, semi-structured, and unstructured data.
- Distributed architecture.
- Fault tolerance and high availability.
- Support for big data and real-time web applications.

3. Write Down About Data Models

A data model defines how data is structured, stored, and accessed in a database system. It helps in organizing data and defining relationships between data elements.

Types of Data Models:

- Hierarchical Data Model – Data is organized in a tree-like structure.
- Network Data Model – Data is represented using graph-like structures.
- Relational Data Model – Data is stored in tables with rows and columns.
- Object-Oriented Data Model – Data is represented as objects.
- NoSQL Data Models – Includes key-value, document, column-family, and graph models.

4. Difference between RDBMS and NoSQL

RDBMS uses structured tables with fixed schemas and supports SQL queries, whereas NoSQL databases use flexible schemas and are optimized for scalability and performance.

- RDBMS uses tables; NoSQL uses documents, key-value, columns, or graphs.

- RDBMS follows ACID properties; NoSQL follows BASE properties.
- RDBMS supports vertical scaling; NoSQL supports horizontal scaling.
- RDBMS is suitable for structured data; NoSQL handles unstructured data.
- RDBMS ensures strong consistency; NoSQL provides eventual consistency.

5. Major Purpose of Using a NoSQL Database

The major purpose of using NoSQL databases is to efficiently handle big data, high traffic, and rapidly changing data structures. They are designed for modern applications such as social media platforms, IoT systems, real-time analytics, and cloud-based services.

6. Advantages and Disadvantages of NoSQL

Advantages:

- Highly scalable and flexible.
- Handles large volumes of data efficiently.
- Fast read and write operations.
- Schema-less design allows easy changes.
- Suitable for distributed systems.

Disadvantages:

- Lack of standard query language.
- Limited support for complex transactions.
- Eventual consistency issues.
- Not suitable for applications requiring strict ACID compliance.
- Data redundancy may occur.