| Aspect | RDBMS (Relational Database Management System) | Hadoop |
|---|---|---|
| **Data Structure** | Stores data in **structured, tabular format** (tables with rows and columns) | Designed to handle **unstructured, semi-structured, and structured data** |
| **Schema Requirement** | **Schema-on-write**: Requires predefined schema; data must conform to schema before entry | **Schema-on-read**: Flexible; schema can be defined when data is read |
| **Data Volume** | Optimized for managing **small to moderate data volumes** | Built for **big data**; can handle massive datasets (petabytes and beyond) |
| **Data Processing Model** | **Transactional processing** (OLTP) – supports ACID transactions, ideal for frequent updates | **Batch processing** and **distributed computing**; suitable for analysis of large datasets |
| **Scalability** | **Vertical scalability** (adding resources to a single server) | **Horizontal scalability** (adding more servers or nodes in a cluster) |
| **Consistency** | Provides **strong consistency** with ACID (Atomicity, Consistency, Isolation, Durability) | **Eventual consistency**; some frameworks provide options for relaxed consistency |
| **Fault Tolerance** | Limited fault tolerance; requires additional mechanisms (e.g., replication) | **High fault tolerance** through HDFS, which replicates data across nodes |
| **Cost** | Typically **higher cost** due to proprietary software and hardware | **Cost-effective** with open-source software; can run on commodity hardware |
| **Query Language** | Uses **SQL (Structured Query Language)** | Uses **MapReduce** programming model; other tools (e.g., Hive) provide SQL-like querying |
| **Processing Speed** | Low-latency, fast response for small to moderate datasets | High-throughput, but can be slower due to batch processing, suitable for large-scale analysis |

| | | |
|---|---|---|
| **Data Integrity** | High data integrity with strict schema enforcement | Lower data integrity enforcement; more flexible schema with Hadoop ecosystem |
| **Use Cases** | Banking, e-commerce, and ERP systems needing **transactional support** and quick queries | Data warehousing, analytics, IoT data, and large-scale log processing in **big data** contexts |
| **Examples** | Oracle, MySQL, SQL Server, PostgreSQL | Apache Hadoop, HDFS, Hive, Pig, Spark |