



CLOUD COMPUTING APPLICATIONS

Cloud Databases - NoSQL
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Key/value Databases

- Key-value databases are optimized for common access patterns, typically to store and retrieve large volumes of data
- These databases deliver quick response times, even in extreme volumes of concurrent requests
- High-traffic web apps, ecommerce systems, and gaming apps
- AWS DynamoDb
- Azure CosmosDB

Wide Column Databases

- Google BigTable
 - Cloud Bigtable is a fully managed, wide-column NoSQL database that offers low latency and replication for high availability
 - This is what HBase was modeled after
- Managed Casandra
 - *Cassandra was modeled after Dynamo (paper)*
 - *DynamoDB was modeled after Casandra*
 - AWS managed Casandra
- Cassandra AMI for any cloud provider

In Memory (Cache) Databases

- In-memory databases are used for applications that require real-time access to data
- By storing data directly in memory, these databases deliver microsecond latency to applications for whom millisecond latency is not enough
- Caching, gaming leaderboards, and real-time analytics
- Common usage pattern: Cache RDS or document databases
- AWS ElastiCache (Redis / MemCached)
- Azure Cache for Redis
- Google Memorystore (Redis / MemCached)
- IBM Redis

Document Databases

- A document database is designed to store semistructured data as JSON-like documents
- Makes it easy to store, **query**, and index JSON data
- Content management, catalogs, and user profiles
- Non-relational database service
- AWS DocumentDB + (MongoDB compatibility)
- Azure CosmosDB
- Google Firestore
 - Targeted for mobile App support
- IBM Cloudant / IBM MongoDB

AWS DocumentDB

- Managed instance
- Implements MongoDB 3.6 API
- Storage and compute are decoupled, allowing each to scale independently
- Automatically grows the size of storage volume as the database storage needs grow
 - Grows in increments of 10 GB, up to a maximum of 64 TB
- Up to 15 low latency read replicas to increase read capacity
- Replicates six copies of data across three AWS Availability Zones (AZs)
- Access to Amazon DocumentDB clusters must be done through the mongo shell or with MongoDB drivers

Other Types of Cloud Databases

- Graph Databases
 - Covered in a different module
- Time Series Databases
 - AWS Timestream
- Blockchain / Ledgers
 - Immutable and cryptographically verifiable transactions
 - AWS QLDB
- Data Warehouses
 - Covered in a different module
 - Columnar storage
 - AWS Redshift
 - Google BigQuery
 - Azure Synapse (formerly Azure SQL Data Warehouse)