

# NoSQL Databases

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## 1 Introduction

NoSQL databases are referred to as “nonrelational” to highlight the fact that they can handle huge volumes of rapidly changing, unstructured data in different ways than a relational (SQL) database with rows and tables.

NoSQL is a simpler type of database that allows for more flexibility, freedom, and speed than SQL databases. They store data in a few ways:



### Key-value

Key-value stores pair keys and values using a hash table. Key-value types are best when a key is known and the associated value for the key is unknown.



### Document

Document databases extend the concept of the key-value database by organizing entire documents into groups called collections. They support nested key-value pairs and allow queries on any attribute within a document.



### Columnar

Columnar, wide-column, or column-family databases efficiently store data and query across rows of sparse data and are advantageous when querying across specific columns in the database.



### Graph

Graph databases use a model based on nodes and edges to represent interconnected data—such as relationships between people in a social network—and offer simplified storage and navigation through complex relationships.

## 2 AWS DynamoDB

Amazon DynamoDB is a fully managed NoSQL database service that provides fast and predictable performance with seamless scalability. DynamoDB lets you offload the administrative burdens of operating and scaling a distributed database so that you don't have to worry about hardware provisioning, setup and configuration, replication, software patching, or cluster scaling. DynamoDB also offers encryption at rest, which eliminates the operational burden and complexity involved in protecting sensitive data.

Many of the world's fastest growing businesses such as Lyft, Airbnb, and Redfin as well as enterprises such as Samsung, Toyota, and Capital One depend on the scale and performance of DynamoDB to support their mission-critical workloads.

Hundreds of thousands of AWS customers have chosen DynamoDB as their key-value and document database for mobile, web, gaming, ad tech, IoT, and other applications that need low-latency data access at any scale. Create a new table for your application and let DynamoDB handle the rest.



Amazon DynamoDB

## 3 Benefits

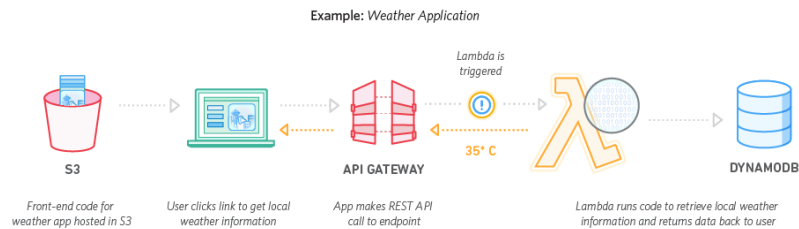
- **Scalable** – DynamoDB supports some of the world's largest scale applications by providing consistent, single-digit millisecond response times at any scale. You can build applications with virtually unlimited throughput and storage. DynamoDB global tables replicate your data across multiple AWS Regions to give you fast, local access to data for your globally distributed applications. For use cases that require even faster access with microsecond latency, DynamoDB Accelerator (DAX) provides a fully managed in-memory cache.
- **Serverless** – DynamoDB is serverless with no servers to provision, patch, or manage and no software to install, maintain, or operate. DynamoDB automatically scales tables up and down to adjust for capacity and maintain performance. Availability and fault tolerance are built in, eliminating

the need to architect your applications for these capabilities. DynamoDB provides both provisioned and on-demand capacity modes so that you can optimize costs by specifying capacity per workload, or paying for only the resources you consume.

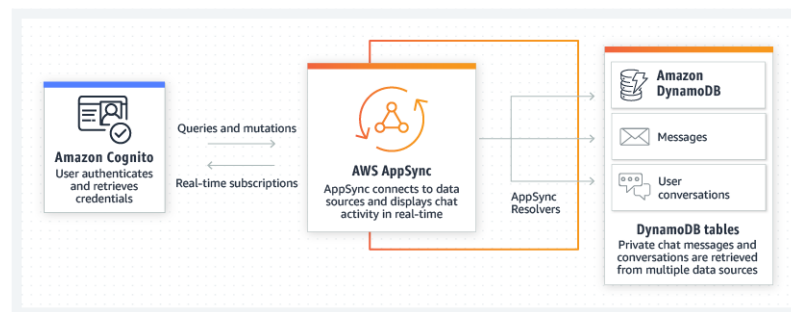
- **Secure** – DynamoDB encrypts all data by default and provides fine-grained identity and access control on all your tables. You can create full backups of hundreds of terabytes of data instantly with no performance impact to your tables, and recover to any point in time in the preceding 35 days with no downtime. DynamoDB is also backed by a service level agreement for guaranteed availability.

## 4 Uses

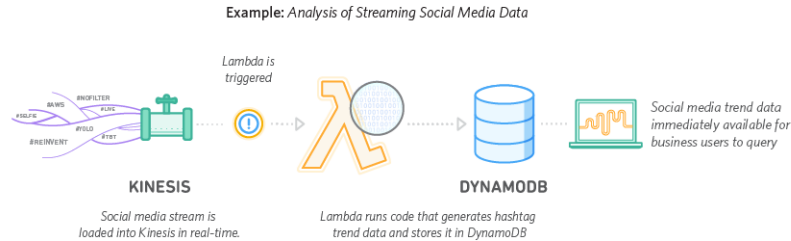
- **Serverless Web Apps** – Build powerful web applications that automatically scale up and down. You don't need to maintain servers, and your applications have automated high availability.



- **Mobile Backends** – Use DynamoDB and AWS AppSync to build interactive mobile and web apps with real-time updates, offline data access, and data sync with built-in conflict resolution.



- **Microservices** – Build flexible and reusable microservices using DynamoDB as a serverless data store for consistent and fast performance.



## 5 Companies that use DynamoDB

- **Snapchat** - Snap migrated their largest storage workload, Snapchat Stories, to DynamoDB and improved performance while reducing costs.
- **Netflix** - Netflix uses DynamoDB to run A/B testing that builds personalized streaming experiences for their 125+ million customers.
- **Capital One** - Capital One uses DynamoDB to reduce latency for their mobile applications by moving their mainframe transactions to a serverless architecture for unbound scale.
- **Lyft** - Lyft leverages the scalability of DynamoDB for multiple data stores, including a ride-tracking system that stores GPS coordinates for all rides.
- **Samsung** - Samsung Electronics uses DynamoDB for their petabyte-sized mobile app backups, resulting in consistent high performance and cost savings.
- **Nike** - Nike Digital migrated their large clusters of Cassandra to a fully managed Amazon DynamoDB, allowing more resources for better customer experience.

## 6 Other Public Cloud Providers

NoSQL databases are very powerful and are relatively simple to use compared to SQL databases, so other public cloud providers such as GCP and Azure also provide NoSQL services.

- **GCP Cloud Datastore** - Offers many of the same features as AWS DynamoDB
- **Azure CosmosDB** - Offers many types of databases, including NoSQL databases which offer similar features as AWS DynamoDB