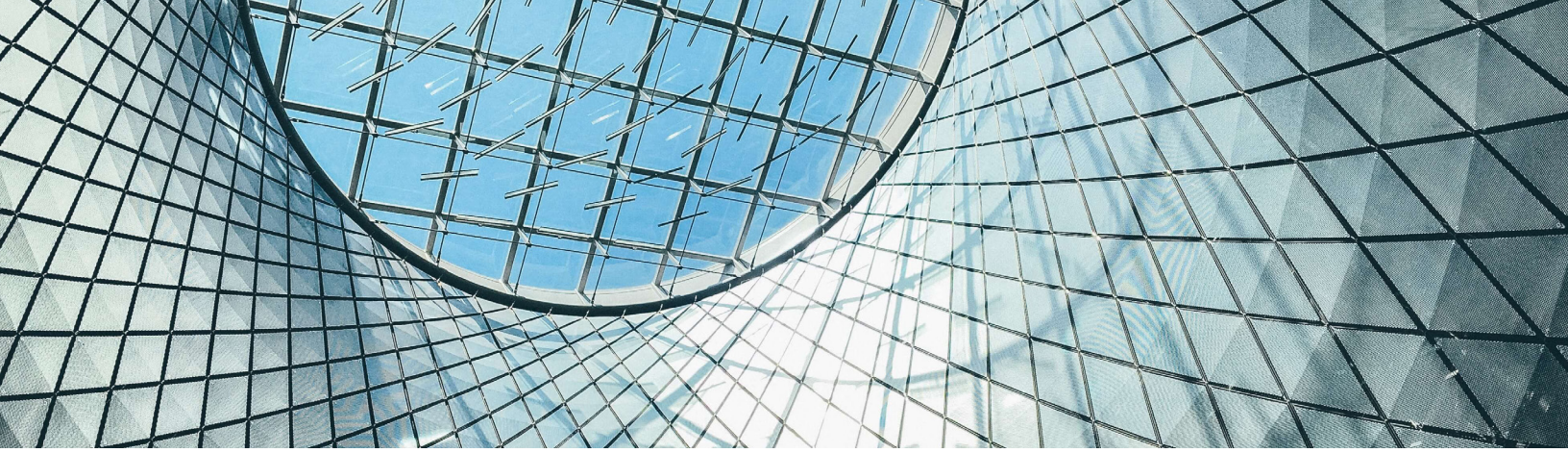

Market Insight Report Reprint

After 10 Years, AWS continues to expand Amazon DynamoDB well beyond scalability

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by James Curtis

DynamoDB started with a focus on scalability, but over the past 10 years, this nonrelational cloud database service has matured significantly, with AWS adding capabilities like usability, manageability and extensibility, targeting a variety of enterprise operational workloads and serving hundreds of thousands of customers.

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Introduction

When AWS rolled out Amazon DynamoDB in 2012 as a managed cloud database service, it was to address several challenges the company had seen with traditional relational databases, particularly around scaling. After 10 years, AWS continues to iterate on this nonrelational (NoSQL) database service, having previously added or enhanced support for ACID transactions, replication, streaming and on-demand pricing, as just a few examples.

AWS added several enhancements throughout 2021, including capabilities for improved client-side application development and improved support for SQL-like querying, as well as broader integration with AWS services such as Amazon S3 storage and Amazon Kinesis streaming. At re:Invent 2021, the company introduced flexible table storage pricing and integration with AWS Backup.

THE TAKE

A decade after its introduction, Amazon DynamoDB can be considered a trailblazer in the managed cloud database space, a sector that began to emerge around 2008. While DynamoDB has been known as a purpose-built service since inception, it's now moving into general-purpose territory, particularly as the scope of the service has broadened to cater to SQL developers to address a wide array of operational workloads. DynamoDB is a mature cloud database service, but there is still room to grow as it looks to tap into the wide array of AWS services. This approach will be necessary to differentiate the offering from a growing cadre of database services, many of which pinpoint serverless and scaling.

Context

Early on, DynamoDB played the role of relational database disruptor, with a focus on scaling operational transactions and doing it with a NoSQL data model as a fully managed cloud service. Amazon DynamoDB was serverless from the get-go, which is noteworthy because database vendors are now rushing to add serverless as core functionality to their cloud database offerings to meet customer demand. Based on 451 451 Research's Voice of the Enterprise: Data, AI, and Analytics, Data Analytics, Data Platforms survey, 62% of respondents report that their organizations are either using serverless, or have plans to adopt the technology in the near term.

The 10-year anniversary of the service is noteworthy – DynamoDB was released as a fully managed serverless cloud database long before serverless was an industry catchword for scaling cloud infrastructure on demand. The impetus behind DynamoDB was to address several challenges that Amazon had experienced with traditional relational databases around scaling in a production environment.

Although DynamoDB's release appeared as a quick answer to its relational database challenges, the company had been chewing on the principles of a highly distributed, scalable and durable NoSQL database for some time. These principles were spelled out in a 2007 technical paper written by AWS engineers on Amazon's Dynamo internal technology.

Fast forward to 2012, when AWS released DynamoDB as a fully managed NoSQL cloud database service, which specifically utilizes a key-value data model that supports a document model. In database speak, DynamoDB is a multimodel NoSQL database.

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Technology updates

DynamoDB is considered a mature database cloud service. A few noteworthy additions from prior updates include support for ACID transactions, active-active global replication, on-demand and point-in-time restore, streaming and on-demand pricing. Significant AWS services integrations include Key Management Service for encrypting data rest, and CloudWatch Contributor Insights – an AWS service for gaining insights on access patterns, tagging, VPN endpoints and triggers. In 2021, the company made further updates that touch on areas such as usability, manageability and extensibility.

Regarding usability, AWS added the NoSQL Workbench, consisting of a client-side, cross-platform IDE tool that provides data modeling, data visualizing and query devolvement for client-side developers. AWS also announced support for PartiQL – compatible with the NoSQL Workbench, the SQL-capability query language enables developers to interact with DynamoDB using common SQL commands.

For manageability, DynamoDB now supports AWS CloudTrail to manage governance, compliance and risk auditing on AWS accounts. Meanwhile, at re:Invent 2021, it announced the Amazon DynamoDB Standard-Infrequent Access table class that provides flexible table storage pricing. This new capability targets storage-heavy workloads in which infrequently accessed tables can be identified for lower storage costs. Customers still pay for throughput (to maintain consistent performance), but the throughput costs are offset by lower storage costs, potentially up to 60% over Standard Access tables, according to AWS.

On the integration front, AWS announced DynamoDB integration with AWS Backup, a centralized automatic backup service. Previously, customers had to carry out backup processes on a case-by-case basis, depending on the database service. With AWS Backup, however, users can manage backup policies across their AWS database services from a single management plane. Additionally, there is now integration with Amazon Kinesis, specifically the Kinesis Data Streams capabilities that capture item-level changes in the form of a data stream to DynamoDB tables.

Competition

DynamoDB's customer appeal centers on its ability to scale a high number of operational transactions while maintaining performance. Sometimes referred to as 'performance at scale,' this approach has traditionally been the sweet spot for NoSQL databases. As a managed cloud service that employs a key-value data and document data model, DynamoDB primarily competes directly with peer cloud platform providers serving up the same or similar data model.

Given this, competitors include Azure Cosmos DB and Google's Datastore, available on Azure and GCP cloud platforms, respectively. There is also Oracle NoSQL Database and Oracle Autonomous JSON Database, which reside on Oracle's cloud platform, while IBM has its Cloudant NoSQL database offered on IBM Cloud. Couchbase Capella and MongoDB Atlas are available on multiple cloud platforms and are worthy competitors, as is Redis Enterprise Cloud.

However, an emerging category of databases referred to as distributed SQL concentrates on handling operational transactions in a highly geo-distributed environment. Many of these vendors are peddling more traditional relational data models, although some are blending relational and nonrelational. Regardless, potential competitors include Cockroach Labs, PlanetScale, YugaByte, Fauna, MariaDB Xpand, AWS Amazon Aurora, Google Cloud Spanner, and Azure Database for PostgreSQL-Hyperscale, SingleStore and PingCAP.

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SWOT Analysis

STRENGTHS

Since its inception, DynamoDB has been serverless and provided performance at scale, which turned out to be a crucial design choice – particularly given the increased demand for serverless database architectures today.

WEAKNESSES

As a NoSQL database, DynamoDB won't match the full spectrum of SQL querying capabilities offered by relational database systems, although that gap seems to be slowly closing.

OPPORTUNITIES

Although DynamoDB can be considered a maturing cloud database service now, there is certainly room to grow as it aims to tap into a wide array of AWS services, which will certainly be necessary to differentiate from a growing cadre of database services.

THREATS

Serverless and scalability are becoming less distinguishable feature, since many existing vendors and new emerging vendors are rolling out serverless architectures and focusing specifically on SQL scaling capabilities.

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