REPORT REPRINT

NuoDB boosts performance, availability of its NewSQL distributed database

JASON STAMPER

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The company has added a number of enhancements around performance and availability, as well as certifying it on Amazon Web Services to give customers confidence in its elastic capabilities in the cloud.

451 Research®

NuoDB is a 'NewSQL' database – a term coined by 451 Research to describe data platforms that support SQL but do not have a traditional relational database architecture under the covers. It's now stronger and even more elastic with version 2.6.

THE 451 TAKE

As more applications move heavily into cloud and hybrid cloud deployments, the market is clearly demanding cloud-capable databases that can scale. However, most of them provide only 'SQL-like' capabilities. NuoDB's support of ANSI-SQL standards and ACID compliance can be very valuable, especially for organizations seeking on-demand scale across multiple datacenters. Version 2.6 may be certified only on AWS so far (in terms of cloud hosts, although it does also run on-premises or on private clouds with the same capability), but that will be more than enough for most companies. The active-active feature across AWS zones is a bonus, and performance and migration tools are improved too. Overall, it's a very compelling transactional database architecture that can 'scale out.'

CONTEXT

Founded in Cambridge, Massachusetts, in 2010, NuoDB's founders were Jim Starkey and Barry Morris. Starkey had previously developed InterBase, the first relational database to support multi-versioning, the blob column type, type event alerts, arrays and triggers, while Morris' former roles include CEO of IONA Technologies and chairman and CEO of StreamBase Systems.

The company has raised just under $60m in funding, the latest being a $17m 2016 series B round landed in February from Hummer Winblad Venture Partners, Longworth Venture Partners and Morgenthaler Ventures. The round was led by Dassault Systèmes, a long-time NuoDB investor and customer.

The company told us in a recent briefing that it has about 70-80 staff. It said it has dozens of paying customers, and over 700 companies were active users of the Community Edition, which is free but not open source, in 2016. The Community Edition has some restrictions on the size of the cluster, which we'll get to in more detail below because those restrictions have just been altered.

Most staff are in its headquarters in Cambridge, Massachusetts, but NuoDB also has a European Development Center in Dublin.

The company told us it rebuilt its go-to-market leadership team in mid-2016, bringing in VP of products Ariff Kassam (previously Teradata, xkoto); CMO Jeff Boehm (previously Endeca, Qlik, Business Objects, Ascential) and SVP of sales Stephen Fahey (previously Oracle and BroadVision).

But while such sweeping changes might suggest some challenges in sales, the company said it was about accelerating, not reinvigorating, its sales. Indeed, it said in Q4 2016, total contract value was 2.6x where it was in 2015.

TECHNOLOGY

NuoDB has pulled off something of a neat trick: it's managed to build a relational database that can scale horizontally – by adding more inexpensive nodes – rather than having to put it on larger and larger (and more and more expensive) machines, as you would have to with traditional relational databases that 'scale up.'

It's not alone in being able to 'scale out' – most of the NoSQL (not only SQL) databases can do this. But not all are also able to support the SQL language, and those that do often support only a subset of it (things like joins are often missing). NuoDB – which is a relational database rather than a non-relational NoSQL database – says it supports 100% of the ANSI standard SQL language thanks to a very clever distributed architecture. NuoDB calls itself an elastic SQL database – and as such also supports 'ACID' compliance – this is desirable in the most mission-critical transactional applications.

Note that it can't keep scaling out horizontally ad infinitum – there are limitations as with any database, especially when scaling across multiple nodes. SQL was originally conceived to run on one big machine. However, NuoDB is growing its node count all the time, and in most cases, it already offers far more scalability and elasticity than a pure in-memory database, while still supporting SQL.

It's worth mentioning that NuoDB is not aimed at analytic use cases, but at transactional ones (so it's primarily for OLTP, not OLAP). Of course as with most databases it is possible to run at least some real-time queries over the database, but this would really be to glean some operational intelligence, not to do advanced analytics, machine learning and the like. In fact, the company has little desire to put additional analytics on its roadmap, preferring to maintain a laser focus on transactions.

So what's new in version 2.6, announced on January 17? The three main areas are high availability (particularly when running on Amazon Web Services), the addition of table partitions and storage groups that improve performance, and additional migration tools for those moving from another database to NuoDB.

Most NuoDB customers either run the database on private clouds within their own infrastructure, or on AWS in the public cloud. The company says there's no architectural reason you couldn't run NuoDB on other clouds such as Microsoft Azure or Google Cloud Platform, but it has only certified AWS so far.

With version 2.6, NuoDB has certified that its database now supports active-active deployment across AWS availability zones (although the same functionality is also available for customers running NuoDB on bare metal or private clouds), making it easier and cheaper to have nodes in different zones that can not only take over in the event of a failure of another node, but can also be actively doing their own database jobs if no failure occurs.

An alternative architecture that some vendors have chosen is to have a 'master' node and then 'slave' nodes that share data. NuoDB points out that this reduces 'scale out' capabilities because everything has to go via the master, even if it is not the nearest. Also, if the master itself goes down, you get the 'split brain' problem where the 'slaves' don't know who is taking over; at least for a while. We'd have to agree with NuoDB's observations.

Active-active is available with NuoDB without additional software – it comes with the database deployment. It still maintains ACID compliance, and it supports both read and write access from multiple hosts. The feature means companies can safely distribute transactions across several AWS availability zones.

The next big change was the addition of table partitioning and distributed storage. This enables organizations to optimize query performance through partition pruning and parallelization, and supports data management use cases such as data aging and fast data loading.

NuoDB Storage Groups, also available with this release, enable customers to scale out the storage layer while maintaining a single, unified database view. Storage choices at the back end include disk or SSD (flash). You can't choose Hadoop at the back end (it would introduce too much latency and probably create transaction conflicts).

The company has also loosened its control of the free Community Edition. It's increased possible usage from one transaction engine and one storage manager, to three transaction engines above a storage manager, in order to better demonstrate to prospects and developers the potential clustering capabilities.

Finally, NuoDB made some improvements to its database migration tooling so that SQL developers should find it even easier if they are moving from the likes of Microsoft SQL Server, Oracle or MySQL to NuoDB. SQL compliance means that there should be few application rewrites, anyway.

CUSTOMERS

As mentioned, the company says it has dozens of paying customers, and saw in the region of 700 active users of the Community Edition in 2016.

The company does have several household names among its paying customers; however, unfortunately these can't be named just yet apart from Dassault Systèmes, which as discussed, is not just a customer but also an investor. Others that NuoDB can name include Kodiak Networks, Nemesis (parent company MatchMe), CauseSquare and J3 Software.

Medical device supply chain automation cloud, systems and software player Movemedical is on the record as saying that unlike the previous database it relied on, with NuoDB it's easy to add capacity to a single instance or across a distributed cluster. It praised the combination of ACID, SQL and elastic scalability.

COMPETITION

Other NewSQL database companies include MemSQL, VoltDB, Clustrix, Fauna (with FaunaDB) and Cockroach Labs, with its CockroachDB. SAP's HANA database has also been described as NewSQL.

But depending on the exact use case, the NewSQL vendors such as NuoDB will also see some competition from NoSQL vendors, which may offer differing levels of SQL and ACID compliance, but may also offer even greater potential for scale-out (while possibly swapping ACID for 'eventual consistency' or 'ultimate consistency'). Companies in this space include MongoDB, Cassandra and Oracle's NoSQL Database.

Of course the incumbent database vendors such as Oracle, IBM and Microsoft, would argue that with their in-memory accelerators and column stores, it's possible to continue to 'scale up' instead of 'scaling out.'

We also believe all of the database vendors – SQL, NoSQL and NewSQL – face growing competition from the in-memory data grid/fabric companies, which are offering growing levels of SQL and ACID as well as pace and high availability. They slide between the applications and the database, but are increasingly handling more and more of the jobs usually associated with the back-end databases themselves. Companies here – and there are a dozen or so – include Redis Labs, IBM with eXtreme Scale, GridGain, Hazelcast, Red Hat (with JBoss Data Grid), Software AG's Terracotta and Oracle's Coherence.

SWOT ANALYSIS

STRENGTHS
NuoDB is a SQL and ACID-compliant transactional database that can 'scale out' horizontally instead of having to scale up on larger and more expensive machines. It now has improved availability and performance, particularly in AWS's cloud.

WEAKNESSES
NuoDB is not ideal for analytical use cases, nor was it designed to be. It's certified only in the AWS cloud so far, although it can run in others. It's not compatible with Hadoop (nor was that the goal).

OPPORTUNITIES
NuoDB reports there were about 700 companies actively using its free Community Edition in 2016. Now that it's loosened restrictions on that edition, NuoDB may be able to tempt more of them into enterprise subscriptions.

THREATS
The database space remains incredibly competitive, and no sector is immune. The incumbents in the SQL space are advancing all the time. The NoSQL vendors have their place too, and even the in-memory data grid/fabric companies want a slice of the pie.