



# NewSQL Without Compromise™

Everyday businesses face serious challenges coping with application performance, maintaining business continuity, and gaining operational intelligence in real-time. There are many DBMS vendors trying to address these challenges. Only NuoDB helps customers build databases that handle all these web-scale requirements easily and economically.

“NuoDB is proving that it can deliver a scalable, elastic and ACID compliant database solution I can seriously recommend to clients.”

*Ian Mariano, Project Manager – Digital, NorthPoint Solutions, a leading consulting firm specializing in custom business applications.*

## NuoDB Operational DBMS

NuoDB leads the industry with a proven NewSQL solution that provides a unique combination of scale-out performance, zero downtime and geo-distributed data management. It's an operational DBMS to handle transactions, interactions and observations anywhere. The product ships with full support for all popular languages and frameworks such as **JAVA, .NET, Node.JS, Perl, PHP, Python, Perl** and others. It's the ideal database for high-performance cloud, datacenter, mobile and SaaS applications.

Its distributed architecture allows you to build a global data management platform with guaranteed 24/7 availability, hot upgrades, built-in data redundancy and disaster recovery. That means zero downtime with less effort and a lot less money.

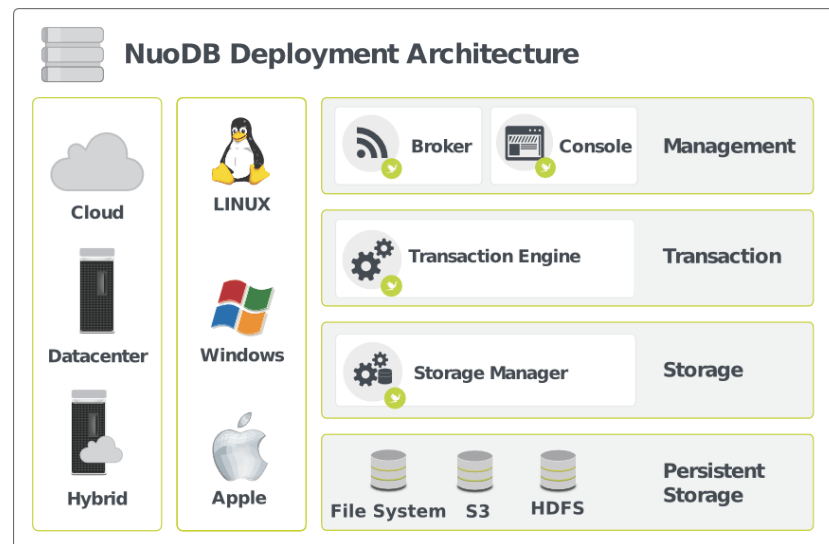


Figure 1: NuoDB three-tier architecture featuring heterogeneous deployment capabilities

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## Using NuoDB

NuoDB behaves just like any other SQL database as far as your applications are concerned. It is ANSI SQL92 compliant with SQL99 extensions and works with many popular ORM tools such as Hibernate, PDO, Active Record and ships with a set of JDBC/ODBC drivers.



Beneath the traditional SQL interface, NuoDB represents the database as a variable number of in-memory objects on a variable number of cooperating computer systems, archived in multiple locations.

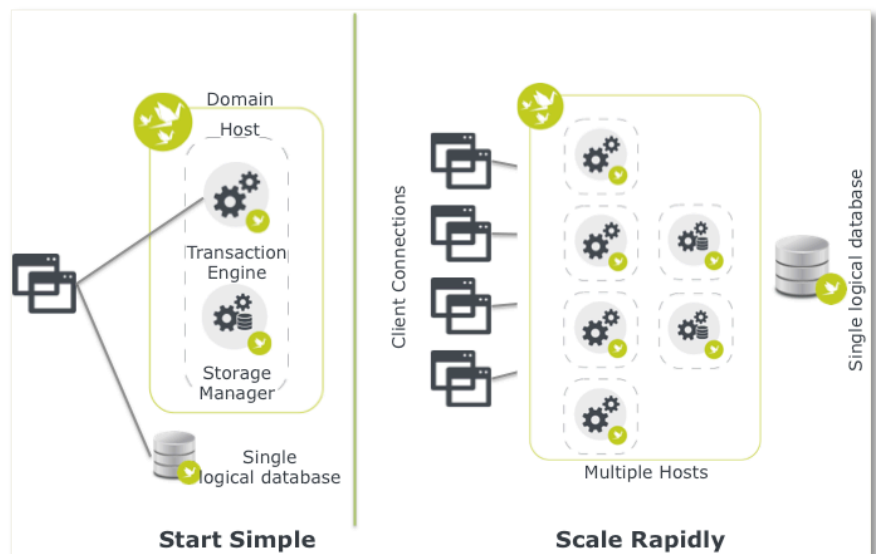
There are three core components that make NuoDB so powerful, high performance and simple to deploy anywhere.

The **NuoDB Transaction Engine**, which is comprised of one or more processes running on compute hosts. These in-memory processes execute the SQL layer by operating on database atoms, listen for changes and communicate changes with peers.

The **NuoDB Storage Manager**, which is a specialized transaction engine that knows how to store and retrieve data on disk. Adding a new storage process automatically creates a copy of the entire database, which increases both performance and resiliency. Storage managers can leverage virtually any type of data storage that can manage a key-value store, for example a local file system, Amazon S3, Hadoop HDFS, or a SAN.

A **NuoDB Broker** is a process running on at least one host that provides applications SQL/JDBC access to the database.

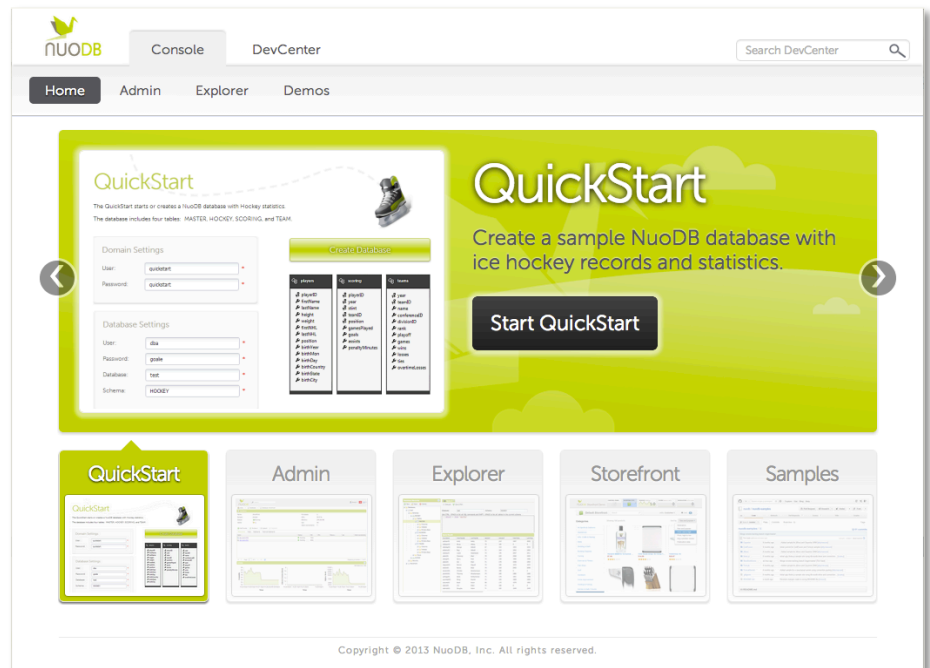
NuoDB enables you to configure and manage one or more databases within an administrative domain, referred to as the NuoDB Domain. Each NuoDB database within a domain can be as simple as a single transaction engine, a single storage manager, and a broker. Each database can be configured to run a number of transaction engines and storage managers across hosts in a datacenter, in the cloud, or a combination of the two.



*Figure 2: NuoDB's distributed database continues to present itself as a single logical database as it scales across virtual and physical resources.*



NuoDB ships with a graphical administrative tool, the **NuoDB Console**, which centralizes monitoring of your decentralized database through an easy-to-use configurable Web app. The console allows you to manage databases within a domain, to start and stop each process, and monitor your database in real-time.



*Figure 3: Use the NuoDB Console to centrally monitor all of your deployment resources, gain access to quick start guides, demos, and DevCenter resources or use the new explorer to start writing SQL.*

Scaling out is achieved by simply adding NuoDB processes. Scaling in is achieved by removing processes. As long as a single transaction engine, a storage manager, and a broker exist, the database continues to operate.

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NuoDB separates transaction management from disk storage, running Transaction Engines on some machines and Storage Managers on others. Transaction Engines manage data through partial, on-demand replication. Data resides where it is needed and used.

When a client of a particular Transaction Engine requires data that is not available locally, the Transaction Engine asks its peers to provide a copy. Data that is no longer necessary on a particular Transaction Engine can be dropped as long as at least one Storage Manager has a durable copy. When a new Transaction Engine starts to serve a database, it first learns the topology of the machines currently running that database, and where to look for data it needs to respond to the requests of its clients.



## NuoDB Editions

To meet the needs of independent developers, small firms and global enterprises delivering traditional database apps or SaaS products, NuoDB is available in three distributions – the Pro, Developer and Cloud Editions.

**NuoDB Pro** allows you to develop and deploy your applications commercially on in-house servers, datacenters, or public clouds like Google Compute Engine, Amazon Web Services, or Windows Azure. Get started with 2 hosts, unlimited databases and built-in redundancy for free. If you need more, pay as you scale.

**NuoDB Developer** lets users develop applications at full throttle without restrictions on data size or number of hosts. Developers can test and scale their applications at no charge to get a true understanding of the resources needed to achieve transactional throughput and data size for pre-production applications. When your app is ready for commercial deployment, move to the Pro Edition.

**NuoDB Cloud** for hosted solutions is currently available on the Amazon AWS Marketplace. NuoDB's unique, distributed architecture gives you the built-in elasticity, multi-tenancy and geo-redundancy capabilities to take your application global any time, anywhere. Handle millions of transactions per second and a global village of concurrent users at a moment's notice; all on commodity hardware.

### NuoDB Performance

[www.nuodb.com/explore/performance](http://www.nuodb.com/explore/performance)

## NuoDB Benefits

NuoDB offers a unique combination of benefits including:

### Scale-out... and in... instantly

Traditional databases cannot deliver capacity on demand. So, too often, application development is hindered by all the work required to make the database scale. To overcome scalability challenges, developers and administrators resort to scaling techniques like partitioning, sharding and clustering. Another common approach is to add larger machines at more cost.

Whatever the workaround, database scaling is frequently a business and technical impediment to application development.

An ideal DBMS should scale elastically, allowing new machines to be introduced to a running database and become effective immediately.

NuoDB's distributed three-tier architecture is the foundation for just that kind of scale-out performance. It decouples management, transactions and storage, meaning each tier can scale a single, logical database elastically. It scales linearly to improve transactions



per second performance and handle both concurrency and data volume. Out and in; by simply adding or removing processes.

### **Keep data safe and applications running all the time**

Modern systems must run 24/7 even when hardware fails or maintenance is performed. This makes business continuity expensive and full of compromises like: buying additional machines that might not be as high performance as your primary ones; setting up replication mechanisms to keep data synchronized and watching dust collect on an expensive disaster recovery setup.

Redundancy is also business critical when it's time to run additional applications on top of your database – e.g., for reporting and analytics. However, redundancy is costly and requires compromises too.

In fact, 59% of Fortune 500 companies experience at least 1.6 hours of downtime per week at an average cost of \$46 million/year. NuoDB can keep you from becoming a part of this statistic. Whether your company is large or small, you need zero downtime.

NuoDB lets you build a global data management platform with guaranteed high availability, rolling upgrades, built-in data redundancy and disaster recovery. It is able to store your data anywhere - locally, remotely, in a datacenter or on a public or private cloud. Store data in whatever storage system is most appropriate - on a directly attached file system, a local key/value store or on a cloud-based storage service.

It provides both an administrative user interface and a scriptable interface. Both are able to dynamically provision additional resources when demand exceeds capacity or when hardware fails. The very nature of the NuoDB distributed architecture means no single point of failure and therefore zero downtime.

### **Distribute databases across clouds or datacenters**

Today's applications are global. What they need is global data consistency with local performance and resilience to datacenter failure.

NuoDB resolves these tough challenges by enabling you to distribute a single database across multiple geographies with multiple master copies and true transactional consistency.

Its geo-distributed data management lets you build an active/active, highly responsive database for high-availability and low latency. By bringing the database closer to your customers, they benefit from faster response times and you eliminate the need for complex replication, backup and recovery schemes.



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No other NewSQL provider offers these business-critical features out of the box. This is the Holy Grail of databases.

## What's New?

The NuoDB Starlings Release is a game changer. NuoDB eliminates the need for complex database workarounds like caching, sharding, clustering and performance tuning typically associated with scaling applications. In addition to the many performance and usability enhancements, this latest release takes the Microsoft deployments to the next level. Features include:

**Improved NuoDB Console** - Integrated admin, SQL development and DevCenter for access to all relevant technical resources.

**Visual Studio Integration** - Develop your applications using all of your favorite .NET languages such as C#, ASP.NET or C++. Use built-in SQL browsing capabilities and full lifecycle development with our ADO.NET driver.

**LINQ Support** – NuoDB ADO.NET enables rapid development, exposes data structures as classes and manages relationships with other classes automatically.

**Entity Framework Compatibility** – Full support for the Microsoft Entity Framework to map your classes to database structures.

**64-bit Windows Support** - Deploy on Windows Server, Windows 7 and 8. Besides Windows, NuoDB also runs on MacOS and various Linux OS platforms.

**NuoDB Wire Protocol** – A fully documented protocol that enables developers to create their own native language drivers.

**Python Driver** – Built on the NuoDB Wire Protocol, it features full support for SQLAlchemy.

**Documentation** – Includes detailed Microsoft Azure deployment and AWS CloudFormation instructions.



## About NuoDB

Everyday businesses face serious challenges coping with application performance, maintaining business continuity and gaining operational intelligence in real-time.

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Launched in 2010 by industry-renowned database architect Jim Starkey and accomplished software CEO Barry Morris, the company is based in Cambridge, MA. Used by thousands of developers worldwide, NuoDB's customers include automotive after-market giant AutoZone, NorthPoint Solutions and other innovative companies.

The company is the recipient of numerous, prestigious industry awards including: Gartner Cool Vendor and The Red Herring Top 100. [www.nuodb.com](http://www.nuodb.com)

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