



Highlights

- Modern apps are using NoSQL solutions to reduce database cost, improve response time and provide faster access to data
 - MongoDB harnesses the advances of NoSQL, maintains the integrity of relational databases and is used by the world's top businesses
 - IBM Power Systems are built for big data — delivering 2.6x better performance for MongoDB at much less cost than x86
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IBM Power Systems and MongoDB for today's applications

The explosive growth of social applications, big data, mobile access and cloud computing is changing the way applications are developed.

There's less time to build applications than ever before as competition is fierce. Today, apps ship in a few weeks or months, not years. Unstructured data — video, images, audio — is becoming more prevalent, which can be problematic for traditional databases.

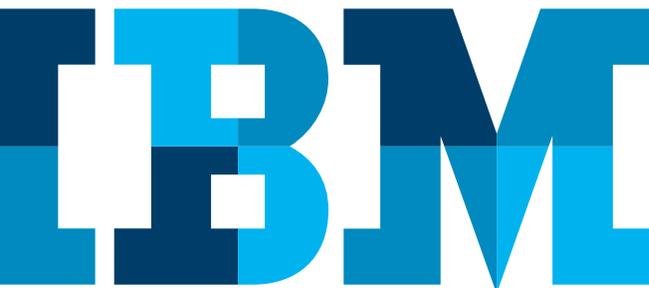
Development methods have shifted from a waterfall process to an iterative process that provides new functionality in weeks and, in some cases, multiple times a day.

These applications often need rapid access to a constant stream of small reads and writes for millions of records that don't fit into traditional SQL database structures. NoSQL can be a better option to relational databases for state-of-the-art applications.

A NoSQL solution with rich querying and secondary indexes, strong consistency, and enterprise management of traditional databases, combined with advanced systems technology, can offer significant advantages to businesses and organizations that want to reduce database management costs, improve application response time and provide faster access to data and analytics.

MongoDB for modern apps

MongoDB is a scalable, high-performance open source document-based database that harnesses the innovations of NoSQL and maintains the foundation of relational databases.



It is a database that fits into the enterprise stack, secured, monitored, automated, and integrated with the existing IT infrastructure and staff.

For a broad range of uses—customer data management, product and asset catalogs, social, mobile and collaboration apps, security and fraud apps and more—MongoDB is a developer friendly platform that preserves the core database capabilities required to build modern applications.

With its secondary indexes, expressive query language, aggregation framework and wide driver support, MongoDB has become the go-to data store for both startups and enterprises.

NoSQL databases were designed for the new world of applications where flexibility, scalability, performance and always-on global deployments are mandatory. For that reason, MongoDB is used by:

- 40 of the top financial services institutions
- 15 of the top retailers
- 15 of the top telecoms
- 15 of the top technology companies
- 15 of the top healthcare companies
- 10 of the top electronics companies
- 10 of the top media and entertainment companies

Because MongoDB is document-oriented, it is schema-less, meaning there is no notion of a rigid table structure composed of columns and types. The flexibility of a dynamic schema is very supportive of modern applications, making it easier to evolve a data model than with a system that has enforced schemas.

MongoDB offers a comprehensive suite of solutions and services to help clients succeed with their MongoDB deployment, including 24/7 support from the same team that builds the database.

Enterprise tooling helps teams operationalize MongoDB more efficiently, including monitoring, performance optimization, automation and backup. Enterprise security makes it easy to protect data and build compliant applications, while the commercial license for MongoDB helps protect your investments.

Application development on MongoDB has lowered time to deployment from years to months, as was the case for a major U.S. insurer when they created a 360 degree view of customers from data across over 50 systems. MongoDB client value is marked by:

- Significantly decreasing time to market by reducing data management challenges of application development
- Lower total costs of ownership through reduced development costs, software licensing costs, database administration costs and hardware costs

IBM Power Systems for Big Data

IBM® Power Systems™ and the POWER8® microprocessor are designed for big data and analytics, providing more threads per core, memory bandwidth and cache than other platform options (Figure 1). These benefits translate into superior performance gains for MongoDB running on POWER8 servers.

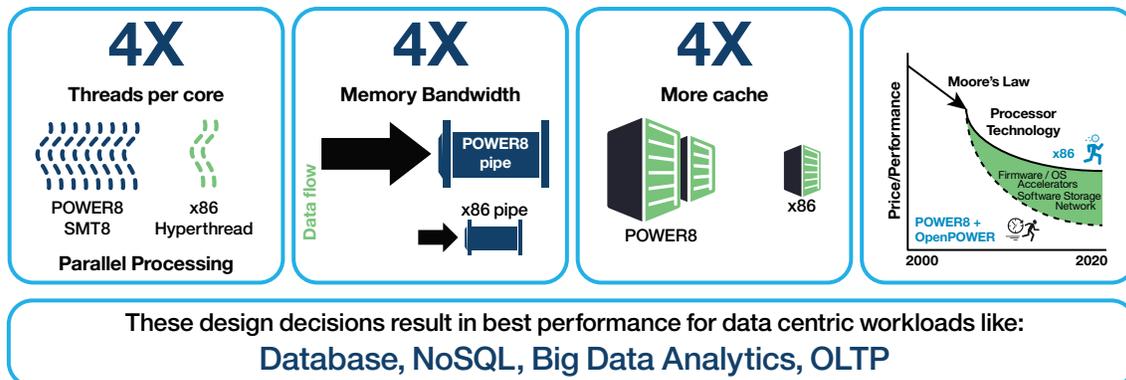


Figure 1: IBM POWER8 is designed to deliver breakthrough performance for data-intensive applications.

The design approach for Power Systems combines computing power, memory bandwidth and I/O throughput for breakthrough performance and economics for a variety of big data and analytics workloads.

POWER8 delivers four times more threads per core versus commodity infrastructure. This helps support more database operations within stringent time constraints—operations can be run concurrently across multiple threads to deliver results quickly.

Power Systems also deliver four times more memory bandwidth and higher memory capacity versus commodity infrastructure, with scale-out systems that can deliver up to two terabytes on a 2-socket server and all the way up to 16 terabytes for enterprise scale-up servers. POWER8 also delivers 4X cache per processor and at a lower latency, which contributes to handling larger chunks of data at higher speeds.

In addition, Power Systems delivers faster I/O to ingest, move and access large volumes of data so that results are available faster.

Another key differentiation is IBM's participation with open innovation. The OpenPOWER Foundation was founded in 2013 as an open technical membership organization to create a vibrant ecosystem to accelerate innovation and to enable data centers to rethink their approach to technology.

OpenPOWER members are actively pursuing innovations across a number of system elements including GPUs, FPGAs, advanced I/O subsystems, and more, to bring state-of-the-art OpenPOWER system designs to market.

In addition to the commitment to OpenPOWER, one of the most important workload changes that POWER8 brings is support for little-endian Linux.

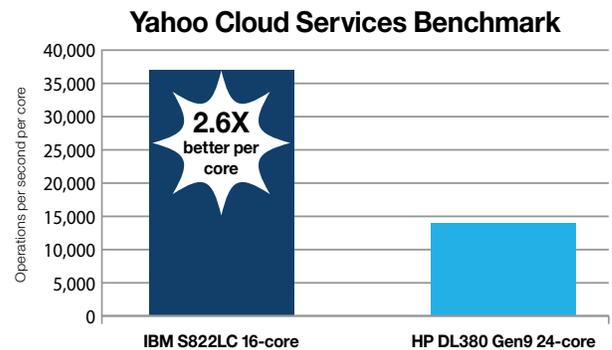


Figure 2: MongoDB on IBM Power Systems performs 2.6 times better than comparable x86.

IBM Power Systems run industry-standard Linux from Red Hat, SUSE and Canonical, which makes moving x86 Linux applications to Power easier than ever before and exploits the advanced hardware and software capabilities of POWER8 technology. Running Linux on Power addresses the demanding needs of today's complex applications and provides economic advantages that scale as business requirements grow.

Why IBM and MongoDB?

IBM Power Systems are built for mission-critical big data applications that provide insights at unparalleled speeds. Exploiting superior price and performance means clients running MongoDB can bring new apps to market faster, reducing risk for mission-critical deployments and building applications that couldn't be built before.

In comparisons with x86 systems, MongoDB on IBM Power Systems has a lower total cost of acquisition and provides significantly greater performance. In a Yahoo Cloud Services Benchmark test, MongoDB on Power Systems was 2.6 times better than an x86 system (Figure 2).¹

On an operations per second (OPS) basis against dollars spent, MongoDB on IBM Power Systems yields a 100 percent advantage over x86, delivering 8.7 OPS per dollar versus 4.35 OPS per dollar on x86.¹

In both highly virtualized open source cloud environments and on-premises system of record deployments, clients can experience major gains in performance and price efficiency with IBM Power Systems and MongoDB.

For more information

To learn more about IBM Power Systems and MongoDB, contact your IBM representative or IBM Business Partner, or visit: ibm.com/power



References

1. Based on IBM internal testing of single system and OS image running Yahoo Cloud Services Benchmark (YCSB) 0.6.0, workload at 50/50 read/write factor. Conducted under laboratory condition, individual result can vary based on workload size, use of storage subsystems and other conditions. IBM Power System S822LC; 16 cores (2 x 8c chips) / 128 threads, POWER8; 3.3 GHz, 256 GB memory, MongoDB 3.3.5 RHEL 7.2. Competitive stack: HP Proliant DL380 Gen9; 24 cores (2 x 12c chips) / 48 threads; Intel E5-2690 v3; 2.6 GHz; 256 GB memory, MongoDB 3.3.5 RHEL 7.2. Both server priced with 2 x 1TB SATA 7.2K rpm HDD, 1 Gb 2-port, 2 x 16gbps FCA. Configurations represent the highest processor frequency for that specific processor running the MongoDB server on 1 socket & the YCSB application workload on the 2nd socket. Both systems used fiber attached file system on IBM Flash 900. Pricing is based on web pricing.



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