

# Is your database ready for the era of big data?



## Highlights

- IBM® DB2® with BLU Acceleration® allows you to fully utilize available system resources to deliver results rapidly by running ad hoc queries and real-time analytics to generate actionable insights
- Shadow Tables help simplify your IT landscape by enabling reporting and transactions in the same system
- Autonomic features and self-healing capabilities help address common database issues while further simplifying management
- It facilitates rapid development of new applications

Welcome to the era of big data, where it is not enough to just manage the growing volume, variety, velocity and veracity of data. As business leaders, you are under growing pressure to find solutions that use this big data as fuel for business growth.

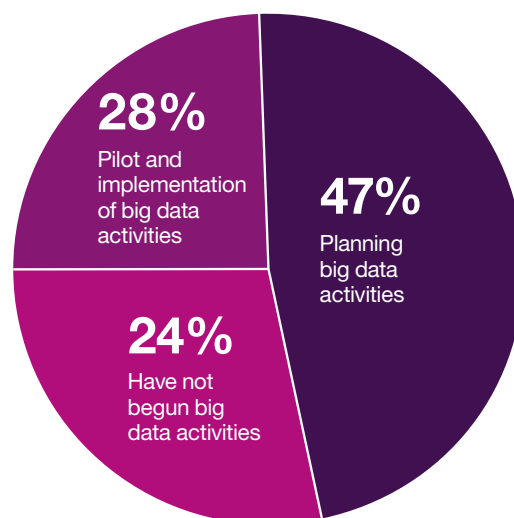
This data is more than a collection of recorded transactions, events and customer information—it is the lifeblood of your business. That makes your database a critical part of everything your business does. Can it stay a step ahead of the demands that your customers, employees and partners place upon it? Does it help you meet service levels for high-availability transactions? Does it deliver up-to-date answers in the moment you need them? Can your database scale up and out? How much will that cost?

To make the most of big data, you need a next-generation database. It has to handle a massive volume of data while delivering the performance to support the real-time analytics you need to take immediate action and plan your next business move. At the same time, it must provide data availability for mission-critical applications, scalability for growth, security for protecting vital information assets and flexibility for responding to changes.

Perhaps most important, your database needs to meet all these requirements without breaking the budget. In today's fast-paced and highly competitive business climate, CIOs must be relentless cost-cutters. According to an IBM Global CIO study, "14 percent of CIOs operate with a Leverage mandate,

and are continually reviewing their legacy environment, with an eye toward cost control."<sup>1</sup> You need a database designed to help control both the infrastructure and personnel costs that form the IT budget.

Choosing a database used to be something the IT department did behind the scenes—today, it is a strategic decision that also involves business users. While many organizations are overwhelmed by the avalanche of information flooding their systems, smart businesses are assessing and adapting their infrastructure to seize the potential for big data. According to the 2012 Big Data @ Work Study conducted by the IBM Institute for Business Value and Saïd Business School at the University of Oxford, most are doing just that: 47 percent of respondents are defining a big data road map, with the rest either already implementing big data projects or taking the first steps to understand big data concepts.<sup>2</sup>



Respondents were asked to identify the current state of big data activities within their organizations. Percentage does not equal 100% due to rounding. Total respondents = 1,061  
Source: 2012 Big Data @ Work Study

Forward-thinking organizations are embracing all available data to engage clients more deeply, anticipate and resolve problems before they happen, and uncover entirely new business models. The key to making it work is using software and systems that are designed for the unique challenges and opportunities of big data.

## IBM DB2: Ready for big data

To make the most of big data and capitalize on time-sensitive opportunities, you need to generate new insights rapidly. IBM DB2 with BLU Acceleration is the next-generation database technology that changes the game for in-memory computing. Delivering a combination of innovations from IBM Research and Development labs, BLU Acceleration provides breakthrough performance and the simplicity of a “load-and-go” setup to enable speed-of-thought analytics without the constraints of other in-memory solutions. With BLU Acceleration, you can analyze more data faster and more efficiently than ever before to uncover insights from your operational and historical data for growing revenue, reducing costs and lowering risk.

DB2 leads the database software field on multiple fronts, as demonstrated by recent client testimonials<sup>3</sup> and industry benchmarks.<sup>4</sup> The new generation of DB2 helps you get more value from big data while dramatically improving IT economics.

DB2 with BLU Acceleration can deliver business answers on demand with in-memory computing performance that is not limited by availability of memory. It allows you to fully utilize available system resources to deliver results rapidly. With the ability to run ad hoc queries and real-time analytics to generate actionable insights at the speed of thought, DB2 with BLU Acceleration helps you unlock new markets and revenue opportunities.

Using a columnar table approach along with encoded compression technology also helps improve database efficiency by significantly reducing the amount of storage capacity required.

Reducing storage capacity helps you cut costs (less-frequent storage purchases and additions) and speed data access (well-managed storage resources keep hot data on fast resources for maximum response times). In addition, you can perform analytics on compressed data without the I/O and performance bottlenecks typically associated with decompression.

DB2 maintains a column-based shadow version of row-based operational data. These Shadow Tables help simplify your IT landscape by enabling reporting and transactions in the same system. Shadow Tables allow you to take advantage of the breakthrough performance of DB2 with BLU Acceleration for instant reporting and operational analytics directly in your transaction processing environment. DB2 automatically routes analytic queries to the column-based Shadow Tables to optimize analytic query performance with all the advantages of BLU Acceleration while preserving high throughput for row-based transaction processing.

## When system downtime is not an option

Big data offers an opportunity to capture additional information surrounding transactions that can be analyzed to gain deeper insights into business operations and customer behavior. For example, marketers want to know which specific promotion was responded to, from what device, when, where, how long someone spent looking at each page or item online, which navigation path they took, what they put into their shopping cart, what they removed, and even what social media posts they made before, during or after their engagement.

All this additional information makes transactional data richer and more valuable, but it must be captured, analyzed and put to use. Databases must be prepared to handle the increasing volume of new data, and they must be available around the clock. This presents a risk to many organizations: Can your systems handle the load and deliver results? Can it meet your service-level requirements for availability and performance to keep your business running?

With DB2, you can help ensure online transactions, queries, analytics and other tasks continue uninterrupted even during planned and unplanned outages. Plus, DB2 can help ensure always-available transactions, give your organization the transparent scalability at will to handle unexpected transactional demand and provide the resiliency to continue business operations and recover quickly if disaster strikes.

You can boost capacity and expand or contract it as needed with IBM DB2 pureScale® technology, available in IBM DB2 10.5 Advanced editions. DB2 pureScale is derived from the gold-standard capabilities of IBM DB2 for z/OS®, and brings high availability and flexible scalability to distributed environments. With DB2 pureScale, administrators can transparently add and manage multiple database nodes, which share data and workload in a clustered system, without changing applications or data distribution. This frees applications from the underlying complexities of database architecture, simplifies application coding and testing, and improves developer productivity. And with broad choices for infrastructure and commodity network hardware, you can change the economics of high availability for a much wider range of use cases.

For another layer of assurance, High Availability Disaster Recovery (HADR) capabilities of DB2 help keep transactions flowing even following large-scale outages that may result from weather, power failures or other events. By replicating data to one or more remote disaster recovery sites, you can protect and maintain data availability for your critical business processes and customer applications.

### **Protecting your vital information assets**

Leveraging data assets is necessary for business growth—but data governance rules dictate strict standards for data protection, and organizations can face heavy penalties for failing to meet these standards. DB2 helps you achieve security and privacy goals while maintaining high performance, protecting your data from external and internal threats while keeping it accessible to those who need it.

The essential security measures in DB2 start with reliable authentication, authorization and multilevel access control. DB2 enables tight control over exactly who can access certain data—or even confirm its existence. At a more granular level, DB2 provides row and column access control without creating multiple data views to reduce duplication. For example, DB2 will mask a column total number if a line item within the column is confidential. Encryption capabilities also protect specific fields if someone accidentally releases your data or accesses it without authorization.

To help you avoid the potentially high fines for compliance issues, DB2 Time Travel Query functionality provides “point-in-time” information, keeping a history of data changes and enabling users to query data as it appeared at different points in time. Time Travel Query helps reduce the costs and complexities associated with maintaining audit trails.

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*“[T]he Time Travel Query feature greatly simplifies the development and maintenance of time-aware application code, resulting in up to nine times coding cost savings. We look forward to the benefits our banking, finance, securities and insurance customers will gain while addressing constant changes in regulatory compliance and auditing requirements.”*

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—Pradeep Naik, Principal Consultant, Wipro Technologies

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### Improving cost-effectiveness—the database matters

IT costs boil down to two elements: performance and people. Costs for servers, data storage, floor space, cooling and electricity tend to go up in rough proportion to processing capacity. How efficiently your database delivers and manages performance is, therefore, a fundamental issue in cost control.

By increasing the processing performance of your database and your infrastructure, you can reduce the data center energy and real estate requirements. With a powerful database and dense infrastructure, you can also reduce the costs of buying and operating hardware.

People are the other part of the IT cost equation. IT systems must be programmed, maintained and occasionally fixed. But your senior IT people should be focused on innovating and pushing the business forward rather than handling trouble tickets. An easy-to-maintain database with well-integrated tools and autonomic capabilities requires fewer staff members for maintenance, so you can deploy more of your skilled staff to higher-value tasks.

DB2 helps your IT organization make the most of both performance and people. It delivers outstanding performance and time-saving automation. You can maintain investments in your existing SAP environments and skills, and adopt next-generation in-memory technology without disrupting your business.

Time and again, DB2 has demonstrated high overall performance and high performance per core across multiple industry-standard benchmarks.<sup>5</sup> The next-generation in-memory computing technology in DB2 with BLU Acceleration runs on x86 and other commodity hardware, and is also optimized to leverage IBM POWER8™. IBM Power Systems™ can run more concurrent queries in parallel faster, across multiple cores with more threads per core.<sup>6</sup>

Database performance also depends heavily on storage efficiency—which is why DB2 uses multi-temperature data management and advanced workload-balancing techniques to promote efficient use of storage assets for a given set of workloads. Deep and adaptive compression technologies help dramatically reduce storage requirements, which can speed up disk I/O, enhance data availability and shorten backup-and-restore windows. By reducing storage capacity requirements, DB2 helps you drive down hardware and storage costs while also cutting energy costs and boosting performance.

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*“IBM DB2 on Linux pays off enormously well. TRUMPF benefits from an optimum cost/performance ratio and increased user productivity because of consistently good response times.”*

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—Volker Blum, Head of IT Applications Technology, TRUMPF

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To help reduce personnel costs, DB2 intelligent administration features make it relatively easy to set up and maintain the database. For example, DB2 can automatically perform high-skill tasks such as memory tuning and optimization for faster processing. These capabilities improve IT staff productivity so they can work on the next innovation or new initiative.

Autonomic features and self-healing capabilities help address common database issues while further simplifying management. For example, the DB2 Health Center continually monitors the database, searching for potential problems. If the Health Center discovers an issue, such as the database running low on memory, it automatically notifies administrators and suggests solutions for the problem, helping make adjustments faster.

DB2 Configuration Advisor can save database administrators time by automatically configuring a database for use—setting the processor speed, the amount of memory that needs to be allocated and the number of users on the system. A related capability, the self-tuning memory manager (STMM), helps avoid slowdowns in performance that would negatively affect business operations.

### **Help reduce application migration cost and risk**

The DB2 SQL compatibility feature can greatly reduce the cost and risk of migrating Oracle Database and data mart applications to take advantage of DB2. DB2 includes extensive native support for the Oracle PL/SQL procedural language as well as new data types, scalar functions, improved concurrency, built-in packages and more. Applications built to run on Oracle databases or data marts require few or no code changes to run on DB2, which helps speed up migration and reduce associated risks. In fact, DB2 achieves an average of 98 percent compatibility with Oracle PL/SQL.<sup>7</sup> You can leverage your existing Oracle database skills and investments while taking advantage of the speed and simplicity of BLU Acceleration.

### **Stay competitive by integrating new technologies**

IT departments are constantly looking for ways to integrate new technologies that help the business keep a competitive edge. The latest version of DB2 allows your business to leverage the agility of a NoSQL environment and broaden your application reach. DB2 facilitates rapid development of new applications. It provides the versatility for cloud-based environments and data-as-a-service (DaaS) approaches as well as virtual servers and mainframes. It offers compatibility with many languages and programming paradigms, including Java, JavaScript, Microsoft .Net and open source languages, enabling your organization to follow almost any development path you prefer.

## Future-ready, today

Today more than ever, effective data management is critical to business success. DB2 is ready for the challenge. Drawing on field-proven technologies from across the IBM portfolio, DB2 combines the high performance needed for big data analytics with exceptional availability, scalability, security and flexibility. By improving data management efficiency and simplifying management, DB2 can help you capitalize on the potential of big data while driving down costs.

Make sure your database and IT resources are fully prepared for the era of big data. IBM and DB2 are ready today.

## Why IBM?

DB2 provides a next-generation data platform for the business that never stops. By combining always-on transactional processing with speed-of-thought analytics, it simplifies the IT landscape to deliver better performance with fewer resources. It is designed for extremely fast time to value and operational simplicity, and can be deployed on-premises or through the cloud for maximum flexibility.

DB2 was built for continuous data availability and scalability of high-throughput transactional workloads. It allows you to allocate more resources for performance or growth at will, and to free applications from the complexities of the underlying

database architecture. With broad infrastructure options, DB2 pureScale brings new economics to high availability for a wider range of use cases.

DB2 with BLU Acceleration offers a huge step forward in analytic workload processing by combining proven in-memory and columnar data store capabilities with advanced compression and hardware exploitation techniques. The result: reliably faster analytic query processing for a variety of online analytical workloads—without the limitations of in-memory-only systems.

## For more information

To learn more about improving database performance and IBM DB2, please contact your IBM representative or IBM Business Partner, or visit the following website:

[ibm.com/db2/luw/](http://ibm.com/db2/luw/)

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<sup>6</sup> Based on IBM internal tests as of April 17, 2014 comparing IBM DB2 with BLU Acceleration on IBM Power® with a comparably tuned competitor row store database server on x86 executing a materially identical 2.6 TB BI workload in a controlled laboratory environment. Test measured 60 concurrent user report throughput executing identical IBM Cognos® report workloads. Report per hour (RPH) metric calculated for each category of reports as total completed reports/hours to complete all reports in the category. Competitor configuration: HP ProLiant DL380p, 24 cores, 256 GB RAM, competitor row-store database, SuSE Linux 11SP3 (database) and HP ProLiant DL380p, 16 cores, 384 GB RAM, Cognos 10.2.1.1, SuSE Linux 11SP3 (Cognos). IBM configuration: IBM Power Systems S824, 24 cores, 256 GB RAM, DB2 10.5, IBM AIX® 7.1 TL2 (database) and IBM Power Systems S822L, 16 of 20 cores activated, 384 GB RAM, Cognos 10.2.1.1, SuSE Linux 11SP3 (Cognos). Results may not be typical and will vary based on actual workload, configuration, applications, queries and other variables in a production environment.

<sup>7</sup> Based on internal tests and reported client experience from 28 Sep 2011 to 07 Mar 2012.

<sup>1</sup> 2011 IBM Global CIO Study: The Essential CIO, p. 23. [ibm.com/ciostudy](http://ibm.com/ciostudy)

<sup>2</sup> 2012 Big Data @ Work Study. IBM Institute for Business Value and Saïd Business School at the University of Oxford. [ibm.com/services/us/gbs/thoughtleadership/ibv-big-data-at-work.html](http://ibm.com/services/us/gbs/thoughtleadership/ibv-big-data-at-work.html)

<sup>3</sup> “Client Praise for IBM DB2 BLU Acceleration - Speed, Access, Data Compression.” <http://youtu.be/5T6f74gYu1Y4> “DB2 Performance: Industry-leading performance across multiple workloads.” [ibm.com/software/data/db2/performance.html](http://ibm.com/software/data/db2/performance.html)

<sup>4</sup> DB2 Performance: Industry-leading performance across multiple workloads.” [ibm.com/software/data/db2/performance.html](http://ibm.com/software/data/db2/performance.html)

<sup>5</sup> [ibm.com/software/data/db2/performance.html](http://ibm.com/software/data/db2/performance.html)



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