DB2 BLU Acceleration for Cognos

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Hoskins, try saying 'profits are up' without the finger quotes, okay?

Source: Wall Street Journal – Pepper and Salt

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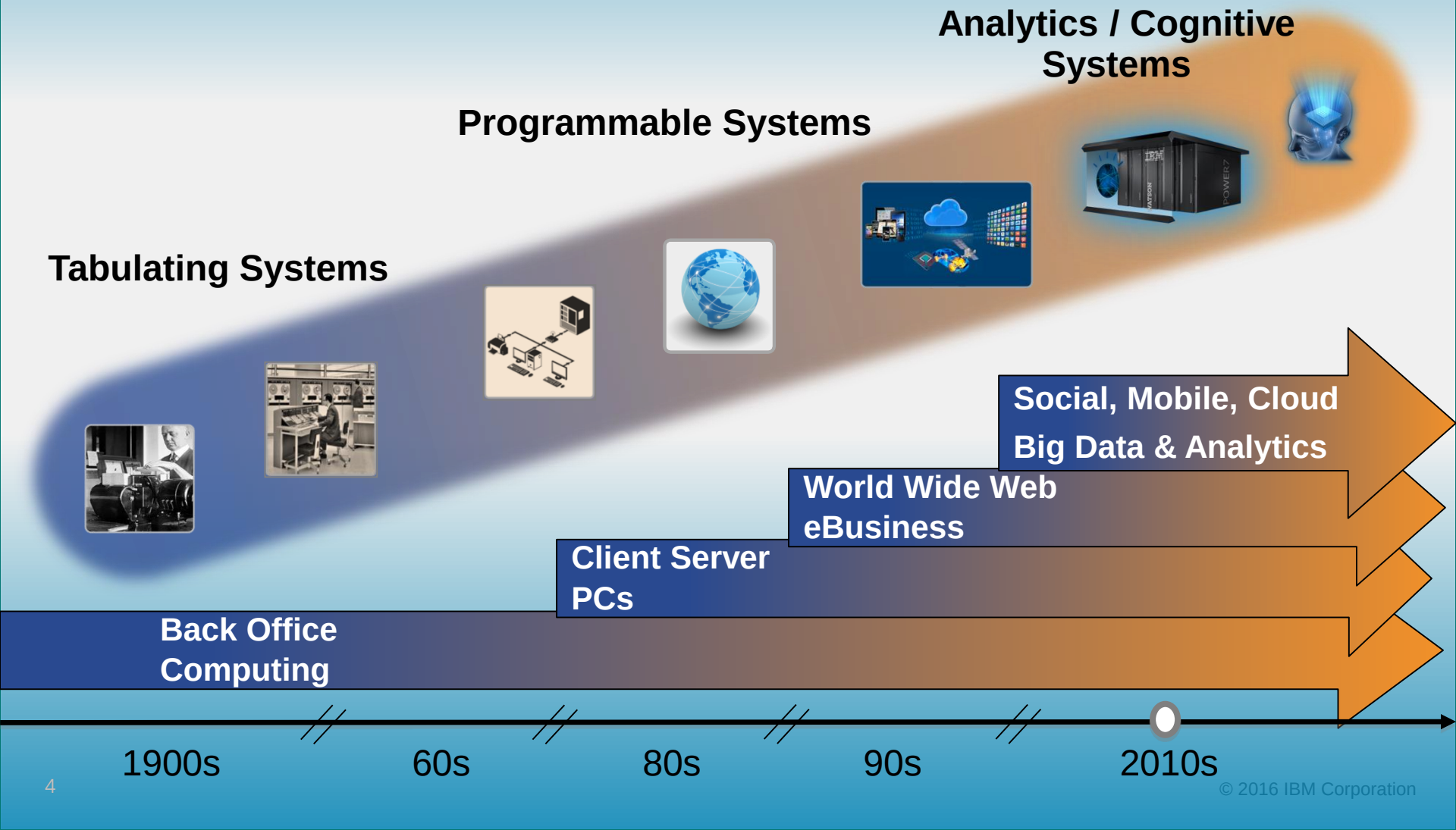
Advances in technology & computing intelligence usher in a new eras



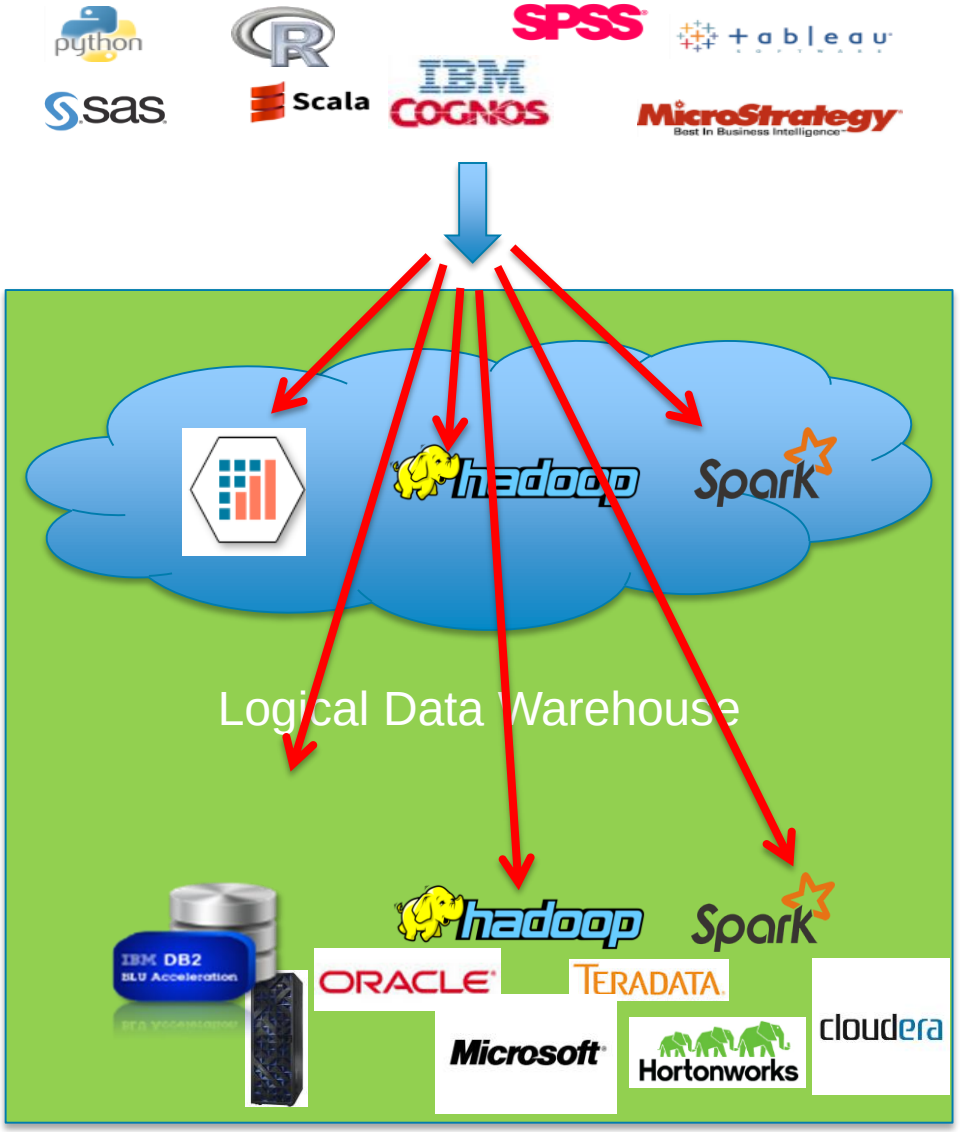
What does the next generation database look like?

- ✓Advanced in-memory technology deployed on multiple nodes in a network of servers
- ✓Super fast for transactional and analytic workloads
- ✓Available, reliable, resilient
- ✓Simple, intelligent and agile
- ✓Easy to deploy, cloud options
- ✓Access independent of data organization

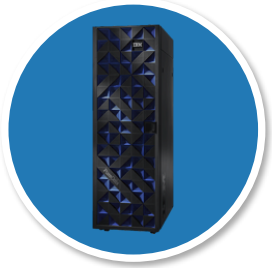
Common Analytic Engine – Leveraging Federation

A new era of cloud, big data and cognitive workloads

- Leverage Hadoop and Spark to broaden DB2 analytics ecosystem to Big Data with application transparency via BigSQL
- dashDB provides the ability to move towards a hybrid cloud type of deployment of workloads and data
- Deploy a complete mix of traditional relational, open source and hybrid cloud with your DB2 environment
- Leverage Federation to provide data virtualization for queries and workloads regardless of where data is, including non-IBM data sources



IBM Analytics Platform- IBM “Common Analytics Engine”

Managed Public Cloud Service	Software-defined	Appliance	Custom Deployable Software	Hadoop / Spark Environment
				
dashDB	dashDB Local	dashDB appliance	DB2	BigSQL

A Common Analytics engine
enables true hybrid solutions with portable analytics

- **Application compatibility:** Write once, run anywhere
- **Operational compatibility:** Reuse operational and housekeeping procedures
- **Licensing:** Flexible entitlements for business agility & cost-optimization
- **Integration:** Common Fluid Query capabilities for query federation and data movement
- **Standardized analytics:** Common programming model for in-DB analytics
- **Ecosystem:** One ISV product certification for all platforms

IBM Analytics Platform- IBM “Common Analytics Engine”

- What is the common analytic engine?
  - It is a hybrid of the best values of the DB2 with BLU Acceleration engine and the PDA engine
  - An initial version of this engine exists today, called dashDB
  - High Value capabilities include
    - DB2-based SQL MPP engine with BLU Acceleration
    - Columnar storage model
    - In-memory processing
    - INZA predictive analytic algorithms
    - Full integrated RStudio and R language
    - Oracle application compatibility
    - Massive parallel processing
    - On-disk data encryption and secure connectivity
    - Advanced SQL (i.e., referential integrity)
    - High concurrency (10,000s of concurrent connections)

DB2 No-Boundaries Data Management Software

DB2: A database Software for the era of digital, cloud and cognitive

Flexible	Deploy on-premises and/or on cloud with integrated security and tools
Easy	Simple to deploy, upgrade, maintain, and move Oracle workloads to DB2
Available	Continuous availability with no loss of data or disruptions
Fast	Extreme performance for transaction processing and analytics with the most advanced in-memory technology
Versatile	Scalable Transactional and Analytics workloads in the same database

New DB2 Capabilities

Petabyte Scale In-Memory Warehousing	Build new or augment your operational warehouse leveraging new Petabyte scale BLU technology
Broader Analytical Horizons	Leverage expanded BLU capabilities to broaden the workloads and analytical functions inside a DB2 warehouse
Data Protection Built In	Enterprise-class data encryption for all databases to ensure the security of large or small data sets
Transact with Confidence	Manage business critical systems with the confidence that DB2 will scale to large data and user volumes than ever before
Continuous Business	DB2 pureScale introduces new and enhanced capabilities to ensure a business data is always up – zero data loss in case of node failure

DB2 Version 11.1 Highlights

Core Mission Critical Workloads : *Extending DB2 Leadership*

Comprehensive Enterprise Security

Enterprise Encryption
- Centralized Key Managers (KMIP)

Availability 2nd only to DB2 for zOS

Simple Fast Deployment
- Up and running in hours

Even Greater Availability
- Zero data loss DR with HADR
- More online management

More Platforms Supported
- Power Linux (LE)
- Virtualization for RDMA (x86)

Significant Core Database Advances

Very Large Database Performanc
- Higher user throughput

Simpler, Faster, More Online Upgrades
- Faster, no need for offline backup
- Streamlined HADR upgrade
- DB2 Version 9.7 direct to 11.1

Warehousing Workloads : *Most Consumable, Most Scalable In-Memory Warehousing Platform*

Massive Scale Warehousing at In-Memory Performance

MPP BLU Scalability
- PB scale in-memory warehousing

Next Gen In-Memory Performance, Function & Workloads

- **Faster ELT/ETL performance**
- **More Query Workloads Optimised**
- **More Function supported**
  - Generated Columns
  - RCAC
  - OLAP + BLU Perf

Enhanced Compatibility & Federation

Multi-Lingual SQL Advances
- PostgresSQL

Support for European Languages
- Codepage 819

DB2: Now with Very Large Database (VLDB) Enhancements

(Extending the OLTP database)

- With ever increasing volumes, we're finding that OLTP environments commonly have 10s, even 100s of TBs of data
- Several enhancements including :
  - Concurrency and scalability for "hot"(recently and commonly referenced) pages
    - Higher transaction throughput
  - Online table reorg for range partitioned tables
    - Includes range specific reorg

DB2 with BLU Acceleration

Rich capability integrated with IBM DB2 V11

Fast Answers. Simply Delivered.

- What is DB2 with BLU Acceleration?
- In-memory analytic database
- Multiple IBM innovations
  - In-memory processing of columnar data without the limitations of memory size
  - Analyze compressed data with actionable compression
  - CPU Acceleration
  - …and more
- Multiplatform: Supports AIX, Linux, zLinux, Windows
- Ready for Analytics: Cloud, On premises, SAP, Cognos, and more
- Agile warehousing via dashDB

BLU Acceleration

Analyze more data faster and more efficiently

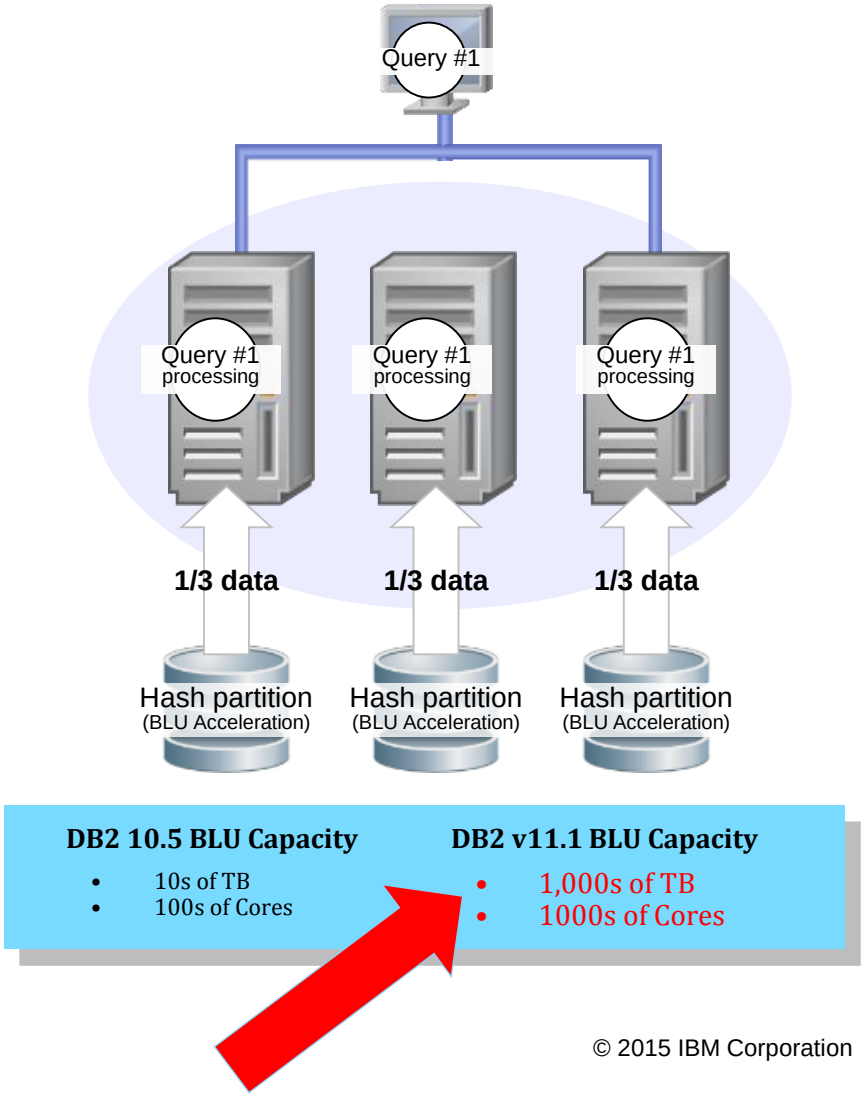
BLU Acceleration: MPP Scale Out & Performance

Technology

- **Pervasive SMP & MPP Query Parallelism**
- **Significant Advances of the in-memory algorithms**

Value To Customers

- **Immediate improvement in business analytics / reporting turn-around time**
- **Reduces costs: Extends the service of existing database assets & technology**



What makes BLU Acceleration different?

Unmatched innovations from IBM Research & Development labs

Next Generation In-Memory

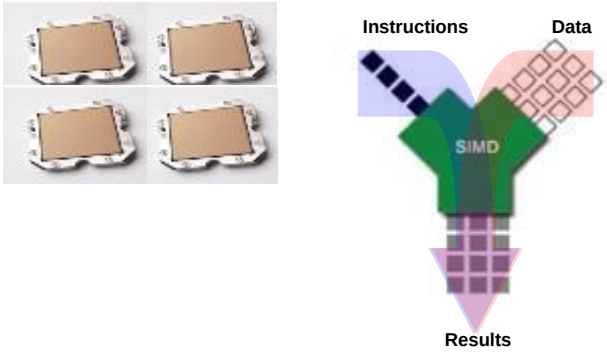
In-memory columnar processing with dynamic movement of data from storage

Analyze Compressed Data

Patented compression technique that preserves order so data can be used without decompressing

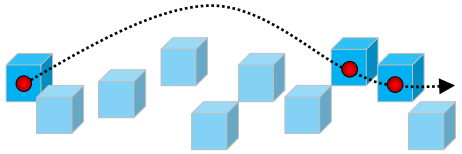
CPU Acceleration

Multi-core and SIMD parallelism (Single Instruction Multiple Data)



Data Skipping

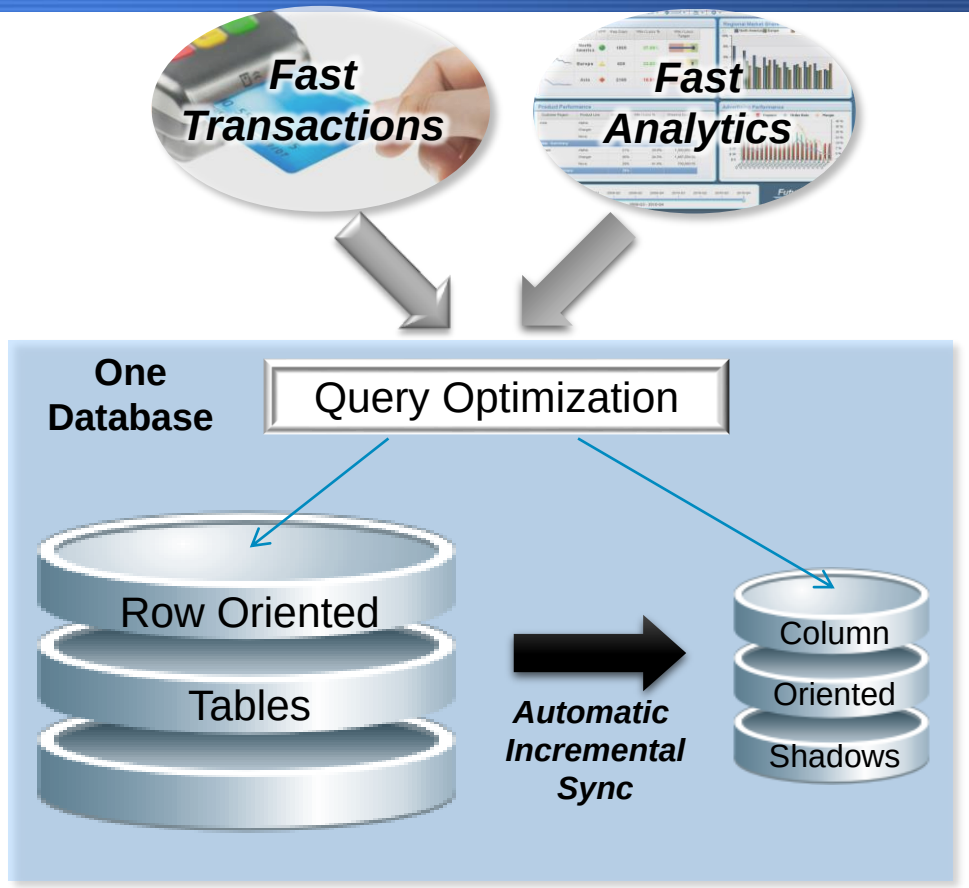
Skips unnecessary processing of irrelevant data



BLU Shadow Tables

Fast Answers. Simply Delivered.

- Instant insight into operational data without compromising transaction performance
- DB2 creates column-based 'Shadow Table' versions of row-based operational data
- Analytic queries are seamlessly routed to Shadow Tables to take advantage of BLU Acceleration analytics performance in the transaction processing environment
- With BLU Shadow Tables, the performance of analytical queries can improve by 10x or more, with equal or greater transactional performance*. In one instance, the removal of secondary analytic indexes improved transactional performance by 2x**



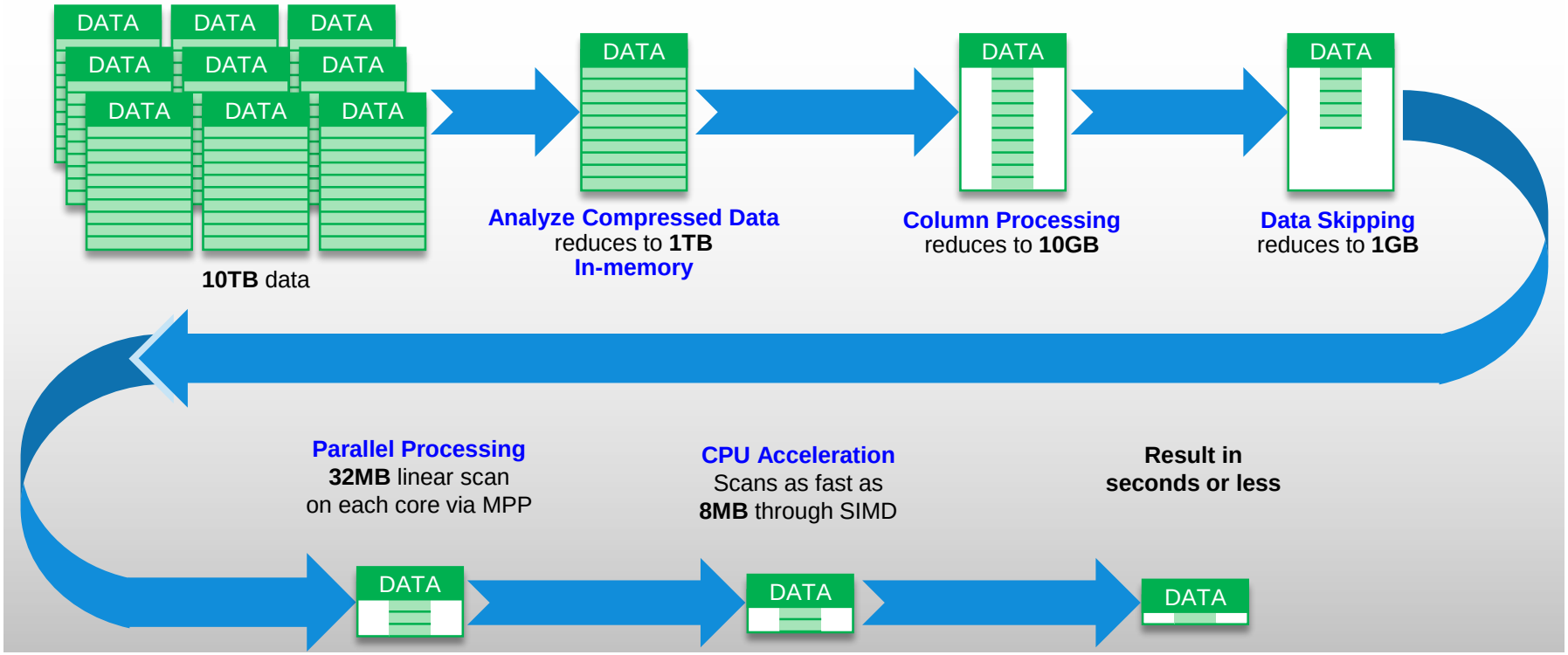
Reporting and Transactions in the same continuously available system

* - Based on internal IBM testing of sample transactional and analytic workloads by replacing 4 secondary analytical indexes in the transactional environment with BLU Shadow Tables. Performance improvement figures are cumulative of all queries in the workload. Individual results will vary depending on individual workloads, configurations and conditions.

** - Based on internal IBM testing of sample transactional and analytic workloads by replacing 20 secondary analytical indexes in the transactional environment with BLU Shadow Tables. Performance improvement figures are cumulative of all queries in the workload. Individual results will vary depending on individual workloads, configurations and conditions.

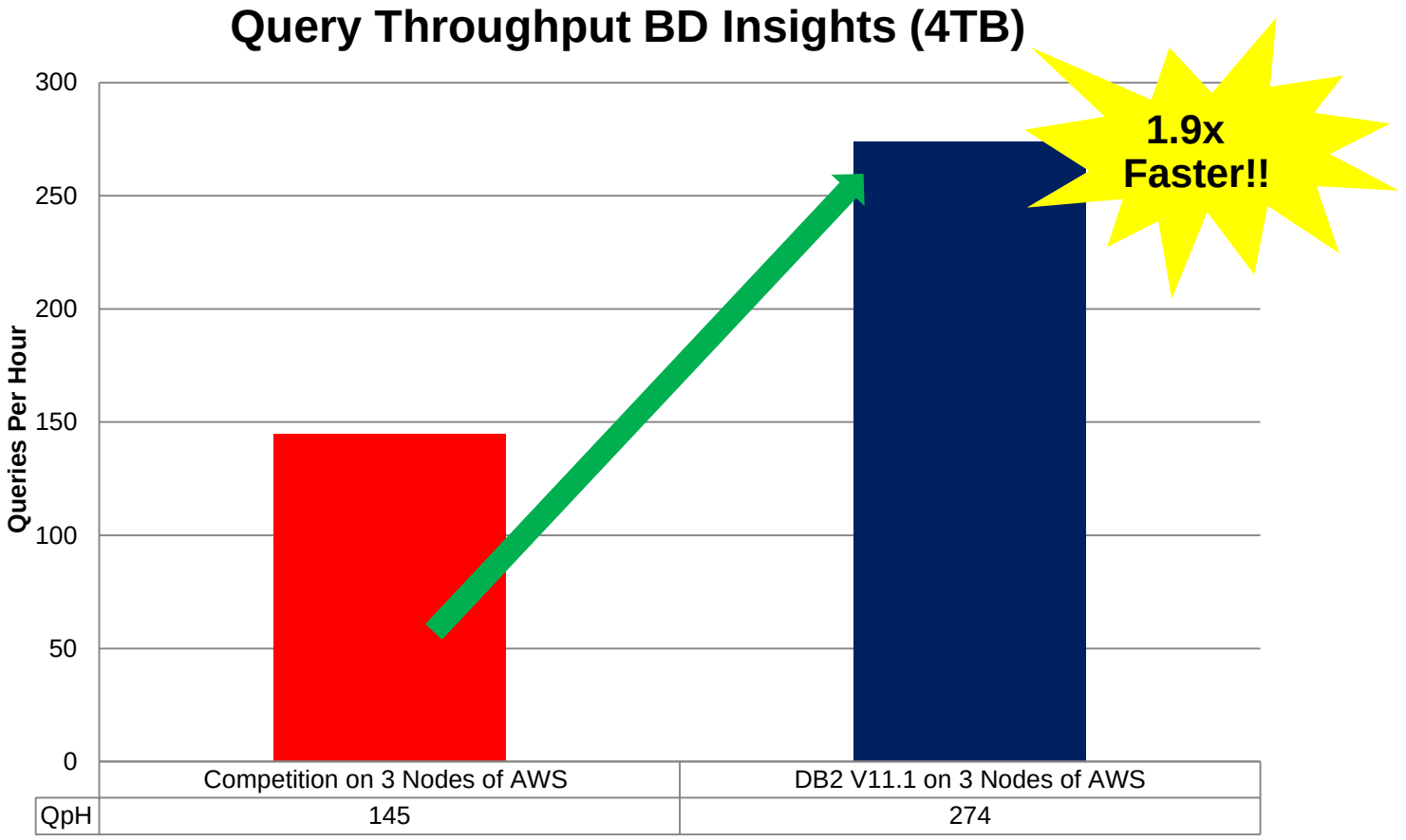
BLU Acceleration illustration
10TB query in seconds or less

- **The System**: 32 cores, 1TB memory, 10TB table with 100 columns and 10 years of data
- **The Query**: How many "sales" did we have in 2010?
  - `SELECT COUNT(*) from MYTABLE where YEAR = '2010'`
- **The Result**: In seconds or less as each CPU core examines the equivalent of just 8MB of data



Outstanding BLU MPP Performance

- **1.9x Higher Throughput with DB2 Version 11.1 vs. the Competition**

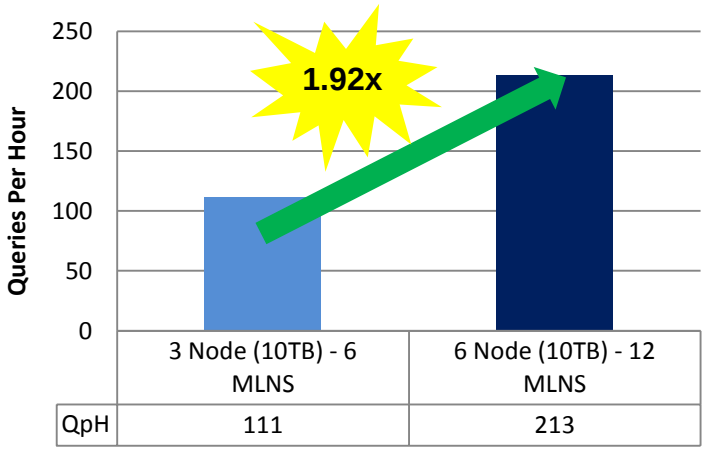


Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user will experience will vary depending upon many factors, including considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve results similar to those stated here.

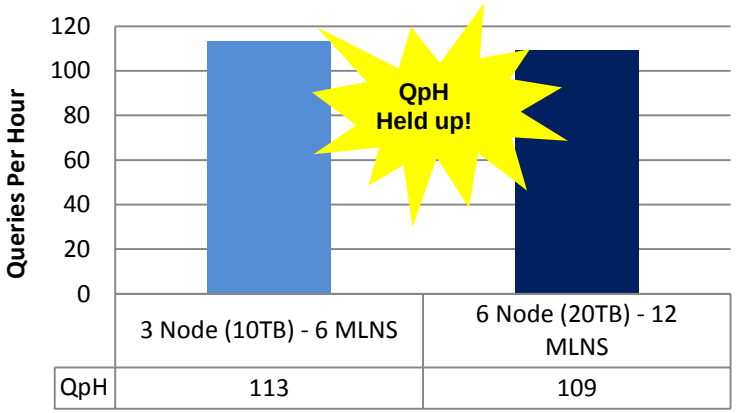
Demonstrating BLU MPP Linear Scaling

- **DB2 Version 11.1 on an IBM Power Systems E850 Cluster**

Scaling Hardware at constant Data Volume



Scaling Hardware along with Data Volume



- **Scaling was measured in two different ways**
  - Doubling the hardware but keeping the database constant
  - Doubling the hardware and doubling the database size
  - Both tests used the BD Insights Heavy Analytics Internal Workload

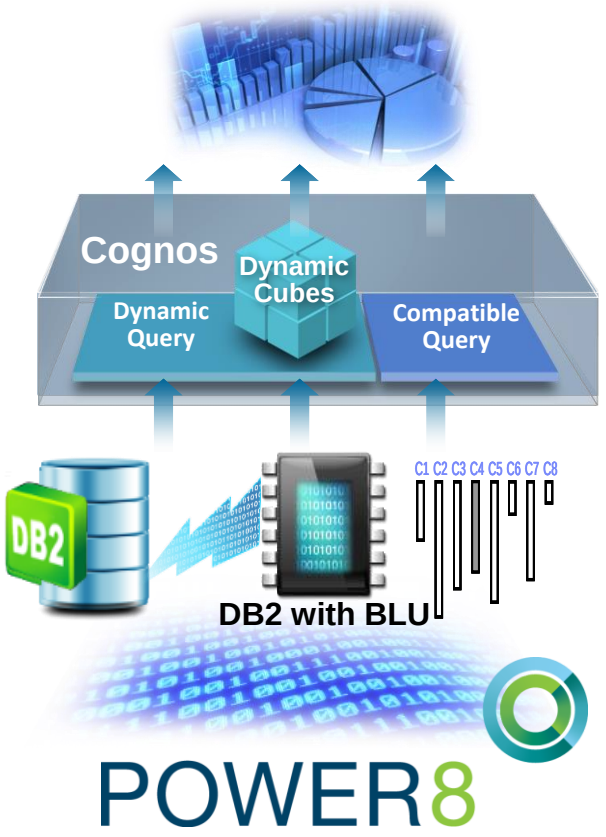
Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user will experience will vary depending upon many factors, including considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve results similar to those stated here.

Cognos BI and BLU Acceleration on Power Systems
Fast on Fast on Fast

82x faster

vs. Competitor Row Store Database on Ivy Bridge (x86)[1]

- Exploitation of processors designed for big data with massive parallelism and bandwidth
- Efficient and improved storage savings for Cognos BI customers
- DB2 with BLU complements and enhances Cognos BI



1) Based on IBM internal tests as of April 7, 2014 comparing IBM DB2 with BLU Acceleration on Power with a comparably tuned competitor row store database server on x86 executing a materially identical 2.6TB BI workload in a controlled laboratory environment. Test measured 60 concurrent user report throughput executing identical Cognos report workloads. Competitor configuration: HP DL380p, 24 cores, 256GB RAM, Competitor row-store database, SuSE Linux 11SP3 (Database) and HP DL380p, 16 cores, 384GB RAM, Cognos 10.2.1.1, SuSE Linux 11SP3 (Cognos). IBM configuration: IBM S824, 24 cores, 256GB RAM, DB2 10.5, AIX 7.1 TL2 (Database) and IBM S824, 16 of 20 cores activated, 384GB 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.

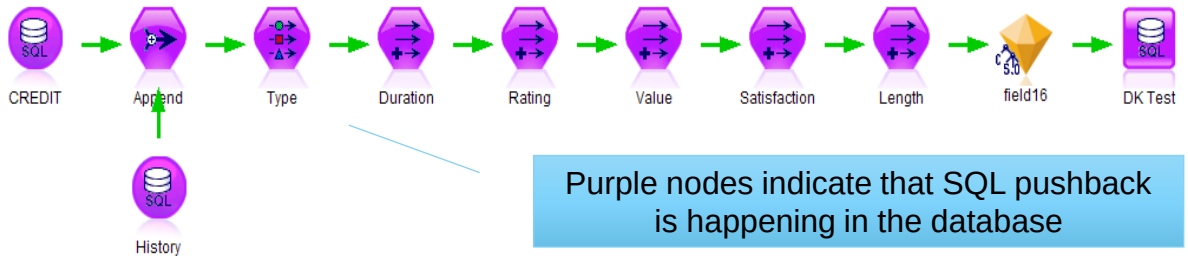
82x calculation based on geometric mean calculation giving equal weighting to the report per hour (RPH) improvements in the three categories of simple, intermediate, and complex reports. GEOMEAN(RPH_simple,RPH_intermediate,RPH_complex) = GEOMEAN(18.85,40.07,747.63)=82.66

Predictive Analytics on DB2 with BLU Acceleration

New

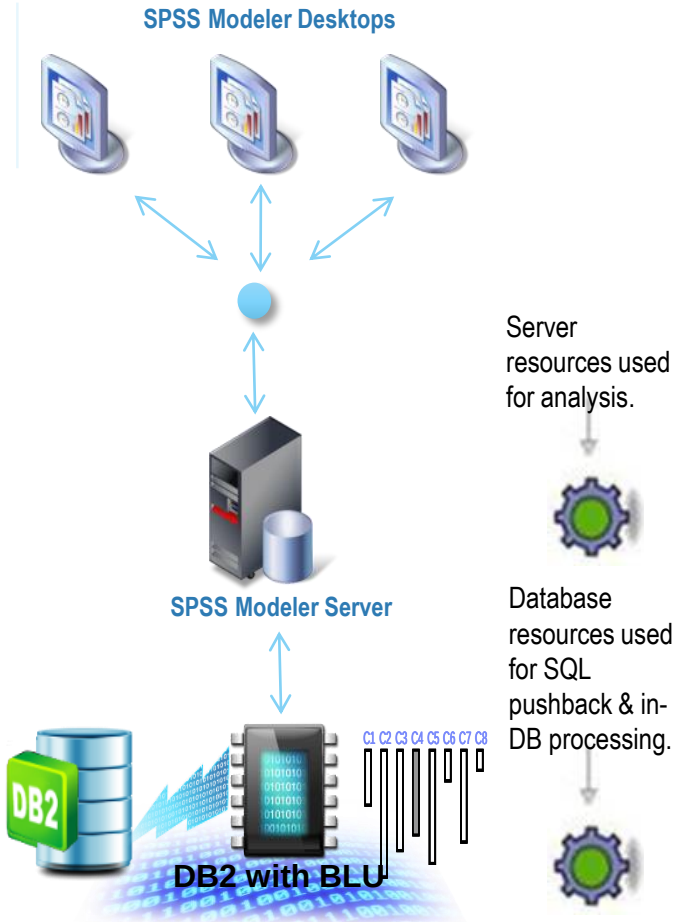
Deliver predictive intelligence for decisions at the point of impact

A sample SPSS Modeler and SPSS Analytic Server stream



DB2 with BLU Acceleration now supports SPSS Modeler

- Improve outcomes and decisions with predictive analytics
- Analyze vast amounts of data in less time with in-database performance and minimized data movement

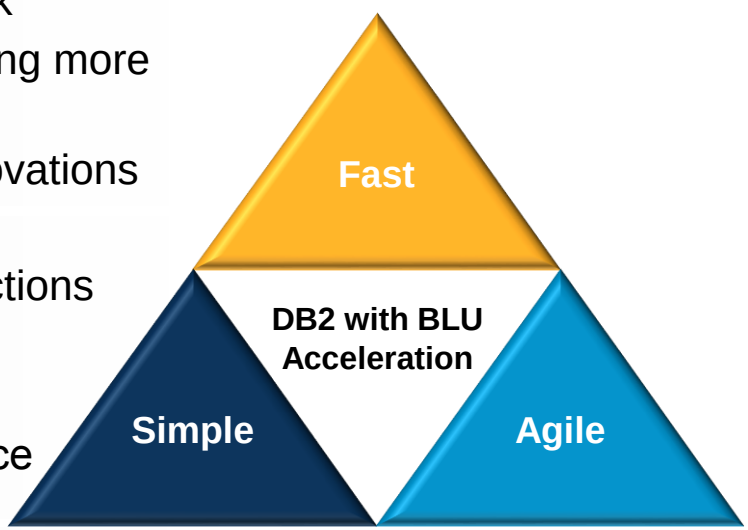


The Benefits of DB2 with BLU Acceleration for Analytics

Fast Answers. Simply Delivered.

- **Instant insight from real-time operational data** for growing revenue, reducing cost and lowering risk
- 35x to 73x faster analytics, with some queries running more than 1400x faster[1,2]
- Next generation in-memory with IBM Research innovations

- **Simplified IT landscape** with reporting and transactions in the same system
- No need for indexes, aggregates or tuning
- Operational simplicity with "load and go" performance



- Available for on-premises or via the cloud
- "In one of our largest customer databases, we saw a compression ranging from **7x to 20x** as compared to the uncompressed tables **"** - Mike Petkau, Director of Database Architecture & Administration, TMW Systems
- **Simple, low-risk upgrade** from Oracle Database

1 Based on internal IBM testing of sample client analytic workloads comparing queries accessing row-based tables on DB2 10.1 vs. columnar tables on DB2 10.5 with BLU Acceleration. Performance improvement figures are cumulative of all queries in the workload. Individual results will vary depending on individual workloads, configurations and conditions.
2 Based on internal IBM tests of analytic workloads comparing queries accessing row-based tables on DB2 10.1 vs. columnar tables on DB2 10.5 with BLU Acceleration. Results not typical. Individual results will vary depending on individual workloads, configurations and conditions, including size and content of the table, and number of elements being queried from a given table..

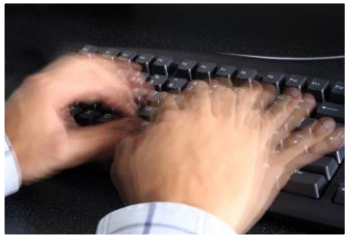
Benefits for key stakeholders

C-level and Line of Business Executives

- **CFO**: Faster Financial Performance analysis to reduce day-long processing to minutes, or provide answers to business questions on-demand
- **CMO**: Faster Market and Customer analysis to deliver insights in time to improve campaign results and customer profitability
- **CIO**: Faster analytics with in-memory performance, “load and go” simplicity, and storage space savings with compression – all without the cost and risk of changing infrastructure or building new skills and processes

IT Managers

- Deliver new analytic capabilities to the business in days, not months
- Transform service levels for analytics
- Fast and easy migrations from Oracle Database to DB2 with native SQL and PL/SQL compatibility



Data Professionals

- Quickly deliver new capabilities and higher service levels to the business
- Work with the most innovative, breakthrough technology in the industry
- Freedom from routine and mundane maintenance and administration

DB2 with BLU Acceleration at Handelsbanken

Full service bank for private and corporate customers
Founded in 1871 with operations in 24 countries

100x improvement

in performance of one of the queries

Up to 82% compression

"BLU Acceleration is very lucrative for us because it's very simple to get up and running. The first query ran within 6 hours."

"We don't have to tune it with index or table spaces or anything. Just load the data and run the queries to see the results."

Phillip Kallander – Chief Technical Architect for Data Warehouse and Analytics, Handelsbanken

DB2 with BLU Acceleration for SAP at

Founded in 1984, this retailer has more than 400 retail locations, 4,000 wholesale locations and 13,000 employees worldwide

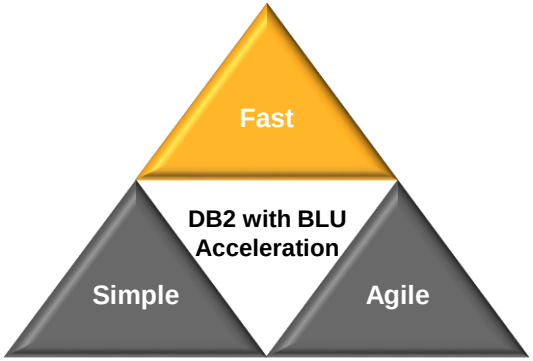
50x improvement

in most time consuming query

"We tested some representative queries taken from our existing SAP application and tested them on DB2 with BLU Acceleration and observed performance improvements in many of our query response times. For example, one of our most time consuming queries experienced a 50x performance improvement."

Richard Simms - Director of Infrastructure, Fossil

Extraordinary Speed



of Tennessee

"Teaming with our SAS actuaries, we gave them a different way to run their analysis which included the BLU Acceleration technology. The result? They experienced ***incredible speedup in their analysis****, one report ran* ***640x*** *times faster and another ran* ***1200x faster****."*

- Randy Wilson, Lead DB2 for LUW DBA, BCBS of Tennessee

泰康人寿 TAIKANG LIFE

"With BLU Acceleration, we've been able to ***reduce the time spent on pre-aggregation by 30x*** *- from* ***one hour to two minutes!*** *BLU Acceleration is truly amazing.*

- Yong Zhou, Sr. Manager of Data Warehouse & Business Intelligence Department

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Triton CONSULTING

"With my ***analytic query workload running 45x times faster*** *with BLU Acceleration in DB2 10.5, I no longer have an excuse for my usual coffee run!"*

- Iqbal Goralwalla, Head of DB2 Managed Services, Triton

DB2 with BLU delivers clear advantages for SAP environment

Speed and Simplicity

Accelerated Performance

- *Over 2x better, 24 core performance for SAP SD benchmark than nearest competitive result[1]*

Faster Time to Value

- *Simple load & go in-memory support*
- *No change to applications needed*

Business Proven

Lower Risk

- *Accelerates SAP BW without application upgrade*
- *10+ year track record of SAP optimization*

Transparent Scalability

- *Active data can be larger than available memory*
- *Automated workload management with shared-everything resource pools*

Lower Cost

Lower Acquisition Costs

- *Leverage existing investments*
- *No need to buy additional HW*

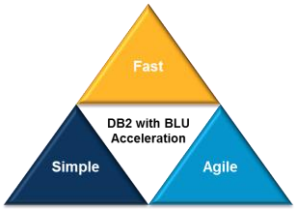
Lower Operating Costs

- *Option for lower cost, near line storage*
- *Mature technology not requiring frequent patching*

(1.0) IBM Power System S824 on the two-tier SAP SD standard application benchmark running SAP enhancement package 5 for the SAP ERP 6.0 application; 4 processors / 24 cores / 96 threads, POWER8; 3.52GHz, 512 GB memory, 21,212 SD benchmark users, running AIX® 7.1 and DB2® 10.5, dialog response: 0.98 seconds, line items/hour: 2,317,330, dialog steps/hour: 6.952,000 SAPS: 115,870 database response time (dialog/update): 0.011 sec / 0.019sec, CPU utilization: 99%, Certification #: * Results valid as of 3/24/14. * Certification # not available at press time. Source: http://www.sap.com/benchmark. (1.1) Fujitsu RX300 S8 on the two-tier SAP SD standard application benchmark running SAP enhancement package 5 for the SAP ERP 6.0 application; 2 processors / 24 cores / 48 threads. Intel Xeon E5-2697 processor 2.70 GHz, 256 GB memory, 10.240 SD benchmark users, running Windows Server 2012 SE and SQL Server 2012, Certification #: 2013024

DB2 with BLU Acceleration

What more can businesses do with BLU?



How many more questions could your business answer if they could get answers this much faster?

Speed of Thought Analytics

- Analyze data literally as fast as you can ask questions
- "We've tested DB2 10.5 with BLU Acceleration and found that it can be up to **43x faster** with an analytic workload…" - Randy Wilson, Lead DB2 for LUW DBA

BlueCross BlueShield of Tennessee
BlueCross BlueShield of Tennessee Inc., an Independent Licensee of the BlueCross BlueShield Association

What can you do for your business with an extra month?

Operational Simplicity

- Maximizes business value from existing infrastructure; no need to rip and replace
- "We project this will save us 42 days per year in lower administration and tuning efforts" – Brenda Boshoff, Sr. DBA

UNIVERSITY OF TORONTO

Where could you invest the 10x savings to drive more business value?

Business Agility

- Deploy on-premise or via the cloud with only a fraction of the computing resources
- "Using DB2 10.5 with BLU Acceleration, our storage consumption went down by about **10x**" - Kent Collins, Database Solutions Architect

BNSF RAILWAY

WWW.IBMBLUHUB.COM

What's Hot

Use BLU Accleration with Apache Spark

This short video hows you how to speed queries using BLU Acceleration with an Apache Spark cluster. You will see the results come back much more quickly using BLU in this video.

Blue Hill Research: BLU – Cognos solution offers speed, efficiency and cost effectiveness

Blue Hill Research analyst James Haight recently completed a study of client benefits when using the BLU Acceleration in-memory database with Cognos BI. He finds performance increases, IT efficiency and cost-effective solutions for existing customers, and believes

Wikibon finds ROI success from operationalized insights, in-memory technology

Wikibon studied big data ROI success factors. The biggest winners operationalized and automated their big data projects and they found BLU Acceleration to mature and cost efficient.

Sizing: Build a Solid Foundation for DB2 with BLU Acceleration

How can you get the most out of BLU Acceleration? Choose a solid foundation to start with. This includes three key steps. Read to learn more from an IBM Labs performance expert about the optimal hardware solutions, what you need to know about storage and more!