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DB2 Information Management
Software

IBM[®] DB2[®] Universal Database[™] on Linux and SAP[®] Standard Applications Benchmarks

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Introduction

Overview

As the size of today's enterprise databases continues to grow, the database choice is extremely important to the successful implementations of highly business-critical applications. The winning combination of IBM DB2 and Linux is powerful enough to run highly demanding applications because it provides excellent:

- Scalability
- Price/Performance
- Availability
- Manageability
- Interoperability

Highlights

IBM is committed to meet the challenges facing today's businesses. IBM DB2, a product from the world's leading database management software provider, is:

- The most universally scalable database for SAP® solutions
- The database with leading performance (Top SAP Standard Application Sales and Distribution three-tier Benchmark result at 47,528 benchmark users ¹)
- The database with lower total cost of ownership (TCO) than the competitions' ²
- SAP's solution of choice for IBM, Sun, and Linux platforms used with the company's internal development and live systems

Benefits of SAP Standard Application Benchmarks

Overview

SAP Standard Application Benchmarks help customers and partners find the appropriate hardware configuration for their IT solutions by testing the hardware and database performance of SAP applications and components.

Benefits for Technology Partners

For technology partners, the benchmarks:

- Provide basic sizing recommendations to customers
- Place a substantial load upon a system during the testing of new hardware, system software components, and RDBMS
- Help determine an optimal hardware configuration for a customer system

Benefits for Customers

For customers, the benchmarks:

- Demonstrate the scalability and manageability of large installations
- Provide basic information for configuring and sizing SAP solutions
- Allow users to compare different platforms
- Enable Proof-of-Concept scenarios
- Provide an outlook to future performance levels



SAP Standard Application Benchmarks

SAP Standard Application Benchmarks

SAP Standard Application Benchmarks are some of the most demanding benchmarks in the industry today and have become de-facto standards, not just for SAP applications but also for evaluating the performance of other e-business solutions.

SAP Standard Application Sales and Distribution (SD) Benchmarks

Among the different benchmarks developed by SAP AG, the Standard Application Sales and Distribution (SD) Benchmark is the most intensively used SAP Standard Application Benchmark with most certifications available. Its high demand on CPU and database resources is similar to that in extremely high volume OLTP environments.

Benchmark Characteristics

During a SAP Standard Application Benchmark run, all areas of a SAP-solution based system, including the database, the operating system, plus the CPU, memory, I/O system, and the network are stress tested. This makes “special tuning” the system to achieve better results impossible.

SAP Standard Application Benchmarks simulate online users executing business transactions in “dialog steps”. The user think time is set to allow ten seconds between dialog steps, which closely approximates the behavior of an experienced power user in a real-world environment.

During the benchmark run, the load on the system is increased until the response time seen by the simulated users reaches a maximum of two seconds.

The resulting metric is expressed as the number of fully processed business items, for example, the number of items ordered, etc.

Benchmark Configurations

SAP Standard Application Benchmarks can be run in two-tier and three-tier configurations.

Three-tier Benchmark

The three-tier configuration benchmark is most representative of today's enterprise-class SAP solution-based production environments, and is considered best practice. In this configuration, the presentation layer, application layer, and database layer each runs on separate physical servers.

Two-tier Benchmark

The two-tier configuration is similar but the application and database layer run on one central server. The results from a two-tier benchmark are equally valid but do require additional analysis and understanding of the vendor's underlying benchmark configuration.

“We utilize DB2 Universal Database for many of our key applications, including SAP R/3, our data warehouse and a portion of our award-winning online legal research service, WestLaw. The scalability that DB2 provides, as well as its support for multiple data types, led us to select DB2 – and what we’re seeing in Version 8.1 reaffirms our decision.”

– Ken Ross, Senior Vice President and CTO, Thomas West

Dialog Steps of SAP Standard Application Sales and Distribution (SD) Benchmark

0 Logon		11 Call /tvm02 (Change delivery)
1 Main screen		12 [F9] (Posts goods issue)
2 Call /tva01 (Create customer order)		13 Call /tva05 (List orders)
3 1st screen		14 [Enter]
4 2nd screen (with 5 items)		15 Call /tvm01 (Create invoice)
5 [F11 - Save]		16 [F11 - Save]
6 Call /tvm01 (Create a delivery)		17 Call /tend
7 1st screen		18 Confirm logoff
8 [F11 - Save]		
9 Call /tva03 (Display customer order)		
10 [Enter]		

Dialog steps 2 to 16 are repeated n times (15 dialog steps -> min. 150 sec duration).

Business aspect:

One run (dialog steps 2 to 16) corresponds to the selling of 5 items.

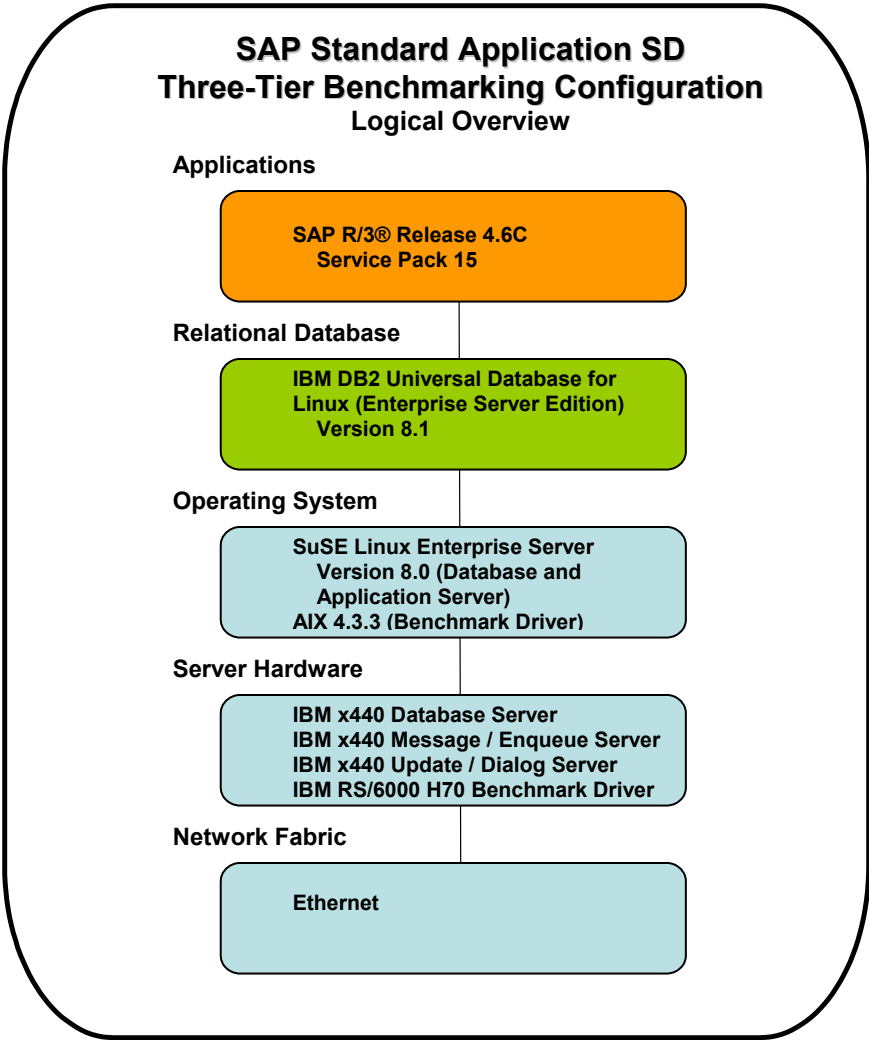
SAP Standard Application SD Benchmark

The SAP Standard Application SD Benchmark consists of the following transactions:

- Create an order with five line items (transaction VA01)
- Create a delivery for this order (VL01)
- Display the customer order (VA03)
- Change the delivery (VL02) and post goods issue
- List 40 orders for one sold-to party (VA05)
- Create an invoice (VF01)

SAP Standard Application SD Three-Tier Benchmark with DB2 on Linux

Logical Overview



“We’re very happy with the performance, user friendliness and support structure of DB2. We need a database that we can rely on to keep pace with our extraordinary growth.”

– Joseph Rehm, Manager IT Systems at Paul Hartman AG

Technical Overview

The three-tier SAP Standard Application SD Benchmark is separated into three layers:

- Presentation Layer
- Application Layer
- Database Layer

On the Presentation Layer, the benchmark driver, which simulates the end users, resides on an IBM RS/6000 Enterprise Model H70 Server running AIX 4.3.3.

On the Application Layer, there are eleven application servers, each of which is an IBM x440 server running SAP R/3 Release 4.6C on SuSE Linux Enterprise Server (SLES). Of the eleven application servers, one is a Message/Enqueue Server, while the rest are Update/Dialog Servers.

On the Database Layer, at the heart of the solution, is the IBM DB2 Universal Database Enterprise Server Edition Version 8.1. It runs on an IBM x440 server with SuSE Linux Enterprise Server (SLES) 8.0.

SAP Standard Application SD Three-Tier Benchmarking Configuration Physical Overview

Presentation Layer

Benchmark Driver / User
Workload Runner
IBM RS/6000 Enterprise
Server Model H70

- Benchmark Driver
- AIX 4.3.3

Application Layer

12 Application Servers:

Message / Enqueue Server
IBM @server xSeries x440

- 4-way 2 GHz CPU
- 4 GB memory

SAP R/3 Release 4.6C
Service Pack 15

Update / Dialog Server #1
IBM @server xSeries x440

- 8-way 2 GHz CPU
- 4 GB memory

SAP R/3 Release 4.6C
Service Pack 15

• • •

Update / Dialog Server #11
IBM @server xSeries x440

- 8-way 2 GHz CPU
- 4 GB memory

SAP R/3 Release 4.6C
Service Pack 15

Database Layer

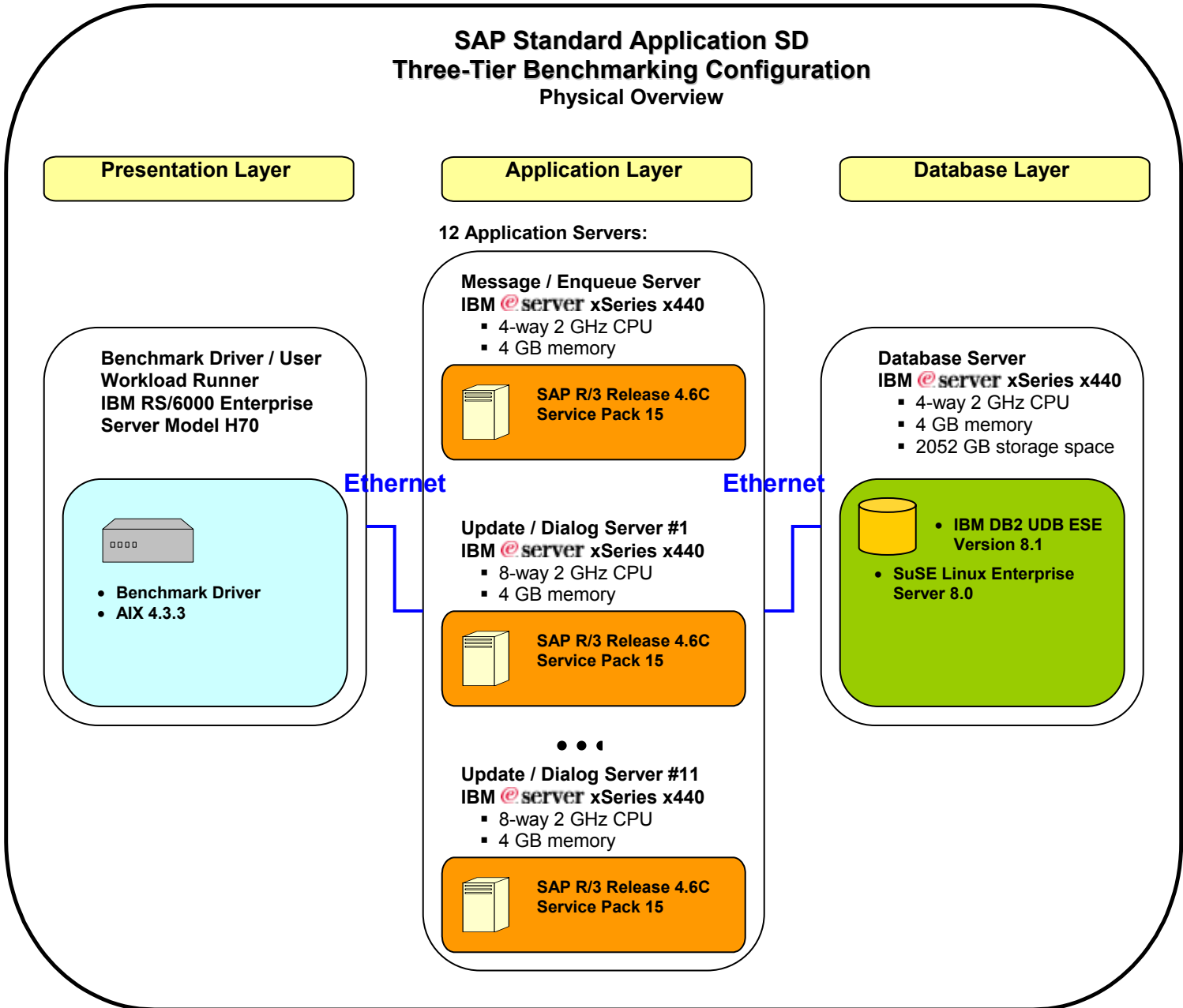
Database Server
IBM @server xSeries x440

- 4-way 2 GHz CPU
- 4 GB memory
- 2052 GB storage space

- IBM DB2 UDB ESE
Version 8.1
- SuSE Linux Enterprise
Server 8.0

Ethernet

Ethernet



Proven Database

IBM DB2 has the most industry benchmarks on Linux. Its great scalability and performance have earned many excellent benchmark results.

DB2 has earned the highest recognition in the latest SAP Standard Application Benchmarks:

- Top three-tier SAP Standard Application SD Benchmark result across all platforms at 47,528 benchmark users ¹
- Top three-tier SAP Standard Application SD Benchmark result on Linux at 5,790 benchmark users ³

These results are testaments to IBM's commitment to provide enterprise class database software on Linux.

DB2 software for Linux means:

- Flexibility – through support of open standards
- Reliability – from the proven technology of DB2 Universal Database
- Cost effectiveness – cross-platform portability protects skills investments and facilitates hardware choices

Over 450,000 companies worldwide rely on IBM data management solutions with more than 1 million DB2 licenses and 60 million DB2 users.

Based on the outstanding track record of DB2, you can be confident in receiving strong return on your investment when deploying DB2 in highly demanding business environments.

Conclusion

As a product from the world's leading database management software provider, IBM DB2 Universal Database lives up to the challenge of demanding SAP Standard Application Benchmarks.

With the powerful technology alliance between IBM and SAP, DB2 continues to meet and exceed the requirements of today's enterprises. Backed by the power and scalability of the Linux operating system, IBM DB2 Universal Database for Linux is the database of choice for any mission-critical applications.



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¹ 47,528 SAP Standard Application SD Benchmark users at 1.88 seconds average dialog response time, 14,398,000 dialog steps per hour, 239,970 SAPS, 4,799,330 fully processed order line items per hour, 96% database server CPU utilization, and 90% application sever CPU utilization (91% Dialog/Update server, 19% Message/Enqueue sever). AIX 5.1 running DB2 V8.1 on the database server. SAP R/3 Release 4.6C running on the application server. 6,228 GB total disk space. One Database server and 13 Dialog/Update servers use IBM **@server** pSeries p690, 32-way SMP, Power4, 1.3 GHz, 24 MB L2 cache, and 64 GB main memory. One Message/Enqueue server uses IBM **@server** pSeries p690, 8-way SMP, Power4, 1.3 GHz, 6 MB L2 cache, and 8 GB main memory.

² Results are based on the following reports: "IBM DB2 Universal Database V8.1 vs. Oracle 9iR2: Total Cost of Ownership" published by D.H. and Associates, Inc. in November 2002; and "Database Comparative Cost of Ownership" published by Market Magic Ltd. in January 2003.

³ 5,790 SAP Standard Application SD Benchmark users at 1.96 seconds average dialog response time, 1,743,000 dialog steps per hour, 29,050 SAPS, 581,000 fully processed order line items per hour, 94% database server CPU utilization, and 60% application sever CPU utilization (61% Dialog/Update server, 4% Message/Enqueue sever). SuSE Linux Enterprise Server 8.0 running DB2 UDB V8.1 on the database server. SAP R/3 Release 4.6C running on the application server. 2,052 GB total disk space. One Database server uses IBM **@server** xSeries x440, 4-way SMP, Intel Xeon MP, 2.0 GHz, 512 KB L2 cache, 2 MB L3 cache, and 4 GB main memory. One Message/Enqueue server uses IBM **@server** xSeries x440, 4-way SMP, Intel Xeon MP, 2.0 GHz, 512 KB L2 cache, 2 MB L3 cache, and 4 GB main memory. Ten Dialog/Update servers use IBM **@server** xSeries x440, 8-way SMP, Intel Xeon MP, 2.0 GHz, 512 KB L2 cache, 2 MB L3 cache, and 4 GB main memory.

All SAP Standard Application Benchmarks included in this document were certified by SAP AG and fully comply with the guidelines issued by the SAP Benchmark Council. More information on SAP Standard Application Benchmarks is available at:

<http://www.sap.com/benchmark>.