



THE TOTAL ENTERPRISE SOLUTION
IBM DB2 Universal Database cluster on Linux and IBM @server xSeries



The Total Enterprise Solution



The Challenge

Organizations today face the challenging job of integrating technologies to pull together a comprehensive solution that fits their business needs and IT budgets.

A complete data center solution consists of enterprise class applications, databases, management tools, network infrastructure and server hardware. Until recently such solutions were based on proprietary systems and involved significant investment in capital, time and resources to assemble, integrate, test, manage and support. This scenario has changed dramatically with Linux® clusters and best-of-breed software, hardware and services from IBM and its partners.

This demonstration is a proof of how even the strictest requirements can easily be satisfied, with the right combination of products, to implement a total data management solution.

SMART database

The benefits of Linux clusters, including superior performance at a low cost, are well known. When you add to the mix the built-in clustering capabilities of IBM DB2® Universal Database™ for Linux, you get a rock-solid foundation for all your enterprise e-business data processing needs.

Powerful hardware

IBM has extensive and proven experience with clustered UNIX® computers. IBM @server xSeries™ has applied that knowledge to produce servers that are armor-plated for Linux, optimized for database workloads, and deliver tremendous power at a fraction of the price.

Demanding applications

The combination of DB2 and Linux on xSeries, with the latest Intel® processors – 32 and 64bit technologies alike, is powerful enough to run highly demanding business applications, including SAP® R/3, mySAP Customer Relationship Management (CRM), mySAP Business Intelligence (BI) and IBM Websphere Application Server.

Reliable management

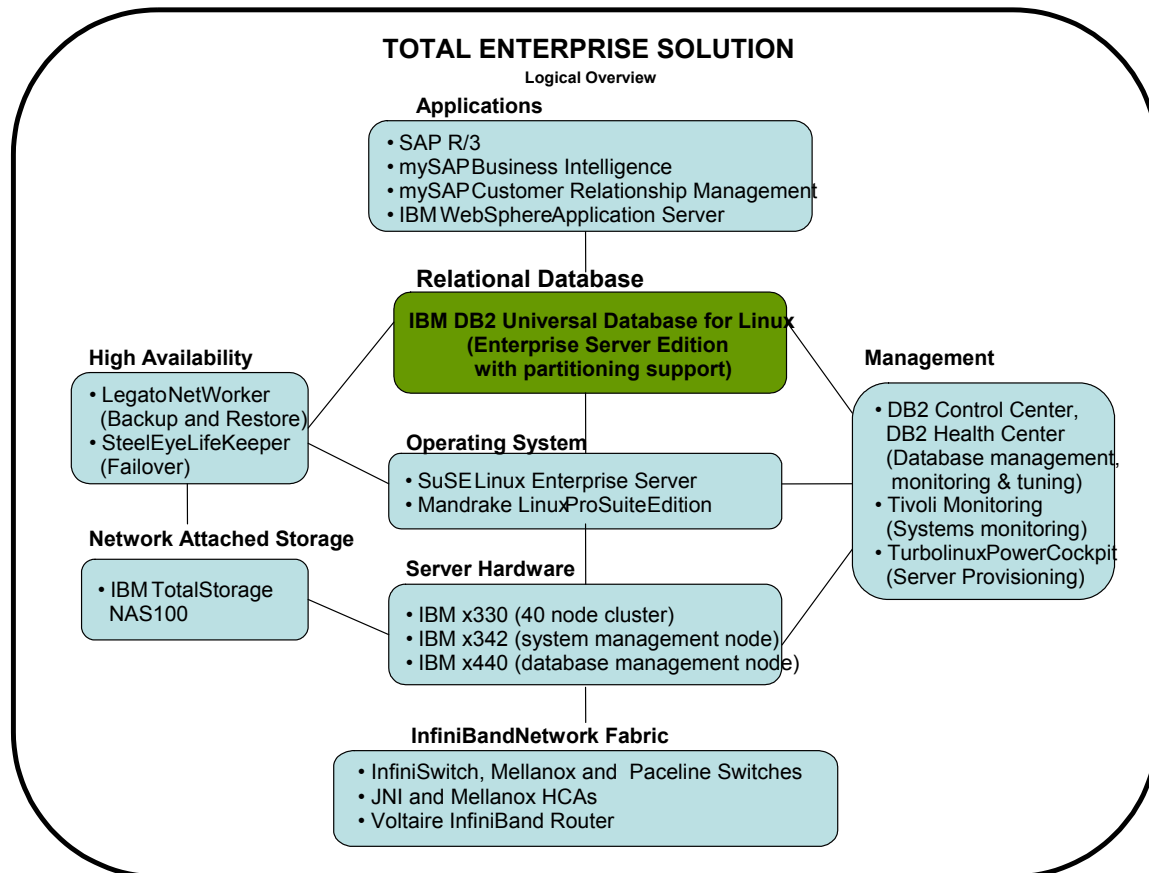
Managing a clustered environment is easy using SMART technologies built into DB2 software and xSeries hardware along with management tools from IBM Tivoli software. The availability and reliability of the solution is further enhanced using Legato NetWorker® and SteelEye LifeKeeper®. Turbolinux PowerCockpit™ facilitates time-saving deployment of servers in the cluster.

High-speed network

Products from Mellanox, InfiniSwitch, Lane15, Paceline and Voltaire, based on InfiniBand architecture, provide the network fabric to meet the high-speed connectivity requirements of database servers and storage within in the cluster. The InfiniBand fabric features chips from IBM InfiniBlue and Mellanox.

Platform support and services

You don't have to go at it alone. IBM Global Services Linux professionals help you install, migrate, configure and tune your database solution. IBM's strong relationships with its Linux partners, supplemented by expertise from SuSE Linux, United Linux and Mandrakesoft gives you the confidence and support to deploy even the most critical solutions.



Scalability pays great returns

Many IT professionals are concerned about whether their relational database system on Linux will be able to scale as workloads increase. DB2 software and xSeries servers for Linux help you avoid large upfront costs as well as migration and training costs later. They can be deployed based on your initial requirements and then scale as large as your business demands.

Managers and IT professionals tasked with selecting and implementing a data management solution that is robust enough for mission critical enterprise needs, yet flexible enough to deliver exceptional value to small businesses, often evaluate technologies based on the following criteria:

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

The possibilities are indeed empowering. You can build powerful clusters using IBM @server xSeries servers running Linux. IBM DB2 Universal Database Enterprise Server Edition provides a single database that can be distributed across such a cluster. You can easily scale up by adding a new machine to the cluster, which will trigger DB2 to automatically redistribute data to the new partition.

Proven performance at a low cost

When you run DB2 Universal Database and xSeries servers on the Linux platform, you can expect the high performance your business needs to support its growth.

DB2, running on xSeries server hardware, is a proven leader in several performance benchmarks on Linux.

The performance story gets even better with high-speed InfiniBand network fabric. Host channel adaptors and switches based on IBM InfiniBlue and Mellanox InfiniBridge silicon featured in components from InfiniSwitch, JNI, OmegaBand, Paceline and Voltaire can meet the most demanding needs for fast, low-latency communication between database partitions in the cluster.

The result of combining these leading technologies is a powerful supercomputer at a fraction of the cost of a special purpose machine with equivalent capabilities.

High levels of availability

DB2 Universal Database is setting the standard for quality and reliability in the database industry. As more mission-critical applications are implemented on Linux, IBM's ability to bring mainframe-level reliability to this environment has become a major factor for customers choosing DB2.

IBM @server xSeries servers offer a reliable foundation for leading Linux-based computing. With the IBM X-Architecture™ advantage, you can feel confident about the availability of the hardware running your core business applications.



“DB2 for Linux lets us maximize our benefit from the economies and performance of the Linux operating system, providing a powerful, cost-efficient data management foundation for our BI cluster.”

- Wolfgang Schlippes-Thiede, BISP Product Manager and Operational Manager of Hosting Center, Triaton

Legato NetWorker protects critical business information by simplifying, centralizing, and automating backup and recovery operations. Legato NetWorker Module for DB2 provides online backup and quick, granular-level recovery, helping to reduce downtime and administrative costs.

SteelEye's LifeKeeper affords increased availability to DB2 operating environments on xSeries hardware by effectively monitoring system and application health. In the event of an outage, LifeKeeper allows applications to automatically failover to other servers in the cluster providing continuous access to DB2 and restored data.

Easily managed

DB2 greatly reduces the complexity of data management by eliminating, simplifying, and automating many tasks traditionally associated with maintaining an enterprise class database. These advances are the first implementation of the Self Managing and Resource Tuning (SMART) project and the first step towards making autonomic computing a reality for database implementations.

Tivoli management products simplify the management of distributed systems. Tivoli Monitoring provides monitoring for essential system resources, to detect bottlenecks and potential problems, and to automatically recover from critical situations. Tivoli NetView extends traditional network management to ensure the availability of critical business systems and to provide rapid resolution of problems.

Turbolinux PowerCockpit dramatically slashes the time required for server provisioning from hours or days to minutes. Using multicast technology, for example, PowerCockpit can get several database servers up and running in just a few minutes.

Seamless interoperability

We recognize that today's business environment is heterogeneous and there is a great need for different technologies to integrate seamlessly. Starting with a vision of making Linux ready for business, coupled with strong relationships, the technology vendors featured here have created a highly capable enterprise class solution.

Furthermore, DB2 and xSeries have introduced validation programs designed to set standards in interoperability on Linux.

Conclusion

This demonstration is a proof point for implementing total enterprise solutions on Linux using scalable data management software, running on a powerful server cluster and an extremely fast network fabric, complemented with tools that provide extreme reliability and intelligent management.

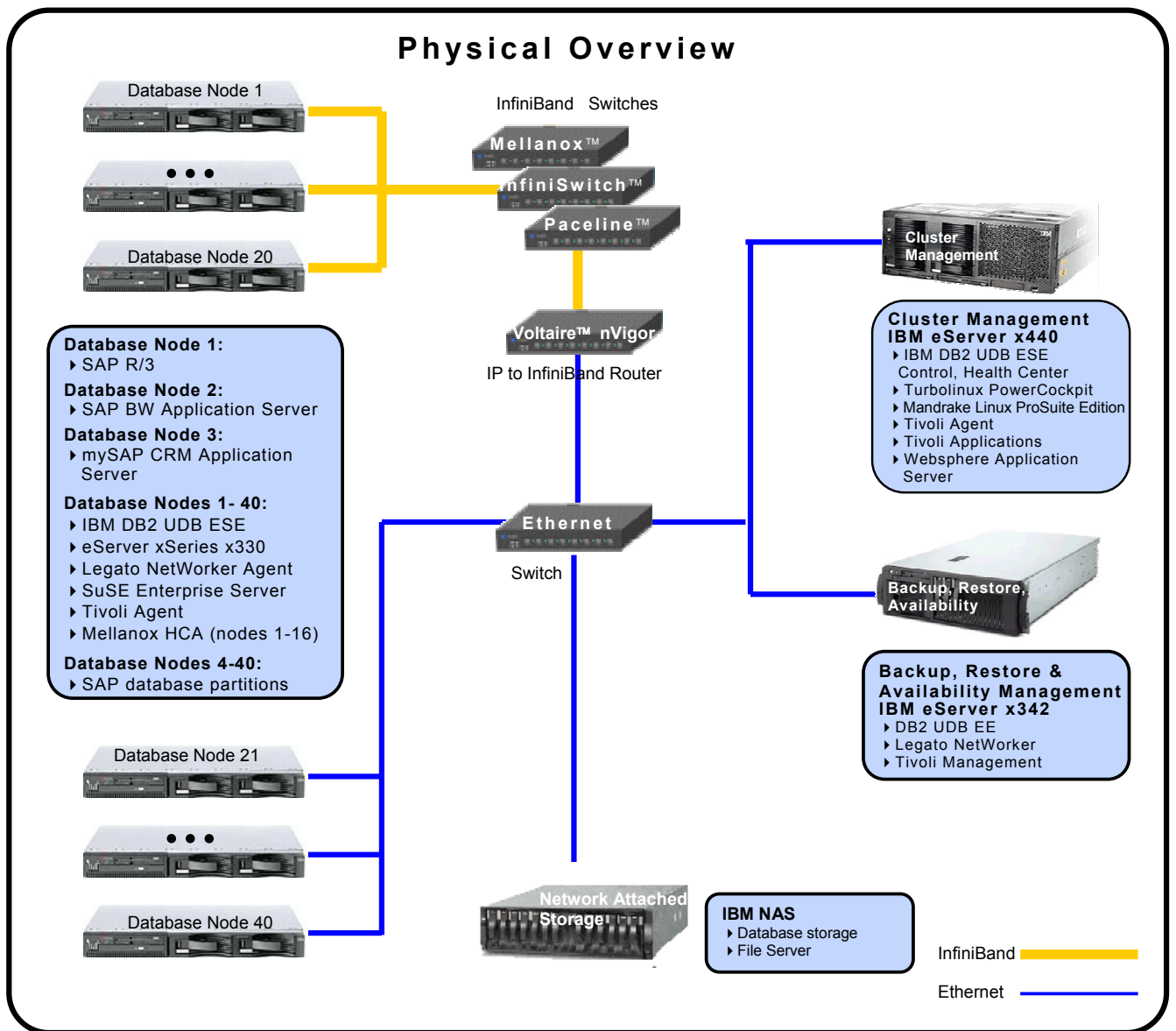
The right products working in harmony enhance productivity, reduce costs of deployment and simplify management of critical e-business applications. In other words, they empower you to focus on your business rather than the technology on which it runs.

Infrastructure Technologies

Delivering the total enterprise solution does emphasize the needs for choosing the right team of partners supporting the customer in a smooth integration

and fast deployment cycle. The chosen connectivity and physical layout is only one way to implement and the redundancy of components is not only a sign

of choice for the customer but for the excellent integration and interoperability giving reference for the cooperation leading to such a solution.





SteelEye's™ LifeKeeper® software enables businesses to get the best of both worlds – industry-proven enterprise-grade reliability together with low total cost of ownership (TCO). SteelEye's LifeKeeper software for IBM's DB2 UDB enables enterprises to protect the reliability of their business-critical applications on DB2 database servers running in Intel-based Linux environments.

LifeKeeper maintains the high availability of clustered Linux systems by monitoring system and application health, maintaining client connectivity and providing uninterrupted data access regardless of where clients reside – on the corporate Internet, intranet, or extranet.

To enable automatic system and application recovery if the system goes down or is taken down for scheduled maintenance, LifeKeeper allows applications to failover to other servers in the cluster. This helps LifeKeeper minimize the risk of a single point of failure and allows Linux systems to meet the stringent availability requirements of mission-critical

operations by creating a fault resilient environment.

Continuous Availability of Critical Applications

No business should suffer downtime of critical database applications. The reliability of LifeKeeper with DB2 UDB is a lower cost alternative to more expensive database solutions, and delivers the same benefits.

Fault Resilient Clusters

LifeKeeper provides fault resilience for Linux environments by enabling other servers in a cluster to take over for failed servers or applications. In addition, LifeKeeper supports active-active server configurations, thus eliminating the need for extra servers dedicated for idle standby.

Proactive Fine-Grain Protections

With LifeKeeper, hardware component or application faults are detected through multiple fault-detection mechanisms before a full-system failure occurs. LifeKeeper monitors Linux clusters using intelligent processes and multiple LAN "heartbeats." By sending redundant signals between server nodes to determine system and application health, LifeKeeper confirms a system's status before taking actions. This reduces the risk of a single

point of failure and minimizes false failovers. LifeKeeper also eliminates unnecessary failovers by recovering only those applications that failed, without requiring a full server power off.

Transparent Failover

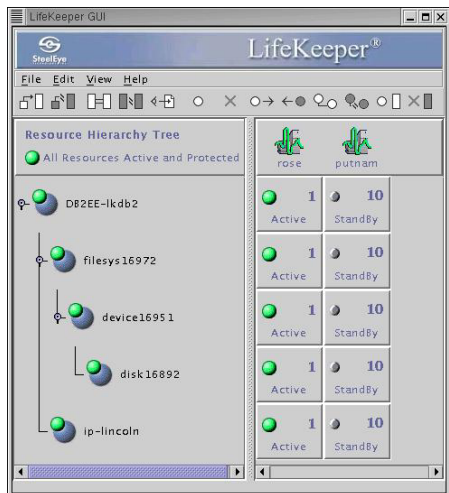
If an event creates an interruption in a server's availability, LifeKeeper moves the protected resources and applications automatically to another server in the cluster with minimum impact on a user's productivity. LifeKeeper's ultimate flexibility allows cascading, multidirectional, and N+1 failover configurations for up to 32 active nodes to ensure continuous client access in the event of system or application failure.



Easy to Deploy and Manage

LifeKeeper's Java-based GUI enables easy installation, operation, and maintenance of clustered systems, applications, and recovery policies. IT administrators can easily manage cluster-wide resources either locally or remotely via any Java-enabled Web browser.

Built-in GUI Wizards simplify and automate common management and operations tasks to further increase the efficiency of IT personnel and eliminate human errors.



Manage and Protect Business Critical Applications such as DB2 UDB

LifeKeeper's non-intrusive architecture, out of the box support for commercial and custom applications, as well as easy installation and deployment processes, provide excellent return on investment (ROI) and TCO value propositions. This is especially true for companies using IBM's DB2 UDB.

Broadest set of Storage Systems Supported

LifeKeeper is designed to be used with the widest range of storage systems including; SCSI, Fibre channel, NAS, and data replication.

Benefits include:

- ✓ No development required for cluster-aware application programming interfaces (APIs).
- ✓ DB2 Application Recovery Kit – which includes tools and utilities that allow LifeKeeper to monitor and failover DB2 in the event of a system or application failure – has been developed and fully tested in SteelEye's engineering lab.
- ✓ Application health monitoring provides uninterrupted client access.
- ✓ The Software Developer's Kit (SDK) offers a powerful framework for developing customized recovery routines for proprietary applications as well as commercial applications.

BBDO INTERACTIVE's Critical Reliability of Web Services with LifeKeeper

BBDO INTERACTIVE, a subsidiary of the third largest

advertising agency worldwide, has chosen Linux to develop and host websites and applications for its clients.

BBDO INTERACTIVE deployed SteelEye's LifeKeeper clustering software running on Linux-based IBM eServer xSeries servers and IBM DB2 Enterprise Edition for Linux.

"We chose SteelEye because we needed 99.99% availability, nothing less," says Harald Wilhelm, BBDO INTERACTIVE DB2 Administrator. "According to our service level agreements with our customers, if their sites go down, we must pay a penalty fee. Even if our machines were down for only an hour, the costs would be huge. With SteelEye's LifeKeeper clustering software we never have to worry about downtime."

"The integrated IBM xSeries server solution, DB2 UDB, and SteelEye LifeKeeper clustering software offerings on Linux provide us with the ability to rapidly deploy and easily manage our platforms, all with a price/performance advantage that's unbeatable," said Andreas Walter, IT Manager for BBDO INTERACTIVE.

Solution Architects



DB2 Data Management Software

IBM's DB2 database software is the worldwide market share leader in the industry. The integrated strength of IBM's data management products, based on DB2, powers the industry's most demanding solutions.

<http://ibm.com/db2>

@server xSeries

The xSeries is IBM's line of scalable industry-standard, Intel-based servers that enable customers to confidently run their e-businesses. The xSeries leverages IBM's X-Architecture leadership to provide highly scalable servers.

<http://ibm.com/eserver>

Tivoli software

Tivoli software from IBM enables an IT organization to reduce the total cost of ownership and improve service levels by helping manage security, storage, performance and availability, and configuration and operations.

<http://ibm.com/tivoli>

IBM InfiniBlue[™]

IBM Microelectronics is a key contributor to IBM's role as the world's premier information technology supplier. IBM Microelectronics develops, manufactures and markets state-of-the-art semiconductor technologies, products, packaging and services. Its superior integrated solutions can be found in many of the world's best-known electronic brands. IBM is a steering committee member and co-founder of the InfiniBand Trade Association and has trademarked the name InfiniBlue[™] for its 4X and 12X InfiniBand-related standard products.

<http://www.chips.ibm.com/products/infiniband>



InfiniSwitch is developing a family of high-speed InfiniBand switch solutions for the data center designed for industry leading performance and compatibility with existing protocols.

<http://www.infiniswitch.com>



enterprising solutions

Fibre Channel host bus adapters for enterprise-level environments. JNI offers a broad line of host adapters, ASICs and software for storage area networks, as well as HCA Modules for InfiniBand. JNI's PCI and PCI-X based products are supported on Linux, Solaris and Windows 2000 servers.

<http://www.jni.com>



Lane15 Software is a leading provider of InfiniBand management software. Lane15 products deliver higher reliability, availability and manageability to enterprise computing center networks. Lane15 products provide the fabric management solution that all InfiniBand OEMs require in their products to deliver greater centralized control and computing power on-demand.

<http://www.lane15.com>



Keeping the World's Business-Critical Information Available

Legato Systems, Inc. delivers worldwide enterprise class software solutions and services that keep the world's business-critical information and applications available.

<http://www.legato.com/ibm>



MandrakeSoft offers its enterprise, government and educational customers a set of GNU Linux and Open-Source software and related services, user-friendly and highly competitive information technologies.

<http://www.mandrakesoft.com>



Mellanox Technologies is a leading supplier of InfiniBand semiconductors; providing switch, host and target channel adapter (HCA/TCA) devices to the server, communications and storage markets.

<http://www.mellanox.com>



Paceline Systems is the developer of the industry's first enterprise-class InfiniBand switching systems. The company's powerful switches feature embedded Apex Software, which delivers the performance of InfiniBand with the scalability, manageability, reliability and ease-of-use required for demanding enterprise applications.

<http://www.pacelinesystems.com>



Founded in 1972, SAP is the recognized leader in providing collaborative e-business solutions for all types of industries and for every major market.

<http://www.sap.com>



SteelEye Technology® is a leading provider of enterprise-grade, low cost, high availability clustering, data replication and disaster recovery software that is easy to deploy and operate.

<http://www.steeleye.com>



SuSE Linux is the international technology leader and solutions provider in Open Source operating system software. SuSE Linux is a privately held company focused entirely on supporting the Linux community.

<http://www.suse.com>



Voltaire provides intelligent connectivity solutions that enable data center managers to take full advantage of InfiniBand, the next generation I/O standard, when connecting to existing networks. With business headquarters in Boston, Massachusetts and an R&D center in Herzliya, Israel, the company has developed exceptional expertise and leadership in delivering intelligent IP to InfiniBand routing solutions. Recognized by Red Herring on its "Ten to Watch" list and backed by leading venture groups, Voltaire is singularly positioned to enter the market with crucial InfiniBand products.

<http://www.voltaire.com>



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