June 2003

Basics of business intelligence systems—an executive overview

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Business data: more than the sum of its parts

In today's highly competitive and challenging environment, companies need to continually assess and redirect their actions in order to stay on top of the markets they choose to serve. In order to make the needed changes, many companies are asking questions like:

- Which of our customers are most profitable to do business with?
- Which products and services can be cross-sold most effectively?
- Which sales channels are most effective for which products?
- How can we boost marketing campaign results?
- How can we improve customer loyalty?
- What is the true cost of retaining a satisfied customer?
- How can we improve the overall quality of our customers' experience with us?

Business intelligence (BI) systems can help provide the answers to questions such as these.

The promise of BI is in specific and timely knowledge about customers, products and markets. This knowledge can help boost profits, reduce costs and support better, more effective management. Based on comprehensive, detailed and relevant information, this knowledge is crucial to achieving and sustaining a competitive advantage.

However, organizations implementing a BI solution may face several challenges:

- Integrating complex data from heterogeneous hardware platforms and software environments
- Managing distributed systems that have no single point of control and time-sensitive operations
- Improving data access while reducing expenses
- Performing frequent updates across already overtaxed networks with rapidly increasing traffic
- Backing up, recovering and archiving data within diminishing availability windows
- Incorporating efficiencies of new technologies without requiring massive downtime, costs or retraining
- Providing scalable servers to run multi-terabyte applications

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- Providing storage that protects data and is scalable, open and manageable

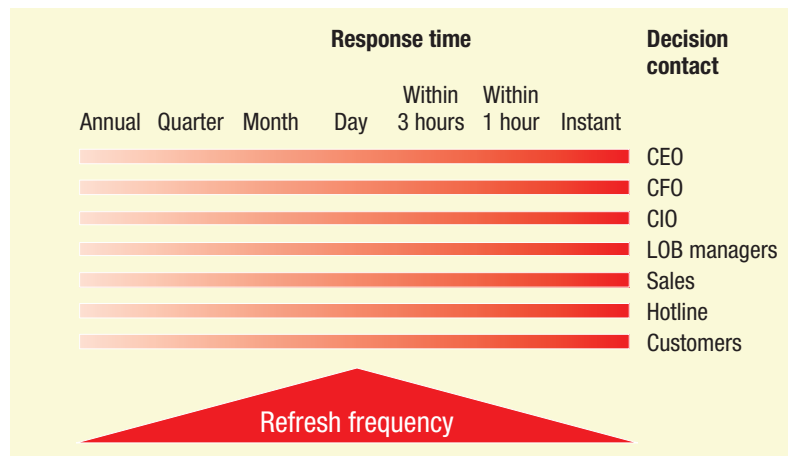Having the right intelligence means providing definitive solutions to these key challenges.

Figure 1: Mission-critical decisions: Strategic road map

Understanding business intelligence today
In today's competitive business environment, having access to the right information can make the difference between prosperity or merely survival. BI systems can help track the pulse of vital performance factors.

BI requires information on demand—achieved by combining multi-dimensional data analysis and data mining with advanced statistical and analytical functions in a real-time, integrated environment. Data collection methods, multimedia files and rapid-access tools that grow and adjust as needed create this dynamic system. Constant vigilance, including tuning and monitoring of these systems, helps maintain a sharp focus for overall enterprise effectiveness.

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IBM

Deciding whether to design and develop a BI system, upgrade an existing BI system or transition to a new hardware or software platform requires disciplined and rigorous analysis. Can the new or upgraded system deliver the right information to help make business decisions? What proof points help demonstrate that the hardware and software infrastructure you are considering will support your performance goals? Similarly, what metrics support the reliability expectations? Can the supplier provide a holistic solution to meet your needs, rather than integrating disparate infrastructure components and leaving you to handle the integration and support? Are skills in place to manage the transition to the new environment? The relevance, strength, compatibility and interoperability of each part of the BI system must optimize productivity.

The role of innovative software tools is noteworthy in the BI arena. In the 30-year-old data warehousing segment, new precision tools have been designed to mine data and correlate patterns to reveal useful trends. Complex algorithms run on superfast processors, and networks yield information never before available. Adopting new analytical software tools can provide the competitive edge that makes the difference between succeeding in, or exiting from, vital markets.

Fundamental considerations when building a BI system include:
- What mission-critical information enables an enterprise to deliver competitive value?
- Who needs access to that information and in what form?
- What criteria and processes will be used to manage and protect information access?
- Can the organization financially afford to implement these processes?
- Can the organization build and manage the skills and systems needed to collect, validate and synthesize the data?

The following sections address these considerations and help provide a preliminary framework for implementing a BI system. Four tiers are used to help define the scope of BI infrastructure required by an enterprise.

Tier I: Identifying mission-critical information and enterprise success factors
What data is vital to the health of the enterprise and is strategic and tactical to its business? Operational indicators could include data such as load

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factors for transportation companies, aging backlog at a manufacturing plant, well-drilling count for oil exploration companies and on-shelf inventory for retailers. These operational details can affect strategic shifts such as realignment of profit goals; investment in skills or technology; consideration of mergers, acquisitions or partnering; repositioning of the company; or targeting of a key segment. Such enterprise success factors constitute mission-critical information.

BI provides access to information required to keep the enterprise vibrant and competitive. A clear understanding of strategic and tactical information is the cornerstone of a BI system. Anything less may not trigger alerts when potentially fatal trouble-spots occur.

A thorough analysis and validation process can help determine the information requirements for the overall design of your BI system.

Tier II: Determining who needs access and essential criteria and processes
The goals of your BI system are to help you maintain a competitive edge, allowing you to respond in a timely manner to competitive opportunities or threats. Your BI system should help monitor the vital statistics of the enterprise in a real-time environment and to mobilize team response as appropriate. Determining who needs access, what criteria will govern that access and what processes will be used to manage access will influence networking, processing and analysis costs.

Tier III: Calculating the costs
Several factors affect the cost of implementing a BI system, such as how much information is gathered and analyzed and how often the information will be refreshed. In addition, analysis can become expensive, and the time spent modeling can be lengthy. Cost decisions will influence the system design—the choice of servers, storage and software, for example.

Tier IV: Building the necessary skills and systems
After determining your options and the cost of installing or updating an enterprise BI system, you need to decide what kind of system to build. Can the current system deliver sufficient results by upgrading some of the components? Will partial upgrades be feasible in the future? Do you want

the best-in-the-industry components? What is the cost of installing new systems versus performing upgrades of the current system? Does the return on investment (ROI) incorporate post-installation or post-migration maintenance and upgrade costs?

The BI infrastructure: hardware

The hardware layer forms the foundation and determines the potential flexibility of a BI system. The hardware will have a big impact on the infrastructure's software functionality, tool selection options, and support skills and costs. However, your goals should be to measure total system performance, not just the hardware.

Servers. Breakthroughs in technology, increasing processor speeds and lower prices have established new performance points for server and storage devices and have expanded the options available to help meet your needs. Microsoft® Windows NT®, Microsoft Windows® 2000 and Linux operating systems on Intel® processor-based servers can rival the performance of

**Server Hardware:
Price/Performance by OS**

Price

S/390®,
Linux

UNIX,
Linux

Windows NT,
Linux

Performance

Storage Selection Considerations

Criteria	Media		
	Disk	Tape	Other
Compatibility/openess			
Reliability			
Capacity			
Speed			
Connectivity			
Software tools			
Access frequency			
Storage duration			

Skills and
competencies

Software

**Reliable, interoperable
hardware**
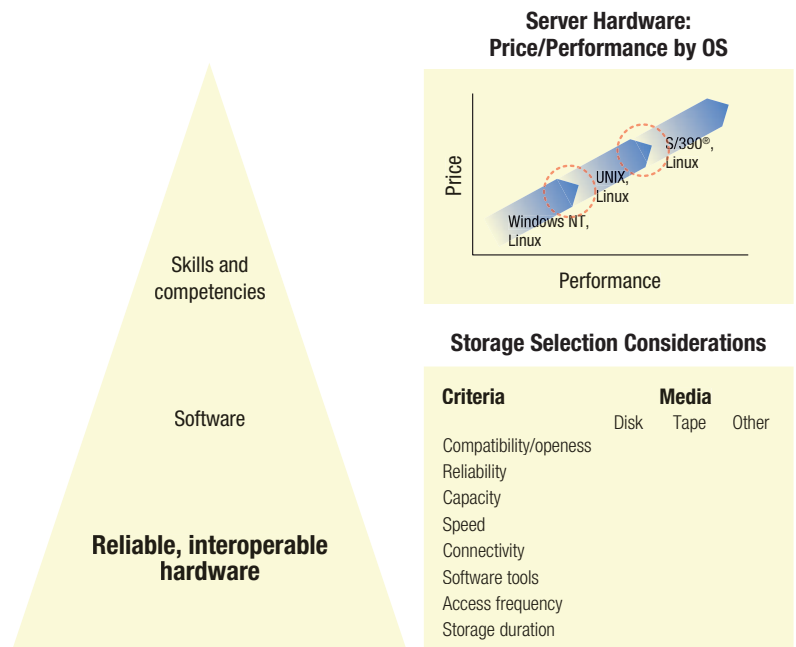
Figure 2: Fundamentals to build a BI system: Hardware

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low-end UNIX® systems, and clusters of UNIX systems can match some performance characteristics of mainframes.

Storage. To determine the best storage options for a BI system, you should consider not just compatibility with servers and networks, but also scalability, conformance to open industry standards and performance impact. Apart from the technical specifications of a storage device, you also must consider the software that manages and provides additional functionality for the storage device. The cost and relative advantages and disadvantages of this software can be significant. Savings in commodity hardware purchases can quickly be consumed by expensive support requirements.

Networking and connectivity. Although networking and connectivity methods and devices have become significantly faster with Fibre Channel and Fast Ethernet connections, choices for these components should be determined by server and storage selection. Choices here can affect access speed as well as backup and restore functions.

Overall, the hardware infrastructure should help deliver performance to maintain a competitive advantage. It should provide you with the level of software compatibility that your organization desires based on cost and skills. Open architectures can help ease deployment of new software from independent software vendors (ISVs) for specific functions.

The BI infrastructure: software

Software helps to extract the right information from the vast reservoirs of data. Determining the degree of freedom necessary to manage your system will help define your software options. Are you better off outsourcing your systems requirements, or would you prefer to work with best-of-breed hardware and software tools within your enterprise?

The innovative analytical techniques developed by industry-specialized ISVs have significantly benefited the dynamic advancement in the BI market share. Tools and techniques provided by these ISVs can help to solve specific problems—from commissions-based compensation tracking to measuring the success of a product promotion in a particular store or a region.

Typically, these ISVs develop software to address focused BI-related solutions, enabling their products to target specific industries or perform
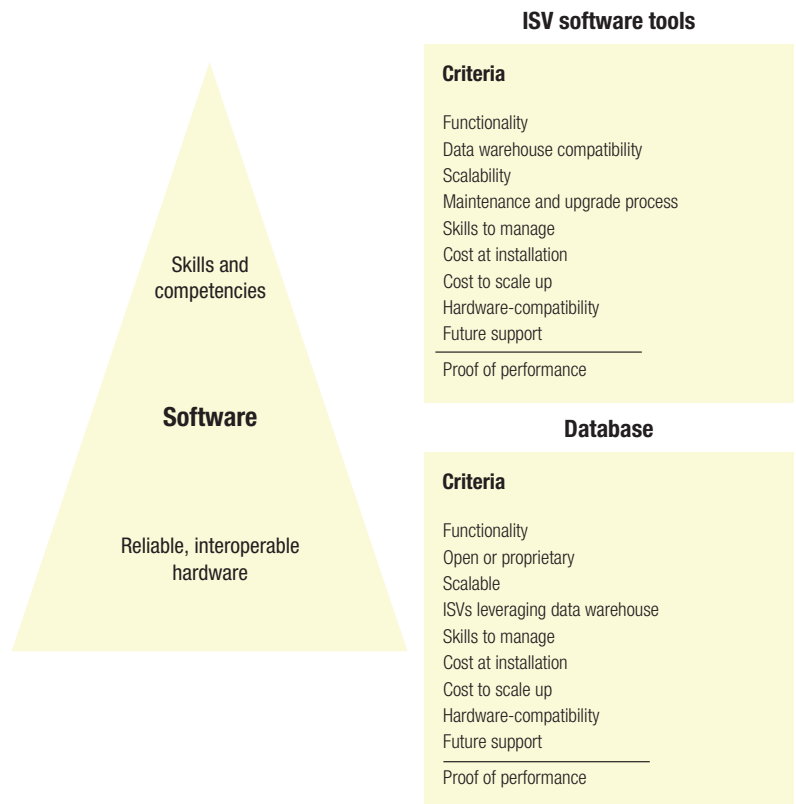
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ISV software tools

Criteria

Functionality
Data warehouse compatibility
Scalability
Maintenance and upgrade process
Skills to manage
Cost at installation
Cost to scale up
Hardware-compatibility
Future support

Proof of performance

**Skills and
competencies**

Software

Database

Criteria

Functionality
Open or proprietary
Scalable
ISVs leveraging data warehouse
Skills to manage
Cost at installation
Cost to scale up
Hardware-compatibility
Future support

Proof of performance

**Reliable, interoperable
hardware**

Figure 3: Fundamentals to build a BI system: Software

special functions. Although functionality is generally excellent, support and integration services from such start-ups can be less than optimal unless they are teamed with a knowledgeable and experienced BI solution provider like IBM, that can help you span multivendor infrastructures and applications that tailor the situation to meet your needs.

Because software is a critical component in the function of the overall IT system, you should evaluate the extent of testing and validation performed on the data warehouse and associated tools in regard to your workload and

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specific environment. Ask for references and interoperability test reports. If not satisfied, ask the vendors to create a prototype environment and demonstrate it. You should understand the system's performance scalability, including performance degradation thresholds created for your specific data model, the number of concurrent users and the number of simple and complex queries. Then, get an estimate for scaling up performance, data and storage.

Developing skills and competencies to manage a BI system

BI systems are dynamic, evolving environments with an objective of rapid delivery of critical customer, marketplace and operational information. To maintain sharp focus on enterprise efficiency and system performance, an ongoing assessment is necessary to keep the system well tuned. This assessment translates into continuous evaluation of the new software tools, cost savings and performance gains incurred from hardware transitions or consolidation; the new needs for information to gain a competitive edge; and the new ways to deliver the right information. Maintaining the skills to
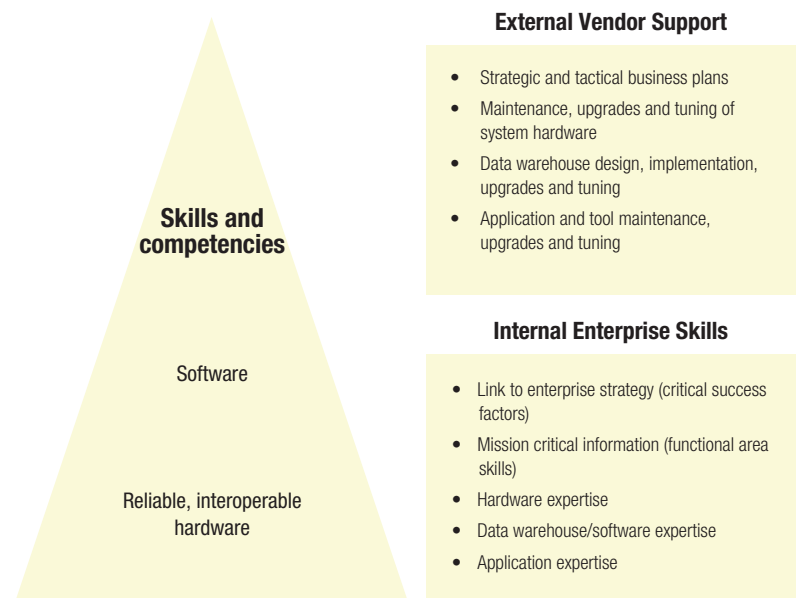
Skills and competencies

Software

Reliable, interoperable hardware

External Vendor Support

- Strategic and tactical business plans
- Maintenance, upgrades and tuning of system hardware
- Data warehouse design, implementation, upgrades and tuning
- Application and tool maintenance, upgrades and tuning

Internal Enterprise Skills

- Link to enterprise strategy (critical success factors)
- Mission critical information (functional area skills)
- Hardware expertise
- Data warehouse/software expertise
- Application expertise

Figure 4: Fundamentals to build a BI system: Skills and competencies

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access and calibrate the BI system is as valuable as the hardware and software infrastructure itself.

Which vendors will provide you with the overall solution options customized to your specific environment?

Determining levels of efficiency

At a basic interoperability level, all hardware and software platforms need to be compatible and function together synergistically. These hardware and software components include the operating systems, data warehouses and data marts, inputs from heterogeneous systems and software tools that mine data, conduct analysis, create reports and post data to be shared and protected across the enterprise.

Scalability is necessary to accommodate growth in data, users, applications and peak usage. The entire infrastructure should supply acceptable

Foundations for a BI System

Tier I
- Mission-critical information
- Enterprise success factors

Tier II
- User access
- Criteria and process

Tier III
- Information refresh rate
- Cost versus value analysis

Tier IV
- Affordability
- Installation/conversion maintenance, skills
- Cost of non-compliance

BI Infrastructure

Skills and competencies
Base hardware/software interoperability
Customization

Software
Mission-critical applications
Infrastructure software

Reliable, interoperable hardware
Servers
Storage
Network
Connectivity

Levels of Efficiency

Fine-tuned system
- Integrated, scalable, tuned system
- ISVs, data warehouse, hardware

Scalability
- Hardware, software and data warehouse tools

Interoperable infrastructure hardware and software
- Server, storage, network, data warehouse, enterprise tape library (ETL), analytics

Figure 5: Blueprint for business intelligence systems

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performance. Another necessity is a risk mitigation strategy that optimizes performance today, can accommodate future growth and is open and flexible enough to integrate new tools needed for businesses to remain competitive.

Optimization, a much sought-after goal, occurs when the desired functionality is delivered at a minimal system and skills cost. The system fully utilizes the software functions to supply the right information on demand. Neither capacity nor skill resources are underutilized, and performance is not handicapped. Often, because of the many components in the BI system, custom software is installed to achieve efficiencies for integration and performance.

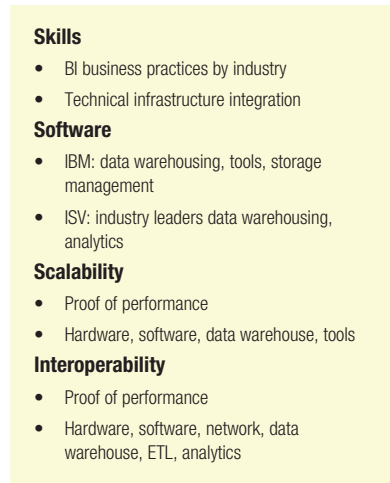In summary, the following factors will significantly affect your BI implementation:

- **Risk mitigation**—because your enterprise success depends on BI
- **Open systems**—to keep choices flexible
- **ISV tools**—to energize BI
- **Costs**—for the total system, during installation, ongoing support and future upgrades
- **Vendors**—to be there when you need help

IBM solutions: tools to help build your BI system

IBM BI systems solutions have been developed to address our customers' demanding expectations. We begin with a customer-centric orientation so that we can understand customer needs and then match them with our state-of-the-art hardware and software tools while working to minimize implementation disruption. Our broad experience includes business planning as well as technical competencies.

For BI software on IBM hardware, we test interoperability and scalability at various levels. Base-level interoperability tests examine functional compatibility with the IBM DB2® suite and select IBM Business Partner software for analytics, reporting or Web posting. These tests can serve as system compatibility proof-points.

Sometimes, more intense testing to emulate specific enterprise environments is the only acceptable path when the future of the enterprise may be at risk. We routinely conduct such tests at our labs with IBM hardware

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Skills

- BI business practices by industry
- Technical infrastructure integration

Software

- IBM: data warehousing, tools, storage management
- ISV: industry leaders data warehousing, analytics

Scalability

- Proof of performance
- Hardware, software, data warehouse, tools

Interoperability

- Proof of performance
- Hardware, software, network, data warehouse, ETL, analytics

Figure 6: IBM BI solutions components: Risk mitigation plan

and software as well ISV tools. Using customer workloads and patterns of queries and reporting, we stretch the system to monitor peak performance workloads and choke-points. Customer database administrators and IT managers routinely participate to gain system insights for fine-tuning and optimizing performance.

Many products available in the marketplace provide "point solutions" that address only a few of the important aspects of BI solutions. IBM provides solutions in each of the areas today. IBM offers @server™ systems for IBM z/OS®, IBM OS/400®, UNIX, Windows NT, Windows 2000 and Linux operating systems; IBM TotalStorage® disk and tape products; and the IBM DB2 suite of database products. In addition, we work with best-of-breed software vendors to provide a selection of pretested options.

The IBM product families and offerings span the capacity, performance and cost spectrum, enabling you to select products and services that are right for your needs—today, and tomorrow as your needs change. For example, to help you address your organization's storage needs, IBM offers IBM @server

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Capacity Upgrade on Demand (CUoD), an offering designed to help provide a flexible framework that matches your dynamic workload requirements. By enabling you to proactively size your capacity needs, these solutions can help provide the flexibility to stay a step ahead of your actual storage requirements. IBM products are designed to operate in a heterogeneous environment to support both IBM and other vendors' servers.

IBM solutions for managing DB2 and Oracle data warehouse environments provide high functionality, integrated software products from leading vendors in the relational database management marketplace. Other products offer functions similar to other point solutions, but with an important difference—they are integrated. That is, they are designed and tested to work together and are supported by one vendor, providing perhaps the greatest advantage of all: your IT professionals can address your organization's business needs, rather than their spending time integrating point solutions from different vendors and continually supporting them.

Comprehensive BI solutions from IBM can help combine business applications with superb technical performance and reliability. These solutions comprise server and storage hardware, database and analytical software and consulting services that address BI needs from all angles. The strength of IBM BI solutions has been fueled by technology advancements, including powerful parallel processing systems, self-diagnosing infrastructures, self-managing server and storage technologies, versatile and innovative data storage systems and the creation of new algorithms for data protection, analysis and data mining.

Exploring IBM @server systems

To thrive today, your business must relentlessly focus on core competencies while adapting to ever-changing conditions. This focus and flexibility requires solutions that offer integration, automation and virtualization—in short, an on demand operating environment.

IBM @server products provide broad support for Linux, Java™, XML and other open standards for flexibility and investment protection. They offer leading-edge technology that can integrate across your enterprise to solve complex business problems. Using automation and virtualization technology,

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these systems can dynamically allocate computing resources to help manage costs and adapt to business needs.

IBM @server **zSeries**® **servers.** Running Linux alongside traditional mainframe operating systems in a single, dynamically managed system and offering legendary 99.999% reliability, zSeries is the ultimate on demand computing platform.

IBM @server **iSeries**™ **servers.** A highly integrated, reliable server that runs multiple operating systems simultaneously, iSeries dynamically adjusts to the changing requirements of an e-business, delivering the performance and capacity you need, when you need it.

IBM @server **pSeries**™ **servers.** pSeries provides on demand capabilities that help customers get the most out of their UNIX and Linux systems. New capacity on demand offerings for processing power and memory let businesses pay for what they need, when they need it. Now it is easier and more affordable than ever to prepare for the unexpected.

IBM @server **xSeries**® **servers.** These powerful Intel-processor based servers use Enterprise X-Architecture™, provide intelligent systems management capabilities and are backed by world-class service and support teams. xSeries servers are an open, secure and reliable foundation for your e-business solutions.

IBM @server **BladeCenter**™ **servers.** BladeCenter servers deliver manageability, performance, density and autonomic features for Microsoft Windows and Linux-based solutions for pay-as-you-grow scalability and resilience.

Exploring IBM TotalStorage systems

IBM TotalStorage systems include both disk and tape storage devices. Disk-based systems include the IBM TotalStorage Enterprise Storage Server® (ESS) and the family of IBM TotalStorage FAStT Storage Servers. Tape-based systems include Linear Tape-Open™ (LTO®) products as well as several other enterprise tape drives and libraries. In addition, IBM TotalStorage includes various Storage Area Network (SAN), Network Attached Storage (NAS) and storage virtualization systems.

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Disk-based storage

IBM TotalStorage Enterprise Storage Server. The IBM TotalStorage
Enterprise Storage Server helps set new standards for performance,
automation and integration as well as for capabilities that support continuous
data availability in the on demand world. The ESS has many autonomic
capabilities that help supply data protection, reliability, performance and
availability. It also provides several advanced functions, such as FlashCopy®,
Peer-to-Peer Remote Copy (PPRC) and Extended Remote Copy (XRC), which
can be critical for increasing data availability through data protection and
disaster tolerance and recovery. The ESS enables enterprises with multiple
heterogeneous platforms, such as zSeries, iSeries, UNIX and Intel processor-
based hosts, to attach to a single storage server. The ESS offers scalability up
to 55.9TB of physical disk capacity while maintaining excellent performance.

IBM TotalStorage FAStT Storage Server. IBM FAStT Storage Servers
deliver high disk performance and reliability for demanding applications
in compute-intensive environments. These systems are designed to offer
investment protection through advanced functions and flexible features.
FAStT Storage Servers scale from 36GB to more than 32TB of physical disk
capacity to support growing storage requirements. They also offer advanced
replication services such as FlashCopy and Remote Mirroring to support
business continuance and disaster recovery. FAStT Storage Servers enable
heterogeneous attachment of UNIX and Intel processor-based servers in a
SAN or direct-attach environment

Tape-based storage

Linear Tape-Open. LTO offers a new approach to tape-format specifications
and was designed to bring open standards and new levels of scalability,
reliability and automation to tape storage. It provides customers with the
powerful benefits of data interchange and leading performance capabilities.
The mechanical simplicity of linear technology means there are few moving
parts, providing durability and supporting lower maintenance costs. The
current generation of LTO has a capacity of 200GB of uncompressed data
(400GB compressed) per LTO cartridge. Library implementations can scale up
to capacities of 992TB of compressed data.

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IBM TotalStorage Enterprise Tape family. The IBM TotalStorage
Enterprise Tape family consists of several powerful, integrated storage
solutions designed to provide high levels of performance and data reliability
for both standalone and automated systems. The TotalStorage Enterprise
Tape System 3590 provides the highest levels of performance and reliability
of any IBM tape subsystem. Depending on the 3590 Tape Drive model and
tape cartridge length, an Enterprise Tape System 3590 can store up to 60GB
of data (180GB with 3:1 compression) on a single cartridge. The 3590 Tape
Drive is designed for mission-critical data storage. The TotalStorage Enterprise
Tape Library supports this tape drive and can handle more than 6,000 tape
cartridges. The IBM TotalStorage Virtual Tape Server is an automated library
solution that reduces "real" tape mounts and, in turn, can help reduce the
number of physical tape cartridges required and the floor space needed to
support the tape process. By requiring fewer physical resources, the Virtual
Tape Server can help improve performance and decrease operating costs.

Storage Area Networks
The IBM SAN strategy is to support open, interoperable attachment of
heterogeneous server and storage platforms. IBM provides a complete suite
of SAN infrastructure components from best-of-breed providers such as
Brocade, McDATA, INRANGE and Cisco. These Fibre Channel switches and
directors are designed to provide the reliability, availability, performance and
management capabilities required to create entry-level through enterprise-
level SAN fabrics.

Network Attached Storage
The IBM TotalStorage Network Attached Storage series of products are
available as self-contained appliances or as a gateway. The appliances are
well suited for both workgroup and departmental applications. These storage
products are great choices for distributed environments in which they can be
used for file serving and client backups, or for other environments that require
large amounts of inexpensive storage. As a gateway, IBM NAS connects clients
and servers on an IP network to Fibre Channel storage, helping to efficiently
and cost-effectively bridge the gap between LAN storage needs and SAN
storage capacities.

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Storage virtualization systems
Scheduled for general availability in late July 2003, the IBM TotalStorage
SAN Volume Controller has been designed to help reduce the complexity
and costs of managing storage networks. It will allow users to virtualize their
storage, helping to increase the utilization of existing capacity and centralize
the management of multiple controllers in an open-system SAN environment.

Also scheduled for general availability in July 2003, the IBM
TotalStorage SAN Integration Server has been designed to help integrate
IBM virtualization technology, Fibre Channel switches and RAID storage
technologies into a preconfigured, comprehensive solution. Delivered and
installed as a single unit, it offers upgrade options for connectivity, storage
capacity and performance levels. The solution has been developed to provide
the benefits of SAN with the ease of single-system manageability. The SAN
Integration Server will initially capable of scaling to more than 100TB of
storage capacity and connecting up to 42 hosts.

Planned for general availability in late 2003, the TotalStorage SAN File
System[1] has been designed as a network-based heterogeneous file system
for file aggregation and data sharing in an open environment. It is intended
to help lower the cost of storage management and enhance productivity by
providing centralized management, higher storage utilization and improved
application availability.

Building BI systems with IBM DB2 software

BI solutions require a robust infrastructure for the exploding amount of
data generated by a business. A BI infrastructure also must be capable of
exploiting that data and turning it into valuable information. It should enable
better decisions in near real-time—decisions that can power your business past
your competition. IBM DB2 software delivers the world's best data warehouse
and analytics infrastructure for your BI solution architecture.

DB2 products and components
**IBM DB2 Universal Database™ Data Warehouse–Enterprise Edition
and Standard Edition.** These products represent the latest milestone in the
evolution of DB2. The Data Warehouse Enterprise Edition is the flagship IBM

[1]Planned for general availability in late 2003. An initial version of the SAN File Systems protocol
specification is now available. It includes a description of the protocols used between a SAN File
Systems metadata server and SAN File System clients running on application servers.

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database offering and is part of the IBM DB2 framework for comprehensive BI capabilities. The DB2 Cube Views component brings online analytical processing (OLAP) awareness into the database to provide metadata support.

DB2 Intelligent Miner™ tools. These BI tools are standards-based, using XML/PMML and SQL. The advanced DB2 Intelligent Miner modeling algorithms generate models that can be visualized using DB2 Intelligent Miner Visualization. DB2 Intelligent Miner Scoring harnesses the underlying parallelism, scalability and manageability of the database.

DB2 OLAP Server™ software. This software delivers analytic applications for fast, intuitive multidimensional analysis.

Query Management Facility. This product is a tightly integrated, powerful and reliable query and reporting tool set for the DB2 relational database management system (RDBMS).

DB2 solutions
DB2 Data Warehousing and Analytics Solutions can provide proof-points to grow your data warehouse on a solid foundation and make the most of your IT budget. DB2 Information Management Industry Solutions can help determine information management and BI solutions for banking, financial markets, government, healthcare, retail, telecommunications and other industry-specific environments.

Deploying and managing BI systems with the help of IBM
The people of IBM Global Services (IGS) understand the challenges you face. IGS can help you use BI solutions to improve customer relationships and increase customer loyalty.

Across industries, IGS has the resources to help businesses transform customer and operational data into insight. We have industry-specific tools and advanced information technology expertise—from strategy to implementation.

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Business intelligence: transforming data to insight

Are you profiting from one of your most valuable assets—your business data?
Here are some industry examples:

- Forty percent of a bank's customers are prime targets for the latest direct mail campaign.
- Someone with a record of committing fraud has just filed a questionable insurance claim.
- Thirty percent of a retailers' customers who purchase bottled water have also shown a high proclivity to purchase health drinks.

These companies have lots of data. The question is how to access, collect and transform it to achieve the desired objectives?

In an increasingly knowledge-based, around-the-clock economy, managing information is critical. Competition is intense. To gain new competitive advantages, your business must constantly innovate and develop new, winning strategies. Operating in networked, global markets alters the landscape and creates new conditions, magnifying the significance of readily accessible information. In an e-business environment, effective data management can define your competitive edge. How can you stay ahead and still increase the bottom line?

Integrating information from the diverse components of your business can give you the power to make insightful decisions:

- A Canadian financial institution learned how to leverage its existing business processes to take advantage of the rapidly expanding marketplace for financial services.
- An international entrepreneur established an online market to help Italian businesses market high-quality goods to a global clientele.
- A leading outdoor retailer in the United States moved its core business to the Internet, opening new, strategic opportunities.

IBM Business Intelligence Services helped each of these enterprises integrate and synchronize disparate components of their businesses. By gathering and accessing essential information from business data, you can develop processes to transform knowledge into powerful insight.

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Management Tools from IBM

Storage and Performance

IBM TotalStorage ESS Expert: The IBM TotalStorage ESS Expert can help storage administrators manage the performance of the IBM TotalStorage Enterprise Storage Server. This innovative software tool gives administrators powerful yet flexible storage asset and capacity management capabilities to centrally manage Enterprise Storage Servers located throughout the enterprise. The ESS Expert collects and presents the information administrators need to improve performance, asset and capacity management.

IBM TotalStorage ETL Expert: The IBM TotalStorage Enterprise Tape Library (ETL) Expert can help storage administrators manage the performance of three IBM ETL solutions: the TotalStorage Enterprise Tape Library 3494, TotalStorage Virtual Tape Server and TotalStorage Peer-to-Peer Virtual Tape Server. This innovative software tool provides administrators with the storage asset, capacity and performance information they need to centrally manage IBM tape libraries located anywhere within the enterprise. As a result, the ETL Expert can help simplify the management of tape libraries while helping to increase administrator productivity and reduce overall storage costs.

SAN Management

IBM Tivoli® SAN Manager: IBM Tivoli Storage Area Network Manager is a solution that helps discover, monitor and manage SAN fabric components. Tivoli SAN Manager is built to ANSI SAN standards, allowing you to choose best-of-breed products for your storage infrastructure. Tivoli SAN Manager can help you reduce storage administration costs and workloads while maintaining high availability and minimizing downtime. Tivoli SAN Manager is designed to do all this by automatically discovering SAN components and devices; detecting potential problem situations; and managing LANs, WANs and SANs from a single management console.

IBM Tivoli Storage Resource Manager: IBM Tivoli Storage Resource Manager is an intelligent console for the storage environment that provides a set of policy-driven automated tools for managing storage capacity, availability, events and assets in your enterprise environment, including DAS, NAS and SAN technologies. Tivoli Storage Resource Manager can help you identify, evaluate, control and predict your enterprise storage management assets. Through autonomic self-healing and self-configuring capabilities, Tivoli Storage Resource Manager can detect many potential problems and automatically make adjustments based on the policies and actions you have established.

Backup/Recovery

IBM Tivoli Storage Manager: IBM Tivoli Storage Manager (TSM) protects an organization's data by storing backup and archive copies of data on offline storage. TSM can scale to protect hundreds of devices—from PDAs to zSeries servers—running various operating systems connected via internet, WAN, LAN or SAN. TSM's centralized Web-based management, intelligent data movement and store techniques, and comprehensive policy-based automation work together to minimize administrative costs and the impact to users, computers and networks that data protection often incurs.

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IBM Tivoli Storage Manager for Databases: IBM Tivoli Storage Manager for Databases is a software module that works with TSM to secure a wide range of application data via the protection of the underlying database management systems holding that data. Tivoli Storage Manager for Databases exploits the backup-certified utilities and interfaces provided by Oracle, Microsoft SQL Server and Informix. In conjunction with TSM, this module automates data protection tasks and allows database servers to continue running their primary applications while they backup and restore data to and from offline storage. (This same functionality is included in the IBM DB2 Universal Database package, allowing it to work directly with TSM without requiring additional modules.) Regardless of which brand of database is used, Tivoli Storage Manager for Databases allows the centralized and automated data protection capabilities of TSM to be applied to up and running database servers.

IBM Tivoli Storage Manager for Hardware: IBM Tivoli Storage Manager for Hardware improves the data protection of business-critical databases and applications that require 24×7 availability. This software module helps TSM and its other data protection modules to perform high-efficiency data backups and archives of your most business-critical applications while eliminating nearly all performance impact on databases or servers. This elimination of server performance impact is accomplished by coupling the FlashCopy function of the IBM Enterprise Storage Server with the database protection capabilities of Tivoli Storage Manager for Databases (for DB2, Oracle and SAP R/3 databases).

TotalStorage Proven Interoperable Solutions with ISVs IBM developed the TotalStorage Proven program to underscore its commitment to interoperability in multi-vendor environments. Through the program, applications and hardware are validated with IBM server and storage technology to create pre-tested solutions for customers, including several leading BI independent software vendors.

A complete list of TotalStorage Proven offerings can be accessed at http://www.storage.**ibm.com**/proven/index.html.

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