ZDNet Make the Case Series:

IT Business Case Template:

Why X? Making the Case for IBM eServer xSeries Servers

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General Introduction

This business case template explores the opportunities and benefits that can be realized in the use of IBM eServer xSeries® systems for enterprise-based needs, as well as the costs and associated risks involved. However, the template may need customization to suit your specific needs, since each organization is likely to have unique challenges and opportunities that the business case should address.

IBM eServer xSeries systems provide an Intel® processor-based line of high-performance servers that can support the demand of mission-critical enterprise applications. Based on IBM Enterprise X-Architecture™ technology, xSeries servers offer both 32-and 64-bit Intel processors, enabling organizations to scale as they grow, while helping maintain costs.

xSeries systems allow organizations to take advantage of mainframe-inspired technologies, such as Active Memory™ Mirroring, Memory ProteXion, and Predictive Failure Analysis®, with the volume economic benefits of an Intel architecture. And by leveraging IBM systems management tools, such as IBM Director, organizations can potentially reduce deployment, maintenance time and cost.

As you make the case for xSeries systems for enterprise-based needs, remember these key benefits:

- Reliable systems management and deployment tools, such as IBM Director and Tivoli® Enterprise
- Available 24/7/365 technical support
- Support of Open Standards across the entire line
- Strong price-to-performance ratio because of Enterprise X-Architecture and on demand computing
- Pay-as-you-grow scalability
- OS-independent Active Memory which increases fault tolerance with Memory Mirroring
- Trusted, innovative, industry-leading Business Partners
- Early warning systems for hardware and software
- Integrated networking for simplified maintenance
- Hot-swap hardware components for easy upgrades
- Wide range of warranty and e-service options

IBM eServer xSeries Product Overview

xSeries systems are designed to match nearly any application workload environment, from the entry-level uni-processor x205, to the enterprise-powered (up to 32-way) x445. The following overview provides a quick glimpse of the xSeries family.

Enterprise Scalable Servers (2-way to 16-way SMP)

- **x450**

The x450 is a 64-bit, Intel Itanium® 2-based sever built for high performance and value. The x450 handles memory-intensive applications, ranging from DB2 and Oracle database serving to enterprise applications, including SAP and SAS.

- **x445**

The x445 offers the latest mainframe-inspired IBM Enterprise X-Architecture technologies that help balance high availability with high performance.

Rack Optimized Servers (Uni to 8-way SMP)

Ideal for ISP/ASP environments, or areas where space is constrained.

- **x360**

The x360 features the Intel Xeon™ processor MP at up to 2.8GHz and provides computing power in a rack-optimized design—ideal for the constrained data center. The x360 is a flexible, 4-way server that can handle diverse applications, such as Microsoft® Exchange, Lotus Notes®, Microsoft SQL Server 2000, DB2, SAP, and file and print.

- **x345**

The x345 is a 2U server that delivers extreme performance and availability for demanding applications in data-dense environments. Dual Intel Xeon processors with 533MHz front-side bus speed and 8GB of DDR memory provide the power required for nimble operations.

- **x335**

With dual high-speed Intel Xeon processors, the x335 delivers maximum performance density in a flexible stand-alone server.

- **x305**

The 305 packs a cost-efficient, edge-of-network solution in a 1U, 16.75-inch deep form factor. The x305 offers a range of Intel Pentium® 4 processors with high-performance 533MHz front-side bus and up to 4GB of DDR memory.

Tower Servers (Uni to 4-way SMP)

These servers help meet a variety of needs, including file, print, application and mail serving, and are ideal for small businesses or departmental computing.

- **x255**

The x255 delivers economical high performance and combines high-availability features with substantial internal storage. It is well-suited for business-critical applications, such as messaging/collaboration, smaller databases and enterprise resource planning (ERP).

- **x235**

The x235 delivers performance with Intel Xeon processors at 533MHz front-side bus speed and up to 12GB of DDR memory, and can meet the needs of branch or remote offices.

- **x225**

The 2-way x225 provides value to workgroups by combining scalable performance and new availability features at an affordable price.

- **x205**

The x205 delivers availability features and easy manageability to small and medium-sized businesses.

High Performance Computing Solutions (2-way to 16-way SMP)

- **x382**

The x382 is designed to excel in the demanding environments of scientific and technical computing customers. High floating point capability and expanded memory addressability of the

Intel Itanium 2 processors power strong performance. The compact 2U design enables deployment of substantial computing power in a small footprint.

- **Cluster 1350**

The Cluster 1350 combines xSeries rack-optimized servers running the Linux operating system with robust systems management and world-class service and support to deliver highly scalable, integrated cluster offerings.

Blade Servers

- **IBM eServer BladeCenter™**

BladeCenter's modular design packs computing resources into cost-effective, high-density enclosures that support hot-swappable, high-performance blade servers. BladeCenter delivers integration, performance, manageability and resiliency features in a blade architecture. BladeCenter offers twice the density of many comparable Intel processor-based 1U servers on the market.

Key Differentiators of IBM eServer xSeries Servers

Smart Systems Management

IBM Director systems management software provides comprehensive systems management, helping reduce the risk of downtime and lower IT costs. While IBM Director takes predictive and proactive actions to keep systems running, you're free to concentrate on important business matters, such as market opportunities or responding to customers.

PC Magazine ranks IBM Director as the leading server management tool*. One of the key reasons IBM Director earns this industry honor is that it regulates and heals the server, so it can resolve critical issues on-the-fly.

Facts:
- Much server downtime is due to software. IBM Director's Software Rejuvenation tool helps address this problem.
- IBM Director offers robust monitoring that generates alerts based on the Windows Event Log, as well as monitors any of the "NT Performance Monitors."
- IBM Director offers support for Predictive Failure Analysis (PFA) alerts for hard disk drives, memory, CPUs, fans, voltage regulator modules, and power supplies.
- IBM Director can take multiple actions based on a single event—up to 20 actions generated by an alert.
- IBM Director allows for full graphical software remote control of any Microsoft Windows management station, independent of having a hardware service processor card.
- IBM Director offers calendar-based task/event scheduler, so you can execute tasks at a desired time (inventory scans, capacity management reports, etc.).

*PC Magazine's Editor's Choice, October 2002, IBM Director v3.1

Service and Support

IBM offerings include the IBM HelpCenter® support centers, IBM Electronic Service Agent™ and IBM Access Support.

IBM Help Center consists of more than 1,000 support specialists. These specialists can answer your questions about IBM servers, network equipment, storage options and other IBM products—in 22 languages. The IBM HelpCenter also handles OEM operating systems and applications supported on IBM systems. The HelpCenter is available 24 hours a day, seven days a week, 365 days a year, and spans nine facilities around the world. A single, centralized database helps IBM technicians share customer information and solutions worldwide.

IBM Electronic Service Agent (eSA) is a free-of-charge software tool that resides on a server and provides electronic support and problem management capabilities through a secure electronic dialogue between your systems and IBM. eSA monitors your networked servers for hardware errors and has an integrated performance monitor function that automatically collects system utilization information. eSA can also perform hardware and software inventories, and reports inventory changes to IBM. All information sent to IBM is stored in a highly secure database and used for improved problem determination.

IBM Access Support is for desktop, mobile and xSeries server customers. Access Support is a customizable HTML-based application portal that provides tools, support, and services in a common interface, to help diagnose and resolve common user problems. It provides information and functions that include automated solutions to common system problems, a display of key system configuration, automated self-service, as well as links to system update tools and icons to support applications. System information can be saved to an XML file and sent to another system, or accessed remotely from an authorized client or server.

Mainframe-Inspired Technologies

XpandOnDemand™ provides new levels of scalability for industry-standard servers—achieved with the Enterprise X-Architecture platform using enhanced, high-performance symmetrical multiprocessing (SMP) building blocks that allow effective scalability beyond 4-way SMP. These technologies provide scalability from 4-way to 8-way to 16-way systems—using "scalable enterprise nodes." A scalable enterprise node contains processors, memory, I/O support, storage and other devices and operates stand-alone like other computers. Each node may run an operating system different from the other nodes, or if desired, multiple nodes can be assigned to one OS image via system partitioning. Nodes are attached to one another through dedicated high-speed interconnections, called SMP Expansion Ports, sharing resources for an unmatched combination of performance and expandability. This gives you the adaptability to run several nodes as either a single large "complex" or as two or smaller units—and even rearrange the configurations later, as needed. XpandOnDemand scalability gives your business the capacity to grow, with unparalleled flexibility.

Features of IBM Director

Predictive Failure Analysis, Real Time Diagnostics, Capacity Manager, Remote Deployment Manager and Software Rejuvenation.

Predictive Failure Analysis can detect when components are operating outside of normal specifications and approaching historical failure thresholds. This enables PFA to predict the failure of supported components, often as much as 24 to 48 hours before failure occurs, helping afford administrators the time to locate replacement parts and hot-swap the failing components prior to actual failure—and at a time that's convenient to the administrator.

Real Time Diagnostics is systems management software that runs on your xSeries systems while your system is active. It can help prevent downtime, thereby increasing your system's availability.

Previously, running diagnostics on your servers required them to be taken down, which could greatly disrupt users' productivity and impact your bottom line. With the new industry-leading Real Time Diagnostics software, administrators can run industry-standard diagnostic utilities on servers while the server is being productive. This enables proactive server maintenance, while maximizing server availability.

Capacity Manager monitors critical server resources, such as processor utilization, disk capacity, and memory usage and network traffic. Using advanced artificial intelligence, it identifies bottlenecks for an individual system, a group of systems or a cluster, and recommends upgrades to prevent diminished performance or downtime.

Remote Deployment Manager (RDM) runs on your xSeries server to simplify and automate the deployment, redeployment, lower-level management and disposal of other xSeries servers. RDM incorporates imaging technology from industry leader PowerQuest to provide high-performance cloning, recovery, and re-provisioning solutions. RDM reduces unnecessary visits to each machine because you can download the operating system from the network.

IBM Director's Software Rejuvenation tool provides the ability to prevent software-caused downtime. In networked servers, software often exhibits an increasing failure rate over time, due to programming errors, data corruption, numerical error accumulation, etc. This software aging can cause threads or processes to never be terminated, and can lead to unplanned server outages. IBM Director Software Rejuvenation can monitor and predict these outages based on previous experience, and auto reset all or part of the software system with no operator intervention.

Light Path Diagnostics sets a new standard for Intel processor-based server maintenance and repair. Light Path Diagnostics contributes to enhanced manageability. xSeries servers are designed with fast, accurate problem isolation as a goal, and Light Path Diagnostics helps meet that goal. xSeries servers include LED status indicators on the front panel. When the Predictive Failure Analysis of a component indicates impending problems, the service processor alerts the system manager, illuminates the front-panel status indicator and turns on an indicator light on the Light Path Diagnostics service panel in servers that include the Light Path Diagnostics feature.

Active Memory Mirroring
Active Memory offers a collection of memory technologies found in the xSeries product line. Two of the key technologies include Chipkill and Memory ProteXion.

Chipkill™ is integrated into the XA-32 second-generation chipset and does not require special Chipkill DIMMs. Chipkill corrects multiple single-bit errors to help keep a DIMM from failing. When combining Chipkill with Memory ProteXion and Active Memory, the server provides very high reliability in the memory subsystem. Chipkill memory is up to 100 times more effective than ECC technology, providing correction for up to four bits per DIMM (eight bits per memory controller), whether on a single chip or multiple chips.

If a memory chip error does occur, Chipkill is designed to automatically take the inoperative memory chip offline while the server keeps running. The memory controller provides memory protection similar in concept to disk array striping with parity, writing the memory bits across multiple memory chips on the DIMM. The controller is able to reconstruct the "missing" bit from the failed chip and continue working as usual.

Memory ProteXion helps protect you from unplanned outages due to memory errors far more effectively than standard ECC technology, even while using standard ECC DIMMs. It works somewhat like hot-spare disk sectors in the Windows NTFS file system, where if the operating system detects bad sectors on disk, it will write the data to spare sectors set aside for that purpose. Think of Memory ProteXion as providing hot-spare bits. The error correction is handled by the memory controller, so there is no operating system overhead or support requirement—it's transparent to the OS. Because it operates on standard ECC DIMMs, you don't have to pay extra for special memory for this protection either.

Virtualization is powered by VMware® ESX Server™ that helps you build cost-effective, high-availability solutions by using fail-over clustering between virtual machines. Until now, system partitioning—the ability of one server to run multiple operating systems simultaneously—has been the domain of mainframes and other large, sophisticated servers. But with VMware ESX Server, you can enable dynamic, logical partitioning on your xSeries systems. Instead of deploying multiple servers scattered around your company and running a single application on each, you can consolidate servers and enhance system availability at the same time with this software tool. A key enabler for server consolidation, VMware allows each of your xSeries servers to run multiple operating systems and applications in virtual machines—allowing you to centralize IT management. Since these virtual machines are completely isolated from one another; if one were to go down, it (in virtually all cases) would not affect the others. This means that not only is VMware ESX Server software great for optimizing hardware usage, it can also give you the added benefits of higher availability and scalability.

XceL4™ Cache enhances the performance-of Enterprise X-Architecture servers by adding up to 64MB of DDR (double data rate) high-speed ECC memory per 4 processors in Itanium-based or Xeon MP-based systems. The addition of a large *external* L4 cache (along with the faster and wider front-side bus) reduces memory latency and increases memory bandwidth for unprecedented performance. Without an L4 cache, a high-end processor like the Itanium can consume as much as 80-85% of available main memory bandwidth, leaving little for other devices that require memory bandwidth, such as the PCI-X, Ethernet, SCSI and Fibre Channel interfaces. By using high-speed DDR memory, and interposing it between the processors and user RAM, the IBM XceL4 Server Accelerator Cache gives processors and I/O devices alike a considerable boost in performance.

Tool-less and reduced cable server design leverages the innovative rack-dense form of IBM xSeries servers, and decreases the amount of cable that server administrators have to manage. Likewise, they boast tool-less rails that make them easier to deploy and manage.

Business Case Outline

In the following sections, the key components of the business case for IBM eServer xSeries servers are presented, including the tangible goals, the impact of deploying xSeries systems, as well as the implications of direct purchase or outsourcing. As you compile your case, you will need to be familiar with the xSeries product features and the corresponding business benefits of those features, as detailed in the previous sections. For explanations of the various components within the following sections, please refer to the glossary in the final section.

I. Need/Opportunity

Key technical and business objectives for migrating xSeries systems:

A. Tangible goals or objectives

- Deliver high performance, speed, and scalability
- Cost-effective deployment and maintenance across the enterprise infrastructure
- Establish a consistent, end-to-end system management tool to reduce operating costs
- Provide a flexible platform for business-critical applications
- Increased modular scalability that anticipates future growth
- Support backbone applications, such as business intelligence and enterprise resource planning applications
- Provide edge-of-network, application, and database servers within the same product line
- Wide range of support services options
- Maximize capital and operating budgets
- Increase IT staff productivity when deploying new servers
- Choice of operating systems
- Reduce total cost of ownership (TCO)

B. Scope

Impact and benefits from deploying xSeries servers.

Availability

- OS-independent Active Memory, which increases fault tolerance with Memory Mirroring
- Integrated Chipkill support
- Memory ProteXion that provides multilevel fault tolerance
- Hot-swap and add capabilities
- Redundant fans, power supplies, and hard drives
- RAID Storage
- Active PCI
- Real-time diagnostics
- Capacity Manager
- Remote mirroring solutions
- Early warning systems for hardware and software
- Tool-and-cable-less server design
- A leading Linux clustering provider
- Automatic data recovery
- Remote deployment and conducting complex system backups

Scalability

- XpandOnDemand that offers pay-as-you-grow scalability
- Modular Node building blocks
- 4 to16-way SMP for 32-and 64-bit Intel Architecture
- NUMA technologies
- Triple I/O with RXE Remote I/0
- XceL4 accelerator cache

Flexibility

- Choice of Linux® or Windows platform
- Wide spectrum of servers from Uni towers to enterprise-scalable servers
- Support a range of enterprise applications from enterprise resource planning (ERP) to customer relationship management (CRM) solutions
- Virtualization for consolidation for VMware

Manageability

- Integrated hardware/software solution,
- Tivoli Enterprise tools provide comprehensive, cross-platform solution
- Multiple image deployment
- Application package distribution
- Predictive failure alerting
- Light Path Diagnostics
- Software Rejuvenation
- Easy-to-use monitoring and deployment tools
- Integrated networking simplifies maintenance
- Hot-swap hardware components for easy upgrades
- Enables billing, reporting, chargeback, and capacity planning for on demand computing
- Virtualization
- Server consolidation
- Track IT assets and inventory with single point of management

Affordability

- Low long-term TCO
- Help reduce cost for tracking and managing IT assets
- Help reduce costs because of operating system flexibility
- Modular, space-maximizing design of blade servers
- Minimize downtime with OnForever, inspired by mainframe technology
- Strong price-to-performance ratio

II. Stakeholders

A. Primary

- Executives and managers who need to deploy the latest applications and high-performance hardware platforms
- Executives and managers who need easier manageability and faster infrastructure deployment
- Executives and managers who need to anticipate growth and increased demand on hardware

- Executives and managers who need to maximize server robustness and reliability
- Executives and managers who need a lower TCO and a faster ROI
- Executives and managers who want a reliable hardware business partner that can meet the needs of the enterprise

B. Secondary

- Employees/End-users who need faster, more reliable, and highly available applications
- IT staff who manage deployment and maintenance of the enterprise infrastructure

III. Alternatives

A. No change

No change may be the best option if the current technologies implemented are still running satisfactorily and there is no demand for better functionalities or more features.

1. Cost

Even if not considering an xSeries server deployment, evaluate the costs of maintaining the status quo:
- Costs due to sub-optimal performance and speed
- Costs for maintenance and management of existing systems
- Licensing/maintenance costs for existing operating systems and related software
- Storage and other management cost of supporting multiple hardware platforms/components (vs. ability to consolidate applications/resources/peripheral components on a single high-performance system)
- Running costs, such as energy usage, depreciation
- Other upfront and monthly/annual costs paid directly to vendors
- Management costs associated with keeping the system current and secure (patches, updates, etc.), and performing up to user requirements
- Costs of any future upgrade requirements
- Possible increased cost if need to upgrade in the future
- Increased TCO over long-term
- Cost of frequent downtime and lost productivity

2. Return on savings

Savings can be derived from the following:
- Based on the costs, the potential return on investment (ROI) for not deploying xSeries servers may be zero or a negative number

3. Risk

Tangible risks include those mentioned in the Cost section, as well as:
- Lowered productivity and efficiency during server deployments
- Inability to run multithreaded/multitasking applications requiring the latest 32-bit and 64-bit architectures
- Locked into a proprietary operating system
- Risk of an obsolete enterprise platform and associated business process applications
- Expiration of warranties and technical guarantees

- Inability to keep pace with early adopters that have already realized a competitive advantage
- Inability to leverage complete IT investment
- Costs of frequent system downtime
- Loss of productivity when deploying new servers and workstations

B. Delay Procurement/Implementation

4. Cost

While the cost of xSeries systems might be delayed, other costs may be incurred:

- Costs may be similar to a No Change alternative. However, these costs will decrease after implementation.

5. ROI

- The short-term savings of not deploying xSeries servers are weighed against the costs of waiting to avoid initial expenses.
- Long-term costs of existing server infrastructure may increase considerably if purchase is delayed.

6. Risks

- Higher migration costs in the future
- Operational/financial considerations when migration is deferred to a later time (such as management commitment, availability of funds, etc.)
- Exposure to sudden changes in macroeconomic conditions, such as exchange rate fluctuations, new legislation, etc.
- Safeguarding supply/availability of software when purchased at a later time
- Managing/scheduling availability of personnel to oversee procurement/implementation
- Inability to leverage complete IT investment
- Costs of system downtime
- Loss of productivity when deploying new servers
- Inability to keep pace with early adopters

C. Outsourcing

Make a list of the possible vendors for outsourcing services. Solutions may be layered and come from multiple vendors, or may be a single solution from one vendor. For each vendor, consider:

1. Costs

- Initial and monthly/annual costs paid directly to vendor for software and hardware procurement and maintenance
- Cost of ongoing maintenance
- Costs related to make existing hardware or software compatible, such as upgrades, replacements, reconfigurations, and additional telecommunications tools/ facilities
- Incremental fees for upgrades
- Remote management costs (related hardware and software tools, network connectivity/bandwidth)
- Cost of arranging and managing contracts/service agreements with vendors

- Administrative, communication, and other related costs in coordinating with vendors
- Cost of devising remote/risk management strategies
- Conversion or changeover costs from status quo

2. **ROI**
- Short-term savings of outsourcing versus buying
- The short-term savings of not deploying xSeries servers are weighed against the costs of waiting in order to avoid initial expenses.

3. **Risk**
- Quality of Service (QoS) may not be reliable
- Risk of lock-in/dependency on vendor
- Less control over the technology
- Inability to finish the proposed solution at specified time
- Inadequate legal identity/capacity of vendor
- Questionable financial viability of vendor
- Deficient technical capability, experience, dependability, reliability, and flexibility of vendor
- Loss of intellectual property
- Inadequate security/risk management policies and procedures on the part of the vendor (management of system vulnerabilities, virus protection, application access controls, etc.)
- Limited control during implementation
- Limited options for recourse in case of problems
- Exposure to sudden changes in macroeconomic conditions, such as exchange rate fluctuations, new legislation, etc.
- Other unforeseen costs/risks that can lower ROI
- Costs of system downtime

D. **Buy**

When buying xSeries servers, consider:

1. **Cost**
- Price/performance ratios
- Licensing/support and maintenance cost
- Initial and monthly/annual costs paid directly to vendors for proposed solutions
- Costs related to make existing hardware or software compatible, such as upgrades, replacements and reconfigurations
- Labor cost for implementing the system
- Cost for technical staff or system administrator
- Cost for installation or configuration
- Cost of end-user training
- Insurance costs, where applicable
- Freight, transport, and delivery cost
- Installation and commissioning costs
- Inventory-holding, maintenance, and management costs
- Applicable duties and taxes
- Decommissioning and disposal costs for obsolete hardware

2. **ROI**

The cost of buying is weighed against the relative savings of:
- No change
- Delay procurement
- Outsourcing

3. **Risk**
- Unforeseen add-on services/applications to make the system ready for use or to comply with licensing terms
- Scarcity of qualified personnel to administer/oversee deployment and management of new versions of the software
- Interoperability issues with legacy applications, systems from other vendors
- Firmness of price
- Inability to deal with system level challenges
- Quality of Service (QoS) of vendor may not be reliable
- Structure of corporate technology staff
- Foreign-exchange risks
- Management of payment terms
- Conformity with installation and customization requirements
- Management of licensing terms, warranties, technical guarantees
- Product liability arrangements
- Compliance with health and safety requirements
- Maintenance and durability of purchased hardware
- Adverse impact on budgets allotted for non-IT capital spending over the short term
- Financial viability of reseller

E. **Buy competing brand**

When buying a competing brand, consider:

1. **Cost**
- The limitations of focusing only on the initial purchase cost, which is typically less than 20 percent of TCO
- Cost of cabling
- Cost of space requirements
- Cost of downtime
- Cost of non-integrated system management tools

2. **ROI**
- Long-term maintenance costs could reduce ROI

3. **Risks**
- Inability to leverage performance and long-term cost benefits of industry-leading innovation
- Inability to take advantage of advanced scalability and on-demand technologies
- Inability to utilize end-to-end integrated network and system management tools
- Lack of available 24/7 world-wide service and support

IV. Business values for the alternatives

A. ROI

Costs/Savings in terms of:

1. Tangible returns
- Weigh the alternatives to discover which best meets the objectives specified in the alternatives section

2. Incremental revenue
- The increase in revenue likely to be seen from each alternative
- The cost savings likely to be seen from each alternative
- The actual time period for the company to realize the additional revenue stemming from alternatives

3. Return on capital
- Aside from the returns projected from the capital investment, other benefits may be realized as a result of the investment. This will increase productivity, thereby yielding more profit for the company.

4. Cost of capital

Short-term costs may include:
- Hardware and operating systems
- Training for employees and technical staff

Long-term costs include
- Depreciation of capital investments
- Cost of maintenance including monthly/annual charges, if any
- Cost of management, upgrades, and maintenance
- Costs associated with the risks involved

B. Customer satisfaction

The criteria for customer satisfaction for the stakeholders include:
- Business continuity and security
- Enhanced productivity
- Improved efficiency
- Increased business agility and flexibility
- Improved competitive advantage
- Lowered management and maintenance costs
- General feedback of IT staff and other company employees

C. Resources and roles
- In-house resources involved in each solution, if applicable
- Outsourced resources involved in implementing each solution, if applicable

D. Timetable/Time-to-market

The timeline specified in the project implementation to fulfill the solutions in the company

V. Recommendation

Weigh recommendation against the business values of the alternatives based on:

A. ROI

Costs/Savings in terms of:

1. Tangible returns
- Weigh the alternatives to discover which best meets the objectives specified in this business case.

2. Incremental revenue
- The additional revenue likely to be seen from each alternative, if any
- The cost savings likely to be seen from each alternative, if any
- The time period in which the organization will see additional revenue from each alternative

3. Return on capital
- In addition to the returns expected from capital investments, other benefits may be realized as a result of the investment.

4. Cost of capital

Short-term costs may include:
- Hardware and operating systems
- Training for employees

Long-term costs include:
- Depreciation of capital investment
- Cost of maintenance, including monthly/annual charges, if any
- Cost of management, upgrades and maintenance
- Costs associated with risks involved

B. Customer satisfaction

The criteria for customer satisfaction for the stakeholders include:
- Guaranteed business continuity and security
- Enhanced productivity
- Improved efficiency
- Increased business agility and flexibility
- Improved competitive advantage
- Lower management and maintenance costs
- General feedback of IT staff and other company employees

C. Resources and roles
- In-house resources involved in the implementation, if applicable
- Outsourced resources involved in the implementation, if applicable

D. Timetable/Time-to-market
- The timeline specified in the project implementation to fulfill the solutions in the company

Product Details: IBM eServer xSeries Product Tables and a Few More Considerations

On demand ready
Becoming an on demand business means finding new ways to grow, adapt and respond in a dynamic business environment, while managing costs. IBM eServer xSeries systems provide outstanding availability and systems management capabilities that help better manage and provision your computing resources, for a responsive IT environment that can grow with your business. Just the capabilities you need in today's on demand world.

Linux solutions
IBM works closely with the leading Linux distribution companies—Red Hat, Inc., SuSE Linux AG and Turbolinux, Inc.—to offer tested and validated configurations for xSeries servers. This helps deliver outstanding xSeries performance and functionality. Also, IBM fully supports United Linux. The range of Linux offerings available on xSeries servers gives you the flexibility to choose the optimum Linux implementation for your unique requirements.

Microsoft solutions
IBM works closely with Microsoft so that xSeries servers provide outstanding performance and robust functionality, running the different versions of the Windows operating system. xSeries systems support a broad range of offers, from select products preloaded with the Windows operating system (for customers who desire one-stop shopping) to distributing the Datacenter Edition for customers demanding scalability and reliability.

Growing storage demands
Managing storage resources has become one of the most strategic issues today. Companies are moving fast to reduce backup windows, increase data availability, increase security and boost IT productivity to support today's round-the-clock, e-commerce driven applications. From disk, tape, storage area networks, network attached storage, software and services, to qualified IBM TotalStorage® Solution Centers and IBM Business Partners, IBM offers a broad storage solutions portfolio. The TotalStorage product portfolio provides scalable, open, integrated solutions for your storage and application needs.

Product Tables

High-performance scalable		
xSeries model	x445	x450
Form Factor	Rack/4U per chassis	Rack/4U
Processor	Intel Xeon Processor MP up to 2.8GHz or Intel Xeon Processor 3.0GHz	Intel Itanium 2 processor at up to 1.5GHz
Number of processors (std/max)	2/32 with Intel Xeon Processor MP 2/4 with Intel Xeon Processor	1/4

Cache (max)	2MB L3, 64MB Xcel4 per 4-way for Intel Xeon Processor MP or 512MB L2, 64MB XceL4 per 2-way for Intel Xeon Processor	Up to 6MB L3 and up to 64MB L4
Memory (std/max)	64GB Chipkill DDR SDRAM	1GB/40GB PC2100 DDR Chipkill memory
Expansion Slots	6/6 Active PCI-X per chassis with optional Remote I/O	Six 64-bit PCI-X (2 at 133MHz, 2 at 100MHz and 2 at 66MHz)
Disk bays (total/hot-swap)	2/2 Supporting Ultra320 SCSI	2/2
Maximum internal Storage[1]	293.6GB	146.8GB
Network	Integrated Dual 10/100/1000 Ethernet	Integrated Dual 10/100/1000 Ethernet
System Management processor	Remote Supervisor Adapter in dedicated slot	Remote Supervisor Adapter in dedicated slot
Power supply (std/max)	1050W 2/2 hot-swap	2 1050W/2
Hot-swap components	Power supplies, cooling fans, hard disk drives, PCI-X adapters and memory DIMMs	Power supply, fans, Active PCI-X adapters and hard disk drives
Light Path Diagnostics	Yes	Yes
RAID support	Integrated RAID-1	Integrated RAID-1, optional ServeRAID controllers for RAID-5
xSeries OS compatibilities	Red Hat, SuSE, Microsoft Windows®, Novell NetWare, VMware ESX Server	Red Hat, SuSE, Microsoft Windows

Rack-optimized					
xSeries model	**x305**	**x335**	**x345**	**x360**	**x382**
Form Factor	Rack/1U	Rack/1U	Rack/2U	Rack/3U	Rack/2U
Processor	Intel Pentium 4 processor with up to 3.06GHz/533MHz front-side bus	Intel Xeon processor up to 3.06GHz/533MHz front-side bus	Intel Xeon processor up to 3.06GHz/533MHz front-side bus	Intel Xeon Processor MP at up to 2.8GHz	Intel Itanium 2 up to 1.5GHz
Number of processors (std/max)	1/1	1/2	1/2	1/4 or 2/4	2/2
Cache (max)	512KB L2	512KB L2	512KB L2	1MB or 2MB	Up to 6MB

Memory (std/max)	256MB/4GB PC2100	512MB/8GB PC2100 ECC DDR Chipkill	512MB/8GB PC2100 DDR Chipkill	1GB/16GB² or 2GB/16GB PC1600 DDR Chipkill	2GB or 4GB/16GB PC2100 DDR Chipkill
Expansion Slots	2 PCI-X (133MHz)	2 PCI-X (64-bit 100MHz)	4/0 PCI-X, 1/0 PCI	6/6 Active PCI-X with optional 12 PCI-X slots via RXE-100 Remote Expansion Enclosure	3/3 PCI-X
Disk bays (total/hot-swap)	2/0	2/2	6/6	3/3	2/2
Maximum internal Storage[1]	240GB IDE or 293.6GB SCSI	293.6GB Ultra320 SCSI or 240GB IDE	880.8GB	220.2GB (supports 18GB, 36GB and 73GB hard disk drives)	293GB (supports 36GB, 73GB and 146GB hard disk drives)
Network	Dual integrated 10/100/1000 Ethernet	Dual integrated 10/100/1000 Ethernet	Dual integrated 10/100/1000 Ethernet	Integrated 10/100 Ethernet	Dual integrated 10/100/1000 Ethernet
System Management processor	Supports optional Remote Supervisor Adapter	Integrated (supports Remote Supervisor Adapter)	Integrated (supports Remote Supervisor Adapter)	Remote Supervisor Adapter in dedicated slot	Integrated Intel IPMI 1.5
Power supply (std/max)	220W1/1	332W 1/1	1/2	370W 1 or 2/3 hot-swap	350W 2/3
Hot-swap components	N/A	Ultra320 SCSI hard disk drives	Power supply, fans and hard disk drives	Power supply, fans, hard disk drives and PCI-X adapters	Power supply and hard disk drives
Light Path Diagnostics	N/A	Yes	Yes	Yes	N/A
RAID support	Optional	Integrated RAID-1 (mirroring)	Integrated RAID-1, optional RAID-5	Optional	Integrated RAID-1

xSeries OS compatibilities	Red Hat, SuSE, Microsoft Windows, Novell® NetWare®	Red Hat, Microsoft Windows, Novell NetWare	Red Hat, SuSE, Turbolinux, Microsoft Windows, Novell NetWare	Red Hat, SuSE, Microsoft Windows, Novell NetWare	Red Hat, SuSE, Microsoft Windows

Universal				
xSeries model	**x205**	**x225**	**x235**	**x255**
Form Factor	Tower rack/4U	Tower rack/4U	Tower rack/5U	Tower, rack/7U
Processor	Intel Pentium 4 up to 3.06GHz/533MHz front-side bus	Intel Xeon processor up to 3.06GHz/533MHz front-side bus	Intel Xeon processor up to 3.06GHz/533MHz front-side bus	Intel Xeon Processor MP at up to 2.8GHz
Number of processors (std/max)	1/1	1/2	1/2	1/4
Cache (max)	512KB L2	512KB L2	512KB	2MB L3
Memory (std/max)	128MB/2GB PC2100	512MB/8GB PC2100 DDR Chipkill	512MB/12GB PC2100 DDR Chipkill	512MB/24GB PC1600 DDR Chipkill
Expansion Slots	5 PCI	5 total/4 PCI-X	6 total/2 Active PCI-X	6 Active PCI-X
Disk bays (total/hot-swap)	4 non-hot-swap SCSI, 3 hot-swap SCSI, 3 IDE	6/6 6 hot-swap SCSI 4 non-hot-swap SCSI	6/6	12/12 with optional 6-pack hot-swap hard disk drive kit
Maximum internal Storage[1]	360GB IDE, 587.2GB SCSI	880.8GB Ultra320 hot-swap, 587.2GB Ultra320 non-hot-swap	1.3TB Ultra320 SCSI	1.76TB Ultra320 SCSI
Network	Integrated 10/100/1000 Ethernet	Integrated 10/100/1000 Ethernet	Integrated 10/100/1000 Ethernet	Integrated 10/100/1000 Ethernet
System Management processor	Supports optional Remote Supervisor Adapter	Supports optional Remote Supervisor Adapter	Integrated (supports Remote Supervisor Adapter)	Integrated (supports Remote Supervisor Adapter)
Power supply (std/max)	340W 1/1	425W or (2) 514W hot-swap	1/2	370W 2/4 hot-swap (redundant at 110V and 220V)
Hot-swap components	Hard disk drives (select models)	Power supply, hard disk drives (select models)	Drives, power supply, fans and PCI-X slots	Power supply, fans, hard disk drives, PCI-X adapters
Light Path Diagnostics	Limited	Limited	Yes	Yes

RAID support	Optional	Integrated RAID-1	Integrated RAID-1, optional RAID-5	Optional
xSeries OS compatibilities	Red Hat, SuSE, Microsoft Windows, Novell NetWare	Red Hat, SuSE, Microsoft Windows, Novell NetWare	Red Hat, SuSE, Turbolinux, Microsoft Windows, Novell NetWare	Red Hat, SuSE, Microsoft Windows, Novell NetWare

BladeCenter at a glance	
Form Factor	Rack/7U, high-availability midplane
Blade bays	14
Standard Media	CD-ROM and diskette drive accessible from each blade server
Switch Modules	4 switch module bays
Power supply module	Up to 4 hot-swap and redundant 1400W with load balancing and failover capabilities
Cooling modules	2 hot-swap and redundant blowers standard
Systems management hardware	1 management module standard, add an optional second module for redundancy
I/O ports	Keyboard, video, mouse, Ethernet, USB

BladeCenter HS20 at a glance	
Processor	Intel Xeon processor up to 2.8GHz
Number of processors (std/max)	1/2
Level 2 cache	512KB
Front side bus	Up to 533MHz
Memory	Up to 8GB[2] DDR ECC Chipkill
Internal hard disk drives	Up to 2 IDE (or up to 2 hot-swap Ultra320 SCSI drives with optional SCSI storage expansion unit)
Maximum internal storage[1]	146.8GB[3] SCSI/80GB IDE
RAID support	Integrated IDE RAID standard on blade server, integrated RAID with SCSI storage expansion unit option
Network	2 Integrated Gigabit Ethernet controllers
I/O Upgrade	1 expansion card connection
Systems management hardware	Integrated system management processor
Systems management software	IBM Director with systems management and trial deployment tools, IBM Director Server Plus Pack optional
Predictive Failure Analysis	Hard disk drives, processors, blowers, memory
Light Path Diagnostics	Blade server, processor, memory, power supplies, blowers, switch module, management module, hard disk drives and expansion card

Limited warranty and support[4]	3-year onsite limited warranty
External storage	Support for IBM TotalStorage solutions (including FAStT and NAS family of products)
Operating systems supported	Microsoft Windows Server 2003, Microsoft Windows 2000 Server/Advanced Server, Red Hat Linux, SuSE Linux, Novell Netware

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Product Table Footnotes:
1) When referring to storage capacity, GB means 1,000,000,000 bytes and TB means 1,000,000,000,000 bytes . Accessible capacity is less.
2) Using 2GB DIMMs
3) Varies by model
4) **Visit *www.ibm.com/pc/safecomputing* periodically for the latest information on safe and effective computing.** For a copy of the IBM Statement of Limited Warranty, call 1 800 426-7378. Telephone support may be subject to additional charges. For onsite service, IBM sends a technician after attempting to diagnose and resolve the problem remotely.

IBM eServer xSeries TCO Calculator

Brought to you by IBM, the TCONow! Tool, created by the CIOView Corp., provides IT decision-makers with a simple means of comparing the TCO for xSeries servers versus competing products, for example, Dell and Compaq servers. To familiarize yourself with the tool, and the various components of a TCO analysis, you can review a prepared assessment for the xSeries on server consolidation, or you can request a customized assessment for your specific needs. To learn more about TCONow! refer to: http://www-1.ibm.com/servers/solutions/serverconsolidation/tco/

Learn more about the xSeries family of servers running on Intel architecture at:
http://www.pc.ibm.com/us/eserver/xseries/

Glossary for Business Case Outline

I. Need Opportunity

This section explains why the product or service is needed, including productivity and cost issues.

A. Tangible goals or objectives

The purpose or desired end-result. In the business case, this section identifies what company needs, problems or issues the proposed product or service can address.

B. Scope

This defines the reach or extent of the topic or idea being discussed. In the business case, this section identifies the potential impact of the proposed product or service on existing systems and staff. Potential benefits and risks associated with project deployment are also identified.

II. Stakeholders

Those individuals who have a share or interest in a particular endeavor or organization. In the business case, this section identifies those individuals and departments within the organization that will be directly and indirectly affected by the product or solution being discussed in the business case.

A. Primary

The stakeholders who directly realize efficiencies, revenues and/or a competitive advantage are considered primary stakeholders. Those departments or individuals implementing the new systems and services are also primary stakeholders.

B. Secondary

The secondary stakeholders are those who depend on, or will be affected by, the actions of the primary stakeholders.

III. Alternatives

The Alternatives section weighs the various routes to reaching the specified goals and fulfilling the needs of the stakeholders.

A. No Change

This section observes the costs and benefits of not addressing the issue(s) outlined in the Needs/Opportunity section.

1. Cost

The price to be paid or resources to be expended. Measured by identifying and quantifying the price or resource expended (example is time consumed or money spent).

2. Return on Savings

Measure of income the company is able to earn from money not spent or expended. In this particular section, the savings realized by not implementing the product or service is weighed against:

- Whether the issue to be addressed is expected to become a larger or smaller problem

- The length of time it would take to break even or to see a positive return with the No Change alternative

3. Risks

Expected loss. Risks may include issues detailed in the Cost section, as well as intangible risks, such as employee annoyance with current system, or morale issues.

B. Delay Procurement/ Implementation

This option explores the costs and benefits of implementing a solution at a future date, rather than as soon as possible.

1. Costs

While there are no direct purchasing costs in the short term, deferring implementation can potentially create similar issues found in the Cost section for the No Change alternative.

2. ROI

Income earned from company assets. In this section, the short-term savings of not implementing the product or service are weighed against the cost of waiting to determine the break-even point and length of time to see a return on investment.

3. Risks

This section explores the likelihood that serious problems would arise while waiting to implement the new product or service and cost the firm would need to absorb, if problems did occur.

C. Outsourcing

Have the work done by an outside service provider or manufacturer, usually to cut costs or realize greater efficiencies.

1. Costs

For this section, examples would include upfront and monthly/annual costs to be paid to vendors, the cost of making existing systems and/or processes compatible and the cost of the company's implementation time.

2. ROI

To evaluate the ROI for this alternative, costs and benefits of the other alternatives must be examined and compared with outsourcing's costs and benefits.

3. Risk

The potential weaknesses of the service provider/vendor's solution and additional costs that may be incurred because of those weaknesses are examined in this section.

D. Build

Developing the product or service in-house.

1. Costs

The costs in developing include the organization's time to evaluate, design, build and operate the product or service.

2. ROI

The ROI result weighs the cost of using in-house resources to build and maintain the product/service, plus the initial capital cost against the savings realized from the other alternatives.

3. Risks

This includes the quantifiable likelihood of loss, the possibility that the project will go unfinished or take extra time because of unforeseen or competing priorities.

E. Buy

To purchase outright and have the company manage the product or service on their own.

1. Cost

The charges in buying a product/service, such as upfront monthly/ annual costs paid to the vendor, the cost of implementation time and others.

2. ROI

The ROI is the cost of buying, weighed against the relative savings from other alternatives.

3. Risks

Risks may include the possible losses that may be incurred from the purchased product or service and unforeseen maintenance and upgrade costs.

IV. Business Values for the Alternatives

A. ROI

1. Tangible returns

These are the measurable or quantifiable benefits from each alternative.

2. Incremental revenue

The additional revenue or income that may be earned from each alternative is discussed in this section.

3. Return on Capital

The income that may be earned or savings that may be realized from the investment (in this case, the proposed product or service).

4. Cost of Capital

The cost of the funds used to finance the company's investment (such as interest). The goal is to invest in assets that offer a higher return than the cost that may be incurred to finance those assets.

B. Customer Satisfaction

Measure of how the company is able to meet or exceed customer's and/or stakeholders needs and expectations.

C. Resources and Roles

Defines the in-house and/or outsourced resources needed for each alternative.

D. Timetable/Time-to-market

Based on each alternative, the time line to launch the product or service is planned.

V. Recommendation

A. ROI

This section includes the

- Costs and savings in terms of tangible returns
- Incremental revenue
- Return on Capital
- Short-term costs
- Long-term costs

B. Customer Satisfaction

Criteria to determine customer satisfaction may speak to the needs of Company's internal stakeholders, as well as external customers. However, the criteria may be unique to each business case.

C. Resources and Roles

This section designates the in-house and the outsourced resources needed for each alternative, if applicable.

D. Timetable/Time-to-market

Based on each alternative, the time line to launch the product or service is outlined.

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