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WHITE PAPER

The ROI of Windows and Linux Server Consolidation on IBM eServer iSeries: Analysis and Case Studies of Small and Medium-Sized Businesses

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IN THIS WHITE PAPER

In the highly competitive worldwide market, many information technology (IT) managers find themselves having to do more work with fewer resources, in terms of both personnel and budget. Demand for services provided by Web-enabled server platforms continues to increase, along with rapid growth of distributed, small x86 servers (formerly called Standard Intel Architecture Servers [SIAS] by IDC) running Microsoft Windows and Linux operating systems. At the same time, IT's ability to keep up with the growing demand and manage the server farms that have resulted is diminished. In such a climate, the ability to measure return on investment (ROI) has become an important indicator for IT decision makers, including IT managers, chief information officers, and chief financial officers. This is particularly true in highly competitive industries, such as manufacturing. As a result, many organizations are choosing to consolidate their IT environments, recentralizing technology, applications, and processes into a more streamlined and consistent environment.

Consolidation projects are often launched in response to the proliferation of x86 servers that has occurred in most organizations over the past decade. While inexpensive to acquire, through purchase or lease, these systems have often proven to be costly to maintain, difficult to manage in a consistent way, and, in many cases, less reliable than more scalable server platforms depending on the workloads being run. After realizing some short-term benefits that were associated with purchasing small server systems that have low acquisition costs, many organizations have found that for more challenging workloads they may need to duplicate systems, applications, databases, and processes. These systems, many of which were installed in small form factors with two to four processors, also were unable to share information effectively, at a time when users began to demand universal and uninterrupted access to a unified body of corporate information. The result is an IT environment that is expensive to maintain and does not effectively utilize the organization's resources.

More recently, the mix of operating systems running on server systems has begun to change, due in part to the end-of-life product retirement of Microsoft Windows NT Server 4.0 by Microsoft, the consolidation of NT Server 4.0 and Novell NetWare workloads that were deployed in the 1990s as file/print servers and email servers that supported local area networks, and the emergence of Linux as a new server operating environment for infrastructure-related and Web-related workloads. As a result of these business and technology forces, many organizations are at a decision point, having to evaluate alternatives to their x86-based server farm deployments.

Note: In the previous study, IDC referred to SIAS, which were servers based on Intel-compatible IA32 microprocessor architecture. Such servers include 32-bit servers that are based on Intel microprocessors (i.e., Pentium and Xeon) and on AMD microprocessors (such as Athlon). The new IDC Server Taxonomy, which went into effect this spring, now refers to the same category of servers as "x86 servers."

CONSOLIDATING MULTIPLE WORKLOADS ON THE iSERIES PLATFORM

The ability of the IBM eServer iSeries platform to support multiple operating system environments on a single server that can be managed by a small number of system administrators has made it an attractive consolidation platform for organizations that wish to lower their total costs while continuing to support the workloads they need to support their business. Historically, running multiple operating systems has been expensive because each operating system required its own hardware platform, infrastructure software, storage, network connectivity, and management resources.

Consolidating the workloads from multiple Linux servers or Microsoft Windows servers onto a single iSeries platform not only can lower a customer's total cost of ownership but also can improve the overall manageability of the multiple computing environments by creating a single, consistent approach to systems management and console-based control of the server infrastructure. In some cases, organizations can merge the back-office and infrastructure functions from multiple business units into one consolidated solution. This creates a common environment for lower-level administrative tasks, which lowers costs and frees up administrative staff to work on higher-level tasks that deliver greater strategic value.

IDC RESEARCH STUDIES ABOUT iSERIES USE

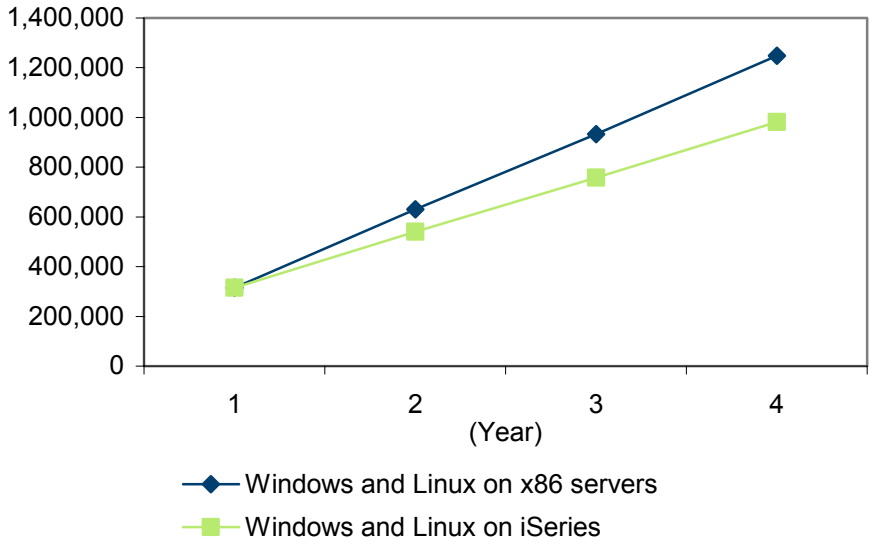
Two years ago, an IDC study of enterprise resource management workloads showed that the iSeries offered significantly lower total cost of ownership (TCO) than both Unix and x86 server platforms. In the previous research, IDC compared Unix and x86 server environments with a more traditional type of iSeries deployment. These iSeries servers ran the IBM OS/400 operating system, included an integrated database, and were configured to support a specific business application. The approaches of these two studies are quite different: The current ROI study looks at small and medium-sized businesses that are running workloads on multiple operating system environments, including Windows and Linux, within the same iSeries system using IBM eServer xSeries technology to run Windows and/or logical partitioning to run Linux. (Please refer to customer case studies below for more details about IT deployments at some of the six sites included in this ROI study.) As shown in Figure 1, iSeries continues to deliver lower costs than x86 servers, even when deployed in a multiple operating system configuration.

Figure 1 compares the cost of ownership of an iSeries solution with that of an x86 server solution when running a Windows or Linux computing environment. This comparison includes costs for hardware, software, services, and IT support personnel that were required to develop, deploy, and maintain the total server solution over time. Further details are provided in Table 2.

Costs that are associated with iSeries servers and with x86 servers begin to diverge fairly quickly, as shown in Figure 1, and the gap continues to expand over the three-year period that was studied. This significant TCO advantage is the basis for the very strong ROI performance that was demonstrated by the iSeries in this study. Over time, the collective impact of a variety of costs adds up, including costs that are related to application development, software maintenance, downtime, and IT personnel. This means that IT managers cannot judge the impact of x86 server deployment by acquisition costs alone, because total costs accumulate over time.

FIGURE 1

COST COMPARISON OF WINDOWS AND LINUX ON X86 SERVERS VERSUS iSERIES SERVERS (PER 100 USERS)



Note: Costs include hardware, software, services, and IT staff to support.

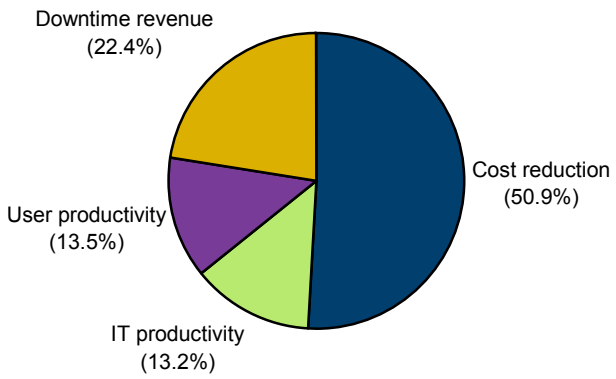
Source: IDC, 2003

In all, IDC studied six companies that had deployed iSeries servers running IBM OS/400 as workload-consolidation platforms. These iSeries servers gathered workloads from many, smaller x86 servers and supported these workloads by running Microsoft Windows on integrated Intel-based technology and by running Linux in iSeries logical partitions (LPARs). When redeployed on the iSeries platform, these Windows workloads and Linux workloads could be more effectively and efficiently managed — leading to considerable ROI savings. Importantly, much of the savings came in the form of actual cost reduction, as shown in Figure 2.

Since an iSeries implementation can demonstrate such a direct impact on bottom-line costs, the business benefits of its deployment are an important part of its value proposition. Many organizations require projects to be justified on the basis of clear-cut financial arguments rather than on potential improvements in productivity and availability, and decision makers in these situations look for demonstrable, quantifiable cost reduction.

FIGURE 2

THREE-YEAR SAVINGS (PER 100 USERS)



n = $542,728

Source: IDC, 2003

KEY FINDINGS OF THIS STUDY

The cost savings delivered by deploying iSeries servers in workload-consolidation environments are dramatic, especially when compared with operating similar Linux workloads and Windows workloads on distributed x86 servers. Specifically, the key findings include the following points:

- IDC found a three-year ROI of 213.9%, using averages of results found across all six iSeries sites.
- Consolidation on iSeries servers enables these organizations to continue to expand the automation of their businesses by integrating the Windows and Linux computing environments.
- The investment in the iSeries platform began to pay off relatively quickly, with a payback period of 261 days — slightly less than nine months.
- The iSeries implementations resulted in total three-year savings of $542,728 per 100 users to the organizations that were interviewed in this IDC study. Average annual savings are $183,716 per 100 users.
- Significant savings are realized through productivity improvements and a decrease in lost revenue, both associated with higher availability. Compared with x86 server environments running Windows and Linux, the iSeries solutions, including those that leveraged xSeries coprocessors, reduced the combined downtime associated with Windows and Linux servers by more than 90%.

IDC ANALYSIS OF DATA GATHERED FOR THIS ROI STUDY

The following sections provide detailed information about the results of this IDC research study, which examined six enterprises (four manufacturing companies, one hospitality company, and one services company) that had deployed iSeries server platforms as part of their strategy to consolidate their servers (see Table 1). All of the sites that deployed the iSeries servers were small and medium-sized business units, which means that they had fewer than 1,000 employees at the site. These iSeries servers, which were deployed since CY01, ran a mix of workloads. Two of the IT respondents had already deployed mixed computing environments in which all three operating environments — IBM OS/400, Microsoft Windows, and Linux — were present.

TABLE 1

STUDY PARTICIPANTS

Category	Data
Number of employees	725
Annual revenue ($M)	270
IT staff	11
Workloads	10
Number of servers before implementation	34
Number of servers after implementation	20

Source: IDC, 2003

The workloads included iSeries-specific workloads that ran under the iSeries OS/400 operating system and other workloads that ran under the Linux operating system or under the Microsoft Windows operating system. Both Linux and Windows can run within the iSeries server. These workloads can be managed by the iSeries' built-in Navigator system management software allowing a small number of IT system administrators to manage multiple workloads, running under multiple operating systems, from a single system console. (See iSeries Technology sidebar.)

The iSeries' impressive ROI is driven by cost reduction in several essential areas, including the following:

- Reduced IT payroll costs
- Reduced outsourcing costs
- Less spending on new server hardware and software

By consolidating multiple workloads onto the iSeries platform, the organizations surveyed realized benefits in three other important areas:

- Increased IT staff productivity
- Increased user productivity
- Decreased revenue lost due to downtime

The following sections describe the findings of the ROI research, and they include IDC analysis about the meaning of the ROI results associated with the IT sites that deployed the iSeries servers. Each section is associated with a data table, as shown below. Please refer to the Methodology section for explanation of terms and how the research was conducted.

ROI ANALYSIS AND TOTAL COST SAVINGS OF iSERIES CONSOLIDATION SOLUTIONS

When cost reduction and productivity increases are considered, an iSeries consolidation solution results in a three-year ROI of 213.9%, as shown in Table 2.

TABLE 2

THREE-YEAR RETURN ON INVESTMENT FOR SERVER CONSOLIDATION (PER 100 USERS)

Category	Data
Annual cost savings	$183,716
Net present value (NPV)	$302,052
Total investment	$141,227
ROI = NPV/investment	213.9%
Payback = (investment/first-year cash flow)	261 days
Discount rate	12%

Source: IDC, 2003

The iSeries begins to deliver on its savings promise within the first year of deployment — a phenomenon that continues over three years — which gives impetus to a strong ROI argument for an IT server purchase. As most organizations continue to approach IT investments cautiously, especially during periods of global economic competitiveness that drive a strong focus on costs, identifying a solution that demonstrates a quantifiable positive effect on cash flow is a valuable discovery for the IT evaluation committee and for the senior business management that approves IT purchases.

When cost reduction, user productivity, and reduction in downtime are considered, compared with other server systems, the iSeries implementations result in total three-year savings of $542,728 per 100 users to the organizations in this IDC study (see Table 3).

TABLE 3

TOTAL THREE-YEAR SAVINGS ANALYSIS (PER 100 USERS) ($)

	Year 1	Total	Average	Share (%)
Cost reduction	108,846	275,915	93,398	50.9
IT productivity	24,288	71,750	24,288	13.2
User productivity	23,200	73,350	24,829	13.5
Downtime	41,201	121,714	41,201	22.4
Total savings	197,534	542,728	183,716	100
Investments	41,720	141,227	47,076	

Source: IDC, 2003

Average annual savings, across all elements, are $183,716 per 100 users. For the same three-year period, the investment made by the organizations studied is $141,227. The difference between investment and savings is testimony to how the iSeries delivers its overall ROI.

To quantify overall ROI, IDC looked at cost reductions, productivity gains, and impact on revenue. Cost reductions are "hard" cost savings, such as those associated with payroll, outsourcing, and the acquisition of new hardware and software. The figures for cost reduction represent a reduction in actual cash outlay over a three-year period, as reported by IT managers. The cost reductions are fairly consistent across the organizations surveyed.

Savings calculations also include "softer" costs, such as those associated with productivity — the improved capability of both IT staff members and end users to do their jobs. Finally, IDC also measured the savings that were realized from the reduction in the revenue that would otherwise be lost to server downtime. The cost savings that are associated with improved user productivity and with the revenue impact of new system deployments vary widely by company because they are dependent on the internal structure and processes of a particular organization.

iSERIES LEADS TO REDUCED COSTS

The companies that were interviewed derived half of their savings from reducing the costs for purchasing, deploying, operating, and maintaining their server environments. Many were expanding the functions of their servers; therefore, consolidating onto iSeries reduced (or eliminated) the need to purchase and deploy new servers. On average, these companies were able to forgo the purchase of five x86 servers for

each iSeries deployed. Having fewer server hardware and software platforms leads to lower staffing requirements and more efficient training and maintenance.

Table 4 presents the cost reduction involved.

TABLE 4

COST REDUCTION (PER 100 USERS) ($)

	Year 1	Three-Year Total	Three-Year Average
Outsourcing	1,963	5,700	1,929
Payroll savings	40,061	124,428	42,119
Server hardware/software	66,822	145,787	49,349
Purchase	24,964	24,167	8,181
Lease	37,733	109,583	37,094
Annual training	1,148	3,391	1,148
Annual maintenance/support	2,977	8,646	2,927
Total	108,846	275,915	93,398

Source: IDC, 2003

Among the organizations surveyed, IDC identified a total cost reduction of $275,915 per 100 users over a three-year period. As reflected in the short payback time for the iSeries investment, the organizations reduced costs by $108,846 per 100 users in year 1. The annual average decrease in costs is $93,398 over the three-year period. (Please refer to the Methodology section for an explanation of how this data was gathered and analyzed by IDC.)

REDUCED OUTSOURCING COSTS

Many organizations outsource some or all of their ongoing IT functions to external firms. This is done in order to gain access to additional person-hours, flexibility in scheduling, or specialized IT expertise. The iSeries customers in this study were able to nearly eliminate their reliance on outsourced IT services after implementing the iSeries solutions. They reduced outsourcing costs by $5,700 per 100 users over the three-year period, which amounts to an average of $1,929 per 100 users annually. By reducing their reliance on external IT resources, organizations can gain better control over their costs and over their deployment of computing resources. Some of the organizations surveyed were able to bring all of their spending in-house, while others significantly lowered their spending on external resources.

REDUCED PAYROLL COSTS

The lower payroll costs shown in this IDC study result from higher efficiency and productivity among IT staff members. Greater IT efficiency lowers cost in several important ways. The most obvious of these is the need to deploy fewer IT staff

members in order to operate the overall computing environment, compared with maintaining large numbers of distributed servers. In addition, systems such as the iSeries, which are more easily managed than dozens of small, distributed servers, allow the end-user base to grow as business needs change. This can be done without requiring customers to hire additional IT staff, including programmers and system administrators, to maintain consistent levels of service. The scalable iSeries server allows IT managers to have greater flexibility in deploying available computing resources because IT staff can be reallocated to serve different needs, including support for more varied workloads.

One of the key indicators of IT efficiency is the number of users that can be supported by each full-time equivalent (FTE) IT staff member. The more users supported by each FTE, the lower the costs associated with maintaining that single IT staff position. In this study, organizations found that the number of users supported per FTE increased by 24% after implementing the iSeries solution, which led directly to a decrease in IT payroll costs. IDC notes that the six enterprises that were studied as part of this ROI analysis are headquartered in the United States or Western Europe. However, IDC recognizes that payroll costs vary by geographic region, which means that the cost savings and ROI payback period would be slightly different within different regional economies worldwide.

The iSeries customers surveyed reduced their payroll costs by a total of $124,428 per 100 users over a three-year period. The iSeries solutions began to deliver cost savings in short order, resulting in a reduction in payroll costs of $66,822 in the first year. On average, the organizations surveyed saved $42,119 annually per 100 users over a period of three years, compared with distributed server computing environments running similar workloads.

REDUCED SERVER HARDWARE AND SOFTWARE SPENDING

Organizations look to consolidation of workloads to streamline their server environments, including hardware, associated software, and related costs like maintenance, support, and training. The iSeries workload-consolidated environments in this study provided savings across all of these areas, leading to a total hardware/software cost reduction of $145,787 per 100 users over a three-year period and amounting to an average reduction of $49,349 per year.

The iSeries users realized a cost reduction in leases and purchases of new equipment as well as in maintenance and training. IDC studied a combination of sites, some of which leased equipment, some of which purchased equipment, and some of which did both. Thus, the cost savings reflect an average of savings across both the purchased and leased server installations.

The iSeries has a long history of being a well-integrated solution that is stable; easy to install, maintain, and upgrade; and well supported by its dedicated value-added resellers (VARs). IBM has built on its strengths in these areas to add software capabilities that make the system more easily managed by providing system administrators with a consistent, graphical system management interface. IBM has also focused on enhancing the system's flexibility through the management of multiple workloads and through the support of growing and changing applications through logical partitioning and capacity on demand. These server features allow organizations to extend their iSeries solutions to address new business requirements without having to acquire new systems to support the growing workloads.

Maintaining a consistent hardware environment not only helps to reduce direct costs, but it also can raise availability and productivity. These benefits are reflected in the increased user and IT productivity as well as in the decrease in revenue that would otherwise be lost to system downtime (see below for a more detailed discussion of

the impact of downtime on costs and the finding that deploying iSeries servers reduced the amount of downtime that was experienced by IT organizations).

iSERIES LEADS TO INCREASES IN USER AND IT PRODUCTIVITY

By consolidating to an iSeries server solution, the organizations surveyed by IDC saw productivity increases among both IT staff and end users following deployment.

In addition to measuring IT efficiency, as quantified by the number of users that can be supported by each IT staff member, this study also looked at the productivity of the IT resources that were deployed. This was done by capturing the amount of time that IT staffers spent on specific tasks before the iSeries consolidation and then afterwards. The amount of time saved, and the associated annual savings that resulted, are shown in Table 5.

TABLE 5

IT PRODUCTIVITY (PER 100 USERS)

	Time Spent Before (%)	Time Spent After (%)	Monthly Savings (%)	Annual Savings ($)
Desktop support (desktop system setup/configuration, desktop software install/upgrades, and hardware/software asset management)	1	0.2	83	1,321
Server support (server OS system support/tuning and server setup and configuration)	1	0.6	66	1,794
Operations (disk, file, and database management; backup/archiving; running batch jobs; file transfers)	3	1.1	74	5,158
Business support (capacity planning, network performance management, and applications development/integration/management)	39	47.4	1	675
User support (user administration and user support/helpdesk)	5	1.2	79	7,449
Availability (network troubleshooting/repair, addressing security breaches, addressing virus outbreaks, responding to downtime, travel, and the mean time to repair [MTTR]).	4	0.4	92	7,480
Total			22	23,877

Source: IDC, 2003

As Table 5 shows, the study identified a 22% monthly time savings across the different elements of IT support and an associated annual savings of $23,877 per 100 users supported.

The figures on IT productivity, as computed for this study, also reveal that implementing the iSeries server solutions allowed the organizations that were studied to shift the deployment of their IT resources to high-value tasks. Prior to the iSeries implementation, IT staff personnel were spending 39% of their time on tasks that are categorized as "business support." These tasks included capacity planning, network performance management, and application development, integration, and management. After the implementation, the IT staffers spent 47.4% of their time on these functions — adding value to the organization's current investment in IT personnel.

With less time spent on responding to downtime, troubleshooting the systems and network, installing new systems and software, and performing routine maintenance, IT staff members are better able to work on the applications that drive the organization's business and to focus on better overall management of the IT environment. This helped those IT organizations that deployed the iSeries servers to deliver a higher level of service, one that has a greater impact on the organization's bottom line. This shifting of work from low-value tasks to high-value tasks can also improve employee morale and career satisfaction among IT staff members by allowing them to focus on more strategic work.

As described in this paper, the term *downtime* means that the applications that run the business are not available to the end users that depend upon those business-critical applications in order to get their daily work accomplished. Indeed, downtime can slowly sap an organization of its business momentum because valuable time is devoted to restoring the business systems to normal operational levels. This is valuable time that could and should be productive for end users, but it is lost to extended coffee breaks, early lunches, and prolonged waits for computer services to return online. Thus, the provision of highly available applications and data to end users is a top priority for most IT organizations. This study also looked at the impact that iSeries support for high availability of business applications had on end users' productivity (see Table 6).

TABLE 6

USER PRODUCTIVITY (CALCULATED PER 100 USERS)

	Before	After	Change (Actual)	Change (%)
Hours per month	8.2	0.8	-7.4	-90.5
Internal users affected (%)	22	20	-2	-9.1
User downtime hours per month	1.8	0.2	-1.6	-91.4
Productivity loss factor (%)	55	55		
User productivity	0.98	0.08	-0.9	-91.4
Total hours lost/month	0.98	0.08	-0.9	-91.4
Annual hours lost	11.82	1.02	-10.8	-91.4
Availability (hours)	1,898.18	1,908.98	10.8	0.6

Source: IDC, 2003

User productivity is difficult to quantify as actual cost savings, but it has a direct impact on how the solution delivers value to the organization and translates into ROI. The increased availability has a significant impact on user productivity. Before consolidating workloads on the iSeries platform, the IT organizations studied by IDC experienced 8.2 hours of downtime per month. After the consolidation was accomplished, the amount of downtime per month dropped to 0.8 hours, a decrease of 90.5%. This represents a dramatic turnabout in business efficiency.

From the amount of system downtime, IDC calculates the amount of user downtime, and the subsequent impact of that downtime on the users' productivity. The assumptions made as part of this analysis are that not all forms of downtime affect all users and that downtime does not affect 100% of a user's productivity because those employees may use downtime to work on tasks that do not require system access, such as doing paperwork or making phone calls.

This study shows that user downtime hours dropped from 1.8 hours per month in the distributed server environments to 0.2 hours per month in the iSeries environments. When users' ability to work on noncomputer tasks is taken into account, the resulting user productivity downtime drops to just 0.08 hours per month. On an annual basis, the loss of user productivity drops from 11.8 hours to just 1.02 hours, which represents an impressive decrease of 91.4%.

iSERIES DECREASES THE IMPACT OF DOWNTIME ON REVENUE

System downtime affects organizations in different ways. Some organizations may experience significant lost revenue when systems are unavailable, while others have a higher tolerance for downtime depending on the type of business, the applications that are running, and how the systems are used. To adjust for these differences, IDC discounts the amount of downtime when figuring the impact on revenue. In this particular study, the average loss per hour of downtime is nearly $44,000. This figure is rather high for manufacturers, but these companies were engaged in process manufacturing, which tends to have a high sensitivity to downtime, based on years of IDC survey-based research.

In addition to the hours and incidents per month of downtime, IDC captured two other important downtime components: the average loss of revenue per hour of downtime and the percentage loss of revenue (or percentage loss of productivity for user productivity calculations). These averages allowed IDC to factor in the reality that downtime hours are not the same for all IT organizations and that the impact of network downtime from 2:00 p.m. to 3:00 p.m. on a Monday is not the same as the impact of network downtime from 2:00 a.m. to 3:00 a.m. on a Saturday. Finally, because we are estimating revenue impact, we chose to reduce the revenue impact of the downtime-related effects to the ROI calculation by 50%.

As shown in Table 7, the iSeries dramatically reduces the amount of revenue that is lost to downtime among the IT organizations that were studied.

TABLE 7

DOWNTIME IMPACT ON REVENUE (CALCULATED PER 100 USERS)

	Before	After	Change (Actual)	Change (%)
Hours per month	8.2	0.8	-7.42	-91
Incidents per month	5.8	0.4	-5.33	-93
Servers affected (%)	12.3	12.2	-0.1	-1
Server downtime hours per year	12.1	1.1	-10.93	-91
Revenue loss factor (%)	32	32		
Revenue loss/hour ($)	43,799	43,799		
Revenue loss due to downtime ($)	528,393	49,779	-478,614	-91
Availability (%)	99.862	99.9870	0.12	0

Source: IDC, 2003

The organizations in this study experienced an average loss of more than $43,700 per hour when their systems were down. The significant improvement in availability that was offered by the iSeries solutions led to a 91% decrease in lost revenue. As Table 7 indicates, organizations were losing $528,393 per year due to downtime before implementing the iSeries solutions, which consolidated workloads that had been running on multiple, distributed servers. After an iSeries deployment for server-consolidation purposes, this loss dropped to $49,779 per year.

CASE STUDIES

Of the six IBM iSeries customers interviewed in this ROI study, four are discussed here in more detail. The organizations — Amelia Island Plantation, Bristol-Myers Squibb Australia, Huhtamaki, and Brenntag Nordic (Denmark) — demonstrate how a significant ROI can be realized by consolidating Linux and Windows environments by implementing Linux on iSeries or Windows on iSeries and xSeries.

AMELIA ISLAND PLANTATION

COMPANY OVERVIEW AND BUSINESS ENVIRONMENT

Amelia Island Plantation is a 1,200-acre resort and conference center located on Florida's Atlantic coast. The property includes three golf courses, a spa and fitness center, conference facilities, and more than 600 guest rooms. The privately held company has more than 1,000 employees, about 25% of whom rely on timely access to corporate data as part of their daily jobs.

Amelia Island Plantation relies on its online reservations system to keep its business running smoothly. The system handles all bookings for the resort — whether they are made directly or through travel agents — as well as scheduling of special services and events for guests. Both the network and the Web site are critical elements in making Amelia Island Plantation's reservations system work. If the Web site were to become unavailable, potential customers and travel agents would not be able to make online reservations or to search the site for information. That is why ensuring high levels of uptime for its IT systems is a priority for the resort.

THE ROLE OF THE iSERIES SOLUTION

Amelia Island Plantation was faced with the dual challenge of trying to expand and to update its IT environment while simultaneously managing costs. It needed to replace outdated hardware and implement new reservation software to support its spa facilities. The company also wanted to improve the overall performance of its servers to support the increasing number of business-critical applications it was installing. While it needed systems that could support the expansion, Amelia Island Plantation also wanted to avoid hiring additional IT staff members.

Amelia Island Plantation decided to consolidate its Microsoft Windows 2000 and Windows NT servers onto one iSeries system. In moving the Windows workloads onto xSeries servers integrated with the iSeries, the company hoped to reduce or eliminate its use of disparate hardware and software technologies and standardize on a single IT system platform for implementing new business applications.

FACTORS CONTRIBUTING TO ROI

Amelia Island Plantation reported that it has achieved significant cost savings in terms of its acquisition of new hardware and software and IT staff costs. The company was able to avoid hiring one full-time equivalent IT staff position. In addition, the company estimates that it did not have to acquire six new servers, which resulted in a reduction of leasing costs that amounted to $90,000 over a period of three years. Because the company avoided acquiring six new servers, it also saved $54,000 in software costs, including licensing costs, over a period of three years. Specifically, by using the built-in iSeries Navigator management software, Amelia Island Plantation avoided a $4,500 upgrade to its previous management solution.

Improved backup procedures can reduce cost and enhance business effectiveness by decreasing system downtime and by making it easier to recover from a system failure. Amelia Island Plantation reduced the cost of backup and recovery procedures, including the elimination of a full-time equivalent IT staff position. At the same time, it was able to ensure that all of the Windows business-critical data was backed up in a consistent way and that there was no single point of failure.

According to IT managers, in its first eight months of using the iSeries consolidated solution, Amelia Island Plantation experienced no downtime incidents. This is a significant drop from the 12 hours of downtime that had affected users in its Windows server environment during the previous year of operations. The company estimated that downtime costs $2,000 per hour, meaning that a decrease in overall downtime contributes to ROI.

BRISTOL-MYERS SQUIBB AUSTRALIA

COMPANY OVERVIEW AND BUSINESS ENVIRONMENT

Bristol-Myers Squibb Australia (BMS Australia) is part of the worldwide medicines group of the Bristol-Myers Company. In Australia, the company has research, product development, and manufacturing and distribution facilities that serve Australia as well as export markets. The Australian facility houses 1 of 14 worldwide research hubs for Bristol-Myers. Estimated annual revenue is $250 million (Australian). The company has approximately 700 employees in Australia; at least 70% of those employees rely on the use of its IT systems.

THE ROLE OF THE iSERIES SOLUTION

As a manufacturer, BMS Australia relies heavily on its network, estimating that nearly all of its revenue is tied to its systems in some way. The company found that its growth was constrained by physical space limitations. It did not have the real estate available to add additional Windows NT servers within its existing datacenters. Expanding the available computer room space would have cost up to $500,000 (Australian). Instead, BMS Australia chose to consolidate its Windows NT servers onto the xSeries servers integrated with the iSeries platform.

FACTORS CONTRIBUTING TO ROI

Prior to consolidation, BMS Australia had 22 servers of different types running Windows NT. It consolidated these onto only 11 x86 servers inside one iSeries server. In doing so, the company gained capacity and performance while reducing the complexity of managing its IT environment.

Consolidating Windows NT servers onto an iSeries solution reduced downtime and its associated costs. Before the consolidation, BMS Australia experienced 2.5 hours of downtime per month. After consolidation, it experienced just 0.001 hours per month. In the simplified environment, the time needed to identify and fix problems also dropped considerably, from 120 minutes to 30 minutes.

BMS Australia describes direct and indirect impacts on its bottom line as a result of the consolidation effort. There are obvious savings that are related to reducing the amount of revenue lost to downtime, estimated at $100,000 per hour. The company also says that consolidation has allowed IT to align much more closely with the business groups that drive the company's revenue. As a result, there is a potential upside in increased revenue from expanded business opportunities.

HUHTAMAKI

COMPANY OVERVIEW AND BUSINESS ENVIRONMENT

Huhtamaki is a manufacturer of paper and packaging products for consumer and food service markets. Based in De Soto, Kansas, the company is a division of Finland-based Huhtamaki Oyj. Its 1,700 end users at 11 sites worldwide must be able to access its IT systems. This study considered the company's sites that are located in the Americas.

After growing through numerous acquisitions and implementing applications to support its expanding business, Huhtamaki found itself with a proliferation of x86 systems running Microsoft Windows, resulting in a total of 80 servers at the 11 different sites. This presented a number of challenges to business effectiveness and efficiency. The company was spending a considerable amount of time on system

administration, due to the large number of servers at the IT site. The servers also consumed a significant amount of floor space, and Huhtamaki did not want to add additional datacenter capacity and its associated costs.

The company also faced a growing backup window that was costly and that diminished the ability to recover from a failure. At times, the backup window approached 12 hours in order to back up all of the 80 servers, prior to consolidation. Huhtamaki operates its worldwide manufacturing plants 24 hours a day, and any downtime is costly, causing expenditures of as much as $1 million to $2 million per hour. With such a recognizable potential for both reducing costs and improving service levels to its customers, Huhtamaki considered the iSeries consolidation solution.

THE ROLE OF THE iSERIES SOLUTION

Huhtamaki chose to implement a solution that comprises iSeries servers that support its OS/400 applications running in LPARs along with Windows applications that are running on the Integrated xSeries Server Intel-based adapter cards. Its goal in consolidating was to reduce the costs associated with maintaining disparate equipment by bringing all the workloads together to be managed on a single server system.

FACTORS CONTRIBUTING TO ROI

The company estimates that it reduced costs by $365,000 per year and improved the availability of its systems. Cost reductions were seen in staffing with the elimination of one full-time equivalent IT staff position. Huhtamaki anticipates that it will be able to eliminate one or two more positions. Prior to the consolidation, servers had to be administered by onsite IT staffers. After the consolidation took place, the company was able to make sure that 75% of server administration was done from a central location. Before the consolidation project, travel expenses for IT staff were approximately $500,000 per year. Huhtamaki now anticipates cutting that figure in half.

Additional cost savings were realized through decreased spending on hardware and software. Huhtamaki was able to expand capacity within the iSeries platform, eliminating the need to add additional server machines. The company estimates that it saved between $30,000 and $40,000 in leasing costs for new hardware over a three-year period. The company not only reduced spending for new products but also lowered its support and maintenance costs by having fewer server machines to maintain.

Streamlining the server environment also led to a reduction in the time spent on installing and configuring machines. Huhtamaki estimates its IT staff members spent two days per server per year on configuration and setup prior to the consolidation. After consolidation, they spent 20 minutes per server per year. This is a significant reduction in IT staff time, when both the reduction in time per server and the overall reduction in the number of servers are considered.

Huhtamaki improved efficiency and reduced the costs associated with backups. Before consolidating the workloads of its 40 x86-based servers onto the iSeries platform, it had 5–20 servers located at each of its 11 plants, for a total of 80 servers. By reducing the number of servers to 40 and using iSeries backup software, the company estimates that it saves about $30,000 per year compared with its preconsolidation costs.

Huhtamaki realized significant savings by reducing the amount of downtime it experienced in its x86-based server environment. The number of downtime incidents per month dropped from 15 to 2.5. The number of hours per month that users are affected by downtime decreased from 12.5 to 4.5. By eliminating many of its widely dispersed Windows servers, Huhtamaki also saw the reliability of its network improve following the consolidation. IT staffers spend considerably less time on network troubleshooting and on repair after the consolidation than they did prior to the implementation of the iSeries solution.

The reduction in downtime associated with the iSeries solution also had a significant impact on the company's revenue. Huhtamaki estimates its lost revenue from downtime to be $1–2 million per hour. The business benefits are clear: Reducing downtime hours by nearly 65% greatly improved Huhtamaki's bottom line.

BRENNTAG NORDIC (DENMARK)

COMPANY OVERVIEW AND BUSINESS ENVIRONMENT

Brenntag Nordic (Denmark) is a global distributor of chemical products. Its business model is built around its ebusiness systems, so reliability and availability are important. Its most recent annual revenue was approximately $200 million last year, and its workforce numbered approximately 350 employees, nearly all of whom rely on its IT systems.

Prior to selecting the iSeries solution, this Danish business unit of Brenntag Nordic had already decided to move away from its Windows x86 servers because they did not provide the necessary levels of availability. The company believed it was losing business and risked losing customers if it did not improve the stability of its ebusiness platforms. In addition, it felt the x86 server environment was expensive to maintain and upgrade.

THE ROLE OF THE iSERIES SOLUTION

Brenntag Nordic (Denmark) had 55 x86-based servers running the Microsoft Windows 2000 or Windows NT operating systems. It eliminated 25 of these by consolidating the Windows workloads onto Linux running on two iSeries systems, which also support native OS/400 applications. Linux runs through the iSeries logical partitioning capability.

FACTORS CONTRIBUTING TO ROI

In consolidating its Windows servers onto Linux on the iSeries platform, Brenntag Nordic reduced the costs of hardware and software acquisitions, training, and payroll. Consolidating onto iSeries allowed the company to eliminate one IT staff position, at an average salary of $60,000 per year. It also led to a reduction in annual IT training costs, from $40,000 to $10,000.

By using iSeries' built-in Navigator system management software, Brenntag Nordic saved on licensing costs. The company anticipates it will continue to save on license costs as it acquires new software by having fewer servers in its environment.

Brenntag Nordic estimates it avoided spending $150,000 for 25 new servers by consolidating to Linux on iSeries. Maintaining the x86 server environment would have required not only the acquisition costs of new hardware and software but also two $1,500 upgrades in five years for each server. Brenntag Nordic also reduced annual maintenance costs, which were about $1,000 for each of the 25 servers annually.

Each hour of system downtime costs Brenntag Nordic approximately $23,000. Before the iSeries solution was implemented, the company experienced 8 hours of downtime per month that had an impact on users. After consolidation, downtime is just 0.001 hours per month. In addition to reducing the amount of revenue lost to downtime, the consolidation effort improved user productivity. Brenntag Nordic estimates a 40% improvement in productivity for the 20% of its users whose work is affected by downtime.

Brenntag Nordic not only reduced its spending on IT staff, it also focused its IT resources on areas that could improve the overall level of service. The company can now spend more time on security and virus prevention, capacity and network planning, performance management, and disaster recovery planning. Before the consolidation to iSeries, IT staff members had no time for these functions.

Brenntag Nordic can also deliver new applications faster — in one week, instead of four. In the iSeries environment, the company has implemented a test server on which it can test and deploy new applications before rolling them out to users. This allows applications to be developed and deployed in less time with greater stability.

METHODOLOGY

IDC ROI METHODOLOGY: GETTING TO ROI

IDC takes a very conservative route in its ROI analyses, relying on three fundamental rules:

- Use interview data rather than assumptions
- Count the same factors in the same way
- Discount the return and expand the investment

IDC looks at the IT environment and its impact on the business before and after an investment and then forecasts that impact over three years to calculate the ROI.

AREAS OF SAVINGS

All savings are broken down into the following:

- **Reduced costs.** Hard savings that impact non–cost of goods sold (non-CGS). Calculations are based on actual costs for hardware, software, support services, or, in the case of staff reductions, loaded salary (loaded salary is salary and benefits and assigned overhead).
- **Increased productivity.** Soft savings derived when automation and better reliability reduce mundane task work and downtime, thus freeing up IT staff and technology users to perform their jobs and to contribute to the business. Savings are based on a percentage of their loaded salary.
- **Revenue impact.** Hard savings that are not applicable to all companies. Half of the organizations today suffer a loss of revenue when end-user access to the network is down. Reducing downtime reduces the loss. Revenue savings are a straight calculation of the loss per hour x number of hours x a factor (20–50%) that allows for the variations in company operations.

INVESTMENT

IDC captures all initial aspects of the IT investment (hardware, software, deployment, services, training, peripherals, support, and outsourcing) and forecasts ongoing costs based on the computing environment's growth.

ROI

The savings and investments are put into standard financial terms:

- **Discount factor.** Savings are discounted to reflect the present values at a rate of 12%.
- **Net present value.** NPV is the net return of the savings minus investment. While IDC discounts the savings, we do not discount the investment by accounting for the cost of capital. Therefore, IDC's methodology produces a conservative NPV (discounted savings – investment).
- **ROI.** Equal to NPV/investment. This is a measure of the attractiveness of an investment that often is used to compare investment in unrelated areas.
- **Payback.** Equal to investment/first-year savings x 12 months. This represents the time required for the savings to equal the investment.

CHALLENGES IN THE MARKETPLACE AND MEETING THE CHALLENGES

The iSeries demonstrates significant ROI advantages, but it still faces challenges in today's highly competitive server marketplace. The category of x86 servers continues to lag behind that of scalable servers, such as the iSeries, in terms of reliability, availability, and serviceability (RAS); scalability; and manageability. However, x86 servers are gradually catching up with more scalable servers, as more features and functions are added over time. As was seen in this study, the iSeries can be shown to be a highly available server that keeps downtime to a minimum and supports high levels of end-user productivity. More servers will be built on a new generation of microprocessors, including Intel's Itanium 2 and Xeon MP and AMD's Opteron, that will take over workloads that run on today's x86 servers. And, as the launch of Windows 2003 in April 2003 shows, Windows — the operating system that runs on more than half of all x86-based servers — is gaining in features and functionality over time. Even so, not all Windows servers will be upgraded to Windows 2003 in the short term because it will take time for the large installed base to be upgraded to the most recent version and because some customers may elect to continue running Windows 2000 and, in some cases, Windows NT Server.

IBM has invested considerably to make the iSeries into a more "open" platform. In fact, it is the use of consistent processor technology and other IBM-branded technologies (i.e., LPAR and Hypervisor) across the iSeries and Unix-based IBM eServer pSeries platforms that has allowed the iSeries platform to survive competitive and technological challenges. However, despite IBM's efforts, the iSeries retains the image of a proprietary (single-vendor), midrange server for many potential customers. This results in a limiting of the total available market for the iSeries servers. IBM should continue to market the iSeries platform's ability to integrate multiple types of server operating environments on a single server platform and to run business-critical applications at a significantly lower cost of ownership than is possible on a large number of small, distributed servers. The availability of business applications that were written for operating systems other than the iSeries' own OS/400 operating environment — such as those written for Windows 2000 or Windows 2003 — should

help to make the iSeries platform more visible to customers outside the traditional installed base of iSeries and IBM AS/400 servers. IBM's support for Linux on the iSeries server will also help to broaden the iSeries' market appeal by bringing a larger number of Web-centric workloads to the iSeries platform.

CONCLUSION

The iSeries has built a reputation as a reliable, available, and secure server platform, but it has also been perceived by many as a server solution that has high acquisition costs. However, an IDC ROI study that looked at a group of small and medium-sized businesses that had deployed iSeries servers for purposes of server consolidation found substantial savings in ongoing operational costs and a payoff period of less than a year for the purchase or lease of an iSeries server system. The findings may be somewhat surprising to some, given the initial outlay in costs for hardware, software, applications, and IT personnel. However, the efficient computer operations that resulted from the server consolidation of multiple workloads onto the iSeries server quickly overshadowed the initial purchase price, according to IT respondents. In addition, important business benefits could be demonstrated that resulted from the deployment of iSeries servers. These benefits include the following: improved user productivity, improved IT personnel productivity, reduced downtime, and a more stable computing environment that preserved service level agreements (SLAs) to end users and end customers.

Indeed, consolidation of workloads that once ran on distributed servers offers IT managers the opportunity to change the dynamics of server management, compared with the ongoing operations of the server farms that have proliferated in many IT sites. Thus, IT sites have the opportunity to dedicate the financial and human resources that once would have been directed toward system administration of server farms to fund high-value business projects. This approach to IT strategy has the potential to have a direct impact on line-of-business (LOB) operations. There are a number of management approaches available to IT managers that can be applied to transforming IT resources; however, as we have seen in this study, the consolidation of workloads onto scalable servers is one approach that can be demonstrated to impact ongoing business operations — and the bottom line.

IT managers must do all that they can to keep operational costs as low as possible given the economic downturn and their concerns about the need to contain IT costs. ROI is a key metric that is being scrutinized by senior management in most companies today for the purchase, deployment, and maintenance of server systems and associated storage devices. Platforms such as the iSeries must prove to IT managers and business managers that they can "pay their way" in today's tough economic climate. This study has shown the benefits that some iSeries sites have gained through the consolidation of multiple workloads onto the iSeries server platform. By consolidating workloads from a large number of underutilized, distributed servers onto a smaller number of iSeries computer "footprints," these IT sites were able to demonstrate ROI savings in less than a year, providing a short payback time for their initial investment in a new server platform.

iSeries Technology

Designed as a well-integrated, easily managed solution that includes its own database and storage, the iSeries has consistently demonstrated a TCO advantage over time. IBM has continued to invest in the platform. For example, IBM has designed the iSeries to support more feature sets over time, including the following: building the architecture on top of the IBM POWER brand of RISC processors; providing 64-bit computing capability that shortens search times for scans of large databases; providing integrated support for more "open" technologies such as Linux and Windows environments; and incorporating capabilities from IBM's mainframe heritage, such as the provision of logical partitioning (LPAR) that allows multiple workloads to run simultaneously without interrupting one another through the IBM Hypervisor. The Hypervisor manages multiple partitions and can move workloads across partitions as needed.

A single iSeries server can support multiple software environments, including the Linux and IBM AIX Unix server operating environments (AIX support is now provided in an emulation mode through the PASE feature, but it will be provided in native support in 2004) and the Lotus Domino collaborative software suite. Importantly, the iSeries can support Microsoft Windows server operating environments in two ways: customers have the option of running Windows operating systems inside the iSeries cabinet on an Integrated xSeries Server or, alternatively, an iSeries server can be directly attached to one or more freestanding xSeries servers via the Integrated xSeries Adapter. Partitioning within an iSeries server supports the creation of up to 32 separate logical partitions with allocation of server resources across them. Importantly, each of the partitions can access the global storage resources available on the iSeries. With the use of virtualization software, each of the partitions "sees" very large blocks of storage available to its workloads. These storage blocks can support Windows applications, Linux applications, or both as needed. Further, the Hypervisor software isolates partitions from one another so that events in one partition do not affect another.

The IBM iSeries systems are available in configurations ranging up to 32 processors, all running the IBM OS/400 operating system. Linux is supported natively through IBM's LPAR technology; the iSeries server also leverages resource utilization that allows multiple Linux applications to run on the same system. Up to 9 Linux partitions can be supported on a uniprocessor iSeries, while up to 31 Linux partitions can be supported on a 32-way iSeries system. Processor and memory resources can be shared across partitions and between the Linux partitions and the OS/400 partitions. Linux applications have access, via ODBC software components, to data stored in a DB2 Universal Data Base as well as to OS/400 programs and services.

Integration of IBM's Windows platforms (xSeries) is accomplished through the Integrated xSeries Server and Integrated xSeries Adapter, which adds Windows computing resources to iSeries servers through the provision of Intel-based co-processors. The Integrated xSeries Server is a Windows server on a PCI card that plugs into the iSeries server. By leveraging this technology, as many as 48 Windows-based Integrated xSeries Servers can be housed within a single iSeries server and up to 60 freestanding xSeries servers can be directly attached to an iSeries server via the Integrated xSeries Adapter. The Windows servers function as discrete Windows servers while taking advantage of the iSeries communications, management, and storage resources.

The iSeries servers support IBM's On/Off Capacity on Demand program, which allows organizations to deploy computing resources when business demands peak. Selected models allow customers to activate one or more available processors as their needs require. Depending on the iSeries model, up to 8 additional processors may be available as standby processors, for a total system maximum of 32 processors in upper-end models, increasing business agility and potentially reducing cost by eliminating the need to purchase more servers, or later upgrades, following the initial deployment.