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Strategic Snapshot

Consolidation, Expansion, or Both?

Measuring IBM eServer iSeries Business Value for SMBs

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INTRODUCTION

The causes and effects of heterogeneous computing environments are nearly cliché. Blessed by an excess of choices, deal-minded IT vendors, and continually evolving price/performance metrics, enterprise customers took advantage of countless opportunities over the past half decade. The results, however, are not pretty, and as often as not look more like high-tech crazy quilts than ready-for-primetime computing infrastructures. Curiously, the inherent challenges of multi-vendor computing environments for large enterprises have been widely discussed, but they are no less profound for small to medium-sized businesses (SMBs).

The sheer cost of ongoing IT maintenance and operation is a very real consideration for today's small and mid-sized enterprises. Budgets are tight for SMBs but IT spending is necessary for survival. SMBs (like larger companies) often have a complex heterogeneous environment because they have applied a series of short-term fixes to solve problems. Because of this, IT infrastructure has become a business inhibitor rather than an enabler. Consider, hypothetically, that if a fully burdened IT staff member costs the enterprise $70,000 annually, the reduction of the need for IT staff makes the value of server/workload consolidation very clear. If seven servers running at 10% utilization are replaced with a single server running at 70% utilization, the potential savings becomes obvious (and in reach) to most any enterprise.

Given the compelling cost argument in favor of server/workload consolidation, it is not surprising that SMBs (like larger companies) are looking to simplify, streamline, and consolidate their infrastructure. While there is no shortage of vendor rhetoric to each vendor's roadmap for heterogeneous solutions, it can prove very difficult for the small to mid-sized organization to realistically assess vendors' promises. Conventional benchmark testing procedures tend to focus on measuring narrow areas of hardware performance but do not adequately quantify the complex, consolidated workloads inherent in server consolidation.

So how can an SMB realistically assess the value of server consolidation for itself? The answer may be found in the IBM Three-in-One Benchmark for the eServer iSeries. In this paper, we will examine the needs and concerns of small to mid-sized businesses with respect to their IT infrastructures, explore issues related to taming the complexity of existing IT solutions, and investigate the potential of the IBM eServer iSeries as a workload and server consolidation platform for small and medium-sized companies.

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SMB Business Concerns

Consider the plight of the small to mid-sized company. Caught in a perplexing economy, with customers holding the line on spending, belt-tightening is the mantra that echoes up and down the SMB food chain. Layoffs, deferred or canceled bonuses, staff consolidations... you name it, and the SMB is doing it to survive. Add into the mix the ongoing cost of existing IT deployments. Many more moderately sized companies, like their larger cousins, spent lavishly in the 1990s investing in perhaps an inventory management application center here, a new accounting solution there, and a call center and customer service center across the street. In many cases, these investments have borne fruit. In others, there has been little or no return at all. Regardless of whether promised ROI has been achieved, IT investments are now well entrenched in SMBs. Business processes have been modified, and both employees and customers are now familiar and comfortable with existing IT infrastructures. Turning back the clock is not an option.

In many cases, small and mid-sized firms considered IT investments a means of survival. To play in an increasingly global economy, the ability to compete with and appear like "large" enterprises was crucial. We believe that for many the process of creating these capabilities strained IT spending. Today, resources for additional investment are extremely limited. At the same time, SMBs face much more precipitous threats than companies that are larger and more diversified. With a smaller, more discrete customer base, the SMB needs to make every effort to maintain ongoing interaction and connection with those customers and suppliers. Now is certainly not the time to pull the plug. In fact, the opposite is true.

While the ambiguous economic outlook can make IT spending harder to justify for companies of any size, such economic conditions can be the most perilous for SMBs. It is in such economies that market consolidations occur, and those that fail to keep up will find themselves consumed via takeovers and market poaching, or worse, extinct. Flying in the face of these perils are well-established customer expectations. Many SMBs find themselves in a bind that is largely a product of the success of the "revolutionary" aspects of the Internet. The ability to share information internally and externally via collaborative tools such as Lotus Notes or Sametime has put smaller firms in a "go forward or go away" situation. The SMB that decides to provide its customers with something less than the customers have come to expect faces potentially dire "go away" consequences.

SMB IT Challenges

What are the key IT challenges facing SMBs today? Foremost is the need to manage IT investment intelligently. For many, the solution to any given IT problem has been to plug discernable holes with whichever offering was first to come to market or offered at the lowest price. This "strategy" was largely an ad hoc, catch-as-catch-can approach, but one that in many cases met the extraordinary pressures of solving problems in the shortest possible time. Of course, while shortsighted strategies are good for solving short-term problems, they also tend to create persistent, long-term challenges.

The complexity of managing a host of different vendors' products is the most painful of these new challenges. The reality of managing heterogeneous environments is the waking night-mare of many an IT manager. To effectively manage complex and convoluted environments costs time and money and often demands IT staff with specialized knowledge of idiosyncratic deployments; i.e., how a specific IT infrastructure was deployed and is now held together. Reducing IT staff may mean the proper sequence for a system-wide reboot has walked out the door. Of course, as this unique collection of operating systems, hardware, and applications ages, the incidence of "one time" fixes and patches can become staggering. As

such an IT infrastructure ages, becomes more unreliable, and increasingly demands constant attention, the 21st century IT staff begins to resemble the engine room crew of a 19th century ocean liner, scurrying about with oil cans and rags, lubricating here, adjusting a steam valve there, and whacking a pipe with wrench over there.

In such scenarios, IT becomes not a business enabler, but an inhibitor. As the TCO of hodge-podge IT deployments grows, it diverts increasingly scarce resources out of the company's core lines of business. IT infrastructure brittleness can cripple SMBs that are seeking to respond to the latest changes in the marketplace. Rather than being focused on acquiring new customers or exploiting new market opportunities, such an enterprise must instead watch helplessly as existing customers migrate to more accommodating vendors. In its proper place, IT should be one factor in overall business strategy, not a magic bullet that guarantees success or becomes an overwhelming drag on revenue. In the light of this reality, the IT staff is hearing more talk in the marketplace about increased simplicity, scalability, resilience, and security. Furthermore, the notion that IT infrastructure will attain these attributes by becoming self-healing, self-managing, and more intelligent seems like something out of a fairy tale to the average SMB. For the small to mid-sized organization, "On Demand" describes the way IT staff typically responds to problems, not how a computing environment can act and react independently to changing business needs.

Taming Complexity – Now

It comes as no surprise that both smaller and larger enterprises are attempting to contain and manage the increasing complexity of their IT deployments through server consolidation. The advances in server technologies, distributed storage, and a host of related solutions have significantly decreased the number of hardware and software servers required in enterprises of all sizes. The potential for server consolidation offers many benefits. Not only are the sheer numbers of servers reduced, but consolidation provides opportunities for more centralized control and management of both the hardware and software resources. Smaller numbers of servers allow for more flexibility for failover and redundancy, while also reducing the associated costs of server management and maintenance.

Another key advantage to server consolidation is the concept of providing the same level (or more) of IT capability with fewer pieces of hardware. By reducing the number of boxes and operating systems, one reduces the breadth of knowledge needed to keep the IT infrastructure up and running. In focusing their efforts more specifically, IT staff can perform more flexibly and with less essential knowledge pigeonholed in individual staffers. Furthermore, training in a consolidated environment can be uniform since what works in one section of the IT deployment will, in many or most cases, work in another. "Localized" lingua franca requirements can be minimized, resulting in lower training and maintenance costs.

Not surprisingly, many vendors are now touting their wares as server consolidation becomes a more widely spread solution to the epidemic of datacenter sprawl. With a range of sales pitches — many of which include or imply the phrase, "Of course it will do that" — it is important for SMBs to have ways to reliably quantify the potential solution's capabilities, especially in the area of server consolidation. Such capabilities would include reliability, multiple OS, application support, manageability, and, one would hope, performance. To meet this need, IBM created a series of "Three-in-One Benchmark" tests focused on products that can run multiple applications in a single virtual partition within a single server. These tests were designed, in part, to help quantify the capabilities of server consolidation deployments on the company's eServer iSeries solutions.

SMBs and the Quest to Evaluate IT Solutions

Benchmarking tests are only one way that enterprises can evaluate IT solutions. Input from vendors and or channel providers offers other avenues, as do business integrators and consultants. Third party evaluations can also be helpful, as can IT staff recommendations. We believe it is wise to consider their relative strengths and weaknesses.

Vendor/Channel

While likely to be one of the most well known sources of information for IT evaluations, it can also be a confusing source. Furthermore, the quality of the source of information is somewhat — and in some instances, entirely — compromised by the desire to put forward offerings that represent the best value to the vendor, as opposed to the customer. As noted earlier, there are many sales pitches that include the phrase, "Of course it can do that" when, in fact, it cannot. At times, vendor and channel partner advice does play a valuable role, for example, in setting reasonable expectations for proposed deployments. What is most important is that customers directly ask and the vendors directly and truthfully answer the right questions.

SIs and Consultants

While systems integrators and third party consultants can offer helpful advice on which deployments make sense, they are often beholden to a particular vendor or set of vendors. These parties prefer, for the most part, to recommend (and in some cases install) the technologies they are most familiar with. While in many instances this may be an appropriate course of action, it is not in others. Furthermore, since the SI/consultant evaluation process is largely focused on larger enterprises, such options may not be viable or affordable for the small and mid-sized business market.

Third Party Product Evaluation

There is no shortage of third party evaluations of IT offerings. Most notably, the IT media has moved aggressively from reporting the news to offering "laboratory analysis" of various IT products and technologies. Similar evaluations are easily available from IT analyst firms; operations that offer recommendations for products by vendors who sometimes pay hefty fees for subscription analysis services. The end user is well advised to closely examine recommendations from these sources. On one hand, the information delivered can be helpful in guiding the SMB through myriad choices; but on the other hand, advice can often be contradictory. Unfortunately, the most valuable source of product recommendations — either positive or negative — often comes from the company's competition that has deployed the products in question. But the likelihood of receiving cooperative and honest evaluations of IT capability in such cases remains diminished.

IT Staff Recommendations

A SMB's IT staff can also be a source of recommendations for technology solutions, especially as it relates to taking the next step in IT deployments. Certainly, IT staff will make these recommendations with more first-hand knowledge of their own IT landscape, and for these reasons their input deserves equal or even more weight than that of outsider observers. Of course, that insider knowledge comes with its own caveats; notably an inherent bias towards the familiar, whose idiosyncratic faults are already well understood. In short, status quo can lead IT staff to recommend solutions that may offer only incremental improvement. Thus, the nature of IT staff recommendations tends to be more tactical than strategic.

Benchmarks

Performance benchmarks can be a source of such information, especially if they are designed to go beyond mere "speeds and feeds" measurements found in the laboratory and instead focus on real world conditions. A benchmark that uses optimized techniques (or one that is designed in a way that does not accurately mirror the actual environment in which an application is used within an enterprise) becomes immediately suspect. Examples of such corner cutting are notorious and widespread, offering IT managers myriad reasons to eye such proceedings skeptically. But what about a test that measures more than mere horsepower?

IBM's Three-in-One Benchmark for eServer iSeries

IBM has developed a testing regimen to measure the ability of its iSeries Server to run multiple workloads on a single server. The tests were designed to measure not just performance, but performance in real world situations that include configurations typically associated with server consolidation efforts. The results are indicative of a range of capability and performance and can be very helpful in determining the potential performance in a given commercial environment. However, as with any benchmark or testing regimen, the ability to achieve the exact same result in every commercial environment is not guaranteed. Data from the test was gathered in April 2004 during a six-hour test.

Purpose of the Benchmark

The purpose of the Three-in-One Benchmark test is not only to demonstrate response times under load, but to do so in a real world scenario that could be replicated (and generally found) outside the testing laboratory. Since the principal thrust of the test is to demonstrate a multi-application workload scenario typical of server consolidation deployments, it includes more than a single speed component. This is intended to provide results that would have real meaning for IT managers attempting to meet the demands of ongoing customer expectations and cost-saving measures. A new Three-in-One Benchmark was announced in May 2004, superseding the first benchmark established in May 2003,

For this second benchmark effort, there were some changes in both the hardware and the software environment. The new benchmark tested a single CPU Power5-based eServer i5 model 520 as opposed to the dual processor solution (model i810) employed in the May 2003 test. In addition, the workloads in this test were scaled to focus more on the smaller side of SMB; however, the workload complexity was greater than in the previous benchmark

Background on Testing Variables

The benchmark test was designed to demonstrate the capability of the eServer iSeries to manage the execution of multiple application environments simultaneously while doing so with solid response time performance for all workloads. It is a deliberate choice to make no attempt to optimize hardware for the benchmark, or to minimize the applications to enhance performance. In all cases, the applications are installed and run at default settings, including the default security level of 40, which is a standard setting for iSeries servers and one that most customers use.

The following workloads were deployed in the Three-in-One benchmark:

OLTP: PeopleSoft World (version A7.3 with Cumulative Update 15)

Collaborative: Domino Web Access and Lotus Instant Messaging (Domino version 6.5.1)

Web Serving: Trade3 (WebSphere Base Application Server version 5.1)

There were 3 scenarios deployed in the benchmark: Base, Stress, and Growth

The base scenario featured 200 simulated users for the OLTP workload by deploying 16 different scripts simulating three PeopleSoft World processing categories: Financial, Distribution, and Manufacturing. The collaborative workload was comprised of 200 Domino Web Access accessing their 16MB mail databases through HTTP while sending and receiving messages and 200 Instant Messaging users chatting with members of a 50-person buddy list. The Web serving workload consisted of a collection of Java classes, Java Servlets, Java Server Pages, Message Driven Beans, and Enterprise Java Beans that provided an emulated brokerage services maintaining 25.1 transactions/second.

Test Results

Base Scenario

This scenario executed the three workloads simultaneously and drove the system at an average 73% CPU utilization. The OLTP workload represented an average 2.7% CPU utilization, the collaborative workload represented an average 13.6% utilization, and the Web serving workload represented an average 56.7% utilization.

Stress Scenario

This scenario modified the base scenario to reduce the base amount of Web serving (22.4 transactions/second) so that a subsequent 50% increase in the Web serving processing (user load) could be applied to represent the peak workload portion of the scenario. The average number of Web transactions was 32.4/second. Overall CPU utilization was 95.4%. During the stress, the OLTP workload represented an average 2.9% CPU utilization, the collaborative workload represented an average 13.7% utilization, and the Web serving workload represented an average 78.8% utilization.

Growth Scenario

This scenario increased the three workloads to represent an overall growth in user load, with the number of OLTP and collaborative users raised to 300, and the average number of Web transactions raised to 30.5/second. Overall CPU utilization was 97.1%. The OLTP workload represented an average 4.4% CPU utilization, the collaborative workload represented an average 19.2% utilization, and the Web serving workload represented an average 73.5% utilization.

What is Really Interesting Here

While these numbers illustrate a system utilization that would eclipse standard server utilization on Intel or UNIX solutions, what is interesting is not merely the speeds and feeds, but rather that the load being tested on a single server would normally be distributed amongst multiple servers.

The Three-in-One Benchmark base scenario exercised three workloads on one server and achieved 73% utilization. Assuming that competitive UNIX solutions can maintain approximately 15–20 % utilization, it would require four or five servers to replicate this load. Intel-based solutions with typical 5–10% utilization would require seven or more servers to maintain the same level of utilization. Even if competitive solutions could provide the same level of capability with only one server per workload, the IT resources needed to maintain multiple server environments are simply greater than those required for a single server.

Multiplatform Support

Nearly two-thirds of all SMBs run more than one operating system[i]. Of those that are not operating a multi-OS environment, more than a quarter are Windows-only shops. In both situations, eServer iSeries and its capabilities — as demonstrated by the Three-in-One benchmark results — offers the potential for both present day savings and capacity to add and centrally manage new applications and operating systems in the future. Notably, this can take place while operating at higher levels of server utilization than are available in typical unconsolidated environments. The capabilities of eServer iSeries can address present and future SMB needs in a unique consolidated solution.

Multi Workload Support

As the Three-in-One Benchmark demonstrates, the eServer iSeries can handle a wide range of SMB scale workloads simultaneously without the inherent degradation of response times or the dropping of users during load spikes common in traditional solutions. Yet for the vast majority of the six-hour benchmark test, the eServer iSeries had more than a quarter of its CPU capacity unused, illustrating headroom available for additional peaks.

LPAR Virtual Partitioning

Although the Three-in-One Benchmark simply measures performance within a single partition, the eServer iSeries virtual partitioning offers a far more flexible approach to server consolidation efforts than do hardware-based solutions from vendors such as HP and Sun. As a result, SMBs can consolidate complex workloads on single eServer iSeries machines while typically achieving higher overall levels of server utilization with the capability to separate execution environments through partitioning if they so desire.

Centralized Management and Enterprise Level Security

Since the eServer iSeries is the descendant of larger mainframe computing environments, it features a market-tested centralized management console that affords IT staff a single view of the deployment environment. eServer iSeries can centrally manage numerous applications in multiple operating environments including Windows, Linux, and PASE (enables running UNIX applications) at present, with a statement of direction by IBM to include AIX in 2004. In addition, enterprise level security is a built in component of the eServer iSeries.

Legacy Application Performance Enhancements

The eServer iSeries offers the SMB the ability to upgrade the performance of existing application deployments. Domino on the eServer iSeries can scale from several hundred to upwards of 50,000 users. This user load is far beyond the needs of the typical SMB but illustrates how much capacity the eServer iSeries brings to the table.

How Does the Competition Stack Up?

The breadth of performance issues addressed by IBM's Three-in-One Benchmark indicates that the eServer iSeries has distinctly unique capabilities vis-à-vis competitors including HP, Sun, and Dell. In essence, the eServer iSeries has no direct competitors apart from IBM's eServer zSeries and other mainframe products, or IBM's eServer pSeries, which are the only other computing solutions that offer the ability to simultaneously support, control, and manage multiple applications on multiple operating environments. In other words, the IBM eServer iSeries provides mainframe-style computing capabilities in a solution designed to address the business, technical, and financial pressures faced by SMBs.

What Three-in-One Means for SMBs

IBM's Three-in-One Benchmark and the eServer iSeries demonstrate a number of real value propositions for SMBs. The eServer iSeries is unlike traditional multiple server implementations, through its support of multiple operating systems, multiple workloads, ebusiness applications, centralized management, and enterprise-level security and reliability. The eServer iSeries offers dependable, affordable solutions to the problems SMBs face with a well-established technology and customer track record: the total number of eServer iSeries currently in use worldwide is approaching half a million. Furthermore, many of the security and management capabilities in the eServer iSeries are the direct descendants of mainframe offerings that also have a long history in the marketplace. In addition, the eServer iSeries has the capacity to grow to meet future needs. With the ability to consolidate multiple servers into a single machine and the capacity to run existing and new applications, the eServer iSeries presents SMBs a unique solution for solving today's concrete business problems while offering the flexibility for future hardware and application growth.

As IBM's Three-in-One Benchmark demonstrates, the eServer iSeries provides a great deal of flexibility for any company seeking not only to consolidate servers but to expand and grow with changing business demands. Notable in the benchmarking test was the ability to handle high-load Internet and collaborative applications, the very types of deployments that SMBs require to stay current with customers and the market, and apace or ahead of competitors. Many SMBs do significant business with larger enterprises, who in most cases are utilizing more powerful hardware than is typically found in SMBs. The eServer iSeries' ability to handle high workloads and data processing chores offers small and mid-sized firms the technology needed to seamlessly work with robust enterprise computing environments. This facility provides SMBs a means to secure revenue opportunities that might otherwise be unavailable or technically problematic.

What Does It All Mean?

The SMB market is unique in the special challenges it offers information technology vendors. This is especially true for those vendors who have often focused most of their attention on the large enterprise market. Smaller and mid-sized companies have concerns and needs unlike their larger cousins, and live with constrictions and limitations that are not usually found in larger enterprises.

Despite these differences, SMBs' technical prowess has become increasingly sophisticated. For some, their IT infrastructure represents small-scale recreations of larger enterprise deployments, but for others, IT resources are either scarce or effectively non-existent. Nonetheless, the business-critical nature of technology for the SMB market mirrors the IT-reliance of larger enterprises. In addition, SMBs must deal with similar issues of IT complexity, yet are challenged to find economies of scale within these relatively smaller environments. Thus for most organizations, new technology deployments cannot be considered without including new personnel to manage and maintain them. At a hypothetical $70,000 annual cost for a single IT staff member, it becomes clear that IT growth, despite its potential long-term competitive advantage, is simply beyond the reach of many small and mid-sized firms.

Given the reality of the budgetary constraints, it is no surprise that small and mid-sized organizations tend to be conservative in their present-day IT investments. Many find themselves overwhelmed with existing infrastructures issues, to the point of questioning the value of those deployments in the first place. Once burned, twice shy, the SMB attitude toward the latest and great technology is appropriately skeptical. While this skepticism may guard SMBs against unnecessary IT investments, it could also hinder future business

potential if appropriate, strategic IT solutions are dismissed out of hand. For example, replacing a half dozen independent Intel-based servers and migrating the workload to a single eServer iSeries server, could give the smaller enterprise a tangible ROI and reduced TCO that is much larger in proportion to the similar savings a large enterprise would enjoy. In addition, there is still substantial spare capacity in the eServer iSeries, providing the bonus of instant future growth without additional hardware investment.

Despite the challenging economic times, we believe that SMB skepticism can be allayed if vendors develop solutions that are well suited to small and mid-sized organizations' business and technology needs. Offering market-tested products such as IBM's eServer iSeries complete with benchmarking tests that demonstrate the product's ability to address both contemporary needs and future requirements is a step in the right direction. This customer-friendly approach sets an example for all vendors that are looking to garner the support of SMBs seeking to consolidate servers, streamline IT management, and lay the groundwork for future IT deployments. The eServer iSeries' capacity to offer mainframe-like capabilities including multi-OS, multi-workload, LPAR, and Capacity Upgrade on Demand allows small and mid-sized firms the opportunity to address the demands of today and the flexibility to deal with tomorrow's requirements.

As IBM's Three-in-One Benchmark demonstrates, the eServer iSeries is fully capable of performing within the most demanding SMB environments. Overall, we believe that small and medium-sized businesses looking for dependable, flexible, and affordable IT solutions would do well to consider the options and capabilities the IBM eServer iSeries presents for both traditional workloads and emerging ebusiness applications and processes.

[i] IBM Server Group Tracking Studies