WHITE PAPER

Server Transition Alternatives: A Business Value View Focusing on Operating Costs

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EXECUTIVE SUMMARY

Most organizations, when faced with budget challenges, put off capital expenditures (capex) and seek alternatives to acquiring new hardware platforms, such as extending server life cycles and extending software licenses. This pattern of extending the useful life cycle of servers has a number of near-term benefits for customers in terms of depreciating assets over a long period of time or extending an existing lease. But if a transition to new technologies has been deferred too long, then the time comes when the system has fallen far behind the performance curve being offered by multiple vendors in the marketplace today. This has been especially true in recent years, as the performance of processors has more than doubled each year, based on the emergence of multicore, multiprocessor system designs with improved system speeds.

This paper demonstrates that a buy-and-hold strategy can actually add costs to the datacenter, for a number of reasons, as systems age in place:

- Hardware maintenance and software maintenance fees rise over time.
- The aging of applications costs the organization money because without modernization, the availability of applications can suffer over a period of years when hardware and software platforms are not updated, affecting uptime and business continuity.
- The entire software stack begins to age in place about five years after initial installation so that a broad spectrum of hardware and software products falls behind the technology update cycle, and the total cost of deploying replacements can become more expensive.

IDC studied IBM Power Systems sites that remained on the POWER5 platform long after its initial introduction in 2004 and then skipped the next replacement cycle of POWER6 processors during the downturn that began in late 2008. When comparisons to the succeeding generation of POWER7 are made, customers have found that the increase in scalability and performance of POWER7 systems, combined with a reduction in server “footprint” size and overall electrical requirements, resulted in significant reductions in ongoing costs, or opex, per 100 end users supported.

The research found that server costs per 100 users declined over 60% when comparing the POWER7-based server platforms with the older POWER5-based platforms. Investing in a transition from POWER5 to POWER7 resulted in a return on
investment (ROI) of more than 150% over three years. Importantly, savings from the
technology transition covered the initial investment (payback period) after less than a
year (11.7 months). So within a year, the savings from reduced maintenance and
support costs pays for the investment in new POWER7 technology. While Power
servers have become much more powerful over time, acquisition costs and energy
requirements have dropped since 2008. This means that for every dollar invested in
the new technology, two and a half times as much was eventually saved, over a
period of three years, per 100 users using the new system.

This paper presents these findings, along with a summary of the technical differences
between the POWER5 and POWER7 platforms. It shows how a period of technology
transition resulted in IT cost avoidances and operational cost reductions, when the shift
to POWER7 occurred, within a short period of time.

**SITUATION OVERVIEW**

**Saving Money by Leveraging Technology Refresh: How Current Accounting Misses**

Most organizations continue to purchase their servers and IT equipment, and then,
following the initial investment, these organizations use a "standard" financially
derived amortization period, often five years. Typically, this has led to a useful server
life cycle of three to seven years, depending on the type of platform, operating
system, and workloads being used. While most IT shops replace their x86 systems
every three to five years, they have tended to hold onto their Unix servers supporting
mission-critical workloads for longer periods of time — generally five to seven years
or more — given the importance of the workloads being supported.

After acquiring and capitalizing equipment and then initiating the amortization period,
most IT managers avoid replacing the equipment before its normal depreciation cycle
runs its course if the system is performing adequately and meeting availability
requirements. This approach to server replacement/renewal cycles misses an
assessment of the actual conditions and cost factors experienced. Instead, it relies on
the calendar to determine when the server should be replaced or refreshed with new
technology.

During this time, system administrators may work to repeatedly upgrade and
reconfigure servers in support of workloads rather than to consider a fully burdened
cost assessment highlighting the cost reductions that could be gained by replacing
the servers sooner. Additionally, IT technology planners, knowing that the equipment
will remain in place for five years or more, tend to specify new acquisitions with as
much physical capacity as possible to maximize flexibility and to reduce future in-
place hardware upgrades. IDC believes that, in general, these management patterns
can lead to unnecessarily expensive infrastructure costs over the server life cycle.
The Economic Downturn Led to Lengthened Server Life Cycles

IDC’s supply-side data for the worldwide server market showed these patterns for lengthened server life cycles. The data documented the delay and deferral of many midrange and high-end servers, starting in fall 2008 — at the onset of the economic downturn — and continuing through 2010. At that point, IDC saw an uptick in midrange and high-end server sales, fed by a wave of technology upgrades across those server classes. Unix servers were among the categories that benefited most, as did mainframes; that trend has continued into 2011, as midrange enterprise and high-end enterprise server revenue has grown.

This reflects the importance of the workloads running on those systems — and IT organizations’ interest in building on previous investments in Unix server deployments. The rise in server revenue reflected the acceleration of the technology replacement cycle and indications that IT organizations had run out of capacity and needed to acquire new hardware platforms while taking advantage of consolidating workloads onto fewer server platforms for the sake of operational efficiency.

Focusing on Operational Costs

The drive to reduce capital expenditures is strong — and has been since 2008 — and understandably so, given the current economic climate. However, IT managers also know that the need to address opex within the datacenter is equally important.

Although IT managers did a good job of capping IT spend on servers and storage throughout the economic downturn, costs on the operational side of the IT organization continued to grow. Starting in the late 2000s, and throughout the economic downturn period, costs for maintenance and management, along with costs for power/cooling, have soared. Power/cooling costs grew eight times as fast as server acquisition costs — and costs for maintenance/management, viewed as a category, grew four times as fast as server acquisition costs.

Starting with the delivery of POWER5-based systems in 2004 and extending through the introduction of POWER7-based systems in 2010, customers saw improvements over previous generations of POWER technology. But the gains realized from 2004 to 2007 did not keep pace with the improvements that were delivered in POWER7 processors. Customer sites that installed POWER7 have shown that technology transitions can reduce operational costs associated with Power Systems deployments. Improvements in power/cooling for these servers and reductions in maintenance costs over the entire system life cycle were seen. Specifically, IDC’s study of customer sites that had deployed POWER5-based servers, and then later transitioned to POWER7-based servers, shows that the opex costs per 100 users have actually dropped since 2010, when POWER7 servers shipped as replacements for older systems — and as platforms that are well-designed for workload consolidation.
**Maintenance Costs and Power/Cooling Costs Rise over Time**

As Figure 1 shows, by 2010, maintenance/management costs generated twice as much in total IT costs as server acquisition alone — and power/cooling costs grew enough to nearly equal server acquisition costs worldwide; in some cities, power/cooling costs already outstripped the server acquisition costs. Meanwhile, the worldwide installed base now stands at more than 35 million units and is projected to grow even more. Fortunately, the growth in logical servers (virtual servers, or virtual machines/VMs) is providing more usable capacity per physical server — and this is improving server resource utilization for each server — over time.

These findings regarding the technology replacement cycle for Power-based servers contrast with those of the overall market, given their operational efficiency throughout the 2000s. The IT organizations that run Power Systems show a very different experience from that of the overall worldwide server market. In general, the rapid deployment of large numbers of servers that started in the 2000s, which began with a drive to contain capex costs, resulted in sharp increases in maintenance and management costs for IT organizations — and power/cooling costs rose rapidly. However, Power Systems sites benefited from the overall design of these Unix servers — and the management costs (e.g., IT staff needed to manage scalable Power servers), often kept costs in check. In many cases, a relative handful of IT staff could manage multiple Power Systems, with dozens of PowerVM virtual machines among them, most of which supported mission-critical workloads.
Server Replacement Cycles

What does this pattern of maintenance, management, and operating costs mean to server life cycles? How has this changed since 2009?

Figure 1 demonstrates that opex must be kept in check, or it will outpace the savings from deferred server acquisitions. Certainly, midrange and high-end server revenue and unit shipments have been held in check since the economic downturn began in fall 2008 — but IDC supply-side research found that midrange and high-end servers saw a return to revenue and unit growth in 4Q2010 and 1H2011. The changes in the supply-side data indicate that a period of technology replacement has begun as workloads are being consolidated onto fewer, more powerful platforms.
There are other signs of technology refresh: IDC’s customer-based study of Server Workloads found that technology refresh helped to address opex. In 2010, the IDC Server Workloads study of 1,000+ IT sites found that 39% of new server acquisitions occurred as part of a routine, or planned, server refresh. New application projects drove the acquisition of another 33% of new server purchases, and 28% more were acquired to support additional compute capacity.

As we see in this paper, aging server infrastructures can play a substantial cost-adding role in datacenter cost dynamics. The trend to leverage VMs running on the hardware is key to improving resource utilization — and to providing highly granular controllability of workloads. Further, workload isolation is enforced, which preserves uptime by preventing workloads from interfering with one another — taking a “pooled resources” approach to computing resources.

The next section looks at the way in which these market forces are affecting deployments of IBM Power Systems, which are based on POWER7 processors.

**IDC’s Study of Power-Based Server Sites**

In 2010 and 2011, IDC studied more than a dozen sites that had installed Power-based server systems — including the older POWER5 servers, which were introduced in 2004, and the new POWER7-based servers, which were introduced in 2010. The study did not interview customers with POWER6 systems, which were introduced in 2008, the year in which the economic downturn began.

IDC conducted this study to determine the business value experienced by customers consolidating on IBM Power servers. The study reviewed the experiences at six sites that had consolidated disparate server workloads on Power servers. These companies ranged in size from 1,500 to 175,000 employees and were located across geographies, including the United States, Western Europe, and Central Europe.

Importantly, the organizations represented a wide variety of vertical markets, including retail, financial services, manufacturing, and energy. Most of these organizations were large companies with a server infrastructure that supported tens of thousands of intra-enterprise end users — and an even larger number of extra-enterprise users, including end customers who are accessing their enterprise systems.

The study of these respondents provided substantial data about their deployments as part of an IDC business value survey measuring the costs associated with deployment of new systems and the operational results, such as reductions in IT operating costs, costs related to system downtime, and employee productivity improvements associated with those deployments.
Research Methodology

IDC supplemented this original primary research with deeper interviews of two large organizations that had made the transition from POWER5 directly to POWER7 servers. This study used the existing research and subsequent interviews to determine the sources of cost — both capex and opex. By capturing these components of cost, IDC was able to calculate the impact of moving from the older server to the new servers in terms of hardware acquisition costs, IT staff costs, impact of downtime, and productivity — both for IT staff and for end users.

The interviews yielded information defining up-front investment costs in the technology, as well as deployment and ongoing maintenance costs. The interviews also elicited the companies’ experiences with tangible and measurable IT and end-user business benefits over a three-year period. IDC’s Business Value team combined all of these factors in the synthesis of an overall ROI calculation.

Key Findings

Importantly, the benefits of transitioning — increased productivity for IT and employees, reduced opex (e.g., reduced downtime) — resulted in a rapid return on the up-front investment. The summary data tables that are part of the figures in this document present the key findings, providing data about the costs to deploy the new platforms and about the business benefits that resulted. They show efficiencies related to cost avoidance in hardware, software, and facilities requirements — and reduced ongoing maintenance costs, key dimensions of which appear in Figure 2.
FIGURE 2

Relative Costs to Support Users: POWER5 Versus POWER7

<table>
<thead>
<tr>
<th></th>
<th>POWER5</th>
<th>POWER7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Networking Cost</td>
<td>12.1</td>
<td>3.8</td>
</tr>
<tr>
<td>CPU's (per 50 users)</td>
<td>10.1</td>
<td>5.2</td>
</tr>
<tr>
<td>IT Support Staff Cost (Annual $100s)</td>
<td>8.3</td>
<td>4.8</td>
</tr>
<tr>
<td>Facilities Cost (Annual $10s)</td>
<td>2.7</td>
<td>0.9</td>
</tr>
<tr>
<td>Power Cost (Annual $100s)</td>
<td>2.4</td>
<td>0.9</td>
</tr>
<tr>
<td>Networking Cost ($10s)</td>
<td>12.1</td>
<td>3.8</td>
</tr>
</tbody>
</table>

Notes:
- All dollar cost values per 100 users
- CPUs per 50 users

Source: IDC's Business Value Research, 2011

As can be seen in the table at the bottom of Figure 2, the following comparisons could be made between the new servers and the older servers:

- POWER7 servers required almost 50% fewer cores to provide the same capacity as the older POWER5-based servers, enabling savings in software and hardware maintenance costs.

- The new servers needed less than half the amount of datacenter "real estate" required by POWER5-based servers; facilities costs dropped from $27 to $9 per 100 users.
The new servers needed less than half the amount of power required by POWER5-based servers — although the processors themselves worked in a similar thermal envelope. Power costs per 100 users dropped from $242 to $93.

IT support staff costs for the POWER7 servers were nearly half as much as those for the POWER5 servers, dropping from $1,297 to $335 per 100 users.

Networking costs for the new servers were less than 25% as much as those for the POWER5-based servers — $38 versus $121 per 100 users.

To understand the reasons why these changes were so dramatic, one needs to look at the technology changes between the two generations of IBM POWER processors, which are based on a RISC design, and run three operating systems: IBM AIX, IBM i, and Linux. (IDC notes that IBM i is the successor to the i5/OS or OS/400 used on earlier System i or AS/400 servers.)

TRIAGING THE IT INFRASTRUCTURE

A Closer Look at POWER7

The announcement of the POWER7 processor in 2010 provided a new building block that was leveraged throughout IBM's Power Systems product line, from Express servers and blades — including the Power 710, 720, 730, 740, and 750 and the PS 702 and 703 — through the Enterprise midrange models and up to the Enterprise high-end models — the Power 770, 780, and 795 servers.

The IBM POWER7 processors are designed to provide twice the performance per core of the fastest POWER5+ processor and can deliver up to four times the number of cores and up to seven times more capacity than the POWER5+ p5-595 system. This performance and scale enables POWER7 systems to support new levels of workload consolidation for Unix, Linux, or IBM i workloads (including those that formerly ran on the i5/OS and OS/400 operating systems).

Importantly, POWER7 systems are designed to work in the same thermal and energy envelopes as POWER6-based systems. IBM's previous investments, its in-house design and fabrication of the POWER7 processor, and its intent to build out future generations of POWER processors speak to the value it places on datacenter computing and on the large customers that support that market space. The high-end Power 570 and 595 servers have been updated to the POWER7-based IBM 770, 780, and 795. These high-end systems are designed to support the most complex and demanding transaction and database processing applications, and they are architected with Capacity on Demand (COD) capabilities that allow customers to add built-in processor and memory capacity, as needed. These capabilities allow the midrange and high-end Power Systems to share resources for workloads that demand dynamic processing capability — with peak usage associated with time-of-day, seasonality, or interactive computing patterns.
Specifics about the POWER7 architecture include the following:

- **Performance.** POWER7 cores are significantly faster than POWER5+ cores, with speeds up to 4.25GHz. Power servers are offered with up to eight cores per processor, with up to four threads per core to deliver new levels of performance for highly parallelized and Internet-centric workloads with multiple streams of data. For memory access, the POWER7 processor includes two DDR3 (double data rate 3) memory controllers, each with four memory channels. IBM has also optimized aspects of its middleware (e.g., IBM WebSphere and IBM DB2 database software) to take advantage of the POWER7 architecture.

- **Scalability.** With the POWER7 generation, IBM optimized the new processor features with the IBM AIX 7.1 operating system and firmware controlling on-chip data flow. This optimization, as well as the coordination of data processing, supports smoother scaling on the new systems. The IBM Power 770 and 795 servers also support four times as many cores in a single system as their predecessors, the Power 570 and 595 models, respectively, providing greater scalability for application growth within each server footprint than before.

- **Enterprise-class PowerVM virtualization.** PowerVM provides the flexibility to rapidly respond to changing business requirements. This includes the ability to transparently share processing power and memory between partitions and reallocate these system resources without rebooting affected partitions. IDC notes that PowerVM includes the hypervisors for the IBM AIX and IBM i operating environments so that both are available for use on POWER7 systems. Due to its long history of working with virtualization, IBM is providing mature levels of virtualization, such as support for high numbers of VMs per physical server and a high level of granularity and management control for the workloads running inside each VM.

- **Price/performance of the platform.** IBM intentionally priced the POWER7-based servers to ensure that the price/performance ratio was improved significantly throughout the product line. These improvements decrease the cost of acquisition and ongoing maintenance of the POWER7 servers. The improved price/performance also shortens the time period for ROI, as it highlights the benefits associated with replacing a POWER5-based server infrastructure.

- **Scaling SMP fabric.** In the POWER7 generation of servers, each “node” or “book” of processors interconnects with every other book. Therefore, any single processor can send data to any other processor all the way along the fabric. This reduces intrasystem bottlenecks, improving overall system throughput.

- **Reduced software license costs per processor.** The increased performance per core enables an enterprise to run workloads on fewer processors compared with the earlier POWER4, 5, and 6 processors, providing an opportunity to save significantly on per-core software licensing and maintenance costs. This can apply to not only operating systems (IBM AIX) but also, potentially, to application and database software.
**Power/cooling per workload.** IDC’s customer-based studies have repeatedly found that IT managers rank power/cooling as a top concern. However, several features that are built into POWER7 designs directly address this important customer issue. For example, POWER7 Intelligent Energy features help dynamically optimize energy usage and performance. IBM Systems Director Active Energy Manager works with Intelligent Energy features, such as Energy Scale, to dynamically optimize processor speed based on the system’s thermal conditions and system utilization. And as stated earlier, POWER7 can run a given workload on fewer processors than earlier generations of POWER processors would have required, which in turn reduces the overall amount of power/cooling needed to run the servers.

These improvements result in lower-cost operations. Customers we interviewed found that the higher performance, capacity, and speed of IBM POWER7 systems resulted in markedly lower costs for administration, power, licenses, and networking, as depicted in Figure 3.
### FIGURE 3

Three-Year Pro Forma POWER5 to POWER7 Investment and Returns

<table>
<thead>
<tr>
<th>Year</th>
<th>Hardware Purchase</th>
<th>Implementation</th>
<th>Network Equipment</th>
<th>Facilities Cost</th>
<th>Administer Datacenter</th>
<th>License/Maintenance</th>
<th>Cumulative Net Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>(1,435)</td>
<td>(347)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>(1,782)</td>
</tr>
<tr>
<td>1</td>
<td>-</td>
<td>-</td>
<td>67</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>(1,782)</td>
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<td>2</td>
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<td>-</td>
<td>(1,782)</td>
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<tr>
<td>3</td>
<td>-</td>
<td>-</td>
<td>83</td>
<td>167</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Notes:
- All values per year (12 months) time period
- All values per 100 connected users (We define connected users as the number of users actively linked and interacting on the infrastructure network.)
- Pro forma assumes that initial cost of the solution occurs as lump sum outflow in year zero.
- The Implementation category sums the time for staff to learn and implement new technology.
- The Hardware Purchase category sums the acquisition expenditure on hardware (servers, storage, network, etc.).
- The Network Equipment category sums the reduction in requirement for adding switches and cabling network equipment given the consolidation of server infrastructure.
- The Facilities Cost category sums the reduction in cost for power and cooling, datacenter space, etc.
- The Administer Datacenter category sums the reduction in IT staff time to manage and implement all aspects of datacenter operations.
- The License/Maintenance category sums the net reduction in fees for hardware and software licensing and vendor's maintenance and support.

Source: IDC's Business Value Research, 2011
Technology Transition: Before and After

As servers age in place, various cost categories show that spending gets steeper as time goes on. These categories include maintenance costs; costs for power and cooling, managing, and monitoring servers; and staff costs. However, according to a demand-side, customer-based study conducted by IDC, a server transition that takes into account all these factors offers surprising findings that contradict and challenge traditional IT depreciation cycles. It shows that investments in new technology pay off in less than a year — and that the cost savings benefits over three years were more than three times as much as the initial amount invested.

The IDC study found that transitioning Power server infrastructure on pace with newer technology (e.g., every two years) can reduce multiyear server costs. This occurred not only because today's POWER7 servers can handle comparable workloads at less than 40% of the aggregate power requirements that POWER5 servers require but also because of POWER7's advanced technologies, which in turn reduce maintenance overhead and IT labor costs.

As indicated in Figure 3, moving from POWER5 to POWER7 results in cost savings that pay for the original investment within the first year (11.7 months) and continue to accrue financial benefits for ensuing years.

Other cost savings benefits can be added to this list. They include administrative labor associated with physical equipment management and cabling, as well as upgrades to firmware and the associated regression testing prior to production deployment.

Because of the high cost and potentially disruptive nature of upgrades, IT organizations strive to avoid this activity. Nevertheless, as the length of the deployment increases, the cost of maintenance per server increases. Because newer servers require less of this type of maintenance and management, labor cost savings ensue. Operational expense factors can be materially reduced with newer servers.

Customer Snapshots

This section presents two "customer snapshots" based on interviews that IDC conducted with two sites that moved from POWER5-based servers to POWER7-based servers. Multiple Power Systems were involved in this technology replacement cycle. These customers reported that they were able to move production workloads from older platforms to newer ones in a relatively short period of time — often within a few weeks. Although the applications could run without change or recompilation, databases were sometimes migrated from one server to another — and the planning for workload consolidation, which mapped workloads to available, shared resources, also took several weeks.

Both customers have metrics that show that they experienced reduced operational costs, which they described in their own terms. In general, the number of IT staff assigned to work on the systems remained roughly the same — due to IT skill sets and proficiency in managing the systems. But the total capacity provided for workloads was much larger than currently needed to host production workloads.
This additional capacity leaves "headroom" for future growth in application demand. It also results in reduced system utilization rates during peak periods of usage, when thousands of end users are accessing the system. The combination of virtualization and workload management made the replacement task easier — and the new servers ran "inside" the thermal envelope that had originally been provided for the older POWER5 servers.

Customer One

One major governmental agency site in the Midwestern region of the United States made the move from POWER5 to POWER7 and has already relocated all of the production workloads to the new POWER7 system. Installation of the new system coincided with the buildout of a new datacenter — and the idea was to ensure that there would be adequate capacity for both current and future workloads.

The POWER5 system was acquired through a four-year lease, which expired last fall. Although the price for the POWER7 system with additional capacity for growth was higher than the amount paid for the older system, it was less than the sum of the system and the projected four years of maintenance for the POWER5 system. "The point is that if we chose not to do the maintenance on the POWER5, then it pays a good chunk of the POWER7," this customer said. "But it’s not just that. It's that the POWER7 price included four years of support."

System uptime is as good as before, as is security and change management, so the operating environment is very much the same for IT staffers and system administrators.

The POWER7 system supports nearly 60 logical partitions, or LPARs — using the PowerVM hypervisor to do so — providing a lot of workload consolidation within the same system “footprint.” And yet the same number of IT staff members — two people — have primary responsibility for the POWER7 systems — just as they had for the POWER5 systems. They are part of a large IT organization with more than 150 staffers at this site, which is in the government sector.

"The performance immediately got better with POWER7," the IT manager said. "We weren’t running what we thought overloaded the POWER5. But when we moved to POWER7, even the developers were saying, "Oh my gosh, this thing's fast." For the POWER5 system, running at more than 90% utilization was the norm — now, the POWER7 system is running at less than 50% utilization. Among the key workloads running on the POWER7 system is an ERP application supporting more than 30,000 end users.

Another program, a CRM workload, is also running on the POWER7 system. The site is also considering migrating a number of IBM i5/OS (IBM i) workloads from older IBM AS/400 servers but has made no final decision yet to do that.

The technology transition to POWER7 has brought more processing power into a system with about the same number of processors — but only 30 of the 48 processors are currently "turned on," the IT manager said. And the processor resources and memory resources are shared among the applications, as needed,
because of the way the system is virtualized and managed. "The processors on the POWER7 [system] are faster and can handle more workload themselves," the IT manager said. "But the combination of the POWER7 hardware and the [IBM AIX Unix] operating system has made it more efficient."

**Customer Two**

Another customer is part of an international consumer goods company, with offices in the United States, Europe, and Asia/Pacific.

This company has a "deep bench" of Power Systems including those based on POWER5, POWER6, and POWER7 processors. This company has more than 50 Power-based systems worldwide — and it is working to consolidate workloads from many of the older systems to run on the POWER7 servers. Already, the total number of racks that house the Power Systems has been reduced to 8, compared with more than 12 racks that were used before the move from POWER5 to POWER7 systems.

"We have fewer systems now," the IT manager said. "That's because the CPUs [processors] are more powerful. The system performs better. We got a very good surprise when we replaced the older systems. We got much better performance than we were expecting … We know the performance is better because we took a look at CPU utilization. We took a look at response time for the application. The time it takes to load a page … and so we reduced the number of machines." This change reflects the process of workload consolidation in which fewer server footprints in the datacenter now deliver more computing capacity and perform faster than earlier generations of systems — dramatically reducing the per-workload operational costs.

Overall, the site did so much workload consolidation that it was able to reduce the total amount of rack space needed for the Power Systems by half. Not only has the amount of physical space decreased, even as capacity has increased, but the amount of cabling has lessened as well. The number of IT staffers and others working on the systems has remained fairly constant, with 5–10 experts running the systems, given their specific IT skills related to Power Systems and IBM AIX Unix. But this relatively small number of IT staff is able to manage more workloads — and to support more end users — than ever before.

The workloads running on the systems include many in the mission-critical category, such as ERP, CRM, data warehousing, and business intelligence (BI). The sustained utilization rate is running between 60% and 80%, although it can run higher during peak periods of use, when many thousands of end users are accessing the system.

Power/cooling costs have declined since the POWER7 systems were installed — with savings of up to 20% at this site. And because the maintenance fees that were being paid for the older machines were higher, there have been substantial maintenance savings with the new systems, making the upgrade’s cost much more attractive. Payback for installing multiple new POWER7 systems is expected within three years, including all of the aspects of the technology transition — servers, storage, software, and services.
CHALLENGES AND OPPORTUNITIES

The worldwide server market is a competitive one, with five top systems vendors worldwide — and dozens of others competing more closely at the regional and country levels. Server platforms continue to compete in terms of price, performance, and price/performance — as well as in their capacity to support and to manage virtualized workloads and their ability to provide reliability, availability, and serviceability to IT staff and end users.

In the Unix server market, there are four top vendors in terms of revenue — and IBM is currently ranked the leader by revenue in quarterly and annual sales. As of January 2011, IBM's market share had grown to 53% of all Unix server factory revenue worldwide — with two primary competitors worldwide. This large market share can be attributed to deep investments made by IBM since the late 1990s, which led to the POWER processors being shipped in the 2000s, as well as the continued development of IBM AIX Unix and the associated virtualization and systems management software.

IBM recognizes that its ability to integrate functionality into the platform (e.g., hardware and software), while supporting open computing standards for software and key hardware components (e.g., I/O, software APIs), is the basis for much of its differentiation and business value as it goes to market with its server solutions. That is why IBM is emphasizing its role as a provider of business-critical and mission-critical workload server platforms that will support business continuity and business value, based on customer usage patterns.

CONCLUSION

As we have seen, the continual progression of ever-increasing computing power, with computing power more than doubling every two years, counters the conclusion that avoiding new equipment and capital expense is the best way to reduce capex acquisition costs.

As organizations consider server transition in their datacenters, they also should consider incorporating a full accounting of all of the relevant factors — including not only capital costs but also labor, power/cooling, and electricity costs. This type of analysis, including avoidance of opex costs, may provide surprising conclusions, showing long-term cost projections over the server life cycle that challenge traditional IT depreciation cycles.

One example of this approach is replacing POWER5 technologies that have been supporting specific workloads over many years. In-depth IDC interviews with longtime IBM Power Systems sites show that updating the POWER processor technology at their sites reduced many types of operational costs, including IT staff time for maintenance and management, per-workload energy costs, and facilities costs. Respondents reported that more workloads can be run in less datacenter space with POWER7-based systems than was possible with POWER5-generation systems, via workload consolidation.
Refreshing server infrastructure on pace with newer technology — including server acquisition costs, IT staff costs, and power/cooling costs — can reduce opex by as much as 33%, as we have seen in this paper. Rather than put off capital expenditures and extend server life cycles (buy and hold strategy), organizations that are faced with sharp budget challenges should consider selectively upgrading their servers to the latest available technology, targeting the workloads that would benefit most from workload consolidation, including mission-critical workloads that demand high levels of availability and high levels of security.

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