ITG STATUS REPORT

June 2009

VALUE PROPOSITION FOR IBM POWER SERVERS AND i: COMPARING COSTS FOR ENTERPRISEONE DEPLOYMENTS

Challenges and Solutions

It is a challenging time for users of the Oracle EnterpriseOne (E1) system. Organizations must contain IT costs. Yet, business demands must still be met. In many cases, pressures to improve competitive performance and increase operating efficiency are magnified by today's economic conditions.

The evolution of the E1 system, as well as the complementary solutions introduced by Oracle that extend the functionality and scope of the E1 environment, offer new opportunities to meet business demands. However, these opportunities must be realized without excessive growth in IT staffing and costs. How can this be achieved?

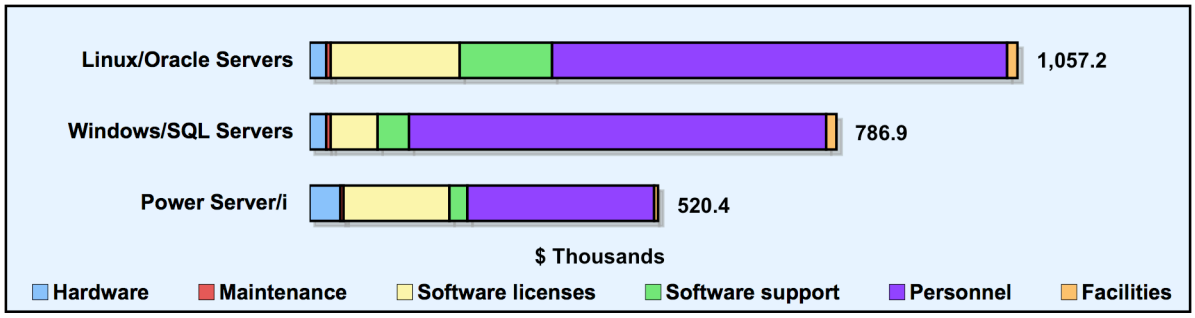
One solution is to employ – or continue to employ – the IBM Power server platform and i for core E1 systems. This combination retains the strengths of the IBM System i and its predecessors in stability, availability, security, low staffing levels and other areas that have been enjoyed by over 2,000 E1 users, in some cases for more than a decade.

The transition from the System i to Power server hardware and firmware, however, also delivers advances in performance and virtualization that have magnified the appeal of this platform. In particular, cost-effectiveness has increased.

In four E1 installation examples presented in this report, use of Power servers and i results in three-year IT costs that average 34 percent less than for use of Windows servers and SQL Server databases; and 51 percent less than for use of Linux servers and Oracle databases.

Figure 1 illustrates these results.

Figure 1
Three-year IT Costs for EnterpriseOne Deployments: Averages for All Installations



Three-year IT costs include hardware acquisition and maintenance; license and support costs for operating systems, databases, management tools and other software required to support E1 systems; personnel costs for system and database administration; and facilities – primarily energy – overhead.

Comparisons are between IBM Power 520 and 550 servers equipped with i and PowerVM virtualization tools; and Dell PowerEdge x86 servers equipped with Windows Server 2008 and SQL Server 2008, and Linux and Oracle 11g databases. In some cases, VMware ESX tools are employed for Windows and Linux/Oracle servers.

Costs of downtime – meaning business costs due to outages – are also significantly lower for Power servers and i than those for Windows and SQL Server, and Linux/Oracle equivalents. These disparities are discussed later in this report.

The installations upon which these comparisons are based include an industrial distributor and three manufacturing companies. These installations, which have between $250 million and $1.2 billion in sales and between 350 to 4,000 employees, utilize a wide range of E1 applications.

Details of these installations and of the methodology and assumptions employed for cost comparisons may be found in the Basis of Calculations section of this report.

IT Cost Factors

Lower IT costs for use of Power servers and i are due to three main factors:

1. ***Staffing levels***. There are major differences between platforms in full time equivalent (FTE) staffing levels and corresponding personnel costs for system and database administration.

   Users have typically reported that FTE staffing levels for System i environments were two to three times lower than for use of Windows and Linux servers. This continues to be the case for Power servers with i.

   Low i staffing levels reflect close integration of operating system, database, application server, system management and other software components, enabling common tools and processes to be applied across these. Streamlined interfaces, as well as use of distinctive IBM automation technologies employing artificial intelligence further increase administrator productivity.

   Because database and system administration functions are closely integrated and comparatively simple, most i users do not need to employ database administrators (DBAs). This is not the case if E1 systems are deployed using SQL Server or Oracle databases. In both cases, specialized DBA skills are required.

   The strengths of i in security and resistance to viruses, worms and other forms of malicious code ("malware") also contribute to higher administrator productivity. A great deal more time and effort must be expended in applying corrective patches to Windows and Linux than to i.

2. ***Consolidation***. Higher levels of performance as well as use of firmware-based logical partitions (LPARs) on Power platforms enable higher levels of E1 system consolidation than may be achieved with Windows and Linux servers. LPARs are enabled by IBM PowerVM technology.

   LPARs allow organizations to deploy multiple E1 components – including database, application and batch, and Web servers, along with development systems – on a single Power server.

If x86 platforms are employed, however, separate physical servers are typically deployed for each of these components for performance reasons. In the installation comparisons presented in this report, four separate Windows and Linux servers are required for the same applications and workloads handled by single LPAR-equipped Power 520 or 550 platforms.

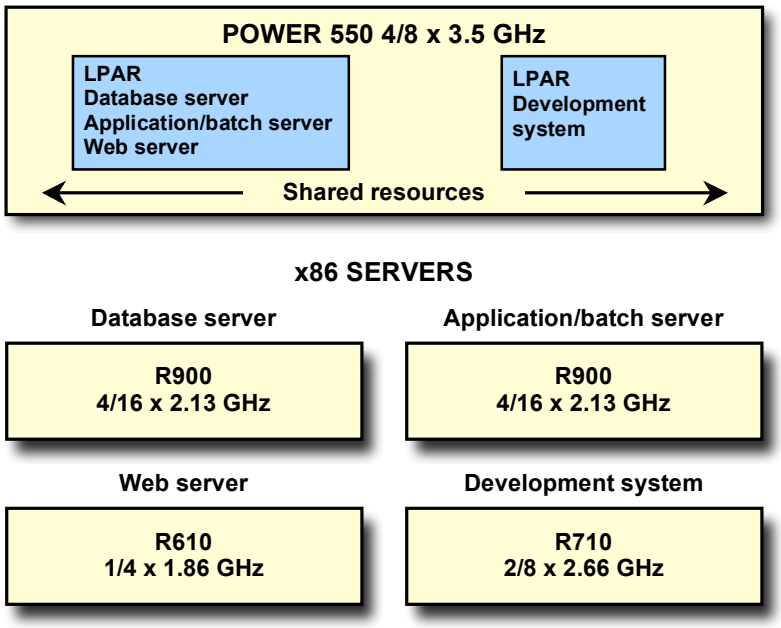
Fewer physical servers translate into reduced administration complexity and lower energy costs. A further benefit is that workloads may be more evenly balanced across Power server processor, memory and I/O resources.

LPAR advantages are reinforced by high levels of granularity (LPARs may be configured in increments as small as 1/100th of a processor core) and by industry-leading system and workload management capabilities. For example, resources may be automatically shifted between LPARs in as little as 10 milliseconds to meet changing workload requirements.

These capabilities mean that significantly higher levels of overall capacity utilization may be realized than if dedicated servers are employed. One effect is that the size of Power server configurations relative to x86 equivalents may be a greater deal smaller than comparisons of raw processing power might suggest.

In one of the installations employed for cost comparisons, for example, four Dell PowerEdge servers with a total of 44 cores are required to handle the same E1 workloads as a single eight-core Power server. Figure 2 shows these configurations.

Figure 2
Power and x86 Server Configurations: Installation Example



(In this presentation and elsewhere in this report, numbers of processors and cores are shown for all servers – e.g., "550 4/8 x 3.5 GHz" refers to an IBM Power 550 server with four dual-core 3.5 GHz processors, while "4/16 x 2.13 GHz" refers to a Dell R900 server with four quad-core Xeon 2.13 GHz processors.)

Such disparities may have important cost implications. For example, SQL Server and Oracle database products are priced on a per core basis, which tends to increase costs for production database servers as well as for development systems.

Partitioning is also supported on Windows and Linux servers, and VMware and other x86 server virtualization tools have been adopted by many E1 users. Typically, however, these support development and test systems. Experience has shown that use of VMware and equivalents results in unacceptable performance degradation for production systems.

This is a common experience with VMware as well as with other software-based partitioning techniques. Multiple workloads running in software-based partitions are more likely to interfere with each other than is the case if "hard" partitions such as LPARs are employed. This may result in performance degradation and outages. Many organizations restrict use of software-based partitioning to non-production instances and non-critical production applications.

For cost comparisons presented in this report, VMware ESX is employed for development systems in the two largest installations. Its use would not have resulted in hardware capacity and cost savings in the others.

3. ***Database requirements.*** Although an Oracle Standard Edition license is included in the inexpensive Oracle Technology Foundation for E1, in practice database costs for use of Linux/Oracle servers are often higher than this would appear to indicate.

   One reason is that Oracle requires the use of separately priced tools for key database management tasks. IBM and Microsoft incorporate comparable functionality in the i DB2 database and in SQL Server respectively for no additional charge.

   A second reason is that it may be necessary to employ Oracle Enterprise Edition, which is significantly more expensive, for larger E1 systems.

   The requirement for additional Oracle tools affects Linux/Oracle database server costs for all of the installations upon which cost comparisons are based. Use of Oracle Enterprise Edition also increases Linux/Oracle database server costs for the two largest installations.

These results confirm a broader principle. Experience has shown that, for any IT solution, it is important to address the full range of costs of ownership including personnel, facilities and other components. Inexpensive hardware does not necessarily translate into lower overall costs over time.

For existing System i users, there are further cost implications. Moving to Power servers and i is a comparatively simple exercise. Changing operating systems and databases, however, is a longer and more expensive process. Moreover, users moving to Windows or Linux servers would typically need to expand IT staffs.

Serious risk issues may also be raised. Even with outside assistance, organizations would incur significant risks of disruption not only while migration was occurring, but also during the longer period when new systems and skill sets were being shaken down.

Power servers and i deliver higher levels of stability, availability and security than Windows and Linux equivalents. Their use lowers risks of disruption whose bottom-line implications may far exceed total IT expenditure by organizations. In a difficult economic climate, it would be foolhardy to incur such risks unless there was a compelling business case to do so.

If costs are not reduced, it is unclear what that business case might be.

Costs of Downtime

Business Impact

More than 20 years of experience with ERP systems has demonstrated that outages impact bottom lines. Operations may be disrupted, personnel and capacity idled, orders and shipments delayed, and a wide range of business activities affected. Customers may also be alienated, and business lost.

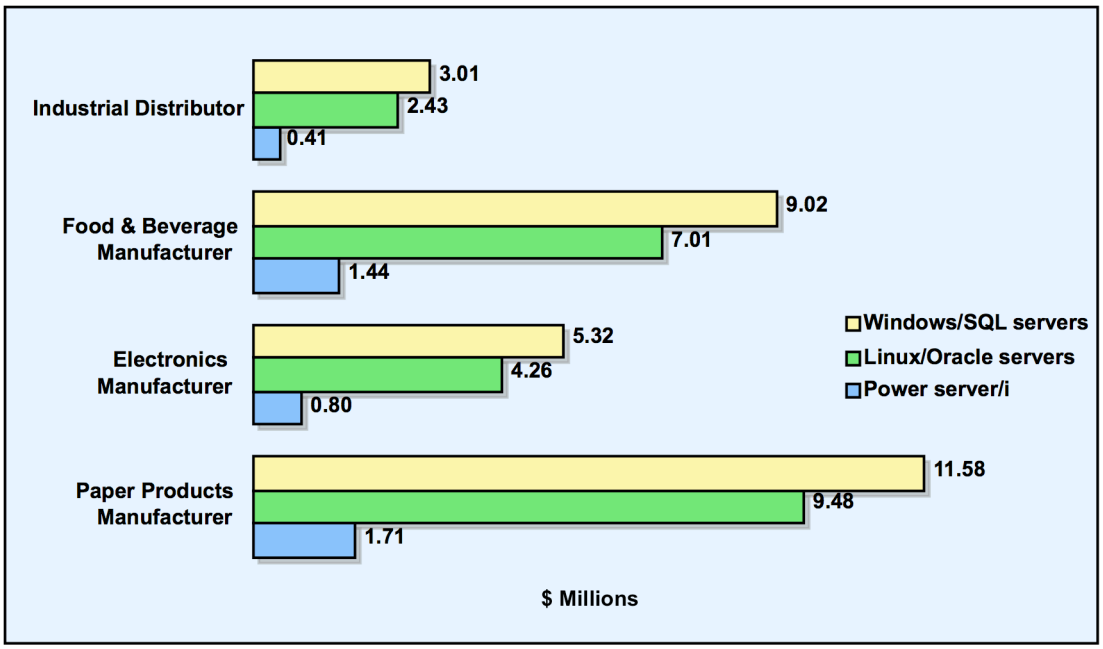
Recent trends have increased vulnerability. A tightly integrated supply chain operating in real time, with lean inventories, is a great deal more vulnerable to outages than a looser, less efficient structure. In such environments, disruptions tend to generate "cascading effects" that may spread rapidly across the entire organization, and extend to customers and suppliers.

The potential impact of outages has been further magnified by shifts to 24x7 business operations. Globalization, as well as the growth of Internet commerce and mounting competitive pressures in many industries, have contributed to this trend.

Organizations are increasingly exposed to the effects not only of unplanned (i.e., accidental) outages, but also of planned downtime for such tasks as hardware and software upgrades, patching and routine maintenance. In the past, these might be performed outside normal business hours. For a growing number of businesses, however, "normal business hours" are now 24 hours per day, 365 days per year.

There is thus a direct correlation between system availability and the bottom-line effects of business disruption. For the four companies upon which cost comparisons presented in this report are based, differences in availability levels between Power servers with i, Windows servers with SQL Server and Linux/Oracle server scenarios translate into major variations in three-year costs of downtime. These are shown in figure 3.

Figure 3
Profile Companies: Three-year Costs of Downtime by Scenario



Three-year costs of downtime for use of Power servers and i average 85 percent and 81 percent less than for Windows servers and Linux/Oracle servers respectively.

Costs of downtime include idle and underutilized capacity and personnel for production and logistics operations; costs of scheduling and production setup changes; costs of order, shipment and payment delays; additional inventory carrying costs; customer-related costs such as late delivery and imperfect order fees; and other components. The basis of these calculations is described in the Basis of Calculations section in this report.

These costs may be characterized as "operational." An additional set of "strategic" costs may also be incurred if outages are severe, protracted or both. Share prices may be impacted. Other effects such as reduced brand value, increased risk provision, higher insurance premiums, and a variety of reputational, legal and compliance problems may be experienced.

The potential significance of such effects was highlighted by a study co-authored by Kevin Hendricks of the University of Western Ontario and Vinod Singhal of the Georgia Institute of Technology. After reviewing the financial results of more than 800 public companies that had experienced severe supply chain disruptions, the authors concluded that company stocks experienced from 33 to 40 percent lower returns relative to industry benchmarks over a three-year period because of these.

The study also reported declines of 7 percent in sales growth, 107 percent in operating income, 114 percent in return on sales, 93 percent in return on assets, and increases in cost of sales, selling, general and administrative (SG&A) expenses and inventory levels.

The business impact of such effects would be severe at any time. In highly competitive markets, with a weak economy, the impact might be a great deal more serious.

Technology Differentiators

Lower costs of downtime for Power servers and i reflect fundamental differences in system design and technology content between these and Windows and Linux server equivalents.

Power servers are characterized by extremely high levels of hardware reliability – the reliability, availability and serviceability (RAS) features of latest-generation Power servers are even more advanced than was the case for the System i platform. The i environment is highly stable and resilient, and incorporates unique design features that minimize planned as well as unplanned downtime.

Power server LPAR capability allows software to be upgraded and maintained without taking systems offline, and the amount of time required for applying patches to i is – by wide margins – less than that for Windows and Linux servers.

The integration of operating system, database and other components in i also facilitates availability. Risks of software failure are typically less than for complex multivendor environments. Simplified, high-productivity management interfaces mean that the potential for administrator and operator errors causing outages, data loss or both is reduced.

User experiences also highlight a broader benefit. The distinctive capabilities of Power servers and i materially reduce the technical complexities with which organizations must deal.

In the past, the effects of IT complexity have debilitated the ERP strategies of more than a few large corporations. In organizations with smaller IT staffs and more limited technical and financial resources, the damage may be greater and longer lasting.

Basis of Calculations

Installations and Scenarios

The cost comparisons presented in this report are based on the installations and platform scenarios summarized in figure 4.

Figure 4
Installations and Scenarios Summary

Industrial Distributor	Food & Beverage Manufacturer	Electronics Manufacturer	Paper Products Manufacturer
Business Profile			
$250 million specialty industrial distributor 350 employees 2 distribution centers	$750 million manufacturer of food & beverage products 2,000 employees 6 manufacturing plants	$600 million manufacturer of electronic components & subassemblies 3,500 employees 15 manufacturing plants	$1.2 billion manufacturer of paper & paperboard products 4,000 employees 52 manufacturing plants
EnterpriseOne Applications			
CRM/Order Management Financial Management Supply Chain Execution Supply Management 13 modules	CRM/Order Management Financial Management Human Capital Management Manufacturing Supply Chain Execution Supply Management 20 modules	CRM/Order Management Financial Management Human Capital Management Logistics, Manufacturing Supply Chain Execution Supply Management 18 modules	CRM/Order Management Financial Management Human Capital Management Logistics, Manufacturing Supply Management 18 modules
Number of Users			
250	500	750	1,000
PLATFORM SCENARIOS			
Power Server/i			
520 1/2 x 4.2 GHz i 6.1 0.45 FTE	520 2/4 x 4.2 GHz i 6.1 0.65 FTE	550 4/8 x 3.5 GHz i 6.1 0.8 FTE	550 4/8 x 4.2 GHz i 6.1 1.0 FTE
Windows/SQL Servers			
R710 1/4 x 2.13 GHz 3 x R610 1/4 x 1.86 GHz Windows Server 2008 SQL Server 2008 1.0 FTE	R710 2/8 x 2.26 GHz 2 x R610 2/8 x 1.86 GHz R610 1/4 x 1.86 GHz Windows Server 2008 SQL Server 2008 1.4 FTEs	2 x R900 4/16 x 2.13 GHz R710 2/8 x 2.26 GHz R610 1/4 x 1.86 GHz Windows Server 2008 SQL Server 2008 VMware ESX 2.25 FTEs	R900 4/24 x 2.13 GHz R900 4/16 x 2.93 GHz R710 2/8 x 2.8 GHz R610 1/4 x 2.26 GHz Windows Server 2008 SQL Server 2008 VMware ESX 2.75 FTEs
Linux/Oracle Servers			
R710 1/4 x 2.4 GHz R610 1/4 x 2.13 GHz 2 x R610 1/4 x 1.86 GHz Linux, Oracle 11g 1 FTE	R710 2/8 x 2.66 GHz 2 x R610 2/8 x 1.86 GHz R610 1/4 x 1.86 GHz Linux, Oracle 11g 1.45 FTEs	2 x R900 4/16 x 2.13 GHz R710 2/8 x 2.66 GHz R610 1/4 x 1.86 GHz Linux, Oracle 11g VMware ESX 2.35 FTEs	R900 4/24 x 2.13 GHz R900 4/16 x 2.93 GHz R710 2/8 x 2.93 GHz R610 1/4 x 2.26 GHz Linux, Oracle 11g VMware ESX 2.95 FTEs

Installations and scenarios were constructed using data on E1 applications and workloads, server configurations, database and system administrator staffing and other variables supplied by 14 companies in the same industries and approximate size ranges, with generally similar business profiles. Companies employed Power servers with i and/or x86 Windows or Linux servers.

IT Costs

IT costs were calculated as follows:

- ***Server costs*** include hardware and software license acquisition, along with three-year hardware maintenance and software update and support subscriptions. Maintenance and support costs are for vendor 24x7 coverage. Calculations based on vendor list prices discounted to reflect prevailing "street" prices.

  Dell PowerEdge servers employed for comparisons were Xeon-based R900 (four-way), and R610 and R710 (two-way) models. Some Linux/Oracle database server and development system configurations are more powerful than Windows server equivalents, reflecting the higher system overhead generated by Oracle databases.

  Power server platforms were configured with i 6.1 and PowerVM Standard Edition, which enables use of LPARs and other virtualization features.

  Windows server platforms were configured with Windows Server 2008 and, for database servers and development systems, SQL Server 2008 Standard Edition. License costs for Microsoft software include Client Access Licenses (CALs). Software support costs are for Microsoft Software Assurance coverage.

  Linux server platforms were configured with a leading commercial Linux distribution, along with Oracle Technology Foundation and Oracle 11g Diagnostics, Tuning and Configuration Management Packs. Database servers for the two largest installations were configured with Oracle 11g Enterprise Edition.

  Windows and Linux/Oracle servers were also configured with third-party system management and security tools providing functionality corresponding to that incorporated in i for no additional charge. VMware ESXi Version 3.5 Foundation was employed on Windows and Linux/Oracle development system servers in the two largest installations.

- ***Personnel costs*** were calculated based on annual average salaries of $86,762 for Power/i administrators handling database as well as system administration tasks; $72,793 and $73,734 for Windows and Linux system administrators respectively; and $86,201 and $93,375 for SQL Server and Oracle DBAs respectively.

  Salaries were increased by 47.7 percent to allow for benefits, bonuses, training and other personnel-related overhead. Overall costs were calculated for a three-year period.

- ***Facilities costs*** include data center occupancy and energy consumption by servers as well as by the infrastructure equipment such as power distribution systems, uninterruptible power supplies (UPS) and computer room air conditioning (CRAC) supporting these.

  Energy costs were calculated using vendor electricity consumption values for server configurations and data center equipment. Specific utilization levels and hours of operation for the installation were then applied, and a conservative assumption for average price per kilowatt/hour was employed to determine three-year costs.

All cost values employed were for the United States.

Costs of Downtime

Costs of downtime were calculated using a two-phase process.

First, average costs per hour of downtime were calculated for companies using appropriate industry- and company-specific values. "Average" in this context means that costs are based on overall annual volumes of business activity divided by hours of operation (in all three cases, 24x365 = 8,760).

Three main cost categories were employed:

1. ***Outbound supply chain disruption*** consisted of costs caused by disruption of activities between factory release and customer delivery. These included costs of idle and underutilized capacity, including personnel costs; handling of delivery delays (including distribution center and transportation costs); inventory carrying costs; and costs of change for affected processes.
2. ***Inbound supply chain and production disruption*** consisted of costs incurred for activities between initial supplier queries and factory release. These included costs of idle and under-utilized capacity, including personnel costs, for inbound logistics and production operations; handling of delivery delays (including transportation costs); inventory carrying costs; and costs of supplier order, production scheduling and other changes.
3. ***Other costs*** included penalties for late delivery and imperfect orders, along with buyback costs such as rebates; costs of customer billing delays; reduced productivity of and additional work performed by sales, customer service and administrative personnel; and other items.

Second, average costs per hour of downtime were multiplied by numbers of hours of downtime per year for each platform scenario. These were calculated based on user input. The focus was placed on downtime for underlying hardware and software platforms, rather than downtime for E1-related functions. Annual costs of downtime for each scenario were then multiplied for three-year totals.

All of companies that formed the basis of calculations were located in the United States.

Additional Information

This ITG Status Report is based upon the preliminary results and methodology for an upcoming Management Brief to be released by the International Technology Group. For copies of this Management Brief, please email requests to info-itg@pacbell.net.

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