ITG Executive Summary

July 2009

BUSINESS CASE FOR IBM VIRTUALIZATION SOLUTIONS: BOTTOM LINE IMPACT FOR ENTERPRISE INFRASTRUCTURES

Value Proposition

In many organizations, IT infrastructures are fundamentally inefficient. Decades of case-by-case deployments, uncoordinated platform choices and ad hoc upgrades to support growth have created high levels of fragmentation. Capacity is underutilized, quality of service experienced by users is increasingly problematic, and costs and risks are too high.

The IBM Dynamic Infrastructure initiative is designed to meet these challenges. It is a combination of programs, products and services designed to improve service to users, reduce costs and more effectively manage risk across all components of organizational IT infrastructures. It extends across the full range of IBM platforms and places a new focus on applying new technologies to all infrastructure resources.

One of the most critical technologies in IBM's Dynamic Infrastructure strategy is virtualization. IBM is an industry leader in server as well as storage virtualization.

A key – and unique – IBM advantage has been that the company has been able to draw upon mainframe technologies. Virtualization originated on mainframe systems in the 1970s, and the IBM System z continues to offer the IT world's most mature and stable virtualization architecture.

Key mainframe virtualization capabilities, however, have been progressively transferred to other IBM platforms. Power, System x and BladeCenter servers all draw upon mainframe virtualization strengths.

IBM has also been one of the earliest and most effective supporters of x86 server virtualization solutions offered by VMware, Microsoft, Citrix and others. The company has invested heavily in optimizing and supporting all of these.

This report is about the benefits that IBM virtualization solutions can deliver to large as well as midsize organizations. Specifically, it looks at the potential bottom-line impact of these. Two examples presented in this report demonstrate a wide range of potential savings in server and storage costs, and in middleware and personnel costs associated with these.

In a large financial services company, effective deployment of IBM virtualization solutions is shown to reduce five-year costs of ownership for x86, UNIX server and disk storage infrastructures by 53 percent; i.e., costs are more than halved. In a midsize manufacturing company, costs of ownership are reduced by 44 percent.

Infrastructure Economics

A key conclusion may be drawn. Virtualization should be pursued as a central component of broader strategies to improve the cost-effectiveness of organizational system infrastructures. The larger business value of such strategies may be simply demonstrated.

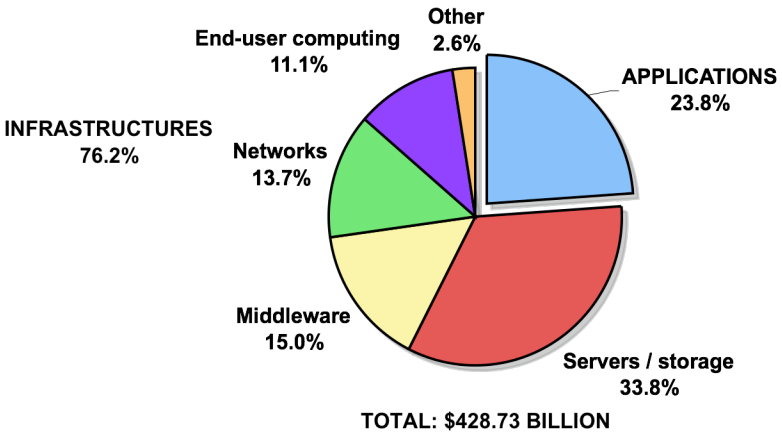
The business contribution of IT expenditure has been the subject of growing debate since the late 1990s. Business executives, consultants and analysts have long been frustrated by their inability to relate overall IT expenditure to business performance. Some have argued, "IT doesn't matter."

The issue, however, may be not the overall level of IT expenditure, but rather the way in which it is distributed. A strong case can be made that spending on underlying infrastructures has come to dominate IT budgets. This has occurred to the extent that, in many organizations, investment in new application capabilities has become entirely inadequate.

If IT expenditure is broken out into infrastructures and applications, the nature of the problem becomes apparent. Figure 1 shows 2008 IT expenditure by Fortune 1000 companies using these categories.

Figure 1

IT Expenditure on Infrastructures and Applications by Fortune 1000 Companies in 2008



Source: International Technology Group

Infrastructure costs include hardware acquisition and maintenance, licenses and support for all software except applications, facilities costs including data center occupancy, power and cooling, and system management personnel costs.

In 2008, more than three quarters of IT expenditure was on infrastructures. Of this, the single largest component was servers and storage.

It is difficult to resist the conclusion that a fundamental misalignment has developed between business requirements and the manner in which overall IT resources are allocated.

Users interact with, and business processes are enabled by applications. They are the direct source of business value. Underlying server, storage, middleware and network resources are merely the delivery mechanisms for these. Their contribution to business value is indirect. Yet, resources have been progressively diverted from applications to infrastructures.

One of the main drivers of this process has been fragmentation of server, storage and network infrastructures. This process has been most visible for x86 server bases, but has also extended to UNIX servers and storage systems. Low levels of capacity utilization and high administration overhead and energy costs have become pervasive.

More than any other technology or technique available in the IT world today, virtualization offers the potential to reverse this situation. Which means that there is an opportunity not only to realize short-term cost savings, but also to fundamentally increase the value that IT expenditure brings to businesses.

An effective organization-wide virtualization strategy could enable the average Fortune 1000 corporation to release from 10 to 15 percent of its total IT expenditure for investment in new initiatives. Expenditure on high-impact application initiatives with high business yields could be increased by wide margins. The bottom-line business impact would clearly be substantial.

Proof of Concept

General Approach

As a "proof of concept" of the potential bottom-line impact of virtualization, two composite profiles were developed for this report using data supplied by 26 companies in the same industries and approximate size ranges, with generally similar business profiles.

Input was obtained on applications, existing server and storage bases, staffing levels for system administration and related functions, and other variables for x86 and UNIX servers, and for disk storage systems. Using this data, two sets of scenarios were constructed:

1. ***Conventional scenarios*** represent existing IT environments within companies and are based on user-reported data. Scenarios include diverse multivendor bases of x86 and UNIX servers and disk systems.
2. ***IBM virtualized scenarios*** are for the same applications and workloads deployed on current-generation IBM System x and BladeCenter servers exploiting the full potential of VMware and equivalents (x86 servers); IBM POWER6-based Power servers exploiting the full potential of IBM PowerVM (UNIX servers); and IBM disk systems exploiting the full potential of SVC.

Five-year costs for hardware, maintenance, systems and database software, personnel for system or storage administration and related tasks, and facilities were then calculated for each scenario.

Systems software costs for server scenarios include licenses and five-year support for operating systems, system management tools and, where appropriate, virtualization software. Database software costs include five-year support and, where appropriate, new license costs for Microsoft SQL Server (x86 server scenarios) and Oracle (UNIX server scenarios).

Systems software costs for disk storage scenarios include operating systems, storage management and, where appropriate, point-in-time copy, remote replication, host access and other software.

Server and storage costs were calculated using "street" prices (i.e., discounted prices paid by users). Personnel costs were calculated based on prevailing annual salaries for UNIX, Windows and Linux system administrators; and storage administrators.

Facilities cost calculations include data center occupancy, power and cooling equipment, and energy consumption. Costs for power and cooling equipment were calculated using discounted acquisition and maintenance prices for leading vendor offerings. Energy costs were calculated using a conservative assumption for average price per kilowatt/hour.

All costs are for the United States.

Financial Services Company

This profile is of a diversified retail bank with approximately $400 billion in assets, $15 billion in revenues and more than 1,600 branches. It employs around 55,000 people.

Scenarios for this company are as follows:

- ***Conventional scenarios***. At the beginning of the five-year cost measurement period, conventional scenarios include 3,852 x86 and 242 UNIX servers. x86 servers include a variety of models from Dell, HP, IBM, Sun and others, while UNIX servers include the platforms shown in figure 2.

Figure 2
UNIX Server Conventional Scenario: Platforms

SUN MICROSYSTEMS	HEWLETT-PACKARD	OTHER PLATFORMS
E25K, E6800, E4900, E4800, E2900, M4000, V890, V880, V490, V480, V40Z, X4600, X4500, X4200, X4100, X2000, Blade 6000, various Total: 158 servers	Superdome, rx8640, rx8620, rx7620, rx6600, rx4640, rx3600, rx2660, rx2620, rp8420, rp8400 Total: 41 servers	IBM pSeries 690, 670, 650, 615, System p 570, 550, 520, 510, 505, Power 570, BladeCenter Silicon Graphics Altix 450 Total: 43 servers

The conventional disk storage scenario includes 1,488 terabytes (TB) of centralized and distributed disk storage. Disk systems include Dell, EMC, HP, Hitachi, IBM and Sun platforms.

Conventional scenarios correspond to the server and storage environments found in many large organizations today. There is no coordinated strategy for server or storage virtualization.

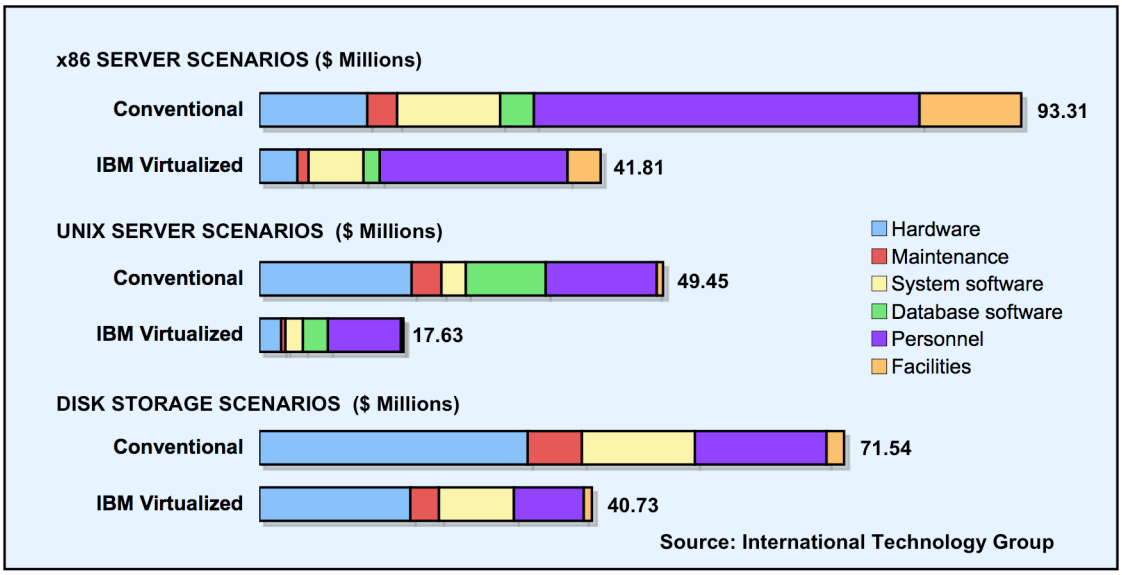
- ***IBM virtualized scenarios***. In these, beginning of period totals are reduced to 1,431 System x and BladeCenter servers, and 43 Power servers ranging from dual-core blades to 32-way Power 570 models. Disk storage includes 768 TB of IBM DS8000 and DS5000 physical disk system capacity in SVC environments.

  In these scenarios, an effective virtualization strategy has been put in place across organizational server and storage bases.

For both sets of scenarios, allowance is made for capacity growth over the measurement period, with the result that end-of-period totals are higher. This is particularly the case for disk storage capacity.

Five-year costs for these scenarios are summarized in figure 3.

Figure 3
Five-year Cost Comparisons for Conventional and IBM Virtualized Scenarios: Financial Services Company

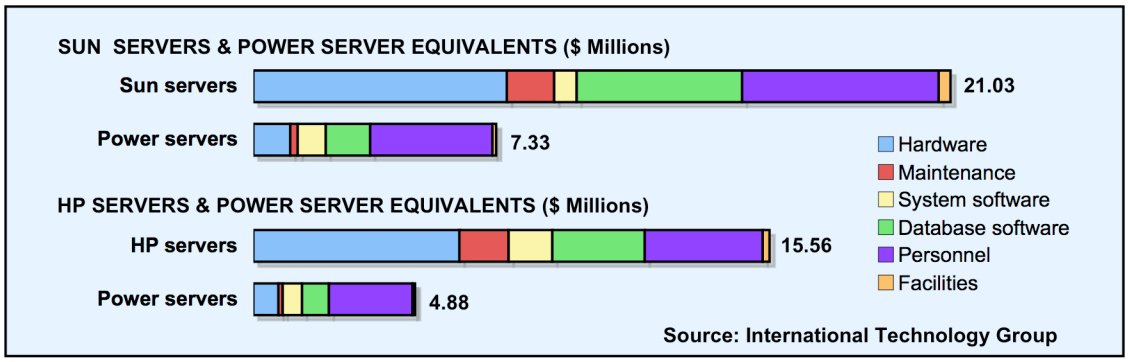


Five-year costs for IBM virtualized scenarios are 55 percent lower than conventional equivalents for x86 servers, 64 percent lower for UNIX servers, and 43 percent lower for disk systems.

There are a number of variations in comparative costs between platforms. For UNIX servers, five-year costs for Power servers in IBM virtualized scenarios were 65 percent lower than for Sun servers, and 69 percent lower than for HP servers in conventional scenarios. These costs are broken out in figure 4.

Figure 4

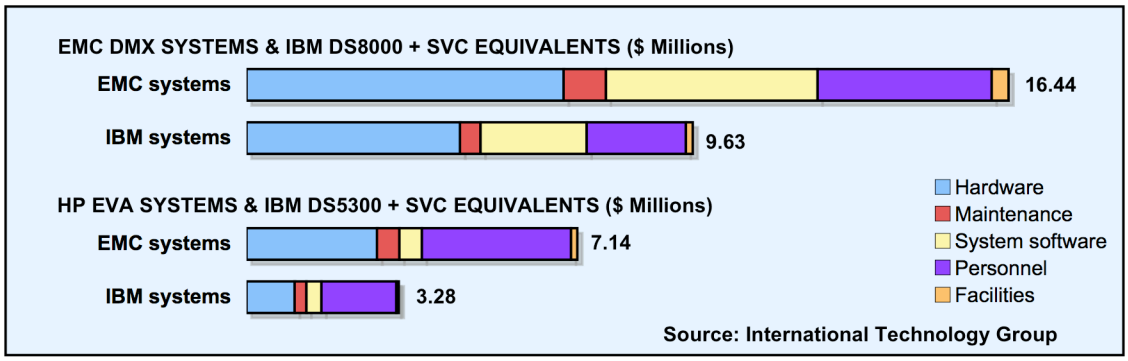
Five-year Cost Comparisons for Conventional and IBM Virtualized Scenarios: Financial Services Company – UNIX Server Breakouts



For high-end disk storage, five-year costs for IBM DS8000 systems and SVC in IBM virtualized scenarios were 41 percent lower than for EMC DMX equivalents. For midrange disk storage, costs for IBM DS5000 systems and SVC were 54 percent lower than for HP Enterprise Virtual Array (EVA) equivalents. These costs are broken out in figure 5.

Figure 5

Five-year Cost Comparisons for Conventional and IBM Virtualized Scenarios: Financial Services Company – Disk Systems Breakouts



IBM virtualized scenarios for both companies assume that organizations apply best practice techniques in configuring servers and disk systems to take advantage of the potential of virtualization, and in managing VMware, PowerVM and SVC environments.

Manufacturing Company

This profile is of a discrete manufacturing company with approximately with $800 million in revenues and around 3,000 employees.

The company's core enterprise resource planning (ERP) and supply chain management (SCM) systems are deployed on UNIX servers. A variety of Windows applications are deployed on x86 servers.

Scenarios for the manufacturing company are as follows:

- ***Conventional scenarios***. At the beginning of the five-year cost measurement period, conventional scenarios include 7 Hewlett-Packard Integrity and 9000 UNIX servers, and 63 Dell PowerEdge and HP ProLiant x86 servers. The conventional disk storage scenario includes 83.4 TB of physical disk capacity on HP EVA systems.
- ***IBM virtualized scenarios***. In these, beginning of period totals include 3 Power 550 and 520 servers, 29 System x and BladeCenter servers, and SVC-enabled DS5300 disk systems with 38.4 TB of physical disk capacity.

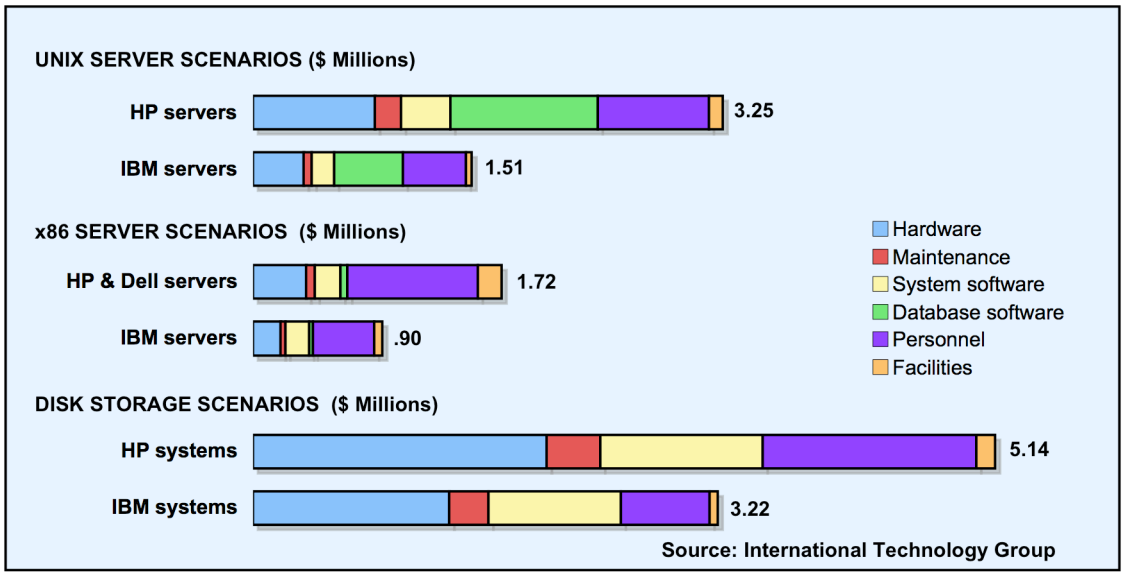
For both scenarios, allowance is again made for server as well as storage capacity growth over the measurement period.

Five-year costs for IBM virtualized scenarios are 48 percent lower than conventional equivalents for x86 servers, 53 percent lower for UNIX servers and 37 percent lower for disk systems. Combined costs are 44 percent lower.

These results are summarized in figure 6.

Figure 6

Five-year Cost Comparisons for Conventional and IBM Virtualized Scenarios: Manufacturing Company



In IBM virtualized scenarios, lower UNIX server costs are due to higher levels of consolidation for multiple system images enabled by PowerVM technology. More granular partitioning, as well as superior Power server performance, means that the same workloads are handled by fewer, smaller servers.

Lower x86 server costs reflect the scalability and performance strengths of IBM X-Architecture servers, which enable these to support larger numbers of VMware images than HP and Dell platforms. More effective System x and BladeCenter management features, as well as higher levels of energy efficiency also translate into lower personnel and facilities costs respectively.

Lower disk storage costs for IBM virtualized scenarios are due to use of SVC, which more than halves the amount of physical disk storage required, as well as to industry-leading DS5300 performance.

Positioning IBM

The potential benefits of enterprise-scale virtualization are diverse. Organizations have realized not only cost savings, but also increased flexibility of provisioning (virtual resources can be deployed more rapidly and easily than physical systems), improved availability, more effective backup, recovery and security of data, and other benefits.

The server and storage environments that must be addressed in most organizations are even more diverse. At the end of 2008, for example, the average Fortune 1000 corporation contained more than 4,800 x86 and UNIX servers running a variety of operating systems, databases and tools.

The same corporation also had mainframes, midrange systems and almost 300 TB of server disk storage capacity on centralized and distributed platforms, employing multiple disk technologies and media types.

In larger organizations, all of these numbers may be significantly greater. Even midsize businesses must deal with multivendor installations and levels of technological diversity that have increased dramatically during the last decade and will continue to increase in the future.

No single virtualization solution can meet all requirements. It will be necessary to employ multiple solutions. It will also be necessary to put facilities in place that can manage each of these effectively, while allowing for integrated management of physical and virtualized resources at the enterprise level.

The IBM offerings described in this document meet these requirements. They include industry-leading capabilities for UNIX and x86 server virtualization; SVC, the most widely-used, highest-performing storage virtualization solution; and a set of server, storage and enterprise management facilities whose interoperability and functional breadth are unrivalled by any other vendor.

Although many server and storage vendors offer virtualization capabilities, or support third-party solutions such as VMware, few have developed and implemented a coordinated virtualization strategy across all of their platforms. IBM has done so. Virtualization enjoys a strategic focus in IBM platform strategy that is significantly greater than that of any competitor.

The list of vendors who can meet the full range of virtualization requirements is very short. IBM clearly stands at the top of this list.

Additional Information

This ITG Executive Summary is based upon results and methodology contained in a Management Brief released by the International Technology Group. For copies of this Management Brief, please email requests to info-itg@pacbell.net.

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