



Issue 2

- 2 HP BladeSystem: Industry's Leader in Virtualization
- 4 From the Gartner Files: Best Practice: Virtualize Your IT Systems Incrementally to Reduce Costs
- 7 About HP

Maximizing Your Infrastructure through Virtualization

Featuring Virtualization Best Practices for Reducing Costs

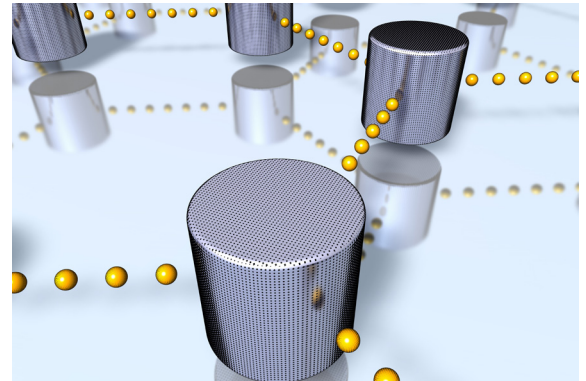
Introduction

Virtualization continues to be one of the most effective ways to consolidate, reduce cost, and make data centers more efficient. Gartner research outlines how to get the most from your virtualization efforts in their paper titled "Best Practice: Virtualize Your IT Systems Incrementally to Reduce Costs". HP BladeSystem fits the needs of today's demanding virtualized workloads to maximize the benefits recommended in Gartner's research.

Gartner research is a trusted source of objective, independent intelligence on information technology. Gartner's methodology is geared to discovering how current trends are likely to become future events, and what effect those events are likely to have on client technology investments and their businesses. Gartner found that "Sixty percent of all new server workloads are virtualized" and that virtualizing delivered significant savings through consolidation and management. The best practices included in this paper reflect Gartner's additional findings and recommendations on virtualization deployment.

HP BladeSystem: Industry's Leader in Virtualization

HP BladeSystem, the #1 industry leader in the blade market and #1 server for virtualization worldwide, is the ideal platform for virtualization. HP Server Blades are designed for virtualization from the ground up, delivering more memory and superior networking capability for virtualized environments and compute intensive application workloads. You can consistently achieve high



levels of virtual machine performance while reducing your data center footprint and lowering your cost per virtual machine with the HP server blades. The modular, future proof design of HP BladeSystem can be quickly scaled, repurposed, and upgraded to fit your changing business needs. What does this mean to you? HP can help you create a virtualized solution that can be tailored to meet your needs today and tomorrow allowing for growth and changing needs down the road.

Gartner projects that "Approximately 40% of server workloads in the installed base are virtualized; this likely will grow to 80% by 2015." As you continue the implementation of virtualization in your environment, your IT budget dollars must work harder. Making an investment in the infrastructure that makes virtualization easier and more efficient just makes sense. HP BladeSystem is an essential element for your data center growth plans because it maximizes every hour, watt, and dollar by provisioning in minutes verses months, reducing infrastructure at the server edge by 95%, and reducing TCO by 56%. Considerations for HP BladeSystem:

Featuring research from



HP BladeSystem: Provision in minutes verses months, 95% reduction at the server edge, 56% reduction in TCO...maximizing every hour, watt, and dollar.

"Approximately 40% of server workloads in the installed base are virtualized; this likely will grow to 80% by 2015."

“Sixty percent of all new server workloads are virtualized.”

“When between 25% and 50% of the workload is virtualized, the ratio of VMs to physical servers increases to its peak ratio of 12:1.”

“The BL460 Gen 8 platform effectively cuts my hardware investments in half as compared to the G6 models by doubling CPU cores & memory at about the same cost.” Domenic DiStefano, ECCS Chief Architect, JPMC

Gartner RAS Core Research
Note G00218910 Best Practice: Virtualize Your IT Systems Incrementally to Reduce Costs, P. Dawson, 23 September 2011

The Gartner research note in this newsletter provides best practices for virtualization

Simplify your path to virtualization with HP BladeSystem

1. *Less Cost – Reduce total cost of ownership up to 56%¹ over traditional infrastructures*
2. *Less Power – Double the capacity of your data center² without adding power infrastructure with power aware, energy optimized Intelligent Infrastructure*
3. *Simplified Management - Manage your infrastructure in less time with Insight Management*
4. *Less Infrastructure – up to 95% fewer components with HP Virtual Connect³, the world’s simplest way to connect to any network*

Gartner states “When between 25% and 50% of the workload is virtualized, the ratio of VMs to physical servers increases to its peak ratio of 12:1”. With increased virtualization, complexity can be mitigated through the use of tools that simplify management while efficiently handling storage and networking capabilities. HP makes managing these virtual servers much easier with HP Insight Control to seamlessly integrate with VMware vCenter for better management of virtualization environments. Administrators gain insight and control of their HP infrastructure from a single pain of glass reducing the time it takes to make important change decisions as well as manage

planned and unplanned downtime. Best of all is the fact that servers, storage, and networking can be managed together from inside VMware vCenter, a unique HP capability.

Too often virtualization solutions view the networking components as a separate piece of the puzzle. HP has fully integrated networking and offers a complete infrastructure solution. HP BladeSystem with Virtual Connect allows one server networking port to be allocated to up to 4 physical connections reducing port count and cost while increasing flexibility. It also simplifies networks by reducing cables without adding switches to manage, change servers in just minutes, and fine tunes network bandwidth based on application needs. Virtualization network traffic demands low-latency, server to server and server to storage connectivity. HP’s Virtual Connect, together with HP’s Intelligent Resilient Framework enables flatter, low-latency networks. When compared to other solutions, HP BladeSystem with Virtual Connect can lower latency by up to 59%⁴. With HP Virtual Connect, businesses can reduce costs and simplify connections to LANs and SANs, consolidate and precisely control their network connections and enable administrators to add, replace and recover servers on-the-fly. VMware recommends physical connections for vMotion, vCenter Console, VMs and Fibre Channel or iSCSI storage, and HP Virtual Connect Flex-10 Technology provides the flexibility to configure these connections with the necessary bandwidth with a fraction of the server ports. That’s ideal for today’s demanding converged and virtualized applications.

¹HP White Paper: The business case for HP BladeSystem Matrix, based on data from the HP BladeSystem and BladeSystem Matrix TCO Calculator, <http://roianalyst.hp.com/bladesystemmatrixtco/launch.html>

²Dynamic Power Capping TCO and Best Practices White Paper, <http://h71028.www7.hp.com/ERC/downloads/4AA2-3107ENW.pdf>

³Based on internal calculations; Internal study HP BladeSystem Matrix TCO Analysis, 1/24/2011; HP BladeSystem and BladeSystem Matrix TCO Calculator

⁴Latency Substantiation:

- SFP+ CU copper cable 0.1us http://www.cisco.com/en/US/docs/unified_computing/ucs/hw/6200/install/overview.html
- UCS 6200 3.2 to 2usec <http://www.cisco.com/en/US/products/ps11548/index.html>
- Nexus5548 2usec http://www.cisco.com/en/US/prod/collateral/switches/ps9441/ps9670/ps11215/white_paper_c11-622479.html
- UCS-IOM-2208XP 0.6usec http://www.cisco.com/web/FI/expo2011/presentations/Cisco_Salli.pdf
- UCS-IOM-2204XP 0.5 usec Cisco
- Virtual Connect Flex Fabric 1.5 μs Ethernet ports and 2.0 μs Enet/Fibre Channel ports http://h18004.www1.hp.com/products/quickspecs/13652_na/13652_na.pdf

Protect Your Investment

HP BladeSystem has an integrated design that has fewer components, uses less power, incorporates better management, as well as delivering robust services and support. With HP BladeSystem you can virtualize everything for enhanced resiliency, flexibility, and efficiency. From the servers to storage, networking to management, and services and support, HP has you covered.

In support of virtualization proven professionals are an important consideration, and HP has the right credentials. HP Technology and Enterprise Services have more than 1,200 VMware certified professionals. HP Enterprise Services has executed over 2,000 Data Center Modernization engagements in the last three years, using with over 900 consultants performing IT transformation projects. As global leader in virtualization solutions based on VMware, HP has more server models certified for VMware than any other vendor - so we can deliver what you need. Our goal is to consistently meet your growing requirements as your trusted partner for the full spectrum of your IT investments.

Source: HP



We invite you to read the full Gartner report and learn more about HP BladeSystem at www.hp.com/go/BladeSystem or contact your local HP account manager to explore the ideal platform for virtualization - HP BladeSystem!

Sincerely,

Chuck Smith

Vice President, WW Blades,
Cloud and Business Development
Industry-standard Servers & Software
Hewlett-Packard Company

From the Gartner Files:

Best Practice: Virtualize Your IT Systems Incrementally to Reduce Costs

Many IT leaders are under pressure to virtualize their infrastructures, in part because virtualization cuts costs and improves IT efficiency. However, IT leaders should virtualize their systems incrementally to ensure the most effective outcome.

Overview

IT leaders should begin IT infrastructure virtualization with the systems that are the easiest (e.g., low utilized application, Web or infrastructure servers) and that make the most sense to virtualize (i.e., delivering savings through consolidation and management). To maximize the migration of IT systems to virtual machines (VMs), focus on one-third of your infrastructure at a time.

Key Findings

- While vendors push for 100% virtualization as being easy and a continuum, the last third of the workloads and projects require a different migration approach, because they tend to be more complex.
- Approximately 40% of server workloads in the installed base are virtualized; this likely will grow to 80% by 2015.
- Sixty percent of all new server workloads are virtualized.
- One-third of all workloads tend to be easy to virtualize, while the next third will require more effort, depending on input/output (I/O), software licenses and the VM mix. The final third of the total workload will require a mix of rationalization (reduction of type of things), consolidation (reduction of number of things) and alternate delivery.
- Many issues — such as license management, software upgrades and patching of systems — need to be addressed in virtual host environments. Only a reduction in the number of virtual systems (rationalization) can provide true management improvements and cost reductions.

Recommendations

- Consolidate the virtual hosts into fewer, and maybe larger, virtual hosts once the virtualization process of moving from physical servers to logical servers is complete.
- Understand that all projects are not equal in a virtualization strategy. Some systems require more effort and resources than others to become logical servers, and may be best left alone, retired or outsourced.
- Cost and plan your virtualization growth, using a workload approach. Understand that the more you virtualize, the more the cost of each workload to virtualize will increase. Virtualize the easy-to-virtualize workloads first.
- Split your final third of systems to be virtualized into three more groups, according to complexity; try to manage, retire or outsource/cloudsource the last of these thirds as soon as possible to help manage and fence off costs.

Analysis

Many Gartner clients are continuing to virtualize their IT infrastructures, because they realize that virtualization can save costs and improve system efficiency. However, IT managers must understand that virtualization projects require different investments in terms of cost, time and effort. Therefore, Gartner advises developing a workload strategy that divides the infrastructure into thirds and approaches each third incrementally, targeting the easiest systems to convert first, and progressively moving to systems that are more complex in terms of I/O, software licensing and VM.

The relatively simple systems virtualized first should also be consolidated, thereby avoiding the problem of just moving a management problem from a physical environment to a virtual environment. Many tasks, such as OS and application software maintenance, are not solved by virtualization, but are only transferred and potentially amplified. During the virtualization system selection process, identify systems that can be consolidated, as well as moved.

The More You Virtualize, the More the Costs Will Vary and Increase

In 2011, we see IT departments virtualizing 40% of their workloads. While that figure is bound to increase, it's important for IT managers to understand how to approach virtualization projects that promise different levels of difficulty, complexity and price/cost.

As clients start virtualization initiatives, the ratio of VMs to physical server is approximately 8:1. During this time, operations staff are gaining skills and learning to virtualize workloads. When between 25% and 50% of the workload is virtualized, the ratio of VMs to physical servers increases to its peak ratio of 12:1. At this point, the IT organization (ITO) can virtualize the remaining workloads relatively easily, and the cost per VM is at its optimum and most efficient. Virtualization upward of 50%, moving toward 75% or more of the workload, results in the VM ratio moving back to an acceptable 10:1. However, once the infrastructure is more than 75% virtualized, other issues — e.g., problems with skill levels and capabilities, I/O bottlenecks of the platform and VM mix and increased complexity — kick in.

ITO must consider:

- **Number of cores:** Increasingly, the number of cores per socket affects VM scaling. With dual-core systems, the VMs per core was a ratio of 1.7:1. Today, the ratio of VMs per core is 1.3:1, but this figure is dropping as cores per socket

continue to double every 18 months. Through 2015, the VM-to-core ratio will move to 1:1, as core density continues to increase.

- **x86 servers:** While x86 server virtualization may seem to have been done by all clients, it has not. It is still being done — and there is a lot more to do. We believe that 40% of workloads are VMs, and that this will double in four years to 80%. Clients must plan and manage this growth and understand their own ceiling.

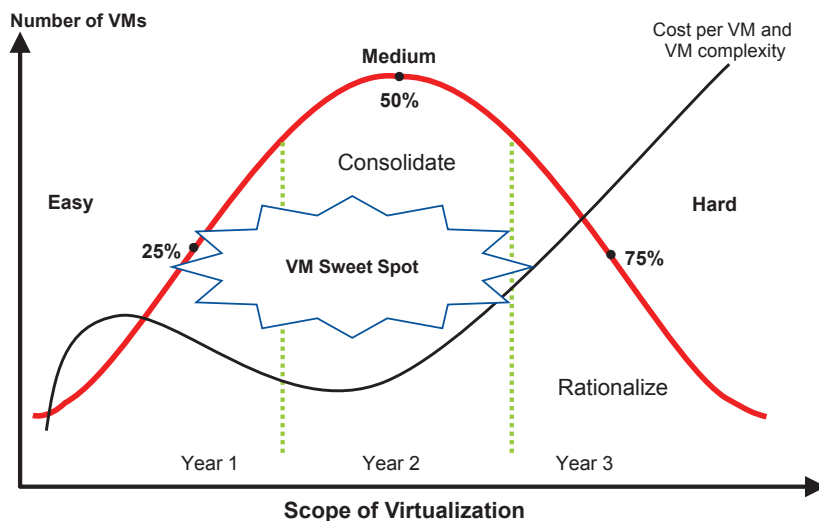
Remember, the more systems you virtualize, the more it will cost per each workload, which also can increase with workload complexity. The cost per VM also depends on “what not to virtualize.”

Year 1: Start With the Easiest Work

IT managers should begin their virtualization projects by creating a simple, standard distribution curve that assesses workloads as: (1) easy, (2) medium and (3) hard to virtualize — and overlay this onto the exponential cost per VM (see Figure 1).

For example, if 40% of workloads in an organization are virtualized today, then a majority of these workloads are apparently easy to virtualize. Costs are also fairly predictable with this level of virtualization penetration. At 60% virtualized workload adoption, we see a tipping point. From that point, additional workloads virtualized should see an increase in cost per VM, but, at this point, the costs are contained.

FIGURE 1 Virtualization: Standard Workload Distribution Curve



Source: Gartner (September 2011)

Therefore, we can virtualize 50% to 66% of workloads with an acceptable degree of cost and time investment. These workloads and projects should be consolidated and rationalized accordingly over one to two years. Focus on projects close to the boundaries (shown in Figure 1) between easy and hard to virtualize workloads. Clients should reset the SLA/price (move the projects to the easiest one-third of workloads) or simply wait until IT skills and technology mature.

Review the whole IT infrastructure to determine if other components, such as storage and the network, also need to be upgraded. When many virtual servers and workloads are consolidated onto a single server, the storage connections often need to be upgraded to adjust to the increased workload — for example, where file-based network-attached storage (NAS) storage was sufficient for single physical systems. Several virtual hosts on a physical server may require lower latency (8 Gbps) Fibre Channel storage area network (SAN) connections, because the number of I/O operations per second (IOPS) increases. This may also be true for the network, as customers may have to upgrade from 1 Gigabit Ethernet (GigE) to 10 GigE.

Buyer Beware: Use a New Strategy for the Final-Third Workload

Vendors will push for 100% virtualization. However, this is unrealistic, as the last third of the workloads and projects (66% or more) deserve special consideration; virtualization, in certain cases, may or may not be worthwhile.

Virtualization beyond 66% of workloads gives rise to exponential costs from storage, software, test development and platform. If you start virtualization projects with these hard-to-do

workloads, then you will hit these high costs early and eradicate much of the anticipated savings. Follow this process:

- Split the last third (upward of 66%) into thirds (so you end up with the top three-ninths).
- Address the most difficult of these parts by retiring or outsourcing/cloudsourcing the workloads in them as soon as possible.
- For the first of these thirds, wait approximately a year for the market, technology and skills to mature, and then virtualize these workloads.
- For the middle part, again wait approximately a year for maturity, then look at drilling down further into thirds. The same rules used for the first third apply, but, this time, the splices are only one-27th of the workloads.
- Understand that smaller portfolios may not require this level of drill down.

With this approach, there will be a need to virtualize up to 66% of the workload in one to two years, and up to 80% in three to four years. Projects scheduled for beyond that time frame should be fenced off as physical, and charged accordingly, retired or outsourced/cloudsourced.

Finally, it is important to know that as you manage a mixed, partially virtualized environment, you should manage physical servers, VM hosts, virtual workloads and physical workloads with as few toolsets as possible. Try to share tools and processes across the portfolio to reduce the number of systems or manage repeat costs.

About HP

HP is a technology company that operates in more than 170 countries around the world. We explore how technology and services can help people and companies address their problems and challenges, and realize their possibilities, aspirations and dreams. We apply new thinking and ideas to create more simple, valuable and trusted experiences with technology, continuously improving the way our customers live and work.

No other company offers as complete a technology product portfolio as HP. We provide infrastructure and business offerings that span from handheld devices to some of the world's most powerful supercomputer installations. We offer consumers a wide range of products and services from digital photography to digital entertainment and from computing to home printing. This comprehensive portfolio helps us match the right products, services and solutions to our customers' specific needs. More information about HP (NYSE: HPQ) is available at <http://www.hp.com>.

HP BladeSystem Portfolio

- BladeSystem ProLiant Server Blades
- BladeSystem Integrity Server Blades
- BladeSystem Enclosures
- CloudSystem Matrix
- BladeSystem Storage

- Management Software
- Virtual Connect
- BladeSystem Services



HP BladeSystem Customers

- Success Stories: www.hp.com/go/success

HP Online

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- HP CloudSystem: www.hp.com/go/cloudsystem
- HP Integrity Servers: www.hp.com/go/integrity
- HP Virtual Connect: www.hp.com/go/virtualconnect
- HP Insight Software: www.hp.com/go/insight
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