IT consolidation with HP and VMware
Reduce costs, simplify your IT environment and increase business agility.
Are you capitalizing on your virtualization opportunities?

As businesses grow, many are left with inflexible IT environments that are costly to operate and difficult to manage. In a common scenario, a company will have large numbers of underutilized servers that are dedicated to particular applications. Each takes up valuable data center floor space, consumes scarce power and cooling capacity, and drives up management costs.

To address the problem, your company may be looking for ways to consolidate stand-alone servers into denser blade and storage systems. This alone is a good first step, but it doesn’t take full advantage of consolidation opportunities. To make greater use of your server and storage resources, you need to add another element to your IT consolidation approaches: virtualization. Virtualization allows you to pool and share your IT resources to increase utilization and reduce costs. Through its ability to consolidate many physical servers into one pool of virtual compute resources, virtualization can result in a 10:1 or greater ratio of virtual machines on a single physical server. Better still, virtualization enables a change-ready infrastructure—in which IT supply can shift quickly to meet changing business demands.

So how do you achieve these gains? Look to IT consolidation solutions from HP and VMware. Together, HP and VMware have the technology and services you need to put virtualization to work to consolidate your IT environment in a manner that reduces costs, simplifies your IT environment and increases business agility.

What goes into an HP IT consolidation solution? Here are the key components.

Together with VMware, HP simplifies your project by bringing together all the components you need for a virtualized IT consolidation solution. HP solutions are composed of several hardware and software building blocks—including servers, storage, VMware virtualization software and management tools—along with professional services to design, integrate, deploy and support your solution.

When you work with HP, your IT consolidation solution can include any of the following components:

**HP ProLiant and HP BladeSystem servers**
HP ProLiant and HP BladeSystem servers provide ideal platforms for virtualization on industry-standard hardware. With HP, you have the added assurance that comes with hardware and software that have been certified for VMware. Today, HP has more certified platforms for VMware than any other vendor—more than 30 HP ProLiant server models have been certified for use with VMware ESX 3.5.*

By using HP BladeSystem, you can leverage the performance, density and low power consumption of server blades. A smaller solution footprint helps you make the most of the valuable space in your data center, and attachment to a storage area network (SAN) is economical.

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Network storage allows you to take advantage of many of the features of VMware, including the ability to quickly move virtual machines to different physical servers using VMware VMotion—while shielding the business from potential hardware failures and protecting end users from service interruptions. In networked storage environments, VMware VMotion and VMware Storage VMotion allow you to perform maintenance on storage and servers with no downtime, because virtual machines continue to run throughout the live migration process.

HP StorageWorks Fibre Channel storage arrays and iSCSI SAN provide an ideal storage platform for virtualization with VMware. The HP StorageWorks storage array portfolio is tested and certified to perform in VMware environments. This portfolio includes the All-in-One Storage System (AiO), Modular Smart Array (MSA), Enterprise Virtual Array (EVA) and XP disk array families.

VMware virtualization software
VMware provides core building blocks for an enterprise-class virtualization solution. At the center of these offerings is VMware ESX 3.5, which provides virtual infrastructure software for partitioning, consolidating and managing servers as hardware-independent virtual machines.

The HP virtualization solution with VMware builds on the capabilities of VMware ESX 3.5 with complementary software products from HP and VMware to provide an enterprise-ready virtual machine environment. These components can include VMware VirtualCenter, which helps you rapidly provision virtual machines and monitor the performance of physical servers and virtual machines.

HP management tools
A unique HP ProLiant advantage is HP Insight Control, the integrated server management portfolio that allows you to monitor, deploy and control your HP ProLiant and HP BladeSystem servers from almost anywhere. Consolidated management of physical and virtual assets is also enabled through this software portfolio. It combines the capabilities of HP Systems Insight Manager (SIM), HP ProLiant Essentials and HP Storage Essentials software, which work in concert with your VMware environment. HP ProLiant Essentials virtualization management software provides critical management and migration capabilities for your VMware virtualization solution, including the ability to migrate from physical to virtual machines. This software complements both HP Systems Insight Manager and VMware VirtualCenter.

For a broader solution from an enterprise management perspective, the HP Software organization offers additional software to address your IT Service Management (ITSM) processes and the automation and technology support you need to deliver the agility provided by virtualization. Combining HP management software and VMware’s technology suite with specialized Smart Plug-ins, our IT virtualization management solution gives you a holistic framework for managing your virtualized infrastructure.

HP Virtual Connect modules
HP Virtual Connect is a breakthrough virtual input/output (I/O) technology for the HP BladeSystem that simplifies connections to your local and storage area networks. HP Virtual Connect allows you to pool and share multiple network connections across multiple servers and virtual machines. Your administrators can then add, replace and recover server resources on the fly—without impacting networks or requiring multiple experts at each step in the process.

HP Services
HP offers a full range of professional services to complement your in-house capabilities. HP virtualization services provide you with assistance for capacity planning, design, deployment and service management, including mission-critical support. To help you get off to a good start, we offer detailed assessment services using the VMware Capacity Planner tool. These services leverage our extensive experience with VMware. HP has the largest number of VMware Certified Professionals of any company except VMware itself.
When approaching IT consolidation, keep these best practices in mind.

Regardless of the size of the organization, IT consolidation is a major initiative that requires an extensive amount of planning. So what does it take to put a consolidated IT infrastructure in place? Here is a look at some best practices, technologies and services that enable a successful consolidation initiative. In our experience, these are all important points to consider when mapping out an IT consolidation strategy.

Design, planning and architecture

Assessment and data collection
To truly understand your consolidation opportunities, it helps to collect a wide range of data on your existing environment, including the workloads that each physical server supports. This process helps you understand the kind of consolidation results you can expect from virtualization.

Assessment and data collection can be completed manually or in an automated fashion. With a manual approach, you might complete this process over weeks or months using internal staff resources and online capacity planning tools. These tools help you size your virtual environment appropriately, plan for migration and design an adaptive environment. One such tool is the HP VMware Solution Sizer, which is available free from HP—and the second most used sizer on hp.com. You can access this tool via www.hp.com/go/vmware.

With an automated approach, you can make use of an outside virtualization assessment service, such as the HP Virtualization Assessment Services offering, to collect the data automatically. The automated process typically takes five to six weeks from beginning to end.

Server inventory
One aspect of the assessment and data collection process is to identify all of the servers in your environment. Many companies are surprised at the results. It’s not unusual for IT managers to identify 20–50 percent more servers than they thought they had in place. That’s because companies typically have many rogue servers that exist outside the realm of IT management. These servers are often found within departments or workgroups that deployed them for certain projects or limited-use applications. Many of these rogue servers are chronically underutilized.

Server utilization rates
When collecting data and planning for consolidation, it is important to consider both peak and average server utilization rates. Typically, peak rates can be up to three times greater than average utilization rates. This has implications for your consolidation efforts. If you consolidate multiple servers on the basis of average utilization rates, you might end up overloading a physical server at certain times of the day. That could be the case if a physical server hosts multiple virtual machines that share the same peak load times. You can avoid this problem by making sure that the virtual machines you place on a single physical server have different peak load times.

CPU, memory, disk I/O and network metrics
When identifying candidates for consolidation, you should consider CPU, memory, disk I/O and network throughput rates. Set a goal to find a complementary balance of throughput rates when consolidating multiple
virtualized servers onto a single physical host. Several high CPU/low disk I/O applications consolidated on one server might result in wasted disk I/O and a CPU-bound physical host. However, after the physical servers have been migrated into a virtualized environment, VMware’s Distributed Resource Scheduler (DRS) feature can be configured to automatically balance the workload across the hosts.

It is also important to plan appropriate server overheads for CPU, memory, disk I/O and network I/O for your consolidated environment. While it is possible to achieve levels of 90 percent utilization, most customers set utilization between 60 and 80 percent. This utilization level allows your applications access to system resources in peak periods of usage. If more resources are required, VMware DRS allows you to cluster your servers and migrate your applications to balance the workload with no downtime to the applications. VMware High Availability (HA) provides an extra level of protection. Should a server host fail, VMware HA will automatically restart the VMs of a failed host on the other hosts in the cluster.

Memory sizing is also an important consideration in virtualization planning. A rough rule of thumb is to provide two to four GB of memory per CPU core.

**Consolidation strategies**

When it comes to IT consolidation, not all server consolidation candidates are equal. With virtualization, some types of server consolidation candidates tend to yield high consolidation ratios, while other types tend to yield more modest ratios. From a strategic viewpoint, it makes sense to focus first on the servers that will yield high consolidation ratios. This iterative approach allows you to accelerate the gains from your IT consolidation efforts while demonstrating the benefits of virtualization to management and business units.

In addition, you might choose to add new server builds to virtual machines and retire old servers as they reach their replacement dates. This approach can simplify your move to a virtual environment.

Based on our experiences with our own consolidation efforts and our work with enterprises around the world, file/print servers and domain controllers are an area to focus on first. With these types of servers, some companies achieve consolidation ratios ranging from 10:1 to 30:1. At the other end of the spectrum you have database and mail servers. With these types of servers, you might achieve consolidation ratios as low as 4:1 or even, in some cases, 1:1. Along with low consolidation ratios, these servers typically are considered “business hours critical.” This is another reason to put them last in line in your consolidation queue.

When assessing your environment, it is also important to consider the seasonality of your business. It might be best to postpone the start of data collection to the end of a quarter in order to capture quarter-end activity or peaks due to holidays.

**Building a business case**

The assessment and planning process helps you build a business case for IT consolidation. While funding is always a concern with any IT initiative, it may be possible to implement virtualization projects as part of your normal hardware refresh cycles. That’s because the cost savings associated with buying, managing and maintaining fewer servers can more than offset the costs associated with software purchases.
As you lay the groundwork for your IT consolidation initiative, you will need to consider and evaluate storage alternatives, including a storage area network, and plan for data management and backup requirements. In our experience, 80 percent of virtualized environments use shared storage. Among those environments, roughly 90 percent use SANs and 10 percent use iSCSI or network file system (NFS) storage. SAN storage is usually preferred for a virtualized environment because it allows for greater disk I/O—an all-important metric. Disk I/O is critical to plan for during a virtualization project because multiple virtual machines will be accessing storage instead of single physical machines accessing direct attached storage.

As for data protection, there is no real difference between a physical environment and a virtual environment. While shared storage enables better data protection and availability, data protection methods and policies do not have to change because of virtualization. They are driven by the business need for the data, not the virtualization technologies (except in cases when VMware HA and VMware DRS are used).

As processor speeds and memory sizes increase, it becomes all the more important to plan for network throughput. That’s because network I/O, as well as disk I/O, can become a bottleneck when many virtual machines are residing on a single physical host. You can improve your network environment for higher throughput and greater redundancy via configuration and network interface card (NIC) teaming. Network adapters can be configured as highly available pairs, designed to maintain network connections even after an adapter failure. Several adapters may also be configured for load balancing using one of several algorithms, including source media access control (MAC) address or destination IP, to name a few.

In addition, you can use HP Virtual Connect modules to virtualize the connections between compatible HP BladeSystem servers and your storage and local area networks. HP Virtual Connect makes it easy to pool and share SAN and LAN network connections across multiple servers and virtual machines. Just as VMware provides an interface between physical servers and associated operating systems and applications, HP Virtual Connect provides a simple interface to your networks.
It enables you to wire everything once and then add, replace and recover server resources on the fly. Server administrators can accomplish these changes themselves without impacting networks or calling in multiple experts at each step in the process.

Management
One of the steps in planning for IT consolidation is to identify the right software tools for physical and virtual machine management, lifecycle management and policy management. The good news is, you don’t need separate management software for your virtual and physical environments. HP IT consolidation solutions incorporate tools that allow you to integrate the management of physical servers, virtual machines and storage resources and view your environment through a single console. The HP management tools previously mentioned can help you achieve much more efficient and productive management of your virtual and physical environments.

Operations
Operations considerations include the need to review your existing governance models for adding and removing servers, managing security and enabling regulatory compliance. The governance processes that you currently have in place for physical servers can probably be easily adapted to virtual machines, in most cases without any changes at all. But it may be good to specify that the guidelines also apply to virtual machines. This can help you avoid a proliferation of loosely governed virtual machines.

Process creation
Virtualization of server and storage resources triggers changes in some processes. So it’s important to consider your post-virtualization processes and how they will support all relevant groups and business requirements. Issues to consider in your planning efforts include service level definitions, service level management, change management and chargebacks for IT services.

Data center preparation
In addition to process considerations, there are physical data center aspects to consider. These include power and cooling needs, space requirements (planning for retiring old servers and adding new servers and storage), and changes to networking and connections.

There are also human aspects to consider. It’s important to make sure employees receive appropriate training before making the transition to a consolidated IT environment.

Applications
A good strategy for applications is to virtualize by application vendor and then size systems to handle peak application workloads. As noted earlier, different applications may peak at different times of day. When assigning virtual machines to a physical server, it’s a good idea to look for complementary workloads—perhaps some that peak in the daytime and some that peak in the middle of the night.

Licensing requirements for applications remain the same in a virtualized environment. Virtualization requires that you have the appropriate number of software licenses for the applicable number of applications running on virtual machines. If you have questions on this, your software providers should be able to help you verify that you have the appropriate number of licenses for the third-party software used in your virtualized environment.

Workload automation
Another best practice is to create server clusters to balance workloads across servers to meet service level agreements. If you have a SAN environment, you can use VMware DRS to help manage workloads. VMware DRS balances application workloads within clusters of physical servers. If one server is becoming overloaded or one application isn’t getting the processing power it needs, VMware DRS shifts the load in a stateful manner, without application interruption, to a different server.
Education and advocacy

If this is your organization’s first foray into virtualization, you may encounter the concerns about the perceived risks that come with any new technology. This can put IT professionals in the role of technology educators and advocates. You may have to work actively to help management and others understand virtualization and the benefits it creates.

You may also need to help business units and departments understand that virtual machines can have dedicated resources carved out, to alleviate any concerns about sharing resources that support different applications. These individual system and performance requirements should be considered carefully in the process of planning for IT consolidation.

HP Services can help you bring it all together.

HP Services can help you transition smoothly to a consolidated IT infrastructure—without interrupting your usual program and business activity or over-extending your in-house IT support staff. Our vast portfolio of services allows you to use HP expertise as needed, tailoring it to your specific requirements.

Consider using HP Services to assist you with the major phases of your IT consolidation initiative. Our professionals can help you with IT service and desktop management, process and solution design, deployment either through HP Factory Express or onsite custom solution delivery, migration and ongoing integrated support.

HP Services provides:

- Access to highly qualified experts who can cover all facets of your software, server, network and storage infrastructure support needs, with a deep knowledge of multi-vendor hardware and software environments—not just HP technologies
- HP Care Packs for a range of installation and startup and support services, available either at fixed prices or via a customized statement of work
- Comprehensive solution design, migration, optimization and support services tailored to your virtualized environment needs
- HP Education Services for your education needs, including online and instructor-led courses that build both core and advanced skill sets, and can help you improve system performance and availability

In addition, HP Financial Services provides innovative financing and financial asset management programs to help you cost-effectively acquire, manage and ultimately retire your HP solutions.