The business case for virtualization
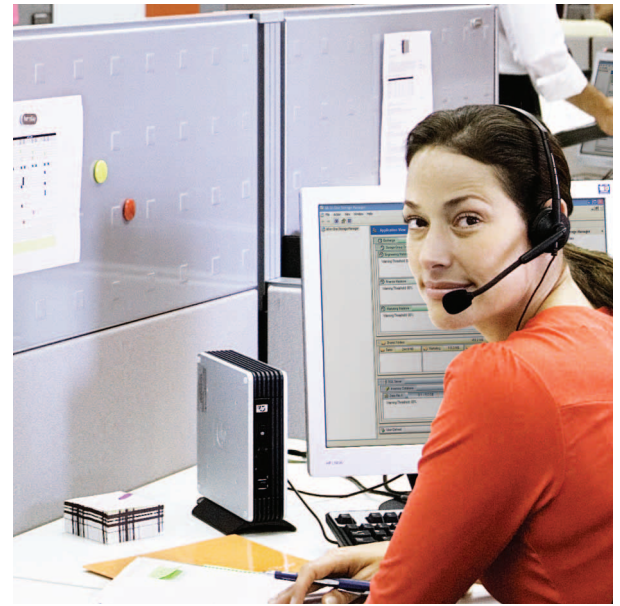
Reduce capital and operational costs and increase agility
with an integrated HP virtualization solution with VMware.

vmware®

hp
invent

The business case is clear: Virtualization can help you save money, increase IT agility and improve business outcomes.
Are you capitalizing on these opportunities?

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Data center challenges grow steeper by the day.

In today's competitive global economy, your business needs to be poised to respond faster to market changes, new customer demands and growth opportunities. To do this, you need an agile IT infrastructure that is built to deliver better business outcomes.

At the same time, you have to hold the line on rising data center costs. One way to do this is to increase the utilization of information technology (IT) assets, including servers and storage devices. In today's enterprise data centers, for example, it's not uncommon to find servers with utilization rates as low as 5 to 15 percent, and storage with utilization rates of 50 percent.

And then there's the issue of rising energy expenditures. As you fill your data center with storage, more servers, and higher density servers, power and cooling costs can threaten to break your budget. These are all challenges that virtualization addresses.

Pooling and sharing resources helps you overcome the challenges.

Virtualization enables you to pool and share IT resources to better serve the business. With new, innovative HP technology—such as HP Virtual Connect modules and HP Thermal Logic cooling—you can now pool and share network connections and power and cooling resources, in addition to server and storage resources.

From a business perspective, the pooling and sharing of IT resources allows IT supply to keep pace with fluctuating demand. From a cost perspective, pooling and sharing helps you increase the utilization of IT assets and pack more computing and storage capacity into the same space. Storage area network (SAN) storage, for instance, is typically only 50 percent utilized in a non-virtualized environment. That increases to 80 percent in a virtualized environment.

This all contributes to bottom-line business benefits. Virtualization helps you reduce the total cost of ownership of IT assets—in terms of both capital expenses and operating expenses—by enabling greater use of your physical resources.

A virtualized environment increases flexibility because a diverse range of resources can be added, changed and moved as needed, to meet shifts in business demand. Resources can be quickly scaled up or down based on changing workloads. Virtualization techniques also improve resiliency by simplifying backup, failover and disaster recovery solutions.

So the benefits are clear. But how do you get there? In short, look to HP and VMware for your complete, end-to-end virtualization solution.

Achieving the benefits: Publicis Groupe
Virtualization with HP BladeSystem, HP StorageWorks HP Insight Control, and VMware is helping Publicis Groupe reduce costs and create an IT infrastructure that supports its business growth. The company's virtualization solution includes HP ProLiant BladeSystem servers, HP StorageWorks storage products, HP Insight Control management tools and VMware ESX Server software. With its virtualization solution in place, Publicis Groupe has reduced operational costs in its data centers by millions of U.S. dollars, cut server deployment times to fewer than 30 minutes and increased system availability.

HP and VMware offer a complete virtualization solution.

To help you capitalize on your virtualization opportunities, HP offers a complete, integrated virtualization solution. This solution leverages HP ProLiant and BladeSystem servers, HP StorageWorks disk arrays, VMware technology, and virtualization management tools and services.

This integrated HP virtualization solution puts your organization on a predictable path to the broad benefits of a total virtualized environment. Our solution allows you to capitalize on virtualization opportunities that stretch from the desktop to the data center.

## Your virtualization opportunities span four key areas.

Drawing on the capabilities of HP hardware and software and VMware technology, forward-looking organizations are realizing the benefits of virtualization across four key areas:

- **IT consolidation**—With virtualization, you can consolidate many physical servers into one virtual server pool, similarly for storage. This can result in a 10:1 or greater ratio of virtual servers on a single physical server. This helps you stop physical server and storage sprawl and solve the problem of devices that are underutilized, consume too much space, and cost too much to power, cool and maintain.

Virtualizing a server environment can result in significant cost savings. Often virtualization leads to total savings across capital and operating costs of up to 50 percent or more.

- **Development and testing**—Virtualization can also improve the efficiency of your test and development environment. With virtualization, you can run multiple operating systems and versions on fewer servers and workstations. This helps you support complex development and testing environments with limited resources.

- **Virtual desktop infrastructure (VDI)**— With VDI, a desktop operating system is hosted on a virtual machine running on a centralized server. VDI provides your end users with all the functionality of a stand-alone desktop plus features that increase security, decrease cost and provide high reliability. It is an alternative to the more traditional server-based computing models offered by our competitors.

- **Disaster recovery/high availability**—Virtualization allows your company to create a high availability and disaster recovery plan for your IT infrastructure based on virtual machine environments. By allowing virtual machines to be easily replicated, backed up and moved from one machine to another, virtualization greatly simplifies recovery in the event of system failure or even planned downtime.

Figure 1. Virtualization adoption model

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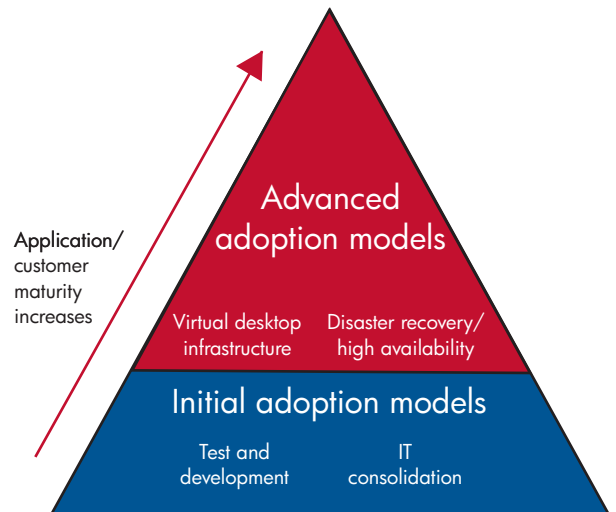
In our scenario for a virtualized environment, 100 physical servers are reduced to a total of 13 physical servers running 100 virtual machines. This level of virtualization yields savings of greater than 60 percent over a three-year period.

Still investigating the benefits of a virtualized environment? Here are some of the ways you can save.

When you virtualize your company's infrastructure, you put yourself on the path to two types of savings: capital cost savings and operational cost savings.

Capital cost savings

Capital cost savings come in the form of reduced expenses for hardware acquisition and data center real estate. Examples of these potential savings are shown in rows A–D of Table 1, which illustrates a business case scenario for virtualization with VMware.

A. **Server hardware**—Moving to a virtual environment helps you cut capital costs by reducing the number of physical servers necessary to support your infrastructure. In our business-case scenario, server utilization averages less than ten percent. With virtualization, server consolidation ratios are typically in the range of 8:1 to 15:1. This leads to a reduction in expenditures that is significantly greater than 50 percent.

HP virtualization solutions help you achieve these sorts of gains by leveraging VMware software, VMware-certified HP servers and advanced management tools, such as HP Insight Control Environment (ICE), to allow workloads to be consolidated onto fewer servers. In addition, HP BladeSystem servers help you gain even greater flexibility from your virtualized environment and pack more computing power into the same footprint.

B. **Storage hardware**—With a virtualized environment, you can reduce your capital expenditures for storage devices by consolidating data storage. As part of a VMware implementation, storage consolidation is a natural progression.

To help you virtualize your storage environment, HP StorageWorks SANs deliver pools of shared storage that enable greater server consolidation. Implementing an HP SAN in a non-virtualized environment can increase storage utilization from less than 25 percent to as much as 50 percent. And when you combine HP StorageWorks SANs with HP servers running VMware, you can increase utilization to as high as 80 percent.

In our scenario, the costs of implementing new SANs is offset by the cost savings associated with reduced server purchases.

C. **Network hardware**—With fewer physical servers in a virtualized environment, you need less network switching infrastructure. Our business-case scenario assumes a greater than 70 percent reduction in capital expenditures for network hardware.

D. **Data center space savings**—Virtualization helps you make better use of valuable data center real estate. It allows you to remove servers from your environment to open up data center floor space. In our sample consolidation project, consolidating 100 servers to 13 servers yields over 60 percent cost savings. The total server footprint is reduced to one 42U rack.

Virtualization also helps you avoid the high costs of data center expansions. With data center building cost estimates ranging from $800 per square foot to a projected $5,000 per square foot in 2009[1], this is an important area for cost savings. This is especially true when you consider that each rack of servers requires approximately 6.5[2] square feet.

In addition, an ancillary benefit of virtualization is the possible redeployment of some of your existing infrastructure as part of a disaster recovery solution. This is made easier using HP StorageWorks and VMware solutions. Redeployment provides additional capital cost savings that can help fund disaster recovery solutions.

To enable your consolidation efforts, HP offers a range of VMware-certified servers and storage, including DL-series servers the HP BladeSystem, the HP StorageWorks family of MSA, EVA and XP arrays, which can help you reduce the overall data-center space required. In fact, the HP BladeSystem allows you to more than double the number of servers in the same physical space required by conventional rackmount servers. Combining an HP BladeSystem with an HP EVA array allows you to make more efficient use of your data center real estate.

[1]Anthes, Gary, "Data Centers Get a Makeover", Computerworld news article, published November 1, 2005. http://www.computerworld.com/database topics/data/datacenter/story/0,10801,97021,00.html?SKC=home97021

[2]HP ProLiant Rack 10000 Series at 23.62" wide by 39.37" deep. http://h18004.www1.hp.com/products/servers/proliantstorage/racks/10000series.html

Operational cost savings

In a virtualized environment, operational cost savings are also substantial. These savings stem from reductions in power and cooling costs, management costs and the costs associated with server downtime. Examples of these potential savings are shown in rows E–F of Table 1.

E. **Power and cooling**—Virtualization can help you hold the line on rapidly rising power and cooling costs. These savings stem from reductions in the number of physical servers in your environment. The total power and cooling savings from removing just one server from your environment is $835 per year (power savings of $239 per year and reduced cooling costs of $596 per year). And consider this: The one-year power and cooling cost savings resulting from consolidating six servers to one (an easily attainable ratio) will fully cover the cost of a new one-processor server.

To extend your power and cooling savings, unique HP technologies, such as HP Thermal Logic and Insight Power Management allow you to cut your energy bill when compared to conventional servers. In fact, HP c-Class blades with HP Thermal Logic use 20 to 27 percent less power per server than IBM BladeCenter-H. What's more, c-Class blades generate less heat due to the lower power consumption, requiring 31 to 60 percent less air to be pushed into the data center.

HP Insight Power Manager, meanwhile, helps you increase efficiency. This integrated power monitoring and management application extends the capacity of your data center by enabling you to reduce the amount of power and cooling required for HP ProLiant servers.

F. **Server provisioning costs and time savings**—Virtualizing allows you to provision servers in less time, which in turn leads to reduced infrastructure management costs. In the example shown here, adding 33 servers per year to a 100-server environment as part of a server refresh, where one-third of the server environment is replaced annually, results in 330 hours of provisioning at an average of ten hours per server. This ten-fold reduction in provisioning time allows you to recover approximately 300 hours, or 7.5 weeks of time, to apply to more strategic IT projects that can help your business grow.

HP Insight Control Environment helps you save time by streamlining server provisioning and management. Based on HP Systems Insight Manager and ProLiant Essentials software, the Insight Control Environment gives you a single view of your physical and virtual resources. It delivers comprehensive health and performance monitoring, remote control, vulnerability scanning and patch management. ICE includes HP ProLiant Essentials Rapid Deployment Pack (RDP), a server deployment solution that facilitates the installation, configuration and deployment of high volumes of servers, and enables the rapid replacement and addition of new servers.

HP also offers migration tools to make it easy to move resources between and within your virtual and physical environments. We have great virtual-to-physical and physical-to-virtual tools here that are simple to use. To further accelerate provisioning, HP Virtual Connect modules virtualize the connections between the HP BladeSystem c-Class servers and your local area networks (LANs) and SANs, enabling quick, transparent server changes.

G. **Disaster recovery costs**—Virtualization can also help you keep your business up and running during disasters and other disruptive events. Reducing the number of servers through consolidation reduces the number of servers that must be restored in case of disaster. This shortens recovery times and reduces losses associated with downed servers.

H. **Unplanned downtime costs**—By enabling faster recovery from unplanned downtime and allowing for better management of planned downtime, virtualization helps you further reduce indirect costs. With a VMware solution, server availability can be better managed by implementing virtual machines so that workloads can be balanced and proactively moved from overloaded hosts, and virtual machines can be quickly restored on other servers if a host experiences hardware failure. This scenario projects that costs associated with unplanned downtime may be reduced by up to 75 percent.

I–K. **VMware software, services and training**—Some additional costs are associated with a VMware consolidation that otherwise would not have been incurred in a non-virtualized environment. These costs, for software, planning and implementation, and training, are easily offset by the savings outlined above.

HP Services offers end-to-end expertise that helps you gain more value from your virtualized environments. From initial assessment and design to ongoing support, HP Services is your single point of contact and accountability. With more than 69,000 services professionals and over 4,000 ITIL-certified professionals operating in 170 countries, HP Services has an extensive track record of helping customers support their changing business needs.

These are just some of the ways virtualization drives cost savings. Server virtualization often leads to total savings across capital and operating costs of 50 percent or more over a three-year period. You also can expect a fast return on your investment. Total payback time for virtualization projects is typically less than one year due to the significant capital and operational savings.

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[3]Power cost savings = .67*(.5kW)*(24h/1day)*(365day/1year)=$238.58

[4]Cooling cost savings = .8*.67*(1.25)*(1.25)*(.5kW)*(.0813/kWh)* (24h/1day)(365day/1year) =$596.46

[5]Removing 6 servers x $835 = $5,010 annual power and cooling savings. Subtract power consumed by new 1P server = $835. Dollars to cover new server purchase at $4,175 exceeds cost of new server at $4,000.
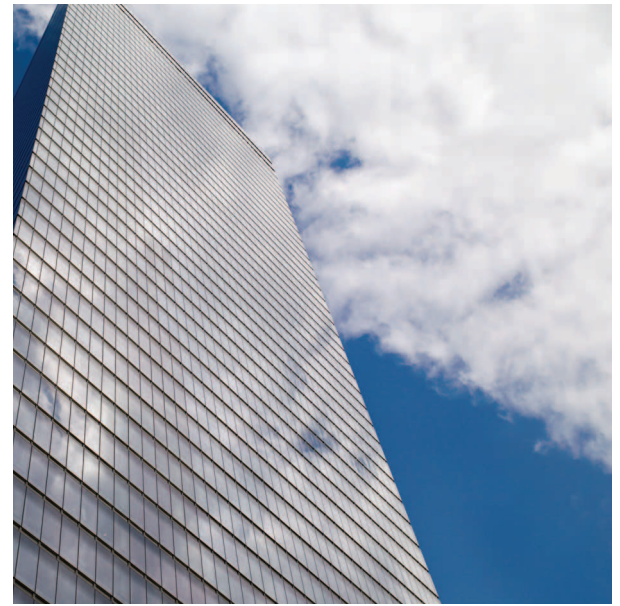
To understand the business case, explore this virtualization scenario.

To understand the business case for virtualization, it helps to compare the costs of a physical server environment to a virtualized server environment that meets the same business requirements.

This is the case in Table 1. It compares two scenarios for a 100-server physical environment. The first scenario maintains the status quo of 100 physical servers. The second scenario shows what happens when those 100 servers have been virtualized with VMware. Both scenarios assume a three-year replacement cycle where one-third of the infrastructure is replaced every year.

In the virtualized environment, the 100 physical servers are reduced to a total of 13 physical servers running 100 virtual machines. The virtualization yields savings of greater than 60 percent over a three-year period.

Table 1. Projected costs savings with virtualization with VMware*

	As-is scenario expenses	Virtualization scenario expenses	Savings	
Year 1				
Capital cost savings				
Server hardware	154,167	45,067	109,100	A
Storage	29,193	21,767	7,426	B
Network	12,000	2,667	9,333	C
Data center space	11,200	3,760	7,440	D
Operational cost savings				
Power and cooling	53,025	8,833	44,192	E
Server provisioning	44,256	3,319	40,937	F
Disaster recovery	6,618	1,654	4,964	G
Unplanned downtime	262,200	65,400	196,800	H
VMware software	—	74,750	(74,750)	I
VMware services	—	106,908	(106,908)	J
VMware training	—	6,465	(6,465)	K
Totals	572,659	340,590	232,069	
Year 2				
Capital cost savings				
Server hardware	169,584	49,574	120,010	A
Storage	32,112	23,944	8,168	B
Network	13,200	2,934	10,266	C
Data center space	12,320	4,136	8,184	D
Operational cost savings				
Power and cooling	58,328	9,716	48,612	E
Server provisioning	48,682	3,651	45,031	F
Disaster recovery	7,280	1,819	5,461	G
Unplanned downtime	288,420	71,940	216,480	H
VMware software	—	18,688	(18,688)	I
VMware services	—	—	—	J
VMware training	—	—	—	K
Totals	629,926	186,402	443,524	
Year 3				
Capital cost savings				
Server hardware	186,542	54,531	132,011	A
Storage	35,323	26,338	8,985	B
Network	14,520	3,227	11,293	C
Data center space	13,552	4,550	9,002	D
Operational cost savings				
Power and cooling	64,161	10,688	53,473	E
Server provisioning	53,550	4,016	49,534	F
Disaster recovery	8,008	2,001	6,007	G
Unplanned downtime	317,262	79,134	238,128	H
VMware software	—	18,688	(18,688)	I
VMware services	—	—	—	J
VMware training	—	—	—	K
Totals	692,918	203,173	489,745	
3-year totals	**1,895,503**	**730,165**	**1,165,338**	

* These projected costs savings are derived from the VMware TCO Calculator, available online at **www.vmware.com/products/vi/calculator.html**.

Table 2. Breakeven excluding indirect costs of downtime
In this scenario, the total payback period for the initial virtualization phase is less than nine months when indirect downtime savings are excluded.

Breakeven excluding indirect costs of downtime			Month 0	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9
Without VMware	Capital costs	Hardware costs	195,360									
	Operating costs			9,040	9,040	9,040	9,040	9,040	9,040	9,040	9,040	9,040
With VMware	Capital costs	Hardware costs	69,501									
		Costs of VMware	188,123									
		Total VMware implementation cost	257,624									
	Operating costs			1,326	1,326	1,326	1,326	1,326	1,326	1,326	1,326	1,326
		Net savings (expenditure) with VMware	(62,264)	7,714	7,714	7,714	7,714	7,714	7,714	7,714	7,714	7,714
				(54,550)	(46,836)	(39,122)	(31,408)	(23,694)	(15,980)	(8,265)	(551)	7,163

Table 3. Breakeven including indirect costs of downtime
In this scenario, the total payback period for the initial virtualization phase is less than three months when indirect downtime savings are included.

Breakeven including indirect costs of downtime			Month 0	Month 1	Month 2	Month 3
Without VMware	Capital costs	Hardware costs	195,360			
	Operating costs			31,422	31,422	31,422
With VMware	Capital costs	Hardware costs	69,501			
		Costs of VMware	188,123			
		Total VMware implementation cost	257,624			
	Operating costs			6,914	6,914	6,914
		Net savings (expenditure) with VMware	(62,264)	24,528	24,528	24,528
				(37,736)	(13,209)	11,319

Why HP? Here are some of the key reasons.

Around the world, thousands of IT organizations are working with HP to turn rigid data centers into agile, virtualized environments. Here are some of the reasons why these forward-looking companies are choosing to work with HP to virtualize IT infrastructure.

HP offers a complete solution.

With HP, you gain an end-to-end, tightly integrated virtualization solution that incorporates everything you need—hardware, software and services, including planning, deployment and management. Additionally, HP management software brings business level management capabilities such as application functionality and performance testing, operations support, asset tracking and change and configuration management to virtualized environments.

HP addresses critical IT initiatives.

HP delivers the resources you need to put virtualization to work for business-driven IT initiatives. These include initiatives focused on IT consolidation, virtual desktop infrastructure, disaster recovery/high availability, and development and testing.

HP is a leader in server and storage virtualization.

The HP portfolio of virtualization offerings has helped thousands of companies achieve better business outcomes. This portfolio includes leading HP ProLiant and ProLiant BL series server blades for HP BladeSystem for virtualization of your x86 environment. In addition, we offer wide ranging partitioning solutions for HP Integrity servers, so you can find the right virtualization approach for your Integrity environment.

HP is also a leader in storage virtualization—we have sold more than 30,000 virtual storage arrays. We understand storage virtualization, and how you can reduce your total cost of ownership with an HP SAN using our Enterprise Virtual Arrays and XP Disk Arrays. And HP client virtualization solutions, meanwhile, deliver a cost-efficient desktop environment by consolidating many physical desktops onto a single server or blade environment.

HP has the expertise to make it all work.

Most importantly, HP has the services expertise to deliver a comprehensive VMware solution to our customers. HP is the only company to have earned VMware's Enterprise VMware Authorized Consultant (EVAC) designation, which is the highest level of certification for delivering VMware virtualization services available, and HP is the only worldwide VMware Authorized Training Center (VATC). Contact HP Services or HP channel partners to help you evaluate your needs, plan your solution, deploy and operate your virtualized environment.

Let's get started

Whether you have 10 servers, 100 servers or 1,000 servers, we can help you put virtualization solutions in place to achieve savings, simplification and scalability across your environment.

Get started today with our virtualization assessment service. Through this service, we inventory and analyze your current infrastructure and help you develop a detailed business case based on your business needs.

To learn more, contact your local HP representative, or visit **www.hp.com/go/vmware**.

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