

Virtualization: HP Utility Data Center pools data-center resources for a better return on IT



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Executive summary

Businesses worldwide are striving to create an adaptive enterprise, one that can keep pace with business change by adapting dynamically to the ebb and flow of demand for various services.

The volume and rate of change experienced by business remain at a staggering pace with little sign of relenting. Increasingly, every change in the business environment generates hundreds of changes in the IT infrastructure. Therefore, today's fast and furious rate of change has many CIOs wondering if they're not fighting the same fires over and over again. In fact, independent studies continue to show that the cost of change is the fastest growing component of infrastructure total cost of ownership.

Presently, the chief barrier to rapid change is that network resources are tied to physical installations. Excess server capacity or storage allocated to one service cannot be transferred to another without physically picking up and moving the resources—a time-consuming, expensive, and risky business.

Many enterprises have started to overcome this barrier through consolidation, centralizing and reducing the number of assets. But consolidation does not address the challenge of shifting resources to the services that need them, when they need them. That requires a complementary strategy called virtualization. While consolidation aggregates resources, virtualization enables different services to tap those resources whenever needed.

One way that HP enables virtualization is with a solution called the HP Utility Data Center (UDC), which rewrites the rules of data-center management. Leveraging consolidation efforts, the HP UDC solution creates a single virtual pool of all computing resources, including servers, storage, appliances, and applications. IT can quickly provision new services and re-allocate resources to existing services as needed—without traveling to the site or physically moving components.

Companies that adopt the HP UDC benefit immediately from rapid provisioning, reduced operational and capital expense, resource optimization, and improved business agility. And because the HP UDC solution tracks each client's actual resources consumed, companies can choose to adopt the utility computing model, transforming IT from a cost center to a profit center.

This white paper describes the growing influence of IT on company profitability, the business case for virtualization, and how the HP UDC solution uses virtualization technology to extend the economic benefits of consolidation.

Figure 1. Business agility: the new dimension. By reducing costs, increasing the quality of service, and mitigating risk, enterprises become more adaptive, creating increasing synchronization between business and IT.



IT: Its new influence on the bottom line

The role of IT has shifted. Though service remains its primary function, IT now exerts a greater influence on enterprise profitability based on its ability to reduce costs, deliver quality services that improve business agility, and mitigate risk. To achieve these goals, IT organizations worldwide are striving to enable their enterprises to respond dynamically to changes in the business or computing environment (see Figure 1).

Reducing costs

Cost reduction tops IT priority lists for companies across the globe. For many companies, IT spending has fallen in the last few years and continues to remain under pressure.

An infrastructure for an adaptive enterprise lowers costs in these ways:

- **Reducing the cost of managing change.** IT needs the ability to quickly increase or decrease resources in step with demand for a given service.
- **Improving manageability.** Although price/performance is increasing 30 to 40% a year, manageability has not improved, according to Tom Bittman of Gartner. Therefore, IT needs a way to manage more servers without increasing headcount.

- **Increasing utilization throughout the infrastructure.** At any given time, some services consume all allocated resources, while others operate at just a fraction of capacity. IT could cut capital costs if it had the ability to dynamically transfer unused resources from one service to another.

Increasing quality

Despite flat or even declining budgets, companies are asking IT to provide more services and increase the quality of existing services. Metrics for service quality include availability, service prioritization, security, and manageability.

How can IT do more with less? The solution demands more than making small improvements in current processes. Instead, IT must pursue a new way of operating that takes into account the rapid pace of business change.

“Your operational effectiveness enables you to run the same race faster, but your strategic positioning allows you to choose a different race.”

– Michael Porter, Professor,
Harvard Business School

Mitigating risk

Business and IT risk is increasing. Mitigating risk now requires these actions:

- **Ensuring that CIOs comply with legislation guaranteeing the security and reliability of the systems that support their businesses.** Current legislation includes the U.S. Healthcare Insurance Portability and Accountability Act of 1996 (HIPAA), Gramm-Leach-Bliley Act of 1999 affecting U.S. financial services, the Turnbull Report on Internal Control for public companies in the U.K., and the U.K.'s Data Protection Act of 1999. The events of September 11, 2001 underscored the importance of disaster recovery not only for business availability, but also for business survival.
- **Automating processes to reduce human factors in downtime.** Human error, such as disconnecting the wrong cable, is a major source of downtime for many data centers.
- **Accommodating unpredictable demand for resources without over-provisioning.** IT groups routinely over-provision to avoid the time and expense of frequent upgrades. Over-provisioning creates two forms of risk. Should demand exceed forecasts, the company risks having insufficient resources to sustain business availability. Conversely, if the excess capacity is never needed, the company incurs financial risk associated with purchasing and managing unused resources.

Improving agility

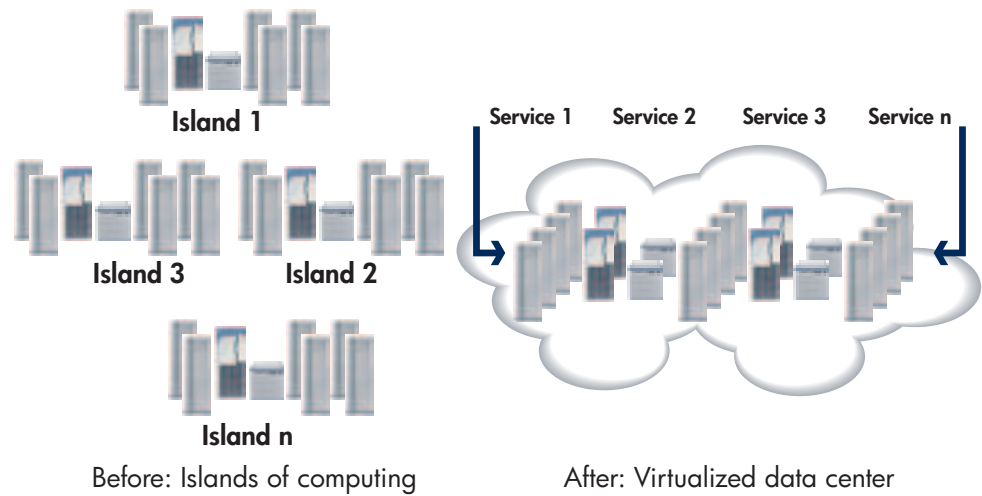
Business users and process owners want IT service levels to match the flow of their increasingly real-time business activities. Additionally, they would like an IT infrastructure with the flexibility to easily accommodate business priorities, delivering high-quality, vital services that meet their most immediate business needs.

Therefore, IT needs to respond quickly to these challenges and opportunities and adapt quickly to these changing business models, processes, and market demands.

Business agility has three key metrics:

- **Time**—the amount of time needed to implement or react to a business environment change
- **Range**—the implementation of IT across geographies, business processes, and operating units
- **Ease**—the breadth and scope of change that the infrastructure can support

Figure 2. Virtualization of the data center. When resources are dedicated to islands of computing, change is complex and costly. In contrast, when all IT resources belong to a single virtualized data center, IT can quickly allocate additional resources to services as needed, enabling enterprises to be more adaptive. In this way, IT shifts its focus from managing resources to managing services.



The barrier: Inflexible IT The solution: Virtualization of the data center

So what stands in the way of a company becoming an adaptive enterprise? One critical impediment to agility is an inflexible IT infrastructure. That is, resources are confined to “islands of computing” devoted to HR, finance, Web retail systems, and other groups. At any given time some systems are stretched to their limits while others remain nearly idle. For example, during the holiday season a Web retail system might operate at 100% of capacity, locking out prospective customers and losing sales, while the HR system operates at just 10% of capacity.

In this “silo” environment, transferring resources between services or provisioning a new service can take weeks. An IT staff person must physically travel to the service location to physically move servers, configure the operating system and applications, allocate storage, and establish network connections. Human mistakes, such as cabling or configuration errors, can introduce further delays. What’s more, changes are so painful to implement that they’re typically left in place after the need has passed—wasting resources that other services might urgently need. Often IT concludes that the risks of resource optimization outweigh the benefits.

To break free from the constraints of islands of computing and become an adaptive enterprise, companies need the agility to allocate resources in a way that reduces costs, increases service quality, and mitigates risk.

Virtualization extends the benefits of consolidation and helps make IT infrastructures more flexible. The two strategies work in concert. Whereas consolidation brings together redundant resources, virtualization enables resources to be assigned dynamically to the services that need them.

An analogy: Suppose a city has several school districts, each with its own administrative overhead and surplus supplies. By consolidating the school districts, the city cuts costs, reduces surplus, and gains efficiency. However, consolidation does not give the district the ability to quickly shift teachers or students to different classrooms throughout the day to maintain an optimum teacher/student ratio.

Applying the principles in the analogy to IT, virtualization enables resources to be shifted instantly, whenever and wherever needed.

Now companies can adopt virtualization through a solution from HP called HP Utility Data Center. The HP Utility Data Center solution treats all resources—servers, storage, networking, and applications—as if they belonged to a single pool. Instead of purchasing and managing multiple islands of computing, IT can manage a single virtual system whose components can be dynamically shifted from one service to another, whenever needed, regardless of their physical location (see Figure 2).

“The goal for IT has become to virtualize the IT infrastructure and turn it into a ‘black box’ into which you submit requirements, policies, and service levels, and out of which you get services.”

– Tom Bittman, Vice President of Server Strategies, Gartner

Virtualizing the data center eliminates the time, expense, and risk associated with physically moving resources. The company is able to become a more adaptive enterprise with the ability to manage costs, improve service, and mitigate risk.

Virtualizing the data center delivers immediate, quantifiable benefits, including resource optimization, rapid provisioning, reduced operational and capital expense, and increased business availability.

Resource optimization

The HP UDC eliminates islands of computing by treating all resources as part of a common pool. The HP UDC can automatically re-allocate shared resources as needed, ensuring that every service always has access to the resources it needs for high service quality. As a result, IT can shift its attention from managing infrastructure to managing services. By spending less time physically moving servers, configuring, and wiring, IT gains time to develop new services that increase productivity and generate revenue—all without increasing headcount.

Rapid provisioning

The HP UDC solution renders physical provisioning activities such as recabling, rewiring, and racking servers obsolete. With HP UDC, IT can provision new services logically rather than physically, using a simple drag-and-drop interface (see Figure 3). New services or additional resources are available in just minutes compared to days or weeks for physical provisioning. Travel time and costs are eliminated, as is downtime associated with cabling mistakes, poor connections, or configuration errors.

Provisioning with the HP UDC also facilitates standardization. When service components are configured manually, deviations from standards can occur when a technician installs the operating system,

configures the firewall software, and so on. Using the HP UDC, each service component—firewall, Internet connection, server—is defined once. When the person provisioning the service selects that component, the HP UDC applies the standard configuration automatically.

Reduced operational and capital expense

By pooling all resources to create a single virtual data center, the enterprise reduces operational and capital costs in the following ways:

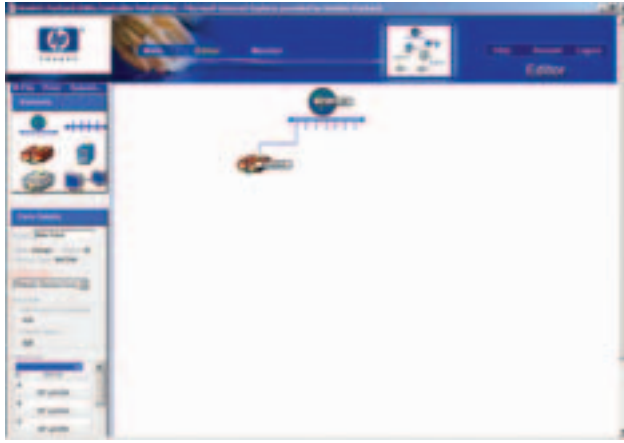
- IT departments can consolidate their separate budgets, gaining greater purchasing power
- Provisioning services and re-allocating resources requires less time and fewer human resources
- Over-provisioning individual services becomes unnecessary, cutting capital expense
- With fewer total servers and devices, the company needs less square footage, reducing real estate rent and utility costs

Business availability

Business availability means that a company’s vital information is protected and accessible, and that employees, customers, and partners can interact without interruption. Both human error and system failures can impede business availability.

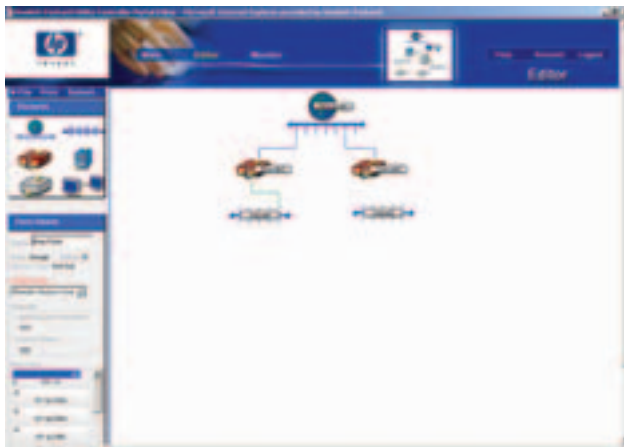
The HP UDC boosts business availability by replacing failed components automatically. For example, should a server or firewall associated with a Web retail system fail, it is replaced instantly with other resources in the pool, without human intervention. Operator alerts are sent instantly via HP OpenView Service Desk software so that IT can correct the fault and the repaired component can re-enter the pool.

Figure 3. Steps to create a Web retail system. IT provisions new services with a drag-and-drop interface.



Step 1—Add an Internet connection

Step 2—Add a firewall and connect it to the Internet



Step 3—Add another firewall

Step 4—Add two subnets and connect them to the firewall



Step 5—Add access servers and load balancing software

Step 6—Click Submit

Success story: HP Labs and the HP UDC

In 2001, HP Labs, the company's central research organization, was asked to add more than 600 systems, and yet not add budget or headcount. Ordinarily, scaling to this extent would require renting an additional 5,000 square feet of data-center space and adding 50 people to the IT staff, at a total cost of \$1.5 million annually.

HP Labs met the challenge with the HP UDC solution. By virtualizing all data-center resources—servers, storage, and networking equipment—IT added more than 600 more systems at no incremental cost.

Economic advantages of the HP UDC

Physical provisioning	Deployment costs reduced 30 to 80%
	Capacity planning costs reduced 5 to 40%
Operations	Management costs reduced 80 to 100% as a result of self-adapting technologies
	Security costs reduced 20 to 30%
Metering	Usage metering costs reduced 4 to 30%
Upgrading and migration	Costs reduced 20 to 40%

Toward a usage-based model for IT

Utility computing refers to a business model in which IT departments and third-party providers bill users based on computing resources actually consumed, in a manner similar to how a power utility bills by the kilowatt hour and telecommunications companies bill by minutes of use. Utility computing can build on charge-back systems already in place in many companies.

The HP UDC solution enables utility computing by automatically metering usage of data-center resources—servers, storage, and appliances—for all internal and external clients. It also can create invoices in real time. Therefore, IT departments gain the option of transforming themselves from a cost center to a profit center. In the process, they improve service by charging internal clients only for the infrastructure they actually use.

Conclusion

In a business climate characterized by rapid change, success requires an adaptive enterprise. By creating a single, virtual data center from previously separate resources, the HP UDC solution enables companies to adapt IT resources instantly to changing demand for services, through logical rather than physical provisioning. Extracting more benefits from consolidation, the HP UDC solution delivers immediate, quantifiable results, including nearly instant provisioning, reduced operational and capital expense, resource optimization, and increased business agility.

By virtualizing data-center resources, the HP UDC solution transforms data-center economics to deliver a better return on IT.

To find out more about the HP UDC, visit www.hp.com/go/hpudc.

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