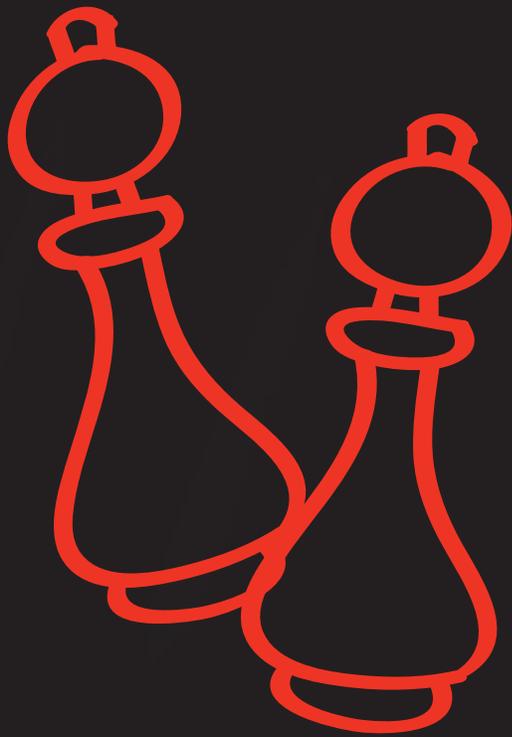


A Practical Strategy for Converged Infrastructure



Build a roadmap to the data center in your future that you can follow at your own pace

Converged
Infrastructure



Specialist



Converged Infrastructure

All the technologies you use today—servers, storage, networks, applications and management—have evolved to the point where they can be converged into a single entity.

The converged infrastructure in your future is as much a mind set as it is a bill of materials for new technology.

If you've been keeping up with the trends in IT over the last few years, you've gone from runaway server sprawl with racks of physical servers in your data center operating at less than 10 percent of their capacity to runaway server sprawl with images of virtual servers propagating with reckless abandon in your virtualized pools of resources.

According to industry watchers, most IT departments are still spending more than 70 percent of their time scrambling to keep their existing IT environments from self-destructing. That doesn't leave much time for doing the innovative things that support the business in creative and rewarding ways.

If you think there must be a better solution, you're right. And it may be closer than you think.

The good news is that a truly converged infrastructure for your data center is now technologically feasible. In fact, if you had an unlimited budget, you could build the future of computing today right in your own data center. And it would work great, too.

Instead of deploying individual resources piecemeal, you could deploy compute capacity and provision applications as they are brought online. You'd realize the key benefits of cloud computing—rapid self-provisioning, automation and capacity-on-demand—in your own data center. The next time you have a rush project

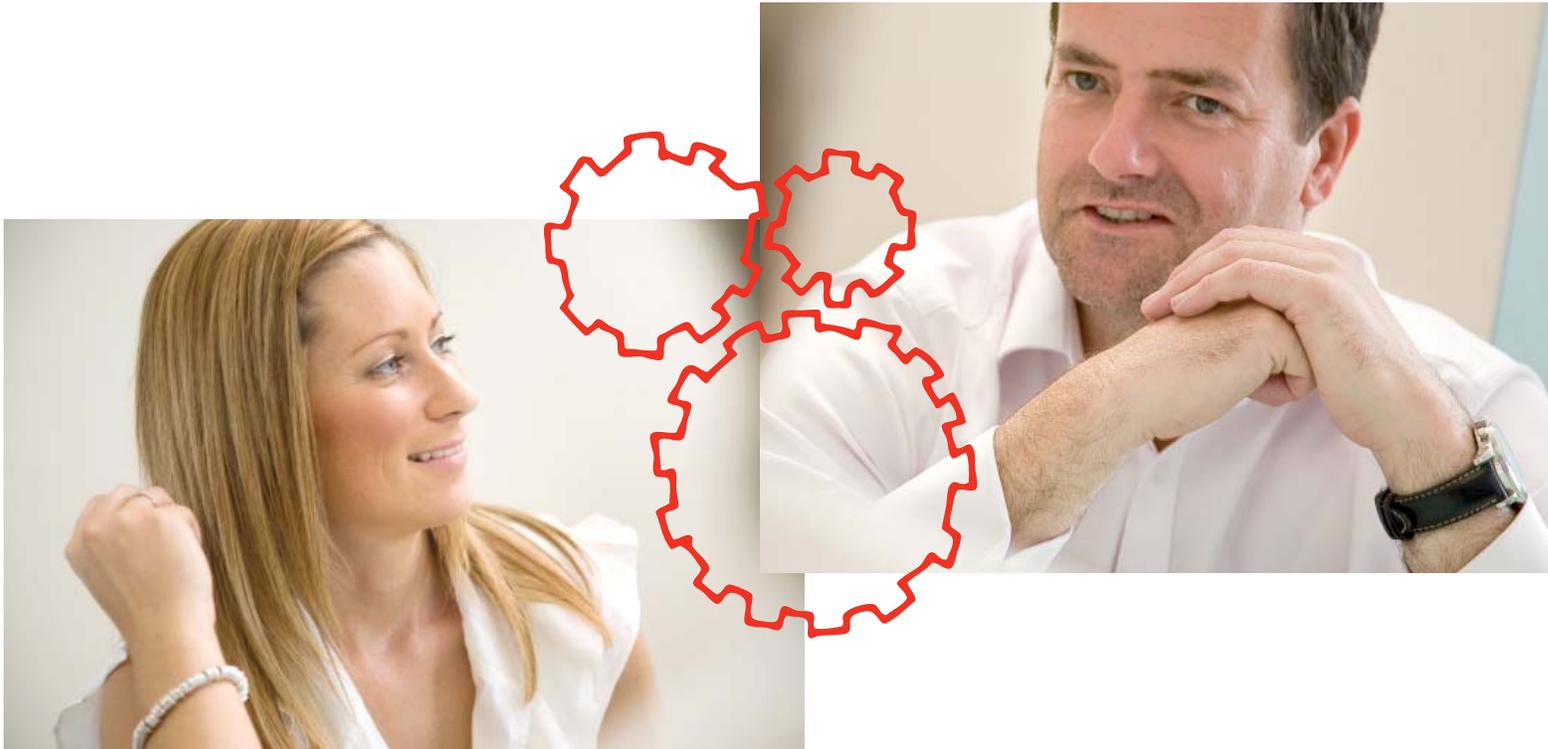
with a high-level mandate, you could provision a new system from available capacity on demand, and de-provision it and use the capacity somewhere else when the project is complete.

It would be possible to provide end users with a range of choices—within parameters set by your operating environment—to provision their own computing capacity for specific projects. Your department could also accurately allocate costs to departments for the capacity they use, turning the IT department into a service provider instead of a cost center.

A Realistic Process

If you don't have an unlimited budget, what you need is a realistic process that will enable you to incrementally transform your current heterogeneous, somewhat jerry-rigged IT environment into the well-mannered, converged infrastructure that you've read about on your vendor's website as time and your actual budget allow. It can be done.

The converged infrastructure in your future is as much a mind set as it is a bill of materials for new technology. According to Brandon Harris, Logicalis' vice president of HP solutions, your "data center of the future" begins as soon as you decide to stop thinking in terms of discrete servers and storage for every application and start thinking about shared interoperable resources across your entire IT infrastructure.



As Kevin Gruneisen, vice president of Logicalis' data center practice, likes to say, the first step in figuring out how to get to where you want to go is figuring out where you are. Understanding your current environment will determine where to begin in a way that suits your unique situation. Once you know where you are and where you want to go, you can develop a strategy that gets you there at a pace you can afford.

The ultimate destination, admittedly, can seem a little hazy. Although they might call it a converged infrastructure, dynamic infrastructure, unified computing or even utility computing, every computer company in the market claims to have a vision of your "data center of the future."

Breaking from Tradition

The devil, of course, is in the details. Today, only HP, through a combination of acquisition and innovation, has assembled an architectural framework and all of the building blocks to take you from the conceptual level all the way down to the servers, storage, networks, desktops, thin clients and management tools that you can use to start implementing a converged infrastructure in your data center right now.

Breaking from the tradition of dividing the IT environment into silos by product category—i.e., server, storage, networks and management—the HP converged infrastructure framework establishes four sets of related functions. They are:

- 1. HP Matrix Operating Environment**—A common management platform to manage technologies from infrastructure to application.
- 2. HP Virtual Connect FlexFabric**—A common, wired-once, virtual I/O network.
- 3. HP Virtual Resource Pools**—Virtualized computer, memory, storage and network resources.
- 4. HP Data Center Smart Grid**—An intelligent energy management grid that encompasses all systems and facilities.

Unlike the traditional silos in many data centers that are defined, and often jealously protected behind their own acronyms and skill sets, the components of HP's converged infrastructure roadmap are defined by how they interact with each other.



Within HP's converged infrastructure framework there are several technologies that reach across the traditional silos that you can use as catalysts to accelerate the controlled, incremental transformation of your data center environment.

For example, HP introduced Virtual Connect in 2006 to provide blade server edge connectivity that was wire-once and change ready.

Two million ports later, Virtual Connect, in combination with HP Networking technology, has become the foundation for HP's FlexFabric strategy.

On a practical, if not personal level, what this means is that if the server guy decides on Virtual Connect for his blade servers, he better be talking to the networking guy. Virtual Connect converges up to four NICs over a 10 Gb server connection. Bandwidth limits can also be dynamically configured on the fly on each NIC, and the number of blade interconnect modules required can be reduced by as much as 75 percent. And, because it is based on open standards, it is possible to plug Virtual Connect into the network of your choice: HP Networking, Cisco, Brocade, etc.

Wave of Change

Another catalyst that has initiated a wave of change through everything in the data center is blade technology. Blades are modular, need fewer cables, require less floor space, use less power, require less cooling and can be managed by integrated management tools. These and other dramatic efficiencies enabled the blade form factor to take the data center by storm. The first commercial blade servers were shipped in 2001, and the worldwide blade server market is now projected to reach almost \$16 billion by 2013.

Blade servers like HP's family of ProLiant servers built on the x86 platform became the building blocks of the first wave of virtualized and consolidated data centers. Blade enclosure deployments accommodate the ebb and flow of virtualized workloads. If more capacity is needed, more blades can be added to the enclosure avoiding a complete replacement of

a rack-optimized or tower-based standalone server.

HP recently introduced Integrity server blades, the industry's first line of 8-socket, Unix scale-up blades that have been optimized to run multiple operating systems, including: HP-UX 11i v3, Microsoft Windows Server 2008 R2, HP OpenVMS, and HP NonStop. Integrity server blades deliver all the benefits of the blade form factor and are also capable of running mission-critical applications.

A key advantage of introducing blades to your data center is that your investment in blade chassis and racks is protected over time because you can always add additional blades, unlike money spent on maintaining older technology for which there is no roadmap to the future.

Blade Everything

HP has more than servers in mind for the blade transformation. And, HP is at the forefront of the "blade everything" approach to the data center that makes it possible to physically integrate servers, storage, networking, applications and management in a single blade enclosure.

The best example of this concept is HP's Matrix Operating Environment which is essentially the kernel of a converged infrastructure in a blade enclosure. Matrix works like a command center that uses your guidelines to automatically provision and de-provision resources on the fly. If demands by one application require more storage, for example, it will provide it. If specific servers are hitting performance levels, it will adjust the workload accordingly.

Implementing the Matrix Operating Environment is, frankly, not for everyone. Depending on the configuration, it can approach \$200,000 for the hardware, software and services involved. Everyone, however, can use the Matrix Operating Environment as a model for a converged infrastructure which they can approximate in their own data center as budgets and resources allow.

The key to building your own converged infrastructure command center is implementing technologies in each area of your data center that can communicate and interact with each other. Matrix packages them together, but if you can't afford the package, you can still move toward a functional operating environment by aligning technology building blocks that have the capacity to interact with each other according to the specific requirements of your IT environment.

“Just to Be Sure”

The concept of multi-tenancy and shared resources has been around since the early days of storage area networks (SANs) which made disk arrays, tape libraries and optical storage available to servers.

Despite having a head start on shared resources, the prevailing tendency in most organizations has been to buy more storage than you need—“just to be sure.” Predictably, the tendency to over-buy has filled many data centers with a variety of storage devices all performing at a small percentage of their designed performance—kind of like where servers were before virtualization when the rule of thumb was a server for every application.

HP is building a better approach to storage with the technologies in its StorageWorks portfolio that will deliver the same kind of dynamic flexibility—and higher performance levels—that virtualization has made possible in servers. Knowing that you can quickly and easily scale up and out as demand changes allows you to buy just the storage you need, when you need it.

HP's commitment to taking a leading role in the storage market was firmly declared through its \$2.35 billion acquisition of 3PAR. Besides wresting 3PAR from Dell's grasp, HP's acquisition of 3PAR was a shot across the bows of the major storage vendors—IBM, EMC, HDS and NetApp—and a clear indication that HP was not satisfied as an also-ran in the storage market.

3PAR technology is recognized as leading the category of highly virtualized, dynamically tiered, multi-tenant storage arrays built for public and private cloud computing. Industry analysts say that 3PAR points the direction for the next generation of HP storage. Shortly after the acquisition, HP named 3PAR CEO David Scott head of StorageWorks, HP's storage portfolio.

The technologies in StorageWorks now include:

- Modular Smart Array (now P2000)—for small businesses
- LeftHand iSCSI (now P4000)—for the SMB market
- The Enterprise Virtual Array (EVA) family (now P6000)—for SMB and up
- 3PAR—enterprise level
- P9000/XP Disk Arrays—for high-end enterprise storage

Ultimately, all of HP's storage products will be integrated and absorbed into what will become a common storage platform that will make it possible to dynamically select the best storage configuration for a specific application from a menu that includes all the choices. In the meantime, organizations need to carefully select a specific storage solution that meets their current needs and leaves their future options open.

“Knowing an organization's requirements is going to drive you toward the right solution,” says Marlin Kovaleski, a Logicalis account executive who has been helping customers with storage for 30 years. “If you understand an organization's storage requirements, budget and business continuity/disaster recovery strategy, the right product becomes obvious.”

HP's EVAs have been the obvious choice for thousands of organizations for years. EVAs have earned a reputation for being extremely dependable, and for those who appreciate the ease of use of the EVA for traditional, predictable workload environments, it will continue to provide fiber channel connectivity below 3PAR. HP is adding thin provisioning to EVA this year.

HP has made it very clear that networking is an essential part of HP's converged infrastructure go-to-market strategy.

To broaden its storage portfolio, HP acquired LeftHand Networks, a pioneer of iSCSI SAN technology in 2008. LeftHand's intelligent cloning technology reduces the amount of disk space required for storage and its thin provisioning features reduce power consumption. Advanced data replication technology with bandwidth management and failover protection also makes the LeftHand line (now rebranded as HP P4000) ideal for backup and disaster recovery operations between remote offices and a central location.

Five Nines

Often a specific requirement will drive the right storage solution. For example, Kovaleski says a technology-savvy university client with a dread of downtime was on the verge of buying storage from Dell's EqualLogic when Kovaleski told the client about the ability of HP's P4000s to stripe across nodes and effectively provide five nines (99.999%) uptime.

"Each P4000 is a tray with eight to 12 disk drives and two controllers. That's the brick you build with," says Kovaleski. What Logicalis proposed for this university was a storage solution that included two P4000s in its central data center and two more in a backup site in the business administration building. Connecting the two locations with high-speed fiber made it possible to stripe data across all four nodes. The university could lose either site completely and nothing would be lost.

StorageWorks provides a range of storage to choose from that can be matched to an organization's unique requirements—and their budget. One strategy that Kovaleski has followed with several budget-conscious customers is virtualizing their data centers to reduce their footprint first and then building a DR center. For a Midwestern city that was putting a new data center in a new addition to the city hall, for example, Logicalis used

virtualization to consolidate its data center down to three servers and a P4300 for storage. "Basically, we built a converged infrastructure in a room," says Kovaleski. Once the central data center was virtualized and consolidated, the city implemented a matching disaster recovery site in the basement of a fire station several miles away.

Prior to this solution, Kovaleski adds, the city's off-site recovery plan consisted of the IT manager taking backup tapes home with him on Monday nights...if he didn't forget. Today, the municipal data uses HP D2D for backup with HP Data Protector software. There are no longer any tapes to forget.

Acquisition. Absorption. Innovation.

The same pattern of acquisition, absorption and innovation that is happening in HP StorageWorks is underway in HP Networking. Networking is not a new idea at HP. HP's ProCurve networking business dates back 25 years. Traditionally, ProCurve targeted the edge (where end-point devices are plugged in) and HP's products were used in SMB, small campus, and wireless solutions.

The acquisition of 3Com last year for nearly \$3 billion brought HP a suite of solutions targeted at the core networking space, particularly in core routing, aggregation, campus core, and enterprise core solutions that HP ProCurve did not have. It also gave HP Networking an array of products that spans the entire network space from high-end routers and switches to security and management. HP has since retired the "ProCurve" name and has rebranded its entire line of networking solutions as "HP Networking."

HP has made it very clear that networking is an essential part of its converged infrastructure go-to-market strategy. HP Networking is led by Senior Vice President and General Manager Marius Haas, and is part of the Enterprise



Servers, Storage and Networking business unit led by Executive Vice President and General Manager David Donatelli.

Convergence has been a goal in networking since it became possible to integrate voice over the same network infrastructure with data. Video is the new member of the converged network. If your organization still has separate LAN traffic and a PBX with twisted pair copper wire, this would be a good place to start converging. Even if you are not ready to implement VoIP, the next time you upgrade your data network, you should consider switches that support power over Ethernet (PoE) so that when you have the budget and resources to add voice, the infrastructure will be there to support it.

“To ensure that you are progressing toward the goal of a converged infrastructure,” Brett Anderson, Logicalis’ director of HP servers and networking, says, “you need to align each new project that crosses your desk with your long-term vision. The strategic choice might be more expensive in the short term, but nothing is as expensive as finding yourself in a technological dead-end that forces you to start over.”

Software Solutions

All the emphasis on infrastructure has upstaged the emergence of software building blocks that help you realize that converged infrastructure.

A good example of this new generation of software is HP’s StoreOnce which allows the same software to be used on backup clients, virtual appliances, inline appliances and scale-out storage systems. Developed in HP Labs, StoreOnce is implemented in all HP D2D backup systems. By enabling deduplication one time, everywhere, StoreOnce frees organizations from the cycle of escalating storage demands every time data is replicated from remote offices to regional offices and from there to headquarters. With the data compression of 20:1 that StoreOnce makes possible, you can store more backups online; instead of three to five weeks, you can now keep a whole year.

Industry analysts speculate that Léo Apotheker, the former CEO of SAP, was chosen to replace Mark Hurd as HP CEO at least in part because of his background in software. Apotheker is expected to drive software development within HP and has already increased the funds for



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research and development. Analysts also expect to see more acquisition announcements from HP in the software area in the near future.

The Unclaimed Silo

One aspect of the IT environment that IT departments have not been quick to claim is power and cooling. Many in IT have been content to let the facilities department deal with the power and cooling requirements of their data centers, but as the cost of energy has soared, integrating this all-important asset into the total converged infrastructure has become a practical necessity.

HP's Smart Grid is a combination of technologies that includes building sensors into devices that make it possible to reduce power consumption and maximize efficiency by more than 50 percent. Smart Grid also has hooks into VMware that make it possible to migrate virtual machines to as few physical servers as possible and, during periods of low demand, actually shut the power down to un-needed servers. As demand increases, virtual servers are re-distributed to physical servers as necessary.

As with other new technologies, the first step in taking advantage of the Smart Grid is becoming aware of the possibilities and incorporating the appropriate building blocks as you upgrade systems within your data center.

Metaphor for Involvement

Stepping up to take ownership of the costs of power and cooling is an example of a fundamental change that is occurring in the role of IT within an organization. Following the roadmap toward a converged infrastructure in IT inevitably leads an IT department into more direct participation in the business side of an

organization. The emphasis on communication, integration and interaction that is inherent in the technology of a converged IT infrastructure is a good metaphor for the involvement of the IT department in the overall well-being of an organization.

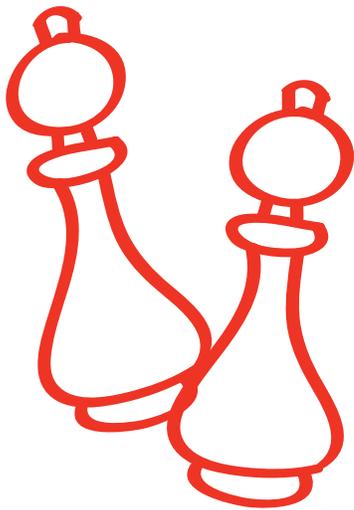
It turns out that figuring out the technology of a converged infrastructure could be the easy part. Probably the single biggest barrier to realizing a converged infrastructure is political, according to Anderson. “Before you can effectively change the technology, you have to change the culture of protected fiefdoms that make up the typical IT department. This is the hill on which a converged infrastructure initiative will live or die.” The implications of a converged infrastructure extend throughout an organization, not just the IT department. What's possible with the technology needs to be possible with the politics. To succeed in today's extremely competitive markets, everyone in every department has to have the overall well-being of the organization as his or her focus. Technologists may not know anything about double-entry accounting, but they should know that if they can help get a product to market faster or ensure that manufacturing has less downtime, that is going to have a positive impact on business.

The plus side for IT politically is that the changes required to implement a converged infrastructure will, in fact, tend to elevate the value and visibility of IT within an organization. Technologists may have to give up their sanctuary in the data center, but the opportunity is there to spend more time in the executive suite.



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About Logicalis

Logicalis is an international IT solutions and managed services provider with a breadth of knowledge and expertise in communications and collaboration; data center and cloud services; and managed services.

Logicalis Group employs over 2,500 people worldwide, including highly trained service specialists who design, specify, deploy and manage complex ICT infrastructures to meet the needs of over 6,000 corporate and public sector customers. To achieve this, Logicalis maintains strong partnerships with technology leaders such as Cisco, HP, IBM and Microsoft.

The Logicalis Group has annualized revenues of over \$1 billion, from operations in the UK, US, Germany, South America and Asia Pacific, and is fast establishing itself as one of the leading IT and Communications solution integrators, specializing in the areas of advanced technologies and services.

The Logicalis Group is a division of Datatec Limited, listed on the Johannesburg and London AIM Stock Exchanges, with revenues of approximately \$5 billion.

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