The Urge to Converge

Investing in a converged infrastructure product could be just the thing to solve your data center problems.
Should You Get IT Together?

The mix of products and tools found in the modern data center allows an organization to accomplish impressive things in support of its business objectives. The trouble, of course, comes in trying to manage that sprawling assemblage of technologies. It’s complicated, and only getting more so.

One way to simplify things is to effectively replace what’s in your data center with a converged infrastructure product. By bundling servers, storage and network devices into a single tool, converged infrastructure (CI) vendors solve many of those IT management headaches. After all, a CI product arrives in the data center already integrated and optimized. Unified management tools are up and running. What’s not to love?

Well, for one thing, there’s the price tag. CI requires a significant up-front investment. In addition, an organization adopting CI needs to be willing to walk away from some—or even many—of its in-place IT assets. The parts of a legacy environment that remain will need to coexist with the newly arrived CI product or appliance. It’s a lot to consider.

This handbook offers insight into the benefits of converged infrastructure as well as its drawbacks. In her article, SearchDataCenter editor Meredith Courtemanche looks closely at use cases for CI and related technologies, including hyper-converged infrastructure.

Next, Stephen Bigelow, the senior technology editor in TechTarget’s data center group, examines the particular components of typical converged infrastructure products and offers tips on how an organization can determine if CI is a good fit or a costly blunder.

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Finding the Right Approach to Converged Infrastructure

FOR BRANCH OFFICE deployments, distributed scale-out computing and other scenarios in corporate data centers, interest is rising in converged infrastructure and its siblings reference architectures, hyper-converged infrastructure and appliances. Successful implementations, though, depend on choosing the right architecture to match particular tasks.

“Converged infrastructure is ... going into larger environments with different lifecycles for servers, storage, network—all different lengths for depreciation schedules and upgrade paths,” said Camberley Bates, an analyst at Evaluator Group, an IT analyst firm.

For Tapad, a cross-screen content delivery specialist in New York City, converged infrastructure was a way to augment existing two-year-old standard rack servers in a distributed computing model.

“Converged infrastructure gave us a minimal fault domain, was cost-effective and let us go denser for power and cooling,” said Ryan Tennant, vice president of technical operations at Tapad. The IT team evaluated vendors for hardware- and appliance-based converged infrastructure (CI), as well as software-defined CI, and found the appliance model wasn’t right for the amount of open source technology in Tapad’s data center.

The company adopted the Dell PowerEdge FX2, a 2U chassis that holds up to four FC630 sleds, which each host two-socket Intel Xeon E5 processors with hard disk and solid-state drive options for storage.

“Converged infrastructure gave us a minimal fault domain, was cost-effective and let us go denser for power and cooling.”—RYAN TENNANT, Tapad VP
“CI lets us reduce a lot of waste infrastructure,” Tennant said. He added that FX2 is flexible, with more options for growth in servers and storage than traditional data center hardware.

THE HYPER-CONVERGED OPTION

Hyper-converged infrastructure has a “strong purpose” in the data center, Bates said. It enables flexible scaling and often is sized to take on entire branch offices, the IT duties of small- or medium-sized businesses and virtual desktop infrastructure (VDI) deployments.

“There’s no getting around local compute if your branch office is big enough,” said Scott Miller, data center director for World Wide Technology Inc., a global systems integrator. And branch-in-a-box offerings eliminate many of the problems of non-centralized IT: local IT management and support at each office, non-standard components and disparity from one deployment to another.

For a large enterprise with a tightly centralized data center infrastructure, an appliance could help achieve continuity across the IT domain. Miller said one example of this would be EMC’s VSPEX Blue, which consists of a 2U, four-node package of x86 hardware, VMware’s EVO:RAIL management, and additional features that include EMC RecoverPoint for VMs and VMware vSphere Data Protection Advanced software.

“This is a natural extension of that deployment federation,” Miller said, with “the same management software all under one big umbrella with low risk.”

Miller anticipates a future generation of hyper-converged infrastructure products that might include a router, wireless access and voice systems to truly centralize IT management while boosting local compute capabilities.

AN APPLIANCE FOR SOME JOBS

Another CI option is the dedicated appliance: a tightly integrated package of hardware, management software and applications that perform a specific task seamlessly. We’re accustomed to these products for databases—Oracle’s Exadata debuted back in 2008—and now they’re getting a converged spin.
For Secure-24, a managed hosting and IT services provider based in Michigan, the appeal of Oracle’s converged infrastructure offering over other choices is having one vendor from top to bottom in the stack. The company moved off of a fleet of x86 servers with VMware virtualization and EMC/NetApp storage onto two Oracle Virtual Compute Appliances, with Oracle Linux supporting Oracle VMs for its offering of e-Business Suite, Hyperion and other Oracle applications.

The Oracle Virtual Compute Appliance (VCA) also meant easier licensing with Trusted Partitions for VMs. “This allowed us to take Oracle databases—just about every app has one—and put them in our private cloud and still be licensing compliant,” said Sean Donaldson, Secure-24’s CTO. He noted one example where a business saved $150,000 in licensing costs when it hosted its Oracle applications on the VCA instead of on a heterogeneous hardware and cloud stack.

This tight integration also changed how Secure-24 organized its staff, with a smaller sub-team of unified engineers focusing only on this stack.

With IT putting a greater focus on applications, Donaldson expects more companies will follow suit. “Even internal teams need to look at the infrastructure as one holistic unit.”

**PLAN FOR GROWTH**

Organizations need to know what they want before jumping on a converged, hyper-converged or appliance bandwagon.

“Let’s say [you] have a branch office that needs 50 virtual desktops. [You] could have bought a dedicated appliance for VDI, but who only needs VDI? Nobody,” said WWT’s Miller. The branch has other IT needs and goals, and a hyper-converged box could run the VDI deployment as well as the additional IT tasks at the location.

In the same vein, hyper-converged infrastructure might offer the simple scaling that small businesses and branch offices rely on, but isn’t necessarily the best way to run a core enterprise data center for large companies, he added.

In such a new class of data center IT, growth is an important criterion for deployment. Early
CI adopters are now getting to the point where they need to refresh or increase capacity, the Evaluator Group’s Bates said. “It’s suddenly a million-dollar transaction.”

Reference architectures might have an edge on converged infrastructures, she said, because they don’t include as much vendor lock-in, which eases the refresh process. However, a reference architecture also means more involvement from the IT team and/or outside experts to design, deploy and manage infrastructure.

The best thing to do is understand your deployment’s specific needs and goals, along with its limitations, then test products’ viability. —Meredith Courtemanche
The Big Questions Surrounding Converged Infrastructure

Choosing to go with a converged infrastructure product is a major turning point for an IT organization. In addition to being a significant financial decision, it’s a major change philosophically. Let’s look at some of the most pressing questions that you’ll want to be mulling when evaluating the CI option.

What are the elements in a converged infrastructure, and what is actually virtualized?
The goal of converged infrastructure is to replace disparate, heterogeneous data center equipment with a complete suite of highly integrated and optimized hardware, including servers, storage and networking devices.

Virtualization is present in all three aforementioned areas, allowing IT professionals to quickly pool and provision the storage and networking resources among a legion of VMs—each of which can easily be migrated between local and remote hardware. The high level of virtualization and flexibility found in converged infrastructure (CI) deployments is often a precursor to private cloud deployments or even some type of software-defined data center.

CI platforms can be built from the ground up, such as IBM’s Flex System, which includes an IBM Flex System Enterprise chassis, a range of x86 or POWER servers, PCIe expansion devices, IBM Flex System V7000 or Storwise V7000 storage units and a choice of networking, including Ethernet and IBM Flex System fabric. The hardware choices are all managed by a single management framework, such as IBM Flex System Manager.

Cisco UCS is another example of the ground-up approach. For example, Cisco UCS C-Series Rack Servers and Cisco Nexus Fabric Extenders for UCS Rack Servers can work together for a dedicated CI deployment while providing access to an existing SAN. Cisco UCS
is supported through UCS Manager or UCS Director software.

CI platforms can also be bundled using gear from several vendors. For example, NetApp’s FlexPod combines NetApp storage systems, Cisco UCS servers and Cisco Nexus fabric into a single validated CI product. Cisco’s UCS Director can provide centralized automation and management of the FlexPod’s components through a single, unified management tool.

Virtualization can be provided through almost any hypervisor, including Hyper-V or vSphere.

**How well does converged infrastructure interact with existing (non-CI) systems?**

The question of heterogeneity can be a challenging one for converged infrastructure environments. Generally speaking, CI can interoperate with non-CI devices whether virtualized or not. For example, there is no technical reason why a server of a different make or model can’t be added to a switch port on a CI platform. However, this often defeats the purpose of CI.

The entire point of converged infrastructure is to provide a single ubiquitous hardware and software framework with comprehensive, granular management tools. Everything is tuned, tested and known to work together. When a foreign device is connected to CI, a new heterogeneous situation occurs, which can result in reduced performance, diminished insight for management tools and other interoperability problems. These are well-known issues in traditional heterogeneous environments, but an undesirable (and unnecessary) scenario once CI is introduced.

When converged infrastructure is added to an existing data center environment—perhaps as a platform for a private cloud—the CI usually exists as an island of infrastructure with its own unique management tools and standards of performance. Any existing infrastructure and management tools are typically left to continue operating as they had previously. Supporting two “different” environments in this manner can pose a great deal of additional work for IT staff.

When considering a converged infrastructure, it is critically important to discuss support for heterogeneous or legacy environments...
with the CI vendor. You should also perform extensive proof-of-principle testing in advance of any purchase commitment. This will tell you exactly how CI will interact with heterogeneous devices in your own data center.

**We already have a virtualized data center, is it really worth moving to converged infrastructure?**

Converged infrastructure has proven itself to be a powerful option for the modern data center. CI can be a more robust, flexible and better-managed, high-performance virtualized infrastructure than typical heterogeneous data centers. But CI is still just a tool designed to tackle an organization’s computing tasks. As with any tool, it’s important to understand when and how the tool is used most effectively.

Choosing CI is not a simple step. A CI bundle (with servers, storage and networking) essentially replaces the existing data center infrastructure as well as the investment made in that existing infrastructure, software licenses and service agreements. Few organizations are willing to throw away the capital invested in a current data center in favor of an entirely new platform. These financial implications have been a principal reason that CI has been slow to gain broad acceptance. In many cases, CI adoption is deferred until a major technology refresh is needed, or until a new greenfield facility becomes available (such as a new remote data center).

CI can pose growth and vendor challenges. Even though converged infrastructure platforms are designed for scalability, it’s important to realize that there are only a limited range of products that are compatible with the CI bundle. Limited product choices (and dependence on CI vendor product lifecycles and roadmaps) often translate into higher product costs and potential availability challenges later in the product lifecycle. Organizations with unpredictable or erratic spikes in computing growth may have trouble obtaining adequate gear upgrades in a cost-effective manner. This is very different than traditional heterogeneous data centers, where any x86 white-box server or Ethernet switch might work in the environment.

CI deployments are also being slowed by alternative infrastructure paradigms like colocation and public cloud providers, both of
which offer effective computing resources (and all necessary support) as a monthly operating expense rather than a major capital expense. This conversion of Capex into Opex has become increasingly attractive as organizations seek to exert better control over IT expenses.

The benefits of converged infrastructure are considerable, but making the switch is a big decision. A CI deployment should be clearly justified with a return on investment analysis, and it should be vetted with a thorough proof-of-principle project. In addition, organizations can reduce the potential for future complications by evaluating the CI vendor’s product roadmap against anticipated computing needs. If the case for CI is simply too weak, organizations might be better off with a more traditional data center model. —Stephen J. Bigelow
Converged Infrastructure’s Benefits

Over the years, heterogeneous data centers have curated the highest-performance products for the budget. But mixing systems and software from an array of vendors always poses the potential for integration, management and support problems.

Converged infrastructure (CI) represents a significant shift, especially for traditional businesses with extensive data center assets and staff in place. But if the business is willing to invest in the change, CI will ease the burden on IT staff and tear down the traditional silos that limit productivity.

Easier Interoperability and Visibility

Converged infrastructure products do away with the subtle differences in hardware designs, firmware, expansion devices, operating systems and drivers found in multi-sourced data center infrastructures.

In a traditional data center, for example, an older server’s processor doesn’t support a hypervisor command set like Intel’s Virtualization Technology for Directed I/O. Another server’s firmware disables the feature by default or omits support for parts of the I/O chain. In the overarching data center server mix, this lack of integration could throw off deployment objectives until the IT team identifies the problem and mitigates it via hardware upgrades or software patches.

Converged infrastructure vendors do all of the integration and testing work upfront. The data center manager chooses from prescreened server, network and storage components. If the individual components need alterations for full interoperability or fine-tuning for maximum performance, it occurs on the vendor’s time, not yours.

The differences between heterogeneous server, network and storage components also
adversely affect systems management. Ideally, one management tool would identify, monitor and control every piece of equipment in the data center. With hardware from a variety of vendors, one tool rarely achieves the same level of granular insight and control across every device. In some cases, it won’t talk to the device at all. If you’re buying multiple management tools for visibility into and control of a heterogeneous data center, it lowers efficiency, adds training time and increases the chance of errors.

Converged infrastructures typically come coupled with management tools that provide full compatibility with all the components. The management layer sees and controls everything at a granular level, so there are no gaps in system control or reporting. This finally achieves the vaunted single pane of glass data center management scenario.

SOLVING SUPPORT AND SPACE ISSUES
The challenges of heterogeneous interoperability also spill over into vendor maintenance and support. For example, the server vendors may be unable or unwilling to address issues that they believe are caused by the networking vendor’s equipment or software. Mutual blame leads to wasted time, unresolved helpdesk tickets and unproductive service calls while the data center team chases multiple vendors for support. Meanwhile, key applications are offline for unpredictable outage periods.

Single-source support is an important justification for CI—the vendor provides all maintenance and service. The “one-throat-to-choke” concept is compelling for converged infrastructure adopters. It’s important to read and understand any maintenance and service agreements for a clear perspective on problem resolution and escalation paths with the CI vendor.

Converged infrastructure deployments will likely shrink and bring order to the data center
center footprint. CI replaces conventional rack servers, network switches and storage arrays sprawl, often where new systems were installed for years in any available rack space without detailed planning.

Rather than a mix of conventional boxes and blanking panels taking up racks, converged infrastructures comprise small form factor system hardware, such as blade servers and high-density storage arrays. This high-density approach offers more computing with far less physical space, while minimizing airflow containment and cooling efforts.

CI has become popular for remote and space-constrained data centers. Some vendors even claim such significant reductions in physical space requirements that users eliminated entire data center sites.

Heterogeneous data centers also support private cloud deployments. However, the matters of interoperability, management, support and space are only exacerbated by private cloud projects that demand automation, scalability and self-service.

Some vendors tailor converged infrastructure products for private clouds, such as HP’s CloudSystem platform or Dell’s varied cloud offerings, but all converged infrastructures naturally suit cloud architectures.

Converged infrastructures offer businesses a faster and more efficient pathway to building and running an enterprise-class data center by creating a one-stop shop for systems and software. —Stephen J. Bigelow
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