

Hyperconverged  
Infrastructure (HCI) —  
Is It Right for Your IT  
Environment?



# Hyperconverged Infrastructure (HCI)—Is It Right for Your IT Environment?\*

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*When considering replacement of aging information technology (IT) infrastructure, hyperconverged infrastructure may be a good option for large-scale implementations. Courts managing numerous servers and a large network should consider this approach.*

\* NCSC *Trends* produces factual articles on new developments and innovations in courts across the United States with the purpose of helping the courts anticipate and manage change to increase public accountability, trust, and confidence in the judicial system. The NCSC does not endorse any products or entities that may be mentioned in *Trends* articles.

## *Hyperconverged Infrastructure (HCI)— Is It Right for Your IT Environment?*

Court IT staff are taking a hard look at cloud infrastructures, further virtualization,<sup>1</sup> and a relatively new architecture known as HCI to replace their outdated IT resources. HCI is particularly advantageous for large court implementations where there are numerous servers and a large network to be managed.

HCI is a process of pre-integrating a system's entire stack of computing, network, storage, and virtualization resources in a scale-out server. HCI takes the place of increased IT infrastructure requirements to manage hardware and software components separately.

Like many government entities, courts operate with limited IT funding, often resulting in outdated data centers and network resources in need of replacement. Aging IT infrastructure leaves organizations vulnerable to cybersecurity attacks and data breaches. In addition, an aging infrastructure cannot meet the requirements for a modern business continuity/disaster recovery plan.

Digital transformation is driving technology to rapidly evolve toward application modernization to be more agile with microservices-based processes. This architectural pattern of evolution drives the need for an infrastructure solution tailor-made for application modernization and inherently supports hybrid cloud deployments. It also addresses the need for a ready-to-use end-to-end platform for application modernization.

Complex problems of data management, data placement, and workload orchestration become part of the platform. Digital transformation ensures consistent access and availability of data across a hybrid cloud and allows for the proper levels of cyber-resiliency with required security.

Complex and expensive legacy infrastructure is replaced by a distributed platform running on industry-standard commodity servers that enable enterprises to size their workloads precisely and to scale flexibly as needed. Software running on each node (server) distributes all operating functions across the cluster for superior performance and resilience.

HCI provides software orchestration of network, storage, and computing resources with a single management interface that can be accessed remotely. It also tends to have a smaller physical footprint than a standard set of server racks and corresponding equipment. HCI orchestrates the entire data-center stack—computing, storage, storage networking, and virtualization—from a single interface with a management pane. Specifically, it combines commodity data-center server hardware with locally attached storage devices and is powered by a distributed software layer to eliminate common pain points associated with legacy infrastructure.

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1 Virtualization is technology that allows creation of useful IT services using resources that are usually performed by hardware installations. It allows use of a physical machine's full capacity by distributing its capabilities among many users or environments.

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This new architecture can operate on premises, in a multiple or single cloud, or in a hybrid environment. The flexibility in architecture allows geographically distant locations, thus providing resiliency and redundancy to minimize the threats caused by cyberattacks and natural disasters.

In addition to the distributed storage and computing platform, HCI includes a management pane for easy administration of resources from a single interface. This eliminates the need for separate management solutions for servers, storage, storage networks, and virtualization.

Organizations use public cloud services for deploying IT applications to run their businesses. Public cloud services are flexible and dynamic and enable organizations to adapt to changing business needs.

Despite increased flexibility, cloud computing has its own challenges. Building and deploying applications in public clouds requires specialized skill sets that diverge from traditional IT teams, increasing the specialization in already highly siloed organizations. In addition, using public cloud resources is more expensive than on-premises infrastructure and creates control and security challenges.

Hyperconverged infrastructure is underpinned by many of the same distributed systems technologies as public clouds, enabling IT organizations to build private clouds that bring the benefits of cloud computing into organization data centers. Hyperconverged infrastructure services can also be extended into public clouds for true hybrid cloud infrastructure. This enables applications to be deployed and managed with the same tools and procedures while making it easy to migrate data and services across clouds.

HCI has been put into place in the 1st Judicial District in Philadelphia as well as in other courts. “The decision for HCI was through the lens of scalability and maximizing our resources,” says Joshua Reece, CIO for the Philadelphia courts.

HCI reduces the data-center footprint by decreasing typical infrastructure stacks down to scalable building blocks with computing, storage, and network built in. A drastically reduced footprint enables administrators to run the same infrastructure at the edge as in their core data centers, resulting in additional efficiency while improving resiliency and performance.

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Separate servers, storage networks, and storage arrays can be replaced with a single HCI solution to create an agile data center that scales with the business. Hyperconvergence makes administration much easier, enabling management of all aspects of infrastructure from one place, while reducing complexity by removing compatibility problems between multiple vendors. If resources become scarce, administrators can contact their vendor, ask for more servers and software licenses, then deploy them with a few clicks.

Data is growing at 50 percent or more per year and is stored on block, file, and object storage. New requirements for visibility and control are increasing demands on storage administrators. Cloud storage has become an important tier that must be considered in any storage architecture. However, traditional storage infrastructure cannot keep up with the demands caused by these new realities because it is siloed, which creates complexity, limits flexibility, and reduces utilization.

Traditional infrastructure lacks sufficient visibility into the data to support new compliance and control requirements. It was designed in a time before the cloud, making adoption of cloud-like capabilities difficult. HCI breaks down silos and pools resources into a single resource that is easy to manage and control. The more “invisible” infrastructure can be, the better. HCI extends that invisibility into the storage domain.

Remote access capabilities have become increasingly necessary and more attractive as remote work has increased. It can easily be combined with a managed, off-site data center that provides greater physical security and

redundancy of power and security systems. A managed data center that is deployed, managed, and monitored by a third-party data-center-service provider through a managed server platform reduces reliance on in-house resources.

HCI is a step beyond mere virtualization of servers into virtualization of storage and networking. A single platform for these resources provides better coordination and enhanced performance. It also provides for better orchestration of security services.

Despite all the benefits of HCI, there are times when it is not the best solution. Large databases that require dedicated storage are not well suited to this architecture, as HCI is meant to scale horizontally, not vertically. For example, a large case management system implementation in Philadelphia was recommended to stay on standard server technology.

There are many HCI vendors operating in a competitive environment. It is necessary to do sufficient research before committing to such a project. The migration of existing data and applications can be a lengthy process that requires planning and deliberation, much like any large architectural shift. Various HCI solutions offer partner services and features that can greatly improve the entire enterprise IT system.

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Nick Hinge, senior account executive for Competitive Computing, Inc. (CCI), a Xerox partner that implemented HCI in Vermont, has the following advice about determining whether HCI is a good fit:

*Most of our clients are a great fit for Hyperconverged Infrastructure. The features that are most appreciated are ease of management, scalability, performance, resiliency and even security. HCI is not a fit for every environment, but where it does make sense, the value is compelling.*

*We often go through the exercise of comparing the cost of traditional 3-tier infrastructure to a similar-sized HCI solution for client evaluation. Above a certain scale, HCI is very cost-effective. And the total cost of ownership favors HCI due to the time savings realized by ease of management.*

*One of the features of government organizations is the presence of multiple buildings and more than one data center. This creates the need to build redundancy by installing infrastructure across multiple buildings (data centers). If the bandwidth is fast between data centers, HCI makes it simple to build a “stretch-cluster” that can be a cornerstone for High Availability (HA) systems and even a Disaster Recovery (DR) strategy. Also common is the use of HCI as the cornerstone of a hybrid-cloud strategy with an on-premises “private cloud,” communicating directly with “public cloud” resources.*

Recent implementations of HCI have supported its use in several ways.

**Ease of management:** HCI platforms provide life-cycle management that is engineered and fully supported by the manufacturers, reducing maintenance time for in-house system engineers. Built-in resiliency even allows administrators to upgrade the systems during the workday. In-house system engineers are able to keep up with upgrade cycles to ensure that the underlying infrastructure is properly patched. That practice leads to a much higher cybersecurity posture. Time saved by IT admins allows them to spend more time supporting end-user applications and facing end-user challenges, which adds a lot of value.

**Scalability:** There are multiple ways to add resources to these platforms. Existing nodes can be expanded by adding RAM and disk drives through a simple process. This is referred to as “scale up.” Providing additional HCI nodes to a cluster to support new and expanding workloads is referred to as “scale-out.”

**Performance:** The top platforms in the industry are engineered with effective, software-defined storage algorithms that allow for fast reads and writes of the data. Especially when engineered with all-flash storage, the speed of the applications served to the end users is excellent. The networking should support at least 10GB of traffic as these nodes are busy communicating between each other (east-west traffic). Larger installs will run on top of 25GB networking. High-quality, properly configured top-of-rack switches are instrumental to a successful deployment and ensure high performance.

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Replacing infrastructure is never an easy task, and it must be thoughtfully planned and architected. In the long term, HCI supports overstretched IT resources that may exist in courts. The interoperability of an HCI implementation provides a more seamless approach to standard upgrades and expansion. In addition, when properly implemented, HCI provides more flexibility for IT to improve its cybersecurity profile while allowing IT staff to be more responsive to support end users.

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## Resources

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