Less Hardware. More Software.

How Hyper-Converged Infrastructure Accelerates Government Data Center Modernization
Contents

01 Digital Demands More of Government IT Infrastructure
02 Why HCI?
03 Key Use Cases for HCI
06 So, How Do I Get There?
08 Mission Success: iGov Technologies Delivers a Lighter Tactical DoD Computing Solution with VMware vSAN
09 Mission Success: How the State of Louisiana Deployed a Service-Oriented Architecture using HCI
11 Mission Success: Growing Demands on IT Infrastructure Empowered a Federal Government Agency to Replace Hardware-Based SAN
12 Accelerate Your Agency’s Data Center Optimization Goals with VMware
Digital Demands More of Government IT Infrastructure

As agencies continue to modernize data center infrastructure to meet evolving mission needs and technologies, they are turning to agile software and cloud solutions. One such solution is hyper-converged infrastructure (HCI), a melding of virtual compute, storage, and networking capabilities supported by commodity hardware.

With data and applications growing exponentially along with the need for more storage capacity and flexibility, HCI helps offset the rising demands placed on government IT infrastructure. HCI also provides a foundation for hybrid cloud, helping agencies permanently move applications and workloads into public cloud and away from the data center.
Why HCI?

Traditional three-tiered architecture comprises three distinct silos, each requiring a distinct set of hardware and management tools. This classic approach to IT infrastructure is becoming unsustainable in a multi-cloud, high-density world.

As part of an agency’s data center modernization journey, HCI accelerates hybrid cloud adoption, mission agility, and innovation by collapsing storage and networking into the hypervisor. HCI is:

- **Efficient** – Instead of virtual appliances running separately on top of the hypervisor, HCI is tightly integrated with the hypervisor for the best performance and memory resources.
- **Lower cost** – HCI reduces storage CapEx and OpEx by leveraging server-side economics, affordable flash, and simplified management.
- **Scalable** – A distributed architecture, HCI allows for grow-as-you-go, non-disruptive scaling.

Agencies are adopting HCI solutions to achieve significant IT outcomes, and trends suggest that agencies are going all-in on HCI to:

- **Speed data center initiatives**, including data center consolidation, optimization, and legacy system modernization.
- **Improve the cost and quality of IT service delivery**, accelerating responsiveness with faster deployment, easier operations, and scalability across a software-defined infrastructure.
- **Unify management**, consolidating multiple administrative functions into a unified and virtualized management stack that is workload-centric, automated, and policy-based.
- **Support hybrid cloud strategies**, implementing a consistent architecture and common operating environment across on-premises infrastructure and commercial cloud services.
- **Accelerate the pace of innovation**, leveraging infrastructure that meets new mission requirements and provides a flexible platform for next-generation applications and container technologies.
- **Increase data protection and security**, addressing growing requirements to protect critical data and resources with native, software-based security.
Key Use Cases for HCI

Although not an exhaustive list, the benefits of HCI are especially evident across the following common use cases in government:

- Hybrid cloud adoption
- Mission-critical applications and databases
- Virtual desktop infrastructure
- Remote office
- Business continuity and disaster recovery

1. Hybrid cloud adoption

HCI enables the seamless migration of IT applications and workloads across clouds, giving IT the flexibility and freedom to run any app, both traditional and cloud-native, on any platform across private and public clouds.

Infrastructure transformation at the State of Louisiana

Hyper-converged infrastructure is at the core of the State of Louisiana’s long-term plan to implement a public cloud-first strategy. To support this next-generation strategy, the state virtualized data center architecture—compute, storage, and networking—to standardize and support IT services across private and public clouds. Read more about Louisiana's service-oriented HCI architecture on page 9.

2. Mission-critical applications and databases

Traditional infrastructure makes mission-critical applications slow to provision and complicated to manage. Tasks such as Oracle database processing, for example, require high levels of performance, availability, and reliability. Older architectures simply can’t deliver without overprovisioned storage, expensive purpose-built hardware, and management tools designed for silos.

In contrast, HCI offers a simple, distributed scale-out architecture, optimized for high-performance flash devices, that puts IT back in charge of the applications most important to the agency. In an HCI model, storage management and provisioning is all about the application, not the hardware, thanks to the flexibility and agility of a software-defined infrastructure. By enabling application-centric storage services through software, IT is able to adjust to the specific needs of the application in real time, giving applications the storage services they need when they need them, without routinely overprovisioning capacity or data services.
A State’s Department of Health deploys HCI to increase storage capacity and performance

A state’s aging IT infrastructure and out-of-capacity storage solution hindered efficient delivery of the Bureau of Women, Infants, and Children (WIC) services. System performance had slowed to a crawl, and crashes were far from unusual. To improve application and system performance, as well as customer service, the state leveraged hyper-converged storage for its enormous capacity and tight integration with existing virtualized infrastructure. With the new hyper-converged setup, the bureau was able to reduce storage costs by 50 percent. Using the savings afforded by reductions in capital and operational expenses, the bureau was able to invest in a software-defined networking solution, VMware NSX®, to strengthen the WIC firewall and protect sensitive data.

3. Virtual desktop infrastructure

On traditional infrastructure, virtual desktop infrastructure (VDI) can be expensive to deploy and maintain, with high upfront capital requirements and maintenance costs. HCI delivers the perfect solution to VDI challenges by offering a lower CapEx requirement, simpler operational model for managing storage policies, and greater densities across desktops and applications that scale as needs grow.

Improving public safety services

The City of North Las Vegas extended virtual desktops to its firefighters and police officers, giving them easy access to computing resources from their laptops and tablets in the field. Virtual desktops perform much better than aging desktop hardware, making staff more efficient while also being easier to update and maintain. Each firefighter and officer has their own VDI profile, meaning access and communication with dispatch is streamlined, making response quicker and their presence more impactful.

4. Remote office

Many agencies have distributed computing environments and remote offices that rely on local IT infrastructure managed by staff at another location. This distributed architecture presents a host of challenges that range from unpredictable performance and management complexity to poor reliability and availability. IT teams need better visibility from a distance, along with tools that will make administration and management simpler.

HCI is a perfect match for remote office deployments since it delivers a complete, integrated solution for compute, storage, management, and networking. The right HCI solution can be easily scaled up or down, is simple to manage, and is flexible enough to accommodate changing needs—exactly what agencies with remote offices need.

"Virtualization has been so important in enabling us to get out from behind our desks and into the community, yet still securely access information when we need it. We can access floor plans from our devices in the field and quickly strategize about how to attack a fire, saving more property and lives."

JOSEPH CALHOUN
FIRE CHIEF FOR THE CITY OF NORTH LAS VEGAS
Managing distributed work environments at a U.S. Federal Agency

A large U.S. Federal Government agency operates a departmental headquarters where 2,000 workers manage lifecycle procurement programs that supply the agency’s operations worldwide. The agency had plans to streamline operations across its geographic footprint, but it had a multitude of costly legacy applications running in different locations in diverse hardware environments. To turn its data center infrastructure into a highly flexible and scalable cloud service platform, the agency replaced a mixed storage tier consisting of network-attached storage devices and a hardware-based SAN nearing capacity with hyper-converged infrastructure, helping the agency prepare for rapid growth across offices by easily adding more compute or storage capacity on demand.

5. Continuity of operations and disaster recovery

The cost of a disaster recovery (DR) site is costly for most organizations. As a result, a number of agencies have an inadequate disaster recovery plan, which introduces considerable risk. HCI alleviates one of the more significant costs of a DR site—infrastructure—by natively integrating compute, storage, and network resources on industry-standard hardware to reduce CapEx. Additionally, HCI improves recovery point objectives by fine-tuning workload distribution and baking backup and replication into the platform.

Keeping the British Army on the frontlines by boosting application services

The British Army required a new hosting system to deliver the application services it needed to run day to day operations for up to 50,000 users. Replacing a legacy infrastructure that was no longer fit for purpose, the Army partnered with VMware to shift to a software-defined data center to enable faster development and deployment of applications. By replacing legacy hardware with software, the Army is now able to connect private cloud infrastructure to its colocation failover site for backup—ensuring availability.

“With VMware, we have complete control and oversight of our infrastructure; it has significantly improved our ability to deploy and support applications services that enable the Army to deploy globally and carry out its duties.”

LT COL DORIAN SEABROOK
HEAD OF OPERATIONS,
IAS BRANCH
THE BRITISH ARMY
So, How Do I Get There?

Modernizing the data center is the key to future-proofing IT operations and services, but what does that mean exactly? Modernizing your data center with VMware extends your agency’s investment in compute virtualization to storage and networking to fully abstract the data center into a flexible pool of software-defined infrastructure resources. By leveraging the same policy-based approach used in compute virtualization to the storage and network layers, your enterprise can ensure a future-proof and flexible architecture that is prepared for any future need (hybrid cloud, public cloud, global operations, etc.).

VMware provides a unique, software-defined approach to hyper-convergence, leveraging the hypervisor to deliver compute, storage, and management in a tightly integrated software stack. VMware’s industry-leading software is offered on the broadest set of HCI consumption options, helping agencies evolve data center infrastructure without risk, and scale to tomorrow with support for new hardware, applications, and cloud strategies.

VMware HCI solutions include:

- **VMware vSphere** – The industry-leading virtualization and cloud platform that provides a powerful, flexible, and secure foundation for mission agility, next-gen apps, and hybrid cloud environments.
- **VMware vSAN™** – The only enterprise-class, vSphere native storage solution that accelerates data center modernization by extending virtualization to storage. Integrated in the kernel of the vSphere hypervisor, vSAN is the core foundation of VMware HCI.
- **VMware vCenter Server** – The unified and extensible management solution for vSphere environments.
- **vRealize Operations** – The hybrid cloud management platform that helps plan, manage, and scale SDDC environments with unified monitoring, automated performance management, and capacity optimization.
- **VMware NSX** – The network virtualization platform for the SDDC that embeds networking and security functionality typically handled in hardware directly into the hypervisor.
- **VMware Cloud Foundation™** – A complete hyper-converged solution stack delivered through the market leading hypervisor.
Reducing Cost and Complexity with VMware vSAN

VMware vSAN is the only native vSphere hyper-converged storage solution that seamlessly works with your existing tools, skill sets, and platforms to deliver secure, flash-optimized storage for private and public cloud deployments. Leveraging commodity x86 components and a unified management platform, vSAN reduces complexity, accelerates responsiveness, and eliminates support silos, giving IT the ability to focus on data and applications instead of storage infrastructure.

Improving Security with VMware NSX

VMware NSX, as part of a fully software-defined data center, provides a virtual network overlay on top of physical network architecture. Virtual networks are programmatically provisioned and managed independent of the underlying hardware, enabling micro-segmentation, a key capability of NSX that isolates, segments, and applies security policies to data center resources.
This new approach is the next step in the evolution of DoD command and control systems. It’s hard to argue with the SWaP-C, scalability, security, and performance benefits of virtual storage and hyper-converged infrastructure. iGov has a long history of rapidly transferring and transforming emerging technologies into capable tactical systems. Our partnership with companies like VMware is what makes this possible."

CHUCK REICHE
VICE OF PRESIDENT
BUSINESS DEVELOPMENT, iGOV

Mission Success: iGov Technologies Delivers a Lighter Tactical DoD Computing Solution with VMware vSAN

The Challenge
When tactical C4I federal systems integrator, iGov Technologies, was tasked with building a smaller, lighter version of a defense customer’s tactical network platform, it turned to VMware vSAN HCI. The new product had to support the full range of tactical command and control systems, with services that included email, radio over IP, full-motion video, Internet, and Microsoft Office. It also had to be more portable, compact, and able to run far longer on less power than the current version.

The Solution
The existing version ran on vSphere, with a separate module of network-attached disk arrays for storage. To meet the new weight and power requirements, iGov replaced its network-attached storage modules with server-attached storage virtualized using VMware vSAN.

Outcome
Using server-attached virtual storage, iGov was able to reduce the product’s weight by 75 percent, improve storage performance by 10x, and extend battery runtime from 18 minutes to 2 hours.
Mission Success: How the State of Louisiana Deployed a Service-Oriented Architecture using HCI

The Challenge
When upgrading its statewide Medicaid Eligibility and Enrollment system, the State of Louisiana’s Office of Technology Services (OTS) had service-oriented architecture (SOA) in mind. To support SOA, IT leadership determined that a modern, hybrid cloud-ready data center was necessary to achieve its security, high availability, and shared services goals.

The Solution
Leveraging HCI, the state built a private, on-premises cloud as part of its move to an SDDC. Architecturally segmenting underlying technology infrastructure from services and applications was critical to implementing a successful SOA, and the state’s SDDC enables OTS to provision applications, services, and capacity to various state programs and departments securely and on demand.

Outcome
The state now operates on a common, hyper-converged operating model that spans both private and public clouds to more securely manage and scale its newly consolidated IT operations. By implementing HCI, the department is able to deliver a service-first approach that prioritizes end-user security, efficiency, and cost-effectiveness while enabling seamless scalability across programs.
Extend to the Cloud with VMware Cloud Foundation

Quickly and easily stand up and manage an enterprise-grade private cloud that delivers infrastructure as a service (IaaS) with flexibility, control, and security with VMware Cloud Foundation. Cloud Foundation is delivered as a complete hyper-converged solution through the market leading hypervisor and includes virtualized compute, storage, networking, and management for an agile, software-defined data center with consistent cloud management.

- **Maximize existing resources** – Use existing investments, skill sets, and processes to manage workloads across the hybrid cloud both on-premises and through public cloud partners.
- **Accelerate time to market** – Enable automation and self-service that allows IT to speed resource delivery with minimal disruptions.
- **Choice and flexibility** – Use developer tools that make sense without compromising existing operational, management, and security frameworks.
- **Streamline system management** – Automate lifecycle management for system design, set up, testing, and patching.
- **Run both traditional and cloud-native applications** – On the same platform, and with familiar tools and resources.

HCI Powered by vSAN Deployment Options

Government agencies ready to deploy HCI can choose common, off-the-shelf hardware and software, or take advantage of a hyper-converged software stack as an appliance. VMware HCI solutions, featuring the most streamlined deployment experience, are offered on the broadest set of consumption options from a turnkey HCI appliance to more than 200 certified platforms, including the following:

- **Dell EMC VxRail** – This solution is a jointly engineered appliance by Dell EMC and VMware and the easiest and fastest way to implement a VMware powered HCI solution. With the power of a whole SAN in just two rack units, it provides a simple, cost effective hyper-converged solution for a wide variety of applications and workloads. With VxRail, agency IT teams can start small and easily scale capacity and performance by non-disruptively adding appliances to the cluster without the investment or up-front planning required with traditional infrastructure.
- **vSAN ReadyNodes** – VMware has partnered with all of the leading x86 server vendors to provide a broad choice of pre-certified hardware, enabling government organizations to deploy HCI with maximum flexibility of hardware, software, licenses, and support. vSAN ReadyNodes have been pre-configured, tested and certified for VMware HCI software. Each ReadyNode is optimally configured for vSAN with the required amount of CPU, memory, network, I/O controllers and storage (SSDs, HDDs or flash devices).
Mission Success: Growing Demands on IT Infrastructure Empowered a Federal Government Agency to Replace Hardware-Based SAN

The Challenge
A departmental headquarters of a global U.S. government agency needed to evolve its partially virtualized IT environment to reduce capital and administrative costs, improve performance, and enhance scalability. The agency was pursuing a long-term consolidation strategy to streamline operations, but it had a multitude of costly legacy software applications developed over decades and running in different locations in diverse hardware environments.

The Solution
With its hardware-based SAN nearing capacity and performance limits, the IT team would need to expand the SAN environment significantly or move to a new technology. Since much of the agency’s server infrastructure was virtualized using VMware technologies, the IT team quickly found a solution in VMware vSAN.

Outcome
The seamless integration with the vSphere platform and the entire VMware product stack made vSAN a simple and fast storage platform for the agency’s virtual environments, including its virtual desktop environment and on-premises private cloud. The agency was able to reduce total cost of ownership by 50 percent due to reductions in storage capital costs and administration. Application performance and storage response surpassed expectations, allowing the agency to accelerate new application development, and provide superior private cloud services to various locations.

“We needed to change from a physical, client-server, manual-touch business model to a totally virtualized, cloud-delivered infrastructure-as-a-service model. That would give us a platform on which we could efficiently automate development operations.”

IT DIRECTOR
U.S. FEDERAL GOVERNMENT AGENCY
Accelerate Your Agency’s Data Center Optimization Goals with VMware

A modern data center is key to meeting government digital transformation and cost containment objectives now and into the future. VMware solutions are built on the flexibility and scalability of software, empowering agencies to build, secure, and manage a complete HCI platform that includes market-leading compute, storage, and management technologies. A comprehensive solution, HCI delivers a familiar operating environment for agencies looking to evolve toward a true hybrid cloud model.

Industry’s Most Complete Solution for Modern Government Data Centers

- **Multi Cloud**: Experience unified operating environment from on-prem to choice of public clouds
- **SDDC ecosystem**: Full SDDC offering with broad ecosystem of hardware platforms and complementary software
- **Native security**: Industry’s first native HCI security solution for data-at-rest encryption
- **Simplified management**: Policy-based management to automate common tasks and reduce operational risk
- **Reduce TCO**: Higher performance for any application

To learn more about the benefits of HCI for government organizations,

- Test drive solutions in the VMware Hands-On Lab: Modernize Infrastructure
- Visit VMware Solutions for Government on the web
- Join the conversation at @vmwaregov