



# Building the Future-proofed Data Center for Federal Agencies with Next-Generation Hyperconvergence

**WHITEPAPER**



# Overview

Advances in information technology are revolutionizing how federal managers view and execute their missions. Caring for veterans' health, for example, no longer means just providing point-of-service diagnostics and treatment when a patient visits a VA clinic — today, it includes employing wearable micro-sensors and telehealth technologies to continuously monitor a patient's bodily functions from hundreds of miles away and intervening with treatment as needed. Warfighters wield advanced smartphone technologies to generate situational awareness and real-time intelligence tailored to their specific battlefield tasks. Federal law enforcement personnel harness smart video analytics technologies to identify threats, analyze movement in live and recorded video, and even interpret intentions and predict behaviors of monitored subjects.

Mission owners look to these advances to deliver powerful computing and analytics capability at the tactical edge, translating vast stores of data into actionable intelligence, and, ultimately, yielding greater efficiency and mission success. But in delivering such capability, IT managers need infrastructures that are highly efficient and agile, easily scalable, simple to manage, and that offer predictable and manageable levels of performance for specific applications.

However, over time, most federal IT environments have become a hodgepodge of old and new technologies, cobbled together to serve widely diverse types of workloads — some virtualized, some not, some heavily reliant on computing resources, some more reliant on storage resources, some employing file storage models, some employing block or object storage models. The challenge for many agencies is in connecting and scaling such fragmented infrastructures to service multi-varied workloads, however complex and challenging they may be.

## First-Wave HCI Adoption

One of the most attractive solutions for agencies in recent years has been hyperconverged infrastructure (HCI) technology, which tightly integrates compute, storage and network resources into a single piece of commodity hardware that is orchestrated by a software-centric architecture. HCI's integrated, software-driven approach to supporting and scaling workloads brings cloud-like agility and performance to the data center environment and enables what is known as a software-defined data center (SDDC). In a SDDC, the virtualization principles of abstraction, resource pooling, and intelligent automation are extended across all data center resources and services to achieve unprecedented efficiencies and reduced costs. HCI is the easiest, most efficient path to building a high-functioning SDDC platform that supports both legacy applications and cloud-based services. Moreover, HCI significantly reduces and standardizes the data center's hardware footprint, thereby lowering costs and simplifying operations.

Federal adoption of early – or first wave – HCI technology occurred primarily to support specific workloads and use cases, such as virtual desktop infrastructure (VDI). HCI increases the efficiency and scalability of VDI, provides a much simpler infrastructure and supports growing end user computing needs. Agencies have seen success with first wave HCI in terms of the cost avoidance of a smaller hardware footprint, reduced energy consumption and required rack space, as well as the streamlining and automation of typically siloed back-end data center operations, which frees up staff resources for more pressing mission-focused tasks. But first wave HCI has limits. Agencies scaling out their hyperconverged infrastructures to meet the demands of increasing end users and applications often encounter performance and scaling issues. More end users and mixed application workloads introduces resource contention to HCI environments. Often referred to as the 'noisy neighbor' problem, resource contention occurs when the system is incapable of distinguishing and servicing individual workloads with the resources they need and can result in downtime

and unreliable performance. When application performance is critical to mission success, resource contention is unacceptable. While federal agencies enjoy the simplicity and economics of HCI, scalability and performance concerns have relegated hyperconverged technology to confined use cases, preventing HCI from being seen as a reliable solution for mixed workloads across the organization, particularly those including complex, mission-critical applications.

## Enter Next-Generation Hyperconvergence

Fortunately, new technologies and features have emerged recently that substantially augment first-wave HCI capabilities to fully address these challenges. One of those is an advanced Quality of Service (QoS) engine, which allows customers to set minimum levels for IOPS, throughput and response times for individual applications, as well as prioritizing performance resources to ensure mission-critical workloads meet their service levels during periods of resource contention or degraded conditions.

Another important development is non-volatile memory express (NVMe), an advanced protocol for accessing flash memory on solid-state drives (SSDs) that is two to four times faster than traditional SATA or SAS protocols. By assigning mission-critical applications to NVMe SSDs, federal agencies can guarantee microsecond latency and the most exacting service level agreements (SLAs) available.

Finally, policy-based automation enables administrators to quickly and easily configure settings for delivering various levels and priorities of service to different workloads, freeing up staff resources and ensuring predictable service delivery.

These features fully address the performance and scalability challenges that have vexed past HCI deployments, delivering higher, predictable levels of performance and the ability to service any workload across the enterprise, regardless of how demanding or complex. But these technologies have not been packaged onto a single HCI platform — until now.

## HCI for the Federal Enterprise

In modernizing their infrastructures, federal agencies seek numerous benefits: high efficiency and cost avoidance, standardization, simplification, scalability, guaranteed and controllable performance, extremely high performance for the most critical and complex workloads, and integration with existing infrastructures. As the industry's first priority-aware, performance-architected HCI solution with policy-based management, Pivot3 Acuity offers these benefits. Acuity's advanced QoS enables IT to simply and predictably run multiple, mixed applications on a single platform with guaranteed performance, significantly expanding what federal enterprises can do with hyperconverged technology.

### Top 10 Benefits of Pivot3 Acuity for Federal Agencies:

1. **Significant cost avoidance.** Pivot3 delivers a cloud-like economic model to enterprise IT that provides faster time to value for data center expenditures and lower total cost of ownership through a vastly reduced hardware footprint and associated facility and energy requirements. Even among other HCI vendors, Pivot3 delivers unparalleled efficiency. For example, Pivot3 Acuity employs a patented erasure coding technology — providing robust data protection and high fault tolerance to enable data recovery without the need of costly data mirroring between nodes.
2. **High resource efficiency.** Pivot3's uniquely designed architecture means federal customers realize reduced costs in hardware, physical space, energy, and storage, while having more computing resources on hand to tackle mission-related needs. Pivot3's patented erasure coding technology delivers exceptional storage efficiency — maximizing the amount of total installed

capacity that is effectively available for storage in an array. That translates into reduced storage resourcing needs and far more computing resources available for the mission. Only about 10 percent of CPU resources are needed for storage services such as data deduplication and compression, whereas, for other competitors, the figure is 30 percent to 40 percent. This means that Pivot3 delivers comparable capability in a far smaller hardware package and makes available more CPU resources for virtual machines and mission needs than other vendors, saving space and yielding more computing power for front-line personnel.

3. **Reduced cost and footprint through flexible scaling.** With hyperconverged infrastructures, IT capacity grows via a scalable building-block approach — simply, rapidly, and precisely, as with a LEGO set. Unlike integrated systems, which typically require large investments, hyperconverged solutions have a much smaller step size (the building block unit size needed to achieve the next level of infrastructure resources). A smaller step size translates into less up-front cost and less time to fully utilize new resources. A key Pivot3 differentiator is that it compounds the traditional scaling benefits of HCI with a high degree of flexibility: federal enterprises needing only additional compute or storage resources can add only what they need. The ability to scale compute and storage independently of one another allows agencies to better calibrate infrastructure to their needs while avoiding the cost and upkeep of unneeded resources.
4. **Elite-level performance for the most challenging workloads.** Federal enterprises run atop myriad applications with widely varying degrees of complexity and performance needs. Therefore, a dynamic approach to performance is needed to support the full spectrum of workloads. Pivot3 Acuity is powered by a multi-tier storage architecture, leveraging NVMe PCIe flash, RAM, SSD and HDD to deliver superior performance and cost-effective capacity. With NVMe PCIe flash delivering breakthrough performance over SSDs, the consolidation of sub-millisecond latency-sensitive, IOPS-demanding applications on HCI is now possible. This means that even the most critical and challenging federal workloads can enjoy reliable, elite-level performance while running on a common platform with automated, policy-based service levels.
5. **Guaranteed, individually controllable performance for all workloads.** High performance by itself is not enough unless it can be guaranteed or isolated to certain workloads. Pivot3 Acuity is the only HCI vendor that allows federal customers to meet application SLAs with easy-to-manage policies that provision performance, prioritize workloads, and manage data placement and protection. With an advanced QoS engine, Acuity offers the ability to automate and schedule granular quality-of-service settings — such as minimum IOPS and throughput and maximum latency — from a logical unit number (LUN) or datastore level down to an individual virtual machine or virtual volume (VM/vVOL), significantly reducing the time it takes to manage performance and data protection. This enables federal customers to avoid inconsistent application performance caused by resource contention, software overhead, controller bottlenecks, and other system constraints. The QoS features for most vendors are not designed to address these issues because they only set caps on performance and are unable to prioritize IOPS or data protection operations.

Acuity's advanced QoS policies also deliver agencies the agility to adjust performance and priority settings as needed. Whether managing their own enterprise workloads or providing multi-tenant shared services for other agencies, federal IT administrators now have an easy-to-use platform to manage performance and data protection with policy automation and comprehensive data services. An IT administrator can assign one of five pre-set policies to each workload, without needing to know its exact performance details. Acuity's QoS scheduling capability automates policy changes only when needed for periodic, cyclical, or seasonal workloads such as quarterly or end-of-year reporting tasks. Along with performance QoS policies, data protection QoS policies schedule snapshots and asynchronous replication with application integration.

6. **Integration with existing infrastructure.** Other HCI vendors service only virtualized workloads, so their value is limited, and they create resource islands within existing infrastructures. Pivot3 Acuity's unique ability to service and support both virtualized and non-virtualized workloads means agencies no longer need to bear the expense of virtualizing their workloads before mounting them on an HCI platform. And workloads relying on physical hardware no longer need their own storage infrastructures. Pivot3's unique block-level storage architecture leverages all existing assets in the data center, effectively pooling all storage drives across the network to create a software-defined SAN.
7. **Ease of management.** Whether it is scaling up new capacity, setting performance and priority policies for specific workloads, or managing day-to-day operations across the enterprise, Pivot3 Acuity is extremely simple to manage and relies on easy-to-configure automation for most aspects of its administration. Hyperconvergence combines compute, storage, networking and virtualization resources into a single shared resource pool with hypervisor technology. This simple, efficient design enables an IT administrator to centrally manage aggregated resources across individual nodes from disparate geographic locations with a single pane of glass and service the entire organization.
8. **Single-vendor convenience.** Hyperconvergence provides economies of scale in procurement, operations, and support. When everything is converged, there is no more vendor blame game and customers need only one point of contact for the life of the system, from acquisition to retirement.
9. **Cloud benefits, on-prem.** Agencies are under pressure to move workloads to the Cloud, but many applications are not easily migrated off premises for various reasons. For agencies seeking the cost, efficiency, and performance benefits of a cloud environment for their applications, Pivot3 offers an on-premises alternative, also known as a private cloud, that delivers cloud-like economic and performance gains to enterprise IT.
10. **Suits any deployment model.** Pivot3's building block design means it fits any circumstance, whether that is a SAN replacement, a VDI deployment, or a more ambitious data center refresh. As an agency deploys Pivot3 from one project to the next, however small or large, it continues extending a homogenous HCI platform that works with any workload, optimizing the data center along the way.

# Conclusion

Whether they are warfighters on the battlefield, responders in a disaster zone, law enforcement teams on a crime scene, or scientists in the field, federal personnel at the tactical edge need to receive, analyze and relay information quickly to accomplish their missions. The challenge of federal agencies today is to deliver this capability to their personnel in a way that is highly efficient, economical, and reliable. Today's federal modernization initiatives include consolidating and optimizing the data center, embracing cloud and shared service models, and implementing IT strategies to become more agile. Wherever agencies are on that modernization path, Pivot3 hyperconverged infrastructure brings demonstrated and lasting value.

Pivot3 has architected a unique solution in Acuity that packages industry-leading performance and advanced quality-of-service capabilities with the high efficiency, economics, and simplicity of a software-defined, hyperconverged environment. With Pivot3 Acuity, federal agencies can consolidate any mix of application workloads on a single platform to deliver breakthrough application performance at any scale, across the entire organization.

## About Pivot3

Pivot3 brings simplicity and savings to the enterprise datacenter by integrating storage, compute and networking on commodity hardware under an easy to use single-pane-of-glass. Our next-generation hyperconverged platforms are natively designed with policy-based Quality of Service and NVMe flash acceleration to enable IT to run multiple, mixed workloads on a single infrastructure while guaranteeing service delivery to the applications that power business results. With over 2,000 customers in 54 countries, and over 18,000 hyperconverged deployments in healthcare, government, transportation, security, entertainment, education, gaming, retail and more, Pivot3 is defining the future of autonomous cloud computing with smarter infrastructure solutions.

**To learn more about how Pivot3 can help your agency reap the benefits of next-generation HCI, visit [Pivot3.com](https://www.pivot3.com)**