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Swish White Paper

Six Considerations For Building an Effective Hyperconverged Infrastructure (HCI) Strategy For Federal Agencies

For federal agencies, mission success today is increasingly reliant on the ability to skillfully employ digital infrastructures to deliver responsive constituent services and ensure the right information gets to the right people at the right time, wherever they may be. The challenge many agencies have, however, is that those infrastructures are more fragmented and complex than ever. Many federal data centers have evolved into a mishmash of seemingly incongruent components: on-premises legacy systems, virtualized and non-virtualized workloads, commercial clouds, private clouds and shared services. The result is that IT performance lags behind mission needs; staff resources focus on maintenance and troubleshooting, not on advancing the mission; IT resources are underutilized; and, ultimately, technology fails to deliver promised transformations.

Modernizing these complicated environments to run demanding, mixed workloads across the enterprise requires that solutions deliver high efficiency, automation, reliable performance, and simplicity. For on-premises infrastructure, many agencies have turned to hyperconverged infrastructure (HCI) solutions. HCI technology tightly integrates computing, storage and network resources into a single piece of commodity hardware that is orchestrated by software into efficient, scalable, high-functioning resource pools optimized for the particular workloads they serve.

Until recently, federal agencies have viewed HCI technology primarily as a solution for specific use cases, such as implementing virtual desktop initiatives (VDIs), consolidating workloads, and consolidating storage resources. But as HCI technologies have continued to advance, agencies — like commercial businesses — are increasingly turning to HCI as a robust platform to advance enterprise-wide modernization goals, as well as to simplify operations, lower costs, and drive better workload performance and IT management decisions

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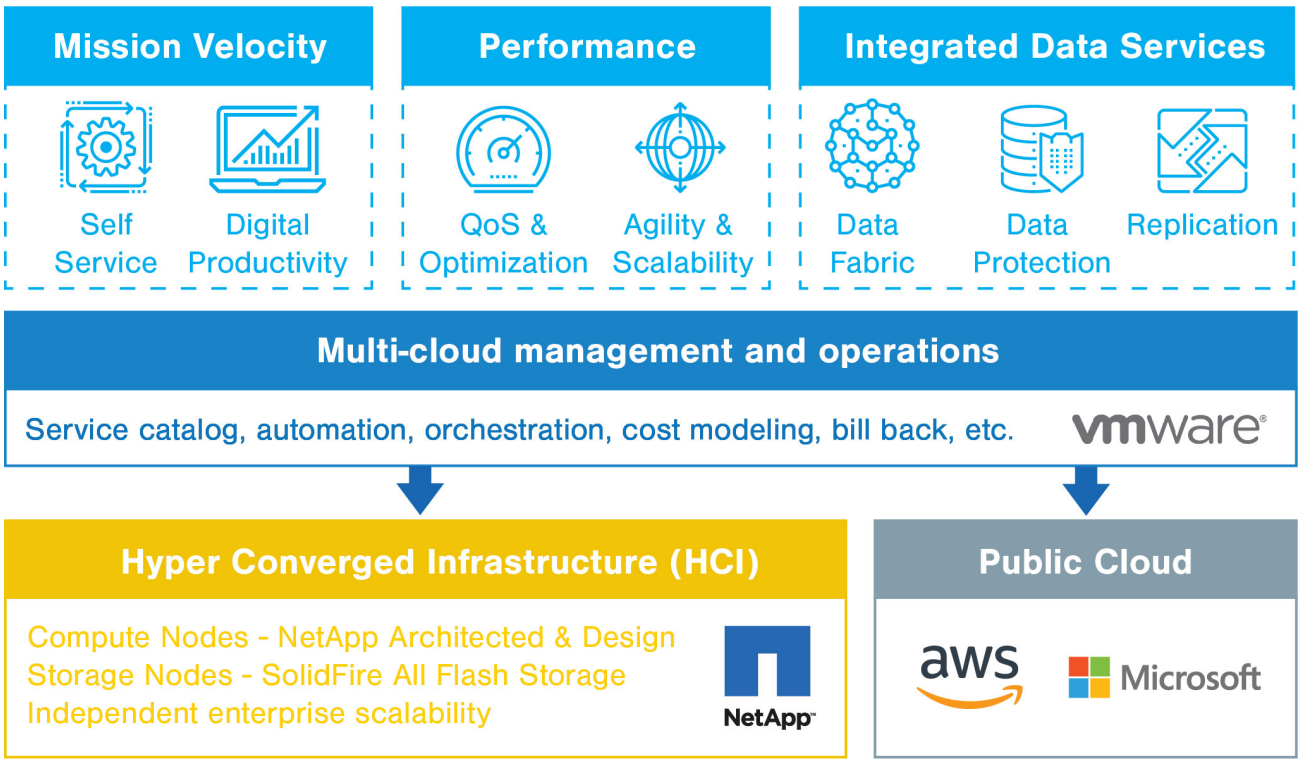
Hyper Converged Infrastructure Solution



At Swish, we know that HCI solutions can deliver important and lasting benefits for federal organizations looking to simplify and streamline IT operations and build smart foundations for modernization. But getting maximum benefit from an HCI investment requires foresight and planning. We suggest federal agency planners consider these six points as they develop their HCI implementation strategies.

1. Performance Matters

A powerful driver behind many federal HCI investments is the desire to manage IT operations very efficiently and free up limited IT staff for tasks that deliver greater value than simply maintaining and troubleshooting IT infrastructure. So it is critical that an HCI solution be capable of delivering reliable performance — simply and automatically — to all workloads, regardless of what they do or their specific resource demands

For example, an HCI system that serves a large, complex enterprise relying upon hundreds of virtual machines with widely varying workloads must be capable of avoiding “noisy neighbor” problems in which high-demanding applications usurp storage or compute resources from other applications, causing degraded performance.

An effective approach to avoid this common problem is to ensure that the selected HCI solution is capable of applying quality-of-service (QoS) parameters and priorities around individual workloads to guarantee they each get the resources they need, even when operating at peak levels. Swish recommends that,

for large, complex federal enterprises, an HCI solution be capable of setting QoS parameters for minimum, maximum, and burst levels of performance. (Burst levels exceed maximum levels for short durations of time, such as during morning "boot storms" when many end users are logging on simultaneously.)

Another important feature when considering performance is the need for minimal downtime due to repairs and maintenance. Seek an HCI solution that boasts an architecture that is highly integrated and durable so there are fewer opportunities for things to break. When repairs, maintenance, or upgrades are required, those workflows should be streamlined and components should be "hot swappable" so there is little or no need to shut down the system. High availability must be enabled to ensure critical applications and systems stay online.

While meeting system availability and uptime service level agreements (SLAs) is critical, perhaps more important are the metrics gauging end-user productivity, whether they are employees using a network or citizens consuming digital services. Having an effective enterprise-wide application performance management (APM) capability embedded in the HCI architecture is critical to providing visibility and control for each application's performance within the HCI infrastructure and for services it touches outside the HCI infrastructure. This drives a generative culture, reduces the mean time to repair and ensures end-to-end visibility.

2. Enable the Mission

Assessing how well information technology is supporting business and mission goals — something called digital performance management — is critical. Agency planners should design their HCI solutions to provide insights into important metrics such as labor cost optimization, transaction completion times, end-user consumption of digital services, web services response times, helpdesk ticket resolution rates, and application availability. Digital performance management will help explain, for example, whether certain workloads would be more cost-effective if hosted in the cloud or on-premises. In short, digital performance management provides the visibility needed to improve citizen experience, fulfill the mandates of the Federal Information Technology Acquisition Reform Act (FITARA), and achieve greater mission effectiveness, among other management goals.

A well-designed HCI environment also will monitor the availability and performance of storage and compute resources to ensure the system is performing optimally, identify problems quickly, and plan new deployments — whether on-premises or in the field — to meet emerging mission demands. Visibility into the HCI environment is also critical to assess resource utilization for charge-back arrangements. NetApp HCI, for example, builds in robust HCI monitoring and administration functionality as part of the VMware integration that administrators use to manage their multi-cloud operations.

3. Enable High-velocity IT Operations

A critical benefit of consolidating storage, computing and network resources is that it enables traditional workflows and business processes within the data center to be dramatically streamlined. Provisioning a new virtual machine, for example, no longer requires multiple teams to assign and allocate CPU, RAM and storage resources.

Within an HCI environment, one need only to establish minimum, maximum, and burst performance thresholds. Likewise, many other tasks that were previously time-consuming, such as

developing new applications or gaining insights into IT consumption across the enterprise, will need to be reconfigured to better leverage the intrinsic benefits of an HCI environment — something Swish has extensive experience in. Processes that previously took days or weeks or months, can now be done in minutes with the help of automation and simple web-based interfaces. As business processes and workflows are reconsidered, so too must SLA metrics be redefined. Swish recommends that federal clients conduct baseline assessments of their core applications prior to an HCI deployment to understand what performance thresholds, business processes, and procedures will be needed in the new environment. Your HCI deployment will be a totally different environment and your old processes and procedures will need major modifications in order to ensure efficiency.

A key ingredient to running workflows fast, efficiently and in a repeatable manner is the ability to employ readily available, purpose-specific building blocks that are pre-secured, tested, configured, and authorized. These easily assembled, secure building blocks — such as virtual machine images, containers, microservices, and infrastructure as code (IAC) — are accessible via workflow catalogs. They serve as shortcuts that can be quickly snapped into place to effect commonplace workflows such as application development, application deployment, and infrastructure provisioning. Managing workflows in this way also enables agencies to more easily and quickly comply with Defense Department and federal civilian security regimes such as the Risk Management Framework (RMF), NIST Special Publication 800-53, and the Security Technical Implementation Guides (STIG).

HCI also enables fast IT operations with elastic scaling capabilities. New compute and storage modules can be snapped into an existing infrastructure and they will quickly, seamlessly, and automatically integrate into that new environment to service workloads. Tasks such as scaling, load balancing, and workload distribution are done automatically, saving valuable time for IT staff while enabling workloads to scale up responsively to end user demand.

Swish encourages federal clients to ensure their HCI solution scales not only elastically, but also flexibly, to best serve the specific mix of workloads they are running. Some workloads require more computing power, others more storage, and still others require both. With some HCI solutions, it is impossible to scale up compute resources without also scaling up storage and vice versa. To avoid costly and inefficient over-provisioning, we encourage agencies to find an HCI solution, such as NetApp HCI, that can scale storage and compute resources independently based on the specific needs of their workload mix.

Flexible scaling of resources is one feature of an HCI solution that helps drive significant resource efficiencies, but there are others. We encourage federal clients to seek out technologies and features in their HCI solution — such as data compression, deduplication, and data compaction — that also create more efficient and dense infrastructures.

4. Automate for Repeatable Outcomes

A highly compelling benefit of HCI is that it enables extensive automation of IT operations that were previously done manually — not only within the data center, but across the broader hybrid cloud or multi-cloud environment. Transitioning to HCI means that today's cloud management platforms, such as VMware's vRealize Suite, can automate delivery of customized infrastructure, applications, and IT services across multiple on-premises and cloud domains. The result is that tasks such as planning

and deploying workloads, forecasting costs and resource demand, determining optimal cost-effectiveness of multiple deployment options, and the setup, upgrade, patch management, health monitoring, and configuration management of applications are done automatically across all IT infrastructure domains.

This capability allows end users to self-provision IT services and resources as needed, as well as to project, track and optimize costs along the way. It also ensures that workload placements are optimized to run services based on policies that reflect agency imperatives.

This robust level of automation allows end users to more directly — and therefore quickly — decide deployment, resourcing and IT servicing matters without having to go through IT or encounter bottlenecks.

5. Manage Data Risk

Agencies should make sure their HCI planning and deployments align seamlessly with existing disaster recovery (DR) and continuity of operations (COOP) best practices. This means thinking through how to backup data as part of day-to-day operations across a hybrid cloud environment and how to shift workloads from one site to another or between an on-premises data center and the cloud, if that becomes necessary. Agencies also need to consider how they will maximize efficiencies in utilizing IT resources for backup and DR purposes by using technologies such as deduplication and others. This also requires thinking about exactly which types of storage media options are most cost-effective for different types of data and backup policies.

Also important is understanding which aspects of an application require backing up and what form of backup is appropriate. In some cases, the entire application may require backup. But in other cases — such as with highly customized applications — the virtual machines that run the applications may require backing up. Snapshots of data can also serve as sufficient backup in some situations if the frequency of those snapshots provides an adequate restoration capability for the client's needs. But for more robust database applications, backups of the data itself may be required.

6. Ensure Seamless Integration with Legacy and Hybrid Cloud Environments

Only by tightly integrating an HCI deployment into an agency's overall enterprise architecture can it deliver maximum value. It is important to have clear visibility across the enterprise — through a cloud management framework, such as VMware's vRealize — to know what is running where and which resources are available where. In this way, applications and data can be easily and seamlessly joined or moved across different infrastructure domains, whether a public cloud or an on-premises HCI deployment. This can be done through something called a data fabric, which is a software-based approach for data movement and management that provides consistent capabilities and services that span across hybrid cloud and multi-cloud environments. This capability is highly valuable, for example, when there may be large volumes of data stored in an HCI cluster on-premises that must be processed using specialized applications in the cloud. Being able to quickly and seamlessly move data or workloads from one place to another automatically delivers enormous versatility, mission utility, and efficiency.

Conclusion

HCI is a powerful technology with enormous capability to deliver efficiency, elite performance, and versatility. That said, not all HCI solutions are alike. Swish encourages federal agencies to recognize that a well-planned HCI deployment can maximize the efficiency and capability of the entire IT enterprise, stretching across on-premises data centers and public clouds.

Finding the right HCI for your federal enterprise translates into significant business value in terms of increased efficiency, better time management, greater performance and mission success, optimal resource utilization, improved visibility into IT costs and value, stronger risk management, and unprecedented agility. Let the experts at Swish guide you through these choices and enable the best possible outcome for your mission.

About Swish

We're the data performance architects. Swish ensures the performance, affordability, and security of your agency's data infrastructure through both architecture and deployment. To Learn more, Please visit: **www.swishdata.com**

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