An Essential Guide for Implementing an Efficient HCI Solution

BRIEFING NOTES | DECEMBER 2021

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StarWind HYPERCONVERGENCE

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For more information, please email **contact@isg-one.com**

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Introduction

The hyperconverged infrastructure (HCI) market has been growing steadily over the past years and is expected to continue on its growth trajectory in the coming years. Digitalization of enterprises is driving the convergence of the physical and digital worlds, thus eliminating the large abstraction layer between hardware and software ecosystems. According to ISG's estimates, the global HCI market size, in 2020, was little over US$7 Billion, and the revenue is expected to grow substantially in the coming years to reach US$28 Billion by 2025, at a CAGR of more than 30 percent. Enterprises are mainly using HCI for benefits such as capacity scalability, high reliability, disaster recovery, independent compute capabilities, and monitoring and management, along with strong integration with virtualization software. Added to that are the advantages of virtual desktop hosts, disaster recovery platforms, ROBO use cases, etc. HCI solutions are easy to implement and manage in an integrated software-defined-anything format.

The origins of HCI can be traced back to a few decades. In the initial wave of technological transformation in this space, we saw appliances combining servers and storage and then moving to a distributed computing model, which was further condensed to evolve into a converged infrastructure. Storage virtualization was added to it, which finally led to the development of a hyperconverged model, where compute, storage and networking converged. In the last few quarters, we have seen one key development in HCI – leveraging AI to drive automated operations and providing insights and intelligence across IT environments. HCI has matured considerably in the last decade and undergone considerable transformation to become what we are accustomed to today – robust, scalable, efficient, reliable, secure and resilient.

The COVID-19 pandemic has had a huge impact on the global IT industry, in terms of business decisions and technology investments planned for the coming years by the enterprise community. Due to the restrictions imposed by the pandemic, enterprises introduced new ways of working, namely, delivering everything virtually and scaling up their IT development teams. HCI solutions include an agile IT platform that enables employees to work remotely. Although enterprises have embraced a virtual model, their delivery expectations have not changed. For an IT department, this means supporting mobile and remote workforces with unified collaboration, with focus on infrastructure resiliency and cybersecurity, and accelerated digital transformation initiatives. Therefore, there is a significant need for HCI solutions to keep businesses running.

The building blocks of any HCI are nodes of compute, storage and network capacity that use virtualization for configuration and an orchestration layer to allow administrators to manage them, centrally, as a single pool of resources. Simply adding a node provides predictable scale and automatic balancing of both compute and storage, enabling organizations to start small and grow easily. Enterprises have found the entire experience with HCI to be far simpler than with legacy infrastructure, especially for remote working environments. They have accrued the benefits of the simplicity of deployment an HCI offers, along with ease of management and the readily available infrastructure. Its ability to offer unified management and policy-based automation eliminates silos and the need for manual processes. This has translated to increased productivity, improved resource efficiencies, faster time-to-market, and thereby cost savings.

What is Happening in the HCI Space?

Foundation for Hybrid-cloud Ecosystem

As we see the rate of adoption of hybrid cloud increasing rapidly, there is a corresponding increase in demand for integration of cloud platforms. For these hybrid cloud adopters, flexibility in workload deployment is a priority, alongside the need to shift on-premises workloads to the cloud. HCI systems have become the backbone of a hybrid multicloud environment, enabling a true hybrid state with great flexibility.

Modernize Infrastructure

Application modernization has compelled CIOs to look for opportunities to move to next-generation digital platforms that leverage HCI and cloud-native technologies. These next generation technologies deliver dynamic functionalities and support rapid development of new products, processes and services to enhance customer experience. One of the primary advantages of an HCI is that it lets users choose fully integrated and performance-tuned hardware right out of the box; users just need to plug them in, turn them on and deploy as needed. For growth, they just need to add more building blocks to the appliance.

Highly Automated Environments

Several enterprises leverage HCI appliances due to their automated nature that helps reduce the risk of downtime associated with infrastructure management tasks such as firmware upgrades and system refreshes. The use of AI and hyper-convergence is making data centers more intelligent, with the use of automation for monitoring and managing assets and risks. Several HCI vendors are investing heavily in automation and machine learning technologies to enhance the underlying hardware and hyper-converged software and also better manage the complexity of decentralized and distributed systems.

Resiliency through Hyperconverged Appliances

The ability of hyper-convergence to reduce total cost of ownership and operating expenses for backup and disaster recovery is a big driver of adoption. The growing concern over rapid data backup, security and disaster recovery is currently the fastest-growing use case in the HCI market. Enterprises are changing their strategies to embrace a hybrid or multicloud setup as either a backup or a disaster recovery option, or as an alternative to on-premises infrastructure.

"Rising demand for VDI, disaster recovery and data security solutions are primary factors for growth in the HCI market. Hyperconverged appliances are becoming popular due to its flexible, dependable and scalable infrastructure offering for all types of physical, virtual filetypes and databases."

– Shashank Rajmane, Senior Lead Analyst, ISG

> “We substantially reduced network complexity by eliminating our standalone SAN with StarWind’s HCA. It reduced complexity and has allowed us to concentrate on improving other areas of our network.”
>
> **– Director of IT at an outsourcing company.**

HCI in the Edge

With the prevalence of cloud computing, traditional data center infrastructures are evolving and adapting. Innovations such as 5G and HCI have led to an increase in the number of micro or edge data centers. The growth of the remote workforce has accelerated edge adoption, enabling businesses to dynamically scale with little impact to the core business.

Increased Flexibility in Doing Business

Enterprises are looking at new ways to build a modern IT ecosystem and gain a competitive advantage. They are increasingly turning to hybrid cloud models to modernize their infrastructure and achieve flexibility in workload placement, but without compromising on performance and security. HCI is helping to simplify the move to a hybrid or multicloud model that offers more flexibility in doing business.

Focus on Reducing Cloud Costs

For every organization, the primary goal is to reduce IT overheads and costs. With the plug-and-play option, modern HCI appliances work out of the box, reducing the need for expensive specialists and extensive IT involvement. Also, an HCI offers significant savings through its storage options. An HCI creates a software-based virtual storage appliance (VSA) that runs across multiple cluster nodes, all connected by Ethernet, creating a distributed file system on which virtual machines (VMs) run.

Where is HCI Primarily Used?

Virtualization Desktop Infrastructure (VDI)

With the rise in the remote working model, enterprises are opting for a VDI or Desktop-as-a-Service (DaaS) model. In the past, VDI implementation used to often fail due to an underperforming storage or because of the sheer architectural complexity. An HCI lets organizations opt for a VDI for benefits such as low upfront costs, consistent performance and predictable scaling. It allows the VDI to condense in a single appliance, which is often configured with just a flash storage to help enterprises endure the boot and login complications. Also, an HCI can be scaled up easily in tandem with growth in needs by simply adding more nodes to its hyperconverged appliance (HCA). HCI combines solid state drives (SSDs) and spinning disks (hard-disk drives [HDDs]) into a single distributed, multi-tier, object-based data store, resulting in increased performance and enabling the storage system to do more with limited resources.

Edge Computing

Enterprises are creating distributed infrastructure for data collection and local processing, while removing the need to constantly transfer data in and out of data centers. In some cases, the data sets are too large to be transferred to a centralized data center or to a cloud environment. In such instances, enterprises just wish to transfer the most valuable portion back for compilation with other sources and further analysis. That is where edge and HCI come together – HCI offers a way to efficiently manage infrastructure at the edge for machine learning processing and other data-driven jobs

> The growing use of online banking services is influencing the adoption of HCI in the banking, financial services, and insurance (BFSI) sector for a seamless user experience.

Backup and Disaster Recovery

Backup, failover, failback and recovery systems are essential to all IT environments. By default, almost all HCI solutions include backup and disaster recovery options. It is advisable to include these features natively in HCI solutions as native disaster recovery solutions are typically embedded in the storage layer and allow innate awareness of block changes for cleaner backup, replication and recovery options. An HCI also reduces the requirement for a separate backup software, deduplication appliances and storage arrays.

Testing and Development

Testing and development environments are usually miniature versions of the production environment and usually have tighter budgets than production. An HCI lets developers provision their own resources on an agile basis, reconfigure virtualized hardware as they iterate through frequent code revisions and leverage instant cloning and snapshot capabilities. HCI platforms also have automation capabilities, allowing replication from a production cluster to another cluster for non-production tasks such as test and development.

Hybrid Cloud Deployments

The cloud era has changed the way an infrastructure is deployed. Infrastructure in silos of storage, networking and compute can no longer meet the needs of hybrid environments for digital transformation. An HCI simplifies hybrid cloud deployments and IT operations management. Modern HCI solutions are helping enterprises grow by allowing them to leverage standardized, software-defined and highly automated data center infrastructure to accrue the benefits of seamless multicloud environments. An HCI has become a strong alternative to the public cloud from the perspective of performance, manageability at scale and cost.

Remote Office or Branch Office (ROBO)

The need for an HCI in a ROBO use case is growing rapidly, as the simple deployment and centralized management features eliminate costly on-site resource allocation; the HCA can be managed remotely and offers key data-protection features such as snapshots and deduplication/compression and can manage data efficiently. An HCI is particularly beneficial for global and/or growing enterprises that wish to deploy hardware in remote locations but managed it from a central location. Even the largest enterprises have small needs at the edge. HCI solutions are extremely scalable and useful in situations where a store or office grows and needs more workload capacity as it is easy to expand.

Why do Enterprises Choose an HCI Solution?

Mainly for high flexibility and scalability along with improving the overall efficiencies and many other benefits.

High Flexibility

Several enterprises in Europe and the U.S. have successfully implemented an HCI to support their hybrid infrastructure and VDI use cases. It has also enabled enterprises to modify their strategies pertaining to the speed and performance of their machines, while also enabling them to expand and add new machines as required.

Improved Productivity and Efficiency

Within a VDI setup, the traditional infrastructure is less capable of managing high-density, IO-intensive workloads. During peak activity periods, the pool of storage units might struggle to handle random IO requests from thousands of virtual desktops. This latency can affect end-user performance considerably, resulting in loss of productivity and drive down the ROI of the entire solution, affecting project delivery adversely and leading to process failure, which has a direct impact on revenues. An HCI cluster consolidates all the hardware components into an integrated infrastructure that keeps applications and data close together, offering high network speeds and data rates, while eliminating the bottlenecks are a part of a distributed architecture. By implementing an HCI, IT teams can monitor and manage resources from a single window, thus improving overall efficiency. Also, if the vendor owns the components and the hypervisor, it can design the hypervisor and storage to directly interact with each other, resulting in a drastic increase in efficiency and performance.

Greenwood Village South saw a vast improvement in IT infrastructure uptime by leveraging StarWind's HyperConverged Appliance (HCA)

The retirement care services organization needed a hyper-converged solution to replace aging servers and achieve redundancy. With StarWind HCA, the organization upgraded its IT infrastructure, accruing the benefits of scalability, redundancy, and flexibility at a feasible cost.

Highly Scalable

An HCI is highly responsive to changing business needs. Many scaling related challenges are addressed through HCI applications. The nodes that make up an HCI cluster serve as building blocks for assembling the infrastructure into an integrated whole. These nodes are preconfigured and can be added with relatively little effort, thus eliminating complex deployment challenges that are usually associated with scaling traditional infrastructure. Some HCI products take a different approach to scaling because of their architectural differences. As HCIs can be set up in a matter of minutes, they also minimize downtime, which frequently occurs during scaling activities.

Low Storage Costs

HCIs offer improved scale-in and scale-out capabilities, which makes them cost-effective. Unlike many other technologies, enterprises need not invest in purpose-built infrastructure. The capacity of an HCI can be expanded to meet changing requirements with no additional challenges or disruptions. Enterprises can easily eliminate the possibilities of overprovisioning that could increase operational costs. This helps to tremendously reduce infrastructure spend across data centers.

Optimal Resource Utilization

With the help of an HCI, enterprises can improve system reliability and availability in terms of storage and computing power. It enables them to optimize their available resources, providing end users with a better service experience and reduced operational costs.

Ease of Management

HCI solutions can be easily managed from a single interface, eliminating the need for multiple management consoles and interfaces as characteristic of a traditional infrastructure architecture. For an HCI with a native hypervisor, this single interface approach significantly reduces management time and effort and simplifies management tasks for an administrator. Also, it enables a single vendor to provide the servers, storage, and hypervisor, making the overall solution much easier to support, update, patch and manage without traditional compatibility issues and discords among vendors. Ease of management implies significant savings from the IT budget both in terms of time and training.

Highly Reliable

Data centers do not offer any guarantees on infrastructure availability. In contrast, an HCI offers a highly reliable and robust infrastructure, where some vendors offer guaranteed availability of five nines. In fact, we have seen a few vendors in the space even guarantee certain outcomes based on the kind of workloads that are in operation at the time of purchase. Such commitments provide enterprises with peace of mind for what can be significant investments.

With StarWind Virtual SAN (VSAN), Farmers & Merchants Bank saw high intensity of I/O operations and savings of US$60,000 on hardware

The bank needed a shared storage solution to achieve fault tolerance and high availability. By using StarWind's VSAN solution, it implemented a cost-efficient and reliable shared storage, along with the desired amount of IOPS, without the need for an additional SAN hardware.

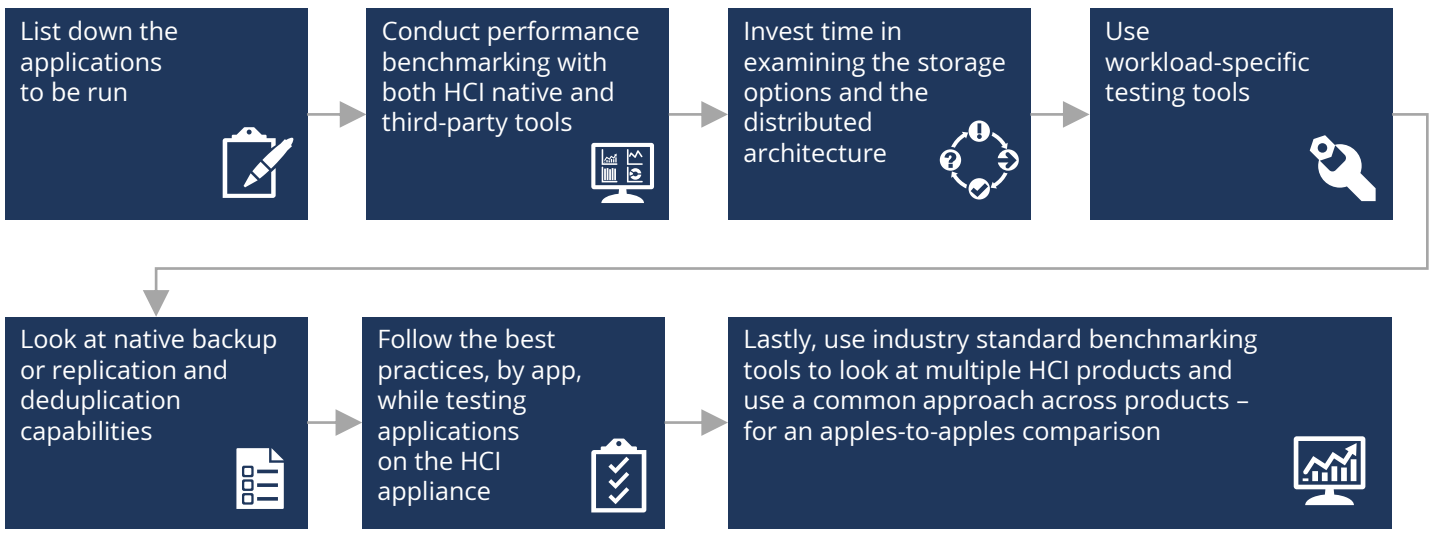
Cost Savings

One of the key lookouts for any enterprise IT department is cost reduction. By utilizing a native hypervisor, the storage in an HCI can be architected and embedded directly with the hypervisor, eliminating inefficient storage protocols, files systems, and VSAs. The most efficient data paths allow direct access between the VM and the storage and can be achieved when the hypervisor vendor is the same as the storage vendor. An HCI may not always be the solution with lowest costs in terms of the capital investments, but in most cases, it is as the ease of scalability allows organizations to purchase only the needed appliances, thus preventing over-provisioning in the initial investments. An HCI also allows considerable operational expense savings, over time, by considerably reducing the costs of management and maintenance. Some of the cost savings stem from the fact that HCIs are self-contained, integrated systems. This means the enterprise will not incur costs such as the ones related to deploying and maintaining a SAN.

Key Criteria to Consider while Choosing the Right HCI Solution?

While evaluating an HCI solution, it is essential that an enterprise runs a trial or a proof of concept to evaluate if the HCI will work as expected in production environments. The following steps need to be taken before making a decision:

Figure 1: Steps to follow before deciding on a HCI vendor



Post this, the following questions need to be put to an HCI vendor:

- Can the solution be integrated with the existing cloud infrastructure?
- Can the solution offer a native hypervisor or does an additional hypervisor license and support need to be purchased?
- Does the solution integrate and scale with different appliance vendor configurations and models?
- Does the solution have hypervisor-embedded storage, or does it use VSAs?
- Does the appliance offer native backup and disaster recovery capabilities?

Some of the key parameters to consider before selecting a hyperconverged appliance and vendor are listed below:

Cluster Size

This is one of the most important factors to consider while purchasing an HCI appliance. Some HCIs support up to eight nodes, per cluster, while a few support up to 64 nodes. But that does not mean that an HCI system that supports fewer nodes is bad. For example, if a smaller organization needs to deploy hyper-convergence for a discrete workload, then it might consider the smaller option with a small and medium-sized business (SMB)-centric solution. Also, there may be cases where the chatter among all of the nodes in the cluster could result in performance degradation. But the number of nodes that it takes to get to this point depends on the product architecture and the application code.

Support Options

Enterprises need to select a support option that matches their business needs. First, they should analyze if they really require 24/7/365 support with immediate replacement requirements. Enterprises might choose to slightly overengineer their environments to be able to pay for a lower tier support. Doing so will protect them from any node failure. Also, buying a software only HCI product may require the purchase of separate support contracts for the hardware and software.

Storage Type

HCI vendors offer a plethora of storage options. Enterprises can select from hard drive-based nodes, all-flash nodes with nothing but solid-state storage or hybrid nodes that combine hard drives and flash storage. The storage choice depends on the kind of applications an enterprise will be deploying, and the kind of support needed. If one has few workloads or workloads that do not require much storage resources, a hard drive-based or hybrid node may be suitable, else all-flash node options would be suitable. Enterprises need to also look into the ability to scale storage independent of compute.

Hypervisor Options

A pet peeve with HCIs is buying new hypervisor licenses each time a node is added, even if only a node to support storage expansion has been added. This increases costs drastically. Enterprises must choose an option that enables them to expand a cluster's storage capacity without the need to buy more hypervisor licenses. Also, some HCIs support multiple hypervisors, while others support only one or two. Enterprises need to anticipate the hypervisors they would be using and then take a decision.

Scalable Storage Options

StarWind's HCI products enables enterprises to scale storage a bit more independently than other offerings in the market. For example, users can add storage-centric nodes to a cluster, and feature a lot of storage capacity, also offers multi-hypervisor support.

Sizing Nodes

In terms of sizing the nodes, enterprises need to decide on the cluster size as well as the sizing of individual nodes. This sometimes throws a choice between software and hardware. With a software-centric product, enterprises can usually configure individual nodes as they like, but to a certain point. On the other hand, within the guidelines of the hardware compatibility list defined by the HCI software vendor, enterprises can configure each individual node with as much RAM, processor and storage type and capacity as needed.

Integration Options

Containerization is becoming a common practice in data center environments. Enterprises need to consider the integration of containers on HCIs, as the containers need to run seamlessly in VMs that run atop HCI environments. Some HCI vendors have definitive programs to support containers. Additional benefits are accrued when the platform can natively support containers without the need to deploy a series of resource-consuming VMs. There are platforms that provide native container support on a bare-metal OS.

Trial Option

Lastly, enterprises need to run a proof of concept at a small scale first. Therefore, they need to check if the HCI vendor offers a trial period or can conduct a proof of concept in their environments. This enables the enterprises to check the compatibility of the HCI solution with their existing IT infrastructure.

"The StarWind engineering and support staff were a tremendous help as they assisted in the restoration process. Knowing that StarWind will drop and do what's needed to help a customer in dire straights has won us over as a faithful customer for life."

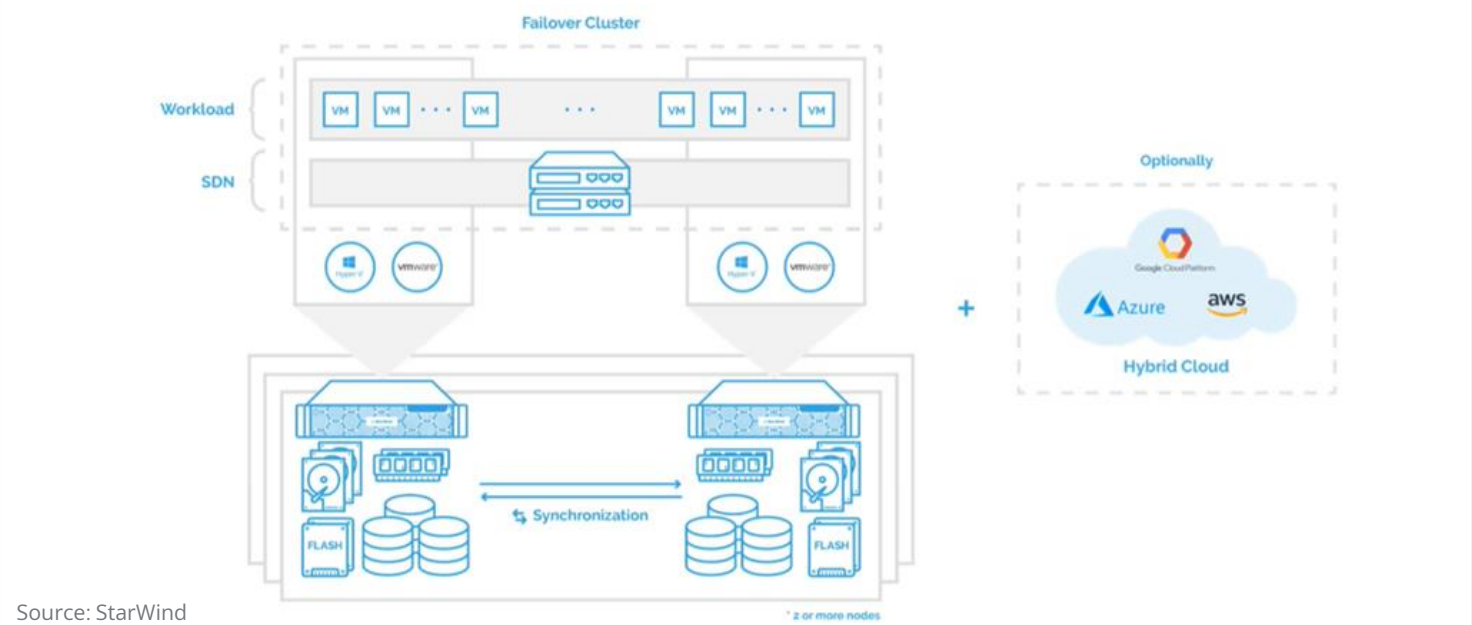
– IT Manager at a healthcare organization

StarWind Hyperconvergence in a Flash

StarWind offers highly configurable HCI products with high performance and without the exorbitant hardware and software costs

StarWind's HCAs are designed to offer a sustainable model that supports overall HCI investments to derive optimal business value. The cost-efficient solution offers applications with a highly available environment, even with a single physical node. It also offers a high fault tolerance rate and constant uptime of the appliance due to its multi-redundant hyperconverged architecture. The HCA is a plug-and-play solution with enterprise grade features and services that need to be racked and connected to the network to get started with the deployment of virtual machines. It is available in various models with a range of RAM and storage capacity. The company offers a 100 percent preconfigured turnkey hyperconverged solution, packaged and designed in accordance with a client's business needs. The solution includes configuration, application migration and integration modules, with features such as low downtime, RDMA (to maximize performance), active-active data replications, high availability, secure backups and high fault tolerance. It also offers a true 2-node cluster at low cost, which is ideal for enterprises with strict IT budgets (primarily SMBs and ROBO). For instance, a constant uptime with fault tolerance would be achieved from a 2-node system that would stay undeterred with 1 node and 1 disk failure. Moreover, the solution's ability to manage all the nodes from a single console simplifies an enterprise's systems administration.

Figure 2: StarWind HCA Architecture



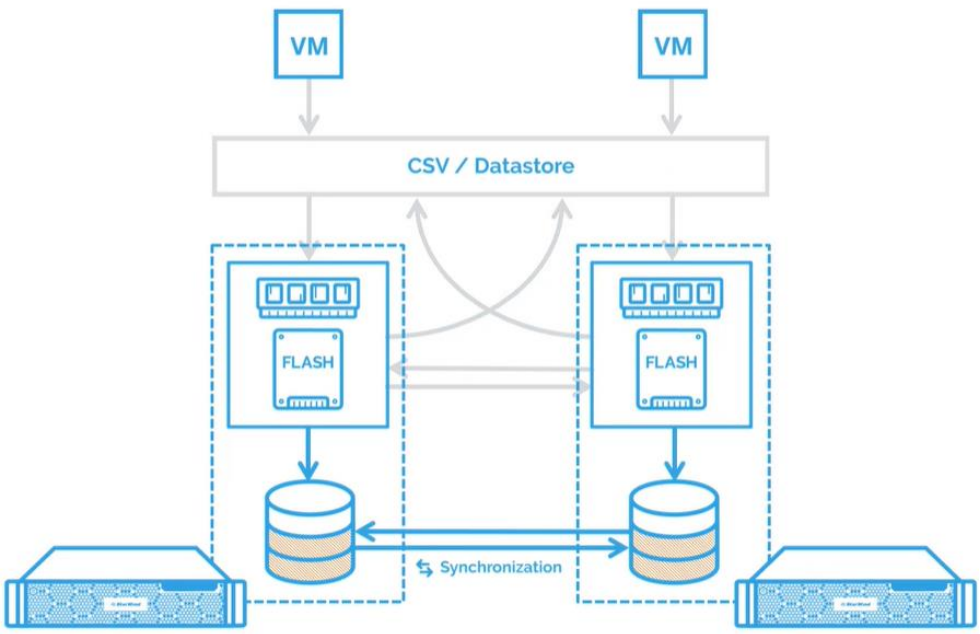
Source: StarWind

Each StarWind HCA comes with StarWind ProActive support services – an analytical and reporting system that runs 24/7, thus helping to monitor and prevent potential issues with a response time of less than one hour. The services also function as a single support system for all the HCA components, instead of having to deal with multiple vendors. Also, to cut-down virtualization deployment expenses related to HCI solutions, StarWind has partnered with xByte Technologies to deliver significant cost savings with certified refurbished HCA options for enterprise customers. The refurbished HCA nodes can carry similar line of support and warranty programs as the original ones.

The StarWind Command Center offers single pane of glass management and cluster monitoring – consolidated dashboards covering key information related to each of environment components on a single screen. This reduces the time an enterprise takes to perform IT-related routine functions. Its hyperconverged solution pro-actively manages the infrastructure failures (reacting to the failures before occurrence) and continuously monitors cluster health. Hence, the framework spots anomalies through persistent monitoring and by harnessing machine learning.

StarWind offers a highly available infrastructure through block level replication in the cache layer as well as the storage level on both nodes (seen in the figure below). Since data in the cache memory is also replicated across nodes, a node failure will not lead to data loss an inert copy exists in the other node. This simple and reliable architecture of StarWind's HCA makes sure that the highest level of reliability is available.

Figure 3: StarWind HA Dataflow



Source: StarWind

Sun Peaks Resorts deployed StarWind HCA and created clusters of servers without using dedicated storage devices to run the applications. StarWind's all-flash appliance had single-pane-of-glass management and monitoring web user interface (UI), which enabled the client to convert VMware virtual HD to a Hyper-V VHD, resulting in a seamless experience. The solution also had a built-in data center license and delivered more flexibility for Sun Peaks to spin up VMs as per need.

One of the primary differentiators of StarWind's HCA is that it includes all-flash storage options. It has a strong portfolio of storage solutions such as Performance Flash Appliance, Capacity Flash Appliance and Value Flash Appliance (all with built-in Intel Xeon Scalable Family) that are designed specifically for virtualized environments across verticals such as IT, finance, healthcare and legal.

a) **Performance Flash Appliance** has been designed for SMBs and enables an enterprise to easily scale-up by adding more memory, storage and interface cards with clusters having mixed node configurations, to adjust the demand for multiple workloads.

b) **Capacity Flash Appliance** provides the best balance between cost and performance. The various models in this appliance are built to deliver high storage capacity to enterprises. Like performance flash, these models deliver ease of scaling up by adding more storage, memory and interface cards.

c) **Value Flash Appliance** is best suited for low-footprint IT infrastructures. These solutions are built to deliver steadiness among cost efficiency and performance for several VMs and low storage demand.

Unlike other HCI vendors, StarWind does not create vendor lock-in. Its solutions allow flexible scalability on commodity hardware. Moreover, the company's VSAN is compatible with any commercial off-the-shelf hardware available with an enterprise. Also, enterprises can purchase their permanent license without any restrictions. The company also offers customization of the appliance with an aim to prevent additional expenditure (while purchasing more servers) related to storage needs.

Summary

HCI is not only a buzzword but a revolutionary way of thinking about IT infrastructure that reduces IT investments in terms of both money and manpower. ISG believes that HCI solutions need to be given due importance to ensure that organizations can gain maximum benefits from modern IT infrastructure. As the IT industry continues to evolve, HCI is the next logical step for on-premises and cloud-integrated virtualization infrastructure. Enterprises continuing with traditional virtualization architecture may end up spending far more on capital, manpower and training than they would have if they made a switch to the simplicity and savings of a an HCI solution. Also, the traditional storage-centric definition of performance is no longer valid; high performance storage is becoming the norm.

Smart enterprises recognize that strategic cost-saving initiatives such as HCI strike a balance between reduced IT spend, leveraging innovative technologies, resource utilization, and employee productivity. This eventually builds a competitive advantage for the enterprise. **StarWind** is an ideal vendor for enterprises that have these requirements. Its all-flash cost-efficient solution offers applications in a highly available environment along with a high fault tolerance rate and constant uptime of the appliance.

Summary Facts

StarWind
HYPERCONVERGENCE

StarWind is headquartered in **Beverly, USA**

StarWind has revenues around **US$35 Million** (2021)

StarWind is a **hyperconvergence** and **virtualization solutions** provider

StarWind has operations in more than **100 countries** from **North America, Europe, Middle East** and **Asia Pacific**

About the Author

Shashank Rajmane

Senior Lead Analyst

Shashank.Rajmane@isg-one.com

Shashank Rajmane has more than a decade of extensive research experience and has led the ISG Provider Lens™ studies – Public Cloud Services and Solutions, and Private/Hybrid Cloud & Data Center Outsourcing Services. He leads the efforts for the U.S. geography along with global geography reports. Apart from authoring these reports, Shashank has been part of many consulting engagements and helps ISG's enterprise clients select the right service providers and vendors based on their IT buying requirements. He is also responsible for authoring whitepapers, thought leadership papers, briefing notes, blogs and service provider intelligence reports, especially in the next-generation cloud and infrastructure services domain. He has also authored several research papers on best practices for choosing cloud vendors and cloud management platforms, along with writing several whitepapers on the cloud industry.

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