HP CONVERGEDSYSTEM
Altering Business Efficiency and Agility with Integrated Systems

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THE NET NET

The era of IT infrastructure convergence is upon us. Integrated converged infrastructure systems – the integration of compute, networking, and storage - have rapidly become the preferred foundational building block adopted by enterprises of all shapes and sizes. The success of these systems has been driven by an insatiable desire to make IT simpler, faster, and more efficient. The success of these systems has been built by taking well-known IT workloads and combining it with purpose built integrated computing systems optimized for that particular workload. Example workloads today that are being integrated to create these systems are Cloud, Big Data, Virtualization, Database, VDI or even combinations of two or more.

Traditional integrated converged infrastructure systems are built using a three-tier architecture; where compute, networking and storage, integrated at the rack scale gave enterprises the flexibility to cover the widest range of solution workload requirements while still using well know infrastructure components. Emerging onto the scene recently has been a more modular approach to convergence using what we term Hyper-Converged. With hyper-convergence, the three-tier architecture has been collapsed into a single system that is purpose-built for virtualization by integrating the hypervisor, server, storage, management and advanced data services into a small form factor x86 industry-standard building block node. The promised set of business benefits delivered by both these systems fall into these key areas:
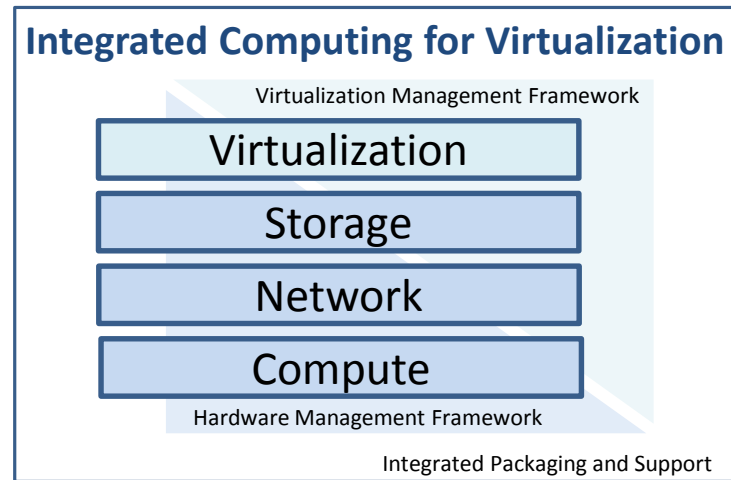
- Implementation efficiency that accelerates time to realizing value from integrated systems.

- Operational efficiency through optimized workload density and an ideally right sized set of infrastructure.

- Management efficiency enabled by an integrated management umbrella that ties all of the components of a solution together.

- Scale and agility efficiency unlocked through a repeatedly deployable building block approach.

- Support efficiency that comes with deeply integrated, pre-configured technologies, overarching support tools, and a single vendor support approach for an entire-set of infrastructure.

Building on its Converged and Hyper-Converged strategy HP has built a vast portfolio of integrated computing systems called HP ConvergedSystem. HP offers these integrated systems along with reference architectures for cloud, mobility, security, and big data. However, at the foundation of all of these offerings are the core products used for general purpose virtualized solutions that HP calls On-Demand IT Infrastructure. These core products are capable of covering a wide range of virtualized workloads for enterprise businesses of all sizes. In this profile, we'll examine how integrated computing systems marks a serious departure from the inefficiencies of the traditional do-it-yourself customer processes, and also evaluate HP's latest advancement of these types of systems.

REARCHITECTING THE DATA CENTER WITH INTEGRATED COMPUTING

The industry is in the crux of a serious data center evolution stemming from multiple interconnected fronts of transformative technologies such as virtualization, mobility, the cloud, big data, and solid-state storage. While some of these sit on the horizon awaiting strategic IT plans and purchasing cycles, one particular technology is more quickly effecting a rapid evolution of the data center and stands to broadly improve IT agility, ease of use, and across the board efficiency. This technology is the convergence of virtualization, storage, networking, and compute in a single pre-integrated system, wrapped in an umbrella of management and services that allows orchestration of the entire infrastructure while radically reducing the need to integrate and manage individual components separately. Integrated Computing (IC) – also known by various other monikers as Converged Infrastructure – stands to fundamentally alter how IT is done.

Figure 1: Integrated Computing for Virtualization

Integrated Computing for Virtualization

Virtualization Management Framework

Virtualization

Storage

Network

Compute

Hardware Management Framework

Integrated Packaging and Support

SOURCE: TANEJA GROUP

THE BUSINESS BENEFITS OF INTEGRATED COMPUTING

IT challenges around depth and breadth of skillsets, affordability, and available human power are being felt everywhere. Under recognized by most businesses are the tremendous costs of on-going support behind the IT infrastructure. Storage is but one example. Whereas storage is acquired at a cost between $3-$5/GB, maintaining that storage infrastructure runs between $5-$8/GB annually, among average mid-sized and large enterprise businesses. While this is the most extreme domain, when we assess the costs of operating and maintaining the overall IT infrastructure across businesses, we find that operations and maintenance often consume as much as 3/4ths of the IT budget. This makes advancing IT capabilities even more difficult, and makes IT solution value even harder to obtain.

The promise of Integrated Computing is that fully engineered and pre-integrated systems will fundamentally alter this equation, while also enabling more agile deployment of new infrastructure with the limited "new project" capabilities of today's IT organizations. In essence, the promise of Integrated Computing is one of lifecycle-long, multi-dimensional efficiency that starts with the customer's initial order and returns operational benefits no matter how long a solution is used, or how large the infrastructure is scaled. Taneja Group breaks down this lifecycle of efficiencies in the following manner.

Implementation Efficiency – time to value

Businesses today cannot afford to spend significant resources building up domain expertise in order to design and validate best in class IT infrastructure using seemingly best in breed components. Often the best of intentions lead to long delays in acquisition and integration of these components and the end solution at times still does not meet the business requirements. Pre-integrated and pre-validated IC systems saves up front time in the design of the system and also in getting the system fully deployed into production as the purchase order to production deployment times are greatly improved.

Operational efficiency – workload density with right sized infrastructure

Businesses come in all shapes and sizes and with that infrastructure workload requirements come in all shapes and sizes. IC systems are designed to handle business application workloads in an efficient and predictable manner; in addition, these systems are also sized appropriately such that the acquisition cost fits within the budget of the business.

Management efficiency – management simplicity and integration

Businesses often allocate a high percentage of available human resources to manage the infrastructure after the production deployment has taken place. IC systems reduce ongoing costs dramatically when the hardware infrastructure components can be managed and orchestrated as one integrated system all while seamlessly integrated into the virtualization framework of choice. This allows the entire system to be managed as one entity with fewer resources enabling business to put those precious resources to higher value projects.

Scale and Agility efficiency – building block approach

Businesses want to maximize capital efficiency as well as operational efficiency. IC systems can improve this cost efficiency when designed to start at the right size acquisition cost and also scale seamlessly in right sized increments. In addition, further agility can be achieved by how well the system operates with both a legacy infrastructure and possible future infrastructure like private and public clouds.

Support efficiency – one vendor to call

Businesses often underestimate the cost of ongoing support and the time associated with resolving a complex solution issue between multiple vendors. IC systems can significantly reduce this complexity by having a single vendor to call that will stand behind the system and also broker any issues that might crop up between partner vendors. In addition with proactive services, patches, capacity planning, and other system maintenance can be done before trouble hits.

These efficiencies translate into IT capabilities and business benefits, but not all solutions are built equal. In fact, in a competitive market place that is fast evolving, we find that significant differences exist between vendors and may exist to the customer's detriment. Support, for example, may be a significant hurdle for IC customers, as IC systems package and deeply integrate multiple components, and create firmware and configuration dependencies between components that may not be well understood by third party vendors of virtualization or application software. Solutions may also vary in how they scale and aggregate scaling resources as a single unit of infrastructure, or in how rapidly they can be delivered and deployed. With this in mind, let's take a look at a couple of the most recent converged offerings from HP – HP ConvergedSystem 700 and the hyper-converged HP ConvergedSystem 200-HC.

FOCUS ON HP CONVERGEDSYSTEM FOR ON-DEMAND IT INFRASTRUCTURE

HP ConvergedSystem for On-Demand IT Infrastructure portfolio brings with them new levels of deployment speed, management simplicity, and scalability which matches HP's stated commitment to make IT fast, simple and efficient. For the virtual infrastructure, HP's ConvergedSystem 700 and 200-HC offerings focuses on general purpose workload environments ranging from 50 to 9,000+ VMs. While we will focus on the capabilities of these HP ConvergedSystem offerings, HP has also built ConvergedSystem products for Cloud, Big Data, Security, and Mobility using some of the same design philosophies such that customers can realize similar benefits across a broad range of applications.

RIGHT-SIZED INFRASTRUCTURE

Designing a fully integrated system that ties together compute, networking, and storage requires careful balancing of the inherent trade-offs between cost, performance, scalability, and reliability. Optimizing in one dimension often creates compromises in others and may mean a system might fall short of meeting customer or industry-specific needs. HP's ConvergedSystem has been architected into two different systems that are each designed to deliver specific benefits to customers, and provide maximum flexibility for different infrastructure approaches and/or existing technology investments and skills.

| HP System	Customer Segment	Product Attributes
ConvergedSystem 200-HC StoreVirtual	• Environment with 100 – 1200* VM's • Enterprise, midsize, remote/branch office, departmental (line of business)	• Modular linear scalability to eight appliances (32 nodes per management group, 16 nodes per VMware cluster) • More flexible compute to storage ratios • Higher VM rack density and enhanced data services • All-HP system based on VMware vSphere and HP StoreVirtual VSA
ConvergedSystem 700	• Environment with up to 9,000*+ VM's • Large Enterprise *based on IOmark testing*	• From single rack to multi-rack scalability • Highly flexible compute to storage ratios • Highest VM rack density with tier 1 enterprise reliability • Flexible hypervisor and networking choice

Let's turn to a brief look at the architectural underpinnings of the systems that will most often surface in customer infrastructures.

ConvergedSystem 200-HC StoreVirtual

The ConvergedSystem 200-HC products falls into the Hyper-Converged category. Traditionally converged infrastructure systems have been built using a three-tier architecture; where compute, storage networking and storage are integrated together in same rack. With hyper-convergence, the three-tier architecture has been collapsed into a single system that is purpose-built for virtualization with the hypervisor, compute and storage with advanced data services all integrated into an x86 industry-standard building block node. The ConvergedSystem 200-HC has been designed for a rapid, simple set up and installation (in less than 15 minutes);

Figure 2: Traditional Three-Tier versus Hyper-Converged Architecture Benefits
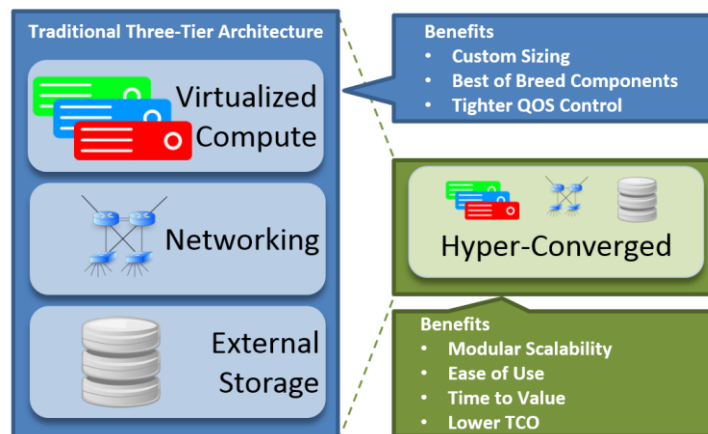
SOURCE: TANEJA GROUP

and uses a dense 4-node, 24-disk, 2U form-factor modular scale out approach that can support a wide variety of workload requirements. Solution environments can start as low as 100 VM's and increase up to a max of 1200 VM's in eight appliances. The software to run the virtualized environment, shared storage, and management – is loaded on an appliance with 4 server nodes within an HP Apollo 2000 Gen9 chassis using Intel's Xeon E5 v3 processors. Additional appliances are each configured with an identical amount of compute, memory, storage, and networking. This approach allows for very symmetrical and linear scaling from 1-8 appliances or 4-32 nodes. The systems are integrated with VMware vCenter Server for a familiar management interface. The latest HP ConvergedSystem 200-HC model is summarized in the following table.

Key Attribute	ConvergedSystem 250-HC StoreVirtual
Server Platform	HP Apollo 2000 – 4 nodes and 6 drives per node
Virtualization Platform	VMware 5.5 or 6.0
Cores and RAM per Node	Choice of 16 or 24 Cores Choice of 128 GB, 256GB, or 512GB RAM
Disk Configuration per node	6X 1.2 TB SAS Or 4X 1.2 TB SAS and 2X 400 GB SSD
Usable Disk Capacity per Appliance	Up to 11.5 TB
Shared Storage Technology	HP StoreVirtual Virtual Storage Appliance (VSA)
Storage Expansion approach	Can add compatible external HP StoreVirtual capacity into the storage group
Max Scale	32 nodes / 8 Appliances(~1200 VMs)

A key architectural challenge for node-based scale-out solutions is the ability to share the local storage of each node. Shared storage in a node-based architecture can eliminate the need for more expensive external storage.

For the ConvergedSystem 200-HC StoreVirtual, HP solves this problem by using their HP StoreVirtual VSA which is HP's Software-Defined Storage (SDS) technology. SDS allows for storage services to run as a software layer on each node, virtualizing local storage disks into a single storage pool that is shared across nodes through internode network communication. In addition for better capacity utilization, shared storage also enables key virtualization features like vMotion or highly available clustered applications. With over 8 years in the market, and over a million installs, StoreVirtual VSA technology allows HP to leverage a highly mature and field proven solution that offers cross-platform capability and compatibility.

Moreover, StoreVirtual VSA is uniquely scalable and available. By placing a StoreVirtual instance on each node, a cluster of devices runs Network RAID10 for enhanced redundancy across the cluster that can tolerate complete node failures. Then the cluster can scale linearly in both performance and capacity by adding additional nodes with StoreVirtual instances. StoreVirtual VSA runs an iSCSI block level protocol with a rich set of enterprise data services like thin provisioning, snapshots, synchronous replication etc. StoreVirtual VSA also enables more flexibility through the ability to add other compatible HP StoreVirtual products to the cluster and also use the storage cluster to support a more

heterogeneous environment. With the HP ConvergedSystem 200-HC StoreVirtual, the inclusion of both SAS and SSD drives VSA enables auto-tiering of data storage to reduce latency.

HP ConvergedSystem 700

The ConvergedSystem 700 has been designed for very high per-rack VM-density and also takes advantage of HP's premier compute and storage technology already running in many enterprise data centers today. To achieve increased rack density, HP uses the latest HP BladeSystem c7000 and Intel Xeon E5 v3-based HP ProLiant BL460c Gen9 blades. The BladeSystems then leverages Virtual Connect FlexFabric along with HP SN6000B switches to attach to one or multiple HP 3PAR StoreServ 7000 series arrays. This combination delivers the substantial density and highly controlled performance capabilities of Fibre Channel storage, while harnessing the 3PAR StoreServ's rich set of data services for virtualized environments. 3PAR StoreServ is based on wide-striping technology that can harness all available storage resources to maximize performance for even extremely contentious simultaneous workloads. The 3PAR StoreServ arrays can be configured in all flash configurations or capacity optimized hybrid arrays. Included with 3PAR StoreServ are powerful features that enable multiple arrays to operate as a single unit through the use of over-arching management technologies combined with 3PAR StoreServ Peer Persistence and Peer Motion

> **ConvergedSystem 200-HC and 700 Common Optimization Design Principles**
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> Producing an optimized general purpose system suitable for a wide variety of workloads requires some fundamental design principles to be considered. For the ConvergedSystem 200-HC and 700, HP has balanced the compute, storage, and networking after extensively researching their current customer's needs and real world practices, through direct customer interaction and technology partner collaboration. HP designed the workload for compute requirements to range from 1-4 VM's per core using Intel's latest Xeon processors with Intel Hyper-Threading Technology and hardware-based Intel Virtualization Technology. The expectation is most environments will be able to provision up to 2 VM's per core for heavy workloads and up to 4 VM's for lighter workloads. The design center for storage is to have enough performance for 30-50 IOPs per VM at a cost optimized capacity, using the combination of SSD and HDD to get proper IOP density. Finally on the networking side, a generous amount of total bandwidth has been designed-in and logically partitioned to allow system management tasks like VM migration, replication, and other background services to be performed without impact to business applications.

technology. Peer Motion (a data movement tool) and Peer Persistence (a data replication tool) allow customers to easily move, rebalance, and protect data across many ConvergedSystem 700 systems and treat their scaling infrastructure as a single resource pool. The ConvergedSystem 700 system is designed to scale both within a rack and across multiple racks through additional systems.

The ConvergedSystem 700 also brandishes an innovative and flexible backplane product that further enhances customer agility – HP Virtual Connect FlexFabric. Embedded within the ConvergedSystem 700, this technology uses wire once connectivity between blades, storage, and top of rack switching, and virtualizes nearly any logical connection (dynamically and on-demand) between these components. Virtual Connect also allows for easy isolation of bandwidth between blades and top of rack switches, and is tightly integrated into the virtualized environment management framework. For multi-rack configurations the storage networking is extended using multiple HP SN6000B 16Gb FC switches. While the ConvergedSystem 700 arrives in an optimized configuration, FlexFabric technology allows administrators to flexibly reconfigure and/or isolate production workload, management, storage, and VM connections to support IT processes or meet any unique quality of service requirements.

For single rack solutions the ConvergedSystem 700 Virtual Connect technology also enables the use of 3PAR storage in a FlatSAN topology creating the industry's lowest network latency between server and

external storage. FlatSAN technology allows for the communication between servers and 3PAR storage to essentially act like a traditional Fibre Channel SAN without needing any extra Fibre Channel capable switches in the system. By taking out the intermediate switching technology between HBA's and storage controllers the system runs faster with reduced latency, cost, and complexity. When combined with 3PAR flash based arrays the end-to-end response times will sustain at sub millisecond rates for a wide range of extreme workloads.

For top of rack switching technology the ConvergedSystem 700 takes advantage of unique HP Networking technology such as Intelligent Resilient Framework (IRF). HP IRF is an innovative technology that lets you 'flatten' data center and campus networks, eliminating the need for a dedicated aggregation layer and providing more direct, higher capacity connections between users and network resources. As an alternative to HP Networking, the ConvergedSystem 700 can be configured with Cisco Nexus switches which provides investment protection for a business that has standardized on Cisco networking.

HP separated the management infrastructure on the ConvergedSystem 700 from the production infrastructure through the use of separate clustered DL360 server pairs isolated from the BladeSystem environment. This is important because it improves the quality of service for production workloads and lets the management cluster support a growing infrastructure of ConvergedSystem 700 racks while managing the entire infrastructure as a single system. HP has developed an overarching management framework called HP OneView that enables a ConvergedSystem 700 to seamless integrate into multiple virtualized environments as shown in Figure 3 below.

Figure 3: HP ConvergedSystem 700 with flexible hypervisor choice
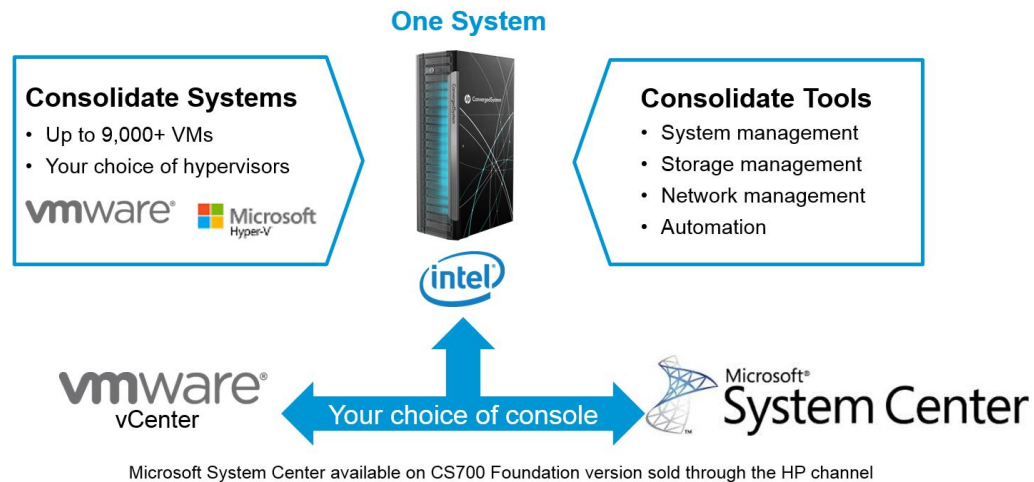
SOURCE: HEWLETT-PACKARD

In Summary, the ConvergedSystem 700 allows for a very flexible set of compute to server ratios by offering a wide variety of 3PAR storage configurations including all flash configurations and/or capacity optimized hybrid arrays. The ConvergedSystem 700 also supports multiple hypervisors, cloud environments, and networking environments. This is extremely important as this allows for a business to invest in one platform that can be optimized for any and all enterprise workloads.

INTEGRATED / COMPREHENSIVE MANAGEMENT

The family of HP ConvergedSystem products can contain physical components that look distinctly different between systems. These differing components are needed to optimize each system for the workloads they are designed to address. The promises of simplicity and efficiency for each solution depend upon how well the system enables day to day management. To address this challenge HP has designed and implemented an overarching management framework called HP OneView.

HP OneView can operate both as a standalone tool that manages HP's converged infrastructure and also as a powerful plug-in tool that integrates seamlessly into other management frameworks by exposing all of HP OneView's capability through a modern RESTful API. HP supports plug-in tools for both VMware vCenter and Microsoft System Center for Hyper-V.

Figure 4 demonstrates an example of how HP OneView for VMware vCenter plugin uses the powerful HP OneView API's such that you don't need to leave the vCenter application to provision and manage your HP infrastructure. HP provides an equivalent plugin for those customer using Microsoft System Center and Hyper-V environments. The ConvergedSystem 200-HC utilizes VMware vCenter directly for an integrated storage management console.

Figure 4: Screen shot of HP Management integrated with vCenter
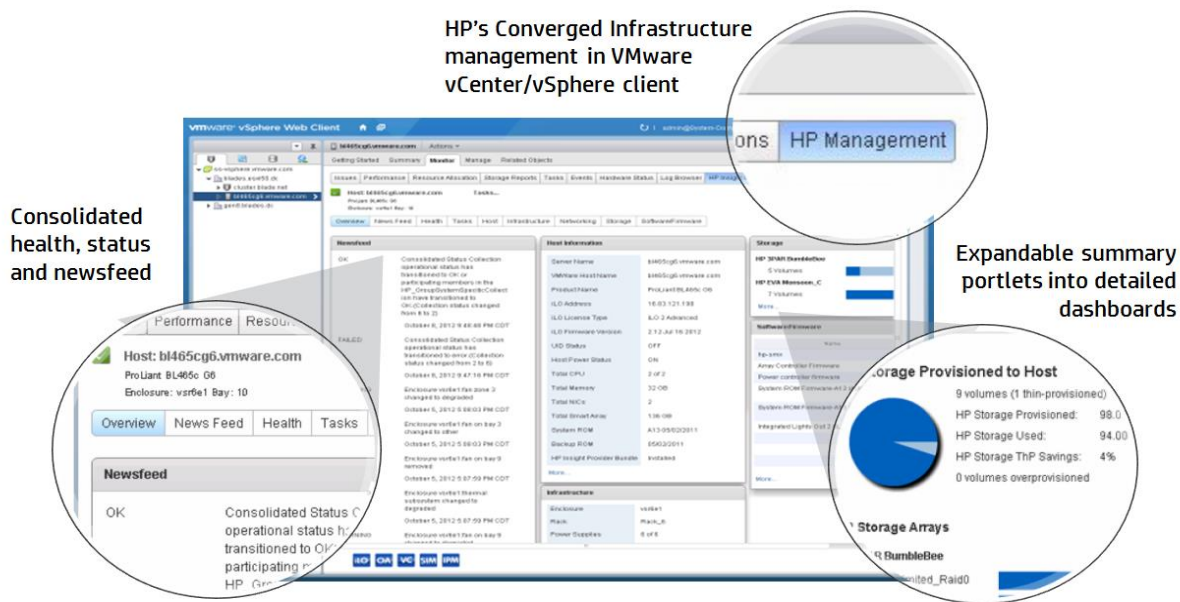
SOURCE: HEWLETT-PACKARD

Essential features of HP OneView are workflow engines and templates. Workflow templates allow organizations to sequence infrastructure management tasks and processes; those templates can then be used over and over again which in turn will save a business time and money. As examples, an administrator can now detect and automatically fix inconsistent network topologies between physical and virtual switches in one step, grow a cluster up to 12X faster by reducing 15 steps down to 5 by using server and networking profiles, or provision multiple VM's with storage and optional 3PAR Peer Persistence configurations for fault tolerance in just one click.

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Figure 5: High Level Overview of HP Management integration of HP OneView into vCenter
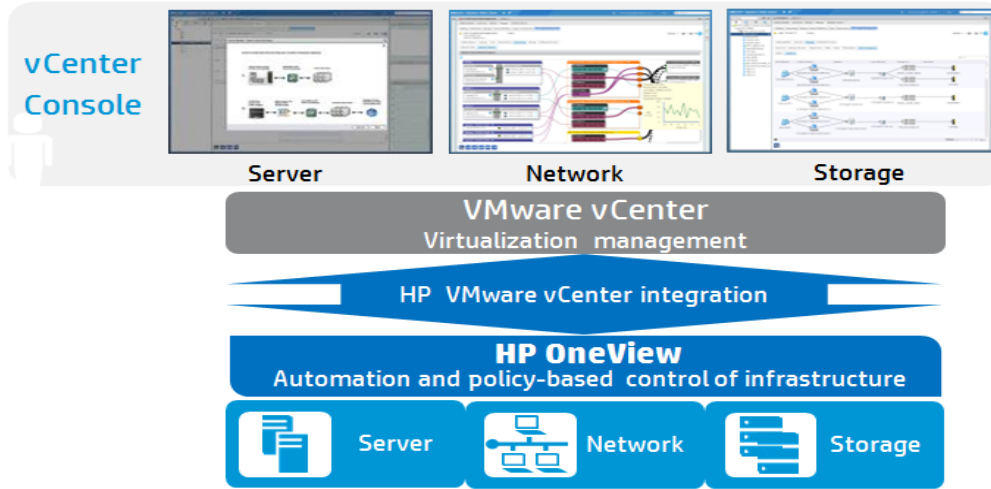
SOURCE: HEWLETT-PACKARD

HP, with the introduction of HP OneView, has set in motion a modern approach to tackling the ever elusive simplification of orchestrating the key components of compute, network, and storage in a way administrators ideally want to manage infrastructure. Exposing these powerful API's and integrating HP OneView with virtualization management frameworks simplifies end to end administration to an even greater extent by creating customized templates and features that make sense to the environment the ConvergedSystem operates in. This architectural approach minimizes the need to bring in experts from each of the disparate technologies.

ACCELERATED TIME TO VALUE

Time to value is defined as how quickly a business can get a system ready for production in their environment once they have issued a purchase order for a technology system. With ConvergedSystem, HP has created a highly optimized configuration and delivery

Figure 6: Example Time to Value Life Cycle Pocess
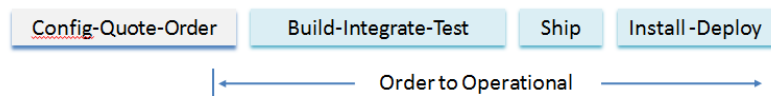
SOURCE: TANEJA GROUP

process that aims to give customers best-in-class time-to-value. Order to operational time is measured in days instead of the typical do-it-yourself time of months. HP addresses the key parts of this process in the following way:

Config-Quote-Order

Config-Quote-Order is the time it takes to take a potential customer through a sizing exercise of getting a valid system configuration then getting an accepted quote and in turn finally placing that quote into an order. HP has significantly simplified the configuration options especially for the ConvergedSystem 200-HC and now leverages very easy to use sizing tools for virtualization that can specify a workable solution based on a few easy input questions. If the scale of the solution does not fit within the envelope of the ConveredSystem 200-HC then a customized design can be used to configure a ConvergedSystem 700 which, depending on the design complexity, may take longer to design and quote.

Build-Integrate-Test

HP builds the ConvergedSystem in its regional factory integration locations. These regionally dispersed factories specialize in the ability to assemble several HP converged infrastructure components to create fully integrated, tested, and ready to deploy ConvergedSystem architected for On-demand IT infrastructure. This manufacturing process is much deeper than bolting together components; HP will completely install HP management software along with the third party virtualization software, and verify and test the unit's readiness for the customer's production environment. HP has invested in sophisticated automation tools which enable the entire end to end manufacturing process to complete quickly even for the more complex ConvergedSystem 700 configurations.

Install and Deploy

HP has packaged with the ConvergedSystem 700 the installation and startup service and this is optional on the ConvergedSystem 200-HC StoreVirtual. This service for the ConvergedSystem 700 can now be streamlined and delivered with minimal site work because of the extensive integration work already done in the factories. This service includes fully integrating the system into the customer's network and management framework, provides basic training on the device, and finishes with a formal system readiness checklist before handing over the system. HP also includes a dedicated project manager named to the customer as a single point of contact who will track the entire process all the way from order, manufacturing, site prep, through to installation and deployment. For the ConvergedSystem 200-HC, after installation, the startup and configuration time can typically done within just 15 minutes due to its hyper-converged packaging and simple, easy to use wizard, HP OneView InstantOn.

INTEGRATED SUPPORT

Integrated support – or comprehensive, system-wide, single-point-of-contact support – is another key value proposition for businesses considering integrated computing systems as a core building block for their infrastructure. HP has simplified the approach for ConvergedSystem by including a robust solution-level proactive service that covers the entire system for three years or more as required. HP Proactive Care helps customers prevent problems before they occur as well as stay informed and in control with real-time alerting and highly accurate diagnostics. With HP Proactive Care service, a remote Technical Account Manager (TAM) actively monitors the entire system and proactively contacts the customer with patch updates, service advisories, and any other potential issues the system might experience. This base service includes 24x7 with 4-hour onsite response. Moreover, HP resolves many issues automatically due to the fact the system comes with phone home technology that covers all the individual components (servers, network, and storage).

HP Proactive Care Advanced builds on the value of Proactive Care and is designed for a high-level of personal attention and assistance from dedicated resources. An assigned, local Account Support Manager (ASM), who has access to specialist technical resources, provides personalized technical and operational advice as well as shares best practices and expertise. Proactive Care Advanced provides enhanced call handling and dedicated critical case management, with automated case and problem logging for customers' connected products. Critical event management is key if the device is experiencing downtime, a Critical Event Manager (CEM) is assigned and dedicated to the incident. The CEM accelerates resolution through rigorous incident management, enlists additional resources as required, and keeps the customer informed with regular progress updates.

Starting with the Proactive Care support level, HP's service and support flow is specifically designed for ConvergedSystem. HP at the factory assigns each ConvergedSystem a unique system level ID which becomes the master identity for entitlement, asset tracking, and support tracking. When a customer calls into HP with this unique system ID they are immediately sent to a specialized and expert support team with solution level expertise. That support team will track the issue to resolution at the solution level, regardless of where the issue may reside within the multiple software and hardware components. Given the HP badge on nearly all solution components, and the tight ecosystem partnerships when there are third party elements in the solution (such as with Microsoft Hyper-V and VMware ESXi), HP's

support process provides an unique advantage over many of the competitive offerings in the marketplace.

SCALABILITY

Both the ConvergedSystem 200-HC and 700 have been designed for considerable scalability though each does so through a different architectural approach.

The ConvergedSystem 200-HC is designed for midsize or remote office deployments. These systems scale using a modular scale-out approach. HP designed the scalability of the ConvergedSystem 200-HC to support a 16 node VMware cluster and up to a 32 node management group (depending on the model) or roughly a maximum of 600 or 1200 VM's. To scale beyond that, the approach would be to build another set of these systems. HP supports the virtualized software-based VM migration (vMotion) and/or high availability functionality (VMware HA) between a ConvergedSystem 200-HC and any other existing compatible virtualized environment. The ConvergedSystem 200-HC StoreVirtual also supports VMware Metro Storage Cluster which enables very robust DR/HA configurations.

The ConvergedSystem 700 is designed for large enterprise deployments so it scales both in-frame and also frame-to-frame which in turn gives it a much higher upper limit when it comes to scalability (9,000+ of VMs). The management infrastructure has been sized and isolated from the business workload infrastructure and designed to be clustered together with other ConvergedSystem 700 systems or even existing legacy virtualized environments. In addition, the ConvergedSystem 700 has advanced storage features enabled in the 3PAR StoreServ system that makes it more seamless to link in additional ConvergedSystem 700 using features like Peer Motion and Peer Persistence.

The differences in scalability may incline customers to select one solution over the other depending on workload characteristics and their requirements for SLA quality of service. A business needing administrative simplicity with workloads that scale linearly may find the ConvergedSystem 200-HC appealing. Large scale consolidated virtual environments that need independent compute and storage growth flexibility may find that the ConvergedSystem 700 is ideally matched to their requirements.

EXTENSIBLE INTEGRATION THROUGH REFERENCE ARCHITECTURES

HP has a rich history of partnering effectively with a very broad range of third party vendors and services. HP has leveraged this ecosystem with ConvergedSystem, and has worked directly with some of the leading critical business application vendors to characterize how their applications perform on ConvergedSystem. These fully tested blueprints (called HP Reference Architectures) define the optimal application workload configurations for ConvergedSystem. Some examples include Database Consolidation for Microsoft SQL 14 and SharePoint Server 2013. Other integration examples include testing and developing reference architectures for data services like backup from leading backup and recovery suppliers including HP Data Protector, Veeam, and CommVault.

The ConvergedSystem 700 and 200-HC has been also pre-tested with the expectation that a business might like to add a private cloud infrastructure to their IT portfolio or as on-ramp to public cloud. HP's own Helion CloudSystem software has been certified and can be used easily with the Converge System (factory installation optional on some models). HP also supports many multi-vendor cloud software platforms; as an example VMware vCloud, Microsoft Azure Pack and RedHat OpenStack cloud environments are supported on the ConvergedSystem 700 systems. This is important because many businesses today are looking for a private cloud infrastructure as a key enabler to an eventual hybrid cloud strategy where a business has the flexibility to move their application workloads to wherever they get the best return on investment.

HP through its broad and deep relationship with ecosystem partners and the ability to certify and test a wide ranging set of business critical applications on HP infrastructure makes the ConvergedSystem 200-HC and 700 investments go significantly further, and this again combines with HP's one-stop-support to further enhance on-going value and minimize operational costs.

TANEJA GROUP OPINION

HP's ConvergedSystem for On-demand IT Infrastructure has all the right elements to further accelerate the era of convergence and continue to enhance HP's leadership in this product category. In an area where most vendors suggest that one architectural approach fits all, HP demonstrates the breadth of its capabilities by being able to design the appropriate right sized system for the right sized task. Whether you believe in scale out or scale up, HP has all the technical assets in place to build a portfolio of systems that can optimize both approaches. The HP products reviewed here are often times the core building blocks for the many other HP ConvergedSystem products purpose built for other workloads.

Moreover, HP arguably has one of the longest and deepest systems management pedigrees of major compute vendors. HP has upped the ante further with their HP OneView approach to managing across historically disparate technology silos (compute, network, and storage), and leverages a radically simplify management scheme to eliminate the domain separation and specialization that often makes infrastructure less agile. HP OneView has powerful template and workflow approaches that stand to simplify the most complex administrative tasks across these technologies while being flexible enough to operate as a standalone application or embedded within third party application frameworks. HP is well positioned to accelerate this approach and further distance itself from other competitors because HP owns these key technology components as well as the subsystem components. HP is also focused on extending, opening up, and enhancing the management capabilities of each underlying component through more modern, robust and lighter weight RESTful APIs.

HP has also further leveraged these core technology strengths by combining the technology with HP processes that improve time to value (time from manufacturing to customer deployment) and in service and support. It shouldn't be missed that HP knows how to pull together a broad ecosystem of partners and provide system level integration and consequent support that covers a tremendous range of business applications. This long-standing strength of HP has been extended to the ConvergedSystem portfolio of products. HP has produced several application level Reference Architectures for ConvergedSystem with expectations for even more as time goes on. With this assembly of both technology and process, HP has been able to create what was traditionally a top of class capability at the component level and turn it into a top of class approach for the entire integrated system.

In sum, HP's recipe for integrated computing today is about making IT infrastructure faster, simpler and more efficient. For today's data center customers who have reached complexity-imposed limits of deployment, integration, scale, and management, HP ConvergedSystem solutions makes some compelling promises and delivers on them. In our view, HP is poised to continue to expand on their leadership position in providing integrated computing systems by offering choice and flexibility while still maintaining the simplicity and speed that businesses are demanding.