

ACCELERATING SOFTWARE-DEFINED INFRASTRUCTURE WITH HPE SYNERGY

SUMMARY

Software-Defined Infrastructure (SDI) is the ability to manage hardware resources (compute, storage, and networking) in a programmable manner. Put differently, it enables fluid pools of IT resources to be provisioned and re-provisioned on the fly with little to no human intervention.

Composable Infrastructure (CI) is a disaggregated pool of hardware resources that better enables the automatic and on-the-fly provisioning of SDI. By creating pools of compute, storage and networking that stand independent of one another, software is better able to utilize CI platforms such as Hewlett Packard's HPE Synergy which serves as a foundational element to any SDI strategy.

The enablement of SDI lies in the software that makes hardware programmable, or *composable*. When deployed and utilized to its full extent, SDI drives levels of agility and automation that are arguably unmatched. Enterprise IT organizations respond faster to the needs of the business through "as-a-service" deployment models. This, in turn, can reduce the cost and complexity of IT operations.

While enterprise IT organizations look to accelerate the path to SDI, questions may exist:

- What makes a successful SDI deployment?
- How does software differentiate SDI solutions and what does this software do?
- What is the real benefit of composable versus traditional infrastructure?
- Can CI support any enterprise workload?
- What should an IT organization look for in an SDI solutions provider?

These questions will be explored in this white paper with a critical look at HPE's software-defined and CI offering, HPE Synergy.

THE JOURNEY TO THE SOFTWARE-DEFINED DATACENTER

Moor Insights & Strategy (MI&S) believes SDI is the foundational building block to the software-defined datacenter (SDDC). True software defined infrastructure is:

- *Self-provisioning*, by applying the settings, tools, operating system (OS), and applications to bring a server online.
- *Self-monitoring*, by looking at server utilization and capacity to determine the need for additional resources.
- *Self-managing and self-healing*, by using predictive analytics, artificial intelligence/machine learning (AI/ML), infrastructure is able to respond to performance and capacity issues before they arise.

While this may seem obvious, it bears stating: software is a key component to software-defined infrastructure. It is the tools and extensible interfaces that makes CI programmable. Put more simply, without advanced software automation, you don't have software-defined.

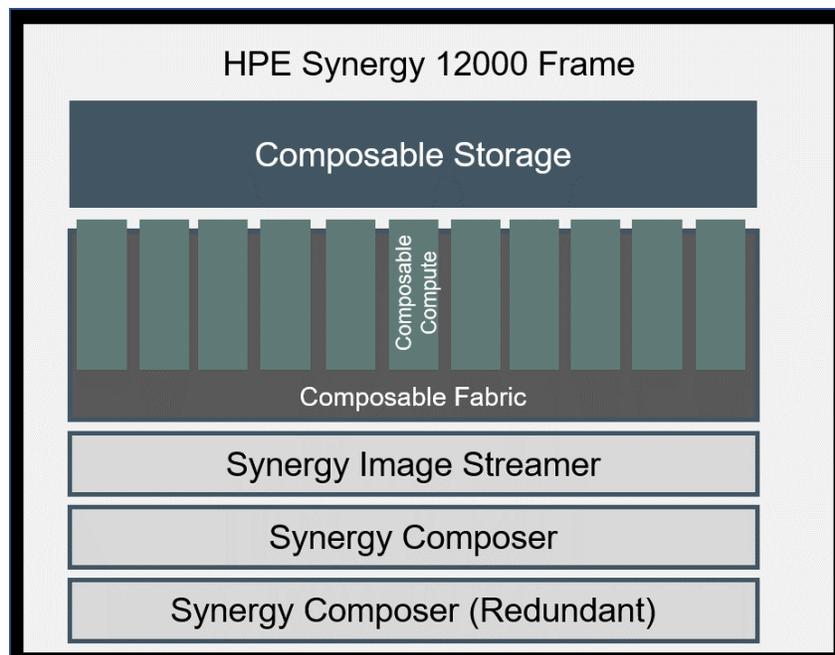
MI&S believes HPE Synergy is well-positioned in the SDI space for two distinct reasons. First, the product's time in the market gives it the advantage of a platform, unified application programming interface (API), and toolset that is strongly evolved. Secondly, HPE has had ample opportunity to introduce functionalities to the solution born out of real customer needs with more than 3,000 HPE Synergy customers.

HPE SYNERGY – ONE ARCHITECTURE FOR ALL WORKLOADS

HPE Synergy is HPE's response to the needs of the enterprise IT organization struggling to balance the support of traditional IT functions with the deployment of the workloads and applications of tomorrow. HPE positions HPE Synergy as software-defined, CI architected to simplify the hybrid cloud environment.

HPE Synergy provides fluid pools of resources (Intel Xeon-based compute, storage, and networking) that are provisioned on-the-fly and custom-fitted to the specific needs of applications. Deploying the newest HPE Synergy compute modules delivers security features that go beyond perimeter security, arming an organization's infrastructure to detect, prevent, and recover quickly from threats. HPE Synergy's toolset—its Unified RESTful API and management tools—is what makes HPE Synergy more than just a modular infrastructure.

FIGURE 1: HPE SYNERGY



Source: Moor Insights & Strategy

HPE’s claim to differentiation in the SDI market is through software that configures and manages this composable hardware. HPE’s management software, HPE OneView, comes integrated with HPE Synergy in the form of Composer, a dedicated scalable management and automation appliance. HPE Synergy Image Streamer facilitates the storage and automated deployment of software images. Additionally, third party provisioning tools such as Chef and Puppet can be utilized to provision and manage a HPE Synergy installation through the RESTful API.

BENEFITS OF HPE SYNERGY

- *IT agility* – One of the biggest benefits realized through HPE Synergy is the ability of an enterprise IT organization to do more with less. The collective IT capability, like the infrastructure it supports, is highly underutilized. HPE Synergy helps flip this equation by automating the process of provisioning and deploying server instances and applications on time and as needed.
- *Complexity* – Reducing the complexity associated with the provisioning and management of infrastructure is what enables IT agility. HPE Synergy reduces complexity and improves efficiency through HPE Synergy’s integration with HPE

OneView and third-party APIs to enable automation of routine administrative tasks.

- *Time-to-value* – Enterprise IT’s role has shifted. IT must help the business react to the needs of the market faster in addition to maintaining the infrastructure that runs the business. This means decreasing the amount of time it takes to turn an idea into a product. The ability to provision environments in real time on HPE Synergy enables business users to more quickly innovate.
- *Total Cost of Ownership (TCO)* – Ultimately, deploying SDI is about reducing cost: the cost of under-provisioned servers that sit in racks with minimal utilization while consuming power, the cost of management, the cost of IT inefficiency, and the cost of lost opportunity because IT is unable to quickly respond to the competitive needs of the business. HPE Synergy delivers a promising TCO by addressing all of these variables together.

USE CASES ENABLED BY HPE SYNERGY

While the need to stay competitive in the digital economy is a driving factor, so is the need for enterprise IT to stay responsive to the demands of the digitally transformed business. Today’s enterprise IT organization is more challenged than ever. The need to support new workloads (such as containerized and cloud native) in new deployment models competes with the requirement to maintain traditional applications (i.e., bare metal and virtualized, etc.). Considering the full impact of these competing dynamics, one can appreciate the concept of SDI. Because of its abstraction of resources, SDI enables different workloads and deployment models to be employed on a single pool of hardware. In other words, one HPE Synergy platform can enable both legacy and next-generation workloads.

HPE SYNERGY WORKLOAD AFFINITY

Part of the daily challenge of enterprise IT is supporting workloads and applications that are divergent both in architecture and usage. Traditional line-of-business applications tend to be different than modern, cloud-native applications. In the past, organizations would dedicate different infrastructure to support these differing workloads.

As a CI solution, HPE Synergy has a natural affinity for almost any workload in the enterprise datacenter. This is partly due to the nature of SDI and partly due to the work that HPE put into the toolset that enables the modular CI hardware.

FIGURE 2 : HPE SYNERGY DEPLOYMENT MODEL & WORKLOAD AFFINITY



Source: Moor Insights & Strategy

PRIVATE / HYBRID CLOUD

One of the more significant deployment models where HPE Synergy delivers value is hybrid cloud. HPE Synergy leverages the benefits of a software-defined composable platform to build a scalable private cloud and to remove the deployment and management complexity many enterprise IT organizations face. HPE's partnership with different independent software vendors (ISVs) helps customers on their journey to hybrid cloud. One example of this is its partnership with VMware Cloud Foundation. HPE and VMware have tightly integrated SDDC Manager and HPE OneView, enabling HPE Synergy to simplify the management of CI and private cloud environments.

With the integration of HPE OneView and SDDC Manager, HPE is the only manufacturer to bring composability features to VMware Cloud Foundation (VCF). Customers can now dynamically compose resources to meet the needs of public and/or private cloud workloads within a single console, saving time and increasing efficiency using SDDC Manager. This integration simplifies management of infrastructure by enabling IT to quickly respond to business needs and add capacity on demand directly from SDDC Manager. This approach also increases business agility by automating the provisioning process, effectively reducing the costs associated with overprovisioning or under-provisioning of resources.

VIRTUALIZATION

IT organizations can use HPE Synergy, its software, and third-party virtualization software to deliver virtualized and infrastructure-as-a-service solutions to its internal customers. Compute modules based on Intel Xeon Scalable processors can enable highly dense virtualized environments. Through its RESTful API Composer, virtual machines can be constructed (and deconstructed) at the speed of the cloud, leveraging the image storage repository and deployment characteristics of the Image Streamer.

HPE partnered broadly to enable virtualized infrastructure solutions, certifying VMware's ESX, Microsoft Hyper-V, and Oracle VM, among others.

VIRTUAL DESKTOP INFRASTRUCTURE

HPE Synergy should enable enterprise IT organizations to finally realize the benefits of virtual desktop infrastructure (VDI) while simplifying the deployment and management challenges that have long been a barrier to adoption. It starts with HPE Synergy frames that are rich in Intel Xeon Scalable CPU cores. These cores are matched with up to 42 NVIDIA Tesla or Quadro graphics processing units (GPUs) per HPE Synergy frame, so remote desktops and applications can run faster and seamlessly while enterprise IT organizations drive down the support cost per user. Thanks to HPE Synergy's composable nature, compute and GPU cycles dedicated to remote desktops can be quickly reallocated to other applications and needs when users log out at the end of the workday.

CLOUD NATIVE APPLICATIONS AND DEVOPS

Architectures that drive today's business are increasingly cloud native and frequently containerized services. This is for good reason as security, mobility, time-to-value, and productivity all greatly benefit an organization. These are the driving principles behind the adoption of containers and microservices in the enterprise.

HPE Synergy can benefit cloud native applications and the agile, DevOps-driven organizations that build and deploy them. The ability to allocate and take away resources as needed, virtualized or bare metal, can drive a high level of infrastructure efficiency. The security designed into each HPE Synergy compute module adds an additional level of security. Finally, HPE Synergy's RESTful API allows for high levels of integration with many of the languages and management stacks that support cloud and DevOps environments.

DevOps is about velocity. The faster an organization can get products and services to market, the greater the chance of success in the digital economy. By combining HPE's Synergy with DevOps tools, enterprise IT organizations can enable business units to respond to customer and market needs faster and with greater efficiency.

A good example of HPE partnering with the ecosystem to deliver a container-based DevOps environment is the HPE Synergy reference architecture for Red Hat OpenShift. HPE and Red Hat partnered to deliver an integrated platform designed to simplify the deployment and management of containerized environments.

DATA MANAGEMENT AND ANALYTICS

Data-derived insights are invaluable to the modern business. This puts enormous strains on IT, since IT is tasked with the creation and management of the different database, data repositories, and analytics tools that are used by business units. Through HPE’s partnership with the ecosystem, HPE Synergy can greatly simplify data management in two ways:

1. Creation –Database and analytic environments are created on-the-fly through a “point-and-click” template using HPE OneView. SAP HANA, Microsoft SQL Server, SAS High-Performance Visual Analytics, or Oracle environments are created in seconds through these few clicks.
2. Resource allocation – HPE Synergy manages the allocation of compute and storage resources for those data and analytic environments automatically. This allows IT to respond to the needs of the business before they occur.

SOFTWARE-DEFINED STORAGE

Software-defined storage (SDS) aggregates local storage on a host and makes it available to all servers as a centralized data store. Compute and storage do not generally scale independently in a traditional server “racked server” environment. CI changes this equation by disaggregating compute and storage. Organizations looking for a simpler way to deploy SDS may find a good underlying architecture with HPE Synergy.

FIGURE 3: MAPPING HPE SYNERGY COMPUTE MODULES TO WORKLOADS

HPE Synergy 480	HPE Synergy 660
<ul style="list-style-type: none"> • Virtualization • Collaboration • Content • Business • IT/Web Infrastructure • VDI/GPU Compute 	<ul style="list-style-type: none"> • Virtualization <ul style="list-style-type: none"> • Enterprise IT consolidation • Structured database <ul style="list-style-type: none"> • Large memory demands • Business processing • Decision support
Gen10 <ul style="list-style-type: none"> • Intel Xeon Scalable <ul style="list-style-type: none"> • 4 – 56 cores 	Gen10 <ul style="list-style-type: none"> • Intel Xeon Scalable <ul style="list-style-type: none"> • 8 -112 cores

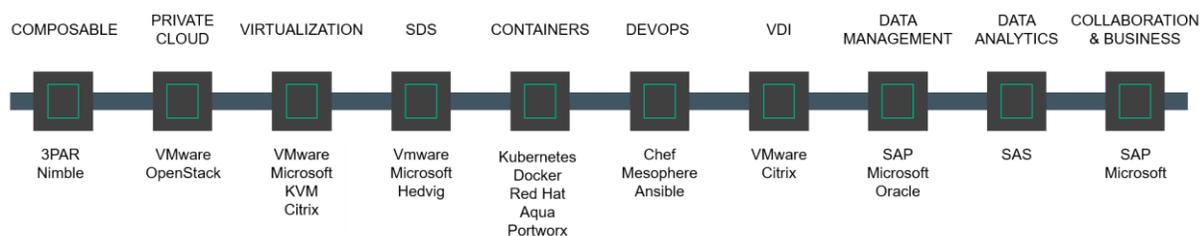
Source: Moor Insights & Strategy

FAST TRACKING HPE SYNERGY DEPLOYMENTS

Deploying SDI can be equal parts science and art with a little bit of guesswork for good measure. HPE applies some of the science and art and takes the guesswork out of deploying solutions on HPE Synergy via **reference architectures**. Reference architectures give repeatable best practices for fully tested and validated workloads. Using reference architectures enables customers to deploy with a higher degree of predictability regarding performance. HPE developed reference architectures for complex workloads and applications that run on HPE Synergy as validated configurations for organizations knowledgeable enough to do their own deployments. Alternately, customers can purchase HPE’s pre-validated and factory integrated Converged Systems 750.

By consuming HPE Synergy via the Converged Systems delivery model customers get to take advantage of HPE’s engineering talents. HPE will build and customize the solution specifically for their environment which eliminates any concerns about driver versions or software path levels. The Converged Systems 750 integrates all the components in the factory and provides start-up services on-site to ensure a timely deployment. The Converged Systems 750 also provides a unique support experience for the entire infrastructure versus the more traditional component level experience.

FIGURE 4: HPE SYNERGY REFERENCE ARCHITECTURES



Source: Moor Insights & Strategy

THE POWER OF SDI LIES IN THE DEPTH OF THE SOFTWARE ECOSYSTEM

Software is the key to separating CI from a hardware design. Without software, IT organizations cannot achieve manageability, agility, and efficiency goals.

MI&S finds HPE Synergy a compelling player in the SDI market because of the HPE Synergy management capabilities and the breadth and depth of integration with the software ecosystem via its RESTful API.

MI&S believes HPE Synergy's management via HPE OneView is impressive. HPE OneView, embedded in HPE Synergy Composer, is what turns hardware into programmable infrastructure. It starts with deploying and provisioning HPE Synergy resources (compute, storage, and networking), continues through the monitoring and management of instrumentation, and on through the re-provisioning of compute on-the-fly. The ability for an IT organization to deploy and provision bare metal on-the-fly alone brings immediate value.

HPE SYNERGY IMAGE STREAMER

HPE Synergy Image Streamer facilitates rapid image/application changes to multiple compute nodes in an automated manner. The platform works with HPE Synergy Composer to rapidly deploy and update multiple virtual machines (VM). Operating environment images for bare-metal use might boot directly into a running OS or a VM host might perform quick image changeovers. "Infrastructure-as-code" capability enables fast delivery of applications and services, including the ability to perform rapid workload switching (using Linux, VMware, or MS Windows). Enhanced profiles provide true stateless images, which integrate the physical infrastructure configuration with operating environment images. Enhanced profiles are stored in redundant image repositories and are automatically deployed for ease of use and reduced administration effort. The unified API enables customization, automation, and integration of operations and applications with HPE Synergy Image Streamer.

Equally impressive is HPE's support for third-party integration with a variety of management consoles via its RESTful API. It is this third-party integration that demonstrates HPE's understanding of the datacenter and an IT administrator's desire to use the tools and consoles that are most familiar.

Finally, HPE Synergy's RESTful API integrates with programming frameworks and tools such as Python, Ruby, and Java via standard scripting processes. This interface allows for the programmatic control of hardware resources directly from applications.

POINTNEXT – TRUST THE EXPERTS

Deploying CI is bigger than just installing new hardware and management software. CI deployment is usually in support of a bigger initiative—modernization of infrastructure,

SDI initiatives, or IT organization transformation. People, processes, and integration of technologies have to be considered when taking on such an initiative. IT organizations would be wise to engage with experienced partners. Investing in such a partnership can lead to faster deployments with the tightest levels of integration and highest levels of efficiency.

MI&S believes customers looking to deploy CI in their organization should consider HPE's Pointnext consulting services organization. This team of professionals has assisted in thousands of HPE Synergy deployments and is able to leverage the tools and toolchain to their greatest extent for individual customers. Organizations like Pointnext can help IT maximize the ROI on investments in composable deployments from planning to deploying, to optimizing and maintaining.

FLEXIBLE CAPACITY WITH HPE GREENLAKE

Budget constraints are a challenge for most IT organizations. HPE GreenLake Flex Capacity offers a low-touch, easy-to-buy, prepackaged consumption solution for HPE Synergy that eliminates the need for significant, upfront cost. It provides organizations with a complete solution that serves as an on-ramp to pay-as-you-go CI. Additionally, the elasticity capacity in HPE GreenLake Flex Capacity assists customers in avoiding lengthy purchase cycles in the future by adding capacity as needed.

CALL TO ACTION

The evolution of the datacenter more resembles a revolution. The pace of innovation and adoption of new technologies is too rapid for IT to fully support. It is not hyperbole to say the modern business requires an agile IT organization to compete in the new economy.

If IT is going to be the engine of innovation, it must rely on technologies that hide complexity and drive efficiency. CI, as an enabling technology of SDI, delivers on simplicity and efficiency. MI&S believes IT organizations would be wise to consider HPE Synergy for a number of reasons:

- *Synergy is proven.* HPE has a long and proven track record of success with HPE Synergy. Thousands of customers use HPE Synergy to reduce complexity, increase utilization, and deliver services.
- *Synergy is a comprehensive solution.* The management capabilities of HPE OpenView, HPE Synergy Composer, and HPE Synergy Image Streamer

automate the deployment, provisioning, and managing of infrastructure in addition to composable hardware.

- *Synergy has a rich ecosystem.* The real power of SDI lies in the depth and breadth of partnerships and HPE has partnered with industry-leading companies to ensure the highest levels of enablement (and greatest optimization) of the workloads that power today's enterprise.
- *Synergy has strong support.* The HPE Synergy team has deep experience in the planning, deployment, and support of CI solutions to enable a number of use cases across a variety of industries.

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