Overview

HPE Synergy Composer

HPE Synergy -- the first Composable Infrastructure -- empowers IT to create and deliver new value instantly and continuously. This single infrastructure reduces operational complexity for traditional workloads and increases operational velocity for the new breed of applications and services. Through a single interface, HPE Synergy composes compute, storage, and fabric pools into any configuration for any application. It also enables a broad range of applications and operational models such as virtualization, hybrid cloud, and DevOps. With HPE Synergy, IT becomes the internal partner to rapidly launch new businesses.

HPE Synergy Composer, which embeds HPE OneView, manages the Composable Infrastructure by delivering:

- **Fluid pools of resources**, where a single infrastructure of Compute, Storage, and Fabric boots up ready for workloads and demonstrates self-assimilating capacity,
- **Software-defined intelligence**, with a single interface that precisely composes logical infrastructures at near-instant speeds; and demonstrates template-driven, frictionless operations, and
- **Unified API access**, which enables simple line-of-code programming of every infrastructure element; easily automates IT operational processes; and effortlessly automates applications through infrastructure deployment.

Fluid pools of resources

HPE Synergy Composer eliminates complexity and empowers IT to orchestrate a single infrastructure of compute, storage, and fabric pools with a single interface to assemble and re-assemble resources into any configuration. By delivering flexible pools of compute, storage, and fabric in a single infrastructure, all the resources needed to run an application are instantly available. Additional capacity self-assimilates into larger flexible pools, which makes scaling simple and automated. Hardware and operational complexity does not increase with growth, ensuring IT can achieve economies of scale and efficiency.

Software-defined intelligence

HPE Synergy Composer delivers software-defined intelligence for IT to quickly and confidently make frictionless changes to the infrastructure. Templates define how the infrastructure needs to be configured, and the infrastructure's software-defined intelligence implements the needed changes programmatically without human intervention. This dramatically reduces operational complexity and cost while increasing service availability.
Software-defined intelligence is a paradigm shift in how infrastructure is managed. HPE Synergy Composer can automatically implement change operations via a template using a single interface, which significantly reduces the manual interaction and human error. IT is empowered to configure development, test, and production environments with precision, accuracy, and speed.

Unified API

The Unified API in HPE Synergy Composer delivers automation by providing a single interface to discover, search, inventory, configure, provision, update, and diagnose the composable infrastructure in a heterogeneous environment. This aggregates and hosts internal IT infrastructure to present physical resources in the same way as virtual and public cloud resources.
Traditional environments can automate their operational processes and design their workflow around enterprise needs. Developers can also programmatically control the infrastructure to create a hyper-connected data center. DevOps tools can provision instantly and programmatically, without needing a detailed understanding of the underlying physical elements. The Unified API, which is also native to HPE OneView, is a fully programmable interface which will integrate into popular management tools such as Microsoft SystemsCenter® and VMWare vCenter® and also into open source automation and DevOps tools such as Chef, DockerTM, and OpenStack.
HPE Synergy Composer manages Composable Infrastructure and delivers "infrastructure-as-code".

What's New

HPE Synergy Composer manages the Composable Infrastructure of HPE Synergy.

Overview

Composable Infrastructure Management

- Redundant physical management appliances with failover and high-availability
- Dedicated Management (or 'control') plane, separate from Data plane
- Configuration planning tools
- Auto-discovery
- Field Technician installation mode
- Software-defined intelligence with powerful profiles with control for compute, storage, fabrics, and images
- Collaborative user interface with MapView, Smart Search, Activity Log, HTML5 Mobile access, Customizable Dashboard System Health: Inventory, monitoring, alerts, and proactive email notifications
- Standardized reports, with export in CSV or Microsoft MS-Excel formats.
- HPE Image Streamer with 'stateless' and 'instant-on' capability to deploy and update at extreme speed
- Includes embedded versions of HPE OneView and HPE iLO Advanced

Composable Compute and Frame Management

- HPE Synergy 1200 frames and HPE Synergy Gen9 compute modules
- Frictionless firmware updates using Logical Enclosures for varied components in multiple frames
- Frictionless Firmware and OS Driver updates using profile templates to 'monitor, flag, and remediate'
- Server provisioning access via the HPE Unified REST API with support for enabling/disabling UEFI secure boot mode

Composable Fabric Management

- Simultaneous support for Ethernet, Fibre Channel (FC), Fibre Channel over Ethernet (FCoE), and iSCSI
- HPE Virtual Connect Master/Satellite architecture for high-performance resilient scaling
- Fabric disaggregation optimizations to match resources to workloads
- Frictionless scaling to grow resources
- East-west throughput performance of 2.56Tb/s per fabric in any configuration
- Flexible bandwidth pools
- Multi-module link aggregation (MLAG) to avoid single-points-of-failure in hyper-virtualized environments

Composable Storage Management

- HPE Composer-driven SAN storage volume and data path lifecycle management
- Simultaneous support for Fibre Channel (FC), Fibre Channel over Ethernet (FCoE), and iSCSI storage
- Automated policy-driven storage volume provisioning from storage pools
- Support for private, shared, or ephemeral (storage lifecycle tied to server lifecycle) storage volumes
- Support for thick/thin provisioning and snapshots/clones of volumes
- Automated data path configuration including SAN zoning and storage System port load balancing
- Boot-from-SAN for FC-, FCoE-, and iSCSI- accessed storage
- Flexible SAN zoning policy customization to control zone and alias configuration to fit with local data center standards.
- SAN and Storage device support
  - StoreServ 3PAR 7000/8000/10000/20000 models (FC and FCoE)
  - StoreVirtual VSA, P4000 models (iSCSI)
  - Brocade SAN switches (all supported by Brocade Network Advisor)
  - HPE 5900cp/af, 5930 SAN switches
  - Cisco Nexus 5500/6000, MDS SAN switches (FC and FCoE)

Solution Partner Integrations

- VMware vCenter Server integration.
- Microsoft System Center integration.
- HPE Operations Analytics for HPE OneView provides 'Big Data' analytics for IT operations.
- HPE Virtualization Performance Viewer for HPE OneView adds capacity optimization capabilities.
- Additional software solutions are supported.

Overview

Infrastructure as Code

HPE Synergy Composer manages Composable Infrastructure with software-defined intelligence to present an 'infrastructure as code' view of fluid resource pools to developers and users.
HPE Synergy Composer provides native infrastructure management for assembling and re-assembling fluid pools of compute, storage, and fabric resources to meet any workload. Detailed configuration information can be saved as templates and then re-applied, enabling the physical infrastructure to be managed like software. 'Infrastructure as code' capability provides on-demand delivery and support of applications and services with consistent governance, compliance, and integration.
This represents a paradigm shift in managing infrastructure. Software-defined architecture auto-discovers and self-assimilates all HPE Synergy resources for immediate use with template-driven operations. This intelligence increases the speed, efficiency, and reliability of operations.
Composer deploys, monitors, and updates the infrastructure from one interface and one Unified API, which is also native to HPE OneView. IT groups can deploy infrastructure for traditional, virtualized, and cloud environments. And resources can be updated, flexed, and redeployed in a frictionless manner without service interruptions.

High Availability Lifecycle Management

HPE Synergy Composer is the management appliance that provisions, monitors, updates, and repairs your composable infrastructure.

Composer appliance pairs provide failover capability (Active-Standby) for enterprise high availability (HA). HPE Composer provides management of the HPE Synergy 'ready-to-run' infrastructure. And there are no licensing issues or requirements.
This management platform provides a holistic basis for security:

- Separation of the data and management (or 'control') planes provides maximum control.
- User identifications and authorizations comply with the best known security practices, and utilize role-based access control.
- Single-sign-on (SSO) to iLO is supported and tracked via audit logs.
- Provisioning control assures standardization in mass deployments.
- Management appliances are security-hardened and have encryption of critical data.
- Backup and Recovery for the management appliance is handled in a secure manner.

Separation of Data and Management planes provides optimal bandwidth to maintain control at all times without oversubscription issues, and helps avoid malicious takeovers in Denial of Service (DoS) attacks.

Industry-standard enterprise Directory Services are utilized to confirm user identification and to control access to compute resources. This allows one administrator to quickly set up authentication and authorization for each user, as appropriate to their responsibilities and organizational associations, for specific categories of compute resources. Role-based access control (RBAC) restricts system access to authorized users.

Single-sign-on (SSO) to iLO is provided in HPE Composer. All user actions are logged in an audit log. Options for LDAP/AD-based directory services authentication and authorization are also supported.

Provisioning control is provided for general deployment and provisioning use in HPE Synergy. Additional levels of security and compliance are optionally available with HPE Image Streamer. Both approaches avoid use of PXE Boot with its known security issues.

Management appliances are security-hardened with limited open ports, limited access to the command prompt, and a restricted "kiosk" graphical user interface (which prevents access to the underlying operating system and other software). Sensitive data on the appliance is encrypted and data downloaded from the appliance is encrypted by default (e.g. support dumps, backup files).

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Automated appliance backups for HPE Composer provide the ability to do automated and scheduled, 'push' backups. The user supplies access to a backup repository system, and the backup is 'pushed' to that location at regular intervals. Remote locations and a regular schedule for backups can be specified. Backup processes utilize a specific user role which does not permit access to other resource views and tasks. Backup files are also encrypted and contain configuration settings and management data, which avoids the need to create separate backup files for the appliance and its database files. Backups can be created while the management appliance is online, and the backup process can be scheduled from outside the management appliance with file collection set according to your site's policies.

Auto-Discovery and Self-Assimilation

HPE Synergy provides automated discovery of physical resources. Everything in the network fabric is automatically discovered upon insertion or upon being linked into the network fabric. All linked frames in a domain are automatically discovered, resources are created for them in HPE Composer, and they are put into a monitored state. New resources are self-assimilated into the managed environment. Specific capabilities include:

- Discovery and inventory of each linked frame and its components that are connected on that same frame with the HPE Composer (including Frame Link Modules, compute modules, fans, power supplies) without the user having to supply any IP or toe-tag information,
- Discovery of each interconnect from the Field Replaceable Unit (FRU) with its device data (Serial number, DNS name, Base Mgmt MAC address, Base WWN),
- Automatic placement of discovered frames into a 'monitored' state,
- Resilience to add frames or remove frames (for example, if link cables get disconnected or reconnected),
- Issuance of alerts for configured frames that are 'missing' if HPE Synergy Composer is not reachable for communications, and
- Detection of errors and diagnostic information about error conditions.

HPE Synergy also incorporates an installation technician mode for faster and easier setups. This mode allows setup technicians to verify that hardware is correctly installed and is free of configuration errors -- before the systems are handed over to the infrastructure administrator for configuration.
This mode enables setup technicians to perform all their typical tasks:

- Racking and cabling the frames and supplied power,
- Viewing the hardware inventory and health status,
- Viewing newly-added frames in HPE OneView as soon as the new frame is installed, powered on, and link cables are correctly in place, and
- Troubleshooting of any hardware faults.

Technicians can perform all their necessary installation tasks without being given unlimited administrative access to the systems.

Self-Assimilating Systems

Software-defined infrastructure assembles and re-assembles resources to eliminate complexity and to orchestrate fluid pools of resources. Templates capture best practices and efficiently use resources, including creation of logical infrastructures to provision at near-instant speeds and meet application needs.
Self-assimilation of additional capacity into larger flexible pools, which reduces operational complexity as hardware grows, results in simple and automated scaling to achieve economies of scale and efficiency.
The result? …HPE Synergy systems are the easiest set-up and bring-under management!

Software-defined Storage

HPE Synergy Composer enables software-defined storage for HPE 3PAR StoreServ Storage Systems. This 3PAR storage is completely fungible via HPE Composer – it can be created, grown, and recycled on demand for use in compute composition, as defined by Server profiles and Server profile templates. Storage changes

Overview

are implemented quickly and non-disruptively through these template-based operations. HPE Composer allows 3PAR storage resources to be aggregated and disaggregated in a fluid manner and with flexible ratios.

Software-defined intelligence: Storage in Server profiles

Software-defined intelligence integrates storage with Server profiles to save you time and make you more productive. This software-defined nature in HPE Composer enables you to:

- Attach storage to Server profiles,
- View and manage your storage system and storage pools,
- Add existing volumes and create new volumes,
- Create volume templates to provision multiple volumes with the same configuration, and
- Automate zoning of Fiber Channel SANs.

You can attach private or shared storage volumes to Server profiles to enable automated boot target configuration and to move Direct Attach (FlatSAN) profiles across frames.
This intelligence additionally provides automated, policy-driven provisioning of storage resources. It is fully integrated with Server profiles so you can manage your HPE 3PAR storage infrastructure.

Flexible SAN topologies

Support for SAN topologies of Switched fabric, Direct Attach (FlatSAN), and vSAN provide dynamic connectivity between HPE Synergy systems and HPE 3PAR StoreServ Storage Systems. HPE Composer discovers the SAN paths and provides connectivity services for the following HPE SAN infrastructure:

- Directly connected to an enclosure via Fibre Channel.
- Connected to an HPE B-series Fibre Channel SAN configurations (which are SANs managed through the HPE B-Series SAN Network Advisor software).
- Connected to a Brocade Fibre Channel SAN configurations (which are SANs managed through Brocade Network Advisor (BNA) software).
- Connected to HPE 5900 family Fibre Channel and FCoE SAN configurations (which are managed directly through a switch in the SAN).

HPE Synergy also supports Cisco-managed SANs.

Automatic SAN zoning

You can also add Storage Area Network (SAN) managers to bring their managed SANs under management of the appliance. Managed SANs can be associated with Fiber Channel networks on the appliance to enable automated zoning and automatic detection of Fiber Channel connectivity. HPE Composer automatically configures SAN zoning through Server profile volume attachments.

Boot from SAN

HPE Composer allows users to select a managed volume as the boot target using a simplified Server profile boot configuration. This action enables the software-defined intelligence in HPE OneView to internally perform the 'cut and paste' functions. The user configures the connections as bootable, and then he selects a managed volume from which to boot.

- For HPE StoreServ (Fibre Channel / FCoE) volumes with HPE Virtual Connect connections, boot target support is provided for all Fibre Channel initiators (FC HBAs and FlexFabric adapters), and all network and uplink configurations (FCoE, FC Fabric attach, and FC Direct Attach).
- For HPE StoreVirtual (iSCSI) volumes with HPE Virtual Connect connections, boot target support is provided for all iSCSI initiators (iSCSI function on FlexFabric adapters and UEFI iSCSI boot with Ethernet function on FlexFabric adapters).
- Additionally, Server Profile Templates can specify which Server Profile should boot from managed StoreVirtual (iSCSI) volumes. Resulting Server Profiles that are generated from the Template will indicate which volume is the boot target. And compliance checks are included.

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StoreVirtual VSA Software (Storage Virtualization)

HPE StoreVirtual VSA uses scale-out, distributed clustering to provide a pool of storage with enterprise storage features and simple management at reduced cost. This software product option is a Virtual Storage Appliance that provides complete array functionality of HPE StoreVirtual 4000 Storage on top of VMware vSphere or Microsoft Hyper-V environments without external array hardware. StoreVirtual VSA enables implementation of advanced hypervisor features by virtualizing up to 50TB of disk capacity. Therefore, businesses can lower their IT infrastructure costs and protect business critical systems without the purchase of additional hardware.

Multiple StoreVirtual VSAs running on multiple servers create a clustered pool of storage with the ability to make data highly-available by protecting volumes with Network RAID. Adding more StoreVirtual VSAs to the cluster grows the storage pool. With Network RAID, blocks of data are striped and mirrored across multiple StoreVirtual VSAs, allowing volumes and applications to stay online in the event of disk, storage subsystem or server failure. iSCSI connectivity on StoreVirtual VSAs support the use of the storage pools by hypervisors as well as other applications.

See **HPE StoreVirtual VSA** for more information.

Pooled storage

HPE Synergy D3940 Storage Module provides pooled storage for Composable Infrastructure. This double-wide module fits within the HPE Synergy frame and can provide storage capacity of up to 40 X 3.84 TB (SSD) for a total of 153.6TB (SSD), or 40 x 2TB (SAS/SATA HDD) for a total of 80TB (HDD). Furthermore, each frame can support up to five modules for in-frame maximum capacities of up to 768TB (SSD) or 400TB (HDD). This pooled storage can be zoned within a single frame, or shared across multiple frames using HPE StoreVirtual VSA.

Storage monitoring, connectivity, and synchronization

HPE Composer monitors storage systems and issues alerts when there is a change in health or connectivity status of storage systems. Storage systems are also monitored to ensure that they are synchronized with changes to hardware and configuration settings. Should the appliance lose connectivity with a storage system, an alert is displayed until connectivity is restored. Storage topology is also available in Map View.

See the **HPE Synergy Support Matrix** for supported storage systems.

Fabric management

Fabric management using HPE Virtual Connect

HPE Synergy Composer manages Virtual Connect to deliver simple, composable bandwidth resources with no fixed ratios using a high performance, cost-effective architecture. HPE Virtual Connect provides wire-once, edge-safe, change-ready environment to make it easy for administrators to manage their dynamic network environment at the server edge.

HPE Synergy Composer manages fabric by extending the software-defined intelligence to HPE Virtual Connect features to simplify management and capture best practices:

- Profiles enable the configuration of Virtual Connect capabilities and support dynamic network changes. Virtual Connect administrators can change pre-existing connection networks and connection bandwidth without powering down modules.
- Profile templates allow a parent-child relationship with profiles for configuring multiple Virtual Connect modules, with capability to update many profiles later based on a template change (such as a new connection).
- Logical Interconnect Groups are created for configuring the Virtual Connect module with its uplinks and satellite modules, creating one 'big' Virtual Connect fabric between multiple frames. These groups enable efficient application to multiple Virtual Connect environments.
- Network Sets are used to easily update multiple networks in various profiles from a single location, rather than updating each network separately. Network sets are useful in virtual environments where each profile connection needs to access multiple networks.

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HPE Synergy brings next-generation fabric capabilities for use in composable infrastructure:

- Future-proofed mid-plane that is 100G ready and pre-built for future optical interconnects,
- Single-hop, low latency performance across multiple enclosures using a single ASIC and without bandwidth contentions,
- Exceptional bandwidth elasticity from a virtual backplane that provides flexible pools of bandwidth, that can be distributed across multiple enclosures, and
- Savings from optical CXP cables that reduce costs in cables and transceivers, and from unique 20G offerings that provide 8G FCoE without requiring 40G.

Simplicity in Management for Composable Fabrics

HPE Synergy Composer manages the next-generation fabrics with software-defined intelligence to achieve simplicity in management. Simplicity in management uses next-generation Virtual Connect technologies with rich telemetry, MLAG on uplinks, and future-proofed chipsets and platforms that are ready for SDN/OpenFlow, network virtualization, VxLAN switching and routing.

Composable Fabrics go beyond the familiar Virtual Connect 'wire-once' experience to add:

- Fabric disaggregation optimizations,
- Scaling,
- East-west throughput performance,
- Flexible bandwidth pools, and
- Multi-module link aggregation

Fabric disaggregation optimizes resources to workloads. Composable fabrics allow you to disaggregate the networking resources pool and eliminate the constraints of a fixed-ratio of interconnects per frame. The result: 'No forced ratios!'

Scaling with additional frames is made possible through the resilient HPE Virtual Connect Master/Satellite architecture. This architecture supports 10/20Gb connectivity to compute modules, and converged fabrics with Ethernet, Native FC, and FCoE to the upstream switch.

East-West throughput performance (for example, rack-to-rack) is exceptional, with 2.56 Tb/s per fabric of throughput performance in any configuration.

Flexible bandwidth pools are enabled by using a single very large switching fabric which utilizes special cables and satellites to reach compute modules in additional frames. Single bandwidth pools will enjoy flexible subscription ratios, low-cost scaling with additions of Interconnect Link Modules, and enhanced firmware upgrade experiences. Single-hop east-west switching, for both intra-frame and inter-frame configurations, will see negligible latency with Interconnect Link Modules, and reduced ToR switch port consumptions.

Multi-Module Link Aggregation uses the resilient fabric architecture to sustain operations in the event of a single-point-of-failure in hyper-virtualized environments. This allows the fabric to withstand a single-point-of-failure in real-time fashion without disruption to hundreds of virtual machines, even though the failure might range from the port-level to the module-level. This appears as one logical switch to the upstream switch. Furthermore, efficient bandwidth utilization is achieved using Active/Active configurations. And this is simple to configure.

Additional capabilities supported in HPE Synergy include: untagged traffic, VLAN tunneling, and configurable Link Aggregation Control Protocol (LACP) timers, min/max bandwidth settings on connections, visibility to MAC address tables, 'per FlexNIC' traffic statistics and performance monitoring, and enhanced detection-protection-reporting of Network Loops.

See the **HPE Synergy Support Matrix** for specific Virtual Connect and network hardware requirements.

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Remote Support

Unlock the benefits of your HPE Synergy technology investment by connecting to Hewlett Packard Enterprise for remote support. Achieve up to 77% reduction in down time, near 100% diagnostic accuracy and a single consolidated view of your environment in the HPE Support Center portal. By connecting, you will experience 24x7 monitoring, automatic support case creation, and automatic parts dispatch. Customers of HPE Proactive Care service and HPE Datacenter Care will additionally benefit from proactive reports and issue prevention activities.
These benefits are available to you at no additional cost with your HPE Synergy frames and compute modules securely connected to Hewlett Packard Enterprise support:

- Enable remote support via 'Settings' in the HPE OneView interface,
- Support HPE Synergy 1200 frames and HPE Synergy Gen9 compute modules,
- Check a single box to enable remote support for all eligible devices,
- Quickly register your data center contacts, designated service partners, and reseller partners,
- Automatically trigger creation of a support case with display of the case ID from service events associated with hardware failures,
- Sign in to Hewlett Packard Enterprise support Center to view case details, contract and warranty details, and a dashboard of all your connected devices, and
- Display a single consolidated view of devices connected via Insight Remote Support in HPE Support Center along with your HPE OneView Remote Support connected devices.

HPE Synergy Composer provides integrated remote support from the management appliance. It utilizes the agentless remote support that is part of iLO4 and is independent of operating systems.

System Health

Efficient data views and effective control enable you to respond to issues for managing the health of HPE Synergy systems. HPE Composer simplifies monitoring by providing a streamlined, modern alert management architecture. When managed resources are added to the appliance, they are automatically set up for monitoring, including the automatic registration of SNMP traps and scheduling of health data collection. HPE Synergy compute modules are monitored immediately without requiring you to invoke additional configuration or discovery steps.

All monitoring and management of data center devices is agentless and out-of-band for increased security and reliability. No OS software is required, no open SNMP ports on the host OS are required, and zero downtime updates can be performed for these embedded agents. HPE Synergy compute modules support agentless monitoring via iLO. HPE Composer uses SNMP in a 'read-only' mode ('gets' and 'traps', but not 'sets') to the iLO only – not to the host OS.

HPE Composer also provides proactive alert notifications via email (instead of using SNMP trap forwarding). An administrator can configure alert filters and email identifications to match new alerts to filter criteria and then send an email to the identified contact. You can also view all alerts, filter your alerts, and search your alerts using HPE Smart Search. Alerts can be assigned to specific users and annotated with notes from administrators. Notifications or traps can be automatically forwarded to enterprise monitoring consoles or to centralized SNMP trap collectors.

Customized dashboard capability allows you to select and display important inventory, health, or configuration information and to define custom queries for new dashboard displays. The single user interface provides additional summary views of firmware revisions and of the hardware inventory for servers, storage, and networks. Other data and inventory elements are visible through the user interface and REST API, and can be found using HPE Smart Search.

Frictionless Changes for

HPE Composer delivers infrastructure stability by enhancing configuration change management with frictionless updates and frictionless scaling.

Overview

Infrastructure Stability

Frictionless Updates

The goal of frictionless updates is to seamlessly deliver firmware and driver updates without impacting operations. Frictionless lifecycle operations automatically implement the desired changes without disruptive downtime.
'Non-disruptive firmware update' refers to the impact the update has on an application, not simply whether packets will be lost. In a non-disruptive update, the packet latency (or loss) is not sufficient to result in unrecoverable network errors or in a net performance degradation for networked applications (assuming TCP and loss-tolerant UDP applications).

Frictionless updates for interconnects are available where there is no data path outage. This might be encountered in minor version updates and bug fixes. These updates are non-disruptive, with no dependency on the compute module or top-of-rack (ToR) configurations, and the interconnect modules continue to forward traffic. There is no data path interruption, no packet losses, and the CPU reboots with a stateful restart of the protocol daemons.
HPE Composer aids the frictionless updates by providing a single firmware/driver set (Service Pack for ProLiant, or SPP), in which all the firmware and system software are tested together as a single solution stack. Furthermore, the application owner has options on how to activate the update process, by launching it on-demand or by aligning it to maintenance windows.
HPE Synergy's simplified lifecycle operations allow IT to confidently change the infrastructure while dramatically reducing service interruption, operational costs, and planned downtime. It's the first architecture that lets IT quickly and accurately configure the entire infrastructure in one step, using one interface. Change operations — such as adding additional storage to a service, modifying network connectivity, or updating firmware — are implemented via templates. These templates allow changes to be implemented automatically, significantly reducing manual interactions and errors. Continuous lifecycle operations cost less, save time, and are less disruptive -- ensuring real-time compliance with less effort.

Powerful templates, which control compute, storage, fabrics, and images in an 'infrastructure as code' approach, can quickly and reliably update and maintain existing infrastructure. HPE Synergy Composer uses templates to manage profiles and simplify updates using a one-to-many approach. Template-based updates have inheritance properties, which allow a single change in the template to propagate to all profiles created from that template. Templates typically control elements like firmware, BIOS settings, local RAID settings, boot order, network configs, and shared storage configs.
HPE Composer also use templates to enforce compliance by using their 'monitor, flag, and remediate' capabilities. This capability enables profiles created from the template to be monitored for configuration compliance. When inconsistencies are detected, an alert is generated indicating that the profile is out-of-compliance with its template. When an update is made at the template level, all profiles derived from that template are flagged as inconsistent. The user then has complete control over the remediation process to bring individual modules or multiple systems back into compliance.
All firmware update operations in HPE Composer will not impact your production network in any way because they are performed entirely via the management network – which is a separate network.

Frictionless Scaling

Frictionless scaling is about composing resources on-demand to meet your business needs. When you need to add frames or grow your environment, the unique HPE Synergy scaling makes multi-frame deployment simple. Software-defined intelligence in HPE Composer uses the software-defined intelligence of 'Logical Enclosures' to add frames to the Master/Satellite architecture using true line-rate link extensions when adding Satellite interconnects. This allows you to extend networking to Satellite enclosures without adding hops, and it maintains single-hop intra- and inter-frame connections for ultra-low-latency east-west traffic with 2.56 Tb/s in any configuration. Using this easy-to-manage, cost-efficient, resilient fabric results in seamless network connectivity.

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Image Streamer

HPE Image Streamer is a new approach to deployment and updates for composable infrastructure. This product option works with HPE Composer for fast software-defined control over physical compute modules with operating system (OS) provisioning. HPE Image Streamer enables true stateless computing combined with instant-on capability for deployment and updates.
HPE Image Streamer provides a highly-available appliance pair that can capture/edit/store images, create stateless boot images, and deploy or update compute modules quickly. Profiles are combined with golden images and personalities for stateless operation. Stateless boot images are stored in an image repository for fast implementation onto compute hardware at any time. These stateless capabilities can deploy and/or update multiple compute nodes with extreme speed.

True stateless computing combines the following elements using software-defined intelligence:

- Profile – Software-defined intelligence which defines compute modules
- Golden Image -- Operating environment (Bootable OS and Application) and I/O driver version
- Personality – Operating system (OS) and Application configuration (Hostname, IP config, etc.)

Capabilities in HPE Image Streamer provide:

- IP addresses assigned to Bootable Images for true stateless operation
- Highly-available image archive
- Secure access with rights and privileges (from HPE Composer)
- Compliance to the latest verified image(s)
- Image capture and editing
- Software-defined integration
- Accessibility via GUI and Unified API
- Performance

HPE Image Streamer is private-cloud-ready for VMware ESXi and Docker-enabled Linux images. These capabilities will be of great benefit to IT areas needing fast changeovers, security update compliance, HA image storage, or programmatic access and control over infrastructure.
For more information on Hewlett Packard Enterprise Image Streamer, see **http://www.hp.com/products/imagestreamer**.

Compute Provisioning

HPE Composer provides the right-to-use a complete provisioning solution for HPE Synergy.
This virtual appliance solution, also known as HPE Insight Control server provisioning, can be used to install and configure HPE Synergy compute modules using resources such as OS Build Plans and scripts to run deployment jobs. Server provisioning features allow you to:

- Install Windows, Linux, and ESXi on HPE Synergy compute modules.
- Deploy operating systems to Virtual Machines (VMs).
- Update drivers, utilities, and firmware on HPE Synergy compute modules using the HPE SPPs.
- Configure HPE Synergy system hardware, iLOs, BIOS, HPE Smart Array, and Fibre Channel HBA.
- Deploy to HPE Synergy Gen9 modules without using PXE (using HPE Intelligent Provisioning).
- Run deployment jobs on multiple servers simultaneously.
- Customize your HPE Synergy deployments via an easy-to-use browser-based interface.
- Create and run customized Build Plans to perform additional configuration tasks either before or after OS deployment.

Use REST API calls to perform all of the functions available from the user interface.

Reports

Standardized reports are available to users in HPE Synergy Composer. A pre-defined list of reports is available from the user interface or through the REST API. These reports can be exported to CSV or Microsoft Excel files or printed as PDF files. Pre-defined reports include:

- Alerts Report
- Users Report

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- Server Inventory
- Server Firmware Inventory
- Server Profiles Inventory
- Enclosure Bay Inventory
- Enclosure Inventory
- Interconnect Inventory

Reports are based on inventory, configuration, and health status information. Additional data and information can be obtained for custom reporting by querying the REST API.

Remote management (HPE iLO Advanced)

HPE Synergy Composer enables **iLO Advanced**, The Hewlett Packard Enterprise comprehensive lights-out remote management solution. Numerous key features help to solve complex IT problems, including:

- Remote access to compute module power control and event logs.
- Graphical Remote Console turns a supported browser into a virtual desktop, giving the user full control over the display, keyboard, and mouse of the host node. The OS-independent console displays remote host node activities (like shutdown/startup operations) and can be launched from the HPE Composer Server profile page.
- Shared console and Console replay allows up to six team members to view and share control of a single virtual KVM session, while capturing and saving screen video for later review.
- USB-based Virtual Media allows an IT administrator to boot the remote node from the client machine (or anywhere on the client's network), and execute functions remotely.
- Integration with Microsoft Terminal Services provides a graphical remote console when the OS is fully-loaded/available on the host system -- and a secure, hardware-based Lights-Out console for remote access to the host server when the OS is not operational.

Serial record and play back saves the text-based output data for later access and play back. Remote System logs record everything being done for later troubleshooting or records.

Environmental management

HPE Synergy Composer provides you with a power and energy monitoring that scales with your datacenter. Centralized monitoring of datacenter power consumption and thermal output is complemented with energy instrumentation connected into HPE iLO capabilities, allowing compatibility with any operating system residing on the managed compute module.

Composer integrates thermal data visualization and power delivery infrastructure representation for environmental management of the data center. These key areas are captured in the following environmental management features:

- 3D data center thermal mapping allows you to view the thermal status of your entire data center at a glance. Thermal data is collected from the managed resources in each data center rack and is presented graphically, allowing easy identification of hot spots in a particular rack.
- Power Discovery Services enable automatic discovery and visualization of power delivery topology for your data center. The Hewlett Packard Enterprise Intelligent Power Distribution Units (iPDUs) in the rack with intelligent Titanium power supplies in the Synergy frame enable automatic rack power topology mapping, which can also automatically detect wiring errors (like lack of redundancy) and can automatically update electrical inventory when new servers are installed. Per-outlet power control for remote power cycling of each iPDU outlet is also supported.
- Utilization dashboards display key CPU/power/thermal information for the selected compute module, frame, or iPDU. Historical utilization graphs provide up to three years of data (depending on storage limitations) help identify and improve power utilization.
- Visualization of CPU, power, and thermal data for compute modules may be viewed and managed.

The environmental management in HPE Synergy Composer can help you save on your operating expenses (OpEx), and it can even extend data center capacity to avoid additional capital expenses (CapEx). It provides performance when you need it, and cost savings when you don't.

Overview

Unified API for Open Integration

A Unified API enables access to the full power of the management architecture, assuming appropriate permissions, via the REpresentational State Transfer (REST) API and State-Change Message Bus. RESTful APIs are the standard of the modern IT industry because they are widely used, simple, and efficient. You can integrate, automate, and customize HPE Composer to access additional information or to control activities using the Unified API. This Unified API, which is also native to HPE OneView, makes 'infrastructure as code' accessible to:

- Create an intelligent automation hub to orchestrate and reduce manual operations,
- Automate standard work flows, troubleshooting steps, and integrations (such as for configuration management databases, also known as CMDB),
- Connect to Service Desks, providing a consistent and reliable representation of the state of infrastructure across multiple tools at any given moments,
- Monitor resources, collect data, map/model systems, and export data to custom formats,
- Attach custom databases, data warehouses, or 3rd party business intelligence tools, or
- Integrate in-house user customizations.

HPE Composer, which embeds HPE OneView, hosts a powerful State-change Message Bus which the REST APIs use to provide automation and a closed-loop method of ensuring compliance. This interface notifies custom scripts and integrations of all changes to managed resources (both logical and physical resources) via asynchronous messaging without having to continuously poll for status. The message bus returns commands in 500 milliseconds to give you fast responses for your custom integration of applications, processes, and devices.
HPE OneView embeds RabbitMQ as a highly-scalable and distributed message bus infrastructure, which supports the industry-standard Advanced Message Queuing Protocol (AMQP). RabbitMQ offers a variety of features like reliability and high availability, flexible routing, clustering, federation, guaranteed delivery, multiprotocol, and tracing. These are important capabilities for enterprise-class management.
Using HPE OneView RESTful APIs, you can obtain certificates to access the two message buses: the State-Change Message Bus or the Metric Streaming Message Bus. The message content is sent in JavaScript Object Notation (JSON) format and includes the resource model.

Software developer kits (SDK) for the REST-based Unified API are available for several languages:

- **Python : https://github.com/HewlettPackard/python-hpOneView**
- **PowerShell: https://github.com/HewlettPackard/POSH-HPOneView**
- **Java: https://github.com/HewlettPackard/oneview-sdk-java**

Other documents to assist your custom integrations using the REST APIs can be found at:

- **http://h17007.www1.hp.com/docs/enterprise/servers/oneviewhelp/oneviewRESTAPI/content**
- **HPE OneView technical documentation**
- Integration with HPE OneView: A technical guide for ISVs and developers **http://www8.hp.com/h20195/v2/GetDocument.aspx?docname=4AA5-8669ENW**
- **HPE OneView Community forum**

HPE Operations Analytics

'HPE Operations Analytics for HPE OneView' provides 'Big Data' analytics for your IT Operations. This solution leverages data from HPE OneView in HPE Synergy Composer to provide real-time troubleshooting of your converged infrastructure, viewing of the overall health of the data center, and predictions of when infrastructure capacity will be exhausted. This solution spans capabilities from triage and diagnosis, to stakeholder analysis, to decision support.
'HPE Operations Analytics for HPE OneView' is an optional licensed solution for HPE OneView in HPE Synergy Composer and requires as an independent purchase. The full power of **HPE Operations Analytics**, which brings tiered applications and virtualization together with physical converged infrastructure, requires a full HPE Operations Analytics license (available from HPE Software).

HPE

'HPE Virtualization Performance Viewer for HPE OneView' is cloud-ready, enterprise-class software for virtualization management. Capacity optimization capabilities for physical, virtual, and cloud use are complemented

Overview

Virtualization Performance Viewer

with single-pane-of-glass manageability of the physical infrastructure elements (compute, storage, and fabrics). Infrastructure sizing recommendations improve efficiency and reduce costs. Your infrastructure administrator can assess the risks of planned or unplanned downtime for a compute node (or frame), rebalance (i.e. flex) clusters, and achieve optimal configurations for best workload performance.

'HPE Virtualization Performance Viewer for HPE OneView' is an optional license for HPE OneView in HPE Synergy Composer and requires an independent purchase. Incremental purchases may require a full **HPE Virtualization Performance Viewer** license (available from HPE Software).

Service and Support

Service and Support

HPE Technology Services offers you a rich portfolio of consulting and support services designed to add value to our core products and solutions. We have the know-how and experience to put technology to work for you. We work closely with you, as your strategic partner, leveraging our full services portfolio to make sure that everything works to help optimize your enterprise.
Choose from services aligned to our product offerings and lifecycle. From proactive onsite services to innovative support when your products are connected to Hewlett Packard Enterprise, you choose the precise level of attention and support your business demands.

HPE Technology Services for HPE Synergy
HPE Technology Services delivers confidence, reduces risk and helps customers realize agility and stability. Connect to Hewlett Packard Enterprise to help prevent problems and solve issues faster. Our support technology lets you to tap into the knowledge of millions of devices and thousands of experts to stay informed and in control, anywhere, any time.

Protect your business beyond warranty with HPE Support Services
Hewlett Packard Enterprise support services offer complete care and support expertise with committed response choices that are designed to meet your IT and business needs.

HPE Foundation Care services offer scalable reactive support-packages for HPE Synergy and software. You choose the type and level of service that is most suitable for your IT and business needs.

HPE Proactive Care keeps your system stable and reliable helping to prevent problems and reduce outages through proactive service management and enhanced technical response.

Advise, transform, integrate, support, automate, and flex

HPE Technology Services helps you get the most out of what you have today and transition to HPE Synergy, a composable infrastructure, at your pace and from wherever you are on the journey.
Start with the HPE Transformation Workshop to ensure that your business and IT organizations collaborate, define the topline strategy for composable, software-defined, cloud-ready infrastructure and kick-start your projects confidently. This workshop clarifies your business requirements and the issues that IT and operations teams must resolve in order to meet these requirements. A detailed executive briefing or high-level report summarizes the strategies, high-level plan and functional requirements.

HPE Modernization and Migration Services helps you choose the right platform for the right workload at the right cost and evolve your IT infrastructure, processes and organization taking advantage of "on-hybrid infrastructure" innovations such as composable, converged, software-defined, technologies. HPE experts advise, transform, integrate and implement for platform refresh, datacenter consolidation virtualization, migration and automation projects.

HPE Flexible Capacity is a pay per use model for on premise infrastructure. This offers needed HPE Synergy capacity in the datacenter, plus a buffer of additional capacity. As HPE Synergy will be a dynamic environment, this provides enough room to grow your environment, but only pay for actual metered use. Technology transitions and refresh can be built in, infrastructure and services are billed monthly, enabling you to align costs to business use.

HPE Datacenter Care-Infrastructure Automation (DC-IA) is an extension to HPE Datacenter Care and delivers enterprise-grade support, advice, guidance and best practices for infrastructure automation. The service also includes Enterprise editions of automation tools including Enterprise Chef and selected others. The DC-IA Center of Excellence (CoE) is staffed with highly trained experts who have specific expertise on

Service and Support

	integrating Chef with HPE OneView. Choose the right support to maximize uptime, free up your resources, and achieve improved value—as you get the most out of the existing IT assets while accelerating time-to-revenue.
Optimized Support	**HPE Proactive Care Advanced - 24x7 coverage, three-year Support Service** Builds and incorporates on Proactive Care and also gives customers personalized technical and operational advice from an assigned, local Account Support Manager for personalized technical collaboration, flexible access to specialist skills to help optimize business critical IT, and Critical Incident Management to help so the business is not affected if there is a system or device outage. This recommendation provides 24x7 coverage with four-hour response for hardware and Basic Software Support and Collaborative Call Management for selected non-HPE software that offers two-hour callback for supported software issues. **http://www8.hp.com/h20195/v2/GetPDF.aspx/4AA5-3259ENW.pdf**
Standard Support	**HPE Proactive Care - 24x7 coverage, three-year Support Service** Hardware and software support services designed specifically for your technology with rapid access to Advanced Solution Center specialists for start to finish case management plus proactive reports and recommendations for firmware and software management and best practice advice. This recommendation provides 24x7 coverage with four-hour response for hardware and Basic Software Support and Collaborative Call Management for selected non-HPE software that offers two-hour callback for supported software issues. **http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA3-8855ENW.pdf**
Deploy and integrate	**HPE Synergy First Frame Installation and Startup -** Provides for hardware installation (HPE Synergy compute modules, Storage Modules, Virtual Connect modules, Interconnect Link Modules, Frame Link Modules, and HPE Synergy D3940 Storage Modules) and software startup for the first frame of your HPE Synergy deployment. Additional frames can be added using the HPE Synergy Additional Frame Installation and Startup Service. **HPE Synergy Additional Frame Installation and Startup Service -** Add additional frames to your HPE Synergy First Frame Startup service or expand your existing HPE Synergy Infrastructure.
HPE Education Services	Training your IT staff is critical to help drive the value of HPE Synergy with increased efficiencies and better business outcomes. Training is key to the transformation and management of HPE Synergy.
Parts and Materials	Hewlett Packard Enterprise will provide Hewlett Packard Enterprise-supported replacement parts and materials necessary to maintain the covered hardware product in operating condition, including parts and materials for available and recommended engineering improvements. Parts and components that have reached their maximum supported lifetime and/or the maximum usage limitations as set forth in the manufacturer's operating manual, product QuickSpecs, or the technical product data sheet will not be provided, repaired, or replaced as part of these services. The defective media retention service feature option applies only to Disk or eligible SSD/Flash Drives replaced by Hewlett Packard Enterprise due to malfunction.
For more information	Additional Support Services can be found at HPE Support Services Central **http://ssc.hp.com**

Models

HPE Synergy Composer	**HPE Synergy Composer with embedded HPE OneView and iLO Advanced**	
	HPE Synergy Composer (single unit)	
	NOTE: HIGHLY RECOMMENDED that a second HPE Synergy Composer appliance module be added for high availability or redundancy.	
	NOTE: No direct license is required. Supports any HPE Synergy Compute module and other installed module options.	
	NOTE: Server provisioning (via 'HPE Insight Control server provisioning') is licensed for use with HPE Synergy Composer. It provides multi-server OS and driver provisioning. Media kit #BD883A can be ordered for a physical software copy (USB flash drive).	
HPE Image Streamer	**HPE Synergy Image Streamer is a hardware option for use with HPE Composer**	
	HPE Synergy Image Streamer (single unit)	
	NOTE: HPE Synergy Image Streamer units are always implemented as redundant pairs.	
	NOTE: No direct license is required. Supports any HPE Synergy Compute module and other installed module options.	
	NOTE: HPE Synergy Image Streamer requires a minimum of three (3) Synergy Frames with redundant Synergy Composers for operation and must be implemented as redundant pairs. This minimal system requires four (4) cables, two (2) transceivers and one (1) Interconnect Module for complete operation. See below:	
	HPE VC SE 40Gb F8 Module (2 redundant modules per solution)	
	HPE Dual 10GBASE-T QSFP+ 30m RJ45 Transceiver	
	NOTE: Two (2) transceivers required for redundant connection to Interconnect Modules above.	
	10 Ft CAT6A Cable (CBL: CAT6A, GRAY 10 FT 2159610-6 MP-6ARJ45SLGY-010)	
	NOTE: Four (4) cables are required for the Synergy Image Streamer connection from the Frame Link Modules (MGMT port) to the Transceiver.	
Software Options for HPE Synergy	HPE Operations Analytics for HPE OneView LTU	K8G29A
	HP Operations Analytics for HP OneView E-LTU	K8G29AAE
	HP Virtualization Performance Viewer for HP OneView LTU	M5R19A
	HP Virtualization Performance Viewer for HP OneView E-LTU	M5R19AAE
Software Solutions for HPE Synergy	**NOTE: For partner software integrations and solutions, see www.hp.com/go/composablepartners**	
	VMware vCenter solution integrations (including vCenter Server, vRealize Operations, and vCenter Log Insight)	
	Microsoft System Center solution integrations	

Related Options

HPE Support Services	**NOTE:** Additional Support Services can be found at HPE Support Services Central **http://ssc.hp.com**
	Proactive Care Services
	Installation & Start-up Services

Technical Specifications

Environmental-friendly Products and Approach	**End-of-life Management and Recycling**	Hewlett Packard Enterprise offers end-of-life Hewlett Packard Enterprise product return, trade-in, and recycling programs in many geographic areas. For trade-in information, please go to **http://www.hp.com/go/green**. To recycle your product, please go to: **http://www.hp.com/go/green** or contact your nearest Hewlett Packard Enterprise sales office. Products returned to Hewlett Packard Enterprise will be recycled, recovered or disposed of in a responsible manner. The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard Enterprise web site at: **http://www.hp.com/go/green**. These instructions may be used by recyclers and other WEEE treatment facilities as well as Hewlett Packard Enterprise OEM customers who integrate and re-sell Hewlett Packard Enterprise equipment.

Summary of Changes

Date	Version History	Action	Description of Change
17-Dec-2015	From Version 1 to 2	Changed	Overview section was updated.
1-Dec-2015	Version 1	Created	New QuickSpecs

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