HPE OneView Architectural Advantages

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The HPE OneView concept

Several years ago, the HPE architectural and product management staff conducted extensive customer interviews and made many data center visits to observe how IT was managed with separate management tools for servers, storage, networking, and facilities. In many cases, these tools had different foundation services, different graphical user interfaces (GUIs), and different management requirements. Also, there were often multiple authentication requirements for each tool. Figure 1 summarizes some of the difficulties with using multiple disparate management tools based on this old paradigm.

Figure 1. Conceptual summary of the inefficiencies caused by using current tools to manage infrastructure

HPE realized they needed a management platform that addressed both the technical and organizational issues. In addition, they understood that IT was making a fundamental shift driven by virtualization, cloud, and Software-Defined technologies. A new paradigm was emerging. From this understanding, HPE OneView monitoring and management was born.

HPE understood from their experience with the original HPE BladeSystem, Virtual Connect, and Insight management suite that IT organizations needed a management platform that would allow them to transition efficiently while enabling them to span multiple generations of infrastructure.

Objectives of this white paper

This technical white paper explains the issues that must be addressed in Composable Infrastructure management and why HPE developed the unique architectural features of HPE OneView. We will explain our approach to the following key requirements:

• Provide fast time-to-value and intuitive ease of use
• Must be inherently Software-Defined and automated
• Unify previously isolated silos of compute, storage, and networking
• Scale must be achieved without additional layers of management complexity
• Enable a broad Application Programming Interface (API) ecosystem with open APIs and a Software Development Kit (SDK)
• Must offer secure user and communication configuration options to support modern data center policies

An Integrated Platform with a Consistent, Logical, Resource Model

HPE OneView is a comprehensive single-platform designed from the ground up for infrastructure management. An integrated platform increases the productivity of every member of the team; across servers, storage, and networking. By streamlining processes, incorporating best practices, and creating a new, holistic, way to work; HPE OneView enhances organizational efficiency. To extend these efficiencies, HPE OneView is designed for open integration with existing tools and processes.
HPE OneView is delivered as an appliance to make it easy to deploy. It can be either a virtual appliance to manage HPE infrastructure environments or a hardware appliance (called Composer) to manage HPE Synergy environments. When it is fully implemented, HPE OneView manages servers, storage, networking, power, and cooling resources throughout their lifecycle. Infrastructure management tools are collapsed into a single resource-oriented architecture that provides direct access to all physical and logical resources.

With HPE OneView, monitored and managed physical resources include:

- Users
- Data centers, Racks, and Power Deliver Devices
- Server Hardware (includes local disks and other components) and Server Hardware Types
- Enclosures (for BladeSystem)
- StoreVirtual Storage Systems, Synergy Drive Enclosures, SANs, and SAN Managers
- Networks and networking Interconnects

HPE OneView logical resources include:

- User Groups
- Server Profiles and Server Profile Templates
- Hypervisor Cluster Profiles, Hypervisor Profiles, and Hypervisor Managers
- Logical Enclosures and Enclosure Groups
- Storage Pools (aggregation of disks), storage Volume Templates, and storage Volumes
- Logical Interconnects, Logical Interconnect Groups, and Network Sets

With HPE Synergy systems, the HPE Synergy Image Streamer appliance extends the HPE Synergy Composer (OneView) capabilities with the ability to deploy on demand and manage stateless OS server golden images. The golden images may include stateful applications and data. With HPE Synergy Image Streamer, the following monitored and managed resources are added:

- Physical resources:
  - Operating System Deployment Servers (OSDS)/Deployment Appliances (i.e., Image Streamer appliance servers)
  - Deployment Groups (security and other configuration details used for the Deployment Appliance and deployed servers supported by that appliance)
  - Golden Images (stateless server images)
  - Artifact Bundles (stateful OS artifacts stripped from the server golden images) that include:
    - Deployment Plans (defines how to compose the stateless server image using the Artifact Bundle)
    - OS Build Plans (defines the sequence for Plan Script execution)
    - Plan Scripts (OS volume configuration scripts)

- Logical resources:
  - OS Volumes (boot volumes that can be used with stateless servers)

The configuration of HPE OneView's monitoring and management of resources is simplified with HPE's Guided Setup that provides a simple to follow step-by-step process for adding new resources being brought under management. The Guided Setup directs you through the configuration steps required so you don't miss any important configuration requirements.

When you add a device, HPE OneView automatically detects all the hardware and prepares it for monitoring and management. In HPE OneView, server hardware either has a server profile, which is allocated and fully configured, or it has no server profile and is available as raw hardware in a global pool awaiting a new configuration. This supports dynamic reconfiguration of hardware, while preserving the simplicity of provisioning a new server profile just like the last one. It guarantees the server profile will successfully deploy to the allocated hardware based on deep knowledge of the server hardware type and enclosure group.
The HPE OneView platform offers a uniform way of interacting with resources through its RESTful implementation of Representational State Transfer (REST) APIs. This integrated resource model provides:

- A streamlined process for bringing enclosures, interconnects, and server hardware under management
- Configuration baselines so you only need to enter and maintain the configuration data once
- Automatic version updates
- Encapsulation and abstraction of many underlying tools so resource monitoring and maintenance is simple, flexible, and fast
- Interconnectivity maps for enhanced problem isolation and easy determination of the risk of making changes. Figure 2 demonstrates the interconnectivity map when drive enclosure #2 is selected

Figure 2. HPE OneView interconnectivity map
Managing Infrastructure at Scale

HPE OneView was developed with an architecture designed for fault tolerance, scalability, and good performance while still making it easy to deploy and use. To expedite setup and implementation, HPE OneView is deployed as a ready to run software appliance for VMware® ESXi® or Microsoft® Hyper-V. With HPE Synergy systems, HPE OneView is supplied as the HPE Synergy Composer hardware appliance. For customers with large environments, or environments with a combination of HPE Synergy and other servers, multiple HPE OneView appliances can be aggregated for monitoring in a “single pane of glass” using HPE OneView Global Dashboard.

HPE OneView Global Dashboard is delivered as an additional virtual appliance that provides a web interface to unify HPE OneView appliances along with other monitored servers. HPE OneView Global Dashboard provides:

1. Simple import of OneView management appliances to support up to:
   - 25 HPE OneView appliances or HPE Synergy Composers
   - 150 HC380 systems
   - 25 HPE SimpliVity
   - or a mix of the above
   Other limitations likely apply when approaching the limits. See the HPE Global Dashboard and HPE OneView documentation.

2. Dashboard with links to HPE OneView managed enclosures and frames, systems, and profiles.

3. Enclosure or system summary data and in-context, single sign-on, launch to managed systems, enclosures, and their embedded management controllers (e.g., Onboard Administrator [OA] and Integrated Lights Out [iLO]).

4. Reports that provide details on:
   - Resource inventory, health, availability, utilization, firmware, and firmware baseline compliance
   - Remote support service events
   - SPP bundle availability and utilization
   - Virtual ID conflicts
   - HPE OneView license assignment
   - Contract and warranty status

5. Ability to schedule and email reports to users, administrators, and managers.

6. Unified view of activities and alerts logged with all HPE Synergy Composers and HPE OneView virtual appliances.

7. Unified view of basic inventory data.

8. Search bar that enables rapid search for managed devices, device attributes, and/or activities/alerts by name or other criteria across all infrastructure monitored or managed by HPE OneView.

Each management appliance is responsible for its own resources

Figure 3. Example of HPE OneView Global Dashboard supporting large-scale deployments at multiple locations
HPE BladeSystem, ConvergedSystem, DL servers, HPE SimpliVity servers, HPE 3PAR storage, HPE Synergy, and other supported configuration items form an entire system that is viewed and managed through HPE OneView Global Dashboard. End users no longer need to understand which systems are managed by which HPE OneView management appliance. They can consolidate management of data from multiple management appliances into one or multiple HPE OneView Global Dashboard instances.

**Enhanced User Experience**

The HPE OneView UI is designed to enhance the interaction between IT staff and to match your work practices in the data center. It is designed to be simple, efficient, and consistent. The OneView GUI features new capabilities inspired by web technology commonly used in our consumer lives and re-thinks them for the data center. The OneView GUI is a RESTful programmatic overlay to the OneView set of REST APIs. If desired, you can also interface directly with the REST APIs.

The HPE OneView GUI design builds functionality around administrators work practices and puts resources in the menu. The HPE OneView UI fully embraces the web experience. Right click to open in a new tab, copy and paste browser bookmarks, easily email links to colleagues, and print diagrams and data. There are search capabilities, newsfeeds, and other functions that work as you’ve come to expect in a web experience.

The HPE OneView GUI works on desktops, tablets, and mobile devices. The combination of Java compatibility checks and security updates creates an operational burden, so HPE OneView uses HTML5. The GUI is built on the modern web, using HTML5, CSS3, JavaScript, and AJAX. It has been tested with modern web browsers.

**Designed for Automation**

A substantial portion of the work of operations consists of routine tasks related to infrastructure lifecycle management, including designing, provisioning, monitoring, and updating. HPE OneView is designed to automate day-to-day responsibilities by simplifying time-consuming tasks, thereby leading to increased productivity and reduced operational costs. HPE OneView automates your infrastructure that supports traditional, virtualized, and cloud workloads.

A complementary relationship exists between the REST APIs and the message buses. HPE OneView provides two message buses; one called the State Change Message Bus (SCMB) contains messages about any change in the resources monitored by HPE OneView and the other called the Metric Streaming Message Bus (MSMB) contains metrics such as temperature, power, or CPU utilization for monitored resources. The message buses are messaging brokers, or intermediary for exchanging messages, that is well suited for large-scale management of virtualized and cloud environments.

We paired these message buses with the industry standard REST API architecture. They form a symbiotic relationship where HPE OneView “listens” to changes in the environment and publishes messages about the changes to all the consumers on the bus. Message bus consumers can then leverage the HPE OneView REST APIs to carry out Create, Read, Update, and Delete (CRUD) operations or integrate with other systems. This powerful combination of the REST APIs and the message buses provides the foundation for building higher level IT automation and integration with a broad ecosystem of management partners. This includes service desk, orchestration, monitoring, Configuration Management Database (CMDB), and other tools. Please see the “Developer’s Hub” section of this document for further details.

HPE OneView is a set of cooperating resource managers that each focus on a specific resources such as servers, storage, and networking. The resources managers provide the REST APIs for those resources, as well as publish State Change Messages (SCMs) and metrics to the message buses. Changes may be user-initiated or they may be detected through monitoring using protocols such as SNMP. Changes are reflected in the REST API responses and result in SCMs that are published to the SCMB. Interested parties can subscribe to the SCMB and/or MSMB to be notified of the changes and/or current state. Interested parties may include the OneView GUI, partner integrations, or higher-level automation scripts. Figure 4 illustrates this concept.
Figure 4. Examples of HPE OneView integrations with other tools

Figure 5 illustrates how the HPE OneView REST APIs and SCMB are heavily used within the HPE OneView appliance for communication between resource managers and the foundation services.

HPE OneView embeds RabbitMQ, a highly scalable and distributed message bus infrastructure that supports the industry standard Advanced Message Queuing Protocol (AMQP). RabbitMQ offers a variety of features that are important for enterprise-class management. These include reliability, high availability, flexible routing, clustering, federation, guaranteed delivery, multi-protocol, and tracing.

There is a large community around RabbitMQ, producing all sorts of clients, plugins, guides, and more that make it easy to consume HPE OneView’s SCMB and MSMB messages. RabbitMQ supports a variety of languages including Java, Ruby, Python, C# .Net, PHP, Perl, C/C++, Erlang, Node.js, and so on. The SCMs produced by an HPE OneView resource manager are made available to external clients via an SCMB gateway as shown in Figure 5.
By subscribing to the SCMB, your automation can immediately respond to changes in the HPE OneView managed environment. You can subscribe to a subset of SCMs in the SCMB by using a routing key filter. There is a wealth of state changes you may be interested in, such as:

- Arrival of critical alerts like a disk drive or memory failure or pre-failure conditions
- Deployment to enclosures, including associated firmware updates
- Updates to server, network, or logical interconnect profiles

In addition, HPE OneView reduces the need for frequent resource polling. Most monitoring tools rely on polling using SNMP or other methods that scan infrastructure periodically, say every 60 seconds. Vast amounts of data are collected that often indicate no change. With HPE OneView, the SCMB sends instantaneous messages on changes to the state of the infrastructure, thereby updating your infrastructure current state details while only requiring infrequent polling for verification.

Why the REST API Architecture is Important

The advantages of the REST methodology includes the ability to create web services using an accepted and prevalent interface that is used to manage large-scale environments. This well-documented, public API is very useful for developers and end users who wish to create their own apps or provide integration capabilities with other applications they use (see the Enterprise Information Library for more details).

REST has significant advantages over other well-known interface methods, such as Simple Object Access Protocol (SOAP), especially when combined with simple and widely adopted JavaScript Object Notation (JSON) payloads. Developers can use REST to easily create and modify resources without the heavyweight toolkits required for SOAP. REST has lighter bandwidth requirements with short requests and responses, unlike SOAP where such exchanges require data wrappers. REST with JSON describes a resource's configuration in a standard text-based format. Since REST is based on a simple use of the ubiquitous HTTP protocol, REST API calls can be made from a variety of tools and almost any programming language, including cURL (a common tool available on many Linux® platforms), Microsoft Windows® PowerShell, Python, Ruby, Perl, and other tools that support making calls to HTTP servers.

Security is always a key aspect of any enterprise product, so all REST API calls require HTTPS. HPE OneView generates self-signed certificates out of the box, but recommends uploading a Certificate Authority (CA) signed certificate to your management appliance.

The HPE OneView appliance supports a large number of REST APIs. Requests for these functions can be issued by any client, and not just a browser. HPE OneView REST APIs are fully documented in the Enterprise Information Library.

REST-based Resource Model

The resource is a fundamental concept of any REST API. The HPE OneView appliance uses a resource model that reduces complexity and simplifies management of your data center. This REST-based resource model provides logical resources, including templates, groups, and sets that when applied to physical resources provides a common structure across your data center. REST APIs identify an architectural class with simple principles that include a uniform interface and a fixed set of operations (such as the PUT, POST, GET, PATCH, and DELETE found in HTTP) and associated properties you can set or modify. The stateless APIs contain these common data elements:

- Resource—any meaningful information or model within the managed infrastructure
- Resource identifier—address of a resource, or Uniform Resource Identifier (URI) representing a particular view of a physical or logical resource or some metadata (all resources are addressable)
- Representation—how the resource is represented, for example using JSON or XML metadata and control information
- HTTP headers such as an entity tag (ETag)

In the resource model, all information and state is exposed as a resource. This includes:

- All managed device information, control, and state (such as inventory, configuration, and statistics)
- All logical resources representing concepts or configurations (such as networks and connections)
- All metadata describing the physical and logical resources

The HPE OneView GUI and REST APIs are organized by resource. The online help for each screen in the GUI describes the resources and, as needed, their configuration rules.
**Software-Defined resources**

HPE OneView provides Software-Defined resources including templates, profiles, and groups that provide an innovative way to manage your entire data center. These logical constructs let you specify the desired configuration of your environment and let HPE OneView automate the process of making it so. These reusable logical constructs mean that you can capture the best practices of your experts across a wide variety of disciplines, including networking, storage, compute hardware configuration, and operating system build and configuration. HPE OneView keeps your best-practice approaches intact as you grow, but it still allows for customization so that you maintain ultimate control. Groups and templates enable you to define configurations that are specific to the environment you want to build, such as VMware vSphere® virtual hosts, container hosts, web servers, etc. They provide flexibility to simplify changes across your data center and for controlled change management. This facilitates faster provisioning, greater consistency, and fewer errors.

Server profiles and enclosure groups make it easier to prepare a bare-metal server for operating system deployment by defining and configuring the entire desired configuration, including firmware, BIOS settings, local storage configurations, SAN storage, and network connectivity. For example, you can use server profiles in conjunction with OS deployment tools, such as Image Streamer, to deploy hypervisor hosts from bare metal and add them to existing clusters automatically. (See the Enterprise Information Library for more details). The following diagram summarizes some of the most frequently used resources and shows their relationships.

- Data centers may appear to be a collection of individual servers, storage, and networking, but in reality these components are often grouped together as clusters for the workloads and applications they serve. HPE OneView can import and manage vSphere clusters as one entity, taking advantage of the template based provisioning that is core to HPE OneView. With the HPE OneView cluster profiles capability, you can deploy, update, and automate configuration changes for clusters.

- HPE OneView rolling cluster updates allow users to automate cluster updates and eliminates downtime by keeping the workload online with available VMs while other servers are updated. HPE OneView online BIOS and firmware updates apply the profile to the server while it is online, with zero downtime and a reduced risk of error with the automated process. If the updates require a server reboot, the updates are applied via the profile when the server is rebooted during the next maintenance window.

**Resource Relationships and Map View**

The resource model in HPE OneView tracks the relationships between resources. It generates a Map View that replaces static diagrams with dynamic interactive visualizations. The Map View allows you to examine the configuration and understand the relationships between logical and physical resources in your data center. Map View gives you immediate visibility into your resources from the individual Ethernet and Fibre Channel networks all the way up to the enclosure, rack, and top-level physical data center. You can instantly see the big picture and what may be affecting the resource you’re evaluating. The three-dimensional map of your data center allows you to identify areas where the temperature is too high or too low, and it lets you identify trends and plans for future data center expansion.
An added benefit of Map View is that it helps minimize user errors caused by changing resources without understanding all the associations and potential impact. For example, HPE OneView automatically synchronizes physical and virtual networks as well as servers and associated SAN storage volumes. It can identify network connectivity issues (Layer 2) and notify the user of a potential problem if they plan to make a change to the network that will have a negative impact. Also, it will warn the end user if they plan to delete storage volumes currently in use by servers in the environment.

**Expanding Interoperability to a Broader Range of Devices**

HPE OneView is a Composable Infrastructure management platform that was architected to provide support for a wide range of devices from HPE and third parties. This allows organizations to preserve their investment in existing systems and operational processes while incorporating new technologies into their environment. Also, it reduces the risk of vendor lock-in by providing greater choice. The adaptability of HPE OneView is demonstrated by support for multiple types and generations of products. There is a long list of supported devices in the latest support matrix at [hpe.com/info/oneview/docs](http://hpe.com/info/oneview/docs).

The support for the Cisco Nexus Top of Rack (ToR) switch is an example of the interoperability of the HPE OneView architecture to support heterogeneous environments. This support includes the ToR switch associated with interconnects, specifically the Cisco Fabric Extender (FEX) for HPE BladeSystem modules within an enclosure. Cisco FEX information is obtained from the Onboard Administrator (OA) and relationships to the ToR Nexus 5000 or 6000 Switch Series are displayed in the HPE OneView Map View. HPE OneView supports multiple devices from third-party vendors, including Brocade, Cisco, Emulex, and QLogic.
Transitioning to Cloud and the Software-Defined Data Center

A primary objective of cloud services is to give users greater control of infrastructure resources. This allows the control to move up the management stack from the IT administrators to the users. The Software-Defined Data Center (SDDC) is an evolution that moves the control even further up the stack, so the applications ultimately have control of the underlying Infrastructure resources. The REST APIs and message buses are core design elements for HPE OneView to enable end-user, application, and third-party control of the OneView-managed resources. The cloud and application management layers are built upon the management layer that provides the IT administrative control. Acceptance of this framework is rapidly gaining speed as technologies mature and it is validated as a good architectural decision.

While HPE OneView reduces the number of tools your system administrators need to use, most organizations will continue to use many other tools in their environment, including:

- Virtualization and systems management tools such as VMware® vCenter™ and Microsoft System Center
- Automation tools such as Chef, Puppet, Ansible, and PowerShell
- Cloud and container management tools like Red Hat® OpenShift, Docker, SUSE, Morpheus Data, and more
- Facilities management tools such as Schneider Electric, Nlyte, and Eaton

HPE OneView is designed to interoperate with these and other software environments. Applications can use HPE OneView to generate a baseline of information about infrastructure and capture data on any state or metrics changes that are relevant. To do this, the RESTful implementation is used to first discover what is in the infrastructure and then receive updates on any changes via subscription to the SCMB and MSMB.

HPE OneView passes back the initial configuration information that it has already discovered and then shares state changes. Applications can also use the Software-Defined approach of HPE OneView to control and automate changes in IT infrastructure directly from their applications. HPE OneView provides Software-Defined resources, including templates, profiles, and groups that serve as an innovative way to manage the entire data center.

For example, the majority of IT organizations use business service management tools to monitor and manage their existing IT operations. These solutions typically consolidate management information integrated from domain-specific element managers that are focused on individual technologies for servers, networks, storage, operating systems, and applications. This consolidation gives IT teams the end-to-end visibility they desire and enables prioritization based on business importance.

HPE OneView easily plugs into business service management tools like ServiceNow, letting organizations integrate infrastructure health into the resulting top-to-bottom service views for faster issue resolution. HPE OneView is a key enabling technology to help organizations transition their existing management software and processes to the SDDC and the cloud.

For example, when you bring a new enclosure or rack of equipment online, HPE OneView automatically generates notifications to management tools that are registered as listeners on the message bus. An example of such a listener is the HPE Intelligent Management Center (IMC) that manages data center switches, which could configure the adjacent Ethernet switch ports with the appropriate Virtual Local Area Networks (VLANs) with Link Aggregation Channel Protocol (LACP) aggregates. The integrations provide users with the advantage of managing their environment from a familiar console while taking advantage of the automation and the capabilities of infrastructure lifecycle management in HPE OneView.
Cloud and the SDDC require managing infrastructure as a pool of resources that can be dynamically allocated. The infrastructure is abstracted from the underlying hardware components using hypervisors. The cloud administrator can provision cloud infrastructure (compute nodes, storage nodes, controller nodes, etc.) dynamically from pools of physical infrastructure. HPE OneView provides a Composable Infrastructure management plane that supports Software-Defined compute, storage, and networking, so it unifies these previously isolated silos. HPE OneView’s REST APIs allows for an open and extensible means of managing the infrastructure based on established industry standards. The lifecycle management of the infrastructure is automated to support rapid deployment or retiring of IT services, as required. Software-Defined templates provide a structured, consistent means of implementing routine tasks and ensuring quality by establishing a common set of best practices.

HPE OneView was architected using newer, proven technologies that provide a fundamentally better foundation for the future. It provides a platform for Software-Defined management at the infrastructure level by delivering template-based policy automation. HPE OneView integrates cleanly as a physical infrastructure provider into a variety of environments including OpenStack® and HPE Helion clouds using REST APIs, the SCMB, and SNMP trap forwarding capabilities.

Figure 9. Overview of relationship between administrators, REST APIs, resource managers, and infrastructure

**HPE OneView Developers Hub**

The HPE OneView Developers Hub is a resource for Software Development Kits (SDKs), software repositories, validated HPE OneView integrations, and other resources to support your DevOps, automation, and IT management initiatives. HPE OneView supports a large partner community as is illustrated here. The two sections of this document that follow will provide examples by focusing on the Microsoft and VMware® hypervisor integrations.

Figure 10. HPE OneView integrations and development community
Ecosystem partners will integrate with HPE OneView in three different ways:

- Partners can establish a means to consume data from HPE OneView in their application. By consuming the comprehensive data on infrastructure configuration, topology, and health from HPE OneView, Independent Software Vendors (ISVs) can ensure that customers have a consistent and reliable representation of the state of their infrastructure across multiple tools at any given moment.

- Partners can use the Software-Defined approach of HPE OneView to control and automate changes in IT infrastructure. In this way, they can help customers save time by automating processes that previously required manual work.

- Partners can feed information into their applications from HPE OneView automatically, such as alerts. This can streamline the troubleshooting and remediation process for customers.

HPE OneView for Microsoft System Center

The HPE OneView extension for Microsoft System Center (OV4SC) integration provides consistency for software deployments and updates, enables fast response to server and storage failures, and reduces the risk of downtime. OV4SC integrates with Microsoft System Center components for Operations Manager (SCOM), Virtual Machine Manager (SCVMM), and Configuration Manager (SCCM). The integration eliminates the need for Microsoft OS-based SNMP agents or WBEM clients to be loaded on the HPE infrastructure. HPE Storage Management Pack for Microsoft SCOM will continue to provide added value for storage monitoring and management of events, alerts, capacity, health, and to provide a detailed virtual infrastructure view.

![Figure 11. HPE Fabric Management, storage in Microsoft System Center Virtual Machine Manager](image-url)
The OV4SC integration delivers the following HPE OneView monitored server, storage, and networking content into Microsoft System Center consoles:

- Comprehensive system health and alerting
- Detailed inventory
- Cluster configuration
- HPE 3PAR StoreServ hierarchical view
- HPE Virtual Connect fabric visualization
- Visual relationship between Hyper-V and ESXi VMs, host servers, and HPE storage systems
- Audit logs
- HPE Insight Remote Support warranty expiration reporting

In addition, the integration enables the following HPE OneView management capabilities from Microsoft System Center:

- Driver and firmware updates
- Certificate management
- Deployment, using HPE OneView server profile templates, of Microsoft Windows and Microsoft Hyper-V hosts to bare metal servers, including pre-deployment hardware and BIOS configuration and post-OS driver and agent installation
- Cluster Expansion
- Create and expand volumes for HPE 3PAR Storage and HPE StoreVirtual Storage
- Deployment of HPE StoreVirtual VSA

For customers using Microsoft Azure Log Analytics for infrastructure monitoring, HPE OneView for Microsoft Azure Log Analytics provides hybrid cloud infrastructure management for on-premises HPE hardware and firmware inventory, health status, event correlation, and trend analysis.

The HPE license for OV4SC integration is included with the HPE OneView Advanced license and with HPE Synergy.

Additional information can be found at the HPE OneView for Microsoft System Center site.

**HPE OneView for VMware vCenter**

From the VMware vSphere client, with the HPE OneView for VMware vCenter add-in, administration of health, inventory, and configuration monitoring of your HPE infrastructure is simplified. This integration provides physical and virtual views of your HPE virtualized infrastructure. Directly from VMware vSphere you can:

- Deploy ESXi hosts on bare-metal HPE servers
- Grow an existing cluster or easily deploy a new cluster
- Provision HPE storage
- Visually trace and monitor your infrastructure network end-to-end, from the host all the way to the individual network modules connected within your domain, thereby delivering comprehensive management of the network
- View and monitor the configuration of your HPE Storage Array portfolio by diving into detailed tables that provide the relationship between volumes to LUN connections to your virtual machines and ESXi server hosts
- Accelerate configuration of VMware host networking and HPE Virtual Connect by presenting the required host networking changes and synchronizing configuration with a single click
- Use VMware Proactive HA to prevent VM downtime by automatically migrating affected workloads before a possible hardware degradation causes a disruption to service
• Provision your HPE servers and HPE 3PAR storage together using the five-step automated wizard
• Enable single-sign on to HPE resources with role-based security and segmentation
As a further extension, HPE OneView for VMware vRealize Operations Manager, uncovers critical trend changes, including dashboards that facilitate the identification of root cause problems and impacted resources across your HPE infrastructure. With HPE OneView for VMware vRealize Log Insight, HPE iLO and HPE Onboard Administrator logs are integrated for faster troubleshooting and root cause analysis. With HPE OneView for VMware vRealize Orchestrator (VRO), you get easy-to-use drag and drop access to automation of HPE OneView managed hardware deployment, firmware updates, and other lifecycle tasks.

![Figure 14. VMware vRealize Operations Manager displaying the health, risk, and efficiency of an HPE OneView managed server](image)

The HPE Storage management and automation portfolio for VMware is summarized in Figure 15.

![Figure 15. HPE Storage integration enhancements for VMware](image)
Security built into HPE OneView

Securing your infrastructure, applications, and your corporate environment is becoming more and more of a priority. It used to be sufficient to have basic security policies in place and call it good enough so long as nothing went wrong. Today, the risk and cost of a security breach is too high to neglect strong security policies and the effort required to implement those policies. Today, every application, and the IT infrastructure that supports those applications, needs strong security controls. For an application such as HPE OneView, that integrates with your IT infrastructure and potentially many third-party applications, security is paramount.

HPE OneView is a security hardened black box appliance that:

- Has a restricted set of interfaces that control and reduce its attack surface
  - HTTPS, REST APIs, AMQP-based message bus, and a restricted CLI
- Does not allow interactive OS users and, therefore, no local execution
- Encrypts all sensitive data-at-rest
- Performs security scans and penetration testing
- And digitally signs and authenticates all software patches

HPE OneView allows you to take advantage of enhanced security features such as two factor authentication, Federal Information Processing Standard (FIPS) 140-2 validation, and support for CNSA ciphers that provide users with the highest level of cryptography in the industry.

User access controls

By default, HPE OneView uses local user accounts. For secure production environments, HPE recommends the only local account be an “administrator” maintenance account with a complex password. All other accounts should be integrated with an enterprise directory such as Microsoft Active Directory or OpenLDAP. After enabling the enterprise directory integration, all local user access can be disabled. An optional “break glass in case of emergency” feature may remain enabled to allow Administrator access during the rare circumstances when the enterprise directory is not available.
To define user privileges and control user access, HPE OneView uses a Role-Based Access Control (RBAC) and an extension to RBAC, Scope-Based Access Control (SBAC) that can further restrict the rights granted to a role. RBAC grants access rights to a set of users (i.e., role) to perform actions (create, read, update, delete, or use) on all resources in a resource category. SBAC limits a rights within the scope for creating, modifying, or deleting data. A resource can be assigned to zero or more scopes in order to restrict operations that can be performed on it. When specified as part of a permission, a scope further restricts the rights granted by the role. You can assign multiple permissions to a user or a directory group.

For enhanced security, two-factor user authentication can be enabled via the integration with Active Directory or OpenLDAP. Two-factor authentication is performed using a Common Access Card (CAC) or Personal Identity Verification (PIV) X.509-based smartcards along with a user supplied PIN.

The HPE OneView GUI provides a centralized interface to enable security functions.

![Figure 17. User authentication security configuration in HPE OneView Settings](image)
IT infrastructure communication controls

With HPE OneView, all browser operations and REST API calls use HTTPS over Transport Layer Security (TLS).

If a device is SNMPv3 enabled, HPE OneView supports SNMPv3 communication with the device. SNMPv3 communication is available for servers using iLO 4 or later. HPE OneView will use SNMPv1 to communicate with all other SNMP enabled devices.

In addition, HPE OneView can forward SNMP traps using SNMPv3, includes automatically converting any incoming SNMPv1 traps to SNMPv3 prior to forwarding the traps. Support for trap forwarding via SNMPv1 is preserved for backward compatibility. Supported SNMP authentication and privacy protocol (SNMPv1 or SNMPv3) varies with the type of devices or trap forwarding requirements.

HPE OneView has extensive certificate management features, only available through the REST APIs, which include:

- Automatically trusted self-signed certificates during initial device discovery
- Certificate Authority (CA) signed certificates for iLOs, Onboard Administrators, Frame Link Modules, remote repositories, proxy servers, etc.
- Support for Certificate Revocation Lists (CRLs)
- Management of the HPE OneView certificate store
- Alerts for certificate expiration related events
- Security preferences to control the strictness of certificate validation

Additional security features are available for HPE OneView connectivity, communication, and management of HPE Gen10 servers, such as:

- Two-factor authentication
- TLS encryption and Advanced Encryption Standard (AES) encryption
- Firmware update validation using a 4096-bit private key digital signature
- Trusted Platform Module (TPM) for securely storing passwords, certificates, and encryption keys
- Federal Information Processing Standard (FIPS) 140-2 and Commercial National Security Algorithm (CNSA) Suite security
- Silicon Root Trust with Runtime Firmware Verification and secure recovery of essential firmware in the unlikely event of a breach into the HPE server firmware

For additional information, see the “HPE Gen10 Security Reference Guide”.

External Firmware Repository

HPE OneView allows for a user-maintained external firmware repository as an HTTP/HTTPS web server. Microsoft Internet Information Services (IIS) is used to create a virtual directory that is mapped to a physical directory on a local or remote server. Secure HTTPS communication with the virtual directory is established via the server certificate and user credentials specified in the HPE OneView configuration screen. External firmware repository configuration details are provided in the “HPE OneView User Guide”.

![Add Repository](#)

**Figure 18.** Adding an external firmware repository
Conclusion

Your investment is secure with HPE OneView as your foundation for building a software-defined data center. HPE OneView will be around for the long-term with support for your legacy systems and for cutting edge technologies like composable, hyper-converged, and cloud. HPE will continue to invest in the future with their composable infrastructure partner ecosystem resources that integrate efficiently with existing strategic partners and future vendor management tools and technologies.

Resources

HPE OneView documentation
hpe.com/info/oneview/docs

Download HPE OneView
hpe.com/downloads/oneview

HPE Composable Ecosystem Developer Hub
hpe.com/developers/oneview

Learn more at
hpe.com/info/oneview