INTEGRATION WITH HPE ONEVIEW
A technical overview for ISVs and developers
# CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive summary</td>
<td>3</td>
</tr>
<tr>
<td>Architecting solutions to close the gaps</td>
<td>3</td>
</tr>
<tr>
<td>HPE OneView: The foundation for a software-defined data center</td>
<td>4</td>
</tr>
<tr>
<td>Creating a new IT infrastructure</td>
<td>4</td>
</tr>
<tr>
<td>Why integrate with HPE OneView</td>
<td>5</td>
</tr>
<tr>
<td>HPE OneView essentials</td>
<td>5</td>
</tr>
<tr>
<td>Common ISV integration use cases</td>
<td>7</td>
</tr>
<tr>
<td>Consume data</td>
<td>7</td>
</tr>
<tr>
<td>Automate configuration</td>
<td>8</td>
</tr>
<tr>
<td>Architectural overview of HPE OneView</td>
<td>8</td>
</tr>
<tr>
<td>Designed for automation</td>
<td>8</td>
</tr>
<tr>
<td>RESTful API resource model</td>
<td>8</td>
</tr>
<tr>
<td>Software-defined resources</td>
<td>10</td>
</tr>
<tr>
<td>HPE OneView message bus architecture</td>
<td>11</td>
</tr>
<tr>
<td>Accessing an HPE OneView message bus</td>
<td>11</td>
</tr>
<tr>
<td>State-Change Message Bus</td>
<td>11</td>
</tr>
<tr>
<td>SNMP traps</td>
<td>12</td>
</tr>
<tr>
<td>Choosing between the Message Bus and SNMP traps</td>
<td>12</td>
</tr>
<tr>
<td>Getting started</td>
<td>12</td>
</tr>
<tr>
<td>Appendix</td>
<td>13</td>
</tr>
<tr>
<td>Resource operations</td>
<td>13</td>
</tr>
<tr>
<td>URI format</td>
<td>13</td>
</tr>
<tr>
<td>Data transfer format</td>
<td>14</td>
</tr>
<tr>
<td>Version control</td>
<td>14</td>
</tr>
</tbody>
</table>
The digital age requires speed, stability, and diversity. To become a competitive force in this hybrid world, IT architects must foster a faster, more fluid approach to IT delivery. For independent software vendors and developers, improved automation, management, and integration strategies are key.

**EXECUTIVE SUMMARY**

Businesses are now managing and consuming IT services across a hybrid infrastructure that combines traditional IT, private cloud, and managed and public clouds. Complicated, manual lifecycle operations and nonintegrated tools fail to provide the speed and simplicity businesses need to support their current IT tasks, much less new ideas and applications. A composable infrastructure uses flexible pools of compute, storage, and fabric and a software-defined approach to on-premises infrastructure to deliver value dramatically faster.

To turn this vision of an agile and fluid infrastructure into reality, it must be controlled programmatically through a unified API. This API is delivered by HPE OneView, which automates the provisioning, configuration, and monitoring of HPE infrastructure. By integrating with this composable infrastructure API, ISVs can provide solutions that let customers reduce the time spent on managing their environments and accelerate time to value. By providing interoperability with a single API, ISVs can support customer requirements for both traditional IT workloads as well as applications demanding the agility of the cloud.

This white paper is for architects with independent software vendors (ISVs) whose software manages, monitors, and automates related IT processes. It is also useful for organizations who want to understand how to programmatically control physical infrastructure to support automation, operations, and DevOps initiatives. The paper describes HPE OneView architecture and its functionality, and how the unified composable infrastructure API native to the HPE OneView can be used to create packaged integrations between other software and HPE OneView. It shows how you can consume data from HPE OneView to help ensure that your applications have a consistent data set automatically, as well as how to use HPE OneView APIs to trigger automated actions directly from your software. This paper also serves as a guide to HPE resources, including API documentation, code libraries, best practices, and testing resources, so you can get started in developing your integration to HPE OneView and reaping the rewards of improved interoperability.

**ARCHITECTING SOLUTIONS TO CLOSE THE GAPS**

By 2022, creating a flexible, adaptive infrastructure will be among the top infrastructure and operations (I&O) goals for more than 70% of enterprises, which is a major increase from fewer than 20% in 2019.¹ Organizations will no longer be able to spend the majority of their resources on maintaining legacy environments with siloed infrastructure and archaic management processes, which are dependent on time-consuming manual tasks and the use of separate management tools for compute, storage, networking, and facilities.

Historically, application developers have been challenged to treat physical infrastructure in the same way they treat other application services—they define their requirements and then call those services using specified programming calls, or APIs. While automating the processes to provision or change that physical infrastructure to meet the needs of the application has been possible, the automation logic is complex and difficult to maintain. Simple tasks like provisioning a new server with all of its network and storage connections can take hundreds or even thousands of lines of code.

¹ “Programmable Infrastructure is Foundational to Infrastructure—Led Disruption” Gartner.
Composable infrastructure helps overcome these challenges by making management simple through highly automated operations controlled through software. Composable infrastructure empowers IT to create and deliver value instantly, continuously, and at the speed and flexibility of cloud—within a customer’s own secure data center. It consists of fluid pools of compute, storage, and fabric resources that can dynamically self-assemble to meet the needs of an application or workload. These resources are defined in software and controlled programmatically through a unified API, thereby transforming physical infrastructure into code that is optimized to the needs of the application.

**FIGURE 1.** HPE Composable Infrastructure empowers IT to create and deliver value

Effectively, physical infrastructure becomes code. At HPE, we believe that it is possible to achieve this vision with the right set of infrastructure management tools. We’ve spent years working closely with customers to design a platform to make this vision possible. We call it HPE OneView.

**HPE ONEVIEW: THE FOUNDATION FOR A SOFTWARE-DEFINED DATA CENTER**

**Creating a new IT infrastructure**

HPE OneView allows enterprise teams to work in a more natural, collaborative way, offering a streamlined consumer experience. It is management software that provisions, configures, monitors, and updates the physical server infrastructure and logical groupings of servers with storage and networks. HPE OneView was developed by working closely with over 150 data center operators in 30 real-world data centers to understand the most common infrastructure management tasks, processes, and steps, as well as how the user experience could be improved and simplified. HPE drew inspiration from social and consumer-style applications that help users manage massive complexity and applied those capabilities to the task of lifecycle management.

HPE OneView is a fresh approach to infrastructure management, but it draws on HPE’s vast experience in designing software for IT administrators, which dates back to the original HPE Systems Insight Manager product from the mid-1990s as well as extensive engagement with customers around the world. Today, HPE OneView manages the industry’s leading composable infrastructure platform, HPE Synergy and its market-leading product such as HPE Composable Rack, Superdome Flex, HPE Nimble Storage, HPE ProLiant, HPE Apollo servers, HPE Primera, and HPE 3PAR StoreServ Storage.
Why integrate with HPE OneView

Customer adoption of HPE OneView has surpassed one million licenses worldwide. By integrating with HPE OneView, ISVs can help their customers see faster time to value. Since these customers need to spend less time integrating products within their environments, they can spend more time focusing on their business opportunities. By building interoperability between their application and HPE OneView using the composable infrastructure API, ISVs help their customers build a bridge between traditional IT approaches and digital business.

The HPE OneView Ecosystem is a broad software partner community. Which includes large software suites such as VMware vCenter®, Microsoft Systems Center and Red Hat®. In addition to more focused solution providers such as Morpheus Data, Terraform, Puppet, Chef, Prometheus, Schneider Electric, and SUSE. The HPE OneView team is constantly working on enhancing this ecosystem with new partners and developer toolkits that make it easy to plug into HPE OneView.

There is more information listed below in the “Getting Started” section about how to join the Composable Ecosystem Partner Program.

There are two primary opportunities for ISVs to build interoperability between their applications and HPE OneView:

- 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, you can provide customers with a consistent and reliable representation of the state of their infrastructure across multiple tools at any given moment.
- Use the software-defined approach of HPE OneView to control and automate changes in IT infrastructure. In this way, you can help customers save time by automating processes that previously required manual work.

HPE ONEVIEW ESSENTIALS

HPE OneView is an infrastructure management solution that makes it simple to deploy and manage today’s complex hybrid cloud infrastructure. Through software-defined intelligence, HPE OneView takes a template-driven approach for deploying, provisioning, updating, and integrating compute, storage, and networking infrastructure. Designed with a modern, unified API, HPE OneView also helps you develop more applications faster through integrations with a broad ecosystem of third-party management services and tools. By using templates that treat infrastructure as code, it brings the flexibility of the cloud to physical, bare-metal infrastructure.

HPE OneView manages servers, storage, networking, and power and cooling resources through their full lifecycle. It collapses infrastructure management tools into a single resource-oriented architecture that provides direct access to all logical and physical resources. Logical resources include server profiles and server profile templates, storage volumes and storage volume templates, enclosures and enclosure groups, logical interconnects and logical interconnect groups, and network connections and storage volume attachments that can be provisioned as a service.
Physical resources include server hardware blades and rack servers, networking interconnects, storage systems, disks, and compute enclosures. HPE OneView is delivered as an appliance for easy and fast deployment, and with HPE Synergy, is delivered with the HPE Synergy Composer.

HPE OneView offers a uniform way of interacting with resources through its RESTful API. This integrated resource model removes the need to enter and maintain the same configuration data more than once and struggle to keep all versions up to date. It encapsulates and abstracts many underlying tools behind the integrated resource model to achieve new levels of simplicity, speed, and agility to provision, monitor, and maintain a composable infrastructure. This model is critical for diagnosing problems or determining the risk of making a change by seeing affected resources and how they are interconnected before making the change.

HPE OneView also streamlines the process of bringing the enclosures, interconnects, and server hardware under management. When a device is added, HPE OneView automatically detects all the hardware and prepares it for monitoring and management. With the HPE OneView approach, server hardware either has a server profile that's allocated and fully configured, or it has no server profile and is available as raw hardware in a pool awaiting a new configuration. This supports the 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. Figure 2 shows a high-level conceptual view of HPE OneView.

HPE OneView provides a wide variety of capabilities to manage infrastructure and reduce infrastructure complexity with automation simplicity. It's a modern, integrated workspace for IT team collaboration that automates the deployment and management of infrastructure repeatedly, reliably, and at scale. Here's a list of HPE OneView key capabilities:

- Infrastructure management for servers, storage, and network management
- Software-defined control (sets, groups, templates, and profiles)
- Open integration using the RESTful API and State-Change Message Bus
- Automated server and storage provisioning
- HPE Virtual Connect management
- Pervasive Smart Search and Map View
- Remote management with HPE Integrated Lights-Out (iLO) Advanced
- Environmental (power and thermal) management
- System health monitoring
- Firmware updates and configuration change management
- Role and scope-based access
• Remote support
• Global monitoring/single pane monitoring
• Enhanced security features such as two-factor authentication, Federal Information Processing Standard (FIPS) 140-2 validation, and support for CNSA ciphers

**HPE OneView has been shown to provide current HPE BladeSystem customers with a 96% reduction in server configuration times,² 93% less downtime, and 69% less operator time for firmware updates and patching,³ as well as a 10X reduction in the tools required to learn, manage, deploy, and integrate the workloads.⁴**

**COMMON ISV INTEGRATION USE CASES**

HPE is working with ISV partners to establish a broad, open ecosystem by leveraging the composable infrastructure API and HPE OneView. This management ecosystem allows the wide range of infrastructure supported by HPE OneView to be integrated with a variety of operations management tools. To help facilitate integrations, **HPE delivers software development kits (SDK) which provide language bindings for popular programming languages such as Python and Ruby, along with getting started samples and best practice methods to consume and automate resources.**

When considering the integration of an application with HPE OneView, ISVs should consider two integration use cases. The following describes each use case and with a sample integration.

**Consume data**

Applications can use HPE OneView to generate a baseline of information about infrastructure and capture data on any state or metric changes that are relevant. To do this, they use the RESTful APIs to first discover what is in the infrastructure and then receive updates on any changes via subscription to the State-Change Message Bus (SCMB). HPE OneView passes back the initial configuration information that it has already discovered, and then shares state changes.

For example, an integration of HPE OneView and Micro Focus Operations Bridge can speed up the process of identifying and responding to critical infrastructure incidents with agentless monitoring and event consolidation. Initially, Operations Bridge queries HPE OneView to populate its Management Database with the infrastructure inventory and topology.

The moment HPE OneView is notified of an issue with the infrastructure it is managing, it processes and then propagates the event in near real-time (two seconds or less) to Operations Bridge. Critical events requiring immediate attention will be posted to Operations Bridges’ Business Value Dashboard. When an incident is resolved, the resolution is propagated from Operations Bridge back to HPE OneView and the alert is cleared in HPE OneView.

HPE OneView can also provide information about the physical environment such as temperature, power, and CPU readings. Facilities management applications can utilize this information to provide benefits such as improved energy efficiency. Better business continuity can be achieved by addressing issues such as overheating down to the server level and triggering preventive actions, such as power capping.

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² HPE internal testing of HPE OneView vs. manual operations.
³ HPE internal testing of HPE OneView vs. Cisco UCS Manager.
⁴ HPE internal testing; testing compared HPE OneView vs. a traditional approach to infrastructure management. Comparison was of one HPE OneView system vs. multiple management consoles.
Automate configuration
ISVs can use a 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, tools such as HPE OneView and Ansible provide a software-defined approach to the management of the entire hardware and software stack, giving IT the ability to deliver new or updated services on an as-needed or on-demand basis. Ansible is an open source community project, sponsored by Red Hat, providing a simple IT automation engine that automates provisioning, configuration management, application deployment, and many other IT needs. Ansible uses scripts or playbooks to provide automation and orchestration capabilities. A playbook can call the Ansible role for HPE OneView to physically provision servers and configures networks, storage, BIOS, and firmware, then delegate to other playbooks to provision the rest of the application stack. Using Ansible with HPE OneView also allows automated nondisruptive upgrades from the physical bare metal all the way up through the software stack. More information about HPE OneView and Ansible can be found here: developer.hpe.com/platform/hpe-oneview/home.

In another example supporting virtualization, the HPE vCenter plug-in integrates VMware vCenter with HPE OneView for fully automated VMware vSphere® cluster deployment, monitoring, and streamlined firmware updates. First, the HPE OneView credentials are established in the vCenter plug-in. Then, this plug-in talks to the HPE OneView RESTful API in order to automate the physical infrastructure provisioning for a node cluster. An administrator can initiate the request to expand a cluster directly within vCenter. An automated workflow is used to grow cluster compute capacity, and a reference server profile is selected to deploy the best configuration from a VMware ESX® template, which is then applied to multiple server blades. All hosts are automatically added to the cluster and the host network is configured to match the HPE OneView Server Profile configuration. For more details about using the HPE OneView VMware vCenter plug-in, see the HPE OneView integration with VMware vCenter video at here.

ARCHITECTURAL OVERVIEW OF HPE ONEVIEW
The HPE OneView architecture was designed to fit into today's complex data center landscape, coexisting with legacy management tools and related infrastructure, while helping customers move to new, more agile modes of IT like HPE Composable Infrastructure. With a unified API, HPE OneView provides full programmability across infrastructures, enabling the provisioning of physical resources with a single line of code.

Designed for automation
With HPE OneView, you can extend the power of infrastructure automation to every aspect of the data center: virtualization, facilities, cloud, and application development. A unified API provides full programmability—a single line of code can fully describe and provision physical resources required for an application, a virtual host, or a container infrastructure. This capability eliminates time-consuming scripting to low-level tools and interfaces. Using HPE OneView, users can reduce the time it takes to stand up infrastructure from hours to minutes.

The unified API also provides performance, health, and configuration data to data center infrastructure management (DCIM) applications to ensure a unified view of the infrastructure. This means that you can spend less time controlling infrastructure and spend more time creating value for the business.

RESTful API resource model
HPE OneView offers a uniform way of interacting with resources by providing a RESTful API. This integrated resource model removes the need for IT organizations to enter and maintain the same configuration data more than once, while eliminating struggles of keeping all versions up to date. It encapsulates and abstracts many underlying tools behind the integrated resource model. The model is critical for diagnosing problems or determining the risk of making a change by seeing affected resources and how they are interconnected before making the change. Within HPE OneView, every resource has one uniform resource identifier (URI) and represents a physical device or logical construct, and may be manipulated using RESTful APIs. 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. HPE OneView provides backwards compatibility for previous API versions, so integrations will continue to work as OneView versions are upgraded. For example, HPE OneView 5.0 provides full support for API versions from releases 5.0, 4.2, 4.1, 4.0 and even earlier releases. A summary of the resource model is seen in Figure 4.
RESTful APIs identify an architectural class with simple principles that include a uniform interface and a fixed set of operations (such as the PUT, POST, PATCH, GET, and DELETE found in HTTP) and associated properties you can set or modify. The stateless APIs contains 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 metadata and control information—HTTP headers such as an entity tag (ETag)

In the resource model, all information and state are 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

Every action that can be performed in the HPE OneView interface can also be done via the RESTful APIs. In fact, the HPE OneView GUI is a RESTful API client. IT organizations can develop scripts in languages such as PowerShell and Python that call these APIs to drive repeatable actions within HPE OneView. These APIs can also be called from other software programs.

The HPE OneView GUI and RESTful APIs are organized by resource. The online help for each screen in the UI describes the resources and, as needed, their configuration rules. To view the list of resources, see [HPE OneView API Reference](http://hpe.com/info/oneview/docs). OneView technical documentation is also available in the HPE Enterprise Library at [hpe.com/info/oneview/docs](http://hpe.com/info/oneview/docs).
Software-defined resources

HPE OneView provides software-defined resources, including templates, profiles, and groups that provide an innovative way to manage the entire data center. These logical constructs let an application or IT organization specify the desired configuration of an environment and allow HPE OneView to automate the process of making it so. 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, Microsoft Exchange environments, web servers, and so on. They provide flexibility to simplify changes across the data center and controlled change management. The HPE OneView appliance provides several software-defined resources, such as groups, server profiles, and server profile templates. These reusable logical constructs mean that organizations can capture the best practices of experts across a wide variety of disciplines, including networking, storage, hardware configuration, and operating system build and configuration. HPE OneView keeps this best-practice approach intact as an organization grows, but it still allows for customization to maintain ultimate control. This facilitates faster provisioning, greater consistency, and fewer errors.

Server profiles templates enable you to provision bare metal infrastructure quickly and consistently. Server Profile Templates can be used to capture best practices once, and then roll them out multiple times in an efficient and error-free way.

A server profile template captures key aspects of a server configuration in one place, including:

- BIOS settings
- Boot order configuration
- Unique IDs such as MAC addresses
- Firmware update selection and scheduling
- OS deployment settings
- Local storage and SAN storage
- Local RAID configuration
- Network connectivity

Figure 5 shows the default view of the HPE OneView dashboard and an overview of activity and alerts. Hardware resources include Server Profiles, Server Hardware, Storage Pools, Volumes, Enclosures, Logical Interconnects, and the HPE OneView appliance itself. All of these form profiles that capture best practices in templates.
HPE OneView message bus architecture

HPE OneView supports asynchronous messaging to notify subscribers of changes to managed resources—both logical and physical. For example, ISVs can program applications to receive notifications, for example, when new server hardware is added to the managed environment, or when the health status of physical resources changes. Organizations benefit from integration as information is useful for compliance, auditing, and reconciliation. As changes occur in the environment, your applications are notified of them. Your application can receive alerts and notifications of state changes in a customer's environment.

Various health alerts are recorded regarding the lifecycle management of the data center and IT equipment. This capability enables your application to be notified of events that arise such as:

- The insertion of a new server blade/compute module
- Create/delete/modify networks
- A firmware update
- Prefailure warnings
- Uplink status of logical interconnects
- New potential overload conditions precipitated by the addition of new hardware
- Thermal capacity of devices in a rack that exceeds specified thermal limit
- Lack of power delivery redundancy to devices attached to power delivery devices

Accessing an HPE OneView message bus

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 that are important to enterprise-class management. These include reliability and high availability, flexible routing, clustering, federation, guaranteed delivery, multiprotocol, and tracing.

Using HPE OneView RESTful APIs, you can obtain certificates to access the State-Change Message Bus. The message content is sent in JavaScript Object Notation (JSON) format and includes the resource model. Before you can set up a subscription to messages, you must create and download an AMQP certificate from the appliance using RESTful APIs. Next, you connect to the message bus using the external authentication mechanism with or without specifying a username and password. This ensures that you use certificate-based authentication between the message bus and your client. After connecting to the message bus, you set up a queue with the queue name empty, and AMQP generates a unique queue name. You use this queue name to bind your client to exchanges and receive messages. To connect to the message and set up a queue, you must use a client that supports the AMQP. There are clients for almost every language: rabbitmq.com/devtools.html.

State-Change Message Bus

The State-Change Message Bus (SCMB) is an interface that uses asynchronous messaging to notify subscribers of changes to managed resources—both logical and physical. It is used to notify anyone listening on that bus for state changes of any current version of a resource. You can program applications to receive notifications when new server hardware is added to the managed environment or when the health status of physical resources changes—without having to continuously poll the appliance for status using the RESTful APIs. The SCMB provides an effective way of notifying about changes with an environment to your application so it can take specific actions.

The single, consistent resource model, RESTful APIs, and SCMB enable you to integrate HPE OneView with your application to address user needs and perform tasks such as:

- Automating standard workflows like provisioning a software stack
- Adding a resource to a configuration management database (CMDB)
- Connecting to service desks
- Monitoring resources, collecting data, and mapping and modeling systems
- Exporting data to formats that suit your needs
- Attaching custom databases, data warehouses, or third-party business intelligence tools
1. The SCMB consumer requests a client certificate as part of the registration process.
2. The appliance manages the client certificates in a Java KeyStore (.jvk) file.
3. The appliance issues a client certificate to the SCMB consumer.
4. The SCMB client provides an SSL client certificate to create a connection with the appliance.
5. The appliance can revoke the SCMB client certificate to deny access to the SCMB client. The client is managed into a certificate revocation list (CRL) file.
6. The appliance authenticates the SCMB client using the client certificate.

**SNMP traps**

Many network management systems use Simple Network Management Protocol (SNMP) to monitor network-attached devices for conditions that require administrative attention. There are two configuration options: the appliance global trap forwarding for all servers and enclosures managed by HPE OneView, and virtual interconnect trap forwarding via logical interconnect groups.

An SNMP manager typically manages a large number of devices, and each device can have a large number of objects. It is impractical for the manager to poll information from every object on every device. Instead, each agent on the managed device notifies the manager without solicitation by sending a message known as an event trap. You can also configure HPE OneView to forward SNMP traps received from servers and enclosures to enable the third-party managers to monitor these devices.

HPE OneView enables ISVs to read values from an interconnect when a query is initiated for SNMP information. An ISV application can filter the type of SNMP trap to capture, and then designate the SNMP manager to which the traps will be forwarded. By default, SNMP is enabled with no trap destinations set. When customers create a logical interconnect, it inherits the SNMP settings from its logical interconnect group. RESTful APIs can be used to customize the SNMP settings at the logical interconnect level.

**Choosing between the Message Bus and SNMP traps**

HPE recommends using the message bus process to capture state changes in most cases as it provides more categories and a richer set of alerts. It is the preferred method as ISV integrations can consume the message bus directly. Instead of forwarding traps, you can specify the types of alerts that are relevant for your application and understand their state in depth using the message bus. The message bus provides access to all alerts that HPE OneView displays, including both alerts that come from traps as well as from additional monitoring built into HPE OneView. For a complete picture, the SCMB should be used. However, to support use with legacy systems, SNMP trap forwards are available from HPE OneView as well.

**GETTING STARTED**

HPE OneView provides ISVs with the opportunity to quickly integrate their software with infrastructure management that’s software defined and automated. By providing a unified API for composable infrastructure, it lets applications treat infrastructure as code. It lets ISVs address a range of customer needs, for applications focused both on traditional IT environments as well as the rise of digital business.
To develop an integration with HPE OneView using the composable infrastructure API, start by visiting the HPE Composable Ecosystem Partners page to see what other partners are doing. If you like what you see, we encourage you to join the HPE Partner Ready for Technology program.

When you join this program, you'll have access to a comprehensive set of resources created specifically for software developers, including:

- A full working version of HPE OneView software to help your development
- A simulated HPE data center environment, including HPE Synergy, to help with API development and testing
- Software development kits SDKs with language bindings for popular programming languages, along with getting started samples and best practice methods to consume and automate resources
- Access to HPE OneView experts to assist with technical questions
- Access to the HPE Composable Ecosystem Lab for final validation of integration on physical infrastructure including HPE Synergy, HPE Composable Rack, HPE StoreServ, and HPE ProLiant DL servers.
- For Silver-level Partner Ready partners, we provide access to marketing tools including program insignia, listing on hpe.com, HPE business unit partner resources, access to technical resources and access to HPE Partner Ready portal.

By joining the Partner Ready for Technology Program, ISV partners can meet the integrated management requirements of their customers while maximizing opportunities and visibility in the market. As a member of the HPE Composable Ecosystem, you become an integral part of our broader HPE OneView community.

**APPENDIX**

**Resource operations**

Basic CRUD operations are performed on the appliance resources via the standard HTTP POST, PATCH, GET, PUT, and DELETE methods. RESTful interfaces are based on the world wide web standards. Thus, most modern languages support RESTful API natively. RESTful APIs are stateless. Any application state must be maintained by the client, and while it may manipulate the resource locally, until a PUT is made, the resource as it is known by the resource manager is not changed. REST HTTP operations are shown in Table 1.

**TABLE 1. REST HTTP operations**

<table>
<thead>
<tr>
<th>Operation</th>
<th>HTTP verb</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create</td>
<td>POST URI &lt;Payload = Resource data&gt;</td>
<td>New resources are created using the POST operation and include relevant data in the payload. On Success, the Resource URI (Task ID with some asynchronous operations) is returned.</td>
</tr>
<tr>
<td>Read</td>
<td>GET URI</td>
<td>Returns the requested resource representation(s).</td>
</tr>
<tr>
<td>Update</td>
<td>PUT URI &lt;Payload = Update data&gt;</td>
<td>Updates an existing resource using the update data.</td>
</tr>
<tr>
<td></td>
<td>PATCH URI &lt;Payload = Update data&gt;</td>
<td>Updates an existing resource using the update data.</td>
</tr>
<tr>
<td>Delete</td>
<td>DELETE URI</td>
<td>Deletes the addressed resource.</td>
</tr>
</tbody>
</table>

**URI format**

All the appliance URIs point to resources, and the client does not need to modify or create URIs. The URI for a specific resource is static and follows this format: https://{appli}/rest/{resource name}. The three parts of the URI are described in Table 2.

**TABLE 2. URI format**

<table>
<thead>
<tr>
<th>https://{appli}</th>
<th>The appliance address</th>
</tr>
</thead>
<tbody>
<tr>
<td>/rest</td>
<td>Type of URI</td>
</tr>
<tr>
<td>/{resource name}</td>
<td>Name of the appliance resource such as server profile</td>
</tr>
</tbody>
</table>
Data transfer format
The appliance supports JSON as the standard for exchanging data using a RESTful API. If JSON is not specified in the RESTful API call, then it is the default.

To learn more about JSON, go to json.org.

Version control
Following are the recommended best practices to keep integrations working even when the HPE OneView version deployed is not the one that you have developed against:

- At run time, always use an X-API-Version HTTP header to specify the expected API level for the call (that is, X-API-Version=1200).
- At integration time, query the /rest/version API to find out if the requested API version is indeed supported by the target OV.
- Make sure that over time, the application is updated to newer versions of the API. HPE provides support for HPE OneView releases for 12 months. So, HPE 4.1, delivered in June 2020, will be supported until December 2021.

Resources and additional links
Composable Ecosystem Partners
HPE OneView Developer Community
HPE OneView Slack channel
HPE Technology Partner Program
HPE OneView product
HPE OneView documentation: Enterprise Information Library
HPE OneView Architectural Advantages (Technical white paper)

LEARN MORE AT
hpe.com/info/oneview