# HP Helion OpenStack Carrier Grade

SOFTWARE DEVELOPMENT KIT

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# *Introduction to the HP Helion OpenStack Carrier Grade SDK*

## About the SDK

HP Helion OpenStack Carrier Grade is a high-performance, high-availability cloud operating system that enables telecommunications operators to use commercial off-the-shelf (COTS) hardware to manage virtual network functions (VNFs) within a carrier-grade network function virtualization (NFV) architecture. It brings together the flexibility and scalability of the IT cloud, and the high-availability and performance demanded by the telecommunications industry into a unique carrier-grade, industry-leading solution to deliver a price-performance ratio well above alternative solutions.

The HP Helion OpenStack Carrier Grade SDK can be used by guest applications to interact programmatically with HP Helion OpenStack Carrier Grade . The guest applications and their Linux OS are hosted within VMs on HP Helion OpenStack Carrier Grade compute nodes. The Linux/VM platform is used to implement software applications, such as VNFs.

## Using the SDK

The Software Development Kit (SDK) provides drivers, daemons, API libraries, and configuration files that you can include in a guest image to leverage the extended capabilities of HP Helion OpenStack Carrier Grade. They can be used to enhance or extend the networking features of the

applications and to access the virtual machine (VM) management capabilities of HP Helion OpenStack Carrier Grade. Applications can leverage this functionality to realize enhanced performance and reliability.

Each SDK component is independent from the others. Therefore, you can choose which components to use based on your specific needs. The SDK is made up of two types of components: capability components and documentation components. Each component is then made up of a tarball, which packages each individual component.

Capability components include:

• Accelerated Kernel Network Drivers
• Accelerated DPDK Network Drivers
• VM Resource Scaling
• Guest Heartbeat
• Server Group Messaging

Documentation components include:

• SNMP MIBs
• Sample Heat Orchestration Templates
• OpenStack REST API Extension Documentation
• Custom Branding

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# *Getting Started*

## Obtaining the SDK

1.  Download the SDK from *https://windshare.windriver.com/*.

## Installing the SDK

Each SDK component comes with different instructions for use. To use the SDK,
you must incorporate the required components into your development environment.

**Step 1** Confirm that your guest platform is supported.

**Step 2** Extract the individual SDK tarballs from the overall tarball downloaded.

**Step 3** For each of the individual SDK tarballs that you wish to use, extract the files into the appropriate folder.

Each individual SDK tarball contains a detailed README file including:

- a description
- requirements and dependencies
- compile and build instructions
- application integration instructions

- guest target usage / install instructions
- caveats / limitations

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# *Working with the SDK*

## SDK components

The following components are included in the SDK.

Capability components include:

- wrs-avp-kmod—Accelerated Kernel Network Drivers
- wrs-avp-pmd—Accelerated DPDK Network Drivers
- wrs-guest-scale—VM Resource Scaling
- wrs-heartbeat—Guest Heartbeat
- wrs-server-group—Server Group Messaging

  Documentation components include:
- wrs-snmp-mib—SNMP MIBs
- wrs-heat-templates—Sample Heat Orchestration Templates
- wrs-restapi-doc—OpenStack REST API Extension Documentation
- wrs-branding—Custom Branding

### wrs-avp-kmod—Accelerated Kernel Network Drivers

This component contains AVS-compatible kernel drivers for improved VM networking performance of kernel-based networking VNFs. The AVP virtual network interface

card (NIC) is a shared, memory-based, high-performance networking device. Its potential maximum throughput is higher than standard virtual NIC devices (for example, e1000, virtio). This package provides the AVP Linux kernel device driver source. It can be compiled against most recent Linux kernel distributions.

The HP Helion OpenStack Carrier Grade AVP Linux kernel device driver is delivered as source with the required makefiles in a compressed tarball so that it can be compiled for the applicable guest Linux distribution as an external kernel module.

### wrs-avp-pmd—Accelerated DPDK Network Drivers

This component contains AVS-compatible DPDK drivers for high-performance DPDK-based networking VNFs. The HP Helion OpenStack Carrier Grade AVP virtual NIC is a high-performance networking device. It can provide line rate throughput (depending on the guest and AVS configuration). This package provides the Intel DPDK compatible Poll Mode Driver (PMD). It can be compiled as a component of an Intel DPDK distribution.

### wrs-guest-scale—VM Resource Scaling

VM Resource Scaling is a service to allow a guest to scale the capacity of a single guest server up and down on demand. Currently, only scaling the number of online guest vCPUs is supported. The resources can be scaled up or down from the Nova CLI or the Horizon web administration interface. Scaling can also be set up using Heat to be automatically triggered based on Ceilometer statistics. This package contains an agent and APIs for integration with the Scale Up / Down service. These will handle the guest side of the coordinated efforts involved in scaling up and down guest resources.

### wrs-heartbeat—Guest Heartbeat

This component contains APIs for integration with the HP Helion OpenStack Carrier Grade heartbeat service. The HP Helion OpenStack Carrier Grade Guest Heartbeat is a service to monitor the health of guest applications within a VM running under HP Helion OpenStack Carrier Grade. Loss of heartbeat will result in a specified corrective action (for example, rebooting the VM). Guest applications are given the opportunity to receive notification of, or even veto, some Nova commanded status changes that would stop or reboot the VM. Guest applications can use this capability to cleanly shut down or even live migrate their service to a peer VM.

### wrs-server-group—Server Group Messaging

This component contains APIs for the HP Helion OpenStack Carrier Grade "server group" peer monitoring service. Server Group Messaging is a service to provide simple, low-bandwidth datagram messaging and notifications for servers that are part of the same server group. This messaging channel is available regardless of whether IP networking is functional within the server, and it requires no knowledge within the server about the other members of the group. The service provides three types of messaging:

- Broadcast: enables a server to send a datagram (up to 3050 bytes) to all other servers within the server group

- Notification: provides servers with information about changes to the state of other servers within the server group
- Status: enables a server to query the current state of all servers within the server group (including itself)

This service is not intended for high-bandwidth or low-latency operations. It is best-effort and not guaranteed. For improved reliability, applications should do end-to-end ACKs and retries.

### wrs-snmp-mib—SNMP MIBs

This component documents the Enterprise SNMP Management Information Base (MIB) for system alarms management on a HP Helion OpenStack Carrier Grade deployment. Support for SNMP is implemented as follows:

- Access is disabled by default and must be enabled manually from the command-line interface.
- It is available using the controller node's floating OAM IP address, over the standard UDP port 161.
- The supported version is SNMPv2c.
- Access is read-only for all SNMP communities.
- All SNMP communities have access to the entire OID tree. There is no support for VIEWS.
- The supported SNMP operations are GET, GETNEXT, GETBULK, and SNMPv2c-TRAP2. The SNMP SET operation is not supported.

### wrs-heat-templates—Sample Heat Orchestration Templates

This component contains sample HP Helion OpenStack Carrier Grade Heat templates and instructions. Heat is an OpenStack service that is meant to simplify the launching and basic management of complex applications or application services. The OpenStack commands that are executed to create the individual resources of an application service can be described in a Heat template. Heat also provides a means of autoscaling the application service.

For example, Heat templates allow you to reassign stack resources automatically to meet changing conditions. HP Helion OpenStack Carrier Grade supports two types of scaling:

- In/Out: adds or removes instances as needed
- Up/Down: increases or decreases resources for individual instances as needed

For more information, including detailed examples, see the *HP Helion OpenStack Carrier Grade Administration Guide: Managing Stacks*.

### wrs-restapi-doc—OpenStack REST API Extension Documentation

This component contains documentation for HP Helion OpenStack Carrier Grade extensions to the open source OpenStack REST APIs. Together with the standard OpenStack REST APIs, you can use these extensions to manage the cloud.

The following extensions are included in the documentation:

- Compute API v2 Extensions
  - Allows the user to specify the VIF-Model on a per-NIC basis when they create, launch, or boot a VM server.

- Allows the user to scale the resources of a server up and down quickly.
- Provides support for server groups.
- Provides support for various new flavor Extra Specs.
- Networking API v2 Extensions

    - Supports centralized management of provider networks from the controller node.
    - Supports per-tenant Quality of Service (QoS) policies.
    - Supports displaying of MTU values for ports, networks, and subnets.
    - Supports guest VLANs.
- Telemetry API v2 Extensions

    - Exports Ceilometer samples to CSV files.
- Block Storage API v2 Extensions

    - Provides support for backing up volumes and snapshots.
- SysInv API v1

    - Allows the user to manage physical servers, including inventory collection and configuration of nodes, ports, interfaces, CPUs, disks, and memory.
    - Provides support for alarm collection.
- Patching API v1

    - Allows the user to manage software patches on hosts, including upload, application, installation, removal, deletion and querying of software patches.

These Extensions to open-source OpenStack APIs follow the OpenStack 'Extension' Mechanism in order to extend functionality to OpenStack APIs in a manner that ensures compatibility with existing clients.

### wrs-branding—Custom Branding

This component contains instructions and examples for adding custom branding to the Horizon GUI. You can modify the existing style sheet, font, and image files to develop your own branding, and then apply the branding by installing a tarball that includes the modified files along with a manifest.

## Deploying and Configuring the SDK Components

The deployment and configuration varies depending on the SDK component. However, some common high-level steps exist.

You must extract the individual SDK tarballs that you wish to use from the overall tarball downloaded from the WindShare site into the appropriate folder.

Depending on the SDK component you want to use, you can:

- Modify configuration files associated with the component.

- Create application-specific scripts and place them in the specified directories, so that the SDK component invokes them in response to HP Helion OpenStack Carrier Grade events in order to trigger the required behavior.
- Code API-based interactions with HP Helion OpenStack Carrier Grade