



Hewlett Packard
Enterprise

Helion OpenStack Carrier Grade 4.0

SOFTWARE DEVELOPMENT KIT

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Titanium Server

Cloud Administration, 16.10

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Introduction to the Titanium Server SDK

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[Using the Titanium Server SDK](#) 1

About the Titanium Server SDK

Wind River Titanium Server is a Network Functions Virtualization cloud solution capable of meeting demanding customer requirements for scalability, performance, capacity, and availability. It is not a one-size-fits-all solution, but a highly flexible framework that supports a range of deployment models, types and quantities of hardware, and tunable parameters to enable an optimized deployment for varying customer requirements.

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

Using the Titanium Server SDK

The Titanium Server 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 Titanium Server.

These components can be used to enhance or extend the networking features of the applications and to access the virtual machine (VM) management capabilities of Titanium Server. 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 or tool components include:

- SNMP MIBs
- Sample Heat Orchestration Templates
- OpenStack REST API Extension Documentation
- Custom Branding
- Configuration Utilities

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Getting Started

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Obtaining the Titanium Server SDK

The Titanium Server SDK is available as a download from WindShare.

To obtain the SDK, visit <https://windshare.windriver.com/>

Installing the Titanium Server SDK

To use the Titanium Server SDK, you must incorporate the required components into your development environment.

Each SDK component comes with different instructions for use.

Procedure

1. Confirm that your guest platform is supported.



NOTE: Refer to [Requirements for Using the SDK](#) on page 15.

2. Extract the individual SDK tarballs from the overall tarball downloaded from the WindShare site.
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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SDK components

The SDK includes selected drivers, OpenStack extensions, utilities, templates, and documentation.

The following components are included in the Titanium Server SDK. You can obtain the latest versions from the following link: <https://windshare.windriver.com/>

Capability components include:

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

Documentation or tool 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-configutilities—Configuration Utilities

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

The Titanium Server 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 Titanium Server 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 Titanium Server 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 Titanium Server Scale Up / Down service. These will handle the guest side of the coordinated efforts involved in scaling up and down guest resources.

wrs-guest-heartbeat—Guest Heartbeat

This component contains APIs for integration with the Titanium Server Guest Heartbeat service.

Titanium Server Guest Heartbeat is a service to monitor the health of guest applications within a VM running under the Wind River Titanium Server. 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, actions affecting 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 Titanium Server "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 Wind River Enterprise SNMP Management Information Base (MIB) for system alarms management on a Titanium Server 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 Titanium Server 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. Titanium Server 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 *Titanium Server Administration Guide: Managing Stacks*.

wrs-restapi-doc—OpenStack REST API Extension Documentation

This component contains documentation for Titanium Server extensions to the open source OpenStack REST APIs.

Together with the standard OpenStack REST APIs, you can use these extensions to manage the Titanium Server cloud.

The following extensions are included in the documentation:

- Compute API v2 Titanium 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 Titanium 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 Titanium Extensions
 - Exports Ceilometer samples to CSV files.
- Block Storage API v2 Titanium Extensions
 - Provides support for backing up volumes and snapshots.
- Titanium 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.
- Titanium Patching API v1
 - Allows the user to manage software patches on Titanium Server hosts, including upload, application, installation, removal, deletion and querying of software patches.

Titanium Server 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 and to the login banner for console and SSH access.

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.

You can also modify the system login banner displayed at console or ssh login, and then apply this branding by installing the modified files.

wrs-configutilities—Configuration Utilities

Tools are available to assist in generating and validating Titanium Server controller configuration input **.ini** files and bulk host configuration **.xml** file. Consult the **README** file in the SDK for installation instructions.

The **config_gui** tool prompts you for the information it needs to automatically generate valid configuration files. It is started by running **config_gui** from the command line.

The **config_validator** utility reports on errors in controller configuration input **.ini** files.

wrs-install-log-server—ELK Log Server

This component contains scripts for configuring a server to collect Titanium Server logs via **syslog** for central presentation and analysis.

This package can be used to install and configure the open-source Elasticsearch, Kibana and Logstash (ELK) packages on a remote Linux central logging server to provide a basic remote log server for Titanium Server. You can then enable the remote logging feature on Titanium Server to send logs from all hosts through the active controller to the log server over the OAM network. To enable the remote logging feature, refer to the Titanium Server Administration Guide.

Deploying and Configuring the SDK Components

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.

Please refer to each individual README file for more detailed information.

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 Titanium Server events in order to trigger the required behavior.
- Code API-based interactions with Titanium Server.

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Remote CLI Client

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Overview of Remote CLI SDK Module

The Titanium Server remote CLI software package provides a set of CLI commands that can be installed on a remote workstation and used to manage Titanium Server remotely.

This package is delivered in Titanium Server's **wrs-remote-clients** SDK Module and is installable on any Ubuntu or CentOS host. The host must have network connectivity to the OAM IP address of the Titanium Server system in order to execute remote CLI commands against that Titanium Server system. The Titanium Server remote CLI module supports both an admin role user and a non-admin role user. It also provides support for both HTTP and HTTPS access, and Keystone authentication. This enables access to the Titanium Server CLI without requiring the user to have SSH login access to Titanium Server controllers.



NOTE: For HTTPS access, if Titanium Server uses the self-signed digital certificate included for demonstration purposes, then CLI commands from the remote client must be used in insecure mode (typically by including an **--insecure** option) to accept the certificate without verifying it.

CLI clients supported by Titanium Server's remote CLI access include:

- Nova
- Neutron
- Cinder
- Glance
- Keystone

- Ceilometer
- Heat
- System
- OpenStack (the new OpenStack all-in-one CLI Client)

The remote CLI module does not support the Titanium Server patching CLI Client.

In addition to being able to send CLI commands to a Titanium Server OpenStack system or region, the Remote Titanium Server CLI Client can also be used to send CLI commands to open-source OpenStack and/or non-Titanium Server OpenStack systems or regions.



NOTE: The Titanium Server remote CLI client and the open-source OpenStack remote CLI client cannot be installed on the same host; only one CLI client or the other can be installed on a host.

Authentication

All CLI commands within the Titanium Server remote CLI client are authenticated through Keystone. Authentication can be specified using the CLI, or retrieved from a shell environment. For convenience, you can download an RC file from the Titanium Server web administration interface and use it to export authentication parameters into the Linux shell. For more information, see [Using an Open RC File for Remote CLI Access](#) on page 13.

Installing and Configuring the Remote CLI

You must extract the tar file and run the installation script before using the remote CLI.

Procedure

1. Extract the tar file **wrs-remote-clients-1.0.0.tgz** from the overall tar file downloaded from the WindShare site.
2. Next, extract the files from **wrs-remote-clients-1.0.0.tgz**.
3. Run **install_clients.sh** with **sudo** permissions.

```
$ sudo install_clients.sh
```

To use the Titanium Server remote CLI client, you must establish Keystone credentials. You can use an open RC file to configure a shell with credentials. For more information, see [Using an Open RC File for Remote CLI Access](#) on page 13.

Using an Open RC File for Remote CLI Access

You can generate an Open RC file to configure a shell for remote CLI access.

To generate an Open RC file for a given user, you must be logged in as the appropriate user and tenant.

Procedure

1. Log into the Titanium Server Web administration interface as the applicable user.
2. Select the appropriate tenant.
3. In the Web administration interface page, select **Project > Compute > Access & Security > API Access**.
4. Click **Download OpenStack RC File**.
5. To obtain authentication, source the RC file.

```
$ source tenantName-openrc.sh
```

This establishes a shell with access to the Titanium Server command-line interface. It sets the tenant name, user name, and other shell parameters (including the Titanium Server URL), and prompts for the password. It also prompts for the optional CA Certificate if using HTTPS. For more information about certificates, see *Titanium Server Installation*.

From within the shell, you can issue OpenStack commands directly to the Titanium Server CLI.

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Requirements for Using the SDK

The platform requirements for using the SDK vary depending on the component.

For each individual component, please ensure that your guest platform meets the requirements set out in the appropriate README file.

Additional Resources / Further Reading

Additional information resources are available for SDK users.

- Titanium Server includes vSwitch querying and packet tracing tools for analysis and troubleshooting. For more information, refer to the *Titanium Server Administration Guide*.
- Titanium Server SDK 15.05 Release Notes

This document provides details about changes to the SDK components.

- README file for each component

Each README file contains:

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

- guest target usage / install instructions
- caveats / limitations
- The Wind River [WindShare](#) site

This website provides the link to the Titanium Server SDK, as well as other Wind River products.