

Cloud Agent for Linux

Installation Guide

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Qualys, Inc.
919 E Hillsdale Blvd
4th Floor
Foster City, CA 94404
1 (650) 801 6100

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Preface

Welcome to Qualys Cloud Agent for Linux. This user guide describes how to install cloud agents on hosts in your network.

About Qualys

Qualys, Inc. (NASDAQ: QLYS) is a pioneer and leading provider of cloud-based security and compliance solutions. The Qualys Cloud Platform and its integrated apps help businesses simplify security operations and lower the cost of compliance by delivering critical security intelligence on demand and automating the full spectrum of auditing, compliance and protection for IT systems and web applications.

Founded in 1999, Qualys has established strategic partnerships with leading managed service providers and consulting organizations including Accenture, BT, Cognizant Technology Solutions, Deutsche Telekom, Fujitsu, HCL, HP Enterprise, IBM, Infosys, NTT, Optiv, SecureWorks, Tata Communications, Verizon and Wipro. The company is also a founding member of the Cloud Security Alliance (CSA). For more information, please visit www.qualys.com.

Contact Qualys Support

Qualys is committed to providing you with the most thorough support. Through online documentation, telephone help, and direct email support, Qualys ensures that your questions will be answered in the fastest time possible. We support you 7 days a week, 24 hours a day. Access support information at www.qualys.com/support/.

Get Started

Thank you for your interest in Qualys Cloud Agent!

This document tells you all about installing Qualys Cloud Agent for Linux. We'll tell you about Requirements, Installation Steps, Proxy Configuration, Anti-Virus and HIPS Exclusion / Whitelisting, how to use our Agent Configuration Tool, Best Practices and more.

Qualys Cloud Agent Introduction

Qualys Cloud Platform gives you everything you need to continuously secure all of your global IT assets. Now with Qualys Cloud Agent, there's a revolutionary new way to help secure your network by installing lightweight cloud agents in minutes, on any host anywhere - server, virtual machine, laptop, desktop or cloud instance.

Get informed quickly on Qualys Cloud Agent (CA).

Video Tutorials

Cloud Agent Platform Introduction (2m 10s)

Getting Started Tutorial (4m 58s)

Cloud Agent Platform Availability for Linux

For the most current list of supported cloud agents with versions and modules on the Qualys Cloud Platform, please refer to the following article: Cloud Agent Platform Availability Matrix

A few things to consider...

Cloud Agent requirements

- Your hosts must be able to reach your Qualys Cloud Platform (or the Qualys Private Cloud Platform) over HTTPS port 443. Log into the Qualys Cloud Platform and go to Help > About to see the URL your hosts need to access.

- To install Cloud Agent for Linux, you must have root privileges, non-root with Sudo root delegation, or non-root with sufficient privileges (VM license only). Proxy configuration is supported. Learn more

- The Cloud Agent requires minimum 512 MB RAM if you are using VM/PC. Minimum 1GB RAM is required for VM/PC + FIM.

- Minimum 100 MB of available disk space is required.

What are the installation steps?

Our Cloud Agent UI walks you through the steps to install agents on your hosts. Once the agent is installed you will need to provision it using our agent configuration tool. You might want to configure proxy settings for our agent to communicate with our cloud platform.

Run as user and user's default group

Typically, the agent installation requires root level access on the system (for example in order to access the RPM database). After the Cloud Agent has been installed it can be configured to run in a specific user and group context using our configuration tool. This ability limits the level of access of the Cloud Agent. Learn more

Need help with troubleshooting?

We recommend you inspect the agent's log file located here:

/var/log/qualys/qualys-cloud-agent.log

Learn more

Troubleshooting

Error messages

Privileges - what are my options?

The Qualys Cloud Agent offers multiple deployment methods to support an organization's security policy for running third-party applications and least privilege configuration. As vulnerability and configuration assessments need to be comprehensive with authenticated scans, the Cloud Agent installs as a daemon with SYSTEM level privileges and does not require authentication records to access local system data and artifacts.

This can be updated to any of the following options.

1.Use a non-root account with sufficient privileges:

The specific privileges required are:

- Execute "rpm" for automatic update
- Agent requires certain commands to operate which vary from environment to environment.

Non-root users with limited access may not be able to access certain areas of the system, such as applications installed with root privileges, and may have insufficient results or lack of functionality.

2.Use a non-root account with Sudo root delegation

Either the non-root user needs to be assigned direct sudo privileges assigned or through a group membership. Ensure that NOPASSWD option is configured.

Here is an example of an agent user entry in sudoers file (where "agentuser" is the username for the account that you use to install the Linux Agent):

```
%agentuser ALL=(ALL) NOPASSWD: ALL
```

You can also use secure Sudo. When you set UseSudo=1, the agent tries to find the custom path in the `secure_path` parameter located in the `/etc/sudoers` file. This can be used to restrict the path from where commands are picked up during data collection. If this parameter is not set, the agent refers to the PATH variable to locate the command by running sudo sh.

3.Use an account with root privileges

Typically, you may start with a comprehensive assessment for vulnerabilities and misconfigurations, including privilege access for administrators and root. This agent configuration provides the Cloud Agent for Linux with all the required privileges (for example to access the RPM database) to conduct a complete assessment on the host system and allows for high fidelity assessments with less management overhead.

However, after the Qualys Cloud Agent is installed, it can be configured to run as a specific user and group context using our configuration tool. When you create a non-privileged user with full sudo, the user account is exclusive to the Qualys Cloud Agent and you can disable SSH/ remote login for that user if needed.

The Qualys Cloud Agent does not require SSH (Secure Shell). You can also assign a user with specific permissions and categories of commands that the user can run. If the path is not provided in the command, the system provides the path and only a privileged user can set the PATH variables.

Considerations to Select an Option

The Qualys Cloud Agent uses multiple methods to collect metadata to provide asset inventory, vulnerability management, and Policy Compliance (PC) use cases. Some of these methods include running commands to collect a list of installed applications and versions, running processes, network interfaces, and so on.

Root access is required for some detections, including most detections that are part of PC (reading global config files related to system-wide security settings and gathering information from more than one user account). There is an exceptionally low number of QIDs in VM module that require root, other QIDs run fine without root. However, those that do need elevated privileges are likely to result into False negatives, if the user does not have the necessary privileges.

Qualys also provides a scan tool that identifies the commands that need root access in your environment. For this scan tool, connect with the Qualys support team. You can decide whether to elevate/grant the required permissions to run the commands or risk losing visibility to the information. You can grant permissions only for the specific commands/binaries that are failing.

Qualys sanitizes the PATH variable to remove any directory which is world writable as a security measure, which is designed to ensure that the Qualys Cloud Agent does not execute any custom-made scripts. This provides the option to harden or whitelist the path, where you can configure the set of allowed directories, on which the commands can be executed during our data collection.

Qualys uses the system-appended paths to run or assume root integrity. As per NIST SP 800-53 Revision 5, control for Vulnerability Monitoring and Scanning RA-5 indicates that in certain situations, the nature of the vulnerability scanning may be more intrusive and require privileged access authorization to selected system components to facilitate more thorough vulnerability scanning.

For **PC scans**, we require the sudo/root privilege. With non-root privilege, the PC report is unreliable and does not provide a complete covering of CIS&DISA policies. As per CIS benchmarks, root privileges are required for specific detections, including most detections that are part of PC (reading global config files related to system-wide security settings and gathering information from more than one user account). Refer to any CIS benchmark (for example, https://workbench.cisecurity.org/benchmarks/493) on Linux which broadly assumes that operations are being performed as the root user.

Following is the paragraph from the CIS benchmark document:

“The guidance within broadly assumes that operations are being performed as the root user. Non-root users may not be able to access certain areas of the system, especially after remediation has been performed. It is advisable to verify the root user’s path integrity and the integrity of any programs being run prior to execution of commands and scripts included in this benchmark.”

For **Patch Management**, **Endpoint Detection and Response (EDR)**, and **File Integrity Monitoring (FIM)** modules, use an account with root privileges to hook into a system, perform real-time-time monitoring, to install patches etc., as these modules are not dependent on any signatures/command execution.

Installation

It's easy to install Cloud Agent for Linux. We'll walk you through the steps quickly.

Qualys provides installers and packages for each supported operating system that are coded for each Qualys platform. It's not possible to connect an agent coded for one platform to another platform. Organizations can use their existing software distribution tools (SCCM, BigFix, rpm, Casper, etc.) to install the agent into target machines. Cloud Agent can be installed into gold images including VM templates and cloud provider images such as Amazon AWS, Microsoft Azure, and Google Compute Platform.

The platform supports detection of duplicate agent IDs and automatically re-provisions the duplicate agents. The section Install Agents in Gold Images describes how to install an agent into a gold image without initial provisioning. This is the recommended method to prevent duplicate asset records.

Customers using software distribution tools must package the Qualys-provided installer along with the specific Activation Key and Customer ID strings to install properly. Do not package up the artifacts that are installed by the agent into your own installer as the installation environment is keyed for that specific machine when the agent is installed; doing so will create duplicates that the platform may not be able to easily de-duplicate.

Keep in mind - Depending on your environment, you might need to take steps to support communications between agent hosts on your network and the Qualys Cloud Platform.

Tips and best practices

How to download Agent Installer

Installation steps

Proxy configuration

Multiple Proxy Server support in Proxy URL (Linux Agent 2.5 or later)

Need to Bypass Proxy?

Using the hostid from previous installation

If you are reinstalling the agent on the same machine, and you want to reuse the earlier hostid, set HostIdSearchDir to /root/hostdir.

Tips and best practices

What is an activation key? You'll need an agent activation key to install agents. This provides a way to group agents and bind them to your subscription with Qualys Cloud Platform. You can create different keys for various business functions and users.

Benefits of adding asset tags to an activation key Tags assigned to your activation key will be automatically assigned to agent hosts. This helps you manage your agents and report on agent hosts.

Running the agent installer You'll need to run the installer from an elevated command prompt, or use a systems management tool using elevated privileges.

Be sure to activate agents to provision agents for modules - Vulnerability Management (VM), Policy Compliance (PC), or File Integrity Monitoring (FIM). Activating an agent for a module consumes an agent license. You can set up auto activation by defining modules for activation keys, or do it manually in the Cloud Agent UI.

What happens if I skip activation? Agents will sync inventory information only to the cloud platform (IP address, OS, DNS and NetBIOS names, MAC address), host assessments will not be performed.

How many agents can I install? You can install any number of agents but can activate an agent only if you have a license. The Agents tab in the Cloud Agent UI tells you about your installed agents.

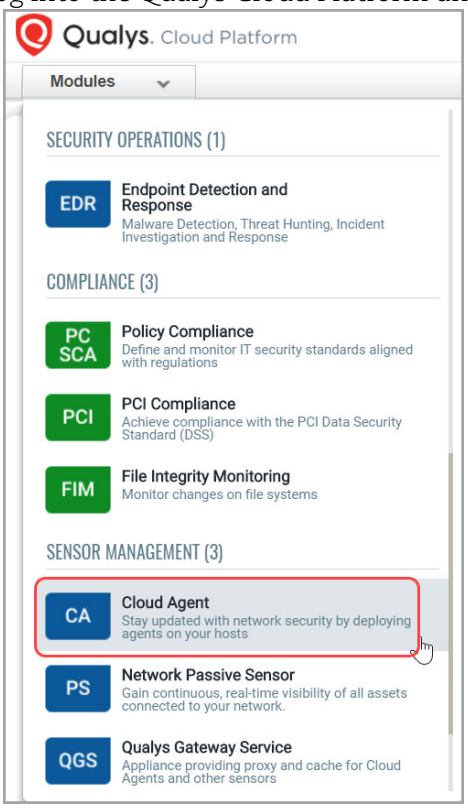
Check to be sure agents are connected Once installed agents connect to the Qualys Cloud Platform and provision themselves. You can see agent status on the Agents tab - this is updated continuously. If your agent doesn't have a status, it has not successfully connected to the cloud platform and you need to troubleshoot.

net-tools package You may need to install the net-tools package on agent endpoints, if not already present, in order to run network commands. This is required on systems running Red Hat Enterprise Linux, Oracle Enterprise Linux, and CentOS version 7.1 since some commands like netstat, /sbin/ifconfig, route are deprecated.

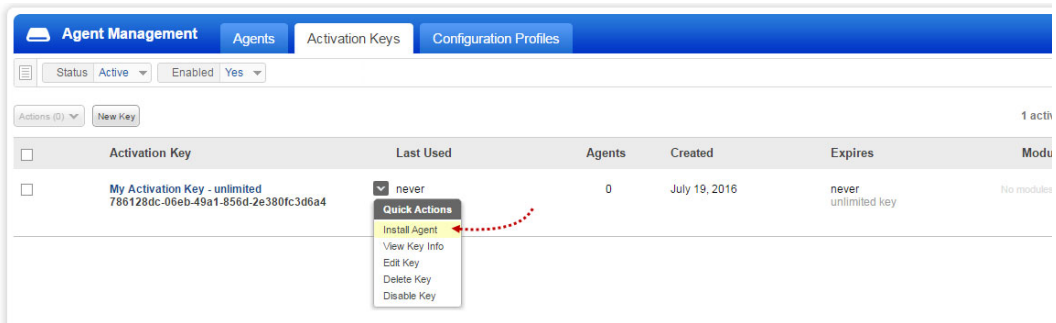
How to download Agent Installer

Here's how to download an installer from the Qualys Cloud Platform and get the associated Activation ID and Subscription ID.

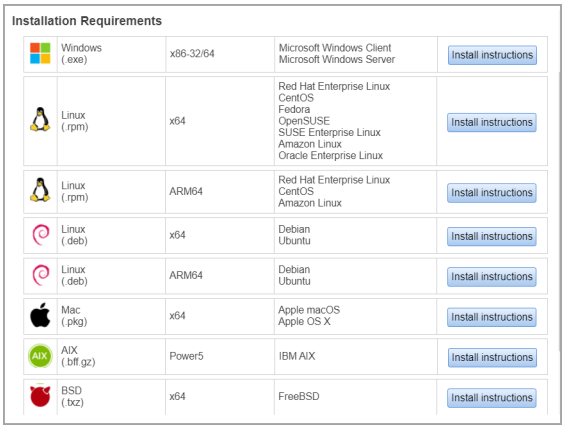
Log into the Qualys Cloud Platform and select **CA** for the Cloud Agent module.



Choose an activation key (create one if needed) and select **Install Agent** from the Quick Actions menu.



Click **Install instructions** for the target host.



What happens? The Agent installer is downloaded to your local system, and in the UI you'll see the associated Activation key ID and Subscription ID - copy and paste this to a safe place, you'll need it to complete the installation.

Installation steps

What you'll need

To install cloud agents, you'll need to download the Cloud Agent installer and get the associated ActivationID and CustomerID. Just log into the Qualys Cloud Platform, go to the Cloud Agent (CA) module, and follow the installation steps for Linux (.rpm) or Linux (.deb) to get everything you need.

Cloud Agent requirements

Steps to install Agents

1. Copy the Qualys Cloud Agent installer onto the target host.

2. Install the Qualys Cloud Agent using the following commands for x64. Depending on the package(x64 or ARM64), following commands varies.

Linux (.rpm)

```
> sudo rpm -ivh qualys-cloud-agent.x86_64.rpm
> sudo /usr/local/qualys/cloud-agent/bin/qualys-cloud-agent.sh
ActivationId=xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx
CustomerId=xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx
```

Linux (.deb)

```
> sudo dpkg --install qualys-cloud-agent.x86_64.deb
> sudo /usr/local/qualys/cloud-agent/bin/qualys-cloud-agent.sh
ActivationId=xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx
CustomerId=xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx
```

Install Agents in Gold Images

These steps are similar to installing on Linux (.rpm) hosts, with an extra step to restart the Qualys Cloud Agent service and AMI instance.

1. Start the Gold Image instance.

2. Copy the Qualys Cloud Agent RPM onto the instance.

3. Install the Qualys Cloud Agent RPM using the following command:

```
> sudo rpm -ivh qualys-cloud-agent.x86_64.rpm
```

4. Stop Qualys Cloud Agent service:

```
> sudo service qualys-cloud-agent stop
```

5. Run the Qualys Cloud Agent installation command:

```
> sudo /usr/local/qualys/cloud-agent/bin/qualys-cloud-agent.sh
ActivationId=xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx
CustomerId=xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx
```

6. Stop the instance and create an image out of the instance. This completes the bake-in process.

When the instance is started it will activate the Cloud Agent which will provision itself and continue functioning as expected.

What happens next?

We'll start syncing asset data to the cloud!

Once installed an agent connects to the Qualys Cloud Platform and provisions itself. We would expect you to see your first asset discovery results within a few minutes. The first assessment scan in the cloud takes some time, after that scans complete as soon as new host metadata is uploaded to the cloud platform.

Troubleshooting

You'll find helpful information in Qualys online help.

Learn more

Troubleshooting

Error messages

Cloud agents installed on RHEL 5.4 may throw SSL communication errors while trying to communicate with the Qualys Platform. This happens when the certificate files are not present on the host asset. Click here for solution to fix the issue.

Cloud agents installed on SUSE Linux Enterprise 11 may throw a file not found error for the certificate ca-bundle.crt when trying to communicate with the Qualys Platform. This happens when the certificate files are not present on the host asset. Click here for solution to fix the issue.

You might also be interested in...

Proxy configuration

Multiple Proxy Server support in Proxy URL (Linux Agent 2.5 or later)

Need to Bypass Proxy?

Using the hostid from previous installation

If you are reinstalling the agent on the same machine, and you want to reuse the earlier hostid, set HostIdSearchDir to /root/hostdir.

Proxy configuration

Good to Know By default the Cloud Agent for Linux will operate in non-proxy mode. The agent can be configured to use an HTTPS proxy for internet access.

Note:

- For Azure Security Center (ASC), use an HTTP proxy.

- If proxy connection fails then agent will NOT attempt a direct connection outbound (Fail Closed).

What are my options?

The agent can be configured to use an HTTPS proxy in one of these ways:

1) /etc/sysconfig/qualys-cloud-agent - applies to Cloud Agent for Linux (.rpm)

2) /etc/default/qualys-cloud-agent - applies to Cloud Agent for Linux (.deb)

3) /etc/environment - applies to Cloud Agent for Linux (.rpm) and Linux (.deb)

Tip - Option 3) is a better choice if the systemwide proxy will be used by the agent.

Tell me the steps

Here are the steps to enable the Linux agent to use a proxy for communication with our cloud platform:

1) if /etc/sysconfig/qualys-cloud-agent file doesn't exist create it

2) add 1 of the following lines to the file (1 line only):

```
https_proxy=https://[<username>:<password>@]<host>[:<port>]
qualys_https_proxy=https://[<username>:<password>@]<host>[:<port>]
```

where <username> and <password> are specified if the https proxy uses authentication. If special characters are embedded in the username or password (e.g. @, :, $) they need to be url-encoded. where <host> is the proxy server's IPv4 address or FQDN. where <port> is the proxy's port number.

If the proxy is specified with the https_proxy environment variable, it will be used for all commands performed by the Cloud Agent. If the proxy is specified with the qualys_https_proxy environment variable, it will only be used by the Cloud Agent to communicate with our cloud platform.

Note: You can use the Proxy Configuration Encryption Utility to encrypt the user name and password that you provide to the proxy environment variable.

3) change the permissions using these commands:

Linux (.rpm)

```
chown <cloud_agent_user> /etc/sysconfig/qualys-cloud-agent
chmod 600 /etc/sysconfig/qualys-cloud-agent
```

Linux (.deb)

```
chown <cloud_agent_user> /etc/default/qualys-cloud-agent
chmod 600 /etc/default/qualys-cloud-agent
```

Where `<cloud_agent_user>` is a user configured through the Configuration Tool.

4) restart qualys-cloud-agent service using the following command:

```
service qualys-cloud-agent restart
```

Need to Bypass Proxy?

By default the Cloud Agent for Linux will operate in non-proxy mode. But in the event, if you are already using proxy mode and need to switch to non-proxy mode, you need to configure agent to use no_proxy in /etc/environment. Environment variable 'no_proxy' is used to bypass proxy. Curl library honors 'no_proxy' environment variable. If 'no_proxy' is set, curl will not use proxy even if any proxy environment variable is set.

Here are the steps to enable the Linux agent to use a no_proxy for communication with our cloud platform:

1) Edit /etc/environment file.

2) Add following line (bold faced) where qualys_https_proxy is mentioned:

```
qualys_https_proxy=https://[<username>:<password>@]<host>[:<port>]
no_proxy=<pod domain name>
```

Note: For init.d based systems, you need to prefix 'export' to 'no_proxy' line.

Multiple Proxy Server support in Proxy URL (Linux Agent 2.5 or later)

The Cloud Agent has support for multiple proxy servers defined in the Proxy URL. Cloud Agent will use the first proxy server in the list for its connection, if it fails to connect, the agent will use the next configured proxy server in the list until all proxy servers are attempted. You can have up to five proxy servers included in the proxy URL.

Each time the Cloud Agent connects to the Qualys Platform, it always uses the first proxy server in the ordered list. You can use the Configuration Tool to the set the proxy order to be sequential or random. The agent does not maintain a history of last proxy server used.

This proxy configuration can be used with the Qualys Gateway Service or third-party proxy servers. There is no requirement that the failover proxy servers need to be on the same subnet as the first proxy server; as long as the Cloud Agent can connect to other proxy servers even on other subnets, the agent will use those proxy server(s) if the first proxy server is not available.

You can configure multiple proxies in any of the files mentioned in the section What are my options?

Multiple proxies can be configured with qualys_https_proxy or https_proxy environment variables. It is recommended that you provide multiple proxies in the qualys_https_proxy environment variable.

The following example shows how to set multiple proxies:

```
qualys_https_proxy="https://[<username>:<password>@]<host1>:<port>;
https://[<username>:<password>@]<host2>:<port>;
https://[<username>:<password>@]<host3>:<port>"
```

The list of proxies must be given in double quotes ("...") and separated by a semi-colon (;), and if ";" is embedded in username/password, you must url-encode it. You can use the Proxy Configuration Encryption Utility to encrypt the user name and/or password that you provide to the proxy environment variable.

You can combine multiple proxy certificates into a single file, and place it at same location as earlier /etc/qualys/cloud-agent/cert/ca-bundle.crt. Ensure that all certificates are valid, else you might get SSL/certificate errors.

Anti-Virus and HIPS Exclusion / Whitelisting

Have Anti-Virus or HIPS software installed? It's required that the following files, directories, and processes are excluded or whitelisted in all security software installed on the system in order to prevent conflicts with the Cloud Agent.

Directory list used by Cloud Agent installation

```
/etc
/etc/init.d
/etc/qualys
/etc/qualys/cloud-agent
/etc/qualys/cloud-agent/.centos
/etc/qualys/cloud-agent/cert
/etc/qualys/cloud-agent/.suse
/etc/qualys/cloud-agent/.systemd
/usr/local
/usr/local/qualys
/usr/local/qualys/cloud-agent
/usr/local/qualys/cloud-agent/bin
/usr/local/qualys/cloud-agent/lib
/usr/share/doc
/usr/share/doc/qualys-cloud-agent-<version>
```

Agent daemon process "qualys-cloud-agent"

The agent runs as daemon process "qualys-cloud-agent".

The agent runs various read-only commands during the scanning process. These are the same commands run by a scan using a scanner appliance. Learn more

https://community.qualys.com/message/16520

Some transient files are created during agent execution

`/usr/local/qualys/cloud-agent/Config.db`
- this is the current agent configuration

`/usr/local/qualys/cloud-agent/manifests/*.db`
- this contains manifests used during agent based scans

Using the hostid from previous installation

If you are reinstalling an agent on a host and you wish to use the same hostid used in the previous installation, set the hostid directory location to the same location used in the previous installation.

For example, let's say in the previous installation you use HostIdSearchDir=/root/hostdir while setting the activation key, it creates hostid under /root/hostdir/qualys/. When you uninstall the agent it doesn't remove /root/hostdir/qualys/hostid.

If you are reinstalling the agent on the same machine, and you want to reuse the earlier hostid, set HostIdSearchDir to /root/hostdir.

Configuration Tool

The Agent Configuration Tool gives you many options for configuring Cloud Agent for Linux after installation. You'll find this tool at /usr/local/qualys/cloud-agent/qualys-cloud-agent.sh.

Our configuration tool allows you to:

- Provision agents

- Configure logging - set a custom log level and log file path

- Enable Sudo to run all data collection commands

- Configure the daemon to run as a specific user and/or group

- Change the ActivationID, CustomerID and/or platform configuration

The Agent will automatically pick up changes made through the configuration tool so there is no need to restart the agent or reboot the agent host.

Note: While switching from low privileged user to high privileged user, it is not recommended to directly run the configuration tool on the already running agents. The user should first stop the agent and then run the configuration tool to switch to a high privileged user.

Command line options

qualys-cloud-agent.sh supports these command line options.

Configuration option	Description
ActivationId	A valid activation key ID (UUID). This value is obtained from the Cloud Agent UI (go to Activation Keys, select a key then View Key Info). This parameter is required to provision an agent.
CustomerId	A valid customer ID (UUID). This value is obtained from the Cloud Agent UI (go to Activation Keys, select a key then Install Agent). This parameter is required to provision an agent.

Configuration option	Description
LogLevel	A log level (0-5). A higher value corresponds to more verbosity. Default is mapped to information (3). 0 - mapped to fatal 1 - mapped to error 2 - mapped to warning 3 - mapped to information 4 - mapped to debug 5 - mapped to trace **Note**: In a debug/trace mode, the log file may contain sensitive command-line parameters or passwords for configuration files, if the passwords are in clear-text format. Qualys recommends you use a password vault or token-based authentication instead of storing passwords in the configuration file. Storing passwords in configuration files can result in non-compliance with ISO, SOC, PCI-DSS, HIPAA, and FedRAMP guidelines.
LogFileDir	A full path to the log file. By default the path is /var/log/qualys/
UseSudo	Set to 1 to run all data collection commands using the sudo escalation method. By default sudo is not used (0). Limitations of using UseSudo=1
SudoCommand	A command for privilege escalation such as SudoCommand pbrun. If the command has spaces it must be double quoted.
User	A valid username if you want the daemon to run as a certain user. The daemon will start as root but will drop to the specified user, and continue running as the specified user.
Group	A valid group name if you want the daemon to run as a certain group. The daemon will switch to the specified group (if any).
HostIdSearchDir	(Available using Linux Agent 1.3.3 and later) The directory where the host ID file is located. This file contains a host ID tag assigned to the system by Qualys. By default the directory is /etc/ and the location of the host ID file is /etc/qualys/hostid
LogDestType	(Available using Linux Agent 1.3.3 and later) The destination of log lines generated by Linux Agent. Set to **file** or **syslog**. If set to **file** specify the location of the log file. By default the destination is a log file: /var/log/qualys/qualys-cloud-agent.log

Configuration option	Description
ServerUri	Use this option to migrate the agent from one Qualys subscription to another (on same POD or PCP). ServerUri takes the URL of the Qualys shared Pod or PCP you want to migrate the Agent to, in the following format: `ServerUri=<http_url>/CloudAgent` where `<http_url>` is the URL of the Qualys shared Pod or PCP. If the subscription is on the same POD, the ServerUri is the same. Use this option along with ActivationId and CustomerId in order to move the agent to another Qualys shared Pod or PCP. **Note**: The agent requires the appropriate Activation ID and Customer ID that are on the new subscription/platform. The original IDs cannot be used as they are unique per subscription.
CmdMaxTimeOut	Execution of a command is dropped if the time taken to execute is more than the specified value. Default timeout is 1800 seconds (30 minutes).
ProcessPriority	Specify the Linux niceness scale between -20 to 19 to set a priority for the Qualys cloud agent process. The lower the number the more priority the agent process gets. Default value is zero.
UseAuditDispatcher	Set UseAuditDispatcher to 1 if you want to run FIM along with auditd enabled. Agent version 2.0.2 required auditd to be disabled on the host. These agents when upgraded to 2.1 through selfpatch retain this setting where UseAuditDispatcher is set to 0. Agents with 1.x version are set with UseAuditDispatcher=1 on selfpatch to 2.1. Fresh installation of 2.1 agent comes with UseAuditDispatcher=1 (by default) where you can run FIM along with auditd enabled.
QualysProxyOrder	If you are using multiple proxies, set the proxy order to be sequential or random. Sequential: `QualysProxyOrder=sequential` OR `QualysProxyOrder=seq` Random: `QualysProxyOrder=random`
MaxRandomScanInterval	(This is supported for Agent version between 2.6.4 to 3.3) This option will enabled the Agent to upload at the configured VM scan interval and adding a randomized interval. The random interval can be any value between 0 and the configured MaxRandomScanInterval seconds. MaxRandomScanInterval can be set to any value between 0 (default) to 4294967295.
ScanDelayVM	(This is supported for Agent version greater than or equal to 4.6) The time added to the start of vm scanning for new installs and new manifest download. Default value is 0 (zero) and that means no delay added. Range is between 0 to 43200.

Configuration option	Description
ScanDelayPC	(This is supported for Agent version greater than or equal to 4.6) The time added to the start of pc scanning for new installs and new manifest download. Default value is 0 (zero) and that means no delay added. Range is between 0 to 43200.
MaxRandomScanIntervalVM	(This is supported for Agent version greater than or equal to 4.6) This option will enabled the Agent to upload at the configured VM scan interval and adding a randomized interval. The random interval can be any value between 0 and the configured MaxRandomScanIntervalVM seconds. MaxRandomScanIntervalVM can be set to any value between 0 (default) to 43200.
MaxRandomScanIntervalPC	(This is supported for Agent version greater than or equal to 4.6) This option will enabled the Agent to upload at the configured PC scan interval and adding a randomized interval. The random interval can be any value between 0 and the configured MaxRandomScanIntervalPC seconds. MaxRandomScanIntervalPC can be set to any value between 0 (default) to 43200.

Limitations of using UseSudo=1

If you configure the cloud agent for **UseSudo=1** to run commands using the sudo escalation method, you may face any of the following issues:

- Commands run by the cloud agent or any script added in the cloud agent manifest, fail to get the custom path set in the PATH environment.

- Scan results show empty values for service_list, bios_info, and service_info, when the agents fails to find related path in the PATH environment.

This happens because when you set UseSudo=1, the agent tries to find the custom path in the **secure_path** parameter located in the /etc/sudoers file. If this parameter is not set, the agent then tries to find the custom path in the path that is used when you run **sudo sh**.

To resolve this issue, add your custom path or the path used by the agent while scanning for service_list, bios_info, and service_info, to the secure_path parameter. If you have disabled secure_path parameter, add the respective paths to the path that is used when you run sudo sh.

Alternatively, you can configure the agent for UseSudo=0.

Note: For RHEL platforms, if you run argument UseSudo=0 with agent configuration tool and do revocation, qualys-cloud-agent process is still **running** in background. Ideally, qualys-cloud-agent process should have stopped after revocation. This is known limitation with UseSudo=0 while it works for UseSudo=1.

Use cases

Example 1 – Provision Agent

The following example shows how to provision Qualys Cloud Agent. Please note that this method of activation will assume that root user should be used by the agent.

```
$ /usr/local/qualys/cloud-agent/bin/qualys-cloud-agent.sh
ActivationId="022224c8-31c7-11e5-b4f7-0021ccba987e"
CustomerId="146556fa-31c7-11e5-87b6-0021ccba987e"
```

Example 2 – Use non-root account

The following example shows how to configure Qualys Cloud Agent to use a non-root account for running data collection commands.

```
$ /usr/local/qualys/cloud-agent/bin/qualys-cloud-agent.sh
ActivationId="022224c8-31c7-11e5-b4f7-0021ccba987e"
CustomerId="146556fa-31c7-11e5-87b6-0021ccba987e" UseSudo=1
User=scanuser
Group=wheel
```

Keep in mind - A new group needs to exist when the configuration command runs. The expectation is that the non-root user will be added to the specified group to allow it to access binary and temporary files that comprise Qualys Cloud Agent. In order to perform unattended data collection the non-root user needs to have sudo privilege without a password.

Example 3 – Raise logging level

It is also possible to instruct Qualys Cloud Agent to log events at a higher than normal logging level using the following command:

```
$ /usr/local/qualys/cloud-agent/bin/qualys-cloud-agent.sh
LogLevel=4
```

Note: We've omitted the ActivationID and CustomerID parameters to illustrate the configuration tool can be used to adjust the log level after provisioning.

Example 4 – Change platform

The following example shows how to configure Qualys Cloud Agent to re-provision to a new platform:

```
qualys-cloud-agent.sh ActivationId="022224c8-31c7-11e5-b4f7-
0021ccba987e" CustomerId="146556fa-31c7-11e5-87b6-0021ccba987e"
ServerUri="https://qagpublic.qg2.apps.qualys.com/CloudAgent"
```

On Demand Scan

You can run an On Demand Scan to instruct the agent to immediately scan as long as the agent is not already scanning. The On Demand Scan runs independently of the interval scan that you configure in the Configuration Profile and will reset the scan interval on the local agent after a successful scan.

Prerequisite: The agent must be activated for that specific Qualys application for which you are running the On Demand Scan. When activated, the Agent downloads manifests for that application from the Qualys platform; if the manifest is not present for that type, On Demand Scan will not execute.

Use the cloudagentctl.sh script to run the OnDemand Scan. You'll find this script at /usr/local/qualys/cloud-agent/bin/.

```
>#  ./cloudagentctl.sh action={demand} type={vm|pc|inv|udc|sca|vmpc}
cputhrottle={0-1000}
```

Where action and type are mandatory parameters.

action is "demand", meaning an On Demand Scan.

type is the application for which you want to run the scan (the agent must be activated for the respective application first).

Note: "vmpc" is a legacy application manifest and most likely may not be present.

cputhrottle is 1-1000. Default is 0, which is no throttling.

For example, to initiate an On Demand Scan for the Vulnerability Management application (VM) with no throttling:

```
>#  ./cloudagentctl.sh action=demand type=vm
```

The script calls the agent to run asynchronously in the background and returns to the shell prompt. The script prints a ControlId that you can track in the log file. The ControlId is the timestamp of the script initiation, e.g. On-Demand-Request ControlId: 20200427151136.0

The On Demand Scan logs to the same log file as the agent at /var/log/qualys/qualys-cloud-agent.log. You can find the logging for the scan initiation and completion in the log file.

```
2020-04-27 15:11:36.474 [qualys-cloud-
agent][9710]:[Information]:[140048573286144]:OnDemandRequest Params:
ControlID=20200427151136.0, Action=OnDemand, Type=VM, CPUThrottle=0"
```

If the agent is currently performing an interval scan for the same type, the On Demand Scan will delay waiting for the currently running scan to finish. The script will print a log line with this status.

```
2020-04-27 15:11:36.474 [qualys-cloud-
agent][9710]:[Information]:[140048573286144]:Interval Event of same type
is in progress with state INTERVAL_EVENT_SCAN
```

```
2020-04-27 15:11:36.474 [qualys-cloud-
agent][9710]:[Information]:[140048573286144]:OnDemand request for
Control ID : 20200427151136.0 will be delayed.
```

If the script errors due to the manifest file not being present, check whether the Cloud Agent is activated for that particular application. If agent is activated but you still get manifest related errors while running the On Demand Scan command, the agent may not have downloaded the manifest for that application. You can manually force a manifest download by deactivating then reactivating the agent for that application from the Cloud Agent user interface module. If that doesn't correct the issue, contact Qualys Support.

Once an On Demand Scan is complete the results are logged in the log file located at /var/log/qualys/qualys-cloud-agent.log.

Best Practices

Here are some best practices for managing your cloud agents. Refer to the Cloud Agent Technical Whitepaper for additional documentation and best practices.

Upgrading Cloud Agent

The Qualys Cloud Platform can be used to upgrade agents to newer available versions when agents check into the platform, depending on the settings in the Configuration Profile.

Software distribution tools can package the Cloud Agent installer of a newer version to upgrade already installed agents. In those cases the agents are not configured to auto-upgrade versions.

Use following commands to upgrade your Cloud Agent:

Linux RPM based system

```
rpm -Uvh package_file.rpm
```

Linux Debian based system

```
dpkg -i package_file.deb
```

Note: If needed, restart agent using **`/usr/local/qualys/cloud-agent/bin/qagent_restart.sh`** command.

Uninstalling Cloud Agent

Uninstalling the agent from the Cloud Agent module UI or API

When you uninstall a cloud agent using the Cloud Agent module user interface or Cloud Agent API, the agent and license is removed from the Qualys subscription. We'll also purge the associated agent host record and scan results for any licensed modules, i.e. Vulnerability Management, Policy Compliance.

Uninstalling the agent from the host itself

When you uninstall a cloud agent from the host itself (using the uninstall utility), the agent record, its license usage, and scan results are still present in the Qualys subscription. In order to remove the agent's host record, license, and scan results use the Cloud Agent module user interface or Cloud Agent API to uninstall the agent.

Linux RPM based system

```
sudo rpm -e qualys-cloud-agent
```

Linux Debian based system

```
sudo dpkg --purge qualys-cloud-agent
```

Agentless Tracking and Cloud Agents

Say you're already using Agentless Tracking on hosts and now you're ready to install Cloud Agent on the same hosts. You'll want to use the same host ID tag installed on the host. This will help you to avoid duplicate assets for the same host in your account.

You can configure the location of the host ID file installed on your Linux hosts with the recommended default of /etc (the agent will create/use a 'qualys' directory under /etc). This is recommended best practice if you are interested in using Linux Agent and Agentless Tracking to evaluate the same host.

Once configured, the same file with the same host ID tag is accessed by our service when the host is evaluated using 1) Agentless Tracking AND 2) Cloud Agent.

What are the steps?

1) Check your Unix authentication record

This is the record you're using to access the system using Agentless Tracking. You'll see the location of the host ID file configured for the authentication record.

Want help with Agentless Tracking? Log into the Qualys Cloud Platform, go to Help > Contact Support and search for **Agentless Tracking**.

2) Install the Agent

Use the agent configuration tool (qualys-cloud-agent.sh) and the HostIdSearchDir option to install the Linux Agent and configure the location of the host ID file. Be sure this location matches the location defined in your authentication record. By default HostIdSearchDir is set to /etc/. To stay consistent with the Agentless Tracking location Qualys appends "/qualys/hostid" to the path provided.

Example - Install as root user and set host ID file to /mydir/qualys/hosted

```
$ /usr/local/qualys/cloud-agent/bin/qualys-cloud-agent.sh
ActivationId="022224c8-31c7-11e5-b4f7-0021ccba987e"
CustomerId="146556fa-31c7-11e5-87b6-0021ccba987e"
HostIdSearchDir="/mydir/"
```

Known Issues

Here are some known issues/limitations in the cloud agents.

- FIM rules displayed using the command **`auditctl`** do not show system calls. The rules work successfully even though system calls are not seen.
- There is audit limitation to set the full directory path while configuring profile for FIM. You can set the limited path in the Rule Details from module - FIM > Configuration > Profiles. Use Case: If you have a file (for example, a file with **`filename`**) under directory `/root/test/directoryname` and if you delete **`directoryname`**, audit system does not provide correct file path. In that case the file present with `/root/test/directoryname/filename` is considered as `/root/test/filename` by fimc process.
- Audit rules should not have rules to exclude EOE and CWD audit records in order to parse a event in the agent. You need to restart your agent after removing these rules.
- For CentOS 7.6.1810, Red Hat Enterprise Linux 7.6, and Amazon Linux 2, rename event with **`mv`** command does not work if you have created FIM config profile with rule to rename a directory or a file.
- Cloud Agent with version 3.0 or later terminates when user configures invalid sudo command using qualys-cloud-agent.sh script or HostID file has insufficient permissions.
- If the remediation manifest is received during polling before clone detection, it will be executed by both the agents. If the clone machine acknowledges manifest before the master starts polling, master agent won't receive remediation manifest, but the status will be updated as per status reported by the clone instance.
- Remediation manifest execution fails if you switch from root user to non-sudo user while execution is in progress. You must execute the remediation manifest with the root user.
- For the Debian based systems, software installedDate is always shown as 1970-01-01 as these systems do not save the date in their package database. Therefore, the cloud agent cannot capture date and it’s shown default as 1970-01-01

Certificate Support on RHEL 5.4

Cloud agent installed on RHEL 5.4 may throw this error while trying to communicate with the Qualys Platform. This happens when the certificate files are not present on the host asset.

```
Http request failed: Peer certificate cannot be authenticated with
given CA certificates: SSL certificate problem: unable to get
local issuer certificate
```

To fix this issue, you must manually create the certificate files, and place them in the appropriate location on the host asset.

Create the two cert files: cert1.crt and cert2.crt. Paste the contents in a text editor, and then save the file with the extension ".crt".

Use the following commands to append the contents of **cer1.crt** and **cert2.crt** at the end of **/etc/pki/tls/certs/ca-bundle.crt**

```
cat cert1.crt >> /etc/pki/tls/certs/ca-bundle.crt
cat cert2.crt >> /etc/pki/tls/certs/ca-bundle.crt
```

Now restart the QAgent Service.

cert1.crt

subject= /C=US/O=DigiCert Inc/CN=DigiCert SHA2 Secure Server CA

issuer= /C=US/O=DigiCert Inc/OU=www.digicert.com/CN=DigiCert Global Root CA

```
-----BEGIN CERTIFICATE-----
MIIElDCCA3ygAwIBAgIQAf2j627KdciIQ4tyS8+8kTANBgkqhkiG9w0BAQsFADBh
MQswCQYDVQQGEwJVUzEVMBMGA1UEChMMRGlnaUNlcnQgSW5jMRkwFwYDVQQLExB3
d3cuZGlnaWNlcnQuY29tMSAwHgYDVQQDExdEaWdpQ2VydCBHbG9iYWwgUm9vdCBD
QTAeFw0xMzAzMDgxMjAwMDBaFw0yMzAzMDgxMjAwMDBaME0xCzAJBgNVBAYTAlVT
MRUwEwYDVQQKEwxEaWdpQ2VydCBJbmMxJzAlBgNVBAMTHkRpZ2lDZXJ0IFNIQTIg
U2VjdXJlIFNlcnZlciBDQTCCASIwDQYJKoZIhvcNAQEBBQADggEPADCCAQoCggEB
ANyuWJBNwcQwFZA1W248ghX1LFy949v/cUP6ZCWA1O4Yok3wZtAKc24RmDYXZK83
nf36QYSvx6+M/hpzTc8zl5CilodTgyu5pnVILR1WN3vaMTIa16yrBvSqXUu3R0bd
KpPDkC55gIDvEwRqFDu1m5K+wgdlTvza/P96rtxcflUxDOg5B6TXvi/TC2rSsd9f
/ld0Uzs1gN2ujkSYs58O09rg1/RrKatEp0tYhG2SS4HD2nOLEpdIkARFdRrdNzGX
kujNVA075ME/OV4uuPNcfhCOhkEAjUVmR7ChZc6gqikJTvOX6+guqw9ypzAO+sf0
/RR3w6RbKFfCs/mC/bdFWJsCAwEAAaOCAVowggFWMBIGA1UdEwEB/wQIMAYBAf8C
AQAwDgYDVR0PAQH/BAQDAgGGMDQGCCsGAQUFBwEBBCgwJjAkBggrBgEFBQcwAYYY
aHR0cDovL29jc3AuZGlnaWNlcnQuY29tMHsGA1UdHwR0MHIwN6A1oDOGMWh0dHA6
Ly9jcmwzLmRpZ2ljZXJ0LmNvbS9EaWdpQ2VydEdsb2JhbFJvb3RDQS5jcmwwN6A1
oDOGMWh0dHA6Ly9jcmw0LmRpZ2ljZXJ0LmNvbS9EaWdpQ2VydEdsb2JhbFJvb3RD
QS5jcmwwPQYDVR0gBDYwNDAyBgRVHSAAMCowKAYIKwYBBQUHAgEWHGh0dHBzOi8v
d3d3LmRpZ2ljZXJ0LmNvbS9DUFMwHQYDVR0OBBYEFA+AYRyCMWHVLyjnjUY4tCzh
xtniMB8GA1UdIwQYMBaAFAPeUDVW0Uy7ZvCj4hsbw5eyPdFVMA0GCSqGSIb3DQEB
```

```
CwUAA4IBAQAjPt9L0jFCpbZ+QlwaRMxp0Wi0XUvgBCFsS+JtzLHgl4+mUwnNqipl
5TlPHoOlblyYoiQm5vuh7ZPHLgLGTUq/sELfeNqzqPlt/yGFUzZgTHbO7Djc1lGA
8MXW5dRNJ2Srm8c+cftIl7gzbckTB+6WohsYFfZcTEDts8Ls/3HB40f/1LkAtDdC
2iDJ6m6K7hQGrn2iWZiIqBtvLfTyyRRfJs8sjX7tN8Cp1Tm5gr8ZDOo0rwAhaPit
c+LJMto4JQtV05od8GiG7S5BNO98pVAdvzr508EIDObtHopYJeS4d60tbvVS3bR0
j6tJLp07kzQoH3jOlOrHvdPJbRzeXDLz
-----END CERTIFICATE-----
```

cert2.crt

subject= /C=US/O=DigiCert Inc/OU=www.digicert.com/CN=DigiCert Global Root CA

issuer= /C=US/O=DigiCert Inc/OU=www.digicert.com/CN=DigiCert Global Root CA

```
-----BEGIN CERTIFICATE-----
MIIDrzCCApegAwIBAgIQCDvgVpBCRrGhdWrJWZHHSjANBgkqhkiG9w0BAQUFADBh
MQswCQYDVQQGEwJVUzEVMBMGA1UEChMMRGlnaUNlcnQgSW5jMRkwFwYDVQQLExB3
d3cuZGlnaWNlcnQuY29tMSAwHgYDVQQDExdEaWdpQ2VydCBHbG9iYWwgUm9vdCBD
QTAeFw0wNjExMTAwMDAwMDBaFw0zMTExMTAwMDAwMDBaMGExCzAJBgNVBAYTAlVT
MRUwEwYDVQQKEwxEaWdpQ2VydCBJbmMxGTAXBgNVBAsTEHd3dy5kaWdpY2VydC5j
b20xIDAeBgNVBAMTF0RpZ2lDZXJ0IEdsb2JhbCBSb290IENBMIIBIjANBgkqhkiG
9w0BAQEFAAOCAQ8AMIIBCgKCAQEA4jvhEXLeqKTTo1eqUKKPC3eQyaKl7hLOllsB
CSDMAZOnTjC3U/dDxGkAV53ijSLdhwZAAIEJzs4bg7/fzTtxRuLWZscFs3YnFo97
nh6Vfe63SKMI2tavegw5BmV/Sl0fvBf4q77uKNd0f3p4mVmFaG5cIzJLv07A6Fpt
43C/dxC//AH2hdmoRBBYMql1GNXRor5H4idq9Joz+EkIYIvUX7Q6hL+hqkpMfT7P
T19sdl6gSzeRntwi5m3OFBqOasv+zbMUZBfHWymeMr/y7vrTC0LUq7dBMtoM1O/4
gdW7jVg/tRvoSSiicNoxBN33shbyTApOB6jtSj1etX+jkMOvJwIDAQABo2MwYTAO
BgNVHQ8BAf8EBAMCAYYwDwYDVR0TAQH/BAUwAwEB/zAdBgNVHQ4EFgQUA95QNVbR
TLtm8KPiGxvDl7I90VUwHwYDVR0jBBgwFoAUA95QNVbRTLtm8KPiGxvDl7I90VUw
DQYJKoZIhvcNAQEFBQADggEBAMucN6pIExIK+t1EnE9SsPTfrgT1eXkIoyQY/Esr
hMAtudXH/vTBH1jLuG2cenTnmCmrEbXjcKChzUyImZOMkXDiqw8cvpOp/2PV5Adg
06O/nVsJ8dWO41P0jmP6P6fbtGbfYmbW0W5BjfIttep3Sp+dWOIrWcBAI+0tKIJF
PnlUkiaY4IBIqDfv8NZ5YBberOgOzW6sRBc4L0na4UU+Krk2U886UAb3LujEV0ls
YSEY1QSteDwsOoBrp+uvFRTp2InBuThs4pFsiv9kuXclVzDAGySj4dzp30d8tbQk
CAUw7C29C79Fv1C5qfPrmAESrciIxpg0X40KPMbp1ZWVbd4=
-----END CERTIFICATE-----
```

Certificate Support on SUSE Linux Enterprise 11

Cloud agent installed on SUSE Linux Enterprise 11 may throw the following error for the certificate ca-bundle.crt when trying to communicate with the Qualys Platform. This happens when the certificate files are not present on the host asset.

```
[qualys-cloud-agent][8056]:[Error]:Http request failed:Problem
with the SSL CA cert (path? access rights?): error setting
certificate verify locations:
CAfile: /etc/ssl/ca-bundle.crt
CApath: none
```

To fix this issue, you must manually install the certificate files in the appropriate location on the host asset. You can either use the certificate files from your existing RHEL or CentOS assets or download the certificate files from the following location:

https://curl.haxx.se/docs/caextract.html

Download the file cacert.pem and rename it to ca-bundle.pem.

Copy the certificate files (ca-bundle.pem) at the following default location on SUSE Linux Enterprise 11:

```
/etc/ssl/
```

If you want to use a non default location, ensure that the directory path is added in the /etc/qualys/cloud-agent/qagent.config file in the following manner:

```
{
 "os": "Suse",
  "cafile": "<CustomizedPath>"
}
```

Now restart the QAgent Service.

Proxy Configuration Encryption Utility

You can use the Proxy Configuration Encryption utility to encrypt the user name and/or password (as needed) that you provide to the proxy environment variable qualys_https_proxy or https_proxy.

The **string-util** utility is included in the Cloud Agent installation package. Install or extract the Cloud Agent installation package to get the utility.

The string-util utility is to be used once on any system where it's installed to encrypt the values that will be used on all systems running Cloud Agent that have the same credentials. It is not required to run the utility on each system running Cloud Agent.

To use the encryption utility:

Go to /usr/local/qualys/cloud-agent/bin, and then export the LD_LIBRARY_PATH variable to /usr/local/qualys/cloud-agent/lib.

```
export LD_LIBRARY_PATH=/usr/local/qualys/cloud-agent/lib
```

Use the following command to run the utility to encrypt the user name and/or password. If you want to encrypt both, run the utility twice to separately encrypt the user name and password.

Note: You need root privileges to run string-util. If the user name or password contain special characters (e.g., @, :, $) they need to be url-encoded prior to using the utility.

To encrypt the user name (use double quotes):

```
./string-util "<user name_to_be_encrypted>"
```

For example,

```
./string-util "sys_account"
```

To encrypt the password (use double quotes):

```
./string-util "<password_to_be_encrypted>"
```

The utility returns the user name or password in encoded format.

For example,

```
sRpSHQP582a1+gaJwHOm3g==
```

Once you get the encrypted user name add/or password, unset the LD_LIBRARY_PATH variable by using the following command:

```
export LD_LIBRARY_PATH=
```

Provide the encrypted user name and password to your proxy environment variable.

```
qualys_https_proxy=https://[<#encrypted_username>:<#encrypted_password>@
]<host>[:<port>]
```

The # delimiter indicates to the Cloud Agent that the user name and password are encrypted. Not including the # indicates that the user name and password are in plain text format.

For example (only encrypting password):

```
qualys_https_proxy=https://sys_account:#sRpSHQP582a1+gaJwHOm3g==@proxy.m
yco.com:8080
```

For example (encrypting username and password):

```
qualys_https_proxy=https://#uWpsHMSY932b2+fdcH723d==:#sRpSHQP582a1+gaJwH
Om3g==@proxy.myco.com:8080
```