



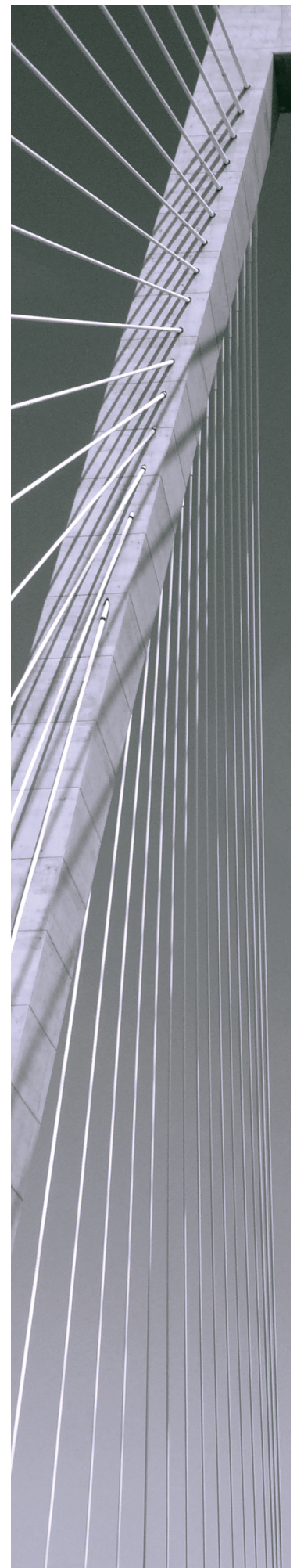
Simba Cassandra ODBC Driver with SQL Connector

Installation and Configuration Guide

Simba Technologies Inc.

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About This Guide

Purpose

The *Simba Cassandra ODBC Driver with SQL Connector Installation and Configuration Guide* explains how to install and configure the Simba Cassandra ODBC Driver with SQL Connector. The guide also provides details related to features of the driver.

Audience

The guide is intended for end users of the Simba Cassandra ODBC Driver, as well as administrators and developers integrating the driver.

Knowledge Prerequisites

To use the Simba Cassandra ODBC Driver, the following knowledge is helpful:

- Familiarity with the platform on which you are using the Simba Cassandra ODBC Driver
- Ability to use the data source to which the Simba Cassandra ODBC Driver is connecting
- An understanding of the role of ODBC technologies and driver managers in connecting to a data source
- Experience creating and configuring ODBC connections
- Exposure to SQL

Document Conventions

Italics are used when referring to book and document titles.

Bold is used in procedures for graphical user interface elements that a user clicks and text that a user types.

`Monospace font` indicates commands, source code, or contents of text files.

Note:

A text box with a pencil icon indicates a short note appended to a paragraph.

! Important:

A text box with an exclamation mark indicates an important comment related to the preceding paragraph.

Table of Contents

About the Simba Cassandra ODBC Driver	8
Windows Driver	9
Windows System Requirements	9
Installing the Driver on Windows	9
Creating a Data Source Name on Windows	10
Configuring Authentication on Windows	12
Configuring Advanced Options on Windows	12
Configuring SSL Verification on Windows	14
Configuring Logging Options on Windows	16
Verifying the Driver Version Number on Windows	17
macOS Driver	19
macOS System Requirements	19
Installing the Driver on macOS	19
Verifying the Driver Version Number on macOS	20
Linux Driver	21
Linux System Requirements	21
Installing the Driver Using the RPM File	21
Installing the Driver Using the Tarball Package	22
Verifying the Driver Version Number on Linux	23
Configuring the ODBC Driver Manager on Non-Windows Machines	24
Specifying ODBC Driver Managers on Non-Windows Machines	24
Specifying the Locations of the Driver Configuration Files	25
Configuring ODBC Connections on a Non-Windows Machine	27
Creating a Data Source Name on a Non-Windows Machine	27
Configuring a DSN-less Connection on a Non-Windows Machine	29
Configuring Authentication on a Non-Windows Machine	32
Configuring SSL Verification on a Non-Windows Machine	32
Configuring Logging Options on a Non-Windows Machine	33
Testing the Connection on a Non-Windows Machine	35
Using a Connection String	37
DSN Connection String Example	37
DSN-less Connection String Examples	37

Features	39
SQL Connector	39
Data Types	39
Virtual Tables	41
Write-Back	43
Query Modes	44
Catalog and Schema Support	44
Security and Authentication	44
Driver Configuration Options	46
Binary Column Length	47
Blacklist Datacenter Hosts	47
Blacklist Hosts	47
Client-side Certificate	48
Client-side Private Key	48
Default Keyspace	48
Enable Case Sensitive	48
Enable Latency Aware	49
Enable Null Value Insert	49
Enable Paging	50
Enable Server Hostname Verification	51
Enable Token Aware	51
Encrypt Password	51
Host	52
Key File Password	52
Load Balancing Policy	53
Log Level	53
Log Path	54
Mechanism	54
Password	55
Port	55
Query Mode	55
Rows Per Page	56
SSL	56
String Column Length	57
Trusted CA Certificates	57
Tunable Consistency	57
Use SQL_WVARCHAR For String Data Types	58

Installation and Configuration Guide

User Name	59
Virtual Table Name Separator	59
Whitelist Datacenter Hosts	59
Whitelist Hosts	60
Third-Party Trademarks	61
Third-Party Licenses	62

About the Simba Cassandra ODBC Driver

The Simba Cassandra ODBC Driver enables Business Intelligence (BI), analytics, and reporting on data that is stored in Apache Cassandra databases. The driver complies with the ODBC 3.80 data standard and adds important functionality such as Unicode, as well as 32- and 64-bit support for high-performance computing environments on all platforms.

ODBC is one of the most established and widely supported APIs for connecting to and working with databases. At the heart of the technology is the ODBC driver, which connects an application to the database. For more information about ODBC, see the *Data Access Standards Glossary*: <http://www.simba.com/resources/data-access-standards-library>. For complete information about the ODBC specification, see the *ODBC API Reference*: [http://msdn.microsoft.com/en-us/library/windows/desktop/ms714562\(v=vs.85\).aspx](http://msdn.microsoft.com/en-us/library/windows/desktop/ms714562(v=vs.85).aspx).

The Simba Cassandra ODBC Driver is available for Microsoft® Windows®, Linux, and macOS platforms.

The *Installation and Configuration Guide* is suitable for users who are looking to access data residing within Cassandra from their desktop environment. Application developers might also find the information helpful. Refer to your application for details on connecting via ODBC.

**Note:**

For information about how to use the driver in various BI tools, see the *Simba ODBC Drivers Quick Start Guide for Windows*: http://cdn.simba.com/docs/ODBC_QuickstartGuide/content/quick_start/intro.htm.

Windows Driver

Windows System Requirements

The Simba Cassandra ODBC Driver supports Apache Cassandra versions 2.0.0 through 3.x.

Install the driver on client machines where the application is installed. Each machine that you install the driver on must meet the following minimum system requirements:

- One of the following operating systems:
 - Windows Vista, 7, 8, or 10
 - Windows Server 2008 or later
- 150 MB of available disk space
- Visual C++ Redistributable for Visual Studio 2013 installed (with the same bitness as the driver that you are installing).
You can download the installation packages at <https://www.microsoft.com/en-ca/download/details.aspx?id=40784>.

To install the driver, you must have Administrator privileges on the machine.

Installing the Driver on Windows

On 64-bit Windows operating systems, you can execute both 32- and 64-bit applications. However, 64-bit applications must use 64-bit drivers, and 32-bit applications must use 32-bit drivers. Make sure that you use the version of the driver that matches the bitness of the client application:

- `Simba Cassandra 2.4 32-bit.msi` for 32-bit applications
- `Simba Cassandra 2.4 64-bit.msi` for 64-bit applications

You can install both versions of the driver on the same machine.

To install the Simba Cassandra ODBC Driver on Windows:

1. Depending on the bitness of your client application, double-click to run **Simba Cassandra 2.4 32-bit.msi** or **Simba Cassandra 2.4 64-bit.msi**.
2. Click **Next**.
3. Select the check box to accept the terms of the License Agreement if you agree, and then click **Next**.
4. To change the installation location, click **Change**, then browse to the desired folder, and then click **OK**. To accept the installation location, click **Next**.


5. Click **Install**.
6. When the installation completes, click **Finish**.
7. If you received a license file through email, then copy the license file into the `\lib` subfolder of the installation folder you selected above. You must have Administrator privileges when changing the contents of this folder.

Creating a Data Source Name on Windows

Typically, after installing the Simba Cassandra ODBC Driver, you need to create a Data Source Name (DSN).

Alternatively, for information about DSN-less connections, see [Using a Connection String](#) on page 37.


To create a Data Source Name on Windows:

1. Open the ODBC Administrator:
 - If you are using Windows 7 or earlier, click **Start**  > **All Programs** > **Simba Cassandra ODBC Driver 2.4** > **ODBC Administrator**.
 - Or, if you are using Windows 8 or later, on the Start screen, type **ODBC administrator**, and then click the **ODBC Administrator** search result.

 **Note:**

Make sure to select the ODBC Data Source Administrator that has the same bitness as the client application that you are using to connect to Cassandra.

2. In the ODBC Data Source Administrator, click the **Drivers** tab, and then scroll down as needed to confirm that the Simba Cassandra ODBC Driver appears in the alphabetical list of ODBC drivers that are installed on your system.
3. Choose one:
 - To create a DSN that only the user currently logged into Windows can use, click the **User DSN** tab.
 - Or, to create a DSN that all users who log into Windows can use, click the **System DSN** tab.

 **Note:**

It is recommended that you create a System DSN instead of a User DSN. Some applications load the data using a different user account, and might not be able to detect User DSNs that are created under another user account.

4. Click **Add**.

5. In the Create New Data Source dialog box, select **Simba Cassandra ODBC Driver** and then click **Finish**. The Simba Cassandra ODBC Driver DSN Setup dialog box opens.
6. In the **Data Source Name** field, type a name for your DSN.
7. Optionally, in the **Description** field, type relevant details about the DSN.
8. Choose one:
 - In the **Host** field, type the name or IP address of the host where your Cassandra instance is running.
 - Or, in the **Host** field, type a comma-separated list of host names or IP addresses of Cassandra servers to which the driver connects.

 **Note:**

The driver attempts to connect to all the servers concurrently, and then keep the first connection that is successfully established. The driver does not maintain a connection with any of the other servers in the list.

9. In the **Port** field, type the number of the TCP port that the server uses to listen for client connections.

 **Note:**

The default port used by Cassandra is 9042.

10. If user login is required to access the Cassandra instance, then configure authentication. For more information, see [Configuring Authentication on Windows](#) on page 12.
11. In the **Default Keyspace** field, type the name of the Cassandra keyspace to use by default.
12. To configure advanced driver options, click **Advanced Options**. For more information, see [Configuring Advanced Options on Windows](#) on page 12.
13. To configure logging behavior for the driver, click **Logging Options**. For more information, see [Configuring Logging Options on Windows](#) on page 16.
14. To test the connection, click **Test**. Review the results as needed, and then click **OK**.

 **Note:**

If the connection fails, then confirm that the settings in the Simba Cassandra ODBC Driver DSN Setup dialog box are correct. Contact your Cassandra server administrator as needed.

15. To save your settings and close the Simba Cassandra ODBC Driver DSN Setup dialog box, click **OK**.
16. To close the ODBC Data Source Administrator, click **OK**.

Configuring Authentication on Windows

Some Cassandra databases require authentication. You can configure the driver to pass your user name and password to the Cassandra server to authenticate the connection.

To configure authentication on Windows:

1. To access authentication options, open the ODBC Data Source Administrator where you created the DSN, select the DSN, and then click **Configure**.
2. In the **Mechanism** drop-down list, select **Cassandra User Name and Password**.
3. In the **Username** field, type an appropriate user name for accessing the Cassandra database.
4. In the **Password** field, type the password corresponding to the user name you typed above.
5. Encrypt your credentials by doing one of the following:
 - If the credentials are used only by the current Windows user, select **Current User Only**.
 - Or, if the credentials are used by all users on the current Windows machine, select **All Users Of This Machine**.
6. To save your settings and close the dialog box, click **OK**.

Configuring Advanced Options on Windows

You can configure advanced options to modify the behavior of the driver.


To configure advanced options on Windows:

1. To access advanced options, open the ODBC Data Source Administrator where you created the DSN, then select the DSN, then click **Configure**, and then click **Advanced Options**.
2. In the **Query Mode** list, select an option to specify how the driver executes queries:
 - To execute all queries in SQL, select **SQL**.
 - To execute all queries in CQL, select **CQL**.
 - To execute queries in SQL by default and then execute failed queries in CQL, select **SQL with CQL fallback**.
3. In the **Tunable Consistency** list, select an option to specify a Cassandra replica or the number of Cassandra replicas that must process a query in order for the query to be considered successful. For detailed information about each option, see the topic *Configuring data consistency* in the Apache Cassandra 2.0

documentation:

http://www.datastax.com/documentation/cassandra/2.0/cassandra/dml/dml_config_consistency_c.html.

4. In the **Load Balancing Policy** list, select the load balancing policy to use:
 - To cycle through all nodes in the cluster on a per-query basis, select **Round Robin**.
 - To first try all nodes in a primary "local" data center before trying any nodes from other data centers, select **DC Aware**.
5. In the **Binary Column Length** field, type the default column length to report for BLOB columns.
6. In the **String Column Length** field, type the default column length to report for ASCII, TEXT, and VARCHAR columns.
7. In the **Virtual Table Name Separator** field, type a separator for naming a virtual table built from a collection.

 **Note:**

For more information about virtual tables, see [Virtual Tables](#) on page 41.

8. To use a Blacklist or Whitelist when connecting to hosts in the Cassandra cluster, enter the host IP addresses in the **Blacklist Hosts** or **Whitelist Hosts** field.
 - Each IP addresses should be entered in quotation marks, separated by a comma. For example: "1.2.3.4", "5.6.7.8".
9. To use a Blacklist or Whitelist of datacenter hosts, enter the host names or addresses in the **Blacklist Datacenter Hosts** or **Whitelist Datacenter Hosts** field.
 - Each name or addresses should be entered in quotation marks, separated by a comma. For example: "datacenter1", "datacenter2".
10. To use a token-aware policy to improve load balancing and latency, select the **Enable Token Aware** check box.
11. To use a latency-awareness algorithm to distribute more of the workload onto faster machines, select the **Enable Latency Aware** check box.
12. Select how the driver handles null value INSERT statements:
 - To configure the driver to insert all NULL values as specified in INSERT statements, select the **Enable null values insertion** check box.
 - To configure the driver to ignore NULL values inserted into a column that contains only NULL values, clear the **Enable null values insertion** check box.

 **Note:**

For more information about this option, see [Enable Null Value Insert](#) on page 49.

13. Select how the driver handles capitalization in schema, table, and column names:
 - To differentiate between capital and lower-case letters in schema, table, and column names, select the **Enable Case Sensitive** check box.
 - To ignore the capitalization of schema, table, and column names, clear the **Enable Case Sensitive** check box.

 **Note:**

For more information about case sensitivity in Cassandra, see [Enable Case Sensitive](#) on page 48.

14. To map text and varchar data types in Cassandra to use SQL_WVARCHAR, select the **Use SQL_WVARCHAR for string data type** check box.
15. Select how the driver handles large result sets:
 - To configure the driver to split large result sets into pages, select the **Enable paging** check box and then type the maximum number of rows to display on each page in the **Rows per page** field.
 - To configure the driver to fetch all results into memory regardless of the result set size, clear the **Enable paging** check box.

 **Important:**

Disabling paging and then fetching a large result set can cause issues such as out of memory errors and database timeouts.

16. To configure client-server verification over SSL, use the options in the SSL area. For more information, see [Configuring SSL Verification on Windows](#) on page 14.
17. To save your settings and close the Advanced Options dialog box, click **OK**.
18. To close the Simba Cassandra ODBC Driver DSN Setup dialog box, click **OK**.

Configuring SSL Verification on Windows

If you are connecting to a Cassandra server that has Secure Sockets Layer (SSL) enabled, then you can configure the driver to connect to an SSL-enabled socket. When connecting to a server over SSL, the driver supports identity verification between the client and the server.

Configuring an SSL Connection without Identity Verification

You can configure a connection that uses SSL but does not verify the identity of the client or the server.

To configure an SSL connection without verification on Windows:

1. To access the SSL options for a DSN, open the ODBC Data Source Administrator where you created the DSN, then select the DSN, then click **Configure**, and then click **Advanced Options**.
2. In the SSL area, select **One-way Server Verification** or **Two-way Server and Client Verification**.
3. Clear the **Enable Server Hostname Verification** check box.
4. To save your settings and close the dialog box, click **OK**.

Configuring One-way SSL Verification

You can configure one-way SSL verification so that the client verifies the identity of the Cassandra server.

To configure one-way SSL verification on Windows:

1. To access the SSL options for a DSN, open the ODBC Data Source Administrator where you created the DSN, then select the DSN, then click **Configure**, and then click **Advanced Options**.
2. In the SSL area, select **One-way Server Verification**.
3. Ensure that the **Enable Server Hostname Verification** check box is selected.
4. In the **Trusted CA Certificates** field, specify the full path of the PEM file containing the certificate for verifying the server.
5. To save your settings and close the dialog box, click **OK**.

Configuring Two-way SSL Verification

You can configure two-way SSL verification so that the client and the Cassandra server verify each other.

To configure two-way SSL verification on Windows:

1. To access the SSL options for a DSN, open the ODBC Data Source Administrator where you created the DSN, then select the DSN, then click **Configure**, and then click **Advanced Options**.
2. In the SSL area, select **Two-way Server and Client Verification**.
3. Ensure that the **Enable Server Hostname Verification** check box is selected.
4. In the **Trusted CA Certificates** field, specify the full path of the PEM file containing the certificate for verifying the server.

5. In the **Client-side Certificate** field, specify the full path of the PEM file containing the certificate for verifying the client.
6. In the **Client-side Private Key** field, specify the full path of the file containing the private key used to verify the client.
7. If the private key file is protected with a password, type the password in the **Key File Password** field. To save the password in the DSN, select the **Remember Password** check box.

! Important:

Passwords are saved in plain text in the DSN; they are not encrypted or censored.

8. To save your settings and close the dialog box, click **OK**.

Configuring Logging Options on Windows

To help troubleshoot issues, you can enable logging. In addition to functionality provided in the Simba Cassandra ODBC Driver, the ODBC Data Source Administrator provides tracing functionality.

! Important:

Only enable logging or tracing long enough to capture an issue. Logging or tracing decreases performance and can consume a large quantity of disk space.

To enable driver logging on Windows:

1. To access logging options, open the ODBC Data Source Administrator where you created the DSN, then select the DSN, then click **Configure**, and then click **Logging Options**.
2. From the **Log Level** drop-down list, select the logging level corresponding to the amount of information that you want to include in log files:

Logging Level	Description
OFF	Disables all logging.
FATAL	Logs severe error events that lead the driver to abort.
ERROR	Logs error events that might allow the driver to continue running.

Logging Level	Description
WARNING	Logs events that might result in an error if action is not taken.
INFO	Logs general information that describes the progress of the driver.
DEBUG	Logs detailed information that is useful for debugging the driver.
TRACE	Logs all driver activity.

3. In the **Log Path** field, specify the full path to the folder where you want to save log files.
4. If requested by Technical Support, type the name of the component for which to log messages in the **Log Namespace** field. Otherwise, do not type a value in the field.
5. Click **OK**.
6. Restart your ODBC application to make sure that the new settings take effect.

The Simba Cassandra ODBC Driver produces a log file named `Simba Cassandra ODBC Driver_driver.log` at the location that you specify in the Log Path field.


To disable driver logging on Windows:


1. Open the ODBC Data Source Administrator where you created the DSN, then select the DSN, then click **Configure**, and then click **Logging Options**.
2. From the **Log Level** drop-down list, select **LOG_OFF**.
3. Click **OK**.
4. Restart your ODBC application to make sure that the new settings take effect.

Verifying the Driver Version Number on Windows

If you need to verify the version of the Simba Cassandra ODBC Driver that is installed on your Windows machine, you can find the version number in the ODBC Data Source Administrator.

To verify the driver version number on Windows:

1. Open the ODBC Administrator:
 - If you are using Windows 7 or earlier, click **Start**  > **All Programs** > **Simba Cassandra ODBC Driver 2.4** > **ODBC Administrator**.
 - Or, if you are using Windows 8 or later, on the Start screen, type **ODBC administrator**, and then click the **ODBC Administrator** search result.

 **Note:**

Make sure to select the ODBC Data Source Administrator that has the same bitness as the client application that you are using to connect to Cassandra.

2. Click the **Drivers** tab and then find the Simba Cassandra ODBC Driver in the list of ODBC drivers that are installed on your system. The version number is displayed in the **Version** column.

macOS Driver

macOS System Requirements

The Simba Cassandra ODBC Driver supports Apache Cassandra versions 2.0.0 through 3.x.

Install the driver on client machines where the application is installed. Each machine that you install the driver on must meet the following minimum system requirements:


- macOS version 10.9, 10.10, or 10.11
- 100 MB of available disk space
- iODBC 3.52.7 or later

Installing the Driver on macOS

The Simba Cassandra ODBC Driver is available for macOS as a .dmg file named `Simba Cassandra 2.4.dmg`. The driver supports both 32- and 64-bit client applications.

To install the Simba Cassandra ODBC Driver on macOS:

1. Double-click **Simba Cassandra 2.4.dmg** to mount the disk image.
2. Double-click **Simba Cassandra 2.4.pkg** to run the installer.
3. In the installer, click **Continue**.
4. On the Software License Agreement screen, click **Continue**, and when the prompt appears, click **Agree** if you agree to the terms of the License Agreement.
5. Optionally, to change the installation location, click **Change Install Location**, then select the desired location, and then click **Continue**.

 **Note:**

By default, the driver files are installed in the `/Library/simba/cassandra` directory.

6. To accept the installation location and begin the installation, click **Install**.
7. When the installation completes, click **Close**.
8. If you received a license file through email, then copy the license file into the `/lib` subfolder in the driver installation directory. You must have root privileges when changing the contents of this folder.

For example, if you installed the driver to the default location, you would copy the license file into the `/Library/simba/cassandra/lib` folder.

Next, configure the environment variables on your machine to make sure that the ODBC driver manager can work with the driver. For more information, see [Configuring the ODBC Driver Manager on Non-Windows Machines](#) on page 24.

Verifying the Driver Version Number on macOS

If you need to verify the version of the Simba Cassandra ODBC Driver that is installed on your macOS machine, you can query the version number through the Terminal.

To verify the driver version number on macOS:

- At the Terminal, run the following command:

```
pkgutil --info com.simba.cassandraodbc
```

The command returns information about the Simba Cassandra ODBC Driver that is installed on your machine, including the version number.

Linux Driver

The Linux driver is available as an RPM file and as a tarball package.

Linux System Requirements

The Simba Cassandra ODBC Driver supports Apache Cassandra versions 2.0.0 through 3.x.

Install the driver on client machines where the application is installed. Each machine that you install the driver on must meet the following minimum system requirements:

- One of the following distributions:
 - Red Hat® Enterprise Linux® (RHEL) 5, 6, or 7
 - CentOS 5, 6, or 7
 - SUSE Linux Enterprise Server (SLES) 11 or 12
 - Debian 7 or 8
 - Ubuntu 12.04, 14.04, or 16.04
- 50 MB of available disk space
- One of the following ODBC driver managers installed:
 - iODBC 3.52.7 or later
 - unixODBC 2.2.12 or later

To install the driver, you must have root access on the machine.

Installing the Driver Using the RPM File

On 64-bit editions of Linux, you can execute both 32- and 64-bit applications. However, 64-bit applications must use 64-bit drivers, and 32-bit applications must use 32-bit drivers. Make sure to install and use the version of the driver that matches the bitness of the client application:

- `simbacassandra-[Version]-[Release].i686.rpm` for the 32-bit driver
- `simbacassandra-[Version]-[Release].x86_64.rpm` for the 64-bit driver

You can install both versions of the driver on the same machine.

The placeholders in the file names are defined as follows:

- `[Version]` is the version number of the driver.
- `[Release]` is the release number for this version of the driver.

To install the Simba Cassandra ODBC Driver using the RPM File:

1. Log in as the root user, and then navigate to the folder containing the RPM package for the driver.
2. Depending on the Linux distribution that you are using, run one of the following commands from the command line, where *[RPMFileName]* is the file name of the RPM package:
 - If you are using Red Hat Enterprise Linux or CentOS, run the following command:

```
yum --nogpgcheck localinstall [RPMFileName]
```

- Or, if you are using SUSE Linux Enterprise Server, run the following command:

```
zypper install [RPMFileName]
```

The Simba Cassandra ODBC Driver files are installed in the `/opt/simba/cassandra` directory.

3. If you received a license file through email, then copy the license file into the `/opt/simba/cassandra/lib/32` or `/opt/simba/cassandra/lib/64` folder, depending on the version of the driver that you installed. You must have root privileges when changing the contents of this folder.

Next, configure the environment variables on your machine to make sure that the ODBC driver manager can work with the driver. For more information, see [Configuring the ODBC Driver Manager on Non-Windows Machines](#) on page 24.

Installing the Driver Using the Tarball Package

The Simba Cassandra ODBC Driver is available as a tarball package named `SimbaCassandraODBC-[Version].[Release]-Linux.tar.gz`, where *[Version]* is the version number of the driver and *[Release]* is the release number for this version of the driver. The package contains both the 32-bit and 64-bit versions of the driver.

On 64-bit editions of Linux, you can execute both 32- and 64-bit applications. However, 64-bit applications must use 64-bit drivers, and 32-bit applications must use 32-bit drivers. Make sure that you use the version of the driver that matches the bitness of the client application. You can install both versions of the driver on the same machine.

To install the Simba Cassandra ODBC Driver using the tarball package:

1. Log in as the root user, and then navigate to the folder containing the tarball package.

2. Run the following command to extract the package and install the driver:

```
tar -zxvf [TarballName]
```

Where `[TarballName]` is the name of the tarball package containing the driver.

The Simba Cassandra ODBC Driver files are installed in the `opt/simba/cassandra` directory.

3. If you received a license file through email, then copy the license file into the `opt/simba/cassandra/lib/32` or `opt/simba/cassandra/lib/64` folder, depending on the version of the driver that you installed. You must have root privileges when changing the contents of this folder.

Next, configure the environment variables on your machine to make sure that the ODBC driver manager can work with the driver. For more information, see [Configuring the ODBC Driver Manager on Non-Windows Machines](#) on page 24.

Verifying the Driver Version Number on Linux

If you need to verify the version of the Simba Cassandra ODBC Driver that is installed on your Linux machine, you can query the version number through the command-line interface if the driver was installed using an RPM file.

To verify the driver version number on Linux:

- Depending on your package manager, at the command prompt, run one of the following commands:
 - `yum list | grep SimbaCassandraODBC`
 - `rpm -qa | grep SimbaCassandraODBC`

The command returns information about the Simba Cassandra ODBC Driver that is installed on your machine, including the version number.

Configuring the ODBC Driver Manager on Non-Windows Machines

To make sure that the ODBC driver manager on your machine is configured to work with the Simba Cassandra ODBC Driver, do the following:

- Make sure that your machine uses the correct ODBC driver manager by setting the library path environment variable. For more information, see [Specifying ODBC Driver Managers on Non-Windows Machines](#) on page 24.
- If the driver configuration files are not stored in the default locations, then make sure that the ODBC driver manager locates and uses those files by setting environment variables. For more information, see [Specifying the Locations of the Driver Configuration Files](#) on page 25.

After configuring the ODBC driver manager, you can configure a connection and access your data store through the driver. For more information, see [Configuring ODBC Connections on a Non-Windows Machine](#) on page 27.

Specifying ODBC Driver Managers on Non-Windows Machines

You need to make sure that your machine uses the correct ODBC driver manager to load the driver. To do this, set the library path environment variable.

macOS

If you are using a macOS machine, then set the `DYLD_LIBRARY_PATH` environment variable to include the paths to the ODBC driver manager libraries. For example, if the libraries are installed in `/usr/local/lib`, then run the following command to set `DYLD_LIBRARY_PATH` for the current user session:

```
export DYLD_LIBRARY_PATH=$DYLD_LIBRARY_PATH:/usr/local/lib
```

For information about setting an environment variable permanently, refer to the macOS shell documentation.

Linux

If you are using a Linux machine, then set the `LD_LIBRARY_PATH` environment variable to include the paths to the ODBC driver manager libraries. For example, if the libraries are installed in `/usr/local/lib`, then run the following command to set `LD_LIBRARY_PATH` for the current user session:


```
export LD_LIBRARY_PATH=$LD_LIBRARY_PATH:/usr/local/lib
```

For information about setting an environment variable permanently, refer to the Linux shell documentation.

Specifying the Locations of the Driver Configuration Files

By default, ODBC driver managers are configured to use hidden versions of the `odbc.ini` and `odbcinst.ini` configuration files (named `.odbc.ini` and `.odbcinst.ini`) located in the home directory, as well as the `simba.cassandraodbc.ini` file in the `lib` subfolder of the driver installation directory. If you store these configuration files elsewhere, then you must set the environment variables described below so that the driver manager can locate the files.

If you are using iODBC, do the following:

- Set `ODBCINI` to the full path and file name of the `odbc.ini` file.
- Set `ODBCINSTINI` to the full path and file name of the `odbcinst.ini` file.
- Set `SIMBACASSANDRAODBC` to the full path and file name of the `simba.cassandraodbc.ini` file.

If you are using unixODBC, do the following:

- Set `ODBCINI` to the full path and file name of the `odbc.ini` file.
- Set `ODBCSYSINI` to the full path of the directory that contains the `odbcinst.ini` file.
- Set `SIMBACASSANDRAODBC` to the full path and file name of the `simba.cassandraodbc.ini` file.

For example, if your `odbc.ini` and `odbcinst.ini` files are located in `/usr/local/odbc` and your `simba.cassandraodbc.ini` file is located in `/etc`, then set the environment variables as follows:

For iODBC:

```
export ODBCINI=/usr/local/odbc/odbc.ini
export ODBCINSTINI=/usr/local/odbc/odbcinst.ini
export SIMBACASSANDRAODBC=/etc/simba.cassandraodbc.ini
```

For unixODBC:

```
export ODBCINI=/usr/local/odbc/odbc.ini
export ODBCSYSINI=/usr/local/odbc
```

```
export SIMBACASSANDRAODBC=/etc/simba.cassandraodbc.ini
```

To locate the `simba.cassandraodbc.ini` file, the driver uses the following search order:

1. If the `SIMBACASSANDRAODBC` environment variable is defined, then the driver searches for the file specified by the environment variable.
2. The driver searches the directory that contains the driver library files for a file named `simba.cassandraodbc.ini`.
3. The driver searches the current working directory of the application for a file named `simba.cassandraodbc.ini`.
4. The driver searches the home directory for a hidden file named `.simba.cassandraodbc.ini` (prefixed with a period).
5. The driver searches the `/etc` directory for a file named `simba.cassandraodbc.ini`.

Configuring ODBC Connections on a Non-Windows Machine

The following sections describe how to configure ODBC connections when using the Simba Cassandra ODBC Driver on non-Windows platforms:

- [Creating a Data Source Name on a Non-Windows Machine](#) on page 27
- [Configuring a DSN-less Connection on a Non-Windows Machine](#) on page 29
- [Configuring Authentication on a Non-Windows Machine](#) on page 32
- [Configuring SSL Verification on a Non-Windows Machine](#) on page 32
- [Configuring Logging Options on a Non-Windows Machine](#) on page 33
- [Testing the Connection on a Non-Windows Machine](#) on page 35

Creating a Data Source Name on a Non-Windows Machine

When connecting to your data store using a DSN, you only need to configure the `odbc.ini` file. Set the properties in the `odbc.ini` file to create a DSN that specifies the connection information for your data store. For information about configuring a DSN-less connection instead, see [Configuring a DSN-less Connection on a Non-Windows Machine](#) on page 29.

If your machine is already configured to use an existing `odbc.ini` file, then update that file by adding the settings described below. Otherwise, copy the `odbc.ini` file from the `Setup` subfolder in the driver installation directory to the home directory, and then update the file as described below.

To create a Data Source Name on a non-Windows machine:

1. In a text editor, open the `odbc.ini` configuration file.

 **Note:**

If you are using a hidden copy of the `odbc.ini` file, you can remove the period (.) from the start of the file name to make the file visible while you are editing it.

2. Create a section that has the same name as your DSN, and then specify configuration options as key-value pairs in the section:
 - a. Set the `Driver` property to the full path of the driver library file that matches the bitness of the application.

For example, on a macOS machine:

```
Driver=/Library/simba/cassandra/lib/libcassandraodbc_sbu.dylib
```

As another example, for a 32-bit driver on a Linux machine:

```
Driver=/opt/simba/cassandra/lib/32/libcassandraodbc_sb32.so
```

b. Do one of the following:

- If you are connecting to a single Cassandra server, set the `Host` property to the IP address or host name of the server, and then set the `Port` property to the number of the TCP port that the server uses to listen for client connections.

For example:

```
Host=192.168.222.160
Port=9042
```

- Or, if you are connecting to a multiple servers, set the `Host` property to a comma-separated list of the servers in the cluster, specifying the host names or IP addresses and port numbers.

For example:

```
Host=192.168.222.160:9042, 192.168.222.165:9042,
192.168.222.231:9042
```

- c. If authentication is required to access the server, then enable authentication and specify your credentials. For more information, see [Configuring Authentication on a Non-Windows Machine](#) on page 32.
 - d. If you want to connect to the server through SSL, then enable SSL and specify the certificate information. For more information, see [Configuring SSL Verification on a Non-Windows Machine](#) on page 32.
 - e. Optionally, set additional key-value pairs as needed to specify other optional connection settings. For detailed information about all the configuration options supported by the Simba Cassandra ODBC Driver, see [Driver Configuration Options](#) on page 46.
3. Save the `odbc.ini` configuration file.

 **Note:**

If you are storing this file in its default location in the home directory, then prefix the file name with a period (.) so that the file becomes hidden. If you are storing this file in another location, then save it as a non-hidden file (without the prefix), and make sure that the ODBCINI environment variable specifies the location. For more information, see [Specifying the Locations of the Driver Configuration Files](#) on page 25.

For example, the following is an `odbc.ini` configuration file for macOS containing a DSN that connects to a single Cassandra server without authentication:

```
[ODBC Data Sources]
Sample DSN=Simba Cassandra ODBC Driver
[Sample DSN]
Driver=/Library/simba/cassandra/lib/libcassandraodbc_
sbu.dylib
Host=192.168.222.160
Port=9042
```

As another example, the following is an `odbc.ini` configuration file for a 32-bit driver on a Linux machine, containing a DSN that connects to a single Cassandra server with authentication:

```
[ODBC Data Sources]
Sample DSN=Simba Cassandra ODBC Driver 32-bit
[Sample DSN]
Driver=/opt/simba/cassandra/lib/32/libcassandraodbc_sb32.so
Host=192.168.222.160
Port=9042
```

You can now use the DSN in an application to connect to the data store.

Configuring a DSN-less Connection on a Non-Windows Machine

To connect to your data store through a DSN-less connection, you need to define the driver in the `odbcinst.ini` file and then provide a DSN-less connection string in your application.

If your machine is already configured to use an existing `odbcinst.ini` file, then update that file by adding the settings described below. Otherwise, copy the

`odbcinst.ini` file from the `Setup` subfolder in the driver installation directory to the home directory, and then update the file as described below.

To define a driver on a non-Windows machine:

1. In a text editor, open the `odbcinst.ini` configuration file.

 **Note:**

If you are using a hidden copy of the `odbcinst.ini` file, you can remove the period (.) from the start of the file name to make the file visible while you are editing it.

2. In the `[ODBC Drivers]` section, add a new entry by typing a name for the driver, an equal sign (=), and then `Installed`.

For example:

```
[ODBC Drivers]
Simba Cassandra ODBC Driver=Installed
```

3. Create a section that has the same name as the driver (as specified in the previous step), and then specify the following configuration options as key-value pairs in the section:
 - a. Set the `Driver` property to the full path of the driver library file that matches the bitness of the application.

For example, on a macOS machine:

```
Driver=/Library/simba/cassandra/lib/libcassandraodbc_sb32.dylib
```

As another example, for a 32-bit driver on a Linux machine:

```
Driver=/opt/simba/cassandra/lib/32/libcassandraodbc_sb32.so
```

- b. Optionally, set the `Description` property to a description of the driver.

For example:

```
Description=Simba Cassandra ODBC Driver
```

4. Save the `odbcinst.ini` configuration file.

 **Note:**

If you are storing this file in its default location in the home directory, then prefix the file name with a period (.) so that the file becomes hidden. If you are storing this file in another location, then save it as a non-hidden file (without the prefix), and make sure that the ODBCINSTINI or ODBCYSINI environment variable specifies the location. For more information, see [Specifying the Locations of the Driver Configuration Files](#) on page 25.

For example, the following is an `odbcinst.ini` configuration file for macOS:

```
[ODBC Drivers]
Simba Cassandra ODBC Driver=Installed
[Simba Cassandra ODBC Driver]
Description=Simba Cassandra ODBC Driver
Driver=/Library/simba/cassandra/lib/libcassandraodbc_
sbu.dylib
```

As another example, the following is an `odbcinst.ini` configuration file for both the 32- and 64-bit drivers on Linux:

```
[ODBC Drivers]
Simba Cassandra ODBC Driver 32-bit=Installed
Simba Cassandra ODBC Driver 64-bit=Installed
[Simba Cassandra ODBC Driver 32-bit]
Description=Simba Cassandra ODBC Driver (32-bit)
Driver=/opt/simba/cassandra/lib/32/libcassandraodbc_sb32.so
[Simba Cassandra ODBC Driver 64-bit]
Description=Simba Cassandra ODBC Driver (64-bit)
Driver=/opt/simba/cassandra/lib/64/libcassandraodbc_sb64.so
```

You can now connect to your data store by providing your application with a connection string where the `Driver` property is set to the driver name specified in the `odbcinst.ini` file, and all the other necessary connection properties are also set. For more information, see "DSN-less Connection String Examples" in [Using a Connection String](#) on page 37.

For instructions about configuring specific connection features, see the following:

- [Configuring Authentication on a Non-Windows Machine](#) on page 32
- [Configuring SSL Verification on a Non-Windows Machine](#) on page 32

For detailed information about all the connection properties that the driver supports, see [Driver Configuration Options](#) on page 46.

Configuring Authentication on a Non-Windows Machine

Some Cassandra databases require authentication. You can configure the Simba Cassandra ODBC Driver to authenticate your connection to the database by providing your Cassandra user name and password.

You can set the connection properties described below in a connection string or in a DSN (in the `odbc.ini` file). Settings in the connection string take precedence over settings in the DSN.

To configure authentication:

1. Set the `AuthMech` property to 1.
2. Set the `UID` property to an appropriate user name for accessing the Cassandra server.
3. Set the `PWD` property to password corresponding to the user name you provided above.

Configuring SSL Verification on a Non-Windows Machine

You can configure the driver to connect to Cassandra over SSL and enable identity verification between the client and the server.

You can set the connection properties described below in a connection string or in a DSN (in the `odbc.ini` file). Settings in the connection string take precedence over settings in the DSN.

Configuring a Connection without SSL

You can configure a connection that does not use SSL.

To configure a connection without SSL on a non-Windows machine:

- Set the `SSLMode` property to 0.

Configuring One-way SSL Verification

You can enable the client to verify the Cassandra server.

To configure one-way SSL verification on a non-Windows machine:

1. Set the `SSLMode` property to 1.
2. Set the `UseSslIdentityCheck` property to 1.
3. Set the `SSLTrustedCertsPath` property to the full path of the `.pem` file containing the certificate for verifying the server.

Configuring Two-way SSL Verification

You can enable the client and the Cassandra server to verify each other.

To configure two-way SSL verification on a non-Windows machine:

1. Set the `SSLMode` property to 2.
2. Set the `UseSslIdentityCheck` property to 1.
3. Set the `SSLTrustedCertsPath` property to the full path of the `.pem` file containing the certificate for verifying the server.
4. Set the `SSLUserCertsPath` property to the full path of the `.pem` file containing the certificate for verifying the client.
5. Set the `SSLUserKeyPath` property to the full path of the file containing the private key used to verify the client.
6. If the private key file is protected with a password, set the `SSLUserKeyPWD` property to specify the password.

! Important:

Passwords are saved in plain text in the DSN; they are not encrypted or censored.

Configuring an SSL Connection that does not Verify Certificates

You can configure a connection that uses SSL but does not verify the client or the server.

To configure an SSL connection without verification on a non-Windows machine:

1. Set the `SSLMode` property to 1 or 2.
2. Set the `UseSslIdentityCheck` property to 0.

Configuring Logging Options on a Non-Windows Machine

To help troubleshoot issues, you can enable logging in the driver.

! Important:

Only enable logging long enough to capture an issue. Logging decreases performance and can consume a large quantity of disk space.

Logging is configured through driver-wide settings in the `simba.cassandraodbc.ini` file, which apply to all connections that use the driver.

To enable logging on a non-Windows machine:

1. Open the `simba.cassandraodbc.ini` configuration file in a text editor.
2. To specify the level of information to include in log files, set the `LogLevel` property to one of the following numbers:

LogLevel Value	Description
0	Disables all logging.
1	Logs severe error events that lead the driver to abort.
2	Logs error events that might allow the driver to continue running.
3	Logs events that might result in an error if action is not taken.
4	Logs general information that describes the progress of the driver.
5	Logs detailed information that is useful for debugging the driver.
6	Logs all driver activity.

3. Set the `LogPath` key to the full path to the folder where you want to save log files.
4. Set the `LogFileCount` key to the maximum number of log files to keep.

Note:

After the maximum number of log files is reached, each time an additional file is created, the driver deletes the oldest log file.

5. Set the `LogFileSize` key to the maximum size of each log file in megabytes (MB).

 **Note:**

After the maximum file size is reached, the driver creates a new file and continues logging.

6. Save the `simba.cassandraodbc.ini` configuration file.
7. Restart your ODBC application to make sure that the new settings take effect.

The Simba Cassandra ODBC Driver produces a log file named `SimbaCassandraODBC_Driver_driver.log` at the location you specify using the `LogPath` key.

To disable logging on a non-Windows machine:

1. Open the `simba.cassandraodbc.ini` configuration file in a text editor.
2. Set the `LogLevel` key to 0.
3. Save the `simba.cassandraodbc.ini` configuration file.
4. Restart your ODBC application to make sure that the new settings take effect.

Testing the Connection on a Non-Windows Machine

To test the connection, you can use an ODBC-enabled client application. For a basic connection test, you can also use the test utilities that are packaged with your driver manager installation. For example, the iODBC driver manager includes simple utilities called `iodbctest` and `iodbctestw`. Similarly, the unixODBC driver manager includes simple utilities called `isql` and `iusql`.

Using the iODBC Driver Manager

You can use the `iodbctest` and `iodbctestw` utilities to establish a test connection with your driver. Use `iodbctest` to test how your driver works with an ANSI application, or use `iodbctestw` to test how your driver works with a Unicode application.

 **Note:**

There are 32-bit and 64-bit installations of the iODBC driver manager available. If you have only one or the other installed, then the appropriate version of `iodbctest` (or `iodbctestw`) is available. However, if you have both 32- and 64-bit versions installed, then you need to make sure that you are running the version from the correct installation directory.

For more information about using the iODBC driver manager, see <http://www.iodbc.org>.

To test your connection using the iODBC driver manager:

1. Run **iodbctest** or **iodbctestw**.
2. Optionally, if you do not remember the DSN, then type a question mark (?) to see a list of available DSNs.
3. Type the connection string for connecting to your data store, and then press ENTER. For more information, see [Using a Connection String](#) on page 37.

If the connection is successful, then the `SQL>` prompt appears.

Using the unixODBC Driver Manager

You can use the `isql` and `iusql` utilities to establish a test connection with your driver and your DSN. `isql` and `iusql` can only be used to test connections that use a DSN. Use `isql` to test how your driver works with an ANSI application, or use `iusql` to test how your driver works with a Unicode application.

 **Note:**

There are 32-bit and 64-bit installations of the unixODBC driver manager available. If you have only one or the other installed, then the appropriate version of `isql` (or `iusql`) is available. However, if you have both 32- and 64-bit versions installed, then you need to make sure that you are running the version from the correct installation directory.

For more information about using the unixODBC driver manager, see <http://www.unixodbc.org>.

To test your connection using the unixODBC driver manager:

- Run `isql` or `iusql` by using the corresponding syntax:

- `isql [DataSourceName]`
- `iusql [DataSourceName]`

`[DataSourceName]` is the DSN that you are using for the connection.

If the connection is successful, then the `SQL>` prompt appears.

 **Note:**

For information about the available options, run `isql` or `iusql` without providing a DSN.

Using a Connection String

For some applications, you might need to use a connection string to connect to your data source. For detailed information about how to use a connection string in an ODBC application, refer to the documentation for the application that you are using.

The connection strings in the following sections are examples showing the minimum set of connection attributes that you must specify to successfully connect to the data source. Depending on the configuration of the data source and the type of connection you are working with, you might need to specify additional connection attributes. For detailed information about all the attributes that you can use in the connection string, see [Driver Configuration Options](#) on page 46.

DSN Connection String Example

The following is an example of a connection string for a connection that uses a DSN:

```
DSN= [DataSourceName]
```

[DataSourceName] is the DSN that you are using for the connection.

You can set additional configuration options by appending key-value pairs to the connection string. Configuration options that are passed in using a connection string take precedence over configuration options that are set in the DSN.

DSN-less Connection String Examples

Some applications provide support for connecting to a data source using a driver without a DSN. To connect to a data source without using a DSN, use a connection string instead.

The placeholders in the examples are defined as follows, in alphabetical order:

- *[PortNumber]* is the number of the TCP port that the Cassandra server uses to listen for client connections.
- *[Server]* is the IP address or host name of the Cassandra server to which you are connecting. You can specify a comma-separated list of servers.
- *[YourPassword]* is the password corresponding to your user name.
- *[YourUserName]* is the user name that you use to access the Cassandra server.

Connecting to a Cassandra Server Without Authentication

The following is the format of a DSN-less connection string for a Cassandra server that does not require authentication:

```
Driver=Simba Cassandra ODBC Driver;Host=[Server];  
Port=[PortNumber];
```

For example:

```
Driver=Simba Cassandra ODBC Driver;Host=192.168.222.160;  
Port=9042;
```

Connecting to a Cassandra Server Requiring Authentication

The following is the format of a DSN-less connection string for a Cassandra server that requires authentication:

```
Driver=Simba Cassandra ODBC Driver;Host=[Server];  
Port=[PortNumber];AuthMech=1;UID=[YourUserName];  
PWD=[YourPassword];
```

For example:

```
Driver=Simba Cassandra ODBC Driver;Host=192.168.222.160;  
Port=9042;AuthMech=1;UID=simba;PWD=simba123;
```

Features

For more information on the features of the Simba Cassandra ODBC Driver, see the following:

- [SQL Connector](#) on page 39
- [Data Types](#) on page 39
- [Virtual Tables](#) on page 41
- [Write-Back](#) on page 43
- [Query Modes](#) on page 44
- [Catalog and Schema Support](#) on page 44
- [Security and Authentication](#) on page 44

SQL Connector

The SQL Connector feature of the driver allows applications to execute standard SQL queries against Cassandra. It converts SQL-92 queries to CQL operations and processes the results. When the driver is configured to work in SQL with CQL Fallback mode, it uses the SQL Connector to handle SQL queries by loading and processing the data in memory. This feature enables the driver to support SQL operations that cannot be executed natively through CQL queries, such as column filtering and table joins.

Data Types

The Simba Cassandra ODBC Driver can convert between Cassandra data types and SQL data types.

The table below lists the supported ODBC 3.x data type mappings. A few data types are mapped to a different type when using ODBC 2.x. Those data type mappings are listed in the next table.

To support complex data types such as sets, lists, and maps, the driver renormalizes the data into virtual tables. For more information, see [Virtual Tables](#) on page 41.

Cassandra Type	SQL Type
ASCII	SQL_VARCHAR
BIGINT	SQL_INT

Cassandra Type	SQL Type
BLOB	SQL_LONGVARBINARY
BOOLEAN	SQL_BIT
COUNTER	SQL_BIGINT
DATE	SQL_DATE (2.x) and SQL_TYPE_DATE (3.x)
DECIMAL	SQL_DECIMAL
DOUBLE	SQL_DOUBLE
FLOAT	SQL_REAL
INET	SQL_VARCHAR
INT	SQL_INTEGER
SMALLINT	SQL_SMALLINT
TEXT	SQL_WVARCHAR
TIME	SQL_TIME (2.x) or SQL_TYPE_TIME (3.x)
TIMESTAMP See the note below.	SQL_TYPE_TIMESTAMP
TIMEUUID	GUID
TINYINT	SQL_TINYINT
UUID	GUID
VARCHAR	SQL_VARCHAR
VARINT	SQL_NUMERIC

Note:

Cassandra internally represents a Timestamp value as a 64-bit signed integer value representing the number of milliseconds since epoch January 1 1970 at 00:00:00 GMT. The range of Timestamp values supported by the Simba Cassandra ODBC Driver is from "1601-01-01 00:00:00.000" to "9999-12-31 23:59:59.999".

Cassandra Type	SQL Type
TIMESTAMP See the note above.	SQL_TIMESTAMP
TIMEUUID	SQL_VARCHAR
UUID	SQL_VARCHAR

Virtual Tables

One advantage of the Apache Cassandra design is the ability to store data that is denormalized into fewer tables. By taking advantage of nested data structures such as sets, lists, and maps, transactions can be simplified. However, the ODBC interface does not natively support accessing this type of data. By renormalizing the data contained within collections (sets, lists, and maps) into virtual tables, the Simba Cassandra ODBC Driver allows users to directly interact with the data but leave the storage of the data in its denormalized form in Cassandra.

If a table contains any collection columns, when the table is queried for the first time, the driver creates the following virtual tables:

- A "base" table, which contains the same data as the real table except for the collection columns.
- A virtual table for each collection column, which expands the nested data.

Virtual tables refer to the data in the real table, enabling the driver to access the denormalized data. By querying the virtual tables, you can access the contents of Cassandra collections via ODBC. When you write or modify data in a virtual table, the data in the real table in the Cassandra database is updated.

The base table and virtual tables appear as additional tables in the list of tables that exist in the database. The base table uses the same name as the real table that it represents. The virtual tables that represent collections are named using the name of the real table, a separator (`_vt_` by default), and the name of the column.

For example, consider the table below. ExampleTable is a Cassandra database table that contains an integer primary key column named `pk_int`, a list column, a map column, and a set column (named `StringSet`).

<code>pk_int</code>	List	Map	StringSet
1	["1", "2", "3"]	{"S1": "a", "S2": "b" }	{"A", "B", "C" }
3	["100", "101", "102", "105"]	{"S1": "t" }	{"A", "E" }

The driver would generate multiple virtual tables to represent this single table. The first virtual table is the base table, shown below.

<code>pk_int</code>
1
3

The base table contains the same data as the original database table except for the collections, which are omitted from this table and expanded in other virtual tables.

The following tables show the virtual tables that renormalize the data from the List, Map, and `StringSet` columns.

<code>pk_int</code>	List#index	List#value
1	0	1
1	1	2
1	2	3
3	0	100
3	1	101
3	2	102
3	3	105

pk_int	Map#key	Map#value
1	S1	A
1	S2	b
3	S1	t

pk_int	StringSet#value
1	A
1	B
1	C
3	A
3	E

The foreign key columns in the virtual tables reference the primary key columns in the real table, and indicate which real table row the virtual table row corresponds to. The columns with names that end with #index or #key indicate the position of the data within the original list or map. The columns with names that end with #value contain the expanded data from the collection.

The data in the virtual tables can be selected, inserted, and updated as if they were normal tables, and the driver will handle the storage details within Cassandra. You can also explicitly append data to the end of a list by inserting a row of data with the index column set to -1.

For example, to append 106 to the List column in ExampleTable, where pk_int = 3, use the following query:

```
INSERT INTO "ExampleTable_vt_List" (pk_int, "List#index",
"List#value") VALUES (3, -1, '106')
```

Write-Back

The Simba Cassandra ODBC Driver supports Data Manipulation Languages (DML) statements such as INSERT, UPDATE, and DELETE.

Because Cassandra supports the UPSERT operation instead of INSERT and UPDATE, when you execute an INSERT or UPDATE statement using the Simba Cassandra ODBC Driver, the resulting behavior is an UPSERT operation. When you use the driver to write data to a Cassandra database, the INSERT and UPDATE operations both set the column value regardless of whether the data already exists.

You can use the TRUNCATE TABLE statement to delete rows from non-virtual tables. However, to delete rows from virtual tables, you must use the DELETE FROM statement instead.

Query Modes

The Simba Cassandra ODBC Driver can be configured to process queries as SQL statements or as CQL statements.

The default query mode used by the driver is SQL with CQL Fallback. In this query mode, the driver treats all incoming queries as SQL. If an error occurs while handling the query as SQL, then the driver will pass the original query to Cassandra to execute as CQL. However, because Cassandra is not aware of virtual tables, incoming queries that reference virtual tables will fail when they are passed through to the server to be executed as CQL.


Alternatively, you can configure the driver to work in SQL mode or CQL mode. When working in SQL mode, the driver treats all incoming queries as SQL, so any queries that are not written in standard SQL-92 syntax will fail. When working in CQL mode, the driver treats all incoming queries as CQL, so any queries written in a non-CQL syntax will fail.

Catalog and Schema Support

The Simba Cassandra ODBC Driver supports both catalogs and schemas to make it easy for the driver to work with various ODBC applications. Since Cassandra only organizes column families into keyspaces, the driver provides a synthetic catalog named CASSANDRA under which all of the keyspaces are organized. The driver also maps the ODBC schema to the Cassandra keyspace.

Security and Authentication

To protect data from unauthorized access, some Cassandra data stores require connections to be authenticated with user credentials or the SSL protocol. The Simba Cassandra ODBC Driver provides full support for these authentication protocols.

 **Note:**

In this documentation, "SSL" refers to both TLS (Transport Layer Security) and SSL (Secure Sockets Layer). The driver supports TLS 1.1 and 1.2. The SSL version used for the connection is the highest version that is supported by both the driver and the server.

The driver provides a mechanism that enables you to authenticate your connection using your Cassandra user name and password. For detailed configuration instructions, see [Configuring Authentication on Windows](#) on page 12 or [Configuring Authentication on a Non-Windows Machine](#) on page 32.

Additionally, the driver supports the following types of SSL connections:

- No identity verification
- One-way authentication
- Two-way authentication

It is recommended that you enable SSL whenever you connect to a server that is configured to support it. SSL encryption protects data and credentials when they are transferred over the network, and provides stronger security than authentication alone. For detailed configuration instructions, see [Configuring SSL Verification on Windows](#) on page 14 or [Configuring SSL Verification on a Non-Windows Machine](#) on page 32.

Driver Configuration Options

Driver Configuration Options lists the configuration options available in the Simba Cassandra ODBC Driver alphabetically by field or button label.

When creating or configuring a connection from a Windows machine, the fields and buttons are available in the following dialog boxes:

- Simba Cassandra ODBC Driver DSN Setup
- Advanced Options

When using a connection string or configuring a connection from a Linux or macOS machine, use the key names provided.

The following configuration options are available:

- [Binary Column Length](#) on page 47
- [Blacklist Datacenter Hosts](#) on page 47
- [Blacklist Hosts](#) on page 47
- [Client-side Certificate](#) on page 48
- [Client-side Private Key](#) on page 48
- [Default Keyspace](#) on page 48
- [Enable Case Sensitive](#) on page 48
- [Enable Latency Aware](#) on page 49
- [Enable Null Value Insert](#) on page 49
- [Enable Paging](#) on page 50
- [Enable Token Aware](#) on page 51
- [Enable Server Hostname Verification](#) on page 51
- [Host](#) on page 52
- [Key File Password](#) on page 52
- [Load Balancing Policy](#) on page 53
- [Log Level](#) on page 53
- [Log Path](#) on page 54
- [Mechanism](#) on page 54
- [Password](#) on page 55
- [Port](#) on page 55
- [Query Mode](#) on page 55
- [Rows Per Page](#) on page 56
- [SSL](#) on page 56
- [String Column Length](#) on page 57
- [Trusted CA Certificates](#) on page 57
- [Tunable Consistency](#) on page 57
- [Use SQL_WVARCHAR For String Data Types](#) on page 58
- [User Name](#) on page 59
- [Virtual Table Name Separator](#) on page 59
- [Whitelist Datacenter Hosts](#) on page 59
- [Whitelist Hosts](#) on page 60

Binary Column Length

Key Name	Default Value	Required
BinaryColumnLength	4000	No

Description

The default column length to report for BLOB columns.

Blacklist Datacenter Hosts

Key Name	Default Value	Required
BlacklistDatacenterFilteringHosts	None	No

Description

The address or name of data center hosts in the Cassandra cluster you do not wish to connect to. Each name or addresses should be entered in quotation marks, separated by a comma.

For example: "datacenter1", "datacenter2".

Blacklist Hosts

Key Name	Default Value	Required
BlacklistFilteringHosts	None	No

Description

The IP addresses of data store hosts in the Cassandra cluster you do not wish to connect to. Each IP addresses should be entered in quotation marks, separated by a comma.

For example: "1.2.3.4", "5.6.7.8".

Client-side Certificate

Key Name	Default Value	Required
SSLUserCertsPath	None	Yes, if two-way SSL verification is enabled.

Description

The full path to the `.pem` file containing the certificate for verifying the client.

Client-side Private Key

Key Name	Default Value	Required
SSLUserKeyPath	None	Yes, if two-way SSL verification is enabled.

Description

The full path to the file containing the private key used to verify the client.

Default Keyspace

Key Name	Default Value	Required
DefaultKeyspace	None	No

Description

The default keyspace (schema) to connect to in Cassandra.

Enable Case Sensitive

Key Name	Default Value	Required
EnableCaseSensitive	Selected (1)	No

Description

This option specifies whether the driver differentiates between capital and lower-case letters in schema, table, and column names.

- Enabled (1): The driver differentiates between capital and lower-case letters in schema, table, and column names. It is recommended that you enclose the names of all schemas, tables, and columns in double quotation marks (") if this option is enabled.
- Disabled (10): The driver ignores the capitalization of schema, table, and column names.

! Important:

- If the naming conventions for your Cassandra server are case-sensitive, you must leave this option enabled.
- If you are using the driver in a BI tool such as Tableau or Lumira, it is recommended that you leave this option enabled.
- If this option is disabled, then queries that use case-sensitive schema, table, and column names are not supported.

Enable Latency Aware

Key Name	Default Value	Required
EnableLatencyAware	Clear (0)	No

Description

This option specifies whether the driver uses a latency-awareness algorithm to distribute the load away from slower-performing nodes.

- Enabled (1): The driver uses the latency-awareness algorithm.
- Disabled (0): The driver does use the latency-awareness algorithm.

Enable Null Value Insert

Key Name	Default Value	Required
EnableNullInsert	Clear (0)	No

Description

This option specifies how the driver inserts NULL values.

- Enabled (1): The driver inserts all NULL values as specified in INSERT statements.
- Disabled (0): If an INSERT statement only specifies NULL values for a column or does not specify any values for a column, then the driver omits that column when executing the INSERT statement.

Consider the following before modifying this property:

- It is recommended that you leave the property disabled so that the driver does not insert NULL values into empty cells and create tombstones, which may decrease server performance and cause errors to occur. However, this setting may decrease driver performance when executing INSERT statements that affect a large number of rows.
- It is recommended that you enable this property by setting it to 1 only when executing INSERT statements that do not contain unnecessary NULL values, because inserting NULL values into empty columns creates tombstones.

For more information about tombstones, see "About deletes" in the Apache Cassandra 2.0 documentation: http://docs.datastax.com/en/cassandra/2.0/cassandra/dml/dml_about_deletes_c.html.

Enable Paging

Key Name	Default Value	Required
EnablePaging	Selected (1)	No

Description

This option specifies whether to split large result sets into pages.

- Enabled (1): The driver splits large result sets into pages.
- Disabled (0): The driver fetches all results into memory regardless of the result set size.

See also the driver configuration option [Rows Per Page](#) on page 56.

Enable Server Hostname Verification

Key Name	Default Value	Required
UseSslIdentityCheck	Selected (1)	No

Description

This option specifies whether the driver requires the host name of the server to match the host name in the SSL certificate.

- Enabled (1): During SSL verification the driver requires the host name of the server to match the host name in the certificate.
- Disabled (0): During SSL verification the driver allows the host name of the server to not match the host name in the certificate.

Enable Token Aware

Key Name	Default Value	Required
EnableTokenAware	Selected (1)	No

Description

This option specifies whether to use a token-aware policy to improve load balancing and latency.

- Enabled (1): The driver uses the token-aware policy.
- Disabled (0): The token-aware policy is not used.

Encrypt Password

Key Name	Default Value	Required
N/A	All Users Of This Machine	No

Description

This option specifies how the driver encrypts the credentials that are saved in the DSN:

- **Current User Only:** The credentials are encrypted, and can only be used by the current Windows user.
- **All Users Of This Machine:** The credentials are encrypted, but can be used by any user on the current Windows machine.

! Important:

This option is available only when you configure a DSN using the Simba Cassandra ODBC Driver DSN Setup dialog box in the Windows driver. When you connect to the data store using a connection string, the driver does not encrypt your credentials.

Host

Key Name	Default Value	Required
Host	None	Yes

Description

The IP address or host name of the Cassandra server.

You can specify a comma-separated list of IP addresses or host names. The driver will attempt to connect to all the servers concurrently, and then keep the first connection that is successfully established. The driver does not maintain a connection with any of the other servers in the list.

Key File Password

Key Name	Default Value	Required
SSLUserKeyPWD	None	No

Description

The password for the private key file that is specified in the Client-side Private Key field or the `SSLUserKeyPath` key.

For more information, see [Client-side Private Key](#) on page 48.

Load Balancing Policy

Key Name	Default Value	Required
COLoadBalancingPolicy	DC Aware (0)	No

Description

This option specifies the load balancing policy to be used.

- Round Robin (1): The driver uses the Round Robin policy to cycle through all nodes in the cluster on a per-query basis.
- DC Aware (0): The driver uses the DC Aware policy. For each query, all nodes in a primary "local" data center are tried first, before any nodes from other data centers.

Log Level

Key Name	Default Value	Required
LogLevel	OFF (0)	No

Description

Use this property to enable or disable logging in the driver and to specify the amount of detail included in log files.

! Important:

- Only enable logging long enough to capture an issue. Logging decreases performance and can consume a large quantity of disk space.
- This option is not supported in connection strings. To configure logging for the Windows driver, you must use the Logging Options dialog box. To configure logging for a non-Windows driver, you must use the `simba.cassandraodbc.ini` file.

Set the property to one of the following values:

- OFF (0): Disable all logging.
- FATAL (1): Logs severe error events that lead the driver to abort.
- ERROR (2): Logs error events that might allow the driver to continue running.

- WARNING (3): Logs events that might result in an error if action is not taken.
- INFO (4): Logs general information that describes the progress of the driver.
- DEBUG (5): Logs detailed information that is useful for debugging the driver.
- TRACE (6): Logs all driver activity.

When logging is enabled, the driver produces a log file named `Simba Cassandra ODBC Driver_driver.log` in the location specified in the `Log Path (LogPath)` property.

Log Path

Key Name	Default Value	Required
LogPath	None	Yes, if logging is enabled.

Description

The full path to the folder where the driver saves log files when logging is enabled.

! Important:

This option is not supported in connection strings. To configure logging for the Windows driver, you must use the Logging Options dialog box. To configure logging for a non-Windows driver, you must use the `simba.cassandraodbc.ini` file.

Mechanism

Key Name	Default Value	Required
AuthMech	No Authentication (0)	No

Description

The authentication mechanism to use.

Select one of the following settings, or set the key to the corresponding number:

- No Authentication (0)
- User Name And Password (1)

Password

Key Name	Default Value	Required
PWD	None	Yes, if the authentication mechanism is User Name And Password (1).

Description

The password corresponding to the user name that you provided in the User Name field (the `UID` key).

Port

Key Name	Default Value	Required
Port	9042	Yes

Description

The TCP port that the Cassandra server uses to listen for client connections.

Query Mode

Key Name	Default Value	Required
QueryMode	SQL with CQL Fallback (2)	No

Description

This option specifies the query mode to use when sending queries to Cassandra.

- SQL (0): The driver uses `SQL_QUERY_MODE` and executes all queries in SQL.
- CQL (1): The driver uses `CQL_QUERY_MODE` and executes all queries in CQL.

- **SQL with CQL Fallback (2):** The driver uses `SQL_WITH_CQL_FALLBACK_QUERY_MODE` and executes all queries in SQL by default. If a query fails, then the driver executes the query in CQL.

Rows Per Page

Key Name	Default Value	Required
RowsPerPage	10000	No

Description

When the Enable Paging option is enabled, use this option to specify the maximum number of rows to display on each page.

See also the driver configuration option [Enable Paging](#) on page 50.

SSL

Key Name	Default Value	Required
SSLMode	No SSL (0)	No

Description

This option specifies how the driver uses SSL to connect to the Cassandra server.

- **No SSL (0):** The driver does not use SSL.
- **One-way Server Verification (1):** If the Enable Server Hostname Verification option is enabled, the client verifies the Cassandra server using SSL. Otherwise, the driver connects to the Cassandra server using SSL but the client and the server do not verify each other.
- **Two-way Server and Client Verification (2):** If the Enable Server Hostname Verification option is enabled, the client and the Cassandra server verify each other using SSL. Otherwise, the driver connects to the Cassandra server using SSL but the client and the server do not verify each other.

For more information, see [Enable Server Hostname Verification](#) on page 51.

String Column Length

Key Name	Default Value	Required
StringColumnLength	4000	No

Description

The default column length to report for ASCII, TEXT, and VARCHAR columns.

Trusted CA Certificates

Key Name	Default Value	Required
SSLTrustedCertsPath	The path to the <code>cacerts.pem</code> file in the <code>\lib</code> folder in the driver's installation directory. The exact file path varies depending on the version of the driver that is installed.	Yes, if SSL verification is enabled.

Description

The full path to the `.pem` file containing the certificate for verifying the server.

Tunable Consistency

Key Name	Default Value	Required
TunableConsistency	ONE (1)	No

Description

The specific Cassandra replica or the number of Cassandra replicas that must process a query in order for the query to be considered successful.

Select one of the following settings, or set the key to the number corresponding to the desired setting:

- ANY (0)
- ONE (1)
- TWO (2)
- THREE (3)
- QUORUM (4)
- ALL (5)
- LOCAL_QUORUM (6)
- EACH_QUORUM (7)
- LOCAL_ONE (10)

These settings correspond to the consistency levels available in Cassandra. For detailed information about each consistency level, see *Configuring data consistency* in the Apache Cassandra 2.0 documentation:

http://www.datastax.com/documentation/cassandra/2.0/cassandra/dml/dml_config_consistency_c.html.

Use SQL_WVARCHAR For String Data Types

Key Name	Default Value	Required
UseSqlWVarchar	Clear (0)	No

Description

This option specifies how text and varchar types are mapped to SQL.

- Enabled (1): The Cassandra text and varchar types are mapped to SQL_WVARCHAR.
- Disabled (0): The Cassandra text and varchar types are mapped to SQL_VARCHAR.

User Name

Key Name	Default Value	Required
UID	None	Yes, if the authentication mechanism is User Name And Password (1).

Description

The user name that you use to access the Cassandra server.

Virtual Table Name Separator

Key Name	Default Value	Required
VTTableNameSeparator	_vt_	No

Description

The separator for naming a virtual table built from a collection.

The name of a virtual table consists of the name of the original table, then the separator, and then the name of the collection.

For example:

```
OriginalTable_vt_CollectionName
```

Whitelist Datacenter Hosts

Key Name	Default Value	Required
WhitelistDatacenterFilteringHosts	None	No

Description

The addresses or names of the datacenter hosts in the Cassandra cluster you wish to connect to. Each name or addresses should be entered in quotation marks, separated by a comma.

For example: "datacenter1", "datacenter2".

Whitelist Hosts

Key Name	Default Value	Required
WhitelistFilteringHosts	None	No

Description

The IP addresses of data store hosts in the Cassandra cluster you wish to connect to. Each IP addresses should be entered in quotation marks, separated by a comma.

For example: "1.2.3.4", "5.6.7.8".

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