MySQL Connector/ODBC Developer Guide
**Abstract**

This manual describes how to install and configure MySQL Connector/ODBC, the driver that enables ODBC applications to communicate with MySQL servers, and how to use it to develop database applications.

MySQL Connector/ODBC 8.0 is recommended for use with MySQL Server 8.0, 5.7, and 5.6. Please upgrade to MySQL Connector/ODBC 8.0.

For notes detailing the changes in each release of Connector/ODBC, see MySQL Connector/ODBC Release Notes.

For legal information, see the Legal Notices.

For help with using MySQL, please visit the MySQL Forums, where you can discuss your issues with other MySQL users.

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Preface and Legal Notices

This manual describes how to install, configure, and develop database applications using MySQL Connector/ODBC, the driver that allows ODBC applications to communicate with MySQL servers.

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Chapter 1 Introduction to MySQL Connector/ODBC

The MySQL Connector/ODBC is the name for the family of MySQL ODBC drivers (previously called MyODBC drivers) that provide access to a MySQL database using the industry standard Open Database Connectivity (ODBC) API. This reference covers Connector/ODBC 8.0, which includes the functionality of the Unicode driver and the ANSI driver.

MySQL Connector/ODBC provides both driver-manager based and native interfaces to the MySQL database, with full support for MySQL functionality, including stored procedures, transactions and full Unicode compliance.

For more information on the ODBC API standard and how to use it, refer to http://support.microsoft.com/kb/110093.

The application development section of the ODBC API reference assumes a good working knowledge of C, general DBMS, and a familiarity with MySQL. For more information about MySQL functionality and its syntax, refer to https://dev.mysql.com/doc/.

Typically, you need to install Connector/ODBC only on Windows machines. For Unix and macOS, you can use the native MySQL network or named pipes to communicate with your MySQL database. You may need Connector/ODBC for Unix or macOS if you have an application that requires an ODBC interface to communicate with the database. Applications that require ODBC to communicate with MySQL include ColdFusion, Microsoft Office, and Filemaker Pro.

For notes detailing the changes in each release of Connector/ODBC, see MySQL Connector/ODBC Release Notes.

Key Connector/ODBC topics include:

• Installing Connector/ODBC: Chapter 4, Connector/ODBC Installation.
• The configuration options: Section 5.2, “Connector/ODBC Connection Parameters”.
• An example that connects to a MySQL database from a Windows host: Section 6.2, “Step-by-step Guide to Connecting to a MySQL Database through Connector/ODBC”.
• An example that uses Microsoft Access as an interface to a MySQL database: Section 6.4, “Using Connector/ODBC with Microsoft Access”.
• General tips and notes, including how to obtain the last auto-increment ID: Section 8.1, “Connector/ODBC General Functionality”.
• Application-specific usage tips and notes: Section 8.2, “Connector/ODBC Application-Specific Tips”.
• A FAQ (Frequently Asked Questions) list: Section 8.4, “Connector/ODBC Errors and Resolutions (FAQ)”.
• Additional Connector/ODBC support options: Chapter 9, Connector/ODBC Support.
Chapter 2 Connector/ODBC Versions

These are the versions of Connector/ODBC that are currently available:

- Connector/ODBC 8.0: adds MySQL Server 8.0 support, including caching_sha2_password and the related GET_SERVER_PUBLIC_KEY connection attribute. For additional details, see the Connector/ODBC 8.0 release notes. Connector/ODBC 8.0: is the recommended version.

- Connector/ODBC 5.3: functions with MySQL Server versions between 4.1 and 5.7. It does not work with 4.0 or earlier releases, and does not support all MySQL 8 features. It conforms to the ODBC 3.8 specification and contains key ODBC 3.8 features including self-identification as a ODBC 3.8 driver, streaming of output parameters (supported for binary types only), and support of the SQL_ATTR_RESET_CONNECTION connection attribute (for the Unicode driver only). Connector/ODBC 5.3 also introduces a GTK+-based setup library, providing GUI DSN setup dialog on some Unix-based systems. The library is currently included in the Oracle Linux 6 and Debian 6 binary packages. Other new features in the 5.3 series include file DSN and bookmark support; see the release notes for the 5.3 series for details.

  Connector/ODBC 5.3.11 added caching_sha2_password support by adding the GET_SERVER_PUBLIC_KEY connection attribute.

- Connector/ODBC 5.2: upgrades the ANSI driver of Connector/ODBC 3.51 to the 5.x code base. It also includes new features, such as enabling server-side prepared statements by default. At installation time, you can choose the Unicode driver for the broadest compatibility with data sources using various character sets, or the ANSI driver for optimal performance with a more limited range of character sets. It works with MySQL versions 4.1 to 5.7.

- Connector/ODBC 5.1: is a partial rewrite of the of the 3.51 code base, and is designed to work with MySQL versions 4.1 to 5.7.

  Connector/ODBC 5.1: also includes the following changes and improvements over the 3.51 release:

  - Improved support on Windows 64-bit platforms.
  - Full Unicode support at the driver level. This includes support for the SQL_WCHAR data type, and support for Unicode login, password and DSN configurations. For more information, see Microsoft Knowledgebase Article #716246.
  - Support for the SQL_NUMERIC_STRUCT data type, which provides easier access to the precise definition of numeric values. For more information, see Microsoft Knowledgebase Article #714556.
  - Native Windows setup library. This replaces the Qt library based interface for configuring DSN information within the ODBC Data Sources application.
  - Support for the ODBC descriptor, which improves the handling and metadata of columns and parameter data. For more information, see Microsoft Knowledgebase Article #716339.

- Connector/ODBC 3.51, also known as the MySQL ODBC 3.51 driver, is a 32-bit ODBC driver. Connector/ODBC 3.51 has support for ODBC 3.5x specification level 1 (complete core API + level 2 features) to continue to provide all functionality of ODBC for accessing MySQL.

The manual for versions of Connector/ODBC older than 5.3 can be located in the corresponding binary or source distribution.
Note
Versions of Connector/ODBC earlier than the 3.51 revision were not fully compliant with the ODBC specification.

Note
From this section onward, the primary focus of this guide is the Connector/ODBC 5.3 driver.

Note
Version numbers for MySQL products are formatted as X.X.X. However, Windows tools (Control Panel, properties display) may show the version numbers as XX.XX.XX. For example, the official MySQL formatted version number 5.0.9 may be displayed by Windows tools as 5.00.09. The two versions are the same; only the number display formats are different.
Chapter 3 General Information About ODBC and Connector/ODBC

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ODBC (Open Database Connectivity) provides a way for client programs to access a wide range of databases or data sources. ODBC is a standardized API that enables connections to SQL database servers. It was developed according to the specifications of the SQL Access Group and defines a set of function calls, error codes, and data types that can be used to develop database-independent applications. ODBC usually is used when database independence or simultaneous access to different data sources is required.

For more information about ODBC, refer to http://support.microsoft.com/kb/110093.

Open Database Connectivity (ODBC) is a widely accepted application-programming interface (API) for database access. It is based on the Call-Level Interface (CLI) specifications from X/Open and ISO/IEC for database APIs and uses Structured Query Language (SQL) as its database access language.

A survey of ODBC functions supported by Connector/ODBC is given at Section 7.1, “Connector/ODBC API Reference”. For general information about ODBC, see http://support.microsoft.com/kb/110093.

3.1 Connector/ODBC Architecture

The Connector/ODBC architecture is based on five components, as shown in the following diagram:

Figure 3.1 Connector/ODBC Architecture Components

- Application:
The Application uses the ODBC API to access the data from the MySQL server. The ODBC API in turn communicates with the Driver Manager. The Application communicates with the Driver Manager using the standard ODBC calls. The Application does not care where the data is stored, how it is stored, or even how the system is configured to access the data. It needs to know only the Data Source Name (DSN).

A number of tasks are common to all applications, no matter how they use ODBC. These tasks are:

• Selecting the MySQL server and connecting to it.
• Submitting SQL statements for execution.
• Retrieving results (if any).
• Processing errors.
• Committing or rolling back the transaction enclosing the SQL statement.
• Disconnecting from the MySQL server.

Because most data access work is done with SQL, the primary tasks for applications that use ODBC are submitting SQL statements and retrieving any results generated by those statements.

• **Driver manager:**

  The Driver Manager is a library that manages communication between application and driver or drivers. It performs the following tasks:

  • Resolves Data Source Names (DSN). The DSN is a configuration string that identifies a given database driver, database, database host and optionally authentication information that enables an ODBC application to connect to a database using a standardized reference.

  Because the database connectivity information is identified by the DSN, any ODBC-compliant application can connect to the data source using the same DSN reference. This eliminates the need to separately configure each application that needs access to a given database; instead you instruct the application to use a pre-configured DSN.

  • Loading and unloading of the driver required to access a specific database as defined within the DSN. For example, if you have configured a DSN that connects to a MySQL database then the driver manager will load the Connector/ODBC driver to enable the ODBC API to communicate with the MySQL host.

  • Processes ODBC function calls or passes them to the driver for processing.

• **Connector/ODBC Driver:**

  The Connector/ODBC driver is a library that implements the functions supported by the ODBC API. It processes ODBC function calls, submits SQL requests to MySQL server, and returns results back to the application. If necessary, the driver modifies an application’s request so that the request conforms to syntax supported by MySQL.

• **DSN Configuration:**

  The ODBC configuration file stores the driver and database information required to connect to the server. It is used by the Driver Manager to determine which driver to be loaded according to the
ODBC Driver Managers

The driver uses this to read connection parameters based on the DSN specified.
For more information, Chapter 5, Configuring Connector/ODBC.

- **MySQL Server:**

  The MySQL database where the information is stored. The database is used as the source of the data (during queries) and the destination for data (during inserts and updates).

### 3.2 ODBC Driver Managers

An ODBC Driver Manager is a library that manages communication between the ODBC-aware application and any drivers. Its main functionality includes:

- Resolving Data Source Names (DSN).
- Driver loading and unloading.
- Processing ODBC function calls or passing them to the driver.

Most ODBC Driver Manager implementations also include an administration application that makes the configuration of DSN and drivers easier. Examples and information on ODBC Driver Managers for different operating systems are listed below:

- **Windows:** Microsoft Windows ODBC Driver Manager (**odbc32.dll**). It is included in the Windows operating system. See [http://support.microsoft.com/kb/110093](http://support.microsoft.com/kb/110093) for more information.

- **macOS:** ODBC Administrator is a GUI application for macOS. It provides a simplified configuration mechanism for the iODBC Driver Manager. You can configure DSN and driver information either through ODBC Administrator or through the iODBC configuration files. This also means that you can test ODBC Administrator configurations using the `iodbctest` command. See [http://support.apple.com/kb/​DL895](http://support.apple.com/kb/​DL895) for more information.

- **Unix:**

  - **unixODBC** Driver Manager for Unix (**libodb.so**). See [http://www.unixodbc.org](http://www.unixodbc.org), for more information.

  - **iODBC** Driver Manager for Unix (**libiodbc.so**). See [http://www.iodbc.org](http://www.iodbc.org), for more information.
Chapter 4 Connector/ODBC Installation

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This section explains where to download Connector/ODBC, and how to run the installer, copy the files manually, or build from source.

Where to Get Connector/ODBC

You can get a copy of the latest version of Connector/ODBC binaries and sources from our website at https://dev.mysql.com/downloads//connector/odbc/.

Choosing Binary or Source Installation Method

You can install the Connector/ODBC drivers using two different methods:

• The binary installation is the easiest and most straightforward method of installation. You receive all the necessary libraries and other files pre-built, with an installer program or batch script to perform all necessary copying and configuration.

• The source installation method is intended for platforms where a binary installation package is not available, or in situations where you want to customize or modify the installation process or Connector/ODBC drivers before installation.

If a binary distribution is not available for a particular platform, and you build the driver from the original source code.

Connector/ODBC binary distributions include an INFO_BIN file that describes the environment and configuration options used to build the distribution. If you installed Connector/ODBC from a binary distribution and experience build-related issues on a platform, it may help to check the settings that were used to build the distribution on that platform. Binary and source distributions include an INFO_SRC file that provides information about the product version and the source repository from which the distribution was produced. This information was added in Connector/ODBC 8.0.14.

Supported Platforms

Connector/ODBC can be used on all major platforms supported by MySQL according to https://www.mysql.com/en/support/supportedplatforms/database.html. This includes Windows, most Unix-like operation systems, and macOS.
Note

On all non-Windows platforms except macOS, the driver is built against unixODBC and is expecting a 2-byte SQLWCHAR, not 4 bytes as iODBC is using. For this reason, the binaries are only compatible with unixODBC; recompile the driver against iODBC to use them together. For further information, see Section 3.2, “ODBC Driver Managers”.

For further instructions, consult the documentation corresponding to the platform where you are installing and whether you are running a binary installer or building from source:

<table>
<thead>
<tr>
<th>Platform</th>
<th>Binary Installer</th>
<th>Build from Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>Installation Instructions</td>
<td>Build Instructions</td>
</tr>
<tr>
<td>Unix/Linux</td>
<td>Installation Instructions</td>
<td>Build Instructions</td>
</tr>
<tr>
<td>macOS</td>
<td>Installation Instructions</td>
<td>Build Instructions</td>
</tr>
</tbody>
</table>

Choosing Unicode or ANSI Driver

Connector/ODBC offers the flexibility to handle data using any character set through its Unicode-enabled driver, or the maximum raw speed for a more limited range of character sets through its ANSI driver. Both kinds of drivers are provided in the same download package, and are both installed onto your systems by the installation program or script that comes with the download package. Users who install Connector/ODBC and register it to the ODBC manager manually can choose to install and register either one or both of the drivers; the different drivers are identified by a w (for “wide characters”) for the Unicode driver and a for the ANSI driver at the end of the library names. For example, myodbc8w.dll versus myodbc8a.dll, or libmyodbc8w.so versus libmyodbc8a.so.

Note

Related: The previously described file names contain an "8", such as myodbc8a.dll, which means they are for Connector/ODBC 8.x. File names with a "5", such as myodbc5a.dll, are for Connector/ODBC 5.x.

Prerequisites

The ODBC driver is linked against the MySQL Server client library, so it inherits its dependencies for its shared libraries. For example, the MySQL Server client library depends on C++ runtime libraries.

4.1 Installing Connector/ODBC on Windows

Before installing the Connector/ODBC drivers on Windows:

- Make sure your Microsoft Data Access Components (MDAC) are up to date. You can obtain the latest version from the Microsoft Data Access and Storage website.

- Make sure the Visual C++ Redistributable for Visual Studio is installed.

  - Connector/ODBC 8.0.14 or higher: VC++ Runtime 2015 or VC++ Runtime 2017
  - Connector/ODBC 8.0.11 to 8.0.13: VC++ Runtime 2015
  - Connector/ODBC 5.3: VC++ Runtime 2013
Use the version of the package that matches the system type of your Connector/ODBC driver: use the 64-bit version (marked by "x64" in the package's title and filename) if you are running a 64-bit driver, and use the 32-bit version (marked by "x86" in the package's title and filename) if you are running a 32-bit driver.

- OpenSSL is a required dependency. The MSI package bundles OpenSSL libraries used by Connector/ODBC while the Zip Archive does not and requires that you install OpenSSL on the system.

There are different distribution types to use when installing for Windows. The software that is installed is identical in each case, only the installation method is different.

- **MySQL Installer (recommended):** The general MySQL Installer application for Windows can install, upgrade, configure, and manage most MySQL products, including Connector/ODBC. Download it from [http://dev.mysql.com/downloads/windows/installer/](http://dev.mysql.com/downloads/windows/installer/) and see the MySQL Installer documentation for additional details. This is not a Connector/ODBC specific installer.


- **Zip Archive:** Contains DLL files that must be manually installed. See Section 4.1.1, "Installing the Windows Connector/ODBC Driver Using the Zipped DLL Package" for additional details.

**Note**

An OLEDB/ODBC driver for Windows 64-bit is available from [Microsoft Downloads](https://support.microsoft.com/en-us/help/910799).

### 4.1.1 Installing the Windows Connector/ODBC Driver Using the Zipped DLL Package

If you have downloaded the zipped DLL package:

1. Unzip the installation files.
2. Run the included batch file to perform an installation to the default locations.
3. Alternatively, install the individual files required for Connector/ODBC operation manually.

**Note**

The following instructions only work for 32-bit Windows systems. If you have a 64-bit Windows system, use the MSI installer, which installs both the 32-bit and 64-bit drivers to the correct locations.

To install using the **batch file**:

1. Unzip the Connector/ODBC zipped DLL package.
2. Open a command prompt.
3. Change to the directory created when you unzipped the Connector/ODBC zipped DLL package.
4. Run **Install.bat**:  
   ```
   C:\> Install.bat
   ```
Installing the Windows Connector/ODBC Driver Using the Zipped DLL Package

This copies the necessary files into the default location, and then registers the Connector/ODBC driver with the Windows ODBC manager.

Note
Changing or adding a new DSN (data source name) may be accomplished using either the GUI, or from the command-line using myodbc-installer.exe.

Although Oracle recommends installing these files in the standard location, you can also copy the files by hand to an alternative location - for example, to run or test different versions of the Connector/ODBC driver on the same machine. To copy the files to a location of your choice, use the following steps:

1. Unzip the Connector/ODBC zipped DLL package.
2. Open a command prompt.
3. Change to the directory created when you unzipped the Connector/ODBC zipped DLL package.
4. Copy the library files to a suitable directory. The default location is the default Windows system directory \Windows\System32:

   For Connector/ODBC 8.x:
   ```
   C:\> copy lib\myodbc8S.dll \Windows\System32
   C:\> copy lib\myodbc8S.lib \Windows\System32
   
   If installing the Unicode-enabled driver:
   C:\> copy lib\myodbc8w.dll \Windows\System32
   C:\> copy lib\myodbc8w.lib \Windows\System32
   
   If installing the ANSI driver:
   C:\> copy lib\myodbc8a.dll \Windows\System32
   C:\> copy lib\myodbc8a.lib \Windows\System32
   ```

   For Connector/ODBC 5.x:
   ```
   C:\> copy lib\myodbc5S.dll \Windows\System32
   C:\> copy lib\myodbc5S.lib \Windows\System32
   
   If installing the Unicode-enabled driver:
   C:\> copy lib\myodbc5w.dll \Windows\System32
   C:\> copy lib\myodbc5w.lib \Windows\System32
   
   If installing the ANSI driver:
   C:\> copy lib\myodbc5a.dll \Windows\System32
   C:\> copy lib\myodbc5a.lib \Windows\System32
   ```

5. Copy the Connector/ODBC tools. These must be placed in a directory that is in the system %PATH%. The default is to install these into the Windows system directory \Windows\System32:
   ```
   C:\> copy bin\myodbc-installer.exe \Windows\System32
   ```

6. Optionally, copy the help files. For these files to be accessible through the help system, they must be installed in the Windows system directory:
   ```
   C:\> copy doc\*.hlp \Windows\System32
   ```

7. Finally, register the Connector/ODBC driver with the ODBC manager:
   For Connector/ODBC 8.x:
   ```
   ```
   For Unicode-enabled driver:
For ANSI driver:
C:\> myodbc-installer -a -d -n "MySQL ODBC 8.0 Driver" \\
    -t "DRIVER=myodbc8w.dll;SETUP=myodbc8S.dll"

For Unicode-enabled driver:
C:\> myodbc-installer -a -d -n "MySQL ODBC 8.0 Driver" \\
    -t "DRIVER=myodbc8a.dll;SETUP=myodbc8S.dll"

For Connector/ODBC 5.3:
C:\> myodbc-installer -a -d -n "MySQL ODBC 5.3 Driver" \\
    -t "DRIVER=myodbc5w.dll;SETUP=myodbcS.dll"

For ANSI driver:
C:\> myodbc-installer -a -d -n "MySQL ODBC 5.3 Driver" \\
    -t "DRIVER=myodbc5a.dll;SETUP=myodbc5S.dll"

If you installed these files into a non-default location, change the references to the DLL files and command location in the above statement.

4.2 Installing Connector/ODBC on Unix-like Systems

There are three methods available for installing Connector/ODBC on a Unix-like system from a binary distribution. For most Unix environments, you will use the tarball distribution. For Linux systems, RPM distributions are available, through the MySQL Yum repository (for some platforms) or direct download.

Prerequisites

- unixODBC 2.2.12 or later
- OpenSSL
- C++ runtime libraries (libstdc++)

4.2.1 Installing Connector/ODBC Using the MySQL Yum Repository

The MySQL Yum repository for Oracle Linux, Red Hat Enterprise Linux, CentOS, and Fedora provides Connector/ODBC RPM packages using the MySQL Yum repository. You must have the MySQL Yum repository on your system’s repository list (see Adding the MySQL Yum Repository for details). Make sure your Yum repository setup is up-to-date by running:

```
$> su root
$> yum update mysql-community-release
```

You can then install Connector/ODBC by the following command:

```
$> yum install mysql-connector-odbc
```

See Installing Additional MySQL Products and Components with Yum for more details.

4.2.2 Installing Connector/ODBC from a Binary Tarball Distribution

To install the driver from a tarball distribution (.tar.gz file), download the latest version of the driver for your operating system and follow these steps, substituting the appropriate file and directory names based on the package you download (some of the steps below might require superuser privileges):

1. Extract the archive:

```
$> gunzip mysql-connector-odbc-8.0.29-i686-pc-linux.tar.gz
```
Installing Connector/ODBC from a DEB Distribution

2. The extra directory contains two subdirectories, `lib` and `bin`. Copy their contents to the proper locations on your system (we use `/usr/local/bin` and `/usr/local/lib` in this example; replace them with the destinations of your choice):

   ```
   $> cp bin/* /usr/local/bin
   $> cp lib/* /usr/local/lib
   ```

   The last command copies both the Connector/ODBC ANSI and the Unicode drivers from `lib` into `/usr/local/lib`; if you do not need both, you can just copy the one you want. See Choosing Unicode or ANSI Driver for details.

3. Finally, register the driver version of your choice (the ANSI version, the Unicode version, or both) with your system's ODBC manager (for example, iODBC or unixodbc) using the `myodbc-installer` tool that was included in the package under the `bin` subdirectory (and is now under the `/usr/local/bin` directory, if the last step was followed); for example, this registers the Unicode driver with the ODBC manager:

   For Connector/ODBC 8.0:
   ```
   // Registers the Unicode driver:
   $> myodbc-installer -a -d -n "MySQL ODBC 8.0 Driver" -t "Driver=/usr/local/lib/libmyodbc8w.so"
   ```

   For Connector/ODBC 5.3:
   ```
   // Registers the Unicode driver:
   $> myodbc-installer -a -d -n "MySQL ODBC 5.3 Driver" -t "Driver=/usr/local/lib/libmyodbc5w.so"
   ```

4. Verify that the driver is installed and registered using the ODBC manager, or the `myodbc-installer` utility:

   ```
   $> myodbc-installer -d -l
   ```

   Next, see Section 5.5, “Configuring a Connector/ODBC DSN on Unix” on how to configure a DSN for Connector/ODBC.

4.2.3 Installing Connector/ODBC from a DEB Distribution

Connector/ODBC Debian packages (.deb files) are available (as of v8.0.20) for Debian or Debian-like Linux systems from the Connector/ODBC downloads page. The two package types are:

- **mysql-connector-odbc**: This driver package installs MySQL ODBC driver libraries and the installer tool. It installs these files:

  ```
  ${LibDir}/odbc/libmyodbc8a.so
  ${LibDir}/odbc/libmyodbc8w.so
  ${BinDir}/myodbc-installer
  ${DocDir}/mysql-connector-odbc/*
  ```

  Prerequisites: it depends on the unixODBC libraries (libodb, libodbdbi).

  It installs and registers both the Unicode (MySQL ODBC 8.0 Unicode Driver) and ANSI (MySQL ODBC 8.0 ANSI Driver) drivers.
Installing Connector/ODBC from an RPM Distribution

This driver package does not conflict with the official Debian package libmyodbc. It is possible to install/uninstall/use both packages independently.

- **mysql-connector-odbc-setup**: This setup package provides the GUI configuration widget library. It installs these files:

  ```
  ${LibDir}/odbc/libmyodbc8S.so
  ${DocDir}/mysql-connector-odbc-setup/*
  ```

  The installation process registers the setup library for ODBC drivers with the ODBC manager.

The ${LibDir}, ${BinDir}, ${DocDir} locations used above should be the standard locations where DEB packages install libraries/executables/documentation. The library location contains architecture component, and here are example locations:

  ```
  /usr/lib/x86_64-linux-gnu/odbc/libmyodbc8a.so
  /usr/lib/x86_64-linux-gnu/odbc/libmyodbc8w.so
  /usr/lib/x86_64-linux-gnu/odbc/libmyodbc8S.so
  /usr/bin/myodbc-installer
  /usr/share/doc/mysql-connector-odbc/*
  /usr/share/doc/mysql-connector-odbc-setup/*
  ```

### 4.2.4 Installing Connector/ODBC from an RPM Distribution

To install or upgrade Connector/ODBC from an RPM distribution on Linux, simply download the RPM distribution of the latest version of Connector/ODBC and follow the instructions below. Use `su root` to become root, then install the RPM file.

If you are installing for the first time:

```
$> su root
$> rpm -ivh mysql-connector-odbc-8.0.29.i686.rpm
```

If the driver exists, upgrade it like this:

```
$> su root
$> rpm -Uvh mysql-connector-odbc-8.0.29.i686.rpm
```

If there is any dependency error for MySQL client library, `libmysqlclient`, simply ignore it by supplying the `--nodeps` option, and then make sure the MySQL client shared library is in the path or set through `LD_LIBRARY_PATH`.

This installs the driver libraries and related documents to `/usr/local/lib` and `/usr/share/doc/MyODBC`, respectively. See Section 5.5, "Configuring a Connector/ODBC DSN on Unix" for the post-installation configuration steps.

To **uninstall** the driver, become root and execute an rpm command:

```
$> su root
$> rpm -e mysql-connector-odbc
```

### 4.3 Installing Connector/ODBC on macOS

macOS is based on the FreeBSD operating system, and you can normally use the MySQL network port for connecting to MySQL servers on other hosts. Installing the Connector/ODBC driver lets you connect to MySQL databases on any platform through the ODBC interface. If your application requires an ODBC interface, install the Connector/ODBC driver.
Prerequisites

On macOS, the ODBC Administrator, based on the iODBC manager, provides easy administration of ODBC drivers and configuration, allowing the updates of the underlying iODBC configuration files through a GUI tool. The tool is included in macOS v10.5 and earlier; users of later versions of macOS need to download it from http://www.iodbc.org/dataspace/doc/iodbc/wiki/iodbcWiki/Downloads and install it manually.

**Prerequisites**

- iODBC
- OpenSSL is a required dependency. The macOS installation binaries bundle OpenSSL, while the compressed tar archives do not and require that you install OpenSSL on your system before the installation process.
- C++ runtime libraries (libc++)

There are two ways to install Connector/ODBC on macOS. You can use either the package provided in a compressed tar archive that you manually install, or use a compressed disk image (.dmg) file, which includes an installer.

To install using the compressed tar archive (some of the steps below might require superuser privileges):

1. Download the compressed tar archive.
2. Extract the archive:
   ```bash
   $> tar xvzf mysql-connector-odbc-x.y.z-macos10.z-x86-(32|64)bit.tar.gz
   ```
3. The directory created contains two subdirectories, `lib` and `bin`. Copy these to a suitable location such as `/usr/local`:
   ```bash
   $> cp bin/* /usr/local/bin
   $> cp lib/* /usr/local/lib
   ```
4. Finally, register the driver with iODBC using the `myodbc-installer` tool that was included in the package:
   - For Connector/ODBC 8.0:
     ```bash
     $> myodbc-installer -a -d -n "MySQL ODBC 8.0 Driver" -t "Driver=/usr/local/lib/libmyodbc8w.so"
     ```
   - For Connector/ODBC 5.3:
     ```bash
     $> myodbc-installer -a -d -n "MySQL ODBC 5.3 Driver" -t "Driver=/usr/local/lib/libmyodbc5w.so"
     ```

To install using the a compressed disk image (.dmg) file:

**Important**

iODBC 3.52.12 or later must be installed on the macOS system before you can install Connector/ODBC using a compressed disk image. See Section 4.3, “Installing Connector/ODBC on macOS” [16].

1. Download the disk image.
2. Double click the disk image to open it. You see the Connector/ODBC installer inside.
3. Double click the Connector/ODBC installer, and you will be guided through the rest of the installation process. You need superuser privileges to finish the installation.
To verify the installed drivers, either use the ODBC Administrator application or the `myodbc-installer` utility:

```bash
$> myodbc-installer -d -l
```

### 4.4 Building Connector/ODBC from a Source Distribution on Windows

You only need to build Connector/ODBC from source on Windows to modify the source or installation location. If you are unsure whether to install from source, please use the binary installation detailed in Section 4.1, “Installing Connector/ODBC on Windows”.

Building Connector/ODBC from source on Windows requires a number of different tools and packages:

- MDAC, Microsoft Data Access SDK from [http://support.microsoft.com/kb/110093](http://support.microsoft.com/kb/110093).
- A suitable C++ compiler, such as Microsoft Visual C++ or the C++ compiler included with Microsoft Visual Studio 2015 or later. Compiling Connector/ODBC 5.3 can use VS 2013.
- CMake.
- The MySQL client library and include files from MySQL 8.0 or higher for Connector/ODBC 8.0, or MySQL 5.7 for Connector/ODBC 5.3. This is required because Connector/ODBC uses calls and structures that do not exist in older versions of the library. To get the client library and include files, visit [https://dev.mysql.com/downloads/](https://dev.mysql.com/downloads/).

### Build Steps

Set the environment variables for the Visual Studio toolchain. Visual Studio includes a batch file to set these for you, and installs a Start menu shortcut that opens a command prompt with these variables set.

Set `MYSQL_DIR` to the MySQL server installation path, while using the short-style file names. For example:

```cmd
C:\> set MYSQL_DIR=C:\PROGRA~1\MySQL\MYSQLS~1.0
```

Build Connector/ODBC using the `cmake` command-line tool by executing the following from the source root directory (in a command prompt window):

```cmd
C:\> cmake -G "Visual Studio 12 2013"
```

This produces a project file that you can open with Visual Studio, or build from the command line with either of the following commands:

```cmd
C:\> devenv.com MySQL_Connector_ODBC.sln /build Release
```

While building Connector/ODBC from source, dynamic linking with the MySQL client library is selected by default—that is, the `MYSQLCLIENT_STATIC_LINKING` option is `FALSE` by default (however, the binary distributions of Connector/ODBC from Oracle are linked statically to the client library). If you want to link statically to the MySQL client library, set the `MYSQLCLIENT_STATIC_LINKING` option to `TRUE`, and use the `MYSQLCLIENT_LIB_NAME` option to supply the client library's name for static linking:

```cmd
C:\> cmake -G "Visual Studio 12 2013" -DMYSQLCLIENT_STATIC_LINKING:BOOL=TRUE  
  DMYSQLCLIENT_LIB_NAME=client_lib_name_with_extension
```

Also use the `MYSQLCLIENT_LIB_NAME` option to link dynamically to a MySQL client library other than `libmysql.dll`. `cmake` looks for the client library under the location specified by the `MYSQL_LIB_DIR`
Building Connector/ODBC from a Source Distribution on Unix

option; if the option is not specified, `cmake` looks under the default locations inside the folder specified by the `MYSQL_DIR` option.

Since Connector/ODBC 8.0.11, use `BUNDLE_DEPENDENCIES` to install external library runtime dependencies, such as OpenSSL, together with the connector. For dependencies inherited from the MySQL client library, this only works if these dependencies are bundled with the client library itself.

`INFO_SRC`: this file provides information about the product version and the source repository from which the distribution was produced. Was added in Connector/ODBC 8.0.14.

Optionally link Connector/ODBC statically (equivalent to the /MT compiler option in Visual Studio) or dynamically (equivalent to the /MD compiler option in Visual Studio) to the Visual C++ runtime. The default option is to link dynamically; if you want to link statically, set the option `STATIC_MSVCRT:BOOL=TRUE`, that is:

```
C:\> cmake -G "Visual Studio 12 2013" -DSTATIC_MSVCRT:BOOL=TRUE
```

The `STATIC_MSVCRT` option and the `MYSQLCLIENT_STATIC_LINKING` option are independent of each other; that is, you can link Connector/ODBC dynamically to the Visual C++ runtime while linking statically to the MySQL client library, and vice versa. However, if you link Connector/ODBC dynamically to the Visual C++ runtime, you also need to link to a MySQL client library that is itself linked dynamically to the Visual C++ runtime; and similarly, linking Connector/ODBC statically to the Visual C++ runtime requires linking to a MySQL client library that is itself linked statically to the Visual C++ runtime.

To compile a debug build, set the `cmake` build type so that the correct versions of the MySQL client libraries are used; also, because the MySQL C client library built by Oracle is not built with the debug options, when linking to it while building Connector/ODBC in debug mode, use the `WITH_NODEFAULTLIB` option to tell `cmake` to ignore the default non-debug C++ runtime:

```
C:\> cmake -G "Visual Studio 14 2015" -DWITH_DEBUG=1  -DWITH_NODEFAULTLIB=libcmt
```

Create the debug build then with this command:

```
C:\> devenv.com MySQL_Connector_ODBC.sln /build Debug
```

Upon completion, the executables are in the `bin/` and `lib/` subdirectories.

See Section 4.1.1, “Installing the Windows Connector/ODBC Driver Using the Zipped DLL Package” on how to complete the installation by copying the binary files to the right locations and registering Connector/ODBC with the ODBC manager.

4.5 Building Connector/ODBC from a Source Distribution on Unix

You need the following tools to build MySQL from source on Unix:

- A working ANSI C++ compiler. GCC 4.2.1 or later, Sun Studio 12.1 or later, and many current vendor-supplied compilers are known to work.

- CMak4.5 Building Connector/ODBC from a Source Distribution on Unix e.

- MySQL client libraries and include files. To get the client libraries and include files, visit https://dev.mysql.com/downloads/.

- A compatible ODBC manager must be installed. Connector/ODBC is known to work with the iODBC and unixODBC managers. See Section 3.2, “ODBC Driver Managers” for more information.

- If you are using a character set that is not compiled into the MySQL client library, install the MySQL character definitions from the `charsets` directory into `SHAREDIR` (by default, `/usr/local/mysql/`
Once you have all the required files, unpack the source files to a separate directory, then run `cmake` with the following command:

```
$> cmake -G "Unix Makefiles"
```

### Typical `cmake` Parameters and Options

You might need to help `cmake` find the MySQL headers and libraries by setting the environment variables `MYSQL_INCLUDE_DIR`, `MYSQL_LIB_DIR`, and `MYSQL_DIR` to the appropriate locations; for example:

```
$> export MYSQL_INCLUDE_DIR=/usr/local/mysql/include
$> export MYSQL_LIB_DIR=/usr/local/mysql/lib
$> export MYSQL_DIR=/usr/local/mysql
```

When you run `cmake`, you might add options to the command line. Here are some examples:

- `-DODBC_INCLUDES=dir_name`: Use when the ODBC include directory is not found within the system $PATH.
- `-DODBC_LIB_DIR=dir_name`: Use when the ODBC library directory is not found within the system $PATH.
- `-DWITH_UNIXODBC=1`: Enables unixODBC support. iODBC is the default ODBC library used when building Connector/ODBC from source on Linux platforms. Alternatively, unixODBC may be used by setting this option to “1”.
- `-DMYSQLCLIENT_STATIC_LINKING=boolean`: Link statically to the MySQL client library. Dynamic linking with the MySQL client library is selected by default—that is, the `MYSQLCLIENT_STATIC_LINKING cmake` option is `FALSE` by default (however, the binary distributions of Connector/ODBC from Oracle are linked statically to the client library). If you want to link statically to the MySQL client library, set the option to `TRUE`. See also the description for the `-DMYSQLCLIENT_LIB_NAME=client_lib_name_with_extension` option.
- `-DBUNDLE_DEPENDENCIES=boolean`: Enable to install external library runtime dependencies, such as OpenSSL, together with the connector. For dependencies inherited from the MySQL client library, this only works if these dependencies are bundled with the client library itself. Option added in v8.0.11.
- `-DMYSQLCLIENT_LIB_NAME=client_lib_name_with_extension`: Location of the MySQL client library. See the description for `MYSQLCLIENT_STATIC_LINKING`. To link statically to the MySQL client library, use this option to supply the client library's name for static linking. Also use this option if you want to link dynamically to a MySQL client library other than `libmysqlclient.so`. `cmake` looks for the client library under the location specified by the environment variable `MYSQL_LIB_DIR`; if the variable is not specified, `cmake` looks under the default locations inside the folder specified by the environment variable `MYSQL_DIR`.
- `-DMYSQL_CONFIG_EXECUTABLE=/path/to/mysql_config`: Specifies location of the utility `mysql_config`, which is used to fetch values of the variables `MYSQL_INCLUDE_DIR`, `MYSQL_LIB_DIR`, `MYSQL_LINK_FLAGS`, and `MYSQL_CXXFLAGS`. Values fetched by `mysql_config` are overridden by values provided directly to `cmake` as parameters.
- `-DMYSQL_EXTRA_LIBRARIES=dependencies`: When linking the MySQL client library statically (`-DMYSQLCLIENT_STATIC_LINKING=ON`) and when setting `MYSQL_LIB_DIR` and `MYSQL_INCLUDE_DIR` (so that the `mysql_config` is not used to detect settings), use this to define a list of dependencies required by the client library.
### Build Steps for Unix

To build the driver libraries, execute `make`:

```bash
$> make
```

If any errors occur, correct them and continue with the build process. If you are not able to finish the build, see Section 9.1, “Connector/ODBC Community Support”.

### Installing Driver Libraries

To install the driver libraries, execute the following command:

```bash
$> make install
```

For more information on build process, refer to the `BUILD` file that comes with the source distribution.

### Testing Connector/ODBC on Unix

Some tests for Connector/ODBC are provided in the distribution with the libraries that you built. To run the tests:

1. Make sure you have an `odbc.ini` file in place, by which you can configure your DSN entries. A sample `odbc.ini` file is generated by the build process under the `test` folder. Set the environment variable `ODBCINI` to the location of your `odbc.ini` file.

2. Set up a test DSN in your `odbc.ini` file (see Section 5.5, “Configuring a Connector/ODBC DSN on Unix” for details). A sample DSN entry, which you can use for your tests, can be found in the sample `odbc.ini` file.

3. Set the environment variable `TEST_DSN` to the name of your test DSN.

4. Set the environment variable `TEST_UID` and perhaps also `TEST_PASSWORD` to the user name and password for the tests, if needed. By default, the tests use “root” as the user and do not enter a password; if you want the tests to use another user name or password, set `TEST_UID` and `TEST_PASSWORD` accordingly.

5. Make sure that your MySQL server is running.

6. Run the following command:

```bash
$> make test
```

### 4.6 Building Connector/ODBC from a Source Distribution on macOS

To build Connector/ODBC from source on macOS, follow the same instructions given for Section 4.5, “Building Connector/ODBC from a Source Distribution on Unix”. Notice that `iODBC` is the default ODBC...
library used when building Connector/ODBC on macOS from source. Alternatively, unixODBC may be used by setting the option `-DWITH_UNIXODBC=1`.

### 4.7 Installing Connector/ODBC from the Development Source Tree

**Caution**

This section is only for users who are interested in helping us test our new code. To just get MySQL Connector/ODBC up and running on your system, use a standard release distribution.

The Connector/ODBC code repository uses Git. To check out the latest source code, visit GitHub: https://github.com/mysql/mysql-connector-odbc To clone the Git repository to your machine, use this command:

```
$> git clone https://github.com/mysql/mysql-connector-odbc.git
```

You should now have a copy of the entire Connector/ODBC source tree in the directory `mysql-connector-odbc`. To build and then install the driver libraries from this source tree on Unix or Linux, use the same steps outlined in Section 4.5, “Building Connector/ODBC from a Source Distribution on Unix”.

On Windows, make use of Windows Makefiles `WIN-Makefile` and `WIN-Makefile_debug` in building the driver. For more information, see Section 4.4, “Building Connector/ODBC from a Source Distribution on Windows”.

After the initial checkout operation to get the source tree, run `git pull` periodically to update your source according to the latest version.
Chapter 5 Configuring Connector/ODBC

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Before you connect to a MySQL database using the Connector/ODBC driver, you configure an ODBC Data Source Name (DSN). The DSN associates the various configuration parameters required to communicate with a database to a specific name. You use the DSN in an application to communicate with the database, rather than specifying individual parameters within the application itself. DSN information can be user-specific, system-specific, or provided in a special file. ODBC data source names are configured in different ways, depending on your platform and ODBC driver.

5.1 Overview of Connector/ODBC Data Source Names

A Data Source Name associates the configuration parameters for communicating with a specific database. Generally, a DSN consists of the following parameters:

- Name
- Host Name
- Database Name
- Login
- Password

In addition, different ODBC drivers, including Connector/ODBC, may accept additional driver-specific options and parameters.

There are three types of DSN:

- A **System DSN** is a global DSN definition that is available to any user and application on a particular system. A System DSN can normally only be configured by a systems administrator, or by a user who has specific permissions that let them create System DSNs.

- A **User DSN** is specific to an individual user, and can be used to store database connectivity information that the user regularly uses.
A File DSN uses a simple file to define the DSN configuration. File DSNs can be shared between users and machines and are therefore more practical when installing or deploying DSN information as part of an application across many machines.

DSN information is stored in different locations depending on your platform and environment.

5.2 Connector/ODBC Connection Parameters

You can specify the parameters in the following tables for Connector/ODBC when configuring a DSN:

- Table 5.1, “Connector/ODBC DSN Configuration Options”
- Table 5.3, “Connector/ODBC Option Parameters”

Users on Windows can use the ODBC Data Source Administrator to set these parameters; see Section 5.3, “Configuring a Connector/ODBC DSN on Windows” on how to do that, and see Table 5.1, “Connector/ODBC DSN Configuration Options” for information on the options and the fields and check boxes they correspond to on the graphical user interface of the ODBC Data Source Administrator. On Unix and macOS, use the parameter name and value as the keyword/value pair in the DSN configuration. Alternatively, you can set these parameters within the InConnectionString argument in the SQLDriverConnect() call.

Table 5.1 Connector/ODBC DSN Configuration Options

<table>
<thead>
<tr>
<th>Parameter</th>
<th>GUI Option</th>
<th>Default Value</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>user</td>
<td>User</td>
<td>ODBC</td>
<td>The user name used to connect to MySQL.</td>
</tr>
<tr>
<td>uid</td>
<td>User</td>
<td>ODBC</td>
<td>Synonymous with user. Added in 3.51.16.</td>
</tr>
<tr>
<td>server</td>
<td>TCP/IP Server</td>
<td>localhost</td>
<td>The host name of the MySQL server.</td>
</tr>
<tr>
<td>database</td>
<td>Database</td>
<td>-</td>
<td>The default database.</td>
</tr>
<tr>
<td>option</td>
<td>-</td>
<td>0</td>
<td>Options that specify how Connector/ODBC works. See Table 5.3, “Connector/ODBC Option Parameters” and Table 5.4, “Recommended Connector/ODBC Option Values for Different Configurations”.</td>
</tr>
<tr>
<td>port</td>
<td>Port</td>
<td>3306</td>
<td>The TCP/IP port to use if server is not localhost.</td>
</tr>
<tr>
<td>initstmt</td>
<td>Initial Statement</td>
<td>-</td>
<td>Initial statement. A statement to execute when connecting. In version 3.51 the parameter is called stmt. The driver supports the initial statement being executed only at the time of the initial connection.</td>
</tr>
<tr>
<td>password</td>
<td>Password</td>
<td>-</td>
<td>The password for the user account on server. pwd is an alias.</td>
</tr>
<tr>
<td>password1</td>
<td>Password</td>
<td>-</td>
<td>For Multi-Factor Authentication (MFA); password1 is an alias. There’s also the pwd1, pwd2, and pwd3 aliases. These were added in 8.0.28.</td>
</tr>
<tr>
<td>password2</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>password3</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>socket</td>
<td>-</td>
<td>-</td>
<td>The Unix socket file or Windows named pipe to connect to if server is set to localhost.</td>
</tr>
<tr>
<td>ssl-ca</td>
<td>SSL Certificate</td>
<td>-</td>
<td>Alias of SSLCA as an eventual replacement; added in v8.0.29.</td>
</tr>
<tr>
<td>SSLCA</td>
<td>SSL Certificate</td>
<td>-</td>
<td>The path to a file with a list of trust SSL CAs. An ssl-ca alias was added in 8.0.29, which is preferred.</td>
</tr>
<tr>
<td>ssl-capath</td>
<td>SSL CA Path</td>
<td>-</td>
<td>Alias of SSLCAPATH as an eventual replacement; added in v8.0.29.</td>
</tr>
<tr>
<td>SSLCAPATH</td>
<td>SSL CA Path</td>
<td>-</td>
<td>The path to a directory that contains trusted SSL CA certificates in PEM format.</td>
</tr>
<tr>
<td>Parameter</td>
<td>GUI Option</td>
<td>Default Value</td>
<td>Comment</td>
</tr>
<tr>
<td>-----------</td>
<td>------------</td>
<td>---------------</td>
<td>---------</td>
</tr>
</tbody>
</table>
| ssl-capath | - | An `ssl-capath` alias was added in 8.0.29, which is preferred over `SSLCAPATH`.
| SSLCERT   | SSL Certificate | - | The name of the SSL certificate file to use for establishing a secure connection. An `ssl-cert` alias was added in 8.0.29, which is preferred over `SSLCERT`.
| SSLCipher | SSL Cipher | - | The list of permissible ciphers for SSL encryption. The format is the `openssl ciphers` command. An `ssl-cipher` alias was added in 8.0.29, which is preferred over `SSLCIPHER`.
| SSLKEY    | SSL Key | - | The name of the SSL key file to use for establishing a secure connection. An `ssl-key` alias was added in 8.0.29, which is preferred over `SSLKEY`.
| rsakey     | RSA Public Key | - | The full-path name of the PEM file that contains the RSA public key for using the SHA256 authentication plugin of MySQL. Added in 5.3.4.
| sslverify  | Verify SSL | 0 | If set to 1, the SSL certificate will be verified when using the connection. If not set, then the default behavior is to ignore certificate verification. **Note** The option is deprecated since Connector/ODBC 5.3.7. It is preferable to use the `SSL_MODE` option instead.
| charset    | Character Set | - | The character set to use for the connection. Added in 3.51.17. Note: executing `SET NAMES` is not allowed as of v5.1.
| readtimeout| - | The timeout in seconds for attempts to read from the server. If this timeout value and there are retries if necessary, the effective timeout value is three times the option value so that a lost connection can be detected earlier than the TCP/IP `Close_Wait_Timeout` value of 10 minutes. This option works only for TCP/IP connections, and only for Windows prior to MySQL 5.1.12. Corresponds to the `MYSQL_OPT_READ_TIMEOUT` option of the MySQL Client Library. Added in 3.51.27.
| writetimeout| - | The timeout in seconds for attempts to write to the server. This timeout value and there are `net_retry_count` retries if necessary, the total effective timeout value is `net_retry_count` times the option value. This option works only for TCP/IP connections, and only for Windows prior to MySQL 5.1.12. Corresponds to the `MYSQL_OPT_WRITE_TIMEOUT` option of the MySQL Client Library. Added in 3.51.27.
| interactive| Interactive Client | 0 | If set to 1, the `CLIENT_INTERACTIVE` connection option of `mysql_real_connect()` is enabled. Added in 5.1.7.
## Connector/ODBC Connection Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>GUI Option</th>
<th>Default Value</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>prefetch</td>
<td>Prefetch from server by _ rows at a time</td>
<td>0</td>
<td>When set to a non-zero value ( N ), causes all queries in the connection to return ( N ) rows at a time rather than the entire result set. Useful for very large tables where it is not practical to retrieve the whole result set at once. You can scroll through the result set, ( N ) records at a time. This option works only with forward-only cursors. It does not work if the option parameter <code>MULTI_STATEMENTS</code> is set. It can be used in combination with the option parameter <code>NO_CACHE</code>. Its behavior in ADO applications is undefined: the prefetching might or might not occur. Added in 5.1.11.</td>
</tr>
<tr>
<td>no_ssps</td>
<td>-</td>
<td>0</td>
<td>In Connector/ODBC 5.2 and after, by default, server-side prepared statements are used. When this option is set to a non-zero value, prepared statements are emulated on the client side, which is the same behavior as in 5.1 and 3.51. Added in 5.2.0.</td>
</tr>
<tr>
<td>can_handle_exp_pwd</td>
<td>Can Handle Expired Password</td>
<td>0</td>
<td>Indicates that the application can deal with an expired password, which is signalled by an SQL state of <code>08004</code> (“Server rejected the connection”) and a native error code <code>ER_MUST_CHANGE_PASSWORD_LOGIN</code> (1862). The connection is “sandboxed”, and can do nothing other than issue a <code>SET PASSWORD</code> statement. To establish a connection in this case, you must either use the <code>initstmt</code> connection option to set a new password at the start, or issue a <code>SET PASSWORD</code> statement immediately after connecting. Once the expired password is reset, the restrictions on the connection are lifted. See the <code>ALTER USER</code> Statement for details about password expiration for MySQL server accounts. Added in 5.2.4.</td>
</tr>
<tr>
<td>ENABLE_CLEARTEXT</td>
<td>Enable Cleartext Authentication</td>
<td>0</td>
<td>Set to 1 to enable cleartext authentication. Added in 5.1.13 and 5.2.5.</td>
</tr>
<tr>
<td>ENABLE_LOCAL_INFILE</td>
<td>Enable LOAD DATA operations</td>
<td>0</td>
<td>A connection string, DSN, and GUI option. Set <code>ENABLE_LOCAL_INFILE=1</code> to enable LOAD DATA operations. This toggles the <code>MYSQL_OPT_LOCAL_INFILE</code> mysql_options() option. The DSN value overrides the DSN value if both are set. Added in 5.3.12 and 8.0.14.</td>
</tr>
<tr>
<td>LOAD_DATA_LOCAL_DIR</td>
<td>Restrict LOAD DATA operations</td>
<td></td>
<td>A connection string, DSN, and GUI option. Set <code>LOAD_DATA_LOCAL_DIR</code> to a specific directory, such as <code>LOAD_DATA_LOCAL_DIR=/tmp</code>, to restrict uploading files to a specific path. This sets the <code>MYSQL_OPT_LOAD_DATA_LOCAL_DIR</code> mysql_options() option. The connection string overrides the DSN value if both are set. This option has no effect if <code>ENABLE_LOCAL_INFILE=1</code>. Added in 8.0.22.</td>
</tr>
<tr>
<td>GET_SERVER_PUBLIC_KEY</td>
<td>Get Server Public Key</td>
<td>0</td>
<td>When connecting to accounts that use <code>caching_sha2_password</code> authentication over non-secure connection (TLS disabled), it requests the RSA public key required to perform the authentication. The option is ignored if the authentication mechanism for the connection is different from <code>caching_sha2_password</code>. This option corresponds to the <code>MYSQL_OPT_GET_SERVER_PUBLIC_KEY</code> mysql_options() C API function. The value is a boolean. The option is added in Connector/ODBC versions 8.0.11 and later. Connector/ODBC built using OpenSSL-based MySQL client library used by Connector/ODBC was built with YaSSL, as is the case for GPL distributions of Connector/ODBC 5.3, the option does not function and is ignored.</td>
</tr>
<tr>
<td>NO_TLS_1.0</td>
<td>Disable TLS 1.0</td>
<td>0</td>
<td>This option was removed in v8.0.28. It disallowed the use of TLS for connection encryption. All versions of TLS are allowed by default.</td>
</tr>
</tbody>
</table>

---
<table>
<thead>
<tr>
<th>Parameter</th>
<th>GUI Option</th>
<th>Default Value</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO_TLS_1.1</td>
<td>Disable TLS 1.1</td>
<td>0</td>
<td>This option was removed in v8.0.28. It disallowed the use of version 1.1 for connection encryption. All versions of TLS are allowed by default, and this option excludes version 1.1 from being used. Added in 5.3.7. TLS 1.1 support was deprecated in v8.0.26 before removal in v8.0.28.</td>
</tr>
<tr>
<td>NO_TLS_1.2</td>
<td>Disable TLS 1.2</td>
<td>0</td>
<td>Disallows the use of TLS 1.2 for connection encryption. All versions of TLS are allowed by default, and this option excludes version 1.2 from being used. Added in 5.3.7.</td>
</tr>
<tr>
<td>NO_TLS_1.3</td>
<td>Disable TLS 1.3</td>
<td>0</td>
<td>Disallows the use of TLS 1.3 for connection encryption. All versions of TLS are allowed by default, and this option excludes version 1.3 from being used. Added in 8.0.26.</td>
</tr>
<tr>
<td>tls-versions</td>
<td>Define the allowed TLS protocol versions</td>
<td>TLSv1.2,TLSv1.3 (set by libmysqlclient)</td>
<td>Accepts TLSv1.2 and/or TLSv1.3; while other values do not have any effect if ssl-mode=DISABLED, and overrides (disables) NO_TLS_X_Y connection options such as NO_TLS_1_2. Added in 8.0.30.</td>
</tr>
<tr>
<td>SSL_ENFORCE</td>
<td>Enforce SSL</td>
<td>0</td>
<td>Enforce the requirement to use SSL for connections to the server. See Table 5.2, “Combined Effects of SSL_ENFORCE and DISABLE_SSL_DEFAULT”. Added in 5.3.6.</td>
</tr>
</tbody>
</table>

**Note**

This option is deprecated since Connector/ODBC 5.3.7 and removed in 8.0.13. It is preferable to use the SSLMODE option parameter instead.

<table>
<thead>
<tr>
<th>SSL_MODE</th>
<th>SSL Mode</th>
<th>-</th>
<th>Sets the SSL mode of the server connection. The option can be set to any of the following values: DISABLED, PREFERRED, REQUIRED, or VERIFY_CA or VERIFY_IDENTITY. See description for the --ssl-mode option in the MySQL 8.0 Reference Manual for the meaning of each of these options. An ssl-mode alias was added in 8.0.29, which is preferred over SSL_MODE.</th>
</tr>
</thead>
</table>

If SSL_MODE is not explicitly set, use of the SSL_CA or SSL_CLIENT_CA option overrides the SSL_MODE option.

Added in 5.3.7. This option overrides the deprecated SSL_ENFORCE option.
Note
The SSL configuration parameters can also be automatically loaded from a `my.ini` or `my.cnf` file. See Using Option Files.

Table 5.2 Combined Effects of SSL_ENFORCE and DISABLE_SSL_DEFAULT

<table>
<thead>
<tr>
<th>SSL_ENFORCE</th>
<th>DISABLE_SSL_DEFAULT = 0</th>
<th>DISABLE_SSL_DEFAULT = 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>(Default) Connection with SSL is attempted first; if not possible, fall back to unencrypted connection.</td>
<td>Connection with SSL is not attempted; use unencrypted connection.</td>
</tr>
<tr>
<td>1</td>
<td>Connect with SSL; throw an error if an SSL connection cannot be established.</td>
<td>Connect with SSL; throw an error if an SSL connection cannot be established. DISABLE_SSL_DEFAULT=1 is overridden.</td>
</tr>
</tbody>
</table>

The behavior of Connector/ODBC can be also modified by using special option parameters listed in Table 5.3, “Connector/ODBC Option Parameters”, specified in the connection string or through the GUI dialog box. All of the connection parameters also have their own numeric constant values, which can be added up as a combined value for the option parameter for specifying those options. However, the numerical option value in the connection string can only enable, but not disable parameters enabled on the DSN, which can only be overridden by specifying the option parameters using their text names in the connection string.

Note
While the combined numerical value for the option parameter can be easily constructed by addition of the options' constant values, decomposing the value to verify if particular options are enabled can be difficult. We recommend using the options' parameter names instead in the connection string, because they are self-explanatory.

Table 5.3 Connector/ODBC Option Parameters

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>GUI Option</th>
<th>Constant Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOUND_ROWS</td>
<td>Return matched rows instead of affected rows</td>
<td>2</td>
<td>The client cannot handle when MySQL returns the true value of affected rows. If this flag is set, MySQL returns &quot;found rows&quot; instead. You must have MySQL 3.21.14 or newer for this to work.</td>
</tr>
<tr>
<td>BIG_PACKETS</td>
<td>Allow big result set</td>
<td>8</td>
<td>Do not set any packet limit for results and bind parameters. Without this option, parameter binding will be truncated to 255 characters.</td>
</tr>
<tr>
<td>NO_PROMPT</td>
<td>Don't prompt when connecting</td>
<td>16</td>
<td>Do not prompt for questions even if driver would like to prompt.</td>
</tr>
<tr>
<td>DYNAMIC_CURSOR</td>
<td>Enable Dynamic Cursors</td>
<td>32</td>
<td>Enable or disable dynamic cursor support.</td>
</tr>
<tr>
<td>NO_SCHEMA</td>
<td>Disables support for ODBC schemas</td>
<td>64</td>
<td>Ignore use of database schema name in <code>catalog.schemata</code>. See also the related NO_CATALOG option. This option was removed in Connector/ODBC 8.0.13 but served no function before then.</td>
</tr>
<tr>
<td>Parameter Name</td>
<td>GUI Option</td>
<td>Constant Value</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-------------------------------------</td>
<td>----------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>NO_DEFAULT_CURSOR</td>
<td>Disable driver-provided cursor support</td>
<td>128</td>
<td>Force use of ODBC manager cursors (experimental).</td>
</tr>
<tr>
<td>NO_LOCALE</td>
<td>Don't use setlocale()</td>
<td>256</td>
<td>Disable the use of extended fetch (experimental).</td>
</tr>
<tr>
<td>PAD_SPACE</td>
<td>Pad CHAR to full length with space</td>
<td>512</td>
<td>Pad CHAR columns to full column length.</td>
</tr>
<tr>
<td>FULL_COLUMN_NAMES</td>
<td>Include table name in SQLDescribeCol()</td>
<td>1024</td>
<td>SQLDescribeCol() returns fully-qualified column names.</td>
</tr>
<tr>
<td>COMPRESSED_PROTO</td>
<td>Use compression</td>
<td>2048</td>
<td>Use the compressed client/server protocol.</td>
</tr>
<tr>
<td>IGNORE_SPACE</td>
<td>Ignore space after function names</td>
<td>4096</td>
<td>Tell server to ignore space after function names and before &quot;(&quot;. This makes all function names keywords.</td>
</tr>
<tr>
<td>NAMED_PIPE</td>
<td>Named Pipe</td>
<td>8192</td>
<td>Connect with named pipes to a mysql server running on NT.</td>
</tr>
<tr>
<td>NO_BIGINT</td>
<td>Treat BIGINT columns as INT columns</td>
<td>16384</td>
<td>Change BIGINT columns to INT columns (some applications cannot handle BIGINT).</td>
</tr>
<tr>
<td>NO_CATALOG</td>
<td>Disable catalog support</td>
<td>32768</td>
<td>Forces results from the catalog functions, such as SQLTables, to always return NULL and the driver to report that catalogs are not supported. See also the related NO_SCHEMA option. For usage details, see Section 8.1.3, &quot;Configuring Catalog and Schema Support&quot;.</td>
</tr>
<tr>
<td>USE_Mycnf</td>
<td>Read options from my.cnf</td>
<td>65536</td>
<td>Read parameters from the [client] and [odbc] groups in my.cnf.</td>
</tr>
<tr>
<td>SAFE</td>
<td>Enable safe options</td>
<td>131072</td>
<td>Add some extra safety checks.</td>
</tr>
<tr>
<td>NO_TRANSACTIONS</td>
<td>Disable transaction support</td>
<td>262144</td>
<td>Disable transactions.</td>
</tr>
</tbody>
</table>
| LOG_QUERY                    | Log queries to %TEMP%
\myodbc.sql | 524288         | Enable query logging to c:\myodbc.sql (\tmp\myodbc.sql) file. (Enabled only in debug mode.) |
| NO_CACHE                     | Don't cache results of forward-only cursors | 1048576       | Do not cache the results of the driver, in cases of applications regularly using forward-only cursors in dealing with very large tables. |
| FORWARD_CURSOR               | Force use of forward-only cursors   | 2097152        | Force the use of forward-only cursors, in cases of applications regularly using noncache result sets. |
| AUTO_RECONNECT               | Enable automatic reconnect          | 4194304        | Enables automatic reconnect.                                               |
## Connector/ODBC Connection Parameters

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>GUI Option</th>
<th>Constant Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUTO_IS_NULL</td>
<td>Enable SQL_AUTO_IS_NULL</td>
<td>8388608</td>
<td>When <code>AUTO_IS_NULL</code> is set, the driver does not change the default value of <code>sql_auto_is_null</code>, leaving it at 1, so you get the MySQL default, not the SQL standard behavior. When <code>AUTO_IS_NULL</code> is not set, the driver changes the default value of <code>SQL_AUTO_IS_NULL</code> to 0 after connecting, so you get the SQL standard, not the MySQL default behavior. Thus, omitting this option forces SQL standard behavior. See <a href="#">IS NULL</a>. Added in 3.51.13.</td>
</tr>
<tr>
<td>ZERO_DATE_TO_MIN</td>
<td>Return SQL_NULL_DATA for zero date</td>
<td>16777216</td>
<td>Translates zero dates (XXXX-00-00) into the minimum date values supported by ODBC, XXXX-01-01. This resolves an issue where some statements will not work because the date returned and the minimum ODBC date value are incompatible. Added in 3.51.17.</td>
</tr>
<tr>
<td>MIN_DATE_TO_ZERO</td>
<td>Bind minimal date as zero date</td>
<td>33554432</td>
<td>Translates the minimum ODBC date value (XXXX-01-01) to the zero date format supported by MySQL (XXXX-00-00), where some statements are not affected by the date returned and the minimum ODBC date value are incompatible. Added in 3.51.17.</td>
</tr>
<tr>
<td>NO_DATE_OVERFLOW</td>
<td>Ignore data overflow error</td>
<td>0</td>
<td>Continue with the query execution rather than return error if the time portion is missing. The server will ignore the time component and the result is the same as if they were zeros. Added in 5.3.8.</td>
</tr>
<tr>
<td>MULTI_STATEMENTS</td>
<td>Allow multiple statements</td>
<td>67108864</td>
<td>Enables support for multiple statements. As of 8.0.24, preparing a query with multiple statements raises an error. The direct execution of parameter-less statements prepared using the SQLPrepare() function is not supported. Multiple statements can only be executed through the SQLExecDirect() ODBC function.</td>
</tr>
<tr>
<td>COLUMN_SIZE_S32</td>
<td>Limit column size to signed 32-bit range</td>
<td>134217728</td>
<td>Limits the column size to prevent problems for applications that are not set up to handle larger column sizes. Added in 3.51.22.</td>
</tr>
</tbody>
</table>
## Connector/ODBC Connection Parameters

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>GUI Option</th>
<th>Constant Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO_BINARY_RESULT</td>
<td>Always handle binary function results as character data</td>
<td>268435456</td>
<td>When set, the columns with 3.51.26.</td>
</tr>
<tr>
<td>NO_INFORMATION_SCHEMA</td>
<td>Don’t use INFORMATION_SCHEMA for metadata</td>
<td>1073741824</td>
<td>Tells catalog functions not to use INFORMATION_SCHEMA, but rather use legacy algorithms. The trade-off here is usually speed for information quality. Using INFORMATION_SCHEMA is often slow, but the information obtained is more complete. Added in 5.1.7.</td>
</tr>
<tr>
<td>CB_FIDO_GLOBAL</td>
<td>Registers a global callback function for the FIDO connection</td>
<td>20480</td>
<td>User-defined constant (see Connector/ODBC FIDO Information); the last registered global callback is reused in connections not defining a callback. Only use with connections that use the MySQL ODBC driver; using with other connections might lead to undefined behavior. Example usage: SQLSetConnectAttr(hdbc, CB_FIDO_GLOBAL, &amp;my_user_callback, SQL_IS_POINTER); Support added in 8.0.30.</td>
</tr>
<tr>
<td>CB_FIDO_CONNECTION</td>
<td>Registers a per-connection callback function for the FIDO connection</td>
<td>20481</td>
<td>User-defined constant (see Connector/ODBC FIDO Information); the callback is registered for a single connection. Only use with connections that use the MySQL ODBC driver; using with other connections might lead to undefined behavior. Support added in 8.0.30.</td>
</tr>
</tbody>
</table>

Table 5.4, “Recommended Connector/ODBC Option Values for Different Configurations” shows some recommended parameter settings and their corresponding option values for various configurations:

Table 5.4 Recommended Connector/ODBC Option Values for Different Configurations

<table>
<thead>
<tr>
<th>Configuration Settings</th>
<th>Parameter Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft Access,</td>
<td>FOUND_ROWS=1;</td>
</tr>
<tr>
<td>Visual Basic</td>
<td>Access, Visual Basic</td>
</tr>
<tr>
<td>Microsoft Access</td>
<td>FOUND_ROWS=1;DYNAMIC_CURSOR=1; Access (with improved DELETE queries)</td>
</tr>
<tr>
<td>Configuration Setting</td>
<td>Value</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Microsoft SQL Server</td>
<td>COLUMN_SIZE_S32=1; 134217728</td>
</tr>
<tr>
<td>Large tables with too many rows</td>
<td>COMPRESSEDPROTO=1; 2048</td>
</tr>
<tr>
<td>Sybase PowerBuilder</td>
<td>IGNORE_SPACE=1;FLAG_SAFE=1; 135168</td>
</tr>
<tr>
<td>Query log generation (Debug mode)</td>
<td>LOG_QUERY=1; 524288</td>
</tr>
<tr>
<td>Large tables with no-cache results</td>
<td>NOCACHE=1;FORWARD_CURSOR=1; 3145728</td>
</tr>
<tr>
<td>Applications that run full-table &quot;SELECT * FROM ...&quot; query, but read only a small number (N) of rows from the result</td>
<td>PREFETCH=N Not Applicable 32</td>
</tr>
</tbody>
</table>
5.3 Configuring a Connector/ODBC DSN on Windows

To add or configure a Connector/ODBC 5.x or 8.x DSN on Windows, use either the ODBC Data Source Administrator GUI, or the command-line tool `myodbc-installer.exe` that comes with Connector/ODBC.

5.3.1 Configuring a Connector/ODBC DSN on Windows with the ODBC Data Source Administrator GUI

The ODBC Data Source Administrator on Windows lets you create DSNs, check driver installation, and configure ODBC functions such as tracing (used for debugging) and connection pooling. The following are steps for creating and configuring a DSN with the ODBC Data Source Administrator:

1. Open the ODBC Data Source Administrator.

   Different editions and versions of Windows store the ODBC Data Source Administrator in different locations. For instructions on opening the ODBC Data Source Administrator, see the documentation for your Windows version; these instructions from Microsoft cover some popular Windows platforms. You should see a window similar to the following when you open the ODBC Data Source Administrator:

   **Figure 5.1 ODBC Data Source Administrator Dialog**

   ![ODBC Data Source Administrator Dialog](image)

2. To create a System DSN (which will be available to all users), select the **System DSN** tab. To create a User DSN, which will be available only to the current user, click the **Add...** button to open the “Create New Data Source” dialog.

3. From the “Create New Data Source” dialog, select the MySQL ODBC 5.x ANSI or Unicode Driver, then click **Finish** to open its connection parameters dialog.
Figure 5.2 Create New Data Source Dialog: Choosing a MySQL ODBC Driver
4. You now need to configure the specific fields for the DSN you are creating through the Connection Parameters dialog.

**Figure 5.3 Data Source Configuration Connection Parameters Dialog**

In the Data Source Name box, enter the name of the data source to access. It can be any valid name that you choose.

**Tip**
To identify whether a DSN was created using the 32-bit or the 64-bit driver, include the driver being used within the DSN identifier. This will help you to identify the right DSN to use with applications such as Excel that are only compatible with the 32-bit driver. For example, you might add Using32bitCODBC to the DSN identifier for the 32-bit interface and Using64bitCODBC for those using the 64-bit Connector/ODBC driver.

5. In the Description box, enter some text to help identify the connection.

6. In the Server field, enter the name of the MySQL server host to access. By default, it is localhost.

7. In the User field, enter the user name to use for this connection.

8. In the Password field, enter the corresponding password for this connection.

9. The Database pop-up should be automatically populated with the list of databases that the user has permissions to access.

10. To communicate over a different TCP/IP port than the default (3306), change the value of the Port.

11. Click OK to save the DSN.
To verify the connection using the parameters you have entered, click the Test button. If the connection can be made successfully, you will be notified with a Connection Successful dialog; otherwise, you will be notified with a Connection Failed dialog.

You can configure a number of options for a specific DSN by clicking the Details button.

**Figure 5.4 Connector/ODBC Connect Options Dialog**

Toggling the Details button opens (or closes) an additional tabbed display where you set additional options that include the following:

- **Connections**, **Metadata**, and **Cursors/Results** enable you to select the additional flags for the DSN connection. For more information on these flags, see Section 5.2, “Connector/ODBC Connection Parameters”.
For the Unicode version of Connector/ODBC, due to its native Unicode support, you do not need to specify the initial character set to be used with your connection. However, for the ANSI version, if you want to use a multibyte character set such as UTF-16 or UTF-32 initially, specify it in Character Set box; however, that is not necessary for using UTF-8 or UTF-8-MB4 initially, because they do not contain \0 bytes in any characters, and therefore the ANSI driver will not truncate the strings by accident when finding \0 bytes.

- **Debug** lets you turn on ODBC debugging to record the queries you execute through the DSN to the myodbc.sql file. For more information, see Section 5.9, “Getting an ODBC Trace File”.

- **SSL** configures the additional options required for using the Secure Sockets Layer (SSL) when communicating with MySQL server.

**Figure 5.5 Connector/ODBC Connect Options Dialog: SSL Options**

You must also enable and configure SSL on the MySQL server with suitable certificates to communicate using it using SSL.

### 5.3.2 Configuring a Connector/ODBC DSN on Windows, Using the Command Line

Use myodbc-installer.exe when configuring Connector/ODBC from the command-line.

Execute myodbc-installer.exe without arguments to view a list of available options.

### 5.3.3 Troubleshooting ODBC Connection Problems

This section answers Connector/ODBC connection-related questions.

- **While configuring a Connector/ODBC DSN, a Could Not Load Translator or Setup Library error occurs**

  For more information, refer to MS KnowledgeBase Article(Q260558). Also, make sure you have the latest valid ct13d32.dll in your system directory.

- The Connector/ODBC .dll (Windows) and .so (Linux) file names depend on several factors:
**Connector/ODBC Version:** A digit in the file name indicates the major Connector/ODBC version number. For example, a file named myodbc8w.dll is for Connector/ODBC 8.x whereas myodbc5w.dll is for Connector/ODBC 5.x.

**Driver Type:** The Unicode driver adds the letter "w" to file names to indicate that wide characters are supported. For example, myodbc8w.dll is for the Unicode driver. The ANSI driver adds the letter "a" instead of a "w", like myodbc8a.dll.

**GUI Setup module:** The GUI setup module files add the letter "S" to file names.

- **Enabling Debug Mode:** typically debug mode is not enabled as it decreases performance. The driver must be compiled with debug mode enabled.

## 5.4 Configuring a Connector/ODBC DSN on macOS

To configure a DSN on macOS, you can either use the command-line utility (myodbc-installer), edit the odbc.ini file within the Library/ODBC directory of the user, or use the ODBC Administrator GUI.

### Note

The ODBC Administrator is included in OS X v10.5 and earlier; users of later versions of OS X and macOS need to download and install it manually.

To create a DSN using the myodbc-installer utility, you only need to specify the DSN type and the DSN connection string. For example:

```bash
// With Connector/ODBC 8.0:
$> myodbc-installer -a -s -t "DSN=mydb;DRIVER=MySQL ODBC 8.0 Driver;SERVER=mysql;USER=username;PASSWORD=pass"

// With Connector/ODBC 5.3:
$> myodbc-installer -a -s -t "DSN=mydb;DRIVER=MySQL ODBC 5.3 Driver;SERVER=mysql;USER=username;PASSWORD=pass"
```

To use ODBC Administrator:

### Warning

- For correct operation of ODBC Administrator, ensure that the `/Library/ODBC/odbc.ini` file used to set up ODBC connectivity and DSNs are writable by the `admin` group. If this file is not writable by this group, then the ODBC Administrator may fail, or may appear to work but not generate the correct entry.

- There are known issues with the macOS ODBC Administrator and Connector/ODBC that may prevent you from creating a DSN using this method. In that case, use the command line or edit the `odbc.ini` file directly. Existing DSNs or those that you created using the `myodbc-installer` tool can still be checked and edited using ODBC Administrator.

1. Open the ODBC Administrator from the **Utilities** folder in the **Applications** folder.
2. From the ODBC Administrator dialog, choose either the User DSN or System DSN tab and click Add.

3. Select the Connector/ODBC driver and click OK.
4. You will be presented with the **Data Source Name** (DSN) dialog. Enter the **Data Source Name** and an optional **Description** for the DSN.

**Figure 5.7 ODBC Administrator Data Source Name Dialog**

5. Click **Add** to add a new keyword/value pair to the panel. Configure at least four pairs to specify the server, **username**, **password** and **database** connection parameters. See Section 5.2, “Connector/ODBC Connection Parameters”.

6. Click **OK** to add the DSN to the list of configured data source names.

A completed DSN configuration may look like this:

**Figure 5.8 ODBC Administrator Sample DSN Dialog**

You can configure other ODBC options in your DSN by adding further keyword/value pairs and setting the corresponding values. See Section 5.2, “Connector/ODBC Connection Parameters”.
5.5 Configuring a Connector/ODBC DSN on Unix

On Unix, you configure DSN entries directly in the odbc.ini file. Here is a typical odbc.ini file that configures myodbc8w (Unicode) and myodbc8a (ANSI) as DSN names for Connector/ODBC 8.0:

```
; / odbc.ini configuration for Connector/ODBC 8.0 driver
;
[ODBC Data Sources]
myodbc8w = MyODBC 8.0 UNICODE Driver DSN
myodbc8a = MyODBC 8.0 ANSI Driver DSN

[myodbc8w]
Driver = /usr/local/lib/libmyodbc8w.so
Description = Connector/ODBC 8.0 UNICODE Driver DSN
SERVER = localhost
PORT = 
USER = root
Password = 
Database = test
OPTION = 3
SOCKET = 

[myodbc8a]
Driver = /usr/local/lib/libmyodbc8a.so
Description = Connector/ODBC 8.0 ANSI Driver DSN
SERVER = localhost
PORT = 
USER = root
Password = 
Database = test
OPTION = 3
SOCKET = 
```

Refer to the Section 5.2, “Connector/ODBC Connection Parameters”, for the list of connection parameters that can be supplied.

**Note**

If you are using unixODBC, you can use the following tools to set up the DSN:

- **ODBCConfig** GUI tool ([HOWTO: ODBCConfig](#))
- **odbcinst**

In some cases when using unixODBC, you might get this error:

```
Data source name not found and no default driver specified
```

If this happens, make sure the ODBCINI and ODBC_SYSINI environment variables are pointing to the right odbc.ini file. For example, if your odbc.ini file is located in /usr/local/etc, set the environment variables like this:

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

5.6 Connecting Without a Predefined DSN

You can connect to the MySQL server using **SQLDriverConnect**, by specifying the DRIVER name field. Here are the connection strings for Connector/ODBC using DSN-less connections:
For Connector/ODBC 8.0:

```sql
ConnectionString = "DRIVER={MySQL ODBC 8.0 Driver};
    SERVER=localhost;
    DATABASE=test;
    USER=venu;
    PASSWORD=venu;
    OPTION=3;"
```

Substitute “MySQL ODBC 8.0 Driver” with the name by which you have registered your Connector/ODBC driver with the ODBC driver manager, if it is different. If your programming language converts backslash followed by whitespace to a space, it is preferable to specify the connection string as a single long string, or to use a concatenation of multiple strings that does not add spaces in between. For example:

```sql
ConnectionString = "DRIVER={MySQL ODBC 8.0 Driver};"
    "SERVER=localhost;"
    "DATABASE=test;"
    "USER=venu;"
    "PASSWORD=venu;"
    "OPTION=3;"
```

**Note.** On macOS, you might need to specify the full path to the Connector/ODBC driver library.

Refer to Section 5.2, “Connector/ODBC Connection Parameters” for the list of connection parameters that can be supplied.

### 5.7 ODBC Connection Pooling

Connection pooling enables the ODBC driver to re-use existing connections to a given database from a pool of connections, instead of opening a new connection each time the database is accessed. By enabling connection pooling you can improve the overall performance of your application by lowering the time taken to open a connection to a database in the connection pool.


### 5.8 Authentication Options

Connector/ODBC supports different authentication methods, including:

- Standard authentication using a MySQL username and password, such as `caching_sha2_password`.
- The Kerberos authentication protocol for passwordless authentication. For more information about Kerberos authentication, see [Kerberos Pluggable Authentication](#).
  
  Support added in Connector/ODBC 8.0.26 for Linux clients, and 8.0.27 for Windows clients.

- Multi-Factor Authentication (MFA) by utilizing the `PASSWORD1` (alias of `PASSWORD`), `PASSWORD2`, and `PASSWORD3` connection options. In addition there are `PWD1`, `PWD2`, and `PWD3` aliases.
  
  Support added in Connector/ODBC 8.0.28.

- [FIDO Pluggable Authentication](#); an authentication mechanism added in MySQL Enterprise Edition 8.0.27.
  
  Conditions: see the general [FIDO](#) documentation for installation requirements and implementation details.
Callback support

```
// SQL_DRIVER_CONNECT_ATTR_BASE is not defined in all driver managers.
// Therefore use a custom constant until it becomes a standard.
#define MYSQL_DRIVER_CONNECT_ATTR_BASE 0x00004000

// Custom constants used for callback
#define CB_FIDO_GLOBAL MYSQL_DRIVER_CONNECT_ATTR_BASE + 0x00001000
#define CB_FIDO_CONNECTION MYSQL_DRIVER_CONNECT_ATTR_BASE + 0x00001001

// Usage example
// Callback function inside code:
void user_callback(const char* msg)
{
   // Do something ...
}
SQLHENV henv = nullptr;
SQLAllocHandle(SQL_HANDLE_ENV, nullptr, &henv);
// Set the ODBC version to 3.80 otherwise the custom constants don't work
SQLSetEnvAttr(henv, SQL_ATTR_ODBC_VERSION,
(SQLOINTER)SQL_OV_ODBC3_80, 0);
SQLHDBC hdbc = nullptr;
SQLAllocHandle(SQL_HANDLE_DBC, henv, &hdbc);
// CB_FIDO_X is either CB_FIDO_GLOBAL or CB_FIDO_CONNECTION
SQLSetConnectAttr(hdbc, CB_FIDO_X, &user_callback, SQL_IS_POINTER);
SQLDriverConnect(hdbc, hwnd, conn_str, ....);
```

FIDO support added in Connector/ODBC 8.0.29; callback support added in 8.0.30.

5.9 Getting an ODBC Trace File

If you encounter difficulties or problems with Connector/ODBC, start by making a log file from the ODBC Manager and Connector/ODBC. This is called tracing, and is enabled through the ODBC Manager. The procedure for this differs for Windows, macOS and Unix.

5.9.1 Enabling ODBC Tracing on Windows

To enable the trace option on Windows:

1. The Tracing tab of the ODBC Data Source Administrator dialog box lets you configure the way ODBC function calls are traced.
2. When you activate tracing from the **Tracing** tab, the **Driver Manager** logs all ODBC function calls for all subsequently run applications.

3. ODBC function calls from applications running before tracing is activated are not logged. ODBC function calls are recorded in a log file you specify.

4. Tracing ceases only after you click **Stop Tracing Now**. Remember that while tracing is on, the log file continues to increase in size and that tracing affects the performance of all your ODBC applications.

### 5.9.2 Enabling ODBC Tracing on macOS

To enable the trace option on macOS, use the **Tracing** tab within ODBC Administrator.

1. Open the ODBC Administrator.

2. Select the **Tracing** tab.
3. Select the **Enable Tracing** check box.

4. Enter the location to save the Tracing log. To append information to an existing log file, click the **Choose...** button.

### 5.9.3 Enabling ODBC Tracing on Unix

To enable the trace option on OS X 10.2 (or earlier) or Unix, add the `trace` option to the ODBC configuration:

1. On Unix, explicitly set the `Trace` option in the `ODBC.INI` file.
   
   Set the tracing `ON` or `OFF` by using `TraceFile` and `Trace` parameters in `odbc.ini` as shown below:

   ```ini
   TraceFile  = /tmp/odbc.trace
   Trace      = 1
   ```

   *TraceFile* specifies the name and full path of the trace file and *Trace* is set to `ON` or `OFF`. You can also use `1` or `YES` for `ON` and `0` or `NO` for `OFF`. If you are using `ODBCConfig` from `unixODBC`, then follow the instructions for tracing `unixODBC` calls at `HOWTO-ODBCConfig`.

### 5.9.4 Enabling a Connector/ODBC Log

To generate a Connector/ODBC log, do the following:

1. Within Windows, enable the **Trace Connector/ODBC** option flag in the Connector/ODBC connect/configure screen. The log is written to file `C:\myodbc.log`. If the trace option is not remembered when you are going back to the above screen, it means that you are not using the `myodbc.dll` driver, see Section 5.3.3, “Troubleshooting ODBC Connection Problems”.

---

**Figure 5.10 ODBC Administrator Tracing Dialog**

[Image of ODBC Administrator Tracing Dialog]
Enabling a Connector/ODBC Log

On macOS, Unix, or if you are using a DSN-less connection, either supply `OPTION=4` in the connection string, or set the corresponding keyword/value pair in the DSN.

2. Start your application and try to get it to fail. Then check the Connector/ODBC trace file to find out what could be wrong.

If you need help determining what is wrong, see Section 9.1, “Connector/ODBC Community Support”.
Once you have configured a DSN to provide access to a database, how you access and use that connection is dependent on the application or programming language. As ODBC is a standardized interface, any application or language that supports ODBC can use the DSN and connect to the configured database.

### 6.1 Basic Connector/ODBC Application Steps

Interacting with a MySQL server from an application using the Connector/ODBC typically involves the following operations:

- **Configure the Connector/ODBC DSN.**
- **Connect to MySQL server.**
  
  This might include: allocate environment handle, set ODBC version, allocate connection handle, connect to MySQL Server, and set optional connection attributes.

- **Initialization statements.**
  
  This might include: allocate statement handle and set optional statement attributes.

- **Execute SQL statements.**
  
  This might include: prepare the SQL statement and execute the SQL statement, or execute it directly without prepare.

- **Retrieve results, depending on the statement type.**
  
  For SELECT / SHOW / Catalog API the results might include: get number of columns, get column information, fetch rows, and get the data to buffers. For Delete / Update / Insert the results might include the number of rows affected.

- **Perform transactions; perform commit or rollback.**

- **Disconnect from the server.**
  
  This might include: disconnect the connection and free the connection and environment handles.
Most applications use some variation of these steps. The basic application steps are also shown in the following diagram:

**Figure 6.1 Connector/ODBC Programming Flowchart**

6.2 Step-by-step Guide to Connecting to a MySQL Database through Connector/ODBC

A typical situation where you would install Connector/ODBC is to access a database on a Linux or Unix host from a Windows machine.

As an example of the process required to set up access between two machines, the steps below take you through the basic steps. These instructions assume that you connect to system ALPHA from system BETA with a user name and password of `myuser` and `mypasswd`.

On system ALPHA (the MySQL server) follow these steps:
1. Start the MySQL server.

2. Use `GRANT` to set up an account with a user name of `myuser` that can connect from system BETA using a password of `mypassword` to the database `test`:

   ```sql
   GRANT ALL ON test.* to 'myuser'@'BETA' IDENTIFIED BY 'mypassword';
   ```

   For more information about MySQL privileges, refer to Access Control and Account Management.

On system BETA (the Connector/ODBC client), follow these steps:

1. Configure a Connector/ODBC DSN using parameters that match the server, database and authentication information that you have just configured on system ALPHA.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSN</td>
<td>remote_test</td>
<td>A name to identify the connection.</td>
</tr>
<tr>
<td>SERVER</td>
<td>ALPHA</td>
<td>The address of the remote server.</td>
</tr>
<tr>
<td>DATABASE</td>
<td>test</td>
<td>The name of the default database.</td>
</tr>
<tr>
<td>USER</td>
<td>myuser</td>
<td>The user name configured for access to this database.</td>
</tr>
<tr>
<td>PASSWORD</td>
<td>mypassword</td>
<td>The password for <code>myuser</code>.</td>
</tr>
</tbody>
</table>

2. Using an ODBC-capable application, such as Microsoft Office, connect to the MySQL server using the DSN you have just created. If the connection fails, use tracing to examine the connection process. See Section 5.9, "Getting an ODBC Trace File", for more information.

### 6.3 Connector/ODBC and Third-Party ODBC Tools

Once you have configured your Connector/ODBC DSN, you can access your MySQL database through any application that supports the ODBC interface, including programming languages and third-party applications. This section contains guides and help on using Connector/ODBC with various ODBC-compatible tools and applications, including Microsoft Word, Microsoft Excel and Adobe/Macromedia ColdFusion.

Connector/ODBC has been tested with the following applications:

<table>
<thead>
<tr>
<th>Publisher</th>
<th>Application</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adobe</td>
<td>ColdFusion</td>
<td>Formerly Macromedia ColdFusion</td>
</tr>
<tr>
<td>Borland</td>
<td>C++ Builder</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Builder 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Delphi</td>
<td></td>
</tr>
<tr>
<td>Business Objects</td>
<td>Crystal Reports</td>
<td></td>
</tr>
<tr>
<td>Claris</td>
<td>Filemaker Pro</td>
<td></td>
</tr>
<tr>
<td>Corel</td>
<td>Paradox</td>
<td></td>
</tr>
<tr>
<td>Computer Associates</td>
<td>Visual Objects</td>
<td>Also known as CAVO</td>
</tr>
<tr>
<td></td>
<td>AllFusion ERwin Data Modeler</td>
<td></td>
</tr>
<tr>
<td>Gupta</td>
<td>Team Developer</td>
<td>Previously known as Centura Team Developer; Gupta SQL/Windows</td>
</tr>
<tr>
<td>Gensym</td>
<td>G2-ODBC Bridge</td>
<td></td>
</tr>
</tbody>
</table>
6.4 Using Connector/ODBC with Microsoft Access

You can use a MySQL database with Microsoft Access using Connector/ODBC. The MySQL database can be used as an import source, an export source, or as a linked table for direct use within an Access application, so you can use Access as the front-end interface to a MySQL database.

6.4.1 Exporting Access Data to MySQL

**Important**

Make sure that the information that you are exporting to the MySQL table is valid for the corresponding MySQL data types. Values that are valid within Access but are outside of the supported ranges of the MySQL data types may trigger an "overflow" error during the export.

To export a table of data from an Access database to MySQL, follow these instructions:

1. With an Access database opened, the navigation plane on the right should display, among other things, all the tables in the database that are available for export (if that is not the case, adjust the navigation plane's display settings). Right click on the table you want to export, and in the menu that appears, choose **Export**, **ODBC Database**.
2. The **Export** dialog box appears. Enter the desired name for the table after its import into the MySQL server, and click **OK**.

3. The **Select Data Source** dialog box appears; it lists the defined data sources for any ODBC drivers installed on your computer. Click either the **File Data Source** or **Machine Data Source** tab, and then double-click the Connector/ODBC DSN to which you want to export your table. To define a new DSN
for Connector/ODBC instead, click **New** and follow the instructions in Section 5.3, “Configuring a Connector/ODBC DSN on Windows”; double click the new DSN after it has been created.

**Figure 6.4 Selecting An ODBC Database**

If the ODBC data source that you selected requires you to log in, enter your login ID and password (additional information might also be required), and then click **OK**.

4. A dialog box appears with a success message if the export is successful. In the dialog box, you can choose to save the export steps for easy repetitions in the future.

**Figure 6.5 Save Export Success Message**

---

**Note**

If you see the following error message instead when you try to export to the Connector/ODBC DSN, it means you did not choose the **Database** to connect to when you defined or logged in to the DSN. Reconfigure the DSN and specify the
6.4.2 Importing MySQL Data to Access

To import tables from MySQL to Access, follow these instructions:

1. Open the Access database into which that you want to import MySQL data.
2. On the External Data tab, choose ODBC Database.
3. In the Get External Data dialog box that appears, choose Import the source data into a new table in the current database and click OK.
4. The **Select Data Source** dialog box appears. It lists the defined data sources for any ODBC drivers installed on your computer. Click either the **File Data Source** or **Machine Data Source** tab, and then double-click the Connector/ODBC DSN from which you want to import your table. To define a new DSN for Connector/ODBC instead, click **New** and follow the instructions in Section 5.3, “Configuring a Connector/ODBC DSN on Windows”; double-click the new DSN after it has been created.

If the ODBC data source that you selected requires you to log in, enter your login ID and password (additional information might also be required), and then click **OK**.
5. Microsoft Access connects to the MySQL server and displays the list of tables (objects) that you can import. Select the tables you want to import from this Import Objects dialog (or click Select All), and then click OK.

**Figure 6.10 Import Objects Dialog: Selecting Tables To Import**

![Image of Import Objects Dialog]

**Notes**
- If no tables show up for you to select, it might be because you did not choose the Database to connect to when you defined or logged in to the DSN. Reconfigure the DSN and specify the Database to connect to (see Section 5.3, “Configuring a Connector/ODBC DSN on Windows” for details), or choose a Database when you log in to the DSN.
- If your Access database already has a table with the same name as the one you are importing, Access will append a number to the name of the imported table.

6. A dialog box appears with a success message if the import is successful. In the dialog box, you can choose to save the import steps for easy repetitions in the future.

**Figure 6.11 Get External Data: Save Import Steps Dialog**

![Image of Save Import Steps Dialog]

### 6.4.3 Using Microsoft Access as a Front-end to MySQL

You can use Microsoft Access as a front end to MySQL by linking tables within your Microsoft Access database to tables that exist within your MySQL database. When a query is requested on a table within Access, ODBC is used to execute the queries on the MySQL database.

**To create a linked table:**
1. Open the Access database that you want to link to MySQL.
2. On the **External Data** tab, choose **ODBC Database**.

**Figure 6.12 External Data: ODBC Database**

3. In the **Get External Data** dialog box that appears, choose **Link to the data source by creating a linked table** and click **OK**.

**Figure 6.13 Get External Data: Link To ODBC Database Option Chosen**

4. The **Select Data Source** dialog box appears; it lists the defined data sources for any ODBC drivers installed on your computer. Click either the **File Data Source** or **Machine Data Source** tab, and then double-click the Connector/ODBC DSN you want to link your table to. To define a new DSN
for Connector/ODBC instead, click **New** and follow the instructions in Section 5.3, “Configuring a Connector/ODBC DSN on Windows”; double click the new DSN after it has been created.

**Figure 6.14 Selecting An ODBC Database**

If the ODBC data source that you selected requires you to log in, enter your login ID and password (additional information might also be required), and then click **OK**.
5. Microsoft Access connects to the MySQL server and displays the list of tables that you can link to. Choose the tables you want to link to (or click **Select All**), and then click **OK**.

**Figure 6.15 Link Tables Dialog: Selecting Tables to Link**

Notes

- If no tables show up for you to select, it might be because you did not choose the **Database** to connect to when you defined or logged in to the DSN. Reconfigure the DSN and specify the **Database** to connect to (see Section 5.3, "Configuring a Connector/ODBC DSN on Windows" for details), or choose a **Database** when you log in to the DSN.

- If your database on Access already has a table with the same name as the one you are linking to, Access will append a number to the name of the new linked table.
6. If Microsoft Access is unable to determine the unique record identifier for a table automatically, it will ask you to choose a column (or a combination of columns) to be used to uniquely identify each row from the source table. Select the column[s] to use and click OK.

Figure 6.16 Linking Microsoft Access Tables To MySQL Tables, Choosing Unique Record Identifier

Once the process has been completed, you can build interfaces and queries to the linked tables just as you would for any Access database.

Use the following procedure to view links or to refresh them when the structures of the linked tables have changed.

To view or refresh links:

1. Open the database that contains links to MySQL tables.
2. On the External Data tab, choose Linked Table Manager.
3. The Linked Table Manager appears. Select the check box for the tables whose links you want to refresh. Click **OK** to refresh the links.

**Figure 6.18 External Data: Linked Table Manager Dialog**

If the ODBC data source requires you to log in, enter your login ID and password (additional information might also be required), and then click **OK**.

Microsoft Access confirms a successful refresh or, if the tables are not found, returns an error message, in which case you should update the links with the steps below.

**To change the path for a set of linked tables** (for pictures of the GUI dialog boxes involved, see the instructions above for linking tables and refreshing links):

1. Open the database that contains the linked tables.
2. On the **External Data** tab, choose **Linked Table Manager**.

3. In the **Linked Table Manager** that appears, select the **Always Prompt For A New Location** check box.

4. Select the check box for the tables whose links you want to change, and then click **OK**.

5. The **Select Data Source** dialog box appears. Select the new DSN and database with it.

### 6.5 Using Connector/ODBC with Microsoft Word or Excel

You can use Microsoft Word and Microsoft Excel to access information from a MySQL database using Connector/ODBC. Within Microsoft Word, this facility is most useful when importing data for mailmerge, or for tables and data to be included in reports. Within Microsoft Excel, you can execute queries on your MySQL server and import the data directly into an Excel Worksheet, presenting the data as a series of rows and columns.

With both applications, data is accessed and imported into the application using Microsoft Query, which lets you execute a query through an ODBC source. You use Microsoft Query to build the SQL statement to be executed, selecting the tables, fields, selection criteria and sort order. For example, to insert information from a table in the World test database into an Excel spreadsheet, using the DSN samples shown in Chapter 5, *Configuring Connector/ODBC*:

1. Create a new Worksheet.
2. From the **Data** menu, choose **Import External Data**, and then select **New Database Query**.
3. Microsoft Query will start. First, you need to choose the data source, by selecting an existing Data Source Name.

**Figure 6.19 Microsoft Query Wizard: Choose Data Source Dialog**

4. Within the **Query Wizard**, choose the columns to import. The list of tables available to the user configured through the DSN is shown on the left, the columns that will be added to your query are shown on the right. The columns you choose are equivalent to those in the first section of a **SELECT** query. Click **Next** to continue.
5. You can filter rows from the query (the equivalent of a `WHERE` clause) using the Filter Data dialog. Click Next to continue.
6. Select an (optional) sort order for the data. This is equivalent to using a `ORDER BY` clause in your SQL query. You can select up to three fields for sorting the information returned by the query. Click **Next** to continue.

**Figure 6.22 Microsoft Query Wizard: Sort Order**

7. Select the destination for your query. You can select to return the data Microsoft Excel, where you can choose a worksheet and cell where the data will be inserted; you can continue to view the query and results within Microsoft Query, where you can edit the SQL query and further filter and sort the information returned; or you can create an OLAP Cube from the query, which can then be used directly within Microsoft Excel. Click **Finish**.

**Figure 6.23 Microsoft Query Wizard: Selecting A Destination**

The same process can be used to import data into a Word document, where the data will be inserted as a table. This can be used for mail merge purposes (where the field data is read from a Word table), or where you want to include data and reports within a report or other document.

**6.6 Using Connector/ODBC with Crystal Reports**

Crystal Reports can use an ODBC DSN to connect to a database from which you to extract data and information for reporting purposes.
Using Connector/ODBC with Crystal Reports

Note

There is a known issue with certain versions of Crystal Reports where the application is unable to open and browse tables and fields through an ODBC connection. Before using Crystal Reports with MySQL, please ensure that you have update to the latest version, including any outstanding service packs and hotfixes. For more information on this issue, see the Business) Objects Knowledgebase for more information.

For example, to create a simple crosstab report within Crystal Reports XI, follow these steps:

1. Create a DSN using the Data Sources (ODBC) tool. You can either specify a complete database, including user name and password, or you can build a basic DSN and use Crystal Reports to set the user name and password.

   For the purposes of this example, a DSN that provides a connection to an instance of the MySQL Sakila sample database has been created.

2. Open Crystal Reports and create a new project, or open an existing reporting project into which you want to insert data from your MySQL data source.

3. Start the Cross-Tab Report Wizard, either by clicking the option on the Start Page. Expand the Create New Connection folder, then expand the ODBC (RDO) folder to obtain a list of ODBC data sources.

   You will be asked to select a data source.

Figure 6.24 Cross-Tab Report Creation Wizard

4. When you first expand the ODBC (RDO) folder you will be presented the Data Source Selection screen. From here you can select either a pre-configured DSN, open a file-based DSN or enter and manual connection string. For this example, the pre-configured Sakila DSN will be used.
If the DSN contains a user name/password combination, or you want to use different authentication credentials, click **Next** to enter the user name and password that you want to use. Otherwise, click **Finish** to continue the data source selection wizard.

**Figure 6.25 ODBC (RDO) Data Source Selection Wizard**

5. You will be returned the Cross-Tab Report Creation Wizard. You now need to select the database and tables that you want to include in your report. For our example, we will expand the selected Sakila
database. Click the **city** table and use the > button to add the table to the report. Then repeat the action with the **country** table. Alternatively you can select multiple tables and add them to the report.

Finally, you can select the parent **Sakila** resource and add of the tables to the report.

Once you have selected the tables you want to include, click **Next** to continue.

**Figure 6.26 Cross-Tab Report Creation Wizard with Example ODBC (RDO) Data**

6. Crystal Reports will now read the table definitions and automatically identify the links between the tables. The identification of links between tables enables Crystal Reports to automatically lookup and summarize information based on all the tables in the database according to your query. If Crystal
Reports is unable to perform the linking itself, you can manually create the links between fields in the tables you have selected.

Click **Next** to continue the process.

**Figure 6.27 Cross-Tab Report Creation Wizard: Table Links**

7. You can now select the columns and rows that to include within the Cross-Tab report. Drag and drop or use the > buttons to add fields to each area of the report. In the example shown, we will report on cities,
organized by country, incorporating a count of the number of cities within each country. If you want to browse the data, select a field and click the Browse Data... button.

Click Next to create a graph of the results. Since we are not creating a graph from this data, click Finish to generate the report.

Figure 6.28 Cross-Tab Report Creation Wizard: Cross-Tab Selection Dialog
8. The finished report will be shown, a sample of the output from the Sakila sample database is shown below.

**Figure 6.29 Cross-Tab Report Creation Wizard: Final Report**

<table>
<thead>
<tr>
<th>Total</th>
<th>8,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>Total</td>
</tr>
<tr>
<td>Kabul</td>
<td>1</td>
</tr>
<tr>
<td>Algeria</td>
<td>Total</td>
</tr>
<tr>
<td>Batna</td>
<td>1</td>
</tr>
<tr>
<td>Béchar</td>
<td>1</td>
</tr>
<tr>
<td>Skikda</td>
<td>1</td>
</tr>
<tr>
<td>American Samoa</td>
<td>Total</td>
</tr>
<tr>
<td>Tutuila</td>
<td>1</td>
</tr>
<tr>
<td>Angola</td>
<td>Total</td>
</tr>
<tr>
<td>Benguela</td>
<td>1</td>
</tr>
<tr>
<td>Namibe</td>
<td>1</td>
</tr>
<tr>
<td>Anguilla</td>
<td>Total</td>
</tr>
<tr>
<td>South Hill</td>
<td>1</td>
</tr>
<tr>
<td>Argentina</td>
<td>Total</td>
</tr>
<tr>
<td>Almirante Bryn</td>
<td>1</td>
</tr>
</tbody>
</table>

Once the ODBC connection has been opened within Crystal Reports, you can browse and add any fields within the available tables into your reports.

### 6.7 Connector/ODBC Programming

With a suitable ODBC Manager and the Connector/ODBC driver installed, any programming language or environment that can support ODBC can connect to a MySQL database through Connector/ODBC.

This includes, but is not limited to, Microsoft support languages (including Visual Basic, C# and interfaces such as ODBC.NET), Perl (through the DBI module, and the DBD::ODBC driver).

#### 6.7.1 Using Connector/ODBC with Visual Basic Using ADO, DAO and RDO

This section contains simple examples of the use of Connector/ODBC with ADO, DAO and RDO.

##### 6.7.1.1 ADO: `rs.addNew`, `rs.delete`, and `rs.update`

The following ADO (ActiveX Data Objects) example creates a table `my_ado` and demonstrates the use of `rs.addNew`, `rs.delete`, and `rs.update`.

```vbscript
Private Sub myodbc_ado_Click()
    Dim conn As ADODB.Connection
    Dim rs As ADODB.Recordset
    Dim fld As ADODB.Field
    Dim sql As String
```
'connect to MySQL server using Connector/ODBC
Set conn = New ADODB.Connection
conn.ConnectionString = "DRIVER={MySQL ODBC 3.51 Driver};" & "SERVER=localhost;" & " DATABASE=test;" & "UID=venu;PWD=venu; OPTION=3"
conn.Open

'create table
conn.Execute "DROP TABLE IF EXISTS my_ado"
conn.Execute "CREATE TABLE my_ado(id int not null primary key, name varchar(20), txt text, dt date, tm time, ts timestamp)"

'direct insert
conn.Execute "INSERT INTO my_ado(id,name,txt) values(1,100,'venu')"
conn.Execute "INSERT INTO my_ado(id,name,txt) values(2,200,'MySQL')"
conn.Execute "INSERT INTO my_ado(id,name,txt) values(3,300,'Delete')"

Set rs = New ADODB.Recordset
rs.CursorLocation = adUseServer

'fetch the initial table..
rs.Open "SELECT * FROM my_ado", conn
Debug.Print rs.RecordCount
rs.MoveFirst
Debug.Print String(50, "-") & "Initial my_ado Result Set " & String(50, "-")
For Each fld In rs.Fields
Debug.Print fld.Name,
Next
Debug.Print
Do Until rs.EOF
For Each fld In rs.Fields
Debug.Print fld.Name,
Next
rs.MoveNext
Debug.Print
Loop
rs.Close

'rs insert
rs.Open "select * from my_ado", conn, adOpenDynamic, adLockOptimistic
rs.AddNew
rs!ID = 8
rs!Name = "Mandy"
rs!txt = "Insert row"
rs.Update
rs.Close

'rs update
rs.Open "SELECT * FROM my_ado"
rs!Name = "update"
rs!txt = "updated-row"
rs.Update
rs.Close

'rs update second time..
rs.Open "SELECT * FROM my_ado"
rs!Name = "update"
rs!txt = "updated-second-time"
rs.Update
rs.Close

'rs delete
rs.Open "SELECT * FROM my_ado"
Using Connector/ODBC with Visual Basic Using ADO, DAO and RDO

rs.MoveNext
rs.MoveNext
rs.Delete
rs.Close

'fetch the updated table..
rs.Open "SELECT * FROM my_ado", conn
Debug.Print rs.RecordCount
rs.MoveNext
Debug.Print String(50, "-") & "Updated my_ado Result Set " & String(50, "-"
For Each fld In rs.Fields
Debug.Print fld.Name,
Next
Debug.Print
Do Until rs.EOF
For Each fld In rs.Fields
Debug.Print fld.Value,
Next
rs.MoveNext
Debug.Print
Loop
rs.Close
conn.Close
End Sub

6.7.1.2 DAO: rs.addNew, rs.update, and Scrolling

The following DAO (Data Access Objects) example creates a table my_dao and demonstrates the use of rs.addNew, rs.update, and result set scrolling.

Private Sub myodbc_dao_Click()
Dim ws As Workspace
Dim conn As Connection
Dim queryDef As queryDef
Dim str As String

'connect to MySQL using MySQL ODBC 3.51 Driver
Set ws = DBEngine.CreateWorkspace("", "venu", "venu", dbUseODBC)
str = "odbc;DRIVER={MySQL ODBC 3.51 Driver};" _
& "SERVER=localhost;" _
& "UID=venu;PWD=venu; OPTION=3"
Set conn = ws.OpenConnection("test", dbDriverNoPrompt, False, str)

'Create table my_dao
Set queryDef = conn.CreateQueryDef("", "drop table if exists my_dao")
queryDef.Execute
Set queryDef = conn.CreateQueryDef("", "create table my_dao(Id INT AUTO_INCREMENT PRIMARY KEY, " _
& "Ts TIMESTAMP(14) NOT NULL, Name varchar(20), Id2 INT)"
queryDef.Execute

'Insert new records using rs.addNew
Set rs = conn.OpenRecordset("my_dao")
Dim i As Integer

For i = 10 To 15
rs.AddNew
rs!Name = "insert record" & i
rs!Id2 = i
rs.Update
Next i
rs.Close
Using Connector/ODBC with Visual Basic Using ADO, DAO and RDO

Using ADO, DAO and RDO

```vbnet
'rs update..
Set rs = conn.OpenRecordset("my_dao")
rs.Edit
tsName = "updated-string"
rs.Update
rs.Close

'fetch the table back.
Set rs = conn.OpenRecordset("my_dao", dbOpenDynamic)
str = "Results:",
rs.MoveFirst
While Not rs.EOF
str = " rs!Id & ", " rs!Name & ", " rs!Ts & ", " rs!Id2
Debug.Print "DATA:" & str
rs.MoveNext
Wend

'rs Scrolling
rs.MoveFirst
str = " FIRST ROW: " & rs!Id & " , " & rs!Name & " , " & rs!Ts & " , " & rs!Id2
Debug.Print str

rs.MoveLast
str = " LAST ROW: " & rs!Id & " , " & rs!Name & " , " & rs!Ts & " , " & rs!Id2
Debug.Print str

rs.MovePrevious
str = " LAST-1 ROW: " & rs!Id & " , " & rs!Name & " , " & rs!Ts & " , " & rs!Id2
Debug.Print str

'free all resources
rs.Close
queryDef.Close
conn.Close
ws.Close
End Sub
```

6.7.1.3 RDO: **rs.addNew and rs.update**

The following RDO (Remote Data Objects) example creates a table **my_rdo** and demonstrates the use of **rs.addNew** and **rs.update**.

```vbnet
Dim rs As rdoResultset
Dim cn As New rdoConnection
Dim cl As rdoColumn
Dim SQL As String

'cn.Connect = "DSN=test;"
cn.Connect = "DRIVER=MySQL ODBC 3.51 Driver;" _
& "SERVER=localhost;" _
& "DATABASE=test;" _
& "UID=venu;PWD=venu;OPTION=3"

cn.CursorDriver = rdUseOdbc
cn.EstablishConnection rdDriverPrompt

'drop table my_rdo
SQL = "drop table if exists my_rdo"
cn.Execute SQL, rdExecDirect

'create table my_rdo
SQL = "create table my_rdo(id int, name varchar(20))"
cn.Execute SQL, rdExecDirect
```
Using Connector/ODBC with .NET

This section contains simple examples that demonstrate the use of Connector/ODBC drivers with ODBC.NET.

6.7.2.1 Using Connector/ODBC with ODBC.NET and C# (C sharp)

The following sample creates a table `my_odbc_net` and demonstrates its use in C#.

```csharp
/**
 * @sample    : mycon.cs
 * @purpose   : Demo sample for ODBC.NET using Connector/ODBC
 */
```
using Console = System.Console;
using Microsoft.Data.Odbc;

namespace myodbc3
{
    class mycon
    {
        static void Main(string[] args)
        {
            try
            {
                //Connection string for Connector/ODBC 3.51
                string MyConString = "DRIVER={MySQL ODBC 3.51 Driver};" +
                    "SERVER=localhost;" +
                    "DATABASE=test;" +
                    "UID=venu;" +
                    "PASSWORD=venu;" +
                    "OPTION=3;";

                //Connect to MySQL using Connector/ODBC
                OdbcConnection MyConnection = new OdbcConnection(MyConString);
                MyConnection.Open();
                Console.WriteLine("\n !!! success, connected successfully !!!\n");

                //Display connection information
                Console.WriteLine("Connection Information:");
                Console.WriteLine("\tConnection String:" +
                    MyConnection.ConnectionString);
                Console.WriteLine("\tConnection Timeout:" +
                    MyConnection.ConnectionTimeout);
                Console.WriteLine("\tDatabase:" +
                    MyConnection.Database);
                Console.WriteLine("\tDataSource:" +
                    MyConnection.DataSource);
                Console.WriteLine("\tDriver:" +
                    MyConnection.Driver);
                Console.WriteLine("\tServerVersion:" +
                    MyConnection.ServerVersion);

                //Create a sample table
                OdbcCommand MyCommand =
                    new OdbcCommand("DROP TABLE IF EXISTS my_odbc_net",
                    MyConnection);
                MyCommand.ExecuteNonQuery();
                MyCommand.CommandText =
                    "CREATE TABLE my_odbc_net(id int, name varchar(20), idb bigint)";
                MyCommand.ExecuteNonQuery();

                //Insert
                MyCommand.CommandText =
                    "INSERT INTO my_odbc_net VALUES(10,'venu', 300)";
                Console.WriteLine("INSERT, Total rows affected:" +
                    MyCommand.ExecuteNonQuery());

                //Insert
                MyCommand.CommandText =
                    "INSERT INTO my_odbc_net VALUES(20,'mysql',400)";
                Console.WriteLine("INSERT, Total rows affected:" +
Using Connector/ODBC with .NET

MyCommand.ExecuteNonQuery();

//Insert
MyCommand.CommandText = 
"INSERT INTO my_odbc_net VALUES(20,'mysql',500)"
Console.WriteLine("INSERT, Total rows affected:" +
    MyCommand.ExecuteNonQuery());

//Update
MyCommand.CommandText = 
"UPDATE my_odbc_net SET id=999 WHERE id=20"
Console.WriteLine("Update, Total rows affected:" +
    MyCommand.ExecuteNonQuery());

//COUNT(*)
MyCommand.CommandText = 
"SELECT COUNT(*) as TRows FROM my_odbc_net"
Console.WriteLine("Total Rows:" +
    MyCommand.ExecuteScalar());

//Fetch
MyCommand.CommandText = "SELECT * FROM my_odbc_net"
OdbcDataReader MyDataReader;
MyDataReader = MyCommand.ExecuteReader();
while (MyDataReader.Read())
{
    if(string.Compare(MyConnection.Driver,"myodbc3.dll") == 0) {
        //Supported only by Connector/ODBC 3.51
        Console.WriteLine("Data:" + MyDataReader.GetInt32(0) + " " +
            MyDataReader.GetString(1) + " " +
            MyDataReader.GetInt64(2));
    } else {
        //BIGINTs not supported by Connector/ODBC
        Console.WriteLine("Data:" + MyDataReader.GetInt32(0) + " " +
            MyDataReader.GetString(1) + " " +
            MyDataReader.GetInt32(2));
    }
}

//Close all resources
MyDataReader.Close();
MyConnection.Close();
}
catch (OdbcException MyOdbcException) //Catch any ODBC exception .
{
    for (int i=0; i < MyOdbcException.Errors.Count; i++)
    {
        Console.Write("ERROR "+ i + "\n" +
            "Message: " +
            MyOdbcException.Errors[i].Message + "\n" +
            "Native: " +
            MyOdbcException.Errors[i].NativeError.ToString() + "\n" +
            "Source: " +
            MyOdbcException.Errors[i].Source + "\n" +
            "SQL: " +
            MyOdbcException.Errors[i].SQLState + "\n");
    }
}
}

6.7.2.2 Using Connector/ODBC with ODBC.NET and Visual Basic

The following sample creates a table my_vb_net and demonstrates the use in VB.
@sample : myvb.vb
@purpose : Demo sample for ODBC.NET using Connector/ODBC

build command
vbc /target:exe
/out:myvb.exe
/r:Microsoft.Data.Odbc.dll
/r:System.dll
/r:System.Data.dll

Imports Microsoft.Data.Odbc
Imports System

Module myvb
    Sub Main()
        Try
            'Connector/ODBC 3.51 connection string
            Dim MyConString As String = "DRIVER={MySQL ODBC 3.51 Driver};" & _
                "SERVER=localhost;" & _
                "DATABASE=test;" & _
                "UID=venu;" & _
                "PASSWORD=venu;" & _
                "OPTION=3;"

            'Connection
            Dim MyConnection As New OdbcConnection(MyConString)
            MyConnection.Open()

            Console.WriteLine("Connection State::" & MyConnection.State.ToString)

            'Drop
            Console.WriteLine("Dropping table")
            Dim MyCommand As New OdbcCommand()
            MyCommand.Connection = MyConnection
            MyCommand.CommandText = "DROP TABLE IF EXISTS my_vb_net"
            MyCommand.ExecuteNonQuery()

            'Create
            Console.WriteLine("Creating....")
            MyCommand.CommandText = "CREATE TABLE my_vb_net(id int, name varchar(30))"
            MyCommand.ExecuteNonQuery()

            'Insert
            MyCommand.CommandText = "INSERT INTO my_vb_net VALUES(10,'venu')"
            Console.WriteLine("INSERT, Total rows affected:" & _
                MyCommand.ExecuteNonQuery())

            'Insert
            MyCommand.CommandText = "INSERT INTO my_vb_net VALUES(20,'mysql')"
            Console.WriteLine("INSERT, Total rows affected:" & _
                MyCommand.ExecuteNonQuery())

            'Insert
            MyCommand.CommandText = "INSERT INTO my_vb_net VALUES(20,'mysql')"
            Console.WriteLine("INSERT, Total rows affected:" & _
                MyCommand.ExecuteNonQuery())

            'Insert
            MyCommand.CommandText = "INSERT INTO my_vb_net VALUES(30)"
            Console.WriteLine("INSERT, Total rows affected:" & _
                MyCommand.ExecuteNonQuery())
    End Sub
End Module
Using Connector/ODBC with .NET

'Update
MyCommand.CommandText = "UPDATE my_vb_net SET id=999 WHERE id=20"
Console.WriteLine("Update, Total rows affected:" & _
MyCommand.ExecuteNonQuery())

'COUNT(*)
MyCommand.CommandText = "SELECT COUNT(*) as TRows FROM my_vb_net"
Console.WriteLine("Total Rows:" & MyCommand.ExecuteScalar())

'Select
Console.WriteLine("Select * FROM my_vb_net")
MyCommand.CommandText = "SELECT * FROM my_vb_net"
Dim MyDataReader As OdbcDataReader
MyDataReader = MyCommand.ExecuteReader
While MyDataReader.Read
    If MyDataReader("name") Is DBNull.Value Then
        Console.WriteLine("id = " & _
            CStr(MyDataReader("id")) & " name = " & _
            "NULL")
    Else
        Console.WriteLine("id = " & _
            CStr(MyDataReader("id")) & " name = " & _
            CStr(MyDataReader("name")))
    End If
End While

'Catch ODBC Exception
Catch MyOdbcException As OdbcException
    Dim i As Integer
    Console.WriteLine(MyOdbcException.ToString)
End Catch

'Catch program exception
Catch MyException As Exception
    Console.WriteLine(MyException.ToString)
End Try
Chapter 7 Connector/ODBC Reference

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This section provides reference material for the Connector/ODBC API, showing supported functions and methods, supported MySQL column types and the corresponding native type in Connector/ODBC, and the error codes returned by Connector/ODBC when a fault occurs.

7.1 Connector/ODBC API Reference

This section summarizes ODBC routines, categorized by functionality.


An application can call SQLGetInfo function to obtain conformance information about Connector/ODBC. To obtain information about support for a specific function in the driver, an application can call SQLGetFunctions.

Note
For backward compatibility, the Connector/ODBC driver supports all deprecated functions.

The following tables list Connector/ODBC API calls grouped by task:

Table 7.1 ODBC API Calls for Connecting to a Data Source

<table>
<thead>
<tr>
<th>Function Name</th>
<th>Connector/ODBC Supports?</th>
<th>Standard</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQLAllocHandle</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Obtains an environment, connection, statement, or descriptor handle.</td>
</tr>
<tr>
<td>SQLConnect</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Connects to a specific driver by data source name, user ID, and password.</td>
</tr>
<tr>
<td>SQLDriverConnect</td>
<td>Yes</td>
<td>ODBC</td>
<td>Connects to a specific driver by connection string or requests that the Driver Manager and driver display connection dialog boxes for the user.</td>
</tr>
<tr>
<td>SQLAllocEnv</td>
<td>Yes</td>
<td>Deprecated</td>
<td>Obtains an environment handle allocated from driver.</td>
</tr>
<tr>
<td>SQLAllocConnect</td>
<td>Yes</td>
<td>Deprecated</td>
<td>Obtains a connection handle</td>
</tr>
</tbody>
</table>

Table 7.2 ODBC API Calls for Obtaining Information about a Driver and Data Source

<table>
<thead>
<tr>
<th>Function Name</th>
<th>Connector/ODBC Supports?</th>
<th>Standard</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQLDataSources</td>
<td>No</td>
<td>ISO 92</td>
<td>Returns the list of available data sources, handled by the Driver Manager</td>
</tr>
</tbody>
</table>
### Table 7.3 ODBC API Calls for Setting and Retrieving Driver Attributes

<table>
<thead>
<tr>
<th>Function Name</th>
<th>Connector/ODBC Supports?</th>
<th>Standard</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQLSetConnectAttr</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Sets a connection attribute.</td>
</tr>
<tr>
<td>SQLGetConnectAttr</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Returns the value of a connection attribute.</td>
</tr>
<tr>
<td>SQLSetConnectOption</td>
<td>Yes</td>
<td>Deprecated</td>
<td>Sets a connection option</td>
</tr>
<tr>
<td>SQLGetConnectOption</td>
<td>Yes</td>
<td>Deprecated</td>
<td>Returns the value of a connection option</td>
</tr>
<tr>
<td>SQLSetEnvAttr</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Sets an environment attribute.</td>
</tr>
<tr>
<td>SQLGetEnvAttr</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Returns the value of an environment attribute.</td>
</tr>
<tr>
<td>SQLSetStmtAttr</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Sets a statement attribute.</td>
</tr>
<tr>
<td>SQLGetStmtAttr</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Returns the value of a statement attribute.</td>
</tr>
<tr>
<td>SQLSetStmtOption</td>
<td>Yes</td>
<td>Deprecated</td>
<td>Sets a statement option</td>
</tr>
<tr>
<td>SQLGetStmtOption</td>
<td>Yes</td>
<td>Deprecated</td>
<td>Returns the value of a statement option</td>
</tr>
</tbody>
</table>

### Table 7.4 ODBC API Calls for Preparing SQL Requests

<table>
<thead>
<tr>
<th>Function Name</th>
<th>Connector/ODBC Supports?</th>
<th>Standard</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQLAllocStmt</td>
<td>Yes</td>
<td>Deprecated</td>
<td>Allocates a statement handle</td>
</tr>
<tr>
<td>SQLPrepare</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Prepares an SQL statement for later execution.</td>
</tr>
<tr>
<td>SQLBindParameter</td>
<td>Yes</td>
<td>ODBC</td>
<td>Assigns storage for a parameter in an SQL statement. Connector/ODBC 5.2 adds support for “out” and “inout” parameters, through the SQL_PARAM_OUTPUT or SQL_PARAM_INPUT_OUTPUT type specifiers. (“Out” and “inout” parameters are not supported for LONGTEXT and LONGBLOB columns.)</td>
</tr>
<tr>
<td>SQLGetCursorName</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Returns the cursor name associated with a statement handle.</td>
</tr>
<tr>
<td>SQLSetCursorName</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Specifies a cursor name.</td>
</tr>
<tr>
<td>SQLSetScrollOptions</td>
<td>Yes</td>
<td>ODBC</td>
<td>Sets options that control cursor behavior.</td>
</tr>
</tbody>
</table>
Table 7.5 ODBC API Calls for Submitting Requests

<table>
<thead>
<tr>
<th>Function Name</th>
<th>Connector/ODBC Supports?</th>
<th>Standard</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQLExecute</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Executes a prepared statement.</td>
</tr>
<tr>
<td>SQLExecDirect</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Executes a statement</td>
</tr>
<tr>
<td>SQLNativeSql</td>
<td>Yes</td>
<td>ODBC</td>
<td>Returns the text of an SQL statement as translated by the driver.</td>
</tr>
<tr>
<td>SQLDescribeParam</td>
<td>No</td>
<td>ODBC</td>
<td>Returns the description for a specific parameter in a statement. Not supported by Connector/ODBC—the returned results should not be trusted.</td>
</tr>
<tr>
<td>SQLNumParams</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Returns the number of parameters in a statement.</td>
</tr>
<tr>
<td>SQIParamData</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Used in conjunction with SQLPutData to supply parameter data at execution time. (Useful for long data values.)</td>
</tr>
<tr>
<td>SQLPutData</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Sends part or all of a data value for a parameter. (Useful for long data values.)</td>
</tr>
</tbody>
</table>

Table 7.6 ODBC API Calls for Retrieving Results and Information about Results

<table>
<thead>
<tr>
<th>Function Name</th>
<th>Connector/ODBC Supports?</th>
<th>Standard</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQLRowCount</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Returns the number of rows affected by an insert, update, or delete request.</td>
</tr>
<tr>
<td>SQLNumResultCols</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Returns the number of columns in the result set.</td>
</tr>
<tr>
<td>SQLDescribeCol</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Describes a column in the result set.</td>
</tr>
<tr>
<td>SQLColAttribute</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Describes attributes of a column in the result set.</td>
</tr>
<tr>
<td>SQLColAttributes</td>
<td>Yes</td>
<td>Deprecated</td>
<td>Describes attributes of a column in the result set.</td>
</tr>
<tr>
<td>SQLFetch</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Returns multiple result rows.</td>
</tr>
<tr>
<td>SQLFetchScroll</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Returns scrollable result rows.</td>
</tr>
<tr>
<td>SQLExtendedFetch</td>
<td>Yes</td>
<td>Deprecated</td>
<td>Returns scrollable result rows.</td>
</tr>
<tr>
<td>SQLSetPos</td>
<td>Yes</td>
<td>ODBC</td>
<td>Positions a cursor within a fetched block of data and enables an application to refresh data in the rowset or to update or delete data in the result set.</td>
</tr>
<tr>
<td>SQLBulkOperations</td>
<td>Yes</td>
<td>ODBC</td>
<td>Performs bulk insertions and bulk bookmark operations, including update, delete, and fetch by bookmark.</td>
</tr>
</tbody>
</table>

Table 7.7 ODBC API Calls for Retrieving Error or Diagnostic Information

<table>
<thead>
<tr>
<th>Function Name</th>
<th>Connector/ODBC Supports?</th>
<th>Standard</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQLError</td>
<td>Yes</td>
<td>Deprecated</td>
<td>Returns additional error or status information</td>
</tr>
<tr>
<td>SQLGetDiagField</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Returns additional diagnostic information (a single field of the diagnostic data structure).</td>
</tr>
<tr>
<td>Function Name</td>
<td>Connector/ODBC Supports?</td>
<td>Standard</td>
<td>Purpose</td>
</tr>
<tr>
<td>---------------------</td>
<td>--------------------------</td>
<td>----------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>SQLGetDiagRec</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Returns additional diagnostic information (multiple fields of the diagnostic data structure).</td>
</tr>
</tbody>
</table>

Table 7.8 ODBC API Calls for Obtaining Information about the Data Source's System Tables (Catalog Functions) Item

<table>
<thead>
<tr>
<th>Function Name</th>
<th>Connector/ODBC Supports?</th>
<th>Standard</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQLColumnPrivileges</td>
<td>Yes</td>
<td>ODBC</td>
<td>Returns a list of columns and associated privileges for one or more tables.</td>
</tr>
<tr>
<td>SQLColumns</td>
<td>Yes</td>
<td>X/Open</td>
<td>Returns the list of column names in specified tables.</td>
</tr>
<tr>
<td>SQLForeignKeys</td>
<td>Yes</td>
<td>ODBC</td>
<td>Returns a list of column names that make up foreign keys, if they exist for a specified table.</td>
</tr>
<tr>
<td>SQLPrimaryKeys</td>
<td>Yes</td>
<td>ODBC</td>
<td>Returns the list of column names that make up the primary key for a table.</td>
</tr>
<tr>
<td>SQLSpecialColumns</td>
<td>Yes</td>
<td>X/Open</td>
<td>Returns information about the optimal set of columns that uniquely identifies a row in a specified table, or the columns that are automatically updated when any value in the row is updated by a transaction.</td>
</tr>
<tr>
<td>SQLStatistics</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Returns statistics about a single table and the list of indexes associated with the table.</td>
</tr>
<tr>
<td>SQLTablePrivileges</td>
<td>Yes</td>
<td>ODBC</td>
<td>Returns a list of tables and the privileges associated with each table.</td>
</tr>
<tr>
<td>SQLTables</td>
<td>Yes</td>
<td>X/Open</td>
<td>Returns the list of table names stored in a specific data source.</td>
</tr>
</tbody>
</table>

Table 7.9 ODBC API Calls for Performing Transactions

<table>
<thead>
<tr>
<th>Function Name</th>
<th>Connector/ODBC Supports?</th>
<th>Standard</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQLTransact</td>
<td>Yes</td>
<td>Deprecated</td>
<td>Commits or rolls back a transaction.</td>
</tr>
<tr>
<td>SQLEndTran</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Commits or rolls back a transaction.</td>
</tr>
</tbody>
</table>

Table 7.10 ODBC API Calls for Terminating a Statement

<table>
<thead>
<tr>
<th>Function Name</th>
<th>Connector/ODBC Supports?</th>
<th>Standard</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQLFreeStmt</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Ends statement processing, discards pending results, and, optionally, frees all resources associated with the statement handle.</td>
</tr>
<tr>
<td>SQLCloseCursor</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Closes a cursor that has been opened on a statement handle.</td>
</tr>
</tbody>
</table>
Connector/ODBC Data Types

### Table 7.11 ODBC API Calls for Terminating a Connection

<table>
<thead>
<tr>
<th>Function Name</th>
<th>Connector/ODBC Supports?</th>
<th>Standard</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQLCancel</td>
<td>Yes</td>
<td>ISO 92</td>
<td>Cancels an SQL statement.</td>
</tr>
</tbody>
</table>

### 7.2 Connector/ODBC Data Types

The following table illustrates how Connector/ODBC maps the server data types to default SQL and C data types.

#### Table 7.12 How Connector/ODBC Maps MySQL Data Types to SQL and C Data Types

<table>
<thead>
<tr>
<th>Native Value</th>
<th>SQL Type</th>
<th>C Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>bigint unsigned</td>
<td>SQL_BIGINT</td>
<td>SQL_C_UBIGINT</td>
</tr>
<tr>
<td>bigint</td>
<td>SQL_BIGINT</td>
<td>SQL_C_SBIGINT</td>
</tr>
<tr>
<td>bit</td>
<td>SQL_BIT</td>
<td>SQL_C_BIT</td>
</tr>
<tr>
<td>bit</td>
<td>SQL_CHAR</td>
<td>SQL_C_CHAR</td>
</tr>
<tr>
<td>blob</td>
<td>SQL_LONGVARBINARY</td>
<td>SQL_C_BINARY</td>
</tr>
<tr>
<td>bool</td>
<td>SQL_CHAR</td>
<td>SQL_C_CHAR</td>
</tr>
<tr>
<td>char</td>
<td>SQL_CHAR</td>
<td>SQL_C_CHAR</td>
</tr>
<tr>
<td>date</td>
<td>SQL_DATE</td>
<td>SQL_C_DATE</td>
</tr>
<tr>
<td>datetime</td>
<td>SQL_TIMESTAMP</td>
<td>SQL_C_TIMESTAMP</td>
</tr>
<tr>
<td>decimal</td>
<td>SQL_DECIMAL</td>
<td>SQL_C_CHAR</td>
</tr>
<tr>
<td>double precision</td>
<td>SQL_DOUBLE</td>
<td>SQL_C_DOUBLE</td>
</tr>
<tr>
<td>double</td>
<td>SQL_FLOAT</td>
<td>SQL_C_DOUBLE</td>
</tr>
<tr>
<td>enum</td>
<td>SQL_VARCHAR</td>
<td>SQL_C_CHAR</td>
</tr>
<tr>
<td>float</td>
<td>SQL_REAL</td>
<td>SQL_C_FLOAT</td>
</tr>
<tr>
<td>int unsigned</td>
<td>SQL_INTEGER</td>
<td>SQL_C_UULONG</td>
</tr>
<tr>
<td>int</td>
<td>SQL_INTEGER</td>
<td>SQL_C_SLONG</td>
</tr>
<tr>
<td>integer unsigned</td>
<td>SQL_INTEGER</td>
<td>SQL_C_UULONG</td>
</tr>
<tr>
<td>integer</td>
<td>SQL_INTEGER</td>
<td>SQL_C_SLONG</td>
</tr>
<tr>
<td>long varbinary</td>
<td>SQL_LONGVARBINARY</td>
<td>SQL_C_BINARY</td>
</tr>
<tr>
<td>long varchar</td>
<td>SQL_LONGVARCHAR</td>
<td>SQL_C_CHAR</td>
</tr>
</tbody>
</table>
## Connector/ODBC Error Codes

<table>
<thead>
<tr>
<th>Native Value</th>
<th>SQL Type</th>
<th>C Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>longblob</td>
<td>SQL_LONGVARBINARY</td>
<td>SQL_C_BINARY</td>
</tr>
<tr>
<td>longtext</td>
<td>SQL_LONGVARCHAR</td>
<td>SQL_C_CHAR</td>
</tr>
<tr>
<td>mediumblob</td>
<td>SQL_LONGVARBINARY</td>
<td>SQL_C_BINARY</td>
</tr>
<tr>
<td>mediumint unsigned</td>
<td>SQL_INTEGER</td>
<td>SQL_C_ULONG</td>
</tr>
<tr>
<td>mediumint</td>
<td>SQL_INTEGER</td>
<td>SQL_C_SLONG</td>
</tr>
<tr>
<td>mediumtext</td>
<td>SQL_LONGVARCHAR</td>
<td>SQL_C_CHAR</td>
</tr>
<tr>
<td>numeric</td>
<td>SQL_NUMERIC</td>
<td>SQL_C_CHAR</td>
</tr>
<tr>
<td>real</td>
<td>SQL_FLOAT</td>
<td>SQL_C_DOUBLE</td>
</tr>
<tr>
<td>set</td>
<td>SQL_VARCHAR</td>
<td>SQL_C_CHAR</td>
</tr>
<tr>
<td>smallint unsigned</td>
<td>SQL_SMALLINT</td>
<td>SQL_C_USHORT</td>
</tr>
<tr>
<td>smallint</td>
<td>SQL_SMALLINT</td>
<td>SQL_C_SSHORT</td>
</tr>
<tr>
<td>text</td>
<td>SQL_LONGVARCHAR</td>
<td>SQL_C_CHAR</td>
</tr>
<tr>
<td>time</td>
<td>SQL_TIME</td>
<td>SQL_C_TIME</td>
</tr>
<tr>
<td>timestamp</td>
<td>SQL_TIMESTAMP</td>
<td>SQL_C_TIMESTAMP</td>
</tr>
<tr>
<td>tinyblob</td>
<td>SQL_LONGVARBINARY</td>
<td>SQL_C_BINARY</td>
</tr>
<tr>
<td>tinyint unsigned</td>
<td>SQL_TINYINT</td>
<td>SQL_C_UTINYINT</td>
</tr>
<tr>
<td>tinyint</td>
<td>SQL_TINYINT</td>
<td>SQL_C_STINYINT</td>
</tr>
<tr>
<td>tinytext</td>
<td>SQL_LONGVARCHAR</td>
<td>SQL_C_CHAR</td>
</tr>
<tr>
<td>varchar</td>
<td>SQL_VARCHAR</td>
<td>SQL_C_CHAR</td>
</tr>
<tr>
<td>year</td>
<td>SQL_SMALLINT</td>
<td>SQL_C_SHORT</td>
</tr>
</tbody>
</table>

### 7.3 Connector/ODBC Error Codes

The following tables lists the error codes returned by Connector/ODBC apart from the server errors.

#### Table 7.13 Special Error Codes Returned by Connector/ODBC

<table>
<thead>
<tr>
<th>Native Code</th>
<th>SQLSTATE 2</th>
<th>SQLSTATE 3</th>
<th>Error Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>01000</td>
<td>01000</td>
<td>General warning</td>
</tr>
<tr>
<td>501</td>
<td>01004</td>
<td>01004</td>
<td>String data, right truncated</td>
</tr>
<tr>
<td>502</td>
<td>01S02</td>
<td>01S02</td>
<td>Option value changed</td>
</tr>
<tr>
<td>503</td>
<td>01S03</td>
<td>01S03</td>
<td>No rows updated/deleted</td>
</tr>
<tr>
<td>504</td>
<td>01S04</td>
<td>01S04</td>
<td>More than one row updated/deleted</td>
</tr>
<tr>
<td>505</td>
<td>01S06</td>
<td>01S06</td>
<td>Attempt to fetch before the result set returned the first row set</td>
</tr>
<tr>
<td>506</td>
<td>07001</td>
<td>07002</td>
<td>SQLBindParameter not used for all parameters</td>
</tr>
<tr>
<td>507</td>
<td>07005</td>
<td>07005</td>
<td>Prepared statement not a cursor-specification</td>
</tr>
<tr>
<td>508</td>
<td>07009</td>
<td>07009</td>
<td>Invalid descriptor index</td>
</tr>
<tr>
<td>509</td>
<td>08002</td>
<td>08002</td>
<td>Connection name in use</td>
</tr>
<tr>
<td>510</td>
<td>08003</td>
<td>08003</td>
<td>Connection does not exist</td>
</tr>
<tr>
<td>Native Code</td>
<td>SQLSTATE 2</td>
<td>SQLSTATE 3</td>
<td>Error Message</td>
</tr>
<tr>
<td>-------------</td>
<td>------------</td>
<td>------------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>511</td>
<td>24000</td>
<td>24000</td>
<td>Invalid cursor state</td>
</tr>
<tr>
<td>512</td>
<td>25000</td>
<td>25000</td>
<td>Invalid transaction state</td>
</tr>
<tr>
<td>513</td>
<td>25S01</td>
<td>25S01</td>
<td>Transaction state unknown</td>
</tr>
<tr>
<td>514</td>
<td>34000</td>
<td>34000</td>
<td>Invalid cursor name</td>
</tr>
<tr>
<td>515</td>
<td>S1000</td>
<td>HY000</td>
<td>General driver defined error</td>
</tr>
<tr>
<td>516</td>
<td>S1001</td>
<td>HY001</td>
<td>Memory allocation error</td>
</tr>
<tr>
<td>517</td>
<td>S1002</td>
<td>HY002</td>
<td>Invalid column number</td>
</tr>
<tr>
<td>518</td>
<td>S1003</td>
<td>HY003</td>
<td>Invalid application buffer type</td>
</tr>
<tr>
<td>519</td>
<td>S1004</td>
<td>HY004</td>
<td>Invalid SQL data type</td>
</tr>
<tr>
<td>520</td>
<td>S1009</td>
<td>HY009</td>
<td>Invalid use of null pointer</td>
</tr>
<tr>
<td>521</td>
<td>S1010</td>
<td>HY010</td>
<td>Function sequence error</td>
</tr>
<tr>
<td>522</td>
<td>S1011</td>
<td>HY011</td>
<td>Attribute can not be set now</td>
</tr>
<tr>
<td>523</td>
<td>S1012</td>
<td>HY012</td>
<td>Invalid transaction operation code</td>
</tr>
<tr>
<td>524</td>
<td>S1013</td>
<td>HY013</td>
<td>Memory management error</td>
</tr>
<tr>
<td>525</td>
<td>S1015</td>
<td>HY015</td>
<td>No cursor name available</td>
</tr>
<tr>
<td>526</td>
<td>S1024</td>
<td>HY024</td>
<td>Invalid attribute value</td>
</tr>
<tr>
<td>527</td>
<td>S1090</td>
<td>HY090</td>
<td>Invalid string or buffer length</td>
</tr>
<tr>
<td>528</td>
<td>S1091</td>
<td>HY091</td>
<td>Invalid descriptor field identifier</td>
</tr>
<tr>
<td>529</td>
<td>S1092</td>
<td>HY092</td>
<td>Invalid attribute/option identifier</td>
</tr>
<tr>
<td>530</td>
<td>S1093</td>
<td>HY093</td>
<td>Invalid parameter number</td>
</tr>
<tr>
<td>531</td>
<td>S1095</td>
<td>HY095</td>
<td>Function type out of range</td>
</tr>
<tr>
<td>532</td>
<td>S1106</td>
<td>HY106</td>
<td>Fetch type out of range</td>
</tr>
<tr>
<td>533</td>
<td>S1117</td>
<td>HY117</td>
<td>Row value out of range</td>
</tr>
<tr>
<td>534</td>
<td>S1109</td>
<td>HY109</td>
<td>Invalid cursor position</td>
</tr>
<tr>
<td>535</td>
<td>S1C00</td>
<td>HYC00</td>
<td>Optional feature not implemented</td>
</tr>
<tr>
<td>0</td>
<td>21S01</td>
<td>21S01</td>
<td>Column count does not match value count</td>
</tr>
<tr>
<td>0</td>
<td>23000</td>
<td>23000</td>
<td>Integrity constraint violation</td>
</tr>
<tr>
<td>0</td>
<td>42000</td>
<td>42000</td>
<td>Syntax error or access violation</td>
</tr>
<tr>
<td>0</td>
<td>42S02</td>
<td>42S02</td>
<td>Base table or view not found</td>
</tr>
<tr>
<td>0</td>
<td>42S12</td>
<td>42S12</td>
<td>Index not found</td>
</tr>
<tr>
<td>0</td>
<td>42S21</td>
<td>42S21</td>
<td>Column already exists</td>
</tr>
<tr>
<td>0</td>
<td>42S22</td>
<td>42S22</td>
<td>Column not found</td>
</tr>
<tr>
<td>0</td>
<td>08S01</td>
<td>08S01</td>
<td>Communication link failure</td>
</tr>
</tbody>
</table>
Here are some common notes and tips for using Connector/ODBC within different environments, applications and tools. The notes provided here are based on the experiences of Connector/ODBC developers and users.

8.1 Connector/ODBC General Functionality

This section provides help with common queries and areas of functionality in MySQL and how to use them with Connector/ODBC.

8.1.1 Obtaining Auto-Increment Values

Obtaining the value of column that uses AUTO_INCREMENT after an INSERT statement can be achieved in a number of different ways. To obtain the value immediately after an INSERT, use a SELECT query with the LAST_INSERT_ID() function.

For example, using Connector/ODBC you would execute two separate statements, the INSERT statement and the SELECT query to obtain the auto-increment value.

```
INSERT INTO tbl (auto,text) VALUES(NULL,'text');
SELECT LAST_INSERT_ID();
```

If you do not require the value within your application, but do require the value as part of another INSERT, the entire process can be handled by executing the following statements:

```
INSERT INTO tbl (auto,text) VALUES(NULL,'text');
INSERT INTO tbl2 (id,text) VALUES(LAST_INSERT_ID(),'text');
```

Certain ODBC applications (including Delphi and Access) may have trouble obtaining the auto-increment value using the previous examples. In this case, try the following statement as an alternative:

```
SELECT * FROM tbl WHERE auto IS NULL;
```
Dynamic Cursor Support

This alternative method requires that sql_auto_is_null variable is not set to 0. See Server System Variables.

See also Obtaining the Unique ID for the Last Inserted Row.

8.1.2 Dynamic Cursor Support

Support for the dynamic cursor is provided in Connector/ODBC 3.51, but dynamic cursors are not enabled by default. You can enable this function within Windows by selecting the Enable Dynamic Cursor check box within the ODBC Data Source Administrator.

On other platforms, you can enable the dynamic cursor by adding 32 to the OPTION value when creating the DSN.

8.1.3 Configuring Catalog and Schema Support

Many relational databases reference CATALOG and SCHEMA in ways that do not directly correspond to what how MySQL refers to a database. It is neither a CATALOG nor a SCHEMA. Generally, catalogs are collections of schemas, so the fully qualified name would look like catalog.schema.table.column. Historically with MySQL ODBC Driver, CATALOG and DATABASE were two names used for the same thing. At the same time SCHEMA was often used as a synonym for MySQL Database. This would suggest that CATALOG equals a SCHEMA, which is incorrect, but in MySQL Server context they would be the same thing.

In ODBC both schemas and catalogs can be used when referring to database objects such as tables. The expectation on how to interpret these schema and catalog notions differs between developers, so this is why both the NO_CATALOG and NO_SCHEMA options exist; to cover all these expectations and allow one to explicitly disable interpreting ODBC function parameters as CATALOG or SCHEMA.

The Connector/ODBC driver does not allow using catalog and schema functionality at the same time because it would cause unsupported naming. However, some software such as MS SQL Server might try do so through the linked server objects. This is why Connector/ODBC 8.0.26 added a NO_SCHEMA option to MySQL ODBC Driver to report schemas as not supported, which is already done for catalogs with the NO_CATALOG option. Using NO_SCHEMA causes the driver to report schema operations unsupported through SQLGetInfo() call. As a result the client software will not attempt to access tables as catalog.schema.table, but instead as catalog.table.

Table 8.1 Connector/ODBC NO_CATALOG and NO_SCHEMA combinations

<table>
<thead>
<tr>
<th>NO_CATALOG</th>
<th>NO_SCHEMA</th>
<th>Description and notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>true</td>
<td>Driver does not support catalogs nor schemas.</td>
</tr>
<tr>
<td>false</td>
<td>true</td>
<td>Catalogs are supported and interpreted as MySQL database names, specifying schema triggers an error.</td>
</tr>
<tr>
<td>true</td>
<td>false</td>
<td>Schemas are supported and interpreted as MySQL database names, specifying catalog triggers an error.</td>
</tr>
<tr>
<td>false</td>
<td>false</td>
<td>Both catalogs and schemas are supported but it is an error if both are specified at the same time. If only catalog or only schema is specified, it is interpreted as a MySQL database name.</td>
</tr>
</tbody>
</table>

8.1.4 Connector/ODBC Performance

The Connector/ODBC driver has been optimized to provide very fast performance. If you experience problems with the performance of Connector/ODBC, or notice a large amount of disk activity for simple queries, there are a number of aspects to check:
• Ensure that ODBC Tracing is not enabled. With tracing enabled, a lot of information is recorded in the tracing file by the ODBC Manager. You can check, and disable, tracing within Windows using the Tracing panel of the ODBC Data Source Administrator. Within macOS, check the Tracing panel of ODBC Administrator. See Section 5.9, “Getting an ODBC Trace File”.

• Make sure you are using the standard version of the driver, and not the debug version. The debug version includes additional checks and reporting measures.

• Disable the Connector/ODBC driver trace and query logs. These options are enabled for each DSN, so make sure to examine only the DSN that you are using in your application. Within Windows, you can disable the Connector/ODBC and query logs by modifying the DSN configuration. Within macOS and Unix, ensure that the driver trace (option value 4) and query logging (option value 524288) are not enabled.

8.1.5 Setting ODBC Query Timeout in Windows


8.2 Connector/ODBC Application-Specific Tips

Most programs should work with Connector/ODBC, but for each of those listed here, there are specific notes and tips to improve or enhance the way you work with Connector/ODBC and these applications.

With all applications, ensure that you are using the latest Connector/ODBC drivers, ODBC Manager and any supporting libraries and interfaces used by your application. For example, on Windows, using the latest version of Microsoft Data Access Components (MDAC) will improve the compatibility with ODBC in general, and with the Connector/ODBC driver.

8.2.1 Using Connector/ODBC with Microsoft Applications

The majority of Microsoft applications have been tested with Connector/ODBC, including Microsoft Office, Microsoft Access and the various programming languages supported within ASP and Microsoft Visual Studio.

8.2.1.1 Microsoft Access

To improve the integration between Microsoft Access and MySQL through Connector/ODBC:

• For all versions of Access, enable the Connector/ODBC Return matching rows option. For Access 2.0, also enable the Simulate ODBC 1.0 option.

• Include a TIMESTAMP column in all tables that you want to be able to update. For maximum portability, do not use a length specification in the column declaration (which is unsupported within MySQL in versions earlier than 4.1).

• Include a primary key in each MySQL table you want to use with Access. If not, new or updated rows may show up as #DELETED#.

• Use only DOUBLE float fields. Access fails when comparing with single-precision floats. The symptom usually is that new or updated rows may show up as #DELETED# or that you cannot find or update rows.

• If you are using Connector/ODBC to link to a table that has a BIGINT column, the results are displayed as #DELETED#. The work around solution is:
• Have one more dummy column with TIMESTAMP as the data type.

• Select the Change BIGINT columns to INT option in the connection dialog in ODBC DSN Administrator.

• Delete the table link from Access and re-create it.

Old records may still display as #DELETED#, but newly added/updated records are displayed properly.

• If you still get the error Another user has changed your data after adding a TIMESTAMP column, the following trick may help you:

Do not use a table data sheet view. Instead, create a form with the fields you want, and use that form data sheet view. Set the DefaultValue property for the TIMESTAMP column to NOW(). Consider hiding the TIMESTAMP column from view so your users are not confused.

• In some cases, Access may generate SQL statements that MySQL cannot understand. You can fix this by selecting "Query\SQLSpecific|Pass-Through" from the Access menu.

• On Windows NT, Access reports BLOB columns as OLE OBJECTS. If you want to have MEMO columns instead, change BLOB columns to TEXT with ALTER TABLE.

• Access cannot always handle the MySQL DATE column properly. If you have a problem with these, change the columns to DATETIME.

• If you have in Access a column defined as BYTE, Access tries to export this as TINYINT instead of TINYINT UNSIGNED. This gives you problems if you have values larger than 127 in the column.

• If you have very large (long) tables in Access, it might take a very long time to open them. Or you might run low on virtual memory and eventually get an ODBC Query Failed error and the table cannot open. To deal with this, select the following options:

  • Return Matching Rows (2)

  • Allow BIG Results (8).

  These add up to a value of 10 (OPTION=10).

Some external articles and tips that may be useful when using Access, ODBC and Connector/ODBC:

• Read How to Trap ODBC Login Error Messages in Access

• Optimizing Access ODBC Applications

  • Optimizing for Client/Server Performance

  • Tips for Converting Applications to Using ODBCDirect

  • Tips for Optimizing Queries on Attached SQL Tables

8.2.1.2 Microsoft Excel and Column Types

If you have problems importing data into Microsoft Excel, particularly numeric, date, and time values, this is probably because of a bug in Excel, where the column type of the source data is used to determine the data type when that data is inserted into a cell within the worksheet. The result is that Excel incorrectly identifies the content and this affects both the display format and the data when it is used within calculations.
To address this issue, use the `CONCAT()` function in your queries. The use of `CONCAT()` forces Excel to treat the value as a string, which Excel will then parse and usually correctly identify the embedded information.

However, even with this option, some data may be incorrectly formatted, even though the source data remains unchanged. Use the `Format Cells` option within Excel to change the format of the displayed information.

### 8.2.1.3 Microsoft Visual Basic

To be able to update a table, you must define a primary key for the table.

Visual Basic with ADO cannot handle big integers. This means that some queries like `SHOW PROCESSLIST` do not work properly. The fix is to use `OPTION=16384` in the ODBC connect string or to select the `Change BIGINT columns to INT` option in the Connector/ODBC connect screen. You may also want to select the `Return matching rows` option.

### 8.2.1.4 Microsoft Visual InterDev

If you have a `BIGINT` in your result, you may get the error `[Microsoft][ODBC Driver Manager] Driver does not support this parameter`. Try selecting the `Change BIGINT columns to INT` option in the Connector/ODBC connect screen.

### 8.2.1.5 Visual Objects

Select the `Don't optimize column widths` option.

### 8.2.1.6 Microsoft ADO

When you are coding with the ADO API and Connector/ODBC, you need to pay attention to some default properties that aren’t supported by the MySQL server. For example, using the `CursorLocation Property` as `adUseServer` returns a result of −1 for the `RecordCount Property`. To have the right value, you need to set this property to `adUseClient`, as shown in the VB code here:

```vbnet
Dim myconn As New ADODB.Connection
Dim myrs As New Recordset
Dim mySQL As String
Dim myrows As Long

myconn.Open "DSN=MyODBCsample"
mySQL = "SELECT * from user"
myrs.Source = mySQL
Set myrs.ActiveConnection = myconn
myrs.CursorLocation = adUseClient
myrs.Open
myrows = myrs.RecordCount
myrs.Close
myconn.Close
```

Another workaround is to use a `SELECT COUNT(*)` statement for a similar query to get the correct row count.


For information, see ActiveX Data Objects(ADO) Frequently Asked Questions.
8.2.1.7 Using Connector/ODBC with Active Server Pages (ASP)

Select the **Return matching rows** option in the DSN.

For more information about how to access MySQL through ASP using Connector/ODBC, refer to the following articles:

- **Using MyODBC To Access Your MySQL Database Via ASP**
- **ASP and MySQL at DWAM.NT**


8.2.1.8 Using Connector/ODBC with Visual Basic (ADO, DAO and RDO) and ASP

Some articles that may help with Visual Basic and ASP:

- **MySQL BLOB columns and Visual Basic 6** by Mike Hillyer (<mike@openwin.org>).
- **How to map Visual basic data type to MySQL types** by Mike Hillyer (<mike@openwin.org>).

8.2.2 Using Connector/ODBC with Borland Applications

With all Borland applications where the Borland Database Engine (BDE) is used, follow these steps to improve compatibility:

- Update to BDE 3.2 or newer.
- Enable the **Don’t optimize column widths** option in the DSN.
- Enable the **Return matching rows** option in the DSN.

8.2.2.1 Using Connector/ODBC with Borland Builder 4

When you start a query, you can use the **Active** property or the **Open** method.

The **Active** property starts by automatically issuing a `SELECT * FROM ...` query. That may affect performance for large tables.

8.2.2.2 Using Connector/ODBC with Delphi

Also, here is some potentially useful Delphi code that sets up both an ODBC entry and a BDE entry for Connector/ODBC. The BDE entry requires a BDE Alias Editor that is free at a Delphi Super Page near you. (Thanks to Bryan Brunton <bryan@flesherfab.com> for this):

```delphi
fReg:= TRegistry.Create;
fReg.OpenKey('\Software\ODBC\ODBC.INI\DocumentsFab', True);
fReg.WriteString('Database', 'Documents');
fReg.WriteString('Description', ' ');
fReg.WriteString('Driver', 'C:\WINNT\System32\myodbc.dll');
fReg.WriteString('Flag', '1');
fReg.WriteString('Password', '');
fReg.WriteString('Port', '');
fReg.WriteString('Server', 'xmark');
fReg.WriteString('User', 'winuser');
fReg.OpenKey('\Software\ODBC\ODBC.INI\ODBC Data Sources', True);
fReg.WriteString('DocumentsFab', 'MySQL');
fReg.CloseKey;
fReg.Free;
```
8.2.2.3 Using Connector/ODBC with C++ Builder

Tested with BDE 3.0. The only known problem is that when the table schema changes, query fields are not updated. BDE, however, does not seem to recognize primary keys, only the index named PRIMARY, although this has not been a problem.

8.2.3 Using Connector/ODBC with ColdFusion

The following information is taken from the ColdFusion documentation:

Use the following information to configure ColdFusion Server for Linux to use the unixODBC driver with Connector/ODBC for MySQL data sources. You can download Connector/ODBC at https://dev.mysql.com/downloads/Connector/ODBC/.

ColdFusion version 4.5.1 lets you use the ColdFusion Administrator to add the MySQL data source. However, the driver is not included with ColdFusion version 4.5.1. Before the MySQL driver appears in the ODBC data sources drop-down list, build and copy the Connector/ODBC driver to /opt/coldfusion/lib/libmyodbc.so.

The Contrib directory contains the program mydsn-xxx.zip which lets you build and remove the DSN registry file for the Connector/ODBC driver on ColdFusion applications.

For more information and guides on using ColdFusion and Connector/ODBC, see the following external sites:

- Troubleshooting Data Sources and Database Connectivity for Unix Platforms.

8.2.4 Using Connector/ODBC with OpenOffice.org

Open Office (http://www.openoffice.org) How-to: MySQL + OpenOffice. How-to: OpenOffice + MyODBC + unixODBC.

8.2.5 Using Connector/ODBC with Pervasive Software DataJunction

You have to change it to output VARCHAR rather than ENUM, as it exports the latter in a manner that causes MySQL problems.

8.2.6 Using Connector/ODBC with SunSystems Vision
Select the Return matching rows option.

8.3 Connector/ODBC and the Application Both Use OpenSSL

If Connector/ODBC is connecting securely with the MySQL server and the application using the connection makes calls itself to an OpenSSL library, the application might then fail, as two copies of the OpenSSL library will then be in use.

Note
Connector/ODBC 8.0 and higher link to OpenSSL dynamically while earlier Connector/ODBC versions link to OpenSSL statically. This solves problems related to using two OpenSSL copies from the same application.

Note
The TLSv1.0 and TLSv1.1 connection protocols were deprecated in Connector/ODBC 8.0.26 and removed in version 8.0.28.

Note
See also the tls-versions connection option.

To prevent the issue, in your application, do not allow OpenSSL initialization in one thread and the opening of an Connector/ODBC connection in another thread (which also initializes openSSL) to happen simultaneously. For example, use a mutex to ensure synchronization between SQLDriverConnect() or SQLConnect() calls and openSSL initialization. In addition to that, implement the following if possible:

- Use a build of Connector/ODBC that links (statically or dynamically) to a version of the libmysqlclient library that is in turn dynamically linked to the same OpenSSL library that the application calls.

- When creating a build of Connector/ODBC that links (statically or dynamically) to a version of the libmysqlclient library that is in turn statically linked to an OpenSSL library, do NOT export OpenSSL symbols in your build. That prevents incorrect resolution of application symbols; however, that does not prevent other issues that come with running two copies of OpenSSL code within a single application.

8.4 Connector/ODBC Errors and Resolutions (FAQ)

The following section details some common errors and their suggested fix or alternative solution. If you are still experiencing problems, use the Connector/ODBC mailing list; see Section 9.1, “Connector/ODBC Community Support”.

Many problems can be resolved by upgrading your Connector/ODBC drivers to the latest available release. On Windows, make sure that you have the latest versions of the Microsoft Data Access Components (MDAC) installed.

64-Bit Windows and ODBC Data Source Administrator

I have installed Connector/ODBC on Windows XP x64 Edition or Windows Server 2003 R2 x64. The installation completed successfully, but the Connector/ODBC driver does not appear in ODBC Data Source Administrator.

This is not a bug, but is related to the way Windows x64 editions operate with the ODBC driver. On Windows x64 editions, the Connector/ODBC driver is installed in the %SystemRoot%\SysWOW64 folder. However, the default ODBC Data Source Administrator that is available through the
Error 10061 (Cannot connect to server)

Administrative Tools or Control Panel in Windows x64 Editions is located in the %SystemRoot% \system32 folder, and only searches this folder for ODBC drivers.

On Windows x64 editions, use the ODBC administration tool located at %SystemRoot% \SysWOW64\odbcad32.exe, this will correctly locate the installed Connector/ODBC drivers and enable you to create a Connector/ODBC DSN.

This issue was originally reported as Bug #20301.

Error 10061 (Cannot connect to server)

When connecting or using the Test button in ODBC Data Source Administrator I get error 10061 (Cannot connect to server)

This error can be raised by a number of different issues, including server problems, network problems, and firewall and port blocking problems. For more information, see Can't connect to [local] MySQL server.

"Transactions are not enabled" Error

The following error is reported when using transactions: Transactions are not enabled

This error indicates that you are trying to use transactions with a MySQL table that does not support transactions. Transactions are supported within MySQL when using the InnoDB database engine, which is the default storage engine in MySQL 5.5 and higher. In versions of MySQL before MySQL 5.1, you may also use the BDB engine.

Check the following before continuing:

• Verify that your MySQL server supports a transactional database engine. Use SHOW ENGINES to obtain a list of the available engine types.

• Ensure that you have not enabled the disable transactions option in your DSN.

#DELETED# Records Reported by Access

Access reports records as #DELETED# when inserting or updating records in linked tables.

If the inserted or updated records are shown as #DELETED# in Access, then:

• If you are using Access 2000, get and install the newest (version 2.6 or higher) Microsoft MDAC (Microsoft Data Access Components) from http://support.microsoft.com/kb/110093. This fixes a bug in Access that when you export data to MySQL, the table and column names aren’t specified.

Also, get and apply the Microsoft Jet 4.0 Service Pack 5 (SP5), which can be found at http://support.microsoft.com/default.aspx?scid=kb;EN-US;q239114. This fixes some cases where columns are marked as #DELETED# in Access.

• For all versions of Access, enable the Connector/ODBC Return matching rows option. For Access 2.0, also enable the Simulate ODBC 1.0 option.

• Include a TIMESTAMP in all tables that you want to be able to update.

• Include a primary key in the table. If not, new or updated rows may show up as #DELETED#.

• Use only DOUBLE float fields. Access fails when comparing with single-precision floats. The symptom usually is that new or updated rows may show up as #DELETED# or that you cannot find or update rows.
Write Conflicts or Row Location Errors

- If you are using Connector/ODBC to link to a table that has a BIGINT column, the results are displayed as #DELETED#. The work around solution is:
  - Have one more dummy column with TIMESTAMP as the data type.
  - Select the Change BIGINT columns to INT option in the connection dialog in ODBC DSN Administrator.
  - Delete the table link from Access and re-create it.

Old records still display as #DELETED#, but newly added/updated records are displayed properly.

Write Conflicts or Row Location Errors

How do I handle Write Conflicts or Row Location errors?

If you see the following errors, select the Return Matching Rows option in the DSN configuration dialog, or specify OPTION=2, as the connection parameter:

- Write Conflict. Another user has changed your data.
- Row cannot be located for updating. Some values may have been changed since it was last read.

Importing from Access 97

Exporting data from Access 97 to MySQL reports a Syntax Error.

This error is specific to Access 97 and versions of Connector/ODBC earlier than 3.51.02. Update to the latest version of the Connector/ODBC driver to resolve this problem.

Importing from Microsoft DTS

Exporting data from Microsoft DTS to MySQL reports a Syntax Error.

This error occurs only with MySQL tables using the TEXT or VARCHAR data types. You can fix this error by upgrading your Connector/ODBC driver to version 3.51.02 or higher.

SQL_NO_DATA Exception from ODBC.NET

Using ODBC.NET with Connector/ODBC, while fetching empty string (0 length), it starts giving the SQL_NO_DATA exception.

You can get the patch that addresses this problem from http://support.microsoft.com/default.aspx?scid=kb;EN-US;q319243.

Error with SELECT COUNT(*)

Using SELECT COUNT(*) FROM tbl_name within Visual Basic and ASP returns an error.

This error occurs because the COUNT(*) expression is returning a BIGINT, and ADO cannot make sense of a number this big. Select the Change BIGINT columns to INT option (option value 16384).

Multiple-Step Operation Error

Using the AppendChunk() or GetChunk() ADO methods, the Multiple-step operation generated errors. Check each status value error is returned.
The `GetChunk()` and `AppendChunk()` methods from ADO do not work as expected when the cursor location is specified as `adUseServer`. On the other hand, you can overcome this error by using `adUseClient`.

A simple example can be found from [http://www.dwam.net/iishelp/ado/docs/adomth02_4.htm](http://www.dwam.net/iishelp/ado/docs/adomth02_4.htm)

**Modified Record Error**

Access returns *Another user had modified the record that you have modified* while editing records on a Linked Table.

In most cases, this can be solved by doing one of the following things:

- Add a *primary key* for the table if one doesn't exist.
- Add a timestamp column if one doesn't exist.
- Only use double-precision float fields. Some programs may fail when they compare single-precision floats.

If these strategies do not help, start by making a log file from the ODBC manager (the log you get when requesting logs from ODBCADMIN) and a Connector/ODBC log to help you figure out why things go wrong. For instructions, see Section 5.9, “Getting an ODBC Trace File”.

**Direct Application Linking Under Unix or Linux**

When linking an application directly to the Connector/ODBC library under Unix or Linux, the application crashes.

Connector/ODBC under Unix or Linux is not compatible with direct application linking. To connect to an ODBC source, use a driver manager, such as *iODBC* or *unixODBC*.

**Microsoft Office and DATE or TIMESTAMP Columns**

Applications in the Microsoft Office suite cannot update tables that have *DATE* or *TIMESTAMP* columns.

This is a known issue with Connector/ODBC. Ensure that the field has a default value (rather than *NULL*) and that the default value is nonzero (that is, something other than *0000-00-00 00:00:00*).

**INFORMATION_SCHEMA Database**

When connecting Connector/ODBC 5.x to a MySQL 4.x server, the error 1044 *Access denied for user 'xxx'@'%' to database 'information_schema'* is returned.

Connector/ODBC 5.x is designed to work with MySQL 5.0 or later, taking advantage of the *INFORMATION_SCHEMA* database to determine data definition information. Support for MySQL 4.1 is planned for the final release.

**S1T00 Error**

When calling `SQLTables`, the error *S1T00* is returned, but I cannot find this in the list of error numbers for Connector/ODBC.

The *S1T00* error indicates that a general timeout has occurred within the ODBC system and is not a MySQL error. Typically it indicates that the connection you are using is stale, the server is too busy to accept your request or that the server has gone away.
"Table does not exist" Error in Access 2000

When linking to tables in Access 2000 and generating links to tables programmatically, rather than through the table designer interface, you may get errors about tables not existing.

There is a known issue with a specific version of the msjet40.dll that exhibits this issue. The version affected is 4.0.9025.0. Reverting to an older version will enable you to create the links. If you have recently updated your version, check your WINDOWS directory for the older version of the file and copy it to the drivers directory.

Batched Statements

When I try to use batched statements, the execution of the batched statements fails.

Batched statement support was added in 3.51.18. Support for batched statements is not enabled by default. Enable option FLAG_MULTI_STATEMENTS, value 67108864, or select the Allow multiple statements flag within a GUI configuration. Batched statements using prepared statements is not supported in MySQL.

Packet Errors with ADODB and Excel

When connecting to a MySQL server using ADODB and Excel, occasionally the application fails to communicate with the server and the error Got an error reading communication packets appears in the error log.

This error may be related to Keyboard Logger 1.1 from PanteraSoft.com, which is known to interfere with the network communication between MySQL Connector/ODBC and MySQL.

Outer Join Error

When using some applications to access a MySQL server using Connector/ODBC and outer joins, an error is reported regarding the Outer Join Escape Sequence.

This is a known issue with MySQL Connector/ODBC which is not correctly parsing the "Outer Join Escape Sequence", as per the specs at Microsoft ODBC Specs. Currently, Connector/ODBC will return a value > 0 when asked for SQL_OJ_CAPABILITIES even though no parsing takes place in the driver to handle the outer join escape sequence.

Hebrew/CJK Characters

I can correctly store extended characters in the database (Hebrew/CJK) using Connector/ODBC 5.1, but when I retrieve the data, the text is not formatted correctly and I get garbled characters.

When using ASP and UTF8 characters, add the following to your ASP files to ensure that the data returned is correctly encoded:

```plaintext
Response.CodePage = 65001
Response.CharSet = "utf-8"
```

Duplicate Entry in Installed Programs List

I have a duplicate MySQL Connector/ODBC entry within my Installed Programs list, but I cannot delete one of them.

This problem can occur when you upgrade an existing Connector/ODBC installation, rather than removing and then installing the updated version.
Warning
To fix the problem, use any working uninstallers to remove existing installations; then may have to edit the contents of the registry. Make sure you have a backup of your registry information before attempting any editing of the registry contents.

Values Truncated to 255 Characters

When submitting queries with parameter binding using `UPDATE`, my field values are being truncated to 255 characters.

Ensure that the `FLAG_BIG_PACKETS` option is set for your connection. This removes the 255 character limitation on bound parameters.

Disabling Data-At-Execution

Is it possible to disable data-at-execution using a flag?

If you do not want to use data-at-execution, remove the corresponding calls. For example:

```c
SQLLEN ylen = SQL_LEN_DATA_AT_EXEC(10);
SQLBindCol(hstmt,2,SQL_C_BINARY, buf, 10, &ylen);
```

Would become:

```c
SQLBindCol(hstmt,2,SQL_C_BINARY, buf, 10, NULL);
```

This example also replaced `&ylen` with `NULL` in the call to `SQLBindCol()`.

For further information, refer to the MSDN documentation for `SQLBindCol()`.

NULLABLE Attribute for AUTO_INCREMENT Columns

When you call `SQLColumns()` for a table column that is `AUTO_INCREMENT`, the `NULLABLE` column of the result set is always `SQL_NULLABLE` (1).

This is because MySQL reports the `DEFAULT` value for such a column as `NULL`. It means, if you insert a `NULL` value into the column, you will get the next integer value for the table's `auto_increment` counter.
Chapter 9 Connector/ODBC Support

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There are many different places where you can get support for using Connector/ODBC. Always try the Connector/ODBC Mailing List or Connector/ODBC Forum. See Section 9.1, “Connector/ODBC Community Support”, for help before reporting a specific bug or issue to MySQL.

9.1 Connector/ODBC Community Support

Community support from experienced users is also available through the ODBC Forum. You may also find help from other users in the other MySQL Forums, located at http://forums.mysql.com. See MySQL Community Support at the MySQL Forums.

9.2 How to Report Connector/ODBC Problems or Bugs

If you encounter difficulties or problems with Connector/ODBC, start by making a log file from the ODBC Manager (the log you get when requesting logs from ODBC ADMIN) and Connector/ODBC. The procedure for doing this is described in Section 5.9, “Getting an ODBC Trace File”.

Check the Connector/ODBC trace file to find out what could be wrong. Determine what statements were issued by searching for the string >mysql_real_query in the myodbc.log file.

Also, try issuing the statements from the mysql client program or from admndemo. This helps you determine whether the error is in Connector/ODBC or MySQL.

Ideally, include the following information with your bug report:

• Operating system and version
• Connector/ODBC version
• ODBC Driver Manager type and version
• MySQL server version
• ODBC trace from Driver Manager
• Connector/ODBC log file from Connector/ODBC driver
• Simple reproducible sample

The more information you supply, the more likely it is that we can fix the problem.

If you are unable to find out what is wrong, the last option is to create an archive in tar or zip format that contains a Connector/ODBC trace file, the ODBC log file, and a README file that explains the problem. Initiate a bug report for our bugs database at http://bugs.mysql.com/, then click the Files tab in the bug report for instructions on uploading the archive to the bugs database. Only MySQL engineers have access to the files you upload, and we are very discreet with the data.
If you can create a program that also demonstrates the problem, please include it in the archive as well.

If the program works with another SQL server, include an ODBC log file where you perform exactly the same SQL statements so that we can compare the results between the two systems.

Remember that the more information you can supply to us, the more likely it is that we can fix the problem.