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.

The latest MySQL Connector/ODBC version is recommended for use with MySQL Server version 8.0 and higher.

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 9.3, 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

The latest version of Connector/ODBC supports all active MySQL Server versions, which today includes MySQL Server 8.0 and higher. As an example, use Connector/ODBC 9.3.0 with MySQL Server 8.0, 8.4, and 9.3.

Information about each Connector/ODBC version; for release notes, see the Connector/ODBC release notes.

Information about major changes per Connector/ODBC series is described at Section 9.3, “Connector/ODBC Version History”.

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.

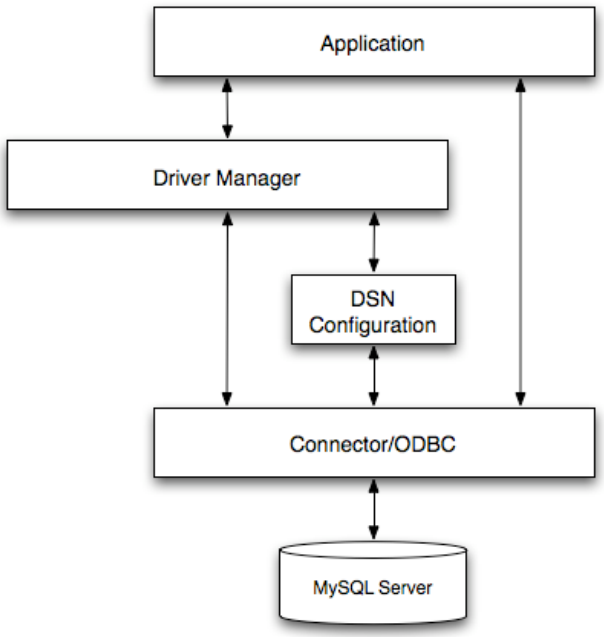
Open Database Connectivity (ODBC) is a widely accepted application-programming interface (API) for database access. It is based on the Call-Level Interface (CLI) specifications from X/Open and ISO/IEC for database APIs and uses Structured Query Language (SQL) as its database access language.

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 definition in the DSN. 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 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 for more information.
- Unix:
  - `unixODBC` Driver Manager for Unix (`libodbc.so`). See http://www.unixodbc.org, for more information.
  - `iODBC` Driver Manager for Unix (`libiodbc.so`). See 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:

Platform	Binary Installer	Build from Source
Windows	Installation Instructions	Build Instructions
Unix/Linux	Installation Instructions	Build Instructions
macOS	Installation Instructions	

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, `myodbc9w.dll` versus `myodbc9a.dll`, or `libmyodbc9w.so` versus `libmyodbc9a.so`.

Note

Related: The previously described file names contain an "9", such as `myodbc9a.dll`, which means they are for Connector/ODBC 9.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 8.0.40 and later, and 9.1.0 and later: Visual C++ Runtime 2022 version 14.40 or later
  - Connector/ODBC 8.0.14 to 8.0.39: Visual C++ Runtime 2015 or 2017
  - Connector/ODBC 8.0.11 to 8.0.13: Visual C++ Runtime 2015

  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.

- **MSI**: The Windows MSI Installer Package wizard installs Connector/ODBC. Download it from https://dev.mysql.com/downloads/connector/odbc/. Configure ODBC connections using Chapter 5, *Configuring Connector/ODBC* after the installation.
- **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.
- Connector/ODBC 8.0 and below: **MySQL Installer**: The general MySQL Installer application for Windows can install, upgrade, configure, and manage most MySQL 8.0 products, including Connector/ODBC 8.0 and its prerequisites. Download it from http://dev.mysql.com/downloads/windows/installer/ and see the MySQL Installer documentation for additional details. This is not a Connector/ODBC specific installer.

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 to the location you want it installed.
2. Run the included batch file to perform an installation from the current directory and registers the ODBC driver.
3. Alternatively to the batch file, install the individual files required for Connector/ODBC operation manually.
4. Optionally install debug related files that are bundled in a different Zip file.

To install using the **batch file**:

1. Unzip the Connector/ODBC zipped Connector/ODBC package to the desired installation directory. For example, to `C:\Program Files\MySQL\Connector ODBC 9.3\`.

   > **Note**
   >
   > Multiple Zip files are available: 32-bit and 64-bit, and (as of 8.0.31) a separate Debug Zip file that includes PDB files and unit tests.

2. Open a command prompt (with Admin privileges) and change the location to that directory.
3. Run `Install.bat` to register the Connector/ODBC driver with the Windows ODBC manager for both the ANSI and Unicode versions. Output is similar to:

```
cd C:\Program Files\MySQL\Connector ODBC 9.3\
Install.bat

Registering Unicode driver
Checking if "MySQL ODBC 9.3 Unicode Driver" is not already registered
Registering "MySQL ODBC 9.3 Unicode Driver"
Success: Usage count is 1

Registering ANSI driver
Checking if "MySQL ODBC 9.3 ANSI Driver" is not already registered
Registering "MySQL ODBC 9.3 ANSI Driver"
Success: Usage count is 1
```

   > **Note**
   >
   > `Install.bat` assumes the default naming scheme but optionally accepts a custom name as the first parameter. For example, "Install.bat Fun" yields "Fun Unicode" and "Fun ANSI" as the driver names.

   Optionally use `myodbc-installer.exe` to list the registered drivers, for example:

```
cd C:\Program Files\MySQL\Connector ODBC 9.3\bin
myodbc-installer -d -l

SQL Server
MySQL ODBC 9.3 Unicode Driver
MySQL ODBC 9.3 ANSI Driver
```

> **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`.

Using `Install.bat` is optional, directly using `myodbc-installer.exe` is an alternative option to register drivers. For example:

```
# For Unicode-enabled driver:
myodbc-installer -a -d -n "MySQL ODBC 9.3 Unicode Driver" -t "DRIVER=myodbc9w.dll;SETUP=myodbc9S.dll"

# For ANSI driver:
myodbc-installer -a -d -n "MySQL ODBC 9.3 ANSI Driver" -t "DRIVER=myodbc9a.dll;SETUP=myodbc9S.dll"
```

4.1.2 Installing the Windows Connector/ODBC Debug Packages

The associated Debug files are bundled in its own Zip file, including two `lib/` directories:

- `lib/`: PDB files to use with regular builds; they are built in RelWithDebInfo mode.
- `Debug/lib/`: Debug builds built in Debug mode; includes driver, PDB files, and unit tests in `test/` subdirectory.

> **Note**
>
> The separate debug Zip file was added in v8.0.31.

Add Debug Functionality to Regular Build

Download the debug zip and copy its `lib/` contents to your driver installation directory; this adds the PDB files generated in the RelWithDebInfo build.

> **Note**
>
> Regular builds are built with RelWithDebInfo so not all debugging information is available. For example, some variables might be optimized out.

Replace Regular Build with Debug Build

Manually copy `Debug/lib/` files from the Zip package into the driver installation directory to replace the DLL and PDB files inside. No new driver registration is required.

Install an Independent Debug Build

This requires copying the `plugin/` directory and dependency libraries (`lib*.dll`) from the regular driver build, and optionally copying additional authentication plugins (`fido2.dll`, `libsasl.dll`, and `saslSCRAM.dll`) depending on the plugins you use.

Register with the `myodbc-installer` command line tool from the regular driver `bin/` sub-directory.

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++)

> **Note**
>
> Connector/ODBC provides generic Linux packages for Intel architecture (both 32 and 64 bits). As of Connector/ODBC 8.0.32, generic Linux packages for ARM architecture (64 bit) are also available.

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-9.3.0-i686-pc-linux.tar.gz
   $> tar xvf mysql-connector-odbc-9.3.0-i686-pc-linux.tar
   ```

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:

   ```
   // Registers the Unicode driver:
   $> myodbc-installer -a -d -n "MySQL ODBC 9.3 Unicode Driver" -t "Driver=/usr/local/lib/libmyodbc9w.s

   // Registers the ANSI driver
   ```

```
$> myodbc-installer -a -d -n "MySQL ODBC 9.3 ANSI Driver" -t "Driver=/usr/local/lib/libmyodbc9a.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/libmyodbc9a.so
${LibDir}/odbc/libmyodbc9w.so
${BinDir}/myodbc-installer
${DocDir}/mysql-connector-odbc/*
```

  Prerequisites: it depends on the unixODBC libraries (libodbc, libodbcinst).

  It installs and registers both the Unicode (MySQL ODBC 9.3 Unicode Driver) and ANSI (MySQL ODBC 9.3 ANSI Driver) drivers.

  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/libmyodbc9S.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/libmyodbc9a.so
/usr/lib/x86_64-linux-gnu/odbc/libmyodbc9w.so
/usr/lib/x86_64-linux-gnu/odbc/libmyodbc9S.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-9.3.0.i686.rpm
```

If the driver exists, upgrade it like this:

```
$> su root
$> rpm -Uvh mysql-connector-odbc-9.3.0.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.

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:

   ```
   $> 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`:

   ```
   $> 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:

   ```
   $> myodbc-installer -a -d -n "MySQL ODBC 9.3 Driver" -t "Driver=/usr/local/lib/libmyodbc9w.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” [15].

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:

```
$> 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 https://www.microsoft.com/en-in/download/details.aspx?id=21995.
- 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 9.3, 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/.

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:

```
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):

```
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:

```
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` `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 `MYSQLCLIENT_STATIC_LINKING` option to `TRUE`, and use the `MYSQLCLIENT_LIB_NAME` option to supply the client library's name for static linking:

```
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` 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.
- CMake.
- 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/share/mysql/charsets). These should be in place if you have installed the MySQL server on the same machine. See Character Sets, Collations, Unicode for more information on character set support.

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.
- -DMYSQL_LINK_FLAGS=*MySQL link flags*
- -DMYSQL_CXXFLAGS=*MySQL C++ linkage flags*
- -DMYSQL_CXX_LINKAGE=*1*: Enables C++ linkage to MySQL client library. By default, MYSQL_CXX_LINKAGE is enabled for MySQL 5.6.4 or later. For MySQL 5.6.3 and earlier, this option must be set explicitly to *1*.

Build Steps for Unix

To build the driver libraries, execute make:

```
$> 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:

```
$> 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:

```
$> 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

Table of Contents

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 corrrespond 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

Parameter	GUI Option	Default Value	Comment
`user`	User	ODBC	The user name used to connect to MySQL.
`uid`	User	ODBC	Synonymous with `user`. Added in 3.51.16.
`server`	TCP/IP Server	`localhost`	The host name of the MySQL server. Can define multipl `MULTI_HOST` is enabled.
`database`	Database	-	The default database.
`option`	-	0	Options that specify how Connector/ODBC works. See “Connector/ODBC Option Parameters” and Table 5.4, “ Connector/ODBC Option Values for Different Configurat
`port`	Port	3306	The TCP/IP port to use if `server` is not `localhost`.
`initstmt`	Initial Statement	-	Initial statement. A statement to execute when connecti version 3.51 the parameter is called `stmt`. The driver su statement being executed only at the time of the initial c
`password`	Password	-	The password for the `user` account on `server`. `pwd` is
`password1`, `password2`, `password3`	Password	-	For Multi-Factor Authentication (MFA); `password1` is a `password`. There'as also the pwd1, pwd2, and pwd3 al added in 8.0.28.
`socket`	-	-	The Unix socket file or Windows named pipe to connect socket if `server` is set to `localhost`
`openid-token-file`	-	-	Defines a path to a file containing the JWT formatted ide in 9.1.0.
`ssl-ca`	SSL Certificate	-	Alias of SSLCA as an eventual replacement; added in v
`SSLCA`	SSL Certificate	-	The path to a file with a list of trust SSL CAs. An `ssl-ca` alias was added in 8.0.29, which is preferre
`ssl-capath`	SSL CA Path	-	Alias of SSLCAPATH as an eventual replacement; adde
`SSLCAPATH`	SSL CA Path	-	The path to a directory that contains trusted SSL CA cer format. An `ssl-capath` alias was added in 8.0.29, which is pre `SSLCAPATH`.
`ssl-cert`	SSL Certificate	-	Alias of SSLCERT as an eventual replacement; added i

Parameter	GUI Option	Default Value	Comment
SSLCERT	SSL Certificate	-	The name of the SSL certificate file to use for estab connection. An ssl-cert alias was added in 8.0.29, which is p
ssl-cipher	SSL Cipher	-	Alias of SSLCIPHER as an eventual replacement; a
SSLCIPHER	SSL Cipher	-	The list of permissible ciphers for SSL encryption. T same format as the openssl ciphers command. An ssl-cipher alias was added in 8.0.29, which i SSLCIPHER.
ssl-key	SSL Key	-	Alias of SSLKEY as an eventual replacement; adde
SSLKEY	SSL Key	-	The name of the SSL key file to use for establishing An ssl-key alias was added in 8.0.29, which is pre
ssl-crl	The path name of the file containing certificate revocation lists in PEM format.	-	Added in 8.0.31
ssl-crlpath	The path of the directory that contains certificate revocation list files in PEM format.	-	Added in 8.0.31
rsakey	RSA Public Key	-	The full-path name of the PEM file that contains the using the SHA256 authentication plugin of MySQL.
sslverify	Verify SSL	0	If set to 1, the SSL certificate will be verified when u connection. If not set, then the default behavior is to verification. **Note** The option is deprecated since C 5.3.7. It is preferable to use the S parameter instead.
authentication_kerberos_mode	Kerberos implementation	SSPI	Acceptable values are "SSPI" (default) or "GSSAPI" details, see Kerberos Pluggable Authentication. The supported by Windows, whereas GSSAPI is suppor and other operating systems. Added in Connector/C
OPENTELEMETRY	OpenTelemetry implementation	PREFERRED	Acceptable values are PREFERRED (default) or DI functionality details, see Section 5.8, "OpenTelemet Added in Connector/ODBC 8.1.0.
PLUGIN_DIR	Plugin directory		A directory containing client authentication (and pot used by the ODBC driver when connecting to a MyS
MULTI_HOST	Whether to enable multiple host functionality	0	Enable new connections to try multiple hosts until a successful connection is established. A list of hosts defined with SERVER in the connection string. For ex *SERVER=address1[:port1],address2[:port2];MULTI* added in 8.0.19.
ENABLE_DNS_SRV	Whether to use DNS +SRV usage in the DSN	0	If set to 1, enables DNS+SRV usage in the DSN; th is passed for SRV lookup without a port and with a f lookup name. Example usage: *DRIVER={MySQL O*

Parameter	GUI Option	Default Value	Comment
			Driver};SERVER=_mysql._tcp.foo.abc.com;ENABLE_D -- option added in Connector/ODBC 8.0.19.
`charset`	Character Set	-	The character set to use for the connection. Added in 3. executing SET NAMES is not allowed as of 5.1. This op for the Unicode driver as of 9.0.0.
`readtimeout`		-	The timeout in seconds for attempts to read from the se uses this timeout value and there are retries if necessar effective timeout value is three times the option value. Y value so that a lost connection can be detected earlier t IP `Close_Wait_Timeout` value of 10 minutes. This op for TCP/IP connections, and only for Windows prior to M Corresponds to the `MYSQL_OPT_READ_TIMEOUT` optio Client Library. Added in 3.51.27.
`writetimeout`		-	The timeout in seconds for attempts to write to the serve uses this timeout value and there are `net_retry_cou` necessary, so the total effective timeout value is `net_r` times the option value. This option works only for TCP/I and only for Windows prior to MySQL 5.1.12. Corresp `MYSQL_OPT_WRITE_TIMEOUT` option of the MySQL Cli in 3.51.27.
`interactive`	Interactive Client	0	If set to 1, the `CLIENT_INTERACTIVE` connection optio connect() is enabled. Added in 5.1.7.
`OCI_CONFIG_FILE`	Oracle Cloud Infastructure configuration file path	`~/.oci/config` on Linux and macOS, and `%HOMEDRIVE %%HOMEPATH% \.oci\config` on Windows.	Used by the authentication_oci_client plugin for the Ora Infrastructure (OCI) to support ephemeral key pairs and tokens. The default profile is DEFAULT and can be conf `OCI_CONFIG_PROFILE`. Option added in Connector/OD
`OCI_CONFIG_PROFILE`	Oracle Cloud Infastructure configuration profile name	DEFAULT	Defaults to DEFAULT, optionally specify a specific profil `OCI_CONFIG_FILE`. Option added in Connector/ODBC
`prefetch`	Prefetch from server by _ rows at a time	0	When set to a non-zero value *`N`*, causes all queries in th return *`N`* rows at a time rather than the entire result set. against very large tables where it is not practical to retri set at once. You can scroll through the result set, *`N`* reco This option works only with forward-only cursors. It does option parameter `MULTI_STATEMENTS` is set. It can be with the option parameter `NO_CACHE`. Its behavior in AD undefined: the prefetching might or might not occur. Add
`no_ssps`	-	0	In Connector/ODBC 5.2 and after, by default, server-sid statements are used. When this option is set to a non-ze statements are emulated on the client side, which is the in 5.1 and 3.51. Added in 5.2.0.
`can_handle_exp_pwd`	Can Handle Expired Password	0	Indicates that the application can deal with an expired p is signalled by an SQL state of `08004` ("Server rejected and a native error code `ER_MUST_CHANGE_PASSWORD_` The connection is "sandboxed", and can do nothing othe `SET PASSWORD` statement. To establish a connection in application must either use the `initstmt` connection o password at the start, or issue a `SET PASSWORD` statem after connecting. Once the expired password is reset, th

Parameter	GUI Option	Default Value	Comment
			the connection are lifted. See ALTER USER Statem password expiration for MySQL server accounts. Ad
ENABLE_CLEARTEXT_PLUGIN	Enable Cleartext Authentication	0	Set to *1* to enable cleartext authentication. Added in
ENABLE_LOCAL_INFILE	Enable LOAD DATA operations	0	A connection string, DSN, and GUI option. Set ENA to enable LOAD DATA operations. This toggles the MYSQL_OPT_LOCAL_INFILE mysql_options() opti string overrides the DSN value if both are set. Adde
LOAD_DATA_LOCAL_DIR	Restrict LOAD DATA operations		A connection string, DSN, and GUI option. Set LOA to a specific directory, such as LOAD_DATA_LOCA tmp, to restrict uploading files to a specific path. This MYSQL_OPT_LOAD_DATA_LOCAL_DIR mysql_op connection string overrides the DSN value if both ar no effect if ENABLE_LOCAL_INFILE=1. Added in 8
GET_SERVER_PUBLIC_KEY	Get Server Public Key	0	When connecting to accounts that use caching_sh authentication over non-secure connection (TLS dis ODBC requests the RSA public key required to perf from the server. The option is ignored if the authenti for the connection is different from caching_sha2_ corresponds to the MYSQL_OPT_GET_SERVER_PUB mysql_options() C API function. The value is a The option is added in Connector/ODBC versions 8 requires Connector/ODBC built using OpenSSL-bas If MySQL client library used by Connector/ODBC wa is the case for GPL distributions of Connector/ODBC not function and is ignored
NO_TLS_1_0	Disable TLS 1.0	0	This option was removed in v8.0.28. It disallowed th connection encryption. All versions of TLS are allow this option exluded version 1.0 from being used. Ad support was deprecated in v8.0.26 before removal i
NO_TLS_1_1	Disable TLS 1.1	0	This option was removed in v8.0.28. It disallowed th connection encryption. All versions of TLS are allow this option exluded version 1.1 from being used. Ad support was deprecated in v8.0.26 before removal i
NO_TLS_1_2	Disable TLS 1.2	0	Disallows the use of TLS 1.2 for connection encrypt are allowed by default, and this option exludes versi Added in 5.3.7.
NO_TLS_1_3	Disable TLS 1.3	0	Disallows the use of TLS 1.3 for connection encrypt are allowed by default, and this option exludes versi Added in 8.0.26.
tls-versions	Define the allowed TLS protocol versions	TLSv1.2,TLSv1.3 (set by libmysqlclient)	Accepts TLSv1.2 and/or TLSv1.3; while other values has no effect if *ssl-mode=DISABLED*, and overrides NO_TLS_X_Y connection options such as NO_TLS
SSL_ENFORCE	Enforce SSL	0	Enforce the requirement to use SSL for connections See Table 5.2, “Combined Effects of SSL_ENFORC DISABLE_SSL_DEFAULT ”. Added in 5.3.6. **Note** This option is deprecated since C 5.3.7 and removed in 8.0.13. It is the SSLMODE option parameter in

Parameter	GUI Option	Default Value	Comment
DISABLE_SSL_DEFAULT	Disable default SSL	0	Disable the default requirement to use SSL for connecti When set to “0” [default], Connector/ODBC tries to conn first, and falls back to unencrypted connection if it is not establish an SSL connection. When set to “1,” Connecti attempted, and unencrypted connection is used, unless also set to “1.” See Table 5.2, “Combined Effects of SSL DISABLE_SSL_DEFAULT ”. Added in 5.3.6. **Note** The option is deprecated since Conn 5.3.7 and removed in 8.0.13. Use the option parameter instead.
ssl-mode	SSL Mode	-	Alias of SSLMODE as an eventual replacement; added
SSLMODE	SSL Mode	-	Sets the SSL mode of the server connection. The option of the following values: DISABLED, PREFERRED, REQUI or VERIFY_IDENTITY. See description for the --ssl- MySQL 8.0 Reference Manual for the meaning of each An ssl-mode alias was added in 8.0.29, which is prefe If SSLMODE is not explicitly set, use of the SSLCA or SSL implies SSLMODE=VERIFY_CA. Added in 5.3.7. This option overrides the deprecatedss SSL_ENFORCE options.

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

	DISABLE_SSL_DEFAULT = 0	**DISABLE_SSL_DEFAULT = 1**
SSL_ENFORCE = 0	(Default) Connection with SSL is attempted first; if not possible, fall back to unencrypted connection.	Connection with SSL is not attempted; use unencrypted connection.
SSL_ENFORCE = 1	Connect with SSL; throw an error if an SSL connection cannot be established.	Connect with SSL; throw an error if an SSL connection cannot be established. DISABLE_SSL_DEFAULT=1 is overridden.

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

Parameter Name	GUI Option	Constant Value	Description
`FOUND_ROWS`	Return matched rows instead of affected rows	2	The client c the true valu MySQL retu have MySQ
`BIG_PACKETS`	Allow big result set	8	Do not set a parameters. binding will
`NO_PROMPT`	Don't prompt when connecting	16	Do not prom like to prom
`DYNAMIC_CURSOR`	Enable Dynamic Cursors	32	Enable or di
`NO_SCHEMA`	Disables support for ODBC schemas	64	Ignore use c *`catalog.s`* also the rela option was 8.0.13 but s and was rei 8.0.26. This Connector/C Section 8.1. Support”
`NO_DEFAULT_CURSOR`	Disable driver-provided cursor support	128	Force use o (experiment
`NO_LOCALE`	Don't use setlocale()	256	Disable the (experiment
`PAD_SPACE`	Pad CHAR to full length with space	512	Pad `CHAR` c
`FULL_COLUMN_NAMES`	Include table name in SQLDescribeCol()	1024	`SQLDescri` column nam
`COMPRESSED_PROTO`	Use compression	2048	Use the com
`IGNORE_SPACE`	Ignore space after function names	4096	Tell server t and before ' makes all fu
`NAMED_PIPE`	Named Pipe	8192	Connect wit running on M
`NO_BIGINT`	Treat BIGINT columns as INT columns	16384	Change `BI` (some appli
`NO_CATALOG`	Disable catalog support	32768	Forces resu as `SQLTab` driver to rep See also the usage detai Catalog and

Parameter Name	GUI Option	Constant Value	Description
USE_MYCNF	Read options from my.cnf	65536	Read parameter [odbc] groups
SAFE	Enable safe options	131072	Add some extra
NO_TRANSACTIONS	Disable transaction support	262144	Disable transact
LOG_QUERY	Log queries to %TEMP% \myodbc.sql	524288	Enable query lo tmp/myodbc.s mode.)
NO_CACHE	Don't cache results of forward-only cursors	1048576	Do not cache th the driver, instea (mysql_use_r for forward-only important in dea do not want the set.
FORWARD_CURSOR	Force use of forward-only cursors	2097152	Force the use o cases of applica dynamic cursor to use noncache the forward-only
AUTO_RECONNECT	Enable automatic reconnect	4194304	Enables auto-re not use this opti an auto-reconne transaction may reconnected co same settings a connection. MyS functionality in 8 8.3.0. This conn Connector/ODB SQL_SUCCESS error stating tha
AUTO_IS_NULL	Enable SQL_AUTO_IS_NULL	8388608	When AUTO_IS does not change sql_auto_is_ get the MySQL behavior. When AUTO_IS driver changes t SQL_AUTO_IS_ so you get the S default behavior Thus, omitting th option and force See IS NULL. A
ZERO_DATE_TO_MIN	Return SQL_NULL_DATA for zero date	16777216	Translates zero minimum date v XXXX-01-01. T some statement returned and the incompatible. Ac

Parameter Name	GUI Option	Constant Value	Description
MIN_DATE_TO_ZERO	Bind minimal date as zero date	33554432	Translates t (XXXX-01- supported b resolves an not work be minimum O Added in 3.5
NO_DATE_OVERFLOW	Ignore data overflow error	0	Continue wi return error server will ig result is the in 5.3.8.
MULTI_STATEMENTS	Allow multiple statements	67108864	Enables sup of 8.0.24, pr statements of paramete the SQLPre Multiple stat through the
COLUMN_SIZE_S32	Limit column size to signed 32-bit range	134217728	Limits the co to prevent p in applicatio option is aut with ADO ap
NO_BINARY_RESULT	Always handle binary function results as character data	268435456	When set, th columns wit 3.51.26.
DFLT_BIGINT_BIND_STR	Bind BIGINT parameters as strings	536870912	Causes BIG strings. Micr a string on l correctly, bu is used auto Microsoft Ac
NO_I_S	Don't use INFORMATION_SCHEMA for metadata	1073741824	Tells catalog INFORMATI algorithms. speed for in deprecated ignored) in 8
WEBAUTHN_DEVICE_NUMBER	Sets the authenticator device used during WebAuthN authentication	0	The option i WebAuthN a does not ch option was a (#0) authent
CB_FIDO_GLOBAL	Registers a global callback function for the authentication_webauthn connection	20480	User-define ODBC Web the last regi in connectio use with co ODBC drive might lead t usage: SQL

Parameter Name	GUI Option	Constant Value	Description
			CB_FIDO_GLOB SQL_IS_POINT
CB_FIDO_CONNECTION	Registers a per-connection callback function for the authentication_webauthn connection	20481	User-defined co WebAuthn and is registered for with connections driver; using wit to undefined bel

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

Configuration	Parameter Setting	Option Value
Microsoft Access, Visual Basic	FORWARD_ROWS=1;	8
Microsoft Access (with improved DELETE queries)	FORWARD_ROWS=1;DYNAMIC_CURSOR=1;	8
Microsoft SQL Server	NO_DEFAULT_FIELDS=1;	32
Large tables with too many rows	COMPRESSED_PROTO=1;	2048
Sybase PowerBuilder	NO_BIGINT=1;PAD_SPACE=1;FLAG_SAFE=1;	16384
Query log generation (Debug mode)	LOG_QUERY=1;	2
Large tables with no-cache results	NO_CACHE=1;FORWARD_CURSOR=1;	4
Applications that run full-table "SELECT	NO_PROMPT	Applicable

Configuration Parameter	Configuration Value	Connection Setting
* FROM ... " query, but read only a small number (*N*) of rows from the result		

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.

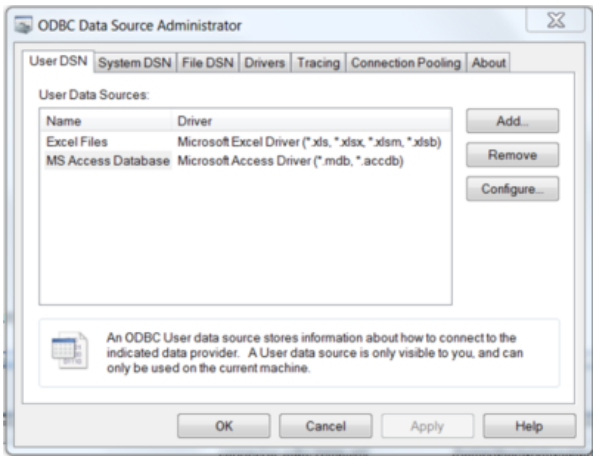
5.3.1 Configuring a Connector/ODBC DSN on Windows with the ODBC Data Source Administrator GUI

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 you Windows version; these instructions from Microsoft cover some popuar Windows platforms. You should see a window similar to the following when you open the `ODBC Data Source Administrator`:

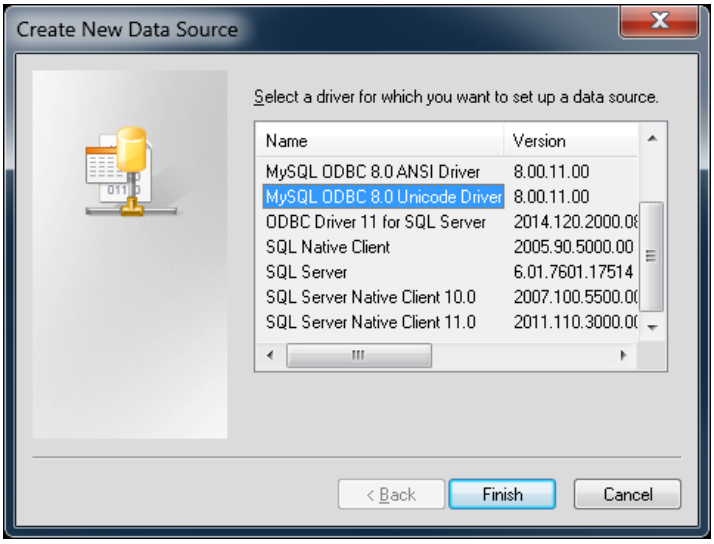
   Figure 5.1 `ODBC Data Source Administrator` Dialog

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.

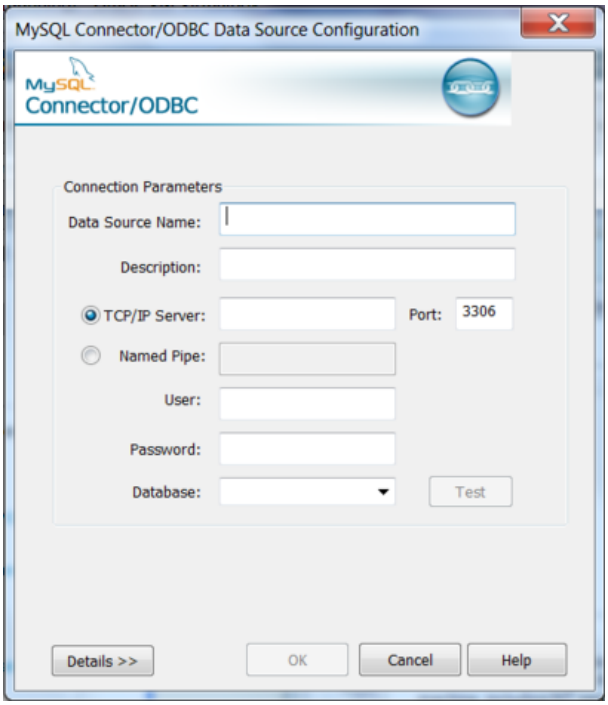
3. From the "Create New Data Source" dialog, select the MySQL ODBC 5.*x* ANSI or Unicode Driver, then click **Finish** to open its connection parameters dialog.

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.

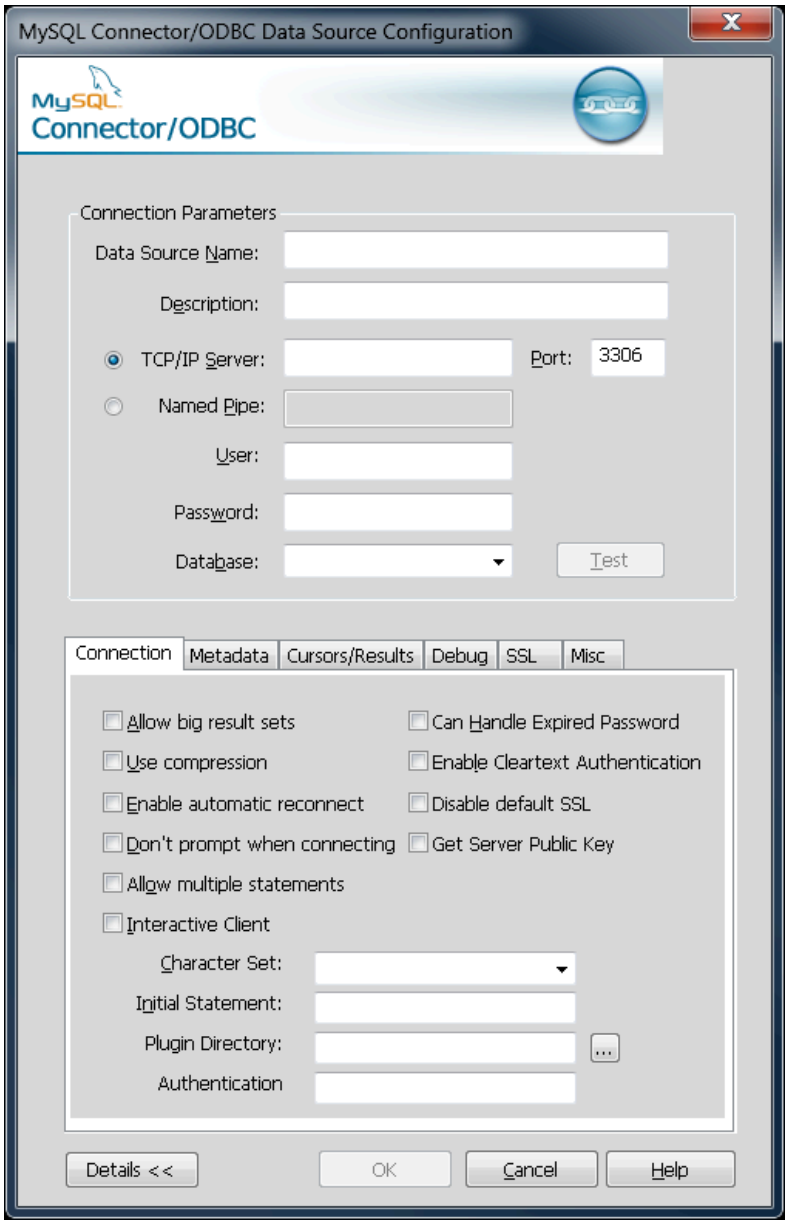
   > **Tip**
   >
   > To identify whether a DSN was created using the 32-bit or the 64-bit driver, include the driver being used within the DSN identifier. This will help you to identify the right DSN to use with applications such as Excel that are only compatible with the 32-bit driver. For example, you 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



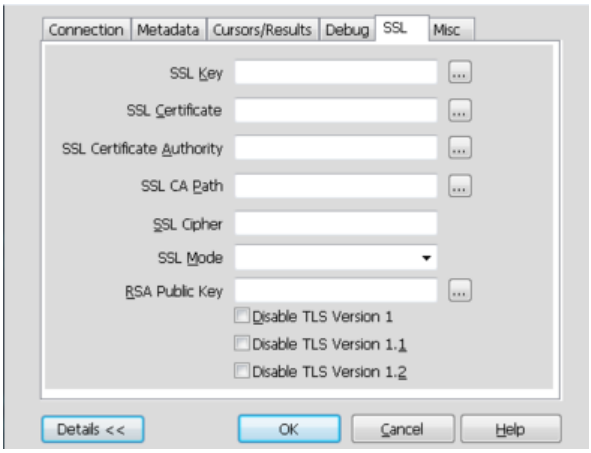
Toggling the **Details** button opens (or closes) an additional tabbed display where you set additional options that include the following:

- **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”.

> **Note**
>
> 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 5.10, “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 `ctl3d32.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 myodbc**9**w.dll is for Connector/ODBC 9.x whereas myodbc**5**w.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, myodbc9**w**.dll is for the Unicode driver. The ANSI driver adds the letter "a" instead of a "w", like myodbc9**a**.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:

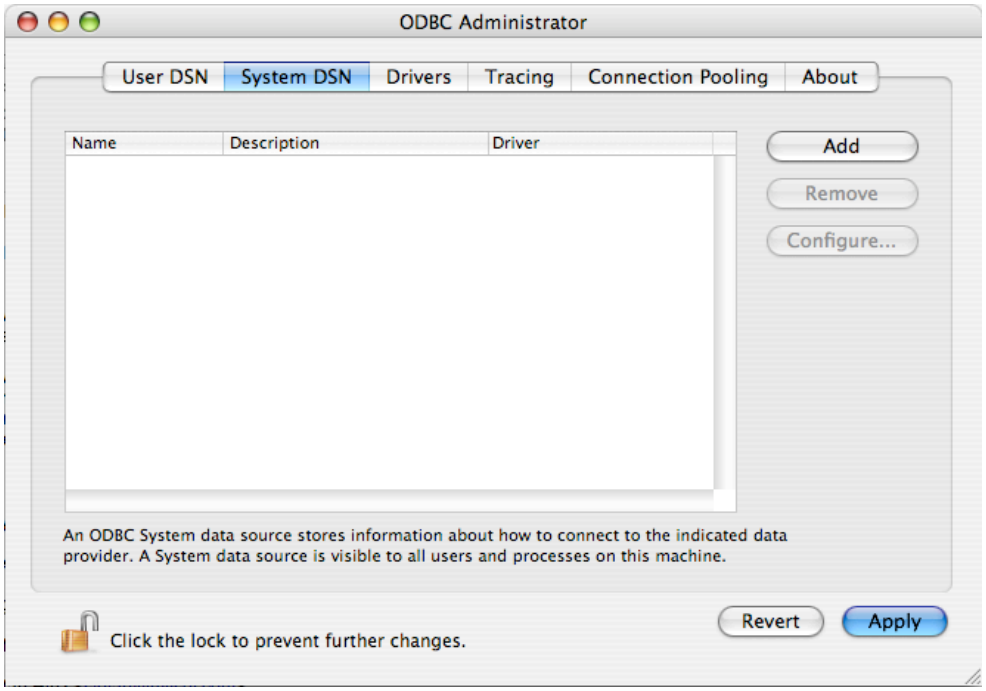
```
$> myodbc-installer -a -s -t"DSN=mydb;DRIVER=MySQL ODBC 9.3 Driver;SERVER=mysql;USER=username;PASSWORD=pass
```

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.

   Figure 5.6 `ODBC Administrator` Dialog

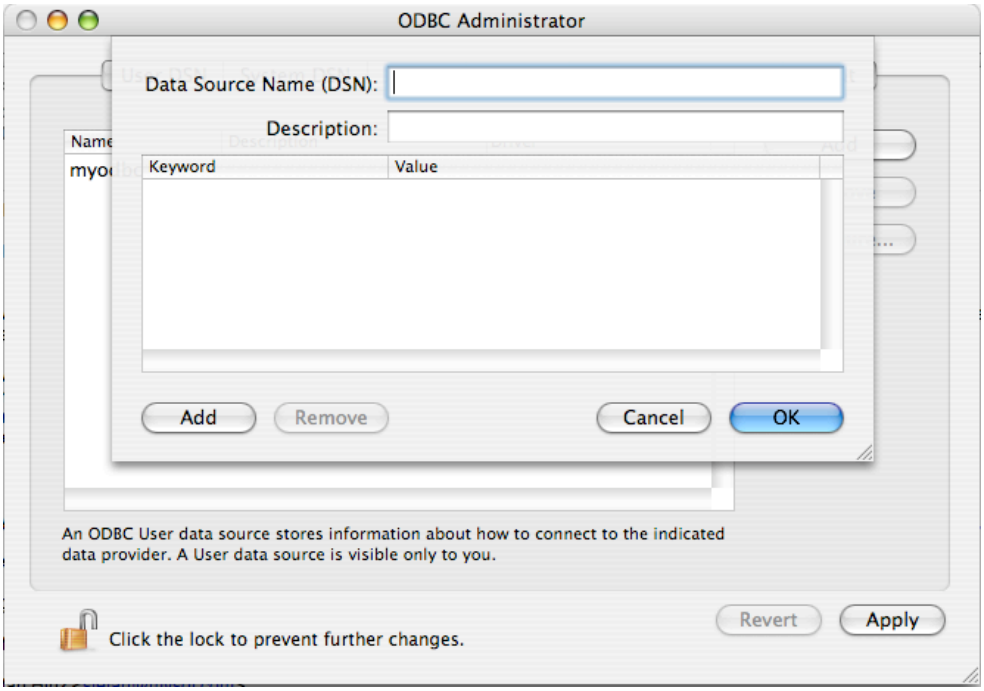
   

2. From the `ODBC Administrator` dialog, choose either the **User DSN** or **System DSN** tab and click **Add**.

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

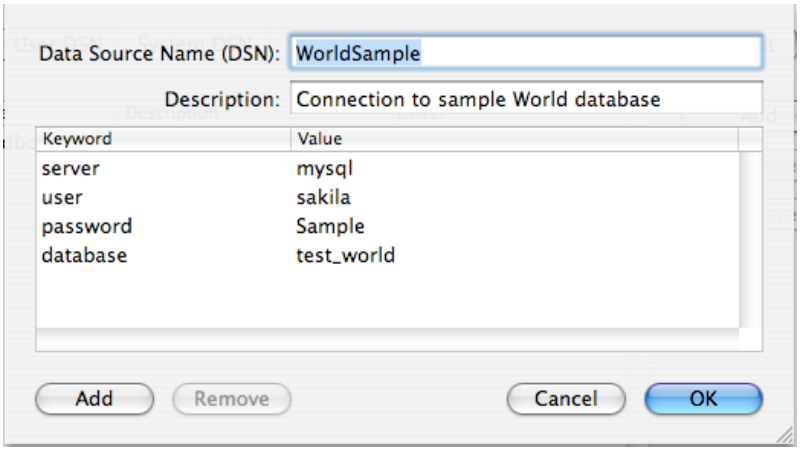


5. Click **Add** to add a new keyword/value pair to the panel. Configure at least four pairs to specify the `server`, `username`, `password` and `database` connection parameters. See Section 5.2, “Connector/ODBC Connection Parameters”.

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 myodbc9w (Unicode) and myodbc9a (ANSI) as DSN names for Connector/ODBC 9.3:

```
;
;  odbc.ini configuration for Connector/ODBC 9.3 driver
;

[ODBC Data Sources]
myodbc9w     = MyODBC 9.3 UNICODE Driver DSN
myodbc9a     = MyODBC 9.3 ANSI Driver DSN

[myodbc9w]
Driver       = /usr/local/lib/libmyodbc9w.so
Description  = Connector/ODBC 9.3 UNICODE Driver DSN
SERVER       = localhost
PORT         =
USER         = root
Password     =
Database     = test
OPTION       = 3
SOCKET       =

[myodbc9a]
Driver       = /usr/local/lib/libmyodbc9a.so
Description  = Connector/ODBC 9.3 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 ODBCSYSINI 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 9.3:

```
ConnectionString = "DRIVER={MySQL ODBC 9.3 Unicode Driver};\
                   SERVER=localhost;\
```

```
                    DATABASE=test;\
                    USER=venu;\
                    PASSWORD=venu;\
                    FOUND_ROWS=1;"
```

Substitute “MySQL ODBC 9.3 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:

```
ConnectionString = "DRIVER={MySQL ODBC 9.3 Unicode Driver};"
                   "SERVER=localhost;"
                   "DATABASE=test;"
                   "USER=venu;"
                   "PASSWORD=venu;"
                   "FOUND_ROWS=1;"
```

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.

For more information about connection pooling: http://support.microsoft.com/default.aspx?scid=kb;EN-US;q169470.

5.8 OpenTelemetry Tracing Support

For applications on Linux systems that use OpenTelemetry (OTel) instrumentation, the connector adds query and connection spans to the trace generated by application code and forwards the current OpenTelemetry context to the server. OpenTelemetry tracing was introduced in the Connector/ODBC 8.1.0 release.

> **Note**
>
> OTel context forwarding works only with MySQL Enterprise Edition, a commercial product. To learn more about commercial products, see https://www.mysql.com/products/.

Enabling and Disabling Tracing

By default, the connector forwards the context only when an instrumented application installs the required OpenTelemetry SDK libraries and configures the trace exporter to send trace data to some destination. If the application code does not use instrumentation, then the legacy connector does not use it either.

Connector/ODBC supports a connection property option, `OPENTELEMETRY`, which has these values:

- `PREFERRED`: Default. Use instrumentation in the connection if the required OpenTelemetry instrumentation is available. Otherwise, permit the connection to operate without any OpenTelemetry instrumentation.
- `DISABLED`: The connector does not create OpenTelemetry spans or forward the OpenTelemetry context to the server.

Setting to boolean `false` behaves the same as `DISABLED`.

When you build code that links to Connector/ODBC and uses OTel instrumentation, the additional spans generated by the connector appear in the traces generated by your code. Spans generated by the connector are sent to the same destination (trace exporter) where other spans generated by the user code are sent as configured by user code. It is not possible to send spans generated by the connector to any other destination.

This implementation is distinct from the implementation provided through the MySQL client library (or the related `telemetry_client` client-side plugin).

Limitation

OTel instrumentation in the ODBC driver only functions if the application is built with the `-rdynamic` compiler option so that symbols defined in user code are externally visible. Without this, the OTel context is not forwarded to the server (as the driver has no way of getting the current OTel context) and the spans generated by the ODBC driver will be not sent to the destination specified in the application (they will be discarded).

5.9 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.
- *OpenID Connect* is supported with the `authentication_openid_connect_client` client-side authentication plugin connecting to MySQL Enterprise Edition with the `authentication_openid_connect` authentication plugin.

  The required `openid-token-file` connection option defines a path to a file containing the JWT formatted identity token. TLS, socket, and shared memory connection methods are supported.

  Support was added in Connector/ODBC 9.1.0.
- 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-based authentication is supported and Connector/ODBC supports the FIDO-based WebAuthn Pluggable Authentication plugin. See the general WebAuthn Pluggable Authentication documentation for installation requirements and implementation details.

  > **Note**
  >
  > Support for the authentication_webauthn plugin was added in Connector/ODBC 8.2.0. Support for the authentication_fido plugin was added in 8.0.29, deprecated in 8.2.0, and removed in 8.4.0.

  A callback usage example:

```
// 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,
(SQLPOINTER)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, ....);
```

5.10 Getting an ODBC Trace File

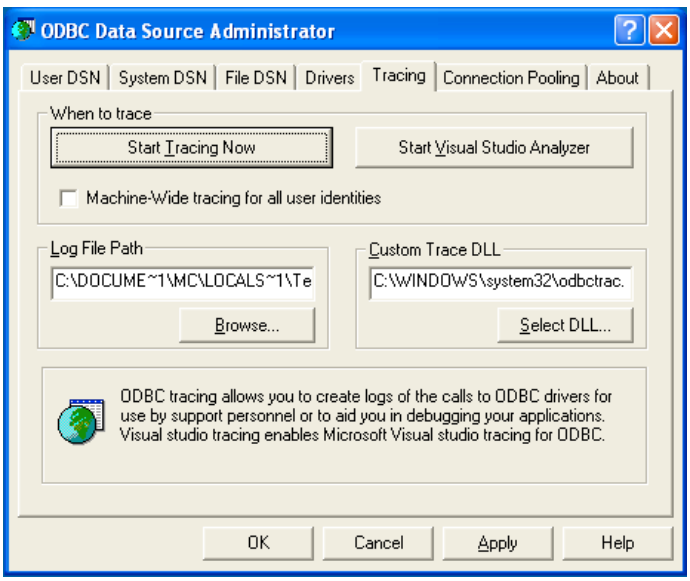
If you encounter difficulties or problems with Connector/ODBC, start by making a log file from the `ODBC Manager` and Connector/ODBC. This is called *tracing*, and is enabled through the ODBC Manager. The procedure for this differs for Windows, macOS and Unix.

5.10.1 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.

   Figure 5.9 ODBC Data Source Administrator Tracing Dialog

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.

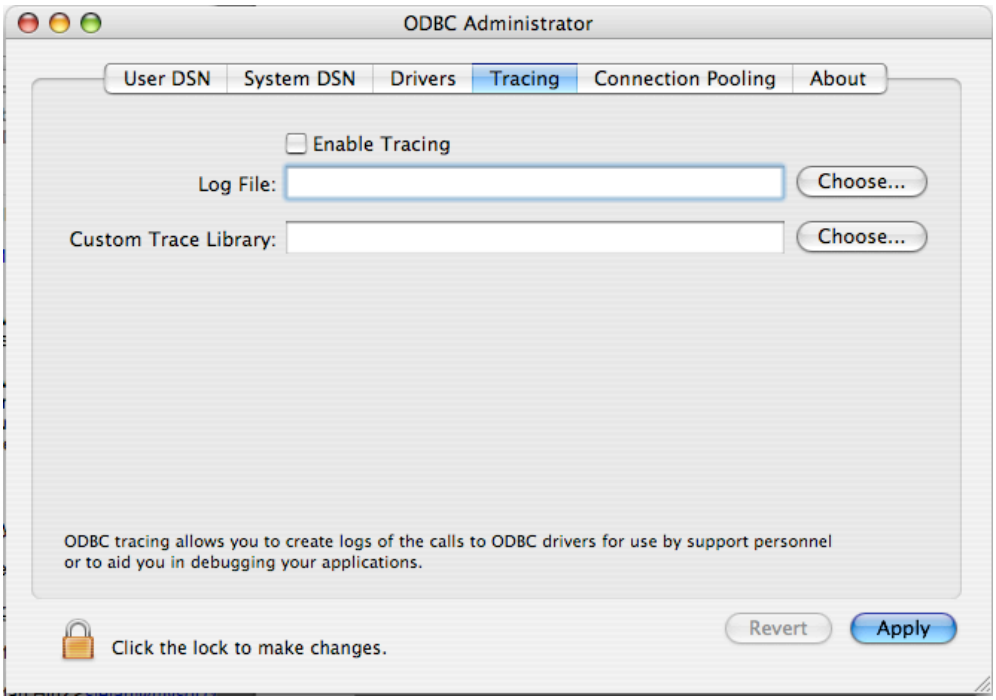
4. Tracing ceases only after you click `Stop Tracing Now`. Remember that while tracing is on, the log file continues to increase in size and that tracing affects the performance of all your ODBC applications.

5.10.2 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.

   Figure 5.10 ODBC Administrator Tracing Dialog



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.

5.10.3 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:

```
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.

5.10.4 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 `myodbcd.dll` driver, see Section 5.3.3, “Troubleshooting ODBC Connection Problems”.

   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”.

Chapter 6 Connector/ODBC Examples

Table of Contents

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 applications 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.

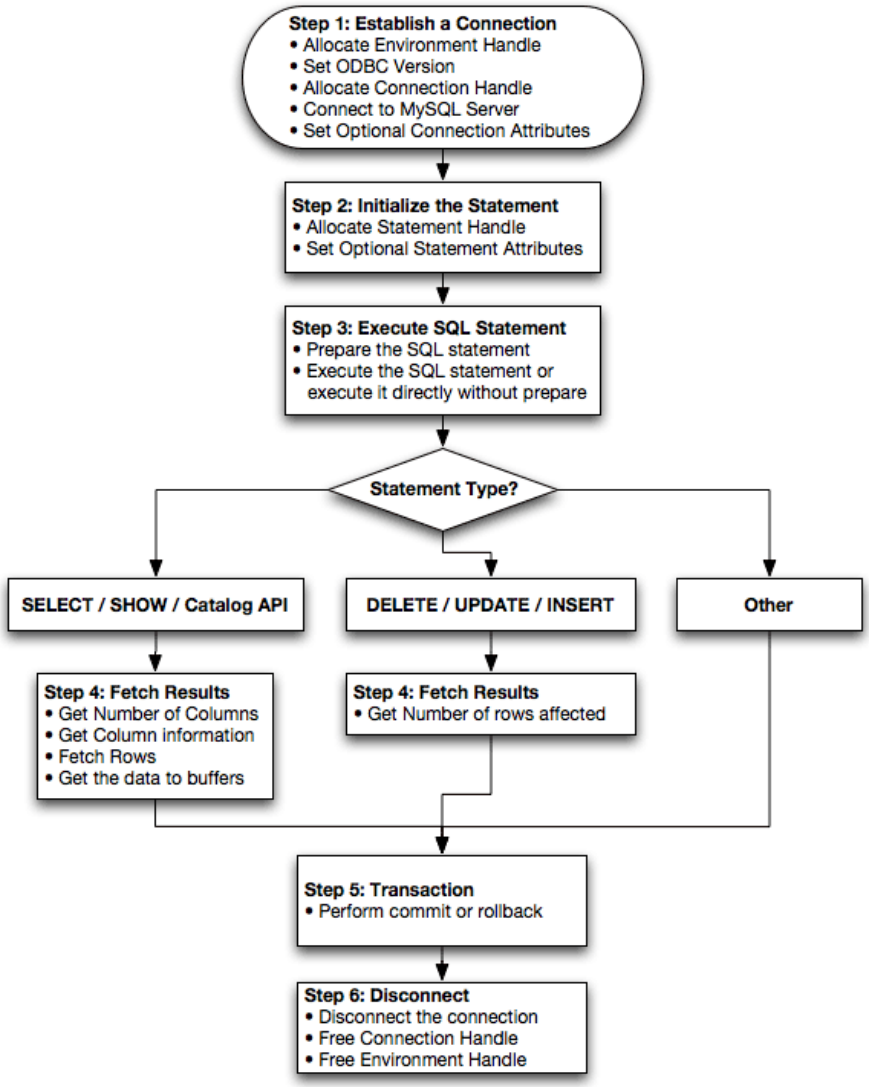
  This might include: prepare the SQL statement and execute the SQL statement, or execute it directly without prepare.
- Retrieve results, depending on the statement type.

  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 `mypassword`.

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 `myuser` to the database `test`:

   ```
   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.

Parameter	Value	Comment
DSN	remote_test	A name to identify the connection.
SERVER	ALPHA	The address of the remote server.
DATABASE	test	The name of the default database.
USER	myuser	The user name configured for access to this database.
PASSWORD	mypassword	The password for `myuser`.

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 5.10, “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:

Publisher	Application	Notes
Adobe	ColdFusion	Formerly Macromedia ColdFusion
Borland	C++ Builder	
	Builder 4	
	Delphi	
Business Objects	Crystal Reports	
Claris	Filemaker Pro	
Corel	Paradox	
Computer Associates	Visual Objects	Also known as CAVO
	AllFusion ERwin Data Modeler	
Gupta	Team Developer	Previously known as Centura Team Developer; Gupta SQL/Windows
Gensym	G2-ODBC Bridge	
Inline	iHTML	
Lotus	Notes	Versions 4.5 and 4.6
Microsoft	Access	
	Excel	
	Visio Enterprise	
	Visual C++	
	Visual Basic	
	ODBC.NET	Using C#, Visual Basic, C++

Publisher	Application	Notes
	FoxPro	
	Visual Interdev	
OpenOffice.org	OpenOffice.org	
Perl	DBD::ODBC	
Pervasive Software	DataJunction	
Sambar Technologies	Sambar Server	
SPSS	SPSS	
SoftVelocity	Clarion	
SQLExpress	SQLExpress for Xbase++	
Sun	StarOffice	
SunSystems	Vision	
Sybase	PowerBuilder	
	PowerDesigner	
theKompany.com	Data Architect	

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.

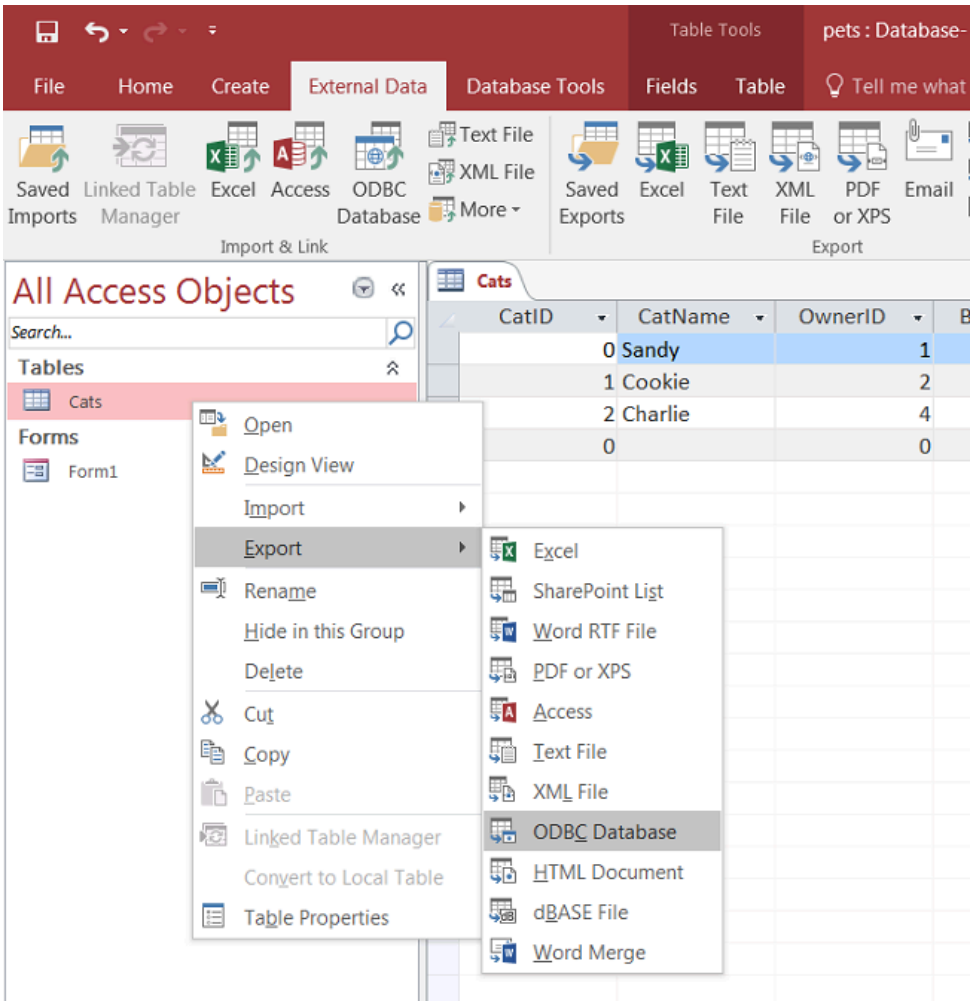
6.4.1 Exporting Access Data to MySQL

> **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:

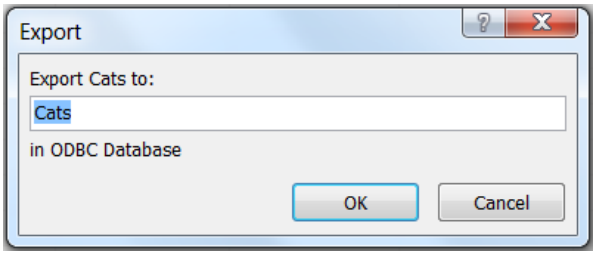
1. With an Access database opened, the navigation plane on the right should display, among other things, all the tables in the database that are available for export (if that is not the case, adjust the navigation plane's display settings). Right click on the table you want to export, and in the menu that appears, choose **Export** , **ODBC Database**.

Figure 6.2 Access: Export ODBC Database Menu Selected



2. The **Export** dialog box appears. Enter the desired name for the table after its import into the MySQL server, and click **OK**.

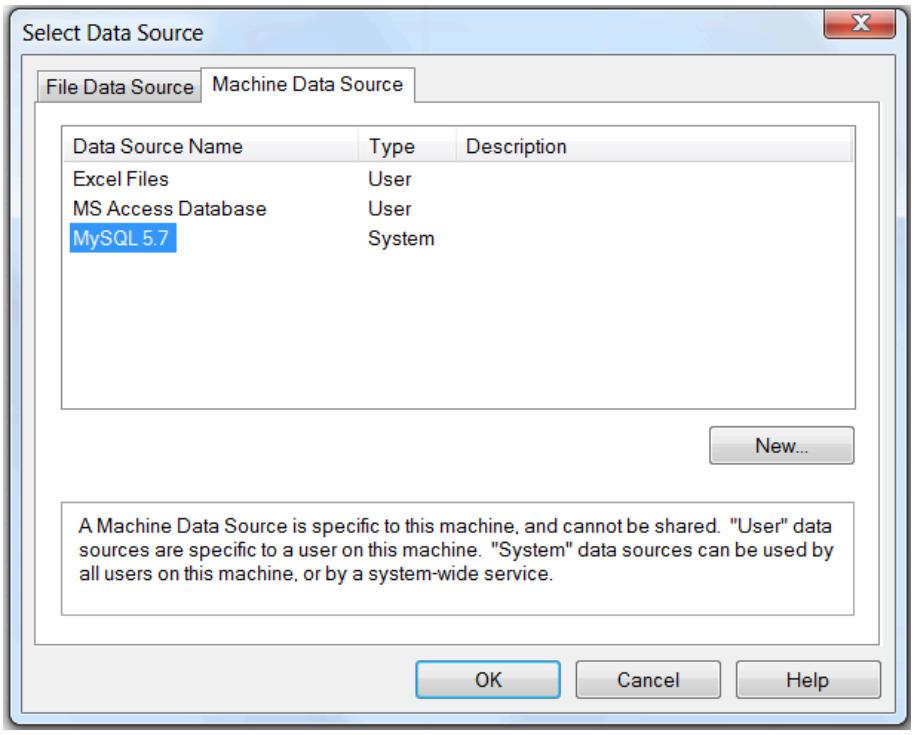
Figure 6.3 Entering Name For Table To Be Exported



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.

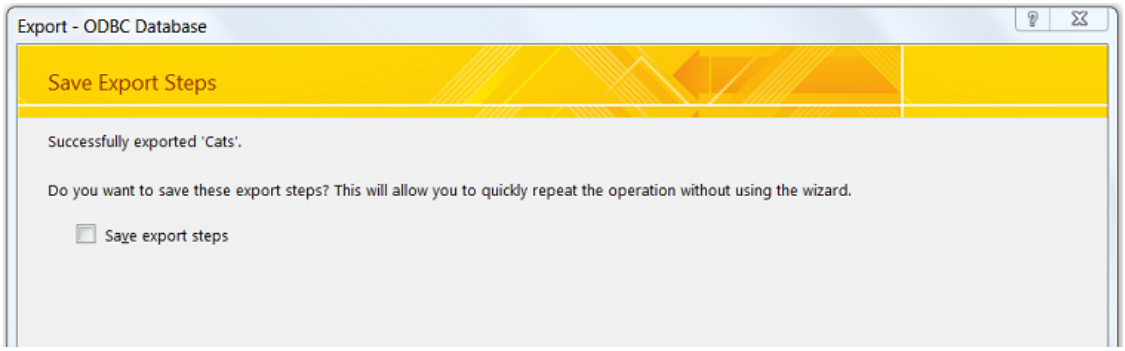
Figure 6.4 Selecting An ODBC Database



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.

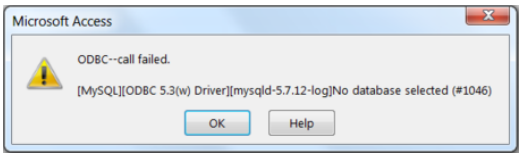
Figure 6.5 Save Export Success Message



> **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 **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 .

Figure 6.6 Error Message Dialog: Database Not Selected

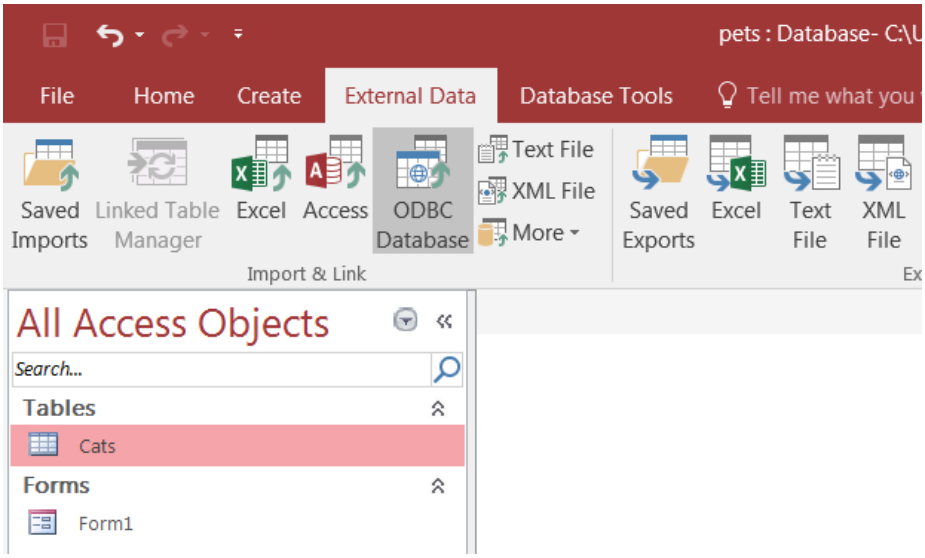


6.4.2 Importing MySQL Data to Access

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

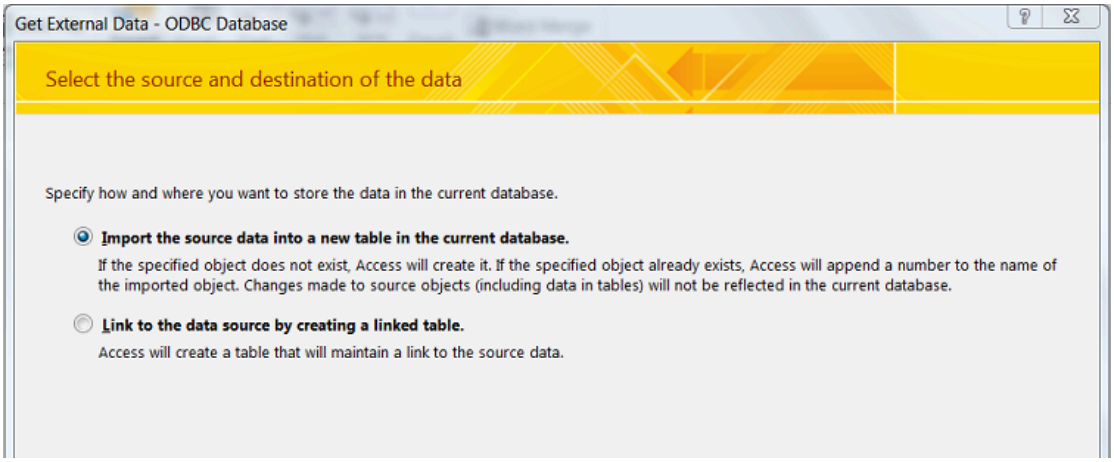
1. Open the Access database into which that you want to import MySQL data.
2. On the **External Data** tab, choose **ODBC Database**.

Figure 6.7 External Data: ODBC Database



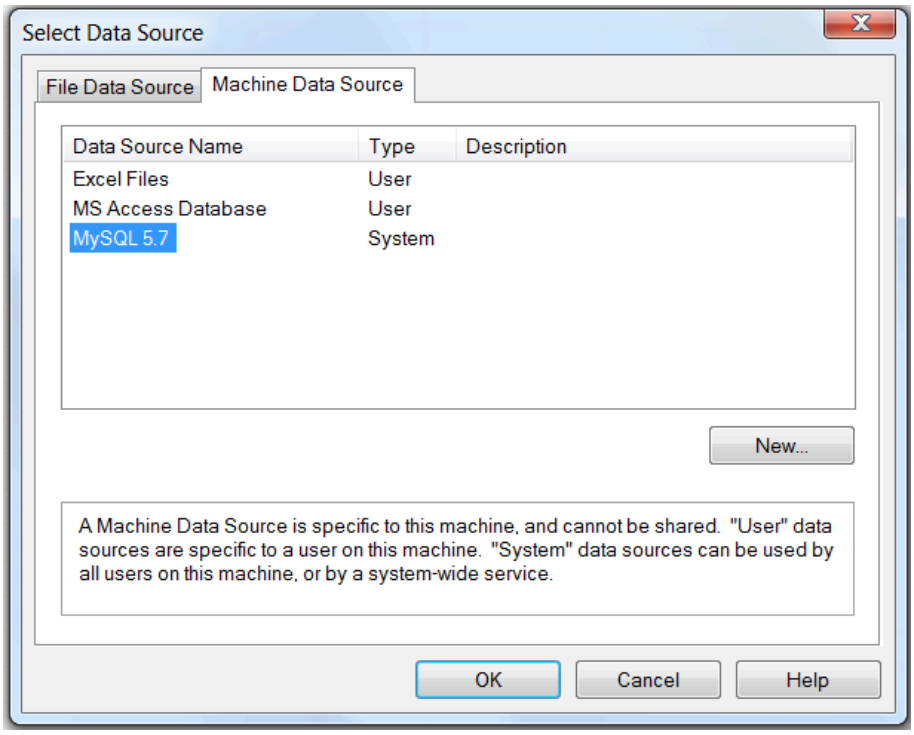
3. In the `Get External Data` dialog box that appears, choose **Import the source data into a new table in the current database** and click **OK**.

Figure 6.8 Get External Data: ODBC Database



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.

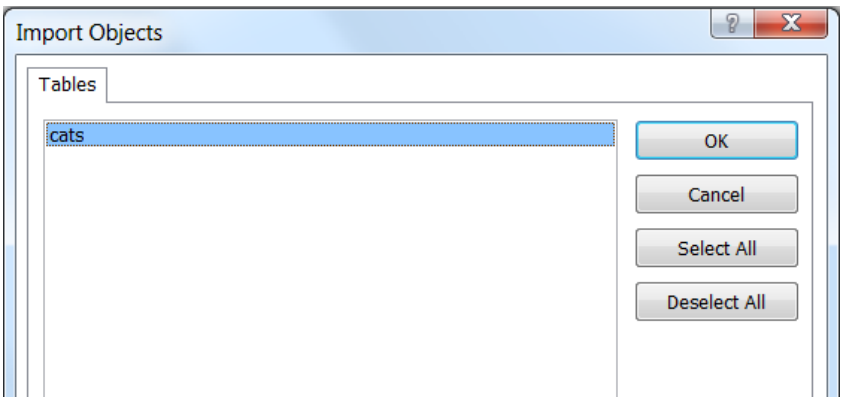
Figure 6.9 Select Data Source Dialog: Selecting an ODBC Database



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 (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



Notes

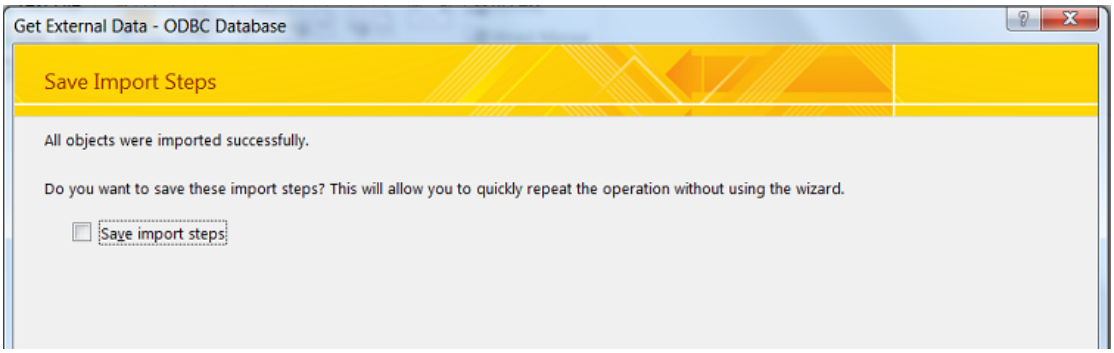
- If no tables show up for you to select, it might be because you did not choose the **Database** to connect to when you defined or logged in to

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



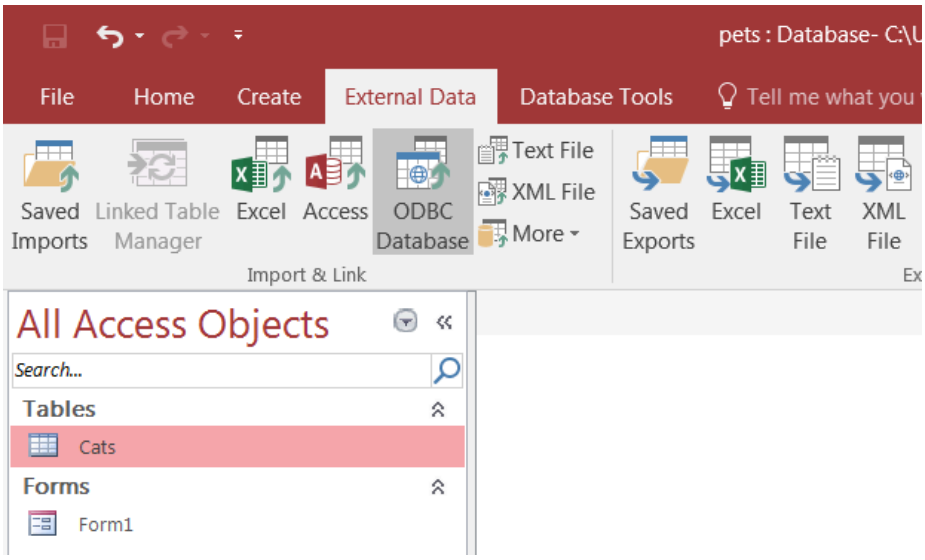
6.4.3 Using Microsoft Access as a Front-end to MySQL

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:

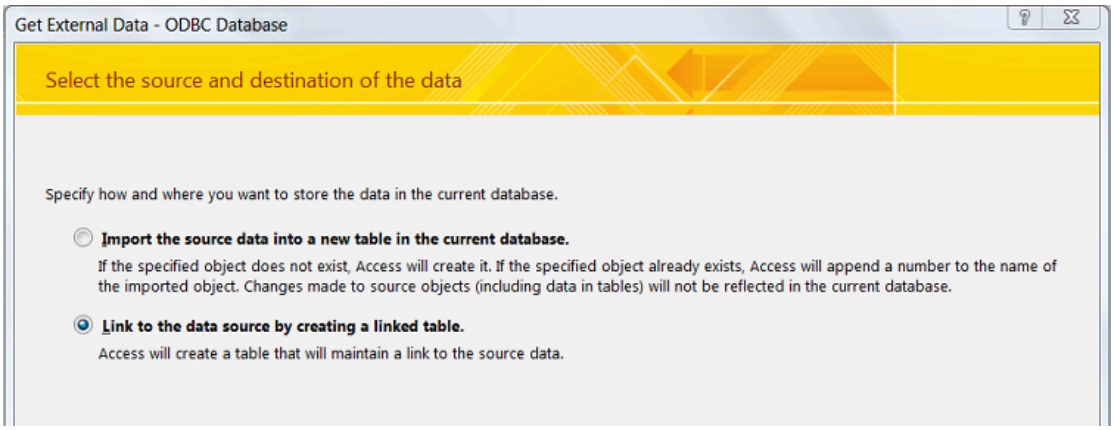
1. Open the Access database that you want to link to MySQL.
2. On the **External Data** tab, choose **ODBC Database**.

Figure 6.12 External Data: ODBC Database



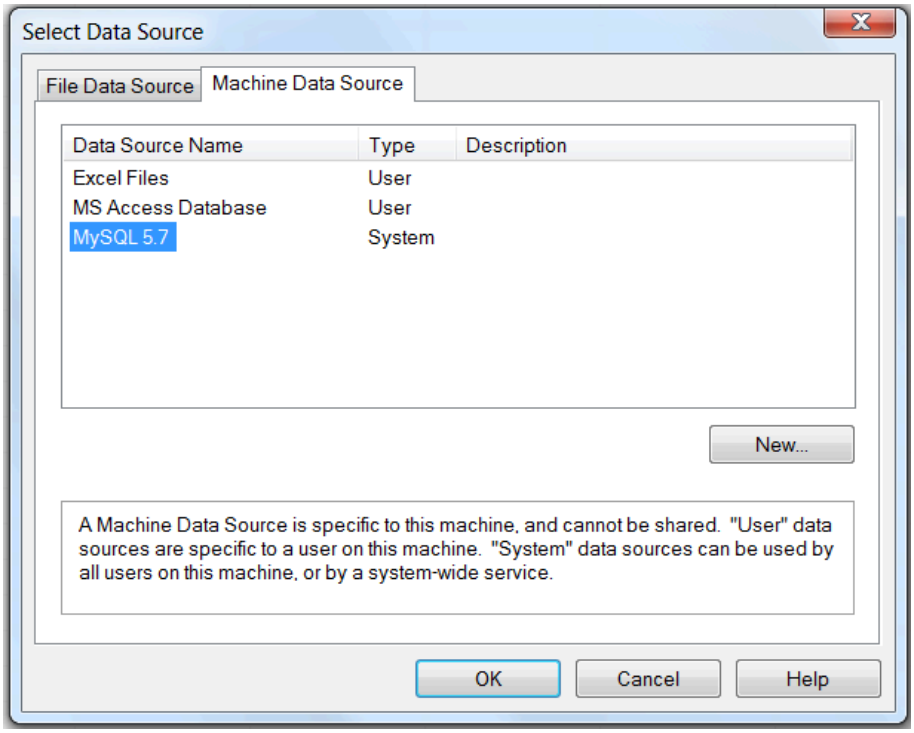
3. In the `Get External Data` dialog box that appears, choose **Link to the data source by creating a linked table** and click **OK**.

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.

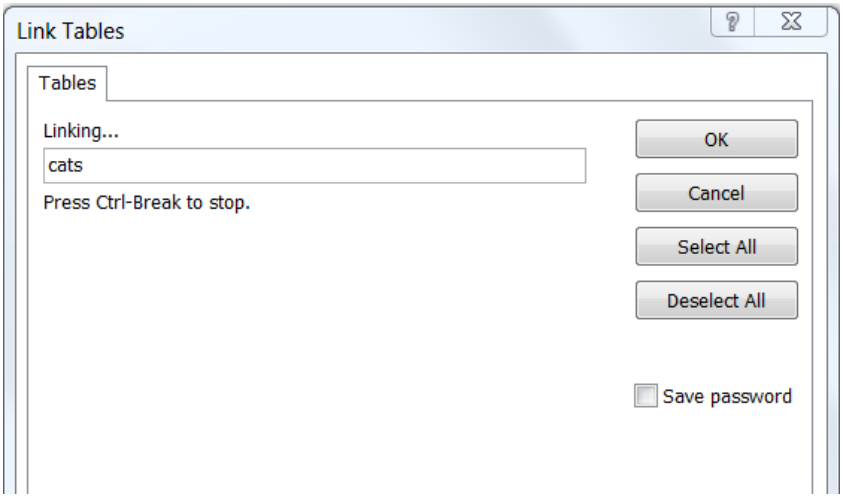
Figure 6.14 Selecting An ODBC Database



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

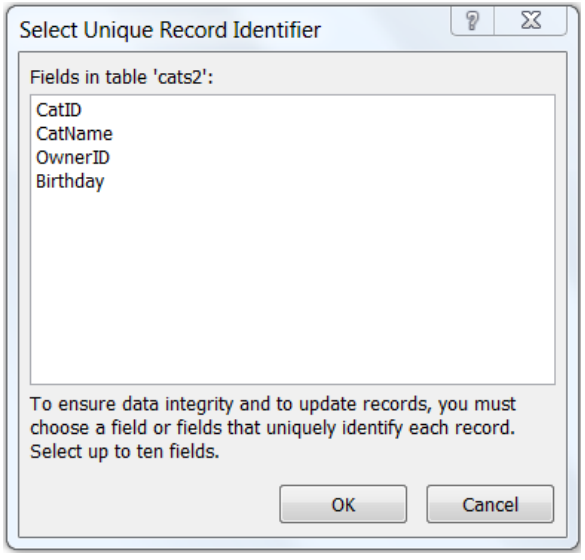


Notes

- 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



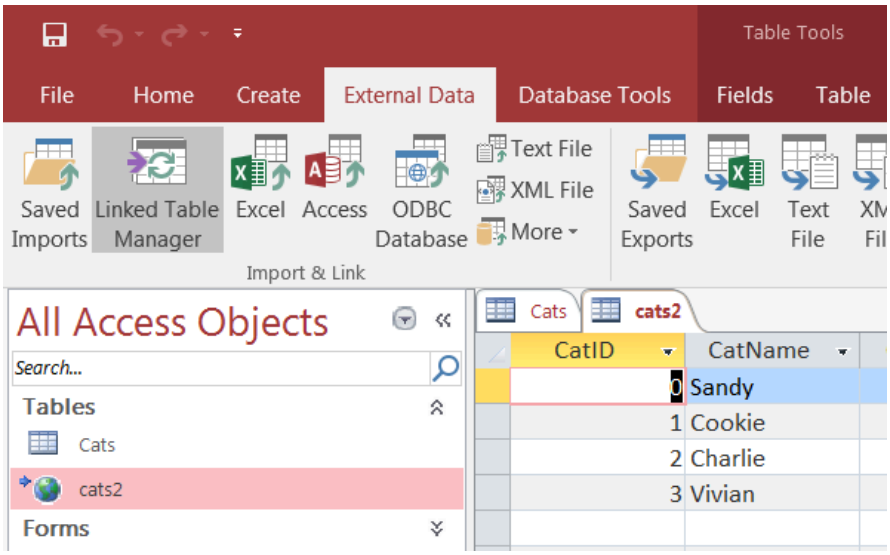
Once the process has been completed, you can build interfaces and queries to the linked tables just as you would for any Access database.

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:

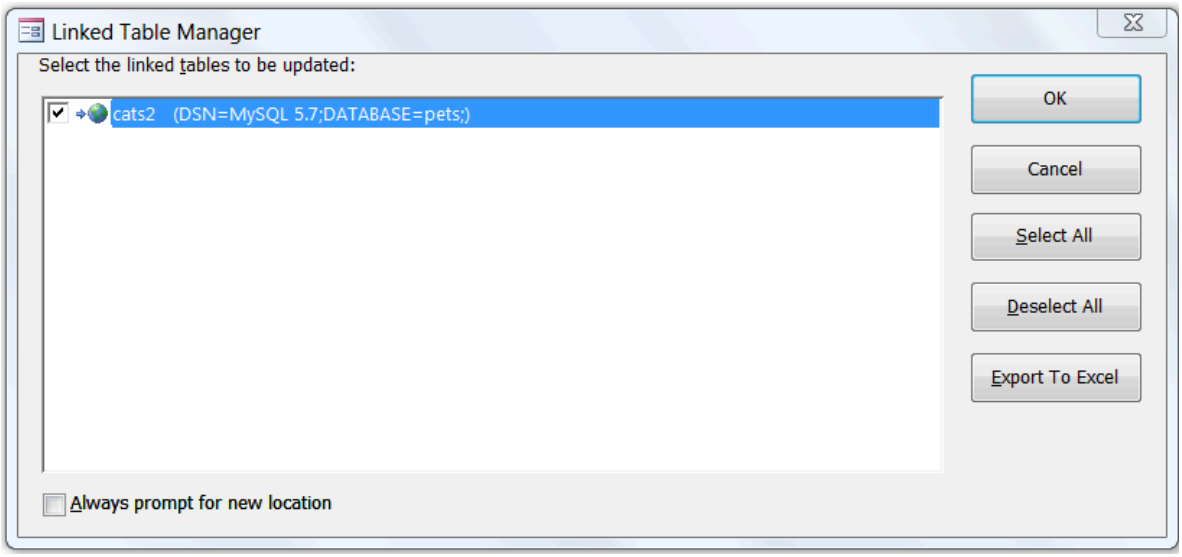
1. Open the database that contains links to MySQL tables.
2. On the **External Data** tab, choose **Linked Table Manager**.

   Figure 6.17 External Data: 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.

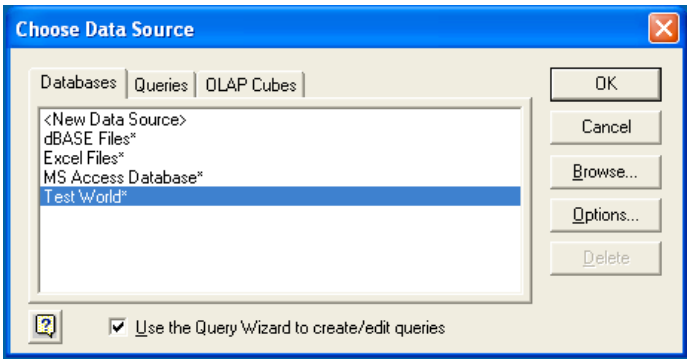
6.5 Using Connector/ODBC with Microsoft Word or Excel

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 though 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*:

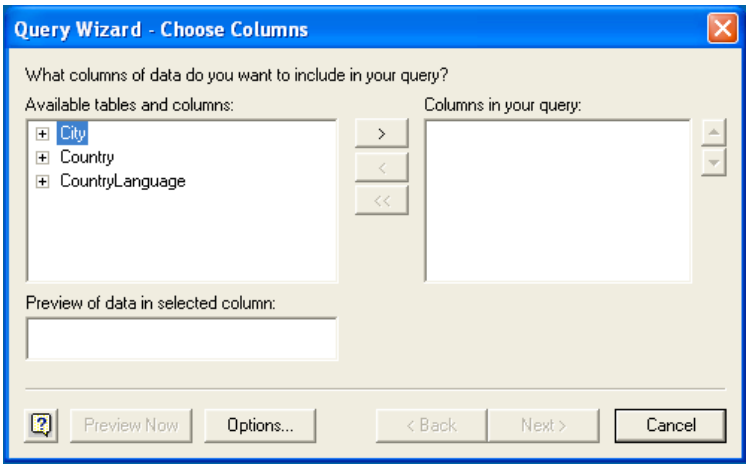
1. Create a new Worksheet.
2. From the `Data` menu, choose `Import External Data`, and then select `New Database Query`.
3. Microsoft Query will start. First, you need to choose the data source, by selecting an existing Data Source Name.

Figure 6.19 Microsoft Query Wizard: Choose Data Source Dialog



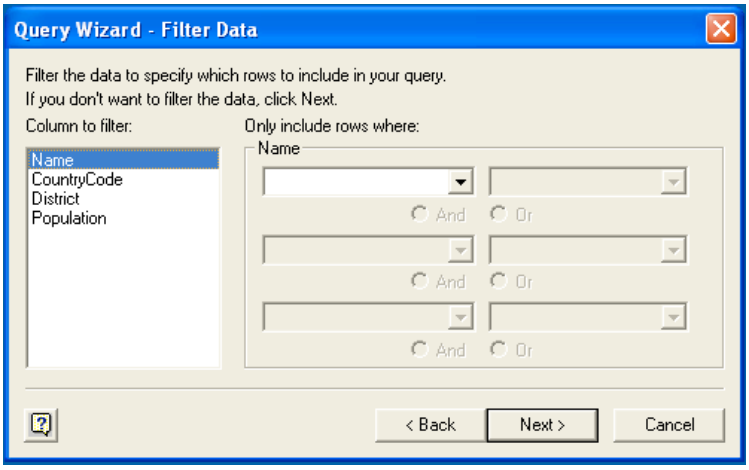
4. Within the `Query Wizard`, choose the columns to import. The list of tables available to the user configured through the DSN is shown on the left, the columns that will be added to your query are shown on the right. The columns you choose are equivalent to those in the first section of a `SELECT` query. Click **Next** to continue.

Figure 6.20 Microsoft Query Wizard: Choose Columns



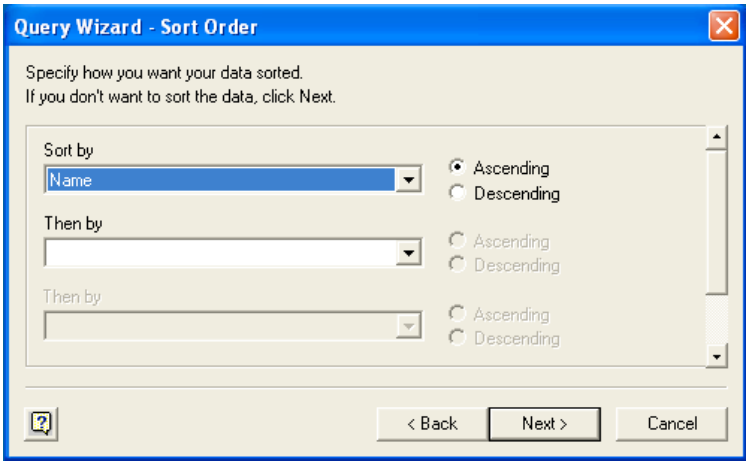
5. You can filter rows from the query (the equivalent of a `WHERE` clause) using the `Filter Data` dialog. Click **Next** to continue.

Figure 6.21 Microsoft Query Wizard: Filter Data



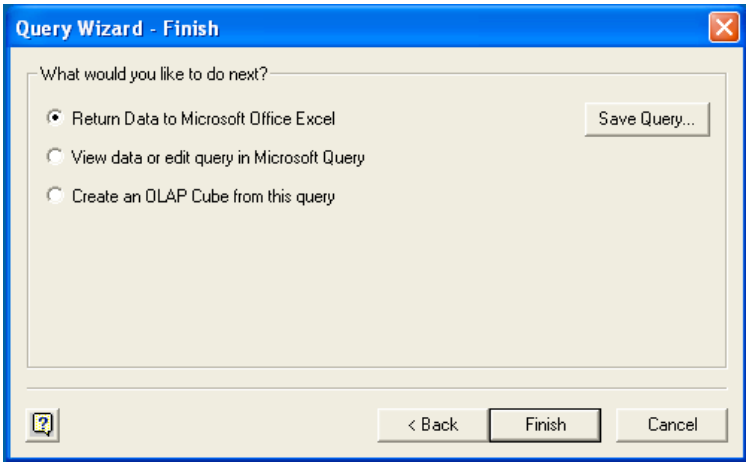
6. Select an (optional) sort order for the data. This is equivalent to using a `ORDER BY` clause in your SQL query. You can select up to three fields for sorting the information returned by the query. Click **Next** to continue.

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.

> **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.

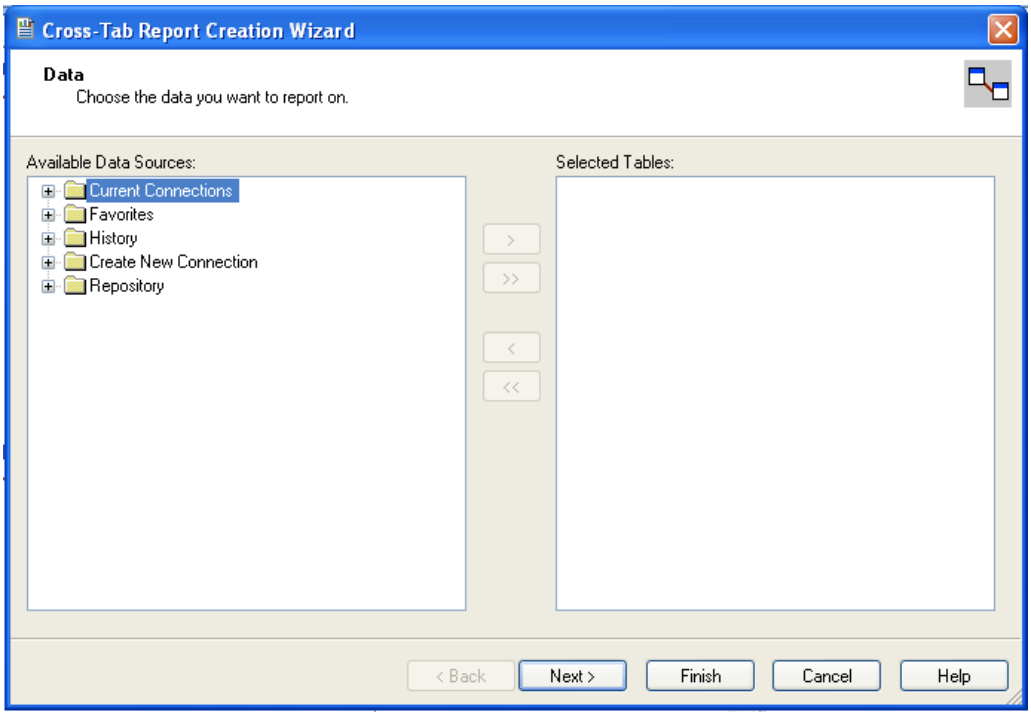
   For the purposes of this example, a DSN that provides a connection to an instance of the MySQL Sakila sample database has been created.

2. Open Crystal Reports and create a new project, or an 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.

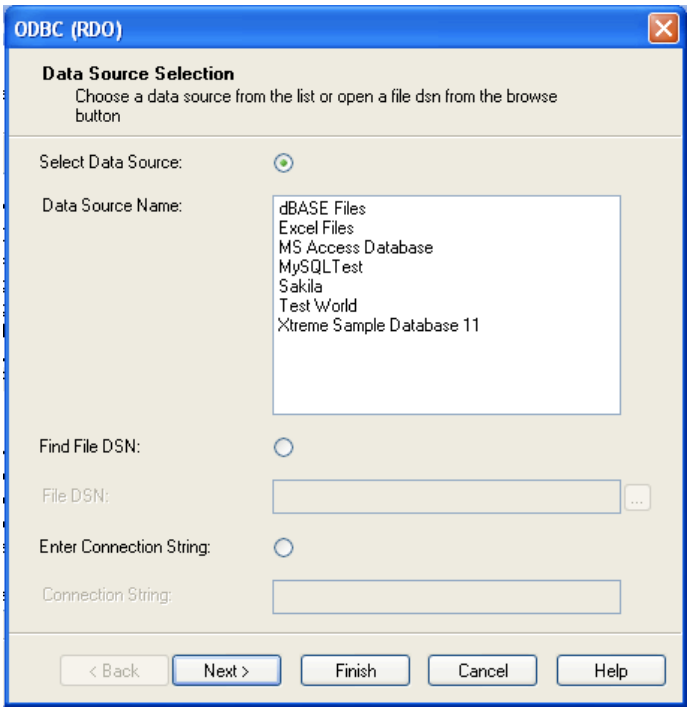
Figure 6.24 Cross-Tab Report Creation Wizard



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

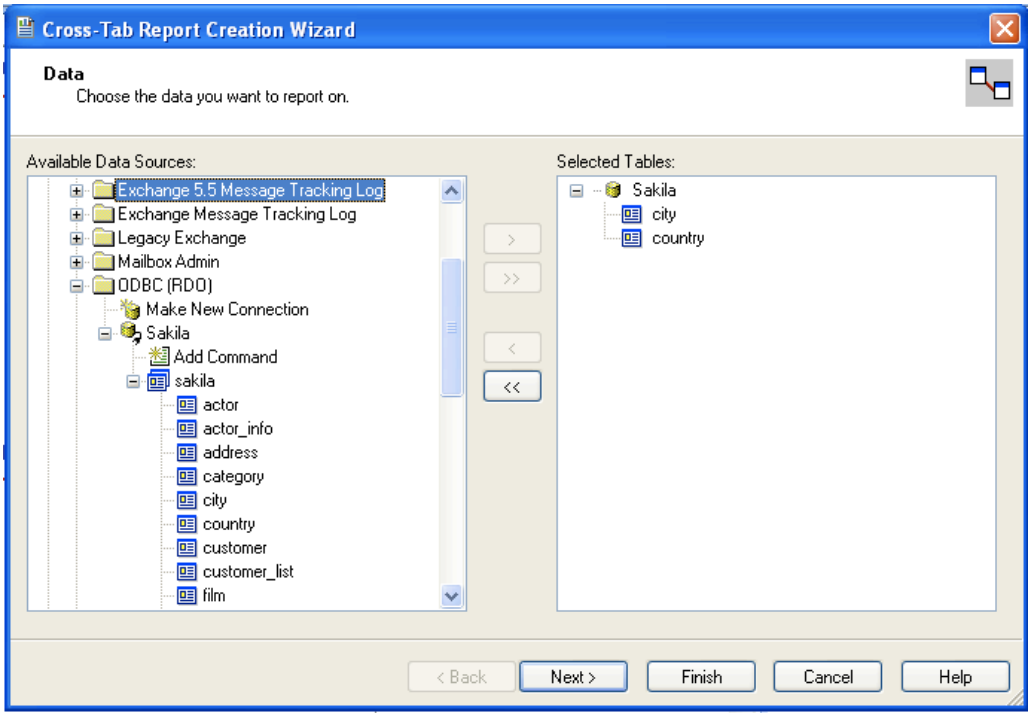


5. You will be returned the Cross-Tab Report Creation Wizard. You now need to select the database and tables that you want to include in your report. For our example, we will expand the selected Sakila database. Click the `city` table and use the **>** button to add the table to the report. Then repeat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

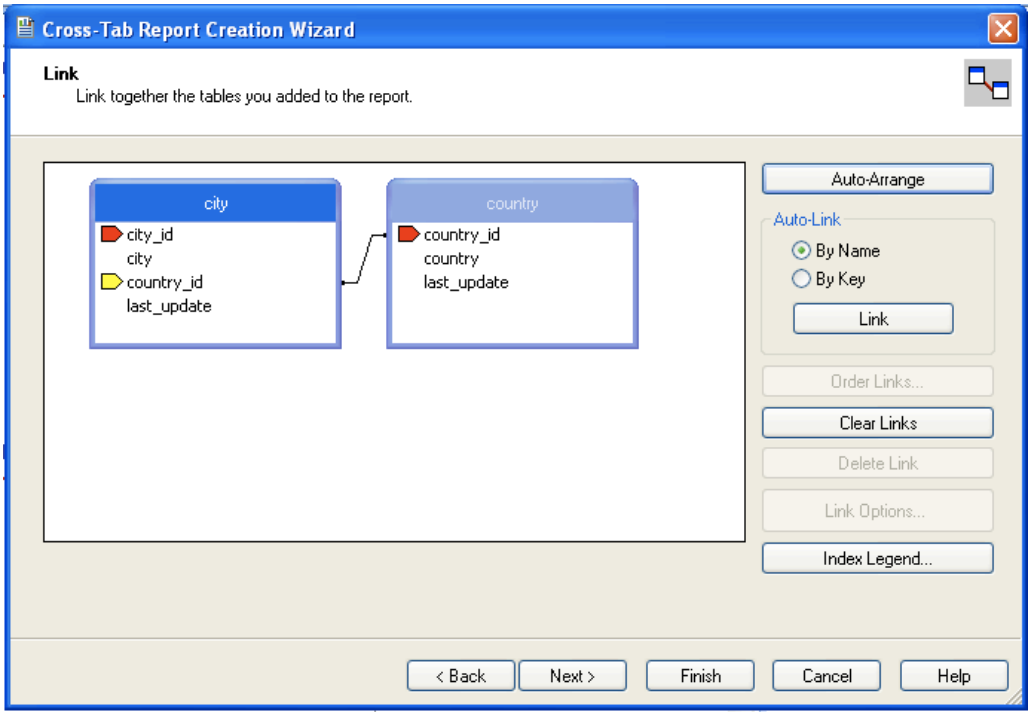


6. Crystal Reports will now read the table definitions and automatically identify the links between the tables. The identification of links between tables enables Crystal Reports to automatically lookup and summarize information based on all the tables in the database according to your query. If

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

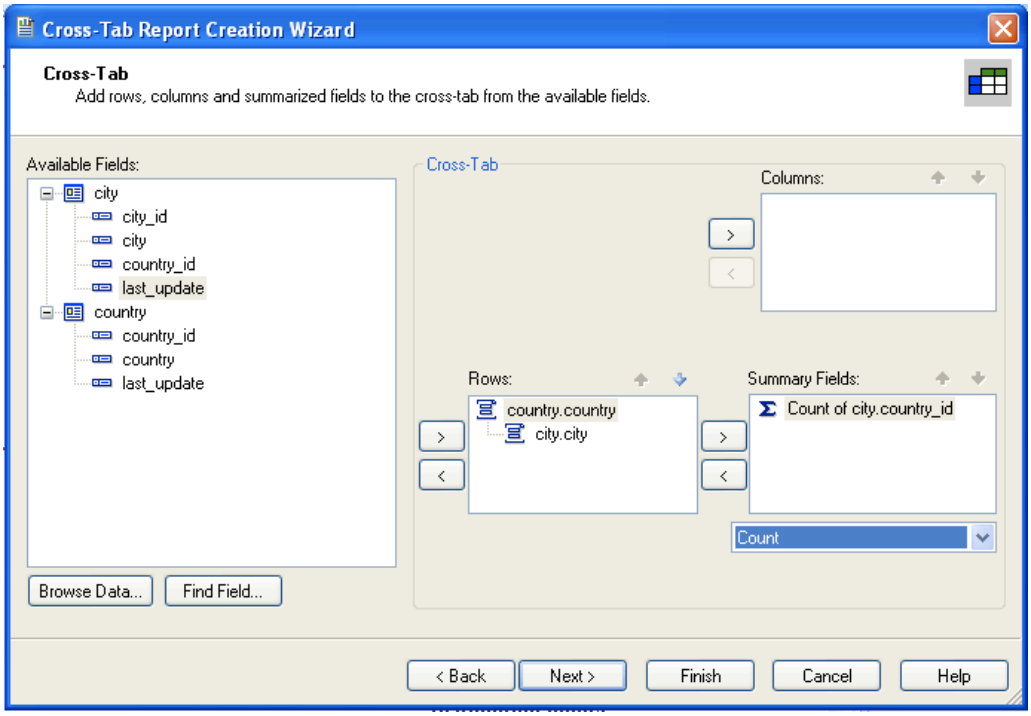


7. You can now select the columns and rows that to include within the Cross-Tab report. Drag and drop or use the **>** buttons to add fields to each area of the report. In the example shown, we will

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

		Total
Total		600
Afghanistan	Total	1
	Kabul	1
Algeria	Total	3
	Batna	1
	Bchar	1
	Skikda	1
American Samoa	Total	1
	Tafuna	1
Angola	Total	2
	Benguela	1
	Namibe	1
Anguilla	Total	1
	South Hill	1
Argentina	Total	13
	Almirante Brow	1

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`.

```
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 9.3 Unicode Driver};"_
& "SERVER=localhost;"_
& " DATABASE=test;"_
```

```
& "UID=venu;PWD=venu; FOUND_ROWS=1"

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.Value,
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"
rs.MoveNext
rs.MoveNext
rs.Delete
rs.Close

'fetch the updated table ..
rs.Open "SELECT * FROM my_ado", conn
Debug.Print rs.RecordCount
rs.MoveFirst
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 9.3 Unicode Driver
Set ws = DBEngine.CreateWorkspace("", "venu", "venu", dbUseODBC)
str = "odbc;DRIVER={MySQL ODBC 9.3 Unicode Driver};"_
& "SERVER=localhost;"_
& " DATABASE=test;"_
& "UID=venu;PWD=venu; FOUND_ROWS=1"
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

'rs update..
Set rs = conn.OpenRecordset("my_dao")
rs.Edit
rs!Name = "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`.

```
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 9.3 Unicode Driver};"_
& "SERVER=localhost;"_
& " DATABASE=test;"_
& "UID=venu;PWD=venu; FOUND_ROWS=1"

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

'insert - direct
SQL = "insert into my_rdo values (100,'venu')"
cn.Execute SQL, rdExecDirect

SQL = "insert into my_rdo values (200,'MySQL')"
cn.Execute SQL, rdExecDirect

'rs insert
SQL = "select * from my_rdo"
Set rs = cn.OpenResultset(SQL, rdOpenStatic, rdConcurRowVer, rdExecDirect)
rs.AddNew
rs!id = 300
rs!Name = "Insert1"
rs.Update
rs.Close

'rs insert
SQL = "select * from my_rdo"
Set rs = cn.OpenResultset(SQL, rdOpenStatic, rdConcurRowVer, rdExecDirect)
rs.AddNew
rs!id = 400
rs!Name = "Insert 2"
rs.Update
```

```
rs.Close

'rs update
SQL = "select * from my_rdo"
Set rs = cn.OpenResultset(SQL, rdOpenStatic, rdConcurRowVer, rdExecDirect)
rs.Edit
rs!id = 999
rs!Name = "updated"
rs.Update
rs.Close

'fetch back...
SQL = "select * from my_rdo"
Set rs = cn.OpenResultset(SQL, rdOpenStatic, rdConcurRowVer, rdExecDirect)
Do Until rs.EOF
For Each cl In rs.rdoColumns
Debug.Print cl.Value,
Next
rs.MoveNext
Debug.Print
Loop
Debug.Print "Row count="; rs.RowCount

'close
rs.Close
cn.Close

End Sub
```

6.7.2 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#.

```
/**
 * @sample    : mycon.cs
 * @purpose   : Demo sample for ODBC.NET using Connector/ODBC
 *
 **/

/* build command
 *
 *  csc /t:exe
 *      /out:mycon.exe mycon.cs
 *      /r:System.Data.Odbc.dll
 */

using Console = System.Console;
using System.Data.Odbc;

namespace myodbc3
{
  class mycon
  {
    static void Main(string[] args)
    {
      try
        {
          //Connection string for Connector/ODBC 9.3
          string MyConString = "DRIVER={MySQL ODBC 9.3 Unicode Driver};" +
            "SERVER=localhost;" +
            "DATABASE=test;" +
            "UID=venu;" +
            "PASSWORD=venu;" +
            "FOUND_ROWS=1";

          //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:" +
                          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())
          {
              Console.WriteLine("Data:" + MyDataReader.GetInt32(0) + " " +
                                MyDataReader.GetString(1) + " " +
                                MyDataReader.GetInt64(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:System.Data.Odbc.dll
'     /r:System.dll
'     /r:System.Data.dll
'

Imports System.Data.Odbc
Imports System

Module myvb
  Sub Main()
    Try
      Dim MyConString As String = "DRIVER={MySQL ODBC 9.3 Unicode Driver};" & _
      "SERVER=localhost;" & _
      "DATABASE=test;" & _
      "UID=venu;" & _
      "PASSWORD=venu;" & _
      "FOUND_ROWS=1;"

      '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(id) VALUES(30)"
    Console.WriteLine("INSERT, Total rows affected:" & _
                      MyCommand.ExecuteNonQuery())

    '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)

    'Catch program exception
  Catch MyException As Exception
    Console.WriteLine(MyException.ToString)
  End Try
End Sub
```

Chapter 7 Connector/ODBC Reference

Table of Contents

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.

For the complete ODBC API reference, please refer to the ODBC Programmer's Reference at http://msdn.microsoft.com/en-us/library/ms714177.aspx.

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

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

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

Function Name	Connector/ODBC Supports?	Standard	Purpose
`SQLDataSources`	No	ISO 92	Returns the list of available data sources, handled by the Driver Manager
`SQLDrivers`	No	ODBC	Returns the list of installed drivers and their attributes, handles by Driver Manager

Function Name	Connector/ODBC Supports?	Standard	Purpose
SQLGetInfo	Yes	ISO 92	Returns information about a specific driver and data source.
SQLGetFunctions	Yes	ISO 92	Returns supported driver functions.
SQLGetTypeInfo	Yes	ISO 92	Returns information about supported data types.

Table 7.3 ODBC API Calls for Setting and Retrieving Driver Attributes

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

Table 7.4 ODBC API Calls for Preparing SQL Requests

Function Name	Connector/ODBC Supports?	Standard	Purpose
SQLAllocStmt	Yes	Deprecated	Allocates a statement handle
SQLPrepare	Yes	ISO 92	Prepares an SQL statement for later execution.
SQLBindParameter	Yes	ODBC	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.)
SQLGetCursorName	Yes	ISO 92	Returns the cursor name associated with a statement handle.
SQLSetCursorName	Yes	ISO 92	Specifies a cursor name.
SQLSetScrollOptions	Yes	ODBC	Sets options that control cursor behavior.

Table 7.5 ODBC API Calls for Submitting Requests

Function Name	Connector/ODBC Supports?	Standard	Purpose
SQLExecute	Yes	ISO 92	Executes a prepared statement.
SQLExecDirect	Yes	ISO 92	Executes a statement
SQLNativeSql	Yes	ODBC	Returns the text of an SQL statement as translated by the driver.

Function Name	Connector/ODBC Supports?	Standard	Purpose
SQLDescribeParam	No	ODBC	Returns the description for a specific parameter in a statement. Not supported by Connector/ODBC—the returned results should not be trusted.
SQLNumParams	Yes	ISO 92	Returns the number of parameters in a statement.
SQLParamData	Yes	ISO 92	Used in conjunction with SQLPutData to supply parameter data at execution time. (Useful for long data values.)
SQLPutData	Yes	ISO 92	Sends part or all of a data value for a parameter. (Useful for long data values.)

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

Function Name	Connector/ODBC Supports?	Standard	Purpose
SQLRowCount	Yes	ISO 92	Returns the number of rows affected by an insert, update, or delete request.
SQLNumResultCols	Yes	ISO 92	Returns the number of columns in the result set.
SQLDescribeCol	Yes	ISO 92	Describes a column in the result set.
SQLColAttribute	Yes	ISO 92	Describes attributes of a column in the result set.
SQLColAttributes	Yes	Deprecated	Describes attributes of a column in the result set.
SQLFetch	Yes	ISO 92	Returns multiple result rows.
SQLFetchScroll	Yes	ISO 92	Returns scrollable result rows.
SQLExtendedFetch	Yes	Deprecated	Returns scrollable result rows.
SQLSetPos	Yes	ODBC	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.
SQLBulkOperations	Yes	ODBC	Performs bulk insertions and bulk bookmark operations, including update, delete, and fetch by bookmark.

Table 7.7 ODBC API Calls for Retrieving Error or Diagnostic Information

Function Name	Connector/ODBC Supports?	Standard	Purpose
SQLError	Yes	Deprecated	Returns additional error or status information
SQLGetDiagField	Yes	ISO 92	Returns additional diagnostic information (a single field of the diagnostic data structure).
SQLGetDiagRec	Yes	ISO 92	Returns additional diagnostic information (multiple fields of the diagnostic data structure).

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

Function Name	Connector/ODBC Supports?	Standard	Purpose
SQLColumnPrivileges	Yes	ODBC	Returns a list of columns and associated privileges for one or more tables.

Function Name	Connector/ODBC Supports?	Standard	Purpose
SQLColumns	Yes	X/Open	Returns the list of column names in specified tables.
SQLForeignKeys	Yes	ODBC	Returns a list of column names that make up foreign keys, if they exist for a specified table.
SQLPrimaryKeys	Yes	ODBC	Returns the list of column names that make up the primary key for a table.
SQLSpecialColumns	Yes	X/Open	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.
SQLStatistics	Yes	ISO 92	Returns statistics about a single table and the list of indexes associated with the table.
SQLTablePrivileges	Yes	ODBC	Returns a list of tables and the privileges associated with each table.
SQLTables	Yes	X/Open	Returns the list of table names stored in a specific data source.

Table 7.9 ODBC API Calls for Performing Transactions

Function Name	Connector/ODBC Supports?	Standard	Purpose
SQLTransact	Yes	Deprecated	Commits or rolls back a transaction
SQLEndTran	Yes	ISO 92	Commits or rolls back a transaction.

Table 7.10 ODBC API Calls for Terminating a Statement

Function Name	Connector/ODBC Supports?	Standard	Purpose
SQLFreeStmt	Yes	ISO 92	Ends statement processing, discards pending results, and, optionally, frees all resources associated with the statement handle.
SQLCloseCursor	Yes	ISO 92	Closes a cursor that has been opened on a statement handle.
SQLCancel	Yes	ISO 92	Cancels an SQL statement.

Table 7.11 ODBC API Calls for Terminating a Connection

Function Name	Connector/ODBC Supports?	Standard	Purpose
SQLDisconnect	Yes	ISO 92	Closes the connection.
SQLFreeHandle	Yes	ISO 92	Releases an environment, connection, statement, or descriptor handle.
SQLFreeConnect	Yes	Deprecated	Releases connection handle.
SQLFreeEnv	Yes	Deprecated	Releases an environment handle.

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

Native Value	SQL Type	C Type
bigint unsigned	SQL_BIGINT	SQL_C_UBIGINT
bigint	SQL_BIGINT	SQL_C_SBIGINT
bit	SQL_BIT	SQL_C_BIT
bit	SQL_CHAR	SQL_C_CHAR
blob	SQL_LONGVARBINARY	SQL_C_BINARY
bool	SQL_CHAR	SQL_C_CHAR
char	SQL_CHAR	SQL_C_CHAR
date	SQL_DATE	SQL_C_DATE
datetime	SQL_TIMESTAMP	SQL_C_TIMESTAMP
decimal	SQL_DECIMAL	SQL_C_CHAR
double precision	SQL_DOUBLE	SQL_C_DOUBLE
double	SQL_FLOAT	SQL_C_DOUBLE
enum	SQL_VARCHAR	SQL_C_CHAR
float	SQL_REAL	SQL_C_FLOAT
int unsigned	SQL_INTEGER	SQL_C_ULONG
int	SQL_INTEGER	SQL_C_SLONG
integer unsigned	SQL_INTEGER	SQL_C_ULONG
integer	SQL_INTEGER	SQL_C_SLONG
long varbinary	SQL_LONGVARBINARY	SQL_C_BINARY
long varchar	SQL_LONGVARCHAR	SQL_C_CHAR
longblob	SQL_LONGVARBINARY	SQL_C_BINARY
longtext	SQL_LONGVARCHAR	SQL_C_CHAR
mediumblob	SQL_LONGVARBINARY	SQL_C_BINARY
mediumint unsigned	SQL_INTEGER	SQL_C_ULONG
mediumint	SQL_INTEGER	SQL_C_SLONG
mediumtext	SQL_LONGVARCHAR	SQL_C_CHAR
numeric	SQL_NUMERIC	SQL_C_CHAR
real	SQL_FLOAT	SQL_C_DOUBLE
set	SQL_VARCHAR	SQL_C_CHAR
smallint unsigned	SQL_SMALLINT	SQL_C_USHORT
smallint	SQL_SMALLINT	SQL_C_SSHORT
text	SQL_LONGVARCHAR	SQL_C_CHAR
time	SQL_TIME	SQL_C_TIME
timestamp	SQL_TIMESTAMP	SQL_C_TIMESTAMP
tinyblob	SQL_LONGVARBINARY	SQL_C_BINARY
tinyint unsigned	SQL_TINYINT	SQL_C_UTINYINT

Native Value	SQL Type	C Type
tinyint	SQL_TINYINT	SQL_C_STINYINT
tinytext	SQL_LONGVARCHAR	SQL_C_CHAR
varchar	SQL_VARCHAR	SQL_C_CHAR
year	SQL_SMALLINT	SQL_C_SHORT

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

Native Code	SQLSTATE 2	SQLSTATE 3	Error Message
500	01000	01000	General warning
501	01004	01004	String data, right truncated
502	01S02	01S02	Option value changed
503	01S03	01S03	No rows updated/deleted
504	01S04	01S04	More than one row updated/deleted
505	01S06	01S06	Attempt to fetch before the result set returned the first row set
506	07001	07002	SQLBindParameter not used for all parameters
507	07005	07005	Prepared statement not a cursor-specification
508	07009	07009	Invalid descriptor index
509	08002	08002	Connection name in use
510	08003	08003	Connection does not exist
511	24000	24000	Invalid cursor state
512	25000	25000	Invalid transaction state
513	25S01	25S01	Transaction state unknown
514	34000	34000	Invalid cursor name
515	S1000	HY000	General driver defined error
516	S1001	HY001	Memory allocation error
517	S1002	HY002	Invalid column number
518	S1003	HY003	Invalid application buffer type
519	S1004	HY004	Invalid SQL data type
520	S1009	HY009	Invalid use of null pointer
521	S1010	HY010	Function sequence error
522	S1011	HY011	Attribute can not be set now
523	S1012	HY012	Invalid transaction operation code
524	S1013	HY013	Memory management error
525	S1015	HY015	No cursor name available
526	S1024	HY024	Invalid attribute value
527	S1090	HY090	Invalid string or buffer length
528	S1091	HY091	Invalid descriptor field identifier
529	S1092	HY092	Invalid attribute/option identifier

Native Code	SQLSTATE 2	SQLSTATE 3	Error Message
530	S1093	HY093	Invalid parameter number
531	S1095	HY095	Function type out of range
532	S1106	HY106	Fetch type out of range
533	S1117	HY117	Row value out of range
534	S1109	HY109	Invalid cursor position
535	S1C00	HYC00	Optional feature not implemented
0	21S01	21S01	Column count does not match value count
0	23000	23000	Integrity constraint violation
0	42000	42000	Syntax error or access violation
0	42S02	42S02	Base table or view not found
0	42S12	42S12	Index not found
0	42S21	42S21	Column already exists
0	42S22	42S22	Column not found
0	08S01	08S01	Communication link failure

Chapter 8 Connector/ODBC Notes and Tips

Table of Contents

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;
```

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 MySQL refers to as 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 a MySQL Database. This would suggest that CATALOG equals a SCHEMA, which is incorrect, but in the 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, which is why both the NO_CATALOG and NO_SCHEMA options exist: to cover all these expectations and allow one to disable interpreting ODBC function parameters as CATALOG or SCHEMA explicitly.

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

NO_CATALOG	NO_SCHEMA	Description and notes
`true`	`true`	Driver does not support catalogs nor schemas.
`false`	`true`	Catalogs are supported and interpreted as MySQL database names, specifying schema triggers an error.
`true`	`false`	Schemas are supported and interpreted as MySQL database names, specifying catalog triggers an error.
`false`	`false`	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.

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 5.10, “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

For more information on how to set the query timeout on Microsoft Windows when executing queries through an ODBC connection, read the Microsoft knowledgebase document at https://docs.microsoft.com/en-us/office/client-developer/access/desktop-database-reference/database-querytimeout-property-dao.

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:

```
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.

To find the number of rows affected by a specific SQL statement in ADO, use the `RecordsAffected` property in the ADO execute method. For more information on the usage of execute method, refer to http://msdn.microsoft.com/library/default.asp?url=/library/en-us/ado270/htm/mdmthcnnexecute.asp.

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

A Frequently Asked Questions list for ASP can be found at http://support.microsoft.com/default.aspx?scid=/Support/ActiveServer/faq/data/adofaq.asp.

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.
- Enabled 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):

```
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;

Memo1.Lines.Add('DATABASE NAME=');
Memo1.Lines.Add('USER NAME=');
Memo1.Lines.Add('ODBC DSN=DocumentsFab');
Memo1.Lines.Add('OPEN MODE=READ/WRITE');
Memo1.Lines.Add('BATCH COUNT=200');
Memo1.Lines.Add('LANGDRIVER=');
Memo1.Lines.Add('MAX ROWS=-1');
Memo1.Lines.Add('SCHEMA CACHE DIR=');
Memo1.Lines.Add('SCHEMA CACHE SIZE=8');
Memo1.Lines.Add('SCHEMA CACHE TIME=-1');
Memo1.Lines.Add('SQLPASSTHRU MODE=SHARED AUTOCOMMIT');
Memo1.Lines.Add('SQLQRYMODE=');
Memo1.Lines.Add('ENABLE SCHEMA CACHE=FALSE');
Memo1.Lines.Add('ENABLE BCD=FALSE');
Memo1.Lines.Add('ROWSET SIZE=20');
Memo1.Lines.Add('BLOBS TO CACHE=64');
Memo1.Lines.Add('BLOB SIZE=32');

AliasEditor.Add('DocumentsFab','MySQL',Memo1.Lines);
```

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 `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.
- Verify that the tables you are updating use a transactional database engine.
- 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 https://www.microsoft.com/en-in/download/details.aspx?id=21995. 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.
- 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

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 5.10, “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:

```
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:

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

Would become:

```
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.

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 5.10, “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.

9.3 Connector/ODBC Version History

This section highlights substantial changes per major Connector/ODBC release series, especially useful when updating legacy code. The connector release model changed after version 8.0, and now releases one version. The latest Connector/ODBC version supports all active MySQL Server versions.

Information about each Connector/ODBC version; for release notes, see the Connector/ODBC release notes.

- Connector/ODBC 8.x: 8.1.0 is the first GA release version that supersedes the 8.0 series. MySQL connector releases use the latest Innovation release number. For example, when MySQL Server released versions 5.7.43, 8.0.34, and 8.1.0, this connector released connector version (8.1.0) that connects to all three MySQL Server versions.

  This is the first series without 32-bit support, which ended for all MySQL products.

- Connector/ODBC 8.0: added MySQL Server 8.0 support, including caching_sha2_password and the related GET_SERVER_PUBLIC_KEY connection attribute.

  > **Note**
  >
  > As of 8.0.35, 32-bit Connector/ODBC builds exist for Windows. The 8.0 series no longer includes new functionality but it does contain bug fixes. You're encouraged to use the latest Connector/ODBC version and not the 8.0 series if you do not need 32-bit builds.

- 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.

  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.