FileMaker® 14

ODBC and JDBC Guide

Contents

Chapter 1
Introduction

This guide describes how you can use FileMaker® software as an ODBC client application and as a data source for Open Database Connectivity (ODBC) and Java Database Connectivity (JDBC) applications.

The following table gives an overview of how to use ODBC and JDBC with FileMaker software.

What do you want to do?	How do you do it?	Product	See
- Use FileMaker software as an ODBC client application. - Access ODBC data stored in an external SQL data source.	1. Interactively via the relationships graph 2. One-time, static via ODBC import or **File** menu > **Open**. Also, the Import Records script step, the Execute SQL script step, and the ExecuteSQL function	- FileMaker Pro - FileMaker Pro Advanced - FileMaker Server	- This guide, chapter 2. - FileMaker Pro Help
- Use a FileMaker database as a data source. - Share FileMaker Pro data with a third-party ODBC client application.	1. ODBC and JDBC 2. SQL queries	- FileMaker Pro - FileMaker Pro Advanced - FileMaker Server	- This guide, chapters 3 to 6. - *FileMaker SQL Reference*

About this guide

- This guide assumes that you are familiar with the basics of using ODBC and JDBC, and constructing SQL queries. *FileMaker SQL Reference* describes the SQL statements and standards supported by FileMaker. Refer to a third-party book for more general information on constructing SQL queries.

- This guide uses "FileMaker Pro" to refer to both FileMaker Pro and FileMaker Pro Advanced, unless describing specific FileMaker Pro Advanced features.

Where to find FileMaker documentation

- In FileMaker Pro, choose **Help** menu > **Product Documentation**.

- In FileMaker Server Admin Console, choose **Help** menu > **FileMaker Server Product Documentation**.

- To learn about, view, or download additional FileMaker documentation, visit http://www.filemaker.com/documentation.

About ODBC and JDBC

ODBC and JDBC are application programming interfaces (APIs). ODBC is an API for applications written in the C language, and JDBC is a similar API for the Java language. These APIs give client applications a common language for interacting with a variety of data sources and database services, including FileMaker Pro and FileMaker Server.

All applications that support ODBC and JDBC recognize a basic subset of SQL (Structured Query Language) statements. Working with SQL, you can use other applications (such as spreadsheets, word processors, and reporting tools) to view, analyze, and modify data.

Using ODBC or JDBC APIs, a *client application* communicates with a *driver manager* that identifies the *client driver* to communicate with a *data source*.

FileMaker software can act either as a client application or as a data source.

Using FileMaker software as an ODBC client application

As an ODBC client application, FileMaker software can access data in external SQL data sources. FileMaker software connects to the external SQL data source using the client driver for the ODBC data source, and either imports ODBC data or works with ODBC tables in the relationships graph.

Importing ODBC data

You can import ODBC data in either of these ways:

- from the File menu, by specifying an ODBC data source and entering SQL statements in the FileMaker Pro SQL Query builder dialog box

- by creating a FileMaker script that uses the Import Records script step, the Execute SQL script step, or the ExecuteSQL function

For either of these methods, you enter the SQL statements yourself, so you need to know the supported SQL statements and their syntax for your ODBC data source. And because you write the SQL statements, you can import ODBC data from any ODBC data source. For more information on SQL statements and syntax supported by FileMaker, see *FileMaker SQL Reference.*

Adding ODBC tables to the relationships graph

When you add an ODBC table to the relationships graph, you can connect to and work with data in external SQL data sources in much the same way that you work with data in the current, active FileMaker database file. For example, you can:

- create tables in the relationships graph for ODBC data sources

- add supplemental fields to ODBC tables to perform unstored calculations or to summarize data in the ODBC tables

- add, change, and delete external data interactively

- create relationships between fields in FileMaker tables and fields (also called "columns") in ODBC tables

Because FileMaker Pro generates the SQL statements used to communicate with an ODBC table that has been added to the relationships graph, you are limited to the specific Oracle, SQL Server, and MySQL data sources that FileMaker Pro supports in the relationships graph.

Note You cannot modify the schema of external ODBC data sources using FileMaker Pro.

Chapter 2, "Accessing external SQL data sources," describes how to use FileMaker software as an ODBC client application.

Using a FileMaker database as a data source

As a data source, FileMaker data is shared with ODBC- and JDBC-compliant applications. The application connects to the FileMaker data source using the FileMaker client driver, constructs and executes the SQL queries using ODBC or JDBC, and processes the data retrieved from the FileMaker database solution.

Accessing a hosted FileMaker Pro database

With either FileMaker Server or FileMaker Pro, you can host a FileMaker database file as a data source, sharing your data with other applications using ODBC and JDBC. The following table describes what each FileMaker product allows.

This FileMaker product	Allows
FileMaker Server	Unlimited connections and supports local access (same computer) and remote access (both for middleware such as web servers, and for remote client access from desktop productivity applications).
FileMaker Pro	Up to five connections and supports local access (same computer) only.

If your FileMaker database solution uses more than one FileMaker database file, all of the database files must be on the same computer.

To access a hosted FileMaker database file, you need to install the corresponding ODBC or JDBC client driver. Install the client driver on the machine where the third-party application is installed.

This guide documents how the ODBC and JDBC client drivers, when used with FileMaker Pro and FileMaker Server, support the industry standards for ODBC and JDBC.

- Chapter 3, "Installing FileMaker ODBC client drivers," explains how to install the driver files needed for accessing a FileMaker data source using ODBC.

- Chapter 4, "Using ODBC to share FileMaker data," describes how to use the FileMaker ODBC client driver to connect to a FileMaker data source from another application.

- Chapter 5, "Installing FileMaker JDBC client drivers," explains how to install the driver files needed for accessing a FileMaker data source using JDBC.

- Chapter 6, "Using JDBC to share FileMaker data," describes how to use the FileMaker JDBC client driver with a Java application or applet that connects to a FileMaker data source.

- Chapter 7, "Reference information," describes mapping FileMaker fields to ODBC and JDBC data types.

To learn about the SQL statements supported by ODBC and JDBC client drivers when used with FileMaker Pro and FileMaker Server, see *FileMaker SQL Reference*.

Important   If you disable ODBC/JDBC sharing after it has already been on, a data source hosted by FileMaker Server or FileMaker Pro immediately becomes unavailable. The database administrator doesn't have the capability to alert ODBC and JDBC client applications about the data source's availability (the administrator can communicate only with FileMaker database file clients). No errors are reported, and the client application should notify users that the data source is not available and transactions cannot be completed. If a client application attempts to connect to an unavailable FileMaker database file, a message explains that the connection failed.

Limitations with third-party tools

Microsoft Access: When using Microsoft Access to view data in a FileMaker data source, do not use data from a summary field. The summary field's data should not be edited in Microsoft Access, and the data value that is displayed in Microsoft Access may not be accurate.

Networking requirements

You need a TCP/IP network when using FileMaker Server to host a FileMaker database file as a data source over a network. FileMaker Pro supports local access (same computer) only.

Updating files from previous versions

Installing current drivers

If you installed a driver from earlier versions of FileMaker Pro or FileMaker Server, you must install the driver for version 14.

The driver for FileMaker version 14 is not compatible with earlier versions of FileMaker Pro or FileMaker Server.

For more information on installing drivers, see chapter 3, "Installing FileMaker ODBC client drivers," and chapter 5, "Installing FileMaker JDBC client drivers."

Notes

- You have to create a Data Source Name (DSN) for each FileMaker database file you want to access as a data source. If you have previously set up access through one DSN that allows tables to be spread among several FileMaker database files, you'll need to consolidate those tables into a single database file (or create several DSNs).

- For information on using ODBC and JDBC with previous versions of FileMaker Pro, see http://www.filemaker.com/documentation.

Chapter 2
Accessing external SQL data sources

As an ODBC client application, FileMaker software can access data in external SQL data sources. FileMaker software connects to the external SQL data source using the client driver for the ODBC data source, and either imports ODBC data or works with ODBC tables in the relationships graph.

Whether you are importing ODBC data or working with ODBC tables in the relationships graph, you must configure a driver for the ODBC data source you're using. For example, to access records from an Oracle database, you configure an Oracle client driver.

Importing ODBC data

When you import ODBC data, you need an ODBC client driver for the external SQL data source configured on the client machine.
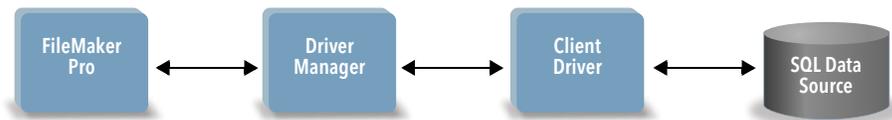
After configuring an ODBC client driver, you can interact with records, import records into an existing FileMaker Pro database file, or create a new FileMaker Pro database file from an ODBC data source (such as Oracle or Microsoft Access databases).

First, you access the data source you want to import from. Then you construct a query for the records you want to import from the data source. Finally, if you're importing data into an existing file, you map fields from your data source to fields in your FileMaker Pro database file.

You can access your ODBC data source through the File menu, with the Import Records script step, with the Execute SQL script step, or with the ExecuteSQL function.

To import ODBC data, follow this general process:

1. Install and configure specific ODBC drivers for the external data sources you want to access.

2. On the computer that hosts the current FileMaker Pro file, define a system Data Source Name (DSN) for each ODBC data source you want to access.

3. Determine any additional considerations for the ODBC data sources you want to access (for example, whether users are prompted for a user name and password).

4. In FileMaker Pro, do one of the following:

- To import into an existing FileMaker Pro file, choose **File** menu > **Import Records** > **ODBC Data Source**.

- To create a FileMaker Pro file from the data source records, choose **File** menu > **Open**. In the Open dialog box, choose **ODBC Data Source** for **Files of type** (Windows) or **Show** (OS X).

5. Choose your data source, enter the user name and password (if any), and click **OK** to open the FileMaker Pro SQL Query builder dialog box.

6. Using the FileMaker Pro SQL Query builder dialog box, you can construct a query. Select the table from which you want to import, and then select specific columns you want to use in your SQL query. Use the WHERE tab to construct search criteria and the ORDER BY tab to specify a sort order.

You can also type an SQL statement directly into the SQL Query builder dialog box.

You can execute the query immediately, or you can use the Import Records script step, the Execute SQL script step, or the ExecuteSQL function to execute a query as part of a FileMaker script.

Note   ODBC import, the Execute SQL script step, and external SQL data sources are not supported in runtime solutions created with FileMaker Pro Advanced.

See FileMaker Pro Help for more information on importing data, using the SQL Query builder dialog box, and creating FileMaker scripts. For information on SQL statements and syntax supported by FileMaker, see *FileMaker SQL Reference.*

Executing SQL to interact with data sources via ODBC

In addition to importing data into a FileMaker Pro database file via ODBC, you can also interact with data sources using SQL statements through the Execute SQL script step and the ExecuteSQL function. The Execute SQL script step may use any SQL statement supported by the data source, such as `INSERT`, `UPDATE`, and `DELETE`.   The ExecuteSQL function supports only the `SELECT` statement.

You can also use SQL statements that go beyond simply importing data into a FileMaker Pro database file. For example, you could execute SQL statements that add records to a database table in SQL Server, using information from a FileMaker Pro database file.

See FileMaker Pro Help for more information on creating FileMaker scripts that use the Execute SQL script step and the ExecuteSQL function. For information on SQL statements and syntax supported by FileMaker, see *FileMaker SQL Reference.*

Working with ODBC tables in the relationships graph

When you add an ODBC table to the relationships graph, you can connect to and work with data in external SQL data sources in much the same way that you work with data in the current, active FileMaker database file.

When you use FileMaker Pro or FileMaker Server as the host for a solution that includes ODBC tables in the relationships graph, you configure the ODBC client driver for the external SQL data source on the host machine.
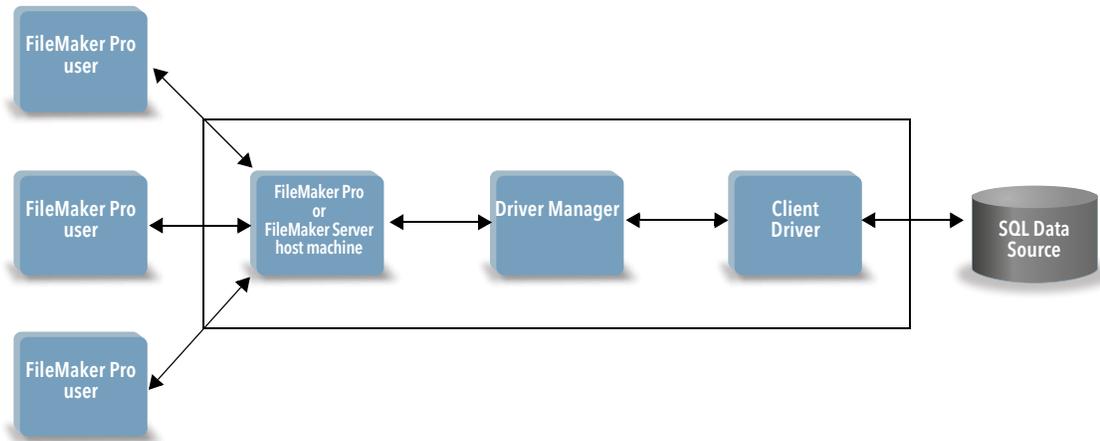
Data sources supported in FileMaker 14

As an ODBC client application, FileMaker supports the following external SQL data sources as ODBC tables in the relationships graph:

- Oracle
- Microsoft SQL Server
- MySQL Community Edition (free)

For information about the supported versions of these ODBC data sources, search the FileMaker Knowledge Base available at http://help.filemaker.com.

Adding ODBC tables to the relationships graph

To set up a FileMaker Pro database to access data in supported ODBC data sources:

1. Install and configure specific ODBC drivers for the external data sources you want to access.

2. On the computer that hosts the current FileMaker Pro file, define a system Data Source Name (DSN) for each ODBC data source you want to access.

3. Determine any additional considerations for ODBC data sources you want to access (for example, whether users are prompted for a user name and password).

4. Add one or more tables from the ODBC data source to the relationships graph in the current FileMaker Pro file.

5. Add fields to layouts in the FileMaker Pro file to display external data.

6. Optionally, add supplemental fields to external tables and layouts to display calculation and summary results based on data stored in external ODBC data sources.

See FileMaker Pro Help for detailed steps and additional information on configuring an ODBC client driver, connecting to ODBC data sources, editing ODBC data sources, and setting up an ODBC table in the relationships graph.

Chapter 3
Installing FileMaker ODBC client drivers

These instructions help you install the ODBC client driver needed to access FileMaker as a data source from third-party and custom applications via ODBC. The ODBC client driver is available through a separate installation on your FileMaker installation disk or electronic download in the xDBC folder.

Check for updates to the client drivers at this URL: http://www.filemaker.com/support/downloads

If you'll be hosting a FileMaker database file using FileMaker Server, make the client drivers available to remote users.

After installing the client driver you need, you can configure the driver to access a FileMaker data source and construct SQL queries to interact with the data.

Hardware and software requirements

To install and use the ODBC client drivers, you need to meet the minimum hardware and software requirements described on the FileMaker website: http://www.filemaker.com/r/fms-specs

Networking requirements

If you'll be accessing a FileMaker data source hosted on another computer, you'll need network access via TCP/IP.

ODBC client driver architecture overview

FileMaker provides 32-bit and 64-bit client drivers for both Windows and OS X, to support 32-bit and 64-bit ODBC applications.

You must install the client driver that matches your ODBC application, not your operating system:

- If your ODBC application is a 32-bit application, then install the 32-bit client driver.
- If your ODBC application is a 64-bit application, then install the 64-bit client driver.

ODBC client driver installation (Windows)

Windows 32-bit and 64-bit client drivers are installed as separate libraries. On a 32-bit version of the Windows operating system, you can install the 32-bit client driver only. On a 64-bit version of the Windows operating system, you can install both the 32-bit and 64-bit client drivers.

To install the ODBC client driver:

1. Do one of the following:

- If you received your software electronically, double-click the installation icon (.exe file).
- If you have an installation disk, insert the disk into the drive.

2. In the FileMaker Pro or FileMaker Server window, double-click the xDBC folder.

3. In the xDBC folder, double-click the ODBC Client Driver Installer folder.

4. In the ODBC Client Driver Installer folder, double-click the installer file for the driver you want to install.

- To install the 32-bit client driver (fmodbc32.dll), use the 32-bit installer file: FMODBC_Installer_Win32.msi
- To install the 64-bit client driver (fmodbc64.dll), use the 64-bit installer file: FMODBC_Installer_Win64.msi

The FileMaker ODBC Driver Setup Wizard opens.

5. Install the ODBC client driver by following the onscreen instructions.

6. When the installation is complete, click **Close**.

By default, the ODBC client driver will be installed in this folder:

- On a 32-bit version of the Windows operating system, the 32-bit client driver (fmodbc32.dll) is installed in C:\Windows\System32
- On a 64-bit version of the Windows operating system, the 32-bit client driver (fmodbc32.dll) is installed in C:\Windows\SysWOW64
- On a 64-bit version of the Windows operating system, the 64-bit client driver (fmodbc64.dll) is installed in C:\Windows\System32

The ODBC client driver, **FileMaker ODBC**, is now available for you to configure for accessing a FileMaker data source.

Configuring client drivers (Windows)

Before using an ODBC client application to access a FileMaker data source, you must configure a client driver for the data source. Configuration settings identify the client driver you're using, the location of the data source, and details on how you intend to connect.

Important   When using a FileMaker client driver, you must reserve 2399 as the port.

Opening the ODBC administrator (Windows)

To open the 32-bit ODBC administrator on a 32-bit Windows operating system:

In Windows Control Panel, open **Administrative Tools** > **Data Sources (ODBC)**.

Note   **Administrative Tools** control panel appears in the **System and Security** category.

The 32-bit ODBC Data Source Administrator opens.

To open the 32-bit ODBC administrator on a 64-bit Windows operating system:

In Windows Control Panel, open **Administrative Tools** > **ODBC Data Sources (32-bit)**.

Note   **Administrative Tools** control panel appears in the **System and Security** category.

The 32-bit ODBC Data Source Administrator opens.

To open the 64-bit ODBC administrator on a 64-bit Windows operating system:

In Windows Control Panel, open **Administrative Tools** > **ODBC Data Sources (64-bit)**.

Note   **Administrative Tools** control panel appears in the **System and Security** category.

The 64-bit ODBC Data Source Administrator opens.

Configuring the DSN (Windows)

To configure the ODBC client driver:

1. In the ODBC Data Source Administrator, select the **System DSN** or **User DSN** tab. You create a DSN for each FileMaker database file you want to access as a data source.

2. Click **Add**.

   The Create New Data Source dialog box opens.

3. Select **FileMaker ODBC**, and click **Finish**.

   The FileMaker DSN Configuration dialog box opens.

4. Click **Next**.

5. For **Name**, enter a name that will be meaningful to others accessing the FileMaker data source. For **Description**, enter an optional description of the FileMaker data source. Click **Next**.

6. For **Host**:

   - If you're connecting to a database file hosted by FileMaker Pro on your local machine, enter `localhost` or the IP address `127.0.0.1`.

   - If you're connecting to a database file hosted by FileMaker Server over a network, enter the IP address of the FileMaker Server.

   If you have enabled sharing via ODBC/JDBC in the host application, you can select **Connect to host to obtain the names of available databases**. Click **Next**.

   Otherwise, click **Finish** to save your data source information.

7. For **Database**, select a database from the list of available databases, or type the filename of the FileMaker database file you're using as a data source.

   Note   For database files hosted by FileMaker Server, the list of databases may be filtered based on the **File Display Filter** setting. See FileMaker Server Help for information.

   - If you need special handling of non-English text, click **Advanced Language**. The Advanced Language Options dialog box opens.

   To auto-detect language settings, select the **Auto-detect language settings for application** option. To specify the language setting, clear the **Auto-detect language settings for application** option and select the system setting you want to use.

For the **Multi-byte text encoding** option, select **System** or select **UTF-8**. For example, some applications such as Microsoft Excel may expect text to be encoded using the **System** encoding, but web applications may expect text to be encoded using **UTF-8** encoding. If the application expects a specific encoding but this option specifies a different encoding, then the application may display some characters incorrectly.

- Select the **Describe text fields as long varchar** option to correct issues with long field values, such as fields that do not have a maximum length specified getting used for Microsoft Word Mail Merge import, or field values in PHP applications that are longer than 255 characters. If you do not use this option for field values longer than 255 characters, then your application may retrieve an empty string (Windows) or only 255 characters (OS X).

- If you want to create a log file for long-running queries, select the **Save long-running queries to a log file** option, and enter the name for the log file.

Click **Finish** to save your data source information.

8. Review the information about your FileMaker DSN.

- Click **Test** to verify that you have correctly configured the ODBC client driver to access the FileMaker data source.

  If you receive an error message, you can correct the connection information. You may also need to check that the FileMaker database file is hosted and available, that the FileMaker account specified uses a privilege set with the extended privilege Access via ODBC/JDBC, and that the FileMaker Server or FileMaker Pro host application has been set up for sharing via ODBC/JDBC.

- Click **Done** to save your data source information.

ODBC client driver installation (OS X)

OS X 32-bit and 64-bit client drivers are installed as a single bundle (FileMaker ODBC.bundle) in the /Library/ODBC folder. The ODBC client application loads the correct driver automatically.

To install the ODBC client driver:

1. Do one of the following:

- If you received your software electronically, double-click the disk image icon (.dmg file).
- If you have an installation disk, insert the disk into the drive.

2. In the FileMaker Pro or FileMaker Server window, double-click the xDBC folder.

3. In the xDBC folder, double-click the ODBC Client Driver Installer folder.

4. In the ODBC Client Driver Installer folder, double-click **FileMaker ODBC.pkg**.

The Install FileMaker ODBC Driver application opens.

5. Install the ODBC client driver by following the onscreen instructions.

6. When the installation is complete, click **Close**.

The ODBC client driver will be installed in this folder: /Library/ODBC

Note   You cannot change the installation folder for the ODBC client driver.

The ODBC client driver, **FileMaker ODBC**, is now available for you to configure for accessing a FileMaker data source.

Configuring client drivers (OS X)

Before using an ODBC client application to access a FileMaker data source, you must configure a client driver for the data source. Configuration settings identify the client driver you're using, the location of the data source, and details on how you intend to connect.

These instructions assume you have installed the ODBC Manager from Actual Technologies, available at http://www.odbcmanager.net, which is a freeware product not supported by FileMaker.

Because there is only one installed bundle for both 32-bit and 64-bit client drivers, you can use the same ODBC administrator for both 32-bit and 64-bit ODBC applications. The FileMaker DSN that you configure can be used for both 32-bit and 64-bit ODBC applications.

Important   When using a FileMaker client driver, you must reserve 2399 as the port.

To configure the ODBC client driver:

1. Launch the ODBC Manager utility. (ODBC Manager is installed in the Utilities folder in the Applications folder.)

2. Select the **System DSN** or **User DSN** tab. You create a DSN for each FileMaker database file you want to access as a data source.

3. Click **Add**.

The Choose a driver dialog box opens.

4. Select **FileMaker ODBC**, and click **OK**.

The FileMaker DSN Configuration dialog box opens.

5. Click **Continue**.

6. For **Name**, enter a name that will be meaningful to others accessing the FileMaker data source. For **Description**, enter an optional description of the FileMaker data source. Click **Continue**.

7. For **Host**:

- If you're connecting to a database file hosted by FileMaker Pro on your local machine, enter `localhost` or the IP address `127.0.0.1`.
- If you're connecting to a database file hosted by FileMaker Server over a network, enter the IP address of the FileMaker Server.

If you have enabled sharing via ODBC/JDBC in the host application, you can select **Connect to host to obtain the names of available databases**. Click **Continue**.

Otherwise, click **Finish** to save your data source information.

8. For **Database**, select a database from the list of available databases, or type the filename of the FileMaker database file you're using as a data source.

Note   For database files hosted by FileMaker Server, the list of databases may be filtered based on the **File Display Filter** setting. See FileMaker Server Help for information.

- If you need special handling of non-English text, click **Advanced Language**. The Advanced Language Options dialog box opens.

  To auto-detect language settings, select the **Auto-detect language settings for application** option. To specify the language setting, clear the **Auto-detect language settings for application** option and select the system setting you want to use.

  If your application uses ODBC functions with character buffers whose characters are 4 bytes wide, select the **Application uses the "wide" ODBC API** option.

  If you want the `SQL_C_CHAR` text type to be interpreted by the driver as the `SQL_C_WCHAR` text type, select the **Treat text types as Unicode** option.

  For the **Multi-byte text encoding** option, select **System (MacRoman)** or select **UTF-8**. For example, some applications such as Microsoft Excel may expect text to be encoded using the **System** encoding, but web applications may expect text to be encoded using **UTF-8** encoding. If the application expects a specific encoding but this option specifies a different encoding, then the application may display some characters incorrectly.

- Select the **Describe text fields as long varchar** option to correct issues with long field values, such as fields that do not have a maximum length specified getting used for Microsoft Word Mail Merge import, or field values in PHP applications that are longer than 255 characters.

- If you want to create a log file for long-running queries, select the **Save long-running queries to a log file** option, and enter the name for the log file. You can also change the **Long query time** value.

  Click **Finish** to save your data source information.

9. Review the information about your FileMaker DSN.

- Click **Test** to verify that you have correctly configured the ODBC client driver to access the FileMaker data source.

  If you receive an error message, you can correct the connection information. You may also need to check that the FileMaker database file is hosted and available, that the FileMaker account specified uses a privilege set with the extended privilege Access via ODBC/JDBC, and that the FileMaker Server or FileMaker Pro host application has been set up for sharing via ODBC/JDBC.

- Click **Done** to save your data source information.

Where to go from here

After you install and configure a client driver, you can construct and execute SQL queries to access a FileMaker data source.

Client applications sometimes use different terminology for accessing a data source via ODBC. Many applications have menu items with names such as **Get external data** or **SQL query**. Review the documentation or Help that comes with your application for details.

For more information on using FileMaker as an ODBC data source, see chapter 4, "Using ODBC to share FileMaker data."

Chapter 4
Using ODBC to share FileMaker data

Use the ODBC client driver to connect to a FileMaker data source from another application. The application that uses the ODBC client driver can directly access the data in a FileMaker database file.
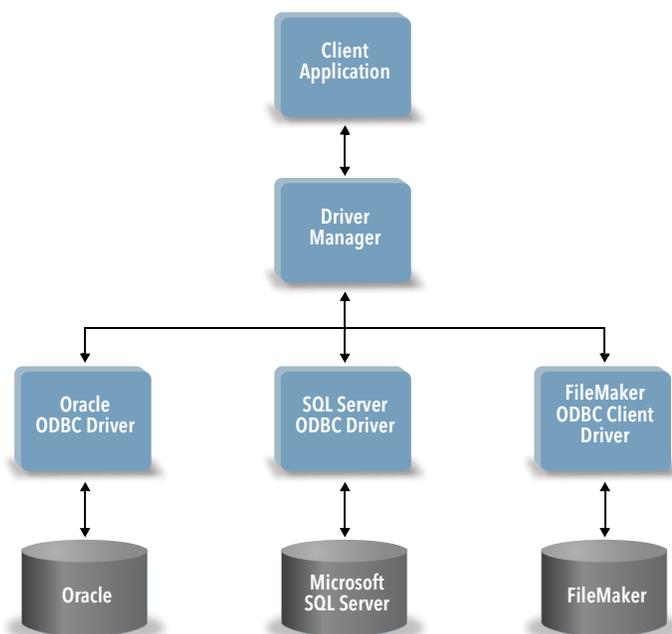
The FileMaker ODBC client driver is **FileMaker ODBC**.

Note You can also use FileMaker Pro as an ODBC client application, interacting with records from another data source via ODBC using SQL. See chapter 2, "Accessing external SQL data sources," for details about accessing an external SQL data source via ODBC.

About ODBC

ODBC is an API that enables applications to access data from many database management systems. ODBC gives client applications a common language for interacting with data sources and database services.

All applications that support ODBC recognize a basic subset of SQL (Structured Query Language) statements. SQL lets you use other applications (such as spreadsheets, word processors, and reporting tools) to view, analyze, and modify FileMaker data. See *FileMaker SQL Reference* for the SQL statements, functions, and expressions that the ODBC client driver supports.

Your application can talk directly to a FileMaker database file by using the ODBC client driver. Your SQL statements are delivered to the FileMaker host of the database file and the results of those statements are sent back to you. If you use FileMaker Server to host a FileMaker database file as a data source, the database file can be located on another machine (the server machine) connected to the network, while your client application is located on your machine (the client machine). This is referred to as a *client/server configuration*.

Using the ODBC client driver

You can use the ODBC client driver with any ODBC-compliant application. Sharing your FileMaker database file as a data source, you can:

- perform mail merges with Microsoft Word.
- create charts with Microsoft Excel.
- move FileMaker data to a DBMS like Microsoft SQL Server.
- further analyze your FileMaker data with query or reporting tools to create charts, construct ad-hoc queries, and perform drill-down analysis.
- create a Microsoft Visual Basic application that shares information with FileMaker Pro.

To share a FileMaker database file as a data source, use FileMaker Pro to define accounts that need access to the database file. Then, control access to the database file by assigning privilege sets to the accounts, including the extended privilege of access via ODBC/JDBC. Finally, enable the FileMaker Server or FileMaker Pro host application to share data via ODBC/JDBC. For details, see FileMaker Pro Help or FileMaker Server Help.

Important　Prior versions of the FileMaker ODBC client driver are not compatible with FileMaker 14. To connect to a FileMaker 14 database file, you need to install and configure the new ODBC client driver.

Note　To confirm that the FileMaker XDBC Listener is currently running, you can use the Activity Monitor on OS X or the Task Manager on Windows to check the status of the FileMaker XDBC Listener process. When the process is started, it is named fmxdbc_listener, and events are logged by that name. The FileMaker XDBC Listener process is separate from the FileMaker Server process. You can use the FileMaker Server Admin Console to stop and start the XDBC Listener process. On the FileMaker Server Status pane, set ODBC/JDBC to **OFF** to stop the XDBC Listener and set ODBC/JDBC to **ON** to start the XDBC Listener.

Overview of accessing a FileMaker database file

From an ODBC-compliant application, you can construct SQL queries to access a FileMaker database file. The ODBC client driver must be installed on the computer generating the SQL query.

To access a FileMaker database file:

1. In FileMaker Pro, review the privilege sets you've assigned to accounts that will access the database file.

Accounts that need access must use a privilege set with the extended privilege of **Access via ODBC/JDBC**.

2. Enable the FileMaker Server (via FileMaker Server Admin Console) or FileMaker Pro host application to share data via ODBC/JDBC.

FileMaker Server Admin Console: Choose **General Settings** > **ODBC/JDBC** then select **Enable ODBC/JDBC**.

FileMaker Pro: Choose **File** menu > **Sharing** > **Enable ODBC/JDBC** and set **ODBC/JDBC Sharing** to **On**.

3. Make sure the FileMaker database file you want to access is hosted and available.

If your FileMaker database solution uses more than one FileMaker database file, all of the database files must be on the same computer.

4. Connect to the FileMaker data source.

5. Construct and execute an SQL query in the client application.

Each FileMaker database file that is open and set up for access is a separate data source (you create a DSN for each FileMaker database file you want to access as a data source).

Each database can have one or more tables. FileMaker fields are represented as columns. The complete field name, including any non-alphanumeric characters, displays as the column name.

Accessing a FileMaker database file from a Windows application

Specifying ODBC client driver properties for a FileMaker DSN (Windows)

Create a DSN for each FileMaker database file you want to access as a data source. The DSN identifies the FileMaker ODBC client driver, the location of the FileMaker host application, and the FileMaker database file you're accessing as a data source.

For information on creating a DSN, see "Configuring client drivers (Windows)" on page 13.

Verifying access via ODBC (Windows)

To verify that you've correctly configured the ODBC client driver to access the FileMaker data source:

1. In the Windows Control Panel, open **Administrative Tools** > **Data Sources (ODBC)**.

Note **Administrative Tools** control panel appears in the **System and Security** category.

The ODBC Data Source Administrator opens.

2. Select the **System DSN** or **User DSN** tab (select the tab used when you previously configured).

3. Choose the FileMaker data source that you previously configured.

The data source name you originally entered appears under **Name**, and **FileMaker ODBC** appears as the **Driver**.

4. Click **Configure**.

The FileMaker DSN Configuration dialog box appears.

5. Click **Next** until you reach the **Conclusion** page.

6. Click **Test**.

You are prompted to enter your FileMaker account name (in **Database User Name**) and password (in **Database Password**).

If the connection is OK, you receive the message **Test completed successfully**.

If the connection fails:

▪ Make sure the FileMaker database file is hosted and available.

▪ Update or correct your connection information.

- Make sure your FileMaker account uses a privilege set with the extended privilege of **Access via ODBC/JDBC**.

- Verify that the FileMaker Server or FileMaker Pro host application has been set up for sharing via ODBC/JDBC.

Accessing a FileMaker database file from an OS X application

Specifying ODBC client driver properties for a FileMaker DSN (OS X)

Create a DSN for each FileMaker database file you want to access as a data source. The DSN identifies the FileMaker ODBC client driver, the location of the FileMaker host application, and the FileMaker database file you're accessing as a data source.

For information on creating a DSN, see "Configuring client drivers (OS X)" on page 16.

Verifying access via ODBC (OS X)

To verify that you've correctly configured the ODBC client driver to access the FileMaker data source:

1. Launch the ODBC Manager utility. (The ODBC Manager is located in the Utilities folder in the Applications folder.)

2. Select the **System DSN** or **User DSN** tab (select the tab used when you previously configured).

3. Choose the FileMaker data source that you previously configured.

The data source name you originally entered appears under **Name**, and **FileMaker ODBC** appears as the **Driver**.

4. Click **Configure**.

The FileMaker DSN Configuration dialog box opens.

5. Click **Continue** until you reach the **Conclusion** page.

6. Click **Test**.

You are prompted to enter your FileMaker account name (in **Database User Name**) and password (in **Database Password**).

If the connection is OK, you receive the message **Test completed successfully**.

If the connection fails:

- Make sure the FileMaker database file is hosted and available.

- Update or correct your connection information.

- Make sure your FileMaker account uses a privilege set with the extended privilege of **Access via ODBC/JDBC**.

- Verify that the FileMaker Server or FileMaker Pro host application has been set up for sharing via ODBC/JDBC.

Chapter 5
Installing FileMaker JDBC client drivers

These instructions help you install the client driver needed to access FileMaker as a data source from third-party and custom applications via JDBC. The client driver is available on your FileMaker DVD or electronic download in the xDBC folder.

Check for updates to the client drivers at this URL: http://www.filemaker.com/support/downloads

If you'll be hosting a FileMaker database file using FileMaker Server, make the client drivers available to remote users.

After installing the client driver you need, you can configure the driver to access a FileMaker data source and construct SQL queries to interact with the data.

The JDBC client driver is the driver portions of the FileMaker software that allow third-party applications or custom applications to access FileMaker files as JDBC data sources.

Software requirements

To install and use the JDBC client drivers, you need JDK 1.6 or later.

To find which version of Java you're running, open a command window (Windows) or Terminal window (OS X) and type `java -version`.

Networking requirements

If you'll be accessing a FileMaker data source hosted on another computer, you'll need network access via TCP/IP.

JDBC client driver installation

You must have write access to the folder where you're installing the JDBC client driver.

To install the JDBC client driver:

1. Do one of the following:

- Windows: If you received your software electronically, double-click the installation icon (.exe file).
- OS X: If you received your software electronically, double-click the disk image icon (.dmg file).
- If you have an installation disk, insert the disk into the drive.

2. In the FileMaker Pro or FileMaker Server window, double-click the xDBC folder.

3. In the xDBC folder, double-click the JDBC Client Driver Installer folder.

4. Copy the fmjdbc.jar file to the appropriate folder for your operating system:

- Windows: Copy the fmjdbc.jar file to the folder that includes your Java executable file (java.exe) or to another folder location included in the ClassPath of your Java application.
- OS X: Copy the fmjdbc.jar file to the /Library/Java/Extensions folder or to another folder location included in the ClassPath of your Java application.

The JDBC client driver is now available for you to use to access a FileMaker data source.

Using the JDBC client driver

Your Java application or applet must register the JDBC client driver with the JDBC driver manager, and you must specify the correct JDBC URL from within the application or applet.

Important   You must reserve the port 2399 for the FileMaker JDBC client driver. The port number is always 2399. You cannot change the JDBC sharing to a different port.

For more information on using the JDBC client driver, see chapter 6, "Using JDBC to share FileMaker data."

Chapter 6
Using JDBC to share FileMaker data

If you're a Java programmer, you can use the JDBC client driver with any Rapid Application Development (RAD) tool to visually create a Java application or applet that connects to a FileMaker data source. The Java application or applet that uses the JDBC client driver can directly access the data in a FileMaker database file.

About JDBC

JDBC is a Java API for executing SQL statements, the standard language for accessing relational databases. JDBC is a low-level interface, which means that it is used to call SQL commands directly. It is also designed to be used as a base for higher level interfaces and tools.

Your Java applet or application can talk directly to a FileMaker database file by using the JDBC client driver. Your SQL statements are delivered to the FileMaker host of the database file and the results of those statements are sent back to you. If you use FileMaker Server to host, the FileMaker database file you're using as a data source can be located on another machine (the server machine) connected to the network, while your Java applet or client application is located on your machine (the client machine). This is referred to as a *client/server configuration*.

| Java application |
| JDBC driver |

FileMaker

Client machine   Database server
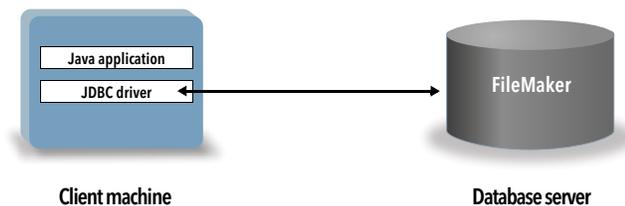
Using the JDBC client driver

You can use the JDBC client driver with a Java compiler or RAD tool to connect with your database while you build the code for your Java application or applet. After the Java application or applet has been created, the JDBC client driver must be present with the files or included within the code in order for the application or applet to communicate with the database.

To use the JDBC client driver, your Java application or applet must register the driver with the JDBC driver manager and you must specify the correct JDBC URL from within the application or applet. You need the JDBC URL to make the connection to the database.

About the JDBC client driver

The JDBC client driver provides partial support for the JDBC 3.0 specification. The following features are not supported by FileMaker:

- Savepoint
- Retrieval of auto-generated keys
- Passing parameters to a callable statement object by name
- Holdable cursor
- Retrieving and updating the object referenced by a Ref object

- Updating of columns containing CLOB, ARRAY, and REF data types
- Boolean data type
- DATALINK data type
- Transform groups and type mapping
- Relationship between the JDBC SPI and the Connector architecture

The JDBC client driver has been tested against the Java Development Kit (JDK) 1.6 and 1.7. It is a Type 4 driver — a native protocol, pure Java driver that converts JDBC calls directly into the network protocol used by FileMaker. This type of driver offers all the advantages of Java, including automatic installation (for example, downloading the JDBC driver with an applet that uses it).

The driver class and main entry point for the driver is named:

com.filemaker.jdbc.Driver

Important   The JDBC client driver replaces the FileMaker JDBC driver released with a previous version of FileMaker. If you have previously set up access to a FileMaker data source using the older driver, you'll need to re-define access by using and configuring the new driver.

Note   To confirm that the FileMaker XDBC Listener is currently running, you can use the Activity Monitor on OS X or the Task Manager in Windows to check the status of the FileMaker XDBC Listener process. When the process is started, it is named fmxdbc_listener, and events are logged by that name. The FileMaker XDBC Listener process is separate from the FileMaker Server process. You can use the FileMaker Server Admin Console to stop and start the XDBC Listener process. On the FileMaker Server Status pane, set ODBC/JDBC to **OFF** to stop the XDBC Listener and set ODBC/JDBC to **ON** to start the XDBC Listener.

Using a JDBC URL to connect to your database

In Java, most resources are accessed through URLs (Uniform Resource Locators). A JDBC URL is used to identify the database so the JDBC client driver can recognize and establish a connection with the database.

The JDBC URL consists of three main parts separated by colons:

jdbc:<subprotocol>:<subname>

The first part in the JDBC URL is always the JDBC protocol (`jdbc`). The *subprotocol* is the driver name or the mechanism that supports multiple drivers. For the JDBC client driver, the subprotocol is `filemaker`. The *subname* is the IP address of the machine that is hosting the FileMaker data source.

Registering the JDBC client driver and connecting to a FileMaker data source (an example)

Here is a portion of a JDBC client application that:

1. Registers the JDBC client driver with the JDBC driver manager.

2. Establishes a connection with the FileMaker data source. The JDBC URL is
jdbc:filemaker://192.168.1.1/database

3. Returns error codes.

```java
import java.sql.*;
class FMPJDBCTest
{
    public static void main(String[ ] args)
    {
        // register the JDBC client driver
        try {
        Driver d =
        (Driver)Class.forName("com.filemaker.jdbc.Driver").newInstance();
        } catch(Exception e) {
            System.out.println(e);
        }
        // establish a connection to FileMaker
        Connection con;
        try {
            con =
            DriverManager.getConnection("jdbc:filemaker://192.168.1.1/mydataba
            se","username", "password");
        } catch(Exception e) {
            System.out.println(e);
        }
        // get connection warnings
        SQLWarning warning = null;
        try {
            warning = con.getWarnings();
            if (warning == null) {
                System.out.println("No warnings");
                return;
            }
            while (warning != null) {
                System.out.println("Warning: "+warning);
                warning = warning.getNextWarning();
            }
        } catch (Exception e) {
        Sysem.out.println(e);
        }
    }
}
```

Note This example is not meant to be compiled.

Specifying driver properties in the URL subname

Specify the user and password driver properties in the subname of the JDBC URL. These are the properties that could be passed to the connection when calling the DriverManager.getConnection method via the Properties parameter.

- user: An account in the FileMaker database file that uses a privilege set with the extended privilege **Access via ODBC/JDBC**

- password: The password for the account in the FileMaker database file

JDBC URL connection with the database name specified in the URL

Format:

jdbc:filemaker://<filemaker host IP address>/<databasename>

Example:

```
jdbc:filemaker://192.168.1.1/publications
```

JDBC URL connection with the database name, user name, and password specified in the URL

Format:

jdbc:filemaker://<filemaker host IP address>/<databasename>?user=<databaseusername>&password=<databasepassword>

Example:

```
jdbc:filemaker://192.168.1.1/customers?user=Collections&password=
admin
```

Note   Because of the use of the ampersand character (&) in this syntax, you cannot use an ampersand character in the user name or the password.

Invalid user name example:

```
jdbc:filemaker://localhost/sales_db?user=ad&min&password=admin
```

Invalid password example:

```
jdbc:filemaker://localhost/sales_db?user=admin1&password=ad&min
```

Solutions with multiple FileMaker database files

If your FileMaker database solution uses many FileMaker database files, create an additional database file that contains all the necessary external data source references, table occurrences, and relationships for your solution. Then define this additional database file as your data source in the JDBC URL. All of the FileMaker database files must be on the same computer.

Verifying access via JDBC

When verifying access to a FileMaker database file via JDBC, make sure:

- the FileMaker database file is hosted and available.

- your FileMaker account uses a privilege set with the extended privilege of **Access via ODBC/JDBC**.

- The FileMaker Server or FileMaker Pro host application has been set up for sharing via ODBC/JDBC.

  To share a FileMaker database file as a data source, use FileMaker Pro to define accounts that need access to the database file. Then, control access to the database file by assigning privilege sets to the accounts, including the extended privilege of access via ODBC/JDBC. Finally, enable the FileMaker Server or FileMaker Pro host application to share data via ODBC/JDBC. For details, see FileMaker Pro Help or FileMaker Server Help.

- The JDBC client driver registration and the JDBC URL are correct (the driver can be included inside the Java Application or located on the client machine).

Chapter 7
Reference information

ODBC Catalog functions

The ODBC client driver supports the following Catalog functions:

- SQLTables - catalog information is stored and reported as single part names (table name only).
- SQLColumns
- SQLColumnPrivileges
- SQLDescribeCol
- SQLGetTypeInfo

JDBC DatabaseMetaData methods

The JDBC client driver supports the following DatabaseMetaData methods:

- getColumns
- getColumnPrivileges
- getMetaData
- getTypeInfo
- getTables
- getTableTypes
- getVersionColumns

Mapping FileMaker fields to ODBC data types

This table illustrates how FileMaker field types map to the standard ODBC data types.

FileMaker field type	Converts to ODBC data type	About the data type
text	SQL_VARCHAR	The maximum column length of text is 1 million characters, unless you specify a smaller **Maximum number of characters** for the text field in FileMaker. FileMaker returns empty strings as **NULL**.
number	SQL_DOUBLE	The FileMaker number field type can contain positive or negatives values as small as 10^{-308}, and as large as 10^{+308}, with up to 15 significant digits.
date	SQL_DATE	
time	SQL_TIME	The FileMaker time field type can contain the time of day or a time interval. A time interval is returned as a time of day, unless it is less than 0 or greater than 24 hours (both return a value of **0**).
timestamp	SQL_TIMESTAMP	

FileMaker field type	Converts to ODBC data type	About the data type
container (`BLOB`)	`SQL_LONGVARBINARY`	You can retrieve binary data, file reference information, or data of a specific file type from a container field.
		Within a `SELECT` statement, use the `CAST()` function to retrieve file reference information, and use the `GetAs()` function to retrieve data of a specific file type.
calculation		The result is mapped to the corresponding ODBC data type.

String length is optional in table declarations. All strings are stored and retrieved in Unicode.

Note   FileMaker repeating fields are supported like arrays. Examples:

```
INSERT INTO mytable(repField[3]) VALUES ('this is rep 3')
SELECT repField[1], repField[2] FROM mytable
```

Mapping FileMaker fields to JDBC data types

The JDBC client driver uses the following mappings when converting FileMaker data types to JDBC SQL types.

FileMaker field type	Converts to JDBC SQL type
text	`java.sql.Types.VARCHAR`
number	`java.sql.Types.DOUBLE`
date	`java.sql.Types.DATE`
time	`java.sql.Types.TIME`
timestamp	`java.sql.Types.TIMESTAMP`
container	`java.sql.Types.BLOB`
calculation	specified by the data type of the calculation's result

The JDBC client driver converts the FileMaker **calculation** data type to the JDBC SQL type matching the calculation's result. For example, the JDBC client driver converts a FileMaker calculation that results in a **timestamp** data type to **java.sql.Types.TIMESTAMP**.

Data types in 64-bit applications

In the 32-bit version of the ODBC API, some functions used parameters that could pass integer values or pointer values, depending on context. But in 64-bit Windows operating systems, integers and pointers are not the same size. The 64-bit version of the ODBC API uses abstract data types that are not defined as a specific size.

Applications that use 32-bit values may crash when they are ported to a 64-bit operating system. Applications that use abstract data types work correctly on both 32-bit and 64-bit operating systems.

ODBC and JDBC error messages

Here are the basic formats of error messages you receive when working with FileMaker and ODBC/JDBC.

ODBC error messages

Error messages can come from:

- ODBC driver errors
- FileMaker and FileMaker XDBC Listener errors

FileMaker ODBC error messages

An error that occurs in the FileMaker listener or data source includes the data source name, in the following format:

[FileMaker] [FileMaker ODBC] message

For example, you might get the following message from your FileMaker data source:

[FileMaker] [FileMaker ODBC] Invalid Username/Password

If you get this type of error, you did something incorrectly with the database system. Check your FileMaker documentation for more information or consult your database administrator.

Consecutive messages for errors in different columns can sometimes display an incorrect column name.

JDBC error messages

The FileMaker JDBC driver reports errors to the calling application by returning SQLExceptions. Error messages can come from:

- JDBC driver errors
- FileMaker and FileMaker XDBC Listener errors

FileMaker JDBC error messages

An error that occurs in the FileMaker listener or data source includes the data source name, in the following format:

[FileMaker] [FileMaker JDBC] message

For example, you might get the following message from your FileMaker data source:

[FileMaker] [FileMaker JDBC] Invalid Username/Password

If you get this type of error, you did something incorrectly with the database system. Check your FileMaker documentation for more information or consult your database administrator.

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