Title

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odbc — Load, write, or view data from ODBC sources

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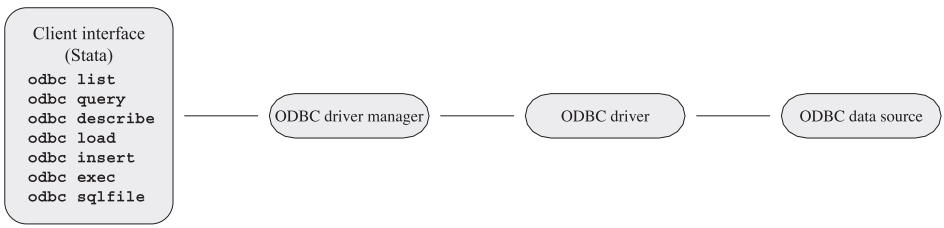
Description

`odbc` allows you to load, write, and view data from Open DataBase Connectivity (ODBC) sources into Stata. ODBC is a standardized set of function calls for accessing data stored in both relational and nonrelational database-management systems. By default on Unix platforms, iODBC is the ODBC driver manager Stata uses, but you can use unixODBC by using the command `set odbcmgr unixodbc`.

ODBC's architecture consists of four major components (or layers): the client interface, the ODBC driver manager, the ODBC drivers, and the data sources. Stata provides `odbc` as the client interface. The system is illustrated as follows:



`odbc list` produces a list of ODBC data source names to which Stata can connect.

`odbc query` retrieves a list of table names available from a specified data source's system catalog.

`odbc describe` lists column names and types associated with a specified table.

`odbc load` reads an ODBC table into memory. You can load an ODBC table specified in the `table()` option or load an ODBC table generated by an SQL SELECT statement specified in the `exec()` option. In both cases, you can choose which columns and rows of the ODBC table to read by specifying *extvarlist* and `if` and `in` conditions. *extvarlist* specifies the columns to be read and allows you to rename variables. For example,

```
. odbc load id=ID name="Last Name", table(Employees) dsn(Northwind)
```

reads two columns, `ID` and `Last Name`, from the `Employees` table of the `Northwind` data source. It will also rename variable `ID` to `id` and variable `Last Name` to `name`.

`odbc insert` writes data from memory to an ODBC table. The data can be appended to an existing table or replace an existing table.

`odbc exec` allows for most SQL statements to be issued directly to any ODBC data source. Statements that produce output, such as SELECT, have their output neatly displayed. By using Stata's ado language, you can also generate SQL commands on the fly to do positional updates or whatever the situation requires.

`odbc sqlfile` provides a "batch job" alternative to the `odbc exec` command. A file is specified that contains any number of any length SQL commands. Every SQL command in this file should be delimited by a semicolon and must be constructed as pure SQL. Stata macros and ado-language syntax are not permitted. The advantage in using this command, as opposed to `odbc exec`, is that only one connection is established for multiple SQL statements. A similar sequence of SQL commands used

via odbc exec would require constructing an ado-file that issued a command and, thus, a connection for every SQL command. Another slight difference is that any output that might be generated from an SQL command is suppressed by default. A loud option is provided to toggle output back on.

set odbcdriver unicode specifies that the ODBC driver is a Unicode driver (the default). set odbcdriver ansi specifies that the ODBC driver is an ANSI driver. You must restart Stata for the setting to take effect.

set odbcmgr iodbc specifies that the ODBC driver manager is iODBC (the default). set odbcmgr unixodbc specifies that the ODBC driver manager is unixODBC.

Quick start

List all defined data source names (DSNs) to which Stata can connect

```
odbc list
```

List available table names in MyDSN

```
odbc query "MyDSN"
```

Describe the column names and data types in table MyTable from MyDSN

```
odbc describe "MyTable", dsn("MyDSN")
```

Load MyTable into memory from MyDSN

```
odbc load, table("MyTable") dsn("MyDSN")
```

Menu

odbc load

File > Import > ODBC data source

odbc insert

File > Export > ODBC data source

Syntax

List ODBC sources to which Stata can connect

```
odbc list
```

Retrieve available names from specified data source

```
odbc query ["DataSourceName", verbose schema connect_options]
```

List column names and types associated with specified table

```
odbc describe ["TableName", connect_options]
```

Import data from an ODBC data source

```
odbc load [extvarlist] [if] [in], {table("TableName") | exec("SqlStmt")}
    [load_options connect_options]
```

Export data to an ODBC data source

```
odbc insert [varlist] [if] [in], table("TableName")
    {dsn("DataSourceName") | connectionstring("ConnectStr")}
    [insert_options connect_options]
```

Allow SQL statements to be issued directly to ODBC data source

```
odbc exec("SqlStmt"),
    {dsn("DataSourceName") | connectionstring("ConnectStr")}
    [connect_options]
```

Batch job alternative to odbc exec

```
odbc sqlfile("filename"),
    {dsn("DataSourceName") | connectionstring("ConnectStr")}
    [loud connect_options]
```

Specify ODBC driver type

```
set odbcdriver {unicode | ansi} [, permanently]
```

Specify ODBC driver manager (Mac and Unix only)

```
set odbcmgr {iodbc | unixodbc} [, permanently]
```

DataSourceName is the name of the ODBC source (database, spreadsheet, etc.)
ConnectStr is a valid ODBC connection string
TableName is the name of a table within the ODBC data source
SqlStmt is an SQL SELECT statement
filename is pure SQL commands separated by semicolons
extvarlist contains
    sqlvarname
    varname = *sqlvarname*

connect_options	Description
`user(`*UserID*`)`	user ID of user establishing connection
`password(`*Password*`)`	password of user establishing connection
`dialog(noprompt)`	do not display ODBC connection-information dialog, and do not prompt user for connection information
`dialog(prompt)`	display ODBC connection-information dialog
`dialog(complete)`	display ODBC connection-information dialog only if there is not enough information
`dialog(required)`	display ODBC connection-information dialog only if there is not enough mandatory information provided
* `dsn("`*DataSourceName*`")`	name of data source
* `connectionstring("`*ConnectStr*`")`	ODBC connection string

*`dsn("`*DataSourceName*`")` is not allowed with `odbc query`. You may not specify both *DataSourceName* and `connectionstring()` with `odbc query`. Either `dsn()` or `connectionstring()` is required with `odbc insert`, `odbc exec`, and `odbc sqlfile`.

load_options	Description
* `table("`*TableName*`")`	name of table stored in data source
* `exec("`*SqlStmt*`")`	SQL SELECT statement to generate a table to be read into Stata
`clear`	load dataset even if there is one in memory
`noquote`	alter Stata's internal use of SQL commands; seldom used
`lowercase`	read variable names as lowercase
`sqlshow`	show all SQL commands issued
`allstring`	read all variables as strings
`datestring`	read date-formatted variables as strings
`multistatement`	allow multiple SQL statements delimited by `;` when using `exec()`
`bigintasdouble`	store BIGINT columns as Stata doubles on 64-bit operating systems

*Either `table("`*TableName*`")` or `exec("`*SqlStmt*`")` must be specified with `odbc load`.

insert_options	Description
* table("*TableName*")	name of table stored in data source
overwrite	clear data in ODBC table before data in memory is written to the table
insert	default mode of operation for the odbc insert command
quoted	quote all values with single quotes as they are inserted in ODBC table
sqlshow	show all SQL commands issued
as("*varlist*")	ODBC variables on the data source that correspond to the variables in Stata's memory
block	use block inserts

*table("*TableName*") is required for odbc insert.

Options

user(*UserID*) specifies the user ID of the user attempting to establish the connection to the data source. By default, Stata assumes that the user ID is the same as the one specified in the previous odbc command or is empty if user() has never been specified in the current session of Stata.

password(*Password*) specifies the password of the user attempting to establish the connection to the data source. By default, Stata assumes that the password is the same as the one previously specified or is empty if the password has not been used during the current session of Stata. Typically, the password() option will not be specified apart from the user() option.

dialog(noprompt | prompt | complete | required) specifies the mode the ODBC Driver Manager uses to display the ODBC connection-information dialog to prompt for more connection information.

noprompt is the default value. The ODBC connection-information dialog is not displayed, and you are not prompted for connection information. If there is not enough information to establish a connection to the specified data source, an error is returned.

prompt causes the ODBC connection-information dialog to be displayed.

complete causes the ODBC connection-information dialog to be displayed only if there is not enough information, even if the information is not mandatory.

required causes the ODBC connection-information dialog to be displayed only if there is not enough mandatory information provided to establish a connection to the specified data source. You are prompted only for mandatory information; controls for information that is not required to connect to the specified data source are disabled.

dsn("*DataSourceName*") specifies the name of a data source, as listed by the odbc list command. If a name contains spaces, it must be enclosed in double quotes. By default, Stata assumes that the data source name is the same as the one specified in the previous odbc command. This option is not allowed with odbc query. Either the dsn() option or the connectionstring() option may be specified with odbc describe and odbc load, and one of these options must be specified with odbc insert, odbc exec, and odbc sqlfile.

connectionstring("*ConnectStr*") specifies a connection string rather than the name of a data source. Stata does not assume that the connection string is the same as the one specified in the previous odbc command. Either *DataSourceName* or the connectionstring() option may be specified with odbc query; either the dsn() option or the connectionstring() option can be specified with odbc describe and odbc load, and one of these options must be specified with odbc insert, odbc exec, and odbc sqlfile.

`table("`*TableName*`")` specifies the name of an ODBC table stored in a specified data source's system catalog, as listed by the `odbc query` command. If a table name contains spaces, it must be enclosed in double quotes. Either the `table()` option or the `exec()` option—but not both—is required with the `odbc load` command.

`exec("`*SqlStmt*`")` allows you to issue an SQL SELECT statement to generate a table to be read into Stata. An error message is returned if the `SELECT` statement is an invalid SQL statement. The statement must be enclosed in double quotes. Either the `table()` option or the `exec()` option—but not both—is required with the `odbc load` command.

`clear` permits the data to be loaded, even if there is a dataset already in memory, and even if that dataset has changed since the data were last saved.

`noquote` alters Stata's internal use of SQL commands, specifically those relating to quoted table names, to better accommodate various drivers. This option has been particularly helpful for DB2 drivers.

`lowercase` causes all the variable names to be read as lowercase.

`sqlshow` is a useful option for showing all SQL commands issued to the ODBC data source from the `odbc insert` or `odbc load` command. This can help you debug any issues related to inserting or loading.

`allstring` causes all variables to be read as string data types.

`datestring` causes all date- and time-formatted variables to be read as string data types.

`multistatement` specifies that multiple SQL statements delimited by `;` be allowed when using the `exec()` option. Some drivers do not support multiple SQL statements.

`bigintasdouble` specifies that data stored in 64-bit integer (BIGINT) database columns be converted to Stata doubles. If any integer value is larger than 9,007,199,254,740,965 or less than −9,007,199,254,740,992, this conversion is not possible, and `odbc load` will issue an error message.

`overwrite` allows data to be cleared from an ODBC table before the data in memory are written to the table. All data from the ODBC table are erased, not just the data from the variable columns that will be replaced.

`insert` appends data to an existing ODBC table and is the default mode of operation for the `odbc insert` command.

`quoted` is useful for ODBC data sources that require all inserted values to be quoted. This option specifies that all values be quoted with single quotes as they are inserted into an ODBC table.

`as("`*varlist*`")` allows you to specify the ODBC variables on the data source that correspond to the variables in Stata's memory. If this option is specified, the number of variables must equal the number of variables being inserted, even if some names are identical.

`loud` specifies that output be displayed for SQL commands.

`verbose` specifies that `odbc query` list any data source alias, nickname, typed table, typed view, and view along with tables so that you can load data from these table types.

`schema` specifies that `odbc query` return schema names with the table names from a data source. Note: The schema names returned from `odbc query` will also be used with the `odbc describe` and `odbc load` commands. When using `odbc load` with a schema name, you might also need to specify the `noquote` option because some drivers do not accept quotes around table or schema names.

`block` specifies that `odbc insert` use block inserts to speed up data-writing performance. Some drivers do not support block inserts.

`permanently` (`set odbcdriver` and `set odbcmgr` only) specifies that, in addition to making the change right now, the setting be remembered and become the default setting when you invoke Stata.

Remarks and examples

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When possible, the examples in this manual entry are developed using the `Northwind` sample database that is automatically installed with Microsoft Access. If you do not have Access, you can still use `odbc`, but you will need to consult the documentation for your other ODBC sources to determine how to set them up.

Remarks are presented under the following headings:

Unicode and ODBC
Setting up the data sources
Listing ODBC data source names
Listing available table names from a specified data source's system catalog
Describing a specified table
Loading data from ODBC sources

Unicode and ODBC

Stata supports accessing databases with Unicode data through Unicode ODBC drivers on the following platforms:

- Microsoft Windows through ODBC driver manager (version 3.5 or higher).
- Unix through unixODBC driver manager with ODBC drivers compiled for unixODBC. Stata does not support Unicode drivers when using iODBC as your driver manager. Stata requires that the driver support UTF-8.
- macOS through unixODBC driver manager with ODBC drivers compiled for unixODBC. Stata does not support Unicode drivers when using iODBC as your driver manager. Stata requires that the driver support UTF-8.

Stata supports non-Unicode databases through ASCII drivers with all driver managers.

Setting up the data sources

Before using Stata's ODBC commands, you must register your ODBC database with the *ODBC Data Source Administrator*. This process varies depending on platform, but the following example shows the steps necessary for Windows.

Using Windows 10, follow these steps to create an ODBC User Data Source for the `Northwind` sample database:

1. On the Start page, type `ODBC Data Sources`. From the list that appears, select the **ODBC Data Sources Desktop App**.
2. In the *Data Sources (ODBC)* dialog box,
   a. click on the *User DSN* tab;
   b. click on **Add...**;

c. choose *Microsoft Access Driver (*.mdb,*.accdb)* on the *Create New Data Source* dialog box; and

d. click on **Finish**.

3. In the *ODBC Microsoft Access Setup* dialog box, type `Northwind` in the *Data Source Name* field and click on **Select...**. Locate the `Northwind.mdb` database and click on **OK** to finish creating the data source.

Using Windows 7, follow these steps to create an ODBC User Data Source for the `Northwind` sample database:

1. From the *Start Menu*, select the *Control Panel*.
2. In the *Control Panel* window, click on *System and Security* > *Administrative Tools*.
3. In the *Data Sources (ODBC)* dialog box,

   a. click on the *User DSN* tab;

   b. click on **Add...**;

   c. choose *Microsoft Access Driver (*.mdb,*.accdb)* on the *Create New Data Source* dialog box; and

   d. click on **Finish**.

4. In the *ODBC Microsoft Access Setup* dialog box, type `Northwind` in the *Data Source Name* field and click on **Select...**. Locate the `Northwind.mdb` database and click on **OK** to finish creating the data source.

❑ Technical note

In earlier versions of Windows, the exact location of the *Data Source (ODBC)* dialog varies, but it is always somewhere within the *Control Panel*.

❑

Listing ODBC data source names

`odbc list` is used to produce a list of data source names to which Stata can connect. For a specific data source name to be shown in the list, the data source has to be registered with the *ODBC Data Source Administrator*. See *Setting up the data sources* for information on how to do this.

▷ Example 1

```
. odbc list
Data Source Name                Driver
------------------------------------------------------------------------------
dBASE Files                     Microsoft Access dBASE Driver (*.dbf, *.ndx
Excel Files                     Microsoft Excel Driver (*.xls, *.xlsx, *.xl
MS Access Database              Microsoft Access Driver (*.mdb, *.accdb)
Northwind                       Microsoft Access Driver (*.mdb, *.accdb)
------------------------------------------------------------------------------
```

In the above list, `Northwind` is one of the sample Microsoft Access databases that Access installs by default.

◁

Listing available table names from a specified data source's system catalog

`odbc query` is used to list table names available from a specified data source.

▷ Example 2

```
. odbc query "Northwind"
DataSource: Northwind
Path      : C:\Program Files\Microsoft Office\Office\Samples\Northwind.accdb
-------------------------------------------------------------------------------
Customers
Employee Privileges
Employees
Inventory Transaction Types
Inventory Transactions
Invoices
Order Details
Order Details Status
Orders
Orders Status
Orders Tax Status
Privileges
Products
Purchase Order Details
Purchase Order Status
Purchase Orders
Sales Reports
Shippers
Strings
Suppliers
-------------------------------------------------------------------------------
```

◁

Describing a specified table

odbc describe is used to list column (variable) names and their SQL data types that are associated with a specified table.

▷ Example 3

Here we specify that we want to list all variables in the Employees table of the Northwind data source.

```
. odbc describe "Employees", dsn("Northwind")
DataSource: Northwind (query)
Table:      Employees (load)
```

Variable Name	Variable Type
ID	COUNTER
Company	VARCHAR
Last Name	VARCHAR
First Name	VARCHAR
E-mail Address	VARCHAR
Job Title	VARCHAR
Business Phone	VARCHAR
Home Phone	VARCHAR
Mobile Phone	VARCHAR
Fax Number	VARCHAR
Address	LONGCHAR
City	VARCHAR
State/Province	VARCHAR
ZIP/Postal Code	VARCHAR
Country/Region	VARCHAR
Web Page	LONGCHAR
Notes	LONGCHAR
Attachments	LONGCHAR

◁

Loading data from ODBC sources

odbc load is used to load an ODBC table into memory.

To load an ODBC table listed in the odbc query output, specify the table name in the table() option and the data source name in the dsn() option.

▷ Example 4

We want to load the Employees table from the Northwind data source.

```
. clear
. odbc load, table("Employees") dsn("Northwind")
E-mail_Address invalid name
 - converted E-mail_Address to var5
State/Province invalid name
 - converted State/Province to var13
ZIP/Postal_Code invalid name
 - converted ZIP/Postal_Code to var14
Country/Region invalid name
 - converted Country/Region to var15
```

```
. describe
Contains data
 Observations:             9
    Variables:            18
```

Variable name	Storage type	Display format	Value label	Variable label
ID	long	%12.0g		
Company	str17	%17s		
Last_Name	str14	%14s		Last Name
First_Name	str7	%9s		First Name
var5	str28	%28s		E-mail Address
Job_Title	str21	%21s		Job Title
Business_Phone	str13	%13s		Business Phone
Home_Phone	str13	%13s		Home Phone
Mobile_Phone	str1	%9s		Mobile Phone
Fax_Number	str13	%13s		Fax Number
Address	strL	%9s		
City	str8	%9s		
var13	str2	%9s		State/Province
var14	str5	%9s		ZIP/Postal Code
var15	str3	%9s		Country/Region
Web_Page	strL	%9s		Web Page
Notes	strL	%9s		
Attachments	strL	%9s		

```
Sorted by:
     Note: Dataset has changed since last saved.
```

❑

❑ Technical note

When Stata loads the ODBC table, data are converted from SQL data types to Stata data types. Stata does not support all SQL data types. If the column cannot be read because of incompatible data types, Stata will issue a note and skip a column. The following table lists the supported SQL data types and their corresponding Stata data types:

SQL data type	Stata data type
SQL_BIT	byte
SQL_TINYINT	
SQL_SMALLINT	int
SQL_INTEGER	long
SQL_DECIMAL	double
SQL_NUMERIC	
SQL_FLOAT	double
SQL_DOUBLE	
SQL_REAL	double
SQL_BIGINT	string
SQL_CHAR	string
SQL_VARCHAR	
SQL_LONGVARCHAR	
SQL_WCHAR	
SQL_WVARCHAR	
SQL_WLONGVARCHAR	
SQL_TIME	
SQL_DATE	
SQL_TIMESTAMP	
SQL_TYPE_TIME	double
SQL_TYPE_DATE	
SQL_TYPE_TIMESTAMP	
SQL_BINARY	
SQL_VARBINARY	
SQL_LONGVARBINARY	

❑

You can also load an ODBC table generated by an SQL SELECT statement specified in the `exec()` option.

▷ Example 5

Suppose that, from the `Northwind` data source, we want a list of all the customers who have placed orders. We might use the SQL SELECT statement

```
SELECT DISTINCT c.ID, c.Company
FROM Customers c
INNER JOIN Orders o
        ON c.[Customer ID] = o.CustomerID
```

To load the table into Stata, we use `odbc load` with the `exec()` option.

```
. odbc load, exec(‘"SELECT DISTINCT c.ID, c.Company FROM Customers c INNER JOIN
> Orders o ON c.ID = o.[Customer ID]"’) dsn("Northwind") clear
. describe
Contains data
 Observations:            15
    Variables:             2
-------------------------------------------------------------------------------
Variable      Storage   Display    Value
    name         type    format    label      Variable label
-------------------------------------------------------------------------------
ID              long    %12.0g
Company         str10   %10s
-------------------------------------------------------------------------------
Sorted by:
     Note: Dataset has changed since last saved.
```

The *extvarlist* is optional. It allows you to choose which columns (variables) are to be read and to rename variables when they are read.

Example 6

Suppose that we want to load the `ID` column and the `Last Name` column from the `Employees` table of the `Northwind` data source. Moreover, we want to rename `ID` as `id` and `Last Name` as `name`.

```
. odbc load id=ID name="Last Name", table("Employees") dsn("Northwind") clear
. describe
Contains data
 Observations:             9
    Variables:             2
-------------------------------------------------------------------------------
Variable      Storage   Display    Value
    name         type    format    label      Variable label
-------------------------------------------------------------------------------
id              long    %12.0g                ID
name            str14   %14s                  Last Name
-------------------------------------------------------------------------------
Sorted by:
     Note: Dataset has changed since last saved.
```

The `if` and `in` qualifiers allow you to choose which rows are to be read. You can also use a `WHERE` clause in the SQL SELECT statement to select the rows to be read.

▷ Example 7

Suppose that we want the information from the `Order Details` table, where `Quantity` is greater than 50. We can specify the `if` and `in` qualifiers,

```
. odbc load if Quantity>50, table("Order Details") dsn("Northwind") clear
. sum Quantity
    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
    Quantity |         10       177.7    94.21966        87        300
```

or we can issue the SQL SELECT statement directly:

```
. odbc load, exec("SELECT * FROM [Order Details] WHERE Quantity>50")
> dsn("Northwind") clear
. sum Quantity
    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
    Quantity |         10       177.7    94.21966        87        300
```

◁

▷ Example 8

To use `odbc insert`, you must have an SQL table already created in your data source. If you do not, you can use `odbc exec` to create a table in your data source. For example, one might create a table in an Oracle database with the SQL command below:

```
#delimit ;
local cols '"  ID  NUMBER(5,0),
             PAY NUMBER(8,2),
           TITLE NVARCHAR2(18),
        LOCATION VARCHAR(40)"; ;
#delimit cr
odbc exec('"CREATE TABLE JOB_TYPES ('cols');"'), dsn(oracle_dsn) ///
       user(username) password(password)
```

You must create a table using the correct data type for each table column for your data to transfer correctly. Note that the SQL syntax to create a table differs across data sources, as do column data types.

◁

Reference

Crow, K. 2017. Importing WRDS data into Stata. *The Stata Blog: Not Elsewhere Classified.* https://blog.stata.com/2017/09/19/importing-wrds-data-into-stata/.

Also see

[D] **jdbc** — Load, write, or view data from a database with a Java API

[D] **export** — Overview of exporting data from Stata

[D] **import** — Overview of importing data into Stata