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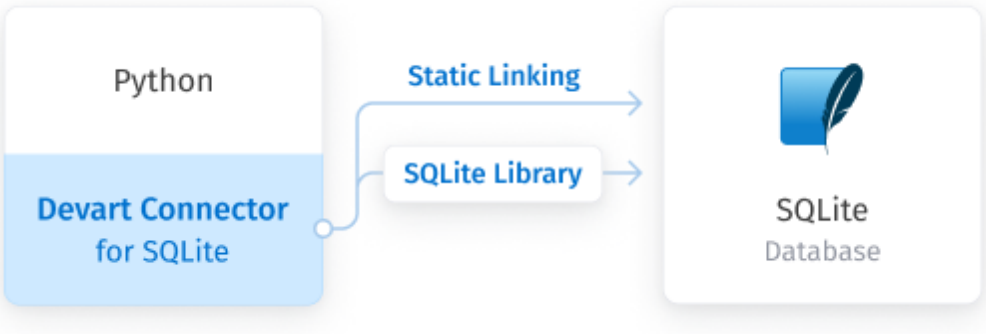
1 Overview

Overview

Python Connector for SQLite is a connectivity solution for accessing SQLite databases from Python applications. It fully implements the Python DB API 2.0 specification. The connector is distributed as a wheel package for Windows, macOS, and Linux.

Direct connection

The connector supports two SQLite library linking modes: static linking and dynamic linking. Static linking enables a direct connection to SQLite, so you don't have to deploy the SQLite libraries on user workstations. You can use the built-in encryption capabilities in the Direct mode to protect your data from unauthorized access—the statically linked library provides SQLite database encryption without requiring you to purchase an encryption extension.



Compatibility

- Python versions from 3.7 to 3.12
- SQLite version 3.x
- SQLAlchemy
- pandas
- petl

Supported platforms

- Windows 32-bit and 64-bit
- Windows Server 32-bit and 64-bit
- macOS 64-bit and ARM (Apple M1 and M2)
- Linux 64-bit

Note: For details on supported OS versions, check the compatibility page of your Python version.

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2 What's new

Python Connector for SQLite 1.0

- Initial release of Python Connector for SQLite
- Added support for Windows 32-bit and 64-bit
- Added support for Windows Server 32-bit and 64-bit
- Added support for macOS 64-bit and ARM (Apple M1 and M2)
- Added support for Linux 64-bit

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3 Install the connector

3.1 Windows

Install the connector on Windows

1. Download the zip archive.
2. Extract the contents of the archive.
3. Open Command Prompt.
4. Verify that you have the pip package installer on your system using the `py -m pip --version` command. If you don't have it, run the following command to install pip.

```
python -m ensurepip --upgrade
```

5. In Command Prompt, navigate to the directory that contains the extracted wheel packages.
6. Install the package:
   - Windows 32-bit

```
pip install devart_sqlite_connector-1.0.1-cp312-cp312-win32.whl
```

   - Windows 64-bit

```
pip install devart_sqlite_connector-1.0.1-cp312-cp312-win_amd64.whl
```


3.2 Linux

Install the connector on Linux

1. Download the zip archive.
2. Extract the contents of the archive.
3. Open a terminal window.
4. Verify that you have the pip package installer on your system using the `py -m pip --version` command. If you don't have it, run the following command to install pip.

```
python -m ensurepip --upgrade
```

5. In terminal, navigate to the directory that contains the extracted wheel package.
6. Install the package.

```
pip install devart_sqlite_connector-1.0.1-cp312-cp312-manylinux_2_34_x86_64.
```


3.3 macOS

Install the connector on macOS

1. Download the zip archive.

2. Extract the contents of the archive.

3. Open a terminal window.

4. Verify that you have the pip package installer on your system using the `py -m pip --version` command. If you don't have it, run the following command to install pip.

```
python -m ensurepip --upgrade
```

5. In terminal, navigate to the directory that contains the extracted wheel package.

6. Install the package.

```
pip install devart_sqlite_connector-1.0.1-cp312-cp312-macosx_10_9_universal2
```


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4 Using the module

Using the module

To retrieve data from a database:

1. Import the module.

```
import devart.sqlite
```

2. Connect to a database using the `connect()` module method and obtain a `connection` object:

- If you're using the Direct mode:

```
my_connection = devart.sqlite.connect(
    Direct=True,
    Database="your_database"
)
```

- If you're using a dynamically linked SQLite client library:

```
my_connection = devart.sqlite.connect(
    Direct=False,
    Database="your_database",
    ClientLibrary="your_sqlite_lib"
```

```
)
```

3. Create a `cursor` object using the `cursor()` connection method.

```
my_cursor = my_connection.cursor()
```

4. Execute the SQL statement using the `execute()` cursor method.

```
my_cursor.execute("SELECT * FROM employees")
```

5. Retrieve the result set using one of the `fetch*()` cursor methods.

```
for row in my_cursor.fetchall():
    print(row)
```


5 Connection parameters

Connection parameters

The following table lists SQLite connection parameters you can use in the `connect()` module method.

Parameter	Description
`Database`	The path to the SQLite database file
`Direct`	Enables a direct connection to the database, which doesn't require the SQLite client library. The default value is `True`.
`EncryptionAlgorithm`	The encryption algorithm for accessing an encrypted database. The possible values are: • `TripleDES` • `Blowfish` • `AES128` • `AES192` • `AES256`

	• Cast128 • RC4
EncryptionKey	The encryption key for accessing an encrypted database
ClientLibrary	The path to the SQLite library. This parameter is available when Direct is set to False.
ForceCreateDatabase	Specifies whether to create a database when opening a connection if the database specified in the Database parameter doesn't exist. The default value is False.
ConnectMode	The connection mode. The possible values are: • Default – (Default) Open a database in the default mode. • ReadWrite – Open a database for reading and writing. • ReadOnly – Open the database in read-only mode.
LockingMode	The database locking mode. The possible values are: • Normal – (Default) The database connection unlocks the database file after each read or write transaction. • Exclusive – The database connection never releases file locks. The first time the database is read or written in this mode, a shared lock is obtained and held. Use this mode to prevent other processes from accessing the database file, reduce the number of filesystem operations, or access WAL databases without using the shared memory.
JournalMode	The journal mode. The possible values are: • Default – If the database was previously opened in the WAL mode, then Default will open the database in the WAL mode. Otherwise, the database will be opened in the Delete mode. • Delete – The rollback journal is deleted after each transaction. • Truncate – Commit transactions by truncating the rollback journal to zero-length instead of deleting it. On many systems, truncating a

	file is much faster than deleting the file since the containing directory doesn't need to be changed. • `Persist` – The rollback journal file isn't deleted when the transaction is committed. The journal header is filled with zeroes to prevent other connections from rolling back from the journal. This mode optimizes performance on platforms where deleting or truncating a file is much more expensive than overwriting the first block of a file with zeros. • `Memory` – The rollback journal is stored in volatile RAM. This reduces the disk I/O but decreases database safety and integrity. If the application using SQLite crashes in the middle of a transaction in this mode, the database file is likely to become corrupt. • `WAL` – A write-ahead log is used instead of a rollback journal to implement transactions. When a database is updated, the original content is preserved in the database file, and the changes are appended in a separate WAL file. All the transactions that are appended in the WAL file are eventually transferred back into the original database. • `Off` – The rollback journal is completely disabled. No rollback journal is created, and there's no rollback journal to delete. The ROLLBACK command doesn't work — it behaves in an undefined way. Avoid using the ROLLBACK command when the journal mode is disabled.
`Synchronous`	The database synchronization mode. The possible values are: • `Normal` – (Default) The database engine still syncs at the most critical moments but less often than in the FULL mode. The Normal mode is faster than the Full mode. When using the WAL mode (and probably the DELETE mode) with synchronous=NORMAL, data is safe from corruption. The synchronous=NORMAL setting is a

	reasonable choice for most applications running in the WAL mode. • `Full` – The database engine ensures that all content is safely written to disk before continuing. This preserves database integrity even in case of an operating system failure or power outage. It is a safe but slower mode, and is most commonly used when not in the WAL mode. • `Extra` – This mode is similar to the FULL mode, but in the DELETE mode, the directory containing the rollback journal is synced after that journal is unlinked to commit a transaction. This provides additional durability if a power outage occurs right after the commit. • `Off` – The database engine continues without syncing after handing data off to the operating system. If the application running SQLite crashes, the data will save unless the operating system crashes or the computer loses power before data has been written to disk, in which case the database might become corrupted. This is the fastest mode.

6 Connection pooling

Connection pooling

Connecting to a database server typically consists of several time-consuming steps. Connection pooling can significantly improve the performance and scalability of an application by reducing the number of times that new database connections must be opened. This is particularly useful for applications that involve many connect/disconnect operations. Connection pooling uses a cache of database connections, which enables an application to reuse a connection from a pool instead of opening a new connection when future requests to the database are required.

When you close a connection object using the `close()` method, the connection remains alive

and is added to a pool. When a new connection object is created with the `connect()` method, the module returns an existing connection from the pool if the connection pooler hasn't detected the severed connection and marked it as invalid. A new connection will be established if the pool is empty or doesn't have a valid connection.

To enable connection pooling, set the value of the `connection_pool.enabled` module attribute to `True`. Additional options include `connection_pool.min_size`, `connection_pool.max_size`, `connection_pool.lifetime`, and `connection_pool.validate`. For more information about these attributes, see the connection pool class.

The following example sets the attributes for the default connection pool, which implicitly has the ID `0`.

```
devart.sqlite.connection_pool.min_size = 0
devart.sqlite.connection_pool.max_size = 1000
devart.sqlite.connection_pool.lifetime = 60000
devart.sqlite.connection_pool.validate = True
devart.sqlite.connection_pool.enabled = True
```

You can define several connection pools with different settings. To define settings for a connection pool with a particular ID, use the syntax `connection_pool[pool_id: int]`, where `pool_id` is the ID of the pool. You can also pass the the `PoolId` connection string parameter to specify which connection pool will be used for a particular connection.

```
devart.sqlite.connection_pool[42].max_size = 100
devart.sqlite.connection_pool[42].lifetime = 120000
devart.sqlite.connection_pool.enabled = True
my_connection = devart.sqlite.connect("Direct=True;Database=your_database",P
```

Database connections belong to the same pool when they have identical parameters in the connection string. Two connections with different connection string parameters will be placed into separate pools with the same identifiers. The connector creates a separate pool when a new connection has the same pool ID as an existing pool but different connection parameters.

The `connection_pool.enabled` attribute is global. If pooling is enabled, all new connections will be pooled. Pooling can be disabled for a particular connection using the `DisablePooling=True` connection string parameter.

```
my_connection = devart.sqlite.connect("Direct=True;Database=your_database",D
```

Database connections in a pool are validated every 30 seconds to ensure that a broken

connection won't be returned from the pool when a connection object is constructed. Invalid connections are destroyed. The connection pooler also validates connections when they are added or released back into the pool (for example, when you call the `connection.close()` method).

If you set the `validate` attribute to `True`, connections will also be validated when they're drawn from the pool. In the event of a network issue, all connections to a database may become broken. Therefore, if a fatal error is detected in one connection from the pool, the pooler will validate all connections in the pool.

The pooler removes a connection from the pool after it's been idle for approximately 4 minutes. If no new connections are added to the pool during this time, it becomes empty to save the resources. If you set the `min_size` attribute to a non-zero value, the pool won't destroy all idle connections and become empty unless the remaining connections are marked as invalid.

The `max_size` pool attribute limits the number of connections that can be stored in a pool at the same time. When the maximum number of connections in a pool is reached, all future database connections will be destroyed once the connection object releases them.

You can limit the connection lifetime using the `lifetime` attribute. When a connection object is closed, and a database connection is returned to the pool, the creation time of the connection is compared with the current time, and the connection is destroyed if that timespan exceeds the lifetime value. This technique serves for load balancing.

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7 Database encryption

Database encryption

The SQLite database engine provides the ability to work with encrypted databases. SQLite performs low-level encryption or decryption on the fly during read/write operations. These operations are completely transparent to the application accessing the database. The official SQLite library doesn't support database encryption by default; you need to use a custom version of SQLite with encryption extensions or the built-in encryption capabilities in our connector.

The connector provides built-in encryption capabilities in the Direct mode, which enables you to encrypt a database, connect to an encrypted database, change the encryption key, or decrypt a database.

Note: There're no standard requirements for implementing SQLite database encryption. The implementation of database encryption in the connector is only compatible with other Devart products for SQLite: ODBC Driver, dotConnect, LiteDAC, and UniDAC. The connector can work with databases that were encrypted by itself or other Devart products.

The `PRAGMA ENCRYPTION` statement specifies the encryption algorithm that will be used to encrypt a database. The statement cannot be executed against an encrypted database—you must decrypt it first. The following encryption algorithms are supported: `TripleDES`, `Blowfish`, `AES128`, `AES192`, `AES256`, `Cast128`, `RC4`.

The `PRAGMA REKEY` statement is used to encrypt a database, change the encryption key of an encrypted database, or decrypt a database.

Encrypt a database

Connect to the database in the Direct mode and execute the `PRAGMA ENCRYPTION` and `PRAGMA REKEY` statements.

```
connection = devart.sqlite.connect("Direct=True;Database=your_database;")
cursor = connection.cursor()
cursor.execute("PRAGMA ENCRYPTION=AES256")
cursor.execute("PRAGMA REKEY='your_key'")
```

Connect to an encrypted database

Enable the Direct mode and specify the `EncryptionAlgorithm` and `EncryptionKey` in the connection string.

```
connection = devart.sqlite.connect("Direct=True;Database=your_database;Encry
```

Change the encryption key

Connect to the database in the Direct mode and execute the `PRAGMA REKEY` statement with a new encryption key.

```
connection = devart.sqlite.connect("Direct=True;Database=your_database;Encry
connection.cursor().execute("PRAGMA REKEY='your_new_key'")
```

Decrypt a database

Connect to the database in the Direct mode and execute the `PRAGMA REKEY` statement with an empty value.

```
connection = devart.sqlite.connect("Direct=True;Database=your_database;Encry
connection.cursor().execute("PRAGMA REKEY=''")
```


8 Data types

Data types

The following table describes the supported SQLite data types and their mapping to the Python data types. The type codes returned in the `description` cursor attribute can be used in the `addtypecast()` cursor method.

SQLite data type	Type code	Python data type
INT8	613	int
TINYINT	606	int
INT2	607	int
SMALLINT	608	int
INT	609	int
INTEGER	601	int
MEDIUMINT	610	int
INT64	614	int
BIGINT	611	int
UNSIGNED BIGINT	612	int
REAL	602	float
FLOAT	618	float
DOUBLE	619	float
CHAR	615	str
VARCHAR	616	str

TEXT	603	str
DATE	627	datetime.date
TIME	628	datetime.time
DATETIME	629	datetime.datetime
TIMESTAMP	630	datetime.datetime
BLOB	604	binary
BINARY	604	binary

Special data type

Python Connector for SQLite provides a special data type for fetching columns with optional or user-defined data type names in column definitions.

SQLite data type	Type code	Python data type
UNKNOWN	605	str

9 Class reference

9.1 Module class

Module class

The `module` class provides methods, global properties, exceptions, constructors, and type objects to be used by all connections created in the module.

- Methods
  - connect()
- Globals
  - apilevel
  - threadsafety
  - paramstyle

- Exceptions
  - Warning
  - Error
  - InterfaceError
  - DatabaseError
  - DataError
  - OperationalError
  - IntegrityError
  - InternalError
  - ProgrammingError
  - NotSupportedError
- Constructors
  - Date()
  - Time()
  - Timestamp()
  - DateFromTicks()
  - TimeFromTicks()
  - TimestampFromTicks()
  - Binary()
- Type objects
  - STRING
  - BINARY
  - NUMBER
  - DATETIME
  - ROWID
  - binary

Methods

`connect(connection string|connection parameters)`

Creates a new connection to the database.

Arguments

`connection string`

A string literal of form `"parameter=value;parameter=value"`

`connection parameters`

A sequence of named parameters

Connection parameters

For the full list of supported connection parameters, see Connection parameters.

Return value

Returns a `connection` object.

Code sample

```
# establising a connection using a connection string
connection1 = devart.sqlite.connect("Direct=True;Database=your_database")
# establising a connection using named parameters
connection2 = devart.sqlite.connect(
    Database="your_database"
)
```

Globals

`apilevel`

Indicates the DB API level supported by the module. Returns a string value `"2.0"`.

`threadsafety`

Indicates the thread safety level of the module. Returns an integer value `2` that means that threads may share the module and connections.

`paramstyle`

Indicates the type of parameter marker formatting expected by the module. Returns a string value `"named"` that means that the module supports named style parameters, for example, `...WHERE name=:name`.

Exceptions

The module provides the following exceptions to make all error information available.

`Warning`

This exception is raised for important warnings like data truncations while inserting, etc. The `Warning` exception is a subclass of the Python `Exception` class.

`Error`

This exception is the base class of all error exceptions. You can use it to catch all errors with a single `except` statement. The `Error` exception is a subclass of the Python `Exception` class.

`InterfaceError`

This exception is raised for errors that are related to the database interface rather than the database itself. The `InterfaceError` exception is a subclass of `Error`.

`DatabaseError`

This exception is raised for errors that are related to the database. The `DatabaseError` exception is a subclass of `Error`.

`DataError`

This exception is raised for errors caused by issues with the processed data like division by zero, numeric value out of range, etc. The `DataError` exception is a subclass of `DatabaseError`.

`OperationalError`

This exception is raised for errors that are related to the database operation and not necessarily under the control of the developer, for example, an unexpected disconnect occurs, the data source name isn't found, a transaction couldn't be processed, a memory allocation error occurred during processing, etc. The OperationalError exception is a subclass of `DatabaseError`.

`IntegrityError`

This exception raised when the relational integrity of the database is affected, for example, a foreign key check fails. The `IntegrityError` exception is a subclass of `DatabaseError`.

InternalError

This exception is raised when the database encounters an internal error, for example, the cursor isn't valid anymore, the transaction is out of sync, etc. The InternalError exception is a subclass of DatabaseError.

ProgrammingError

This exception is raised for programming errors, for example, table not found or already exists, syntax error in the SQL statement, wrong number of parameters specified, etc. The ProgrammingError exception is a subclass of DatabaseError.

NotSupportedError

This exception is raised when a method or database API isn't supported by the database, for example, requesting a rollback() on a connection that doesn't support transactions or has transactions turned off. The NotSupportedError exception is a subclass of DatabaseError.

The complete exception inheritance tree looks as follows.
Exception

Warning

Error

InterfaceError

DatabaseError

DataError

OperationalError

IntegrityError

InternalError

ProgrammingError

NotSupportedError

Constructors

The module provides the following constructors for creating date/time objects. The created date/time objects are implemented as Python `datetime` module objects.

`Date(year, month, day)`

Creates an object that holds a date value.

Arguments

`year`

`month`

`day`

Values of type `int` that specify the year, month, and day.

Return value

Returns a `datetime.date` object.

`Time(hour, minute, second[, timezone])`

Creates an object that holds a time value.

Arguments

`hour`

`minute`

Values of type `int` that specify hours and minutes.

`second`

An `int` value that specifies seconds or a `float` value that specifies seconds and microseconds.

`timezone`

(Optional) A value of type `datetime.tzinfo` that specifies a timezone. The value can be

`None`.

Return value

Returns a `datetime.time` object.

`Timestamp(year, month, day[, hour[, minute[, second[, timezone]]]])`

Creates an object that holds a timestamp value.

Arguments

`year`

`month`

`day`

Values of type `int` that specify the year, month, and day.

`hour`

`minute`

(Optional) Values of type `int` that specify hours and minutes.

`second`

(Optional) An `int` value that specifies seconds or a `float` value that specifies seconds and microseconds.

`timezone`

(Optional) A value of type `datetime.tzinfo` that specifies a timezone. The value can be `None`.

Return value

Returns a `datetime.datetime` object.

`DateFromTicks(ticks)`

Creates an object that holds a date value from the given ticks value (the number of seconds since the Unix epoch). For more information, see the `time` module in the standard Python documentation.

Arguments

`ticks`

A value of type `float` that specifies number of seconds since the Unix epoch.

Return value

Returns a `datetime.date` object.

`TimeFromTicks(ticks)`

Creates an object that holds a time value from the given ticks value (number of seconds since the Unix epoch). For more information, see the `time` module in the standard Python documentation.

Arguments

`ticks`

A value of type `float` that specifies number of seconds since the Unix epoch.

Return value

Returns a `datetime.time` object.

`TimestampFromTicks(ticks)`

Creates an object that holds a timestamp value from the given ticks value (number of seconds since the Unix epoch). For more information, see the `time` module in the standard Python documentation.

Arguments

`ticks`

A value of type `float` that specifies number of seconds since the Unix epoch.

Return value

Returns a `datetime.datetime` object.

The module provides the following additional constructors.

`Binary(value)`

Creates an object that holds binary data.

Arguments

`value`

A value of type `str`, `bytes`, `bytearray`, `array.array`, or a `binary` object.

Return value

Returns a `binary` object.

Type objects

The module provides the following type objects to create mapping between the SQLite database types and Python types. You can use these type objects as arguments for the `addtypecast()` cursor method to define a data type cast rule to use when fetching data from the cursor. They can also be used to determine the Python types of the result columns returned by the `execute*()` cursor methods.

`STRING`

This type object describes string-based columns in a database .

`BINARY`

This type object describes binary columns in a database.

`NUMBER`

This type object describes numeric columns in a database.

`DATETIME`

This type object describes date/time columns in a database.

`ROWID`

This type object describes the `row ID` column in a database.

Code sample

```
cursor.execute("select column1 from table1")
# check if the first column in the result set is string-based so that its va
if cursor.description[0].type_code in postgresql.STRING:
    # do something
```

The module provides the following additional type objects.

`binary`

This type object describes an object that holds binary data. By default, this type object is used to fetch BLOB-based columns from the cursor. You can also create a `binary` object using the `Binary()` constructor.

Attributes

`value`

A value of type `bytes` that represents binary data. This is a read/write attribute that accepts values of type `str`, `bytes`, `bytearray`, `array.array`, and `binary`.

9.2 Connection class

Connection class

The `connection` class encapsulates a database session. It provides methods for creating cursors, type casting, and transaction handling. Connections are created using the `connect()` module method.

Methods

`cursor()`

Creates a new cursor object, which is used to manage the context of fetch operations.

Arguments

This method has no arguments.

Return value

Returns a `cursor` object.

`commit()`

Commits any pending transaction to the database.

Arguments

This method has no arguments.

`rollback()`

Causes the database to roll back any pending transaction.

Arguments

This method has no arguments.

Remarks

Closing a connection without first committing changes causes an implicit rollback.

`addtypecast(database type|module type object|column name|description|dictionary[, Python type])`

Defines a data type cast rule to use when fetching data from the cursor.

Arguments

`database type`

An `int` value that specifies the database data type code. You can also pass multiple data type codes in a `tuple` or `list`.

`module type object`

A `module type object` that specifies the family of the database data types.

`column name`

A string literal that specifies the name of the database column. You can also pass multiple string literals in a `tuple` or `list`.

`description`

A `description` object that describes the column in a rowset. You can also pass multiple objects in a `tuple` or `list`.

`dictionary`

A `dictionary` of pairs `column name:Python type` that specifies individual cast rules for a set of columns. The method argument `Python type` can be omitted.

`Python type`

A Python type object that specifies the target type to which to cast the database type, or an `int` value which means that the column will be of type `str` and defines its maximum length.

Code sample

```
connection = devart.sqlite.connect("Direct=True;Database=your_database")
# all database columns with data type code  (SQLite database type ) will be
connection.addtypecast(, int)
# all numeric database columns will be fetched as strings
connection.addtypecast(devart.sqlite.NUMBER, str)
# data of "column1" will be fetched as a string
connection.addtypecast("column1", str)
# data of "column2" will be fetched as `int` and data of "column3" will be f
connection.addtypecast({"column2":int, "column3":50})
```

Remarks

The cast rule affects all cursors created within the connection. To define a cast rule for a particular cursor, use the `addtypecast()` cursor method. The type code of a database column can be obtained from the `type_code` attribute of the corresponding element of the `description` cursor attribute.

`cleartypecast()`

Removes all data type cast rules defined for the connection.

Arguments

This method has no arguments.

Remarks

This method doesn't remove cast rules defined for a particular cursor using the `addtypecast()` cursor method.

`close()`

Closes the connection.

Arguments

This method has no arguments.

Remarks

The connection becomes unusable after calling this method. The `InterfaceError` exception is raised if any operation is attempted with the connection. The same applies to all cursor objects trying to use the connection. Closing a connection prior to committing changes causes an implicit rollback.

Attributes

`connectstring`

A read-only attribute that returns a string literal of the form `"parameter=value;parameter=value"` that contains the parameters for the current connection.

Exceptions

The `connection` class provides a set of exception classes that exactly match the module exceptions. This simplifies error handling in environments with multiple connections.

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9.3 Cursor class

Cursor class

The `cursor` class represents a database cursor, which is used to manage the context of fetch operations. This class provides methods for executing SQL statements and operating rowsets. Cursors are created using the `cursor()` connection method.

- Methods
  - setinputsizes()
  - execute()
  - executemany()
  - fetchone()
  - fetchmany()
  - fetchall()
  - next()
  - scroll()
  - addtypecast()
  - cleartypecast()
  - close()

Methods

`setinputsizes([sizes])`

Predefines the types of parameters for the further call to the `execute*()` method.

Arguments

`sizes`

(Optional) A sequence (`list` or `tuple`) with one item for each input parameter. The item should be a type object that defines the type of the input parameter, or an integer value specifying the maximum length of the string parameter. If the item is `None`, the parameter type is determined by the value provided in the `execute*()` method.

Remarks

Once set, the types of parameters are retained on subsequent calls to the `execute*()` method until the cursor is closed by calling `close()`. To clear the set parameter types, call the method with no arguments.

Code sample

```
cursor = connection.cursor()
# in the further call to cursor.execute() the supplied parameters will be tr
cursor.setinputsizes(int, float, 20)
```

`execute(operation[, parameters])`

Prepares and executes a database operation.

Arguments

`operation`

A string literal that specifies the database command (SQL statement) to be executed.

`parameters`

(Optional) A sequence (`list` or `tuple`) of values to be bound to the corresponding parameters of the operation.

Code sample

```
cursor = connection.cursor()
cursor.execute("create table test_table(column1 , column2 )")
cursor.execute("insert into test_table(column1, column2) values(:parameter1,
```

Remarks

The types of the input parameters can be pre-specified using the `setinputsizes()` method. To execute a batch operation that affects multiple rows in a single operation, use the `executemany()` method.

`executemany(operation[, sequence of parameters])`

Prepares and executes a batch database operation.

Arguments

`operation`

A string literal that specifies the database command (SQL statement) to be executed.

`parameters`

(Optional) A sequence (`list` or `tuple`) of sequences of values, each of which is to be bound to the corresponding parameter of the operation.

Code sample

```
cursor = connection.cursor()
```

```
cursor.execute("create table test_table(column1 , column2 )")
cursor.executemany("insert into test_table(column1, column2) values(:paramet
```

Remarks

The types of the input parameters can be pre-specified using the `setinputsizes()` method. This method is significantly faster than executing the `execute()` method in a loop.

fetchone()

Fetches the next row of a query result set.

Arguments

This method has no arguments.

Return value

Returns a single `tuple` that contains values for each queried database column, or `None` when no more data is available.

Remarks

The `ProgrammingError` exception is raised if the previous call to the `execute*()` method didn't produce any result set, or no call was made yet.

fetchmany([size=cursor.arraysize])

Fetches the next set of rows of a query result.

Arguments

`size`

(Optional) The number of rows to fetch per call. If the number isn't specified, the `arraysize` attribute determines the number of rows to be fetched.

Return value

Returns a `list` of `tuples` for each result row. Each `tuple` contains values for each queried database column. An empty `list` is returned when no more rows are available.

Remarks

The `ProgrammingError` exception is raised if the previous call to the `execute*()` method didn't produce any result set, or no call was made yet.

`fetchall()`

Fetches all remaning rows of a query result.

Arguments

This method has no arguments.

Return value

Returns a `list` of `tuples` for each result row. Each `tuple` contains values for each queried database column. An empty `list` is returned when no more rows are available.

Remarks

This method returns as many rows as are left in the result set, regardless of the `arraysize` value. The `ProgrammingError` exception is raised if the previous call to the `execute*()` method didn't produce any result set or no call was made yet.

`next()`

Returns the next row from the currently executed SQL statement.

Arguments

This method has no arguments.

Return value

Returns a single `tuple` that contains values for each queried database column.

Remarks

This method uses the same semantics as `fetchone()`, except that the standard `StopIteration` exception is thrown if no more rows are available.

`scroll(value[, mode='relative'])`

Scrolls the cursor in the result set to a new position.

Arguments

`value`

An `int` value that specifies the new cursor position.

`mode`

(Optional) The value can be either `relative` or `absolute`. If the `mode` is `relative` (the default value), the `value` is taken as offset to the current position in the result set. If the `mode` is set to `absolute`, the `value` states an absolute target position.

Remarks

The `IndexError` exception is raised in case a scroll operation attempts to access an item beyond bounds of the result set. In this case, the cursor position is left unchanged.

`addtypecast(database type|module type object|column name|description|dictionary[, Python type])`

Defines a data type cast rule to use when fetching data from the cursor.

Arguments

`database type`

An `int` value that specifies the database data type code. You can also pass multiple data type codes in a `tuple` or `list`.

`module type object`

A `module type object` that specifies the family of the database data types.

`column name`

A string literal that specifies the name of the database column. You can also pass multiple string literals in a `tuple` or `list`.

`description`

A `description` object that describes the column in a rowset. You can also pass multiple objects in a `tuple` or `list`.

`dictionary`

A `dictionary` of pairs `column name:Python type` that specifies individual cast rules for a set of columns. The method argument `Python type` can be omitted.

`Python type`

A Python type object that specifies the target type to which to cast the database type, or an `int` value which means that the column will be of type `str` and defines its maximum length.

Remarks

The cast rule affects only the current cursor. To define the cast rule for all cursors created within the connection, use the `addtypecast()` connection method. The type code of a database column can be obtained from the `type_code` attribute of the corresponding element of the `description` attribute.

Code sample

```
cursor = connection.cursor()
# all database columns with data type code  (SQLite database type ``) will b
cursor.addtypecast(, int)
# all numeric database columns will be fetched as strings
cursor.addtypecast(sqlite.NUMBER, str)
# data of "column1" will be fetched as a string
cursor.addtypecast("column1", str)
# data of "column2" will be fetched as `int` and data of "column3" will be f
cursor.addtypecast({"column2":int, "column3":50})
```

`cleartypecast()`

Removes all data type cast rules defined for the cursor.

Arguments

This method has no arguments.

Remarks

This method doesn't remove cast rules defined for the entire connection using the `addtypecast()` connection method.

`close()`

Closes the cursor.

Arguments

This method has no arguments.

Remarks

The cursor becomes unusable after calling this method. The `InterfaceError` exception is raised if any operation is attempted with the cursor.

`setoutputsize(int size[, int column])`

This method is provided for compatibility with the DB API 2.0 specification. It currently does nothing but is safe to call.

Attributes

`connection`

A read-only attribute that specifies the `connection` object to which the cursor belongs.

`arraysize`

A read/write attribute that specifies the number of rows to fetch at a time with the `fetchmany()` method.

Remarks

The default value of the attribute is `1` meaning to fetch a single row at a time.

`description`

A read-only attribute that describes the columns in a rowset returned by the cursor.

Return value

Returns a `tuple` of `description` objects with the following attributes:

`name`

The name of the column in the rowset

`type_code`

The database type code that corresponds to the type of the column

`display_size`

The actual length of the column in characters for a character column, `None` otherwise

`internal_size`

The size in bytes used by the connector to store the column data

`precision`

The total number of significant digits for a numeric column, `None` otherwise

`scale`

The number of digits in the fractional part for a numeric column, `None` otherwise

`null_ok`

`Py_True` if the corresponding database column accepts `NULL` values, `Py_False` otherwise

Remarks

The attribute is `None` for operations that don't return rows or if no operation has been invoked for the cursor via the `execute()` method yet. The `type_code` attribute can be used in the `addtypecast()` method to define a data type cast rule for the corresponding column.

`rowcount`

A read-only attribute that specifies the number of rows that the last `execute()` call produced by a `SELECT` statement or affected by `UPDATE` or `INSERT` statements.

Remarks

The value of this attribute is `-1` if no `execute()` call has been made on the cursor or the rowcount of the last operation cannot be determined.

`rownumber`

A read-only attribute that indicates the current 0-based index of the cursor in the result set.

Remarks

The next `fetch*()` method fetches rows starting with the index in the `rownumber`. The attribute initial value is always `0`, regardless of whether the `execute()` call returned a rowset or not.

lastrowid

This read-only attribute is provided for compatibility with the DB API 2.0 specification. It currently returns None.

9.4 Connection pool class

Cursor class

The connection_pool class is used to manage the connection pooling mechanism. This class provides properties for enabling and configuring pooling.

- Properties
  - enabled
  - max_size
  - min_size
  - lifetime
  - validate

Properties

enabled

Enables connection pooling.

Remarks

Set enabled to True to enable connection pooling. The default value is False.

Syntax

```
enabled = False | True
```

max_size

The maximum number of connections allowed in the pool

Remarks

When the maximum number of connections in the pool is reached, new database connections will be destroyed instead of released back into the pool after you close them. The default value of `max_size` is `100`.

If no pool ID (`pool_id`) is specified, the maximum number of connections is set for the default connection pool. If the pool ID is specified, the maximum number of connections is set for the pool with the given ID.

Syntax

```
max_size = int
max_size[pool_id: int] = int
```

min_size

The minimum number of connections maintained in the pool

Remarks

Set this property to a non-zero value to prevent removing all connections from the pool after they have been idle for a long time. The default value of `min_size` is `0`.

If no pool ID (`pool_id`) is specified, the minimum number of connections is set for the default connection pool. If the pool ID is specified, the minimum number of connections is set for the pool with the given ID.

Syntax

```
min_size = int
min_size[pool_id: int] = int
```

lifetime

The maximum time (in milliseconds) during which a database connection will be kept in the connection pool

Remarks

The creation time of a connection is compared with the current time, and the connection is destroyed if that timespan exceeds the lifetime. If `lifetime` is set to `0` (by default), the lifetime of a connection is infinite.

If no pool ID (`pool_id`) is specified, the connection lifetime is set for the default connection pool. If the pool ID is specified, the maximum number of connections is set for the pool with the given ID.

Syntax

```
lifetime = int
lifetime[pool_id: int] = int
```

`validate`

Specifies whether to validate a connection when it's returned from the pool.

Remarks

If the value of `validate` is `False`, the pool will validate a connection only when it's added to the pool. If the value is `True`, the pool will validate a connection when it's added or drawn from the pool. The default value is `False`.

If no pool ID (`pool_id`) is specified, the validation rule is set for the default connection pool. If the pool ID is specified, the rule is set for the pool with the given ID.

Syntax

```
validate[pool_id: int] = False | True
```


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10 Support

Support

This page describes the support options and programs available for users of Python Connector for SQLite.

Support options

The following support options are available for users of Python Connector for SQLite:

- Annual maintenance and support service through the Python Connector for SQLite

Subscription program

- Community assistance and technical support through the community forum.
- Advanced technical support from the product developers through the Python Connector for SQLite Priority Support program.

Subscriptions

The Python Connector for SQLite Subscription program is an annual maintenance and support service that provides the following benefits:

- Support through the Priority Support program
- Access to new versions of the product
- Access to nightly builds with hotfixes (on demand)
- Notifications about new product versions

Priority Support

Python Connector for SQLite Priority Support is an advanced product support service from the product developers. Devart staff will provide a response to the customer via email within two business days from the date of receipt. Priority Support is available for users with an active subscription.

If you need assistance with our product, send us an email at support@devart.com with the following details:

- The license number of your product
- The version and edition of your product
- The version of your SQLite client library
- A detailed description of the issue
- (Optional) Scripts for creating and populating the database objects

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11 Licensing

Licensing

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12 Uninstall the connector

Uninstall the connector

To uninstall the connector, run the following command.

```
pip uninstall devart-sqlite-connector
```

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