
Queries Documentation

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Queries is a BSD licensed opinionated wrapper of the `psycopg2` library for interacting with PostgreSQL.

The popular `psycopg2` package is a full-featured python client. Unfortunately as a developer, you're often repeating the same steps to get started with your applications that use it. *Queries* aims to reduce the complexity of `psycopg2` while adding additional features to make writing PostgreSQL client applications both fast and easy.

Key features include:

- Simplified API
- Support of Python 2.6+ and 3.2+
- PyPy support via `psycopg2ct`
- Asynchronous support for `Tornado`
- Connection information provided by URI
- Query results delivered as a generator based iterators
- Automatically registered data-type support for UUIDs, Unicode and Unicode Arrays
- Ability to directly access `psycopg2 connection` and `cursor` objects
- Internal connection pooling

Installation

Queries can be installed via the [Python Package Index](#) and can be installed by running `easy_install queries` or `pip install queries`

When installing Queries, `pip` or `easy_install` will automatically install the proper dependencies for your platform.

2.1 Using Queries

Queries provides both a session based API and a stripped-down simple API for interacting with PostgreSQL. If you're writing applications that will only have one or two queries, the simple API may be useful. Instead of creating a session object when using the simple API methods (`queries.query()` and `queries.callproc()`), this is done for you. Simply pass in your query and the URIs of the PostgreSQL server to connect to:

```
queries.query("SELECT now()", "postgresql://postgres@localhost:5432/postgres")
```

Queries built-in connection pooling will re-use connections when possible, lowering the overhead of connecting and reconnecting. This is also true when you're using Queries sessions in different parts of your application in the same Python interpreter.

2.1.1 Connection URIs

When specifying a URI, if you omit the username and database name to connect with, Queries will use the current OS username for both. You can also omit the URI when connecting to localhost on port 5432 as the current OS user, connecting to a database named for the current user. For example, if your username is *fred* and you omit the URI when issuing `queries.query()` the URI that is constructed would be `postgresql://fred@localhost:5432/fred`.

If you'd rather use individual values for the connection, the `queries.uri()` method provides a quick and easy way to create a URI to pass into the various methods.

```
queries.uri(host='localhost', port=5432, dbname='postgres', user='postgres', password=None)
```

Return a PostgreSQL connection URI for the specified values.

Parameters

- **host** (*str*) – Host to connect to
- **port** (*int*) – Port to connect on
- **dbname** (*str*) – The database name
- **user** (*str*) – User to connect as
- **password** (*str*) – The password to use, None for no password

Return str The PostgreSQL connection URI

2.1.2 Examples

The following examples demonstrate various aspects of the Queries API. For more detailed examples and documentation, visit the [simple](#), [Session API](#), [Query Results](#), and [TornadoSession Asynchronous API](#) pages.

Using `queries.uri` to generate a URI from individual arguments

```
>>> queries.uri("server-name", 5432, "dbname", "user", "pass")
'postgresql://user:pass@server-name:5432/dbname'
```

Using the `queries.Session` class

To execute queries or call stored procedures, you start by creating an instance of the `queries.Session` class. It can act as a context manager, meaning you can use it with the `with` keyword and it will take care of cleaning up after itself. For more information on the `with` keyword and context managers, see [PEP 343](#).

In addition to both the `queries.Session.query()` and `queries.Session.callproc()` methods that are similar to the simple API methods, the `queries.Session` class provides access to the `psycopg2` `connection` and `cursor` objects.

Using `queries.Session.query`

The following example shows how a `queries.Session` object can be used as a context manager to query the database table:

```
>>> import pprint
>>> import queries
>>>
>>> with queries.Session() as s:
...     for row in s.query('SELECT * FROM names'):
...         pprint.pprint(row)
...
{'id': 1, 'name': u'Jacob'}
{'id': 2, 'name': u'Mason'}
{'id': 3, 'name': u'Ethan'}
```

Using `queries.Session.callproc`

This example uses `queries.Session.callproc()` to execute a stored procedure and then pretty-prints the single row results as a dictionary:

```
>>> import pprint
>>> import queries
>>> with queries.Session() as session:
...     results = session.callproc('chr', [65])
...     pprint.pprint(results.as_dict())
...
{'chr': u'A'}
```

2.2 Session API

The `Session` class allows for a unified (and simplified) view of interfacing with a PostgreSQL database server.

Connection details are passed in as a PostgreSQL URI and connections are pooled by default, allowing for reuse of connections across modules in the Python runtime without having to pass around the object handle.

While you can still access the raw `psycopg2` `connection` and `cursor` objects to provide ultimate flexibility in how you use the `queries.Session` object, there are convenience methods designed to simplify the interaction with PostgreSQL.

For `psycopg2` functionality outside of what is exposed in `Session`, simply use the `queries.Session.connection` or `queries.Session.cursor` properties to gain access to either object just as you would in a program using `psycopg2` directly.

2.2.1 Example Usage

The following example connects to the postgres database on localhost as the postgres user and then queries a table, iterating over the results:

```
import queries

with queries.Session('postgresql://postgres@localhost/postgres') as session:
    for row in session.query('SELECT * FROM table'):
        print row
```

2.2.2 Class Documentation

`class queries.Session(uri='postgresql://localhost:5432', cursor_factory=<class 'psycopg2.extensions.RealDictCursor'>, pool_idle_ttl=60, pool_max_size=1)`

The `Session` class allows for a unified (and simplified) view of interfacing with a PostgreSQL database server. The `Session` object can act as a context manager, providing automated cleanup and simple, pythonic way of interacting with the object.

Parameters

- `uri` (*str*) – PostgreSQL connection URI
- `psycopg2.extensions.cursor` – The cursor type to use
- `pool_idle_ttl` (*int*) – How long idle pools keep connections open
- `pool_max_size` (*int*) – The maximum size of the pool to use

backend_pid

Return the backend process ID of the PostgreSQL server that this session is connected to.

Return type

`int`

callproc(name, args=None)

Call a stored procedure on the server, returning the results in a `queries.Results` instance.

Parameters

- `name` (*str*) – The procedure name
- `args` (*list*) – The list of arguments to pass in

Return type

`queries.Results`

Raises `queries.DataError`

Raises `queries.DatabaseError`

Raises `queries.IntegrityError`

Raises `queries.InternalError`

Raises `queries.InterfaceError`

Raises `queries.NotSupportedError`

Raises `queries.OperationalError`

Raises `queries.ProgrammingError`

close()

Explicitly close the connection and remove it from the connection pool if pooling is enabled. If the connection is already closed

Raises `psycopg2.InterfaceError`

connection

The current open connection to PostgreSQL.

Return type `psycopg2.extensions.connection`

cursor

The current, active cursor for the open connection.

Return type `psycopg2.extensions.cursor`

encoding

The current client encoding value.

Return type `str`

notices

A list of up to the last 50 server notices sent to the client.

Return type `list`

pid

Return the pool ID used for connection pooling

Return type `str`

query (*sql*, *parameters=None*)

A generator to issue a query on the server, modifying the parameters against the sql statement. Results are returned as a `queries.Results` object which can act as an iterator and has multiple ways to access the result data.

Parameters

- **sql** (*str*) – The SQL statement
- **parameters** (*dict*) – A dictionary of query parameters

Return type `queries.Results`

Raises `queries.DataError`

Raises `queries.DatabaseError`

Raises `queries.IntegrityError`

Raises `queries.InternalError`

Raises `queries.InterfaceError`

Raises `queries.NotSupportedError`

Raises `queries.OperationalError`

Raises `queries.ProgrammingError`

set_encoding (*value='UTF8'*)

Set the client encoding for the session if the value specified is different than the current client encoding.

Parameters `value` (*str*) – The encoding value to use

2.3 Query Results

Results from calls to `Session.query` and `Session.callproc` are returned as an instance of the `Results` class. The `Results` class provides multiple ways to access the information about a query and the data returned from PostgreSQL.

2.3.1 Examples

The following examples illustrate the various behaviors that the `Results` class implements:

Using Results as an Iterator

```
for row in session.query('SELECT * FROM foo'):
    print row
```

Accessing an individual row by index

```
results = session.query('SELECT * FROM foo')
print results[1] # Access the second row of the results
```

Casting single row results as a dict

```
results = session.query('SELECT * FROM foo LIMIT 1')
print results.as_dict()
```

Checking to see if a query was successful

```
results = session.query("UPDATE foo SET bar='baz' WHERE qux='corgie'")
if results:
    print 'Success'
```

Checking the number of rows by using len(Results)

```
results = session.query('SELECT * FROM foo')
print '%i rows' % len(results)
```

2.3.2 Class Documentation

class `queries.Results` (*cursor*)

The `Results` class contains the results returned from `Session.query` and `Session.callproc`. It is able to act as an iterator and provides many different methods for accessing the information about and results from a query.

Parameters `cursor` (*psycopg2.extensions.cursor*) – The cursor for the results

as_dict ()

Return a single row result as a dictionary. If the results contain multiple rows, a `ValueError` will be raised.

Returns dict

Raises `ValueError`

count ()

Return the number of rows that were returned from the query

Return type int

free()

Used in asynchronous sessions for freeing results and their locked connections.

items()

Return all of the rows that are in the result set.

Return type list

query

Return a read-only value of the query that was submitted to PostgreSQL.

Return type str

rownumber

Return the current offset of the result set

Return type int

status

Return the status message returned by PostgreSQL after the query was executed.

Return type str

2.4 TornadoSession Asynchronous API

Use a Queries Session asynchronously within the [Tornado](#) framework.

The `TornadoSession` class is optimized for asynchronous concurrency. Each call to `TornadoSession.callproc` or `TornadoSession.query` grabs a free connection from the connection pool and requires that the results that are returned as a `Results` object are freed via the `Results.free` method. Doing so will release the free the `Results` object data and release the lock on the connection so that other queries are able to use the connection.

2.4.1 Example Use

The following `RequestHandler` example will return a JSON document containing the query results.

```
import queries
from tornado import gen, web

class ExampleHandler(web.RequestHandler):

    def initialize(self):
        self.session = queries.TornadoSession()

    @gen.coroutine
    def get(self):
        result = yield self.session.query('SELECT * FROM names')
        self.finish({'data': result.items()})
        result.free()
```

See the [Examples](#) for more `TornadoSession()` examples.

2.4.2 Class Documentation

```
class queries.tornado_session.TornadoSession (uri='postgresql://localhost:5432',
                                             cursor_factory=<class 'psy-
                                             copg2.extras.RealDictCursor'>,
                                             pool_idle_ttl=60, pool_max_size=25,
                                             io_loop=None)
```

Session class for Tornado asynchronous applications. Uses `tornado.gen.coroutine()` to wrap API methods for use in Tornado.

Utilizes connection pooling to ensure that multiple concurrent asynchronous queries do not block each other. Heavily trafficked services will require a higher `max_pool_size` to allow for greater connection concurrency.

`TornadoSession.query` and `TornadoSession.callproc` must call `Results.free`

Parameters

- **uri** (*str*) – PostgreSQL connection URI
- **psycopg2.extensions.cursor** – The cursor type to use
- **pool_idle_ttl** (*int*) – How long idle pools keep connections open
- **pool_max_size** (*int*) – The maximum size of the pool to use

backend_pid

Return the backend process ID of the PostgreSQL server that this session is connected to.

Return type `int`

callproc (name, args=None)

Call a stored procedure asynchronously on the server, passing in the arguments to be passed to the stored procedure, yielding the results as a `Results` object.

You **must** free the results that are returned by this method to unlock the connection used to perform the query. Failure to do so will cause your Tornado application to run out of connections.

Parameters

- **name** (*str*) – The stored procedure name
- **args** (*list*) – An optional list of procedure arguments

Return type `Results`

Raises `queries.DataError`

Raises `queries.DatabaseError`

Raises `queries.IntegrityError`

Raises `queries.InternalError`

Raises `queries.InterfaceError`

Raises `queries.NotSupportedError`

Raises `queries.OperationalError`

Raises `queries.ProgrammingError`

close ()

Explicitly close the connection and remove it from the connection pool if pooling is enabled. If the connection is already closed

Raises `psycopg2.InterfaceError`

connection

Do not use this directly with Tornado applications

Returns

encoding

The current client encoding value.

Return type str

notices

A list of up to the last 50 server notices sent to the client.

Return type list

pid

Return the pool ID used for connection pooling

Return type str

query (*sql*, *parameters=None*)

Issue a query asynchronously on the server, mogrifying the parameters against the sql statement and yielding the results as a *Results* object.

You **must** free the results that are returned by this method to unlock the connection used to perform the query. Failure to do so will cause your Tornado application to run out of connections.

Parameters

- **sql** (*str*) – The SQL statement
- **parameters** (*dict*) – A dictionary of query parameters

Return type *Results*

Raises queries.DataError

Raises queries.DatabaseError

Raises queries.IntegrityError

Raises queries.InternalError

Raises queries.InterfaceError

Raises queries.NotSupportedError

Raises queries.OperationalError

Raises queries.ProgrammingError

set_encoding (*value='UTF8'*)

Set the client encoding for the session if the value specified is different than the current client encoding.

Parameters **value** (*str*) – The encoding value to use

validate ()

Validate the session can connect or has open connections to PostgreSQL

Return type bool

class queries.tornado_session.**Results** (*cursor, cleanup, fd*)

A TornadoSession specific *queries.Results* class that adds the *Results.free* method. The *Results.free* method **must** be called to free the connection that the results were generated on. *Results* objects that are not freed will cause the connections to remain locked and your application will eventually run out of connections in the pool.

The following examples illustrate the various behaviors that the `:queries.Results` class implements:

Using Results as an Iterator

```
results = yield session.query('SELECT * FROM foo')
for row in results:
    print row
results.free()
```

Accessing an individual row by index

```
results = yield session.query('SELECT * FROM foo')
print results[1] # Access the second row of the results
results.free()
```

Casting single row results as a dict

```
results = yield session.query('SELECT * FROM foo LIMIT 1')
print results.as_dict()
results.free()
```

Checking to see if a query was successful

```
sql = "UPDATE foo SET bar='baz' WHERE qux='corgie'"
results = yield session.query(sql)
if results:
    print 'Success'
results.free()
```

Checking the number of rows by using len(Results)

```
results = yield session.query('SELECT * FROM foo')
print '%i rows' % len(results)
results.free()
```

`as_dict()`

Return a single row result as a dictionary. If the results contain multiple rows, a `ValueError` will be raised.

Returns dict

Raises `ValueError`

`count()`

Return the number of rows that were returned from the query

Return type int

`free(*args, **kwargs)`

Release the results and connection lock from the `TornadoSession` object. This **must** be called after you finish processing the results from `TornadoSession.query` or `TornadoSession.callproc` or the connection will not be able to be reused by other asynchronous requests.

`items()`

Return all of the rows that are in the result set.

Return type list

`query`

Return a read-only value of the query that was submitted to PostgreSQL.

Return type str

rownumber

Return the current offset of the result set

Return type int

status

Return the status message returned by PostgreSQL after the query was executed.

Return type str

2.5 Connection Pooling

The *PoolManager* class provides top-level access to the queries pooling mechanism, managing pools of connections by DSN in instances of the *Pool* class. The connections are represented by instances of the *Connection* class. *Connection* holds the *psycopg2* connection handle as well as lock information that lets the Pool and PoolManager know when connections are busy.

These classes are managed automatically by the *Session* and should rarely be interacted with directly.

If you would like to use the *PoolManager* to shutdown all connections to PostgreSQL, either reference it by class or using the *PoolManager.instance* method.

class `queries.pool.PoolManager`

The connection pool object implements behavior around connections and their use in queries.Session objects.

We carry a pool id instead of the connection URI so that we will not be carrying the URI in memory, creating a possible security issue.

classmethod `add` (*pid*, *connection*)

Add a new connection and session to a pool.

Parameters

- **pid** (*str*) – The pool id
- **connection** (*psycopg2.extensions.connection*) – The connection to add to the pool

classmethod `clean` (*pid*)

Clean the specified pool, removing any closed connections or stale locks.

Parameters **pid** (*str*) – The pool id to clean

classmethod `create` (*pid*, *idle_ttl=60*, *max_size=1*)

Create a new pool, with the ability to pass in values to override the default idle TTL and the default maximum size.

A pool's idle TTL defines the amount of time that a pool can be open without any sessions before it is removed.

A pool's max size defines the maximum number of connections that can be added to the pool to prevent unbounded open connections.

Parameters

- **pid** (*str*) – The pool ID
- **idle_ttl** (*int*) – Time in seconds for the idle TTL
- **max_size** (*int*) – The maximum pool size

Raises KeyError

classmethod `free` (*pid*, *connection*)

Free a connection that was locked by a session

Parameters

- **pid** (*str*) – The pool ID
- **connection** (*psycopg2.extensions.connection*) – The connection to remove

classmethod `get` (*pid*, *session*)

Get an idle, unused connection from the pool. Once a connection has been retrieved, it will be marked as in-use until it is freed.

Parameters

- **pid** (*str*) – The pool ID
- **session** (*queries.Session*) – The session to assign to the connection

Return type *psycopg2.extensions.connection*

classmethod `has_connection` (*pid*, *connection*)

Check to see if a pool has the specified connection

Parameters

- **pid** (*str*) – The pool ID
- **connection** (*psycopg2.extensions.connection*) – The connection to check for

Return type `bool`

classmethod `has_idle_connection` (*pid*)

Check to see if a pool has an idle connection

Parameters **pid** (*str*) – The pool ID

Return type `bool`

classmethod `instance` ()

Only allow a single PoolManager instance to exist, returning the handle for it.

Return type *PoolManager*

classmethod `is_full` (*pid*)

Return a bool indicating if the specified pool is full

Parameters **pid** (*str*) – The pool id

Return type `bool`

classmethod `lock` (*pid*, *connection*, *session*)

Explicitly lock the specified connection in the pool

Parameters

- **pid** (*str*) – The pool id
- **connection** (*psycopg2.extensions.connection*) – The connection to add to the pool
- **session** (*queries.Session*) – The session to hold the lock

classmethod `remove` (*pid*)

Remove a pool, closing all connections

Parameters **pid** (*str*) – The pool ID

classmethod `remove_connection` (*pid*, *connection*)

Remove a connection from the pool, closing it if is open.

Parameters

- **pid** (*str*) – The pool ID
- **connection** (*psycogp2.extensions.connection*) – The connection to remove

Raises ConnectionNotFoundError

classmethod `set_idle_ttl` (*pid*, *ttl*)

Set the idle TTL for a pool, after which it will be destroyed.

Parameters

- **pid** (*str*) – The pool id
- **ttl** (*int*) – The TTL for an idle pool

classmethod `set_max_size` (*pid*, *size*)

Set the maximum number of connections for the specified pool

Parameters

- **pid** (*str*) – The pool to set the size for
- **size** (*int*) – The maximum number of connections

classmethod `shutdown` ()

Close all connections on in all pools

classmethod `size` (*pid*)

Return the number of connections in the pool

Parameters **pid** (*str*) – The pool id

:rtype int

class `queries.pool.Pool` (*pool_id*, *idle_ttl=60*, *max_size=1*)

A connection pool for gaining access to and managing connections

add (*connection*)

Add a new connection to the pool

Parameters **connection** (*psycogp2.extensions.connection*) – The connection to add to the pool

Raises PoolFullError

clean ()

Clean the pool by removing any closed connections and if the pool's idle has exceeded its idle TTL, remove all connections.

close ()

Close the pool by closing and removing all of the connections

free (*connection*)

Free the connection from use by the session that was using it.

Parameters **connection** (*psycogp2.extensions.connection*) – The connection to free

Raises ConnectionNotFoundError

get (*session*)

Return an idle connection and assign the session to the connection

Parameters `session` (`queries.Session`) – The session to assign

Return type `psycogp2.extensions.connection`

Raises `NoIdleConnectionsError`

id

Return the ID for this pool

Return type `str`

idle_connections

Return a list of idle connections

Return type `list`

idle_duration

Return the number of seconds that the pool has had no active connections.

Return type `float`

is_full

Return True if there are no more open slots for connections.

Return type `bool`

lock (`connection`, `session`)

Explicitly lock the specified connection

Parameters

- **connection** (`psycogp2.extensions.connection`) – The connection to lock
- **session** (`queries.Session`) – The session to hold the lock

remove (`connection`)

Remove the connection from the pool

Parameters **connection** (`psycogp2.extensions.connection`) – The connection to remove

Raises `ConnectionNotFoundError`

Raises `ConnectionBusyError`

set_idle_ttl (`ttl`)

Set the idle ttl

Parameters **ttl** (`int`) – The TTL when idle

set_max_size (`size`)

Set the maximum number of connections

Parameters **size** (`int`) – The maximum number of connections

shutdown ()

Forcefully shutdown the entire pool, closing all non-executing connections.

Raises `ConnectionBusyError`

class `queries.pool.Connection` (`handle`)

Contains the handle to the connection, the current state of the connection and methods for manipulating the state of the connection.

busy

Return if the connection is currently executing a query or is locked by a session that still exists.

Return type `bool`

close()

Close the connection

Raises ConnectionBusyError

closed

Return if the psycopg2 connection is closed.

Return type bool

executing

Return if the connection is currently executing a query

Return type bool

free()

Remove the lock on the connection if the connection is not active

Raises ConnectionBusyError

id

Return id of the psycopg2 connection object

Return type int

lock(session)

Lock the connection, ensuring that it is not busy and storing a weakref for the session.

Parameters **session** ([queries.Session](#)) – The session to lock the connection with

Raises ConnectionBusyError

locked

Return if the connection is currently exclusively locked

Return type bool

2.6 Examples

The following examples show more advanced use of Queries:

2.6.1 Basic TornadoSession Usage

The following example implements a very basic RESTful API. The following DDL will create the table used by the API:

```
CREATE TABLE widgets (sku varchar(10) NOT NULL PRIMARY KEY,
                       name text NOT NULL,
                       qty integer NOT NULL);
```

The Tornado application provides two endpoints: /widget(/sku-value) and /widgets. SKUs are set to be a 10 character value with the regex of [a-z0-9]{10}. To add a widget, call PUT on /widget, to update a widget call POST on /widget/[SKU].

```
from tornado import gen, ioloop, web
import queries

class WidgetRequestHandler(web.RequestHandler):
    """Handle the CRUD methods for a widget"""
```

```

def initialize(self):
    """Setup a queries.TornadoSession object to use when the RequestHandler
    is first initialized.

    """
    self.session = queries.TornadoSession()

@gen.coroutine
def prepare(self):
    try:
        yield self.session.validate()
    except queries.OperationalError as error:
        logging.error('Error connecting to the database: %s', error)
        raise web.HTTPError(503)

def options(self, *args, **kwargs):
    """Let the caller know what methods are supported

    :param list args: URI path arguments passed in by Tornado
    :param list args: URI path keyword arguments passed in by Tornado

    """
    self.set_header('Allow', ', '.join(['DELETE', 'GET', 'POST', 'PUT']))
    self.set_status(204) # Successful request, but no data returned
    self.finish()

@gen.coroutine
def delete(self, *args, **kwargs):
    """Delete a widget from the database

    :param list args: URI path arguments passed in by Tornado
    :param list args: URI path keyword arguments passed in by Tornado

    """
    # We need a SKU, if it wasn't passed in the URL, return an error
    if 'sku' not in kwargs:
        self.set_status(403)
        self.finish({'error': 'missing required value: sku'})

    # Delete the widget from the database by SKU
    else:
        results = yield self.session.query("DELETE FROM widgets WHERE sku=%(sku)s",
                                           {'sku': kwargs['sku']})

        if not results:
            self.set_status(404)
            self.finish({'error': 'SKU not found in system'})
        else:
            self.set_status(204) # Success, but no data returned
            self.finish()

    # Free the results and release the connection lock from session.query
    results.free()

@gen.coroutine
def get(self, *args, **kwargs):
    """Fetch a widget from the database

    :param list args: URI path arguments passed in by Tornado

```

```

:param list args: URI path keyword arguments passed in by Tornado

"""
# We need a SKU, if it wasn't passed in the URL, return an error
if 'sku' not in kwargs:
    self.set_status(403)
    self.finish({'error': 'missing required value: sku'})

# Fetch a row from the database for the SKU
else:
    results = yield self.session.query("SELECT * FROM widgets WHERE sku=%(sku)s",
                                       {'sku': kwargs['sku']})

    # No rows returned, send a 404 with a JSON error payload
    if not results:
        self.set_status(404)
        self.finish({'error': 'SKU not found in system'})

    # Send back the row as a JSON object
    else:
        self.finish(results.as_dict())

# Free the results and release the connection lock from session.query
results.free()

@gen.coroutine
def post(self, *args, **kwargs):
    """Update a widget in the database

    :param list args: URI path arguments passed in by Tornado
    :param list args: URI path keyword arguments passed in by Tornado

    """
    # We need a SKU, if it wasn't passed in the URL, return an error
    if 'sku' not in kwargs:
        self.set_status(403)
        self.finish({'error': 'missing required value: sku'})

    # Update the widget in the database by SKU
    else:
        sql = "UPDATE widgets SET name=%(name)s, qty=%(qty)s WHERE sku=%(sku)s"
        try:
            results = yield self.session.query(sql,
                                               {'sku': kwargs['sku'],
                                                'name': self.get_argument('name'),
                                                'qty': self.get_argument('qty')})

            # Free the results and release the connection lock from session.query
            results.free()

            # DataError is raised when there's a problem with the data passed in
        except queries.DataError as error:
            self.set_status(409)
            self.finish({'error': {'error': error.pgerror.split('\n')[0][8:]}})

        else:
            # No rows means there was no record updated

```



```

        if not results:
            self.set_status(404)
            self.finish({'error': 'SKU not found in system'})

        # The record was updated
        else:
            self.set_status(204) # Success, but not returning data
            self.finish()

@gen.coroutine
def put(self, *args, **kwargs):
    """Add a widget to the database

    :param list args: URI path arguments passed in by Tornado
    :param list args: URI path keyword arguments passed in by Tornado

    """
    try:
        results = yield self.session.query("INSERT INTO widgets VALUES (%s, %s, %s)",
                                          [self.get_argument('sku'),
                                           self.get_argument('name'),
                                           self.get_argument('qty')])

        # Free the results and release the connection lock from session.query
        results.free()
    except (queries.DataError,
            queries.IntegrityError) as error:
        self.set_status(409)
        self.finish({'error': {'error': error.pgerror.split('\n')[0][8:]}})
    else:
        self.set_status(201)
        self.finish()

class WidgetsRequestHandler(web.RequestHandler):
    """Return a list of all of the widgets in the database"""

    def initialize(self):
        """Setup a queries.TornadoSession object to use when the RequestHandler
        is first initialized.

        """
        self.session = queries.TornadoSession()

    def options(self, *args, **kwargs):
        """Let the caller know what methods are supported

        :param list args: URI path arguments passed in by Tornado
        :param list args: URI path keyword arguments passed in by Tornado

        """
        self.set_header('Allow', ', '.join(['GET']))
        self.set_status(204)
        self.finish()

@gen.coroutine
def get(self, *args, **kwargs):
    """Get a list of all the widgets from the database

```

```

:param list args: URI path arguments passed in by Tornado
:param list args: URI path keyword arguments passed in by Tornado

"""
results = yield self.session.query('SELECT * FROM widgets ORDER BY sku')

# Tornado doesn't allow you to return a list as a JSON result by default
self.finish({'widgets': results.items()})

# Free the results and release the connection lock from session.query
results.free()

if __name__ == "__main__":
    application = web.Application([
        (r"/widget", WidgetRequestHandler),
        (r"/widget/(?P<sku>[a-zA-Z0-9]{10})", WidgetRequestHandler),
        (r"/widgets", WidgetsRequestHandler)
    ]).listen(8888)
    ioloop.IOLoop.instance().start()

```

2.6.2 Concurrent Queries in Tornado

The following example issues multiple concurrent queries in a single asynchronous request and will wait until all queries are complete before progressing:

```

from tornado import gen, ioloop, web
import queries

class RequestHandler(web.RequestHandler):

    def initialize(self):
        self.session = queries.TornadoSession()

    @gen.coroutine
    def prepare(self):
        try:
            yield self.session.validate()
        except queries.OperationalError as error:
            logging.error('Error connecting to the database: %s', error)
            raise web.HTTPError(503)

    @gen.coroutine
    def get(self, *args, **kwargs):

        # Issue the three queries and wait for them to finish before progressing
        (q1result,
         q2result,
         q3result) = yield [self.session.query('SELECT * FROM foo'),
                            self.session.query('SELECT * FROM bar'),
                            self.session.query('INSERT INTO requests VALUES (%s, %s, %s)',
                                                [self.remote_ip,
                                                 self.request_uri,
                                                 self.headers.get('User-Agent', '')])]

        # Close the connection

```

```
self.finish({'q1result': q1result.items(),
            'q2result': q2result.items()})

# Free the results and connection locks
q1result.free()
q2result.free()
q3result.free()

if __name__ == "__main__":
    application = web.Application([
        (r"/", RequestHandler)
    ]).listen(8888)
    ioloop.IOLoop.instance().start()
```

2.7 Version History

- 1.7.5 2015-09-03 - Dont let Session and TornadoSession share connections
- 1.7.1 2015-03-25 - Fix TornadoSession's use of cleanup (#8) - Fix by Oren Itamar
- 1.7.0 2015-01-13 - Implement *Pool.shutdown* and *PoolManager.shutdown* to cleanly shutdown all open, non-executing connections across a Pool or all pools. Update locks in Pool operations to ensure atomicity.
- 1.6.1 2015-01-09 - Fixes an iteration error when closing a pool (#7) - Fix by Chris McGuire
- 1.6.0 2014-11-20 - Handle URI encoded password values properly
- 1.5.0 2014-10-07 - Handle empty query results in the iterator (#4) - Fix by Den Teresh
- 1.4.0 2014-09-04 - Address exception handling in `tornado_session`

Issues

Please report any issues to the Github repo at <https://github.com/gmr/queries/issues>

Source

Queries source is available on Github at <https://github.com/gmr/queries>

Inspiration

Queries is inspired by [Kenneth Reitz's](#) awesome work on requests.

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