
pysnow
Release 0.6.6

Jan 26, 2018

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Library written in Python that makes interacting with the ServiceNow REST API much enjoyable.

CHAPTER 1

Compatibility

Python 2.6+ and Python 3.3+

CHAPTER 2

Installing

```
$ pip install pysnow
```


CHAPTER 3

Testing

The code is automatically tested using **travis** and **nose**.

To run tests manually, move to the cloned directory and run:

```
$ nosetests --cover-package=pysnow --with-coverage --cover-erase
```


CHAPTER 4

Demo!

This demo features the `pysnow.QueryBuilder` and shows an example of how to fetch records using the **incident** table API.

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```
class pysnow.client.Client (instance=None, host=None, user=None, password=None,  
raise_on_empty=None, request_params=None, use_ssl=True,  
session=None)
```

User-created Client object.

Parameters

- **instance** – Instance name, used to construct host
- **host** – Host can be passed as an alternative to instance
- **user** – User name
- **password** – Password
- **raise_on_empty** – Whether or not to raise an exception on 404 (no matching records), defaults to True
- **request_params** – Request params to send with requests globally (deprecated)
- **use_ssl** – Enable or disable the use of SSL, defaults to True
- **session** – Optional `requests.Session` object to use instead of passing user/pass to `Client`

Raises

- `InvalidUsage`: On argument validation error

```
resource (api_path=None, base_path='/api/now', chunk_size=None)
```

Creates a new `Resource` object after validating paths

Parameters

- **api_path** – Path to the API to operate on
- **base_path** – (optional) Base path override
- **chunk_size** – Response stream parser chunk size (in bytes)

Returns

- Resource object

Raises

- InvalidUsage: If a path fails validation

```
class pysnow.oauth_client.OAuthClient (client_id=None, client_secret=None, token_updater=None, **kwargs)
    Pysnow Client with extras for oauth session and token handling.
```

Parameters

- **client_id** – client_id from ServiceNow
- **client_secret** – client_secret from ServiceNow
- **token_updater** – function called when a token has been refreshed
- **kwargs** – kwargs passed along to `pysnow.Client`

```
set_token (token)
    Validate and set token
```

Parameters **token** – the token (dict) to set

```
resource (api_path=None, base_path='/api/now', chunk_size=None)
    Overrides resource() provided by pysnow.Client with extras for OAuth
```

Parameters

- **api_path** – Path to the API to operate on
- **base_path** – (optional) Base path override
- **chunk_size** – Response stream parser chunk size (in bytes)

Returns

- Resource object

Raises

- InvalidUsage: If a path fails validation

```
generate_token (user, password)
    Takes user and password credentials and generates a new token
```

Parameters

- **user** – user
- **password** – password

Returns

- dictionary containing token data

Raises

- `TokenCreateError`: If there was an error generating the new token

class pysnow.query_builder.**QueryBuilder**
Query builder - for constructing advanced ServiceNow queries

field (*field*)
Sets the field to operate on
Parameters **field** – field (str) to operate on

order_descending ()
Sets ordering of field descending

order_ascending ()
Sets ordering of field ascending

starts_with (*starts_with*)
Adds new STARTSWITH condition
Parameters **starts_with** – Match field starting with the provided value

ends_with (*ends_with*)
Adds new ENDSWITH condition
Parameters **ends_with** – Match field ending with the provided value

contains (*contains*)
Adds new LIKE condition
Parameters **contains** – Match field containing the provided value

not_contains (*not_contains*)
Adds new NOTLIKE condition
Parameters **not_contains** – Match field not containing the provided value

is_empty ()
Adds new ISEMPY condition

equals (*data*)
Adds new IN or = condition depending on if a list or string was provided

Parameters **data** – string or list of values

Raise

- QueryTypeError: if `data` is of an unexpected type

not_equals (*data*)

Adds new NOT IN or = condition depending on if a list or string was provided

Parameters **data** – string or list of values

Raise

- QueryTypeError: if `data` is of an unexpected type

greater_than (*greater_than*)

Adds new > condition

Parameters **greater_than** – str or datetime compatible object

Raise

- QueryTypeError: if *greater_than* is of an unexpected type

less_than (*less_than*)

Adds new < condition

Parameters **less_than** – str or datetime compatible object

Raise

- QueryTypeError: if *less_than* is of an unexpected type

between (*start*, *end*)

Adds new BETWEEN condition

Parameters

- **start** – int or datetime compatible object
- **end** – int or datetime compatible object

Raise

- QueryTypeError: if start or end arguments is of an invalid type

AND ()

Adds an and-operator

OR ()

Adds an or-operator

NQ ()

Adds a NQ-operator (new query)

class `pysnow.resource.Resource` (*base_url=None, base_path=None, api_path=None, parameters=None, **kwargs*)

Creates a new *Resource* object

Resources provides a natural way of interfacing with ServiceNow APIs.

Parameters

- **base_path** – Base path
- **api_path** – API path
- **chunk_size** – Response stream parser chunk size (in bytes)
- ****kwargs** – Arguments to pass along to Request

get (*query, limit=None, offset=None, fields=[]*)

Queries the API resource

Parameters

- **query** – Dictionary, string or `QueryBuilder` object
- **limit** – (optional) Limits the number of records returned
- **fields** – (optional) List of fields to include in the response created_on in descending order.
- **offset** – (optional) Number of records to skip before returning records

Returns

- Response object

create (*payload*)

Creates a new record in the API resource

Parameters **payload** – Dictionary containing key-value fields of the new record

Returns

- Dictionary of the inserted record

update (*query*, *payload*)

Updates a record in the API resource

Parameters

- **query** – Dictionary, string or `QueryBuilder` object
- **payload** – Dictionary containing key-value fields of the record to be updated

Returns

- Dictionary of the updated record

delete (*query*)

Deletes matching record

Parameters **query** – Dictionary, string or `QueryBuilder` object

Returns

- Dictionary containing information about deletion result

request (*method*, *path_append=None*, *headers=None*, ***kwargs*)

Create a custom request

Parameters

- **method** – HTTP method to use
- **path_append** – (optional) relative to `api_path`
- **headers** – (optional) Dictionary of headers to add or override
- **kwargs** – kwargs to pass along to `requests.Request`

Returns

- Response object

class pysnow.params_builder.ParamsBuilder

Provides an interface for setting / getting common ServiceNow sysparms.

static stringify_query (*query*)

Stringifies the query (dict or QueryBuilder) into a ServiceNow-compatible format

Returns

- ServiceNow-compatible string-type query

add_custom (*params*)

Adds new custom parameter after making sure it's of type dict.

Parameters *params* – Dictionary containing one or more parameters

custom_params

Returns a dictionary of added custom parameters

display_value

Maps to `sysparm_display_value`

query

Maps to `sysparm_query`

limit

Maps to `sysparm_limit`

offset

Maps to `sysparm_offset`

fields

Maps to `sysparm_fields`

exclude_reference_link

Maps to `sysparm_exclude_reference_link`

suppress_pagination_header

Maps to `sysparm_suppress_pagination_header`

as_dict()

Constructs query params compatible with `requests.Request`

Returns

- Dictionary containing query parameters

class pysnow.response.**Response** (*response*, *chunk_size=2048*)

Takes a `requests.Response` object and performs deserialization and validation.

Parameters

- **response** – `request.Response` object
- **chunk_size** – Read and return up to this size (in bytes) in the stream parser

all ()

Returns a chained generator response containing all matching records

Returns

- Iterable response

first ()

Return the first record or raise an exception if the result doesn't contain any data

Returns

- Dictionary containing the first item in the response content

Raise

- `NoResults`: If no results were found

first_or_none ()

Return the first record or `None`

Returns

- Dictionary containing the first item or `None`

one ()

Return exactly one record or raise an exception.

Returns

- Dictionary containing the only item in the response content

Raise

- MultipleResults: If more than one records are present in the content
- NoResults: If the result is empty

one_or_none()

Return at most one record or raise an exception.

Returns

- Dictionary containing the matching record or None

Raise

- MultipleResults: If more than one records are present in the content

The Client comes in two forms:

- The regular `pysnow.Client` - use if you're authenticating with password credentials or wish to pass an already created session object.
- The `pysnow.OAuthClient` - use if you wish to do OAuth with an OAuth2 enabled ServiceNow instance.

12.1 Using `pysnow.Client`

This shows some examples of how to create the `pysnow.Client` using username and password or a custom session object

See the `pysnow.Client` documentation for details.

12.1.1 With username and password

```
s = pysnow.Client(instance='myinstance',
                  user='myusername',
                  password='mypassword')
```

12.1.2 With a custom session object

You can pass a custom session object to `pysnow.Client`. In this example password credentials are used, but with SSL verification disabled.

```
s = requests.Session()
s.verify = False
s.auth = requests.auth.HTTPBasicAuth('myusername', 'mypassword')
```

```
sn = pysnow.Client(instance='myinstance', session=s)
```

12.2 Using pysnow.OAuthClient

Pysnow provides the `pysnow.OAuthClient` to simplify the process of obtaining initial tokens, refreshing tokens and keeping tokens in sync with your storage.

Should the `pysnow.OAuthClient` not be sufficient for your requirements some reason, you can always create a custom `Requests` compatible OAuth session and pass along to `pysnow.Client()`

Enabling OAuth in ServiceNow is fairly simple but beyond the scope of this document. Details on how to do this can be found in the [official ServiceNow documentation](#).

12.2.1 Getting initial tokens

In order to use the `pysnow.OAuthClient` you first need to obtain a new token from ServiceNow. Creating a new token bound to a certain user is easy. Simply call `pysnow.OAuthClient.generate_token()` and keep it in your storage (e.g. in session or database)

```
s = pysnow.OAuthClient(client_id='<client_id_from_servicenow>', client_secret='
↳<client_secret_from_servicenow>', instance='<instance_name>')

if not session['token']:
    # No previous token exists. Generate new.
    session['token'] = s.generate_token('<username>', '<password>')
```

12.2.2 Using tokens

Once an initial token has been obtained it will be refreshed automatically upon usage, provided its `refresh_token` hasn't expired.

After a token has been refreshed, the provided `token_updater()` function will be called with the refreshed token as first argument.

```
def updater(new_token):
    print("OAuth token refreshed!")
    session['token'] = new_token

s = pysnow.OAuthClient(client_id='<client_id_from_servicenow>', client_secret='
↳<client_secret_from_servicenow>', token_updater=updater, instance='<instance_name>')
s.set_token(session['token'])
```

CHAPTER 13

Resources

The `pysnow.Resource`, given an API path, offers an interface to all CRUD functionality available in the ServiceNow REST API.

The idea with Resources is to provide a logical, nameable and reusable container-like object.

Example of a resource using the **incident table API** with a doubled **chunk_size** of 8192 bytes and **sysparm_display_value** set to True.

```
incident = client.resource(api_path='/table/incident', chunk_size=8192)
incident.parameters.display_value = True
```

Request parameters

Request parameters (sysparms in ServiceNow) are key-values passed in the query string for GET requests. Default parameters can be set on both the `pysnow.Client` and the `pysnow.Resource` using the `parameters` property. Parameters set on **Client** are automatically inherited by **Resource**, but can of course be overridden.

Please see the API documentation for more info on this.

14.1 Client object parameters

```
client = pysnow.Client(instance=instance,
                       user=username,
                       password=password)

client.parameters.display_value = False
client.parameters.exclude_reference_link = True
client.parameters.add_custom({'foo': 'bar'})
```

14.2 Resource object parameters

```
incident = client.resource(api_path='/custom/api')
incident.parameters.add_custom({'foo': 'bar'})
```


There are three different ways to create queries using the pysnow library.

15.1 Key-value

Simple. And sufficient in many cases.

```
content = incident.get(query={'NUMBER': 'INC012345'}).one()
```

15.2 Using the query builder

The recommended way to create advanced queries.

See the `pysnow.QueryBuilder()` documentation for details.

```
# Set start and end range
start = datetime(1970, 1, 1)
end = datetime.now() - timedelta(days=20)

# Query incident records with number starting with 'INC0123', created between 1970-01-
↪01 and 20 days back in time
qb = (
    pysnow.QueryBuilder()
        .field('number').starts_with('INC0123')
        .AND()
        .field('sys_created_on').between(start, end)
        .AND()
        .field('sys_updated_on').order_descending()
)

iterable_content = incident.get(query=qb).all()
```

15.3 SN Pass-through

It's recommended to use the query builder for complex queries, as it offers error handling and a cleaner way of creating queries.

However, you can still use SN pass-through queries should the query builder not satisfy your needs for some reason.

Below is the pass-through equivalent of the QB in the previous example. You decide ;)

```
# Set start and end range
start = datetime(1970, 1, 1)
end = datetime.now() - timedelta(days=20)

# Query incident records with number starting with 'INC0123', created between 1970-01-
↳ 01 and 20 days back in time
iterable_content = incident.get(query='numberSTARTSWITHINC0150^sys_created_
↳ onBETWEENjavascript:gs.dateGenerate("%s")@javascript:gs.dateGenerate("%s")' %
↳ (start, end)).all()
```

Fetching data

The `pysnow.Resource.get()` returns an instance of `pysnow.Response`, which exposes an interface to the various methods available for getting the data you're after.

Note: All get-methods uses an incremental stream parser when fetching data.

16.1 Multiple records

The `pysnow.Response.all()` returns a generator iterator, which is iterated on in chunks of 8192 bytes by default.

```
import pysnow

# Create client object
c = pysnow.Client(instance='myinstance', user='myusername', password='mypassword')

# Define a resource, here we'll use the incident table API
incident = c.resource(api_path='/table/incident')

# Query for incidents with state 1
response = incident.get(query={'state': 1})

# Iterate over the result and print out `sys_id` of the matching records.
for record in response.all():
    print(record['sys_id'])
```

16.2 First record

The `pysnow.Response.first()` returns the first record in a result containing one or more records. An exception is raised if the result doesn't contain any records.

```
import pysnow

# Create client object
c = pysnow.Client(instance='myinstance', user='myusername', password='mypassword')

# Define a resource, here we'll use the incident table API
incident = c.resource(api_path='/table/incident')

# Query for incidents with state 3
response = incident.get(query={'state': 3})

# Print out the first match
print(response.first())
```

16.3 First or none

The `pysnow.Response.first_or_none()` returns the first record in a result containing one or more records. None is returned if the result doesn't contain any records.

```
import pysnow

# Create client object
c = pysnow.Client(instance='myinstance', user='myusername', password='mypassword')

# Define a resource, here we'll use the incident table API
incident = c.resource(api_path='/table/incident')

# Query for incidents with state 3
response = incident.get(query={'state': 3})

# Print out the first match, or `None`
print(response.first_or_none())
```

16.4 Exactly one

The `pysnow.Response.one()` returns exactly one record. An exception is raised if the result is empty or contains multiple records.

```
import pysnow

# Create client object
c = pysnow.Client(instance='myinstance', user='myusername', password='mypassword')

# Define a resource, here we'll use the incident table API
incident = c.resource(api_path='/table/incident')

# Query for incident with number INC012345
```

```
response = incident.get(query={'number': 'INC012345'})  
  
# Print out the matching record  
print(response.one())
```

16.5 One or none

The `pysnow.Response.one_or_none()` returns one record, or `None` if no matching records were found. An exception is raised if the result contains multiple records

```
import pysnow  
  
# Create client object  
c = pysnow.Client(instance='myinstance', user='myusername', password='mypassword')  
  
# Create a new resource for the incident table API  
incident = c.resource(api_path='/table/incident')  
  
# Query for incident with number INC012345  
response = incident.get(query={'number': 'INC012345'})  
  
# Print out the matching record, or `None` if no matches were found.  
print(response.one_or_none())
```

Creating a new record

The `Client.resource.create()` takes a dictionary payload with key-values of the record to be created.

Note: This method calls `pysnow.Resource.one()` if the record was created successfully, returning a dictionary of the created record.

```
import pysnow

# Create client object
c = pysnow.Client(instance='myinstance', user='myusername', password='mypassword')

# Define a resource, here we'll use the incident table API
incident = c.resource(api_path='/table/incident')

# Set the payload
new_record = {
    'short_description': 'Pysnow created incident',
    'description': 'This is awesome'
}

# Create a new incident record
result = incident.create(payload=new_record)
```


CHAPTER 18

Updating a record

The `Client.resource.update()` takes a **payload** and **query** to perform an update.

Note: This method returns the updated record (dict) if the operation was successful. Refer to `Client.resource.custom()` if you want a **Response** object back.

Note: Updating multiple records is **not supported**.

```
import pysnow

# Create client object
c = pysnow.Client(instance='myinstance', user='myusername', password='mypassword')

# Define a resource, here we'll use the incident table API
incident = c.resource(api_path='/table/incident')

update = {'short_description': 'New short description', 'state': 5}

# Update 'short_description' and 'state' for 'INC012345'
updated_record = incident.update(query={'number': 'INC012345'}, payload=update)

# Print out the updated record
print(updated_record)
```


CHAPTER 19

Deleting a record

Deletes the queried record and returns the result (dict).

Note: Deletion of multiple records is **not supported**.

```
import pysnow

# Create client object
c = pysnow.Client(instance='myinstance', user='myusername', password='mypassword')

# Define a resource, here we'll use the incident table API
incident = c.resource(api_path='/table/incident')

# Delete incident with number 'INC012345'
result = incident.delete(query={'number': 'INC012345'})
```

Using the OAuthClient

Example showing how tokens can be obtained, stored and refreshed using the OAuthClient.

In this example a basic dictionary is used as store, which offers no persistence, meaning that `OAuthClient.generate_token` will be called every time this code executes, which introduces an overhead. The store here could be a database table, file, session or whatever you want.

```
import pysnow

store = {'token': None}

# Takes care of refreshing the token storage if needed
def updater(new_token):
    print("OAuth token refreshed!")
    store['token'] = new_token

# Create the OAuthClient with the ServiceNow provided `client_id` and `client_secret`,
↪ and a `token_updater`
# function which takes care of refreshing local token storage.
s = pysnow.OAuthClient(client_id='<client_id_from_servicenow>', client_secret='
↪<client_secret_from_servicenow>',
                       token_updater=updater, instance='<instance_name>')

if not store['token']:
    # No previous token exists. Generate new.
    store['token'] = s.generate_token('<username>', '<password>')

# Set the access / refresh tokens
s.set_token(store['token'])

# We should now be good to go. Let's define a `Resource` for the incident API.
incident_resource = s.resource(api_path='/table/incident')

# Fetch the first record in the response
record = incident_resource.get(query={}).first()
```

```
# Print it  
print(record)
```

Using the QueryBuilder

Example showing how the QueryBuilder can be used to construct a query using the Python datetime library.

```
import pysnow
from datetime import datetime, timedelta

# Create client object
c = pysnow.Client(instance='myinstance', user='myusername', password='mypassword')

today = datetime.today()
sixty_days_ago = today - timedelta(days=60)

# Query incident records with number starting with 'INC0123', created between 60 days_
↪ago and today.
qb = (
    pysnow.QueryBuilder()
    .field('number').starts_with('INC0123')
    .AND()
    .field('sys_created_on').between(sixty_days_ago, today)
)

incident = c.resource(api_path='/table/incident')

response = incident.get(query=qb)

# Iterate over the matching records and print out number
for record in response.all():
    print(record['number'])
```


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