
pysnow
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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.

CHAPTER 5

License

MIT License

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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, ses-  
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*)
Sets token after validating

Parameters **token** – dict containing the information required to create an OAuth2Session

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

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

Creates 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 result 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 no records are present in the content

one_or_none ()

Return at most one result 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 shapes:

- 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 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 (known as sysparms in ServiceNow) can be set on both the `pysnow.Client` object and on the `pysnow.Resource` object using the `parameters` property. Parameters set on **Client** are automatically inherited by **Resource**, but can 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='/table/incident')

incident.parameters.display_value = True
incident.parameters.limit = 5 # Limits the max number of records returned for this_
↪Resource
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()
```

The `pysnow.Resource.get()` returns an instance of `pysnow.Response`, which exposes a public API with various convenience methods for getting the data you're after.

The Response API uses an incremental stream parser when fetching results, which dramatically reduces memory usage, load on the ServiceNow instance and response times.

Example: using `first()` on a query that would yield 50000 records when iterated on, would yield only records contained in the first **4096 bytes** (the default) of the response.

See the `pysnow.Response` documentation for more details.

16.1 Multiple records

The `pysnow.Response.all()` returns a generator that yields records as iterated on.

```
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. If the result contain no records, an exception is thrown.

```
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. If the result contains zero or multiple records, an exception is raised.

```
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.

This method returns `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)
```

Updating a record

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

This method returns `pysnow.Response.one()` (dict) if the update was successful. Refer to `Client.resource.custom()` if you want a **Response** object back.

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 record returned from the query. Successfully deleting a record returns a dictionary containing the result.

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.

```
import pysnow
import session

# Takes care of refreshing the token storage
def updater(new_token):
    print("OAuth token refreshed!")
    session['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 session['token']:
    # No previous token exists. Generate new.
    session['token'] = s.generate_token('<username>', '<password>')

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

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

# Fetch incident with number INC012345, or None
record = incident_resource.get(query={'number': 'INC012345'}).one_or_none()

if not record:
    print("No such incident")
else:
    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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