
pyDAL Documentation

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web2py-developers

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Indices and tables

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1.1 Subpackages

1.1.1 pydal.adapters package

Submodules

pydal.adapters.base module

class `pydal.adapters.base.AdapterMeta`

Bases: `type`

Metaclass to support manipulation of adapter classes.

At the moment is used to intercept *entity_quoting* argument passed to DAL.

class `pydal.adapters.base.BaseAdapter` (*db*, *uri*, *pool_size=0*, *folder=None*, *db_codec='UTF-8'*, *credential_decoder=<function IDENTITY at 0x7f781c8f6500>*, *driver_args={}*, *adapter_args={}*, *do_connect=True*, *after_connection=None*)

Bases: `pydal.connection.ConnectionPool`

ADD (*first*, *second*)

AGGREGATE (*first*, *what*)

ALLOW_NULL ()

AND (*first*, *second*)

AS (*first*, *second*)

BELONGS (*first*, *second*)

CASE (*query*, *t*, *f*)

CAST (*first*, *second*)

COALESCE (*first*, *second*)

COALESCE_ZERO (*first*)

COMMA (*first, second*)

CONCAT (**items*)

CONTAINS (*first, second, case_sensitive=True*)

COUNT (*first, distinct=None*)

DIV (*first, second*)

ENDSWITH (*first, second*)

EPOCH (*first*)

EQ (*first, second=None*)

EXTRACT (*first, what*)

FALSE = 'F'

FALSE_exp = '0'

GE (*first, second=None*)

GT (*first, second=None*)

ILIKE (*first, second*)
Case insensitive like operator

INVERT (*first*)

JOIN ()

LE (*first, second=None*)

LEFT_JOIN ()

LENGTH (*first*)

LIKE (*first, second*)
Case sensitive like operator

LOWER (*first*)

LT (*first, second=None*)

MOD (*first, second*)

MUL (*first, second*)

NE (*first, second=None*)

NOT (*first*)

NOT_NULL (*default, field_type*)

ON (*first, second*)

OR (*first, second*)

PRIMARY_KEY (*key*)

QUOTE_TEMPLATE = "%s"

RANDOM ()

RAW (*first*)

REGEXP (*first, second*)
 Regular expression operator

REPLACE (*first, (second, third)*)

STARTSWITH (*first, second*)

SUB (*first, second*)

SUBSTRING (*field, parameters*)

TRUE = 'T'

TRUE_exp = '1'

T_SEP = ' '

UPPER (*first*)

adapt (*obj*)

alias (*table, alias*)
 Given a table object, makes a new table object with alias name.

build_parsemap ()

bulk_insert (*table, items*)

can_select_for_update = True

close_connection ()

commit ()

commit_on_alter_table = False

commit_prepared (*key*)

common_filter (*query, tablename*)

concat_add (*tablename*)

connection = None

connector (**args, **kwargs*)

constraint_name (*table, fieldname*)

count (*query, distinct=None*)

create_sequence_and_triggers (*query, table, **args*)

create_table (*table, migrate=True, fake_migrate=False, polymodel=None*)

dbpath = None

delete (*tablename, query*)

distributed_transaction_begin (*key*)

driver = None

driver_auto_json = []

driver_name = None

drivers = ()

drop (*table, mode=''*)

execute (**a, **b*)

expand (*expression*, *field_type*=None, *colnames*=False)

expand_all (*fields*, *tablenames*)

file_close (*fileobj*)

file_delete (*filename*)

file_exists (*filename*)

file_open (*filename*, *mode*='rb', *lock*=True)

find_driver (*adapter_args*, *uri*=None)

folder = None

get_table (*query*)

id_query (*table*)

insert (*table*, *fields*)

isOperationalError (*exception*)

isProgrammingError (*exception*)

is_numerical_type (*ftype*)

lastrowid (*table*)

log (*message*, *table*=None)
Logs migrations
It will not log changes if logfile is not specified. Defaults to sql.log

log_execute (**a*, ***b*)

migrate_table (*table*, *sql_fields*, *sql_fields_old*, *sql_fields_aux*, *logfile*, *fake_migrate*=False)

parse (*rows*, *fields*, *colnames*, *blob_decode*=True, *cacheable*=False)

parse_blob (*value*, *field_type*)

parse_boolean (*value*, *field_type*)

parse_date (*value*, *field_type*)

parse_datetime (*value*, *field_type*)

parse_decimal (*value*, *field_type*)

parse_double (*value*, *field_type*)

parse_id (*value*, *field_type*)

parse_integer (*value*, *field_type*)

parse_json (*value*, *field_type*)

parse_list_integers (*value*, *field_type*)

parse_list_references (*value*, *field_type*)

parse_list_strings (*value*, *field_type*)

parse_reference (*value*, *field_type*)

parse_time (*value*, *field_type*)

parse_value (*value*, *field_type*, *blob_decode*=True)

```

prepare (key)
represent (obj, fieldtype)
represent_exceptions (obj, fieldtype)
rollback ()
rollback_prepared (key)
rowslice (rows, minimum=0, maximum=None)
    By default this function does nothing; overload when db does not do slicing.
save_dbt (table, sql_fields_current)
select (query, fields, attributes)
    Always returns a Rows object, possibly empty.
select_limitby (sql_s, sql_f, sql_t, sql_w, sql_o, limitby)
sequence_name (tablename)
smart_adapt (obj)
sqlsafe_field (fieldname)
sqlsafe_table (tablename, ot=None)
support_distributed_transaction = False
table_alias (tbl)
tables (*queries)
test_query = 'SELECT 1;'
trigger_name (tablename)
truncate (table, mode=' ')
types = {'reference': 'INTEGER REFERENCES %(foreign_key)s ON DELETE %(on_delete_action)s', 'text': 'TEXT'}
update (tablename, query, fields)
uploads_in_blob = False
varquote (name)

class pydal.adapters.base.NoSQLAdapter (db, uri, pool_size=0, folder=None, db_codec='UTF-8', credential_decoder=<function IDENTITY at 0x7f781c8f6500>, driver_args={}, adapter_args={}, do_connect=True, after_connection=None)

    Bases: pydal.adapters.base.BaseAdapter

ADD (first, second)
AGGREGATE (first, what)
AND (first, second)
AS (first, second)
DIV (first, second)
ENDSWITH (first, second=None)
EXTRACT (first, what)
ILIKE (first, second)

```

LEFT_JOIN ()

LENGTH (*first*)

LOWER (*first*)

MUL (*first, second*)

ON (*first, second*)

OR (*first, second*)

PRIMARY_KEY (*key*)

QUOTE_TEMPLATE = '%s'

RANDOM ()

STARTSWITH (*first, second=None*)

SUB (*first, second*)

SUBSTRING (*field, parameters*)

UPPER (*first*)

can_select_for_update = **False**

close_connection ()
remember: no transactions on many NoSQL

commit ()
remember: no transactions on many NoSQL

commit_prepared (*key*)

concat_add (*table*)

constraint_name (*table, fieldname*)

create_sequence_and_triggers (*query, table, **args*)

distributed_transaction_begin (*key*)

drop (*table, mode*)

execute (**a, **b*)

id_query (*table*)

lastrowid (*table*)

log_execute (**a, **b*)

migrate_table (**a, **b*)

prepare (*key*)

represent (*obj, fieldtype*)

represent_exceptions (*obj, fieldtype*)

rollback ()
remember: no transactions on many NoSQL

rollback_prepared (*key*)

rowslice (*rows, minimum=0, maximum=None*)

static to_unicode (*obj*)

pydal.adapters.couchdb module

```
class pydal.adapters.couchdb.CouchDBAdapter (db, uri='couchdb://127.0.0.1:5984',
                                             pool_size=0, folder=None, db_codec='UTF-8',
                                             credential_decoder=<function IDENTITY at 0x7f781c8f6500>,
                                             driver_args={}, adapter_args={}, do_connect=True,
                                             after_connection=None)
```

Bases: `pydal.adapters.base.NoSQLAdapter`

AND (*first, second*)

COMMA (*first, second*)

EQ (*first, second*)

NE (*first, second*)

OR (*first, second*)

count (*query, distinct=None*)

create_table (*table, migrate=True, fake_migrate=False, polymodel=None*)

delete (*tablename, query*)

drivers = ('couchdb',)

expand (*expression, field_type=None*)

file_close (*fileobj*)

file_exists (*filename*)

file_open (*filename, mode='rb', lock=True*)

insert (*table, fields*)

represent (*obj, fieldtype*)

select (*query, fields, attributes*)

types = {'string': <type 'str'>, 'reference': <type 'long'>, 'text': <type 'str'>, 'id': <type 'long'>, 'float': <type 'float'>},

update (*tablename, query, fields*)

uploads_in_blob = True

pydal.adapters.cubrid module

```
class pydal.adapters.cubrid.CubridAdapter (db, uri, pool_size=0, folder=None,
                                             db_codec='UTF-8', credential_decoder=<function
                                             IDENTITY at 0x7f781c8f6500>, driver_args={},
                                             adapter_args={}, do_connect=True,
                                             after_connection=None)
```

Bases: `pydal.adapters.mysql.MySQLAdapter`

REGEX_URI = <_sre.SRE_Pattern object at 0x2b86e40>

after_connection ()

drivers = ('cubriddb',)

pydal.adapters.db2 module

```
class pydal.adapters.db2.DB2Adapter (db, uri, pool_size=0, folder=None, db_codec='UTF-8', credential_decoder=<function IDENTITY at 0x7f781c8f6500>, driver_args={}, adapter_args={}, do_connect=True, after_connection=None)

Bases: pydal.adapters.base.BaseAdapter

LEFT_JOIN ()

RANDOM ()

drivers = ('ibm_db_dbi', 'pyodbc')

execute (command, placeholders=None)

lastrowid (table)

represent_exceptions (obj, fieldtype)

rowslice (rows, minimum=0, maximum=None)

select_limitby (sql_s, sql_f, sql_t, sql_w, sql_o, limitby)

types = {'reference': 'INT, FOREIGN KEY (%(field_name)s) REFERENCES %(foreign_key)s ON DELETE %(on_del
```

pydal.adapters.firebird module

```
class pydal.adapters.firebird.FireBirdAdapter (db, uri, pool_size=0, folder=None, db_codec='UTF-8', credential_decoder=<function IDENTITY at 0x7f781c8f6500>, driver_args={}, adapter_args={}, do_connect=True, after_connection=None)

Bases: pydal.adapters.base.BaseAdapter

CONTAINS (first, second, case_sensitive=False)

EPOCH (first)

LENGTH (first)

NOT_NULL (default, field_type)

RANDOM ()

REGEX_URI = <_sre.SRE_Pattern object at 0x2b2d150>

SUBSTRING (field, parameters)

commit_on_alter_table = False

create_sequence_and_triggers (query, table, **args)

drivers = ('kinterbasdb', 'firebirdsql', 'fdb', 'pyodbc')

lastrowid (table)

select_limitby (sql_s, sql_f, sql_t, sql_w, sql_o, limitby)

sequence_name (tablename)

support_distributed_transaction = True

trigger_name (tablename)
```

types = {'reference': 'INTEGER REFERENCES %(foreign_key)s ON DELETE %(on_delete_action)s', 'text': 'BLOB'}

```
class pydal.adapters.firebird.FireBirdEmbeddedAdapter (db, uri, pool_size=0,
                                                    folder=None,
                                                    db_codec='UTF-8', credential_decoder=<function IDENTITY at 0x7f781c8f6500>,
                                                    driver_args={},
                                                    adapter_args={},
                                                    do_connect=True, after_connection=None)
```

Bases: `pydal.adapters.firebird.FireBirdAdapter`

REGEX_URI = `<_sre.SRE_Pattern object at 0x2b5da40>`

drivers = ('kinterbasdb', 'firebirdsql', 'fdb', 'pyodbc')

pydal.adapters.google module

pydal.adapters.imap module

```
class pydal.adapters.imap.IMAPAdapter (db, uri, pool_size=0, folder=None, db_codec='UTF-8',
                                       credential_decoder=<function IDENTITY at 0x7f781c8f6500>,
                                       driver_args={}, adapter_args={},
                                       do_connect=True, after_connection=None)
```

Bases: `pydal.adapters.base.NoSQLAdapter`

IMAP server adapter

This class is intended as an interface with email IMAP servers to perform simple queries in the web2py DAL query syntax, so email read, search and other related IMAP mail services (as those implemented by brands like Google(r), and Yahoo!(r) can be managed from web2py applications.

The code uses examples by Yuji Tomita on this post: <http://yuji.wordpress.com/2011/06/22/python-imaplib-imap-example-with-gmail/#comment-1137> and is based in docs for Python imaplib, python email and email IETF's (i.e. RFC2060 and RFC3501)

This adapter was tested with a small set of operations with Gmail(r). Other services requests could raise command syntax and response data issues.

It creates its table and field names “statically”, meaning that the developer should leave the table and field definitions to the DAL instance by calling the adapter's `.define_tables()` method. The tables are defined with the IMAP server mailbox list information.

`.define_tables()` returns a dictionary mapping dal tablename to the server mailbox names with the following structure:

```
{<tablename>: str <server mailbox name>}
```

Here is a list of supported fields:

Field	Type	Description
uid	string	
answered	boolean	Flag
created	date	
content	list:string	A list of dict text or html parts
to	string	
cc	string	
bcc	string	
size	integer	the amount of octets of the message*
deleted	boolean	Flag
draft	boolean	Flag
flagged	boolean	Flag
sender	string	
recent	boolean	Flag
seen	boolean	Flag
subject	string	
mime	string	The mime header declaration
email	string	The complete RFC822 message (*)
attachments	list	Each non text part as dict
encoding	string	The main detected encoding

(*) At the application side it is measured as the length of the RFC822 message string

WARNING: As row id's are mapped to email sequence numbers, make sure your imap client web2py app does not delete messages during select or update actions, to prevent updating or deleting different messages. Sequence numbers change whenever the mailbox is updated. To avoid this sequence numbers issues, it is recommended the use of uid fields in query references (although the update and delete in separate actions rule still applies).

```
# This is the code recommended to start imap support  
# at the app's model:
```

```
imapdb = DAL("imap://user:password@server:port", pool_size=1) # port 993 for ssl  
imapdb.define_tables()
```

Here is an (incomplete) list of possible imap commands:

```
# Count today's unseen messages  
# smaller than 6000 octets from the  
# inbox mailbox  
  
q = imapdb.INBOX.seen == False  
q &= imapdb.INBOX.created == datetime.date.today()  
q &= imapdb.INBOX.size < 6000  
unread = imapdb(q).count()  
  
# Fetch last query messages  
rows = imapdb(q).select()  
  
# it is also possible to filter query select results with limitby and  
# sequences of mailbox fields  
  
set.select(<fields sequence>, limitby=<int>, <int>))  
  
# Mark last query messages as seen  
messages = [row.uid for row in rows]  
seen = imapdb(imapdb.INBOX.uid.belongs(messages)).update(seen=True)  
  
# Delete messages in the imap database that have mails from mr. Gumby
```



```

deleted = 0
for mailbox in imapdb.tables
    deleted += imapdb(imapdb[mailbox].sender.contains("gumby")).delete()

# It is possible also to mark messages for deletion instead of erasing them
# directly with set.update(deleted=True)

# This object give access
# to the adapter auto mailbox
# mapped names (which native
# mailbox has what table name)

imapdb.mailboxes <dict> # tablename, server native name pairs

# To retrieve a table native mailbox name use:
imapdb.<table>.mailbox

### New features v2.4.1:

# Declare mailboxes statically with tablename, name pairs
# This avoids the extra server names retrieval

imapdb.define_tables({"inbox": "INBOX"})

# Selects without content/attachments/email columns will only
# fetch header and flags

imapdb(q).select(imapdb.INBOX.sender, imapdb.INBOX.subject)

AND (first, second)
BELONGS (first, second)
CONTAINS (first, second, case_sensitive=False)
EQ (first, second)
GE (first, second)
GT (first, second)
LE (first, second)
LT (first, second)
NE (first, second=None)
NOT (first)
OR (first, second)
REGEX_URI = <_sre.SRE_Pattern object at 0x7f781c424558>
convert_date (date, add=None, imf=False)
count (query, distinct=None)
create_table (*args, **kwargs)
dbengine = 'imap'
define_tables (mailbox_names=None)
    Auto create common IMAP files

```

This function creates fields definitions “statically” meaning that custom fields as in other adapters should not be supported and definitions handled on a service/mode basis (local syntax for Gmail(r), Ymail(r))

Returns a dictionary with tablename, server native mailbox name pairs.

delete (*tablename, query*)

drivers = ('imaplib',)

encode_text (*text, charset, errors='replace'*)
convert text for mail to unicode

get_charset (*message*)

get_last_message (*tablename*)

get_mailboxes ()
Query the mail database for mailbox names

get_query_mailbox (*query*)

get_uid_bounds (*tablename*)

static header_represent (*f, r*)

insert (*table, fields*)

is_flag (*flag*)

reconnect (*f=None, cursor=True*)
IMAP4 Pool connection method

imap connection lacks of self cursor command. A custom command should be provided as a replacement for connection pooling to prevent uncaught remote session closing

select (*query, fields, attributes*)
Searches and Fetches records and return web2py rows

types = {'boolean': <type 'bool'>, 'string': <type 'str'>, 'list:string': <type 'str'>, 'integer': <type 'int'>, 'date': <type 'date'>}

update (*tablename, query, fields*)

uri = None
MESSAGE is an identifier for sequence number

pydal.adapters.informix module

```
class pydal.adapters.informix.InformixAdapter(db, uri, pool_size=0, folder=None,
                                              db_codec='UTF-8', credential_decoder=<function IDENTITY
                                              at 0x7f781c8f6500>, driver_args={},
                                              adapter_args={}, do_connect=True, after_connection=None)
```

Bases: `pydal.adapters.base.BaseAdapter`

NOT_NULL (*default, field_type*)

RANDOM ()

REGEX_URI = <_sre.SRE_Pattern object at 0x7f781c85c830>

drivers = ('informixdb',)

execute (*command*)

lastrowid (*table*)

represent_exceptions (*obj, fieldtype*)

select_limitby (*sql_s, sql_f, sql_t, sql_w, sql_o, limitby*)

types = {'reference': 'INTEGER REFERENCES %(foreign_key)s ON DELETE %(on_delete_action)s', 'text': 'BLOB'}

```
class pydal.adapters.informix.InformixSEAdapter (db, uri, pool_size=0, folder=None,
                                               db_codec='UTF-8', credential_decoder=<function
                                               IDENTITY
                                               at 0x7f781c8f6500>, driver_args={},
                                               adapter_args={}, do_connect=True,
                                               after_connection=None)
```

Bases: `pydal.adapters.informix.InformixAdapter`

work in progress

rowslice (*rows, minimum=0, maximum=None*)

select_limitby (*sql_s, sql_f, sql_t, sql_w, sql_o, limitby*)

pydal.adapters.ingres module

```
class pydal.adapters.ingres.IngresAdapter (db, uri, pool_size=0, folder=None,
                                           db_codec='UTF-8', credential_decoder=<function
                                           IDENTITY
                                           at 0x7f781c8f6500>, driver_args={},
                                           adapter_args={}, do_connect=True,
                                           after_connection=None)
```

Bases: `pydal.adapters.base.BaseAdapter`

LEFT_JOIN ()

RANDOM ()

create_sequence_and_triggers (*query, table, **args*)

drivers = ('pyodbc',)

lastrowid (*table*)

select_limitby (*sql_s, sql_f, sql_t, sql_w, sql_o, limitby*)

types = {'reference': 'INT, FOREIGN KEY (%(field_name)s) REFERENCES %(foreign_key)s ON DELETE %(on_delete_action)s', 'text': 'TEXT'}

```
class pydal.adapters.ingres.IngresUnicodeAdapter (db, uri, pool_size=0, folder=None,
                                                  db_codec='UTF-8', credential_decoder=<function
                                                  IDENTITY
                                                  at 0x7f781c8f6500>, driver_args={},
                                                  adapter_args={}, do_connect=True,
                                                  after_connection=None)
```

Bases: `pydal.adapters.ingres.IngresAdapter`

drivers = ('pyodbc',)

types = {'reference': 'INTEGER4, FOREIGN KEY (%(field_name)s) REFERENCES %(foreign_key)s ON DELETE %(on_delete_action)s', 'text': 'TEXT'}

pydal.adapters.mongo module

```
class pydal.adapters.mongo.MongoDBAdapter (db, uri='mongodb://127.0.0.1:5984/db',  
                                           pool_size=0, folder=None, db_codec='UTF-8',  
                                           credential_decoder=<function IDENTITY at 0x7f781c8f6500>,  
                                           driver_args={},  
                                           adapter_args={}, do_connect=True,  
                                           after_connection=None)
```

Bases: `pydal.adapters.base.NoSQLAdapter`

ADD (*first, second*)

AND (*first, second*)

AS (*first, second*)

BELONGS (*first, second*)

COMMA (*first, second*)

CONTAINS (*first, second, case_sensitive=False*)

DIV (*first, second*)

ENDSWITH (*first, second*)

EQ (*first, second=None*)

GE (*first, second=None*)

GT (*first, second*)

ILIKE (*first, second*)

INVERT (*first*)

LE (*first, second=None*)

LIKE (*first, second*)

LT (*first, second=None*)

MOD (*first, second*)

MUL (*first, second*)

NE (*first, second=None*)

NOT (*first*)

ON (*first, second*)

OR (*first, second*)

STARTSWITH (*first, second*)

SUB (*first, second*)

bulk_insert (*table, items*)

count (*query, distinct=None, snapshot=True*)

create_table (*table, migrate=True, fake_migrate=False, polymodel=None, isCapped=False*)

delete (*tablename, query, safe=None*)

driver_auto_json = ['loads', 'dumps']

drivers = ('pymongo',)

drop (*table*, *mode*='')

error_messages = {'javascript_needed': 'This must yet be replaced with javascript in order to work.'}

expand (*expression*, *field_type*=None)

insert (*table*, *fields*, *safe*=None)
 Safe determines whether a asynchronous request is done or a synchronous action is done For safety, we use by default synchronous requests

object_id (*arg*=None)
 Convert input to a valid Mongodb ObjectId instance
 self.object_id("<random>") -> ObjectId (not unique) instance

parse_id (*value*, *field_type*)

parse_reference (*value*, *field_type*)

represent (*obj*, *fieldtype*)

select (*query*, *fields*, *attributes*, *count*=False, *snapshot*=False)

truncate (*table*, *mode*, *safe*=None)

types = {'string': <type 'str'>, 'reference': <type 'long'>, 'text': <type 'str'>, 'id': <type 'long'>, 'float': <type 'float'>},

update (*tablename*, *query*, *fields*, *safe*=None)

uploads_in_blob = False

pydal.adapters.mssql module

class pydal.adapters.mssql.**MSSQL2Adapter** (*db*, *uri*, *pool_size*=0, *folder*=None, *db_codec*='UTF-8', *credential_decoder*=<function IDENTITY at 0x7f781c8f6500>, *driver_args*={}, *adapter_args*={}, *do_connect*=True, *srid*=4326, *after_connection*=None)

Bases: pydal.adapters.mssql.MSSQLAdapter

drivers = ('pyodbc',)

execute (*a*)

represent (*obj*, *fieldtype*)

types = {'reference': 'INT, CONSTRAINT %(constraint_name)s FOREIGN KEY %(field_name)s REFERENCES %'

class pydal.adapters.mssql.**MSSQL3Adapter** (*db*, *uri*, *pool_size*=0, *folder*=None, *db_codec*='UTF-8', *credential_decoder*=<function IDENTITY at 0x7f781c8f6500>, *driver_args*={}, *adapter_args*={}, *do_connect*=True, *srid*=4326, *after_connection*=None)

Bases: pydal.adapters.mssql.MSSQLAdapter

Experimental support for pagination in MSSQL

Requires MSSQL >= 2005, uses ROW_NUMBER()

rowslice (*rows*, *minimum*=0, *maximum*=None)

select_limitby (*sql_s*, *sql_f*, *sql_t*, *sql_w*, *sql_o*, *limitby*)

types = {'reference': 'INT NULL, CONSTRAINT %(constraint_name)s FOREIGN KEY %(field_name)s REFEREN

```
class pydal.adapters.mssql.MSSQL4Adapter (db, uri, pool_size=0, folder=None, db_codec='UTF-8',
                                          credential_decoder=<function IDENTITY at 0x7f781c8f6500>, driver_args={},
                                          adapter_args={}, do_connect=True, srid=4326,
                                          after_connection=None)
```

Bases: `pydal.adapters.mssql.MSSQLAdapter`

Support for “native” pagination

Requires MSSQL >= 2012, uses *OFFSET ... ROWS ... FETCH NEXT ... ROWS ONLY*

rowslice (*rows, minimum=0, maximum=None*)

select_limitby (*sql_s, sql_f, sql_t, sql_w, sql_o, limitby*)

types = {'reference': 'INT NULL, CONSTRAINT %(constraint_name)s FOREIGN KEY (%(field_name)s) REFERENC

```
class pydal.adapters.mssql.MSSQLAdapter (db, uri, pool_size=0, folder=None, db_codec='UTF-8',
                                          credential_decoder=<function IDENTITY at 0x7f781c8f6500>, driver_args={},
                                          adapter_args={}, do_connect=True, srid=4326,
                                          after_connection=None)
```

Bases: `pydal.adapters.base.BaseAdapter`

AGGREGATE (*first, what*)

ALLOW_NULL ()

CAST (*first, second*)

CONCAT (**items*)

EPOCH (*first*)

EXTRACT (*field, what*)

FALSE = 0

LEFT_JOIN ()

LENGTH (*first*)

PRIMARY_KEY (*key*)

QUOTE_TEMPLATE = “%s”

RANDOM ()

REGEX_ARGPATTERN = `<_sre.SRE_Pattern object at 0x7f781f07c1d0>`

REGEX_DSN = `<_sre.SRE_Pattern object at 0x7f781f0890d8>`

REGEX_URI = `<_sre.SRE_Pattern object at 0x2b37560>`

ST_ASTEXT (*first*)

ST_CONTAINS (*first, second*)

ST_DISTANCE (*first, second*)

ST_EQUALS (*first, second*)

ST_INTERSECTS (*first, second*)

ST_OVERLAPS (*first, second*)

ST_TOUCHES (*first, second*)

ST_WITHIN (*first, second*)

```

SUBSTRING (field, parameters)
TRUE = 1
T_SEP = 'T'
concat_add (tablename)
drivers = ('pyodbc',)
lastrowid (table)
represent (obj, fieldtype)
rowslice (rows, minimum=0, maximum=None)
select_limitby (sql_s, sql_f, sql_t, sql_w, sql_o, limitby)
types = {'reference': 'INT NULL, CONSTRAINT %(constraint_name)s FOREIGN KEY (%(field_name)s) REFERENC'
varquote (name)
class pydal.adapters.mssql.SybaseAdapter (db, uri, pool_size=0, folder=None, db_codec='UTF-8', credential_decoder=<function IDENTITY at 0x7f781c8f6500>, driver_args={}, adapter_args={}, do_connect=True, srid=4326, after_connection=None)
Bases: pydal.adapters.mssql.MSSQLAdapter
drivers = 'Sybase'
types = {'reference': 'INT NULL, CONSTRAINT %(constraint_name)s FOREIGN KEY (%(field_name)s) REFERENC'
class pydal.adapters.mssql.VerticaAdapter (db, uri, pool_size=0, folder=None, db_codec='UTF-8', credential_decoder=<function IDENTITY at 0x7f781c8f6500>, driver_args={}, adapter_args={}, do_connect=True, srid=4326, after_connection=None)
Bases: pydal.adapters.mssql.MSSQLAdapter
EXTRACT (first, what)
T_SEP = ' '
drivers = ('pyodbc',)
execute (a)
lastrowid (table)
select_limitby (sql_s, sql_f, sql_t, sql_w, sql_o, limitby)
types = {'big-reference': 'BIGINT REFERENCES %(foreign_key)s ON DELETE %(on_delete_action)s', 'string': 'VAL

```

pydal.adapters.mysql module

```

class pydal.adapters.mysql.MySQLAdapter (db, uri, pool_size=0, folder=None, db_codec='UTF-8', credential_decoder=<function IDENTITY at 0x7f781c8f6500>, driver_args={}, adapter_args={}, do_connect=True, after_connection=None)
Bases: pydal.adapters.base.BaseAdapter
CAST (first, second)

```

```
CONCAT (*items)
EPOCH (first)
QUOTE_TEMPLATE = “%s”
RANDOM ()
REGEXP (first, second)
REGEX_URI = <_sre.SRE_Pattern object at 0x2b86e40>
SUBSTRING (field, parameters)
after_connection ()
commit_on_alter_table = True
commit_prepared (key)
distributed_transaction_begin (key)
drivers = ('MySQLdb', 'pymysql', 'mysqlconnector')
lastrowid (table)
prepare (key)
rollback_prepared (key)
support_distributed_transaction = True
types = {'reference': 'INT, INDEX %(index_name)s (%(field_name)s), FOREIGN KEY (%(field_name)s) REFERENC
varquote (name)
```

pydal.adapters.oracle module

```
class pydal.adapters.oracle.OracleAdapter (db, uri, pool_size=0, folder=None,
db_codec='UTF-8', credential_decoder=<function IDENTITY
at 0x7f781c8f6500>, driver_args={},
adapter_args={}, do_connect=True, af-
ter_connection=None)
```

Bases: `pydal.adapters.base.BaseAdapter`

```
LEFT_JOIN ()
NOT_NULL (default, field_type)
RANDOM ()
REGEXP (first, second)
after_connection ()
commit_on_alter_table = False
constraint_name (tablename, fieldname)
create_sequence_and_triggers (query, table, **args)
drivers = ('cx_Oracle',)
execute (command, args=None)
lastrowid (table)
```



```

oracle_fix = <_sre.SRE_Pattern object at 0x7f781c8c18f0>
represent_exceptions (obj, fieldtype)
select_limitby (sql_s, sql_f, sql_t, sql_w, sql_o, limitby)
sqlsafe_table (tablename, ot=None)
trigger_name (tablename)
types = {'reference': 'NUMBER, CONSTRAINT %(constraint_name)s FOREIGN KEY ( %(field_name)s) REFERENC

```

pydal.adapters.postgres module

```

class pydal.adapters.postgres.JDBCPostgreSQLAdapter (db, uri, pool_size=0, folder=None,
                                                    db_codec='UTF-8', credential_decoder=<function IDENTITY
                                                    at 0x7f781c8f6500>, driver_args={}, adapter_args={},
                                                    do_connect=True, after_connection=None)

```

Bases: `pydal.adapters.postgres.PostgreSQLAdapter`

```

REGEX_URI = <_sre.SRE_Pattern object at 0x7f781c85c830>

```

```

after_connection ()

```

```

drivers = ('zJDBC',)

```

```

class pydal.adapters.postgres.NewPostgreSQLAdapter (db, uri, pool_size=0, folder=None,
                                                    db_codec='UTF-8', credential_decoder=<function IDENTITY
                                                    at 0x7f781c8f6500>, driver_args={}, adapter_args={},
                                                    do_connect=True, srid=4326, after_connection=None)

```

Bases: `pydal.adapters.postgres.PostgreSQLAdapter`

```

ANY (first)

```

```

CONTAINS (first, second, case_sensitive=True)

```

```

EQ (first, second=None)

```

```

ILIKE (first, second)

```

```

drivers = ('psycpg2', 'pg8000')

```

```

parse_list_integers (value, field_type)

```

```

parse_list_references (value, field_type)

```

```

parse_list_strings (value, field_type)

```

```

represent (obj, fieldtype)

```

```

types = {'reference': 'INTEGER REFERENCES %(foreign_key)s ON DELETE %(on_delete_action)s', 'text': 'TEXT'

```

```

class pydal.adapters.postgres.PostgreSQLAdapter (db, uri, pool_size=0, folder=None,
                                                    db_codec='UTF-8', credential_decoder=<function IDENTITY
                                                    at 0x7f781c8f6500>, driver_args={}, adapter_args={},
                                                    do_connect=True, srid=4326, after_connection=None)

```

Bases: `pydal.adapters.base.BaseAdapter`

ADD (*first, second*)

ILIKE (*first, second*)

LIKE (*first, second*)

QUOTE_TEMPLATE = “%s”

RANDOM ()

REGEXP (*first, second*)

REGEX_URI = <_sre.SRE_Pattern object at 0x2b414b0>

ST_ASJSON (*first, second*)
http://postgis.org/docs/ST_AsGeoJSON.html

ST_ASTEXT (*first*)
http://postgis.org/docs/ST_AsText.html

ST_CONTAINS (*first, second*)
http://postgis.org/docs/ST_Contains.html

ST_DISTANCE (*first, second*)
http://postgis.org/docs/ST_Distance.html

ST_DWITHIN (*first, (second, third)*)
http://postgis.org/docs/ST_DWithin.html

ST_EQUALS (*first, second*)
http://postgis.org/docs/ST_Equals.html

ST_INTERSECTS (*first, second*)
http://postgis.org/docs/ST_Intersects.html

ST_OVERLAPS (*first, second*)
http://postgis.org/docs/ST_Overlaps.html

ST_SIMPLIFY (*first, second*)
http://postgis.org/docs/ST_Simplify.html

ST_SIMPLIFYPRESERVE TOPOLOGY (*first, second*)
http://postgis.org/docs/ST_SimplifyPreserveTopology.html

ST_TOUCHES (*first, second*)
http://postgis.org/docs/ST_Touches.html

ST_WITHIN (*first, second*)
http://postgis.org/docs/ST_Within.html

ST_X (*first*)
http://postgis.org/docs/ST_X.html

ST_Y (*first*)
http://postgis.org/docs/ST_Y.html

adapt (*obj*)

after_connection ()

commit_prepared (*key*)

create_sequence_and_triggers (*query, table, **args*)

distributed_transaction_begin (*key*)

drivers = ('psycopg2', 'pg8000')

```

lastrowid (table=None)
prepare (key)
represent (obj, fieldtype)
rollback_prepared (key)
sequence_name (table)
support_distributed_transaction = True
try_json ()
types = {'reference': 'INTEGER REFERENCES %(foreign_key)s ON DELETE %(on_delete_action)s', 'text': 'TEXT'}
varquote (name)

```

pydal.adapters.sapdb module

```

class pydal.adapters.sapdb.SAPDBAdapter (db, uri, pool_size=0, folder=None, db_codec='UTF-8', credential_decoder=<function IDENTITY at 0x7f781c8f6500>, driver_args={}, adapter_args={}, do_connect=True, after_connection=None)
    Bases: pydal.adapters.base.BaseAdapter
    REGEX_URI = <_sre.SRE_Pattern object at 0x2b414b0>
    create_sequence_and_triggers (query, table, **args)
    drivers = ('sapdb',)
    lastrowid (table)
    select_limitby (sql_s, sql_f, sql_t, sql_w, sql_o, limitby)
    sequence_name (table)
    support_distributed_transaction = False
    types = {'reference': 'INT, FOREIGN KEY (%(field_name)s) REFERENCES %(foreign_key)s ON DELETE %(on_del

```

pydal.adapters.sqlite module

```

class pydal.adapters.sqlite.JDBCSQLiteAdapter (db, uri, pool_size=0, folder=None, db_codec='UTF-8', credential_decoder=<function IDENTITY at 0x7f781c8f6500>, driver_args={}, adapter_args={}, do_connect=True, after_connection=None)
    Bases: pydal.adapters.sqlite.SQLiteAdapter
    after_connection ()
    drivers = ('zxJDBC_sqlite',)
    execute (a)

```

```
class pydal.adapters.sqlite.SQLiteAdapter (db, uri, pool_size=0, folder=None,
                                           db_codec='UTF-8', credential_decoder=<function
                                           IDENTITY
                                           at 0x7f781c8f6500>, driver_args={},
                                           adapter_args={}, do_connect=True, af-
                                           ter_connection=None)
```

Bases: `pydal.adapters.base.BaseAdapter`

EXTRACT (*field, what*)

REGEXP (*first, second*)

after_connection ()

can_select_for_update = None

delete (*tablename, query*)

drivers = ('sqlite2', 'sqlite3')

lastrowid (*table*)

select (*query, fields, attributes*)

Simulate *SELECT ... FOR UPDATE* with *BEGIN IMMEDIATE TRANSACTION*. Note that the entire database, rather than one record, is locked (it will be locked eventually anyway by the following UPDATE).

static web2py_extract (*lookup, s*)

static web2py_regexp (*expression, item*)

```
class pydal.adapters.sqlite.SpatialiteAdapter (db, uri, pool_size=0, folder=None,
                                                db_codec='UTF-8', credential_decoder=<function
                                                IDENTITY
                                                at 0x7f781c8f6500>, driver_args={},
                                                adapter_args={}, do_connect=True,
                                                srid=4326, after_connection=None)
```

Bases: `pydal.adapters.sqlite.SQLiteAdapter`

ST_ASJSON (*first, second*)

ST_ASTEXT (*first*)

ST_CONTAINS (*first, second*)

ST_DISTANCE (*first, second*)

ST_EQUALS (*first, second*)

ST_INTERSECTS (*first, second*)

ST_OVERLAPS (*first, second*)

ST_SIMPLIFY (*first, second*)

ST_TOUCHES (*first, second*)

ST_WITHIN (*first, second*)

after_connection ()

drivers = ('sqlite3', 'sqlite2')

represent (*obj, fieldtype*)

types = {'string': 'CHAR(%(length)s)', 'reference': 'INTEGER REFERENCES %(foreign_key)s ON DELETE %(on_c

pydal.adapters.teradata module

```

class pydal.adapters.teradata.TeradataAdapter(db, uri, pool_size=0, folder=None,
                                              db_codec='UTF-8', credential_decoder=<function IDENTITY
                                              at 0x7f781c8f6500>, driver_args={}, adapter_args={}, do_connect=True, af-
                                              ter_connection=None)

Bases: pydal.adapters.base.BaseAdapter

LEFT_JOIN()

close(action='commit', really=True)

drivers = ('pyodbc',)

select_limitby(sql_s, sql_f, sql_t, sql_w, sql_o, limitby)

types = {'reference': 'INT', 'text': 'VARCHAR(2000)', 'float': 'REAL', 'datetime': 'TIMESTAMP', 'bigint': 'BIGINT'}

```

Module contents

```

pydal.adapters.GoogleDatastoreAdapter = None
make the import available for BaseAdapter

```

1.1.2 pydal.helpers package

Submodules

pydal.helpers.classes module

```

class pydal.helpers.classes.DatabaseStoredFile(db, filename, mode)

```

```

close()
close_connection()
escape(obj)
static exists(db, filename)
read(bytes)
readline()
static try_create_web2py_filesystem(db)
web2py_filesystems = set([])
write(data)

```

```

class pydal.helpers.classes.MethodAdder(table)
Bases: object

```

```

register(method_name=None)

```

```

class pydal.helpers.classes.RecordDeleter(table, id)
Bases: object

```

```
class pydal.helpers.classes.RecordUpdater (colset, table, id)
    Bases: object
```

```
class pydal.helpers.classes.Reference
    Bases: long

    get (key, default=None)
```

```
pydal.helpers.classes.Reference_pickler (data)
```

```
pydal.helpers.classes.Reference_unpickler (data)
```

```
class pydal.helpers.classes.SQLALL (table)
    Bases: object
```

Helper class providing a comma-separated string having all the field names (prefixed by table name and '.') normally only called from within gluon.dal

```
class pydal.helpers.classes.SQLCallableList
    Bases: list
```

```
class pydal.helpers.classes.SQLCustomType (type='string', native=None, encoder=None, de-
    coder=None, validator=None, _class=None)
    Bases: object
```

Allows defining of custom SQL types

Parameters

- **type** – the web2py type (default = 'string')
- **native** – the backend type
- **encoder** – how to encode the value to store it in the backend
- **decoder** – how to decode the value retrieved from the backend
- **validator** – what validators to use (default = None, will use the default validator for type)

Example

Define as:

```
decimal = SQLCustomType( type = 'double', native = 'integer', encoder =(lambda x: int(float(x) *
    100)), decoder = (lambda x: Decimal("0.00") + Decimal(str(float(x)/100)) ) )
```

```
db.define_table( 'example', Field('value', type=decimal) )
```

```
endswith (text=None)
```

```
startswith (text=None)
```

```
class pydal.helpers.classes.UseDatabaseStoredFile
```

```
    file_close (fileobj)
```

```
    file_delete (filename)
```

```
    file_exists (filename)
```

```
    file_open (filename, mode='rb', lock=True)
```

pydal.helpers.methods module

```

pydal.helpers.methods.archive_record(qset, fs, archive_table, current_record)
pydal.helpers.methods.auto_represent(field)
pydal.helpers.methods.auto_validators(field)
pydal.helpers.methods.bar_decode_integer(value)
pydal.helpers.methods.bar_decode_string(value)
pydal.helpers.methods.bar_encode(items)
pydal.helpers.methods.bar_escape(item)
pydal.helpers.methods.cleanup(text)
    Validates that the given text is clean: only contains [0-9a-zA-Z_]
pydal.helpers.methods.geoLine(*line)
pydal.helpers.methods.geoPoint(x, y)
pydal.helpers.methods.geoPolygon(*line)
pydal.helpers.methods.hide_password(uri)
pydal.helpers.methods.int2uuid(n)
pydal.helpers.methods.list_represent(values, row=None)
pydal.helpers.methods.pluralize(singular, rules=[(<_sre.SRE_Pattern object at
0x7f781c93a5e0>, <_sre.SRE_Pattern object at
0x7f781c93a5e0>, 'children'), (<_sre.SRE_Pattern ob-
ject at 0x7f781c89a660>, <_sre.SRE_Pattern object
at 0x7f781c89a660>, 'et'), (<_sre.SRE_Pattern ob-
ject at 0x7f781ca96db0>, <_sre.SRE_Pattern object
at 0x7f781ca96db0>, 'eeth'), (<_sre.SRE_Pattern ob-
ject at 0x7f781ca96e70>, <_sre.SRE_Pattern object at
0x7f781c93a6b0>, '\Naves'), (<_sre.SRE_Pattern ob-
ject at 0x7f781c89a710>, <_sre.SRE_Pattern object
at 0x7f781c89a710>, 'ses'), (<_sre.SRE_Pattern ob-
ject at 0x7f781c89a7c0>, <_sre.SRE_Pattern object
at 0x7f781c89a7c0>, 'men'), (<_sre.SRE_Pattern ob-
ject at 0x7f781c89a870>, <_sre.SRE_Pattern object
at 0x7f781c89a870>, 'ives'), (<_sre.SRE_Pattern ob-
ject at 0x7f781c89a920>, <_sre.SRE_Pattern object
at 0x7f781c89a920>, 'eaux'), (<_sre.SRE_Pattern ob-
ject at 0x7f781c96d8f0>, <_sre.SRE_Pattern object
at 0x7f781c96d8f0>, 'lves'), (<_sre.SRE_Pattern ob-
ject at 0x7f781c93a780>, <_sre.SRE_Pattern object
at 0x7f781c8b7030>, 'es'), (<_sre.SRE_Pattern ob-
ject at 0x7f781c8982d0>, <_sre.SRE_Pattern object
at 0x7f781c8b7030>, 'es'), (<_sre.SRE_Pattern ob-
ject at 0x7f781c9ce7f0>, <_sre.SRE_Pattern object
at 0x7f781c95f930>, 'ies'), (<_sre.SRE_Pattern ob-
ject at 0x7f781c8b7098>, <_sre.SRE_Pattern object at
0x7f781c8b7098>, 's')]])
pydal.helpers.methods.smart_query(fields, text)
pydal.helpers.methods.use_common_filters(query)

```

`pydal.helpers.methods.uuid2int` (*uuidv*)

`pydal.helpers.methods.varquote_aux` (*name, quotestr='%s'*)

`pydal.helpers.methods.xorify` (*orderby*)

pydal.helpers.regex module

Module contents

1.2 Submodules

1.3 pydal.base module

This file is part of the web2py Web Framework

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This file contains the DAL support for many relational databases, including:

- SQLite & SpatiaLite
- MySQL
- Postgres
- Firebird
- Oracle
- MS SQL
- DB2
- Interbase
- Ingres
- Informix (9+ and SE)
- SapDB (experimental)
- Cubrid (experimental)
- CouchDB (experimental)
- MongoDB (in progress)
- Google:nosql
- Google:sql
- Teradata
- IMAP (experimental)

Example of usage:


```

>>> # from dal import DAL, Field

### create DAL connection (and create DB if it doesn't exist)
>>> db = DAL(('sqlite://storage.sqlite', 'mysql://a:b@localhost/x'),
... folder=None)

### define a table 'person' (create/alter as necessary)
>>> person = db.define_table('person', Field('name', 'string'))

### insert a record
>>> id = person.insert(name='James')

### retrieve it by id
>>> james = person(id)

### retrieve it by name
>>> james = person(name='James')

### retrieve it by arbitrary query
>>> query = (person.name=='James') & (person.name.startswith('J'))
>>> james = db(query).select(person.ALL)[0]

### update one record
>>> james.update_record(name='Jim')
<Row {'id': 1, 'name': 'Jim'}>

### update multiple records by query
>>> db(person.name.like('J%')).update(name='James')
1

### delete records by query
>>> db(person.name.lower() == 'jim').delete()
0

### retrieve multiple records (rows)
>>> people = db(person).select(orderby=person.name,
... groupby=person.name, limitby=(0,100))

### further filter them
>>> james = people.find(lambda row: row.name == 'James').first()
>>> print james.id, james.name
1 James

### check aggregates
>>> counter = person.id.count()
>>> print db(person).select(counter).first()(counter)
1

### delete one record
>>> james.delete_record()
1

### delete (drop) entire database table
>>> person.drop()

```

Supported DAL URI strings:

```
'sqlite://test.db'  
'spatialite://test.db'  
'sqlite:memory'  
'spatialite:memory'  
'jdbc:sqlite://test.db'  
'mysql://root:none@localhost/test'  
'postgres://mdipierro:password@localhost/test'  
'postgres:psycopg2://mdipierro:password@localhost/test'  
'postgres:pg8000://mdipierro:password@localhost/test'  
'jdbc:postgres://mdipierro:none@localhost/test'  
'mssql://web2py:none@A64X2/web2py_test'  
'mssql2://web2py:none@A64X2/web2py_test' # alternate mappings  
'mssql3://web2py:none@A64X2/web2py_test' # better pagination (requires >= 2005)  
'mssql4://web2py:none@A64X2/web2py_test' # best pagination (requires >= 2012)  
'oracle://username:password@database'  
'firebird://user:password@server:3050/database'  
'db2:ibm_db_dbi://DSN=dsn;UID=user;PWD=pass'  
'db2:pyodbc://driver=DB2;hostname=host;database=database;uid=user;pwd=password;port=port.'  
'firebird://username:password@hostname/database'  
'firebird_embedded://username:password@c://path'  
'informix://user:password@server:3050/database'  
'informixu://user:password@server:3050/database' # unicode informix  
'ingres://database' # or use an ODBC connection string, e.g. 'ingres://dsn=dsn_name'  
'google:datastore' # for google app engine datastore (uses ndb by default)  
'google:sql' # for google app engine with sql (mysql compatible)  
'teradata://DSN=dsn;UID=user;PWD=pass; DATABASE=database' # experimental  
'imap://user:password@server:port' # experimental  
'mongodb://user:password@server:port/database' # experimental
```

For more info:

```
help(DAL)  
help(Field)
```

```
class pydal.base.DAL (uri='sqlite://dummy.db', pool_size=0, folder=None, db_codec='UTF-  
8', check_reserved=None, migrate=True, fake_migrate=False, mi-  
grate_enabled=True, fake_migrate_all=False, decode_credentials=False,  
driver_args=None, adapter_args=None, attempts=5, auto_import=False, big-  
int_id=False, debug=False, lazy_tables=False, db_uid=None, do_connect=True,  
after_connection=None, tables=None, ignore_field_case=True, en-  
tity_quoting=False, table_hash=None)
```

Bases: object

An instance of this class represents a database connection

Parameters

- **uri** (*str*) – contains information for connecting to a database. Defaults to `'sqlite://dummy.db'`

Note: experimental: you can specify a dictionary as uri parameter i.e. with:

```
db = DAL({"uri": "sqlite://storage.sqlite",  
         "tables": {...}, ...})
```

for an example of dict input you can check the output of the scaffolding db model with

```
db.as_dict()
```

Note that for compatibility with Python older than version 2.6.5 you should cast your dict input keys to str due to a syntax limitation on kwargs names. for proper DAL dictionary input

you can use one of:

```
obj = serializers.cast_keys(dict, [encoding="utf-8"])
#or else (for parsing json input)
obj = serializers.loads_json(data, unicode_keys=False)
```

-
- **pool_size** – How many open connections to make to the database object.
 - **folder** – where .table files will be created. Automatically set within web2py. Use an explicit path when using DAL outside web2py
 - **db_codec** – string encoding of the database (default: ‘UTF-8’)
 - **table_hash** – database identifier with .tables. If your connection hash change you can still using old .tables if they have db_hash as prefix
 - **check_reserved** – list of adapters to check tablename and column names against sql/nosql reserved keywords. Defaults to *None*
 - ‘common’ List of sql keywords that are common to all database types such as “SELECT, INSERT”. (recommended)
 - ‘all’ Checks against all known SQL keywords
 - ‘<adaptername>’ Checks against the specific adapters list of keywords
 - ‘<adaptername>_nonreserved’ Checks against the specific adapters list of nonreserved keywords. (if available)
 - **migrate** – sets default migrate behavior for all tables
 - **fake_migrate** – sets default fake_migrate behavior for all tables
 - **migrate_enabled** – If set to False disables ALL migrations
 - **fake_migrate_all** – If set to True fake migrates ALL tables
 - **attempts** – Number of times to attempt connecting
 - **auto_import** – If set to True, tries import automatically table definitions from the databases folder (works only for simple models)
 - **bigint_id** – If set, turn on bigint instead of int for id and reference fields
 - **lazy_tables** – delay a table definition until table access
 - **after_connection** – can a callable that will be executed after the connection

Example

Use as:

```
db = DAL('sqlite://test.db')
```

or:

```
db = DAL(**{"uri": ..., "tables": [...]...}) # experimental
```

```
db.define_table('tablename', Field('fieldname1'),
               Field('fieldname2'))
```

```
class Table (db, tablename, *fields, **args)
```

Bases: object

Represents a database table

Example

You can create a table as:: `db = DAL(...)` `db.define_table('users', Field('name'))`

And then:

```
db.users.insert(name='me') # print db.users._insert(...) to see SQL
db.users.drop()
```

```
as_dict (flat=False, sanitize=True)
```

```
as_json (sanitize=True)
```

```
as_xml (sanitize=True)
```

```
as_yaml (sanitize=True)
```

```
bulk_insert (items)
```

here items is a list of dictionaries

```
drop (mode='')
```

```
fields
```

```
has_key (key)
```

```
import_from_csv_file (csvfile, id_map=None, null='<NULL>', unique='uuid',
                      id_offset=None, *args, **kwargs)
```

Import records from csv file. Column headers must have same names as table fields. Field 'id' is ignored. If column names read 'table.file' the 'table.' prefix is ignored.

- 'unique' argument is a field which must be unique (typically a uuid field)
- 'restore' argument is default False; if set True will remove old values in table first.
- 'id_map' if set to None will not map ids

The import will keep the id numbers in the restored table. This assumes that there is an field of type id that is integer and in incrementing order. Will keep the id numbers in restored table.

```
insert (**fields)
```

```
items ()
```

```
iteritems ()
```

```
on (query)
```

```
sqlsafe
```

```
sqlsafe_alias
```

```
truncate (mode=None)
```

```
update (*args, **kwargs)
```

```
update_or_insert (_key=<function <lambda> at 0x7f781c8f6488>, **values)
```

```
validate_and_insert (**fields)
```

```
validate_and_update (_key=<function <lambda> at 0x7f781c8f6488>, **fields)
```

```
validate_and_update_or_insert (_key=<function <lambda> at 0x7f781c8f6488>,
                               **fields)
```

`with_alias` (*alias*)

`DAL.as_dict` (*flat=False, sanitize=True*)

`DAL.as_json` (*sanitize=True*)

`DAL.as_xml` (*sanitize=True*)

`DAL.as_yaml` (*sanitize=True*)

`DAL.check_reserved_keyword` (*name*)
Validates *name* against SQL keywords Uses `self.check_reserve` which is a list of operators to use.

`DAL.close` ()

`DAL.commit` ()

`DAL.define_table` (*tablename, *fields, **args*)

static `DAL.distributed_transaction_begin` (**instances*)

static `DAL.distributed_transaction_commit` (**instances*)

`DAL.executesql` (*query, placeholders=None, as_dict=False, fields=None, colnames=None, as_ordered_dict=False*)
Executes an arbitrary query

Parameters

- **query** (*str*) – the query to submit to the backend
- **placeholders** – is optional and will always be None. If using raw SQL with placeholders, placeholders may be a sequence of values to be substituted in or, (if supported by the DB driver), a dictionary with keys matching named placeholders in your SQL.
- **as_dict** – will always be None when using DAL. If using raw SQL can be set to True and the results cursor returned by the DB driver will be converted to a sequence of dictionaries keyed with the db field names. Results returned with `as_dict=True` are the same as those returned when applying `.to_list()` to a DAL query. If `“as_ordered_dict”=True` the behaviour is the same as when `“as_dict”=True` with the keys (field names) guaranteed to be in the same order as returned by the select name executed on the database.
- **fields** – list of DAL Fields that match the fields returned from the DB. The Field objects should be part of one or more Table objects defined on the DAL object. The “fields” list can include one or more DAL Table objects in addition to or instead of including Field objects, or it can be just a single table (not in a list). In that case, the Field objects will be extracted from the table(s).

Note: if either *fields* or *colnames* is provided, the results will be converted to a DAL *Rows* object using the `db_adapter.parse()` method

- **colnames** – list of field names in `tablename.fieldname` format

Note: It is also possible to specify both “fields” and the associated “colnames”. In that case, “fields” can also include DAL Expression objects in addition to Field objects. For Field objects in “fields”, the associated “colnames” must still be in `tablename.fieldname` format. For Expression objects in “fields”, the associated “colnames” can be any arbitrary labels.

DAL Table objects referred to by “fields” or “colnames” can be dummy tables and do not have to represent any real tables in the database. Also, note that the “fields” and “colnames” must be in the same order as the fields in the results cursor returned from the DB.

DAL.**export_to_csv_file** (*ofile*, *args, **kwargs)

DAL.**get** (*key*, *default=None*)

static DAL.**get_instances** ()

Returns a dictionary with uri as key with timings and defined tables:

```
{'sqlite://storage.sqlite': {
    'dbstats': [(select auth_user.email from auth_user, 0.02009)],
    'dbtables': {
        'defined': ['auth_cas', 'auth_event', 'auth_group',
                    'auth_membership', 'auth_permission', 'auth_user'],
        'lazy': '[]'
    }
}
```

DAL.**has_key** (*tablename*)

DAL.**has_representer** (*name*)

DAL.**has_serializer** (*name*)

DAL.**import_from_csv_file** (*ifile*, *id_map=None*, *null='<NULL>'*, *unique='uuid'*,
map_tablenames=None, *ignore_missing_tables=False*, *args,
**kwargs)

DAL.**import_table_definitions** (*path*, *migrate=False*, *fake_migrate=False*, *tables=None*)

DAL.**lazy_define_table** (*tablename*, *fields, **args)

DAL.**logger** = <logging.Logger object at 0x7f781c408ed0>

DAL.**parse_as_rest** (*patterns*, *args*, *vars*, *queries=None*, *nested_select=True*)

Example

Use as:

```
db.define_table('person', Field('name'), Field('info'))
db.define_table('pet',
    Field('ownedby', db.person),
    Field('name'), Field('info')
)

@request.restful()
def index():
    def GET(*args, **vars):
        patterns = [
            "/friends[person]",
           ("/{person.name}/:field",
           ("/{person.name}/pets[pet.ownedby]",
           ("/{person.name}/pets[pet.ownedby]/{pet.name}",
           ("/{person.name}/pets[pet.ownedby]/{pet.name}/:field",
            ("/dogs[pet]", db.pet.info=='dog'),
            ("/dogs[pet]/{pet.name.startswith}", db.pet.info=='dog'),
        ]
        parser = db.parse_as_rest(patterns, args, vars)
        if parser.status == 200:
            return dict(content=parser.response)
        else:
```

```

        raise HTTP(parser.status, parser.error)

    def POST(table_name, **vars):
        if table_name == 'person':
            return db.person.validate_and_insert(**vars)
        elif table_name == 'pet':
            return db.pet.validate_and_insert(**vars)
        else:
            raise HTTP(400)
    return locals()

DAL.represent(name, *args, **kwargs)
DAL.representers = {}
DAL.rollback()
DAL.serialize(name, *args, **kwargs)
DAL.serializers = None
static DAL.set_folder(folder)
DAL.smart_query(fields, text)
DAL.tables
DAL.uuid(x)
DAL.validators = None
DAL.validators_method = None
pydal.base.DAL_pickler(db)
pydal.base.DAL_unpickler(db_uid)
class pydal.base.MetaDAL
    Bases: type
pydal.base.ogetattr
    x.__getattr__('name') <==> x.name
pydal.base.osetattr
    x.__setattr__('name', value) <==> x.name = value

```

1.4 pydal.connection module

```

class pydal.connection.ConnectionPool
    Bases: object
    POOLS = {}
    after_connection()
    after_connection_hook()
        Hook for the after_connection parameter
    check_active_connection = True
    close(action='commit', really=True)

```

static close_all_instances (*action*)
to close cleanly databases in a multithreaded environment

find_or_make_work_folder ()

reconnect (*f=None, cursor=True*)
Defines: *self.connection* and *self.cursor* (if *cursor* is *True*) if *self.pool_size>0* it will try pull the connection from the pool if the connection is not active (closed by db server) it will loop if not *self.pool_size* or no active connections in pool makes a new one

static set_folder (*folder*)

1.5 pydal.objects module

class `pydal.objects.Expression` (*db, op, first=None, second=None, type=None, **optional_args*)
Bases: `object`

abs ()

avg ()

belongs (**value, **kwattr*)

Accepts the following inputs:

```
field.belongs(1,2)
field.belongs((1,2))
field.belongs(query)
```

Does NOT accept:

```
field.belongs(1)
```

If the set you want back includes *None* values, you can do:

```
field.belongs((1,None), null=True)
```

coalesce (**others*)

coalesce_zero ()

contains (*value, all=False, case_sensitive=False*)

For MongoDB and GAE contains is always case sensitive

day ()

endswith (*value*)

epoch ()

hour ()

ilike (*value*)

len ()

like (*value, case_sensitive=True*)

lower ()

max ()

min ()

minutes ()


```

month ()
regexp (value)
replace (a, b)
seconds ()
st_asgeojson (precision=15, options=0, version=1)
st_astext ()
st_contains (value)
st_distance (other)
st_dwithin (value, distance)
st_equals (value)
st_intersects (value)
st_overlaps (value)
st_simplify (value)
st_simplifypreservetopology (value)
st_touches (value)
st_within (value)
st_x ()
st_y ()
startswith (value)
sum ()
upper ()
with_alias (alias)
year ()

```

```

class pydal.objects.Field (fieldname, type='string', length=None, default=<function <lambda>
at 0x7f781c8f6488>, required=False, requires=<function <lambda> at
0x7f781c8f6488>, ondelete='CASCADE', notnull=False, unique=False,
uploadfield=True, widget=None, label=None, comment=None,
writable=True, readable=True, update=None, authorize=None, au-
todelete=False, represent=None, uploadfolder=None, uploadsepa-
rate=False, uploadfs=None, compute=None, custom_store=None,
custom_retrieve=None, custom_retrieve_file_properties=None,
custom_delete=None, filter_in=None, filter_out=None, cus-
tom_qualifier=None, map_none=None, rname=None)

```

Bases: `pydal.objects.Expression`

Lazy

Represents a database field

Example

Usage:

```
a = Field(name, 'string', length=32, default=None, required=False,
         requires=IS_NOT_EMPTY(), ondelete='CASCADE',
         notnull=False, unique=False,
         uploadfield=True, widget=None, label=None, comment=None,
         uploadfield=True, # True means store on disk,
                          # 'a_field_name' means store in this field in db
                          # False means file content will be discarded.
         writable=True, readable=True, update=None, authorize=None,
         autodelete=False, represent=None, uploadfolder=None,
         uploadseparate=False # upload to separate directories by uuid_keys
                              # first 2 character and tablename.fieldname
                              # False - old behavior
                              # True - put uploaded file in
                              #   <uploaddir>/<tablename>.<fieldname>/uuid_key[:2]
                              #       directory)
         uploadfs=None       # a pyfilesystem where to store upload
         )
```

to be used as argument of *DAL.define_table*

alias of `FieldMethod`

Method

alias of `FieldMethod`

Virtual

alias of `FieldVirtual`

as_dict (*flat=False, sanitize=True*)

as_json (*sanitize=True*)

as_xml (*sanitize=True*)

as_yaml (*sanitize=True*)

clone (*point_self_references_to=False, **args*)

count (*distinct=None*)

formatter (*value*)

retrieve (*name, path=None, nameonly=False*)

If *nameonly=True* return (filename, fullfilename) instead of (filename, stream)

retrieve_file_properties (*name, path=None*)

set_attributes (**args, **attributes*)

sqlsafe

sqlsafe_name

store (*file, filename=None, path=None*)

validate (*value*)

class `pydal.objects.FieldMethod` (*name, f=None, handler=None*)

Bases: `object`

class `pydal.objects.FieldVirtual` (*name, f=None, ftype='string', label=None, table_name=None*)

Bases: `object`

class `pydal.objects.LazyReferenceGetter` (*table, id*)

Bases: `object`

```

class pydal.objects.LazySet (field, id)
    Bases: object

    count (distinct=None, cache=None)

    delete ()

    delete_uploaded_files (upload_fields=None)

    isempty ()

    nested_select (*fields, **attributes)

    select (*fields, **attributes)

    update (**update_fields)

    update_naive (**update_fields)

    validate_and_update (**update_fields)

class pydal.objects.Query (db, op, first=None, second=None, ignore_common_filters=False, **optional_args)
    Bases: object

```

Necessary to define a set. It can be stored or can be passed to `DAL.__call__()` to obtain a `Set`

Example

Use as:

```

query = db.users.name=='Max'
set = db(query)
records = set.select()

```

```

as_dict (flat=False, sanitize=True)
    Experimental stuff

```

This allows to return a plain dictionary with the basic query representation. Can be used with json/xml services for client-side db I/O

Example

Usage:

```

q = db.auth_user.id != 0
q.as_dict(flat=True)
{
  "op": "NE",
  "first":{
    "tablename": "auth_user",
    "fieldname": "id"
  },
  "second":0
}

```

```

as_json (sanitize=True)

```

```

as_xml (sanitize=True)

```

```

case (t=1, f=0)

```

```
class pydal.objects.Row(*args, **kwargs)
```

Bases: object

A dictionary that lets you do d['a'] as well as d.a this is only used to store a Row

```
as_dict (datetime_to_str=False, custom_types=None)
```

```
as_json (mode='object', default=None, colnames=None, serialize=True, **kwargs)
```

serializes the row to a JSON object kwargs are passed to .as_dict method only "object" mode supported

serialize = False used by Rows.as_json

TODO: return array mode with query column order

mode and colnames are not implemented

```
as_xml (row_name='row', colnames=None, indent=' ')
```

```
get (key, default=None)
```

```
has_key (key)
```

```
items ()
```

```
iteritems ()
```

```
keys ()
```

```
update (*args, **kwargs)
```

```
values ()
```

```
class pydal.objects.Rows(db=None, records=[], colnames=[], compact=True, rawrows=None)
```

Bases: object

A wrapper for the return value of a select. It basically represents a table. It has an iterator and each row is represented as a Row dictionary.

```
__iter__ ()
```

Iterator over records

```
__str__ ()
```

Serializes the table into a csv file

```
as_csv ()
```

Serializes the table into a csv file

```
as_dict (key='id', compact=True, storage_to_dict=True, datetime_to_str=False, custom_types=None)
```

Returns the data as a dictionary of dictionaries (storage_to_dict=True) or records (False)

Parameters

- **key** – the name of the field to be used as dict key, normally the id
- **compact** – ? (default True)
- **storage_to_dict** – when True returns a dict, otherwise a list (default True)
- **datetime_to_str** – convert datetime fields as strings (default False)

```
as_json (mode='object', default=None)
```

Serializes the rows to a JSON list or object with objects mode='object' is not implemented (should return a nested object structure)

```
as_list (compact=True, storage_to_dict=True, datetime_to_str=False, custom_types=None)
```

Returns the data as a list or dictionary.

Parameters

- **storage_to_dict** – when True returns a dict, otherwise a list
- **datetime_to_str** – convert datetime fields as strings

as_trees (*parent_name='parent_id', children_name='children', render=False*)
returns the data as list of trees.

Parameters

- **parent_name** – the name of the field holding the reference to the parent (default `parent_id`).
- **children_name** – the name where the children of each row will be stored as a list (default `children`).
- **render** – whether we will render the fields using their represent (default `False`) can be a list of fields to render or `True` to render all.

as_xml (*row_name='row', rows_name='rows'*)

column (*column=None*)

exclude (*f*)

Removes elements from the calling Rows object, filtered by the function *f*, and returns a new Rows object containing the removed elements

export_to_csv_file (*ofile, null='<NULL>', *args, **kwargs*)

Exports data to csv, the first line contains the column names

Parameters

- **ofile** – where the csv must be exported to
- **null** – how null values must be represented (default `'<NULL>'`)
- **delimiter** – delimiter to separate values (default `','`)
- **quotechar** – character to use to quote string values (default `'"'`)
- **quoting** – quote system, use `csv.QUOTE_***` (default `csv.QUOTE_MINIMAL`)
- **represent** – use the fields `.represent` value (default `False`)
- **colnames** – list of column names to use (default `self.colnames`)

This will only work when exporting rows objects!!!! DO NOT use this with `db.export_to_csv()`

find (*f, limitby=None*)

Returns a new Rows object, a subset of the original object, filtered by the function *f*

first ()

group_by_value (**fields, **args*)

Regroups the rows, by one of the fields

json (*mode='object', default=None*)

Serializes the rows to a JSON list or object with objects `mode='object'` is not implemented (should return a nested object structure)

last ()

render (*i=None, fields=None*)

Takes an index and returns a copy of the indexed row with values transformed via the “represent” attributes of the associated fields.

Parameters

- **i** – index. If not specified, a generator is returned for iteration over all the rows.
- **fields** – a list of fields to transform (if None, all fields with “represent” attributes will be transformed)

setvirtualfields (***keyed_virtualfields*)

For reference:

```
db.define_table('x',Field('number','integer'))
if db(db.x).isempty(): [db.x.insert(number=i) for i in range(10)]

from gluon.dal import lazy_virtualfield

class MyVirtualFields(object):
    # normal virtual field (backward compatible, discouraged)
    def normal_shift(self): return self.x.number+1
    # lazy virtual field (because of @staticmethod)
    @lazy_virtualfield
    def lazy_shift(instance,row,delta=4): return row.x.number+delta
db.x.virtualfields.append(MyVirtualFields())

for row in db(db.x).select():
    print row.number, row.normal_shift, row.lazy_shift(delta=7)
```

sort (*f, reverse=False*)

Returns a list of sorted elements (not sorted in place)

xml (*strict=False, row_name='row', rows_name='rows'*)

Serializes the table using sqlhtml.SQLTABLE (if present)

class `pydal.objects.Set` (*db, query, ignore_common_filters=None*)

Bases: `object`

Represents a set of records in the database. Records are identified by the *query=Query(...)* object. Normally the Set is generated by *DAL.__call__(Query(...))*

Given a set, for example:

```
myset = db(db.users.name=='Max')
```

you can:

```
myset.update(db.users.name='Massimo')
myset.delete() # all elements in the set
myset.select(orderby=db.users.id, groupby=db.users.name, limitby=(0,10))
```

and take subsets:

```
subset = myset(db.users.id<5)
```

as_dict (*flat=False, sanitize=True*)

as_json (*sanitize=True*)

as_xml (*sanitize=True*)

build (*d*)

Experimental: see `.parse()`

count (*distinct=None, cache=None*)

delete ()

```

delete_uploaded_files (upload_fields=None)
isempty ()
nested_select (*fields, **attributes)
parse (dquery)
    Experimental: Turn a dictionary into a Query object
select (*fields, **attributes)
update (**update_fields)
update_naive (**update_fields)
    Same as update but does not call table._before_update and _after_update
validate_and_update (**update_fields)

```

```

class pydal.objects.Table (db, tablename, *fields, **args)
    Bases: object

    Represents a database table

```

Example

You can create a table as:: `db = DAL(...) db.define_table('users', Field('name'))`

And then:

```

db.users.insert(name='me') # print db.users._insert(...) to see SQL
db.users.drop()

```

```

as_dict (flat=False, sanitize=True)

```

```

as_json (sanitize=True)

```

```

as_xml (sanitize=True)

```

```

as_yaml (sanitize=True)

```

```

bulk_insert (items)
    here items is a list of dictionaries

```

```

drop (mode='')

```

```

fields

```

```

has_key (key)

```

```

import_from_csv_file (csvfile, id_map=None, null='<NULL>', unique='uuid', id_offset=None,
                        *args, **kwargs)

```

Import records from csv file. Column headers must have same names as table fields. Field 'id' is ignored. If column names read 'table.file' the 'table.' prefix is ignored.

- 'unique' argument is a field which must be unique (typically a uuid field)
- 'restore' argument is default False; if set True will remove old values in table first.
- 'id_map' if set to None will not map ids

The import will keep the id numbers in the restored table. This assumes that there is an field of type id that is integer and in incrementing order. Will keep the id numbers in restored table.

```

insert (**fields)

```

```
items ()
iteritems ()
on (query)
sqlsafe
sqlsafe_alias
truncate (mode=None)
update (*args, **kwargs)
update_or_insert (_key=<function <lambda> at 0x7f781c8f6488>, **values)
validate_and_insert (**fields)
validate_and_update (_key=<function <lambda> at 0x7f781c8f6488>, **fields)
validate_and_update_or_insert (_key=<function <lambda> at 0x7f781c8f6488>, **fields)
with_alias (alias)

class pydal.objects.VirtualCommand (method, row)
    Bases: object

pydal.objects.ogetattr
    x.__getattr__('name') <==> x.name

pydal.objects.osetattr
    x.__setattr__('name', value) <==> x.name = value
```

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