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# **Sparrow Documentation**

*Release 0.1*

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Quick Links:

- Github: <https://github.com/evertheylen/Sparrow>

Sparrow stands for “Single Page Application Real-time Relational Object Wrapper”.

It doesn't have to be used for a SPA, but it has JSON support out of the box to send objects inside messages (I personally prefer websockets).

I could have added an extra 'a' somewhere to signal it is asynchronous.

Contents:



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## Basic usage

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Define some classes and create a SparrowModel:

```
from sparrow import *

class User(RTEntity):
    username = Property(str, sql_extra="UNIQUE")
    password = Property(str, constraint = lambda p: len(p) > 8)
    key = UID = KeyProperty()

class Message(Entity):
    msg = Property(str)
    from = Reference(User)
    to = RTReference(User)
    key = MID = KeyProperty()

model = SparrowModel(ioloop, {"dbname": "Example"}, [User, Message])

class MyListener:
    # For example, inside a websocket connection
    def new_reference(self, obj, ref_obj):
        # Send the user (registered to this connection) the new message
        self.send(ref_obj, ref_obj.to_json())
```

## Dependencies

Sparrow depends on `psycopg2` and `momoko`. The examples may use Tornado for an ioloop, but this is not directly required. However, `momoko` depends on Tornado.

Changing the underlying database library (and async wrapper) should not be too difficult.





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## Model

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The model binds everything together (and might form the actual model of your MVC app). You don't *have* to use this, but it is highly encouraged.

### Reference

```
class sparrow.model.SparrowModel (ioloop, db_args, classes, debug=True, db=None,  
                                set_global_db=False)
```

Bases: `object`

The central class that keeps everything together.

**add\_sql\_statement** (*stat: sparrow.sql.Sql*)  
Add an *Sql* that you want printed on *info()*.

**all\_sql\_statements** ()  
Return all *Sql* statements that have been added or are automatically generated.

**install** ()  
Set up database, only once for each “install” of the model

**json\_info** ()  
Print all JSON info (as organized as possible). Send this to frontend devs.

**sql\_for\_class** (*cls*)

**sql\_info** ()  
Print all SQL statements (as organized as possible).

**uninstall** ()  
Very brutal operation, drops all tables.

`sparrow.model.indent` (*s*, *i=4*, *code=True*)

`sparrow.model.inline` (*s*)



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## Entities

---

How? Simple, inherit from Entity and define some properties. Define a property with its type and possibly an extra string that gets included in the ‘CREATE TABLE’ statement. Example:

```
class User(Entity):
    name = Property(str)
    mail = Property(str, sql_extra="UNIQUE")
```

(In what follows I will often skip properties that are not essential to exemplify the topic at hand.)

## Keys

If you try the above example, sparrow will complain, because there is no key. An Entity class can only have 1 key, and you define it with `key`. So if we for example want to have a UID attribute and define it as key, we would do:

```
class User(Entity):
    name = Property(str)
    UID = Property(int)
    key = Key(UID)
```

However, this would be irritating. We would have to come up with a unique UID every time we create a User. To solve this problem, we have a `KeyProperty`. This will use Postgres’ `SERIAL` type to create the property. Use it like this:

```
class User(Entity):
    name = Property(str)
    UID = KeyProperty()
    key = UID
```

We can shorten this even further:

```
class User(Entity):
    name = Property(str)
    key = UID = KeyProperty()
```

Note that for a `KeyProperty`, its value will be `None` until you insert the object into the database (which will provide the value for it).

A Key can also contain multiple properties:

```
class User(Entity):
    firstname = Property(str)
    lastname = Property(str)
    key = Key(firstname, lastname)
```

You can always use a `key` attribute of an object as if it was an entity:

```
u = User(...)
u.key = ("Evert", "Heylen")
```

In case of multiple properties, you need to put it in a tuple. Otherwise (also in the case of a `KeyProperty`, it has to be a simple value.

## Constraints

There are two types of constraints: constraints for properties and object-wide constraints. The latter is only checked when calling `__init__`, `update` and `insert`. An example:

```
class User(Entity):
    name = Property(str)
    password = Property(str, constraint=lambda p: len(p) >= 8) # Password of minimum length

    constraint = lambda u: u.name != u.password # Don't use your name as password
```

## References

Often, you want to keep a reference to other objects. In `sparrow`, you use a `Reference` to do so. A `Reference` will automatically create properties to fully save a key of another `Entity` class. Note that a `Reference` can not be constrained, but it can be used in a `Key`:

```
class User(Entity):
    firstname = Property(str)
    lastname = Property(str)
    key = Key(firstname, lastname)

class Message(Entity):
    msg = Property(str)
    to = Reference(User)
    from = Reference(User)
```

In this case, the table created for `Message` will have 5 attributes: `msg`, `to_firstname`, `to_lastname`, `from_firstname` and `from_lastname`. It will also be constrained (in the DB) so so that always refers to a `User` in the database. However, you should not set these attributes directly, you should rather use `to` and `from` as if it were properties:

```
>>> msg = Message(msg="Test", to=some_user.key, from=other_user.key)
>>> # Or after initializing
>>> msg.to = another_user.key
```

Remember to always refer to the key of an object, not the object itself.

## JSON

To get a JSON representation, simply call `obj.to_json()`. Some options are available to change this output. You can override `json_repr`, which has to return some datatype that is convertible to JSON. By default, it returns a dictionary of all properties. This too you can control:

```
class User(Entity):
    name = Property(str)
    password = Property(str, json=False) # We don't want to send passwords
```

## Real-time

Sparrow has excellent support for real-time updates. Or you could call it live updates but ‘spalrow’ is not a word. Anyway, in its simplest form, just inherit from `RTEntity` instead of `Entity`. This will allow you to call `add_listener` (and `remove_listener`) on the object:

```
class User(RTEntity):
    name = Property(str)
    key = UID = KeyProperty()
```

Whenever `update` or `delete` is called, all listeners will get notified of this.

A `RTEntity` gets an extra method `send_update` which will trigger all listeners to be notified of an update without actually writing to the database.

## Real-time references

The real fancy stuff is a `RReference` though. This will make sure that whenever some object refers to another object, it will automatically call `add_reference` on all listeners of the referencing object. For example, with a few modifications we can add live messaging to our `Message` class of before:

```
class Message(Entity):
    msg = Property(str)
    to = RReference(User) #
    from = Reference(User) # Assuming the sender knows it has sent a message, it doesn't
                          # need to know it has sent a message again.
```

A `RReference` requires a `RTEntity` as referencing class.

Both `RReference` and `RTEntity` add some overhead, so only use it when necessary.

The listeners need to following a certain interface, more info about that in `RTEntity`.

## Database

More info about this can be found in the docs for the file `sql.py`. However, some `Entity`-specific things are not explained there. A list of the possibilities

- **Classmethods (where `Cls` is a subclass of `Entity`):**

- `Cls.get(Cls.prop1 == val, Cls.prop2 <= Cls.prop3)`: returns a `SELECT` query.
- `Cls.raw("SELECT * FROM ...")`: returns whatever query you want.
- `obj = await Cls.find_by_key(some_key, db)`: returns **an instance** with that key.

- **Methods (where `obj` is an instance of a subclass of `Entity`):**

- `await obj.insert(db)`: inserts the object in the database. Will also fill in the `KeyProperty` if it exists.
- `await obj.update(db)`: update in the database.

– `await obj.delete(db)`: delete from the database.

## Caching

It's there, and it's magic. All objects in memory with the same key will, in fact, be the exact same object (I'm talking about `is` equality, not `==` equality). It will regulate itself and you shouldn't really care about it. However, I'd like to mention that if an object is in the cache, it will be crazy fast to call `find_by_key`, as it will not use the database at all.

## Reference

**exception** `sparrow.entity.CantSetProperty` (*obj*, *propnames*)

Bases: `sparrow.util.Error`

Raised when trying to set properties you may not edit. Mainly when editing/setting through `edit_from_json` or `Cls(json_dict=...)`.

**args**

**with\_traceback** ()

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

**class** `sparrow.entity.ConstrainedProperty` (*typ*, *constraint: function=None*, *sql\_extra: str=''*, *required: bool=True*, *json: bool=True*)

Bases: `sparrow.entity.Property`

**sql\_def** ()

**type\_sql\_def** ()

**class** `sparrow.entity.Entity` (*\*args*, *\*\*kwargs*)

Bases: `object`

Central class for an Entity. WARNING: Be careful with changing the key as it will fuck with caching. Basically, don't do it.

**check** ()

Check object-wide constraint.

**constraint** = `None`

**delete** (*db=None*)

Delete object from the database.

**edit\_from\_json** (*dct: dict*)

**classmethod** **find\_by\_key** (*key*, *db: sparrow.sql.Database=None*) → 'cls'

Works different from `get`, as it will immediatly return the object

**classmethod** **get** (*\*where\_clauses: list*) → `sparrow.sql.Sql`

**insert** (*db: sparrow.sql.Database=None*, *replace=False*)

Insert in database.

**json\_repr** () → `dict`

Returns a dictionary of all properties that don't contain `json = False`. When overriding this method, you can return anything you want as long as it is convertible to JSON.

```

classmethod raw (text: str, dct={}) → sparrow.sql.RawSql
    Return a RawSql where the results will be interpreted as objects of cls.

to_json () → str

update (db=None)
    Update object in the database.

```

**class** sparrow.entity.**Enum** (*\*args*)  
 Bases: *sparrow.entity.Type*

```

constraint

from_sql (obj)

to_sql (obj: 'self.python_type')

```

**class** sparrow.entity.**Key** (*\*props*)  
 Bases: *sparrow.entity.Queryable*

A reference to other properties that define the key of this object.

```

referencing_props ()

sql_constraint () → str
    Returns the SQL needed to define the PRIMARY KEY constraint.

```

**class** sparrow.entity.**KeyProperty**  
 Bases: *sparrow.entity.SingleKey, sparrow.entity.Property*

A specifically created property to be used as a key. Type in postgres is SERIAL.

```

referencing_props ()

sql_constraint () → str

sql_def ()

type_sql_def ()

```

**class** sparrow.entity.**List** (*inner\_type*)  
 Bases: *sparrow.entity.Type*

```

constraint = None

from_sql (obj)

to_sql (obj: 'self.python_type', f=<built-in function repr>)

```

**class** sparrow.entity.**Listener**  
 Bases: *object*

Interface for a listener to be used with *RTEntity*. Main use is documentation, not functionality. Most implementations will want to define a *set* of objects they are listening to (*listenees*).

```

delete (obj: sparrow.entity.RTEntity)
    Handle deletions of the object.

new_reference (obj: sparrow.entity.RTEntity, ref_obj: sparrow.entity.Entity)
    Handle a new reference from ref_obj to obj. ref_obj does not have to be a RTEntity.

remove_reference (obj: sparrow.entity.RTEntity, ref_obj: sparrow.entity.Entity)
    Handle the removal of a reference from ref_obj to obj. ref_obj does not have to be a RTEntity.

update (obj: sparrow.entity.RTEntity)
    Handle updates to the object.

```

**class** `sparrow.entity.MetaEntity`

Bases: `type`

Metaclass for *Entity*. This does a whole lot of stuff you should not care about as user of this library. If you do want to know how it works I suggest you read the code.

**mro** () → list

return a type's method resolution order

**exception** `sparrow.entity.ObjectConstraintFail (obj)`

Bases: `sparrow.util.Error`

Raised when an object failed to follow its constraint.

**args**

**with\_traceback** ()

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

**class** `sparrow.entity.Property (typ, constraint: function=None, sql_extra: str='', required: bool=True, json: bool=True)`

Bases: `sparrow.entity.Queryable`

**sql\_def** ()

**type\_sql\_def** ()

**exception** `sparrow.entity.PropertyConstraintFail (obj, prop)`

Bases: `sparrow.util.Error`

Raised when a property failed to follow its constraint.

**args**

**with\_traceback** ()

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

**class** `sparrow.entity.Queryable`

Bases: `object`

**class** `sparrow.entity.RTEntity (*args, **kwargs)`

Bases: `sparrow.entity.Entity`

Subclass of Entity that sends live updates! Listeners should follow the interface of *Listener*.

**add\_listener** (l: 'Listener')

Add listeners to this object.

**check** ()

Check object-wide constraint.

**constraint** = None

**delete** (db=None)

**edit\_from\_json** (dct: dict)

**find\_by\_key** (key, db: `sparrow.sql.Database=None`) → 'cls'

Works different from *get*, as it will immediatly return the object

**get** (\*where\_clauses: list) → `sparrow.sql.Sql`

**insert** (db: `sparrow.sql.Database=None`, `replace=False`)

Insert in database.



**json\_repr** () → dict  
Returns a dictionary of all properties that don't contain *json = False*. When overriding this method, you can return anything you want as long as it is convertible to JSON.

**new\_reference** (*ref, ref\_obj*)

**raw** (*text: str, dct={}*) → `sparrow.sql.RawSql`  
Return a `RawSql` where the results will be interpreted as objects of *cls*.

**remove\_all\_listeners** ()

**remove\_listener** (*l: 'Listener'*)

**remove\_reference** (*ref, ref\_obj*)

**send\_update** (*db=None*)

**to\_json** () → str

**update** (*db: sparrow.sql.Database=None*)

**class** `sparrow.entity.RTReference` (*ref: 'MetaEntity'*)  
Bases: `sparrow.entity.Reference`  
Reference that automatically notifies the referencing object.

**classmethod** **single\_upgrade** ()

**sql\_constraint** () → str  
Will only generate the SQL constraint. The metaclass will take care of the properties.

**class** `sparrow.entity.RTSingleReference` (*ref: 'MetaEntity'*)  
Bases: `sparrow.entity.RTReference`, `sparrow.entity.SingleReference`  
Version of `RTReference` with only one referencing property. (Don't directly use this, it will be automatic.)

**single\_upgrade** ()

**sql\_constraint** () → str  
Will only generate the SQL constraint. The metaclass will take care of the properties.

**class** `sparrow.entity.Reference` (*ref: 'MetaEntity', json=True, cascade=True*)  
Bases: `sparrow.entity.Queryable`  
A reference to another Entity type.

**classmethod** **single\_upgrade** ()

**sql\_constraint** () → str  
Will only generate the SQL constraint. The metaclass will take care of the properties.

**class** `sparrow.entity.SingleKey` (*\*props*)  
Bases: `sparrow.entity.Key`  
Version of `Key` with only one property. (Don't directly use this, it will be automatic.)

**referencing\_props** ()

**sql\_constraint** () → str  
Returns the SQL needed to define the PRIMARY KEY constraint.

**class** `sparrow.entity.SingleReference` (*ref: 'MetaEntity', json=True, cascade=True*)  
Bases: `sparrow.entity.Reference`  
Version of `Reference` with only one referencing property. (Don't directly use this, it will be automatic.)

**single\_upgrade** ()

**sql\_constraint** () → str

Will only generate the SQL constraint. The metaclass will take care of the properties.

**class** sparrow.entity.**StaticType** (*python\_type*, *sql\_type=None*)

Bases: *sparrow.entity.Type*

**constraint** = None

**from\_sql** (*obj*)

**to\_sql** (*obj*: 'self.python\_type')

**class** sparrow.entity.**Type** (*python\_type*, *sql\_type=None*)

Bases: *object*

**constraint** = None

**from\_sql** (*obj*)

**to\_sql** (*obj*: 'self.python\_type')

sparrow.entity.**classitems** (*dct*, *bases*)

Helper function to allow for inheritance

sparrow.entity.**create\_order** (*op*)

sparrow.entity.**create\_where\_comparison** (*op*)

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## Database and Queries

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Example:

```
res = await User.get(User.mail == Unsafe(usermail)).exec(db)
u = res.single()
```

Shorter example:

```
u = await User.get(User.mail == Unsafe(usermail)).single(db)
```

For preprocessing a query, you can translate it into RawSql, this is faster:

```
users_query = User.get(User.mail == Field("mail")).to_raw()
users = await users_query.with_data(mail = usermail).all(db)
```

Raw requests are also possible:

```
query = User.raw("SELECT * FROM table_User WHERE UID = %(name)s")
```

Or if you don't like pyformat:

```
query = User.raw("SELECT * FROM table_User WHERE UID = {}".format(Field("name")))
u = await query.with_data(name = "evert").single(db)
```

You don't have to mention a class:

```
query = RawSql("SELECT * FROM users WHERE name = 'Evert'")
```

More general and safer example:

```
query = RawSql("SELECT * FROM users WHERE name = %(name)s", {"name": some_user_data})
```

## Reference

**class** `sparrow.sql.And(*conds)`

Bases: `sparrow.sql.MultiCondition`

**all()**

Returns all objects in the query.

Wrapped version, first argument is the database.

**amount** (*i: int*)

Returns a given number of objects in the query.

Wrapped version, first argument is the database.

**check** (*what*)

Helper function to *parse* parts of a query and insert their data in *self.data*. Handles *Unsafe*, *Field*, other *Sql* instances and tuples. It will simply return all others types.

**cls = None**

**copy** ()

Create a copy of the statement, by default uses *copy.deepcopy*.

**count** ()

Return the number of rows found in the query.

Wrapped version, first argument is the database.

**exec** (*db: sparrow.sql.Database=None*)

Execute the SQL statement on the given database.

**raw** ()

Returns the raw (single) result, without any interpreting. If you want to do more than getting a single raw value, consider accessing *self.cursor* directly.

Wrapped version, first argument is the database.

**raw\_all** ()

Returns all raw values.

Wrapped version, first argument is the database.

**single** ()

Returns a single object (and raises *NotSingle* if there is not only one).

Wrapped version, first argument is the database.

**to\_raw** ()

Compile this to a *RawSql* instance for more performance!

**with\_data** (\*\**kwargs*)

This function creates a copy of the statement with added data, passed as keyword arguments.

**class** *sparrow.sql.ClassedSql* (*cls: type, data={}*)

Bases: *sparrow.sql.Sql*

Version of *Sql* that also saves a given class. *SqlResult* will later try to parse its result as instances of this class.

**all** ()

Returns all objects in the query.

Wrapped version, first argument is the database.

**amount** (*i: int*)

Returns a given number of objects in the query.

Wrapped version, first argument is the database.

**check** (*what*)

Helper function to *parse* parts of a query and insert their data in *self.data*. Handles *Unsafe*, *Field*, other *Sql* instances and tuples. It will simply return all others types.

**cls = None**

**copy** ()

Create a copy of the statement, by default uses *copy.deepcopy*.

**count ()**

Return the number of rows found in the query.

Wrapped version, first argument is the database.

**exec (db: sparrow.sql.Database=None)**

Execute the SQL statement on the given database.

**raw ()**

Returns the raw (single) result, without any interpreting. If you want to do more than getting a single raw value, consider accessing `self.cursor` directly.

Wrapped version, first argument is the database.

**raw\_all ()**

Returns all raw values.

Wrapped version, first argument is the database.

**single ()**

Returns a single object (and raises `NotSingle` if there is not only one).

Wrapped version, first argument is the database.

**to\_raw ()****with\_data (\*\*kwargs)**

This function creates a copy of the statement with added data, passed as keyword arguments.

**class sparrow.sql.Command (cls: type, data={})**

Bases: `sparrow.sql.ClassedSql`

For INSERT, DELETE, UPDATE, CREATE TABLE, DROP TABLE, ... statements.

**all ()**

Returns all objects in the query.

Wrapped version, first argument is the database.

**amount (i: int)**

Returns a given number of objects in the query.

Wrapped version, first argument is the database.

**check (what)**

Helper function to *parse* parts of a query and insert their data in `self.data`. Handles *Unsafe*, *Field*, other *Sql* instances and tuples. It will simply return all others types.

**cls = None****copy ()**

Create a copy of the statement, by default uses `copy.deepcopy`.

**count ()**

Return the number of rows found in the query.

Wrapped version, first argument is the database.

**exec (db: sparrow.sql.Database=None)**

Execute the SQL statement on the given database.

**raw ()**

Returns the raw (single) result, without any interpreting. If you want to do more than getting a single raw value, consider accessing `self.cursor` directly.

Wrapped version, first argument is the database.

**raw\_all** ()

Returns all raw values.

Wrapped version, first argument is the database.

**single** ()

Returns a single object (and raises `NotSingle` if there is not only one).

Wrapped version, first argument is the database.

**to\_raw** ()

**with\_data** (\*\*kwargs)

This function creates a copy of the statement with added data, passed as keyword arguments.

**class** `sparrow.sql.Condition` (data={})

Bases: `sparrow.sql.Sql`

**all** ()

Returns all objects in the query.

Wrapped version, first argument is the database.

**amount** (i: int)

Returns a given number of objects in the query.

Wrapped version, first argument is the database.

**check** (what)

Helper function to *parse* parts of a query and insert their data in *self.data*. Handles *Unsafe*, *Field*, other *Sql* instances and tuples. It will simply return all others types.

**cls** = None

**copy** ()

Create a copy of the statement, by default uses *copy.deepcopy*.

**count** ()

Return the number of rows found in the query.

Wrapped version, first argument is the database.

**exec** (db: `sparrow.sql.Database`=None)

Execute the SQL statement on the given database.

**raw** ()

Returns the raw (single) result, without any interpreting. If you want to do more than getting a single raw value, consider accessing *self.cursor* directly.

Wrapped version, first argument is the database.

**raw\_all** ()

Returns all raw values.

Wrapped version, first argument is the database.

**single** ()

Returns a single object (and raises `NotSingle` if there is not only one).

Wrapped version, first argument is the database.

**to\_raw** ()

Compile this to a *RawSql* instance for more performance!

**with\_data** (\*\*kwargs)

This function creates a copy of the statement with added data, passed as keyword arguments.

**class** `sparrow.sql.CreateTable` (cls)

Bases: `sparrow.sql.Command`

For CREATE TABLE statements.

**all** ()

Returns all objects in the query.

Wrapped version, first argument is the database.

**amount** (i: int)

Returns a given number of objects in the query.

Wrapped version, first argument is the database.

**check** (what)

Helper function to *parse* parts of a query and insert their data in *self.data*. Handles *Unsafe*, *Field*, other *Sql* instances and tuples. It will simply return all others types.

**cls = None**

**copy** ()

Create a copy of the statement, by default uses *copy.deepcopy*.

**count** ()

Return the number of rows found in the query.

Wrapped version, first argument is the database.

**exec** (db: `sparrow.sql.Database=None`)

Execute the SQL statement on the given database.

**raw** ()

Returns the raw (single) result, without any interpreting. If you want to do more than getting a single raw value, consider accessing *self.cursor* directly.

Wrapped version, first argument is the database.

**raw\_all** ()

Returns all raw values.

Wrapped version, first argument is the database.

**single** ()

Returns a single object (and raises *NotSingle* if there is not only one).

Wrapped version, first argument is the database.

**to\_raw** ()

**with\_data** (\*\*kwargs)

This function creates a copy of the statement with added data, passed as keyword arguments.

**class** `sparrow.sql.Database` (ioloop, dbname, user='postgres', password='postgres', host='localhost', port=5432, momoko\_poolsize=5)

Bases: `object`

Class for Postgres database.

**get\_cursor** (statement: 'Sql', unsafe\_dict: dict)

**class** `sparrow.sql.Delete` (what)

Bases: `sparrow.sql.Command`

**all** ()

Returns all objects in the query.

Wrapped version, first argument is the database.

**amount** (*i: int*)

Returns a given number of objects in the query.

Wrapped version, first argument is the database.

**check** (*what*)

Helper function to *parse* parts of a query and insert their data in *self.data*. Handles *Unsafe*, *Field*, other *Sql* instances and tuples. It will simply return all others types.

**cls = None**

**copy** ()

Create a copy of the statement, by default uses *copy.deepcopy*.

**count** ()

Return the number of rows found in the query.

Wrapped version, first argument is the database.

**exec** (*db: sparrow.sql.Database=None*)

Execute the SQL statement on the given database.

**raw** ()

Returns the raw (single) result, without any interpreting. If you want to do more than getting a single raw value, consider accessing *self.cursor* directly.

Wrapped version, first argument is the database.

**raw\_all** ()

Returns all raw values.

Wrapped version, first argument is the database.

**single** ()

Returns a single object (and raises *NotSingle* if there is not only one).

Wrapped version, first argument is the database.

**to\_raw** ()

**with\_data** (\*\**kwargs*)

This function creates a copy of the statement with added data, passed as keyword arguments.

**class** *sparrow.sql.DropTable* (*cls*)

Bases: *sparrow.sql.Command*

For DROP TABLE statements.

**all** ()

Returns all objects in the query.

Wrapped version, first argument is the database.

**amount** (*i: int*)

Returns a given number of objects in the query.

Wrapped version, first argument is the database.



**check** (*what*)

Helper function to *parse* parts of a query and insert their data in *self.data*. Handles *Unsafe*, *Field*, other *Sql* instances and tuples. It will simply return all others types.

**cls = None****copy** ()

Create a copy of the statement, by default uses *copy.deepcopy*.

**count** ()

Return the number of rows found in the query.

Wrapped version, first argument is the database.

**exec** (*db: sparrow.sql.Database=None*)

Execute the SQL statement on the given database.

**raw** ()

Returns the raw (single) result, without any interpreting. If you want to do more than getting a single raw value, consider accessing *self.cursor* directly.

Wrapped version, first argument is the database.

**raw\_all** ()

Returns all raw values.

Wrapped version, first argument is the database.

**single** ()

Returns a single object (and raises *NotSingle* if there is not only one).

Wrapped version, first argument is the database.

**to\_raw** ()**with\_data** (*\*\*kwargs*)

This function creates a copy of the statement with added data, passed as keyword arguments.

**class** *sparrow.sql.EntityCommand* (*cls: type, data={}*)

Bases: *sparrow.sql.Command*

Class for commands that work for both classes (will require inserting data later on) as objects.

**all** ()

Returns all objects in the query.

Wrapped version, first argument is the database.

**amount** (*i: int*)

Returns a given number of objects in the query.

Wrapped version, first argument is the database.

**check** (*what*)

Helper function to *parse* parts of a query and insert their data in *self.data*. Handles *Unsafe*, *Field*, other *Sql* instances and tuples. It will simply return all others types.

**cls = None****copy** ()

Create a copy of the statement, by default uses *copy.deepcopy*.

**count** ()

Return the number of rows found in the query.

Wrapped version, first argument is the database.

**exec** (*db: sparrow.sql.Database=None*)

Execute the SQL statement on the given database.

**raw** ()

Returns the raw (single) result, without any interpreting. If you want to do more than getting a single raw value, consider accessing `self.cursor` directly.

Wrapped version, first argument is the database.

**raw\_all** ()

Returns all raw values.

Wrapped version, first argument is the database.

**single** ()

Returns a single object (and raises `NotSingle` if there is not only one).

Wrapped version, first argument is the database.

**to\_raw** ()

**with\_data** (*\*\*kwargs*)

This function creates a copy of the statement with added data, passed as keyword arguments.

**class** `sparrow.sql.Field` (*name*)

Bases: `object`

Wrapper for data that is to be inserted into the query (with `Sql.with_data`) later on.

**class** `sparrow.sql.GlobalDb`

Bases: `object`

**db** = `None`

**classmethod** `get` ()

**classmethod** `globalize` (*db*)

**classmethod** `set` (*db*)

**class** `sparrow.sql.Insert` (*what, returning=None, replace=False*)

Bases: `sparrow.sql.EntityCommand`

For INSERT statements.

**all** ()

Returns all objects in the query.

Wrapped version, first argument is the database.

**amount** (*i: int*)

Returns a given number of objects in the query.

Wrapped version, first argument is the database.

**check** (*what*)

Helper function to *parse* parts of a query and insert their data in `self.data`. Handles `Unsafe`, `Field`, other `Sql` instances and tuples. It will simply return all others types.

**cls** = `None`

**copy** ()

Create a copy of the statement, by default uses `copy.deepcopy`.

**count** ()

Return the number of rows found in the query.

Wrapped version, first argument is the database.

**exec** (*db: sparrow.sql.Database=None*)

Execute the SQL statement on the given database.

**raw** ()

Returns the raw (single) result, without any interpreting. If you want to do more than getting a single raw value, consider accessing `self.cursor` directly.

Wrapped version, first argument is the database.

**raw\_all** ()

Returns all raw values.

Wrapped version, first argument is the database.

**returning** (*prop*)

Set what the database should return. Can be chained.

**single** ()

Returns a single object (and raises `NotSingle` if there is not only one).

Wrapped version, first argument is the database.

**to\_raw** ()

**with\_data** (*\*\*kwargs*)

This function creates a copy of the statement with added data, passed as keyword arguments.

**class** `sparrow.sql.MultiCondition` (*\*conds*)

Bases: `sparrow.sql.Condition`

**all** ()

Returns all objects in the query.

Wrapped version, first argument is the database.

**amount** (*i: int*)

Returns a given number of objects in the query.

Wrapped version, first argument is the database.

**check** (*what*)

Helper function to *parse* parts of a query and insert their data in *self.data*. Handles *Unsafe*, *Field*, other *Sql* instances and tuples. It will simply return all others types.

**cls = None**

**copy** ()

Create a copy of the statement, by default uses *copy.deepcopy*.

**count** ()

Return the number of rows found in the query.

Wrapped version, first argument is the database.

**exec** (*db: sparrow.sql.Database=None*)

Execute the SQL statement on the given database.

**raw** ()

Returns the raw (single) result, without any interpreting. If you want to do more than getting a single raw value, consider accessing `self.cursor` directly.

Wrapped version, first argument is the database.

**raw\_all** ()

Returns all raw values.

Wrapped version, first argument is the database.

**single** ()

Returns a single object (and raises `NotSingle` if there is not only one).

Wrapped version, first argument is the database.

**to\_raw** ()

Compile this to a *RawSql* instance for more performance!

**with\_data** (\*\*kwargs)

This function creates a copy of the statement with added data, passed as keyword arguments.

**class** `sparrow.sql.Not` (*cond*)

Bases: `sparrow.sql.Condition`

**all** ()

Returns all objects in the query.

Wrapped version, first argument is the database.

**amount** (*i: int*)

Returns a given number of objects in the query.

Wrapped version, first argument is the database.

**check** (*what*)

Helper function to *parse* parts of a query and insert their data in *self.data*. Handles *Unsafe*, *Field*, other *Sql* instances and tuples. It will simply return all others types.

**cls = None**

**copy** ()

Create a copy of the statement, by default uses *copy.deepcopy*.

**count** ()

Return the number of rows found in the query.

Wrapped version, first argument is the database.

**exec** (*db: sparrow.sql.Database=None*)

Execute the SQL statement on the given database.

**raw** ()

Returns the raw (single) result, without any interpreting. If you want to do more than getting a single raw value, consider accessing `self.cursor` directly.

Wrapped version, first argument is the database.

**raw\_all** ()

Returns all raw values.

Wrapped version, first argument is the database.

**single** ()

Returns a single object (and raises `NotSingle` if there is not only one).

Wrapped version, first argument is the database.

**to\_raw()**

Compile this to a *RawSql* instance for more performance!

**with\_data(\*\*kwargs)**

This function creates a copy of the statement with added data, passed as keyword arguments.

**exception** `sparrow.sql.NotSingle`

Bases: `sparrow.util.Error`

**args**

**with\_traceback()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.

**class** `sparrow.sql.Or(*conds)`

Bases: `sparrow.sql.MultiCondition`

**all()**

Returns all objects in the query.

Wrapped version, first argument is the database.

**amount(i: int)**

Returns a given number of objects in the query.

Wrapped version, first argument is the database.

**check(what)**

Helper function to *parse* parts of a query and insert their data in *self.data*. Handles *Unsafe*, *Field*, other *Sql* instances and tuples. It will simply return all others types.

**cls = None**

**copy()**

Create a copy of the statement, by default uses *copy.deepcopy*.

**count()**

Return the number of rows found in the query.

Wrapped version, first argument is the database.

**exec(db: sparrow.sql.Database=None)**

Execute the SQL statement on the given database.

**raw()**

Returns the raw (single) result, without any interpreting. If you want to do more than getting a single raw value, consider accessing *self.cursor* directly.

Wrapped version, first argument is the database.

**raw\_all()**

Returns all raw values.

Wrapped version, first argument is the database.

**single()**

Returns a single object (and raises *NotSingle* if there is not only one).

Wrapped version, first argument is the database.

**to\_raw()**

Compile this to a *RawSql* instance for more performance!

**with\_data** (\*\*kwargs)

This function creates a copy of the statement with added data, passed as keyword arguments.

**class** `sparrow.sql.Order` (*field, op: str, data={}*)

Bases: `sparrow.sql.Sql`

Encodes an 'ORDER BY' clause.

**all** ()

Returns all objects in the query.

Wrapped version, first argument is the database.

**amount** (*i: int*)

Returns a given number of objects in the query.

Wrapped version, first argument is the database.

**check** (*what*)

Helper function to *parse* parts of a query and insert their data in *self.data*. Handles *Unsafe*, *Field*, other *Sql* instances and tuples. It will simply return all others types.

**cls = None**

**copy** ()

Create a copy of the statement, by default uses *copy.deepcopy*.

**count** ()

Return the number of rows found in the query.

Wrapped version, first argument is the database.

**exec** (*db: sparrow.sql.Database=None*)

Execute the SQL statement on the given database.

**raw** ()

Returns the raw (single) result, without any interpreting. If you want to do more than getting a single raw value, consider accessing *self.cursor* directly.

Wrapped version, first argument is the database.

**raw\_all** ()

Returns all raw values.

Wrapped version, first argument is the database.

**single** ()

Returns a single object (and raises *NotSingle* if there is not only one).

Wrapped version, first argument is the database.

**to\_raw** ()

Compile this to a *RawSql* instance for more performance!

**with\_data** (\*\*kwargs)

This function creates a copy of the statement with added data, passed as keyword arguments.

**class** `sparrow.sql.RawClassedSql` (*cls, text, data={}*)

Bases: `sparrow.sql.RawSql`, `sparrow.sql.ClassedSql`

Version of *RawSql* that also saves a given class like *ClassedSql*.

**all** ()

Returns all objects in the query.

Wrapped version, first argument is the database.

**amount** (*i: int*)

Returns a given number of objects in the query.

Wrapped version, first argument is the database.

**check** (*what*)

Helper function to *parse* parts of a query and insert their data in *self.data*. Handles *Unsafe*, *Field*, other *Sql* instances and tuples. It will simply return all others types.

**cls = None**

**copy** ()

**count** ()

Return the number of rows found in the query.

Wrapped version, first argument is the database.

**exec** (*db: sparrow.sql.Database=None*)

Execute the SQL statement on the given database.

**raw** ()

Returns the raw (single) result, without any interpreting. If you want to do more than getting a single raw value, consider accessing *self.cursor* directly.

Wrapped version, first argument is the database.

**raw\_all** ()

Returns all raw values.

Wrapped version, first argument is the database.

**single** ()

Returns a single object (and raises *NotSingle* if there is not only one).

Wrapped version, first argument is the database.

**to\_raw** ()

Already raw, just return self.

**with\_data** (\*\**kwargs*)

This function creates a copy of the statement with added data, passed as keyword arguments.

**class** `sparrow.sql.RawSql` (*text, data={}*)

Bases: `sparrow.sql.Sql`

Simply saves a string, and also some data. This is in contrast with *Sql*, which may save the query in a more abstract way.

**all** ()

Returns all objects in the query.

Wrapped version, first argument is the database.

**amount** (*i: int*)

Returns a given number of objects in the query.

Wrapped version, first argument is the database.

**check** (*what*)

Helper function to *parse* parts of a query and insert their data in *self.data*. Handles *Unsafe*, *Field*, other *Sql* instances and tuples. It will simply return all others types.

**cls = None**

**copy ()**

More optimized version of copy.

**count ()**

Return the number of rows found in the query.

Wrapped version, first argument is the database.

**exec (db: sparrow.sql.Database=None)**

Execute the SQL statement on the given database.

**raw ()**

Returns the raw (single) result, without any interpreting. If you want to do more than getting a single raw value, consider accessing `self.cursor` directly.

Wrapped version, first argument is the database.

**raw\_all ()**

Returns all raw values.

Wrapped version, first argument is the database.

**single ()**

Returns a single object (and raises `NotSingle` if there is not only one).

Wrapped version, first argument is the database.

**to\_raw ()**

Already raw, just return self.

**with\_data (\*\*kwargs)**

This function creates a copy of the statement with added data, passed as keyword arguments.

**class** `sparrow.sql.Select (cls, where_clauses=[], order: sparrow.sql.Order=None, offset=None, limit=None)`

Bases: `sparrow.sql.ClassedSql`

Encodes a 'SELECT' query.

**all ()**

Returns all objects in the query.

Wrapped version, first argument is the database.

**amount (i: int)**

Returns a given number of objects in the query.

Wrapped version, first argument is the database.

**check (what)**

Helper function to *parse* parts of a query and insert their data in `self.data`. Handles `Unsafe`, `Field`, other `Sql` instances and tuples. It will simply return all others types.

**cls = None**

**copy ()**

Create a copy of the statement, by default uses `copy.deepcopy`.

**count ()**

Return the number of rows found in the query.

Wrapped version, first argument is the database.



**exec** (*db: sparrow.sql.Database=None*)  
Execute the SQL statement on the given database.

**limit** (*l*)  
'LIMIT' the query. Can be used for chaining.

**offset** (*o*)  
'OFFSET' the query. Can be used for chaining.

**order** (*\_order: sparrow.sql.Order*)  
'ORDER' the query. Can be used for chaining.

**raw** ()  
Returns the raw (single) result, without any interpreting. If you want to do more than getting a single raw value, consider accessing `self.cursor` directly.

Wrapped version, first argument is the database.

**raw\_all** ()  
Returns all raw values.

Wrapped version, first argument is the database.

**single** ()  
Returns a single object (and raises `NotSingle` if there is not only one).

Wrapped version, first argument is the database.

**to\_raw** ()

**where** (*\*clauses*)  
'OFFSET' the query. Can be used for chaining.

Parameters: a number of Where clauses.

**with\_data** (*\*\*kwargs*)  
This function creates a copy of the statement with added data, passed as keyword arguments.

**class** `sparrow.sql.Sql` (*data={}*)  
Bases: `object`

Main class to save a given SQL query/command. Do not use directly, use the subclasses.

**all** ()  
Returns all objects in the query.

Wrapped version, first argument is the database.

**amount** (*i: int*)  
Returns a given number of objects in the query.

Wrapped version, first argument is the database.

**check** (*what*)  
Helper function to *parse* parts of a query and insert their data in *self.data*. Handles *Unsafe*, *Field*, other *Sql* instances and tuples. It will simply return all others types.

**cls = None**

**copy** ()  
Create a copy of the statement, by default uses *copy.deepcopy*.

**count** ()  
Return the number of rows found in the query.

Wrapped version, first argument is the database.

**exec** (*db: sparrow.sql.Database=None*)

Execute the SQL statement on the given database.

**raw** ()

Returns the raw (single) result, without any interpreting. If you want to do more than getting a single raw value, consider accessing `self.cursor` directly.

Wrapped version, first argument is the database.

**raw\_all** ()

Returns all raw values.

Wrapped version, first argument is the database.

**single** ()

Returns a single object (and raises `NotSingle` if there is not only one).

Wrapped version, first argument is the database.

**to\_raw** ()

Compile this to a `RawSql` instance for more performance!

**with\_data** (\*\**kwargs*)

This function creates a copy of the statement with added data, passed as keyword arguments.

**exception** `sparrow.sql.SqlError` (*err: psycogp2.Error, query: 'Sql', data: dict*)

Bases: `sparrow.util.Error`

Exception raised while executing a query (or command). Wraps a `psycogp2` error to also include the query that went wrong.

**args**

**with\_traceback** ()

`Exception.with_traceback(tb)` – set `self.__traceback__` to `tb` and return `self`.

**class** `sparrow.sql.SqlResult` (*cursor, query: 'Sql'*)

Bases: `object`

Class wrapping a database cursor. Note that most of the time, you can use the ‘easier’ methods in `Sql`. Instead of:

```
>>> res = await User.get(User.name == "Evert").exec(db)
>>> u = res.single()
```

You can do:

```
>>> u = await User.get(User.name == "Evert").single(db)
```

This doesn’t work for scrolling and getting raw data.

The methods `single`, `all` and `amount` will try to interpret the result as object(s) of the given class in `self.query.cls`, don’t try them if it that class is `None`.

**all** ()

Returns all objects in the query.

**amount** (*i: int*)

Returns a given number of objects in the query.

**count** ()

Return the number of rows found in the query.

**raw()**  
Returns the raw (single) result, without any interpreting. If you want to do more than getting a single raw value, consider accessing `self.cursor` directly.

**raw\_all()**  
Returns all raw values.

**scroll(*i: int*)**  
Scroll the cursor *i* steps. *i* can be negative. This method is chainable.

**single()**  
Returns a single object (and raises `NotSingle` if there is not only one).

**class** `sparrow.sql.Unsafe(value)`  
Bases: `object`

Wrapper for unsafe data. (For data that needs to inserted later, use `Field`.)

**class** `sparrow.sql.Update(what)`  
Bases: `sparrow.sql.EntityCommand`

**all()**  
Returns all objects in the query.  
Wrapped version, first argument is the database.

**amount(*i: int*)**  
Returns a given number of objects in the query.  
Wrapped version, first argument is the database.

**check(*what*)**  
Helper function to *parse* parts of a query and insert their data in *self.data*. Handles *Unsafe*, *Field*, other *Sql* instances and tuples. It will simply return all others types.

**cls = None**

**copy()**  
Create a copy of the statement, by default uses `copy.deepcopy`.

**count()**  
Return the number of rows found in the query.  
Wrapped version, first argument is the database.

**exec(*db: sparrow.sql.Database=None*)**  
Execute the SQL statement on the given database.

**raw()**  
Returns the raw (single) result, without any interpreting. If you want to do more than getting a single raw value, consider accessing `self.cursor` directly.  
Wrapped version, first argument is the database.

**raw\_all()**  
Returns all raw values.  
Wrapped version, first argument is the database.

**single()**  
Returns a single object (and raises `NotSingle` if there is not only one).  
Wrapped version, first argument is the database.

**to\_raw()**

**with\_data** (\*\*kwargs)

This function creates a copy of the statement with added data, passed as keyword arguments.

**class** `sparrow.sql.Where` (lfield, op: str, rfield, data={})

Bases: `sparrow.sql.Condition`

Encodes a single 'WHERE' clause.

**all** ()

Returns all objects in the query.

Wrapped version, first argument is the database.

**amount** (i: int)

Returns a given number of objects in the query.

Wrapped version, first argument is the database.

**check** (what)

Helper function to *parse* parts of a query and insert their data in *self.data*. Handles *Unsafe*, *Field*, other *Sql* instances and tuples. It will simply return all others types.

**cls** = None

**copy** ()

Create a copy of the statement, by default uses *copy.deepcopy*.

**count** ()

Return the number of rows found in the query.

Wrapped version, first argument is the database.

**exec** (db: `sparrow.sql.Database=None`)

Execute the SQL statement on the given database.

**raw** ()

Returns the raw (single) result, without any interpreting. If you want to do more than getting a single raw value, consider accessing *self.cursor* directly.

Wrapped version, first argument is the database.

**raw\_all** ()

Returns all raw values.

Wrapped version, first argument is the database.

**single** ()

Returns a single object (and raises *NotSingle* if there is not only one).

Wrapped version, first argument is the database.

**to\_raw** ()

Compile this to a *RawSql* instance for more performance!

**with\_data** (\*\*kwargs)

This function creates a copy of the statement with added data, passed as keyword arguments.

Not so much here so far.

## Reference

**exception** `sparrow.util.Error`

Bases: `Exception`

Base class for all exceptions of Sparrow

**args**

**with\_traceback()**

Exception.with\_traceback(tb) – set self.\_\_traceback\_\_ to tb and return self.



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