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Booby is a standalone data *modeling* and *validation* library written in Python. Booby is under active development (visit this blog post for more info and the roadmap) and licensed under the Apache2 license, so feel free to **contribute** and report errors and suggestions.
See the sample code below to get an idea of the main features.

```python
from booby import Model, fields

class Token(Model):
    key = fields.String()
    secret = fields.String()

class Address(Model):
    line_1 = fields.String()
    line_2 = fields.String()

class User(Model):
    login = fields.String(required=True)
    name = fields.String()
    email = fields.Email()
    token = fields.Embedded(Token, required=True)
    addresses = fields.Collection(Address)

jack = User(
    login='jack',
    name='Jack',
    email='jack@example.com',
    token={
        'key': 'vs7dfxxx',
        'secret': 'ds5ds4xxx'
    },
    addresses=[
        {'line_1': 'Main Street'},
        {'line_1': 'Main St'}
    ]
)

if jack.is_valid:
    print(jack.to_json(indent=2))
else:
    print(json.dumps(dict(jack.validation_errors)))
```

{  
    "email": "jack@example.com",
}
"login": "jack",
"token": {
    "secret": "ds5ds4xxx",
    "key": "vs7dfxxx"
},
"name": "Jack",
"addresses": [
    {
        "line_1": "Main St",
        "line_2": null
    },
    {
        "line_1": "Main Street",
        "line_2": null
    }
]
You can install the last stable release of Booby from PyPI using pip or easy_install.

```
$ pip install booby
```

Also you can install the latest sources from Github.

```
$ pip install -e git+git://github.com/jaimegildesagredo/booby.git#egg=booby
```
To run the Booby test suite you should install the development requirements and then run nosetests.

```
$ pip install -r test-requirements.txt
$ nosetests tests/unit
$ nosetests tests/integration
```
See Changes.
5.1 Installation

You can install Booby directly from PyPI using pip or easy_install:

```
$ pip install booby
```

Or install the latest sources from Github:

```
$ pip install -e git+git://github.com/jaimegildesagredo/booby.git#egg=booby
```

Also you can download a source code package from Github and install it using setuptools:

```
$ tar xvf booby-{version}.tar.gz
$ cd booby
$ python setup.py install
```

5.2 Models

The `models` module contains the *booby* highest level abstraction: the *Model*.

To define a model you should subclass the *Model* class and add a list of *fields* as attributes. And then you could instantiate your *Model* and work with these objects.

Something like this:

```python
class Repo(Model):
    name = fields.String()
    owner = fields.Embedded(User)

booby = Repo(
    name='Booby',
    owner={
        'login': 'jaimegildesagredo',
        'name': 'Jaime Gil de Sagredo'
    })

print booby.to_json()
```

```python
class models.Model(**kwargs)
    The Model class. All Booby models should subclass this.
```
By default the `Model.__init__()` takes a list of keyword arguments to initialize the fields values. If any of these keys is not a field then raises `errors.FieldError`. Of course you can overwrite the `Model.__init__()` to get a custom behavior.

You can get or set Model fields values in two different ways: through object attributes or dict-like items:

```python
>>> booby.name is booby['name']
True
>>> booby['name'] = 'booby'
>>> booby['foo'] = 'bar'
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
errors.FieldError: foo
```

### Parameters
**kwargs – Keyword arguments with the fields values to initialize the model.

### is_valid
This property will be `True` if there are not validation errors in this model fields. If there are any error then will be `False`.

This property wraps the `Model.validate()` method to be used in a boolean context.

### to_json(*args, **kwargs)
This method returns the model as a json string. It receives the same arguments as the builtin `json.dump()` function.

To build a json representation of this model this method iterates over the object to build a dict and then serializes it as json.

### update(*args, **kwargs)
This method updates the model fields values with the given dict. The model can be updated passing a dict object or keyword arguments, like the Python’s builtin `dict.update()`.

### validate()
This method validates the entire model. That is, validates all the fields within this model.

If some field validation fails, then this method raises the same exception that the field.validate() method had raised, but with the field name prepended.

### validation_errors
Generator of field name and validation error string pairs for each validation error on this model fields.

### 5.3 Fields

The `fields` module contains a list of Field classes for model’s definition.

The example below shows the most common fields and builtin validations:

```python
class Token(Model):
    key = String()
    secret = String()

class User(Model):
    login = String(required=True)
    name = String()
    role = String(choices=['admin', 'moderator', 'user'])
    email = Email(required=True)
    token = Embedded(Token, required=True)
    is_active = Boolean(default=False)
```
class fields.Boolean(*args, **kwargs)
    Field subclass with builtin bool validation.

class fields.Collection(model, *args, **kwargs)
    Field subclass with builtin list of models.Model validation, encoding and decoding.

Example:

class Token(Model):
    key = String()
    secret = String()

class User(Model):
    tokens = Collection(Token)

    user = User(
        'tokens': [
            {
                'key': 'xxx',
                'secret': 'yyy'
            },
            {
                'key': 'zzz',
                'secret': 'xxx'
            },
        ]
    )

    user.tokens.append(Token(key='yyy', secret='xxx'))

class fields.Email(*args, **kwargs)
    Field subclass with builtin email validation.

class fields.Embedded(model, *args, **kwargs)
    Field subclass with builtin embedded models.Model validation.

class fields.Field(*validators, **kwargs)
    This is the base class for all booby.fields. This class can also be used as field in any models.Model declaration.

Parameters

• default – This field default’s value.

    If passed a callable object then uses its return value as the field’s default. This is particularly useful when working with mutable objects.

    If default is a callable it can optionally receive the owner model instance as its first positional argument.

• required – If True this field value should not be None.

• choices – A list of values where this field value should be in.

• name – Specify an alternate key name to use when decoding and encoding.

• read_only – If True, the value is treated normally in decoding but omitted during encoding.

• *validators – A list of field validators as positional arguments.
class fields.Float (*args, **kwargs)
   Field subclass with builtin float validation.

class fields.Integer (*args, **kwargs)
   Field subclass with builtin integer validation.

class fields.List (*args, **kwargs)
   Field subclass with builtin list validation and default value.

class fields.String (*args, **kwargs)
   Field subclass with builtin string validation.

5.4 Validators

The validators module contains a set of fields validators.

A validator is any callable object which receives a value as the target for the validation. If the validation fails then should raise an errors.ValidationError exception with an error message.

Validators are passed to fields.Field and subclasses as positional arguments.

class validators.Boolean
   This validator forces fields values to be an instance of bool.

class validators.Email
   This validator forces fields values to be strings and match a valid email address.

class validators.Float
   This validator forces fields values to be an instance of float.

class validators.In (choices)
   This validator forces fields to have their value in the given list.

   Parameters choices – A list of possible values.

class validators.Integer
   This validator forces fields values to be an instance of int.

class validators.List (*validators)
   This validator forces field values to be a list. Also a list of inner validators could be specified to validate each list element. For example, to validate a list of models.Model you could do:

   books = fields.Field(validators.List(validators.Model(YourBookModel)))

   Parameters *validators – A list of inner validators as positional arguments.

class validators.Model (model)
   This validator forces fields values to be an instance of the given models.Model subclass and also performs a validation in the entire model object.

   Parameters model – A subclass of models.Model

class validators.Required
   This validator forces fields to have a value other than None.

class validators.String
   This validator forces fields values to be an instance of basestring.
5.5 Inspection

The `inspection` module provides users and 3rd-party library developers a public api to access booby objects and classes internal data, such as defined fields, and some low-level type validations.

This module is based on the Python `inspect` module.

```python
inspection.get_fields(model)
```

Returns a `dict` mapping the given `model` field names to their `fields.Field` objects.

- **Parameters**
  - `model` - The `models.Model` subclass or instance you want to get their fields.
  - **Raises**
    - `TypeError` if the given `model` is not a model.

```python
inspection.is_model(obj)
```

Returns `True` if the given object is a `models.Model` instance or subclass. If not then returns `False`.

5.6 Errors

The `errors` module contains all exceptions used by Booby.

- **exception** `errors.BoobyError`
  - Base class for all Booby exceptions.

- **exception** `errors.FieldError`
  - This exception is used as an equivalent to `AttributeError` for fields.

- **exception** `errors.ValidationError`
  - This exception should be raised when a `value` doesn’t validate. See `validators`.

5.7 Changes

5.7.1 0.7.0 (Dec 3, 2014)

Backwards-incompatible

- The `List` encoder no longer encodes models. To achieve the old behavior pass the `Model` encoder as an argument instead:

  ```python
class User(Model):
    tokens = fields.Field(encoders=[encoders.List(encoders.Model())])
  ```

Highlights

- Added a `Collection` field that works like `Embedded` for lists of models:

  ```python
class User(Model):
    tokens = fields.Collection(Token)
  ```

```python
user = User(
    'tokens': [
        {
            'key': 'xxx',
            'secret': 'yyy'
        }
    ]
)```
user.tokens.append(Token(key='zzz', secret='www'))
user.validate()

See the docs for more info.

5.7.2 0.6.0 (Oct 12, 2014)

Backwards-incompatible

- The List validator now accepts None as a valid value allowing not required list fields. Before this a field with a List validator couldn’t be None.

Highlights

- The Model class now defines a decode and encode methods with serialization/deserialization support.
- A Field now can receive lists of callable objects, encoders and decoders, to perform serialization/deserialization.
- Added a List field that can be used to create fields containing lists of objects (even models).
- Datetime validator, encoder, and decoder were added.

5.7.3 0.5.2 (Mar 22, 2014)

Highlights

- Added readable Field instances repr. See issue 20.
- Added readable Model classes and instances repr.

5.7.4 0.5.1 (Jan 31, 2014)

Highlights

- The Email validator now only performs a basic sanity check instead of the more restrictive previous check. See issue 17.
- The List validator now accepts any object that implements the list interface (collections.MutableSequence). See issue 18.
- Any object implementing the dict interface (collections.MutableMapping) can be used as a value for an Embedded field. See issue 18.
- When iterating a Model object all objects implementing the list interface are treated as lists. See issue 18.
5.7.5 0.5.0 (Jan 4, 2014)

Backwards-incompatible

- Now field validators must be callable objects. Before this release validators had a validate method that is not longer used to perform a validation. This change only affects to custom user validators with a validate method.

Highlights

- The FieldError exception now is raised only with the field name as argument. See issue 12.
- Fields default argument callables can now optionally receive the model as argument.
- Added the inspection module which provides the get_fields and is_model functions as a public api to get access to models fields and type validation.

5.7.6 0.4.0 (Ago 4, 2013)

Backwards-incompatible

- Moved the Model.to_dict functionality to dict(model).
- The Model.validation_errors method now is an interable of field name and validaton error pairs.
- Removed the Field subfix for all Booby fields. Now use the module as namespace: fields.String.

Highlights

- Added an is_valid property to Model.
- The Model instances now are iterables of field name, value pairs.

5.7.7 0.3.0 (Jun 20, 2013)

Highlights

- When passed a callable object as a field default then the default value for this field in a model instance will be the return value of the given callable.
- Added the models.Model.validation_errors() method to get a dict of field name and error message pairs for all invalid model fields.
CHAPTER 6

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