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# **pyknow Documentation**

*Release 0.0.8*

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## 1.1 Introduction

### 1.1.1 Philosophy

We aim to implement a Python alternative to CLIPS, as compatible as possible. With the goal of making it easy for the CLIPS programmer to transfer all of his/her knowledge to this platform.

### 1.1.2 Features

- Python 3 compatible.
- Pure Python implementation.
- Matcher based on the RETE algorithm.

### 1.1.3 Difference between CLIPS and PyKnow

1. CLIPS is a programming language, PyKnow is a Python library. This imposes some limitations on the constructions we can do (specially on the LHS of a rule).
2. CLIPS is written in C, PyKnow in Python. A noticeable impact in performance is to be expected.
3. In CLIPS you add facts using *assert*, in Python *assert* is a keyword, so we use *declare* instead.

## 1.2 Installation

### 1.2.1 From PyPI

To install PyKnow, run this command in your terminal:

```
$ pip install pyknow
```

## 1.2.2 Getting the source code

PyKnow is developed on [Github](#).

You can clone the repository using the git command:

```
$ git clone https://github.com/buguroo/pyknow.git
```

Or you can [download the releases](#) in .zip or .tar.gz format.

Once you have a copy of the source, you can install it running this command:

```
$ python setup.py install
```

## 1.3 The Basics

An expert system is a program capable of pairing up a set of **facts** with a set of **rules** to those facts, and execute some actions based on the matching rules.

### 1.3.1 Facts

*Facts* are the basic unit of information of PyKnow. They are used by the system to reason about the problem.

Let's enumerate some facts about *Facts*, so... metafacts ;)

1. The class *Fact* is a subclass of *dict*.

```
>>> f = Fact(a=1, b=2)
>>> f['a']
1
```

2. Therefore a *Fact* does not maintain an internal order of items.

```
>>> Fact(a=1, b=2) # Order is arbitrary :0
Fact(b=2, a=1)
```

3. In contrast to *dict*, you can create a *Fact* without keys (only values), and *Fact* will create a numeric index for your values.

```
>>> f = Fact('x', 'y', 'z')
>>> f[0]
'x'
```

4. You can mix autonumeric values with key-values, but autonumeric must be declared first:

```
>>> f = Fact('x', 'y', 'z', a=1, b=2)
>>> f[1]
'y'
>>> f['b']
2
```

5. You can subclass *Fact* to express different kinds of data or extend it with your custom functionality.

```
class Alert(Fact):
    """The alert level."""
    pass

class Status(Fact):
    """The system status."""
    pass

f1 = Alert('red')
f2 = Status('critical')
```

```
from pyknow import Fact
from django.contrib.auth.models import User as DjangoUser

class User(Fact):
    @classmethod
    def from_django_model(cls, obj):
        return cls(pk=obj.pk,
                   name=obj.name,
                   email=obj.email)

    def save_to_db(self):
        return DjangoUser.create(**self)
```

### 1.3.2 Rules

In PyKnow a **rule** is a callable, decorated with *Rule*.

Rules have two components, LHS (left-hand-side) and RHS (right-hand-side).

- The *LHS* describes (using **patterns**) the conditions on which the rule \* should be executed (or fired).
- The *RHS* is the set of actions to perform when the rule is fired.

For a *Fact* to match a *Pattern*, all pattern restrictions must be **True** when the *Fact* is evaluated against it.

```
class MyFact(Fact):
    pass

@Rule(MyFact()) # This is the LHS
def match_with_every_myfact():
    """This rule will match with every instance of `MyFact`."""
    # This is the RHS
    pass

@Rule(Fact('animal', family='felinae'))
def match_with_cats():
    """
    Match with every `Fact` which:

    * f[0] == 'animal'
    * f['family'] == 'felinae'

    """
    print("Meow!")
```

You can use logic operators to express complex *LHS* conditions.