Introduction to python ORM SQLAlchemy

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What is an ORM?

An ORM is the software artefact who maps from the relational data base tables to object/class
This means: maps tables in a relational database directly to the object instance and wraps all SQL/DDL functionality in his methods.

SQLAlchemy it's equivalent to...

- Hiberante in java (main ideas become from here)
- Doctrine in PHP
- DataMapper in ruby (this is more close to Active Record pattern)
- NHibernate in .Net C#
- django ORM in python Web framework

differences with django orm

There are two very important differences between SQLAlchemy and Django. SQLAlchemy is a deeply layered system, whereas Django's ORM is basically just one layer which is the ORM you see.

1. In SQLAlchemy you have at the very bottom the engine:
   - Connection pools and basic API differences between different databases
   - On top of that: the SQL abstraction language,
   - On top of SQL abstraction: the table definitions with the basic ORM
   - And on top of ORM you have the declarative ORM which looks very close to the Django ORM.
2. The other more striking difference however is that SQLAlchemy follows the "Unit of Work" pattern whereas Django's ORM follows something that is very close to the "Active Record" pattern.

Advantages

- Good documentation very helpful at http://www.sqlalchemy.org
- Independent framework
- Evolve really good
- Strong design from the beginning
- Layered components Connection pool, ORM, API, SQL, Aggregates, etc.
- We can reuse part of the abstraction layer or all functionality
- Implement advanced ideas from Hibernate.
- SQLAlchemy does not override all your columns when you just changed one on update.
- differed column load
- Connection pooling

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Disadvantages

- Documentation overwhelming
- Confuse in the beginning because different ways you can configure SQLAlchemy and the ORM.
- Independent framework and not integrate by default with another frameworks like django or pylons/pyramid
- Only integrate in Flask-SQLAlchemy.

Supported Platforms

SQLAlchemy has been tested against the following platforms:

- cPython since version 2.6, through the 2.xx series
- cPython version 3, throughout all 3.xx series
- Pypy 2.1 or greater

Installation

With pip

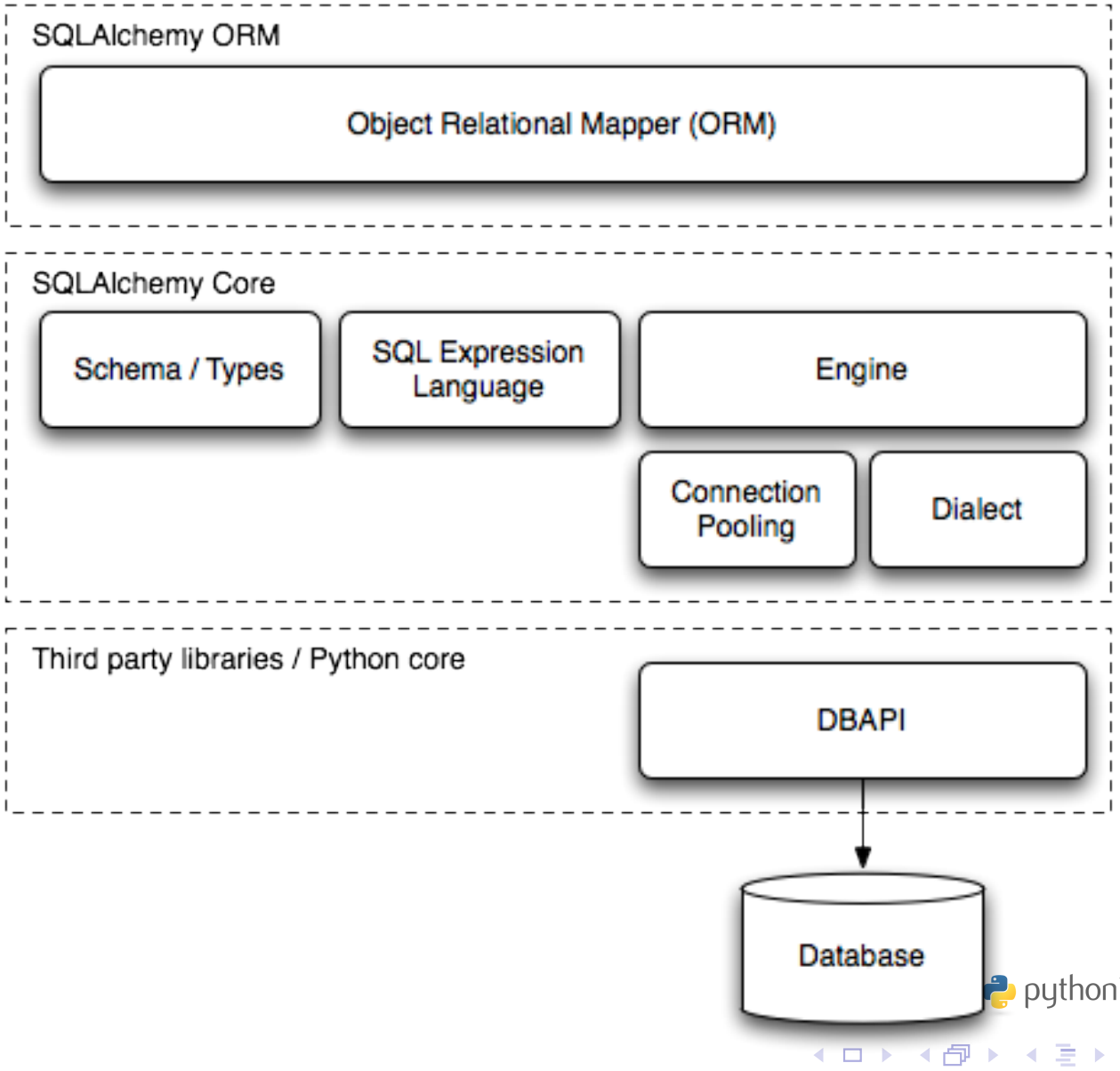
```
pip install SQLAlchemy
```

Or with easy_install

```
easy_install SQLAlchemy
```

All other methods are supported too...

Arquitecture of SQLAlchemy



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Code objects for basic import

```
""" SQLAlchemy engine factory """
from sqlalchemy import create_engine
""" ORM Datatypes """
from sqlalchemy import Column, ForeignKey, Integer, String
""" ORM Session factory """
from sqlalchemy.orm import sessionmaker
""" ORM relationship mapper """
from sqlalchemy.orm relationship
""" Declarative Base Object """
from sqlalchemy.ext.declarative import declarative_base
""" SQL expresions functions wrappers """
from sqlalchemy.sql import func
```

Basic Use case

```
engine = create_engine('sqlite:///demo.db', echo=False)
session = sessionmaker(bind=engine)()
Base.metadata.create_all(engine, checkfirst=True)
p = Parent('prueba')
session.add(p)
session.commit()
```

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Basic Use case

```
q = session.query(Parent).all()
for x in q:
    c = Child("child", x.id)
    session.add(c)
session.commit()
session.refresh(p)
for x in q:
    print("{}+\n       |".format(x.name))
    for i in x.children:
        print("       +-->{}".format(i.name))
```

Object mapper and relational pattern

One to Many

```
Base = declarative_base()

class Parent(Base):
    __tablename__ = 'parent'
    id = Column(Integer, primary_key=True)
    children = relationship("Child", backref="parent")

class Child(Base):
    __tablename__ = 'child'
    id = Column(Integer, primary_key=True)
    parent_id = Column(Integer, ForeignKey('parent.id'))
```

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Object mapper and relational pattern

Many to One

```
class Parent(Base):
    __tablename__ = 'parent'
    id = Column(Integer, primary_key=True)
    child_id = Column(Integer, ForeignKey('child.id'))
    child = relationship("Child")

class Child(Base):
    __tablename__ = 'child'
    id = Column(Integer, primary_key=True)
```

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Object mapper and relational pattern

One to One

```
class Parent(Base):
    __tablename__ = 'parent'
    id = Column(Integer, primary_key=True)
    child = relationship("Child", uselist=False,
     backref="parent")

class Child(Base):
    __tablename__ = 'child'
    id = Column(Integer, primary_key=True)
    parent_id = Column(Integer, ForeignKey('parent.id'))
```

Object mapper and relational pattern

Many to Many

```
association_table = Table('association', Base.metadata,
    Column('left_id', Integer, ForeignKey('left.id')),
    Column('right_id', Integer, ForeignKey('right.id'))
)

class Parent(Base):
    __tablename__ = 'left'
    id = Column(Integer, primary_key=True)
    children = relationship("Child",
                    secondary=association_table,
                    backref="parents")

class Child(Base):
    __tablename__ = 'right'
    id = Column(Integer, primary_key=True)
```

Bibliography

1. SQLAlchemy - Official documentation, March 28, 2014
   http://docs.sqlalchemy.org
2. Armin Ronacher - SQLAlchemy and You, July 19, 2011
   http://lucumr.pocoo.org/2011/7/19/sqlachemy-and-you/
3. Alexander Solovyov, April 23, 2011
   http://solovyov.net/en/2011/basic-sqlalchemy/
4. Alexander Solovyov, May 14, 2012
   https://github.com/piranha/slides/blob/gh-pages/sqla-talk/sqla.md

Thanks & Contact info

Questions?

More information or social links about me:

http://bsdchile.cl