
Deet

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Patrick Michl

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Contents

1	Introduction	1
2	Installation	3
2.1	Install the latest distributed package	3
2.2	Install the development branch	3
2.3	Update the development branch	4
2.4	Testing the development branch	4
3	Data Integration	5
4	Staging	7
5	deet	9
5.1	deet package	9
6	Glossary	11
7	License	13
	Python Module Index	25
	Index	27

CHAPTER 1

Introduction

Deet is a universal database proxy and SQL-Database engine, that implements high-performance and security requirements for enterprise analytical applications.

The primary goal of *Deet* is to provide a unified (universal) data interface for machine learning- and data analysis applications, to facilitate their integration into existing operational data landscapes. To achieve this goal, *Deet* implements the two fundamental layers of a data warehouse:

The *integration layer* of *Deet* utilizes [SQLAlchemy](#) to allow it's connection to a variety of SQL-Databases (e.g. IBM DB2, Oracle, SAP, MS-SQL, MS-Access, Firebird, Sybase, MySQL, Postgresql, SQLite, etc.). Thereupon it provides native support for flat file databases (e.g. CSV-Tables, R-Table exports), laboratory measurements and data generators.

The *staging layer* of *Deet* is implemented as a native SQL-Database engine, featuring a DB-API 2.0 interface with full SQL:2016 support, a vertical data storage manager and real-time encryption. This allows the data analysis application to integrate a variety of different data sources, by using a unified data interface (and SQL dialect).

Deet is open source, based on the [Python](#) programming language and actively developed as part of the [Smart Analytics](#) project at [Frootlab](#).

Deet requires Python 3.7 or later. If you do not already have a Python environment configured on your computer, please see the instructions for installing the full [scientific Python stack](#).

Note: If you are using the Windows platform and want to install optional packages (e.g., *scipy*), then it may be useful to install a Python distribution such as: [Anaconda](#), [Enthought Canopy](#), [Python\(x,y\)](#), [WinPython](#), or [Pyzo](#). If you already use one of these Python distributions, please refer to their online documentation.

Below it is assumed, that you have the default Python environment configured on your computer and you intend to install *Deet* inside of it. If you want to create and work with Python virtual environments, please follow instructions on [venv](#) and [virtual environments](#).

2.1 Install the latest distributed package

You can install the latest distributed package of *Deet* by using `pip`:

```
$ pip install deet
```

2.2 Install the development branch

The installation requires that you have [Git](#) installed on your system. Under this prerequisite the first step is to clone the GitHub repository of *deet*:

```
$ git clone https://github.com/frootlab/deet.git
```

Thereupon the development branch can locally be installed by using `pip`:

```
$ cd deet
$ pip install -e .
```

The `pip install` command allows you to follow the development branch as it changes by creating links in the right places and installing the command line scripts to the appropriate locations.

2.3 Update the development branch

Once you have cloned the GitHub repository onto a local directory, you can update it anytime by running a `git pull` in this directory:

```
$ git pull
```

2.4 Testing the development branch

Deet uses the Python builtin module **module:‘unittest’** for testing. Since the tests are not included in the distributed package at you are required to install the development branch, as described above. Thereupon you have to switch to the repository directory and run:

```
$ python3 tests
```


CHAPTER 3

Data Integration

The *integration layer* of Deet utilizes **'SQLAlchemy'** to allow it's connection to a variety of SQL-Databases (e.g. IBM DB2, Oracle, SAP, MS-SQL, MS-Access, Firebird, Sybase, MySQL, Postgresql, SQLite, etc.). Thereupon it provides native support for flat file databases (e.g. CSV-Tables, R-Table exports), laboratory measurements and data generators. The following table gives an overview of the currently supported back-ends:

	Planning	Pre-Alpha	Alpha	Beta	Stable
IBM-DB2					
Oracle					
SAP					
MySQL					
Postgresql					
SQLite					
CSV-Tables					
R CSV-Exports					

CHAPTER 4

Staging

The *staging layer* of Deet is implemented as a native SQL-Database engine, featuring a DB-API 2.0 interface with full SQL:2016 support, a vertical data storage manager and real-time encryption. This allows the data analysis application to integrate a variety of different data sources, by using a unified data interface (and SQL dialect).

5.1 `deet` package

5.1.1 Subpackages

`deet.base` package

Submodules

`deet.base.dbapi2` module

Module contents

`deet.core` package

Submodules

`deet.core.cursor` module

`deet.core.dtype` module

Data Types.

This module comprises a collection of data types, as specified in the SQL standard. Thereby in most cases the types are directly taken from Python3 builtin or standard library types. For fixed length arrays the corresponding ctypes type is used.

`deet.core.parser` module

deet.core.record module

deet.core.table module

Module contents

deet.proxy package

Submodules

deet.proxy.csv module

deet.proxy.excel module

deet.proxy.sql module

Module contents

5.1.2 Module contents

Deet database engine.

Deet is a universal data mapper and SQL-Database engine, that implements high-performance and security requirements for enterprise analytical applications.

Row Like *Row like* data comprises different data formats, which are used to represent table records. This includes tuples, mappings and instances of the `Record` class. The `Table` class accepts these data types for appending rows by `insert()` and for retrieving rows by `select()`.

Cursor Mode The *cursor mode* defines the *scrolling type* and the *operation mode* of a cursor. Internally the respective parameters of the `Cursor` class are identified by binary flags. The public interface uses a string representation, given by the space separated names of the scrolling type and the the operation mode. Supported scrolling types are:

forward-only The default scrolling type of cursors is called a forward-only cursor and can move only forward through the result set. A forward-only cursor does not support scrolling but only fetching rows from the start to the end of the result set.

scrollable A scrollable cursor is commonly used in screen-based interactive applications, like spreadsheets, in which users are allowed to scroll back and forth through the result set. However, applications should use scrollable cursors only when forward-only cursors will not do the job, as scrollable cursors are generally more expensive, than forward-only cursors.

random Random cursors move randomly through the result set. In difference to a randomly sorted cursor, the rows are not unique and the number of fetched rows is not limited to the size of the result set. If the method `fetch()` is called with a zero value for size, a `CursorModeError` is raised.

Supported operation modes are:

dynamic A **dynamic cursor** is built on-the-fly and therefore comprises any changes made to the rows in the result set during it's traversal, including new appended rows and the order of it's traversal. This behavior is regardless of whether the changes occur from inside the cursor or by other users from outside the cursor. Dynamic cursors are thread-safe but do not support counting filtered rows or sorting rows.

indexed Indexed cursors (aka **Keyset-driven cursors**) are built on-the-fly with respect to an initial copy of the table index and therefore comprise changes made to the rows in the result set during it's traversal, but not new appended rows nor changes within their order. Keyset driven cursors are thread-safe but do not support sorting rows or counting filtered rows.

static Static cursors are buffered and built during it's creation time and therefore always display the result set as it was when the cursor was first opened. Static cursors are not thread-safe but support counting the rows with respect to a given filter and sorting the rows.

Aggregation Function *Aggregation Functions* are callable objects, that transform sequences of objects of a given domain into a single value. Examples include `len()`, `sum()`, `min()` or `max()`, but depending on the domain, many out-of-the-box aggregators are shipped with the standard library package `statistics` or with third party packages like `numpy`.

CHAPTER 7

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d

`deet`, 10

`deet.base`, 9

`deet.core`, 10

`deet.core.dtype`, 9

A

Aggregation Function, **12**

C

Cursor Mode, **11**

D

deet (*module*), 10

deet.base (*module*), 9

deet.core (*module*), 10

deet.core.dtype (*module*), 9

R

Row Like, **11**