

SPJRUD to SQL Converter

Introduction

This library allows you to write database queries and execute them in a SQLite database. The SPJRUD expressions are first checked according to a database schema and can then be translated to SQL.

Please note that NULL values are not supported.

This software is written as a part of a project for the course of Databases I, given by Professor Jef Wijsen at the University of Mons (UMONS).

Usage

To use the module, you must first create a SQLiteDB object. This is the interface between the SQLite database and the SPJRUD to SQL Converter. To execute queries using the database stored in the `example.db` file use following:

```
from algebra import *
db = SQLiteDB("example.db")
```

Once you have a SQLiteDB object you can start performing queries. Queries can be written either as a `str` or an `Expression` by using the `execute()` command. For example:

```
db.execute("SELECT * FROM my_table")
db.execute(Relation("my_table")["id"])
```

Please, note that SQL queries sent as a `str` are not checked in any way before being executed in the SQLite database, whereas SPJRUD expressions are checked before execution.

To save the changes, if you made any in the database, use the `commit()` method:

```
db.commit()
```

SPJRUD expressions

Selection

The selection is separated into two operations: `SelectionConstant` and `SelectionAttribute`.

- `SelectionConstant(attribute, constant, expression)`

Selects all rows of the expression where the value of the attribute mentioned has the value of the

constant. attribute can be either an Attribute object or a str with the name of the column to select. constant can be either a Constant object or a str/int/float with the desired value. expression is an Expression object which is the table on which the selection is executed.

- SelectionAttribute(attribute1, attribute2, expression)

Selects all rows of the expression where the value of the two attributes are the same. attribute1 and attribute2 can be either an Attribute object or a str with the name of the column to select. expression is an Expression object which is the table on which the selection is executed.

Projection

Projection(list_of_attributes, expression)

Reduces the attributes of the table to the ones mentioned. list_of_attributes is the list of the attributes as str to keep in the table. expression is an Expression object which is the table on which the projection is executed.

The shortcut Expression[list_of_attributes] is also available.

For example, the two following queries are similar:

```
q1 = Project(["id","name"], Relation("users"))
q2 = Relation("users")["id", "name"]
```

Join

Join(expression1, expression2)

Merges two tables together. expression1 and expression2 are the tables to be merged.

The shortcut Expression1 * Expression2 is also available.

For example, the two following queries are similar:

```
q1 = Join(Relation("students"), Relation("marks"))
q2 = Relation("students") * Relation("marks")
```

Rename

Rename(from, to, expression)

Changes the name of one attribute. from is the attribute which will be changed and to is the new name of this attribute. expression is an Expression object which is the table on which the attribute will be renamed.

from and to can be Attribute objects or str.

Union

`Union(expression1, expression2)`

Returns tuples from the two expressions which have the same attributes. `expression1` and `expression2` are the two tables on which the union is executed.

The shortcut `Expression1 + Expression2` is also available.

For example, the two following queries are similar:

```
s1 = SelectConstant("name", "Alice", Relation("users"))
s2 = SelectConstant("name", "Bob", Relation("users"))

q1 = Union(s1, s2)
q2 = s1 + s2
```

Difference

`Difference(expression1, expression2)`

Returns tuples from `expression1` that are not in `expression2` where `expression1` and `expression2` must have the same attributes. `expression1` and `expression2` are the two tables on which the difference is executed.

The shortcut `Expression1 - Expression2` is also available.

For example, the two following queries are similar:

```
s = SelectConstant("name", "Alice", Relation("users"))

q1 = Difference(Relation("users"), s)
q2 = Relation("users") - s
```