Syntax of the SECONDO Optimizer Query Language

In the sequel, we give a short grammar for the SECONDO Optimizer Query Language (SECONDO-SQL). This language can be used directly with the sql/1 predicate of the optimizer (SecondoPL), or with a running `OptimizerServer` from the `JavaGUI`.

All attribute and database objects must be stated using lower case characters only. Indexes need to have canonic names, for details consult the more extensive explanations in files `$SECONDO_BUILD_DIR$/Optimizer/optimizer.pl` and `$SECONDO_BUILD_DIR$/Optimizer/database.pl`.

sql-clause	-->	**let** objectname mquery**.** | **let(**objectname**,** mquery**,** secondo-rest-query**).** | **sql** mquery**.** | **sql(**mquery, secondo-rest-query**).**
aggr	-->	groupattr | groupattr **as** newname | aggr2
aggr2	-->	**count(**distinct-clause ***) as** newname | aggrop**(**ext-attr-expr**) as** newname | **aggregate(**ext-attr-expr**,** aggrfun**,** datatype**,** datatype-*constant***) as** newname
aggrop	-->	**min** | **max** | **sum** | **avg** | **extract** | **count**
aggr-clause	-->	aggr | **[**aggr**,** aggr-list**]**
aggr-fun	-->	**(*)** | **(+)** | **union_new** | **intersection_new** | ... % any name *fun* of a binary SECONDO-operator or function object with syntax *fun*: T x T --> T which should be associative and commutative. Infix-operators must be enclosed in round paranthesis.
aggr-list	-->	aggr | aggr**,** aggr-list
attr	-->	attrname | var**:**attrname
attr-list	-->	attr | attr**,** attr-list
attrname	-->	id
column	-->	newname **:** datatype
columnlist	-->	column | column, column-list
createquery	-->	**create table** newname **colums [**columnlist**]** | **create index on** newname **columns** index-clause
datatype	-->	**int** | **real** | **bool** | **string** | **line** | **points** | **mpoint** | **uregion** | ... % any name of a SECONDO-datatype
deletequery	-->	**delete from** rel-clause where-clause
distinct-clause	-->	**all** | **distinct** | **ε**
dropquery	-->	**drop table** relname | **drop index** indexname | **drop index on** relname indexclause
ext-attr	-->	distinct-clause attr
ext-attr-expr	-->	distinct-clause attr-*expr*
first-clause	-->	**first** int-*constant* | **last** int-*constant* | **ε**
groupattr	-->	attr
groupattr-list	-->	groupattr | groupattr**,** groupattr-list | **ε**
groupby-clause	-->	**groupby [**groupattr-list**]** | **groupby** groupattr
id	-->	% any valid Prolog constant-identifier without any underscore-

character
indexname --> id
indextype --> **btree** | **rtree** | **hash** | …
% any name of a logical index type
index-clause --> attrname | attrname **indextype** indextype
insertquery --> **insert into** rel **values** value-list | **insert into** rel query
mquery --> query
| insertquery
| deletequery
| updatequery
| createquery
| dropquery
| **union [**query-list**]**
| **intersection [**query-list**]**
newname --> id
% where id is not already defined within the database or the current query
orderattr --> attrname | attrname **asc** | attrname **desc** | **distance(**id, id**)**
orderattr-list --> orderattr | orderattr**,** orderattr-list
orderby-clause --> **orderby [**orderattr-list**]** | **orderby** orderattr | **ε**
pred --> attr-*boolexpr*
pred-list --> pred | pred**,** pred-list
query --> **select** distinct-clause sel-clause **from** rel-clause where-clause orderby-clause first-clause
| **select** aggr-clause **from** rel-clause where-clause groupby-clause orderby-clause first-clause
query-list --> query | query**,** query-list
rel --> relname | relname **as** var
rel-clause --> rel | **[**rel-list**]**
rel-list --> rel | rel**,** rel-list
relname --> id
result --> attr | attr-expr **as** newname
result-list --> result | result**,** result-list
secondo-rest-query --> **'** text **'**
% any valid subexpression in SECONDO executable language
sel-clause --> ***
| result | **[**result-list**]**
| **count(**distinct-clause ***)**
| aggrop**(**ext-attr-expr**)**
| **aggregate(**ext-attr-expr**,** aggrfun**,** datatype**,** datatype-*constant***)**
text --> % any sequence of characters, that completes the optimized query to a valid expression in Secondo executable language
transform --> attrname **=** update-expression
transform-clause --> transform | **[**transform-list**]**
transform-list --> transform | transform, transform-list
update-expression --> % a fixed value, or an operation calculating a value
updatequery --> **update** rel **set** transform-clause where-clause
var --> id
value --> % an integer, boolean or string value in prolog
value-list --> value | value**,** value-list
where-clause --> **where [**pred-list**]** | **where** pred | **ε**

Unconsidered Query Language Elements

The grammar given above does still not consider the following extensions to the Secondo Optimzer:

- **macros**
- **nonempty** within select-clauses
- subqueries
- DDL-coammand (aside let)
- NN-Queries