SQL

DOMAIN MANIPULATION LANGUAGE

Agenda

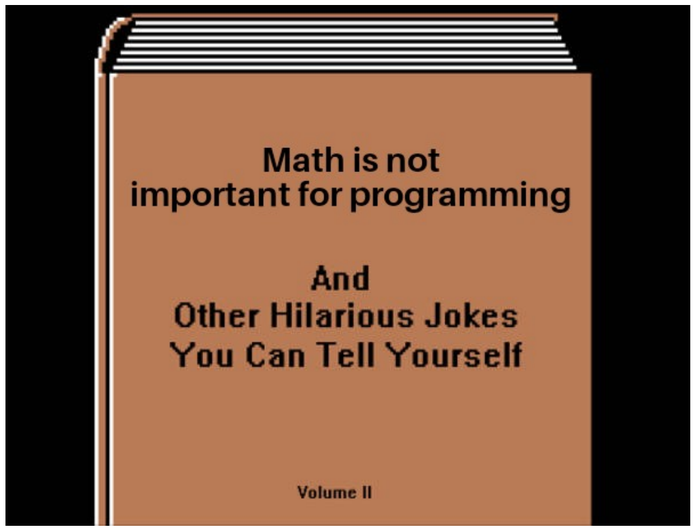
- Insert
- Select
- Delete
- Update

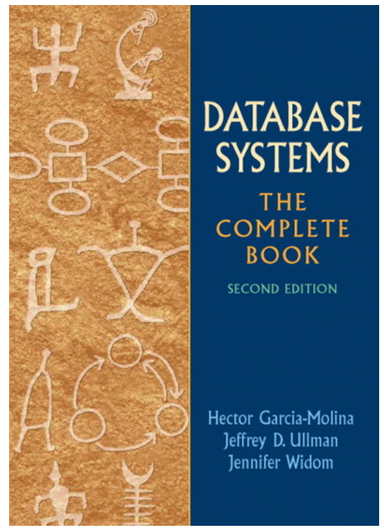
Relational Algebra

Table 6.1 Operations of Relational Algebra

OPERATION	PURPOSE	NOTATION
SELECT	Selects all tuples that satisfy the selection condition from a relation R.	$\sigma_{\text{<selection condition>}}(R)$
PROJECT	Produces a new relation with only some of the attributes of R, and removes duplicate tuples.	$\pi_{\text{<attribute list>}}(R)$
THETA JOIN	Produces all combinations of tuples from R_1 and R_2 that satisfy the join condition.	$R_1 \bowtie_{\text{<join condition>}} R_2$
EQUIJOIN	Produces all the combinations of tuples from R_1 and R_2 that satisfy a join condition with only equality comparisons.	$R_1 \bowtie_{\text{<join condition>}} R_2$, OR $R_1 \bowtie_{\text{(<join attributes 1>), (<join attributes 2>)}} R_2$
NATURAL JOIN	Same as EQUIJOIN except that the join attributes of R_2 are not included in the resulting relation; if the join attributes have the same names, they do not have to be specified at all.	$R_1 *_{\text{<join condition>}} R_2$, OR $R_1 *_{\text{(<join attributes 1>), (<join attributes 2>)}} R_2$ OR $R_1 * R_2$

Math is fun


Math is not
important for programming
And
Other Hilarious Jokes
You Can Tell Yourself
Volume II


DATABASE
SYSTEMS
THE
COMPLETE
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Jeffrey D. Ullman
Jennifer Widom

INSERT documentation

```
INSERT {
  [ TOP ( expression ) [ PERCENT ] ]
  [ INTO ]
  { <object> | rowset_function_limited
    [ WITH ( <Table_Hint_Limited> [ ...n ] ) ]
  }
{   [ ( column_list ) ]
  [ <OUTPUT Clause> ]
  { VALUES ( { DEFAULT | NULL | expression } [ ,...n ] ) [ ,...n     ]
  | derived_table
  | execute_statement
  | <dml_table_source>
  | DEFAULT VALUES
} } }
```

SQL syntax

- UPPERCASE – keyword
- Italic – arguments
- Bold – names (table, database ..)
  - On slides bold is focus
- [,…n], […n] – Item can be repeated (with comma or without)
- [] – optional
- {} – required
- <block> – block syntax

Insert

- **TOP**
  - Limits the rows returned in a query result set to a specified number of rows or percentage of rows in SQL Server 2017. When you use TOP with the ORDER BY clause, the result set is limited to the first N number of ordered rows. Otherwise, **TOP returns the first N number of rows in an undefined order**. Use this clause to specify the number of rows returned from a SELECT statement. **Or, use TOP to specify the rows affected by an INSERT, UPDATE, MERGE, or DELETE statement (random rows)**.

INSERT documentation

<SELECT statement> ::=
[WITH <common_table_expression> [,...n]]
<query_expression>
[ORDER BY { order_by_expression | column_position [ASC | DESC] }
[,...n]]
[<FOR Clause>]
[OPTION (<query_hint> [,...n])]
<query_expression> ::=
{ **<query_specification>** | (<query_expression>) }
[{ UNION [ALL] | EXCEPT | INTERSECT }
<query_specification> | (<query_expression>) [...n]]

<query_specification>

<query_specification> ::= **SELECT** [ALL | DISTINCT]
[TOP (expression) [PERCENT] [WITH TIES]]
< select_list >
[INTO new_table]
[**FROM** { <table_source> } [,...n]]
[**WHERE** <search_condition>]
[<GROUP BY>]
[HAVING < search_condition >]

Deep breath

Delete

```
[ WITH <common_table_expression> [ ,...n ] ]
DELETE  [ TOP ( expression ) [ PERCENT ] ]
  [ FROM ]
  { { table_alias | <object>  | rowset_function_limited [ WITH ( table_hint_limited [ ...n ] ) ] }  | @table_variable }
  [ <OUTPUT Clause> ]
  [ FROM table_source [ ,...n ] ]
  [ WHERE { <search_condition>
     | { [ CURRENT OF
          { { [ GLOBAL ] cursor_name }
             | cursor_variable_name
          } ] } }  ]
  [ OPTION ( <Query Hint> [ ,...n ] ) ]
[; ]
```

<search_condition>

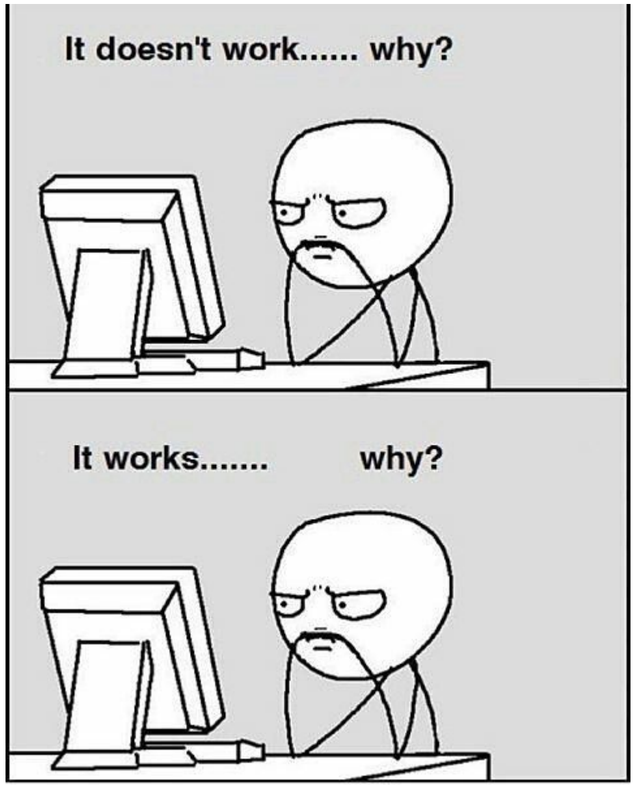
<search_condition> ::=
  { [NOT] <predicate> | (<search_condition>) }
  [{ AND | OR } [NOT] { <predicate> | (<search_condition>) }]
[,...n]

```
<predicate> ::=
    { expression { = | < > | ! = | > | > = | ! > | < | < = | ! < } expression
    | string_expression [ NOT ] LIKE string_expression
  [ ESCAPE 'escape_character' ]
    | expression [ NOT ] BETWEEN expression AND expression
    | expression IS [ NOT ] NULL
    | CONTAINS
( { column | * } , '<contains_search_condition>' )
    | FREETEXT ( { column | * } , 'freetext_string' )
    | expression [ NOT ] IN ( subquery | expression [ ,...n ] )
    | expression { = | < > | ! = | > | > = | ! > | < | < = | ! < }
{ ALL | SOME | ANY} ( subquery )
    | EXISTS ( subquery )    }
```

Update

```
UPDATE
 [ TOP ( expression ) [ PERCENT ] ]
 { { table_alias | <object> | rowset_function_limited
     [ WITH ( <Table_Hint_Limited> [ ...n ] ) ]
  } | @table_variable }
 SET
   { column_name = { expression | DEFAULT | NULL }
   CUT  OUT
[ <OUTPUT Clause> ]
[ FROM{ <table_source> } [ ,...n ] ]
[ WHERE { <search_condition>
      | { [ CURRENT OF
          { { [ GLOBAL ] cursor_name }
            | cursor_variable_name  } ]  } }  ]
[ OPTION ( <query_hint> [ ,...n ] ) ]
```

Exercises

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References

Frontpage meme: https://rtask.thinkr.fr/the-ten-commandments-for-a-well-formatted-database/
Exercise gif: https://giphy.com/gifs/13HgwGsXF0aiGY/media