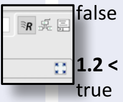
Rel + Tutorial D Quickstart

Rel is an open source desktop database management system from Dave Voorhis that implements **Tutorial D**, a relational database language designed by Chris Date and Hugh Darwen.
Tutorial D is not SQL.
For more information, see https://reldb.org, http://thethirdmanifesto.com and http://www.dcs.warwick.ac.uk/~hugh/TTM/Tutorial%20D%202016-09-22.pdf

Start

Launching: Download instructions are at https://reldb.org/c/index.php/download/ Once downloaded, open the folder – or go to Applications on macOS – and run the Rel executable.
***Rel* command-line**: In the upper-right hand corner of the *Rel* window, there are these three icons.



The left icon is for the main *Rel* user interface, the middle icon is the visual query editor, and the right icon is the command-line.
Loading a database script: Go to the command-line, select the Load File icon, load the file. Press F5 to execute.
Evaluating expressions and statements: Type the expression at the command-line and press F5. Statements always end with a semicolon; expressions do not.

NOTE: To run the examples on this page, download and unzip Rel_ExamplesAndUtilities_3.*xxx*.zip, load and execute database script DateBookSampleRelvars.rel

Scalar Expressions

```
3 + 4
7

3.4 + 5.6
9.0

3.4 > 5.6
false

1.2 < 3.4
true

"a" || "bcd"
abcd

'a' || 'bcd'
abcd

SIN(0.25)
0.24740395925452294
```

Tuple Expressions

TUPLE {x 1, y 2.3, z 'zap'}

x 1	*y* 2.3	*z* zap

TUPLE {x 1, y 2.3, z 'zap'} JOIN TUPLE {p 1, q 4.3, r true}

x 1	*y* 2.3	*z* zap	*p* 1	*q* 4.3	*r* true

TUPLE {x 1, y 2.3, z 'zap'} MINUS TUPLE {p 1, q 4.3, r true}

x 1	*y* 2.3	*z* zap

TUPLE {x 1, y 2.3, z 'zap'} MINUS TUPLE {x 1, y 2.3}

z zap

TUPLE {x 1, y 2.3, z 'zap'} UNION TUPLE {x 1, y 2.3}

x 1	*y* 2.3	*z* zap

TUPLE {x 1, y 2.3, z 'zap'} UNION TUPLE {x 1, y 2.3, r 4.5}

x 1	*y* 2.3	*z* zap	*r* 4.5

User-defined operators and types

```
// This is a user-defined operator
OPERATOR myOperator (x INTEGER, y INTEGER) RETURNS INTEGER;
    RETURN x + y * 2;
END OPERATOR;

// Evaluate
myOperator(3, 4) * 2

// Execute
CALL myOperator(3, 4);

// Drop operator
DROP OPERATOR myOperator(INTEGER, INTEGER);

// User-defined type
TYPE myNewTYPE POSSREP {x INT, y CHAR};

// Value of type myNewTYPE
myNewTYPE(2, 'zot')

// Relvar using user-defined type
VAR myNewRelvar REAL RELATION {x INT, y myNewTYPE} KEY {x};
```

Flow control

```
// IF ... THEN statement
IF RANDOM() > 0.5 THEN
  WRITELN "heads";
ELSE
  WRITELN "tails";
END IF;

// IF ... THEN expression
WRITELN
  IF RANDOM() > 0.5 THEN "heads"
  ELSE "tails" END IF;

// CASE ... WHEN statement
VAR x INIT(RANDOM());
CASE;
  WHEN x > 0.5 THEN WRITELN "heads";
  WHEN x < 0.5 THEN WRITELN "tails";
  ELSE WRITELN "on edge";
END CASE;

// CASE ... WHEN expression
VAR y INIT(RANDOM());
WRITELN CASE
  WHEN y > 0.5 THEN "heads"
  WHEN y < 0.5 THEN "tails"
  ELSE "on edge"
END CASE;

// WITH expression
WRITELN WITH (
  v := 2.0 * SIN(RANDOM()),
  q := 3.0 * TAN(RANDOM())
     ): v * v * q + q;

// DO loop
VAR i INT;
DO i := 1 TO 10;
  WRITELN i;
END DO;

// WHILE loop
VAR j INIT(10);
WHILE j > 0;
  WRITELN j;
  j := j - 1;
END WHILE;
```

Relational Expressions

```
// Return value of relvar S

S

// Join S and P on common attributes
S JOIN P

// Return tuples of S that match tuples in P,
// based on common attributes
S MATCHING P

// Return tuples of S that do not match tuples in P,
// based on common attributes
S NOT MATCHING P

// Join S and P on common attributes;
// do not include common attributes
S COMPOSE P

// Return tuples of S where STATUS is greater than 10
S WHERE STATUS > 10

// Return tuples of S where SNAME equals
// NAME('Smith'). NAME is a user-defined type.
S WHERE SNAME = NAME('Smith')

// Return UNION of tuples of S where SNAME equals
// NAME('Smith') with tuples
// of S where STATUS equals 30.
(S WHERE SNAME = NAME('Smith')) UNION (S WHERE STATUS =
30)

// Return tuples of S with S#, SNAME and STATUS
// attributes converted to a relation-valued attribute X.
S GROUP {S#, SNAME, STATUS} AS X

// Return tuples of S with S#, SNAME and STATUS
// attributes converted to a tuple-valued attribute X.
S WRAP {S#, SNAME, STATUS} AS X

// Get the single tuple from S WHERE STATUS = 10.
// Error if there isn't exactly 1 tuple.
TUPLE FROM (S WHERE STATUS = 10)

// Get the SNAME attribute from the tuple from
// S WHERE STATUS = 10. Error if there isn't 1.

SNAME FROM TUPLE FROM (S WHERE STATUS = 10)

// Project S on SNAME and STATUS.

S {SNAME, STATUS}

// Return value of S with SNAME renamed to NAME;
// STATUS renamed to STAT.
S RENAME {SNAME AS NAME, STATUS AS STAT}

// Return the scalar sum of the STATUS attribute of S.
SUM(S, STATUS)

// Return the scalar sum of an expression.
SUM(S, STATUS * 2)

// Obtain total of STATUS attribute grouped by CITY
SUMMARIZE S BY {CITY}: {TOTAL := SUM(STATUS)}

// Obtain total of STATUS attribute, and count of tuples,
// grouped by CITY
SUMMARIZE S BY {CITY}:
   {N := COUNT(), TOTAL := SUM(STATUS)}

// Obtain total of STATUS attribute times two,
// and count of tuples, grouped by CITY
SUMMARIZE S BY {CITY}:
   {N := COUNT(), TOTAL := SUM(STATUS * 2)}

// Calculate new attribute values from expressions.
EXTEND S: {BIGSTATUS := STATUS * 10, R := 'Test'}
```

Relvars

```
VAR myVariable REAL RELATION {x INT, y RATIONAL, z CHAR} KEY {x};

INSERT myVariable RELATION {
    TUPLE {x 1, y 2.3, z 'zap'},
    TUPLE {x 2, y 3.4, z 'zot'},
    TUPLE {x 3, y 4.2, z 'zaz'}
};
```

myVariable

x	y	z
INTEGER	*RATIONAL*	*CHARACTER*
1	2.3	zap
2	3.4	zot
3	4.2	zaz

```
UPDATE myVariable WHERE x > 2: {y := y + 4.2, z := z || 'gurgle'};
```

myVariable

x	y	z
INTEGER	*RATIONAL*	*CHARACTER*
1	2.3	zap
2	3.4	zot
3	8.4	zazgurgle

```
DELETE myVariable WHERE x = 1;
```

myVariable

x	y	z
INTEGER	*RATIONAL*	*CHARACTER*
2	3.4	zot
3	8.4	zazgurgle

```
// Describe all relvars in the database
sys.Catalog

// Get the names of all relvars in the database
sys.Catalog {Name}

// Get all the operators in the database
sys.Operators
sys.OperatorsBuiltin
```