Relational Operator Examples

Consider the following tables with three attributes:

R

L	*D*	*C*
A	3	r
B	1	b
C	2	g

S

L	*D*	*C*
C	3	y
D	1	b
C	2	g

The Primitive Operators

A selection will (potentially) reduce the number of rows. Thus the following selection operation: $\sigma_{D>1}(R)$ will produce the following table:

L	*D*	*C*
A	3	r
C	2	g

A projection will eliminate columns: $\pi_{C,D}(R)$ will produce:

C	*D*
r	3
b	1
g	2

A cartesian product of R×S will produce:

L	*D*	*C*	*L'*	*D'*	*C'*
A	3	r	C	3	y
B	1	b	C	3	y
C	2	g	C	3	y
A	3	r	D	1	b
B	1	b	D	1	b
C	2	g	D	1	b
A	3	r	C	2	g
B	1	b	C	2	g
C	2	g	C	2	g

The last three columns must be renamed to avoid duplicate attribute names.

A set union R∪S will produce:

L	*D*	*C*
A	3	r
B	1	b
C	2	g
C	3	y
D	1	b

A set intersection R∩S will produce:

L	*D*	*C*
C	2	g

A set difference R-S will produce:

L	*D*	*C*
A	3	r
B	1	b

The difference is not symmetric so the difference S-R is different:

L	*D*	*C*
C	3	y
D	1	b

The Composite Operators

Since these two relations have exactly the same attributes in their schemas a join could occur on any column. First an equijoin on the L attribute, $R \bowtie_{R.L=S.L} S$ gives:

L	*D*	*C*	*D'*	*C'*
C	2	g	3	y
C	2	g	2	g

Next a equijoin on the D attribute, $R \bowtie_{R.D=S.D} S$ gives:

L	*D*	*C*	*L'*	*C'*
A	3	R	C	y
B	1	B	D	b
C	2	G	C	g

Next a equijoin on the C attribute, $R \bowtie_{R.C=S.C} S$ gives:

L	*D*	*C*	*L'*	*D'*
B	1	B	D	1
C	2	G	C	2

The division is one of the least used and it needs its own set of relations.

R

L	*D*	*C*
A	3	R
A	5	R
B	1	B
B	3	B
B	3	R
C	2	G

S1

C
r

S2

C
r
b

R/S1 will be:

L	*D*
A	3
A	5
B	3

R/S2 will be:

L	*D*
B	3