REL1

A	B
10	20
30	42

REL2

C	B
20	10
32	42

REL3

A	B
10	20
10	30
30	20
30	42

REL4

C	D
30	24
30	20
10	20
36	42

REL2 RENAME (B, B1)

1) REL2 RENAME (C,A)
REL1 MINUS REL

A	B
10	20
30	42

2) REL1 JOIN REL2 (C>10)

A	B	C	B1
10	20	20	10
10	20	32	42
30	42	20	10
30	42	32	42

3) REL1 NATURAL JOIN REL2

A	B	C
30	42	32

4) REL3 <AND> REL4

A	B	C	D
10	20	30	24
10	20	30	20
10	20	10	20
10	20	36	42
10	30	30	24
10	30	30	20
10	30	10	20
10	30	36	42

...

30	20	30	24
30	20	30	20
30	20	10	20
30	20	36	42
30	42	30	24
30	42	30	20
30	42	10	20
30	42	36	42

5) <NOT> REL3
A = {10, 30}
B = {20, 42, 30, ~~10~~}

A	B
10	42
~~10~~	~~10~~
30	30
~~30~~	~~10~~

REL1

A	B
10	20
30	20
30	42

REL2

B	D
20	10
20	40
32	42

REL3

A	B
10	20
30	20
30	42

REL4

A	C
11	24
10	20
36	42

REL3 <OR> REL4

A	B	C	...
10	20	24	30 42 20
10	20	20	30 42 42
10	20	42	11 20 24
30	20	24	11 42 24
30	20	20	10 42 20
30	20	42	36 20 42
30	42	24	36 42 42
...			

1) REL2 RENAME (D,A)
REL1 UNION REL2

A	B
10	20
30	20
30	42
40	20
42	32

2) REL2 RENAME (D,A)
REL1 INTERSECT REL2

A	B
10	20

3) REL2 RENAME (D,A)
REL1 MINUS REL2

A	B
30	20
30	42

4) REL2 RENAME (B,C)
REL1 TIMES REL2

A	B	C	D
10	20	20	10
10	20	20	40
10	20	32	42
30	20	20	10
30	20	20	40
30	20	32	42
30	42	20	10
30	42	20	40
30	42	32	42

5) REL1 WHERE (B < 34)

A	B
10	20
30	20

6) PROJECT REL1 (B)

B
20
42

7) REL1 JOIN REL2 (C>10)
REL2 RENAME (B,C)

A	B	C	D

TIMES (ger C>10)

8) REL1 DIVIDE BY
(REL2 PROJECT (B))

A

9) REL1 NATURAL JOIN REL2

A	B	D
10	20	10
10	20	40
30	20	10
30	20	40

10) REL3 <AND> REL4

A	B	C
10	20	20

12) ~~REL3 <OR> REL4~~
NOT REL3

A	B
10	42

A B C
10 20 24
11 20 24
10 20 20
10 20 42
30 20 42
30 20

REL1

D	C
10	20
20	10
32	42
30	42

REL2

C	D
20	10
32	42

1) REL 1 UNION REL 2

D	C
10	20
20	10
32	42
30	42
42	32

8) ~~REL A DIVIDE BY REL 2~~
8) PROJECT REL1 DIVIDE BY (PROJECT REL2 (C))

D

2) REL1 INTERSECT REL2

D	C
10	20

7) REL1 JOIN ((REL2 RENAME (C,B) RENAME (D,A)) (C>10))

B	C	B	A
10	20	20	10
10	20	32	42
32	42	20	10
32	42	32	42
30	42	20	10
30	42	32	42

3) REL1 MINUS REL2

D	C
20	10
32	42
30	42

9) REL A NATJOIN REL 2

D	C
10	20

4) REL A TIMES ((REL2 RENAME (C,B) RENAME (D,A))

D	C	B	A
10	20	20	10
10	20	32	42
20	10	20	10
20	10	32	42
32	42	20	10
32	42	32	42
30	42	20	10
30	42	32	42

5) (REL1 RENAME (C,B)) WHERE (B<34)

D	B
10	20
20	10

6) ~~REL~~ PROJECT (REL1 RENAME (C,B) (B))

B
20
10
42

REL3

FF	B
10	20
11	24
13	24
30	42

REL4

C	B
11	24
36	42

10) REL3 <AND> REL4

FF	B	C
11	24	11
13	24	11
30	42	36

11) REL3 <OR> REL4

FF	B	C
10	20	11
10	20	36
11	24	11
11	24	36
13	24	11
13	24	36
30	42	11
30	42	36
10	24	11
30	24	11
10	42	36
11	42	36
13	42	36

12) <NOT> REL3

FF	B
10	24
10	42
11	20
11	42
13	20
13	42
30	20
30	24

REL1

K	L
10	20
30	42
10	32
42	32
42	20
30	20

REL2

L	D
20	10
32	42

1) REL1 TIMES (REL2 RENAME (L,C))

K	L	C	D
10	20	20	10
10	20	32	42
30	42	20	10
30	42	32	42
10	32	20	10
10	32	32	42
42	32	20	10
42	32	32	42
42	20	20	10
42	20	32	42
30	20	20	10
30	20	32	42

2) REL1 RENAME (K,B) WHERE (B<34)

B	L
10	20
30	42
10	32
30	20

3) PROJECT REL1 RENAME (K,B) (B)

B
10
30
42

4) REL1 JOIN REL2 RENAME (L,C)

Всё равно, что TIMES b&v3 (C>10)

5) REL1 NATURAL JOIN REL2

K	L	D
10	20	10
42	20	10
30	20	10
10	32	42
42	32	42

REL3

A	B
10	20
30	42

REL4

A	D
11	24
30	42
36	42

6) REL3 <AND> REL4

как схемы отношений имеют неуместное пересечение <AND> работаем как NAT зоны

A	B	D
30	42	42

7) REL3 <OR> REL4

A	B	D
10	20	24
10	20	42
30	42	24
30	42	42
11	20	24
11	42	24
36	20	42
36	42	42

8) <NOT> REL3

A	B
10	42
30	20

REL1

C	B
30	20
40	20
30	42

REL2

C	D
20	10
50	10
62	42

1) REL1 RENAME (B,D) UNION REL2

C	D
30	20
40	20
30	42
20	10
50	10
62	42

2) REL1 RENAME (B,D) INTERSECT REL2

C	D

3) REL1 RENAME (B,D) MINUS REL2

C	D
30	20
40	20
30	42

4) REL1 RENAME (C,A) TIMES REL2

A	B	C	D
30	20	20	10
30	20	50	10
30	20	62	42
40	20	20	10
40	20	50	10
40	20	62	42
30	42	20	10
30	42	50	10
30	42	62	42

5) REL1 WHERE (B<34)

C	B
30	20

6) PROJECT REL1 (B)

B
20
42

7) REL1 RENAME (C,A)
JOIN REL2 (C>10)

A	B	C	D

аналогично так же как TIMES в 4)

8) REL1 DIVIDE BY ~~REL2~~ PROJECT REL2 (C)

B

9) REL1 NATURAL JOIN REL2

A	B	C	D
17	20	11	24
30	42	36	42

REL3

A	D
17	20
30	42

REL4

C	D
11	24
36	42

10) REL3 <AND> REL4

A	D	C
30	42	36

11) REL3 <OR> REL4

A	D	C
17	20	11
17	20	42
30	42	11
30	42	~~36~~
17	24	11
30	24	11
17	42	36

12) <NOT> REL3

A	D
17	42
30	20

REL1

A	B
10	20
30	42

REL2

C	D
20	10
32	42

1) REL1 RENAME (B,D) UNION REL2 RENAME (C,A)

A	D
10	20
30	42
20	10
32	42

2) REL1 RENAME (B,D) ~~UNION~~ INTERSECT REL2 RENAME (C,A)

A	D
∅	

3) REL1 RENAME (B,D) MINUS REL2 RENAME (C,A)

A	D
10	20
30	42

4) REL1 TIMES REL2

A	B	C	D
10	20	20	10
10	20	32	42
30	42	20	10
30	42	32	42

5) REL1 WHERE (B<34)

A	B
10	20

6) PROJECT REL1 (B)

B
20
42

7) REL1 JOIN REL2 (C>10)
аналогично 4)

8) REL1 DIVIDE BY PROJECT REL2 C RENAME (C,B)

A
∅

R

9) REL1 NATURAL JOIN REL2 RENAME (CA)

A	B	D
∅		

10) REL3 <AND> REL4

REL3

A	B
10	20
30	42
11	20
36	42

REL4

A	B	D
11	20	24
36	40	42

A	B	D
11	20	24

11) REL3 <OR> REL4

A	B	D
10	20	24
10	20	42
30	42	24
30	42	42
11	20	24
11	20	42
36	42	24
36	42	42
11	20	24
36	40	42

~~11 20~~

12) <NOT> REL3

A	B
10	42
30	20
11	42
36	20

REL1

A	B
10	20
30	42

REL2

X	Z
30	10
30	42

1) REL1 RENAME (B,Z) UNION REL2
RENAME (X,A)

Это Морозов начудил тут (X,A), как и ниже

Бонус — мой зачёт

A	Z
10	20
30	42
30	10

+

2) REL1 RENAME (B,Z) INTERSECT
REL2 RENAME (X,A)

A	Z
30	42

+

3) REL1 RENAME (B,Z) MINUS REL2
RENAME (X,A)

A	Z
10	20

+

4) REL1 TIMES REL2

A	B	X	Z
10	20	30	10
10	20	30	42
30	42	30	10
30	42	30	42

+

5) REL1 WHERE (B<34)

A	B
10	20

+

6) PROJECT REL1 (B)

B
20
42

+

7) REL1 RENAME (A,C) JOIN REL2 (C>10)

C	B	X	Z
30	42	30	10
30	42	30	42

8) REL1 RENAME (A,X) DIVIDE BY PROJECT REL2 (X)

B
42

9) REL1 RENAME (B,X) NATURAL JOIN REL2

A	X	Z

10) REL3 <AND> REL4

REL3

A	B
10	20
30	42
10	42

A	B
30	42
10	42

11) REL3 <OR> REL4

A	B
10	20
30	42
10	42

REL4

A	B
30	42
10	42

12) <NOT> REL3

A	B
10	42
30	20
10	20