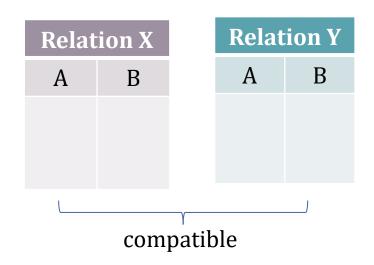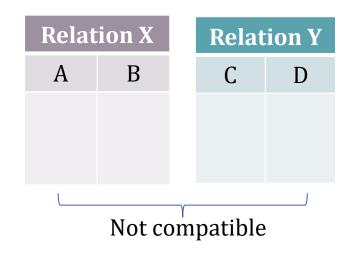DATABASE

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CSE3103 : Database
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Binary Operation Compatibility

- To perform Union, Intersection, difference operation relations should be UNION compatible.

- Two relations are UNION compatible if they have same number of attributes and belong to the same domain.
  - Column number need to be same.
  - Domain Type need to be same.

Relation X	
A	B

Relation Y	
A	B

compatible

Relation X	
A	B

Relation Y	
C	D

Not compatible

Binary Operation : Union

R	
A	B
α	1
α	2
β	1

S	
A	B
α	2
β	3

UNION Operation among R and S relation

R U S =

R	
A	B
α	1
α	2
β	1

U

S	
A	B
α	2
β	3

=

R U S	
A	B
α	1
α	2
β	1
β	3

Binary Operation : Intersection

R	
A	B
α	1
α	2
β	1

S	
A	B
α	2
β	3

Intersection Operation among R and S relation

$$R \cap S =$$

R	
A	B
α	1
α	2
β	1

$\cap$

S	
A	B
α	2
β	3

$$=$$

R ∩ S	
A	B
α	2

Binary Operation : Difference

Difference Operation among R and S relation

R

A	B
α	1
α	2
β	1

S

A	B
α	2
β	3

R - S =

R

A	B
α	1
α	2
β	1

-

S

A	B
α	2
β	3

=

R - S

A	B
α	1
β	1

S - R =

S

A	B
α	2
β	3

-

R

A	B
α	1
α	2
β	1

=

R - S

A	B
β	3

Binary Operation : Division

R	
A	B
α	1
α	2
β	1
θ	2

S
B
1
2

Division Operation among R and S relation

$$R / S = \begin{array}{|c|c|} \hline \multicolumn{2}{|c|}{R} \\ \hline A & B \\ α & 1 \\ α & 2 \\ β & 1 \\ θ & 2 \\ \hline \end{array} / \begin{array}{|c|} \hline S \\ \hline B \\ 1 \\ 2 \\ \hline \end{array}$$

$$= \begin{array}{|c|} \hline R / S \\ \hline A \\ α \\ \hline \end{array}$$

Rules :
1. The uncommon columns in divisor and dividend column will be the resulting column. Suppose ABC/C so AB will be the result column.
2. Elements that are jointly common with the dividend will be an account as quotient. There is no chance to keep the remainder.
3. If there are no common with the dividend then the quotient will be zero.

Binary Operation : Division

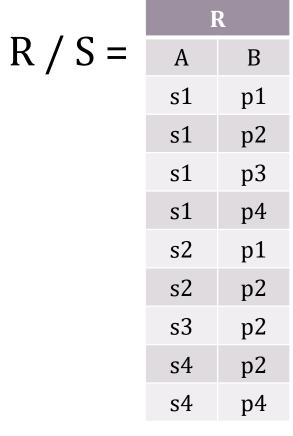| R	
A	B
s1	p1
s1	p2
s1	p3
s1	p4
s2	p1
s2	p2
s3	p2
s4	p2
s4	p4

S
B
p2

T
B
p4

R / S =

R	
A	B
s1	p1
s1	p2
s1	p3
s1	p4
s2	p1
s2	p2
s3	p2
s4	p2
s4	p4

/

S
B
p2

=

R / S
A
s1
s2
s3
s4

R / T =

R / T
A
s1
s4

Cartesian Product Operation

R
A
α
β

S
B
1
2
3

$$R \times S = \begin{array}{|c|} \hline R \\ \hline A \\ \alpha \\ \beta \\ \hline \end{array} \times \begin{array}{|c|} \hline S \\ \hline B \\ 1 \\ 2 \\ 3 \\ \hline \end{array} = $$

R X S	
A	B
α	1
α	2
α	3
β	1
β	2
β	3

Cartesian Product Operation

?

R	
A	**B**
α	1
α	2

S	
B	**C**
1	X
2	Y

R X S =

R	
A	**B**
α	1
α	2

X

S	
B	**C**
1	X
2	Y

=

R X S			
A	**B**	**B**	**C**
α	1	1	X
α	1	2	Y
α	2	1	X
α	2	2	Y

$\rho_{B \to R.B}$ (R)

$\rho_{B \to S.B}$ (S)

So, Finally

R X S =

R X S			
A	**R.B**	**S.B**	**C**
α	1	1	X
α	1	2	Y
α	2	1	X
α	2	2	Y