

## Examples of the Relational Algebra Operations $\sigma$ , $\pi$ , and $\times$

Base Relations:

S	<u>S#</u>	Sname	Status	City
S1	Acme	20	Omro	
S2	Fubar	10	Fisk	
S3	Snafu	0	Ring	

SP	<u>S#</u>	<u>P#</u>	Qty
S1	P1	50	
S1	P2	150	
S2	P2	25	
S3	P1	300	

P	<u>P#</u>	Pname	Color	Weight
P1	Nut	Pink	0.2	
P2	Bolt	Blue	0.9	

Select ( $\sigma$ ):

Which suppliers are currently active?

$$\sigma_{\text{Status} > 0}(S) =$$

<u>S#</u>	Sname	Status	City
S1	Acme	20	Omro
S2	Fubar	10	Fisk

Project ( $\pi$ ):

Which part numbers are represented in the SP relation?

$$\pi_{P\#}(SP) =$$

<u>P#</u>
P1
P2

Cartesian Product ( $\times$ ):

What is the Cartesian Product of SP and P?

$$SP \times P =$$

<u>S#</u>	<u>SP.P#</u>	Qty	<u>P.P#</u>	Pname	Color	Weight
S1	P1	50	P1	Nut	Pink	0.2
S1	P1	50	P2	Bolt	Blue	0.9
S1	P2	150	P1	Nut	Pink	0.2
S1	P2	150	P2	Bolt	Blue	0.9
S2	P2	25	P1	Nut	Pink	0.2
S2	P2	25	P2	Bolt	Blue	0.9
S3	P1	300	P1	Nut	Pink	0.2
S3	P1	300	P2	Bolt	Blue	0.9

Query: What are the names of the active suppliers of nuts?

In Relational Algebra:

$$\pi_{\text{Sname}}(\sigma_{\text{Status} > 0 \wedge \text{Pname} = \text{'Nut'}}(\sigma_{\text{S.S\#} = \text{SP.S\#}}(\sigma_{\text{SP.P\#} = \text{P.P\#}}(\text{S} \times (\text{SP} \times \text{P}))))))$$

(1)  $\text{SP} \times \text{P} =$  (See previous page!)

(2)  $\text{S} \times (\text{SP} \times \text{P}) =$

<u>S.S#</u>	<u>Sname</u>	<u>Status</u>	<u>City</u>	<u>SP.S#</u>	<u>SP.P#</u>	<u>Qty</u>	<u>P.P#</u>	<u>Pname</u>	<u>Color</u>	<u>Weight</u>
S1	Acme	20	Omro	S1	P1	50	P1	Nut	Pink	0.2
S1	Acme	20	Omro	S1	P1	50	P2	Bolt	Blue	0.9
S1	Acme	20	Omro	S1	P2	150	P1	Nut	Pink	0.2
S1	Acme	20	Omro	S1	P2	150	P2	Bolt	Blue	0.9
S1	Acme	20	Omro	S2	P2	25	P1	Nut	Pink	0.2
S1	Acme	20	Omro	S2	P2	25	P2	Bolt	Blue	0.9
S1	Acme	20	Omro	S3	P1	300	P1	Nut	Pink	0.2
S1	Acme	20	Omro	S3	P1	300	P2	Bolt	Blue	0.9
S2	Fubar	10	Fisk	S1	P1	50	P1	Nut	Pink	0.2
S2	Fubar	10	Fisk	S1	P1	50	P2	Bolt	Blue	0.9
S2	Fubar	10	Fisk	S1	P2	150	P1	Nut	Pink	0.2
S2	Fubar	10	Fisk	S1	P2	150	P2	Bolt	Blue	0.9
S2	Fubar	10	Fisk	S2	P2	25	P1	Nut	Pink	0.2
S2	Fubar	10	Fisk	S2	P2	25	P2	Bolt	Blue	0.9
S2	Fubar	10	Fisk	S3	P1	300	P1	Nut	Pink	0.2
S2	Fubar	10	Fisk	S3	P1	300	P2	Bolt	Blue	0.9
S3	Snafu	0	Ring	S1	P1	50	P1	Nut	Pink	0.2
S3	Snafu	0	Ring	S1	P1	50	P2	Bolt	Blue	0.9
S3	Snafu	0	Ring	S1	P2	150	P1	Nut	Pink	0.2
S3	Snafu	0	Ring	S1	P2	150	P2	Bolt	Blue	0.9
S3	Snafu	0	Ring	S2	P2	25	P1	Nut	Pink	0.2
S3	Snafu	0	Ring	S2	P2	25	P2	Bolt	Blue	0.9
S3	Snafu	0	Ring	S3	P1	300	P1	Nut	Pink	0.2
S3	Snafu	0	Ring	S3	P1	300	P2	Bolt	Blue	0.9

$$(3) \sigma_{SP.P\#=P.P\#} (S \times (SP \times P))$$

<u>S.S#</u>	<u>Sname</u>	<u>Status</u>	<u>City</u>	<u>SP.S#</u>	<u>SP.P#</u>	<u>Qty</u>	<u>P.P#</u>	<u>Pname</u>	<u>Color</u>	<u>Weight</u>
S1	Acme	20	Omro	S1	P1	50	P1	Nut	Pink	0.2
S1	Acme	20	Omro	S1	P2	150	P2	Bolt	Blue	0.9
S1	Acme	20	Omro	S2	P2	25	P2	Bolt	Blue	0.9
S1	Acme	20	Omro	S3	P1	300	P1	Nut	Pink	0.2
S2	Fubar	10	Fisk	S1	P1	50	P1	Nut	Pink	0.2
S2	Fubar	10	Fisk	S1	P2	150	P2	Bolt	Blue	0.9
S2	Fubar	10	Fisk	S2	P2	25	P2	Bolt	Blue	0.9
S2	Fubar	10	Fisk	S3	P1	300	P1	Nut	Pink	0.2
S3	Snafu	0	Ring	S1	P1	50	P1	Nut	Pink	0.2
S3	Snafu	0	Ring	S1	P2	150	P2	Bolt	Blue	0.9
S3	Snafu	0	Ring	S2	P2	25	P2	Bolt	Blue	0.9
S3	Snafu	0	Ring	S3	P1	300	P1	Nut	Pink	0.2

$$(4) \sigma_{S.S\#=SP.S\#} (\sigma_{SP.P\#=P.P\#} (S \times (SP \times P)))$$

<u>S.S#</u>	<u>Sname</u>	<u>Status</u>	<u>City</u>	<u>SP.S#</u>	<u>SP.P#</u>	<u>Qty</u>	<u>P.P#</u>	<u>Pname</u>	<u>Color</u>	<u>Weight</u>
S1	Acme	20	Omro	S1	P1	50	P1	Nut	Pink	0.2
S1	Acme	20	Omro	S1	P2	150	P2	Bolt	Blue	0.9
S2	Fubar	10	Fisk	S2	P2	25	P2	Bolt	Blue	0.9
S3	Snafu	0	Ring	S3	P1	300	P1	Nut	Pink	0.2

$$(5) \sigma_{Status>0 \wedge Pname='Nut'} (\sigma_{S.S\#=SP.S\#} (\sigma_{SP.P\#=P.P\#} (S \times (SP \times P))))$$

<u>S.S#</u>	<u>Sname</u>	<u>Status</u>	<u>City</u>	<u>SP.S#</u>	<u>SP.P#</u>	<u>Qty</u>	<u>P.P#</u>	<u>Pname</u>	<u>Color</u>	<u>Weight</u>
S1	Acme	20	Omro	S1	P1	50	P1	Nut	Pink	0.2

$$(6) \pi_{Sname} (\sigma_{Status>0 \wedge Pname='Nut'} (\sigma_{S.S\#=SP.S\#} (\sigma_{SP.P\#=P.P\#} (S \times (SP \times P))))$$

Sname

Acme
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