

selection σ
 projection π
 rename ρ

Set operations: $\cup, \cap, -$

Oct 19-9:56 AM

Cartesian Product (Cross product)
 $A \times B = \{(a,b) \mid a \in A, b \in B\}$

Join:
 $A \bowtie_{\text{cond}} B$

A			B		
r	s	t	u	v	w
1	2	7	1	1	1
2	3	6	3	3	2
3	1	5	7	7	2
4	1	9	1	1	6

$A \bowtie_{r=u} B$

r	s	t	u	v
1	2	7	1	1
2	1	5	3	2
3	1	2	7	1
4	1	2	7	1

$A \bowtie_{r=u} B = \sigma_{r=u}(A \times B)$

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$A \bowtie_{\Theta} B$ Theta join
 Θ is any condition
 Θ : arbitrary condition (AND, OR, NOT)

EQUIJOIN: Θ is only =

Natural Join: $A \bowtie B$
 - remove duplicate columns
 - columns must have same name for comparison
 $A(r,s,t) \quad B(r,v)$

$A \bowtie B = C \leftarrow \sigma_{r=v}(A \times B)$
 Pair $(r,s,t,v)(c)$

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complete set of operations
 $\{\sigma, \pi, \rho, \cup, -, \times\}$

$R \cap S = (R \cup S) - ((R - S) \cup (S - R))$

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$R \div S$
 $R(z) \div S(x) \quad x \subseteq z$
 take tuples (z) from $R(z)$ s.t.
 the values in t appear in R w/ every tuple in $S(x)$

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Aggregate
 $\langle \text{grouping attribs} \rangle \mathcal{F}_{\langle \text{functions} \rangle} (R)$

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Outer Joins

Left $A \bowtie B$
 Right $A \bowtie B$
 Full $A \bowtie B$

A			B	
r	s	t	u	v
1	2	3	1	7
4	5	6	4	6
1	7	9	5	3
2	4	6		2

$A \bowtie B$

r	s	t	u	v
1	2	3	1	7
1	7	9		2
4	5	6	4	6
2	4	6	5	3

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Relational Calculus

- what the results look like

$$\{t \mid \text{cond}(t)\}$$

Join A, B on r

$$\{s, t \mid s \in A \text{ and } t \in B \text{ and } s.r = t.r\}$$

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