

1. Aggregates

SUM, MIN, MAX, CNT., AVG

$$G_{\sigma(A_i)}(r) \quad r = R(A_1, A_2, \dots, A_n)$$

Ex:

A	D	C
2	2	7
2	B	7
D	D	3
D	B	10

$$G_{SUM(C)}(r) = \begin{matrix} \text{SUM(C)} \\ 27 \end{matrix}$$

$$G_{SUM(C), AVG(C)}(r) = \begin{matrix} \text{SUM} & \text{AVG} \\ 27 & 27/4 \end{matrix}$$

grouping

$$G_{\sigma(A_i)}(r)$$

Ex.

$$G_{SUM(C)}(r)$$

A	D	C
2	2	7
2	B	7
D	D	3
D	B	10

SUM(C)
14
13

$$G_{SUM(C)}(r) \text{ (2 grps)}$$

SUM(C)
7
7
13

According to the textbook, under the grouping situation, the resulting table should also contain the attributes that are used for making the groups. Therefore, the results are:

A	SUM(C)
alpha	14
beta	13

and

A	B	SUM(C)
alpha	alpha	7
alpha	beta	7
beta	beta	13

2

$\Pi_{A,D}(r)$   
generalized project

$\Pi_{\sigma(A+B)}(r)$

Relational algebra - procedural language  
 relational calculus - declarative language  
 $\downarrow$  { tuple relational calculus - SQL\*  
 domain " " - R.D.E.

$$trc = \{ t \mid cond(t) \}$$

$$drc = \{ \sigma_i, \sigma_{i_1, i_2} \mid cond(\sigma_i, \sigma_{i_1}, \sigma_{i_2}) \}$$

exercises in R.A.

Emp (Eid, Empname, age, salary)

Works\_owl(Eid, did, start\_time)  
 Dept(did, location, manager\_id)

Q1 Find the names of all employees who are younger than 45 and with salaries in the range of [20k, 100k]

$\Pi_{name} (\sigma_{age < 45 \wedge salary \in [20k, 100k]} (Emp))$

Q2 Find the IDs and the location of the dept where John Doe works

$\sigma_{Emp.name = 'John Doe'} (Emp) \times W_{o} \times Dept$

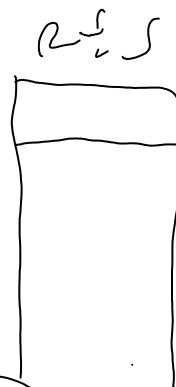
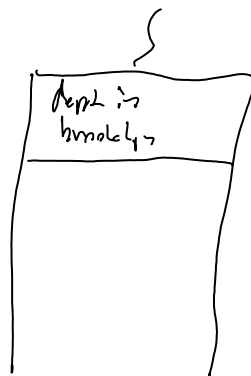
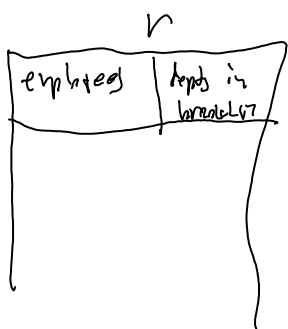
**PROJECT did, location**

Q3 Find the names and use of all employees who work for dept. #1.

$\Pi_{name, use} (\sigma_{did=1} (Emp \times W_{o}))$  (also right)

$\Pi_{name, use} [Emp.did=1 \times W_{o}]$   
 $W_{o}.did = Emp.did$

Q4: Find the names of employees who work for all depts. in Brooklyn



$\Pi_{name, eid} (Emp \times W_{o}) \div \Pi_{did} (\sigma_{loc = 'Brooklyn'} (Dept))$

div set