

DBMS Tutorial 16/10/19

1. Consider the following relational schema:

- Suppliers(sid:integer, sname: string, address: string)
- Parts(pid:integer, pname: string, color: string)
- Catalog(sid:integer, pid: integer, cost: real)

Underlined fields form the primary key for the relation. Write each of the following queries as a relational algebra expression:

1. Find the names of suppliers who supplies any red part.
2. Find the *sids* of suppliers who supplies any red or green part.
3. Find the *sids* of suppliers who supplies any red part and whose address is 221 Packer Street.
4. Find the *pids* of the most expensive part(s) supplied by suppliers named "Yosemite Sham".
5. Find the *sids* of suppliers who supply every part.
6. Find the *sids* of suppliers who supply every red or green part.
7. Find the *pids* of parts that are supplied by at least two different suppliers.
8. Find pairs of *sids* such that the supplier with the first *sid* charges more for some part than the supplier with the second *sid*.

DBMS Tutorial 16/10/19 Solutions -

$$1. \pi_{sname}(\pi_{sid}((\pi_{pid} \sigma_{color='red'} Parts) \bowtie Catalog) \bowtie Suppliers)$$

$$2. \pi_{sid}(\pi_{pid}(\sigma_{color='red' \vee color='green'} Parts) \bowtie catalog)$$

$$\begin{aligned} & \rho(R1, \pi_{sid}((\pi_{pid} \sigma_{color='red'} Parts) \bowtie Catalog)) \\ 3. & \rho(R2, \pi_{sid} \sigma_{address='221PackerStreet'} Suppliers) \\ & R1 \cap R2 \end{aligned}$$

$$\begin{aligned} & \rho(R1, \pi_{sid} \sigma_{sname='YosemiteSham'} Suppliers) \\ & \rho(R2, R1 \bowtie Catalog) \\ & \rho(R3, R2) \\ & \rho(R4(1 \rightarrow sid, 2 \rightarrow pid, 3 \rightarrow cost), \sigma_{R3.cost < R2.cost} (R3 \times R2)) \\ 4. & \pi_{pid}(R2 - \pi_{sid,pid,cost} R4) \end{aligned}$$

$$5. (\pi_{sid,pid} Catalog) / (\pi_{pid} Parts)$$

$$6. (\pi_{sid,pid} Catalog) / (\pi_{pid} \sigma_{color='red' \vee color='green'} Parts)$$

$$\begin{aligned} & \rho(R1, Catalog) \\ & \rho(R2, Catalog) \\ 7. & \pi_{R1.pid} \sigma_{R1.pid=R2.pid \wedge R1.sid \neq R2.sid} (R1 \times R2) \end{aligned}$$

$$\begin{aligned} & \rho(R1, Catalog) \\ & \rho(R2, Catalog) \\ 8. & \pi_{R1.sid, R2.sid} (\sigma_{R1.pid=R2.pid \wedge R1.sid \neq R2.sid \wedge R1.cost > R2.cost} (R1 \times R2)) \end{aligned}$$