

Exercise 1

1) Find the names of suppliers who supply some red parts.

$$\Pi_{sname}(\Pi_{sid}(\Pi_{pid}(\sigma_{color=red}(Parts)) \bowtie Catalog) \bowtie Suppliers)$$

2) Find the sids of suppliers who supply some red or green part.

$$\Pi_{sid}(\Pi_{pid}(\sigma_{color=red \text{ OR } color=green}(Parts)) \bowtie Catalog)$$

3) Find the sids of suppliers who supply some red part or are at 221 Packer Street.

$$(\Pi_{sid}(\Pi_{pid}(\sigma_{color=red}(Parts)) \bowtie Catalog)) \cup (\Pi_{sid} \sigma_{address=221 \text{ Packer Street}}(Suppliers))$$

4) Find the sids of suppliers who supply some red part and some green part.

$$(\Pi_{sid}(\Pi_{pid}(\sigma_{color=red}(Parts)) \bowtie Catalog)) \cap (\Pi_{sid}(\Pi_{pid}(\sigma_{color=green}(Parts)) \bowtie Catalog))$$

5) Find the sids of suppliers who supply every part.

$$(\Pi_{sid, pid}(Catalog)) / (\Pi_{pid}(Parts))$$

6) Find the sids of suppliers who supply every red part

$$(\Pi_{sid, pid}(Catalog)) / (\Pi_{pid}(\sigma_{color=red}(Parts)))$$

7) Find the sids of suppliers who supply every red or green part

$$(\Pi_{sid, pid}(Catalog)) / (\Pi_{pid}(\sigma_{color=red \text{ OR } color=green}(Parts)))$$

8) Find the sids of suppliers who supply every red part or supply every green

$$(\Pi_{sid, pid}(Catalog)) / (\Pi_{pid}(\sigma_{color=red}(Parts))) \cup$$

$$(\Pi_{sid, pid}(Catalog)) / (\Pi_{pid}(\sigma_{color=green}(Parts)))$$

9) Find pairs of sids such that the supplier with the first sid charges more for some part than the supplier with the second sid.

$$\rho(Catalog \rightarrow T1), \rho(Catalog \rightarrow T2)$$

$$(\Pi_{T1.sid, T2.sid}(\sigma_{T1.pid=T2.pid \text{ AND } T1.pid \neq T2.pid \text{ AND } T1.cost > T2.cost}(T1 \times T2)))$$

10) Find the pids of parts supplied by at least two different suppliers.

$$\rho(Catalog \rightarrow T1), \rho(Catalog \rightarrow T2)$$

$$(\Pi_{T1.pid}(\sigma_{T1.pid=T2.pid \text{ AND } T1.sid \neq T2.sid}(T1 \times T2)))$$

Exercise 2

$$+ \Pi_{sname} (\Pi_{sid} ((\sigma_{color=red} Parts) \bowtie (\sigma_{cost < 100} Catalog)) \bowtie Suppliers)$$

1) Find the names of Suppliers who supplies red part that costs less than 100 dollars

$$+ (\Pi_{sname} ((\sigma_{color=red} Parts) \bowtie (\sigma_{cost < 100} Catalog)) \bowtie Suppliers) \cap (\Pi_{sname} ((\sigma_{color=green} Parts) \bowtie (\sigma_{cost < 100} Catalog)) \bowtie Suppliers)$$

2) Find the names of Suppliers who supplies red part that costs less than 100 dollars and the names of Suppliers who supplies green part that costs less than 100 dollars

$$+ (\Pi_{sid} ((\sigma_{color=red} Parts) \bowtie (\sigma_{cost < 100} Catalog)) \bowtie Suppliers) \cap (\Pi_{sid} ((\sigma_{color=green} Parts) \bowtie (\sigma_{cost < 100} Catalog)) \bowtie Suppliers)$$

3) Find the ids of Suppliers who supplies red part that costs less than 100 dollars and the ids of Suppliers who supplies green part that costs less than 100 dollars

$$+ \Pi_{sname} ((\Pi_{sid,name} ((\sigma_{color=red} Parts) \bowtie (\sigma_{cost < 100} Catalog)) \bowtie Suppliers) \cap (\Pi_{sid,name} ((\sigma_{color=green} Parts) \bowtie (\sigma_{cost < 100} Catalog)) \bowtie Suppliers))$$

4) Find the names of Suppliers who supplies red part that costs less than 100 dollars and the names of Suppliers who supplies green part that costs less than 100 dollars