DATABASE MANAGEMENT SYSTEM

CS - 631

Spring – 2019

Assignment 1 Solutions

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Schema :

0. π_{CITY} **(**π_{PID} **(**σ $_{COLOR = 'red'}$ **(PARTS)) * **σ $_{COST>100}$ **(CATALOG)*** $\pi_{SID, CITY}$**(SUPPLIERS))**

Solution 0

City of the suppliers are computed in the end which supplies parts of Red color that cost more than $100.

1. Find the names of parts for which there is some supplier

Solution 1

π_{PNAME} (PARTS * CATALOG)

2. Find the names of parts supplied by suppliers who are at 1 Central Ave.

Solution 2

π_{PNAME} (PARTS * CATALOG * $\sigma_{STREET='1 Central Ave'}$ (SUPPLIERS))

3. Find the names of suppliers who supply some red part.

Solution 3

π_{SNAME} ($\pi_{SNAME, SID}$ (SUPPLIERS) * $\pi_{SID, PID}$ (CATALOG) * π_{PID} (σ $_{COLOR = 'red'}$ (PARTS)))

4. Find the SIDs of suppliers who supply some red or green part.

Solution 4

π_{SID} ($\pi_{SID, PID}$ (CATALOG) * π_{PID} ($\sigma_{COLOR = 'red' OR COLOR = 'green'}$ (PARTS)))

5. Find the SID of suppliers who supply some red part or whose address is '221 Packer Street'.

Solution 5

Part_Color ← π_{SID} (π_{PID} ($\sigma_{COLOR = 'red'}$ (PARTS)) * $\pi_{SID, PID}$ (CATALOG))

Supplier_addr ← π_{SID} ($\sigma_{ADDRESS = '221 Parcker Street'}$ (SUPPLIERS))

RESULT ← Part_Color ∪ Supplier_addr

6. Find the SIDs of suppliers who supply some red part and some green part.

Solution 6

Red_Part ← π_{SID} (π_{PID} ($\sigma_{COLOR = 'red'}$ (PARTS)) * $\pi_{SID, PID}$ (CATALOG))

Green_Part ← π_{SID} (π_{PID} ($\sigma_{COLOR = 'green'}$ (PARTS)) * $\pi_{SID, PID}$ (CATALOG))

RESULT ← Red_Part ∩ Green_Part

7. Find the PIDs of parts that are red or are supplied by a supplier who is at the city of Newark.

Solution 7

Red_Part ← π_{PID} ($\sigma_{COLOR = 'red'}$ (PARTS))

City_Supplier ← π_{PID} (CATALOG * $\sigma_{CITY = 'Newark'}$ (SUPPLIERS))

Result ← Red_Part ∪ City_Supplier

8. Find the PIDs of parts supplied by a supplier who is at the city of Newark and by a supplier who is at the city of Trenton.

Solution 8

City1_Supplier ← π_{PID} (CATALOG * $\sigma_{CITY = 'Newark'}$ (SUPPLIERS))

City2_Supplier ← π_{PID} (CATALOG * $\sigma_{CITY = 'Trenton'}$ (SUPPLIERS))

Result ← City1_Supplier ∩ City2_Supplier

9. Find the PIDs of parts supplied by every supplier.

Solution 9

$\pi_{SID, PID}$ (CATALOG) ÷ π_{SID} (SUPPLIER)

10. Find the PIDs of parts supplied by every supplier who supplies at least one part.

Solution 10

$\pi_{SID, PID}$ (CATALOG) ÷ π_{SID} (CATALOG)

11. Find the PIDs of parts supplied by every supplier who is at the city of Newark or at the city of Trenton (equivalently: find the PIDs of parts supplied by every supplier who is at the city of Newark and by every supplier who is at the city of Trenton).

Solution 11

City1_Supplier ← $\pi_{SID, PID}$ (CATALOG)) ÷ π_{SID} ($\sigma_{CITY = 'Newark'}$ (SUPPLIERS))

City2_Supplier ← $\pi_{SID, PID}$ (CATALOG)) ÷ π_{SID} ($\sigma_{CITY = 'Trenton'}$ (SUPPLIERS))

Result ← City1_Supplier ∩ City2_Supplier

12. Find the PIDs of parts supplied by every supplier who is at the city of Newark or by every supplier who is at the city of Trenton.

Solution 12

City1_Supplier ← $\pi_{SID, PID}$ (CATALOG)) ÷ π_{SID} ($\sigma_{CITY = 'Newark'}$ (SUPPLIERS))

City2_Supplier ← $\pi_{SID, PID}$ (CATALOG)) ÷ π_{SID} ($\sigma_{CITY = 'Trenton'}$ (SUPPLIERS))

Result ← City1_Supplier ∪ City2_Supplier

13. Which one of the queries 11 and 12 is more restrictive (if any)?

Solution 13

According to the question, Query 11 is more restrictive than 12.

14. Find the pairs of PIDs such that the part with the first PID is sold at a higher price than the part with the second PID by some supplier.

Solution 14

$\pi_{PID,\ Sec\_PID}\ (\sigma_{\ COST>Sec\_COST}\ (CATALOG\ *\ \rho_{PID\rightarrow Sec\_PID,\ COST\rightarrow Sec\_COST1}\ (CATALOG)))$

15. Find the SIDs of suppliers who supply at least two different parts (you are not allowed to use a grouping/aggregation operation for this query).

Solution 15

$\Pi_{SID}\ (\sigma_{\ PID\ \neq\ Sec\_PID}\ (\Pi_{SID,PID}\ (CATALOG)\ *\ \rho_{PID\rightarrow Sec\_PID}\ (\ \pi_{SID,\ PID}\ (CATALOG))))$

16. Find the SIDs of suppliers who supply at least two different parts (you have to use a grouping/aggregation operation for this query).

Solution 16

Count_val $\leftarrow\ _{SID}\mathcal{F}_{count(PID)}\ (CATALOG)$

Result $\leftarrow \Pi_{SID}(\ \sigma_{\ count(PID)\geq 2}\ (Count\_val))$

17. For every part supplied by a supplier who is at the city of Newark, print the PID and the SID and the name of the suppliers who sell it at the highest price.

Solution 17

City1_R $\leftarrow \pi_{PID}\ (CATALOG\ *\ \ \sigma_{CITY\ =\ 'Newark'}\ (SUPPLIERS))$

Max1_R $\leftarrow\ _{PID}\mathcal{F}_{MAX(COST)}\ (City1\_R\ *\ CATALOG)$

Max2_R $\leftarrow \rho_{MAX(COST)\ \rightarrow COST}\ (Max1\_R)$

All_values $\leftarrow \pi_{PID,\ SID}\ (\ Max2\_R\ *\ CATALOG)$

RESULT $\leftarrow\ \ \pi_{PID,\ SID,\ SNAME}\ (All\_values\ *\ \pi_{SID,SNAME}(SUPPLIERS)\ )$

18. For every part, find its PID, its PNAME and the number of suppliers who sell it.

Solution 18

$\pi_{PID,\ PNAME,\ COUNT(SID)}\ ((_{PID}\mathcal{F}_{count(SID)}\ CATALOG)\ *\ PARTS)$

19. List the PID, PNAME and average cost of all parts.

Solution 19

$_{PID,\ PNAME}\mathcal{F}_{avg(COST)}$(CATALOG * PARTS)

20. Find the average cost of red parts.

Solution 20

$\mathcal{F}_{avg(COST)}$ ($\sigma_{COLOR='Red'}$(PARTS) * CATALOG)

21. Find the average cost of parts supplied by suppliers named 'Yosemite Sham'.

Solution 21

$\mathcal{F}_{avg(COST)}$ *(CATALOG * π_{SID} ($\sigma_{SNAME\ =\ 'Yoshemite\ Sham'}$ (SUPPLIERS)))*