

Washington State University
School of Electrical Engineering and Computer Science
CptS 451 – Introduction to Database Systems
Online

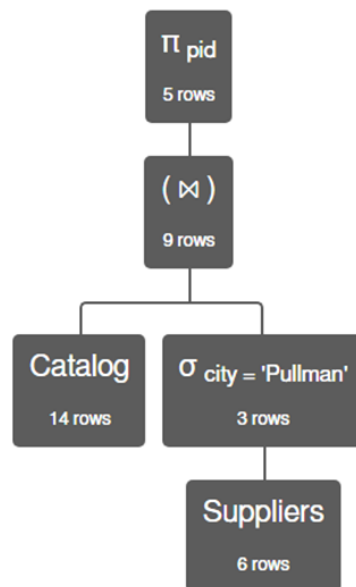
Dr. Sakire Arslan Ay

Homework-3
Relational Algebra

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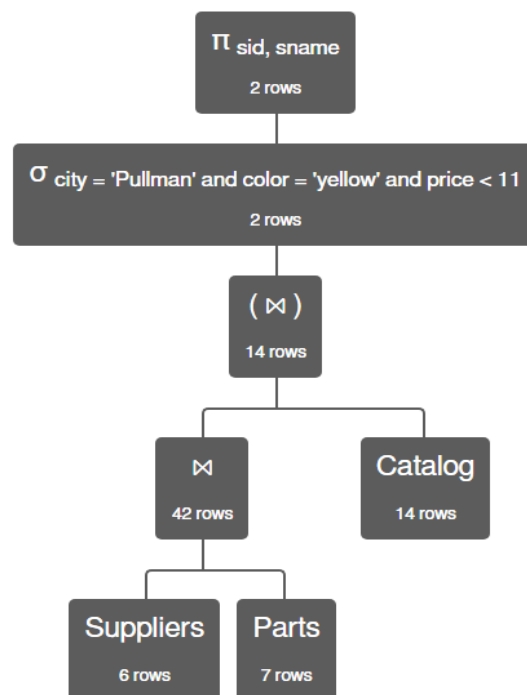
Student Number: 11606459

1. Find all distinct parts supplied by Pullman stores. Return “pid”’s of those parts.



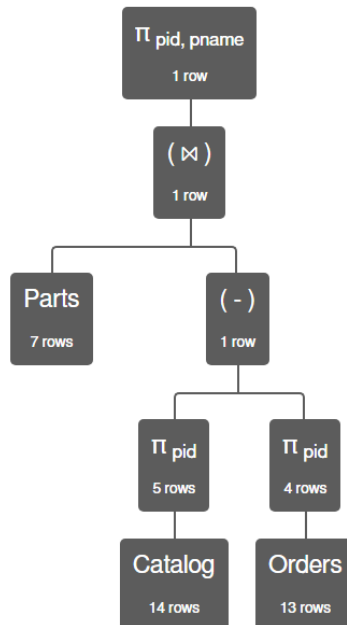
$\pi_{pid} (\text{Catalog} \bowtie \sigma_{city = 'Pullman'} (\text{Suppliers}))$

2. Find the suppliers in Pullman who supply a yellow part for less than \$11. Return “sid”’s and names for those suppliers.



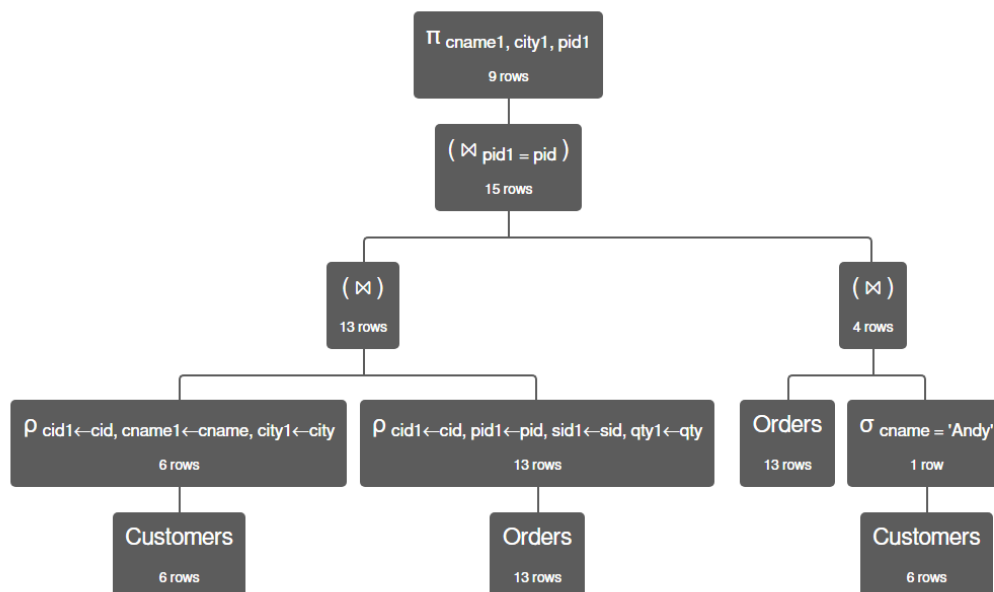
$\pi_{sid, sname} (\sigma_{city = 'Pullman' \text{ and } color = 'yellow' \text{ and } price < 11} ((\text{Suppliers} \bowtie \text{Parts}) \bowtie \text{Catalog}))$

3. Find all parts which are provided by some supplier (i.e., they appear in the catalog) but they were never ordered by a customer. Return the “pid”’s and names of those parts.



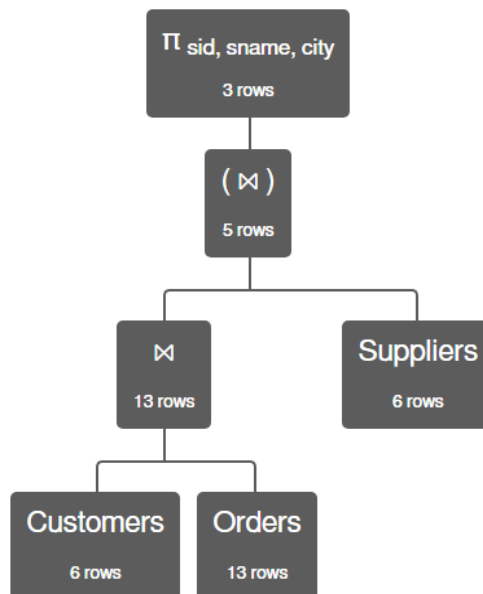
$\pi_{pid, pname} (Parts \bowtie (\pi_{pid} (Catalog) - \pi_{pid} (Orders)))$

4. Find all customers who ordered one of the products that Andy ordered. Return names and cities of those customers and the “pid”’s of the products they ordered.



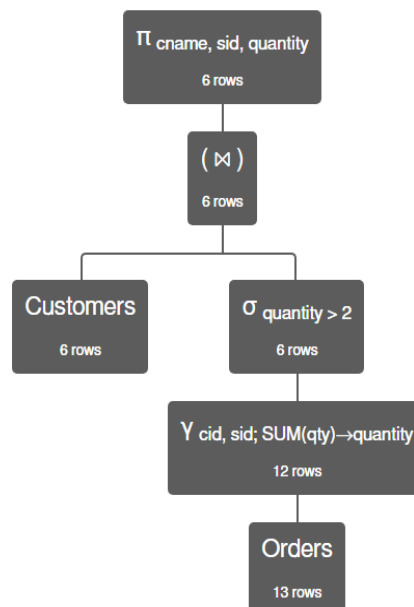
$\pi_{cname1, city1, pid1} (((\rho_{cid1 \leftarrow cid, cname1 \leftarrow cname, city1 \leftarrow city} (Customers)) \bowtie (\rho_{cid1 \leftarrow cid, pid1 \leftarrow pid, sid1 \leftarrow sid, qty1 \leftarrow qty} (Orders))) \bowtie pid1 = pid (Orders \bowtie \sigma_{cname = 'Andy'} (Customers)))$

5. Find the suppliers who have received orders from customers who live in the city where that supplier is located. Return “sid”s, names, and cities of those suppliers.



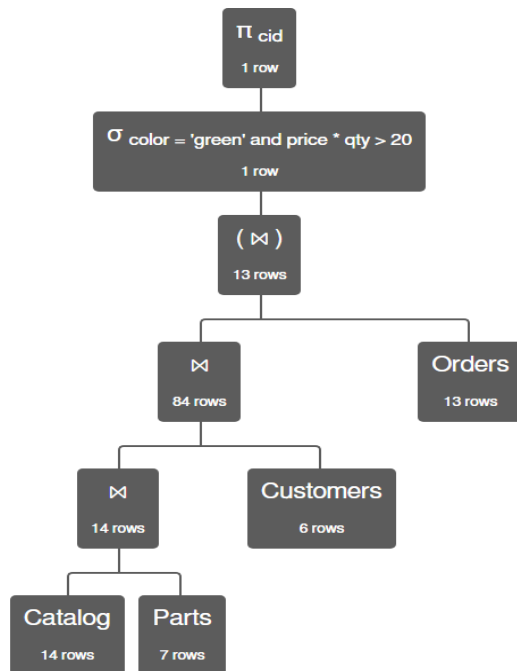
$\Pi_{sid, sname, city} ((Customers \bowtie Orders) \bowtie Suppliers)$

6. Find customers who ordered more than 2 items from a single supplier (i.e., sum of the quantities of all parts customer purchased from the supplier is at least 2) . Return names of the customers, “ sid”s of the suppliers, and number of items they ordered.



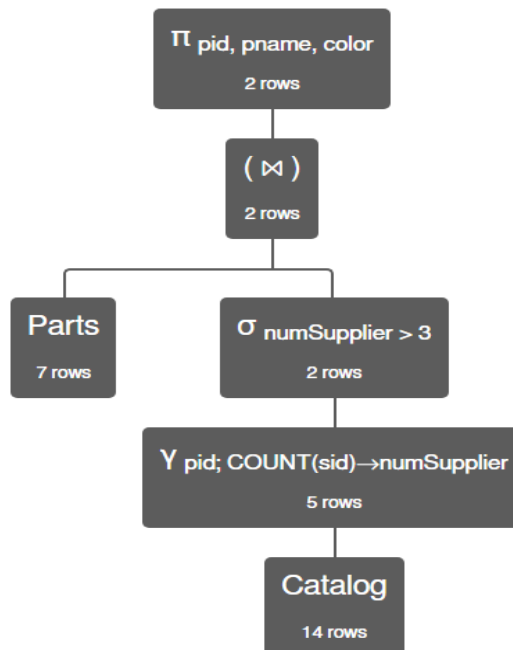
$\Pi_{cname, sid, quantity} (Customers \bowtie \sigma_{quantity > 2} (\Upsilon_{cid, sid; SUM(qty) \rightarrow quantity} (Orders)))$

7. Find the customer “cid”s who paid more than \$20 on ‘green’ parts.



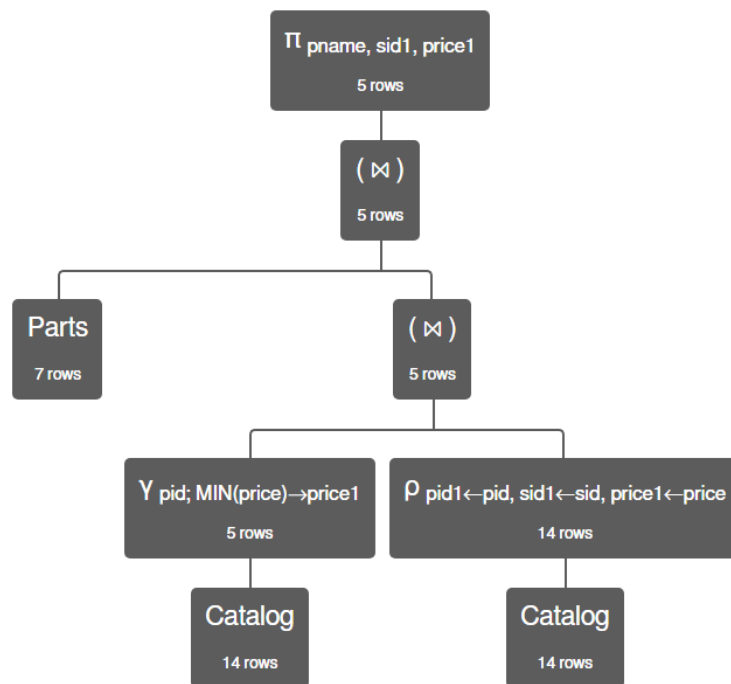
$\pi_{cid} (\sigma_{color = 'green' \text{ and } price * qty > 20} (((Catalog \bowtie Parts) \bowtie Customers) \bowtie Orders))$

8. Find the parts which are supplied by at least 3 different suppliers. Return the “pid”s, names, and colors of those parts.



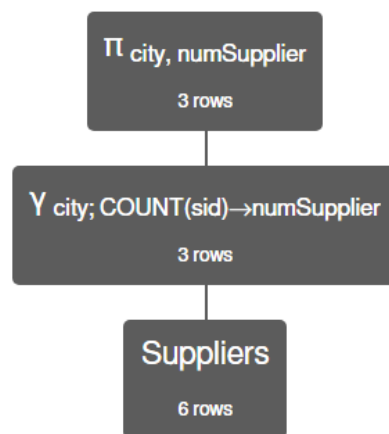
$\pi_{pid, pname, color} (Parts \bowtie (\sigma_{numSupplier > 3} (\gamma_{pid; COUNT(sid) \rightarrow numSupplier} (Catalog))))$

9. For each part in the catalog find the supplier that offers the lowest price; give the part name, supplier “sid” and the price supplier sells the part for.



$\Pi_{\text{pname, sid1, price1}} (\text{Parts} \bowtie (\Upsilon_{\text{pid; MIN(price) \rightarrow price1}} (\text{Catalog}) \bowtie (\rho_{\text{pid1} \leftarrow \text{pid, sid1} \leftarrow \text{sid, price1} \leftarrow \text{price}} (\text{Catalog}))))$

10. Find the number of suppliers in each city.



$\Pi_{\text{city, numSupplier}} (\Upsilon_{\text{city; COUNT(sid) \rightarrow numSupplier}} (\text{Suppliers}))$