Database Management System 13

Query Using Relational Algebra

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Query Using Relational Algebra

Employee Database

Emp(empNo,name)

Project(projectNo,pName,manager)

Assigned_To(projectNo,empNo)

Query: Find empNo of employees working on project 'comp01'

$\pi_{empNo}(\sigma_{projectNo='comp01'}(\text{Assigned\_To}))$

Query: Find details of employees working on project 'comp01'

$\pi_{empNo,name}(\sigma_{projectNo='comp01'}(\text{Emp} \bowtie \text{Assigned\_To}))$

Query: Obtain the details of employees working on the database project

$\pi_{empNo,name}(\sigma_{pName='database'}(\text{Emp} \bowtie \text{Assigned\_To} \bowtie \text{Project}))$

Query Using Relational Algebra...

Query: Find the details of employees working on the 'comp01' and 'comp02' projects

$\pi_{empNo,name}(\sigma_{projectNo='comp01' \wedge projectNo='comp02'}(\text{Emp} \bowtie \text{Assigned\_To}))$

Query: Find the empNo who don't work on project 'comp01'

$\pi_{empNo}(\text{Assigned\_To}) - \pi_{empNo}(\sigma_{projectNo='comp01'}(\text{Assigned\_To}))$

This query can be solved as:

$\pi_{empNo}(\sigma_{projectNo\neq'comp01'}(\text{Assigned\_To}))$

Query Using Relational Algebra...

Sailor Database

Sailors(sid, sname, rating, age)

Boats(bid, bname, color)

Reserves(sid, bid, day)

Query: Find the names of sailors who've reserved boat 105

$\pi_{sname}(\sigma_{bid=105}(\text{Reserves} \bowtie \text{Sailors}))$

This query can also be written as:

$\pi_{sname}(\sigma_{bid=105}(\text{Reserves}) \bowtie \text{Sailors})$

Query: Find the names of sailors who've reserved a green boat

$\pi_{sname}(\sigma_{color='green'}(\text{Boats} \bowtie \text{Reserves} \bowtie \text{Sailors}))$

This query can also be written as:

$\pi_{sname}((\sigma_{color='green'}(\text{Boats})) \bowtie \text{Reserves} \bowtie \text{Sailors})$

Query Using Relational Algebra...

Query: Find the sailor ids of the sailors who've reserved all boats

$\pi_{sid,bid}$ (Reserves) $\div$ π_{bid} (Boats)

Query: Find the names of sailors who've reserved all boats

1. ρ_{Temp} ($\pi_{sid,bid}$ (Reserves) $\div$ π_{bid} (Boats))
2. π_{sname} (Temp $\bowtie$ Sailors)

This query can also be written as:
$\pi_{sname,bid}$ (Sailors $\bowtie$ Reserves) $\div$ π_{bid} (Boats)

Query Using Relational Algebra...

Query: Find the colors of boats reserved by Akash

$\pi_{color}((\sigma_{sname='Akash'}(\text{Sailors})) \bowtie \text{Reserves} \bowtie \text{Boats})$

Query: Find all sailor id's of sailors who have a rating of at least 10 or reserved boat 105

$\pi_{sid}(\sigma_{rating \geq 10}(\text{Sailors})) \cup \pi_{sid}(\sigma_{bid=105}(\text{Reserves}))$

Query: Find the names of sailors who have not reserved a green boat

$\pi_{sname}((\pi_{sid}(\text{Sailors}) - \pi_{sid}(\sigma_{color='green'}(\text{Boats}) \bowtie \text{Reserves})) \bowtie \text{Sailors})$

Query: Find the sailor id's of sailors with age over 20 who have not reserved a green boat

$\pi_{sid}(\sigma_{age>20}(\text{Sailors})) - \pi_{sid}(\sigma_{color='green'}(\text{Boats}) \bowtie \text{Reserves})$

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Query: Find the names of sailors who have reserved at least two boats

$\pi_{sname}(\sigma_{Reserves.sid=Reserves2.sid \wedge Reserves.bid \neq Reserves2.bid}(Reserves \times \rho_{Reserves2}(Reserves)) \bowtie Sailors)$

Query: Find the sailor id's of sailors whose rating is better than some sailor called Bobby

$\pi_{Sailors2.sid}(\sigma_{Sailors2.rating > Sailors.rating}(\rho_{Sailors2}(Sailors) \times \sigma_{sname='Bobby'}(Sailors)))$

Query: Find the sailor id's of sailors whose rating is better than every sailor called Bobby

$\pi_{sid}(Sailors) - \pi_{Sailors2.sid}(\sigma_{Sailors2.rating \leq Sailors.rating}(\rho_{Sailors2}(Sailors) \times \sigma_{sname='Bobby'}(Sailors)))$

Query: Find the sailor id's of sailors with the highest rating

$\pi_{sid}(Sailors) - \pi_{Sailors2.sid}(\sigma_{Sailors2.rating < Sailors.rating}(\rho_{Sailors2}(Sailors) \times (Sailors))$

Query Using Relational Algebra...

Shipment Database

Customer(cust_id, cust_name, annual_revenue)
Truck(truckno, driver_name)
City(city_name, population)
Shipment(shipment_no, cust_id, weight, truckno, destination_city)

Query: Find the list of shipment numbers for shipments weighing over 20 pounds

$\pi_{shipment\_no}(\sigma_{weight>20pound}(\text{Shipment}))$

Query: Find the names of customers with more than $10 million in annual revenue

$\pi_{cust\_name}(\sigma_{annual\_revenue>\$10million}(\text{Customer}))$

Query Using Relational Algebra...

Query: Find the driver of truck 45

$\pi_{driver\_name}(\sigma_{truckno=45}(\text{Truck}))$

Query: Find the names of cities which have received shipments weighing over 100 pounds

$\pi_{destination\_city}(\sigma_{weight>100pounds}(\text{Shipment}))$

Query: Find the name and annual revenue of customers who have sent shipments weighing over 100 pounds

$\pi_{cust\_name,annual\_revenue}(\sigma_{weight>100pounds}(\text{Customer} \bowtie \text{Shipment}))$

Query: Find the truck numbers of trucks which have carried shipments weighing over 100 pounds

$\pi_{truckno}(\sigma_{weight>100pounds}(\text{Shipment}))$

Query Using Relational Algebra...

Query: Find the names of drivers who have delivered shipments weighing over 100 pounds

$\pi_{driver\_name}(\sigma_{weight>100pounds}(\text{Shipment} \bowtie \text{Truck}))$

Query: List the cities which have received shipments from customers having over $15 million in annual revenue

$\pi_{destination\_city}(\sigma_{annual\_revenue>\$15million}(\text{Customer} \bowtie \text{Shipment}))$

Query: List the customers having over $5 million in annual revenue who have sent shipments weighing greater than 1 pound

$\pi_{cust\_name}(\sigma_{annual\_revenue>\$5million}(\text{Customer}) \bowtie \sigma_{weight>1pound}(\text{Shipment}))$

This query can also be written as:

$\pi_{cust\_name}(\sigma_{annual\_revenue>\$5million \wedge weight>1pound}(\text{Customer} \bowtie \text{Shipment}))$

Query Using Relational Algebra...

Query: List the customers whose shipments have been delivered by truck driver Ramesh

$\pi_{\textit{cust\_name}}(\sigma_{\textit{driver\_name}='\textit{Ramesh}'}(\text{Customer} \bowtie \text{Shipment} \bowtie \text{Truck}))$

Query: Find the customers having over $5 million in annual revenue who have sent shipments weighing less than 1 pound or have sent a shipment to Bhubaneswar

$\pi_{\textit{cust\_name}}(\sigma_{\textit{annual\_revenue}>\$5\textit{million}}(\text{Customer}) \bowtie \sigma_{\textit{weight}>1\textit{pound} \vee \textit{destination\_city}='\textit{Bhubaneswar}'}(\text{Shipment}))$

Query: Find the customers who have sent shipments to every city with population over 500000

$\pi_{\textit{cust\_name},\textit{destination\_city}}(\text{Customer} \bowtie \text{Shipment}) \div \pi_{\textit{city}}(\sigma_{\textit{population}>500000}(\text{City}))$

Query Using Relational Algebra...

Query: List the drivers who have delivered shipments for customers with annual revenue over $20 million to cities with population over 1 million

$\pi_{driver\_name}(\sigma_{annual\_revenue>20million}(\text{Customer}) \bowtie \text{Shipment} \bowtie \text{Truck} \bowtie (\sigma_{population>1million}(\text{City})))$

This query can also be written as:

$\pi_{driver\_name}(\sigma_{annual\_revenue>20million \wedge population>1million}(\text{Customer} \bowtie \text{Shipment} \bowtie \text{Truck} \bowtie \text{City}))$

Query: Find the cities which have received shipments from every customer

$\pi_{destination\_city, cust\_id}(\text{Shipment}) \div \pi_{cust\_id}(\text{Customer})$

Query: Find the drivers who have delivered shipments to every city

$\pi_{driver\_name, destination\_city}(\text{Truck} \bowtie \text{Shipment}) \div \pi_{city\_name}(\text{City})$