Assignment #4

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Total Marks: 50 (5% of the Individual Assignments)
Due Date: Oct 7, 14:30

For all questions, use the AdventureWorksLT database.

Question 1) [12 marks] Find the names of customers who have ordered all products in category 'Helmets'. First, write the relational algebra using the basic operations (selection, projection, Cartesian product, set-difference, union), then write the SQL code to perform the division. Hint, both are covered in the slides.

ProductCategory = PC
Product = P
SalesOrderDetail = SOD
SalesOrderHeader = SOH
Customer = C
ProductID = PID
CustomerID = CID

Step 1 Find all PIDs that customers had to purchase, call it *temp1*

$\rho_{temp1}\pi_{PID}\sigma_{PC.Name='Helmet'}P \times \text{PC}$

Step 2 Find all products customers actually purchased, call it *temp2*

$\rho_{temp2}\pi_{CID,PID}C \times \text{SOH} \times \text{SOD}$

Step 3 Assume all customers purchased all products in 'Helmet'

$\pi_{CID,PID}(\text{C} \times temp1)$

Step 4 Find all customer/product <CID,PID> combinations that could have been, but weren't, call it *temp3*

$\rho_{temp3}\pi_{CID,PID}(\text{C} \times temp1) - temp2$

Step 5 Find all customers who did not buy at least one product

$\pi_{CID}temp3$

Step 6 Find all customers who bought all products

π_{Name} (C-$\pi_{CID}temp3$)