4. Let us consider the logical schema of a data mart

\[ \text{Customer} (\text{PkCustPhoneNo, CustName, CustCity}) \]
\[ \text{CallingPlans} (\text{PkPlanId, PlanName}) \]
\[ \text{Calls} (\text{PkCustPhoneNo, FkPlanId, Day, Month, Year, Duration, Charge}) \]

where PkPlanId e PlanName are two different keys, and the following query

\[ \text{Q: SELECT Year, PlanName, SUM(Charge) AS TC FROM Calls, CallingPlans WHERE FkPlanId = PkPlanId AND Year } \geq 2000 \text{ AND Year } \leq 2005 \text{ GROUP BY Year, PlanName HAVING SUM(Charge) } > 1000; \]

(b) (5 points) Show if and how the query can be rewritten using the materialized view

\[ \text{V1: SELECT FkPlanId, Month, Year, SUM(Charge) AS C FROM Calls WHERE Year } \geq 2000 \text{ GROUP BY FkPlanId, Month, Year;} \]
Let us consider the logical schema of a data mart, without null values,

Customers(Phone, CustName, CustCity)
CallingPlans(PlanId, PlanName)
Calls(Phone, PlanId, Day, Month, Year, Duration, Charge)

and the following query

Q: SELECT CustCity, SUM(Charge) AS SC
FROM Calls NATURAL JOIN Customers
AND Year = 2005 AND CustCity IN ('Roma', 'Milano')
GROUP BY CustCity;

2. Show if and how the query $Q$ can be rewritten using the materialized view:

V: SELECT Phone, Year, SUM(Charge) AS SC
FROM Calls NATURAL JOIN Customers
AND CustCity IN ('Roma', 'Milano', 'Firenze', 'Torino')
GROUP BY Phone, Year;
Exercise 3

4. Let us consider the database without null values:

Customer(PKCustomer, CName, CCity)
Order(PKOrder, FKKCustomer, ODate)
Product(PKProduct, PName, PCost)
OrderLine(LineNo, FKOOrder, FKKProduct, Quantity, ExtendedPrice, Discount, Revenue)

and the query

Q: SELECT CCity, AVG(Revenue) AS avgR
   FROM OrderLine, Order, Customer
   WHERE FKOOrder = PKOrder AND FKKCustomer = PKCustomer
   GROUP BY CCity, FKKCustomer
   HAVING SUM(Revenue) > 1000;

(c) (4 points) Show if and how the query Q can be rewritten using the materialized view V

V: SELECT FKKCustomer, SUM(Revenue) AS TR, COUNT(*) AS Cnt
   FROM OrderLine, Order
   WHERE FKOOrder = PKOrder
   GROUP BY FKKCustomer;