

Name : Subhajit Ghimire

Sch Id. : 1912160

Subject : DBMS Tutorial

Date : 25/12/2021

Solve this using Tuple Relational Calculus

Q. Consider the following relational schema of a bank.

Opening : (AccountNumber, OpenDate, OpeningBalance, TotalDeposit,
TotalWithdrawal, ClosingBalance, ClosingBalanceDate,
LastDepositDate, LastWithdrawalDate).

Deposit : (AccountNumber, Date, Amount, Mode)

Withdrawal : (AccountNumber, Date, Amount, Mode)

Account Holder : (Account Number, Name, BuildingNumber,
AreaName, StreetNumber, CityCode,
Pincode, StateCode)

Cities : (CityCode, CityName, StateCode)

State : (State Code, StateName)

Solve the following queries :

a) List of all Account Numbers having zero balance as on November 2021.

→ { O.AccountNumber | Opening(O) \wedge O.ClosingBalance = 0 \wedge O.ClosingBalanceDate = "2021-11-30" }

b) List of all Account Numbers having no transaction as on November 2021.

→ { a.AccountNumber | AccountHolder(a) \wedge $\neg \exists d \exists w$ (Deposit(d) \wedge Withdrawal(w) \wedge a.AccountNumber =

$d.\text{AccountNumber} \wedge d.\text{AccountNumber} = w.\text{AccountNumber} \wedge$
 $d.\text{Date} < "2021-11-30" \wedge d.\text{Date} > "2021-11-01" \wedge$
 $w.\text{Date} < "2021-11-30" \wedge w.\text{Date} > "2021-11-01")})\}$

c) List the names of all customers who have withdrawn an amount of Rs. 20000/- only from their respective accounts on 17th November, 2021.

$\rightarrow \{ a.\text{Name} | \text{AccountHolder}(a) \wedge (\exists w)(\text{Withdrawal}(w) \wedge$
 $a.\text{AccountNumber} = w.\text{AccountNumber} \wedge w.\text{Date} =$
 $"2021-11-25" \wedge w.\text{Amount} = 20000) \}$

d) List the name of all Account Holders from city Silchar who have opened an account on 17th November, 2021 with an amount of Rs. 500/- only.

$\rightarrow \{ a.\text{Name} | \text{AccountHolder}(a) \wedge ((\exists o)(\exists c)(\text{Opening}(o) \wedge$
 $\text{Cities}(c) \wedge a.\text{AccountNumber} = o.\text{AccountNumber} \wedge$
 $a.\text{CityCode} = c.\text{CityCode} \wedge a.\text{openDate} = "2021-11-25"$
 $\wedge a.\text{OpeningBalance} = 500 \wedge c.\text{cityName} = "Silchar")\}$

e) Find the name of the customer having AccountNumber = 10675432 who have withdrawn an amount of Rs. 20000/- from his account on 16th November 2021, but re-deposited an amount of Rs. 5000/- to his account on 17th November, 2021.

$\rightarrow \{ a.\text{Name} | \text{AccountHolder}(a) \wedge a.\text{AccountNumber} = 10675432$
 $\wedge ((\exists w)(\exists d)(\text{Withdrawal}(w) \wedge \text{Deposit}(d) \wedge$
 $w.\text{Account Number} = a.\text{AccountNumber} \wedge d.\text{AccountNumber} =$
 $w.\text{Account Number} \wedge w.\text{Amount} = 20000 \wedge w.\text{Date} =$
 $"2021-11-24" \wedge d.\text{Amount} = 5000 \wedge d.\text{Date} = "2021-11-25")\}$

f) List of all city Names from which there is no Account Holders.

$\rightarrow \{ c.\text{cityName} | \text{Cities}(c) \wedge (\neg((\exists a)(\text{AccountHolder}(a)$
 $\wedge c.\text{CityCode} = a.\text{CityCode}))\}$