

Name: Subhjit Ghimire
Sch Id.: 1912160
Subject: DBMS Tutorial
Date: 17/11/2021

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: (AccountNumber, Name, BuildingNumber, AreaName, StreetNumber, CityCode, Pincode, StateCode)

Cities: (CityCode, CityName, StateCode)

State: (StateCode, StateName)

Express the following queries in Relational Algebra:

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

→ $\pi_{\text{AccountNumber}}(\text{Opening}) \left[\sigma_{\text{ClosingBalance} = 0 \wedge \text{ClosingBalanceDate} = "30-11-2021"} \right]$

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

→ $\pi_{\text{AccountNumber}}(\text{Account Holder}) - \left[\sigma_{\text{Date} < "30-11-2021" \wedge \text{Date} > _} \right]$

"01-11-2021" ($\pi_{\text{AccountNumber}} [\text{Deposit}] \cup \pi_{\text{AccountNumber}} [\text{Withdrawal}]])$

- c) List the names of all customers who have withdrawn an amount of Rs. 20000/- only from their respective accounts on 17th November, 2021.

→ $\pi_{\text{Name}} (\text{Account Holder}) [(\pi_{\text{Withdrawal}.\text{AccountNumber}} (\sigma_{\text{Date} = "17-11-2021" \wedge \text{Amount} = 20000 }) \bowtie (\pi_{\text{AccountNumber}, \text{Name}} (\text{Account Holder}))]$

- 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.

→ $\pi_{\text{Name}} (\text{Account Holder}) [(\pi_{\text{Opening}.\text{AccountNumber}} (\sigma_{\text{openDate} = "17-11-2021" \wedge \text{openingBalance} = 500 }) \bowtie (\pi_{\text{cities.citycode}} (\sigma_{\text{cityName} = "Silchar" })]$

- e) Find the name of the customer having AccountNumber = 10675432 who have withdrawn an amount of Rs. 20000/- from his account on 16th November 2021, but re-deposited an amount of Rs. 5000/- to his account on 17th November, 2021.

→ $\pi_{\text{Name}} (\text{Account Holder}) [(\pi_{\text{Withdrawal}.\text{AccountNumber}} (\sigma_{\text{AccountNumber} = "10675432" \wedge \text{Amount} = 20000 \wedge \text{Date} = "16-11-2021" })) \cap (\pi_{\text{Deposit}.\text{AccountNumber}} (\sigma_{\text{AccountNumber} = "10675432" \wedge \text{Amount} = 5000 \wedge \text{Date} = "17-11-2021" }) \bowtie (\pi_{\text{AccountNumber}, \text{Name}} (\text{Account Holder}) [\sigma_{\text{AccountNumber} = "10675432" }])]$

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

→ $\pi_{\text{cityName}} (\text{Cities}) [\text{cities.citycode} \rightarrow = \text{Account Holder.citycode}]$