

Relational Algebra Questions answer

2013 Spring

2a) consider a relational database:

Employee (emp-name, street, city)

Company (company-name, city)

works (emp-name, company-name, salary)

Manages (emp-name, Manager-name)

i) Find the names and cities of residence of all employee who work for "Nabil Bank"

Temp-name, city ($\sigma_{\text{company-name} = \text{'Nabil Bank'}}$ (Company) \bowtie Employee)

ii) Find the name, street and city of all employee who work for 'Nabil bank' and earn more than 240000/- per annum".

emp-name, street, city ($\sigma_{\text{company-name} = \text{'Nabil Bank'}} \wedge \text{salary} > 240000$) WORKS \bowtie Employee)

iii) Modify the db now "Kiran" likes lives in "Kathmandu"

Employee $\leftarrow \pi_{\text{emp-name}, \text{street}, \text{city}} \text{('Kathmandu')}$

($\sigma_{\text{emp-name} = \text{'Kiran'}} (\text{Employee}) \cup$)

($\sigma_{\text{emp-name} \neq \text{'Kiran'}} (\text{Employee})$)

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iv) Give all employee of Nabil bank 10% salary rise.

WORKSIS $\leftarrow \pi_{\text{emp-name}, \text{company-name}, \text{salary} \times 1}$
 $(\text{G}_{\text{company-name} = \text{Nabilbank}} \text{ (WORKIS)}) \cup$
 $(\text{G}_{\text{company-name} \neq \text{Nabilbank}} \text{ (WORKIS)})$

2014 spring

consider the following relational db.

Employee (person-name, street, city)

works (person-name, bank-name, salary)

Bank (bank-name, city)

Manages (person-name, manager-name)

i) Find the total salary sum of all the banks.

$\sum_{\text{WORKS}} (\text{sum}(\text{salary}))$

ii) modify the database so that Ram now lives in Kathmandu.

Employee $\leftarrow \pi_{\text{person-name}, \text{street}, \text{city} = \text{Kathmandu}}$

$(\text{G}_{\text{person-name} = \text{Ram}} \text{ (employee)}) \cup$

$(\text{G}_{\text{person-name} \neq \text{Ram}} \text{ (employee)})$

- iii) Find the street address, name cities of all employee who work for Nepal World bank corporation and earn more than \$ 10,000 per annum.

$\Pi_{\text{person-name}, \text{street}, \text{city}} \left(\begin{array}{l} \sigma_{\text{bank-name} = \text{'Nepal world bank'}} \\ (\text{works} \bowtie \text{employee}) \\ \wedge \text{salary} > 10000 \end{array} \right)$

- iv) Delete all tuples in works relation for employee of small Bank corporation.

$\text{works} \leftarrow \text{works} - \left(\begin{array}{l} \sigma_{\text{ban-name} = \text{'small Bank corporation'}} \\ (\text{works}) \end{array} \right)$

2015 Fall

Consider a relational db. 2014 Spring same question.

- i) Find the names of all employees who work for Nepal Rastra bank and salary greater than \$10,000

$\Pi_{\text{person-name}} \left(\begin{array}{l} \sigma_{\text{bank-name} = \text{'Nepal Rastra bank'}} \\ (\text{employee} \bowtie \text{works}) \\ \wedge \text{salary} > 10000 \end{array} \right)$

- ii) Find names and cities of residence of all employees who work for Nepal Rastra Bank.

$\Pi_{\text{person-name}, \text{city}} \left(\begin{array}{l} \sigma_{\text{bank-name} = \text{'Nepal Rastra bank'}} \\ (\text{employee} \bowtie \text{works}) \end{array} \right)$

iii) Find the names of all employees in this db who live in the same city as the company for which they work.

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$\pi_{\text{person-name}} \left(\begin{array}{l} (\text{Employee} \bowtie \text{works}) \\ (\text{Employee} \cdot \text{city} = \text{bank} \cdot \text{city}) \\ \forall \text{Banks} \end{array} \right)$

iv) Give all the employee of Firstbank corporation a 10% salary rise.

$\text{WORKS} \leftarrow \pi_{\text{person-name}, \text{bank-name}, \text{salary} * 1.1}$

$\left(\begin{array}{l} (\text{works}) \\ (\text{bankname} = \text{Firstbank}) \end{array} \right) \cup$

$\left(\begin{array}{l} (\text{works}) \\ (\text{bank-name} \neq \text{Firstbank}) \end{array} \right)$

2016 Fall

(a) Student (CRN, Name, Gender, Address, Telephone)
course (courseID, courseName, Hour, TeacherID)
Teacher (Teacher, TeacherName, office)
Registration (CRN, courseID, Date)

i) Count the number of student registered subject in year 2015 gender wise.

$\pi_{\text{Gender}} \left(\begin{array}{l} \text{Count}(\text{CRN}) \\ \text{Student} \end{array} \right)$

ii) Show student details taught by teacher Rohit Shrestha

Teacher (Teacher Name =
 Teacher → course → Registration
 (Teacher Name = Rohit Shrestha)
 (Student → Student))

iii) Delete Student information taught by teacher N. Mathema.

Student ← Student - (Teacher Name = N. Mathema)

Q 2016 - Spring

Branch (branch-name, branch-city, assets)

Account (account-number, branch-name, balance)
 Customer (customer-id, customer-name, customer-street, customer-city)

Depositor (customer-id, account-name)

Loan (loan-number, branch-name, amount)

Borrow (customer-id, loan-number)

Write RA.

i) Find all customer either account or loan.

 $\pi_{\text{customer-id}} \text{ (Borrow)}$
 $\cup \pi_{\text{customer-id}} \text{ (Depositor)}$

ii) List the name and city of customer who have their account at the branch location 'Butwal'.

 $\pi_{\text{customer-name}, \text{customer-city}} \text{ (customer)} \left(\text{customer-city} = \text{Butwal} \right)$

iii) Delete all account in the branch "B1"

 $\text{Account} \leftarrow \text{Account} - \left(\text{branch-name} = \text{B1} \right) \text{ (account)}$

iv) Increase balance by 5% to all branches.

 $\text{balance} \leftarrow \pi_{\text{account-number}, \text{branch-name}, \text{balance} * 1.05}$

v) Find all customer who have an account from at least the 'downtown' and the 'uptown' branches.

 $\pi_{\text{customer-id}} \left(\begin{array}{l} \text{branch-name} = \text{downtown} \\ \text{branch-name} = \text{uptown} \end{array} \right) \text{ ((Account \bowtie loan) \bowtie Borrow) }$

2017 Fall

2a) Consider a Relational Algebra.

employee (person-name, street, city)

works (person-name, company-name, salary)

company (company-name, city)

Manages (person-name, Manager-name)

- a) Find the name of all employee who earns more than ^{every employee} managers and works at small bank.

$$\pi_{\text{person-name}} - (\pi_{\text{works}} \cdot \text{person-name})$$

$$\pi_{\text{works}} \bowtie (\text{works} \cdot \text{salary} \leq \text{works}_2 \cdot \text{salary} \wedge \text{works}_2 \cdot \text{company-name} = \text{small bank}) \quad \pi_{\text{works}_2} (\text{works}))$$

- b) Find the names of all employees who lives in the same city and on the same street as their manager.

$$\pi_{\text{person-name}} ((\text{employee} \bowtie \text{manages}))$$

$$\text{manager-name} = \text{employee}_2 \cdot \text{person-name} \wedge$$

$$\text{employee} \cdot \text{street} = \text{employee}_2 \cdot \text{street} \wedge$$

$$\text{employee} \cdot \text{city} = \text{employee}_2 \cdot \text{city} \quad (\rho_{\text{employee}_2} (\text{employee}))$$

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c) Find the names of all employees in the db who do not work for NBL company.

$\pi_{\text{person-name}} (\sigma_{(\text{company-name} \neq \text{NBL company})} (\text{works}))$

If question is, If people may not work for any company than.

$\pi_{\text{person-name}} (\text{employee}) - \pi_{\text{person-name}}$

$(\sigma_{(\text{company-name} = \text{Fin+bank})} (\text{works}))$

d) Find the names of all employees in the database who earns more than the top earner at NBL company in the db. same as q no 9)

2018-Fall

Department (DepartmentID, DepartmentName)

Designation (DesignationID, DesignationName, salary)

Employee (EmpID, EmpName, Gender, DesignationID,
DepartmentID)

Allowance (AllowanceID, AllowanceName)

Allowance-Details (DetailID, EmpID, AllowanceID,
Amount)

i) Find the number of employees department-wise.

DepartName
Count (DepartmentID)

(Department)

ii) List the employee details whose total salary is
above RS 50000
$$\begin{array}{l} \text{EmpID, EmpName, Gender, DesignationID, DepartmentID} \\ \text{Designation} \bowtie \text{Employee} \\ \text{6 Salary} > 50000 \end{array}$$

iii) List the employee those who are getting house allowance.

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Tempname ($\sigma_{\text{AllowanceName} = \text{house allowance}}$ (Allowance \bowtie Allowance_Details) \bowtie Employee)
2018 Spring

Q) Consider the relational database

Users (uid, crame, city)

Items (itemid, itemname, city, quantity, price)

Manager (mid, aname, city)

Query (qnyno, uid, mid, itemid, qny-details, hitratio)

i) Find all (qnyno, uid) pairs for query with hitratio value greater than 500.

T_{qnyno, uid} ($\sigma_{\text{hitratio} > 500}$ (query))

ii) Find all item names of items in pokhara ordered with qny-details as pokhara-details.

(query \bowtie Items)

T_{itemname} ($\sigma_{\text{city} = \text{pokhara}} \wedge \text{qnydetails} = \text{pokhara-details}$)

iii) Find itemids of items ordered through Manager 35 but not through manager 27.

Itemid ($\text{Mid} = '35'$) \cap (Query on Items) \cup Itemid ($\text{Mid} \neq '27'$) \cap (Query on Items)

Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11 Q12 Q13 Q14 Q15 Q16 Q17 Q18 Q19 Q20 Q21 Q22 Q23 Q24 Q25 Q26 Q27 Q28 Q29 Q30 Q31 Q32 Q33 Q34 Q35 Q36 Q37 Q38 Q39 Q40 Q41 Q42 Q43 Q44 Q45 Q46 Q47 Q48 Q49 Q50 Q51 Q52 Q53 Q54 Q55 Q56 Q57 Q58 Q59 Q60 Q61 Q62 Q63 Q64 Q65 Q66 Q67 Q68 Q69 Q70 Q71 Q72 Q73 Q74 Q75 Q76 Q77 Q78 Q79 Q80 Q81 Q82 Q83 Q84 Q85 Q86 Q87 Q88 Q89 Q90 Q91 Q92 Q93 Q94 Q95 Q96 Q97 Q98 Q99 Q100

b) Doctors (DoctorID, DoctorName, Department, Address, Salary)

Patients (PatientID, PatientName, Address, Age, Gender)

Hospitals (PatientID, DoctorID, HospitalName, Location)

It's SQL question //

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Project (ProjectNum, ProjectName, ProjectType,
ProjectManager)

Employee (EmpName, EmpNum)

Assigned - TO (ProjectNum, EmpNum)

i) Find Employee details working on a project name starts
with 'L'.

$\pi_{EmpName, EmpNum} (\exists ProjectName = \text{like}(L\%))$
(Project \bowtie Assigned-to
 \bowtie Employee)

ii) List the employee details who are working under
Project Manager 'Rohan'

$\pi_{EmpNum, EmpName} (\exists ProjectManager = \text{Rohan})$
Project \bowtie Assigned-to (Employee)

iii) $\pi_{EmpName}$ (Employee) - $\pi_{EmpName}$ (Employee \bowtie Assigned-to)

List the employees who are still not assigned
with any project.

iv) $\pi_{EmpName, EmpNo} (\exists Employee.EmpNum = \text{AssignedTo.EmpNum})$
(Employee \bowtie Assigned-to)
($\exists \text{Count} (\text{Assigned-to-projectNum}) > 1$)
Assigned-to

\Rightarrow List Emp details who work for more than one project.