CMPT 354 Assignment 2

Junchen Li

301385486

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Part 1 - A Professorial ERD to Tables

```
CREATE TABLE Research paper (
title           CHAR (40),
field           CHAR (10),
employeeID      CHAR (9),
billing         INTEGER,
FOREIGN KEY (employeeID) REFERENCES Professor
PRIMARY KEY (title)   )

CREATE TABLE Professor (
employeeID      CHAR (9),
name            CHAR (40 ) NOT NULL,
tenureDeadline  DATETIME,
biling          INTEGER,
title           CHAR (40),
FOREIGN KEY (title) REFERENCES Research paper
PRIMARY KEY(employeeID)   )

CREATE TABLE conference (
conYear         INTEGER,
conName         CHAR (40),
attendance      INTEGER,
location        CHAR (40),
title           CHAR (40),
employeeID      CHAR (9),
FOREIGN KEY (employeeID) REFERENCES Professor
FOREIGN KEY (title) REFERENCES Research paper
```

```
PRIMARY KEY ((conYear, conName)    )


CREATE TABLE Course(
course Number    INTEGER,
department       CHAR (4),
termID           CHAR (9),
capacity         INTEGER,
year             INTEGER,
pay              REAL,
employeeID       CHAR (9),
studentID        CHAR (9),
FOREIGN KEY (employeeID) REFERENCES Professor
FOREIGN KEY (studentID) REFERENCES TA
PRIMARY KEY((course Number, department, termID) )    )

CREATE TABLE TA(
studentID        CHAR (9),
name             CHAR (40) NOT NULL,
pay              REAL,
course Number    INTEGER,
department       CHAR (4),
termID           CHAR (9),
FOREIGN KEY ((course Number, department, termID) ) REFERENCES Course
PRIMARY KEY (studentID)     )
```

CREATE TABLE Grade(

email CHAR (20),

studentName CHAR (40),

finalGrade CHAR (2),

course Number INTEGER,

department CHAR (4)

termID CHAR (9)

CONSTRAINT unique_email UNIQUE (email),

FOREIGN KEY((course Number, department, termID)) REFERENCES Course ON DELETE CASCADE,

PRIMARY KEY (email))

Part 2 - Relational Algebra Queries

1. π firstName, lastName (σ birthDate < 1994. 5. 1 $\wedge$ income (customer) >=94000)
2. π customer ID, lastName, birthDate ((σ budget > 2300000 $\wedge$ Account.accNumber = owns.accNumber $\wedge$ customer.customerID = owns.customerID (customer x Owns x Account))
3. π SIN, firstName, lastName, startDate (σ Branch.managerSIN = PersonalBanker.SIN(Employee $\bowtie$ PersonalBanker x Branch))
4. π customerID, accNumber (σ Owns.accNumber = temp.accNumber $\wedge$ Owns.SIN != temo.SIN(Owns $\bowtie$ ρ temp(Owns))
5. π Employee.SIN, Employee.salary (σ Employee.salary > manager.salary $\wedge$ employee.branchNumber = manager.branchNumber (Employee x (Employee $\bowtie$ Employee.SIN = Branch.managerSIN(Branch $\bowtie$ Employee))))
6. π branchName (Branch.branchNumber = Employee.branchNumber (σ Employee.lastName = “Carson” (π lastName, branchName (Employee) $\wedge$ σ Employee.lastName = “Wilson” (π lastName, branchName (Employee $\bowtie$ Branch)))))

7. π firstName, lastName, birthdate (σbranchName = “Lonsdale” (Customer $\bowtie$ Owns $\bowtie$ Account $\bowtie$ Branch) $\vee$ π firstName, lastName, StartDate (σ branchName = “Lonsdale” (Employee x Branch)))
8. π customerID, birthDate (σbranchName = “Kitsilano” $\wedge$ Employee.branchNumber = Branch.branchNumber $\wedge$ PersonalBanker.customerID = Customer.customerID $\wedge$ PersonalBanker.SIN = Employee.SIN(Employee $\bowtie$ Branch $\bowtie$ PersonalBanker $\bowtie$ Customer) $\wedge$ π customerID, birthDate (σ branchName = “Marine” $\wedge$ Employee.branchNumber = Branch.branchNumber $\wedge$ PersonalBanker.SIN = Employee.SIN(Employee $\bowtie$ Branch $\bowtie$ PersonalBanker $\bowtie$ Customer))
9. π customerID (Owns) – π customerID (σ amount $\geq$20000 $\cup$ amount $\leq$ -20000 (Owns $\bowtie$Transactions))
10. π customerID, customer.incomes (σ type = “chequing” $\wedge$ Customer.customerID = Owns.customerID $\wedge$ Account.accNumber = Own.accNumber (Customer x Account x Owns) || σ type = “saving” $\wedge$ Customer.customerID = Own.customerID $\wedge$ Account.accNumber = Owns.accNumber(Customer x Account x Owns))
11. π SIN, firstName, lastName (σ Customer.firstName = Employee.firstName $\wedge$ Customer.lastName = Employee.lastName $\wedge$ Branch.branchNumber = Employee.branchNumber (Customer $\bowtie$ Employee $\bowtie$ Branch)

Answer: No this query can not exactly match the desired data because of there would be some people who have the same name however, they can have different SINs number.

12. {T.firstName, T.lastName | T $\in$ (Customer $\wedge$ T.birthDate < 1994.5.1 $\wedge$ T.income > 94000) }
13. {J.SIN, J.firstName, J.lastName, J.startDate | $\exists$j $\in$ PersonalBanker (S,SIN = j.SIN) $\wedge$ $\exists$k $\in$ Branch(k.managerSIN = j.SIN) }