



National University of Computer & Emerging Sciences, Karachi
Assignment 1/5
CS 2005 Database Systems



SOLUTION

Note: Consider the database state in Figure 1 (given below) for the following questions.

Question #01: Identify all possible Candidate Keys (except primary keys) in the given schema, stating any assumptions you make.

ANSWER: FREE RESPONSE, some examples could be:

- Telephone Number (*tel-no*) and Email(*email*) in *Client* Table if kept UNIQUE
- Post Code (*postCode*) in *Branch* table
- Post Code (*postCode*) in *propertyForRent* table

....

Question #02: Identify all the FOREIGN KEYS present in the given schema, stating any assumptions you make.

ANSWER:

1. *branchNo* in *Staff* table, reference *Branch*
2. *ownerNo* in *propertyForRent* table, reference *privateOwner*
3. *staffNo* in *propertyForRent* table, reference *Staff*
4. *branchNo* in *propertyForRent* table, reference *Branch*
5. *clientNo* in *Viewing* table, reference *Slient*
6. *propertyNo* in *Viewing*, reference *propertyForRent*
7. *clientNo* in *Registration*, reference *Client*
8. *branchNo* in *Registration*, reference *Branch*
9. *staffNo* in *Registration*, reference *Staff*

Question #03: Suppose that each of the following Update operations is applied directly to the database state shown in figure 1, discuss all constraints violated by each operation, if any?

- Insert <SA9, 'Scott', 'Jeff', 'Clerk', 1, '1977-10-01', 58000, B007> into STAFF

ANSWER: PK can't be duplicated (PK constraint violation), domain constraint violation, 'missing for character data (B007)

- Insert <CR56, "", '1990-12-07'> into REGISTRATION

ANSWER: NOT NULL violation.

- Delete the Branch tuple with branchNo = 'B002'

ANSWER: No Violations

- Delete the PrivateOwner tuple with the Name = 'Tony Shaw'
ANSWER: FK Violation, his ownerNo (C093) is referenced in *propertyForRent* table.
- Modify the clientNo of the VIEWING tuple with clientNo = 'CR62' to 'CR97'
ANSWER: FK Violation
- Modify the propertyNo attribute of the PropertyForRent tuple with propertyNo = 'PA14' to 'PA16'
ANSWER: PA16 doesn't exist in parent table (FK Violation).
- Modify the branchNo attribute of the PropertyForRent tuple with branchNo = 'B007' to NULL
ANSWER: No Violations

Question #04: Write appropriate SQL DDL statements to define each of the following tables in the database with the specified additional constraints. The defined statements should execute the constraint efficiently when updates are applied to the database.

Staff

No staff member should be older than 60 years as of today's date

Salary must remain in between 9000 to 30000

Every attribute of staff must have some valid value

CREATE TABLE staff (

```

    staffNo    VARCHAR(5)      NOT NULL,
    fName      VARCHAR(15)     NOT NULL,
    lName      VARCHAR(15)     NOT NULL,
    position   VARCHAR(15)     NOT NULL,
    sex        CHAR(1)         NOT NULL,
    DOB        DATE            NOT NULL CHECK (DOB > '01-OCT-1961' AND DOB
    < '01-OCT-2021'),
    salary     DECIMAL(7,2)     NOT NULL   CHECK (salary >= 9000
    AND salary <=30000),
    branchNo   VARCHAR(6)      DEFAULT 'B0001',

```

```

CONSTRAINT PK_staffNo PRIMARY KEY (staffNo),
CONSTRAINT FK_branchNo FOREIGN KEY (branchNo) REFERENCES
Branch(branchNo) ON DELETE SET DEFAULT ON UPDATE CASCADE);

```

PropertyForRent

‘House’ should be the default type for any property.

A property must at least have 3 rooms

```
CREATE TABLE propertyForRent(  
    propertyNo    VARCHAR(6)        NOT NULL,  
    street        VARCHAR(30)       NOT NULL,  
    city          VARCHAR(15)       NOT NULL,  
    postcode      VARCHAR(15)       NOT NULL,  
    type          VARCHAR(10)       DEFAULT 'House',  
    rooms         INT(2)            NOT NULL CHECK (rooms >= 3),  
    rent          DECIMAL(4,2)      NOT NULL,  
    ownerNo       VARCHAR(5)        NOT NULL,  
    staffNo       VARCHAR(5),  
    branchNo      VARCHAR(6) NOT NULL,  
  
    CONSTRAINT PK_propertyNo PRIMARY KEY (propertyNo),  
    CONSTRAINT FK_ownerNo    FOREIGN KEY(ownerNo) REFERENCES  
privateOwner(ownerNo) ON DELETE SET DEFAULT ON UPDATE CASCADE,  
    CONSTRAINT FK_staffNo    FOREIGN KEY(staffNo) REFERENCES  
staff(staffNo) ON DELETE SET DEFAULT ON UPDATE CASCADE,  
    CONSTRAINT FK_branchNo   FOREIGN KEY(branchNo) REFERENCES  
branch(branchNo) ON DELETE SET DEFAULT ON UPDATE CASCADE );
```

PrivateOwner

telNo must be DISTINCT for every Owner

eMail must be DISTINCT for every Owner

```
CREATE TABLE privateOwner(  
    ownerNo    VARCHAR(6),  
    fname      VARCHAR(15) NOT NULL,  
    lname      VARCHAR(15) NOT NULL,  
    address    VARCHAR(50) NOT NULL,  
    telNo      VARCHAR(15) NOT NULL UNIQUE,  
    eMail      VARCHAR(20) NOT NULL UNIQUE,  
    password   CHAR(8)     NOT NULL,  
  
    CONSTRAINT PK_ownerNo PRIMARY KEY(ownerNo));
```

Viewing

```
CREATE TABLE Viewing (  
    clientNo    VARCHAR(6),  
    propertyNo  VARCHAR(6),  
    viewDate    VARCHAR(15)    NOT NULL,  
    commen      VARCHAR(50),  
    CONSTRAINT PK_Viewing PRIMARY KEY(clientNo, branchNo),  
    CONSTRAINT FK_clientNo FOREIGN KEY(clientNo) REFERENCES  
        registration(clientNo) ON DELETE CASCADE ON UPDATE CASCADE,  
    CONSTRAINT FK_propertyNo FOREIGN KEY(propertyNo) REFERENCES  
        propertyForRent(clientNo) ON DELETE CASCADE ON UPDATE CASCADE);
```

Question #05: Write SQL Queries for each of the following:

- a) Make a list of all property numbers for properties that involve a Female Staff member.

```
SELECT P.propertyNo  
FROM   propertyForRent P, staff S  
WHERE  P.branchNo = S.branchNo AND S.sex = 'F'
```

- b) Retrieve all privateOwners who own a 'House'

```
SELECT PO.*, PR.type  
FROM   privateOwner PO, propertyForRent PR  
WHERE  PO.ownerNo = PR.ownerNo AND PR.type = 'House'
```

- c) Show the resulting salaries if every staff member working in 'London' is given a 15% raise

```
SELECT s.staffNo, s.fname, s.lname, s.salary,  
       (s.salary+s.salary*0.15) AS IncreasedSalary, b.city  
FROM   staff S, branch B  
WHERE  S.branchNo = B.branchNo AND b.city = 'London'
```

- d) Retrieve all the properties which were viewed in 'May 2013'

```
SELECT P.*, V.viewDate  
FROM   propertyForRent P, viewing V  
WHERE  P.propertyNo = V.propertyNo AND V.viewDate LIKE '%MAY%13'
```

- e) Retrieve all the staff members whose first name starts with 'D' or last name starts with 'W'

```
SELECT *  
FROM   staff  
WHERE  fname LIKE 'D%' OR lname LIKE 'W%'
```

Branch

branchNo	street	city	postcode
B005	22 Deer Rd	London	SW1 4EH
B007	16 Argyll St	Aberdeen	AB2 3SU
B003	163 Main St	Glasgow	G11 9QX
B004	32 Manse Rd	Bristol	BS99 1NZ
B002	56 Clover Dr	London	NW10 6EU

Staff

staffNo	fName	lName	position	sex	DOB	salary	branchNo
SL21	John	White	Manager	M	1-Oct-45	30000	B005
SG37	Ann	Beech	Assistant	F	10-Nov-60	12000	B003
SG14	David	Ford	Supervisor	M	24-Mar-58	18000	B003
SA9	Mary	Howe	Assistant	F	19-Feb-70	9000	B007
SG5	Susan	Brand	Manager	F	3-Jun-40	24000	B003
SL41	Julie	Lee	Assistant	F	13-Jun-65	9000	B005

PropertyForRent

propertyNo	street	city	postcode	type	rooms	rent	ownerNo	staffNo	branchNo
PA14	16 Holhead	Aberdeen	AB7 5SU	House	6	650	CO46	SA9	B007
PL94	6 Argyll St	London	NW2	Flat	4	400	CO87	SL41	B005
PG4	6 Lawrence St	Glasgow	G11 9QX	Flat	3	350	CO40		B003
PG36	2 Manor Rd	Glasgow	G32 4QX	Flat	3	375	CO93	SG37	B003
PG21	18 Dale Rd	Glasgow	G12	House	5	600	CO87	SG37	B003
PG16	5 Novar Dr	Glasgow	G12 9AX	Flat	4	450	CO93	SG14	B003

Client

clientNo	fName	lName	telNo	prefType	maxRent	eMail
CR76	John	Kay	0207-774-5632	Flat	425	john.kay@gmail.com
CR56	Aline	Stewart	0141-848-1825	Flat	350	astewart@hotmail.com
CR74	Mike	Ritchie	01475-392178	House	750	mr Ritchie01@yahoo.co.uk
CR62	Mary	Tregear	01224-196720	Flat	600	maryt@hotmail.co.uk

PrivateOwner

ownerNo	fName	lName	address	telNo	eMail	password
CO46	Joe	Keogh	2 Fergus Dr, Aberdeen AB2 7SX	01224-861212	jkeogh@lhh.com	*****
CO87	Carol	Farrel	6 Achray St, Glasgow G32 9DX	0141-357-7419	cfarrel@gmail.com	*****
CO40	Tina	Murphy	63 Well St, Glasgow G42	0141-943-1728	tinam@hotmail.com	*****
CO93	Tony	Shaw	12 Park Pl, Glasgow G4 0QR	0141-225-7025	tony.shaw@ark.com	*****

Viewing

clientNo	propertyNo	viewDate	comment
CR56	PA14	24-May-13	too small
CR76	PG4	20-Apr-13	too remote
CR56	PG4	26-May-13	
CR62	PA14	14-May-13	no dining room
CR56	PG36	28-Apr-13	

Registration

clientNo	branchNo	staffNo	dateJoined
CR76	B005	SL41	2-Jan-13
CR56	B003	SG37	11-Apr-12
CR74	B003	SG37	16-Nov-11
CR62	B007	SA9	7-Mar-12

Figure 1

Branch (branchNo, street, city, postcode)

Staff (staffNo, fName, IName, position, sex, DOB, salary, branchNo)

PropertyForRent (propertyNo, street, city, postcode, type, rooms, rent, ownerNo,
staffNo, branchNo)

Client (clientNo, fName, IName, telNo, prefType, maxRent, eMail)

PrivateOwner (ownerNo, fName, IName, address, telNo, eMail, password)

Viewing (clientNo, propertyNo, viewDate, comment)

Registration (clientNo, branchNo, staffNo, dateJoined)