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CSC 423 Database Systems

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Pawsome Pets: Design, Development, and Implementation of a Relational Database Pt. 3

I. INTRODUCTION

As part of the University of Miami's Fall 2022 CSC 423 Database Systems course with Dr. Vanessa Aguiar-Pulido, students are tasked with designing and creating a relational database for the case study provided:

Case Study: Pawsome Pets

A company called Pawsome Pets runs multiple clinics. The company would like for their data to be stored in a database. The following description was obtained during the analysis phase:

"Each of the Pawsome Pets clinics has several staff members and a member of staff manages at most one clinic (not all staff manage clinics). Each clinic has a unique clinic number (clinicNo) and each member of staff has a unique staff number (staffNo). Additionally, the company would like to store each clinic's name, address and telephone number, as well as the staff's name, address, telephone number, DOB, position and salary.

When a pet owner contacts a clinic, the owner's pet is registered with the clinic. An owner can own one or more pets, but a pet can only be registered at one clinic. Each owner has a unique owner number (ownerNo), a name, an address, and a telephone number. Each pet has a unique pet number (petNo), name, DOB, animal species, breed, and color.

When the pet comes to the clinic, it undergoes an examination by a member of the consulting staff. The database should store the following information for each examination: chief complaint (i.e., the main cause for the visit), description (i.e., what was done during the examination), date seen, and actions taken (e.g., a treatment was prescribed, tests were ordered). A unique examination number (examNo) is assigned to each examination."

The project is divided into three parts, each constituting a piece of the overall design, development, and implementation process for creating the relational database. The following report is the third and final part of this project: implementing the database schema with all specified constraints.

The database was created using SQLite. All the code for its development, as well as all the reports written for this project, can be found in the following GitHub repository: https://github.com/Spera02/Database-Project.git

II. IMPLEMENTATION

The implementation of the database was achieved through the steps listed below. Note that any mention to the previous report is referring to the Part 2 – Logical Model document.

a. Develop SQL code to create the entire database schema, reflecting the constraints identified in the previous report.

Listed below is the SQL code to create each relation/table in the schema. All tables are empty at this point; their inserted contents can be seen in the next step.

a. For **Clinic**,

```
CREATE TABLE Clinic(
   clinicNo VARCHAR(5) UNIQUE NOT NULL,
   name VARCHAR(250) NOT NULL,
   address VARCHAR(250) NOT NULL,
   telephoneNumber INT UNIQUE NOT NULL
      CONSTRAINT validClinicPhone
         CHECK (telephoneNumber BETWEEN 100000000 AND
          9999999999),
   PRIMARY KEY (clinicNo)
);
```

The foreign key for this relation is then specified after the Staff table is created.

```
ALTER TABLE Clinic
ADD COLUMN staffNo INT
REFERENCES Staff(staffNo) ON UPDATE CASCADE ON DELETE
CASCADE;
```

b. For **Staff**,

```
CREATE TABLE Staff(
   staffNo VARCHAR(4) UNIQUE NOT NULL,
```

```
    clinicNo INT NOT NULL,
    name VARCHAR(250) NOT NULL,
    address VARCHAR(250) NOT NULL,
    telephoneNumber INT UNIQUE NOT NULL
        CONSTRAINT validStaffPhone
            CHECK (telephoneNumber BETWEEN 1000000000 AND
             9999999999),
    DOB DATE NOT NULL
        CONSTRAINT validStaffDOB
            CHECK (DOB < date('now')),
    position VARCHAR(250) NOT NULL,
    salary INT NOT NULL,
    PRIMARY KEY (staffNo),
    FOREIGN KEY (clinicNo) REFERENCES Clinic(clinicNo) ON
    UPDATE CASCADE
);
```

c. For **Owner**,

```
CREATE TABLE Owner(
    ownerNo VARCHAR(5) UNIQUE NOT NULL,
    name VARCHAR(5) NOT NULL,
    address VARCHAR(5) NOT NULL,
    telephoneNumber INT UNIQUE NOT NULL
        CONSTRAINT validOwnerPhone
            CHECK (telephoneNumber BETWEEN 1000000000 AND
             9999999999),
    PRIMARY KEY (ownerNo)
);
```

d. For **Pet**,

```
CREATE TABLE Pet(
    petNo VARCHAR(4) UNIQUE NOT NULL,
    ownerNo VARCHAR(5) NOT NULL,
    clinicNo VARCHAR(5) NOT NULL,
```

```
    name VARCHAR(250),
    DOB DATE NOT NULL
        CONSTRAINT validPetDOB
            CHECK (DOB < date('now')),
    species VARCHAR(250) NOT NULL,
    breed VARCHAR(50) NOT NULL,
    color VARCHAR(50) NOT NULL,
    PRIMARY KEY (petNo),
    FOREIGN KEY (ownerNo) REFERENCES Owner(ownerNo) ON
    UPDATE CASCADE ON DELETE SET NULL,
    FOREIGN KEY (clinicNo) REFERENCES Clinic(clinicNo) ON
    UPDATE CASCADE
);
```

e. For **Examination**,

```
CREATE TABLE Examination(
    examNo VARCHAR(4) UNIQUE NOT NULL,
    staffNo VARCHAR(4) NOT NULL,
    petNo VARCHAR(4) NOT NULL,
    chiefComplaint VARCHAR(250) NOT NULL,
    description VARCHAR(250) NOT NULL,
    dateSeen DATE NOT NULL
        CONSTRAINT validExamDate
            CHECK (dateSeen <= date('now')),
    actionsTaken VARCHAR(250),
    PRIMARY KEY (examNo),
    FOREIGN KEY (staffNo) REFERENCES Staff(staffNo) ON
    UPDATE CASCADE,
    FOREIGN KEY (petNo) REFERENCES Pet(petNo) ON UPDATE
    CASCADE
);
```

b. Create at least five tuples for each relation in the database.

Listed below is the code to insert tuples/rows into each relation, followed by a screenshot of the contents of each following execution. All names, addresses, numbers, salaries, and dates are made-up.

a. For **Clinic**,

```
INSERT INTO Clinic
VALUES ('BA210', 'Big Apple Pet Clinic', '111 NY Ave',
        6461234567, 'R541'),
       ('PM132', 'Pawsome Manhattan Pet Clinic',
        '341 Union Square', 6460987654, 'J592'),
       ('BB520', 'Brooklyn Buddies Pet Clinic',
        '331 Bushwick Blvd', 6466788907, 'C522'),
       ('PA324', 'Pawsome Arlington Pet Clinic',
        '555 Arlington Ave', 6461233214, 'S543'),
       ('NY102', 'New Yorkies Pet Clinic',
        '728 Glendale St', 6465438695, 'L568');
```

	clinicNo	name	address	telephoneNumber	managerNo
0	BA210	Big Apple Pet Clinic	111 NY Ave	6461234567	R541
1	PM132	Pawsome Manhattan Pet Clinic	341 Union Square	6460987654	J592
2	BB520	Brooklyn Buddies Pet Clinic	331 Bushwick Blvd	6466788907	C522
3	PA324	Pawsome Arlington Pet Clinic	555 Arlington Ave	6461233214	S543
4	NY102	New Yorkies Pet Clinic	728 Glendale St	6465438695	L568

b. For **Staff**,

```
INSERT INTO Staff
VALUES ('E115', 'BB520', 'Emma Emerson',
        '723 Bushwick Blvd', 9543251923, '2000-06-11',
        'Staff', 60000),
```

```
('J592', 'BA210', 'Jenny Jenkins', '229 Pizza Pl',
 7866123456, '1977-02-10', 'Manager', 95000),
('J122', 'PA324', 'John Johnson',
 '284 Anchor Ave', 3050987654, '1982-03-25',
 'Staff', 70000),
('R541', 'PM132', 'Robert Roberts', '897 Bear Rd',
 6461112343, '1992-05-04', 'Manager', 85000),
('S788', 'BA210', 'Steven Stephens',
 '909 Subway St', 9544590080, '1982-06-04',
 'Staff', 82000),
('W194', 'NY102', 'Willa Williams',
 '526 Glendale St', 6469994432, '1970-10-10',
 'Staff', 75000),
('L568', 'NY102', 'Liam Leon', '314 Subway St',
 6460525731, '1979-07-22', 'Manager', 90000);
```

	staffNo	clinicNo	name	address	telephoneNumber	DOB	position	salary
0	E115	BB520	Emma Emerson	723 Bushwick Blvd	9543251923	2000-06-11	Staff	60000
1	J592	BA210	Jenny Jenkins	229 Pizza Pl	7866123456	1977-02-10	Manager	95000
2	J122	PA324	John Johnson	284 Anchor Ave	3050987654	1982-03-25	Staff	70000
3	R541	PM132	Robert Roberts	897 Bear Rd	6461112343	1992-05-04	Manager	85000
4	S788	BA210	Steven Stephens	909 Subway St	9544590080	1982-06-04	Staff	82000
5	W194	NY102	Willa Williams	526 Glendale St	6469994432	1970-10-10	Staff	75000
6	L568	NY102	Liam Leon	314 Subway St	6460525731	1979-07-22	Manager	90000

c. For **Owner**,

```
INSERT INTO Owner
VALUES ('MM352', 'Mickey Michaels', '225 Bay St',
        9546557890),
       ('CC248', 'Cristina Christens', '314 Subway St',
        3055039876),
       ('JJ225', 'James Jameson', '516 NY Ave',
        7887623425),
```

```
('DD912', 'Diego Delgado', '182 Anchor Ave',
 3050123210),
('MM410', 'Martina Martinez',
 '837 Buschwick Blvd', 6468769090);
```

	ownerNo	name	address	telephoneNumber
0	MM352	Mickey Michaels	225 Bay St	9546557890
1	CC248	Cristina Christens	314 Subway St	3055039876
2	JJ225	James Jameson	516 NY Ave	7887623425
3	DD912	Diego Delgado	182 Anchor Ave	3050123210
4	MM410	Martina Martinez	837 Buschwick Blvd	6468769090

d. For **Pet**,

```
INSERT INTO Pet
VALUES ('D320', 'DD912', 'PA324', 'Bo', '2018-01-17',
        'Dog', 'Cane Corso', 'Black'),
       ('C100', 'CC248', 'NY102', 'Misty', '2020-08-02',
        'Cat', 'Ragdoll', 'Colorpoint'),
       ('D283', 'MM352', 'BB520', 'Fluffy', '2016-04-12',
        'Dog', 'Pomeranian', 'Cream'),
       ('H101', 'JJ225', 'BA210', 'Ad', '2021-11-25',
        'Hamster', 'Syrian', 'Gold'),
       ('C205', 'MM410', 'PM132', 'Lady', '2017-05-04',
        'Cat', 'Siamese', 'Seal Point'),
       ('H121', 'JJ225', 'BA210', 'Simon', '2021-10-21',
        'Hamster', 'Syrian', 'Gold'),
      ('D375', 'CC248', 'NY102', 'Ham', '2017-11-02',
       'Dog', 'French Bulldog', 'Blonde');
```

	petNo	ownerNo	clinicNo	name	DOB	species	breed	color
0	D320	DD912	PA324	Bo	2018-01-17	Dog	Cane Corso	Black
1	C100	CC248	NY102	Misty	2020-08-02	Cat	Ragdoll	Colorpoint
2	D283	MM352	BB520	Fluffy	2016-04-12	Dog	Pomeranian	Cream
3	H101	JJ225	BA210	Ad	2021-11-25	Hamster	Syrian	Gold
4	C205	MM410	PM132	Lady	2017-05-04	Cat	Siamese	Seal Point
5	H121	JJ225	BA210	Simon	2021-10-21	Hamster	Syrian	Gold
6	D375	CC248	NY102	Ham	2017-11-02	Dog	French Bulldog	Blonde

e. For **Examination**,

```
INSERT INTO Examination
VALUES ('A580', 'E115', 'H101', 'Annual',
        'Routine checkup', '2022-06-11', NULL),
       ('A602', 'J122', 'D283', 'Annual',
        'Routine checkup, ear infection found',
        '2021-06-08', 'Prescribed antibiotics'),
       ('X229', 'E115', 'D320', 'Leg pain, limping',
        'XRay front left leg', '2019-01-19',
        'Cast, prescribed pain medication'),
       ('A849', 'W194', 'C205', 'Annual',
        'Routine checkup', '2022-09-28', NULL),
       ('X300', 'S788', 'D375', 'Limping',
       'XRay back left leg', '2020-12-07',
       'Cast, prescribed pain medication'),
       ('S113', 'W194', 'C100', 'Swallowed buttons',
        'Induced vomiting', '2018-09-24', NULL);
```

	examNo	staffNo	petNo	chiefComplaint	description	dateSeen	actionsTaken
0	A580	E115	H101	Annual	Routine checkup	2022-06-11	None
1	A602	J122	D283	Annual	Routine checkup, ear infection found	2021-06-08	Prescribed antibiotics
2	X229	E115	D320	Leg pain, limping	XRay front left leg	2019-01-19	Cast, prescribed pain medication
3	A849	W194	C205	Annual	Routine checkup	2022-09-28	None
4	X300	S788	D375	Limping	XRay back left leg	2020-12-07	Cast, prescribed pain medication
5	S113	W194	C100	Swallowed buttons	Induced vomiting	2018-09-24	None

c. Develop five SQL queries using embedded SQL.

The user transaction questions formulated in the previous report are now translated into SQL queries. Listed below is each question, followed by the SQL query that extracts the desired information, and a screenshot of the queried information. Any queries that list extra information from that which is asked, do so to check correctness.

a. “Find how many pets owner number JJ225 owns.”

```
SELECT o.ownerNo, COUNT(petNo) AS petCount
FROM OWNER o, PET p
WHERE o.ownerNo = p.ownerNo
AND o.ownerNo = 'JJ225';
```

	ownerNo	petCount
0	JJ225	2

b. “Find how many dogs are registered in clinic number NY102.”

```
SELECT c.clinicNo, species, COUNT(petNo) AS dogCount
FROM CLINIC c, PET p
WHERE c.clinicNo = p.clinicNo
AND c.clinicNo = 'NY102'
AND species = 'Dog';
```

	clinicNo	species	dogCount
0	NY102	Dog	1

c. “Find the average salary of the staff in Big Apple Pet Clinic.”

```
SELECT c.name, AVG(salary)AS AvgStaffSalary
FROM CLINIC c, STAFF s
WHERE c.clinicNo = s.clinicNo
AND c.name = 'Big Apple Pet Clinic';
```

	name	avgStaffSalary
0	Big Apple Pet Clinic	88500.0

d. “List the names and species of the pets that have had annual checkups in 2022.”

```
SELECT dateSeen, chiefComplaint, name, species
FROM PET p, EXAMINATION e
WHERE p.petNo = e.petNo
AND chiefComplaint = 'Annual'
AND dateSeen LIKE '2022%';
```

	dateSeen	chiefComplaint	name	species
0	2022-06-11	Annual	Ad	Hamster
1	2022-09-28	Annual	Lady	Cat

e. “List the names and positions of the staff members who have performed X-Rays and the actions taken at the end of those examinations.”

```
SELECT name, position, description, actionsTaken
```

```
FROM STAFF s, EXAMINATION e
WHERE s.staffNo = e.staffNo
AND description LIKE 'XRay%';
```

	name	position	description	actionsTaken
0	Emma Emerson	Staff	XRay front left leg	Cast, prescribed pain medication
1	Steven Stephens	Staff	XRay back left leg	Cast, prescribed pain medication