

Databases: CSC-423

Part 1:

a. The main entity types are:

Clinic

Staff

Pet Owner

Pet

Examination

b. The main relationship types between the entity types are:

A clinic is managed by one staff member (clinic is managed by staff)

A staff member works at one clinic (staff works at clinic)

An owner can register one or more pets at a clinic (owner registers pet at clinic)

A pet can only be registered at one clinic (pet is registered at clinic)

A pet can have one or more examinations (pet undergoes examination)

An examination is performed by one staff member (examination is performed by staff)

c. The multiplicity constraints for each relationship are:

Clinic is managed by one staff member (1:1)

A staff member works at one clinic (1:1)

An owner can register one or more pets at a clinic (1:M)

A pet can only be registered at one clinic (1:1)

A pet can have one or more examinations (1:M)

An examination is performed by one staff member (1:1)

d. The identified attributes and associated entity or relationship types are:

Clinic: clinicNo, clinic name, address, telephone number

Staff: staffNo, name, address, telephone number, DOB, position, salary

Pet Owner: ownerNo, name, address, telephone number

Pet: petNo, name, DOB, animal species, breed, color

Examination: examNo, chief complaint, description, date seen, actions taken

e. The candidate and primary key attributes for each (strong) entity type are:

Clinic: candidate key is clinicNo, primary key is clinicNo

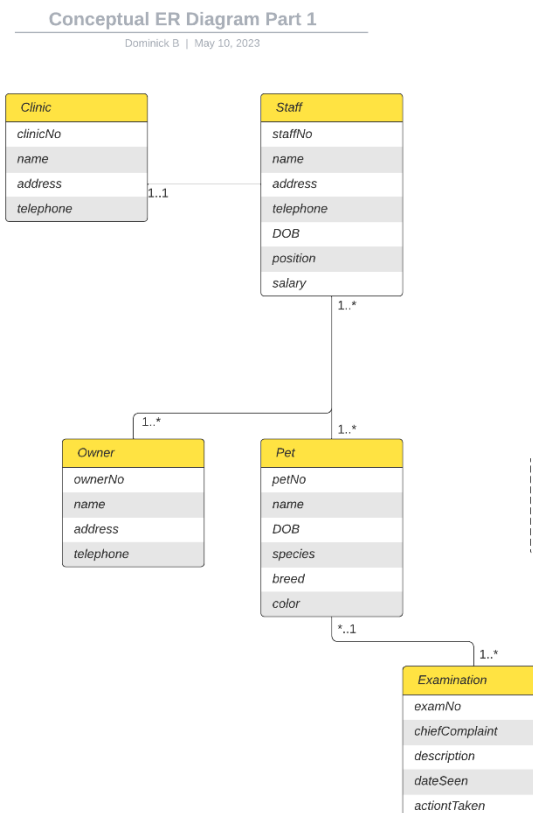
Staff: candidate key is staffNo, primary key is staffNo

Pet Owner: candidate key is ownerNo, primary key is ownerNo

Pet: candidate key is petNo, primary key is petNo

Examination: candidate key is examNo, primary key is examNo

f. The E-R diagram for the conceptual level (no FKs as attributes) would look like this:



Part 2:

a. Based on the conceptual data model, the following relations can be derived:

Clinic (clinicNo PK, name, address, telephone, staffNo FK)

Staff (staffNo PK, name, address, telephone, DOB, position, salary, clinicNo FK)

Owner (ownerNo PK, name, address, telephone)

Pet (petNo PK, name, DOB, species, breed, color, ownerNo FK)

Examination (examNo PK, chiefComplaint, description, dateSeen, actionsTaken, staffNo FK, petNo FK)

b. The logical model should be validated using normalization to 3NF, which involves the following steps:

First Normal Form (1NF): Each relation should have a primary key, and each attribute should be atomic (i.e., indivisible). The relations derived from the conceptual model are already in 1NF.

Second Normal Form (2NF): Each non-key attribute should be dependent on the entire primary key. The relations derived from the conceptual model are already in 2NF.

Third Normal Form (3NF): Each non-key attribute should be dependent only on the primary key and not on any other non-key attribute. The relations derived from the conceptual model are already in 3NF.

c. The logical model should be validated against user transactions to ensure that it supports the required functionality and performance. Some example user transactions might include:

Adding a new clinic/staff member/owner/pet/examination record

Updating an existing clinic/staff member/owner/pet/examination record

Deleting an existing clinic/staff member/owner/pet/examination record

Querying for clinics/staff members/owners/pets/examinations based on various criteria (e.g., clinic name, staff member name, pet species)

d. The following integrity constraints should be defined:

Primary key constraints: Each relation should have a primary key attribute.

Referential integrity/Foreign key constraints: The clinicNo, staffNo, ownerNo, and petNo attributes are all foreign keys.

Alternate key constraints (if any): No keys are alternative keys.

Required data:

- Clinic name and telephone
- Staff name and position,

- owner name, address, petNo and species
- Examination date seen and actions taken

Are all attributes that require a non-null value.

Attribute domain constraints: Staff salary has to be a positive integer and pet DOB has to be a valid date.

General constraints (if any): There are no general constraints.

e. Generate the E-R diagram for the logical level (contains FKs as attributes).

