

CSC 423: Database Systems
Design, development, and implementation of a relational database

1. Develop a conceptual data model reflecting the following requirements:

a) Identify the main entity types.

<i>Entity Name</i>	<i>Description</i>	<i>Aliases</i>	<i>Occurrence</i>
Staff	General term describing all staff employed by Pawsome Pets.	Employee	Not all staff members manage clinics; one staff member can conduct many examinations.
Clinic	General term describing all clinics owned by Pawsome Pets.	Branch	Each clinic is managed by only one staff member; many pets can be registered in one clinic.
Pet	General term describing all pet patients of Pawsome Pets.	Patient	Each pet has one owner and can undergo one or more examinations. A pet can only be registered at one clinic.
Owner	General term describing the owners of all pets registered with Pawsome Pets.	Customer	Each owner can own one or more pets.
Examination	General term describing all pet examinations conducted by Pawsome Pets staff.	Visits	Each examination is conducted by one staff member, and only one pet is checked per examination.

b) Identify the main relationship types between the entity types identified in "a".

<i>Entity Name</i>	<i>Relationship</i>	<i>Entity Name</i>	<i>Relationship Type</i>
Staff	<i>Manages</i>	Clinic	1:1
Pet	<i>IsRegistered</i>	Clinic	1:*
Pet	<i>Undergoes</i>	Examination	1:*
Owner	<i>Owns</i>	Pet	1:*
Staff	<i>Conducts</i>	Examination	1:*

Clinic	<i>Employs</i>	Staff	1:*
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c) Determine the multiplicity constraints for each relationship identified in "b".

<i>Entity Name</i>	<i>Multiplicity</i>	<i>Relationship</i>	<i>Multiplicity</i>	<i>Entity Name</i>
Staff	1..1	<i>Manages</i>	0..1	Clinic
Pet	1..*	<i>IsRegistered</i>	1..1	Clinic
Pet	1..1	<i>Undergoes</i>	1..*	Examination
Owner	1..1	<i>Owns</i>	1..*	Pet
Staff	1..1	<i>Conducts</i>	1..*	Examination
Clinic	1..1	<i>Employs</i>	1..*	Staff

d) Identify attributes and associate them with entity or relationship types.

<i>Entity Name</i>	<i>Attributes</i>	<i>Description</i>
Staff	staffNo	Uniquely identifies a member of staff.
	staffFName	First name of staff member.
	staffLName	Last name of staff member.
	staffAddress	Address of staff member.
	staffDOB	Date of birth of staff member.
	position	Job title of staff member.
	salary	Salary of staff member in USD.
Clinic	clinicNo	Uniquely identifies a clinic.
	clinicName	Name of clinic.
	clinicAddress	Address of clinic.
	clinicTelephone	Telephone number of clinic.
Pet	petNo	Uniquely identifies a pet.
	petDOB	Date of birth of a pet.
	species	Species of pet.
	breed	Breed of pet.

	color	Color of pet.
Owner	ownerNo	Uniquely identifies a pet owner.
	ownerFName	First name of pet owner.
	ownerLName	Last name of pet owner.
	ownerAddress	Address name of pet owner.
	ownerTelephone	Telephone number of pet owner.
Examination	examNo	Uniquely identifies an examination.
	complaint	Main cause for the examination.
	description	Procedure undergone by the pet during the examination.
	date	Date of the examination.
	action	Treatment, test, or other action prescribed to the pet as a result of the examination.

e) Determine candidate and primary key attributes for each (strong) entity type.

<i>Entity Name</i>	<i>Candidate key(s)</i>	<i>Primary Key</i>	<i>Assumptions</i>
Staff	{staffNo}	staffNo	I assume that two staff members could either share the same first and last name or live in the same house. Therefore, the only element that uniquely identifies a row is staffNo.
Clinic	{clinicNo}, {clinicName}, {clinicAddress}, {clinicTelephone}	clinicNo	I'm assuming that each clinic has a unique name, address, and telephone.
Pet	{petNo}	petNo	Since two pets could share a birthday or be of the same species/breed/color, the only element that uniquely identifies a row is petNo.
Owner	{ownerNo}	ownerNo	I don't include ownerTelephone or ownerAddress as a candidate key, because there can be a pet owner who own different pets living in the same house (i.e., a mom owns a cat, and her son owns a dog), which

			means that neither owner telephone nor address would be unique (assuming they both give their house telephone).
Examination	{examNo}	examNo	Since two examinations could have the same complaint, description, date, or action, the only element that uniquely identifies a row is examNo.

f) Generate the E-R diagram for the conceptual level (no FKs as attributes).

