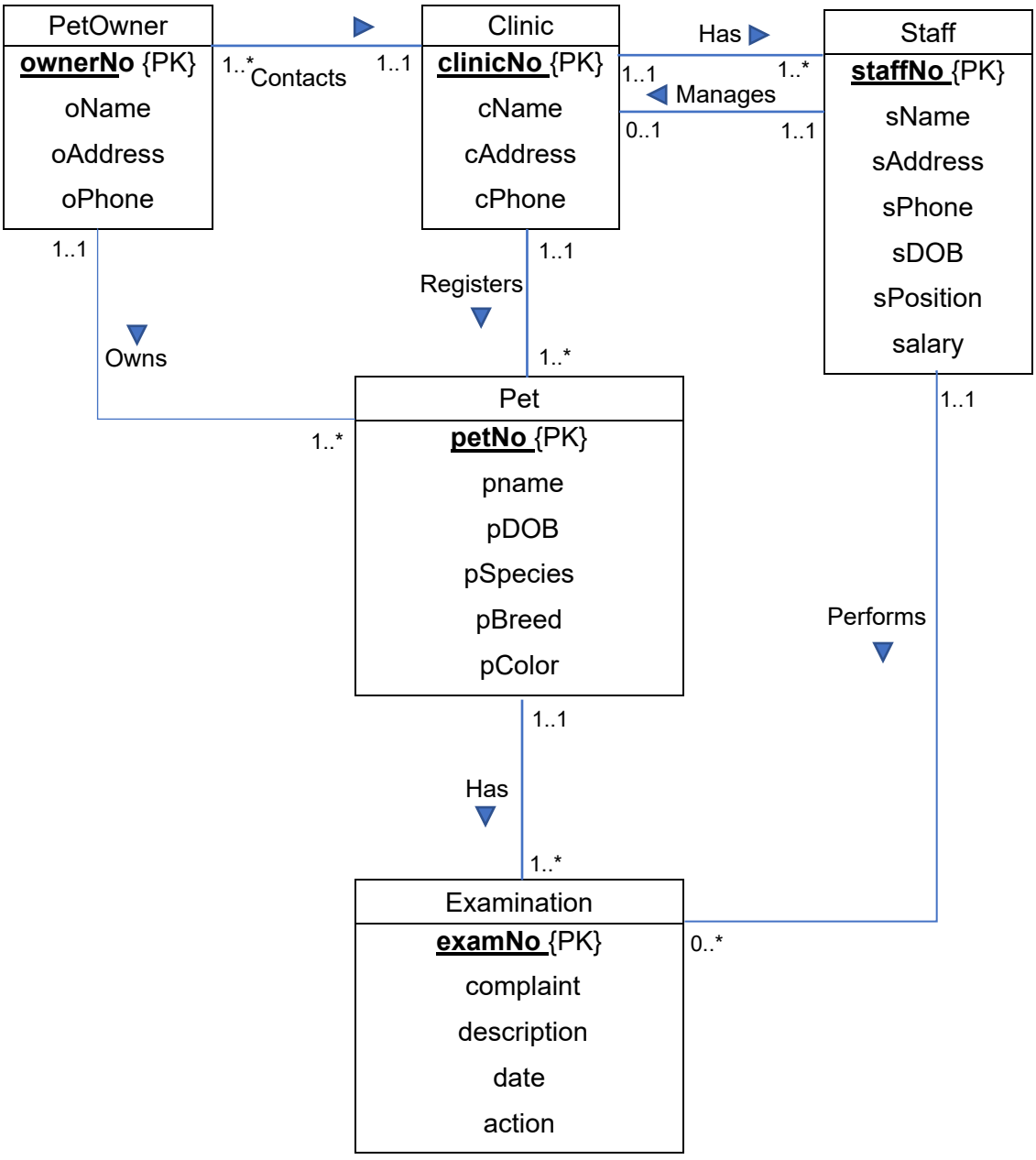
Case study: Pawsome Pets

Conceptual level E-R diagram:



Q2. a) Relations:

To derive the relations, for all “many” relationship types (1:*, 0:*), we designate parent entity as the one on the 1 or 0 side and the child entity as the one on the “many” side. To represent this relationship, we post a copy of the primary key attribute of the parent entity into the relation representing the child entity, to act as a foreign key.

Clinic (clinicNo, cName, cAddress, cPhone) **Primary key** clinicNo **Alternate key** cPhone
Staff (staffNo, sName, sAddress, sPhone, sDOB, sPosition, salary, clinicNo) **Primary key** staffNo **Foreign key** clinicNo references **Clinic**(clinicNo) ON UPDATE CASCADE ON DELETE SET NULL
PetOwner (ownerNo, oName, oAddress, oPhone, clinicNo) **Primary key** ownerNo **Foreign key** clinicNo references **Clinic**(clinicNo) ON UPDATE CASCADE ON DELETE SET NULL
Pet (petNo, pname, pDOB, pSpecies, pBreed and pColor, ownerNo, clinicNo) **Primary key** petNo **Foreign key** ownerNo references **PetOwner**(ownerNo) ON UPDATE CASCADE ON DELETE SET NULL **Foreign key** clinicNo references **Clinic**(clinicNo) ON UPDATE CASCADE ON DELETE NO ACTION
Examination (examNo, complaint, description, date, action, petNo, StaffNo) **Primary key** examNo **Foreign key** petNo references **Pet**(petNo) ON UPDATE CASCADE ON DELETE SET NULL **Foreign key** StaffNo references **Staff**(staffNo) ON UPDATE CASCADE ON DELETE NO ACTION

b) Deriving the relations using the above method, all relations are in the 3NF (i.e. no partial or transitive dependencies).

c) Validate model against user transactions:

i) List the details of the staff that work at a clinic.
Details of staff are in the *Staff* entity and details of Clinic are in the *Clinic* entity. In this case, we can use *Clinic* employs *Staff* relationship to produce the list.

ii) List the details of the examination performed by a staff member
We can use the *Staff* performs *Examination* relationship between the entities *Staff and Examination* to produce this list

iii) List the types of pet breeds by clinic
We can use the relationship *Clinic* registers *Pet* to produce the list of pet breeds for a clinic.

iv) List the details of the examinations that were performed on a particular pet
We can use the relationship *Pet* has *Examination* to find out the examinations performed on a particular pet

v) List all the clinic managers.
We can use the relationship *Staff* manages *Clinic* to get the list of managers using the sPosition attribute.

d) Integrity constraints

i) Primary key constraints: must have a unique value, cannot hold nulls

ii) Referential integrity/foreign key constraints:
- foreign key must contain the value that exists in the referenced primary key
- Referential integrity – refer to Relations Table in 'a' above for each foreign key

iii) Alternate key constraints: cannot be null, must have unique value

iv) Required data: Every member of staff must have an associated staff position; Examination must have an associated petNo; every pet must have an ownerNo – they are not allowed to hold nulls

v) Attribute domain constraints: Clinic phone number cPhone is 10 digits; owner phone number oPhone is 10 digits; sDOB, pDOB, Examination(date) is recorded in format YYYY-MM-DD

vi) General constraints: Each staff manages only one clinic.

e) Logical level E-R diagram: