

## Project Phase 3

Team 10

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### Preliminary changes made to database design:

The Owner\_ID Foreign Key is removed from treatments.

The Treatment\_ID attribute is removed from billing since Treatment is a weak entity.

The attribute Payment\_Method has been removed from billing since it does not depend on any of the keys that form the composite primary key of the relation. It doesn't play any role.

Composite Primary Key in the Billing now becomes Appointment\_ID, Owner\_ID, and Date\_of\_Payment.

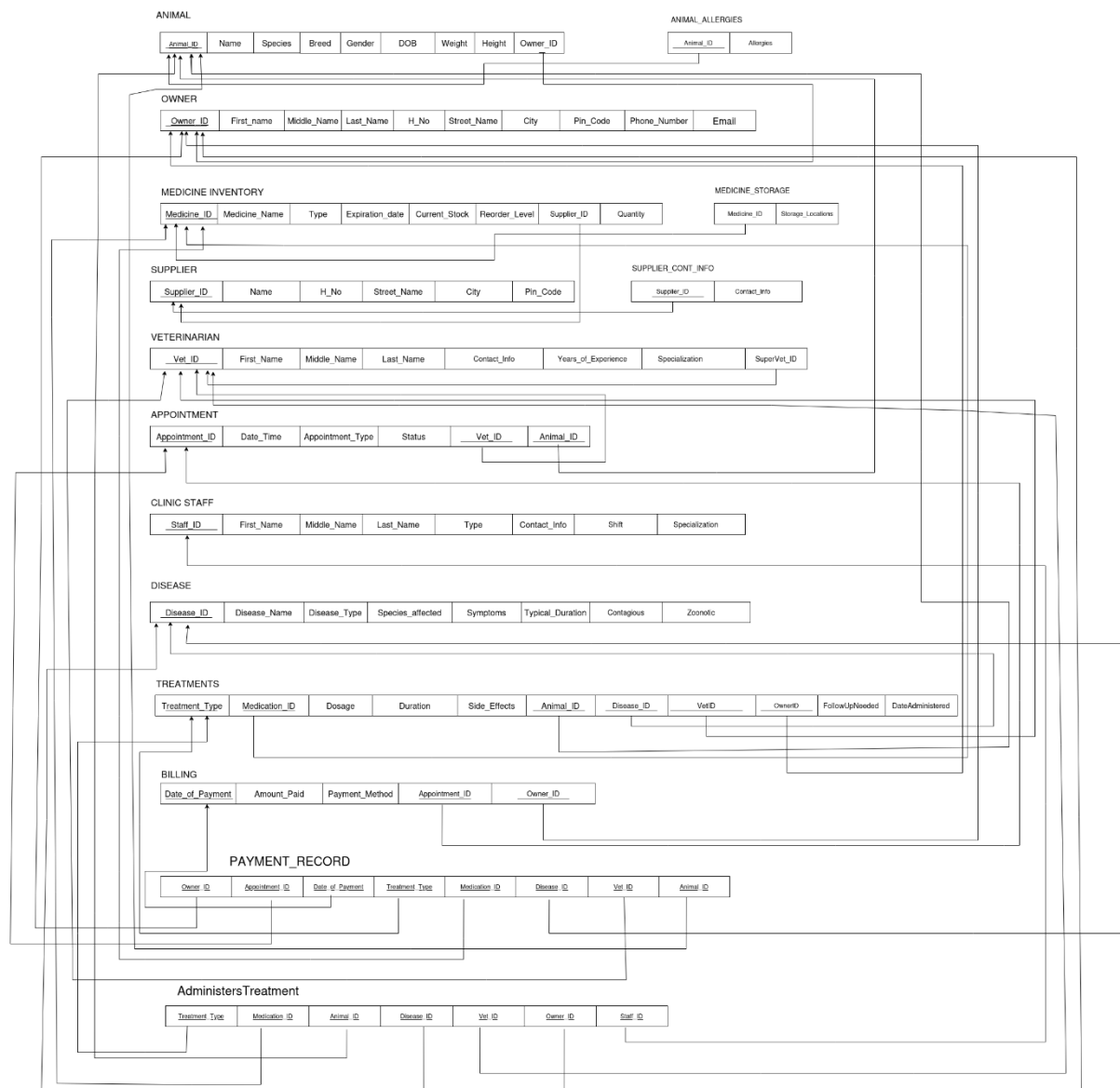
The quaternary relationship Administers\_Treatment has been made non-identifying due to the fact that it does not depend on clinic staff.

### RELATIONAL MODEL

1. We divided the composite and multi-valued attributes into separate attributes in relations wherever we had them.
2. We added Supplier\_ID in Medicine Inventory Relation since Medicine Inventory is in binary relation with Supplier entity with constraints 1: N, So we it is included in Medicine Inventory Relation. We used foreign key approach to ensure that the relationship SuppliesMedicine is included. We added the quantity attribute to the Medicine Inventory relation since the quantity is an attribute to the SuppliesMedicine relationship. So, to ensure that this relationship is represented in this Medicine Inventory we added the quantity attribute to the relation.
3. We added Super\_Vet\_ID in Veterinarian relation as Veterinarian is in a recursive binary relation Mentorship with constraints 1:N. For Mentorship we include the primary key of the Veterinarian relation as foreign key in the Veterinarian relation itself, because the relationship is recursive— and call it Super\_Vet\_ID.
4. We created a new relation Payment\_method, to ensure that the existing Payment\_method relationship is included in the Relation Model. We added it because, in each n-ary relationship type R, where  $n > 2$ , we need to create a new relationship relation which contains all the primary keys from all entities participated in the previous relationship, we can add the attributes also but here we didn't choose the foreign key approach to satisfy the relation, We used cross reference option.

5. We created a new relation AdministersTreatment, to ensure that the existing AdministersTreatment relationship is included in the Relation Model. We added it because, in each n-ary relationship type R, where  $n > 2$ , we need to create a new relationship relation which contains all the primary keys from all entities participated in the previous relationship, we can add the attributes also but here we didn't choose the foreign key approach to satisfy the relation, We used cross reference option.

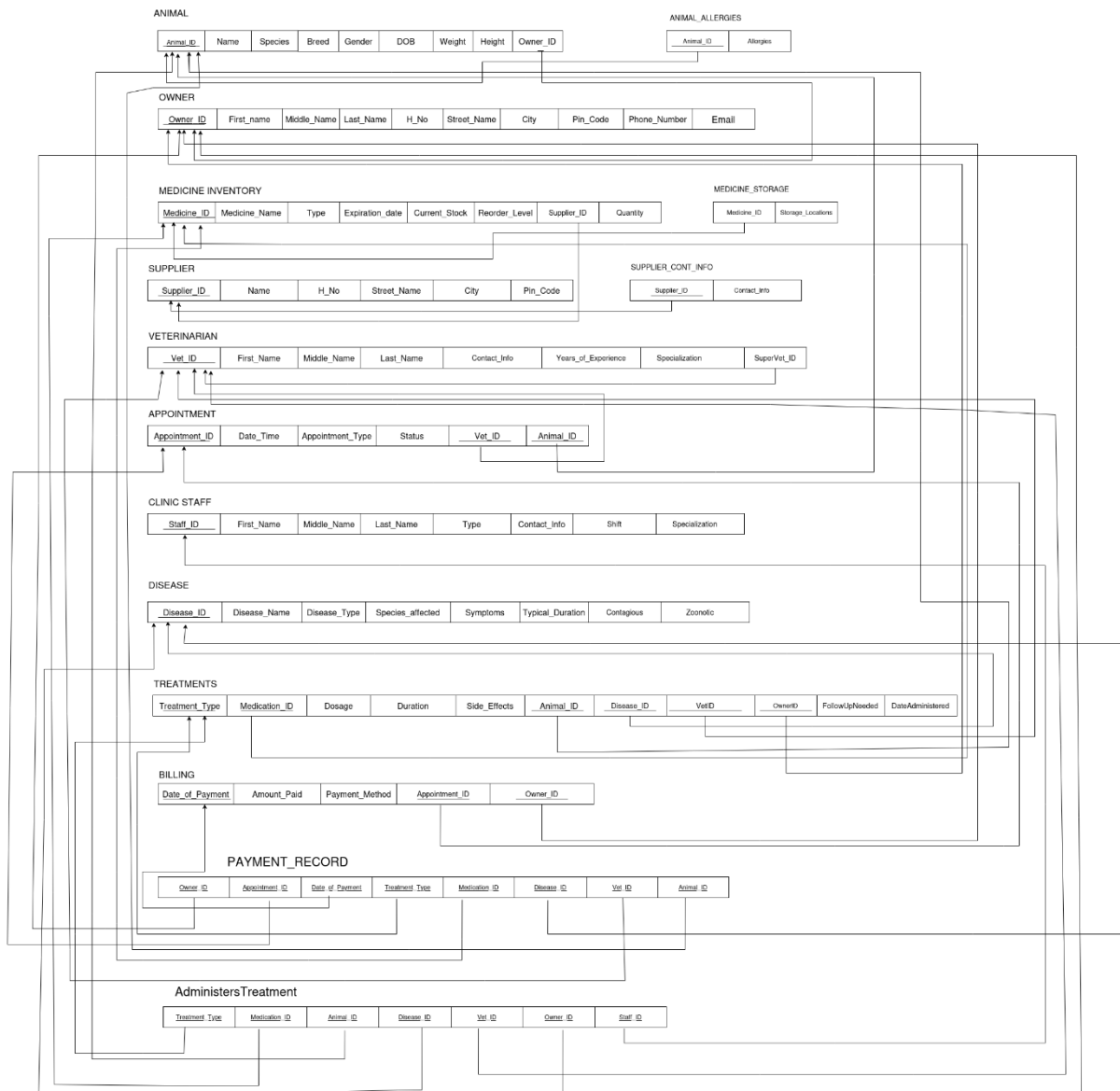
### Relational MODEL



### 1NF

There are no modifications in Relational Model, since all the relations are in 1NF form. Because the relational model satisfied all the conditions of 1NF.

## 1 NF MODEL

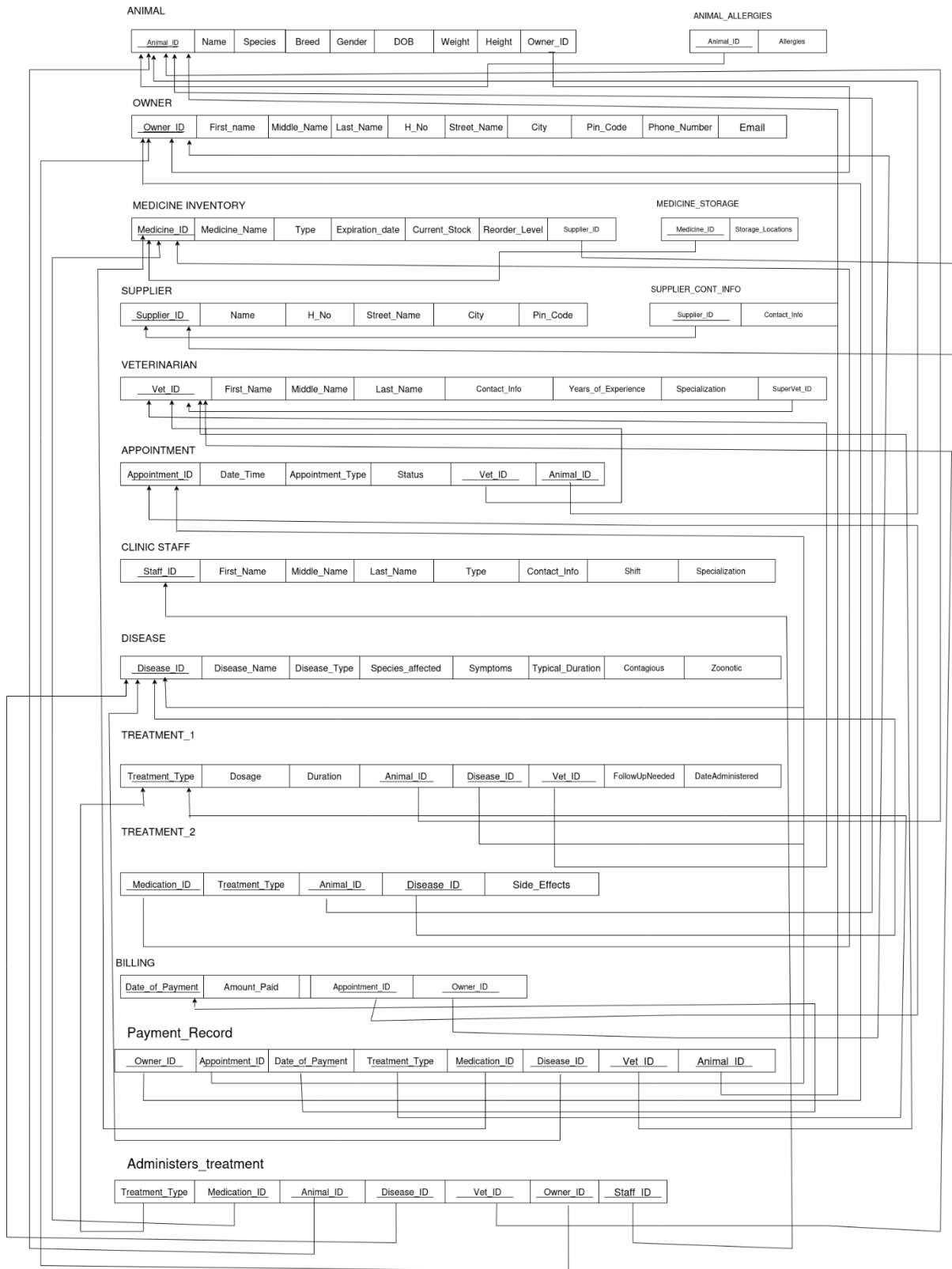


## 2NF

The following changes were made to convert the model from 1NF to 2NF.

1. In the Treatment weak entity, the attributes Treatment type, animal\_ID, Vet\_ID, Disease\_ID, and Medication\_ID form a composite primary key. The non-prime attribute, side-effects, depends only on the subset of primary keys. We made a new relation Treatment\_2 that includes side effects.
2. Another table with owner and animal ID exists. However, a relationship already exists between the animal and the owner. So, this table is not being represented.

## 2 NF



### 3NF

The following changes were made to convert the model from 2NF to 3NF.

1. There is a transitive relationship between Owner\_ID, email, phone number and name via email in the Owner Table. Due to this, the Owner table has been split into two relations: Owner and Owner Contact.
2. There is a transitive relationship between Vet\_ID, contact\_info and name via contact\_info in the Veterinarian Table. Due to this, the Veterinarian table has been split into two relations: Veterinarian and Vet\_Contact.
3. There is a transitive relationship between Staff\_ID, contact\_info and name of the staff member via contact\_info in the Clinic\_Staff Table. Due to this, the Clinic\_Staff table has been split into two relations: Clinic\_Staff and Staff\_Contact.

### 3 NF

