

# **Title   Animal Foster/Adoption Database Design Assignment**

Database Architect

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## Database Design Part A

### A.1. Case Study Overview

Awlnsw.com.au belongs to Animal Welfare League NSW™, and its primary function is that provide animal adoption and foster service.

For the adoption, Applicants can make requests directly under the option of adopting cats, dogs and other animals, or use the website searcher to search with animal species, genders and locations(see figure 1 below).

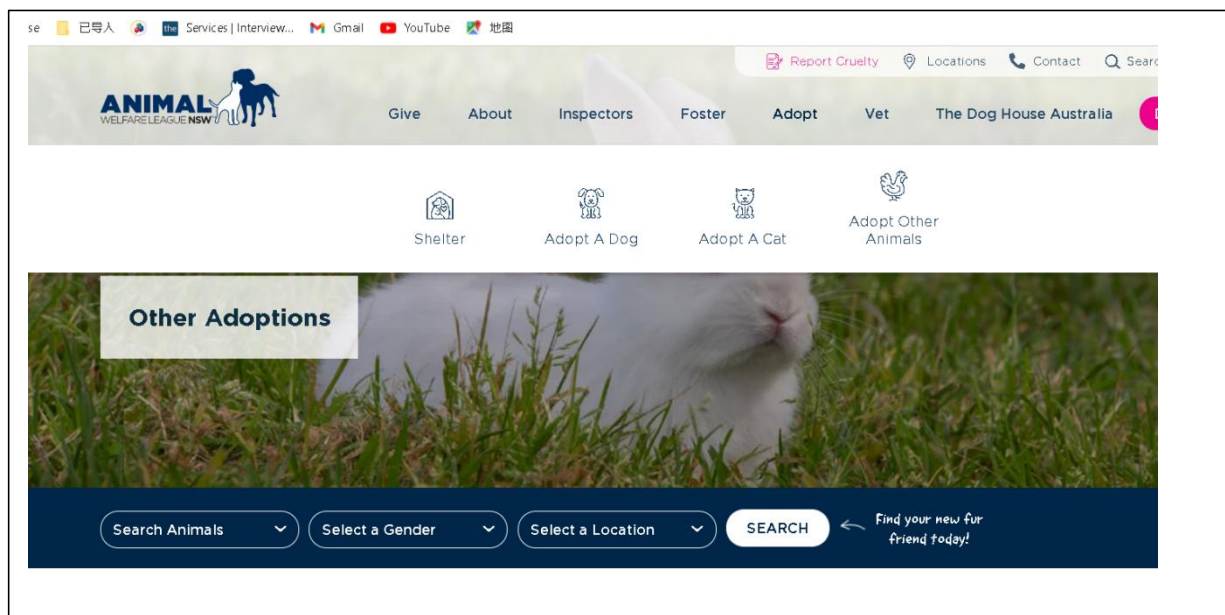


figure 1

After receiving the applicant's personal information and a brief description of the applicant's lifestyle, the staff will directly communicate with the applicant(see figure 2 below).

The image shows a contact form titled 'Want to learn more?'. The form includes a sub-header: 'Complete the form below, and we'll be in touch with additional information about the dog you've been looking at!'. The form fields are: 'Full Name\*', 'Phone\*', 'Email\*', 'Suburb\*', and a dropdown menu for 'New South Wales'. Below these fields is a large text area with the prompt 'Please tell us a bit about you and your family, your home and your lifestyle\*'. At the bottom of the form, there is a checkbox for 'I'm not a robot' next to a reCAPTCHA logo, and a dark blue button labeled 'ENQUIRE NOW'. To the right of the button, there is a checkbox for 'Keep me updated about Animal Welfare League NSW events via email'.

figure 2

According to the website, after selecting the adopted Animal, the adopter must pay the adoption fee to the shelter or branch.

The process of fostering states that applicants must fill out the corresponding application form after connecting and negotiating with the AWL NSW coordinator. There are three application forms with two application methods.

The first method is that fill in the "foster care application form"(figure 3) after selecting a branch. The second method is to fill in the form of "cat foster care signup"(figure 4) or "dog foster care signup" (figure 5) after selecting the cats or dogs that are available to be adopted.

The screenshot shows the 'Foster Care Application Form' with a title bar. Below the title, there is a thank-you message and a request to fill out the form. A contact email 'zheng.wang@911@gmail.com' and a '切账号' (Account) link are visible. A red box highlights the '电子邮件地址' (Email Address) field, which is currently empty. Below this, there is a 'Please read and accept' section with a checkbox for acknowledging the Western Suburbs, Illawarra and North Coast branches only. Another checkbox is for 'Please contact branch BEFORE applying'. A third checkbox is for 'I have spoken to the branch already'. At the bottom, there is a dropdown menu for 'Please choose your closest AWL NSW branch' with 'Eastern Suburbs' selected.

figure 3

The screenshot shows the 'Cat Foster Care Signup' form. It includes a thank-you message and a request to fill out the form. A section titled 'What are the requirements to be an AWL NSW foster carer?' lists several bullet points: 'Ability to provide daily care for a cat or kittens', 'Available to start fostering within 7 days', 'Foster cats/kittens must remain inside at all times', 'Everyone in the home wants to foster and no one is allergic to cats', 'Must follow all AWL NSW guidelines, policies and instructions', and 'Live within an approx. 60-minute drive from the Kemps Creek shelter and have your own car and drivers license'. Below this is the 'Foster Carer Details' section, which includes fields for 'Name' (First Name, Last Name), 'Address' (Street Address, Suburb, Post Code), 'State' (NSW), 'Phone Number', 'Email', and 'I live in a' (House, Apartment).

figure 4

The screenshot shows the 'Dog Foster Care Signup' form. It includes a thank-you message and a request to fill out the form. A section titled 'What are the requirements to be an AWL NSW foster carer?' lists several bullet points: 'Ability to provide daily care for a dog or puppy', 'Available to start fostering within 7 days', 'Everyone in the home wants to foster', 'Must follow all AWL NSW guidelines, policies and instructions', 'Live within an approx. 60-minute drive from the Kemps Creek shelter and have your own car and drivers license', and 'If you already have a dog, you will need to bring them to our Kemps Creek Shelter for a meet'. Below this is the 'Foster Carer Details' section, which includes fields for 'Name' (First Name, Last Name), 'Address' (Street Address, Suburb, Post Code), 'State' (NSW), 'Phone Number', 'Email', and 'I live in a' (House, Apartment, Other).

figure 5

In the "foster care application form", the applicant's email is first confirmed as a personal account. General information such as the applicant's personal information, home address and contact information must be provided. The applicant must provide the name and age of the people who live with the applicant. The details of the applicant's pets must be given in the related form(figure 6).

What are the names and ages of everyone who lives in the household, including you? \*

Name *	Age *
<input type="text"/>	<input type="text"/>
<input type="button" value="+"/>	

Details of current pets (if any) \*

This field is required.

Are current pets desexed and up-to-date with vaccinations and flea/worming treatment? \*

☐ Yes  
☐ No  
☐ I have no pets  
☒ Other

This field is required.

Please describe any prior experience with owning animals or fostering. \*

Type here...

This field is required.

figure 6

The applicants must select "consider adopting cats or dogs or both" and express whether he is willing to adopt animals other than cats and dogs. The applicants must choose the type of cat or dog to adopt (figure 7).

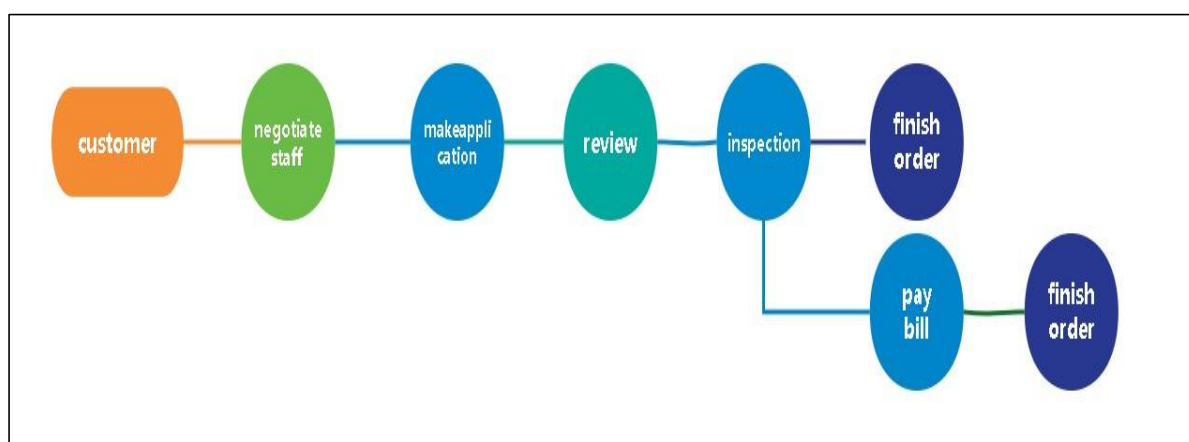
<p>Are you interested in fostering animals other than dogs/cats? (i.e. rabbits, guinea pigs etc). If so, what animals?</p> <p>yes <input type="text"/></p> <hr/> <p>What are you interested in fostering? *</p> <p><input type="radio"/> Cats/kittens <input type="radio"/> Dogs/puppies <input checked="" type="radio"/> Both</p> <p>I want to foster: *</p> <p><input checked="" type="checkbox"/> Adult cats <input checked="" type="checkbox"/> Litter of kittens (weaned, eating by themselves) <input checked="" type="checkbox"/> Timid kittens that need socialisation <input type="checkbox"/> Mum &amp; kittens <input checked="" type="checkbox"/> Cats/kittens with ringworm <input type="checkbox"/> Bottle babies (Previous experience or training required, vet nurses also accepted) <input checked="" type="checkbox"/> Overnight foster for bottle babies in emergencies (Previous experience or training required, vet nurses also accepted)</p> <hr/> <p>I want to foster: *</p> <p><input type="checkbox"/> (most needed) Medium-large dogs requiring training/socialisation <input checked="" type="checkbox"/> Puppies <input type="checkbox"/> Surgical recovery/medical attention <input type="checkbox"/> Mums &amp; pups <input checked="" type="checkbox"/> Small dogs needing training/socialisation</p>	<p>I can foster: *</p> <p><input type="checkbox"/> Adult cat <input type="checkbox"/> Adult cats that require cage rest (must remain in a crate provided by us whilst healing from an injury) <input type="checkbox"/> Litter of kittens (4 weeks - 4 months, eating by themselves) <input type="checkbox"/> Timid kittens that require socialisation <input type="checkbox"/> Mum &amp; kittens <input type="checkbox"/> Cats/kittens with ringworm: See <a href="http://bit.ly/cat-ringworm">bit.ly/cat-ringworm</a> for info</p> <p>Would you consider fostering a timid cat? Our 'most urgent' cats needing foster care are timid. They become friendly with time, patience, daily training and they suit quiet homes where they can stay for at least 5+ weeks. We provide full support and a guide to help: <a href="http://bit.ly/timidcatguide">bit.ly/timidcatguide</a> *</p> <p><input type="radio"/> I am open to fostering a timid cat <input type="radio"/> Not yet</p> <p>Are you open to fostering bottle baby kittens (newborn - 4 weeks old)? Newborns initially require feeds every 2 hours, 24/7 *</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> Overnight foster for bottle babies in emergencies <input type="checkbox"/> Not at the moment <input type="text"/></p>
	<p>I can foster: *</p> <p><input type="checkbox"/> Adult dogs <input type="checkbox"/> Puppies <input type="checkbox"/> Timid dogs or puppies <input type="checkbox"/> Dogs with health concerns <input type="checkbox"/> Dogs with behavioural concerns</p> <p>Would you consider fostering one of our 'special cases'? Some dogs have been in the shelter too long and need urgent foster care. These dogs require some extra attention *</p> <p><input type="radio"/> I am open to fostering a 'Special Case' dog <input type="radio"/> Not yet</p>

figure 7

"Cat foster care signup" and "dog foster care signup" are similar. After providing personal information and expressing the foster care intention, choose the type of foster cats and dogs.

Once the application is accepted, the applicant's residence will be inspected by the coordinator. The coordinator will decide whether the applicant's residence is suitable for adoption. If the application is approved, the Animal will be transported with the coordinator's help.

So the complete adoption and foster workflow are as below:



## A.2. Database Functions

The database must have the function of storing adequate information for all the animals. This information has to meet the requirement of presenting, indexing and researching. The system must identify whether the customer order (application form) is consistent with the applied animals' details. Each Animal needs to have a unique identification code to avoid duplicate information.

The customer's relevant information is classified and stored according to the specified form. The reviewer can call this information along with the customer's basic information and the customer's order for order review.

The database must give the customer order (application form) a unique identification code. The database must store the applicant's personal information and identify the approximate distance between the branch and the applicant's residence. At the same time, the database can match the foster care needs and animal characteristics according to the application form options. For example, the applicant accepts timid dogs or cats with ringworm

The database must define, store and record the information of branches and staff. The branch information and the animal information that can be adopted or fostered in the branch can be presented separately. As there are statements in the application, staff must review each application. According to the website statement, the coordinator will conduct inspections and assist in the delivery of animals. Therefore, the database must have the function of matching the application with the reviewer and coordinator.

After a specific order is completed, the system can generate a bill.

### **A.3. Data Requirements**

**Customer:** a customer refers to an applicant with a unique ID provided by the system as identification and contains personal information as required attributes.

Attributes: Cust\_ID, Cust\_Email, Cust\_Fname, Cust\_Lname, Cust\_Photo, Cust\_Street, Cust\_Sub, Cust\_City, Cust\_State, Cust\_POcode, Cust\_DrivLN.

**Order:** an order refers to a single application made by a customer, with a unique order number and details about the customer for a specific order. The customer details include housing type, family members and agreement, foster care experience, time for foster care, and travel plan within two months required.

Attributes: Order\_ID, Cust\_ID, Order\_LivTp, Order\_Exp, Order\_Starttime, Order\_Trav, Order\_Famagr.

**Customer\_people:** The entity stores data about the members or people living together. Every person has a unique ID provided by the system

Attributes: Cust\_peopleID, Cust\_peoplename, Cust\_peopleage.

**Customer\_pet:** The entity stores the data about current pets belonging to a customer. Every pet has a unique ID provided by the system.

Attributes: Cust\_PetID, Cust\_PetName, Cust\_PetSpecie, Cust\_PetDesexed, Cust\_PetVacc, Cust\_PetFWT.

**Branch:** A branch refers to the branch where the Animal is applied for foster care /adoption or the branch that can meet the demand of the order and finally implement the adoption/foster care. It contains branch information such as

required attributes address, phone number, email address, location, and optional attribute open schedule. The branch code is a unique identification.

Attributes: Bra\_Code, Bra\_name, Bra\_Pho, Bra\_Street, Bra\_Sub, Bra\_City, Bra\_t\_POcode, Bra\_Email, Bra\_Open.

**Staff:** Staff refers to employees participating in the adoption and foster care process. All employees are assigned a unique employee number to identify employee information, which contains the employees' names, email addresses, and mobile numbers.

Attributes: Staff\_Code, Staff\_Fname, Staff\_Lname, Staff\_Email, Staff\_Mob.

**Reviewer:** reviewer needs to connect with customers by phone and by official email.

Attributes: Staff\_Pho, OfficialEmail

**Coordinator:** coordinator needs to inspect customers' homes in person. So, coordinators should have vehicles and be located in the branch.

Attributes: Staff\_Veh.

**Animal:** A animal refers to the animals for adoption or foster. Animals are uniquely identified by animal numbers. The entity contains name, classification, specie, age, breed, second breed, size, and comment.

Attributes: Anim\_Num, Anim\_Name, Anim\_Type, Anim\_Specie, Anim\_Colour, Anim\_Age, Anim\_Breed, Anim\_SecBreed, Anim\_Size, Anim\_chip, Anim\_Comm.

**Animal for adoption:** A animal for adoption refers to a specific animal for adoption with price(adoption fee) and other information such as desexed, rehoming organization number, vaccination, health check, and wormed.

Attributes: Anim\_Price, Anim\_Des, Anim\_Vaccin, Anim\_HC, Anim\_RON, Anim\_Wor.

**Animal for foster:**

**Animal for foster detail:** A animal for foster refers to a specific animal for foster with detailed information. It stores detailed codes and details explanations. It inclouds Dog, Puppy, Timid dogs or puppies, Dogs with health concerns,

Dogs with behavioural concerns, Special Case dogs, Adult cat, Adult cat cage, Litter of kitten, Timid kittens that require socialization, Mum & kittens, Cats/kittens with ringworm, timid cat, bottle baby kittens.

Attributes: Detail\_Code, Detail\_Exp

Adopt

**Bill:** Bills are created when the adoption application is approved

Attributes: Bill\_No, Bill\_Date

#### **A.4. Business Rules**

1. Customers must fill out the application and provide information, including personal information. The system gives each application a unique number.
2. The information on the application provided by the consumer is classified and stored by the system, including consumer personal information, description and explanation suitable for foster care/adoption.
3. Customers have to provide information about their pets.
4. Customers have to provide information about the people living with them.
5. Customers have to state their needs if they apply to foster an animal.
6. Every application is for one Animal, and each customer can make applications for different animals.
7. Every application will be reviewed by one staff.
8. Each reviewer is given a phone and an official email account to connect with customers.
9. Each coordinator has a vehicle. Once an application is approved, a coordinator is in charge of inspection and helping animal delivery.
10. Staff can be a reviewer or a coordinator.
11. Each staff and Animal have to be located in one branch. Each branch has at least one staff, and each branch may have animals.
12. An animal can only be fostered or adopted.
13. Animals for foster have to be detailed to meet the needs of customers.
14. Customers may be issued a bill identified by a unique number.



## Database Design Part B

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### **B.1. Overview of the case study in at most five sentences (From part A)**

Animal Welfare League NSW™( [awlnsw.com.au](http://awlnsw.com.au)) aims to provide appropriate foster care and adoption families for animals that have lost their homes.

According to the statement on the website, after confirming the relevant information with the staff by phone, the applicant can apply for adoption or foster care through the website and provide complete personal information, family members or co-residents information, and current pet information.

The branch staff will review the application form, and the coordinator will conduct an on-site inspection of the applicant's home to determine whether it is consistent with the application.

After the reviewer and the coordinator approve the application, the system will generate a bill for the adopter, and the coordinator will assist in delivering the Animal.

Each Animal for foster care will have one or more details, which will be selected by the applicant in the application to find a suitable applicant for each Animal.

### **B.2. Revised Business rules and Assumptions**

#### **Assumptions**

According to the website's requirements, each applicant must communicate with the staff by telephone before filling in the application form through the website, so it is assumed that the formal process starts from filling in the application form. There is no need for data and operation before filling in the application.

Only the reviewer and the coordinator are involved in the application process. According to business, every staff has a manager. A manager can manage many staffs or no staff. Every staff are supervised by only one manager.

The website uses different application forms (more than three). It is assumed that the system has the identification function and can classify and store the information of different application forms in different modules and automatically generate the information required by the reviewer and coordinator.

The system has to record the health check date.

The system has to record the details record date.

Assumption: the system has to record the date of selecting details.

### **Business rules:**

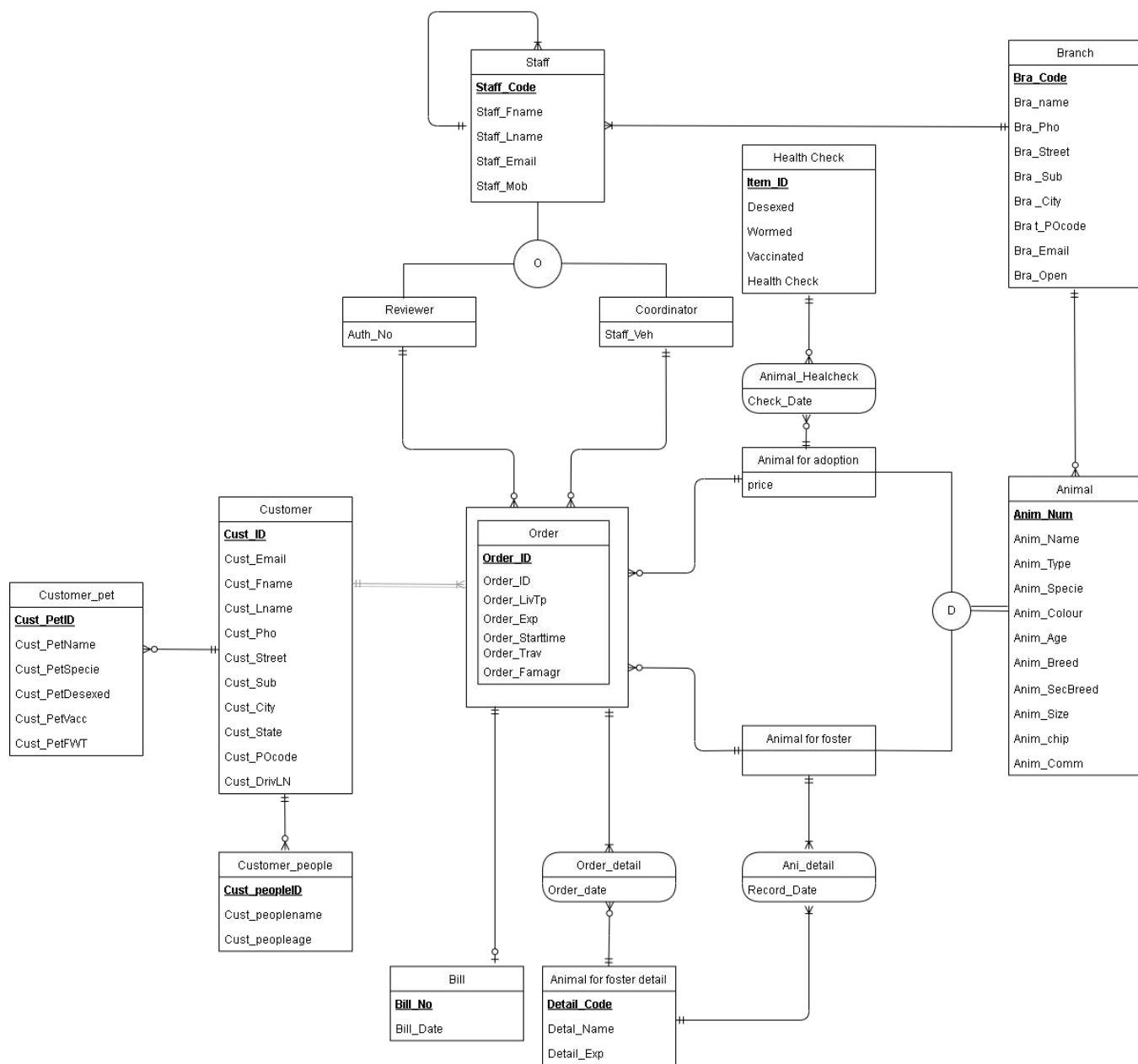
- 1、 The system generates each customer a unique number.
- 2、 Customers have to provide personal information
- 3、 Customers must provide information about their current pet(s) and the people living with them. Customers have to provide all their pets and co-living information. Every pet and person is given a unique ID.
- 4、 Every customer can place many orders, and each must place at least one. Every order is given a unique number. Customer must provide their living type, the experience of having pets, start time, and family agreement.
- 5、 Each order can apply to only one Animal.
- 6、 The customer must select at least one detailed option about the foster animals to match the appropriate foster animals.
- 7、 Each Animal has a unique number for identity and is located in a branch. System provides information for each Animal according to website.
- 8、 Each branch has a unique branch id and contains branch information.
- 9、 All the animals must be put into the foster or adoption group, and an animal can only be fostered or adopted.
- 10、 Each Animal for adoption should provide a health check record. Health checks include desexed check, vaccination, health check and dog wormed check. Different animals apply to the different check(s) for neccerey
- 11、 Each Animal for foster has to be recorded in at least one or many details.
- 12、 The system generates a bill for each order for adoption that is approved. Each bill has a unique bill number.
- 13、 Each staff has a unique staff code. Every staff has a manager as a supervisor, and a manager supervises at least one employee. Every staff must be located in a branch
- 14、 Some employees are authorized to be reviewers or coordinators. Staff can be reviewers and coordinators.
- 15、 Each reviewer has an authorization number for login into the system. Each coordinator has a vehicle for on-site inspection. Once an

application is approved, the coordinator is in charge of helping with animal delivery.

- 16、 Every application will be reviewed by one staff(reviewer). Each reviewer can review many or no orders, and each coordinator can handle many inspection cases.
- 17、 Each staff and Animal have to be located in one branch. Each branch has at least one staff, and each branch may have animals.

### B.3. ERD

31271 Database Fundamentals  
ERD Book Notation Template



**B.4. Justifications** of the ERD based on the business rules and/or assumptions.

BRs related to entity Customer:

1	The system generates each customer a unique number.
2	Customers have to provide personal information.

**The PK of the Customer is Customer ID**

BRs related to the relationship between Customers and Customer\_pet:

3	Customers must provide information about their current pet(s) and the people living with them. Customers have to provide all their pets and co-living information. Every pet and person is given a unique ID.	cardinality one to many
---	---	-------------------------

**The Pk of the Customer\_pet is Cust\_PetID**

**The FK of the Customer\_pet is Cust\_ID** from Customer

**Customer to Customer\_pet:** optional one to many

**Customer\_Pet to Customer:** mandatory one to one

BRs related to the relationship between Customers and Customer\_people:

3	Customers must provide information about their current pet(s) and the people living with them. Customers have to provide all their pets and co-living information. Every pet and person is given a unique ID.	cardinality one to many
---	---	-------------------------

**The Pk of the Customer\_people is Cust\_peopleID**

**The FK of the Customer\_people is Cust\_ID** from Customer

**Customer to Customer\_people:** optional one to many

**Customer\_people to Customer:** mandatory one to one

BRs related to the relationship between Customers and Order:

4	Every customer can place many orders, and each must place at least one. Every order is given a unique number.	Cardinality one to many
---	---	-------------------------

**The Pk of the Order(weak entity) is: Order ID Cust ID**

**The Fk of the Order is:** Cust\_ID from Customer

**Customer to Order:** mandatory one to many

**Order to Customer:** mandatory one to one

BRs related to entity Animal

7	Each Animal has a unique number for identity and is located in a branch. The system provides information for each Animal according to the website.
---	--

**The PK of the Animal is: Anim Num**

BRs related to entity Branch

8	Each branch has a unique branch id and contains branch information.
---	---

**The PK of the Branch is: Branch code**

BRs related the relationship between Animal and Branch:

7	Each Animal has a unique number for identity and is located in a branch. The system provides information for each Animal according to the website.	Cardinality one to many
17	Each staff and Animal have to be located in one branch. Each branch has at least one staff, and each branch may have animals.	Cardinality one to many

**The PK of the Animal is: Anim Num**

**The FK of the Animal is:** Branch\_code from Branch

**Animal to Branch:** mandatory one to one

**Branch to Animal:** optional one to many

BRs related the relationship between Animal, animal for adoption and animal for foster.

9	All the animals must be put into the foster or adoption group, and an animal can only be fostered or adopted.	Apply total specialization rule, disjoin constraint
---	---	---

Animal for adoption and Animal for foster are subtypes of Animal.

**The FK of the Animal for foster is:** Anim\_Num

**The PK of the Animal for foster is:** Anim\_Num from Animal

**The FK of the Animal for adoption is:** Anim\_Num

**The PK of the Animal for adoption is:** Anim\_Num from Animal

BRs related the relationship between Animal for adoption and Health Check.

10	Each Animal for adoption should provide a health check record. Health checks include desexed check, vaccination, health check and dog wormed check. Different animals apply to the different check(s) for neccerey.	cardinality many to many
----	---	--------------------------

Assumption: the system has to record the health check date.

So, create an associate entity: Animal\_Healthcheck

**The PK of Animal\_Healthcheck is:** Anim\_Num, Item\_ID

**The FK of Animal Healthcheck is:** Anim\_Num from Animal for adoption

Item\_ID from Health check

**Health check to Animal health check is:** optional one to many

**Animal health check to Health check is** mandatory one to one

**Animal health check to Animal for adoption:** mandatory one to one

**Animal for adoption to Animal health check:** optional one to many

BRs related the relationship between Animal for foster and Ani\_detail

11	Each Animal for foster has to be recorded in at least one or many details.	cardinality many to many
----	--	--------------------------

Assumption: the system has to record the details record date.

So, create an associate entity: Ani\_detail

**The PK of the Ani\_detail is: Anim\_Num, Detail\_code**

**The FK of the Ani\_detail is:** Anim\_Num from Animal for foster

Detail\_code from Animal for foster detail

**Animal for foster detail to Ani\_detail:** mandatory one to many

**Ani\_detail to Animal for foster detail:** mandatory one to one

**Animal for foster to Ani\_detail:** mandatory one to many

**Ani\_detail to Animal for foster:** mandatory one to one

BRs related the entity Animal for foster detail:

6	The customer must select at least one detailed option about the foster animals to match the appropriate foster animals.	
11	Each Animal for foster has to be recorded in at least one or many details.	

**The PK of the entity Animal for foster detail is: Detail\_code**

BRs related the relationship between Animal for foster detail and Order

6	The customer must select at least one detailed option about the foster animals to match the appropriate foster animals.	cardinality many to many
---	---	--------------------------

Assumption: the system has to record the date of selecting details.

So, create an associate entity: Order\_detail

**The PK of the Order\_detail is: Detail\_code, Order\_ID, Cust\_ID**

**The FK of the Order\_detail is:** Detail\_code from Animal for foster detail

Order\_ID from Order

Cust\_ID from Order

**Order to Order\_detail:** mandatory one to many

**Order\_detail to Order:** mandatory one to one

**Animal for foster detail to Order\_detail:** optional one to many

**Order\_detail to Animal for foster detail:** mandatory one to one

BRs related the entity Bill

12	The system generates a bill for each order for adoption that is approved. Each bill has a unique bill number.
----	---

The PK of Bill is **Bill No**

BRs related the relationship between Order and Bill

12	The system generates a bill for each order for adoption that is approved. Each bill has a unique bill number.	cardinality one to one
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The PK of Bill is **Bill No**

The FK of the Bill is Orde\_ID from Order

Cust\_ID from Order

**Order to Bill:** optional one to one

**Bill to Order:** mandatory one to one

BRs related the relationships between Order and Animal(Animal for adoption and Animal for foster)

5	Each order must apply to only one Animal.	cardinality one to one
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The PK of the Order is **Cust ID, Order ID**

The FK of the Order is Cust\_ID from Customer

Anim\_Num from Animal for adoption or Animal for foster

**Order to Animal for adoption:** mandatory one to one

**Order to Animal for foster:** mandatory one to one

**Animal for adoption to Order:** optional oneto many

**Animal for foster to Order:** optional one to many



BRs related the entity Staff and self-relationship of Staff

13	Each staff has a unique staff code. Every staff has a manager as a supervisor, and a manager supervises at least one employee.	cardinality one to many
----	--	-------------------------

**The PK of the Staff is Staff Code.**

**The FK of the Staff is Staff\_Code (Manger\_ID) from Staff**

Staff to Staff(Manager) is mandatory one to one

Staff(Manager) to Staff is mandatory one to many

BRs related the relationship between Staff and Branch.

17	Each staff and Animal have to be located in one branch. Each branch has at least one staff, and each branch may have animals.	cardinality one to many
----	---	-------------------------

**The PK of the Staff is: Staff Code**

**The Fk of the Staff is: Bra\_Code from Branch**

**Staff to Branch:** mandatory one to one

**Branch to Staff:** mandatory one to many

BRs related the relationship of the Staff, Reviewer and Coordinator

14	Some employees are authorized to be reviewers or coordinators. Staff can be reviewers and coordinators.	Apply partial specialization rule, overlapping constraint
15	Each reviewer has an authorization number for login into the system. Each coordinator has a vehicle for on-site inspection. Once an application is approved, the coordinator is in charge of helping with animal delivery.	

**The PK of the Reviewer is Staff Code**

**The PK of the Coordinator is Staff Code**

**The FK of the Reviewer is Staff\_Code from Staff**

**The FK of the Coordinator is Staff\_Code from Staff**

BRs related the relationships between Order and Staff(Reviewer, Coordinator)

16	Every application will be reviewed by one staff(reviewer). Each reviewer can review many or no orders, and each coordinator can handle many inspection cases.	cardinality one to many cardinality one to many
----	---	--

**The PK of Order is: Order\_ID, Cust\_ID**

**The FK of Order is:** Cust\_ID from Customer

Staff\_ID from Reviewer

Satff\_ID from Coordinator

**Order to Reviewer:** mandatory one to one

**Order to Coordinator:** mandatory one to one

**Reviewer to Order:** optional one to many

**Coordinator to order:** optional one to many

## **Database Design Part C**

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### **C. 1. Revised Business rules and assumptions (From part B)**

#### Assumptions

According to the website's requirements, each applicant must communicate with the staff by telephone before filling in the application form through the website,

so it is assumed that the formal process starts from filling in the application form. There is no need for data and operation before filling in the application.

Only the reviewer and the coordinator are involved in the application process. According to business, every staff has a manager. A manager can manage many staffs or no staff. Every staff are supervised by only one manager.

The website uses different application forms (more than three). It is assumed that the system has the identification function and can classify and store the information of different application forms in different modules and automatically generate the information required by the reviewer and coordinator.

The system has to record the health check date.

The system has to record the date of order.

### **Business rules:**

- 1、 The system generates each customer a unique number.
- 2、 Customers must provide personal information, including email address, full name, phone number, address, Drive license.
- 3、 Customers must provide information about their current pet(s) and the people living with them. Customers have to provide all their pets and co-living information as required. Every pet and person is given a unique ID. Customer must provide their pet's name, specie, desexed, vaccine and wormed. Customer must provide the name and ages of people who live with them.
- 4、 Every customer can place many orders, and each must place at least one. The system gives every order a unique number.
- 5、 Each order can apply to only one Animal.
- 6、 The customer must select at least one detailed option about the foster animals to match the appropriate foster animals. The system needs to store the order data.
- 7、 Each Animal has a unique number for identity and is located in a branch. System provides information for each Animal according to the website. Such as name, type, specie, colour, age, breed, second breed, size, chip number, and comment.
- 8、 Each branch has a unique branch id and contains branch information for customers, including branch name, shop address, email address and open time.
- 9、 All the animals must be put into the foster or adoption group, and an animal can only be fostered or adopted. Each Animal for adoption must provide a health check and price, and each Animal for foster must provide details.

- 10、 Each Animal for adoption should provide a Medi\_ record. The Medi\_ record may includes desexed check, vaccination, animal heart wormed record. Different animals apply to the different item(s) for neccerey. The system record the record date.
- 11、 Each Animal for foster has to be recorded in at least one or many details, and every detail includes a detail name and explanation. An animal can have many details, and each Animal must be recorded at least one detail.
- 12、 The system generates a bill for each order for adoption that is approved. Each bill has a unique bill number, and the system record the date bill is issued.
- 13、 Each staff has a unique staff code. Every staff has a manager as a supervisor, and a manager supervises at least one employee. Every staff must be located in a branch
- 14、 Some employees are authorized to be reviewers or coordinators. Staff can be reviewers and coordinators.
- 15、 Each reviewer has an authorization number for login into the system. Each coordinator has a vehicle for on-site inspection. Once an application is approved, the coordinator is in charge of helping with animal delivery.
- 16、 Every application will be reviewed by one staff(reviewer). Each reviewer can review many or no orders, and each coordinator can handle many inspection cases.
- 17、 Each staff and Animal have to be located in one branch. Each branch has at least one staff, and each branch may have animals.

## **C. 2. Revised ERD of Part B**



### C. 3. Relations

Customer( Cust\_ID, Cust\_Email, Cust\_Fname, Cust\_Lname, Cust\_Pho, Cust\_Street, Cust\_Sub, Cust\_City, Cust\_State, Cust\_Pocode, Cust\_DivLN)

PK Cust\_ID

Customer\_pet(Cust\_PetID, Cust\_PetName, Cust\_PetSpecie, Cust\_PetDesexed, Cust\_PetVacc, Cust\_PetFWT, Cust\_ID\*)

PK Cust\_PetID

FK Cust\_PetID\* References Customer

Customer\_people( Cust\_peopleID, Cust\_peoplename, Cust\_peopleage, Cust\_ID\*)

PK Cust\_peopleID

FK Cust\_PetID\* References Customer

Branch( Bra\_Code, Bra\_Name, Bra\_Pho, Bra\_Street, Bra\_Sub, Bra\_City, Bra\_Pocode, Bra\_Email, Bra\_Open)

PK Bra\_Code

Animal(Anim\_No, Anim\_Name, Anim\_Type, Anim\_Specie, Anim\_Colour, Anim\_Age, Anim\_Breed, Anim\_SecBreed, Anim\_Size, Anim\_Chip, Anim\_Comm, Bra\_Code\* )

PK Anim\_No

FK Bra\_Code\* References Branch

Animal for adoption( Anim\_No\* Price Healthc\_check)

PK Anim\_No

FK Anim\_No\* References Animal

Medi\_record ( Item\_ID, Item\_Name)

PK Item\_ID

Animal\_medirecord ( ( Anim\_No\*, Item\_ID\* Check\_Date)

PK Anim\_No, Item\_ID

FK Anim\_No References Animal for adoption

FK Item\_ID References Medi\_record

Animal for foster( Anim\_No\*)

PK Anim\_No

FK Anim\_No\* References Animal

Animal for foster detail( Detail\_code, Detail\_Name, Detail\_Exp)

PK Detail\_code

Anim\_Detail(Anim\_No\*, Detail\_code\*, Record\_Date)

PK Anim\_No, Detail\_code  
 FK Anim\_No References Animal for foster  
 FK Detail\_code References Animal for foster detail()

Staff(**Staff\_code**, Staff\_Fname, Staff\_Lname, Staff\_Email, Staff\_Mob, ManagerID\*, Bra\_Code\*)  
 PK Staff\_code  
 FK Bra\_Code\* References Branch  
 FK ManagerID\* References Staff (Staff\_code)

Reviewer(**Staff\_code\***, Auth\_No)  
 PK Staff\_code  
 FK Staff\_code References Staff

Coordinator(**Staff\_code\***, Staff\_Veh)  
 PK Staff\_code  
 FK Staff\_code References Staff

Order(**Cust\_ID\***, **Order\_ID**, Order\_Livtp, Order\_Exp, Order\_Starttime, Order\_Trav, Order\_Famgr, Staff\_code\_Coordinator \*, Staff\_code\_Reviewer \*, Anim\_No \*)  
 PK Cust\_ID, Order\_ID  
 FK Cust\_ID Reference Customer  
 FK Staff\_code\_Coordinator Reference Coordinator(Staff\_code)  
 FK Staff\_code\_Reviewer Reference Reviewer(Staff\_code)  
 FK Anim\_No Reference Animal (Anim\_No)

Order\_detail(**Cust\_ID\***, **Order\_ID\*** **Detail\_code\***, Order\_date)  
 PK Cust\_ID\*, Order\_ID\* Detail\_code\*  
 FK Cust\_ID Reference Order  
 FK Order\_ID Reference Order  
 FK Detail\_code Reference Animal for foster detail

Bill( **Bill\_No**, Bill\_Date, Cust\_ID\*, Order\_ID\*)  
 FK Cust\_ID Reference Order  
 FK Order\_ID Reference Order

#### C. 4. List of Functional Dependencies Related to Each Business Rules.

1	The system generates each customer a unique number.
2	Customers must provide personal information, including email address, full name, phone number, address, Drive license.



The following FD is determined based on BR1, BR2,

**FD1: Cust\_ID → Cust\_Email, Cust\_Fname, Cust\_Lname, Cust\_Pho, Cust\_Street, Cust\_Sub, Cust\_City, Cust\_State, Cust\_Pocode, Cust\_DivLN**

3	Customers must provide information about their current pet(s) and the people living with them. Customers have to provide all their pets and co-living information as required. Every pet and person is given a unique ID. Customer must provide their pet's name, specie, desexed, vaccine and wormed. Customer must provide the name and ages of people who live with them.
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The following FD is determined based on BR3

**FD2: Cust\_PentID → Cust\_PetName, Cust\_PetSpecie, Cust\_PetDesexed, Cust\_PetVacc, Cust\_PetFWT**

**FD3: Cust\_peopleID→Cust\_peoplename, Cust\_peopleage**

4	Every customer can place many orders, and each must place at least one. The system gives every order a unique number. Customer must provide their living type, the experience of having pets, start time, and family agreement.
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Strong entity to weak entity.

The following FD is determined based on BR4

**FD4: Cust\_ID, Order\_ID → Order\_Livtp, Order\_Exp, Order\_Starttime, Order\_Trav, Order\_Famgr**

5	Each order can apply to only one Animal.
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Order to Animal : mandatory 1 to 1

Animal to Order: optional 1 to many

6	The customer must select at least one detailed option about the
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	foster animals to match the appropriate foster animals. The system needs to store the order data.
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Order to Animal for foster detail: mandatory 1 to many

Animal for foster detail to Order: optional 1 to many

It's many to many relationships, so create an associate entity

"Order\_detail."

**FD5 Detail\_Code → Detail\_Name, Detail\_Exp**

**FD6 Cust\_ID, Order\_ID, Detail\_Code → Order\_Date**

<b>7</b>	Each Animal has a unique number for identity and is located in a branch. System provides information for each Animal according to the website. Such as name, type, specie, colour, age, breed, second breed, size, chip number, and comment.
<b>9</b>	All the animals must be put into the foster or adoption group, and an animal can only be fostered or adopted. Each Animal for adoption must provide a health check and price, and each Animal for foster must provide details.

Animal is supertype, Animal for adoption and Animal for foster are subtype.

Animal

**FD7**

**Animal\_No → Animal\_Name, Animal\_Type, Animal\_Specie, Animal\_Colour, Animal\_Age, Animal\_Breed, Animal\_SecBreed, Animal\_Size, Animal\_chip, Animal\_Comm.**

Animal for adoption

**FD8**

**Animal\_No → Price, Health\_Check**

<b>10</b>	Each Animal for adoption should provide a Medi_record. The Medi_record may includes desexed check, vaccination, animal heart wormed record. Different animals apply to the different item(s) for neccerey. The system record the record date.
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HealthCheck to Animal for adoption: optional 1 to many

Animal for adoption to HealthCheck: optional 1 to many

It is many to many relationships, so create 'Animal\_Heaithcheck' entity.

**FD9**

**Item\_ID → Item\_Name**

**FD10****Item\_ID, Animal\_No → Check\_Date**

<b>11</b>	Each Animal for foster has to be recorded in at least one or many details, and every detail includes a detail name and explanation. An animal can have many details, and each Animal must be recorded at least one detail.
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Animal for foster detail to Animal for foster : mandatory 1 to many

Animal for foster to Animal for foster detail: mandatory 1 to many

It is many to many relationships, so create Anim\_detail entity.

**FD11****Anim\_No, Detail\_Code → Record\_Date**

<b>12</b>	The system generates a bill for each order for adoption that is approved. Each bill has a unique bill number, and the system record the date bill is issued.
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**FD12****Bill\_No → Bill\_Date**

<b>13</b>	Each staff has a unique staff code. Every staff has a manager as a supervisor, and a manager supervises at least one employee. Every staff must be located in a branch. The system records staffs information as name, email address, mobile number, manager ID.
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**FD13****Staff\_Code → Staff\_Fname, Staff\_Lname, Staff\_Email, Staff\_Mob, ManagerID**

<b>13</b>	Some employees are authorized to be reviewers or coordinators. Staff can be reviewers and coordinators.
<b>14</b>	Each reviewer has an authorization number for login into the system. Each coordinator has a vehicle for on-site inspection. Once an application is approved, the coordinator is in charge of helping with animal delivery.

**FD14****Staff\_Code → Auth\_No****FD15****Staff\_Code → Staff\_Veh**

8	Each branch has a unique branch id and contains branch information for customers, including branch name, shop address, email address and open time.
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## FD16

**Bra\_Code → Bra\_Name, Bra\_Pho, Bra\_Street, Bra\_Sub, Bra\_City, Bra\_Pocode, Bra\_Email, Bra\_Open.**

## C. 5. Normalization

FD1: Cust\_ID → Cust\_Email, Cust\_Fname, Cust\_Lname, Cust\_Pho, Cust\_Street, Cust\_Sub, Cust\_City, Cust\_State, Cust\_Pocode, Cust\_DivLN

FD2: Cust\_PentID → Cust\_PetName, Cust\_PetSpecie, Cust\_PetDesexed, Cust\_PetVacc, Cust\_PetFWT

FD3: Cust\_peopleID → Cust\_peoplename, Cust\_peopleage

FD4: Cust\_ID, Order\_ID → Order\_Livtp, Order\_Exp, Order\_Starttime, Order\_Trav, Order\_Famgr

FD5 Detail\_Code → Detail\_Name, Detail\_Exp

FD6 Cust\_ID, Order\_ID, Detail\_Code → Order\_Date

FD7 Animal\_No → Animal\_Name, Animal\_Type, Animal\_Specie, Animal\_Colour, Animal\_Age, Animal\_Breed, Animal\_SecBreed, Animal\_Size, Animal\_chip, Animal\_Comm

FD8 Animal\_No → Price, Health\_Check

FD9 Item\_ID → Item\_Name

FD10 Item\_ID, Animal\_No → Check\_Date

FD11 Anim\_No, Detail\_Code → Record\_Date

FD12 Bill\_No → Bill\_Date

FD13 Staff\_Code → Staff\_Fname, Staff\_Lname, Staff\_Email, Staff\_Mob, ManagerID

FD14 Staff\_Code → Auth\_No

FD15 Staff\_Code → Staff\_Veh

FD16 Bra\_Code → Bra\_Name, Bra\_Pho, Bra\_Street, Bra\_Sub,  
Bra\_City, Bra\_Pocode, Bra\_Email, Bra\_Open.

## 1- First normal form (1NF)

First definition:

All attributes are atomic: Every attribute is atomic.

There is no derived attribute: All attributes are original, not calculated data.

Second definition:

There is no repeating group in the relation: Checked.

## 2- Second normal form (2NF):

There is no partial dependency. The Keys determine all non-key attributes

## 3- Third normal form (3NF):

All non-key attributes are not determined by other non\_key attributes.

Customer( Cust\_ID, Cust\_Email, Cust\_Fname, Cust\_Lname, Cust\_Pho, Cust\_Street,  
Cust\_Sub, Cust\_City, Cust\_State, Cust\_Pocode, Cust\_DivLN)

PK Cust\_ID

**FD1** Cust\_ID → Cust\_Email, Cust\_Fname, Cust\_Lname, Cust\_Pho, Cust\_Street,  
Cust\_Sub, Cust\_City, Cust\_State, Cust\_Pocode, Cust\_DivLN

Customer\_pet(Cust\_PetID, Cust\_PetName, Cust\_PetSpecie, Cust\_PetDesexed,  
Cust\_PetVacc, Cust\_PetFWT, Cust\_ID\*)

PK Cust\_PetID

FK Cust\_PentID\* References Customer

**FD2** Cust\_PentID → Cust\_PetName, Cust\_PetSpecie, Cust\_PetDesexed,  
Cust\_PetVacc, Cust\_PetFWT

Customer\_people( Cust\_peopleID, Cust\_peoplename, Cust\_peopleage, Cust\_ID\*)

PK **Cust\_peopleID**

FK Cust\_PentID\* References Customer

**FD3** Cust\_peopleID→Cust\_peoplename, Cust\_peopleage

Branch( **Bra\_Code**, Bra\_Name, Bra\_Photo, Bra\_Street, Bra\_Sub, Bra\_City,  
Bra\_Pocode, Bra\_Email, Bra\_Open)

PK **Bra\_Code**

**FD16** Bra\_Code →Bra\_Name, Bra\_Photo, Bra\_Street, Bra\_Sub,  
Bra\_City, Bra\_Pocode, Bra\_Email, Bra\_Open.

Animal(**Anim\_No**, Anim\_Name, Anim\_Type, Anim\_Specie, Anim\_Colour,  
Anim\_Age, Anim\_Breed, Anim\_SecBreed, Anim\_Size, Anim\_Chip, Anim\_Comm,  
Bra\_Code\* )

PK **Anim\_No**

FK Bra\_Code\* References Branch

**FD7** Animal\_No →Animal\_Name, Animal\_Type, Animal\_Specie, Animal\_Colour,  
Animal\_Age, Animal\_Breed, Animal\_SecBreed, Animal\_Size, Animal\_chip,  
Animal\_Comm

Animal for adoption( **Anim\_No\***, Price, Healthc\_check)

PK **Anim\_No**

FK Anim\_No\* References Animal

**FD8** Animal\_No→Price, Health\_Check

Medi\_record ( **Item\_ID**, Item\_Name)

PK **Item\_ID**

**FD9** Item\_ID → Item\_Name

Animal\_medirecord ( ( **Anim\_No\***, **Item\_ID\*** Check\_Date)

PK **Anim\_No**, **Item\_ID**

FK Anim\_No References Animal for adoption

FK Item\_ID References Medi\_record

**FD10** Item\_ID, Animal\_No→Check\_Date

Animal for foster detail( **Detail\_code**, Detail\_Name, Detail\_Exp)

PK Detail\_code

**FD5** Detail\_Code→Detail\_Name, Detail\_Exp

Anim\_Detail(**Anim\_No\***, **Detail\_code\***, Record\_Date)

PK Anim\_No, Detail\_code

FK Anim\_No References Animal for foster

FK Detail\_code References Animal for foster detail()

**FD11** Anim\_No, Detail\_Code →Record\_Date

Staff(**Staff\_code**, Staff\_Fname, Staff\_Lname, Staff\_Email, Staff\_Mob, ManagerID\*, Bra\_Code\*)

PK Staff\_code

FK Bra\_Code\* References Branch

FK ManagerID\* References Staff (Staff\_code)

**FD13** Staff\_Code → Staff\_Fname, Staff\_Lname, Staff\_Email, Staff\_Mob, ManagerID

Reviewer(**Staff\_code\***, Auth\_No)

PK Staff\_code

FK Staff\_code References Staff

**FD14** Staff\_Code → Auth\_No

Coordinator(**Staff\_code\***, Staff\_Veh)

PK Staff\_code

FK Staff\_code References Staff

**FD15** Staff\_Code → Staff\_Veh

Order(**Cust\_ID\***, **Order\_ID**, Order\_Livtp, Order\_Exp, Order\_Starttime, Order\_Trav, Order\_Famgr, Staff\_code\_Coordinator \*, Staff\_code\_Reviewer \*, Anim\_No \*)

PK Cust\_ID, Order\_ID

FK Cust\_ID Reference Customer

FK Staff\_code\_Coordinator Reference Coordinator(Staff\_code)

FK Staff\_code\_Reviewer Reference Reviewer(Staff\_code)

FK Anim\_No Reference Animal (Anim\_No)

**FD4** Cust\_ID, Order\_ID → Order\_Livtp, Order\_Exp, Order\_Starttime, Order\_Trav, Order\_Famgr

Order\_detail(**Cust\_ID\***, **Order\_ID\***, **Detail\_code\***, Order\_date)

PK Cust\_ID\*, Order\_ID\* Detail\_code\*

FK **Cust\_ID** Reference Order

FK **Order\_ID** Reference Order

FK **Detail\_code** Reference Animal for foster detail

**FD6** Cust\_ID, Order\_ID, Detail\_Code → Order\_Date

FD12 Bill( **Bill\_No**, Bill\_Date, Cust\_ID\*, Order\_ID\*)

FK Cust\_ID Reference Order

FK Order\_ID Reference Order

**FD12** Bill\_No → Bill\_Date