

IS-436 Final Capstone

Feline Information Reporting System

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IS-436: Structured Systems Analysis and Design

Section: 2

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Executive Summary

The Gritty Kitties organization was established at UMBC to provide felines in the Catonsville community the care and help they need. As described in UMBC's community portal, Gritty Kitties is dedicated to improving both the health and the quality of life of UMBC's feline population through human education and engagement. Gritty Kitties has been at the forefront of establishing methods to help the local stray felines through TNR (trap-neuter-return). Currently, a google spreadsheet is the primary tool to track spotted felines and organize educational events on campus to help prevent felines from reproducing in dangerous environments. Gritty Kitties offers workshops to educate community members and to find new homes for strays.

Business Problem

Gritty Kitties currently uses a Google spreadsheet as their primary information management system. While the system can be a practical solution in the short-run, it doesn't scale well into the future and doesn't provide a robust platform for data analysis and reporting. Moreover, Gritty Kitties needs to be able to track feline information in real-time to assist in specific cases where stray felines are potentially in danger and notifying the staff, club advisor and the president of Gritty Kitties is important.

Proposed Solution:

Our team of student analysts at UMBC developed this capstone project report in conjunction with training received in IS 436 "Structured Systems Analysis & Design". We believe this project provides a strong foundation for future consideration and long-term implementation planning. Our solution for Gritty Kitties is to provide effective tracking and management of the local feline population through a streamlined mobile application. Our goal is to allow staff, students, and other volunteers to document and notify proper channels of

feline-related cases. In terms of business value, developing a mobile application will allow users to upload a profile in real time and record accurate data about a stray feline in the field. This inputted information will be critical for allowing Gritty Kitties to identify vulnerable felines that need care.

1.0 Systems Request

1.0 Project Sponsor:

Susan Morris | Club Advisor | Gritty Kitties | SMorris2@umbc.edu

1.1 Business Need:

Gritty Kitties is an organization at UMBC, dedicated to helping and identifying feline colonies in the surrounding areas in addition to UMBC that have been trapped, neutered, and returned (TNR). TNR is the act of laying a trap outside to secure a stray feline who needs medical help and allows the specialist to bring the feline to the vet safely to get the feline the care they need. To identify the appropriate care each feline needs, Gritty Kitties observes these feline colonies determining the correct type of care, which one's have been interacted with, and where they go within the surrounding areas and UMBC. Currently, the system used by Gritty Kitties is a spreadsheet containing data about each feline's status and condition.

1.2 Problem Summary:

Gritty Kitties uses a spreadsheet and relies on members to fill out if a feline has been TNR'd or spotted. Members will also report additional information relevant to that feline as well. The following data is recorded: the reporter's name, the date when the feline was spotted, a description of the feline, the status of its health, the location, photo of the feline and space for additional notes. After filling out this information it could be useful when running analytical, annual or informational reports. When looking back at these reports the specialist can identify areas with an increased number of strays and how we can decrease the stray feline population while getting them help. Additionally, the specialist can look at which feline has been through TNR and ensure when out in the field they don't get TNR'd again.

When filling out the spreadsheet, it proves to be difficult to provide detailed information in emergency situations. Also, there may be situations where the feline runs off before gathering all the required information for the spreadsheet. Therefore, Gritty Kitties needs a new management system.

1.5 Business Requirements:

Gritty Kitties requires a new, efficient way to correctly identify and record feline encounters in real-time. The system's purpose is to analyze their condition and identify which type of care is

best suitable for each feline. While properly identifying the traits of each feline, there needs to be a better way of tracking it in real-time. This system needs the ability to accurately capture data about the felines in local neighborhoods; in addition to what's already there, the data should contain weight, color of the feline, gender, and be easily accessible to those who need this information.

1.6 Project Assumptions:

- Gritty Kitty executive board and club advisor will provide training on the new system to prospective members
- Gritty executive board and club advisor will receive training on how to use the new system and efficiently use it
- Gritty Kitty executive board and members will be able to identify a stray feline who has been trapped, neutered and returned.

1.7 Preliminary Project Recommendations:

Numerous options have been analyzed for which solution would be best suited for Gritty Kittie's business needs to improve time and costs towards collecting information. A database management system would be the ideal solution to implement for Gritty Kitties as this best suits their needs. A database system would have a front-end or user interface for the members inputting the information they have gathered into the system. Then on the back end of the system it will keep records of all information stored pertaining to each feline identified in the system.

1.8 Business Value:

Implementing a better system to replace the current one will benefit Gritty Kitties as having an efficient way to track this data will reduce the time by 40% and costs by \$500 annually with caring for these felines. Managing the care for these felines can be time and resource consuming. Having accurate reports will assist these feline's in getting the care they need while reducing time, stress, and money on the members involved.

1.9 Special Constraints:

Gritty Kitties is a medium sized organization that has its own challenges. Member size is a challenge for the organization since a small number of members live near the Catonsville area

which limits the amount of help and data collection needed. Additionally, funding is an issue within the organization and limits the purchasing of resources. Without proper funding, this will decrease the ability and accessibility to expand the organization's efforts and become ineffective.

Roles for deliverables:

D1 Deliverable:

Lead - Courtney Brandon

Admin - IB Olajide

D2 Deliverable:

Lead - IB Olajide

Admin - Mehak Ahuja

D3 Deliverable:

Lead - Mehak Ahuja, Paul Thrasybule

Admin - Isaac Yang

D4 Deliverable:

Lead - Isaac Yang

Admin - Manisha Vijay

D5 Deliverable:

Lead - Manisha Vijay

Admin - Paul Thrasybule, Courtney Brandon

D2 - Requirements: Use Cases & Definitions

2.0: Requirements Definition

Systems need to clearly define requirements for what needs to be done. Basic details of each feline and records of each feline shall be maintained to help track the medical records of each feline. Records shall be easy to access for people with appropriate knowledge to care for each feline. The system shall be accessible for mobile devices to enable real-time entry of reports for multiple users. In addition to report entries, the system shall be able to respond quickly to requests without any performance issues. Security issues also shall be considered. Encryption of sensitive details shall be a priority. An implementation of role-based access can control reports and who can view them. Additionally, the system shall adhere to regulations relevant to the system.

2.1: Functional Requirements

2.1.1 Process-Oriented Requirements

2.1.1.1: The system shall allow users to create and manage profiles for each feline, including details such as description, vaccination status, health status, and care history.

2.1.1.2: The system shall enable users to log sightings of felines in real-time, capturing details including the date, observer name, and condition of the feline.

2.1.1.3: The system shall facilitate the reporting of felines that require medical attention, allowing users to document the necessary steps taken.

2.1.2: Information-Oriented Requirements

2.1.2.1: The system shall store comprehensive attributes, in the form of a feline profile of each feline, including weight, color, gender, vaccination status, and spay/neuter status.

2.1.2.2: The system shall maintain an accessible database of all feline encounters, allowing members to easily search and filter attributes by various criteria.

2.2: Non-Functional Requirements

2.2.1 Operational Requirements

2.2.1.1: The system shall be available as an app for use on mobile devices to enable real-time entry of reports in the field.

2.2.1.2: The system shall support multiple users to allow various members to input feline reports simultaneously.

2.2.2: Performance Requirements

2.2.2.1: The system shall respond to user queries and feline report submissions within a low level of latency not to exceed 3 seconds to achieve optimum performance.

2.2.2.2: The system shall accommodate at least 50 concurrent users without performance degradation.

2.2.3: Security Requirements

2.2.3.1: The system shall encrypt sensitive user and feline details to ensure privacy and security.

2.2.3.2: The system shall implement role-based access control to restrict detailed entry and viewing permissions based on user roles.

2.2.4: Cultural Requirements

2.2.4.1: The system shall comply with local animal welfare regulations and relevant protection laws.

2.2.4.2: The system shall provide multilingual support to the feline for a diverse membership base.

3.0: Interview Guide

To properly obtain a valid overview of the organization, two interviews were conducted. These are done by Ib Olajide, Courtney Brandon, and Mehak Ahuja. The questions contain both open, closed, and probing-ended prompts. Open responses found several things. The process for TNR is around a week. Responses from Discord determine any details regarding the felines. The details show their health, location, and available contacts for them. Closed responses showed several things. Currently, there is no one person that takes care of the felines. The number of felines spayed and in the colony is known. It is unknown how many felines are microchipped. The probing responses showed several things. Current tasks for the organization are on a case-by-case system. The tracking system is unorganized and many students give incomplete reports. Discord and Instagram are the ways to communicate with the organization's members.

3.1: Interview One

Purpose/Objectives of the Interview:

To gather insights and requirements related to the tracking and management of the feline population, focusing on current practices, challenges, and suggestions for improvement.

Date: September 26, 2024

Time: 1:00 PM (MDT)

Location: Webex

Interviewer's Name: Ib Olajide, Courtney Brandon, Mehak Ahuja

Interviewee's Name: Susan Morris

Interviewee's Title: Club Advisor

Open-Ended Questions

1. **Question: How long would you say is the average time for trap, neuter, and rescue of a feline?**
 - *Response:* The timeline for TNR (trap-neuter-return) is about a week.
2. **Question: What system would you say is in place already that is used to keep track of felines?**
 - *Response:* The current system is very informal and disorganized, relying on a small spreadsheet on Discord for logging sightings.

3. Question: What type of reports would you find beneficial when reporting feline-related cases?

- *Response:* Comprehensive reports detailing the feline's condition and location would be beneficial.

4. Question: What details about the felines are currently being tracked?

- *Response:* The spreadsheet tracks sightings, descriptions, location, health status, and contact details for follow-up.

5. Question: Who is in charge of keeping track of the felines?

- *Response:* There isn't a designated person; whoever receives the report generally takes the lead.

6. Question: Can you walk us through a typical day at work?

- *Response:* I check Discord for reports, follow up with the person who reported a sighting, and coordinate TNR if necessary.

7. Question: What are the key objectives and goals for your department?

- *Response:* Ensuring the felines are cared for, education on campus about feral feline care, and increasing outreach efforts in surrounding communities.

Closed-Ended Questions

1. Question: How many felines are currently in the colony?

- *Response:* There are about 5 felines in total across different areas on campus.

2. Question: How many have left (removed, passed away)?

- *Response:* The exact numbers are unclear, but there have been removals and some have passed away.

3. Question: How many are currently spayed/neutered?

- *Response:* At least 2 felines are confirmed to be spayed/neutered.

4. Question: How many are vaccinated, and microchipped?

- *Response:* They receive vaccinations at the time of neutering, but it's uncertain how many are microchipped.

5. Question: How often (if ever) has it occurred where you've accidentally TNR'd a feline more than once?

- *Response:* It's a possibility, but the ear-tipping system helps prevent it.

6. Question: Is there a designated person in charge of keeping track of the felines? (Yes/No)

- *Response:* No, there's currently no specific role assigned.

7. Question: Do you currently use any software to track feline details?

- *Response:* No formal software is used; feline reports are tracked via a spreadsheet on Discord.

Probing Questions

1. Question: What are the tasks that you have to complete on a daily basis?

- *Response:* Tasks include monitoring reports, following up on feline sightings, and coordinating with local shelters if needed.

2. Question: Do you assign tasks to other people? If so, how do you determine who gets what task?

- *Response:* Tasks are assigned based on availability; whoever can act on the reports first takes the lead.

3. Question: Can you explain a situation where the current tracking system fell short?

- *Response:* The current system can be disorganized, leading to repeated reports on the same felines, especially from new campus members.

4. Question: What tools do you use at work? Can you elaborate on how they help you?

- *Response:* We primarily use Discord for communication and Instagram for outreach, which helps keep the community engaged.

5. Question: What details are valuable when feline cases are reported?

- *Response:* We're often "lucky to get the info that we do," as students may not fill out forms completely, leading to challenges like blurry pictures or unclear details.

Summary of Key Findings

Current Practices: The organization relies on informal tracking methods using Discord and a spreadsheet, leading to challenges in the organization.

Challenges Identified: Disorganization, reliance on volunteer reporting, and difficulty in gathering complete details.

Potential Improvements: Implementing a structured database management system for better tracking and reporting.

Key Objectives: Focus on the care of campus felines and educating the community about responsible feral feline management.

Open Action Items

- Explore options for a more effective management system.
- Consider outreach strategies to ensure thorough reporting from the community.

3.2: Interview Two

Purpose/Objectives of the Interview:

To gather insights and requirements related to the tracking and management of the feline population, focusing on current practices, challenges, and suggestions for improvement. Gaining another perspective of the club through the lens of the president.

Date: October 5th, 2024

Time: 5:00 PM (EST)

Location: Webex

Interviewer's Name: Ib Olajide, Courtney Brandon, Mehak Ahuja

Interviewee's Name: Kathryn Rambo

Interviewee's Title: Club President

General Questions:

1. **Question:** After you collect details about the feline, that is: the description of the feline, its location, whether it looks healthy/ injured (the state of the feline), the date of finding, the people who found the feline their initials with their email or phone number for follow up questions (if any). After collecting all the relevant details, how do you operate if you get the details about a feline that doesn't look healthy? (ex: what are the names of all the shots/meds that the felines get)
 - *Response:* Contact the vet to get an appointment.
2. **Question:** Do you have any marketing strategies for how to promote this organization?
 - *Response:* Events every semester, newsletters, for people to be involved in community events. These include advertising at UMBC, Catonsville, nearby Baltimore area, and online on Instagram.
3. **Question:** What are the steps that you take to find a feline?
 - *Response:* They are found through word of mouth, the site log on Discord, and pics of felines. Other sources are feeding stations near libraries away from student traffic and near apartment areas.
4. **Question:** Do you store reports about a healthy feline?

- *Response:* Tracking with local TNR groups, tracking of feeding stations, and trying to keep track of felines in res-life.

5. Question: How do you differentiate between two felines? What if two different people report the same feline? What are the differentiating features of felines?

- *Response:* We look at the color and pattern of the felines. In particular, we look for the paws, chest, and face. The size and ear tips are also considered if they are marked.

6. Question: After neutering the feline and returning it to the same spot where it was found, do you still keep track of the feline?

- *Response:* Yes, to make sure that they are utilizing shelters and feeding stations, the felines have a 1-2 mile area that they stay in.

7. Question: How do you find out if a feline can be adopted or not?

- *Response:* Last winter, the felines were left here on campus by students. They were well-socialized as a result. Some were temperamental as it depends on the time they spent in the wild. There is no background check with some exceptions if they are circumstantial.

8. Question: Do you have a place to keep the felines in for some time? If yes, where and how long do you keep them for?

- *Response:* We keep them with some fosters. It depends on how sick the feline is. It can range from 2 days to 2 weeks in the vet. For the foster, it is 2 to 3 months for socialization. This makes adopting easier for when the feline is younger.

9. Question: How many hours on average do you have to work when someone reports a feline? And which process takes the most time? How much time?

- *Response:* For setting the trap, that takes the longest time, roughly for 1 to 2 hours. Someone needs to come back and check every day for 15 minutes to see if felines are there. This can take up to weeks. During that time they contact the vet and foster. A network of TNR people can be very helpful in fixing this process.

10. Question: How many people are in the organization? Can you provide us with the organizational chart?

- *Response:* 230 in email, on Discord it is 366, and 33 other volunteers.

11. Question: Does the organization get funded? (more info on that: who pays for the meds for the felines)

- *Response:* Through donations and money from fundraisers.

Summary of Key Findings

Interview One

The key findings from the interviews highlight several important aspects of feline population management. The first interview, Susan Morris, revealed that current tracking practices are informal. The tracking practices rely on a spreadsheet and Discord. The challenges include difficulty in gathering complete details about the felines, such as blurry pictures or incomplete forms. A lack of a designated person in charge of tracking could improve the process. The interview suggests that implementing a more structured database management system could improve these practices.

Interview Two

In the second interview, Kathryn Rambo emphasizes the need for veterinary appointments when a feline is found to be unhealthy. felines are tracked through word of mouth, Discord logs, and feeding stations around campus. Differentiating felines involves observing their color, patterns, ear tips, and size. The interview also discussed the process of trapping and neutering felines, which is time-intensive, with the trapping process often taking 1-2 hours each day. The organization is supported by a combination of volunteers and donations, with 33 active volunteers among a larger group of people.

General Findings

Both interviews revealed that the current feline population management system relies on informal methods such as a spreadsheet on Discord, leading to disorganization and repeated reports. There is no designated person responsible for tracking, and challenges arise from incomplete or unclear reports.

Additionally, the process of trapping and neutering is time-consuming. The organization primarily depends on volunteers and donations for support. Implementing a more structured tracking system and enhancing community engagement were identified as key areas for improvement.

4.0: Use Case Analysis

Use cases are designed to help understand the purpose of each system. The main tasks of the system shall be to generate a feline profile, report the TNR(Trap-Neuter-Rescue) status, and report to the website. A feline profile shall help facilitate relevant details of each unique feline. Details of each feline should include a basic description along with the TNR status of the feline. After all the appropriate details have been filled out, the website shall be updated to help maintain a record of felines in a given area.

Use case One: Generate Feline Profile Use case Two: Identify Treated Feline

Use Case Name: Generate Feline Profile	ID: UC-1	Priority: High
Actor: Volunteer or Staff		
Description: This use case describes how a volunteer or staff member generates a comprehensive profile for a feline in the management system. The profile includes essential details such as the feline's description, health status, TNR history, and tracking reports, facilitating better care and management.		
Trigger: The user selects the "Generate Feline Profile" option for a specific feline in the system.		
Type: ☒ External ☐ Temporal		
Preconditions: • The user is logged into the feline management system. • The user has access to feline reports in the system. • The feline has been identified either through prior reports or direct observation.		
Normal Course: • The user navigates to the "feline Management" section. • The user selects the option to generate a new feline profile.	Information for Steps • Log into the feline management system. • Navigate to the "feline Management" section.	

• The system prompts the user for required details (e.g., feline description, health status). • The user inputs the necessary details. • The user submits detailed reports to create a feline profile. • The system generates the feline profile and displays it for review. • The user has the option to save or print the generated profile.	• Select "Generate feline Profile." • Enter the required details about the feline. • Submit the report. • Review the generated profile. • Save or print the profile.		
Postconditions: • A new feline profile is created and stored in the system. • The user receives a confirmation message indicating that the profile was successfully generated.			
Exceptions: • If required fields are missing during the entry of details, the system alerts the user and specifies which fields need completion. • If the feline's report is incomplete or unclear, the system prompts the user to double-check before generating the profile. • If the user does not have permission to create profiles, the system denies access and provides an appropriate message.			
Summary Inputs	Source	Summary Outputs	Destination
• feline Description • Health Status • TNR History	• User input (volunteer or staff member)	• Generated feline Profile containing the feline's details	• feline management system database for storage of

• Microchip Status • Location Details		• Confirmation message of successful profile creation	newly created feline profiles
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Use Case Name: Identify Treated feline	ID: UC-2	Priority: High
Actor: Staff, Specialist		
Description: This use case generates an understanding for members and staff to have the ability to identify which felines have been treated through TNR. This section includes how to tell if a feline has been TNR, and how to correctly proceed once a feline has been identified by a user.		
Trigger: Accurately identifies and captures traits and features of felines		
Type: ☒ External ☐ Temporal		
Preconditions: • The user is able to identify the signs of a feline that has been TNR'd by seeing if it has an ear-tipping • The correct feline has been properly identified • The feline's behavior, pattern, color, and other traits have been noted to determine if the feline needs to be TNR'd		
Normal Course: • The user will accurately take note of the location the feline was spotted in • Additionally, the user will record details about the feline particularly the ear to see if it is tipped. Alongside noting fur color, fur pattern, facial features, health condition, and other notable features. • The user will input the gathered	Information for Steps • Gather details about the feline identified • Ensure details are accurate and ready to be inputted into the system • Details will be inputted and based on what is in our system will trigger a response to the designated contacts • Designated contacts will	

details into the system and record if the feline’s ear has been tipped ● If health condition is of concern and it’s shown the feline’s ear isn’t tipped then designated contacts will be notified. ● Designated contacts will handle the feline’s case and how to TNR the feline to get it help	determine if TNR is necessary based on the context provided		
Postconditions: ● The user will be able to identify the signs of a feline that has been TNR’d in the system ● Based on traits identified there will be an accurate reading on what specific feline needs TNR			
Exceptions: ● Users may miss if the feline’s ear has been tipped. If that is the case the user can indicate they couldn’t see the feline’s ear.			
Summary Inputs ● Health condition of the feline ● Ear tipping ● Designated contacts have been notified if necessary	Source ● User input ● Vet records	Summary Outputs ● A listing of felines that have/haven’t been TNR’d will be created ● A plan of how to TNR the identified feline will be created, analyzed, and implemented by the proper channels	Destination ● feline management system will properly track if the feline has been TNR’d.

Use case Three: Verify Website Registration

Use Case Name: Website Registration	ID: UC-3	Priority: High
Actor: Student		
Description: The website will look into the database and make sure that the feline isn't already registered in the database. If the feline isn't in the database, the website will automatically add the feline and all the details collected from the feline reporter. This eliminates the process of finding out if it's the same feline or not. It also removes the process of following up with the user to get more details. During the scope of this project a website won't be created; however, it could be after.		
Trigger: The reporter opens the website through a given link to report a feline.		
Type: ☒ External ☐ Temporal		
Preconditions: • The user has details about a feline that they saw. • The user wants to report the feline. • The feline might/might not be identified already.		
Normal Course: • The reporter clicks on the link provided on Discord. • The Report the Paw website opens up. • Ask a survey of questions based on each response that the user provides. Questions like: description of the feline, its location, whether it looks healthy/injured (the state of the feline), the date of finding, reporter email/password, and a picture of the feline. • Click submit.	Information for Steps: • Ensure that the details entered on the website are accurate. • The website has to use AI/ML to identify if there are any two similar felines.	

Postconditions:

- The website will check if the feline is already registered in the database or not.
- If it's not, then the website will add the feline reports to the database

Exceptions:

- If the user doesn't leave some fields blank, it will be hard to determine whether the feline is already in the database.

Summary Inputs	Source	Summary Outputs	Destination
• Description of the feline • Location of finding • The state of the feline: healthy/injured • Date of finding the feline • The reporter's email/phone number • Picture of the feline	• User input • Database	• New feline details will be added to the database	• Staff will determine the next steps to take with the new feline report(s).

5.0: Artifact Analysis

The artifact below is a google spreadsheet utilized by the organization called Gritty Kitties. Users fill out this artifact containing information such as contact information, timestamp of the event, location, and date.

6.0 Process Modeling

Data Flow Diagrams:

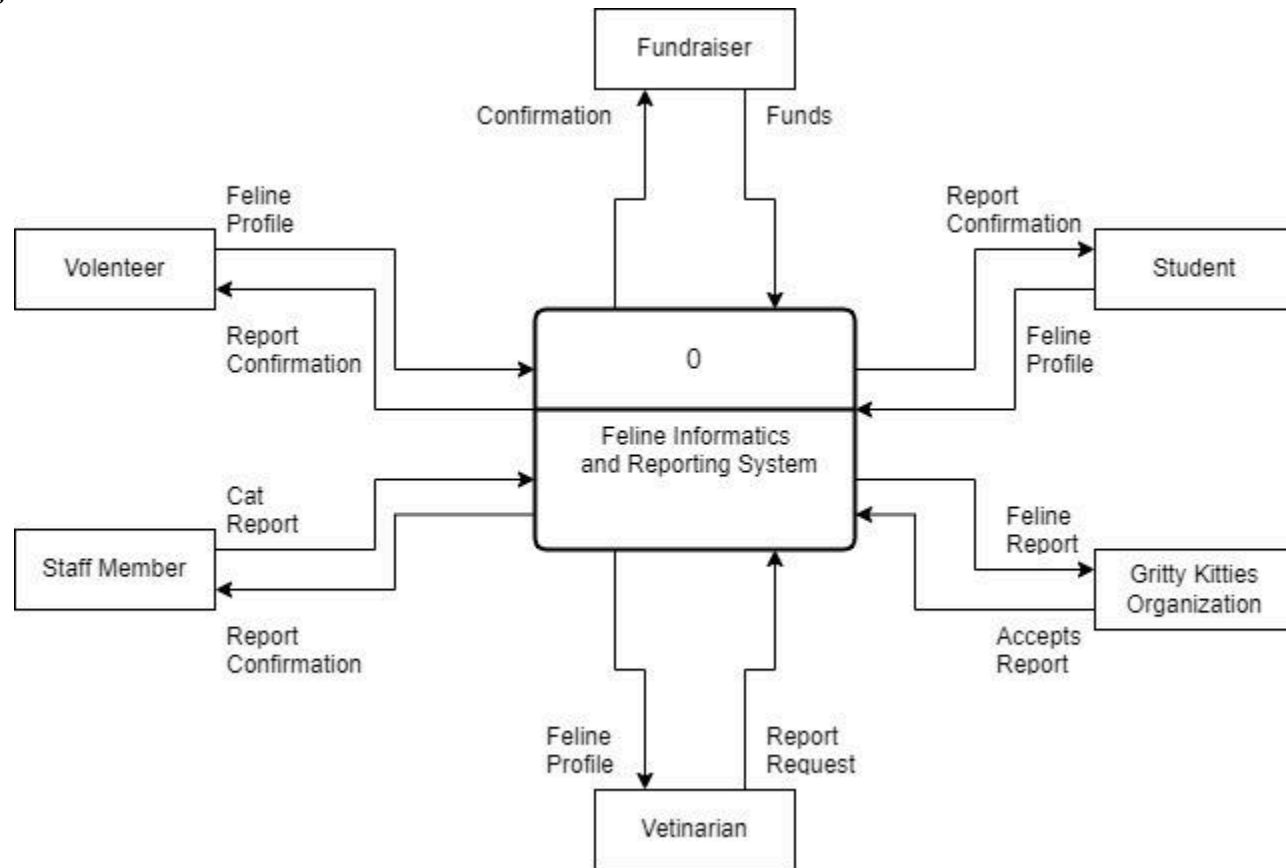
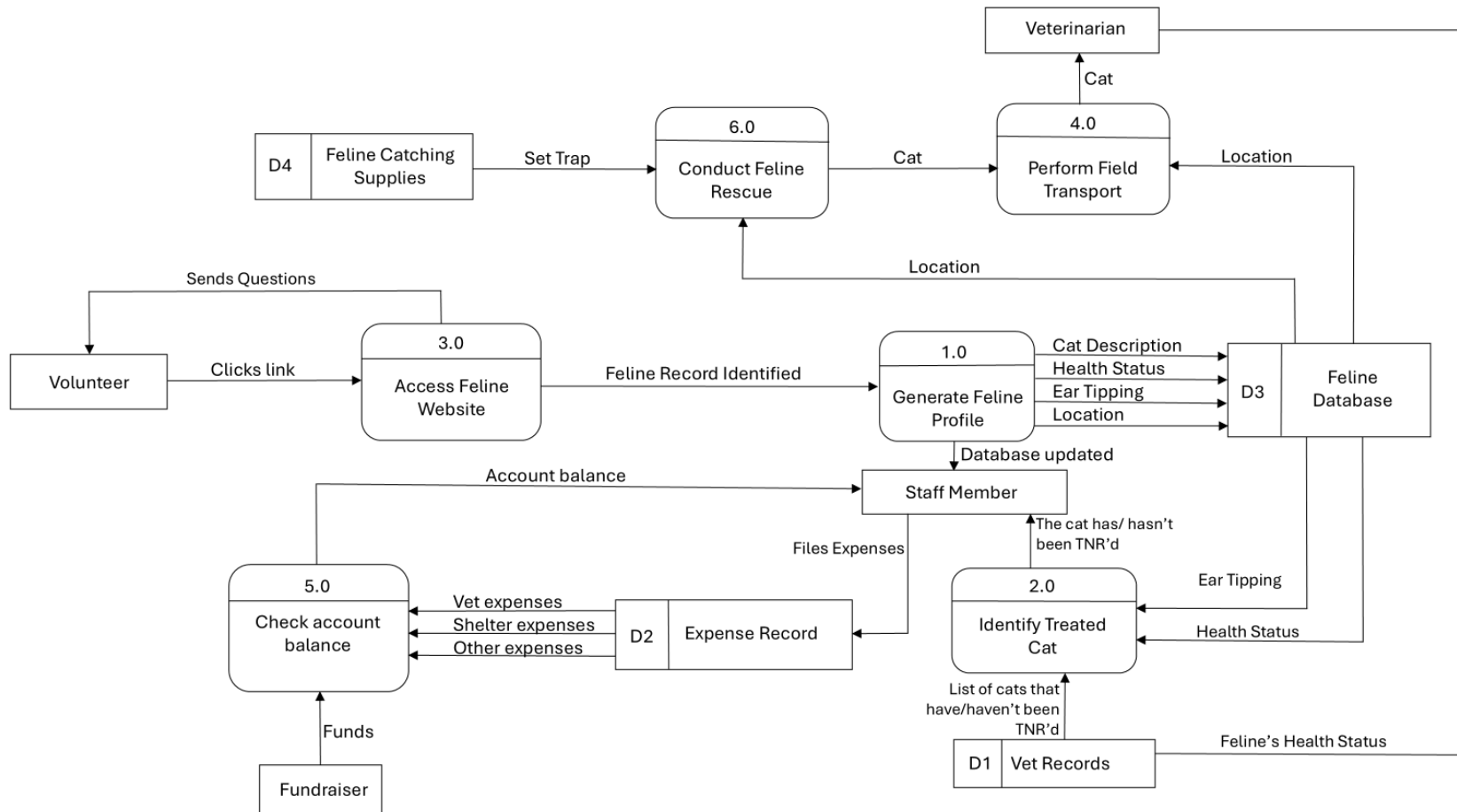


Figure 6.1 is the context diagram for FIRS



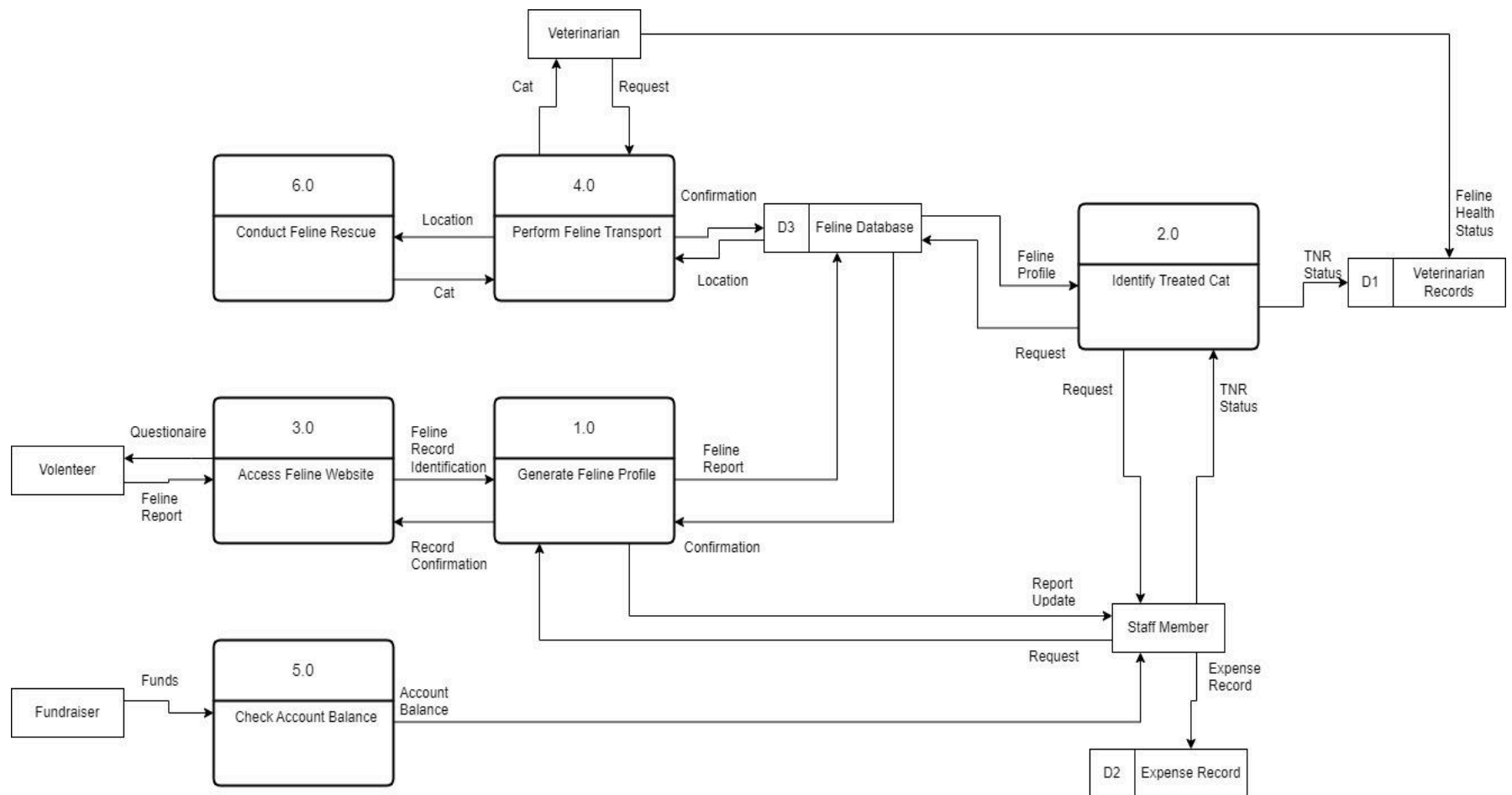


Figure 6.2 displays the level 0 diagram which is a more detailed version of the context diagram.

6.3 Child Diagrams

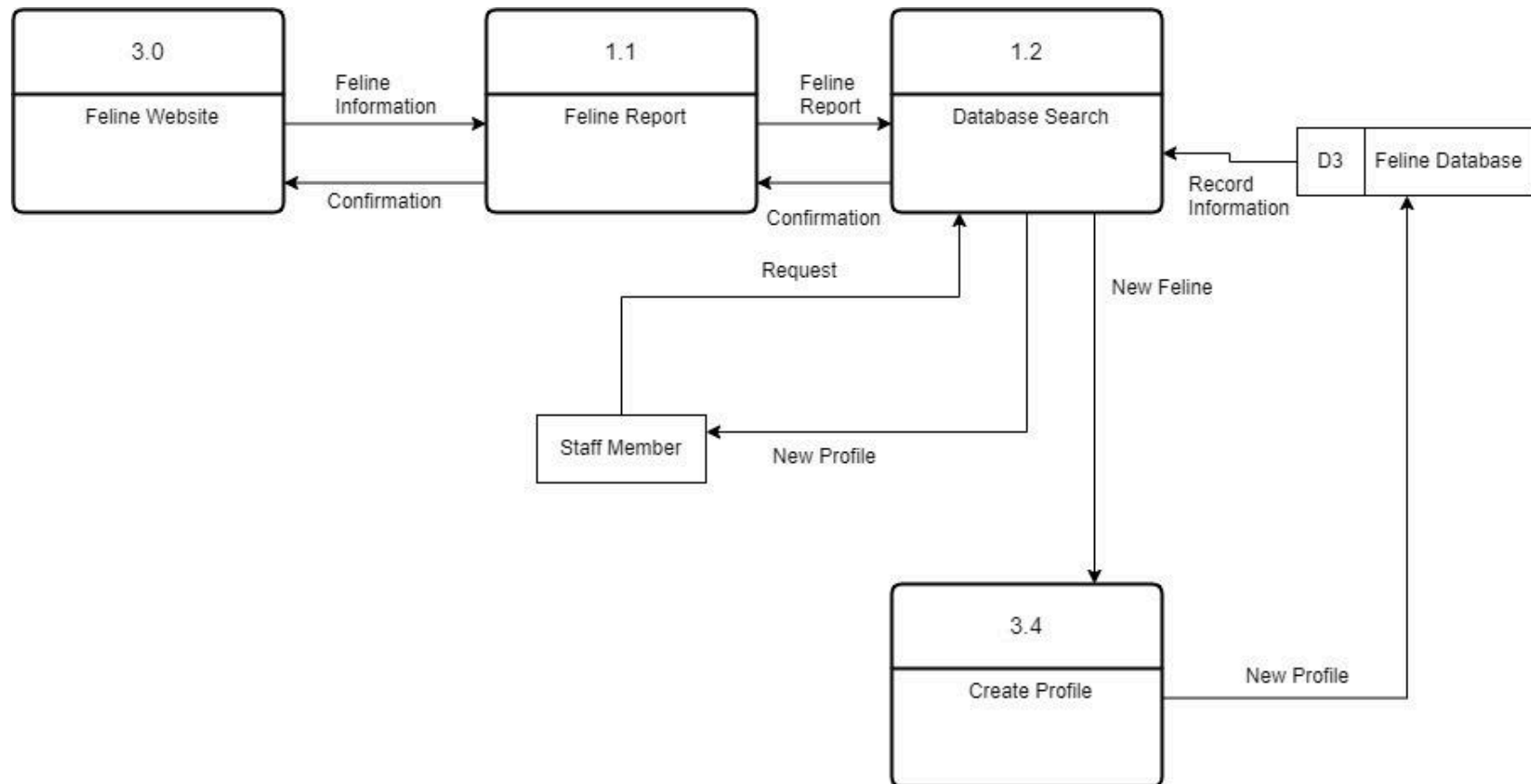


Figure 6.2 is the level 1 diagram for child process 1.0

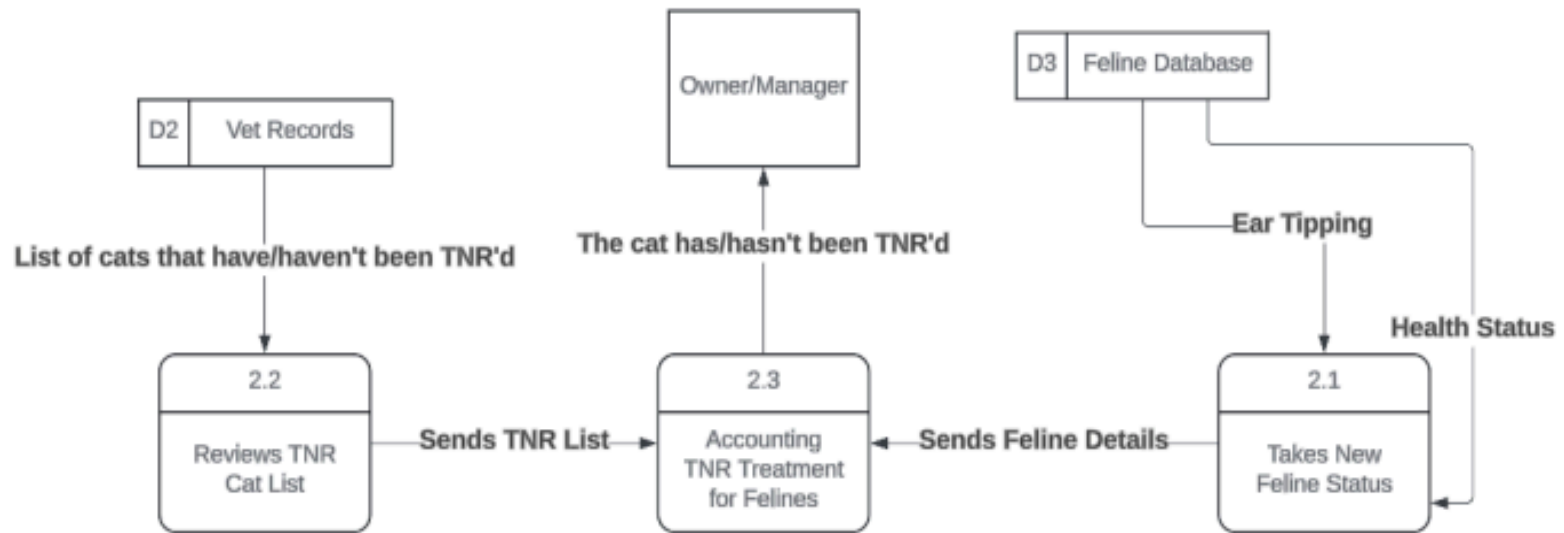


Figure 6.3 is the level 1 diagram for child process 2.0.

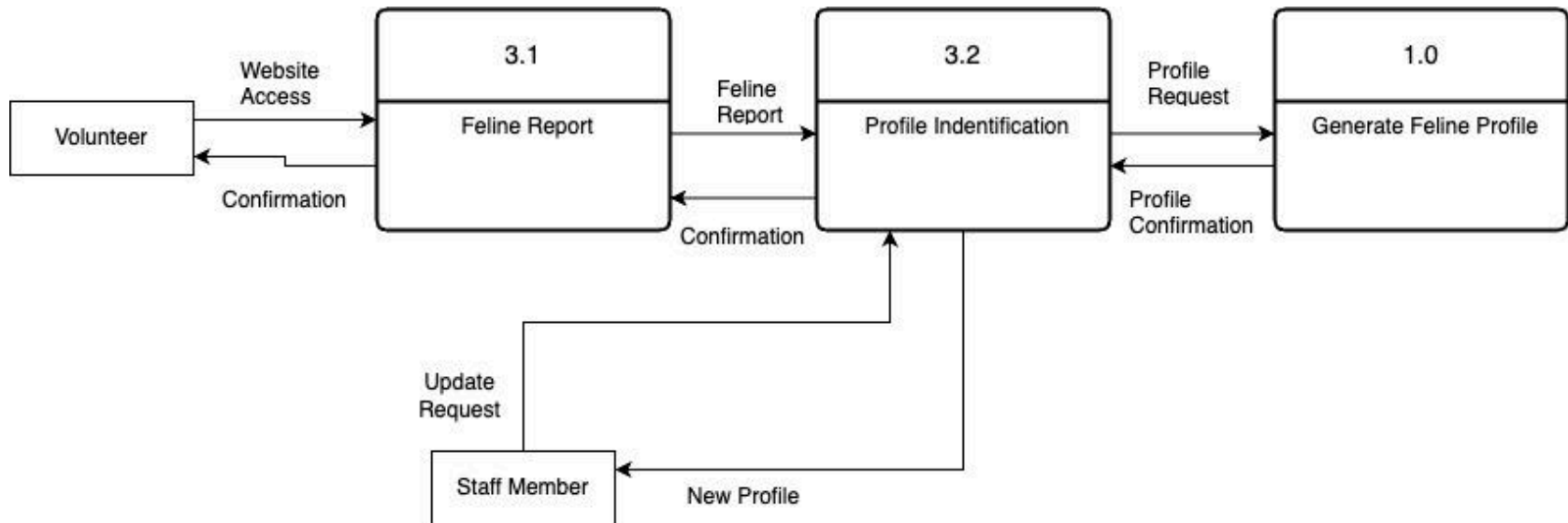


Figure 6.4 is the level 1 diagram for child process for 3.0.

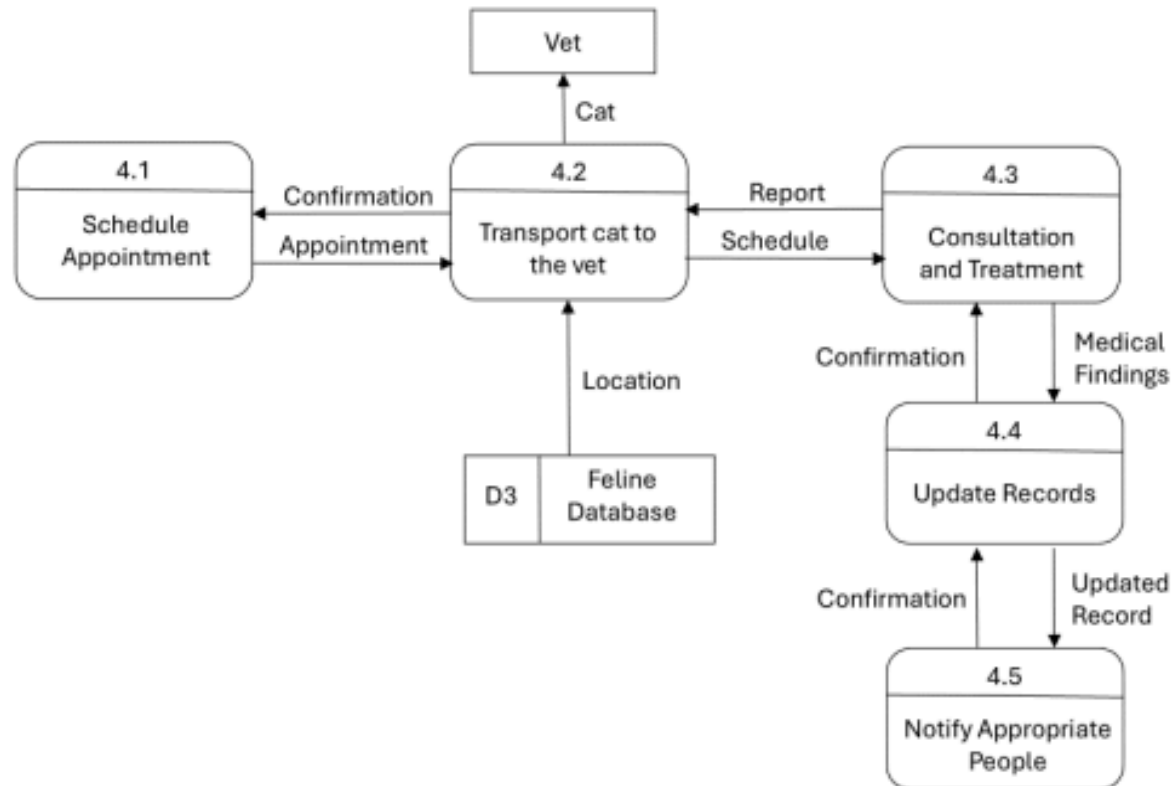


Figure 6.5 is the level 1 diagram for child process 4.0

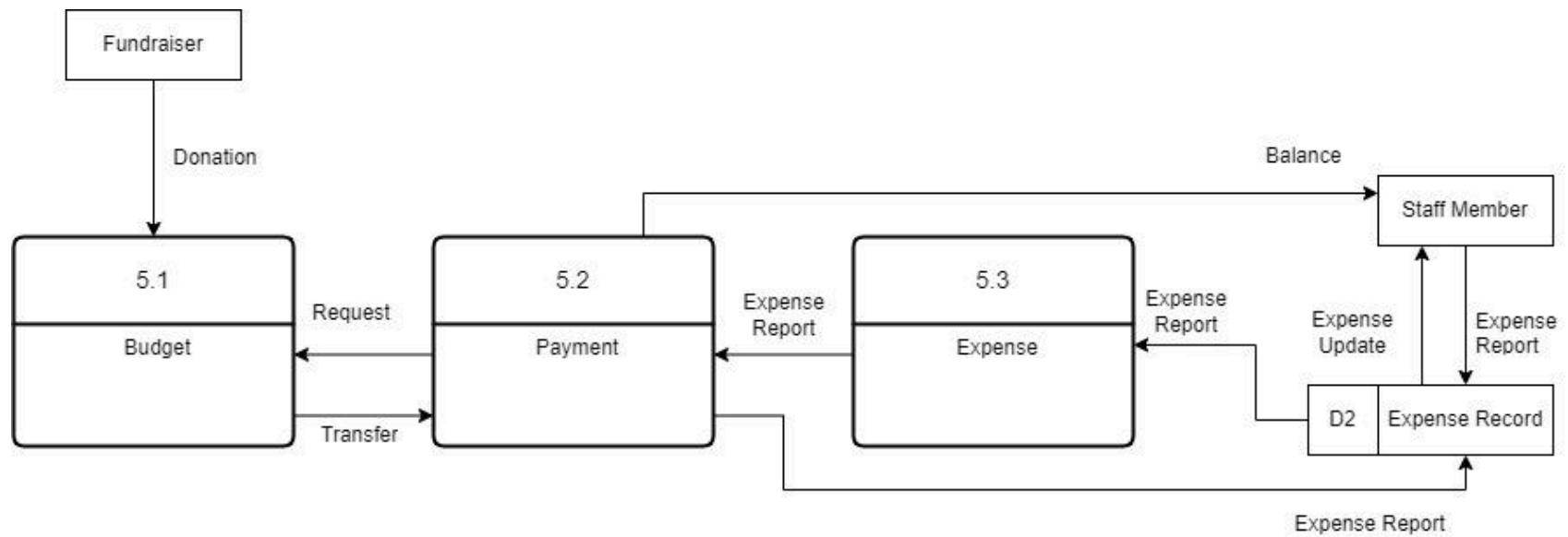


Figure 6.6 is the level 1 diagram for child process 5.0.

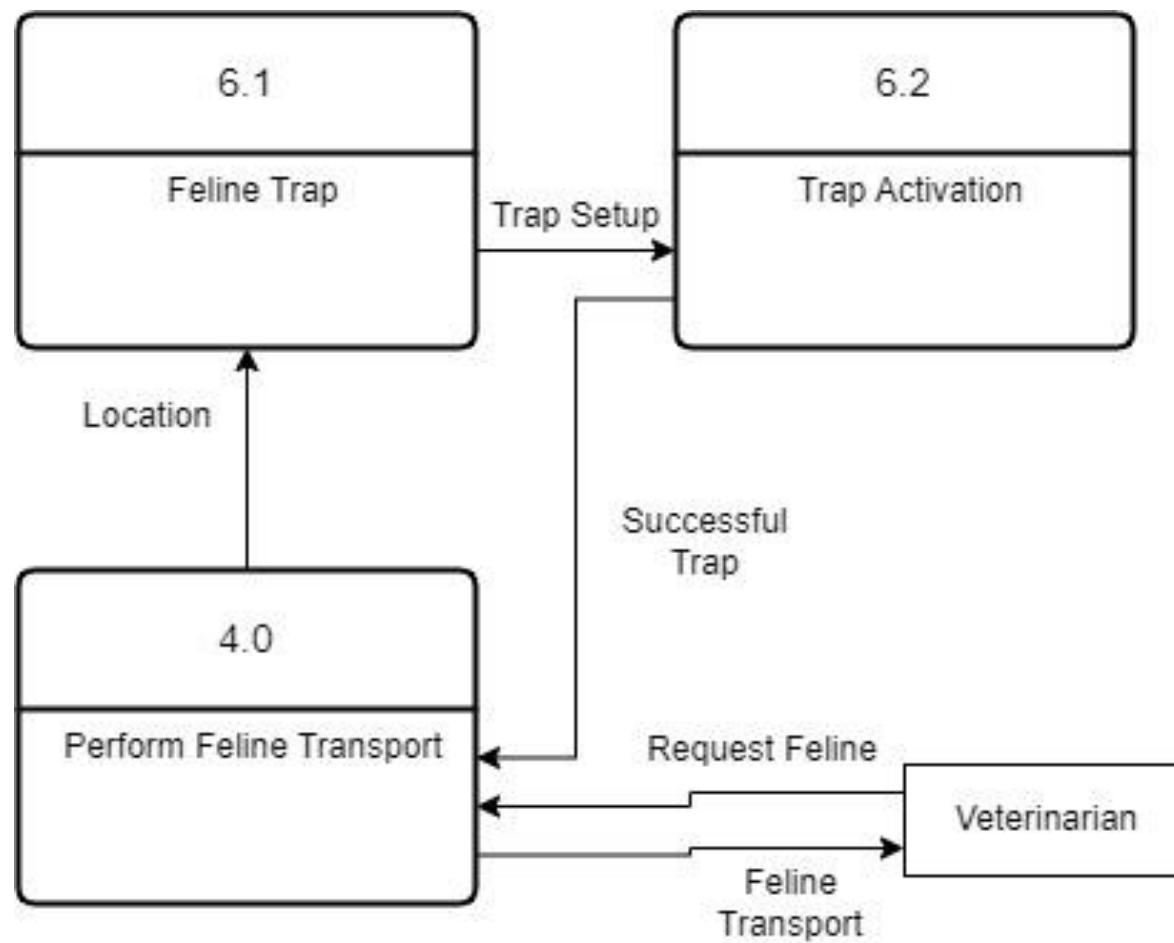


Figure 6.7 is the diagram for level 1 for child process 6.0.

7.0: Data Definitions

7.1: Vet Expenses

Description: Vet expenses are fines from the Veterinarian. Ideally, the expenses will be paid for by fundraisers.

- Type: Data Flow
- Example: \$36
- Constraint: Int

7.2: Feline Database

Description: The database will store info about the felines from the volunteers. It will store basic information like health status, health history, and movement patterns.

- Type: Data Store
- Example: White Feline, Poor, Tipped, Library Dumpster
- Constraint: Varchar

7.3: Vet

Description: A vet, or veterinarian, is a doctor that specializes in animal healthcare. Vet records will help track the medical records of felines within the system.

- Type: Entity
- Example: Gritty Kitties takes the feline that they find here to give them the necessary care that they need
- Constraint: Varchar

7.4: Account Balance

Description: It is the amount of funds that the appropriate staff have access to. The purpose of the balance is to pay for veterinary services and system maintenance.

- Type: Data flow
- Example: \$20.02
- Constraint: Currency

7.5: Location

Description: Locations refers to the place that a feline was last seen. A volunteer provides the location of the feline.

- Type: Data flow
- Example: Dumpster
- Constraint: varchar

7.6: Staff Member

Description: It is a person that helps oversee the operation of Gritty Kitties. Examples could include managers, volunteers, or people that want to help Gritty Kitties.

- Type: Entity
- Example: Susan
- Constraint: Varchar

7.7: Vet Records

Description: It is a file that stores the list of known felines that were reported to the system.

- Type: Data store
- Example: Name: Rosy, TNR Status: Yes
- Constraint: Varchar

7.8: Fundraiser

Description: It is an event that Gritty Kitties gets money from. The purpose is to receive enough funds to continue regular operations.

- Type: Entity
- Example: Craft Night with Gritty Kitties
- Constraint: Varchar

7.9: Expense Record

Description: It is a list of all relevant payments. Examples can include vet bills, shelter maintenance, and treatment plans.

- Type: Data store

- Example: \$39

- Constraint: Varchar

7.10: Ear Tipping

Description: A volunteer tells if the feline has been ear tipped or not. The information provided will be put into the appropriate files and records.

- Type: Data flow

- Example: Name: Suzy, Ear Tipped: Yes

- Constraint: Varchar

8.0 Data Modeling

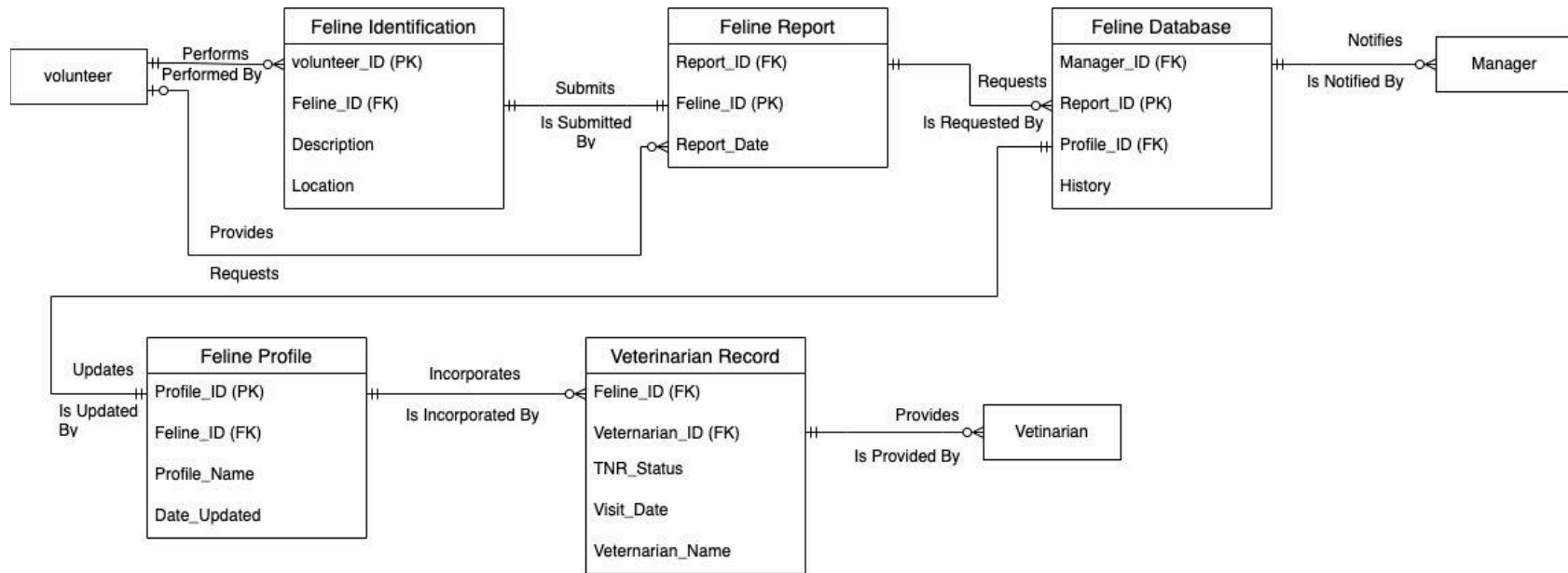


Figure 8.0 is the diagram for the Entity Relationship Model.

The Feline Process Model that outlines the roles and data flow in managing feline information. A volunteer initiates the process by providing basic details about the feline. Details help with the identification of each feline. Examples include a basic description, last known locations, and current status of the feline. All of the details provided by the volunteer is compiled into the Feline Identification entity. Collected details help create a Feline Report. The report has all the records of the relevant feline. Reports are sent to a central Feline Database or multiple databases. The database maintains Feline Profiles to store information about veterinarians and status updates. Additionally, Veterinarian Records track feline health and TNR (Trap-Neuter-Return) status. Appropriate veterinarians will review then confirm the feline's record. A manager oversees notifications and processes within the system. The Feline Process Model should demonstrate how people can help felines.

8.1 Decision Matrices

Decision matrices help with deciding between multiple potential solutions to a problem. The alternative matrix helps decide by defining a set of requirements. Each proposed solution, or alternative, is assigned a score based on how well it meets each requirement. Each requirement is given a weight to determine the importance of the corresponding criteria. The second matrix and third matrix provide additional considerations that should be a part of the decision process. Both the second and third matrix provide general tools to be included in the final solution and its subsequent design.

Criteria	Relative Importance	Mobile App	Score (1-5)	Weighted Score	GPS Collar	Score (1-5)	Weighted Score	Microchip	Score (1-5)	Weighted Score
Technical Feasibility										
System Integration Complexity	25	Requires Coding and Testing	3	75	Hardware and Software	2	50	Similar to GPS But Smaller	1	25
Maintenance Requirements	15	Software Updates	4	60	New Technology and Updates	2	30		1	25
Economic Feasibility										
Initial Development Cost	25		5	125	Off the Shelf Solutions	4	100	Difficult Due to Size	2	50
Long-term Operational Cost	10		5	50		4	40		3	30
Organizational Feasibility										
User Training Requirements	15	Convenient	5	75	Convenient	5	75	Not Visually Obvious	3	45
User Accessibility & Usability	10		5	50	Might Forget Collar	4	40		3	30
Total	100			435			335			205

The criteria are categorized into Technical, Economic, and Organizational Feasibility to assess each option's effectiveness based on system integration, general maintenance, associated cost, and expected usability. Relative importance explains how the criteria impacts the overall feasibility of each proposed solution. Each score is on a 1 to 5 scale. A score of 5 indicates that the related solution is the best option relative to both the criteria and the other proposed solutions. A score of 1 would be considered the worst. Weighted scores are based on an equation. The final calculated values are individual scores multiplied by the relative importance of the corresponding criteria. As the final scores suggest, the mobile app is the chosen solution with the given alternatives due to a score of 435.

Requirements	Server Based	Thin Client Server	Thick Client Server
Operational Requirements			
Mobile Accessibility	✓	✓	
Concurrent User Support	✓		✓
Performance Requirements			
Low-Latency Response		✓	✓
Scalability for 50+ Users	✓	✓	
Security Requirements			
Data Encryption	✓		✓
Role-Based Access Control	✓	✓	
Cultural/Political Requirements			
Compliance with Regulations	✓		✓
Multilingual Support	✓	✓	

Operational requirements emphasize user accessibility across different architectures. Performance requirements focus on the system's responsiveness and scalability. Security requirements address privacy, accessibility, and control within the system.

	Standard Client	Standard Web Server	Standard Application Server	Standard Database Server
Operating System	iOS/Android	Linux/Windows	Linux/Windows	Linux
Special Software	Web Browser/App	Hypervisor	Java, Node.js, .NET	MySQL, Postgres, Oracle
Hardware	Standard SmartPhone	Server Components	Server Components	Server Components
Network	Wi-Fi/4G/5G	Ethernet	Ethernet	Ethernet

The table outlines the technical requirements for each system component, ensuring smooth interaction with the reporting system. Mobile clients will typically use either iOS or Android. Potential users not using the mobile app would rely on Linux or Windows Server to manage data processing and secure interactions. Each component has specific software needs. A mobile app or browser would help typical clients. The requirements and needs on the backend would vary depending on the purpose of the device. Hardware specifications vary depending on the purpose of the device. Some components of the system may require higher performance configurations like high performance CPUs and high capacity RAM. Finally, network connectivity is essential. The reporting system will not be effective if people can't properly connect and interact with it. Furthermore, redundancy that is built into the system will help minimize downtime.

8.2 Summary of Matrices

A comprehensive design and feasibility analysis for a Feline Information Reporting System (FIRS) is created by a team at UMBC. The process model explains the workflow, where volunteers submit data about felines, including identifying details, locations, and status, which then contribute to a Feline Identification entity. This entity forms the basis for a Feline Report, housed in a central database that includes Feline Profiles, Veterinarian Records, and Trap-Neuter-Return (TNR) status information. Managers oversee system updates and notifications, ensuring the accuracy and currency of feline data.

Decision matrices assess three possible tracking technologies for felines. A mobile app, a GPS collar, and a microchip are evaluated based on technical, economic, and organizational criteria. Requirements like maintenance needs, development costs, and user accessibility are evaluated. With scores assigned based on their relative importance, the Mobile App is the preferred solution.

System requirements are detailed for three architecture options: Server-Based, Thin Client, and Thick Client. These requirements encompass operational aspects like mobile accessibility, performance needs including scalability and low-latency response, and security measures such as data encryption and role-based control. The proposed architecture features a smartphone-based client interface and a backend infrastructure that supports Linux/Windows servers. As a result, the architecture should be able to support MySQL/Postgres databases or any similar database software. Another consideration would be the network connections via either Wi-Fi or Ethernet. A properly designed system should help facilitate effective data communication and handling.

In summary, the document outlines the feasibility assessment, technical specifications, and system architecture essential for implementing FIRS, with a strong focus on usability, security, and performance to ensure an effective system.

9.0 System Modeling

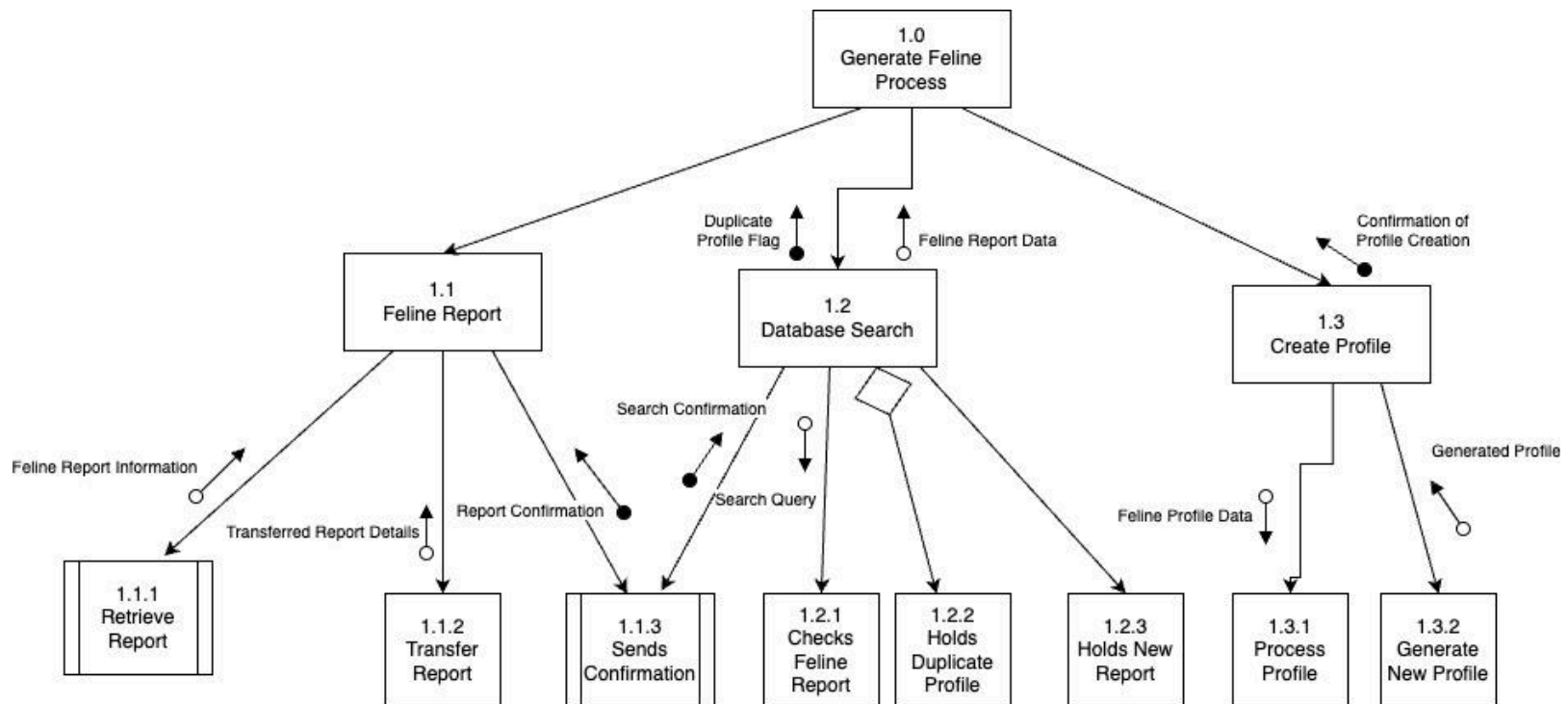


Figure 9.0 is the diagram for the system's structure chart.

The structure chart represents the hierarchical breakdown of the Generate Feline Process (1.0) into its primary modules and submodules, detailing the flow of control and data within the system. The top-level module, 1.0 Generate Feline Process, branches into three main components: 1.1 Feline Report, 1.2 Database Search, and 1.3 Create Profile. Each module is further decomposed to show its specific functions. For instance, 1.1 Feline Report includes processes to receive, transfer, and confirm reports, while 1.2 Database Search handles checking reports, identifying duplicate profiles, and holding new data. The 1.3 Create Profile module manages profile creation, processing, and confirmation. Key data flows include the "Duplicate Profile Flag" from 1.2 to 1.0, the

"Feline Profile Data" from 1.3 to 1.3.1, and the "Confirmation of Profile Creation" from 1.3 to 1.0. This structure emphasizes modular design, clear responsibilities, and feedback loops, ensuring efficient information processing and accurate profile creation.

10.0 User Interface Design

When designing a user interface for the system, the principles the team prioritized are layout, content awareness, and consistency.

Layout ensures the interface is organized into distinct and functional areas, enabling users to navigate efficiently. For example, the application employs a bottom navigation bar present on all pages, allowing users to switch seamlessly between primary sections such as the home page, TNR map, and feline database. The top area is reserved for key elements like the hamburger menu and notification bell, ensuring consistency across pages while making essential functions easily accessible.

Content awareness ensures users always know their location within the system and understand the information being displayed. Clear headings, such as the title of each page, and features like the feline profile previews—which include essential details like name, date found, and TNR status—keep users informed and oriented. Additional tools, such as search bars and sorting menus, further enhance the ease of navigating and filtering data.

Consistency was a key priority in the system's design to provide a predictable and user-friendly experience. The interface maintains consistent visual and functional elements, such as uniform button styles, icons, and layouts, matching the standards found in other mobile applications. This extends to pages like the profile creation form, which draws on familiar design patterns from social media applications, ensuring users can intuitively interact with the system.

By focusing on these principles, the design ensures the interface is easy to navigate, informative, and consistent, allowing users to interact with the application efficiently and confidently.

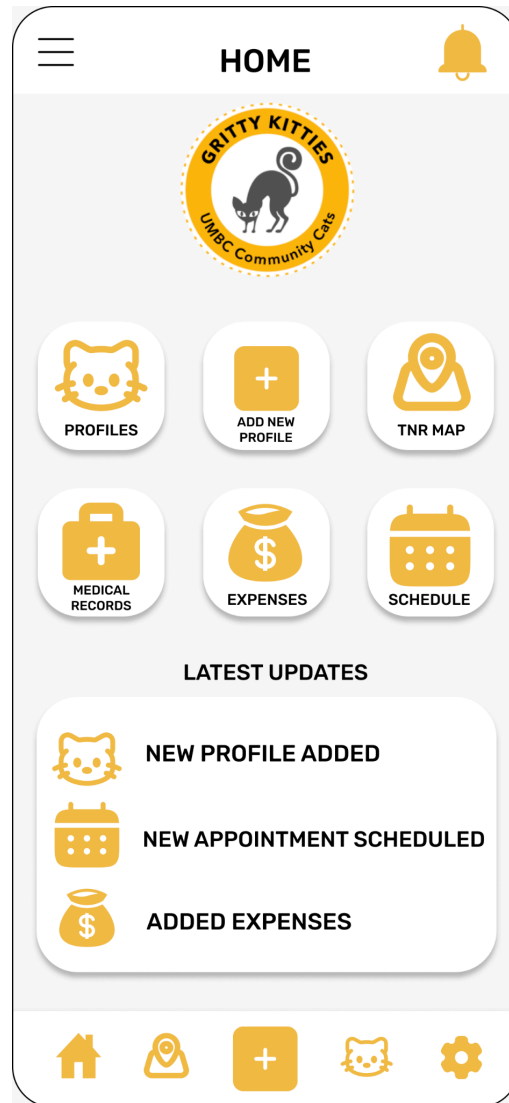


Figure 10.1: Home Page

Figure 10.1 represents the homepage of the FIRS mobile application. Across all five pages has a bottom navigation, allowing the user to access the home page, the TNR map, add a profile page, feline database, and the settings page from any other page on the application. The landing page allows the user to access the main functions of the application through buttons below the organization's logo, with each appropriate icon. Below the main functions are the latest updates messages, letting the user know what has been added to the system. The top left hand corner includes a hamburger button for a full popout menu tab, listing all the application's functions. The top right hand corner has a notification bell for the user to access system notifications.

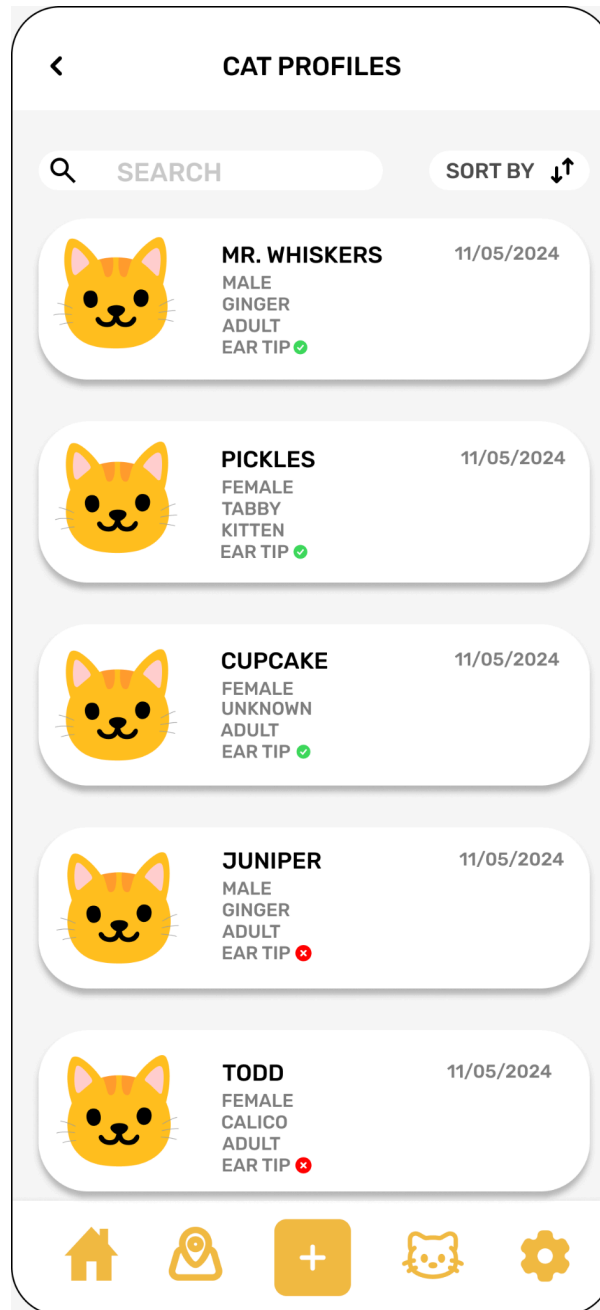


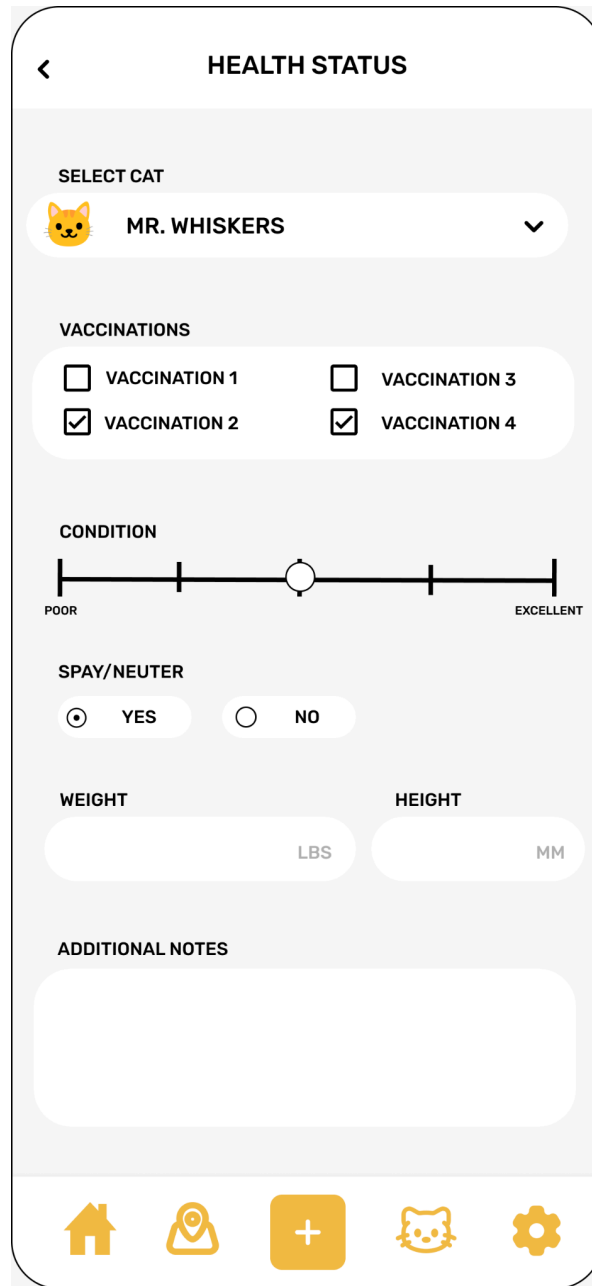
Figure 10.2: Feline Profile Database

The feline profiles page, as seen in Figure 10.2, allows the user to scroll through the list of feline profiles in the database. The top left of the page has a search bar function with a text box for the user to perform a search query through the profiles. The top right of the page has a sort by menu, allowing users to sort the profiles in alphabetical order, date found, and whether or not they have an ear tip. Each feline profile listed includes a preview of their profile with their name, sex, breed, age group, date found, and whether or not they have an ear tip, indicating their TNR status.

The image shows a mobile application screen titled "ADD PROFILE". At the top left is a back arrow icon. Below the title is a large circular profile picture placeholder with an orange cat silhouette and a small camera icon in the bottom right corner. The form consists of several sections: "NAME" with a text input field containing "MR. WHISKERS"; "DATE FOUND" with a calendar icon and a text input field containing "MM/DD/YYYY"; "LOCATION FOUND" with a location pin icon and a text input field containing "1000 HILLTOP CIRCLE"; "PHYSICAL TRAITS" with a large empty text input field; "EAR TIP" with two radio buttons, "YES" (selected) and "NO"; and "ADDITIONAL NOTES" with a large empty text input field. At the bottom is a navigation bar with five icons: a house, a location pin, a plus sign, a cat face, and a gear.

Figure 10.3: Add Profile Page

The add profile page, represented in Figure 10.3, allows the user to report a feline sighting/generate a profile with the corresponding entry fields for identification. This page is modeled after social media “create profile” pages to keep standards consistent for users who typically come across similar pages. At the top of the page there is an option for the user to upload a photograph of the feline. The form includes text entries for name, date found, location found, physical traits, and additional notes. The date found and location found entries also include calendar and map drop down menus for the user to easily enter these data points. The ear tip entry includes radio buttons for the user to select “yes” or “no.”



The image shows a mobile application screen titled "HEALTH STATUS". At the top left is a back arrow. Below the title is a "SELECT CAT" section with a cat icon and a dropdown menu showing "MR. WHISKERS". The "VACCINATIONS" section contains four checkboxes: "VACCINATION 1" (unchecked), "VACCINATION 2" (checked), "VACCINATION 3" (unchecked), and "VACCINATION 4" (checked). The "CONDITION" section features a horizontal slider scale from "POOR" to "EXCELLENT" with a central knob. The "SPAY/NEUTER" section has two radio buttons: "YES" (selected) and "NO". Below these are two text input fields for "WEIGHT" (with "LBS" as a unit) and "HEIGHT" (with "MM" as a unit). An "ADDITIONAL NOTES" section is represented by a large, empty rounded rectangle. At the bottom is a navigation bar with five icons: a house, a location pin, a plus sign, a cat face, and a gear.

Figure 10.4: Health Status Page

The health status page in Figure 10.4 allows the user to view and edit the status of the selected feline with entry fields for medical records. At the top there is a drop down menu allowing the user to select which feline's medical records they want to view. The health status form has a checkbox entry for vaccinations received, a sliding scale for the feline's general condition, radio buttons for their spay/neuter status, and text entry boxes for weight, height, and additional notes.

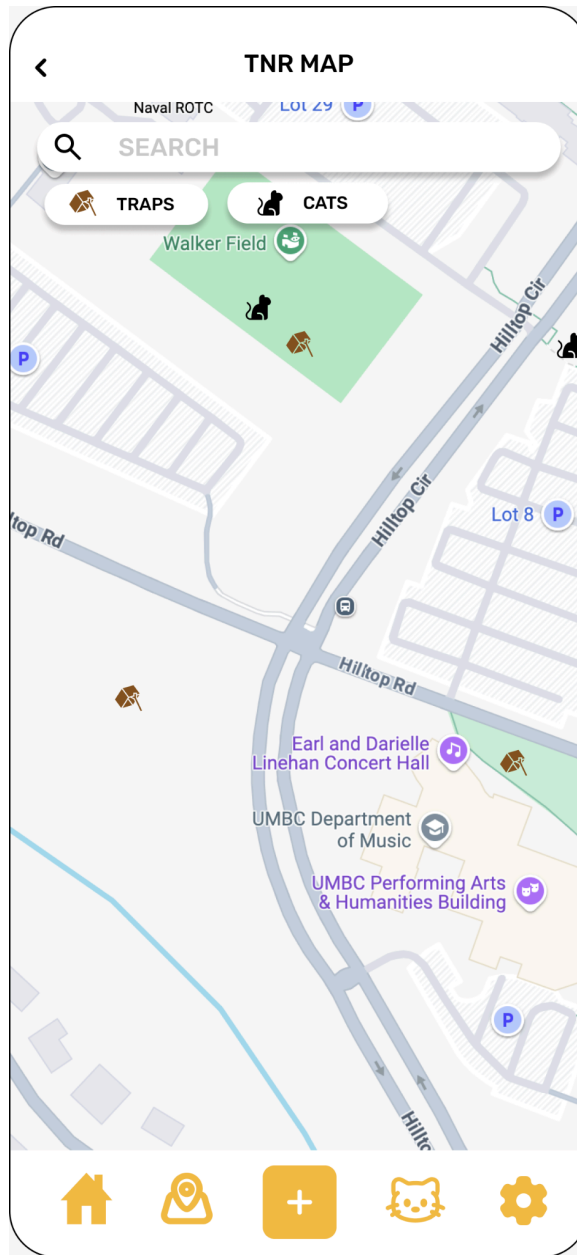


Figure 10.5: Trap Neuter Release (TNR) Map

The Trap Neuter Release (TNR) map in Figure 10.5 implements a Google Maps API to display a map of all the traps set for feline rescue, as well as the reported feline sighting across the UMBC campus. There is a search bar at the top of the screen for the user to search for addresses, felines found, and traps. There are also buttons below the search bar for the user to filter the icons displayed on the map by felines found or traps set.

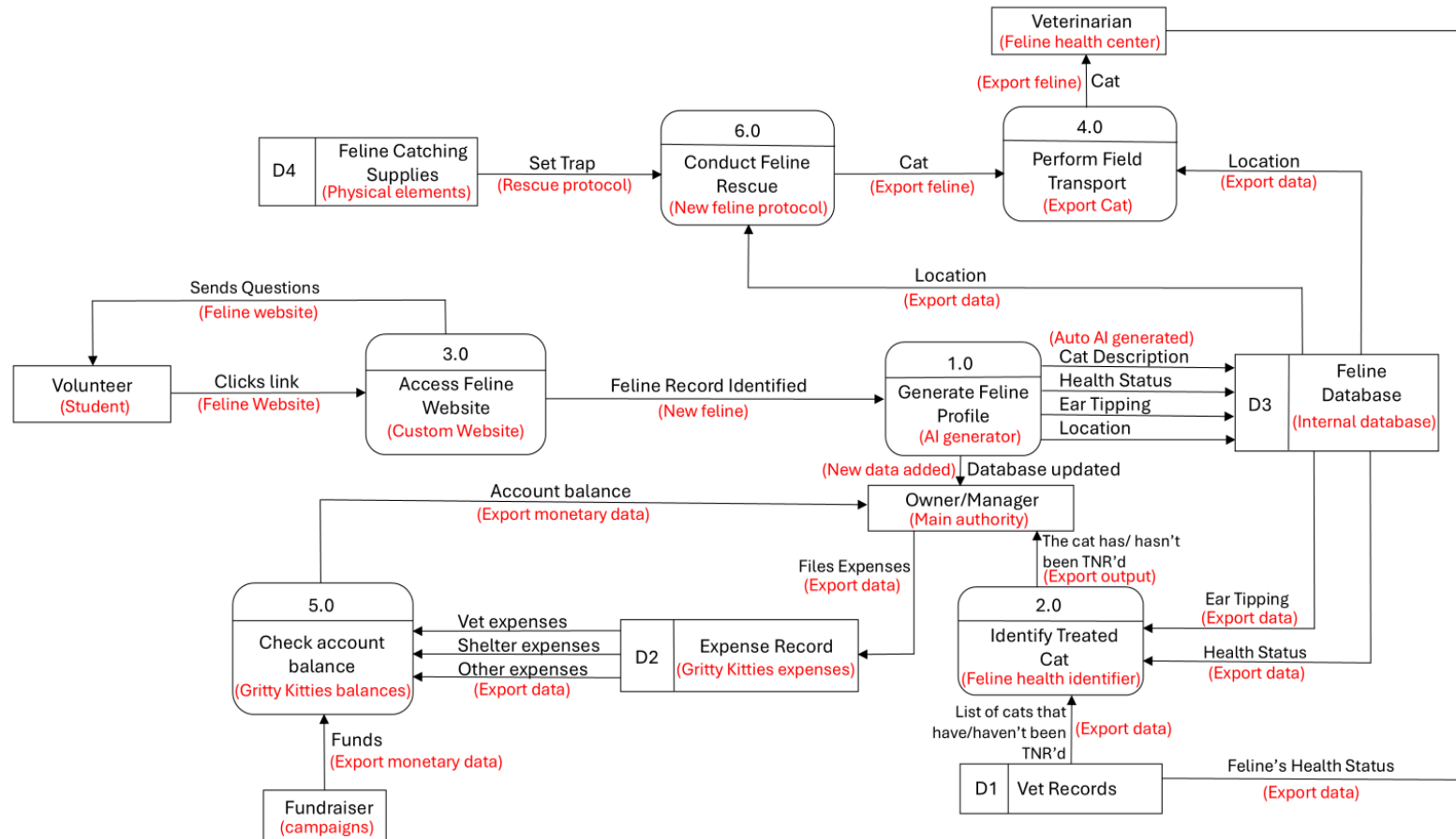


Figure 11.0 is the physical process model

The physical process model lays out the Level 0 context diagram for the Feline Informatics and Reporting System (FIRS) with added details describing how the system will be built. Implementation details were added to each module on the diagram, such as the website for 3.0 and AI generator for 1.0. Each data store has a corresponding reference to a file, database, or human action, such as

Feline Database referring to the internal system's database, or the veterinarian referencing the feline health center. Data flows have also been added to the specifications between each process, including their corresponding data elements and metadata.

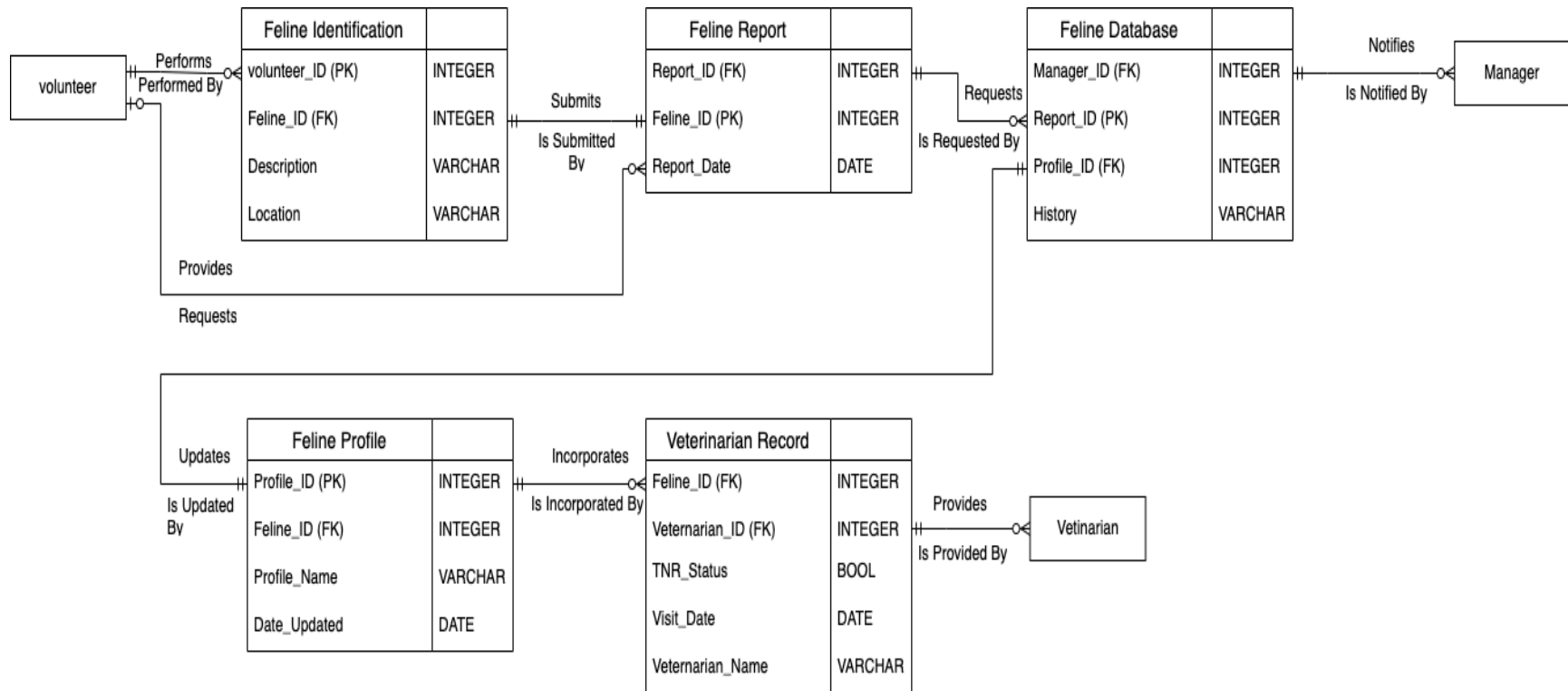


Figure 12.0 is the system's physical data model.

The Feline Entity Relation Diagram outlines the roles and data flow in managing feline information, including each corresponding data type. A volunteer initiates the process by basic details about the feline. Details help with the identification of a feline. Examples include a basic description, last known location, and current status of the feline. All of the details provided by the volunteer is compiled into the Feline Identification entity. Collected details lead into a Feline Report. The report has all the records of the relevant feline. Reports should be sent to a central Feline Database or multiple databases. The database maintains Feline Profiles to store information about veterinarians and status updates. Additionally, Veterinarian Records track feline health and TNR (Trap-Neuter-Return) status. Appropriate veterinarians will review then confirm the feline's record. A manager oversees notifications and processes within the system. Each attribute is matched with their respective data type of either integer, varchar, boolean, or date to correspond with the database development through SQL.

Appendix

D2 Feedback

1. More detailed information like Team 3 (not mandatory).
2. Information for steps (right side of normal course) should be grouped into inputs and outputs.
3. No verbs use nouns for a better design diagram.
4. Actors should be oriented to one person/actor/team.
5. Name of information system: Feline Informatics and Reporting System (FIRS).
6. Remove shalls from requirements (functional and non-functional).
7. Have a mobile application as a part of the scope of the system.
8. Use case 1 - Description is good, use case name should be “generate feline profile” (only titles not all in the document).
9. Get rid of all extra numbering.
10. Use case 2 - Streamline -> single actor for the use case. Staff is not enough. Get distinguishing roles, staff, and specialist (professional roles). Remove TNR'd from the use case name.

D3 Feedback:

1. A new name could be FURS (Feline Unified Reporting Systems) because the system is unified.
 - Pun definitely intended.
2. The introductory narrative is missing.
 - It needs to be a part of the system.
3. The context diagram should be a “plus” symbol.
 - There are too many entities on one side.
4. Names should be consistent
 - Be consistent with plurality
 - Use formal names
 - Examples
 - Veterinarians
 - Administrators
 - Names should be three words long.
5. .Diagrams have problems balancing inputs and outputs.
 - All inputs and outputs should match across all diagrams.
 - Apply the law of balancing to all diagrams.
6. Check the feedback on the blackboard submission.

D4 Feedback:

1. Change process model title to entity relationship diagram.
2. ERD is too small on page.

- Remove the top object “Feline Process Model” .
- Change spatial arrangement.
 - More vertical than horizontal.
 - Move everything to the right of “feline database” down.
- Add more attributes for feline identification.
- Feline profile to veterinarian record.
 - “Updates” and “confirms” to “updates” “is updated by” .
 - Incorporates and is incorporated by.
 - “Submits” to “is submitted by”.

D5 feedback:

1. Data couples don’t go horizontal. Need to be up/down.
2. Receive report = library module and retrieve instead of receive.
3. Have each prototype on a separate page, center line in portrait mode.
4. Figure number and caption.
5. Distinguish vaccinations with 1,2,3,4 at the end of each one.