
Performance Livestock Analytics

Project Design Document

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1. INTRODUCTION

1.1 Project Statement

We will create an intuitive iOS application for tracking veterinary medical information for cattle farmers. This application will help our clients record and monitor medical treatment and recovery information for their animals and facilitate data-driven analysis and decision making to help our users make more informed economic and medical decisions.

1.2 Project Purpose

This project would benefit our clients by giving them better metrics of profitability and animal care analysis for their livestock. This in turn helps make our clients more profitable and reduces operational costs resulting in cheaper prices for the rest of society.

1.3 Project Goals

For this project we are striving to create a veterinary medicine companion app to help our clients manage the health of cattle as well as make data driven decision about medical treatment. Our application would help cattle farmers track the recovery or non-recovery of their animals and would provide support for the monitoring of various health indicators, medical treatment data, and cost analysis. The application will include systems for secure access to the Performance Beef database for information tracking, a method of data entry for more efficient and effective application of medical treatment, and monitoring tools that allow our clients to quickly see how their animals are recovering as well as make informed decision about continuing treatment. To achieve this project we have identified the following project goals:

- Create a simple and intuitive user interface and data entry model that is easy to learn and painless to use in the field
- Develop methods of communication with the existing Performance Beef database systems in order to use and improve the information made available to our clients
- Build a information review system from synthesized data that allows our clients to make more effective and informed decisions about their animal health

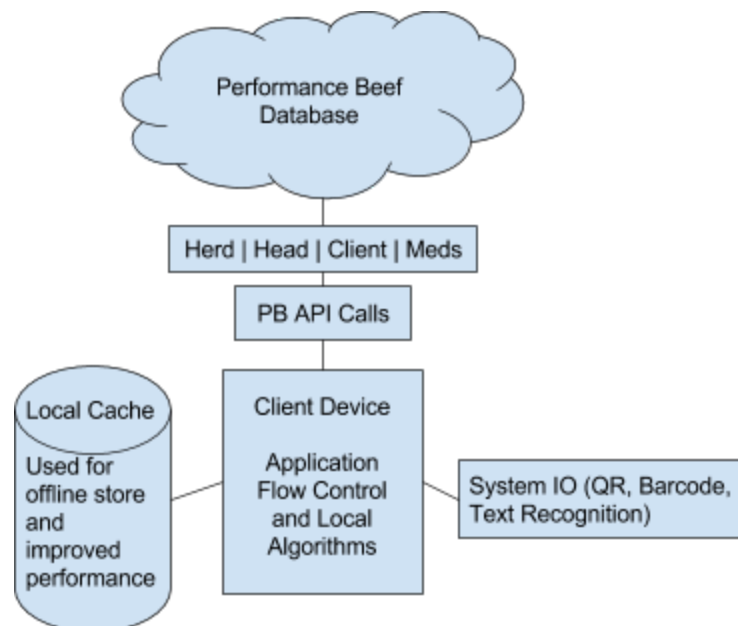
2. DELIVERABLES

In order to accomplish the project goals described above we will create a fully featured iOS application which will be compliant with all Apple development standards and publishable to the Apple App Store. This application will include:

- An easy to use data entry system that allows our clients to retrieve data for each head of cattle as well as add additional health and treatment information for later analysis
- Systems of connected access to Performance Beef for data retrieval and updates as well as methods of offline caching
- A home for synthesized and meaningful data that that allows our clients to see and learn from their treatment and health records

3. DESIGN

There are two primary approaches we can take to solving the problems associated with this project. To achieve the overall goals we could have created an iOS application, Android application, or a multi-platform application. Because our client believes the Android option is not necessary, we are focusing on iOS development at this time. To start the project we setup a GitLab repository for collaborative development and pushed a clean-slate iOS generic distribution project targeting iOS version 10.2. To aid us in our initial development we have set up a Firebase real-time database for storing a master veterinary medications list. Our initial goal is to create a simple application which displays the information contained in our Firebase database. The veterinary medications for this database are currently being obtained through a Java based PDF scraper that generates a simple JSON tree file which can be quickly deployed to Firebase.



3.1.1 System Specifications - Non-Functional

1. Keep offline connectivity and usability by caching specific data
2. Be able to recover after an application failure
3. The application will be able to function on all scales, small to large
4. All screens should be easy to use with a logical workflow
5. The application will be easily maintained and expanded

3.1.2 System Specifications - Functional

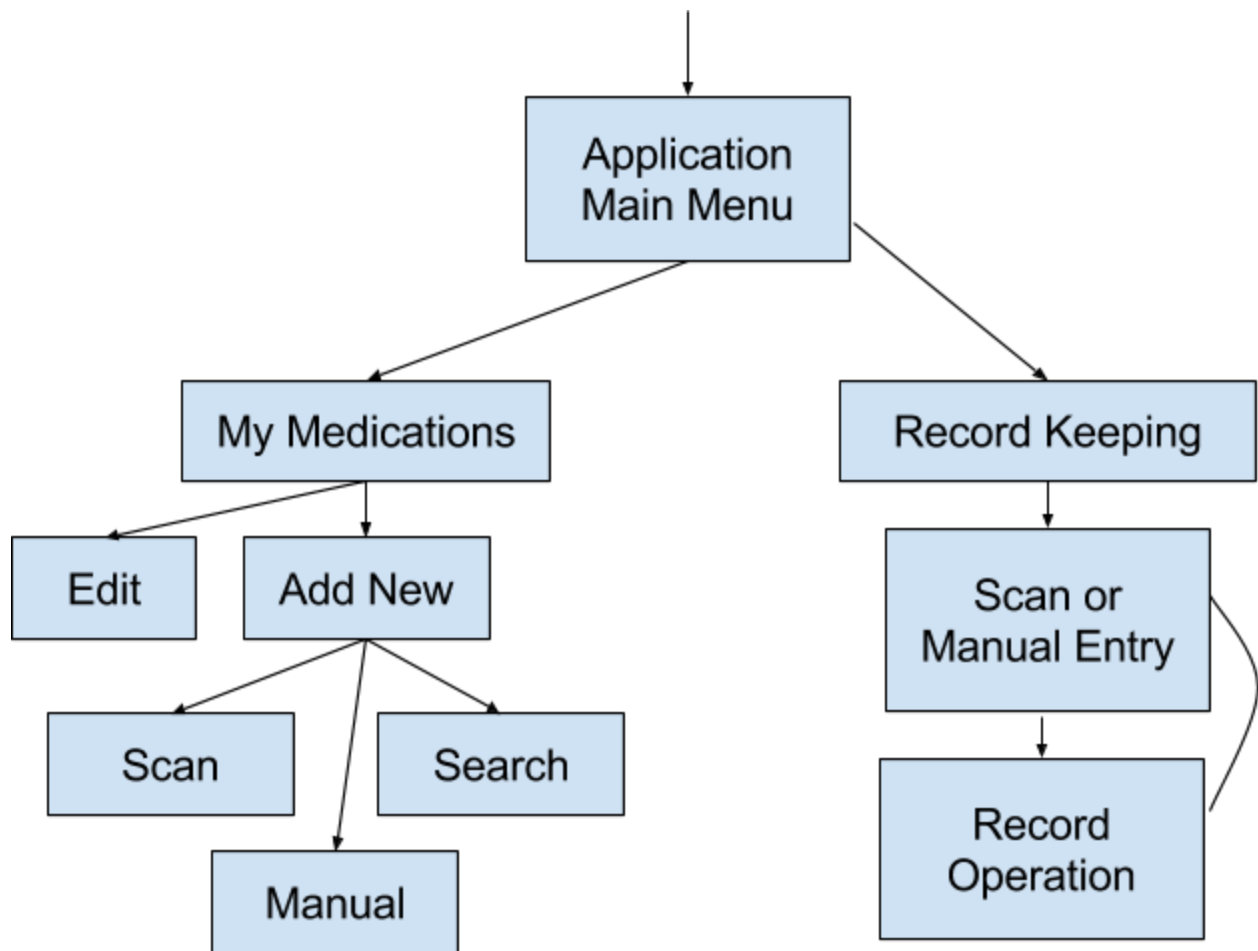
1. Compile livestock drug database information
2. Setup communication with Performance Beef database
 - a. Retrieve cattle head data from database for edits and additions
 - b. Configure user medications list and develop client control systems
3. Systems for scanning heads of cattle and medical information
4. Create a simple and intuitive user interface
5. Systems of data analysis for analytics views and decision making aids

3.1.3 System Specifications - Standards

While developing this product we will operate within the Agile process and adhere to the Apple development and release guidelines associated with releasing to the AppStore. This policy is particularly strict when dealing with medication information even for non-human use so we will have to be careful when interpreting these guidelines. To avoid mistakes here we will avoid recommending any specific medications or any dosage information. There are a few other release guidelines we will need to follow mostly in the area of data security and communication protocols⁽¹⁾.

3.2 Proposed Design and Method

Our application will be broken down into two main functional work flows. When a user opens our application they will be greeted with these two primary methods of use. In the first use case the client will likely be in the field administering treatment to different animals and so our application will present them with an iterative data entry system which allows the user to quickly identify the animal being treated and then record additional health and treatment information during that specific encounter. In the second use case the client will analyze the data they have entered and make decisions from that information. This could include analysis of animal health and the individual head level, etc.



3.3 Design Analysis

We have worked with our client to create an application proposal based on his initial project idea. We first took our client's idea for a vet application which tracks medication use and created an application design. To achieve this we went through what features were needed, what systems would improve user input, and what would advance the usability of the application. We discovered that most of our proposed ideas will work. For example, pulling medication information from the FDA pdf that is published every month and creating a clickable/scrollable database from this data. However, we discovered that using/borrowing a RFID scanner likely isn't feasible at this time. In practice these tools are fairly expensive to buy and work with which limits both our development abilities as well as prospective interest for future clients who would have to own these devices. We have decided to focus on the basic and necessary features to create a working application as soon as possible. From there we decided we would incorporate the more advance technologies once we have the basic skeleton working. As a result, we believe that our application will be strong and stable.

4. TESTING AND DEVELOPMENT

4.1 Interface Specifications

Currently we are examining the feasibility of various forms of UID chips that would be placed on the cattle. This would allow identify specific animals very quickly and possibly even gather health information remotely. Our project client has also done some initial work in the area of UID manufacturers and scanning equipment and has determined a bluetooth reader similar to a device they currently use will likely be the preferred method of operation.

4.2 Hardware and Software Specifications

The main hardware for this will be iOS devices. The project will be designed primarily for an iPad but should work just as well on an iPhone. Our software will be built for iOS 10.2 which is available on all of the latest iOS devices as well as a number of older models.

Additionally we plan to use specific hardware components on these iOS devices such as the camera for text or QR code recognition. Additionally, we will do some research into the usability and feasibility of integrating RFID/Bluetooth scanning tools into our application.

Hardware Specifications:

1. An Apple device running iOS. Particularly an iPad.
2. RFID/Bluetooth Reader and Scanner
3. Camera if text recognition is used.

Software Specifications:

1. iOS operating system version 10.2.
2. Firebase real-time database for testing database.
3. MySQL for professional app using Performance Livestock Analytic's database.
4. OpenCV library for image and text recognition.
5. Swift language for all client-side development.

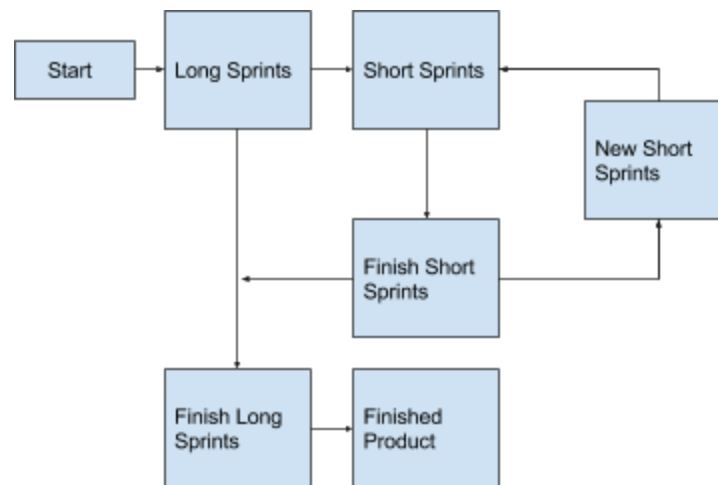
4.3 Development Process

As we are developing the product we will use an Agile based SCRUM project management model. This system consists primarily of software management tools Trello for feature ticket creation and tracking and Gitlab for collaborative development and merge request management. We will be enforcing a branch by feature collaboration paradigm and using collaborative merge requests to help ensure code quality. Our development process will be broken up into weekly

sprints with bi-weekly review meetings with our various stakeholders. This includes a meeting with our client to address non-functional objectives and a meeting with our advisor for development progress standups and future sprint planning.

To test the design methods involved in this project we plan to use a number of different systems. First, while initially developing the application we will use a simplified database system, Firebase, for faster iterative development while the Performance Beef API system is being built.

Additionally, this simplified system will allow us to test our client side operations quickly without risking the integrity of live data. Once our system has become stable in this configuration we will move to an isolated silo within the Performance Beef Database for integrity testing before a full release. Secondly, we will be using the TestFlight platform to monitor app performance and failures during our initial round of user testing. This service will help us identify corner cases and hidden bugs in our product before full release.



5. RESULTS

The results we have obtained so far are an application design that meets our client's requirements. Since we were given a simple idea we have worked through what features, connectivity, and general functionality which would be required for a realized implementation. Our client has proposed a number of possible features for this application and it has been our task to assess the feasibility of these features and brainstorm possible solutions for their implementation. As an example, our client wants to incorporate a medication database for cattle. Since this does not currently exist we needed to find a FDA medications list and convert it to a useable database we could pull in from our application. With all of these initial features defined we have created the platform for development. This platform includes a git repository, firebase database, PDF scrapper, trello board, design features, functional features, non-functional features, and use cases. We have learned how to start an iOS application with tutorials and research. By doing the tutorials before developing we were able to avoid initial pitfalls during

project setup and hopefully during client logic design cycles. Also, we have been working to understand the cattle industry. We have learned the life cycle of common feed cattle and the steps taken to care for them. Along with that we have come to a understanding of a veterinarians and general care takers roles in the cattle's life. By doing so we have been able to think of better use cases to make our application more useful to them.

6. CONCLUSIONS

Our goal for this project is to create an iOS application from start to finish which will be released to the Apple AppStore. Our application will allow farmers to track the health of their cattle by tracking of medication use and sickness. With this data our clients can analyze their herds in real time. Our plan begins with creating and designing a pull/fetch communication system with support for cross-communication between different databases. Once we are able to use the different databases simultaneously we will then implement technical/graphical features. These features will improve client interaction with their data by creating an easy-to-use one-step solution and systems like barcode scanning, analytics, etc. will allow management and use from the field.

To achieve these goals we have done initial testing for a few different possible solutions. This includes research into the Swift and Objective-C technologies, practice developing a few simple test applications, and analysis of Apple's development best practices documentation. This was all done in an attempt to avoid potential pitfalls during our initial development cycle. Currently we are in the process of implementing a Firebase real-time database to allow us to test communications and build our client-side application while simultaneously finalizing the more complicated API for the existing database system. We believe this method of simultaneous testable development is the best option as it affords our team the opportunity to work with easy and consistent data and communication systems while learning the Swift language and paradigms of iOS development.

7. REFERENCES

1. Apple's App Store Review Guidelines:

<https://developer.apple.com/app-store/review/guidelines/>

2. Drug list:

<https://www.fda.gov/downloads/AnimalVeterinary/Products/ApprovedAnimalDrugProducts/UCM042856.pdf>

8. APPENDICES

Not applicable at this time.