AL Fish Guide

P1: Requirements Documentation
CS 495

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Change History:

- Creation, Filled out some of introduction - 2/1/2017 - Derek Russell
- More basic setup of structure, project description - 2/2/2017 - Matt Williams
- Added primary and secondary objectives - 2/6/2017 - Matt Williams
- Modifications to Primary and Secondary objectives, and added Functional Requirements - 2/7/2017 - Derek Russell
- Modified Introduction and Scope - 2/7/2017 - Ryan Josey
- Added Non-functional requirements - 2/7/2017 - Matt Williams
- Modified Introduction, Scope, Goals, Relevant Definitions, Project Description, Primary Features, Secondary Features, Functional and Non-Functional Requirements - 2/9/2017 - Ryan Josey
- Modified Primary and Secondary features; Added Use Case descriptions - 2/21/17 - Derek Russell, Ryan Josey
- Cleaned up formatting of Use Cases, added UI images to Project Description - 2/21/2017 - Ryan Josey
- Formatting updates, Table of contents page numbers / linking - 3/1/17 - Matt Williams
- Added information to the activity diagrams - 3/1/17 - Derek Russell
- Added brief descriptions to Class / use case diagram, updated table of contents - 3/2/2017 - Matt Williams
- Updated Diagram descriptions, general spacing - 3/2/2017 - Ryan Josey

Table of Contents:

I. <u>Introduction</u>

A. Motivation:

The motivation for this project started with a desire to create an application that involved using user's GPS location. We had a connection with the Geological Survey of Alabama (GSA) and they expressed interest in an GPS based application to be used in the field to locate and identify fish species. Currently when anyone from the GSA is in the field they will be relying on reference books to help identify the fish species they are finding during survey work. We feel that providing the GSA with an application they could use in the field instead of having to carry a field book would help improve the efficiency of their surveys. We also can see research students, recreational fishermen, and nature enthusiast using this app. Knowing that there could be a large population of users that would utilize this app provides us with more motivation to build this app.

B. Scope:

The scope of this project covers all areas of Alabama including the Mobile basin and the current known species of fish in the State of Alabama. Our original plans are to focus on a small subset of species. This subset will include the current legal game fish in the State of Alabama. We do not plan on branching out to other states at this time because our main source of fish records comes from GSA, whose research is only for the State of Alabama. In the future, there is a possibility of expansion to include other states through a partnership with the U.S. Geological Survey (USGS), but this is not an immediate priority.

C. Goals:

The goal of this app is to provide a user with a list of fish that can be found in a user's defined radius of their current location. The user's current location will be found using the phone's built-in GPS. Then a list of nearby fish will be populated using survey data provided by the GSA. The list will include a thumbnail image and name of the fish. The idea behind this is to provide a subset of fish so the user can quickly identify what species of fish they have found. Each fish will have their own page which will include a picture of the fish, common name, scientific name, description, and defining characteristics. The user will also be allowed to see a list of all the fish species that are found throughout alabama. We would also like to have an interactive map that would allow for users to search a specific species of fish and have their locations displayed on an map. This will help if users are trying to find a specific fish and know where to go to find the fish. Another goal for our app is to allow users to set a pin on the map and display a list of fish in the surrounding area.

D. Relevant Definitions:

1. **GSA** - Geological Survey of Alabama
2. **GPS** - Global Positioning System
3. **In The Field** - This pertains to researchers or app users that are studying fish in the fish species natural habitat. This can include but is not limited to: streams, rivers, ponds, lakes, or bays.

II.   <u>Project Description</u>

For this project, we will be creating an Android App that helps with the identification of different fish species in the State of Alabama. The main feature of this app will be using a user's GPS location to determine and display what types of fish species will appear near that location. This will aid users in not only identifying what type of fish species that they may encountered, but it will also be helpful in determining specific locations that a fish species will likely appear at. We will be working with the GSA, who will be providing the data, during the process of building this app. The GSA's data will include fish images, common name, scientific name, description, defining characteristics, and locations.

UI Prototype: <u>Interactive View</u>
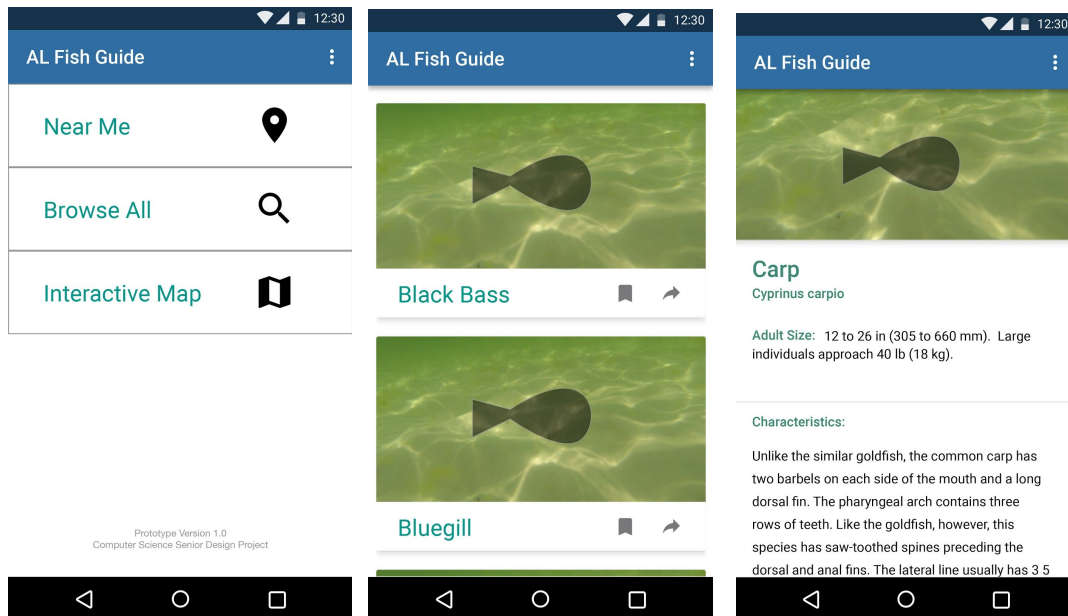
Primary Features:

The primary features of the app are the main goals of this application that we consider a must in terms of completing the application. Here are the features that are currently considered primary features:

1. Fish species information page that displays all of the stats of that fish species. This includes:
   a. A picture of the fish Species that can be enlarged when tapped/selected
   b. The common name
   c. The scientific name
   d. A detailed description including habitat, biology, and distribution.
   e. The characteristics of the fish
2. Find species near you feature. This takes the user's GPS location into account and will provide a subset of all of the fish species that can be found within a specified radius of the user's location.
3. Find species location feature. This allows the user to select a species, and will provide the areas / locations where that species of fish is found at.
4. Browse all list that allows the user to browse all of the fish species within the state.

Secondary Features:

Secondary features are features that are not required in order for the app to be functional, but are features that we would like to add once the primary features are complete. Some secondary features do have a higher priority over other secondary features, however the list below is in no particular order.

1. An offline mode that facilitates use when in the field to minimize data usage with pictures and assets or for when out of range for cell services.
2. A filter option or search that facilitates the specific search of a specific species or species type based on features.
3. The ability to view the locations of a species on a map (this will be on species specific page)
4. A select and compare option that allows the user to compare multiple species to help determine differences, and/or to facilitate easier identification.
5. An interactive map with all the fish location on a map where the user can select a specific location and be shown all the fish in that location.
6. A way for user's to report:
   a. Species they have found
   b. Unknown species they have found
   c. New locations a species has been found
7. Some form of voice assisted speech to allow for use when hands may not be free.

8. Light and dark mode variations to allow user customizations for ease of use.
9. Alphabetical shortcuts when browsing to facilitate easier browsing or searching
10. Ability to pull down on a list to refresh the list of species
11. An option to allow user's to customize the size of the radius for use when they wish to search for fish using their location
12. A main menu that includes additional activities such as "about" and "settings." The "about" activity will display information about the app, team, and copyright info. The "settings" activity will accumulate the various settings discussed in the previous secondary features.

III. <u>Functional and Nonfunctional Requirements</u>

Functional Requirements:

1. A scrollable list that will display fish species that can be found in Alabama.
    a. Each item in the list will correspond to a specific species of fish.
2. A page to display all information on a species of fish. The following information will be included in every page
    a. Common name of the species
    b. The scientific name of the species
    c. A description including habitat, biology, and distribution
    d. Characteristics of the species
3. Ability to located the species of fish in a surrounding radius of the user based on GPS location
4. Ability to search for location that fish can be found at by their common names.

<u>Non - Functional Requirements:</u>

1. Efficiency
    a. The app needs to be efficient for use when in the field. There is a lot of data that has to be accumulated, and it needs to work in an efficient manner in able to quickly return results to the user.
2. Ease of Use
    a. The app needs to be easy to use for several different reasons:
        i.   The primary uses of this app will be in the field, which means it needs to be easy to use when out on location / in different environments.
        ii. We have a range of users in our target audience, which means that the app requires ease of use to accommodate these different user groups.
3. Reliability
    a. This app is designed to be used in many locations/environments so it needs to be reliable and able to work/perform for multiple locations

      b.   The subset of data that is provided while doing a location based search will need to reliable for the user's current location

4. Security / Authentication
      a.   Security is a major concern in terms of securing the different APIs that we will use
      b.   Security and Authentication is also a larger issue if we include any form of crowdsourcing or reporting feature, as we would need a means of verifying correct and proper input.

5. Accessibility
      a.   This is very similar to ease of use, but the app has to be accessible for use by many different target groups
      b.   When working with government data, there are more strict rules in requiring accessibility.

IV.   **Diagrams**

Use Cases:

Use Case: View Fish List

Context: The "View Fish List" use case will allow a user to view a full list of fish found in Alabama.

Actors: General User

Main Success Story:
1. System gets full list of fish
2. System displays list of fish found throughout Alabama in alphabetical order

Use Case: <u>View Nearby Fish</u>

Context: The "View Nearby Fish" use case will use user's current GPS location to populate a list of fish species that can be found in nearby locations.

Actors: General User

Main Success Story:
      1. System will collect User's current GPS location
      2. Using the User's current GPS location the system will populate a list of nearby fish species
      3. The list of fish species will be displayed in alphabetical order

Use Case: <u>Search For Fish</u>

Context: The "Search For Fish" use case allows the User to search for a fish by their common or scientific name

Actors: General User

Main Success Story:
      1. User will enter a common or scientific name of a fish.
      2. The system will populate a list of fish with similar names.

Use Case: <u>View Fish Map</u>

Context: The "View Fish Map" use case displays a map view that shows locations of fish throughout Alabama

Actors: General User

Main Success Story:
      1. System gets a full list of fish
      2. System displays list of fish in alphabetical order
      3. User selects specific fish
      4. System displays a heat map of the fish distribution

Use Case: <u>View Specific Fish Page</u>

Context: The "View Specific Fish Page" use case will display a picture of the fish along with information including names, size, characteristics, distribution, biology, habitat, and a picture.

Actors: General User

Main Success Story:
      1. The system gets a fish description
      2. The system will display the corresponding fish picture and description

Use Case Diagram:
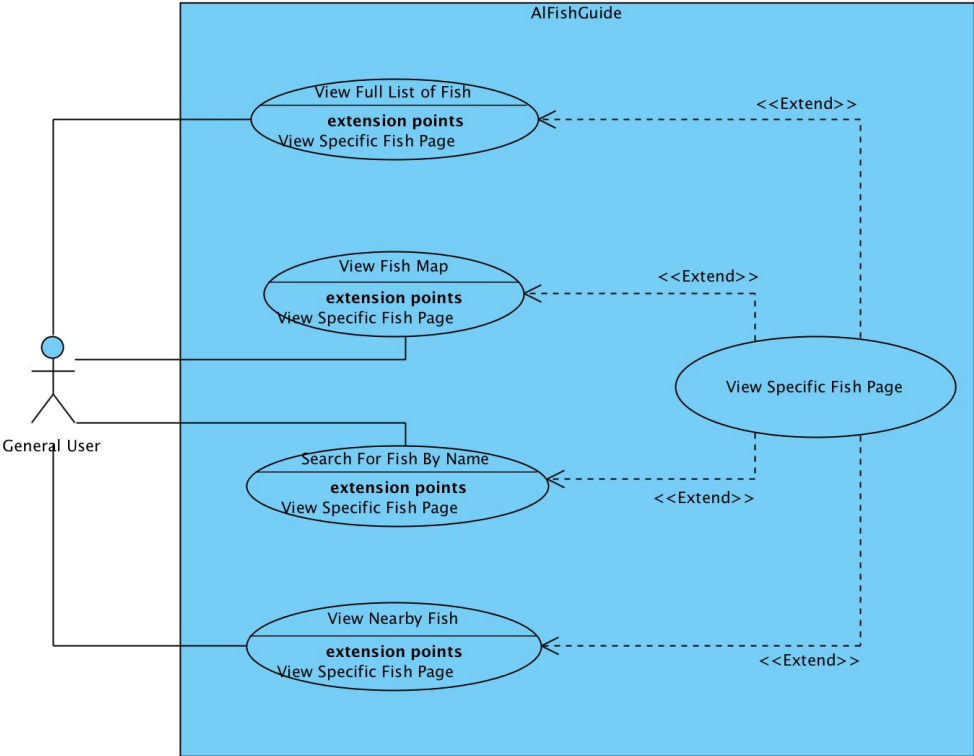
This diagram shows the overall structure of our use cases. The user will have several options for use cases including, viewing a full list of fish, viewing a fish map, searching for a specific fish species, and viewing nearby fish. This diagram also shows how all uses cases can lead to viewing a specific fish page.

Class Diagrams:

```
┌─────────────────────────────────────┐
│              FishClass              │
├─────────────────────────────────────┤
│ −Common Name                        │
│ −Scientific Name                    │
│ −Size                               │
│ −Picture                            │
│ −Characteristics                    │
│ −Distribution                       │
│ −Habitat                            │
│ −Biology                            │
│ −Lat                                │
│ −Lon                                │
│ −Ichthyoregion                      │
├─────────────────────────────────────┤
│ +getAll()                           │
│ +displayAll()                       │
│                                     │
│                                     │
└─────────────────────────────────────┘
```
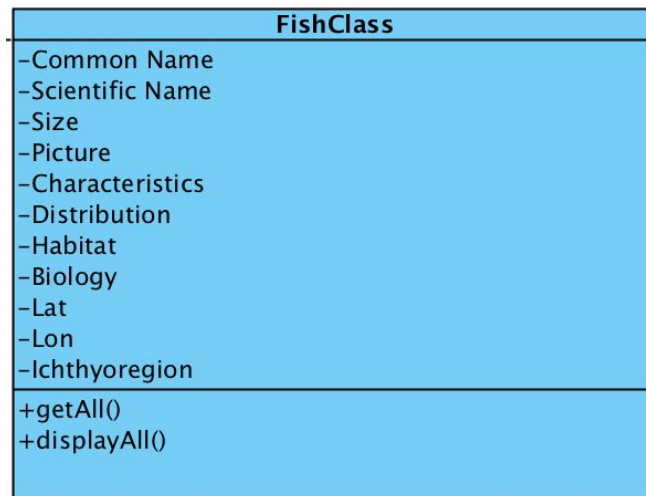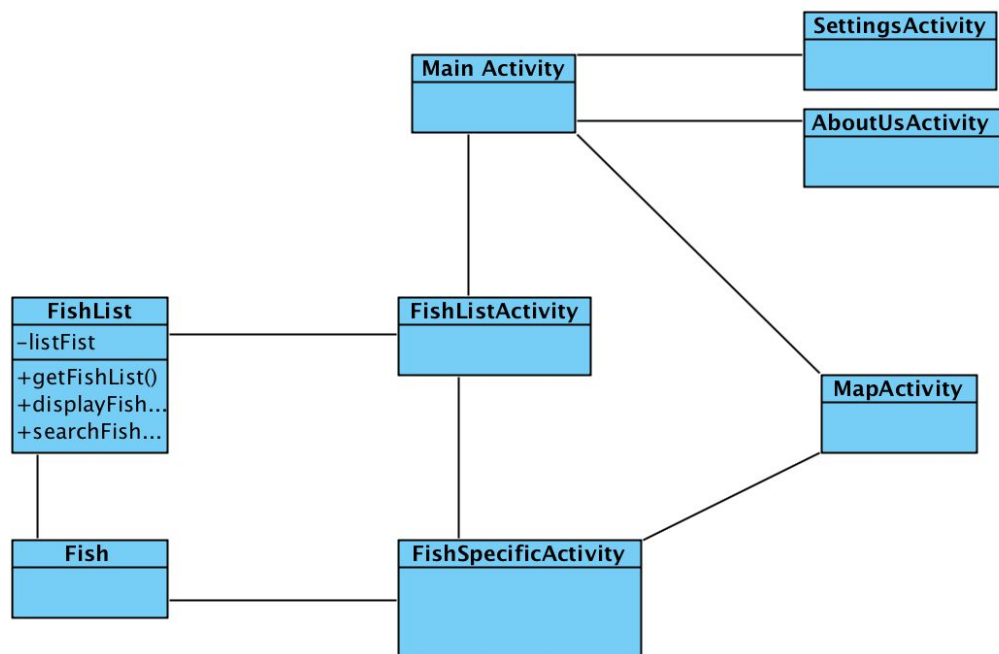
This diagram shows the Fish class, as well as all of its attributes and methods.

```
┌─────────────────────────────────────┐
│              FishList               │
├─────────────────────────────────────┤
│ −listFist                           │
├─────────────────────────────────────┤
│ +getFishList()                      │
│ +displayFishList()                  │
│ +searchFishList()                   │
│                                     │
│                                     │
│                                     │
│                                     │
│                                     │
│                                     │
│                                     │
└─────────────────────────────────────┘
```
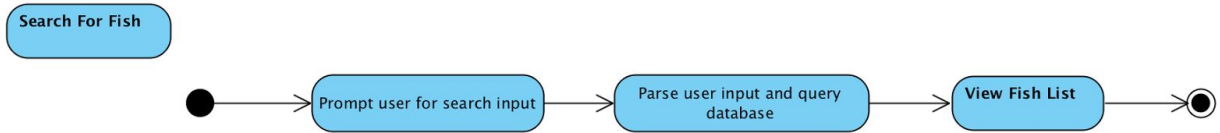
This diagram shows the FishList class, as well as all of its attributes and methods.

High Level Class Diagram:

This diagram shows our high level class diagram with some attributes.
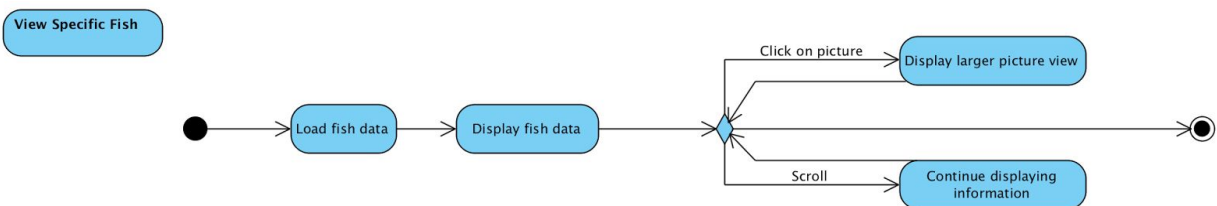
Activity Diagrams:

Search For Fish

○ → Prompt user for search input → Parse user input and query database → **View Fish List** → ◉

This diagram shows the flow of actions for when a user to searches for a specific fish. The user will input a fish name in the search requirements, the user's input will be parsed and then used to query the database for all fish that match the input. This will then move to the use case View Fish List.

View Fish List

○ → Get fish list → Generate fish list → User selects a fish → **View Specific Fish Page** → ◉
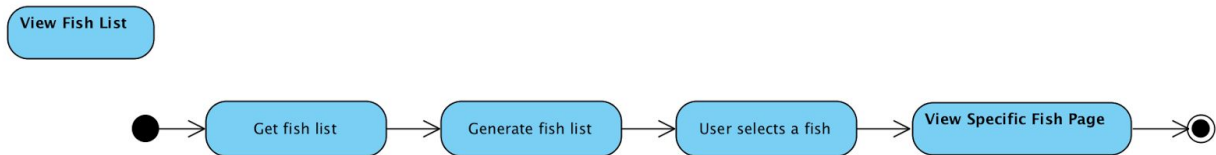
This diagram shows the flow of actions a user would take when using the fish list. The list of fish will be pulled from database during the get fish list, the data will then be transformed into a usable format during the generate fish list. Next, a user will select a fish from the displayed list to move to the View Specific Fish Page use case.

View Nearby Fish

○ → Get user's GPS location → Query database → **View Fish List** → ◉
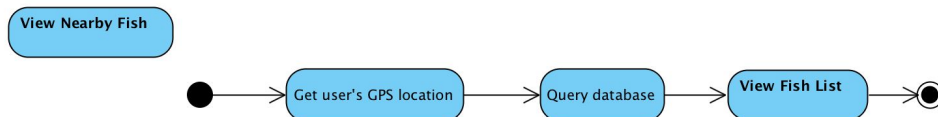
This diagram shows how a user's GPS location is used to generate a fish list. The user's GPS location will be used to query the database for fish close to the location. Once the query has been sent to the database and a list has been returned the activity moves into the View Fish List use case.

View Specific Fish

○ → Load fish data → Display fish data → ◇ →(Click on picture)→ Display larger picture view → ◉
◇ →(Scroll)→ Continue displaying information

This diagram shows the view specific fish use case. Once the data (specie specific) is loaded and displayed the user has the option to select the picture to see an enlarged view of the picture, or to scroll down the activity continue viewing the displayed information.