

# Shark Bytes

# The Team

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Team Shark Bytes

**Colorado River Area Biologists Computer Aided Knowledge Entry System  
(CRAB CAKES)**

Team Mentor: Scott LaRocca

# Intro

We are working with multiple agencies, The Arizona Game and Fish Department (AGFD), U.S. Geological Survey (USGS), and U.S. Fish and Wildlife Service (USFWS)

Clients: David Rogowski (AGFD), Maria Dzul (USGS), Pilar Rinker (USFWS)



# Problem Statement

Monitoring efforts are crucial for protecting the wildlife around the Colorado River and supporting the more than 40 million people that depend on those resources.

⇒ Our clients are at the frontlines of this endeavor.

## Current Workflow:



Catch fish from the Colorado River



Scan/Tag Fish and measure new data



Record data using SHOALS, and upload to Database



# Solution Overview

Through our discussions with our clients, we learned they wanted a program that:

- Maintain SHOALS functionality
- Improve maintainability
- Modernize the UI/UX

## CRAB CAKES

A screenshot of a mobile application interface titled "SPECIMEN". At the top, there is a battery status indicator showing 84%. Below this, a table header lists fields: TAG, SPECIES, FORK\_LENGTH\_MM, TOTAL\_LENGTH\_MM, SEX, and WEIGHT\_G. The table body is currently empty. Below the table, there are several input fields for: AUTO\_ID, SAMPLE\_ID, TAG, SPECIES, MARK\_TYPE, TOTAL\_LENGTH\_MM, FORK\_LENGTH\_MM, and SEX. A "Save Record (F12)" button is located at the bottom right.

## Shoals

A screenshot of a desktop application interface titled "Shoals". The interface includes a status bar at the top with a battery icon, "Data Drives Verified", and a date/time stamp "2026-Feb-17 12:57:12". Below this, there are several tabs: "Tag", "ID\_DateTime", "Species", "T\_len", "F\_len", "weight", and "sex mod". A "System (F1) Sample (F2) Specimen (F3) | VIE (F4) | Review (F5)" menu is visible. The main form area contains various input fields and dropdown menus for: Tag, Reader#, Species, Total Length, Fork Length, Sex, Sexual Condition, Sexual Characteristic, BN (NO PIT OR FIN CL), Recap/YesNo, Fin Clip, Weight, RA (RELEASED ALIVE), Disposition, and Bottle Number. A "Batch" field is also present. At the bottom, there is a "Specimen Notes (0 of 255 characters)" field and a "Field\_Species" dropdown menu. The interface also includes keyboard shortcuts: "ctrl-Enter = Override" and "alt-Enter = 999".

# Key Requirements Review

## Gathering Requirements:

- Client meetings
- In-field testing
- Discussions over email

## Functional Requirements:

- Customizable fields
- High data integrity
- Backups to external drives
- Fully functional while offline

## Performance Requirements:

- Works on Windows
- Fast on older hardware
- Compatible with existing PIT readers

# Implementation



Flutter

High performance multi platform UI framework created by Google.



Dart

Programming language created by Google, that has good developer experience and community support.



SQLite

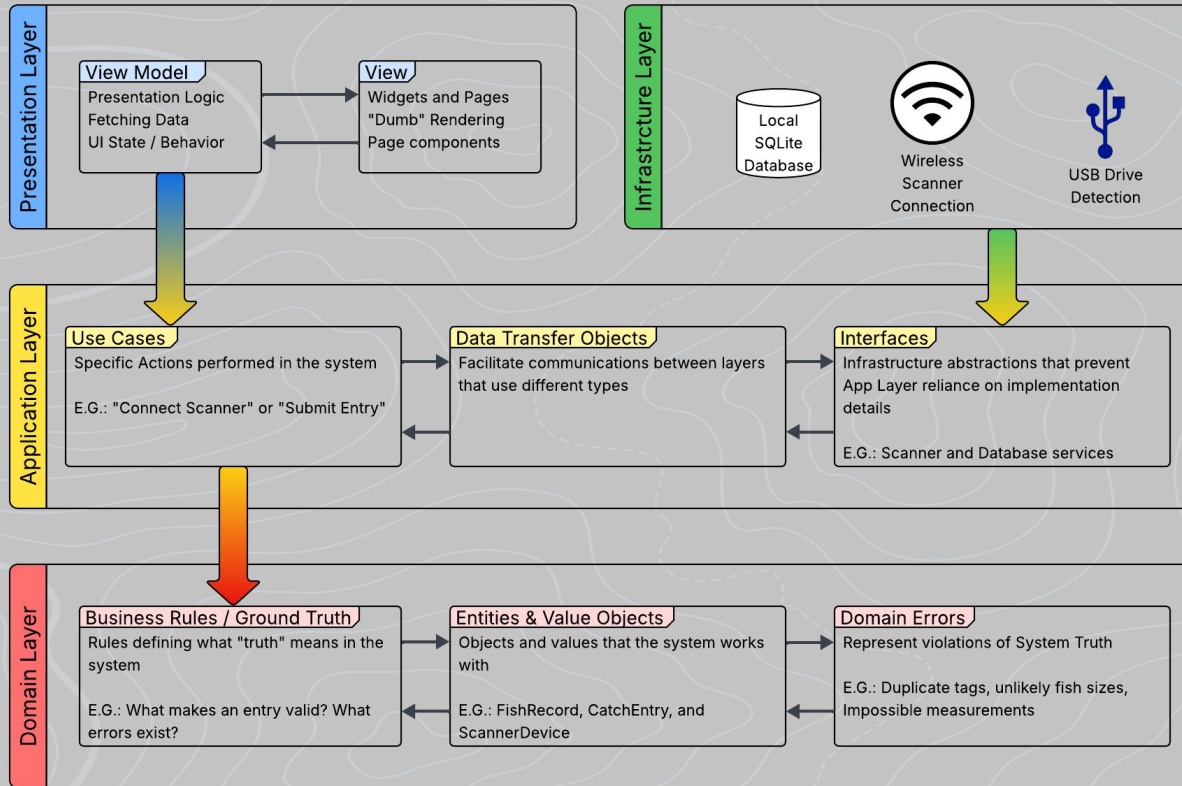
Open source, highly reliable embedded database.



Bluetooth

Wireless communications protocol used to communicate with the clients' PIT tag scanners.

# Architecture Overview



# Demo



# Testing Plan

## Unit Tests:

- Testing core modules relating to data integrity
- Increasing unit test coverage before acceptance demo

## Integration Tests

- Creating integration tests for data entry and check database screens

## Usability Tests

- In-field testing
- Office usability testing



# Challenges & Resolution

## Challenge:

Making the application compatible with a wide variety of schema structures

## Resolution:

Creating a graph representation of the schemas structure

## Challenge:

Keeping up with clients' fast-paced workflow

## Resolution:

Adding keyboard shortcuts for common actions and noise alerts to alert them of if something goes wrong

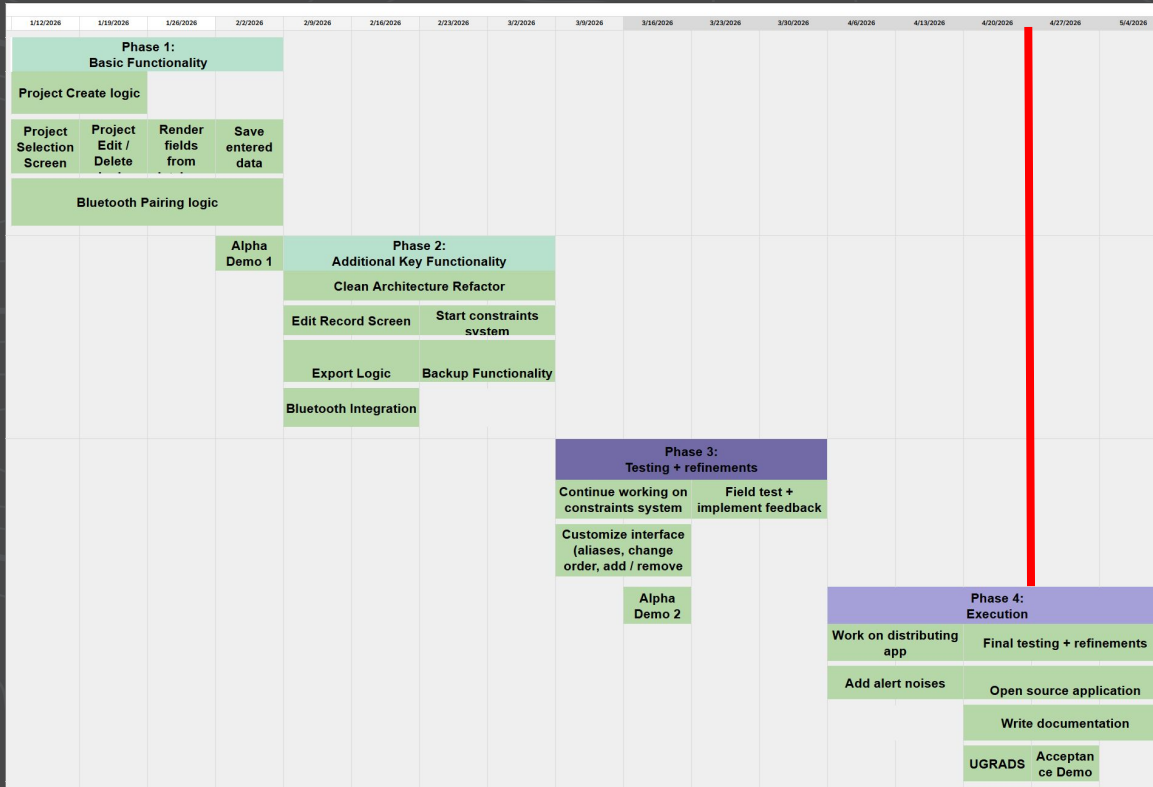
## Challenge:

Pivoting our project to Clean Architecture

## Resolution:

Refactored old code to separate it out into modular layers

# Schedule



# Future Work

## Documentation:

- User manual
- Development documentation
- Future capstones

## Testing:

- Add additional unit tests
- Create integration tests

## Future Capstones:

- Historical entry database
- Field reordering
- Linux Bluetooth support

# Conclusion

Our team is in a strong position with our capstone project, and as we head towards the final weeks of development, we are confident that all promised functionality will be delivered to our clients on time.





**Questions**  
**?**