

MICHIGAN STATE

UNIVERSITY

Project Plan Presentation

#BIKES4ERP Tracking

The Capstone Experience

Team Evolutio

Zhilong Feng

Nick Filerman

Samantha Kissel

Jason Mih

Dorian Smalley

Austin Stickney

Department of Computer Science and Engineering
Michigan State University

Spring 2023



*From Students...
...to Professionals*

Project Sponsor Overview

- Consulting company based in Chicago.
- Helps with building and scaling an enterprise application.
- Part of the Group Elephant non-profit organization.



Project Functional Specifications

- High rate of theft/loss of bikes in South Africa.
- Use GPS to track bikes for children in South Africa.
- Show tracked bikes on web page.
- This allows for lost or stolen bikes to be recovered rather than replaced, lowering costs.

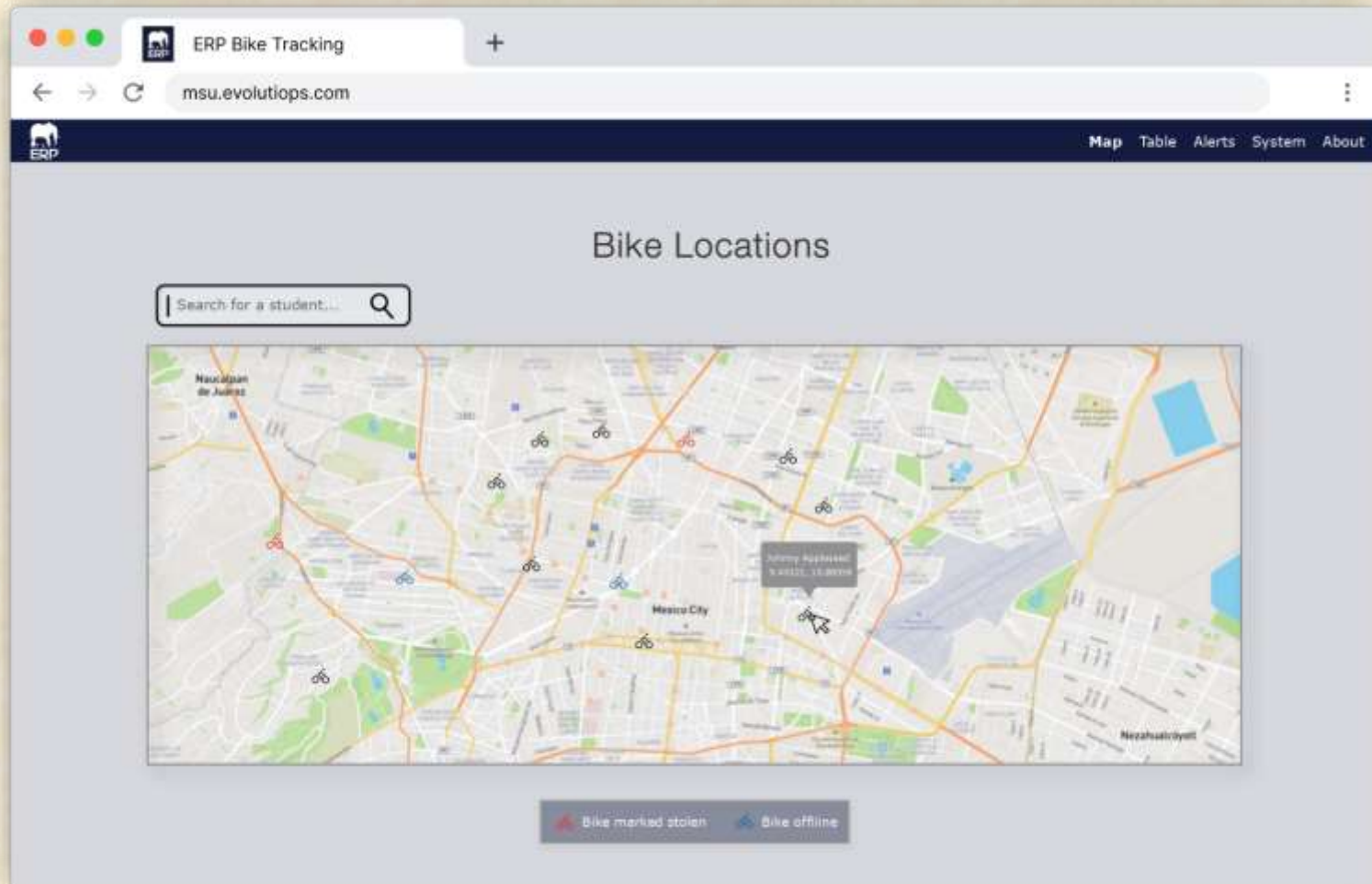


Project Design Specifications

- Interactive map on web page to show the location of the bikes.
- Users are able to mark bikes as lost/stolen.
- Users with a higher role can mark a bike as found.
- Automated message is sent when a bike is reported.
- Bikes are assigned to users by admins.
- Various statistics such as distance traveled and speed are shown in addition to location.



Screen Mockup: Home Screen



Screen Mockup: Bike Status Screen

ERP Bike Tracking

msu.evolutiops.com

Map Table Alerts System About

Bike Locations

Student Name	Bike ID	Bike Status	Last Known Location	Time of Last Update
Sam Kissel	47	Online	9.55454, 10.545454	Today, 10:30am
Dorian Smalley	48	Stolen	8.23232, 9.3232323	1/13/2023
Nick Fierman	104	Offline	124.32323, 10.31322	1/02/2023



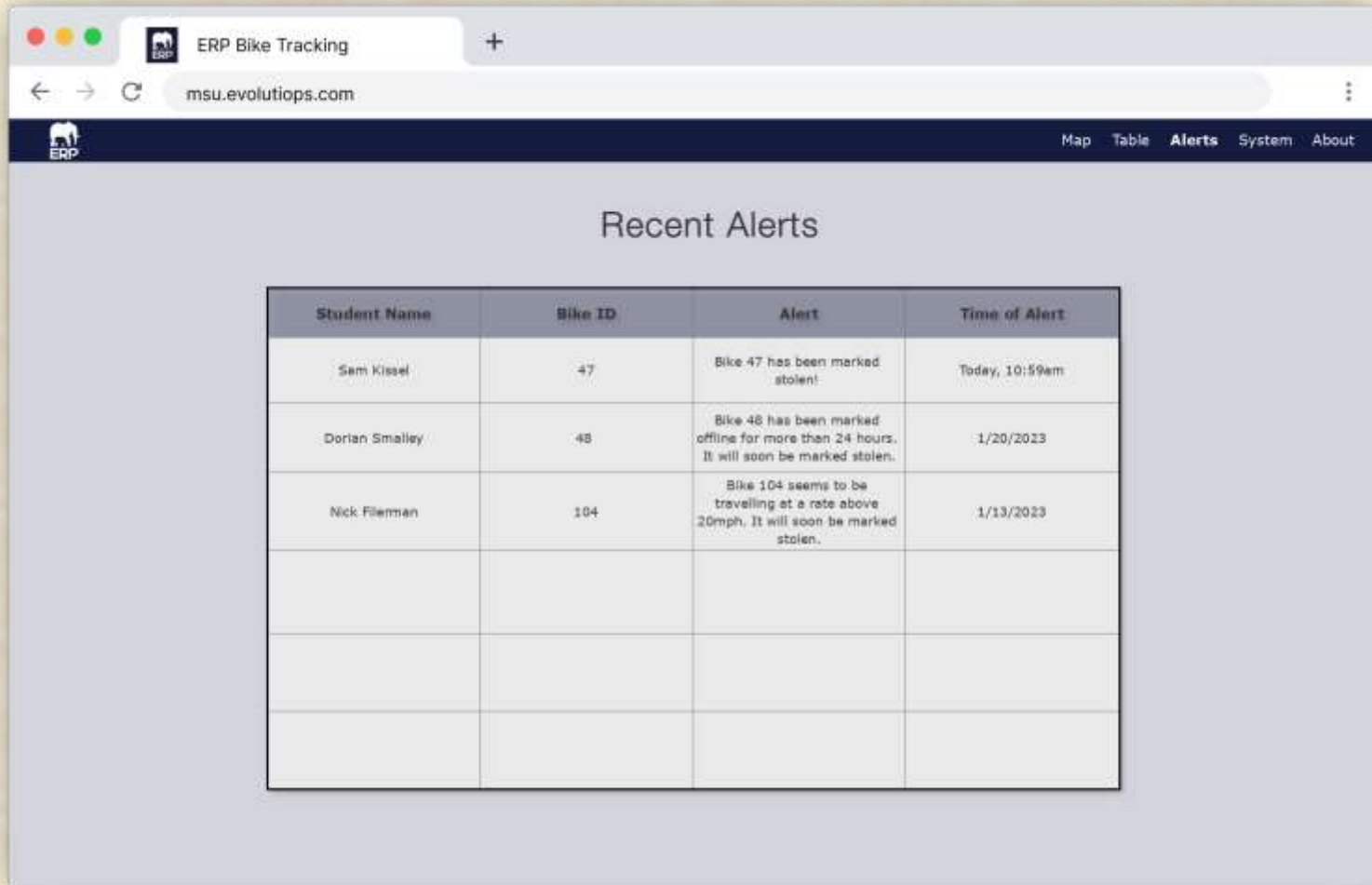
Screen Mockup: Systems Screen

The screenshot displays a web browser window titled "ERP Bike Tracking" with the URL "msu.evolutiops.com". The page features a dark blue navigation bar with the ERP logo and links for "Map", "Table", "Alerts", "System", and "About". The main content area is divided into five sections, each with a "Submit" button:

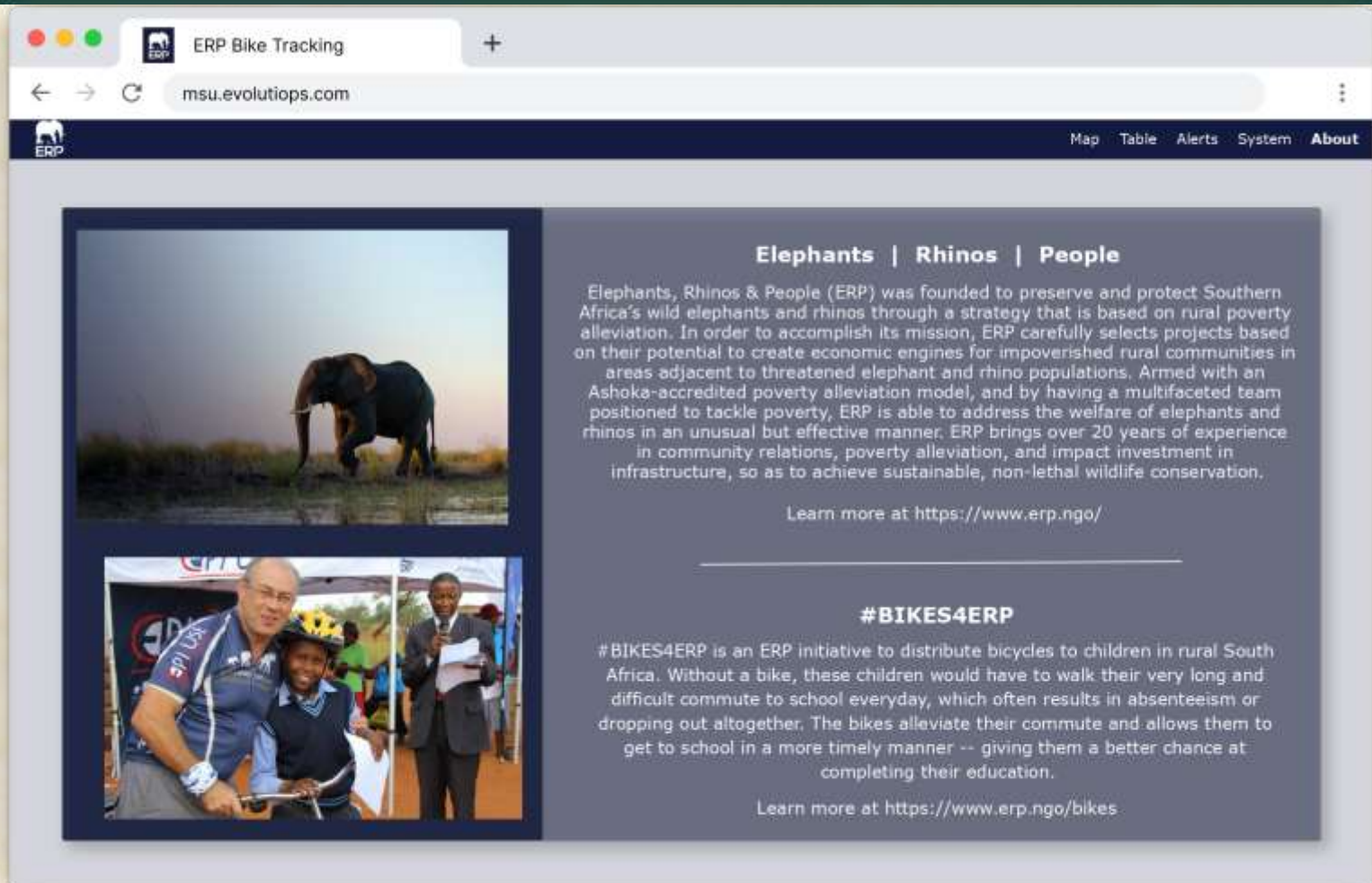
- Add New Bike to System:** Includes an "Add Bike" button and a text field showing "ID of new bike is: 124".
- Assign Bike to Student:** Features input fields for "Bike ID" (value: 12) and "Student Name" (value: Johnny Appleseed).
- Change Status of a Bike:** Features input fields for "Bike ID" (value: 12) and "Change status to:" (value: Stolen).
- Register a New User to the Site:** Features input fields for "Email address of new user:" (value: youremail@email.com), "Password for new user:" (masked with asterisks), and "Role of new user:" (value: Teacher).
- Change Password:** Features input fields for "Current password:" (masked with asterisks), "New password:" (masked with asterisks), and "Confirm new password:" (masked with asterisks).



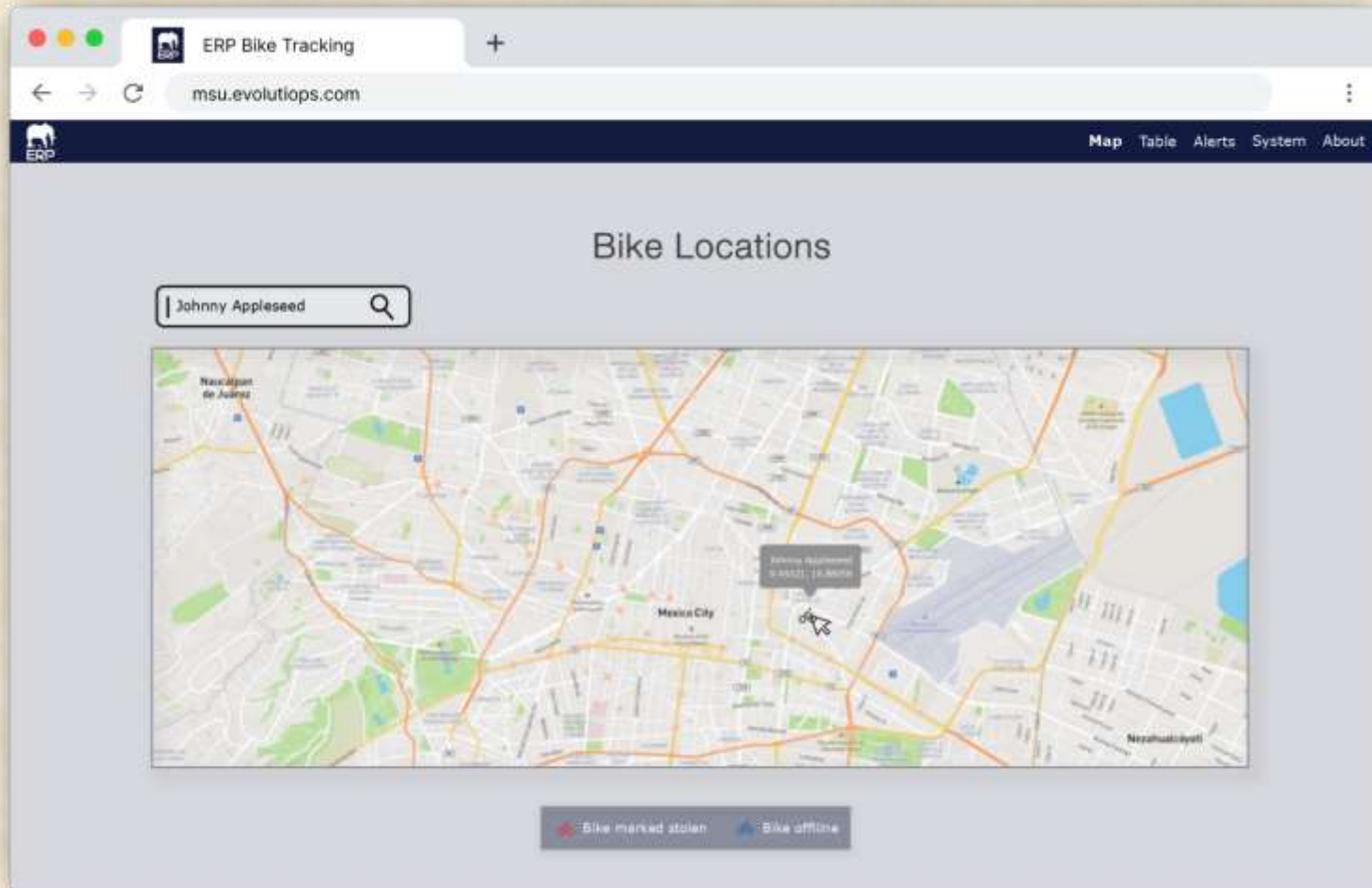
Screen Mockup: Alerts Screen



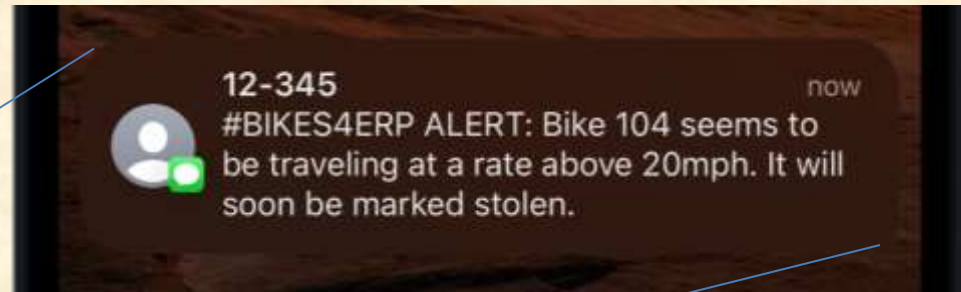
Screen Mockup: About Screen



Screen Mockup: Focused Tracking Screen



Screen Mockup: Mobile Alerts Screen

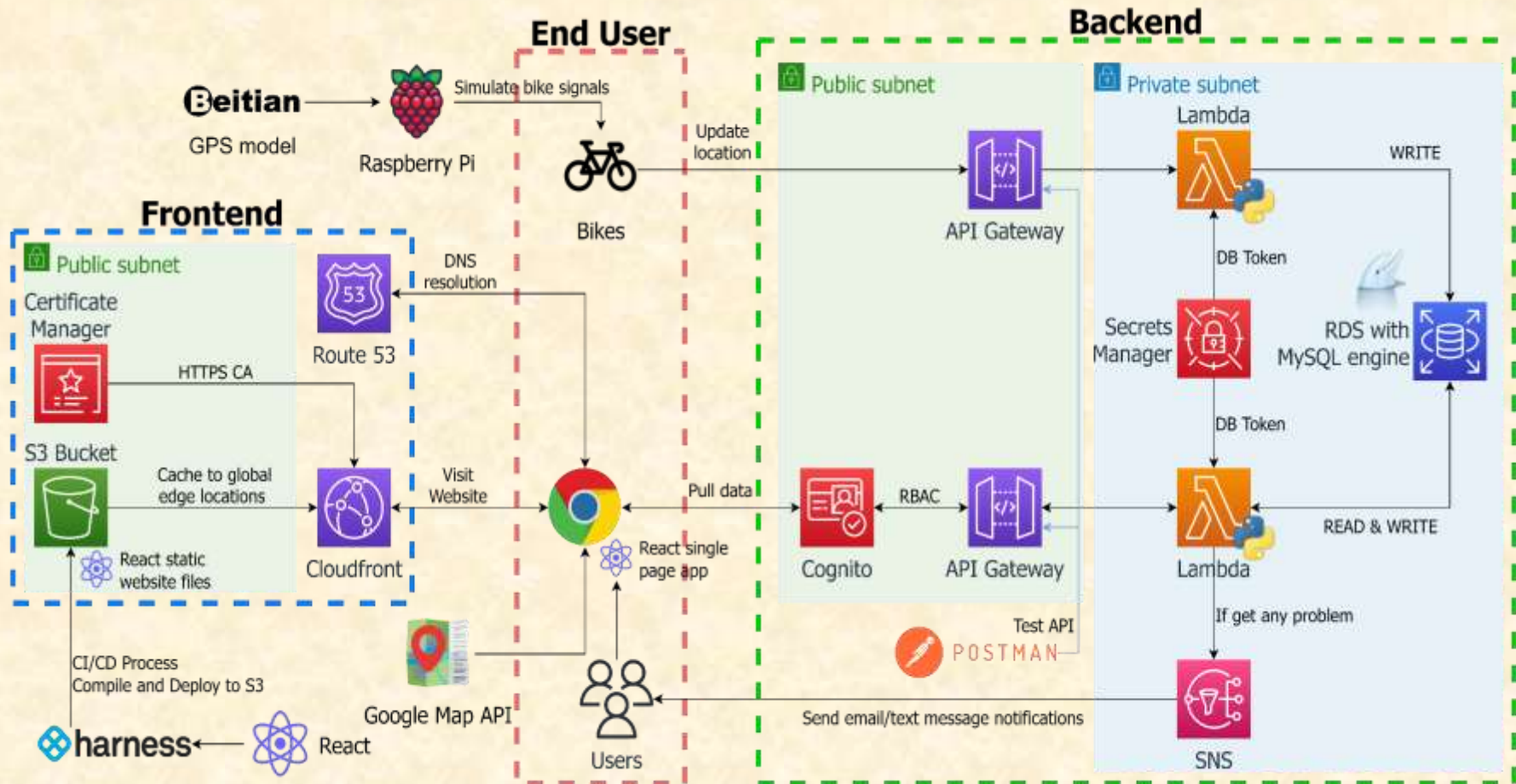


Project Technical Specifications

- Raspberry Pi 3B
- Raspberry Pi GPS Module
- AWS Cloud Platform
- Harness
- Postman
- React
- Google Maps API



Project System Architecture



Project System Components

- Hardware Platforms
 - Raspberry Pi 3B.
 - Beitian BN-880 GPS Module.
- Software Platforms / Technologies
 - Python for Raspberry Pi application.
 - React for web application.
 - AWS for backend and database operations.
 - Harness for CI/CD of React app.
 - Google Maps API for tracking map.
 - Postman in order to test API.



Project Risks

- Tracker Connection
 - How to get GPS and other data points from the Raspberry Pi to the database.
 - Client has stated that the Raspberry Pi is a prototype/proof of concept and has said the use of only Wi-Fi and mobile hot spots are fine.
- Theft Classification
 - What are the metrics for determining if a bike is stolen.
 - Start by basing the metrics on speed or missed pings, adding more as progress is made.
- Database Scalability
 - Client is requesting large amounts of data to be stored for extended periods of time, drastically increasing costs.
 - Test various rates of data upload and possible averaging.
- API Utilization
 - Depending on how often the tracking map is updated the cost associated could quickly rise.
 - Limit the map updates to occurring only once during a period of time and on page reload.



Questions?

?

?

?

?

?

?

?

?

?

