CS486C – Senior Capstone Design in Computer Science
Project Description

Project Title:	Role Based "WorldbyMe" API for N-dimensional Authentication and Access Control Within and Across Entities in a Computer System
Sponsor Information: world:byMe	Kevin Daily, President, EKA Labs, LLC

## Project Overview:

The Background

EKA Labs/WorldbyMe.com is developing the second generation of its API on the AWS platform. Our patented technology enables roles and entities to interact within a computer system in a novel way. Rather than using a traditional user ID/password combination to grant access to information, our method assigns access based on roles within and across organizations.

Think of how many roles a person has throughout life and how they may belong to multiple organizations or entities, each with different roles. Each role may require access to specific information, often needing authentication. Our approach simplifies managing access to this information by focusing on roles rather than individuals, allowing entities to share roles but still control what each role can access within their systems.

In the first-generation pilot, WorldbyMe.com deployed a role-based web platform using HTML, a Python backend, and Postgres on an Apache server in the K-12 education sector. This platform was successfully implemented across six school districts, supporting 24,000 students, teachers, parents, and administrators. It created a secure, authenticated environment for students and staff to interact across districts, controlling access to emails, messaging, apps, and data according to their roles. The system required almost no IT administration, as all updates were automated through nightly imports of each district's student information database.

This technology can be extended to any organization and all the roles an individual can assume in life.

### Example API Layer (in Education/Corporate)
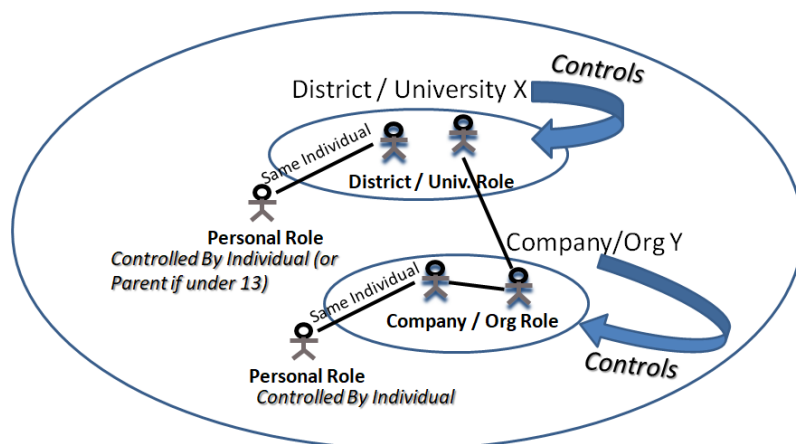
The Project
EKA Labs wishes Capstone team to implement two parts: API and an example App that uses the API. This technology to demonstrate, an extendable design using an API that can be integrated for access within and across organizations. The project will include a demonstration app hosted on AWS that is desktop and mobile friendly. Your sponsors will facilitate will meeting with stakeholders in county government, healthcare, law enforcement, justice and deputy county administration as a group, to define the app to solve an important problem.
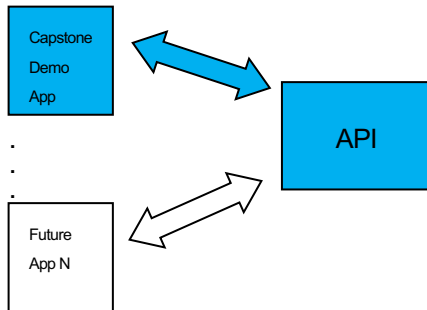
Considerations include:

1. Up-front requirements gathering for demonstration application using an API
2. The Demonstration App:
3. Define and implement API platform in AWS environment based on fundamental patent
    An API architecture example:

Figure: four layers of API architectures

Common technologies: SOAP, REST, …
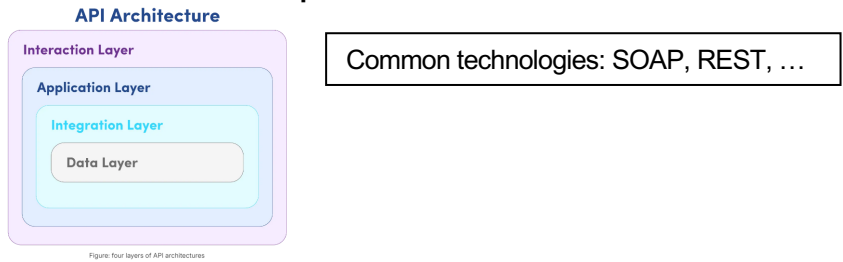
Random Example, API Architecture Link: https://www.catchpoint.com/api-monitoring-tools/api-architecture

API Supports N Apps:

4. Postgres strong candidate for database suggested
5. Language and UI tools to be decided, python is one suggestion
6. Designers/developers suggestion organized into main development areas:
    a. UX for application / Design organization/roles CSV input method
    b. Application core logic / Functionality
    c. Postgres database design / methods / testing
    d. API language focal and AWS Integration

Knowledge, skills, and expertise required for this project:

1. Are you ready to extract/define requirements with a team of experts?
2. Are you ready to work in a Agile design methodology environment?
3. Do you love database design and management? This is an opportunity to implement using postgres which is one of the most common open-source database tools available used in industry.
4. Do you want to get some real life experience using AWS and creating a maintainable dev-ops process flow in an extensible, scalable design?
5. Do you want to become fluent in software design patterns?
6. Do you want to create something that could be transformative?

Equipment Requirements:

Tools will be open source tools such as python, postgres, UX framework, AWS. Team will need to research AWS and recommend best package for development and deployment.

Software and other Deliverables:

- Requirements Document for the API and for the Demo App. The demo App will demonstrate real-world role access to provide common communication / sharing tools for people in county government high level administration, health department, non-profit service providers, law-enforcement and policymakers to communication. You are not expected to develop the communication sharing tools as it is hoped the team can use sharing "widgets" developed from a library or UI framework, like blog tools, messaging tools, email tools already developed.
- Open Source Software will be used such as python, postgresQL, UI toolkit to be decided, AWS
- Use Design Patterns such as singleton, observer, visitor, iterator, factory, others as applicable in backend design.
- Use doc strings in the code or other method to self document the code. Ideally an as-built report can be used by running a doc string report perhaps using XML tool. We would like to avoid a separate documentation activity.
- Complete professionally-documented codebase, delivered both as a repository in GitHub, BitBucket, or some other version control repository; and as a physical archive on a USB drive.
- Database design document
- Code that is written with test cases as part of the development or a facility for implementing test cases, so that regression testing can be done as development progresses.
- Demonstration App employing a UI for desktop and mobile:
    - Admin Menu allowing demonstrating ingest of an entities existing database of users and roles. (An example of a school district will be provided as a starting point)
    - Role visualization in of an entity's roles
    - App using an API to solving a real-world problem city, county and law enforcement need to solve.
- Define the dev-ops process an entity would employ to integrate and maintain an app in AWS.