Mobile App Development: Suspect Tracking Databases for Police Departments

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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ABSTRACT

22nd Century Technologies, Inc. (TSCTI), a DC-based software solutions firm, realized that police departments have trouble keeping track of suspects in their jurisdictions and also getting information about ex-convicts and suspects in other jurisdictions when combating crime. TSCTI designed an app for police departments in six different counties of Florida that helped police officers keep track of ex-convicts and suspected criminals in their areas. Police officers are also able to submit new information to the app after they proof check this information with superiors to keep all other officers updated. I worked on the mobile app version of this software, specifically on the features that allowed police officers to submit requests to add new information on suspects. To work on this application I had to learn how to use the Flutter framework, typescript, and different database languages required to access existing police records. One major outcome of this internship project was deployment of a functional mobile application with an immediate impact in the community. Another outcome was the capability for police officers to be able to submit requests to add new information on suspects. This application can be further built upon by incorporating a predictive policing model to help track crime, as well.

1. INTRODUCTION

I served as a software engineering intern at TSCTI in McLean, VA, during the summer of 2021. My role was to work on a team that was designing the mobile app version of a criminal monitoring application. TSCTI was deploying this software to help police keep track of criminal data and whereabouts, creating a pseudo-crowdsourced database within the many police departments in large areas.

Having a system like this is very important because it allows police departments to exchange information on suspects that cross into multiple jurisdictions. One important feature that most police departments want is the ability to update information quickly so that ongoing investigations have the most accurate information. Being able to update information about specific suspects or ex-convicts was the feature I worked on during my internship. To do this, a police officer that had access to the app would have to submit a form with the updated information, which would need to be double checked by a supervisor. The updated information would then be added, modifying details already in the app.

2. RELATED WORKS

Police departments around the United States use similar applications. One such application is Shadowtrack, used by law enforcement agencies, including Virginia police and probation officers, to monitor and

track individuals on pretrial release or probation—using GPS tracking technology. This system ensures that individuals are complying with the terms of their release, such as staying away from certain areas or avoiding contact with specific people (Hawkins et al. 2021). Studying this system inspired the product that TSCTI designed and let us think of new ways to help the police as well. Instead of just GPS tracking of people on probation, we thought updates on suspects would be beneficial too.

Another resource used by the police is Third Eye, an automobile tracking program. (ThirdEye, 2022) I had to look into the security needed by an app designed for the use of the police and what type of features police departments would be interested in when thinking about the design of our own mobile application. Security is especially important in apps used by the police because the data used in these applications are very critical and can have severe implications if leaked.

3. PROJECT DESIGN

When I first started working on the project, I had to review the existing system architecture. Afterwards, I worked on two large subsections of this application: the frontend and the backend. When working on the frontend I utilized the Flutter framework and Typescript and made some User Interface (UI) updates. When working on the backend, I used SQL and our database platform to do my work.

3.1 Review of System Architecture

When I joined the project a large part of the base application was already done. The team had finished setting up the database and a strong UI to show to our clients, as well. The app was designed with Flutter, an app development framework that can be used for both web and mobile applications. The main reason they used Flutter was that the app could be supported on Android and Apple phones and also be deployed to Google Play Store and the Apple App Store. I had to become familiar with the Flutter Framework and Typescript, the language used for Flutter, before starting to work on the feature I helped implement.

3.2 Front End Development

The front end framework used for this app was Flutter and was written in Typescript. The UI for this application is supposed to be simple and easy to update in the case of any bugs because of how critical this software is to the police and ongoing investigations. If it is hard to access and bug fixes take too long, then the police will not be able to do their job.

When the user opens the app, they have to log in to authenticate their police officer credentials. If they successfully log in, they will be able to access the databases of ex-convicts and suspects. With authorization, users will also be able to request an update to any information in the database. The next highest level of authorization allows users to accept this request to modify information in the database. There are three levels of authorization: users who can only view the data; users who can request to modify the data; and users who can accept these requests.

3.3 Back End Development

The back end development utilized a SQL database that contained Florida Police Department data. Development utilized SQL queries to get pull data requested by users about the individuals of interest, including their last seen location, people they were last seen with and current address. I was not allowed too much access to the back end because of my clearance level for this

project, so I had to use a self-made database to test my frontend work. The fields of my database were similar to the official police database, and the SQL queries I used would have worked the same if I were using the official database, as well.

4. RESULTS

The new feature and the mobile application allowed our clients to use a functional database that sorts information on ex-convicts and existing crime suspects. The application also keeps the data confidential and secure so it meets the requirements of an application used by the police. This is a huge improvement from the typical process that police departments have to go through when exchanging information about overlapping suspects, which is requesting whatever information they have from each other. With this new feature, police departments will be able to update information they have on suspects after it is proofread by a superior. This basically lets police departments crowdsource information about individuals they are tracking. My manager emphasized how much police departments dreaded the task of getting information from other police departments in intense situations, so this feature will be of major use to them.

5. CONCLUSION

This mobile application is of great use to the police as it creates more ease in trading information between multiple police departments about suspects and convicts in their respective areas. It has the security needed for an app used by the police and also meets the requirements gathered when talking to our client. The project used multiple technologies and software to put together a well-developed mobile application including the Flutter framework, Typescript, SQL and rational SQL databases.

This project was my first real look into the life of a software engineer. I got a chance to be a part of various parts of the Software Development Life Cycle and even got to communicate with the client to gather their requirements and needs. I was able to attend daily stand-ups, weekly sprint checks, and mentorship meetings to get help whenever I needed it. I came to the realization that some lessons taught during my time at UVA, especially in CS 3240, have a lot of real-life application, and the knowledge I gained in that class really helped me in this real-world scenario.

6. FUTURE WORK

Future improvements to this application could include the use of predictive policing to help highlight areas where suspects could be on a map. Having an interactive map in the app that showed where suspects are could help police find suspects. This improvement also comes with a fair share of negative side effects because it could increase policing in areas and cause more minor arrests instead of catching the suspects that need to be taken out of the communities.

Another improvement to this application could be hosting the database on a cloud platform instead of using a local police database. This could improve the speed of our software and also provide more help in case of problems in our database, which we ran into during development.

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