Proposal for Senior Capstone Project

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Abstract: For this project, I will complete an app for Cornell College Students that allows them to view Class Schedules, See the weather, see upcoming Cornell Events, View the HillTop Menu, View a Google Map of the college campus, and give quick links to Moodle, Self-Service and the library website. It will also allow the user to configure various other miscellaneous options. This project will allow me to refine my object-oriented programming skills, and work more with databases. At the end of the project, I will have a fully functional app that works on Android devices and can perform all the functions described above.

I. Introduction And Definition

A. Introduction

For the Senior Capstone Project, I am planning on creating a Cornell College Android app that allows students to see local weather, the menu for Hilltop, and events for Cornell College students, including Cornell College events and local Mt. Vernon events, and see their class schedule. It will have quick links to Moodle, Self-Service, and the library website. I will also implement a Google Maps plugin into the app, that allows users to see an interactive map of Cornell College on the app. It will also have an option to reorder these features, change background colors, and change from light to dark themes.

B. Project Tools

The project will be completed using Android Studio [1] and MSSQL[2]. The Android Studio app code will be written using the Kotlin Programming language [3], which has excellent support for Android Studio. The SQL server will be an online database that the app will connect directly to and read and write from.

C. Deliverables

The final product will be a basic, yet fully functional app that works on at least Android Devices. As described above, it will allow students to see local weather, view the menu for Hilltop, see events for Cornell College and local Mt. Vernon events, and have quick links to Moodle, Self-Service, and the library website. It will also have a Google Maps Plugin and allow reordering of features, changing the background color, and changing from light to dark mode. This product will be completed in Block 7 of 2025, and should take around 150 hours to complete, or less.

D. Why Do This Project?

I want to create something that is useful and could have real-world applications if developed fully. I want the project to showcase skills I have learned in the past 4 years and skills I have learned on my own. But, most importantly, I want it to be a project I can be proud of and show to employers to showcase my skills. This is why I chose Kotlin instead of Java [4], which is a language I am more familiar with, as Kotlin is used much more frequently in actual software development as opposed to Java, due to huge security concerns and ease of exploitability with Java. I worked on a larger, yet similar project before but was only part of the back end and only created controllers for the front end to connect to the back end. I had no clue how the front end worked. Maybe if I create a full, workable version with actual student data it could be used by Cornell Students! An exciting prospect.

II. Features

A. Local Weather

This feature will display the temperature, the current weather, and a weather forecast for the rest of the day. This will be done by getting the location of the device in longitude and latitude, and then sending the data to the WeatherBit API [5] via an API key, which will then send a JSON back which can be decoded and used to send relevant weather data to the user. This will be displayed at the top of the screen by default. This will use Kotlin.

B. Hilltop Menu

This feature will show the menu for the Hilltop Café for the day. This includes breakfast, lunch, and dinner. This will be done by loading the website data for the current day's menu at https://cornell.cafebonappetit.com/ via the WebView[6] android class. Then, using JSON parsing, the menu for the hilltop café for breakfast, lunch, and dinner will be extracted

from the website and displayed to the user. There will be GUI buttons for breakfast, lunch, and dinner that the user can touch/click to display relevant information.

C. Events

This feature will display upcoming events for the current month. The app will first get the current date and will get the information for Cornell College events from https://www.cornellcollege.edu/campus-calendar/. Like how the Hilltop menu feature will work, WebView will be used and then JSON parsing will be used to get information from the website. The user will be able to cycle through events and event information in chronological order through two GUI buttons near the displayed information.

It will also display upcoming events for the town of Mt. Vernon. It will do this the same way although it will extract information from https://visitmvl.com/upcoming-events/ instead. Again, the user will be able to cycle through events and event information in chronological order through two GUI buttons near the displayed information.

D. Quick Links

This feature will allow the user to go to Moodle, Self-Service, and the library website. It will simply open the website pages in the user's default internet browser for their device. There will be a button for each link at the bottom of the screen in the default layout.

E. Google Maps

This feature will allow the user to see a Google Map of the Cornell College Campus in the app. Android Studio has a built-in Map SDK that, along with the correct API key, can show Google Maps the same way it could be viewed in a web browser, with all the same functionalities. This includes a navigation mode, which will be helpful for Cornell college students to use to find their class buildings for each block of their new class.

F. Class Schedule

This feature will allow the user to see his or her class schedule, because I don't have actual access to the student's schedule, this app will read from a sample database filled with dummy variables. Once the data has been read, it will display the schedule for the current day, including the time the student has class, the name of the class, and the location.

G. Options

This is a set of features that will allow customization of the app to fit the user's preferences. This includes reordering the default order of the features, such as having the map mode at the top of the screen instead of the weather, changing the solid background color, and changing from light to dark mode for text. Other features may be added if app development goes better and quicker than expected, such as the ability to add personal background pictures, or the ability to add/remove features from the display.

III. Exisitng/Related Work

A. Iowa State University MyState App

During my time at Iowa State, I used an app developed by Iowa State Alumni called MyState[6]. It was an app designed specifically for Iowa State Students. It shows users the local weather, the bus routes for the city of Ames, dining center hours, the location, and menu of the day, and local events. It also has additional widgets that can be added which include a radio widget that connects to 88.5 KURE, a directory widget that allows users to look up Iowa State University faculty, a widget that connects to the Iowa State University library, and a news widget. It works on Android Devices and Apple Devices.

B. Similarities and Differences

My app will be designed specifically for Cornell College students, as opposed to MyState, which is designed specifically for Iowa State students. Many features are similar, such as local weather information, dining center information, and local event information. Both apps will run on phones, and both apps were created with Android Studio. However, there are also some notable differences, such as a bus route information feature on the MyState app. The Cornell College app will not have this feature, as there is no bus in Mount Vernon. The radio feature on the MyState app will not be present in the Cornell College app, as I do not have the skills to create an app that can connect to radio frequencies. There will also not be a staff directory feature on my app, as there is considerably less staff at Cornell College compared to Iowa State University. Another difference is that the Cornell College app will link to Moodle, which is the online learning platform for Cornell College, while MyState does not link to Canvas [7].

IV. Risks and Timeline

A. Risks

The app, specifically the quick links feature and the events and hilltop menu feature, rely on webpage URLs. This is risky, as these URLs can change at any time outside of my control, and a changed URL could cause severe bugs within the app. I will assume for this project, that the URLs will not change.

Another issue/risk is the fact that my app may not be compatible with certain devices, Android Studio itself states that the Android version I am developing for (SDK 35), is compatible with most devices, but it might not work at all on some devices or have device-specific bugs that I will not encounter or see in testing/debugging.

B. Timeline

Day	Objective
1	Initial setup of the app
2	Create SQL database and link to app
3	Local Weather
4	Local Weather debugging
5	Hilltop Menu
6	Hilltop Menu debugging
7	Events
8	Events debugging
9	Quick Links
10	Google Maps
11	Google Maps debugging
12	Class Schedule
13	Class Schedule 2
14	Class Schedule debugging
15	Options
16	Options debugging
17	Cleanup
18	Extra Day if behind

V. What has been done?

A. *Installed needed Programs*

Android Studio has been installed and Gradle has been installed, configured, and tested, as well as all needed Android phone emulators. I also connected my personal phone to be used with Android Studio, which will allow me to see how the touch controls work. SQL and SQL-Server have been installed and a server has been created and successfully connected to directly.

B. *Learned Android Studio*

I have also been learning Android Studio[1], I am familiar with and almost proficient in Kotlin, the programming language used by Android Studio. I have been learning how to implement various GUI elements in Android Studio, such as buttons and displaying text and links, etc. I expect to be proficient enough in Kotlin to complete the project before Block 7.

VI. What More Needs To Be Learned?

I need to learn more about how I'm going to connect Android Studio to my SQL Server. I've watched some videos on how to do so, but I haven't actually tested it out yet. In a similar project two years ago, we used SpringBoot[8] Java code to create controllers that allowed the front end to access the back end. I was in charge of writing the controllers for SpringBoot for the project, but I have forgotten how it was done and the source code has been lost. I may need to reach out to old teammates to see if they have the old code or remember more about the project. I need to learn if I should use Spring Boot for this project, or if there is something else that would be better to use to connect to the SQL server. Also if I do use SpringBoot, I would need to relearn it. As a summary… (This section will change during drafts as more is done).

- Test connecting Android Studio to SQL Server.
- Reach out to old teammates to acquire source code for previous projects for reference (if possible).
- Review SQL.
- Review Spring Boot (if going to use).

VII. Who Is This Project For?

The app is designed specifically for Cornell College students. Originally, I was planning on making it available to all Mt. Vernon Residents, but I struggled with finding possible functions for the app that would be applicable and useful for both Mt.Vernon residents and Cornell College Students. However, this project is mostly for myself, as I want to use it to showcase my skills.

VIII. Summary and Conclusion

The final product is an Android Studio app created using Android Studio, Kotlin, and SQL. Programs needed to complete this project have been installed, and Android Studio skills are proficient or will be proficient before Block 7. I did this project because I want to create something that showcases my skills to employers. I need to work on testing a connection between Android Studio and an SQL Server and reach out to old teammates to see if I can acquire source code. I also need to review writing SQL queries and SpringBoot, if I plan to use it. More still needs to be learned before I can start the project, but I fully believe as long as I continue to learn more applicable skills and knowledge for this project in the coming months, I can complete this project during Block 7 next year. With this project, I can showcase skills learned during my time in college and skills learned on my own to supplement my college curriculum.

References

[1] "Android Studio" Google https://developer.android.com/studio?gad_source=1&gclid=Cj0KCQiA0fu5BhDQARIsAMXUBOK75Aq7KsC-xZ1a_jsfyjOPjhohLXt3aEThxEHsXlts2OBTxjLtt6gaAiUtEALw_wcB&gclsrc=aw.ds
[2] "MSSQL" Microsoft https://www.microsoft.com/en-us/sql-server/sql-server-downloads
[3]"Kotlin" JetBrains https://kotlinlang.org/
[4]"Java" James Gosling https://www.java.com/en/
[5]"WeatherBit API" Weatherbit https://www.weatherbit.io/
[6]"MyState" Iowa State University https://www.mystate.iastate.edu/
[7] "Canvas" Instructure https://www.instructure.com/canvas
[8] "SpringBoot" Open Source https://spring.io/projects/spring-boot