CSE 5236 Project Description

Instructor: Adam C. Champion, Ph.D.
Spring 2018 Semester
Total: 60 points

The team project (2–3 students per team) for this class involves conceptualizing, designing, and developing a mobile application on the Android or iOS SDK. The application should meet the set of functional and non-functional requirements described below. Teams should follow a well-managed development process that results in well-designed, well-documented software.

High-Level Requirements

We discussed in class that a mobile device serves as two things: (a) it serves as your gateway to everything else; and (b) it represents you. Thus, the app that you conceptualize must be you, represent you, and be unique to you. In addition, the app must meet the following requirements:

- Must uniquely meet a clear need;
- Must be well-designed (by following the process outlined in the course);
- Must have a UI (i.e., it cannot only be a background service);
- Must have a rich set of domain objects (at least three);
- Must have data that is persistent across sessions;
- Must use one or more external services (e.g., maps);
- Must use one or more sensors (e.g., GPS, accelerometer, light sensor, etc.).

Note: All student teams in a class section must design original distinct apps. There should NOT be multiple team apps that meet the same need (e.g., multiple apps that “find nearby events around me” via GPS, Google Maps, and Facebook). I expect that each team designs and develops an original app that is distinct from apps already available on the market as well as apps designed by other teams in class. Since the project entails designing and implementing an original app that represents you, use this opportunity to showcase your creativity in your design. In addition, your app may be a game that meets the above requirements and originality considerations.

Stages of Evaluation

In the following, “submit” means “upload to your group folder on BuckeyeBox.” Alternatively, you can submit files to Google Drive, Dropbox, or a similar cloud storage website. If you do so, please tell the grader and me where you submitted them and grant us access to them. Please do not email your app project code to the grader or to me. There have been numerous cases where emails with project code have been rejected due to claims of malware detection (even when none was present).
Checkpoint Grading Policies: Project Checkpoint 1 is graded individually; Checkpoints 2–5 are graded as a group. If team members do not show up to their meetings with the grader, they receive 90% of their group's grade (for their individual grades). (For example, if Alice and Bob are in group a that receives 20/20 for Checkpoint 4 but Alice does not show up to the meeting, then she receives 18/20; Bob receives 20/20.)

Part (1): Android Environment Setup and Running Sample App

Due Date: Friday, Jan. 19, 2018, 11:59 p.m.
Points: 5/60
Submit: Screenshot(s) of Tic-Tac-Toe app running from the Android Studio IDE
Show to Grader: The Tic-Tac-Toe app running from the Android Studio IDE
Evaluation Criteria: The app runs on the emulator (or mobile device).

Part (2): App Requirements and Design

This part involves envisioning and designing a mobile app that meets the requirements specified in the “High-Level Requirements” section.

Due Date: Friday, Feb. 9, 2018, 11:59 p.m.
Points: 5/60
Submit: A single design document that shows:
– Notes of your app conception: Narratives, sketches, categorized list of use cases, relational database schema (i.e., your app's relational model), screen layout mockups, and screen flows; and
– A UML class diagram of your app's domain model designed following the object-oriented approach discussed in class.

Note: Your screen flows, database schema, and other documents may be drawn by hand, but they must be legible.

Show to Grader: Your app design document with the information above. You should explain your app to the grader during your group's meeting with him/her.
Evaluation Criteria: Clear evidence of the object-oriented design process.

Part (3): Installing, Debugging, Profiling, App Lifecycle Management, Logging

This part involves demonstrating your ability to do the following:
– Installing your app on a device;
– Debugging your app (e.g., stepping through code and setting breakpoints);
– Profiling your app using one or more profilers (e.g., Android Studio's CPU, GPU, or memory profilers or Instruments for iOS);
The app lifecycle and logging. Here you must implement a simple part of your app and demonstrate using the Android log that you can trigger the app's lifecycle methods in Activities (e.g., onPause() and onResume()) and Fragments (e.g., onCreateView()).

Due Date: Friday, Feb. 23, 2017, 11:59 p.m.

Points: 10/60

Submit:
- A screenshot of at least one type of profiler (e.g., CPU or memory footprint in Android Studio);
- Screenshot(s) of the app's lifecycle methods being triggered;
- Screenshot(s) of debugging your app in Android Studio (specifically, setting a breakpoint, viewing variables' states, and stepping through code).
- Your app project as a ZIP file.

Show to Grader:
- A mobile device running a recent version of Android or iOS (i.e., Android 5+ or iOS 9+);
- Installing your app on a device;
- Debugging your app (setting breakpoints and stepping through code);
- Profiling your app;
- Invocation and logging of lifecycle methods.

Evaluation Criteria:
- Demonstrated understanding of the use of the IDE;
- Demonstrated understanding of the Android application lifecycle.

Part (4): Functional Demonstration of Your App

For this part you have to demonstrate a functioning app. The app should work from beginning to end, although it does not need be optimized for performance, or be resilient to failures such as loss of network connectivity, GPS signal reception, and so on.

Due: Monday, Mar. 26, 2018, 11:59 p.m.

Points: 20/60

Submit:
- A list of use cases (only a list, no descriptions)
- Screenshots of your app running
- All code (simply export the project as a ZIP file)

Show to Grader: Your app working on a device. (If it works only on an emulator, you will only receive partial credit.)

Evaluation Criteria: TA will check off working use cases.
Part (5): Demonstration of Non-Functional Characteristics of App

For this part you have to demonstrate the non-functional capabilities of the app such as usability, performance, availability, maintainability, modifiability, and scalability. The app should work from beginning to end, should be optimized for performance, and be resilient to failures such as loss of network connectivity, loss of GPS signal reception, screen rotation, and termination by the OS. Non-functional requirements (NFRs) should be app-specific and (ideally) quantified.

The minimum requirements are as follows:
- Address at least one performance NFR and demonstrate improvements using “before and after” profiler snapshots
- Address at least one other NFR (e.g., increased app security, design enhancements, or accessibility support)
- Perform unit testing using an Android test framework (such as JUnit, Robotium, and Espresso)

Due: Monday, Apr. 9, 2018, 11:59 p.m.

Points: 20/60

Submit:
- List of use cases and NON-functional requirements met
- Screenshots of the app
- Profiler screenshots showing areas where performance was improved as well as the “baseline” before improvement (i.e., “before” and “after” screenshots of CPU, GPU, or memory consumption)
- All code (simply export and zip the project).

Show to Grader: The working app on a device demonstrated to work under failures (network connectivity, GPS, screen rotation)

Evaluation Criteria: Number and quality of working use cases and non-functional requirements met.

Final Report

Due: (Fixed) Day of the final exam.

The final report for this class will be a team report that analyzes and critiques the design process described in class. The report should consist of the following three sections:

- Describe the design process and its intended goals in your own words.
- Describe how you translated the design into the implementation of the app. In this section, describe what worked well, and where there were gaps in the process. For these gaps, explain how you bridged them.
- Suggest changes or improvements in the design process that you believe would make the design more complete and more easily translatable into the implementation.

The report should be 4–5 pages (single-spaced) written in 10–12 point font. Sample report templates are provided on the course website.
Report Expectations

- **References:** You are responsible for citing any third-party intellectual property you use in the project. If you build an Android app, you should include an Android reference such as:


  with an inline citation such as [1]. If your group uses Firebase for cloud storage, you should include a Firebase reference:


  with an inline citation such as [2]. Repeat this process for each third-party work you use, including external (code) libraries. Reports without references will receive lower grades than those with references.

- **Clear Writing:** Your writing should be simple, concise, and easy to understand. If it is not, you need to rewrite it. This means that your writing should be free of spelling and grammar errors. Most word processing tools have built-in spelling and grammar checkers; use them! Besides, prospective employers and graduate schools expect clear writing.

- **Figures:** You are welcome to include figures in your report. Please cite them as “Figure 1,” “Figure 2,” and so on.

References
