SE2: Software Design and Architecture – CS 446, CS 646, ECE 452: Sec 001, 002

SE2: Software Design and Architecture is the second course of the three-software engineering capstone project courses, offered jointly by the David R. Cheriton School of Computer Science and the Department of Electrical and Computer Engineering at the University of Waterloo.

Course Schedule

Topics
Introduction to the Class, Expectations, Admin
Introduction to Software Architecture
Non-Functional Properties.
Human Values in Software Engineering
UML Intro
Architectural views & decomposition
Victoria Day. No Class.
Intro to building Android apps - Part 1
Intro to building Android apps - Part 2
Project Proposal Preparation - No Class
Arch Styles Intro
Arch Styles - Part 1
Arch Styles - Part 2
Arch Styles - Part 3
Design Patterns Introduction
Design Patterns - Part 1
Project Prototype Demo
Project Prototype Demo
Design Patterns - Part 2
Design Patterns - Part 3
Release Engineering - Part 1
Release Engineering - Continuous Experimentation
No Class
Final Project Presentation
Final Project Presentation

Course Project

The project forms an integral part of this course. Here are some of the hard requirements:

- The app should be implemented as a Native Android app (i.e., not built using an app builder or a framework like React/Node.js or HTML5).
- The code should be hosted in Github as a private repository. You can choose to open source it after the class if you want. But during the time of the class it shall be private. You will need to add the instructor and each TA users as a collaborator with full privileges.
- The app should use at least 2 architectural styles and 2 design patterns (other than singleton) that have been discussed in class.

The three goals of the project is to

- produce a significant mobile app that performs some **useful** function
- does not cause harm to any population of users
- have a defensible design and architecture that can be presented to us explicitly

When coming up with your own app there are only three soft restrictions on the app idea itself: no database management apps will be accepted (e.g., simple CRUD apps that do not make sense in a mobile context); apps that require crowd buy-in are not acceptable (e.g., apps that would require large numbers of people to contribute content to be viably useful); apps that require a complex server infrastructure are also not acceptable. If your app has any of these components, then you are responsible to have the DB or server infrastructure or crowd set up so that you can demo the app and we can test it too.

If you are unable to come up with an idea, don't worry. We are working with an open source product team to set up an idea for you. This is an app that has social good built into it. This will be the default app that several teams can build at the same time in parallel.

If after the proposal, we feel that the app idea is too simple or too easy, then you will need to change to our default app idea above. The teams will then have to implement our suggested idea. See below for some great ideas from the past.

Human values: In the proposal, you will detail the functional requirements, non-functional properties, and human values that your app addresses. You will also state who some of your stakeholders are and which population of users that your app is useful for.

Buddy team evaluation: You will receive the proposal of another team. Your goal is to look at the proposal and find out which populations could be harmed and what harm could be created by the features of the app. You are expected to think critically and come up with an exhaustive list. The instructor and TAs will also come up with a list. You are evaluated on how similar you are to our list.

Pivot: The lists of harm that exist in the app created by the instructor team and the buddy team will be shared with the team that proposed the project by the prototype demo stage. When you receive your list, you are expected to make changes in the project so that the harm is mitigated. This change has to be documented by the final demo and written deliverable.

The projects will be completed in teams of six. If it has less than six or more than six, you will need to explicitly get permission from the instructor. You should select your own team; if you do not have a team or your team has less than six members, please post on the appropriate Learn discussion thread.

All project grades taken together (D1, D2, D3, D6, D7) need not be the same for all team members. Each team member will get a score based on effort. Please only commit your personal contribution to the repository. Do not commit for another team member. Commits to the repo are an important signal to us. Additionally, projects will have a difficulty scale applied to them by the instructor and TAs. The scale formula will be:

(total score for the team member across all project deliverables D1, D2, D3, D6, D7 + bonus) * (scale/100) = final project grade

Scale will range between 0 and 100. The components of the scaling mark will be determined by:

- 10: completeness (compared to proposal)
- 10: utility
- 10: polish
- 10: difficulty
- 10: pivot
- 50: individual effort - will be based on peer evaluation and our assessment based on oral exam and github logs

NOTE: The expectation is that you will work approximately 9 hours per week on this course; at least 6 of these hours should be on the project. Given that the course lasts 12 weeks, each team member is expected to work on the project *at least* 75 hours. As a team of six that will be 450 hours. You should be able to accomplish something pretty great in this time; please make the most of this opportunity.

Assessment Breakdown and Schedule

Most deliverables are due at 5 PM EST on the respective Friday. Late submissions will be graded only on a case-by-case basis.

Deliverable	Value
Project Team Selection	No Grade
D1: Proposal Document	5%
D2: Buddy team's evaluation	5%
D3: Prototype Demo	5%
D3: Prototype Document	10%
D4: Architecture Style Examples	10%
D5: Design Pattern Examples	10%
D6: Final Presentation	5%
D6: Arch + Design Document	10%
D7: Final Status Report	5%
Final Exam	35%