CSCI 4176/5708:

Mobile Computing

Project Report

PILL O' CLOCK

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1. PRODUCT:

1.1 What did you create? How much of the minimum, desired, and bonus functionality did you implement?

We created an application called: Pill O' Clock, which reminds the user to take medicine on time and motivated to keep doing so. This not only helps the user to keep track of their medications but on next doctor's appointment, it is so easy to show doctor about one's medicine history or even a family member can see one's progress.

Functionalities we completed:

Minimum functionality:
Form filling out medication information: The user can fill in information regarding medicine like name, date of start and date of end, number of doses in a day, dosage amount, medicine colour, refill reminder and notes about the medicine ;Refill notifications: The application will allow the patient to set reminders for when medication must be refilled depending upon doses taken and missed; Daily medication notifications: As per the date and day of medication set, the user can get notifications; List view of prescriptions: The name and respective details of all the drugs for the user can be seen in the form of list as prescribed the consulting doctor.

Expected functionality:
To have different icons: User can set an icon from default gallery of images (colour of the pill ; Login for multiple device access: Using the multi-user feature of android our app facilitates the users to log in from multiple devices into their accounts.

Bonus Functionality :
Adding dashboard view with progress statistics: The user will be able to see all their medications on the homepage along with a statistics section that shows how they well they are doing in terms of taking medication using graphs and charts. (Although we could not generate the graphs given the time constrain, we did try to incorporate it and was one of our future implementations; Motivational aspect: The app will send titbits, facts, or just motivational messages to the user from time to time to incentivise users to keep up their habits or improve them depending on their activity. (Just like progress graph, we intended to have this in our final product but just a default motivational quote was added)

Functionalities we did not complete:

Expected functionality:
Medication information from Database/API: When adding a medication to their list, the user will be able to search for medication from the database. Once a medication has been selected, certain fields will be able to be modified, such as the dosage or the image ; Take a picture or have different icons: To differentiate, the user can either take a picture of the

drug ; Customised and Accessibility alerts (flashlights, sounds, vibrations): Some people with any minor or major disability cannot listen, see, or feel the notifications. Thus, the app provides additional alerts like ringing tone, vibration or flashing light of mobile devices; Archive medicine list (enable/disable): The patient will have a button to disable a particular medicine if they do not need it right now but might need it in the future. Therefore, they can enable it again with the same button if they do.

Bonus Functionality :
Doctor view/linked to patient data: Doctors will be able to connect with patients and enter prescription information to the patient via the app bypassing the need for the patient to enter all the details about their pills themselves; Share with family member:
This feature enables the patient to share their medication with a family member who also has the app installed, enabling the family members to add, tracks and assess the patient's activity; Settings: There will be a settings section for the application that will allow users to customise or enable other tools. Some of which are changing font sizes for older audiences or those who need larger fonts to read, or letting the user export their calendar information in this application to their person Outlook, Google, or other calendars; Scan box or scan prescription pdf for information: This lets the user scan their paper prescription after which the app will identify required fields and fill them for the user.

The reason we did some functionality and did not, was affected by two questions:
Does user really want this?
If yes, which one has more priority?
We completed everything step-by-step and then improved them.

1.2 What does your app actually do?

To be precise, our application not only reminds the user to take medicine but motivates them to be on track by displaying motivating quotes and even if they loose motivation, it sends user notification to boost their confidence that they can do it.

To list few of the many functionalities, the app: lets one save data on cloud by sign-in/log-in using one's email, skip and store the profile and medication details on local machine (mobile), add medication with all little details like colour of pill to any notes doctor described to take the medicine, get notification to take pill, edit the user profile, look at the daily doses of each day of month from calendar view and many more.

1.3 How does it differ from what you planned?

There were so many details we considered we would add but as we learned in lectures and labs, we got the sense to consider the functionalities from user perspective and not the developer perspective. For instance, we were forcing log-in and sign-up as a feature to secure data on cloud but do user's really like logging/signing in every-time? No, they do not. So we decided then let's have a skip button and meet somewhere in the middle. We wanted to give weekly calendar view on the landing page after log in and sign up but due to some issues and time constrain we could not apply it, thus we decided to give a

progress graph and some motivational quotes on the landing page, which to be honest was a better idea to have. Therefore, we learned even if our application turned out different, it was perfect in the sense, we developed it FOR THE USERS.

1.4 Tell me exactly what you created, where it has faults, where you feel you produced something special, and where you feel you could have done better.

As mentioned in section 1.1, we ended up with most of the functionalities and all of the minimum functionality. The reason we filtered and discarded some functionalities is that we kept two factors in mind: 1. User perspective and 2. Time constrain for the application.

All the functionalities we delivered were nearly perfect with some exceptions like:
In Sign-up and Log-in, we implemented snackbars with action buttons in case when user already existed and it does not respectively. But, it gave out weird error messages due to other issued in Sign-up page and still pointed to Log-in action. We states, the flow of the program for error either should have been different or missed something.
Notifications sometimes messed up and showed reminders for other medications in list, which were not scheduled in few cases.

Had we had more detailed planning and taken in account about the obstacles that we might face like end of the semester is really hectic and maximum of task must have been done before that but reality was different. We learned how we can plan for future endeavours.

1.5 What did you really do? If your plan was overly ambitious, please explain in detail where it went wrong.

We created a functional app with all the minimum requirements of a user and which do not overwhelm the users. We are proud of what we created.
The place where we went wrong is calculating the developer hours that we had in hand. We initially thought we had more time than we had and planned to implement some advanced features that were hard to pull considering our inexperience in Kotlin and Android. If we had those extra developers time, we would have added ML logic and read prescriptions to get the pill information to automate the entry.

2. LESSONS:

2.1 What did you learn? Not only about programming, but about teamwork, repository systems, scheduling and planning, and anything else.

Empathy: We didn't have a high-performing crew when we first started. On a routine week, performance was simply mediocre, but there was always sense of belonging, and communication was always clear. We had people on our team from all around the world. Nobody ever hesitated in asking for help and neither did anyone refrained from helping. There were never sour feelings form anyone's side and everyone spoke in a friendly tone. We made sure that, no matter the situation, we will try to do something.

Equality: Even though, the team had graduate and undergraduate members, there was never a time when we pushed some work on someone senior or refrained work if someone were inferior. This type of quality is hard to find, especially when everyone is behind computers. It is extremely easy to ghost someone and make an excuse that is in all sense true and we cannot even deny it.

Responsibility: Whenever we scheduled a meeting, all the members showed up on time. And seldom if a team member missed it due to other subjects matters, they always checked in with any of the team members about the meeting and completed their part on time.

Gitlab: We used Version Control Repository: Gitlab to keep proof and record of everything, every member worked on. This not only encouraged us to keep track of the project but motivated every member of the team to push their code on the repository. All of us already worked on Gitlab in our previous semesters, so it was much easier tool to manage and work with team.

2.2 That is, now the project is over, what really caused you to change your mind about development?

To be honest, it is not the language or the technology that is hard, but the people. Almost all of us didn’t know much about working with Kotlin and architecture of the mobile applications. Some were great at learning new technology and some were little sluggish but above all having a great team who understands background of all the members and works like ONE TEAM, is hard to find and is most important part of working on development projects. We were not a single percent disappointed with out final application even though we could not deliver some of the functionalities. Therefore, no development project is hard enough if a great team is at disposal.

3. ISSUES :

3.1 What problems and issues did you encounter and how did you solve them?

Or, how did they prevent progress and cause you to change your plans?

***Technical Issues**:*
We faced a number of technical issue, since it was our first time working on Kotlin and Android development like: Android Framework Issue: Android Framework did not work as expected, TextView inside RecyclerView sets its text empty upon scroll, needed to set a boiler plate code to set max recycled view to zero fixed this issue. Since android is not stabilised and it keeps on changing the functionality of the APIs, adding restriction and introducing new functions for slightly different functionality, finding resource that works for the latest version is a pretty challenge. For Example, to trigger notification when the App is closed, the initial method was using service, which will be running even after the App is closed but this goes not works in the latest API version. So we later changed to Alarm Manager but its methods works differently on different version. So did a trail and fix to find the function that works as per our need. Unfamiliarity with Kotlin: Since this is the first time we are working on Kotlin, it took a great amount of time to understand the keyword and syntax, we faced the really difficulty when we are trying to implement the MVC pattern and SOLID principles in it. We over came this by working together as a team and help when someone is stuck with something or felt hard to understand.

***Non-Technical Issues**:*
Having a common credentials for Firebase: Since we are working as a group and Firebase credentials are created using Gmail account, we had difficulty in sharing the credentials and we ended up creating a individual account separately and use it in their local instance. Android Studio takes up huge memory and even heats up the laptop with 8GB RAM, so it was a little difficult to run the android studio and connect on teams to pair program or get help from teammates to solve the problem. We are working as team for the first time and we all have other courses and assignments as well, so we had difficulty to meet and work together. We overcame this by working together whenever anyone is available and share their status of that issue in Teams so that the next person to work on it get it fixed. We setup meeting in after-hours and weekends to discuss the course of action. Since we had limited time, we tried our best to get the core functionality running and ended up dropping some advance features.

3.2 Almost always, your product differs greatly from what you envisioned – why?

The distinction between product development development and research research and development is that product development is the full process of developing, creating, and applying new concepts , whereas research and development is the conception phase of the product life cycle. It can never be same and we believe that it never should be. Sometimes we find exceptional things in comparison to what to intended to do. For instance, due to lack of time we decided that dashboard will not have weekly calendar view but a progress graph and motivational quote. This was highly encouraged during our project presentation.

4. SATISFACTION :

4.1 What are you happy with and what are you unhappy with?

We are really happy with how many features we were able to get done considering the limited amount of time and our unfamiliarity with Kotlin. We could have tested the application a bit more and polish it but in the given time period, a larger feature set was more important.

4.2 Go beyond the product and consider the entire project from beginning to end.

A massive positive was that we spent a lot of time in the design phase, and as a result had detailed illustrations of the data models, architecture and wireframes, which made the implementation a lot easier than it otherwise would have been. In the end, we have implemented all of the features that we considered high priority.

4.3 Did you make friends, did you learn a lot, did you have insights into development, QA, requirements, or other parts of the process?

The group was very functional and responsive, which made communication easier and clearer. We learned a lot about Kotlin, MVC, UI design and the whole pre-implementation process. We now realise how important user research and design documentation is, as that helped speed up the implementation. Using GitLab issues to keep track of everyone's tasks and progress proved to be beneficial as we always knew what everyone was up to. We also helped each other with certain areas we were finding tricky and gave feedback on each other's completed tasks.

5. TASK DISTRIBUTION :

5.1 Describe in detail what each group member did. I want to know, in detail, what everyone achieved, where they put their efforts, and what they accomplished.

Since the entire team was collaborating and working together most of the tasks are shared by multiple people and everyone contributed their best, here I'll share the key modules they worked on and some of their out standing works.(Sorted in alphabetical order)

Arianna:
Final UI design :Worked on the final UI design ; Activities Animation : Added animation in transition between activities; Landing Page: Added the graph and motivational quotes in the Landing Page; Navigation Page: Worked on the bottom navigation and created the Landing, Medication, Calendar Activities ; Calendar Module : Started working on Calendar Activity after Julia and made the on calendar change even to list the task to be performed on that day; Task Service: Fixed the issue in loading the list of tasks to be performed for the day.

Julia:
Profile Module: Worked on editing the profile page, in which the name, age and sex of the user can be changed; Calendar Module: Initially worked on the Calendar Module, added the calendar and tried to create both monthly and weekly view ; Edit Medication: Fixed an issue in Edit medication page; Top Notification: Initial worked on calling Profile module by clicking on icon on top navigation in landing page.

Karthik Kannan:
Notification Module: Added a Notification fragment that loads all the pending notification in recycler view, tried to load the list using lazy load but failed to accomplish it. Worked on calling Notification Fragment from Landing Page Activity; List of Task to perform(Pills to take and refills to be done): Worked on the list of tasks to be done, like pills to be taken for the day and pills to be refilled in the Landing page by creating a service that can be used in Calendar page. Worked on creating action upon checking the checkbox to reduce the count of the available pills; External API for medication details: Worked on integrating FDA APIs to get details of the Pills being entered in the create pill page; Notification Service: Added a notification service that schedules Alarm manager to trigger notification service to send notification to the user and integrated it in the Medication creation page; Top Navigation: Worked on top notification to open profile, notification fragment and add medication from menu in top notification.

Ruhi:
Sign Up Module: Worked on signing up new users using Firebase authentication and created new user profile in firebase. Users cannot have multiple accounts for the same email address. If they tried filling in the form, the snackbar will show the error and display log in action button; Log In Module: Worked on authenticating the existing user to login to the application using Firebase Realtime database. If user did not exist, it would

display the error and show sign up action button; More Module:Worked on the More page that has contact us details and information of our group. We kept this page as a dedication to our team effort; Logo Design: Designed our applications logo from scratch. It seemed necessary and fun to have a logo, which allowed to unravel a new realm of logo design. Helped Julia start implementing user details page by going through basics data management and database connection.

Surya:
Medication Create Module: Created the Create Medication module in which the user can manually enter the pill description and the interval in which the pill is to be taken. Integrated the FDA APIs service and stores the pills description if present for reference. Added multiple pill icons to differentiate and identify the pills to be taken which will be helpful for elderly people; Medication Edit Module: Worked on Edit medication page in which the user can edit the medication if any changes needed to be done; Medication View Module: A page to list all the medication added, to select and edit if needed; Profile Module: Helped Julia with the Profile Module; Top Navigation: Helped Julia with the top navigation for profile page.

6. CONCLUSION :

6.1 What is the one single thing you want to tell me about your experience?

Julia: Working in a team, I learnt the areas that I needed to improve.

Karthik: I had a wonderful experience working with a team with various skills, who gave more than their 100% and helped in places they expertise and got help when they needed.

Ruhi: I never thought (given my past experience of being bullied by people who were senior to me in a team) that I will ever have a team this great. My past and present taught me that no matter what, race or gender, accomplishments or failures, experience or naïveté, every person needs to be treated with respect and never to be underestimated. I will always apply and will let people working with or under me remind this thing.

Surya: I was really lucky to work in a group where everyone contributed and was always helpful

6.2 What is the most important thing you learned or accomplished?

Julia: The learning curve is huge, when we learn to work on new technology. I can learn a lot from myself, people around me and resources available.

Karthik: I learned that I really needed to work on people management and project presentation skills. I learned a few skills and how to do them from my teammates.

Ruhi: I learnt that doing things is much easier than it is imagined in head. Given that humans have extra-ordinary creative thinking power, it can be used in envisioning situations and future, which to be honest has never ever have happened in reality. So no matter whatever challenge I have, I never think about problems I will have, I think how I will solve them and who can help me if I cannot. I learnt to stop judging myself.

Surya: Spending more time in the design phase saves time during implementation and it is always great to see what future will look in a tangible format than in imagination.