DALHOUSIE UNIVERSITY
Faculty of Computer Science

CSCI 5708
Mobile Computing

Project Report ➔ RentHvn

April 3rd, 2020

RentHvn

RentHvn

Name	Banner ID	Net ID
Shrey Rameshbhai Vaghela	B00834792	sh367824
Aditya Patel	B00843467	ad723057
Haard Prashant Shah	B00827531	hr606438
Tejasvi Vig	B00833705	tj252001
Harpreet Singh Sodhi	B00833691	hr557871

<u>Abstract</u>

In this era of social fashion, trends are changing every moment. People love to wear designer clothes worn by their favourite celebrity. However, as the craze for the latest fashion clothes increases, the price of such apparel increases in direct proportion. "RentHvn" allows the users to rent an attire of their choice for a given period. The ability to select various attires to suit the occasion provides an economical option to the users. Moreover, they can also donate their old clothes to registered NGOs. Hence, this helps us to explore a market that promises a great future.

Table of Contents

Introduction

RentHvn seems like an exciting concept that can influence an underserved market of rented dresses. Besides, it also provides users to rent and donate without needing to go through complicated and tiring procedures.

We, as a group, identified the issues that the end-users face when it comes to purchasing new attires for different occasions, some of them are listed below:

- People restrict themselves from buying new clothes because of budget issues.
- Once purchased, the attires are not worn frequently, just on some occasions. Later, clothes that do not tend to fit are nothing but waste.
- Moreover, when we think about donation, people sometimes want to donate, but they restrict themselves due to lack of knowledge as to whom they are donating and where their donations will go.

If we want to success with our application, we have to think the about the advantages we can offer to the end-users of Renthvn. Some of them are:

- People can save money; instead of buying the dress they wish to wear; they can rent it for a short duration and have a variety of dresses to wear on different occasions.
- People can save closet space; usually, people wear party dresses just once or twice, then it piles up in their closet, so renting clothes saves them valuable space.
- People after renting clothes can be sure they don't have to wear them again so they can reduce the twinning moments on different occasions.
- People can enjoy a lavish lifestyle, especially women who tend to have an exquisite taste and tend to wear clothes from big brands without repeating them; instead of owing them, they can rent it at half the cost.
- Using this application, people can donate their old clothes, without having to worry about the whereabouts of their donation after they donate.

One of the major advantages this application offers is time efficiency. People would not have to go out to purchase the dresses at short notices; they can just rent clothes at a click of a button.

Tools and Technologies Used

1. Tools
   a. Android Studio – Application Development Tool
   b. Git – Version Control and Source Code Repository
   c. Draw.io – Database Design, ERD and Use Case
   d. Firebase Realtime Database – Database

2. Technologies

   a. Kotlin – Android Programming Language
   b. XML – User Interface Programming
   c. JSON – Data transmission over network

Gantt Chart Diagram
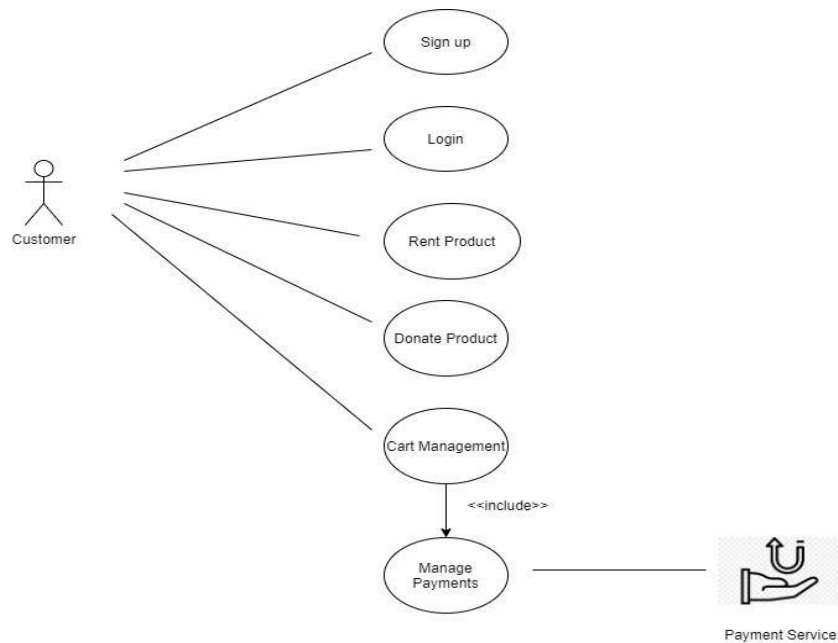

Figure 1: Gantt Chart for Renthvn

Use Case Diagram

Figure 2: Use case diagram

Application Functionalities

1. Login/Sign-up

Login/Signup is the entrance to the app. It is required for the user to login/signup to use the app.This step ensures that users can place the order under some identity (e.g. name, email). After signing up, users can sign in using their email and password. We have used Firebase for authentication and Realtime data. The password is not visible to us and is stored somewhere safe in the Firebase, thus maintaining user security. So, when the user attempts to sign in using email and password, they are verified using the Firebase authentication methods.
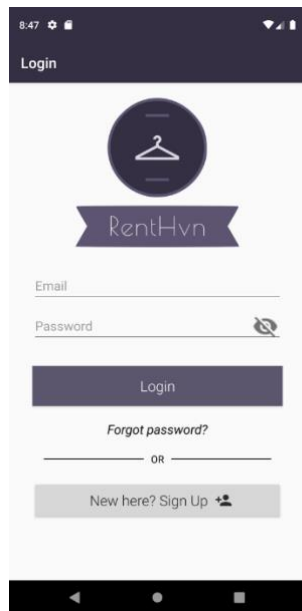

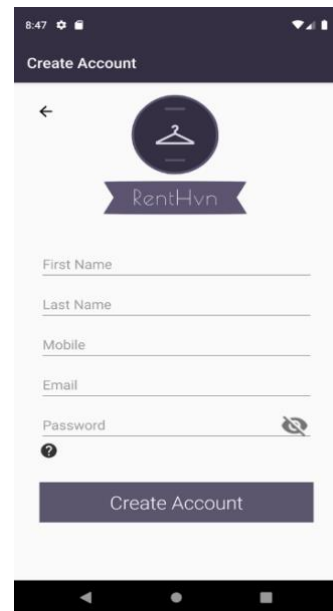*Figure 3: Login Screen*

Figure 4: Signup screen

2. Forgot Password

If the user forgets their password, they can enter their registered email to reset it. They receive a password reset link from Firebase, which they can click to reset the password.
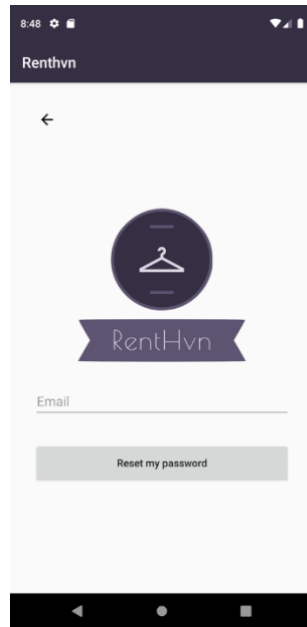
Figure 5: Forgot password screen

3. View dresses on main screen

The home screen is the first screen after logging into the application. The home screen provides various functionalities like selecting the location, navigating to sections like bridal, groom, women's designer, men's designer clothes. It has a scroller image viewer. Additionally, the user can directly navigate to their cart by clicking the cart icon at the top. The bottom navigation bar helps the user to reach for help or go to the donate screen to make donations. The hamburger on the top left is the drawer navigation, which has functionalities for the user to go to generalized women's and men's sections, update the password and sign out.
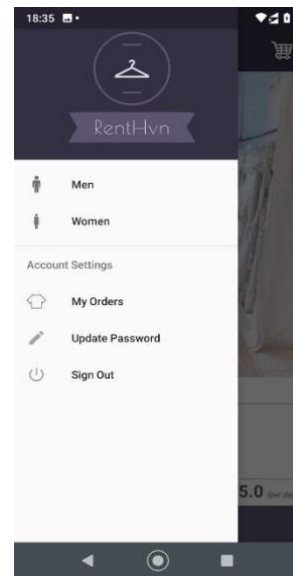

Figure 6: Home screen

Figure 7: Drawer screen

4. Select a dress to rent

   The user can select the dresses on these two screens once the user clicks on the main screen.
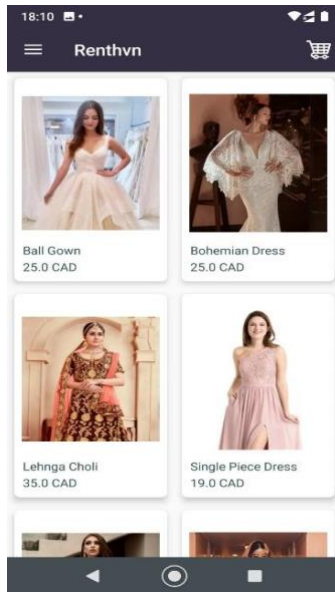
Figure 8: Rent—Women
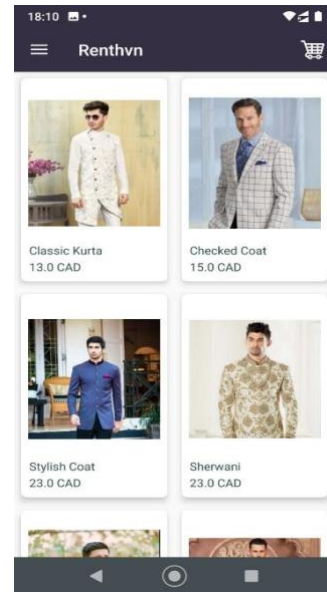
Figure 9: Rent—Men

5. Size and event date selection

   Once the user selects the dress they wish to rent, they are taken to the screen, as shown below. The user on this screen can select the rentable size, rent period (for how much the user wishes to rent the dress 1, 3 or 5 days), event date (the date the user wishes to rent from). The user can also view the price per day for the dress on the screen once they select the dress to rent.

Figure 10: Select Event date

6. Cart Management

If the user visits the cart, the cart is shown empty to the user with a button that leads them to the home screen where products are displayed.

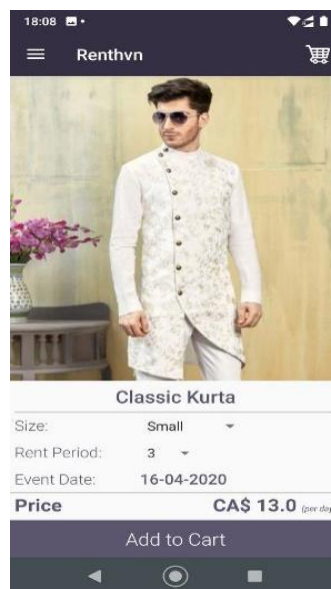Once the user adds items in the cart, the cart will be shown as the image shown in Figure 12. The rent is calculated according to the number of days and the price per day for the dress. The user can remove the clothing from the cart as well. The total value after all additions and deletions will be shown below to the user on the same screen.

Figure 13shows an empty cart that is shown to the user once the cart button is pressed before adding products to the cart.
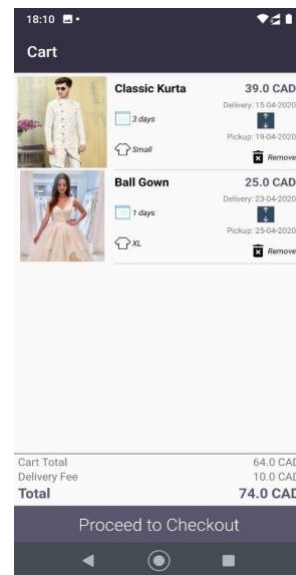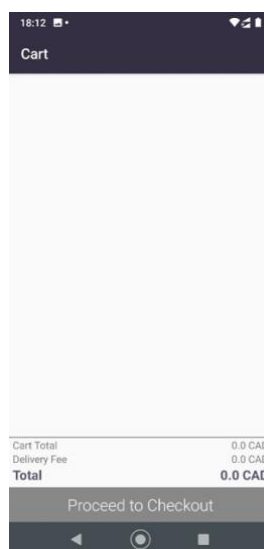

Figure 11: Empty cart

Figure 12: Cart with items

Figure 13: Cart button screen

7. Payment Gateway

The Figure 14 shows the options provided to the user once they click the "Proceed to Checkout" button. The user is given two opportunities to proceed with the payment.

The Figure 15 shows the PayPal interface, which is displayed to the user once they select to pay through PayPal.

The Figure 16 is displayed to the user once the payment is successful. The user has an option to view the orders by clicking on the button "My Orders."
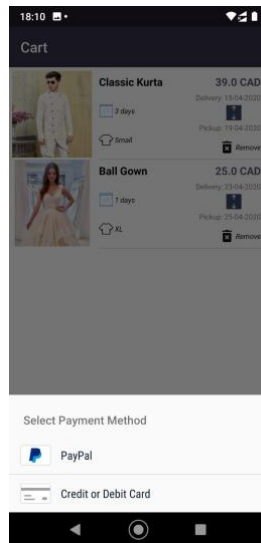
Figure 14: Payment gateway 1
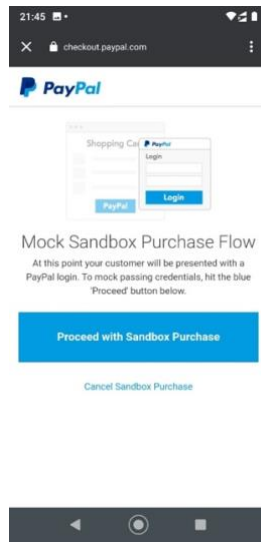
Figure 15: Payment gateway 2
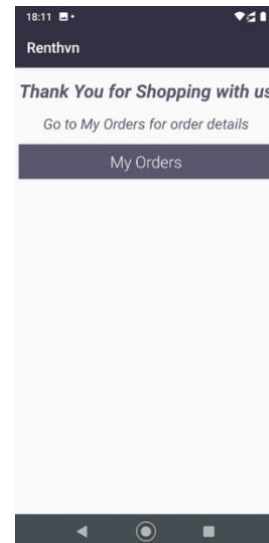
Figure 16: Payment gateway 3

8. Click a picture to donate

This is the first screen users get to see when they click "Donate" on the main screen. User will enter their name, email (in format abc@abc.com), phone number (in format +1 (10-13) digits) description. The user is informed about the requirement through on-screen hints. In the backend, we have handled these inputs with proper validation. The phone number and email validation are shown in Figure 17 and 18:
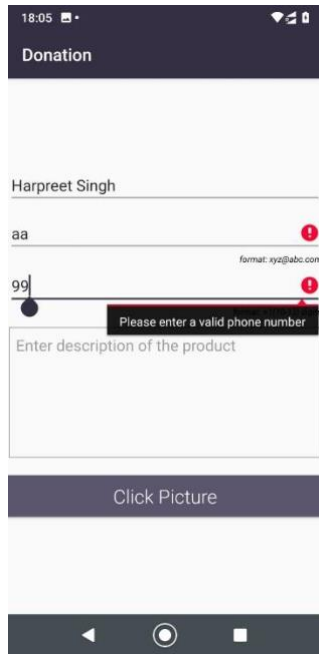
Figure 17: Validation—Phone
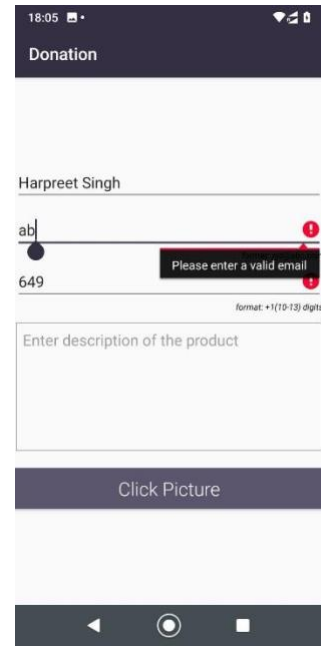
Figure 18: Validation—Email

After all the details are filled the user clicks on the button "Click Picture" and is asked for the permissions for the camera, once they allow the device to capture the image, the camera opens, and the user can then click the picture of the garment/cloth to be donated.

9. Submit for donation
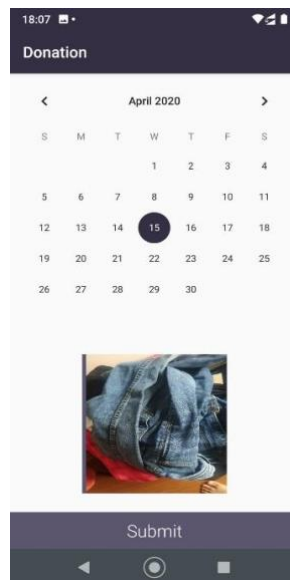
Figure 19: Submit for donation

Once the user clicks the picture and verifies it, they are taken to the screen as shown above. The image user clicked will be shown to them. The user can then select the date of pickup from the calendar provided on the screen and click on the "Submit" button. Once the user clicks on the submit button the details of the user are stored in the Firebase Realtime database.

10. Logout

The user can sign out of their session by clicking the sign out button given in the left panel on the home screen.
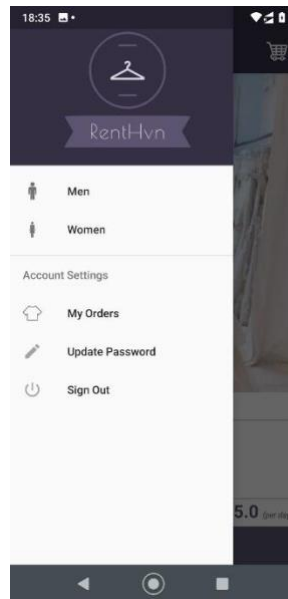
Figure 20: Logout

11. Help Section
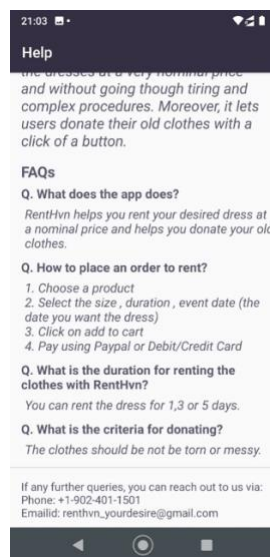
Figure 21: Help1
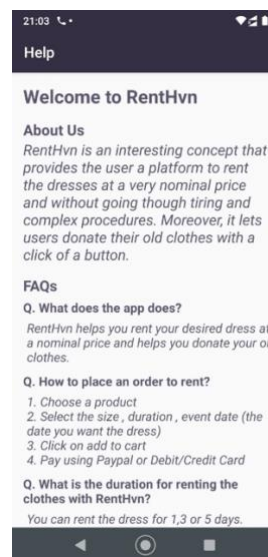
Figure 22: Help2

The figures above are the screens that the user can view through help button on the bottom navigation bar on the main screen. The screen displays information about RentHvn, frequently asked questions and how to contact us.

Work Done

We created 7 branches, and we were able to do 31 commits; our commit count is a bit low due to the merge issues we were encountering.
Link to repository: link

| R | **RentHvn** 🛡
 Project ID: 12063 | Leave project | | 🔔 ⌄ | ☆ Star 0 | ⑂ Fork 0 |

-○- **31 Commits**   ⑂ **7 Branches**   🏷 **0 Tags**   📄 **10.4 MB Files**

This is an Android application for renting and donating clothes. This will be a final term project for us.
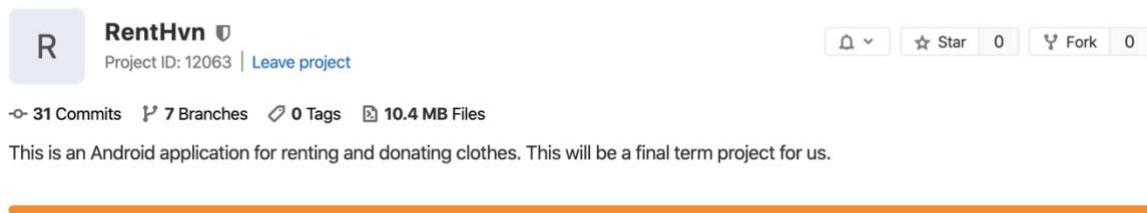
Limitations[1]

1. Location can be selected through the drop-down only. As there was an issue of null values in implementing location API and due to time constraints, we decided to have a drop-down of cities for users to select a location.

2. The cart icon takes the user to the mycart screen. However, the cart icon doesn't show how many unordered items are currently present. Hence, a dynamic number with a cart icon would improve the user experience.

3. A receipt can be generated and mailed for rented clothes, which helps the user to have proof, and it helps to gain the confidence of the user.

4. The search functionality could not be provided due to a lack of time. Hence, to search for an item, the user must click on the categories and search them.

5. Currently, the user is not able to reschedule the delivery of rented clothes. Thus, once ordered, the dates cannot be modified.

[1] Due to the COVID-19 issue, we were not able to physically meet each other; therefore, we were unable to accommodate these limitations in our application.

Issues Encountered During Development

Kotlin as an android programming language – Kotlin as an android programming language was almost a big hurdle for us to cross, none of our group members had any prior experience in writing codes in Kotlin. The Kotlin doc references and continuous lab sessions with our TAs helped us in being efficient in writing code in Kotlin.

Firebase Database—We used Firebase to store and retrieve data like user details, size, quantity and colour of the garments along with the images of the garments. We researched about hosting the database which would allow applications to globally use it which led us to go with Firebase. As we did not have prior experience with the Firebase, initially we faced issues while configuring it. Each of the members did different developments with their dependencies while developing their respective modules, but at the later stage, we realized we only require one single project linked. Also, it took us time to understand the JSON structure of the Firebase and to learn how to use Firebase in Kotlin.

Git (Source Code Repository) – We had conflicts while merging the code to the master branch. Git, as a source code repository, was a new tool for everyone. We created our separate branches leaving the master code empty and intact. Later when we tried to merge, we faced merge conflicts which took a while to resolve.

Satisfaction

We are satisfied with the learning experience that we got after building RentHvn. We know it could cost people to buy a pricey garment for an occasion and then never use it until it fades away or does not fit anymore. RentHvn helps them to look stylish without spending hundreds of dollars on a garment and would also save some space for other clothes in their closet. We are happy that we could contribute to society through the skills we developed while developing this project.

Learning Outcomes

Development

1. **Research**

    a. Target audience

    The target audience is the most crucial aspect of any project. We must give a good amount of thought to identify our target audience. Through the study of the target audience, we can understand their expectations, mindset and interests. Successful identification of the target audience can make a difference in the success of the application.

b. Existing Market

The development of any software requires proper market research. Market research can significantly aid the process of determining the success rate of the application. For our case, we identified the need for expensive designer clothing and felt that if we made it accessible to the people, we can expect success with our application as people would go with the option of renting an attire than to buy it for rare occasions.

c. Already available apps

It is very healthy to keep an eye on the competitors. It only ensures better product quality and higher customer satisfaction. So, analyzing similar apps that exist in the market and studying them in detail can make a huge difference. Such a study can help developers find out the features they are missing, or they need to improve. They can even draw better design inspirations. If the app being studied has not done so well, we can also get to know what might have caused its downfall.

2. Project Planning

A. Documentation

Documentation is crucial to have a proper structure for the project. It chalks out essential milestones, expectations, and minute details like the purpose, scope, deliverables of the project. Working on this document made us realize how important it can get in development. Failure to document things properly or documenting incorrect information can have adverse effects on the project.

B. Task Distribution/Roles

Among our team of 5 people, we distributed the work according to the expertise and willingness of the team members to undertake the task to ensure the completion of development on time. Therefore, we distributed the project into several modules that can be integrated after completion.

C. Milestone and Deliverables

For project completion, deciding proper milestones, deliverables and deadlines play a very crucial part. We learned this when we missed a few deadlines in development milestones. We were able to chart out the milestones and deadlines with a consensus but failed to comply with them for some parts of the development stage, which forced us to shorten the time to be spent on integration of the modules and testing.

D. Status Reports

Assuring the quality of the application while developing it also plays a crucial role in its success. Writing status reports every week that describes the overall progress made in the application can help the managers and developers keep track of how

the team is performing. We used these reports to keep track of the issues that we came across. It also helped us to manage our future work according to the delays caused in the past.

3. Prototyping

a. Paper prototyping

Developing a prototype of an application before beginning with its development helps the developers determine the path to its development. We developed a paper prototype to decide a basic view of what our application would like initially. Although the design of the application is different in the final product, it helped us understand the structure of the application.

b. Clickstreams

Our group developed a clickstream that denoted the basic flow of the application that we would be developing. It helped us prioritize the work on the individual modules and distribute it accordingly among the team members.

4. Kotlin Programming [1]

a. Comments and Docstrings

Initially, we did not use comments on the code files that each group member had developed. But at the time of integration, we felt the need to understand each other's code. This made us realize the importance of excellent commenting skills.

b. Using third party platform

We used Firebase [2] for authentication and storing data. Firebase ensured password encryption and consistent data storage. This really eased the feature development process.

c. Android Lifecycle

Learning about android lifecycle [3] through lab sessions, we realized that it is important to handle the lifecycle functions like onResume and onPause to perform certain tasks peculiar to our application.

d. Working with the session in Android

While developing the cart module, we came across some scenarios such as:
1. the user does not complete the transaction for the items added to the cart
2. the user logs out of the application and logs back in
3. the transaction fails
4. the user closes the application after adding the items to the cart right from the activity where they scan the barcodes.

In the cases mentioned above, the items added to the cart were not being saved. Therefore, we decided to implement the session using Shared Preferences. We found it easy to use because it saved the session data in the user's device itself with minimal memory requirements as weencoded the data in JSON.

e. Using device hardware

We used the phone's camera and local storage. We also learned how to use the phone's camera and run-time permissions fulfilling app requirements.

f. UI revisions
We explored many design options for the views of our application. We applied continuous revision to the design to ensure good user experience. We used Google's material components at many places.

5. Code Debugging

We faced many issues while integrating individual developments into one single app. Especially due to social distancing, merging code was a difficult task, but with patience and cooperation, we resolved the conflicts and were able to merge the code. Android studio's debugging tool helped us a lot in debugging.

6. GitLab

The code-sharing platform we used for the project was GitLab. All the members in our team were familiar with the basic Github commands like add, commit, push, pull, but they haven't worked frequently on it. GitLab is nothing but a Git repository hosting service, adapting to GitLab was a smooth transition for us. The only thing new was branching and merging as some of us did not have a chance to explore it. So, the members that knew it helped the other members out, and we also investigated the basics of merging and branching on the web. Through GitLab we learnt how to:

a. Share code
b. Commit changes
c. Push changes
d. Make a branch
e. Delete a branch
f. Merge Code
g. Review Code

Testing

Over the period while developing this application, our team came across several issues, we encountered several errors and bugs, which were rectified. Before initiating the development process, we came up with some issues that we could have faced during the process. We listed them and tried to figure out solutions on paper. As we progressed, we faced more issues that were new to us. During this whole process, we learnt how to test our application in and out rigorously.

We developed test cases, performed unit testing, regression testing, individual feature testing, and finally, integration testing. We finally checked our application to see if it follows Neilson's heuristics accurately or not. We had the following learning outcomes during the testing phase:

1. Reporting bugs as we encounter them during development phase
2. Unit Testing
3. Integration Testing
4. User Interface Testing

Team Management

Developing a full-fledged mobile application in three months is a cumbersome task, but this task is easily achievable if we have a team that contributes equally and together. We have been blessed in that forte. Every team member came forward with suggestions, opinions, and solutions to the problems we faced. Despite having independent features to develop for everyone in the team, some functionalities required combined effort and coordination. During the phase of developing the application, we also came across another issue that imposed restrictions on our physical meetings for the project—COVID-19—still, our team was able to coordinate through online meeting tools like Teams. We learnt how to coordinate within a team, respecting everyone's opinion and suggestions and coming up with solutions in case of any disagreement.

Feedback from the team

Harpreet Singh Sodhi

Working on this project was a roller coaster ride. I got immense pleasure while exploring my capabilities as a software developer and arranging things together in a team. Kotlin, Firebase Database and overall android application development are a few skills to name that I can boast around my resume now. The overall learning experience was wonderful.

Aditya Patel

This project, to me, was all about exploring new things. I have never developed a mobile application before. Knowing how it is brought to life from its inception to its fully developed stage is an experience. I am very fortunate that despite entering the uncharted domain, I was given adequate space to learn and grow by my team members. There was no rushing. I took my time to learn things and implement them. Working in a team and moving forward together has a different feel to it. Overall, even though the learning curve was steep, it has been nothing but a beautiful journey.

Haard Prashant Shah

The journey of developing a mobile application does not involve just coding but understanding the user perspective and knowing your team well. This was the major learning for me throughout the project. The team was well balanced, with each member

having their expertise in one or the other domain. This was the first time that we used Git for project development, and it was a great experience. Despite the tough circumstances, we kept pushing each other to complete relevant features.

Shrey Rameshbhai Vaghela

It has been a fantastic experience working with hardworking and passionate team members. The most important thing that I learned while developing this application is how important it is for a developer to understand the user's perspective for an application to be successful. As I did not have any prior experience with git, it was difficult for me to use it by creating a branch of my own, but with the help of my team members, I learnt some of the basics. Also, it was challenging to make an application within the given time, but we helped each other in the time of difficulty and overcame any barriers to make the planned application.

Tejasvi Vig

I had an amazing experience while working on this project and collaborating with my team members. I learnt how to code in Kotlin (one of the significant additions to my curriculum vitae), working with Firebase Database. I learnt how to think like a software developer, how to target the audience while developing a software/application. The journey had been tough, but constant efforts and teamwork moved us a step further every single day.

Conclusion

To conclude, we believe that we had a fantastic journey while developing this application. We had our own set of hurdles which we overcame with team effort. We had a balance of technical and non-technical capabilities in our team that helped us sail through. We learnt how to work in a team. We learnt a lot about android application development and development methodologies.

References

[1] (2020). Retrieved April 4, 2020, from Kotlin website: https://kotlinlang.org/docs/reference/

[2] Documentation | Firebase. (2020). Retrieved April 4, 2020, from Firebase website: https://firebase.google.com/docs

[3] Documentation | Android Developers. (2020). Retrieved April 4, 2020, from Android Developers website: https://developer.android.com/docs