

CENG 322 Deliverable 4

Team Name: Coding Comrades

Project Name : BusCare +

Team members:

Naman Bhavinbhai Shah : N01392496

Jaskirat Singh: N01403975

Vishesh Bansal: N01395119

Aryan Sood: N01393003

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Project Description

For the project goal we have decided to design a system that looks after Bus maintenance and safety. Our system would be monitoring Speed of the bus, Co2 level inside the bus, Temperature inside the bus and will keep a count of the number of passengers in it. If any value is more than the preset values it sends a notification via the app to the user to take appropriate action.

Contribution

Name	id	Signature	Effort
Naman Bhavinbhai Shah	N01392496	Naman Bhavinbhai Shah	100%
Jaskirat Singh	N01403975	Jaskirat Singh	100%
Vishesh Bansal	N01395119	Vishesh Bansal	100%
Aryan Sood	N01393003	Aryan Sood	100%

GitHub repo link and strategy

<https://github.com/NamanShah2496/BusCarePlus>

The strategy that we have implemented is that each member would have his separate branch into which they will individually contribute the code. After completion the group members would unanimously decide if the code is acceptable and then it would be pushed into the master branch. This ensures that a bug/error in a member's code doesn't negatively affect the effort of other group members.

Sprint Goals

Sprint 1

Sprint 1 (Sep 28-Oct 12) Epic: Proper data management to enhance quality of app		Assignee	Tasks	Status	Start Date	End date
As a customer, I want my app to have login page for security reasons		NS	5	Done	Oct 9	Oct 30
Subitems						
Create a proper login page to ask for user credentials	(+)	NS	Done	Oct 9	Oct 11	Medium
Extract proper data from database and compare with entered credentials	(+)	NS	Done	Oct 15	Oct 23	Large
Show proper error message if credentials don't match the records	(+)	NS	Done	Oct 15	Oct 30	Small
Provide a remember me button to avoid filling login info every few times of login	(+)	NS	Done	Oct 23	Oct 30	Medium
Show successful login message	(+)	NS	Done	Oct 15	Oct 30	Small
+ Add Subitem						
As a customer, I want my app to have a my account tab which shows user data only		NS	5	Done	Oct 7	Oct 30
Subitems						
Create an option in menu bar to go to my account page	(+)	A	Done	Oct 7	Oct 10	Small
Add proper image with the my account option and make it always visible	(+)	A	Done	Oct 7	Oct 10	Small
Extract user data from database and present it in proper fields	(+)	NS	Done	Oct 10	Oct 22	Large
Provide a button to edit and update data by user	(+)	A	Done	Oct 7	Oct 22	Medium
Keep username field uneditable to avoid clashes between usernames	(+)	NS	Done	Oct 15	Oct 30	Medium
+ Add Subitem						
Sprint 1 (Sep 28-Oct 12) Epic: Proper data management to enhance quality of app		Assignee	Tasks	Status	Start Date	End date
As a customer, I want my app to have a my account tab which shows user data only		NS	5	Done	Oct 7	Oct 30
As a customer, I want a specially dedicated page for showing maintenance report of bus		NS	5	Done	Oct 8	Nov 25
Subitems						
Create a page to show temperature and air quality emitted by bus	(+)	NS	Done	Oct 11	Oct 17	Medium
Use proper images to differentiate between temperature and air quality sections	(+)	NS	Done	Oct 8	Oct 15	Small
Use proper units behind temperature and CO2 readings to give an accurate idea of data	(+)	NS	Done	Oct 8	Oct 15	Small
Extract real time data from database and keep updating the data every few seconds	(+)	NS	Done	Nov 1	Nov 14	Large
Compare the data received with expected levels and notify user whenever some value is ...	(+)	A	Done	Nov 14	Nov 25	Medium
+ Add Subitem						
As a customer, I want a specially dedicated page for showing safety report of bus		IS	5	Done	Oct 8	Nov 25
Subitems						
Create a page to show speed of the bus and number of people on the bus	(+)	IS	Done	Oct 11	Oct 17	Medium
Use proper images to differentiate between speed and number of people sections	(+)	IS	Done	Ocy 8	Oct 15	Small
Extract real time data from database and keep updating the data every few sconds	(+)	IS	Done	Nov 1	Nov 14	Large
Compare the data received with expected levels and notify user whenever some value is ...	(+)	IS	Done	Nov 15	Nov 25	Medium
Use proper units behind number of people and speed readings to give an accurate idea of...	(+)	IS	Done	Oct 10	Oct 15	Small
+ Add Subitem						

Sprint 2

Sprint 2 (Sep 28 1-Oct 12) Epic: Improve user experience by easy app usability		Assignee	Tasks	Status	Start Date	End date
As a customer, I want a setting page to adjust app according to my preferences.		NS	↳ 5	Done	Oct 7	Oct 10
Subitems						
Add settings option to navigation drawer so user can access it easily	+	NS	Done	Oct 7	Oct 10	Medium
Add a proper image and title to settings page	+	NS	Done	Oct 7	Oct 10	Small
Create radio buttons to select user preferred language	+	IS	Done	Oct 8	Oct 10	Small
Create an enable or disable button for portrait lock	+	IS	Done	Oct 8	Oct 10	Small
Create a toggle button to enable or disable dark theme	+	IS	Done	Oct 8	Oct 10	Small
+ Add Subitem						
As a customer, I want my app to have a help section to use in case of any confusion		NS	↳ 5	Done	Oct 7	Oct 17
Subitems						
Create a tab dedicated for help section	+	IS A	Done	Oct 7	Oct 10	Medium
Add proper image and title to make it easily detectable	+	A	Done	Oct 7	Oct 10	Small
Add descriptive information about each page of the app	+	A	Done	Oct 7	Oct 17	Medium
Add description regarding the behaviour of app	+	A	Done	Oct 7	Oct 17	Small
Use different fonts and bold words to make page easily readable	+	IS	Done	Oct 7	Oct 17	Medium
+ Add Subitem						
As a customer, I want a setting page to adjust app according to my preferences.		NS	↳ 5	Done	Oct 7	Oct 10
As a customer, I want my app to have a help section to use in case of any confusion		NS	↳ 5	Done	Oct 7	Oct 17
As a customer, I want to know about the app and their owners		IS	↳ 5	Done	Oct 7	Nov 25
Subitems						
Add brief information in about us page of the app	+	Q	Done	Nov 1	Nov 14	Small
Using different styles and fonts to better the User experience better	+	Q	Done	Nov 1	Nov 14	Small
Created a dedicated tab specially for customer to know about the app history and the dev...	+	Q	Done	Oct 7	Oct 10	Medium
Addition of linkedin profile link of each developer to show that the app was built by profes...	+	Q	Done	Nov 14	Nov 25	Medium
Mentioning role of each team member in the group to know what part they played in the b...	+	Q	Done	Nov 15	Nov 25	Small
+ Add Subitem						
+ Add						

Sprint 3

Sprint 3 (Oct 25 - Nov 14) Epic: Data management using sharedprefs and firebase		Assignee	Tasks	Status	Start Date	End date	
As a customer, I want my account page to edit my details		IS	1 of 5	Done	Oct 26	Nov 10	
As a customer, I want my app to save my setting preferences		IS	1 of 5	Done	Oct 26	Nov 5	
Subitems		Owner	Status	Start Date	End Date	Size	
Use sharedprefs to save customer preferences	IS	Done	Nov 1	Nov 5	Medium		
Create a save button to save preferences into shared preferences function	IS	Done	Oct 26	Oct 26	Small		
Save or update data in shared preferences everytime customer changes any setting	IS	Done	Nov 1	Nov 5	Medium		
Extract previous data and change UI of settings page automatically based on previous se...	IS	Done	Nov 1	Nov 5	Medium		
Extract and apply data on other activities as well to keep settings same for every page of ...	IS	Done	Nov 4	Nov 5	Medium		
+ Add Subitem							
As a customer, I want my app to switch between metric and imperial systems	IS	1 of 5	Done	Oct 26	Nov 5		
Subitems		Owner	Status	Start Date	End Date	Size	
Create 2 radio buttons to select between metric or imperial system	IS	Done	Oct 26	Oct 26	Small		
Change units in speedbar value automatically when customer switches between the 2 op...	IS	Done	Nov 1	Nov 5	Medium		
Create a radiogroup to allow user to select only one radiobutton at a time	IS	Done	Oct 26	Oct 26	Small		
Create a save button to save the final selection of customer	IS	Done	Oct 26	Oct 26	Small		
Save the final selection in shared preferences to use customer's choice of units all over th...	IS	Done	Nov 2	Nov 5	Medium		
+ Add Subitem							
Sprint 3 (Oct 25 - Nov 14) Epic: Data management using sharedprefs and firebase		Assignee	Tasks	Status	Start Date	End date	
As a customer, I want a feedback page to provide my feedback for improvement of app	IS	1 of 5	Done	Oct 25	Nov 10		
Subitems		Owner	Status	Start Date	End Date	Size	
Create a separate tab for accepting user feedback	IS	Done	Oct 25	Oct 25	Small		
Create star emojis to obtain rating out of 5	IS	Done	Oct 26	Oct 26	Medium		
Create plaintext design to obtain written comments	IS	Done	Oct 26	Oct 26	Small		
Create a save button to save final feedback	IS	Done	Oct 26	Oct 26	Small		
Send data to database to save customer feedback	IS	Done	Nov 2	Nov 10	Medium		
+ Add Subitem							
As a customer, I want my account page to edit my details	IS	1 of 5	Done	Oct 26	Nov 10		
Subitems		Owner	Status	Start Date	End Date	Size	
Create a separate screen with proper UI to show and update details of user	IS	Done	Oct 26	Oct 26	Small		
Obtain previous or default data from database	IS	Done	Nov 2	Nov 10	Medium		
Show the data extracted into editable fields so that user can update details	IS	Done	Nov 2	Nov 10	Small		
Create a save button to save the updated details into firebase	IS	Done	Oct 26	Oct 26	Small		
Notify user with the toast on successful updation of data	IS	Done	Nov 9	Nov 10	Small		
+ Add Subitem							

Sprint 4

Sprint 4 (Nov 15- Nov 30) Epic: Notification Feature for better user experience		Assignee	Tasks	Status	Start Date	End date	+
As a customer I want the values and units to change based on the unit settings saved on settings page		IS	1 of 5	Done	Nov 1	Nov 30	
Subitems	Owner	Status	Start Date	End Date	Size		+
Save the user's choice of units in shared preferences	IS	Done	Nov 1	Nov 5	Small		
Extract the data from firebase	IS	Done	Nov 1	Nov 14	Medium		
Change data (if needed) according to user's choice	IS	Done	Nov 5	Nov 30	Medium		
Display data with proper units	IS	Done	Nov 5	Nov 14	Small		
Compare to threshold value set by user to indicate if every value is in expected range or not	IS	Done	Nov 15	Nov 20	Medium		
+ Add Subitem							
As a customer, I want to receive small and accurate notification in case of unexpected data reading value		IS	1 of 5	Done	Nov 1	Nov 25	
Subitems	Owner	Status	Start Date	End Date	Size		+
Extract data from firebase every few seconds	IS	Done	Nov 1	Nov 14	Medium		
Check if data is in expected range everytime we extract data	IS	Done	Nov 15	Nov 20	Medium		
Notify the user if some reading is not in expected range	IS	Done	Nov 15	Nov 25	Small		
Add a proper title to notification	IS	Done	Nov 20	Nov 25	Small		
Add small and descriptive message to notification	IS	Done	Nov 20	Nov 25	Small		
+ Add Subitem							
Sprint 4 (Nov 15- Nov 30) Epic: Notification Feature for better user experience		Assignee	Tasks	Status	Start Date	End date	+
As a customer, I want to receive small and accurate notification in case of unexpected data reading value		Edit	1 of 5	Done	Nov 1	Nov 25	
As a customer, I want to see detailed information about Co2 and temperature of bus		IS	1 of 5	Done	Oct 26	Nov 25	
Subitems	Owner	Status	Start Date	End Date	Size		+
Create a page to show temperature and air quality emitted by bus	IS	Done	Oct 26	Oct 26	Small		
Use proper Images to differentiate between temperature and air quality sections	IS	Done	Nov 1	Nov 10	Small		
Extract real time data from database and keep updating the data every few seconds	IS	Done	Nov 1	Nov 14	Medium		
Compare the data received with expected levels and notify user whenever some value is ...	IS	Done	Nov 15	Nov 25	Medium		
Use proper units behind temperature and CO2 readings to give an accurate idea of data	IS	Done	Nov 5	Nov 14	Small		
+ Add Subitem							
As a customer, I want to see detailed information about number of people on bus and speed of the bus		IS	1 of 5	Done	Oct 26	Nov 25	
Subitems	Owner	Status	Start Date	End Date	Size		+
Create a page to show speed of the bus and number of people on the bus	IS	Done	Oct 26	Oct 26	Small		
Use proper Images to differentiate between speed and number of people sections	IS	Done	Nov 1	Nov 10	Small		
Extract real time data from database and keep updating the data every few seconds	IS	Done	Nov 1	Nov 14	Medium		
Compare the data received with expected levels and notify user whenever some value is ...	IS	Done	Nov 15	Nov 25	Medium		
Use proper units behind number of people and speed readings to give an accurate idea of...	IS	Done	Nov 5	Nov 14	Small		

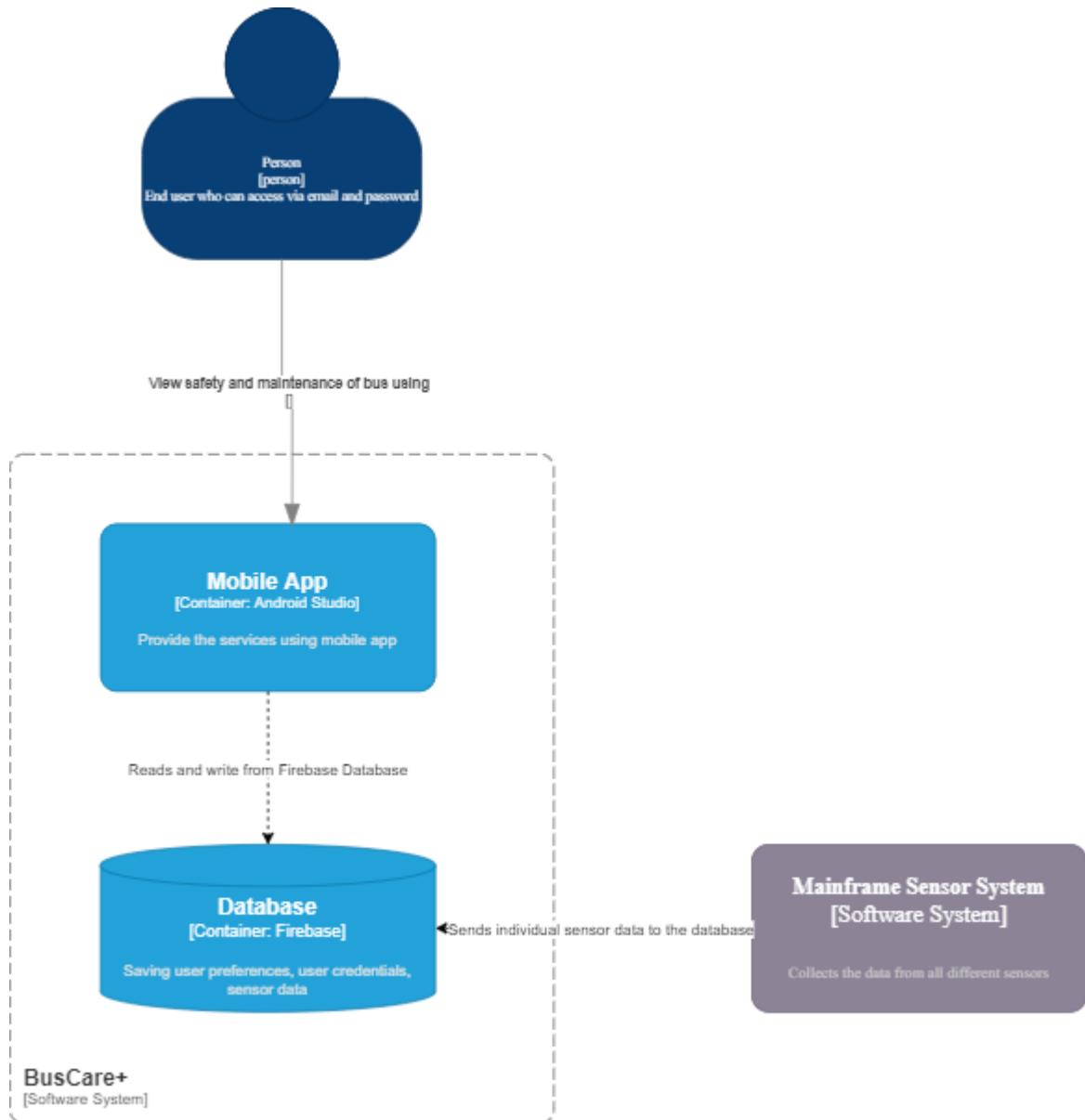
Login Credentials

Email: demouser@gmail.com

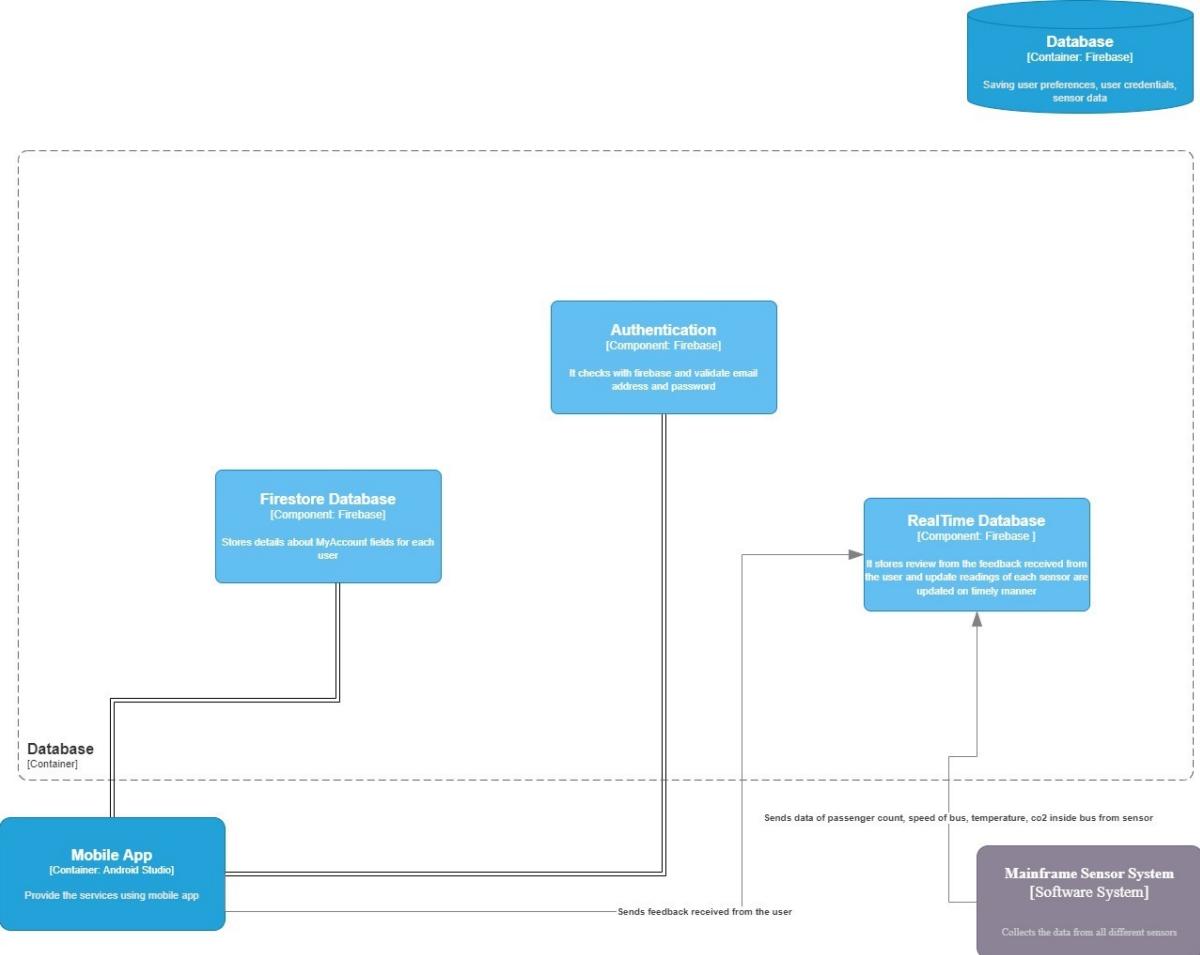
Password: #Humber2021

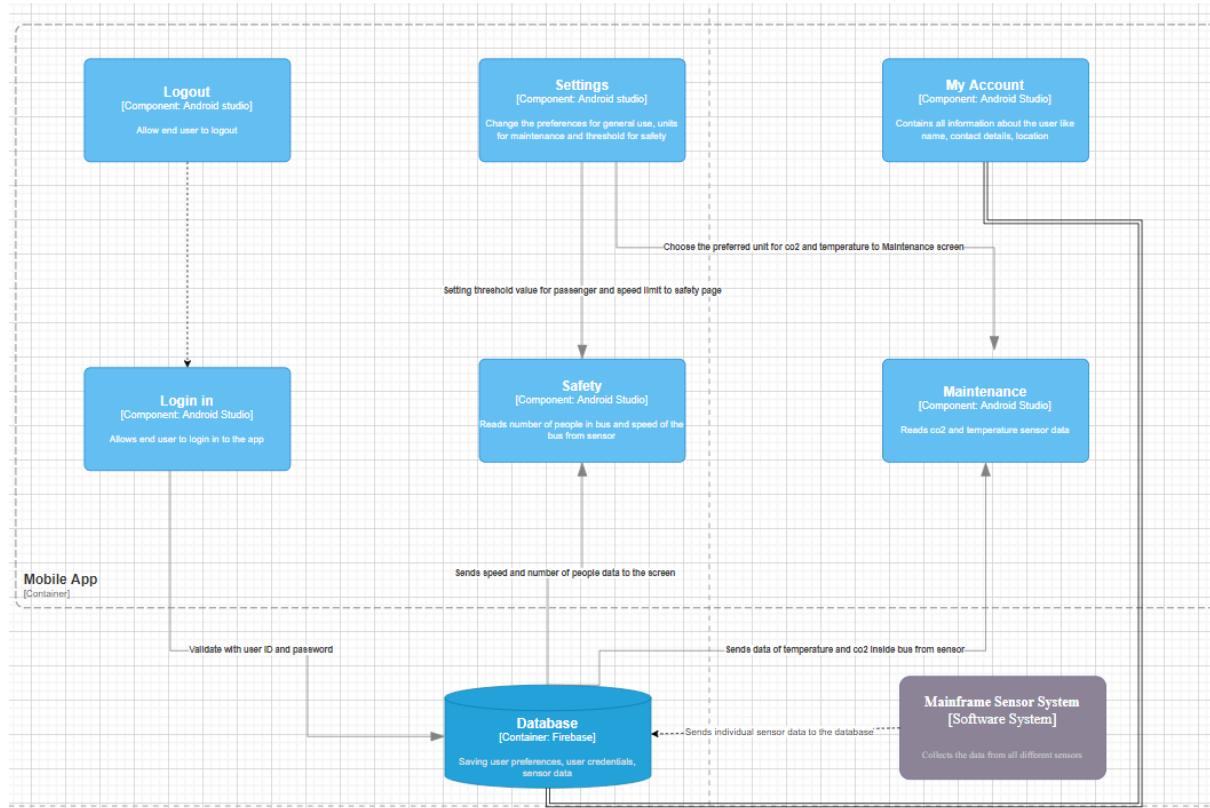
Note- Our app doesn't comply with Q14 of deliverable 3(If you have login logic in your application,in addition to creating an account, allow the user to login using one of the popular accounts, i.e.Gmail, Facebook,...etc) as it is not the requirement for our business model.
As discussed with you in the session on 3rd Nov, as the admin will add users, there is no need for Registration and 3rd Party Sign-In.

C4 Model container Diagram



C4 Model Component Diagram





Google Play Submission

The screenshot shows the Google Play Console interface for the BusCarePlus app. The left sidebar navigation includes:

- Release
- Releases overview
- Production** (selected)
- Testing
 - Open testing
 - Closed testing
 - Internal testing
 - Pre-registration
 - Pre-launch report
 - Reach and devices
 - App bundle explorer
- Setup
- Grow
- Store presence
 - Main store listing
 - Custom store listings

The main content area displays the **Production** section, which includes:

- Production**: Create and manage production releases to make your app available to all users in your chosen countries. [Learn more](#)
- Track summary**: Active - Release 1 (1.0) in review - 177 countries/regions - 0 installs
- Releases** tab (selected): Shows the current release 1 (1.0) which is in review with 1 version code.
- Releases** table:

Version	Status	Actions
1 (1.0)	In review	View release details

Offline features of the App

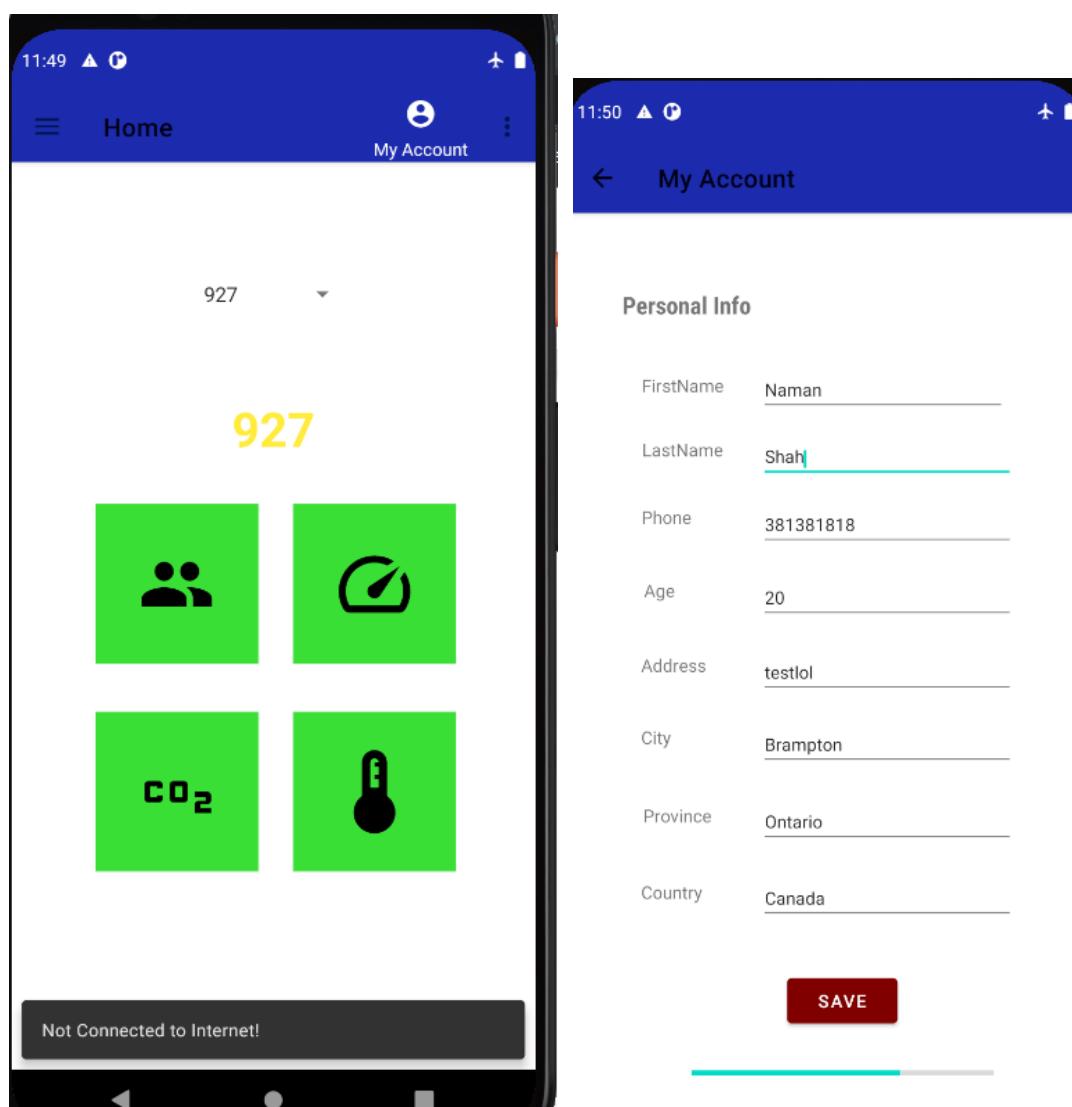
The app has 2 primary offline features:

One allows the user to update their personal information under the MyAccount Screen and when the device is connected to the internet, the information saved is automatically synced with firebase.

Another feature is to allow users to send feedback which will be received when the device is connected to the internet.

Apart from this , in order to inform the user that the app is not connected to the internet, a snackbar is displayed which vanishes automatically when connected to the internet.

The settings screen of the app also functions when the app is offline as it is saving the data into SharedPreferences.

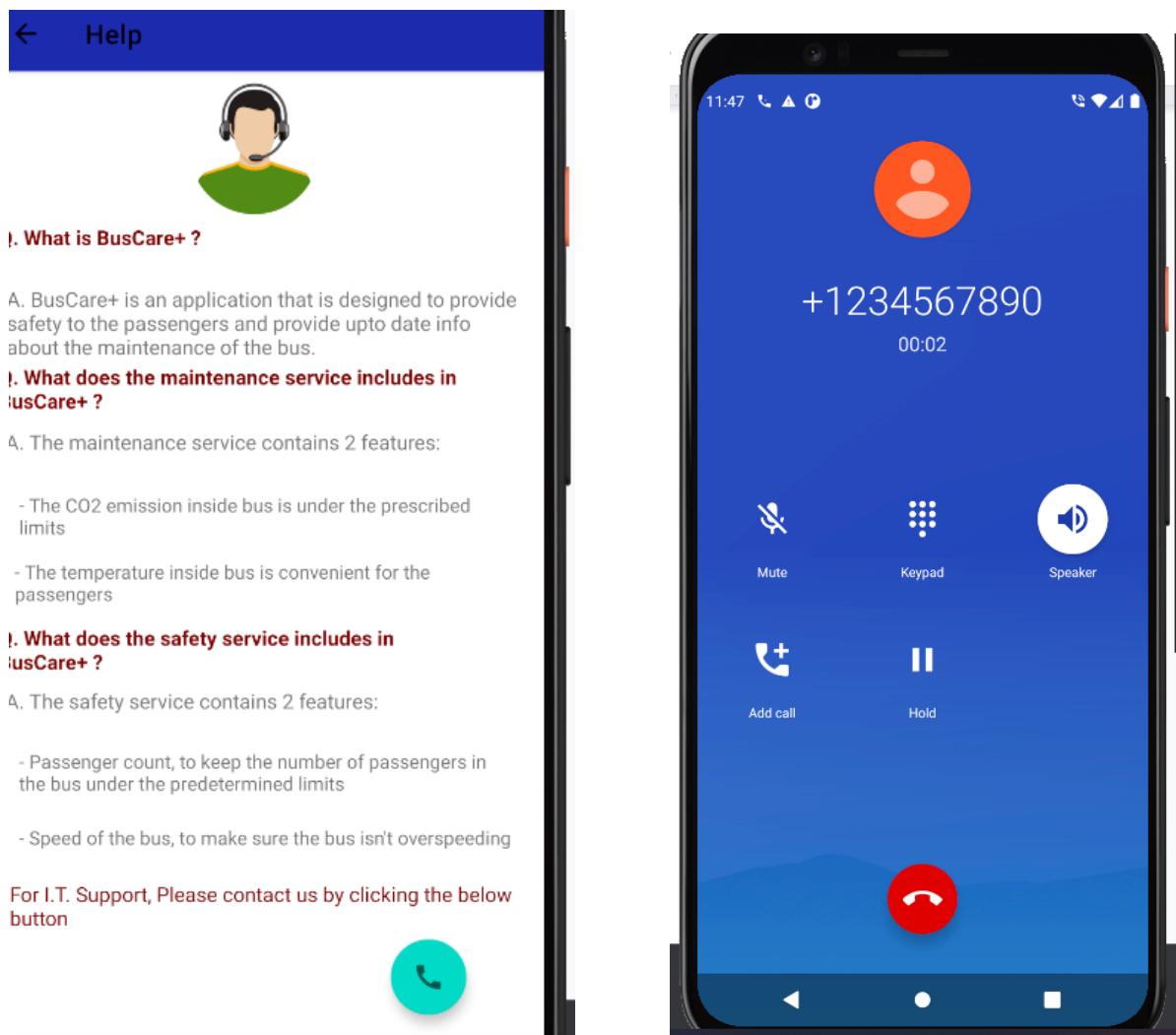


RunTime Permission Implementation

The app asks the permission of the user to perform a phone call.

The functionality is implemented in the Floating Action Button on the bottom right corner of the Help Screen in the menu.

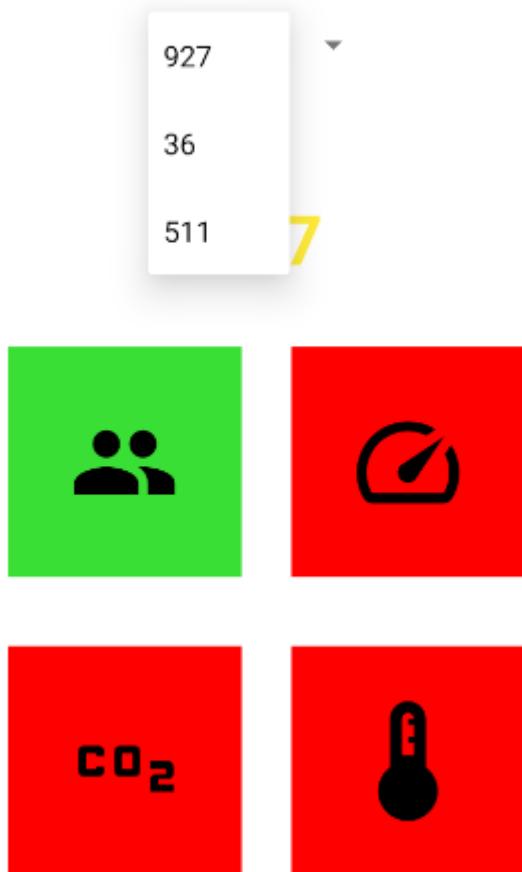
It asks the user permission to call. Upon the user selecting a response, displays an appropriate Snackbar. If the permission is granted, it calls the preset mobile number when the user clicks the Floating Action Button the next time.



Improvising App based on previous feedbacks

Few changes in the app based on the feedback included changing the UI of the Home Screen and Settings Screen

Home Screen: As suggested by the professor to make the app scalable and the home page to provide some meaningful data, We implemented a spinner to allow users to select different buses and see their readings from the sensors that would be installed in the buses. Along with this, the home screen has 4 images representing different readings from our sensors, the images are green when the measurements from the sensors are under the permissible level and turn red if they exceed the threshold.



Here the spinner allows the user to select the bus, In the above example only readings of passenger count is under the allowed limit (Green) and rest are at danger levels (RED).

Settings Screen: Earlier we created an option to change the language settings in the app under the settings screen but as discussed with you, we removed it as language change should be at device level and not the app level.

Scrum Dashboard

The dashboard displays four sprints:

- Sprint 2 (Sep 28 - Oct 12) Epic: Improve user experience by easy app usability**
 - As a customer, I want a setting page to adjust app according to my preferences.
 - As a customer, I want my app to have a help section to use in case of any confusion.
 - As a customer, I want to know about the app and their owners.
- Sprint 1 (Sep 28-Oct 12) Epic: Proper data management to enhance quality of app**
 - As a customer, I want my app to have login page for security reasons.
 - As a customer, I want my app to have a my account tab which shows user data only.
 - As a customer, I want a specially dedicated page for showing maintenance report of bus.
 - As a customer, I want a specially dedicated page for showing safety report of bus.
- Sprint 4 (Nov 15 - Nov 30) Epic: Notification Feature for better user experience**
 - As a customer I want the values and units to change based on the unit settings saved on settings page
 - As a customer, I want to receive small and accurate notification in case of unexpected data reading value.
 - As a customer, I want to see detailed information about Co2 and temperature of bus.
 - As a customer, I want to see detailed information about number of people on bus and speed of the bus.
- Sprint 3 (Oct 25 - Nov 14) Epic: Data management using sharedprefs and firebase**
 - As a customer, I want a feedback page to provide my feedback for improvement of app.
 - As a customer, I want a my account page to edit my details.
 - As a customer, I want my app to save my setting preferences.
 - As a customer, I want my app to switch between metric and imperial systems.

Link

<https://vishesh-cast.monday.com/boards/1761289546>

Post Mortem

1. We had decided that the budget for the project would be about 30\$ per head. This would include the cost of ordering sensors along with the google play membership fees. Our project was completed by the 6th of December which was the intended due date in the gantt chart.
2. Time management among the team was satisfactory. The tasks were assigned to team members within 2 days of the deliverable requirements being posted. Then it

was up to the members what time they chose to complete the tasks. There were regular meetings to make sure everything was on track and no one was in a deadlock. Overall the requirements were fulfilled upto 1 day prior to the submission deadline. Whoever finished a task, they moved on to complete the documentation part, in order to ease the load for other team members.

3. There are no issues with the quality and no compromises were made along the way. The app contains all the features promised in the project proposal .
4. The lesson we learned is not to promise anything to the customer without seeing how to implement it effectively and efficiently. Also during the initial project period, we did not have a fixed DoD criteria, which caused confusion among members. This was eventually dealt with by the establishment of a fixed DoD which would be followed on for the rest of the duration of the project.

The only major compromise made during the project was for the UI color and the app logo. 2 team members were in favour of the app implementing the color green while the other 2 were in favour of changing the color to blue since our app supported dark theme, blue colour suited it better and hence makes the app look better in the Dark mode. The conflict about the app logo was on the same thing, which was settled by changing the original logo to blue so that it was consistent with the blue on the menu bar.

5. The meetings were attended by all the members. There were a couple of instances when a team member was late due to work/ personal reasons, this was taken into account and the other team members would finish other tasks and wait for the member.

Project Review Meeting



Link: https://miro.com/app/board/uXjVOc3vIx0=/?invite_link_id=299122585952

Technical Debt

Each member notes their technical debt created while implementing a new feature which was later reviewed in the team meetings. Apart from this we conducted a separate meeting to review technical debt for each screen and distributed the work to reduce the debts. We made sure that the definition of technical debt meets the current software practices suggested by Android.

Refactoring

2 Area of Refactoring that we did in our app are:

1. MainActivity:

We replace the switch statements which were linked to the side menu options with if elseif statements.

The reason we did that is because of the warnings we received from android studio that were "**resource IDs will be non-final by default in Android Gradle Plugin**

version 8.0, avoid using them in switch case statements" and the alternative was itself provided in the android google website.

2. In order to make the app work efficiently , the recursive function (which updated the values from the firebase every second) was implemented using multi-threading. This prevented too much work on the Main/UI thread and made the app run smoother.

Suggestions

We as a team liked the idea of how the course was implemented. Researching on topics independently has increased the knowledge we have about android considerably. Working in a team is much better than working independently. Having 4 independent people who do the critical thinking and implement their knowledge is far better than just 1 person doing things on their own, in order to make the project a success.

However there is one shortcoming that we would like the professor to change if possible. It is that the professor could make all the requirements available at once rather than in a bi-weekly model. That is due to the fact that we had already decided what thing to implement where in the app. However, each deliverable had its own requirements which needed to be fulfilled. Therefore we had to change things up often. In order to solve this we recommend that all the requirements are posted at once and only a part (for eg the first 15) are due .This would give us an idea on what more features etc we have to implement and use our time efficiently.

Test Cases

We implemented test cases in the following files

Espresso: In MainActivity and HelpActivity

JUnit: Safety Fragment

Robolectric: LoginActivity