Black box testing

Group 6

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1. Introduction

1.1 Purpose

The purpose of the project is to allow the teacher to know the names of students who may not be attentive in class, for a better class environment and for the benefit of the students themselves. In this document, we provide a detailed description of the requirements for our yet unnamed application. It explains user and hardware interfaces ,system requirements, specifications and other constraints as well as the functional and nonfunctional requirements.

1.2 Intended Audience

The intended audience of this document is our overseeing project professor, Dr. Samit Bhattacharya and our teaching assistants , Sir Ujjwal Biswas, Sir Md Shakeel Iqbal Saikia and Sir Subrata Tikadar.

1.3 Scope of Product

The product aims at making the classroom environment better by sending warnings in the form of notifications to un-attentive students as well as sending notifications to the teacher about the students, hence motivating the students to stay attentive in class for their own benefit. The system is based on a database on a server which accepts, processes and pushes data from/to Android devices. A comfortable user-experience will also be built.

1.4 Overall Description

The product is meant to serve as an Android Application which lets the teacher know through alerts or notifications the change in behavior or status of students during the class. Alerts are sent to multiple devices in which the same user, whose state interpretation changes, is logged in. This product will act in collaboration in the parent system which generates the state of a student, but for now we are generating random states

Our users include:

1. Teachers

2. Students studying in a school or university.

The users of this product must also have the following characteristics :

1. Have an Android device with Android version 4.0 or above (API Level 15 or above.)
2. Have familiarity with the functioning and use of Android operating system on a basic level.
3. Can understand simple English to use this product.
4. The user should have multiple Android devices if he wants to register himself on more than one device. For example, a smartphone and a smart watch.

2. Black Box testing

2.1 Purpose

Black Box testing is the term for a methodology in which the tester knows nothing of the underlying code of the software application. Because the tester can't see what went into the development of the application, no assumptions can be made of how each element is meant to operate, so the tester is forced to assess each function as it actually is. In turn, this enables the developers to see at which points the application works as expected, and what needs to be corrected.

2.2 Functioning of Black Box

Black box testing is aimed at finding errors in the errors in the external behaviour of the code. It is mainly aimed at finding errors from the following categories:

- Incorrect or missing functionality
- Errors in data structures used by interface
- Behaviour or performance errors
- Initialization and termination errors
- Interface errors
- Concurrency and timing errors

Because it's done from the user's point of view, it's a look into real-world use, as opposed to the developer's idea of the perfect user. The tester need not know anything about how the application was written, and in fact the tester need not even be part of the originating company

2.3 Goals of testing

As the black box testing purposefully disregards the program's control structure, attention is focused primarily on the information domain (i.e. data that goes in, data that comes out)

The Goal: Derive sets of input conditions (test cases) that fully exercise the external functionality

2.4 Equivalence class partioning

Equivalence partitioning or equivalence class partitioning (ECP) is a software testing technique that divides the input data of a software unit into partitions of equivalent data from which test cases can be derived. In principle, test cases are designed to cover each partition at least once. This technique tries to define test cases that uncover classes of errors, thereby reducing the total number of test cases that must be developed. An advantage of this approach is reduction in the time required for testing a software due to lesser number of test cases.

3. Unit Testing

Unit testing is a way of testing software components. The "Unit" is the thing being tested. This is where we create tests which interact directly with our application. We would check a function in your application and assert that the response should return with value X. Unit Tests are usually, but not always created by the developers themselves as well, whereas if a company does whitebox and blackbox testing, it can be done by anyone.

The code testing team comprises of the following 2nd Year undergraduate students belonging to CSE dept. –

a) Shaurya Gomber , 160101086

b) Rishabh Jain , 160101088

c) Aadil Hoda, 160101001

3.1 Student Notifier

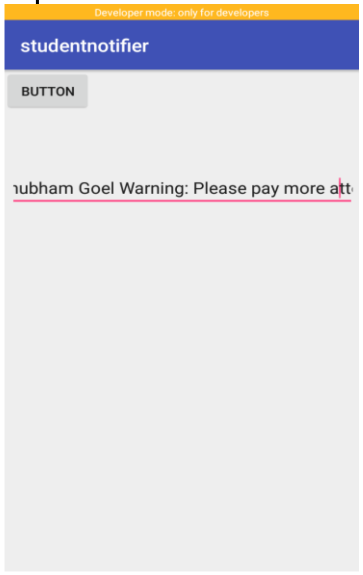
Input - Text to be sent as notification

Output - Notification with content same as input text

3.1.1 Equivalence Classes

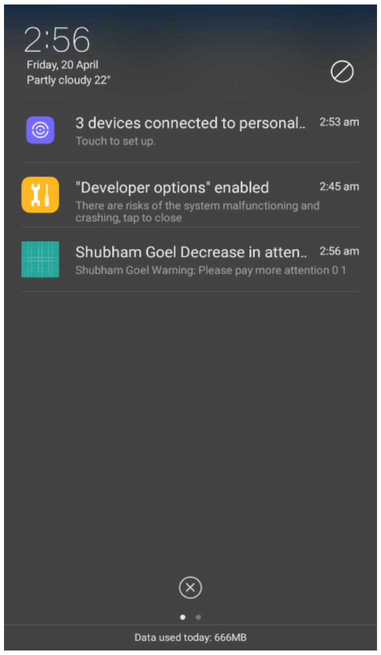
3.1.1.1 There is some text inserted in the field

Input –



ıubham Goel Warning: Please pay more att

Output –



2:56
Friday, 20 April
Partly cloudy 22°

3 devices connected to personal.. 2:53 am
Touch to set up.

"Developer options" enabled 2:45 am
There are risks of the system malfunctioning and crashing, tap to close

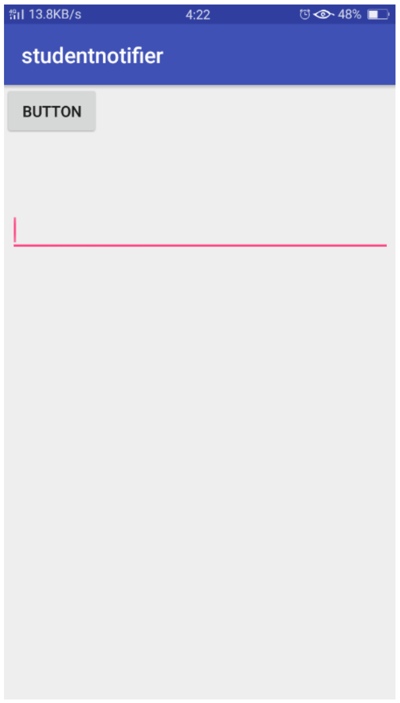
Shubham Goel Decrease in atten.. 2:56 am
Shubham Goel Warning: Please pay more attention 0 1

Data used today: 666MB

CORRECT

3.1.1.2 Text Box is empty

Input -



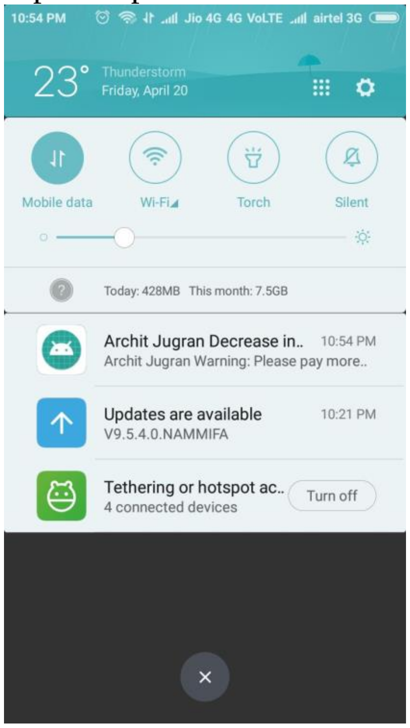
-

Output – No Notification Generated

CORRECT

3.2 Confirm notification

Input - tap on the notification


10:54 PM Jio 4G 4G VoLTE airtel 3G

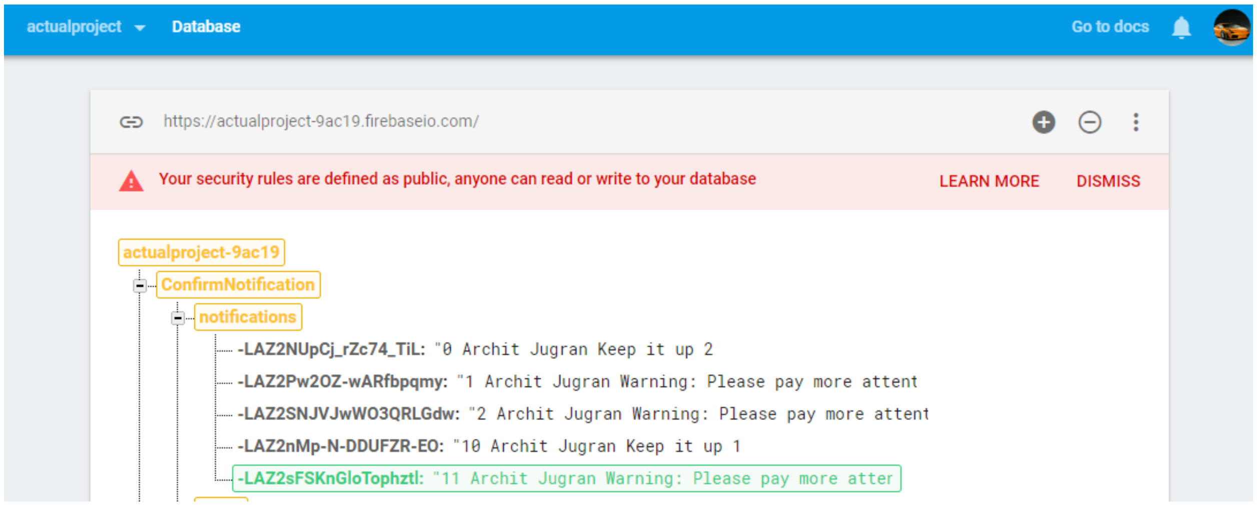
23° Thunderstorm
Friday, April 20

Today: 428MB This month: 7.5GB

Archit Jugran Decrease in.. 10:54 PM
Archit Jugran Warning: Please pay more..

Updates are available 10:21 PM
V9.5.4.0.NAMMIFA

Tethering or hotspot ac.. Turn off
4 connected devices



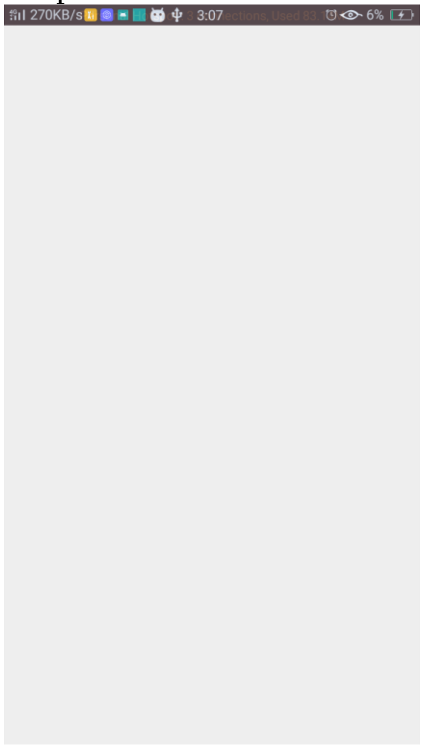
actualproject ▾ Database Go to docs

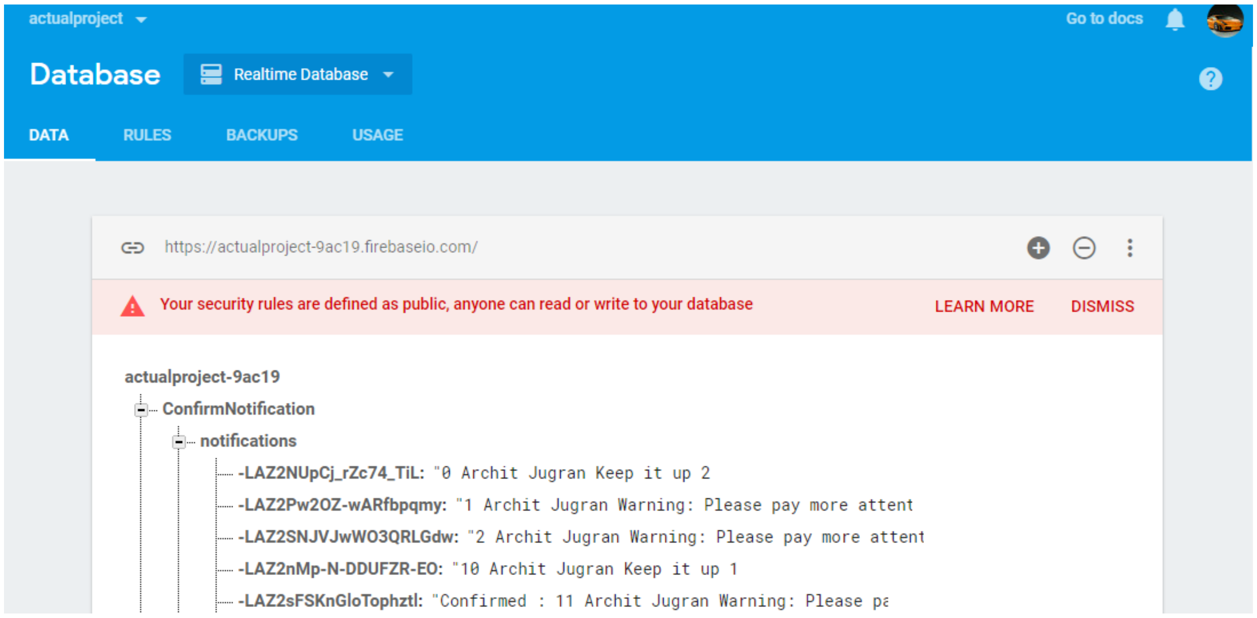
https://actualproject-9ac19.firebaseio.com/

Your security rules are defined as public, anyone can read or write to your database LEARN MORE DISMISS

```
actualproject-9ac19
 ConfirmNotification
   notifications
     -LAZ2NUpCj_rZc74_TiL: "0 Archit Jugran Keep it up 2
     -LAZ2Pw2OZ-wARfbpqmy: "1 Archit Jugran Warning: Please pay more attent
     -LAZ2SNJVJwWO3QRLGdw: "2 Archit Jugran Warning: Please pay more attent
     -LAZ2nMp-N-DDUFZR-EO: "10 Archit Jugran Keep it up 1
     -LAZ2sFSKnGloTophztl: "11 Archit Jugran Warning: Please pay more atter
```

Output - Notification confirmed, status changed in the database





Your security rules are defined as public, anyone can read or write to your database

```
actualproject-9ac19
  ConfirmNotification
    notifications
      -LAZ2NUpCj_rZc74_TiL: "0 Archit Jugran Keep it up 2
      -LAZ2Pw2OZ-wARfbpqmy: "1 Archit Jugran Warning: Please pay more attent
      -LAZ2SNJVJwWO3QRLGdw: "2 Archit Jugran Warning: Please pay more attent
      -LAZ2nMp-N-DDUFZR-EO: "10 Archit Jugran Keep it up 1
      -LAZ2sFSKnGloTophztl: "Confirmed : 11 Archit Jugran Warning: Please pa
```

CORRECT

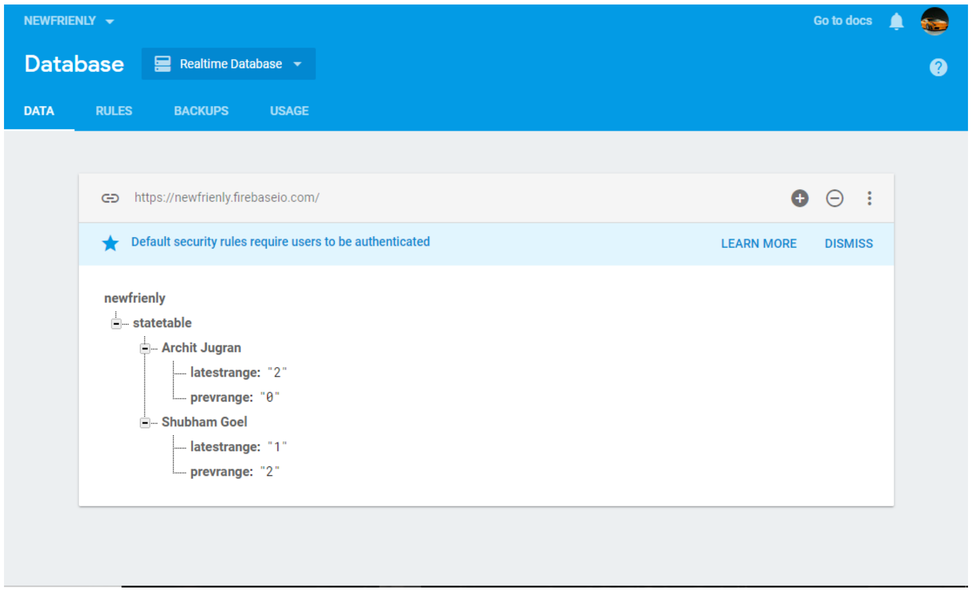
3.3 **Alert decider**

Input - State table with their current states
Output - Alert to/not to be given

3.3.1 Equivalence classes

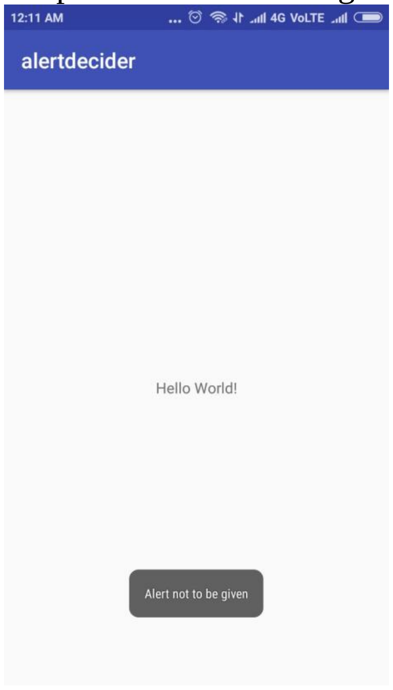
3.3.1.1 More than half of students are paying attention

Input - State table with more than half of users with high states


NEWFRIENLY
Go to docs
Database
Realtime Database
DATA
RULES
BACKUPS
USAGE
https://newfrienly.firebaseio.com/
Default security rules require users to be authenticated
LEARN MORE
DISMISS

```
newfrienly
  statetable
    Archit Jugran
      latestrange: "2"
      prevrange: "0"
    Shubham Goel
      latestrange: "1"
      prevrange: "2"
```

Output - Alert not to be given



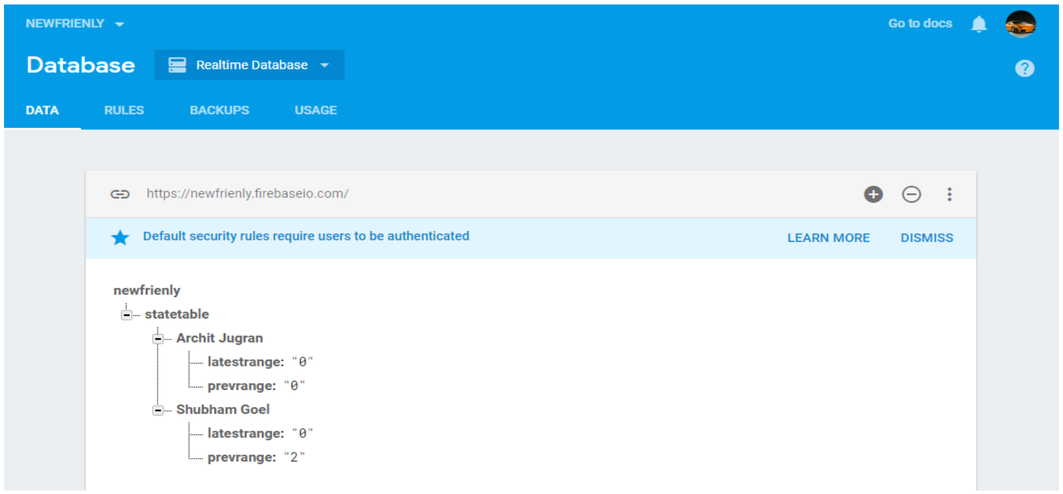
Hello World!

Alert not to be given

CORRECT

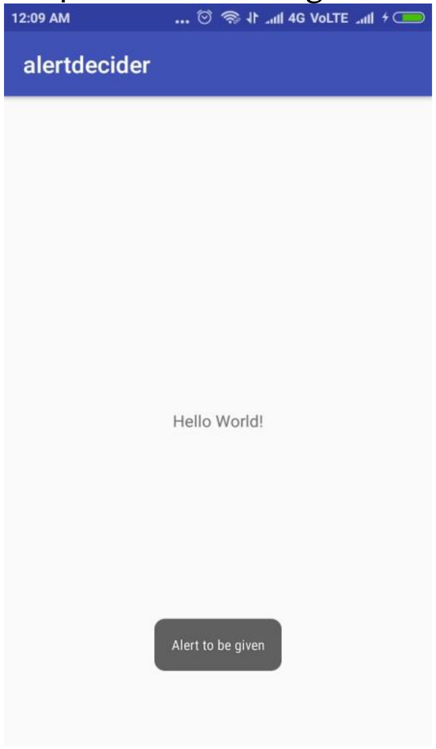
3.3.1.2 More than half of the class is not paying attention

Input - State table with more than half of users with low states


NEWFRIENLY
Go to docs
Database
Realtime Database
DATA
RULES
BACKUPS
USAGE
https://newfrienly.firebaseio.com/
Default security rules require users to be authenticated
LEARN MORE
DISMISS

```
newfrienly
 statetable
   Archit Jugran
     latestrange: "0"
     prevrange: "0"
   Shubham Goel
     latestrange: "0"
     prevrange: "2"
```

Output – Alert to be given

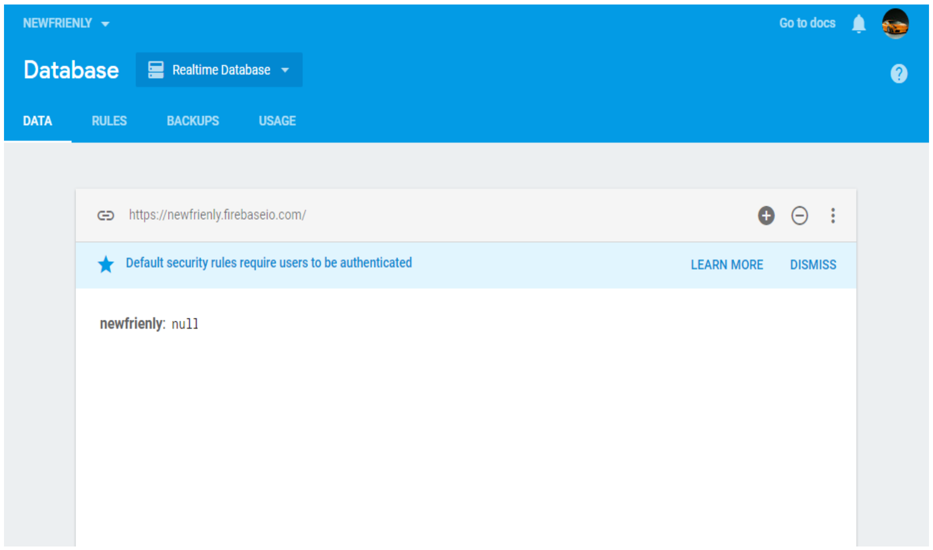


CORRECT

3.3.2 Boundary Cases

3.3.2.1 Number of users connected is zero

Input – Empty State Table

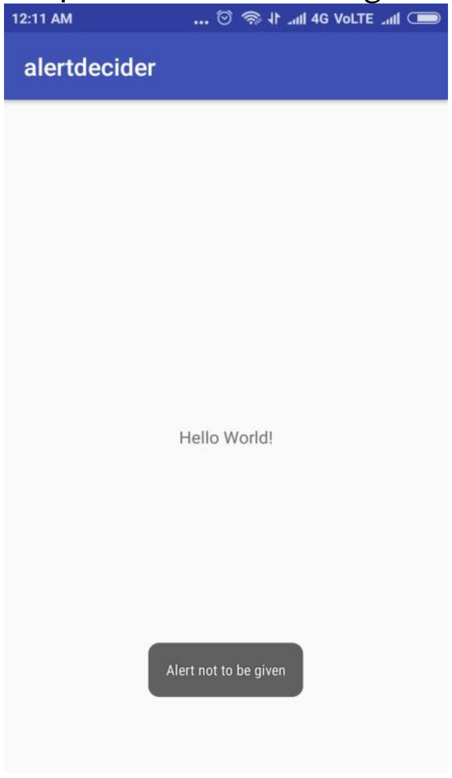


https://newfrienly.firebaseio.com/

Default security rules require users to be authenticated

```
newfrienly: null
```

Output – Alert not to be given



Hello World!

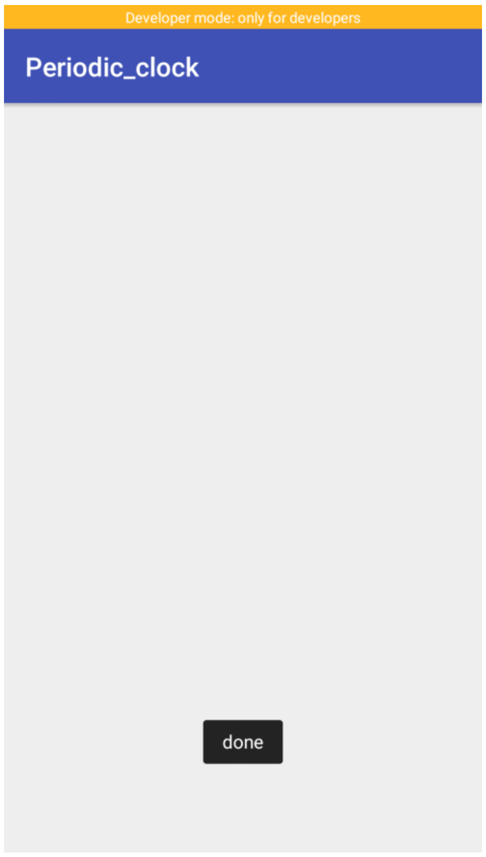
Alert not to be given

CORRECT

3.4 Periodic Clock Signal Generator

This unit prints a toast after every 40 second as a confirmation of periodic clock signal generator

Output - Message “done” is printed after every 40 second.



CORRECT

3.5 Generate Random number

It generates random number which is bounded by 2 and will be used as state for a student

Every time It prints a new random number and hence this unit is correct.

3.6 State Table Updation on Firebase

This Unit updates the state of the student corresponding to the username

Input - State of the Student and Username

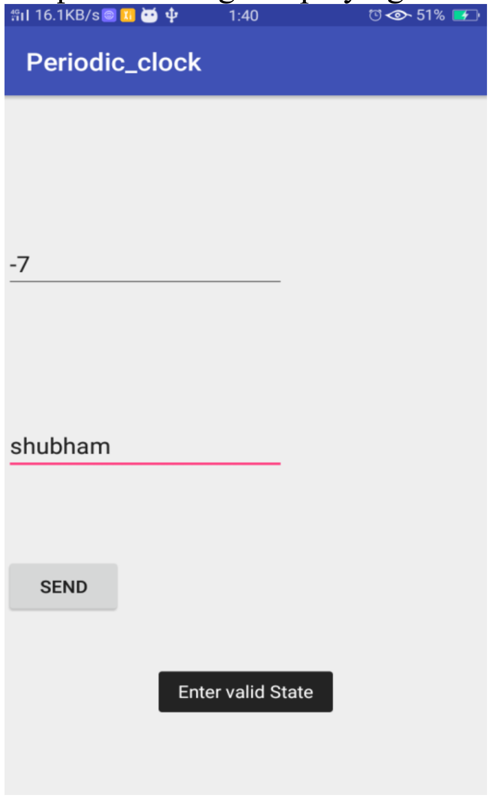
Output - Updation to database

3.6.1 Equivalence classes

3.6.1.1 State of student is negative

Input - Input State of student is negative

Output - Message displaying "Incorrect State"



-7

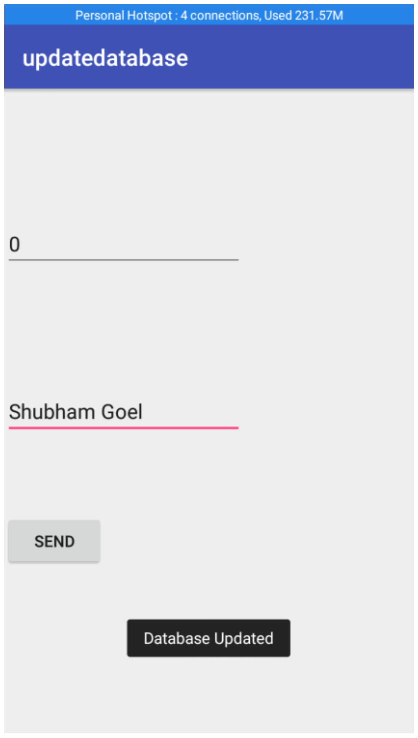
shubham

Enter valid State

CORRECT

3.6.1.2 State of student is positive

Input - Input State of student is positive

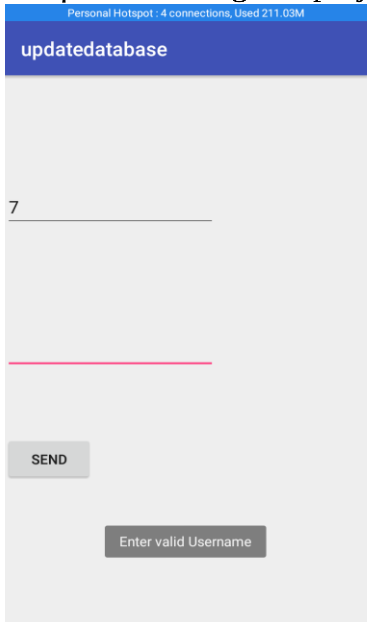


CORRECT

3.6.2 Boundary Cases

3.6.2.1 Username is null

Input – State is Present but username is missing
Output – Message displaying to enter username



CORRECT

3.7 **Vibrate notifier**

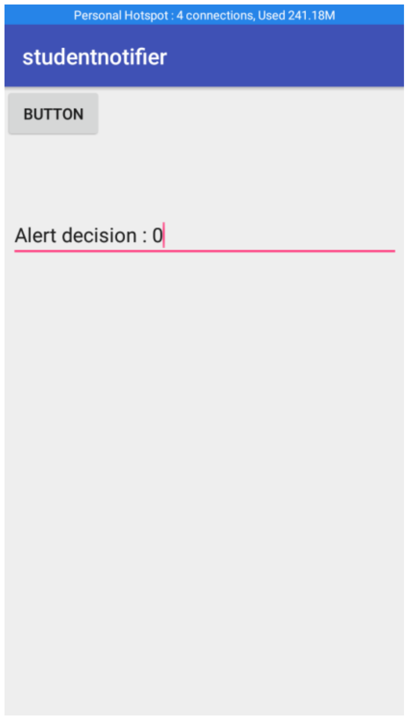
Input - Alert decision

Output – notification

3.7.1 Equivalence class

3.7.1.1More than half of class is paying attention

Input - Alert decision : 0

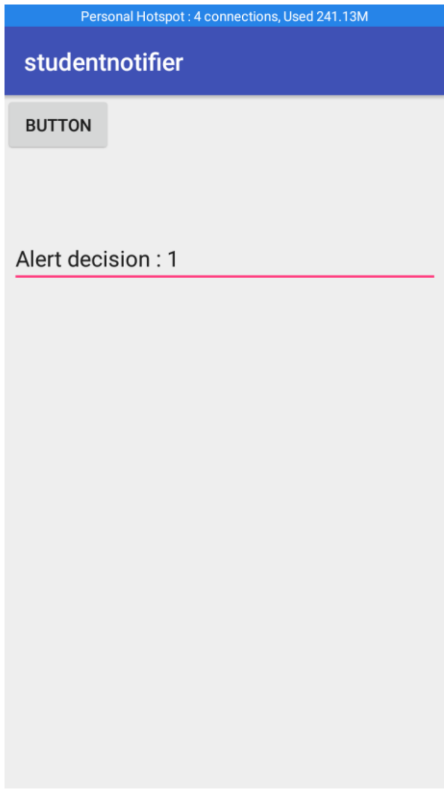


Alert decision : 0

Output - No notification

3.7.1.2 Less than half of the class is paying attention

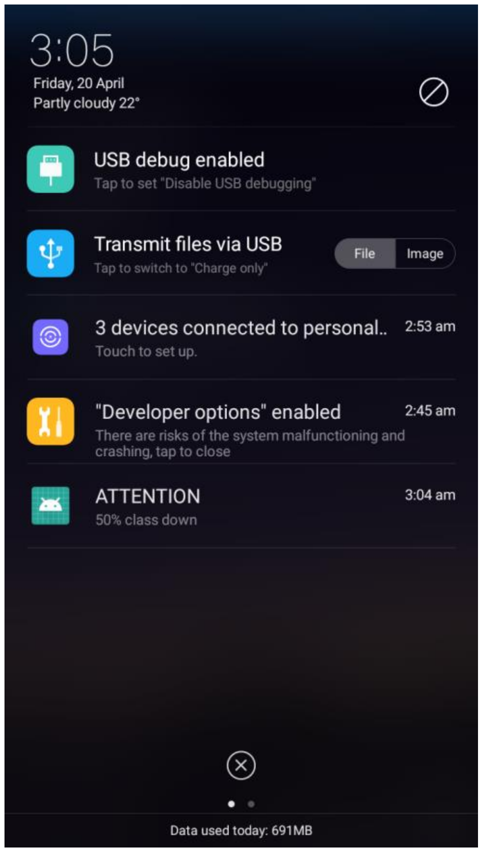
Input - Input - Alert decision : 1


Personal Hotspot : 4 connections, Used 241.13M

studentnotifier

Alert decision : 1

Output - Notification is sent.


3:05
Friday, 20 April
Partly cloudy 22°

USB debug enabled
Tap to set "Disable USB debugging"

Transmit files via USB
Tap to switch to "Charge only"

3 devices connected to personal.. 2:53 am
Touch to set up.

"Developer options" enabled 2:45 am
There are risks of the system malfunctioning and crashing, tap to close

ATTENTION 3:04 am
50% class down

Data used today: 691MB

4. Module Testing

Module testing is a process of testing the individual subprograms, subroutines, classes, or procedures in a program. Instead of testing whole software program at once, module testing recommend testing the smaller building blocks of the program.
The objective of doing Module, testing is not to demonstrate proper functioning of the module but to demonstrate the presence of an error in the module.

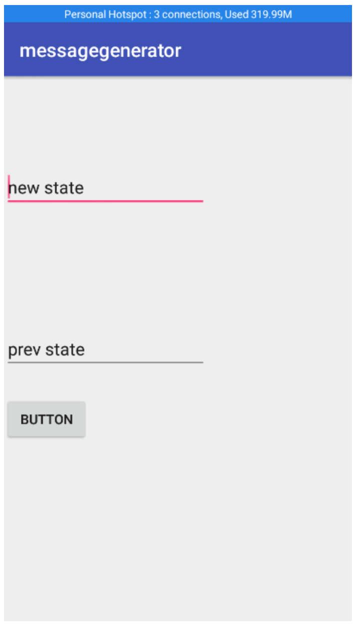
Module testing allows to implement parallelism into the testing process by giving the opportunity to test multiple modules simultaneously.

4.1 Module name – Message generator

The message generator module is basically used to generate correct message on the basis of current and previous states.

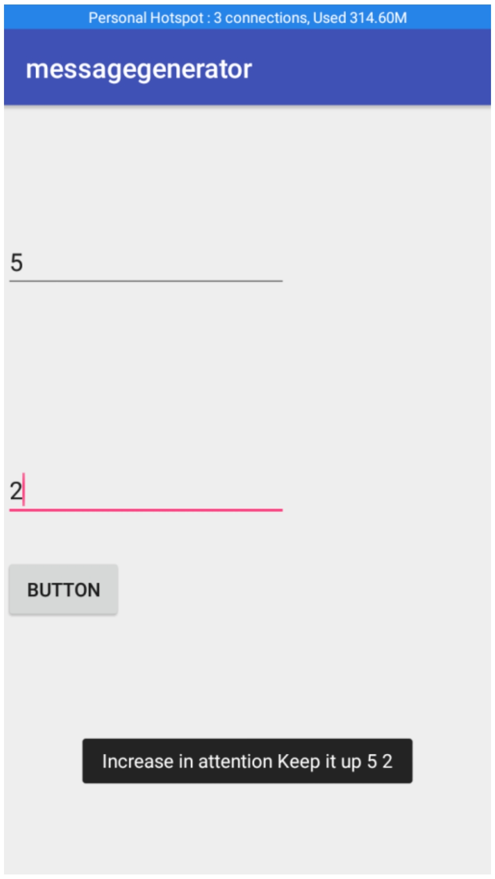
Input - Previous and current state.
Output - Message.

4.1.1 Equivalence Classes



4.1.1.1 Previous state is less than current state

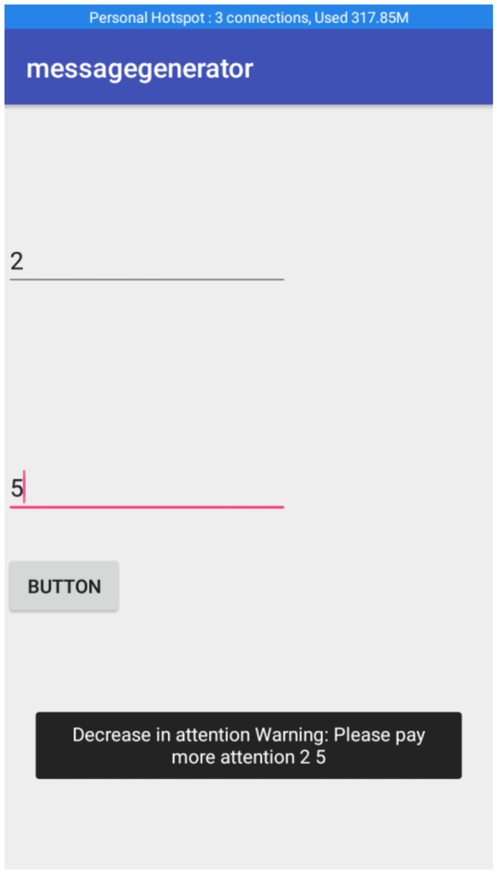
Input - Previous state (= 2), current state (= 5)
Output - Message “ Increase in Attention Keep it up 5 2”
CORRECT



Increase in attention Keep it up 5 2

4.1.1.2 Previous state is more than current state

Input - Previous state (= 5), current state (= 2)
Output - Message “ Decrease in Attention Warning: Please pay more attention. 2 5”
CORRECT

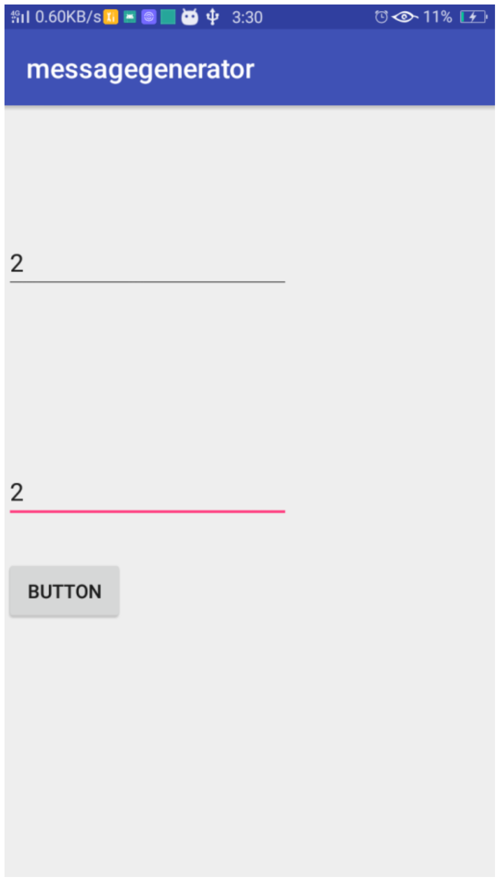


Decrease in attention Warning: Please pay more attention 2 5

4.1.1.3 Previous state is equal than current state

Input - Previous state (= 2), current state (= 2)
Output - Output - Message “”

CORRECT



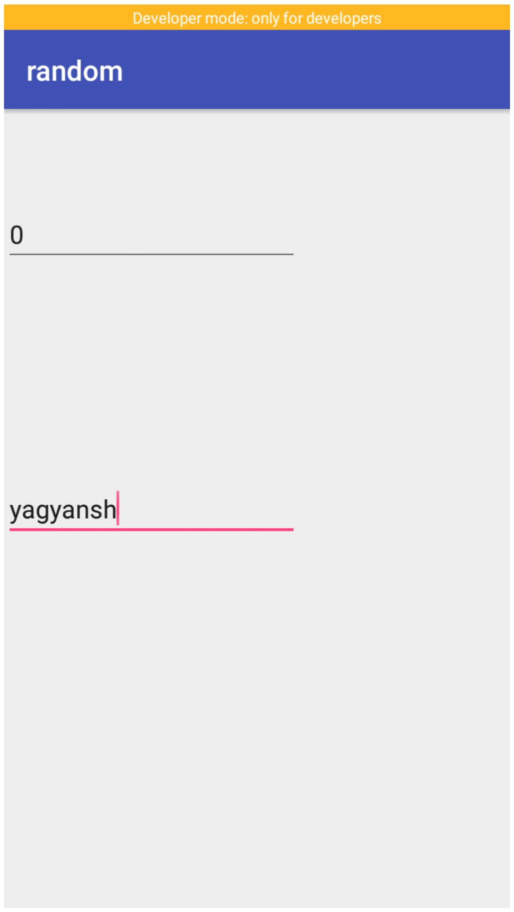
4.2 Module name – Random state generator

This module generates random states of the students periodically after 40 seconds and updates the corresponding values on the firebase.Input - usernames of users and their joining status (boolean)
Output - Updated database with new random state

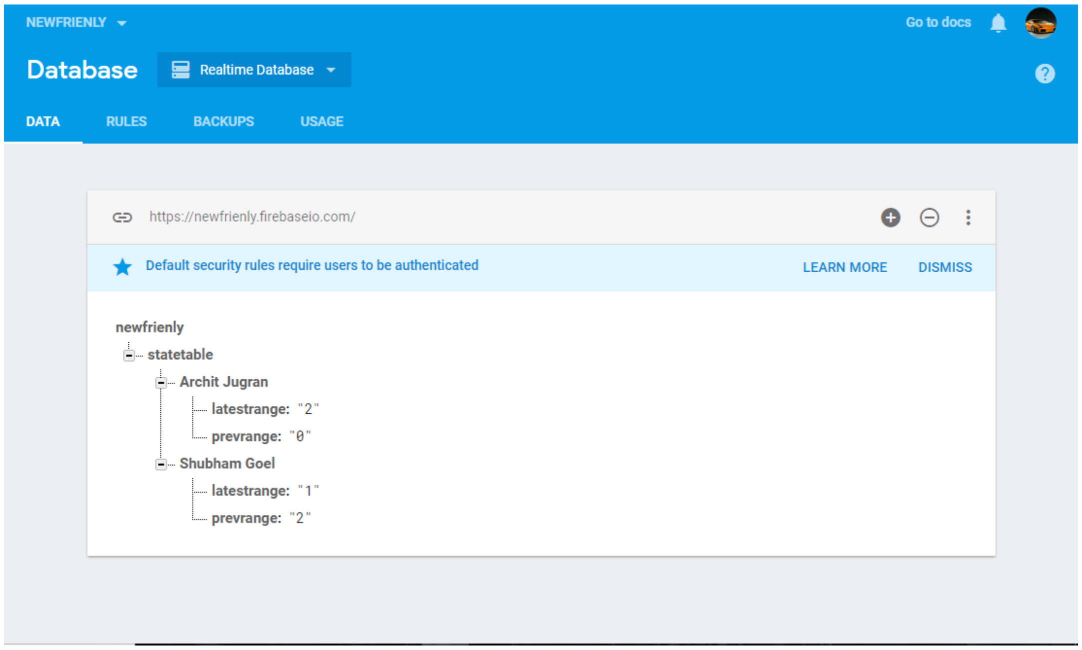
4.2.1 Equivalence class

4.2 .1.1 Join status of a user is false

Input - (“False”, username)



Output - Username not found in database.
CORRECT

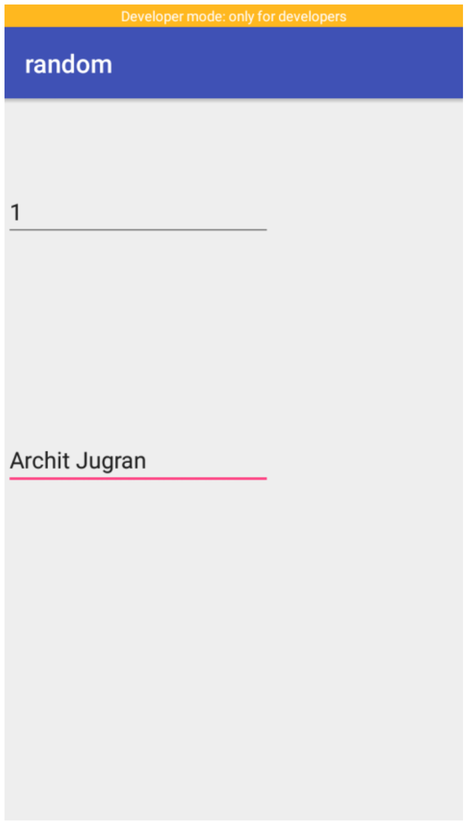


Default security rules require users to be authenticated

```
newfrienly
  statetable
    Archit Jugran
      latestrange: "2"
      prevrange: "0"
    Shubham Goel
      latestrange: "1"
      prevrange: "2"
```

4.1.1.2 Join status of a user is True

Input - (“True”, username)

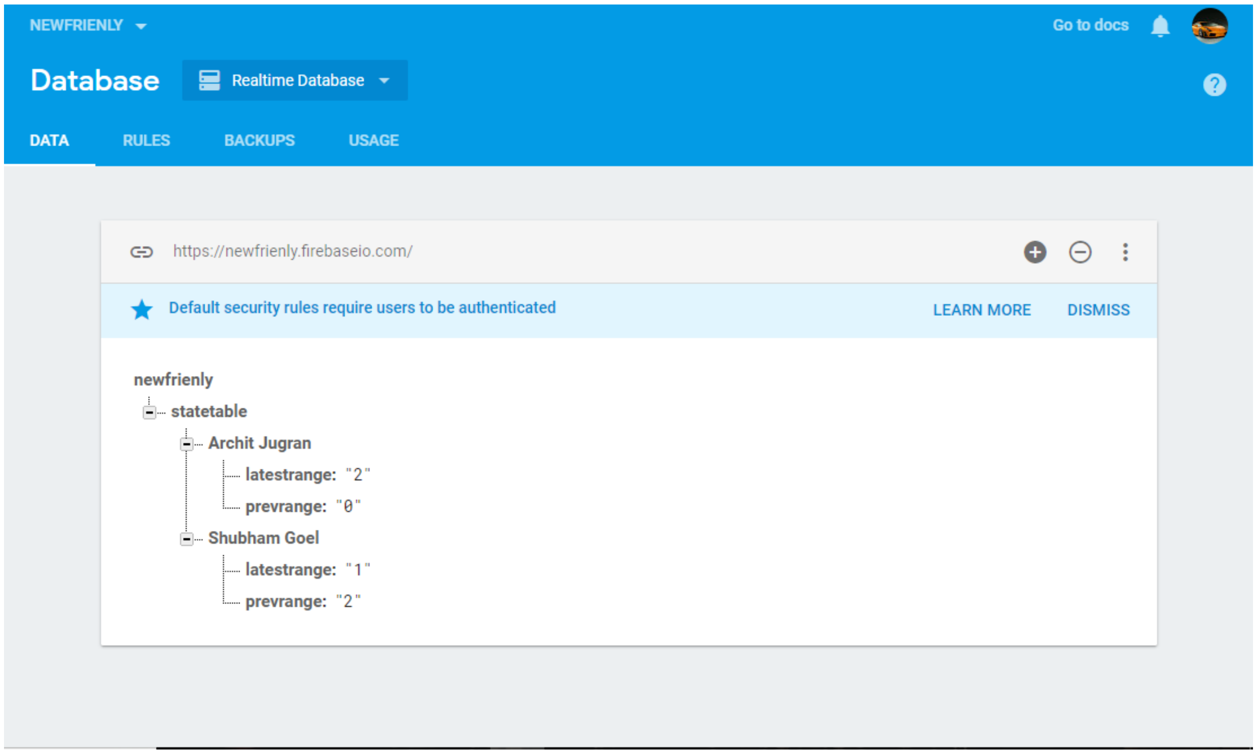


1

Archit Jugran

Output - Random state generated is entered in the database for the respective user.

CORRECT



Default security rules require users to be authenticated

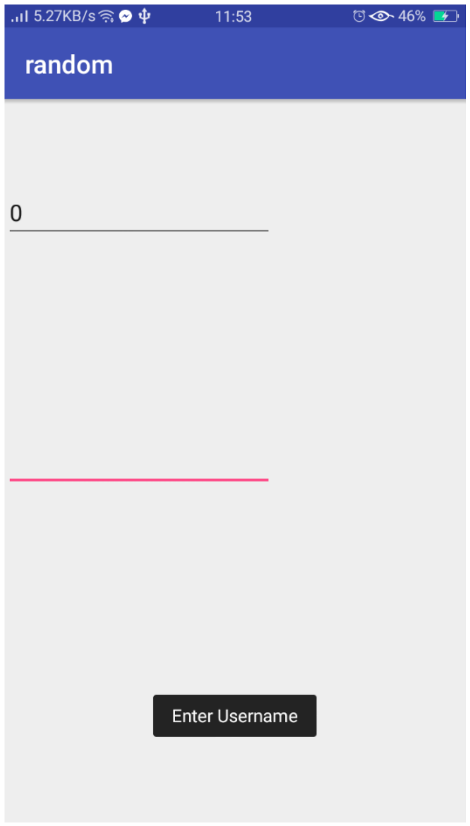
```
newfrienly
  statetable
    Archit Jugran
      latestrange: "2"
      prevrange: "0"
    Shubham Goel
      latestrange: "1"
      prevrange: "2"
```

4.2.1 Boundary cases

4.2.1.1 Username is blank

Input - (“False” , “”)
Output - Message shown “Enter some username”

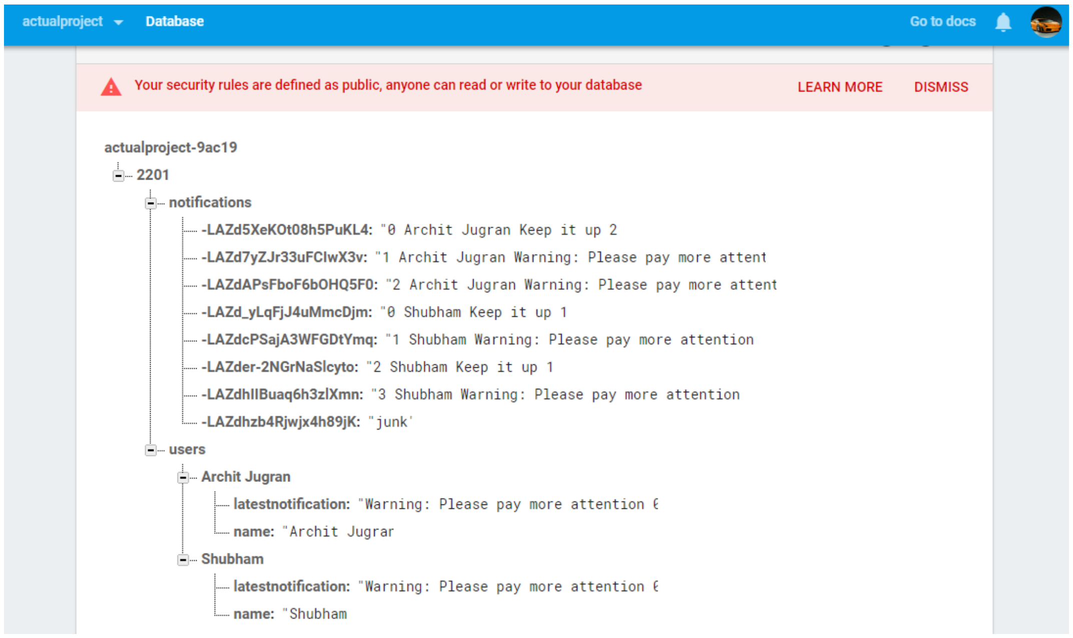
CORRECT



4.3 Module name - Notifier

This module is used to send notification to the student and teacher according to the condition specified.

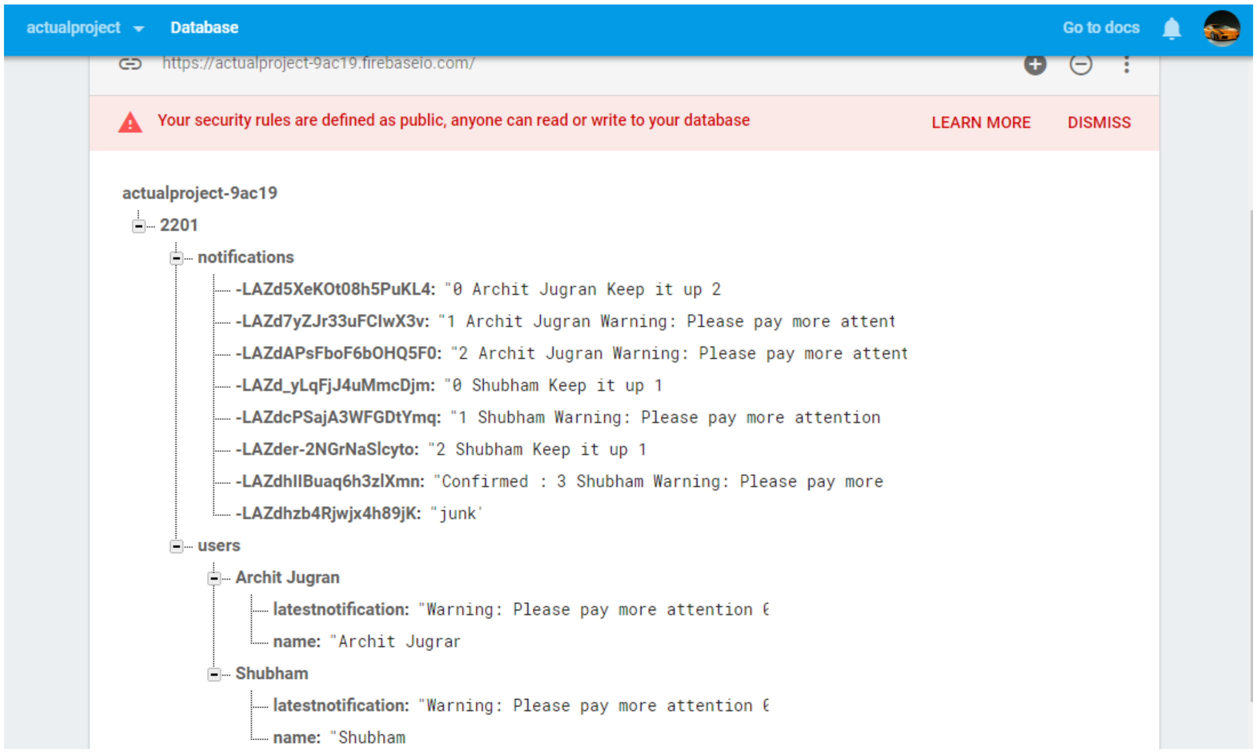
Input - Room number , Messages from the database



Your security rules are defined as public, anyone can read or write to your database

```
actualproject-9ac19
  2201
    notifications
      -LAZd5XeKOt08h5PuKL4: "0 Archit Jugran Keep it up 2
      -LAZd7yZJr33uFClwX3v: "1 Archit Jugran Warning: Please pay more attent
      -LAZdAPsFboF6bOHQ5F0: "2 Archit Jugran Warning: Please pay more attent
      -LAZd_yLqFjJ4uMmcDjm: "0 Shubham Keep it up 1
      -LAZdcPSajA3WFGDtYmq: "1 Shubham Warning: Please pay more attention
      -LAZder-2NGrNaSlcyto: "2 Shubham Keep it up 1
      -LAZdhIIBuaq6h3zlXmn: "3 Shubham Warning: Please pay more attention
      -LAZdhzb4Rjwjx4h89jK: "junk'
    users
      Archit Jugran
        latestnotification: "Warning: Please pay more attention €
        name: "Archit Jugrar
      Shubham
        latestnotification: "Warning: Please pay more attention €
        name: "Shubham
```

Output - Notification, change in Log and alert decision



https://actualproject-9ac19.firebaseio.com/

Your security rules are defined as public, anyone can read or write to your database

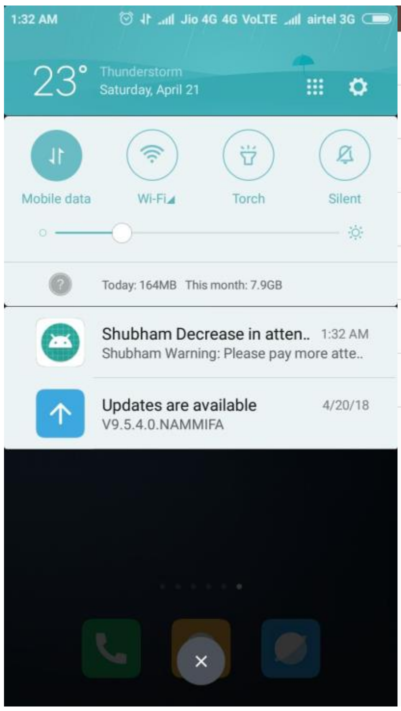
```
actualproject-9ac19
 2201
   notifications
     -LAZd5XeKOt08h5PuKL4: "0 Archit Jugran Keep it up 2
     -LAZd7yZJr33uFClwX3v: "1 Archit Jugran Warning: Please pay more attent
     -LAZdAPsFboF6bOHQ5F0: "2 Archit Jugran Warning: Please pay more attent
     -LAZd_yLqFjJ4uMmcDjm: "0 Shubham Keep it up 1
     -LAZdcPSajA3WFGDtYmq: "1 Shubham Warning: Please pay more attention
     -LAZder-2NGrNaSlcyto: "2 Shubham Keep it up 1
     -LAZdhIlBuaq6h3zlXmn: "Confirmed : 3 Shubham Warning: Please pay more
     -LAZdhzb4Rjwjx4h89jK: "junk'
   users
     Archit Jugran
       latestnotification: "Warning: Please pay more attention 6
       name: "Archit Jugrar
     Shubham
       latestnotification: "Warning: Please pay more attention 6
       name: "Shubham
```

4.3.1 Equivalence classes

4.3.1.1 User is notified by a notification

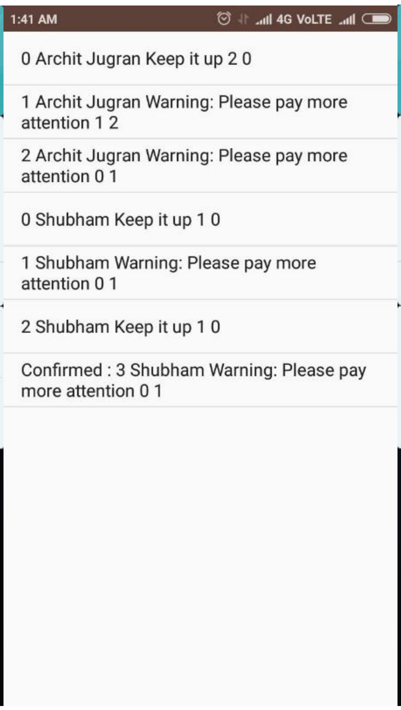
Input - Messages from the database.
Output – Notification

CORRECT



Shubham Decrease in atten.. 1:32 AM
Shubham Warning: Please pay more atte..

Updates are available 4/20/18
V9.5.4.0.NAMMIFA



0 Archit Jugran Keep it up 2 0

1 Archit Jugran Warning: Please pay more attention 1 2

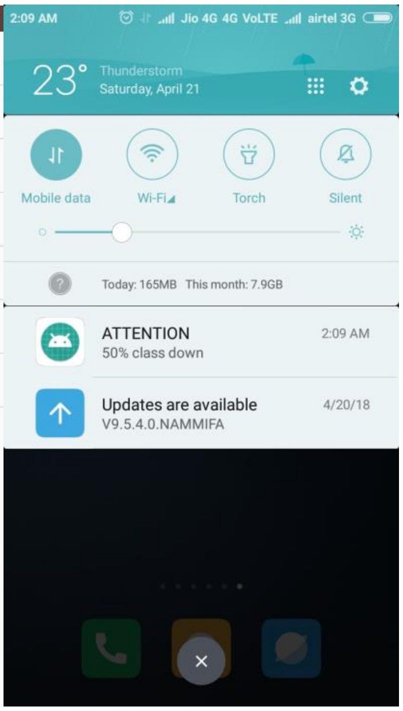
2 Archit Jugran Warning: Please pay more attention 0 1

0 Shubham Keep it up 1 0

1 Shubham Warning: Please pay more attention 0 1

2 Shubham Keep it up 1 0

Confirmed : 3 Shubham Warning: Please pay more attention 0 1



ATTENTION 2:09 AM
50% class down

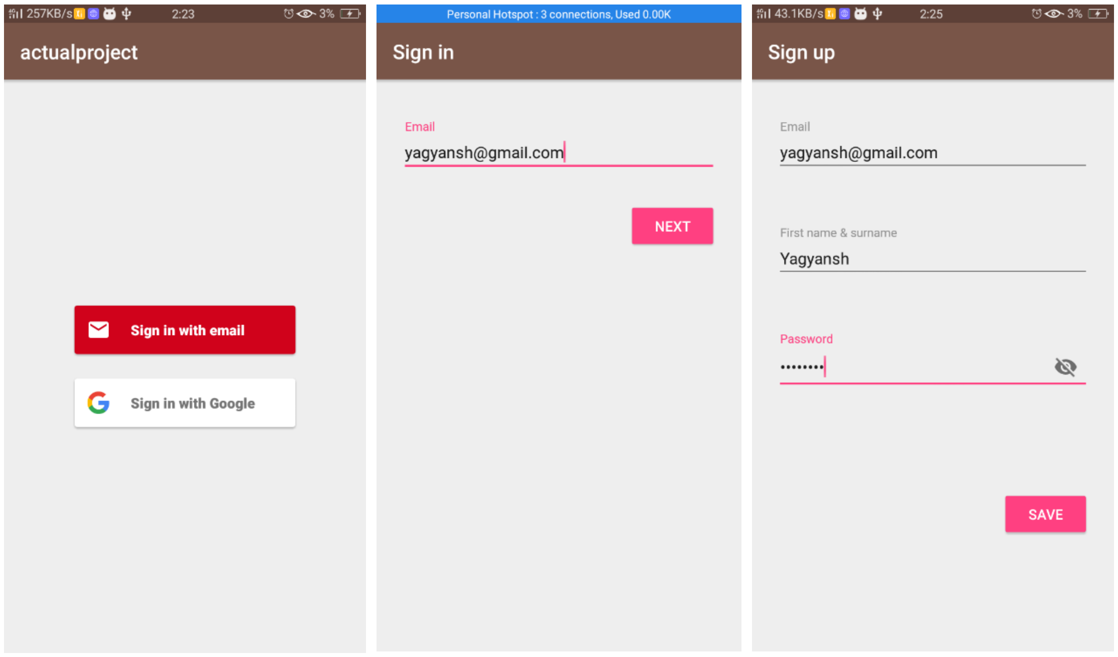
Updates are available 4/20/18
V9.5.4.0.NAMMIFA

5. System testing

5.1 Equivalence Classes

5.1.1 Sign up with Email

Input - Press “sign in with email” button, Email ID, Name, Password



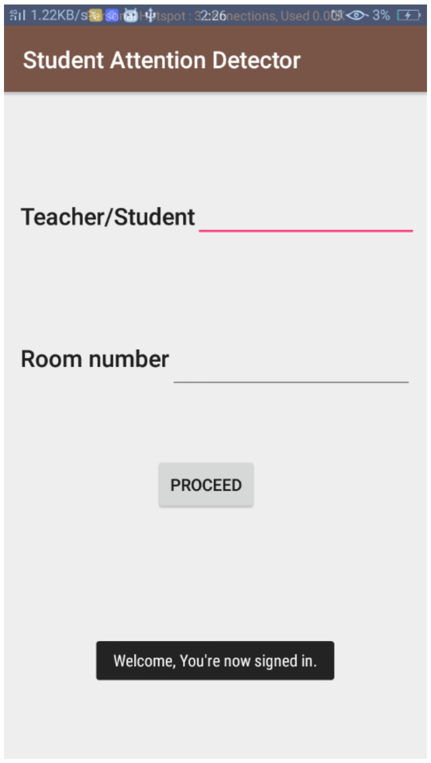
Email
yagyansh@gmail.com

Email
yagyansh@gmail.com

First name & surname
Yagyansh

Password
••••••••

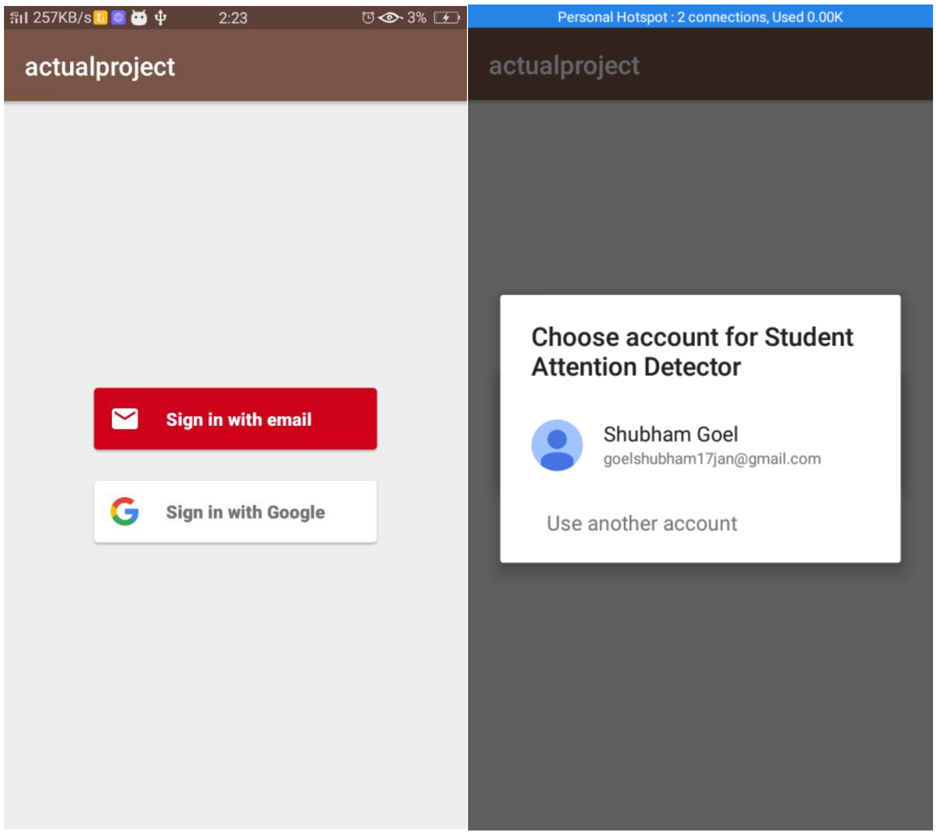
Output - Message saying “Welcome, You’re now signed in”



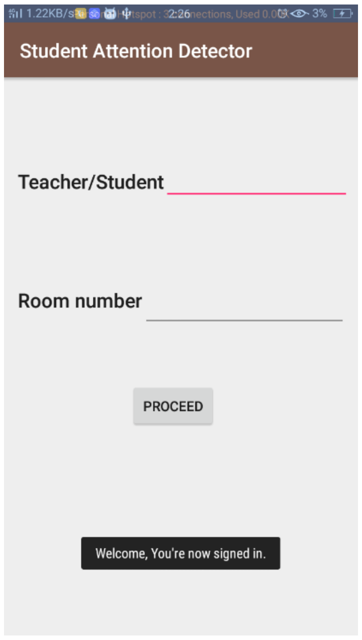
CORRECT

5.1.2 Sign up with GMAIL

Input - Press “sign in with Gmail” button, Choose Account



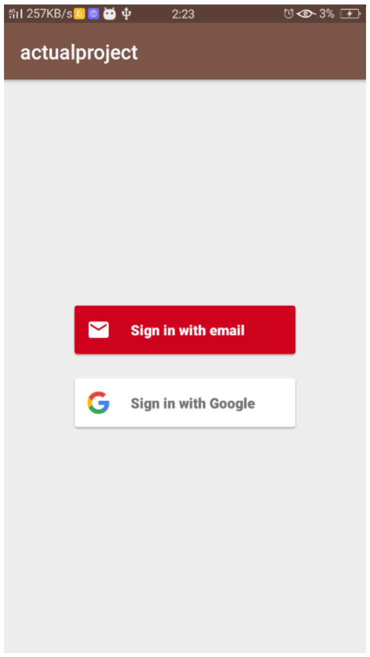
Output - Message saying “Welcome, You’re now signed in”

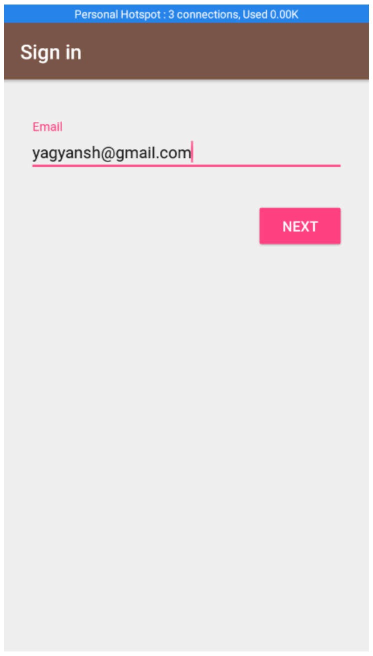


Welcome, You're now signed in.

5.1.3 Sign in with Email

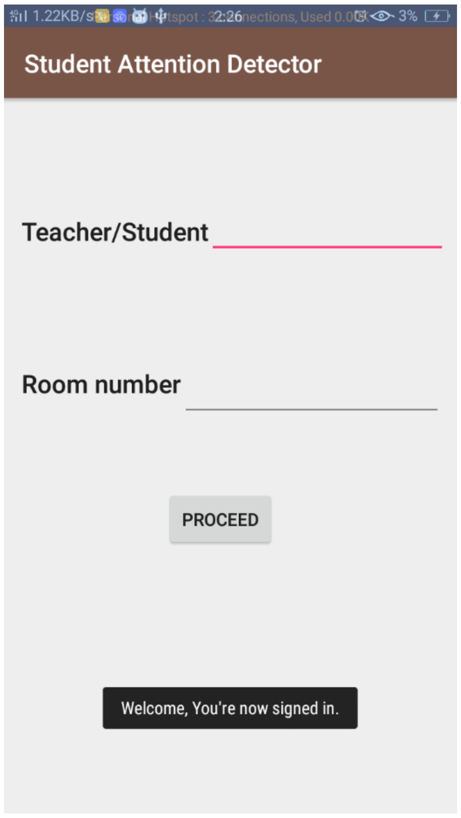
Input - Press “sign in with email” button, Email ID, Password





Output - Message saying "Welcome, You're now signed in"

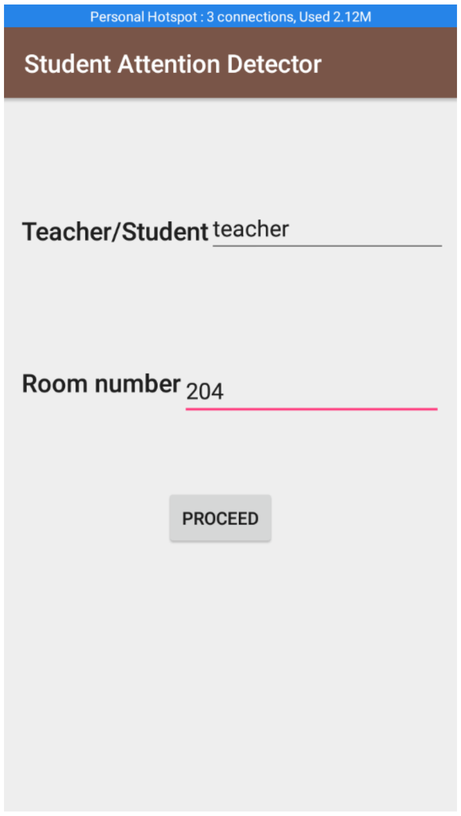
CORRECT



Welcome, You're now signed in.

5.1.4 Join room as teacher

Input - Enter “Teacher” , Room number in which he/she is teaching.


Personal Hotspot : 3 connections, Used 2.12M

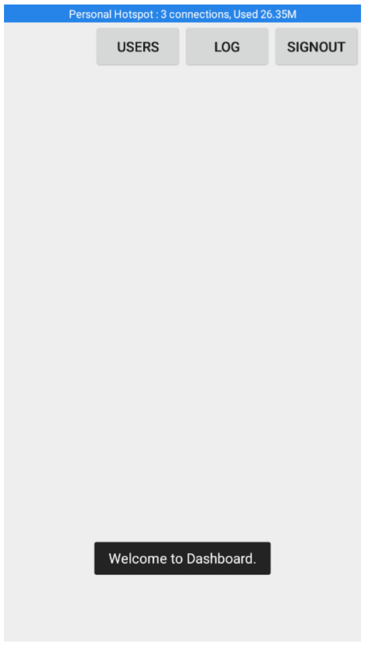
Student Attention Detector

Teacher/Student teacher

Room number 204

Output - Redirected to Teacher Dashboard.

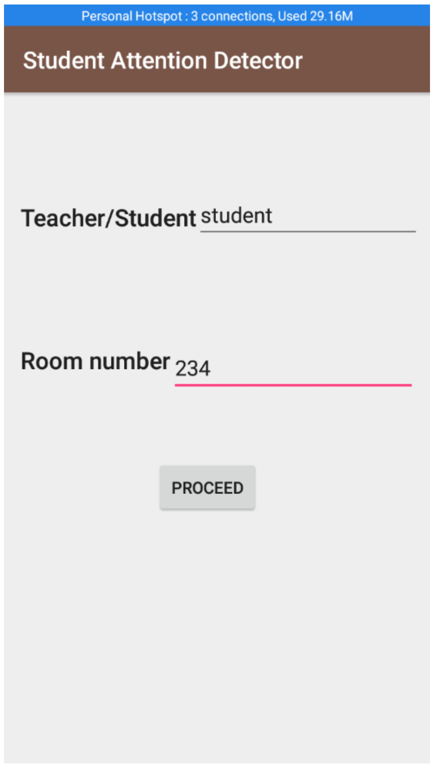
CORRECT


Personal Hotspot : 3 connections, Used 26.35M

Welcome to Dashboard.

5.1.5 Join room to student

Input - Enter “Student” , Room number in which he/she is studying



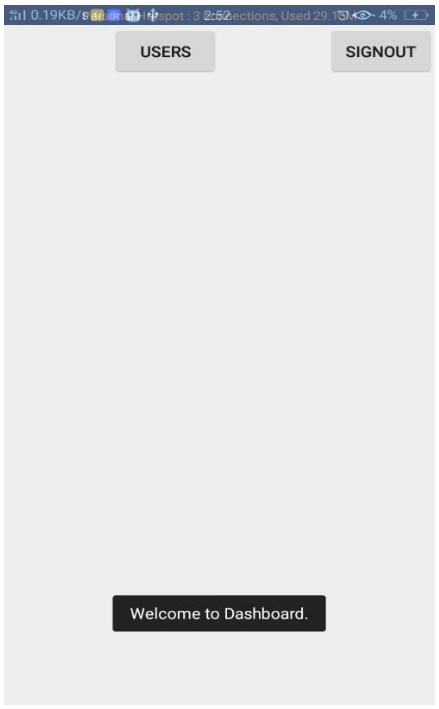
Personal Hotspot : 3 connections, Used 29.16M

Student Attention Detector

Teacher/Student student

Room number 234

Output - Redirected to Student Dashboard.

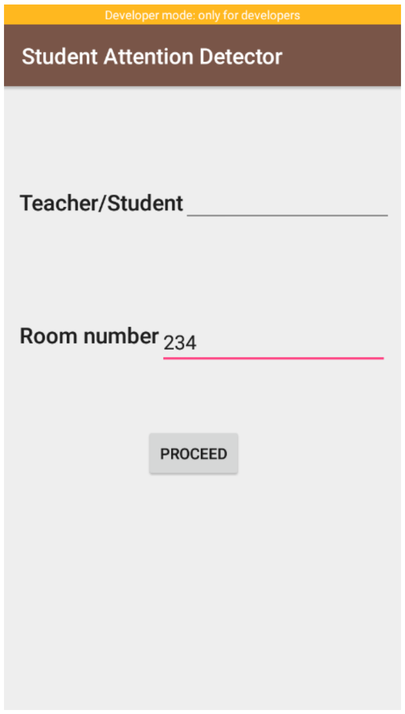


Welcome to Dashboard.

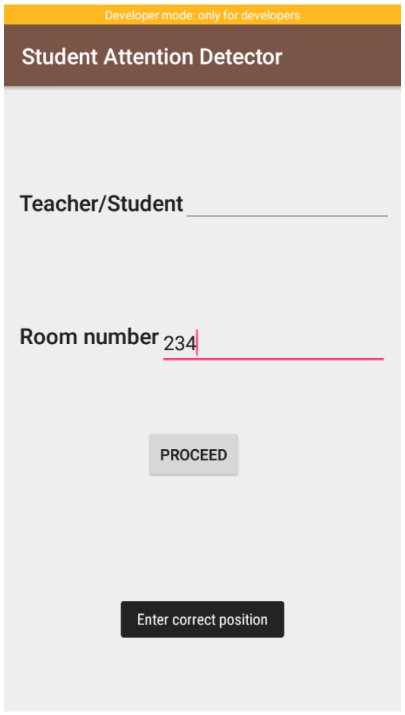
CORRECT

5.1.6 Wrong Position while going to dashboard

Input - Press “PROCEED” button with room number, and position anything except “student” and “teacher”


Developer mode: only for developers
Student Attention Detector
Teacher/Student
Room number 234
PROCEED

Output - Message saying “Enter correct Position”

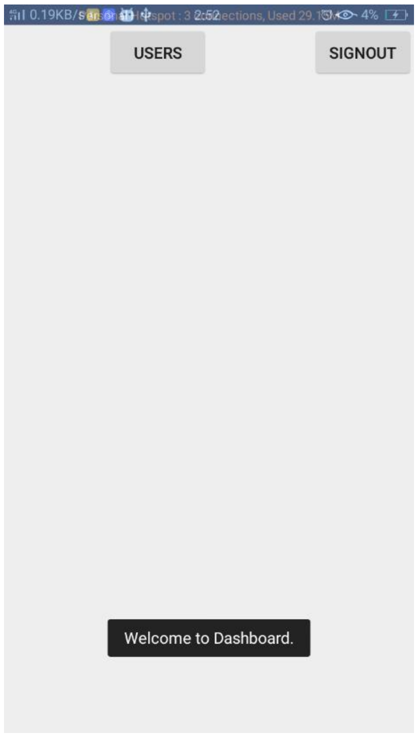

Developer mode: only for developers
Student Attention Detector
Teacher/Student
Room number 234
PROCEED

Enter correct position

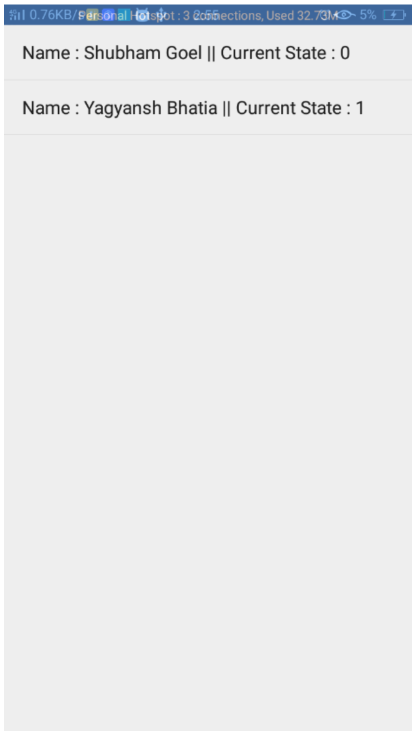
CORRECT

5.1.7 See users connected to room

Input - Press “USERS” button



Output - Redirected to the list of the users.



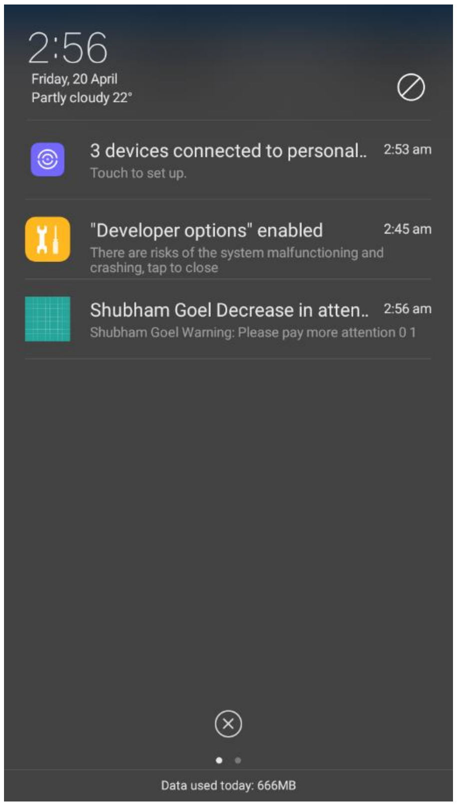
Name : Shubham Goel || Current State : 0

Name : Yagyansh Bhatia || Current State : 1

CORRECT

5.1.8 Confirming a Notification

Input - Tap on the notification.



2:56
Friday, 20 April
Partly cloudy 22°

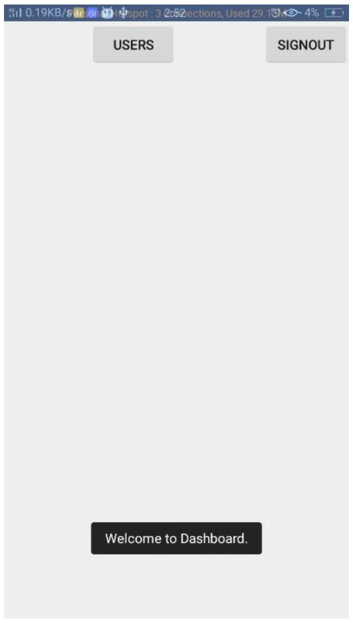
3 devices connected to personal.. 2:53 am
Touch to set up.

"Developer options" enabled 2:45 am
There are risks of the system malfunctioning and crashing, tap to close

Shubham Goel Decrease in atten.. 2:56 am
Shubham Goel Warning: Please pay more attention 0 1

Data used today: 666MB

Output - Notification disappears and user is redirected to main menu.

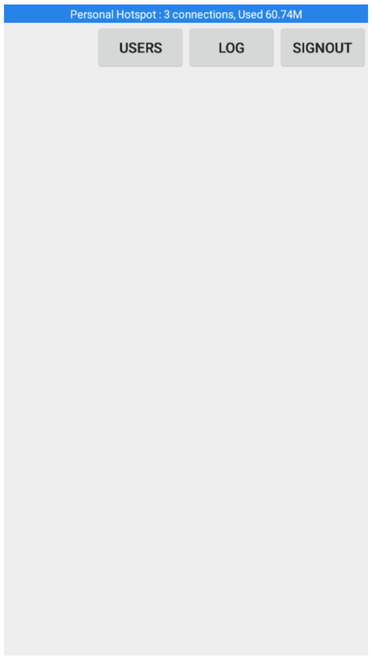


Welcome to Dashboard.

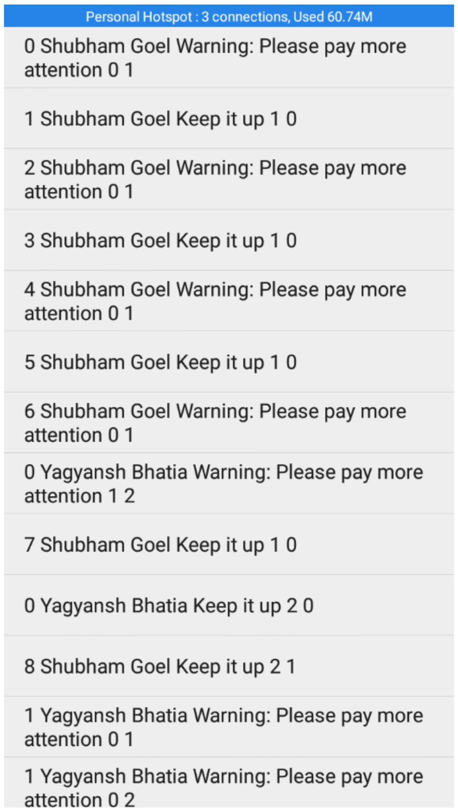
CORRECT

5.1.9 Teacher checks the logs

Input - Press “LOGS” button.



Output - Teacher is redirected to logs.

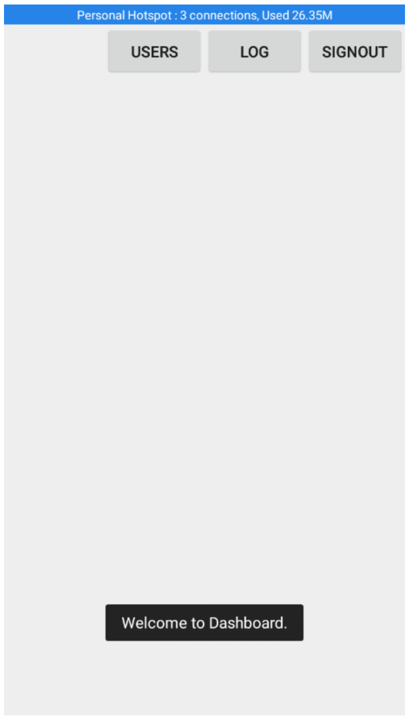


```
0 Shubham Goel Warning: Please pay more
attention 0 1
1 Shubham Goel Keep it up 1 0
2 Shubham Goel Warning: Please pay more
attention 0 1
3 Shubham Goel Keep it up 1 0
4 Shubham Goel Warning: Please pay more
attention 0 1
5 Shubham Goel Keep it up 1 0
6 Shubham Goel Warning: Please pay more
attention 0 1
0 Yagyansh Bhatia Warning: Please pay more
attention 1 2
7 Shubham Goel Keep it up 1 0
0 Yagyansh Bhatia Keep it up 2 0
8 Shubham Goel Keep it up 2 1
1 Yagyansh Bhatia Warning: Please pay more
attention 0 1
1 Yagyansh Bhatia Warning: Please pay more
attention 0 2
```

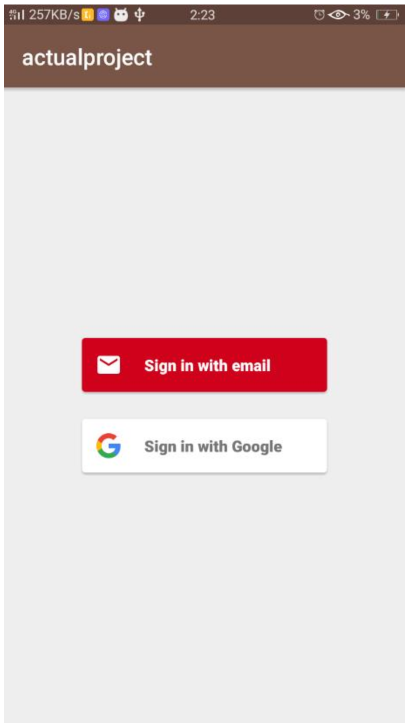
CORRECT

5.1.10 Sign out

Input - Press “SIGNOUT” button



Output - Redirected to Login page.

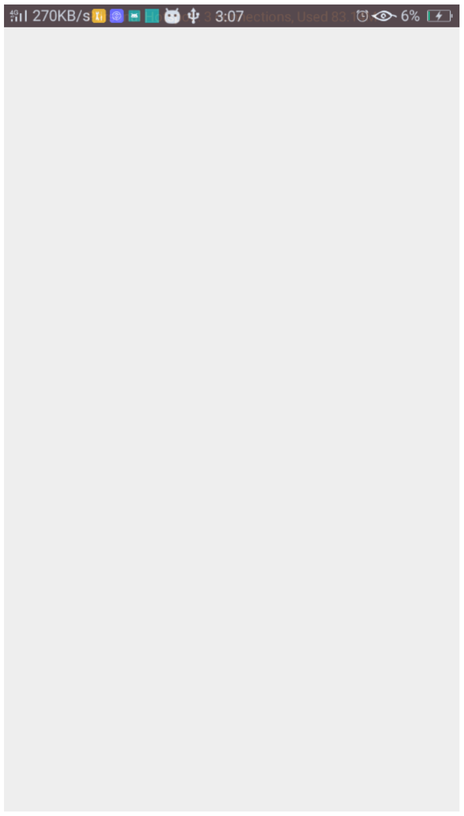


CORRECT

5.2 Boundary conditions

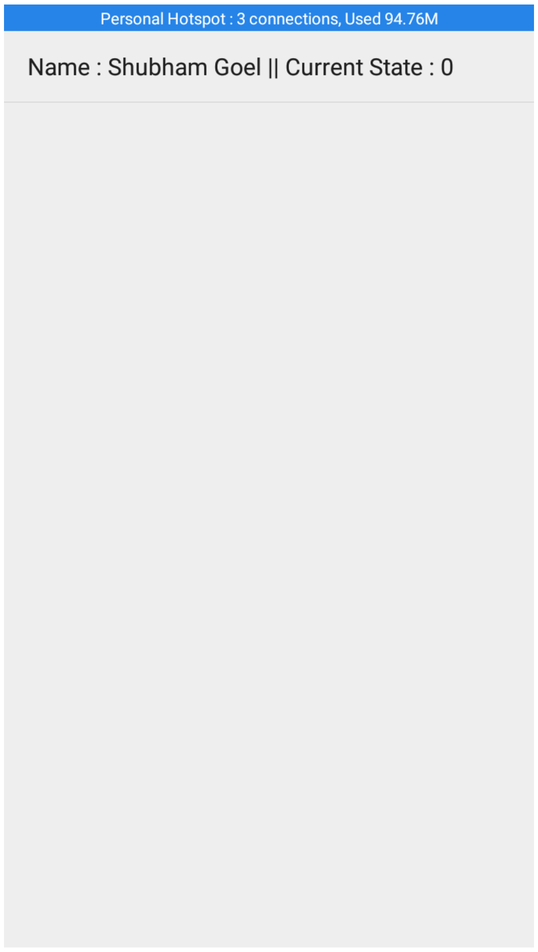
5.2.1 No student has joined the class, teacher checks log

Input - Press “LOGS” button.
Output - Teacher is redirected to a blank screen



5.2.2 First student joins and checks the connected students

Input - Press “USERS” button.
Output - student is redirected to screen where only entry is of himself
CORRECT



Name : Shubham Goel || Current State : 0