



HOSTEL MANAGEMENT SYSTEM

Project Report & Research Paper

Regional Training Institute, Jammu

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From Director General's Desk

The dissemination and exchange of knowledge through training of personnel and research analyses in a training Institute, requires not only skilled and experienced faculty but also a strong 'holding environment' wherein the infrastructure of the Institute plays an important role.

Regional Training Institute (RTI), Jammu has made it a point to continually focus on the adoption of good practice and innovative systems so as to ensure that not only are the training courses positively impactful and results oriented, but also that the physical environment around the learning effort is comfortable and efficiently administered.

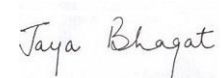
The Hostel complex adjacent to the RTI Jammu office building comprises of 27 residential rooms(including 6 VIP rooms). All rooms are equipped with attached baths and modern facilities (air conditioners, heaters, wall mounted televisions etc.) including internet connectivity. Daily housekeeping, canteen and maintenance teams of staff support the seamless conduct of training programmes and the comfort of the trainees.

As part of the continued process of adding quality improvements and systematizing the housekeeping and hostel related functions, the RTI Team decided to explore using a digital platform such as a mobile phone application that would facilitate the flow of the relevant information among the administration section, caretaker and the housekeeping/cleaning staff so as to ensure consistent quality control in provision of services and allow for a real time view of maintenance and upkeep related issues that may arise.

Accordingly, as a part of our collaborative alliance with the Indian Institute of Technology (IIT), Jammu, a mobile based application has been developed for a new 'Hostel Management System'. The application facilitates and streamlines functions such as the allocation of rooms, monitoring of housekeeping and cleaning services, submission of complaints and redressal mechanisms therefore, meal cancellations, receipts and payments log etc. This research paper and project report outlines the modalities related to and scope of work covered by the application.

The source code for the application is available with RTI, Jammu and our team would be happy to share the source code with any sister office in the Indian Audit and Accounts Department.

Any suggestions would be welcome.



Jaya Bhagat
Director General

Jammu, 22 January,2021

Background

About the RTI Jammu Hostel

Regional Training Institute (RTI), Jammu has a hostel to support a comfortable stay for the participants and the guest faculty. There are 27 rooms including 6 VIP rooms in the hostel. Rooms for the participants are on twin sharing basis with attached washrooms, split type air conditioners, 32" LCD TVs with cable connection, networked computers with internet, intercom and customised almirah.

Need for the Hostel Management Application

RTI Jammu hostel caters to the needs of the participants who visit the institute to attend the courses that are run by the institute throughout the year. The hostel staff and the administration oversee the activities related to the hostel such as room allotments, cleanliness and housekeeping of the rooms, quality of the food served to the participants and receipts & payments related to the hostel mess. To streamline the complete process of managing the hostel, a need was felt for a digital platform such as a mobile phone application that would facilitate the flow of the relevant information from the housekeeping/cleaning staff to the caretaker and from the caretaker to the administration section.

Participating Members

1) The Indian Institute of Technology, Jammu

- i) Ms. Arya, Pursuing B.Tech in Computer Science and Engineering (2018-2022)
- ii) Ms. Unnam Pearly Susan, Pursuing B.Tech in Computer Science and Engineering (2018-2022)

2) The Regional Training Institute, Jammu

- i) Ms. Jaya Bhagat, Director General (Overall guidance on the project)
- ii) Sh. J K Pandita Sr AO (Training)
- iii) Sh. Sahil Pangotra, AAO (Training)
- iv) Sh. Aseem Beetan, AAO (OIOS)
- v) Sh. Bal Krishan Raina, Sr. Accountant (Caretaker)

About the Project

Software Requirements

The requirements expected to be fulfilled by the application based on the functioning of the hostel were compiled and shared with the developers in the form of a Software Requirements Specification (SRS) document prepared by the institute team. Brief description of the requirements as outlined in the SRS document is as follows:

Functional Requirements

S No	Intended System Feature	Functional Requirement(s)
1	Allocation of the rooms to the guests The application shall assist the hostel administration to allot rooms to the guests/participants based on their designation, gender and the purpose of the visit.	<ul style="list-style-type: none">i) Caretaker should have an option to change a room's status to under maintenance in order to avoid it being allotted to anyone.ii) No two participants of different gender should be allotted the same room except in the case of family members accompanying the faculty.iii) Designation of guests as criteria for room allotment – Whenever possible, guests belonging to a senior designation, (which is usually indicative of age) should be allotted rooms on the ground floor.
2	Monitoring the housekeeping and the cleanliness of the rooms The cleaning and housekeeping staff of the hostel shall tick-off the cleanliness and amenities related checklist for each room using a smartphone and the caretaker and administration shall be able to see the status of the checklist execution for each room.	<ul style="list-style-type: none">i) QR Code scanning– Hostel staff should be able to select the room by scanning a QR code.ii) Photograph – After completing their task, hostel staff should be able to click a photograph of the room using the app which would carry a timestamp to ensure authenticity.
3	Complaint submission and redressal The participants would be able to use the application to raise their complaints regarding the food and infrastructure in the hostel so that the hostel administration can take corrective action and track pending issues.	<ul style="list-style-type: none">i) Tracking the issues – The status of the issues should be visible to the hostel administration so that required action may be taken on time.
4	Meal Cancellation The hostel staff would be able to use this application to record meal cancellation requests made by the participants. This would help the hostel staff/administration to calculate the final amount due from the participants on account of meals consumed during their stay.	<ul style="list-style-type: none">i) The caretaker should have the option to choose the to and from dates while logging the requests in the application.

S No	Intended System Feature	Functional Requirement(s)
5	<p>Receipt and Payments log</p> <p>The hostel staff shall record the receipts and payments log in respect of the hostel mess using the application. The log shall be exportable as a Microsoft Excel workbook.</p>	<p>i) The hostel staff should be able to record the payments received from the participants on account of meals and payments made on account of the expenditure on consumables in the hostel mess.</p> <p>ii) The application should provide the user a month-wise and item-wise summary for all the receipts and payments.</p> <p>iii) The users of the application should be able to export the record in the form of an MS Excel workbook.</p>

Other Requirements

- i) All the screens of the user interface by default should be in the portrait mode
- ii) Flat UI design should be followed throughout the application
- iii) Keeping in view, the slow internet connection in the region, the volume of the data to be transmitted at a point of time should be limited to less than 1 MB.

Technology Stack

The following set of technologies have been used to develop the Android Application for the Hostel Management System:

- Programming language - Java
- Integrated Development Environment (IDE) - Android Studio
- Database - Cloud Firestore by Firebase
- Cloud Storage - Firebase Storage
- Authentication by Firebase SDK

Functions of the Application

The detailed description of the functions that the android application can perform are as follows:

1. Monitoring the housekeeping and the cleanliness of the rooms

The application facilitates the housekeeping/cleaning staff of the hostel to go through the housekeeping checklist using android smartphones without the use of pen and paper. The staff member (i) scans a unique QR code pasted in each room (ii) then ticks the relevant items as per the status and (iii) click a photograph of the room which is uploaded to the cloud storage. Room-wise status of the checklist and the photographs can be accessed by the hostel caretaker and the administration who can also see the score for each room which is determined by the number of items checked on the checklist. Also, the score of each room is reflected as the colour in which the room number is displayed in the list of rooms thereby helping the administration to have a view of the overall status of all the rooms at a glance at any point in time. A room with the score 0 is displayed in red colour whereas a room with

the score 14 is displayed in green colour. All the other scores are represented by a gradient shade between the two colours. The administration can instantly raise an 'alert' if it is felt that status of a room is not satisfactory. The alert is then communicated to the caretaker through the application so as to enable relevant action.

The application also provides a feature to maintain a separate record of any surprise checks made by the administration.

2. Allocation of the rooms to the guests

The application facilitates the caretaker of the hostel in allocating the hostel rooms to the guests by entering the relevant details. Depending on the availability, the application allocates the rooms on the ground floor to the participants with seniority or special needs.

All the details entered by the caretaker can be accessed by the administration team which can finally approve or reject the allocations made.

The caretaker and the administration can also access all the current room allocations and also export the data in the form of an Excel workbook.

In an event of a room being not available for allocation due to it being under maintenance, the caretaker or the administration can make the room unavailable for allocation from the application so as to avoid any errors or confusion in room allotment.

3. Complaint submission and redressal

The application can be used by the caretaker and the administration to receive and track the status of complaints submitted by the participants regarding their stay in the hostel. The participants may use the mobile device available with the caretaker to raise the complaint or they may use a Google Forms page to submit their complaints. The link for the Google Forms page shall be available in each room as part of the hostel information booklet/sheet. All the complaints collected through the Google Form shall also be visible to the caretaker and the administration in the application and can be treated in a manner similar to the complaints collected through the application itself.

4. Meal Cancellation

The guests in the hostel may sometimes choose not to have their meal in the hostel mess. To make sure that the food is prepared for the correct number of persons and the guests are not billed for the food that they didn't consume, the guests are required to inform the hostel staff about cancelling their meal(s). The application provides the guests an option to request for cancellation of their meal(s). Similar to submitting the complaints, the guests can use the Google Forms or the device available with the hostel staff to submit the requests in which they can mention the dates as well the meals which they would like to cancel.

The caretaker can access all the requests and can forward them to the hostel cook. This facilitates efficient management of the kitchen and helps avoid wastage of food.

5. Receipt and Payments log

The application can be used by the hostel staff to record all the expenditure and receipts on account of the hostel mess. The staff while recording the transactions can capture the details such as name of the item, quantity and amount paid.

The record can thereafter be used to generate a summary at the end of the month which can be exported in the form of an Excel workbook thereby allowing online maintenance of the hostel receipt and payments log and better efficiency.

The User Manual

The application has three types of users based on the level of access:

1. Cleaning/Housekeeping staff
 - No user authentication is required as the user does not have access to any data.
 - Cleaning/Housekeeping staff can use the application to scan the QR code in each room to identify the room, go through the checklist to update the current status of the room and click a photograph of the room. Given the widespread use of mobile phones and the user friendly interface of the app, familiarisation and training of cleaning and housekeeping staff in use of the app would require minimal time and effort.

2. Caretaker
 - This user account can be accessed using a login ID and password and is intended to be primarily used by the hostel caretaker
 - The caretaker has the access to records generated by the cleaning/housekeeping activities.
 - The caretaker can use the application to perform functions such as room allocation to the guests/participants, add/view meal cancellation requests, add/view complaints submitted by the guests/participants, add new entries and view the receipts and payments register of the hostel mess.

3. Administration
 - This user account can be accessed using a login ID and password and is intended to be primarily used by the administration wing in the institute to monitor the functioning of the hostel.
 - The administration has the access to records generated by the cleaning/housekeeping activities and can alert the caretaker regarding the status of a room if it is found unsatisfactory.
 - In addition to all the privileges available to the caretaker, the administration can approve the room allotments made by the caretaker.

Steps for performing important functions of the application

1. Execution of Cleanliness/Housekeeping checklist

User Access level required: Cleaning/Housekeeping staff

Steps:

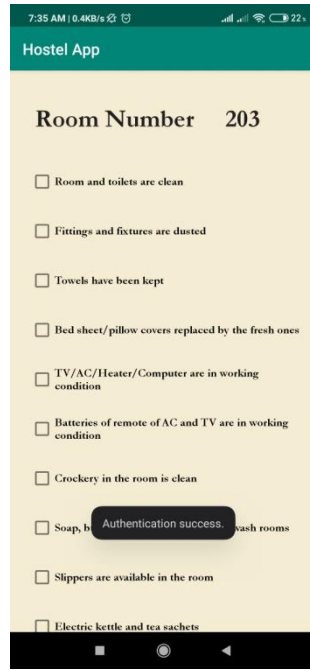
1. On the home screen of the application, select the first option, 'Cleaning Staff'.
2. Scan the unique QR code label in the room.
3. Tap the items in the checklist to mark them 'Done'.
4. Tap on 'Picture' to click a photograph of the room using the application. Wait for the photograph to be uploaded to the cloud.
5. Once the photograph is uploaded, tap on 'Submit' button to update the status of the checklist.



Step 1



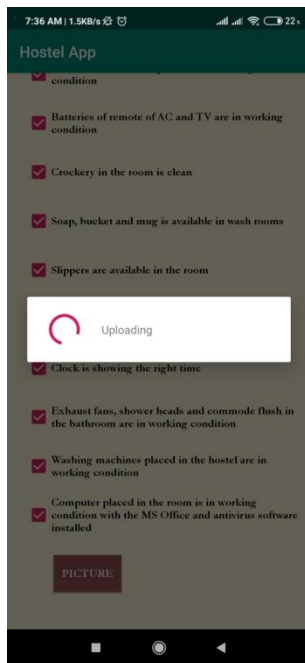
Step 2



Step 3



Step 4



Step 4 (Upload Photograph)



Step 5

2. Allocating rooms to the participants/guests

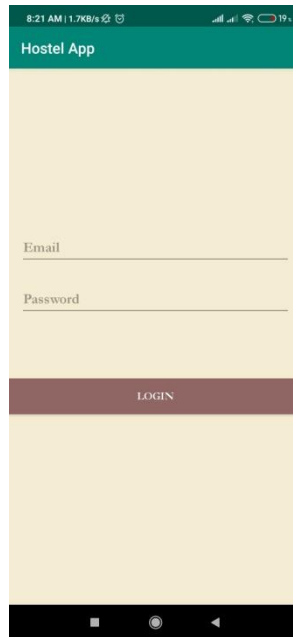
User Access level required: Caretaker/Administration

Steps:

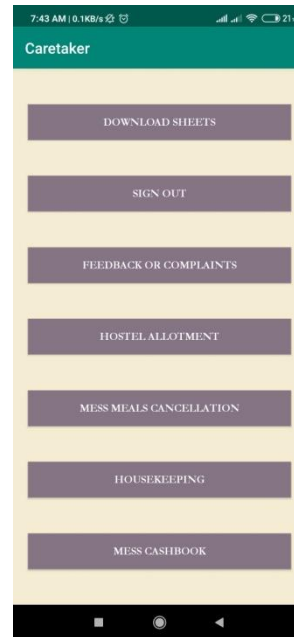
1. Login to the Caretaker's account by tapping on the 'Caretaker' option on the Homescreen.
2. Enter the user id and password for the Caretaker's account.
3. Select 'Hostel Allotment' option.
4. Tap on 'New' and enter the relevant details in the form that appears next.
5. After entering all the details in the form, tap on 'Submit' at the bottom of the page. Allotted room number would be displayed on the next screen.



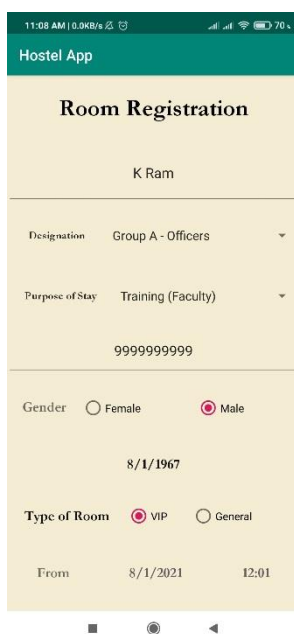
Step 1



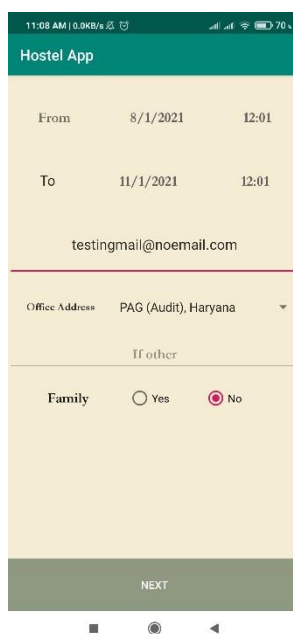
Step 2



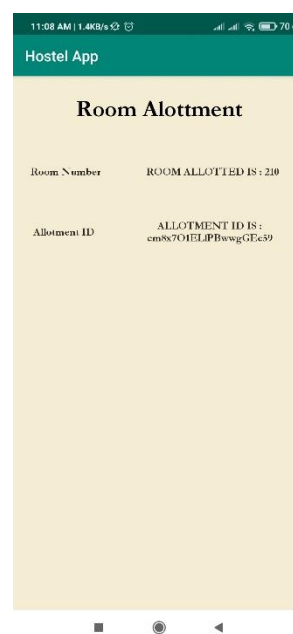
Step 3



Step 4



Step 5

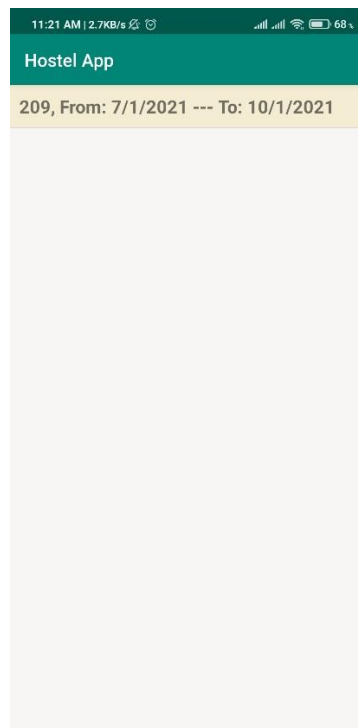


Room Allotted

Approval/Rejection of Room Allotments

Steps:

1. Login to the Administration account by tapping on the 'Administration' option on the Homescreen and entering the credentials.
2. Select the 'Hostel Allotment' option and then select 'All' option on the next screen.
3. All the room allotments that await approval/rejection shall appear on the screen. Select the allotment to be approved/rejected by tapping on it.
4. On the next screen, the room allotment can be approved or rejected by tapping on the 'Approve' or 'Reject' option respectively.



Step 3



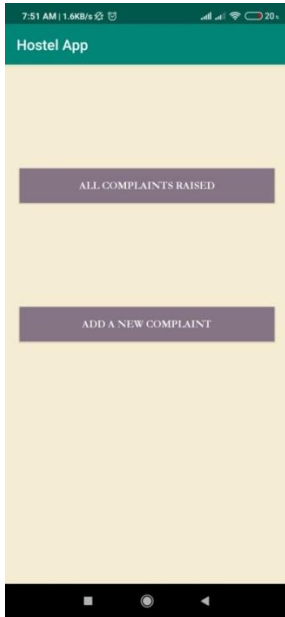
Step 4

3. Submitting a complaint

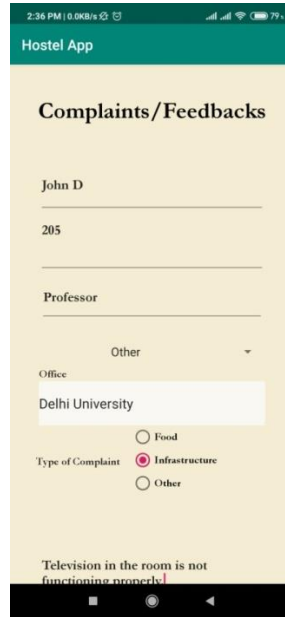
User Access level required: Caretaker/Administration

Steps:

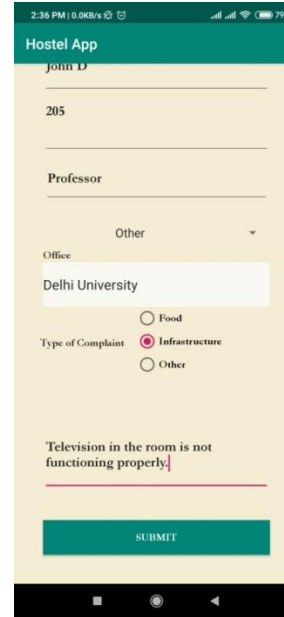
1. Login to the Caretaker's account by tapping on the 'Caretaker' option on the Homescreen and entering the credentials.
2. Select 'Feedback or Complaints' option.
3. Tap on 'Add a New Complaint'.
4. Enter the relevant details of the participant/guest and the details of the complaint/feedback and tap on Submit.



Step 3



Step 4



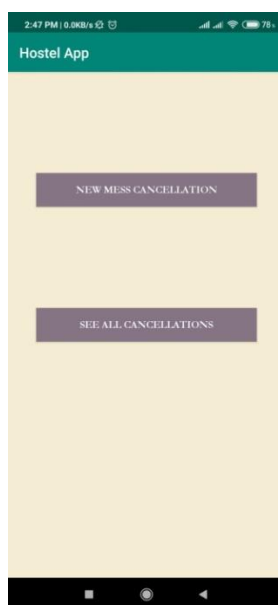
Step 4 (Complete)

4. Submitting a meal cancellation request

User Access level required: Caretaker/Administration

Steps:

1. Login to the Caretaker's account by tapping on the 'Caretaker' option on the Homescreen and entering the credentials.
2. Select 'Mess Meals Cancellation'.
3. Tap on 'New Mess Cancellation'.
4. Enter the relevant details such as Name and Room number of the participant. If the participant wants to request for cancellation of a single meal, then use the radio button to select 'One Meal' otherwise select 'Multiple meals'.
5. Click on submit and the cancellation request shall be recorded in the database.



Step 3



Step 4 & 5

5. Recording a transaction in Receipt and Expenditure

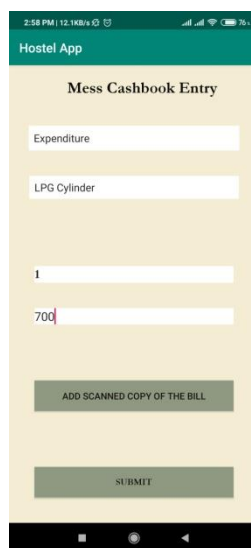
User Access level required: Caretaker/Administration

Steps:

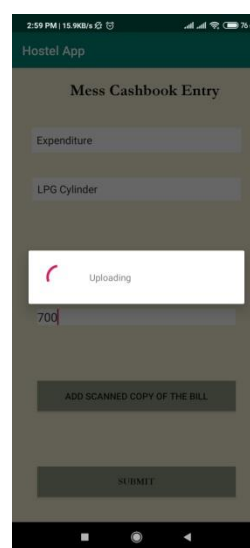
1. Login to the Caretaker's account by tapping on the 'Caretaker' option on the Homescreen and entering the credentials.
2. Select 'Mess Cashbook'.
3. Tap on 'Add Transactions'.
4. Select whether the transaction is an expenditure or a receipt . Further enter the relevant details such as quantity and amount.
5. Tap on 'Add Scanned Copy of The Bill' to select the scanned bill in PDF format.
6. After the uploading of the bill has finished, tap on Submit to record the transaction in the database.



Step 3



Step 4



Step 5 & 6

Note: The steps for performing the important functions have been explained in this User Manual which has been developed as a Quick Start Guide to make the users familiar with the User Interface of the application. The user should be able to access the features not covered in this manual after trying out the functionalities explained above.

Conclusion

This application has been developed keeping in mind the requirements of the Regional Training Institute, Jammu and it has been attempted to incorporate most of the functions of the hostel in the application. This application is based on the Cloud Firestore, therefore does not need regular maintenance. The source code of the application can be modified to suit the needs of the other similar institutes in the department.