University Information with LMS Facilities for Pupils and Lecturers in a PinBoard Android Mobile Application

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Abstract
The Learning Management System (LMS) has been already facilitating the pupils and lecturer in the world widely without a physical classroom. It is used to take lecture notes and many other course-related information from the online portal. Since LMS has been available in web-based software but now also available in an android mobile application with enhancing features of university details. The popularity of LMS in global universities shows a positive factor in previous studies. Therefore, this paper will provide, a different view of LMS and university information in an android mobile application. Drift analysis is used for complexity analysis.

Key words:
LMS, android mobile application and university information.

1. Introduction

Management system (MS) has been proposed the objectives, goals, features, and policies to manage the requirement of the organization which worked on four steps: Planning, implementation, check and act. It has been shown the connection between people and machines. Nowadays organizations used various management systems to fulfill their requirements. Mostly, these management systems are utilized by industries, banks, hospitals, restaurants and in the educational field also. Its helps in, to manage the working and flow of task of the system.

Learning Management System which is also known as LMS is one of the most popular management systems used in the educational field. LMS is an online platform to study higher education to connect pupils and lecturers without a typical classroom [1]. Learning management systems (LMS) have to turn into the main terrace for the consignment of knowledge in many course-related activities like content, presentations, quizzes, assignments for the certain learning demands of others [2]. It's a way of sharing knowledge with pupils. In the beginning, LMS was constructed for distance learning, but presently many universities and institutes use them as accompaniment to physical classes. Many universities, organizations and institutes have integrated these systems to boost pupil learning [3]. In higher education, LMS approval is a universal aspect with pupil contentment and a high estimate of usage. [4]. There are many components that allow the LMS for educational objectives [5], [6]. Time and space provide resilience in these systems that guide in the reliability of resources and the interaction between pupil and lecturer[7], [8]. Lecturer shared their lectures, notes, practical work, tasks on LMS so that pupils take from it, to increase their knowledge and then discuss in a classroom. As well stated, that time is money so pupil and lecturer time is saved with the use of LMS.

Time Complexity plays a vital role in the evaluation of the effect relation. There are different complexity analysis systems like drift analysis, negative analysis, and population-based analysis [10,11,12]. In this article, drift analysis is used for complexity analysis.

1.1 Problem

The problem which is faced by pupils using LMS is that mostly LMS gives the facility of web-based portal because of large memory consume files i.e. .ppt files, pdf, .doc. This file needs a laptop or a personal computer with the compatibility to view and download. But not every pupil can afford such a system. Also, for seeing university information the pupils must go to the university to view notice board as some private announcements cannot be shown on the website as it's for registered students only.

1.2 Objective

The objective of this paper, to resolve the above discuss issue a pinboard mobile application with more features is a better one solution. As mobile is more portable than a system. Some applications are supported by the system as well as mobile too. And mostly pupils prefer to mobile phones as compare to systems. The purposed solution

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provides the facility of LMS and university information which helps a pupil in studies, facilitates the lecturers and beneficial for the university. Pupils can take their lecture notes by selecting program and courses, view their schedule, exam details and result. Lecturers can facilitate by upload their own schedules and provide run time updates of taking lectures in class or not. Which saves time for pupils as well as of lecturer. University information including their event details, event images, lecturer details (schedules), and run time update news feed which is always available for the registered pupils and saves this inner data from the unauthorized pupils as privacy matters.

Today, in the world of technology, architecture matters, and efficient solution is relay on how much memory is used in what time. The purposed quick fix has several impacts but major are discussed in terms of time and memory. As response time of an application constituents with how much memory is consumed.

1.3 Module for Designing PinBoard

Every mobile application which design for the university is must be for the students or teachers. The modules which are described in this paper are:

1. Student: The students can view their timetable and their teacher timetable too. Also, they can see university information (gallery, newsfeed, events, exams, results, and lecture notes).
2. Teacher: In module teacher, the lecturer can view and update their timetable and newsfeed and can also see university information like students.
3. Administration: Admin module is an important module because it has the authority to insert or delete the account of students and teachers. Also, all the features are handled by the administration.

1.4 Analysis of Android Architecture

Fig. 1 shows the architecture of android consist of application framework, libraries, android runtime and Linux kernel (Operation system). The Application Program Interface (API) and Android Software Development Kit (SDK) are also used with java programming language. [9]

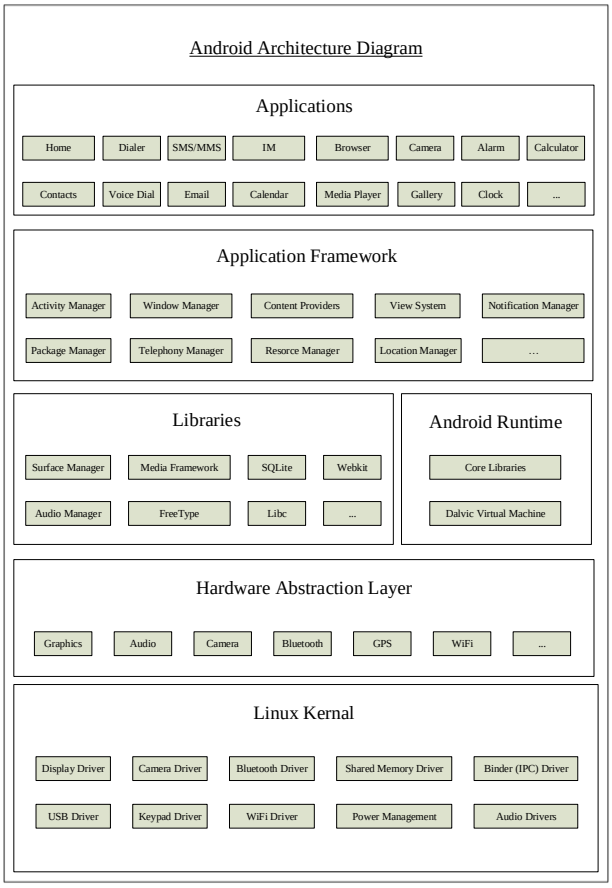

Fig. 1 Android Architecture

1.5 Research Methodology

Extreme programming (XP) was adopted for the paper study. The extreme programming framework is known for Agile Software Development. Basically, frequently iteration can occur in extreme programming so that updates in any module can never disturb the whole application. Extreme programming contains some steps and phases. Four Common phases of extreme programming are:

1. Planning
2. Designing
3. Coding
4. Testing

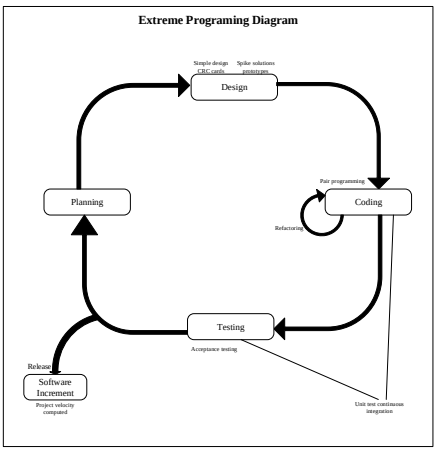

Fig. 2 Extreme Programming (XP)

1.6 Portrayal of Existence system

In existence system student take their lecture notice from their teacher in a USB or some time teacher take email of student to share a drive with them which contain all the content, lectures, learning material. But sometimes not all the students get the notes because of absent in lecture or may have no systems. Some universities give the facility of LMS. For this, they provide ID and Password to their students so by using the credentials they logged in and download the lecture files which their teachers uploaded on the website. Also, to access university information or view university important notices. Pupil must view their website for offering the program, fee structure, conferences, etc.

1.7 Problem of Existence System

Currently, LMS is mostly on the web-based portal. And student needs to download their lecture notes through these portals by using laptops and desktop system because of their fast and reliable compatibility with the systems as compared to phone. But the problem is that not every student cannot bear such a type of system. And for viewing university details some information cannot be display on websites like scholarship lists, teacher replacing, educational trip, etc. Such a type of information is only for registered students.

1.8 Proposed System

The proposed solution stems from the error of the current system. The PinBoard mobile application is useful for students and teachers. To use this application, students and teachers are registered by admin first. User ID and password are provided by admin for login. After login for the first time, the user must change his/her password. Through their account student can access the university info, course details, teacher availability (teacher's schedule), and exam details. And teachers can upload their notes, course outline, and availability days (schedule) at university. All the university details and LMS features can be used and seen on mobile phones with compatibility.

2. System model

The Data offering models of PinBoard mobile application are as follow:

2.1 Data Flow Diagram (DFD)

Data flow diagrams show the flow of data in a graphical form. DFD contains the entities and their flow in the diagram. According to figure 3, the DFD of PinBoard Mobile Application consists of three entity modules of student, teacher, and admin. The working flow of this entity to access the pinboard mobile application is shown below:

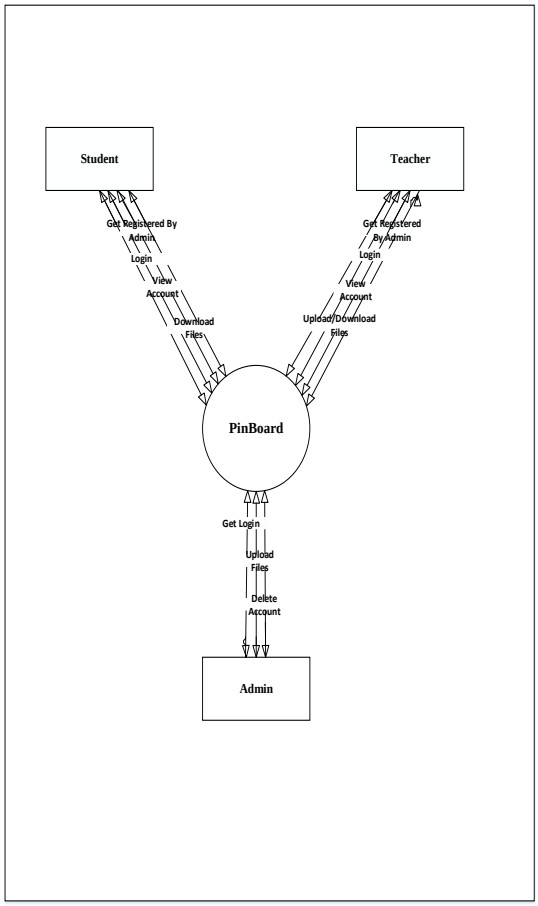

Fig. 3 Data Flow Diagram

2.2 Unified Modeling Language (UML)

A category of rigid diagram that defines model structure by showing the model's classes, attributes, methods, and relationships between the classes. [9]. According to figure 4 the class diagram of pinboard mobile Application contain eight classes which include sign in, sign up, admin main activity, student main activity, teacher main activity, admin settings, deactivate user is below:

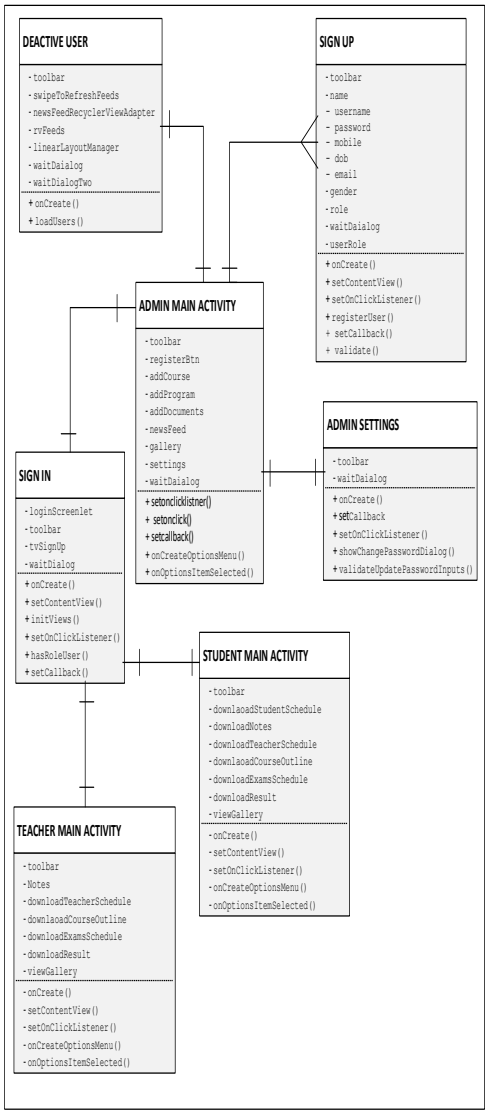

Fig. 4 Class Diagram

2.3 Use Case Diagram

Use case diagram is a manifestation of showing the stipulation of a use case and the user's interaction with the model. Use case certain uncomplicated, makes us define the progression of the act that brings together to see a useful working of a system. [9]. According to figure 5, the use case diagram of the pinboard mobile application includes three user student, teacher and admin, and their access is shown below:

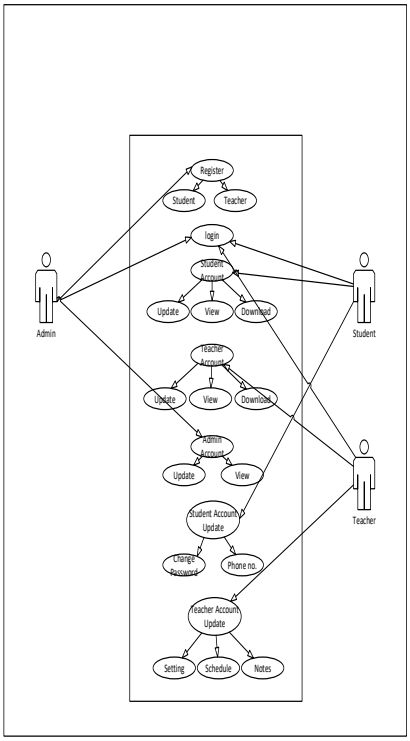

Fig. 5 Use Case Diagram

3. Time Complexity of features

The time complexity is an important component of any application. There are many features which are provided by pinboard application for the benefit of students and teachers. In this paper, we discuss the time complexity of some features which may include teacher schedule, course outline, exam schedule, result, course notes, view gallery, and student schedules. The time complexity of uploaded and downloaded course outline feature is:

$$T_1(j) = [\sum_{i=0}^{j}(1) + \sum_{i=0}^{j}(1) + \sum_{i=0}^{j}(1)] + [\sum_{i=0}^{j}(1) + \sum_{i=0}^{j}(1) + \sum_{i=0}^{j}(1)]$$

$$T_1(j) = [(j+1) + (j+1) + (j+1)] + [(j+1) + (j+1) + (j+1)]$$

$$T_1(j) = 6j+6 \quad \textbf{(1)}$$

The time complexity of download notes is:

T_2 (j) = $\sum_{i=0}^{j}$ [$\sum_{i=0}^{j}(1)$] + $\sum_{i=0}^{j}(1)$ + $\sum_{i=0}^{j}(1)$ + $\sum_{i=0}^{j}(1)$

T_2 (j) = $\sum_{i=0}^{j}(j+1)$ + (j+1) + (j+1) + (j+1)

T_2 (j) = $\sum_{i=0}^{j}(j)$ + $\sum_{i=0}^{j}(1)$ + $3j+3$

T_2 (j) = (j(j+1))/2 +(j+1) +3j+3

T_2 (j) = (j^2+9j+8)/2 **(2)**

The time complexity of upload and download teacher schedule and student schedule is:

T_3 (j) = [$\sum_{i=0}^{j}(1)$ + $\sum_{i=0}^{j}(1)$] + [$\sum_{i=0}^{j}(1)$ + $\sum_{i=0}^{j}(1)$ + $\sum_{i=0}^{j}(1)$ + $\sum_{i=0}^{j}(1)$]

T_3 (j) = [(j+1) + (j+1)] + [(j+1) + (j+1) + (j+1) + (j+1)]

T_3 (j) =6j+6 **(3)**

The time complexity of view gallery and upload notes feature is:

T_4 (j) = [$\sum_{i=0}^{j}(1)$] + [$\sum_{i=0}^{j}(1)$ + $\sum_{i=0}^{j}(1)$ + $\sum_{i=0}^{j}(1)$]

T_4 (j) = [(j+1)] + [(j+1) + (j+1) + (j+1)]

T_4 (j) = 4j+4 **(4)**

The time complexity of upload and download exam schedule is:

T_5 (j) = [$\sum_{i=0}^{j}(1)$ + $\sum_{i=0}^{j}(1)$ + $\sum_{i=0}^{j}(1)$] + [$\sum_{i=0}^{j}(1)$ + $\sum_{i=0}^{j}(1)$ + $\sum_{i=0}^{j}(1)$]

T_5 (j) = [(j+1) + (j+1) + (j+1)] + [(j+1) + (j+1) + (j+1)]

T_5 (j) =6j+6 **(5)**

The time complexity of upload and download result,

T_6 (j) = [$\sum_{i=0}^{j}(1)$ + $\sum_{i=0}^{j}(1)$ + $\sum_{i=0}^{j}(1)$] + [$\sum_{i=0}^{j}(1)$ + $\sum_{i=0}^{j}(1)$ + $\sum_{i=0}^{j}(1)$]

T_6 (j) = [(j+1) + (j+1) + (j+1)] + [(j+1) + (j+1) + (j+1)]

T_6 (j) =6j+6 **(6)**

From equation 1,2,3,4,5, and 6 the overall Complexity of the pinboard android mobile application is:

T(j) = (j^2+65j+64)/2 **(7)**

4. Simulations of PinBoard Mobile Application

The simulation of the pinboard android mobile application is derived from time complexity from above equation 7.

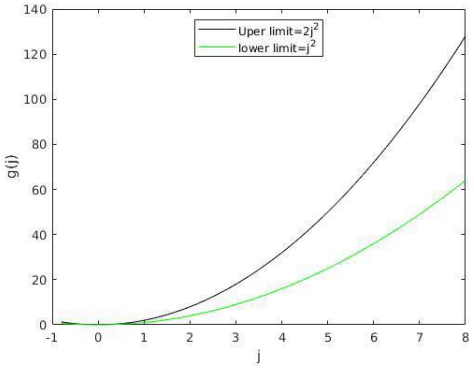

Fig. 6 Time Complexity of features in term of uploading and download

According to figure.6, the graph shows the upper and the lower bound of equation 7 along with the x-axis and y-axis. All the simulations of graphs done on MATLAB software. For lower bound, g1(j) = j2 where j0= -0.8 and c1=1. Also, for upper bound, g2(j) = 2j2 where j0=8 and c2=2.

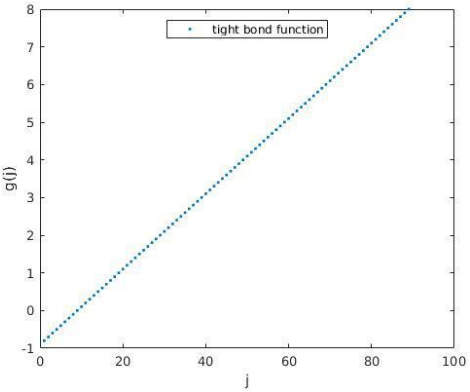

Fig. 7 Time complexity in terms of tightly bound of the pinboard android mobile application

According to figure.7, the tight bound of pinboard android mobile application is:

$$T(j)= (j^2+65j+64)/2$$

The above equation is exact in time complexity, in terms of tightly bound of the pinboard mobile application. And the upper and lower bound exist in the above and below of this tight bound. Figures. 6 and 7 show all the complexity of the application including features of uploading and downloading course outline, notes, schedules of both student and teacher, exams, result, gallery and the module of admin, student, and teacher.

5. Description of PinBoard Application

The pinboard application contains:

i. **User Sign**: Students and teachers sign in with the ID and password.
ii. **Upload Notes**: Teachers can share their lecture notes. And student can download it.
iii. **Event updates**: Students and teachers can check event updates that are organized in the university like international conferences, orientation, seminars, expo, etc.
iv. **Exams details**: Students and teachers can also see exam details through the pinboard application which consists of date sheets, paper cancel, and reappear in exams, etc.
v. **Download Course outline**: Admin can upload or change their course outline only. Teachers and students can easily see and download it.

6. System Requirement

The system main working on mobile phones. Other different functionality of the recommended system from user end are hardware and software requirements [9].

6.1 Hardware Requirement

Hardware works with software in the running of the application. Hardware requirements contain:

- Device Type Android Base Device
- Processor 1.4 GHz Dual Core
- RAM 1.00 GB
- ROM 4.00 GB

6.2 Software Requirement

Software is a set of instructions that perform a specific task to solve a problem. The only software requirement is an Operating System (OS) Android Jelly Bean (4.1) version and above.

7. Description of a UI Design

User Interface (UI) is one of the important factors of application. It depends upon the view and user interactivity. The UI design of pinboard are:

7.1 Sign In/Login

Login fig.8 shows the ID and Password and the pupil must enter the correct credentials. Also, the screen has created an account option for the beginner register.

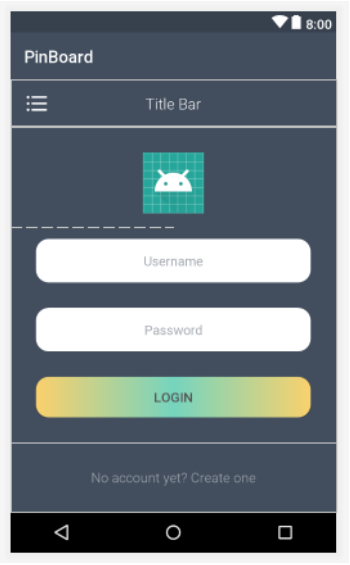

Fig. 8 Sign in

7.2 Signup

The signup screen is for the beginner user and it needs all the details of the user which include name, user name, mobile number, gender and email for registration of the user's account.

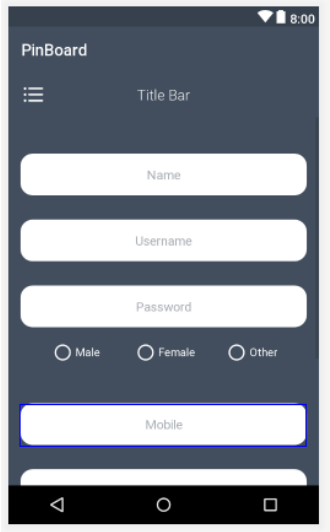

Fig. 9 Sign Up

7.3 Admin Main Activity

Admin Main activity is for administration users. The screen consists of the information of register users (Student and Teacher), add a course, add programs, add documents, news feed alerts, and gallery options. Admin has the authority to deactivate the user's account.

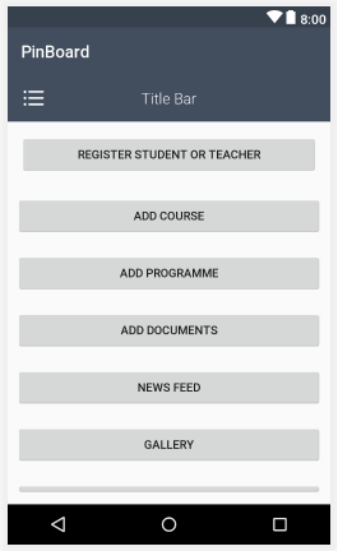

Fig. 10 Admin Main Activity

7.4 Teacher Main Activity

The teacher main activity encloses to upload notes of related courses, download and update teacher schedules, download course outline, exams schedule, result and view gallery option.

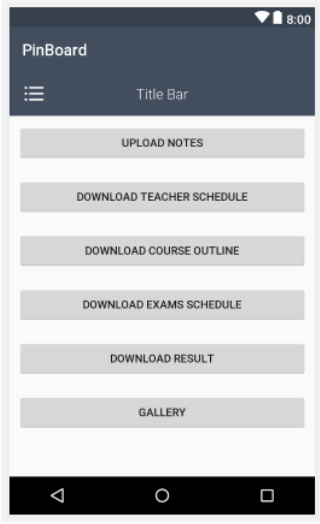

Fig. 11 Teacher Main Activity

7.5 Student Main Activity

The student main activity involves in download the student schedule of their respective class, download and view their teacher schedule, course outline, course-related notes, exam details, result and view gallery option.

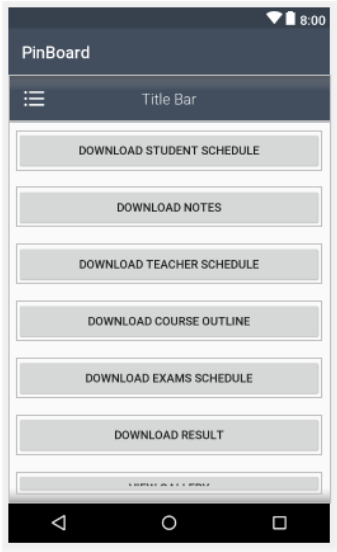

Fig. 12 Student Main Activity

8. Conclusion

The purpose of this paper is to work on the solution to the current problem. The problem is faced by pupils using LMS when they unable to use the laptop or desktop systems. From now, the working of LMS is available on pinboard android mobile applications. Also, the pinboard

mobile application helps in to view university information. And only registered students of the university can access this application. The developing tool used in making pinboard application contain android studio, eclipse and the Liferay portal (server) that is used in the connectivity of the files with interfaces and server for storage purpose.

9. Future Work

The project can be redesign in the flutter platform so that it may be able to support as IOS application, desktop application, and web application too.
The feedback feature can be introducing in the future to check the review of the teacher from pupils. Also, video lecture facilities can also be provided in the future.

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