

An Android-Based Ubiquitous Notification Application for Bukidnon State University

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ABSTRACT

Events are the most important bits of information that should be delivered timely wherever the person is. It is but equally important that a person must have the ability to keep abreast with the recent trends of technology in order to be notified of the important events that need to be addressed or responded immediately. Sometimes, notification of events is given in a short period of time, which sometimes leads to failure in attending or responding such events. In today's generation, smartphones are always and almost available to every individual, with which one of its most important features is notification. It is under this premise that prompted the researchers to develop an Android-based ubiquitous notification app for Bukidnon State University (BukSU) to speed up the dissemination of information about the upcoming events and activities of the university. The University Administrators will act as an admin in order to input and update the list of activities or events for the entire academic

year which is either planned, unplanned, routine or emergency in nature. The faculty, staff, students and other stakeholders will act as a user and will be notified of the academic activities. A Waterfall Model was used in the design process and Android studio in the development of the application. As a result, the system was tested in terms of its functionality, applicability, relevance, and usability. The overall result has a mean of

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4.736 which indicates that the respondents are very satisfied with the mobile application. A ubiquitous notification app is currently being utilized by the Bukidnon State University Administrators in order to notify the students, faculty, staff, and alumni in notifying them of the event before it takes place.

Keywords: Android app for notification, Bukidnon State University Notification App, BukSU Notification App, information system, mobile apps, notification app, notification system, Ubiquitous Notification App

INTRODUCTION

A notification is something that gives official information to someone through mobile phones. According to El-Gazzar et al. (2010), events are the most important bits of information that should be delivered timely wherever the user is. Information and communications technology can help people stay updated with events in the world by Vastenburg et al. (2009). As it is mentioned by Shirazi et al. (2014), notifications are a core feature of mobile phones because they inform users about a variety of events. Osunade et al. (2014) also stated that people were involved in many activities that were planned, unplanned, routine and emergency in nature.

According to the study of DeVoe (2008), in his article about the “Evolution of Notification Systems”, most of the American generally favored the phone and e-mail notification system. Even with the benefits gained from choosing the latest and popular technologies, people remain comfortable with radio and TV broadcasts for sending information or announcement from schools. The study shows that only 39% of these respondents say that their school is “very strong” or “good” in transmitting emergency information. Thus, the researchers felt the need to introduce mobile-based notification system as the latest and more popular tool for reaching out to the stakeholders.

Gulum and Murray (2009) conducted a study on the evaluation of the effectiveness of a mass emergency notification system. These systems being studied were used to deliver information about critical events. The survey results showed that even though students recognized a mass emergency notification system, their belief and lack of mindfulness in the systems might be the reasons behind the very small confirmation rates. Thus, the researchers introduced a new technology where students could enjoy the benefits of using their mobile phones and be notified easily with the latest updates of their school. Emphasizing the importance of the notification system for Bukidnon State University, the researchers joined the school during University-wide student and stakeholder’s forum and orientation to introduce the newest app.

A study was conducted by Voos et al. (2013) on the notification system for the medical event using SMS over the cellular network. The study aimed to determine the implementation of the mobile-based technology which guarantees to reach all recipients even in remote locations. Though SMS services are promising due to the massive adoption of phones, the researchers realized the financial implication it requires when engaging with

the Telecommunications Company for the mass sending of information. The proposed system has the advantage of low-cost development and implementation since the mobile application can be downloaded for free.

In 2013, Campus Announcement Platform- Email and Voice Alert, developed an ideal campus alert system for colleges and universities that needed to communicate quickly and effectively to all personnel, volunteers, students, media, first responders, media and others. This study gives the researchers an overview of the different techniques used by authors in developing mobile applications specifically for notification applications. It also shows factors to consider when to develop mobile applications.

Moreover, the researchers intended to develop a new platform for the school using the Desktop and Mobile Application Alert System as an effective tool for information dissemination. Figure 1 illustrates the conceptual framework of Ubiquitous Notification App of Bukidnon State University. The university administrator inputs the list of activities or events for the entire school year using the application. The administrator is the only person who is authorized to make updates whenever there are changes in the calendar. These inputted lists of activities are then be processed through Android-based ubiquitous notification app.

This study generally aims to develop an Android-based ubiquitous notification app for Bukidnon State University. Specifically, it aims to:

1. Design an Android-based ubiquitous notification app that can speed up the dissemination of information about upcoming events and activities of the university.

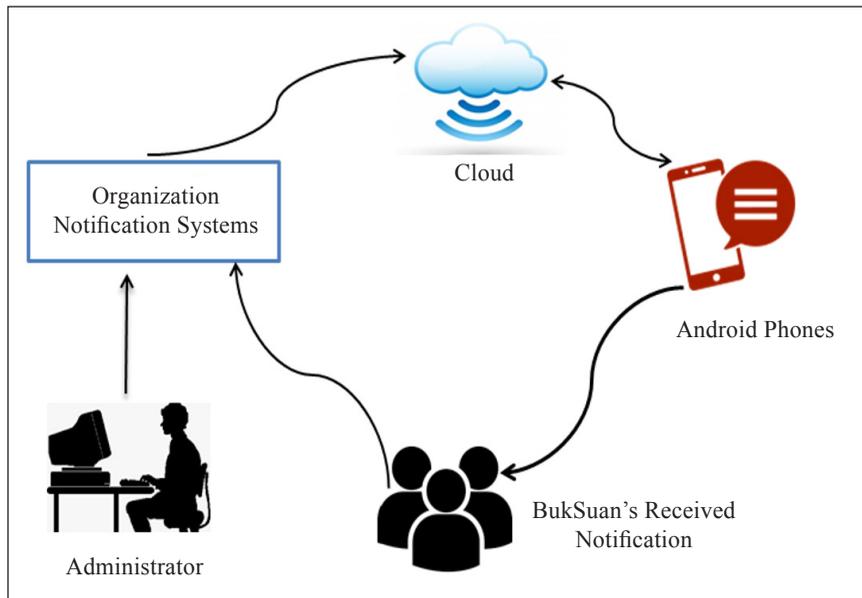


Figure 1. Conceptual framework of Ubiquitous Notification App

2. Develop a user-friendly and secured Android-based ubiquitous notification app
3. Implement a downloadable android-based ubiquitous notification app mobile application which will be accessible by users through Google Play.
4. Evaluate the Android-based ubiquitous notification app in terms of its functionality and usability.

The Ubiquitous Notification App will be a great help to assist the BukSUan's (name assigned to students and other stakeholders of BukSU) to be notified of the different events and activities of the university. Through the Ubiquitous Notification App, they will no longer go to the nearest bulletin boards or ask anybody with regard to information that they need to know.

METHODS

The researchers used the Waterfall Model (see Figure 2) and Android studio in the development of an Android-based ubiquitous notification app. The study began with a data gathering. Survey questions were given to students and instructors to identify the common problems encountered in the course of disseminating information. Results of such survey were used as a guide in developing a more effective requirements' specification for the application. After specifying the requirements, the researchers made use of the Android studio in application development.

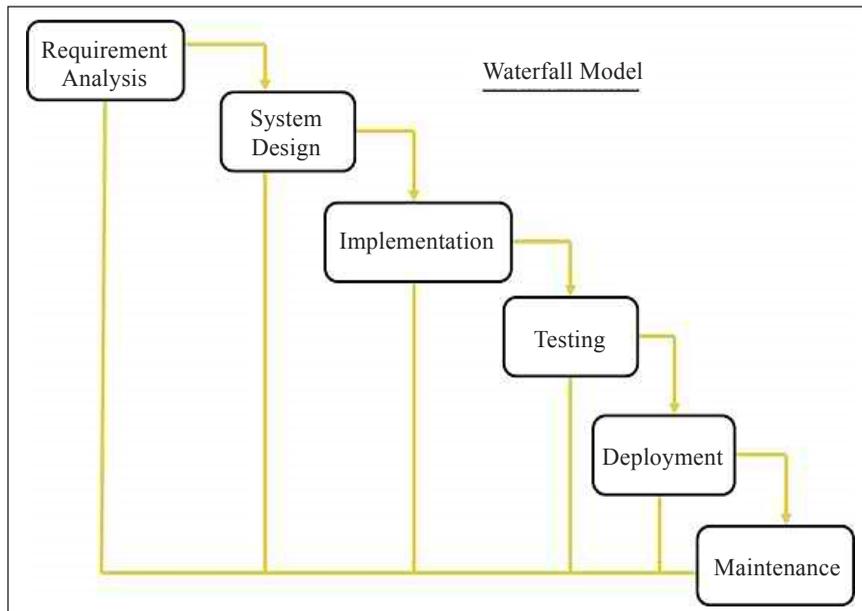


Figure 2. Waterfall model

Research Design

Logical Design. Figure 3 shows the Entity Relationship diagram of the system which consists of 11 tables namely: accounts, profiles, job status, colleges, venues, year levels, departments, attendee, category, announcements, and events. The profiles have five connected foreign keys, and table events have eight connected foreign keys. The use of those foreign keys is to have a cascade update and restricted deletion of the data. Use of the foreign keys can secure the data when there is an unofficial adding and updating of the database.

Figure 4 shows the Use-Case model applied to the ubiquitous notification system showing different sections and its corresponding events.

Figure 5 shows the actual flowchart of the ubiquitous notification system for users in the Bukidnon State University.

Figure 6 illustrates the organized summary of all model elements of the project. This shows the relationship between diagrams, how they are related and how each depends on with regard to what they are representing in the overall functionality of the application. The Client Side Mobile Application depends on the Server Side Application because the client side receives notifications coming from the server side. Model elements coming from the Server Side Application are required and are considered dependent on the Client Side Mobile Application. The Server-Side Application is also dependent on the Server Side Model which describes the model being applied to the Server Side Application's functionality. All other packages are dependent on the Database Model, which is the basis of the organization and collection of data which is represented by events.

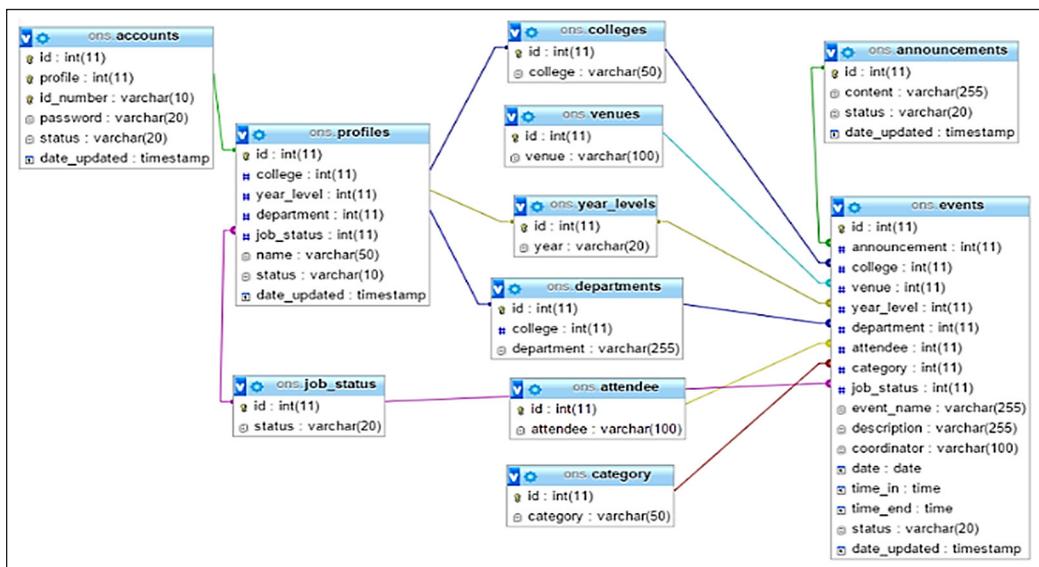


Figure 3. Entity Relationship diagram

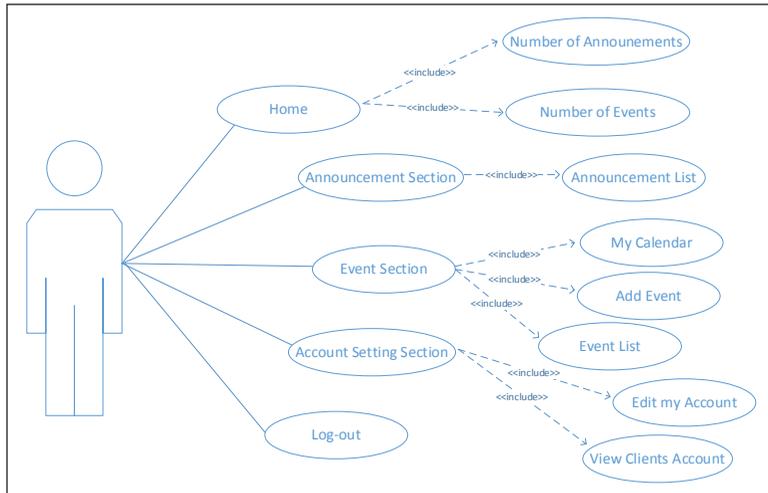


Figure 4. Use-Case model

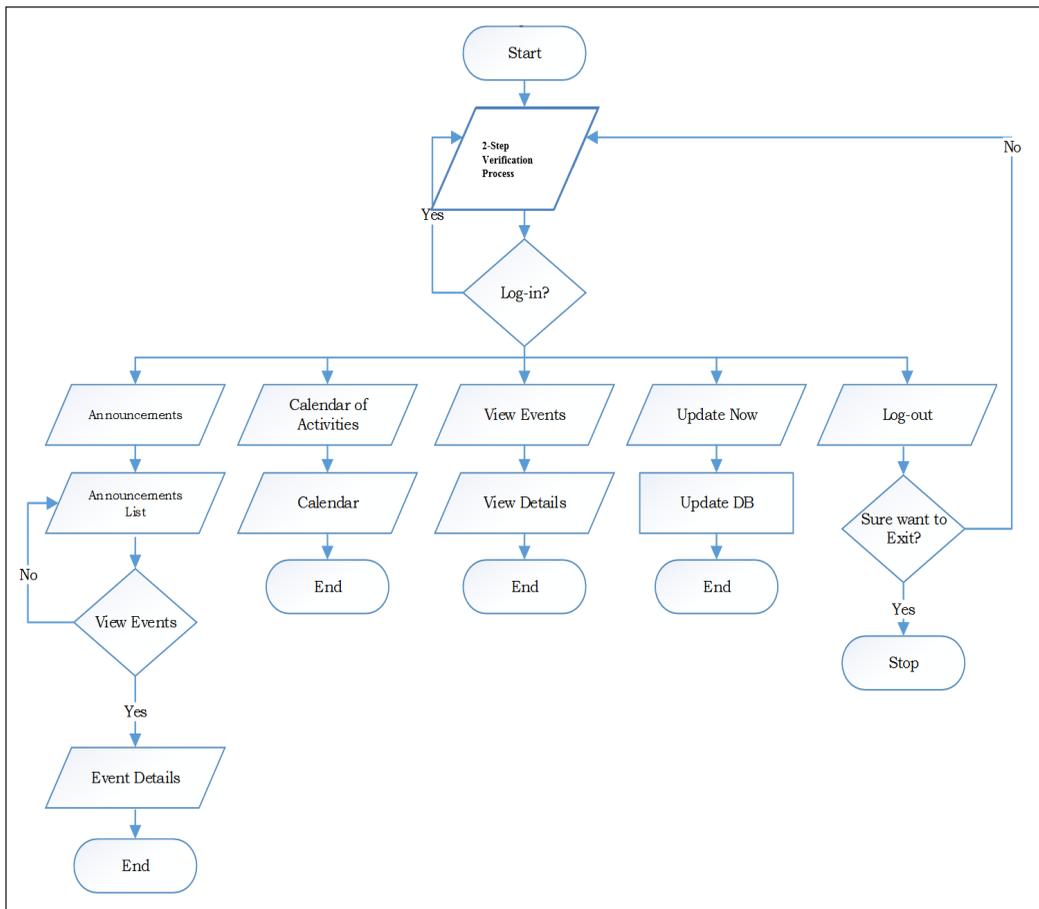


Figure 5. Flowchart for Ubiquitous Notification Application for user

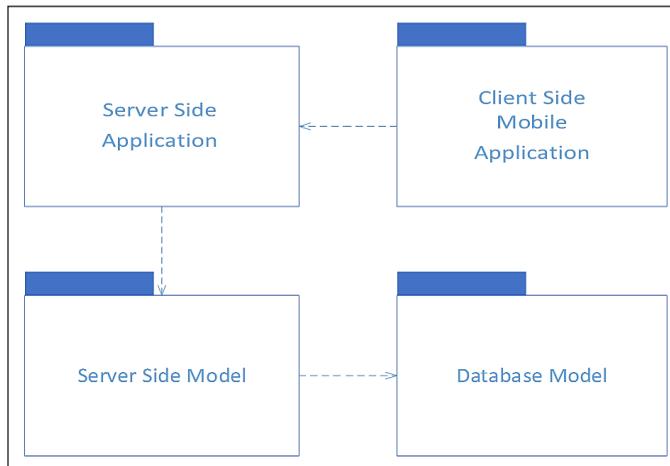


Figure 6. Component/Package diagram

Development Tools

The system uses Java and Android SDK as software development tool in developing a mobile-based application program under Android Studio Platform. On the web development aspect, PHP and JavaScript were used for adding creativity to Web sites and asynchronous to Web applications. MySQL and SQLite are used as an open source SQL database to store files on a device. These tools were used in order to come up with a Notification System for Bukidnon State University in all of its academic and non-academic undertakings, planned or unplanned. The researchers deployed the system to the user of the application with admin functionality which is the Vice President for Administration, Planning, Development (VPAPD) and the Vice President for Academic Affairs (VPAA) of Bukidnon State University.

RESULTS AND DISCUSSION

Table 1 shows the number of samples who participated in the evaluation of the application. There are forty (40) BukSUan's or users who evaluated the Android-based Ubiquitous Notification App during the Stakeholder's Forum. Using random sampling method, 5 participated from each college: College of Arts and Sciences (CAS), College of Education (COE), College of Business (COB), College of Social Development and Technology (CSDT), College of Nursing (CON) and College of Law (COL). A total of 30 students joined during beta testing. Other evaluators include 5 teaching personnel and 5 non-teaching personnel of the University. The number of samples was determined during the said activity organized by the Office of the Vice President of the Administration, Planning, and Development (VPAPD) where the group introduced and demonstrated the mobile application intended for Bukidnon State University. The application is evaluated in terms

of its usability, functionality, applicability, and relevance. The system assessment is as follows: 5- very satisfied, 4-somewhat satisfied, 3-neutral, 2-somewhat dissatisfied and 1-very dissatisfied. Summary of the evaluation is shown in Table 1.

Table 1
Number of samples

Unit/College	Number of Evaluators
College of Arts and Sciences (CAS) Students	5
College of Education (COE) Students	5
College of Business (COB) Students	5
College of Social Development and Technology (CSDT) Students	5
College of Nursing (CON) Students	5
College of Law (COL) Students	5
Teaching Personnel	5
Non-Teaching Personnel	5
TOTAL	40

Table 2 shows the summary of system evaluation. The overall result has a mean of 4.736 which indicates that the respondents are very satisfied with the Android-based ubiquitous notification app. The usability which covers the user interface and security has a mean of 4.6875 and 4.73125 which indicates that the respondents are very satisfied. In terms of functionality, it has a mean of 4.69 which also indicates that the respondents are also very satisfied. With regard to the applicability, it has a mean of 4.825 which indicates that the respondents are again very satisfied application. The overall relevance has a mean of 4.768 that indicates that the respondents which are the users are very satisfied.

The data presented shows that 95% of the students from different colleges noted that the Android-based ubiquitous notification app was very applicable and easy to use. 90% of the students were notified based on the survey. However, 40% of students said that the application loaded quickly and does not crash. The result of the survey shows that 17 or 85% of 20 students surveyed received notifications on time. The survey conducted helped the researchers in the modification of the application of the better performance of the system.

Currently, the system is being maintained by the Information and Communications Technology-Service Unit (ICT-SU) of the Bukidnon State University thru the Office of the Data Center. Regular preventive, corrective and adaptive maintenance activities are being conducted to make sure that the system is fully operational. At present, the use of a private network with a dedicated connection to the web which works only for the app is being highly considered and will be integrated into the Strategic Planning of the said office in order to serve better the students and other stakeholders.

Table 2
Summary of evaluation

		5	4	3	2	1	Weighed Mean	Interpretation
Usability								
User Interface								
1.	The design of the application is functional and visually stimulating	30	10	0	0	0	4.75	<i>Very Satisfied</i>
2.	The content of the application meets customers needs	27	12	1	0	0	4.65	<i>Very Satisfied</i>
3.	The application delivers messages or warnings to the users whenever there are confirmation or permission to perform	31	9	0	0	0	4.775	<i>Very Satisfied</i>
4.	The application provides useful feedback	29	10	1	0	0	4.7	<i>Very Satisfied</i>
5.	Readability of fonts and texts on the screen	29	9	2	0	0	4.675	<i>Very Satisfied</i>
6.	Overall Colour-Scheming	24	15	1	0	0	4.575	
Security								
1.	Password Encryption	29	18	0	0	0	4.725	<i>Very Satisfied</i>
2.	Safety of user accounts and information	30	10	0	0	0	4.75	<i>Very Satisfied</i>
3.	Availability of log information and history	29	10	1	0	0	4.7	<i>Very Satisfied</i>
4.	Access control to all account	30	10	0	0	0	4.75	<i>Very Satisfied</i>
Functionality								
1.	Availability to provide updated and accurate information	36	3	1	0	0	4.875	<i>Very Satisfied</i>
2.	Application loads quickly and does not crash	18	22	0	0	0	4.45	<i>Satisfied</i>
3.	Visibility of all features of the application.	29	11	0	0	0	4.725	<i>Very Satisfied</i>
4.	Users can exit the application at any time	29	11	0	0	0	4.725	<i>Very Satisfied</i>
5.	Dynamic viewing of school activities	30	10	0	0	0	4.75	<i>Very Satisfied</i>
6.	Available on the internet or Wireless LAN	25	15	0	0	0	4.625	<i>Very Satisfied</i>
Applicability								
1.	Actual response time of the application	36	4	0	0	0	4.9	<i>Very Satisfied</i>
2.	The application is very easy to learn and the instructions are clear and simple to follow.	34	5	1	0	0	4.825	<i>Very Satisfied</i>
3.	The application notifies on time.	29	11	0	0	0	4.725	<i>Very Satisfied</i>
4.	The instructions included are helpful	35	5	0	0	0	4.875	<i>Very Satisfied</i>
5.	Responsiveness of the interface relative to the device being used	32	8	0	0	0	4.8	<i>Very Satisfied</i>
Relevance								
1.	Significance of the system in general	32	8	0	0	0	4.8	<i>Very Satisfied</i>
2.	Significance of the study	29	10	1	0	0	4.7	<i>Very Satisfied</i>
3.	Ability of students to get notifications	33	7	0	0	0	4.825	<i>Very Satisfied</i>
4.	Sustainability of the user's notification application	30	10	0	0	0	4.75	<i>Very Satisfied</i>

On the other hand, features such as rates or comments will be integrated into the application program in order to solicit feedback from the end users as the basis for improvement. Table 3 shows the summary of comments and suggestions given by the students during software evaluation. Thirteen of the respondents said that the notification system at Bukidnon State University provided them real-time alerts. Four also agreed that the app was very useful especially for sending information which was critical or emergency in nature. Two respondents also commended the University and the developer for coming up with an alternative solution to inform the students and various stakeholders using the latest technology.

Table 3
Summary of comments and suggestions

Comments/Suggestions	Number of Times Mentioned
This notification system solution of Bukidnon State University is useful for sending information which are emergency in nature	4
Please provide prompt notification for unread announcements/events upon log-in	2
Separate read and unread notifications	2
It does alert me real-time	13
No specific office that provides the announcement	1
Kudos to BukSU for introducing latest technology	2

Meanwhile, there are two respondents who suggested having better notification scheme to prompt the user for any unread notifications upon log into the system, as well as, a separate tab for a read and unread notifications. Moreover, one respondent mentioned about lacking information of the specific office/unit which announced the event or activity.

Figure 7 shows the process of administrator's logging into the system. The system will navigate the administrator to the login page wherein the system will ask for the administrator's username and password. After filling up the username and password, the administrator should click the login button. If the login is successful, the system will redirect the administrator to the home/main page.

Figure 8 shows the home page of the system wherein the administration can view the two important updates. They need to know first the number of announcements and events posted. Figure 9 illustrates the process of viewing the announcement section. After logging on to the system, the administrator can view the announcement list. Clicking the announcement section tab will show a drop-down list of announcements.

Figure 10 depicts the procedure of adding an event by clicking the event section tab. In the event section tab, a drop-down list of menus will show the Calendar of Activities, Add Event, and Event List tab. The administrator can view the Calendar of Activities by navigating to My Calendar Tab. The administrator is capable to add, edit and delete events.

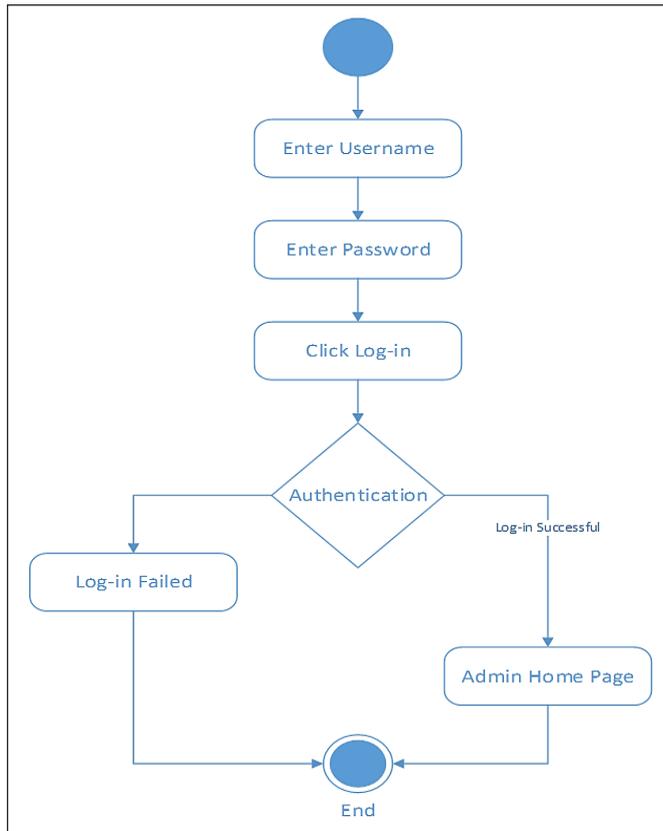


Figure 7. Activity Diagram for Administrator's Login

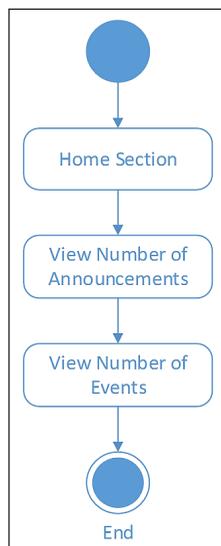


Figure 8. Activity Diagram for Administrator's Home Section

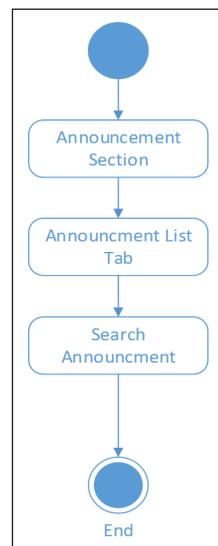


Figure 9. Activity Diagram for Administrator's Announcement Section

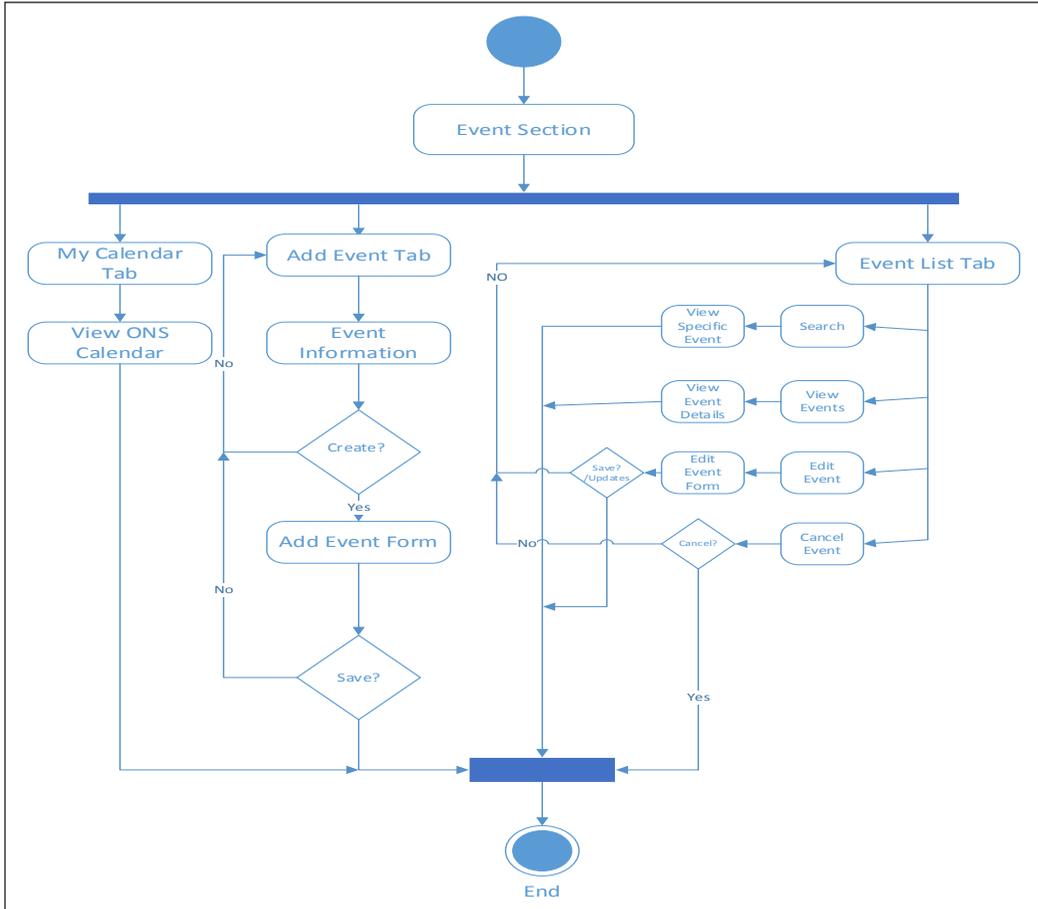


Figure 10. Activity Diagram for Administrator's Event Section

Figure 11 illustrates the process of navigating to the account setting section. By clicking the account setting sections on the home page, a drop-down list will appear which consist of Edit Account and View Accounts tab. In the edit account tab, the administrator can modify his account. He can also look at the list of registered users who can browse announcements and events through their Android devices by clicking the View Accounts tab. The administrator is responsible for registering the user to the System.

Figure 12 shows the interaction of the Administrator to the system upon logging in. The administrator will input the username and password to access the system. Figure 13 illustrates the interaction of the administrator of the system in viewing announcements. The administrator will navigate to the announcement section and view in the announcement list. The administrator can also search for a specific announcement.

Figure 14 shows the interaction between the Administrators to the System when navigating to Event Section. By clicking the Event Section, a drop-down list of tabs will appear containing Calendar of Activities. The second tab, which is the Add Event tab, can

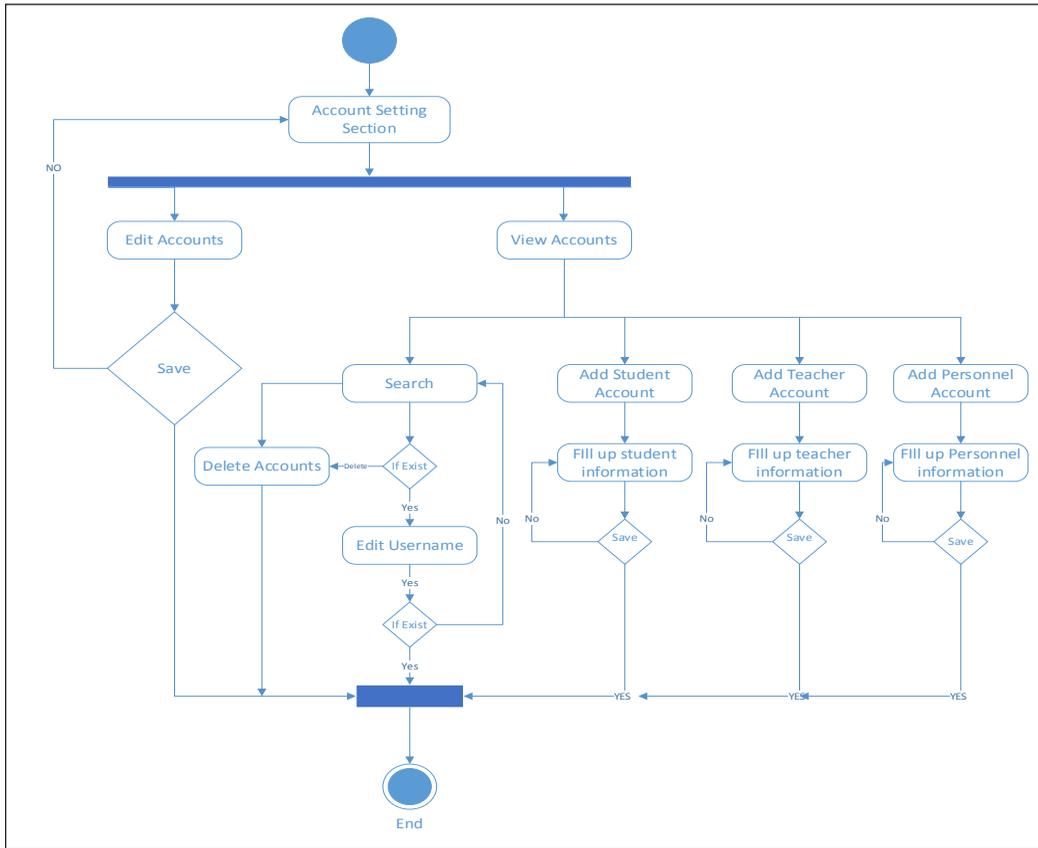


Figure 11. Activity Diagram for Administrator's Account Setting Section

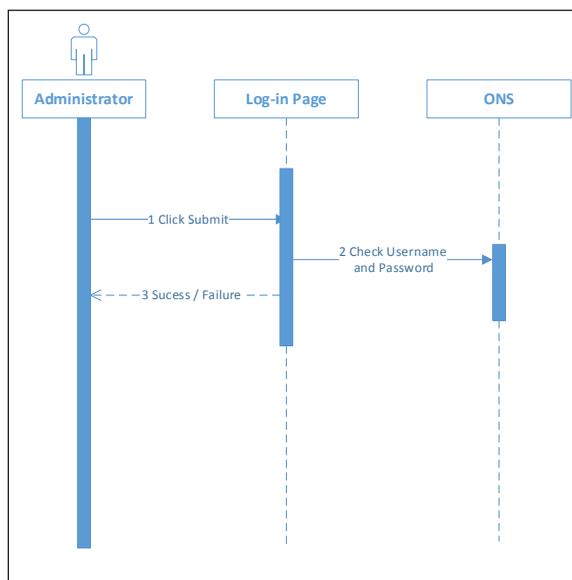


Figure 12. Sequence Diagram for Administrator's Login

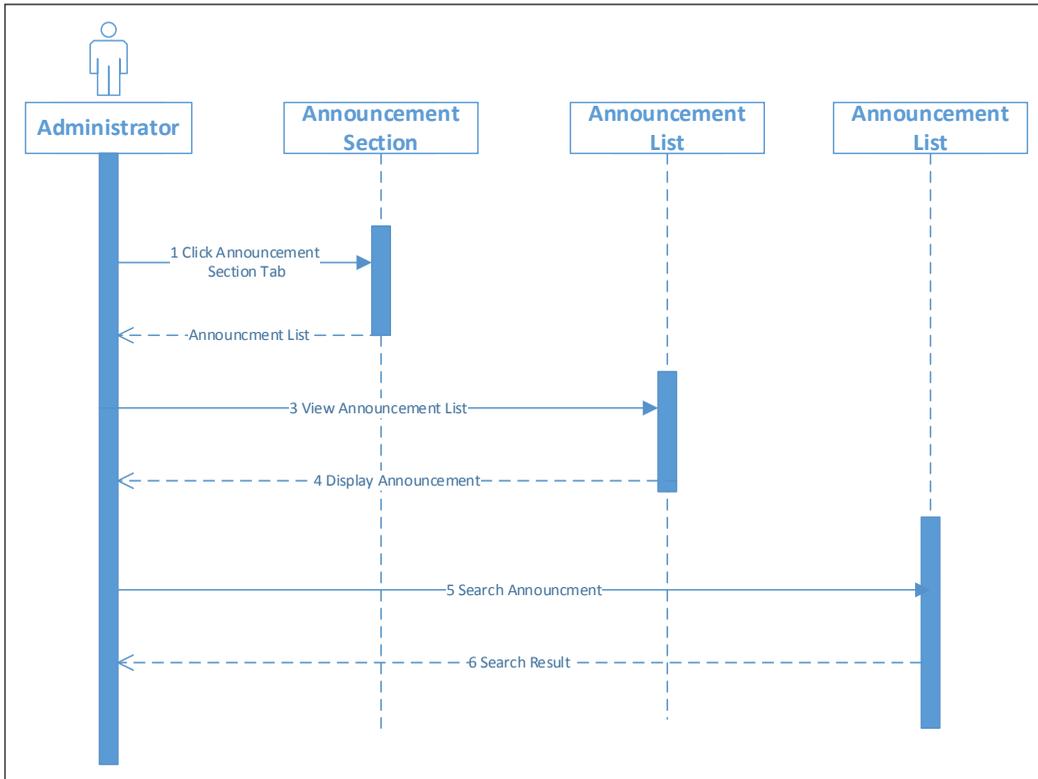


Figure 13. Sequence Diagram for Administrator's Announcement Section Setting

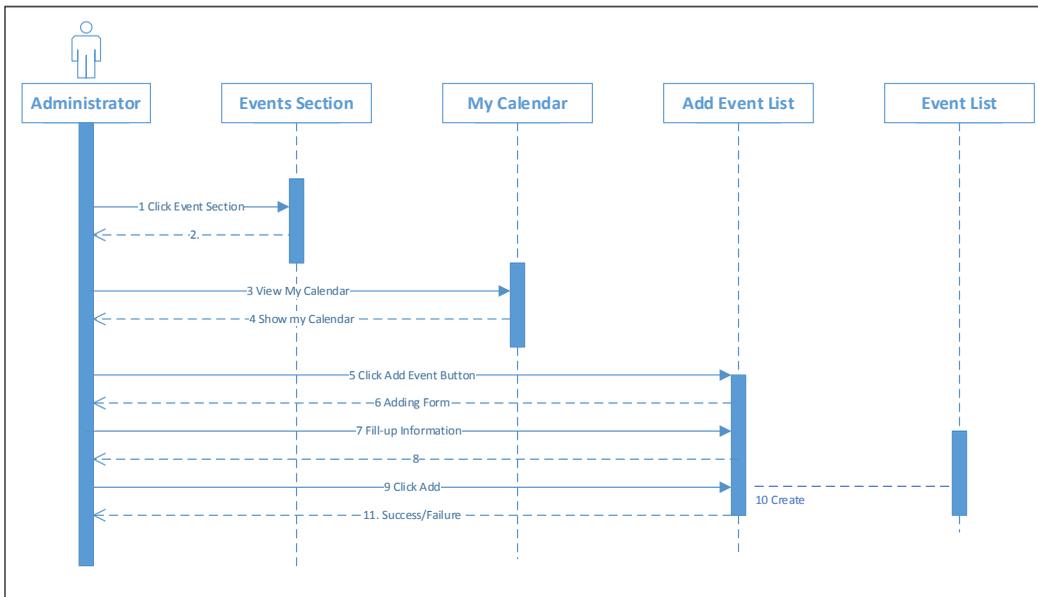


Figure 14. Sequence Diagram for Administrator's Event Section Setting

add event information. Last is the Event List wherein administrator can search for a specific event. The administrators can View Event, Edit and Update Events.

Figure 15 shows the interaction between the Administrators to the system. By clicking the Account Setting Section, a drop-down list will appear containing the Edit Account and View Account tab wherein the Administrator can make any changes to its account. In the View Accounts Tab, the administrator can see the list of registered users.

Figure 16 shows the interaction of the user with the application. Users need to have its own username and password by logging in to the system. The user can view announcement, calendar, view events, and update notifications.

Figure 17 illustrates the process of logging in to the system. The users may opt to use a 2-step verification process. The first step requires the user to enter its username and password. The second step requires the user to enter his registered mobile number. The mobile phone will receive an SMS message bearing the 4-digit code. The user will enter the code into the application and it will redirect the user to the Home/Main page of the application.

Figure 18 illustrates the process of navigating to the announcement tab. By simply clicking the announcement tab, the application will produce a list of announcements wherein user can also view specific event.

Figure 19 illustrates the process of navigating to the Calendar which will display the calendar of activities. The user has to click the date that holds an event in order to see the details.

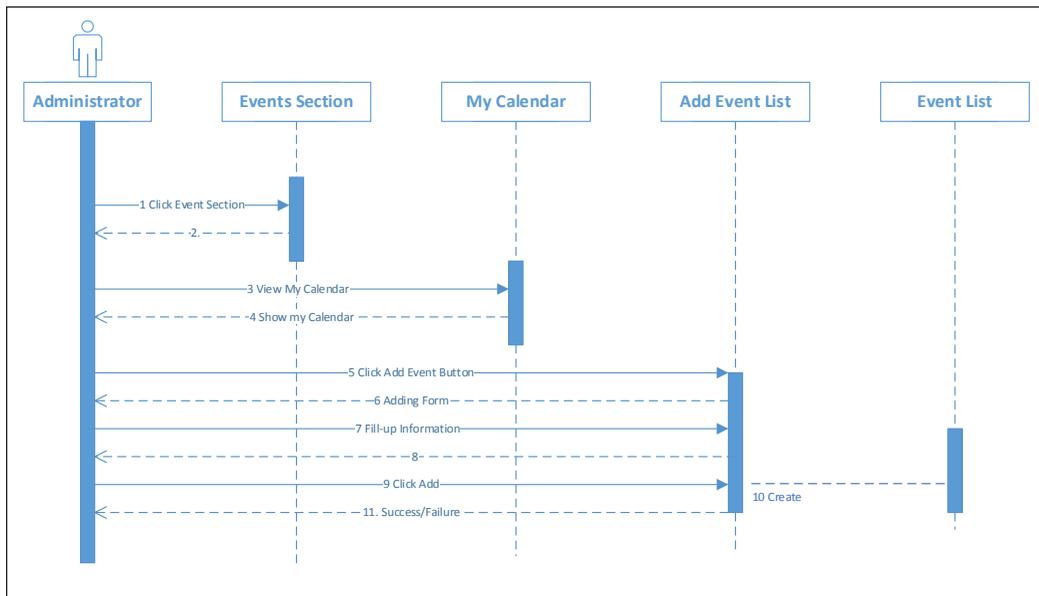


Figure 15. Sequence Diagram for Administrator’s Account Setting Section

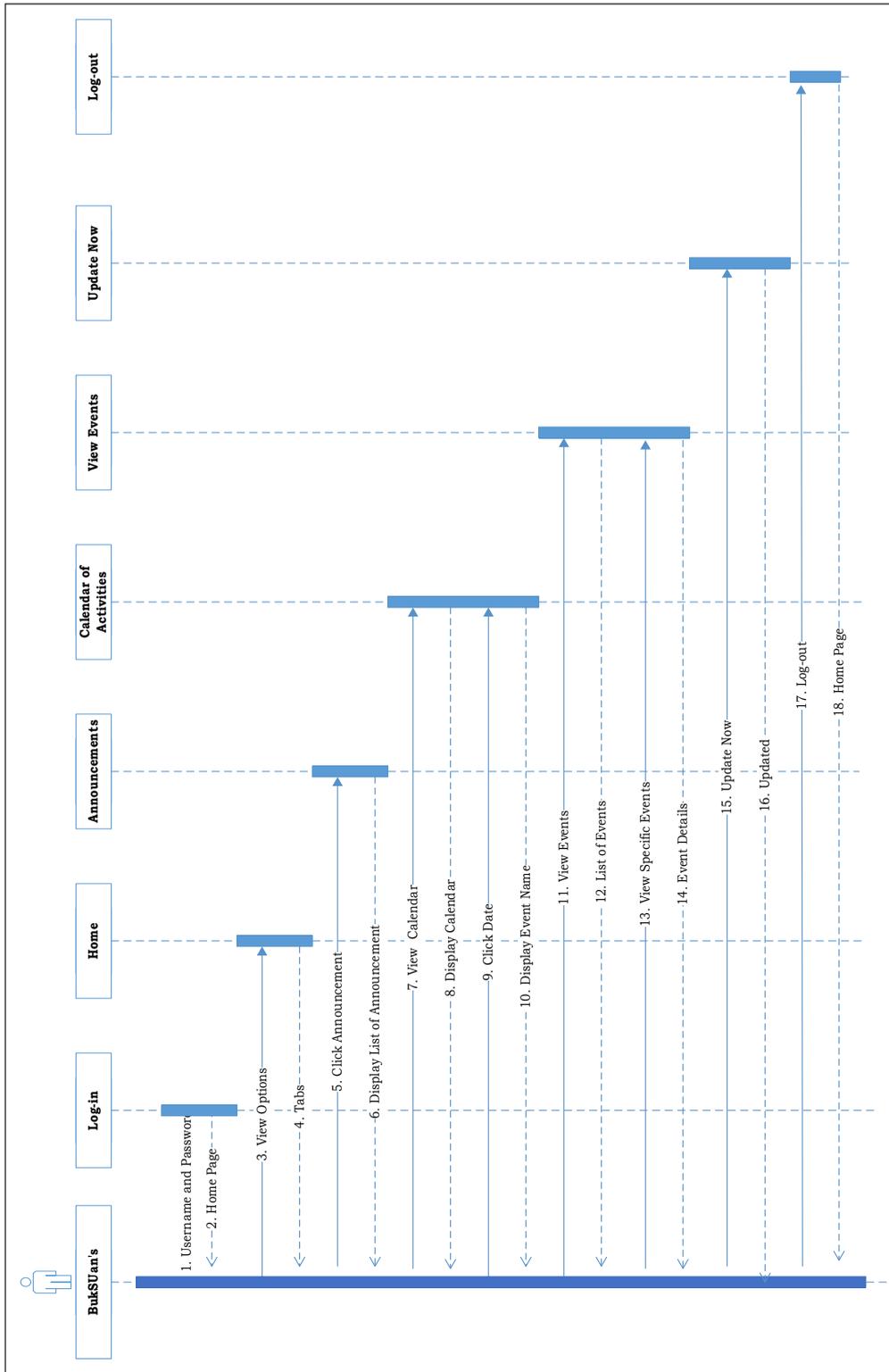


Figure 16. Sequence Diagram for Ubiquitous Notification Application for User

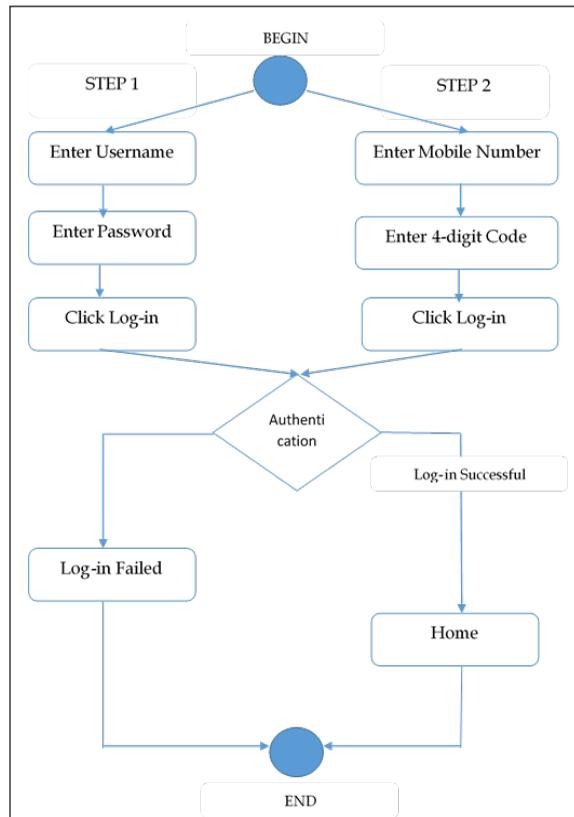


Figure 17. Activity Diagram for User Login Using 2-Step Verification Process

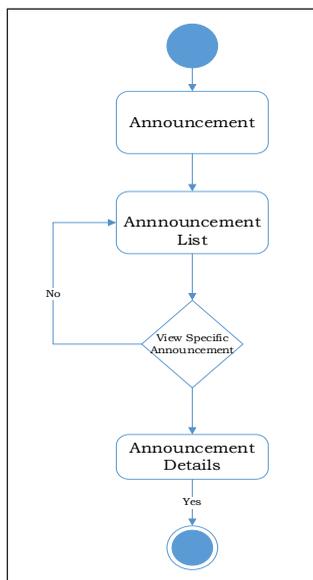


Figure 18. Activity Diagram for User's Announcement Section

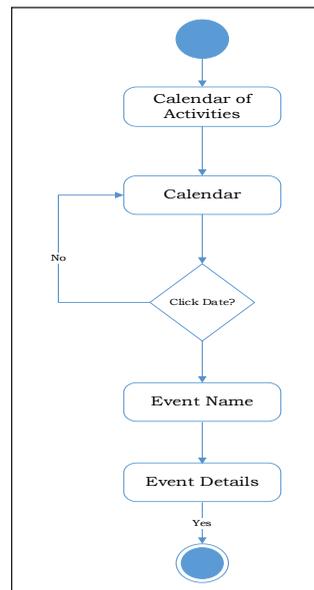


Figure 19. Activity Diagram for User's Calendar of Activities

Figure 20 illustrates the process of navigating to the View Events Tab. By clicking the view event, the application will display the details of the events.

Figure 21 shows the User's Login Activity. To access the application, the user should provide a username and password. Once the user is successfully logged in, it will directly go to the home page, and the user can view all the information and details of the application.

Figure 22 shows the Home Page for the user. Once the user successfully logs in to the application, it will proceed to the home page which accesses various tabs.

Figure 23 shows the new List of Tabs for User. The page has four tabs which are Announcements, My Calendar, View Events and Logout. Under the new app version, the Update Now Tab which allows the user to refresh on the number of announcements and posted events has been removed due to automatic notification feature of the application. The Announcement Tab is used by the administrator to post a public statement, declaration, notification, report or any action of making a formal statement. The My Calendar Tab shows a chart of events organized according to days, weeks, and months of a year. The View Events Tab shows a summary of events and activities of the University organized in reverse chronological order. The Logout Tab ends the login session and exits the application.

Figure 24 shows the Announcement List page. If the user wants to view all the events created, they have to click the Announcement list tab. This page provides the user to view all the events.

Figure 25 shows the Calendar of Activities. To view the entire event that is posted from the Vice President for Academic Affairs (VPAA) or Vice President for Administration, Planning, and Development (VPAPD), the user must click the Calendar of Activities Tab and the system automatically displays the details of a selected event.

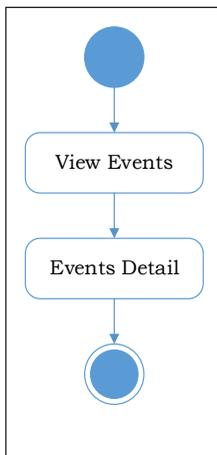


Figure 20. Activity Diagram for User's View Events

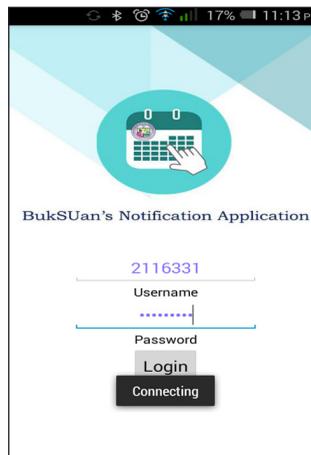


Figure 21. User Login Form



Figure 22. Home Page for User



Figure 23. List of Tab for User

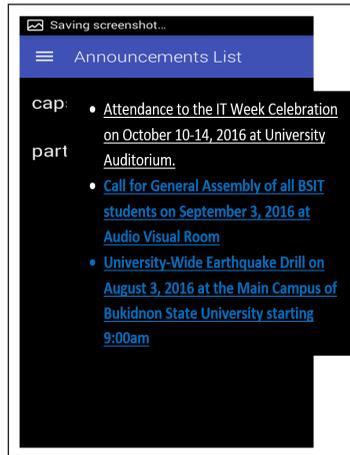


Figure 24. View Announcement List for User.



Figure 25. View Calendar for User.

Figure 26 shows the View Events List page. The View Events List page will display all the events and details about the events. Once the users click the event, it will automatically display the event details. Figure 27 depicts the View Event Details. Once the user clicks the selected event, the application will automatically display the details of the said event.

Figure 28 illustrates the Administrator's Login Page of the Ubiquitous Notification System. The Administrator has to input username and password. The system will then redirect the administrator to the Home Page.

Figure 29 shows the Home or Main Page of the system. There are five options or list of menus in the tab: Announcement Section, Event Section, Account Setting Section, and Logout Section.

Figure 30 illustrates the Announcement Section. It is where the Administrators can view announcements. Whenever there are changes in the events, the updates will first appear in the announcement list. The administrator can also search for a specific announcement or event through the Search Box. There are 3 columns in the table which includes the Events, Contents, and the date the event was posted.

Figure 31 shows the Calendar of Activities under the Event Section. In order to see all the events that are posted by the administrator, the user must click the Calendar of Activities Tab, and automatically the system will display the calendar with all the events listed.

Figure 32 illustrates the viewing of the events listed. By clicking the event section tab, a drop-down list of events will appear. When the event list is clicked, the system will let the administrator view the list of events. The following data will appear in the search results: event name, category, attendee, and action.

Figure 33 illustrates the viewing of registered accounts and adding of user accounts under the account section tab.

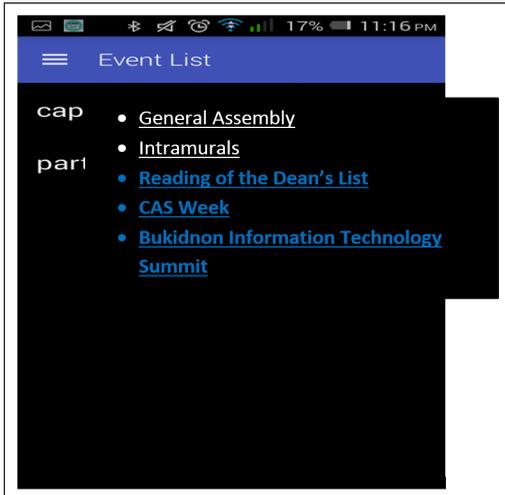


Figure 26. View Event List for User

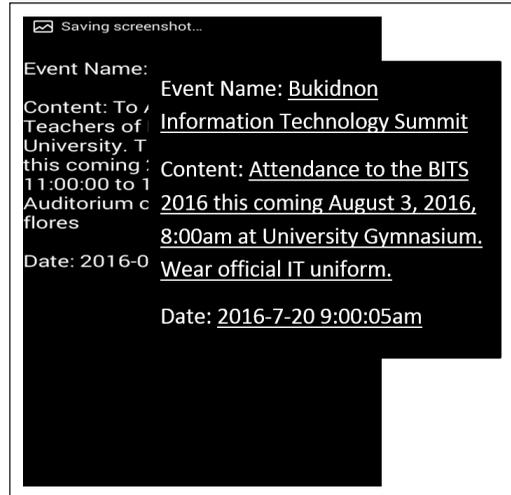


Figure 27. View Event Details for User



Figure 28. Log in Page for Administrator

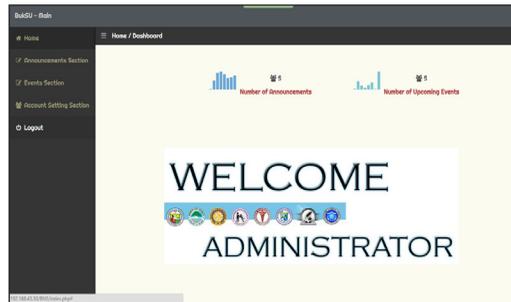


Figure 29. Home Page for Administrator

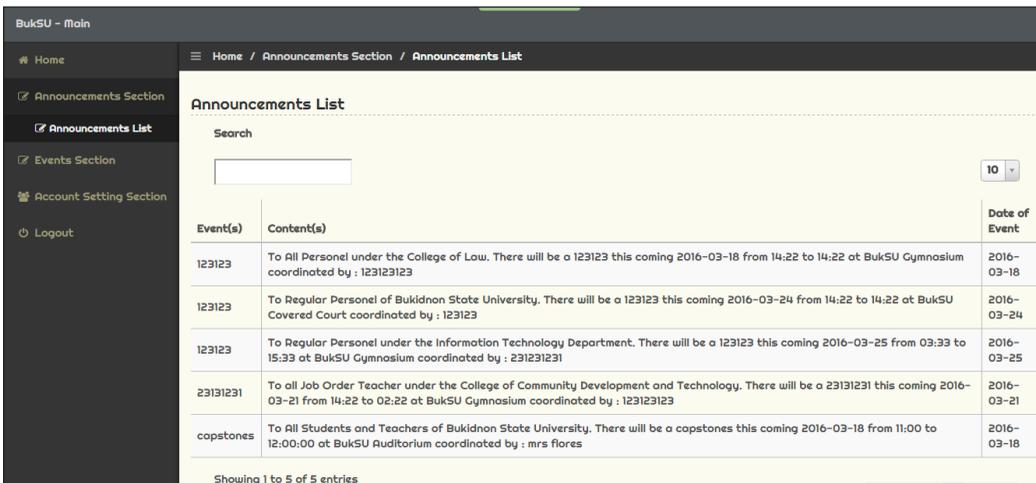


Figure 30. Administrator Announcement Section (Announcements List)

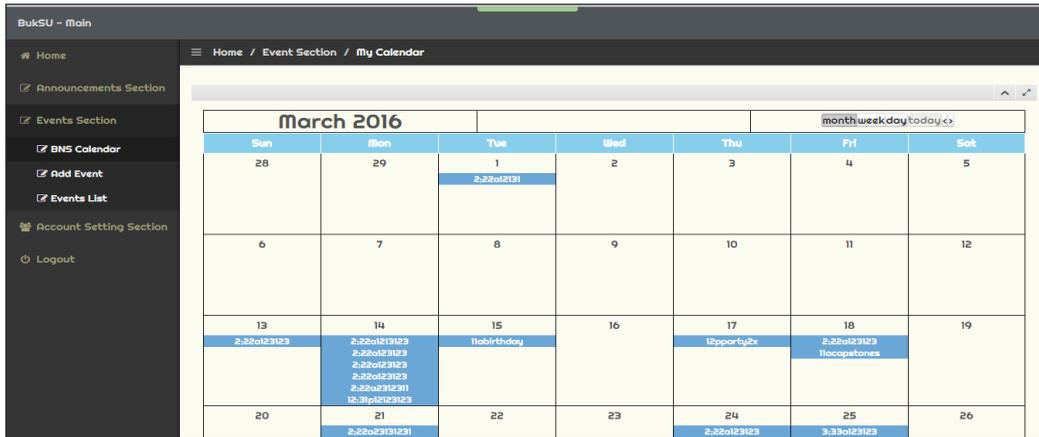


Figure 31. Administrator Event Section (Calendar of Activities)

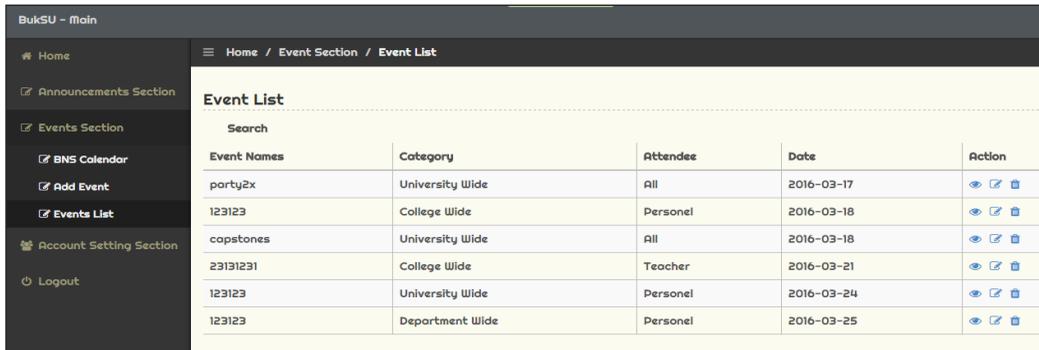


Figure 32. Administrator Event Section (Event List)

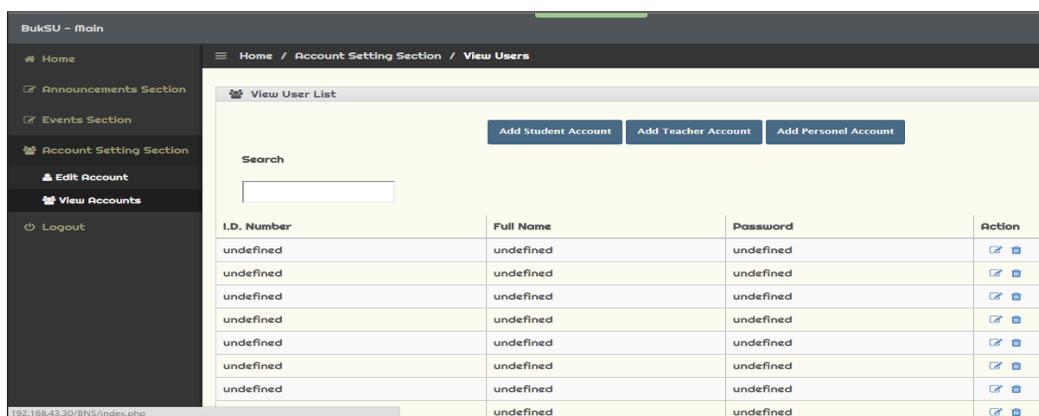


Figure 33. Administrator Account Setting Section

CONCLUSION

One most important feature of the smartphones is notification. The smartphone is a mobile phone with an advanced mobile operating system. With smartphones, users may enjoy the variety of features such as mobile apps. A notification is something that gives official information to someone through mobile phones. An Android-based ubiquitous notification application notifies the users of the events and activities in the university. It is concluded that of this application is useful to the students, faculty, staff and other stakeholders, wherein they can be notified of the information by using the application. Hence, by setting up and installing this application, they are now updated with all the events and activities of the university which can be planned, unplanned, routine or emergency in nature.

Recommendations

The researchers highly recommend performing external testing and evaluation of the system. The researchers also recommend that the school should provide an exclusive internet connection to the system.

REFERENCES

- DeVoe, J. J. (2008). The evolution of notification systems. *District Administration*, 44(9), 40-44.
- El-Gazzar, R. F., Badawy, O., & Kholief, M. (2010). Agent-based mobile event notification system. *International Journal of Interactive Mobile Technologies*, 4(4), 25-30.
- Gulum, M. S., & Murray, S. L. (2009, October). Evaluation of the effectiveness of a mass emergency notification system. In *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* (Vol. 53, No. 18, pp. 1466-1470). Los Angeles, CA: Sage Publications.
- Osunade, O., Osho, A. J., & Oyebamiji, S. O. (2014). Android appointment manager application development with google APIs. *Transnational Journal of Science and Technology*, 4(2), 80-92.
- Shirazi, A. S., Henze, N., Dingler, T., Pielot, M., Weber, D., & Schmidt, A. (2014, April 26 – May 01). Large-scale assessment of mobile notifications. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 3055-3064). New York: ACM.
- Vastenburg, M. H., Keyson, D. V., & De Ridder, H. (2009). Considerate home notification systems: A user study of acceptability of notifications in a living-room laboratory. *International Journal of Human-Computer Studies*, 67(9), 814-826.
- Voos, J., Riva, G., Zerbini, C., Centeno, C., Olmos, C., & Gonzalez, E. (2013). Medical event notification system using SMS technology. *Journal of Physics: Conference Series*, 477(1), 1-5.