



DEVELOPMENT OF ACADEMIC INFORMATION APPLICATION WITH PUSH NOTIFICATION USING MVP ON THE ANDROID PLATFORM.

Danniel Alvianto, S.T

Author Details (optional)

*Danniel Alvianto is currently pursuing a masters degree program in Management information system in Gunadarma University, Indonesia, PH-62-8777-0077-944.
E-mail: danniel.alvianto@gmail.com*

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ABSTRACT

The smartphone device is getting popular among the people. The more functionality offered by smartphones, the more difficult for people to get away of it [1]. The growing demand of smartphones, availability of the Internet, and high speed mobile browsing are ready to provide an alternative channel to deliver education services [2]. Therefore, researchers aim to develop an academic information system application to make it easier for teachers, parents and students to get academic information at educational institutions. The information contained in this academic information system application includes attendance data, class schedules, grade reports, student announcements, and user profiles. The existing information system cannot be accessed optimally because it is still processed on manual systems. Therefore, academic information cannot be given to the parents and students in an optimal way. To solve these issues, the researchers implemented push notification technology into the academic information system application which is expected to be able to solve the shortcomings of the old academic information system. With push notification technology, users can receive updated information with a good experience. The implementation of this application uses the Model-View-Presenter (MVP) architecture where the application development pattern is divided into several different parts which include the model, view and presenter sections. The method used in this research is the Rapid Application Development (RAD) development method which aims to provide faster development and get better quality results compared to the results achieved through traditional cycles [3]. The development stage starts with the requirement planning, system design and implementation stages. The result of this study is an academic information system application with an android platform that can overcome problems contained in the old academic information system.

1. INTRODUCTION

Technology is developing rapidly, one of which is smartphones / cellular where users have reached 2.32 billion worldwide (kominfo.go.id). With the development of smartphones in Indonesia, smartphones are required to facilitate all user needs. The results of technology have long been used in world education, such as the invention of paper, printing machines, radio, film, TV, computers and others. In essence, these tools are not made specifically for educational purposes, but these tools actually provide many benefits in world education. The development of information technology which is increasingly rapid in the current era of globalization cannot be avoided anymore its impact on the world of education. Global demands require the world of education to always and constantly adapt technological developments to efforts to improve the quality of education, which is based on information and communication technology in the learning process [4].

The implementation of technology in educational institutions is a reaction to the development of technology globally and the high use of smartphones in society. This is also supported by developers around the world so as to increase functionality. By looking at these developments, the option for developing an academic information system application is considered necessary by educational institutions to optimize the services provided. Academic information currently available can only be accessed by parties within educational institutions so that the information is not disseminated optimally to student guardians. This information includes attendance, class schedules, grade reports and student announcements. As described in the paper Monica Wangsaputra, Kusno Prasetya, Hery, Andree E. Widjaja entitled "Pengembangan Aplikasi dengan Fitur Push Notification untuk Mendukung Distribusi Informasi di Fakultas" One of the excellent features that make mobile-based applications interactive is the push notification feature. The push notification feature allows the system to be able to provide notifications to users even though the user is not currently accessing the mobile-based application.

Application development with the Android platform can be developed using several methodologies. One of the methodologies used to develop android applications is to use the Model-View-Presenter (MVP) architecture. MVP architecture first appeared in International Business Machines (IBM) and was seen more clearly at Taligent in 1990. Stages of using the MVP architecture: a) Background tasks are separated from activities / views / fragments to make them completely independent of life cycle related events b) Complex tasks are divided into simpler and easier to complete, c) Creating independent data source views, and d) Facilitating automated unit testing. All these features make the MVP architecture more comfortable to use by students with limited programming skills [8]. Some of the advantages of the MVP methodology described can be used as a solution for developing Android applications. Therefore, to overcome problems regarding academic information systems that have not been optimal in real-time information dissemination, the authors conducted a study entitled "Pengembangan Aplikasi Sistem Informasi Akademik dengan Push Notification Menggunakan MVP pada Platform Android."

2. METHODS

2.1. Rapid Application Development (RAD)

RAD is a combination of various structured techniques with prototyping techniques and joint application development techniques to accelerate system / application development [5]. RAD is a software process model that emphasizes a short development life cycle. In addition, RAD is also a quick adaptation version of the waterfall model using a component construction approach [6]. From the explanation of the definition of the RAD concept, it can be seen that application development using this method can be done with a relatively shorter duration. The following are the stages of application development using the RAD method approach from each phase of application development.

This stage consists of 4 structured and interdependent stages with each stage:

1. Requirements planning
This phase is equivalent to a project scoping meeting. Although the planning phase is condensed compared to other project management methodologies, this is a critical step for the ultimate success of the project. During this stage, developers, clients (software users), and team members communicate to determine the goals and expectations for the project as well as current and potential issues that would need to be addressed during the build. [13]
2. User design
This is the meat and potatoes of the RAD methodology — and what sets it apart from other project management strategies. During this phase, clients work hand in hand with developers to ensure their needs are being met at every step in the design process. It's almost like customizable software development where the users can test each prototype of the product, at each stage, to ensure it meets

their expectations.[13]

3. Rapid construction

The software development team of programmers, coders, testers, and developers work together during this stage to make sure everything is working smoothly and that the end result satisfies the client's expectations and objectives. This third phase is important because the client still gets to give input throughout the process. They can suggest alterations, changes, or even new ideas that can solve problems as they arise. [13]

4. Cutover

This is the implementation phase where the finished product goes to launch. It includes data conversion, testing, and changeover to the new system, as well as user training. All final changes are made while the coders and clients continue to look for bugs in the system. [13]

2.2. Push Notification

Push notification service in mobile had become an important service to send content to user [11]. Push notification is a small and short message used by mobile application to tell users about new event[3]. Push notification is an important feature in mobile computing service and had been implemented in many mobile applications [5]. Using push notification, message can still be send to end users even the app is not running [11]. It solved problem from smartphone that doesn't have features like multitasking and battery saver, also when the app is not running [11]. Information that users need can be sent immediately without the needs to request to the system [12]. Notification can be push to this device and initiate by this device to track environment/body/tool or providing context, like location. Push method implementation schema as shown in Figure 1.

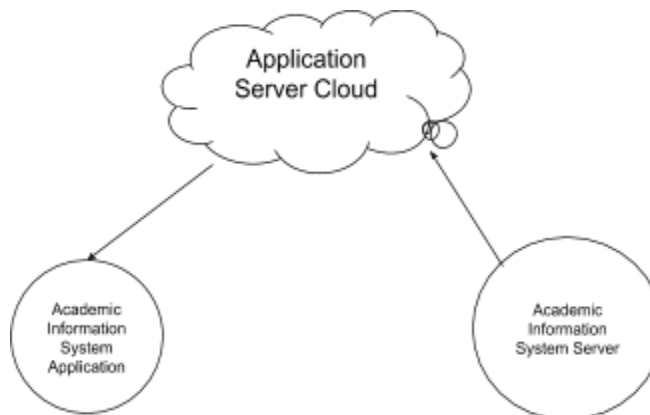


Figure 1. Push method implementation schema

2.3. Model - View - Presenter (MVP)

The MVP (Model-View-Presenter) architecture is a model that first appeared at IBM and was more visible in Taligent the 1990's. This architecture is like any other design pattern, decouples development in a way that allows multiple developers to work and test concurrently. It is important to mention that Android developers have problems arising from the fact that Android activity is closely related to interface and data access mechanisms. With MVP approach, with this approach, the applications are easy to maintain developers and define separate layers well. The figure 2 depicts a basic MVP structure . Activity, fragment and a CustomView act as the View part of the application [14]. The presenter is responsible for listening to user interactions (on the View) and model updates (database, APIs) as well as updating the model and the View [14]. Generally, a View and Presenter are in a one to one relationship [14]. One Presenter class manages on View at a time [14]. Interfaces need to be defined and implemented to communicate between View-Presenter and Presenter-Model [14]. The Presenter is responsible for handling all the background tasks [14]. Android SDK classes must be avoided in the presenter classes [14]. The View and Model classes can't have a reference of one another [14].

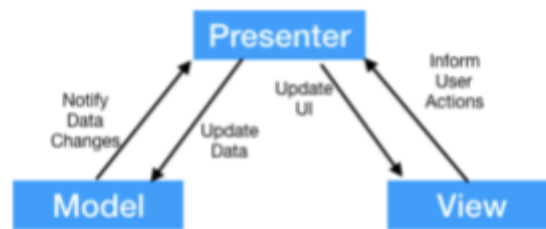


Figure 2 : Model View Presenter Structure

3. RESULT

Before starting a research project, the researcher determines the research methodology to be used. The following is the methodology used in this study:

3.1. Requirements Planning

The results obtained from the meetings conducted by researchers and users are to determine the needs of users of academic information system applications which include management information features. This feature contains announcement information, attendance information, class academic schedule information, grade information, user profile information, home page information, and an information notification feature. During this stage, researchers and users will act as users who communicate with each other to determine goals and expectations as well as potential issues that need to be addressed during the development of this application. This Academic Information Application is a system based on the Android platform which aims to provide important information regarding the needs of activities in educational institutions. Submission of information related to these activities can be sent via push notification.

Steps being taken in this phase include:

- Defining the needs of features for users
- Looking for solutions to solve user problems
- Finalize the requirements with the consent of each party

This stage will produce a document agreement of each of the Parties that the researcher, the project owner and the user. Approval needed to avoid miscommunication and changing needs in the future.

3.2. User Design

In this phase, researchers are working with users to ensure each user needs are met and the researchers adjusted the needs of all parties to develop a messaging feature in the academic information system applications, so researchers can conduct literacy development models back. The steps taken are to create an application prototype, test the application with the user, and make improvements that follow user needs. Information in this application can be obtained by direct users or can receive the information through notifications. Users can view information regarding announcements, academic schedules, grades, and user profiles. There are two ways to open this application, first is by opening the application without notification, and the second way is through notification. The second way makes it easier for users to access the application when a notification appears.

3.3. Construction

This phase will be done when the application user has fulfilled all his needs on the user design phase, because most of the problems and changes have been handled during the phase of design user carried out repeatedly and thoroughly. It is hoped that the steps that have been carried out will make it easier for researchers to start developing work models by coding for the Android platform. This stage is very helpful for researchers because

it can quickly help researchers develop applications compared to using traditional project management, because in the traditional project management approach there is no prototyping phase.

3.4. Cutover

This stage is the stage where the application product will be launched. This stage includes data conversion, testing and switching the old system to the new system, and training to users.

Conclusion

Based on the results of the research, the development of academic information applications with push notifications using MVP on the Android platform can meet the needs of users in obtaining academic information at educational institutions. This application development stage refers to the all-stage approach of the RAD method.

The design and implementation of academic information applications uses the MVP architecture where each component or feature is grouped into each package. Each package has its own model, view and presenter. The package view section functions as the display logic, the model section contains mappings, and the data and presenter settings section functions to communicate between the model and the view. In this architecture, there is no direct communication between the view and the model but with the help of the presenter.

Based on the tests carried out, it can be concluded that this application has succeeded in presenting information without any time and space limitations. In addition, this application has also managed to get real-time notifications which make it a solution to old system problems. This application can also be a promotional media for educational institutions in an effort to optimize services to student guardians. The test results display an application that can provide information and provide real-time and objective notification of information so that it can help and make it easy for users to obtain and provide academic information to educational institutions.

References

- [1] Fiqhan, dkk. 2018. Pengembangan Aplikasi Peningkat Salat Dengan Konsep Context-Aware Menggunakan MVP Pada Platform Android. 2(10): 3802-3809.
- [2] Sarwar M, Soomro TR. 2013. Impact of Smartphone's on Society. 98(2): 216-226.
- [3] U. Acer, et al., (2015, Aug). "Energy Efficient Scheduling for Mobile Push Notification", in Proc. of MOBIQUITOUS'15, Portugal: Coimbra, pp.100-109, 2015.
- [4] Budiman H. 2017. Peran Teknologi Informasi dan Komunikasi dalam Pendidikan. 8
- [5] J. Ding, et al., "An Approach for Modeling and Analyzing Mobile Push Notification Services," in Proc. of 2014 IEEE International Conference on Services Computing (SCC), USA: Anchorage, pp.725-732, 2014.
- [6] K. W. Umbach, "What is 'Push Technology'?", CRB Note, vol.4, no.6, pp.1-18, 1997.
- [7] Firebase.google.com "Firebase Cloud Messaging". [Online]. Available: <https://firebase.google.com/docs/cloud-messaging/>.
- [8] OJEDA-GUERRA, C. N., 2015. A Simple Software Development Methodology Based on MVP for Android Applications in a Classroom Context. International Conference on Computer and Information Technology, [e-jurnal]. 1429-1434. Tersedia melalui: IEEE Xplore Digital Library <<http://ieeexplore.ieee.org>> [Diakses 28 Mei 2017]
- [9] SURYANTO, B. O. (2017, Januari 30). Implementasi MVP (Model-View-Presenter). Tersedia melalui: Medium: <[https://medium.com/@budioktaviyans/ implementasi-mvp-model-view-presenter-2169a346acbb](https://medium.com/@budioktaviyans/implementasi-mvp-model-view-presenter-2169a346acbb)> [Diakses 8 Januari 2018]
- [10] Christoforus dkk. Implementasi Model View Presenter dan Object Relational Mapping NHibernate pada Aplikasi eStop Card berbasis Web (Studi Kasus: PT. XYZ Jakarta)
- [11] Q. Liu, "The Usage of Microsoft Push Notification Service on Mobile Devices," Thesis, Dept. Information, Lappeenranta Univ., Lappeenranta, Finland, 2011.
- [12] K. W. Umbach, "What is 'Push Technology'?", CRB Note, vol.4, no.6, pp.1-18, 1997.
- [13] Lucidchart.com "Rapid Application Development Methodology" Available: <https://www.lucidchart.com/blog/rapid-application-development-methodology>.
- [14] Journaldev.com "Android MVP" Available: <https://www.journaldev.com/14886/android-mvp>