



Designing Mobile Alumni Tracer Study System Using Waterfall Method: an Android Based

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ABSTRACT

The industrial revolution 4.0 has become a paradigm that is being widely discussed both in the industrial sector as well as in the field of education and currently the development of technology has become increasingly rapid with almost everyone currently having a handphone with an android operating system. This opportunity needs to be utilized for institutional development in the Industrial Engineering Department UPN Veteran Yogyakarta (IE UPNVY) especially for alumni searches. The data of alumni currently owned has not been systematically compiled and the alumni data entering the department is still very minimal. This study will develop an android application for tracking alumni of the IE UPNVY Study Program. The research methodology used is qualitative descriptive with a prototyping system development method and data collection techniques through interviews and observation. The tools used in designing Android applications to search IEUPNVY alumni are using Java JDK, Android SDK, Eclipse IDE, Android ADT. The expected results of this study are in the form of an android application for alumni search and analysis of alumni data obtained. Analysis in the form of a description of the graduates' profile and the relevance of the Industrial Engineering Study Program curriculum through a survey approach. The variable profile of graduates includes: 1) the waiting period for graduates, 2) the percentage of graduates who have worked, and 3) the first income earned.

Keywords: Alumni Tracer Study, Graduate Profiles, Curriculum, Android.

1 INTRODUCTION

The industrial revolution 4.0 became the current paradigm discussed both in industry and also in education. The Ministry of Research Technology and Higher Education encourages all Universities High follows technological developments including the application of the revolution paradigm industry 4.0 to education. Curriculum in universities is also necessary adjusting to industry concept 4.0, one of which is in the Engineering study program Industry needs to incorporate Android application programming into the Programming Logic and Information System Design course. Almost everyone today has a cellphone with an operating system android. Mobile technology with the Android system has been reached by all circles and are very familiar to be used by all students, lecturers or ordinary people.

This opportunity needs to be utilized for development institution in the Department of

Industrial Engineering UPN Yogyakarta Veterans (IE UPNVY). One database that is very urgent to upgrade at UPNVY IE Department is alumni data. Alumni data currently owned have not been systematically compiled and alumni data entering the department is still very minimal.

A study program must pay attention to the strategic role of the the alumni. Alumni become one of the elements that can play a role in helping Progress of study programs. On various occasions, the role of alumni in advancing the quality of a study program is often forgotten. In fact, alumni is an important asset that must be embraced, developed and managed with well. Not all universities are aware of the strategic role of the alumni have not optimally managed the data related to the progress of the study program at the college.

One of the points assessed at the time of accreditation is the role of alumni and data on alumni related to the length of time they get a job, first salary obtained, and alumni user satisfaction.

The classic obstacle faced by the drafting of accreditation documents in the study program is when the period is about to expire applicable accreditation decree issued by the National Accreditation Board (BAN) the manager of the new study program moves to search for data. Because the deadline limited then the data collected is not optimal and the benefits of the data is not optimal as well.

The non-optimal collection of alumni data above shows the need for a systematic system for tracing alumni. As is a system that is specifically managed to trace alumni data It is expected that alumni data can be significant amount according to the number graduates who have been produced by the Industrial Engineering study program.

2 LITERATURE REVIEW

2.1 Definition of Tracer Study

Harald Schomburg ^[1] defines that tracer study is an approach that enables higher education institutions to obtain information about possible deficiencies in the education process and learning process and can be the basis for planning activities for future improvement. Information provided by graduates who are successful in their profession is required for example information about relevant knowledge and performance (the relationship between knowledge of skills and job demands, area of work, professional positions). In addition, graduates can also be asked to assess the conditions of study they experienced during the education and learning process. Alumni tracking can also be used as an activity to find information about stakeholder needs for alumni.

2.2 Purpose of Tracer Study

According to Schomburg^[1] the main purpose of alumni tracer study is to find out / identify the quality of graduates in the workforce.

The specific objectives of alumni tracer study are:

- 1) Identify the competency profile and graduate skills.
- 2) Knowing the relevance of curriculum implementation that has been applied in tertiary institutions with the needs of the labor market and professional development within the competencies of the majors.
- 3) To evaluate the relationship of curriculum and studies in the majors as scientific development.
- 4) As a contribution in the department's accreditation process

2.3 Benefit of Tracer Study

Alumni tracer study is one of the strategic things that must be done by every educational institution. There are at least three benefits that can be obtained from the implementation of this activity, namely: 1) Knowing stakeholder satisfaction, in this case graduates, related to the learning experiences they experience, to be used as an evaluator tool for institutional performance. 2) Obtain relevant input as a foundation for institutional development, related to the competitiveness, quality, and working experiences of graduates that can be used to seize opportunities and overcome future threats. 3) Improve the relationship of graduates and alma mater, because when viewed from the experience of well-known educational institutions, strong ties of graduates and alma mater will bring many benefits to the alma mater along with the recognition of the gait of graduates in the community

2.4 Information System Design

2.4.1 Information System Development Life Cycle (SDLC)

Conceptually the development cycle of an information system is as follows ^[2]:

1. Systems Analysis: analyze and define problems and possible solutions for information systems and organizational processes.
2. System Design: designing outputs, inputs, file structures, programs, procedures, hardware and software needed to support information systems
3. System Development and Testing: build the software needed to support the system and carry out testing accurately. Installing and testing the hardware and operating the software
4. System Implementation: switch from the old system to the new system, conduct training and guidance as needed.
5. Operation and Maintenance: support the operation of the information system and make changes or add facilities.
6. System Evaluation: evaluates how well the system has been built and how well the system has been operated.

This cycle takes place repeatedly. The above cycle is a classic model of information system development. New models, such as prototyping, spiral, 4GT and combinations were developed from the classic models above.

Some researcher has developed and implemented information and system design in example ^[3] Lippeveld, et al (2000) Design and Implementation of Health Information Systems”, Sasmito, (2017)

implement waterfall method to develop Geografic Information System^[4], Sistem Informasi Geografis Industri Kabupaten Tegal, and Sofiyanti (2014) designed Management Information System of Technology Service^[5].

2.4.2 System Analysis

Reasons for the importance of initiating system analysis^{[6], [7], [8]}:

1. Problem-solving: the old system does not function as needed. For this reason, analysis is needed to improve the system so that it can function as needed.
2. New needs: there are new needs in the organization or environment so that there is a need for modification or additional information systems to support the organization.
3. Implement new ideas or technologies.
4. Improve overall system performance.

System analysis limits:

Activities carried out in the system analysis must be able to answer common questions, as follows:

1. What new system will be built? or
2. What systems will be added or modified on the existing system?

For this, questions must be answered in detail:

1. What information is needed?
2. By whom?
3. When?
4. Where?
5. In what form?
6. How to get it?
7. Where did it come from?
8. How to collect it?

Sources of facts that can be learned for system analysis:

1. Existing system
2. Other internal sources: people, documents, and relationships between people-organizations or functions exist

External Sources: interfaces with other systems, seminars, vendors, journals, textbooks and other information or knowledge that is outside the system

2.5 Android Programming

There are several reasons why Android is growing so rapidly and why developers should build Android Applications [9], [10]:

- a. Market Share Developers have the opportunity to develop applications for a relatively new and rapidly growing market. The existence of the Android Market will place applications created by

developers directly to users. Users do not need to search through the internet to find and install applications created by developers. Users simply open the Android Market that has been installed on the user's Android device and access the applications that users need and install into the user's Android device.

- b. Time to Market

There are Android APIs (Application Programming Interfaces) that make it easy for developers to build applications easily and a short time.

- c. Open Platform

The Android operating system is an open platform. So it does not refer to a hardware company or a provider. The open android platform allows the development of the market very quickly, because all hardware companies and providers can make and sell android devices. Android source code can be accessed through at <http://source.android.com>, to be used and modified according to the needs of the hardware company, provider or application developer.

- d. Cross Compatibility

Android can run on a variety of devices with different screen sizes and resolutions. Android has features that help developers to develop applications that are compatible for various devices (cross-compatible applications). Google has a detection feature that arranges for applications developed by developers to run on compatible devices. For example, if an application requires a front-facing camera, only Android devices with a front camera will be able to see the application on the Android Market. An android device must follow a rule to get a certificate of conformity with the Android Market to ensure applications can run on it, including the presence of: (a) Camera, (b) Compass, (c) GPS (Global Positioning System), (d) Bluetooth Transceiver. e. Mashup Capability Mashup Capability is the ability to combine two or more services to develop an application.

3 RESEARCH METHOD

3.1 Research Object

Object in this research is alumni tracer study at Industrial Department UPNVY

3.2 Research Method

The research methodology used is descriptive qualitative with the method of developing a prototyping system and data collection techniques through interviews and observations.

3.3 Data Collection

The design of an android application to search for Industrial Engineering UPNVY alumni starts with taking the identification of the system desired by policy makers at the UPNVY Industrial Engineering Department. Identification is done by interview and observation methods. This was done in order to know what was needed in the design of the UPNVY IT Alumni Tracer Study System. Data needed to complete this research are:

3.3.1 Preliminary Study

Prior to data collection, a preliminary study was carried out, which is a search of important aspects in tracing alumni of Industrial Engineering study programs.

3.2.2. Data required

Data needed in this study are:

1. Alumni search attribute data.
2. Data on alumni user satisfaction criteria.
3. Data from UPN Veteran Industrial Engineering alumni Yogyakarta.

3.2.3. Types of Data

The types of data used are:

1. Primary data, i.e. data sourced from respondents' answers to questions in the questionnaire. This data includes alumni data and alumni user satisfaction
2. Secondary data, including other data relevant to this research, such as instruments and urgent data obtained in alumni tracer study

3.3 System Design Tool

The tools used in making android application design for UPNVY IE alumni tracking are using Java JDK, Android SDK, Eclipse IDE, Android ADT.

3.4 System Design Activity

The research method applied in this study is the application of the waterfall method. The waterfall method is a systematic and sequential model of information system development. The Waterfall method has the following stages:

1. Requirements analysis and definition
System services, constraints, and goals are determined by the results of consultations with users who are then defined in detail and function as system specifications.
2. System and software design
System design stages allocate system requirements both hardware and software by forming the overall system architecture. Software design involves identifying and describing the basic system abstraction of the software and its relationships.
3. Implementation and unit testing
At this stage, software design is realized as a series of programs or program units. Testing involves verifying that each unit meets its specifications.
4. Integration and system testing
The individual units of the program or program are combined and tested as a complete system to ascertain whether it matches the software requirements or not. After testing, the software can be sent to the customer
5. Operation and maintenance
Usually (although not always), this stage is the longest stage. The system is installed and used significantly. Maintenance involves correcting errors that were not found in the previous stages, increasing the implementation of the system unit, and improving system services as new needs.

The Waterfall method can be graphically presented as shown in Figure 1.

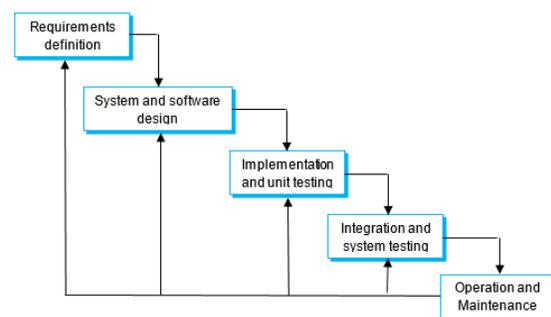


Fig. 1. The Waterfall Method

4 RESULT AND DISCUSSION

Alumni Tracer Study System at Industrial Engineering Department UPNVY was developed using Waterfall Method.

1. Requirements analysis and definition
Problems that occur in tracing alumni at the Industrial Engineering Universitas Pembangunan Nasional Veteran of Yogyakarta include:
 - Alumni searches have so far been done manually and through the website
 - Alumni search has not used mobile platform
 - Alumni information is less accessible to fellow alumni and students
 - The need for networking facilities between students and alumni.
2. System and software design
System design stages allocate system requirements both hardware and software by forming the overall system architecture. Software design involves identifying and describing the basic system abstraction of the software and its relationships.

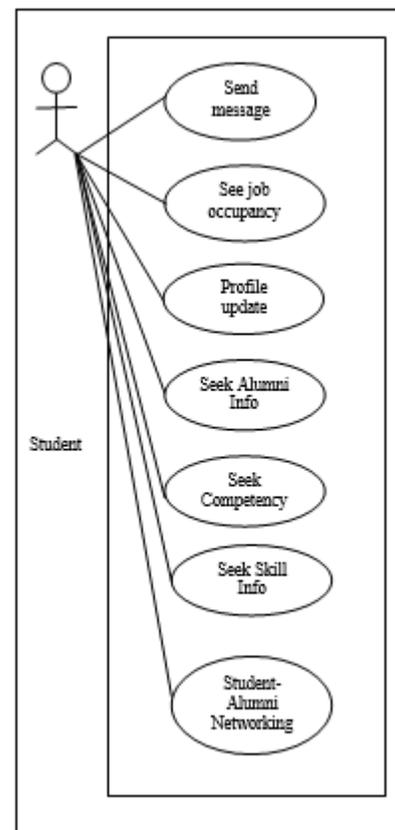
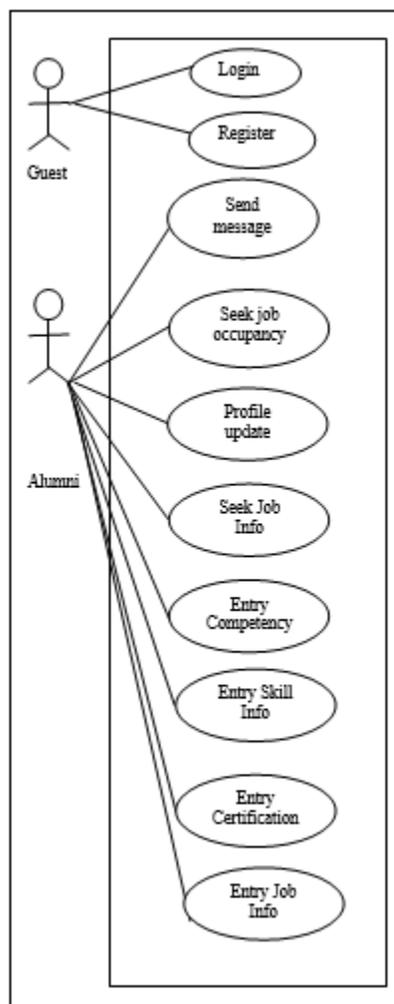


Fig. 2. Use Case Diagram

3. Implementation and unit testing
At this stage alumni tracer study system is realized as a series of programs or program units. Testing involves verifying that each unit meets its specifications.
4. Integration and system testing
The individual units of alumni tracer study system are combined and tested as a complete system to ascertain whether it matches the software requirements or not. After testing, the software can be sent to the customer.
The level of reusability in the tracer study application can be said to be good because it has a 78% result which has exceeded the usability standard value of 68%. And has a good level of compatibility because it has 100% results from 3 different hardware devices.

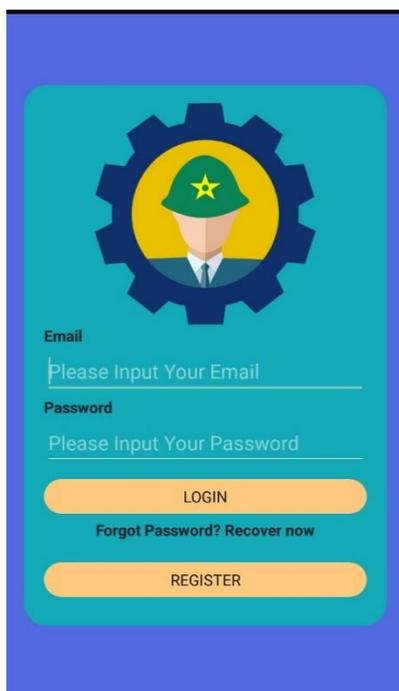


Fig. 3. The user interface of mobile tracer study system

5. Operation and maintenance
Maintenance involves correcting errors that were not found in the previous stages, increasing the implementation of the system unit, and improving system services as new needs. Maintenance of this tracer study system will be Industrial Engineering Department responsibility.

5 CONCLUSION

This study has designed a mobile tracer study system using android. The level of reusability in the tracer study application can be said to be good because it has a 78% result which has exceeded the usability standard value of 68%. And has a good level of compatibility because it has 100% results from 3 different hardware devices.

6 REFERENCES

- [1] Schomburg, Harald (2003). Handbook for Graduate Tracer Study. Moenchebergstrasse Kassel, Germany: Wissenschaftliches Zentrum für Berufs- und Hochschulforschung, Universität Kassel
- [2] Nursal, 2009, Visual Basic I, Dinamika Ilmu, Jakarta

- [3] T. Lippeveld, Rainer Sauerborn, and Claude Bodart, "Design and Implementation Of Health Information Systems", World Health Organization, Geneva, 2000
- [4] Sasmito, G. W., 2017, Penerapan Metode Waterfall Pada Desain Sistem Informasi Geografis Industri Kabupaten Tegal, Jurnal Informatika:Jurnal Pengembangan IT (JPIT) , Vol. 2, No. 1, hal 6 – 12.
- [5] Sofiyanti, 2014, Perancangan Sistem Informasi Manajemen Layanan Jasa Teknologi Dan Kerjasama Di Lembaga DEF, Journal of Information Systems, Vol. 10, Issue 2, hal 97 – 104.
- [6] Nugroho, B., 2009, Database Relational dengan MySQL, Andi Offset, Yogyakarta
- [7] Raharjo, B., 2011, Membuat Database Menggunakan MySql, Informatika, Bandung
- [8] Sommerville, I., 2011, Software Engineering 9th Edition, Addison-Wesley
- [9] Wahana Komputer, 2010, Panduan Belajar MySQL Database Server, Media Kita, Jakarta
- [10] Luthfi, E.T., 2012, Modul Kuliah Program Aplikasi Mobile http://repo.unnes.ac.id/android/MODUL_ANDROID.pdf accessed on 20 Maret 2019
- [11] Google Developer Team Training, 2016, Android Developer fundamental Course Taining, <https://google-developer-training.github.io/android-developer-fundamentals-course-practicals/idn/android-developer-fundamentals-course-practicals-idn.pdf> accessed on 20 Maret 2019.

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