Document Digitalization and Scoring System of Students Final Project

Meliana Christianti Johan ✉ #1, Robby Tan*2, Bernard Renaldy Suteja#3, Nurul Afiany*4

#*Jurusan Teknik Informatika, Universitas Kristen Maranatha*
Jl. Surya Sumantri No. 65 Bandung
1meliana.Christianti@it.maranatha.edu

#*Magister Ilmu Komputer, Universitas Kristen Maranatha*
Jl. Surya Sumantri No. 65 Bandung
3bernard.rs.@it.maranatha.edu

* *Jurusan Teknik Informatika, Universitas Kristen Maranatha*
Jl. Surya Sumantri No. 65 Bandung
2robby.tan@it.maranatha.edu
4it1672035@student.it.maranatha.edu

Abstract — **The Faculty of Information Technology is one of the faculties at Maranatha Christian University Bandung. One of the study programs in the Faculty of Information Technology is Informatics Engineering Department. Nowadays, the management of Final Project and Final Project Seminar is still managed manually. In this research, we did this research to digitalize any documents and scoring grades by using this system for student's final project. This causes the data management process related to the process of recording and completing the final project relying only on Microsoft Excel. In this research, an analysis and application design carried out to assist the process of recording the journey of students in completing the Final Project Assignment. The result from this research is an application prototype that can be used by course coordinators to manage grades of final project and final project seminar. This application is a web-based, built using PHP with Firebase database.**

Keywords— **final project; final project seminar; firebase; web-based application.**

I. INTRODUCTION

The Faculty of Information Technology is one of the faculties at Maranatha Christian University. One of the study programs in the Faculty of Information Technology is Informatics Engineering. Final project is the one of the graduation requirements for undergraduate students. There are several stages that must be taken by students to complete their final project which are: final project topic presentation, seminar, preliminary exams, and final exams. Each stage consists a several grading systems that must be submitted by lecturer to final project coordinator.

Final project coordinator must save the value that submitted by lecturer. This value will be used in audit process or accreditation. The management of final project grading system and value are still managed manually by final project coordinator. This leads to a slow administrative process and the possibility of error input value because it is only done by final project coordinator.

II. LITERATURE REVIEW

Information systems that consist of a series of sub-systems of information processing data to produce information that is useful for decision making. The information system is also very important in the tertiary environment because it can help search for data with a short time and the information needed can be known directly [1] [2]. Information systems are a combination of people, facilities or technological tools, media, procedures and controls that aim to organize important communication networks, process certain and routine transactions, assist management and internal and external users and provide the basis for making appropriate decisions [3]. In this research, we use Unified Modelling Language (UML) as a general-purpose visual modelling language used to determine, visualize, construct, and document artefacts from software systems [4] [5] [6] [7] [8].

For each Real-time application, a Real-time Database is required. Firebase Real-time Database is a NoSQL database hosted in the cloud that synchronizes data in Real-time to each connected client. The Firebase database uses a

synchronization mechanism that synchronizes data to all connected devices in milliseconds. Another key ability is the offline feature. The Firebase SDK keeps data on disk; then if the user loses his internet connection, the application remains responsive. Automatically synchronizes data after the connection is re-established [9] [10]. The following is an example of the data structure in Firebase in Figure 1.

```
1.  {
2.    "-LuCjnDrYxt58hjY0gyf" : {
3.      "-LwGybpAMfcZcscDlQ1Q" : {
4.        "evaluator1" : {
5.          "name" : "Adelia, S.Kom., M.T.",
6.          "nik" : "730049"
7.        },
8.        "evaluator2" : {
9.          "name" : "-",
10.         "nik" : "-"
11.       },
12.       "idSidang" : "-LwGybpAMfcZcscDlQ1Q",
13.       "jenisSidang" : "Sidang1",
14.       "komentarSidangPem1" : "VER SIDANGNYA MANTAP"
      ,
15.       "komentarSidangPeng" : "-",
16.       "namaSidang" : "Sidang Presentasi Topik",
17.       "nilaiPembimbing1" : {
18.         "nilaiAkhirPem1" : "90",
19.         "nilaiPem1A" : "9",
20.         "nilaiPem1B" : "10",
21.         "nilaiPem1C" : "8"
22.       },
23.       "nilaiPenguji1" : {
24.         "nilaiAkhirPeng1" : "94",
25.         "nilaiPeng1A" : "9",
26.         "nilaiPeng1B" : "10",
27.         "nilaiPeng1C" : "9"
28.       },
29.       "pem1" : {
30.         "name" : " Meliana Christianti J., S.Kom.,
      M.T",
31.         "nik" : "720225"
32.       },
33.       "ruangan" : "Lab Adv 1",
34.       "tanggalSidang" : "2019-12-18",
35.       "tglPenyetujuan" : 1576554628183,
36.       "topik" : {
37.         "id_topik" : "-LwGyIegUduUxfMSpwN8",
38.         "nama" : "VERNANDA DWI AYUNINGRUM",
39.         "nrp" : "1672001"
40.       },
41.       "waktuSidang" : "10:00"
42.     }
43. }
```

Figure 1 Example of Firebase Realtime Database

Firebase Real-time Database can generate a Firebase key that has the same function as primary key in Database Management System (DBMS). Each data in Firebase Real-time Database can be assigned with a generated Firebase key or user-defined key. Firebase key will function as the root of a tree. Figure 1 shows Firebase Real-time Database structure used in the application. Table I describes a tree structure in Figure 1.

TABLE I FIREBASE KEY TYPE AND DESCRIPTION

No.	Key Name	Type and Description
1	evaluator1	JSON Object for 1st evaluator NIK and name
2	evaluator2	JSONG Object for 2nd evaluator NIK and name
3	idSidang	String. Value is Firebase Generated Key that taken from another tree (sidang)
4	jenisSidang	String. Value for seminar type (Sidang1, Sidang2, Sidang3, Sidang4)
5	komentarSidangPem1	String. Value for seminar comment from 1st evaluator
6	komentarSidangPeng	String. Value for seminar comment from 2nd evaluator
7	namaSidang	String. Used to store seminar name data.
8	nilaiPembimbing1	JSON Object that consist of scoring component and value from 1st evaluator
9	nilaiPenguji1	JSON Object that consist of scoring component and value from 2nd evaluator
10	pem1	JSON Object for supervisor of this topic.
11	ruangan	String. Used to store seminar place data.
12	tanggalSidang	String. Used to store seminar date data.
13	tglPenyetujuan	long. Used to store seminar approval date.
14	topik	String. Used to keep student's final project topic.
15	waktuSidang	String. Used to keep seminar time.

III. RELATED WORKS

Academic process consists of many small specific problems that can be emerge as topics on research. Some of the emerging topics are alumni tracers [11], class and student's attendance [12] [13] [14], plagiarism detection [15], and administrative system and process [16] [17] [18] [19]. Topics about administrative system and process is the topics that takes most of the attention. The core of administrative system and process is creating a user-friendly system that can be automated or support the decision-making process.

Research that proposed by Imbar et al. [16] is to determine scholarship process that provide some criteria for each scholarship. The research is conducted using a decision support system algorithm (Fuzzy Multiple Attribute Decision Making) which provide recommendations for suitable students. The other research that proposed by Johan et al. [17] create a system that provide a teaching schedule based on lecturer availability. This research utilizes PHP CodeIgniter and MySQL as data source for the desktop application. Research that proposed by Manuel and

JuTISI
Jurnal Teknik Informatika dan Sistem Informasi

Karnalim [18] is to revitalize an old web internship application. Finally, a research that proposed by Bastian et al. manage a scheduling process that happens at preliminary and final project exam.

Research proposed by Payara and Tanone [20] used cloud technology to compensate creating a web service. Web service can be used by any platform and relatively light on data traffic. This research is nullified the needs of web service and replace it with cloud database in JSON format.

The fact that administrative process needs an important attention is because it is related to many other systems. For example, if we look at academic process and administration, there are many small sub-systems that relies on each other. From the student's early registration, payments, lecturer assignments, scorings, graduation, etc. This research takes a portion in academic process that provides a mechanism to record grading system and score in student's final project. The process of creating of fully functional academic system need a dynamic database that can be suited to each new rule. Final Project Administration System using cloud technology that developed so the system not using conventional database. The system utilizing Firebase Real-time Database and Authentication to give a dynamic web-based application.

IV. METHOD AND RESULT

The digitalization process began with understanding rules, processes, and forms that were used in the final project course. Rules and manual processes are important to create a user-friendly system. We also interview with final project coordinator to get detailed knowledge of the process.

Final project coordinator is one who responds to all process, topic data, supervisor, and schedule processes. The previous digitalization application only available is using Google Sheet or Microsoft Excel file which is shared to all lecturers and students. Document digitalization and scoring system will benefit all stakeholder in many ways such as:

1. Reducing the cost of printing and submitting the document. In a single process only, the student will need to submit several documents such as a scoring sheet, originality statement, academic transcript, etc.
2. Reduced time to fetch, calculate, and publish scores.

We use Firebase Authentication and Firebase Real-time Database to separate and identify data. Firebase Authentication is used to authenticate a user using their email and password. Firebase Real-time Database is used to store data in this application such as lecturer data, seminar data, score data, etc. There is a total of 11 collections that we used to build this application.

Figure 2 is a form that is used in seminars to give scores and comments about the topic. There are several data in this form such as student name and ID, score, and comments for the topic. We collect and transform the data into a web application as shown in Figure 3. Each data will be stored in Firebase Real-time Database in a specific collection. For example, seminar data are stored in sidang collection. Sidang collection is shown in Figure 1. Line 17 to 22 and 23 to 28 is an example of storing scoring data.

Figure 2 Score and Comment Sheet

Figure 3 Score and Comment Web Form

Final Project Administration System that has been created is web-based application where only certain people can only access the application. This system is made to convert old process which include a lot of document. Each stage will have minimum 10 documents that had to submitted to final project coordinator. Other advantages from new system are all submission and scoring grades digitally recorded so coordinator does not need to calculate grades manually.

There are several role users who can access and manage data within this system, namely: lecturers and coordinators. Lecturer have a limited access to specific page. On this website there are some additional features such as the final project coordinator can choose a supervisor directly, the coordinator can record submitted score in each seminar/ preliminary exam/ final exam. After all score had been inputted, final project coordinator will have a student report of each stage. Use case diagram can be seen in Figure 4 4.

In Figure 5 you can see a number of menus on the TA coordinator's account, which are the main features of this application.

1. Lecturer data
2. Data for the academic year
3. Final score data
4. Final score rule
5. Submission of topics
6. Topic data
7. Data per trial
8. The score from coordinator

This system needs a master data before it can be used. There are several master data that needs to be save by Final Project Coordinator which are lecturer data and academic year. Figure 6 5 show web page menu where Final Project Coordinator can manage all data. Figure 6 show each lecturer data must be provided with minimum data that consist NIK, name, email, and academic structural position.

This final grade data contains the grade data for each student who has successfully completed. Display of Final Project Grade can be seen in Figure 7. Figure 8 is an application display where the Final Project Coordinator approves the value if the value of each required stage has been completed by the supervisor or examiner.
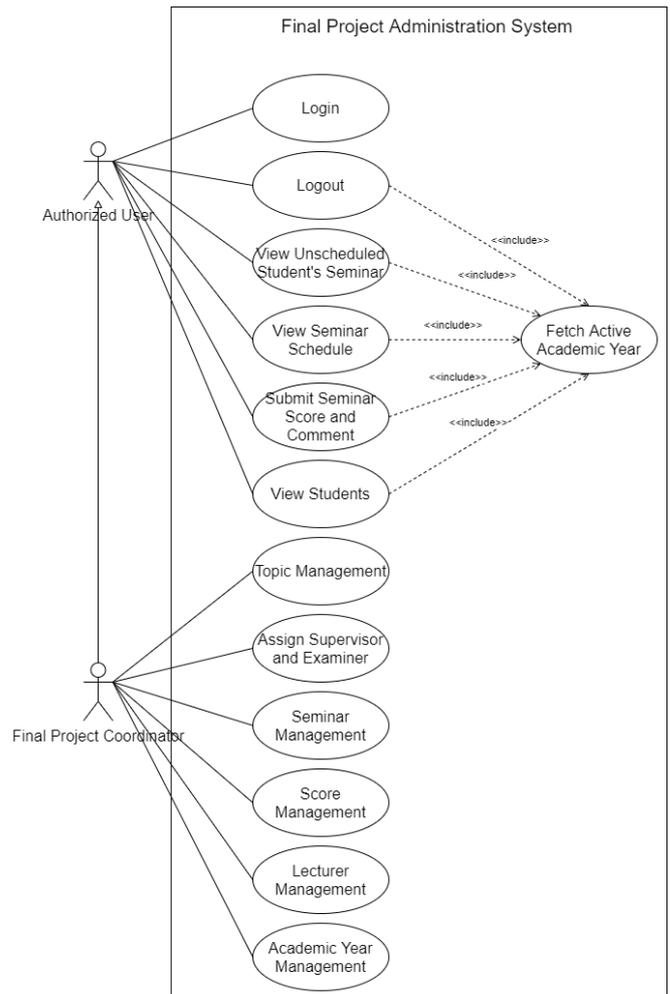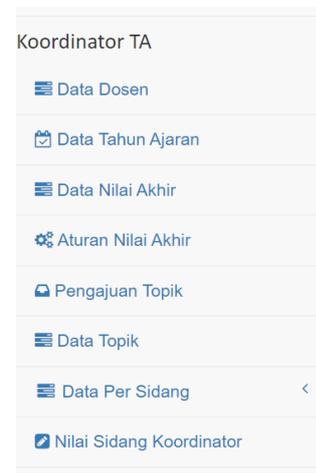

Figure 4 Use Case Diagram

Figure 5 Document Digitalization and Scoring Grading System

Figure 6 Lecturer Data Management

Figure 7 Final Project Data

Figure 8 Final Project Data Progress

V. CONCLUSIONS

This research has produced an application design that can be used to manage the data of students who take the Final Project Seminar and Final Project in Informatics Engineering Study Program. This research has produced an application design that can be used to record the achievement and stages that were successfully completed by students to complete the Final Seminar and Final Project Assignment in Informatics Engineering Study Program. The application prototype is currently under development. Testing version of the system still hasn't reached perfection.

REFERENCES

[1] A. Nugroho, *Rekayasa Perangkat Lunak Menggunakan UML & Java*, Yogyakarta: ANDI, 2010.

[2] K. and A. Koniyo, *Membangun Sistem Informasi Akuntansi dengan Visual Basic dan Microsoft SQL Server*, Yogyakarta: Andi, 2007.

[3] Y. Djahir and D. Pratita, *Bahan Ajar Sistem Informasi Manajemen*, Yogyakarta, Deepublish, 2014, p. 14.

[4] J. Rumbaugh, G. Booch and I. Jacobson, *The Unified Modelling Language Reference Manual*, Addison-Wesley, 2005.

[5] M. Salahuddin and R. A. S, *Modul Pembelajaran Rekayasa Perangkat Lunak berbasis orientasi objek*, in Rekayasa Perangkat Lunak, Bandung, Modula, 2013, p. 161.

[6] J. W. Satzinger, R. B. Jackson and S. D. Burd, *Systems Analysis and Design in a Changing World*, vol. VI, Cengage Learning, 2011.

[7] R. T. Pahlevy, "Rancang Bangun Sistem pendukung Keputusan Menentukan penerima Beasiswa dengan Menggunakan metode Simpele Additive Weighting (SAW).", Skripsi Program Studi Tehnik Informatika. Surabaya,Indonesia: Universitas Pembangunan Nasional "Veteran", 2010.

[8] J. Schmuller, Sams *Teach Yourself UML in 24 Hours*, Sams: Sams Publishing, 2004.

[9] Google (2018) Introduction Firebase. [Online]. Available: https://firebase.google.com.

[10] H. Singh and M. Tanna *Serverless Web Applications with React and Firebase*, Birmingham: Packt Publishing, 2018.

[11] H. Toba, E. A. Wijaya, M. C. Wijanto and O. Karnalim, "Enhanced Unsupervised Person Name Disambiguation to Support Alumni Tracer Study," *Global Journal of Engineering Education*, vol. 19, no. 1, pp. 42-48, 2017.

[12] A. Fakih, I. K. Raharjana and B. Zaman, "Pemanfaatan Teknologi Fingerprint Authentication untuk Otomatisasi Presensi Perkuliahan," *Journal of Information System Engineering and Business Intelligence*, vol. 1, no. 2, pp. 41-48, 2015.

[13] R. Tan, D. S. Kartawihardja and I. Christian, "Penerapan Teknologi RFID untuk Purwarupa Pencatatan Presensi Mahasiswa di Laboratorium Komputer," *Journal of Information System and Business Intelligence*, vol. 3, no. 2, pp. 122-128, 2017.

[14] O. Karnalim, S. Budi, S. Santoso, E. D. Handoyo, H. Toba, H. Nguyen and V. Malhotra, "FACE - Face at Classroom Environment: Dataset and Exploration," in 2018 *Eighth International Conference on Image Processing Theory*, Tools and Applications (IPTA), Xi'an, pp. 1-6, 2018.

[15] O. Karnalim, "Detecting Source Code Plagiarism on Introductory Programming Course Assignments using a Bytecode Approach," in 2016 *International Conference on Information & Communication Technology and Systems (ICTS)*, Surabaya, pp. 63-68, 2016.

[16] R. V. Imbar, K. Masli and D. Edi, "Sistem Pendukung Keputusan Penerima Beasiswa Dengan Metode Simple Additive Weighting (Studi Kasus di Fakultas Teknologi Informasi U.K. Maranatha)," *Jurnal Teknik Informatika dan Sistem Informasi*, vol. 2, no. 3, pp. 275-286, 2016.

[17] M. C. Johan, R. Tan, O. Karnalim, E. Imandha and T. Cahyadi, "Analisis dan Perancangan Aplikasi Penyusunan Jadwal Mengajar Sesuai Jadwal Kesediaan Mengajar Dosen Di Fakultas Teknologi Informasi (Studi Kasus : Jurusan Teknik Informatika)," *Jurnal Teknik Informatika dan Sistem Informasi*, vol. 1, no. 2, pp. 132-141, 2015.

[18] B. A. Manuel and O. Karnalim, "Revitalizing Internship Registration Portal with an Implementation of Application Lifecycle Management," *Journal of Information Systems*, vol. 5, no. 1, pp. 15-21, 2018.

[19] Y. Bastian, D. J. Surjawan and A. , "Aplikasi Penjadwalan Sidang Tugas Akhir di Fakultas Teknologi Informasi Universitas Kristen Maranatha Dengan Metode Depth First Search," *Jurnal Teknik Informatika dan Sistem Informasi*, vol. 4, no. 1, pp. 173-184, 2018.

[20] G. R. Payara and R. Tanone, "Penerapan Firebase Realtime Database Pada Prototype Aplikasi Pemesanan Makanan Berbasis Android," *Jurnal Teknik Informatika dan Sistem Informasi*, vol. 4, no. 3, pp. 397-406, 2018.

JuTISI
Jurnal Teknik Informatika dan Sistem Informasi