Implementation of the Greedy Algorithm for Determining KKN (*Kuliah Kerja Nyata*) Grouping in the Development of the Kuningan University Kkn Online System Service Based on Mobile Applications

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Abstract. KKN (Kuliah Kerja Nyata) is an academic activity in the form of community service programs carried out by students in an interdisciplinary and cross-sectoral manner. Those who have been registered as KKN (Kuliah Kerja Nyata) participants will be divided into several groups where each group is determined based on the criteria of gender and majors. The purpose of this study is to build a system for determining the KKN (Civil Work) group automatically based on gender and majors evenly and optimally. To build a system for determining the KKN (Kuliah Kerja Nyata) class, a greedy algorithm is used. The application of the greedy algorithm is done by dividing the composition of participants into one group based on gender criteria. This system uses PHP as the programming language, Apache as the web server and MYSQL as the database. The results of this study indicate that the Greedy Algorithm can be implemented in an optimal and ideal system for determining groups of KKN participants.

Keywords: Greedy Algorithm; Apache web server; *Kuliah Kerja Nyata*

1 Introduction

Kuliah Kerja Nyata (KKN) are part of the education system at universities in Indonesia[1] Universitas Kuningan as one of the universities located in the West Java region has established KKN as an intracurricular lecture in the form of community service carried out by students as part of a tri dharma of higher education which is multidisciplinary and cross-sectoral[2]. Universitas Kuningan made this activity aimed at developing students' sense of sensitivity and social cognition as well as helping the development process, especially in rural areas.

Students who have been registered as KKN participants are divided into groups consisting of various majors and gender distribution to be placed in the border villages of Kuningan Regency [3]. So far, the division of groups is done manually so that there is an imbalance in the proportion of majors and gender in each group. Ideally, a KKN group is a balanced combination of the distribution of majors and different genders with the aim of creating group dynamics through various criteria including participation, communication, collaboration, influence, trust, attachment, empowerment and satisfaction [4]. The division of KKN groups manually at Kuningan University is not optimal to achieve these goals and takes a relatively long time and requires careful planning.

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For this reason, an optimization step is needed in the Division of Community Service Groups at Kuningan University. Greedy algorithm is an algorithm that is commonly used to solve optimization problems. The main concept of this algorithm is to take opportunities that exist at that time without paying attention to future consequences, or commonly referred to as the principle of "take what you can get now!"[5]. Every decision taken is expected to be the optimum step in that step, recognized as a local optimum solution, then with each step taken is expected to obtain the optimum solution at the end of the process, namely the global optimum solution [6]

2 Methodology

This article uses an optimization approach using the Greedy Algorithm whose terminology, the Greedy algorithm has the meaning of the word "greedy" or "greedy" to solve the main problem, namely the optimization of the distribution of gender and types of majors and faculties in a KKN group. This algorithm has the principle of "take what you can get now!", in other words, the thing chosen is the best at that time, which has the highest optimization value. The way this Greedy method works is to solve a problem by inputting data with several constraints but one objective function. This problem will be solved by certain steps, so it is necessary to choose several possible solutions. From the set of several solutions, an optimal solution will be obtained, namely a solution that has fulfilled its objective or objective function. However, if the input does not have a limiting function, it does not include a possible solution [7].

The Rapid Application Development (RAD) method is used in this study where data collection through triangulation of data with observations, interviews and literature studies is carried out in the Requirement Planning phase, problem solving in the form of optimizing the distribution of group members in several criteria using a Greedy Algorithm is carried out in the Requirement Planning phase towards Workshop Design phase and system development and implementation are carried out in the Implementation phase (Figure 1)

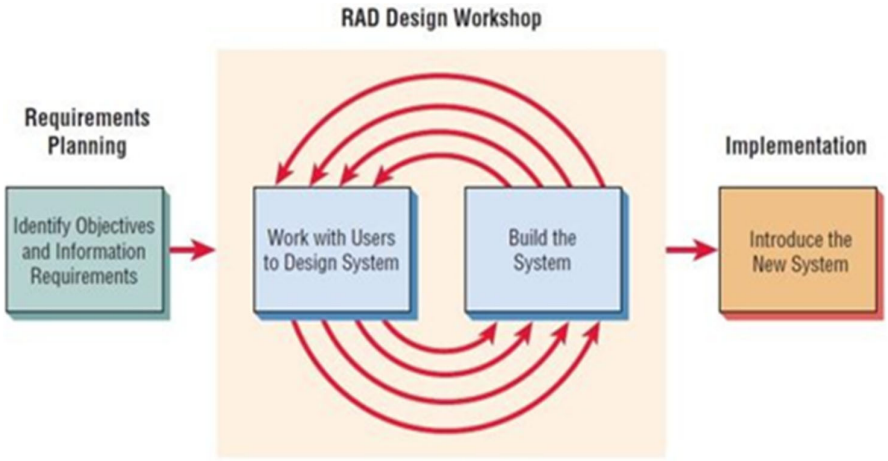

Figure 1. RAD Methodology

2.1. Group Distribution Randomization Strategy

The distribution of group members with several criteria was carried out through group randomization with weighting of gender, study program and faculty

a. Group division by gender

Each group consisted of seven students with an ideal male and female composition. The weighting of the sex criteria is assumed to be a sex composition based on the difference in the number between men and women. Basically the number of men and women will determine the number of members in each group based on the available data. Determination of weight based on sex is assumed by the difference in the number of men and women. The details of the weight assumptions obtained from the difference in the total number of men and women are shown in Table 1

Table 1. Assuming Weight Based On Gender

Gender Criteria	Weight
3 Men dan 4 Women	7
4 Men dan 3 Women	6
2 Men dan 5 Women	5
5 Men dan 2 Women	4
1 Men dan 6 Women	3
6 Men dan 1 Women	2
0 Men dan 7 Women	1
7 Men dan 0 Women	1

b. Group division based on study program and faculty

Each group consists of seven students with different faculties. In this study, it is assumed that faculty weighting is based on differences in faculties and majors in a group. The following is a strategy in determining the weighting criteria based on the faculty:

1) Generate all randomized group data
2) Check the faculty of each group
3) If there are the same faculties in several participants, check the study program.
4) Repeat steps 2) and 3) until all groups have been checked

After determining the strategy in the weighting criteria based on the faculty, then the limits contained in the weighting are determined. If in the group there are no students with the same faculties, the maximum weight will be given, whereas if there are the same faculties or the same majors, the weighting criteria use the Formula 1. For the maximum weight of a group is seven and the minimum weight is one

$$B = \frac{1}{n} + \left(\frac{n-m}{n^2}\right) \qquad \textbf{(Formula 1)}$$

Information:
B = Student weight
n = number of students with the same faculty
m = number of students with the same study program

c. Normalization of Each Weighting Criteria

The formula used to normalize the value of the weighting criteria can be seen in Formula 2

$$n = \frac{B-b}{a-b} \qquad \textbf{(Formula 2)}$$

Information:

N = Normalized value of the total weight per criterion (gender / study program)
B = weighted value of each criterion (gender / study program)
A = maximum value of each weight (gender / study program)
B = minimum value of each weight (gender / study program)

d. Average Normalization of Weighting Criteria

Average normalization is used to see the ideal level of a group. Average normalization using the Formula 3

$$r = \frac{N}{i} \qquad \textbf{(Formula 3)}$$

Information:

R = Average total normalization
N = Total normalization criteria
I = Many criteria

The ideal level of a group is determined by the mean of normalization. Table 2 is an explanation of the criteria for the ideal level of a group

Table 2 Criteria Ideal Level

Criteria	Normalization Mean
Very Ideal	0,9 – 1,00
Ideal	0,8 – 0,89
Pretty Ideal	0,7 – 0,79
Less Ideal	0,6 – 0,69
Not Ideal	< 0,6

2.2. Black Box & White Box Testing

Black box testing is a test data design method based on software specifications. The test data is generated, executed on the software and then the output of the software is checked to be as expected. White box (glass box) testing is a test that is based on checking the design details, using the control structure of the program design procedurally to divide the test into several test cases [8]

3 Result and Discussion

As mentioned earlier, this study aims to develop the Kuningan University Online KKN system by applying the Greedy algorithm optimization to the optimization of gender distribution as well as majors and faculties in each group. System development is carried out based on the Rapid Application Development (RAD) system development method. There are three phases in RAD that involve the analyzer and the user in the assessment, design, and implementation stages. The three phases are requirements planning, RAD design workshop (RAD design workshop), and implementation [9]

3.1. Requirements Planning

In this stage, the writer met with the KKN committee to identify what information needs were and what problems arise when dividing the KKN groups. This stage requires an active role from both parties, planning will be made into the system

3.2. Design Workshop

1) Data Flow Diagram

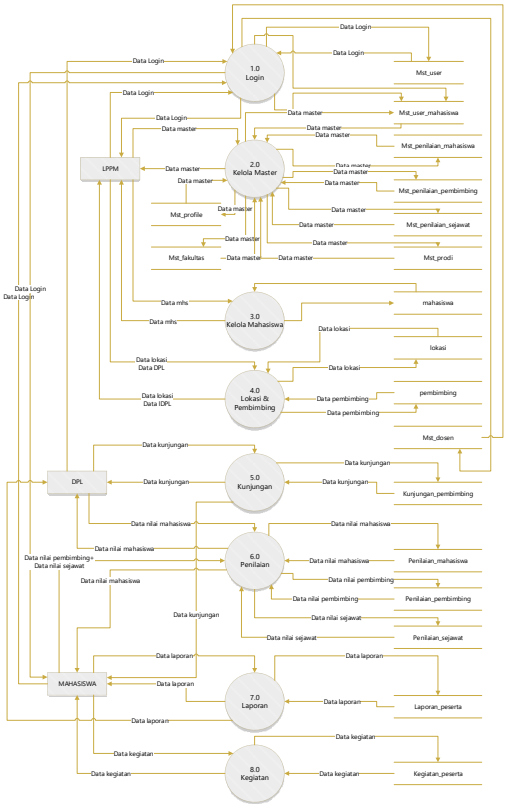

Figure 2. Data Flow Diagram

2) Contexts Diagram

Data Flow Diagram is a network that describes an automatic / computerized system, manualization or a combination of the two, the depiction of which is arranged in the form of a collection of interconnected system components according to the rules of the game [10]

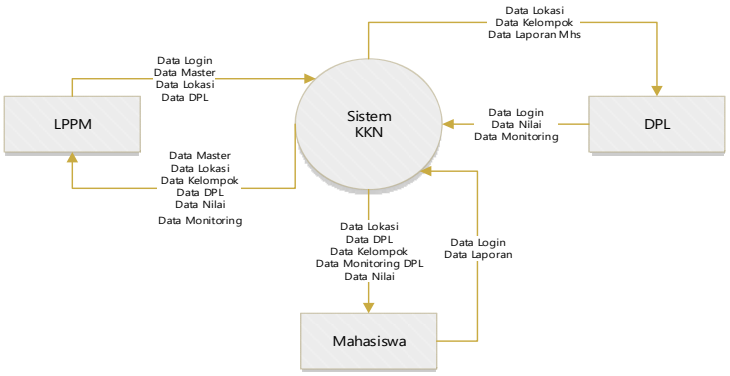

Figure 3 Contex Diagram

3) Entity Relationship Diagram

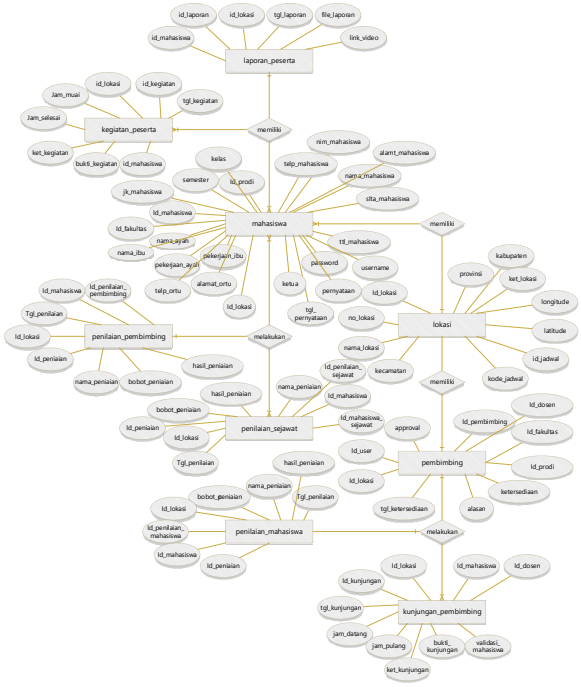

Figure 4. Entity Relationship Diagram

3.3. Implementation

After the implementation is done, here are some views that can be delivered as follows:

1) Homepage

The start page that is displayed after successfully logging in as an admin.

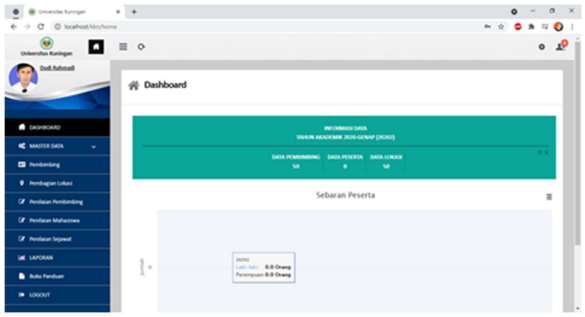

Figure 5. Homepage

2) KKN Schedule Page

This page is a page to see the current or previous KKN schedule, as well as a page to add a KKN schedule, along with the display results on the system

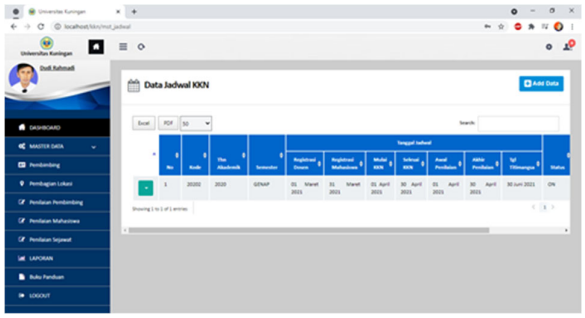

Figure 6. KKN Schedule Page

3) Student Data Page

This page displays student data as KKN participants

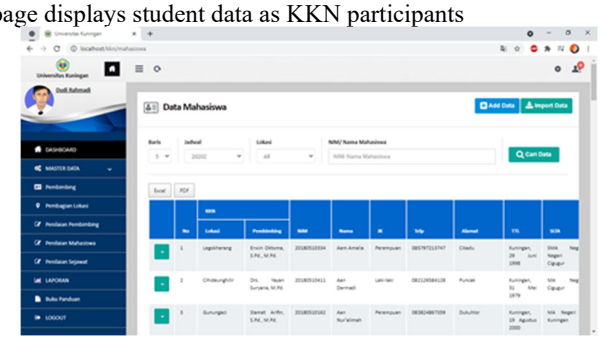

Figure 7. Student Data Page

4) Advisory Lecturer Page
This page displays Field Supervisor

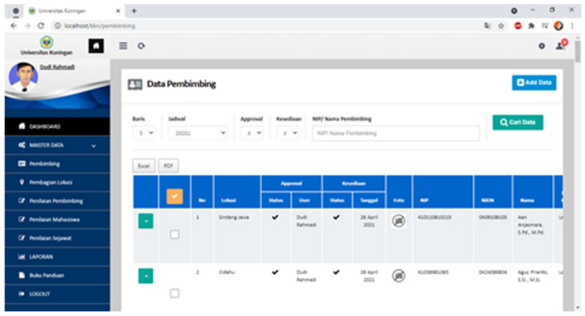

Figure 8. Advisory Lecturer Page

5) KKN Location Pages
This page displays the KKN location page

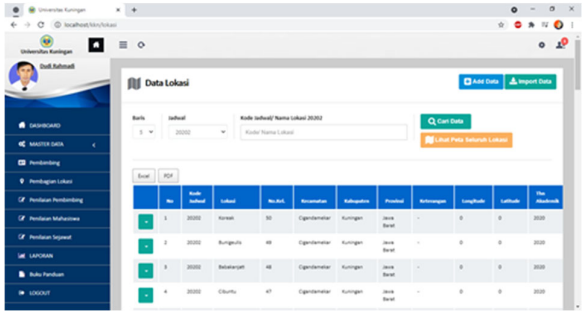

Figure 9. KKN Location Pages

6) Group Split Optimization Page
This page displays the process of grouping KKN participants and the distribution of Advisory Lecture (DPL) in each group

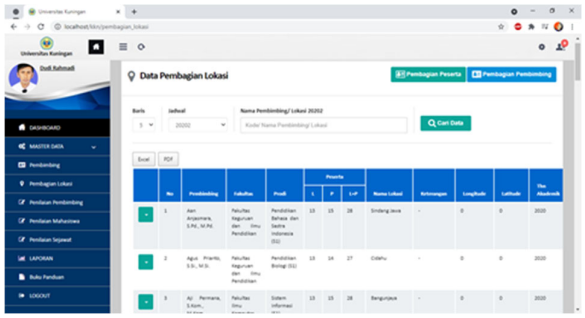

Figure 10. Group Split Optimization Page

7) Report Page
Pages containing reports related to KKN

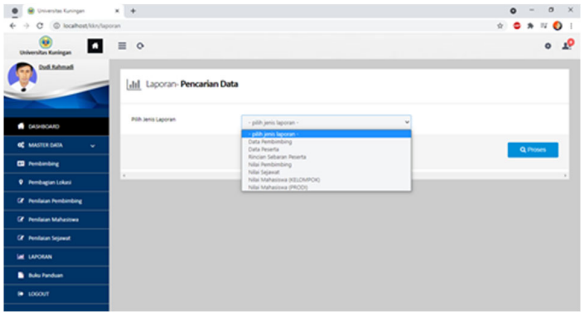

Figure 11. Report Page

8) Student Grades Page
Page to display KKN scores

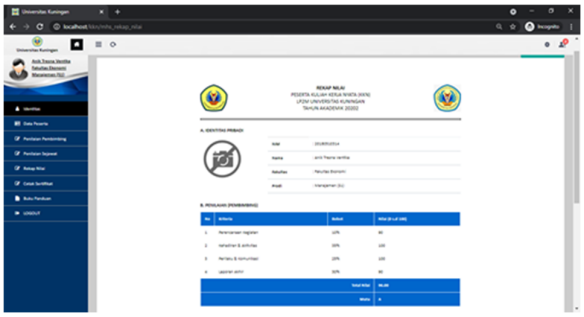

Figure 12. Student Grades Page

9) Certificate Print Page
Page to print KKN certificate

Figure 13. Certificate Print Page

4 Conclusion

Based on the results of analysis and testing on the group determination system for Real Work Lectures (KKN) using the Greedy Algorithm to determine groups of KKN participants based on gender and study program (case study: Kuningan University), the following conclusions were obtained:

1) The Greedy Algorithm can be implemented into a group determination system for Real Work Lectures (KKN) based on gender and study program so that the composition of the division of participants in one group is evenly divided based on gender and study program.
2) The group testing uses the 2018 KKN participant data with a total of 1390 participants. Based on the results of the KKN participant grouping test using the Greedy Algorithm, the KKN group determination system can group KKN participants optimally and ideally with an ideal average achievement of 0.87 points

References

[1] Zufialdi Zakaria, R. Irvan Sophia and Nur Khoirullah, "Modifikasi Konsep Participatory Rural Appraisal Uuntuk Pembekalan Kuliah Kerja Nnyata Mahasiswa di Jawa Barat, Indonesia," *J* Dharmakarya: Jurnal Aplikasi Ipteks untuk Masyarakat Vol. 7, No. 1,: 38 - 45 ISSN 1410 - 5675. Maret 2018.

[2] Husni Mubarok, Rianto, Akhmad Satori, "Perencanaan Sistem Informasi Monitoring dan Evaluasi Kuliah Kerja Nyata Menggunakan Zachman Framework" Jurnal Siliwangi Vol.5. No.1, P-ISSN 2477-3891 Seri Sains dan Teknologi E-ISSN 2615-4765 8. 2019

[3] LPPM. "Panduan Pelaksanaan Kuliah Kerja Nyata Mahasiswa Universitas Kuningan Tahun Akademik 2020/2021". Kuningan : Universitas Kuningan.2020

[4] Dr. Megah Andriany, S.Kp., M.Kep., Sp.Kom, "Dinamika KelompokK Dalam Peningkatan Manajemen Diri Warga Binaan Pemasyarakatan" Prosiding Seminar Nasional Keperawatan. Departemen Ilmu Keperawatan Fakultas Kedokteran Universitas Diponegoro. 2018 .

[5] Brassard, G, "Fundamentals of Algorithmics" ,Prentice-Hall, New Jersey, 1996.

[6] Wiratama, Stefani Gisella, et al. "Penerapan Algoritma Greedy Pada Pengaturan Shipping Buku Diknas PT. X." *Jurnal Rekayasa Sistem & Industri (JRSI)* 5.01: 23-31. 2018

[7] Muwisnawangsa, Vandu Riski, and Aristoteles Aristoteles. "Analisis pengelompokan mahasiswa KKN berdasarkan kriteria jenis kelamin, fakultas dan sekolah." *Jurnal Komputasi* 5.1 .2017

[8] Janner, Simarmata. Kadir, Abdul. Andi Rekayasa Perangkat Lunak . Yogyakarta: Penerbit Andi.2010

[9] Kenneth E. Kendall, Julie E. Kendall. Analisis dan Perancangan Sistem. Jakarta : PT Indeks. 2010.

[10] A.S, Rosa. 2013. *Rekayasa Perangkat Lunak*. Bandung : Informatika Bandung. 2013.