



SISTEM PENDUKUNG KEPUTUSAN PENENTUAN PEMILIHAN DOSEN PEMBIMBING SKRIPSI FAKULTAS ILMU KOMPUTER UNIVERSITAS AL WASHLIYAH (UNIVA) LABUHANBATU BERDASARKAN MINAT MAHASISWA DENGAN METODE AHP

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Abstract

Determination of the thesis supervisor at the Faculty of Computer science, Al Washliyah University (UNIVA) Labuhanbtu is currently carried out by determining directly by determining the thesis supervisor to direct and assist in completing the thesis. The main objective of this research is to determine the thesis supervisor of the Faculty Computer science, University of Al Washliyah (UNIVA) Labuhanbatu, the method used in determining the supervisor is using the AHP (Analytical Hierarchy Process) method. The creation of this system begins. Observing and searching for data, analyzing and collecting data, designing, programming, and the application uses the visual basic programming language, source code and access database for its database. The final result of this research is to produce a decision support system for determining thesis supervisor using the AHP (Analytical Hierarchy Process) method.

1. INTRODUCTION

The ability to make decisions quickly, on target and can be accounted for is the key to the success of a university. Having a lot of information is not enough, if there is no ability to assemble it quickly, it really becomes the best alternative in the decision-making process. However, before the decision-making process is carried out from the various alternatives that exists, it is necessary to have a criterion. Each criterion must be able to provide a question regarding alternatives to solve a problem at hand.

Decision making in universities is strongly influenced by the quality of knowledge and the creative talents of the students themselves. Students are prospective graduates who, in their involvement in universities or colleges (which are getting closer to the community), are nurtured and are expected to become intellectual candidates [1].

The role of the Faculty of Computer Science, the Informatics Engineering study program is very important, especially in determining the selection of the thesis supervisor based on asking the students to obtain a graduation gate for Al Washliyah Labuhanbatu University students. Thesis is a graduation requirement for a student to obtain or obtain a bachelor's degree. Therefore, determining the selection of a thesis supervisor that is in accordance with student interests is very necessary. This is none other than to trigger the mindset of students to continue to be enthusiastic, intelligent and creative in working on the thesis. Generally, the selection of the thesis supervisor is decided by the Faculty of Computer Science in the Informatics Engineering study program through a meeting of the Dean, Head of Study Program and all Informatics Engineering lecturers to determine which lecturer fits the title and description of the student taking the thesis title. The results of the decisions of the Faculty of Computer Science, Informatics Engineering study program, take a day or a week at most after submitting the thesis title. Thus the mechanism is of course very inefficient to do. Decision Support System (SPK) which can reduce the level of inefficiency on the part of the Faculty of Computer Science, Informatics Engineering study program.

Decision Support System (SPK) which can reduce the level of inefficiency of the Faculty of Computer Science, Informatics Engineering study program in making decisions on determining the thesis supervisor based on student interests with several influential criteria so that there is the term the right man in the right position. Decision Support System (SPK) is a decision-making system in the form of information, data by manipulating data. Meanwhile, this system is used to assist in making semi-structured and unstructured decisions, so that no one knows how decisions should be taken [2].

2. RESEARCH METHOD

Decision Support System (SPK)

Decision support system is a system intended to support management decision making. DSS consists of two keys, namely information systems and decisions. The information system is a series of grouped data, a process that results in further information being given to users [4]. Decisions are the result of solving a problem faced quickly and correctly in a decision there are definite, precise answers to questions. And the decision must answer the question of what is conveyed in relation to planning [3]. In order to achieve the goal of the system must be simple controllable, adaptable, complete, with important matters, able to communicate. Implicitly means that the system must be computer-based or used as a tool for someone's problem solving skills [5].

AHP (Analytical Hierarchy Process)

AHP The process of making a decision by selecting an alternative. AHP can be relied upon because in the Analytical Hierarchy Process a priority is composed of several choices, namely in the form of pre-structured criteria, so that the prioritization is unified in a hierarchical process. Analytical hierarchy process is a modeling system in making decisions that are comprehensive [7].

Stages AHP (Analytical Hierarchy Process)

Analytical hierarchy process has advantages or excels in explaining the process of decision-making systems. As illustrated in a graphical way so that it can be understood by all parties involved in decision making [8]. In solving a problem with AHP there are several stages that must be understood, namely:

Definition of the problem and the solution determined. The problem that occurs is the problem in determining the selection of the thesis advisor of the Faculty of Engineering, University of Al Washliyah (UNIVA) Labuhanbatu which is carried out by means of a meeting between the dean, head of study program and other lecturers which takes a long time so that it takes a day or a week to determine it, so there is inefficiency. And in determining the solution to this problem can be overcome by using other alternatives such as using a decision support system (DSS) with the AHP method which is fast in determining and solving a problem with criteria and priorities.

Create a hierarchical structure with a primary objective. In a hierarchical structure that is determined by the goal is the overall system goal at the top level. The next level consists of criteria for assessing or considering existing alternatives and determining these alternatives.

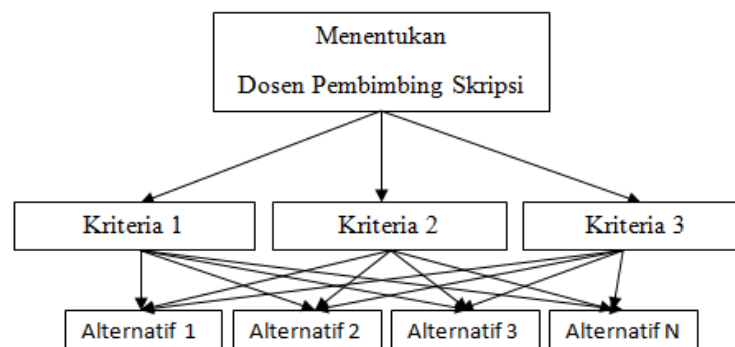


Figure 1. Hierarchy of the AHP Method for Selecting Thesis Advisors

Create a pairwise comparison matrix that describes the effect on each element of the objectives and criteria that are one level above it.

Table 1. Pairwise Comparison Matrix

	Kriteria 1	Kriteria 2	Kriteria 3	Kriteria N
Kriteria 1	K1/K1	K1/K2	K1/K3	K1/KN
Kriteria 2	K2/K1	K2/K2	K2/K3	K2/KN

Kriteria 3	K3/K1	K3/K2	K3/K3	K3/KN
Kriteria N	KN/K1	KN/K2	KN/K3	KN/KN

Defining pairwise comparisons so that $n \times [(n-1)/2]$ pieces are obtained, the meaning of the letter n is the most elements to be compared. Criteria with alternatives are done in pairs. [9] to solve a problem using the analytical hierarchy process method [10], in various comparisons, from a scale of 1 to 9 is the best scale in expressing opinions. The value of the importance level is shown in the following table:

Table 2. Couple Comparison Rating Scale

Intensitas Kepentingan	Keterangan
1	Kedua elemen sama pentingnya
3	Elemen yang satu sedikit lebih penting daripada elemen yang lainnya
5	Elemen yang satu lebih penting daripada elemen lainnya
7	Satu elemen jelas lebih penting daripada elemen lainnya
9	Satu elemen mutlak penting daripada elemen lainnya
2,4,6,8	Nilai-nilai antara dua nilai pertimbangan yang berdekatan
Kebaikan	Jika aktivitas <i>i</i> mendapat satu angka dibandingkan dengan aktivitas <i>j</i> , maka <i>i</i> memiliki nilai kebaikannya dibandingkan dengan <i>j</i>

the

Calculate

eigenvalues and test their consistency.

Calculate the eigenvectors in each pairwise comparison matrix. Eigenvectors are the weights of each element prioritizing elements at the lowest hierarchical level until the goal is reached. Calculation begins by adding up each column value in the matrix, dividing each value from the column by the total column by the total in the column in question until you can normalize the matrix, and adding up the values in each row, dividing by the number of elements to get the average.

Check Hierarchy Consistency. Measurable hierarchical consistency in the analytical hierarchy process, which is the consistency ratio, shows the consistency index. The expected consistency is consistency close to perfect words resulting in valid decisions. However, it is difficult to achieve perfection, the consistency ratio expects less or equal to 10%. The consistency index of an n-order matrix can be obtained by the formula:

$$CI = \frac{\lambda_{\max} - n}{n - 1}$$

Where: Consistency Index (CI)

n = the number of elements

λ_{\max} = The largest eigenvalue of an

n-order matrix If CI = 0, it means the matrix is consistent.

calculations can be declared correct.

AHP System Algorithm

The AHP (Analytical Hierarchy Process) method system, a problem can be described into various criteria arranged in a hierarchy. Each criterion is booted by performing pairwise comparisons between criteria. Each wieght selection alternative performs pairwise comparisons. This step with the AHP system with a final assessment of each alternative. The alternative with the largest final value is the best.

Table 3. The Specified Criteria

Kriteria	Kode
----------	------

Analisis Algoritma Pemograman	A1
Sistem Pendukung Keputusan	A2
Sistem Pakar	A3

In the calculation of the consistency ratio, it functions to check the value of the consistency ratio (CR) \leq 0.1. If it turns out that CR is greater than 0.1. Then the pairwise comparison matrix must be repaired.

Table 4. Consistent Ratio Calculation

Kriteria	Jumlah	Prioritas	Hasil
A1	2.157	0.563	2.72
A2	1.205479	0.288	1.493479
A3	0.523404	0.146	0.669404

From the calculation above, the following values are obtained

Number of results : $2.72 + 1.493479 + 0.669404 = 4.882883$

$N = 3$

$\lambda_{\text{mak}} (\text{amount} / n) = 4.882883 / 3 = 1.627627$

$CI (\lambda_{\text{mak}} (\text{amount} / n) - 3) / 3 = -0.457457$

The following is the data that has been collected based on the results of information data in submitting a thesis title for students of the Faculty of Computer Science, Al Washliyah University (UNIVA) Labuhanbatu which has been ACC by the dean and head of study program. The data was tested using the multicriteria Analytical Hierarchy Process (AHP) method with the thesis supervisor category, the thesis title based on student interests in the from of analysis of programming algorithms, decision support systems, and expert systems.

Table 5. Data of the thesis supervisor of the faculty of computer science

No	Nama Dosen Pembimbing Skripsi	A	B	C
1	Abdul Hakim Dalimunthe, M.Kom	1	5	2
2	Basyarul Ulya, SH,MM	1	3	3
3	Endi Zunaeady Pasaribu, M.Pd	1	2	1
4	Kusmanto, M.Kom	3	3	4
5	M.Bobby Kurniawan Nst, M.Kom	1	2	1
6	M.Fauzi Romadhon, M.Hum	3	1	1
7	Ronal Watrianthos, M.Kom	1	4	3
8	Rahmad Aditiya, M.Kom	1	2	4
9	Rahmi Safriyeti, M.Pd	1	2	1
10	Samsir, ST, M.Kom	8	4	4
11	Sabrina Rasyid Munthe, M.Si	1	2	2
12	Selamet Subagio, M.Kom	1	5	4
13	Sudi Suryadi, M.Kom	5	1	7
14	Taufiqqurahman Nur, MA	2	3	1
15	Wahyu Azhar Ritonga, M.Si	1	3	2

Description :

A : Student interest in the thesis title programming algorithm analysis

B : Student interest in the thesis title decision support system

C : Student interest in the thesis title expert systems

The next step is to determine the priority of each student interest criterion based on a pairwise comparison of each name of the thesis supervisor that has been determined as follows :

Determining the priority of student interest criteria with the thesis title programming algorithm analysis

Table 6. Criteria Priority Matrix

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15
A1	0.0 32	0.0 32	0.0 32	0.0 32	0.0 31	0.0 32	0.0 31	0.0 32	0.0 32	0.0 14	0.0 32	0.0 32	0.0 32	0.0 36	0.0 32
A2	0.0 32	0.0 32	0.0 32	0.0 32	0.0 31	0.0 32	0.0 31	0.0 32	0.0 32	0.0 14	0.0 32	0.0 32	0.0 32	0.0 36	0.0 32
A3	0.0 32	0.0 32	0.0 32	0.0 32	0.0 31	0.0 32	0.0 31	0.0 32	0.0 32	0.0 14	0.0 32	0.0 32	0.0 32	0.0 36	0.0 32
A4	0.0 32	0.0 32	0.0 32	0.0 32	0.0 31	0.0 32	0.0 31	0.0 32	0.0 32	0.0 14	0.0 32	0.0 32	0.0 32	0.0 36	0.0 32
A5	0.0 97	0.0 97	0.0 97	0.0 97	0.1 02	0.0 97	0.1 02	0.0 97	0.0 97	0.0 41	0.0 97	0.0 97	0.0 97	0.1 07	0.0 97
A6	0.0 32	0.0 32	0.0 32	0.0 32	0.0 31	0.0 32	0.0 31	0.0 32	0.0 32	0.1 09	0.0 32	0.0 32	0.0 32	0.0 36	0.0 32
A7	0.0 97	0.0 97	0.0 97	0.0 97	0.1 02	0.0 97	0.1 02	0.0 97	0.0 97	0.0 41	0.0 97	0.0 97	0.0 97	0.1 07	0.0 97
A8	0.0 32	0.0 32	0.0 32	0.0 32	0.0 31	0.0 32	0.0 31	0.0 32	0.0 32	0.1 09	0.0 32	0.0 32	0.0 32	0.0 14	0.0 32
A9	0.0 32	0.0 32	0.0 32	0.0 32	0.0 31	0.0 32	0.0 31	0.0 32	0.0 32	0.1 09	0.0 32	0.0 32	0.0 32	0.0 14	0.0 32
A10	0.2 60	0.2 60	0.2 60	0.2 60	0.2 65	0.2 60	0.2 65	0.2 60	0.2 60	0.1 09	0.2 60	0.2 60	0.2 6	0.2 85	0.2 60
A11	0.0 32	0.0 32	0.0 32	0.0 32	0.0 31	0.0 32	0.0 31	0.0 32	0.0 32	0.0 14	0.0 32	0.0 32	0.0 32	0.0 14	0.0 32
A12	0.0 32	0.0 32	0.0 32	0.0 32	0.0 31	0.0 32	0.0 31	0.0 32	0.0 32	0.0 14	0.0 32	0.0 32	0.0 32	0.0 14	0.0 32
A13	0.1 61	0.1 61	0.1 61	0.1 61	0.1 63	0.1 61	0.1 63	0.1 61	0.1 61	0.0 68	0.1 61	0.1 61	0.1 61	0.1 8	0.1 61
A14	0.0 65	0.0 65	0.0 65	0.0 65	0.0 61	0.0 65	0.0 61	0.0 65	0.0 65	0.0 27	0.0 65	0.0 65	0.0 65	0.0 71	0.0 65
A15	0.0 32	0.0 32	0.0 32	0.0 32	0.0 31	0.0 32	0.0 31	0.0 32	0.0 32	0.0 14	0.0 32	0.0 32	0.0 32	0.0 14	0.0 32
Total	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
jumlah	0.4 63	0.4 63	0.4 63	0.4 63	1.4 83	0.4 65	1.4 83	0.5 35	0.5 35	3.9 4	0.4 38	0.4 38	2.1 84	0.8 66	0.4 41
Prio- ritas	0.0 3	0.0 3	0.0 3	0.0 3	0.0 9	0.0 3	0.0 9	0.0 3	0.0 3	0.2 6	0.0 3	0.0 3	0.1 6	0.0 6	0.0 3

To get a score of 1, first add up all criteria A1 to A15 from top to bottom. And for the score value, we can divide the A1 section with a score value of 1. Priority is generated from the score value divided by the score number of specified criteria.

Determining the priority of student interest criteria with the thesis title decision support system

Table 7. Criteria Priority Matrix

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15
A1	0.1 2	0.1 2	0.1 2	0.1 2	0.1 2	0.1 2	0.1 22	0.1 2	0.1 2	0.1 22	0.1 2	0.1 2	0.1 2	0.1 2	0.1 2
A2	0.0 71	0.0 75	0.0 71	0.0 75	0.0 71	0.0 71	0.0 73	0.0 71	0.0 71	0.0 73	0.0 71	0.0 71	0.0 71	0.0 75	0.0 75

A8	0.0 25	0.0 24	0.0 25	0.0 25	0.0 25	0.0 25	0.0 24	0.0 25	0.0 25	0.0 25	0.0 25	0.0 25	0.0 25	0.0 25	0.0 25
A9	0.0 25	0.0 24	0.0 25	0.0 25	0.0 25	0.0 25	0.0 24	0.0 25	0.0 25	0.0 25	0.0 25	0.0 25	0.0 25	0.0 25	0.0 25
A10	0.1 95	0.0 95	0.1 95	0.1 95	0.1 95	0.1 95	0.0 95	0.1 95	0.1 95	0.1 95	0.1 95	0.1 95	0.1 95	0.1 95	0.1 95
A11	0.0 5	0.0 47	0.0 5	0.0 5	0.0 5	0.0 5	0.0 47	0.0 5	0.0 5	0.0 5	0.0 5	0.0 5	0.0 5	0.0 5	0.0 5
A12	0.1 95	0.0 95	0.1 95	0.1 95	0.1 95	0.1 95	0.0 95	0.1 95	0.1 95	0.1 95	0.1 95	0.1 95	0.1 95	0.1 95	0.1 95
A13	0.1 75	0.1 67	0.1 75	0.1 75	0.1 75	0.1 75	0.1 67	0.1 75	0.1 75	0.1 75	0.1 75	0.1 75	0.1 75	0.1 75	0.1 75
A14	0.0 25	0.0 72	0.0 25	0.0 25	0.0 25	0.0 25	0.0 72	0.0 25	0.0 25	0.0 25	0.0 25	0.0 25	0.0 25	0.0 25	0.0 25
A15	0.0 25	0.0 47	0.0 5	0.0 5	0.0 5	0.0 5	0.0 47	0.0 5	0.0 5	0.0 5	0.0 5	0.0 5	0.0 5	0.0 5	0.0 5
Total	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Jumlah	0.7 44	1.1 19	0.3 73	1.4 9	1.4 9	0.3 73	1.1 19	0.3 73	0.3 73	1.4 9	0.7 44	1.4 9	2.6 09	0.4 69	0.7 44
Prioritas	0.0 5	0.0 75	0.0 25	0.0 99	0.0 99	0.0 25	0.0 75	0.0 25	0.0 25	0.0 99	0.0 5	0.0 99	0.1 73	0.0 31	0.0 5

To get a score of 1, first add up all criteria A1 to A15 from top to bottom. And for the score value, we can divide the A1 section with a score value of 1. Priority is generated from the score value divided by the score number of specified criteria.

For the top on of the highest data to the lowest data from the AHP method in determining the selection of the thesis supervisor of the Faculty of Computer Science, University of Al Washliyah (UNIVA) Labuhanbatu, it can be seen in the following table 9.

Table 9. The Final Result Of Determining The Selection Of The Thesis Supervisor For The Computer Science Faculty Of Al Washliyah (UNIVA) Labuhanbatu

No	Nama Dosen Pembimbing Skripsi	Analisis Algoritma Pemograman	Sistem Pendukung Keputusan	Sistem Pakar	Nilai
1	Samsir, ST, M.Kom	8	4	4	1.452
2	Sudi Suryadi, M.Kom	5	1	7	1.353
3	Ronal Watrianthos, M.Kom	1	4	3	1.258
4	Selamet Subagio, M.Kom	1	5	4	1.246
5	Rahmad Aditiya, M.Kom	1	2	4	1.229
6	Kusmanto, M.Kom	3	3	4	1.198
7	Abdul Hakim Dalimunthe, M.Kom	1	5	2	1.197
8	Basyarul Ulya, SH,MM	1	3	3	1.174
9	Taufiqqurahman Nur, MA	2	3	1	1.16
10	Wahyu Azhar Ritonga, M.Si	1	3	2	1.149
11	Sabrina Rasyid Munthe, M.Si	1	2	2	1.124
12	Endi Zunaeady Pasaribu, M.Pd	1	2	1	1.099
13	M.Bobby Kurniawan Nst, M.Kom	1	2	1	1.099
14	Rahmi Safriyeti, M.Pd	1	2	1	1.099
15	M.Fauzi Romadhon, M.Hum	3	1	1	1.075

2.5. Program Listing

Program

1. **From Login**

```
Private Sub Command2_Click()
Unload Me
End Sub
```

```

Private Sub login_Click()
id = user.Text
pw = pass.Text
If id = "" Or pw = "" Then
MsgBox "Maaf, Anda harus Mengisi Semua Formnya!", vbCritical, "Warning"
Else
If id = "admin" And pw = "12345" Then
utama.Show
utama.Label2.Caption = user.Text
Unload Me
Else
MsgBox "Passwordnya Salah gaes!", vbCritical, "Warning"
End If
End If
End Sub

```

2. From Utama

```

Private Sub Keputusan_Click()
datakeputusan.Show
End Sub
Private Sub Kriteria_Click()
kriteria1.Show
End Sub
Private Sub Logout_Click()
Unload Me
End Sub
Private Sub Profil_User_Click()
profiluser.Show
End Sub
Private Sub Data_Doping_Click()
doping.Show
End Sub

```

3. From Kriteria

```

Private Sub Command1_Click()
Adodc1.Recordset.AddNew
Adodc1.Recordset!analisis_algoritma_pemograman = Text1.Text
Adodc1.Recordset!sistem_pendukung_keputusan = Text2.Text
Adodc1.Recordset!sistem_pakar = Text3.Text
MsgBox "berhasil disimpan", vbInformation, ""
Call bersih
End Sub
Private Sub Command2_Click()
konfirmasi = MsgBox(" Yakin Akan Dihapus???", vbYesNo + vbInformation, "konfirmasi")
If konfirmasi = vbYes Then
Adodc1.Recordset.Delete
Else
End If
End Sub

```

4. From Keputusan

```

Private Sub Command1_Click()
tlaporan.Show
End Sub
Private Sub keluar_Click()
Unload Me
End Sub

```

3. RESULT AND DISCUSSION

In accordance with the analysis and design as described in the previous chapter, namely the analysis and design chapter, this section will present the results of the application that was built using the design that was carried out in the previous chapter. In this chapter the discussion will be carried out on the results of the system being built, the functional system and the analysis of system performance based on the output results generated by the system.

Login display (Input) Login is used to login admin, so that the system can be used in the future. The admin login display can be seen in Figure 3.



Figure 3. Login View

Display of the Main Menu The display of the main menu is the display of the initial page of the system which contains information about the thesis. The main menu display can be seen in Figure 4.

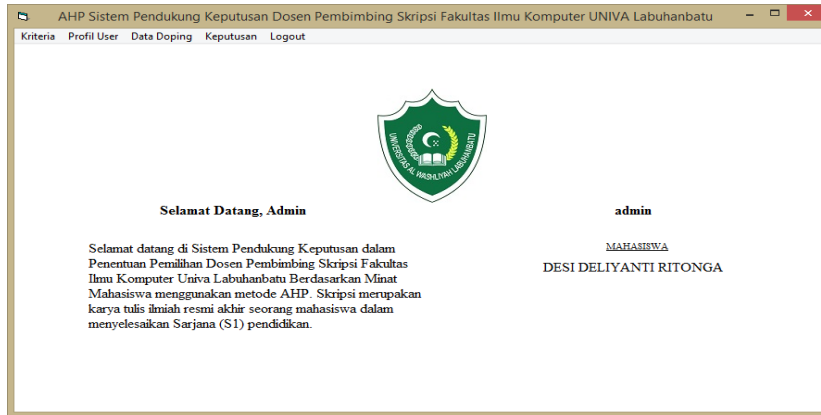


Figure 4. Display Main Menu

Criteria Display Criteria weight display is a function component to input data for each criterion in determining thesis supervisor. display criteria seen in Figure 5.

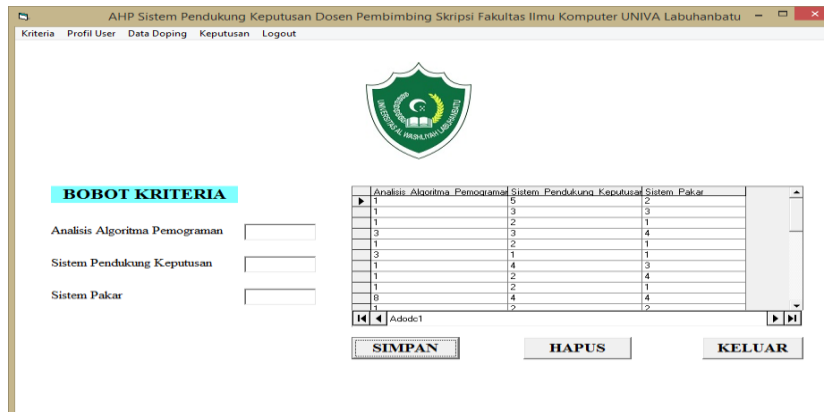


Figure 5. Criteria Weight Display

User Profile Display User profile display is a display that contains admin or operator data. User profile display seen in Figure 6.

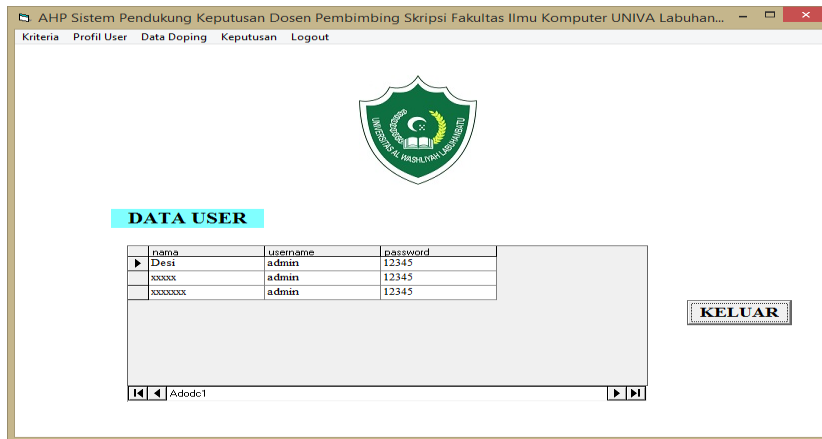


Figure 6. User Data Display

Display of Add User Data Display of added user data is a display that functions to input name, username and admin or operator password data. The display of added user data is shown in Figure 7.

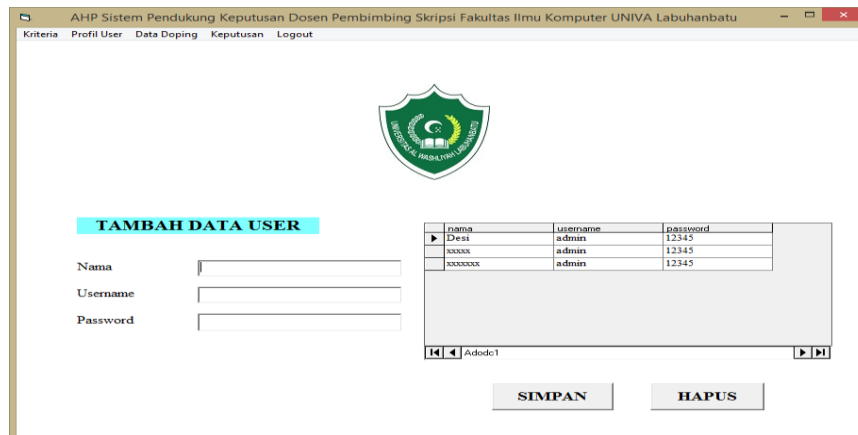


Figure 7. Display added User Data

Doping Data Display Doping data display (thesis supervisor) is a system display that is used to process thesis supervisor data. Doping data is needed in the assessment process using the AHP method. Display doping data seen in Figure 8.

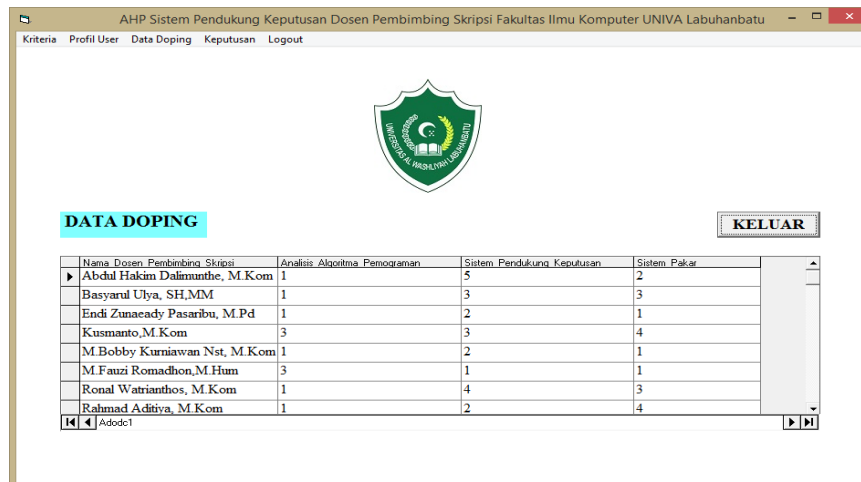


Figure 8. Doping Data Display

Added Doping Data Display Added doping data display is a system component that functions to input and change doping name data if there is a data change. The doping data input columns are developed according

to the system interface design. Display added doping data seen in Figure 9.

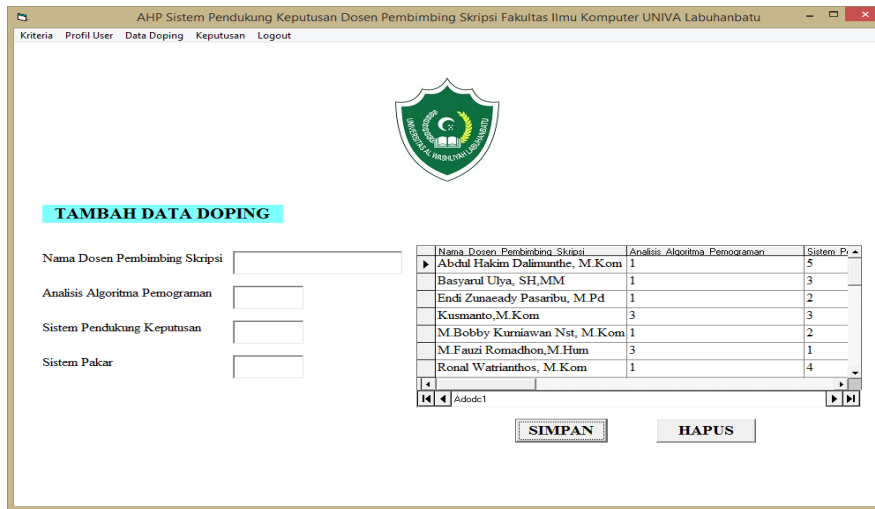


Figure 9. Display Added Doping Data

Display of Decisions (Output) The display of decisions is a system component that functions automatically to provide information on the name of the thesis doping that gets the highest to lowest student interest scores. The decision display is shown in Figure 10.

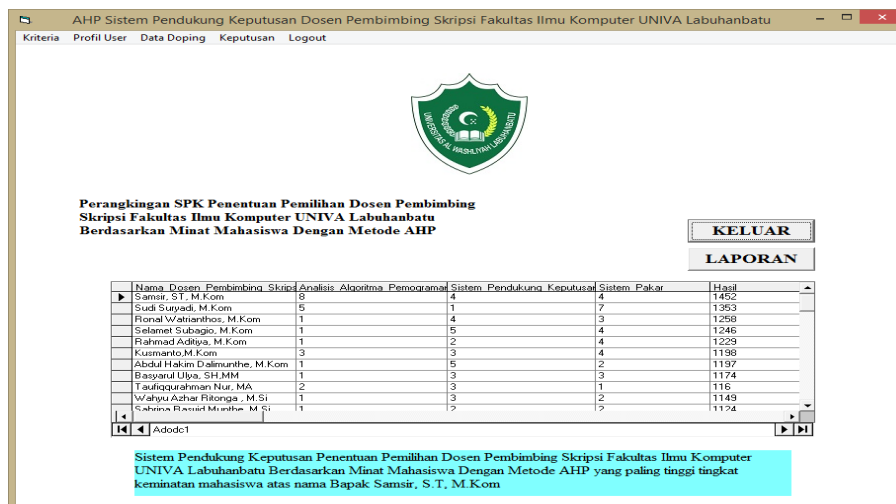


Figure 10. Decision View

4. CONCLUSION

From the formulation and discussion in the previous chapters, it can be concluded that: To determine the level of interest of students in choosing thesis supervisor at the Faculty of Computer Science, Al Washliyah University (UNIVA) Labuhanbatu with the criteria that have been used, namely analysis of programming algorithms, system decision support, and expert systems. And The thesis supervisor is based on student interest so as to produce the highest score on behalf of the thesis supervisor Mr. Samsir, S.T, M.Kom and the lowest score on behalf of the lecturer thesis advisor Mr. M. Fauzi Romadhon, M. Hum.

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