

# The Use of Programming Languages on the Final Project Report by Using Analytical Hierarchy Process (AHP)

(Case Study on the Student of Information Management Amikom Mataram)

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**Abstract**—The development in information technology provides a lot of convenience for everyone. Academy of Information Management and Computer (AIMC) students of the fourth semester, implementing the Job Training must specify the type of programming that will be used as a Final Project Report. The study assessed five types of programming language by using the approach of Analytical Hierarchy Process (AHP) to obtain information on the programming language that has the quality or better rating than 5 programming languages is based on the parameters. Analytical Hierarchy Process (AHP) is one way in determining or making a decision that are multi-criteria or multi-objective such as choosing the programming language for the Student Information Management at the Academy of Information Management and Computer (AIMC). Programming language based on five criteria consisting of Clarity, Simplicity, and unity; Orthogonality; Fairness for Applications; Supports Abstraction; Environment Program; and Portability Program.

**Keywords**—programming language; parameters; AHP

## I. INTRODUCTION

The developments in information technology provide a lot of convenience for everyone. One type of technological development is an information system that is a means of information spread that highly efficient and easy to use to assist people in an institution [1]

The fourth Semester of Academy of Management Information and Computer Mataram (AIMC) that implemented the Job Training should specify the type of programming that will be used as a Final Project Report. The selected program influence the students' success, especially for students who have limited control of languages program [2]

To help the students in determining the programming language to be used required a lot of technical focus. This study will only focused on five types of programming languages by using Hierarchy Analytical Process (AHP) to obtain the information of programming language that has a quality or better rating than five programming languages based on the parameters. Programming Language concerned with those programs in the preparation of Final Project Report i.e. Programming Delphi, Visual Basic, Java, PHP and C / C ++. [3]

The study is aimed to choose programming Language by using Analytical Hierarchy Process (AHP) to obtain appropriate programming language based on Information Management Program or good rating of specified parameters. It is useful to improve the capabilities in information technology, especially in the use of programming languages that relevant to the program used on Final Project Report. Also an encouragement to further improve the control of the relevant programming language to be used in making the program. [4]

## II. RELEVANT STUDY

Marsani Asfi and Ratna Purnama Sari conducted a study entitles the Decision Support Systems Achievement Student Selection Method Using AHP (Case Study: CIC STMIK Cirebon). Another study conducted by Dyno Syah Putra and Sulfikar Sallu entitles the Decision Support System Using AHP And Sig In Determining Location New Branch development Enterprises Culinary. Similarly, Adelia conducted a research entitles Decision Support System Teacher Achievement Selection method Using Analytical Hierarchy Process in State Vocational School of Semarang 9.

Those studies above applied AHP approach to determine the decisions to be taken of several alternatives by established criteria. In this study, we will only use Super Decision aids in the process of calculation and decision eigenvector to find a solution to get priorities.

The similarity of the three approaches used in this study is using the same approach to the assessment of the AHP and the resemblance of a language program by students of a reference or review in completing this study. It determined which of the language program will be used when drafting program Final Project Reports.

### A. The Type of Hierarchy Analytical Process (AHP)

One of the analysis or synthesis methods used by the decision maker to make decisions is by using AHP; it can give a clear picture to the rational decision maker of the resulting decisions. [5]

As for the types AHP are:

#### 1) Single-criteria

In this type, decision-making is done by involving one / more alternatives with one criterion.

2) Multi-criteria

In this type, decision-making is done by involving one / more alternatives with more than one criterion.

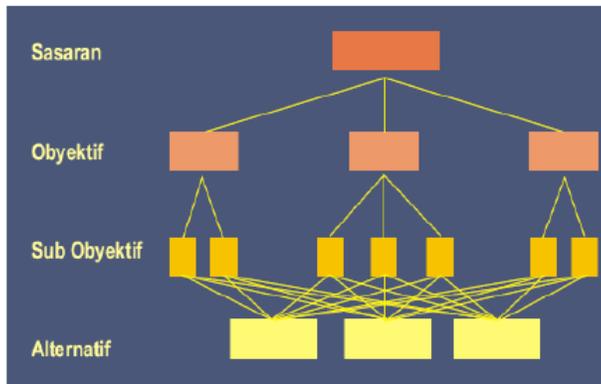


Fig. 1. Structure Chart AHP

The Figure above showed that each element in a level in the AHP will affect the elements at a higher level [6]

In determining priority values often AHP using standard preference table. Table preference these standards have been determined by the researcher’s experience AHP that have considerable basis in comparing two or more alternatives on the following forms:

TABLE I. THE TABLE OF PREFERENCES STANDARDS

the level of interest	Definition	explanation
1	The second equally important criteria	The second criterion has the same value
3	criteria which one is more important	slightly more votes in favor of one of the criteria than one partner
5	criteria that one is much more important than others	assessment is very in favor of one of the criteria than one partner
7	one criterion is clearly more important than others	one of the criteria is very influential and dominance seemed very real
9	one absolute criterion much more important than others	evidence that one very important criterion than his partner is very clear
2,4,6,8	the midpoint between two adjacent consideration	This value is given if there is any doubt between the two adjacent assessment
reverse	if the value of x has one value when compared with the above criteria, the criteria y has a value opposite when compared to criteria x	

B. The basic principles of Analytical Hierarchy Process (AHP)

In the process, AHP is not only used to determine the priority choices with a lot of criteria, but its application has been extended as an alternative model to solve a variety of problems. AHP offers problem-solving decisions involving all sources of complexity.

According to [7] in solving the problems with AHP, we need principles that must be understood such as decomposition, comparative judgment, synthesis of priority, and logical consistency.

1) Decomposition

once the problem is defined, it is necessary to break down the decomposition that whole issue into its elements. If you want to get accurate results, the solution is also made to the elements until no further possible solution, so we get some level of problems faced. There are two types of hierarchy, namely the complete and incomplete. In the complete hierarchy, all elements on a level have all the elements that exist on the next level. Otherwise called incomplete hierarchy

2) Comparative Judgment

This principle means making judgments about the relative interests of the two elements at a certain level in relation to the previous one. This assessment is at the core of AHP, since it will affect the priority elements. The results of this assessment will look better when presented in the form of a matrix called pair wise comparison matrix

3) Synthesis of priority

In each pair wise comparison matrices then the eigencator will be sought to get local priority. Because there is a pair wise comparison matrix at any level, then the global priority to get to do the synthesis between local priorities. The procedure of doing synthesizing is different according to the form of the hierarchy. Ordering the elements according to the interests relative through procedure synthesis of so-called priority setting

4) Logical consistency

Consistency has two meanings, the first is that similar objects can be grouped according to the uniformity and relevance, for example: wine and marbles can be grouped in a set of uniform if the round is the criterion but cannot be grouped if the taste as the criterion, the second is related to the degree of relationship among the objects that are based on certain criteria, for example: if the criteria and honey sweet is rated 5 times sweeter than sugar, and sugar 2 times sweeter than syrup, then it should be a sweet honey rated 10 times sweeter than syrup. If honey is only rated 4 times sweeter than syrup, the valuation was consistent and the process must be repeated if you want to obtain a more precise assessment.

C. Consistency Testing Techniques

In making a decision using AHP approach, Satty defines that a consistency ratio (CR) to provide a consistent matrix tolerance criterion. A matrix is considered consistent if the value of CR <0.1 or inconsistencies that allowed only 10%. To calculate inconsistent limit a matrix, Consistency Ratio can be calculated using the following formula:

$$CR = \frac{CI}{RI} \tag{1}$$

Ratio Index (RI) is a random index that differs according to the size of his order. Saaty determine a matrix berordo random index n according to the table below:

N	1	2	3	4	5	6	7	8	9	10
RI	0	0	0,58	0,9	1,12	1,24	1,32	1,41	1,45	1,49

For **berordo** n matrix, then the consistency index is:

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

Where:

CI = consistency index

$\lambda \max$  = the largest of eigen values of matrix berordo n, obtained by summing the product of the number of columns each criterion with the main eigenvector value, according the following equation:

$$\lambda \max = \sum_{i=1}^n Ki.Ni$$

Where:

Ki = the sum of all the criteria in the column of the matrix K (matrix results criteria weighting)  
 Ni = the value eigenvector of the matrix of criteria in line to i.

$$K = \begin{bmatrix} 1.000 & 1.049 & 0.955 & 1.107 & 0.875 \\ 0.953 & 1.000 & 0.911 & 1.055 & 0.834 \\ 1.047 & 1.098 & 1.000 & 1.159 & 0.915 \\ 0.903 & 0.948 & 0.863 & 1.000 & 0.790 \\ 1.143 & 1.199 & 1.411 & 1.266 & 1.000 \end{bmatrix} \quad N = \begin{bmatrix} 0.1974 \\ 0.1882 \\ 0.2066 \\ 0.1690 \\ 0.2387 \end{bmatrix}$$

Total    5.047   5.294   5.140   5.587   4.414

So that

$$\lambda \max = ( 5,047 \times 0,1974 ) + ( 5,294 \times 0,1882 ) + ( 5,140 \times 0,2066 ) + ( 5,587 \times 0,1690 ) + ( 4,414 \times 0,2387 ) = 5,050$$

then the value of CI is

$$CI = \frac{5,050 - 5}{5 - 1} = 0,0132$$

If the CI is zero, then the matrix perfect consistency. Because CI is not zero, then it should be counted for consistency ratio (CR), namely:

$$CR = \frac{0,0132}{1,12} = 0,0118$$

Because the index is still below the 0.0118 consistency ratio of 0.1, the assessment done is still considered to be consistent.

### 1) Rationale Decision

According to Simon (1977), a decision support system is a process of selecting action (among the various alternatives) to achieve a goal or several goals. The decision making process is basically a screening of some alternative good decisions agreed that the final decision was an optimal alternative chosen by the particular mechanism.

Methods of decision-making process introduced by Simon, HA (1977) consists of four main phases, namely:

#### a) Intelligence Phase

Decision-making process begins in this phase where the investigation and identify the scope of the problems were collected in this phase.

#### b) Design Phase

This stage is the process construction to make estimates is likely to occur from each of the variables and relationships between variables. This stage includes the process to develop and analyze alternative actions that can be performed.

#### c) Selection Phase

After analyzing alternatives action on this phase, the selection process is done between to run. It includes finding, evaluating and recommending appropriate solutions of the model. Solution of a model is a unity of decision variable values in the selected alternatives.

#### d) Implementation Phase

At this stage the solution has been agreed upon is started.

### 2) Basic Decision Making Model

Decision-making in an organization is held or controlled by the employer, because the decision is more to the point the organization. In making a decision grouped into three main components:

#### a) Objective, an objective that will be achieved

b) Constraints, looking below the limit values of the layer objective

c) Alternatively, the option will be taken from the multi choice.

This method can be applied to the criteria of little or a lot of the criteria of (multi criteria of).

### D. Stages of Decision Making

In one organization, a managerial decision-making technique is known as decisions makers, who have a very strong power to accept or reject a proposed solution by the engineering level.

At the engineering level, multi-criteria decision-making process of defining and seek all possible alternatives desired or by ignoring out of the consideration of alternative options as a basis of a multi-criteria analysis methods. [8] At this level are capable of running a multi criteria classification of multi-alternative. The steps in multi criteria decision making are as follows:

- 1) Determine system evaluation criteria relating to the capabilities of the goal.
- 2) Establish or create an alternative system for the achievement of the purpose (generating alternatives)
- 3) Evaluation of alternatives and functions criteria (the value of the function criteria)
- 4) Run or using normative criteria analysis method
- 5) The acceptance of a multi alternative that shows the optimal value (preferred),

6) When the relevant decision is not acceptable, then gather new information and return to the next iteration of the multi-criteria optimization of data.

#### 1) Framework of the Study

The framework of the study is to determine the language program by using AHP method is started from analyzing problems and choosing the topic, and then defining the criteria of alternative language program support using AHP to produce a language program that can be used as a guide on writing the Report Task. [9]

The following diagram illustrated the framework of this study.

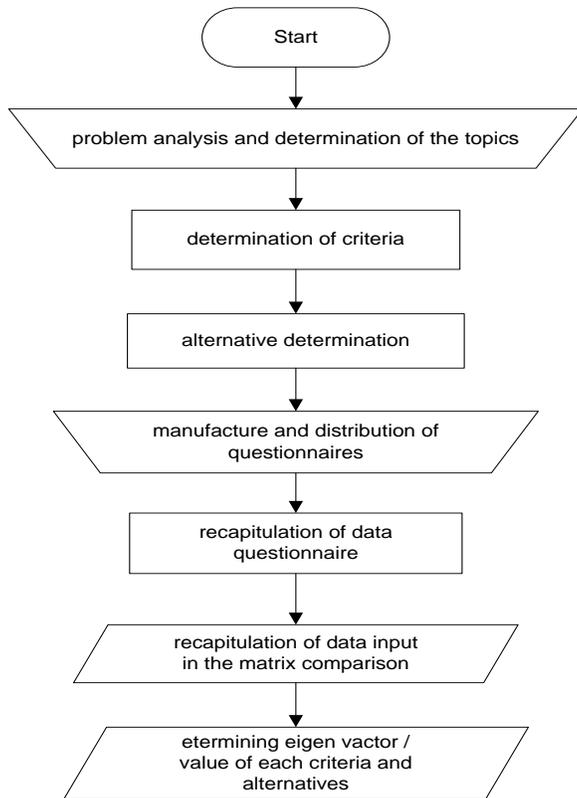


Fig. 2. Flowchart Framework

From the diagram above, it can be explained that when choosing a language program in the preparation of Final Report of work by using AHP, it is began with analyzing the problems and choosing the topic, and then determining the criteria of which will be used as a reference in assessing an alternate assessment that is determined. After determining the criteria of and alternatives, then design the questionnaire and then distributed to the respondents. Questionnaires were distributed to respondents subsequently recapitulated then fed into the matrix comparisons / pair. The next step is to determine the eigen vector / eigen value of each of the criteria of and alternatives that have been determined and the last is the determination of priorities and criteria of each alternative. It means that the criteria of which is the most important of the criteria and which alternative is better or has best quality of some of the alternatives that have been determined.

### III. NEEDS ANALYSIS AND PROCESS ANALYSIS

#### A. Needs Analysis

##### 1) Determination of AHP

Analytical method Hierarchy Process (AHP) is one way in determining or making a decision that are multi-criteria or multi-objective such as determining the programming language for the Student of Information Management of the Academy of Information Management and Computer (AIMC). [10]

The determination of the assessment or evaluation of programming languages based on criteria or parameters. These criteria are as follows:

##### a) Clarity, simplicity, and unity

Programming language should be able to help programmers to create a design program long before programmers coding. Ease, simplicity, and unity is a combination that helps programmers develops algorithms so that the resulting algorithm has a low complexity.

##### b) Orthogonality

Orthogonality is an attribute that can be combined with a variety of programming language features so that each combination has a meaning and can be used. For example, a programming language supports an expression that can produce a value, and the programming language also supports the statement that evaluates the condition of an expression to get the value of true or false. Two features of the programming language, the expressions and statements conditions, are orthogonal if any expression can be used and evaluated in the condition statement. When programming language features are orthogonal, then the programming language that will be easily understood and easy to learn and program will be written because there are few exceptions and a case that should be remembered.

##### c) Reasonableness to Application

Programming languages require proper syntax and matching that used in the program structure to reflect the logical structure that underlies an algorithm. Programming language must have a data structure, operations, control structures, and natural syntax appropriate / suitable to suss out a problem. A programming language designed specifically for particular needs, for example Prologue is used for the purposes of deduction or C ++ object-oriented programming.

##### d) Supports Abstraction

Abstraction is a substantial thing for the programmer to make a solution of the problems faced. Then these abstractions can be easily implemented using existing features in a programming language.

##### e) Programming Environment

The programming language has a good environment and a complete programming will make it easier for programmers to implement abstraction that was drawn up. Programming environment here can mean the editor used, good Documentation of programming languages, debugging facilities, a good user interface, or other tools that can be used

f) *Portability Program*

One of the important criteria for a programming project is the ease of ready-made programs to be transferred from the computer used to create and develop to another computer that will use it. It will facilitate the work of programmers.

2) *Determination of AHP Alternatives*

Alternative selection is based on observation and experience of researchers who often see and ask the students and lecturers of the programming language commonly used in the preparation of the Final Project Report [11]. The process of comparison to some alternative programming language by using AHP, namely:

- a) *Programming languages Borland Delphi*
- b) *Visual Basic Programming Language*
- c) *Java Programming Language*
- d) *PHP Programming Language*
- e) *Programming languages C / C ++*

B. *Analysis Process*

1) *Architectural Model AHP*

Decisions or priority setting that is both complex (multi-criteria or multi-objective) can be done by using AHP. In AHP, criteria and alternatives are two very important components; it is known that the AHP is used to determine the priority of multiple criteria / alternatives by analyzing paired comparisons (pair wise comparison) of each criterion / alternatives. [12]

2) *Questionnaire Model*

The making of questionnaire model, it is based on the needs to be processed using AHP, the processing results of the questionnaire will be performed using software Super Decision.

The form of a questionnaire which is designed in this study is as follows:

- Name : .....
- Completion date : .....
- Signature : .....
- Instructions on filling : .....

Give the cross mark (X) on the selected value, where:

- Value 4 = very important / very good
- Value 3 = critical value / good
- Value 2 = fairly important / fairly good
- Value 1 = less important / less good
- Value 0 = not important / not good

Examples:

In assessing a programming language, how important the following criteria!

TABLE II. EXAMPLES CHARGING QUESTIONNAIRE

Criteria	Value / Score				
	4	3	2	1	0
Clarity, Simplicity dan unity	X				
Orthogonality		X			
Reasonableness to Application		X			
Supports Abstraction		X			
Programming Environment			X		
Portability Program			X		

TABLE III. ALTERNATIVE QUESTIONNAIRE BASED ON THE LEVEL OF CLARITY, SIMPLICITY, AND UNITY

Criteria	Value / Score				
	4	3	2	1	0
Borlan Delphi		X			
Visual Basic		X			
Java				X	
PHP	X				
C/C++			X		

3) *Respondents*

This research was conducted at the Academy of Information Management Computer (AMIKOM). The respondents are the fourth semester of the Student of Information Management. Random technique was used in choosing the participant with the following formula:

$$\text{Slovin formula } n = \frac{N}{N \cdot d^2 + 1} \text{ ----- (1)}$$

Where:

- n = sample size
- N = population size
- d = error estimation

The numbers of participants are 102 people, if the number of participants was 102 people, with an error level / error is estimated at 10%, then the total number of respondents is  $(102) / (102 \cdot (10\% ^ 2) + 1) = 50$

IV. SYSTEM DESIGN

A. *Data Recapitulation Techniques*

Before making decision by using AHP, at first the data was recapitulated from the questionnaire that was distributed to the respondents. Summary data of the questionnaire in this study consisted of data recapitulation questionnaire: [13]

1) *Criteria*

Data on each of these criteria can be gained by taking every value which is filled and / or provided by the respondent on each of criteria to form a recapitulation as follows:

TABLE IV. RECAPITULATION DATA QUESTIONNAIRE

No	Respondents	Criteria				
		Criterion 1	Criterion 2	Criterion 3	...	Criterion n
1	Respondent 1	X1.1	X1.2	X1.3	...	X1.n
2	Respondent 2	X2.1	X2.2	X2.3	...	X2.n
3	Respondent 3	X3.1	X3.2	X3.3	...	X3.n
...	.....	.....	.....	.....	...	.....
n	Respondent n	Xn.1	Xn.2	Xn.3	...	Xn.n
Average		$Y_1 = \frac{\sum X_{n,1}}{n}$	$Y_2 = \frac{\sum X_{n,2}}{n}$	$Y_3 = \frac{\sum X_{n,3}}{n}$	...	$Y_n = \frac{\sum X_{n,n}}{n}$

2) Elements Matrix Pair

After the recapitulation of the questionnaire data according to the table above, then insert each element into a matrix of pair wise form the average value of each of the criteria of the concept based on AHP with matrix form pairs as follows:

TABLE V. AHP PAIR WISE MATRIX

Criteria	Criteria				
	Criterion 1	Criterion 2	Criterion 3	.....	Criterion n
Criterion 1	Y1/Y1	Y1/Y2	Y1/Y3	.....	Y1/Yn
Criterion 2	Y2/Y1	Y2/Y2	Y2/Y3	.....	Y2/Yn
.....	.....	.....	.....	.....	.....
Criterion n	Yn/Y1	Yn/Y2	Yn/Y3	.....	Yn/Yn

3) Consistency Testing Techniques

To obtain a good decision or solution, it takes consistency in charging or weighting criteria. In making a decision using AHP approach, Satty defines a consistency ratio (CR) to provide a consistent matrix tolerance criterion.

A matrix is considered consistent if the value of CR < 0.1 or inconsistencies that allowed only 10%.

To calculate the value of the consistency of each matrix pairs have been described in previous chapters (can be seen in chapter II).

B. Summary of Data

1) Summary of questionnaire data criteria

Based on the questionnaire that was distributed to the respondents obtained the following data:

TABLE VI. RECAPITULATION QUESTIONNAIRE RESULTS CRITERIA

No	Criteria	Average
1	Clarity, Simplicity and unity	3.52
2	Orthogonality	2.80
3	Reasonableness to Application	3.22
4	Supports Abstraction	2.20
5	Programming Environment	3.04
6	Portability Program	2.36

Recapitulation alternative questionnaire data based on the level of clarity, simplicity and unity, orthogonality, Fairness for Applications, Supports Abstraction, and Portability Programming Environment Program

Based on the questionnaire that was distributed to the respondents obtained the following data:

TABLE VII. SUMMARY DATA OF ALTERNATIVES BASED ON THE LEVEL OF CLARITY, SIMPLICITY AND UNITY, ORTHOGONALITY, FAIRNESS FOR APPLICATIONS, SUPPORTS ABSTRACTION, AND PORTABILITY PROGRAMMING ENVIRONMENT PROGRAM

No	Alternative	Criteria					
		Clarity, Simplicity and unity	Orthogonality	Fairness for Applications	Supports Abstraction	Programming Environment	Portability Program
1	Borland Delphi	3.08	3.12	2.88	3.02	3.36	3.18
2	PHP	3.38	3.32	3.60	3.50	3.66	3.34
3	Java	2.18	1.78	1.58	2.60	2.68	2.86
4	Visual Basic	2.66	2.04	1.64	2.80	3.16	2.98
5	C/C++	1.80	2.24	1.86	1.78	2.92	2.70

C. Pair wise Comparison Matrix

After getting the data from the recapitulation of the questionnaire, then enter the value of each criterion and an alternative to the matrix of pair wise comparisons using Super Decisions software.

1) Matrix of pair wise comparisons for all the criteria of from the recapitulation of the questionnaire data collected from respondents, the data obtained as in table 4.3. The data is then inserted into the matrix of pair wise using software Super Decisions as follows:

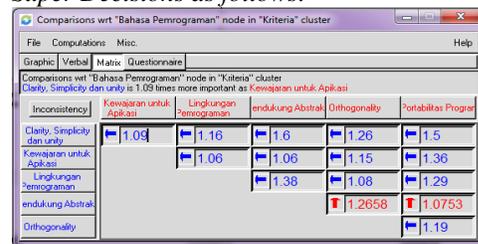


Fig. 3. Pair wise comparison matrix for the criteria

2) Matrix pair wise comparisons for all the alternatives based on the criteria of Clarity, Simplicity and unity

From the recapitulation of the questionnaire data collected from respondents, the data obtained as in table 4.4. The data is then inserted into the matrix of pair wise using software Super Decisions as follows:

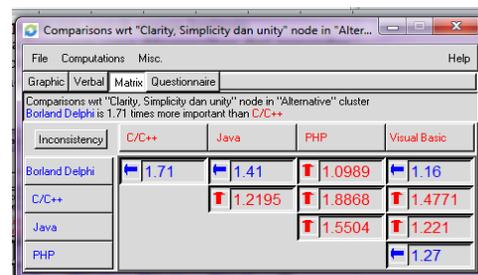


Fig. 4. Matrix of pair wise comparisons of alternatives to the criteria Clarity, Simplicity and unity

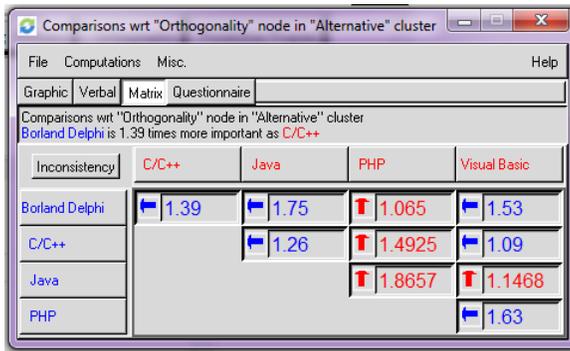


Fig. 5. Matrix of pair wise comparisons of alternatives to the criteria Orthogonality

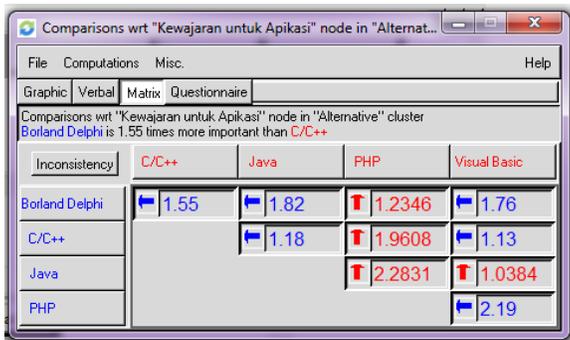


Fig. 6. Matrix of pair wise comparisons of alternatives to the criteria Fairness For Applications

D. Consistency Value

Measurement error rate in determining the numbers pair wise comparisons of each criterion and each alternative based on a criterion can be done by looking at the value of consistency. If the value of consistency is equal to zero, it is considered perfect (no error in charging or weighting matrix), but if the consistency is greater than 0.1 it is considered inconsistent. Measurement error tolerance value against the value of consistency is 10%. So, if the value is smaller than 0.1 then it is considered to be consistent. From the processing of data obtained through the questionnaire is entered into the matrix of pair wise using Super Decisions software to determine the programming language to some alternatives based on several criteria described above, the value of inconsistencies (Table VIII) as follows: [14]

E. The Results of Synthesis Super matrix with Super decision

After processing by using software Super Decisions concerning the determination of the language program synthesis of the results obtained as follows:

1) Synthesis results Criteria

Of the five criteria were used as the standard programming language assessment couple of (alternative) namely; Clarity, Simplicity and unity, Orthogonality, Fairness for Applications, Supports Abstract, Environmental Programs and Portability Program priorities solution obtained by eigen values / eigen vector of each of the following criteria: [15]

TABLE VIII. THE SYNTHESIS OF CRITERIA

No	Criteria	Eigen Value/Eigen Vector
1	Clarity, Simplicity and unity	0.20600
2	Orthogonality	0.17900
3	Reasonableness to Application	0.17700
4	Supports Abstraction	0.13600
5	Programming Environment	0.16400
6	Portability Program	0.13800

2) Alternative syntheses results

Based on 5 criteria to assess six reference sources (website) learning programming synthesizing the results obtained in order to determine priorities website (alternatives) based on the following criteria:

TABLE IX. PRIORITY / RANKING OF PROGRAMMING LANGUAGES BASED ON ALL CRITERIA

Programming Language	Eigen Value / Eigenvector					
	Clarity Simplicity and unity	Orthogonality	Reasonableness to Application	Supports Abstraction	Programming Environment	Portability Program
Borland Delphi	0.234981	0.249371	0.249775	0.220091	0.216743	0.211150
C/C++	0.127097	0.178789	0.160366	0.129103	0.188088	0.178807
Java	0.166667	0.142370	0.136552	0.189907	0.172839	0.189275
PHP	0.258271	0.266088	0.311358	0.256302	0.217387	0.222598
Visual Basic	0.202984	0.163382	0.141949	0.204598	0.204942	0.198170

From table IX data was obtained from the results of the determination of the overall synthesis programming language using AHP with the following priority

TABLE X. PRIORITY PROGRAMMING LANGUAGE BASED ON THE RESULTS OF THE SYNTHESIS

No	Information	Normal value	percentage
1.	Borland Delphi	0.231447	23 %
2.	C/C++	0.161794	16 %
3.	Java	0.164665	16 %
4.	PHP	0.256628	26 %
5.	Visual Basic	0.185466	19 %

These results were obtained after performing data processing using software Super Decision with the following results:

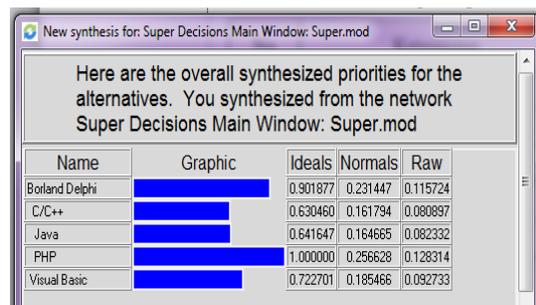


Fig. 7. Synthesis results Super matrix with Super Decision

## V. CONCLUSION AND SUGGESTIONS

### A. Conclusion

*The conclusions of the study,*

*1) Programming Language based on five criteria that are Clarity, Simplicity and unity; Orthogonality; Fairness for Applications; Supports Abstraction; Environment program; and Portability Program resulting percentage Borland Delphi is 23%, C / C ++ 16%, Java is 16%, PHP is 26% and Visual Basic is 19%.*

*2) Questionnaire to obtain the above results, 50 questionnaires from the total students of Information Management in the sixth Semester is 102 people with a level of error / error is estimated at 10%.*

### B. Suggestions

In this study, there are many shortcomings. Therefore the suggestions are:

*1) To obtain more accurate results, it is advisable to use a rating scale questionnaire better and distributing questionnaires to the respondents were properly addressed.*

*2) Choosing programming languages using AHP method can be prepared or implemented into an application program such as online applications.*

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