MECOMARE, 12 (1) (2023) pp. 1-9
Published by:TRIGIN Publisher
International Journal of Mechanical Computational and Manufacturing Research
Homepage journals:www.trigin.pelnus.ac.id

Information System for Determining Student Achievement Using the K-Means Method

Wenny Yulia Cahya
Information Systems Study Program, College of Informatics and Computer Management (STMIK) Potential Main, Medan, Indonesia

ARTICLEINFO

Article history:

Received Apr 20, 2023
Revised May 17, 2023
Accepted May 30, 2023

Keywords:

K-Means Method,
Microsoft Visual Basic.Net 2008,
Information System for Determining Outstanding Students,
SQL Server 2008.

ABSTRACT

Value is an important thing in the world of education and requires a special processing and policy, both in its use, maintenance and recording. Because of the importance of using this value, it is necessary to carry out systematic and effective processing of the values obtained by students. Processing grades consisting of formative grades, assignment grades, and semester grades for each student. To calculate the student's grades, the K-Means method was used to determine students who excel at SMA Swa Bina Karya. The information system for determining outstanding students at Swa Bina Karya High School is still manual. Where the process of recording and calculating student grades is still manual where the recording of each student's grades is recorded in the gradebook owned by each homeroom teacher so that the process of making class ranking reports requires a lot of time and the resulting information is less effective and efficient. To be able to overcome this frequent problem, the authors designed a system for determining student achievement using the K-Means method using Microsoft Visual Basic.Net 2008 and the database used was Sql Server 2008. With the design of this system, the homeroom teacher and school principal can receive more accurate and timely class ranking reports. Besides that, this system also helps admin work much more effectively and efficiently.

Corresponding Author:

Wenny Yulia Cahya,
Information Systems Study Program,
Main Potential STMIK,
Jl. KL Yos Sudarso, Tj. Mulia, Medan Deli, Medan City, North Sumatra, Indonesia.
Email: wennycahya@gmail.com

1. INTRODUCTION

Currently, technological advances are felt in our daily lives, the technology created is becoming more optimal in line with global needs and competition(Septira, 2022),(Wardana, Saksono, & Yudiastuti, n.d.). With intense competition in the global world, we are encouraged to do a job correctly, quickly and thoroughly to achieve optimal results without compromising quality.(Firdianti, 2018),(Andriani et al., 2022). Therefore computers enter into human life as a tool to facilitate work(Harahap & Dar, 2018),(Hasbialloh & Jakaria, 2018).

The use of the k-mean method in determining students who excel at the Swa Bina Karya Private High School (SMA) is to accelerate teachers and schools to find out which students get the best grades in the current school year. The aim of schools in general is to produce superior students to maintain the good name of the school.

The author conducted research at the Private High School (SMA) Swa Bina Karya which is located at Jl. Student P. Brayan Workshop Medan. Swa Bina Karya Private High School (SMA) is a

private school that has a fairly complete laboratory such as a Lab. Language, Labs. Computers, Labs. Biology, Lab. Chemistry and has quite a lot of classrooms.

The information system for determining student achievement in Private High School (SMA) Swa Bina Karya, still uses the average student achievement score for each semester which is written in the grade book for each homeroom teacher(Amar, 2016),(Kuspiyah, 2008). Where the method of finding the highest score for students who excel is only based on the average value of achievement each semester. This will make the process even longer because to find students who excel takes a long time in terms of retrieving data from the value of each student's report card(Riski, 2017),(UGM, 2016).

2. RESEARCH METHOD

2.1 Existing System Analysis

In completing this thesis the author uses 2 (two) study methods, namely

a. Field Study

This research is direct research on research objects that will be used to obtain data by:

a) Observation

In this observation method the author is given the opportunity to make direct observations on one of the homeroom teachers.

b) Interview

In collecting this data the writer conducted interviews and asked questions directed at the problem of giving grades. The interview was conducted on one of the homeroom teachers.

c) Sample

Take examples of the data needed, especially savings and loan transaction data, customer data and others.

b. Library Studies (Library Research)

In this library research the author quotes several opinions or theories from several reading books or textbooks used during lectures. This is intended to provide a strong theoretical basis through the books or literature available in the library, both in the form of lecture materials and brochures related to the title raised by the author.

2.2 Analysis of existing systems

The presentation of the report on the determination of outstanding students at the Private High School (SMA) Swa Bina Karya still uses the average student score each semester which is written in the homeroom teacher's grade book. The data needed in preparing this report is in the form of student identification numbers, student names, student grades. So that you can know the size of the value of each student.

2.3 Research sites

This research was conducted at the Swa Bina Karya Private Senior High School which is located at Jl. Student P. Brayan Workshop Medan.

3. RESULTS AND DISCUSSIONS

3.1 Results Display

This chapter will explain the appearance of the design results of the Information System for Determining Outstanding Students at Swa Bina Karya High School with the aim that readers or users can understand each form in the application program, so that it can help readers or users in implementing or carrying out work of the system being built.

a. Andmin Login Display Form

This page is the initial display when the user accesses the application program before entering the main menu, which can be seen in Figure 1. following:

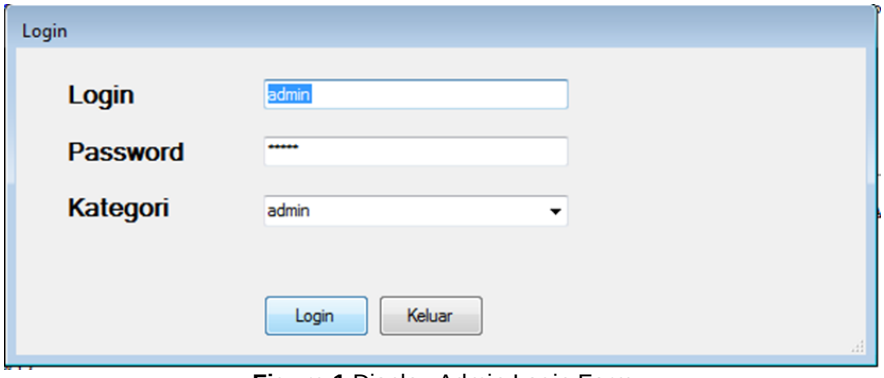


Figure 1. Display Admin Login Form

b. Main Page Display

The results of the main page display that the author made can be seen in Figure 2 below:

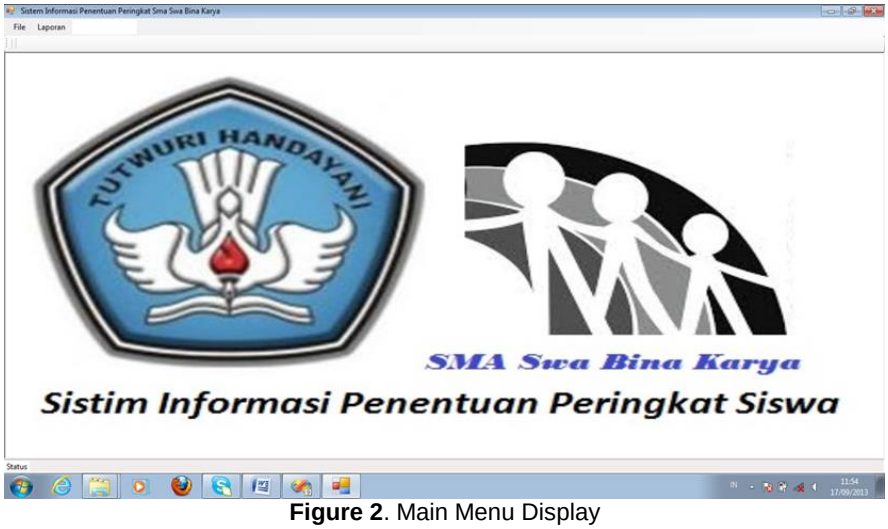
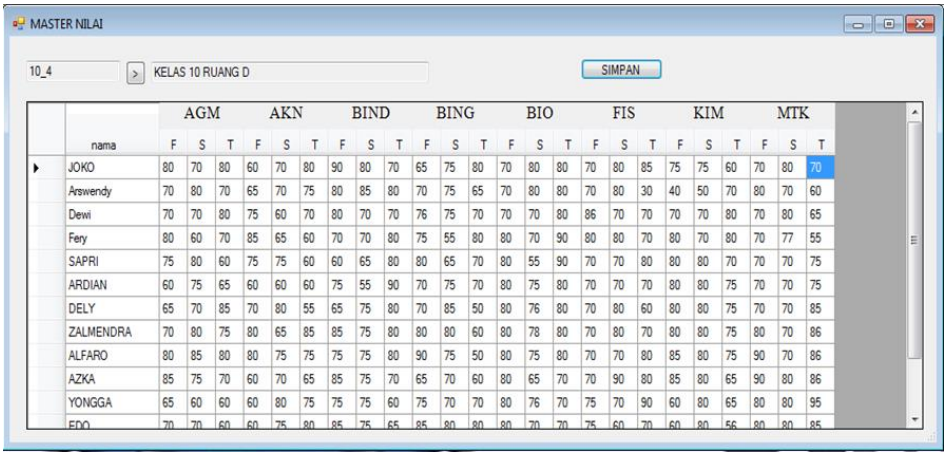


Figure 2. Main Menu Display

c. Value Master Form View

The results of the display of the value master page that the author made can be seen in Figure 3 below:



nama	AGM			AKN			BIND			BING			BIO			FIS			KIM			MTK		
	F	S	T	F	S	T	F	S	T	F	S	T	F	S	T	F	S	T	F	S	T	F	S	T
JOKO	80	70	80	60	70	80	90	80	70	65	75	80	70	80	80	70	80	85	75	75	60	70	80	70
Arswendy	70	80	70	65	70	75	80	85	80	70	75	65	70	80	80	70	80	30	40	50	70	80	70	60
Dewi	70	70	80	75	60	70	80	70	70	76	75	70	70	70	80	86	70	70	70	70	80	70	80	65
Fery	80	60	70	85	65	60	70	70	80	75	55	80	80	70	90	80	80	70	80	70	80	70	77	55
SAPRI	75	80	60	75	75	60	60	65	80	80	65	70	80	55	90	70	70	80	80	80	70	70	70	75
ARDIAN	60	75	65	60	60	60	75	55	90	70	75	70	80	75	80	70	70	70	80	80	75	70	70	75
DELY	65	70	85	70	80	55	65	75	80	70	85	50	80	76	80	70	80	60	80	80	75	70	70	85
ZALMENDRA	70	80	75	80	65	85	85	75	80	80	80	60	80	78	80	70	80	70	80	80	75	80	70	86
ALFARO	80	85	80	80	75	75	75	75	80	90	75	50	80	75	80	70	70	80	85	80	75	90	70	86
AZKA	85	75	70	60	70	65	85	75	70	65	70	60	80	65	70	70	90	80	85	80	65	90	80	86
YONGGA	65	60	60	60	80	75	75	75	60	75	70	70	80	76	70	75	70	90	60	80	65	80	80	95
EDO	70	70	60	60	75	80	85	75	65	85	80	80	80	70	70	75	60	70	60	80	56	80	80	85

Figure 3. Display of Value Master Form

d. Display of Student Master Form

The results of displaying the student form page which is useful for viewing a list of students that the author has made, can be seen in Figure 4 below:

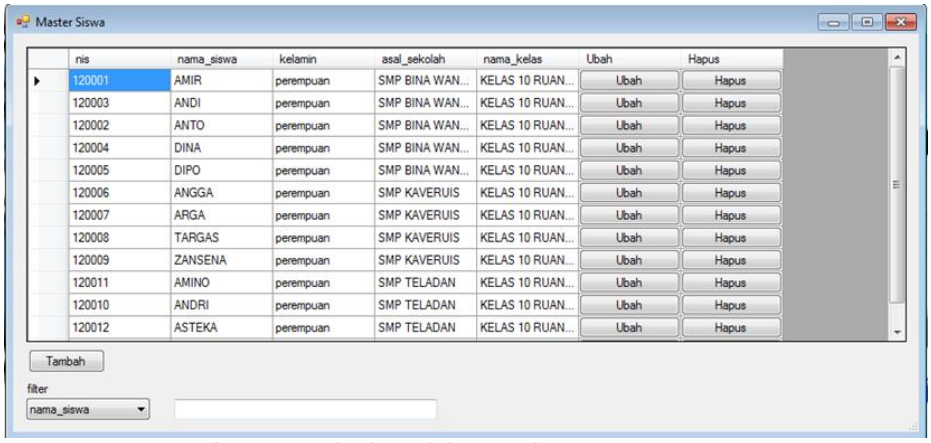


Figure 4. Display of the Student Master Form

e. Display of the Subject Master Form

The results of the display of the subject form pages which are useful for viewing subject data taught at the Swa Bina Karya High School that the author made, can be seen in Figure 5. below:

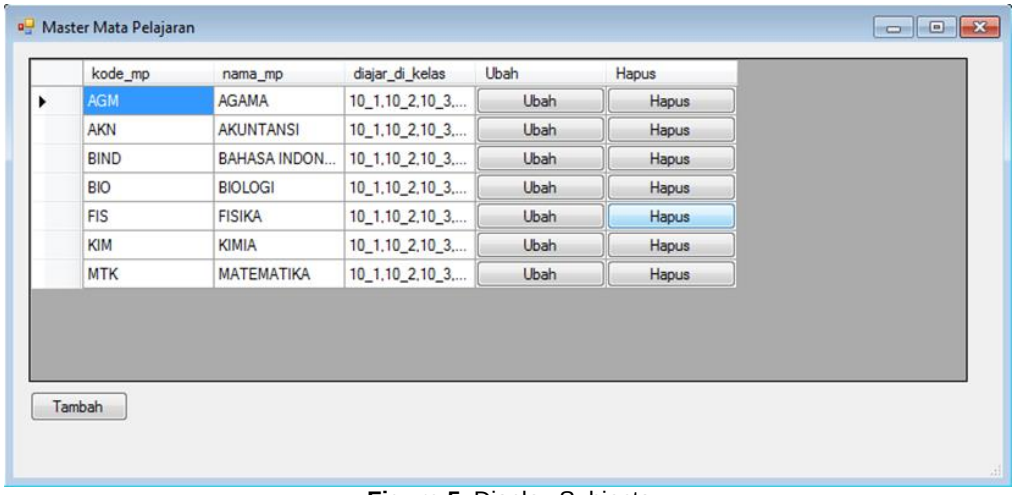


Figure 5. Display Subjects

f. View of the Subject Master Edit Form

The results of this form page display, which is useful for changing and adding to the subject data taught by the author, can be seen in Figure 6 below.

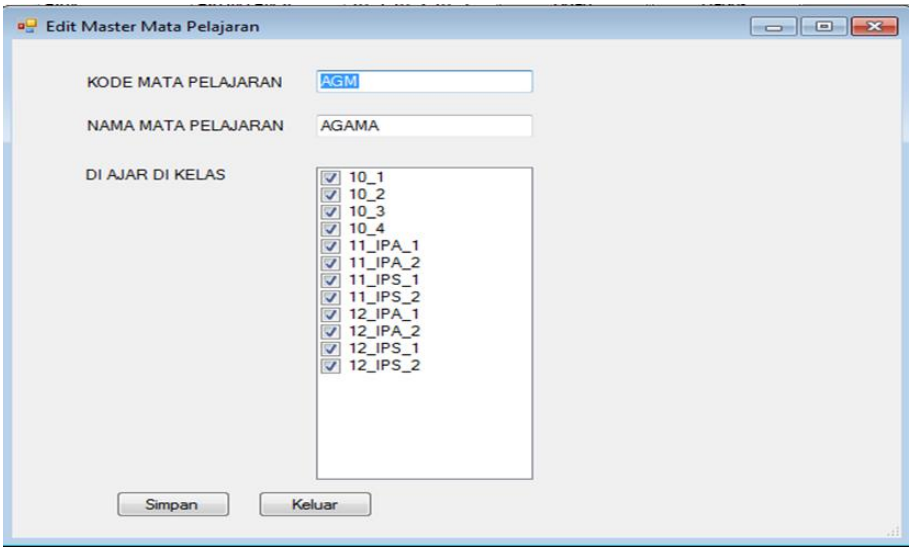


Figure 6. Display of the Subject Master Edit Form

g. Class Master Form view

The results of the class form page display which is useful for viewing all class data that the author has created, can be seen in Figure IV.8. as follows 7. Following

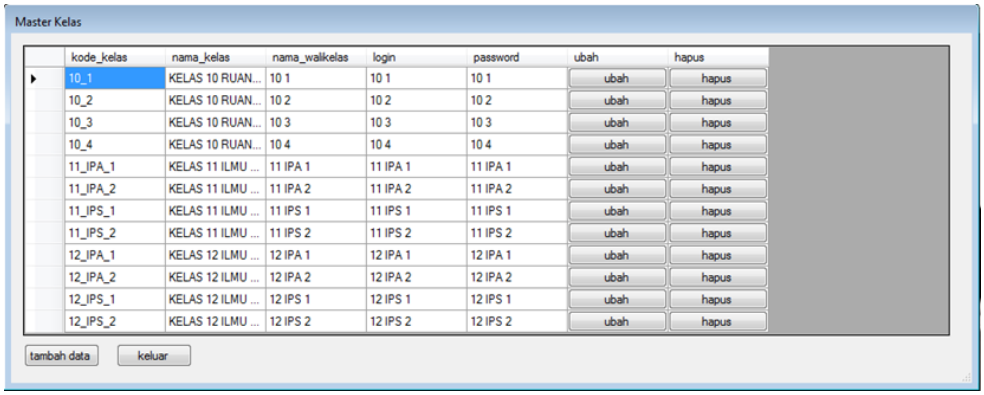
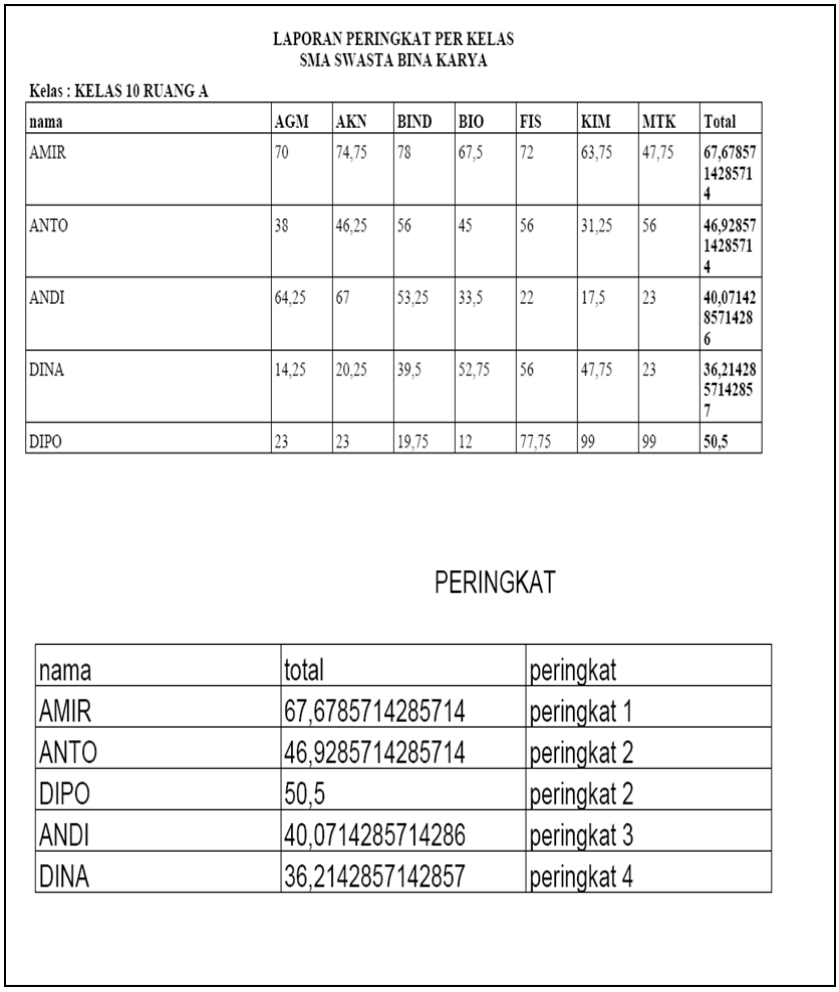


Figure 7. Class Master Form Display

h. Display Output Accessed by the Homeroom Teacher

The results of the display of the report page which can be accessed by each homeroom teacher which is useful for seeing the ranking of the class he teaches, can be seen in Figure 8. Following;



LAPORAN PERINGKAT PER KELAS
SMA SWASTA BINA KARYA

Kelas : KELAS 10 RUANG A

nama	AGM	AKN	BIND	BIO	FIS	KIM	MTK	Total
AMIR	70	74,75	78	67,5	72	63,75	47,75	67,67857142857142
ANTO	38	46,25	56	45	56	31,25	56	46,92857142857142
ANDI	64,25	67	53,25	33,5	22	17,5	23	40,071428571428576
DINA	14,25	20,25	39,5	52,75	56	47,75	23	36,214285714285717
DIPO	23	23	19,75	12	77,75	99	99	50,5

PERINGKAT

nama	total	peringkat
AMIR	67,6785714285714	peringkat 1
ANTO	46,9285714285714	peringkat 2
DIPO	50,5	peringkat 2
ANDI	40,0714285714286	peringkat 3
DINA	36,2142857142857	peringkat 4

Figure 8. Rank Display by Class

i. Rating Calculation Output Display

The results of displaying reports that are useful for showing how to calculate class ratings that the author made, can be seen in Figure 9. Following;

PERINGKAT

==========epoch 1==========

keterangan	1
centroid ke 1	67,6785714285714
centroid ke 2	46,9285714285714
centroid ke 3	40,0714285714286
centroid ke 4	36,2142857142857

nama	total	1	2	3	4	5
AMIR	67,67857 14285714	0	21	27	31	1
ANTO	46,92857 14285714	21	0	6	10	2
ANDI	40,07142 85714286	27	6	0	4	3
DINA	36,21428 57142857	31	10	4	0	4
DIPO	50,5	17	4	10	14	2

==========epoch 2==========

keterangan	1
centroid ke 1	67
centroid ke 2	48
centroid ke 3	40
centroid ke 4	36

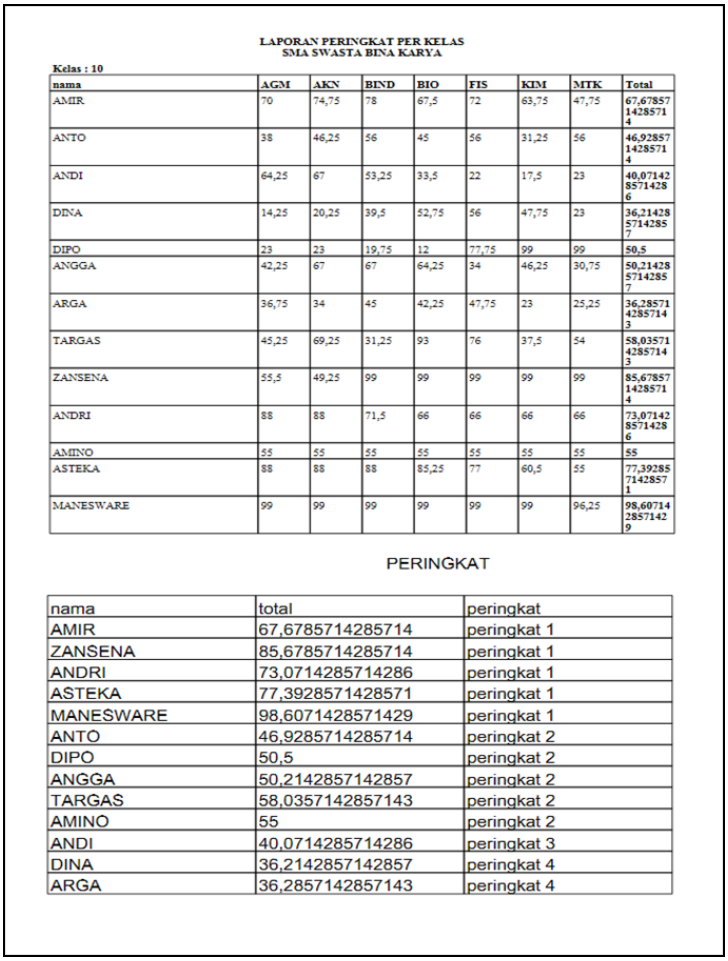
nama	total	1	2	3	4	5
AMIR	67,67857 14285714	0	19	27	31	1
ANTO	46,92857 14285714	21	2	6	10	2
ANDI	40,07142 85714286	27	8	0	4	3
DINA	36,21428 57142857	31	12	4	0	4
DIPO	50,5	17	2	10	14	2

nama	total	peringkat
AMIR	67,6785714285714	peringkat 1
ANTO	46,9285714285714	peringkat 2
DIPO	50,5	peringkat 2
ANDI	40,0714285714286	peringkat 3
DINA	36,2142857142857	peringkat 4

Figure 9. Display of Rating Calculation Method

j. Display Output Accessed by the Principal

The results of displaying the report page which is useful for viewing student grade ratings are based on student classes with other classes in the same 1 class group that the author made, can be seen in Figure 10. Below;



LAPORAN PERINGKAT PER KELAS
SMA SWASTA BINA KARYA

Kelas : 10

nama	AGM	AKN	BIND	BIO	FIS	KIM	MTK	Total
AMIR	70	74,75	78	67,5	72	63,75	47,75	67,678571428571 4
ANTO	38	46,25	56	45	56	31,25	56	46,928571428571 4
ANDI	64,25	67	53,25	33,5	22	17,5	23	40,071428571428 6
DINA	14,25	20,25	39,5	52,75	56	47,75	23	36,214285714285 7
DIPO	23	23	19,75	12	77,75	99	99	50,5
ANGGA	42,25	67	67	64,25	34	46,25	30,75	50,214285714285 7
ARGA	36,75	34	45	42,25	47,75	23	25,25	36,285714285714 3
TARGAS	45,25	69,25	31,25	93	76	37,5	54	58,035714285714 3
ZANSENA	55,5	49,25	99	99	99	99	99	85,678571428571 4
ANDRI	88	88	71,5	66	66	66	66	73,071428571428 6
AMINO	55	55	55	55	55	55	55	55
ASTEKA	88	88	88	85,25	77	60,5	55	77,392857142857 1
MANESWARE	99	99	99	99	99	99	96,25	98,607142857142 9

PERINGKAT

nama	total	peringkat
AMIR	67,6785714285714	peringkat 1
ZANSENA	85,6785714285714	peringkat 1
ANDRI	73,0714285714286	peringkat 1
ASTEKA	77,3928571428571	peringkat 1
MANESWARE	98,6071428571429	peringkat 1
ANTO	46,9285714285714	peringkat 2
DIPO	50,5	peringkat 2
ANGGA	50,2142857142857	peringkat 2
TARGAS	58,0357142857143	peringkat 2
AMINO	55	peringkat 2
ANDI	40,0714285714286	peringkat 3
DINA	36,2142857142857	peringkat 4
ARGA	36,2857142857143	peringkat 4

Figure 10. Rank Display by Class

3.2 Trials

The result of the application of the information system for determining outstanding students at Swa Bina Karya High School is to provide convenience to homeroom teachers and school principals in determining their high achieving students in a short time. In this application, the author uses the Visual Basic 2008 programming language with SQL Server 2008 database data storage. At this stage it also explains how the results of the system evaluation are carried out. Black-box testing is a testing method in which the assessment of the application lies not in the specification of the logic/function of the application, but in input and output. With the various inputs provided, it will be evaluated whether a system/application can provide output that is in accordance with the expectations of the tester.

The stages of determining student rankings are as follows:

a. Enter student grades

Each student's score is entered, starting from formative grades, semester grades, and assignment grades for each subject, shown in the figure:

4. CONCLUSION

After describing the workflow for making this system, several things can be takena conclusion as follows: This system makes it easy for Admins to input and maintain student value data. It makes it easy for the homeroom teacher to see the development of student grades based on the class they care for. The reports generated can help the Principal to see student achievement performance. Can be used as a medium for making the right decisions for students who excel.

REFERENCES

Amar, SL (2016). The decision support system for choosing the best ibtidayah madrasah in the Ministry of Religion of the City of Salatiga uses the simple additive wheigthing method. Maulana Malik Ibrahim State Islamic University.

Andriani, AD, Mulyana, A., Widarnandana, IGD, Armunanto, A., Sumiati, I., Susanti, L., … Dewi, IC (2022). Human resource management (Vol. 1). TOHAR MEDIA.

Firdianti, A. (2018). Implementation of school-based management in improving student achievement. Gre Publishing.

Harahap, SZ, & Dar, MH (2018). Application and Design of Ordering Information Systems at the Upi Convention Center Using the Php and Mysql Programming Languages. Informatics, 6(3), 24–27.

Hasbialloh, M., & Jakaria, DA (2018). Application for selling mobile phone equipment at Zildan Cell Singaparna, Tasikmalaya Regency. Journal of Management and Information Engineering (JUMANTAKA), 1(1).

Kuspiyah, Y. (2008). Implementation of full day school in the formation of children's personalities at Madrasah Ibtidaiyah Integrated (MIT) Bakti Ibu Madiun. Maulana Malik Ibrahim State Islamic University.

Riski, R. (2017). Online Games Among Migrant Students in Banda Aceh. UIN Ar-Raniry Banda Aceh.

Septira, D. (2022). The role of BPSILHK Mataram in improving the welfare of forest product cultivators from the perspective of Islam. UIN Mataram.

UGM, KMB (2016). Big Dreams, Big Hopes: Collection of Memoirs from Gadjah Mada University Students. Deepublish.

Wardana, NS, Saksono, PH, & Yudiastuti, H. (nd). EXPERT SYSTEM TO DIAGNOSE DENGUE HEMORRHAGIC FEVER (DHF) WITH PROLOGUE.