

# Application Decision support System for superior and high Achieving using the AHP Method(case study : SMP TPI Porong)

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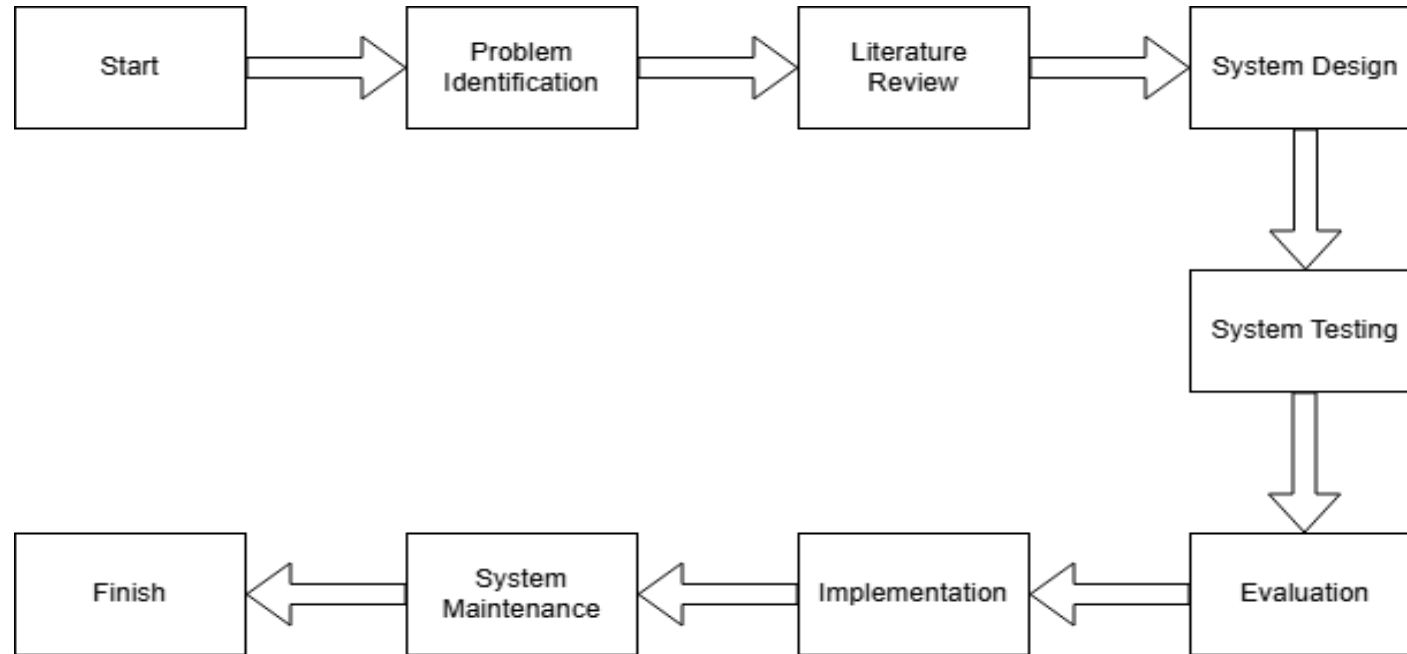
# Pendahuluan

According to Law No. 20 of 2003 on the National Education System, education is a conscious effort designed to create a learning environment and process to develop the potential of students. In the global context, educational institutions are required to focus not only on academic achievements but also on fostering positive character traits and leadership skills. However, conventional methods of identifying outstanding students often take a long time and tend to overlook non-academic aspects such as morality and honesty. At SMP TPI Porong, there is no integrated system for determining outstanding students. This study aims to develop a mobile-based system using the AHP method to address this issue.

# Pertanyaan Penelitian (Rumusan Masalah)

Designing and developing a mobile-based decision support system to determine outstanding students at SMP TPI Porong.

# Metode



This research utilizes the Software Development Life Cycle (SDLC) method to develop a decision support application. The steps outlined above represent the workflow of the research.

# Hasil

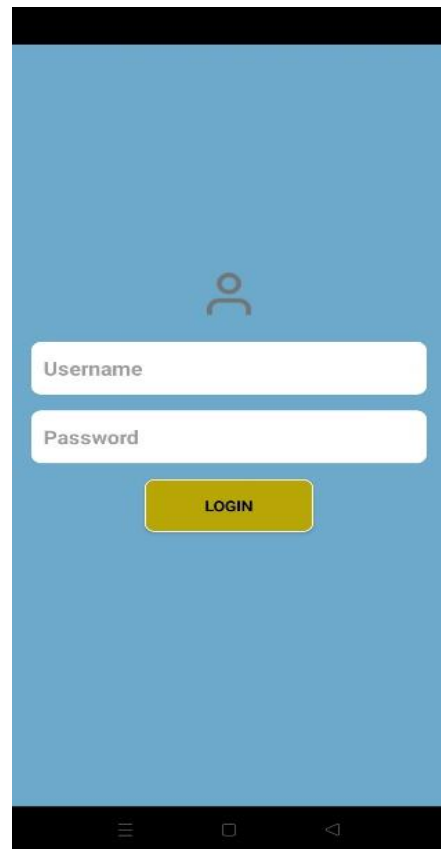
## Planning

The planning of this decision support system includes features for inputting scores and calculating rankings using the AHP method. The system will be developed using Android Studio and will utilize two databases: SQLite and Firebase.

# Hasil

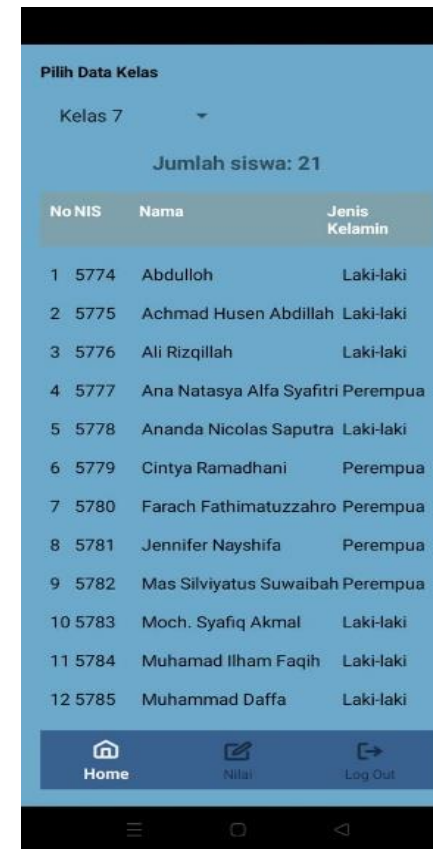
## Design

### Halaman Login



A mobile app login screen with a light blue background. At the top center is a grey person icon. Below it are two white input fields: 'Username' and 'Password'. A yellow 'LOGIN' button is positioned below the password field. The bottom of the screen shows a black navigation bar with three icons: a home icon, a globe icon, and a back arrow icon.

### Halaman Dashboard



A mobile app dashboard screen with a light blue background. At the top, it says 'Pilih Data Kelas' followed by a dropdown menu showing 'Kelas 7'. Below that, it displays 'Jumlah siswa: 21'. A table lists student data with columns 'No NIS', 'Nama', and 'Jenis Kelamin'. At the bottom, there is a dark blue navigation bar with three icons: a home icon labeled 'Home', an envelope icon labeled 'Nilai', and a back arrow icon labeled 'Log Out'.

No NIS	Nama	Jenis Kelamin
1 5774	Abdulloh	Laki-laki
2 5775	Achmad Husen Abdillah	Laki-laki
3 5776	Ali Rizqillah	Laki-laki
4 5777	Ana Natasya Alfa Syafitri	Perempua
5 5778	Ananda Nicolas Saputra	Laki-laki
6 5779	Cintya Ramadhani	Perempua
7 5780	Farach Fathimatuzzahro	Perempua
8 5781	Jennifer Nayshifa	Perempua
9 5782	Mas Silviyatus Suwaibah	Perempua
10 5783	Moch. Syafiq Akmal	Laki-laki
11 5784	Muhamad Ilham Faqih	Laki-laki
12 5785	Muhammad Daffa	Laki-laki

# Hasil

## Design

### Halaman Input Nilai

**Halaman Nilai Siswa**

INPUT NILAI    HITUNG PERINGKAT

Nama	N. Agama	N. rata²	Ujian	N. Extra	N. Etika
Abdullo h Mudha bbiruzza man	0.0	0.0	0.0	0.0	0.0
Achmad Husen Abdillah	0.0	0.0	0.0	0.0	0.0
Ali Rizqillah	0.0	0.0	0.0	0.0	0.0
Ana Natasya Alfa Syafitri	0.0	0.0	0.0	0.0	0.0
Ananda Nicolas Saputra	0.0	0.0	0.0	0.0	0.0
Cintya Ramadh ani	0.0	0.0	0.0	0.0	0.0
Farach Fathima tuzzahro	0.0	0.0	0.0	0.0	0.0
Jennifer Nays hifa	0.0	0.0	0.0	0.0	0.0

Home    Nilai    Log Out

### Halaman Peringkat

**Peringkat Siswa**

Peringkat	Nama	Total Nilai
1	Abdullo h Mudhabbiruzza man	0.0
2	Achmad Husen Abdillah	0.0
3	Ali Rizqillah	0.0
4	Ana Natasya Alfa Syafitri	0.0
5	Ananda Nicolas Saputra	0.0

KEMBALI

# Hasil

## AHP Calculation

The values assigned to the weights are determined based on the decision-making process considering the level of importance of the specified criteria. Table 1 presents the criteria weights to be calculated. There are four criteria: Religion, The average exam score, Extracurricular, and Ethics

Code	Criteria
C1	Religion
C2	The average exam score
C3	Extracurricular
C4	Ethics

# Hasil

## AHP Calculation

After that, the weight of each criterion is calculated as a comparison between the weights. Table 2 shows the calculation of the comparative weights for each criterion. Then, the values in each column are summed, as shown in the example for the first column:  $1 + 0.2 + 0.333 + 0.333 = 1.866$ . Thus, the total for the first column is 1.866, and the same process is applied to the subsequent columns

Criteria	C1	C2	C3	C4
C1	1	5	3	3
C2	0,2	1	0,333	0,333
C3	0,333	3	1	2
C4	0,333	3	0,5	1
Total	1,866	12	4,833	6,333

# Hasil

## AHP Calculation

After obtaining the total weight of the criteria, the matrix is normalized by dividing each criterion weight by the total weight of the criteria. Table 3 shows the results of normalizing the matrix for the priority weight calculation. The normalization process involves dividing each matrix element by the column total. For example,  $C1-C2 = 1/1.866 = 0.5357$ , and  $C2-C3 = 0.333/4.833 = 0.0689$ . This process is repeated for all other cells. The priority weight column is obtained by averaging each row in the normalized matrix.

Criteria	C1	C2	C3	C4
C1	0,5357	0,4167	0,6207	0,4737
C2	0,1071	0,0833	0,0689	0,0526
C3	0,1786	0,25	0,2069	0,3158
C4	0,1786	0,25	0,1034	0,1579

# Hasil

## AHP Calculation

Next, we calculate the priority weight for each criterion. For example, the priority weight for the first row is calculated as follows =  $(0,5357 + 0,4167 + 0,6207 + 0,4737) / 4 = 0,5117$  Similarly, for the subsequent rows, the values in each row are summed and then divided by 4. Table 4 presents the resulting priority weights.

Criteria	C1	C2	C3	C4	Priority Weight
C1	0,5357	0,4167	0,6207	0,4737	0,5117
C2	0,1071	0,0833	0,0689	0,0526	0,078
C3	0,1786	0,25	0,2069	0,3158	0,2378
C4	0,1786	0,25	0,1034	0,1579	0,1725

# Hasil

## AHP Calculation

After obtaining the priority weights, they can be directly applied to the scores. Since I am using a 0–100 interval for all scores, there is no need to adjust the weights for the interval, as the range is already uniform, ensuring fairness in the calculation. Table 5 presents the student scores to be calculated, using 10 student data entries as examples.

Name	C1	C2	C3	C4
Ali Rizqillah	90	80	80	79
Ana Natasya Alfa Syafitri	70	60	85	80
Ananda Nicolas Saputra	85	89	80	95
Cintya Ramadhani	75	78	90	80
Farach Fathimatuzzahro	80	95	86	95
Jennifer Naysyifa Adinda Putri. W	95	60	90	90
Mas Silviyatus Suwaibah	70	80	85	85
Moch. Syafiq Akmal Fahrezi	60	85	75	75
Muhamad Ilham Faqih	94	75	83	80
Muhammad Daffa Pratama	89	90	85	89

# Hasil

## AHP Calculation

After inputting the scores in Table 5, the results are calculated to determine the rankings. For example, the calculation for the first row is as follows =  $((90 \times 0,5117) + (80 \times 0,078) + (80 \times 0,2378) + (79 \times 0,1725)) / 4 = 84,9445$  The same process is applied to the subsequent rows. The calculation results can be seen in Table 6.

Name	C1	C2	C3	C4	Grade	Rankings
Weight Priority	0.5117	0.078	0.2378	0.1725		
Jennifer Nayshifa Adinda Putri. W	48,6115	4,68	21,402	15,525	90,2185	1
Muhammad Daffa Pratama	45,5413	7,02	20,213	15,3525	88,1268	2
Muhamad Ilham Faqih	48,0998	5,85	19,7374	13,8	87,4872	3
Ananda Nicolas Saputra	43,4945	6,942	19,024	16,3875	85,848	4
Farach Fathimatuzzahro	40,936	7,41	20,4508	16,3875	85,1843	5

# Hasil

## Testing

No.	Section	Testing	System Respons			Description
			Good	Fair	Poor	
1	Home Pages	Kelas 7	✓			
		GO Home	✓			
		GO Detail	✓			
		GO Login User	✓			
2	Score Pages	INPUT NILAI	✓			
		HITUNG PERINGKAT	✓			
		Academic Record E-Books Academic Books	✓			
		GO Home	✓			
		GO Home	✓			
		GO Login User	✓			
		Input Nilai Keagamaan	✓			
		Input Nilai Ujian	✓			
		Input Nilai Ekstra	✓			
		Input Nilai Etika	✓			
3	Rankings Page	EDIT NILAI	✓			
		RESET NILAI	✓			
		KEMBALI	✓			

# Hasil

## Distribution

The result is calculated as :

- $f = (14 \times 5) + (1 \times 4)$
- $f = (70 + 4) = 74$
- $P_n = \left(\frac{74}{75}\right) \times 100\%$
- $P_n = 98,7\%$



# Kesimpulan

The developed Decision Support System (DSS) using the AHP method offers an efficient and accurate way of identifying high-achieving students by evaluating multiple criteria. By considering various aspects such as religious competence, academic performance, extracurricular activities, and ethics, the system ensures that students are ranked based on a comprehensive and fair assessment. The mobile-based approach makes it accessible and user-friendly for teachers and administrators, enabling them to easily manage student evaluations. The implementation of this system at SMP TPI Porong will help improve the identification process for high-achieving students and contribute to the overall development of a more holistic educational system. Achieving a feasibility test result of 98.7% indicates that this application is useful and easy to use as an assistive tool for ranking outstanding and high-achieving students.

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