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Decision Support System for Determining Homeroom Teachers in Musda Perbaungan Private Vocational Schools Using the Simple Additive Weighting Method

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ABSTRACT

This research is based on observations, the MUSDA Perbaungan Private Vocational School is one of the vocational schools that cannot be separated from the struggle of the Regional Government of Serdang Bedagai Regency which is located in Tualang. MUSDA Perbaungan Private Vocational School has majors in Computer Network Engineering, Software Engineering, Light Vehicle Engineering, Motorcycle Engineering, and Mechanical Engineering with a total number of 45 teachers. Making a decision support system for determining homeroom teachers is very much needed by the MUSDA Perbaungan Private Vocational School. This system will make it easier to determine homeroom teachers, and also this system can help evaluate teacher performance systems that are lacking in performance standards in general. Thus, a decision support system using the Simple Additive Weighting (SAW) method is suitable to be developed in this system. This system will make it easier to find and determine teachers who are worthy of being homeroom teachers and will speed up the calculation of assessments and attributes to determine teachers who are worthy of being homeroom teachers. The Simple Additive Weighting method can be used as a method in making applications in decision making. Simple Additive Weighting uses a value ordering system in determining attribute ratings, where the rating of each attribute is summed with the weight of the attribute in question. The Simple Additive Weighting method is often also known as the weighted addition method. The basic concept of the Simple Additive Weighting method is to find the weighted sum of the performance ratings for each alternative on all attributes.

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1. INTRODUCTION

As the development of information and communication technology makes people want to make it easier to carry out all kinds of activities, the function of technology itself is to help humans in facilitating all activities or work and streamlining work time. In addition, the human error factor can be minimized as small as possible by the existence of information and communication technology [1].

MUSDA Perbaungan Private Vocational School is one of the vocational schools that cannot be separated from the struggle of the Regional Government of Serdang Bedagai Regency which is located in Tualang. MUSDA Perbaungan Private Vocational School has majors in Computer Network Engineering, Software Engineering, Light Vehicle Engineering, Motorcycle Engineering, and Mechanical Engineering with a total number of 45 teachers. The role of the teacher is the most important educator factor in an educational institution, especially in the homeroom teacher can be said to be a substitute for parents at school. Therefore, the role of homeroom teachers can be said to be important in the development of the teaching and learning process and in the structure of school performance, as well as playing a role in fostering and improving the education quality of students in the daily teaching and learning process in the classroom [2] [3] [4].

The system for determining homeroom teachers at the MUSDA Perbaungan Private Vocational School in general still uses a manual system, so schools still have problems in determining which teachers are eligible to be homeroom teachers, so that in general the teachers selected manually do not match the criteria values. And then the teacher who will be selected later to become the homeroom teacher must achieve the required criteria values.

Making a decision support system for determining homeroom teachers is very much needed by the MUSDA Perbaungan Private Vocational School. This system will make it easier to determine homeroom teachers, and also this system can help evaluate teacher performance systems that are lacking in performance standards in general. Thus, a decision support system using the Simple Additive Weighting (SAW) method is suitable to be developed in this system. This system will make it easier to find and determine teachers who are worthy of being homeroom teachers and will speed up the calculation of assessments and attributes to determine teachers who are worthy of being homeroom teachers.

The Simple Additive Weighting method can be used as a method in making applications in decision making. Simple Additive Weighting uses a value ordering system in determining attribute ratings, where the rating of each attribute is summed with the weight of the attribute in question [5] [6]. The Simple Additive Weighting method is often also known as the weighted addition method. The basic concept of the Simple Additive Weighting method is to find the weighted sum of the performance ratings for each alternative on all attributes [7] [8]. The Simple Additive Weighting method is suggested to solve the selection problem in a multi-process decision-making system. The Simple Additive Weighting method is a method that is widely used in decision making that has many attributes [9] [10].

The Simple Additive Weighting method is often also known as the weighted addition method. The basic concept of the Simple Additive Weighting method is to find the weighted sum of the performance ratings for each alternative on all attributes [11] [12] [13].

It is recommended to solve the selection problem in a multi-process decision-making system. The Simple Additive Weighting method is a method that is widely used in decision making that has many attributes. The Simple Additive Weighting method requires a decision matrix normalization process [14] [15] [16].

2. RESEARCH METHODS

2.1 Data analysis

The results of the study contain data from research that has been carried out at the MUSDA Perbaungan Private Vocational School. With the results of research conducted by researchers at the MUSDA Perbaungan Private Vocational School by collecting all the required data. Data obtained directly from interviews and surveys conducted directly in the field and case studies and literature studies that the authors did in stages to obtain appropriate data, then processed to obtain conclusions that were in accordance with the research conducted.

2.2 System Requirements Analysis

System requirements include the needs of the system that is built as a whole, starting from the information needed, the hardware requirements to be used, and also the software requirements that will be used for making application programs. The breakdown of the system image is built as shown in the flow of document image below:

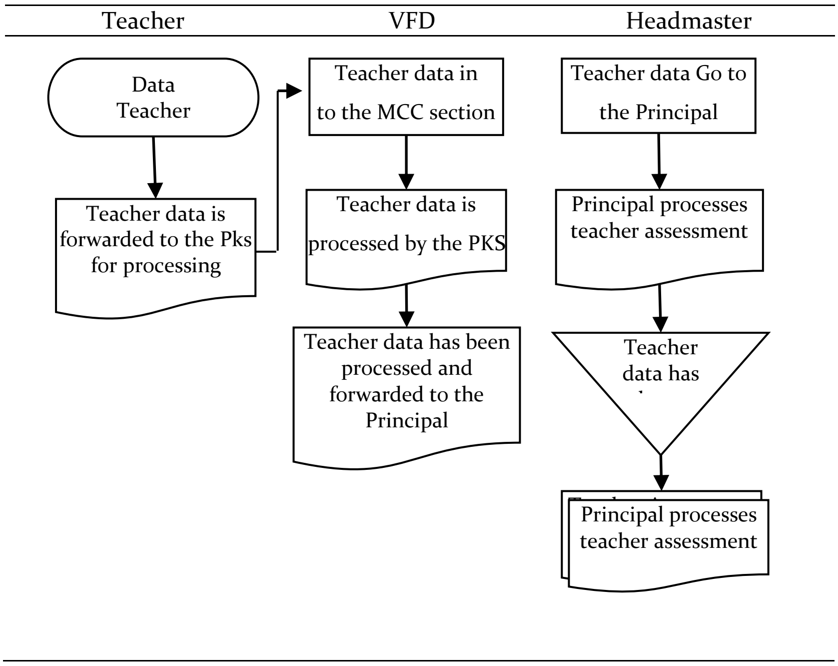


Figure 1. Flow of Documents

2.3 Description of Additive Weighting (SAW) Method

The SAW method is often also known as the weighted addition method. The basic concept of the SAW method is to find the weighted sum of the performance ratings for each alternative on all attributes. The SAW method requires the process of normalizing the decision matrix (X) to a scale that can be compared with all existing alternative ratings. The formula for the Simple Additive Weighting (SAW) method can be seen below;

$$r_{ij} = \begin{cases} \dfrac{x_{ij}}{\underset{i}{Max}\, x_{ij}} & Jika\ j\ adalah\ attribut\ keuntungan\ (benefit) \\ \dfrac{\underset{i}{Min}\, x_{ij}}{x_{ij}} & jika\ j\ adalah\ attribut\ biaya\ (cost) \end{cases} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

SAW Method Formula

Description:

rij = normalized performance rating value
xij = attribute value owned by each criterion
Max xij = the largest value of each criterion
Min xij = the smallest value of each criterion
benefits = if the largest value is the best
cost = if the smallest t value is the best

Where rij as the normalized performance rating of alternative Ai on attribute Cj ; i=1,2,...,m and j=1,2,...,n . The preference values for each alternative (Vi) can be seen below:

$$V_i = \sum_{j=1}^{n} W_j \, r_{ij} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

SAW Metode Method Preference Formula

Description:

Vi = ranking for each alternative
Wj = weight value of each criterion
rij = normalized performance rating value

A larger Vi value indicates that alternative Ai is preferred.

a. Steps to Solve Using the SAW Method

The steps for solving problems using the Simple Additive Weighting (SAW) method according to Kusumadewi (2006:74):

a. Determine the criteria that will be used as a reference in decision making, namely Ci.
b. Determine the suitability rating of each alternative on each criterion.
c. Make a decision matrix based on the criteria (Ci), then normalize the matrix based on the equation that is adjusted to the type of attribute (profit attribute or cost attribute) in order to obtain a normalized matrix R.

The final result is obtained from the ranking process, namely the addition of the normalized matrix multiplication R with the weight vector so that the largest value is chosen as the best alternative (Ai) as the solution.

3. RESULTS AND DISCUSSION

3.1 System Implementation

System implementation is the stage in implementing the system that has been built, where later it will be known the quality of the system designed, whether it can run well and in accordance with the expected goals. To realize the system that has been designed in the information system, other supporting facilities are needed which in principle are usually referred to as technical aspects, namely hardware, software, brainware.

a. Login Form

This decision support system login page is for users to log in as admin by entering the username and password "admin".

admin

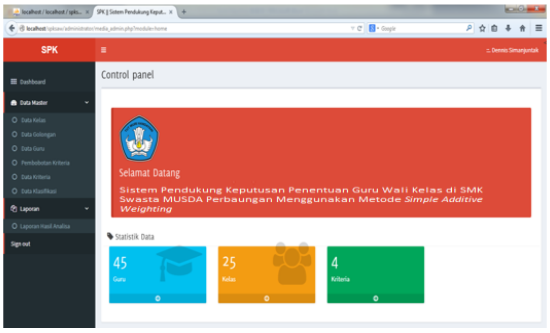
•••••

Sistem Pendukung Keputusan Penentuan Guru Wali Kelas

Figure 2. Display of User Login Form

b. Main course

The main page of the decision support system that has been built below contains menus that function to call other pages. The menus are Class Data, Group Data, Teacher Data, Weighting Criteria, Criteria Data, Classification Data and Analysis Results.



Control panel

Selamat Datang

Sistem Pendukung Keputusan Penentuan Guru Wali Kelas di SMK Swasta MUSDA Perbaungan Menggunakan Metode *Simple Additive Weighting*

Statistik Data

45 Guru

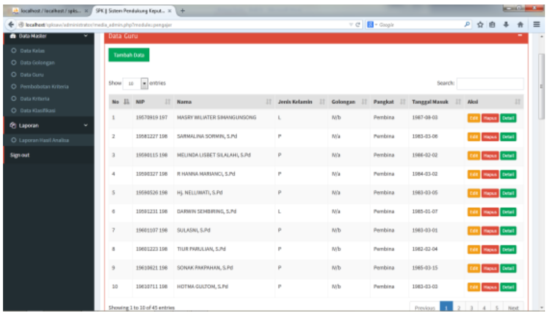
25 Kelas

4 Kriteria

Figure 3. Main Menu Display

c. Teacher Data Page

The teacher data page is used for teacher data processing such as adding teacher data, viewing teacher data in detail, changing teacher data and deleting teacher data. The following shows the teacher data for a total of 45 teachers.



Data Guru

Show 10 entries Search:

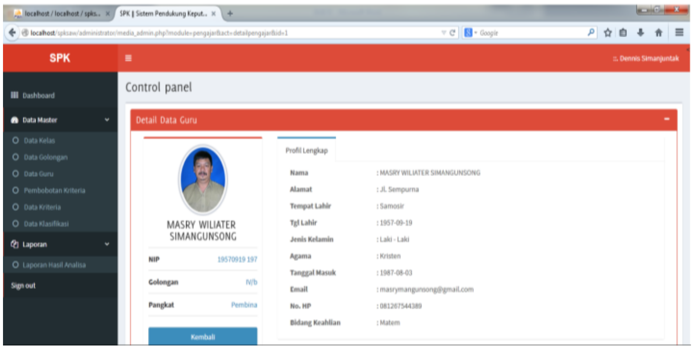
No	NIP	Nama	Jenis Kelamin	Golongan	Pangkat	Tanggal Masuk	Aksi
1	19570919 197	MASRY WILIATER SIMANGUNSONG	L	IV/b	Pembina	1987-08-03	Edit Hapus Detail
2	19581227 198	SARMALINA SORMIN, S.Pd	P	IV/a	Pembina	1983-03-06	Edit Hapus Detail
3	19590115 198	MELINDA LISBET SILALAHI, S.Pd	P	IV/a	Pembina	1986-02-02	Edit Hapus Detail
4	19590327 198	R HANNA MARIANCI, S.Pd	P	IV/a	Pembina	1984-03-02	Edit Hapus Detail
5	19590526 198	HJ. NELLIWATI, S.Pd	P	IV/a	Pembina	1983-03-05	Edit Hapus Detail
6	19591231 198	DARWIN SEMBIRING, S.Pd	L	IV/a	Pembina	1985-01-07	Edit Hapus Detail
7	19601107 198	SULASNI, S.Pd	P	IV/b	Pembina	1983-03-01	Edit Hapus Detail
8	19601223 198	TIUR PARULIAN, S.Pd	P	IV/b	Pembina	1982-02-04	Edit Hapus Detail
9	19610621 198	SONAK PAKPAHAN, S.Pd	P	IV/b	Pembina	1985-03-15	Edit Hapus Detail
10	19610711 198	HOTMA GULTOM, S.Pd	P	IV/b	Pembina	1983-03-03	Edit Hapus Detail

Showing 1 to 10 of 45 entries

Figure 4. Teacher Data Page

d. Teacher Data Input Page and Teacher Data Details

The teacher data input page functions to add teacher data and detail data for teachers who teach at MUSDA Perbaungan Private Vocational Schools.



Control panel

Detail Data Guru

MASRY WILIATER SIMANGUNSONG

NIP 19570919 197

Golongan IV/b

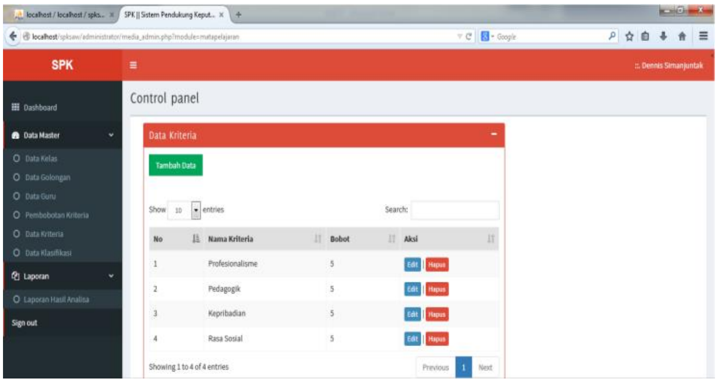
Pangkat Pembina

Nama : MASRY WILIATER SIMANGUNSONG
Alamat : Jl. Sempurna
Tempat Lahir : Samosir
Tgl Lahir : 1957-09-19
Jenis Kelamin : Laki - Laki
Agama : Kristen
Tanggal Masuk : 1987-08-03
Email : masrymangunsong@gmail.com
No. HP : 081267544389
Bidang Keahlian : Matem

Figure 5. Teacher Data Input Page and Teacher Data Details

e. Criteria Data Page

The criteria data page displays criteria data and the weight value of each criterion in determining prospective homeroom teacher candidates. On this page, there is a data display of 4 teacher criteria, Professionalism, Pedagogy, Personality, and Social Sense as well as the weight value of each criterion.



Data Kriteria

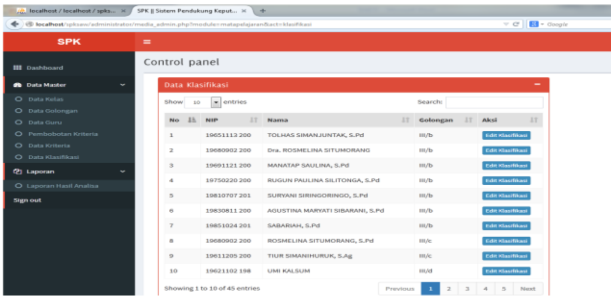
No	Nama Kriteria	Bobot	Aksi
1	Profesionalisme	5	Edit | Hapus
2	Pedagogik	5	Edit | Hapus
3	Kepribadian	5	Edit | Hapus
4	Rasa Sosial	5	Edit | Hapus

Showing 1 to 4 of 4 entries

Figure 6. Criteria Data Page

f. Classification Data Page

The classification data page is a page for grouping teachers with the criteria and weights of each criterion. The following shows the overall classification data for 45 teachers.



Data Klasifikasi

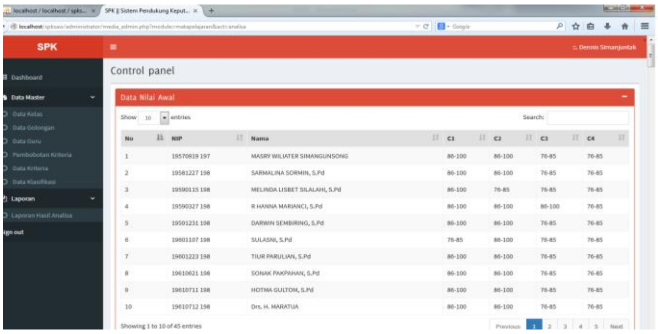
No	NIP	Nama	Golongan	Aksi
1	19651113 200	TOLHAS SIMANJUNTAK, S.Pd	III/b	Edit Klasifikasi
2	19680902 200	Dra. ROSMELINA SITUMORANG	III/b	Edit Klasifikasi
3	19691121 200	MANATAP SAULINA, S.Pd	III/b	Edit Klasifikasi
4	19750220 200	RUGUN PAULINA SILITONGA, S.Pd	III/b	Edit Klasifikasi
5	19810707 201	SURYANI SIRINGORINGO, S.Pd	III/b	Edit Klasifikasi
6	19830811 200	AGUSTINA MARYATI SIBARANI, S.Pd	III/b	Edit Klasifikasi
7	19851024 201	SABARIAH, S.Pd	III/b	Edit Klasifikasi
8	19680902 200	ROSMELINA SITUMORANG, S.Pd	III/c	Edit Klasifikasi
9	19611205 200	TIUR SIMANIHURUK, S.Ag	III/c	Edit Klasifikasi
10	19621102 198	UMI KALSUM	III/d	Edit Klasifikasi

Showing 1 to 10 of 45 entries

Figure 7.Classification Data Page

g. Initial Value Analysis Results Page

The page of the results of the initial value data analysis to display the results of the analysis of the values of the weights on each teacher's criteria using the SAW method. The following is a display of the results of the initial score analysis of 45 teachers.



Data Nilai Awal

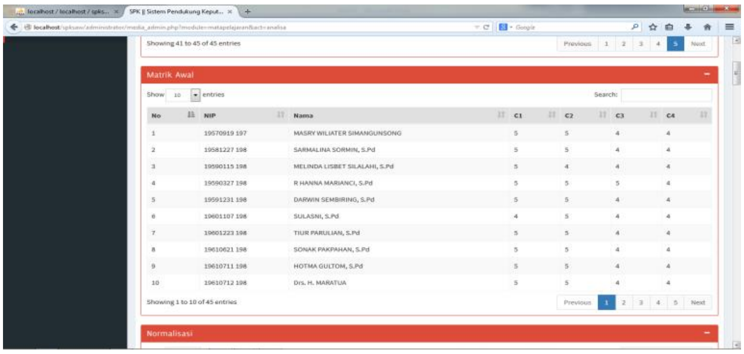
No	NIP	Nama	C1	C2	C3	C4
1	19570919 197	MASRY WILIATER SIMANGUNSONG	86-100	86-100	76-85	76-85
2	19581227 198	SARMALINA SORMIN, S.Pd	86-100	86-100	76-85	76-85
3	19590115 198	MELINDA LISBET SILALAHI, S.Pd	86-100	76-85	76-85	76-85
4	19590327 198	R HANNA MARIANCI, S.Pd	86-100	86-100	86-100	76-85
5	19591231 198	DARWIN SEMBIRING, S.Pd	86-100	86-100	76-85	76-85
6	19601107 198	SULASNI, S.Pd	76-85	86-100	76-85	76-85
7	19601223 198	TIUR PARULIAN, S.Pd	86-100	86-100	76-85	76-85
8	19610621 198	SONAK PAKPAHAN, S.Pd	86-100	86-100	76-85	76-85
9	19610711 198	HOTMA GULTOM, S.Pd	86-100	86-100	76-85	76-85
10	19610712 198	Drs. H. MARATUA	86-100	86-100	76-85	76-85

Showing 1 to 10 of 45 entries

Figure 8. Initial Data Analysis Results

h. Home Matrix Page

This initial matrix results page displays the results of the order of the scoring matrix for each weight value of the criteria C1, C2, C3, and C4. The following shows the initial matrix of 45 teachers.



Showing 41 to 45 of 45 entries

Matrik Awal

Show 10 entries Search:

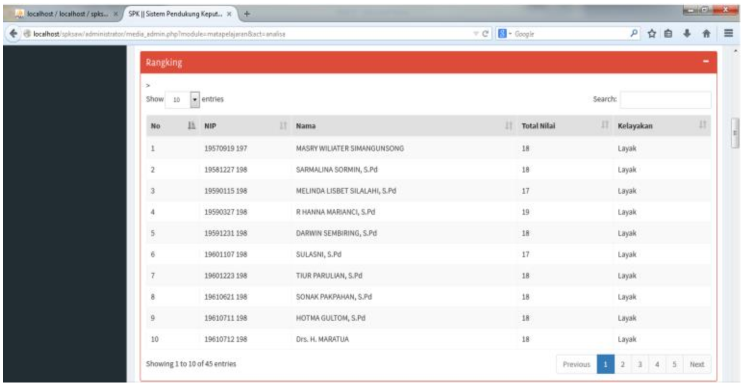
No	NIP	Nama	C1	C2	C3	C4
1	19570919 197	MASRY WILIATER SIMANGUNSONG	5	5	4	4
2	19581227 198	SARMALINA SORMIN, S.Pd	5	5	4	4
3	19590115 198	MELINDA LISBET SILALAHI, S.Pd	5	4	4	4
4	19590327 198	R HANNA MARIANCI, S.Pd	5	5	5	4
5	19591231 198	DARWIN SEMBIRING, S.Pd	5	5	4	4
6	19601107 198	SULASNI, S.Pd	4	5	4	4
7	19601223 198	TIUR PARULIAN, S.Pd	5	5	4	4
8	19610621 198	SONAK PAKPAHAN, S.Pd	5	5	4	4
9	19610711 198	HOTMA GULTOM, S.Pd	5	5	4	4
10	19610712 198	Drs. H. MARATUA	5	5	4	4

Showing 1 to 10 of 45 entries

Figure 9. Initial Matrix Results Page

i. Ranking Results Page

This ranking results page displays the results of the weighted sum ranking, the results of this ranking are the final results of the teacher's criteria assessment. These results also show the overall ranking of 45 teachers who have been graded from the highest to the lowest scores, as well as showing which teachers are eligible and which are not eligible to become homeroom teacher candidates.



Rangking

Show 10 entries Search:

No	NIP	Nama	Total Nilai	Kelayakan
1	19570919 197	MASRY WILIATER SIMANGUNSONG	18	Layak
2	19581227 198	SARMALINA SORMIN, S.Pd	18	Layak
3	19590115 198	MELINDA LISBET SILALAHI, S.Pd	17	Layak
4	19590327 198	R HANNA MARIANCI, S.Pd	19	Layak
5	19591231 198	DARWIN SEMBIRING, S.Pd	18	Layak
6	19601107 198	SULASNI, S.Pd	17	Layak
7	19601223 198	TIUR PARULIAN, S.Pd	18	Layak
8	19610621 198	SONAK PAKPAHAN, S.Pd	18	Layak
9	19610711 198	HOTMA GULTOM, S.Pd	18	Layak
10	19610712 198	Drs. H. MARATUA	18	Layak

Showing 1 to 10 of 45 entries

Figure 10. Ranking Results Page

4. CONCLUSION

Based on research conducted by researchers, it can be concluded several things, namely; With a decision support system to determine homeroom teachers at the MUSDA Perbaungan Private Vocational School, it will assist the principal in determining homeroom teachers for each class. With this decision support system, it proves that the Simple Additive Weighting method has been successfully implemented into the system and has been proven during research testing. Calculation of different weight values from each criterion will produce different values and produce different decisions.

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