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E-Learning Mobile Development of Student Structured Learning Applications during the pandemic

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Abstract

During the Covid-19 pandemic, teaching and learning activities were threatened with a decline in the quality of world education, including the quality of education in Indonesia. Students and teachers cannot interact to carry out educational activities at school. Meanwhile, in the world of education, interaction and communication are very important for the growth and development of student knowledge. If this is lost, then one generation of students could be threatened by poor quality education services caused by the covid-19 virus. Although the internet has been developed in the world of education for a long time, there are still many schools that are still unable to develop it properly for students. This is evident when the national exams were held before the Covid-19 period, there were still many schools that did not understand and understood providing facilities directly to students. This is a challenge in itself for Indonesia when the covid-19 virus attacks and paralyzes all activities. Forcing all activities to be done inside the house and reducing all activities outside the home. Learning activities and examinations are important activities that are always the focus of the school every semester. This activity previously required students to be in school, but during the pandemic this should not be done due to the government's decision to limit the spread of the virus. All schools must think hard for a solution to this problem. Schools take an important role in school activities so that the quality of education services does not decrease drastically. Private schools are no exception, whose activities come from greater than that of students' parents. While many students' parents think that if there are no activities at school, the money for school payments will be postponed. Schools only have one choice so that the learning process and exams continue, namely by using an online application that can adjust national standards and school standards. Although there are many applications in circulation, many of these applications cannot be adapted to school conditions at a low cost. Mostly, if the school wants changes to the application, then the developer sets a lot of rates that the school cannot afford. Learning and examinations are activities where the administration must also exist for reporting by schools. The reporting format, of course, is different for each school with their respective systems. With the mobile application developed by researchers and implemented according to school administration, in general, learning activities and examinations continue to run with results that can be accounted for because they have reports that are adjusted by the school.

Keywords: Education, Elearning, Mobile Android, Pandemic, School.

1. Introduction

Mobile access to the learning environment is an innovative way to use mobile networks to improve access to education [1]. The development of android technology on smartphones makes it possible to realize healthy people's lives easily and cheaply [2],[3]. The development of cellular technology also has an impact on the world of education. During the Covid 19 pandemic, the government began to focus on many mobile applications to solve education problems. Although some tools were wasted due to a mismatch between their design and the user's e-learning needs, others never realized their significant use due to poor perceptions of the pedagogical strategies used in training users, thus triggering major barriers to optimal realization. use of respective educational technology. Therefore, this situation requires a well-formulated balance between push and pull forces between user needs and technological aspects. The need for e-learning is informed by the cognitive domain; hence any form of ignorance of the same thing will overpower efforts to achieve the desired result [4]. e-Learning as a system of knowledge dissemination and evaluation has been assessed by various researchers [5],[6],[7],[8].

The eLearning system has received great attention from researchers in the field of information systems to address the problem of information on learning materials and personalization [9],[10],[11]. The covid 19 pandemic all forms of e-learning are being personalized by schools for use. The school also conducts routine examinations. Learning activities and examinations greatly influence the process of running activities at school. This activity is usually carried out in schools, but with the Covid 19 schools must be able to adapt to new regulations. Previously, the quality of school education could be measured by indicators of the achievement of learning process activities and the results of the exam activities every semester. But during a pandemic this cannot be done because the government requires all students to be able to study and take exams from home. Attitude is very important in an education,

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without a good attitude, of course education will not run smoothly, even education can be said to fail if the output of the education does not have a good attitude towards society [12]. So schools must also think about ways to overcome this problem so that the quality of education does not decrease drastically.

In this case, the development of mobile technology can be used as a school service solution for students to provide learning services and examinations based on online android mobile applications. Seagala something about the learning process and student examinations only need to connect their smartphone to the internet so that all information can be accessed from the grasp of the student. This research will also discuss the impact of applications that are implemented directly in schools.

So with the use of the application directly at school, the author can evaluate all the errors that occur. The problem that often occurs after evaluation is the lack of maximum utilization of the technology it owns. Schools have server computers but they are not used for online applications. In order for research to be directed at the intended aims and objectives, limits are given on learning development problems and online examinations. So that the problem-solving steps do not deviate too much from the research being carried out, so that the expected goals can be achieved. From this research the writer aims to make it easy for schools to carry out school academic activities using the android application. This paper is organized as follows, in Part 2 we explain Mobile Computing, Android Operating System, Learning and Testing. In Part 3 we explain the methodology, hardware and software used for the development of online learning applications and exams using an android phone. Section 4 of this paper is the result of developing Android applications as school academic applications. Section 5 is part of Conclusions and Future Work.

1.1. Literature Review

The growing popularity of mobile devices has permanently changed the computing experience of Internet users [13]. Cellular computing can improve patients' quality of life by providing a system that helps diabetes patients to monitor and control their disease [14]. Mobile computing will always develop rapidly due to its increasing users from time to time. Many uses have been made by researchers with cellular computing. This is also influenced by the many important discoveries using cellular computing in society [15]. In recent years, advancements for innovation have extended to new frontiers for verifying data that will trigger important changes in online learning. Users can view materials online with internet-connected devices from the references provided to them and choose the best approach to view learning materials [16]. Advances in Information and Communication Technology (ICT) have provided new opportunities for teaching and learning in the form of e-learning [17]. E-learning is one of the most important booms driven by internet transformation [18],[19],[20].

The online exam system is an integral and vital component of E-learning [21],[22]. Studying and exams are also important activities that are always carried out in schools. In the world of education, e-learning has played an important role over the last few years due to the flexibility and ease of access of distance-based education systems, most learning materials still rely on traditional learning approaches due to the lack of integrity and security of e-learning-based online learning applications [23].

Objective exams play a major role in educational assessment and electronic learning using the internet. The main problem in the traditional examination system is the low quality of the questions caused by several human factors, such as traditional methods for developing exams that cover a narrow curriculum topic coverage and few references. This has no effect on the separation of the teaching process regarding the learning process [24]. In the last decade, online learning has grown rapidly. However, the outbreak of the corona virus has caused special education learning institutions, schools to adopt online learning due to lockdowns and closures. [25].

2. Research Method

In making and developing applications there will be methods used by the author. This method has been used by the author in developing android mobile applications in other studies. An implementative research design is used because the conditions require the author to immediately find a solution to the problem of quality education services in schools. The method applied is from designing to evaluating the results of the research conducted. So that the tools and design of the development model are used as follows.

2.1. Hardware

The hardware used is the Macbook Air 2017 and Samsung Note 9 Smartphone. Table 1 shows the specifications of the Macbook Air 2017, while in Table 2 describes the specifications of the Android Smartphone device:

Table 1. Macbook Pro 2014

Product	Graphics	Memory	Os
2,8 GHz Dual Core Intel I5	Intel Iris 1536 MB	8 GB 1600 MHz DDR3	macOS Big Sur

Table 2. Android Smartphone Samsung Note 9

Chpshet	CPU	Memory	Display
Qualcomm SDM845 Snapdragon 845 (10 mm)	Octa-Core	4 GB	Trilumin os display

2.2. Development Software

The steps for the process of development activities in this study can be seen in Figure 1. The software development method in the waterfall model of development [26] [27] consists of 4 types of activities:

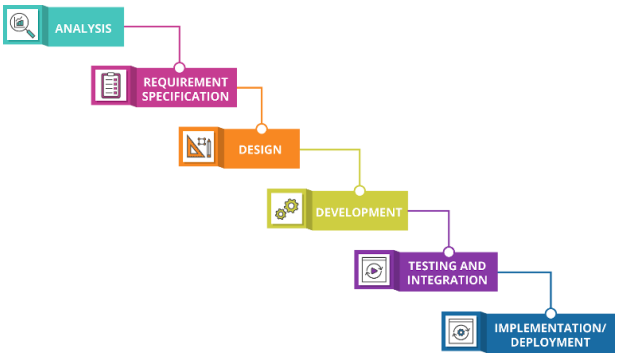

Figure 1. Development Waterfall Model

In developing this model, it can be described as follows:

a. Analysis, at this stage the activities carried out are collecting problems caused by the Covid 19 virus or during the pandemic. Many schools are not allowed to do social activities at school. The government issued regulations during the pandemic, learning activities and like the others were carried out at their respective homes.

b. Requirements Specifications, the author lists all the urgent needs at school, namely learning activities and online examinations that must still be implemented so that the school can continue to run.

c. Design, interface design is made as attractive and easy as possible so that students and teachers have no difficulty using the application. It is also based on standard interfaces that are often found in other applications.

d. Development, building a learning and examination system also views the tools that can be provided by schools as found by the author, schools have server computers that can be maximized as an online learning and exam application server.

e. Testing and Integration, the testing phase sees what fatal errors need to be fixed. This stage is very important to evaluate the application before implementing it.

f. Implementation, after making sure there are no errors in the application, the last stage is to try directly at school and use it without any false data anymore. As a whole, the original data is entered into the application.

3. Result and Discussion

Analysis shows that schools must immediately transition from everything they do in school to online. If schools do not make changes to mobile technology, the school will be threatened with closure because parents think there is no school activity so that school fees are also not paid by parents. The results of the analysis show that the school really hopes that there will be assistance in making an online android-based application.

3.1. On-Going System Design

As for the observation of the current system for learning and current exams, you can see the use case diagram information as in Figure 2.

Figure 2. The learning process and exams before the pandemic.

Before the regulation was issued by the government for studying and examining from home, the previous activity process can be illustrated in Figure 2. So students go to school to get educational services from the school.And the system to be developed by the author can be seen in Figure 3.

Figure 3. Elearning and Exam Mobile Android

Figure 3 illustrates all learning and exam activities in just one hand. Students are very familiar with using mobile technology. Not one single person found an opinion that students do not like mobile technology. The author assumes that from there learning activities and examinations using mobile applications will definitely be very interesting for students. Differences in the abilities of students and their learning styles significantly affect learning outcomes. Meanwhile, with the development of E-Learning technology, students can be provided with a more effective learning environment to optimize their performance [28].

3.2. Application Design Elearning

Existing digital libraries and e-Learning systems are using multi-media extensively [29]. The usability attributes evaluated are user-friendliness, learnability, technology infrastructure and policy [30] can be seen in Figure 4.

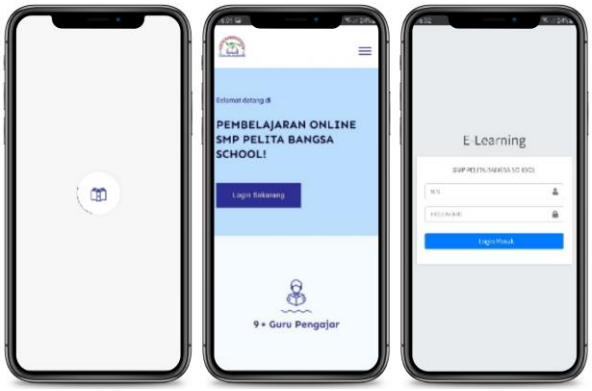

Figure 4. Step 1 Student Elearning

In this step, students open the application and can see the login process page. Students enter a username and password to enter the main page of the application. The design of the application is greatly simplified because the target user is children. From opening the app to the homepage it has a design that is no more than three colors. This makes the impression of the application easy and easy to remember can be seen in Figure 5.

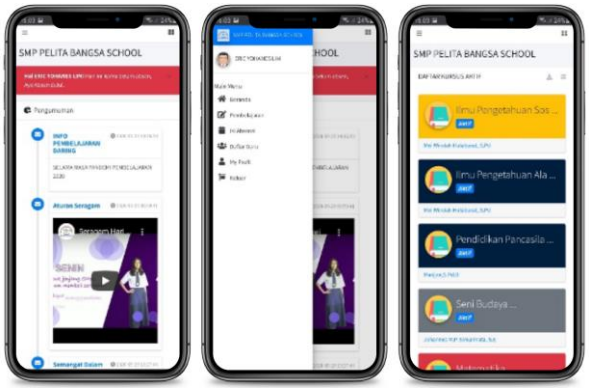

Figure 5. Step 2 Student Elearning

In the next step, students can access various application menus that are already on the left side. For example, the home menu, learning, attendance content, teacher data, my profile and logout. At this stage students can also see a list of material that has been provided by the school. Students can also get announcement information from the school quickly. Students can also view information in the form of videos from school, so that students are not only able to access writing can be seen in Figure 6.

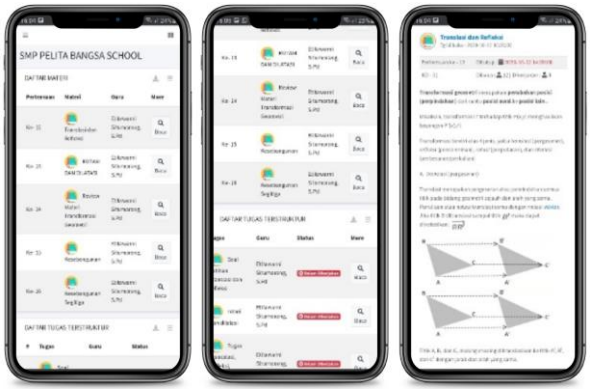

Figure 6. Step 3 Student Elearning

The third step, when students select the material provided by the teacher, after that the material to be read will appear. Information from the material is also very complete, such as the date and time the material was published or students can also see the material that has been studied in the initial week of learning meeting can be seen in Figure 7.

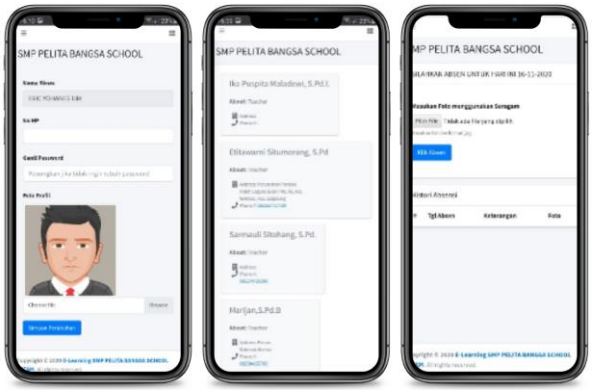

Figure 7. Step 4 Student Elearning

The fourth step, at this stage students can find out the contact from the teacher so that students can directly interact with the teacher. And then every time there is learning students also do a selfie absent which will be developed in further research by the author. In the application the writer will also develop an interface from the teacher. Teacher access is an important point for this study so that in the application there is a two-way interaction between students and teachers. The teacher's most important obligation is to provide material, both visual material and text material that will be read by students. No less important than the role of material, teacher reporting to schools must also be assisted. In the teacher application, only material input remains, then for teacher reporting, there is no need to be preoccupied with making accountability reports for learning. This can be illustrated in the following can be seen in Figure 8.

Figure 8. Features Teacher in Elearning

At the next stage the teacher can also print the attendance report to excel or directly click the print button in the Figure 9.

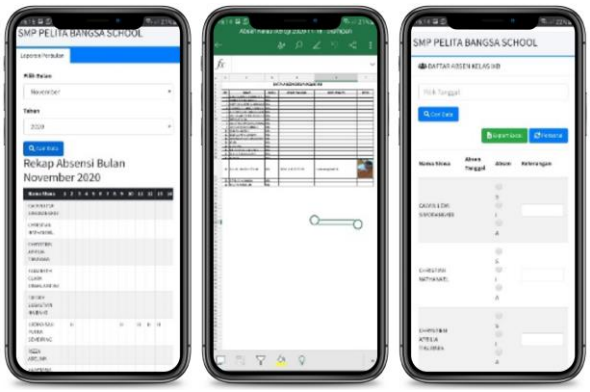

Figure 9. Student Attendance Report.

In further research, it will be developed again about streaming live video in the application when learning begins. Elearning which is adjusted in this research case study in Pelita Bangsa school is an e-learning application that is tailored to the basic needs of schools to continue to carry out learning during the Covid 19 pandemic. In this case the application has been implemented on the server and produces applications that run with no problems. Students can already access material and attendance from home using the android application. If you don't have an Android smartphone, students can also access the school application link.

3.3. Application Design Exam

Android is fast becoming famous day by day, and the number of its users is increasing day by day, because it is easy to access the necessary Android-based applications on smartphones and tablets. Therefore, we found this idea easy and time efficient to facilitate users in this way without any difficulty. There are many online quiz applications available on the internet, but most of them are just for fun and entertainment [31]. From the author's analysis of online exam activities that have been widely circulating today, the appearance of this research exam application also adapts to school needs can be seen in Figure 10.

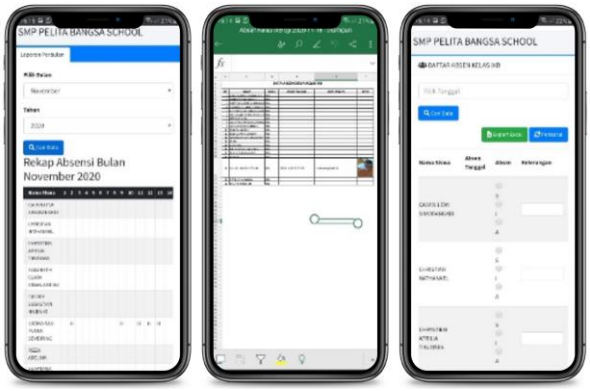

Figure 10. Initial view of students logged in.

Figure 10 it can be concluded that the appearance of the students is very simple. This display is very focused on the access speed and features of the application. Students have four menus, namely dashboard, exam schedule, test results and download menu can be seen in Figure 11.

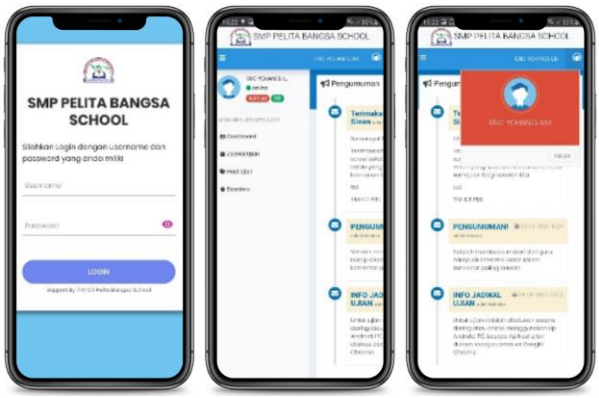

Figure 11. Image menu schedule, exam results, and announcements.

With this online exam application students can quickly find out the results of their test scores after taking the exam. So before the application, students have to wait for the teacher to correct their exam answers. But with this online exam application they don't wait anymore because their exam answers are corrected directly by the application system so that it saves teachers' labor from correcting student answers anymore. All scores are stored in the application, so it is no longer possible to lose all values, let alone be replaced, like the previous system which still used paper during the exam The exam application is also equipped with anti-cheating exam security features on Google. When students exit the application, the exam will immediately remove the student from the subject exam can be seen in Figure 12.

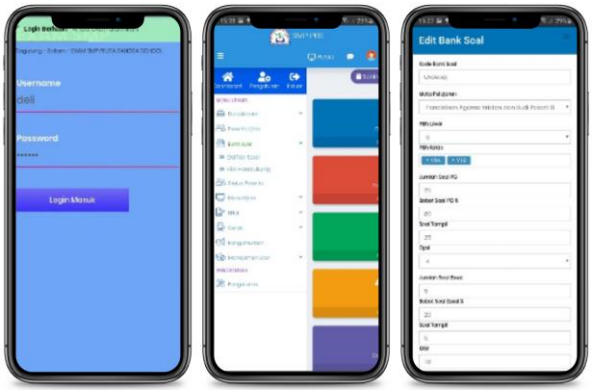

Figure 12. Menu of the teacher.

Figure 12 the teacher has many menus that can be accessed. From adding question banks to printing student test scores can be seen in Figure 13.

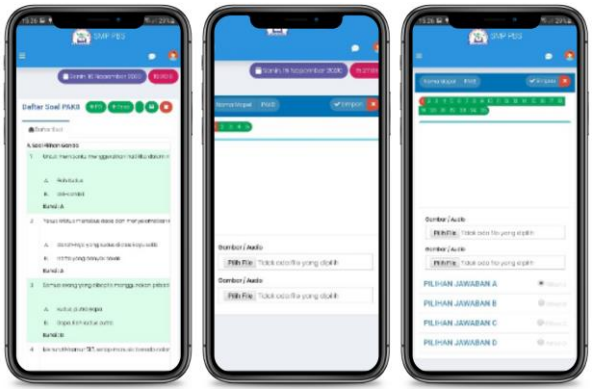

Figure 13. Display manage questions.

The teacher can enter questions in the form of pictures and videos. Multiple choice questions or essays can also be entered into the application. So the application can also be used later for Minimum Competency Assessment (AKM). Schools can make questions for AKM to be worked on by students. This will be very helpful for the future. During the exam, it has been carried out several times to work on questions from the student menu, there are no problems, both questions in the form of videos or in the form of pictures.

In the next stage, the administrator window manages all the menus that are applied to the exam. Both managing reports to managing access rights as shown in Figure 14. There are three reports that are provided automatically by the application, namely attendance reports, exam reports and exam participant card reports. All in digital form so you can save paper for filing. In addition to reports, the application can also manage exams simultaneously and be supervised by a supervisor. Supervisors can also exclude cheating students from online exams. If a student does not score above KM, the school exam operator can also repeat students who are below the standard scorecan be seen in Figure 14.

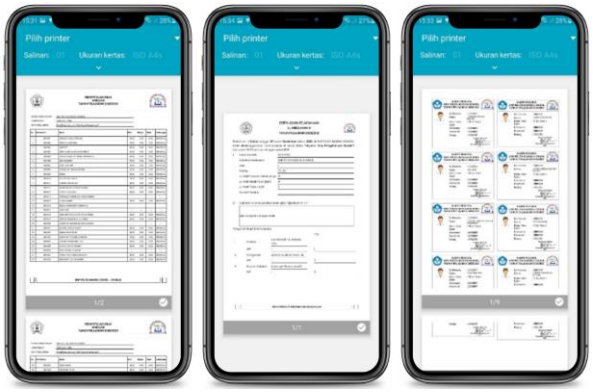

Figure 14. Reports on the exam application.

Figure 14 the report can also be printed directly in pdf format can be seen in Figure 15.

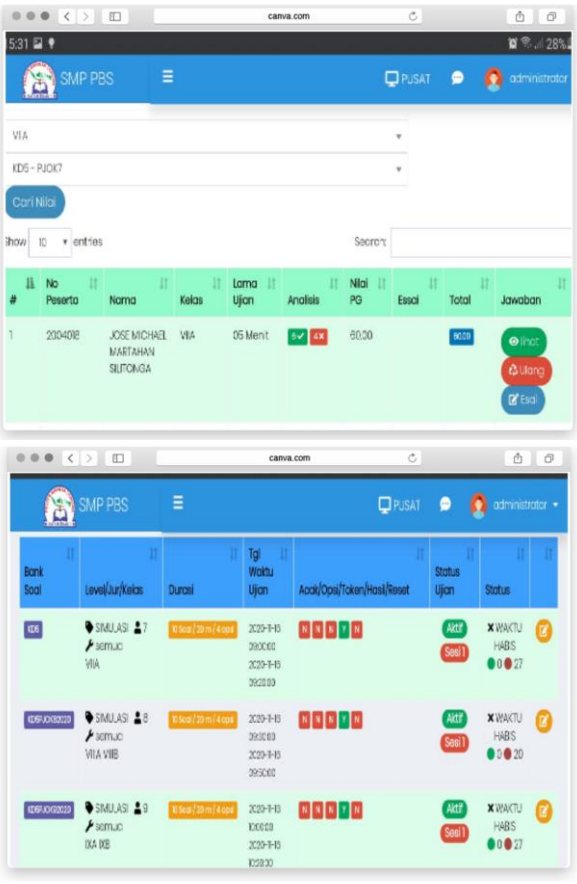

Figure 15. Manage Schedules and Grades.

Figure 15 administrators or application operators can manage schedules and manage student exam scores. Operators can also quickly find out the student's score because in the value menu, information on the test time and test scores will appear directly.

4. Conclusion

From the results of the implementation of the two applications, the elearning application and the exam application have helped Pelita Bangsa School to carry out the online learning process and be able to take

advantage of existing technology at the school. In terms of parents, they are greatly helped by an application with fast and real-time access to their child's learning outcomes. Parents no longer worry about their children's education during the Covid 19 pandemic. For the continuation of this research, there will be online attendance creation using a feature that is very popular with today's teenagers, namely by taking selfies. This feature has not been completed in this research, so it will then be examined in an article after this article is published by the publisher. Research on this topic can also be a solution to limit the spread of the Covid 19 virus.

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