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Research Articles

Application of the Model View Controller Concept for the Academic Information System at PKBM Nola

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Abstract
The Academic Information System (SIA) is important in managing academic data, including processing and reporting report cards, in non-formal educational institutions such as PKBM Nola. This research aims to apply the Model-View-Controller (MVC) concept in the Academic Report Card Information System at PKBM Nola to increase efficiency and accuracy in processing academic data. This study uses a structured software development approach in which the SIA Raport system design is based on the MVC concept. The model manages academic data, including student information, subjects, and grades. View is responsible for displaying the user interface that allows users to view and manipulate academic data. The controller is a liaison between the Model and View, managing data flow and maintaining data integrity. By applying the MVC concept in the Academic Reports Information System at PKBM Nola, institutions can benefit from processing academic data, increasing efficiency, and providing accurate information to relevant stakeholders. This research provides a foundation for developing a better academic information system in other non-formal education institutions, emphasizing systematic segregation of duties and responsibilities through the MVC concept.

Keywords: MVC concept, Report card, Academic information system, PKBM Nola

Abstrak
Sistem Informasi Akademik (SIA) memiliki peran penting dalam pengelolaan data akademik, termasuk pengolahan dan pelaporan raport, di lembaga pendidikan nonformal seperti PKBM Nola. Tujuan dari penelitian ini adalah untuk menerapkan konsep Model-View-Controller (MVC) dalam Sistem Informasi Akademik Raport di PKBM Nola guna meningkatkan efisiensi dan akurasi dalam proses pengolahan data akademik. Penelitian ini menggunakan pendekatan pengembangan perangkat lunak yang terstruktur, di mana desain sistem SIA Raport didasarkan pada konsep MVC. Model berfungsi untuk mengelola data akademik, termasuk informasi siswa, mata pelajaran, dan nilai-nilai. View bertanggung jawab untuk tampilan antarmuka pengguna yang memungkinkan pengguna untuk melihat dan memanipulasi data akademik. Controller berperan sebagai penghubung antara Model dan View, mengatur aliran data dan menjaga integritas data. Melalui penerapan konsep MVC dalam Sistem Informasi Akademik Raport di PKBM Nola, lembaga dapat memperoleh manfaat signifikan dalam pengolahan data akademik, meningkatkan efisiensi, dan memberikan informasi yang akurat kepada stakeholder terkait. Penelitian ini memberikan landasan untuk pengembangan sistem informasi akademik yang lebih baik di lembaga pendidikan nonformal lainnya, dengan penekanan pada pemisahan tugas dan tanggung jawab sistematis melalui konsep MVC.

Kata Kunci: Konsep MVC, Raport, Sistem Informasi Akademik, PKBM Nola

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1. Introduction

With the development of the times, education has become one of the important factors that is very concerned. Currently, the PKBM Nola report card system needs to be improved. This condition occurs due to shortcomings, including the long input process, so it takes much time to fill in student grades. Each subject teacher creates an Excel file for filling in grades and then submits it to the admin tasked with inputting *grades* from teachers in the report template that has been created previously. The results of the report cards that the admin has input are immediately submitted to the parents of students in the form of soft copy in pdf format. This will certainly be an obstacle in the process of grouping data of prospective students (Saputra, D., Haryani, H., Junaidi, A., Baidawi, T., & Surniandari, A. 2023). Very few teachers need to look back at the report card grades that the admin has input. This is a concern that the admin will make errors when inputting grades, and parents of students in Surabaya or outside Java will not be able to see the grades in real time.

Research conducted by (Fauji, 2020) regarding "Web-based report card information system with the MVC concept using *a framework Codeigniter* at SMAIT Abu Bakar Yogyakarta". The research results show that using the MVC concept can facilitate the development of a web-based report card information system, increase efficiency and effectiveness in data management, and facilitate access to information for parents and students.

Model View Controller (MVC), the Report Card Academic Information System concept in PKBM Nola". To provide a solution in dealing with this problem, namely suggesting an online report card application using a web-based CodeIgniter *framework* to make it easier for teachers to inform learning results in the form of student grades and, at the same time, difficulties for those outside the city can be resolved quickly, and the storage of student grade result data is also more structured.

2. Methods

The research method used in this research is a development method, which can be called *a waterfall.* Namely, a development method derived from methods in descriptive-qualitative research. The *waterfall* method is a software development process carried out sequentially, where the progress is seen as a waterfall, meaning that the water continues to flow. *Waterfall* goes through stages such as planning, designing, implementing, and testing (Roger, 2015).

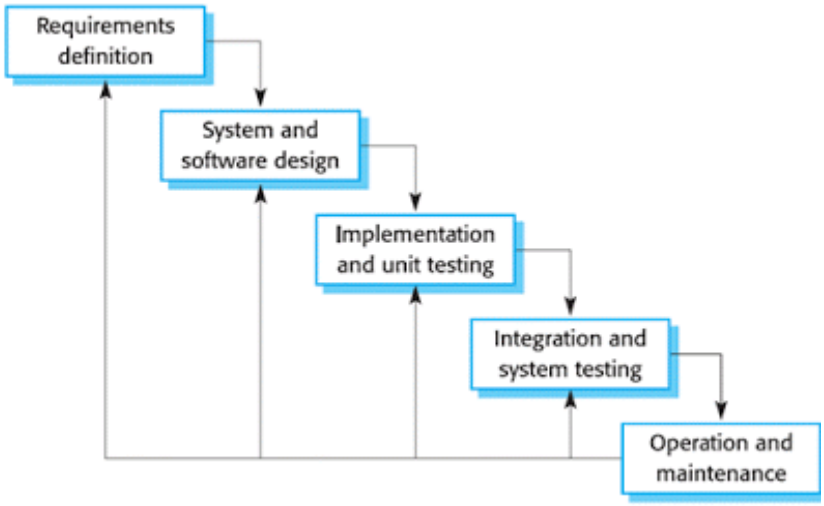

Figure 1. Waterfall method

2.1. Planning System

This planning stage defines the objectives and scope of application of the MVC academic report card that information system concept to determine and evaluate the strategies used in application development. At this stage, several activities related to system planning will be carried out:

Observations, Interviews, and Literature Studies. This system built a web-based clinical information service system using laravel framework with MVC design (Model-View-Controller) that can provide information (Hanifah, A. P., Fitrisia, Y., & Hajar, D. , 2018).

2.2. System Design
The next stage is the design stage, designing the system using Unified Modeling Language (UML) diagrams. System design is done to facilitate researchers in implementing the system. Stages of application design using U*nified Modeling Language* (UML).

2.3. System Implementation
This stage implements the MVC concept for this academic report card information system using *the Codeigniter framework*.

2.4. System Testing
Program testing is carried out using *black box testing* and application testing to the Head of the Nola PKBM Division to determine the suitability of the system output with the system requirements compiled in the early stages.

2.5. Program Implementation and *Maintenance*
This stage is the final stage of the *waterfall method*. The stages are regular system maintenance so that the system can run according to its function.

3. Results
It uses the waterfall method to design the academic report card information system at PKBM Nola. The *waterfall* method is divided into stages: *Requirement Analysis*, *System Design*, *Implementation, Integration and Testing,* and *Operation Maintenance*.

3.1. System Analysis
System analysis is structured based on *requirements* or *"user stories"* from observations made at the case study site. System analysis is dynamic so it can increase according to user needs or *feedback* given by users during application *reviews* or demos (Prastio and Ani 2018).

3.2. System Design
At this stage, information system design is carried out using one of the modeling techniques in system design with the OOP (*Object Oriented Programming) concept*, namely UML (*Unified Modeling Language*), including the following:

A. Use Case Diagrams
The use case describes the expected functionality of a system that represents an interaction between *the actor* and the system. *Use cases* can help when compiling system *requirements, communicating designs with clients, and designing test cases* for all features in the system. Figure 2 show the use case diagram.

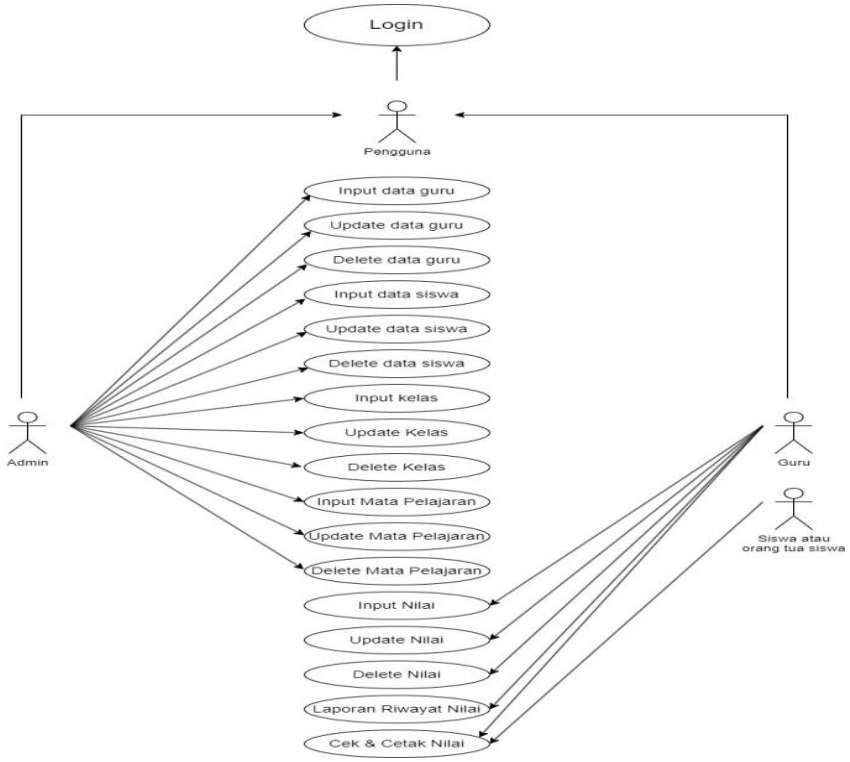

Figure 2. Use Case Diagrams

B. Activity Diagrams

Activity Diagrams describe various activity flows in the system being designed, the beginning of the flow of each activity, and *decisions* that may occur. It can also describe parallel processes that may occur in multiple executions. *Activity diagrams* better describe the processes and flow of activities from the top level in general. Figure 3 show the activity diagram.

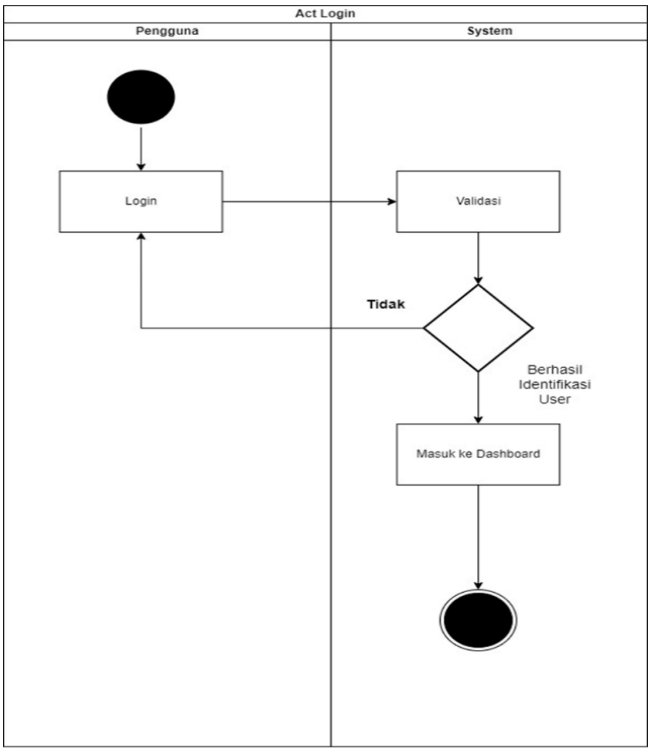

Figure 3. Activity Diagram of the login menu

C. Sequence Diagrams

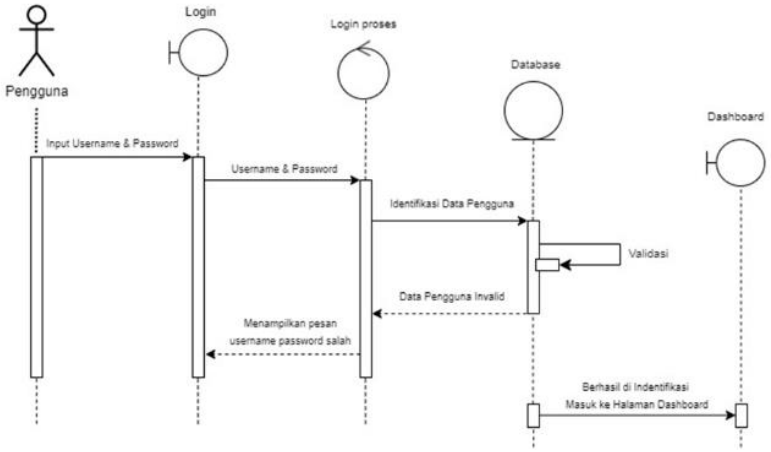

Figure 4. Sequence Diagram

Sequence diagrams, in this case, describe the sequence of object interactions with the system. The following is *a sequence diagram* for the academic report card information system at PKBM Nola.

D. Diagtam Class

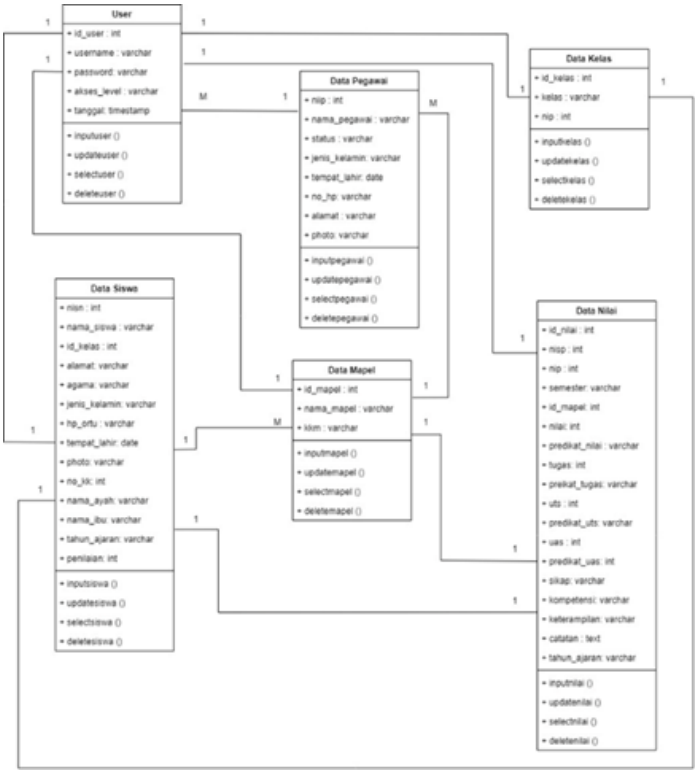

Figure 5. Class diagram

4. Discussion

4.1. System Implementation

In creating the PKBM Nola academic report card information system using the waterfall method, the next step was continued, namely system implementation. The following are the results of the null report card academic information system that has been done:

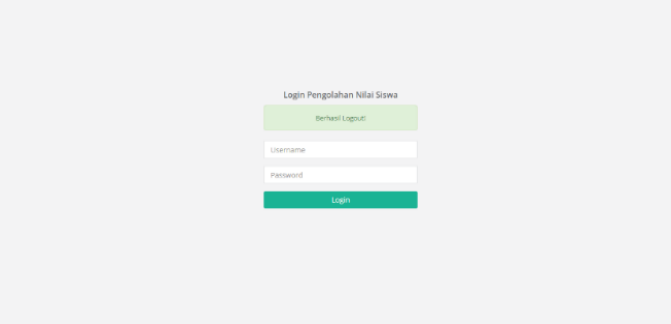

Figure 6. Login Display

Figure 6 displays the *login menu* on the PKBM Nola academic report card information system for all *user interfaces*. There are *username* and *password* columns and a *Login* button to enter the system.

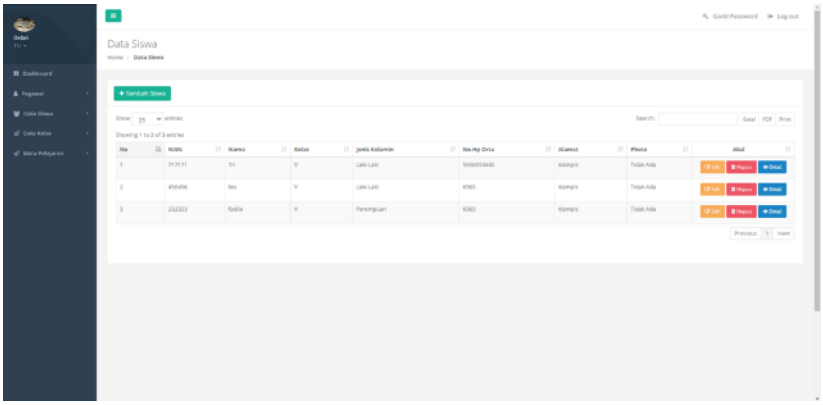

Figure 7. Student data

Figure 7 is the student data display menu for the admin *user interface display*. On this menu, there *are* student details that the previous admin has input, and also, on this menu, the admin can input, update, and delete students.

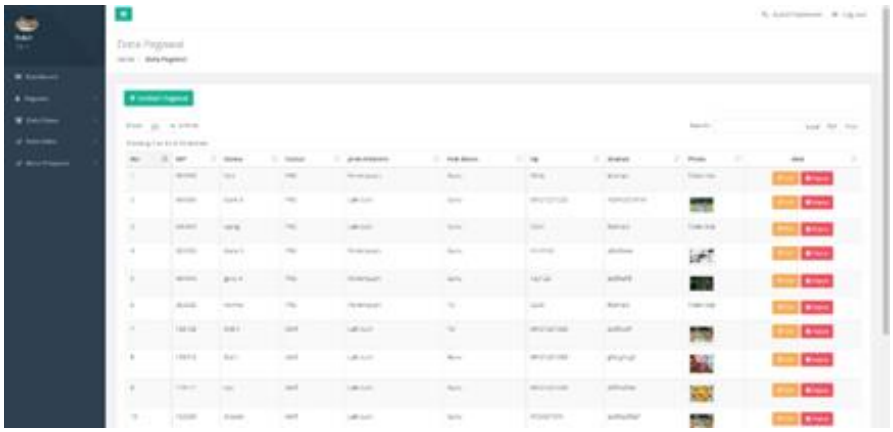

Figure 8. Teacher Data

Figure 8 shows the employee data display menu for the admin *user interface*. On this menu, there are employee details that the previous admin has input, and also, on this menu, the admin can input, update, *and* delete employees.

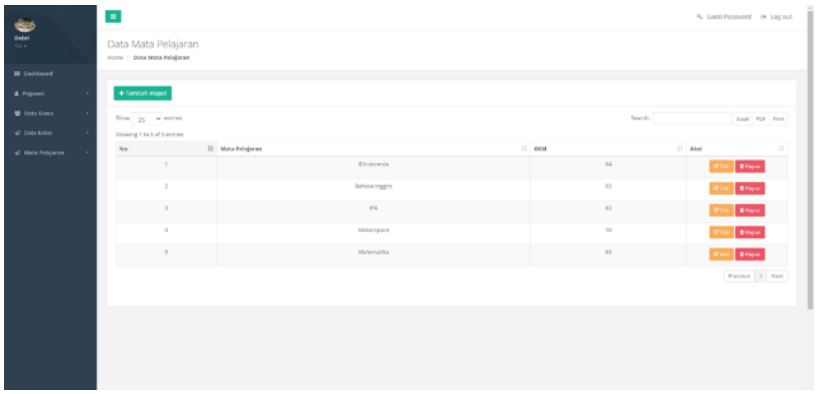

Figure 9. Subject Data

Figure 9 is the subject data display menu for the admin *user interface display*. In this menu, there are subject details that the previous admin has input, and also, in this menu, the admin can input, update, *and* delete class data.

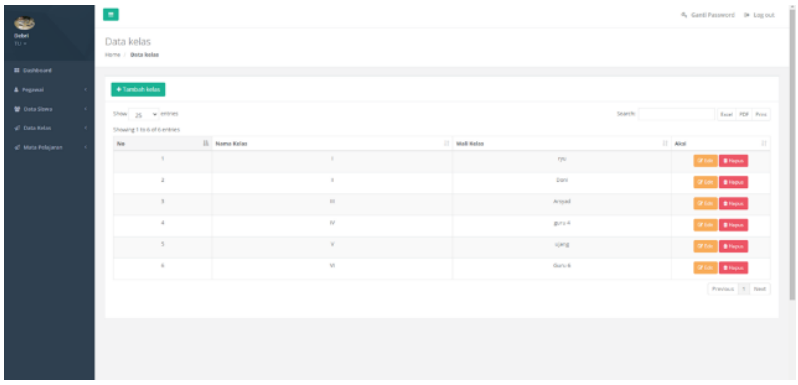

Figure 10. Class Data

Figure 10 is the class data display menu for the admin *user interface display*. On this menu, there are class details that the previous admin has input, and also, on this menu, the admin can input, update, *and* delete class data.

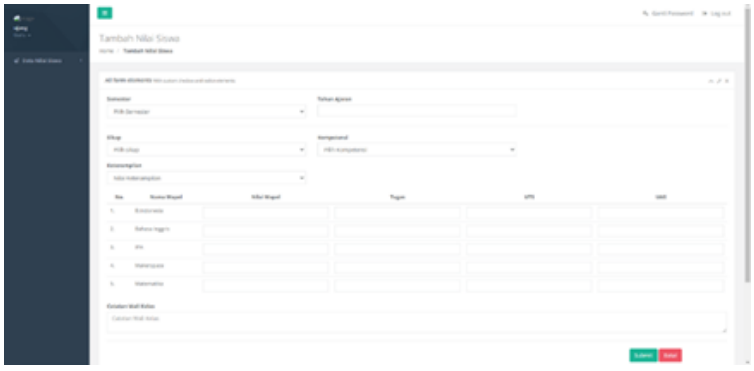

Figure 11. Value Data

Figure 11 shows a detailed menu for the added student value display for the teacher *user interface*. This menu has a complete detailed *form* for adding student grades, namely selecting the academic year, even or odd semester. There is a column for assessing attitudes, competencies, and skills.

4.2. Testing

Aktor	Skenario Pengujian	Hasil Pengujian	Status
Admin	*Login* dengan validasi data yang sesuai	Sukses *Login* dan dapat masuk ke dalam sistem	Berhasil
	Login dengan validasi data yang tidak sesuai	Menampilkan pesan data tidak sesuai	Berhasil
	Menambahkan data Guru	Data berhasil tersimpan di database pegawai dan tampil di halaman data pegawai	Berhasil
	Mengubah data Guru	Data pegawai guru berhasil diubah dan tersimpan di *database* pegawai guru	Berhasil
	Menghapus data Guru	Data pegawai guru berhasil terhapus dan tersimpan di *database* pegawai	Berhasil
	Menambahkan data Admin	Data berhasil tersimpan di database pegawai dan tampil di halaman data pegawai	Berhasil
	Mengubah data Admin	Data pegawai admin berhasil diubah dan tersimpan di *database* pegawai	Berhasil
	Menghapus data Admin	Data pegawai admin berhasil terhapus dan tersimpan di *database* pegawai	Berhasil
	Menambahkan data Siswa	Data berhasil tersimpan di database siswa dan tampil di halaman data siswa	Berhasil
	Mengubah data Siswa	Data siswa berhasil diubah dan tersimpan di *database* siswa	Berhasil
	Menghapus data Siswa	Data siswa berhasil terhapus dan tersimpan di *database* siswa	Berhasil
	Menambahan data Kelas	Data berhasil tersimpan di database kelas dan	Berhasil

Figure 12. System testing

System testing stages are carried out to find out and find *bugs*. In this case tested using the *black-box method*. *Black box* testing is a method of designing test data based on system specifications. Data is checked *(input)*, executed (processed), and then issued *(output)* if the system works as expected or needs improvement. Display testing can be seen in the table.

5 . Conclusion

Based on the research that has been carried out, the academic report card information system at PKBM Nola can help manage student grade data and assist teachers in inputting student report card grades. Applying the MVC concept in developing an academic report card information system at PKBM Nola provides significant benefits in separating duties, code management, and scalability. By separating business logic *(model)*, presentation *(view)*, and interaction *(controller)*, the system becomes more structured, modular, and easy to manage. The waterfall method is used in developing information systems, making it easier to design the system from the beginning until the system is completed.

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