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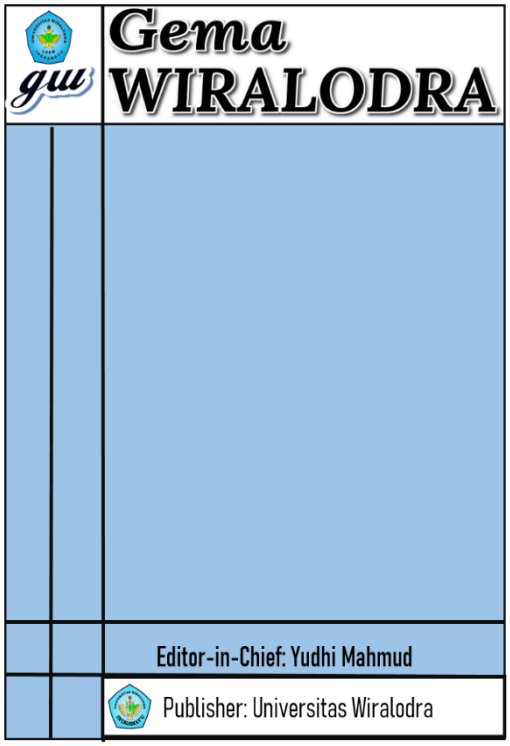

Designing a knowledge management system with big data for data and information center of the Indonesian Ministry of health on software development

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Designing a knowledge management system with big data for data and information center of the Indonesian Ministry of health on software development

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Abstract
Every company has essential information. This information can become company knowledge. Knowledge must be organized so that learning is often used optimally. If knowledge is optimally organized, people who want to use it will find it difficult to find it. Therefore, knowledge management is needed. Knowledge management is used everywhere. In this case, knowledge management will be used for application development. This knowledge was previously processed using ETL, where data would be collected, filtered, and combined with various sources. This knowledge management will be integrated with big data in the software development process so that users can easily find the necessary knowledge.
Keyword(s): Knowledge, Knowledge Management, Big Data, KMSAIM, Software Development.

1. Introduction
In the current era of globalization, technology continues to develop rapidly, especially in the field of information and communication. This causes information technology to become a necessity for companies and organizations to improve performance, especially in terms of disseminating information and becoming an information center, especially for companies or organizations that use technology (Johnson et al., 2008). Dissemination of information is essential because it is one of the keys for a company or organization in carrying out its needs (Bhasin, 2023). Every company or organization requires information technology for making decisions, conducting audits, conducting administration, and others (Kannan, 2022). Human resources will carry out these needs in the company or organization. These human resources (HR) will be the main actors in disseminating information in every company or organization.

The rapid development of technology today changes all fields due to the rapid development of technology and information in this era of globalization (Widayanti, 2012). This situation causes the need for new ways to respond to how companies or organizations stay alive. The rapid development of technology also makes science increasingly needed. All information in a company or organization can be used as knowledge (Law Insider, n.d.). This knowledge is essential for HR as a means of their development. There are various kinds of knowledge. There is knowledge about the company or organization, knowledge about managerial, knowledge about the development of human resources, and knowledge about the company's technology. From the various existing knowledge in the company or organization, we need a system that can organize this knowledge so that knowledge can be structured and accessible to those who need it. Knowledge Management is activities such as finding, retrieving, disseminating, and implementing knowledge to increase and reduce costs that impact company or organizational goals (Fernandez, 2010). It is hoped that the existing layers of the organization will absorb knowledge and insight quickly about its business or operations so that the organization can be mutually sustainable in maintaining and carrying out its processes (Kalkan, 2005). To have a business that can adapt well in the face of various kinds of obstacles requires sufficient and broad knowledge by the company or organization (Kalpič, 2006). Applying Knowledge

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Management (KM) in a company can produce several benefits, including accelerating access to information and knowledge, improving decision-making processes, creating innovation and change, and increasing the efficiency of the organization's or company's business processes(Tiwana, 1999).

KM is one of the important components of the company. A KM is needed to manage the knowledge that exists in the company. The development of science and technology can provide a lot of convenience in managing knowledge or knowledge management for companies (Starmind, 2022). The problems that occur if you do not use KM. One problem is that no knowledge is given to outgoing or new employees. This is very important because solving problems that were previously resolved can happen again, and not know how to handle them. In addition, employees will lose time due to having to solve problems but not knowing how to solve them (Nakash & Bouhnik, 2022). Several problems occur in the company/organization. The problem in the Data and Information Center (Pusdatin) of the Ministry of Health without knowledge management is the decline in employee performance due to high turnover. This high turnover is due to employees at Pusdatin frequently changing divisions. This division change is routinely carried out several times a year. Not only high turnover, the cause of the decline in employee performance, especially the information system development team, is the lack of expertise in the IT field. of the 20 people in the information system development division, as much as 55% are not from IT background. While those who from IT background are only 45% of the 20 people. This greatly affects the performance of the information systems development division in Indonesia. The system development division at Pusdatin itself does not use a framework in system or application development. A lot of knowledge can be obtained (such as a framework that is used when developing application steps that can be used as development innovations) if you use a framework in the process (Knoco Indonesia, 2022).

The growth of data and information stored on Pusdatin servers is very rapid. However, the existing data cannot be used/appropriately utilized. Some data in the Center for Data and Information cannot be accessed because the current database is not connected to the old database. The Pusdatin has many types of data, but these data cannot be used properly because they can only use certain data types. For this reason, big data is needed that can process all structured, semi-structured, and unstructured data and information in the Pusdatin and external sources that can obtain hidden knowledge and expertise stored in the Knowledge Management System (KMS) and become an essential asset in build innovation knowledge of existing employees (Ferraris et al., 2019).

2. Method

In this research, the framework/flow used is problem identification, data collection, knowledge management system design, and prototype knowledge management system design.

Figure 1
Research framework

1) Problem Identification

The problems that exist in this research were found using observation and interviews. Based on the problems described in this introduction research, the object of this research is the knowledge management system at the Pusdatin of the Ministry of Health.

2) Data Collection

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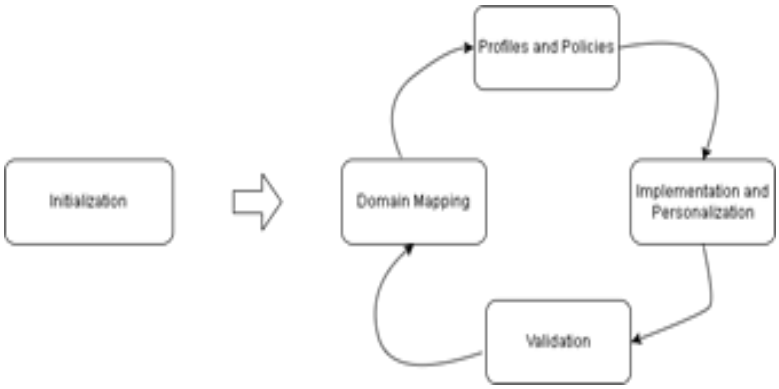
To get all the data needed in this research. The research used several methods, namely interviews and observations. This research interviewed one of the Ministry of Health Data and Information Center employees. The purpose of this interview is to find out user requirements. The results of this interview will be used as primary data in this study. After conducting interviews, this researcher then conducted observations. This research also observes all the Ministry of Health's Data and Information Center technicalities. This observation aims to see how the procedures or data are in the Ministry of Health Data and Information Center. The results of these observations will be used as secondary data in this study.

3) Knowledge Management System Design

The KMS design methodology used in this research comes from the Knowledge Management System Agile Implementation Methodology (KMSAIM) Framework. KMSAIM is a knowledge management methodology with many needs and is well suited to agile methodologies, particularly cloud-based development (Mostefai et al., 2015).

Figure 2
KMSAIM Framework



a) Initialization

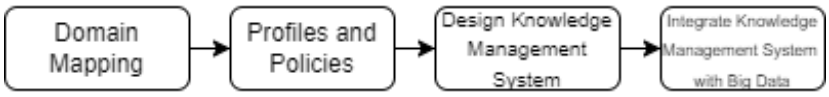
During this phase, the implementation team will communicate with the client to learn about the company, how the client's business operates, and how they manage their knowledge.

b) Domain Mapping

In this phase, the process, technology, and architecture that will be employed in the KMS are explained.

1) Profiles and Policies; This is the phase in which it is decided who will use and manage the KMS.
2) Implementation and Personalization; This step translates the required requirements into functional modules developed with programming tools.
3) Validation; During this phase, the implementation team ensures that the KMS is operational.

Figure 3
KMS Framework used



The stages carried out in this research to develop knowledge management are as follows:

1) Domain Mapping, In the first stage, the author will look for the required requirements. From these requirements, we will determine what modules are needed

2) Profiles and Policies: In this second stage, the author will determine who will use and manage this KMS.
3) Design Knowledge Management System: After determining the users and managers, the author will design knowledge management in UI/UX.
4) Integrate KMS with Big data, In this phase, the author will integrate KMS with big data. This section will use several big data modules in this KMS. The module used comes from the Apache Hadoop framework. Apache Hadoop is a framework that makes it possible to process data with a huge size (Mail, 2020). Extensive data/Hadoop modules used are Sqoop, Flume, Hive, Spark, Arcadia.

3. Results and Discussion

Domain Mapping

In the domain mapping phase, the things that exist in this phase are the requirements needed in making KMS. The required requirements are met by observing and conducting interviews with the information system development division. This requirement determines what module needs will be used for making KMS. Since Pusdatin has its flow, the KMS design will be based on that flow.

a) Gathering requirements

In this phase, KMS acts as data retrieval. The data taken include user requirements, project user interviews, a list of infrastructure used, and others.

b) Application/System Design

In this phase, KMS data will be collected as structural data such as database design, application development reports, etc. While unstructured data such as system or application frameworks, system or application blueprints, and others.

c) Implementation

In this phase, the data to be collected are structural data such as databases, bug reports, system/application documentation, etc. In this mapping domain, the author describes what modules are needed based on the results of interviews and observations in Table 2.

Table 1

Module and User Requirement

Requirement	Modul
The information system development team documents knowledge during development	Wiki
The information system development team exchanges knowledge	Wiki
Documenting the results of one-way discussions with the information technology development division when developing systems or applications	Forum

a) Profile and Policies

In this profile and policies phase, the people involved in this KMS will determine what they can do with this KMS. The people involved in this application are the information system development division as the primary user. For the number of users in the information system development division as many as 20 people, including system development subdivisions such as the information. KMS Admin. KMS admin will delete knowledge from wiki or forum on KMS if it has received submissions from staff or heads of divisions and subdivisions of information system development.

b) Design Knowledge Management System

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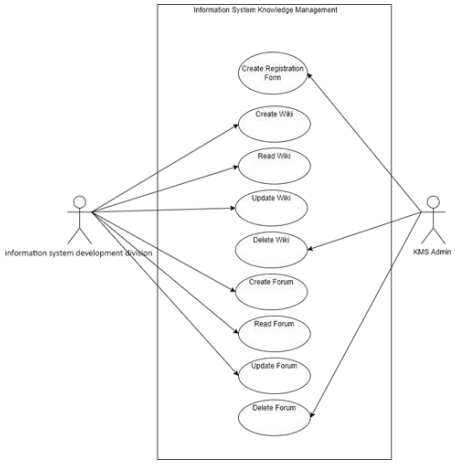
The first user interface design starts from the login page, main page, search engine page, project page, archive page, report page, and feedback page. The design of this user interface is based on the previous phase, namely domain mapping. All the requirements will be included in the design of this user interface.

a. Login Page

b. System architecture division and information system standardization

Figure 4

Use Case Diagram



In Figure 4, the role of the KMS Admin is to create a registration form and user verification. All staff and heads of divisions and subdivisions of information system development can create, read, and update on KMS wikis and forums. If one of the staff or the head of the division and subdivision of information systems development wants to delete knowledge from the wiki or forum, they must apply for permission to delete knowledge or forum.

Figure 5

Login Page

Figure 5 is an image of the login page when the application is opened. Users must login first if they want to use the KMS application. Users can login by entering their username and password.

c. Home Page

Figure 6

Home Page

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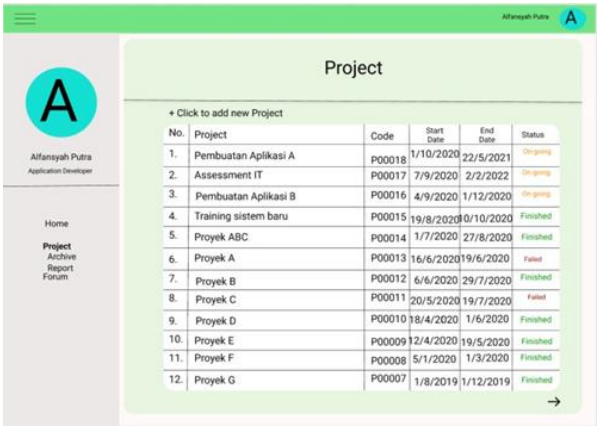
After logging in, the user will be redirected to the main page. On the main page, several features and menus can be used by users. These features can be seen in Figure 6 as a drop-down menu on the left of the image, search tools under the heading home, current project status along with existing knowledge and reports on the project, several projects, archives, and reports provided. Highlighted on the main page.

d. Project Page

If the user presses the project button on the dropdown menu on the main page, the user will be redirected to the project page.

Figure 7

Project Page



There will be an additional dropdown menu on the project page after pressing the project button. The button is the archive and report button, which can be seen in Figure 7. This page contains running, completed, and failed projects. Users can see the start and end of a project. If you want to add a project, users can press the + sign or click the button to add a new project.

e. Create a Project Page

Figure 8

Create Project Page

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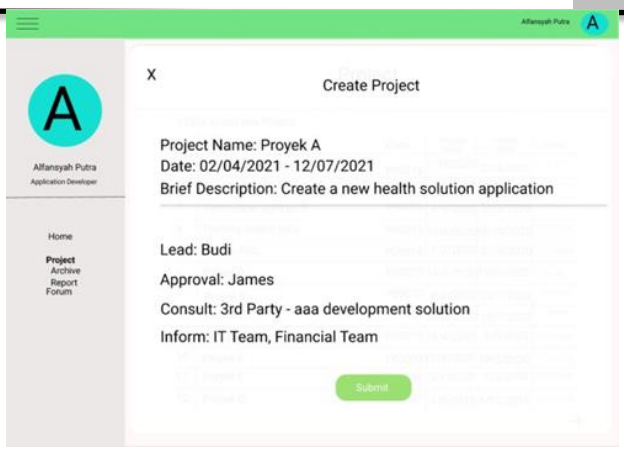
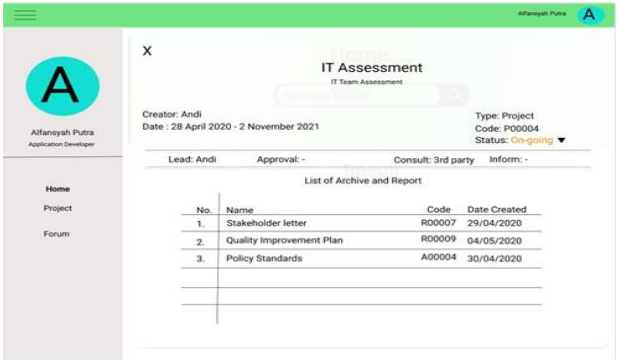


After pressing the button or sign, users will be redirected to the create project page. In Figure 8, the user must fill in the project name, date, brief description, lead, approval, consult, and inform. After filling in the data, the user can press the submit button. The project has been successfully created.

f. View Project Page

Figure 9

View Project Page



Successfully created projects can be viewed by pressing one of the projects on the project page. After pressing a project on the project page, the user will be shown a project view page, as shown in Figure 9.

g. Archive Page

If the user presses the archive button on the dropdown menu on the project page, the user will be redirected to the archive page.

Figure 10

Archive Page

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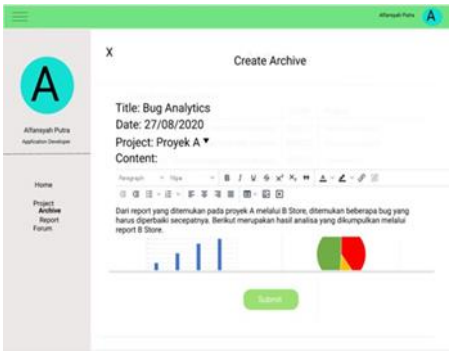
On the archive page, users can see what knowledge is on this page. This page is a wiki module built into kms. All existing knowledge can be included here, whether related to a project. If you want to add knowledge, users can press the + sign or click the button to add a new archive.

h. Create Archive Page

Figure 11

Create Archive Page



Users will be redirected to the Create Archive page after pressing the + button or sign. In Figure 11, the user must fill in the title date, select the project option, and fill in the existing content. After filling in the data, the user can press the submit button. Knowledge has also been successfully stored. If the user presses the report button on the dropdown menu on the project page, the user will be redirected to the report page.

i. View Archive Page

Figure 12

View Archive Page

The successfully stored knowledge can be seen by pressing one of the knowledge areas on the archive page. After pressing one of the knowledge areas on the archive page, the user will be shown the view archive page as shown in Figure 12.

j. Report Page

Figure 13

Report Page

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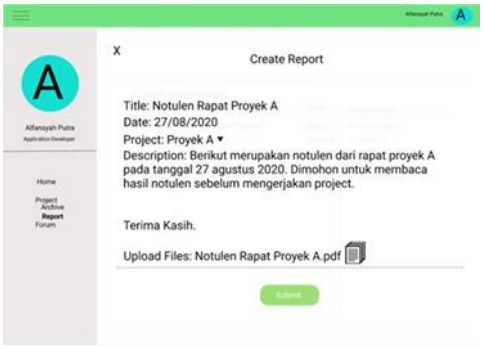
On the report page, users can see what documents are on this page. All existing documentation can be included here, whether related to a project. If you want to add documentation, the user can press the + sign or click to add a new report button.

k. Create a Report Page

Figure 14

Create Report Page

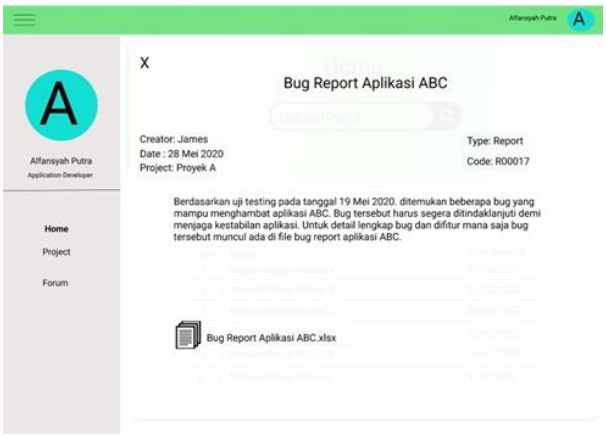


Users will be redirected to the Create Report page after pressing the button or + sign. In Figure 14, users must fill in the title, date, project type, and description and upload the related files. After filling in the data, the user can press the submit button. The document has been successfully saved.

l. View Report Page

Figure 15

View Report Page



Documents successfully saved can be viewed by pressing one of the documents on the report page. After pressing one of the documents on the report page, the user will be shown a report view page, as shown in Figure 15. Users can download the document by pressing the paper icon or the document's title.

m. Forum Page

If the user presses the forum button on the dropdown menu on the main page, the user will be redirected to the forum page.

Figure 16

Forum Page

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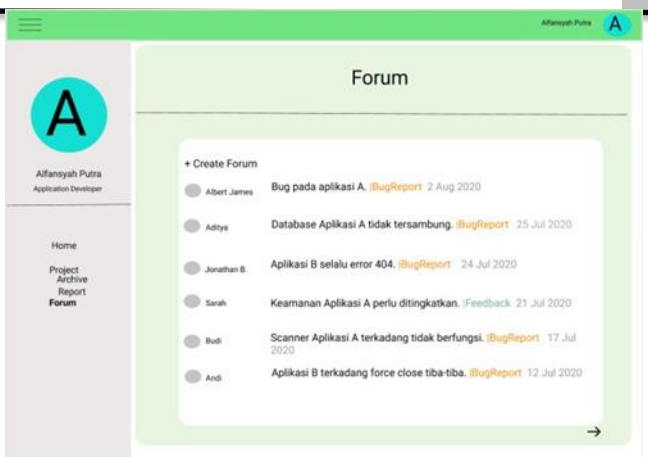
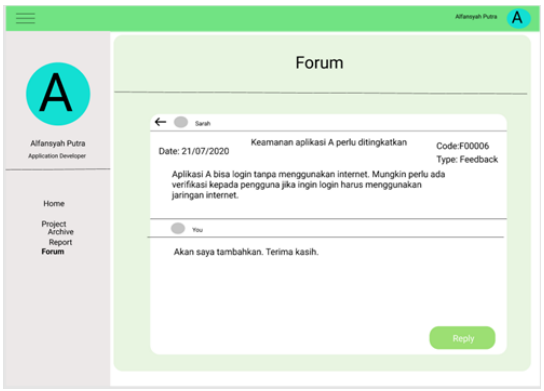


On the forum page, users can see the interactions of fellow users. The interaction is in the form of error notification of a program, criticism, and suggestions for applications and systems being developed. If you want to add a forum, users can press the + sign or the create forum button.

n. Create a Forum Page

Users will be redirected to the Create Forum page after pressing the + button or sign. In Figure 15, the user must fill in the title, date, forum type, and description. After filling in the data, the user can press the submit button. The forum has also been successfully created.

Figure 17
View Forum Page



Successfully created forums can be viewed by pressing one of the forums on the forum page. After pressing one of the forums on the forum page, the user will be shown the forum view page, as shown in Figure 17.

c) Integrate Knowledge Management System with Big Data

Table 2
Big Data Framework Design

Data Sources	Modul Data Acquisition	Modul Data Storage	Modul Data Anlaysis	Modul Reporting & Visualization
Database	SQOOP	HIVE	SPARK	ARCADIA
Website Pusdatin	SQOOP ,FLUME	HIVE	SPARK	ARCADIA
Email	SQOOP, FLUME	HIVE	SPARK	ARCADIA
Microsoft Excel	SQOOP, FLUME	HIVE	SPARK	ARCADIA

1) Data Sources

Data sources are information derived from apps at the Ministry of Health Pusdatin. Unstructured, structured, and semi-structured data are examples of data sources. This design's data sources include the Pusdatin website, Database, Microsoft Excel, Microsoft Word, Microsoft PowerPoint, website, and Email. Microsoft Excel data is structured data. Semi-structured data is information obtained from a website in XML or JSON.

2) Data Acquisition

Methods for obtaining data from data sources are included in data acquisition. Sqoop is used to collect structured data. Applications in Pusdatin, websites, and social media may all conduct ETL into the Data Warehouse using Flume.

3) Data Storage

Data storage in Pusdatin is where data is kept after the preceding phases have been completed. This data storage comes in the form of a Hive Data Warehouse. The data in this data store will be evaluated in the future.

4) Data Analysis

Data analysis is the process of extracting, transforming, and loading data. ETL is the process of extracting data from storage and converting it to the desired format. The Spark module is used at this data processing level, which may subsequently be integrated with the Python API.

5) Reporting & Visualization

Arcadia is used to view the data after ETL. The displayed data is then transformed into new knowledge and incorporated into the knowledge management system.

4. Conclusion

The conclusion that can be summarized in the big data-based knowledge management design at the Pusdatin of the Ministry of Health is that a good Knowledge Management System design can help the information system development division do its work. The usefulness of this KMS can improve the performance of pusdatin employees by sharing knowledge among members of the same division or in different divisions. This is very important due to the high turnover at the Center for Data and Information. Designing a wiki module will help the information systems development division design applications or systems. Integrating knowledge management and big data can help the performance of the system development division in combining data from various applications used.

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