Development of Archives Management Information System with RFID and SMS Gateway

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Abstract-Filing is something that can not be exemplified by an organization or institution, which has a lot of important information, can be used to determine or influence concrete something that goes on within the institution or organization, in its development, the archive that remains, the technology today. not only the objects that can be touched but also something that is digitally we can call with digital archives or electronic archives (E-Archives). Archive management is an attempt by archives to present services that match the character of today's society. Through this report, the author wants to know how the security and security of the system in the E-Archive with RFID and SMS Gateway to anticipate the loss of archival data, as well as devices that become a medium for storing modern information to facilitate the task and archive services forward. Using this additional RFID (Radio Frequency Identification) tool is expected to confuse users and users in identifying users and documents archived in the E-Archive system. And the process of disclosure of documents that have been identified, and minimize the provision of loss of documents due to filing officer misconduct. Here also I added SMS Gateway as a reminder (Reminder) that is suitable to forget Archive documents to the archive officers not to be lost.

Keywords: E-Archives, SMS(Short Message Send) Gateway, RFID, Document, Devices.

I. INTRODUCTION

In today's digital era, humans cannot be separated from sharing information. Humans are supported by advances in technology that can provide information in real-time without limits of time, space, and distance. In the digital era, it has penetrated in all fields, so there are almost no gaps in human life that are not related to digital technology today. The desire of humans to realize their existence relatively with other human beings is not an excessive obsession, where the synergy of the system to interact with humans is currently needed in any case, both to remind or provide information to humans. Because the development of computer technology today has provided convenience in all things because physical computers have become increasingly integrated into everyday life.

SMS Gateway Technology is a platform that provides mechanisms for the UAE to deliver and receive SMS from HP, Modem, PDA, Phone, etc. An SMS gateway allows us to communicate with telco SMSC (Telkomsel, Indosat, etc.) or SMS platform to deliver and receive SMS messages very easily because the SMS Gateway will do all the processes and connections with Telco, SMS Gateway also provides UAE with an easy interface and standard.

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UAE can be an application that requires the use of SMS, such as various web applications, Delphi, etc. that have used a lot of SMS (free SMS, registration, office applications, etc.). UAE communicates with SMS gateways through the internet using standard HTTP GET or HTTPS (for secure communication).

Telco SMSC will deliver the message (SMS) to the SMS Gateway company (according to the destination number) using a special protocol and based on the keywords that have been written on the SMS, the SMS gateway will deliver to the SMS to the specified URL. UAE can deliver SMS replies to customers via the SMS gateway. And the UAE will determine the number of costs (charging) that will be charged to customers, usually, a micro charging mechanism has been determined, for example, Rp.0 - (free) to Rp.200, etc.

At the Special Topic Research this time I use Gammu as the SMS Gateway Media Software. Gammu itself is an application that can be used to manage various functions on mobile phones, modems, and other similar devices. The functions that can be managed by Gammu include the function of the contact number (Phone Book) and the SMS function while the SMS gateway is a device that offers SMS transit services, transforming messages to cellular networks from other media, or vice versa to allow sending or receiving messages Text with or without using a cellphone[7].

After I explained about the SMS gateway for communication and information, I will now explain about identification technology using RFID. What is RFID? RFID stands for (Radio Frequency Identification). RFID is a wireless identification system that allows data retrieval without having to come into contact like barcodes and magnetic cards such as ATMs. RFID is now widely used in various fields of companies, supermarkets, hospitals and even recently used cars to identify the use of subsidized fuel.

The working principle of RFID is to use a system of identification and radio waves. To at least need two devices, namely the one called TAG & READER. When scanning data, the READER will read the signal that will be given by the TAG and the reader will insert it into a computer in the form of a password that is already on the RFID TAG.

The archive is a collection of documents in the form of letters, recordings, videos, which can be used as authentic evidence in searching for evidence in the organization/company/school, in this study specifically at Indonesia's Corruption Eradication Commission, abbreviated as **KPK**, is a government agency established to fight corruption. Here the KPK has an archive section that is organized to store important documents if time is needed [15].

In this KPK, there is often an archive loan and sometimes the borrower forgets to return back to the archive officer and also here everyone without being identified who borrows all can borrow the files they want, so from here I have the idea to make this program to minimize the loss of documents and identifying who borrows the archive, and whose records must be burned according to the specified period [1][3][4].

II.   LITERATURE REVIEW

Archiving

Archiving is a very important part of office work. Every job and activity in an office requires data and information. One data source is an archive because the archive is evidence and recording of an activity. Archives are usually processed manually and by electronic means using a computer.

Basic Concept of Electronic Filing

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Electronic filing has several important components that interact to achieve goals. Where components of electronic filing include processing data and facts into information. According to the National Archives and Record Administration (NASA) the USA: Electronic archives are archives that are stored and processed in a format, where only computers can process them. Therefore electronic archives are often said to be "MACHINE-READABLE RECORD". (Lastiyani, 2008: 4). Compared with conventional archives (paper, electronic media has several advantages including:, (Litiyani, 2008: 8):

1. Quick and complete discovery and presentation of information.
2. Access and presentation of information by more than one user (multi-user)
3. Access and presentation of information by more than one user (multi-user)
4. More centralized information presentation
5. It has high accuracy in storage.

Electronic Media Archive

According to Lastiyani (2008: 6), there is a form of electronic archive media:

1. Magnetic Media
2. Magnetic Disk
3. Magnetic Tape
4. Tapes
5. Optical Media

Definition of Management Information Systems

Management information systems within a company are very important. The following is an understanding of management information systems expressed by experts. According to Barry E. Cushing, management information systems are collections of people and sources of capital in an organization that is responsible for collecting and processing data to produce information that is useful for all levels of management in planning and controlling activities. Jogiyanto (2005: 14).

Davis (1988:3), is an integrated human/machine system, to present information, to support management operations functions, and decision making in organizations. Management information systems cover both formal and informal information systems, both manually and using computers.

From the definition above, it can be concluded that Management Information Systems are a collection of interaction information systems that produce information that is useful for all levels of management. Management Information System is an information system that describes the availability of a fairly complete set of data stored to provide information to support operations, management, and decision making in an organization[12][14].

RFID *(Radio Frequency Identification)*

RFID stands for radio frequency identification, where information is carried or passed through radio waves (Finkenzeller 2003). Data is stored on a data carrier device called Transponder. The provision of power for transponders and the process of exchanging data between transponders and readers is not obtained through electricity but rather from electromagnetic fields (Finkenzeller 2003).

RFID Component

An RFID system has two components, namely (Finkenzeller 2003):

1. A reader or interrogator is a data capture device designed to read the information on tags. The reader can read many tags simultaneously.

2. Transponder or tag is a data carrier device that is used to store information and be placed on the object to be identified.
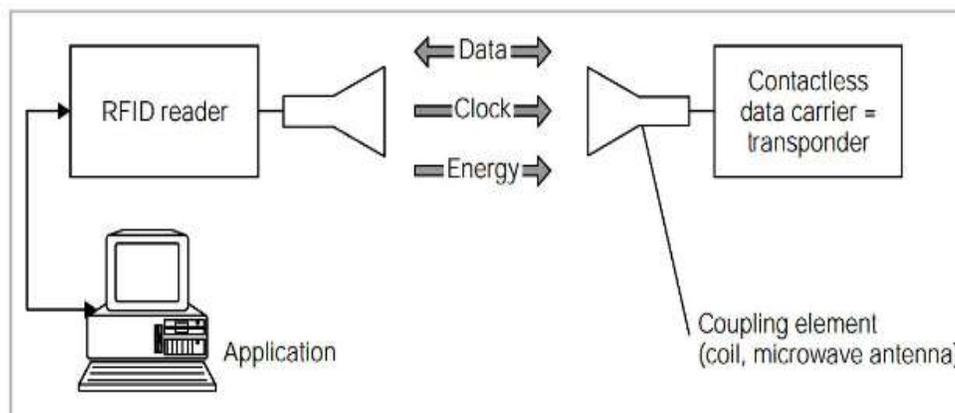

Figure 1. RFID (Finkenzeller 2003)

SMS Gateway

SMS (Short Message Service) is a technology that makes it possible to send and receive messages between mobile phone users. MMS Gateway is a platform that provides a mechanism for EUA to deliver and receive SMS from mobile devices (HP, phone, etc.) via SMS Gateway's shortcodes[9].

The SMS gateway is an application system for sending and/or receiving SMS, mainly used in business applications, both for promotional purposes, customer service, procurement of product or service content, and so on. Because it is an application, the features contained in the SMS gateway can be modified according to needs[7][13].

Some common features developed in the SMS gateway application are:

1. Auto reply.

   The SMS gateway will automatically reply to the incoming SMS. For example, to request certain information (for example, currency rates or travel schedules), where the sender sends an SMS with a specific format that is recognized by the application, then the application can auto-reply by replying to the SMS, containing the information needed.

2. Bulk delivery

   Also called SMS broadcast, it aims to send SMS to many destinations at once. For example, for the latest product information to customers or users

3. Schedule delivery

   An SMS can be set to be sent to the destination automatically at a certain time. For example to say happy birthday.

To create an SMS Gateway, we need to know things related to the SMS gateway itself. One of the things that play an important role in sending SMS is SMSC (Short Message Service Center), which is a cellular telephone network that handles sending SMS. So, when someone sends an SMS message through his cellphone, the SMSC is in charge of sending the message to the destination number. If the destination number is not active, the SMSC will save the message within a certain period. If the SMS still cannot be sent until a certain period. Then the SMS will be deleted from the SMSC storage[8].
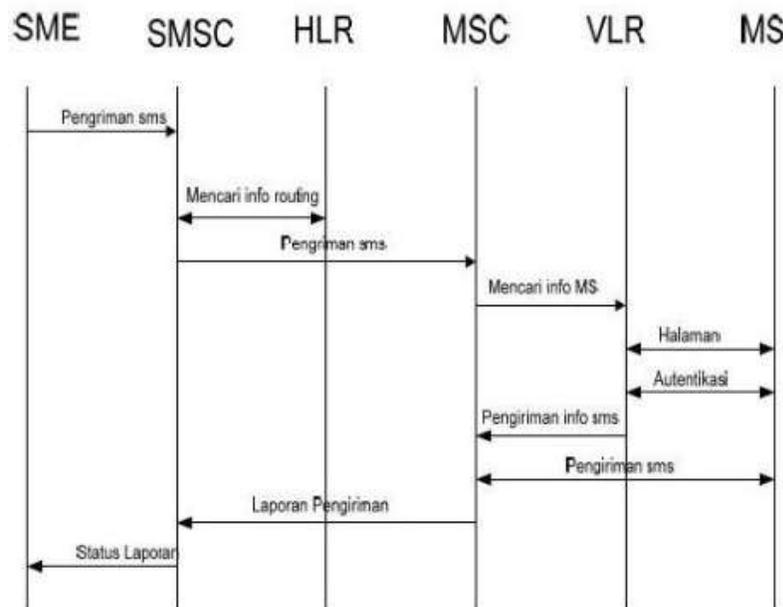

Figure 2. SMS Delivery Process Diagram

Explanation of the diagram above: information from all registered customers of a GSM network along with the location of the mobile station. Then the SMSC will send a message via SMS-GMSC to the MS (Mobile Station) that are addressed in the forward short message format. After the SMC sending process is complete, the SMSC will search for information that we will aim at from the VLR (Visitor Location Register) which contains administrative information selected from the HLR required for call control and permission for subscription service users. Where in this case will send an authentication process that we will send? Next MSC (Mobile Station Center) will send a message to MS (mobile station), then MSC sends the message back. But the difference is that MSC will send forward SMS to MSC instead of MS again. If the SME (Short Message Entity) requests a status report, the SMSC will send a status report to the SME indicating the message sent. Behind the appearance of the Messages menu on a cellphone there is actually an AT Command-AT Command which is in charge of sending or receiving data to and from the SMS Center. AT Command each SMS device can be different, but basically the same[6]. The Command-AT Command command is usually provided by the communication tool vendor that buys.

Some AT commands are important for texting:

1. AT+ CMGS for sending SMS
2. AT+CMGL: for checking SMS
3. AT+CMGD: for deleting SMS

AT Command for SMS is usually followed by I / O data represented by PDU units. Data flowing to/from the SMS-Center must be in the form of a PDU (Protocol Data Unit). PDU contains hexadecimal numbers that reflect the language I / O. The PDU consists of several Headers, the header for sending SMS to the SMS-Center is different from the SMS received from the SMS Center. When we receive an SMS / MMS from a mobile (mobile originated) message that is not directly sent to the destination mobile (mobile terminated), it is sent first to the SMSC (SMS Center) which is usually located in the telephone operator's office and then the message is forwarded to the handphone aim[8].

III. METHOD

Research Design

The design is used as planning, drawing and making sketches or arrangements of several separate elements into a single unit that is intact and functioning properly and correctly. It also aims to explain how the process of input from an archiving system in information systems.

Research Object

In this study, the object is a dynamic filing management system, which is used directly in the planning, implementing, administering. The following documents are observed, namely the Debit / Payment Card (account payment). The procedure for recording debt is divided into 2, as follows:

1. Invoice from supplier
2. signed money receipts by the supplier

Types and Data Source

Type of Research, Research conducted is exploration research, the approaches used include: information systems, archive definitions, types of archives, electronic archives, and Delphi and MySQL software applications for the database.

Source of Engineering Data used in this study there are 2 (two) data sources, namely:

Primary data, by conducting direct research on the object to be studied, using data in the form of dynamic archives aimed at collecting data as the main source. And collect the application along with the tools and materials needed to create an e-archive system that uses RFID and SMS Gateway later. In the research conducted, the author took the example of the company's administration as the object of research.

Secondary data obtained indirectly with the object of research. Sources are obtained from literature studies, literature by studying books that have to do with research to be used as a theoretical basis in finding alternative solutions faced.

Data collection technique

The author conducts research using a case study method with field research techniques (research fields), namely data collection techniques through a careful and systematic recording process of objects that will be directly observed in the management of the e-archive system that will be created. The field research used is as follows:

1. Observation, that is collecting data through direct observation at the research site, the writer observes admin section and administration section at KPK in managing dynamic records of payment voucher accounts and how to find archives again when needed.

2. Interview, namely data collection by conducting a question and answer directly with the resource person in the admin file at KPK as input to complete the research. The author raises questions to informants regarding the management of dynamic records on account payment vouchers and the administration section is the main source of this research.

3. Documentation collects data by searching for documents related to the research. The documents in this study are in the form of dynamic archive account payment vouchers, scanned images, and other documents that can help speed up the research process.

Data Analysis Method

This research is qualitative research. So that the data method used in this study is a descriptive method that aims to find and arrange in an appropriate and sufficient way from all activities of objects, processes, and humans. In this study, the design of the method used is summarizing a large amount of raw data that can be interpreted as information. The data in question is the result of interviews with the administration of KPK in dynamic archive processing[5].

Data analysis technique

In this study, data collected from interviews and documentation studies will be analyzed qualitatively and described in descriptive form. Data processing is done in the following way:

1. Reduction

Reduction, i.e. the selection process, by focusing attention on the object and the rough transformation of data that emerges from the written notes in the field by summarizing. Choose the main things and focus on processing dynamic records in the administration section.

2. Data Presentation

After data reduction, the next step is to present data. Data is presented in the form of narrative texts by grouping according to each sub.

3. Examination Conclusion

After the data is presented, the next step is to draw conclusions. After describing the various data that has been obtained, the author makes conclusions which are the results of the research design.

IV. RESULTS AND DISCUSSION

Context Diagram

Based on the research and theory that supports it according to what I have learned, the outline of the application system for RFID & SMS gateway files can be arranged in context diagrams such as Figure 1.1 below, this diagram illustrates the interaction of the system with external entities namely user, employee, and admin. Admin here has full rights to the system and data management, such as insert, update, delete. And while the user only has the right to archive to register the document to be archived, and report the archive data to find out the archived documents, loan reports and file returns[10].

With a user id and password mechanism, they can access available databases. For data needed by the user or admin has been divided in the distribution of logins using a user id and password specified by the access
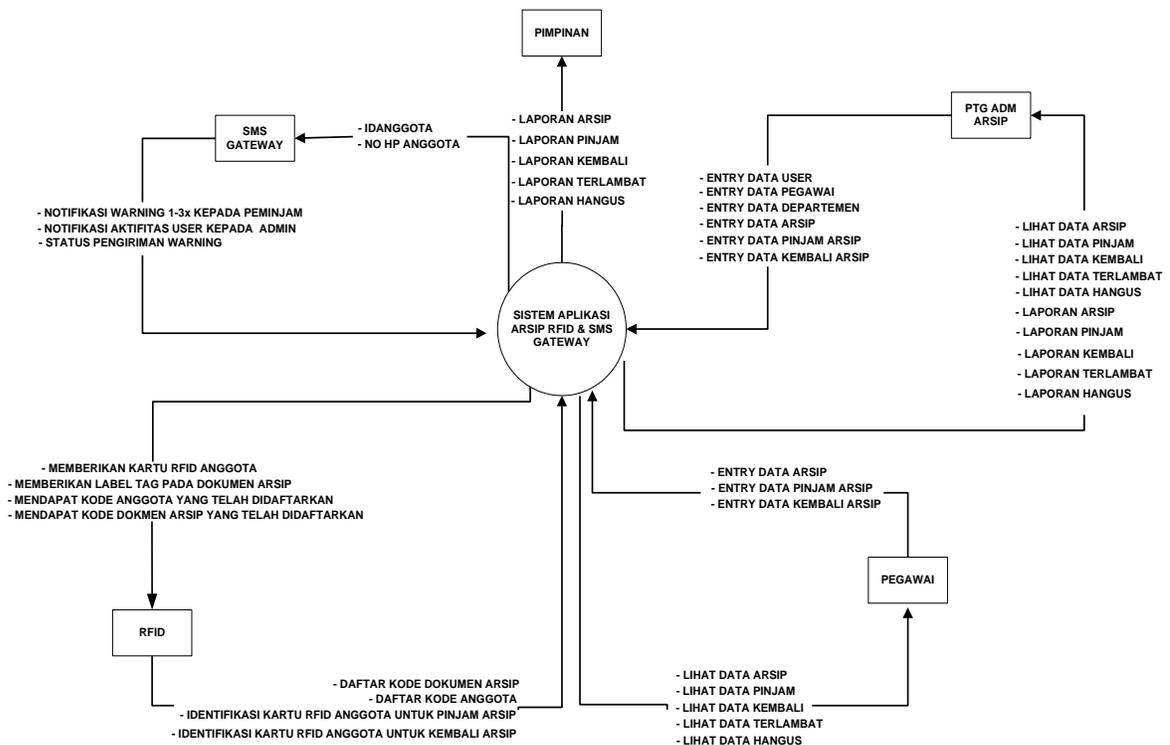

Figure 3. Context Diagram / DFD Level 0

From the context diagram, the processes related to supporting each feature or function of the archive application system will be identified. Besides that, the entities will also be identified as the archive application system database. Database management for storing archive data.

After we know and describe the system design in general and explain the flow of input and output data on the archive program that we make this time on the Data Flow Diagram (DFD) Level 0. Now we make it create and describe complex data streams every system process then form a datastore from the data stream that represents the system flow in part or in full in detail on Level 1 Data Flow Diagrams (DFD) in this archiving program[5].

In this Level 1 DFD, we can see the flow of the archive program and can know a little about how the program runs later, and a little know what processes are in this archive program later. Below is an overview of DFD level 1 for this archive program later.
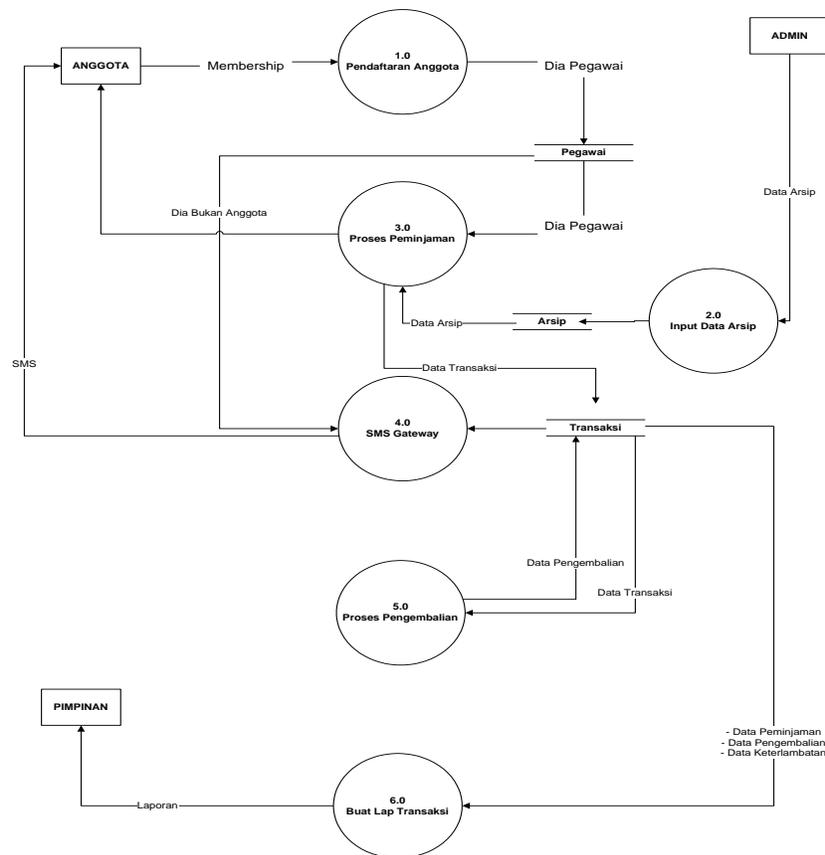

Figure 4. Block Diagram / DFD Lv 1

At this Level 1 DFD, we can see the process of this archive program where a member registers himself to become a member of the archive after becoming a member he gets a membership card to be able to indulge in members of the archive. Until archiving documents and borrowing and returning archives to the admin, and making filing reports carried out by archival officers or archives admin here.

After we make this level 1 DFD we lower it again every process using level 2 DFD every process we will draw in the level 2 DFD diagram below. Next is DFD Level 2 in the member registration process.
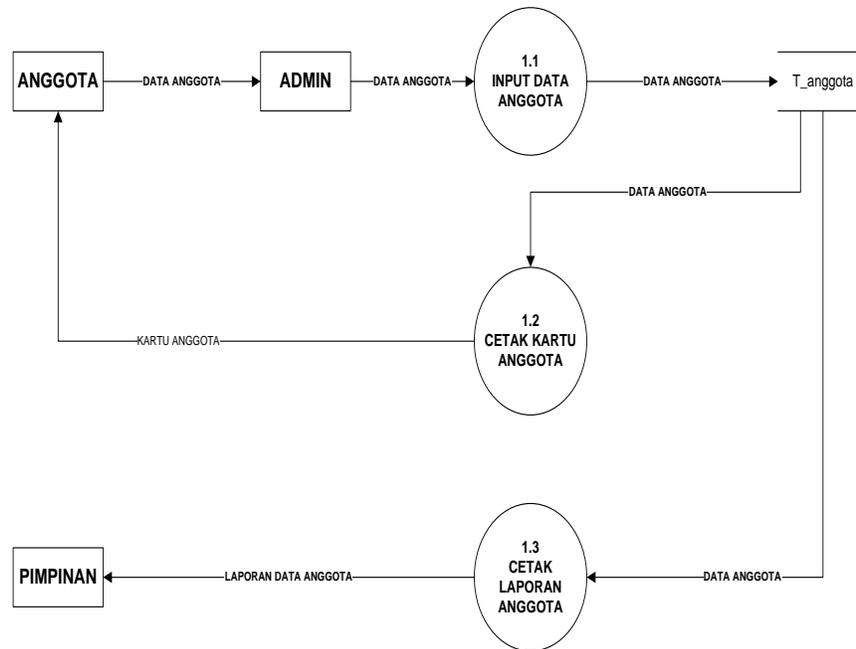
Figure 5. DFD Level 2

In DFD Level 2, this member registration process has several processes where members who will register submit the members' data requirements to the admin then the admin inputs member data into the archive program, then prints the member card and is given to members and prints member reports then given to the leader.

After the registration process is complete, then it is in the filing process, below will be described DFD Level 2 in the filing process. The filing process occurs when documents that are important but need to be stored for a certain period, then this document must be archived so that it does not disappear at any time if it is felt that this document is very important for the company.

In this archiving process, after the document is archived and entered into the document archive program, the id number of the RFID label tag is given to make it easier if at any time to search for document data, so as not to wait too long in searching for documents that have been archived.
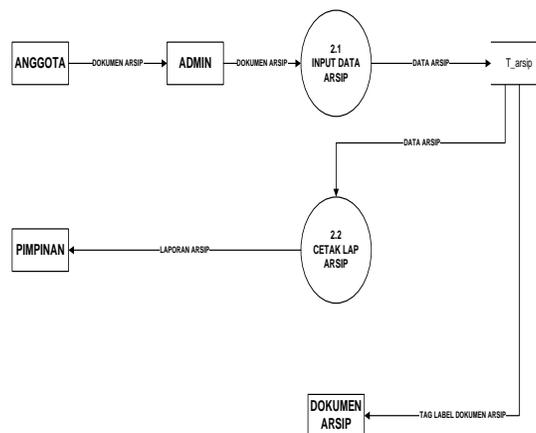

Figure 6. DFD Level 2

In DFD level 2 this archiving process we can see how the flow of members when archiving a document, members provide documents that will be archived to the archive officer or archive admin then the admin enters the archived data in the archive program and admin print archive reports that will be shown to the leadership, and label RFID tags on archived documents to make it easier when searching for archival data with RFID.
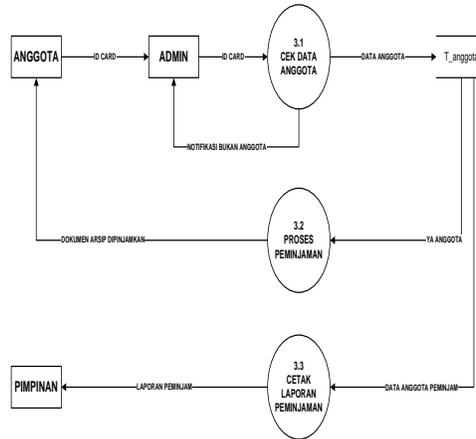

Figure 7. DFD Level 2

At DFD level 2 the process of borrowing there is seen the process of borrowing archives which is where a member who has been registered as a member of the archive can then borrow archived files so that the archive cannot be borrowed by people carelessly. Where the flow of the member gives the id card to the admin then the admin checks it in his program whether it is registered or not, if not then the admin will be notified of notification that he is not a member, if he is a member he can proceed to the next transaction, namely borrowing archival documents. After the admin lends the file and it has been recorded in the database, the admin prints an archive loan report and will be deposited to the company leader about the archive activity.
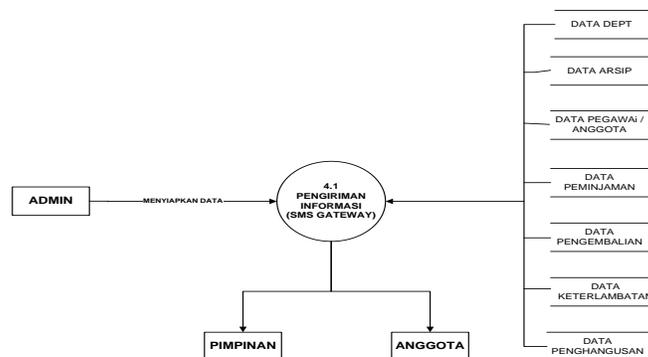

Figure 8. DFD Level 2

In the picture above, DFD level 2 is the process of sending messages by SMS gateway to the entity of this archive program, namely to the leadership and members, where the admin has provided all the data starting from archived data, borrowing, repayment, disobedience, and scorching. Where there are all data from this archive program and can be taken by the Gammu SMS gateway to be executed sending a message to the cellphone number of the member and the leader.
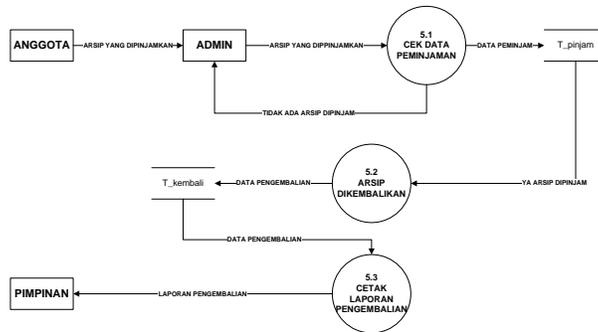
Figure 9. DFD Level 2

In the DFD level, 2 image the process of returning the file explains that the return flow is the borrower or borrowing member returns the borrowed file to the admin and admin immediately processes the return into the system too, where a loan check is carried out if there is a loan to eat the decimal file and if it does not there will be a notification to the admin through the archive program that there is no loan at this time after the archive is returned the radio officer prints a report on the return of the archive.

After all the process of filing and borrowing transaction processes, returns, delays, filing, member registration until the scorching of the archive has been completed, then we make DFD level 2 report printing process, where this report will later be given to the boss or the head of the archival section. As the responsibility of the leadership of the archival section to the company's leadership later if something unwanted happens.

Each recorded report will be taken from the data that has been recorded in the archive database program, then the recording process will be described in the DFD level 2 recording process below. A little extra that the recording is the archive admin and then submitted to the head of the archive.
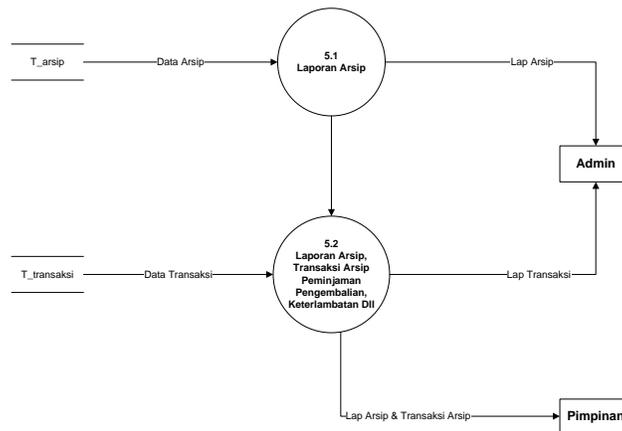

Figure 10. DFD Level 2

The picture above explains that the process of recording a report or report archive and transaction records is taken through archived data and transaction data in the form of loans, returns, delays, to the scorching of records. And sort the archive between the inactive archive and the active archive.

After all, we have finished making the processes starting from DFD level 0 to DFD level 2 we now proceed to create an Entity Relationship Diagram, to find out the source of the data flow from the relationship of each table in this archive database program.

ERD program consists of 7 tables which include: Employee tables, user tables, department tables, archive tables, borrow tables, return tables, scorching tables. Where everyone has their own primary key to be able to connect with each other[16].

As well as tables of employees with a table of users mutually related or connected because to make a user program will check the member/employee table first if it is found that registered non-employee can not register as that user. Below this for more details will be illustrated with the ERD image below [11].
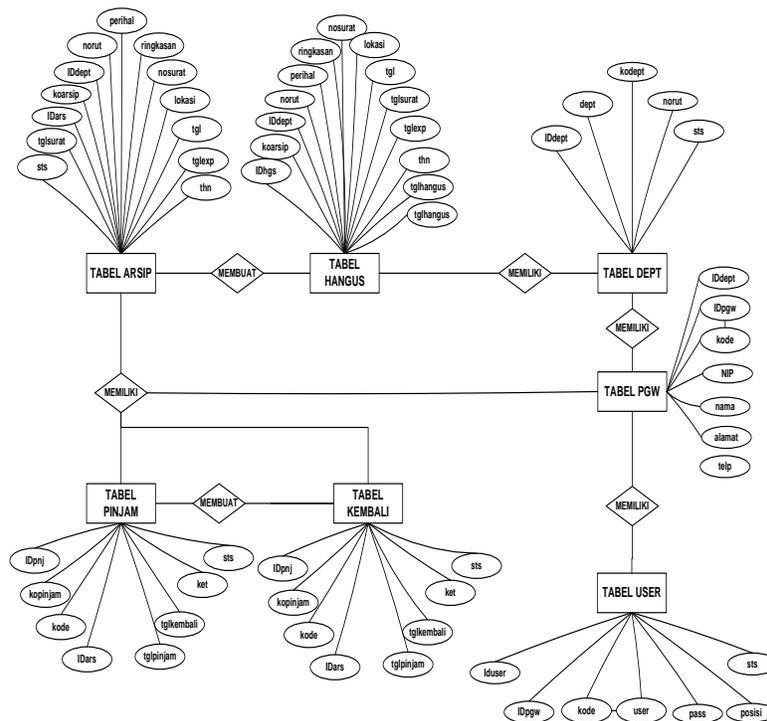

Figure 11. Entity Relation Diagram (ERD)

Above is an ERD (Entity Relation Diagram) from this archive program, where between one table and the other has a primary key that can be used to relate tables to foreign keys that are in other tables to interact with one table with another.

After creating an ERD (Entity Relation Diagram), the next step is to create a database mapping to make it clearer the contents of the table (Entity) of each table that is related to the other tables. Below is a picture of this archive program database mapping.
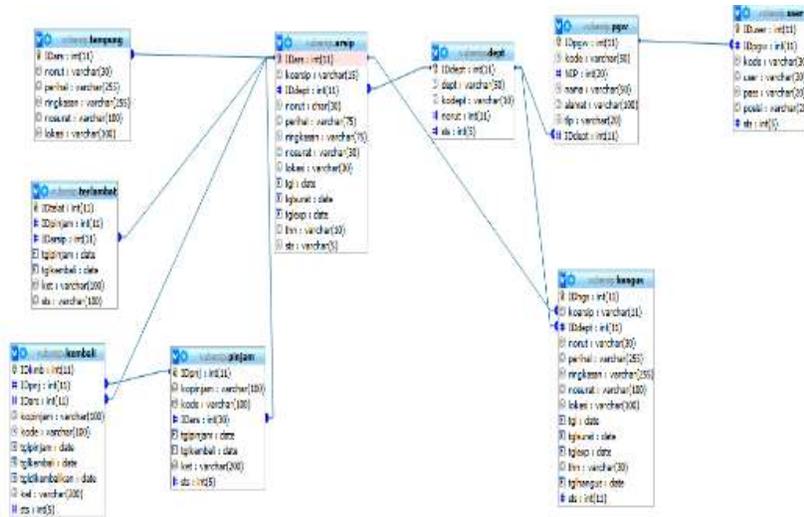
Figure 12. Mapping the Archive Database Program

Interfaces Design Program

Figure 13, illustrates an interface design for login. The login form also has RFID security to open the program.

Figure 13. Login

Figure 14, shows a home interface of the program after the login step. The home interface contains two authorities for administrator and user. The administrator can show all the menu. Meanwhile, Users can operate archiving documents.

Figure 14. Home Interface

Figure 15, contains an input interface for the archiving file. The archive interface is used for determining the filing period. Thus, the unused file is deleted automatically.

Figure 15. Archive Interface

Figure 16, illustrates the archive data report. The report is submitted to the leader for making a decision.

Figure 16. Archive Data Report

System Implementation

The system is implemented by using Delphi 7 and MySQL as a database. Evaluations are conducted with Intel Core i3 Memory RAM 4GB, and video card processing.

Evaluation

Experiments are carried out to measure the accuracy and efficiency of recognition with several evaluations, such as archive data files, RFID card detection, and RFID tag label document detection. Furthermore, SMS gateway evaluation also is experimented.

V. CONCLUSION

Based on our evaluation, the following are the conclusions :

1. The application can run in Computer with a minimum dual-core processor and 4GB RAM.

2. Application size has a small size, namely 5.789KB

3. The application uses 2 additional tools, such as Arduino-RFID and Wavecom Modem for SMS Gateway.

4. Database contents activities of the department for filing documents.

5. RFID RC522 works to identify RFID for member CardandRFID sticker for the document.

6. Arduino works as the security of a tool of RFID based on filling programs and USB RS232 connection with the computer.

7. Wavecom RS232 Modem for SMS Gateway. SMS Gateway works to provide a warning or a notification to the user about filing documents.

The following are the future works based on our experiment results:

1. The application will develop a connection with Whatsapp.

2. The application will add a questionnaire for measuring user satisfaction.

3. The application will be improved to read E-KTP.

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