Development of Data Models on Cooperative Systems

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Abstract

The information system used by cooperatives is generally an accounting information system because it has transaction processes, ledgers, and processes various accounting reports such as balance sheets, cash flows, and profit and loss. The Patria Karya Bersama Cooperative is a cooperative entity engaged in the field of Service Cooperatives where the main service sector is in Tourism. At the present time the condition of the Patria Karya Bersama Cooperative is carrying out all semi-manual administrative processes because some of the data processing processes have utilized computers and data processing aids, but most of them still use handwriting. This study builds a data model that can later be used to build a cooperative system database. The method used for the development of the data model in this study is the Data Base Life Cycle (DBLC) method. The model has several stages of work and will also produce several data models. However, this article only describes the results of research that produces a data model in the form of an E-R Diagram. The use of this method has provided convenience, accuracy and compatibility between the data requirements needed according to the Cooperative Patria Karya Bersama business process. The data model in the form of an E-R diagram has been generated in this study. The data model design of the cooperative information system model resulted in ten entities. The design of the data model produced in this study will make it easier for database developers to build a comparative information system database.

Keywords *— Cooperative Systems, Data Model, E-R Diagram*

1. INTRODUCTION

The information system used by cooperatives is generally an accounting information system because it has transaction processes, ledgers, and processes various accounting reports such as balance sheets, cash flows, and profit and loss. The Patria Karya Bersama Cooperative is a cooperative entity engaged in the field of Service Cooperatives where the main service sector is in Tourism, so the Patria Karya Bersama Cooperative is called the Tourism Cooperative. This cooperative is group based, where the cooperative adopts the Grameen Bank system which is in contrast to conventional banks [1]. The Patria Karya Bersama Cooperative provides assistance to its members in the form of services and product marketing from various fields owned by its members. The Patria Karya Bersama Cooperative has a number of members who are tourism actors. The business processes owned by the cooperative in its implementation are still carried out semi-manually, namely activity management has been

carried out computerized but some activities are still recorded in the ledger. Activities that are still carried out manually are cooperative financial management. Financial management is an activity that really needs to be assisted by a cooperative information system because financial activities that involve several members require an accurate process. Conditions in the cooperative is a collection of groups that are the joint responsibility of all its members, this is because to take a sound decision that is approved is from the cooperative group. Each meeting holds a meeting once a week at the house of one of the members. Each member can make the process of saving in the form of funds or goods. As well as from cooperative activities for Vehicle Control Card Management Services specifically for Tourism Services, from that result there will be a calculation for the results obtained from financing which can later be divided into each group member according to the portion of the member's savings. At the present time the condition of the Patria Karya Bersama Cooperative is carrying out all semi-manual administrative processes because some of the data processing processes have utilized computers and data processing aids, but most of them still use handwriting. The summary results that have been made by the secretary and the entire management of the cooperative are then made a report for the administrative management of the cooperative, so that at this time an application of information technology is needed that is able to handle all administrative processes to be able to speed up and the data search process is faster. This long process takes time to get the best results.

The development of a cooperative information system has also been developed by [1]. The information system was developed at the GEMI Cooperative in Yogyakarta. GEMI provides sharia financing for micro-enterprises without collateral that prioritizes trust. This information system has been suitable for use in group-based cooperatives because it helps ease the workload of facilitators and other cooperative staff. Several studies related to the development of cooperative information systems have been carried out by researchers [2]–[5]. Applications are mostly developed with website platforms. The application program can assist in the operational process of the cooperative. and help reduce problems that occur in the operational process of the cooperative to a minimum. The results of some of these studies show that they are efficient enough to reduce problems that occur in the operational process of cooperatives, one of which is reducing the time in the transaction process.

Based on the description of the problems experienced by the Patria Karya Bersama Cooperative and several research results related to the development of cooperative information systems, this study builds a data model that can later be used to build a cooperative system database. The database that is expected to be built is expected to be used for the development of cooperative information systems. The method used for the development of the data model in this study is the Data Base Life Cycle (DBLC) method. This method has been used by several researchers for the design and development of a data model which can later be used as a model to develop a database system [1], [3]–[7].

2. RESEARCH METHOD

The data model development method used in this study is the Database Model Life Cycle (DMLC) [2]. This method has several stages of work, shown in the Figure 1. The

description of each stage in the method is as follows:

a. System definition is the stage of defining specifications or the scope of the system to be designed and built. System users are also defined in this stage to determine the data requirements and access rights of each user.

b. Database Planning is the stage in determining the purpose of the database to be created (Mission Statement) and determining the functions possessed by the database.

c. Requirements Collection and Analysis is the stage to analyze and collect what requirements are needed to build a database. Activities carried out in this stage include conducting observations, interviews, and collecting documents related to data recording currently carried out by users.

d. Conceptual Data Model is the stage of designing all identified entities and the relationships between these entities.

e. Logical Data Model is a stage to describe data and relationships in detail at a higher level. The logical model describes the primary key of each entity and the foreign key as well.

f. Physical Data Model is a data model that resides in the database. This model describes the specifications of the table and the columns in it. The table specification includes details such as table name, number of columns and column specifications including column names and data types.

g. The final stage of the database life cycle method is to release a database that can be used by the application. Database maintenance is carried out periodically in accordance with the need for adding tables and fields from tables that have been formed in the database.

The database development in Figure 1 is a schema that can be linked to a renewable model with an Object Oriented Programming approach. The existence of these 7 process flows will make it easier for the development team to be able to read database development, so that this development can also be carried out sequentially and it is easier to find fault points at which stages. Before becoming a database, the schema of the requirements for each entity and having these attributes will be important in the development period, as well as in the database maintenance period. During database maintenance, this is a process that almost all development teams find it difficult to monitor where the errors are from the existing database.
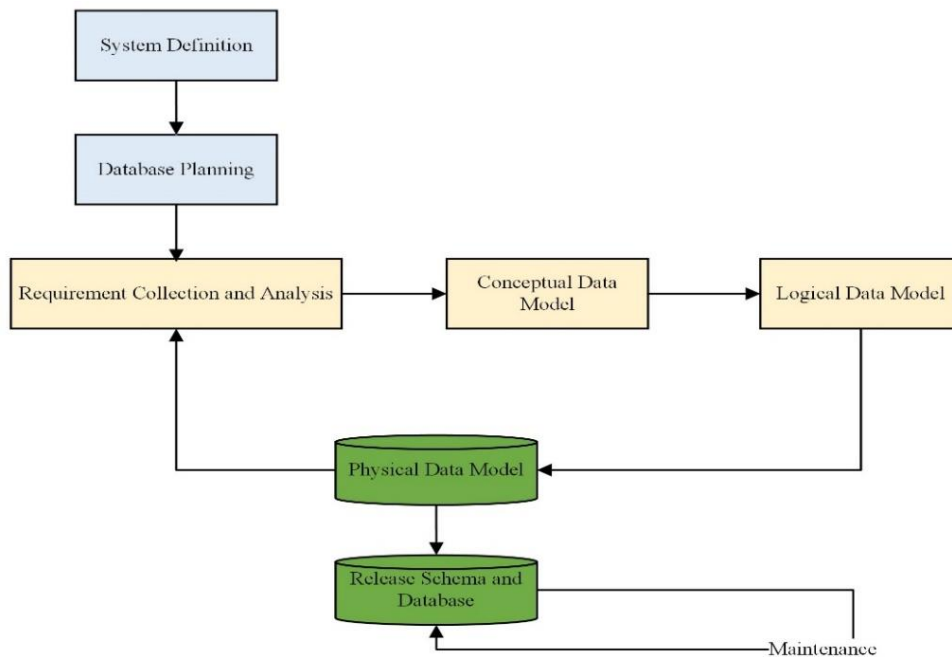

Figure 1. Database Model Life Cycle

3.   RESEARCH RESULTS AND DISCUSSION

The business process of the Multipurpose Cooperative here has the same core business as cooperatives in general. In the picture of the business process (Figure 2), it is explained that the Cooperative Application will have 3 Actors who can interact with the application. The Business Process of this application is developed based on the existing core business in the field, so it will not change the flow of using this application too much later. To get many facilities from the Patria Karya Bersama Cooperative, you have to do or become a member of the cooperative. This prospective member or member will register himself to the cooperative application independently or through the cooperative operator/manager. After becoming a member, you can access various menus in the cooperative application, all transactions for storing funds or in kind can be checked in real time and can be accessed from anywhere, without having to come to the cooperative's office.

Members here will be distinguished based on the daily professions carried out in the field, this is what makes the Patria Karya Bersama cooperative different from other cooperatives. The main activity of the cooperative is a tourism service cooperative and developing Micro, Medium and Small Entrepreneurships MSME products, especially from the members who join. This application will be able to offer various MSME products that are owned by members and can be used as a new business process to be able to support the group in this cooperative. The distribution of Residual Income will be the same process as other cooperatives, in the business processes in this application it also accommodates automatic Residual Income calculations from the system, making it easier for all cooperative members to be able to see the value or nominal Residual Income of each member.

Figure 2 shows the access of 2 actors who can make transactions in this cooperative system. Members will be able to independently access the system from registration to the process of saving at the cooperative. In this management process actor, all operators will have different access rights according to their respective account levels, so that the system will easily detect any misuse of capital in the cooperative. Figure 2 illustrates a cooperative application that can store all data, both transaction data for all members or there is a request to display data. The development of a healthy database design will result in a healthy database as well.
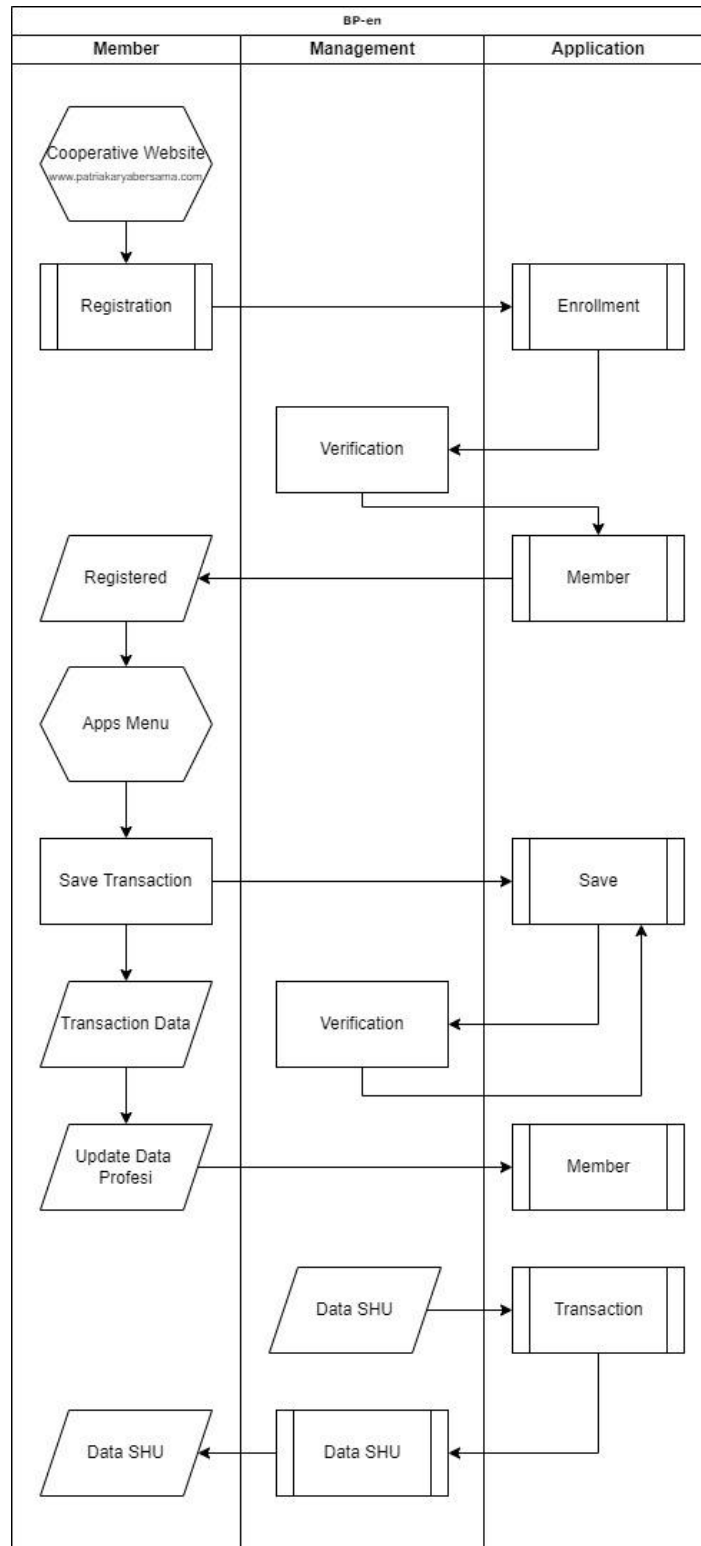
Figure 2. Business Process of Cooperative System

The Data Model demonstrated delineate how a one of kind sort of information ought to address the client's issue. It may be a set of thoughts connected by an affiliation to depict the operation and plan of the database. Data modelling offers an effective strategy for structuring and organizing that overseas of database administration system. The organization of both

gigantic unstructured and organized information us done by utilization of data innovation systems. The information show can delineate the organized information for storage database [8]. The fundamental data approximately progressive information is crucial for programmed program era. Regularly, it doesn't delineate the unstructured information. It archives the database and records prerequisites for an information system. A data model is a mind blowing specialized gadget for clients. It can moreover be connected in organizations as a blueprint for information systems made at different degrees of nuances. The inadequacy data model show goes about as an expansion between the database putting away important and essential information substances to the genuine work model data. The data model show present various preferences to data innovation. It could be a show known by not very numerous people exterior the data innovation, and it has various breaks even with familiar with numerous people[9]–[11].

Two types of data modeling techniques are Entity Relationship (E-R) Model and UML (Unified Modelling Language). The Entity Relationship (E-R) Show outlines the arrangement of a database with the help of a chart, which is recognized as Entity Relationship Graph (ER Chart). An ER show could be a outline or design of a database that can, within the future, be actualized as a database. It could be a high-level information show that depicts information components and their relationship to a predefined programming framework. The rule portions of the E-R model are relationship set and entity set. An ER graph shows the substance sets associations with each other [11]. An substance set could be a bunch of comparable components, and these components can have credits. E-R Diagram components are shown in the Figure 3. With respect to DBMS, an substance could be a table or property of a table within the database. By appearing the association among tables and their qualities, the ER chart appears the whole sensible plan of a database. This paper develop E-R model to show the relationship between entities which are supported cooperative systems.
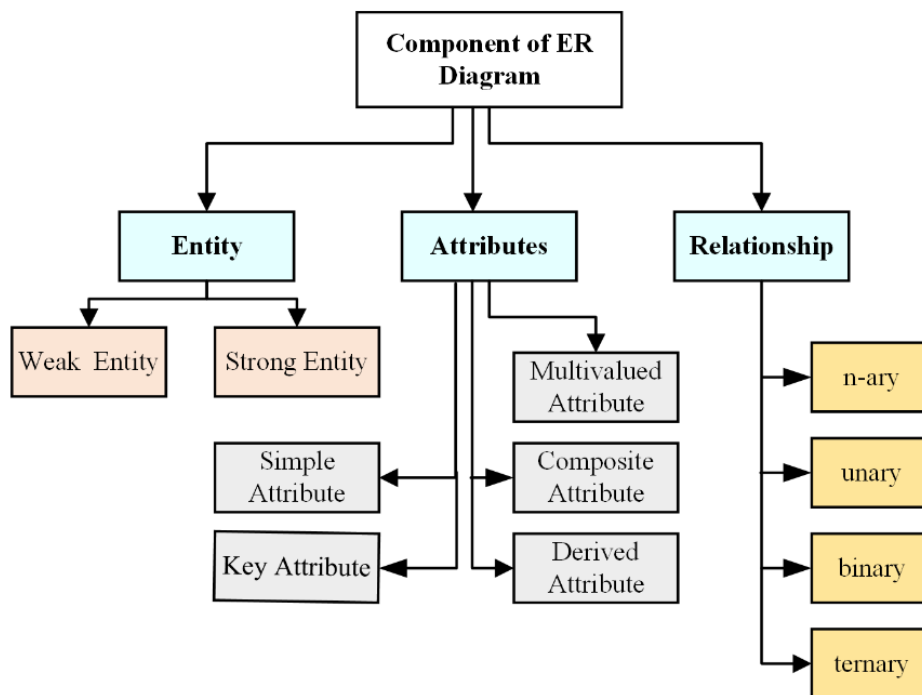

Figure 3. Component of E-R Diagram

Figure 4. E-R Diagram of Cooperative Systems

E-R Diagram of the cooperative system has several entities according to their designation to form a cooperative system database. The E-R diagram of the cooperative system is shown in the Figure 4. The entities that make up the E-R Diagram include tbl_member, tbl_submission, tbl_loan_h, tbl_load_d, tbl_item, tbl_setting, tbl_trans_send, name_treasury_tbl, tbl_user, account_type. The E-R diagram shown in Figure 2 only depicts the relationship between the entities. This is done because each entity has quite a lot of attributes so that the overall E-R diagram cannot be seen clearly. In the following description will be shown and explained some of the relationships between the entities owned by the E-R diagram.

Entity Relationship between tbl_setting and tbl_trans_send

In the Figure 5 described 2 related entities to produce a data storage process where for this tbl_trans_send entity it will accommodate all input from data storage from cooperative members and store all variables in the entity, starting from member code, storage code, transaction time, saving also the history of the login as well as the amount and total funds that will be entered into the system. This tbl_trans_send entity is related to tbl_setting, it is used to provide future data security by encrypting transaction data previously generated in tbl_setting with 1 variable and 1 encryption result from variables stored in the tbl_setting entity
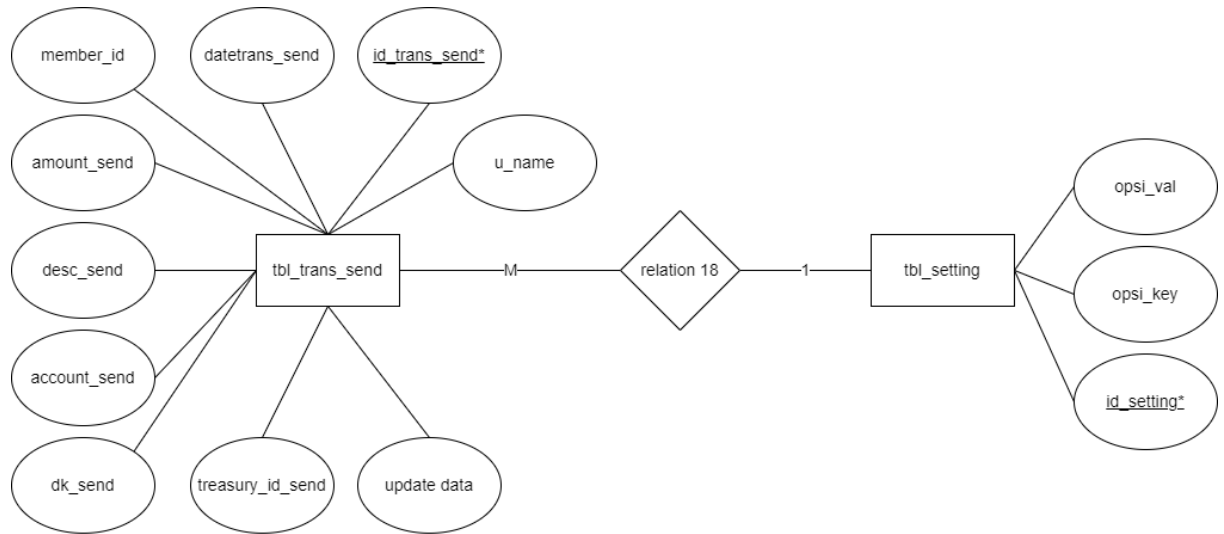
Figure 5. Relationship tbl_setting and tbl_trans_send
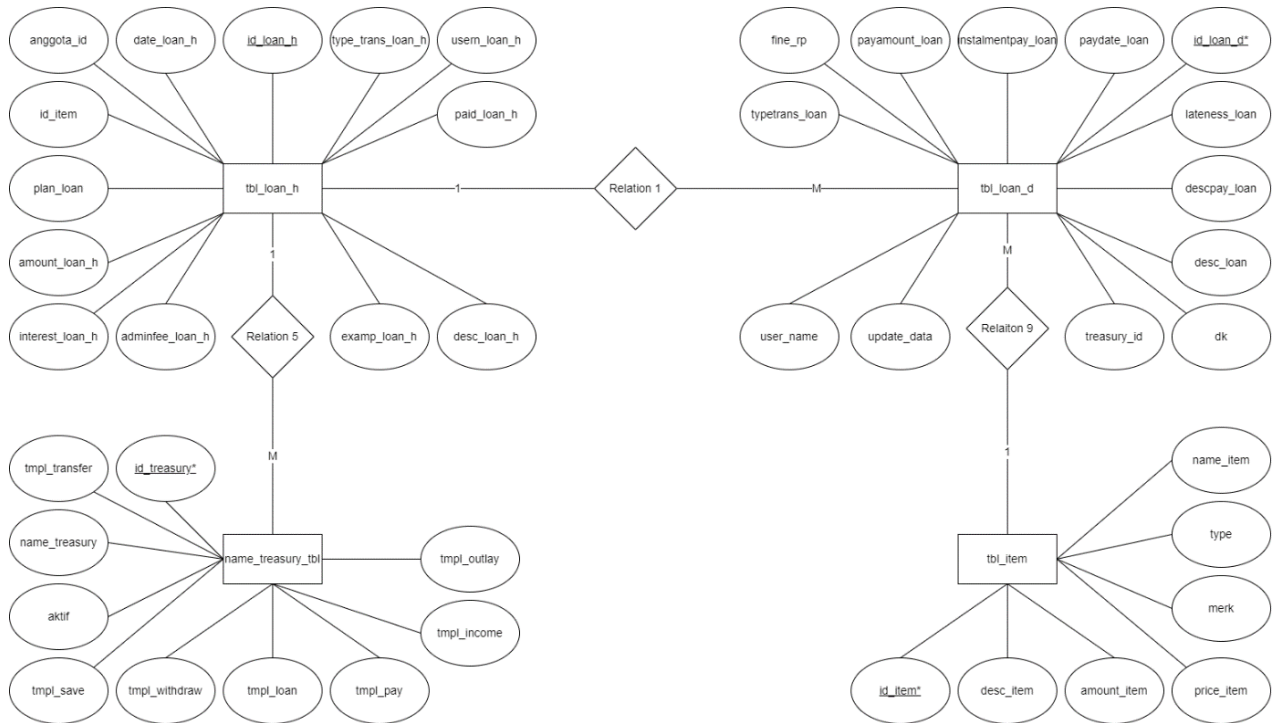
Figure 6. Relationship between Four Entity

Entity Relationship between tbl_item dan tbl_loan_d

In the Figure 6, there are 2 tbl_item entities that are related 1 to M with tbl_loan_d, where the tbl_item entity will store all forms of products that are accommodated by the cooperative to be used as a type of business for all members. The tbl_loan_d is used for detailed processing of loan transactions carried out by the cooperative.
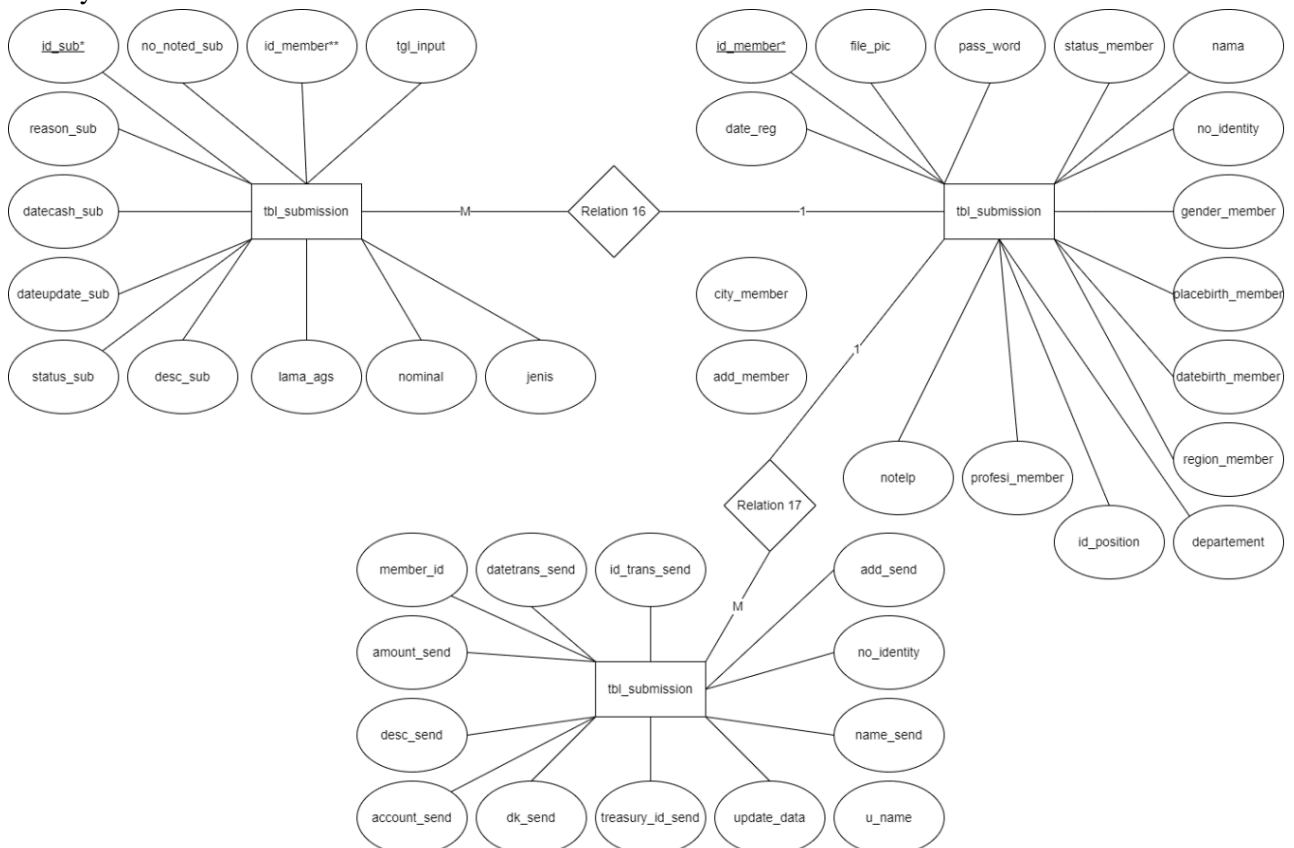
Entity Relationship between tbl_loan_d and tbl_loan_h

In the Figure 6, there are 2 tbl_loan_h entities that are related 1 to M with tbl_loan_d, where the tbl_loan_h entity will store all forms of transactions made by all users/members. The tbl_loan_h entity will store all transactions in the lending process and this entity can also be used to process the history of all transactions from members.

Entity Relationship between tbl_submission and tbl_member

In the Figure 7, there are 2 tbl_submisson entities that are related M to 1 with tbl_member, where the tbl_member entity will accommodate all information related to cooperative members who have registered in the system. This tbl_submission entity is used to record all transaction processes for storing funds from each member, where in the future all history will be recorded and reread so that the results of all transactions per code from registered members can be seen.

Entity Relationship between tbl_member and tbl_trans_send

In the Figure 7, there are 2 tbl_member entities that are related 1 to M with the tbl_trans_send entity, the tbl_trans_send entity will accommodate all entries from data storage from cooperative members and store all variables in the entity, starting from the member code, storage code, transaction time , also save the history of the login as well as the amount and total funds to be entered into the system. The tbl_member will also record all activities in the system.

Figure 7. Relationship between Three Entity
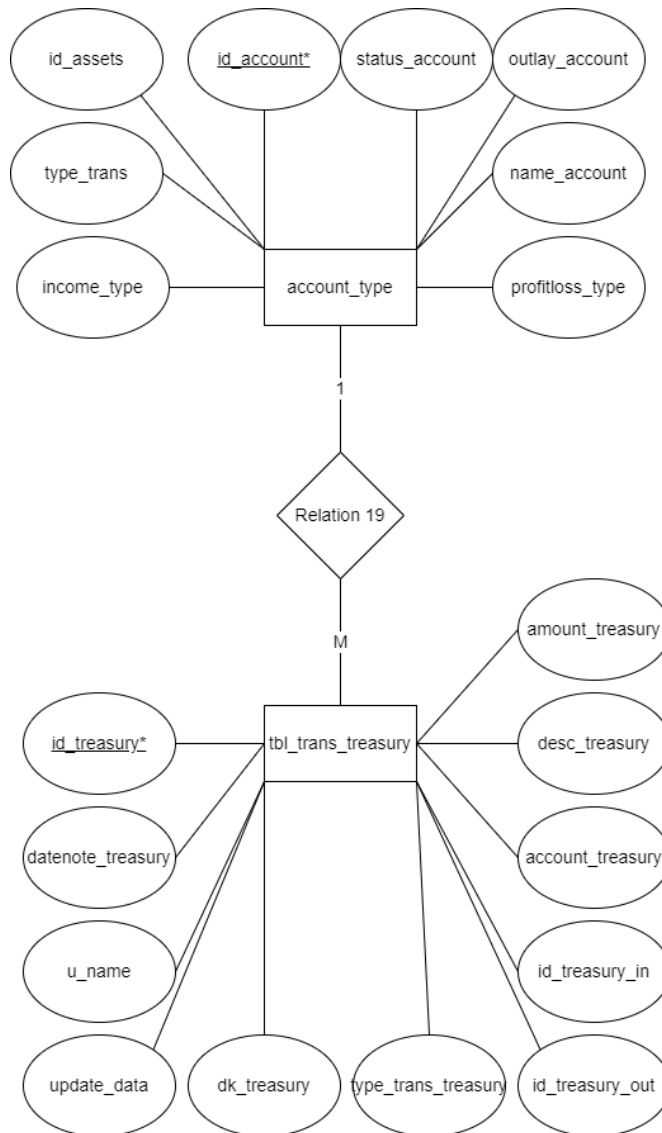
Figure 8. Relationship tbl_account_type and tbl_trans_treasury

Entity Relationship between tbl_account_type and tbl_trans_treasury

In the Figure8, it can be seen that there is a relationship between the tbl_account_type and tbl_trans_treasury entities. Entity tbl_account_type is an entity that will be the master table for code data for all transactions, both borrowing and storing, and is related to tbl_trans_treasury to be able to display cash data that has been inputted from members who have joined the cooperative system.

The data design of the cooperative information system model resulted in ten entities. The data development of the Patria Karya Bersama cooperative system model uses the DBFL method. The model has several stages of work and will also produce several data models. However, this article only describes the results of research that produces a data model in the form of an E-R Diagram. The use of this method has provided convenience, accuracy and compatibility between the data requirements needed according to the Cooperative Patria Karya

Bersama business process. The design of the data model produced in this study will make it easier for database developers to build a comparative information system database.

4. CONCLUSION

Data models routinely help correspondence between the trade individuals characterizing the necessities for agreeable framework and the specialized people characterizing the plan in light of those prerequisites; they are utilized to appear the data require and made by commerce forms. A data-modelling documentation is utilized to demonstrate data   models whose structure is regularly graphical. With respects to programming dialects, a data demonstrate can be implied to as a data structure. Data modelling is an extraordinary resource for tending to and detailing organizational data. It could be an imperative perspective of system examination that expect to a basic portion in data innovation. A data show gives rules to building an organizational database. Data   modelling ought to depict the development of the data system filling distinctive needs. Data model of Cooperative system in this paper will be used for developing database for the future research.

5. SUGGESTED

The design of the database for the Entity Relationship Diagram (ERD) has several shortcomings from the design model and improvements to make a physically sound database. Development of a Logical Database is needed to better be able to separate the master and supporting entities to make a healthy database not redundant.

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