

Data Warehouse Design for the Bank X with Inmon Approach

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Abstract. Various activities related to financial transactions such as the process of deposit and loan funds require the role of the Bank. Along with a large number of customer needs in current technological developments, the banking industry is undergoing many changes. The products offered by the Bank are becoming more diverse. Customers needs for services offered by banks are becoming increasingly high for example internet banking needs. Banks require high data storage so that the bank's business processes can run efficiently. High data requirements by banks also require ease of exchanging data. One concept that can be applied is Data Warehouse. There are various approaches in developing Data Warehouse, one of which is Inmon. This study aims to build a database design from Bank X Data Warehouse with the Inmon approach. The results of the design of the Data Warehouse Bank X database design consists of three fact tables, namely loan fact, saving fact, and portfolio fact, and two data marts, namely loans and saving.

Index Terms—Bank, Data Mart , Data Warehouse, Inmon Approach.

I. INTRODUCTION

In the current era of globalization the role of the Bank is needed by the public [1]–[3]. Various activities related to financial transactions must involve banks as intermediaries. Financial transactions such as the process of savings and loan require the role of the Bank [4]. The Bank activities are included in the collection of funds such as giro, and savings deposits, while those included in the activities of channeling funds such as investment loans, consumer loans, professional loans, working capital loans, trade loans, and productive loans [5]. Along with the increasing needs of the community in the current development, the banking industry has experienced many changes [1]–[3]. The products offered by the Bank are becoming more diverse.

The needs of the community for services offered by the Bank are becoming increasingly high, as is the need for internet banking services [6]–[9]. With internet banking services, customers can be applied for loan funds, deposits, check balances and account mutation, pay various bills, and find out the program from the Bank.

Because of the many services that can be performed by internet banking, the Bank requires high data collection so

that banking activities can run efficiently. High data requirements by the Bank also require convenience to exchange data within the Bank itself. Ease of exchanging data is needed so that efficiency can be maintained. When the process of exchanging data becomes easy, the speed of data access within the Bank will also be maximal. One concept that can be applied is Data Warehouse.

The concept of developing with a data warehouse can help company management to manipulate data and increase productivity in making decisions [10]–[12]. Data warehouse development has been done before in various things [10], [13]–[19]. There are several approaches to developing a data warehouse. One approach that can be used is Inmon [20], [21]. The advantages of the Inmon approach are the centralized data storage and control as well as providing complete technical solutions [12].

Based on the above problems the researcher will propose the design of the Bank data warehouse database with the Inmon approach. A case study was conducted at a Bank X in Bali, Indonesia.

II. PURPOSE OF PAPER

The purpose of this research is to design a database of Data Warehouse Bank X with the Inmon approach so that it can help management in analyzing business and in the future can be developed into a real Data Warehouse system.

III. LITERATURE REVIEW

A. Data Warehouse

Data Warehouse according to Bill Inmon is a subject-oriented, integrated, time-variant, and non-volatile, which supports decision-making management [20], [21].

- Subject-oriented: data is connected with the company's business processes and managed by functions;
- Integrated: data sourced from several operational or OLTP and external systems
- Time variant: data can be identified based on time periods
- Non-volatile: existing data cannot be fixed and cannot be changed

The components from the data warehouse consist of data sources, data staging, data storage metadata, information delivery, management and control. Data Warehouse is often applied in various things such as telecommunications, finance, insurance, education, medical, and others [10], [13]–[19].

B. Data Warehouse Inmon Approach

Inmon's approach to building a data warehouse is done by looking at the company's data model. The process will identify important company subjects. The entity structure that is built will be normalized or 3NF. In the Inmon approach, data redundancy is very much avoided to avoid data update anomalies [22].

The strengths of the Inmon approach are the low data redundancy because it uses a normalized structure, business processes that are easy to understand, very flexible, easy to make changes, and can provide a variety of reports to the company [22].

For designing a Data Warehouse with the Inmon approach consists of several stages as follows [21].

1. Determine the Major Subject

This stage is the process of determining which subjects will be involved in the business processes that take place at the bank.

2. Define Subject

This process selects details from a predetermined subject, so it will produce a fact table on a business process.

3. Conducting Relationships between Objects

This stage will produce a 3NF schema consisting of fact tables and dimension tables.

4. Define Dimension

The defined dimension process is carried out to ensure that the dimension table matches its function.

5. Create Independent Data Mart

The final process is to design a 3NF data mart derived from its derivatives so that it can be used by each department.

C. Bank

Banks are industries that deal in the field of finance such as saving, lending, and other financial transactions. There are various two types of banks in Indonesia, namely Commercial Banks and BPR [23]. In the implementation there is a difference that is not able to accept deposits in the form of demand deposits and can not participate in payment traffic, and business activities in foreign currency, as well as the limited range of operational activities [5]. Some top Banks in Indonesia based on their total asset, total revenue, net income, customer save, and loan outstanding are Mandiri, BRI, BCA, and BNI [4].

IV. RESEARCH METHODOLOGY

In the methodology section of the research the steps in this research will be explained.

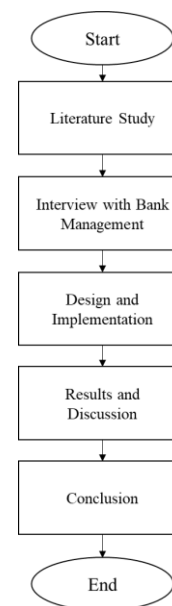


Fig. 1 Research Methodology

1. Literature Study

At this stage will gather references related to the issues raised and supporting theories that exist in this study. A literature study in this study is scientific publications, official websites, and books on data warehouse design using the Inmon approach.

2. Interview with Bank Management

At this stage conduct interviews with Bank X management and find important objects namely profit and asset growth. Furthermore, the results of the interview also found important processes, namely loans, savings, and portfolios.

3. Design and Implementation

The design process is carried out after finding an important process in banking, then designing a data warehouse with an Inmon approach.

4. Results and Discussion

The results of the database Data Warehouse design with the Inmon approach are then analyzed to fit the existing business processes.

5. Conclusion

The results of this study will be presented in a research paper.

V. RESULTS AND DISCUSSION

The process of building a Data Warehouse Bank X database design with the Inmon approach is as follows.

A. Determine the Major Subject

The process of determining the major subject is done by interviewing the management of Bank X. The results of the interview found an important subject in the business process of Bank X, namely profit and asset growth.

B. Define Subject

This process will determine the details of the subject that have been determined in the previous process. The selection of details of the subject will produce a fact table in a business process. In this study, several important subject details are loan, saving, and portfolio.

C. Conducting Relationships between Objects

This process will produce a 3NF schema containing a fact table and dimensions obtained from the previous process.

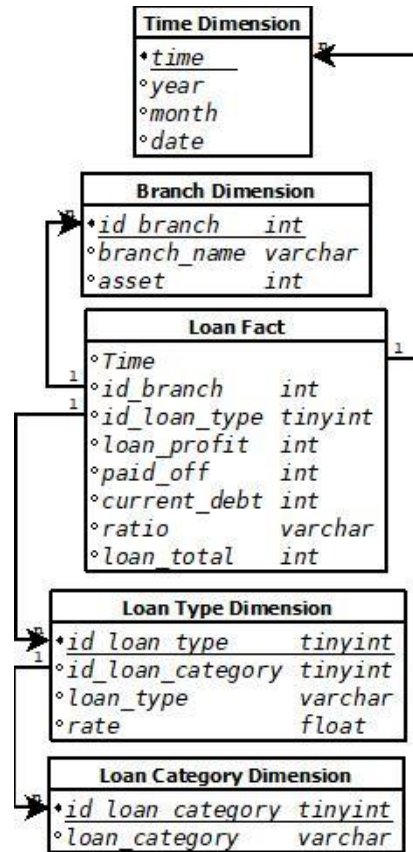


Fig. 2 Loan Fact

The loan fact table serves to provide information related to loans provided by banks based on time, lender's branches, and types of loans.

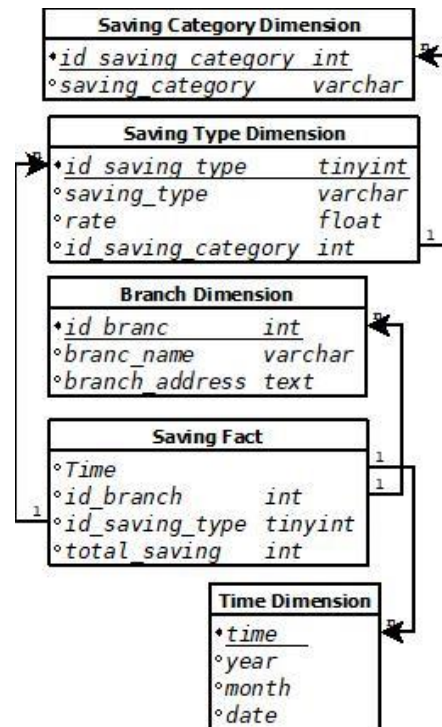


Fig. 3 Saving Fact

The savings fact table functions to provide information related to customer money deposits to the bank based on time, deposit recipient branches, and types of deposits.

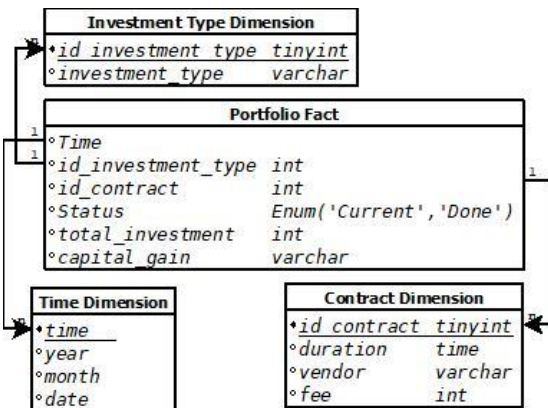


Fig. 4 Portfolio Fact

The portfolio fact table serves to provide information related to investments made by banks based on time, type of investment, and contract.

D. Define Dimension

At this stage will display the dimensions that exist in each fact table.

1. The Loan Fact Table has four dimensions.

- Time Dimension. The time dimension for sorting by day, month, year
- Branch Dimension. The branch dimension for sorting by lender's branch
- Loan Type Dimension. The loan type dimension for sorting by loan type
- Loan Category Dimension. The loan type dimension for sorting by loan category

2. The Saving Fact Table has four dimensions.

- Time Dimension. The time dimension for sorting by day, month, year
- Branch Dimension. The branch dimension for sorting by deposit recipient branch
- Saving Type Dimension. The saving type dimension for sorting by saving type
- Saving Category Dimension. The saving type dimension for sorting by saving category

3. The Portfolio Fact Table has three dimensions.

- Time Dimension. The time dimension for sorting by day, month, year
- Investment Type Dimension. The investment type dimension for sorting by investment type
- Contract Dimension. The contract dimension for sorting by contract

E. Create Independent Data Mart

Data mart that can be generated, namely loans and savings that can be used by each department.

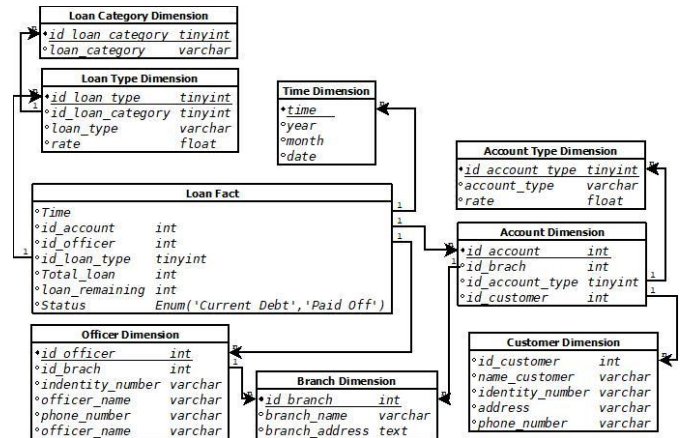


Fig. 4 Data Mart Loan

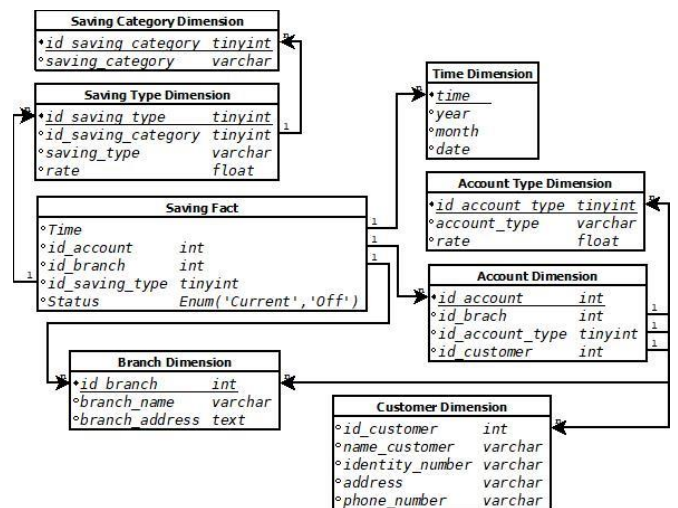


Fig. 5 Data Mart Saving

Data mart is designed with a 3NF scheme based on its derivatives.

VI. CONCLUSION

The results obtained by using the Inmon approach with stages, determine the main subject, define the subject, make connections between objects, determine dimensions, and make an independent data mart.

The results of the Data Warehouse database design process at Bank X produced three fact tables namely, loan fact tables, savings fact tables, and portfolio fact tables. The loan fact table serves to display loans given to banks based on time, lender's branches, and types of loans. The fact saving table functions to display deposits from customers to banks based on time, deposit recipient branches, and types of deposits. The portfolio fact table serves to provide information related to investments made by bank X based on time, type of investment, and contract. Other results obtained

are data mart loans, and data mart savings. Data mart will be used for each department.

VII. SUGGESTION

By using the Inmon approach, it has produced a design from the Bank X Data Warehouse database. Suggestions for the future, the design that has been designed can be implemented so that decision support systems and various other systems can be developed in the future.

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