



Implementation of the Client-Server System for Ordering Food and Beverages with the Android Platform Using the Waterfall Method (Case Study: Maxx Coffee Prima Ap Kualanamu Store)

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ABSTRACT

Today's human needs vary; one of today's human needs is information, which is included in the category of social conditions. With technology in the trade sector, it can simplify buying and selling transactions, promoting merchandise, data collection in trading can be easy. So on. . One of the fields engaged in the trade sector is the Maxx Coffee Prima Store. Maxx Coffee Prima is an authentic Indonesian coffee shop that presents innovative products and the best service designed as comfortable as possible in the form of a full coffee shop where Maxx Coffee Prima offers various types of food And ready-to-serve drinks. The client-server will be implemented at the Maxx Coffee Prima Store as a medium for ordering Food and Beverages by applying the Waterfall method. The waterfall method is a sequential arrangement from planning to testing. So that the system is well structured and can make software quality maintained so that maintenance is more comfortable and as a model for software development approaches. The Application of the waterfall on the client-server is quite useful because of the well-structured planning using a flow chart.

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1. Introduction

Today's human needs are diverse; one of the human needs today is information, which is included in the category of social conditions. The need for current information is critical, so with today's technology, all data can be easily obtained. Technology has developed in many fields, such as in the areas of government, finance and banking, socio-culture, industry, education and even in the field of trade.

With the existence of technology in the trade sector, it can facilitate buying and selling transactions, promoting merchandise, trading data can be made accessible, and so on. One of the fields engaged in the trade sector is the Maxx Coffee Prima Store which is located at Jl Bandara Kualanamu International Airport.

Maxx Coffee Prima is an original Indonesian coffee shop that presents innovative products and the best service that is designed as comfortable as possible in the form of a full coffee shop where Maxx Coffee Prima offers various types of ready-to-eat Food and Beverages, in this ready-to-serve service the number of buyers is in units. time with a limited store area and served only 2 salespeople with a number of customers more than 10 people. In Maxx Coffee Prima service, consumers are queuing for their orders. This is caused by consumers if there are too many consumers. However, with the client server, it will allow consumers to get fast and precise service.

According to Ariyanti (2019) Client server is a term used in the world of information technology and communication that is used to exchange data into the internet network where the data will be stored in a database. The client server will be implemented at the Maxx Coffee Prima Ap Kualanamu Store as a medium for ordering Food and Beverages, by applying the Waterfall method.

The waterfall model or often referred to as the classic life cycle is a software development model that emphasizes sequential and systematic phases, starting with the specification of consumer needs



until developing through the planning, modeling, development or construction process, and deployment, which results in ongoing support for a complete piece of software. This model can be used when the need for a problem is well understood, and work can flow linearly from communication to deployment.

2. Method

2.1 Research Framework

The research framework is a method for carrying out an action or a frame of mind to formulate directed ideas and related to the aims and objectives. The scientific method or scientific process is a scientific process for obtaining knowledge systematically based on physical evidence.

The model used in this research is the waterfall model. The waterfall model is a sequential design approach that is relatively linear for a particular field of engineering design. Starting from data collection, data analysis, design, implementation, and testing. Here is a picture of the waterfall model:

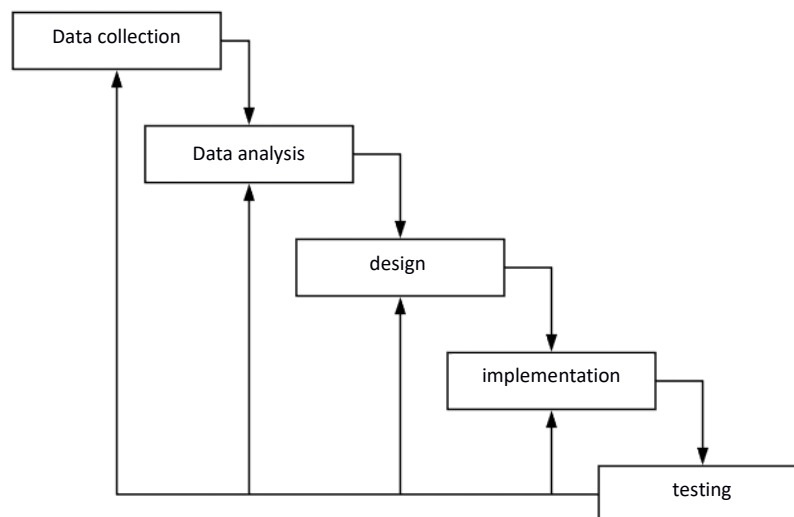


Figure 1. Illustration of Waterfall Model

2.2 Data collection

The description of the framework is a further explanation regarding the elaboration of the process of the research framework being carried out, along with the explanation.

a. Interview

The interview is a data collection technique that is carried out through face to face and direct questions and answers between the researcher and the resource person. In this case the researcher conducted a direct interview to the manager Maxx Coffee Prima.

b. Observation

Observation technique is a method of collecting data by observing directly in the field. This process takes place with observations which include viewing, recording, counting, measuring, and recording events. Observations were made at Store Maxx Coffee Prima, which is located at Jl Bandara Kuala Namu International Airport.

c. Literature review

Literature study is one element that supports the researcher's theoretical basis for studying the issues discussed. In this case, researchers used several sources of literature including: Books, National Journals, Documentation, and other sources

2.3 Analysis method with the Apriori method

The priori algorithm is one of the classic data mining algorithms. A priori algorithms are used so that computers can learn association rules, looking for patterns of relationships between one or more items in a dataset.

A priori algorithms are widely used in transaction data or so-called market basket, for example a supermarket has a market basket, with the a priori algorithm, the owner of the supermarket can find out the buying pattern of a consumer, if a consumer buys items A, B, there is a 50% chance that he will buy item C, this pattern is very significant with the existence of transaction data so far.



The importance of an associative rule can be determined by two parameters, support (supporting value), namely the percentage of the combination of these items in the database and confidence (certainty value), which is the strength of the relationship between items in the associative rule.

The associative rule is usually expressed in the form: {bread, butter} -> {milk} (support = 40%, confidence = 50%)

Which means: "A consumer who buys bread and butter has a 50% chance of also buying milk. This rule is quite significant because it represents 40% of transaction records so far."

Association analysis is defined as a process to find all associative rules that meet the minimum requirements for support (minimum support) and the minimum requirements for confidence (minimum confidence).

But on the other hand, Apriori has a weakness because it has to scan the database every time iteration, so that the time required increases with more iterations. This problem is solved by new algorithms such as FP-growth.

a. Apriori Way Working

1. Determine the minimum support.
2. Iteration 1: count items from support (transactions that contain all items) by scanning the database for 1-itemset, after 1-itemset is obtained, from 1-itemset is above minimum support, if it meets minimum support, 1-itemset it will be a high frequent pattern.
3. Iteration 2: to get 2-itemset, you have to do a combination of the previous k-itemset, then scan the database again to count items that contain support. The itemset that meets the minimum support will be selected as the candidate's high frequent pattern.
4. Set the k-itemset value of the support that has met the minimum support for the k-itemset.
5. Do the process for the next iteration until there are no more k-itemset that meets the minimum support.

b. Support & confidence Value Search Formula

The support value of an item is obtained by the following formula:

$$\text{Support (A)} = \frac{\text{The amount the transaction contains A}}{\text{Total Transaction}}$$

Figure 2. Support-A

While the support value of 2 items is obtained from the following formula:

$$\text{Support (A } \cup \text{ B)} = \frac{\text{The amount the transaction contains A}}{\text{Total Transaction}}$$

Figure 3. Support-AUB

After all high frequency patterns are found, then we look for an associative rule that meets the minimum requirements for confidence by calculating the associative confidence rule A -> B. The confidence value of rule A -> B is obtained from the following formula:

$$\text{Confidence} = P(B | A) = \frac{\text{The amount the transaction contains A dan B}}{\text{The amount the transaction contains A}}$$

Figure 4. Confidence-AB

3. Results and Discussion

3.1 Analysis & Application of Methods

System requirements analysis contains work steps of the system as a whole, both in terms of models and in terms of model architecture to be built. The aim is to simplify the implementation and testing of the client server system for ordering Food and Beverages using the Waterfall method.



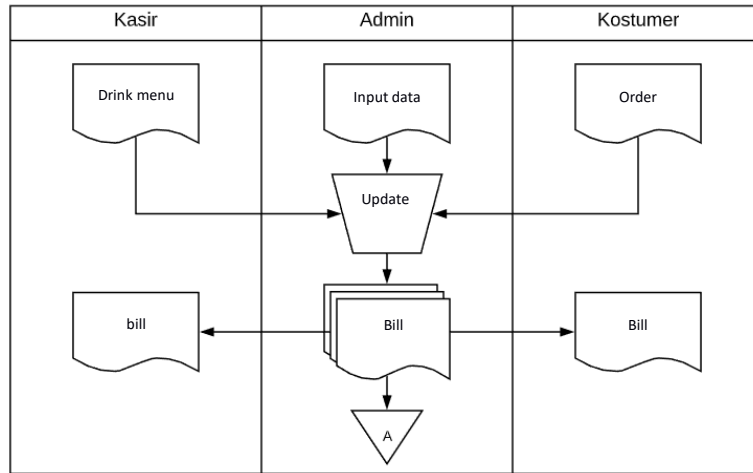


Figure 5. Client Server System Design on Drinking Orders

In doing and completing this research, there are several things that the system needs such as system input requirements, process requirements and output requirements.

- a. *Input* : Filled with some data on Food and Beverage along with the price
- b. *Process* : In the form of recording orders and total prices
- c. *Output* : Is the total result in bills

The flowchart program in designing a client server system for ordering drinks can be seen in the following figure:

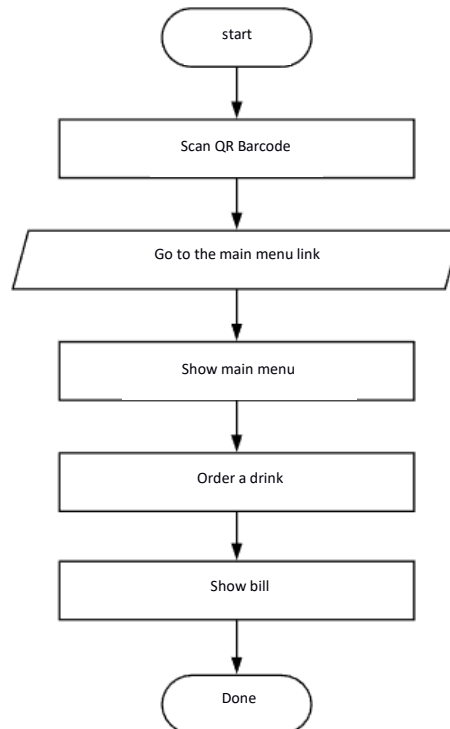


Figure 6. Client System Flowchart on Drinking Orders

As for the transaction table as a research test, the following is the transaction table:

Table 1.
Order Transactions

CODE	ORDER
T1	Americano, Cold Brew Latte, Beef Hamburg, Carbonara Pie
T2	Americano, Green Tea Cream Frappe, Carbonara Pie, Banana Choco Braid



CODE	ORDER
T3	Americano, Green Tea Cream Frappe, Carbonara Pie, Choco Devil Cake
T4	Cappuccino, Cold Brew Latte, Beef Hamburg, Carbonara Pie
T5	Cappuccino, Cold Brew Latte, Beef Hamburg, Choco Devil Cake
T6	Cappuccino, Brewed Tea, Beef Hamburg, Choco Devil Cake

After obtaining these data, the next step is to determine the number of transactions for each item. The following are the results of determining each transaction:

Table 2.

Number of Per-Item Transactions

Item	Support Count	Support
Americano	3	50%
Green tea cream frappe	2	33%
Cappuccino	3	50%
Cold brew latte	3	50%
Brewed tea	1	16%
Hamburger beef	4	66%
Carbonara pie	4	66%
Banana choco braid	1	16%
Choco devil cake	4	66%

Filter data in Table 2, select items that have transactions of 3 or more transactions. Items with a number of transactions less than 3. The following results can be seen in Table 3:

Table 3.

Per-Item Transactions

Item	Support Count	Support
Americano	3	50%
Cappuccino	3	50%
Cold brew latte	3	50%
Hamburger beef	4	66%
Carbonara pie	4	66%
Choco devil cake	4	66%

Create a pair of items starting from the first item, namely (AMERICANO, CAPPUCCINO), (AMERICANO, COLD BREW LATTE) and so on. Then proceed with the second item. Here are the results:

Table 4.

Per-Item Pairs

Item	Support Count	Support
Americano, cappuccino	0	0%
Americano, cold brew latte	1	16%
Americano, beef hamburg	1	16%
Americano, carbonara pie	3	50%
Americano, choco devil cake	1	16%
Cappuccino, cold brew latte	2	33%
Cappuccino, beef hamburg	3	50%
Cappuccino, carbonara pie	1	16%
Cappuccino, choco devil cake	2	33%
Cold brew latte, beef hamburg	3	50%
Cold brew latte, carbonara pie	2	33%
Cold brew latte, choco devil cake	1	16%
Beef hamburg, carbonara pie	2	33%
Beef hamburger, choco devil cake	2	33%
Carbonara pie, choco devil cake	1	16%

Then calculate the number of items purchased in pairs, here are the results of this calculation:

Table 5.



Per-Item Transactions		
Item	Support Count	Support
Americano, carbonara pie	3	50%
Cappuccino, beef hamburg	3	50%
Cold brew latte, beef hamburg	3	50%

The 3-itemset candidate who has met the minimum support, the itemset will become a reference for the next k-itemset

To get an itemset from support, an itemset that meets the minimum support is chosen as a high frequent pattern

Table 6.
frequent pattern

Item	Support Count	Support
Cappuccino, cold brew latte, beef hamburg	2	33%

No more combinations can be formed for the next k-itemset, the process stops, the high frequent pattern found is "Cappuccino, cold brew latte, beef hamburg". Next, form association rules that meet the minimum requirements by calculating confidence association rules A-> B.

Establishing Associative Rule:

Table 7.
Establishing Associative Rule

Item	Support Count	Support	confidence
{cappuccino, cold brew latte} → {beef hamburg}	50%	50%	50%
{cappuccino, beef hamburg} → {cold brew latte}	50%	50%	50%
{cold brew latte, beef hamburg} → {cappuccino}	50%	50%	50%
{cappuccino} → {beef hamburg}	50%	50%	50%
{cappuccino} → {cold brew latte}	50%	50%	50%
{cold brew latte} → {beef hamburg}	50%	50%	50%

The formation of associative rules is quite important to obtain and calculate the confidence value. Please note that a priori algorithm is quite wasteful in memory usage and spends the most time when scanning.

3.2 System Implementation

a. Usecase

UseCaseA diagram is a graphical description of some or all of the actors, usecases, and interactions between them that introduce a system. Usecase diagrams do not explain in detail about the use of usecase, but only provide a brief description of the relationship between the Use Case, Actor, and the system. In this UseCase it will be known what functions are in the system being made. In this UseCase you will know what functions are on the system being created. *Use Case Diagram* from the Food and Beverage client server system are as follows:



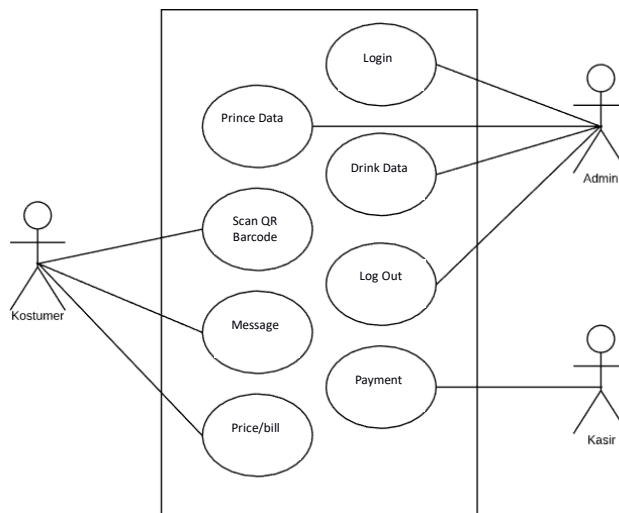


Figure 7. Use Case Diagram

b. Result Display

in this display is the final result of orders from customers that are obtained as follows:

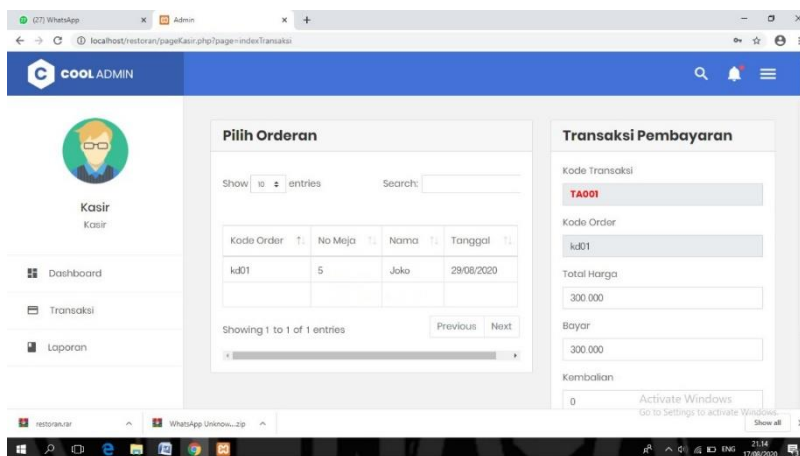


Figure 8. Results

4. Conclusion

Based on the previous description and discussion, the following conclusions can be drawn: The waterfall method is a sequential arrangement from planning to testing. So that the system is well structured and can make software quality maintained so that maintenance is easier and as a model for software development approaches. The Application of the waterfall on the client server is quite effective because of the well-structured planning using a flow chart.

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