

# DESIGN AND IMPLEMENTATION OF FOOD & BEVERAGE ORDER APPLICATIONS USING MULTILEVEL FEEDBACK QUEUE METHOD BASED ANDROID (CASE STUDY : BONK CAFE KRIAN)

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## ABSTRACT

*With the development of information technology that exists today everyone can perform data processing easily, can produce an information we need accurately and save time, as well as cost. Then we need a menu application application program using smartphone technology and web based to facilitate the ordering of food and drinks at Bonk Cafe Krian. With the features that exist in this application, the user can make the ordering process using Android and from the order will be stored into the database server so that the ordering process will appear on the monitor the kitchen along with the cashier. This Android-based service application has a significant time difference so that this application can save time and speed up the service process.*

*Multilevel Feedback Queue algorithm as a method that can increase the efesiesi time and speed up service process to the customer. With this algorithm can be built an application ordering android-based food and beverage that is light and reliable.*

*Functionally in Results in this test requires 4 customer data with different kinds of menus that have different order times, scheduling results in estimated waiting time and presentation time to customers with an average of 3.25 minutes. So the food and beverage system is declared feasible test and feasible to be used functionally.*

**Keywords :** *Application Order, Multilevel Feedback Queue, Android app.*

## INTRODUCTION

Information revolution we have felt with the existence of sophisticated technology. Merging between computer technology and telecommunications has resulted in a revolution in the field of information systems. Along with the advancement of technology is forming a new era in the world of information globalization. When the era of information globalization emerged a smart communication device that is Smartphone. Smartphone users are very much in Indonesia, and this is becoming a new lifestyle. Electronic life lifestyle or abbreviated e-life has become a habit of society in Indonesia. So bnyak things that affect in activities and activities with the style of e-life. Especially in the search for culinary or hawker at a Cafe that has wifi access.

BONK CAFE is one of the cafe is quite crowded in District Krian-Sidoarjo still using manual way to order food and beverage menu. This manual has weaknesses such as at least BONK CAFE service, which makes customers wait, using lots of papers for ordering, if the waiter is busy then the customer has to wait for a relatively long time. Extremely rapacious for those customers who really prioritize the meaning of time commitment.

By leveraging the e-life lifestyle and technological advances to create an application that helps to overcome the problem. Utilizing smartphone technology can design mobile-menu reservation as a medium for ordering food and drink menu to help reduce problems in BONK CAFE Krian.

## THEORETICAL BASIS

### Multilevel Queue Feedback (MQF)

Multilevel feedback queue is one of the algorithms based on multilevel queuing algorithm (Edy, 2012). The fundamental difference that distinguishes multilevel feedback queues by multipolar queues usually lies in the possibility of processes moving from one queue to another, either with a lower or a higher priority, for example in the following example.

1. All newly arrived processes will be placed on queue 0 (quantum = 8 ms).
2. If the process can not be completed in 8 ms, then the process will be stopped and moved to the queue 1 (quantum = 16 ms).
3. Queue 1 will only be done if there is no longer process in queue 0, and if process in queue 1 not finished in 16 ms, then process will be moved to queue 2.
4. Queue 2 will work when queue 0 and 1 are empty, and will run with FCFS algorithm.

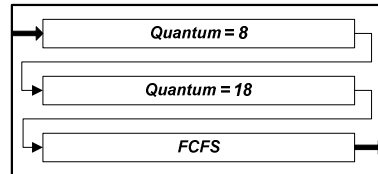


Figure 1. Multilevel Feedback Queue

This algorithm is defined through several parameters, among others:

- a. Number of queues.
- b. Scheduling algorithm for each queue.
- c. When to raise the process to a higher queue.
- d. When to lower the process to a lower queue.
- e. Which queue to enter the process that requires.

Here it is possible to move between queue processes, in this case determined by time quantum, but in practice the application of multilevel feedback queue algorithm will be applied by defining the parameters first:

1. Number of queues.
2. The internal algorithm of each queue.
3. The rules of a process go up to a higher queue.
4. Rule of a process down to a lower queue.
5. Queues to be entered every new process comes.

Example:

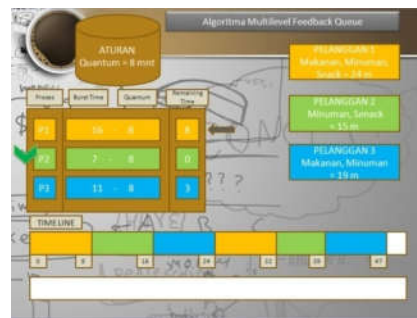


Figure 2. Multilevel Feedback Queue Simulation

Figure 2. Multilevel Feedback Queue Algorithm has a Quantum 8 m rule and there are three queues; P1 = 24 m, FCFS P2 = 15 m, FCFS P3 = FCFS incoming process, enter the P1 queue. If in 8 m is not completed, then the process is transferred to P2. If P2 in 8 m is not completed, then transferred again to P3. If P3 in 8 m is not completed, then transferred to P1 until Remaining Time decreases to 0. Based on the above things then this algorithm can be used flexibly and applied according to system requirement.

The process of Multilevel Feedback Queue Algorithm enables the movement of processes from one queue to another by paying attention to the maximum timeout value in each processor. Application of MFQ Algorithm can work with maximum if there is more than one worker of kitchen work, Because MFQ algorithm can do the distribution of queue load evenly on every kitchen attendant. When one of the kitchen time officers have time process under the specified time limit, then immediately made a priority by the system to process the next order. With equitable division of tasks, cooking break time can be reduced, so ordering can be faster.

### Client Server Application

Client Server is formed by 3 basic components of client, middleware, and server. The relationship between the three components is described in Figure 3 as follows:

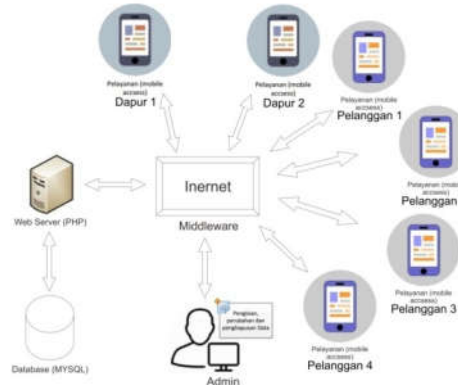


Figure 3. Basic Client Server Components

- Client: It is the terminal used by the user to request certain services that are needed and also used to receive the requested processing results from servers such as admins, customers and kitchens.
- Middleware: An intermediary component that allows clients and servers to connect and communicate with each other like the internet.
- Server: It is the party that provides the server service can be a database such as MYSQL database and web server (PHP).

### RESEARCH METHODOLOGY

The system was developed using waterfall system development method. Waterfall method is a systematic and sequential software development method that starts at the level and progress of the system to the analysis, design, code, test and maintenance. Here is the stage of the waterfall model.

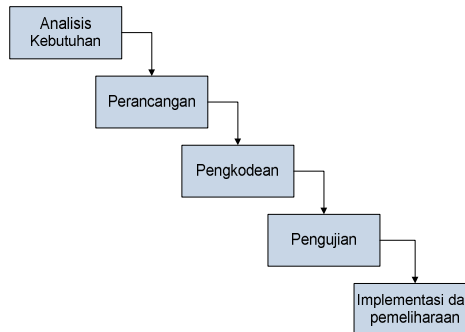


Figure 4. Waterfall Model

- 1) Requirement (Requirement Analysis) - Is a step to analyze the needs of the system. Data collection was obtained from Bonk Cafe owners and employees working in Bonk Cafe in the form of order menu data and price. The data already in can be analyzed further.
- 2) System Design - The design of the design system aims to create a model solution to the problem that has been in complete modelken at the stage of the analyst needs. Design method that will be used is the design that must be done, namely: Designing DFD, ERD Design, Interface Design and design Flowchart.
- 3) Implementation - In this phase, data translation or problem solving has been designed into programming languages. The programming language used in the ordering application is PHP using the CodeIgniter platform and then extracted to android.

- 4) Integration and testing - The system testing process applies black-box testing with functional testing and error handling testing. The system declared feasible test if the percentage of test results are functional testing and error handling of at least 80%. Functional testing is done by giving input on the component, module or feature and then check its output. Error handling testing is done by how far the system can anticipate or handle errors or omissions that may be done by the user.
- 5) Operation and Maintenance - This is the last stage in the waterfall model. The ready-made system on the run as well as in the maintenance. Maintenance includes fixing errors not found in the previous step.

**SYSTEM PLANNING**

**System Design**

System design is done to make it easier to understand and determine the flow of system processes while doing the making. System modeling in this study using tiered diagrams, Data Flow Diagrams (DFD) and Flowchart.

**Tiered Diagrams**

Tiered diagram provides the level of process on the system Here is a tiered system diagram model of the system built is as follows:

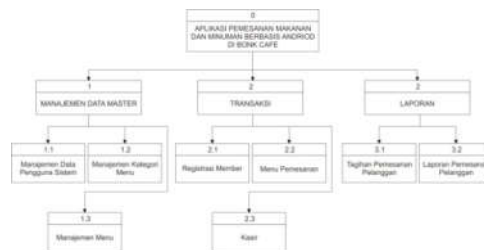


Figure 5. Tiered Diagram

Based on figure 5, on the proposed system can be 3 levels of process. At top level (level 0) is an Android-based food and beverage ordering app at Bonk Cafe. Top level has sub level 1 consisting of master data management process, transaction and report. Each process at level 1 has sub-level 2 that describes the detail of the process as shown in Figure 5.

**Data Flow Diagram (DFD)**

Data flow diagram describes the flow of processes and data on the system to be built. The data flow diagram consists of several sub-diagrams below.

**A. Context Diagram (Level 0)**

Context diagrams describe the flow of data and entities or users of the system in the process of top level tiered diagram. Here is the context diagram design of the system

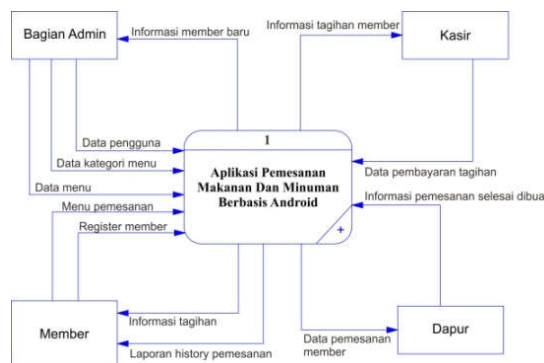


Figure 6. Context Diagram

In the context diagram above consists of 4 entities or users of the system. Admin Entity input user data, menu category data and menu data. The admin entity receives new member information from the system. Member

entity perform member registration and menu ordering. Member entity receives ordering billing information. The cashier entity inputs the bill payment data and receives the member's billing information. The kitchen entity receives information from the member's data.

**B. Data Flow Diagram Level 1**

Based on the context diagram created derived level of the process to be viewed in detail the process flow on the system. Here is the design of the level 1 design diagram.

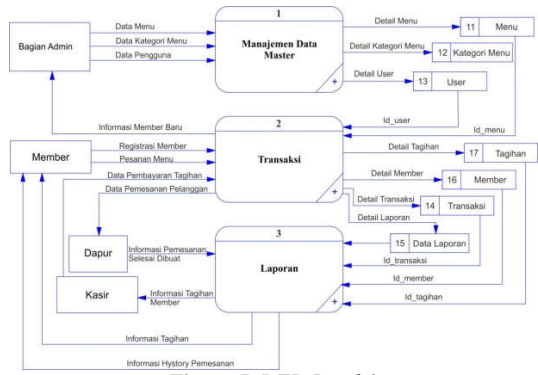


Figure 7. DFD Level 1

**C. Level 2 Master Data Management Process**

Based on the flow of data management process in DFD level 1, the following diagram design DFD master data management process level.

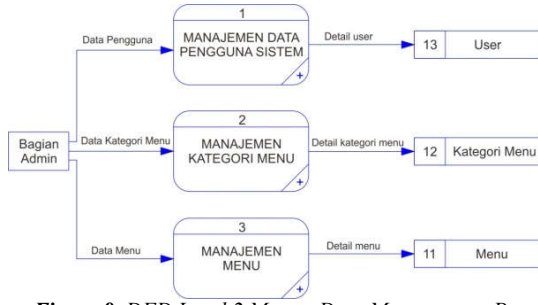


Figure 8. DFD Level 2 Master Data Management Process

**D. Level 2 Transaction Process**

Based on the process flow in DFD level 1, the following diagram design DFD level 2 transaction process.

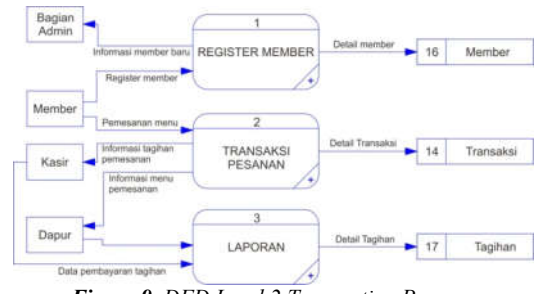


Figure 9. DFD Level 2 Transaction Process

**Flowchart**

With the flowchart the sequence of poses of activities becomes more apparent. If there is addition of process then it can be done more easily. Once the flowchart is completed, the programmer translates it into a program with programming language.

The flowchart function is as follows:

1. To explain the logic of a program
2. Understanding the relationship between the different process steps
3. Collect data about a particular process
4. Assist with decision making
5. Measure process performance
6. Describe the process structure
7. Make it easy in tracking process flow errors

Here is a flowchart in Food and Beverage Ordering Service System Bank Cafe Krian:

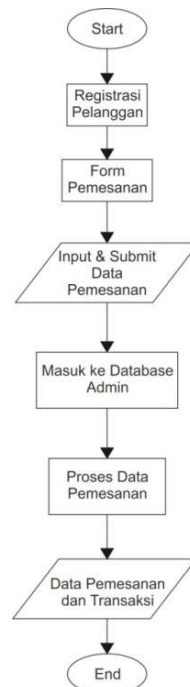


Figure 10. Flowchart

## TESTING AND DISCUSSION OF RESULT

Testing is an important part of the software development cycle. The purpose of testing is to ensure software that has a reliable quality, which is able to present the basic review of the specification, analysis, design and coding of the software itself. In this analysis and design will use error handling testing and functional testing, aims to try to input data in accordance with predefined input variables. Is it in accordance with the results that have been analyzed using Multilevel Feedback Queue Algorithm method.

**Testing Functionally**

On each menu below gives the result of every real data input

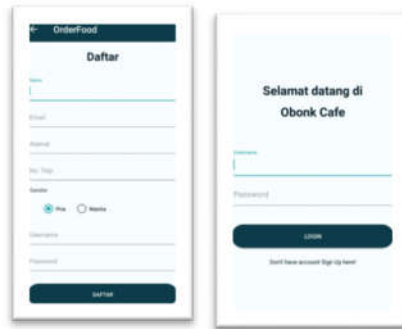


Figure 11. Customers login, if no account then customers are required to register first.

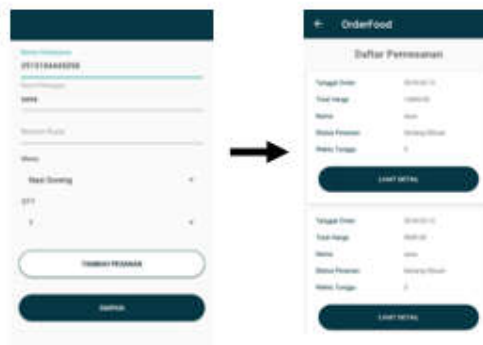


Figure 12. Result of order made by customer

Tgl Pemesanan	Nama Pelanggan	Menu	Jumlah	Status
2018-01-01	aaa	Meal Samping	1	✓Pesan
2018-01-01	aaa	Ice Cream Eska	1	✓Pesan
2018-01-01	aaa	Meal Bakar	1	✓Pesan
2018-01-01	aaa	Meal Samping	1	✓Pesan
2018-01-01	aaa	Meal Samping	1	✓Pesan
2018-01-01	aaa	Meal Bakar	1	✓Pesan
2018-01-01	aaa	Meal Samping	1	✓Pesan

Figure 13. Customer Booking Results Received by the admin

No	Tgl Pemesanan	Nama Pelanggan	No Tagihan	Mata Uang
1	2018-01-01	aaa	1018-01-01	Rp10000

Figure 14. Customer Billing Page

**Testing Applications With Multilevel Feedback Queue Method**

At this stage the testing process to prove the application made able to answer the subject matter well. The process of testing the order process scheduling in this study consider the parameters of order time, waiting time and time of presentation. In this test requires 4 customer data with various kinds of menus that have different order times. The four test test data are as follows:

Mobile Penjualan	Nama Pelanggan	Menu yang	Menu	Kuantitas
2018-05-19 19:40:29	Andi	1	Mie Goreng	1
2018-05-19 19:41:15	Sadak	2	Tahu Crispy	1
2018-05-19 19:41:54	Sofi	1	Pizza Mini	1
2018-05-19 19:48:47	Jadianto	4	Nasi Goreng	1

Figure 15. Data Testing Booking

Here is a detailed description of all four test data:

Table 1. Details of Customer Booking Data

No	Customer	Menu	OT (H)	WT (M)	WT (S)
1	Andi	Mie Goreng	19:40	4	240
2	Sadak	Tahu Crispy	19:41	1	60
3	Sofi	Pizza Mini	19:41	5	300
4	Jadianto	Nasi Goreng	19:48	3	180

The kitchen attendant in charge consists of 2 people who have different responsibilities with the following working time:

Table 2. Detail of Kitchen Data

Kitchen Officers	Max Working time (S)
Officer 1	60
Officer 2	60

The kitchen attendant prepares the order with the calculation of each order as follows:

Table 3. Detail Calculation of each booking

No	Menu	WT (S)	Kitchen	Rest WT (S)	RT (S)
1	Mie Goreng	240	120	120	120
2	Tahu Crispy	60	120	0	180
3	Pizza Mini	300	120 + 60 (Sisa Waktu)	120	360
4	Nasi Goreng	180	120	60	480

In the first stage, the menu "Tofu Crispy" has been completed, because the value of the remaining processing time is 0 (zero). Then, the next step is to calculate the remainder of the ordering process done by the kitchen officer 2. Here is the process of calculation that succeeded in doing.

Table 4. Detail Calculation of each remaining order process

Customer	Menu	WT (S)	Kitchen	Rest WT (S)	RT (S)
Andi	Mie Goreng	120	120	0	601
Sofi	Pizza Mini	120	120	0	721
Jadianto	Nasi Goreng	60	120	0	781



From the second stage of the process, the entire menu successfully completed properly. The following is the result of the ordering process scheduling sequence based on the MFQ method.

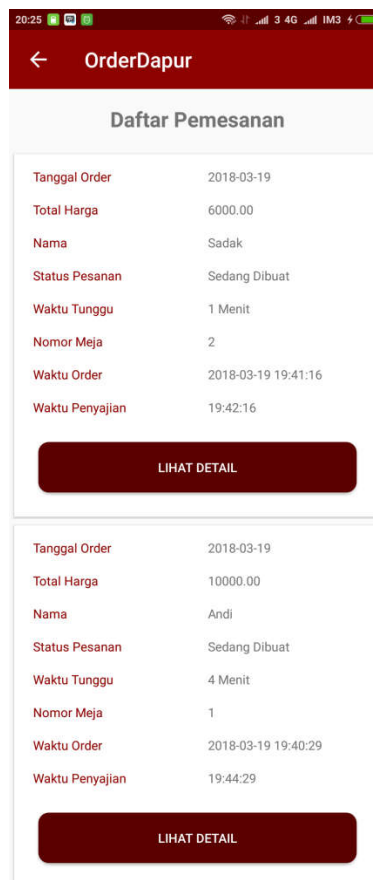
**Table 5. Order Results Scheduling Process Booking**

No	Long WT (S)	Long WT (M)
2	60	1
1	601	10
3	721	12
4	781	13

Based on the final results of the successful ordering scheduling, the duration of the menu presentation in the four test data above is as follows:

**Tabel 6. Hasil Waktu Penyajian Proses Pemesanan**

No	Customer	Menu	OT (H)	WT (M)	PT
2	Sadak	Tahu Crispy	19:41	1	19:42
1	Andi	Mie Goreng	19:40	4	19:44
3	Sofi	Pizza Mini	19:41	5	19:46
4	Jadianto	Nasi Goreng	19:48	3	19:51



Tanggal Order	2018-03-19
Total Harga	9000.00
Nama	Sofi
Status Pesanan	Sedang Dibuat
Waktu Tunggu	5 Menit
Nomor Meja	2
Waktu Order	2018-03-19 19:41:54
Waktu Penyajian	19:46:54

LIHAT DETAIL

Tanggal Order	2018-03-19
Total Harga	10000.00
Nama	Jadianto
Status Pesanan	Sedang Dibuat
Waktu Tunggu	3 Menit
Nomor Meja	4
Waktu Order	2018-03-19 19:48:47
Waktu Penyajian	19:51:47

LIHAT DETAIL

Figure 17. Testing Results On Android App

### Conclusion Testing Results

In the tests that have been done, it can be concluded the application successfully scheduling the reservation using the calculation Multiple Feedback Queue (MFQ). The scheduling results provide an approximate wait time and a serving time to customers with an average of 3.25 minutes.

## CONCLUSIONS AND RECOMMENDATIONS

### Conclusion

From the results of the previous chapters in the discussion get some conclusions, among others, as follows:

1. With Bonk Cafe Krian's food and beverage ordering system using multiple feedback queue algorithm based on Android which has been made according to system design and can be used to simplify service from Bonk Cafe to customer.
2. Food and Beverage Reservation Bonk Cafe Krian has been tested with a given menu list of 53 data and 7 categories. This shows that this system is very helpful to the work of the cashier.
3. Interface implementation of integrated processes on this system has resulted in web and android-based food and beverage ordering features.
4. Based on the results of the Food and Beverage Order System Ordering System Bonk Cafe Krian has met the standard of all the main characteristics. Where the test has been done can be concluded the application managed to schedule the ordering by using the calculation Multiple Feedback Queue (MFQ). The results of this test require 4 customer data with different kinds of menus that have different order times, scheduling results in estimated wait time and presentation time to customers with an average of 3.25 minutes.

### Suggestion

As for suggestions that can be submitted for this system is food and beverage ordering system can be developed by adding some modules depending on the needs of users, so this system can become more complex in serving customers easily and quickly so that customers do not have to queue up.

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