

WIRELESS APPLICATION FOR ORDERING MANAGEMENT SYSTEM IN A RESTAURANT

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ABSTRACT

The primary purpose of this application is to build a PDA (Personal Data Assistance) utility for ordering in a restaurant. The benefits of implementing PDA on ordering management system in a restaurant are to make the waiters or waitresses' works more efficient and also to make the orders more organized. The finding from this project is that PDA as a smart client has several benefits compare to other ordering system in a restaurant. The conclusion of this project is that implementing PDA with its wireless technology on ordering management system in a restaurant will improve the restaurant service.

Keywords: *Wireless Application, Personal Data Assistance, Ordering System.*

1. INTRODUCTION

There are many restaurants that can be found in Jakarta, Indonesia these days. The restaurants have to compete with each other to attract customers. Usually restaurants which provide good food and services will gain a lot of customers.

For restaurant which is not a fast food restaurant and is middle to large size restaurant, a PDA with its wireless technology can be implemented to improve the restaurant service. There are several benefits that can be achieved by implementing PDA:

- With PDA, the waiters or waitresses do not need to waste time on going from tables to the kitchen all the time.
- The customer orders will be well organized. There will be no such thing as the second customer gets his food before the first customer gets his.
- The waiter or waitress will also know the availability of food that is ordered by the customer quicker. Because the food availability can be found out from the message which is sent from the kitchen to waiter or waitress' Pocket PC. There is no need for the waiter or waitress to go to the kitchen to ask for the food availability.
- The waiter or waitress can find out about the order progress when the customer wants to know. For example, whether or not the food has been cooked.

1.1 Research Scope

The development is divided into three phases: Analysis and design phase, by using Object Oriented Analysis and design methodology (UML/Unified Modeling Language); Implementation Phase, that built a PDA application to be used by the waiter or waitress, and PC applications to be used by the kitchen staff and cashier; and the last phase is Deployment, that connect PDA application and PC

application via WLAN (Wireless Local Area Network) through Wi-Fi (Wireless Fidelity).

1.2 Research Purpose and Goal

The primary purpose of this project is to build an application that runs in PDA, so that it can be used for ordering in a restaurant. The application is meant to improve the work efficiency of the waiters and waitresses in the restaurant. With the intention that, the service quality in the restaurant will increase.

The application on the PDA must be able to communicate wirelessly with the kitchen PC. The communication is used to:

- Send customer's orders wirelessly from PDA to kitchen PC.
- Send message or notification from the kitchen PC to the PDA. This message can be a message to inform the unavailability of the customer's order or the order is ready to be served.

2. LITERATURE REVIEW

2.1 PDA

A PDA stands for a Personal Digital Assistant. A PDA is a small computer which fits in your palm. A PDA has similar functions as desktop computer, but it is smaller, lighter, faster and portable. Users can enter data into a PDA via touch-screen technology, handwriting recognition technology, virtual keyboards and miniature keyboards. [7]

2.2 Wi-Fi or WLAN Architecture

Each computer is referred to as a station in Wireless Local Area Networks. When two or more stations come together to communicate with each other, they form a BSS (Basic Service Set). The minimum BSS consists of two stations. WLANs use the BSS as the standard building block.

A BSS that stands alone and is not connected to a base is called an IBSS (Independent Basic Service Set) or is referred to as an Ad-Hoc Network. An Ad-Hoc Network is a network where stations communicate only peer to peer.

When Basic Service Sets are interconnected; the network becomes one with infrastructure. Two or more Basic Service Sets are interconnected using a Distribution System or DS. This concept of DS increases network coverage. Each BSS becomes a component of an extended and larger network. Entry to the DS is accomplished with the use of AP (Access Point). An access point is a station; consequently it is addressable. So, data moves between the BSS and the DS with the help of these access points.

In order to control access to the network, stations must first establish their identities. Once a station has been authenticated, it may then associate itself. The authentication relationship may be between two stations inside an IBSS or to the Access Point of the BSS. There are two types of authentication services offered by WLAN:

- **Open System Authentication.**

This means that anyone who attempts to authenticate will receive authentication.

- **Shared Key Authentication.**

In order to become authenticated the users must be in possession of a shared secret. The shared secret is implemented with the use of the WEP (Wired Equivalent Privacy) privacy algorithm. The shared secret is delivered to all stations ahead of time in some secure method.

Deauthentication is when either the station or AP wishes to terminate a stations authentication. When this happens the station is automatically disassociated. [9]

2.3 Wireless Access Point

One IEEE 802.11 Access Point can typically communicate with 30 client systems within a radius of 100 m. Nevertheless, communication range can vary a lot depending on such variables as indoor or outdoor placement, height above ground, nearby obstructions, type of antenna, the current weather, operating radio frequency, and power output of the device. The range of Wireless Access Point can be extended through the use of repeaters and reflectors, which can bounce or amplify radio signals that ordinarily could not be received. [12]

3. METHODOLOGY

3.1 The Interaction between PDA and Ordering Management System

A PDA in ordering management system at a restaurant is used by a waiter or waitress to:

- take food orders from customers
- send the food orders to the kitchen
- receive notification from the kitchen

- request the order progress information

The orders are sent from the PDA to the PC in kitchen via Wi-Fi.

While in the kitchen there is a PC which is used by a kitchen staff to:

- receive food orders from customers
- give notification to waiter or waitress if the food which the customer ordered is not available or if the food has been cooked

There is also a cash register PC. It is used to:

- update menu
- know the total price that the customer in certain table must pay
- update the table "order" field "status" in the database into "paid"
- create daily sale report

3.2 Use Case Diagram

First Use Case: Connect and Initialize Use Case

- Primary actors: waiter or waitress and kitchen staff
- Precondition: waiter or waitress wants to connect his/her Pocket PC to the Kitchen PC.
- Flow of events:
 - Waiter or waitress tries to establish connection between his or her Pocket PC to kitchen PC via Wi-Fi or WLAN.
 - If the connection succeeds then the Pocket PC can start the initializing with the kitchen PC.

Second Use Case: Order food Use Case

- Primary actors: waiter or waitress and kitchen staff
- Precondition: A waiter or waitress is called by a customer who wants to order food.
- Flow of events:
 - A waiter or waitress receives the food orders from the customers.
 - The waiter or waitress inputs the customer's orders into the Pocket PC.
 - Customer's orders are sent to the kitchen via Wi-Fi.
 - Kitchen staff receives the list of customer's orders in the kitchen computer.
 - The Order List is put in the table "order" and "order-menu" in database.
 - Kitchen staff can see the order in grid.

Third Use Case: Order Verification Use Case

- Primary actors: kitchen staff and waiter or waitress
- Precondition: The food which the customer ordered is not available
- Flow of events:

- Kitchen staff sends notification to the waiter or waitress' PDA that the food which the customer ordered is not available.
- The table "order-menu" field "status" is set into "rejected" in database.
- The waiter or waitress receives the notification.
- The waiter or waitress is capable to inform the customer that the food is not available.

Fourth Use Case: Delivery Notification Use Case

- Primary actors: kitchen staff and waiter or waitress
- Precondition: the food which the customer ordered has finished.
- Flow of events:
 - Kitchen staff sends notification to the waiter or waitress' PDA that the food has finished.
 - The table "order-menu" field "status" is set into "done" in database.
 - The waiter or waitress goes to the kitchen to get the ready food.
 - The waiter or waitress serves the food to the customer.

Fifth Use Case: Check Order Process

- Primary actors: waiter or waitress and Kitchen PC
- Precondition: the customer wants to know what is the progress or status of his order
- Flow of events:
 - The waiter types in the table number.
 - The progress of menu will be retrieved from database via Kitchen PC.

Sixth Use Case: Menu Update Use Case

- Primary actors: cashier, waiter or waitress
- Precondition: there is a need of modification in food menu
- Flow of events:
 - Cashier modifies the food menu.
 - Cashier creates the File Menu.
 - Waiter or waitress gives his or her Pocket PC to the cashier.
 - Cashier copies the File Menu from the Cash Register PC to the waiter or waitress' Pocket PC.

Seventh Use Case: Bill Payment Use Case

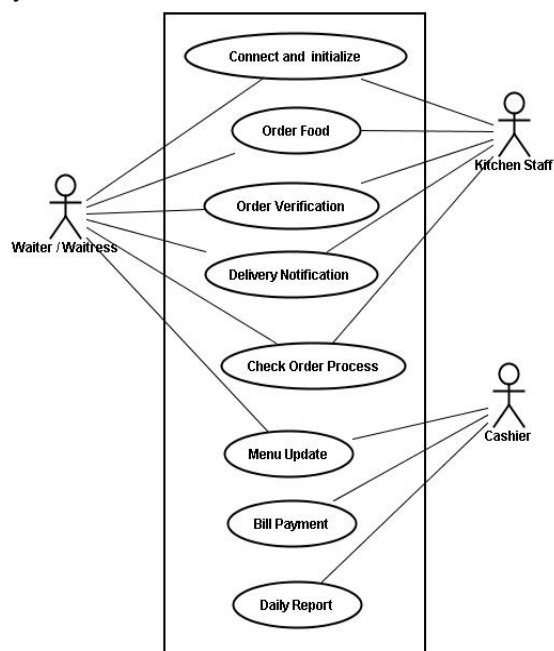
- Primary actor: cashier
- Precondition: the customer wants to pay the bill
- Flow of event:
 - The cashier finds out the amount of bill that the customer in certain table must pay.
 - The customer pays the bill.

- The field "status" in table "order-menu" in the database for the food order that has been paid by the customer is changed into "paid".

Eight Use Case: Daily Report Use Case

- Primary actor: cashier
- Precondition: the cashier wants to view the daily report
- Flow of event:
 - The cashier chooses the date that wants to be viewed the report.

The sale on the specified date can be viewed by the cashier.



3.3 Message Format

The message format for:

- **connecting**
"empid " + empID + ";pass " + empPass
- **ordering**
"*" + table + "*" + MenuID + "*" + Quantity + "*" + MenuName + "*" + AdditionalRequest + "*" + "
- **rejecting**
"msg rjct " + qty + "" + mName + ", " + "table: " + table + ", " + "cause: " + reason
- **telling that the order has been done**
"msg done table: " + table + ", " + qty + "" + mName
- **asking the order progress**
"chk " + tblNum + "*" + "
- **answering the order progress**
"pgr" + " " + cQty + " " + mName + " " + status

4. RESULT

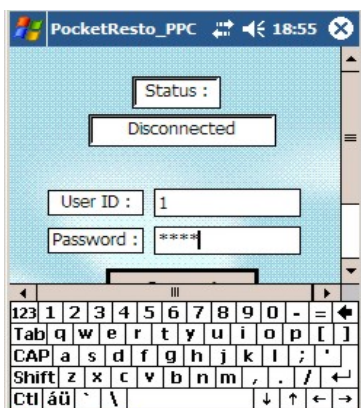
4.1 Pocket PC

Based on the system design, the Pocket PC application is built to be used by the waiter or waitress in a restaurant.

The application in Pocket PC is able to:

- establish connection with the Kitchen PC
- send order to the Kitchen PC
- receive message from the Kitchen PC which informs either the food is not available or is ready
- request information about order progress

4.1.1 Pocket PC Before Connected

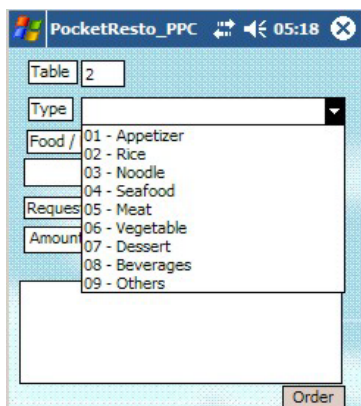


To establish connection the waiter or waitress needs to:

- input the correct user id
- input the correct password
- click the Connect button

In order to be able to input the user ID and password, the virtual keyboard can be used.

4.1.2 Pocket PC Order Dialog Select Food Type

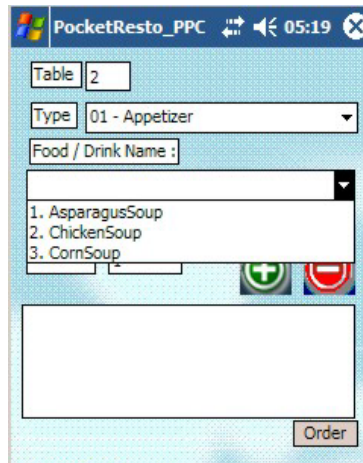


After the connection has been established, the "Order_dialog" can be selected from the toolbar. When the "Order_dialog" is selected, the waiter or waitress can start taking orders.

First the table number needs to be inputted into the text box beside the "Table" text.

After that the type of food can be selected from the combo box beside the "Type" text.

4.1.3 Pocket PC Order Dialog Select Food Name



After the food type is selected, the food name that belongs to the food type can be selected from the combo box below the "Food/ Drink Name" text.

4.1.4 Pocket PC Order Dialog Make Order



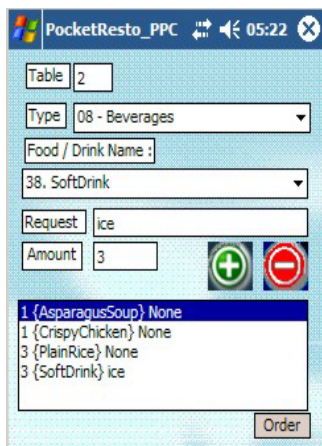
After the food name has been selected, if there is any customer request then it can be inputted in the text box beside the "Request" text.

The amount of ordered food needs to be inputted next to the "Amount" text.

The "+" button needs to be clicked then to add all the order into the list box.

If all of the orders have been inputted into the list box, the "Order" button needs to be clicked to send the orders to the Kitchen PC.

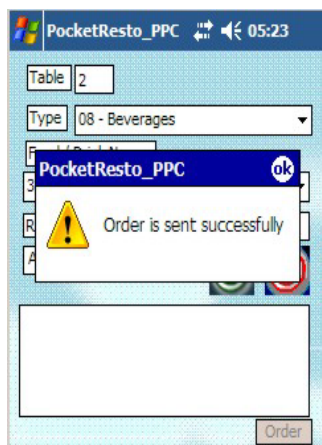
4.1.5 Pocket PC Order Dialog Cancel Order



If there is any order needs to be cancelled, then the order needs to be selected from the list box and after that the “-“button needs to be clicked.

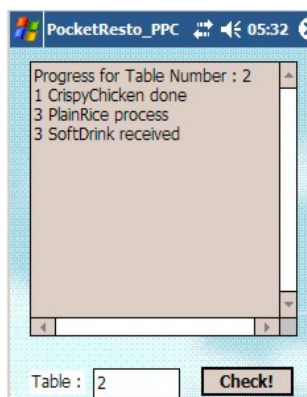
This can be done before the food order has been sent to the Kitchen PC.

4.1.6 Pocket PC Order Dialog Send Order



After the “Order” button has been clicked, all of the orders are sent to the Kitchen PC. If all of the orders are successfully sent to the Kitchen PC, a message dialog will appear to inform that the order is sent successfully.

4.1.7 Pocket PC Progress Dialog



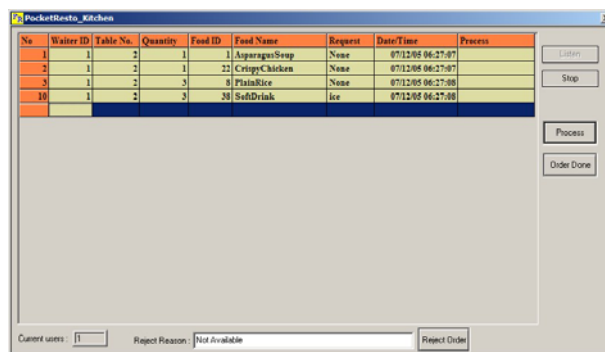
In the progress dialog, the waiter or waitress is able to see the progress of the order of a specified table number.

4.2 Kitchen PC

Based on the system design, the Kitchen PC application is built to be used by the kitchen staff. The application in Pocket PC is able to:

- listen to any incoming connection request from Pocket PC
- send notification to Pocket PC to inform that the food is not available
- mark that the food is going to be processed
- send notification to Pocket PC to inform that the food is ready

4.2.2 Kitchen PC Receive Order



The orders are sent from the Pocket PC to the Kitchen PC and viewed in the flex grid.

If there is any order that can not be served, for example because there is not enough ingredients to cook the food order, the order needs to be selected from the flex grid and then the “Reject Order” button needs to be clicked. A message which informs that the order is not available is sent to the Pocket PC.

If the food is going to be processed, the “Process” button needs to be clicked. This is useful to mark which order is being processed and also if the customer wants to know whether or not his food has been cooked, yet.

If there is any order that is ready to be delivered, the order needs to be selected from the flex grid and then the “Order Done” button needs to be clicked. A message which informs that the order is ready to be delivered is sent to the Pocket PC.

5. CONCLUSION

The objective of this thesis is to build an application in Pocket PC and application in PC (Kitchen PC).

The Pocket PC is used to:

- take orders from the customer and then send it to Kitchen PC
- receive notification from Kitchen PC
- request information about order progress

The Kitchen PC is used to:

- receive the orders
- send messages which informs whether the food is not available or is ready to be served to the customer

For the completeness of a restaurant system, a simple cash register needs to be built. This cash register is used to:

- calculate bill
- update menu
- view daily report

Implementing PDA has several benefits for certain types of restaurants. The benefits compare to restaurant which still using paper:

- No time is wasted for going from tables to the kitchen.
- The customer orders will be well organized.
- Inaccurate orders because of messy handwriting can be avoided.
- The waiter or waitress can know the availability of food that is ordered by the customer quicker.

The benefits which can be gained from implementing PDA as smart client compares to implementing PDA as thin client:

- The client has its own application.
- The server Operating System is undependable.
- Information flows in two way direction.
- The orders which are received by the kitchen are paperless.

The benefits which can be gained from implementing PDA compares to implementing POS:

- Reduce errors which occur because of two times order entry.
- Quick and easy order dispatching.
- Information flows in two way direction.
- More floor space.

6. RECOMMENDATION FOR FUTURE WORK

In view of the fact that there is a limited time to make this thesis, some additional functions in Pocket PC can not be made.

- Each waiter or waitress is able to cancel or edit the customer order that has been sent to the kitchen PC from his or her PDA and has not been cooked, yet.
- Since usually the types of food in restaurant rarely change, they are made static in this thesis. However, there might be a chance that the restaurant wants to change the type of food. So, a dynamic type of food might be needed.

These functions can be developed in the future.

There should be an application for Reception PC which is able to see the condition of the table. There are five conditions of the table:

- occupied
- empty
- has ordered
- has received the order
- has paid the bill

For the Cash Register PC, the functions which should be developed:

- Able to differentiate types of payment, such as cash or using credit card.

There should be also an application for Manager PC which is able to:

- view different kinds of reports
- create a new employee account
- delete existing accounts

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