CENG 490

INITIAL DESIGN REPORT

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Project Name: Sofr@m

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1. Project Scope Definition

1.1 Problem Definition:

We are going to develop and implement a software restaurant automation system that has the following features; stock management, online reservation system, ordering via network enabled handheld computers, customer management, accounting, executive information system, statistical data about sales using graphics and customer profiles.

1.2 Project Scope:

After defining the general concept of the problem definition, it is time to describe the project scope. Our project is going to contain a database, an online reservation, and a bluetooth connection part that will connect the PDAs to the main computer. These three parts are concretized below:

1.2.1 Scope of the Database Part:

Database will hold data about customers, employees, online requests, stock, tables, PDAs, payments of the employees and statistics about sales.

Our database will have stock management support. Ingredients of a meal, how many units are needed for a meal, and quantity of meals that are sold will be hold in the database. The user will know ingredients that are left in his stock in order to control his stock in an efficient way.

In addition to stock management, he can create statistical data (daily, weekly, monthly, etc. sales, most favorite meal of customers, stock situation) and graphical representation of these data by using the related parts of the database model.

Furthermore, online reservations will be held in the database. The user will know the number of reserved tables and what type of meals are ordered by the customers who make an online reservation. Therefore orders of customers will be fulfilled in a rapid way when they come to the restaurant.
Another scope of the database part is that the user can hold customer profiles. So he can know what his customers’ favourite meal are, special infos like birthday that will contribute to the pleasure of the customers.

Besides, employee information such as employee ID, date of employment, salary, employment type, etc. will be kept in the database. Concerning that, the user will know the general information about his employees.

On behalf of these, he can manage his account in accordance with the related data in database. For example, by calculating how much his daily expense and incomes, he can know his daily profit-loss statistics.

1.2.2 Scope of the Online Reservation Part:

Our automation system is going to contain an online reservation part. This part will consist of a web-page and will be in touch with the database part. Customers can see the menu of the restaurant, price of the meals, the unoccupied tables without coming to the restaurant, in their homes, in their offices, etc. As online reservation is in touch with the database part, the user will know what customers’ orders and compare them with his stock situation and can respond customers if their orders will be met or not. These attributes will ease the fulfillment of the customers’ requests so that it is going to be easy to attract the customers’ to the restaurant.

1.2.3 Scope of the Bluetooth Part:

Our system is going to have handheld computers which will be used by waiters to take the customers’ orders. Waiters transfer these orders to the main computer as soon as they take the orders. Then, the main computer transmit these orders to the kitchen. If the ingredients are not sufficient to cook the meal, the kitchen will respond to the main computer and the main computer will transmit this message to the PDA and when the meal is ready, the kitchen will give a signal to the main computer and from there to the PDA so the waiter will understand that the meal is ready. These features are going to make the service in the restaurant faster and reduce the number of mistakes made by the waiters while taking the orders.
As a conclusion, our software is going to quicken the working mechanism in the restaurant. It is going to be easy to take statistical data and graphical representation of these data, to follow stock, reservation, employee situations and customer profiles, to reduce the service time, to increase the service quality.

2. CLASS DIAGRAMS

Here are the class diagrams used in initial design of our project. In the figure below, as it can be seen, Food class is the root abstract class. Other abstract classes namely EdibleMaterials and RawMaterials are derived from Food class. Drinks, Meals and Cereals, Vegetables leaf classes are derived from EdibleMaterials and RawMaterials classes respectively. Here Meals class has a “has-a” relation with Cereals and Vegetables classes. In the similar manner OnlineRequest and RestaurantRequest classes are derived from Request abstract class. Again RestaurantRequest class has a Table and Request class has an Order class. Finally Order class has a “has-a” relation with Drinks and Meals classes.

In the second figure Person is the root abstract class. Waiter and Customer leaf classes are derived from this class. Waiter has Payment class and all Payment, Reservation Statistics and PDA classes have “has-a relation” with Date class. Reservation class has a Table class as well.

It is especially thought to design classes as modular as it can be. In the implementation phase of the project these abstract and root classes are going to be used widely. Carefully designed class diagrams will help a lot in that phase.
Figure 1
Figure 2
3. USE - CASE DIAGRAMS

In the figure below Use-Case diagrams represented at the highest level. As can be seen we have 4 parts mainly. Large rectangles represent system boundary, where out of it there is an actor. Customer, waiter, PDA and cashier are actors, where Online Support, PDA, Kitchen and Cash Desk are the system boundaries.

- **Online Support**
  - Log In
  - Register
  - Log Out

- **PDA**
  - Log In
  - Log Out

- **Cash Desk**
  - Get Table Bill
  - Print Bill
  - Print the End-Of-Day
  - List Orders
  - Show Statistics

- **Kitchen**
  - Update Kitchen Monitor
  - Send Signal

- **Level 0 (Highest Level)**

- **Customer**
- **Waiter**
- **PDA**
- **Cashier**
**Use – Case 1 (Customer - Online Support):** For this Use – Case login action is described as in below figure. Here Customer has to login first, to take an action like Online Reservation, Update Personal Info, View Personal Info or Request Food. Each change in stock or in account results with the update of stock or personal account.
The figures below show registration and log in actions respectively. Log out action results in update of account.
Use – Case 2 (Waiter - PDA): Below action is the log in part of the second Use – Case diagram. Here again to take an action waiter has to log in. Here again Update Personal Info, Check Table Availability, View Personal Info and Receive Signal from Kitchen are main actions to take.
Log out and update kitchen, send signal parts are given below. When meal is ready, some signal is generated in the kitchen and send to the PDA.
Use – Case 3 (PDA – Cash Desk – Cashier): In this Use - Case there are 2 main actors, PDA and Cashier namely. The only action that PDA participates in is Get Table Bill. Cashier’s actions are Print Bill, Print the End-Of-Day, List Order and Show Statistics.
4. COLLABORATION DIAGRAMS

Take Order(Waiter)
Waiter logs in to PDA and takes order if it is available, after this the order added to Active Orderlist.

Cancel Order(Waiter)
Waiter logs in to PDA and sends cancel the order signal, after this the canceled order removed from Active OrderList.

View Personel Info(Waiter)
Waiter logs in to PDA and requests view info, after this Personel Account System shows the info.

Update Personel Info(Waiter)
Waiter logs in to PDA and requests update info, after this Personel Account System loads his profile, he makes changes in his profile and requests save, the request replied by Personel Account System as updating the profile.

Open && Send Bill of Table(Waiter)
Waiter logs in to PDA and requests open new table, the table is selected from tables and marked as “busy”. If another table need to be served, waiter can select it from tables and can service. Besides these, if bill request came from costumers, he sends the bill to cash-desk.

Process in Kitchen(PDA)
When order comes to kitchen, it is displayed on the kitchen monitor. Cook prepares the order and sends order is ready signal.

Registration(Customer)
Customer enters to webservice and requests sign up, Personel Account System replies to request and creates new account.
Online Reservation (Customer)
Customer logs in, selects his/her table from list and sends reserve signal, the request is replied from tables and it returns a result to customer. If the result is positive, table is assigned to customer and changes its status to reserved for a time interval.

Update Personel Info (Customer)
Customer logs in, requests change info, Personel Account System saves the changes.

View Personel Info (Customer)
Customer logs in, requests view info, Personel Account System replies to request and shows the info.

Request Food (Customer)
Customer logs in, requests food (at this time menu is listed and user selects from list). His/her request puts in a queue and checked in the stock. If it is available, a positive reply is given and enqueued to Active Order List.

Create Bill (PDA)
PDA sends bill request of a table with an ID, the request puts in a queue (BillList). Bill List sends bills to printer via cash-desk in a loop.

Get End Of Day (Cash-Desk)
Cash-Desk logs in and requests get end of day, the request is handled by Passive Orders List. It sends bills to executive system. It executes and produces a result. The result is sent to printer.

List Orders (Cash-Desk)
Cash-Desk logs in and requests list orders, the request is handled by Active Orders List. It shows orders on the monitor.

Generate Statistics (Cash-Desk)
Cash-Desk logs in and requests generate statistics, the request is handled by statistics class. It takes the orders from Passive Order List, generate statistics and show them on the monitor.
**Waiter**

1. **ID/Password** →
2. **Add Order** →
3. **Cancel Order** →

**PDA User Interface**

1. **Check the User** →
2. **Update Active Orders** →
3. **Order Ready Signal** →

**Security Login System**

**Personal Accounts System**

**Orders**

**Active Orders**

**Kitchen**

**Orders**

**Active Orders**

**Orders**

**Active Orders**
(1) ID/Password

(1.1) Check the User

(2) View Personal Info

(2.1) View Personal Info

(1.2) Personal Info

(1.3) Load Accounts

Personal Accounts Systems

(2) Update Personal Info

(2.1) Update Personal Info

(1.2) Personal Info

(1.3) Load Accounts

Personal Accounts Systems

VIEW PERSONAL INFO

UPDATE PERSONAL INFO
(1) ID/Password → (4) Send Bill →

(1.1) Check the User →

(2) Open New Table →

(3) Select a Table →

(2.1) New Table →

(3.1) Selected Table →

(4) Send Bill →

(2.1) New Table →

(1.1) User Account →

Cash Desk → Tables → Security Login System → Personal Accounts Systems

Waiter → PDA User Interface

Open & Send Bill of Table

Process in Kitchen

PDA → Kitchen

(1) New Order →

(2) Order Ready Signal →

(1) User Account →

Kitchen Monitor
5. SEQUENCE DIAGRAMS

ID/Password → Check the User → Reserve a table → Check ID/Password → Reserve table → Look up Table → Result → Look for availability → Reserved
VIEW PERSONAL INFO (online)

Customer > User Interface > Security Login System > Personal Accounts System

ID/Password > Check for User > Check ID/Password > Load Account > Load Personal Account

Request Personal Info > Display Personal Info

Personal Info
Fill the Form

Check the Form

Register

Registration Info

Registration(online)
6. GANTT-CHART DIAGRAM

| ID | Task Name               | Start  | Finish  | Duration | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|----|-------------------------|--------|---------|----------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 1  | Database Design         | 01.12.2004 | 09.12.2004 | 7d       |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |