Lab Report for Software Engineering course
Lab 6: Demand Documentation

Wang, Chen   Liu, Jiaxing   Huang, Jiani   Tang, Xinyue
16307110064   17302010049   17302010063   16307110476
School of Software
Fudan University

June 22, 2019

Contents

Chapter 1

Revision History of the demand documentation

Modifier	Modify Time	Approver	Modified Chapter
Huang Jiani	2019-6-19	All	Refined Function Requirements

Chapter 2

Project Outline

2.1 Background information of the project

Now some customers come here to make a request to Star Dad, and hope that the development team can develop a beverage online sales system according to the needs of customers. Now you need to carry out the basic arrangement and rational understanding of the customer's needs (which are specified more clearly in the next section), communicate with the customer, conduct line analysis and refinement, and guide the development of the development team.

2.1.1 General demands of the project

There are two specific restrictions or conditions about the project:

1. Number of users: 1000 people / day

2. Budget: 1 million yuan

2.2 Overview of the features of the project

2.2.1 Beverage Store

The beverage store should have the following functions:

1. Drink support: The system can support a variety of drinks from the beverage store;

2. Ingredient support: The system can support the diverse ingredients offered by the beverage store;

3. Cup support: The system can support the variety of cups offered by the beverage store;

4. Preferential support: The system can support the various discounts offered by the beverage store. Currently, the discounts offered by the beverage store are as follows (these offers have certain superposition and mutual exclusion):

- 20% off 2 cups of espresso
- Tea buy 3 get 1 free
- Cappuccino 2nd Cup Half Price
- All items 30 yuan deduction over 100 yuan
- 50% off on Nov 11th
- 15% off for tea and coffee

5. Language support: The system can support the switching of different languages in different regions of the beverage store;

6. Currency support: The system can support the conversion of different currencies in different regions of the beverage store;

7. Pricing support: The system is priced according to the regulations of the beverage store.

General requirements: This system should support the beverages offered and launched by the beverage store, a variety of ingredients, these drinks have different cup types, of course, in order to sell, the system also needs to support a variety of preferential strategies launched by the beverage store, while In order to develop internationally, the system must support switching between different languages and currency conversion. Finally, the pricing of all goods must be strictly in accordance with the regulations of the beverage store.

2.2.2 Salesperson

The salesperson should have the following functions:

1. Registration: The salesperson can register in the system with a valid account password;

2. Login: The salesperson can log in using the account number and password to ensure the daily operation of the salesperson;

3. Matching: The salesperson can use the system with different drinks when they have permission;

4. Description: The salesperson can use the system to obtain a description of the different beverages when they have permission;

5. Valuation: The salesperson can use the system to place orders when they have permission. After the order is placed, the price of different beverages can be calculated. The price of the beverage depends on the base price of the beverage, the price of the cup of the beverage, the price of the additional ingredients, and also consider the number of drinks. And a variety of preferential strategies.

General requirements: This system must support the salesperson to perform daily operations after obtaining the permission, including registration, registration, beverage matching, description acquisition and order placement. These daily operations must comply with the company's legal requirements. In addition, the system also needs to provide according to company regulations. Pricing function, these operations are convenient for the day-to-day operation of the salesperson.

2.2.3 Development and operation personnel

The development and operation personnel should have the following functions:

1. Background maintenance: Maintenance personnel can configure and maintain various support such as drinks, ingredients, cups, offers, language, currency, pricing, etc. in the background according to company regulations;

2. Log information: The maintenance personnel need the log information provided by the system during maintenance.

3. Support the use of a large number of stores concurrently

4. The system should be stable for a long time

General requirements: Development and operation and maintenance personnel can perform system background maintenance according to company regulations, and provide standardized log information during system operation.

2.2.4 Beverage shop customer

The beverage shop customer should have the following functions:

1. Matching: The order can be matched by the salesperson;

2. Pricing: You can see the price of the order;

3. Offer: Customers want the bigger the better, the better!

4. Description: You can see a description of the different beverages, a detailed description of the beverage price, and a specific description of the specifications used.

General requirements: The customer mainly performs system operation through the salesperson. The customer cares that the system can match the beverage that he wants, and at the same time needs to see the correct price and specific description. Of course, the customer wants the bigger the better.

2.3 Module division of the project

According to the demands of the project, the project can be divided into the following divisions: the account services division, order controller division, the beverage repository implementation division and the utility tools division.

The detailed description of the divisions will be discussed in the consequent chapters.

2.4 User characteristics of the project

There are three different users having relationship with this project.

2.4.1 Beverage shop customers

The beverage shop customers are the customers coming to the beverage shop and wish to buy beverage.

2.4.2 Salesperson

The salesperson are the workers in the beverage shop who help the customers place orders, charge the customers and provide beverages to the customers.

2.4.3 Development and operation personnel

The development and operation personnel are the developers of the system who are in charge of the future maintenance of the system. They will read the log info, organize databases and modify the application in response of the future demand changes.

2.5 Run time environment

There is no obvious runtime environment restriction of the application both in the back end and in the front end.

After analysis of the market, the needs and demands, and the performance of the application, we have decided to use the following runtime environment as our production.

2.5.1 Server side runtime environment

After thorough research about the server providers, we have decided to adopt the DELL Workstation as the server to proved service. As have stated above, there are about 1,000 customers coming to a store a day and there are 200 stores in total. However, what the distribution of customer flow over time is not given and according to the description from the teaching assistants, we can see the statistics above as the average customer flow to the store. In this way, every hour there might be 200,000 order requests, indicating that the server should handle at least 50 requests a second. We have found that the Dell OptiPlex 7050 with 3.6GHz Core i7-7700 CPU meet these demands well, whose 8 cores and 8MB cache will make request handling rapidly.

The price for the DELL OptiPlex 7050 with the specification below will be about $700 and it is well within our budgets.

SYSTEM INFORMATION

Running Ubuntu Linux, the Ubuntu 18.04 (bionic) release.

- GNOME: 3.28.2 (Ubuntu)

- Kernel version: 4.15.0-36-generic (#39-Ubuntu SMP Mon Sep 24 16:19:09 UTC 2018)

- GCC: 7 (x86_64-linux-gnu)

- Xorg: unknown

- Hostname: wangchen-OptiPlex-7050-China-HDD-Protection

- Uptime: 0 days 0 h 12 min

CPU INFORMATION

- GenuineIntel, Intel(R) Core(TM) i7-7700 CPU @ 3.60GHz

- Number of CPUs: 8

- CPU clock currently at 799.996 MHz with 8192 KB cache

- Numbering: family(6) model(158) stepping(9)

- Bogomips: 7200.00

MEMORY INFORMATION

- Total memory: 7854 MB

- Total swap: 2047 MB

STORAGE INFORMATION

- SCSI device - scsi0

  - Vendor: ATA
  - Model: ST1000DM003-1SB1

HARDWARE INFORMATION

- MOTHERBOARD

  - Host bridge
    * Intel Corporation Intel Kaby Lake Host Bridge (rev 05)
    * Subsystem: Dell Intel Kaby Lake Host Bridge
  - PCI bridge(s)
    * Intel Corporation 200 Series PCH PCI Express Root Port #4 (rev f0) (prog-if 00 [Normal decode])
    * Texas Instruments XIO2001 PCI Express-to-PCI Bridge (prog-if 00 [Normal decode])
  - ISA bridge
    * Intel Corporation 200 Series PCH LPC Controller (Q270)
    * Subsystem: Dell 200 Series PCH LPC Controller (Q270)

- GRAPHIC CARD

  - VGA controller
    * Intel Corporation HD Graphics 630 (rev 04) (prog-if 00 [VGA controller])
    * Subsystem: Dell HD Graphics 630

- SOUND CARD

  - Multimedia controller

    * Intel Corporation 200 Series PCH HD Audio
    * Subsystem: Dell 200 Series PCH HD Audio

- NETWORK

  - Ethernet controller

    * Intel Corporation Ethernet Connection (5) I219-LM
    * Subsystem: Dell Ethernet Connection (5) I219-LM

2.5.2 Client side runtime environment

The client side needs to be connected to the Internet, have a display and input devices where the staff can create specific requests. After research, we have found that the Lenovo Laptop Xiaoxin Air 13 Pro well meet the demands. The price for the laptop is $1,000 for new and the old one has a price of $400, which is well within the budget. The detailed configuration for the client side computer is shown as below.

SYSTEM INFORMATION

- Running Ubuntu Linux, the Ubuntu 18.04 (bionic) release.

- GNOME: 3.28.2 (Ubuntu)

- Kernel version: 4.15.0-36-generic (#39-Ubuntu SMP Mon Sep 24 16:19:09 UTC 2018)

- GCC: 7 (x86_64-linux-gnu)

- Xorg: unknown

- Hostname: straybird-Lenovo-XiaoXin-Air-13-Pro

- Uptime: 0 days 0 h 18 min

CPU INFORMATION

- GenuineIntel, Intel(R) Core(TM) i7-6500U CPU @ 2.50GHz

- Number of CPUs: 4

- CPU clock currently at 1000.010 MHz with 4096 KB cache

- Numbering: family(6) model(78) stepping(3)

- Bogomips: 5184.00

MEMORY INFORMATION

- Total memory: 7859 MB

- Total swap: 947 MB

HARDWARE INFORMATION

- MOTHERBOARD

  - Host bridge
    * Intel Corporation Skylake Host Bridge/DRAM Registers (rev 08)
    * Subsystem: Lenovo Xeon E3-1200 v5/E3-1500 v5/6th Gen Core Processor Host Bridge/DRAM Registers

  - PCI bridge(s)
    * Intel Corporation Sunrise Point-LP PCI Express Root Port (rev f1) (prog-if 00 [Normal decode])
    * Intel Corporation Sunrise Point-LP PCI Express Root Port #5 (rev f1) (prog-if 00 [Normal decode])
    * Intel Corporation Sunrise Point-LP PCI Express Root Port #9 (rev f1) (prog-if 00 [Normal decode])
    * Intel Corporation Sunrise Point-LP PCI Express Root Port (rev f1) (prog-if 00 [Normal decode])

  - ISA bridge
    * Intel Corporation Sunrise Point-LP LPC Controller (rev 21)
    * Subsystem: Lenovo Sunrise Point-LP LPC Controller

- GRAPHIC CARD

  - VGA controller
    * Intel Corporation HD Graphics 520 (rev 07) (prog-if 00 [VGA controller])
    * Subsystem: Lenovo Skylake GT2 [HD Graphics 520]

- SOUND CARD

  - Multimedia controller
    * Intel Corporation Sunrise Point-LP HD Audio (rev 21)
    * Subsystem: Lenovo Sunrise Point-LP HD Audio

- NETWORK

  - Network controller
    * Intel Corporation Dual Band Wireless-AC 3165 Plus Bluetooth (rev 99)
    * Subsystem: Intel Corporation Dual Band Wireless-AC 3165 Plus Bluetooth

2.6 Conditions and restrictions

While deploying the project, the project team should care about the budget and meet all the demands stated above. Furthermore, local laws and company regulations should also be adhered to.

The team should adopt satisfied hardware system for the project implementation, while all the hardware resources are within the specified budget.

Nevertheless, the application should have the basic ability of attacker defense, blocking potential risks from the Internet and make sure that our system will not break down because of the attacks. Specifically, the order system should not be destroyed to avoid company loss.

Chapter 3

Feature Demands

3.1 Refined function requirements

According to the interview record of the lab assigner, the whole system should satisfy the requirements in the following perspectives:

3.1.1 Register

1. Any shop assistant can use the unique username and password to register.

2. The username will be persistently recorded in the user.csv after the shop assistant registers.

3. The username must start with **starbb_**;

4. The username can consist of **letters**, **numbers** and **underline**, excluding any other symbols;

5. The username should have a length greater than or equal to 8 and less than 50.

6. The password can consist of **letters**, **numbers** and _, excluding any other symbols;

7. The password must consist of all the three types, i.e. **letters**, **numbers** and _, excluding any other symbols;

8. The password should have a length greater than or equal to 8 and less than 100.

3.1.2 Login

1. Only if the shop assistant logs in successfully can he do the other normal routines including matching drinks, getting drink descriptions and ordering.

2. Anyone except shop assistants is unauthorized to the administration access.

3. The shop assistant will log in successfully if and only if the username and password are matched.

4. The login status will be recorded after the shop assistant logs in successfully.

5. If the shop assistant fails to log in, the system will throw a runtime exception to prompt the failed login.

6. If the shop assistant fails to log in because of wrong password, the system will prompt **Username or password error**;

7. If the shop assistant fails to log in, he will not allowed to conduct any other operations.

3.1.3 Matching beverages

1. The shop assistant can get different drinks considering different cup sizes and different kinds and numbers of ingredients.

3.1.4 Obtaining beverage descriptions

1. The shop assistant can obtain and check different descriptions of beverages.

2. The customer can obtain and check different descriptions of beverages.

3.1.5 Order charge calculation

1. The shop assistant can order according to the verbal instructions of the customer.

2. The shop assistant can calculate the order charge including the original price, discount and the total discount charge.

3. The customer can check the order charge including the original price, discount and the total discount charge.

3.1.6 Beverage supported

1. The default beverages include coffee and tea.

2. The default coffee includes Espresso and Cappuccino.

3. The default tea includes GreenTea and RedTea.

4. Different stores can customize their own beverages of local characteristics.

5. Every beverage should have attributes of its name, price and description(?).

3.1.7 Ingredients supported

1. The default ingredients include milk, chocolate, cream and sugar.

2. The prices of ingredients can be fixed by the maintenance personnel.

3. Different kinds and numbers of Ingredients can be added .

3.1.8 Cup size supported

1. There are totally three kinds of cup size : large, middle and small.

3.1.9 Discount supported

1. There are three categories of discount strategies in total : Double eleven, Full count and Combination.

2. Combination strategy has four concrete strategies.

3. The concrete strategies can have superposition.

4. Different categories of discount strategies cannot have superposition.

    (a) Order including both tea and coffee will have 15% discount.
    (b) 2 cups of Large-cup Espresso will have 20% off discount.
    (c) Buying three cups of tea will send one for free.
    (d) Cappuccino second half price.

5. Full count: All drinks full 100 minus 30

6. Double Eleven: All drinks 50% off.

3.1.10 Language switch

1. The system language can be switched to the official language of different countries and regions.

2. The language switch should cover everywhere customers can see and check.

3. The default supported languages are Chinese and English.

4. Before the shop assistant makes an order, he can switch the language to satisfy the requirements of customers.

3.1.11 Currency switch

1. The currency switch will not consider exchange rate fluctuations.

2. The currency should be switched according to different countries and regions.

3. The default supported currencies are Chinese Yuan, Hong Kong dollar and US dollar.

4. Before the shop assistant makes an order, he can switch the currency to satisfy the requirements of customers.

3.1.12 Price fix

1. The maintenance personnel can fix the prices of all the items according to the regulations of the company.

3.1.13 Configuration and Maintenance

1. The maintenance personnel can configure and maintain all the settings including drinks, ingredients, cup-size, discount, language, currency and price-fixing.

2. The maintenance personnel should maintain two log files including the information of order errors and successful order cases.

3.1.14 Log information supported

1. The system must provide log information for the maintenance personnel.

2. The log information must include records of order errors and successful order cases.

3. The order error file should include the order id and the error information.

4. The order success file should include the order id and payment information.

5. The order id recorded in the files should be unique in the system.

3.2 Detailed description of refined function requirements

3.2.1 Scenario analysis and modeling

We apply the use case diagram to the scenario analysis and modeling procedure. As the diagram shows, there are two actors including customers and shop assistants and the online system in the whole interaction. Ordering and register are the two main use cases. Several sub use cases of ordering like beverage information checking, beverage matching, beverage price calculating, language and currency switch. And All these use cases include the smaller login user case.

Use case 1: Ordering

In this use-case, we apply the swim lane diagram to concisely describe the relationship between users and the system.

- **Use-case name:** ordering

- **Actors:** customers and shop assistants

- **Target:** The shop assistant can complete the order-making process according to the verbal instruction of customers.

- **Precondition:** The shop assistant has registered before.

- **Triggering condition:** There is a customer waiting to order in the store.
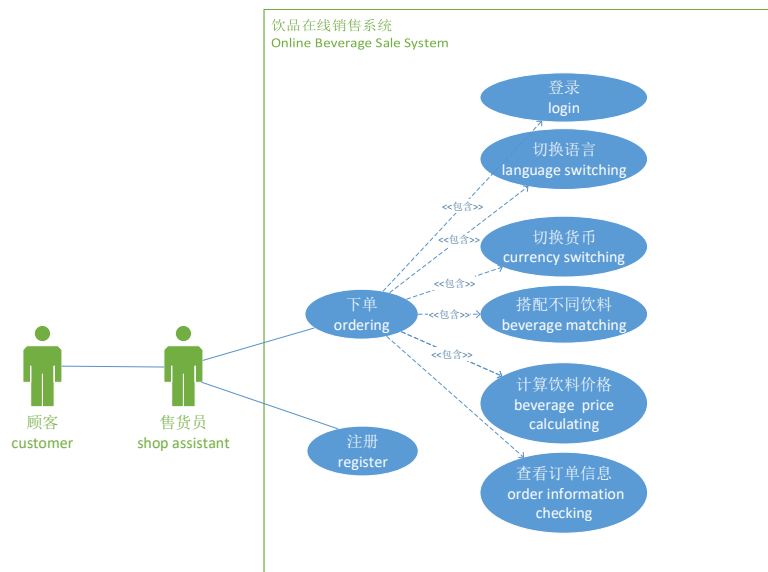
Figure 3.1: Overall Use-case Diagram
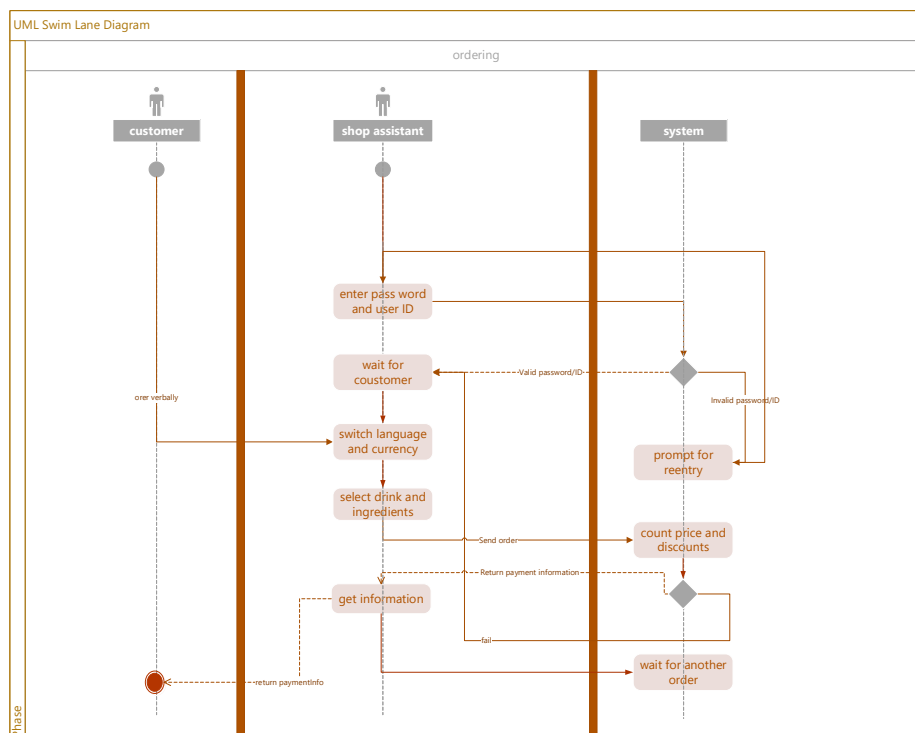
Figure 3.2: UML Swim Lane Diagram
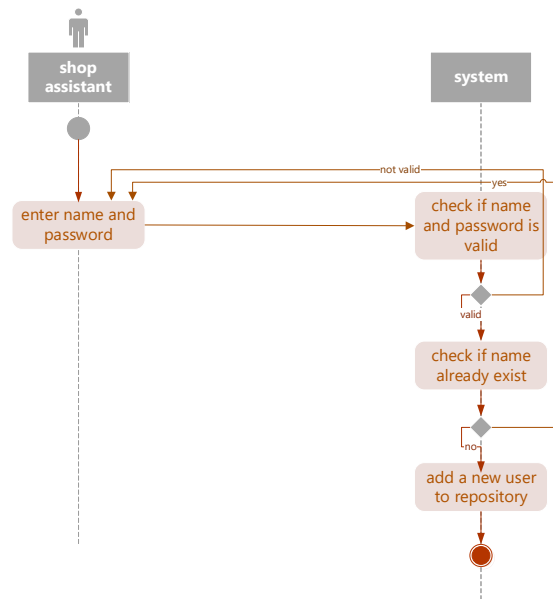
Figure 3.3: Overall Use-case Diagram

- **Main scene:** After the shop assistant logs in the system successfully, he/she waits for the verbal instructions of the customer. After the customer tells him/her the wanted cup-size, ingredients and kind of beverages, the shop assistant can make an ordering, and tells the customer the total price, discounted price and discount information of the order. After the customer has paid the charge, the order is finished and the system will be waiting for another order.

- **Abnormal scenes:**

  1. **Login failure:** If the shop assistant enters wrong username or password, he can get the chance to enter again until he finally enters the correct username and password and logs in the system.

  2. **Order failure:** If the order process is interrupted due to the internet or other hardware break, the order process will restart a new order.

- **Frequency:** The ordering use-case will be continuing 24 hours a day only if there is a customer waiting to order.

Use case 2: Register

In the ordering user-case, we apply the activity diagram to describe the whole process.

- **Use-case name:** register

- **Actors:** shop assistants

- **Target:** The shop assistant can complete the register process.

- **Precondition:**

    1. The server of the system is running normally.

- **Triggering condition:** None

- **Main scene:** After the shop assistant gains the access authorization successfully, he can enter the system to choose login or register. After he enters the valid username and password, he can use them to login and make orders.

- **Abnormal scenes:**

    1. **Password invalid:** If the shop assistant enters invalid password, the system will prompt corresponding message and let the user enter again untill he enters the valid password.

    2. **Username invalid:** If the shop assistant enters invalid username, the system will prompt corresponding message and let the user enter again until he enters the valid username.

- **Frequency:** Relatively low, since only when there is new and unregistered shop assistant will it be triggered. However, the register use-case should be available 24 hours a day.

3.2.2   Class analysis and modeling

Analysis class extraction

- User

- AccountService

- OrderItem

- Order

- PaymentInfo

- OrderService

- MarketingStrategy

- DoubleElevenStrategy

- FullDiscountStrategy

- CombinationDiscountStrategy

- LanguageService

- MenuService

Function of classes

- **User :** The entity class represents shop assistants. There are two attributes: name and password.

- **AccountService :** The service class is charge of the login, signup, status-checking, name-checking and password-checking of users.

- **OrderItem :** The entity class represents beverages. There are three attributes: name, size and ingredients. Also, it has a public method to calculate the price according to its size and ingredients.

- **Order :** The DTO class is used to transfer data from server to client end. There are three attributes: id, currency and orderItems. Also, it has a public method to calculate the total charge of the order.

- **PaymentInfo :** The class is composed of all the return information of the order, including price, discount, discountPrice and messages.

- **OrderService :** The service class includes one attribute strategies and one public method pay.

- **MarketingStrategy :** The strategy class include one public method getDiscount. And all the sub strategy classes including DoubleEleven-Strategy, FullDiscountStrategy and CombinationDiscountStrategy inherit it.

- **LanguageService :** The service class has one public method updateLanguage.

- **MenuService :** The service class has one public method getPrice according to different countries and regions.

Relationship between classes

As the UML diagram shows, the relationships in this system can be divided into three kinds: inheritance, composition and dependency.

3.2.3   Data Flow analysis and modeling

We apply the DFD(data flow diagram) to describe the flow of the input data and output data. We

level 0:

The top/level-0 diagram is an overall description of the whole system. The external entity are only control panel and control panel display. The data flow diagram for level 0 is shown as Figure 3.5.

level 1:

3.2.4   Behavior analysis and modeling

In this part, we apply the UML status diagram to conduct the behavior analysis and modeling.
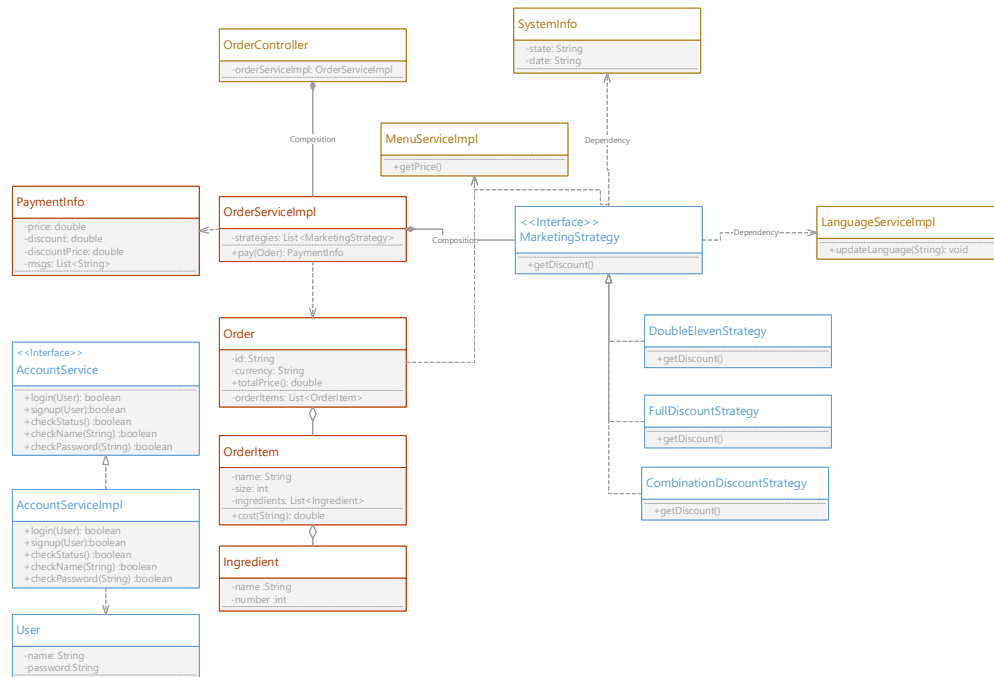
Figure 3.4: Overall UML Class Diagram

Figure 3.5: Data Flow Level 0 Diagram
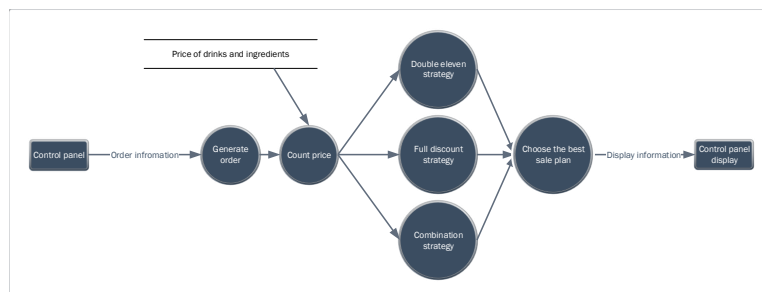
Figure 3.6: Data Flow Level 1 Diagram
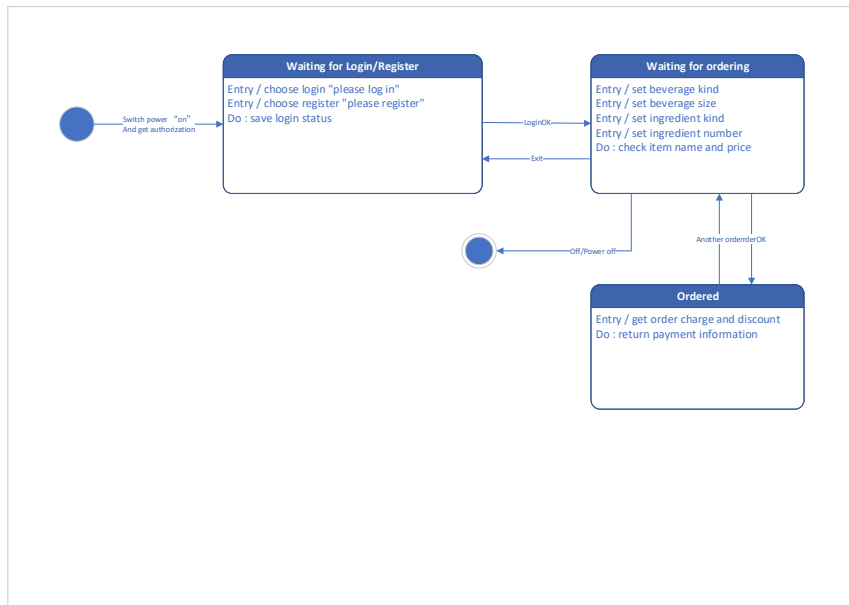
Figure 3.7: UML Status Diagram

Whole status transfer

Chapter 4

Performance Demands

4.1 Massive end user support

4.1.1 Detailed Description

There will be about 200 stores using this system at the same time. And the sale scale will be about 1000 people per day. The people using this system includes customers and shop assistants.

4.1.2 Proposed measures

Since the system will be built on several servers, the strategies like load balancing can be used to handle the big amount of customers.

4.2 Stability over long period of time

4.2.1 Detailed Description

Since the store will be open 24 hours a day, the system must be running all the time and at least maintained evert half a year. Also, the response time of every order should be less than 2 seconds.

4.2.2 Proposed measures

This requires that the system should not stop or exit by accident at any time. We should handle all the possible accidents and catch the exceptions. And we should try every means to enhance the speed of the system.

Chapter 5

Appendix

5.1 Demand interview outline

5.1.1 Constraints (5 minutes)

1. What is the number of servers?

2. Is there a regulation or limitation on the system running server-side operating system?

3. What are the rules or restrictions for the client device operating system (in the store)?

4. Is the salesperson's computer equipped with a screen for the customers?

5. Are there still any other special hardware conditions (supplementary)?

6. Does the company have specific legal restrictions?

7. The development time and delivery time points given?

8. Is there an intermediate time frame when partial project need to be examined?

5.1.2 Performance requirements (5 minutes)

1. Is 1,000 person/day referring to the salesperson or the customer (personal * month) ? What is the upper limit?

2. What is the number of the stores in the description "Support the usage of massive stores concurrently"? What is the average number of orders in the store? And what about the peak order number?

3. Order response time?

4. "Long-running and stable support system": the requirements for a client front end and user-friendliness, cannot be unable to play due to any reason except network or hardware issues, cannot crash under massive clients, cannot have severe bug after online

5.1.3 Functional requirements(15 minutes)

1. Drinks, ingredients, cups in the beverage store supported by the system

2. Superposition and mutual exclusion of offers

3. Language, currency, pricing

4. Register & log in

5. Order versus Associate / independent with drinks, price, and description?

6. What the customer sees: the information returned in the order content and paymentInfo , including the beverage, original price, discounted price, discount information (whether it is necessary to specify the description of each beverage)

7. How the salesperson gets permission

8. Log information provided by the system

9. Process confirmation again

5.1.4 Possible modification of the code

1. Increase currency dollar

2. Salesperson access

3. Offer modification

4. View all aspects of drinks and ingredients (cup type, price) individual customer / salesperson interface

5.1.5 About the requirements document

1. "Give a corresponding map and explanation for each demand"

5.2 Organized interview records

5.2.1 Constraints (5 minutes)

1. What is the number of servers?

   There are 200 stores belonging to the company, each will treat 1000 customers each day.

   The 1000 customers is a approximate number. It is a non-functional restriction and this might influence another function - the order number, which should be unique considering the order number stated below.

2. Is there a regulation or limitation on the system running server-side operating system?

   The infrastructure of the system has no restriction and should be purchased. We should consider the budget while considering the hardware specifications.

3. What are the rules or restrictions for the client device operating system (in the store)?

   The infrastructure of the system has no restriction and should be purchased. We should consider the budget while considering the hardware specifications.

4. Is the salesperson's computer equipped with a screen for the customers?

   Yes.

5. Are there still any other special hardware conditions (supplementary)?

   No.

6. Does the company have specific legal restrictions?

   The salesperson should not have access to the modification of the price of the drinks.

7. The development time and delivery time points given?

   The project should be finished in 2 months.

8. Is there an intermediate time frame when partial project need to be examined?

   No.

5.2.2   Performance requirements (5 minutes)

1. Is 1,000 person/day referring to the salesperson or the customer (personal * month) ? What is the upper limit?

   The 1000 customers is a approximate number. It is a non-functional restriction and this might influence another function - the order number, which should be unique considering the order number stated below.

   The upper limit will not be too greater than the general expectation above.

2. What is the number of the stores in the description "Support the usage of massive stores concurrently"? What is the average number of orders in the store? And what about the peak order number?

   The system should support the service with the customer number stated above. The average number is the customer number stated above and the peak number will not be too much greater than the average number.

3. Order response time?

   The response time is 2 seconds for each order. It means from the order successfully created in the front end to the result of the order from the back end sent to the front end.

4. "Long-running and stable support system ": the requirements for a client front end and user-friendliness, cannot be unable to play due to any reason except network or hardware issues, cannot crash under massive clients, cannot have severe bug after online

The system should run 24 hours a day and should not break down because of the program rather than physical problems. If an order is interrupted because of the network issues, the system can simply discard the order information.

5.2.3 Functional requirements(15 minutes)

1. Drinks, ingredients, cups in the beverage store supported by the system

   The drinks provided currently are coffee and tea, where coffee includes Cappuccino and Espresso and tea includes Red Tea and Green Tea. The ingredients includes chocolate and cream while the cup size vary from small cup, the middle cup to the large cup.

2. Superposition and mutual exclusion of offers

   The first three offers and the last offers are superposition offers, while the full discount offer and the double eleven offer are different.

3. Language, currency, pricing

   The price is different for each currency and we need to provide a price table for each of the currency we provide. In the meanwhile, we still need to provide a description for each item on the menu in each language we provide. That is to say, the menu should have versions according to the languages.

   These information are available after the order in the system. The order placing operation includes generating these information.

   In addition, the US Dollar is added into the system while the languages provided remain the same.

4. Register & log in

   The detailed specification for the register and log in function are the same as Lab 3, and the requirement documentation for Lab 3 can be referred.

5. Order versus Associate / independent with drinks, price, and description?

6. What the customer sees: the information returned in the order content and paymentInfo , including the beverage, original price, discounted price, discount information (whether it is necessary to specify the description of each beverage)

   The customer can place order via the staff and what the customer interact with the system is not considered.

7. How the salesperson gets permission

   A valid log in operation should enable the salesperson with permission.

8. Log information provided by the system

   The log information have two parts. There is an error log and a info log. When there is an error when placing the order, the order number should be recorded in the log whereas the order number is neglected when the error is not generated in the process of placing an order.

The language of the log should be English and it should be independent of the language switch of the application.

9. Process confirmation again

   The process of the order is confirmed and remain the same as the previous lab requirements.

5.2.4   Possible modification of the code

1. Add the US Dollar currency

2. Restrict the salesperson access

3. Offer modification

4. View all aspects of drinks and ingredients (cup type, price) individual customer / salesperson interface

5.2.5   About the requirements document

1. "Give a corresponding map and explanation for each demand"

5.3   Code change logs in response of new demands

Bibliography

[1] Wikipedia contributors. (2019, March 22). JUnit. In *Wikipedia, The Free Encyclopedia.* Retrieved 14:53, April 1, 2019, from `https://en.wikipedia.org/w/index.php?title=JUnit&oldid=888928403`