Hong Kong Institute of Vocational Education (ST)
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Final Report

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Group No. 4

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Abstract

A great company depend on a right management system. As a long history of SLMC, an old management system cannot fulfill the requirement in our industry. Inflexible ordering function, non-comprehensive inventory system, manually work for dispatch instruction and complicated invoice system. These problems are commonly finding out from our company.

These struggles become a resistance to improve our company. Stop moving forward and we will fall back. It seems lack of motivation to change all the existing operation on company. But company actually look down the uncountable benefit or profit after upgrading whole system for our company. According to a consultation form consultant, upgrade our computer system become an urgent task.

The new system is introduced for improving our working efficiency on difference aspects. It reduces manual work, simplify documentation, and centralized data control.

It is expected that the new system can make a better use of human resources. By providing a more comprehensive service, our customer can enjoy a better customer service. It brings us more business opportunities. Increase the market share just around the corner.

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1. Introduction

A brand-new system -- Order Management System.

SLMC(Spare), a company which is assembling and distributing spare parts to its leading parent company - SLMC. Since 1970, SLMC is settle in Peoples' Republic of China (PRC) which have over 50,000 retail stores cover the PRC. As a time go on, after reform and opening-up A big market is raising in China since 1990. SLMC seem cannot afford for the huge demand of orders. Ununified database and manually process put off the whole of the company. By the suggestion of consultant, upgrade the computer system is needed.

Consequently, we now suggest by using a new management system by providing 4 main types of functions (Ordering Process, Inventory, Despatch Process and Invoicing) to replace the old system of SLMC.

Ordering Process

For the old system of SLMC, order function is inflexible. Deals usually not able to answer customer enquiry since the non-transparent file-based system. Also, order keep track by human hand. Delay despatch of order has become a common circumstance. The system provide flexible order function can solve above problems.

Inventory

Inventory function is not comprehensive of SLMC. The old system cannot search the stock record, cannot provide an insufficient alert and replenishment function. It also slows down the whole procedure of replenishment. Many steps need to call by phone for confirming stock record.

The new system provides searching and recording, insufficient stock alert and replenishment function.

Despatch Process

The despatch process of the old system are unorganized and imprecise. Orders' delivery routes are not planned properly. Moreover, there is lack of checking before items deliver to customers. It leads to potential error.

This system groups the order with near destination. Staff can arrange delivery more effectively. Before delivery, the order should be checked by

despatch clerk to reduce the packing mistake.

Invoicing

For the old system, there are six copies of invoice. It wastes time and effort. By this reason, the system provides an electronic invoicing process. System will combine 6 invoices into one electronic invoice for transmission between different department.

Using a new system have several benefits. By using computer, many steps can be skipped. It reduces the workload of labor and the cost of relaying on human work. It cut costs by automating routine tasks and improve streamline business operations. Paper works also can be eliminated by replace paper processes. Data communication also can more effectively by using centralized database. Efficiency must improve.

Even using the greatest system, it must have a disadvantage behind it.

Resistance

In short term, our staff may not adapt well for the new system. We need to spend resource for training our staff to use it. Time is needed for understanding new technology. The habitat of our company is totally reversed. Many works may struggle, or disruption may occur easily. Some running plan may ready for fail if we cannot control the new system well.

2. Problem Findings

2.1 For Back-end Order Processing:

2.1.1 Ineffectiveness on handling chaotic order information

No standard order receiving format

Currently, orders can be received as different methods. There is no standard order form either for issue to dealers or for use as a standard document at SLMC. Hence, data received in different format which wastes a lot of manpower for handling.

Over-night order can only be pended to the next working day

There are many orders placed over the working hours of sales order office. The old system can only pend the orders to the next working day. Delivery of items will delay.

Solution

New System will provide a standardize ordering form for dealers, and they only simply filling the information in specific spaces. Once an order is placed, the system will finish all the recording process immediately. It can reduce the time of data entry and synchronize the data format.

2.1.2 Do not have a clear notice for insufficient stock

Sales Order Office Manager does not get any alert when the stock quantities are under re-order level or danger level. The decision on stock replenishment will delay.

Solution

An alert function is provided when the stock is under the danger level.

2.1.3 Manually keep track of the outstanding orders

Sales Order Office Manager does not get any notification when there is an outstanding order. Also, when the stock is available on that order, manager will not get any notice. Manager need to monitor a giant amount

of stock record every day to ensure the outstanding orders are dealt with speedily and automatically. It is time consuming and sometime outstanding order cannot be carried out quickly due to considerable effort.

Solution

The system provides Electronic Outstanding Order Process with notification function

2.2 For Front Line Sales:

2.2.1 Not always have enough information answer customer queries

Unable to provide accurate real-time-information to dealers

The old file system from SLMC(Spare) cannot provides an instantly inventories record and order information to dealers. Dealers always need to wait for a period contacting office to sure the stock quantity and order's status. Our customers always waste lot of time on this process, and it totally affects the customer experience of ordering SLMC(Spare)'s products.

Wasting lot of labor resources for answering dealer's enquiry

The Spares sales order officers always spend lot of labor resources to answer dealer's enquiry (including order's status, item quantities, etc.) via telephone. They are unable to answer all of them. Dealers even do not know if the items are available while placing an order, and it always cause a late despatch of items to customers. It affects customers experience and low-efficiency become a burden of SLMC.

Solution

With the aims of reducing unnecessary phone enquiry, reducing cross-department data checking time and providing addition contact method for dealers and sales order office. This system allow dealer to check the basic information regarding stock and order status through centralized database.

2.2.2 Difficulty on providing items' information to place an order

Dealers in SLMC is searching the item manually. Human cannot search the item number accurate as a machine. Error occur easily. It wastes a lot of time to amend the error and waste the human resource. It will slow down the efficiency for the company.

Solution

This system provides a searching engine to substitute searching by human. It totally reduces the amount of error by human. It also enhances the efficiency of the company

2.2.3 Inflexible ordering mechanism

Cannot provide reserving service

There are several organizations selling spares and accessories which can be used on SLMC car. Most of them can almost provide hot sale items immediately (off-the-shelf service) and provide reserving service. However, SLMC cannot provide this service for them. Customers tend to purchase from our competitor.

Difficult to modified after ordering

Orders are hard to be modified. Dealer sometimes need to modify the order instruction to satisfy fickle customer need. They need to notice several departments (include order office, warehouse, despatch department and stock recording department), and confirm by phone call. Order amendment may waste lot of human resources and time.

Solutions

The new system support reserving service. Order information can also edit or cancel.

2.2.4 Difficulty on controlling sales-force only by making regular call

As an area manager, they need to monitor lot of dealers by making regular calls. It is difficult to control sales-force properly.

Solution

This system provides several charts of sales performance overview for area managers, they can understand the sale of their subordinates. It helps managers to monitor their works. In addition, manager can deliver broadcast message via the new system. They can announce the business strategy or target to their subordinates in an effective way.

2.3 For Order Assembly Procedure:

2.3.1 Labor intensive on handling documentation

Scattered despatch instruction

In the current system, each ordered item generates one despatch instruction. There are too many scattered DID need to be handled. Each DID is needed to indicate 'actual quantity despatched' and 'to follow' amount.

Several documents need to work on while stock is insufficient

If an ordered item does not have sufficient stock, storeman create an outstanding order which is sent to order office. They also need to complete several documents for sending re-ordering instructions with different priorities to purchasing department. It creates a lot of manual work of storeman, and record may not correct due to human negligence.

Solution

This system supports electronic ordering process. When an order is placed, system will see if there are any item is not available in stock and create outstanding order. Then, ordered item will add to the order assembly list for simply arrange picking and delivering. After order assembly, system determine if the item stock drop to the danger level.

2.3.2 Lack of clear indication for finding items in bins

In the current system, item's category is the only way for storeman to identify items' located bin. Storeman always need to spend a lot of time walking around the bin to find items.

Solution

For improving, item's located shelf number can be provided in an electronic despatch instruction.

2.4 For Delivery Procedure:

2.4.1 Unorganized delivery routes

In the current system, each ordered item generates one despatch instruction for delivery. These instructions are not organized. The delivery routes are hard to be planned properly. It highly increases the delivery cost and workload of van drivers.

Solution

The system provides an order assembly list for order office to arrange delivery base on orders' weight and deliver district. Item with near destination will load at same van. Van drivers can plan their route easily.

2.4.2 Lack of checking before items delivery

When an order has been assembled, it is passed with its DI set to the Spares Despatch Department. Department will then arrange van driver deliver items refer to the given address. There is no double confirmation of items before delivery. Wrong item or wrong quantities of item is often distributed to clients. It leads to a huge write-off of inventory every year.

Solution

Before items delivery, they should be checked and confirmed by despatch clerk. Spares despatch clerk should re-confirm if the items match with its order before delivery.

2.5 For Invoicing Procedure:

2.5.1 Long time is taken to reconcile the copy of invoice

There are 6 copies for set of invoices. Each copy will be sent to different department for notification, acknowledgement and recordings. Those copies will be finally integrated and be considered as a set of completed invoice. This process takes a long time to reconcile the copy of invoice. This involve a lot of manual work to finalize a set of invoices.

Solution

The system centralized the invoice. Certify invoice should be acknowledge by despatch foreman and dealers with simple steps.

2.5.2 Invoice clearing only by manual collate the invoice paper

One of the invoice copies is send to invoicing section. Invoice is then clearing by Chief Invoice Clerk. Chief Invoice Clerk always search the invoice from huge amount of paper. It wastes a lot of human resources and not effective.

Solution

This system can generate invoice clearing report on a selected date. It can clearly display the invoice by their payment day.

2.6 For Stock Recording Procedure:

2.6.1 Error occur easily due to record rely on human work

For the old system of SLMC, there are many steps need to pass by human hand (Inserting data through despatch instruction and copying data from computer to stock record card), and it occur clerical error easily.

Solution

This system will provide a user interface that help those workers to insert the data in certain format and then store in the centralize database. Repetitive clerical work can be omitted. It helps the data more accurately and minimize the human error.

2.6.2 Current system has no support to warehouse operation

The current system does not support warehouse operation. Storemen need to send email to stock recording clerk to report goods received, actual stock figures and defective items. Inventory record does not frequently be verified tend to a huge write-off.

Solution

Storemen can report actual stock or defective items via the system. It can enhance the correctness of stock record and mechanized warehouse document work.

2.7 For General:

2.7.1 NOT Unified File-based System

Independence File System impel for several problems

A disorder file-based system will limit the company development environment. In each department, there are own file system for each department, and each of the system are not connected. Data in those system lack of coordination and central control. The data format is also non-standardized. It leads the data disorder, data redundancy and data inconsistency.

Limitation of data sharing

Independence computer system limits the data sharing through different departments. Most of the data cannot transfer fluently. They need lot of process and steps to transfer data by different file system. Most of the steps are pasted by human hand (sending and inserting data). Compare with picking data in same system, it increases human errors.

Solution

This system will unify one database management system to store all the data with standard format. It helps the communication of different departments. Highly increase the efficiency of company (Help to communicate with front line salesman, allow users share the same source of data to reduce the time of data transfer, etc.)

2.7.2 Data Transfer insecurely by Email and FTP

An insecurity communication system must harm for a company. As many as famous company with insecurity data transfer always lose important data. SLMC also either using external email system or FTPto transfer important business data and it is extremely insecure for data transfer.

Solution

For storing data in the centralized database, transfer of data is not needed. All user can share the data in the database via the system.

2.7.3 Lack of communication between management and staffs

In the current system, the only communication channel between management and staffs is email. Staffs sometimes are too busy to check email. Moreover, too many emails are received every day. Some management important notices are easily be neglected.

Solution

A broadcast message dialog should be developed for management to announce important information to subordinates.

2.7.4 No convincing data for presenting management decision

In the current system, the trend of commodity circulation, trend of orders and overall or individual sales-performance cannot represent clearly. Many business decisions cannot forecast for the trend of demand of future, and it also not effective for monitoring the performance of each department and subordinates.

Solution

This system provides several charts of sales overview. It offers convincing data for future planning, also monitor each department and staffs.

3. Functional Requirements

3.1 Function for Ordering Process

3.1.1 Create Order

User: Dealers, Sales Order Officers

Aims:

- Standardize data format when receiving order

Features:

- Auto-generate Order serial number
- Information submitted must follow certain constraints

Description:

Dealers and Sales Order Officers can place an order by filling the electronic form. When an order is placed, system will auto-generate a serial number. Order officer then arrange for order assembly.

When filling the order form, system would check the availability of items. If it is not available, item cannot be added to the order. User can reserve that item using reserving function.

Problem Tackling:

- 2.1.1 Ineffectiveness on handling chaotic order information

3.1.2 Reserve Item

User: Dealers, Sales Order Officers

Aims:

- Support reserving service

Features:

- Information submitted must follow certain constraints

Description:

Dealers and Sales Order Officers can place reserving instruction by filling the electronic form. The reserved item would be added to the replenishment list.

Problem Tackling:

- 2.2.3 Inflexible ordering mechanism

3.1.3 Notify Reserved Item when available

User: Dealers

Aims:

- User can speedy manage items after reservation

Description:

Dealers would receive a notification when the reserved item is replenished.

3.1.4 Update Order Status

Aims:

- Provide indicator for monitoring order process

Description:

There are several order statuses. Different order statuses can be updated by specific users.

Order status	Description	Updated when
"Save"	The items are saved. It has not entered the ordering procedure.	Dealer save the order form
"Cancel"	The order is cancelled.	Dealer cancel the order
"Processing"	The order is waiting to enter ordering procedure	Dealer submit the order
"Assembled"	The order is assembled	Sales Order Office submit the assembly
"Packing"	Storemen have received the instruction. The order is under packing procedure.	Storemen receive the DIC and DID
"Delivering"	Storemen have finished packing. The order is under delivery procedure.	Despatch Clerk confirm the packed item
"Complete"	The order process is completed.	Dealer receive the ordered item

3.1.5 Search Order record

User: Area Managers, Dealers, Sales Order Manager, Sales Order Officers

Aims:

- Reduce labor resources spend on cross-department data checking

Features:

- Each department share the same source of information
- Provide instance order and reserve information (including order status)
- Several accessibilities on user role *(refer to 3.7.1 Login with access right)*

Description:

After the system receive an order or reserving instruction, information is then saved into database. Users can search their information by entering order created date or order number.

Information Type:	
Basic:	orderID, itemID, item name, quantities, order date
Seller:	dealerID, dealer's name, dealer's address
Status:	order status
Invoice:	invoiceID, item, quantities, price
Pricing:	Payment amount
Delivery:	Receiver, Delivery address, Prefer Item receiving date

	Accessible Information Type
Sales View	All. But only accessible to their own orders
Sales Team View	All. But only accessible to their sales teams' orders
Officer View	All
Logistic View	Basic & Seller & Delivery

Problem Tackling:

- 2.2.1 Not always have enough information to answer customer queries

3.1.6 Modify Order

User: Dealers, Sales Order Officers, Sales Order Manager

Aims:

- Satisfy fickle situation of making deals

Description:

Orders and reserving instruction are able to edit and cancel by dealers and sales order officers in specific order status.

Order status	Information can be modified	Allow Cancel[1]?
"Processing"	All order information	Yes
"Assembled"	Delivery information	No
"Packing"	Delivery information	No
"Delivering"	None	No
"Complete"	None	No

Problem Tackling:

- 2.2.3 Inflexible ordering mechanism

3.1.7 Assemble Order

User: Sales Order Officer

Aims:

- Reduce delivery cost

Features:

- Ordered items list immediately updated while placing an order
- Sort by district of deliver address, unify items' delivery routes
- Outstanding Orders' items is highlighted
- Available stock auto-update when the assembly is confirmed
- Part-completed invoice is generated after assembly

Description:

Order assembly list is an ordered items list sort by city of deliver address. After an order is created, the order will add on the list.

Sales Order Officer can refer to the item weight displayed on the list. By matching items' weight to arrange assembly. When the

[1] Order status change to "Cancelled".

assembly is arranged, the order status change from “Processing” to “Assembled”. After that, despatch instruction (DIC & DID) send to storeman. Then, the available stock of item will be updated automatically. Part-completed invoice is generated and enter the invoice procedure.

Problem Tackling:

- 2.4.1 Unorganized delivery routes

3.2 Function for Inventory

3.2.1 Search Item Information

User: Dealers, Area Manager, Sales Order Officers, Sales Order Manager, Stock Records Clerks, Storemens, Despatch Clerks

Aims:

- Reduce labor resources spend on cross-department item information checking

Features:

- Each department share the same source of information
- Provide instance items information
- Several views for different users *(refer to 3.7.1 Login with access right)*

Description:

Users can search for item information by their item ID, item name or category. They can retrieve information from the system without departmental boundaries. Different user gets different accessibility to the stock information.

Information Type:	
Basic:	itemID, item name, item description
Sales:	available stock, selling price
Stock:	actual stock, item located shelf
Restricted:	purchase price

	Accessible Information Type
General View	Basic & Sales
Warehouse View	Basic & Stock
Administration View	All

Problem Tackling:

- 2.2.1 Not always have enough information to answer customer queries
- 2.2.2 Difficulty on providing items' information during placing an order
- 2.3.2 Lack of clear indication for finding items in bins

3.2.2 Add Item

User: Stock records clerks, Spare part controller

Description:

Stock records clerks can add new item to the database. Item information should contain catergory, item ID, item name, description, purchase price, selling price, actual stock and item located shelf. After that, the new added item would send to spare part controller for setting re-order line and danger line.

3.2.3 Modify Item

record User:

Stock records clerks

Aims:

- Centralize and mechanize the stock recording process

Features:

- Stock record auto-update after order assembly and delivery
- Allow manually update item record

Description:

Stock records clerks can modify item information in the database. Modifiable information includes item name, description, purchase price, selling price, actual stock and item located shelf.

Problem Tackling:

- 2.6.1 Error occur easily due to recording process rely on human work

3.2.4 Generate Goods Received

Confirmation User: Stock records clerks

Aims:

- Centralize and mechanize the stock recording process

Description:

Stock records clerks can input the data of Goods Received notes (GRN) to the system. Then, system will send a goods received acknowledgement to storemen.

3.2.5 Confirm Goods

Received User:

Storemen

Aims:

- Centralize and mechanize the stock recording process

Description:

The system generates goods received confirmation *(refers to 3.2.5 Generate Goods Received Confirmation)*. After storemen perform checking of new goods, they can confirm the receive. Then, stock record update.

3.2.6 Alert for Insufficient Stock

User: Sales Order Manager

Aims:

- Ensure sufficient inventory to support the selling force

Description:

If item's available stock is under danger line, an alert message is prompted while Sales Order Manager login to the system. It is an urgent reminder of items replenishment.

Problem Tackling:

- 2.1.2 Do not have a clear notice for insufficient stock

3.2.7 Amend Re-order Line and Danger Line

User: Spare Parts Controller

Aims:

- Ensure the stock amount can keep on a suitable level at most of the time

Description:

Spare Parts Controller can update the re-order line and danger line of an item refer to their selling trend of the current situation.

3.2.8 Replenish Stock

User: Sales Order Manager, Spare Parts Controller, Storemen

Aims:

- Mechanized documentation on replenishment

Features:

- Auto-filled replenishment instruction list
- Edit and insert replenishment instruction list
- Send instruction to purchasing department

Description:

Items reserved by dealers, and items with available stocks under danger line or re-order line are automatically insert to the replenishment list. Their danger level and re-order level are also noted. Users are able to edit and insert other items to the list. While the list is confirmed by user, it will send to purchasing department.

Problem Tackling:

- 2.3.1 Labor intensive on handling documentation

3.3 Function for Despatch Process

3.3.1 Auto-generate Despatch

Instruction User: Storemen

Aims:

- Speed up order packing process by provide clear instruction
- Minimize documentation work of storemen

Features:

- All items in DID should be in stock
- Items' located shelf number is displayed on the DID

Description:

After an order is assembled, system will generate DIC and DID. DIC include order date, invoice name and address, delivery address and expected delivery date. DID include item ID, quantities and located shelf number. DI set send to spare parts store after Sales Order Officer arrange the order assembly.

3.3.2 Receive Despatch

Instruction User: Storemen

Description:

Storemen in the spare parts store receive DIC and DID then follow the instruction for packing after order assembly by Sales Order Officer. In this stage, order status change to "Packing".

Problem Tackling:

- 2.3.1 Labor intensive on handling documentation
- 2.3.2 Lack of clear indication for finding items in bins

3.3.3 Confirm

Packed Items User:

Despatch clerk

Aims:

- Reduce error on orders packing

Features:

- Re-confirm the items before delivery
- Item received acknowledgement
- Actual stock record auto-update after delivery

Description:

The packed items and despatch instruction passed to spares despatch department. Spares despatch clerk can simply click the 'Confirmed' button to state that they have confirmed the items are match with its order. The order status change to "Delivery". Despatch clerk then arrange van driver deliver items refer to the orders' delivery address.

Problem Tackling:

- 2.4.2 Lack of checking before items delivery

3.3.4 Acknowledge order received

User: Dealers

Aims:

- Ensure the data correctness of inventory

Description:

After delivery, system ask dealer for acknowledgement. After dealer acknowledge to received, the actual stock record will be updated. System will update the order status to "Complete".

3.4 Function for Invoicing

3.4.1 Auto-generate part-completed Invoice Aims:

- Reduce manual work for creating invoice
- Unify invoice with central control

Description:

After order assembly, a new part-completed invoice is generated. The part-completed invoice consists information of orderID, itemID, quantity, price, dealerID, invoice address and delivery address.

Problem Tackling:

2.5.1 Long time is taken to reconcile the copy of invoice

3.4.2 Acknowledged Invoice

User: Spares Despatch Clerk, Dealers, Despatch foreman

Aims:

- Improve effectiveness for deliver and acknowledge invoice

Features:

- Invoice certificate with simple steps

Description:

To certify the part-completed invoice, it should be acknowledged by despatch foreman after order packed. It also needs to confirm by dealers after order delivered. The date of invoice is then updated.

Problem Tackling:

- 2.5.1 Long time is taken to reconcile the copy of invoice

3.4.3 Download Invoice

User: Dealers, Area Managers

Description:

Dealers can download the completed invoice as PDF file from the system. They have an alternative to print it out or keep a soft-copy by themselves.

3.4.4 View Invoice Detail

User: Area Managers, Dealers, Sales Order Manager, Sales Order Officers

Aims:

- Provide clear view on an invoice
- Easy to keep track ordered items

Description:

After an invoice is certified, it will save under its order record. User can check the invoice by searching the above order record. Therefore, user can easily identify which item have completed the deal already.

Problem Tackling:

- 2.2.1 Not always have enough information answer customer queries

3.5 Function for Management

3.5.1 Create Broadcast Message

User: Sales Manager, Area Manager, Sales Order Office Manager

Aims:

- Enforce the communication of management and employee

Features:

- Allow posting, editing and delete broadcast announcement
- Announcement posted on the message dialog when staff login

Description:

A message box is provided for manager deliver broadcast message (e.g. monthly target, team notice, business strategies, etc.) to their subordinate. User can choose to save the message to draft, deliver instantly, or deliver at an arranged time.

The message will be posted on the message dialog that every users or specific group of users can see after login.

Problem Tackling:

- 2.7.3 Lack of communication between management and staffs
- 2.2.4 Difficulty on controlling sales-force only by making regular call

3.5.2 Modify Broadcast Message

User: Sales Manager, Area Manager, Sales Order Office Manager

Description:

The broadcast message created by user themselves are able to edit.

3.5.3 Delete Broadcast Message

User: Sales Manager, Area Manager, Sales Order Office Manager

Description:

The broadcast message created by user themselves are able to delete.

3.6 Function for User Maintain

3.6.1 Create New Staff

Account User: System Administrator **Aims:**

- Support company to hire new staff

Description:

System administrator can add new user. New users should be created with their staff information and assigned with their department, team and position.

3.6.2 Update User Information

and status Users: System Administrator

Aims:

- Support human affair

Brief Description:

Users can update their personal information by themselves or by system administrator. System administrator can update the group of the user, also update staff status to “Disable” when the staff is no longer a member of the company.

3.7 Function for General

3.7.1 Login with access right Aims:

- Protect information by controlling access right
- System can fit the job routine in different position more effectively

Features:

- User only can use the function related to their job
- Different roles have different permission to access the database

Brief description:

When user login to the system, the functions they can use and the information they can access are relevant to their role. Every user can share the latest information in the centralized database management system under control.

	Order	**Item**	**Invoice**
Sales Manager	Officers View	Administrator View	Accessible
Dealer	Sales View	General View	Accessible
Area Manager	Sales Team View	General View	Accessible
Sales Order Office	Officers View	General View	Accessible
Stock Recording Clerk	Not accessible	Administrator View	Not accessible
Storemen	Logistic View	Warehouse View	Not accessible
Despatch Clerk	Logistic View	Not accessible	Not accessible

3.8 Sale Over View

3.8.1 Sale Area Revenue

Aims:

- Manager can observe and analyze sale statistic by reading a graph.
- Reduce the time of drawing a graph with pen.

Feature:

- System can auto generate a selling graph for past 6 months.

Brief description:

- When manager need to read a graph of revenue. They can choose the month of which they want to analysis. Then the system will search the data and draw a graph immediately.

3.8.2 Item Sale Figure

Aims:

- Manager can observe and analyze sale statistic by reading a graph.
- Reduce the time of drawing a graph with pen.

Feature:

- System can auto generate an item sale graph of a specific item.

Brief description:

- When manager need to read the trend of a specific item by a graph. They can choose the month of which they want to analysis. Then the system will search the item detail and draw a graph immediately.

4. Non-Functional Requirements

4.1 Operational

4.1.1 Architect Centralize Database Management System

Aims:

- Synchronize all the data file (stock, order and items) in one database system
- Reduce the frequency of data inconsistency

Description:

- Sharing data for multiuser allow many users to access the same data at the same time
- This access is achieved through Description called “concurrency control strategies”.

4.1.2 Auto-backup Data

Aims:

- Restore the data for prepare the failure of information.

Description:

- The system will back-up per day for the preparation of information loss and can be recovered when if there any incident occurred

4.1.3 Compatible with the current hardware and software

Description:

- Increase the compatibility of the system by developing and testing the system on a general personal computer.

4.2 Security

4.2.1 Protected by Firewall

Aims:

- Ensure incoming information integrity.

Description:

- Determine security rule and create filters for small chunk of data for trapping the incoming data.

4.2.2 Install Anti-virus

Aims:

- Protect the data from malicious attack or data. (CryptoLocker, MyDoom...etc)

Description:

- Malware detection and removal.
- Extracted file itself to check the safety of data.

4.2.3 Encrypt data

Aims:

- Encoding message or information that only a specific authorized or person can access it.

Description:

- By using asymmetric cryptography to generate a pair of unpredictable keys to ensure security of the message.

4.2.4 Operating on private network

Aims:

- Protects data from cyberattack.

Description:

- System will be built on cloud / data center.
- Only accessible to private network of company.

4.3 Interface design

4.3.1 Simple interface design

Aims:

- Make the user's interaction as simple and efficient as possible
- Minimize user's effort in using new system

Description:

- User Acceptance Testing will take before the new system is operated

4.3.2 Font

Aims:

- Show the content to user more comfortable and clearly with softer, fuller curves and more open counters.

Description:

- By using "Line" font with softer, fuller curves and more open counters, it can capable for most of the system.

4.3.3 Font Size

Aims:

- Show the data clearly

Description:

- 22px for word size ,15px to fitting the size of heading and sub-heading of each choice will be bold to show the content

4.3.4 Symbol

Aims:

- More user friendly and eye-catching for user.

Description:

- Using “*” symbol to remind user to insert data to compulsory selection.

- Some selection will use radio box or check box to replace question dialogs.

- Dialog box will add a sample to remind user how to use it.

4.3.5 Color

Aims:

- More attractive for decorating with sharp and monochromatic color.

Description:

- Decorating with monochromatic color allows for a greater range of contrasting tone that can be used to attract attention.

- Using gray color as background color can show to the user more comfortable.

- The heading of the form will use dark gray with line shape to fit the background color and it can sublimate for the whole interface.

4.4 Culture

4.4.1 Simplified Chinese and English version are provided

Aims:

- To show the content in a clearly way.

Description:

- Provide simplified Chinese and English version

4.4.2 RMB as the default currency

Aims:

- Make transaction more convenient for PRC customers
- Reduce the step of convert USD to RMB.

Description:

- Set the default currency of current price as RMB.

4.5 Company Restriction

4.5.1 Follow the standard lead time of order

Aims:

- The ordering time must follow the standard lead time.

Description:

- Set the lead time forcefully.

4.5.2 Primary key in database should follow the current format

Aims:

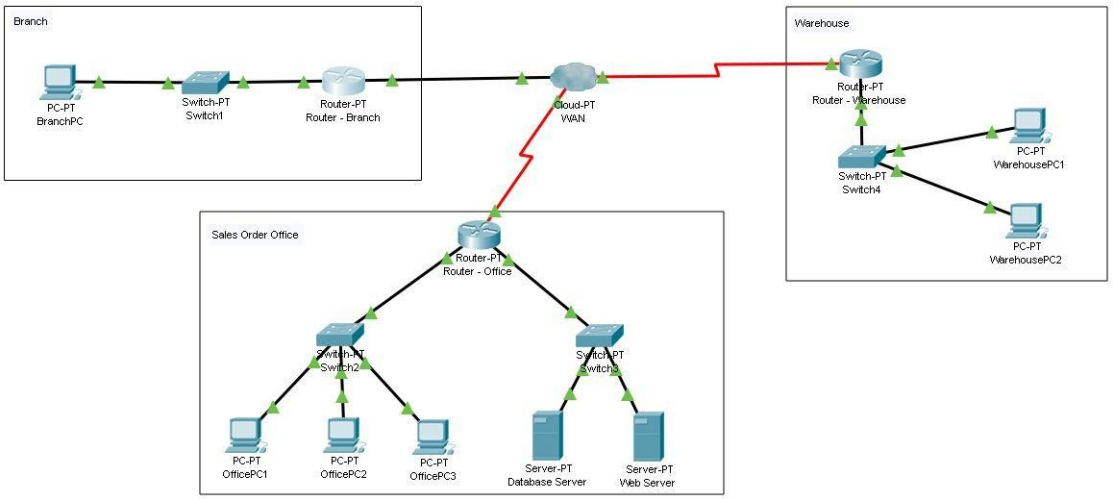
- Reduce data disorder and ununified data format.

Description:

- Part number consists of the category letter (A for Sheet Metal; B for Major Assemblies; C for Light Components; D for Accessories) plus a 5-digit number.
- Dealer's code number is in 3-digit.
- Invoice coding is currently 2 alphas and 6 numeric
- Original orders are files by SLMC serial number within dealer
- The SLMC serial order consists of 8 digits

5. System Architecture

5.1 Network Diagram



In the system, 3-tiered architecture would be applied.

The browser software on client computers makes HTTP requests to view the web-based system from the Web server. Client computer is also responsible for the application logic, which include information check during placing order and data analysis.

As there are huge amount of company data, a separated database server is needed to store confidential information.

5.2 Hardware

For Client

The current minimum hardware specifications to ensure the ability to run the system is:

- Processor – dual core @ 2.4 GHz (i3 Intel processor or equivalent AMD)
- RAM – 4GB
- Hard Drive – 500 GB
- Monitor – 19” LCD

For Server

The hardware specifications to ensure the ability to run the system is:

- Processor – dual core @ 2.4 GHz (i7 Intel processor or equivalent AMD)
- RAM – 8GB
- Hard Drive – 5 TB

5.3 Software

For Client

For operating system, Microsoft Windows 10 would be applied. It is the most common OS system, most of our staff are familiar with it as they use Windows on daily time. It can minimize the time used on training staff. Our new system would also well capable with Windows system.

Browser software is also needed to browse the Web-based system. Any browser software is also applicable.

Adobe Acrobat Reader DC is needed for reading PDF files. Some document would be presented in PDF format.

For Server

For operating system, Linux would be applied. It is because Linux is low cost and its reliability is high. Linux also is a completely open-source for any user. That means it is complementary, and we can add any plus-in partially with high flexibility.

Security is also another main reason of choosing Linux server. There are many users or even hackers have contributed to the security of Linux. Many bugs and errors are already fixed in the latest version.

For the web server, Apache would be used. It similar as Linux that all the source code is free for everyone. The latest version is a collective effort for many users in the internet. Its reliability is high.

For database server, Oracle would be applied. Oracle database is a high security server, even the Ten of the world's top banks are also using it to conduct their business. We can ensure the security, quality and reliability of our service.

6. Benefit and Limitation

6.1 Benefit

It is expected the new system can reduce over 60% of the manual work. It can save approximately $7,200,000 monthly labour cost on order processing.

The new system is expected to increase order processing time for 30%, which can increase revenue for 10% in the first year.

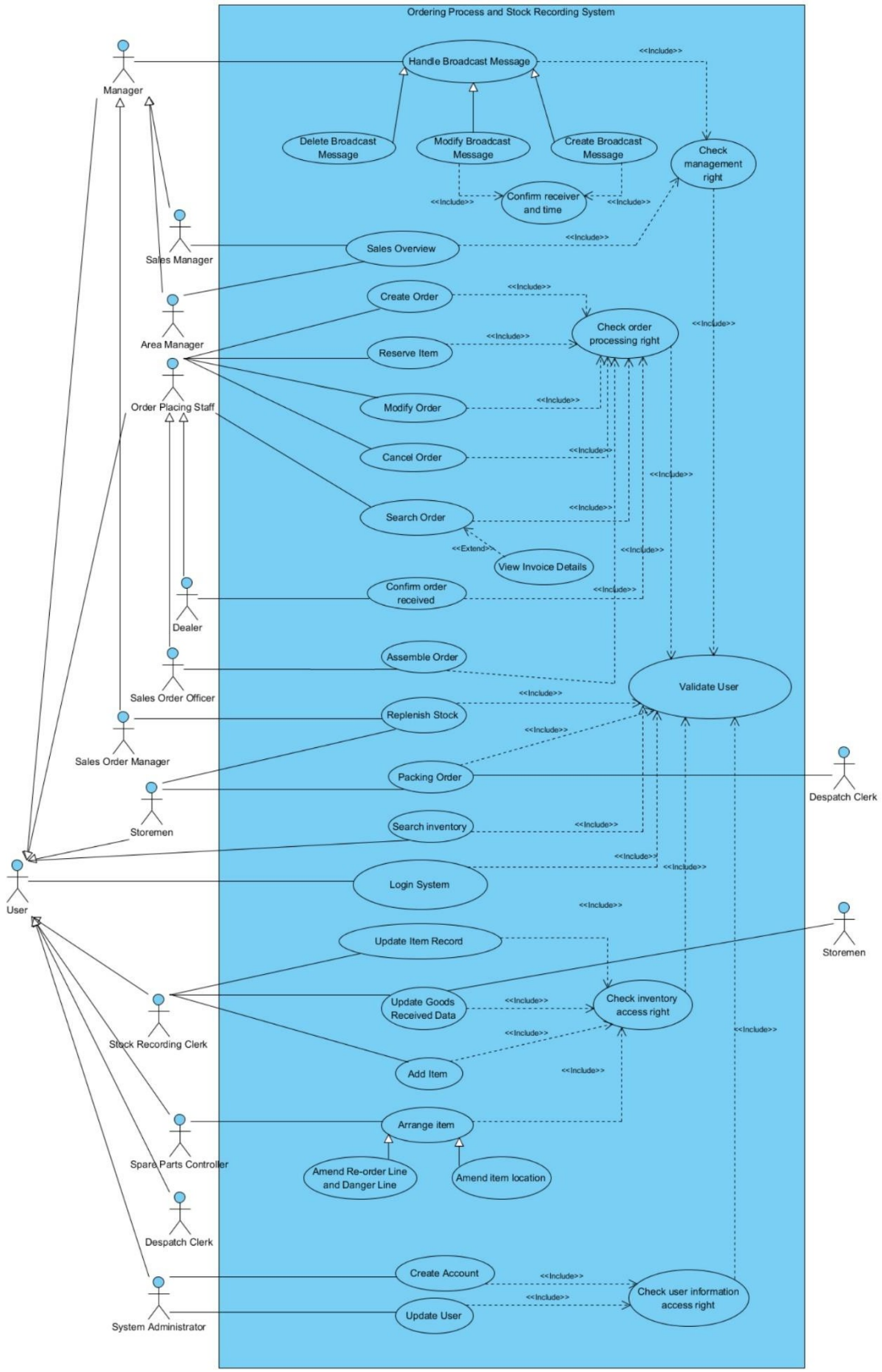
As the system can increase the efficiency of company, it is able to provide a great service to customers. Reputation of company would improve.

6.2 Constraints and Limitations

The current IT department is only responsible for the use of IT in the head office and some major offices and sites. They have no related experience on system maintenance. The operation support of the new system is weak.

7. UML

7.1 Use Case Diagram



7.1.1 Actor Description

Actor	Description
User	All system user includes Sales Manager, Area Manager, Sales Order Manager, Dealer, Sales Order Officer, Storemen, Stock Recording Clerk, Spare Parts Controller, Despatch Clerk and System Administrator.
Manager	Include Sales Manager, Area Manager and Sales Order Manager
Sales Manager	Head of the Sales Order Department
Area Manager	Manager of dealers who controls a selling force in the specific sales areas
Sales Order Manager	Supporting the selling force by processing dealers' orders and issuing instructions for the despatch of spares.
Dealer	Directly subordinate area manager. Selling force of the company
Sales Order Officer	Directly subordinate sales order manager. Supporting order processing and issue despatch instruction
Storemen	Warehouse staff who take response on packing ordered items
Stock Recording Clerk	Take responsibility on inventory record including goods receive, add new items and update items information
Spare Parts Controller	Staff who need to arrange item for better and smoother movement
Despatch Clerk	Staff who arranges items load to van and performs final check before order despatch.
System Administrator	System administrator who perform user maintenance

7.1.2 Use Case Description

Use case name	Handle Broadcast Message
Use case ID	UC-100
Actor(s)	Manager
Brief description	Managers can handle broadcast message in the broadcast message interface.
Pre-Conditions	The user is login
Post-Conditions	
Flow of events	1. User press “Broadcast message” button. 2. Include (Check management right) 3. System display broadcast message UI.
Alternative flows and exceptions	In step 2, if the user does not have management right, system would display an error page.

Use case name	Create Broadcast Message
Use case ID	UC-200
Super use case	Handle Broadcast Message
Actor(s)	Manager
Brief description	Managers can create broadcast message using the message box.
Pre-Conditions	
Post-Conditions	The message is saved to the database.
Flow of events	1. User enter the message, select the groups of receivers, choose message sending date and time in the field of create message. 2. User click “Deliver” button. 3. Include (Confirm receiver and time) 4. System deliver message to the target receivers at the selected time.
Alternative flows and exceptions	In step 2, user can save the message to draft while creating message.

Use case name	Modify Broadcast Message
Use case ID	UC-300
Super use case	Handle Broadcast Message
Actor(s)	Manager
Brief description	The broadcast message created by user themselves are able to edit.
Pre-Conditions	
Post-Conditions	The updated message is saved to the database.
Flow of events	1. Each of the column of message has its own “Modify” button. User click the button to select the message. 2. System display the modifying interface with the message. 3. User modify the message details including content, receiver, sending date and time. 4. User click “Save” button. 5. Include (Confirm receiver and time) 6. System deliver message to the target receivers at the selected time.
Alternative flows and exceptions	
Assumptions	The broadcast message has already been created.

Use case name	Delete Broadcast Message
Use case ID	UC-400
Super use case	Handle Broadcast Message
Actor(s)	Manager
Brief description	The broadcast message created by user themselves are able to delete.
Pre-Conditions	The broadcast message has already been created.
Post-	The message is removed from database

Conditions	
Flow of events	1. System display the list of created messages. 2. User click the “Delete” button of the message. 3. System prompts an alert message. 4. User click “Confirm” to delete the message. 5. System remove the message.
Alternative flows and exceptions	1. User can click “Cancel” to terminate the delete process.

Use case name	Confirm receiver and time
Use case ID	UC-500
Actor(s)	Manager
Brief description	Confirm the broadcast message sending time and the groups of receivers before the message is sent.
Flow of events	1. System prompts the message sending time and groups of receivers for confirmation. 2. User confirms the information.
Alternative flows and exceptions	1. User can cancel the confirmation to edit the message.

Use case name	Sales Overview
Use case ID	UC-600
Actor(s)	Sales Manager, Area Manager
Brief description	System generate sales growth chart, sales target graph and area sales revenue list for management decision.
Flow of events	1. User enter sales overview page 2. Include (Check management right) 3. User selects the time frame and area. 4. User click “Submit” button. 5. System generates sales growth chart, sales target graph and area sales revenue list.
Alternative flows and exceptions	

Use case name	Check management right
Use case ID	UC-700
Actor(s)	
Brief description	System check if the user has management right.
Flow of events	1. System get the user id from the current user 2. Include (Validate User) 3. System verify the user is accessible
Alternative flows and exceptions	In step3, If the user is not accessible, system prompt an alert message and then return to the previous page

Use case name	Create Order
Use case ID	UC-800
Actor(s)	Order Placing Staff
Brief description	Dealers and Sales Order Officers can place an order by filling the electronic form.
Flow of events	1. User click “Create Order” button. 2. Include (Check order processing right) 3. User enter the order information. 4. User confirm to process the order. 5. System check if the information matches the right format. 6. System generate the order ID, DIC and DID. 7. System send the order to sale order office for assembly.
Alternative flows and exceptions	1. If the user cancels the order, the process terminate. 2. If the information does match the right format, alert message prompt. System ask user to correct the information.

Use case name	Reserve Item
Use case ID	UC-900
Actor(s)	Order Placing Staff
Brief description	Order Placing Staff can use this function to reserve our item.
Flow of events	1. User Click “Reserve Item” button.

	2. Include (Check order processing right) 3. System display UI. 4. Use enter item ID and quantity that the item will reserve. 5. System update the reserved list and display a list for user. 6. User Confirm all item for reserve, then user can click the "Submit" button. 7. System ask for confirm. 8. User click "Confirm" button.
Alternative flows and exceptions	1. User do not have an accessibility

Use case name	Modify Order
Use case ID	UC-1000
Actor(s)	Order Placing Staff
Brief description	User can use this function to modify the order.
Flow of events	1. User enter order history page. 2. Include (Check order processing right) 3. User select order and click "Modify". 4. System check which elements are able to modify. 5. System display a modify order interface. 6. User modify the order content. 7. User click the submit button. 8. System save the modified order.
Alternative flows and exceptions	In step 4, the order cannot modify due to its order status

Use case name	Cancel Order
Use case ID	UC-1100
Actor(s)	Order Placing Staff
Brief description	User can use this function to modify the order.
Pre-Conditions	

Post-Conditions	The order status change to “Cancel”.
Flow of events	1. User enter order history page. 2. Include (Check order processing right) 3. User select order and click “Cancel”. 4. System check if the order can be canceled. 5. System asks for confirmation. 6. User confirm to cancel the order
Alternative flows and exceptions	In step 4, the order cannot cancel due to its order status

Use case name	Confirm order received
Use case ID	UC-1200
Actor(s)	Dealer
Brief description	User can use this function to confirm the order is received
Flow of events	1. User enter order history page. 2. Include (Check order processing right) 3. User select order and click “Received”. 4. System change the order status to “Complete”
Alternative flows and exceptions	In step 2, user do not have the right to process. Use case end.

Use case name	Search Order
Use case ID	UC-1300
Actor(s)	Order Placing Staff
Brief description	User can check the order information (order id, dealer id, city, order status, order amount and ordered item) from the system.
Flow of events	1. User click “Search Order” button 2. Include (Check order processing right) 3. System display Order Searching UI. 4. User enter the order ID, dealer ID, order date or order amount. 5. User click “Search” button.

	6. System display the correspondence order list. 7. User select an order is view the order details. 8. If the order is complete. System display the invoice details to user. 9. User can download the invoice in PDF.
Alternative flows and exceptions	In step 2, if the user doesn't have accessible right. System prompt an alert message and return to the previous page. In step 6, if the order not exist while searching. System will prompt out an "Order Not Found" message.

Use case name	Check order processing right
Use case ID	UC-1400
Actor(s)	
Brief description	System check if the user has order processing right.
Flow of events	1. System get the user id from the current user 2. Include (Validate User) 3. System verify the user is accessible
Alternative flows and exceptions	In step3, If the user is not accessible, system prompt an alert message and then return to the previous page

Use case name	Assemble Order
Use case ID	UC-1500
Actor(s)	Sales Order Officer
Brief description	Orders are process by sales order officer. During processing, officer assemble the ordered item and send the despatch instruction to storemen.
Pre-Conditions	Order is created by dealer
Post-Conditions	Despatch instruction is sent to storemen
Flow of events	1. User click "Assemble Order" button. 2. Include (Check order processing right) 3. System display order list sort by their order district 4. User select the order refer to their weight

	5. User click “Submit” button 6. System send the despatch instruction to storemen
Alternative flows and exceptions	In step2, system check not accessible. System display alert message.

Use case name	Replenish Stock
Use case ID	UC-1600
Actor(s)	Sales Order Manager, Storemen
Brief description	Items with available stocks under danger line or re-order line is automatically insert to the replenishment list. Their danger level and re-order level are also noted. Users are able to edit and insert other items to the list. While the list is confirmed by user, it will send to purchasing department.
Pre-Conditions	System add items with available stocks under danger level or re-order level to the replenishment list. System will also collect data of reserved items and add to the list.
Post-Conditions	
Flow of events	1. User click “Replenish item” button. 2. Include (Validate User) 3. System display the replenishment list. 4. User view, edit and insert items to the replenishment list. 5. User click “Confirm” button. 6. System send the replenishment list to purchasing department.
Alternative flows and exceptions	

Use case name	Packing Order
Use case ID	UC-1700
Actor(s)	Storemen
Secondary Actor(s)	Despatch Clerk
Brief description	Storemen receive the despatch instruction. The order is under packing procedure.

Flow of events	1. System display the despatch job list with the orders' DIC and DID 2. System change the order status to "Packing". 3. User follow the despatch instruction on the job list to pack items 4. User select the packed job and click "Packed" 5. System send the confirmation to despatch clerk 6. After despatch clerk check the packed item, he clicks "Confirm" button 7. System change the order status to "Delivering". 8. System generate part-completed invoice.
Alternative flows and exceptions	

Use case name	Search Inventory
Use case ID	UC-1800
Actor(s)	User
Brief description	User can check the item information (Description, Quantity, Location and Price). If there are any product which are under Danger Line, it will display with a red block. Under re-order level will display in orange block.
Flow of events	1. User click "Search item" button 2. Include (Validate User) 3. System display a Searching Item UI. 4. User Insert the item ID or any keyword. 5. System search the item in the data base and return an item list.
Alternative flows and exceptions	In step2, user no accessible right. Use case end. In step5, item is not found. System prompt out a "Item Not Found" message.

Use case name	Login System
Use case ID	UC-1900
Actor(s)	User
Brief description	User should login for entering the system

Pre-Conditions	User must have a validate account
Post-Conditions	
Flow of events	1. System ask for username and password 2. User enter their username and password 3. Include (Validate User) 4. System display the main UI
Alternative flows and exceptions	In step3, if the user is invalid. Return to step1.

Use case name	Validate User
Use case ID	UC-2000
Actor(s)	
Brief description	Validate the user. Ensure accessibility of the user.
Flow of events	1. System get and check the current user information 2. System return valid user
Alternative flows and exceptions	In step2, if the user information is invalid. System return invalid user message.

Use case name	Update item record
Use case ID	UC-2100
Actor(s)	Stock recording clerk
Brief description	User use this function to update item record.
Flow of events	1. User click “Modify item record” button. 2. Include (Check inventory access right) 3. System display modifying page 4. User input the item id and click “modify” button. 5. System display the item information. 6. User modify item information. 7. User click “Submit” button. 8. System save the information to database

Alternative flows and exceptions	In step2, user do not have a accessibility right to access. Use case end. In step4, system cannot find the item with the item id. System display error message.

Use case name	Update good received data
Use case ID	UC-2200
Actor(s)	Stock Recording Clerk
Secondary Actor(s)	Storemen
Brief description	When stock recording clerk receive Good Receive Notes. They should update good received data
Pre-Conditions	
Post-Conditions	The actual stock of items is updated
Flow of events	1. User click “Update good received data” button. 2. Include (Check inventory access right) 3. System display GRN form. 4. User input the GRN data to the system. 5. System send the GRN to storemen 6. Storemen confirm the goods are received.
Alternative flows and exceptions	In step2, user do not accessible to the page. Use case end.

Use case name	Add item
Use case ID	UC-2300
Actor(s)	Stock Recording Clerk
Brief description	When there is new item, stock recording clerk should add the information to database
Pre-Conditions	
Post-Conditions	Item information save to the database
Flow of events	1. User click “Add new item” button.

	2. Include (Check inventory access right) 3. System show the UI and new item pages. 4. User select category and enter item information. 5. User click the “Submit” button. 6. System check if the information is valid.
Alternative flows and exceptions	In step2, user do not accessible to the page. Use case end. In step6, information is not valid (e.g. item ID is not unique). System ask for edit.

Use case name	Arrange item
Use case ID	UC-2400
Actor(s)	Spare parts controller
Brief description	User use this function to control item arrangement.
Flow of events	1. User click “Arrange item” button. 2. Include (Check inventory access right) 3. System show UI to user. 4. User input the item id that need to be arrange. 5. User click the “Submit” button. 6. System display the current item information to user.
Alternative flows and exceptions	In step2, user do not accessible to the page. Use case end. In step5, item ID is not found. System prompt an alert message and ask for edit.

Use case name	Amend Re-Order Line and Danger Line
Use case ID	UC-2410
Super use case	Arrange item
Actor(s)	Spare parts controller
Brief description	The re-order line and danger line of item can be amended by spare parts controller.
Flow of events	1. User amend the re-order line field and danger line field. 2. User click “Submit” button 3. System save the data to database.
Alternative flows and exceptions	

Use case name	Amend item Location
Use case ID	UC-2420
Super use case	Arrange item
Actor(s)	Spare parts controller
Brief description	Spare parts controller can arrange item location for better operational flow.
Flow of events	1. User amend the item location field. 2. User click “Submit” button 3. System save the data to database.
Alternative flows and exceptions	

Use case name	Check inventory access right
Use case ID	UC-2500
Actor(s)	
Brief description	System check if the user has inventory access right.
Flow of events	1. System get the user id from the current user 2. Include (Validate User) 3. System verify the user is accessible
Alternative flows and exceptions	In step3, If the user is not accessible, system prompt an alert message and then return to the previous page

Use case name	Create account
Use case ID	UC-2600
Actor(s)	System Administrator
Brief description	Create a validate account to enter the system
Pre-Conditions	
Post-	An account is created and save to database

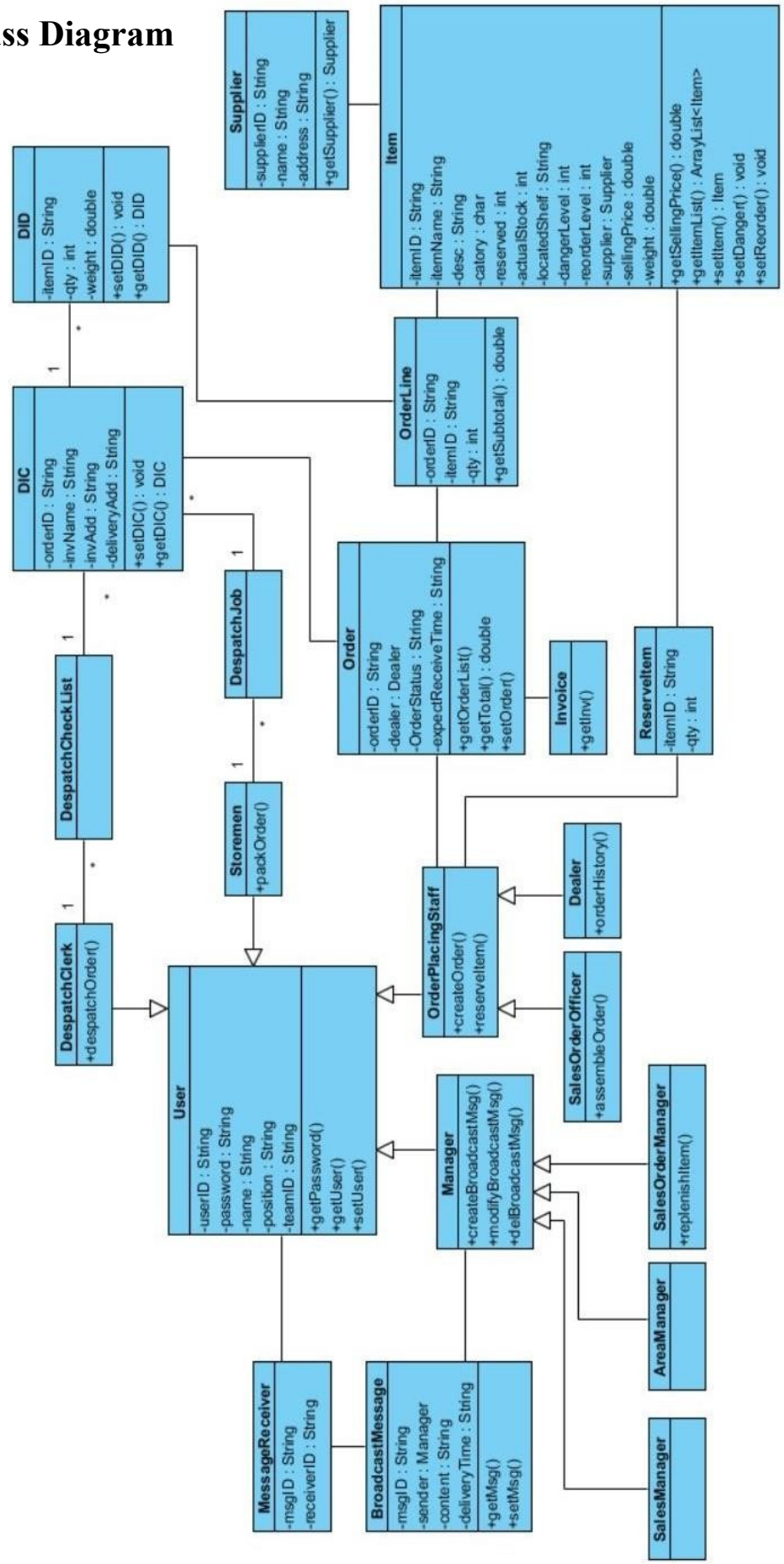
Conditions	
Flow of events	1. User enter account creating page 2. Include (Check user information access right) 3. System display account creating page 4. User enter user information include username and password. 5. User click “Submit” button 6. System create the account
Alternative flows and exceptions	User can cancel the process any time

Use case name	Update User
Use case ID	UC-2700
Actor(s)	System Administrator
Brief description	User information can be updated by system administrator.
Pre-Conditions	The account is existing.
Post-Conditions	
Flow of events	1. User enter user modifying page 2. Include (Check user information access right) 3. System display user modifying page 4. User enter the username and click “Modify” 5. System display the user information of the username 6. User modify the information 7. User click “Submit” button 8. System save the data to database.
Alternative flows and exceptions	User can cancel the process any time In step4, the username is not found. System prompt an alert message.

Use case name	Check user information access right
Use case ID	UC-2800
Actor(s)	
Brief description	System check if the user has user information access right.

Flow of events	1. System get the user id from the current user 2. Include (Validate User) 3. System verify the user is accessible
Alternative flows and exceptions	In step3, If the user is not accessible, system prompt an alert message and then return to the previous page

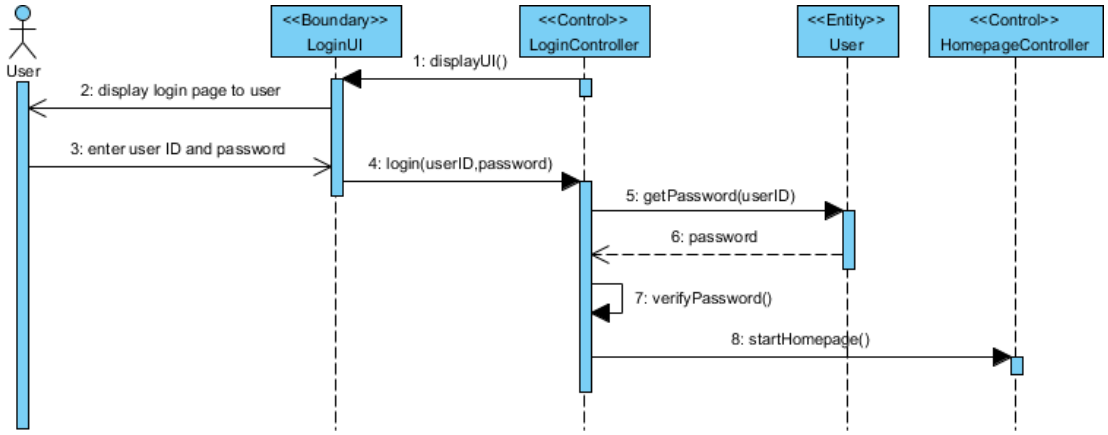
7.2 Class Diagram



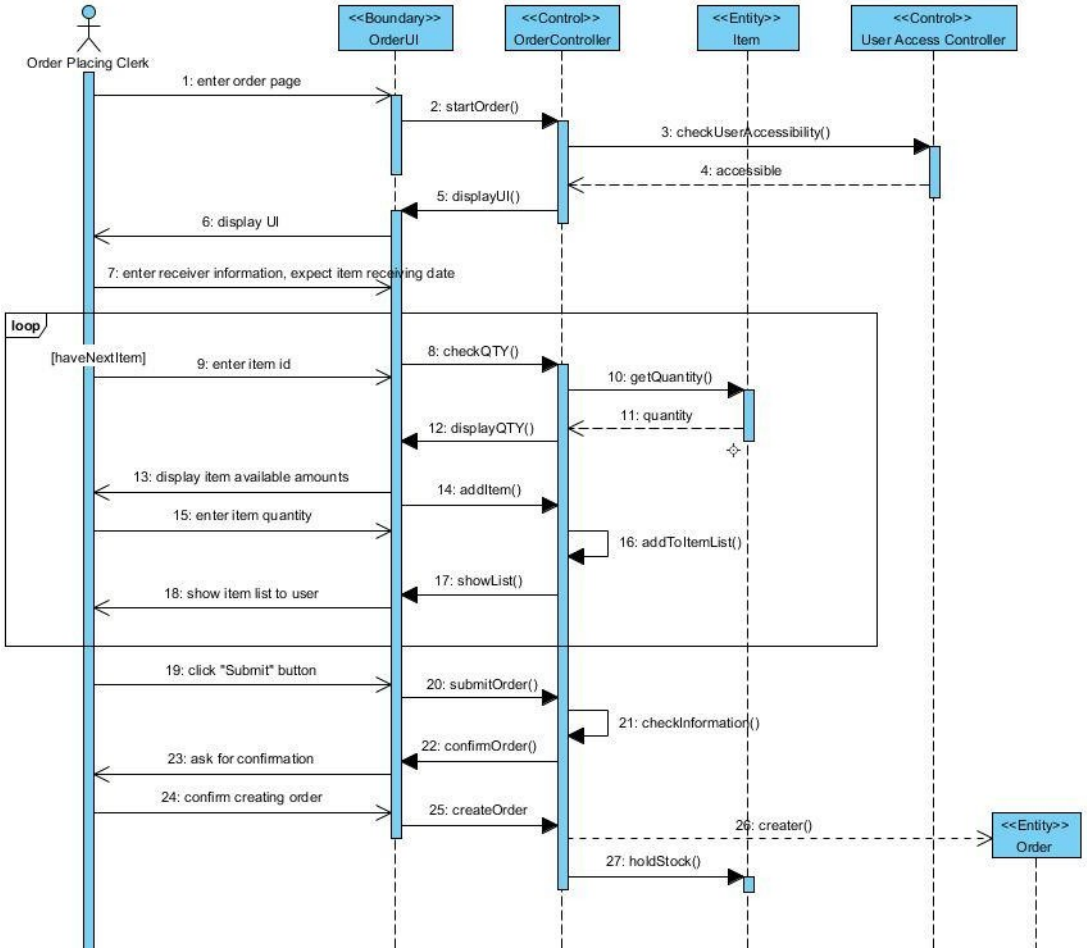
7.3 Sequence Diagram

7.3.1 Login System

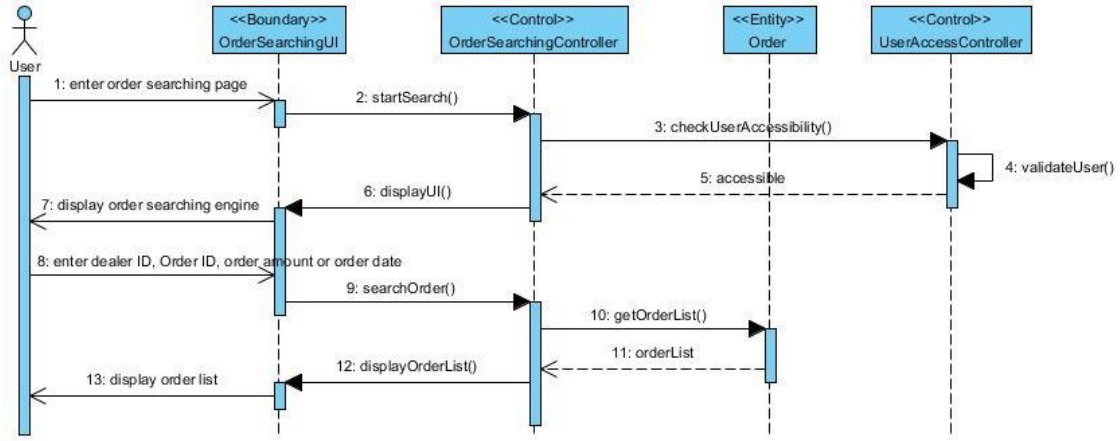
All user must login while using the system.



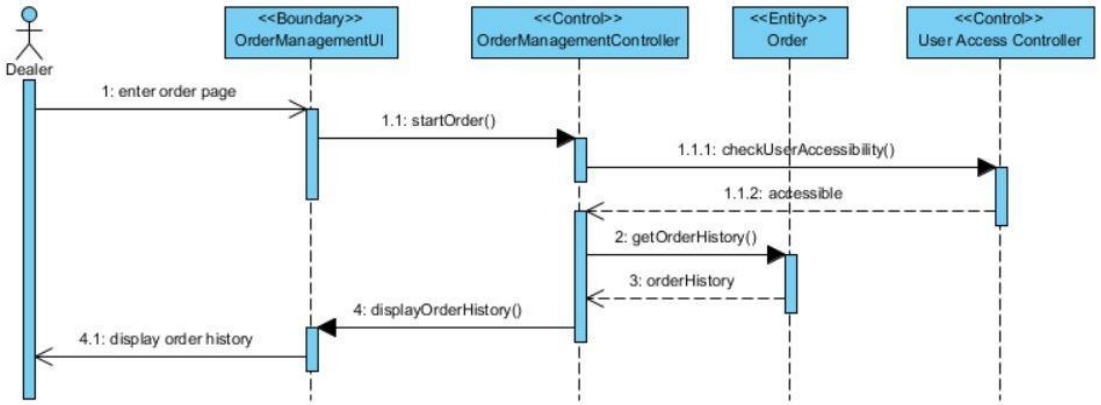
7.3.2 Create Order



7.3.3 Search Order

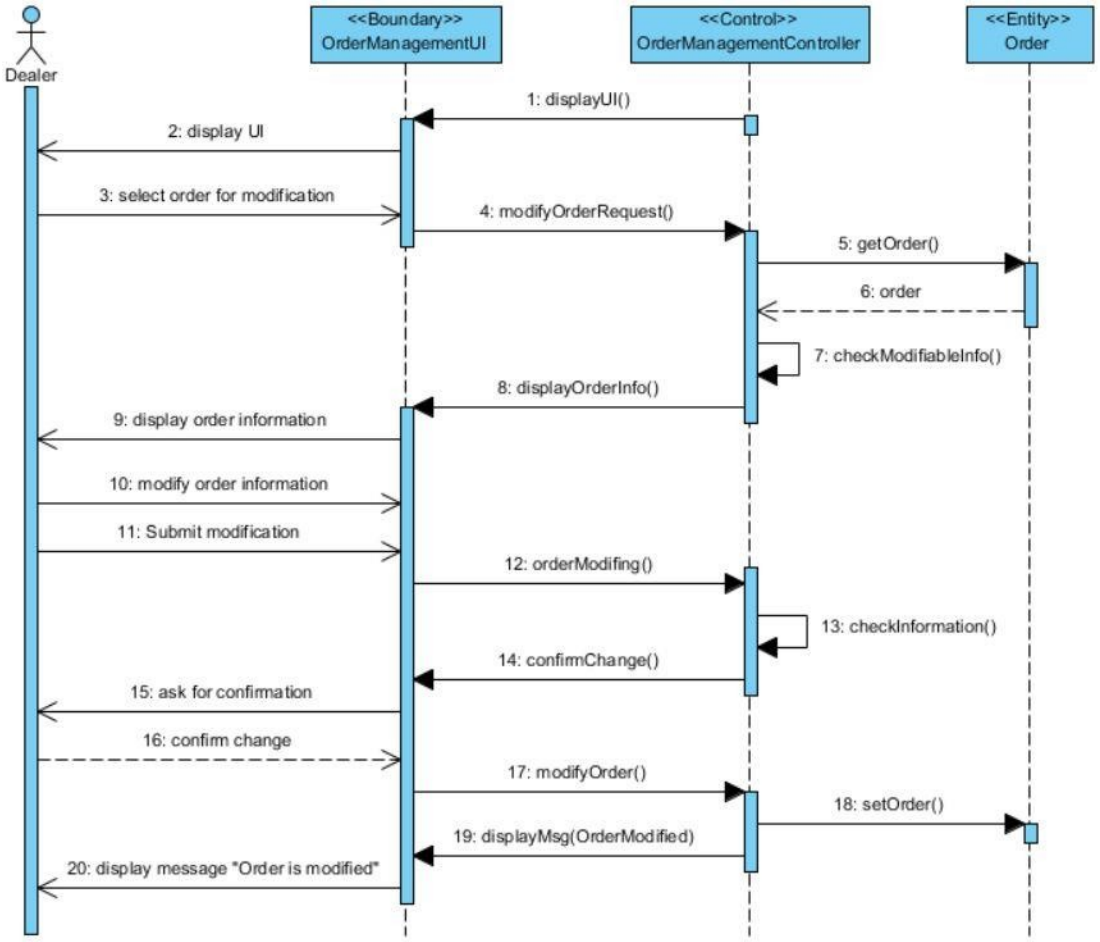


7.3.4 View Order History



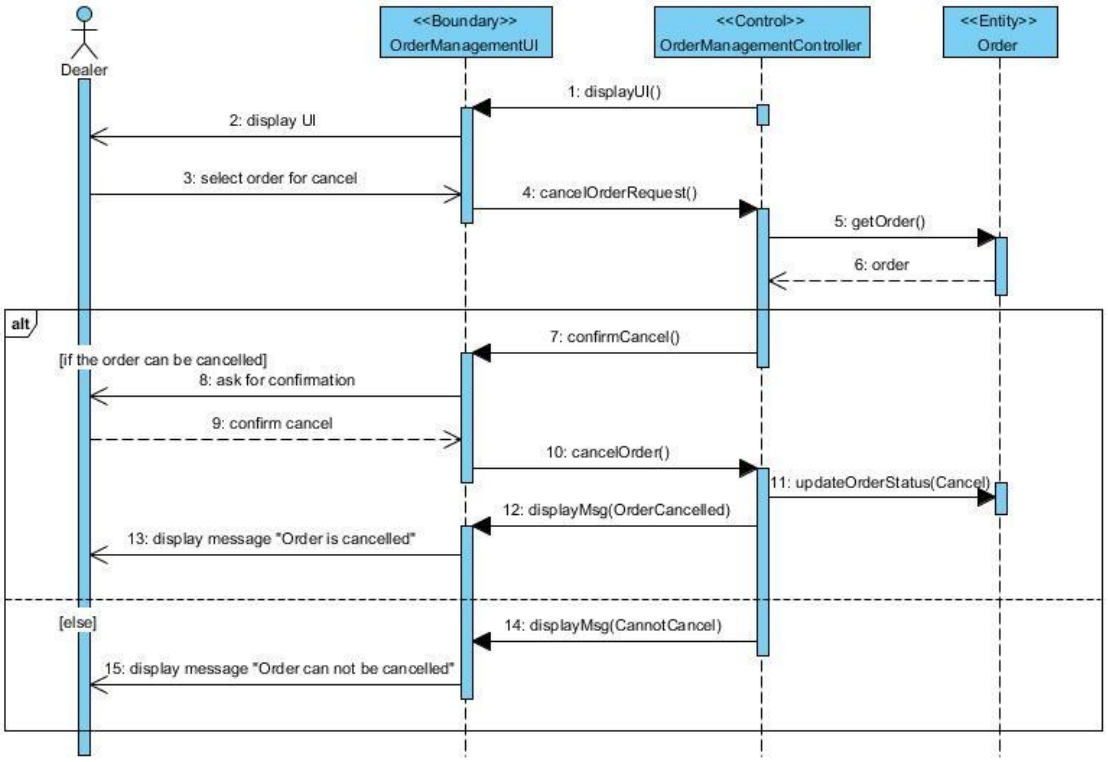
7.3.5 Modify Order

To modify an order, user must first enter order history page.



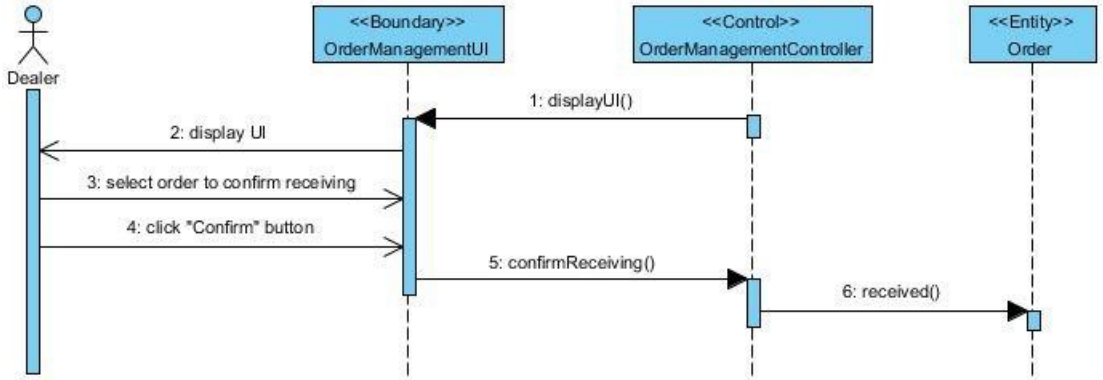
7.3.6 Cancel Order

To cancel an order, user must first enter order history page.

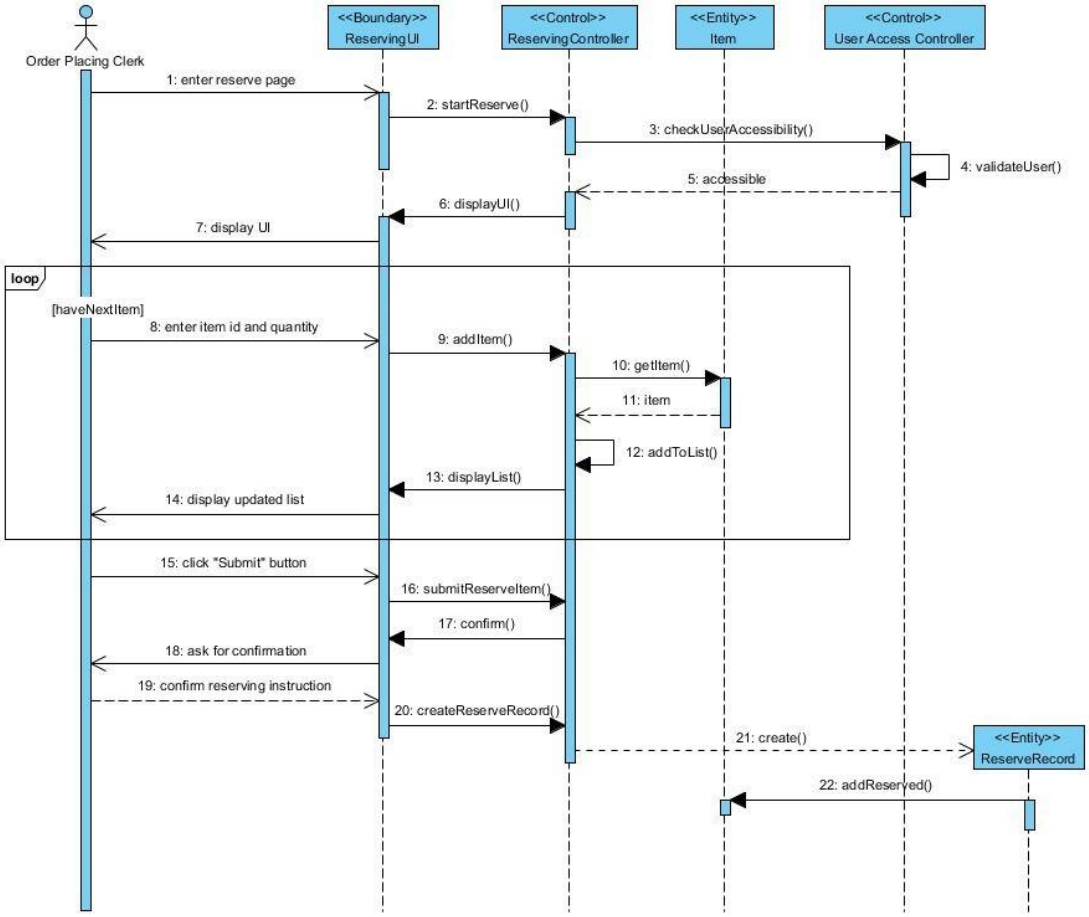


7.3.7 Receive Order

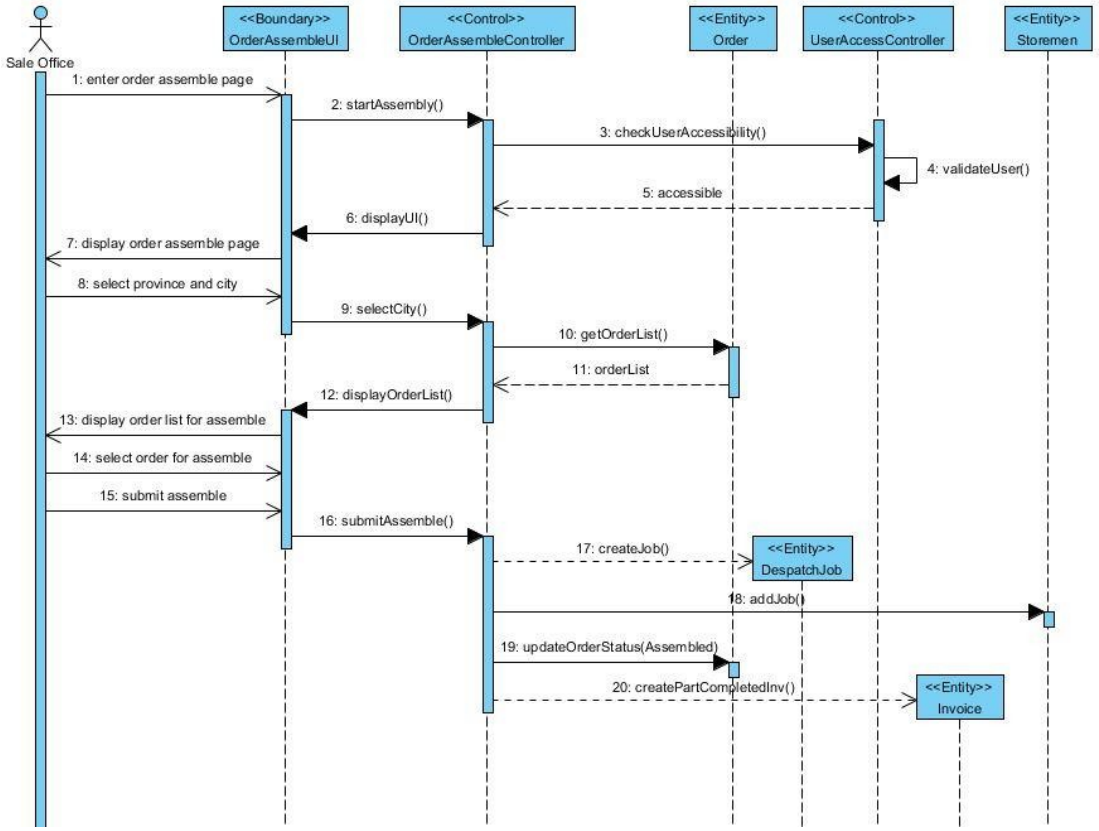
For confirm to receive an order, user must first enter order history page.



7.3.8 Reserve Item

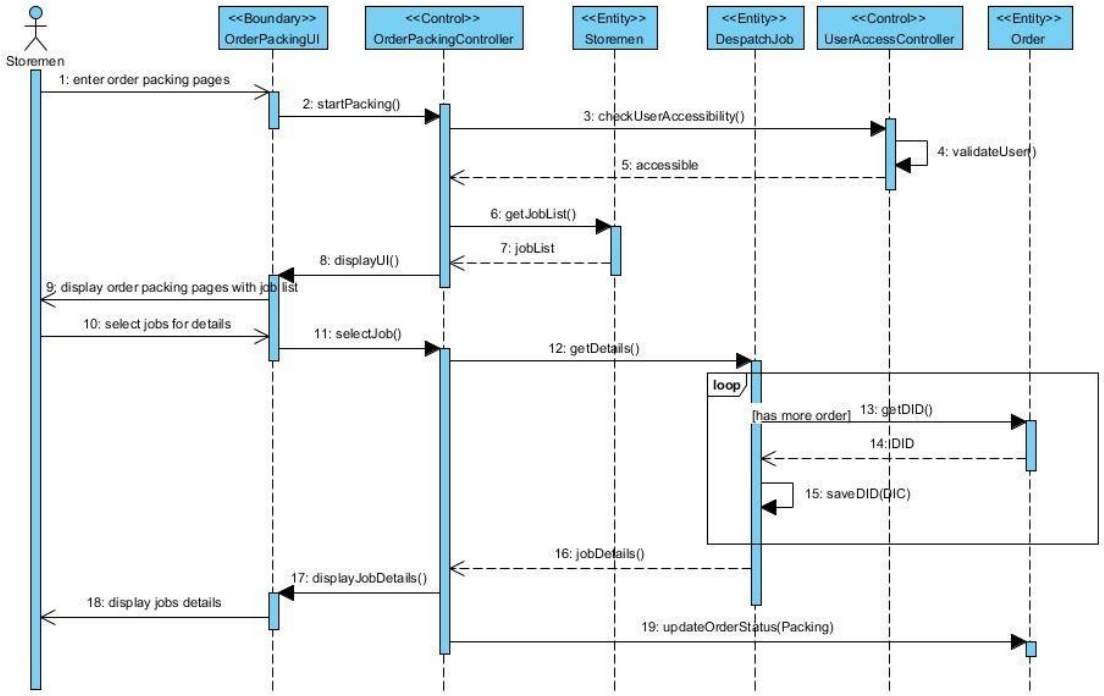


7.3.9 Order Assembly

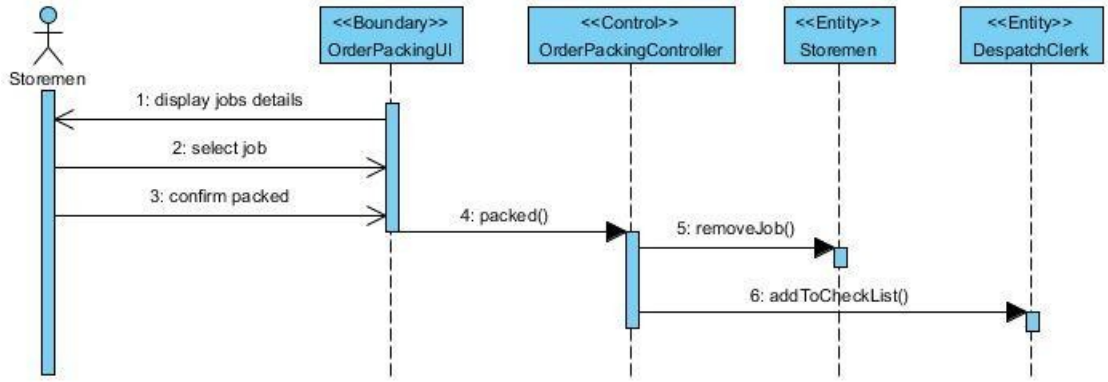


7.3.10 Pack Ordered items

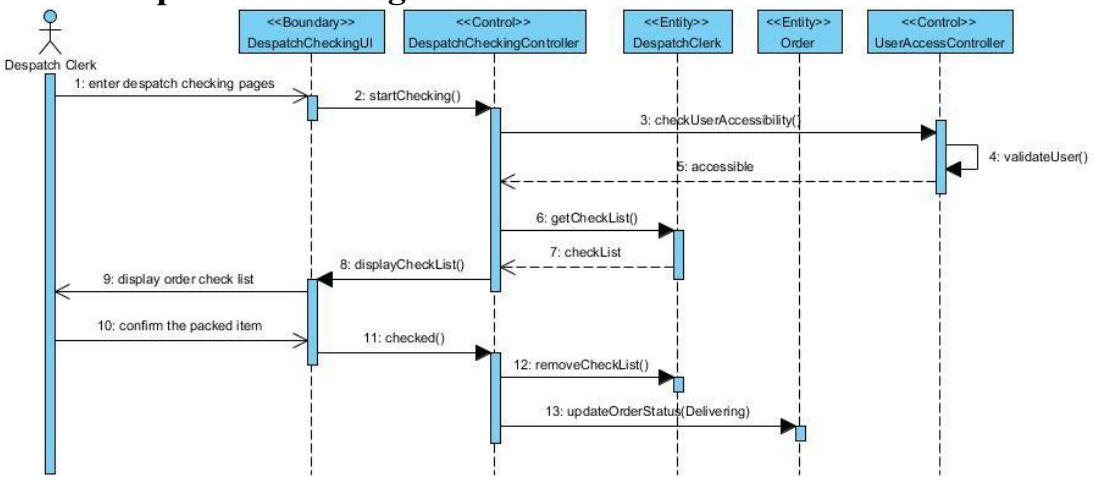
Storemen can get the despatch job list from the system. Once they check the details of the despatch job, system will change the order status to “Packing”.



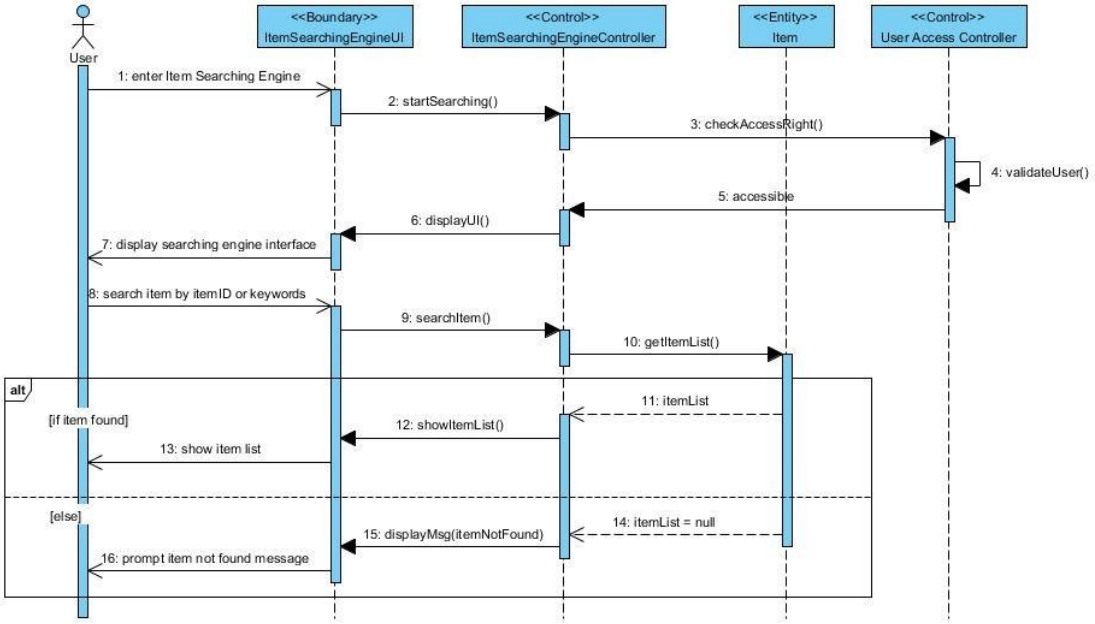
After they finish packing, they can confirm to the system. The packed item is then wait for further checking before delivery.



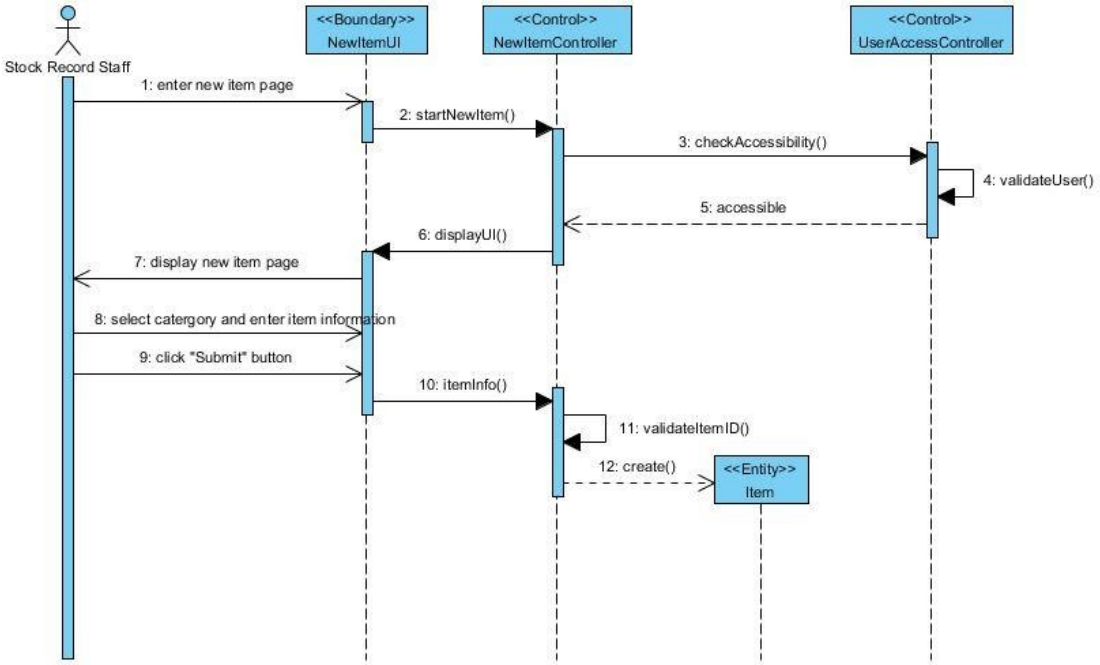
7.3.11 Despatch Checking



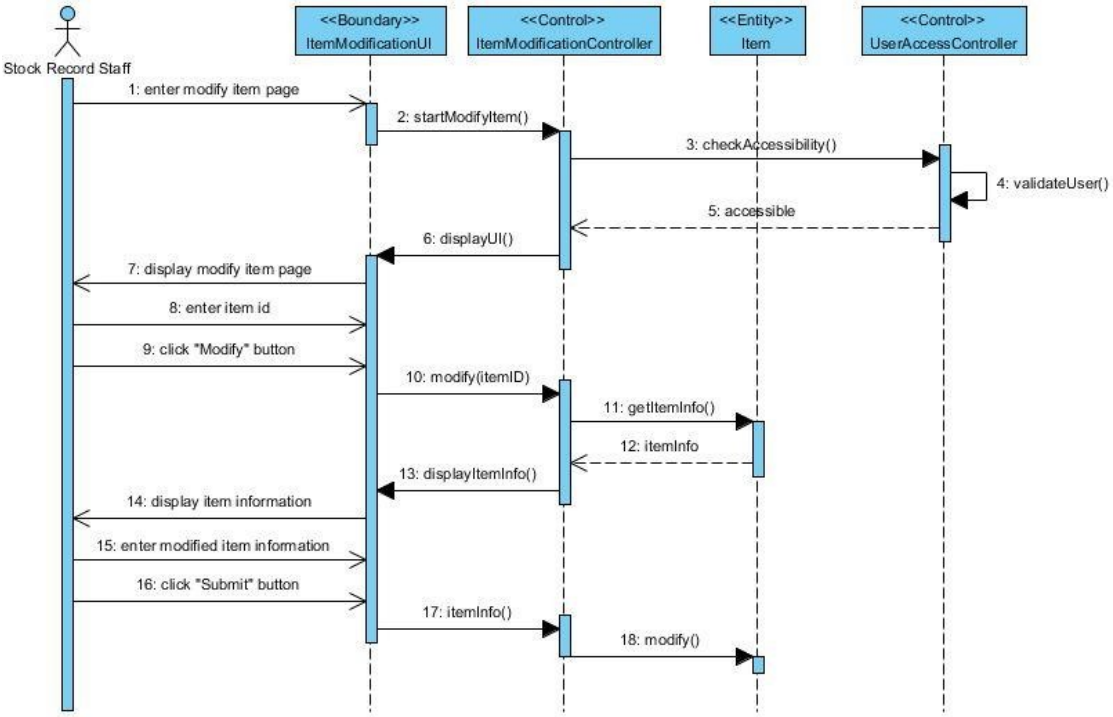
7.3.12 Item Searching



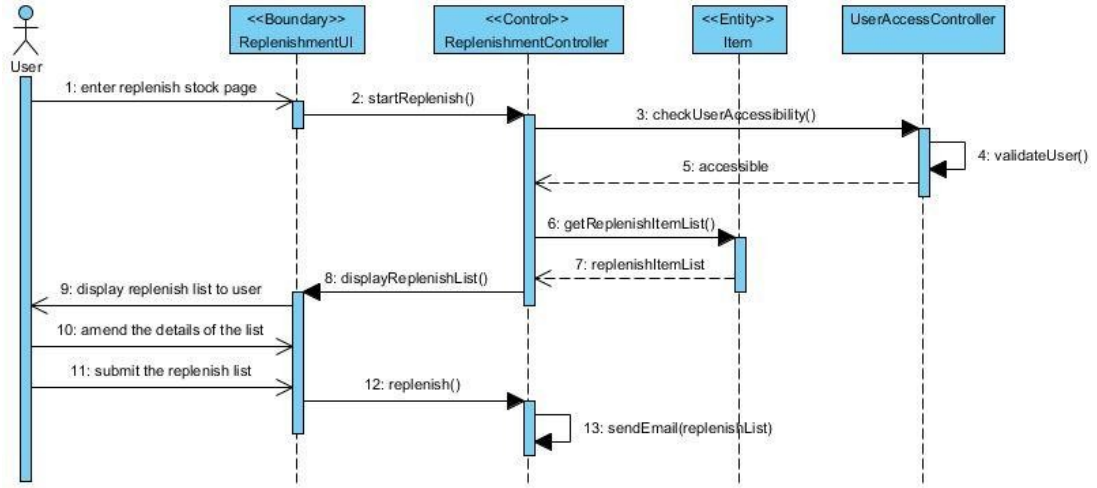
7.3.13 Add new item



7.3.14 Modify item

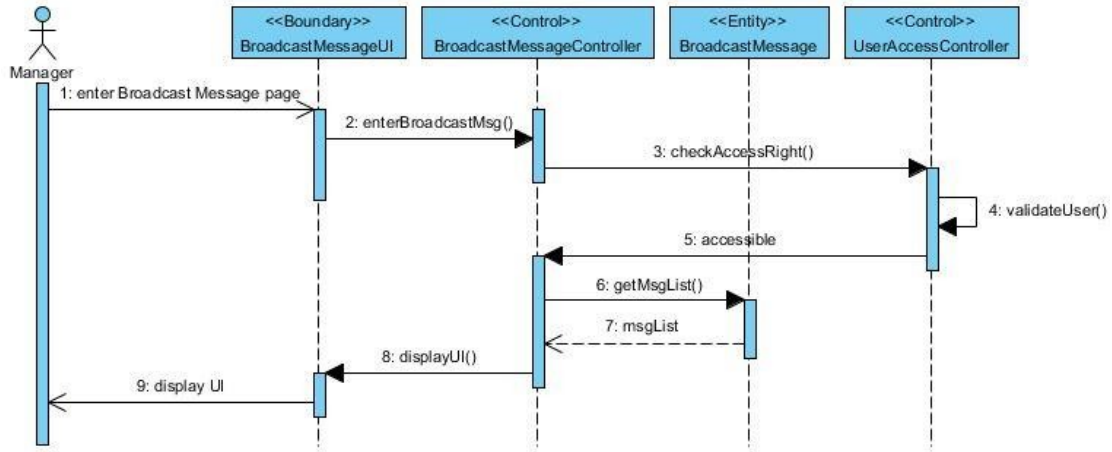


7.3.15 Replenish Stock

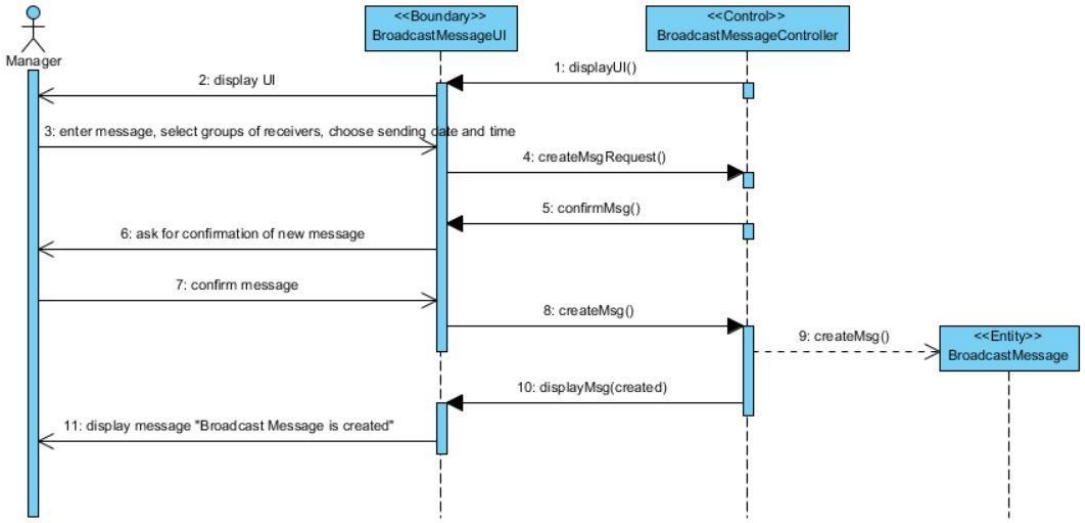


Broadcast Message

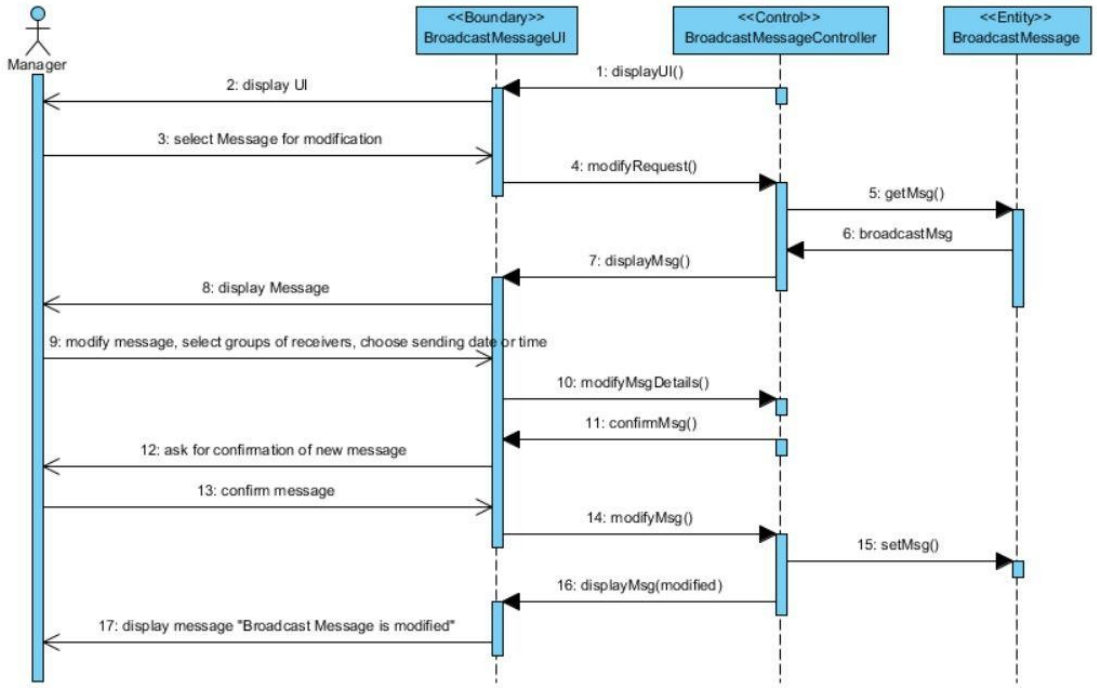
To manage broadcast message, user must first enter broadcast message interface. System will display a list of created messages. Allow user to create, modify or cancel message.



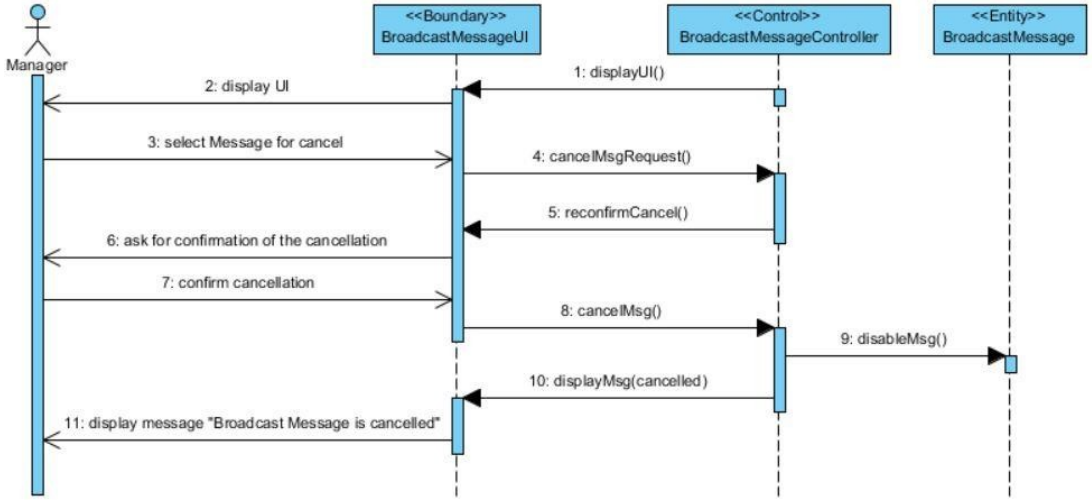
7.3.16 Create Message



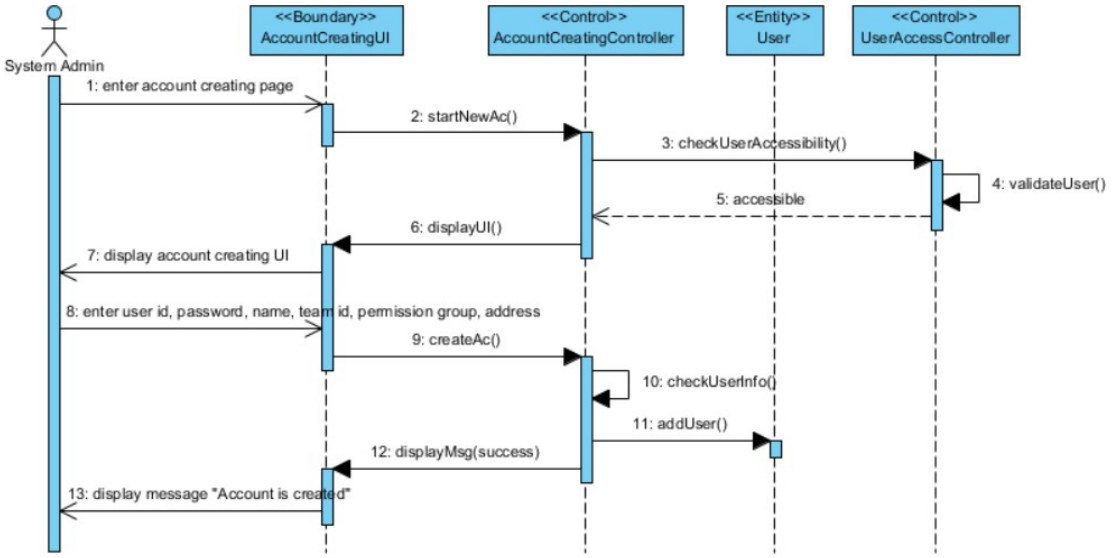
7.3.17 Modify Message



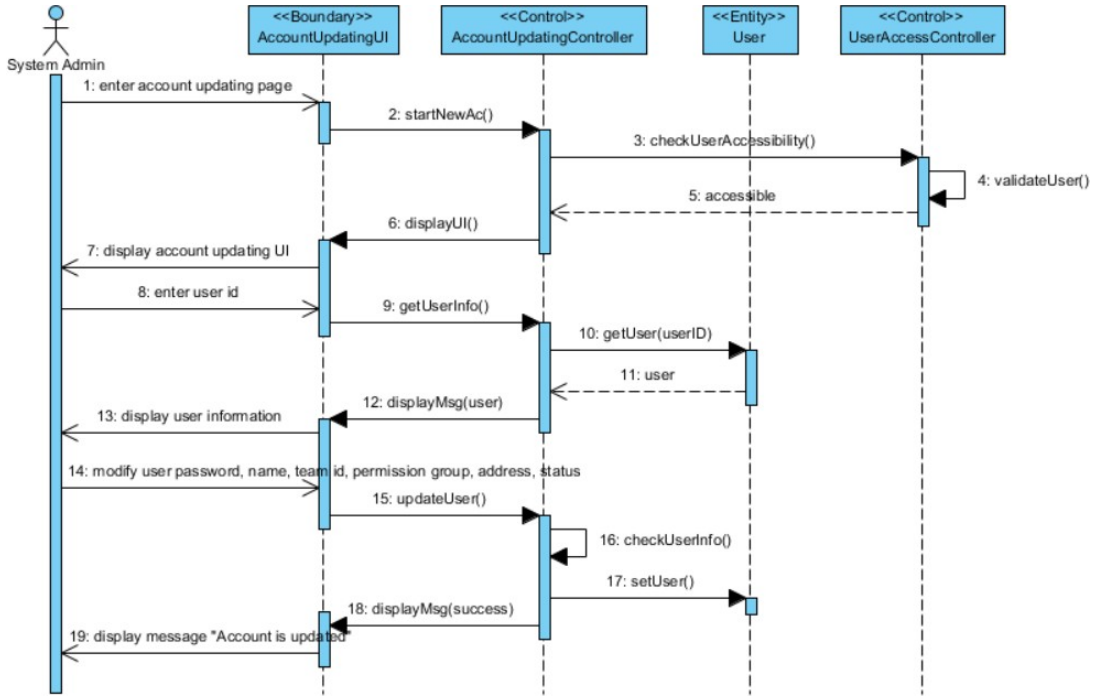
7.3.18 Cancel Message



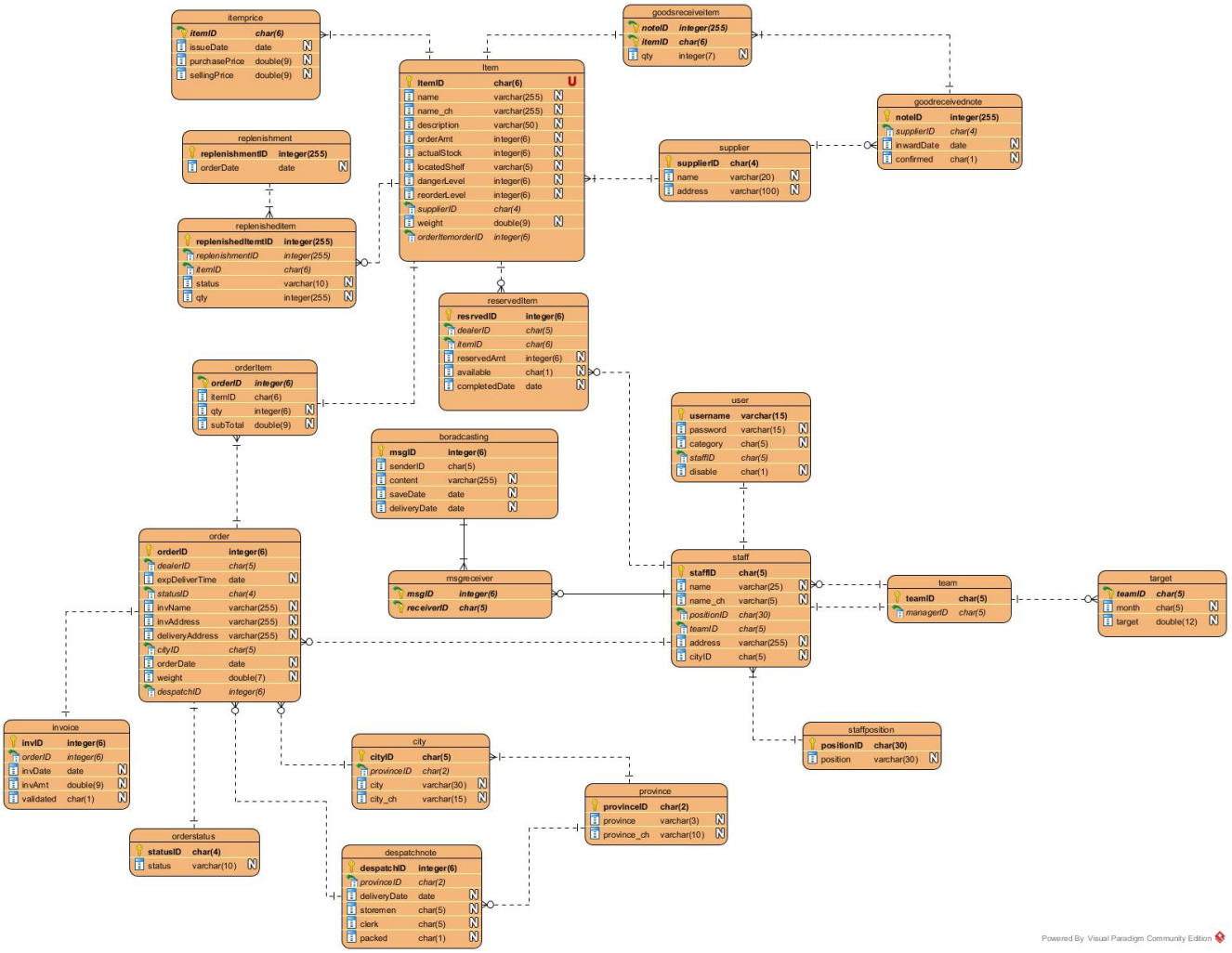
7.3.19 Create Account



7.3.20 Update Account Information



8. Entity Relation Diagram



8.1 Data Dictionary

Item				
name	**type**	**description**	**Null/Not Null**	**Key**
itemID	Char(6)	The item number of item	Not Null	PK
name	Varchar(255)	The item name	Not Null	
name_ch	Varchar(255)	The Chinese name of the item	Not Null	
orderAmt	Int(6)	The total order amount	Not Null	
actualStock	Int(6)	The item stock	Not Null	
locatedShelf	Varchar(5)	The place of item shelf	Not Null	
dangerLevel	Int(6)	The danger line of the item stock	Not Null	
reorderLevel	Int(6)	The reorder line of the item stock	Not Null	
supplierID	Char(4)	The item supplier number	Not Null	FK
Weight	Int(9,2)	The weight of the item	Not Null	

Reserved Item				
name	**type**	**description**	**Null/Not Null**	**Key**
reservedID	Int(6)	The reserved item number	Not Null	PK
dealerID	Char(5)	The dealer who is reserve the item	Not Null	FK
reserveAmt	Int(6)	The reserved Amount of the item	Not Null	
Available	Char(1)	The status of the item	Not Null	
completedDate	Date	The completed date of the item	Not Null	

Goods receive item				
name	**type**	**description**	**Null/Not Null**	**Key**
noteID	Int(255)	The GRN id number	Not Null	PK/FK
itemID	Char(6)	The item id number	Not Null	PK/FK
Qty	Int(7)	The quantity of the goods item	Not Null	

Supplier				
name	**type**	**description**	**Null/Not Null**	**Key**
supplierID	Char(4)	The supplier id number	Not Null	PK
Name	Varchar(20)	The supplier name	Not Null	
Address	Varchar(100)	The supplier address	Not Null	

Goods Receive Note				
name	**type**	**description**	**Null/Not Null**	**Key**
noteID	Int(255)	The GRN id number	Not Null	PK
supplierID	Char(4)	The supplier id number	Not Null	PK/FK
inwardDate	Date	The inward date	Not Null	
Confirmed	Char(1)	The status of item is checked or not	Not Null	

item price				
name	**type**	**description**	**Null/Not Null**	**Key**
itemID	Char(6)	The item id number	Not Null	PK/FK
issueDate	Date	The issue date	Not Null	PK
purchasePrice	Int(9,2)	The purchase price	Not Null	
sellingPrice	Int(9,2)	The selling price of the item	Not Null	

replenishment				
name	**type**	**description**	**Null/Not Null**	**Key**
replenishmentID	Int(255)	The replenishment id number	Not Null	PK
orderDate	Date	The order date of the item	Not Null	

replenished Item				
name	**type**	**description**	**Null/Not Null**	**Key**
replenishedItemID	Int(255)	The replenished item id number	Not Null	PK
replenishmentID	Int(255)	The replenishment id number	Not Null	FK
itemID	Char(6)	The item id number	Not Null	FK
Status	Varchar(10)	The status of the item	Not Null	
Qty	Int(255)	The quantity of the item		

order Item				
name	**type**	**description**	**Null/Not Null**	**Key**
orderID	Int(6)	The order id number	Not Null	PK/FK
ItemID	Char(6)	The item id number	Not Null	PK/FK
Qty	Int(6)	The quantity of the item	Not Null	
subtotal	Int(9,2)	The sub total of the item		

invoice				
name	**type**	**description**	**Null/Not Null**	**Key**
invID	Int(6)	The invoice id number	Not Null	Pk
orderID	Int(6)	The order id number	Not Null	PK/FK
invDate	Date	The invoice date	Not Null	
invAmt	Int(9,2)	The invoice amount	Not Null	
Validated	Char(1)	The status of the invoice		

order				
name	**type**	**description**	**Null/Not Null**	**Key**
orderID	Int(6)	The order id number	Not Null	PK
delaerID	Char(6)	The dealer id number	Not Null	FK
expDeliverTime	Date	The deliver time of the order	Not Null	
statusID	Char(4)	The status id number	Not Null	
invName	Varchar(25)	The invoice name	Not Null	
invAddress	Varchar(255)	The invoice address	Not Null	
deliveryAddress	Varchar(255)	The delivery address	Not Null	
cityID	Char(6)	The city id number	Not Null	FK
orderDate	Date	The order date	Not Null	
Weight	Int(7,2)	The weight of the order	Not Null	
despatchID	Int(6)	The dispatch ID number	Not Null	FK

Order status				
name	**type**	**description**	**Null/Not Null**	**Key**
statusID	Char(4)	The status id number	Not Null	PK
Status	Varchar(10)	The status of the item	Not Null	

city				
name	**type**	**description**	**Null/Not Null**	**Key**
cityID	Char(5)	The city id number	Not Null	Pk
provinceID	Char(2)	The province id number	Not Null	FK
City	Varchar(30)	The city name	Not Null	
City_ch	Varchar(15)	The city name in Chinese	Not Null	

Despatch note				
name	**type**	**description**	**Null/Not Null**	**Key**
despatchID	Int(6)	The dispatch id number	Not Null	Pk
provinceID	Char(2)	The province id number	Not Null	FK
deliveryDate	Date	The delivery date	Not Null	
Storemen	Char(5)	The storemen name	Not Null	
Clerk	Char(5)	The clerk name	Not Null	
Packed	Char(1)	The note status	Not Null	

BroadcastMsg				
name	**type**	**description**	**Null/Not Null**	**Key**
msgID	Int(6)	The msg id number	Not Null	PK
senderID	Char(6)	The sender id number	Not Null	FK
saveDate	Date	The sending date	Not Null	
delveryDate	Date	The delivery date	Not Null	

Msg receiver				
name	**type**	**description**	**Null/Not Null**	**Key**
msgID	Int(6)	The msg id number	Not Null	Pk
receiverID	Char(5)	The receiver id number	Not Null	FK/PK

staff				
name	**type**	**description**	**Null/Not Null**	**Key**
staffID	Char(5)	The staff if number	Not Null	PK
Name	Varchar(25)	The staff name	Not Null	
Name_ch	Varchar(5)	The staff Chinese name	Not Null	
positionID	Char(65)	The position id number of staff	Not null	FK
teamID	Char(5)	The team id number	Not Null	FK
Address	Varchar(255)	The staff address	Not Null	
cityID	Char(5)	The staff working city	Not Null	FK

User				
name	**type**	**description**	**Null/Not Null**	**Key**
Username	Varchar(15)	The username of system	Not Null	PK
Password	Varchar(15)	The password of the account	Not Null	
staffID	Char(5)	The staff id number	Not Null	FK
Disable	Char(1)	The status of the account	Not Null	

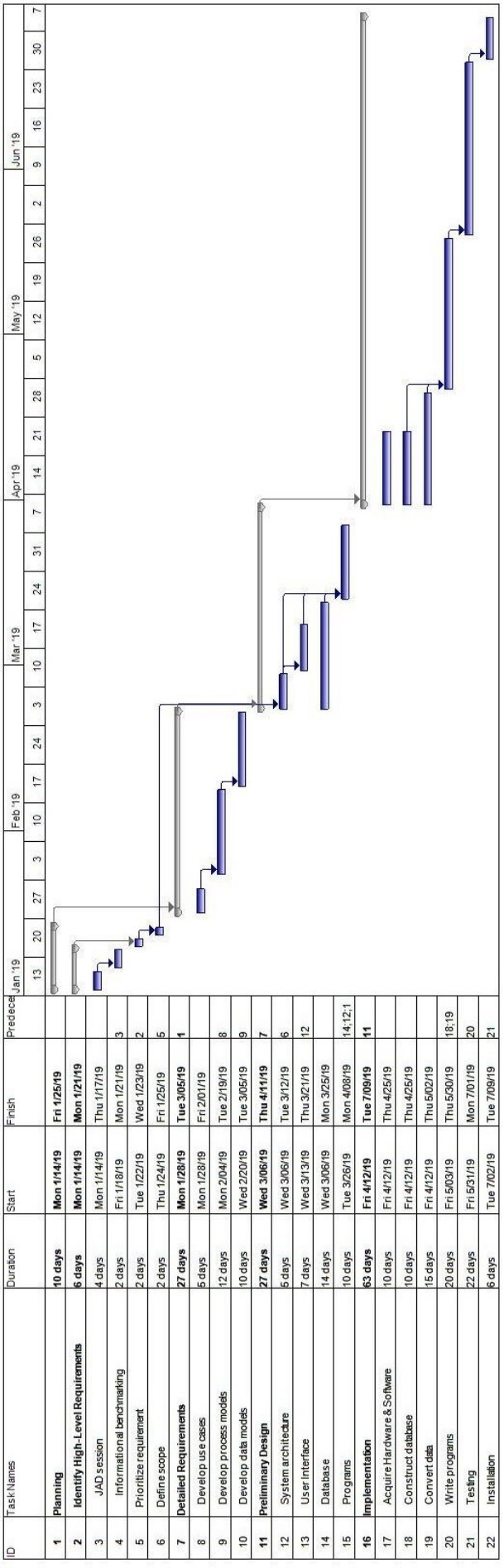
province				
name	**type**	**description**	**Null/Not Null**	**Key**
provinceID	Char(2)	The province id number	Not Null	PK
Province	Varchar(30)	The province name	Not Null	
Province_ch	Varchar(10)	The province Chinese name	Not Null	

team				
name	**type**	**description**	**Null/Not Null**	**Key**
teamID	Char(5)	The team id number	Not Null	PK
managerID	Char(5)	The manager id number	Not Null	FK

staffposition				
name	**type**	**description**	**Null/Not Null**	**Key**
positionID	Char(3)	The position id number	Not Null	PK
Position	Varchar(30)	The position name	Not Null	

target				
name	**type**	**description**	**Null/Not Null**	**Key**
teamID	Char(5)	The team id number	Not Null	PK/FK
Month	Char(5)	The month of the team	Not Null	
Target	Int(12,7)	The target details	Not Null	

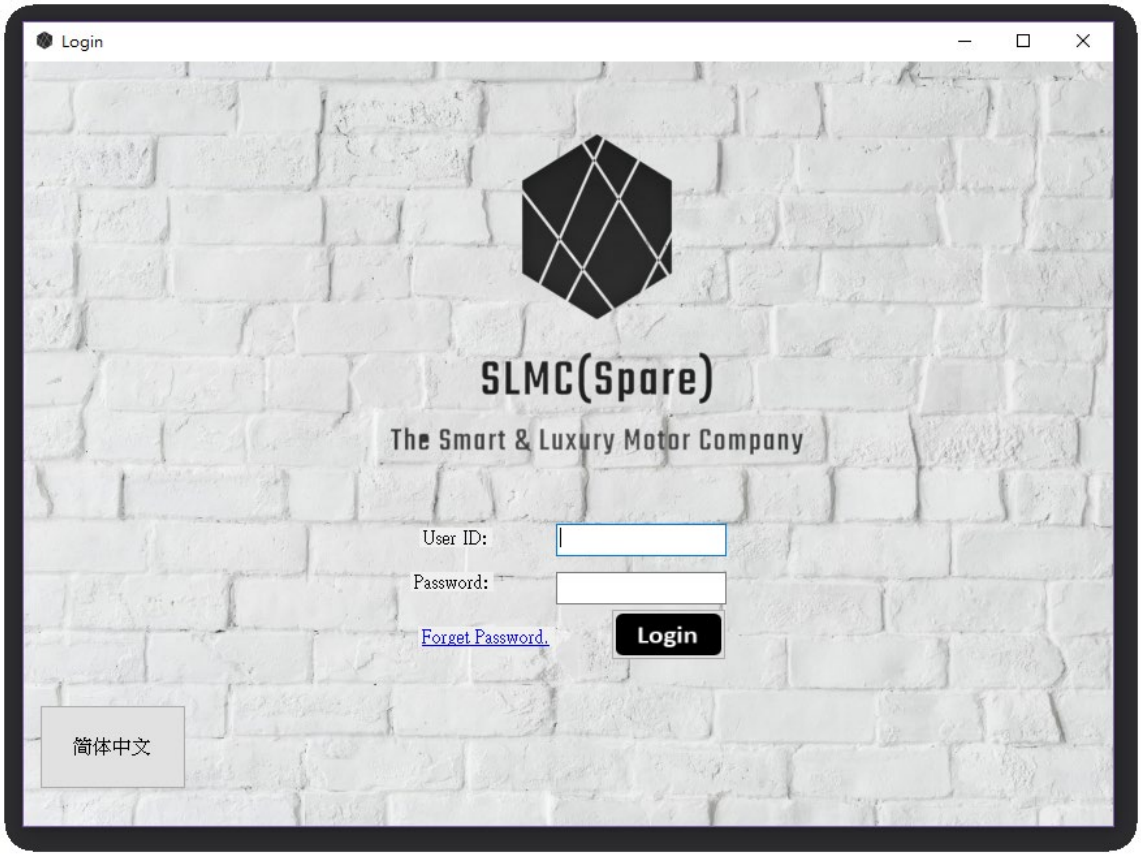
9. Project Schedule



ID	Task Names	Duration	Start	Finish	Predece
1	**Planning**	**10 days**	**Mon 1/14/19**	**Fri 1/25/19**	
2	**Identify High-Level Requirements**	**6 days**	**Mon 1/14/19**	**Mon 1/21/19**	
3	JAD session	4 days	Mon 1/14/19	Thu 1/17/19	
4	Informational benchmarking	2 days	Fri 1/18/19	Mon 1/21/19	3
5	Prioritize requirement	2 days	Tue 1/22/19	Wed 1/23/19	2
6	Define scope	2 days	Thu 1/24/19	Fri 1/25/19	5
7	**Detailed Requirements**	**27 days**	**Mon 1/28/19**	**Tue 3/05/19**	**1**
8	Develop use cases	5 days	Mon 1/28/19	Fri 2/01/19	
9	Develop process models	12 days	Mon 2/04/19	Tue 2/19/19	8
10	Develop data models	10 days	Wed 2/20/19	Tue 3/05/19	9
11	**Preliminary Design**	**27 days**	**Wed 3/06/19**	**Thu 4/11/19**	**7**
12	System architecture	5 days	Wed 3/06/19	Tue 3/12/19	6
13	User interface	7 days	Wed 3/13/19	Thu 3/21/19	12
14	Database	14 days	Wed 3/06/19	Mon 3/25/19	
15	Programs	10 days	Tue 3/26/19	Mon 4/08/19	14;12;1
16	**Implementation**	**63 days**	**Fri 4/12/19**	**Tue 7/09/19**	**11**
17	Acquire Hardware & Software	10 days	Fri 4/12/19	Thu 4/25/19	
18	Construct database	10 days	Fri 4/12/19	Thu 4/25/19	
19	Convert data	15 days	Fri 4/12/19	Thu 5/02/19	
20	Write programs	20 days	Fri 5/03/19	Thu 5/30/19	18;19
21	Testing	22 days	Fri 5/31/19	Mon 7/01/19	20
22	Installation	6 days	Tue 7/02/19	Tue 7/09/19	21

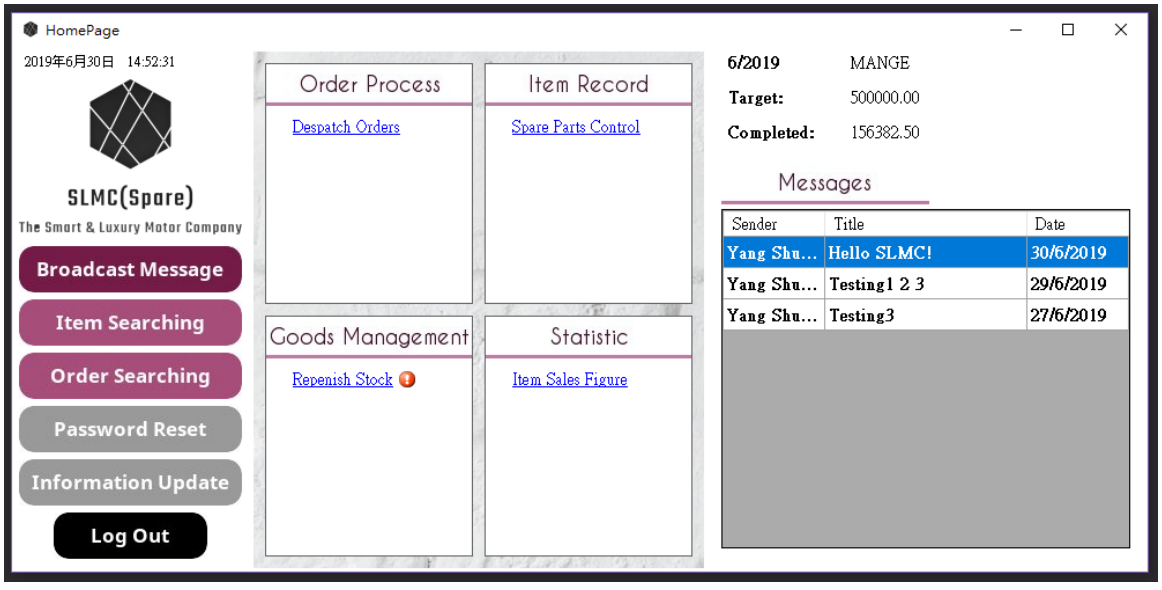
10 User Interface Design

Login

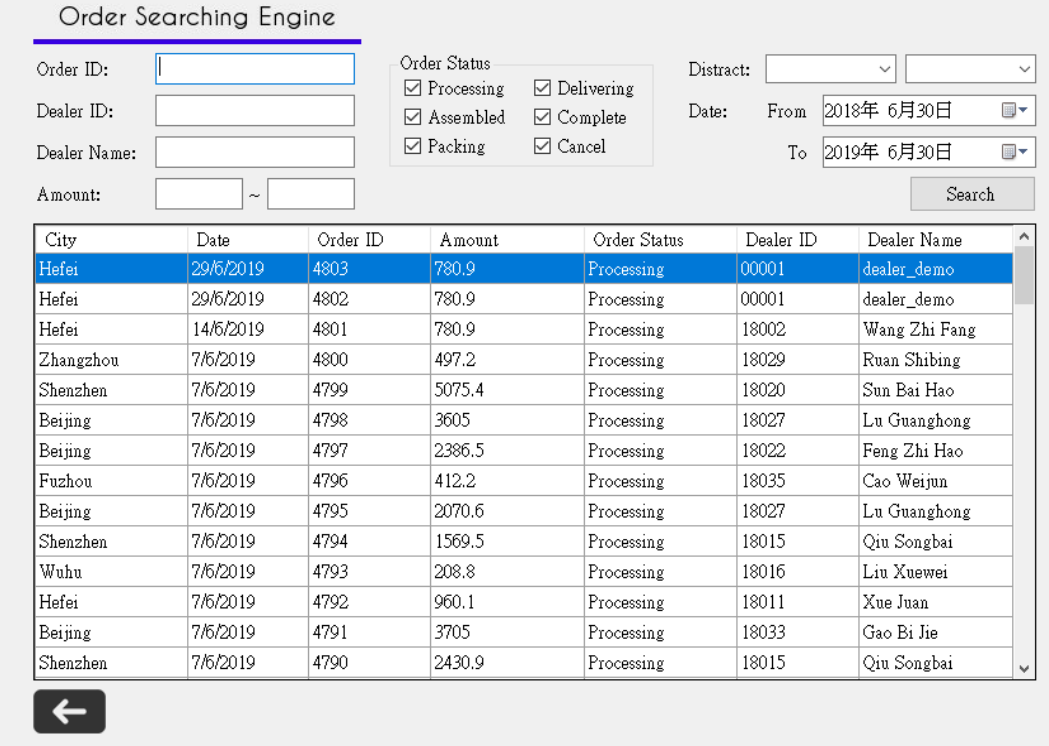


Homepage with broadcast message display (Every user have different Home page interface)

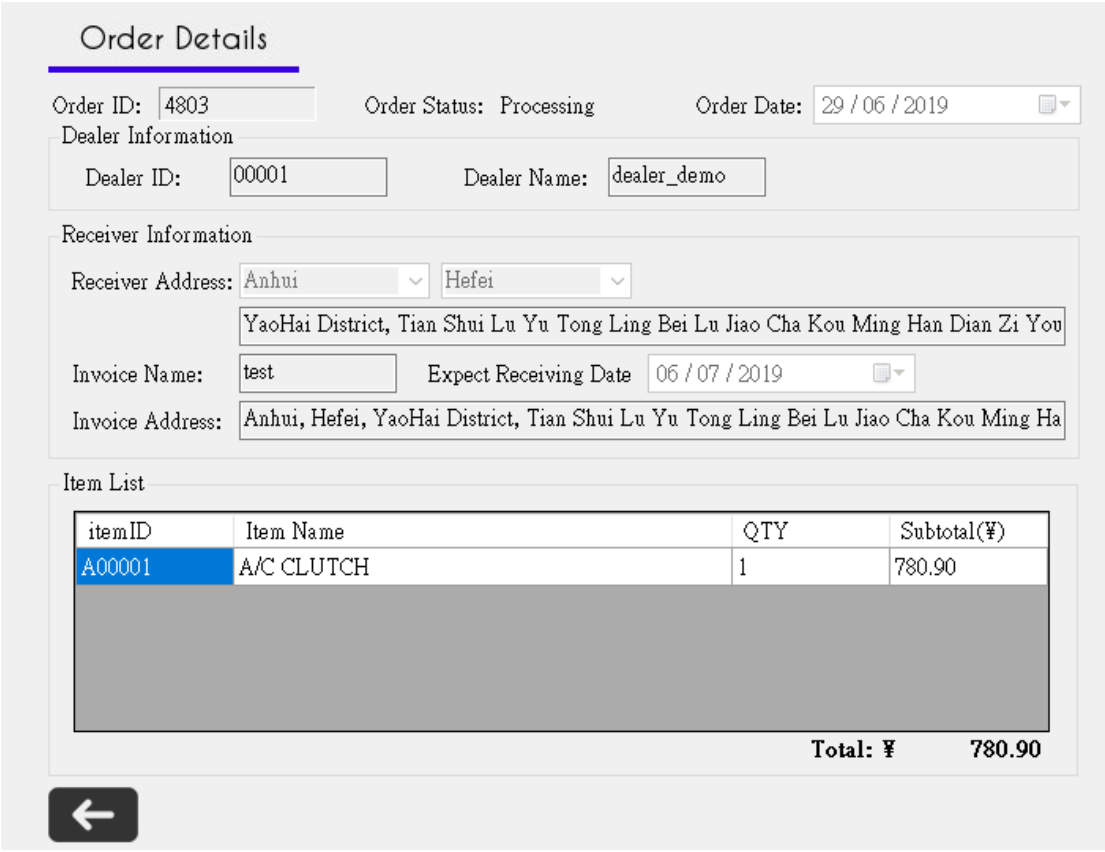
Example: Spare part Controller



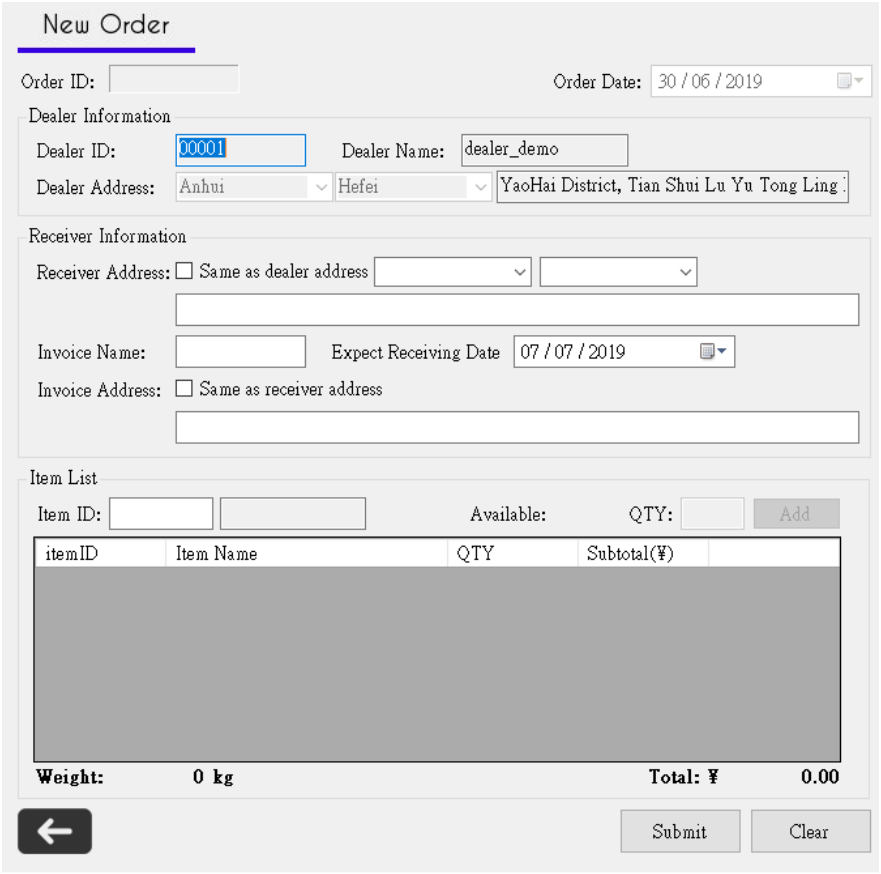
Order Searching



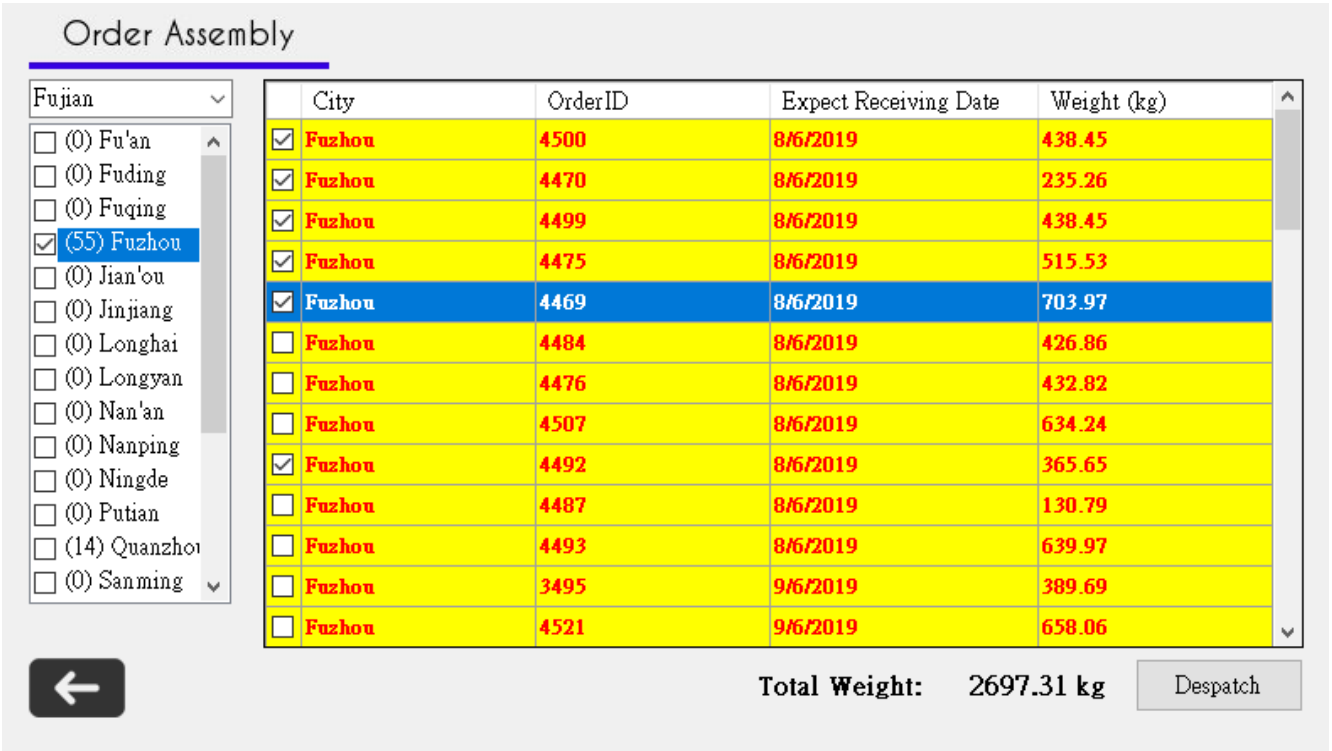
Order Information



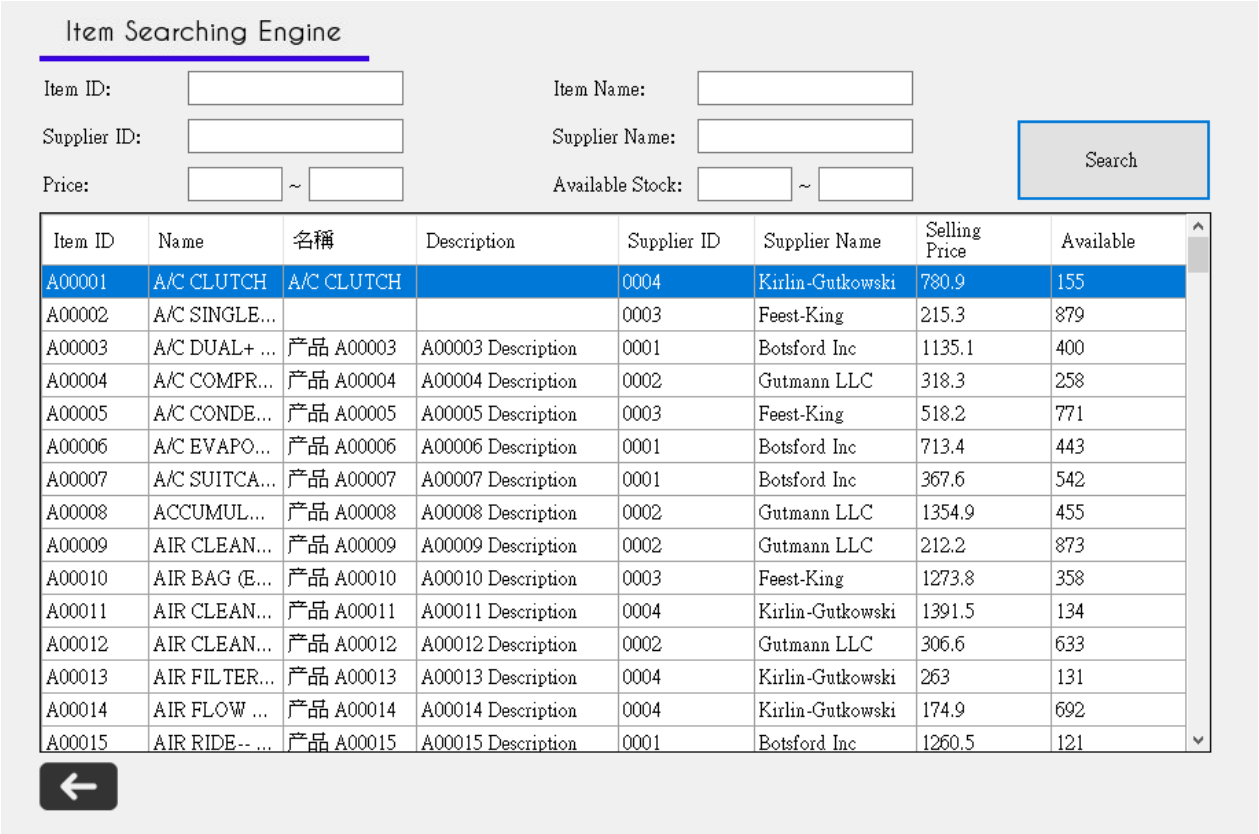
Create New Order



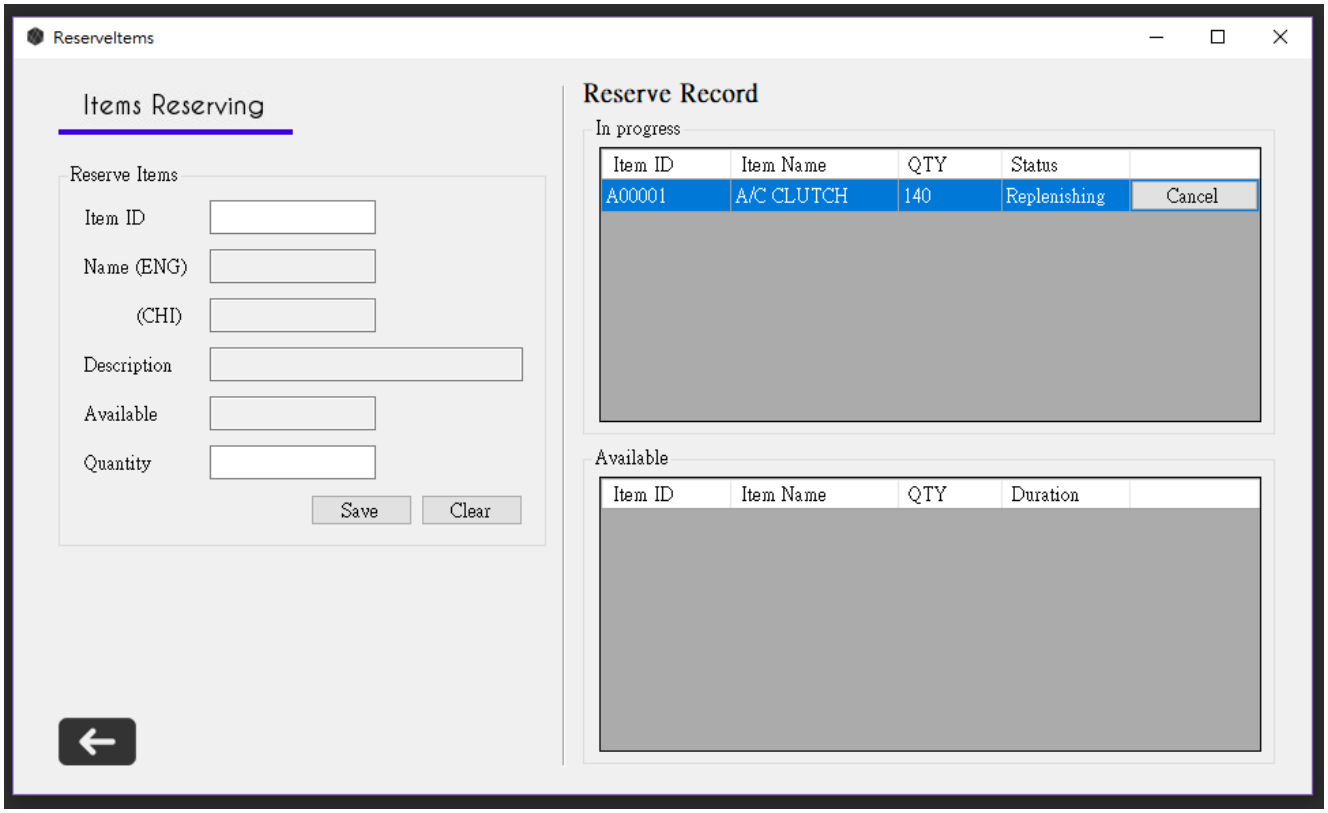
Assemble Order



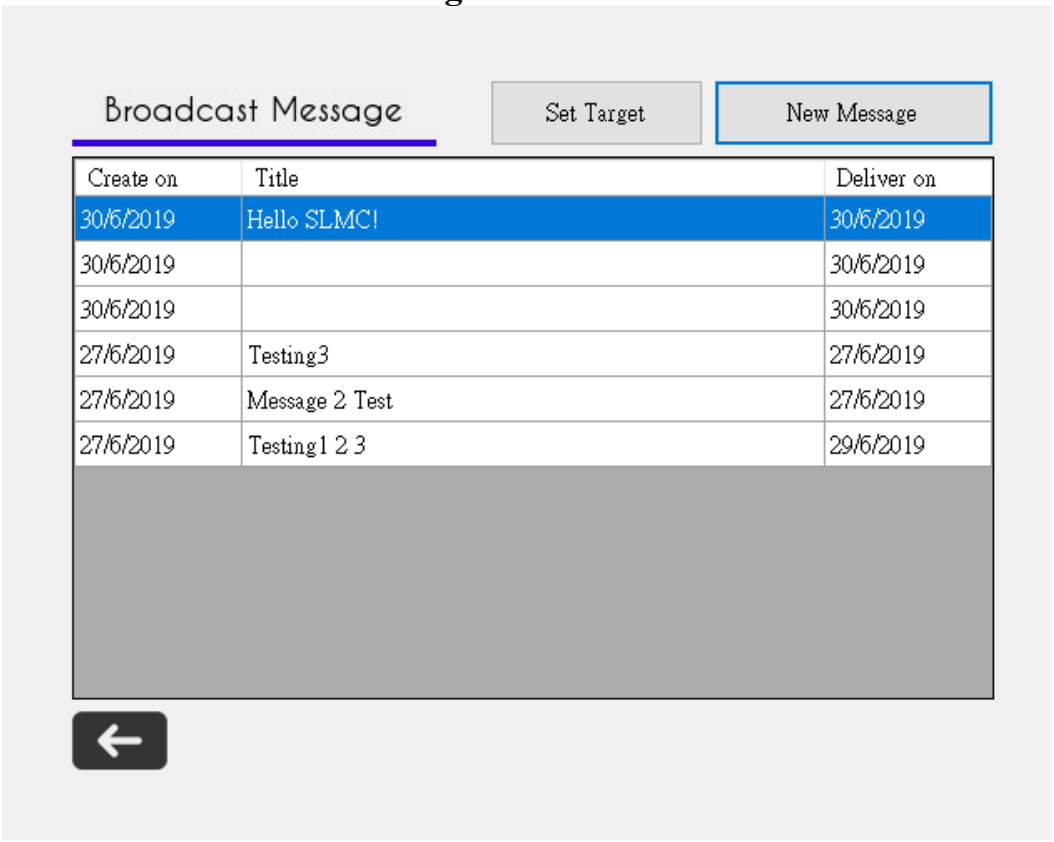
Item Searching Engine

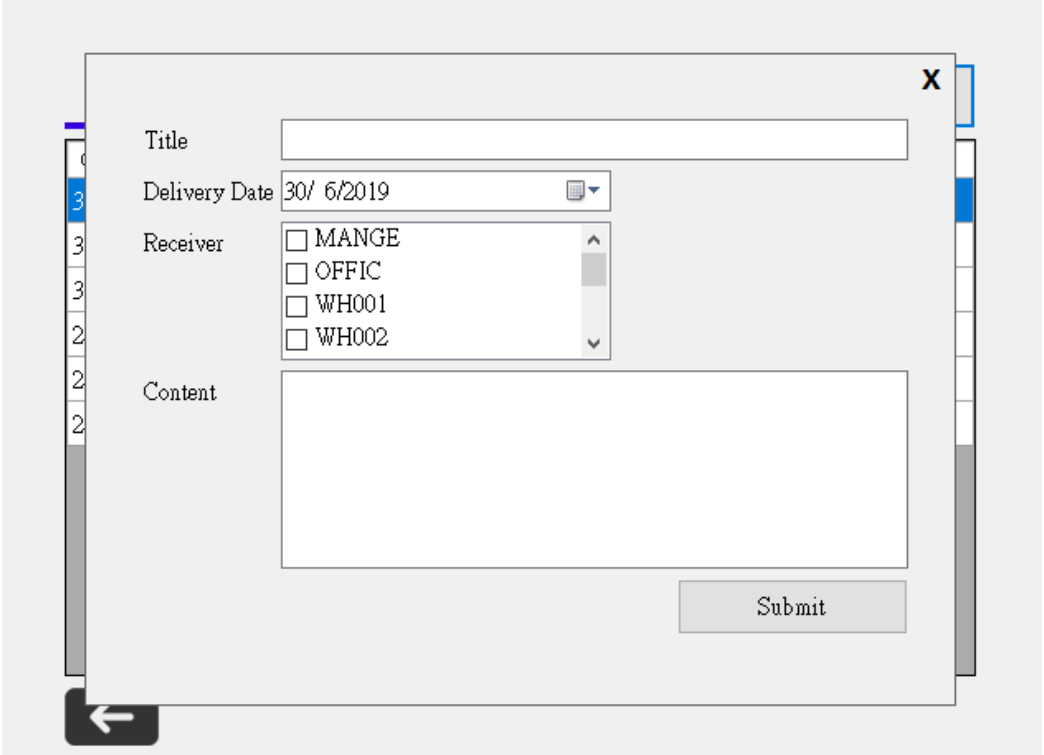


Reserve Item



Create Broadcast Message





11 Test Case

11.1 Unit Test

Test Case	Login
Test Case ID	TC-001
Test Case Description	Login testing

Step No.	Action	Expected Output	Actual Output	Test Result
1	Launch application	Login page	Login page	Pass
2	Login with invalid account	System display error message.	System display error message.	Pass
3	Login with valid account	System home page	System home page	Pass

11.2 Integrated Test

Test Case	Create Order
Test Case ID	TC-002
Test Case Description	Create order testing

Step No.	Action	Expected Output	Actual Output	Test Result
1	Enter order page	Order page	Order page	Pass
2	Add items in order	Items are added	Items are added	Pass
3	Submit order	Order save to database	Order save to database	Pass

Test Case	Reserve item
Test Case ID	TC-003
Test Case Description	Reserve item testing

Step No.	Action	Expected Output	Actual Output	Test Result
1	Enter item reserving page	Item reserving page	Item reserving page	Pass
2	Add items in reserving form	Items are added	Items are added	Pass
3	Submit reserving instruction	Instruction save to database	Instruction save to database	Pass

Test Case	Search order
Test Case ID	TC-004
Test Case Description	Search order from database

Step No.	Action	Expected Output	Actual Output	Test Result
1	Enter order searching engine	Searching engine	Searching engine	Pass
2	Search existing order	Display order list	Display order list	Pass
3	Search non-existing order	Display empty list	Display empty list	Pass

Test Case	Search item

Test Case ID	TC-005
Test Case Description	Search item from database

Step No.	Action	Expected Output	Actual Output	Test Result
1	Enter item searching engine	Searching engine	Searching engine	Pass
2	Search existing item	Display item list	Display item list	Pass
3	Search non-existing item	Display empty list	Display empty list	Pass

Test Case	Data overview
Test Case ID	TC-006
Test Case Description	View item sales figure chart and sales growth chart

Step No.	Action	Expected Output	Actual Output	Test Result
1	View item sales figure chart	Item sales figure chart	Item sales figure chart	Pass
2	View sales growth chart	Sales growth chart	Sales growth chart	Pass

Test Case	User maintain
Test Case ID	TC-007
Test Case Description	Update user information and add new user

Step No.	Action	Expected Output	Actual Output	Test Result
1	Update user information	New information saved to database	New information saved to database	Pass
2	Add new user	New user is added	New user is added	Pass

11.3 System Test

Test Case	Manage Order
Test Case ID	TC-008
Test Case Description	View order history, modify, cancel and confirm receive.
Precondition	Login to dealer's account

Step No.	Action	Expected Output	Actual Output	Test Result
1	Enter item order history page	Order history list	Order history list	Pass
2	View order details	Order information	Order information	Pass
3	Modify order	New information saved to database	New information saved to database	Pass
4	Cancel order	Order status change to "Cancel"	Order status change to "Cancel"	Pass
5	Confirm receive the order	Order status change to "Complete"	Order status change to "Complete"	Pass

Test Case	Check User Accessibility
Test Case ID	TC-009
Test Case Description	Check if the user blocked when access some inaccessible function
Precondition	Create different type of account.

Step No.	Action	Test Result
1	Test dealer’s account accessibility	Pass
2	Test sale office’s account accessibility	Pass
3	Test stock record staff’s account accessibility	Pass
4	Test controller’s account accessibility	Pass
5	Test manager’s account accessibility	Pass
6	Test system administrator’s account accessibility	Pass

12 Conclusion

After developed the system, we got more understand about the need and requires of our company and staffs. This system can deal with those Ordering Process, Inventory, Dispatch Process Invoicing problem and the major changes are shown as below.

General

- Flexible ordering mechanism.
- Synchronize all data format.
- Serve on a synchronize Database.
- Broadcast Message

Ordering Process

- New system now will provide a standardize ordering form for dealer.
- Electronic Outstanding Order Process with notification function.
- Our staff can report the actual or defective item by the system.

Inventory

- An alert function is provided when the stock is under danger line.
- Provide certain Searching Engine to substitute searching by human.

Despatch Process

- Every shelf number now can be provided in a electronic dispatch instruction.
- A delivery routes can generate on dispatch instruction for delivery.
- Now can check and confirmed by our staff in an electronic form and must be confirmed before delivery.

Invoicing Procedure

- System can generate a clearing report to show the payment date.
- Simplify all the cumbersome step to certify all the invoice.

Stock Recording Procedure

- An exquisiteness UI interface will be provided for our worker to insert data in a certain format.

This system will improve our company to another level. It gives a hand to motivate us to change all the existing operation on company, and our company now is on!

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Project Log

Date: 21 Jan 2019		**Logged by:** Ng Yee Ching
Work done & findings	**Not yet finished**	**Plan of work**
Introduction	Problem finding	Functional requirement

Date: 28 Jan 2019		**Logged by:** Ng Yee Ching
Work done & findings	**Not yet finished**	**Plan of work**
	Problem finding Functional requirement	No new plan

Date: 11 Feb 2019		**Logged by:** Ng Yee Ching
Work done & findings	**Not yet finished**	**Plan of work**
Problem finding	Functional requirement	Non-functional requirement

Date: 18 Feb 2019		**Logged by:** Ng Yee Ching
Work done & findings	**Not yet finished**	**Plan of work**
Functional requirement	Non-functional requirement	Finish Requirement Specification

Date: 25 Feb 2019		**Logged by:** Ng Yee Ching
Work done & findings	**Not yet finished**	**Plan of work**
Non-functional requirement Requirement Specification		Design Phase - UML - Database - UI Setup server

Date: 04 Mar 2019		**Logged by:** Ng Yee Ching
Work done & findings	**Not yet finished**	**Plan of work**
Use case draft Database Normalized Form draft	Use case diagram 3NF Setup server	Use case diagram ERD

Date: 11 Mar 2019		**Logged by:** Ng Yee Ching
Work done & findings	**Not yet finished**	**Plan of work**
Use case diagram Database 3NF ERD draft	ERD Setup server	Use case description Sequence Diagram

Date: 18 Mar 2019		**Logged by:** Ng Yee Ching
Work done & findings	**Not yet finished**	**Plan of work**
ERD Setup server	Use case description Sequence Diagram	Data Dictionary

Date: 25 Mar 2019		**Logged by:** Ng Yee Ching
Work done & findings	**Not yet finished**	**Plan of work**
Data Dictionary	Use case description Sequence Diagram	UI Design

Date: 01 Apr 2019		**Logged by:** Ng Yee Ching
Work done & findings	**Not yet finished**	**Plan of work**
Fine tune Use case diagram	Use case description Sequence Diagram UI Design	No new plan

Date: 08 Apr 2019		**Logged by:** Ng Yee Ching
Work done & findings	**Not yet finished**	**Plan of work**
Use case description Sequence Diagram	UI Design	Finish Design Specification

Date: 11 Apr 2019		**Logged by:** Ng Yee Ching
Work done & findings	**Not yet finished**	**Plan of work**
UI Design Design Specification		Implementation (Start on end of April)