



Onion Express

Software Requirements Specification

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1 Introduction

Onion Express® is a system built for logistic companies, which provides them with a solution to logistics tracking, goods packing, goods distribution, after-sales management, data storage, information processing, etc.

1.1 Purpose

These days as B2C business is increasing rapidly, the growth of logistics business is also remarkable. The enormous market demand brings logistics companies opportunities as well as the challenge. Facing such kind of condition, this project is aimed at improving the efficiency of field personnel and customer satisfaction of a logistics company by building a cross-platform system.

1.2 Definitions

As Jobs has ever said, “People don’t know what I really want at all, until your products are in their eyes”. This project is specially designed for an independent logistics companies like UPS. The business scope is limited within China. To be more precise, the express is only available in Jiangsu, Zhejiang and Shanghai at the beginning. Temporarily private orders are not covered in the business scope, which means the express company corporates with e-commercial companies only with the cash-on-delivery express or normal express. The system focuses on logistics service without regard to O2O, bulk cargo or self-support e-business. Timing express might be expanded in future.

1.3 System Overview

The actors in the system are classified as *Postman*, *E-business*, *Customer service*, *Customer* and *Agent*. *Customer* and *Agent* are generalized as Receiver. The *Postman* has access to this system only on mobile devices while *Customer* has access both on browsers as well as mobile devices. *E-business* offers orders periodically. *Customer service* helps to deal with tasks cannot be done only by the system.

Web application and iOS application provide different functions for different users to enhance user experience and have some humanization design(e.g. using different colors to mark tasks as reception or delivery in postman’s app). Besides basic functions, the system also

provides some advanced functions, like printing invoices. Different offline payment methods are supported. And the customer's telephone number is hidden to protect his/her privacy. The postman is equipped with a multifunctional special device, when the customer receives his/her package, he/she can use this device to pay by card and can also press thumb on it to sign digitally, besides, the device helps collect postman's GPS location accurately.

The system considers all the 8 scenarios, including sending the package, paying for the product, signing the package and so on. To integrate the system, two scenarios are added. One is creating the orders, at the beginning of the entire flow. Another is dealing the order manually, to reduce errors caused by the system and handle other unanticipated situations. That can improve the stability of the system and in consideration of the relatively small scale of users in the early stage, robot customer service is not necessary. It can be taken into consideration when the business is expanding to a certain stage.

This project also designs several user interface mock-ups on the website and on mobile devices. Core functions are exhibited in these mock-ups, for example, the dispatch list interface.

Nonfunctional requirements and further explanations on security, performance, data storage and computing, tracking the package, maintenance and others are detailed in supplementary Specification.

2 Use Case Modelling

2.1 Global Use Cases

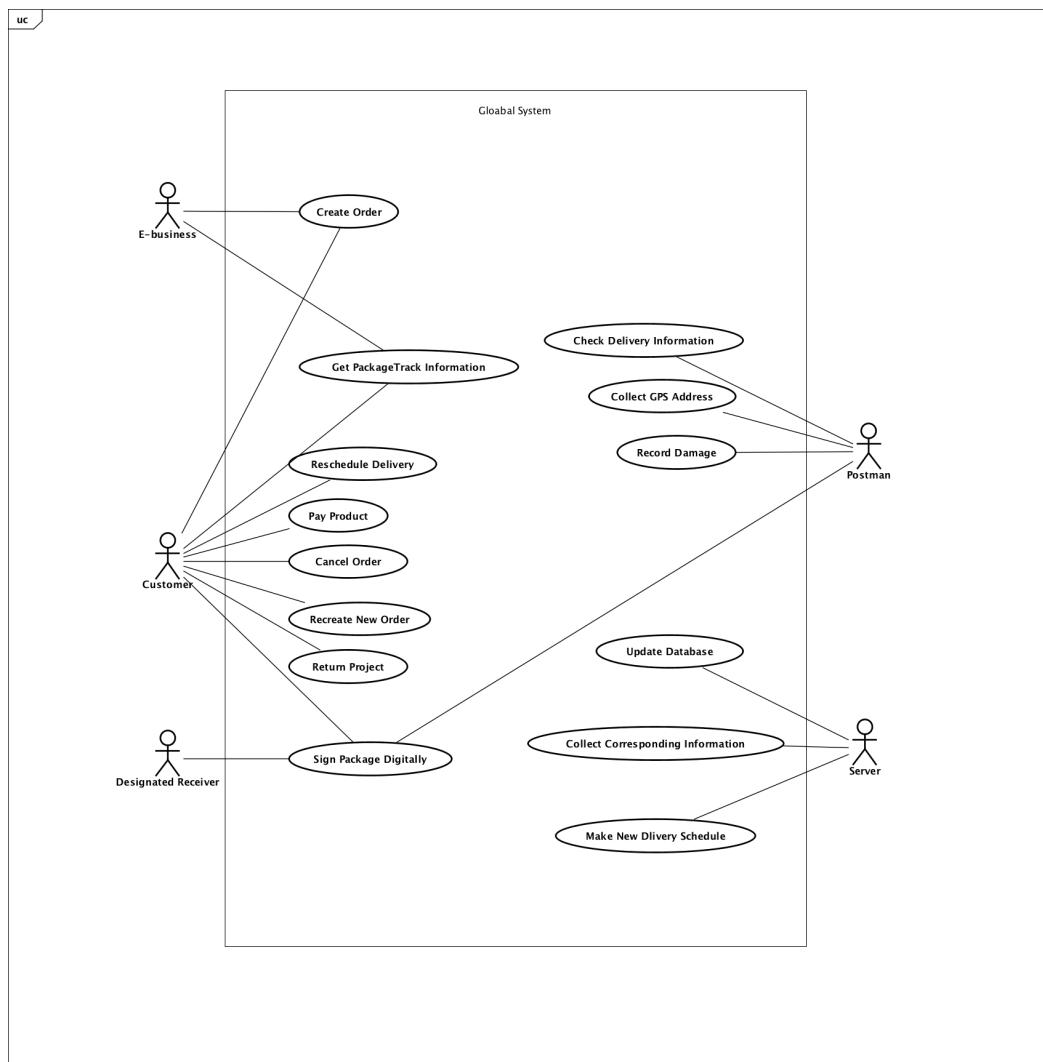


Figure 2.1: Global Use Cases Diagram

2.2 Specigication of Use Cases

2.2.1 Scenario One

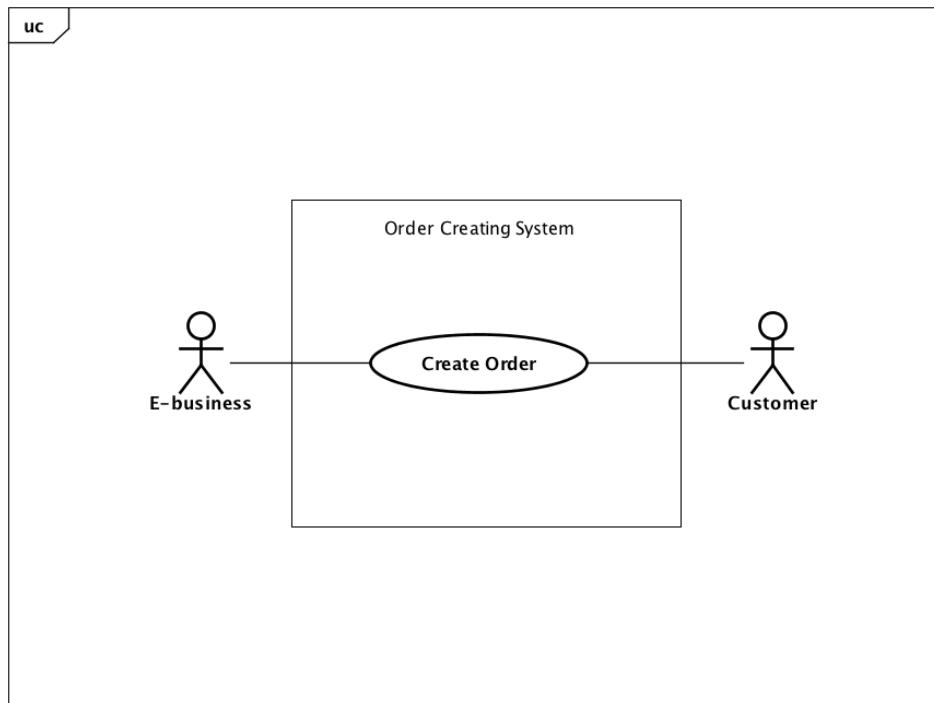


Figure 2.2: Scenario One Use Case Diagram

Use Case Name	Create Order
Related Requirements	Scenario One
Goal in Context	The customer or E-business requests to create order.
Preconditions	The customer buys products from E-business or wants to send packages.
Successful End Condition	Server creates order according to the information provided by E-business & Customer.
Failed End Condition	Server refuses to create an order.
Primary Actors	E-business and Customer
Secondary Actors	None
Trigger	E-business & Customer sends the related information to Server.
Main Flow	<p>Step 1 : Customer & E-business Registers Information to Server.</p> <p>Step 2 : Customer & E-business Sends Information to Server.</p> <p>Step 3 : Server checks whether the information is completed.</p> <p>Step 4 : Server creates orders automatically according to the information above.</p> <p>Step 5 : E-business & customer transfers products to Logistics company and pays for the delivery. If the customer doesn't pay before, Logistics company will pay for products for the customer in advance.</p> <p>Step 6 : Logistics company transports packages to different regional distribution centers.</p>
Extensions	The request of creating Order is rejected.

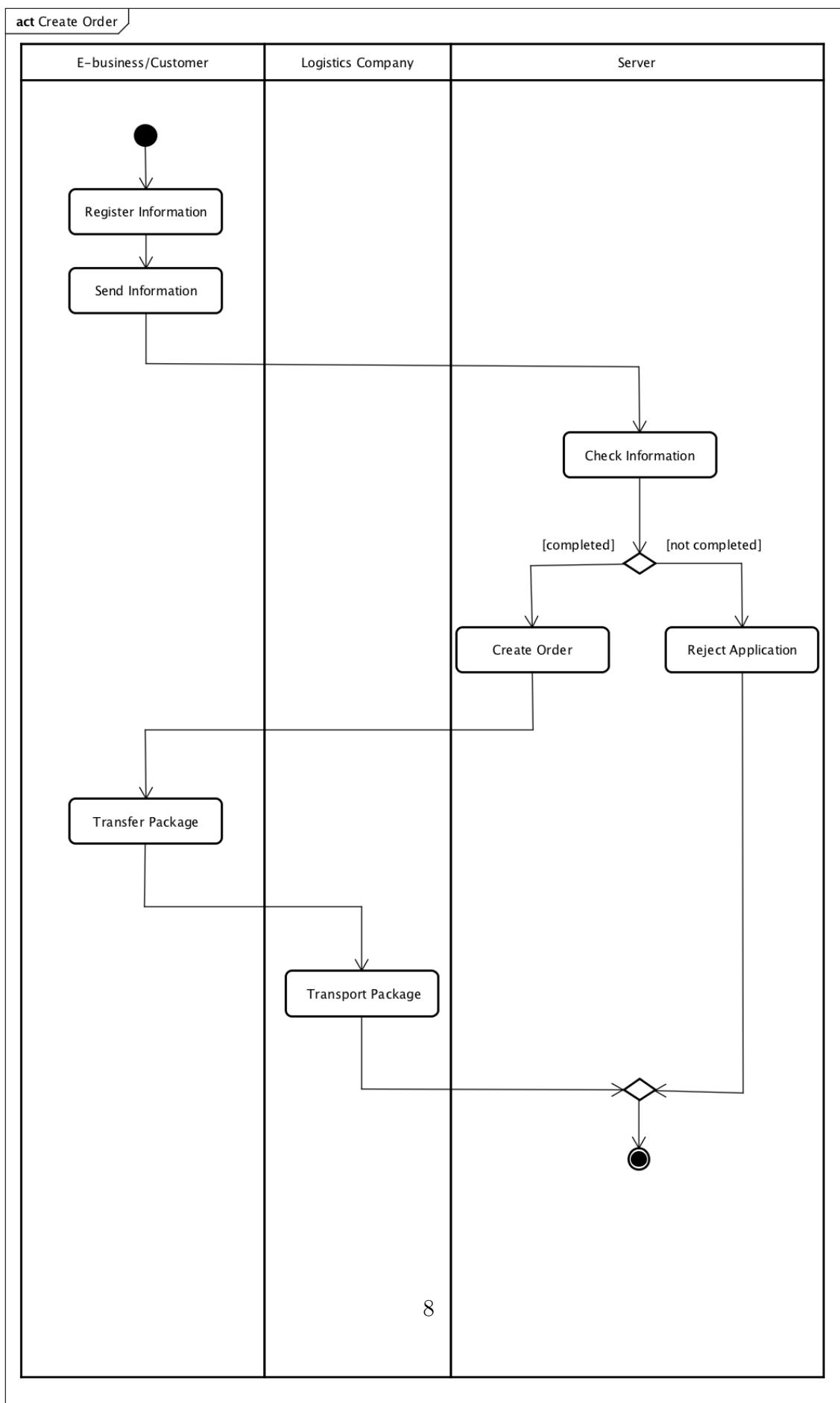


Figure 2.3: Scenario One Activity Diagram

2.2.2 Scenario Two

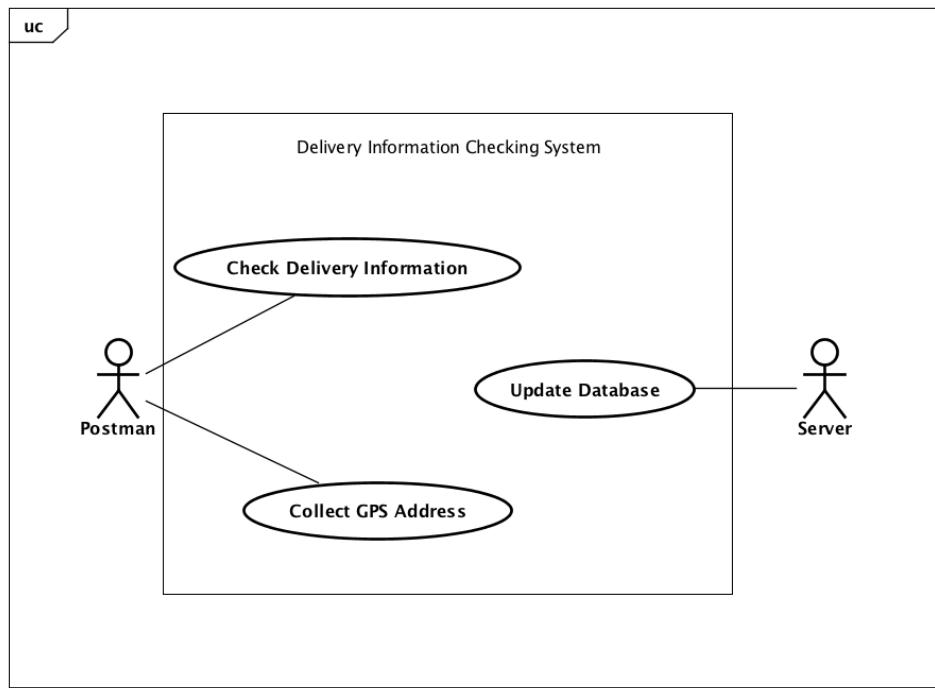
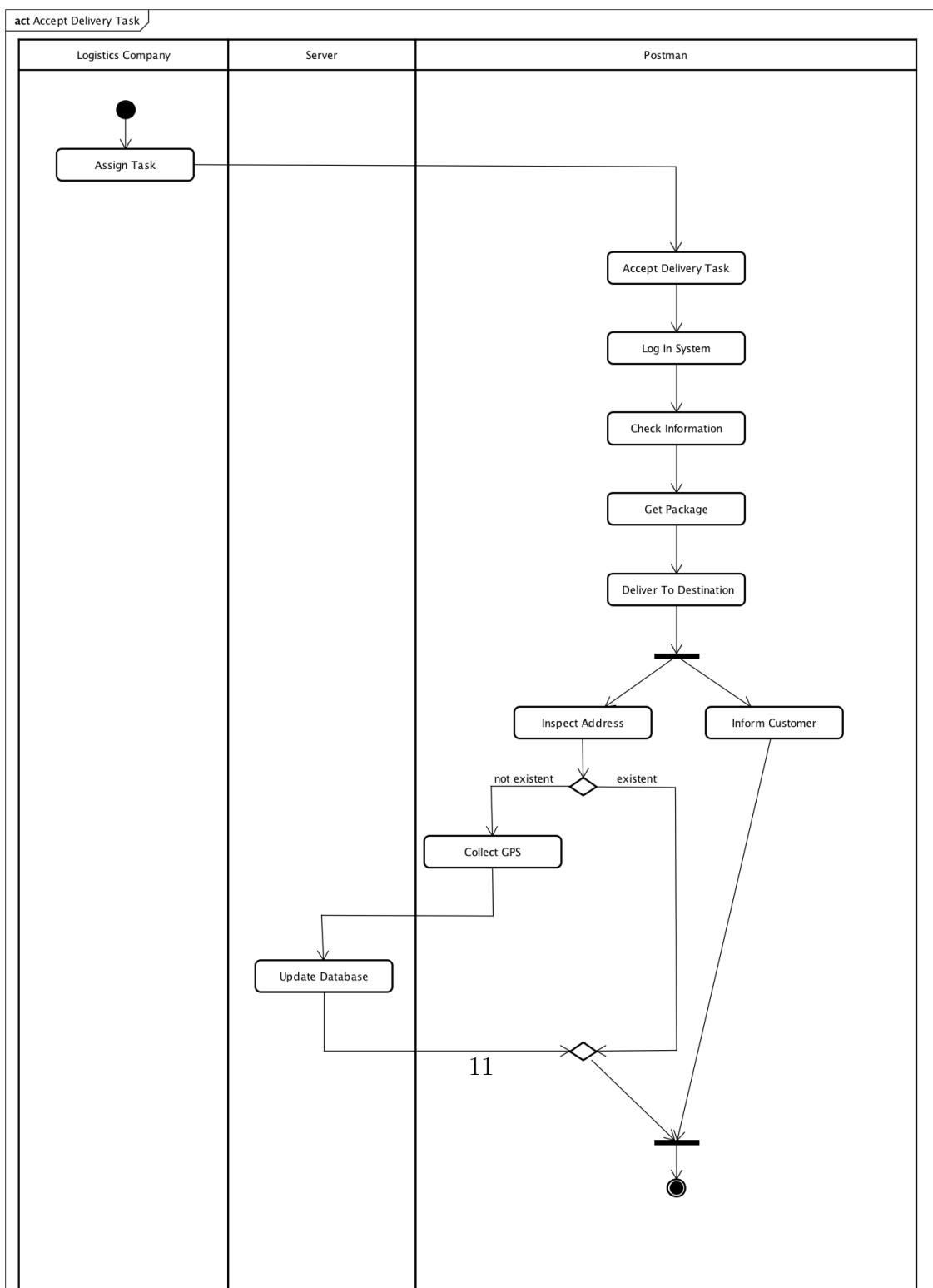


Figure 2.4: Scenario Two Use Case Diagram

Use Case Name	Check Delivery Information
Related Requirements	Scenario Two
Goal in Context	Postmen accept delivery task assigned by the system.
Preconditions	Orders have been created and packages have been transported to the regional distribution centers.
Successful End Condition	Postmen check delivery information and send packages to the customer.
Failed End Condition	None
Primary Actors	Postman
Secondary Actors	None
Trigger	Postmen accept an delivery task.
Main Flow	<p>Step 1 : Logistics Company assigns task to Postman.</p> <p>Step 2 : Postmen accept delivery task.</p> <p>Step 3 : Postmen log in the system.</p> <p>Step 4 : Postmen check delivery information including tracking number, destination, personal information about receivers, QR code for payment (if the customer choose to pay on-site) and so on.</p> <p>Step 5 : Postmen go to the regional distribution center and get the package.</p> <p>Step 6 : Postmen deliver it to the destination.</p> <p>Step 7 : Postmen inform customers to take packages. At the same time, Postmen will Inspect Address, if the GPS address of the customer is not in the database, they will collect the GPS address.</p>
Extensions	None

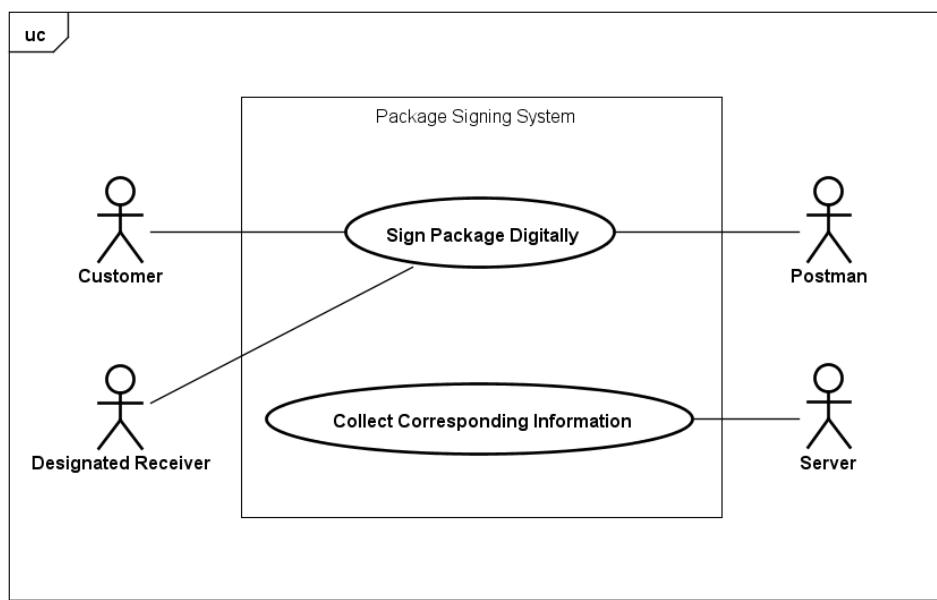
Use Case Name	Collect GPS Address
Related Requirements	Scenario One
Goal in Context	Postmen collect the GPS address of the customer.
Preconditions	Postmen have delivered packages to the destination.
Successful End Condition	Server Updates database successfully.
Failed End Condition	None
Primary Actors	Postman
Secondary Actors	Server
Trigger	The GPS address of the customer is not in the database.
Main Flow	<p>Step 1 : Postmen inspect that whether the GPS address of the customer is in the database.</p> <p>Step 2 : If the GPS address of the customer is not in the database, postmen will collect the GPS address.</p> <p>Include : Update database.</p>
Extensions	None

Use Case Name	Update Database
Goal in Context	Server Updates database.
Preconditions	Postmen collected the GPS address of the customer and sended to server.
Successful End Condition	Server Updates database successfully.
Failed End Condition	Server fails to update database.
Primary Actors	Server
Secondary Actors	None
Trigger	The GPS address of the customer is not in the database.
Main Flow	Step 1 : Server Updates database.
Extensions	None



Use Case Name	Collect Corresponding Information
Related Requirements	Scenario Two & Three
Goal in Context	Collect information and archive related data.
Preconditions	Signing package is finished successfully.
Successful End Condition	The order is marked as complete; Relevant information is gathered.
Failed End Condition	The order is unfinished; Inspect system exception.
Primary Actors	Server
Secondary Actors	None
Trigger	System sends server a message that informs the package delivery is done.
Main Flow	<p>Step 1 : Information including the data of received products, customer acceptance and some other transaction details are collected by the server. All necessary related data is archived to database.</p> <p>Step 2 : Server requests to mark this order as complete.</p>
Extensions	<p>Step 1.1 : Error appears upon the procedure of data collection.</p> <p>Step 1.2 : Data collection is undone.</p>

2.2.3 Scenario Three



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Figure 2.6: Scenario Three Use Case Diagram

Use Case Name	Confirm Reception
Related Requirements	Scenario Two & Three
Goal in Context	Customer verifies if the receiver is designated by him/her.
Preconditions	The package has delivered to the customer-specified location on time but customer is not convenient to receive it.
Successful End Condition	The receiver has the permission to sign the package.
Failed End Condition	The receiver is an imposter; Postman refuses giving him/her the package.
Primary Actors	Customer
Secondary Actors	Postman
Trigger	Someone but not customer claims that he/she have the permission to receive the package.
Main Flow	<p>Step 1 : Postman collects the necessary information of that person and then sends to customer.</p> <p>Step 2 : Customer confirms if the potential receiver is as expected.</p> <p>Step 3 : Postman gets a positive feedback from customer.</p> <p>Step 4 : The receiver can sign the package under customer's permission.</p>
Extensions	<p>Step 3.1 : Postman gets a negative feedback from customer; That person is an imposter.</p> <p>Step 3.2 : Postman refuses to give away the parcel.</p>

Use Case Name	Sign on Pad
Related Requirements	Scenario Two & Three
Goal in Context	A customer or the receiver designated by him/her requests to sign his/her name (or other proofs of identity) on Pad.
Preconditions	The package has delivered to the customer-specified location on time.
Successful End Condition	The customer receives the package; Package delivery success.
Failed End Condition	The customer fails to get the package; Package should be returned or reschedule delivery.
Primary Actors	Customer, Package receiving representative.
Secondary Actors	Postman
Trigger	Postman requests customer to sign on pad with the agreement of customer.
Included Cases	Confirm Reception, Collect Corresponding Information
Main Flow	<p>Step 1 : Customer checks if the parcel is delivered right and in good condition in person.</p> <p>Step 2 : Customer signs on pad.</p> <p>Step 3 : Postman confirms the package is received by customer or his/her representative.</p> <p>Step 4 : All corresponding information including the data of the received product and customer acceptance will be transferred back to the server; The order will be marked as complete.</p> <p>Include : Collect Corresponding Information</p>
Extensions	<p>Step 1.1 : The customer is not convenient to sign the package and asks someone to receive for him/her.</p> <p>Step 2.1 : The representative of customer request to sign the package.</p> <p>Step 2.2 : A confirming message is send to customer and he/she should ensure the package is received by the person he/she designated.</p> <p>Include : Confirm Reception</p> <p>Step 2.3 : The representative signs on pad.</p>

Use Case Name	Sign Package Digitally
Related Requirements	Scenario Two & Three
Goal in Context	A customer requests to sign the package.
Preconditions	The package has delivered to the customer-specified location on time.
Successful End Condition	The customer receives the package; Package delivery success.
Failed End Condition	The customer fails to get the package; Package should be returned or reschedule delivery.
Primary Actors	Customer, Package receiving representative.
Secondary Actors	Postman
Trigger	Postman sends customer the request of signing the package.
Included Cases	Confirm Reception, Collect Corresponding Information
Main Flow	<p>Step 1 : Customer checks if the parcel is delivered right and in good condition in person.</p> <p>Step 2 : Customer signs the package digitally.</p> <p>Step 3 : Postman confirms the package is received by customer or his/her representative.</p> <p>Step 4 : All corresponding information including the data of the received product and customer acceptance will be transferred back to the server; The order will be marked as complete.</p> <p>Inlude : Collect Corresponding Information</p>
Extensions	<p>Step 1.1 : The customer is not convenient to sign the package and asks someone to receive for him/her.</p> <p>Step 2.1 : The representative of customer request to sign the package.</p> <p>Step 2.2 : Step 2.2 : A confirming message is send to customer and he/she should ensure the package is received by the person he/she designated.</p> <p>Inlude : Confirm Reception</p> <p>Step 2.3 : The representative signs the package digitally.</p>

Use Case Name	Sign with Fingerprint
Related Requirements	Scenario Two & Three
Goal in Context	A customer or the receiver designated by him/her requests to sign his/her name (or other proofs of identity) on Pad.
Preconditions	The package has delivered to the customer-specified location on time.
Successful End Condition	The customer receives the package; Package delivery success.
Failed End Condition	The customer fails to get the package; Package should be returned or reschedule delivery.
Primary Actors	Customer, Package receiving representative.
Secondary Actors	Postman
Trigger	Postman requests customer to sign via fingerprint with the agreement of customer.
Included Cases	Confirm Reception, Collect Corresponding Information
Main Flow	<p>Step 1 : Customer checks if the parcel is delivered right and in good condition in person.</p> <p>Step 2 : Customer signs with fingerprint.</p> <p>Step 3 : Postman confirms the package is received by customer or his/her representative.</p> <p>Step 4 : All corresponding information including the data of the received product and customer acceptance will be transferred back to the server; The order will be marked as complete.</p> <p>Include : Collect Corresponding Information</p>
Extensions	<p>Step 1.1 : The customer is not convenient to sign the package and asks someone to receive for him/her.</p> <p>Step 2.1 : The representative of customer request to sign the package.</p> <p>Step 2.2 : A confirming message is send to customer and he/she should ensure the package is received by the person he/she designated.</p> <p>Include : Confirm Reception</p> <p>Step 2.3 : The representative signs with fingerprint.</p>

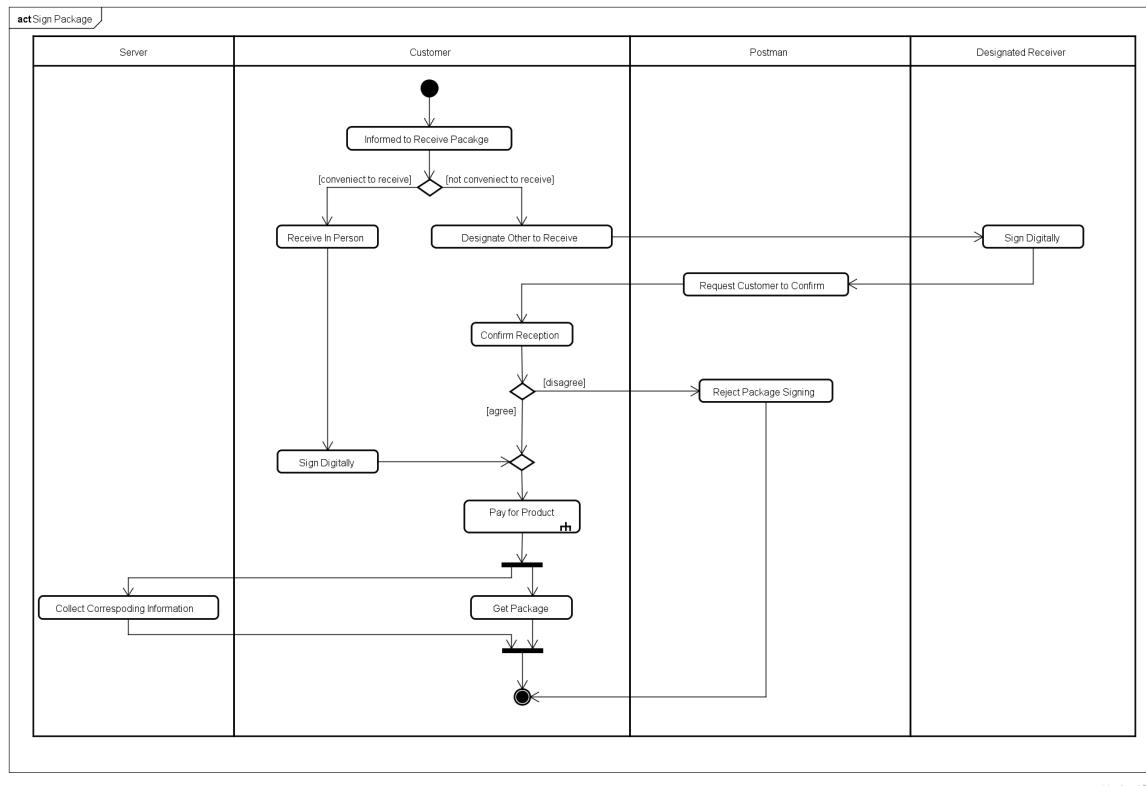


Figure 2.7: Scenario Three Activity Diagram

3 Glossary of Terms

after-sales service

Also called customer service, after sales service is the provision of service to customers before, during and after a purchase.

article

The material in the package which is sent by a normal customer.

bi-directional read

The information can be read in both direction.

cash-on-delivery express

The sale of goods by express where payment is made on delivery rather than in advance.

claim

When packages are damaged or lost, customers have right to ask for compensation.

courier

A courier is a person who delivers messages, packages, and mail. Here it refers to postmen.

customer service staff

The staff in the logistics company serving customers.

damaged express item

The package that is damaged during express.

decision support system(DSS)

A decision support system is a computer-based information system that supports business or organizational decision-making activities.

delivery

A single task to send the package to a customer.

delivery terminal

The destination of the delivery where the receiver receive and sign the package.

dispath list

The digital list of information of the packages to be delivered in postmen's port.

distribution center

A station in a large district to transfer packages to the regional distribution center.

door-to-cfs

From the shipper factory or warehouse to the destination or the Container freight station of the discharging port.

door-to-door

From the shipper factory or warehouse to the consignee's factory or warehouse.

Electronic Data Interchange(EDI)

Electronic Data Interchange is an electronic communication method that provides standards for exchanging data via any electronic means.

Electronic Order System(EOS)

Electronic Order System is to meet demand instantly, with perfect quality and punctuality.

express item

Packages to be delivered.

express item tracking system

A subsystem in our system to track the packages with GIS automatically.

express network

A service network within the scope to help delivery.

express waybill

An express receipt given by the carrier to the shipper acknowledging receipt of the packages being shipped and specifying the terms of delivery.

first time delivery

The first time for particular postman to send the package to a position.

Global Position System(GPS)

The Global Positioning System is a space-based navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites.

Geographic Information System(GIS)

A geographic information system is a system designed to capture, store, manipulate, analyze, manage, and present all types of spatial or geographical data.

handheld terminal

Handheld terminal refers to the portable data processing terminal with some particular features. Here it refers to mobile phones with our app.

inquiry

The customer logins the system or connects with customer service staff to get information about the order, operation instruction etc.

Integrated Services Digital Network(ISDN)

Integrated Services for Digital Network is a set of communication standards for simultaneous digital transmission of voice, video, data, and other network services over the traditional circuits of the public switched telephone network.

interchange receipt

A voucher to certify that the customers or e-business commits articles or products to the logistics company for delivery.

Invoice(INV)

An invoice is a commercial document issued by a seller to a buyer, relating to a sale transaction and indicating the products, quantities, and agreed prices for products or services the seller had provided the buyer.

Just-in-time logistics(JIT logistics)

Just-in-time logistics is a modern logistics method based on the JIT management philosophy.

lost express item

The package that is lost during express.

order number

The number generalized when the order is created.

order processing

A series automatic operation in system to deal the order, such as creating an order, completing an order and so on.

package

The material to be delivered after customers or the e-business company create orders.

product

The material in the package which is ordered by customers from the e-business company.

receiver

Generalized from Customer and Agent, the person receiving and signing the package directly.

redelivery

When no one can sign the package, the postman will carry it back to the delivery terminal and the order will be rescheduled in the system.

redirect express item

When customer changes the destination or the destination is out of scope, the package will be reassigned.

regional distribution center

The substation in a certain region of the logistics company to assign packages to postmen.

return

If customers are unsatisfied with the product, he or she can send it back with a label from system.

sender

The customer or the e-business company who sends the package.

serial number of express

i.e. the tracking number of packages in the system.

sign in

The receiver sign the package and get it.

sorting

The packages in the regional distribution center are sorted to transfer to corresponding postmen or the packages in the distribution center are sorted to transport to regional distribution centers.

tracking number

Especially for tracking the real-time GPS location of the package.

withdrawal

If the customer is unsatisfied with the product and has sent it back, he or she can choose withdrawal the order and the payment will be reimbursed.

4 Supplementary Specification

4.1 Security

The system should avoid the database being attacked and data being taken advantage of by the wicked.

4.1.1 Access and Data Integrity

1. The authorization of access to the system of postmen, customers and customer servers should be classified and announced clearly. With certain authorization, different users have limited access to data and operation.
2. The server should use anti-virus software.
3. Firewalls and network protection are necessary, and they should be updated in time.
4. The atomic processes in the database will ensure the accuracy of the database.

4.1.2 Encryption

1. The session should not be transmitted in DNS.
2. All texts and messages should be encrypted with Encryption Algorithm such as RSA, 3DES or IDEA.
3. Two keys are used to identify a certain user. One public key is used for encryption and another private key is used for decryption. The key is a completely random mix of letters.
4. The session will record the activity of the customer, and if the customer has no operation for 5 minutes, he or she will log out the system automatically.
5. After customers log out the system, all the private information(cookies) will be cleaned.

4.1.3 Digital Certificates

1. We use digital certificates as a replacement of user names and passwords, for example, SSL Certificates. It will be used automatically with the permission of users.

2. The IP address or location where users log in the system will be recorded and when the account is used beyond their regular locations, the user will get alarmed.

4.1.4 Digital Signatures

1. Users should log in the system with a password. Our system will test its complexity. If it is too simple, the system will remind the users to complicate it. That involves cryptography.
2. We use a message digest to ensure the integrality of the data.
3. If necessary, we can extend our fingerprint system to login system.

4.2 Performance

1. The information of the package, including the real-time position, Order-ID, the postman etc., should be checked by customers in 3 seconds with at most 0.1% error rate.
2. The payment should be confirmed in 2 seconds by the system from the moment when the third party trade agent sends the message or the postmen report the payment.
3. The order created by customers should be processed in 15 minutes.
4. The orders obtained from e-business should be processed every hour(about 5,000 orders).
5. Information of the delivery such as the phone number, the address, the receiver and others should be updated and checked by postman in 1 min.
6. This system allows the e-business to create batch orders which can be sent at regular time.
7. The estimate of delivery time should be accurate with the max uncertainty in 2 days.
8. The expectation should be sent to custom service in 2 min from the time a postman reports it.
9. This system's unavailable time should be controlled in 20 minutes in a year.
10. To offer the best user experience, a content delivery network should be used by this system.

4.3 Data Storage and Computing

1. To store a huge amount of data, distributed database should be used. And it should use Homogeneous Distributed Databases Management System.
2. Considering that there may be an enormous number of visitors and inquiries at the same time, the system must implement cloud computing service.
3. The system can support as many as 1500 times of visits per second.
4. There must be a copy of the database, including device entity, software, data and even employees, in order to prevent some unpredictable disasters.
5. If the database is destroyed, the copy should be enabled in 3 hours.
6. The data can be in English, Chinese, Japanese, French and Korean.

4.4 Track the Package

1. In order to track the package, the GIS system should be applied, with the help of the GPS system. The system gets geographic information from a third party system, and get the position of postmen who deliver the package through the system of postmen. And this system should match both kinds of the information and show it to users of the system.
2. The system for postmen should upload the position of the postman automatically every 2 hours, through 3G, 4G or WLAN network.
3. If the locations of postmen are missing for 4 hours, the system should inform the custom servers, and custom servers will contact with postmen.

4.5 Maintenance

1. The distributed database should be maintained by the employees of our own company including the employees of the standby database every day when the visiting traffic is not heavy.
2. The software for custom service, customer and postmen and the system itself should be maintained by our employees.
3. The geographic information source should be multiple, in case that one of the sources is unavailable.
4. The engineers from the company offered DBMS will maintain our system every year.
5. An integrated scheme to deal accidents, for example, the crash of database, is necessary.

4.6 Others

1. The architectures of the postman app and the customer app are B/S and C/S, but that of custom service is C/S for safety.
2. Our system can be used in iOS and Android on mobile devices and in a normal browser on PC(Windows/macOS/Unix).
3. Anticipated development time is two months.

5 User Interface

5.1 Mobile Devices(iOS)

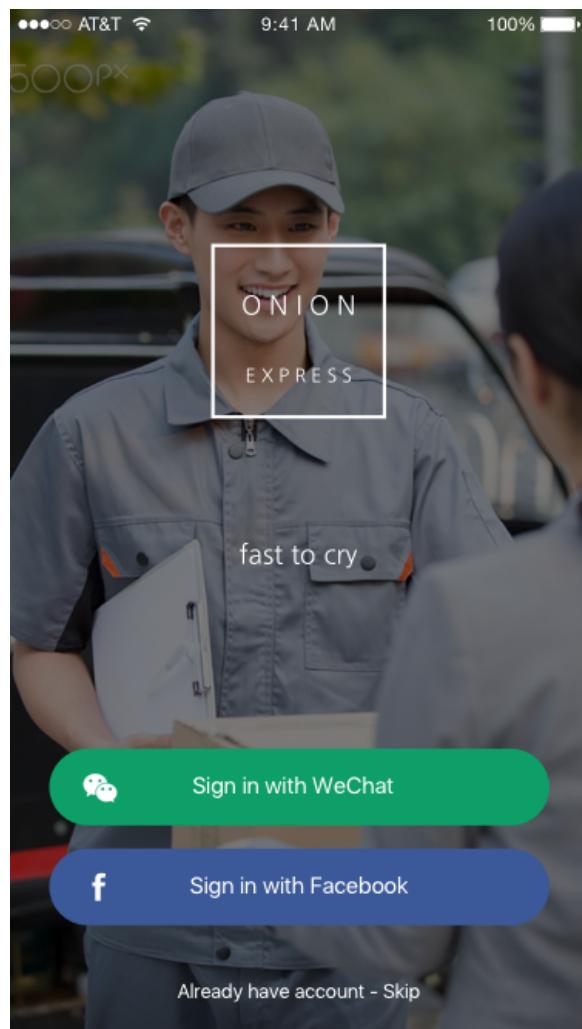


Figure 5.1: Log in

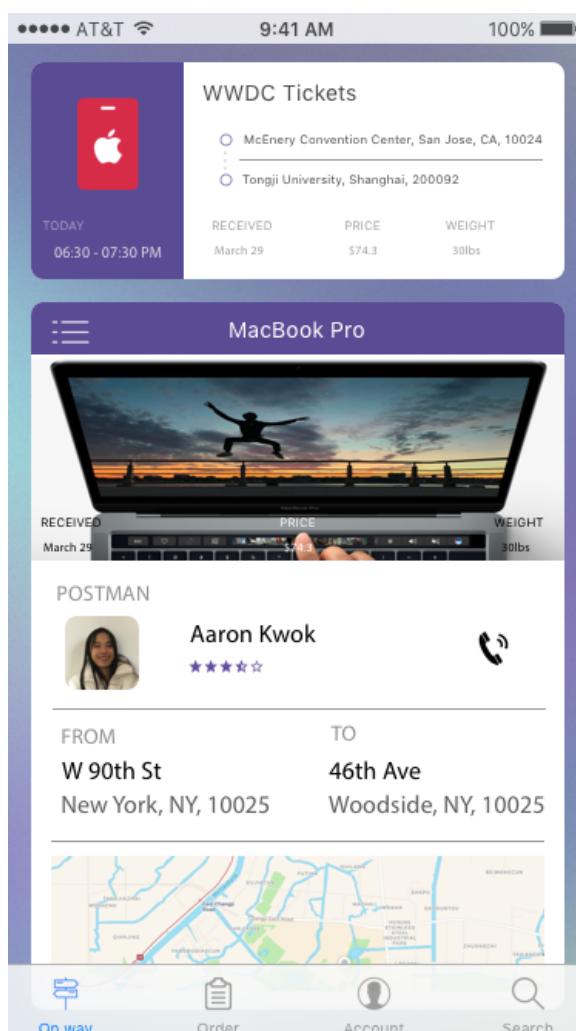


Figure 5.2: On way

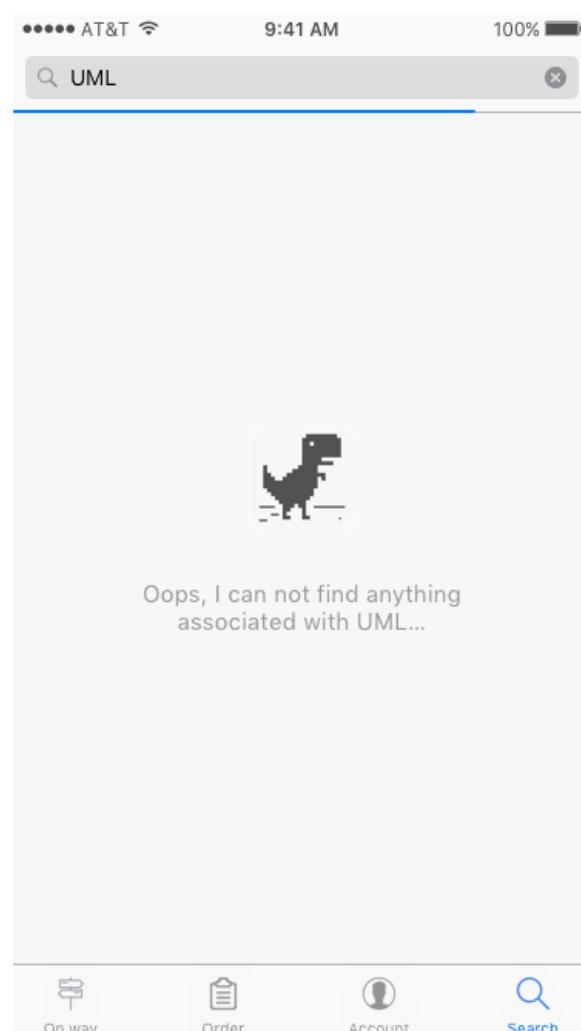


Figure 5.3: Search

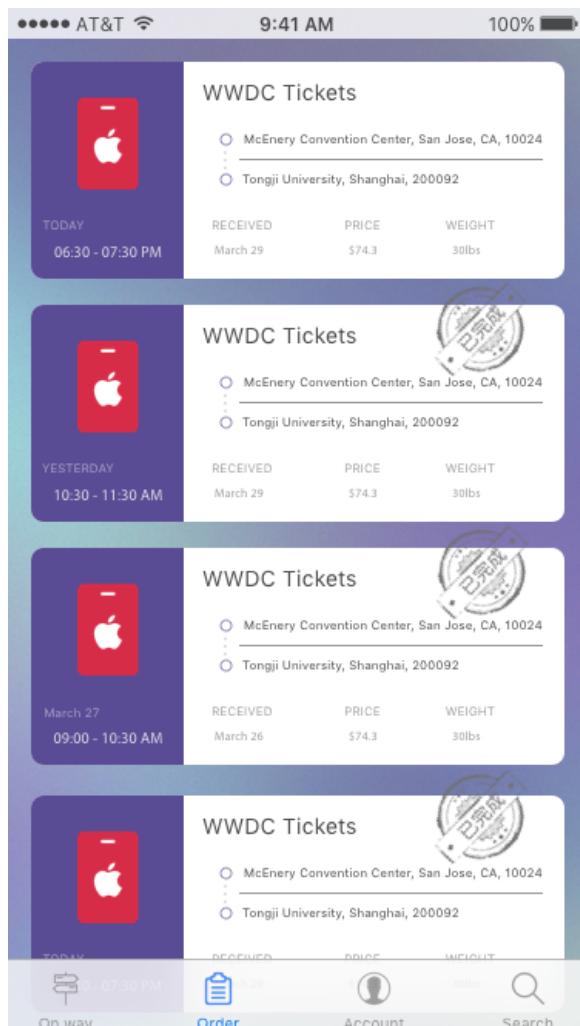
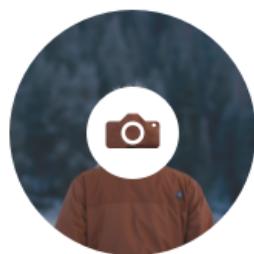


Figure 5.4: Order

••••• AT&T ⌂ 9:41 AM 100% 🔋



Name Alexander Karev

Title POSTMAN

Email zjzsliyang@gmail.com

Password ••••••••••

Location San Diego, CA, USA



Figure 5.5: Account

5.2 Website

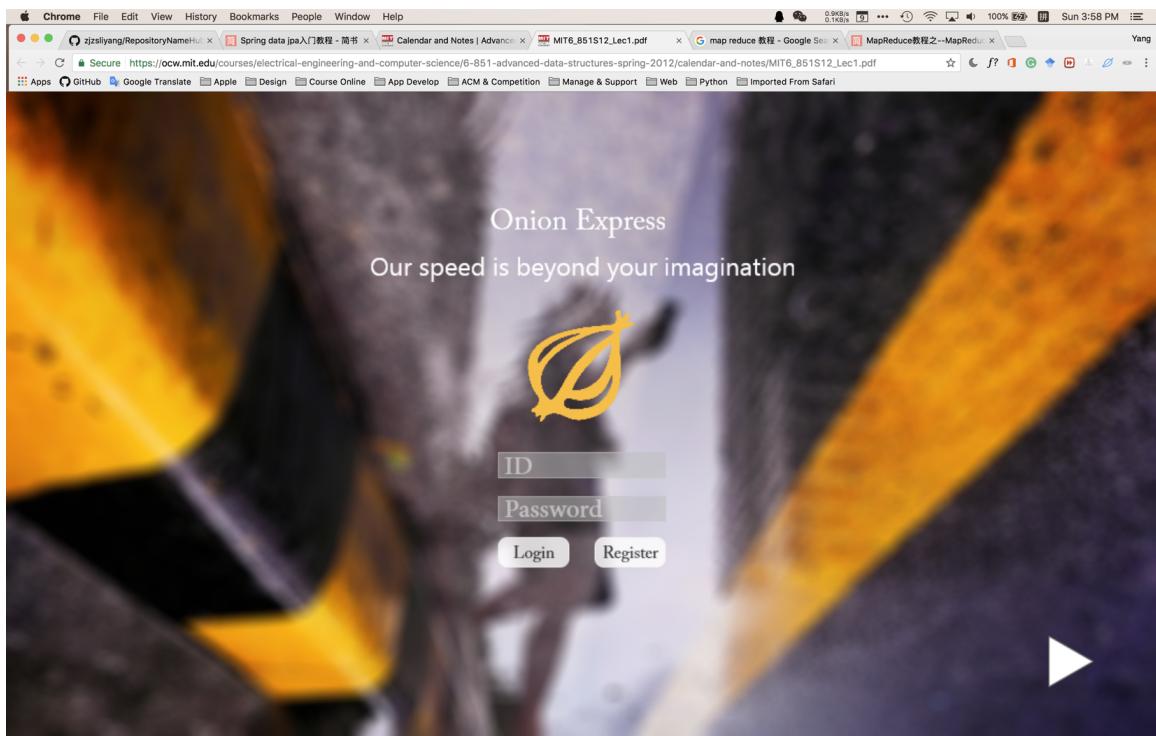


Figure 5.6: Index1

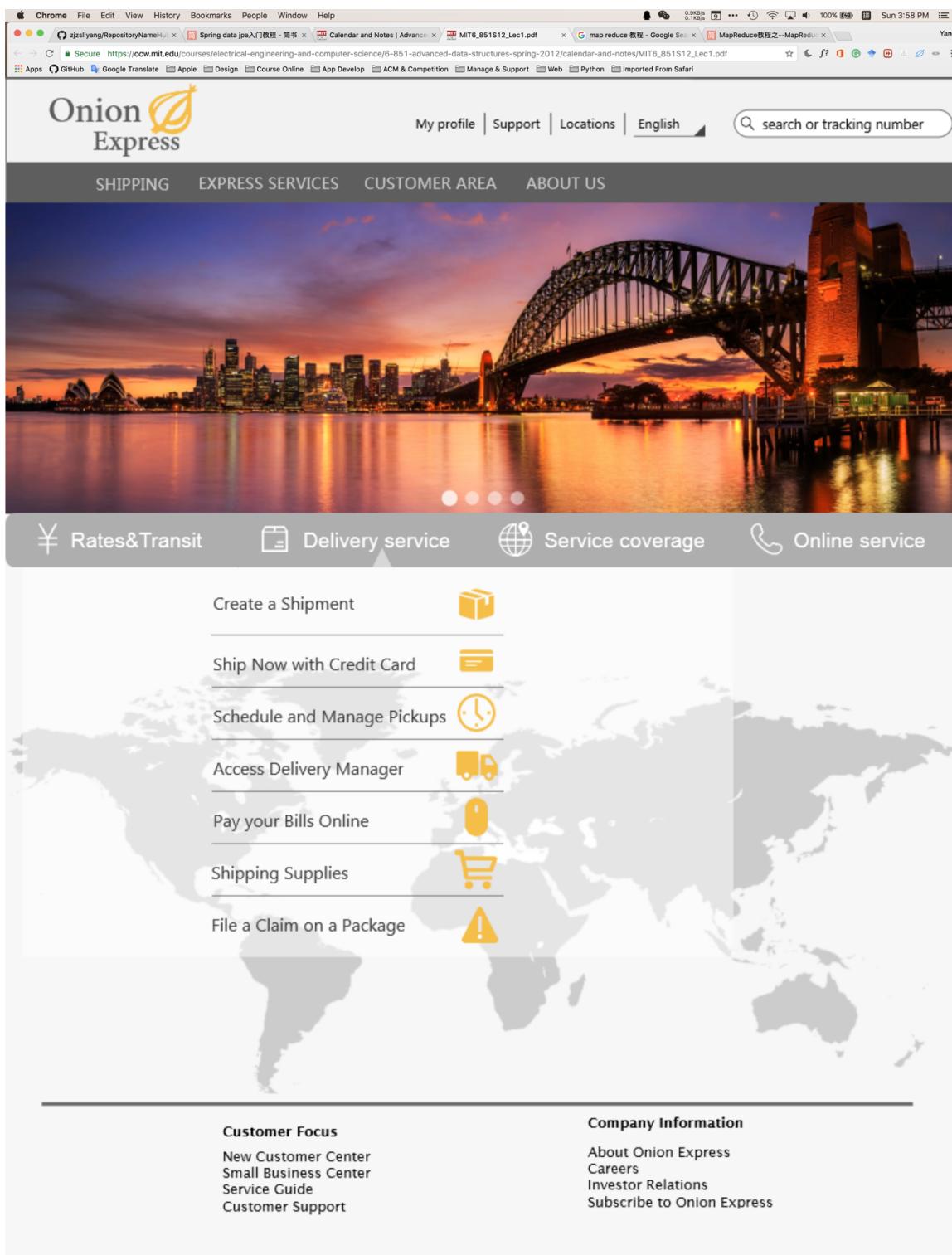


Figure 5.7: Index2

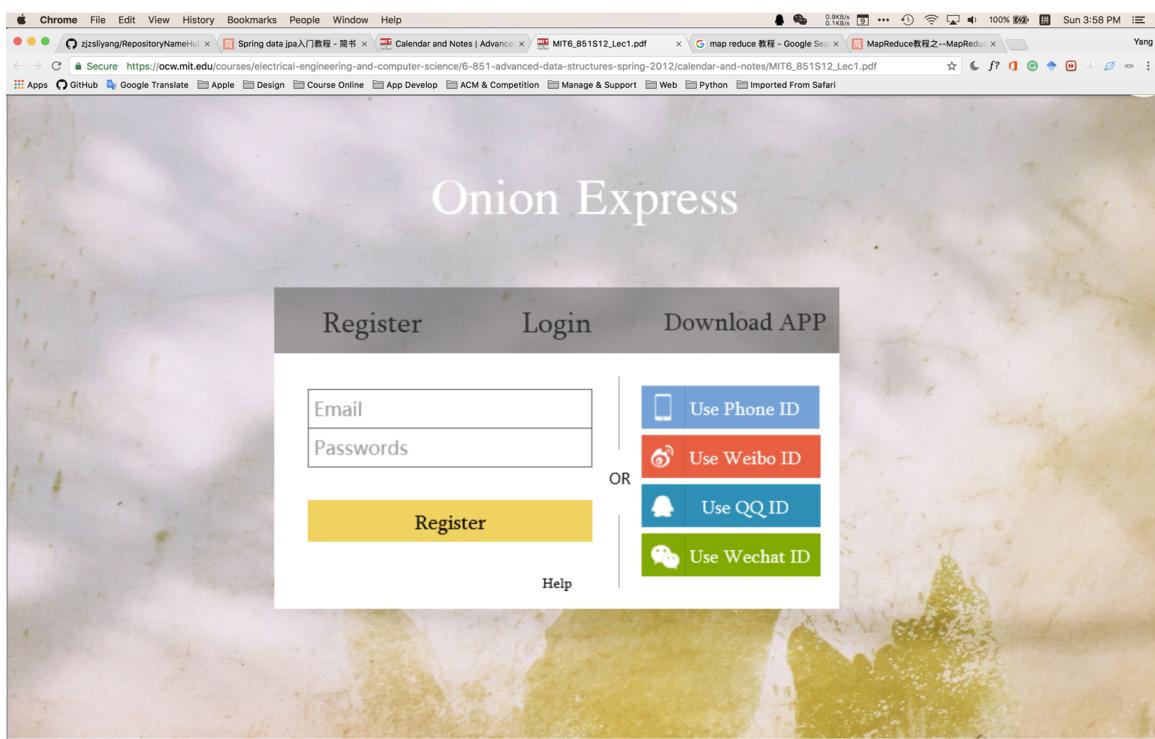


Figure 5.8: Index3

6 Contributions

More information, please visit more on GitHub

1452559 Yang LI	iOS UI, Document	17%
1453645 Zhongjin LUO	Use Case Diagram, Activity Diagram	17%
1451229 Guohui YANG	Use Case Diagram, Activity Diagram	17%
1552651 Yirui WANG	Use Case Diagram, Activity Diagram	17%
1552677 Xinying WU	Web UI	17%
1552705 Yiqun LIN	Use Case Diagram, Activity Diagram	17%

Bibliography

- [1] 830-1998, *IEEE Recommended Practice for Software Requirements Specifications*, IEEE, Oct 1998.
- [2] 29148-2011, *Systems and software engineering – Life cycle processes –Requirements engineering*, ISO/IEC/IEEE International Standard, Dec 2011.
- [3] Russ Miles, Kim Hamilton, *Learning UML 2.0*, O'REILLY, 1st edition, April 2006.
- [4] Jim Arlow, *UML 2.0 and the Unified Process: Practical Object-oriented Analysis and Design*, ADDISON WESLEY, 2nd edition, 2005.
- [5] Karl Eugene Wiegers, Joy Beatty, *Software Requirements*, Microsoft Press, 3rd edition, 2013.
- [6] Craig Larman, *Applying UML and Patterns*, Pearson Education International, 3rd edition, 2005.
- [7] Simon J. Bennett, Steve McRobb, Ray Farmer, *Object-oriented Systems Analysis and Design Using UML*, McGraw-Hill Education, 2nd edition, Dec 2001.
- [8] Yunjie TAN, *Thinking in UML*, China Water Conservancy Hydropower, 2nd edition, March 2012.