Package Delivery Application System

Project description

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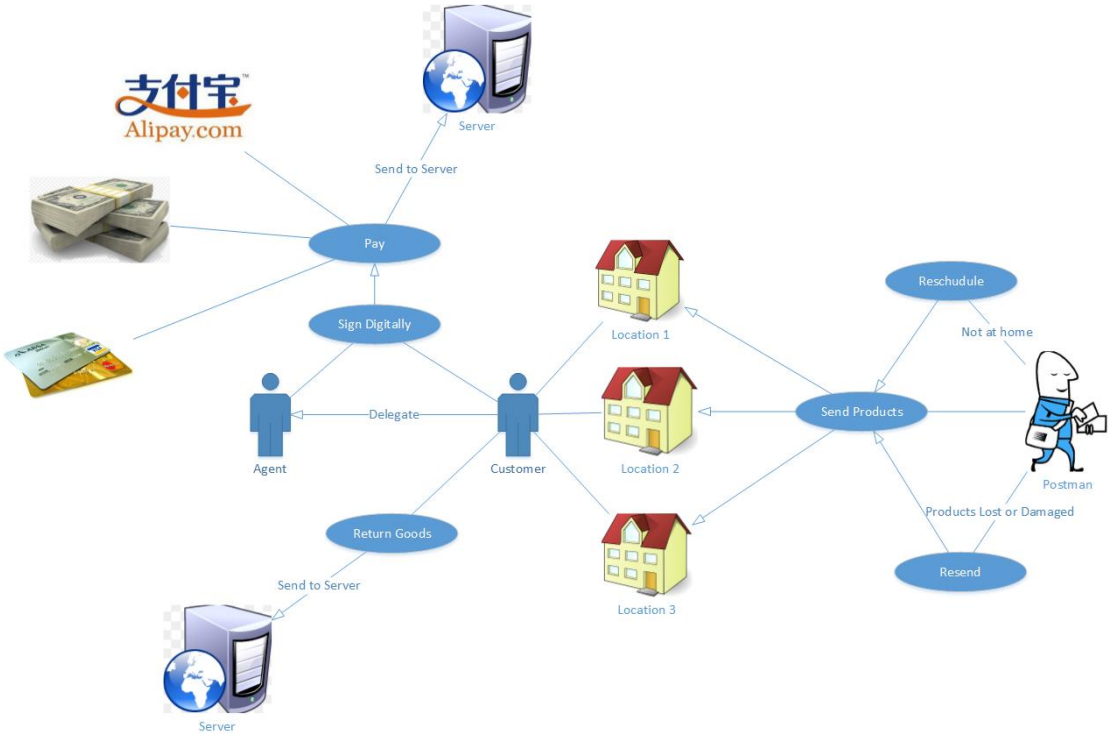
1. Introduction

B2C business is increasing rapidly and it also prompts the logistics business that is responsible for delivering products/mails/documents to customer locations nationwide. The efficiency of filed personnel (people who deliver goods to customers' locations) and customer satisfaction are vital for any logistics company. The purpose of this project is to increase the field people's working efficiency, the efficiency of delivery, and reduce the errors made by human inputs, etc. In the project we are assumed to build the application for some logistics companies in China who delivers the products to customers home. Let's consider the logistics company contracting with TaoBao (淘宝) using the system. The user will be a service persons, the logistics company and the customers of the corresponding logistics company. Here are the use cases or application scenarios, and the system should be built upon these scenarios.

2. Appplications

2.1. Architecture



2.2. Scenario one

When a customer orders a product and wants the product to be delivered to a place that he or she specifies first time, the delivery person will go to the address, and collect the GPS location for the customer's address. If the address of the customer is already stored in the database, the data will not be collected again. Every customer can have many different delivery addresses, for example, a person may want the product ordered to be sent to his or her home or work place. The system is still adaptable if the person moves to another place.

2.3. Scenario Two

The whole process of signing the product ordered will be digitally. When the customer is at home, he or she will sign the receipt using signature on a pad, fingerprint and so on. And the 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.

2.4. Scenario Three

If the customer is not convenient to sign the package and asks someone to receive for him or her, then the designated person ought to sign digitally and the customer confirmation should be received prior in order to rule out the possibility that the product would be received by some imposter.

2.5. Scenario Four

If the customer is not at home and no representative is assigned as mentioned in 2.4, the message should be sent back to the server. The delivery must be rescheduled upon the agreement with the customer. When the schedule is made, the information should be sent to the customer to ensure he or she would be available to receive the ordered product/package. Based on the information from the customer, delivery person will go to the location of the customer when he or she is available.

2.6. Scenario Five

Different kinds of payment methods are offered. Customers can pay for their product when purchasing them online. They can use credit cards or PayPal. Paying by cash is also acceptable (pay upon reception). In this case, the payment is made upon the reception of the order, and then this application should be able to complete the payment on-site. And if the customer asks for invoices, the application should also be able to print them.

2.7. Scenario Six

It is possible that the product could be lost or damaged during the process of delivery. If it is happened, the delivery person would record the information of the product on this system. Meanwhile, a message explaining the situation and making apologies will be sent to the customer. The customer can choose to deliver the product at any time without any extra fees or cancel the order.

2.8. Scenario Seven

When the customer is unsatisfied with the product after receiving it, he or she could return it within a period of a month. The customer will need to log in the system and make the request of returning. The system will obtain the information, it will provide the customer a label containing the address to send it back that also includes the postage. The customer should have the option to send the package back and complete the deal or to replace the current package with the new one. If the customer prefers to return and complete the order, the payment should be reimbursed. However, if the customer wants to have a replacement, the delivery schedule will be made again upon mutual agreement.

2.9. Scenario Eight

A customer should receive a tracking number for his/her package when the package to be delivered is picked by the logistics company. The system should offer the function to track the package.

3. Issues to Consider

Though the functionality is not difficult to build, we need to consider real application and some obstacles. Please check out how many deliveries of TaoBao performed (you may find the data over the web). Furthermore, keep following issues in your mind while conducting requirement analysis, system analysis, database analysis, system design, system implementation, etc..

3.1. The scale of data volume to be handled daily

With around 760 million product listings as of March 2013, Taobao Marketplace is one of the world's top 10 most visited websites according to Alexa. For the year ended March 31, 2013, the combined gross merchandise volume of Taobao Marketplace and Tmall.com exceeded 1 trillion Yuan. So the data volume to be handled daily is tremendous. For example, when you want to search product on this system, if you have just thousands of products, it is feasible to use sql sentence such as "select * from table XX where title like %XX%" to accomplish. But when your data volume reaches the size of Taobao, any single database can't store the whole data, you need to use distributed data storage, and you will have to use search engine instead of fetching data directly from database. And even though you searched the products you want, how to sort them? Which product comes first? It requires complicated sort algorithms or recommender system.

3.2. Number of concurrent users

The number of concurrent users is colossal, similarly, if your website is visited by just 10 people every day, the server can deal with it easily, but if the number reaches to one billion, there would be a lot of problems. Firstly, the requests can't be sent to database directly, any database facing the pressure of 1 billion will crash immediately. Under this circumstance, you will need to use large scale distributed cache. All the information of the seller, products and the evaluations of them are fetched from the cache. In this way you can deal with the enormous number of concurrent users. Although the system won't have the scale of Taobao, the number of concurrent users will be an obstacles.

3.3. Data Security

As every customer stores his or her cell phone number, address and other private information in this system, the system is responsible for the data security. In August, 2014, the database of Firefox broke down, the email addresses and passwords of the developers were leaked. Although no sign shows that someone used the passwords, Firefox still could not preclude the possibility that many people got them. In conclusion, methods should be taken to avoid the database being attacked and data being taken advantage of by the wicked.

3.4. Performance

As mentioned above, the number of users could be colossal. When they search products or read the information of products, they want it to be done quickly. The 12306.cn, scolded by most Chinese who want to order train tickets, is a bad example, because facing the tremendous number of concurrent users, it is unable to react well, and many people have to refresh the web page again and again. And we don't want that happens to our system.

3.5. Operation and Maintenance System

To support such a huge website, how many servers are needed? And what operating system should be deployed to the servers? Can the kernels of the operating system be improved? Can we optimize the communication module? How to roll back if some problem happens?

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4. Requirements

You can use any available technology for which you think is suitable.