
Design of core function module of intelligent distribution system for real-time response to customer change instructions

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Abstract

With the development of modern fast-paced lifestyle, logistics industry occupies a broad market space with point-to-point convenience service. However, there are still some problems in the field of logistics and distribution under the development of Internet and e-commerce, such as the inability of customers to change express information in real time when Express is in transit. Aiming at this problem, this paper puts forward the concept of "intelligent distribution system for real-time response to customer change instructions", and designs three core business function modules of "real-time settlement of freight change, distribution path planning, change instruction execution" to meet the needs of customers to change distribution parameters in real time and realize the goal of customer participation and leading distribution activities throughout.

Keywords

Change real time, Intelligent distribution system, Function modules.

1. Introduction

With the rapid development of intelligent logistics, it is urgent to design an efficient information system for logistics distribution. As the core of the system, the design of the core function module requires the maximum efficiency of the system and achieves the purpose of the designer.

With regard to the design of the function module of logistics information System, Worwa K (2018) proposed a two-criterion optimization method to design and solve the corresponding problems to design the overall structure of logistics information, through the module strength coefficient and module coupling coefficient to achieve the division of the system module. Based on the WEB geographic Information system, Baisheng Sun (2010) constructs the logistics distribution system architecture, and puts forward the module design method, principle and security strategy of the integrated logistics distribution system. The development of network geographic information system realizes the openness of the system, and also realizes the data sharing and remote operation, which has a wider access range and more efficient computational load balancing. Based on the characteristics of low development cost, cross-platform, flexibility and portability of B/S structure design pattern, Aiping Wu (2018) describes the specific operation flow of system functions in detail from the aspects of System Administrator module and customer module.

This paper puts forward the concept of "intelligent distribution system for real-time response to customer change Instructions", explores the customer's real-time online change of distribution parameter information and related logistics system information, in order to meet the needs of customers to change distribution parameters in real time and realize the goal of customer participation and leading distribution activities throughout. This paper selects the application layer in the three-layer

(representation layer, application layer and data layer) structure frame of the intelligent distribution system, and designs the three core business function modules of "real-time settlement of freight change, distribution path planning, change instruction execution".

2. Overall thinking

This chapter mainly for the intelligent distribution system core functions for introduction, the specific content as shown in Fig.1 below, through the freight change real-time settlement, distribution path planning, change instructions to perform three links to complete the Change Directive task. These business functions are implemented in the application layer of the three-tier structured framework of the intelligent distribution system, as shown in Fig.2 below.

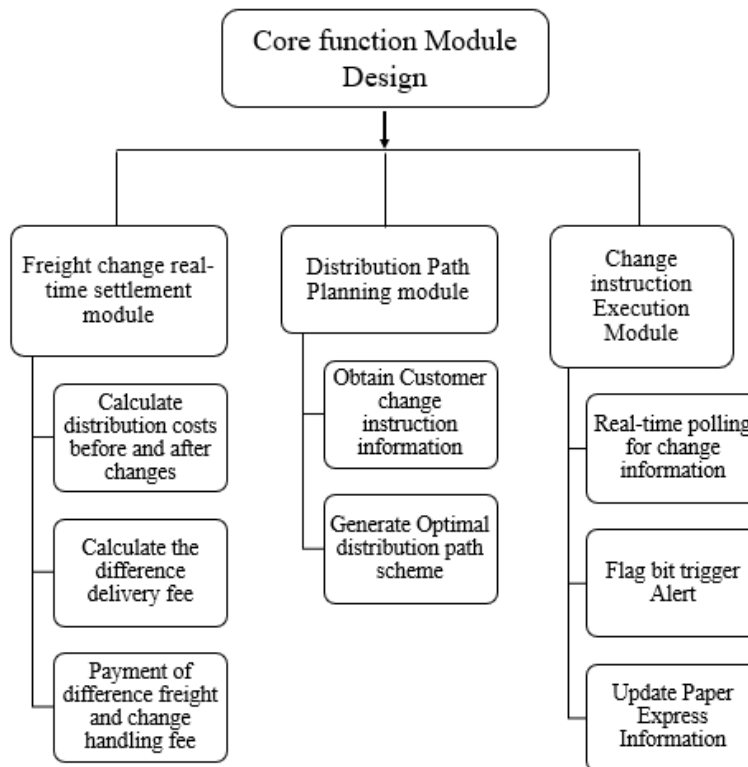


Fig.1 The overall structure of the core function module of the business Application layer of intelligent distribution system

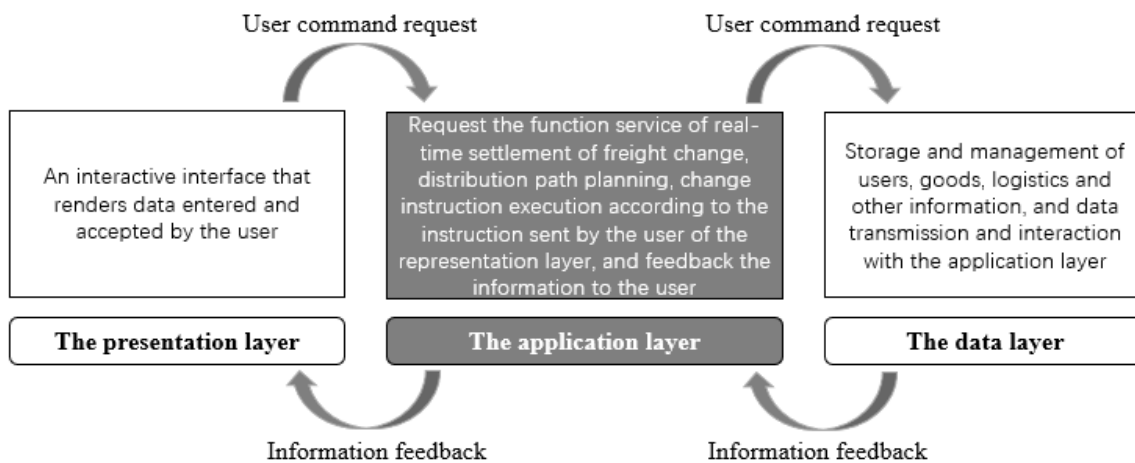


Fig.2 Application Layer Design Diagram

3. Design of real-time settlement module for freight change

3.1 The module overview

The module deals with the settlement of freight charges after responding to customer change instructions. First of all, according to customer change instruction request, intelligent distribution system to extract the relevant express parameters and separately account for the change before and after the express freight, including the parameters include receiving information, shipping information and logistics company's own settlement mode stored in the database cost data, etc., for freight accounting to provide the basis; second, considering that the customer has paid express freight before the change, So when the customer submits the change instruction information only pay the difference shipping cost, finally, the customer carries on the payment operation according to the difference freight and the handling fee of the system accounting, this module introduces the third party payment tool, such as Alipay, WeChat, Cloud flash payment and so on payment software, Customers can easily and quickly complete the payment through the mobile side of the mobile phone or the PC side of the computer, after the payment operation is completed, the electronic contract of the change instruction is established.

3.2 The settlement process

3.2.1 Define the parameters

The module involves the following parameter variables: a —Sending Address; $.$ —Express real time location; b —The logistics node that the Express is about to arrive; c —Original Receiving Address; d —The changed pickup address; C —Logistics cost function; C_{ij} —Logistics costs between logistics nodes i and j , cost data stored in the database from the logistics company's own settlement method; BA —Differential logistics expense. The difference shipping costs to be paid by the user are shown in Fig.3 and Fig.4 below, and the electronic contract for the change instruction is established after payment is completed.

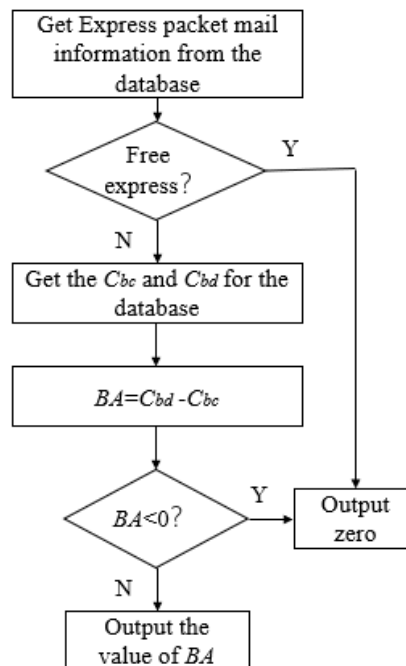


Fig.3 Difference Freight output Logic diagram

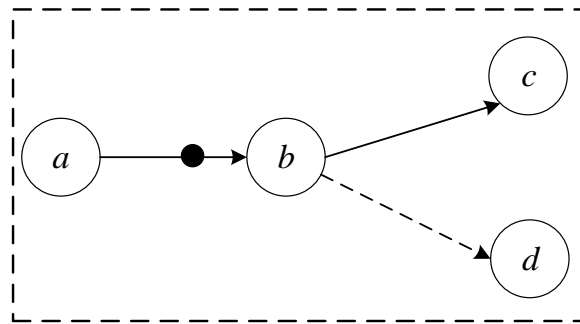


Fig.4 Path diagram in response to customer change instructions

3.2.2 Order of settlement

The sequence diagram in this system is used to describe the information interaction between the user and the intelligent distribution system, that is, to describe the contextual logic diagram of the user completing a functional application. The longitudinal axis in the sequence diagram represents the timeline, and the horizontal axis represents the independent objects. The sequence diagram of this module is as follows in Fig.5, which covers a total of six objects: Customer, System login interface, receiving information management, distribution contract management subsystem, expense payment management, database. The user first logs in according to the account number and password to enter the receiving information management interface and fill in the receiving information; Secondly, the system according to the freight pricing rules, combined with the relevant address information output cost settlement amount; Finally, the customer chooses the corresponding payment method to complete the payment operation.

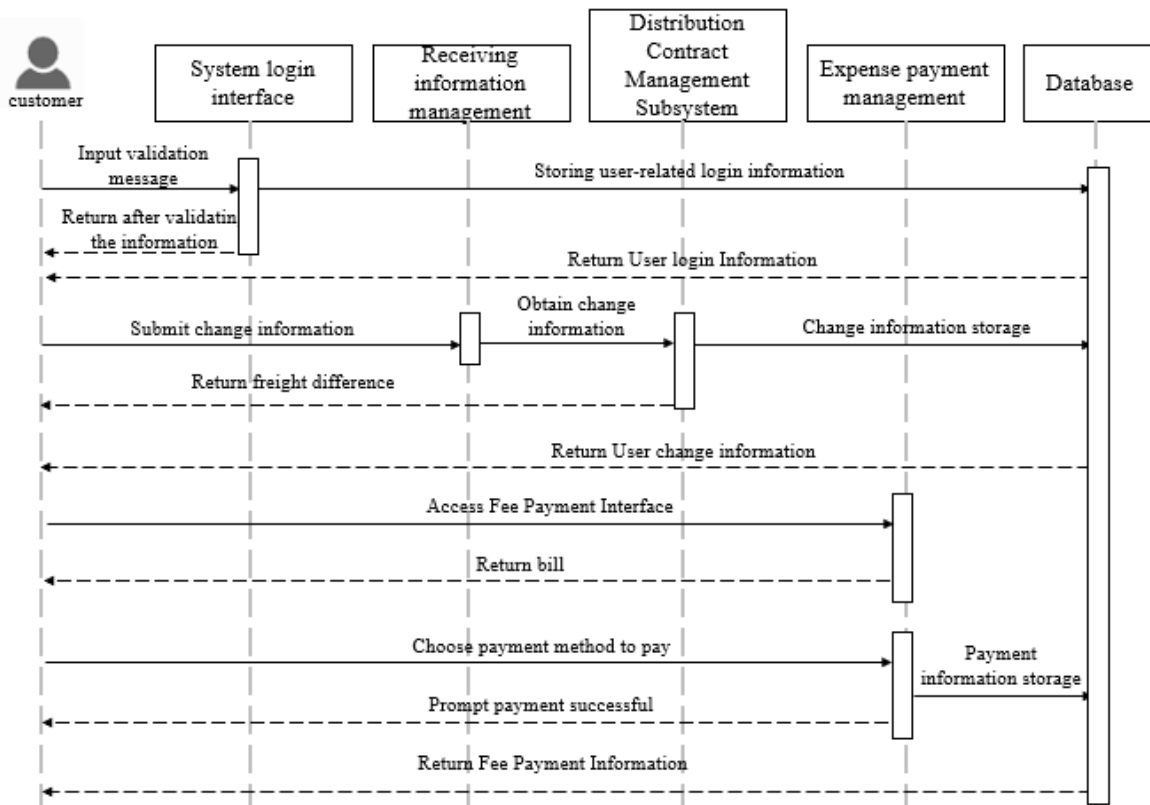


Fig. 5 Express Freight Change settlement sequence diagram

4. Design of Distribution Path planning module

4.1 The module overview

Considering that the customer sends the express address change instruction in real time and the customer pays more attention to the delivery time, the system adopts Floyd algorithm as the guide, takes the time between each distribution node as the weight value, obtains the path after accounting, in order to push the optimal distribution path scheme for the customer, and enables the change task to be reached smoothly. The functions implemented by the distribution path planning module mainly include two parts: one is to generate the path scheme with the least delivery time according to the sending and receiving address, and the other is to monitor the delivery status of the goods in real time, and the distribution vehicles feed back the location information to the logistics end in real time through the vehicle terminal. At the same time, the logistics end will be the customer change instructions and real-time traffic information to each distribution vehicle.

4.2 Path planning

4.2.1 Planning process

Fig.6 Below is a process diagram of path planning, which is mainly divided into two steps of distribution node information acquisition and path push. First, the distribution node information acquisition. The Intelligent distribution system collects information such as traffic status and mileage between logistics distribution nodes, and stores the information in the path database, and secondly, the path push. According to the actual situation of the collected logistics node information, the path planning scheme is developed by using Floyd algorithm, and the distribution command center is reported, and the distribution instructions are issued to the relevant logistics nodes after the audit is passed.

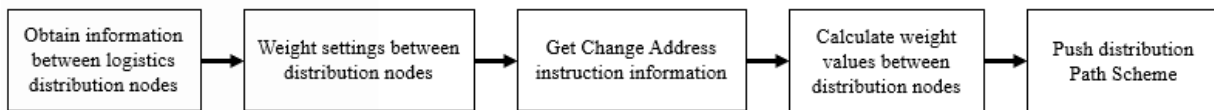


Fig.6 Path planning push flow diagram

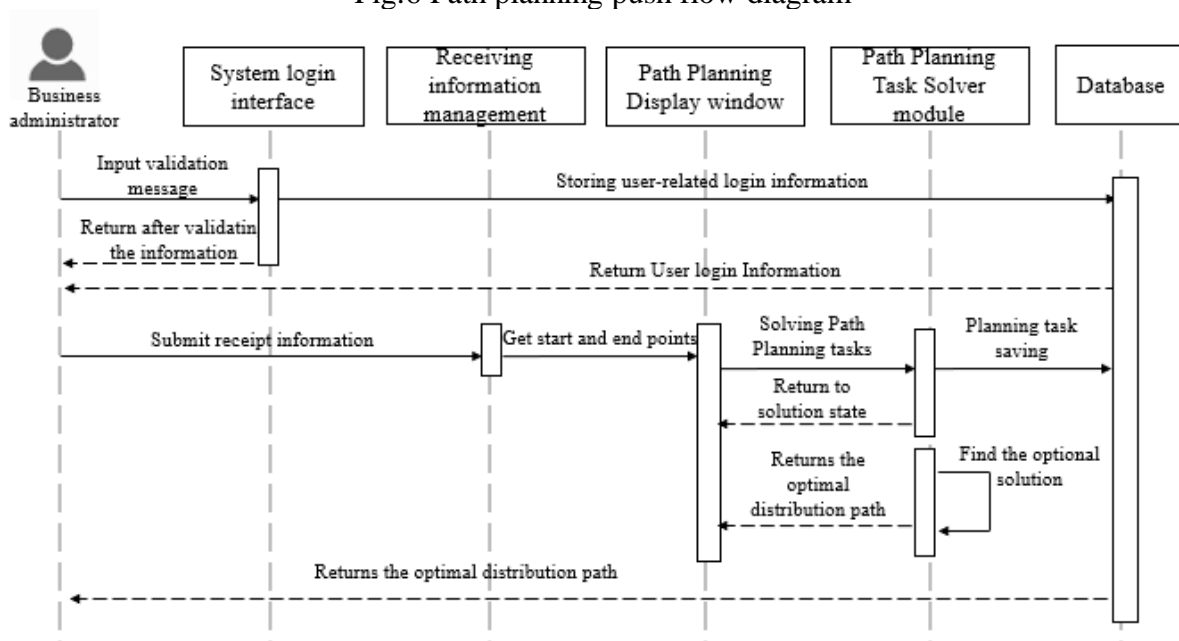


Fig.7 Distribution Path planning module sequence diagram

4.2.2 Order of planning

Distribution path planning sequence diagram There are six objects of business administrator, System login interface, receiving information management, Path Planning display window, Path planning task solving module and database. Firstly, according to the receiving information submitted by the customer to obtain the distribution starting point and end point, the Path Planning task Solution module solves the optimal distribution path according to the Floyd algorithm, and then stores the planning task to the database, and the customer can view the distribution path information in the Path Display window interface.

5. Change instruction Execution Module design

5.1 The module overview

This module refers to the intelligent distribution system in response to customer change instructions, the Distribution command Center will change the task of executing instructions to the relevant distribution node, by the distribution node operators are specifically responsible for the implementation. At the same time, the logistics distribution end of the change instruction implementation progress in real time feedback to the front-end Web user interface. This module specifically contains the following features.

(1) Express Change parameter Capture

This module has a logo bit in the Express barcode information database, and triggers are activated when the express information data in the flag bit changes. The change information can be locked quickly by timing polling technology and displayed to the terminal device by the Express information scanner.

(2) Execution of change order

Distribution node operators through the Express information scanner can trigger the node printer to perform change waybill information printing task, and then the staff will be the new courier list on the original courier list, and then the new Waybill scan, at this time the system will be intelligent and updated database comparison, if the information is consistent to continue to distribute, otherwise repeat the above operation.

5.2 Execution of change order

5.2.1 Execution process

This module is based on a barcode operation technology with the change of express distribution parameters, which mainly includes the customer intelligent terminal Plate, express barcode module, express Barcode database, express information scanning gun, information display, node printer and so on. A brief overview of these plates is provided below.

(1) Express barcode module

A barcode is a graphical identifier that is composed of a number of black bars and white strips of varying widths according to certain orchestration rules to express information. The barcode in this paper is the only "identity" logo of the Express, which records the waybill number of the Express, the logistics company, the sending information, the receiving information and so on. That is, a single express corresponds to a barcode, and a barcode can store multiple distribution parameters of the Express.

(2) Express barcode database

The Express database table has a flag bit that establishes triggers and timed polling on the flag bit. Flag bits capture parameter changes in database tables in real time. Triggers are tagging tabular data, which is performed without a computer program, but is activated by related actions, such as when related operations (insert, delete, update) to a data form. Timed polling is a program that is used in

conjunction with flag bits and triggers, that is, when the flag bit is changed and the trigger is triggered, the changed parameters are highlighted on the information display, as shown in Fig.8 below.

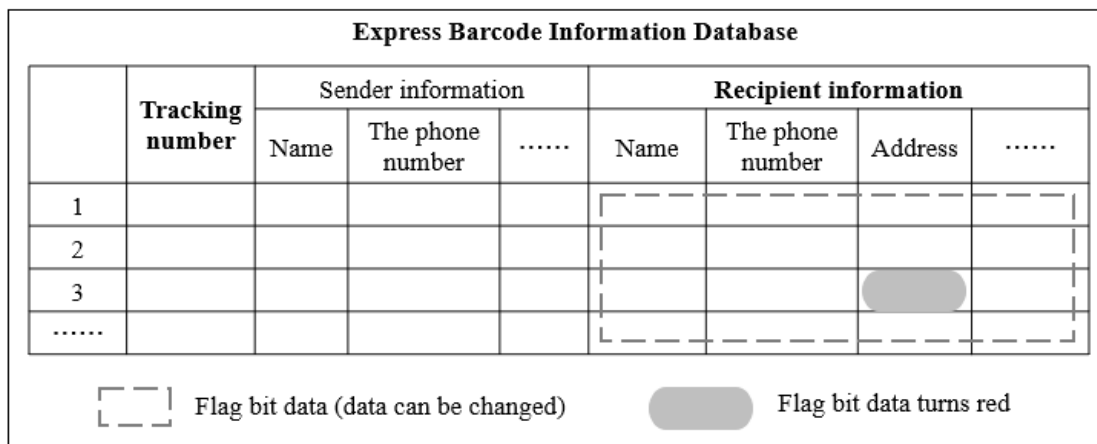


Fig.8 Flag bit display diagram

(3) Node printer

The Distribution node printer is connected to the barcode database, which triggers the printer to perform a print task when the barcode database parameters change. The operation flow of this module is shown in Fig.9 below.

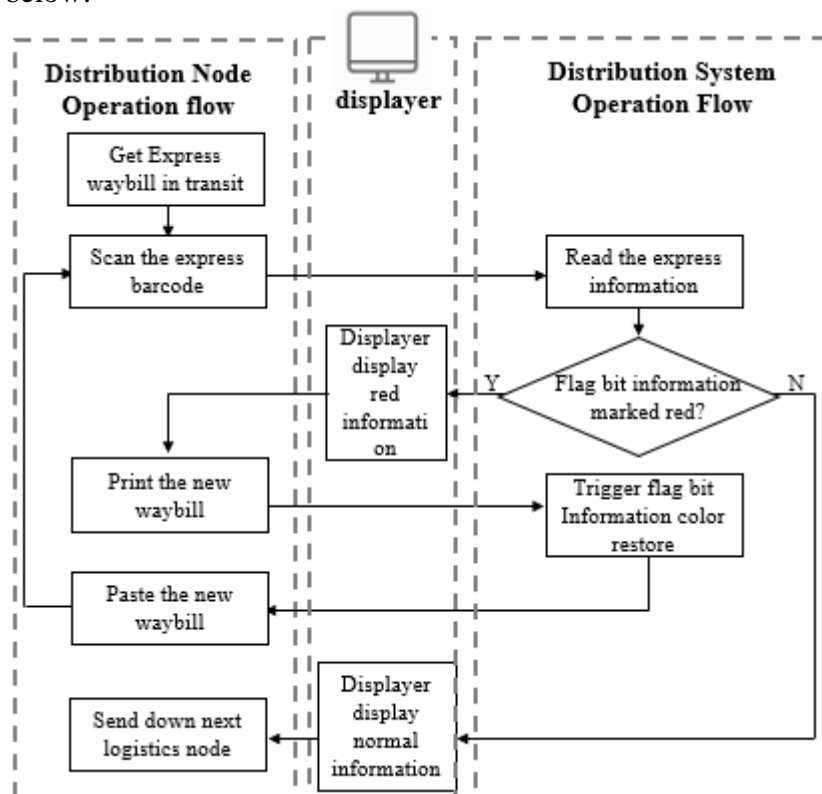


Fig.9 Diagram of the customer change instruction execution process

5.2.2 Order of execution

Change instruction execution module sequence diagram There are a total of five objects: Distribution node operators, System login interface, express barcode information Database, node printing management system, database. Firstly, the distribution node operator uploads the logistics information by scanning the Express barcode and saves it to the barcode database, and then the flag bit in the barcode database can capture the change information and activate the node printing management

system, otherwise it is not activated, and finally the delivery node operator will paste the new paper waybill of the Express barcode into the Express, Then the express continues to deliver.

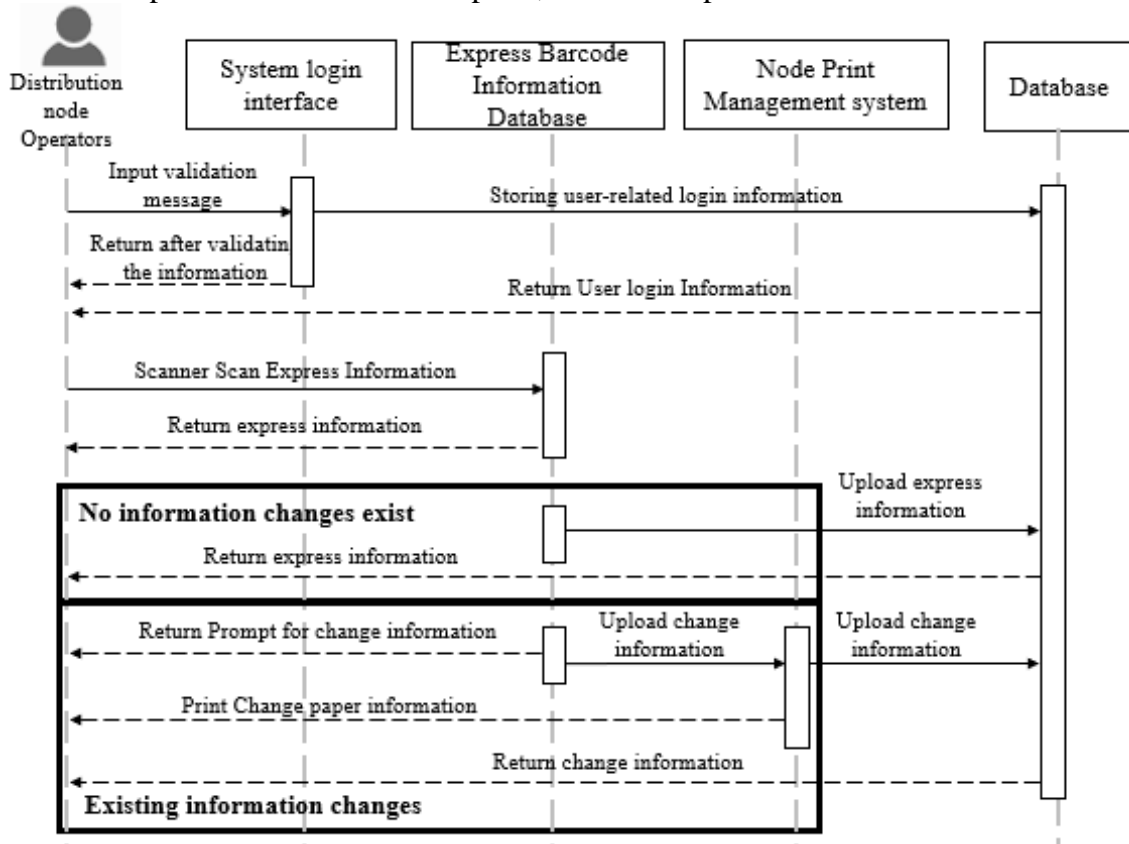


Fig.10 Sequence diagram of change instruction execution

6. Summary

This paper mainly describes the core business function modules in the application level of intelligent distribution system, including "Freight change real-time settlement module", "Distribution Path planning module", "Customer Change instruction Execution module" three application functions. Combined with the relevant system design method, the operation flow and function details are described in detail.

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