

Application of Workflow Technology to Current Dispatching Order System

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Summary

In the paper, workflow technology is firstly applied to the current dispatching order system for railway transportation. The system set up workflow model which conform to the existing system and resource. And the system adopts flexible workflow process mechanism to enhance the adaptability and opening and solve the exception and abnormality manipulation. The results show that it can not only provide the dispatching orders system with drafting and release function, but also set dispatcher free from the fussy daily business and predigest task flow and heighten production efficiency.

Key words:

Workflow Technology; Railway Transportation, model Dispatching Orders.

1. Introduction

Dispatching efficiency should be enhanced to remove the bottleneck of railway transportation effectively. The currency, reliable and secure of dispatching orders is very important. The workflow technology is applied to the current dispatching order system firstly in the paper. It can optimize the dispatching orders model and turn model into practicality.

Workflow Management is a fast evolving technology, which is increasingly being exploited by businesses in a variety of industries. Its primary characteristic is the automation of processes involving combinations of human and machine-based activities, particularly those involving interaction with IT applications and tools. Although its most prevalent use is within the office environment in staff intensive operations such as insurance, banking, legal and general administration, etc, it is also applicable to some classes of industrial and manufacturing applications. Here, Workflow Technology was use in design the current dispatching orders in railway transportation firstly.

2 Modeling

The business of current dispatching order system is so complex that the dispatching orders are very complicated. At first, the data flow chart is preceded, and then the workflow model for dispatching orders is brought forward. The data flow shown as figure 1 indicates obvious database application flow tendency. The different departments and dispatcher workout a dispatching orders processes that are made up of requisition, drafting, modifying, signing and authorizing. The fundamental data is stored in the database, such as the orders content, requisition and etc. It is convenient for query and stat. Conventional application does it alone. In fact the steps are not absolute, but correlative. The back step cannot take place before the front one. And it cannot delay too long. There are cycles in the processes, and there are a great many of flows in every department. Everyone could do several steps. Such makes the user look round for the functions among the complex menus. User feels it is inconvenient and difficult.

We realize that the process of the dispatching orders is requested from bottom to top and released from top to bottom with workflow technology. As soon as the requisition from railway administration, the dispatcher in Ministry of Railway will be hinted at once, such as voice, letters and email. But the man on watch left. The system can hint interval period of time, and the interval can be setting. The dispatcher drafts the orders according to requisition. If the orders should be signed or authorized, they are transferred automation. When the above steps are finished, the orders are released and dispensed. The electrical dispatching orders are on the move to the work-list of the dispatcher in railway administration. Work-list for all level of the dispatcher is shown in table 1. If the dispatcher doesn't dispose in the time limit, the system warns right now.

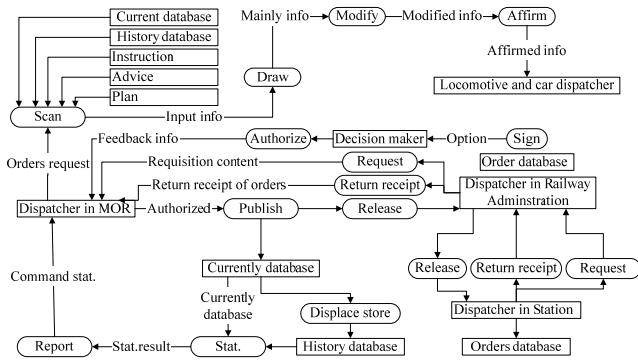


Fig. 1 Dispatching orders data flow chart.

Table 1: State transition table to the system

Station Dispatcher	Railway Admin. Dispatcher	MOR
1.1 request	2.1report requisition	3.1receive req.
	8.2receive orders, 9.3return receipt	4.2draft 5.3sign 6.4authorize 7.5release
13.2receive ord. 14.3return rec.	11.4dispose orders 12.5release order	10.6receive rec.
16.4execute	15.6receive receipt	

The whole railway system in China could divide into three levels: Ministry of Railway, Railway Administration and Station. On each level, the states one order are intercepting, received, Returning rpt., Returned rpt., executing, executed, transmitting, transmitted, intercepting, requested, drafting, drafted, Signing, Signed, authorizing, authorized, releasing and released. These states transformation are the result for tasks transformed. The states are atomic, not subdivide, mutually exclusive and antipathic. By this simple classify method, the complicated order system was reflected simplified.

3 Designing

WebLogic Integration provides a standards-based integration solution for connecting applications both within and between enterprises. WebLogic Integration provides the following tools for integrating applications: application views, the Adapter Development Kit (ADK), EIS adapters and Application View Controls. By using these tools, you can integrate all your enterprise information systems (EIS). Typical IT organizations use several highly specialized

applications. Without a common integration platform, integration of such applications requires extensive, highly specialized development efforts.

The first step in the design of your business process is to build a graphical representation of the business process that meets the business requirements for your project. You create a graph of component nodes in your business process by dragging components from the Business Process Palette and dropping them onto the Design View pane. Program control is represented visually by these nodes (or shapes) and the connections between them. Effectively, you create a graphical representation of your business process and its interactions with clients and resources, such as databases, JMS queues, file systems, and other components.

Dispatching orders workflow model is the base of its manage system. Its credibility ensures the coherence among the infrastructure in the system. It determines a good many steps from design to realization. Dispatching orders processes are made up of a series of fundamental dispatching activity according to definite consecution. Dispatching orders workflow model is a directional graph that is made up of nodes and arcs mapping from these dispatching orders activities and their logic relation. The node is an activity unit. It connects the arcs between the two nodes. The elements of workflow model are starting marker, end marker, activity, node and arc. Arcs are condition arc, not condition arc and data connect arc.

4 Application

After we finish the dispatching orders workflow modeling, we should transform the model into execution code. It is system realization. Workflow management technology based on Web/J2EE has obvious predominance, such as upstanding agility, friendly interface, update easily, and distribute management and access conveniently. We can be by dint of a workflow manage system by BEA Weblogic Integration.

The tasks for Railway Administration dispatcher are typical they have not only receiving and transmitting but also drafting and releasing. Ministry of Railway dispatcher has only drafting and releasing and have not receiving and transmitting. On the contrary, Station dispatcher has only receiving and transmitting, and have not drafting and releasing. So we look on the task for Railway Administration dispatcher as the core. The diagram following figure 2 shows the task flows.

By using page flows, you can avoid making the typical mistakes that often happen during web application development, by separating presentation, business logic implementation, and navigational control. In many web applications, web developers using JSP (or any of the other dynamic web languages such as ASP or CFM) combine

presentation and business logic in their web pages. Page flows allow you to separate the user interface code from navigational control and other business logic. User interface code can be placed where it belongs, in the JSP files. Navigational control can be implemented easily in a page flow's single controller file, which is the nerve center of your web application. A controller file is a special Java file that uses a JPF file extension. Business logic can be implemented in the page controller file, or in Java controls that you call from JPF files.

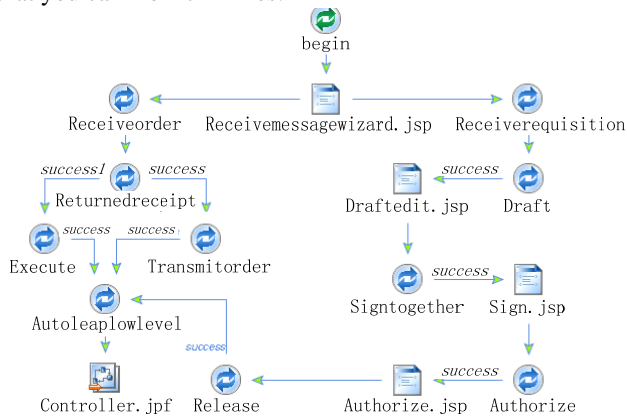


Fig.2 One page flows of the system

The separation of presentation and business logic offers a big advantage to development teams. For example, you can make site navigation updates in a single JPF file, instead of having to search through many JSP files and make multiple updates. In WebLogic Workshop you can as easily navigate between page flows as between individual JSP pages. This allows you to group related web pages under one page flow, and create functionally modular web components. This approach to organizing the entities that comprise web applications makes it much easier to maintain and enhance web applications by minimizing the number of files that have to be updated to implement changes, and lowers the cost of maintaining and enhancing applications. Another advantage of page flows is that an instance of the page flow controller class is kept alive on a per-user-session basis while the user is navigating within the scope of the page flow. This instance ends when the user exits from the page flow. You can use instance member variables in page flow classes to hold user session state.

5 Conclusions

The current dispatching order system based on workflow technology can realize the dispatching orders drafting and releasing process definition, such as building, executing and inspecting. It can change the current dispatching order system design mode from oriented function to process. The system becomes the business process with adductive and

manipulative activity. Workflow insures the right men to do right things in right time by right tools. The missionary layer can concentrate on key business. The management layer can grasp his business and disposal quickly. The lead layer can do decision-making conveniently. User can get the history data and all kinds of reports. We are benefit for workflow, such as low cost, without training, smoothness process and transfer automation and flexible extension. Workflow technology helps us discover the core business process and height railway competition.

Acknowledgments

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References

- [1] WorkflowMC. The Workflow Reference Model [WfMC1003] [R].WFMCTC-1003,1995.
- [2] WorkflowMC. WAPI Naming Conventions [WfMC1013] [R].WFMCTC-1013,1997.
- [3] WorkflowMC. A Common Object Model Discussion Paper [WfMC1013] [R].WFMCTC-1022,1998
- [4] WorkflowMC. Interworkflow Application Model [WfMC1013] [R]. WFMCTC-2102 1997
- [5] HongYan Liu, Hejun, Workflow: The cooperation of work disposal with computer sustaining, Beijing: Tsinghua University, 2003
- [6] Haibin Luo, Yushun Fan, Wu Cheng, The Workflow Model faced Enterprise User, Beijing: CIMS, 2000
- [7] Yushun Fan, Fundamentals of Workflow Management Technology, Beijing: Tsinghua University Press, 2001
- [8] Changjun Jiang, The Theory and Application for the Behavior Petri Net, Beijing: Higher Education Press, 2003
- [9]WorkflowMC. Terminology & Glossary [WfMC1011][R].WFMCTC-1011,1999.
- [10] Ioe Zuffoletto, BEA Weblogic Server Bible, Beijing: Publishing House of Electronics Industry; 2003
- [11] BEA Systems, Inc. BEA Weblogic Integration 8.1,Beijing: Course WLI-D11-81-02, 2003



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