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Using Work-Flow Software to Support Office Collaboration

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Introduction

This paper describes the concepts and experiences of designing a work-flow automation system in supporting group collaboration in office environment. Traditional electronic mail system has effectively improved the person to person communications in a computerized office environment; however, it lacks a control mechanism to support the work group collaboration of a complete office process cycle, which involves tracking office processes, routing documents, filtering messages, etc.. For many years, the Electronic Data Process department has been adopting the software engineering methodology to design custom-made computer program for specific office process. The concept of work-flow software extends the capability of traditional e-mail system to better support office group collaboration. It also provides a generic infrastructure to automate office processes by using tools like form routing, form generation, performance report, etc. In this paper, we will propose a system architecture of work-flow software which supports the group collaboration in office environment. In particular, we will focus on the new features which are usually not found in the traditional e-mail and EDP systems. In the end, we will discuss the implementation experiences from the field study and the future developments for the next generation of groupware.

Work-Flow Software

In order to establish the group communication mechanism, a work-flow server is added into the architecture of the traditional store-and-forward message server. While the message server is storing all the mail data, the work-flow server keeps track of all routing information of the documents, mails and office processes. An office user may pick-up a pre-defined electronic form from Form Library bundled with its approval path. The work flow system will then send this form to the next stop according to the content of the user responses and the pre-defined routing information. Using the graphical routing tool, a user may modify the routing path according to that user's special needs.

Instead of programming each office process application in the traditional EDP way, the user of work-flow software now has the generic tool to process the general office transactions without any help from EDP department.

Our work-flow software is implemented in a client/server architecture under Microsoft Windows (see Figure 1). The server software is based on Microsoft's SQL server. The tools at the client side include Form Designer, Form Routing, Collaborative Annotation, and Message Filter. The server tools include Work-Flow Controller, Role Definition.

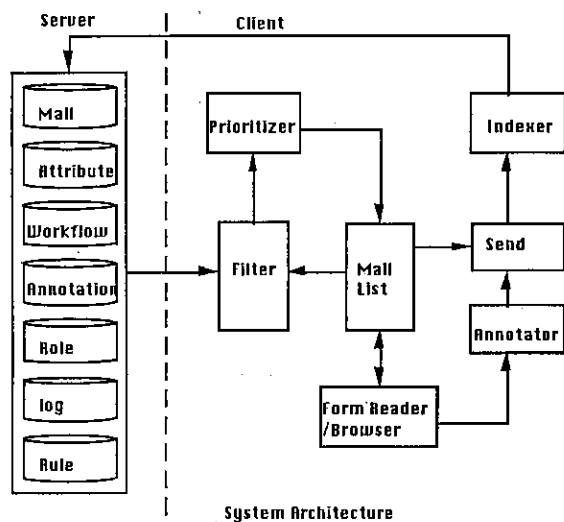


Figure 1. The Architecture of Work-Flow Software

The main screen of our work-flow software looks the same as most of the traditional e-mail system, excepts that the icons of the pre-defined electronic forms at left-hand side and one message filter icon at the upper-right corner (see Figure 2). Figure 3 shows one of the sample electronic form that a user need not actually specify what the next stop would be. The form will automatically route by pre-defined routing rules.

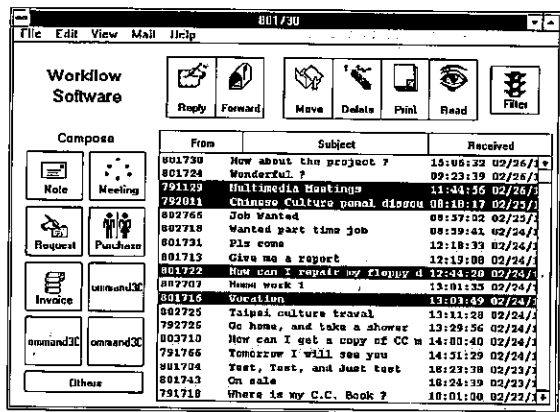


Figure 2. Main Screen

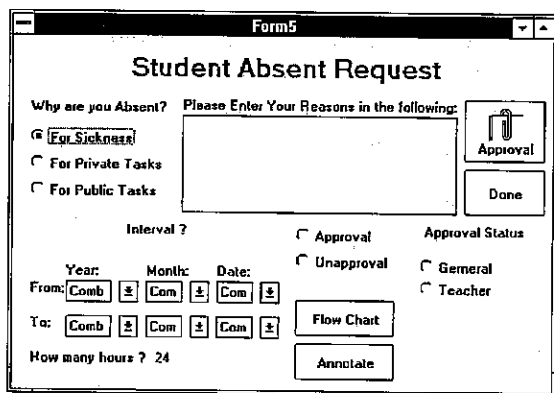


Figure 3. Sample Form

Message Filtering

The offices automated by e-mail system are usually troubled by information overloading problem. The burden of information overloading can be relieved by filtering out the less concerned messages by checking the contents of messages' attributes. The attributes of a message could be data fields of time, date, from, to, keywords in subject or message body. By simply clicking the proper data fields (see Figure 4), users are able to define preferable rules to screen-out all less important messages from the incoming mails.

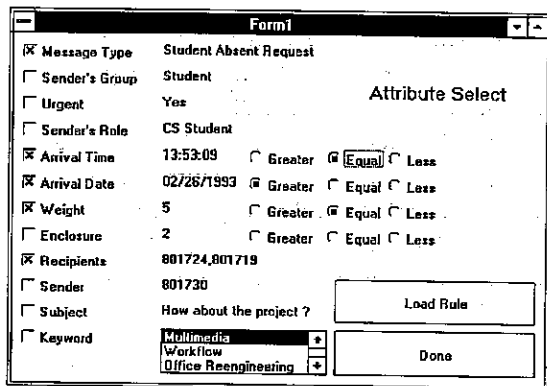


Figure 4. Message Filtering Screen

Collaborative Annotation

After a message is being read by several readers, their judgements on the importance of this message will provide a reference for the following readers. A Collaborative Annotation Tool is developed to allow each message reader in giving a rating among *very important, important, common, unimportant, and garbage*. Users' reactions are recorded into the central database of our work-flow software. The assumption here is that human involvement will produce more effective filtering result, so the next reader of this same message will have a chance to check this importance index before he actually decides to view it. The message filtering tool of our work-flow software can also arrange the message priority list according to this importance index.

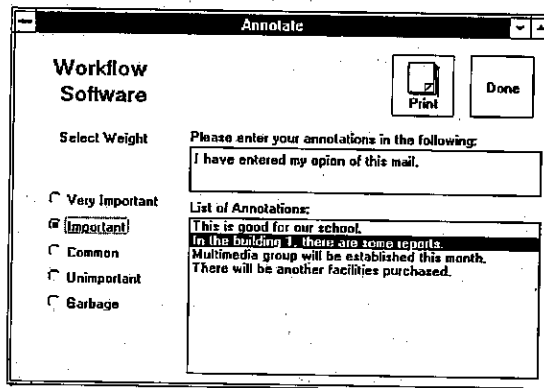


Figure 5. Collaborative Annotation Screen

Role Definition

The action of our work-flow software can be assigned to either a specific person or to a role, such as Director of Computer Center. A person can own more than one professional roles in the work-flow system. The mapping of persons and roles can be easily defined by a friendly graphical interface as Figure 6. Only personal messages are expected to sent to a private mailbox, while all other business messages are supposed to be mailed to the mailboxes with the professional titles. Therefore, a user can arrange the priority list of the incoming mails according to the importance of different roles.

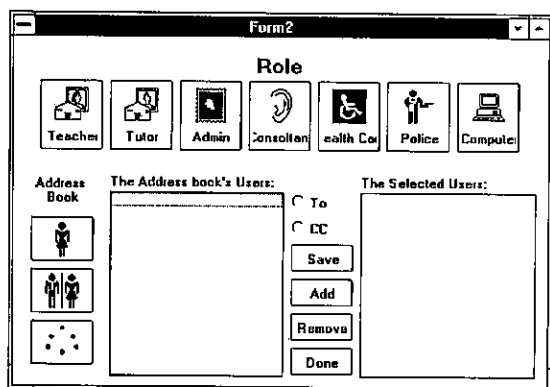


Figure 6. Role Definition Screen

Work-Flow Controller

Our system provides the capability of electronic routing of information, forms and documents. The routing information is defined when each new form is created electronically. The users in each routing step are able to modify the work flow with the ease of using the graphical interface. This work-flow controller should allow users to define and modify the work-flow sequences, actions in each step, and routing conditions. The person assigned to do the action in each step is usually done by the professional title (roles), rather than the private mailbox name.

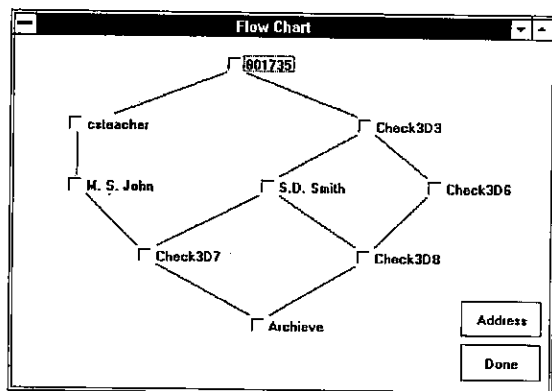


Figure 7. Routing Path Screen

Discussion

We described the general overview of the system architecture of work-flow software developed in our laboratories. Several work-flow tools are proposed both in server and in client sides in order to support office collaboration. Currently, there are about 2,000 mailboxes in campus using the traditional e-mail system. Most of the people are suffering from the information overloading problem. We also found that it is not easy to force office staff to follow exactly the so-called standard procedure, even when it was defined clearly in

the standard of procedure handbook. The office workers sometimes do need short-cuts and modifications in practices. This is part of the reasons why the EDP/MIS department can't meet users' requirements in timing basis. The EDP professionals are too busy on patching and negotiating with users' new requirements.

Our approach of e-mail based groupware is opening up an opportunity for organizations to involve the users to do "Re-Engineering" in their office environment. This user-oriented approach will fundamentally change the way business running in an organization. The office users now have an automated tool that they can program most of their office processes according to their own expertise. In this way, office users are happy to get a good control of office process status. At the same time, the office management can obtain the performance reports on the human resources and office processes effectively.

Conclusions

We have proposed a system that is very applicable to most of the form-driven office processes. Users can easily monitor the process status and execution history. The office process conditions can be easily adjusted according to the changes of the users' needs.

Our experiences suggest that the followings to be the features we could include in the future:

- Define processing conditions in each routing step.
- Create easy-to-use graphical form designer for end users.
- Integrate with other groupware, such as scheduling, project management tools, etc.
- Integrate with user's private agent software.
- Balance the working load among group roles.

The work-flow systems will emerge rapidly with other group technologies in the coming years. Our next research goal will be the development of an integrated office environment which provides support to the office work group in the area of Group Decision Support, Group Communications, and Group Multimedia Applications.

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