HotFlow – A Visual Language for Workflow Applications in E-Commerce

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Abstract

HotFlow is a visual language for controlling the dynamic workflow of negotiating and contracting, enabling users with minor knowledge in information technology to visually define and modify a workflow even at run-time, with simple drag-and-drop actions. It has been architectured within the scope of MALL2000, a project on business-to-business Electronic Commerce.

1. Introduction

When Electronic commerce (EC) came up, it mainly provided the additional possibility to send the usual order forms via Internet to a supplier. The current developments of EC in the business-to-business area add requirements going far beyond the "customer orders, supplier delivers" line of action, which is usually based on filling forms. Instead, extensive transactions have to be handled, which demand the agreement on many fundamental details, varying from one case to another. The manifoldness of those details disables the use of standard forms with predefined fields.

Within MALL2000, document-based negotiations among business partners (typically small and medium sized enterprises, SMEs) will be enabled.

SMEs are generally more easily handicapped by language barriers or national regulations for trading than big enterprises which often have branch offices in many countries. MALL2000 will support them to establish international contacts and to do business with partners from all over the world.

Negotiations in EC [1] include more sophisticated procedures than bargaining for a price. The conduct of a business consists of many steps, ranging from getting in touch with (former unknown) partners, checking whether one partner can supply something the other one wants, up to concluding a contract. Maybe even multiple partners are involved. Such a negotiation procedure can be composed of multiple steps, so that an overall planning of the flow of steps would be desirable. This is what HotFlow will provide, compareable to but more flexible than common Workflow Management Systems (WfMSs).

2. Workflow in MALL2000

A MALL2000 negotiation document (MALLdoc) is an initially empty canvas which will be filled gradually by business partners with hierarchically structureable parts (DOCparts). Available parts are, e.g., text editors, planning/simulation spreadsheets, business graphics, and database access forms. The workflow information for each part of a MALLdoc is handled via a Workflow Control Part (WfCP).

WfCPs may be considered to be specialized workflow control programs for viewing and modifying the currently followed workflow specification. For each negotiation document, HotFlow will provide a view of its contents and a diagram of the workflow definitions.

HotFlow provides a visual language for flexible handling of WfCPs attached to (sub-)parts of a MALLdoc. The language is designed for applications in EC, an environment differing significantly from those of common WfMSs.

The Workflow Management Coalition defines a WfMS as a system that completely defines, manages and executes workflows through the execution of software. The order of execution is driven by a computer representation of the workflow logic, whereby a workflow is the computerised facilitation or automation of a business process [2].

WfMSs provide planning and controlling facilities [3], but they are not flexible enough to be used in EC. WfMSs let the workflow be defined once at build-time, which is then to be exhibited at run-time. Even though there are attempts to enable the modification of the workflow at run-time, a structural, basic change is rarely possible. But the need to add and/or replace partners, to include conditions like time-limits to offers or licensing procedures might occur quite often in extended EC negotiations.

3. Visual support for dynamic workflows

In the common workflow area, the definition of workflow processes and activities is typically done by specialized experts, who are usually not involved in the execution of the activities. For HotFlow, the workflows to be designed will be less complicated and extensive, but

the process definition will be done by the actors, though experts in the business area, will most likely be laities in workflow and information technology topics.

This requires the workflow definition language of HotFlow to be

- applicable intuitively (the users will not be willing to consult a handbook before they are able to implement a time-limit on some DOCpart),
- simple and straightforward (language constructs generated intuit by one workflow amateur have to be correctly understood by another laity user), and
- capacious (all business processes can be mapped).

Irrespective of promotional inducements for the use of appealing charts, there are good reasons to provide a well-designed visual language for the definition and presentation of workflow processes in HotFlow.

The definition of a workflow process is a task similar to programming. In the area of HotFlow, the "workflow engineer" is very likely to be a laity in information technology – and, as a consequence, in programming as well, and the workflow processes to be defined will be of a moderate size.

In several studies (see [4] for an overview) it could be observed that in small-sized problems, visual notations can yield better performance than textual presentations. They play an important role in end-user programming, where problems are usually smaller than those encountered by professional programmers. One advantage of Visual Programming Languages lies in their accessibility to (certain classes of) non-programmers.

HotFlow meets the special requirements by a radical reduction of the available control connectors to those which are elementar. For the convenience of the user, predefined, adaptable subactivities (Workflow Patterns) are provided as well, as a compensation to the very basic parts, which necessitate extensive specification of parameters.

The standard entry provided by HotFlow is threepart:

The user who originates the workflow for a business procedure fills any of these three phases with activities and gives details on each "actor".

Application data (for the business process) may be filled in DOCparts. Therefore, each activity has an input and an output container with links to the respective DOCparts. If one DOCpart is mentioned in the input containers of two activities, HotFlow ensures that only one actor may modify it. Any operation on a DOCpart is one of the following:

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{create, connect_to, view, modify, delete}
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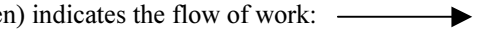
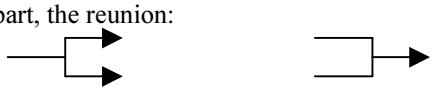
The workflows will be visually presented as graphs which are put together by simple drag-and-drop actions from palettes containing basic connectors, DOCparts, and Workflow Patterns (see [5] for details).

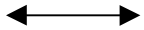
Activities are combined by arrows as Workflow Connectors.

The simplest connector (which will probably be used most often) indicates the flow of work: 

A variation is the split into *n* parallel procedures, and its counterpart, the reunion:



(*n*>0, the pictures show both variations for *n*=2).

Another connector indicates a semantic coherence. It is used, e. g., to connect a time-limit to the respective activity: 

4. Conclusions

The document-centred approach allows to integrate controlled, dynamic workflow processing with business-to-business EC-applications. *Workflow control parts* (WfCPs) in a business document realize a new, advanced workflow processing functionality. The *HotFlow* tool gives visually supported, dynamic modification capabilities for a document workflow to businesspeople, who often might have minor knowledge in information technology. Working with the HotFlow tool offers a specialized, powerful visual language for workflow applications in E-Commerce.

References and Acknowledgement

[1] H.-J. Hoffmann and D. Handl, "Document exchange as a basis for business-to-business co-operation". In: Roger, J.-Y., et al. (Eds.): *Business and Work in the Information Society*. IOS Press, Amsterdam, 1999, p. 325-331.

[2] Hollingsworth, D., "The Workflow Reference Model", Doc. Nr. TC00-1003, Workflow Management Coalition, 1995.

[3] M. Amberg and F. Zimmermann, "Enabling Virtual Workplaces with Advanced Workflow Management Systems", in: Igbaria, M. and M. Tan: *The Virtual Workplace*, Harrisburg, PA, 1998.

[4] K. N. Whitley, "Visual Programming Languages and the Empirical Evidence For and Against", *Journal of Visual Languages and Computing (1997) 8*, Academic Press Ltd., pp.109-142.

[5] D. Handl: "HotFlow – A Visual Language for Workflow Applications in E-Commerce" (extended version), 1999. Available at: http://www.pu.informatik.tu-darmstadt.de/ Projekte/ Mall2000/index_e.html

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