A Framework for Distributed Workflow Systems

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Abstract

Workflow management systems (WFMS) are being adopted to assist the automation of business processes that involve the exchange of information. As a result of developments in distributed information system technology, it is now possible to extend the WFMS idea to wider spheres of activity in the industrial and commercial world and thereby to encompass the increasingly sprawling nature of modern organisations. This paper describes a framework under development that employs such technology so that software tools and processes may interoperate in a distributed and dynamic environment.

The framework employs Petri nets to model the interaction between various sub-processes. CORBA technology is used to enable different participants who are physically disparate to monitor activity in and make resource-level adaptations to their particular subnet.

Keywords

Distributed systems, workflow, process modelling, Petri nets

1. Introduction

Developments in networking and telecommunications have in the past few years opened up enormous opportunities for linking up disparate information sources and computational modules. This has raised significant hopes for improvements in the area of software interoperability: the linking of software modules to carry out complex computational tasks. An example of an application that facilitates software interoperability is a Workflow Management System (WFMS), which provides support for the automation of business or industrial processes involving human and machine-based activities. By using such systems, organizations can accelerate throughput, reduce costs, and monitor performance of common, well-understood operational processes in their domain.

Existing WFMSs, however, are practical for only the most straightforward operational processes and are not necessarily suited for the current business climate. This is due to the fact that the current changing, globally competitive business and engineering environment has led in recent years to fundamental changes in the ways organizations themselves are managed and structured. The climate is increasingly marked these days by the need for rapid response to changing consumer demands, intense competition, and a rapidly evolving technical infrastructure [5]. Organizations that once were vertically arranged in hierarchical, bureaucratic structures are becoming increasingly decentralised into geographically distributed semi-autonomous business units so that they can respond more quickly and efficiently to changing market conditions. At the same time, business processes have become more complex, involving the concurrent participation of multiple and distributed functional units. These changing conditions have led to the need for improved workflow management tools that are (a) adaptive to changing conditions and (b) provide assistance in the area of horizontal, cross-organizational management. The focus of this paper is on the development of such workflow management tools.

We note in general that the management of a business process has three basic stages: (1) design and creation, (2) the provision of resources, and (3) enactment. Of course there are great differences in the range of business processes, and they might be loosely scaled according to the following categories:

- **Administrative** – repetitive, predictable processes with simple coordination rules
- **Ad-hoc** – processes that involve more human judgement, such as a sales process
- **Collaborative** – processes, such as system design, that are even less structured and require support for group work.

Existing WFMSs have primarily concentrated on administrative workflows, for which the processes are well-understood, and so these systems typically only offer support for enactment [11]. As a consequence, such systems often lack support for both design and for