

Chapter 3.7

Distributed Workflow Management Based on UML and Web Services

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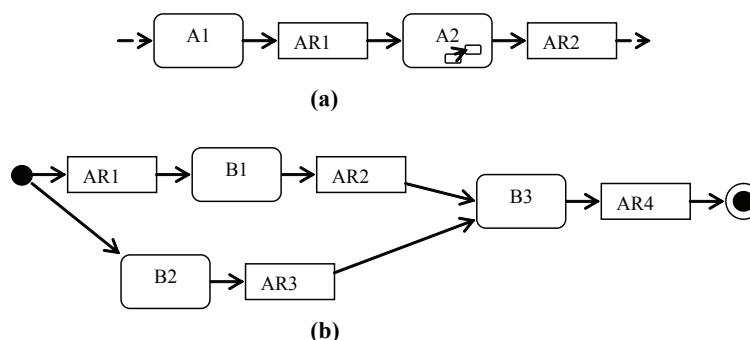
INTRODUCTION

The definition and the management of business processes are considered a relevant issue to support organizations in their activities. Indeed, in the last few years many organizations have been changing their business processes to keep competitive in the global market. Workflow management is an emerging technology enabling process performance improvement in a cooperative working environment. In particular, a workflow management system (WfMS) enables processes automation through the integration, the coordination, and communication of both human and automatic task of business processes. WfMSs

provide a process definition language (PDL) for modeling business processes. A PDL sentence is named process model and is enacted by a component of the WfMS, namely the process engine. The main task of this component is executing the enactment rules and the activities specified in the Process Model.

A huge number of PDLs based on several formalisms have been proposed in literature. Recently, some authors suggest exploiting the unified modeling language (UML) proposed by the Object Management Group (OMG, 2002) to model business processes (Aversano, Canfora, De Lucia, & Gallucci, 2002; Di Nitto, Lavazza, Schiavoni, Tracanella, & Trombetta, 2002; Eriksson &

Figure 1. Process and sub-process modeling



Penker, 2000, Jager, Schleicher, & Westfechtel, 1999; Marshall, 2000). UML is a natural choice for representing business processes, as it is a well known notation that can be easily understood and used by any kind of users.

In this article, we propose a Web services-based WfMS that lets users manage and enact business processes. The proposed system offers a visual environment based on an extension of UML activity diagrams that allows to graphically design a process model and to visually monitor its enactment. Since UML does not have a well defined operational semantics and is not executable, we had to make the process model executable by appropriately enriching the syntax and semantics of UML activity diagrams. The architecture of the proposed WfMS is based on Web services to manage and enact distributed business processes.

BACKGROUND

In the last decades workflow management systems (WfMSs) (Workflow Management Coalition, 1999) have been developed by researchers to provide support to the modeling, improvement, and automation of business and industrial engineering processes (Cugola, Di Nitto, & Fuggetta,

2001; Eder & Panagos, 1999; Winograd & Flores, 1986), including software processes (Bandinelli, Di Nitto, & Fuggetta, 1996; Heimann, Joeris, Krapp, & Westfechtel, 1996; Kaiser, Dossick, Jiang, Yang, & Xi Ye, 1998).

Most of the WfMSs of the last decade are client-server systems, with centralized enactment facilities, although they do not exploit the web as basic infrastructure to ease the accessibility by remote users. Recent research on workflow management is focusing on the use of web technologies and/or specialized middleware to support distributed processes across organizations (Aversano et al., 2004; Cugola et al., 2001; Eder & Panagos, 1999; Kaiser et al., 1998; Kammer, Bolcer, Taylor, & Hitomi, 1998; Maurer et al., 2000). The new frontier for the management of distributed e-business processes is provided by Web services (ebXML, 2001; Leymann, 2001). In particular, Pautasso and Alonso (2003) propose a visual approach to compose the various services as task of a process. A process is modeled by using two different diagrams, one for data flow and another for control flow. This requires two different process views.

In general, a number of process definition languages have been proposed in the literature, based on several formalisms such as event-condition-action mechanisms (Aversano et al., 2004, Loops

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