Document configuration control processes captured in a workflow

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Abstract

This paper proposes a new method of document version management for workflow management systems (WfMSs). A WfMS is considered an essential element for automation of complex business processes involving many companies, particularly for those in an e-business environment. A core element of such business processes is the documents that flow through the processes. In fact, it can be thought that the execution of a business process is often tantamount to working out a set of formed documents. Therefore, it is very important to have a systematic management of document changes along with the process execution. We propose a version model that can take into account the structure of the underlying process over existing version management techniques. In this model, the components of a document and a process are associated with each other, and this becomes the basis for automatic creation of document versions and automatic configuration of relevant documents for a certain user at a certain stage of the process. A prototype system is implemented, and the potential advantages of the approach are discussed.
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Keywords: Business process; Workflow; Version management; Electronic document management

1. Introduction

A workflow management system (WfMS) is a software system that defines, controls and manages business processes [16]. The WfMS is an essential element for the automation of complex business processes, particularly those in an e-business environment [1,23,24,30]. Such a process usually involves documents, and in many cases, filling out the documents can be understood as an important part of the process execution. In this paper, we propose a new method of managing document changes and configurations for WfMS.

Since document handling is an important part of business processes [17], many WfMSs provide functions for creating, delivering, and storing documents to some extent [15,18]. They, however, are limited to the storage services and simple delivery of documents, but do not take into account the underlying process that controls the document flow. Conventional version models [21] maintain the change history with time-stamps. Since they have been developed independent of WfMS, they have nothing to do with any process model. To the best of our knowledge, there is yet no approach to document versioning that can take advantage of the underlying business process.

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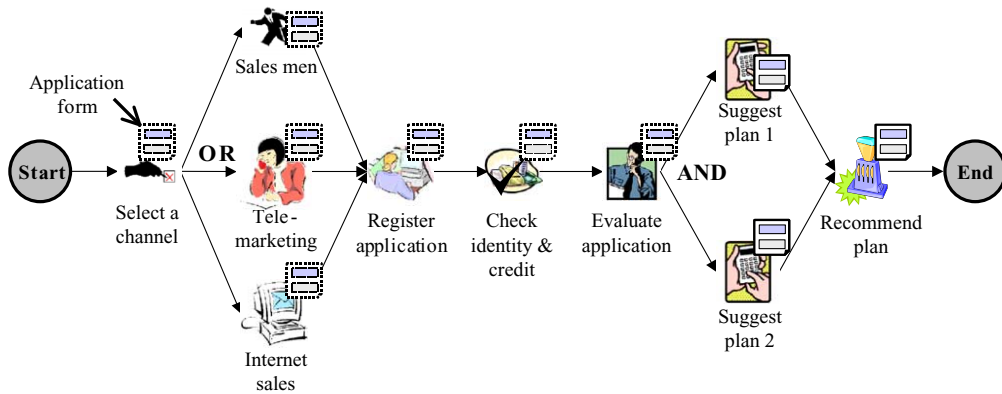*E-mail address:* hrbae@dongeui.ac.kr (H. Bae).

Fig. 1. An illustrative example.

Consider, for example, the process model in Fig. 1, which is a part of an insurance application process. While the process is proceeding, the application form will be completed by relevant participants step by step in due order of the process model. In an early activity, i.e., 'sales men,' 'telemarketing,' or 'Internet sales,' the section describing the applicant is filled out. In the following activities, 'register application' and 'check identity & credit,' additional information, like the applicant's credit, is added to the form, and any erroneous data in the form can be corrected. After a review at 'evaluate application,' a couple of alternative plans are prepared for the applicant. Finally, one alternative is chosen at 'recommend plan.'

Version management is especially important when multiple participants can modify the same part of a document. In the above example, every participant preceding 'evaluate application' can alter the application form. Suppose that there is an error in the resulting form. Since a typical WfMS keeps only the latest version, it cannot identify who is responsible for the error. This explains the necessity of managing the change history that a form has undergone. Otherwise, it would be unable to answer a change-related query, like ''Who modified what part of the form?''. When activities proceed concurrently, like those involved in the second parallel part of the example process, they can produce alternative documents for the same task. Such parallelism makes the version management more complicated.

We propose a new model that can control the versions of documents handled by a WfMS. In this model, the components of a document are associated with the components of the underlying process model. The proposed model is unique in that the versioning takes into account the process semantics, such as the structure, pattern, and definition of processes. This allows the history of the document to be understood in the light of the process' progress, so that it enables users to check immediately the status of the document at a certain step of the process, and to compare the contents before and after the change. The proposed function is especially important in e-business environments in which many companies exchange documents. Our model facilitates tracing the change history of a document along the flow of a process. It can also be used as a basic mechanism for workflow recovery that restores a process status back to a previous one when some exceptions take place.

2. Backgrounds

2.1. Version management

Version management, in its broadest sense, is a method of systematically dealing with changes of objects over time, and a version is defined as a snapshot of an object that is semantically meaningful at a point in time [21].

A version model represents the changes of objects over time [29], or simply version history, and is usually described using graphical methods [21,34]. There are two different types of versions, called