Chapter VII
ICN–Based Workflow Model and its Advances

Kwanghoon Kim
Kyonggi University, South Korea

Clarence A. Ellis
University of Colorado at Boulder, USA

ABSTRACT

This chapter introduces the basic concepts of information control net (ICN) and its workflow models. In principle, a workflow model is the theoretical basis of a workflow modeling methodology as well as a workflow enactment architecture. Particularly, the workflow model is directly related with how its major components are embodied for implementing the underlying workflow enactment system, too. Accordingly, the authors describe the graphical and formal representations of ICN-based workflow model and its advanced models—role-based model and actor-based model—that can be automatically transformed from the ICN-based workflow model in order to improve their verifiability, maintainability and usability. Conclusively stating, we strongly believe that the ICN-based workflow model and its advanced models be very useful not only for maximizing the quality of workflows but also for strengthening theoretical backgrounds of the recent research issues, such as workflow verification/validation, workflow reengineering, workflow intelligence, workflow mining/rediscovery, and advanced workflow architectures, and so on.

INTRODUCTION

In general, a workflow management system consists of two components—modeling component and enacting component. The modeling component allows a modeler to define, analyze and maintain all of the workflow-related information which is necessary to describe a workflow procedure[2], and the enacting component supports users to play essential roles of invoking, execut-

ing and monitoring the workflow model defined by the modeling component. In other words, the logical foundation of the modeling component is the so-called workflow model that is represented by a set of entities and their relationships in order to describe a specific workflow. Therefore, the expressiveness of a workflow is decided by the underlying workflow model and its modeling system. Also, the conceptual methodology of the enacting component is called workflow architecture that is used to describing an internal structure of the workflow enacting component and characterizing its architectural style focusing on capabilities to create, manage and execute the workflow model.

In result, the workflow model and the workflow architecture become the theoretical bases on the design and implementation of a workflow management system. Of course, there may be several different types of the workflow model and different styles of the workflow architecture. According to which type of the workflow model, the underlying workflow management system may have a different way of representation and different features in modeling a workflow procedure. Likewise, different styles of the workflow architecture may show

different ways of executing workflow procedures and different efficiencies as well. Therefore, the workflow model and the workflow architecture have to incorporate the advanced technological and organizational features so that the corresponding workflow management system not only displays an efficient way of modeling work and effective supports of executing performance, but also acclimates itself to a new technological and organizational environment. As the important technological trends that may affect the innovation of workflow model and architecture, we consider the powerful networked personal computing facilities like Grid/P2P computing environment, and the increasingly large and complex workflow applications; The advanced workflow models and their architectures introduced in this chapter are the outcomes of those research activities trying to improve the expressiveness of the traditional workflow model and architecture for acclimating the recent technological trends.

In this chapter, we introduce a typical workflow modeling methodology, the so-called information control net abbreviated to ICN, and describe the basic concept of ICN-based workflow model and its formalism through graphical notations and their

Figure 1. The constituents of a workflow management system
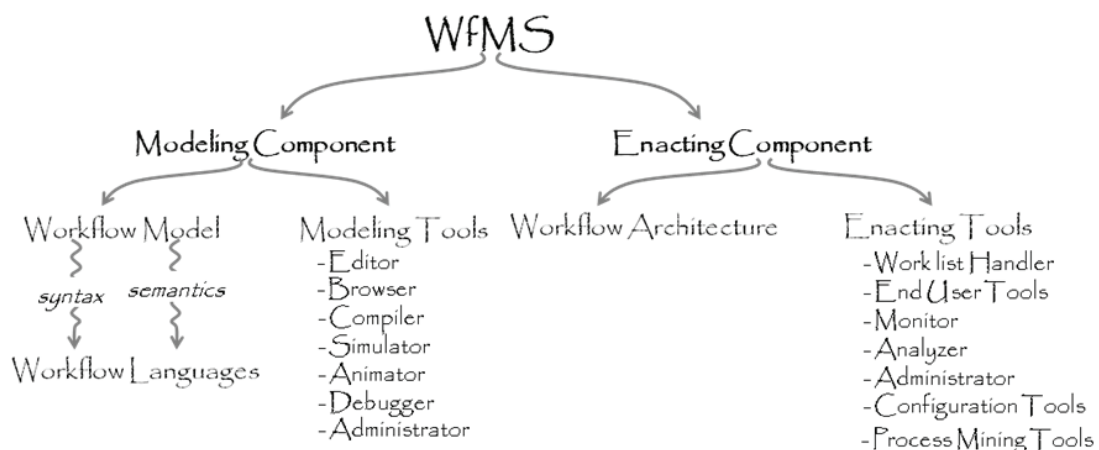
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