Modeling and Analysis using p-Time Petri Nets based Workflow-Net

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ABSTRACT
Workflow management has been a hot issue in both academic and industrial research. Deadline assignment is of great significance in workflow management. In order to avoid deadline violation, this paper presents an approach to the schedulability analysis of workflow system modeled in p-time Petri nets by separating timing properties from other behavior properties. The analysis of behavioral properties is conducted based on the reachability graph of the underlying p-Time Petri net, whereas timing constraints are checked in term of absolute and relative firing domains. Our technique is based on a concept called clock-stamped state class (CS-class). With the reachability graph generated based on CS-class, we can directly compute the end-to-end time delay in workflow execution. We have identified a class of well-structured p-time Petri nets such that their reachability can be easy analyzed.

Keyword: time workflow-net, p-time Petri Nets, reachability analysis.

1. Introduction
At present, workflow management is a key technology in supporting business process reengineering and an effective means realizing full or partial automation of a business process. Workflow management systems support business processes of complex real-time systems via electronic networks and are widely used by organizations to coordinate execution of various applications that represent their day-to-day tasks. Despite many workflow management systems developed for different types of workflow based on different paradigms (Ellis and Nutt, 1993; Georgakopoulos et al., 1995; Jablonski and Bussler, 1996; Lawrence, 1997). It is very important to use an established framework for modeling and analyzing workflow processes, since processes are a main factor in workflow management systems.
Workflow modeling and analysis have been studied for decades, and by now, there