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MODELLING WORKFLOW PATTERNS BASED ON P/T NETS

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Abstract. *The formalization of patterns is a basic theoretical problem of workflow. Based on the WfMS's concepts and the characteristics of workflow, we present some new concepts to help modelling patterns. Moreover, Logic is the control semantics of patterns and is stable and general, and to formalize patterns, we abstract logic from workflow and discuss how to model logic of patterns. With comparing and analyzing patterns' logic, we specify patterns with the classical P/T nets without additional elements. Based on our method, the number of patterns is reduced and the specification of patterns is simplified significantly. Furthermore, a algebra method with synchronic distance is also presented to specify patterns. Accordingly, the patterns are also described by synchronic distance based on the P/T nets specification.*
Keywords: Activity, Pattern, P/T nets, Workflow

1. **Introduction.** Workflow idea originates from the business application of computer software. And the theoretical foundation of workflow has become a hot problem. To formalize workflow, the distributive and concurrent characteristics is the first thing to be described in the specification. Although there are many formalization tools, such as *state machine*, *UML*, *etc.* [1, 2, 3], with the feature of describing the concurrent semantics and the rich analysis techniques [4], Petri nets is an ideal modelling tool of workflow [5].

In the past years, a lot of effort has been devoted to the formalization method of workflow[6, 7, 8, 9, 10, 11, 12]. However, little fruited result have been achieved, especially in the application of workflow specification. W.M.P. van der Aalst is a famous one who is studying modelling workflow with Petri nets. In [13, 14, 15], authors present four kinds of *transitions*, four *triggers* and twenty *workflow patterns*. Although it is easy to describe the semantics of workflow with such new additional elements, one obvious disadvantage is the conciseness can't be guaranteed. Consequently, the theoretical tools of Petri nets can't be applied directly. In fact, Petri nets [16] is powerful to specify the logic of workflow process, and not all workflow patterns(include transitions and triggers) provided by Aalst are necessary if workflow can be modelled by the classical Petri nets.