ABSTRACT

Business process management (BPM) has advanced from the process centric paradigm and recently been receiving great attention from the academia and industrial societies. As a fundamental component in BPM systems, business process modeling is still important and should adapt to changes and requirements in the new business environment.

Business process verification (BPV) falls in the field of business process modeling and will be increasingly important to ensure the correctness of business processes. BPV will make it possible to detect design errors in the early stage and thus decrease development time and cost of business process systems. This thesis proposes a hybrid approach to integrate formal and informal approaches in business process modeling and mostly concentrates on verifying XPDL-defined business processes by employing the formalism of the situation calculus.

Formalization of the concepts in XPDL and the situation calculus works as the theoretical foundation of this research. The mapping from XPDL to the situation calculus is also defined by introducing mathematical structures such as process structure and action structure. Moreover, the correctness properties are formally defined so as to verify business processes by using the situation calculus.

The gap between XPDL and the situation calculus is bridged by formalization efforts and furthermore those formal definitions guide the implementation of transformation from XPDL to XSSL – an introduced language to make this bridging work convenient, and finally to Prolog – a logical language that interprets the situation calculus and enables automatic verification.

A prototype system has been designed and developed to demonstrate the feasibility of this approach. Furthermore, this approach is also conceptually extended to implement dynamic management in the ubiquitous business environment where the situation calculus can enable higher degree of business intelligence and provide customers with customized and satisfied services.