

Business Process Architectures: Concepts, Formalism, and Analysis

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Business Process Management has become an integral part of modern organizations in the private and public sector for improving their operations. In the course of Business Process Management efforts, companies and organizations assemble large process model repositories with many hundreds and thousands of business process models bearing a large amount of information. With the advent of large business process model collections, new challenges arise as structuring and managing a large amount of process models, their maintenance, and their quality assurance.

This is covered by business process architectures that have been introduced for organizing and structuring business process model collections. A variety of business process architecture approaches have been proposed that align business processes along aspects of interest, e.g., goals, functions, or objects. They provide a high level categorization of single processes ignoring their interdependencies, thus hiding valuable information. The production of goods or the delivery of services are often realized by a complex system of interdependent business processes. Hence, taking a holistic view at business processes interdependencies becomes a major necessity to organize, analyze, and assess the impact of their re-/design. Visualizing business processes interdependencies reveals hidden and implicit information from a process model collection.

In this thesis, we present a novel Business Process Architecture approach for representing and analyzing business process interdependencies on an abstract level. We propose a formal definition of our Business Process Architecture approach, design correctness criteria, and develop analysis techniques for assessing their quality. We describe a methodology for applying our Business Process Architecture approach top-down and bottom-up. This includes techniques for Business Process Architecture extraction from, and decomposition to process models while considering consistency issues between business process architecture and process model level. Using our extraction algorithm, we present a novel technique to identify and visualize data interdependencies in Business Process Data Architectures. Our Business Process Architecture approach provides business process experts, managers, and other users of a process model collection with an overview that allows reasoning about a large set of process models, understanding, and analyzing their interdependencies in a facilitated way. In this regard we evaluated our Business Process Architecture approach in an experiment and provide implementations of selected techniques.