

Detecting Data-State Anomalies in BPMN 2.0

A reliable business process is significantly important for stakeholders. They need to be assured about the correctness of their business models before getting into execution. There are many approaches to provide process verification, mostly about control flows. However, in real examples, many business models are incorporated with data. Although some verification methods are provided to support data verification in processes, still many open issues exist in this area.

BPMN 2.0 is a graphical language which helps model designers to represent how the process should be accomplished. In BPMN 2.0, information of the process is represented by data objects. Data object elements can optionally reference a data state, which is the state of the data contained in the data object. Then, a data object may have a lifecycle of different states. The presence of data states may lead to occurrence of unexpected anomalies in processes. For example, activity *A* needs to read a data object *d* which refers to data state *m* (d_m), but in all precedent executions *d* keeps its reference to data state *n*. As a result the error *missing data state* occurs in a process. Detecting these errors in business models is crucial as it may lead to undesired executions like deadlock.

Matter under consideration in this thesis is to detect data state anomalies in business processes. This includes:

- Analyzing and defining anomalies with usage of data objects which refers to data states.
- Checking workflow models for these anomalies.

To do this, you should take the following steps:

- Transformation of semantics of data states to Petri Nets.
- Formalizing properties of anti-patterns in CTL formula.
- Verification of anti-patterns in the created Petri Nets.

In these thesis, you will get the practical knowledge of modeling data-centered workflows. You will learn how to define properties in Computational Tree Logic (CTL) and how to transform your model to Petri Nets for verification. Having background knowledge in workflows and Petri Nets is beneficial but not mandatory if you are eager to learn.

For more information you can read the following references:

- (1) Von Stackelberg, S., Putze, S., Mülle, J., & Böhm, K. (2014). Detecting data-flow errors in BPMN 2.0. *Open Journal of Information Systems (OJIS)*, 1(2), 1-19.
- (2) Awad, A., Decker, G., & Lohmann, N. (2009, September). Diagnosing and repairing data anomalies in process models. In *International Conference on Business Process Management* (pp. 5-16). Springer, Berlin, Heidelberg.

Contact

Elaheh Ordoni	Elaheh.ordoni@kit.edu	+49 721 608-42757	Raum:
Am Fasanengarten 5	76131 Karlsruhe	Gebäude: 50.34	362