Chair of IT Service Management, Development and Operations
TUM School of Computation, Information and Technology
Technical University of Munich

Bachelor Thesis

Data-Based Testing of Blockchain-Based Business Processes

Blockchain has been proposed to facilitate the execution and monitoring of interorganisational processes. Processes implemented through blockchain can enforce process rules and ensure the integrity and transparency of execution logs [1]. However, evaluating such systems is hard, as there are very few inter-organisational datasets available. Therefore, most work relies on testing these systems on artificial process models taken from e.g., the BPMN by Example Document [2]. For these models, synthetic data is generated. Consequently, these approaches are never tested on real-world processes and data. In this topic, we aim to build a testing framework with which decentralised/ blockchain-based process execution tools can be tested realistically. Towards this end, we plan to utilise datasets available from the BPI Challenge (e.g., BPI Challenge 2018 [3]) and process them to be used in the testing environment of Chorpiler [4], a model-driven engineering tool that can transform BPMN Choreographies into Solidity Smart Contracts. The goal is to test and benchmark these Smart Contracts with this realistic data.

Contact

Every theses starts with an exposé, where you shape the topic towards your interest (in consultation with us). If you're interested, please contact us as outlined at https://www.cs.cit.tum.de/en/isdo/teaching/theses/.

Recommended Prerequisites

Familiarity with BPM, Process Mining skills (or willing to acqurie), Strong programming and DevOps skills

[1]: Stiehle, Fabian, and Ingo Weber. "Blockchain for business process enactment: a taxonomy and systematic literature review." BPM 2022 Blockchain, RPA, and CEE Forum, Münster, Germany, September 11–16, 2022, Proceedings. Cham: Springer International Publishing, 2022.
[2]: http://docenti.ing.unipi.it/m.cimino/gpa/res/BPMN_by_example.pdf, accessed 2024-12-17
[3]: https://ais.win.tue.nl/bpi/2018/challenge.html
[4]: https://github.com/fstiehle/chorpiler/tree/v2

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Tasks

1. Familarise yourself with the BPI Challenge data sets (proposal: start with the 2018 data set), decide whether it is suitable to be used as an inter-organisational (see e.g., [1] for an explanation) process.

2. Use process discovery methods [Part III, 2] (e.g., with tools like Celonis, Disco, or ProM) to analyse the data set. Build (a) choreography model(s) from it.

3. Implement/Integrate an automated testing environment (some of this is already present in Chorpiler) that uses the model and data to test and benchmark the capabilities of the smart contract generated by Chorpiler. Some inspiration on how this test setup looks like can be taken from Weber et al. [3].

[1]: Breu, Ruth, et al. "Towards living inter-organizational processes." 2013 IEEE 15th Conference on Business Informatics. IEEE, 2013.
[2]: Wil van der Aalst. 2016. Process Mining: Data Science in Action (2nd. ed.). Springer Publishing Company, Incorporated. https://doi.org/10.1007/978-3-662-49851-4
[3]: Weber, Ingo, et al. "Untrusted business process monitoring and execution using blockchain." Business Process Management: 14th International Conference