Chair of Information System Development and Operation
TUM School of Computation, Information and Technology
Technical University of Munich

Bachelor Thesis

LLMs for Smart Contract Generation from Business Process Descriptions

Large language models (LLMs) have changed the reality of how software is produced. Within the wider software engineering community, they are explored for different code generation use cases, and different benchmarks and benchmarking frameworks exist [1]. In this work, we present an exploratory study to investigate the use of LLMs for generating smart contracts from business process descriptions.

Blockchain-based business process execution relies on rule-based generation tools that transform a normative business model into executable components [2]. These tools are limited in their flexibility, output-target specific (often EVM-based), limited in their support of blockchain-specific features, often not open source, and differ greatly in their efficiency (in terms of, e.g., transaction costs incurred). Thus, the idea to introduce LLMs into the code generation process has recently emerged [3].

However, current work focuses on compilability and manual inspection of LLM-produced code fragments. With this work, we want to develop an automated evaluation framework and provide first empirical data from larger data sets. We want to test LLMs of different sizes in their capabilities of performing crucial tasks encompassing enforcing process flow, resource allocation, and data-based conditions.

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 blockchain and generative AI technology, Strong programming and DevOps skills

[1]: Belzner, Lenz, Thomas Gabor, and Martin Wirsing. "Large language model assisted software engineering: prospects, challenges, and a case study." International Conference on Bridging the Gap between AI and Reality. Cham: Springer Nature Switzerland, 2023.
[2]: Stiehle, Fabian, and Ingo Weber. "Blockchain for business process enactment: a taxonomy and systematic literature review." International Conference on Business Process Management. Cham: Springer International Publishing, 2022.
[3]: 1: S. Gao, W. Liu, J. Zhu, X. Dong and J. Dong, "BPMN-LLM: Transforming BPMN Models into Smart Contracts Using Large Language Models," in IEEE Software

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Tasks

1. Familarise yourself with our current benchmark framework.

2. Suggest and implement extensions of its capabilities.

3. Conduct benchmark experiments to collect more empirical data.

4. Draw on your data to derive suggestions for how LLMs could be integrated into the current state of the art of blockchain-based process execution.