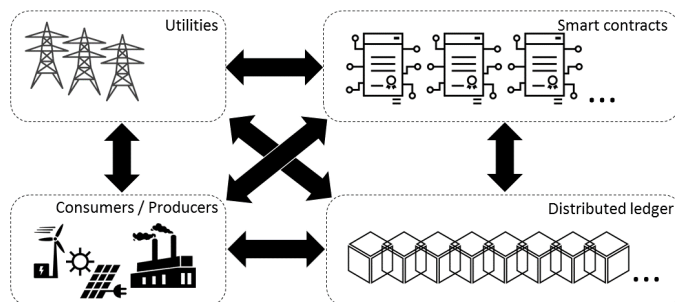




Smart Contracts for Industrial Service Applications

There is tremendous interest in the blockchain, the distributed ledger that powers the Bitcoin network. A key advantage of distributed ledgers compared to centralized solutions is that a distributed ledger removes the need to trust any particular party. In other words, trust is shifted from a specific party to a distributed system and its embedded protocols. As a consequence, one needs to trust that the majority of the parties involved in maintaining the ledger follows the protocols, ensuring that the ledger operations are carried out as intended, and the remaining (malicious) entities cannot corrupt the system. Since trust is a valuable and crucial commodity in any distributed system, numerous use cases for blockchain technology have been proposed.

The focus of this work (internship or Master's thesis) is on industrial applications, in particular service applications for electricity network operators and/or (renewable) energy consumers and providers. For example, smart meters can be reliably used to determine the amount of energy that is generated or consumed, and this information



can be processed automatically in a distributed system in order to trigger appropriate payments. Automated distributed applications, so-called *smart contracts*, can also be used to facilitate the management of service contracts between any service provider and consumer in this domain. A key challenge and goal of this work is to specify smart contracts that are generic enough to capture various service applications while being precise enough for a formal verification of (semantic) correctness. Apart from formally specifying and analyzing such smart contracts, a prototypical implementation should further be developed (based on a real business case provided by ABB!).

Requirements: Prior experience or a strong interest in blockchain technology and consensus protocols is recommended. The student(s) should further have solid programming skills and be able to work independently.

This is a joint project between ETH and ABB Corporate Research. The student(s) will get a workspace at ABB Corporate Research.

Interested? Please contact us for more details!

Contact

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Detailed Project Outline

The following tasks should be carried out as part of this work (on the right side you find a rough estimate for the time that we allocate to the respective task):

- Read up on related work. (★)
- Familiarize yourself with existing platforms that support smart contracts. (★)
- Develop smart contracts for specific service applications. (★★)
- Analyze and document properties of the developed smart contracts. (★★)
- Implement and evaluate smart contracts for specific service applications. (★★★)
- Contribute to an end-to-end demo application. (★★)
- Write a detailed report. (★★)
- Present your findings. (★)

The Student's Duties

- One meeting per week with the advisors to discuss current matters.
- Regular check-ins into the provided *revision control system*.
- A final report in English, presenting work and results.
- A final presentation (15 min) of the work and results obtained in the project.