



Eventually Consistent and Resilient CBDC System

Motivation

Central banks around the world are investigating the introduction of Central Bank Digital Currencies (CBDC) as a digital complement to cash. This will likely create a whole ecosystem of products and services. While CBDC share some characteristics with cryptocurrencies, they serve different purposes. G+D develops a CBDC platform relying on the latest research and available technology. Our Core System offers a convenient API abstraction layer between wallets and ledger. We have working ledger implementations e.g. in PostgreSQL and FoundationDB. The purpose of this thesis is to explore an alternative design, where we give up on the guarantee that double-spending is prevented in all cases. This trade-off should enable us to achieve better results in availability and resilience against byzantine faults. There is work on byzantine fault tolerance with relaxed consistency guarantees [4] which can be a starting point for this research. Goal of the thesis would be to design a fitting solution, using a BFT protocol and come up with a prototype-level implementation that can be tested and evaluated in various metrics and parameters.

Your Task

- Familiarize yourself with the topics of BFT systems
- Analyze existing solutions and pick a suitable one
- Build a proof-of-concept (PoC) & Evaluate the performance of the system

Qualifications

- Program in computer science or security, mathematics, or a related field
- Strong interest in distributed systems
- Basic skills in programming and software engineering
- Strong communication and collaboration abilities

Sources

- [1] <https://pmg.csail.mit.edu/papers/osdi99.pdf>
- [2] Seth Gilbert, Nancy Lynch: Brewer's conjecture and the feasibility of consistent, available, partition-tolerant web services
- [3] Leslie Lamport, Robert Shostak, Marshall Pease: The Byzantine Generals Problem
- [4] Jinyuan Li, David Mazières: Beyond One-third Faulty Replicas in Byzantine Fault Tolerant Systems, <https://www.scs.stanford.edu/~jinyuan/bft2f.pdf>
- [5] <https://www.gi-de.com/en/payment/central-bank-digital-currencies>

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