Comparing Layer-1 and Layer-2 Blockchain Protocols in Reputation-Based Networks

07-400 Milestone 1 Report

February 4, 2022

1 Major Changes

After surveying the metrics of various blockchain technologies, my research group identified a set of Layer-1 and Layer-2 protocols that we will use to develop prototypes of the ledger and perform comparative analyses. Initially, our survey only included Layer-2 protocols. However, our survey revealed that there were high performance Layer-1 protocols as well. In particular, the Layer-1 protocol Solana has a blockchain platform with the highest performance, surpassing the throughput of major centralized payment platforms like Visa and MasterCard. As such, I will be developing the ledger prototype with a Layer-1 protocol, Solana, instead of a Layer-2 protocol. Since Layer-1 protocols are more low level than Layer-2 protocols, it has taken longer to implement a ledger prototype with basic functionality (i.e. creating a bolt specification, minting bolts, and transferring bolts) than expected. As a result, my research group will begin testing with the basic ledger, and if time permits, I will incorporate advanced functionality, such as trust lines, buybacks, and delegation after this intial round of testing.

2 What I Have Accomplished Since My Last Meeting

I wrote an on-chain program from scratch which supports the three basic primitives (creating, minting, and transferring bolts). I have also developed a simple client interface which queries the blockchain to test the basic functionality of this smart contract.

3 Meeting Milestones

Yes, I have met my milestone for this week.

4 Surprises

One surprise has been working with a Layer-1 protocol, instead of a Layer-2 protocol as initially planned. Since Layer-1 protocols are significantly more low level, we are rearranging my work so that I begin testing with a simpler version of the ledger than outline in my project proposal and that I continue developing it with more advanced functionality if the results are promising and time permits.

5 Looking Ahead

In the next two weeks, I hope to draft a plan for the architecture of the client SDK and on-chain program. I will need to make decisions such as what accounts to use as signers for transactions, what the cost of using program-derived addresses is, and whether there are alternative data structures for storing variable-length specifications.

6 Revisions to Future Milestones

I am revising my next two milestones as follows:

- **Milestone 2** (2/14): Finalize the architecture of client interface as stated above.

- **Milestone 3** (2/28): Implement the client interface to the on-chain program.

I expect to begin testing with the ledger prototype as outlined in the fourth milestone and beyond.

7 Resources Needed

No additional resources are needed at this time.