**Lecture 6 Homework**

**1. Answer the following questions in a few sentences using your own words.**

**1.a) Why does Ethereum price EVM instructions in GAS instead of using ETH directly?**

*GAS refers to the computational power required from miners to validate the transaction or smart contract. ETH is the currency used to compensate miners for the GAS required to do the computational work. GAS consumption values are relatively static, while the price of ETH is dynamic and changes overtime.*

*Charging instructions in GAS thus makes it easier for miners to measure the* ***cost-benefits of a computation*** *and planning their work.*

**1.b) What is the goal of the gas sponsorship mechanism introduced in Conflux?**

*Transactions costs on the blockchain are traditionally paid by the user, who benefits from the blockchain network feature.*

*However, as with the case in any other economy, costs are always* ***pain points*** *and discourages adoption. Adoption is critical for building an ecosystem which value increases from network externalities, which precisely the case with most blockchain networks. In addition,* ***blockchain is not necessarily used to facilitate transactions,*** *so there is the possibility that users of the network do not have any deposited amount with which to pay the transaction fee.*

*The gas sponsorship mechanism therefore 1) removes a barrier to adoption of the network by new users and 2) increases the application scenarios / flexibility of the smart contract.*

**1.c) What steps should a developer take so that users of their smart contract do not have to pay for gas?**

Implement the Gas Sponsorship Mechanism: allow anyone willing to pay to become a “Sponsor”, donating funds to any contract to pay for the transactions of other whitelisted users (usually new ones with 0 account balance).

Several parameters to include:

1. Sponsor - records the account providing sponsorship funds for the smart contract
2. Sponsor balance - records the current balance of the sponsorship funds for the smart contract
3. Sponsor limit per transaction - sets an upper limit of funds for individual transactions
4. Whitelist - records, or limits, the accounts that can be sponsored/funded by the smart contract

**+1. Gas cost of token transfers [OPTIONAL]**

Download lecture-5’s CourseToken project ([github.com/Thegaram/cfx-uma-resources/raw/master/cfx-lecture-5.zip 2](http://github.com/Thegaram/cfx-uma-resources/raw/master/cfx-lecture-5.zip)) or use your own version.

Send some tokens to a new address. How much were you charged for this transfer? Try to explain why.

How does the fee change if you send some more tokens to the same address again?

**+1. Sponsored ticket sale [OPTIONAL]**

Download lecture-4’s Tickets project ([github.com/Thegaram/cfx-uma-resources/raw/master/cfx-lecture-4-tickets.zip](http://github.com/Thegaram/cfx-uma-resources/raw/master/cfx-lecture-4-tickets.zip)) or use your own version.

Change the contract so that people buying tickets through it do not have to pay any transaction fee.