Kalpa: final project for MAS.s62

Date: May 16, 2018

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Project goal: To build gift card tokens and exchange leveraging new techniques from the course

Project description:

- Explore and evaluate appropriate techniques for the project e.g ERC20, Lighting
- Build a form of exchange. The exchange will involve two group of participants:
    - Merchants: we will establish coins and build wallets for hypothetical merchants
    - Customers: we will build wallets for hypothetical customers

Context:

1. Small merchants cannot effort a loyalty program because traditional loyalty programs are expensive (lack of time or resources). If they have a loyalty program, it is likely that they have to print out loyalty cards and paper receipts that customers would end up throw away anyway -- yet still, unable to attain repeat customers. On the other hand, large corporations such as Starbucks can afford to build and maintain loyalty program driving significant growth, with over 36 percent of revenue coming from the Star program (see Starbucks rewards members can now earn even more stars at the grocery store)

2. According to CEB TowerGroup, nearly $1 billion in gift cards go unused each year.

Solution:

Kalpa can help merchants everywhere, in both the developed and the developing world. Particularly, in the developing world: according to the World Bank, statistics indicate that the informal sector accounts for over half of total non-agricultural employment in Latin America and

the Caribbean, nearly half in East Asia, and as much as 80 percent in other parts of Asia and in Africa (see Women and Men in the Informal Economy).

Note that, in addition to the exchange, the platform will also has another main functionality of collecting points thru near field communication (NFC)

Process overview:

- Explore and evaluate appropriate techniques/platforms for the project e.g ERC20 (Ethereum Request for Comments 20), Lightning, custom blockchain
- Decided on design and implementation on ERC20
- Design base system architecture
- Set up ERC20 development blockchain
- Implement our base system architecture

Design: store/customer journey

Store journey

- Register: create tokens (new store account)
- Sell coin: receiving fiat in exchange for tokens
- Redemption: receiving tokens in exchange for goods/services
- Key: system needs to be able to verify that tokens are not double spent; ERC20 guarantees this

Customer journey

- Register: create a wallet (Kalpa account)
- Buy coin: giving fiat in exchange for tokens
- Redemption: giving tokens in exchange for goods/services
- Key: system needs to be able to let users exchange tokens with stores and among each other

Design: structure of the base system

3 main functions

- Create a store initialized with a token
- Exchange of tokens between addresses
- Inventory management and item purchasing

Key learning

- Decentralized protocol with ERC20 works for this application. However, the viability of the solution is contingent on the economics e.g. transaction fees, duration (see chart 1 and chart 2 below) and usability e.g. interface, flexibility. While block time doesn't post as much concern with recent average block time of around 15 seconds, fees at $0.50 per transaction are detrimental to this solution with existing providers such as Square process gift card transaction at zero[1]. To solve this, we can explore Lightning to net transactions thus reduce costs.

Chart 1: historical Ethereum block time: average block time (minutes)

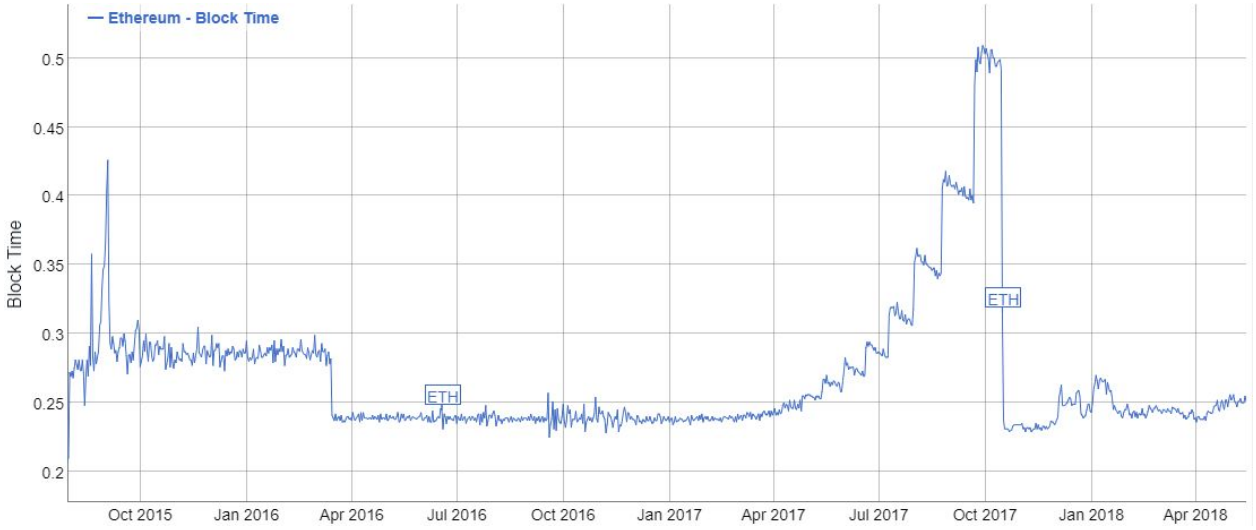
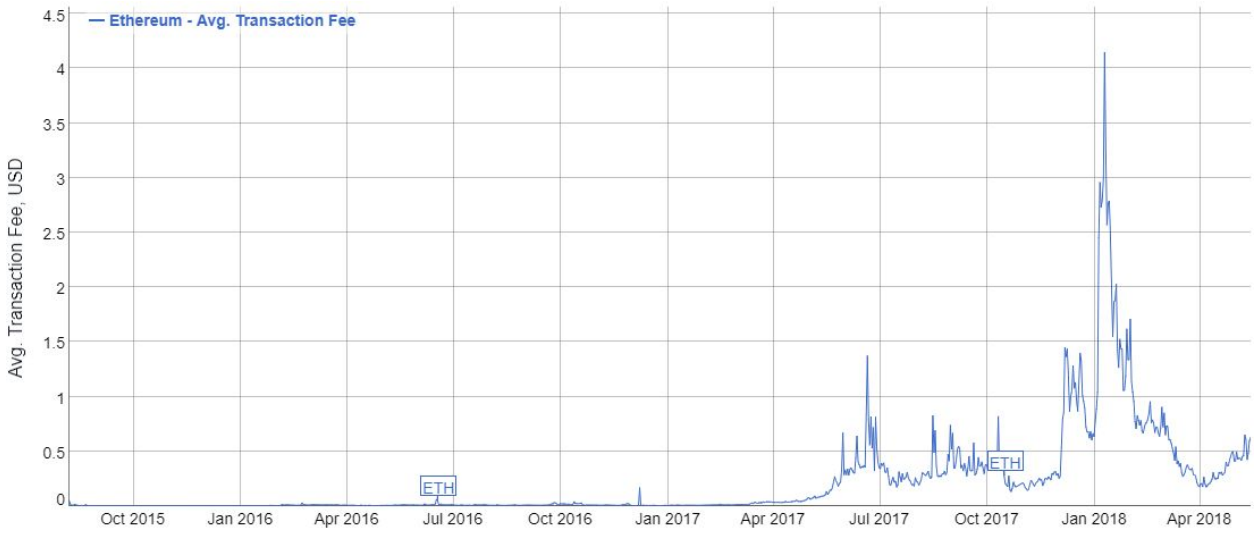


Chart 2: historical Ethereum: average transaction fee (USD)

[1] https://lifehacker.com/insert-citations-in-multiple-formats-easily-with-google-1629738089



- Smart contract set up, design and development flow
- High return (risks) for thoughtful system architecture given future changes are limited once the system is live
- Testing is crucial, given no or little rooms for errors