Challenge Puzzle for Afari PSIP Engineering Intern 2019

We value people who put in effort, thought and care into their work, much more than someone who just has a good resume/good grades. This is your chance to stand out, show us how you can execute and really make an impression, as well as get a taste for the difficult problems we’re working on at Afari.

Your mission, should you choose to accept it:
Pick ONE out of the following 5 puzzles and complete the associated deliverable as described in the challenge. You also get 3 hints - if you get stuck, email us at hello@afari.io, describe your problem and we'll do our best to guide you.

If you’re new to blockchain tech, we encourage you to read the following papers (in the order given) to get up to speed on Bitcoin, Blockstack and Afari before proceeding:
- Bitcoin Whitepaper
- Blockstack Whitepaper or read these blogs if you’re short on time [Part 1] [Part 2]
- BlockTweet Paper (very first version of Afari)
- Afari technical talk

These general Afari resources will also be helpful
- Afari website
- Afari’s response to the Facebook Hack
- Talk at Decentralizing the World Tour
- Article by Princeton University on Afari

If you’ve made it this far, you’re probably the kind of person who knows how to code very competently, so we’re not going to give you more code to write. Instead these are technical design and analysis problems, like a COS 226 algorithm design or a COS 432 Threat Model Analysis.

Pick any ONE out of the 5 questions below and submit it to us as your challenge puzzle.
Option 1: Analyzing Censorship Resistance
Censorship resistance is one of the key benefits of blockchain technology and cryptocurrency. Decentralization means that there’s no longer a single party that can be targeted as a point of failure, and there is no single party governing the system and/or deciding the rules of engagement.

Censorship on social media happens in two ways:
1. Platform Censorship
   a. This happens when platforms pick and choose to remove content/accounts
   b. This also happens when governments legally force companies to remove and/or filter content and accounts. This happened with Facebook in Vietnam.
2. Network Censorship
   a. This happens when governments block access to websites on an IP level, such as governments blocking the IP addresses of sites like Whatsapp, Twitter etc.
      i. This happens in China for websites like Google, Facebook, etc
Afari provides resistance against platform censorship. On Afari, there’s no central authority that owns data, rather, users own their data and keep it in their user-controlled, decentralized storage (using Blockstack GAIA). Moreover, Afari allows users to bring their storage buckets to use while on the platform (see the Blockstack paper for how this is done)

However, at this time, Afari still doesn’t fully protect against network censorship and it thus not a complete solution to a user seeking censorship resistance.

Your goal is to propose and evaluate a ‘censorship stack’, that is a set of tools or technologies that Afari users could use to overcome censorship by platforms and governments as best as possible. Assume the user wants to share content with groups/communities they’re apart of and so your proposal should include Afari as one piece of the stack.

Here are some tips to get you started:
- Some additional products in the censorship stack could be VPNs, onion routing like Tor, Orchid and/or mesh networks.
  - It helps to analyze where things could be censored at each level (e.g. on the platform itself, by the ISP, by the government with a firewall etc.) and think of tools to circumvent that censorship.
- Your evaluation should include technical effectiveness against censorship, degree of centralization of other services, as well as things like cost and ease of setup and use.
- Here’s are some papers on internet censorship to get you started if you’re new to the field.

Submit the analysis and evaluation of your proposed censorship stack in a slide deck of no more than 12 slides in pdf form and cite all your sources.
Option 2: **Incentives for Token Rewards between content creators, content consumers and others in the Afari ecosystem**

In the long run, Afari plans to release a crypto token. One of the uses of this is to incentivize and reward content creators for producing quality content that others enjoy. This idea has also been implemented by companies like [Props](#), [Steem](#), [Mithril](#) among others.

Your task is to compare, contrast and evaluate the pros and cons of Props, Steem and Mithril's content rewards incentives mechanisms. Submit your findings as a report in no more than 12 slides in pdf form and cite all your sources.

Here are some questions to get you started:
- Read the respective whitepapers and isolate the parts where the token rewards are discussed.
- How do the mechanics of the respective systems work?
  - How do content creators, consumers and other agents get rewarded?
- In each system, what gets incentivize?
- Where could the system be gamed and why? Provide examples of possible attacks
- What adverse behaviours might they encourage?
- Does the incentive mechanism encourage low quality/ spam posting? How does it protect against it?
- Does the incentive mechanism encourage fake accounts and bots? How does it protect against this?
- A common approach to content rewards is to reward people based on engagement, which has many different definitions. What determinants of engagement are good to reward and which are bad / not gameable.
- Bonus points for providing suggestions for improving the weaknesses you pointed out :)

Option 3: **Incentives for Content Moderation**

One of Afari's main goals is to provide resistance against unjust platform censorship. To do this, Afari plans to democratize the content moderation process, by giving users a leading role in moderating content, thereby allowing the network to essentially moderate itself.

Your task is to propose and evaluate a system for users within a group to moderate content effectively and honestly. Content moderation can be defined as deciding if a piece of content should remain in the group of not. Your system can use a native Afari token as a reward in order to incentivize people to act a certain way. To the best of your ability, make sure that the system cannot be obviously gamed or exploited for individual gain.

Submit your findings as a report in no more than 12 slides in pdf form and cite all your sources.

Here are some questions to get you started:
- How is content flagged for moderation and what incentives are put in place to ensure that malicious content gets flagged?
Most content on Afari is encrypted. How does the system allow for this content to be moderated?

What incentive mechanisms can you put in place to ensure that the network moderates itself properly i.e. the network takes down bad content and leaves good ones?

What are some common ways people may try to exploit the system and how does your system disincentivize these?

The network may be very large and you may not be able to get the whole network to reach a consensus on moderation in a timely fashion. How will you deal with such a situation?

If you are aware that your system is not strategy proof (i.e can be gamed), then in what ways can it be exploited?

To answer this question, it is helpful to remember that Afari has an aggregator that is used to serve information to users. This aggregator can be configured in any fashion to help in the democratization of content moderation.

Option 4: **Non-invasive data analysis (for you ML folks!)**

Afari is premised on protecting user privacy and giving them ownership over their data. One drawback of this is that data is not stored in a central location and is also encrypted. This makes it difficult for the machine learning / data processing that’s common in companies like Facebook and Google to take place and for insights to be drawn from the data.

Your task is to propose and evaluate the pros and cons of 3 strategies for making data useful, while also preserving user privacy. Submit your findings as a report in no more than 12 slides in pdf form and cite all your sources.

Here are some options to get you started:

- **A marketplace for data:** Users can choose to expose certain pieces of data about themselves and be rewarded for it. See this [website and associated links](#) for more on this idea.
- **Differential privacy**
- **Homomorphic encryption:** One technique to do this is called homomorphic encryption and one such company to leverage it is [Numerai](#) (see [article](#) for more)

Feel free to include other methods whereby user data could be used in order to learn more about how users are using Afari, but ways that still preserve their privacy. Privacy can be defined however you feel is reasonable - e.g) Content posted in a public group is not private because everyone can see it if they navigate to that group.

Option 5: **Software Engineering Experience**

If designing technical solutions is not your cup of tea just yet, but you’re a competent programmer with experience developing web, Android and/or iOS apps, this one’s for you.
To complete this challenge, send us a link to your portfolio of projects, along with a list of tools you used for each one. Be sure to include information about what the purpose of the project was and what your individual contribution was and some metric to measure your impact.

In addition, tell us about your experience working in software engineering teams that you’ve worked in or have lead. What did you learn and how did you grow? How did you work with teammates or lead the team? Was there a time where things didn’t go to plan? Why did that happen and how did you deal with it?

Submit your answer as an essay of no more than 750 words in pdf form. Feel free to anonymize names of people / companies to protect their privacy/ reputation.