***Hyperledger Questions on Loyalty Program Page***

1. **A defined use case with the projected benefits (to you and the participants)**

**Actor :** User using Loyalty Program Platform

**Stakeholders :** InnovFin, because the blockchain (for the loyalty points) network exists because of InnovFin. Any other University offering services and/or offering their own custom points, metamask digital wallet (since it is a software required for this platform). InnovFin or University partners (including their campus stores they have links to) offering services, products and points.

**Preconditions :** Wants to create an account, for some users - has access to the network, Have a metamask wallet

**Triggers :** Anyone who decides to create an account with Innov-Edu platform (– they will automatically be assigned a wallet address and issued with points); University and other partners will have a node created to join the network; have a metamask wallet; external triggers like completing a quiz or level for a particular module; any friend or family sending their redeemed points to another account holder

**System :**

1. User enters the Loyalty Program platform and signs up for earning points
2. User has finished a course/module and opts for earning 10 loyalty points
3. Admins checks the respective boxes to assign 10 loyalty points to the user
4. User earns the 10 points into their metamask wallet
5. User completes a quiz or a particular level within a course module, they earn ‘x’ points
6. User is sent points by a friend/family member
7. User can redeem these points for various activities within the system, various services being offered by some partners
8. Administrators are notified, and they ensure the particular service or product by the partner issued the points reach the user(/student)

**Goal:** Provide user an access to earn points for themselves that can be redeemed later

**Benefits :** Loyalty Program can act as a motivation for users to use Innov-Edu platform more, for education modules, and other various activities available on the network. This may also attract new users to use the platform and enhance and grow the network further. The points can be redeemed and exchanges with friends and family, this will get more attention towards the platform and attract more users, customers that will beneficially grow the network.

1. **Identified participants**

It is important to identify participants.. The main participants that the network will include are :

* **Students** : The new users that will log into the platform to earn points by either completing an education module or other way
* **Admins** : The group of administrators working behind the network and completing the required steps to make sure that the students/users are getting their well-deserved points. Admins are also responsible to ensure the particular service or product by the partner reach the user(/student)
* **Other Node Administrators :** Universities and other partners assign an administrator to manage their nodes on the network
* **InnovFin platform (as a whole)** : InnovFin must also own a node and is a participant on this platform
* **Universities** : Other universities that are on the network and upload education modules. For instance, the more the students that take their module/course, they more points they earn.
* **Individual Teachers** : Users registering as a teacher and uploading their education modules and videos can also earn points. For instance, the more the students that take their module/course, they more points they earn.
* **Partners** : These are the partners offering services or products to the users of Innov-Edu platform in exchange of the redeemable points.

abstract participant Individual identified by Id {  
 object String Id *//identification number* private object String u\_id //unique identification number not to be shared object String name *// name of the individual* object Address address *//the HyperLedger address of the individual*}

participant University extends Individual {  
 int numberOfRegisters *//the count of people who signed up for this module* string id\_group *//a string id to know if individual teacher or a University*}

public Admin extends Individual{  
 string employeeId //variable to separate admins from regular users  
}

1. **The process mapped with key events**
   1. An individual comes up on the Innov-edu Loyalty Program platform and browses over the Loyalty points service we have to offer : It should be ensured that the website is easy to navigate so that anyone new coming on the website can find everything easily and understand the program effortlessly.
   2. The individual decides to sign up to the program. They can register into a course and then sign up for the program. When an individual signs up, they should asked if they have an existing Metamask Wallet. If they say yes, then the address will be taken from the extension. Else, if they choose “no, sign me up”, then they should be assigned a wallet. Only the public address will be with InnovFin and the private key and personal information would be only with the individual. This is done because then they can be provided with the welcoming points and automatically have an option of redeeming points.
   3. Another individual who is a teacher may decide to sign up, in the same way as the student. They must know their specifications on how they can earn points, and that it is different than a student user.
   4. A university and other partners need to have a node so that they can join the network and offer their services, products and also
   5. The administrator gets the request for earning loyalty points (also certificate) by the Individual (the address and the individual Id which is the identification string value for individuals). The administrator issues the points to the individual either manually or automatically (later stage).
   6. The Individual receives the points, and they can redeem them by clicking on the redeem points button. They can chose to use the points for any activities or other action on the network.
   7. After a user redeems their points, admins should be notified. Admins will then ensure the particular service or product by the partner issued the points reach the user(/student).
2. **Critical data to be exchanged**

Critical Data to be exchanged :

* 1. An individual requesting points, the string Id value shared to the admins is critical data.
  2. The individual’s metamask digital wallet private key (only public address can be shared) where the points are stored is critical data and must not be shared with anyone. Also information about the amount of points earned is private to the particular student, InnovFin and whatever University issued the points.
  3. The information about the amount of points redeemed and name, contact information about the individual will be private to the individual redeeming those points, University who commissioned those points, partner they are getting the product from (they know the amount of points required) and InnovFin. This will not be true for partners offering a service since they only need the email of the individual to send them the service.
  4. An individual trying to redeem their points by sending it to some other user on the network, the information about the other individual should not be shared more than necessary. This will be private to the individual sending the points, individual receiving the points, University who commissioned those points and InnovFin.
  5. The collection of information that the administrators need to maintain the node they are responsible for is also private and mustn’t be shared with anyone.

1. **Any rules to be applied in the system**

There are few critical points to be taken care of which can act as rules for the system :

* 1. No individual should be able to look at someone else’s earned points for privacy purpose
  2. The private metamask wallet key of an individual should not be allowed to shared even by mistake. The id is the string value that must be shared with others for identification in case some one else decides to redeem their points and send them to other person.
  3. Metamask wallet private key should be secure and not accessed by anyone else. This should be mostly coded on the user-side and not server-side to avoid any such mistake.
  4. Product partner will need to know the name, address, contact information of the individual when the individual is using their redeemable points to get a product from the partner. Services being offered by the partner can be sent online via email and hence nothing except the email must be shared.
  5. The data about the node being managed by administrators must not be shared

Consensus mechanism

What are your thoughts on us moving the current Loyalty Point Platform to the use of Hyperledger?

Loyalty Program Platform - Hyperledger

Hyperledger is a private permissioned network, that means it allows confidentiality, resilience, and scalability. Hyperledger has the capacity to recover quickly from difficulties and also change in scale and size. This means, that as more user join the network and Innov-edu platform grows, Hyperledger will be easy to maintain. And a private network will allow the users to have confidentiality on the number of points they have been able to earn. Also, the transparency and anonymity outside network can be chosen by the inner organization of business, i.e., InnovFin. No consensus-based mechanism ensures that any changes will not require a unanimous agreement.

Channels in Hyperledger will ensure and help in data partitioning that will help in keeping certain data information hidden. Hyperledger fabric will allow to work in collaboration easily.

One question that may arise is that a permission-less network requires that users be granted both network and application access just to connect. However, this is a good thing since all users will be kind of authorized to join and hence protect the privacy of the network.

Over everything, Hyperledger, unlike Ethereum, do not have a constantly rising gas fee and this is very beneficial. Hence, Hyperledger seems like a good option for the Loyalty program platform.

You also mentioned that a student constitute a node. How do you envision students maintaining their nodes?

For student node : this will be client type node since they will be sending transaction proposal to us where transaction is asking for issuing loyalty points

Since a student is not exactly handling any developing side, there wouldn’t be any hardware requirement for the student. Also, a student node will handle transactions like receiving loyalty points being issued by the Admins, which since now on Hyperledger, will not require any mining to confirm the transaction. Other than that, there are just personal data information in the node that student needs to maintain and keep with them. They need to ensure that they keep their metamask addresses safe for ensuring safety of their transactions.

Next, how can we involve companies that will provide us with their products and or services to be exchanged on the loyalty platform? Should they also get a node?

Any companies getting involved with the network can also be provided with loyalty points – more than a student is being provided since they are providing with service? This will improve customer retention for the operation. Also, the more users use their services, the better the points they receive.

Many companies may find this as an opportunity to contribute data and services they have wanted to. By sufficient permissions, the companies can analyze the data in order to identify latest education or any other service trends among the population and hence evaluate their program’s effectiveness. Also, working on Hyperledger Fabric will allow easy collaborations and stable blockchain.

They can be provided with the client node as well. This way, they can efficiently keep a count of the number of users using their services while maintaining a unique identification.

Based on your understanding of Hyperledger, how many client nodes can be issued on the network without clogging the transaction speed?

I am not a lot sure about this. I read through many sites, and it is clear that there is not exactly any limit on the number of client nodes we can have. Let’s say if there is a lot of nodes, and it starts clogging the network, and the transactions start getting delayed by seconds, then we can perhaps have a clustering stage where we make a cluster of few nodes with issuing a leader node via a leader selection scheme. Also, leader is chosen through previous transaction and reputation basis, and there is a reward for leader when they do a good work in propagating a transaction. Leaders should also be updated time to time so every client node does get a chance. I am not a lot sure though.

Are we able to create channels where only client nodes share information with clients nodes? That would be student nodes sharing information with service

provider nodes?

Yes, I think we should be able to create a new channel that only allows the client nodes to enter. No ledger can pass from one channel to another, hence this would be also maintain a good privacy. This isolation of clients and ledger data, by channel, allows the client – network members – to have transactions on the same Blockchain network. For Student nodes sharing information with service provider nodes, there could be a channel with the leadernode as the service provider?

File : configtx.yaml

Tool : configtxgen