SHR Protocols Details

The Technical Solution Powers SHR Protocols

Technical White Paper V0.9

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1.0 Overview

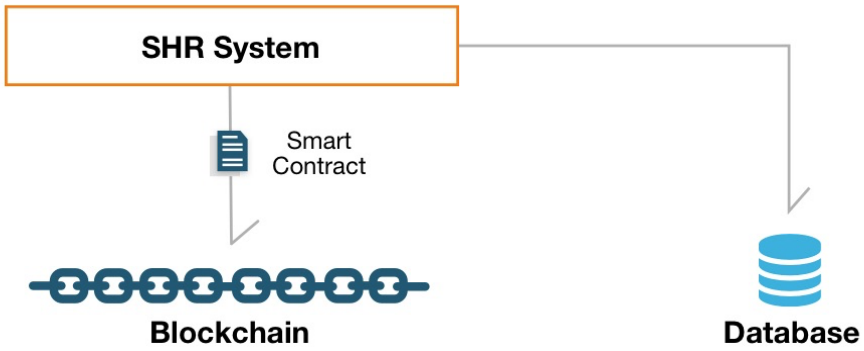
If you haven't read the SEL White Paper, please read it before continue.
(You can find the latest version of SEL White Paper on https://www.shreverything.com)

In Share Everything Lab, we view the blockchain technology as a distributed data storage engine that has some special characteristics, including data transparency, immutability and consensus among all nodes. With this understanding, we will use the blockchain technology to build the SHR (pronounced "share") token and a set of protocols.

The SHR token is to function as the "currency" for incentives and rewards in the SHR community and payment method in the SHR ecosystem for vacation rental hosts and guests as well as partners providing services to SHR community members such as guided tours, car rentals and etc.

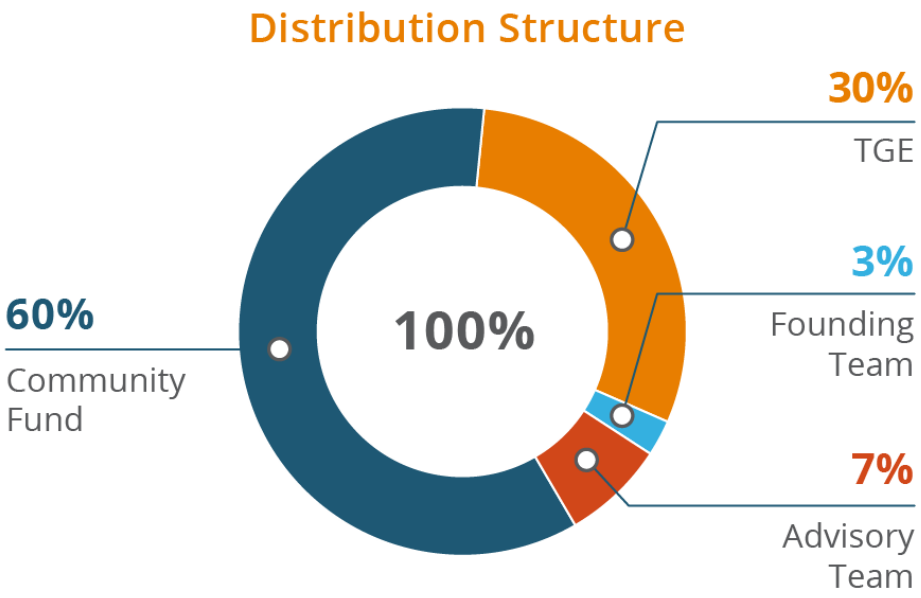
The protocols are the common rules, which SHR community members follow. The protocols are designed to increase the trust around the community members and help them to be more efficient around vacation rental and derived activities, promote good behaviors and eliminate bad intentions.

With blockchain technology, working with our community, we plan to let the community to become a self sufficient and self managing community. The protocols will be built as frameworks from a software architecture point of view, where D-Apps will be able to developed on top of the protocols. We will build a lightweight SHR component to access and process the data stored on blockchain to facilitate different usage of the data.



2.0 SHR Token

SHR Token will be an ERC20 token with total amount of 200,000,000. On top of all the standard ERC20 interfaces, special locking period logic will be implemented for the founding team (4 years).



Out of the 60% of Community Fund, 40% will be used to build and grow the SHR community as incentives and rewards and 20% will be used to bring in more business partners to the ecosystem. For each community member we request to provide a wallet address for the SHR token, to receive reward SHR Tokens.

3.0 SHR Protocols

The protocols are smart contracts that establish common rules in the SHR community. The protocols are designed to be frameworks, where D-Apps will be developed on top of. The SHR Protocols will be managed by the SHR community (starting with SEL members). SHR Members could propose, vote on changes of SHR Protocols, and the SHR community will implement the changes based on voting (starting with SEL tech team members).

3.1 Reputation Protocol

The Reputation score consists of three aspects: verification, community services and reviews, with a total score to be 100, where the maximum score for verification is 10, community services maximum is 40, and reviews up to 50.

$$\text{Reputation Score} = \sum_{v=1}^{n} \text{Verification}(v) + \sum_{c=1}^{n} \text{Community services}(c) + \sum_{r=1}^{n} \text{Reviews}(r)$$

Verification refers to identification verification and listing verification.

$$\text{Verification} = \text{KYM}\ (5) + \left(5 - \frac{5}{1 + \sum \text{Verified listing}} \right) (\text{up to } 5)$$

The registration and listing will be done through the SHR system; however, the member and listing data will be encrypted and put on the blockchain, with a reference stored in the SHR system for querying purposes.

Community services refers to practices under Community Self-Management Protocol, successfully proposing protocol changes and participating in the Protocol Core Group as well as contributing to SHR Protocols program code changes.

$$\sum \text{Self-management} = S(x) \in (0, 20)$$

$$\sum \text{Protocols management} = P(x) \in (0, 10)$$

$$\sum \text{Coding} = C(x) \in (0, 10)$$

$$\text{Community services} = CS(x) = S(x) + P(x) + C(x) \in (0, 40)$$

S(x) is the formula to calculate the Community Self-Management portion (0, 20) of the Community services in the Reputation score (please refer to Section 3.2 for list of activities of Community Self-Management, which might change based on member's voting).

$$S_{(x)} = 20 - \frac{20}{1 + \Sigma \text{ activities}}$$

The activities will be recorded on the blockchain and a reference stored in the SHR system for querying purposes.

P(x) is the formula to calculate the Protocols management portion (0, 10) of the Community services in the Reputation score. Protocols management includes success proposing changes to existing protocols as well as participate in the Protocol Core Group (PCG) to facility the changes to SHR Protocols.

$$P_{(x)} = \left(5 - \frac{5}{1 + \Sigma \text{ succesfully proposed Protocol changes}}\right) + \text{years in PCG}_{\text{(up to 5 years)}}$$

The SHR system will include the function to collect changes proposed by community members. Once a proposed Protocol change is approved by the PCG, the record will be put on the blockchain with the proposing member. A reference of the record will be stored in the SHR system.

C(x) is the formula to calculate the Coding portion (0, 10) of the Community services in the Reputation score. Due to the nature of software development, it is hard to measure the contribution based on number of commits, number of lines of code and etc., so each year each developer could gain maximum 1 reputation point based on the developers voting, up to 10 in total.

$$C_{(x)} = \sum \text{annual developers voting } \text{(up to 10)}$$

The SHR system will record each years voting result on the blockchain directly with a reference stored for querying purpose.

Reviews means the verified reviews received as a guest or host. A host review is weighted twice as heavily as a guest review for reputation score, where the weight factor for guest review is 1 and host review is 2. We use a 5--point review mechanism. Refer to the formula below where k is the weight factor for a review with a review $\in$ (0, 5).

$$\text{Reviews} = (\sum \text{review} \times k / \sum k) \times 10 \text{ (up to 50)}$$

The SHR system store a review at its data store before it is verified. Once a review is verified, it will be put on the blockchain with a reference in the SHR system for querying purpose.

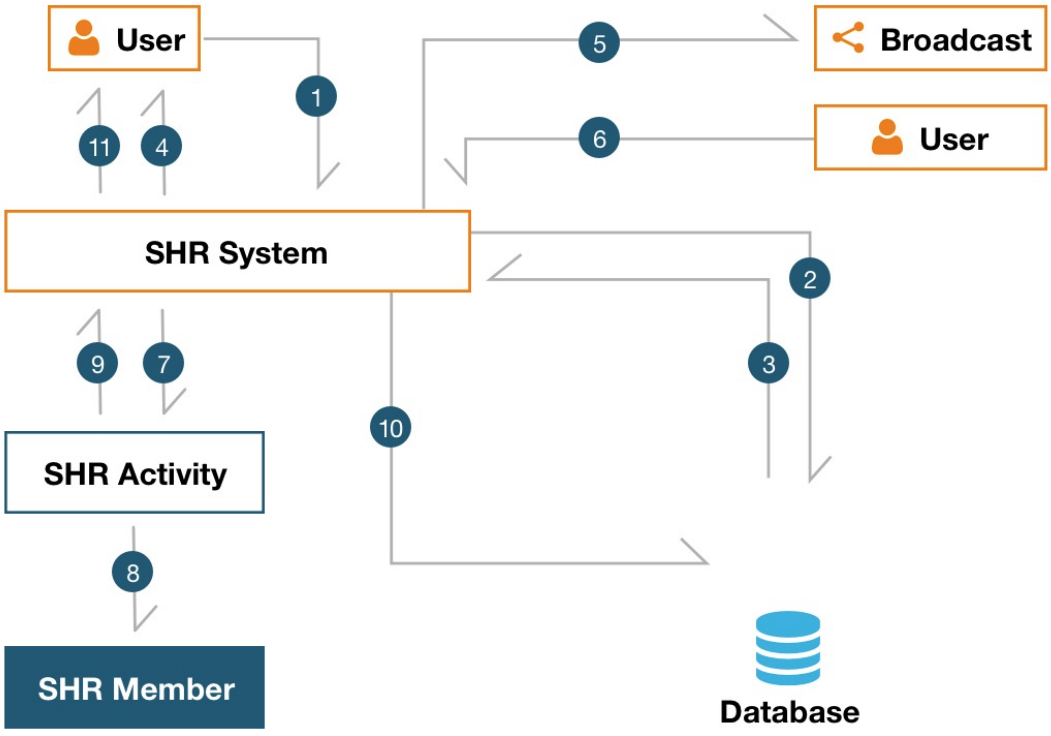
The Reputation score is calculated each time when it is changed, and the a record is put on the blockchain when the reputation score changes.

3.2 Community Self-Management Protocol

The set of rules in the Community Self-Management Protocol are activities with reward and only reputable community members could perform. The activities history and result will be encrypted and put on the blockchain with a reference stored in the SHR system for query purposes.

Know Your Member (KYM):

The process of KYM will be put on the blockchain as a community self-management activity with supporting description and member involved. The smart contract will pay SHR token as rewards to the qualified community member.

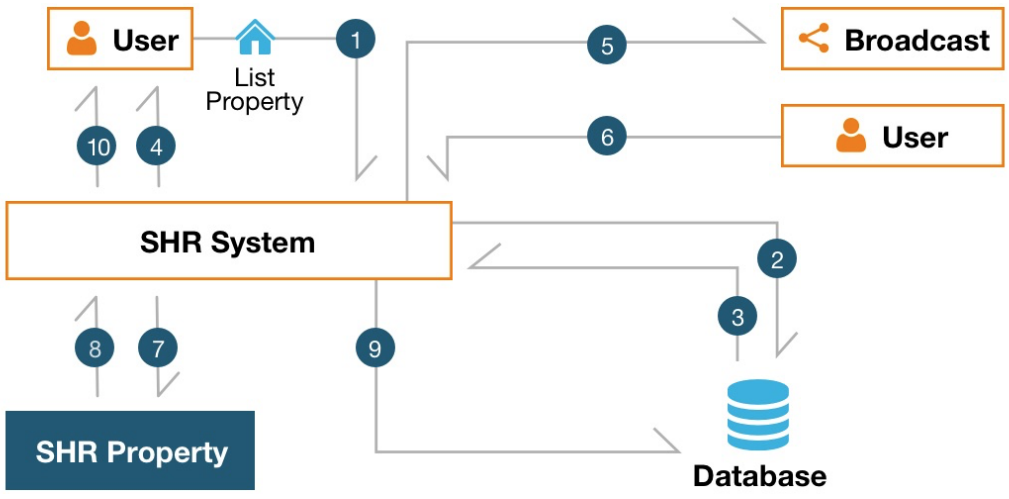


1. A new member registers on the SHR System
2. SHR System saves the member's information to its data store
3. SHR System got the ID from data store
4. SHR System tells the new member his/her registration is complete

5. A KYM message to the qualified members is broadcasted
6. A qualified member picks up the message and conduct the KYM
7. The KYM details is booked on blockchain through SHR Activity smart contract
8. A SHR Member is created on the blockchain with ID from step 3
9. Blockchain identifiers is returned to SHR System
10. The SHR System stores the blockchain identifiers to its own storage
11. A message is sent to the new member that he/she is community verified

Listing Validation:

For listing will be validated by a qualified member. After that, the qualification steps, evidence (e.g. pictures, phone conversations and etc.) and the property will be encrypted and put on the blockchain. All properties, validated or not, will be stored in the SHR system. The smart contract will pay SHR token as rewards to the qualified community member.



1. A host lists a new property on the SHR System
2. SHR System saves the property information to its data store

3. SHR System got the property ID from the data store
4. SHR System tells the host that his/her property is listed
5. A Listing Verification message to the qualified members is broadcasted
6. A qualified member picks up the message and conduct the Listing Verification
7. The property information is booked on blockchain through SHR Property smart contract
8. Blockchain identifiers is returned to SHR System
9. The SHR System stores the blockchain identifiers to its own storage
10. A message is sent to the new member to inform him/her that the listing is community verified

Review Verification:

For each review, the SHR system will validate the payment and stay from the data on the blockchain before encrypt and put the review on the blockchain. A reference of the review will be stored in the SHR system for query purpose.

Dispute Resolution:

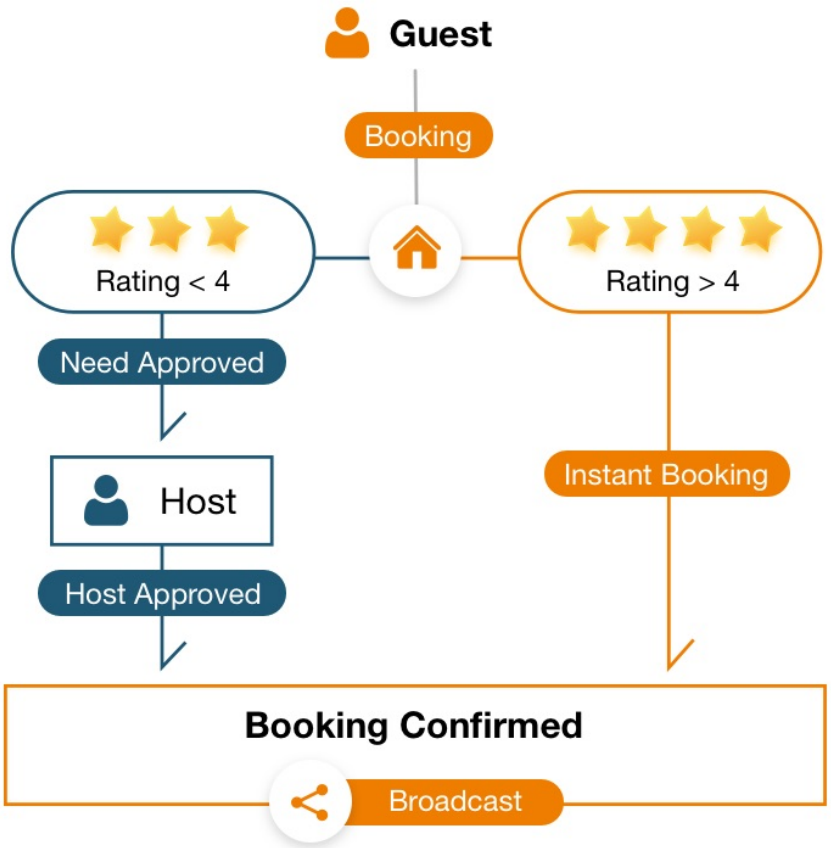
During a resolution of a dispute, all evidence and voting details will be encrypted and put on the blockchain as the final result, during the process, the SHR system will record the status and steps.

3.3 Booking Protocol

In the SHR ecosystem, the Booking Protocol sets the rules to achieve a fast and secure way of booking. By leveraging the KYM process, we will be able to ensure a trust based instant booking experience. Both the host and guest need to meet the criteria to be entitled for instant booking.

- Hosts need to have completed the community Listing Validation process and have a minimum 4-star reputation score
- Guests need to be KYM approved and have a minimum 4-star reputation score
- The transaction must be completed with SHR tokens

With the above 3 rules, we embed authentic community trust into the booking process to ensure a fast and secure way of booking.



The business logic to check if a user could do instance booking is in the SHR system. After the booking confirms, whether through instance booking or after host and guest communicates, the token payment will be processed and the booking information, including payment info, will be encrypted and put on the blockchain, and a reference will be stored in the SHR system for query purposes.

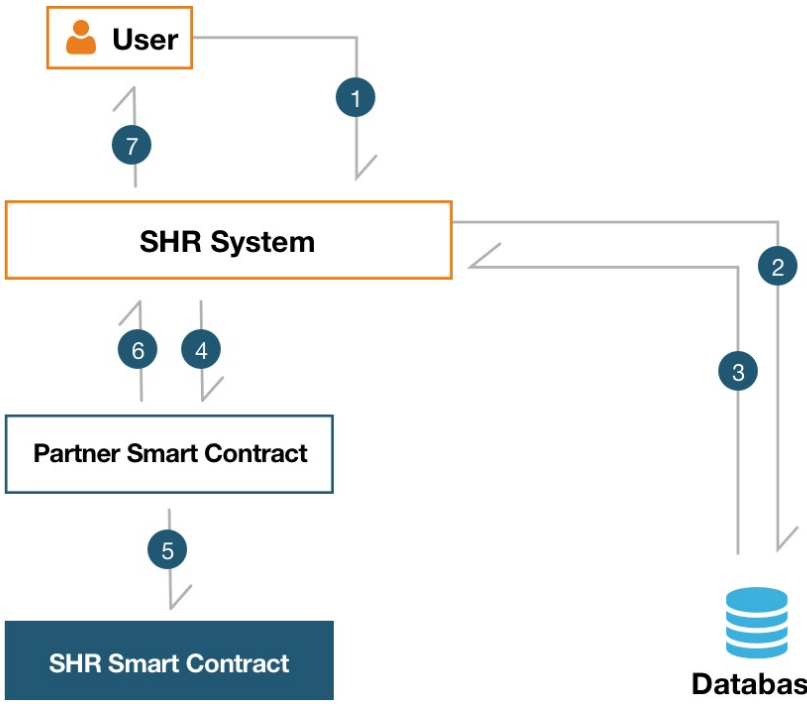
Our solution for double booking contains two scenarios: first, when booking happen in the SHR System, we will notice other system to update the calendar; second, when booking happen in other systems, we will have mechanism to update calendar in our system.

The SHR System provide functionality to normalize an address. For each address the normalization system will normalize the address to a standard format and provide a hashing id on the formatted address. This way, each property will have an unique hashing address for easy identification.

When booking through SHR System, it will send out webhook events for any system subscribe for double booking webhook engine. When booking outside SHR System, SHR System has API endpoint to be notified when a booking of a property is happened. Moreover, at each property, the host could sync iCal of the property to prevent double booking, SHR System provides such functionality for host to do it.

3.4 Ecosystem Partnership Protocol

The Partner Protocol acts like a framework governs the process and rules for any external partner interacts with the SHR ecosystem. External partners that provide different services will provide their unique rules; once accepted, the partners could then interact with SHR community members. The Partners will be able to define their own smart contract logic and participate in the process of interacting with SHR community.



1. Member request a partner feature through SHR System
2. SHR System requests the partner smart contract inform from data store
3. SHR System receives the smart contract information
4. SHR System initiates the partner smart contract
5. Partner smart contract will use some SHR smart contract (e.g. SHR Token)
6. SHR System listens the result from partner smart contract
7. Response to the member about his request.

3.5 Payment Protocol

When a booking is confirmed, the payment will be processed between hosts and guests wallet, a small amount of transaction fee, in SHR token format, to cover the gas on ethereum network will be applied if the wallet is managed by the SHR system. After the transaction, it will be encrypted and store as a part of the booking info on blockchain and a reference will be stored in the SHR system for query purpose.

The payment is first processed as locking for a particular booking, the actual token transfer is done when the locking condition is lifted (usually the booking date has reached). Before the locking condition is lifted, both wallet owners could agrees to cancel the locked payment.

Vacation rental D-Apps build on top of the Protocol will be able to charge up to 5% from the guest and 1% form the host app fee which will be transferred to the D-App’s wallet instantly; however, we strongly recommend the D-Apps not to do that.

3.6 Smart Lock Payout Protocol

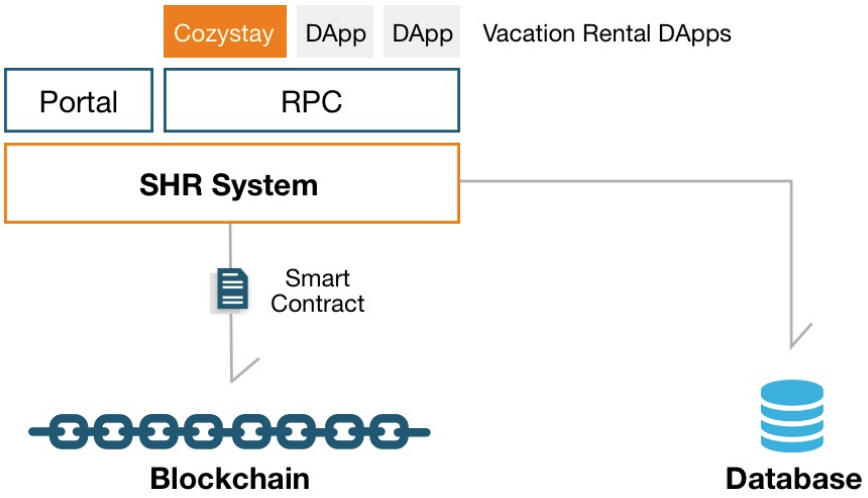
In order to define the payment processing condition more accurately, we will implement external interruptions to be able to lift the payment locking condition; an example is with Smart Lock integration. Once a Smart Lock entering is detected, the smart lock company will trigger an API call to the SHR system, which will then trigger the smart contract with input parameters to be validated and lift the payment transaction.

4.0 D-App Architecture

The SHR Protocols is designed for development capabilities, the lightweight SHR system, which wraps around the SHR Protocols backed by smart contract and blockchain, provides API access to our partners and registered applications. We will build D-App dashboard portal for D-Apps to manage its content (e.g. basic info, D-App access key and etc). We will also manage a test version of the Protocols in the dashboard for any D-App developers to develop and test they apps.

4.1 Vacation Rental D-App

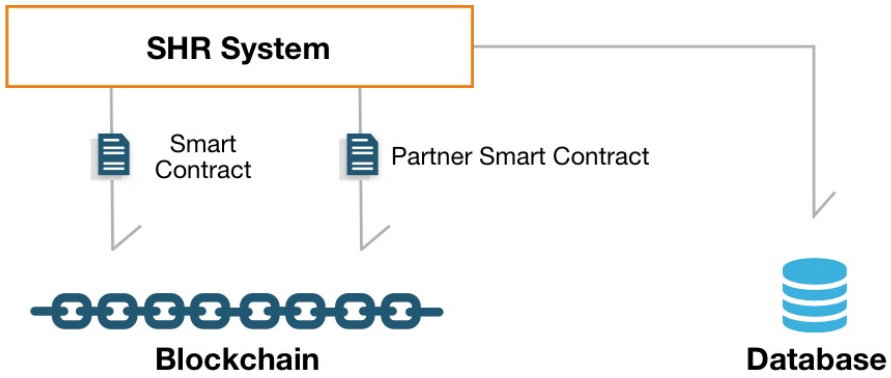
The Protocols functionalities will be easily accessible through RESTFul interface which is build on top of Protocol layer either through direct API calls or SDKs with the exception of registration, which has to be done through a web app powered by the blockchain.



The RESTFul interface layer will perform data validation, encryption / decryption and provide some query functionalities with the SHR system.

4.2 Partnership D-App

There are many potential partners of vacation rental business, such as car rental, guided tour, cleaning service and etc. In order to better integrate with their business logic, we will create an smart contract interface, the SHR partnership interface, for our partners.



When a partner is registered on the SHR system. It could create their own smart contract by implement the SHR partnership interface and register the smart contract with the SHR system. The customized implementation will be invoked from the D-App using the SHR ecosystem partnership protocol. Partner D-App will be reviewed by the Protocol Core Group and have access to SHR community data and member wallet created on the SHR system.

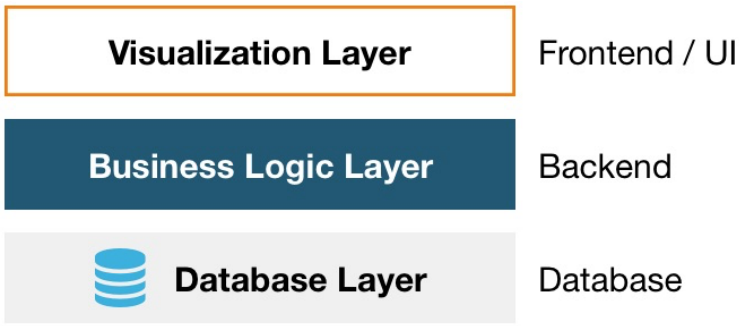
5.0 Partner Technical Integration

With a community self managing ecosystem, vacation rental platforms will be able to off load a lot of centralized platform management to the community, which means they could reduce its cost dramatically.

Our partner, Cozystay (www.cozystay.com), is an existing business in the vacation rental industry. It will be our first adopter to rebuilt its current platform using the SHR Protocols and SHR Token. We will work with Cozystay tech team during the process.

5.1 Current System of Cozystay

After brief collaboration, we have found out the current platform of Cozystay is a 3 layer web application, which includes a data layer, a business logic layer and a presentation/visualization layer.



The data layer consists a relational database and an active record implementation layer to provide an object oriented access.

The business logic layer consists the main vacation rental business logic and a set of microservices to support the core business logic.

The presentation/visualization layer fetches data from the business logic layer and displays it in a meaningful format.

5.2 Integrated System

We anticipate the majority change to the current system of Cozystay will be in the business logic layer. Some data access, such as user and listing data will be coming from SHR system. A lot of business logic such as booking, payment and reviewing will be handled by SHR Protocols. Cozystay will continue support traditional payment method (Visa, Paypal and etc). For host and guest want to use SHR tokens Payment Protocol is triggered.

5.3 Migration Strategy

To be able to migrate Cozystay's services to SHR Protocols without interruption, we will work with Cozystay's technical team to follow the following steps:

For users accounts:

1. Build Cozystay's existing user features on SHR Protocols
2. Dual write Cozystay's newly registered user to SHR system and its own
3. Migrate Cozystay's host and guest to SHR community
4. Migrate Cozystay's user authentication to SHR system

For listings:

1. Build Cozystay's existing listing features on SHR Protocols
2. Dual write Cozystay's new listings to SHR system and its own
3. Migrate Cozystay's old listings to SHR system
4. Migrate Cozystay's searching and booking to SHR system

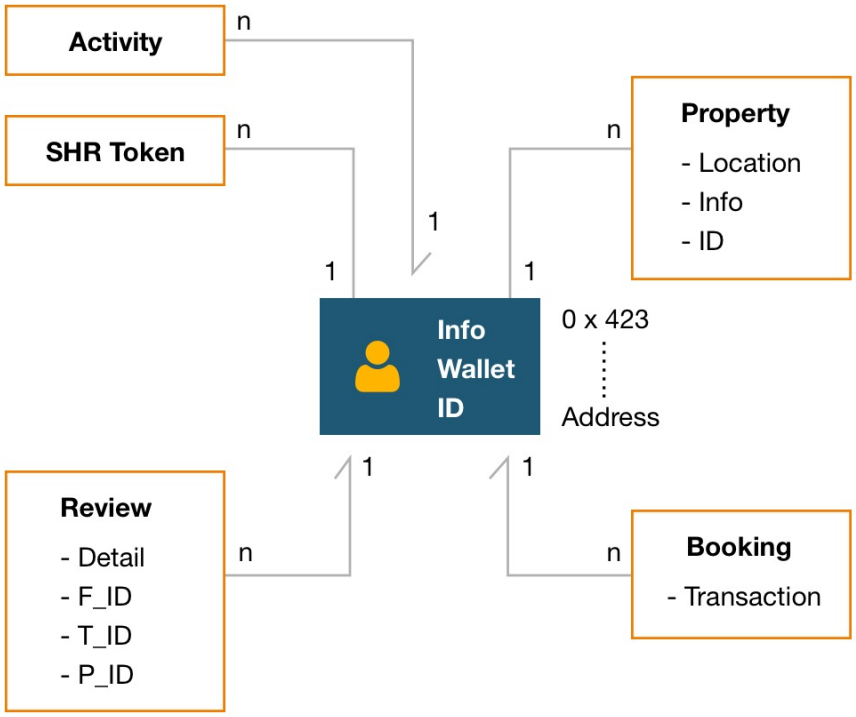
For reviews:

1. Dual write Cozystay's new review data to SHR system and its own
2. Migrate Cozystay's old reviews to SHR system
3. Migrate Cozystay's review writing to SHR system

6 Appendices

6.1 Smart Contracts

There will be 6 basic smart contracts to to interact with the Ethereum blockchain as the foundation for SHR Protocols.



SHRToken (ERC20)

SHR Token is an ERC20 serve as the currency in the SHR Ecosystem. It will provide basic functionality to transfer between wallets; moreover, the SHR Token will be able to provide locking functionality for the vacation rental business model. Holding period could be defined and customized action after holding could be defined.

SHRMember

SHR Member is the smart contract that ties a member information to an Ethereum address, once the member information is tied to the address, the linkage cannot be altered. This means

the mapping between the Ethereum address to member identification is linked once only at creation; however, other information about the member could be updated through transactions.

SHRProperty (ERC721)

SHR Property is the smart contract that uniquely identify a listing property and manages the ownership of the property to an Ethereum address, which links to a SHR Member. This way the properties could be transferred between SHR Members.

SHRCommunityFund

SHR Community Fund is the smart contract that holds the SEL Reserve and provide logic to accept in come SHR and outgoing SHR for reward, incentive and every expense that the community votes for.

SHRBooking

SHR Booking is the smart contract that keeps the record for a booking while processes and holds the payment in SHR Token based on different condition (e.g. confirm booking in a none instant booking case or what for service deliver / move-in). A precondition for SHR Booking to keep the record and process they payment is that the guest must be a SHR Member and the property must be a SHR Property. The payment process will cover the SHR Token staking discount (mentioned in section 6.2).

SHRRefundPolicyInterface

SHR Refund Policy Interface is a smart contract interface that defines a list of functions that a refund policy (e.g. cancel, problem with service and etc) need to implement at the D-App level, a refund policy implementation logic will be injected to the refund flow governed by the SHR System.

SHRReview

SHR Review is the smart contract that keeps the record for all reviews. The Review requires the guest, host to be SHR Members and the property to be a SHR Property.

SHRActivity

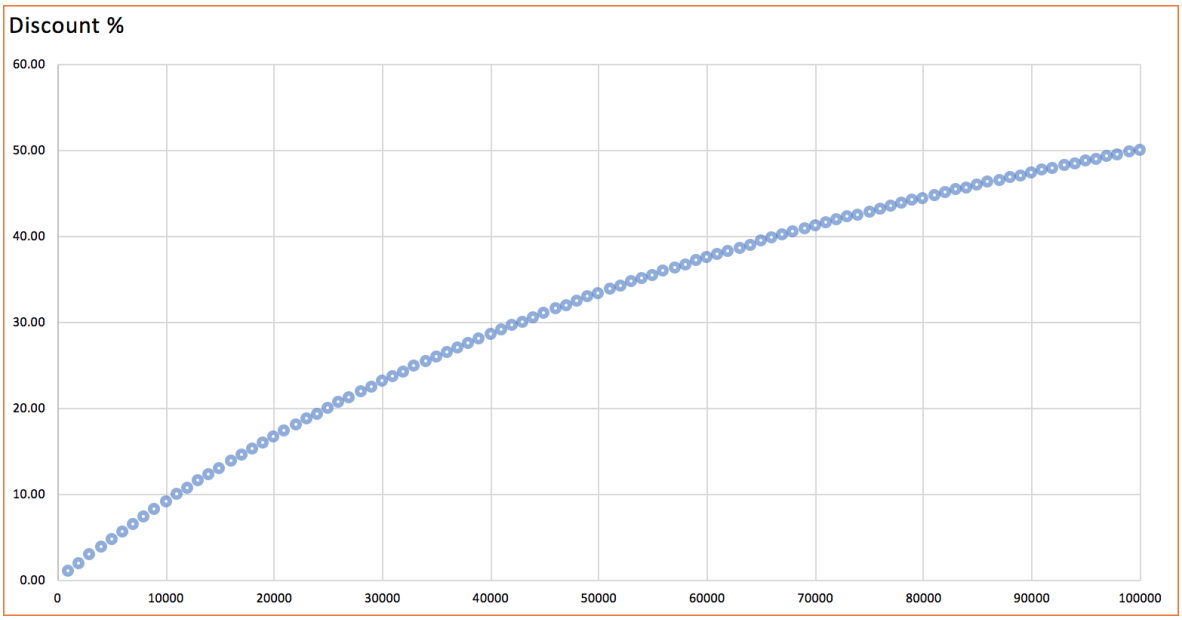
SHR Activity is the smart contract that functions like a log for certain activity of SHR Members (e.g. Listing Verification, KYM and etc). Certain activities may involve supporting document as “evidence”, those evidence will be stored on IPFS with a id reference and md5 hash stored on the blockchain for authenticity verification.

6.2 Discount by Staking SHR Token

As mentioned in our White Paper, we will provide a functionality for guest to staking SHR tokens for 180 days in order to receive discount on booking during that period of time. The discount percentage is calculated with the following formula:

$$\text{Discount \%} = 100 \times \left(1 - \frac{1}{\frac{\text{Tokens}}{100000} + 1} \right)$$

Where Tokens $\in$ (1000, 100000)



Discount percentage vs # of SHR token stacking $\in$ (1000, 100000)

The maximum discount a user could receive from staking SHR Tokens would be 50% when stakes 100,000. Once a SHR Token is staked for discount purpose, it will be locked up for 180 days, during which the SHR Member could enjoy multiple discount when book through SHR Booking, which means the discount is only available in SHR Token payment format (not in fiat format).

SHRStaking smart contract will be implemented to receive the SHR tokens, stake them, track the status and release it back to the member.

6.3 Community Fund and Transaction Fee

In order to empower the SHR Community, SHR Token is used to reward and incentify the SHR members to serve the community, such as KYM, Listing Validation and etc. The reward and incentive fund, Community Fund, 40% of total SHR Tokens (80 million), will come from the 60% SEL Company Reserve Fund. In order to not let the Community Reward Fund dry up to keep empowering the SHR Community, the SHR system will start to charge a low % transaction fee.

The design is to charge close to 0% when the fund is full and charge close to 2% when the fund gets low. To achieve this, we introduce the following formula to calculate the transaction fee based on the SHR Token in the Community Fund:

$$\text{Transacion Fee}(\%) = 0.64 \times \textit{arccot}\left(\frac{\#\text{ of SHR Tokens in the community fund}}{5}\right) - 10{,}000{,}000$$

The following graph demonstrates the variance in transaction fee percentage with number of SHR Token in the Community Fund.

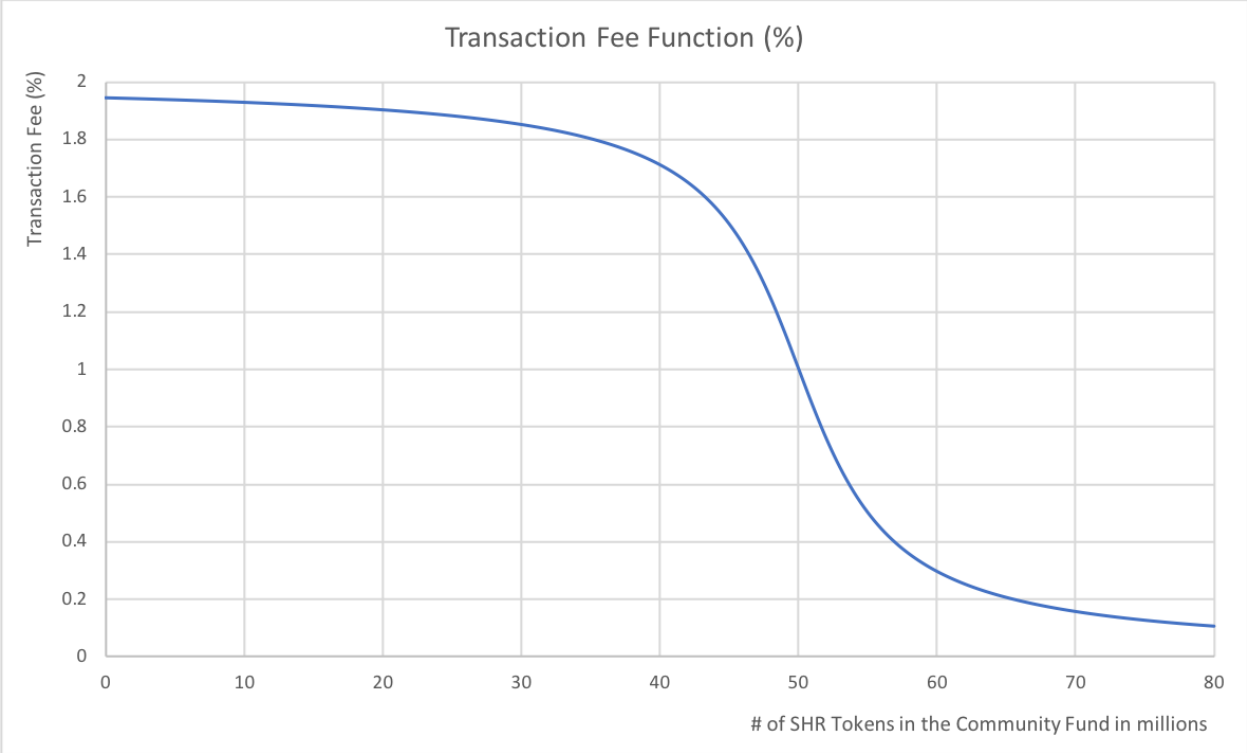


Diagram - Transaction Fee % vs # of SHR Token in Community Fund in millions

As one could see the transaction fee goes to 0% when the fund is close to 80 million and close to 2% when the fund is empty. Moreover, the transaction fee will be 0 at 80 million level.

6.4 Incentive for Vacation Rental Partners

In order to expand our community at the beginning, SEL plan to allocate 20% SHR Tokens from the Community Fund (60%) to use as incentives to work with business partners. Depends on the size of a business and order to join the SHR ecosystem, the amount of incentive provided to the business follows the following formula:

$$\text{Incentive (\%)} = F(o) * N(n)$$

F(x) is the percentage incentive of all the SHR Tokens give out to a business partner and its formula is **F(o) =** $0.875^{(o-7)}$, where o is the order that a business partner joins the SHR ecosystem.

N(x) is the normalization factor of a business partner based on its number of users and its formula is **N(n) =** $log_2(\frac{n}{100{,}000} + 1)$, where n is the number of users of a business partner.

The normalization factor is 1 when a business partner has 100,000 users, which is like the normalized size. If a business partner has more than 100,000 the it will be normalized more than 1 and vice versa, the growth rate of the normalization factor is at logarithmic scale.

$$\text{Incentive (\%)} = I_{(o,n)} = 0.875^{(o-7)} \times \log_2\left(\frac{n}{100{,}000} + 1\right)$$

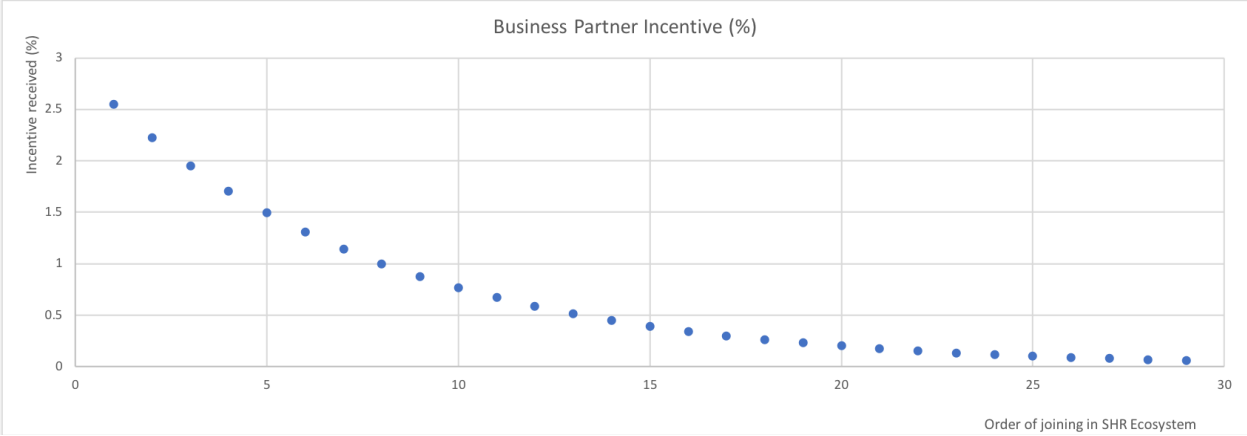


Diagram of $F_{(o)}$ - percentage incentive based on the order joining SHR Ecosystem

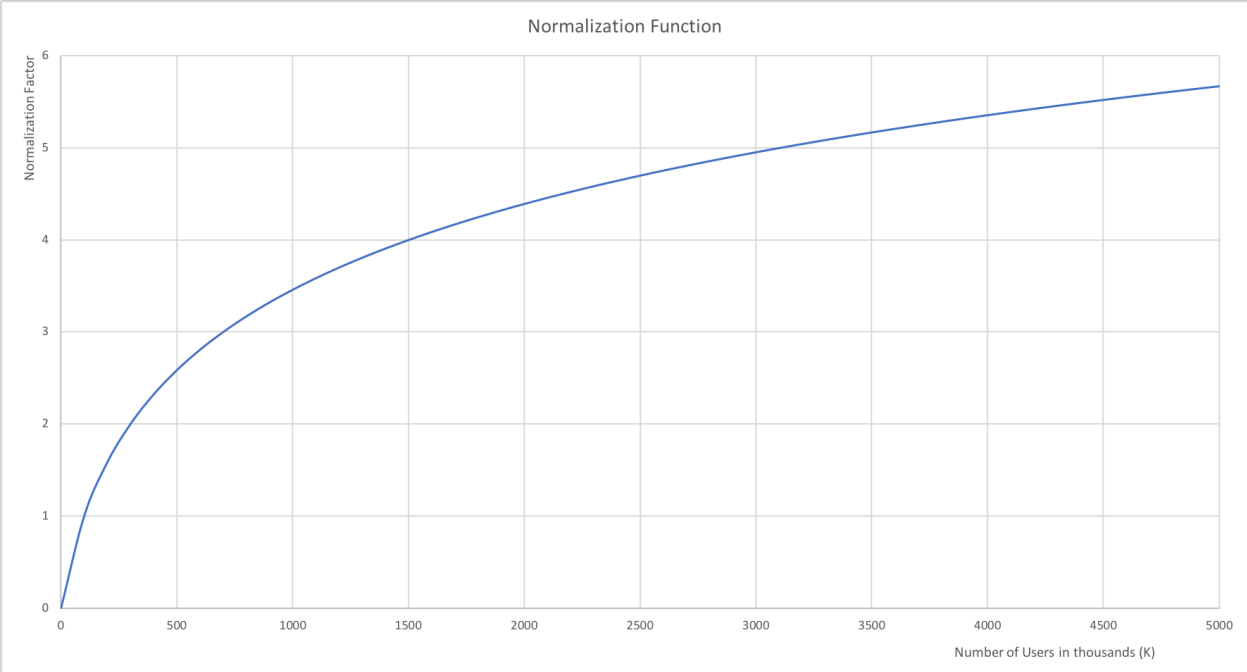


Diagram of $N_{(n)}$ - normalization factor based on the number of users

The overall incentive percentage is governed by both the order a business joined the SHR ecosystem and its number of users. If a business partner joined later could still have a higher incentive than a earlier business if it has a larger user base. For example, if the first business joined has 50,000 users it overall incentive will be 1.3034%, and if the fourth business has 100,000 users it overall incentive will be 1.3061% which is still higher than the first business joined.

As an additional incentive to potential business partner, if a partner stakes all the incentive SHR Tokens, it will not be charged any transaction fee mentioned in section 6.3; however, if a partner choose to disperse the SHR Tokens for any purpose, it will be applied for transaction fee mentioned in section 6.3.

6.5 Instant Exchange Service

For the use case where the guest and host both want spend and receive fiat currency, but wanna do the transaction in SHR Tokens, we will build a embedded instant exchange service to fulfil this demand.

The following steps will be followed to achieve the service:

1. Quote a price from an exchange for SHR token
2. Guest spends fiat from credit card, Paypal or any other payment method to buy SHR token from company reserve to his/her wallet
3. The SHR token is transferred to the host wallet
4. Host sells the SHR token to company reserve to exchange to fiat currency
5. Fiat currency will be pasted back to dApp

We will build a smart contract, **SHRExchange**, to handle the above steps to issue, transfer and receive SHR token from company reserve. If Instant Exchange Service is involved in a transaction, the member will NOT be able to enjoy the staking discount. The reason is that the payment is actually in fiat currency in this case, only the transaction is in SHR Tokens.

6.6 SHR Protocol Management

In order to let SHR community manage the SHR Protocols, we will build **SHRProtocolMgr** smart contract to collect change proposals and have the Protocol Core Group (consists of reputable SHR Members at their own will, starting with SEL team members) vote on them.

The SHR Protocol proposals is collected and voted on every 4 months. The first SHR Protocol proposal event is scheduled to happen in March 2019. Since only 4 months of development time for each event, proposals will be prioritized to be implemented, the top 3 proposals, which did not get in the 4 months implementation cycles will be automatically moved to the next event for prioritization, the rest proposals will be dropped. (e.g. if there are 11 proposals from one event, and after 4 months 4 of them are implemented, the next 3 will be moved carried onto the next event, the remaining 4 proposals will be dropped).