Other Conference Item

A Decentralised Sharing App running a Smart Contract on the Ethereum Blockchain

Author(s):
Bogner, Andreas; Chanson, Mathieu; Meeuw, Arne

Publication Date:
2016

Permanent Link:
https://doi.org/10.3929/ethz-b-000121486

Originally published in:
http://doi.org/10.1145/2991561.2998465

Rights / License:
In Copyright - Non-Commercial Use Permitted

This page was generated automatically upon download from the ETH Zurich Research Collection. For more information please consult the Terms of use.
A Decentralised Sharing App running a Smart Contract on the Ethereum Blockchain

Andreas Bogner  
ETH Zurich  
Zurich, Switzerland  
abogner@ethz.ch

Mathieu Chanson  
ETH Zurich  
Zurich, Switzerland  
mchanson@ethz.ch

Arne Meeuw  
University of St. Gallen  
St. Gallen, Switzerland  
arne.meeuw@unisg.ch

ABSTRACT
The sharing economy, the business of collectively using privately owned objects and services, has fuelled some of the fastest growing businesses of the past years. However, popular sharing platforms like Airbnb or Uber exhibit several drawbacks: a cumbersome sign up procedure, lack of participant privacy, overbearing terms and conditions, and significant fees for users. We demonstrate a Decentralised App (DAPP) for the sharing of everyday objects based on a smart contract on the Ethereum blockchain. This contract enables users to register and rent devices without involvement of a Trusted Third Party (TTP), disclosure of any personal information or prior sign up to the service. With increasing distribution of cryptocurrencies the use of smart contracts such as proposed in this paper has the potential to revolutionise the sharing economy.

ACM Classification Keywords
K.4.4 Electronic Commerce: Distributed commercial transactions

Author Keywords
Sharing; Sharing Economy; Blockchain; Ethereum; Smart Contract; Decentralised App (DAPP); privacy protection.

INTRODUCTION
The sharing economy has emerged as an important driver of growth in the last decade, creating some of the fastest growing unicorns like Airbnb, Uber or Lyft [4]. Common problems of these platforms are the need of a Trusted Third Party (TTP) (i.e. a platform operator), lack of privacy when using them and repetitive individual sign up for each platform. We propose that these problems could be resolved using Ethereum based smart contracts replacing the intermediary.

An Ethereum based smart contract is a cryptograph box which stores information, processes inputs, writes outputs and is only accessible to the outside if certain predefined conditions are met [1]. In practice, Ethereum allows for an easy implementation of such smart contracts [3]. These contracts contain code comprising a Turing complete set of operations. This code is executed by the Ethereum Network once a function of a smart contract is called. Such a computation may result in several outcomes: alteration in the state of the smart contract, returning a result and transferring monetary value.

We demonstrate a web app (shown in Figure 1) for the sharing of objects based on a smart contract running on the Ethereum test network. Users are inherently identified by their Ethereum public key which allows for anyone in possession of such a key to participate in the app without sign up or revelation of personal financial information. All details of the rental agreement are accessible in the public Ethereum blockchain and are executed as specified, thus avoiding a TTP. The rental terms and conditions are set by the owner of an object during the registration process. Objects are identified by scanning a QR code referencing a key in the smart contract. The details of the procedure are explained in the following section.

SYSTEM ARCHITECTURE
An overview of the system architecture is shown in Figure 2. The main components are a smart contract hosted on the blockchain, the local Ethereum client, and a web app. The web app provides a graphical user interface for the (local) Ethereum client, which in turn interacts with the smart contract on the Ethereum blockchain. Objects participating in the rental scheme are labeled with a QR code that encodes a unique numerical ID for the web app.
The registration of an object is automatically initiated when its QR code is read the first time by the DAPP. The owner is prompted to state the details of the rental agreement. On submission, the web app issues a transaction calling the `registerObject` function of the smart contract with the details provided. This contract ensures that solely the creator of the contract is authorized to register objects.

Upon scanning a registered object the user is presented with the rental terms (see Figure 1). When the user clicks "Rent object", the app triggers a transaction calling the `rentObject` function with the object ID and simultaneously transfers the required deposit to the smart contract.

The object owner analogously reclaim the object by triggering the `returnObject` function via the same web app.

The authors have built the web app using the `Truffle` development framework [2]. This framework, amongst others, generates JavaScript bindings for the smart contract and includes libraries such as `web3.js` [5] that facilitates the communication between the web app and the Ethereum client.

**REFERENCES**