A Trustable Platform for Exchange of Resources Across Organizations and their Customers

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ABSTRACT

Collaborations across companies can improve revenue, productivity and customer relationship building. Therefore, it could be desirable to allow customers to exchange digital resources across organizations, e.g. to let customers collect and spend loyalty points across stores. In order to allow such exchange of resources, a secure and trustable environment, where customers are in full control of their resources, is required. In this PhD work, we will develop a generic framework for supporting the set-up of such exchange platforms by providing core functionality in combination with components that can be configured to the specific needs of the use cases.

CCS CONCEPTS

• Information systems ~ Data management systems

KEYWORDS

Resource exchange platform, organization platform, blockchain, smart contracts

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1 Research Problems

Lots of existing organizations prefer to keep their information, such as customer information, within their own control, as this might contain important and critical business strategies. However, collaborations across companies can improve revenue, productivity and customer relationship building. Therefore, it could be interesting to have a kind of collaboration system which allows customers to interact across organizations. Such a system could allow customers to exchange digital information (aka resources) across organizations. An example use case is the exchange of loyalty points across different stores, as pointed out in the abstract. In order to allow customers to exchange such resources, a stable, secure, reliable and trustable environment is required. Also, in the context of the new privacy regulations (such as GDPR [11]) customers should be holding and be in full control of their resources, instead of the companies providing the resources or other third parties. However, such customer information should be handled with extreme care, as leaks could hurt companies. Hence, research is needed to provide customers the ability to exchange digital information (resources) across organizations, without compromising security and privacy for both the customer and the companies. This brings us to the following research questions:

1. What technology/platform could be used for creating a resource-exchange system? What architecture is needed? How to ensure security & reliability of such a system?
2. How should a resource be defined and which properties should it have?
3. How to establish trust & settlement between organizations? I.e. when organizations exchange resources, how to ensure that they will be exchanged at the same time (and at the correct value), and how should companies be compensated for such an exchange? Is there a need for an independent trusted party or could this be solved by a software approach?
4. How to provide the required functionality and usability for different types of companies and resources?

2 Related Work

To the best of our knowledge, the development of a generic framework for cross-company resource exchange systems, providing true ownership to their clients has not yet been considered. An existing system for the exchange of digital assets

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is discussed in [5]. However, the work is in a rather early stage and focuses on one use case and not on a generic framework.

In the context of loyalty programs, Joyn is a Belgian company that allows customers to collect and spend loyalty points of various participating stores with a single physical card [6]. However, points earned in one store cannot be spend in another store. Hence, their system does not allow for exchange of resources.

Loyyal [7] provides a blockchain-based solution in order to allow enterprise systems to make efficient use of the monetary assets locked in the existing loyalty programs of today. Although they have various use cases and partnerships, it is not clear whether they provide a generic framework in order to fulfil organizations their specific needs.

Appsolutely [3] provides a similar framework based on a universal currency, which can be earned from one brand and spent anywhere else. In addition to similar concerns as for Loyyal, it is not clear how a value mapping will be done to this currency.

Blockchain technology is known for its monetary applications, e.g. the exchange of digital currencies [9]. Although the technology is relevant and a candidate implementation, our main goal differs from monetary applications.

3 Research Methodology

Because our main goal is the creation of an artifact, we will follow the six steps of the Design Science Research Methodology [8]: (1) problem identification and motivation, (2) definition of the objectives for a solution, (3) design and development, (4) demonstration, (5) evaluation, and (6) communication. The problem identification and motivation have been briefly addressed in section 2. Our design and development approach, as well as the evaluation, will be explained in section 4. The design, implementation and evaluation will be done in an iterative way, where each iteration step improves on the previous one. For communication we will use the regular academic channels.

4.1 Intended Solution

We intend to develop a generic framework that supports the creation of systems allowing customers to exchange resources across participating organizations. This framework is generic in the sense that the core of the framework will provide the logic to process all information needed to keep track of and exchange resources. The resources themselves and the exchanges rules are configurable to the specific needs of a use case.

Most companies hold and control customer information and resources, such as credit card information and assets owned by customers, in their own systems. Therefore, customers have to fully rely on the security of the information systems of these companies. In our solution, customers would be in full control of their resources. However, this requires that such an exchange system should be stable, secure, reliable and trustable. For this, we have investigated various technologies. Smart contracts (relying on blockchain technology) is a good candidate technology for this. A smart contract is an application that runs on blockchain. It is in essence program code which defines how and when transactions (containing data) are stored in the blockchain [4]. A blockchain is a decentralized (omitting the need for a trusted third party [1]), secure ledger in which data can be stored by the help of transactions [10]. Transactions with respect to a ledger can only be published by the owner of the ledger [12]. Therefore, it is impossible for an external party to manipulate this ledger.

4.2 Current Stage

We have designed a conceptual model for our approach containing Participants (Organizations and Customers), Resources and Transactions. The concept of Resource can differ for different use cases and involved organizations. Currently, we define Resource as a unique entity having a resource type (e.g. a coupon) with a corresponding value (e.g. 50 dollars). We will further investigate how to expand this simplified version of Resource to allow more customization, so that it can be used in various use cases. To do so, we will study the types of resources available in various organizations. Furthermore, we need to establish a mechanism to express how resources can be converted between organizations (i.e. exchange rules) and how the exchange of resources should be compensated between participants (called settlement contracts). Furthermore, to validate the feasibility of our approach, we have implemented the use case in which customers are able to use loyalty points across different stores. For this implementation, we have based ourselves on the Hyperledger Fabric framework [2] for smart contracts, which is widely used and open-source. Our implementation allows customers to purchase products in one store, gain loyalty points, and consume these points in another store.

4.3 Planned Evaluation

We plan to evaluate our generic framework by using it for a number of different use cases. In a first stage, we will do the customization ourselves. Next, we will evaluate it with potential end-users. The evaluations will be a qualitative evaluation measuring the expressive power and the usability of the framework, using questionnaires and interviews.

5 Conclusion

We have established the need for cross-organization customer-controlled resource exchange systems, which can be utilized in order to increase customer satisfaction and organization corporation. Our proposed solution is a generic framework that can be customized for different use cases. We have designed a conceptual model for our approach and identified the use of smart contracts to ensure trust. The feasibility of the approach has been demonstrated by the implementation of a cross-company loyalty reward system, where loyalty points can be collected and spent by customers across stores.

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