Non-repudiation and traceability of asynchronous processes (nTAPiR)

Degree programme: BSc in Computer Science | Specialisation: IT-Security
Thesis advisors: Prof. Gerhard Hassenstein, Prof. Dr. Annett Laube-Rosenpflanzer
Expert: Xavier Monnat (Post CH AG)

Nowadays more and more asynchronous business processes are digitised and automated. However, the traceability of user activities is quite challenging. nTAPiR is an interactive prototype based on a business case study with a private, permissioned blockchain to show how the goals of non-repudiation and traceability can be reached by using a distributed ledger technology.

Introduction

In the business world, most processes run asynchronously. This can be a communication between two participants. A sender transmits a message to the recipient and does not wait for its response. Meanwhile, the sender can perform other tasks and fetches the answer when available.

However, today's business processes are highly complex and multiple participants collaborate in the procedure. Therefore, it is significant to know if a sender transmitted the information in time and the recipient has actually received and read it. Keeping track of the individual activities is cumbersome and often done on an additional communication channel such as email or face-to-face.


Goals

The aim of this project was to demonstrate how these problems in business processes can be solved, using a Distributed Ledger Technology (DLT) to get a more traceable, tamper-resistant system process. The solution was implemented as a prototype to show a suitable case study.

Case Study

A technical change management process was selected for the case study, because it is an asynchronous process among several participants. These were categorised into three roles: Initiators, implementers and revisors. They can interact with two assets: Changes and tasks, whereby tasks are attached to a change.

As a specific use case, Alice wants to have a new software release to be installed on a test server. She acts as an initiator and enters a change request on a web application. A task is automatically created and assigned to the implementor Bob. Alice now can notify Bob and verify if he has read the task. However, he can approve or decline the task but both actions influent the further process. Perhaps Bob does not have time for the installation and declines. Alice gets informed and has to enter a new change request. Alternatively, Bob accepted and the change request would be released. Alice's boss Charly wants to track the whole process. As revisor, he is able to verify all actions from the beginning to the end.

Results

All steps of this asynchronous process are written to the DLT. The DLT documents all process activities seamlessly and tamper-proof in the background. Initiators cannot modify their changes unnoticed and involved participants cannot deny being informed. Roles and access control rules ensure that only authorised participants have access to certain information.

Thus, reviewing and auditing individual steps in business processes becomes more accessible and simpler for all participants.
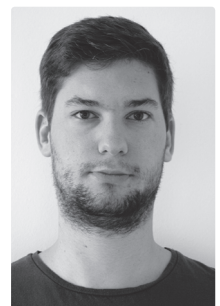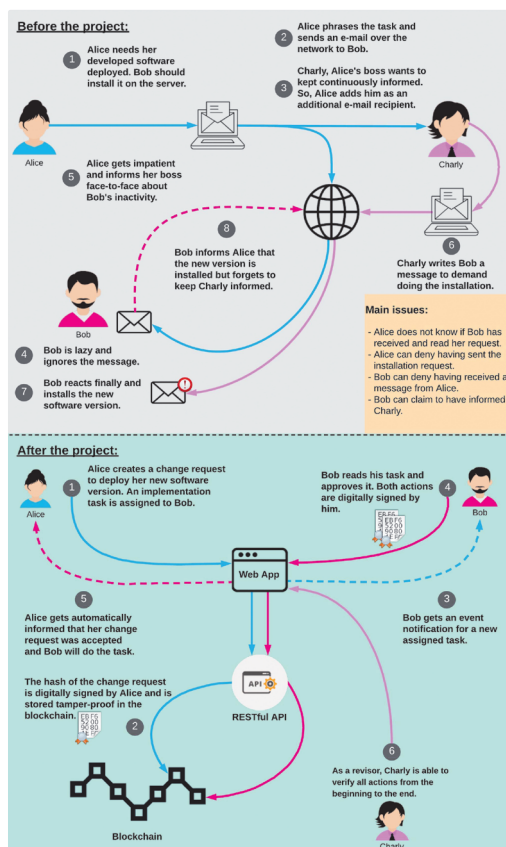
Marc Christen
christemarc@gmail.com

Silas P. Stegmüller