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ABSTRACTS FPDAPP

ACADEMIC ACHIEVEMENT RECOGNITION AND VERIFICATION USING BLOCKCHAIN

Axel Curmi and Frankie Inguanez

Falsification of certificates is a growing concern and the verification process can be a lengthy and challenging one. In this research, we are proposing a distributed ledger-based solution for the storage and verification of academic qualifications. An entity that would want to verify certificates can make use of our API service that would, in turn, scan a certificate, find the matching certificate template, extract the necessary data and verify it from a blockchain stored copy. In this research, we also propose an improved manner of verifying the ownership of a blockchain public address which also does not allow a user to present an address o a third party, this being one of the common security concerns of similar solutions. We also calculate the possible costs to adopt this system in all EU countries taking into consideration different gas prices, which is a determining factor to the transaction cost of a blockchain network. We conclude that a blockchain based certificate verification system addresses various issues related to document forgery and is a viable solution evenwith the current state of technology.

CRYPTO-TRADING. RECHARGEABLE TOKEN-BASED SMART ENERGY MARKET ENABLED BY BLOCKCHAIN AND IOT TECHNOLOGY

Michele Marchesi, Andrea Pinna, Francesco Pisu,Roberto Tonelli

This paper presents the definition and the implementation of a decentralized system for the energy trading managed by blockchain technology. The system, called Crypto-Trading, is composed by three interacting subsystems: the trading platform, the blockchain, and the smart meters system. It is conceived to exploit the IoT technology of smart meters and the decentralization of smart contracts working inside the blockchain technology for managing exchange and trading of energy by means of specific tokens. The paper defines the system as a decentralized application, identifying system actors and describing user stories. Then provides the description of the use case concerning the rechargeable token, one of the main feature of our system, and its interaction with the other components of the system. Finally, the paper compares our implementation choice with other ongoing projects in the field of energy trading.

ETHEREUM TRANSACTION PERFORMANCE EVALUATION USING TEST-NETS

Lin Zhang, Brian Lee, Yuhang Ye, Yuansong Qiao

Blockchain technologies can safely and neutrally store and process transaction data (including smart contracts) on the chain. Based on smart contracts, a special type of applications can be deployed, known as Decentralized Applications (DApps). Within existing Blockchain platforms, Ethereum is the most popular one adopted for DApp developments. The performance constraints of Ethereum dramatical impact usability of DApp. In this paper, we experimentally evaluate the performances of Ethereum from 3 types of tests: 1) Account balance query latency 2) Block generationtime and 3) End-to-end transaction acceptance latency. The results show that the end-to-end transaction time in Ethereum is unstable with large variations. Consequently, the applications with low latency constraints and high frequency transaction requirements are not ready to be deployed unless off-chain transaction methods are considered.

BLOCKCHAIN-BASED TRUSTED CROSS-ORGANIZATIONAL DELIVERIES OF SENSOR-EQUIPPED PARCELS

Marcel Müller and Sandro Rodriguez Garzon

Today's cross-organizational deliveries of high value and perishable goods are difficult to monitor in a reliable and trustful way. Every logistics organization operates its own track and trace system, usually in an isolated manner and with most being incompatible to each other. In order to provide better end-to-end insights and to speed-up conflict management processes, we propose to let all involved parties mutually confirm cross-organizational handovers of a parcel and to log the event immutably within a common distributed ledger. Smart sensors within or attached to parcels will in addition act as independent oracles to monitor environmental variables with respect to parcel-specific service level agreements. Violations of service level agreements will be trustfully detected and logged by the smart sensors directly on the distributed ledger, without potentially compromising legacy systems being involved. The proposed concept will serve as the base for future implementations and opens up new ways to analyze and optimize inter-organizational logistics.

TOWARDS A TRUSTED SUPPORT PLATFORM FOR THE JOB PLACEMENT TASK.

Alevtina Dubovitskaya, Luca Mazzola, and Alexander Denzler

HR tech is a new trend in the hiring process, still facing some inefficiencies and limits. This paper sketches a high level architecture of a trusted support platform for the job placement task. Our design is based on a multifaceted analysis of current practices and requirements from technical, legal, and social perspectives. Relying on the properties of intelligent data analysis approaches, blockchain technology, and distributed identity management, this solution will enable optimisation, compliance, and improvements of the candidate selection process for job openings. The outcomes of the current work will be further applied for the identification of data formats and specific technologies to be used for the implementation. Practical use-cases are currently under development with industry partners.

BLOCKCHAIN MATERIALIZATION AS A GENERAL PURPOSE TECHNOLOGY: A RESEARCH FRAMEWORK

Evgeniia Filippova

Blockchain, often treated as a next transforming general-purpose technology (GPT), might have the potential to revolutionize economic, political and social structures in the subsequent years. However, the actual impact of Blockchain will ultimately depend on the pace and direction of its diffusion process throughout the economy. Being currently in the nascent phase, the diffusion process of Blockchain remained largely neglected in the academic literature so far. The study at hand covers this research gap by investigating the forces affecting Blockchain diffusion leading to its materialization as a GPT. Identified from the broad literature on technological change, the various factors influencing diffusion patterns of GPTs are conceptualized in a framework of three interrelated groups: advancements in the GPT itself, advancements in its application sectors, and environmental factors. This conceptual framework is then applied to structure the current studies of Blockchain technology and reveal unexplored blind spots. In such a way, the present paper serves as a basis for further research on diffusion patterns of Blockchain and its materialization as a general-purpose technology.

SMART CONTRACT DESIGN PATTERNS: A USE CASE ON WATER MANAGEMENT.

Marco Zecchini, Andrea Bracciali, Ioannis Chatzigiannakis, and Andrea Vitaletti

The need for a Blockchain Oriented Software Engineering (BOSE) has been recognized in several research papers. Design Patterns are considered among the main and compelling areas to be developed in BOSE. Anyway, design patterns need to be enhanced to a format which is more appropriate for blockchain development. In this paper we discuss the use of Solidity design patterns applied to a water management use case and we introduce specific fields for the description of design patterns for blockchain. This new way of describing design patterns is more suitable for BOSE and offers to a blockchain developer more tools to build more secure decentralized applications.

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