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**BLOCKCHAIN ÎN APLICAȚII IOT: PLATFORME,
VULNERABILITĂȚI ȘI CONTRAMĂSURI DE
SECURITATE**

Teză de master

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Rezumat

Aceasta teză de master a fost elaborată la tema „**Blockchain în aplicații IoT: Platforme, Vulnerabilități și Contramăsuri de securitate**” și presupune un studiu de analiză a aspectelor de securitate legate de implementarea tehnologiilor blockchain în cadrul sistemelor IoT. Scopul acestei lucrări este de a aduna o colecție desfășurată de informații ce abordează subiectul de integrare a tehnologiei blockchain în sistemele Internet of Things (IoT) ca o soluție a problemelor de securitate cu care se confruntă acestea.

Teza este structurată după cum urmează:

Capitolul 1 – Oferă o prezentare a noțiunii de blockchain. Fiind un domeniu relativ nou, este studiat amplu și se află într-o dezvoltare și modernizare continuă. Acest lucru poate fi dedus din mulțimea de studii identificate ce analizează tehnologia blockchain cu scopul de dezvoltare și creștere a securității cibernetice ce se atribuie acestui domeniu.

Capitolul 2 – Descrie tipurile de blockchain, diferitele tehnologii și protocoale ale acestuia precum și proprietățile de bază pe care se bazează tehnologia dată. Este abordată posibilitatea integrării acestei tehnologii în sistemele IoT.

Capitolul 3 – Enumeră platformele existente ce au la bază tehnologia blockchain. Sunt prezentate o serie de platforme cu experiență, care au o istorie de implementare bogată precum și câteva platforme noi care combină sistemele inteligente IoT cu tehnologia blockchain.

Capitolul 4 – Discută rolurile cruciale pe care le deține blockchain-ul în stimularea și sprijinul sistemelor IoT. Sunt enumerate progresele curente din domeniu prin referințe la cele mai recente inovații. Spre finalul capitolului se vorbește despre aplicațiile IoT bazate pe blockchain.

Capitolul 5 – Abordează cele mai importante probleme cu care se confruntă domeniul blockchain și atrage atenția asupra atacurilor posibile care au loc asupra acestei arhitecturi. În același timp, oferă soluții actuale care vizează minimizarea posibilității atacurilor existente și contribuie la sporirea securității datelor din sistem.

Abstract

This master's thesis was developed on the topic "Blockchain in IoT Applications: Platforms, Vulnerabilities and Security countermeasures" and involves a study with analysis of the security aspects related to the implementation of blockchain technologies within IoT systems. The purpose of these papers is to gather a comprehensive collection of information addressing the topic of integrating blockchain technology into Internet of Things (IoT) systems as a solution to the security issues they face.

The thesis is structured as follows:

Chapter 1 – Provides an overview of blockchain concepts. Being a relatively new field, it is widely studied and is in continuous development and modernization. This can be deduced from the multitude of identified studies that analyze blockchain technology with the aim of developing and increasing the cybersecurity of this field.

Chapter 2 – Describes the types of blockchain, its different technologies and protocols as well as the basic properties on which the given technology is based. It addresses the possibility of integrating these technologies into IoT.

Chapter 3 – Lists existing platforms based on blockchain technology. A number of experienced platforms are presented, which have a rich implementation history, as well as several new platforms that combine smart IoT systems with blockchain technology.

Chapter 4 – Discusses the crucial roles blockchain plays in enabling and supporting IoT systems. Current advances in the field are listed with references to the latest innovations. Towards the end of the chapter, blockchain-based IoT applications are discussed.

Chapter 5 – Addresses the most important issues facing the blockchain field and draws attention to possible attacks on the architecture. At the same time, it offers current solutions aimed at minimizing the possibilities of existing attacks and contributes to increasing the security of the data in the system.

Cuprins

INTRODUCERE	9
1 ANALIZA DOMENIULUI	10
1.1 Lucrări conexe	12
2 TAXONOMIA BLOCKCHAIN	18
2.1. Tipuri de Blockchain	18
2.2 Tehnologii și protocoale blockchain	21
2.3 Proprietăți	24
3 PLATFORME ȘI APLICAȚII	30
3.1. Platforma Bitcoin	30
3.2. Platforma Ethereum	30
3.3. Platformă Hyperledger-Fabric	30
3.4. Platformă cu mai multe lanțuri	31
3.5. Cvorum	31
3.6. Lisk	31
3.7. Litecoin	32
3.8. Tehnologia HDAC	32
3.9. IOTA	32
4 BLOCKCHAIN ÎN IOT: ROLURI ȘI APLICAȚII	35
4.1 Inovații curente	37
4.2 Aplicații IoT bazate pe blockchain	42
4.2.1 Asistență medicală inteligentă.....	42
4.2.2 Rețea electrică inteligentă și utilități.....	42
4.2.3 Oraș inteligent.....	43
4.2.4 Finanțe inteligente.....	43
4.2.5 Transport inteligent.....	44
5 ATACURI ȘI CONTRAMĂSURI DE SECURITATE. PROVOCĂRILE VIITORULUI	46
5.1 Atacuri asupra sistemului blockchain. Soluții de prevenție existente	46
5.2 Contramăsuri de securitate în sistemele blockchain	50
5.3 Viitoare provocări legate de implementarea tehnologiilor blockchain în IoT	53
CONCLUZII	59
BIBLIOGRAFIE	60

INTRODUCERE

Blockchain oferă o abordare inovatoare pentru stocarea informațiilor, executarea tranzacțiilor, îndeplinirea funcțiilor și stabilirea încrederii într-un mediu deschis. Mulți consideră blockchain-ul drept o descoperire tehnologică pentru criptografie și securitate cibernetică, cu cazuri de utilizare variind de la sisteme de criptomonede implementate la nivel global precum Bitcoin, până la contractele inteligente, rețelele inteligente prin Internetul lucrurilor și așa mai departe. Deși blockchain a primit un interes crescând atât în mediul academic, cât și în industrie în ultimii ani, securitatea și confidențialitatea blockchain-urilor continuă să fie în centrul dezbaterii atunci când se implementează module blockchain în diferite aplicații. În IoT, dispozitivele standard devin clare și auto-administrabile. Această viziune se transformă în realitate, având în vedere progresele în dezvoltare, dar există încă probleme de rezolvat, în special în spațiul de securitate, de exemplu, calitatea sigură a datelor.

Internetul lucrurilor (IoT) a devenit o paradigmă populară de tehnologie de calcul. Este din ce în ce mai utilizat pentru a facilita procesele vieții umane printr-o varietate de aplicații, inclusiv asistență medicală inteligentă, rețele inteligente, finanțare inteligentă și orașe inteligente. Scalabilitate, interoperabilitate, securitate și confidențialitate, precum și încrederea, sunt toate problemele cu care se confruntă aplicațiile IoT. Soluțiile blockchain au fost create recent pentru a ajuta la depășirea acestor dificultăți. Blockchain a apărut ca un progres cheie care va schimba modul în care împărtășim informațiile. Construirea încrederii în condiții descentralizate fără condiția prealabilă pentru experți este o îmbunătățire creativă care poate schimba diferite domenii, printre care IoT. Evoluții problematice, de exemplu, informațiile mari și calcularea distribuită au fost folosite de IoT pentru a-și depăși limitările.

Scopul acestei lucrări este de a oferi un studiu privind utilizarea blockchain-ului în sistemele IoT. Se discută importanța tehnologiei blockchain în ceea ce privește caracteristicile și beneficiile pentru constituenții aplicațiilor IoT. Propunerea unei taxonomii blockchain pentru aplicațiile IoT bazată pe cei mai importanți factori. În plus, examinarea celor mai utilizate platforme blockchain pentru aplicații IoT. Adicional și analiza despre modul în care tehnologia blockchain poate fi utilizată pentru a lărgi spectrul de aplicații IoT. Și nu în ultimul rând, analizarea progreselor și soluțiilor recente oferite pentru mediile IoT. În linii generale, studierea și vizualizarea provocărilor și direcțiilor viitoare de cercetare ale utilizării blockchain-ului pentru IoT.

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